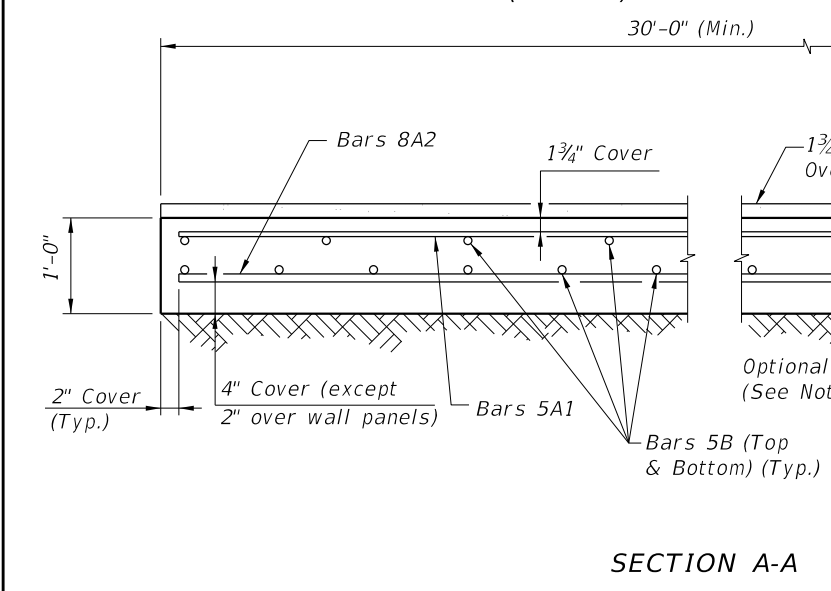
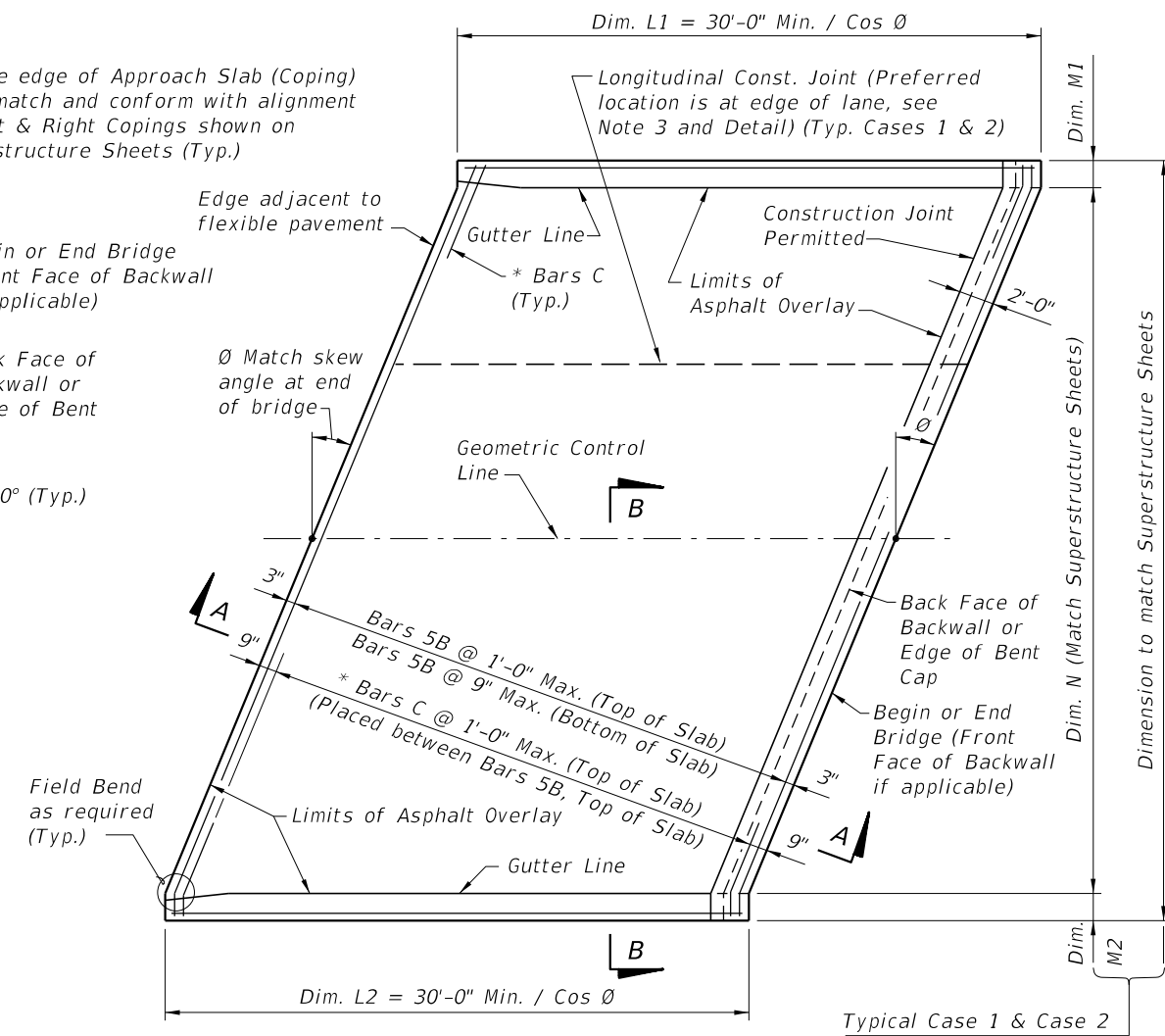


PLAN VIEW (CASE 1)

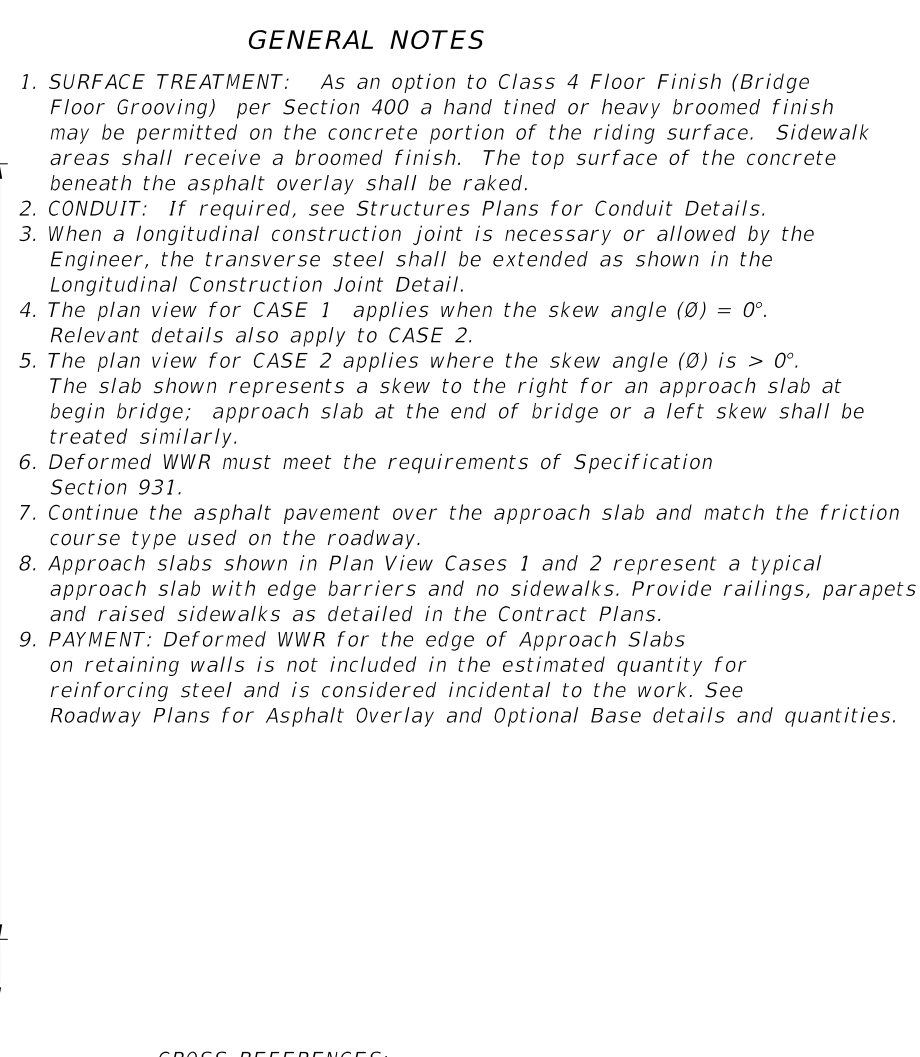


SECTION A-A



PLAN VIEW (CASE 2)

\* NOTE: Bars C are required as shown when the 36" or 42" Single-Slope Traffic Railings, or the Traffic Railing/Noise Wall, are used at the edge of the Approach Slab.

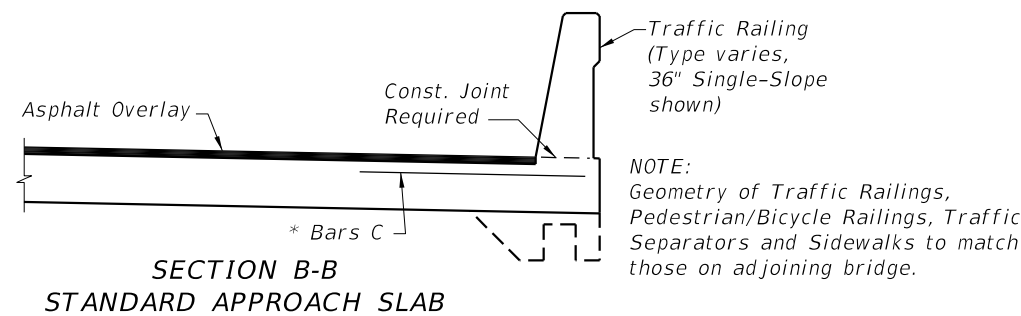


CROSS REFERENCES:

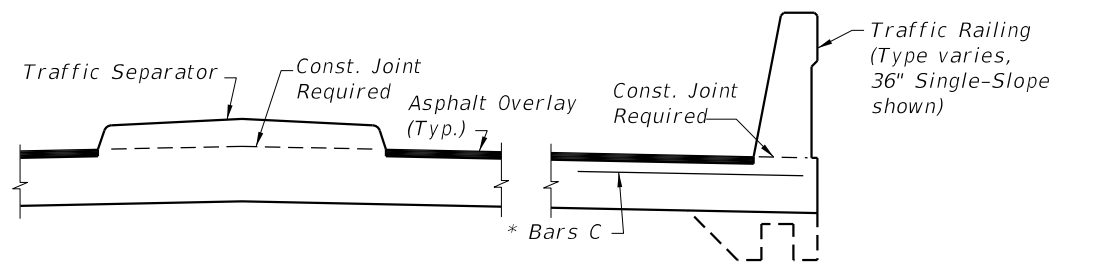
For Section B-B, Longitudinal Construction Joint Detail and Approach Slab Details see Sheet 2.

9/23/2021 9:52:22 AM

LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	APPROACH SLABS (30 FT.) (FLEXIBLE PAVEMENT APPROACHES)	INDEX 400-090	SHEET 1 of 2
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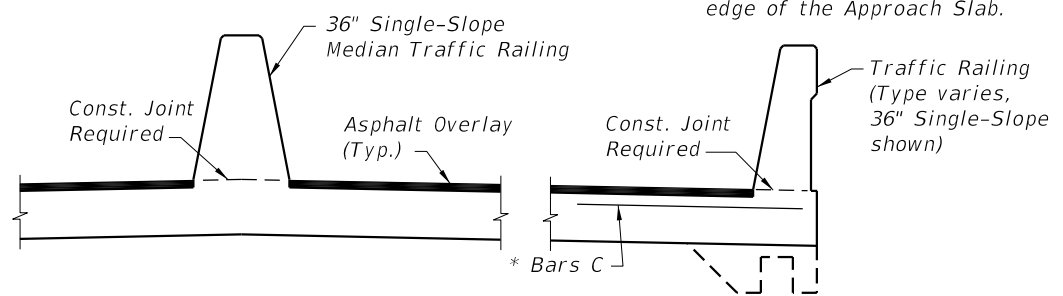


SECTION B-B  
STANDARD APPROACH SLAB

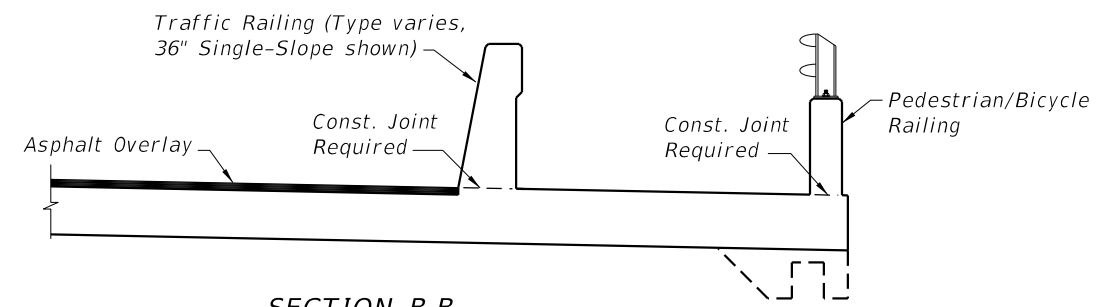


SECTION B-B  
APPROACH SLAB WITH TRAFFIC SEPARATOR

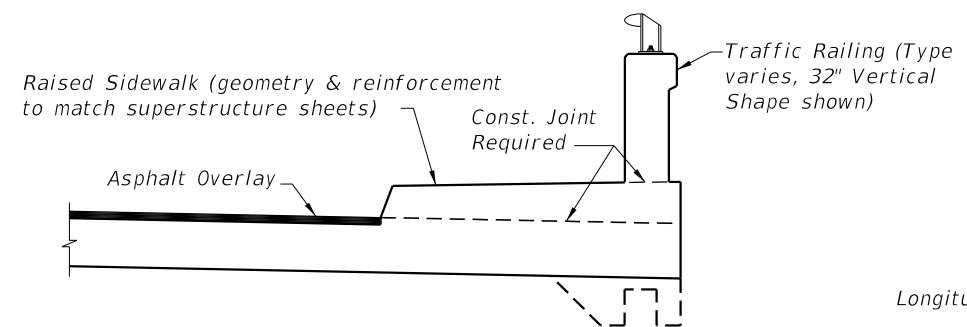
\*NOTE: Bars C are required as shown when the 36\"/>



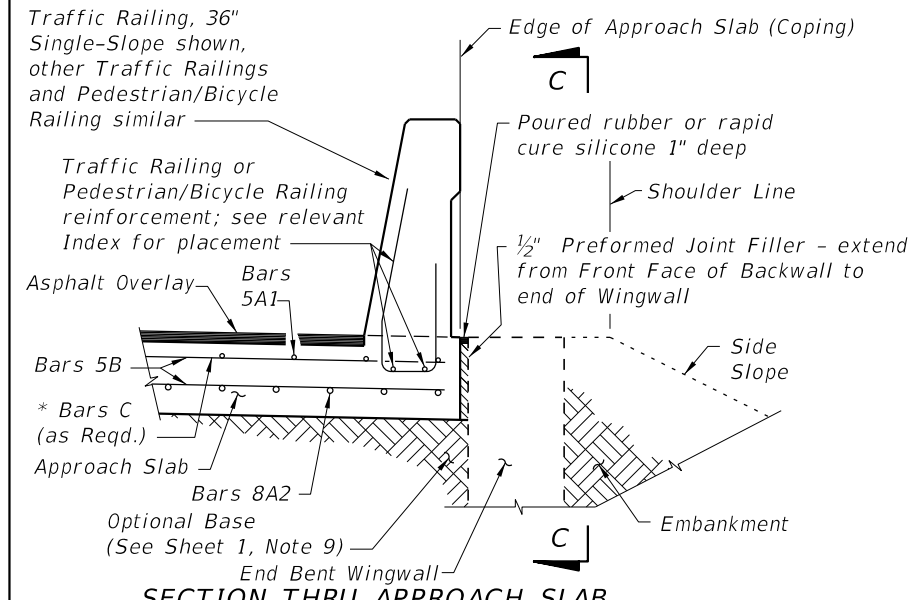
SECTION B-B  
APPROACH SLAB WITH MEDIAN TRAFFIC RAILING



SECTION B-B  
APPROACH SLAB WITH SIDEWALK

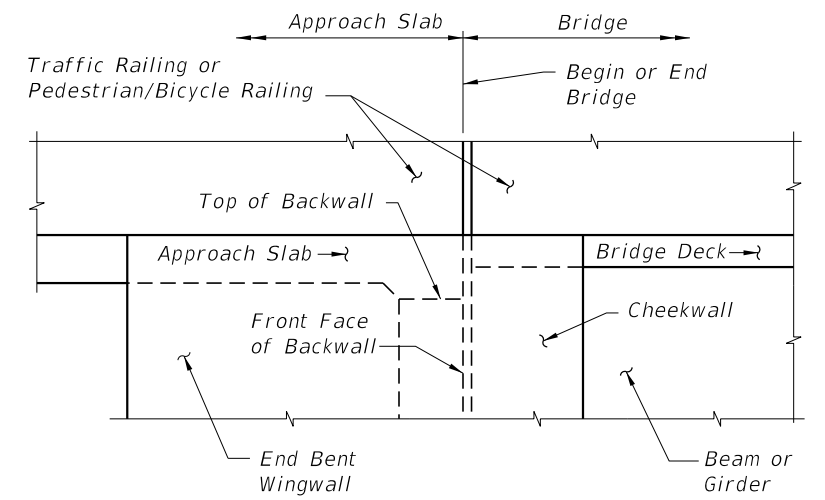


SECTION B-B  
APPROACH SLAB WITH RAISED SIDEWALK

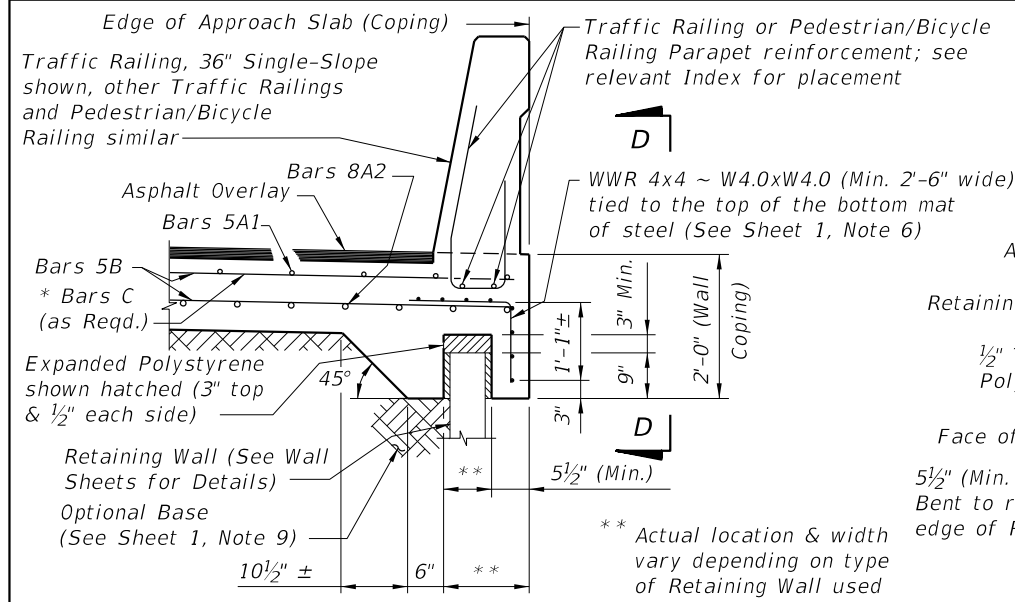


SECTION THRU APPROACH SLAB  
AND END BENT WINGWALL

APPROACH SLAB WITH WINGWALL DETAILS

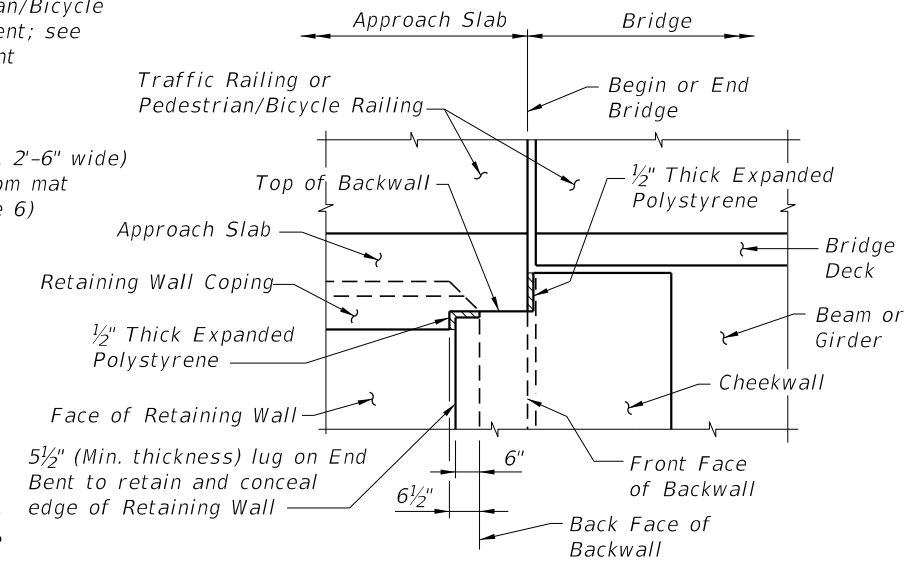


VIEW C-C AT BEGIN OR END BRIDGE (BEAM  
BRIDGE SHOWN, FLAT SLAB BRIDGE SIMILAR)

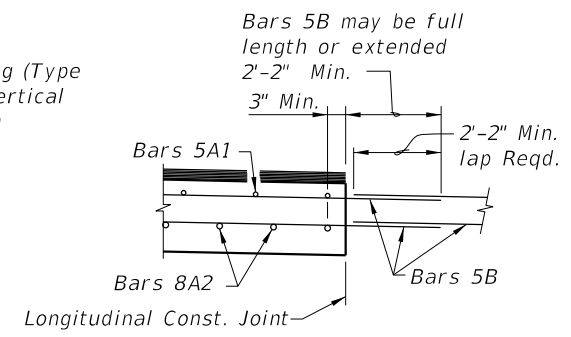


SECTION THRU APPROACH SLAB  
AND RETAINING WALL

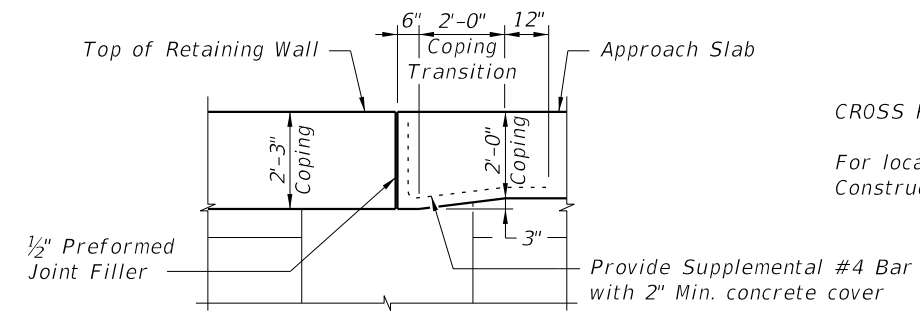
APPROACH SLAB WITH RETAINING WALL DETAILS



VIEW D-D AT BEGIN OR END BRIDGE (BEAM  
BRIDGE SHOWN, FLAT SLAB BRIDGE SIMILAR)



LONGITUDINAL CONSTRUCTION  
JOINT DETAIL

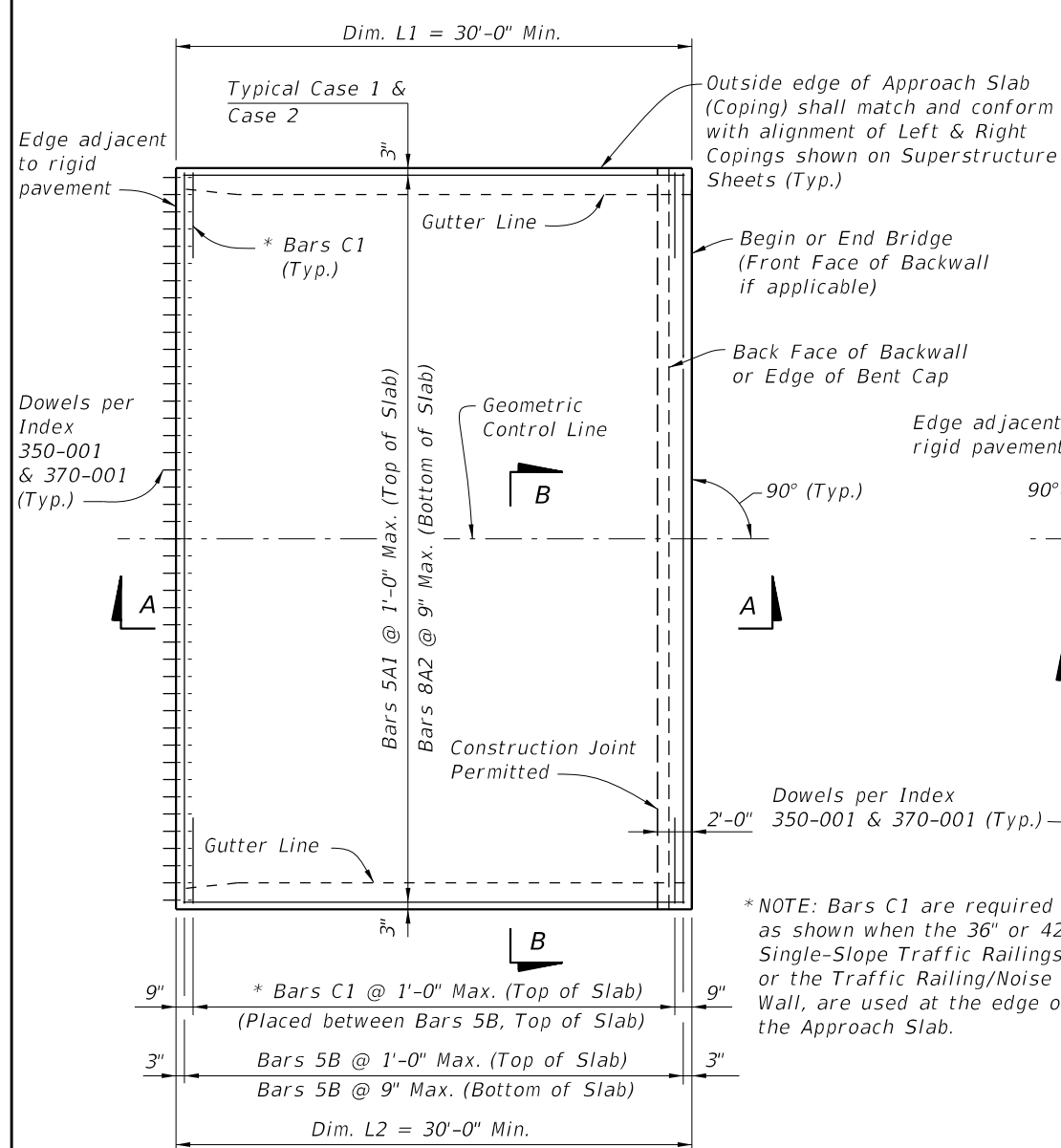


COPING TRANSITION DETAIL FOR  
RETAINING WALLS WITH 2'-3\"/>

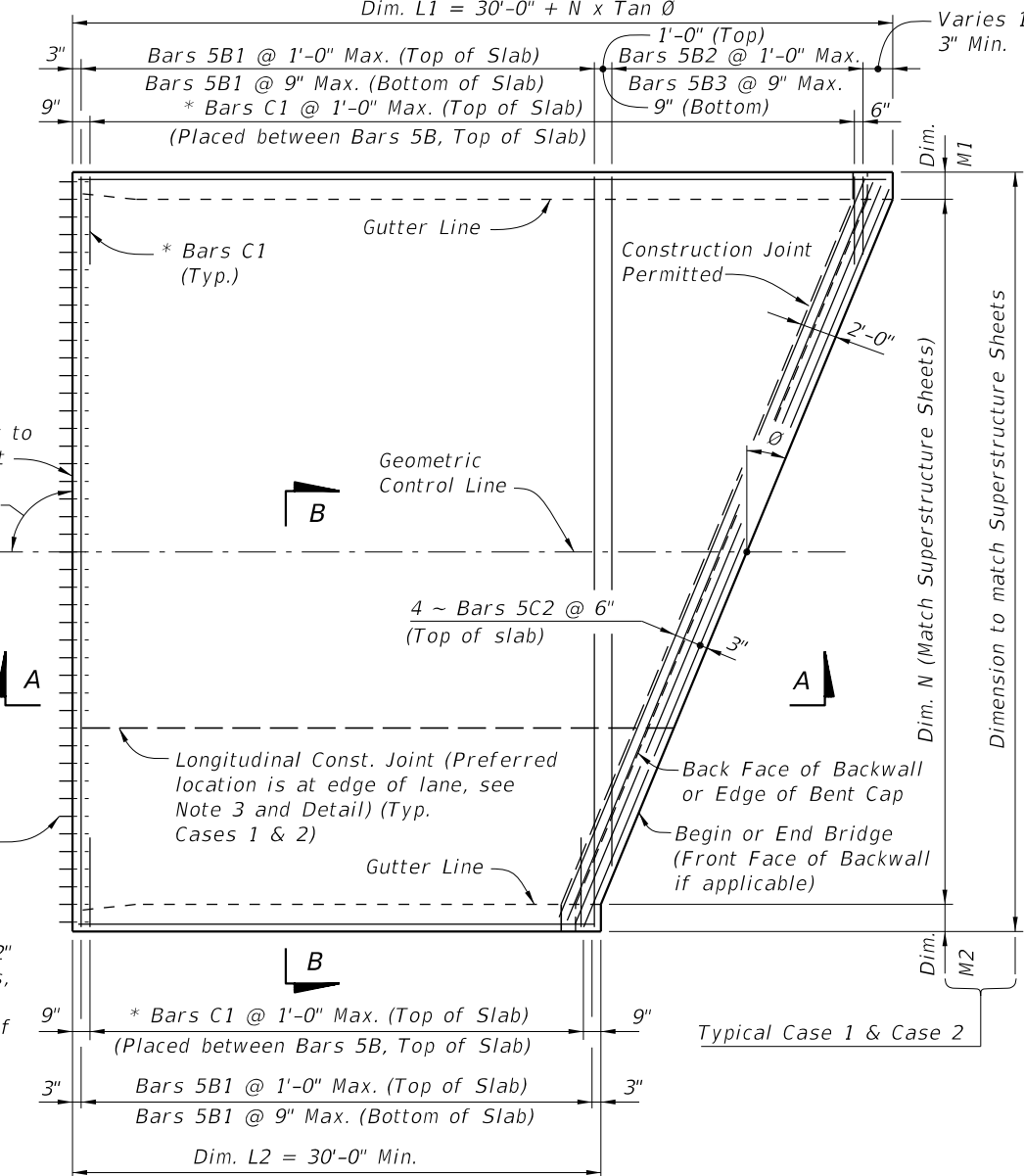
CROSS REFERENCES:  
For location of Section B-B and Longitudinal Construction Joint see Sheet 1.

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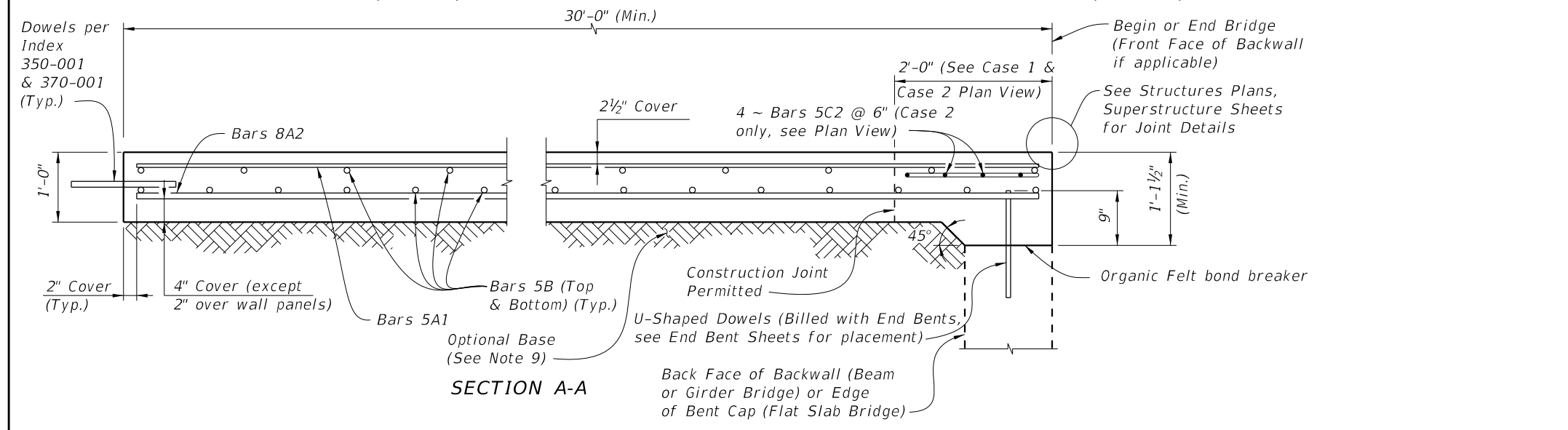
LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	APPROACH SLABS (30 FT.) (FLEXIBLE PAVEMENT APPROACHES)	INDEX 400-090	SHEET 2 of 2
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PLAN VIEW (CASE 1)



PLAN VIEW (CASE 2)



SECTION A-A

GENERAL NOTES

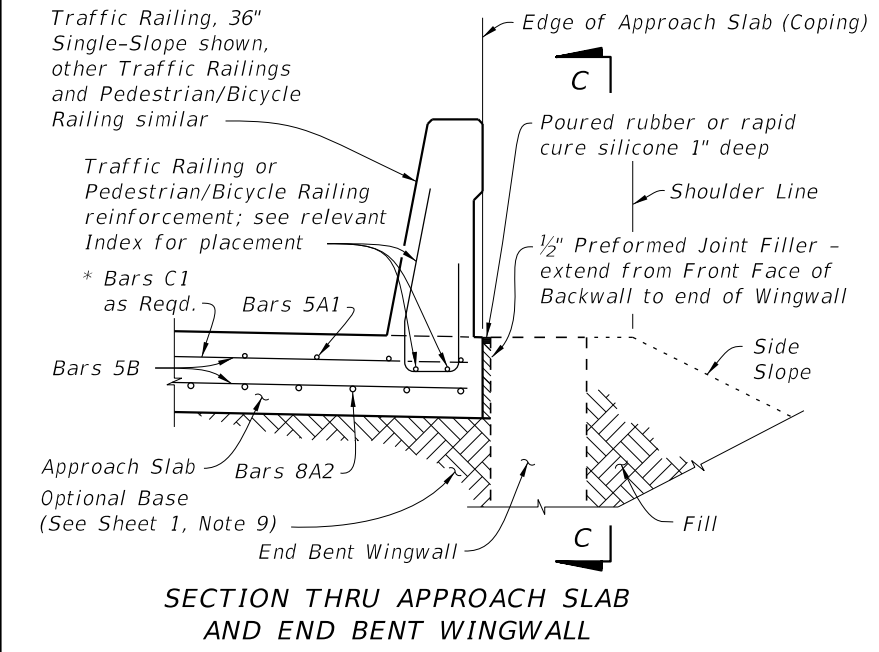
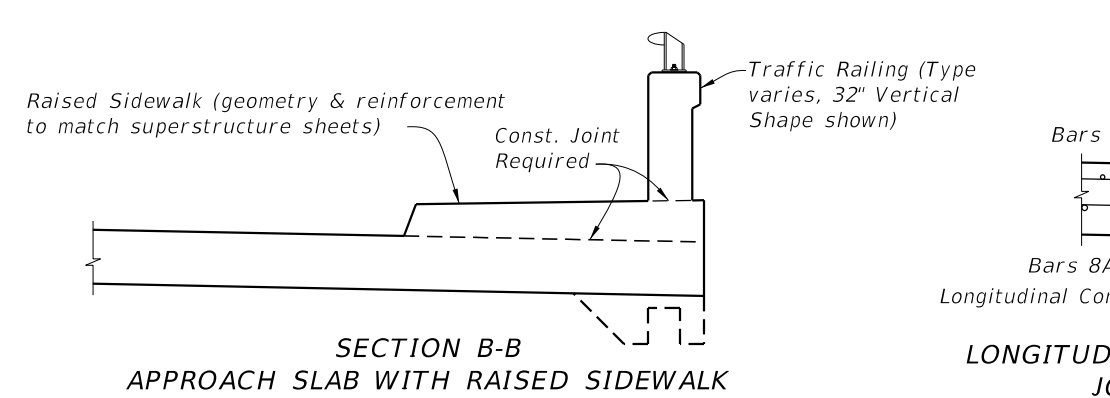
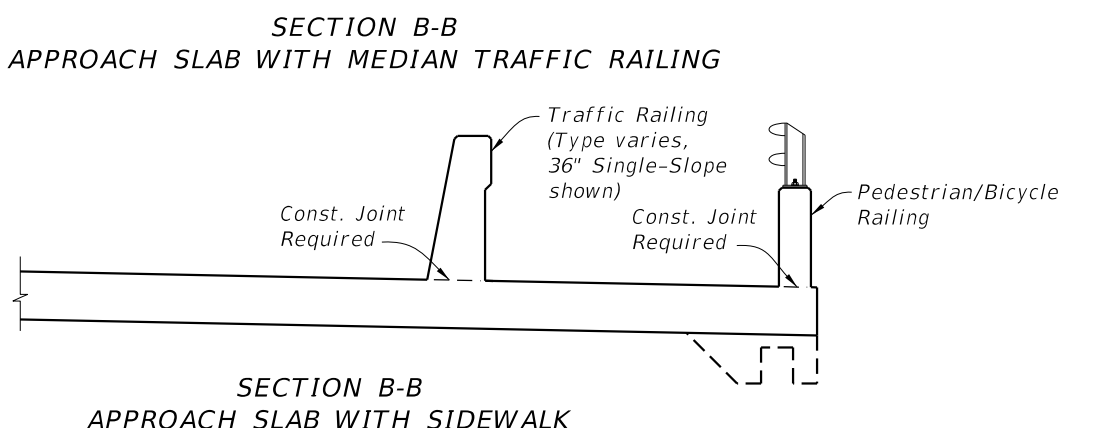
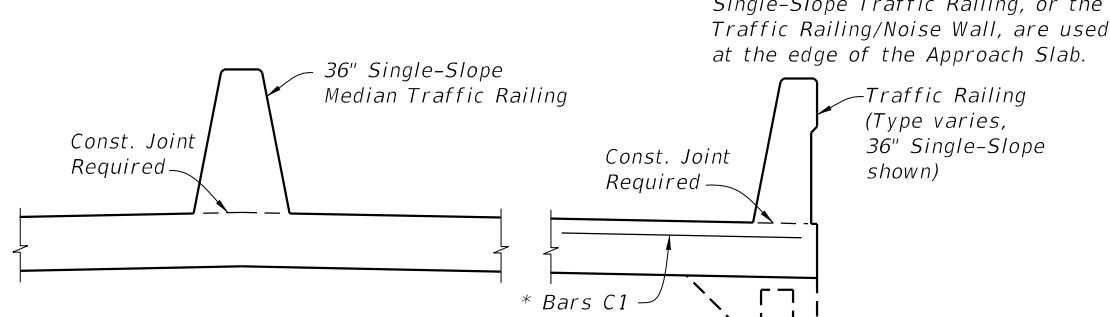
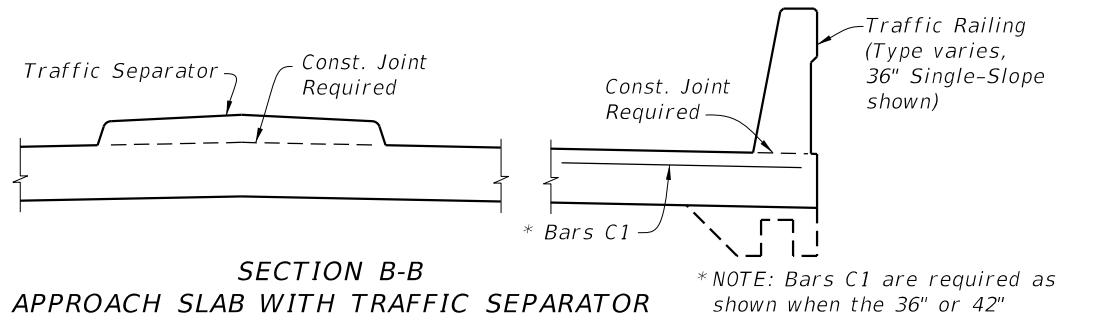
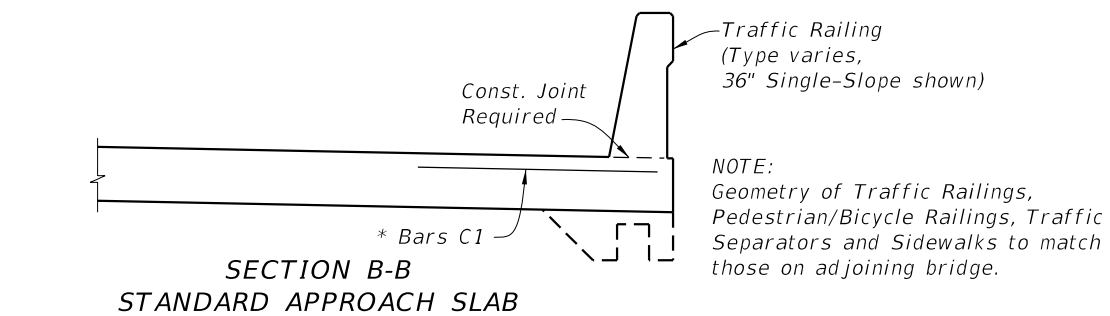
1. SURFACE TREATMENT: Apply a Class 4 Floor Finish (Grooved) to the riding surface from begin or end approach slab joint to begin or end bridge. See Bid Item Notes. Apply a broomed finish to sidewalk areas.
2. CONDUIT: If required, see Structures Plans for Conduit details.
3. When a longitudinal construction joint is necessary or allowed by the Engineer, the transverse steel shall be extended as shown in the Longitudinal Construction Joint Detail.
4. The plan view for CASE 1 applies when the skew angle ( $\theta$ ) = 0°. Relevant details also apply to CASE 2.
5. The plan view for CASE 2 applies where the skew angle ( $\theta$ ) is > 0°. The slab shown represents a skew to the right for an approach slab at begin bridge; approach slab at the end of bridge or a left skew shall be treated similarly. The shown reinforcement shall be utilized, and Dowels provided in accordance with Index 350-001 and 370-001.
6. Deformed WWR must meet the requirements of Specification Section 931.
7. PROFILOGRAPH: If profilograph requirements apply, planing may be required. The permitted construction joint shown in Section A-A will facilitate the placement of the expansion joint.
8. Approach slabs shown in Plan View Cases 1 and 2 represent a typical approach slab with edge barriers and no sidewalks. Provide railings, parapets, traffic separators and sidewalks as detailed on the additional approach slab sheets.
9. PAYMENT: Deformed WWR for the edge of Approach Slabs on retaining walls is not included in the estimated quantity for reinforcing steel and is considered incidental to the work. See Roadway Plans for Optional Base details and quantities.

CROSS REFERENCES:

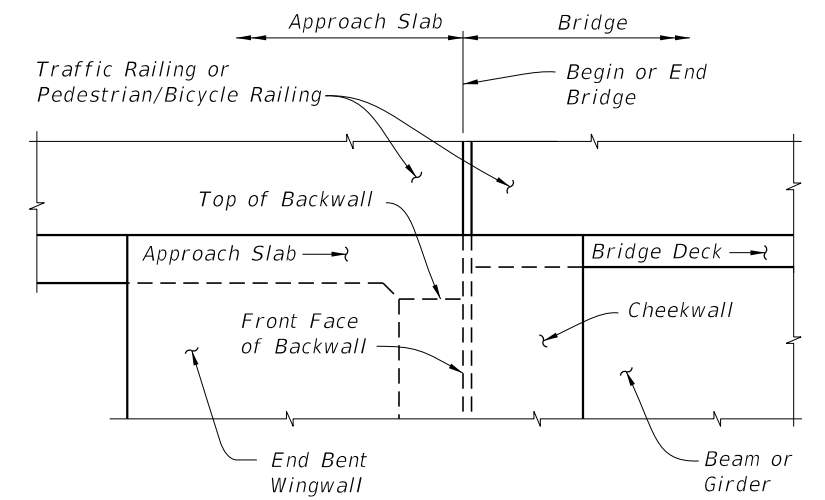
For Section B-B, Longitudinal Construction Joint Detail and Approach Slab Details see Sheet 2.

9/23/2021 9:52:25 AM

LAST REVISION 11/01/17	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	APPROACH SLABS (30 FT.) (RIGID PAVEMENT APPROACHES)	INDEX 400-091	SHEET 1 of 2
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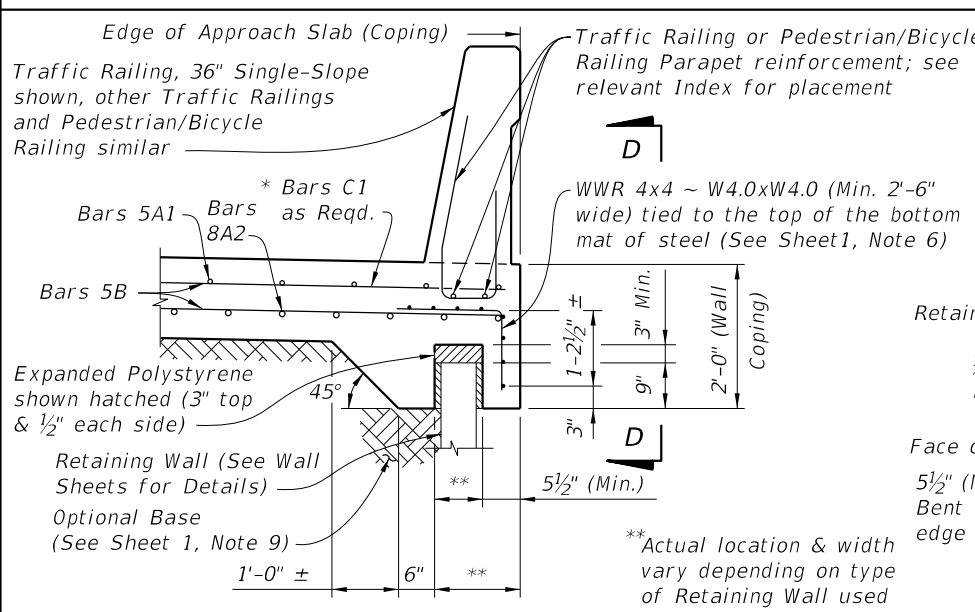


SECTION THRU APPROACH SLAB AND END BENT WINGWALL

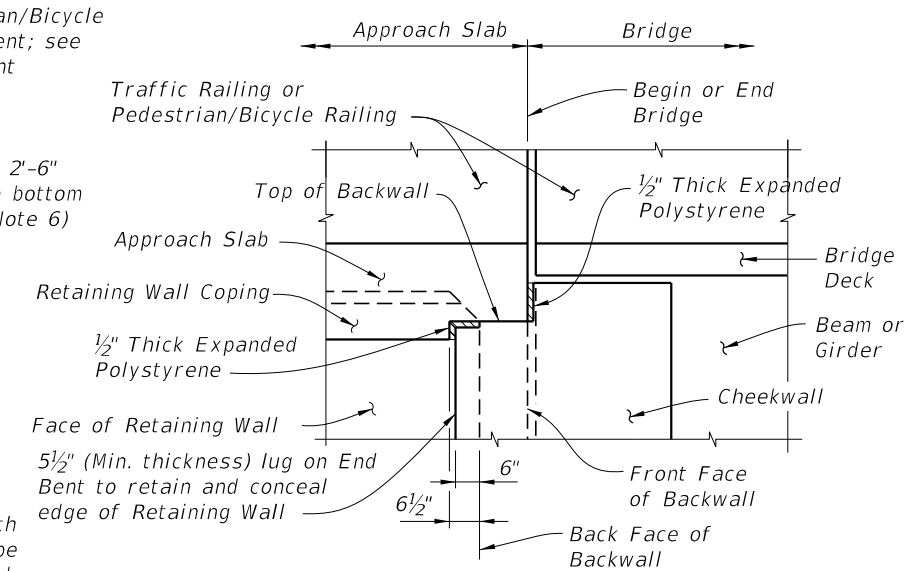


VIEW C-C AT BEGIN OR END BRIDGE (BEAM BRIDGE SHOWN, FLAT SLAB BRIDGE SIMILAR)

APPROACH SLAB WITH WINGWALL DETAILS

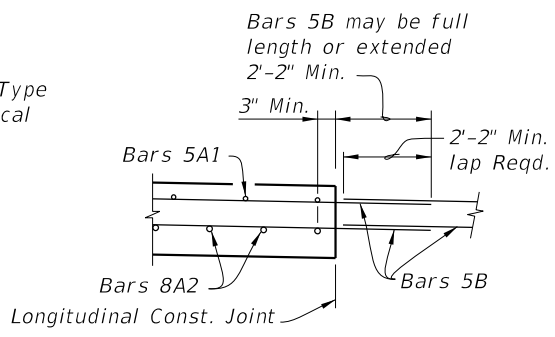


SECTION THRU APPROACH SLAB AND RETAINING WALL

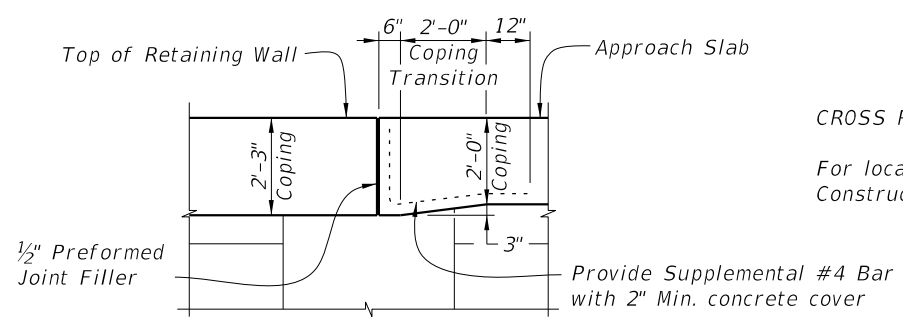


VIEW D-D AT BEGIN OR END BRIDGE (BEAM BRIDGE SHOWN, FLAT SLAB BRIDGE SIMILAR)

APPROACH SLAB WITH RETAINING WALL DETAILS



LONGITUDINAL CONSTRUCTION JOINT DETAIL

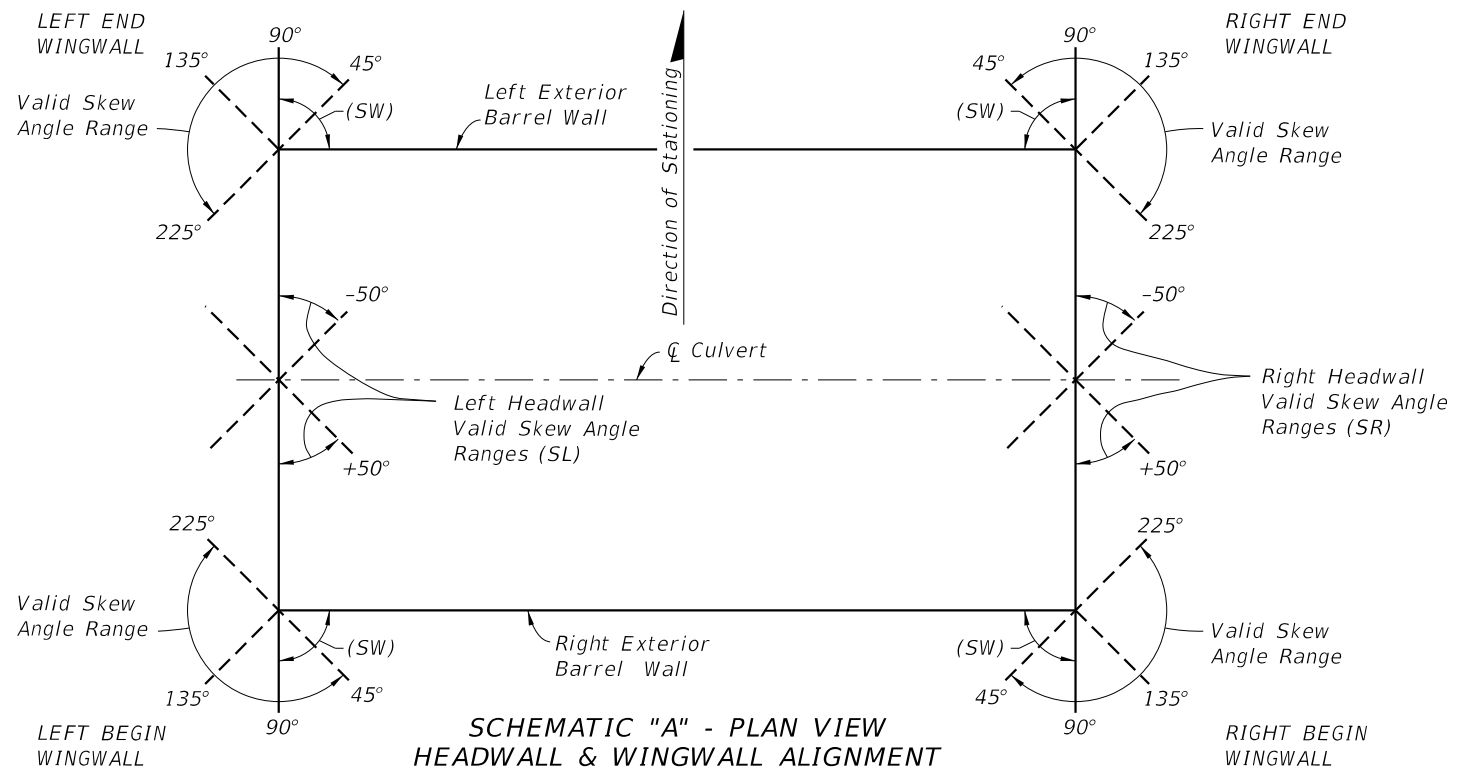


COPING TRANSITION DETAIL FOR RETAINING WALLS WITH 2'-3" COPING HEIGHT (Railing Not Shown For Clarity)

CROSS REFERENCES:  
For location of Section B-B and Longitudinal Construction Joint see Sheet 1.

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LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	APPROACH SLABS (30 FT.) (RIGID PAVEMENT APPROACHES)	INDEX 400-091	SHEET 2 of 2
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**SCHEMATIC "A" - PLAN VIEW HEADWALL & WINGWALL ALIGNMENT**  
 NOTE: All headwall and culvert skew angles are measured in degrees from a line perpendicular to the centerline of culvert (counter-clockwise positive), see Schematic "B".

**GENERAL NOTES:**

LIVE LOAD: HL-93.

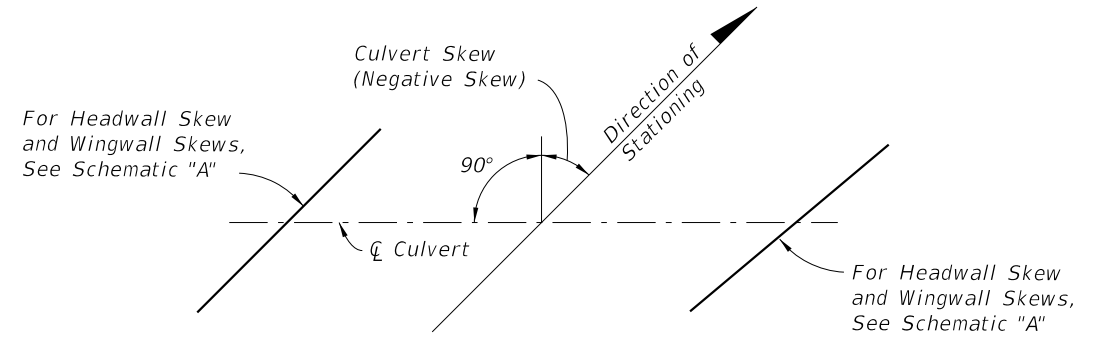
CONSTRUCTION LOADING: It is the construction Contractor's responsibility to provide for supporting construction loads that exceed AASHTO HL-93, and any construction load applied prior to 2 feet of compacted fill placed above the top slab.

SURFACE FINISH: All concrete surfaces shall receive a general surface finish.

SKEWED CONSTRUCTION JOINTS: Construction joints in barrels of culverts with skewed wingwalls may be placed parallel to the headwalls and the reinforcing steel, and the slabs may be cut provided that the cut reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with Table 1 on this sheet. The cost of construction joints and additional reinforcing shall be at the expense of the Contractor.

CULVERT EXTENSIONS: For cut backs and ties into existing concrete box culverts see Sheet 6 of 8.

REINFORCING STEEL: See the "Box Culvert Data Tables" in the Contract Plans for grade and bar spacing. See the Reinforcing Bar List in the Contract Plans for bar sizes and bar bending details.



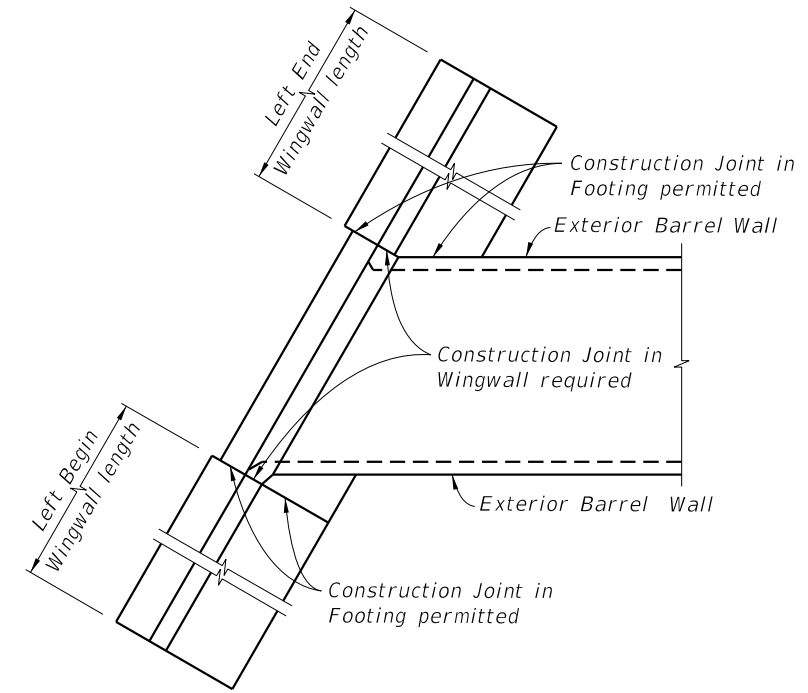
**SCHEMATIC "B" - PLAN VIEW CULVERT ALIGNMENT**

NOTE: For Culvert Skew see Contract Plans.

**TABLE 1 - MINIMUM BAR SPLICE LENGTHS FOR LONGITUDINAL REINFORCING**

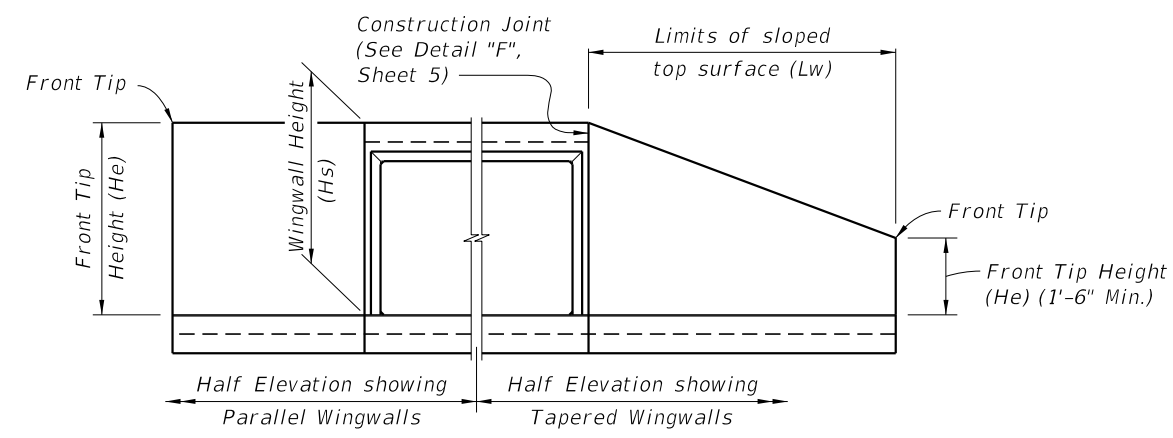
BAR SIZE	SPLICE (CLASS B)		BAR SIZE	SPLICE (CLASS B)	
	CLASS II (3400 psi)	CLASS IV (5500 psi)		CLASS II (3400 psi)	CLASS IV (5500 psi)
#3	1'-4"	1'-0"	#8	3'-5"	2'-8"
#4	1'-9"	1'-4"	#9	4'-3"	3'-4"
#5	2'-2"	1'-8"			
#6	2'-7"	2'-0"			
#7	3'-0"	2'-4"			

TABLE 1 NOTE: Splice lengths are based on an AASHTO Class B tension lap splice for the Specification Section 346 concrete class shown.



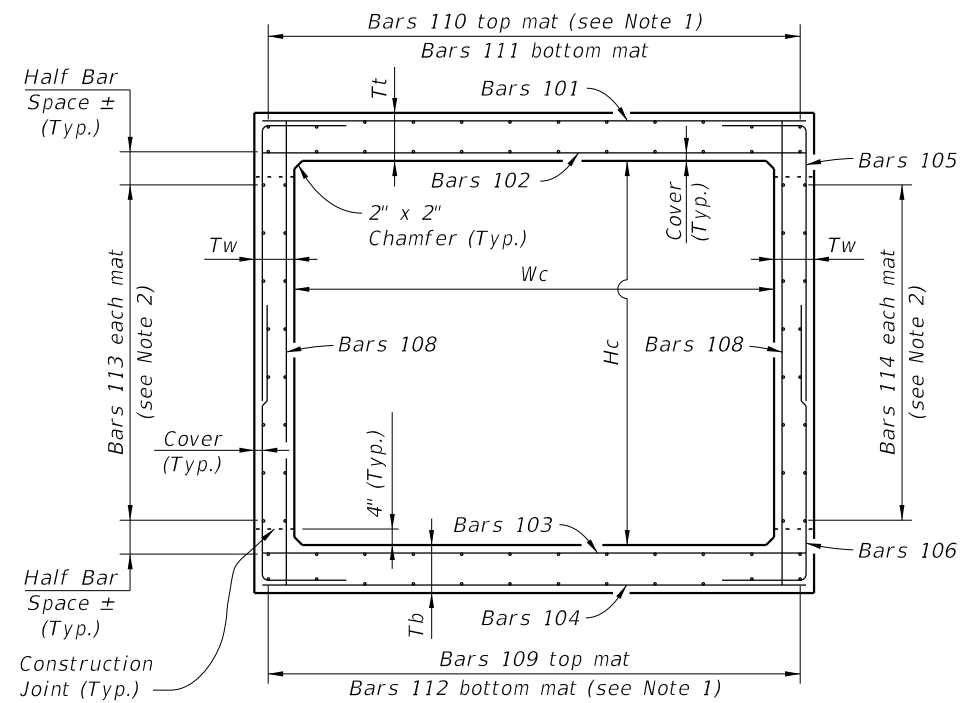
**PART PLAN SHOWING PARALLEL WINGWALLS AND LOCATION OF CONSTRUCTION JOINTS**

NOTE: Construction Joints in wingwalls and footings are located as follows: For non-skewed wingwalls they are located adjacent to the exterior face of the exterior barrel wall; when the centerline of wingwall and centerline of exterior barrel wall results in an acute angle see Left End Wingwall above, and when the angle is obtuse see Left Begin Wingwall above and Detail C (Sheet 5).



**END ELEVATION OF CULVERT**

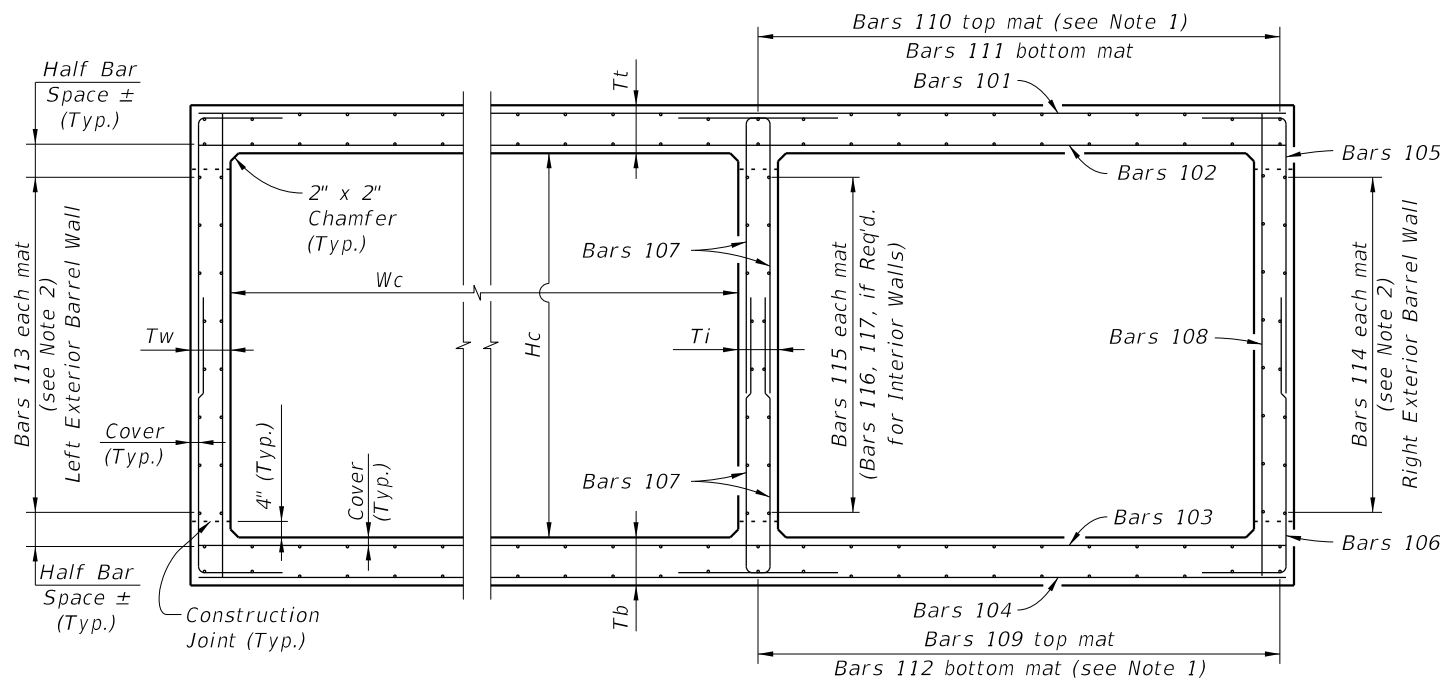
9/23/2021 9:52:27 AM



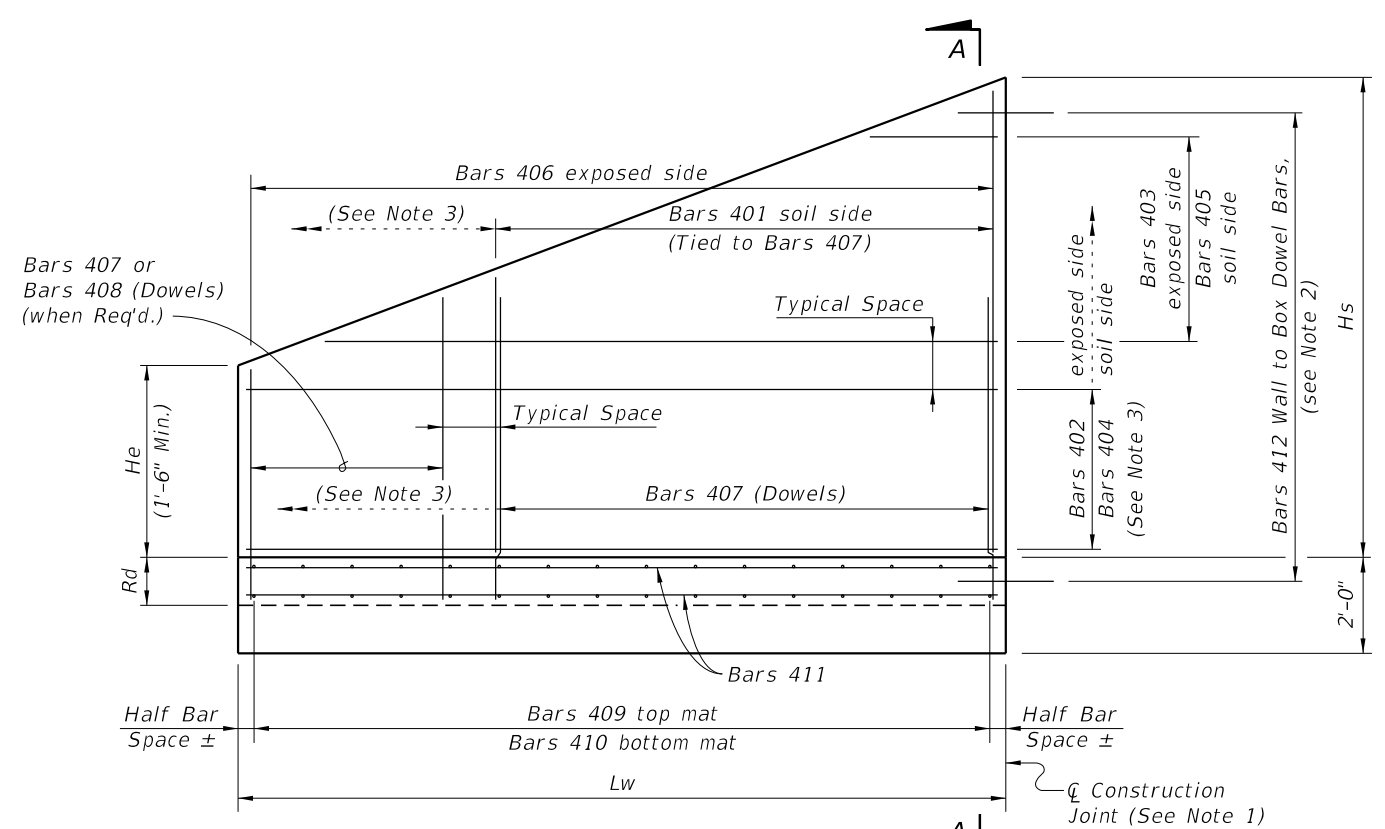
TYPICAL SECTION THRU SINGLE BARREL CULVERT

CULVERT BARREL NOTES:

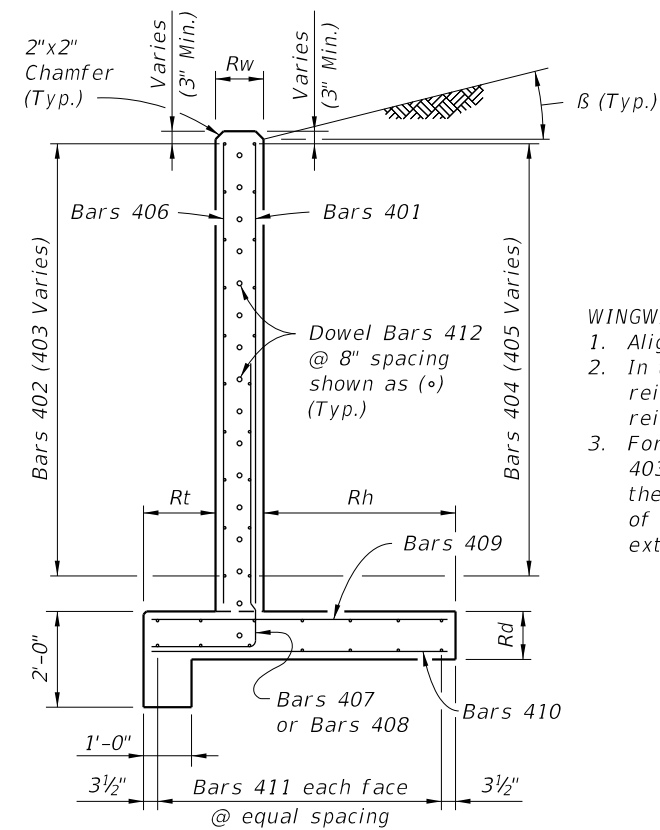
1. Space Bars 110 and 112 with a bar in each corner, and at the  $\text{C}$  of interior walls (for multiple barrel culverts only), and the remaining bars placed at equal spacing shown in the Contract Plans. Adjust last bar spacing when required.
2. Place Bars 113 and 114 at spacing shown in the Contract Plans evenly between Bars 109 and 111.
3. Locate the first transverse bar from the ends of the culvert at one half the bar spacing, but provide the minimum reinforcement cover and not greater than 4" clear.



TYPICAL SECTION THRU MULTIPLE BARREL CULVERT



WINGWALL ELEVATION - Variable Height  
(Left End shown - other corners similar)



WINGWALL SECTION A-A

WINGWALL NOTES:

1. Align construction joint perpendicular to wingwall.
2. In the vicinity of the construction joint, field bend reinforcement as necessary to maintain minimum reinforcement cover.
3. For constant height wingwalls, variable length Bars 403, 405 & 408 are not required, and as such the limits of Bars 401 & 407 extend the full length of the wingwall, and the limits of Bars 402 & 404 extend to the full height of the wingwall.

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LAST REVISION 07/01/13	DESCRIPTION:
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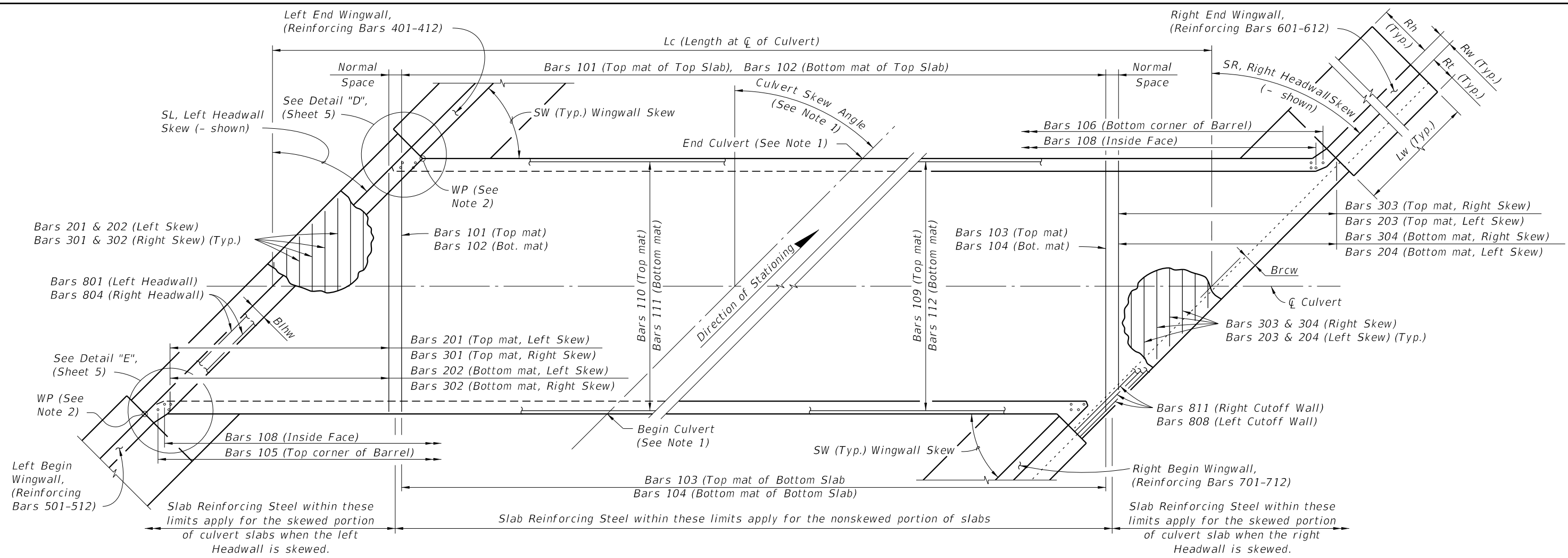


FY 2022-23  
STANDARD PLANS

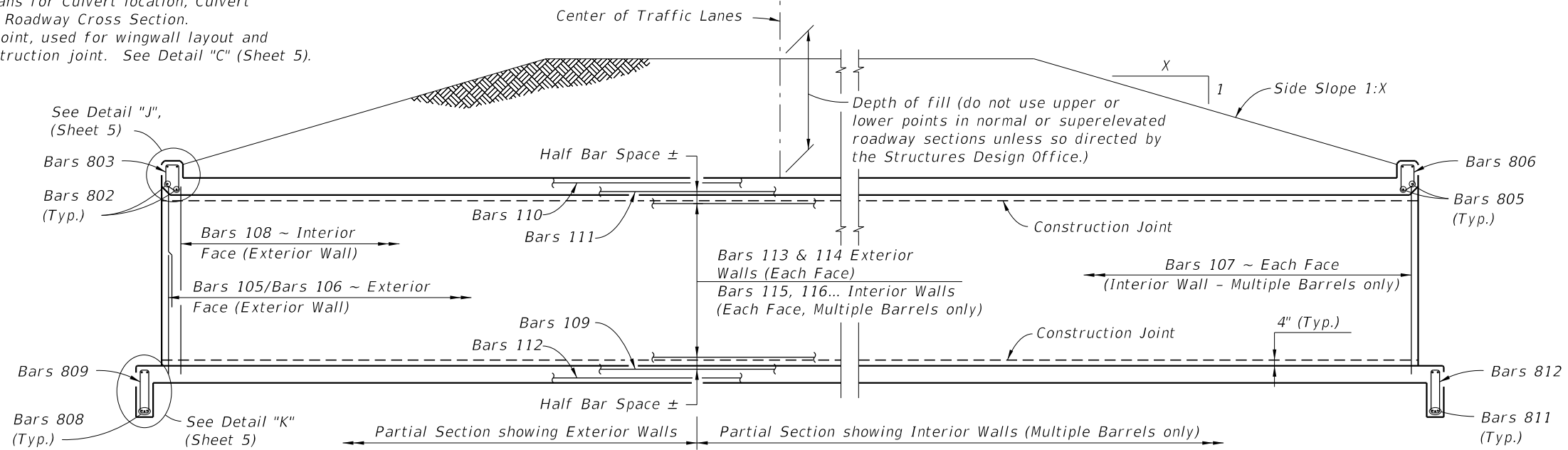
CONCRETE BOX CULVERT DETAILS

INDEX  
400-289

SHEET  
2 of 8

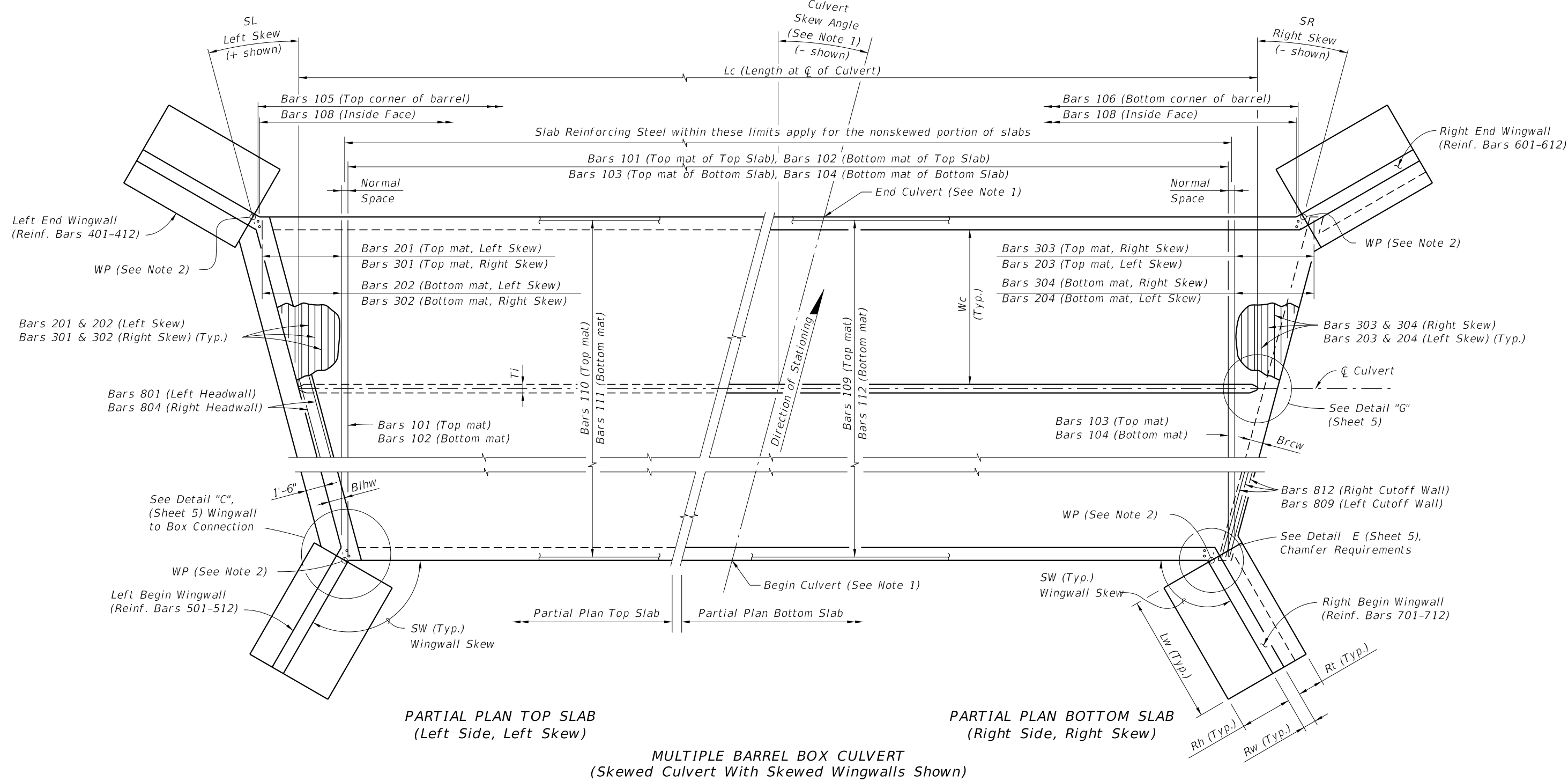


- NOTES:**
1. See Contract Plans for Culvert location, Culvert Skew Angle and Roadway Cross Section.
  2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail "C" (Sheet 5).



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LAST REVISION	01/01/07	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 3 of 8
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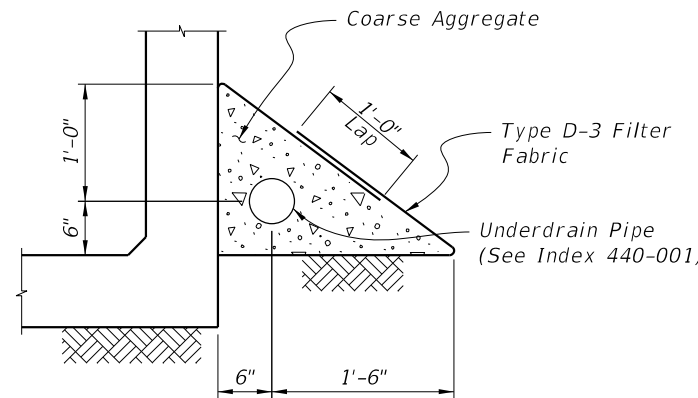
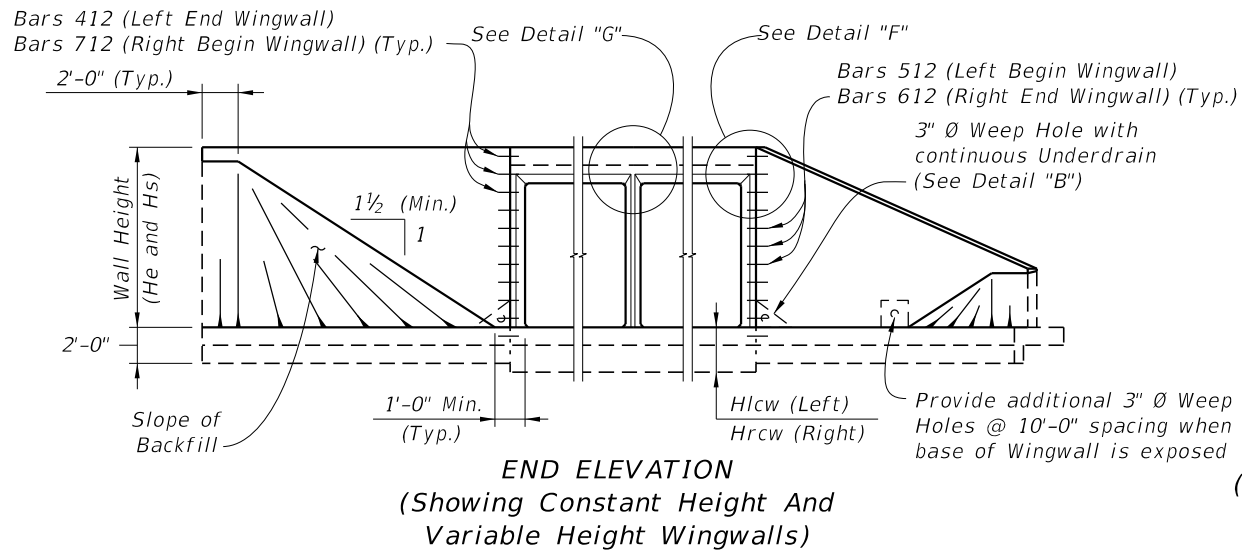


- NOTES:**
1. See Contract Plans for Culvert Location, Culvert Skew Angle and Roadway Cross Section.
  2. WP = Working Point, used for wingwall layout and location of construction joint. See Detail C (Sheet 5).

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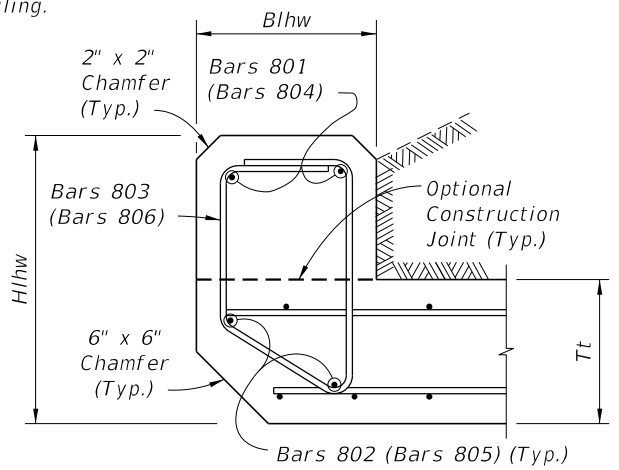
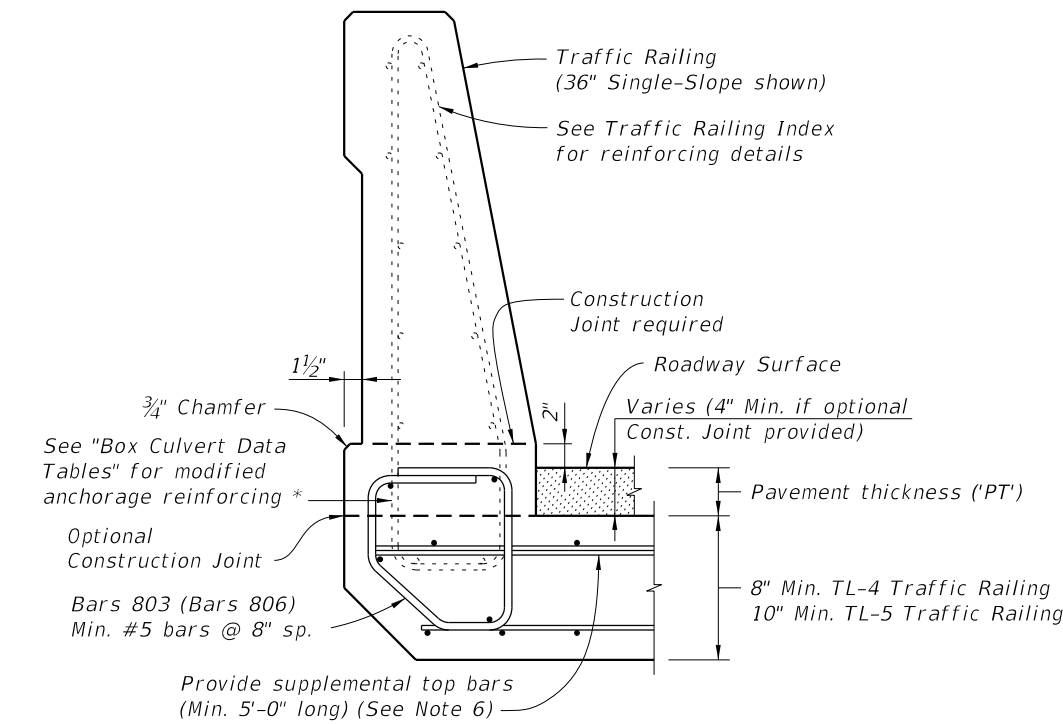
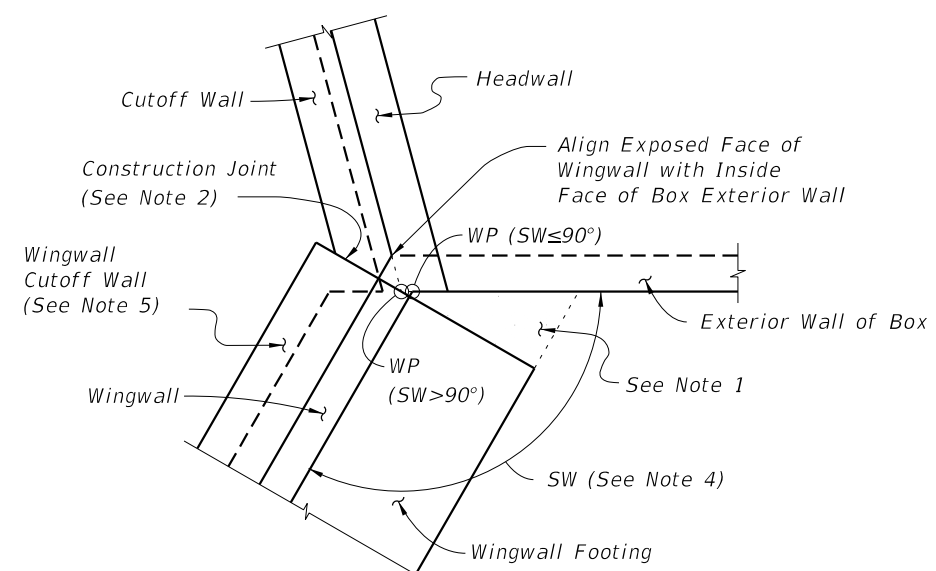
LAST REVISION 01/01/07	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 4 of 8
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- NOTES:**
1. For small angles, the Contractor may elect to fill the area between the box and the wingwall footing with unreinforced concrete. For wingwall skew angles less than 90 degrees, field bend wingwall reinforcement as necessary while maintaining cover. No additional payment will be made for this work.
  2. Location of Construction Joint determined by WP at theoretical intersection of:
    - Soil side face of Headwall and outside face of Box Exterior Wall, for  $SW \leq 90^\circ$ ;
    - Outside face of Wingwall and outside face of Box Exterior Wall, for  $SW > 90^\circ$ .
  3. Provide 6" chamfer when angle 'A' is greater than 45°. Maintain minimum wall thickness. Field adjust reinforcing to maintain cover.
  4. Wingwall Skew Angles (SW) are measured from the adjacent box exterior wall to the wingwall.
  5. Turn or extend Wingwall Cutoff Wall as necessary to meet Box Cutoff Wall.
  6. Provide additional reinforcement in the top of the top slab below traffic railings to ensure a minimum area of 0.80 sq. in./ft. transverse reinforcing.

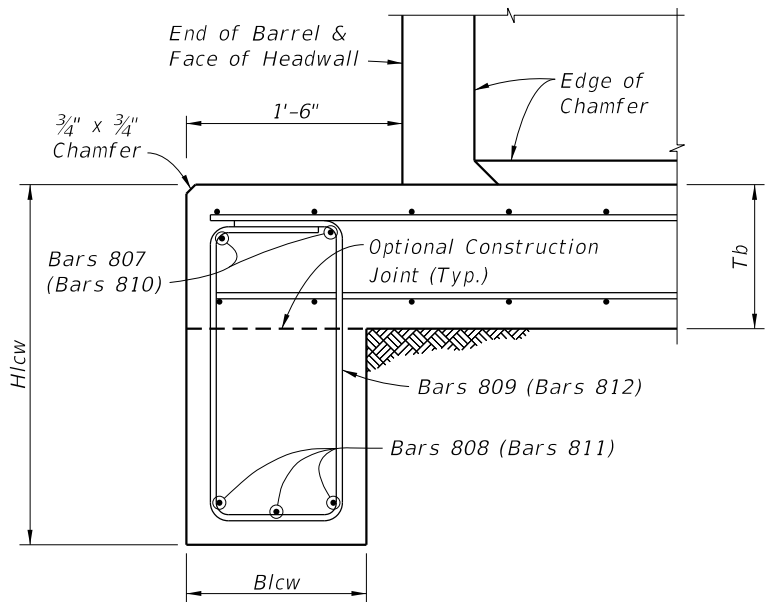
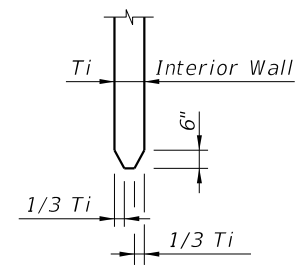
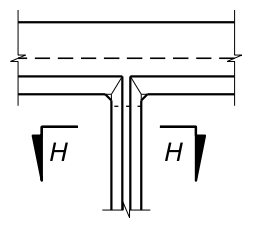
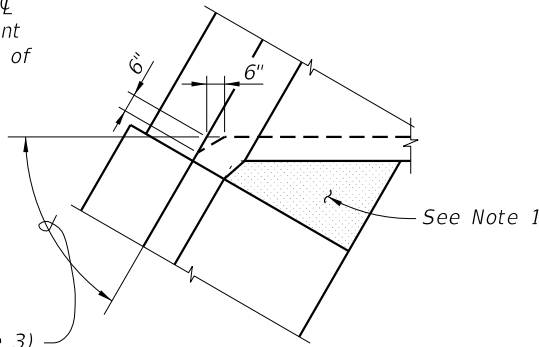
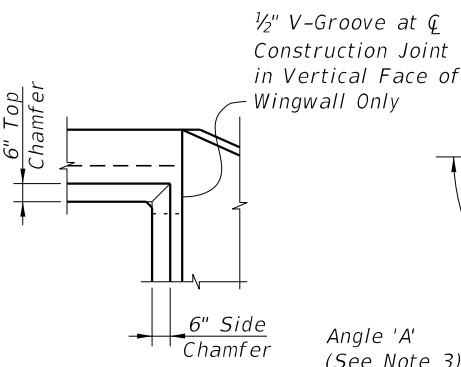
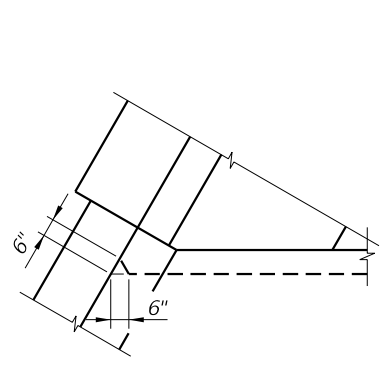
\* Included in the cost of the Traffic Railing.



**DETAIL "C" - PLAN VIEW WINGWALL TO BOX CONNECTION (Left Begin Corner Shown, Other Corners Similar)**

**DETAIL "I" TRAFFIC RAILING ATTACHMENT TO HEADWALL**

**DETAIL "J" LEFT HEADWALL SECTION (Right Headwall similar)**



**DETAIL "D"**

**DETAIL "F"**

**DETAIL "E"**

**DETAIL "G"**

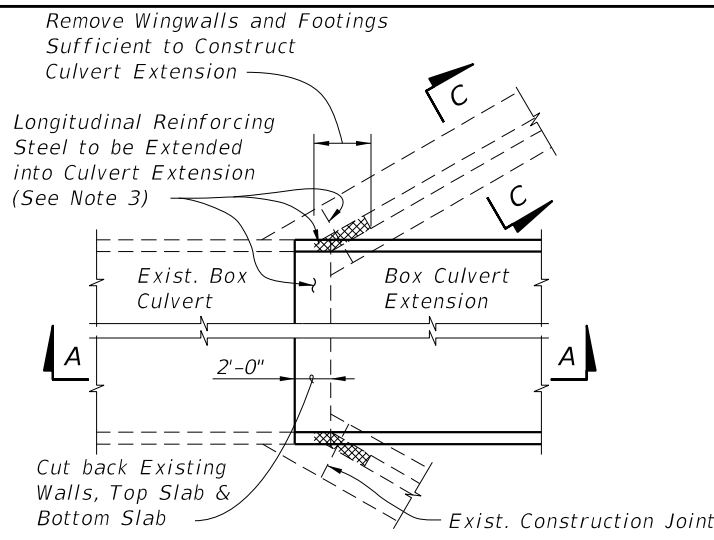
**SECTION H-H**

**DETAIL "K" LEFT CUTOFF WALL SECTION (Right Cutoff Wall similar)**

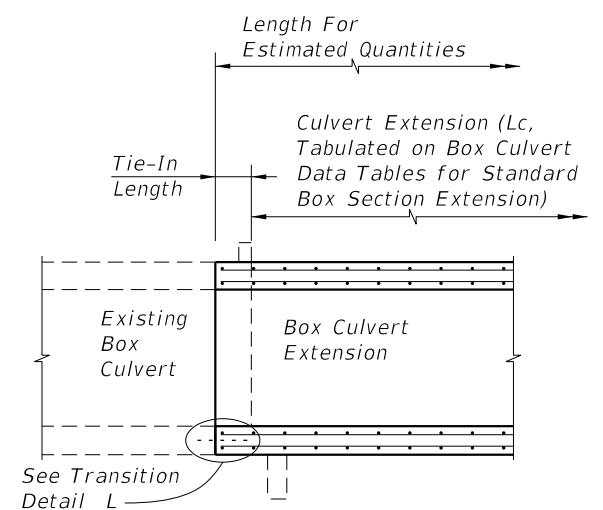
**CROSS REFERENCE:**  
See Sheet 3 for locations of Details "D", "E", "J" & "K".  
See Sheet 4 for locations of Detail "C".

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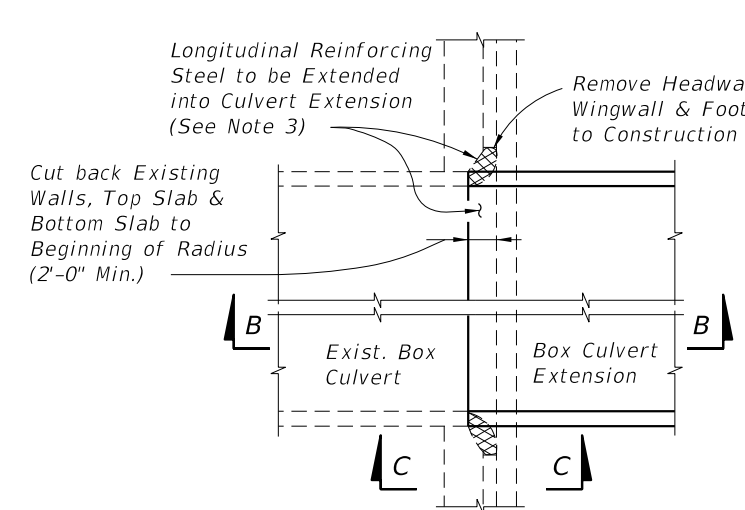
LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 5 of 8
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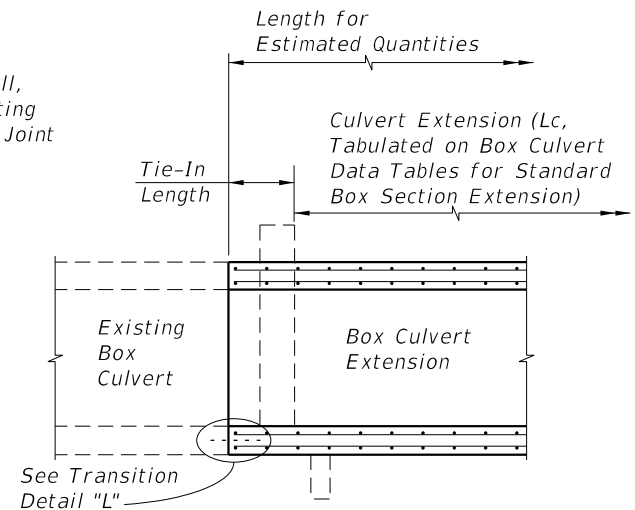
OUTSIDE WALLS OF BOXES



SECTION A-A

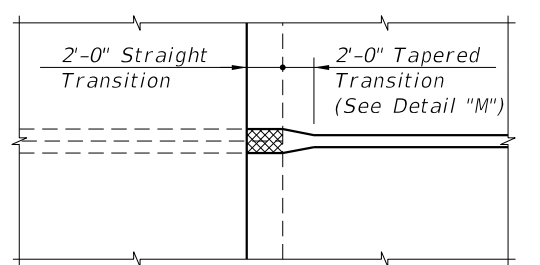


OUTSIDE WALLS OF BOXES

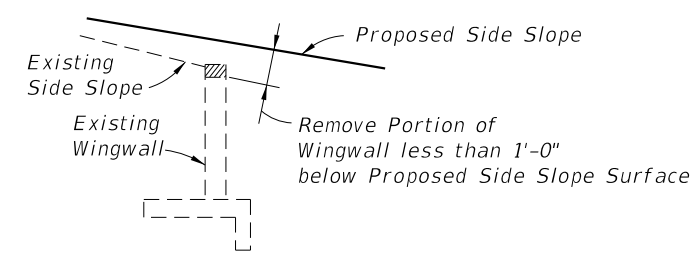


SECTION B-B

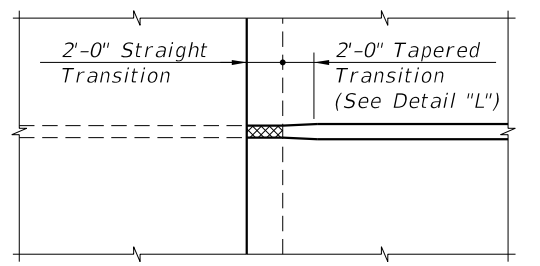
FLARED WINGWALL



INTERIOR DOUBLE WALLS OF BOXES



SECTION C-C



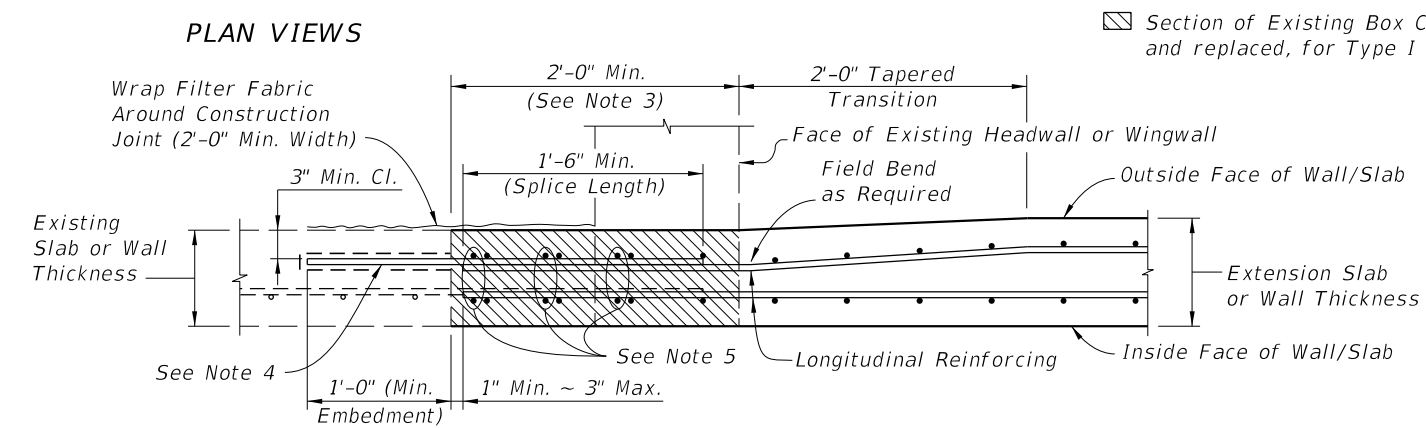
INTERIOR SINGLE WALLS OF BOXES

STRAIGHT WINGWALL

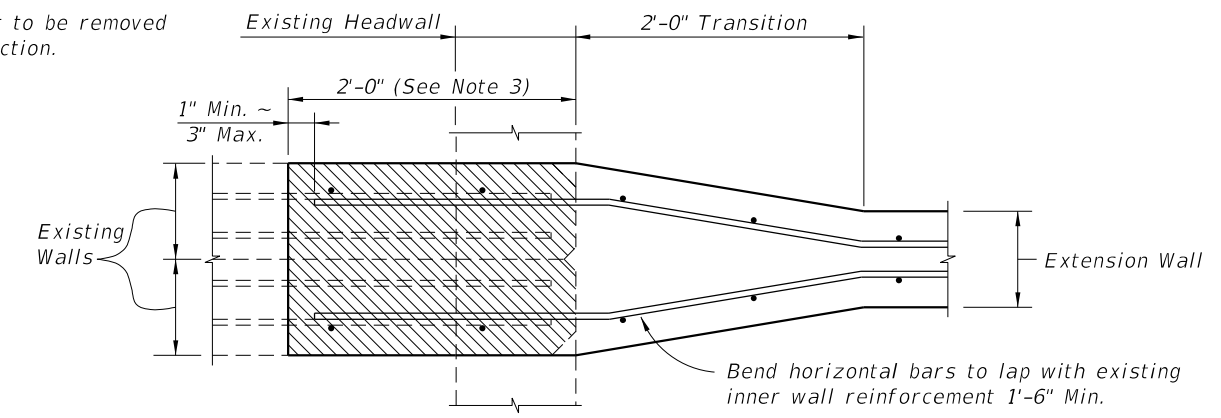
NOTES:

1. The Box Culvert Data Tables and Reinforcing Bar List do not include the additional quantities needed for dowel connections or transitions from double walls of existing concrete box culverts; the cost for additional reinforcement and the thickened concrete wall in the transitional area shall be included in the costs for concrete and steel in the culvert extension.
2. Cost for removal and disposal of material from existing headwalls, wingwalls and box, and cost of cleaning, straightening and extending or doweling longitudinal reinforcing steel shall be included in the cost for concrete and steel of the culvert extension.
3. Remove existing concrete while avoiding damage to existing reinforcement. Clean and straighten existing reinforcement, lap and tie onto extension reinforcement.
4. Dowel in #4 Bars @ 1'-0" max. spacing into wall/slab when there is a single mat of existing reinforcing steel, otherwise splice 1'-6" as shown for inside reinforcement. Use an Adhesive Bonding Material System in accordance with Specifications Section 416 & 937.
5. Provide additional transverse bars for top and bottom slab, parallel and full width of any skewed joint connection when shown in the Plans.
6. See Box Culvert Data Table notes in Plans for Connection Types allowed.

PLAN VIEWS



DETAIL "L" - TRANSITION FOR EXTERIOR WALL/SLAB EXTENSION  
(Interior Single Walls Similar)

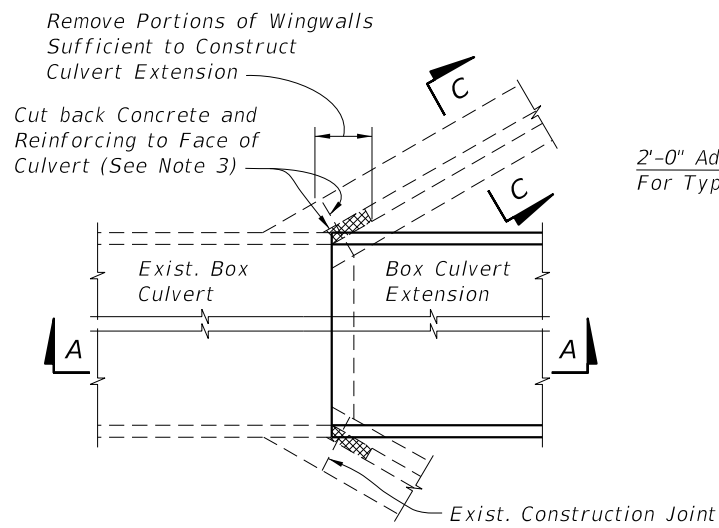


DETAIL "M" - TRANSITION FOR INTERIOR DOUBLE WALLS OF BOX CULVERTS

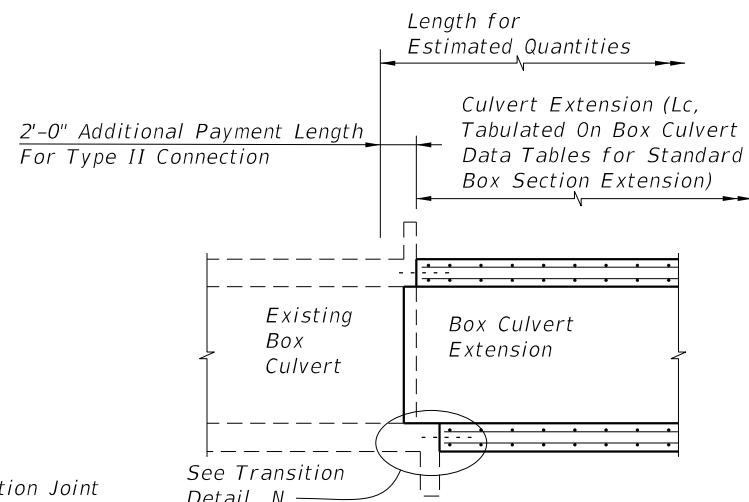
TYPE I CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS  
(CUT BACK EXISTING CONCRETE)

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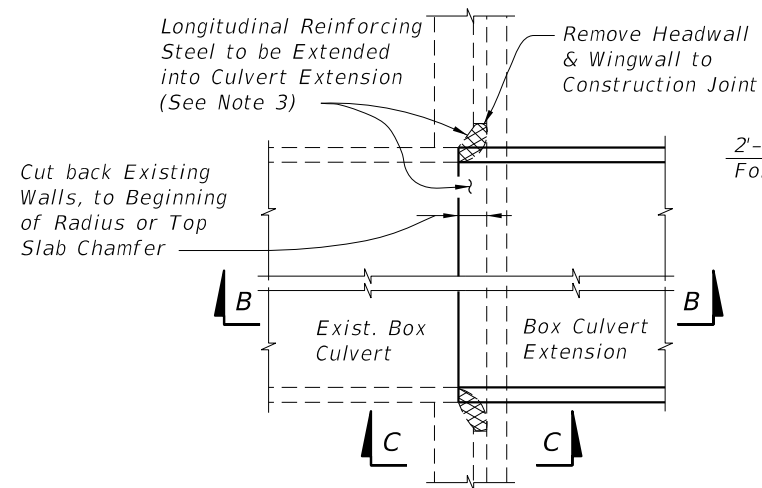
LAST REVISION 01/01/12	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 6 of 8
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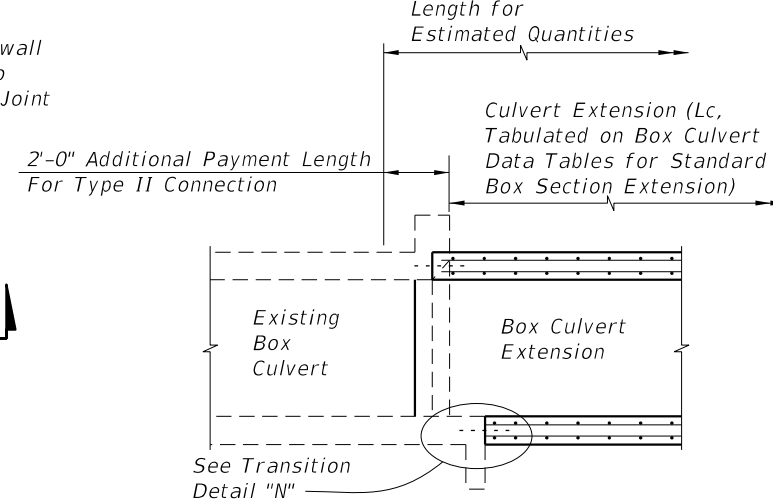
OUTSIDE WALLS OF BOXES



SECTION A-A



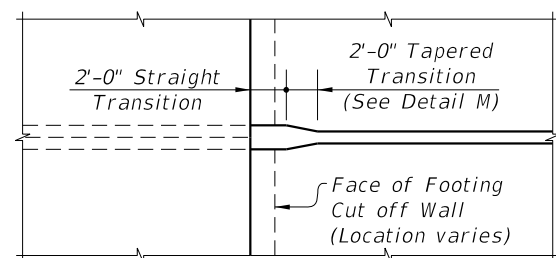
OUTSIDE WALLS OF BOXES



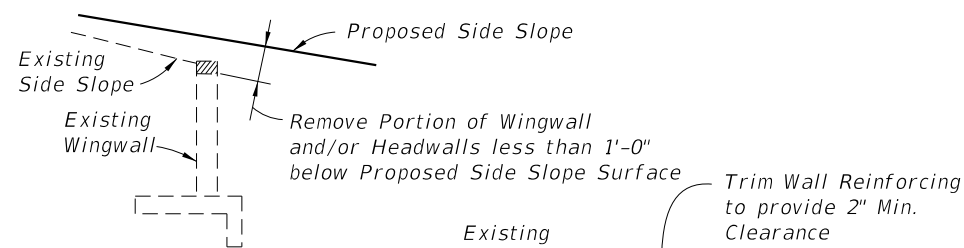
SECTION B-B

FLARED WINGWALL

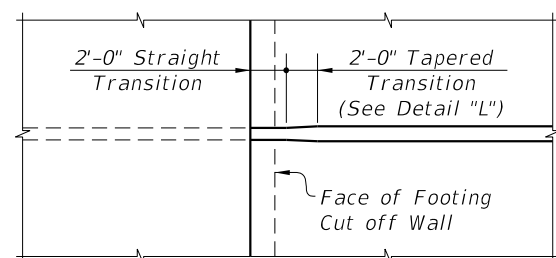
STRAIGHT WINGWALL



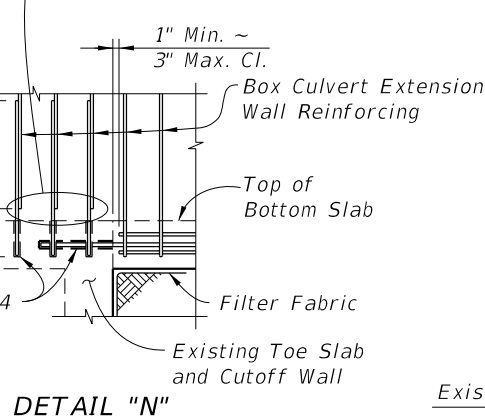
INTERIOR DOUBLE WALLS OF BOXES



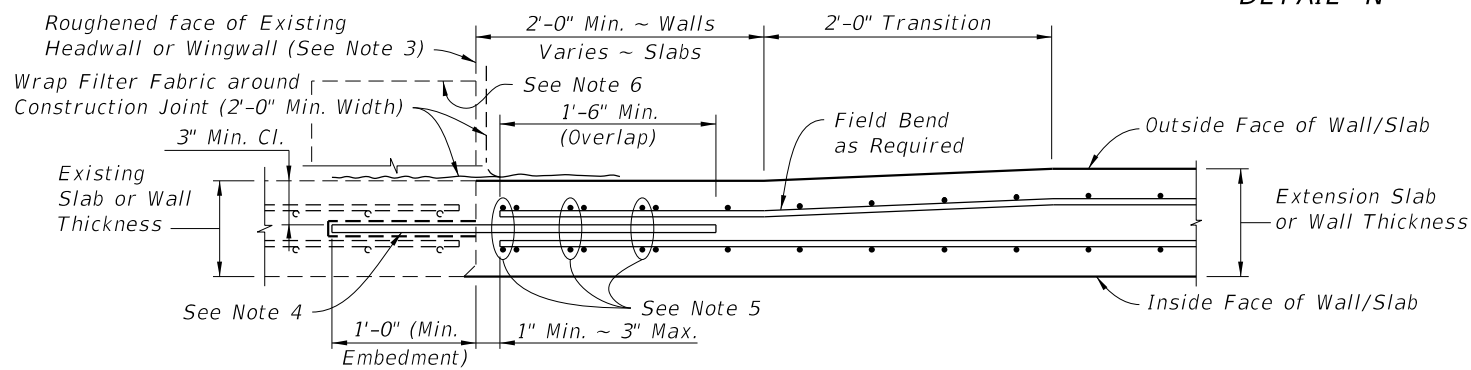
SECTION C-C



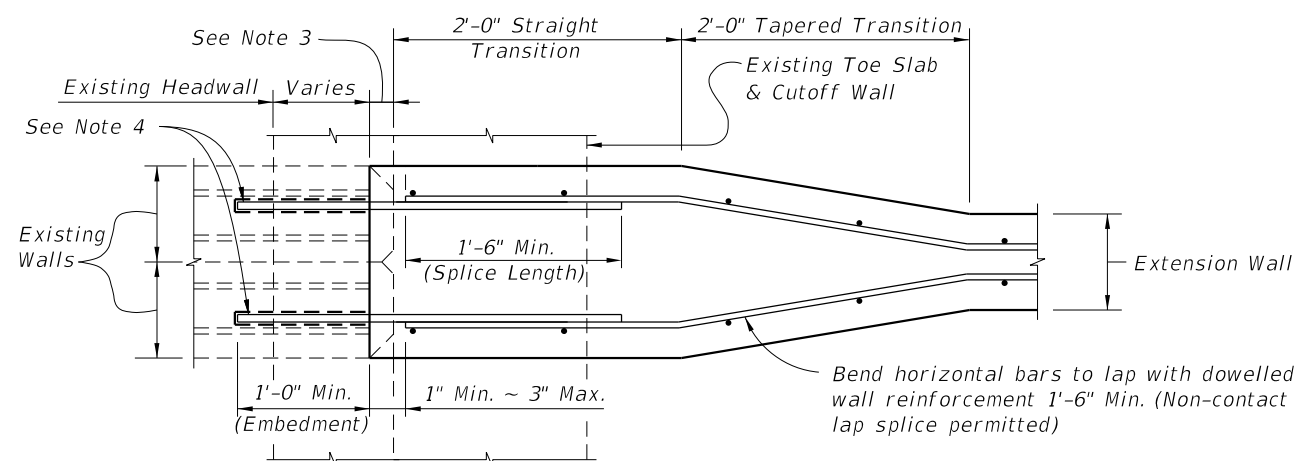
INTERIOR SINGLE WALLS OF BOXES  
PLAN VIEWS



DETAIL "N"



DETAIL "L" - TRANSITION FOR EXTERIOR WALL/SLAB EXTENSION  
(Interior Single Walls Similar)




DETAIL "M" - TRANSITION FOR INTERIOR DOUBLE WALLS OF BOX CULVERTS

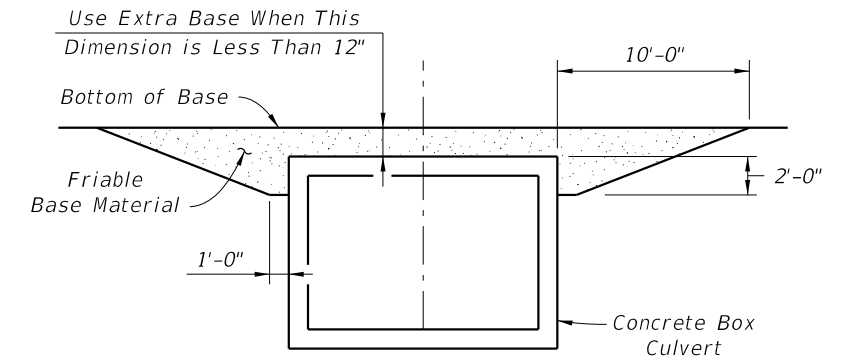
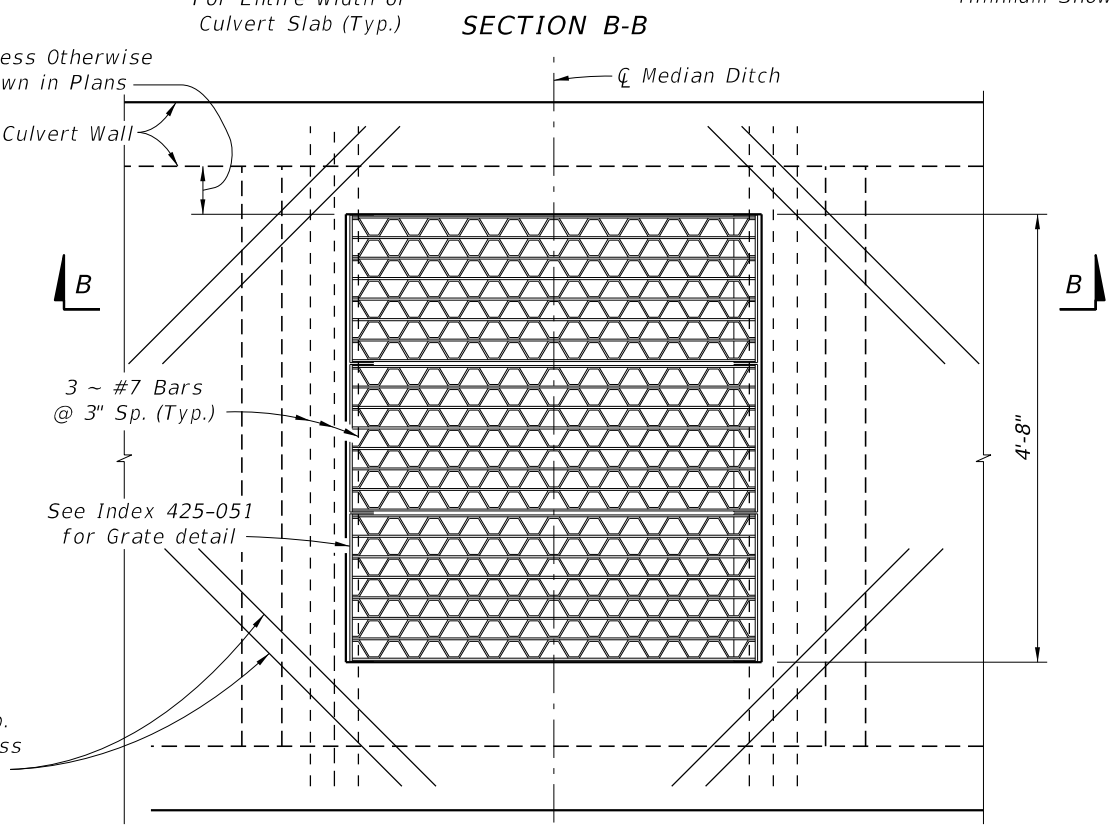
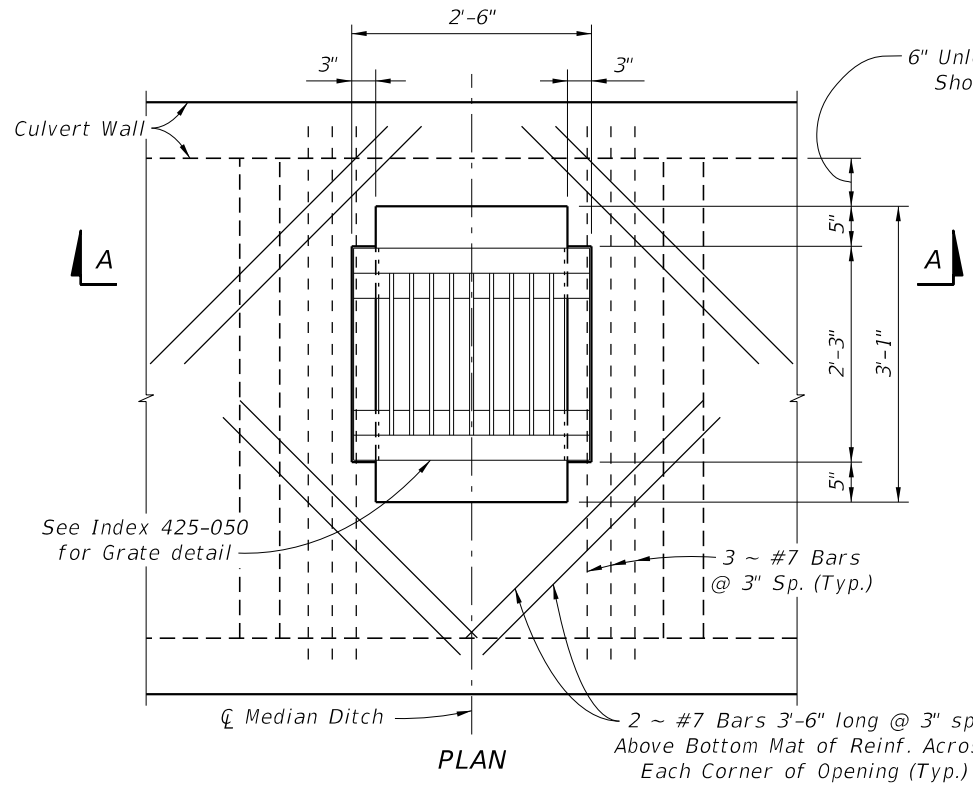
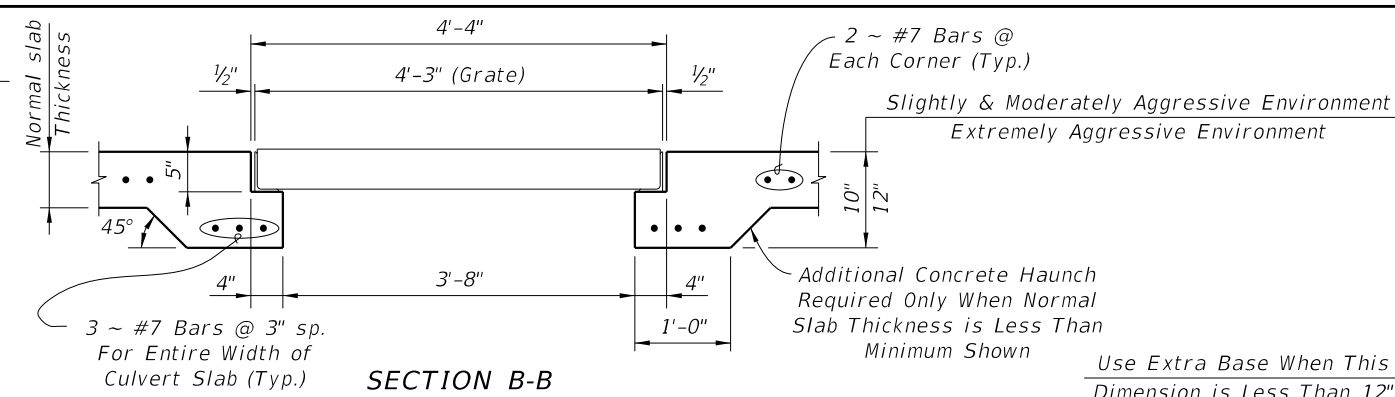
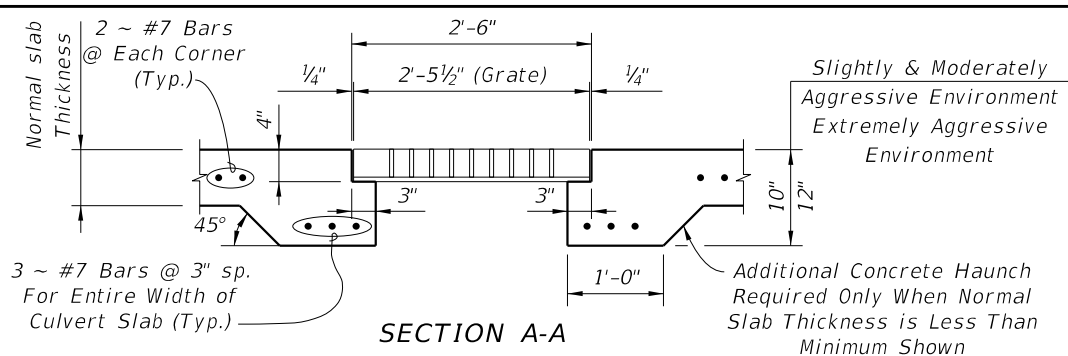
NOTES:

1. The Box Culvert Data Tables and Reinforcing Bar List do not include the additional quantities needed for dowel connections or transitions from double walls of existing concrete box culverts; the cost for additional reinforcement and the thickened concrete wall in the transitional area shall be included in the costs for concrete and steel in the culvert extension.
2. Cost for roughening and cleaning existing headwalls, wingwalls and box, and cost of doweling longitudinal reinforcing steel shall be included in the cost for concrete and steel of the culvert extension.
3. Remove existing concrete and reinforcing back to edge of any chamfers exceeding 1". Roughen and clean existing or exposed surface and coat with a Type A epoxy bonding compound in accordance with the manufacturer's recommendations.
4. Dowel in #5 Bars @ 1'-0" max. spacing horizontally into center of wall/slab. Provide vertical dowels in footing to match size, alignment and spacing of outside vertical wall reinforcing. Use an Adhesive Bonding Material System in accordance with Specifications Section 416 & 937.
5. Provide additional transverse bars for top and bottom slab, parallel and full width of any skewed joint connection when shown in the Plans.
6. Remove top of existing headwall when necessary to provide 1'-0" clearance below finished grade. Saw cut full width and seal with Type F-2 epoxy compound to protect exposed reinforcing.
7. See Box Culvert Data Table notes in Plans for Connection Types allowed.

TYPE II CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS  
(ADHESIVE DOWEL TO EXISTING CONCRETE)

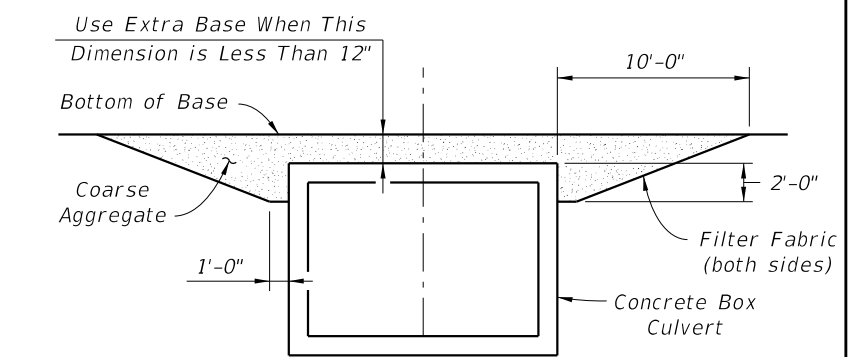
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LAST REVISION 01/01/12	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 7 of 8
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**FRIABLE BASE**

The cost of furnishing and installing extra friable base material shall be included in the cost of the Box Culvert.



**ASPHALTIC CONCRETE BASE**

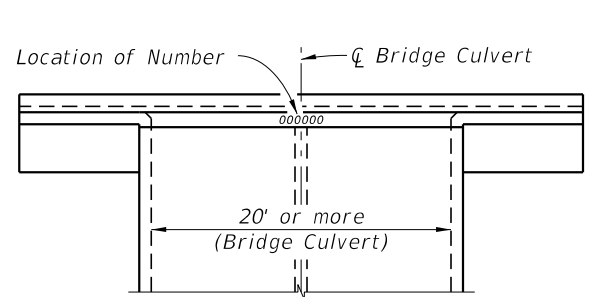
Place coarse aggregate in 6 inch lifts and compact sufficiently as to be firm and unyielding. Provide coarse aggregate gravel or stone meeting the requirements of Specification Section 901-2 or 901-3 respectively. Meet the gradation requirements of Specification Section 901-6, Grades 4, 467, 5, 56 or 57 unless restricted in the plans. Provide Type D-3 filter fabric (see Specification Section 985) The cost of furnishing and installing the coarse aggregate and filter fabric shall be included in the cost of the Box Culvert.

NOTE: Extra base is required when cross box culverts are located on facilities subject to high speed traffic (>45 mph) or high traffic volumes (>1600 ADT) and the cover is within the range specified in the notation above.

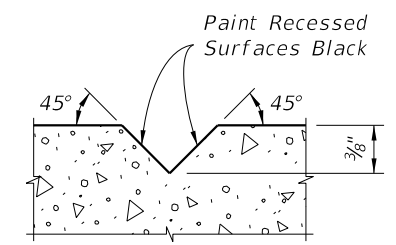
**EXTRA BASE FOR BOX CULVERTS CROSSING UNDER FLEXIBLE PAVEMENT**

- NOTES:
1. Cost of Steel Grating to be included in cost of Box Culvert.
  2. All reinforcing shall be 2" clear for Slightly and Moderately Aggressive Environments, and 3" clear for Extremely Aggressive Environments.

**INLET IN TOP OF BOX CULVERT**



**TOP VIEW OF HEADWALL**



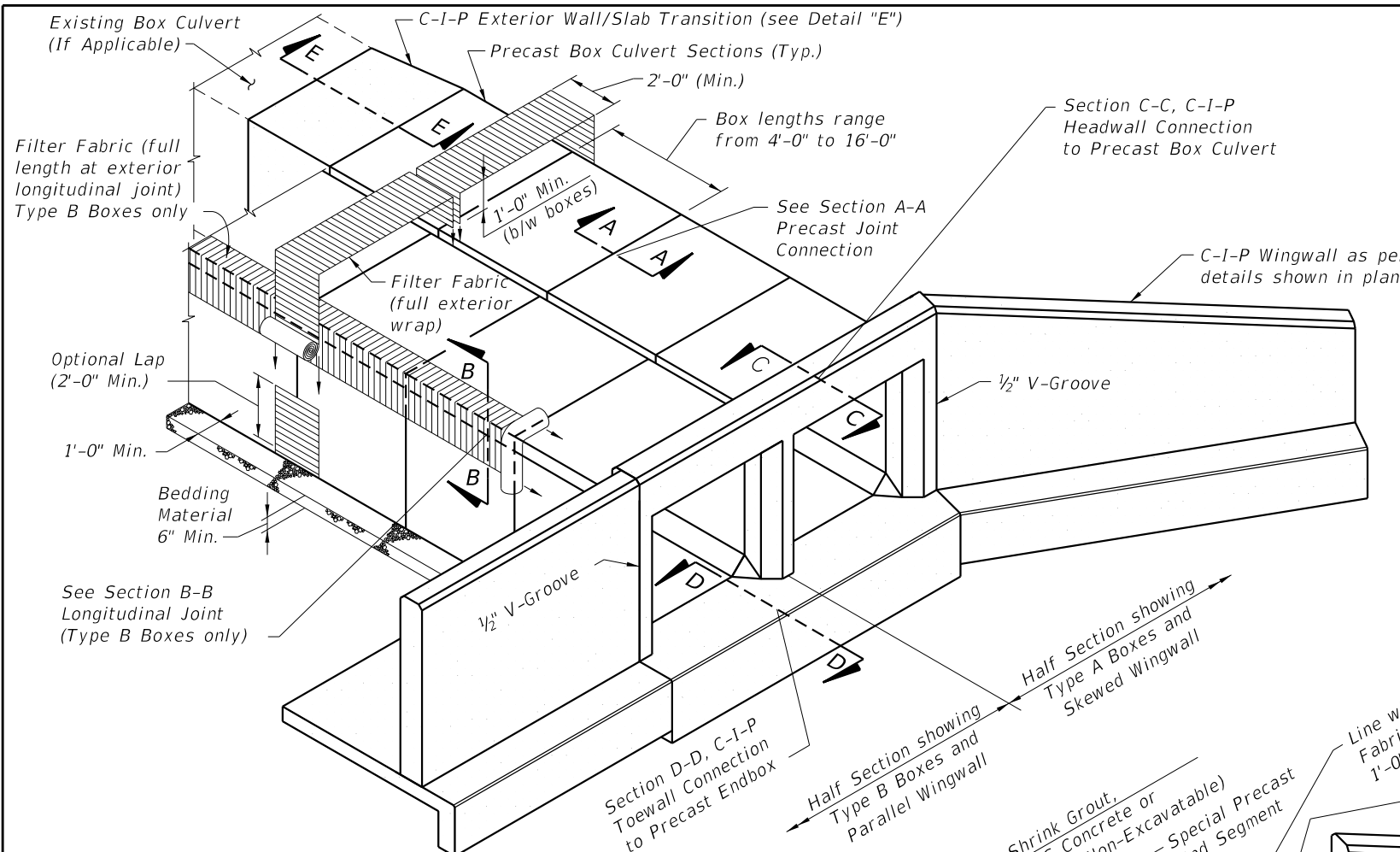
**SECTION THRU RECESSED V-GROOVE TO FORM INSCRIBED FIGURES**

Black Plastic Figures 3" in height as approved by the Engineer may be used in lieu of numbers formed by 3/8" V-Grooves. V-Grooves shall be formed by preformed figures.

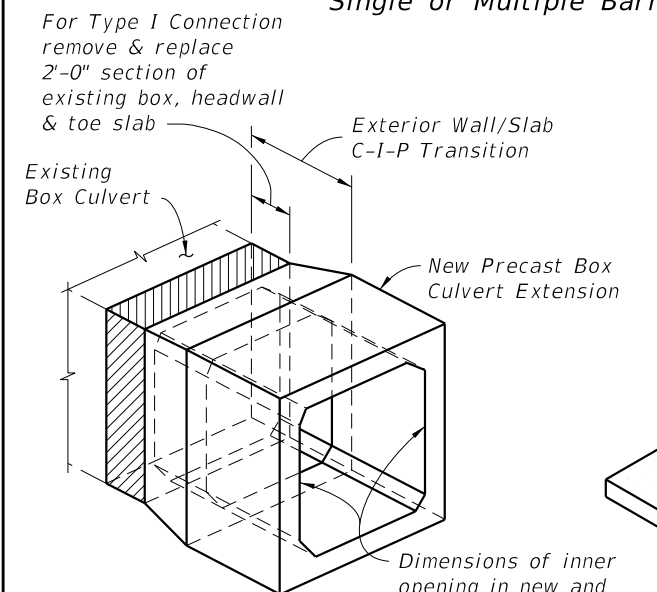
**BRIDGE CULVERT NUMBER LOCATION**

9/23/2021 9:52:36 AM

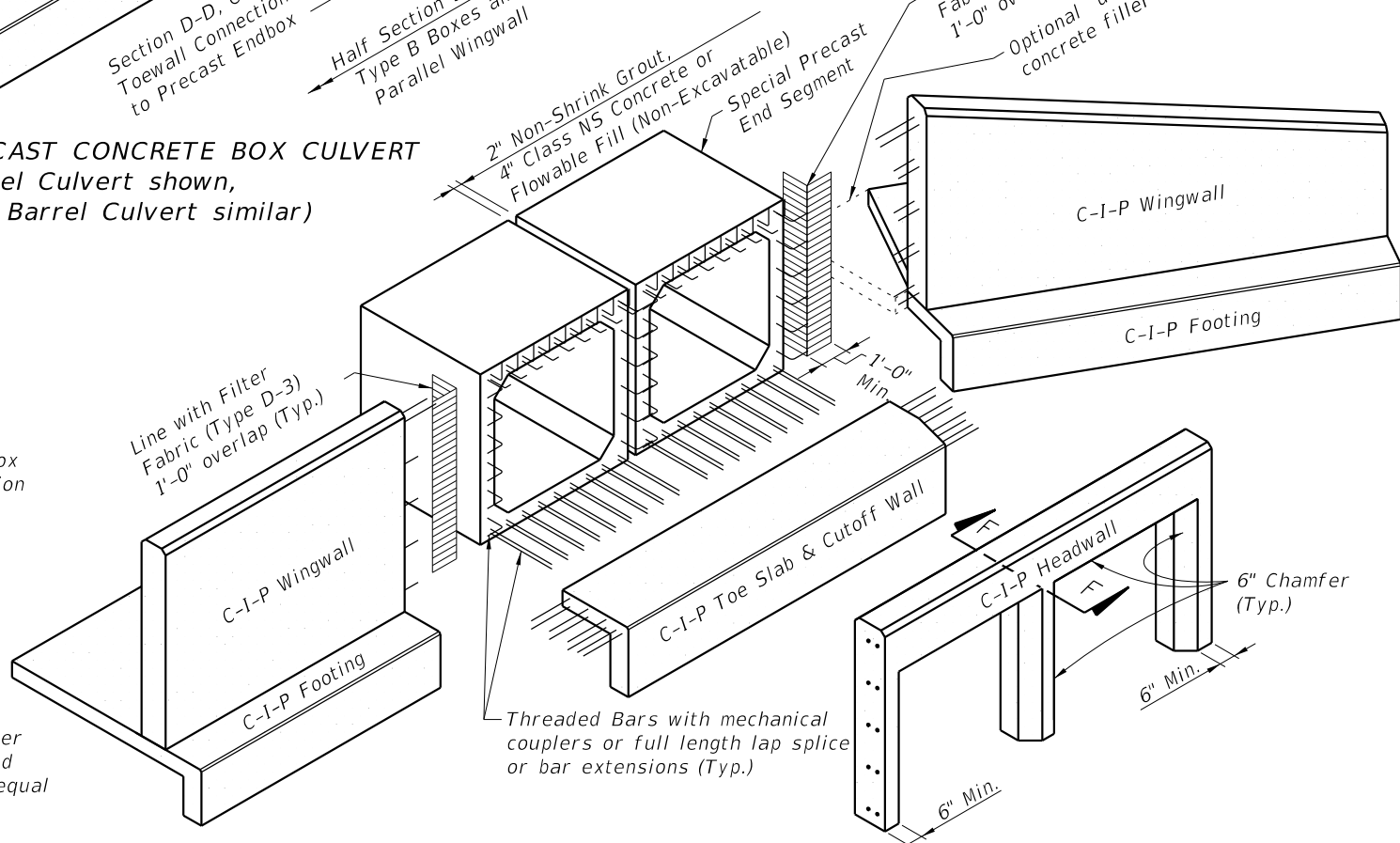
LAST REVISION 07/01/14	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	CONCRETE BOX CULVERT DETAILS	INDEX 400-289	SHEET 8 of 8
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**ISOMETRIC VIEW OF PRECAST CONCRETE BOX CULVERT**  
(Double Barrel Culvert shown, Single or Multiple Barrel Culvert similar)



**DETAIL E**  
**PICTORIAL VIEW OF EXTERIOR WALL/SLAB TRANSITION**



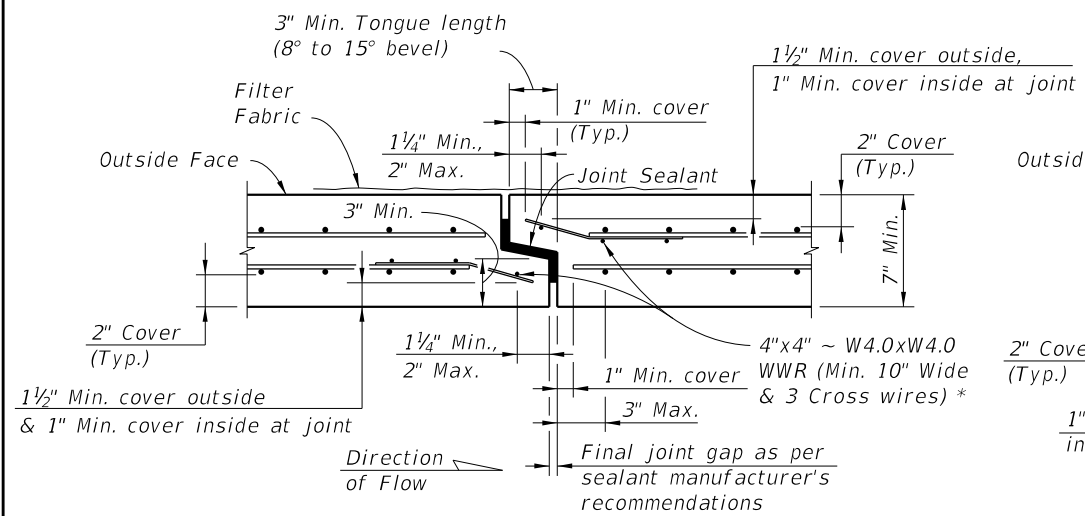
**EXPLODED VIEW OF CONNECTIONS AT END OF CULVERT**  
(Double Barrel Culvert shown, Single or Multiple Barrel Culvert similar)

PERMITTED PRECAST ALTERNATE BOX SECTIONS				
TYPE	DESCRIPTION	SINGLE BARREL	MULTIPLE BARRELS	DESIGN NOTES
A	Single Cell Monolithic (Four Sided)			Index 400-292 or Contractor Design
B	Single Cell Two-Piece (Four Sided)			Contractor Design
C	Multicell Monolithic	Not Applicable		Contractor Design

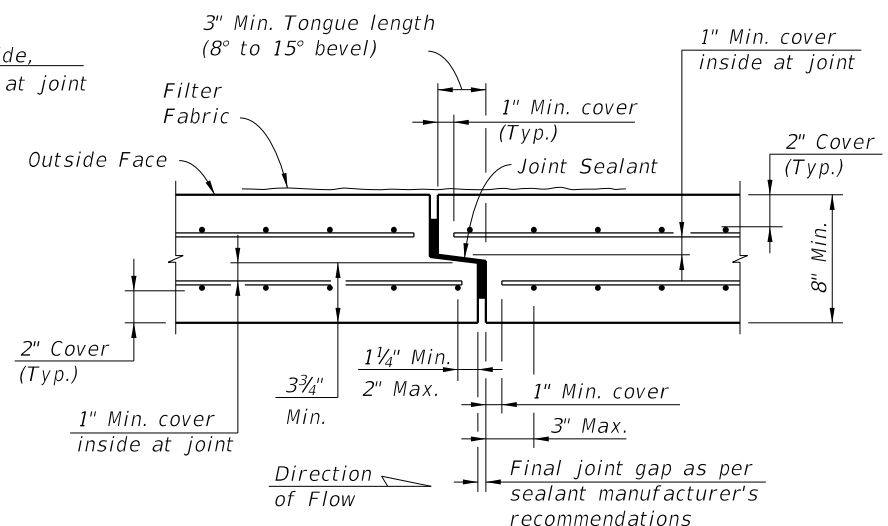
**GENERAL NOTES:**

- Specifications:
  - General:
    - FDOT Standard Specifications for Road and Bridge Construction, Section 410 (current edition, and supplements thereto).
  - Concrete (Precast):
    - Class III or Class II Modified (5,000 psi) for slightly aggressive environments.
    - Class IV (5,500 psi) for moderately to extremely aggressive environments.
  - Concrete (Cast-In-Place):
    - Class II (3,400 psi) for slightly aggressive environments.
    - Class IV (5,500 psi) for moderately to extremely aggressive environments.
  - Reinforcing Steel:
    - Maintain minimum clearance of 2" for slightly and moderately aggressive environments or 3" for extremely aggressive environments, unless otherwise shown. Equal area substitution of welded wire (WWR) reinforcement is permitted.
- Work this Index with the Cast-In-Place Concrete Box Culvert Details and Data Tables shown in the plans, Index 400-289 and the Precast Concrete Box Culverts shown in the shop drawings.
- All joints between precast sections must be tongue & groove with joint sealant. Joints between cast-in-place & precast sections shall have longitudinal reinforcing extending from top, bottom & both side slabs of the precast box tied to the cast-in-place reinforcement. Single barrel culverts may have precast headwalls cast integrally with the end segment when approved by the Engineer.
- Extension of existing multiple barrel box culverts with multiple single cell precast box culverts is not permitted unless approved by the District Structures Engineer. Full transition details must be shown in the shop drawings when approved.
- Culverts larger than the specified size may be substituted with no additional payment to the Contractor. Substitution must be approved by the Engineer, minimum earth cover and invert elevations shown in the Contract Documents must be maintained.

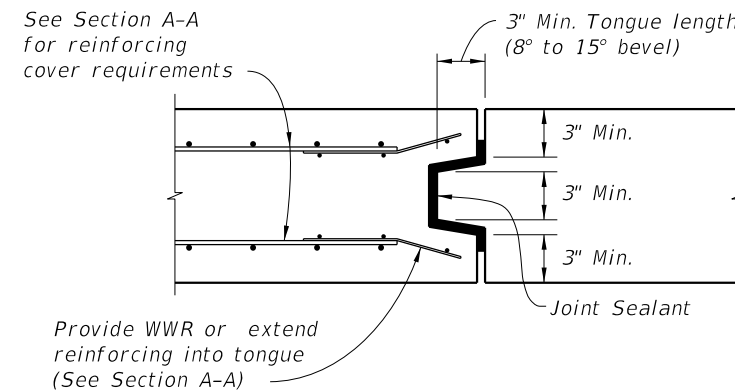
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SECTION A-A  
(2" Cover - Thin Wall Detail)

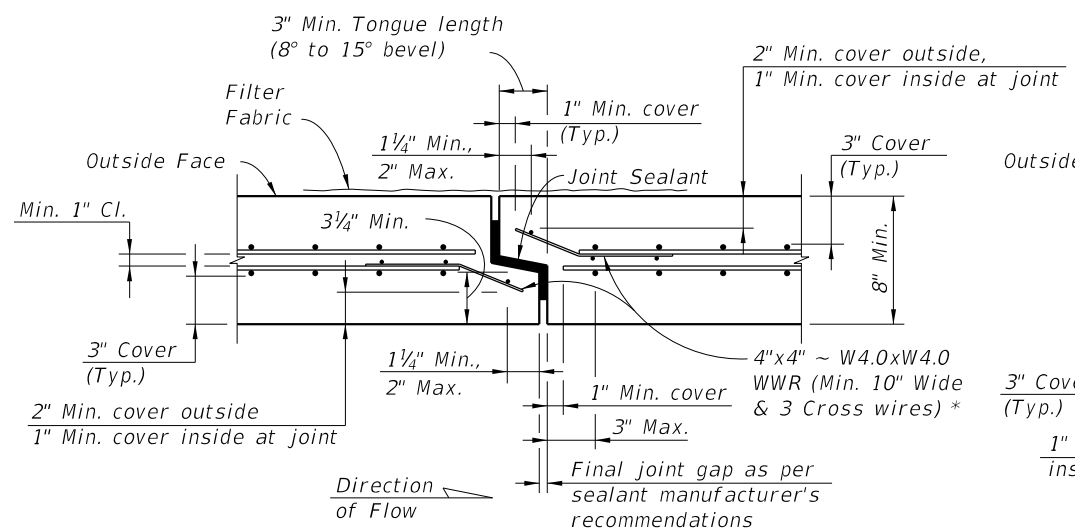


SECTION A-A  
(2" Cover - Thick Wall Detail)



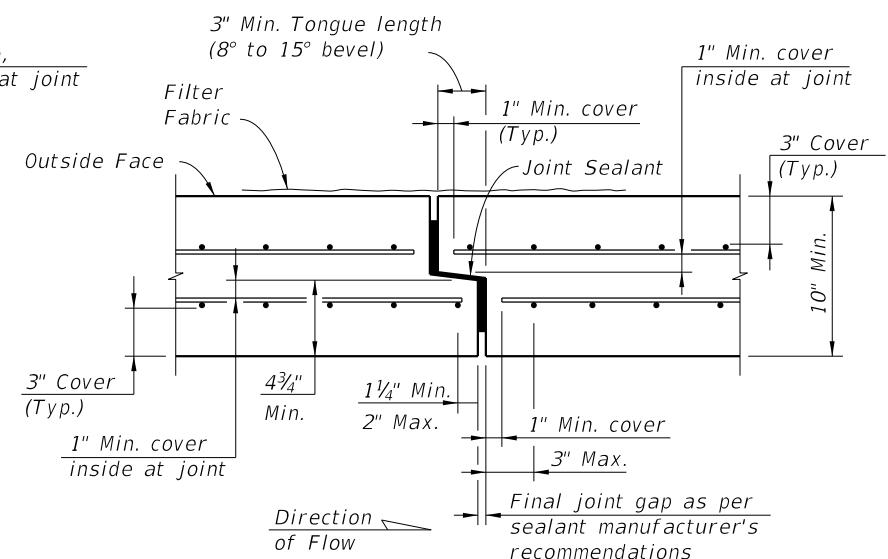
ALTERNATE BOTTOM SLAB TRANSVERSE JOINT  
TYPICAL SECTION  
(DOUBLE-SIDED TONGUE & GROOVE JOINT)  
(All reinforcing not shown for clarity)

NOTE:  
Bottom Slab Joints in Type B Boxes may be single tongue & groove joints as shown in Section A-A when the Top Slab Joints are oriented as shown in Schematic "A".

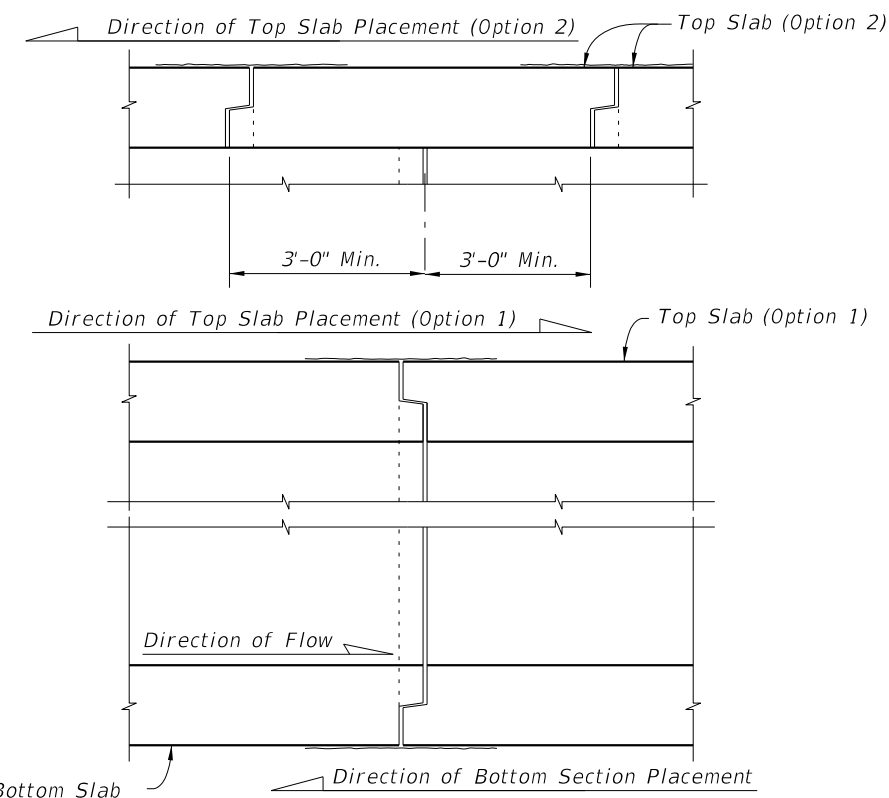


SECTION A-A  
(3" Cover - Thin Wall Detail)

\* At the Contractor's option when the box culvert reinforcing utilizes WWR, extend wall and slab reinforcing into the joint and bend to maintain cover in lieu of 4"x4" ~ W4.0xW4.0 WWR at joint. Transverse wire in tongue may be cut at corners of box to allow bending of the WWR.



SECTION A-A  
(3" Cover - Thick Wall Detail)



SCHEMATIC "A"  
TYPE B BOX SECTION PLACEMENT  
FOR SINGLE TONGUE & GROOVE JOINTS

PRECAST SEGMENT TO SEGMENT TONGUE & GROOVE TRANSVERSE JOINTS

TWO-PIECE PRECAST SEGMENT  
ADDITIONAL JOINT DETAILS  
(TYPE B BOX)

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LAST REVISION 07/01/15	DESCRIPTION:
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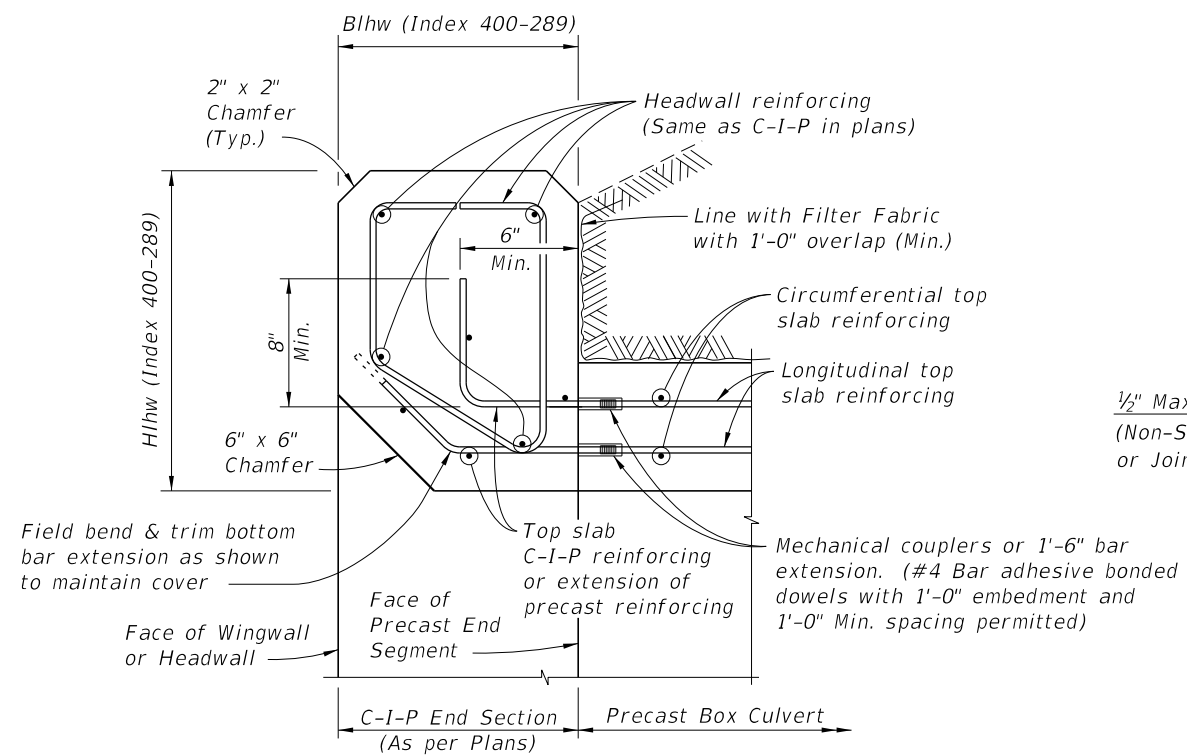


FY 2022-23  
STANDARD PLANS

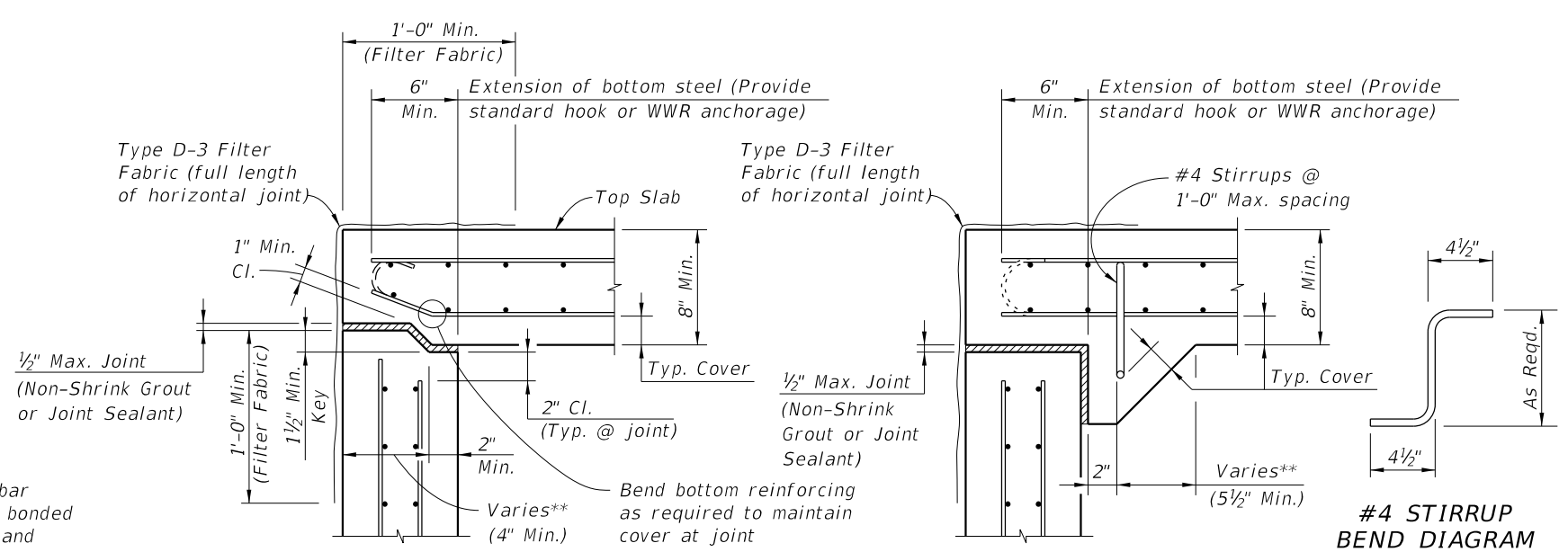
PRECAST CONCRETE BOX CULVERTS  
- SUPPLEMENTAL DETAILS

INDEX  
400-291

SHEET  
2 of 5



**SECTION C-C**  
C-I-P HEADWALL DETAILS AND CONNECTION TO PRECAST BOX

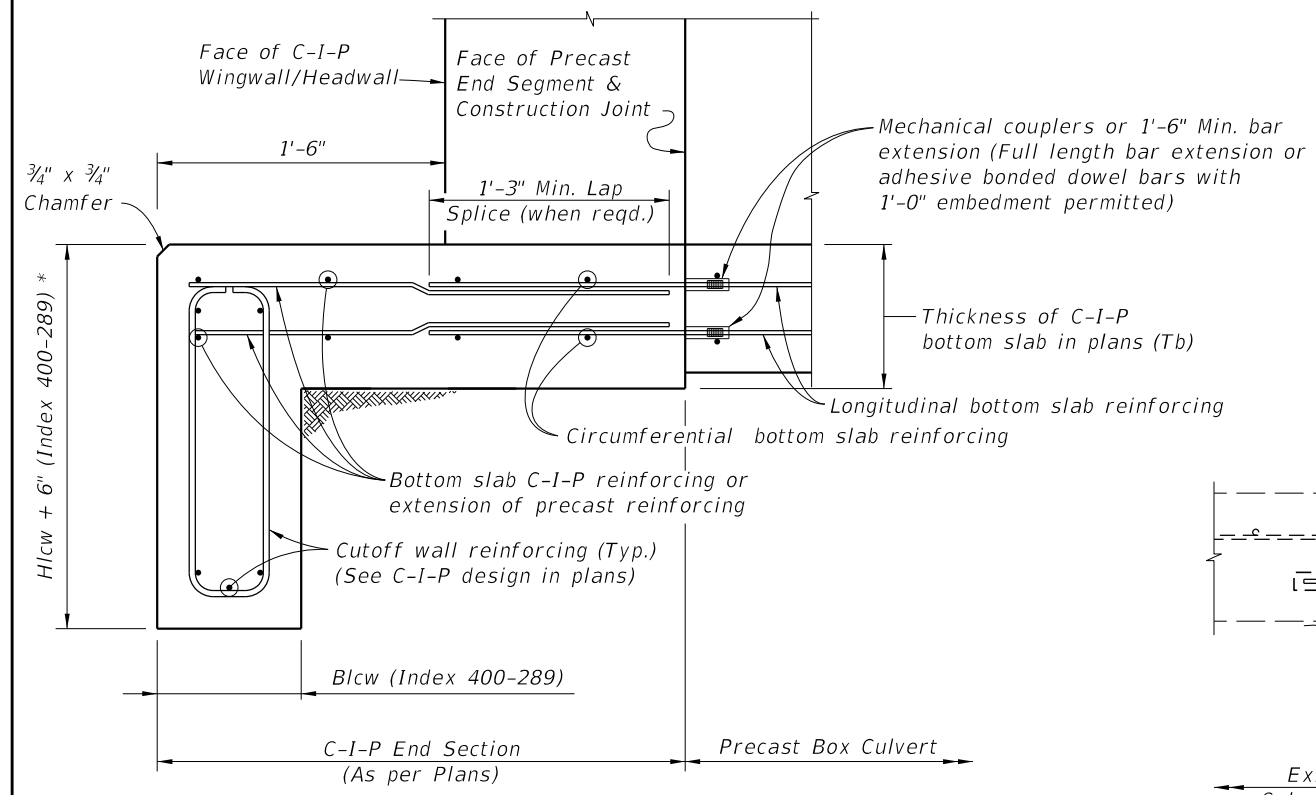


**SECTION B-B**  
TOP SLAB TO WALL JOINT (KEYED JOINT)      **SECTION B-B**  
TOP SLAB TO WALL JOINT (HAUNCHED JOINT)

\*\* Provide adequate width to satisfy shear strength requirements at joint

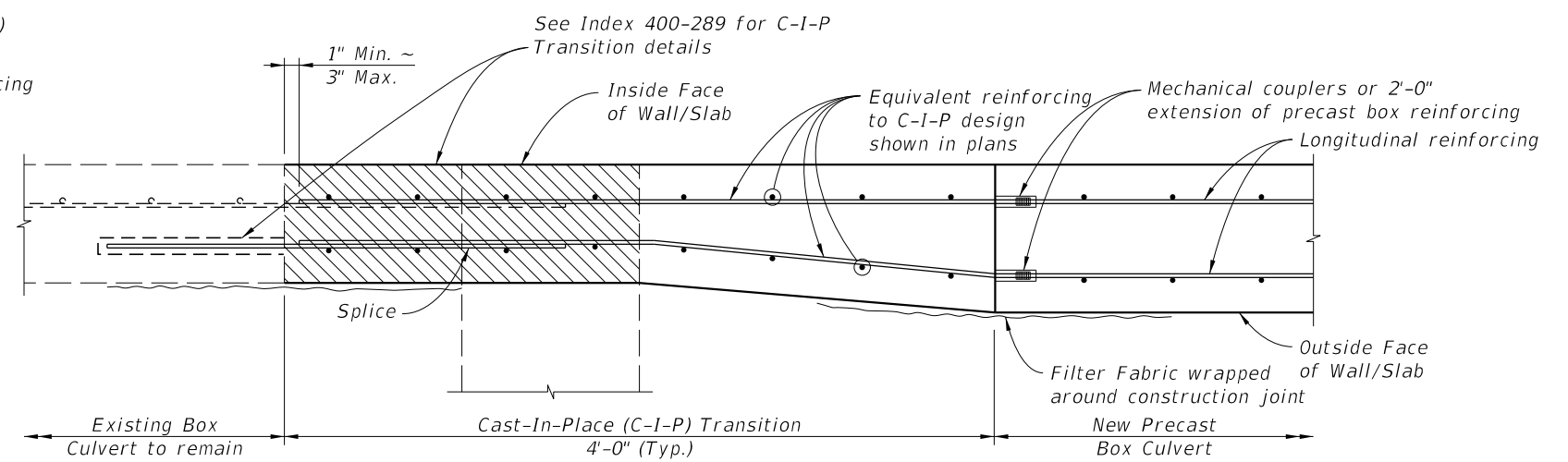


**TYPE B BOX LONGITUDINAL JOINTS**



**SECTION D-D**  
C-I-P TOE SLAB & CUTOFF WALL DETAILS AND CONNECTION TO PRECAST BOX

\* Provide additional 6" depth of cutoff wall at no additional cost.

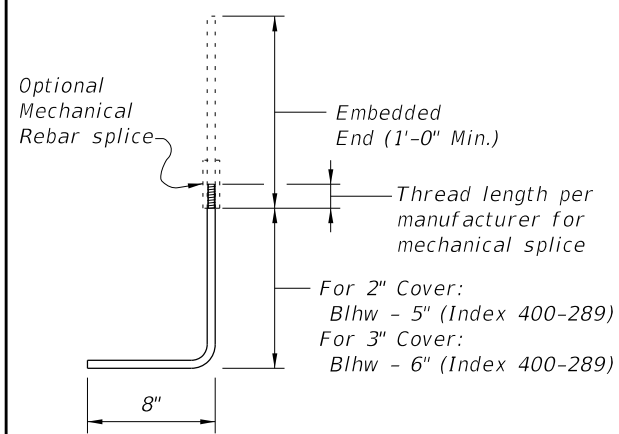


**SECTION E-E**  
EXTERIOR WALL/SLAB TRANSITION DETAIL FOR PRECAST EXTENSION (Type I Connection shown, Type II Connection similar)

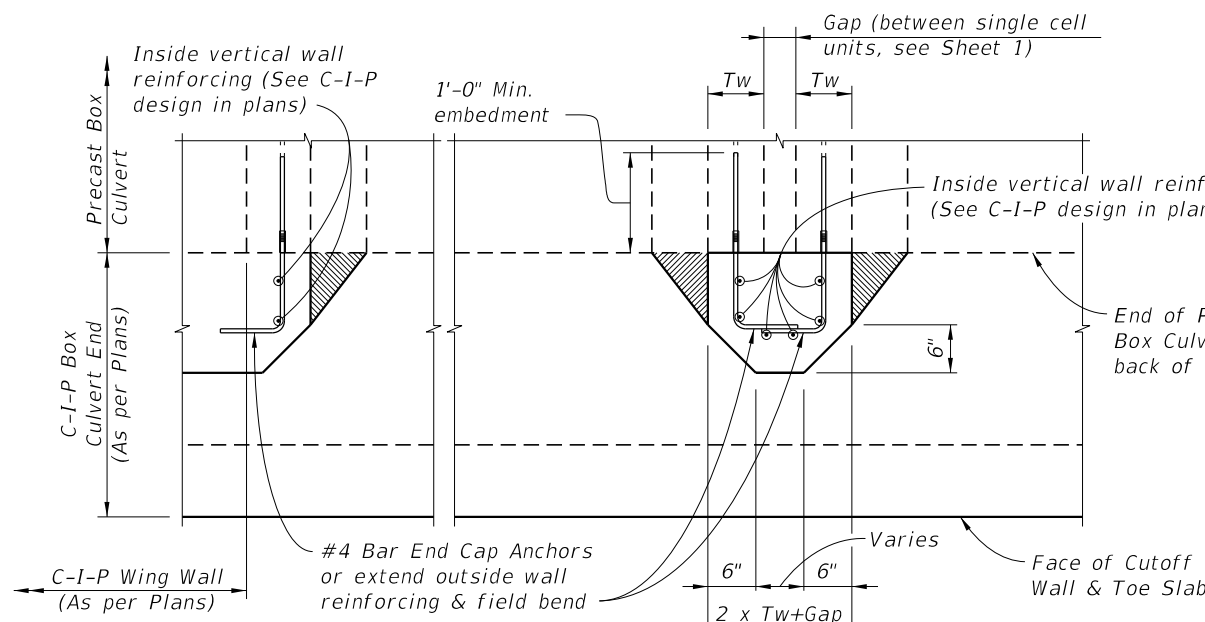
▨ Section of Existing Box Culvert to be removed and replaced, for Type I Connection.

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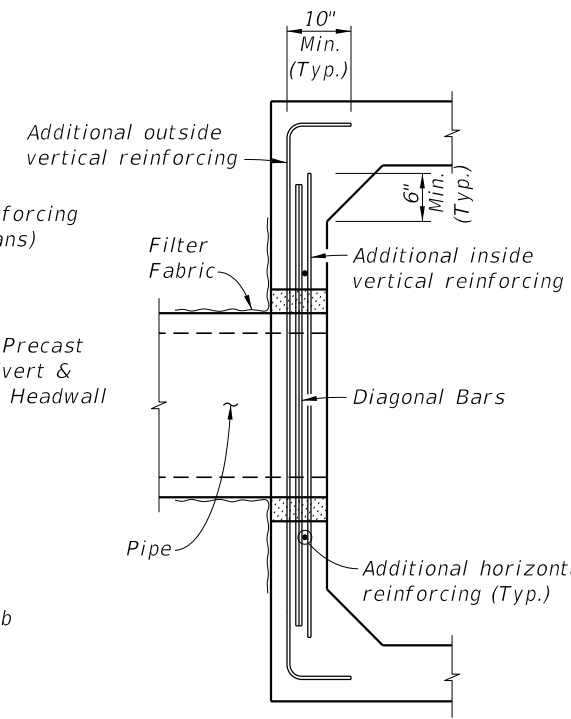
LAST REVISION	01/01/12	DESCRIPTION:		FY 2022-23 STANDARD PLANS	PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS	INDEX	SHEET
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**#4 BAR END CAP ANCHOR  
BAR BEND DIAGRAM**



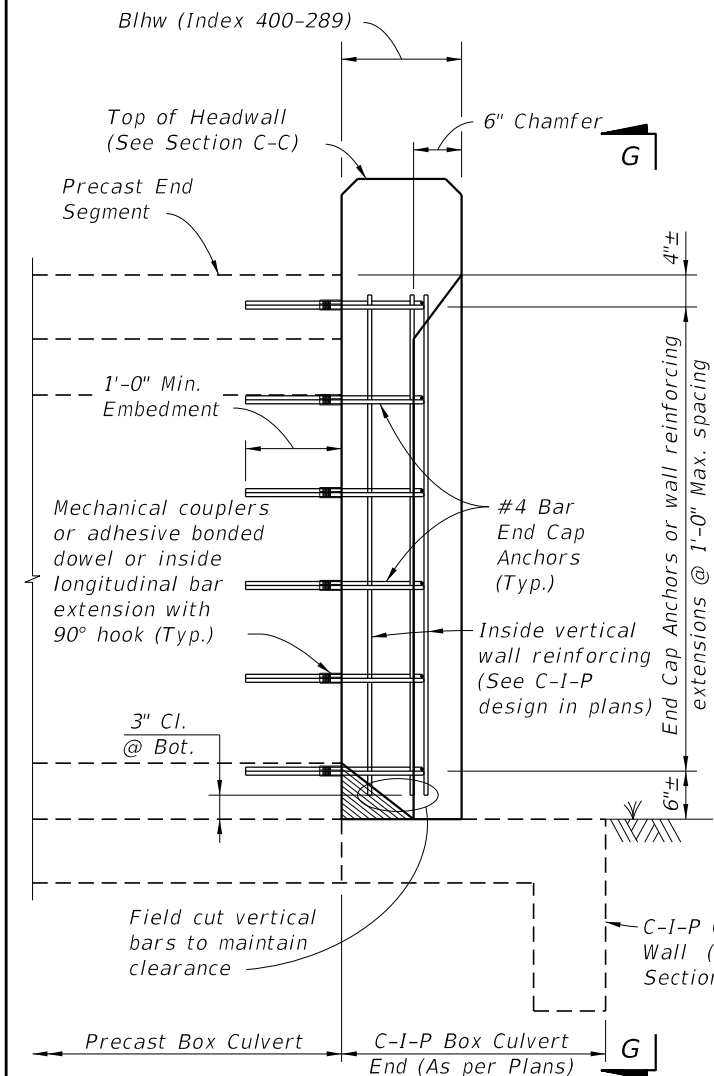
**SECTION H-H**



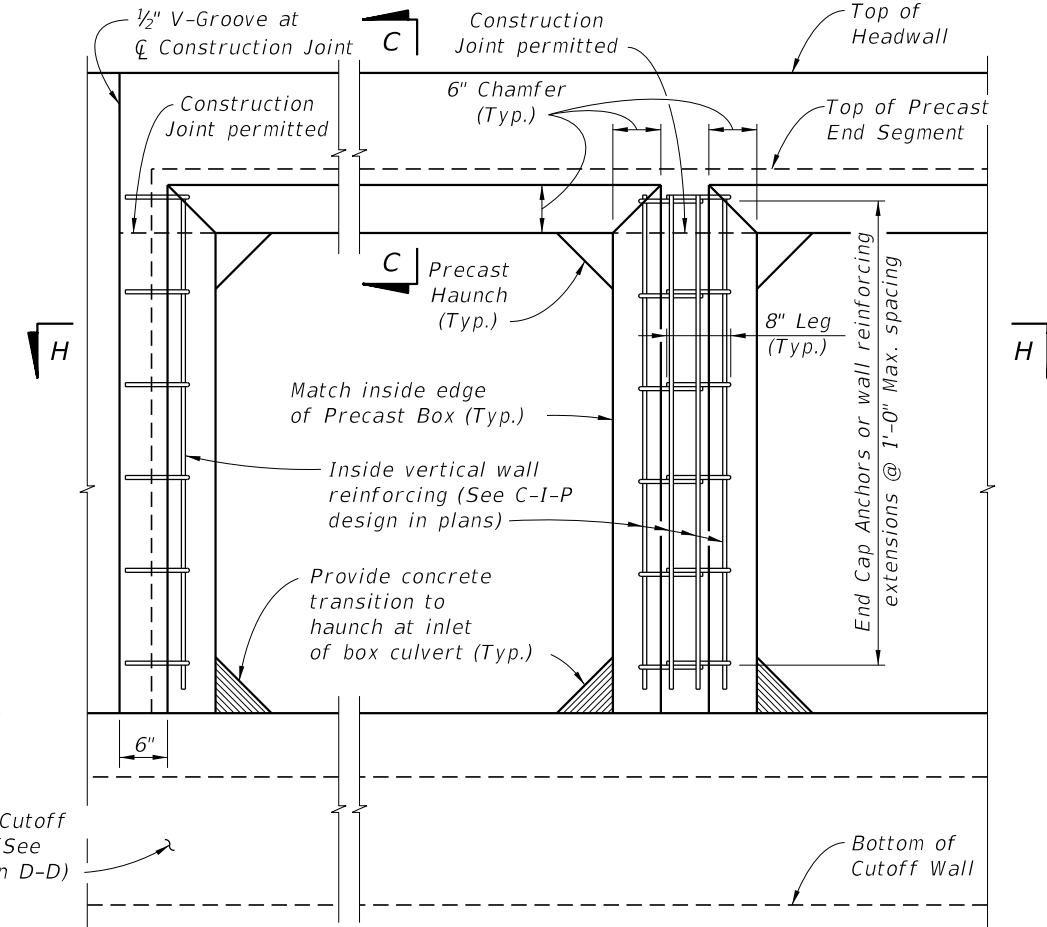
**SECTION I-I**

**(Showing additional blockout reinforcing only)**

- PIPE BLOCKOUT NOTES:**
1. Cut box culvert reinforcement as required to maintain 2" cover.
  2. For Precast Sections construct opening a minimum of 1'-6" away from any box to box joint, except opening may be a minimum of 1'-0" away from joint when at least 2'-0" of clearance to the box to box joint is provided on the opposite side of the pipe opening.
  3. Pipe blockout diameter to be 6" greater than pipe outside diameter.
  4. See Drainage Plans for size, placement, and invert elevation.

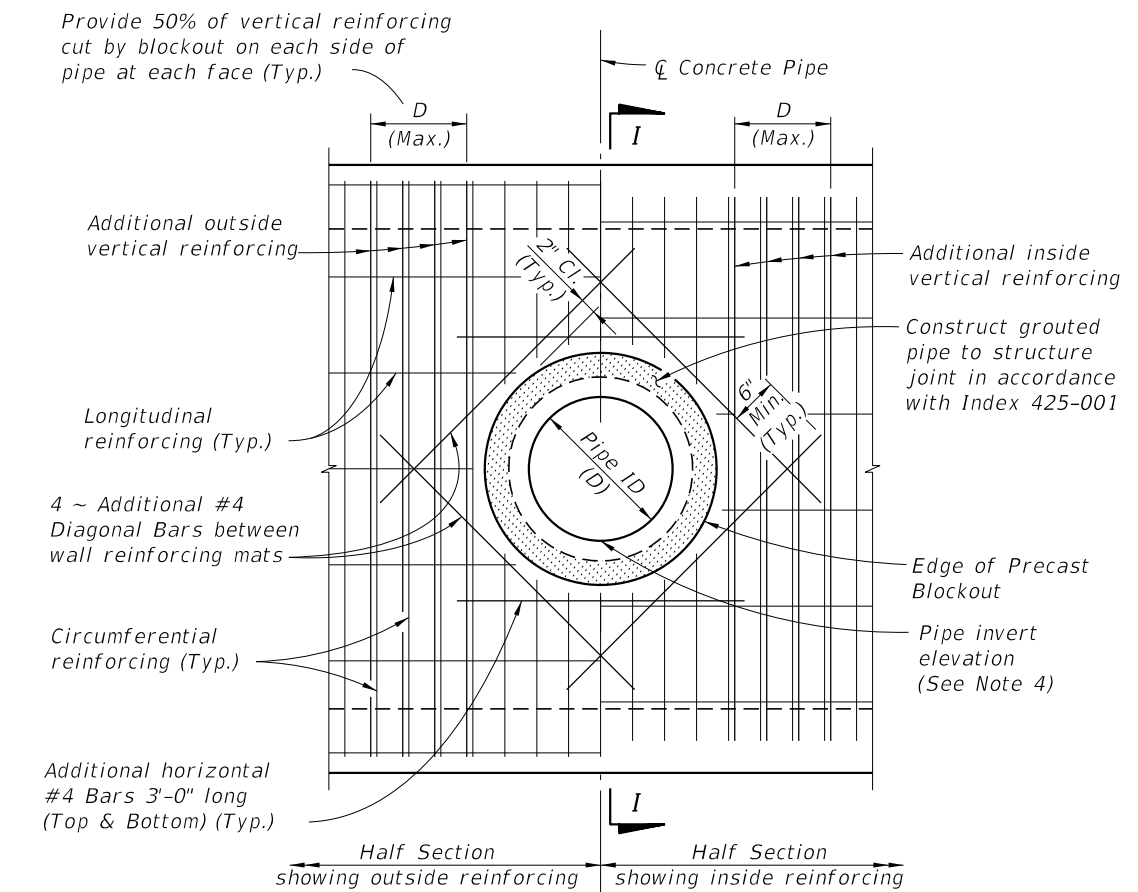


**SECTION F-F**



**VIEW G-G**

**(Headwall, Toe Slab and Cutoff Wall Reinforcing not shown for clarity)**



**ELEVATION VIEW**

**PIPE BLOCKOUT DETAILS**

**C-I-P END CAP DETAILS AND CONNECTION TO PRECAST BOX**

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**PRECAST CONCRETE BOX CULVERTS  
- SUPPLEMENTAL DETAILS**

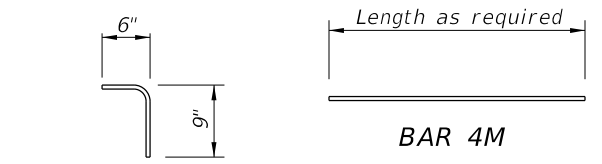
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**BILL OF REINFORCING STEEL**

MARK	SIZE	NO. REQ'D	LENGTH
L	4	2 per Barrel/Ft.	1'-3"
M	4	As Req'd.	As Req'd.

**REINFORCING STEEL BENDING DIAGRAMS**



**DOWEL BARS 4L**  
**BAR 4M**

- NOTES:
- All bar dimensions are out to out.
  - Lap splice length for Bars 4M is 1'-4" minimum.

**DESIGN NOTE:**

- Link Slab required when joint openings from differential settlement exceed 1/8" as determined in Link Slab Note 1.

**LINK SLAB NOTES:**

- Provide a Cast-In-Place Link Slab to ensure uniform joint opening of precast box culverts when the differential settlement shown in the plans exceeds the following limits, except that a Link Slab is not required for differential settlements less than 1/2".

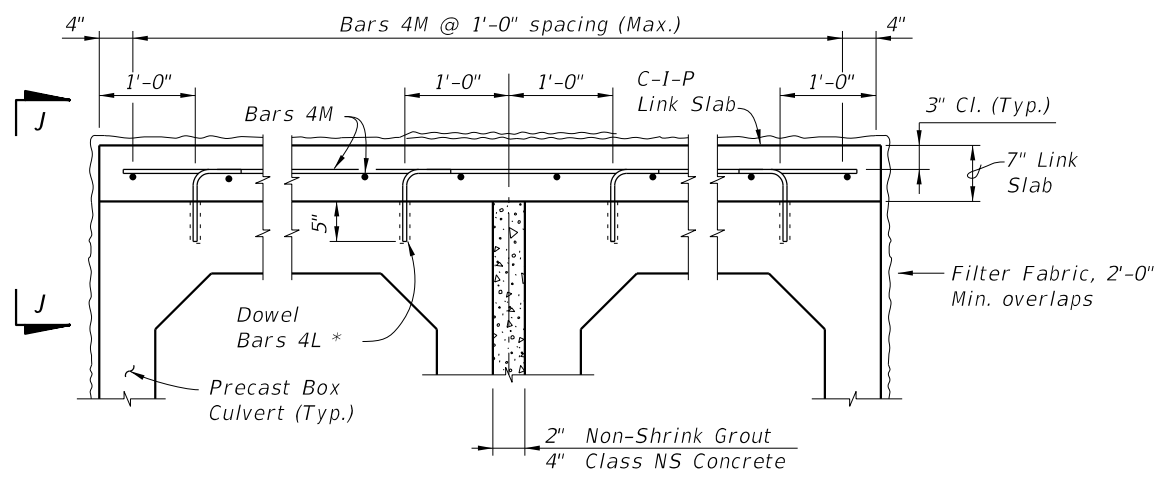
$$\Delta Y \leq \frac{(L)^2}{760 \times R \times W}$$

Where:  
 $\Delta Y$  = Maximum Long-Term Differential Settlement (ft.)  
 $R$  = Exterior height of Box Culvert (ft.)  
 $W$  = Length of Box Culvert Segments (ft.)  
 $L$  = Effective length for single curvature deflection (ft.)

- Extend Link Slab to back face of headwalls and to limits of existing box culverts for extensions.

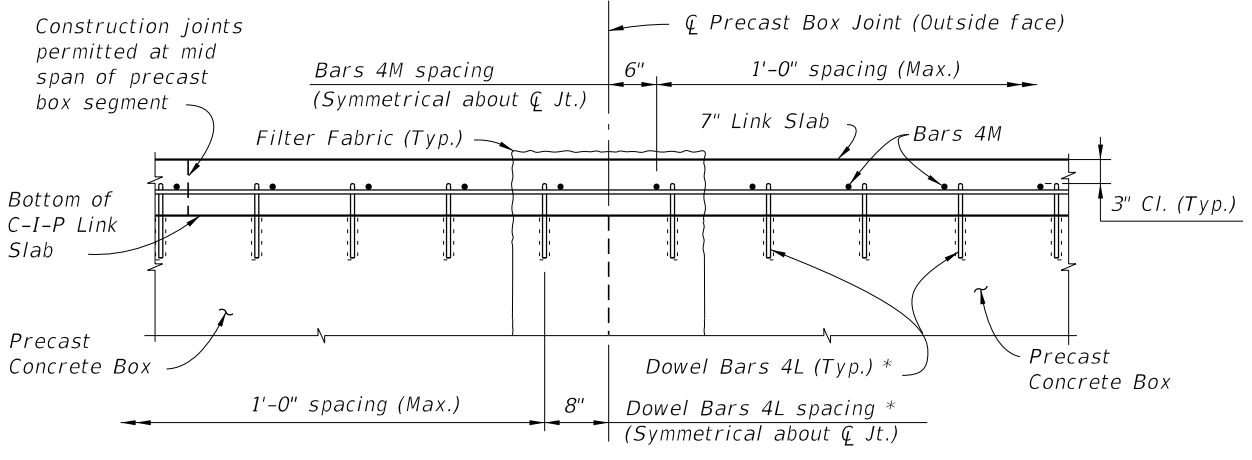
ESTIMATED LINK SLAB QUANTITIES		
ITEM	UNIT	QUANTITY
Class II or IV Concrete (Culvert)	CY/SF	0.0216
Reinforcing Steel (Roadway)	Lb./SF	1.52

NOTE: Estimated quantities are based the plan area of precast box slabs, and are provided for information only. No additional payment will be made for Link Slabs where these are required for the precast box culverts.

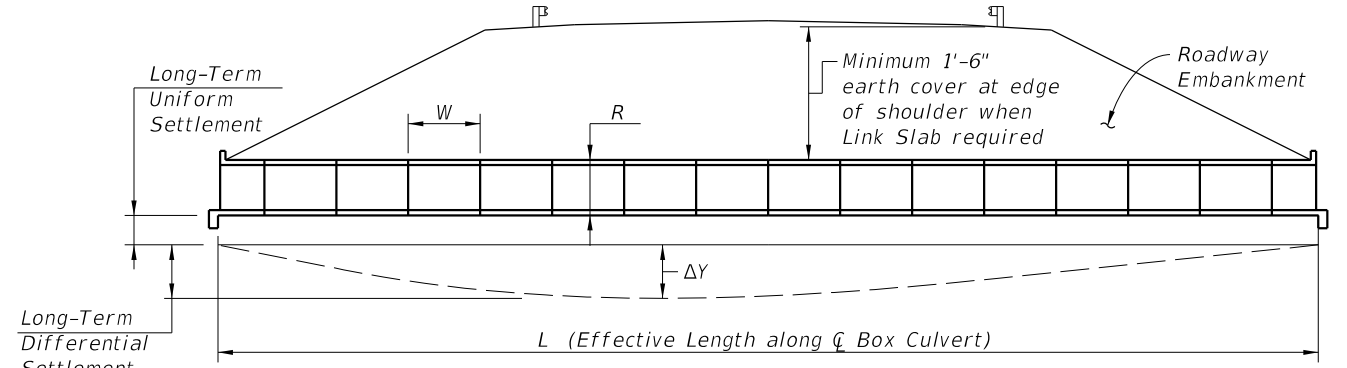


**LINK SLAB TYPICAL SECTION**  
(Multiple Barrel Culvert shown, Single Barrel Culvert similar)

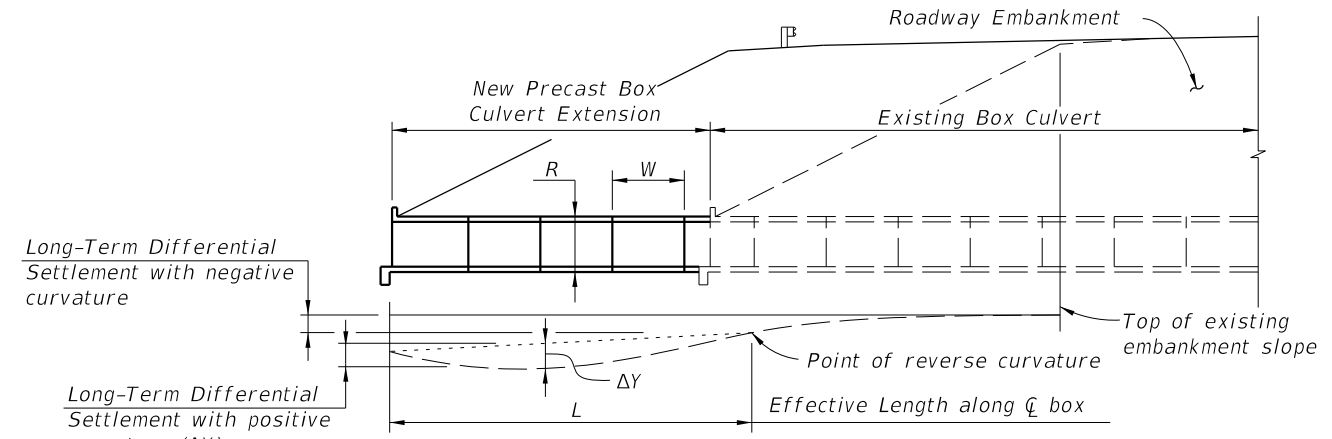
\* Install dowels with an Adhesive Bonding Material System in accordance with Specification Section 416. The Contractor may substitute mechanical couplers in lieu of adhesive bonded dowels. Shift dowels to clear box culvert reinforcing.



**VIEW J-J**



**SCHEMATIC LONGITUDINAL SECTION (NEW CONSTRUCTION)**



**SCHEMATIC LONGITUDINAL SECTION (WIDENING)**

**DIFFERENTIAL SETTLEMENT COUNTERMEASURES FOR PRECAST BOX CULVERTS**

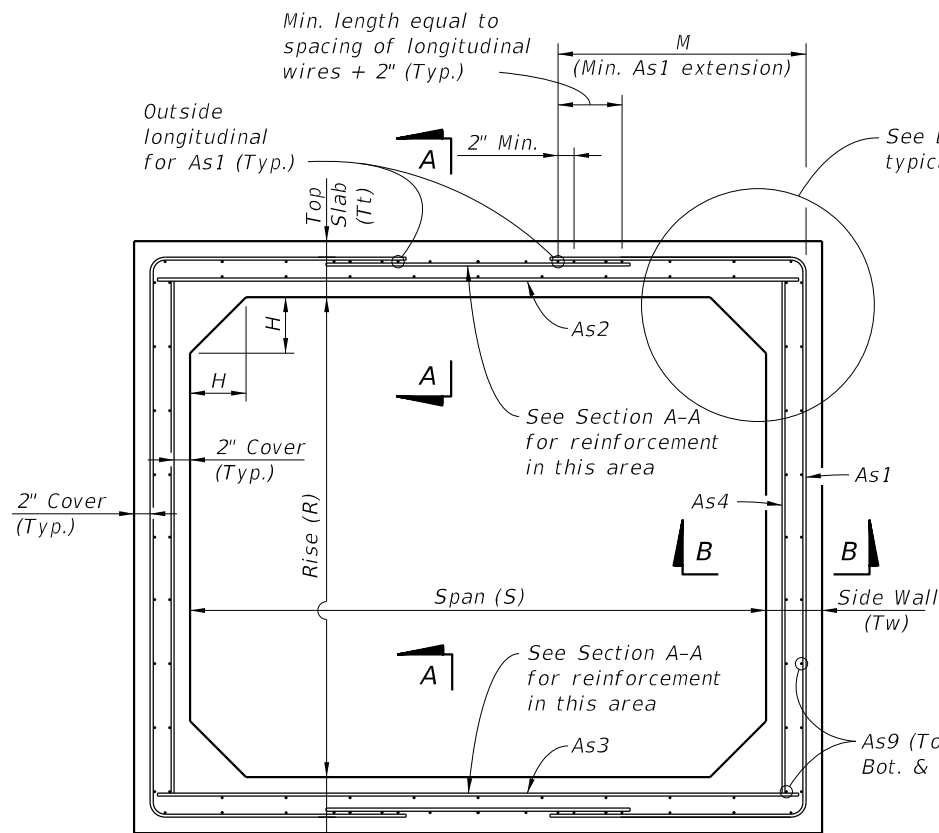
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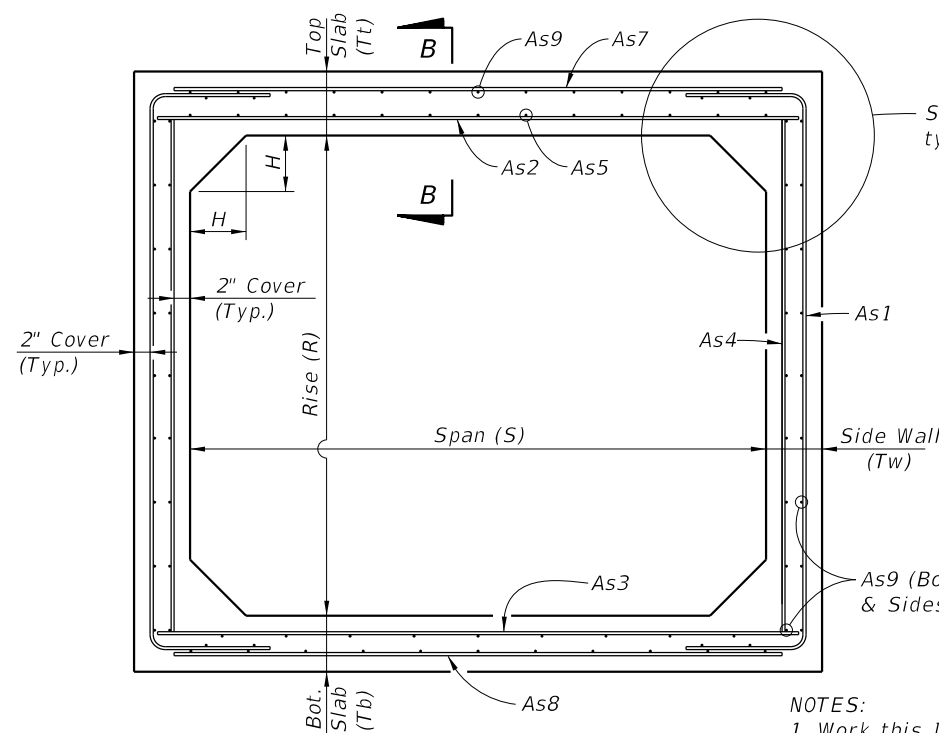
**FDOT** FY 2022-23 STANDARD PLANS

**PRECAST CONCRETE BOX CULVERTS - SUPPLEMENTAL DETAILS**

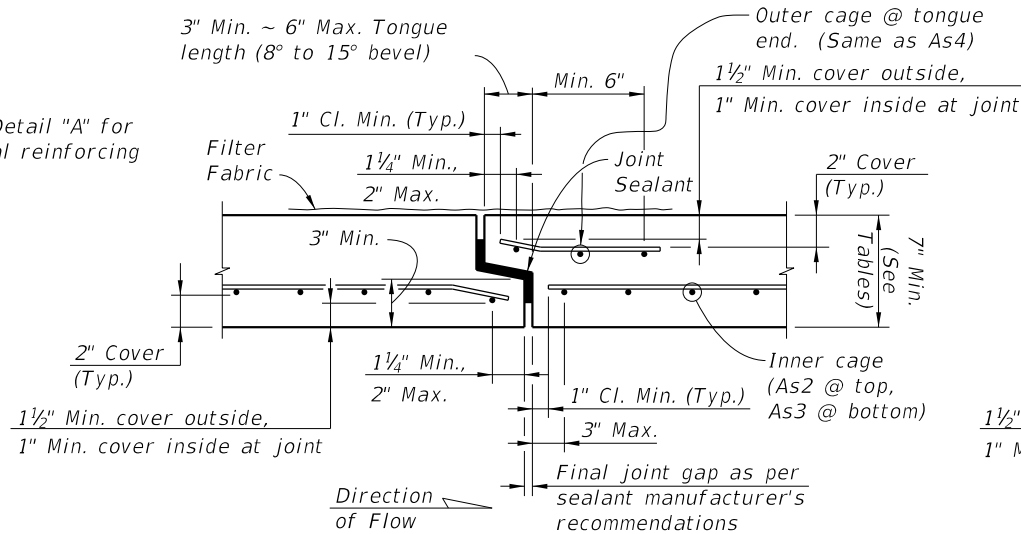
INDEX	SHEET
400-291	5 of 5



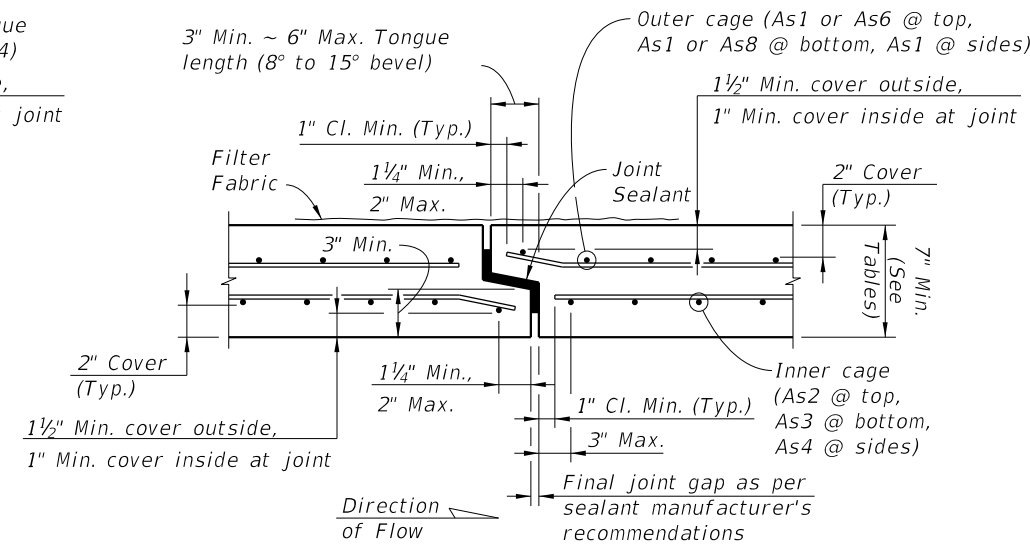
**TYPICAL BOX SECTION (TYPE 2)  
DESIGN EARTH COVER 2' OR GREATER  
(Option 1 Reinforcing Configuration Shown)**



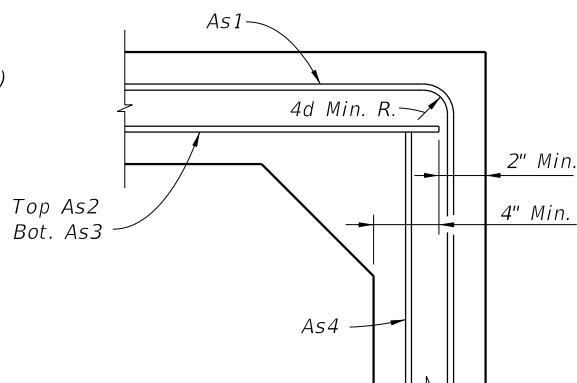
**TYPICAL BOX SECTION (TYPE 1)  
DESIGN EARTH COVER LESS THAN 2'  
(Option 1 Reinforcing Configuration Shown)**



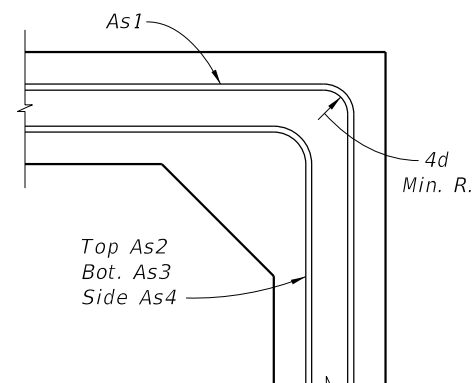
**SECTION A-A**



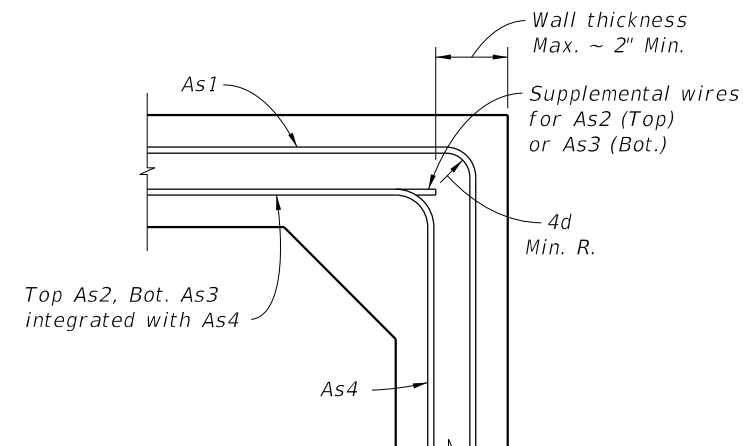
**SECTION B-B  
TYPICAL SECTION THRU JOINT**



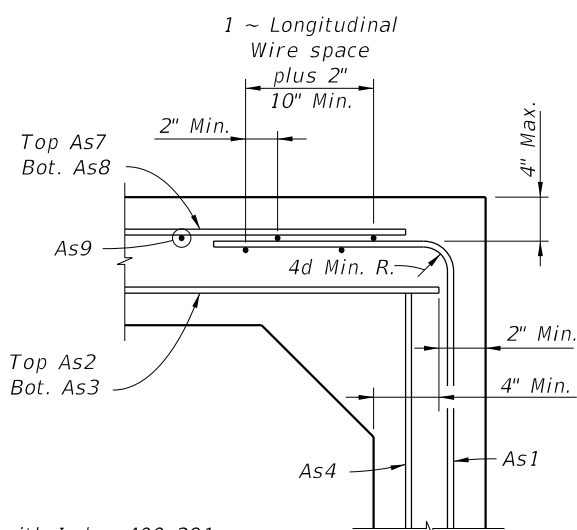
**DETAIL "A"  
(OPTION 1)**



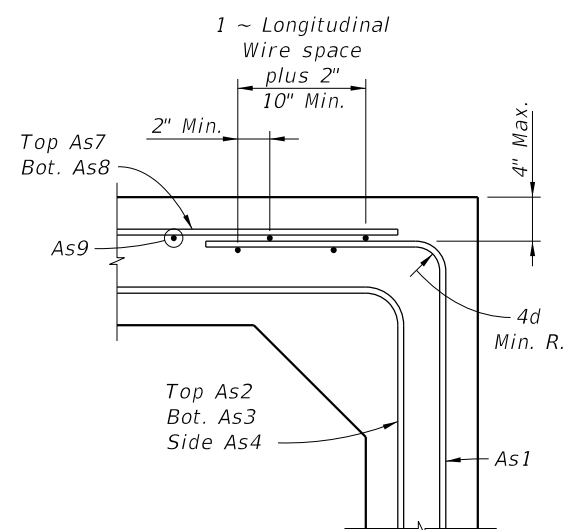
**DETAIL "A"  
(OPTION 2)**



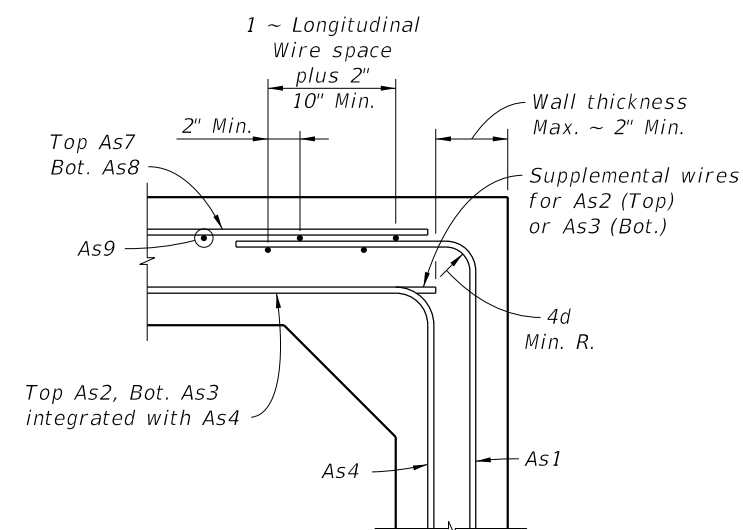
**DETAIL "A"  
(OPTION 3)**



**DETAIL "B"  
(OPTION 1)**



**DETAIL "B"  
(OPTION 2)**



**DETAIL "B"  
(OPTION 3)**

**NOTES:**  
1. Work this Index with Index 400-291.  
2. See sheets 2 thru 5 for dimensions and areas of reinforcement.

**STANDARD PRECAST BOX CULVERT WITH 2" CONCRETE COVER**

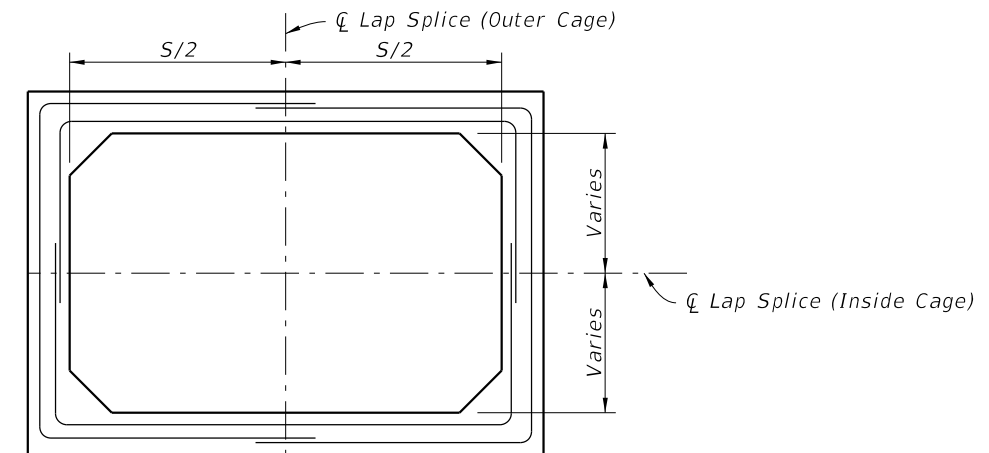
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LAST REVISION 07/01/13	DESCRIPTION:
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**GENERAL NOTES:**

1. These precast designs may be substituted for cast-in-place box culverts designed to AASHTO LRFD Bridge Design Specifications, 4th Edition. Designs are based on the design criteria shown in FDOT Structures Design Guidelines.
2. Loading: HL-93 & any fill heights between the minimum & maximum shown.
3. Only one design of precast box culvert is to be used for any installation.
4. Reinforcing steel must consist of smooth or deformed welded wire reinforcement (WWR) meeting the requirements of Specification Section 931. Longitudinal reinforcement may consist of reinforcing bars meeting the requirements of Specification Section 931. Minimum cover must be 2" for slightly or moderately aggressive environments or 3" for extremely aggressive environments, unless otherwise shown. The spacing of circumferential wires must not be less than 2" nor more than 4". The spacing of longitudinal wires or bars must not be more than 8".
5. As9 longitudinal wires must have a minimum cross-sectional area of 40% of the circumferential wires, but not less than a W2.5 or D4.0 for WWR, or #3 bars for deformed bars.
6. Welding of reinforcement must be limited to the locations shown in ASTM C1577 and in accordance with ANSI/AWS D1.4 "Structural Welding Code - Reinforcing Steel".
7. For alternate reinforcing configuration Options 2 and 3 shown in Detail "A" and "B" (Sheet 1), As1 may be extended to the middle of either slab and lap spliced with As7 and As8. As4 may be lap spliced at any location or connected to As2 or As3 at corners by welding.
8. Haunch dimensions may vary between the minimum and maximum dimensions shown in the Design Tables but only one haunch dimension must be used within the full length of the box culvert installation.

9. Submittal of redesign calculations are not required for any increase to the slab and/or wall thickness when the minimum reinforcement areas shown in the Design Tables are provided.
10. For Design Earth Cover greater than 10 feet, the Contractor may interpolate the required areas of reinforcement and slab or wall thickness. Interpolated areas of reinforcement, slab or wall thickness must be approved by the Engineer.
11. Minimum length of precast box segments is 4 feet and maximum length is 16 feet.
12. See Index 400-291 for connections to wingwalls, headwalls and other general details.



**SCHEMATIC OF LAP SPLICE LOCATIONS FOR OPTION 2 & 3 REINFORCING CONFIGURATIONS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)					
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9						
3' x 3'	7	7	7	4 to 8	0.33' - <2'	0.17	0.29	0.21	0.17	0.17	0.17	0.17	See General Note 5	-					
					2' - <3'	0.13	0.28	0.21	0.09	-	-	-		31					
					3' - <5'	0.09	0.17	0.17	0.09	-	-	-		31					
					5' - 10'	0.09	0.17	0.17	0.09	-	-	-		31					
					15'	0.09	0.17	0.17	0.09	-	-	-		31					
				20'	0.12	0.17	0.17	0.09	-	-	-	31							
				25'	0.14	0.18	0.18	0.09	-	-	-	31							
				30'	0.17	0.21	0.22	0.09	-	-	-	31							
				35'	0.19	0.25	0.25	0.09	-	-	-	31							
				4' x 3'	7	7	7	4 to 8	0.33' - <2'	0.19	0.38	0.26		0.17	0.19	0.17	0.19	See General Note 5	-
2' - <3'	0.19	0.38	0.26						0.09	-	-	-	38						
3' - <5'	0.14	0.20	0.22						0.09	-	-	-	38						
5' - 10'	0.11	0.17	0.17						0.09	-	-	-	38						
15'	0.15	0.17	0.18						0.09	-	-	-	38						
20'	0.20	0.23	0.23					0.09	-	-	-	38							
25'	0.24	0.28	0.29					0.09	-	-	-	38							
30'	0.29	0.34	0.35					0.09	-	-	-	38							
4' x 4'	7	7	7					4 to 8	0.33' - <2'	0.19	0.41	0.28	0.17	0.21	0.17	0.19	See General Note 5		-
									2' - <3'	0.19	0.41	0.28	0.09	-	-	-			38
				3' - <5'	0.14	0.21	0.24		0.09	-	-	-	38						
				5' - 10'	0.12	0.17	0.17		0.09	-	-	-	38						
				15'	0.16	0.19	0.20		0.09	-	-	-	38						
				20'	0.21	0.25	0.25	0.09	-	-	-	38							
				25'	0.26	0.31	0.32	0.09	-	-	-	38							
				30'	0.31	0.37	0.38	0.09	-	-	-	38							

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)					
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9						
3' x 3'	8	8	8	4 to 8	0.33' - <2'	0.20	0.26	0.32	0.20	0.20	0.20	0.20	See General Note 5	-					
					2' - <3'	0.16	0.25	0.31	0.10	-	-	-		31					
					3' - <5'	0.10	0.20	0.20	0.10	-	-	-		31					
					5' - 10'	0.10	0.20	0.20	0.10	-	-	-		31					
					15'	0.10	0.20	0.20	0.10	-	-	-		31					
				20'	0.10	0.20	0.20	0.10	-	-	-	31							
				25'	0.11	0.20	0.20	0.10	-	-	-	31							
				30'	0.13	0.20	0.20	0.10	-	-	-	31							
				35'	0.15	0.21	0.21	0.10	-	-	-	31							
				4' x 3'	8	8	8	4 to 8	0.33' - <2'	0.20	0.31	0.22		0.20	0.20	0.20	0.20	See General Note 5	-
2' - <3'	0.12	0.31	0.22						0.10	-	-	-	38						
3' - <5'	0.12	0.20	0.20						0.10	-	-	-	38						
5' - 10'	0.10	0.20	0.20						0.10	-	-	-	38						
15'	0.12	0.20	0.20						0.10	-	-	-	38						
20'	0.16	0.20	0.20					0.10	-	-	-	38							
25'	0.19	0.24	0.24					0.10	-	-	-	38							
30'	0.22	0.28	0.29					0.10	-	-	-	38							
4' x 4'	8	8	8					4 to 8	0.33' - <2'	0.20	0.33	0.24	0.20	0.20	0.20	0.20	See General Note 5		-
									2' - <3'	0.17	0.33	0.24	0.10	-	-	-			38
				3' - <5'	0.12	0.20	0.20		0.10	-	-	-	38						
				5' - 10'	0.10	0.20	0.20		0.10	-	-	-	38						
				15'	0.13	0.20	0.20		0.10	-	-	-	38						
				20'	0.16	0.21	0.22	0.10	-	-	-	38							
				25'	0.20	0.26	0.27	0.10	-	-	-	38							
				30'	0.23	0.31	0.32	0.10	-	-	-	38							

NOTES: 1. See Sheet 1 for Reinforcing Details and dimension locations.  
2. See Sheet 14 for WWR Bending Diagram.

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SPAN x RISE (S) (R)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)				
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9					
	(Ft.)	(in.)	(in.)	(in.)														
5' x 3'	7	7	7	4 to 8	0.33' - <2'	0.31	0.48	0.42	0.17	0.21	0.23	0.31	-					
					2' - <3'	0.31	0.48	0.42	0.09	-	-	-	45					
					3' - <5'	0.20	0.27	0.27	0.09	-	-	-	36					
					5' - 10'	0.17	0.19	0.21	0.09	-	-	-	36					
					15'	0.24	0.25	0.25	0.09	-	-	-	35					
					20'	0.32	0.33	0.33	0.09	-	-	-	35					
					25'	0.39	0.41	0.42	0.09	-	-	-	35					
					30'	0.47	0.50	0.50	0.09	-	-	-	35					
					5' x 4'	7	7	7	4 to 8	0.33' - <2'	0.30	0.51	0.45	0.17	0.23	0.21	0.30	-
										2' - <3'	0.30	0.51	0.45	0.09	-	-	-	45
3' - <5'	0.18	0.30	0.29	0.09						-	-	-	45					
5' - 10'	0.17	0.21	0.23	0.09						-	-	-	36					
15'	0.24	0.27	0.28	0.09						-	-	-	35					
20'	0.31	0.36	0.37	0.09						-	-	-	35					
25'	0.39	0.45	0.46	0.09						-	-	-	35					
30'	0.46	0.55	0.56	0.09						-	-	-	35					
5' x 5'	7	7	7	4 to 8						0.33' - <2'	0.30	0.53	0.48	0.17	0.24	0.21	0.30	-
										2' - <3'	0.29	0.53	0.48	0.09	-	-	-	45
					3' - <5'	0.19	0.31	0.31	0.09	-	-	-	45					
					5' - 10'	0.19	0.22	0.25	0.09	-	-	-	45					
					15'	0.26	0.29	0.31	0.09	-	-	-	36					
					20'	0.34	0.39	0.40	0.09	-	-	-	35					
					25'	0.41	0.49	0.50	0.09	-	-	-	35					
					30'	0.49	0.59	0.61	0.09	-	-	-	35					
					6' x 3'	7.5	7	7	4 to 12	0.33' - <2'	0.39	0.54	0.48	0.17	0.22	0.25	0.39	-
						2' - <3'				0.39	0.58	0.49	0.09	-	-	-	43	
3' - <5'	0.28	0.36	0.36	0.09		-				-	-	39						
5' - 10'	0.25	0.26	0.28	0.09		-				-	-	39						
15'	0.36	0.34	0.34	0.09		-				-	-	38						
20'	0.47	0.46	0.46	0.09		-				-	-	38						
25'	0.59	0.57	0.55	0.09		-				-	-	38						
30'	0.60	0.64	0.64	0.09		-				-	-	38						
6' x 4'	7.5	7	7	4 to 12		0.33' - <2'				0.37	0.58	0.52	0.17	0.24	0.23	0.37	-	
	2' - <3'					0.37				0.61	0.53	0.09	-	-	-	43		
	3' - <5'				0.26	0.39	0.39	0.09	-	-	-	39						
	5' - 10'				0.24	0.28	0.31	0.09	-	-	-	39						
	15'				0.35	0.37	0.38	0.09	-	-	-	38						
	20'				0.46	0.50	0.50	0.09	-	-	-	38						
	25'				0.56	0.63	0.60	0.09	-	-	-	38						
	30'				0.58	0.69	0.69	0.09	-	-	-	38						
	6' x 5'				7.5	7	7	4 to 12	0.33' - <2'	0.36	0.60	0.56	0.17	0.25	0.22	0.36	-	
					2' - <3'				0.36	0.64	0.56	0.09	-	-	-	43		
3' - <5'		0.26	0.410	0.42	0.09				-	-	-	43						
5' - 10'		0.25	0.30	0.33	0.09				-	-	-	39						
15'		0.34	0.40	0.41	0.09				-	-	-	38						
20'		0.46	0.54	0.54	0.09				-	-	-	38						
25'		0.56	0.67	0.65	0.09				-	-	-	38						
30'		0.60	0.74	0.74	0.09				-	-	-	38						
6' x 6'		7.5	7	7	4 to 12				0.33' - <2'	0.36	0.63	0.59	0.17	0.26	0.22	0.36	-	
		2' - <3'							0.35	0.67	0.59	0.09	-	-	-	52		
	3' - <5'	0.27				0.43	0.44	0.09	-	-	-	52						
	5' - 10'	0.27				0.32	0.35	0.09	-	-	-	43						
	15'	0.38				0.43	0.44	0.09	-	-	-	39						
	20'	0.50				0.57	0.59	0.09	-	-	-	39						
	25'	0.60				0.72	0.70	0.09	-	-	-	38						
	30'	0.67				0.78	0.79	0.09	-	-	-	38						

See General Note 5

SPAN x RISE (S) (R)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)				
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9					
	(Ft.)	(in.)	(in.)	(in.)														
5' x 3'	8	8	8	4 to 8	0.33' - <2'	0.26	0.39	0.36	0.20	0.20	0.20	0.26	-					
					2' - <3'	0.26	0.39	0.36	0.10	-	-	-	45					
					3' - <5'	0.16	0.23	0.24	0.10	-	-	-	36					
					5' - 10'	0.13	0.20	0.20	0.10	-	-	-	36					
					15'	0.19	0.21	0.22	0.10	-	-	-	35					
					20'	0.24	0.28	0.28	0.10	-	-	-	35					
					25'	0.30	0.34	0.35	0.10	-	-	-	35					
					30'	0.36	0.41	0.41	0.10	-	-	-	35					
					5' x 4'	8	8	8	4 to 8	0.33' - <2'	0.25	0.42	0.38	0.20	0.20	0.20	0.25	-
										2' - <3'	0.25	0.42	0.38	0.10	-	-	-	45
3' - <5'	0.16	0.25	0.25	0.10						-	-	-	45					
5' - 10'	0.13	0.20	0.20	0.10						-	-	-	36					
15'	0.19	0.23	0.24	0.10						-	-	-	35					
20'	0.24	0.30	0.31	0.10						-	-	-	35					
25'	0.30	0.37	0.38	0.10						-	-	-	35					
30'	0.35	0.45	0.46	0.10						-	-	-	35					
5' x 5'	8	8	8	4 to 8						0.33' - <2'	0.25	0.44	0.41	0.20	0.20	0.20	0.25	-
										2' - <3'	0.25	0.44	0.41	0.10	-	-	-	45
					3' - <5'	0.16	0.26	0.27	0.10	-	-	-	45					
					5' - 10'	0.15	0.20	0.22	0.10	-	-	-	45					
					15'	0.20	0.25	0.26	0.10	-	-	-	36					
					20'	0.26	0.32	0.33	0.10	-	-	-	35					
					25'	0.32	0.40	0.41	0.10	-	-	-	35					
					30'	0.37	0.48	0.49	0.10	-	-	-	35					
					6' x 3'	8	8	8	4 to 12	0.33' - <2'	0.32	0.47	0.41	0.20	0.20	0.25	0.32	-
										2' - <3'	0.32	0.47	0.41	0.10	-	-	-	43
3' - <5'	0.23	0.30	0.31	0.10						-	-	-	39					
5' - 10'	0.19	0.22	0.24	0.10						-	-	-	39					
15'	0.28	0.29	0.29	0.10						-	-	-	38					
20'	0.36	0.38	0.38	0.10						-	-	-	38					
25'	0.45	0.47	0.47	0.10						-	-	-	38					
30'	0.54	0.57	0.57	0.10						-	-	-	38					
6' x 4'	8	8	8	4 to 12						0.33' - <2'	0.31	0.50	0.44	0.20	0.21	0.23	0.31	-
										2' - <3'	0.31	0.50	0.44	0.10	-	-	-	43
					3' - <5'	0.23	0.32	0.34	0.10	-	-	-	39					
					5' - 10'	0.19	0.24	0.26	0.10	-	-	-	39					
					15'	0.27	0.31	0.32	0.10	-	-	-	38					
					20'	0.35	0.41	0.41	0.10	-	-	-	38					
					25'	0.43	0.51	0.51	0.10	-	-	-	38					
					30'	0.52	0.62	0.62	0.10	-	-	-	38					
					6' x 5'	8	8	8	4 to 12	0.33' - <2'	0.30	0.52	0.47	0.20	0.22	0.22	0.30	-
										2' - <3'	0.30	0.52	0.47	0.10	-	-	-	43
3' - <5'	0.22	0.34	0.36	0.10						-	-	-	43					
5' - 10'	0.20	0.26	0.28	0.10						-	-	-	39					
15'	0.27	0.33	0.34	0.10						-	-	-	38					
20'	0.36	0.44	0.45	0.10						-	-	-	38					
25'	0.44	0.55	0.55	0.10						-	-	-	38					
30'	0.52	0.66	0.67	0.10						-	-	-	38					
6' x 6'	8	8	8	4 to 12						0.33' - <2'	0.30	0.54	0.50	0.20	0.22	0.22	0.30	-
										2' - <3'	0.30	0.54	0.50	0.10	-	-	-	52
					3' - <5'	0.23	0.36	0.38	0.10	-	-	-	52					
					5' - 10'	0.21	0.27	0.30	0.10	-	-	-	43					
					15'	0.29	0.35	0.37	0.10	-	-	-	39					
					20'	0.38	0.47	0.48	0.10	-	-	-	39					
					25'	0.47	0.59	0.60	0.10	-	-	-	38					
					30'	0.55	0.70	0.71	0.10	-	-	-	38					

See General Note 5

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**TABLE 3 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 7' SPANS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
7' x 4'	8	8	8	4 to 12	0.33' - <2'	0.37	0.58	0.49	0.20	0.22	0.29	0.37	-	
					2' - <3'	0.37	0.58	0.49	0.10	-	-	-	43	
					3' - <5'	0.30	0.40	0.42	0.10	-	-	-	43	
					5' - 10'	0.26	0.30	0.33	0.10	-	-	-	43	
					15'	0.37	0.40	0.40	0.10	-	-	-	41	
					20'	0.49	0.53	0.53	0.10	-	-	-	41	
	8	8	8	7 to 12	25'	0.60	0.67	0.66	0.10	-	-	-	41	
	8.5	8.5	8	12	30'	0.68	0.79	0.78	0.10	-	-	-	41	
	7' x 5'	8	8	8	4 to 12	0.33' - <2'	0.36	0.60	0.53	0.20	0.23	0.28	0.36	-
						2' - <3'	0.36	0.60	0.53	0.10	-	-	-	47
3' - <5'						0.30	0.42	0.45	0.10	-	-	-	43	
5' - 10'						0.26	0.32	0.35	0.10	-	-	-	43	
15'						0.37	0.43	0.44	0.10	-	-	-	41	
20'						0.48	0.57	0.57	0.10	-	-	-	41	
8		8	8	7 to 12	25'	0.60	0.72	0.72	0.10	-	-	-	41	
8.5		8.5	8	12	30'	0.67	0.84	0.84	0.10	-	-	-	41	
7' x 6'		8	8	8	4 to 12	0.33' - <2'	0.36	0.63	0.56	0.20	0.24	0.27	0.36	-
						2' - <3'	0.36	0.63	0.56	0.10	-	-	-	59
	3' - <5'					0.29	0.44	0.47	0.10	-	-	-	47	
	5' - 10'					0.27	0.34	0.37	0.10	-	-	-	43	
	15'					0.38	0.46	0.46	0.10	-	-	-	41	
	20'					0.49	0.60	0.61	0.10	-	-	-	41	
	8	8	8	7 to 12	25'	0.61	0.76	0.76	0.10	-	-	-	41	
	8.5	8.5	8	12	30'	0.69	0.89	0.89	0.10	-	-	-	41	
	7' x 7'	8	8	8	4 to 12	0.33' - <2'	0.36	0.65	0.58	0.20	0.25	0.27	0.36	-
						2' - <3'	0.36	0.65	0.58	0.10	-	-	-	59
3' - <5'						0.30	0.46	0.50	0.10	-	-	-	59	
5' - 10'						0.30	0.35	0.50	0.10	-	-	-	47	
15'						0.41	0.48	0.50	0.10	-	-	-	43	
20'						0.53	0.64	0.65	0.10	-	-	-	43	
8		8	8	7 to 12	25'	0.65	0.80	0.81	0.10	-	-	-	43	
8.5		9	8	12	30'	0.72	0.92	0.91	0.10	-	-	-	41	

See General Note 5

**TABLE 4 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 8' SPANS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
8' x 4'	8	8	8	4 to 12	0.33' - <2'	0.40	0.60	0.52	0.20	0.22	0.28	0.39	-	
					2' - <3'	0.45	0.66	0.54	0.10	-	-	-	50	
					3' - <5'	0.39	0.48	0.50	0.10	-	-	-	50	
					5' - 10'	0.34	0.38	0.40	0.10	-	-	-	45	
					15'	0.49	0.51	0.50	0.10	-	-	-	41	
					20'	0.65	0.68	0.66	0.10	-	-	-	41	
	8.5	8.5	8	8 to 12	25'	0.76	0.83	0.80	0.10	-	-	-	41	
	9.5	9.5	8	12	30'	0.79	0.94	0.92	0.10	-	-	-	41	
	8' x 5'	8	8	8	4 to 12	0.33' - <2'	0.38	0.65	0.59	0.20	0.22	0.30	0.37	-
						2' - <3'	0.43	0.69	0.58	0.10	-	-	-	50
3' - <5'						0.37	0.51	0.53	0.10	-	-	-	45	
5' - 10'						0.33	0.41	0.42	0.10	-	-	-	45	
15'						0.48	0.54	0.53	0.10	-	-	-	41	
20'						0.63	0.73	0.70	0.10	-	-	-	41	
8.5		8.5	8	8 to 12	25'	0.74	0.88	0.86	0.10	-	-	-	41	
9.5		9.5	8	12	30'	0.77	1.00	0.98	0.10	-	-	-	41	
8' x 6'		8	8	8	4 to 12	0.33' - <2'	0.32	0.65	0.58	0.20	0.23	0.25	0.31	-
						2' - <3'	0.42	0.71	0.61	0.10	-	-	-	50
	3' - <5'					0.37	0.54	0.56	0.10	-	-	-	50	
	5' - 10'					0.34	0.43	0.45	0.10	-	-	-	45	
	15'					0.49	0.57	0.57	0.10	-	-	-	41	
	20'					0.64	0.77	0.76	0.10	-	-	-	41	
	8.5	8.5	8	8 to 12	25'	0.74	0.94	0.92	0.10	-	-	-	41	
	9.5	9.5	8	12	30'	0.78	1.05	1.04	0.10	-	-	-	41	
	8' x 7'	8	8	8	4 to 12	0.33' - <2'	0.31	0.67	0.60	0.20	0.24	0.24	0.31	-
						2' - <3'	0.42	0.74	0.64	0.10	-	-	-	55
3' - <5'						0.37	0.56	0.59	0.10	-	-	-	55	
5' - 10'						0.36	0.45	0.47	0.10	-	-	-	50	
15'						0.51	0.61	0.61	0.10	-	-	-	45	
20'						0.66	0.81	0.80	0.10	-	-	-	41	
8.5		8.5	8	8 to 12	25'	0.78	0.98	0.97	0.10	-	-	-	41	
9.5		9.5	8	12	30'	0.84	1.10	1.09	0.10	-	-	-	41	
8' x 8'		8	8	8	4 to 12	0.33' - <2'	0.32	0.68	0.62	0.20	0.24	0.25	0.32	-
						2' - <3'	0.43	0.76	0.67	0.14	-	-	-	65
	3' - <5'					0.38	0.58	0.61	0.14	-	-	-	65	
	5' - 10'					0.39	0.46	0.50	0.13	-	-	-	55	
	15'					0.55	0.64	0.65	0.10	-	-	-	45	
	20'					0.71	0.86	0.85	0.10	-	-	-	45	
	8.5	8.5	8	8 to 12	25'	0.84	1.03	1.02	0.10	-	-	-	41	
	9.5	9.5	8	12	30'	0.93	1.15	1.15	0.10	-	-	-	41	

See General Note 5

**NOTES:**

1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 2 for General Notes.
3. See Sheet 14 for Welded Wire Reinforcement Bending Diagram.

LAST REVISION  
07/01/13

REVISION

DESCRIPTION:



FY 2022-23  
STANDARD PLANS

STANDARD PRECAST CONCRETE BOX CULVERTS

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TABLE 5 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 9' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)									As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9		
	9' x 5'	9.5	9.5	9		4	0.33' - <2'	0.41	0.62	0.53	0.22	0.23	0.34	0.38	
9		9	9	2' - <3'	0.44		0.65	0.54	0.11	-	-	-	54		
				3' - <5'	0.39		0.53	0.51	0.11	-	-	-	49		
				5' - 10'	0.35		0.42	0.44	0.11	-	-	-	49		
				15'	0.50	0.56	0.55	0.11	-	-	-	44			
				20'	0.65	0.75	0.73	0.11	-	-	-	44			
9.5		9.5	9	8 to 12	25'	0.77	0.92	0.90	0.11	-	-	-	44		
10.5		11	9		30'	0.81	1.05	1.02	0.11	-	-	-	44		
9' x 6'		9.5	9.5		9	4	0.33' - <2'	0.38	0.64	0.56	0.23	0.23	0.33	0.37	-
		9	9		9		2' - <3'	0.43	0.67	0.57	0.11	-	-	-	54
	3' - <5'						0.37	0.55	0.54	0.11	-	-	-	49	
	5' - 10'			0.35			0.45	0.47	0.11	-	-	-	49		
	15'			0.49		0.60	0.59	0.11	-	-	-	44			
	20'			0.65		0.80	0.78	0.11	-	-	-	44			
	9.5	9.5	9	8 to 12	25'	0.76	0.98	0.95	0.11	-	-	-	44		
	10.5	11	9		30'	0.80	1.10	1.08	0.11	-	-	-	44		
	9' x 7'	9.5	9.5		9	4	0.33' - <2'	0.37	0.67	0.59	0.22	0.23	0.32	0.37	-
		9	9		9		2' - <3'	0.42	0.69	0.60	0.11	-	-	-	59
3' - <5'							0.37	0.58	0.56	0.11	-	-	-	54	
5' - 10'				0.36			0.47	0.49	0.11	-	-	-	49		
15'				0.50		0.63	0.63	0.11	-	-	-	44			
20'				0.66		0.84	0.80	0.11	-	-	-	44			
9.5		9.5	9	8 to 12	25'	0.77	1.02	1.00	0.11	-	-	-	44		
10.5		11	9		30'	0.81	1.15	1.13	0.11	-	-	-	44		
9' x 8'		9.5	9.5		9	4	0.33' - <2'	0.37	0.68	0.61	0.22	0.23	0.31	0.37	-
		9	9		9		2' - <3'	0.42	0.71	0.62	0.11	-	-	-	59
	3' - <5'						0.37	0.60	0.59	0.11	-	-	-	59	
	5' - 10'			0.38			0.49	0.51	0.11	-	-	-	54		
	15'			0.53		0.66	0.66	0.11	-	-	-	44			
	20'			0.68		0.88	0.87	0.11	-	-	-	44			
	9.5	9.5	9	8 to 12	25'	0.81	1.07	1.05	0.11	-	-	-	44		
	10.5	11	9		30'	0.86	1.20	1.18	0.11	-	-	-	44		
	9' x 9'	9.5	9.5		9	4	0.33' - <2'	0.38	0.70	0.63	0.22	0.23	0.32	0.38	-
		9	9		9		2' - <3'	0.43	0.73	0.65	0.15	-	-	-	72
3' - <5'							0.38	0.62	0.61	0.15	-	-	-	72	
5' - 10'				0.41			0.50	0.53	0.14	-	-	-	59		
15'				0.57		0.69	0.70	0.12	-	-	-	49			
20'				0.73		0.92	0.91	0.11	-	-	-	49			
9.5		10	9	8 to 12	25'	0.83	1.11	1.09	0.11	-	-	-	44		
10.5		11	9		30'	0.93	1.25	1.23	0.11	-	-	-	44		

See General Note 5

TABLE 6 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 10' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)									As1 EXT. LENGTH (M) (in.)			
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9					
	10' x 5'	10	10	10		4	0.33' - <2'	0.46	0.62	0.52	0.24	0.24	0.41	0.45		-		
2' - <3'					0.46		0.62	0.52	0.12	-	-	-	58					
3' - <5'					0.42		0.54	0.50	0.12	-	-	-	53					
5' - 10'					0.38		0.46	0.49	0.12	-	-	-	52					
15'					0.52	0.59	0.58	0.12	-	-	-	47						
10.5		10.5	10	8 to 12	20'	0.69	0.78	0.76	0.12	-	-	-	47					
					25'	0.81	0.97	0.93	0.12	-	-	-	47					
					30'	0.87	1.11	1.11	0.12	-	-	-	47					
					10' x 6'	10	10	10	4	0.33' - <2'	0.44	0.64	0.54	0.24	0.24	0.39	0.44	-
										2' - <3'	0.44	0.64	0.54	0.12	-	-	-	58
3' - <5'	0.39	0.57	0.52	0.12						-	-	-	52					
5' - 10'	0.37	0.48	0.52	0.12						-	-	-	52					
15'	0.51	0.62	0.61	0.12					-	-	-	47						
10.5	10.5	10	8 to 12	20'		0.67	0.83	0.80	0.12	-	-	-	47					
				25'		0.79	1.02	0.99	0.12	-	-	-	47					
				30'		0.85	1.17	1.14	0.12	-	-	-	47					
				10' x 7'		10	10	10	4	0.33' - <2'	0.43	0.66	0.57	0.24	0.24	0.38	0.43	-
										2' - <3'	0.43	0.66	0.57	0.12	-	-	-	58
3' - <5'	0.38	0.59	0.55		0.12					-	-	-	58					
5' - 10'	0.37	0.50	0.54		0.12					-	-	-	52					
15'	0.52	0.66	0.65		0.12				-	-	-	47						
10.5	10.5	10	8 to 12		20'	0.67	0.87	0.85	0.12	-	-	-	47					
					25'	0.79	1.07	1.04	0.12	-	-	-	47					
					30'	0.84	1.22	1.19	0.12	-	-	-	47					
					10' x 8'	10	10	10	4	0.33' - <2'	0.43	0.68	0.60	0.24	0.24	0.38	0.43	-
										2' - <3'	0.43	0.68	0.60	0.12	-	-	-	64
3' - <5'	0.38	0.62	0.57	0.12						-	-	-	58					
5' - 10'	0.38	0.52	0.57	0.12						-	-	-	52					
15'	0.53	0.69	0.68	0.12					-	-	-	47						
10.5	10.5	10	8 to 12	20'		0.68	0.91	0.89	0.12	-	-	-	47					
				25'		0.81	1.12	1.09	0.12	-	-	-	47					
				30'		0.86	1.27	1.25	0.12	-	-	-	47					
				10' x 9'		10	10	10	4	0.33' - <2'	0.43	0.70	0.62	0.24	0.24	0.38	0.43	-
										2' - <3'	0.43	0.70	0.62	0.12	-	-	-	70
3' - <5'	0.39	0.64	0.60		0.12					-	-	-	64					
5' - 10'	0.40	0.54	0.59		0.12					-	-	-	58					
15'	0.56	0.72	0.72		0.12				-	-	-	52						
10.5	11	10	8 to 12		20'	0.71	0.95	0.94	0.12	-	-	-	47					
					25'	0.82	1.15	1.13	0.12	-	-	-	47					
					30'	0.90	1.32	1.30	0.12	-	-	-	47					
					10' x 10'	10	10	10	4	0.33' - <2'	0.44	0.71	0.64	0.24	0.24	0.38	0.44	-
										2' - <3'	0.44	0.71	0.64	0.17	-	-	-	79
3' - <5'	0.40	0.65	0.62	0.16						-	-	-	70					
5' - 10'	0.44	0.56	0.61	0.15						-	-	-	64					
15'	0.60	0.75	0.76	0.12					-	-	-	52						
10.5	11	10	8 to 12	20'		0.76	0.99	0.99	0.12	-	-	-	52					
				25'		0.86	1.20	1.18	0.12	-	-	-	47					
				30'		0.97	1.36	1.35	0.13	-	-	-	47					

See General Note 5

- NOTES:  
 1. See Sheet 1 for Reinforcing Details and dimension locations.  
 2. See Sheet 2 for General Notes.  
 3. See Sheet 14 for WWR Bending Diagram.

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**TABLE 7 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 11' SPANS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)	
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9		
11' x 4'	11	11	11	4 to 12	0.33' - <2'	0.51	0.57	0.47	0.27	0.27	0.45	0.48	-		
					2' - <3'	0.51	0.57	0.47	0.14	-	-	-	62		
					3' - <5'	0.48	0.57	0.46	0.14	-	-	-	62		
					5' - 10'	0.47	0.50	0.50	0.14	-	-	-	55		
					15'	0.59	0.58	0.56	0.14	-	-	-	55		
					20'	0.77	0.77	0.74	0.14	-	-	-	55		
	11.5	11.5	11	8 to 12	25'	0.92	0.95	0.91	0.14	-	-	-	55		
	13	13	11		30'	0.94	1.09	1.06	0.14	-	-	-	55		
	11' x 6'	11	11		11	4 to 12	0.33' - <2'	0.45	0.62	0.52	0.27	0.27	0.41	0.45	-
							2' - <3'	0.45	0.62	0.52	0.14	-	-	-	62
							3' - <5'	0.42	0.58	0.51	0.14	-	-	-	55
							5' - 10'	0.43	0.56	0.56	0.14	-	-	-	55
15'				0.54			0.65	0.64	0.14	-	-	-	50		
20'				0.70			0.86	0.83	0.14	-	-	-	50		
11.5		11.5	11	8 to 12	25'	0.83	1.07	1.03	0.14	-	-	-	50		
13		13	11		30'	0.85	1.22	1.19	0.14	-	-	-	50		
11' x 8'		11	11		11	4 to 12	0.33' - <2'	0.42	0.67	0.57	0.27	0.27	0.39	0.43	-
							2' - <3'	0.43	0.67	0.57	0.14	-	-	-	62
							3' - <5'	0.39	0.63	0.56	0.14	-	-	-	62
							5' - 10'	0.43	0.60	0.61	0.14	-	-	-	55
	15'			0.54			0.72	0.71	0.14	-	-	-	50		
	20'			0.70			0.94	0.92	0.14	-	-	-	50		
	11.5	11.5	11	8 to 12	25'	0.82	1.16	1.13	0.14	-	-	-	50		
	13	13	11		30'	0.86	1.32	1.30	0.14	-	-	-	50		
	11' x 10'	11	11		11	4 to 12	0.33' - <2'	0.44	0.71	0.62	0.27	0.27	0.38	0.44	-
							2' - <3'	0.44	0.71	0.62	0.14	-	-	-	75
							3' - <5'	0.41	0.67	0.61	0.14	-	-	-	69
							5' - 10'	0.47	0.64	0.66	0.14	-	-	-	62
15'				0.59			0.78	0.78	0.14	-	-	-	55		
20'				0.75			1.03	1.01	0.14	-	-	-	50		
11.5		12	11	8 to 12	25'	0.85	1.24	1.22	0.14	-	-	-	50		
13		13.5	11		30'	0.91	1.40	1.39	0.14	-	-	-	50		
11' x 11'		11	11		11	4 to 12	0.33' - <2'	0.45	0.72	0.64	0.27	0.27	0.39	0.45	-
							2' - <3'	0.45	0.72	0.64	0.18	-	-	-	86
							3' - <5'	0.42	0.69	0.63	0.18	-	-	-	75
							5' - 10'	0.51	0.66	0.69	0.16	-	-	-	69
	15'			0.63			0.81	0.82	0.14	-	-	-	55		
	20'			0.80			1.07	1.06	0.14	-	-	-	55		
	11.5	12	11	8 to 12	25'	0.91	1.29	1.27	0.14	-	-	-	50		
	13	13.5	11		30'	0.99	1.44	1.44	0.14	-	-	-	50		

See General Note 5

**TABLE 8 - STANDARD PRECAST BOX CULVERT DESIGNS (2" COVER) - 12' SPANS**

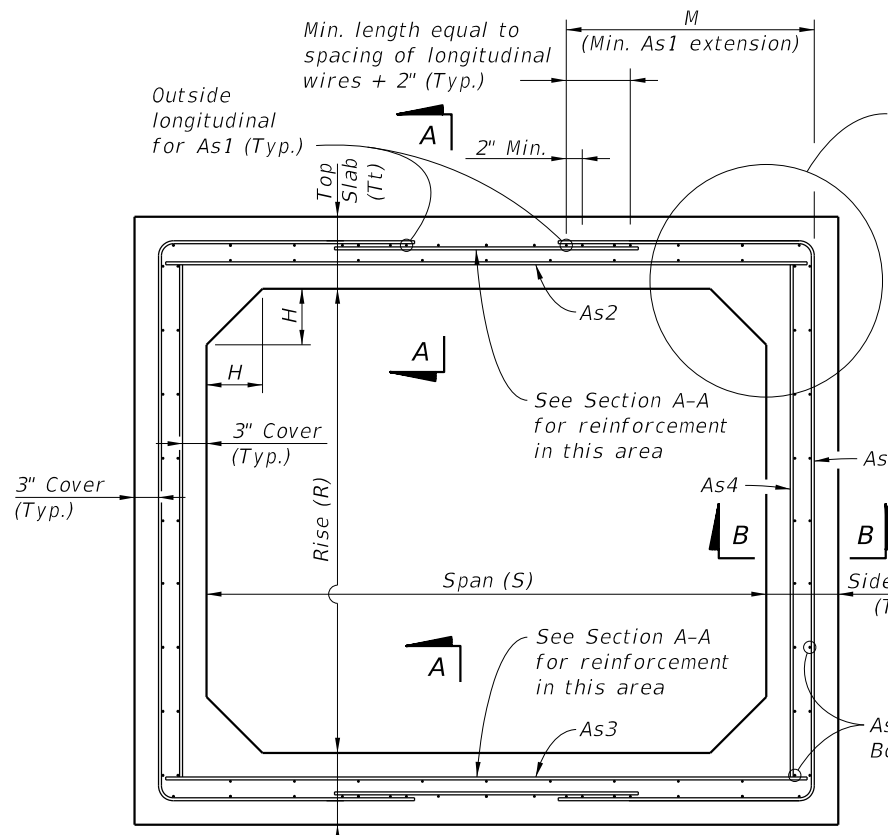
SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)	
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9		
12' x 4'	12	12	12	4 to 12	0.33' - <2'	0.52	0.57	0.45	0.29	0.29	0.47	0.49	-		
					2' - <3'	0.52	0.57	0.45	0.15	-	-	-	73		
					3' - <5'	0.50	0.54	0.45	0.15	-	-	-	66		
					5' - 10'	0.50	0.52	0.52	0.15	-	-	-	66		
					15'	0.63	0.61	0.59	0.15	-	-	-	59		
					20'	0.82	0.81	0.77	0.15	-	-	-	59		
	12.5	12.5	12	8 to 12	25'	0.99	0.99	0.95	0.15	-	-	-	59		
	14	14	12		30'	1.03	1.15	1.11	0.15	-	-	-	59		
	12' x 6'	12	12		12	4 to 12	0.33' - <2'	0.47	0.62	0.51	0.29	0.29	0.42	0.46	-
							2' - <3'	0.47	0.62	0.51	0.15	-	-	-	66
							3' - <5'	0.45	0.60	0.51	0.15	-	-	-	59
							5' - 10'	0.47	0.59	0.59	0.15	-	-	-	59
15'				0.57			0.68	0.66	0.15	-	-	-	53		
20'				0.74			0.90	0.86	0.15	-	-	-	53		
12.5		12.5	12	8 to 12	25'	0.88	1.11	1.06	0.15	-	-	-	53		
14		14.5	12		30'	0.92	1.27	1.24	0.15	-	-	-	53		
12' x 8'		12	12		12	4 to 12	0.33' - <2'	0.44	0.67	0.56	0.29	0.29	0.40	0.44	-
							2' - <3'	0.44	0.67	0.56	0.15	-	-	-	66
							3' - <5'	0.41	0.64	0.56	0.15	-	-	-	59
							5' - 10'	0.45	0.63	0.64	0.15	-	-	-	59
	15'			0.56			0.75	0.73	0.15	-	-	-	53		
	20'			0.72			0.98	0.95	0.15	-	-	-	53		
	12.5	13	12	8 to 12	25'	0.85	1.20	1.16	0.15	-	-	-	53		
	14	14.5	12		30'	0.89	1.38	1.35	0.15	-	-	-	53		
	12' x 10'	12	12		12	4 to 12	0.33' - <2'	0.44	0.71	0.60	0.29	0.29	0.39	0.44	-
							2' - <3'	0.44	0.71	0.60	0.15	-	-	-	73
							3' - <5'	0.42	0.68	0.60	0.15	-	-	-	66
							5' - 10'	0.47	0.67	0.69	0.15	-	-	-	59
15'				0.59			0.81	0.81	0.15	-	-	-	53		
20'				0.75			1.06	1.04	0.15	-	-	-	53		
12.5		13	12	8 to 12	25'	0.87	1.30	1.26	0.15	-	-	-	53		
14		14.5	12		30'	0.92	1.47	1.45	0.15	-	-	-	53		
12' x 12'		12	12		12	4 to 12	0.33' - <2'	0.46	0.74	0.64	0.29	0.29	0.40	0.46	-
							2' - <3'	0.46	0.74	0.64	0.20	-	-	-	93
							3' - <5'	0.42	0.72	0.64	0.20	-	-	-	80
							5' - 10'	0.54	0.71	0.74	0.18	-	-	-	73
	15'			0.66			0.87	0.89	0.15	-	-	-	59		
	20'			0.83			1.14	1.13	0.15	-	-	-	59		
	12.5	13	12	8 to 12	25'	0.96	1.39	1.37	0.15	-	-	-	53		
	14	14.5	12.5		30'	1.05	1.56	1.56	0.15	-	-	-	53		

See General Note 5

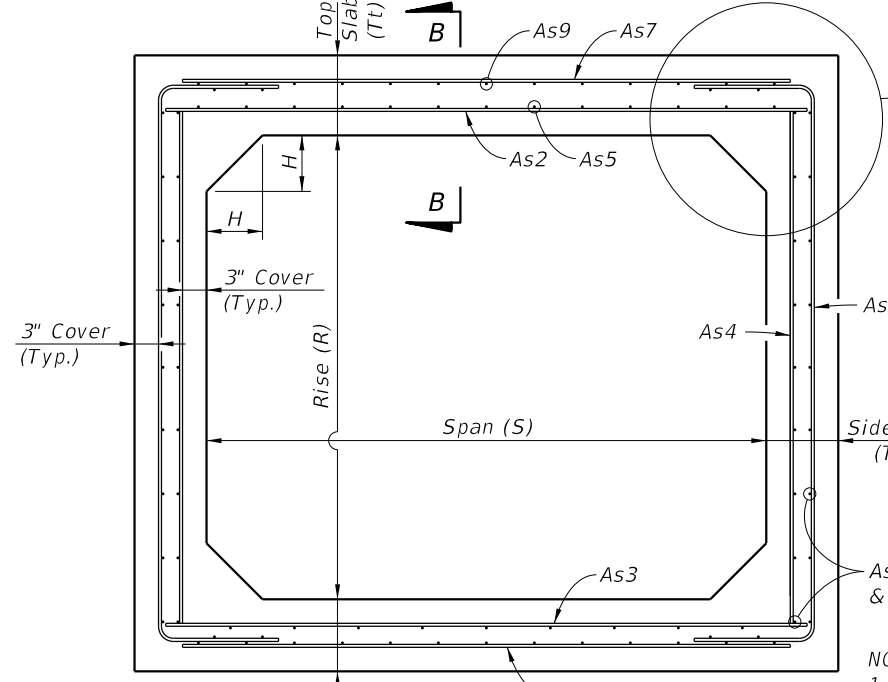
**NOTES:**

1. See Sheet 1 for Reinforcing Details and dimension locations.
2. See Sheet 2 for General Notes.
3. See Sheet 14 for Welded Wire Reinforcement Bending Diagram.

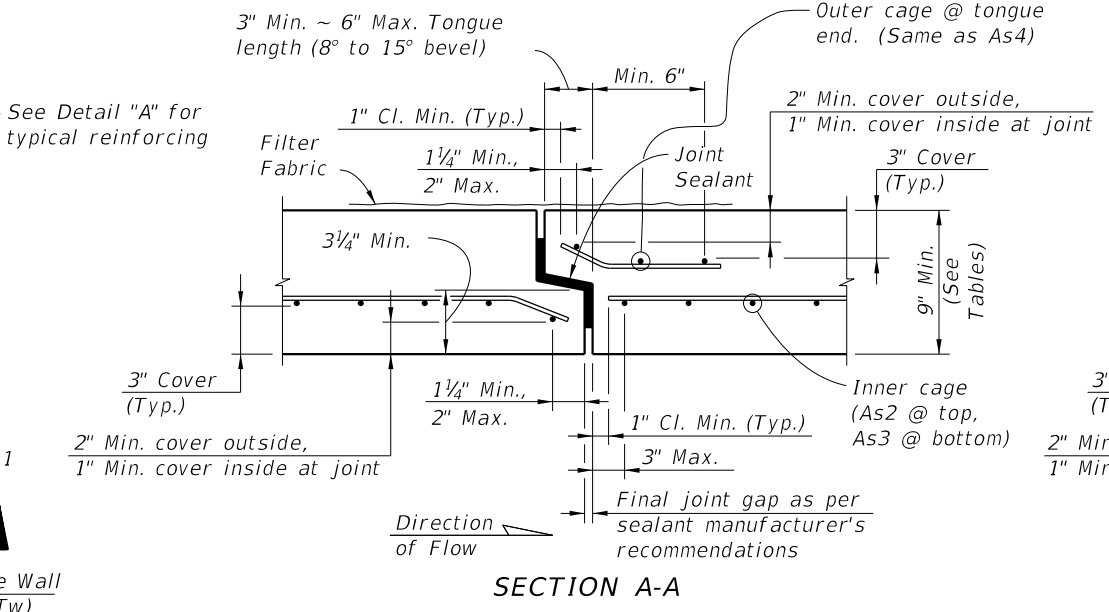
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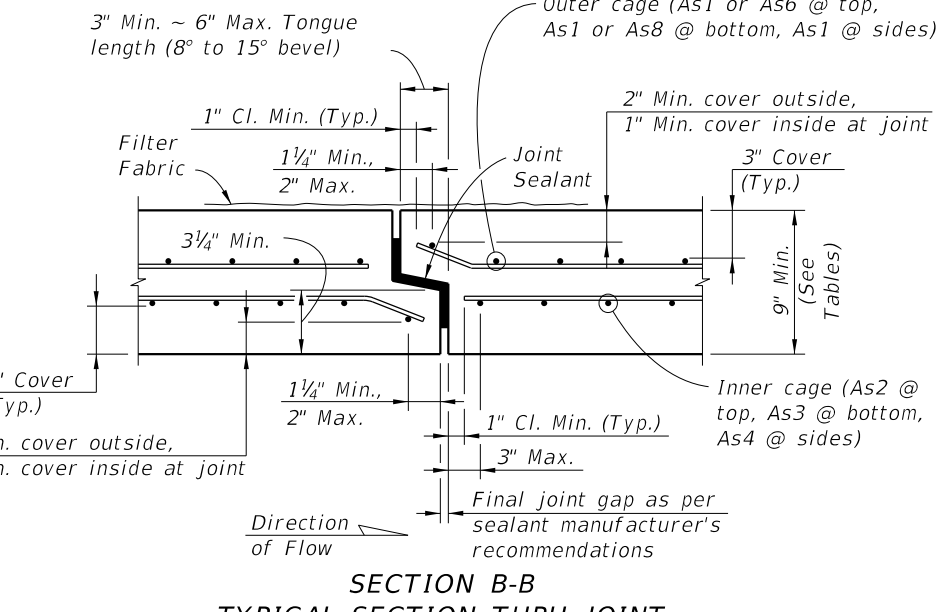
**TYPICAL BOX SECTION (TYPE 2)  
DESIGN EARTH COVER 2' OR GREATER  
(Option 1 Reinforcing Configuration Shown)**



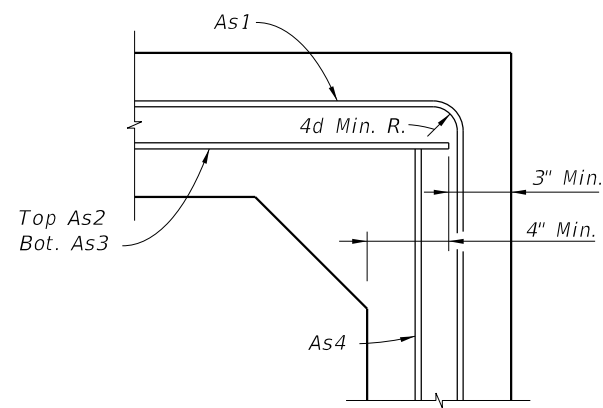
**TYPICAL BOX SECTION (TYPE 1)  
DESIGN EARTH COVER LESS THAN 2'  
(Option 1 Reinforcing Configuration Shown)**



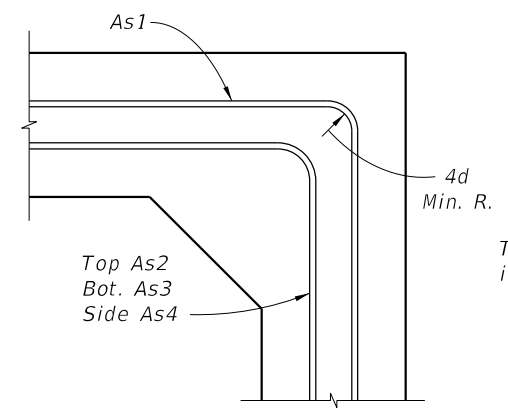
**SECTION A-A**



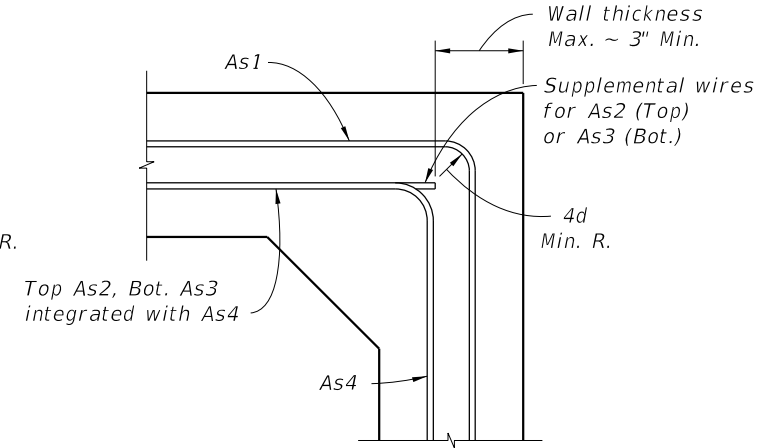
**TYPICAL SECTION THRU JOINT**



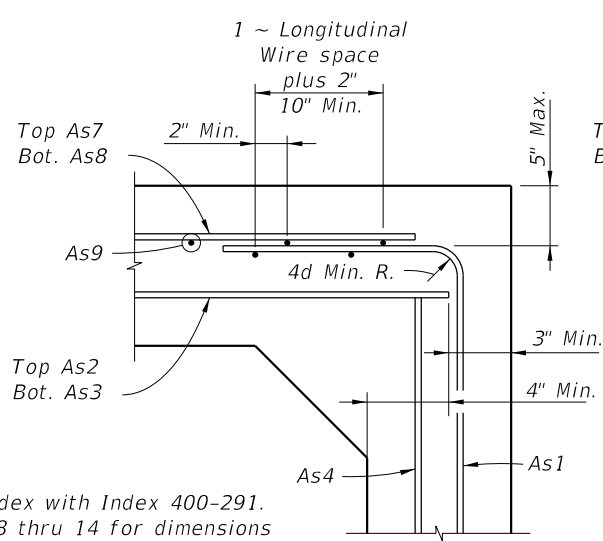
**DETAIL "A"  
(OPTION 1)**



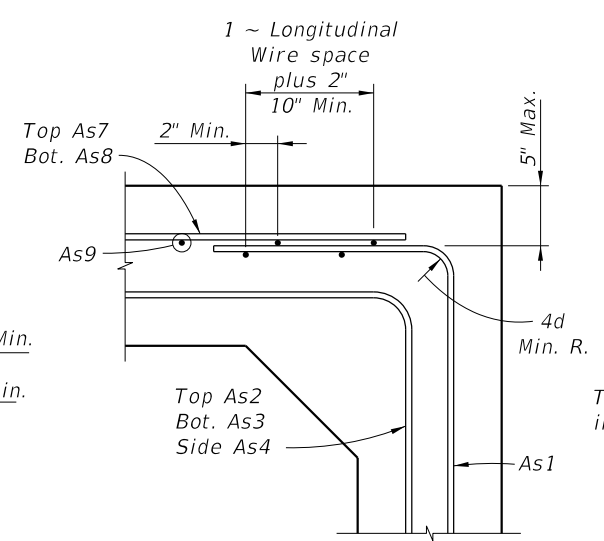
**DETAIL "A"  
(OPTION 2)**



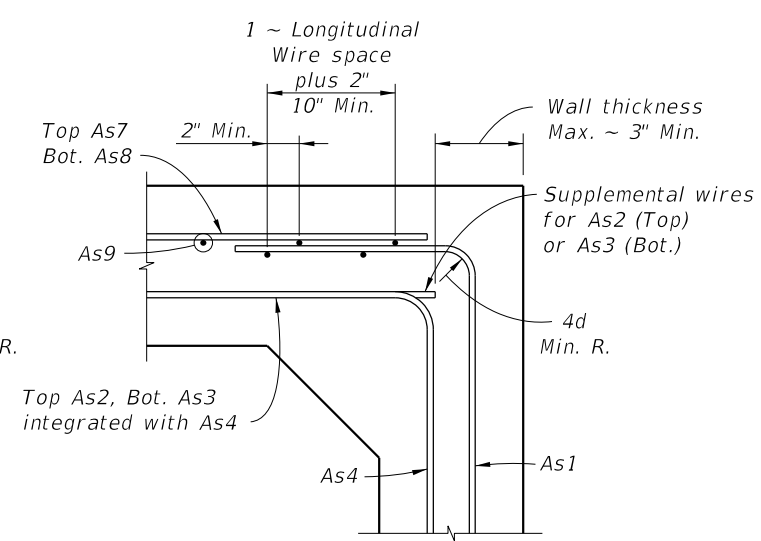
**DETAIL "A"  
(OPTION 3)**



**DETAIL "B"  
(OPTION 1)**



**DETAIL "B"  
(OPTION 2)**



**DETAIL "B"  
(OPTION 3)**

**NOTES:**  
1. Work this Index with Index 400-291.  
2. See Sheets 8 thru 14 for dimensions and areas of reinforcement.

**STANDARD PRECAST BOX CULVERT WITH 3" CONCRETE COVER**

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LAST REVISION 07/01/13	DESCRIPTION:	<b>FY 2022-23 STANDARD PLANS</b>	<b>STANDARD PRECAST CONCRETE BOX CULVERTS</b>	INDEX 400-292	SHEET 7 of 14
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TABLE 9A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 3' & 4' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)				
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9					
3' x 3'	9	9	9	4 to 8	0.33' - <2'	0.22	0.24	0.22	0.22	0.22	0.22	0.22	-	-				
					2' - <3'	0.11	0.23	0.22	0.11	-	-	-	31					
					3' - <5'	0.11	0.22	0.22	0.11	-	-	-	31					
					5' - 10'	0.11	0.22	0.22	0.11	-	-	-	31					
					15'	0.11	0.22	0.22	0.11	-	-	-	31					
					20'	0.13	0.22	0.22	0.11	-	-	-	31					
					25'	0.16	0.22	0.22	0.11	-	-	-	31					
					30'	0.19	0.24	0.25	0.11	-	-	-	31					
					35'	0.22	0.28	0.29	0.11	-	-	-	31					
					4' x 3'	9	9	9	4 to 8	0.33' - <2'	0.22	0.32	0.24	0.22	0.22	0.22	0.22	-
2' - <3'	0.17	0.31	0.24	0.11						-	-	-	38					
3' - <5'	0.13	0.22	0.22	0.11						-	-	-	38					
5' - 10'	0.13	0.22	0.22	0.11						-	-	-	38					
15'	0.17	0.22	0.22	0.11						-	-	-	38					
20'	0.23	0.26	0.27	0.11						-	-	-	38					
25'	0.28	0.32	0.34	0.11						-	-	-	38					
30'	0.33	0.39	0.40	0.11						-	-	-	38					
4' x 4'	9	9	9	4 to 8						0.33' - <2'	0.22	0.34	0.26	0.22	0.22	0.22	0.22	-
										2' - <3'	0.17	0.33	0.26	0.11	-	-	-	38
					3' - <5'	0.13	0.22	0.22	0.11	-	-	-	38					
					5' - 10'	0.14	0.22	0.22	0.11	-	-	-	38					
					15'	0.19	0.22	0.23	0.11	-	-	-	38					
					20'	0.24	0.28	0.30	0.11	-	-	-	38					
					25'	0.29	0.36	0.37	0.11	-	-	-	38					
					30'	0.34	0.43	0.45	0.11	-	-	-	38					

See General Note 5

TABLE 9B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 3' & 4' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)				
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9					
3' x 3'	10	10	10	4 to 8	0.33' - <2'	0.24	0.24	0.24	0.24	0.24	0.24	0.24	-					
					2' - <3'	0.12	0.24	0.24	0.24	-	-	-	31					
					3' - <5'	0.12	0.24	0.24	0.24	-	-	-	31					
					5' - 10'	0.12	0.24	0.24	0.24	-	-	-	31					
					15'	0.12	0.24	0.24	0.24	-	-	-	31					
					20'	0.12	0.24	0.24	0.24	-	-	-	31					
					25'	0.13	0.24	0.24	0.24	-	-	-	31					
					30'	0.15	0.24	0.24	0.12	-	-	-	31					
					35'	0.18	0.24	0.24	0.12	-	-	-	31					
					4' x 3'	10	10	10	4 to 8	0.33' - <2'	0.24	0.26	0.24	0.24	0.24	0.24	0.24	-
2' - <3'	0.14	0.26	0.24	0.12						-	-	-	38					
3' - <5'	0.12	0.24	0.24	0.12						-	-	-	38					
5' - 10'	0.12	0.24	0.24	0.12						-	-	-	38					
15'	0.14	0.24	0.24	0.12						-	-	-	38					
20'	0.18	0.24	0.24	0.12						-	-	-	38					
25'	0.22	0.26	0.27	0.12						-	-	-	38					
30'	0.26	0.31	0.32	0.12						-	-	-	38					
4' x 4'	10	10	10	4 to 8						0.33' - <2'	0.24	0.28	0.24	0.24	0.24	0.24	0.24	-
										2' - <3'	0.14	0.28	0.24	0.12	-	-	-	38
					3' - <5'	0.12	0.24	0.24	0.12	-	-	-	38					
					5' - 10'	0.12	0.24	0.24	0.12	-	-	-	38					
					15'	0.15	0.24	0.24	0.12	-	-	-	38					
					20'	0.19	0.24	0.24	0.12	-	-	-	38					
					25'	0.23	0.28	0.30	0.12	-	-	-	38					
					30'	0.27	0.34	0.35	0.12	-	-	-	38					

See General Note 5

NOTES:

1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
3. See Sheet 14 for WWR Bending Diagrams.

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TABLE 11A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 7' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
7' x 4'	9	9	9	4 to 12	0.33' - <2'	0.42	0.58	0.52	0.22	0.22	0.31	0.42	-	
					2' - <3'	0.42	0.58	0.51	0.11	-	-	-	43	
					3' - <5'	0.36	0.41	0.44	0.11	-	-	-	43	
					5' - 10'	0.39	0.40	0.39	0.11	-	-	-	43	
					15'	0.56	0.56	0.58	0.11	-	-	-	41	
					20'	0.74	0.76	0.77	0.11	-	-	-	41	
	9	9.5	9	7 to 12	25'	0.92	0.97	0.97	0.11	-	-	-	41	
					30'	1.09	1.18	1.10	0.11	-	-	-	41	
					0.33' - <2'	0.41	0.61	0.55	0.22	0.23	0.30	0.41	-	
					2' - <3'	0.41	0.61	0.55	0.11	-	-	-	47	
7' x 5'	9	9	9	4 to 12	3' - <5'	0.37	0.43	0.47	0.11	-	-	-	43	
					5' - 10'	0.39	0.41	0.43	0.11	-	-	-	43	
					15'	0.56	0.61	0.63	0.11	-	-	-	41	
					20'	0.73	0.82	0.83	0.11	-	-	-	41	
					25'	0.90	1.04	1.06	0.11	-	-	-	41	
					30'	1.06	1.26	1.19	0.11	-	-	-	41	
	9	9.5	9	7 to 12	0.33' - <2'	0.42	0.63	0.58	0.22	0.24	0.30	0.42	-	
					2' - <3'	0.42	0.63	0.58	0.11	-	-	-	59	
					3' - <5'	0.38	0.45	0.50	0.11	-	-	-	47	
					5' - 10'	0.41	0.44	0.47	0.11	-	-	-	43	
15'					0.57	0.65	0.68	0.11	-	-	-	41		
20'					0.75	0.87	0.90	0.11	-	-	-	41		
9	9.5	9	7 to 12	25'	0.93	1.11	1.13	0.11	-	-	-	41		
				30'	1.07	1.35	1.27	0.11	-	-	-	41		
				0.33' - <2'	0.44	0.66	0.61	0.22	0.25	0.31	0.44	-		
				2' - <3'	0.44	0.65	0.61	0.11	-	-	-	59		
				3' - <5'	0.41	0.47	0.52	0.11	-	-	-	59		
				5' - 10'	0.44	0.47	0.52	0.11	-	-	-	47		
9	9.5	9	7 to 12	15'	0.62	0.69	0.74	0.11	-	-	-	43		
				20'	0.80	0.93	0.97	0.11	-	-	-	43		
				25'	0.99	1.18	1.22	0.11	-	-	-	43		
				30'	1.12	1.43	1.36	0.11	-	-	-	41		

See General Note 5

TABLE 11B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 7' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
7' x 4'	10	10	10	4 to 12	0.33' - <2'	0.33	0.49	0.44	0.24	0.24	0.24	0.33	-	
					2' - <3'	0.33	0.49	0.44	0.12	-	-	-	43	
					3' - <5'	0.29	0.35	0.38	0.12	-	-	-	43	
					5' - 10'	0.31	0.30	0.31	0.12	-	-	-	43	
					15'	0.44	0.44	0.45	0.12	-	-	-	41	
					20'	0.58	0.59	0.60	0.12	-	-	-	41	
	10	10	10	7 to 12	25'	0.71	0.74	0.75	0.12	-	-	-	41	
					30'	0.85	0.91	0.91	0.12	-	-	-	41	
					0.33' - <2'	0.32	0.51	0.47	0.24	0.24	0.24	0.32	-	
					2' - <3'	0.32	0.51	0.47	0.12	-	-	-	47	
7' x 5'	10	10	10	4 to 12	3' - <5'	0.29	0.37	0.41	0.12	-	-	-	43	
					5' - 10'	0.31	0.32	0.35	0.12	-	-	-	43	
					15'	0.44	0.47	0.50	0.12	-	-	-	41	
					20'	0.57	0.63	0.65	0.12	-	-	-	41	
					25'	0.70	0.80	0.82	0.12	-	-	-	41	
					30'	0.84	0.97	0.99	0.12	-	-	-	41	
	10	10	10	7 to 12	0.33' - <2'	0.33	0.53	0.50	0.24	0.24	0.24	0.33	-	
					2' - <3'	0.33	0.53	0.50	0.12	-	-	-	59	
					3' - <5'	0.30	0.38	0.43	0.12	-	-	-	47	
					5' - 10'	0.33	0.35	0.38	0.12	-	-	-	43	
15'					0.45	0.51	0.54	0.12	-	-	-	41		
20'					0.58	0.68	0.70	0.12	-	-	-	41		
10	10	10	7 to 12	25'	0.72	0.85	0.88	0.12	-	-	-	41		
				30'	0.85	1.04	1.06	0.12	-	-	-	41		
				0.33' - <2'	0.35	0.55	0.52	0.24	0.24	0.24	0.35	-		
				2' - <3'	0.35	0.55	0.52	0.12	-	-	-	59		
				3' - <5'	0.32	0.40	0.46	0.12	-	-	-	59		
				5' - 10'	0.35	0.37	0.41	0.12	-	-	-	47		
10	10	10	7 to 12	15'	0.48	0.54	0.58	0.12	-	-	-	43		
				20'	0.62	0.72	0.76	0.12	-	-	-	43		
				25'	0.76	0.90	0.94	0.12	-	-	-	43		
				30'	0.90	1.10	1.13	0.12	-	-	-	41		

See General Note 5

NOTES:

1. See Sheet 2 for General Notes.
2. See Sheet 7 for Reinforcing Details and dimension locations.
3. See Sheet 14 for WWR Bending Diagrams.

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TABLE 12A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 8' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
8' x 4'	9	9	9	4 to 12	0.33' - <2'	0.52	0.66	0.57	0.22	0.24	0.42	0.52	-	
					2' - <3'	0.52	0.66	0.57	0.11	-	-	-	50	
					3' - <5'	0.48	0.49	0.52	0.11	-	-	-	50	
					5' - 10'	0.52	0.48	0.49	0.11	-	-	-	45	
					15'	0.75	0.72	0.72	0.11	-	-	-	41	
	9 10	9.5 10.5	9	8 to 12	20'	1.00	0.98	0.97	0.11	-	-	-	41	
					25'	1.25	1.24	1.14	0.11	-	-	-	41	
					30'	1.31	1.29	1.21	0.11	-	-	-	41	
					0.33' - <2'	0.51	0.69	0.60	0.22	0.25	0.40	0.51	-	
					2' - <3'	0.51	0.69	0.60	0.11	-	-	-	50	
8' x 5'	9	9	9	4 to 12	3' - <5'	0.46	0.52	0.56	0.11	-	-	-	45	
					5' - 10'	0.51	0.51	0.53	0.11	-	-	-	45	
					15'	0.74	0.77	0.78	0.11	-	-	-	41	
					20'	0.97	1.05	1.05	0.11	-	-	-	41	
					25'	1.20	1.33	1.23	0.11	-	-	-	41	
	9 10	9.5 10.5	9	8 to 12	30'	1.26	1.38	1.30	0.11	-	-	-	41	
					0.33' - <2'	0.51	0.72	0.64	0.22	0.26	0.39	0.51	-	
					2' - <3'	0.51	0.72	0.64	0.11	-	-	-	50	
					3' - <5'	0.47	0.55	0.59	0.11	-	-	-	50	
					5' - 10'	0.52	0.55	0.58	0.11	-	-	-	45	
8' x 6'	9	9	9	4 to 12	15'	0.74	0.83	0.85	0.11	-	-	-	41	
					20'	0.97	1.12	1.13	0.11	-	-	-	41	
					25'	1.18	1.42	1.32	0.11	-	-	-	41	
					30'	1.26	1.46	1.39	0.11	-	-	-	41	
					0.33' - <2'	0.52	0.74	0.67	0.22	0.26	0.40	0.52	-	
	8' x 7'	9	9	9	4 to 12	2' - <3'	0.52	0.74	0.67	0.11	-	-	-	55
						3' - <5'	0.49	0.57	0.62	0.11	-	-	-	55
						5' - 10'	0.55	0.59	0.63	0.11	-	-	-	50
						15'	0.77	0.88	0.91	0.11	-	-	-	41
						20'	1.01	1.19	1.21	0.11	-	-	-	41
9 10		9.5 10.5	9	8 to 12	25'	1.21	1.51	1.41	0.11	-	-	-	41	
					30'	1.31	1.53	1.47	0.11	-	-	-	41	
					0.33' - <2'	0.55	0.77	0.70	0.22	0.27	0.41	0.55	-	
					2' - <3'	0.55	0.77	0.70	0.13	-	-	-	65	
					3' - <5'	0.53	0.59	0.64	0.12	-	-	-	65	
8' x 8'	9	9	9	4 to 12	5' - 10'	0.60	0.63	0.68	0.11	-	-	-	55	
					15'	0.83	0.93	0.98	0.11	-	-	-	45	
					20'	1.08	1.26	1.29	0.11	-	-	-	45	
					25'	1.28	1.59	1.50	0.11	-	-	-	41	
					30'	1.41	1.61	1.55	0.11	-	-	-	41	
	9 10	9.5 10.5	9	8 to 12	20'	1.08	1.26	1.29	0.11	-	-	-	45	
					25'	1.28	1.59	1.50	0.11	-	-	-	41	
					30'	1.41	1.61	1.55	0.11	-	-	-	41	

See General Note 5

TABLE 12B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 8' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
8' x 4'	10	10	10	4 to 12	0.33' - <2'	0.42	0.56	0.49	0.24	0.24	0.32	0.41	-	
					2' - <3'	0.42	0.56	0.49	0.12	-	-	-	50	
					3' - <5'	0.38	0.42	0.46	0.12	-	-	-	50	
					5' - 10'	0.41	0.38	0.39	0.12	-	-	-	45	
					15'	0.59	0.56	0.57	0.12	-	-	-	41	
	10 10.5	10.5	10	8 to 12	20'	0.78	0.75	0.76	0.12	-	-	-	41	
					25'	0.97	0.96	0.96	0.12	-	-	-	41	
					30'	1.15	1.16	1.10	0.12	-	-	-	41	
					0.33' - <2'	0.40	0.58	0.52	0.24	0.034	0.31	0.40	-	
					2' - <3'	0.40	0.58	0.52	0.12	-	-	-	50	
8' x 5'	10	10	10	4 to 12	3' - <5'	0.37	0.45	0.48	0.12	-	-	-	45	
					5' - 10'	0.41	0.41	0.43	0.12	-	-	-	45	
					15'	0.58	0.60	0.62	0.12	-	-	-	41	
					20'	0.76	0.81	0.81	0.12	-	-	-	41	
					25'	0.94	1.03	1.03	0.12	-	-	-	41	
	10 10.5	10.5	10	8 to 12	30'	1.10	1.24	1.24	0.12	-	-	-	41	
					0.33' - <2'	0.40	0.60	0.55	0.24	0.24	0.30	0.40	-	
					2' - <3'	0.40	0.60	0.55	0.12	-	-	-	50	
					3' - <5'	0.37	0.47	0.51	0.12	-	-	-	50	
					5' - 10'	0.42	0.43	0.46	0.12	-	-	-	45	
8' x 6'	10	10	10	4 to 12	15'	0.58	0.64	0.67	0.12	-	-	-	41	
					20'	0.76	0.86	0.88	0.12	-	-	-	41	
					25'	0.94	1.09	1.11	0.12	-	-	-	41	
					30'	1.09	1.32	1.26	0.12	-	-	-	41	
					0.33' - <2'	0.41	0.63	0.58	0.24	0.24	0.30	0.41	-	
	8' x 7'	10	10	10	4 to 12	2' - <3'	0.41	0.63	0.58	0.12	-	-	-	55
						3' - <5'	0.39	0.49	0.53	0.12	-	-	-	55
						5' - 10'	0.44	0.46	0.50	0.12	-	-	-	50
						15'	0.61	0.68	0.72	0.12	-	-	-	45
						20'	0.78	0.91	0.94	0.12	-	-	-	41
10 10.5		10.5	10	8 to 12	25'	0.97	1.16	1.18	0.12	-	-	-	41	
					30'	1.11	1.40	1.34	0.12	-	-	-	41	
					0.33' - <2'	0.44	0.64	0.60	0.24	0.24	0.31	0.44	-	
					2' - <3'	0.44	0.64	0.60	0.12	-	-	-	65	
					3' - <5'	0.42	0.51	0.56	0.12	-	-	-	65	
8' x 8'	10	10	10	4 to 12	5' - 10'	0.47	0.50	0.55	0.12	-	-	-	55	
					15'	0.65	0.72	0.77	0.12	-	-	-	45	
					20'	0.84	0.96	1.01	0.12	-	-	-	45	
					25'	1.03	1.22	1.26	0.12	-	-	-	41	
					30'	1.16	1.47	1.42	0.12	-	-	-	41	
	10 10.5	10.5	10	8 to 12	20'	1.03	1.22	1.26	0.12	-	-	-	41	
					25'	1.03	1.22	1.26	0.12	-	-	-	41	
					30'	1.16	1.47	1.42	0.12	-	-	-	41	

See General Note 5

- NOTES:  
 1. See Sheet 2 for General Notes.  
 2. See Sheet 7 for Reinforcing Details and dimension locations.  
 3. See Sheet 14 for WWR Bending Diagrams.

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TABLE 13A - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 9' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)									As1 EXT. LENGTH (M) (in.)		
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9				
9' x 5'	9	9	9	4 to 12	0.33' - <2'	0.62	0.78	0.65	0.22	0.26	0.52	0.61	-				
					2' - <3'	0.62	0.78	0.65	0.11	-	-	-	54				
					3' - <5'	0.58	0.63	0.61	0.11	-	-	-	49				
					5' - 10'	0.65	0.63	0.64	0.11	-	-	-	49				
					15'	0.95	0.96	0.95	0.11	-	-	-	44				
					20'	1.26	1.32	1.28	0.11	-	-	-	44				
	9	9	9	8 to 12	25'	1.39	1.41	1.32	0.11	-	-	-	44				
					30'	1.46	1.50	1.42	0.11	-	-	-	44				
					10	10.5	9	8 to 12	0.33' - <2'	0.60	0.81	0.69	0.22	0.27	0.51	0.60	-
									2' - <3'	0.60	0.81	0.69	0.11	-	-	-	54
									3' - <5'	0.56	0.66	0.65	0.11	-	-	-	49
									5' - 10'	0.65	0.68	0.69	0.11	-	-	-	49
15'	0.94	1.03	1.02	0.11					-	-	-	44					
20'	1.25	1.40	1.38	0.11					-	-	-	44					
10	10.5	9	8 to 12	25'	1.37	1.49	1.40	0.11	-	-	-	44					
				30'	1.44	1.58	1.50	0.11	-	-	-	44					
				11	11.5	9	8 to 12	0.33' - <2'	0.61	0.84	0.72	0.22	0.28	0.51	0.61	-	
								2' - <3'	0.61	0.83	0.72	0.11	-	-	-	59	
								3' - <5'	0.58	0.69	0.68	0.11	-	-	-	54	
								5' - 10'	0.67	0.73	0.75	0.11	-	-	-	49	
15'	0.96	1.09	1.10					0.11	-	-	-	44					
20'	1.27	1.49	1.47					0.11	-	-	-	44					
10	10.5	9	8 to 12	25'	1.38	1.57	1.48	0.11	-	-	-	44					
				30'	1.49	1.70	1.58	0.11	-	-	-	44					
				11	11.5	9	8 to 12	0.33' - <2'	0.60	0.85	0.73	0.22	0.29	0.52	0.53	-	
								2' - <3'	0.64	0.86	0.76	0.12	-	-	-	59	
								3' - <5'	0.62	0.72	0.72	0.11	-	-	-	59	
								5' - 10'	0.71	0.77	0.81	0.11	-	-	-	54	
15'	1.01	1.16	1.17					0.11	-	-	-	44					
20'	1.27	1.56	1.45					0.11	-	-	-	44					
10	10.5	9	8 to 12	25'	1.45	1.65	1.57	0.11	-	-	-	44					
				30'	1.59	1.72	1.66	0.11	-	-	-	44					
				11	11.5	9	8 to 12	0.33' - <2'	0.68	0.88	0.76	0.22	0.29	0.55	0.57	-	
								2' - <3'	0.68	0.88	0.78	0.18	-	-	-	72	
								3' - <5'	0.68	0.75	0.78	0.18	-	-	-	72	
								5' - 10'	0.79	0.82	0.88	0.17	-	-	-	59	
15'	1.11	1.22	1.26					0.13	-	-	-	49					
20'	1.37	1.64	1.54					0.13	-	-	-	49					
10	10.5	9	8 to 12	25'	1.56	1.73	1.65	0.13	-	-	-	44					
				30'	1.56	1.73	1.68	0.12	-	-	-	44					

See General Note 5

TABLE 13B - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 9' SPANS

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)									As1 EXT. LENGTH (M) (in.)		
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9				
9' x 5'	10	10	10	4 to 12	0.33' - <2'	0.49	0.65	0.57	0.24	0.24	0.40	0.48	-				
					2' - <3'	0.49	0.65	0.57	0.12	-	-	-	54				
					3' - <5'	0.46	0.54	0.53	0.12	-	-	-	49				
					5' - 10'	0.52	0.50	0.51	0.12	-	-	-	49				
					15'	0.75	0.74	0.75	0.12	-	-	-	44				
					20'	0.98	1.01	1.00	0.12	-	-	-	44				
	10	10.5	10	8 to 12	25'	1.21	1.27	1.19	0.12	-	-	-	44				
					30'	1.30	1.36	1.30	0.12	-	-	-	44				
					10	10	10	4 to 12	0.33' - <2'	0.48	0.68	0.60	0.24	0.24	0.39	0.48	-
									2' - <3'	0.48	0.68	0.60	0.12	-	-	-	54
									3' - <5'	0.45	0.57	0.56	0.12	-	-	-	49
									5' - 10'	0.52	0.53	0.56	0.12	-	-	-	49
15'	0.74	0.79	0.81	0.12					-	-	-	44					
20'	0.97	1.07	1.07	0.12					-	-	-	44					
10	10.5	10	8 to 12	25'	1.18	1.35	1.28	0.12	-	-	-	44					
				30'	1.27	1.44	1.38	0.12	-	-	-	44					
				10	10	10	4 to 12	0.33' - <2'	0.49	0.70	0.63	0.24	0.24	0.39	0.49	-	
								2' - <3'	0.49	0.70	0.63	0.12	-	-	-	59	
								3' - <5'	0.46	0.59	0.59	0.12	-	-	-	54	
								5' - 10'	0.54	0.57	0.60	0.12	-	-	-	49	
15'	0.75	0.84	0.86					0.12	-	-	-	44					
20'	0.98	1.13	1.14					0.12	-	-	-	44					
10	10.5	10	8 to 12	25'	1.18	1.43	1.36	0.12	-	-	-	44					
				30'	1.28	1.52	1.46	0.12	-	-	-	44					
				10	10	10	4 to 12	0.33' - <2'	0.51	0.72	0.65	0.24	0.24	0.39	0.51	-	
								2' - <3'	0.51	0.72	0.65	0.12	-	-	-	59	
								3' - <5'	0.49	0.61	0.62	0.12	-	-	-	59	
								5' - 10'	0.57	0.60	0.65	0.12	-	-	-	54	
15'	0.79	0.89	0.92					0.12	-	-	-	44					
20'	1.02	1.20	1.22					0.12	-	-	-	44					
10	10.5	10	8 to 12	25'	1.21	1.50	1.44	0.12	-	-	-	44					
				30'	1.33	1.59	1.54	0.12	-	-	-	44					
				10	10	10	4 to 12	0.33' - <2'	0.54	0.74	0.68	0.24	0.24	0.41	0.54	-	
								2' - <3'	0.54	0.74	0.68	0.15	-	-	-	72	
								3' - <5'	0.53	0.63	0.64	0.13	-	-	-	72	
								5' - 10'	0.62	0.64	0.70	0.12	-	-	-	59	
15'	0.85	0.94	0.99					0.12	-	-	-	49					
20'	1.09	1.26	1.29					0.12	-	-	-	49					
10	10.5	10	8 to 12	25'	1.28	1.56	1.52	0.12	-	-	-	44					
				30'	1.42	1.66	1.66	0.12	-	-	-	44					

See General Note 5

- NOTES:  
 1. See Sheet 2 for General Notes.  
 2. See Sheet 7 for Reinforcing Details and dimension locations.  
 3. See Sheet 14 for WWR Bending Diagrams.

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**TABLE 14 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 10' SPANS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)			
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9				
10' x 5'	10	10	10	4 to 12	0.33' - <2'	0.60	0.73	0.61	0.24	0.24	0.50	0.57	-				
					2' - <3'	0.60	0.73	0.61	0.12	-	-	-	58				
					3' - <5'	0.57	0.64	0.58	0.12	-	-	-	53				
					5' - 10'	0.65	0.60	0.60	0.12	-	-	-	52				
					15'	0.94	0.90	0.89	0.12	-	-	-	47				
					20'	1.24	1.23	1.19	0.12	-	-	-	47				
	10	10	10	8 to 12	25'	1.39	1.37	1.28	0.12	-	-	-	47				
					30'	1.38	1.43	1.41	0.12	-	-	-	47				
					10' x 6'	10	10	4 to 12	0.33' - <2'	0.58	0.75	0.64	0.24	0.24	0.48	0.56	-
									2' - <3'	0.58	0.75	0.64	0.12	-	-	-	58
									3' - <5'	0.56	0.67	0.62	0.12	-	-	-	52
									5' - 10'	0.64	0.64	0.65	0.12	-	-	-	52
15'	0.92	0.96	0.95	0.12					-	-	-	47					
20'	1.21	1.31	1.27	0.12					-	-	-	47					
10	10	10	8 to 12	25'		1.35	1.44	1.36	0.12	-	-	-	47				
				30'		1.35	1.51	1.49	0.12	-	-	-	47				
				10' x 7'		10	10	4 to 12	0.33' - <2'	0.57	0.78	0.67	0.24	0.24	0.48	0.57	-
									2' - <3'	0.57	0.78	0.67	0.12	-	-	-	58
									3' - <5'	0.58	0.70	0.65	0.12	-	-	-	58
									5' - 10'	0.65	0.68	0.70	0.12	-	-	-	52
15'	0.92	1.02	1.02		0.12				-	-	-	47					
20'	1.21	1.38	1.35		0.12				-	-	-	47					
10	10	10	8 to 12		25'	1.33	1.52	1.44	0.12	-	-	-	47				
					30'	1.38	1.58	1.57	0.12	-	-	-	47				
					10' x 8'	10	10	4 to 12	0.33' - <2'	0.58	0.80	0.70	0.24	0.26	0.48	0.58	-
									2' - <3'	0.58	0.80	0.70	0.12	-	-	-	64
									3' - <5'	0.60	0.72	0.68	0.12	-	-	-	58
									5' - 10'	0.67	0.72	0.75	0.12	-	-	-	52
15'	0.95	1.08	1.08	0.12					-	-	-	47					
20'	1.24	1.45	1.44	0.12					-	-	-	47					
10	10	10	8 to 12	25'		1.36	1.59	1.52	0.12	-	-	-	47				
				30'		1.45	1.64	1.64	0.12	-	-	-	47				
				10' x 9'		10	10	4 to 12	0.33' - <2'	0.61	0.82	0.73	0.24	0.26	0.50	0.61	-
									2' - <3'	0.61	0.82	0.73	0.14	-	-	-	70
									3' - <5'	0.64	0.75	0.73	0.13	-	-	-	64
									5' - 10'	0.72	0.77	0.80	0.12	-	-	-	58
15'	1.00	1.13	1.15		0.12				-	-	-	52					
20'	1.30	1.53	1.52		0.12				-	-	-	47					
10	10	10	8 to 12		25'	1.42	1.66	1.60	0.12	-	-	-	47				
					30'	1.57	1.70	1.72	0.12	-	-	-	47				
					10' x 10'	10	10	4 to 12	0.33' - <2'	0.66	0.84	0.75	0.24	0.27	0.52	0.65	-
									2' - <3'	0.66	0.84	0.75	0.20	-	-	-	79
									3' - <5'	0.70	0.77	0.79	0.19	-	-	-	70
									5' - 10'	0.79	0.81	0.87	0.18	-	-	-	64
15'	1.09	1.19	1.23	0.15					-	-	-	52					
20'	1.40	1.61	1.61	0.14					-	-	-	52					
10	10	10	8 to 12	25'		1.53	1.74	1.68	0.14	-	-	-	47				
				30'		1.60	1.71	1.74	0.14	-	-	-	47				

See General Note 5

**TABLE 15 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 11' SPANS**

SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)			
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9				
11' x 4'	11	11	11	4 to 12	0.33' - <2'	0.60	0.66	0.54	0.27	0.27	0.52	0.56	-				
					2' - <3'	0.60	0.66	0.54	0.14	-	-	-	62				
					3' - <5'	0.60	0.61	0.53	0.14	-	-	-	62				
					5' - 10'	0.79	0.63	0.62	0.14	-	-	-	55				
					15'	1.01	0.82	0.79	0.14	-	-	-	55				
					20'	1.34	1.11	1.06	0.14	-	-	-	55				
	11	11	11	8 to 12	25'	1.52	1.27	1.23	0.14	-	-	-	55				
					30'	1.54	1.37	1.34	0.14	-	-	-	50				
					11' x 6'	11	11	4 to 12	0.33' - <2'	0.57	0.71	0.60	0.27	0.27	0.47	0.53	-
									2' - <3'	0.56	0.71	0.60	0.14	-	-	-	62
									3' - <5'	0.56	0.67	0.59	0.14	-	-	-	55
									5' - 10'	0.73	0.71	0.72	0.14	-	-	-	55
15'	0.92	0.92	0.91	0.14					-	-	-	50					
20'	1.21	1.25	1.21	0.14					-	-	-	50					
11	11	11	8 to 12	25'		1.37	1.43	1.39	0.14	-	-	-	50				
				30'		1.39	1.53	1.50	0.14	-	-	-	50				
				11' x 8'		11	11	4 to 12	0.33' - <2'	0.55	0.76	0.66	0.27	0.27	0.46	0.55	-
									2' - <3'	0.55	0.76	0.66	0.14	-	-	-	62
									3' - <5'	0.54	0.72	0.65	0.14	-	-	-	62
									5' - 10'	0.73	0.79	0.82	0.14	-	-	-	55
15'	0.93	1.03	1.03		0.14				-	-	-	50					
20'	1.21	1.39	1.36		0.14				-	-	-	50					
11	11	11	8 to 12		25'	1.34	1.56	1.50	0.14	-	-	-	50				
					30'	1.41	1.66	1.65	0.14	-	-	-	50				
					11' x 10'	11	11	4 to 12	0.33' - <2'	0.60	0.81	0.71	0.27	0.27	0.48	0.60	-
									2' - <3'	0.60	0.81	0.71	0.15	-	-	-	75
									3' - <5'	0.61	0.77	0.70	0.14	-	-	-	69
									5' - 10'	0.80	0.88	0.93	0.14	-	-	-	62
15'	1.01	1.13	1.15	0.14					-	-	-	55					
20'	1.30	1.52	1.52	0.14					-	-	-	50					
11	11	11	8 to 12	25'		1.42	1.70	1.65	0.14	-	-	-	50				
				30'		1.53	1.77	1.74	0.14	-	-	-	50				
				11' x 11'		11	11	4 to 12	0.33' - <2'	0.64	0.83	0.74	0.27	0.27	0.51	0.64	-
									2' - <3'	0.64	0.83	0.74	0.21	-	-	-	86
									3' - <5'	0.67	0.79	0.75	0.21	-	-	-	75
									5' - 10'	0.88	0.93	0.99	0.19	-	-	-	69
15'	1.09	1.19	1.23		0.16				-	-	-	55					
20'	1.40	1.59	1.60		0.15				-	-	-	55					
11	11	11	8 to 12		25'	1.54	1.77	1.73	0.15	-	-	-	50				
					30'	1.57	1.77	1.76	0.14	-	-	-	50				

See General Note 5

**NOTES:**

- See Sheet 2 for General Notes.
- See Sheet 7 for Reinforcing Details and dimension locations.
- See Sheet 14 for WWR Bending Diagrams.

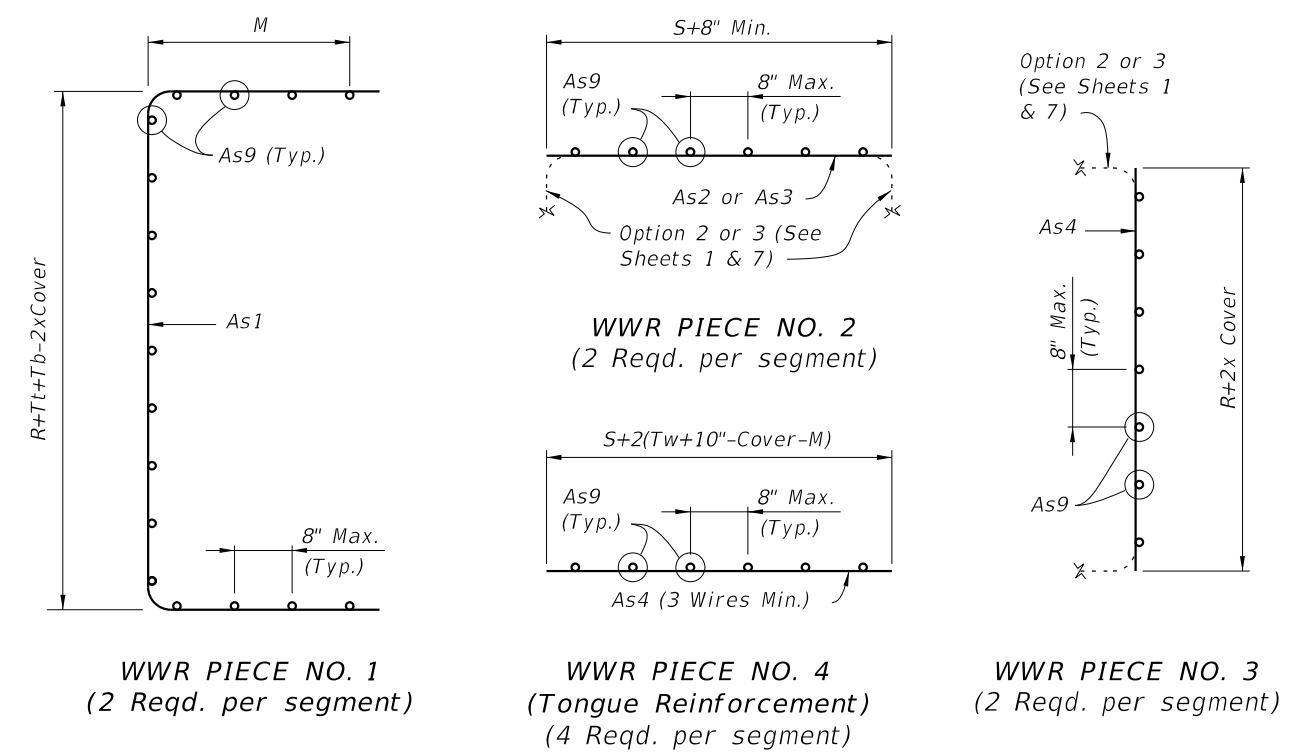
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TABLE 16 - STANDARD PRECAST BOX CULVERT DESIGNS (3" COVER) - 12' SPANS

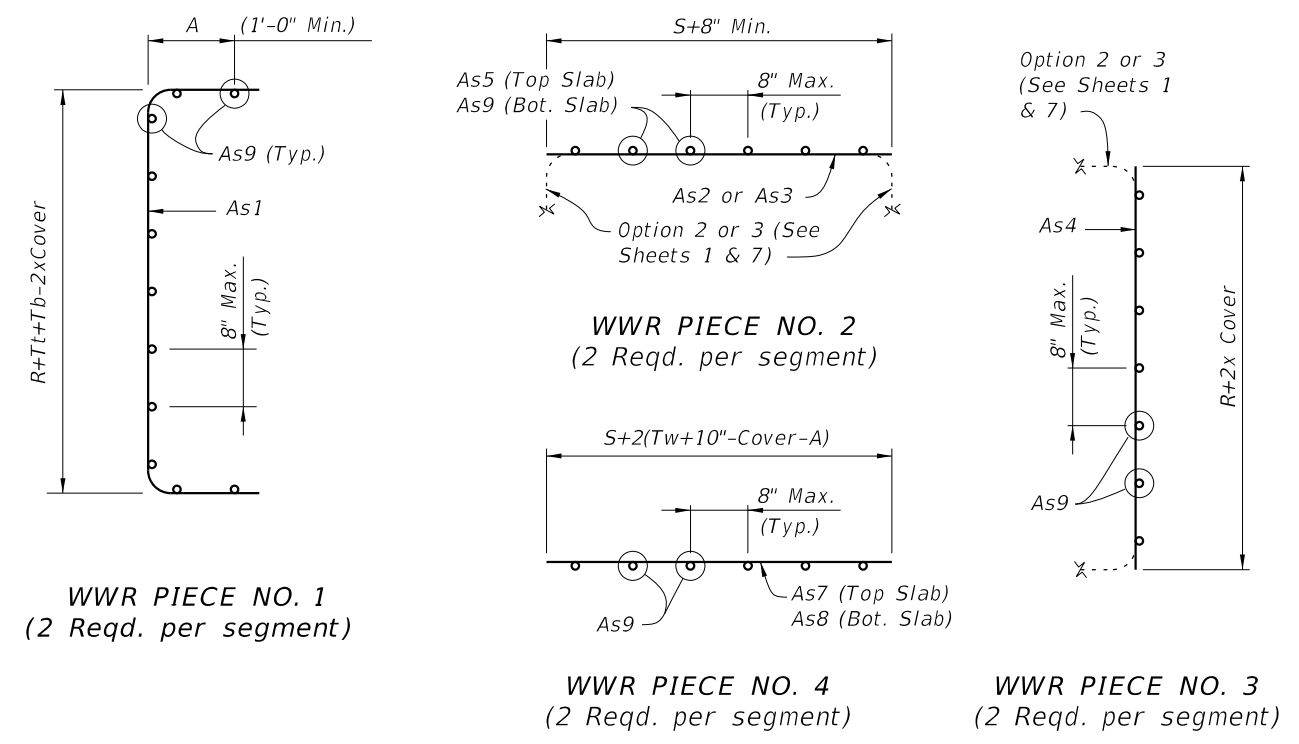
SPAN x RISE (S) (R) (Ft.)	SLAB / WALL THICKNESS				DESIGN EARTH COVER ABOVE TOP SLAB	REINFORCEMENT AREAS (sq. in./Ft.)								As1 EXT. LENGTH (M) (in.)
	TOP (Tt) (in.)	BOT. (Tb) (in.)	SIDE (Tw) (in.)	HAUNCH (H) (in.)		As1	As2	As3	As4	As5	As7	As8	As9	
12' x 4'	12	12	12	12	4	0.33' - <2'	0.59	0.64	0.51	0.29	0.29	0.52	0.55	-
					2' - <3'	0.60	0.64	0.51	0.15	-	-	-	-	73
					3' - <5'	0.60	0.61	0.51	0.15	-	-	-	-	66
					5' - 10'	0.81	0.61	0.61	0.15	-	-	-	-	66
					15'	1.04	0.80	0.77	0.15	-	-	-	-	59
					20'	1.37	1.08	1.03	0.15	-	-	-	-	59
12' x 6'	12	12	12	12	4	0.33' - <2'	0.56	0.70	0.57	0.29	0.29	0.47	0.52	-
					2' - <3'	0.56	0.70	0.57	0.15	-	-	-	-	66
					3' - <5'	0.56	0.67	0.57	0.15	-	-	-	-	59
					5' - 10'	0.74	0.69	0.70	0.15	-	-	-	-	59
					15'	0.94	0.90	0.88	0.15	-	-	-	-	53
					20'	1.23	1.22	1.17	0.15	-	-	-	-	53
12' x 8'	12	12	12	12	4	0.33' - <2'	0.55	0.75	0.63	0.29	0.29	0.45	0.53	-
					2' - <3'	0.55	0.75	0.63	0.15	-	-	-	-	66
					3' - <5'	0.55	0.73	0.63	0.15	-	-	-	-	59
					5' - 10'	0.73	0.77	0.79	0.15	-	-	-	-	59
					15'	0.93	1.00	0.99	0.15	-	-	-	-	53
					20'	1.21	1.35	1.31	0.15	-	-	-	-	53
12' x 10'	12	12	12	12	4	0.33' - <2'	0.57	0.80	0.68	0.29	0.29	0.46	0.57	-
					2' - <3'	0.57	0.80	0.68	0.15	-	-	-	-	73
					3' - <5'	0.59	0.77	0.68	0.15	-	-	-	-	66
					5' - 10'	0.78	0.85	0.89	0.15	-	-	-	-	59
					15'	0.98	1.10	1.11	0.15	-	-	-	-	53
					20'	1.26	1.47	1.45	0.15	-	-	-	-	53
12' x 12'	12	12	12	12	4	0.33' - <2'	0.65	0.84	0.73	0.29	0.29	0.50	0.65	-
					2' - <3'	0.65	0.84	0.73	0.23	-	-	-	-	93
					3' - <5'	0.68	0.81	0.75	0.22	-	-	-	-	80
					5' - 10'	0.90	0.94	1.01	0.21	-	-	-	-	73
					15'	1.12	1.20	1.24	0.18	-	-	-	-	59
					20'	1.42	1.60	1.61	0.16	-	-	-	-	59

See General Note 5

- NOTES:  
 1. See Sheet 2 of 14 for General Notes.  
 2. See Sheet 7 of 14 for Reinforcing Details and dimension locations.



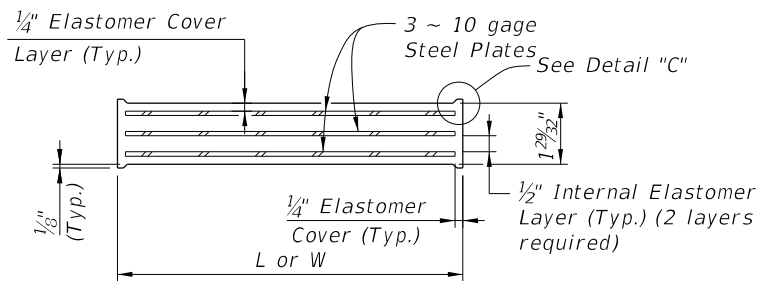
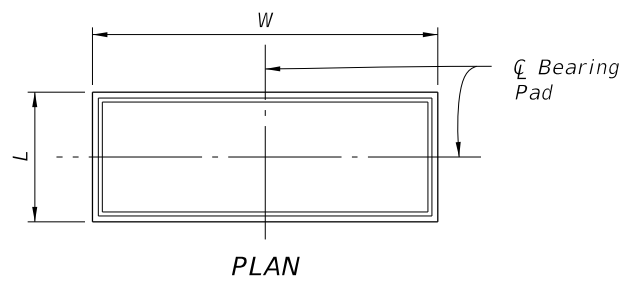
TYPE 2 BOX SECTION (DESIGN EARTH COVER 2' OR GREATER)



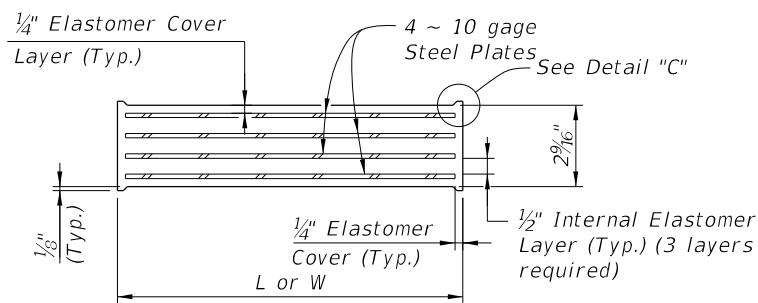
TYPE 1 BOX SECTION (DESIGN EARTH COVER LESS THAN 2')

- REINFORCEMENT NOTES:  
 1. Reinforcement bending dimensions are out-to-out.  
 2. See General Notes 4, 5 and 6 on Sheet 2.  
 3. See Tables 1 thru 16 for dimensions M, R, S, Tb, Tt and Tw.  
 4. Dimension "A" is determined by the Manufacturer in accordance with the requirements of Detail "B" on Sheets 1 and 7.

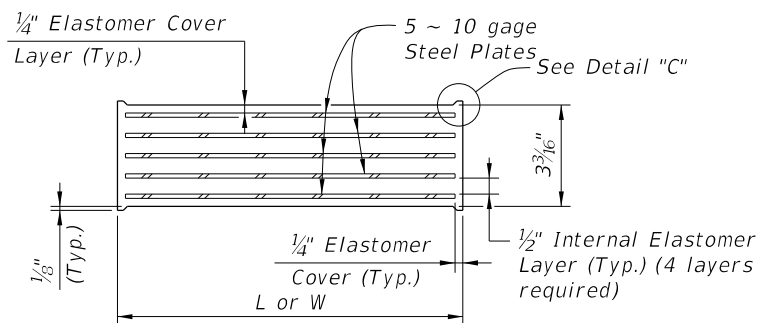
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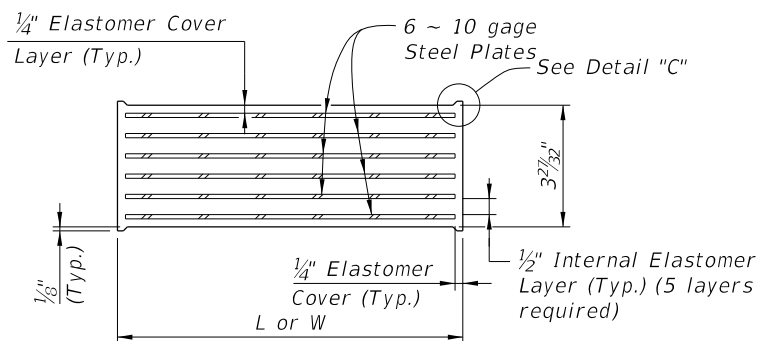
TYPICAL SECTION TYPE D, E & AA PAD



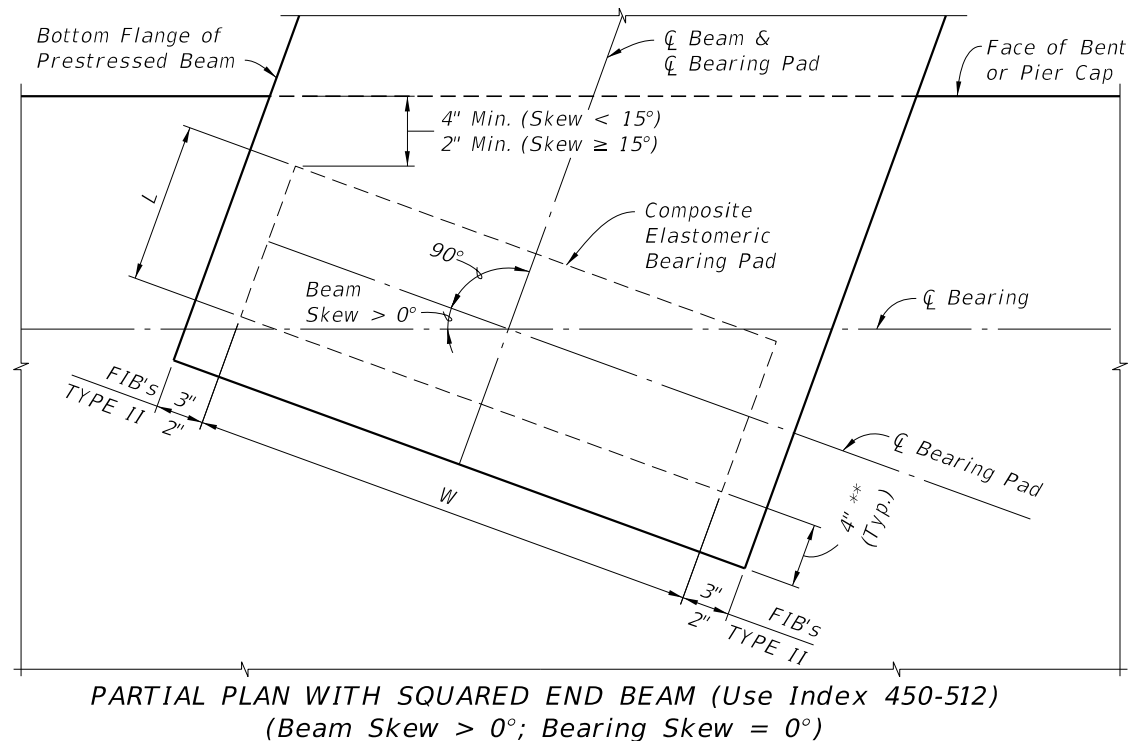
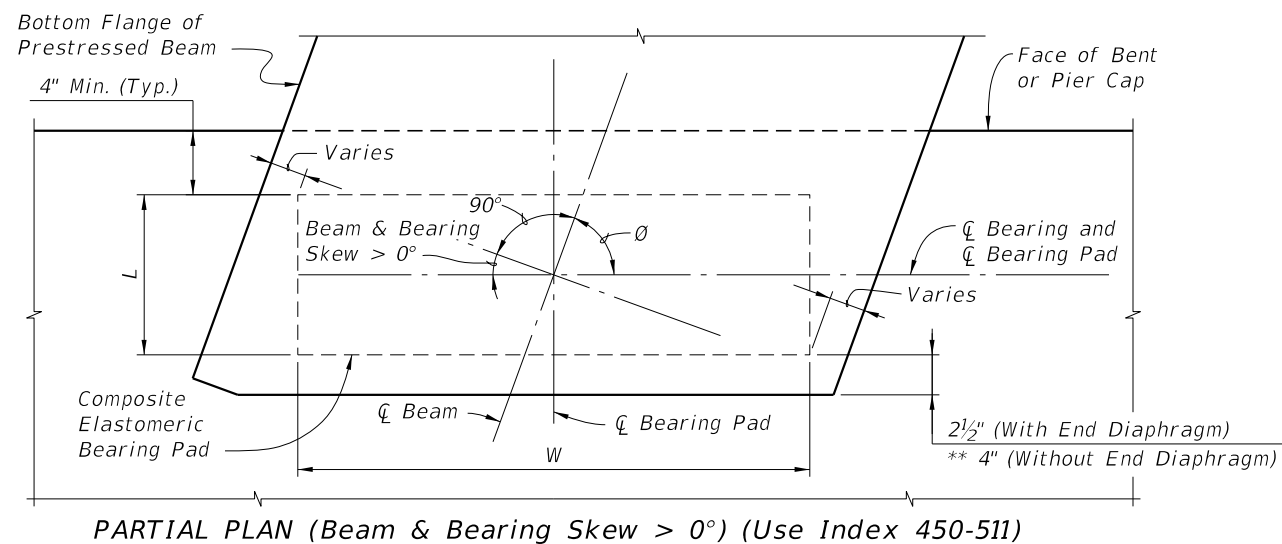
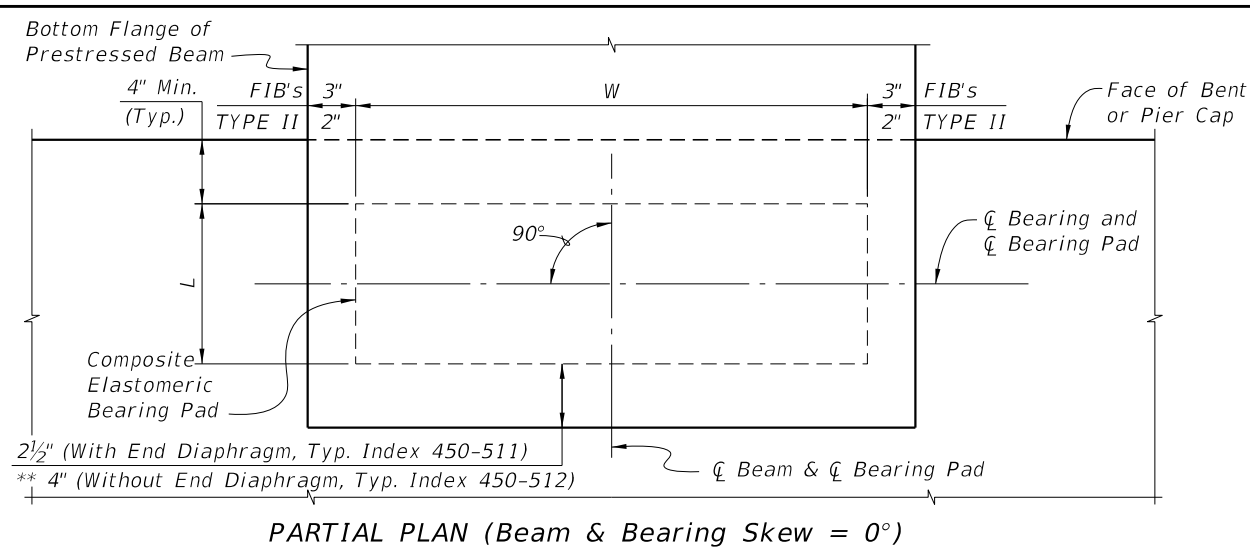
TYPICAL SECTION TYPE F, G & AB PAD



TYPICAL SECTION TYPE H PAD



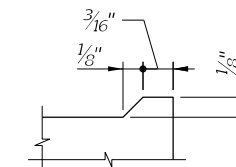
TYPICAL SECTION TYPE J & K PAD



PAD TYPE (See Note 1)	BEAM TYPE	BEARING PAD DIMENSIONS		*BEVELED BEARING PLATE DIMENSIONS	
		L	W	C	D
D (G=110psi)	FLORIDA I-BEAM	8"	2'-8"	1'-0"	3'-0"
E (G=110psi)		10"	2'-8"	1'-0"	3'-0"
F (G=110psi)		10"	2'-8"	1'-0"	3'-0"
G (G=150psi)		10"	2'-8"	1'-0"	3'-0"
H (G=150psi)		10"	2'-8"	1'-0"	3'-0"
J (G=150psi)		10"	2'-8"	1'-0"	3'-0"
K (G=150psi)		1'-0"	2'-8"	1'-1 1/2"	3'-0"
AA (G=110psi)	AASHTO TYPE II	10"	1'-2"	1'-0"	1'-4"
AB (G=150psi)		10"	1'-2"	1'-0"	1'-4"

\* Work this sheet with the appropriate type Bearing Plate Detail (See Bearing Plate Data Table) 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.

\*\* Offset to End of Beam is reduced to 2" for Type K Pad.

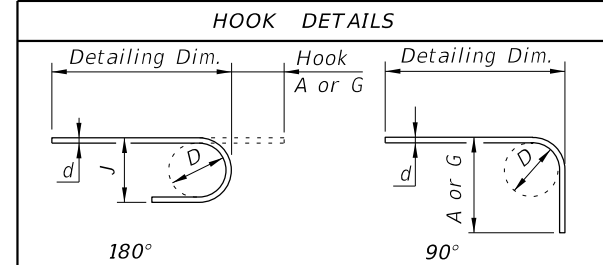
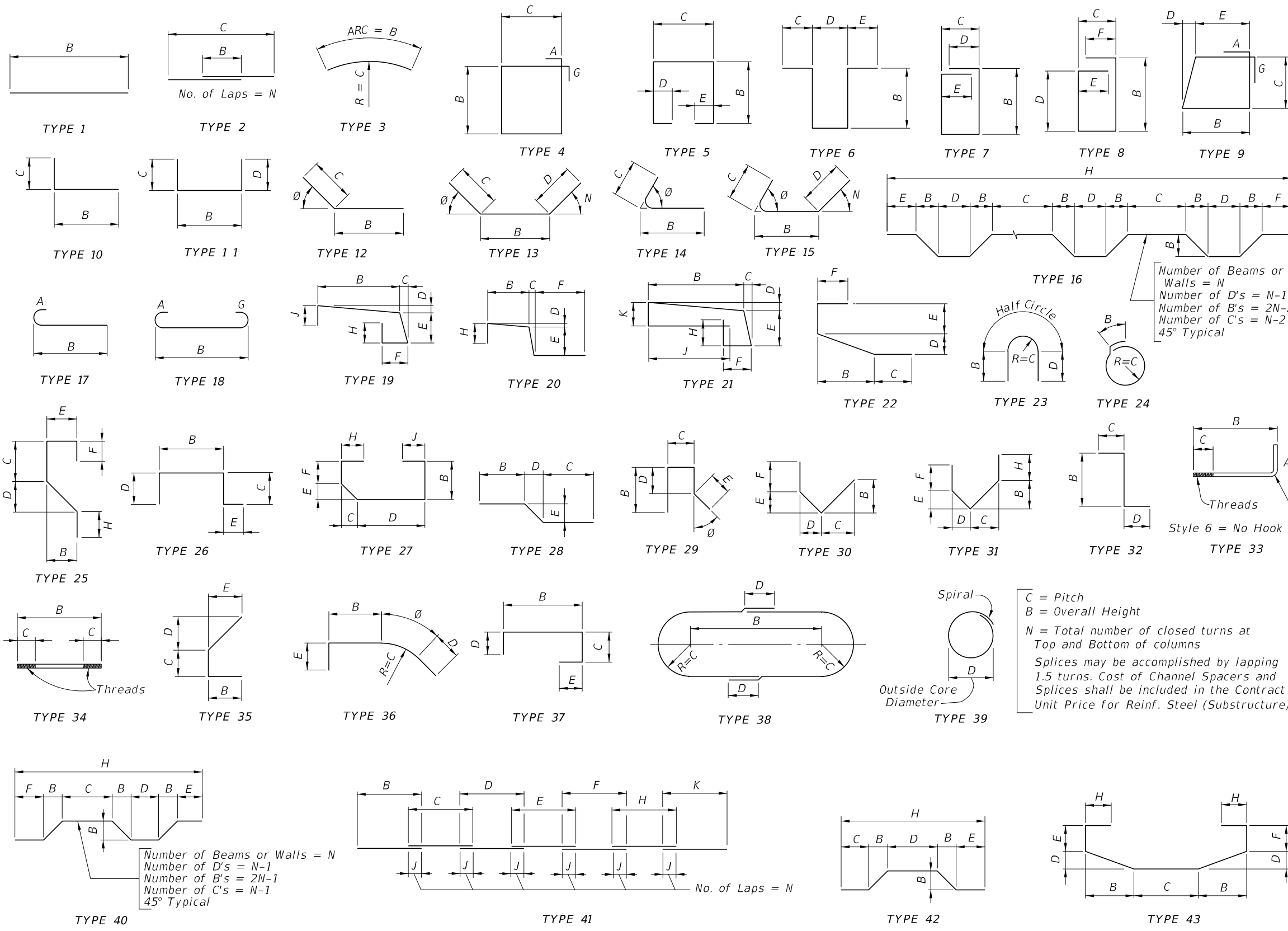


BEARING PAD NOTES:

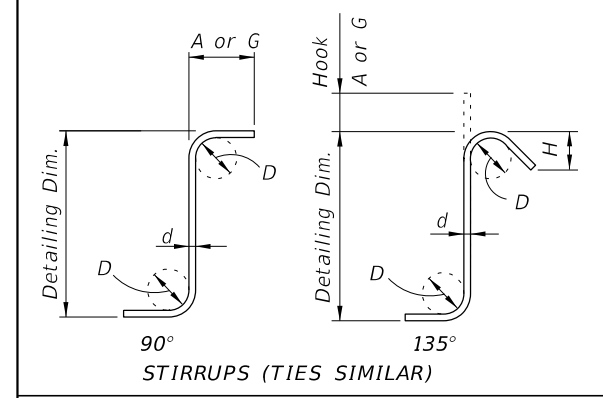
1. Neoprene in Type D, E, F & AA bearing pads shall have a shear modulus (G) of 110 psi. Neoprene in Type G, H, J, K & AB bearing pads shall have a shear modulus (G) of 150 psi.
2. Steel Plates in bearing pads shall conform to ASTM A1011 Grade 36, Type 1.
3. See Bearing Pad Data Table in Structures Plans for quantities of Type D, E, F, G, H, J, K, AA and/or AB Bearing Pads.

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BAR SIZE	D	180° HOOKS		90° HOOKS
		A OR G	J	A OR G
#3	2 1/4"	5"	3"	6"
#4	3"	6"	4"	8"
#5	3 3/4"	7"	5"	10"
#6	4 1/2"	8"	6"	1'-0"
#7	5 1/4"	10"	7"	1'-2"
#8	6"	11"	8"	1'-4"
#9	9 1/2"	1'-3"	11 3/4"	1'-7"
#10	10 3/4"	1'-5"	1'-1 1/4"	1'-10"
#11	12"	1'-7"	1'-2 3/4"	2'-0"
#14	18 1/4"	2'-3"	1'-9 3/4"	2'-7"
#18	24"	3'-0"	2'-4 1/2"	3'-5"
STYLE		1		3



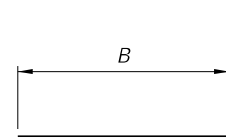
BAR SIZE	D	90° HOOKS		135° HOOKS	
		A or G	A or G	A or G	H *
#3	1 1/2"	4"	4"	4"	2 1/2"
#4	2"	4 1/2"	4 1/2"	4 1/2"	3"
#5	2 1/2"	6"	5 1/2"	5 1/2"	3 3/4"
#6	4 1/2"	1'-0"	8"	8"	4 1/2"
#7	5 1/4"	1'-2"	9"	9"	5 1/4"
#8	6"	1'-4"	10 1/2"	10 1/2"	6"
STYLE		4		5	

STYLE 6 = NO HOOK

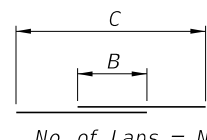
\* Dimension is approximate.  
Hook Styles Detailed on this sheet are for Illustration Only.  
Actual Hook Style for any particular bar will be shown under A or G Heading on REINFORCING BAR LIST sheet(s) in Structures Plans.  
All Dimensions are out-to-out.

NOTE: For Bar Dimensions See REINFORCING BAR LIST Sheet(s) in Structures Plans.

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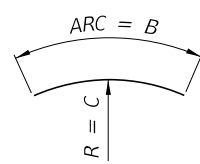


TYPE 1

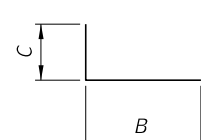


No. of Laps = N

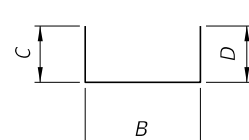
TYPE 2



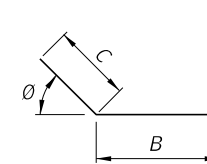
TYPE 3



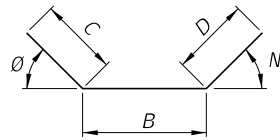
TYPE 10



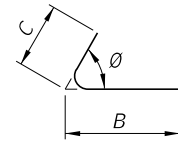
TYPE 11



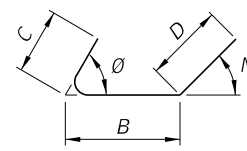
TYPE 12



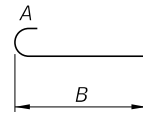
TYPE 13



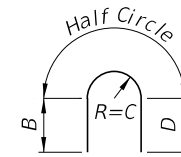
TYPE 14



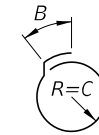
TYPE 15



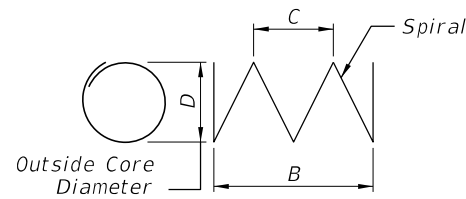
TYPE 17



TYPE 23

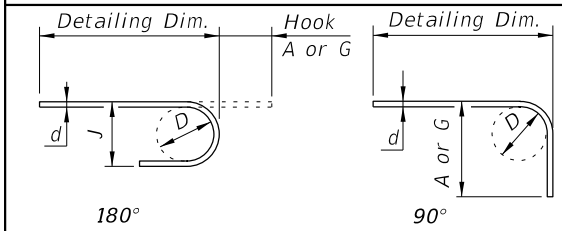


TYPE 24



TYPE 39

HOOK DETAILS



180°

90°

BAR SIZE	D	180° HOOKS		90° HOOKS
		A OR G	J	A OR G
#3	2 1/4"	5"	3"	6"
#4	3"	6"	4"	8"
#5	3 3/4"	7"	5"	10"
#6	4 1/2"	8"	6"	1'-0"
#7	5 1/4"	10"	7"	1'-2"
#8	6"	11"	8"	1'-4"

NOTES

GENERAL

All dimensions are out-to-out.  
For Bar dimensions See REINFORCING BAR LIST Sheet(s) in Structures Plans.

SPIRALS (TYPE 39 BARS)

C = Pitch  
B = Overall Height  
N = Total number of closed turns at Top and Bottom of columns  
Spirals = 1.5 turns

Include spiral splice in Contract Unit Price for FRP Reinforcing.

HOOKS

All Dimensions are approximate.  
Hook Styles Detailed on this sheet are for Illustration Only. Actual Hook Style for any particular bar will be shown under A or G Heading on REINFORCING BAR LIST sheet(s) in Structures Plans.

SINGLE BAR BENDING DETAILS

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LAST REVISION 11/01/20	DESCRIPTION:
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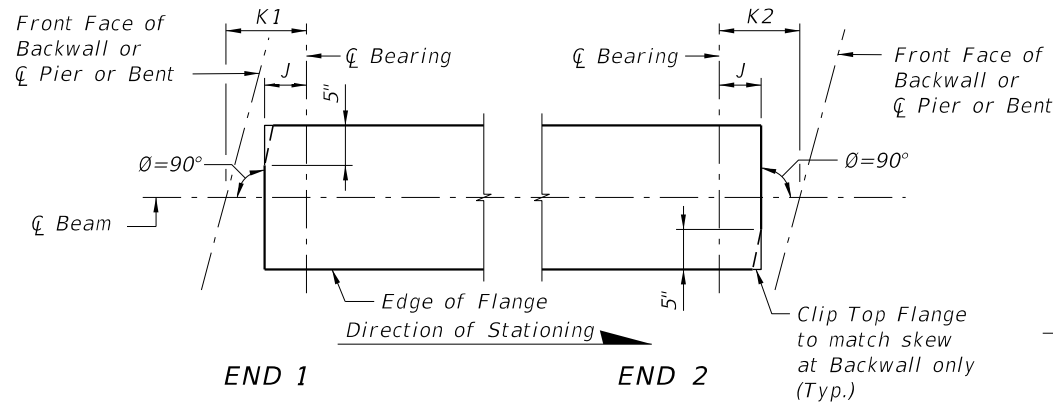


FY 2022-23  
STANDARD PLANS

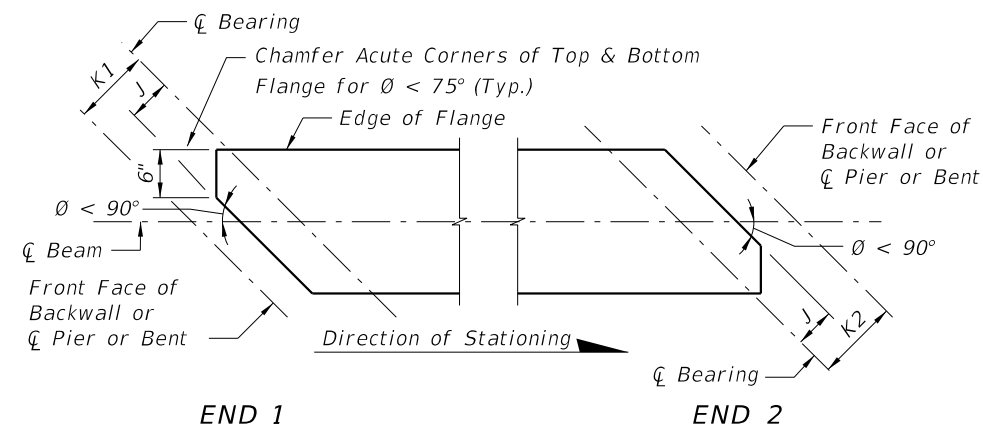
BAR BENDING DETAILS (FRP)

INDEX  
415-010

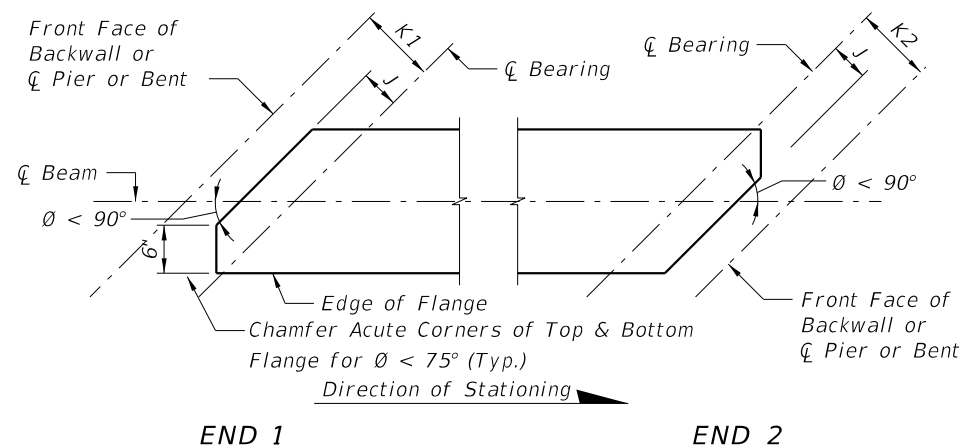
SHEET  
1 of 1



**CASE 1**  
(Standard Orientation for New Construction)

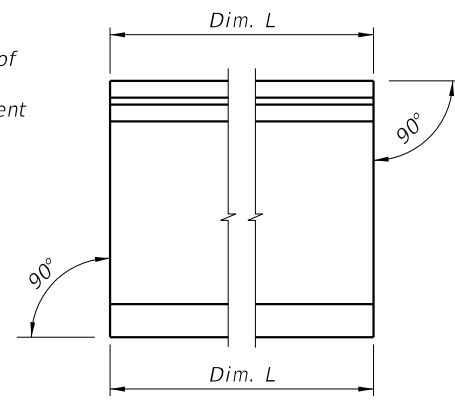


**CASE 2**  
(Special Orientation for Widening)

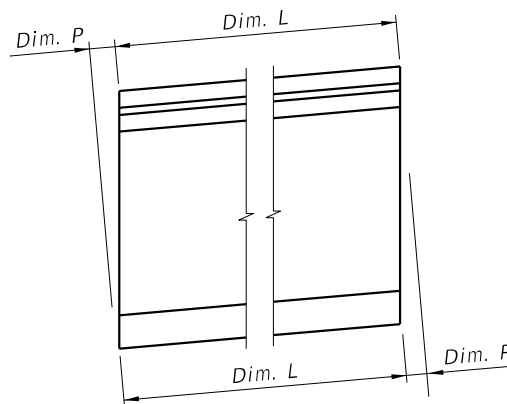


**CASE 3**  
(Special Orientation for Widening)

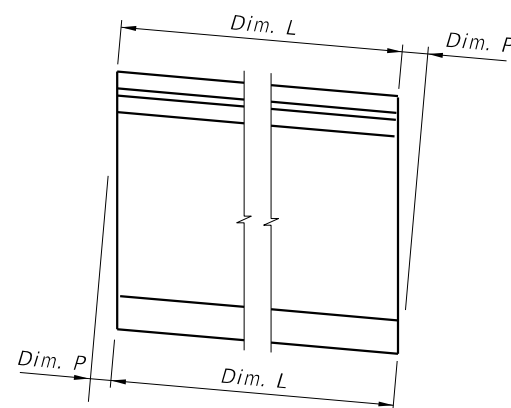
**SCHEMATIC PLAN VIEWS AT BEAM ENDS**



**CONDITION 1**  
(Dim P = 0.0)



**CONDITION 2**



**CONDITION 3**

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

**BEAM NOTES**

1. Work this Index with the Florida-I Beam Standard Details (Index 450-036 thru 450-096) and the Table of Beam Variables in Structures Plans.
2. All bar bend dimensions are out-to-out.
3. Concrete cover: 2 inches minimum.
4. Stress Strands N to 10 kips each.
5. Place one (1) Bar 5K or 5Z at each location. Alternate the direction of the ends for each bar (see "ELEVATION AT END OF BEAM" in Standard Details).
6. Tie Bars 5K and 5Z to the fully bonded strands in the bottom or center row (see "STRAND PATTERN" on the Table of Beam Variables sheet in Structures Plans).
  - A. At the Contractor's option, the length of the bottom legs of Bars 5K and 5Z may be extended to facilitate tying to the exterior strands.
  - B. For deformed WWR, supplemental transverse #4 bars are permitted to support Pieces K & S under the cross wires on the bottom row of strands.
7. Place Bars 3C1, 3D1 and 4M1 in beam END 1, and Bars 3C2, 3D2 and 4M2 in beam END 2. END 1 and END 2 are shown on the Standard Details "ELEVATION".
8. 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 deformed WWR, cut top cross wire and rotate bars as required or reduce end cover at top of the beam to 1" minimum.
9. For beams with skewed end conditions:
  - A. Place end reinforcement parallel to the skewed end of the beam. End reinforcement is 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".
  - B. Beyond the limits of the spacing for Bars 3C, place Bars 3D3, 5K and 4M3 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 "BILL OF REINFORCING STEEL". For placement locations see Skewed Beam End Details for Widening Existing Bridges.
  - C. Adjust the dimensions of Bars 3C1, 3C2, 3D1, 3D2, 4M1 and 4M2 as shown on the Bending Diagram.
  - D. WWR is not permitted for end reinforcement Bars 3D1, 3D2, 4M1 and 4M2; use bar reinforcement.
10. Contractor Options:
  - A. Deformed WWR may be used in lieu of Bars 3D, 5K, 4M, and 5Z as shown on the Standard Details; except at skewed ends (see Note 9).
  - B. Bars 3D1, 3D2 and 3D3 may be fabricated as a single bar with a 1'-0" minimum lap splice of the top legs, or the length of the bottom legs may be extended to facilitate tying to the exterior strands.
11. Embedment of Safety Line Anchorage Devices are permitted in the top flange to accommodate fall protection systems. See shop drawings for details and spacing of any required anchorage devices.
12. For beams with ends that will not be permanently encased in concrete diaphragms, cut wedges and recess Prestressing strands at the end of the beam without damaging the surrounding concrete. See "STRAND CUTTING AND PROTECTING DETAIL" on Sheet 2. Protect end of wedged recessed strands in accordance with Specification Section 450.
13. Holes in the beam web for temporary bracing or shipping devices must be formed prior to casting. Fill holes not meeting all the following criteria in accordance with Specification Section 450.
  - A. The superstructure environmental classification is slightly or moderately aggressive
  - B. Clear cover to adjacent steel reinforcing is 1" or greater
  - C. Hole inside diameter is 2" maximum
  - D. Non-metallic, non-water absorbing forming materials such as PVC, may be left in place permanently.

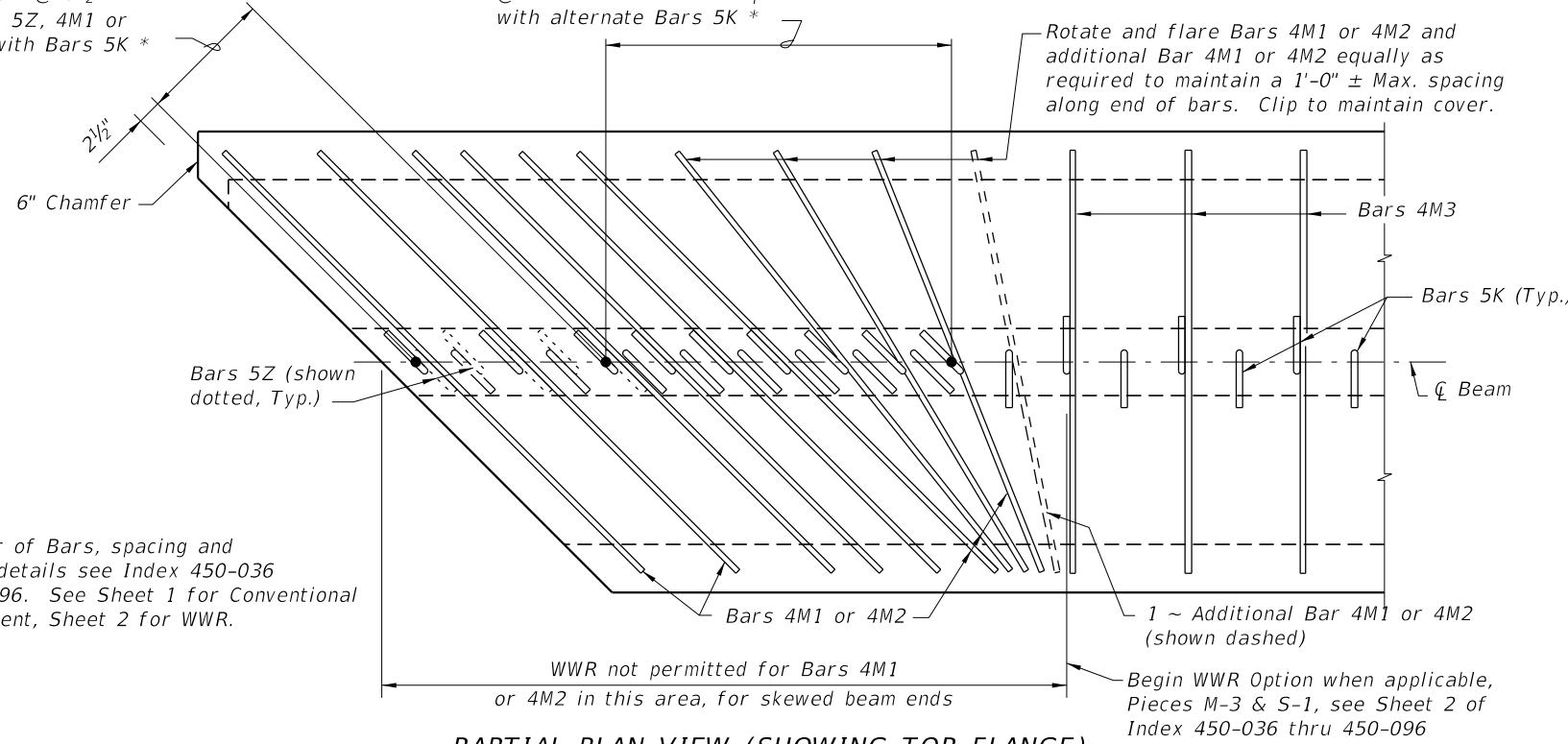
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LAST REVISION 11/01/21	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>FLORIDA-I BEAM</b> - TYPICAL DETAILS & NOTES	INDEX 450-010	SHEET 1 of 2
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Bars 5K spaced perpendicular to end of beam @ 3½". Skewed Bars 5Z, 4M1 or 4M2 placed with Bars 5K \*

Bars 5K spaced along  $\phi$  Beam @ 3". Bars 4M1 or 4M2 placed with alternate Bars 5K \*

Rotate and flare Bars 4M1 or 4M2 and additional Bar 4M1 or 4M2 equally as required to maintain a 1'-0"  $\pm$  Max. spacing along end of bars. Clip to maintain cover.



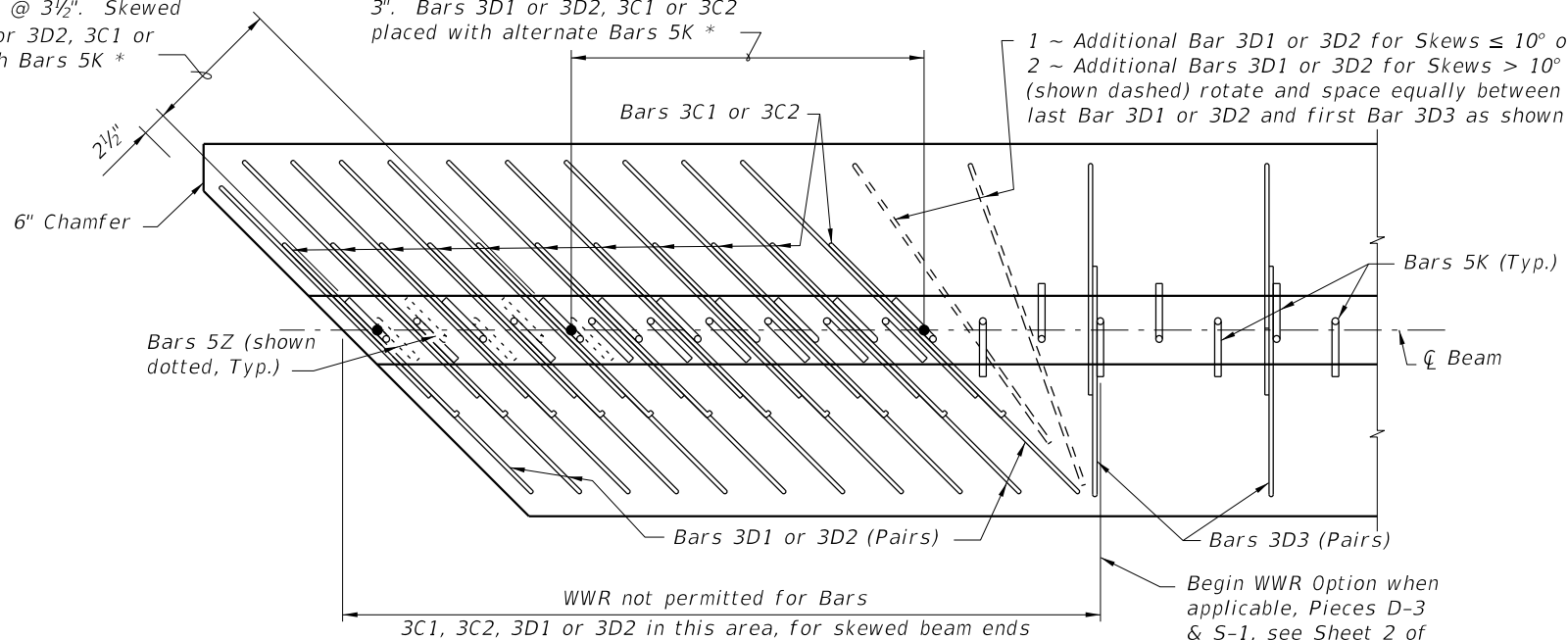
**PARTIAL PLAN VIEW (SHOWING TOP FLANGE)**  
(End 1 Shown, End 2 Similar)  
(Bars 5A, 5Y & Strands N not shown for clarity)

\* For number of Bars, spacing and placement details see Index 450-036 thru 450-096. See Sheet 1 for Conventional Reinforcement, Sheet 2 for WWR.

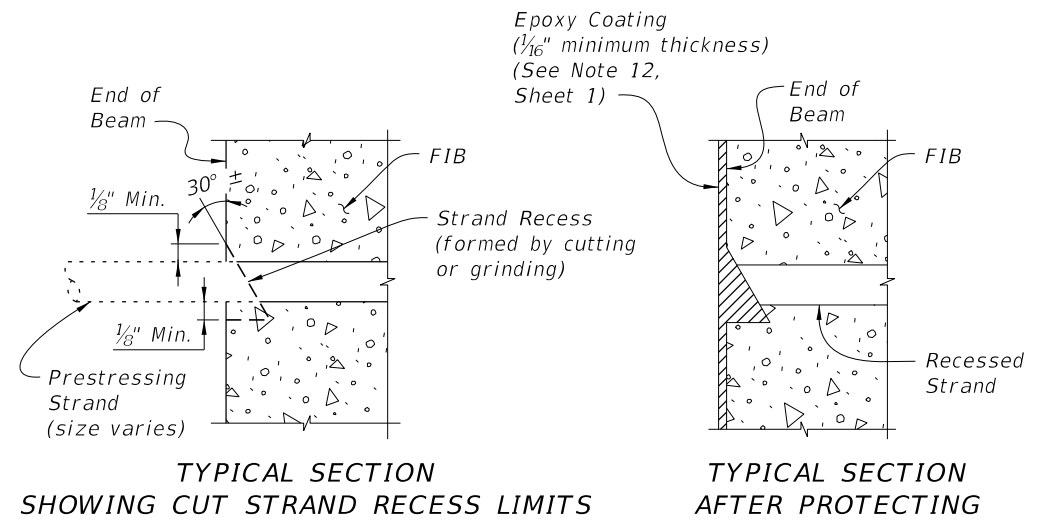
Bars 5K spaced perpendicular to end of beam @ 3½". Skewed Bars 5Z, 3D1 or 3D2, 3C1 or 3C2 placed with Bars 5K \*

Bars 5K spaced along  $\phi$  Beam @ 3". Bars 3D1 or 3D2, 3C1 or 3C2 placed with alternate Bars 5K \*

1 ~ Additional Bar 3D1 or 3D2 for Skews  $\leq 10^\circ$  or 2 ~ Additional Bars 3D1 or 3D2 for Skews  $> 10^\circ$  (shown dashed) rotate and space equally between last Bar 3D1 or 3D2 and first Bar 3D3 as shown



**PARTIAL SECTION THRU WEB (SHOWING BOTTOM FLANGE)**  
(END 1 Shown, END 2 Similar)  
(Bars 5Y, Strands, and Embedded Bearing Plate "A" not shown for clarity)



**TYPICAL SECTION SHOWING CUT STRAND RECESS LIMITS**      **TYPICAL SECTION AFTER PROTECTING**

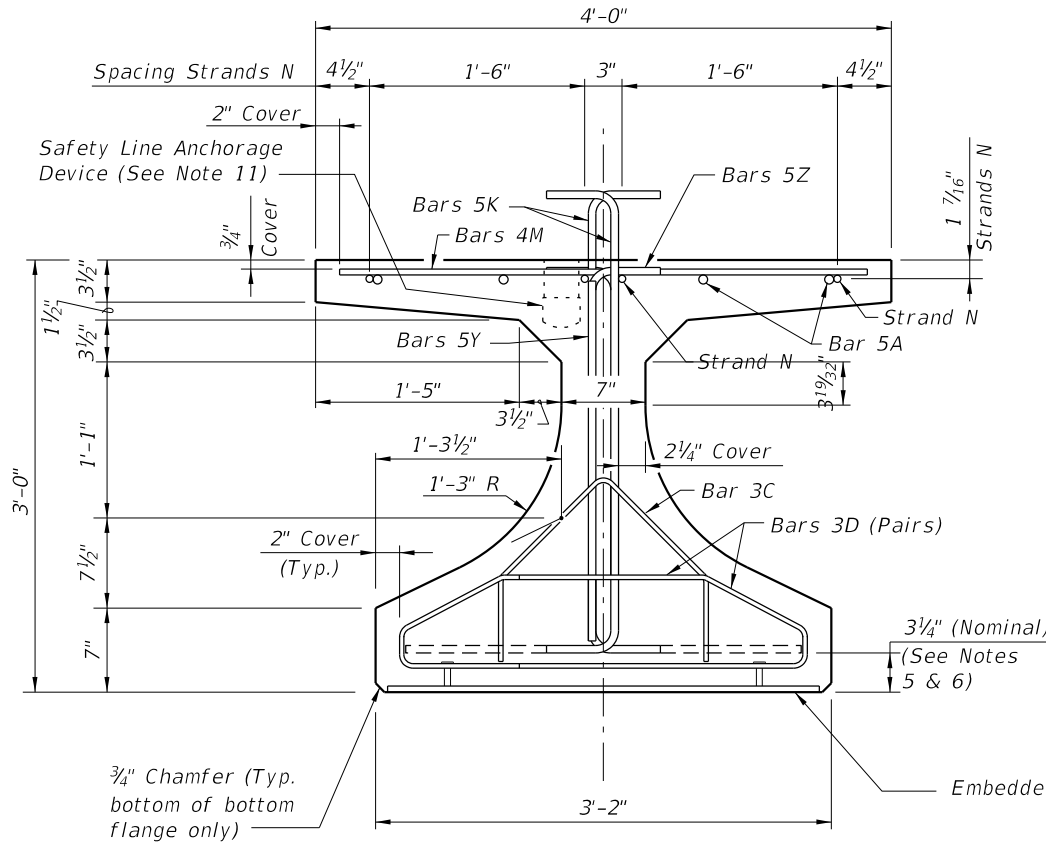
**SKewed BEAM END DETAILS FOR WIDENING EXISTING BRIDGES**  
(Florida-I 36 Beam shown, others similar)

**STRAND CUTTING AND PROTECTING DETAIL**

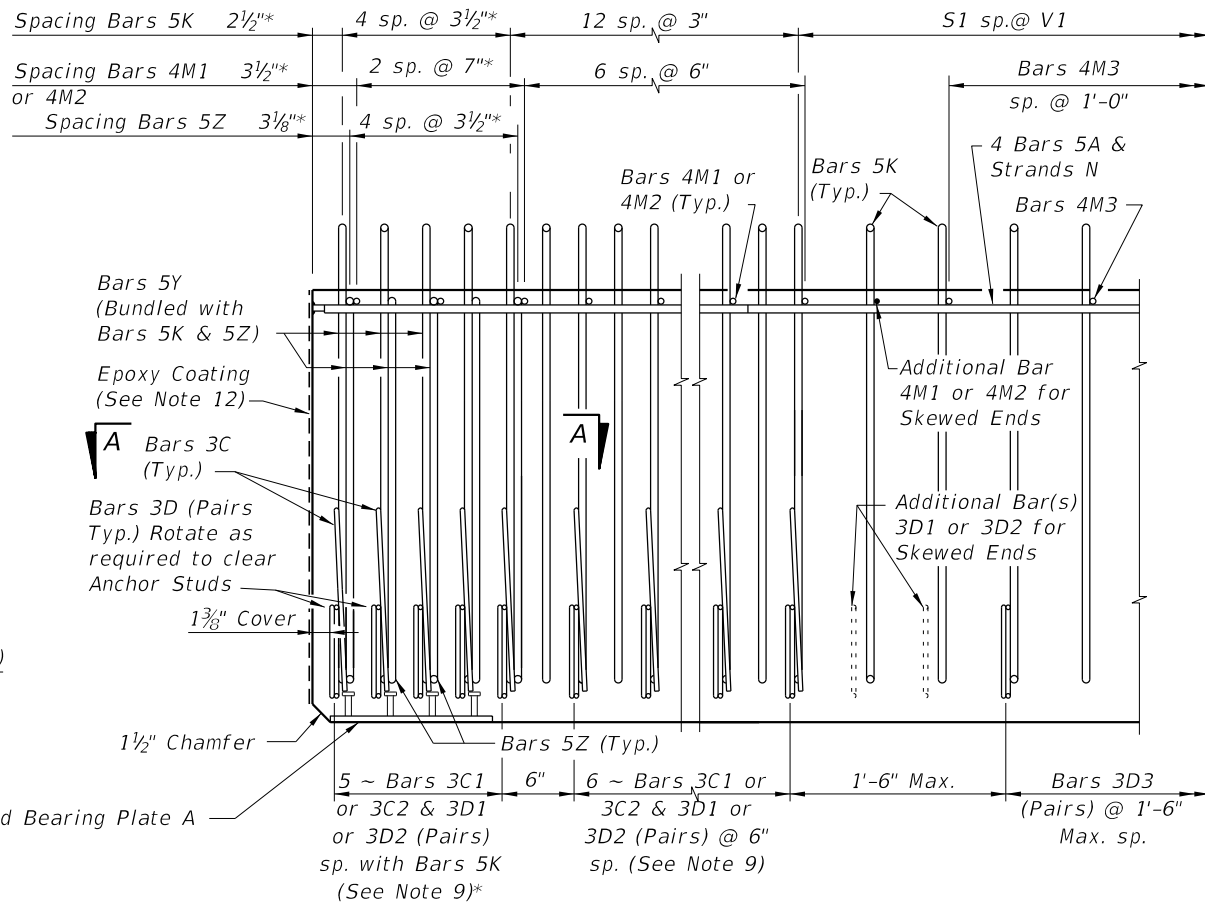
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LAST REVISION 11/01/19	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FLORIDA-I BEAM - TYPICAL DETAILS & NOTES	INDEX 450-010	SHEET 2 of 2
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\* These dimensions are measured perpendicular to the end of beam



END VIEW

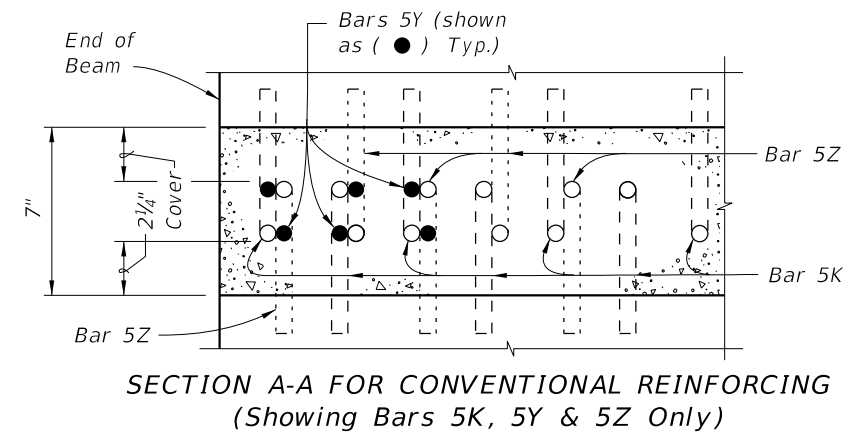
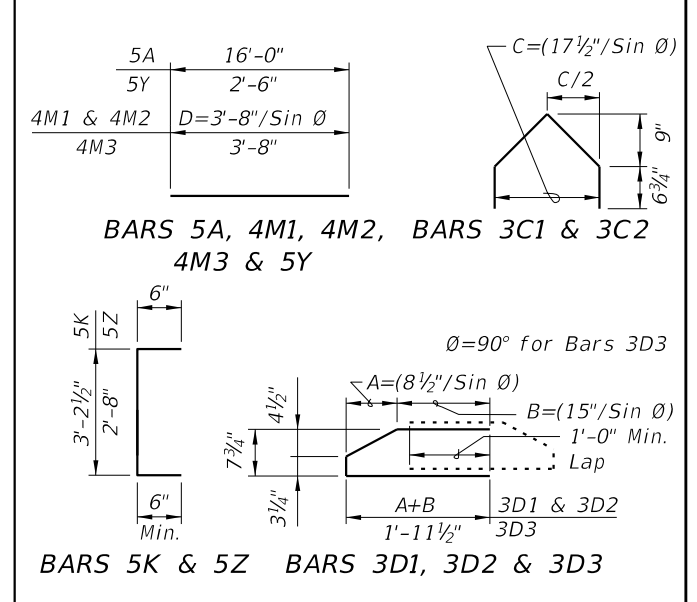


ELEVATION AT END OF BEAM  
(Flanges Not Shown For Clarity)  
(End 1 Shown, End 2 Similar)

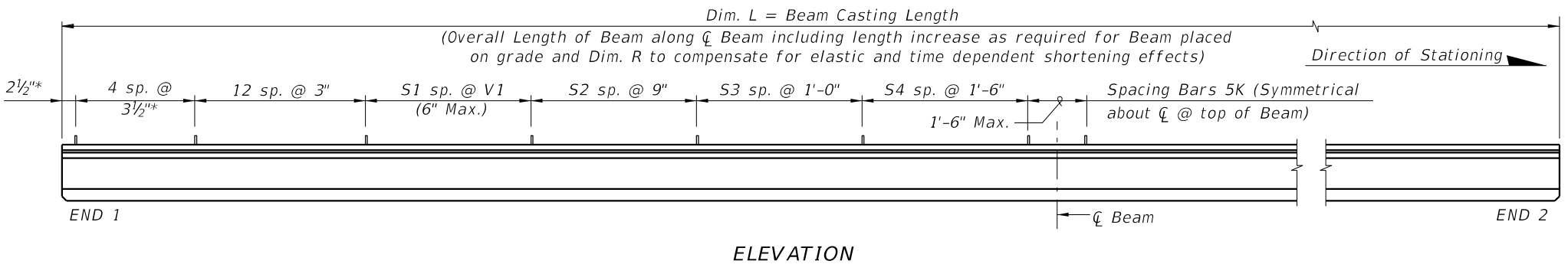
CONVENTIONAL REINFORCING  
BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	5	8	16'-0"
C1	7, 8 & 9	3	11 (End 1)	Varies
C2	7, 8 & 9	3	11 (End 2)	Varies
D1	7, 8, 9 & 10	3	22 (End 1)	Varies
D2	7, 8, 9 & 10	3	22 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	4'-2"
M1	7 & 9	4	9 (End 1)	Varies
M2	7 & 9	4	9 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	3/8" Ø Strand	4	Dim. L
Y	8 & 9	5	12	2'-6"
Z	5, 6, 8, 9 & 10	5	10	3'-8"

BENDING DIAGRAMS (See Note 2)



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



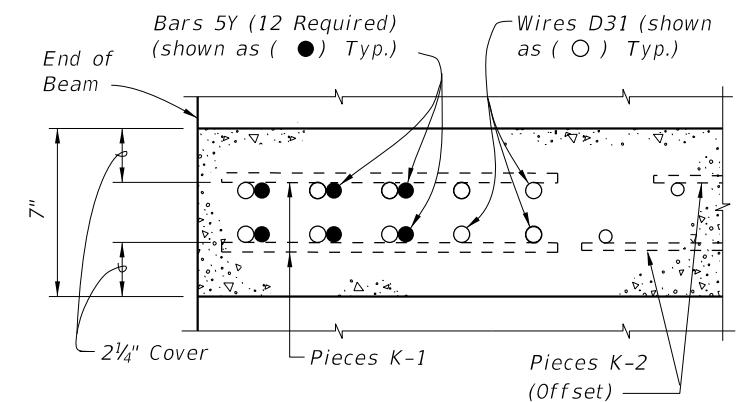
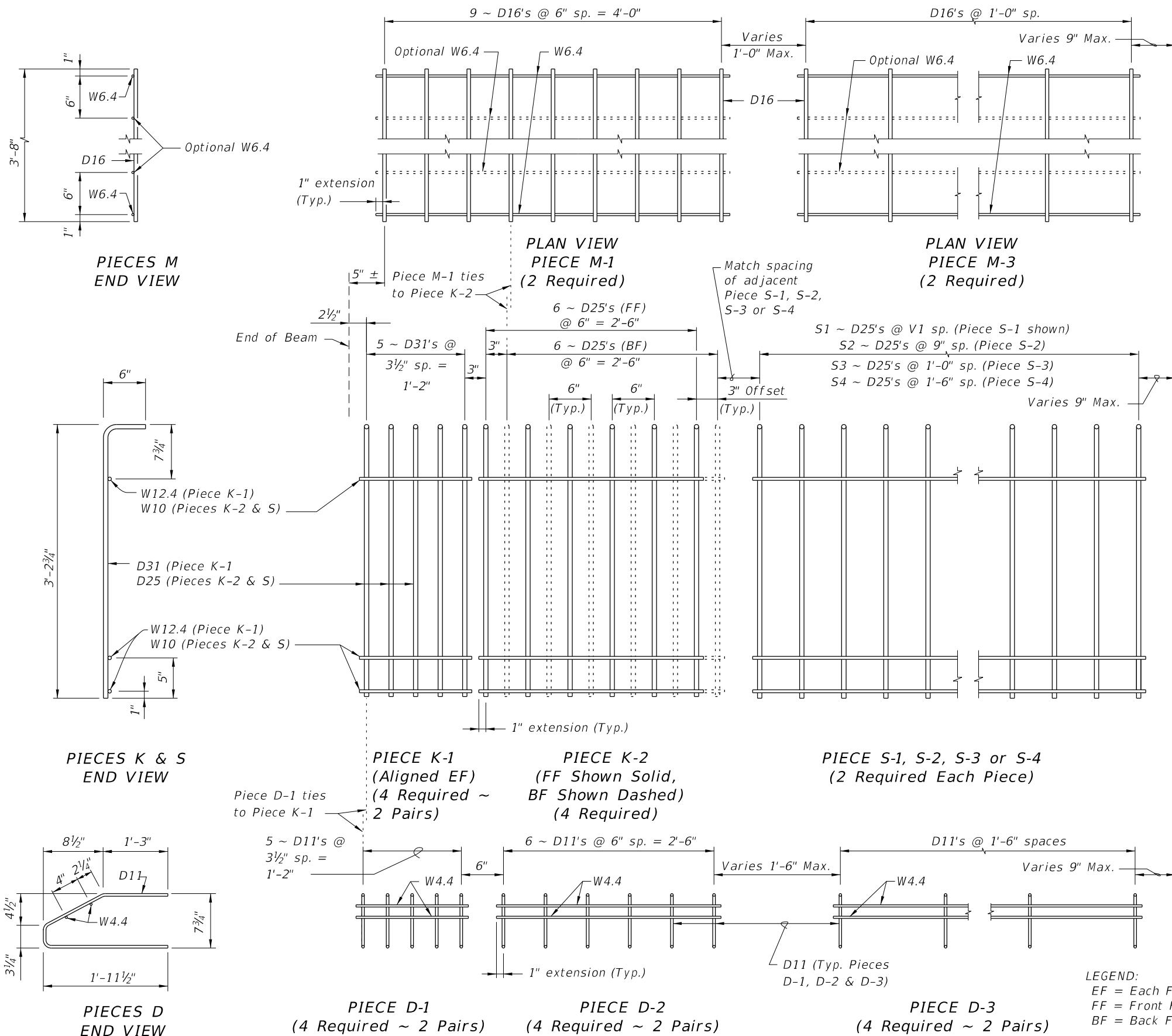
ELEVATION

- NOTES:
- A. Work this Index with Index 450-010 - 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 450-010.
  - 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.

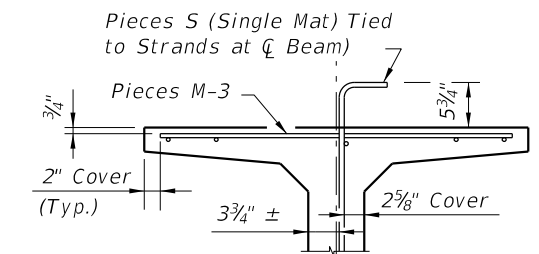
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LAST REVISION	DESCRIPTION:
11/01/19	

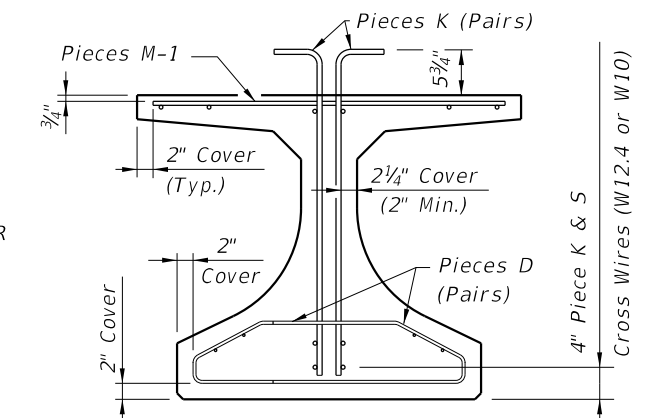
ALTERNATE REINFORCING STEEL (WWR) DETAILS



SECTION A-A FOR WELDED WIRE REINFORCEMENT



PARTIAL SECTION AT CENTER BEAM



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

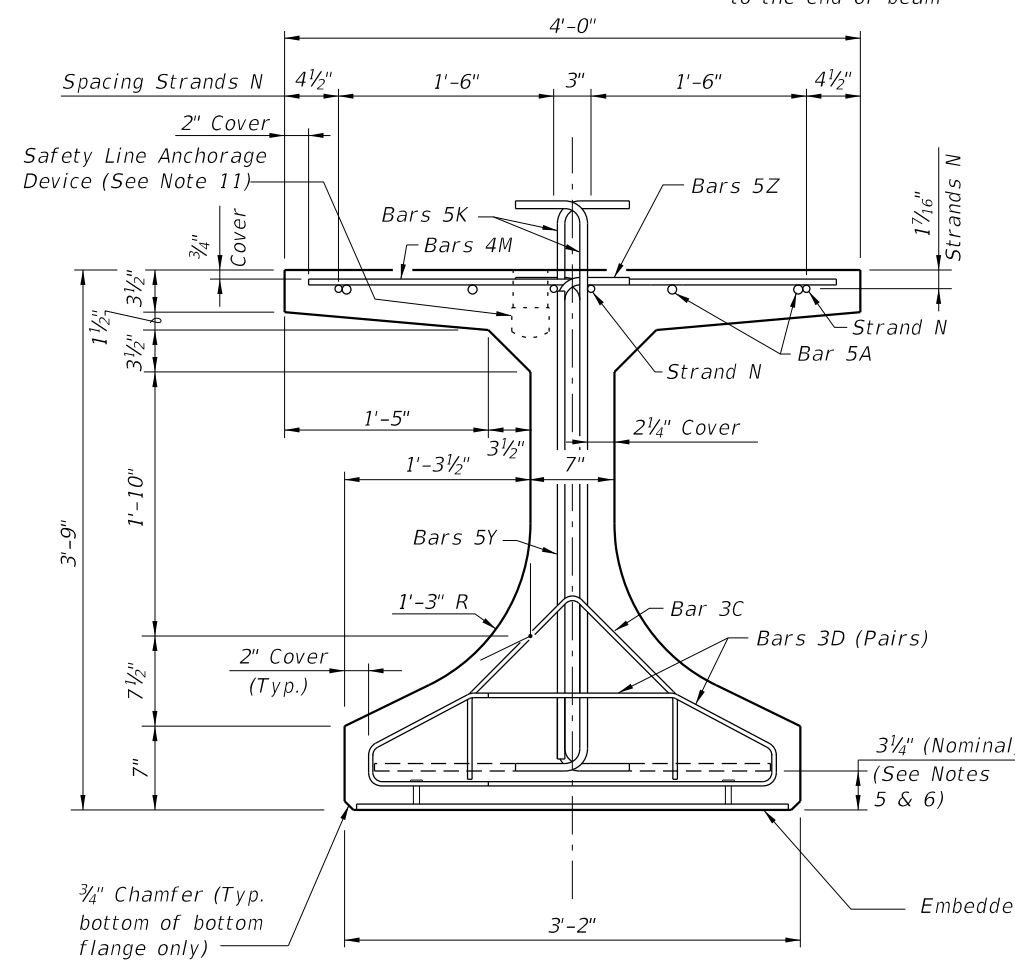
- NOTES:**
- See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
  - Place Conventional Reinforcement Bars 5A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.
  - Pieces may be fabricated in multiple length sections.
  - 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 450-010 Skewed Beam End 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

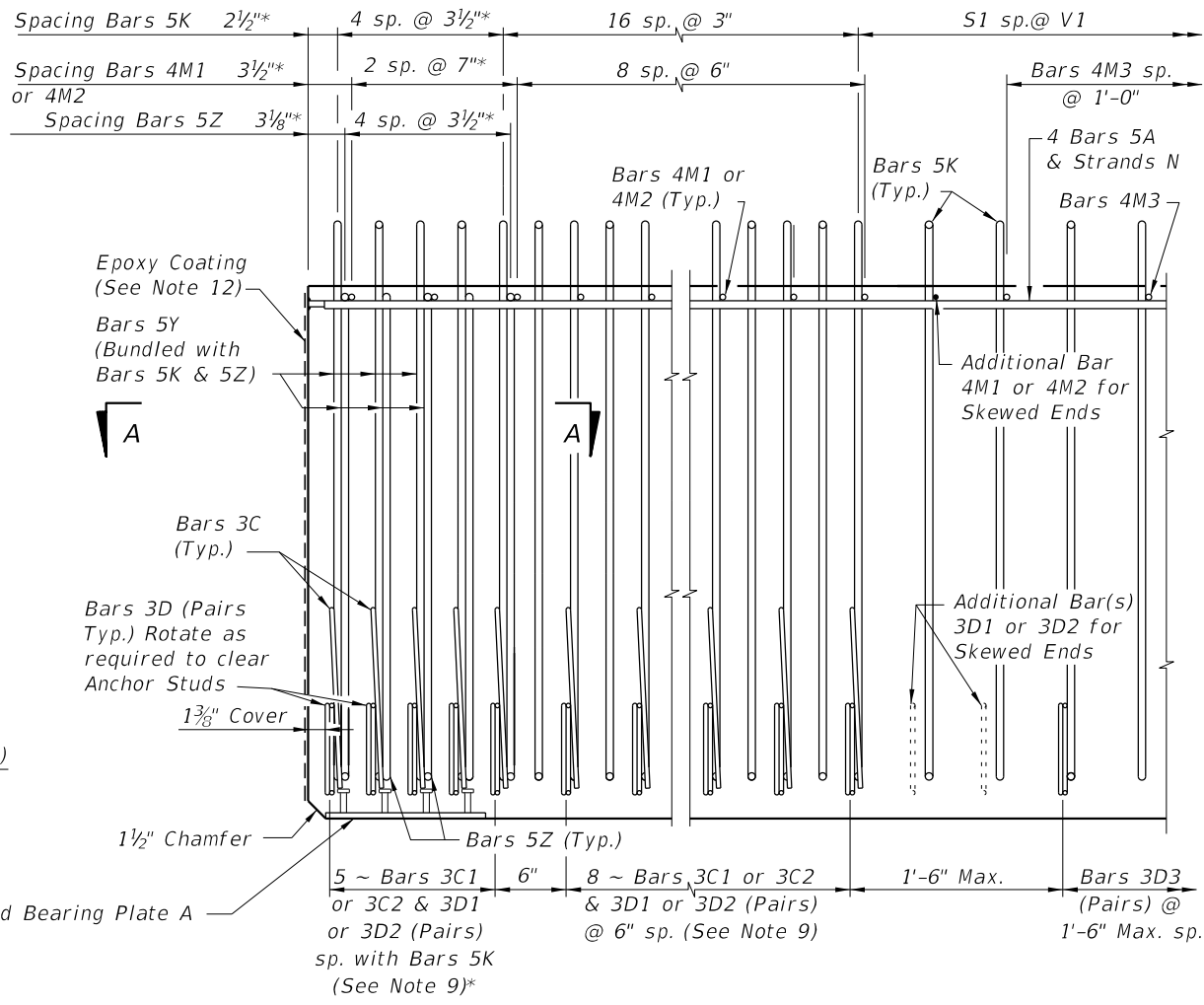
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LAST REVISION 11/01/16	DESCRIPTION:	<p>FY 2022-23 STANDARD PLANS</p>	<p>FLORIDA-I 36 BEAM - STANDARD DETAILS</p>	<p>INDEX 450-036</p>	<p>SHEET 2 of 2</p>
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\* These dimensions are measured perpendicular to the end of beam



END VIEW

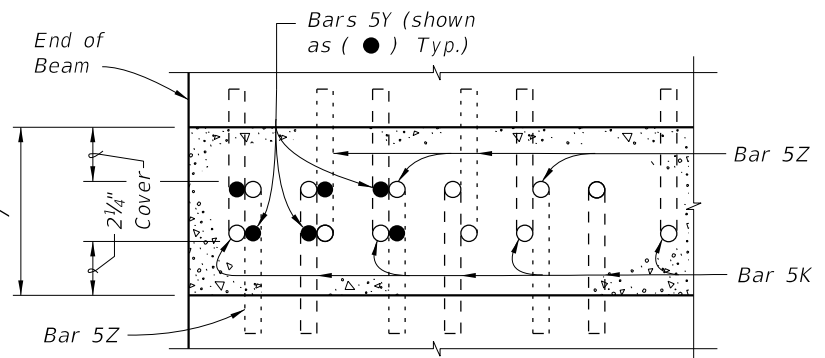
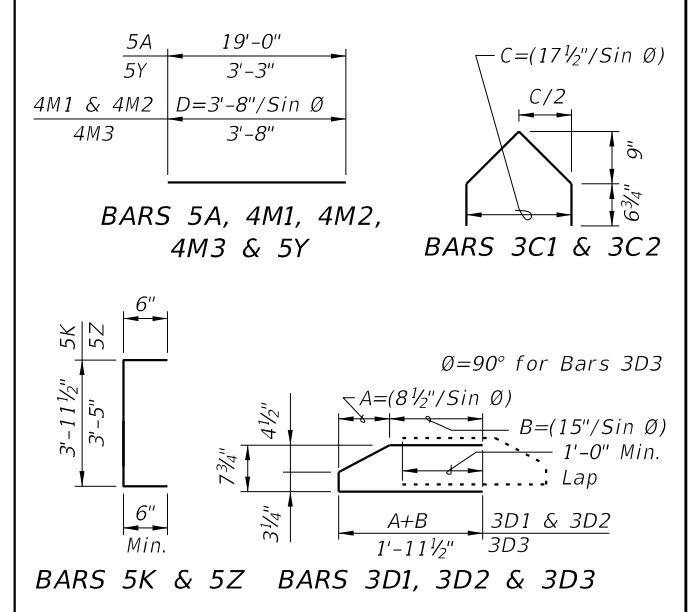


ELEVATION AT END OF BEAM  
(Flanges Not Shown For Clarity)  
(End 1 Shown, End 2 Similar)

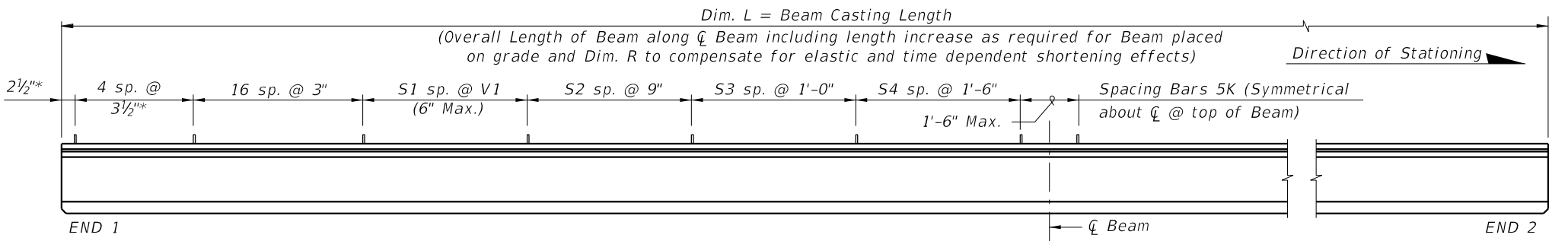
CONVENTIONAL REINFORCING  
BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	5	8	19'-0"
C1	7, 8 & 9	3	13 (End 1)	Varies
C2	7, 8 & 9	3	13 (End 2)	Varies
D1	7, 8, 9 & 10	3	26 (End 1)	Varies
D2	7, 8, 9 & 10	3	26 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	4'-11"
M1	7 & 9	4	11 (End 1)	Varies
M2	7 & 9	4	11 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	3/8" Ø Strand	4	Dim. L
Y	8 & 9	5	12	3'-3"
Z	5, 6, 8, 9 & 10	5	10	4'-5"

BENDING DIAGRAMS (See Note 2)



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



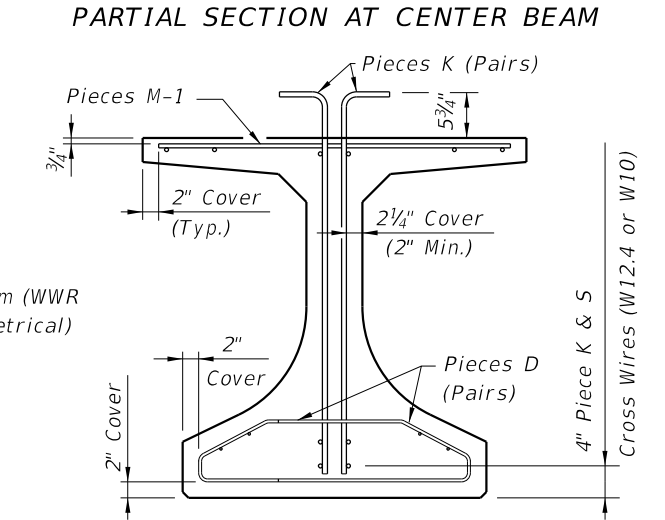
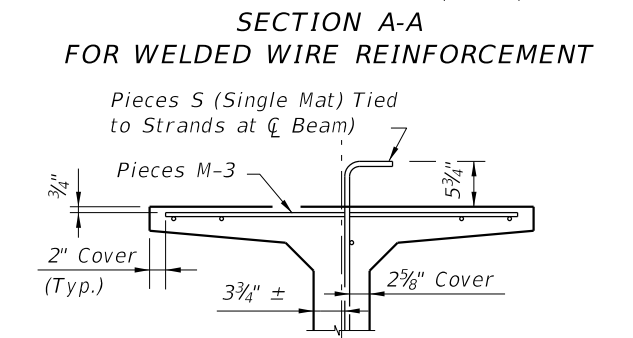
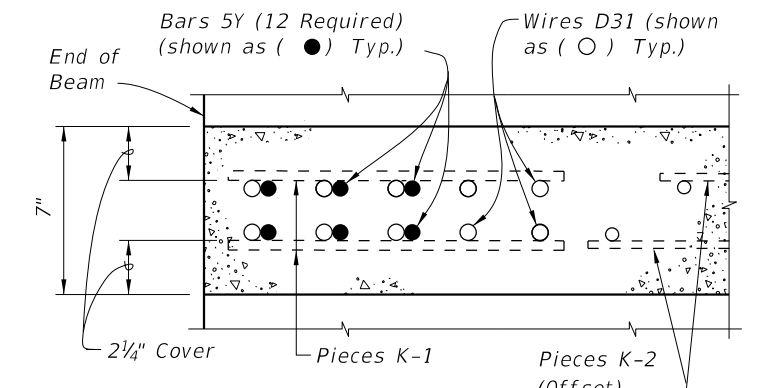
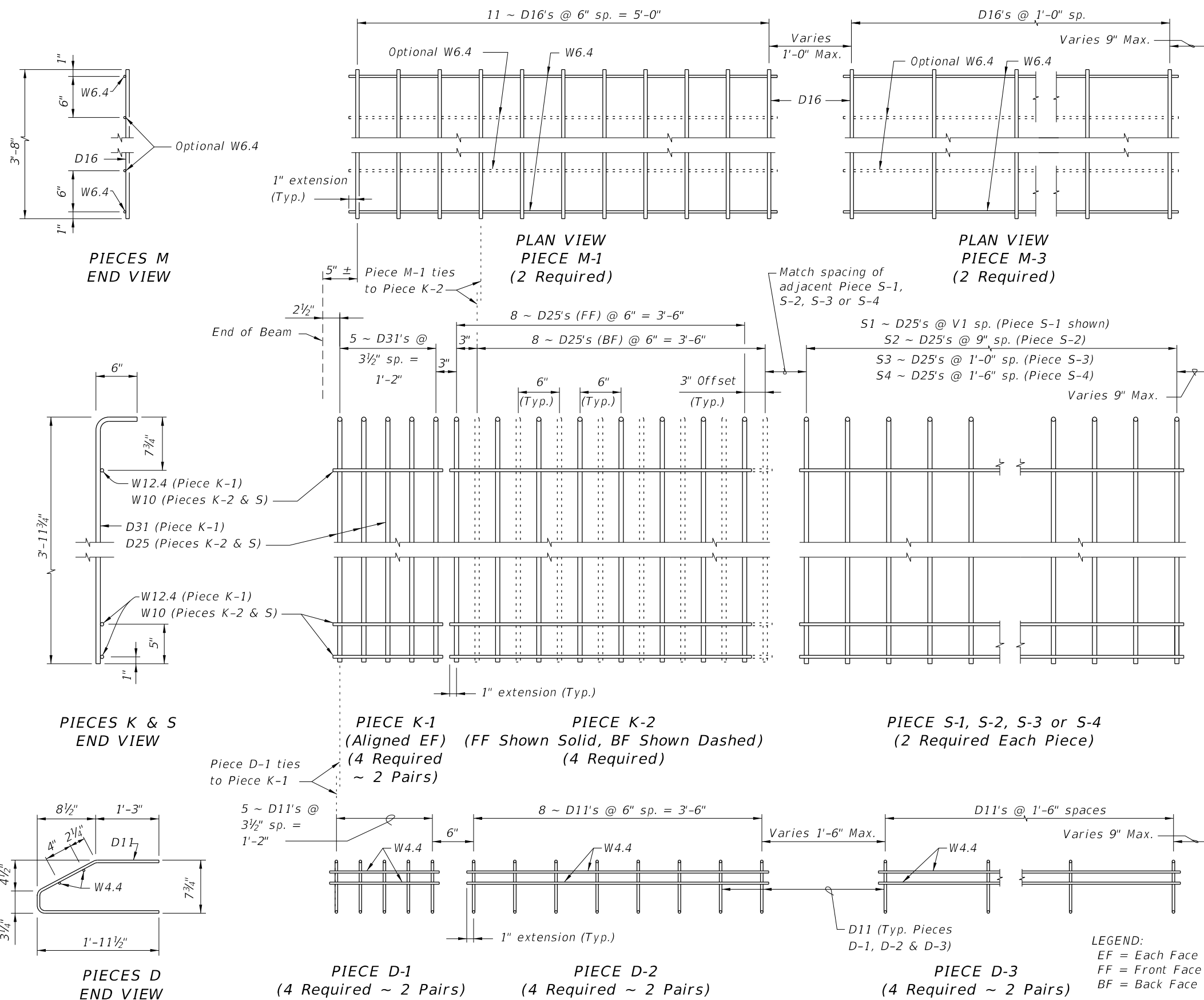
ELEVATION

- NOTES:
- A. Work this Index with Index 450-010 - 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 450-010.
  - 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.

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LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) 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 as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. 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 450-010 Skewed Beam End Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

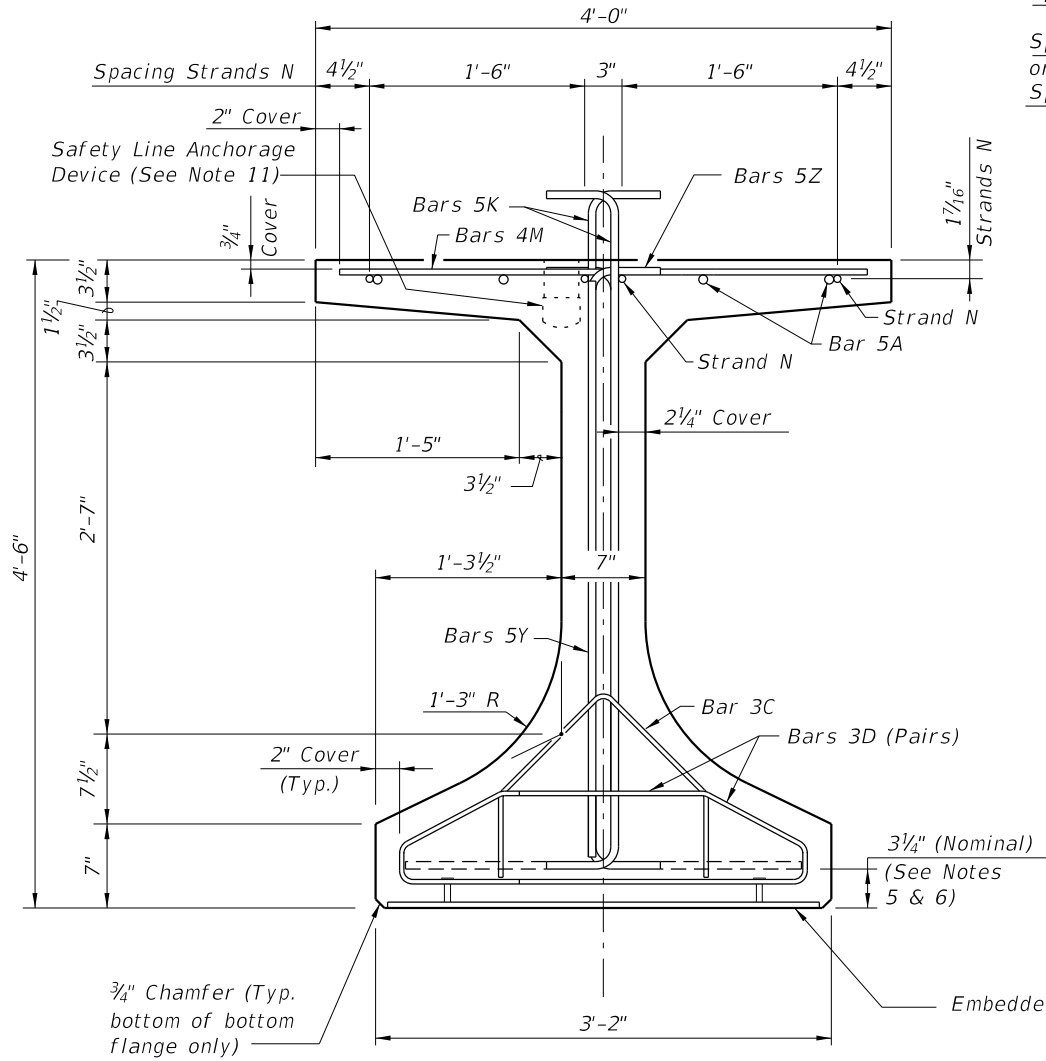
**LEGEND:**  
 EF = Each Face  
 FF = Front Face  
 BF = Back Face

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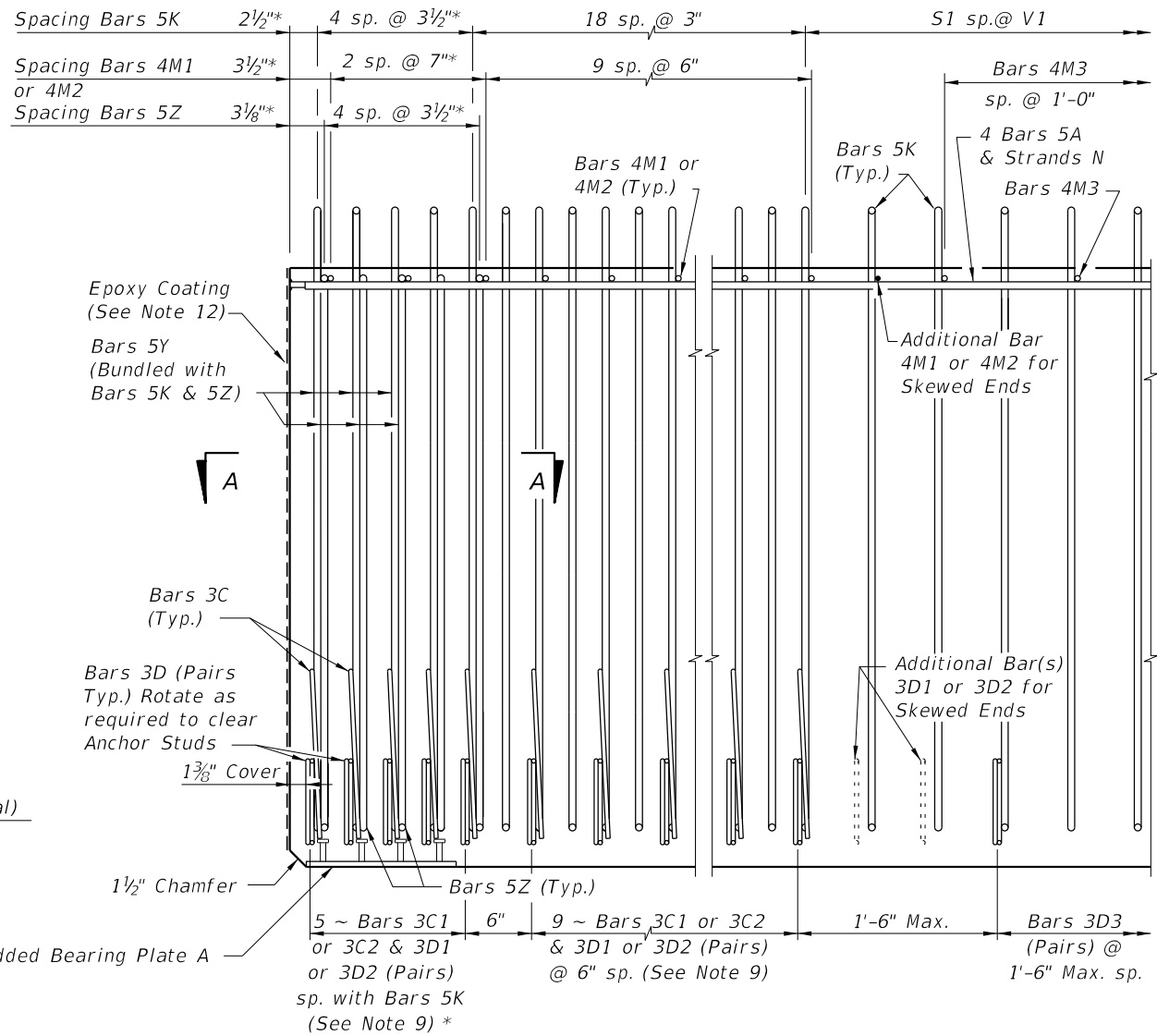
LAST REVISION 11/01/16	DESCRIPTION:	<p>FY 2022-23 STANDARD PLANS</p>	<p>FLORIDA-I 45 BEAM - STANDARD DETAILS</p>	<p>INDEX 450-045</p>	<p>SHEET 2 of 2</p>
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\* These dimensions are measured perpendicular to the end of beam



END VIEW

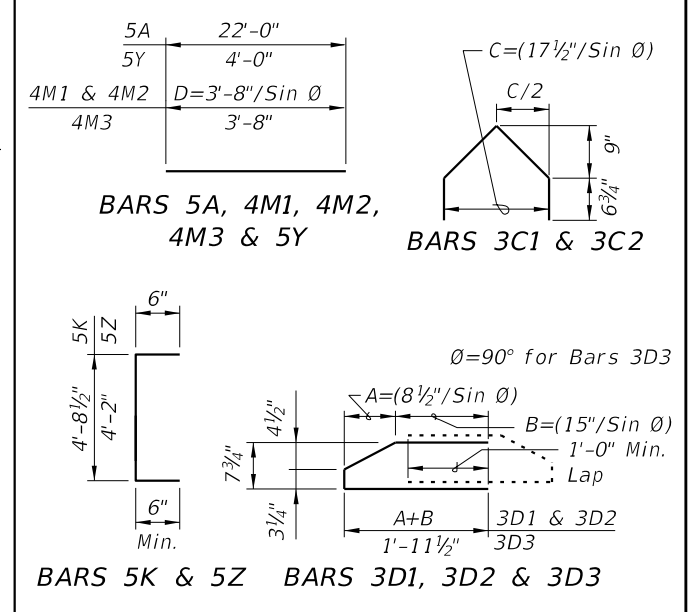


ELEVATION AT END OF BEAM  
(Flanges Not Shown For Clarity)  
(End 1 Shown, End 2 Similar)

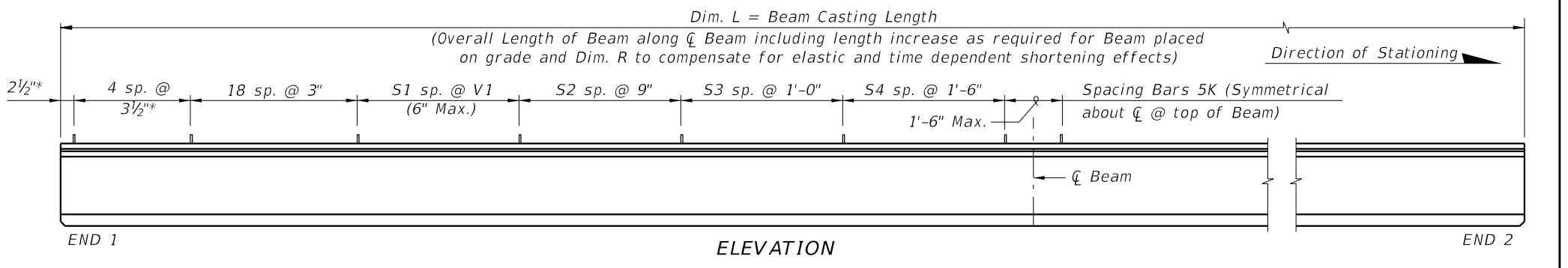
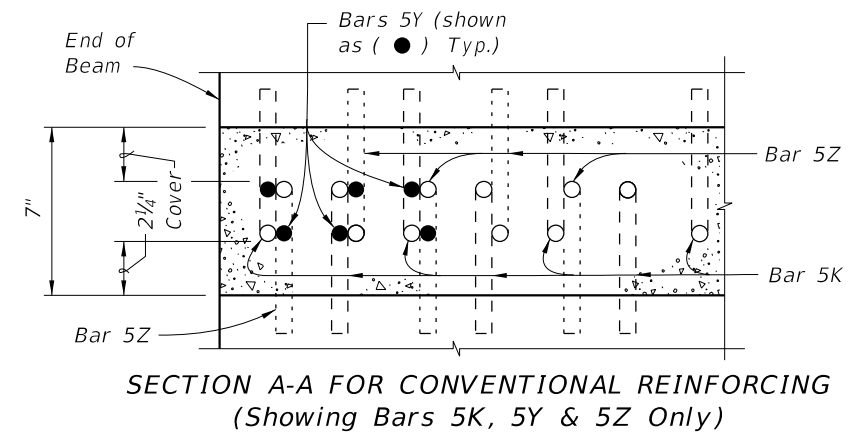
CONVENTIONAL REINFORCING  
BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	5	8	22'-0"
C1	7, 8 & 9	3	14 (End 1)	Varies
C2	7, 8 & 9	3	14 (End 2)	Varies
D1	7, 8, 9 & 10	3	28 (End 1)	Varies
D2	7, 8, 9 & 10	3	28 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	5'-8"
M1	7 & 9	4	12 (End 1)	Varies
M2	7 & 9	4	12 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	3/8" Ø Strand	4	Dim. L
Y	8 & 9	5	12	4'-0"
Z	5, 6, 8, 9 & 10	5	10	5'-2"

BENDING DIAGRAMS (See Note 2)



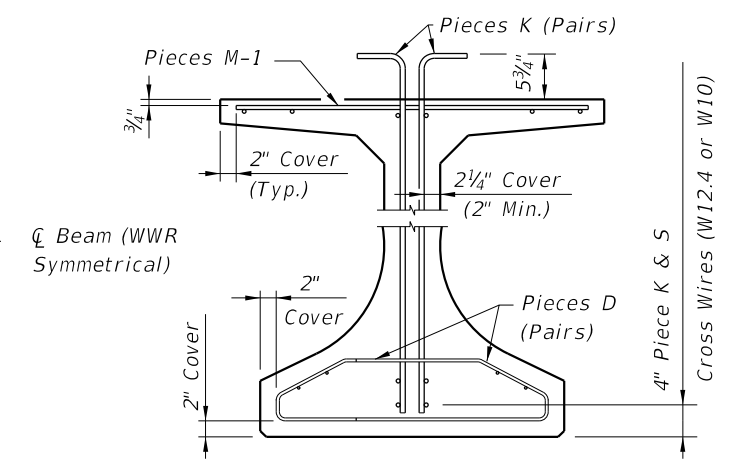
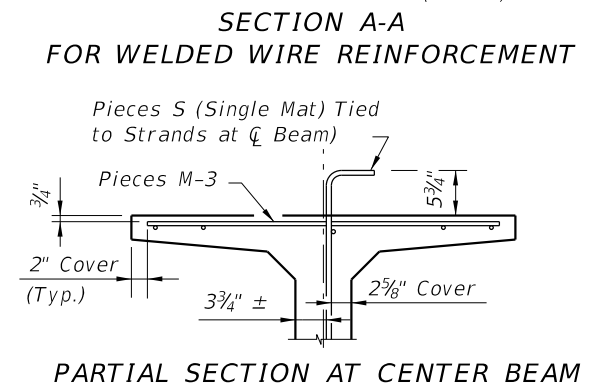
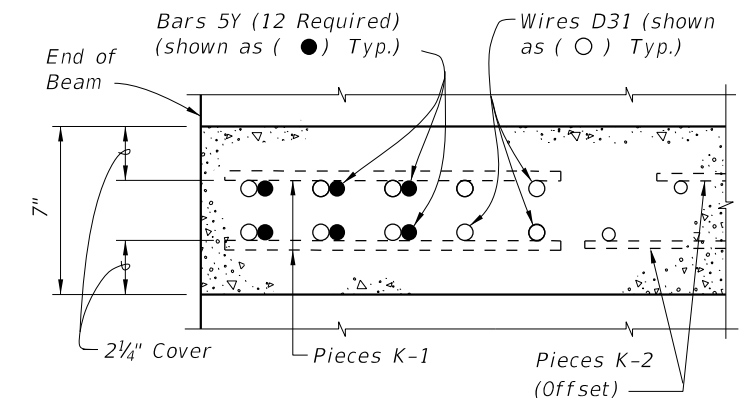
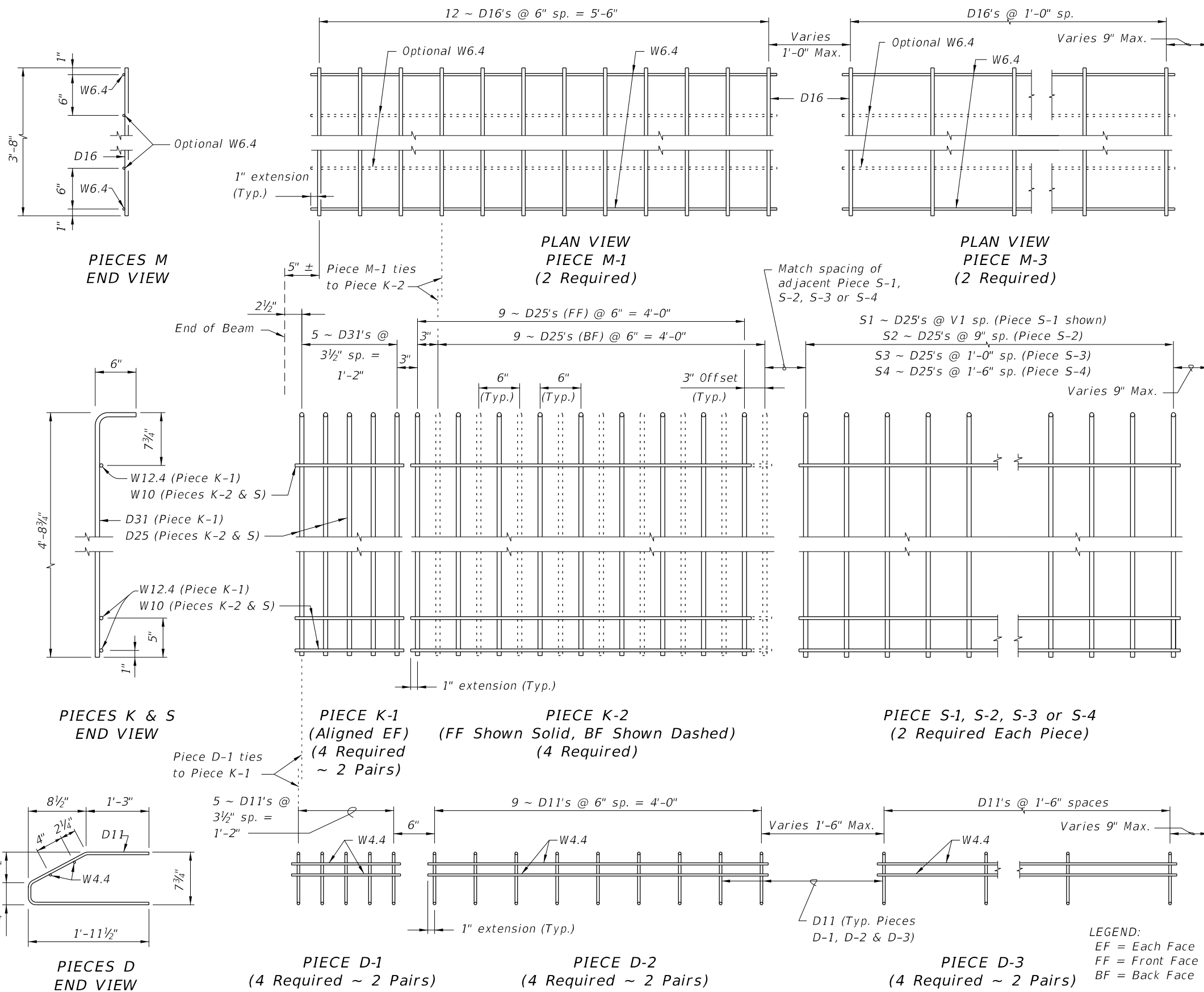
- NOTES:
- A. Work this Index with Index 450-010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.
  - B. For referenced notes, see Index 450-010.
  - C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



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LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) DETAILS



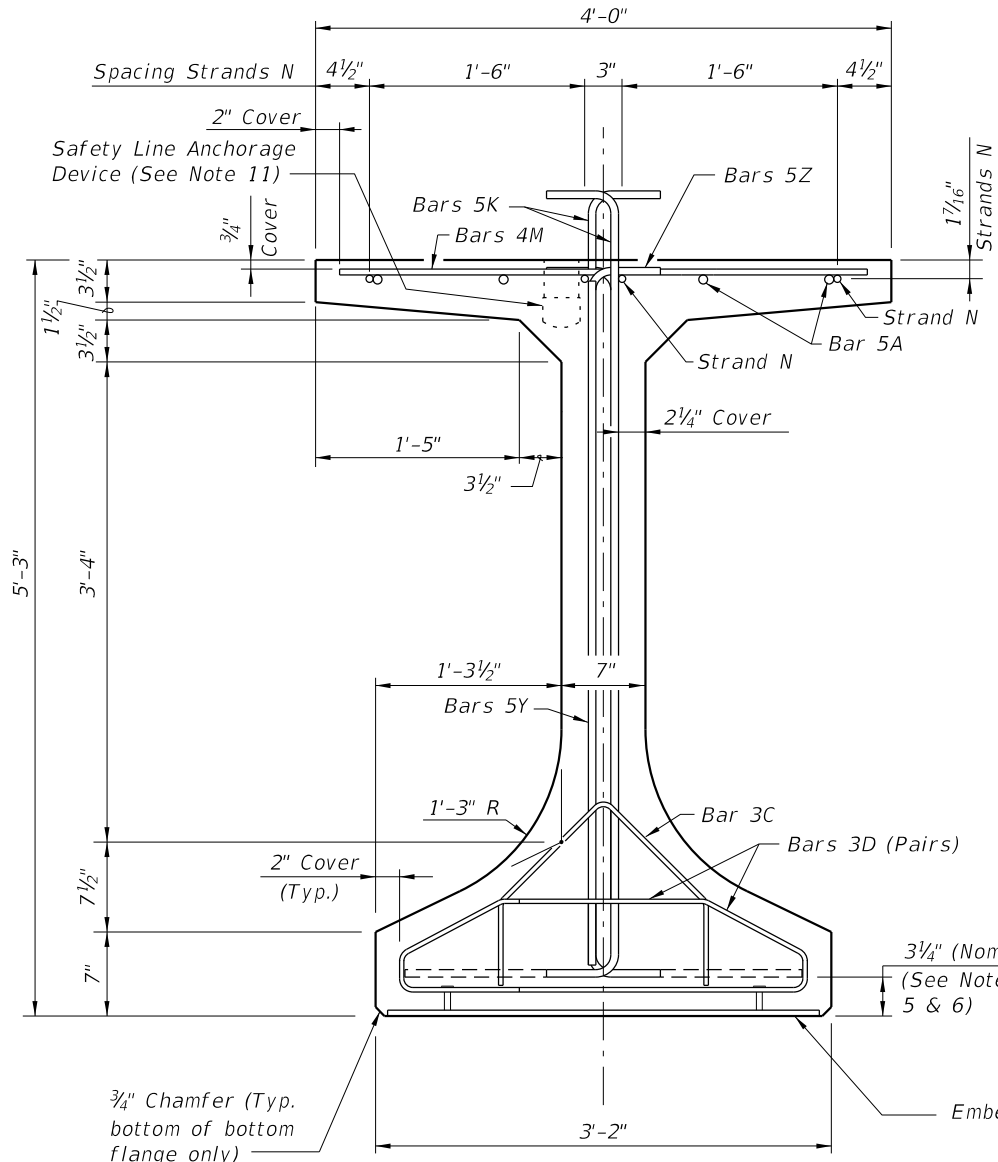
- NOTES:**
- See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
  - Place Conventional Reinforcing Bars 5A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.
  - Pieces may be fabricated in multiple length sections.
  - For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcing Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index 450-010 Skewed Beam End 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

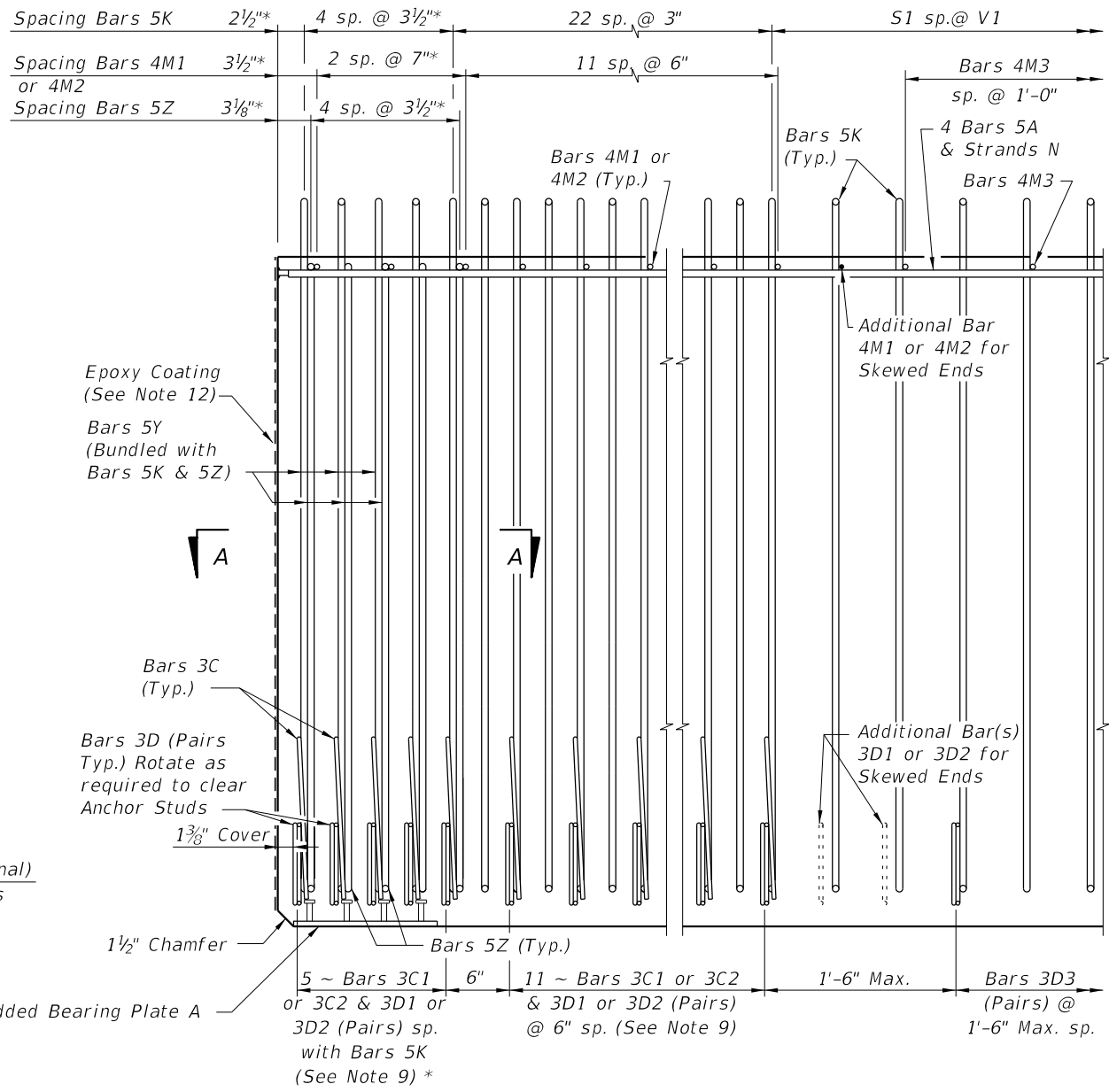
9/23/2021 9:53:10 AM

LAST REVISION 11/01/16	DESCRIPTION:	<p>FY 2022-23 STANDARD PLANS</p>	<p>FLORIDA-I 54 BEAM - STANDARD DETAILS</p>	<p>INDEX 450-054</p>	<p>SHEET 2 of 2</p>
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\* These dimensions are measured perpendicular to the end of beam



END VIEW

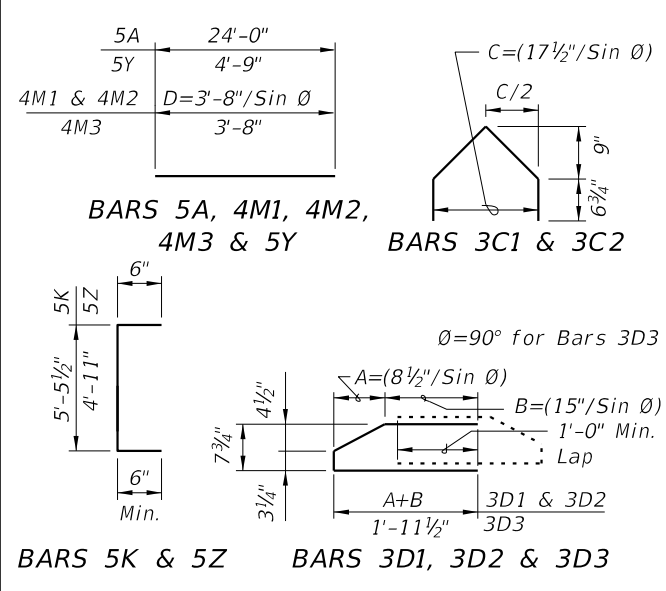


ELEVATION AT END OF BEAM  
(Flanges Not Shown For Clarity)  
(End 1 Shown, End 2 Similar)

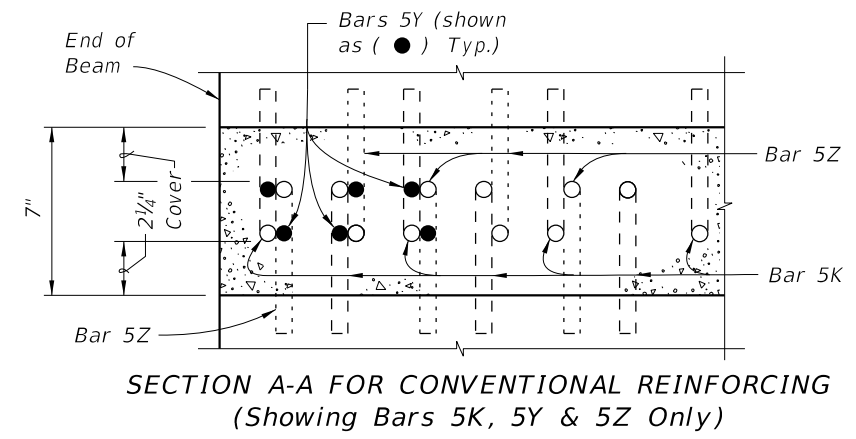
CONVENTIONAL REINFORCING  
BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	5	8	24'-0"
C1	7, 8 & 9	3	16 (End 1)	Varies
C2	7, 8 & 9	3	16 (End 2)	Varies
D1	7, 8, 9 & 10	3	32 (End 1)	Varies
D2	7, 8, 9 & 10	3	32 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	6'-5"
M1	7 & 9	4	14 (End 1)	Varies
M2	7 & 9	4	14 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	3/8" Ø Strand	4	Dim. L
Y	8 & 9	5	12	4'-9"
Z	5, 6, 8, 9 & 10	5	10	5'-11"

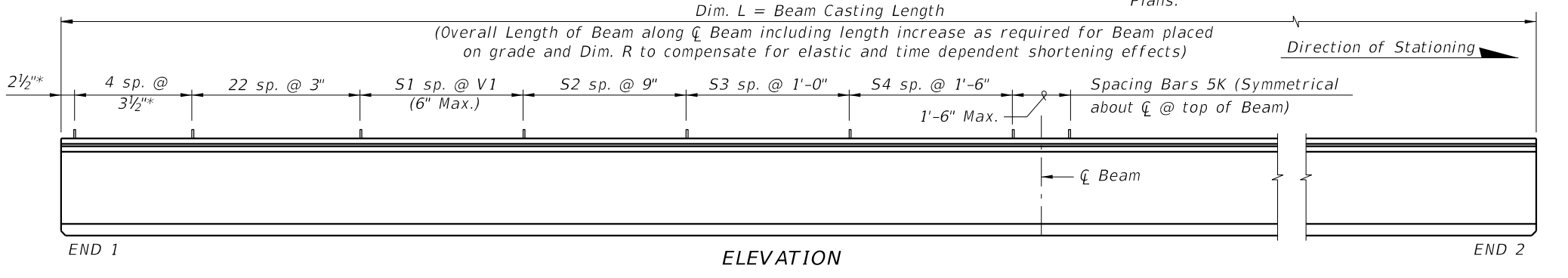
BENDING DIAGRAMS (See Note 2)



- NOTES:
- A. Work this Index with Index 450-010 - 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 450-010.
  - 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)

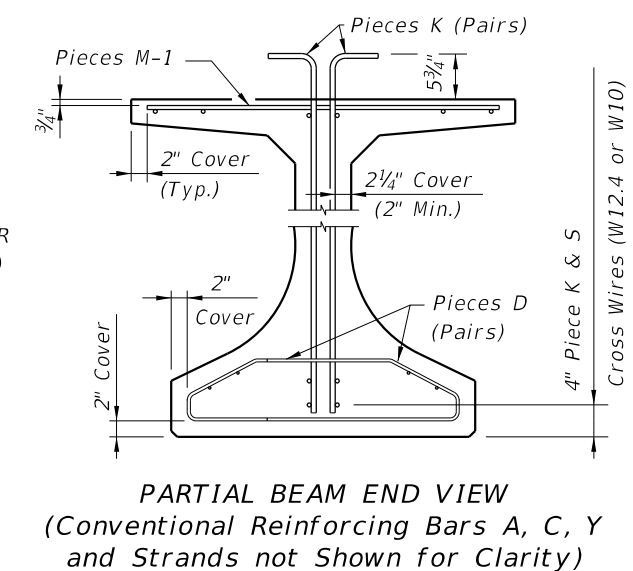
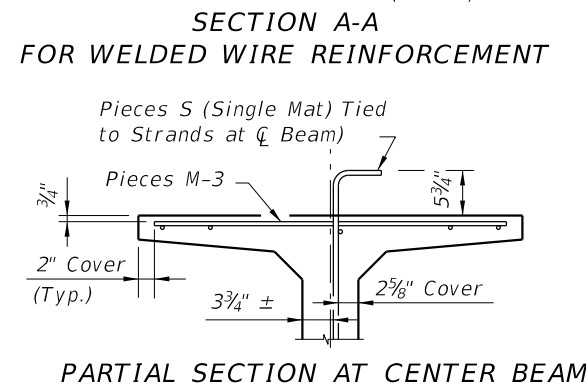
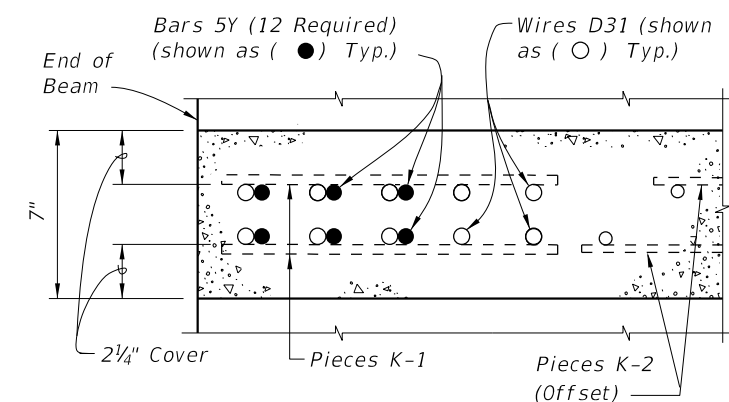
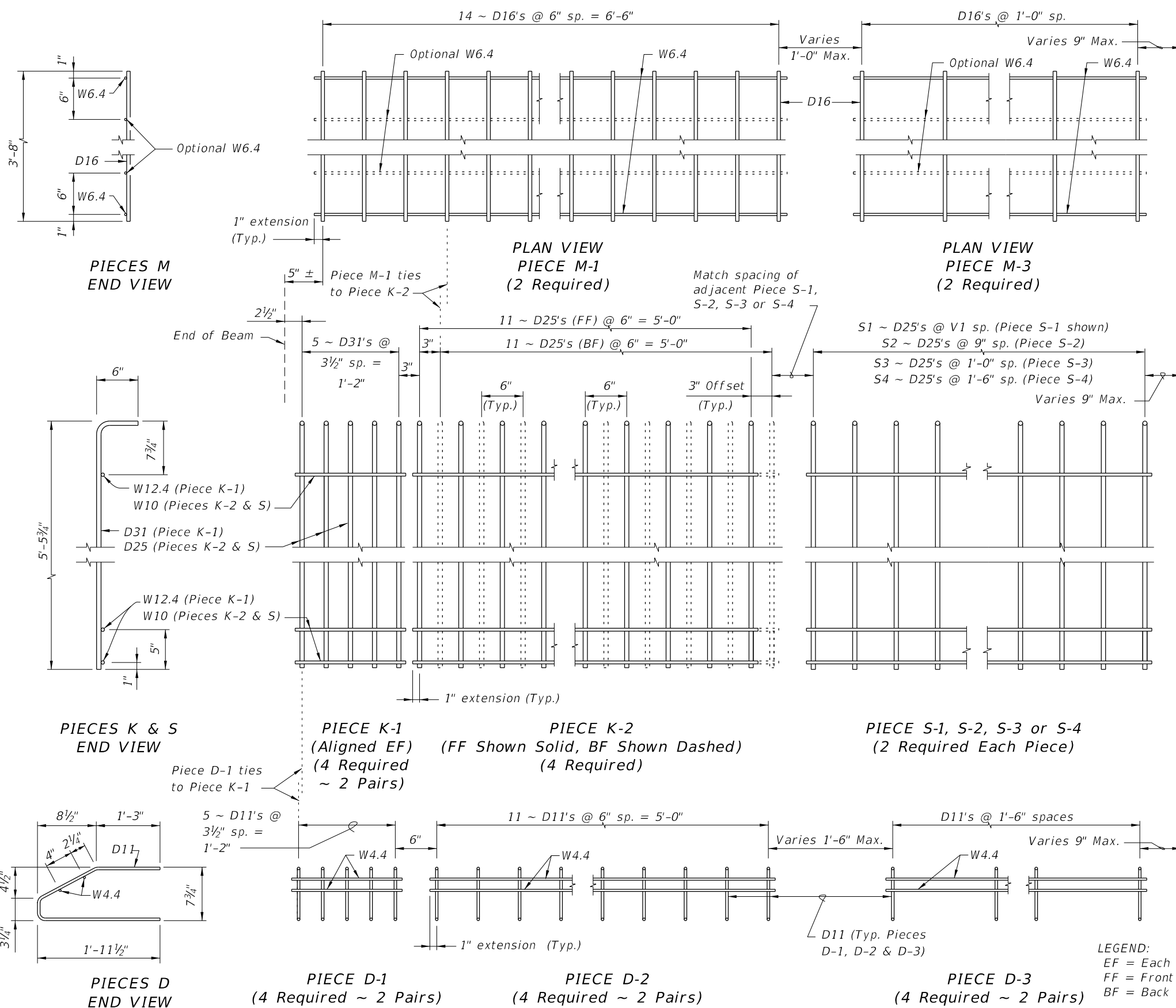


ELEVATION

9/23/2021 9:53:11 AM

LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) DETAILS



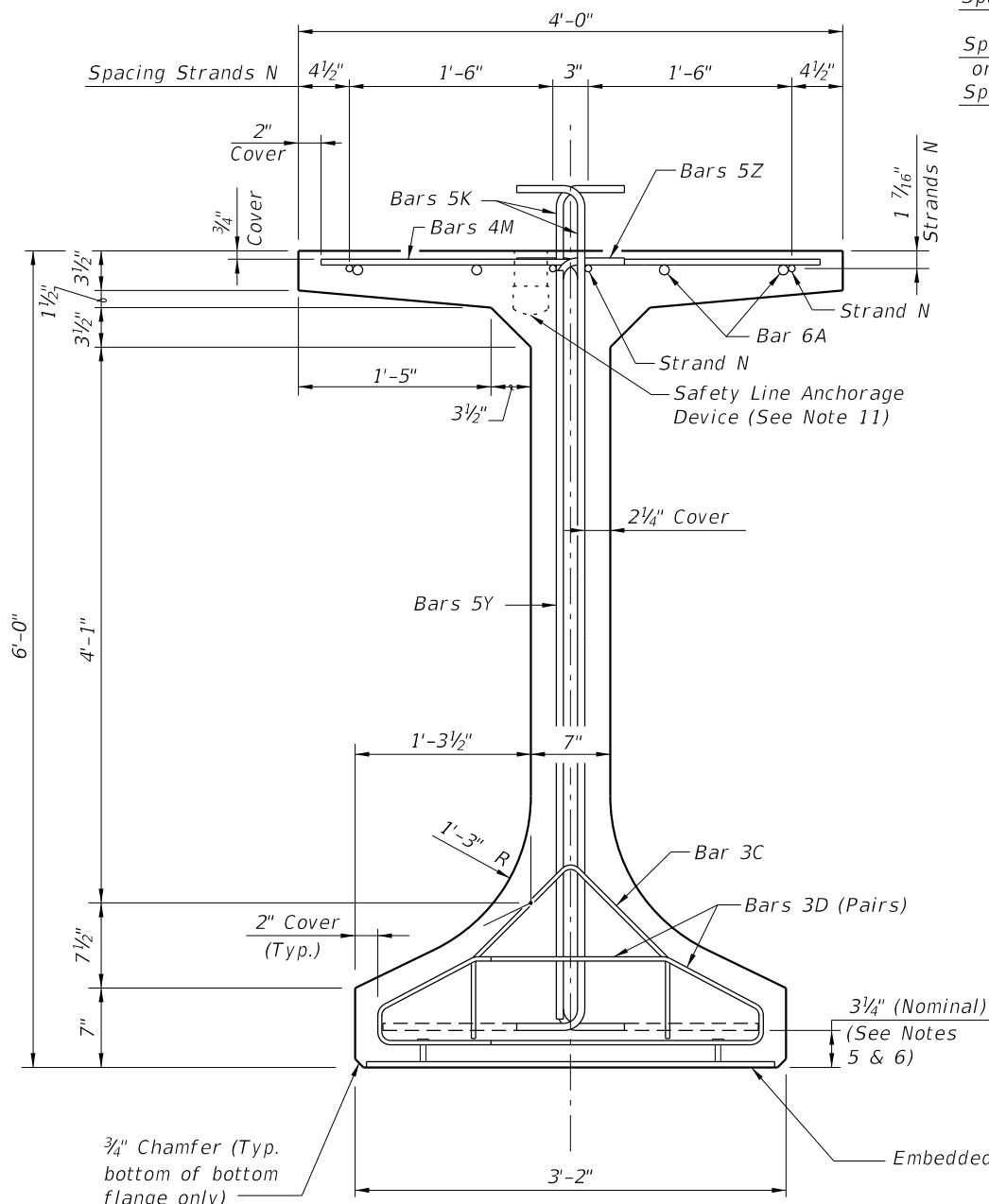
**NOTES:**  
 a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.  
 b. Place Conventional Reinforcement Bars 5A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR 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 450-010 Skewed Beam End 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

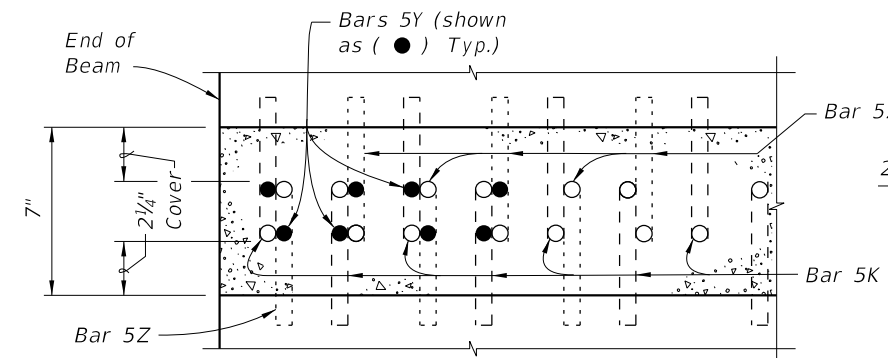
9/23/2021 9:53:13 AM

LAST REVISION 11/01/16	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FLORIDA-I 63 BEAM - STANDARD DETAILS	INDEX 450-063	SHEET 2 of 2
REVISION						

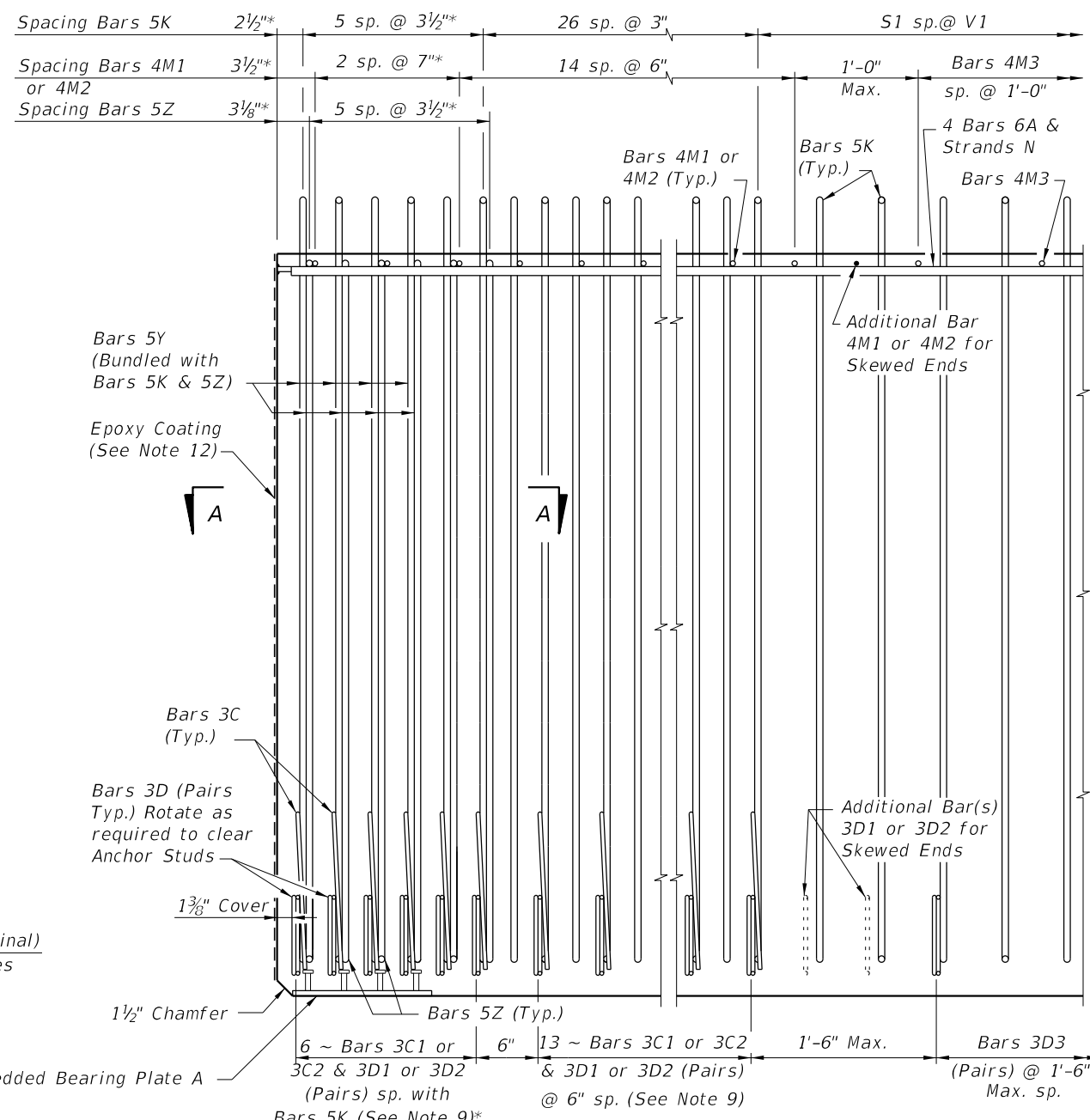
\* These dimensions are measured perpendicular to the end of beam



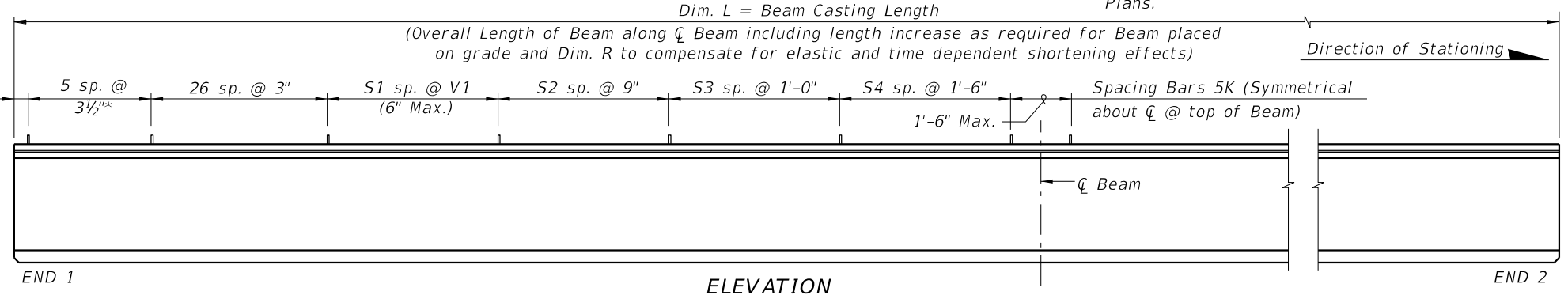
END VIEW



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



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



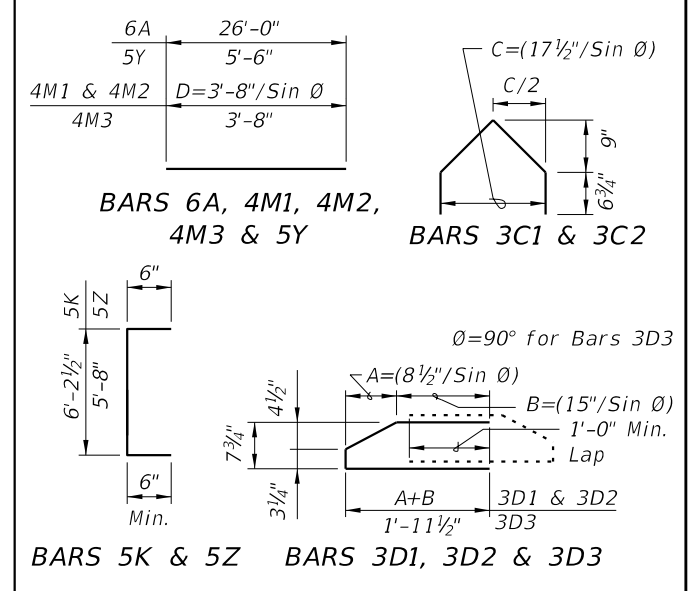
ELEVATION

CONVENTIONAL REINFORCING BAR BENDING DETAILS

BILL OF REINFORCING STEEL

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

BENDING DIAGRAMS (See Note 2)

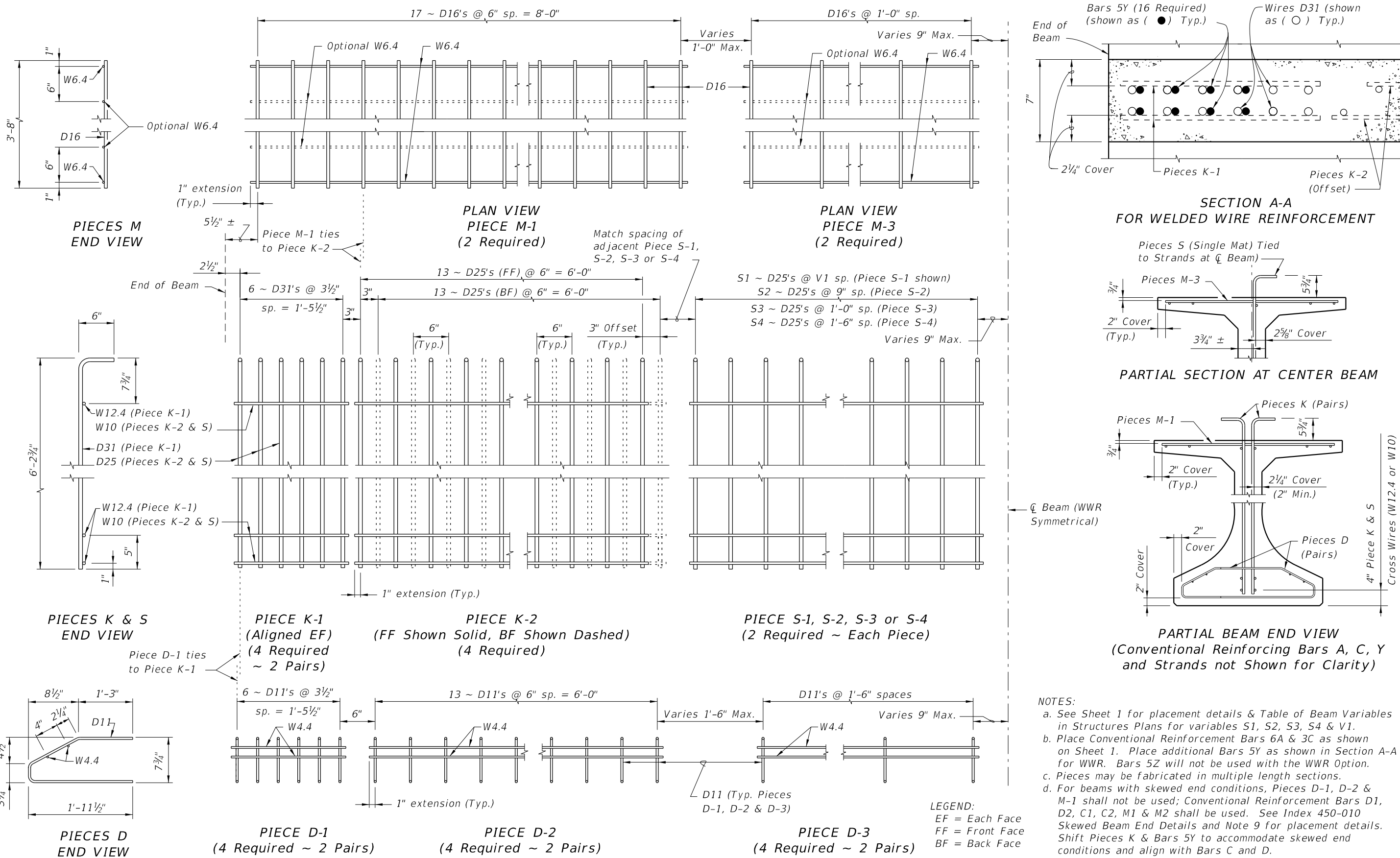


NOTES:  
 A. Work this Index with Index 450-010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.  
 B. For referenced notes, see Index 450-010.  
 C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.

9/23/2021 9:53:14 AM

LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) DETAILS



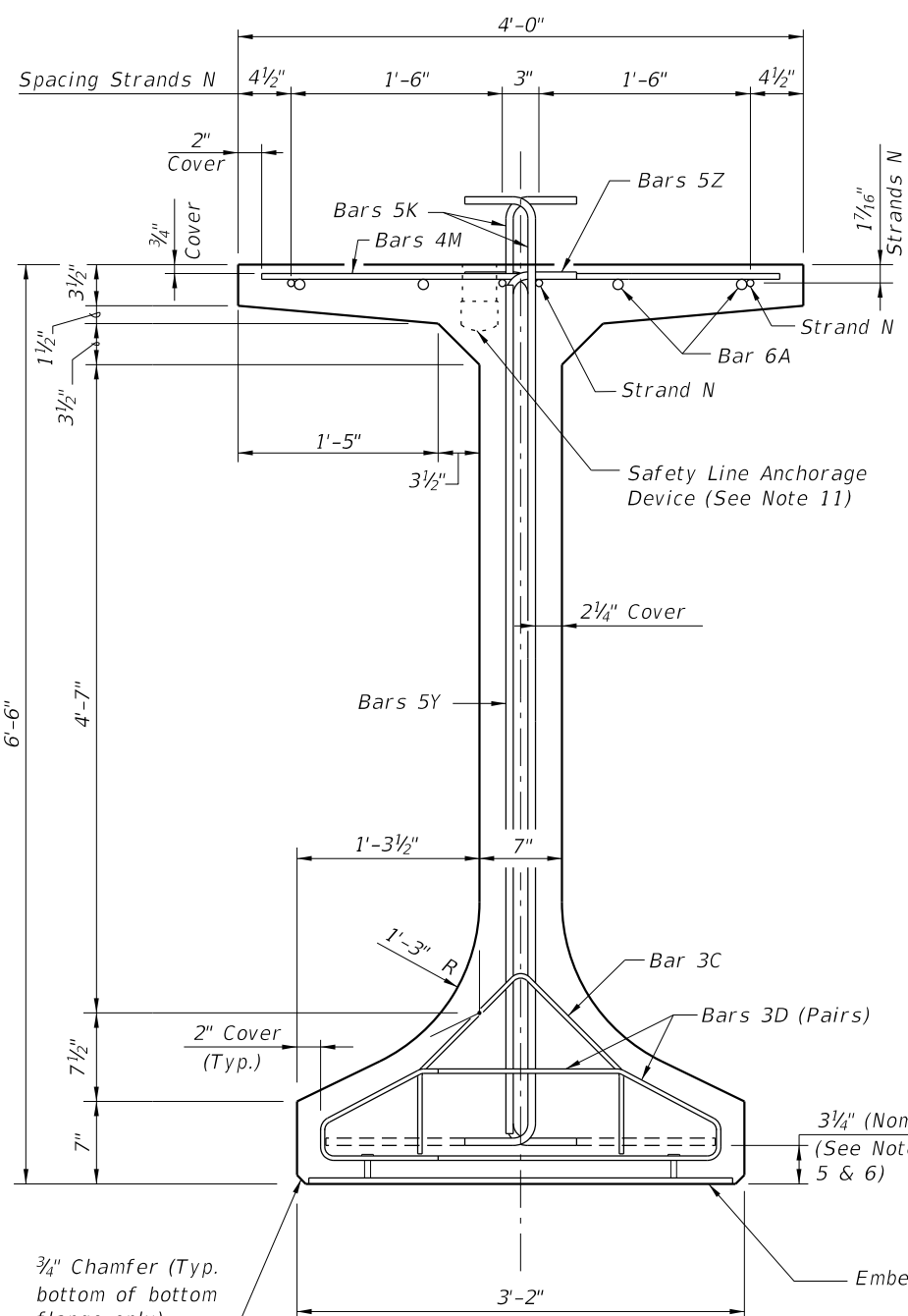
**NOTES:**

- See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
- Place Conventional Reinforcing Bars 6A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.
- Pieces may be fabricated in multiple length sections.
- For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcing Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index 450-010 Skewed Beam End Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

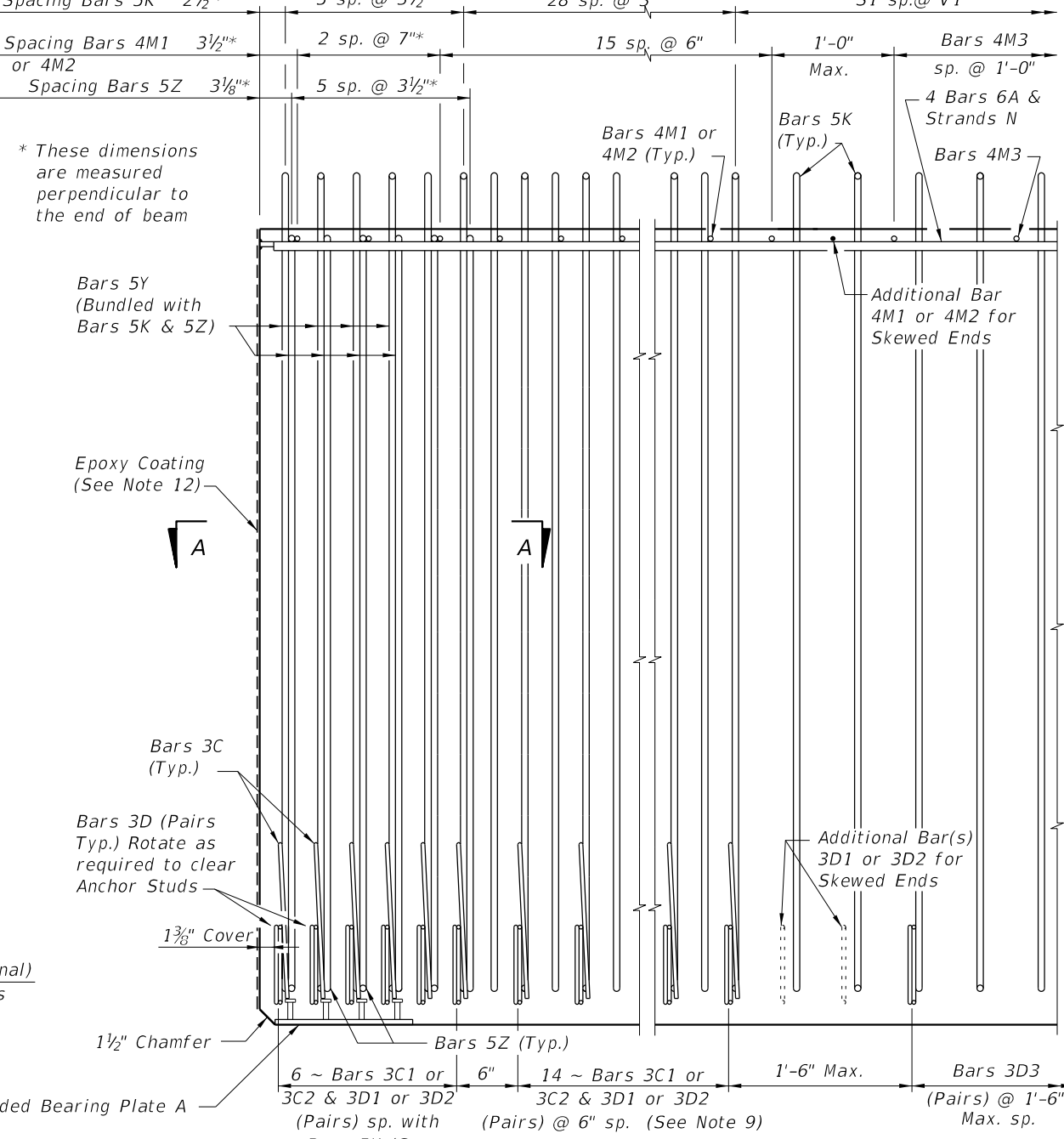
**LEGEND:**  
 EF = Each Face  
 FF = Front Face  
 BF = Back Face

9/23/2021 9:53:15 AM

LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-I 72 BEAM - STANDARD DETAILS	INDEX 450-072	SHEET 2 of 2
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END VIEW

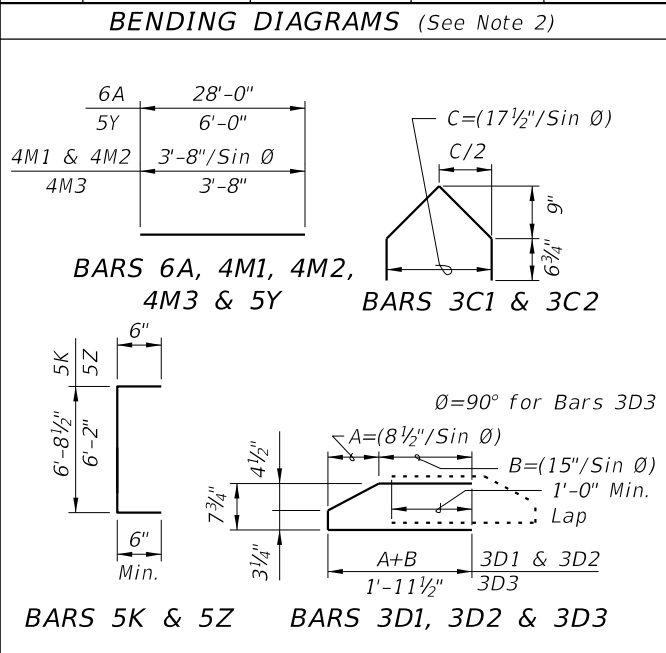


ELEVATION AT END OF BEAM  
(Flanges Not Shown For Clarity)  
(End 1 Shown, End 2 Similar)

**CONVENTIONAL REINFORCING BAR BENDING DETAILS**

**BILL OF REINFORCING STEEL**

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

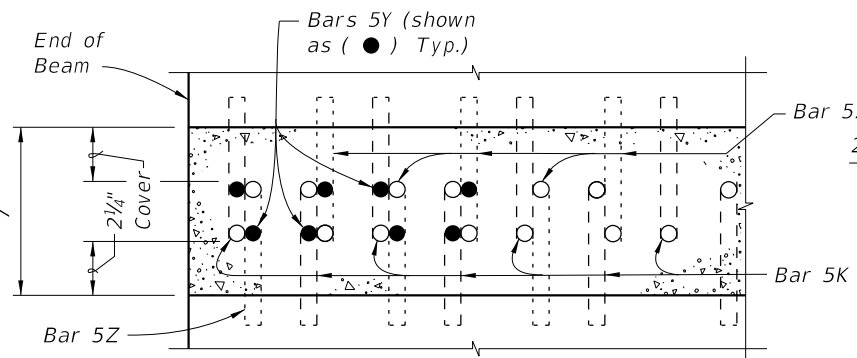


**NOTES:**

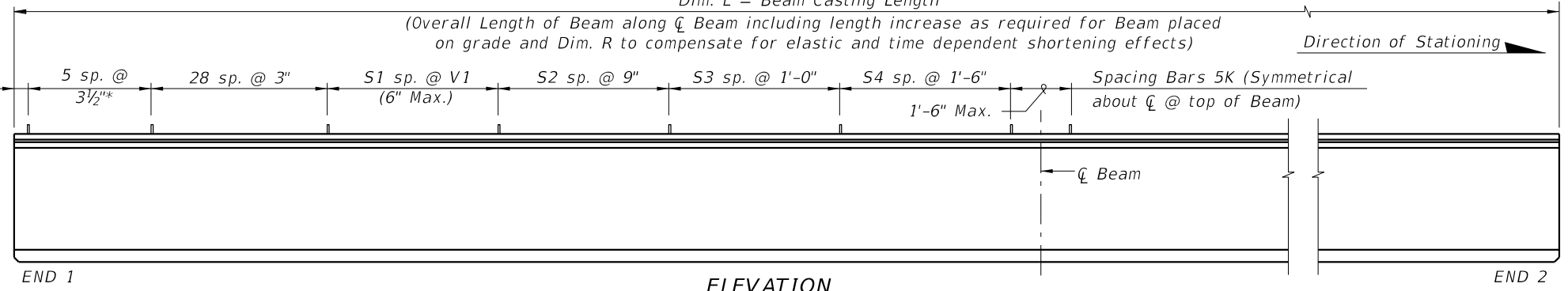
A. Work this Index with Index 450-010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.

B. For referenced notes, see Index 450-010.

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)



END 1

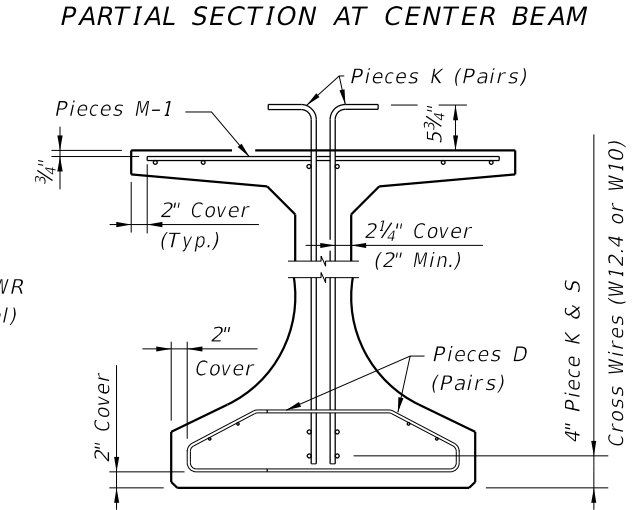
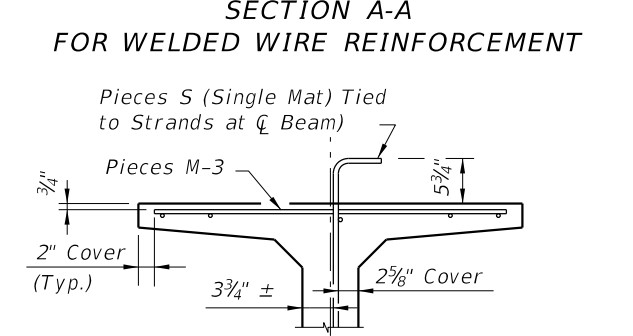
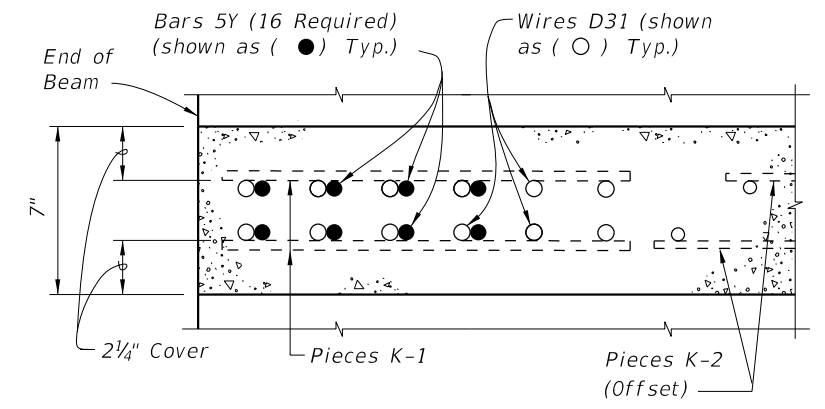
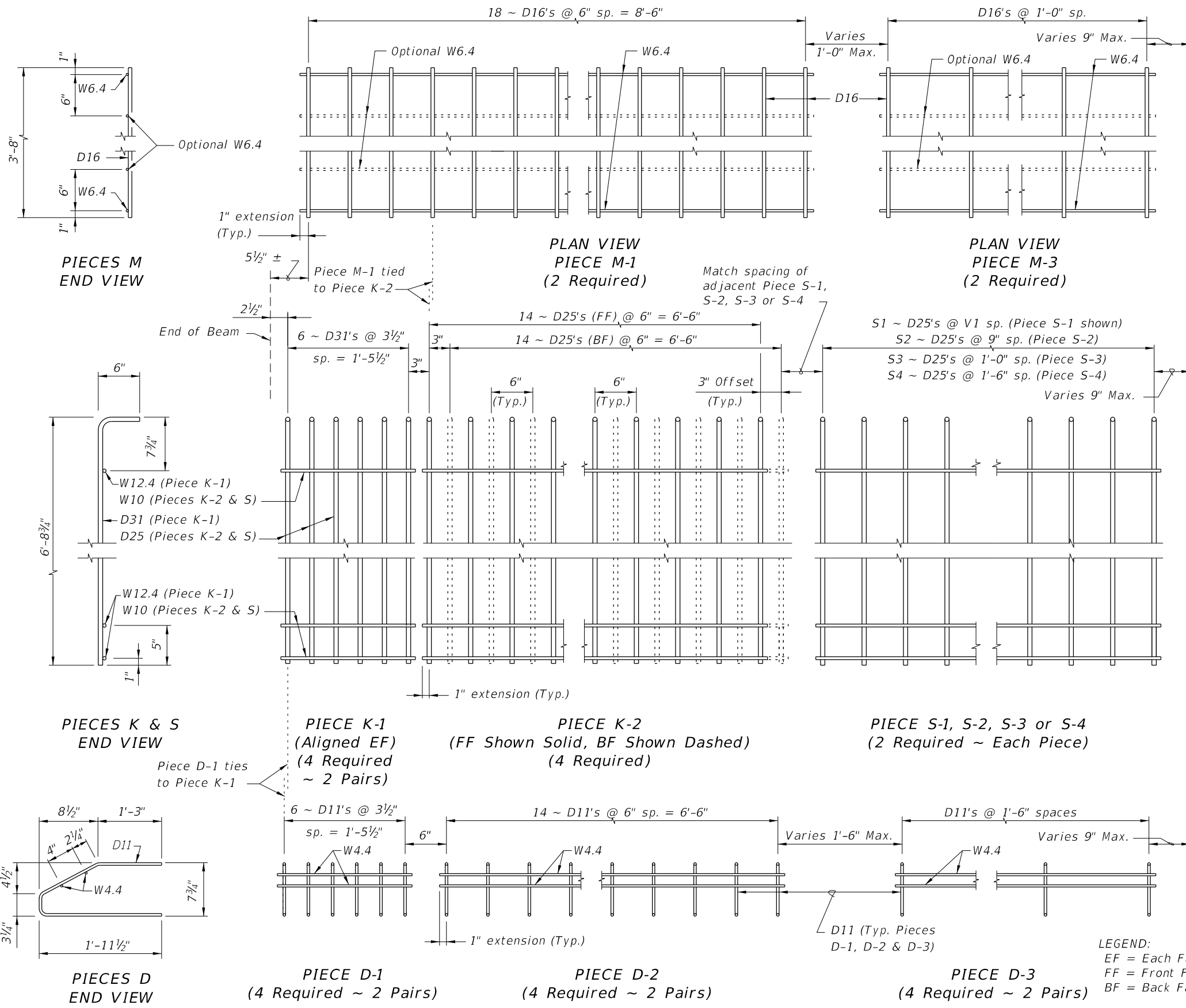
ELEVATION

END 2

9/23/2021 9:53:16 AM

LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) DETAILS



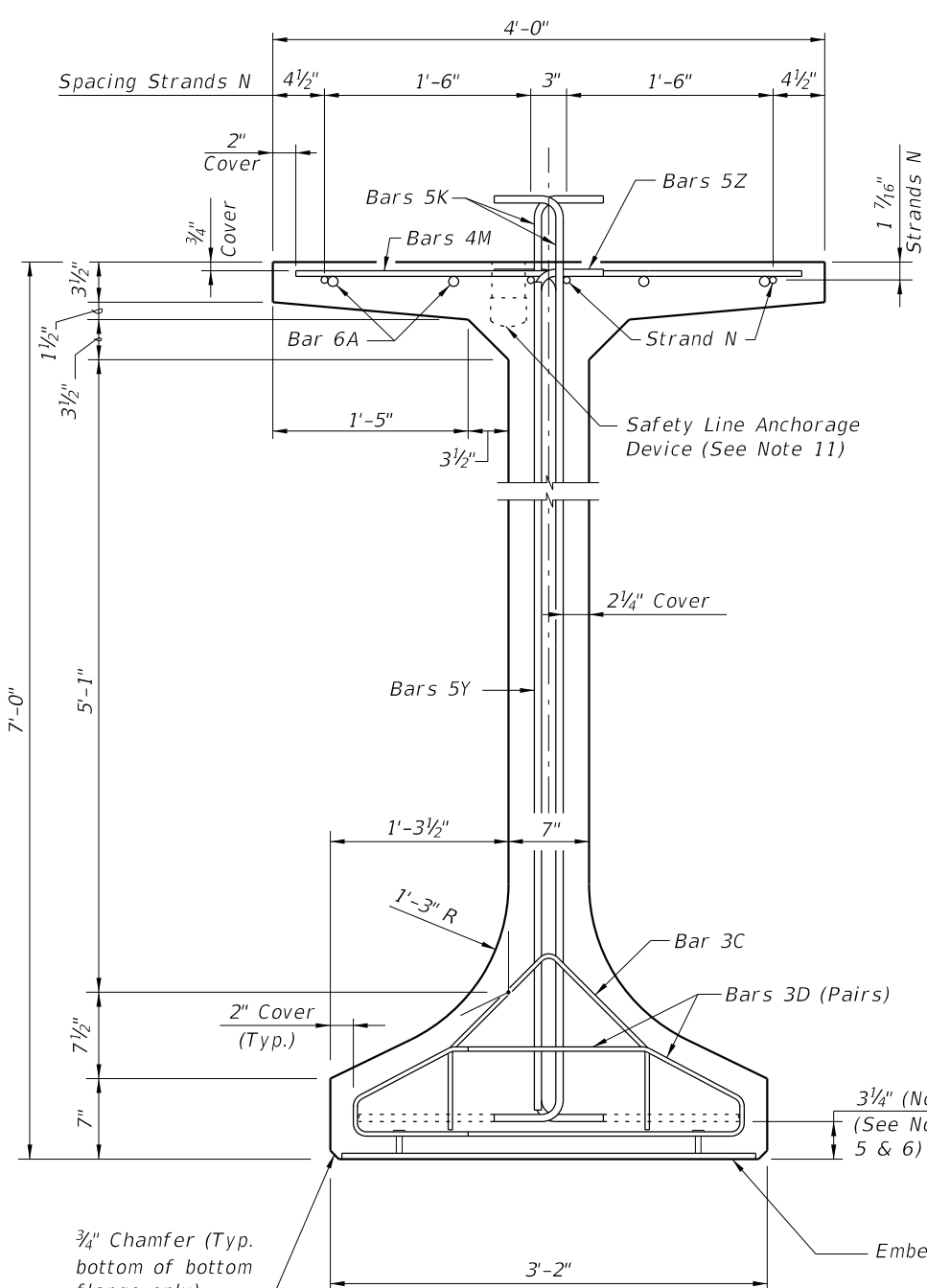
**NOTES:**  
 a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.  
 b. Place Conventional Reinforcing Bars 6A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.  
 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 Reinforcing Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index 450-010 Skewed Beam End 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

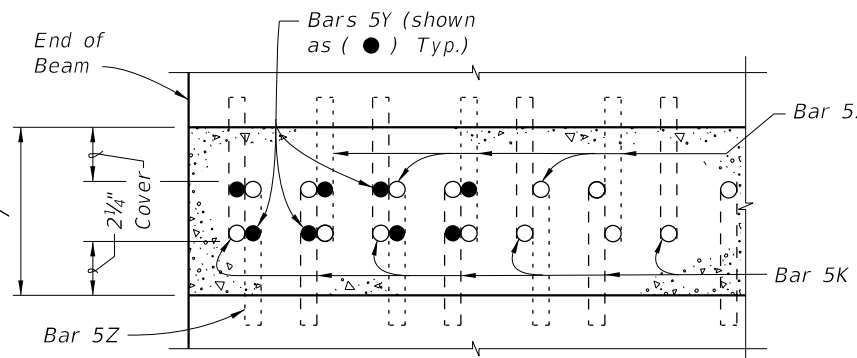
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LAST REVISION 11/01/16	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FLORIDA-I 78 BEAM - STANDARD DETAILS	INDEX 450-078	SHEET 2 of 2
REVISION						

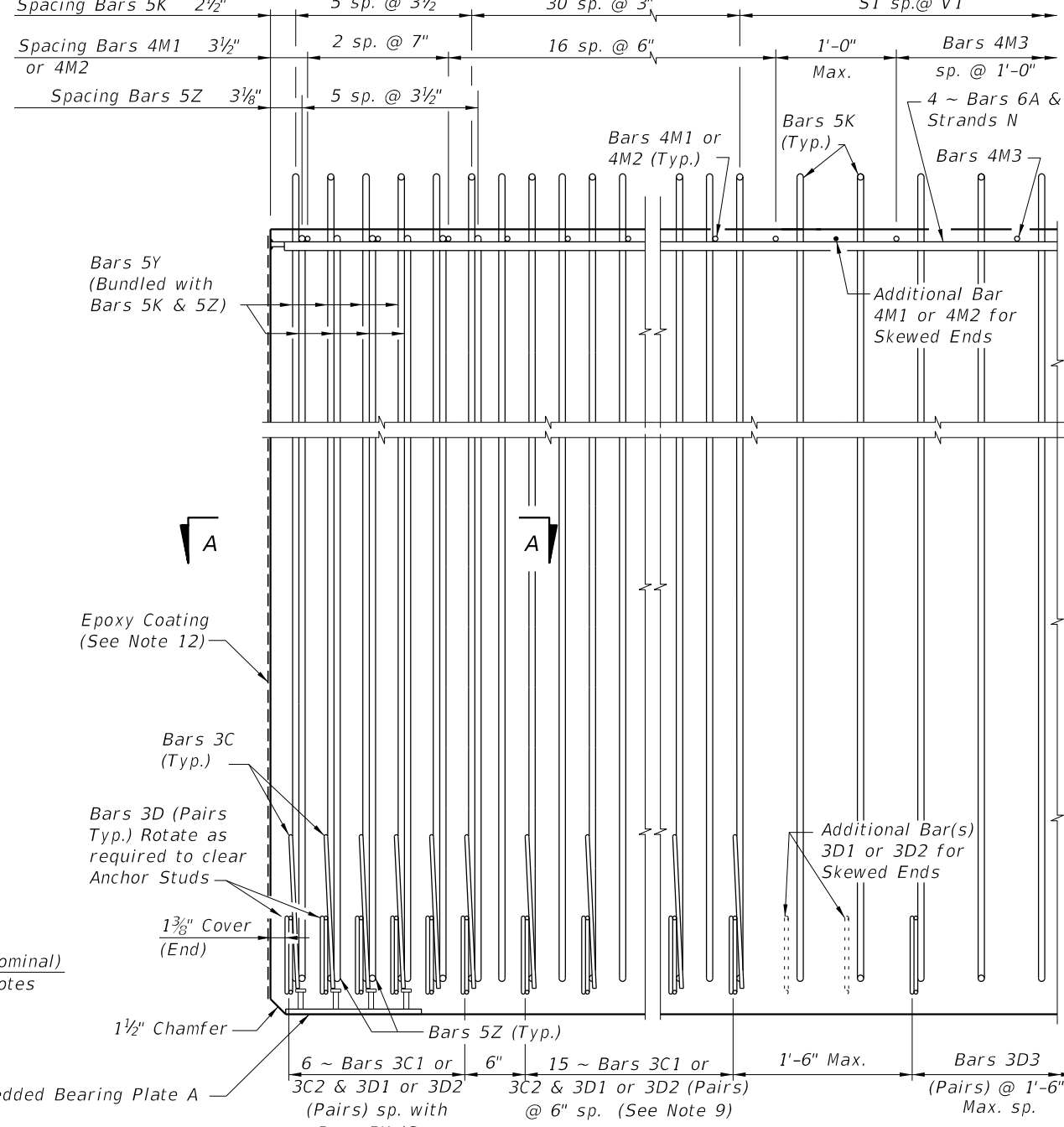




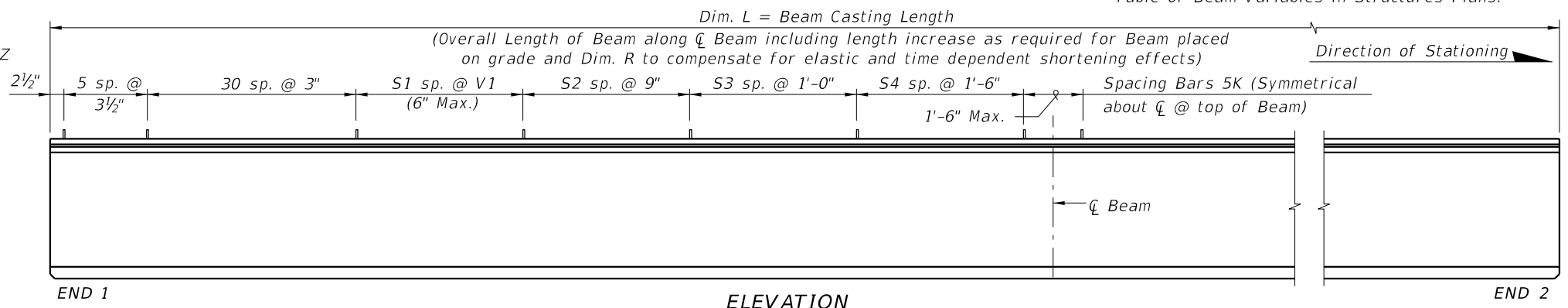
END VIEW



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



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

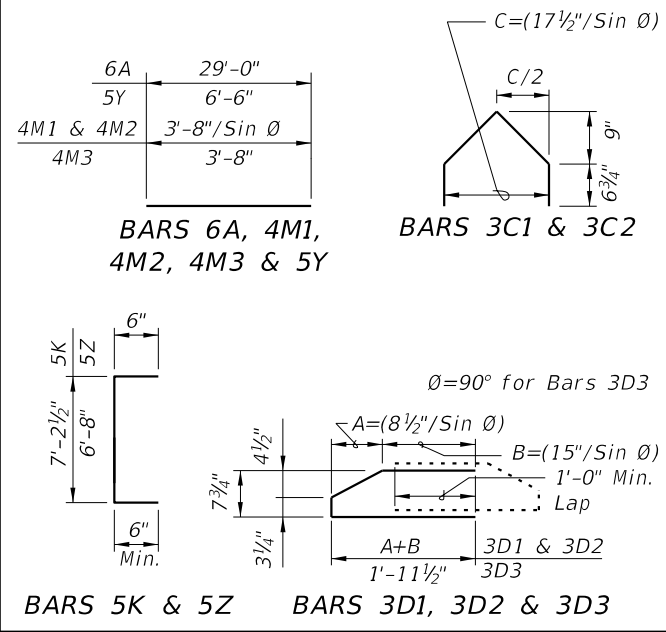


ELEVATION

CONVENTIONAL REINFORCING BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	6	8	29'-0"
C1	7, 8 & 9	3	21 (End 1)	Varies
C2	7, 8 & 9	3	21 (End 2)	Varies
D1	7, 8, 9 & 10	3	42 (End 1)	Varies
D2	7, 8, 9 & 10	3	42 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	8'-2"
M1	7 & 9	4	19 (End 1)	Varies
M2	7 & 9	4	19 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	1/2" Ø Strand	4	Dim. L
Y	8 & 9	5	16	6'-6"
Z	5, 6, 8, 9 & 10	5	12	7'-8"

BENDING DIAGRAMS (See Note 2)

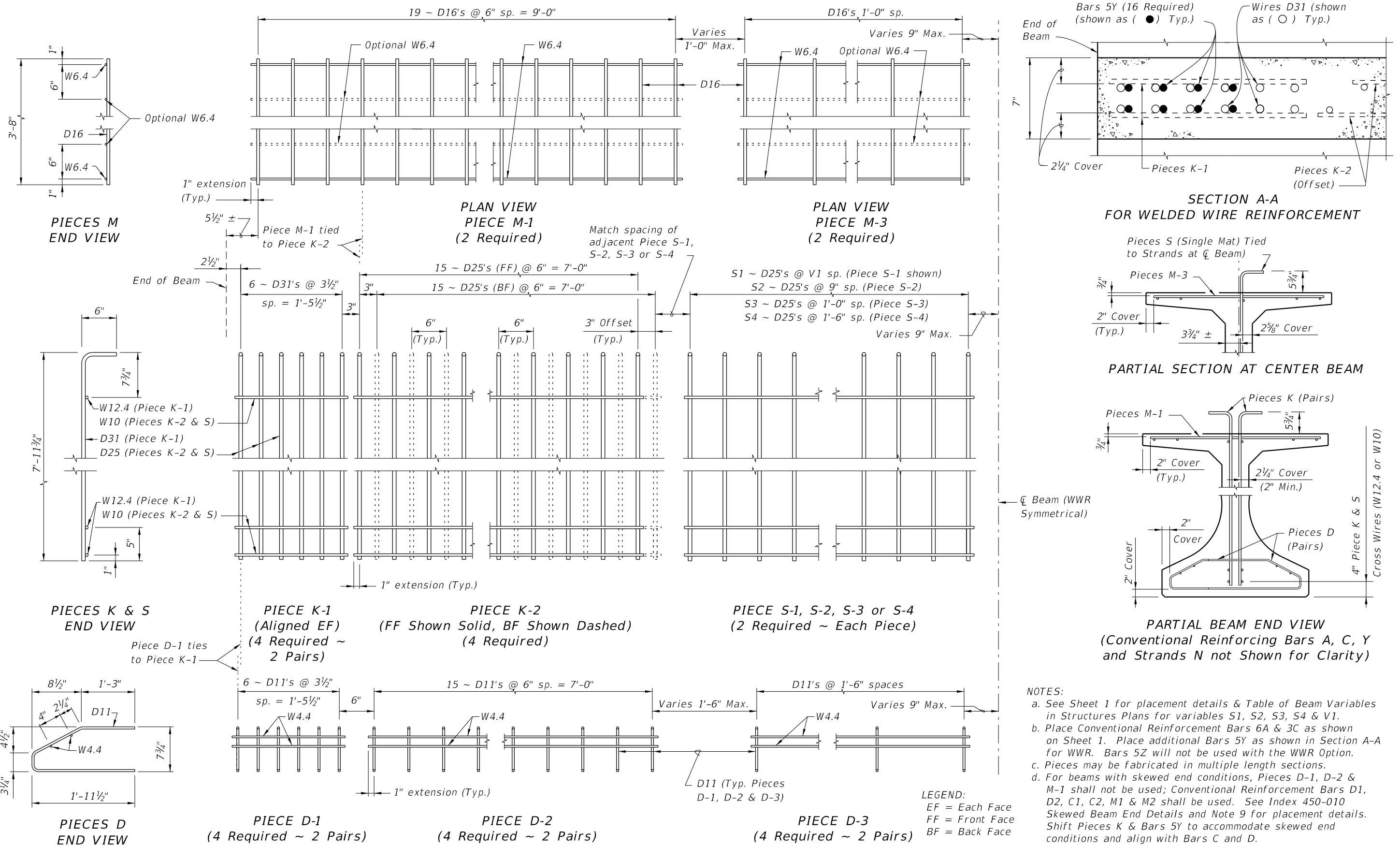


NOTES:  
 A. Work this Index with Index 450-010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.  
 B. For referenced notes, see Index 450-010.  
 C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.

9/23/2021 9:53:31 AM

LAST REVISION 11/01/19	DESCRIPTION:
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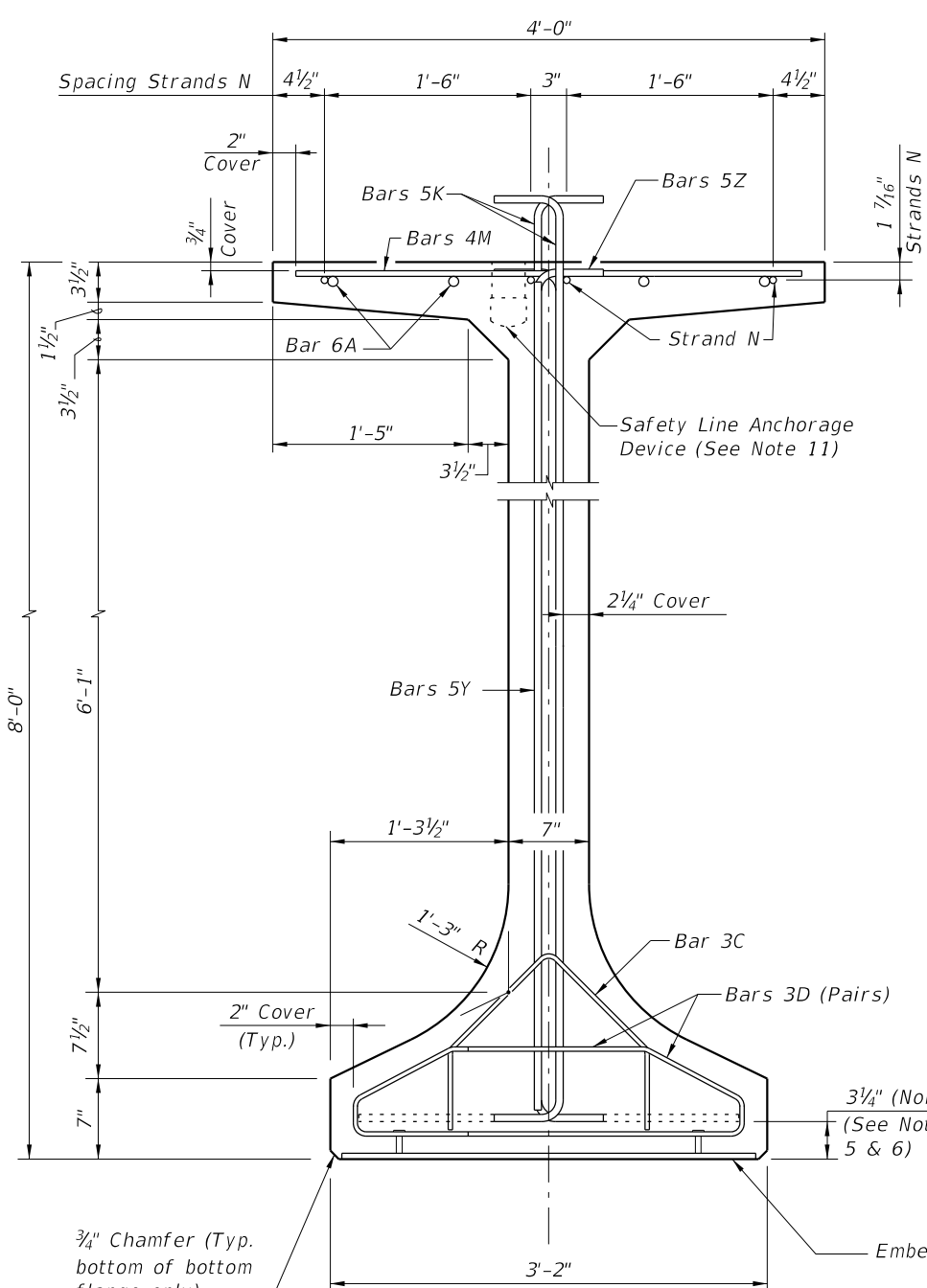
ALTERNATE REINFORCING STEEL (WWR) DETAILS



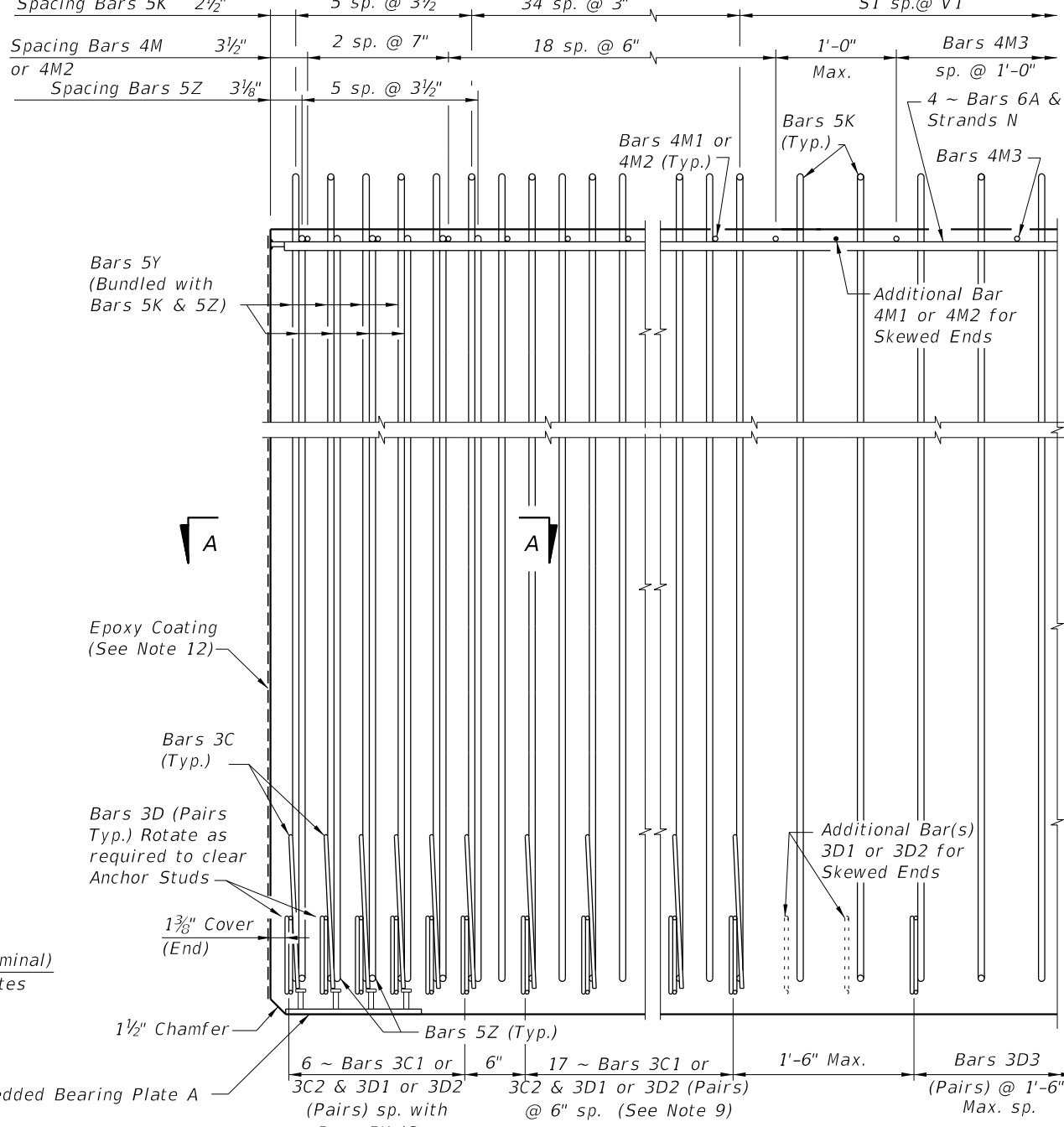
- NOTES:**
- See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
  - Place Conventional Reinforcing Bars 6A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.
  - Pieces may be fabricated in multiple length sections.
  - For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcing Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index 450-010 Skewed Beam End Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

9/23/2021 9:53:32 AM

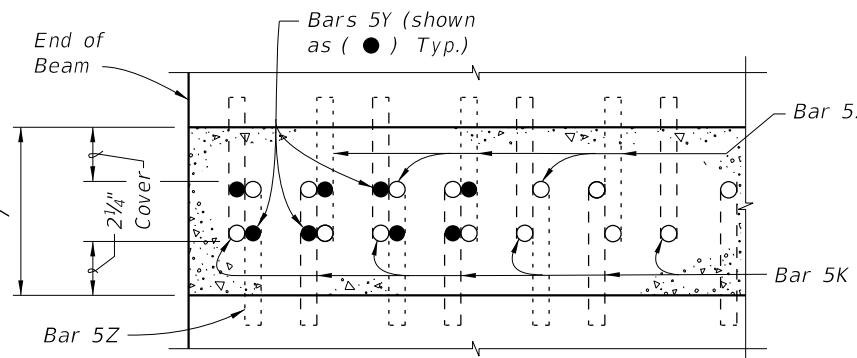
LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-I 84 BEAM - STANDARD DETAILS	INDEX 450-084	SHEET 2 of 2
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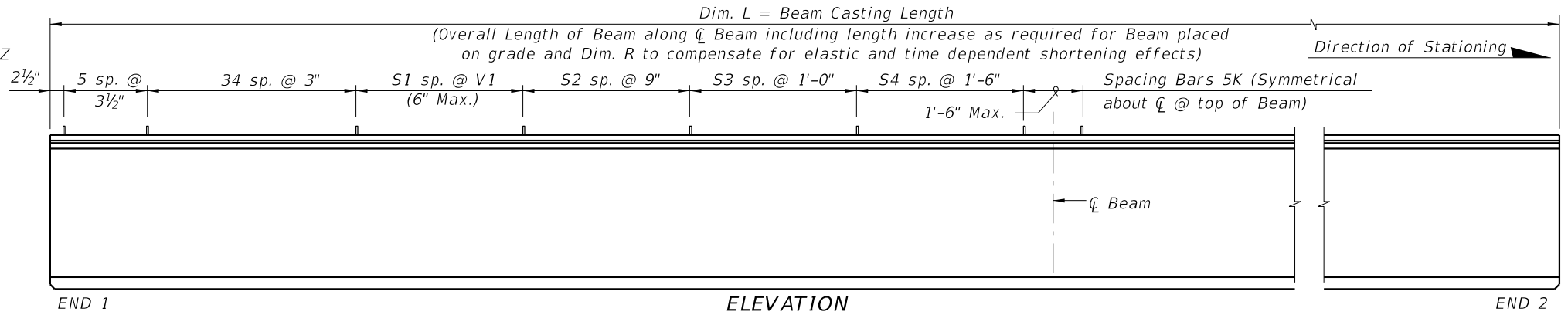
END VIEW



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



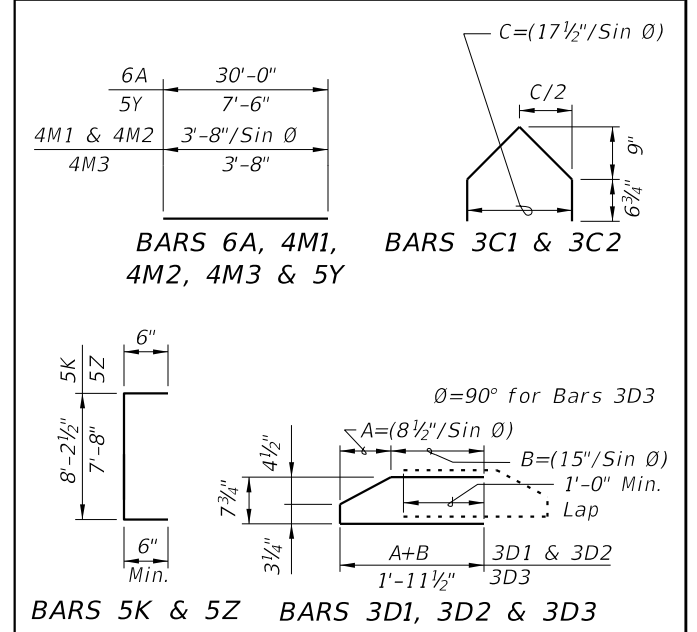
SECTION A-A FOR CONVENTIONAL REINFORCING  
(Showing Bars 5K, 5Y & 5Z Only)



CONVENTIONAL REINFORCING  
BAR BENDING DETAILS

BILL OF REINFORCING STEEL				
MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 2)
A	—	6	8	30'-0"
C1	7, 8 & 9	3	23 (End 1)	Varies
C2	7, 8 & 9	3	23 (End 2)	Varies
D1	7, 8, 9 & 10	3	46 (End 1)	Varies
D2	7, 8, 9 & 10	3	46 (End 2)	Varies
D3	9 & 10	3	See Table	4'-3"
K	5, 6, 8, 9 & 10	5	See Table	9'-2"
M1	7 & 9	4	21 (End 1)	Varies
M2	7 & 9	4	21 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	4 & 12	1/2" Ø Strand	4	Dim. L
Y	8 & 9	5	16	7'-6"
Z	5, 6, 8, 9 & 10	5	12	8'-8"

BENDING DIAGRAMS (See Note 2)

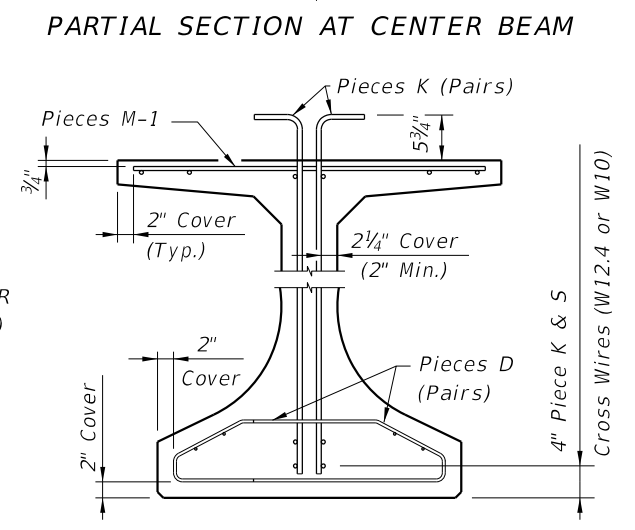
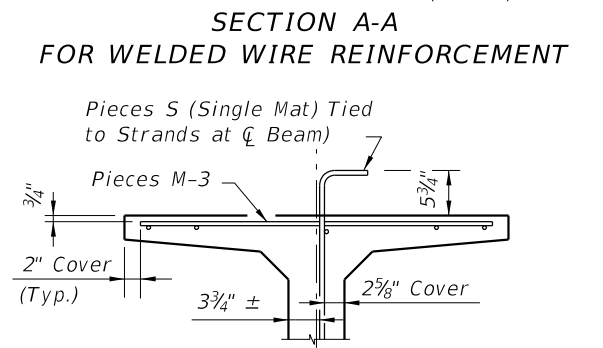
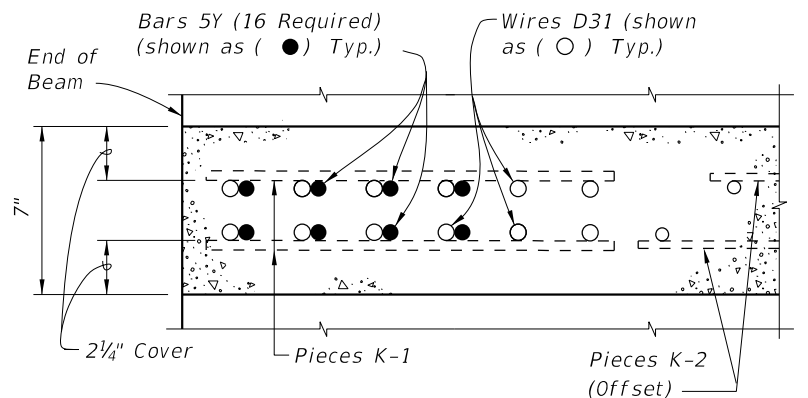
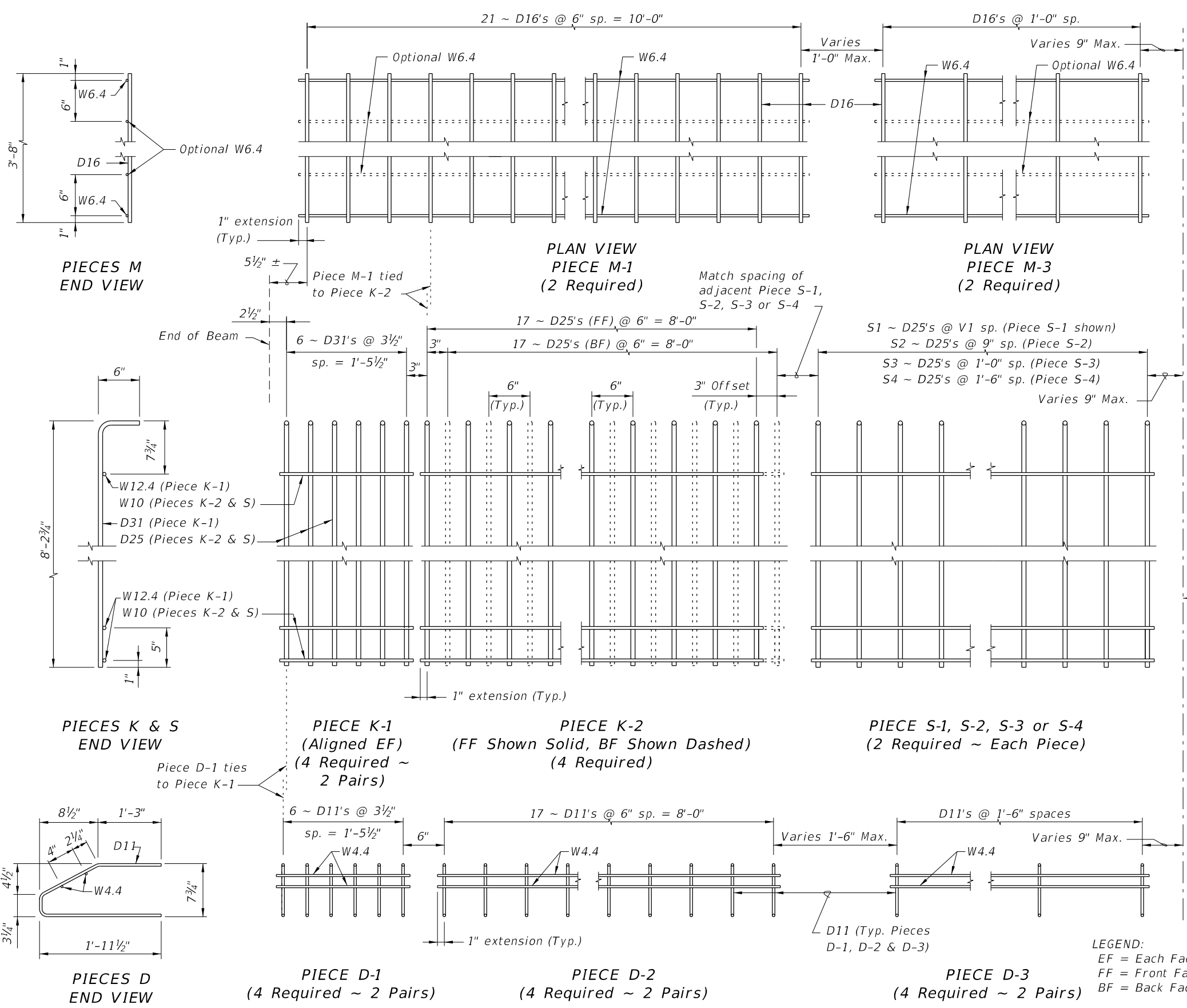


NOTES:  
 A. Work this Index with Index 450-010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.  
 B. For referenced notes, see Index 450-010.  
 C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.

9/23/2021 9:53:33 AM

LAST REVISION	DESCRIPTION:
11/01/19	

ALTERNATE REINFORCING STEEL (WWR) DETAILS

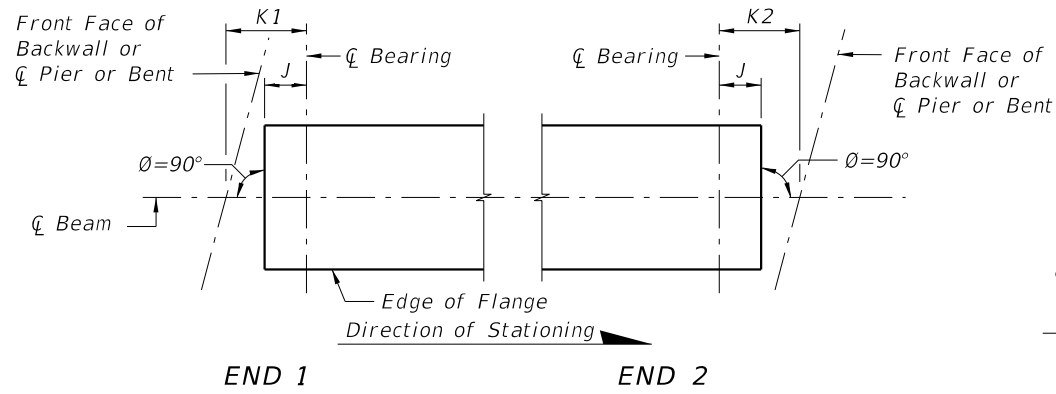


**NOTES:**  
 a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.  
 b. Place Conventional Reinforcing Bars 6A & 3C as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.  
 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 Reinforcing Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index 450-010 Skewed Beam End Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

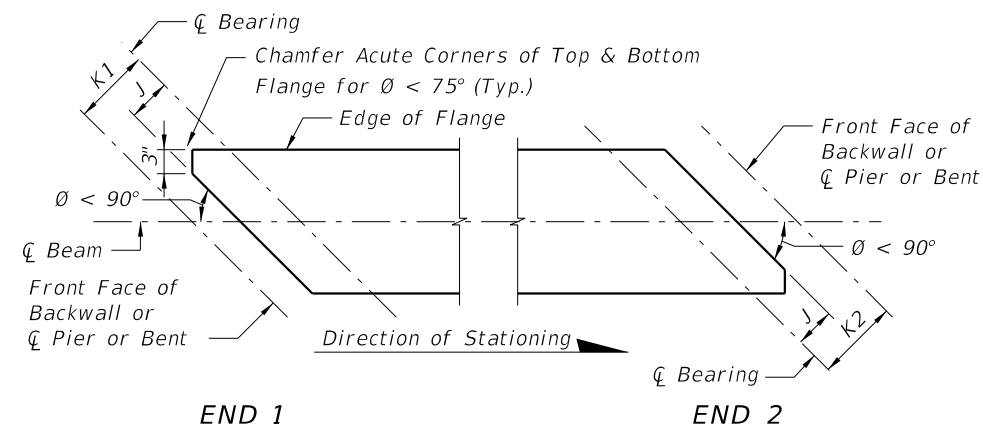
**LEGEND:**  
 EF = Each Face  
 FF = Front Face  
 BF = Back Face

9/23/2021 9:53:34 AM

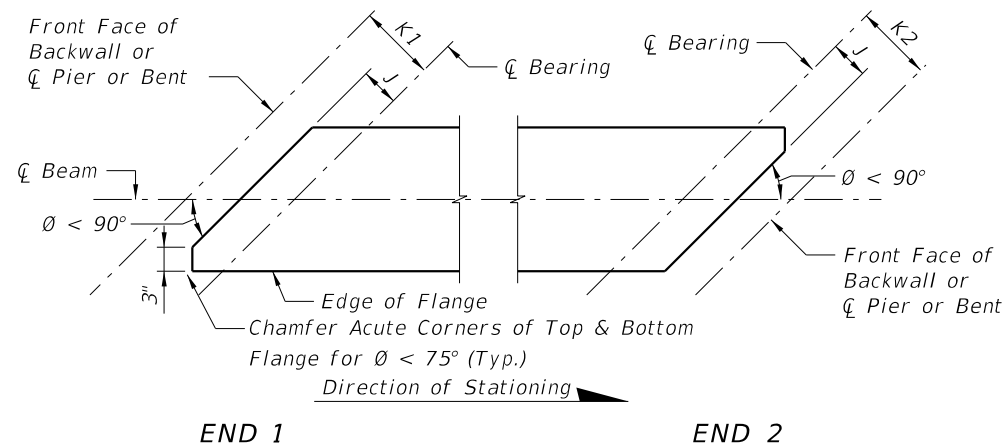
LAST REVISION 11/01/16	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FLORIDA-I 96 BEAM - STANDARD DETAILS	INDEX 450-096	SHEET 2 of 2
REVISION						



**CASE 1**  
(Standard Orientation for New Construction)

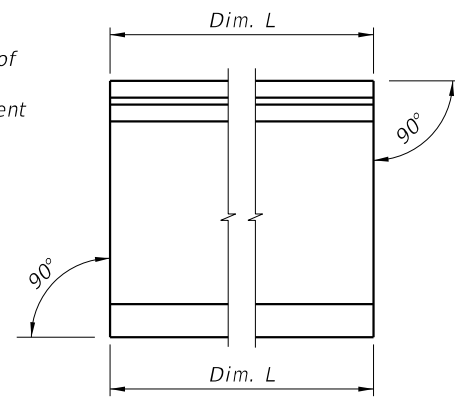


**CASE 2**  
(Special Orientation for Widening)

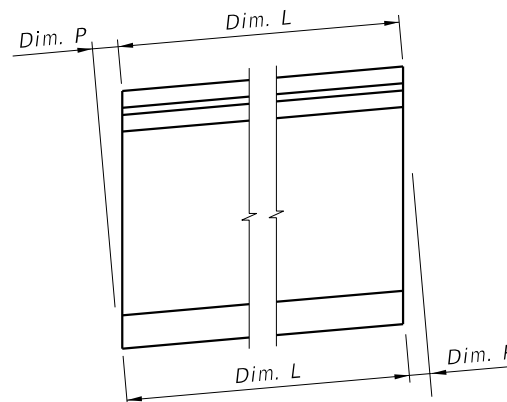


**CASE 3**  
(Special Orientation for Widening)

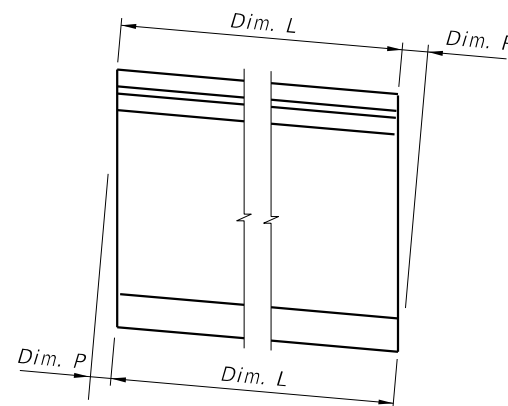
**SCHEMATIC PLAN VIEWS AT BEAM ENDS**



**CONDITION 1**  
(Dim P = 0.0)



**CONDITION 2**



**CONDITION 3**

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

**BEAM NOTES**

1. Work this Index with the Table of Beam Variables in Structures Plans.
2. All bar bend dimensions are out to out.
3. Concrete cover: 2 inches minimum.
4. Strands N:  $\frac{3}{8}$ "  $\emptyset$  minimum, stressed to 10,000 lbs. each.
5. Place one (1) Bar 4K or 5Z at each location. Alternate the direction of the ends for each bar.
6. Tie Bars 4K and 5Z to the fully bonded strands in the bottom or center row (see "STRAND PATTERN" on the Table of Beam Variables sheet in Structures Plans).
7. Place Bars 3D1 in beam END 1, and Bars 3D2 in beam END 2.
8. For Beams with vertically beveled end conditions:
  - A. Place first row of Bars 3D1, 3D2, 4K, 4Y 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".
  - B. For deformed WWR, cut top cross wire and rotate bars as required or reduce end cover at top of the beam to minimum 1".
9. For beams with skewed end conditions:
  - A. WWR is not permitted for end reinforcement Bars 3D1, and 3D2 on skewed ends; use bar reinforcement.
  - B. Place end reinforcement parallel to the skewed end of the beam. End reinforcement is defined as Bars 3D1, 3D2, 4K, 4Y and 5Z placed within the limits of the spacing for Bars 3D in "ELEVATION AT END OF BEAM".
  - C. Beyond the limits of the spacing for Bars 3D, place Bars 4K perpendicular to the longitudinal axis of the beam. For placement see "SKEWED BEAM END DETAILS FOR WIDENING EXISTING BRIDGES" (Sheet 2).
10. Contractor Options:
  - A. Deformed WWR may be used in lieu of Bars 3D, 4K, and 5Z as shown on Sheet 4; except at skewed ends (See Note 9).
  - B. Bars 3D1 and 3D2 may be fabricated as a two-piece bar with a 1'-0" minimum lap splice of the bottom legs.
  - C. For deformed WWR, supplemental transverse #4 bars are permitted to support Pieces K & S under the cross wires on the bottom row of strands or above Strands N.
11. Embedment of Safety Line Anchorage Devices are permitted in the top flange to accommodate fall protection systems. See shop drawings for details and spacing of required anchorage devices.
12. For beams with ends that will not to be encased in concrete diaphragms, cut wedges and recess Prestressing Strands at the end of the beam without damaging the surrounding concrete. See "STRAND CUTTING AND PROTECTING DETAIL" on Sheet 2.
13. Holes in the beam web for temporary bracing or shipping devices must be formed prior to casting. Fill holes not meeting all the following criteria in accordance with Specification Section 450.
  - A. The superstructure environmental classification is slightly or moderately aggressive
  - B. Clear cover to adjacent steel reinforcing is 1" or greater
  - C. Hole inside diameter is 2" maximum
  - D. Non-metallic, non-water absorbing forming materials such as PVC, may be left in place permanently.

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**DETAILS AND NOTES**

LAST REVISION 11/01/18	DESCRIPTION:
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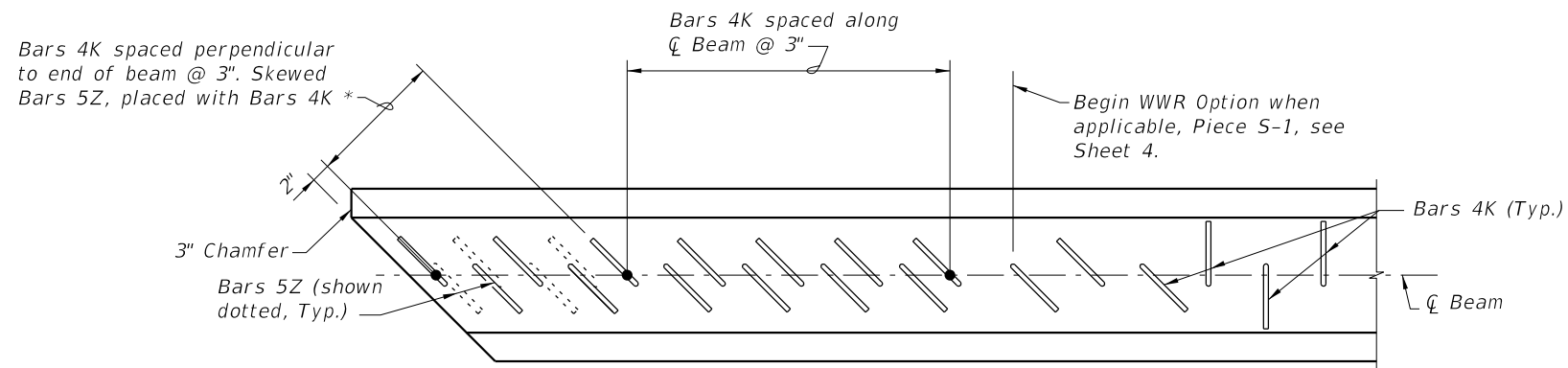


FY 2022-23  
STANDARD PLANS

AASHTO TYPE II BEAM

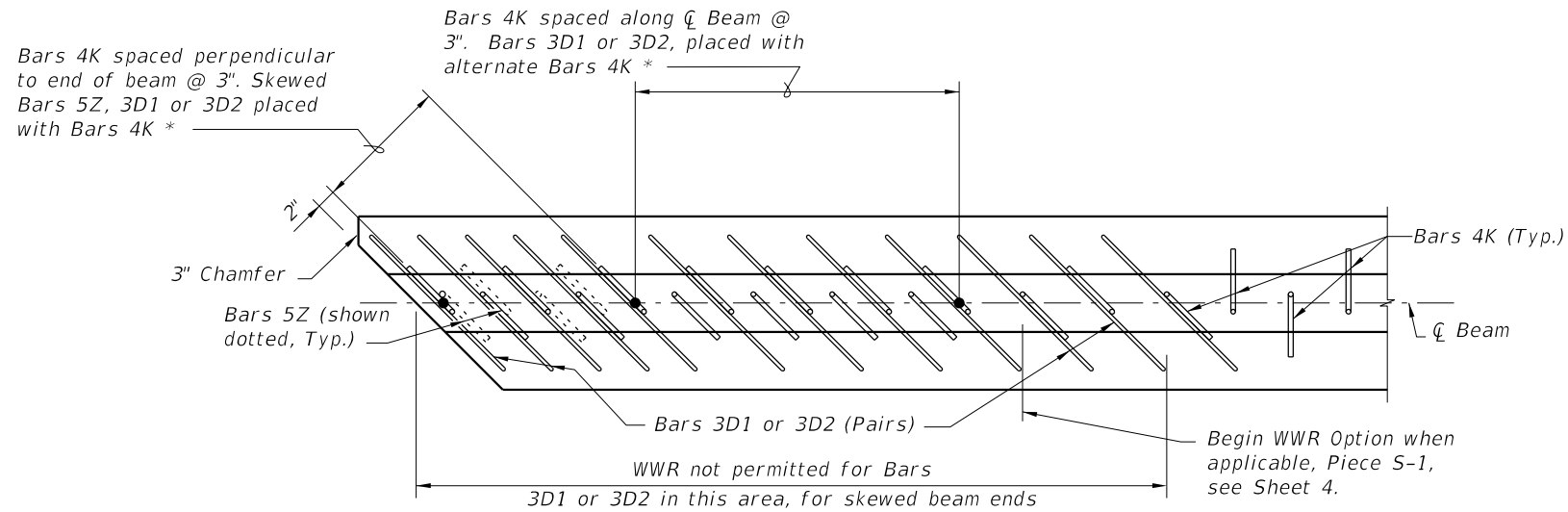
INDEX  
450-120

SHEET  
1 of 4

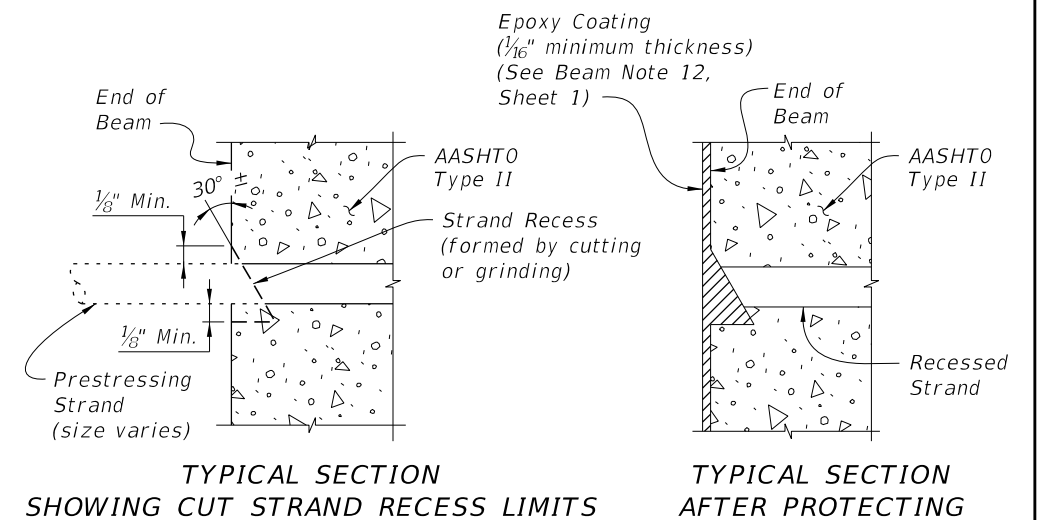


**PARTIAL PLAN VIEW (SHOWING TOP FLANGE)**  
 (End 1 Shown, End 2 Similar)  
 (Bars 5A, 4Y & Strands N not shown for clarity)

\* For number of Bars, spacing and placement details see Sheet 3. See Sheet 3 for Conventional Reinforcement, Sheet 4 for WWR.



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



**STRAND CUTTING AND PROTECTING DETAIL**

**SKEWED BEAM END DETAILS FOR WIDENING EXISTING BRIDGES**

DETAILS AND NOTES

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LAST REVISION 11/01/19	REVISION	DESCRIPTION:
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FY 2022-23  
 STANDARD PLANS

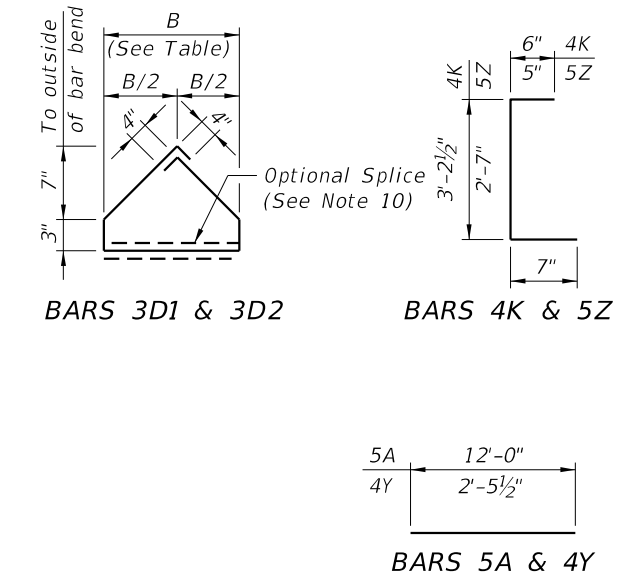
AASHTO TYPE II BEAM

INDEX 450-120	SHEET 2 of 4
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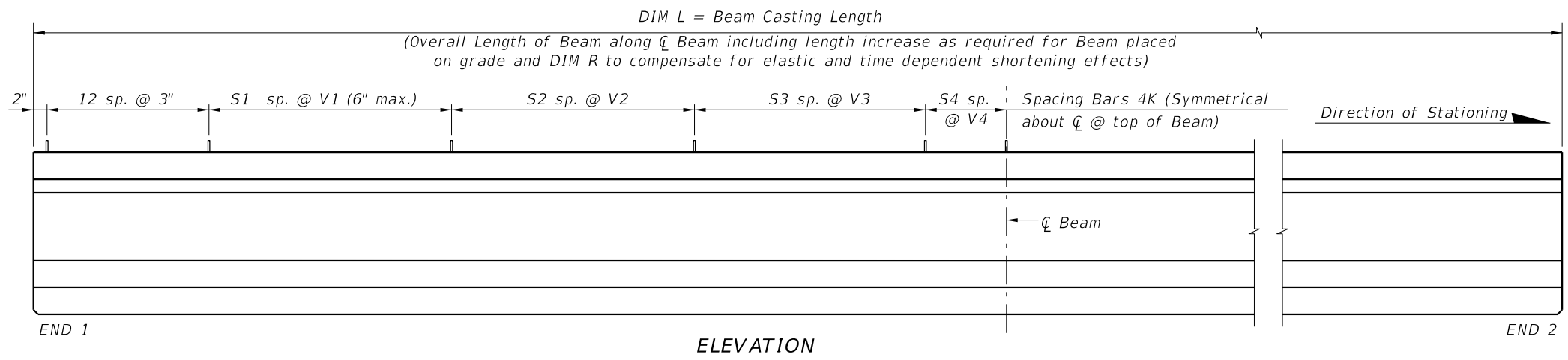
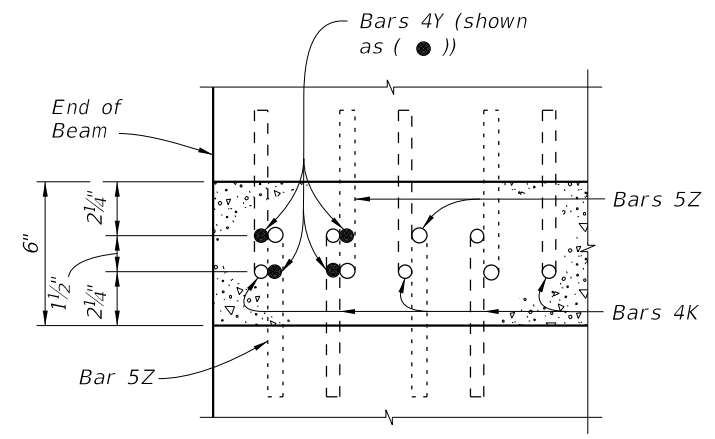
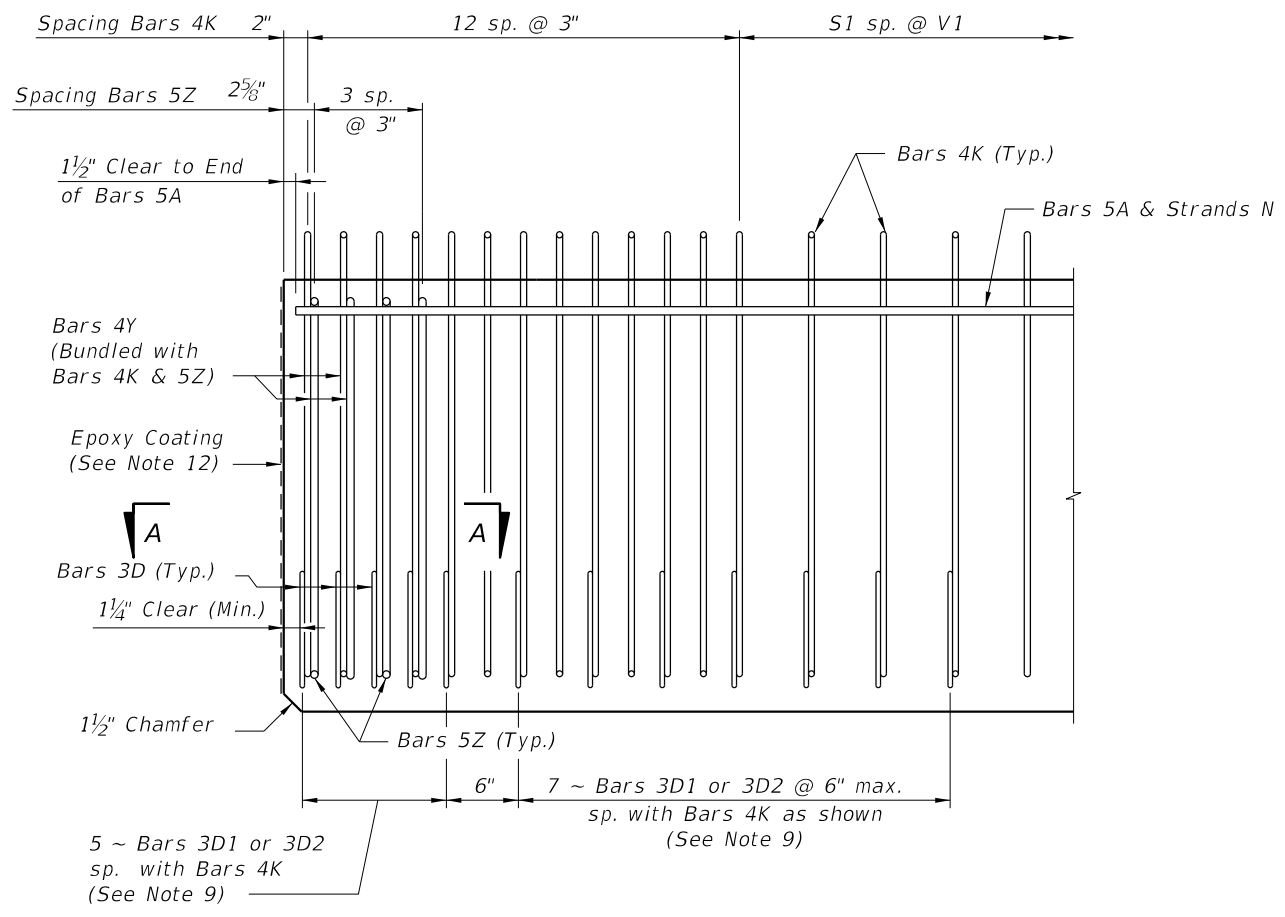
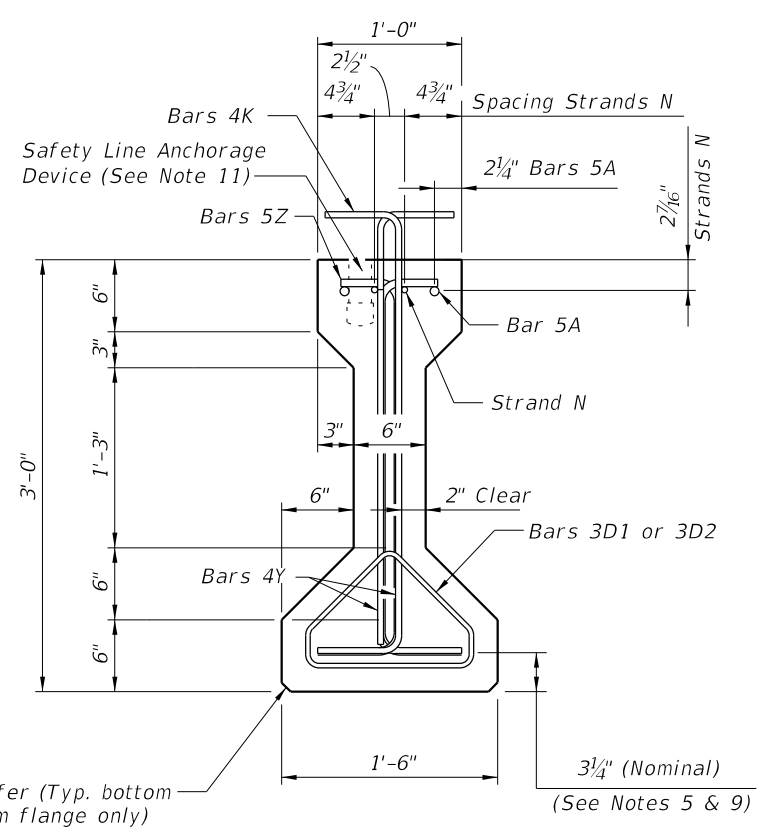
**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	5	4	12'-0"
D1	8, 9 & 10	3	12	See Table
D2	8, 9 & 10	3	12	See Table
K	5, 6, 8, 9 & 10	4	See Table	4'-4"
N	4 & 12	$\frac{3}{8}$ " $\emptyset$ Strand	2	DIM L+5"
Y	8 & 9	4	8	2'-6"
Z	5, 6, 8, 9 & 10	5	8	3'-7"

**BENDING DIAGRAMS (See Note 1)**



**NOTES:**  
 Work this Index with the AASHTO Type II Beam - Table of Beam Variables in Structures Plans.  
 For referenced notes, see Sheet 1.  
 For Dimensions L, R, V1 thru V4 and number of spaces S1 thru S4, see AASHTO Type II Beam - Table of Beam Variables.

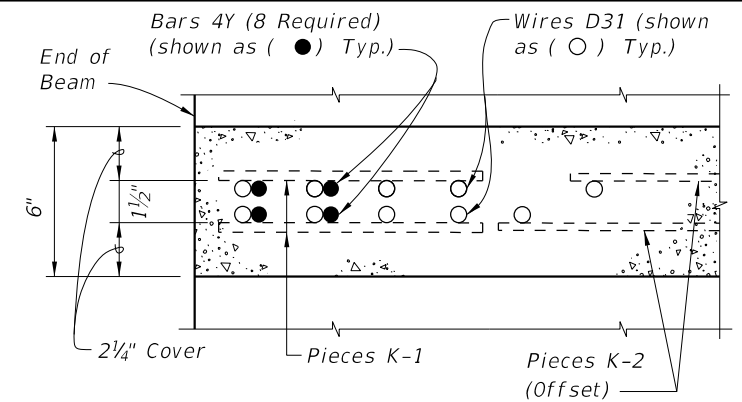


**STANDARD DETAILS**

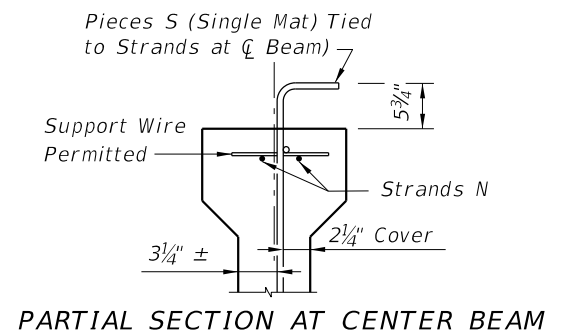
LAST REVISION	DESCRIPTION:
11/01/19	

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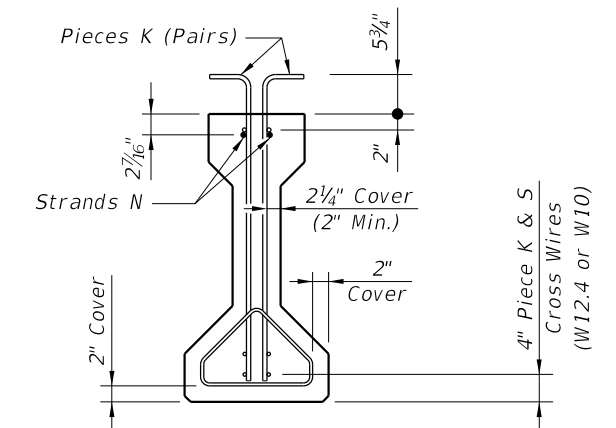
ALTERNATE REINFORCING STEEL WWR DETAILS



SECTION A-A  
FOR WELDED WIRE REINFORCEMENT



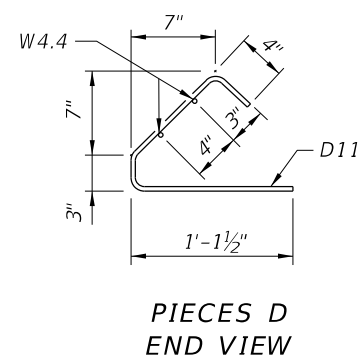
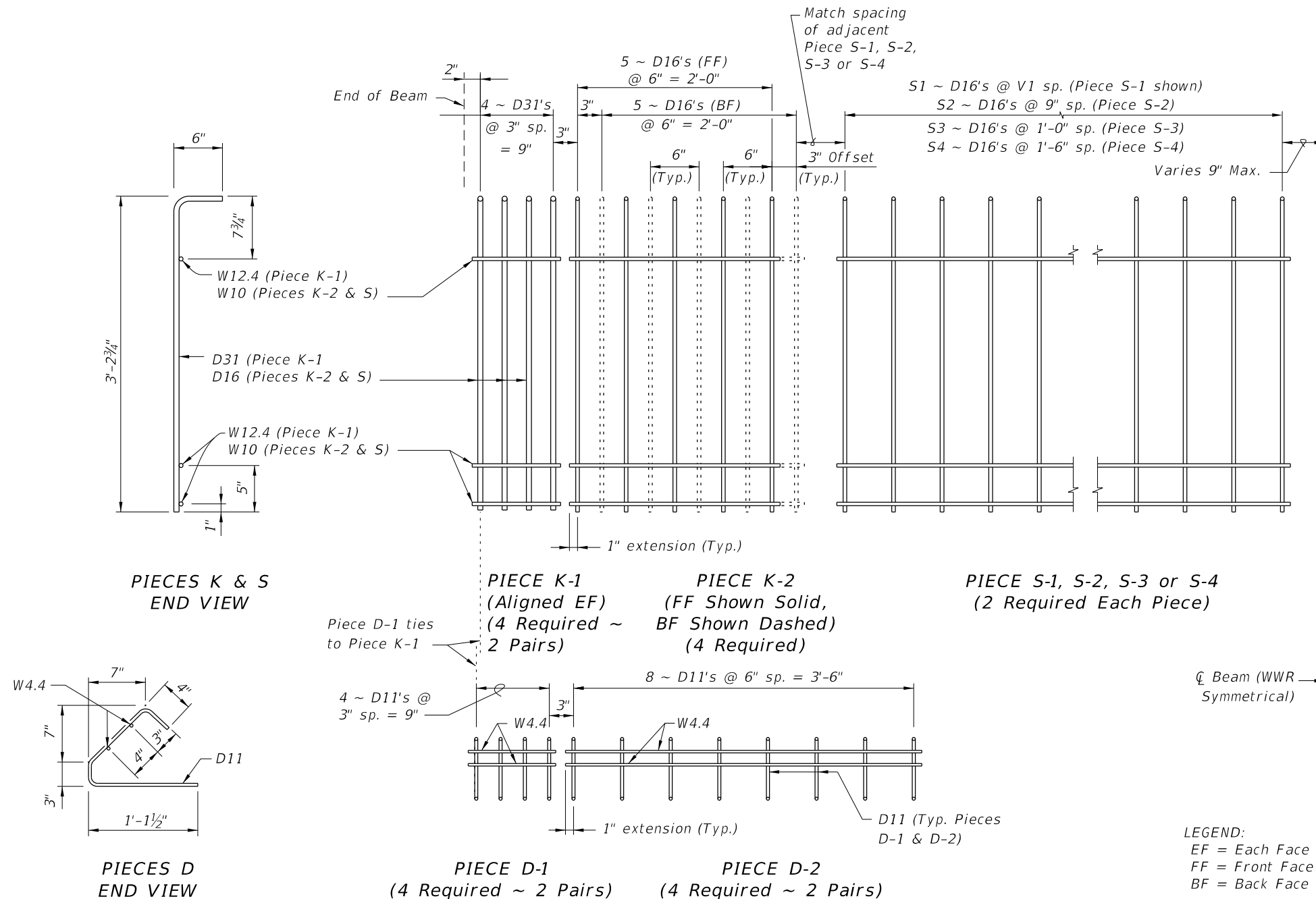
PARTIAL SECTION AT CENTER BEAM



PARTIAL BEAM END VIEW  
(Conventional Reinforcing Bars A, Y and Bottom Strands not shown for clarity)

- NOTES:
- See Sheet 3 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
  - Place Conventional Reinforcement Bars 5A as shown on Sheet 3. Place additional Bars 4Y as shown in Section A-A for WWR. Bars 5Z will not be used with the WWR Option.
  - Pieces may be fabricated in multiple length sections.
  - For beams with skewed end conditions, Pieces D-1 & D-2 shall not be used; Conventional Reinforcement Bars D1 & D2 shall be used. See Sheet 2 Skew Details and Sheet 1 Note 9 for placement details. Shift Pieces K & Bars 4Y to accommodate skewed end conditions and align with Bars D.

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



PIECE D-1 (4 Required ~ 2 Pairs)  
PIECE D-2 (4 Required ~ 2 Pairs)

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LAST REVISION 11/01/16	DESCRIPTION:
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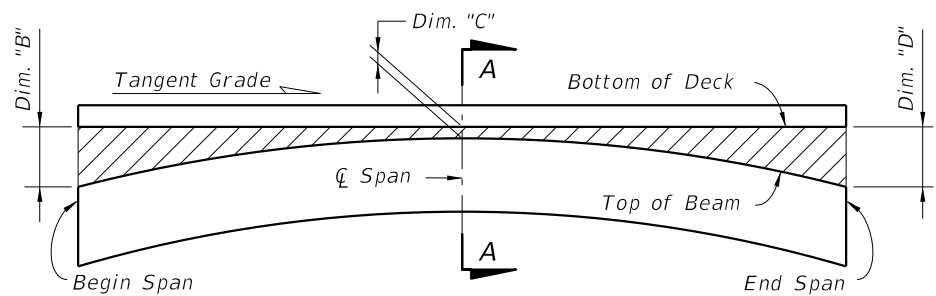

**FY 2022-23  
STANDARD PLANS**

AASHTO TYPE II BEAM

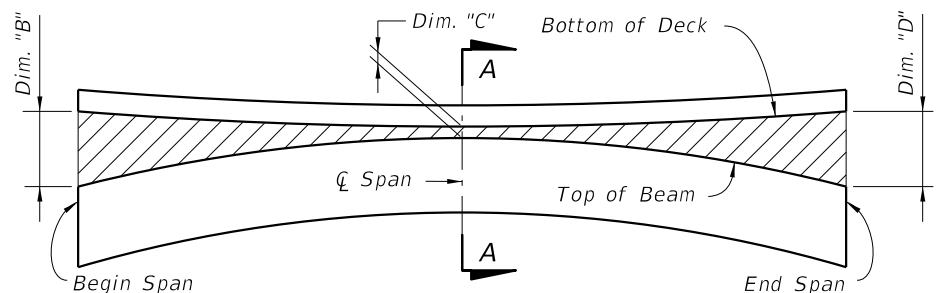
INDEX 450-120	SHEET 4 of 4
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STANDARD DETAILS

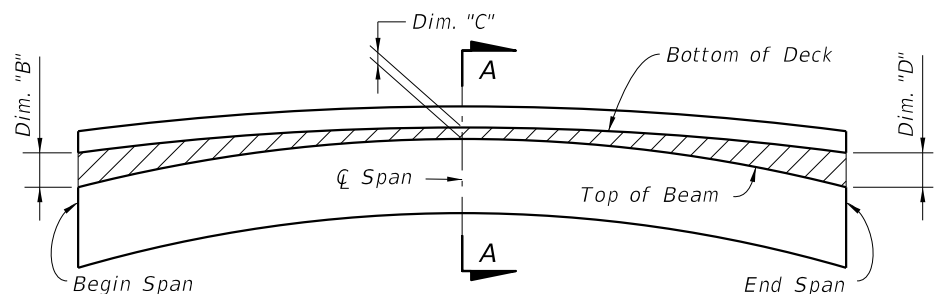




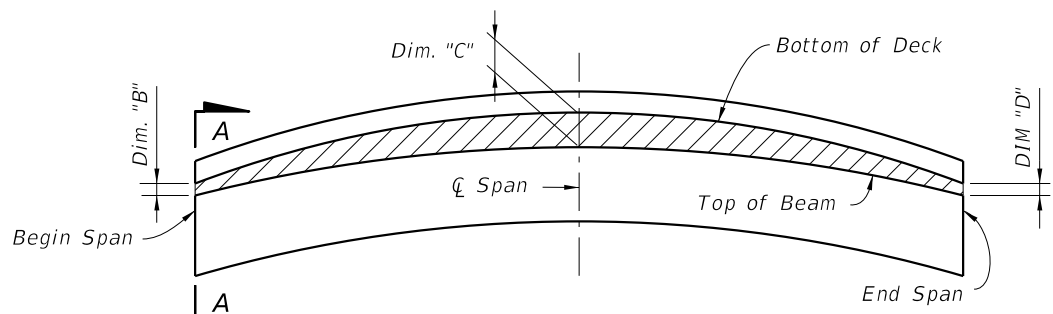
**BUILD-UP DIAGRAM FOR TANGENT SPANS  
(ALONG  $\bar{C}$  BEAM) (CASE 1)**



**BUILD-UP DIAGRAM FOR SAG VERTICAL CURVE & HORIZONTAL CURVE SPANS  
(ALONG  $\bar{C}$  BEAM) (CASE 2)**



**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS  
- CONTROL AT  $\bar{C}$  SPAN  
(ALONG  $\bar{C}$  BEAM) (CASE 3)**

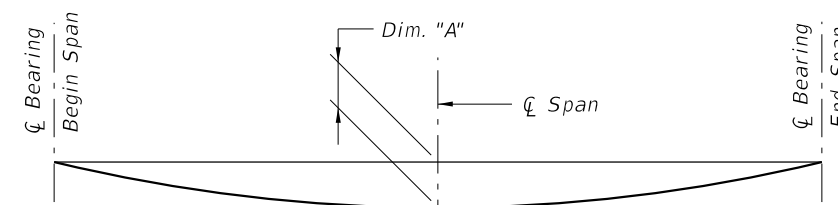


**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS  
- CONTROL AT BEGIN OR END SPAN  
(ALONG  $\bar{C}$  BEAM) (CASE 4)**

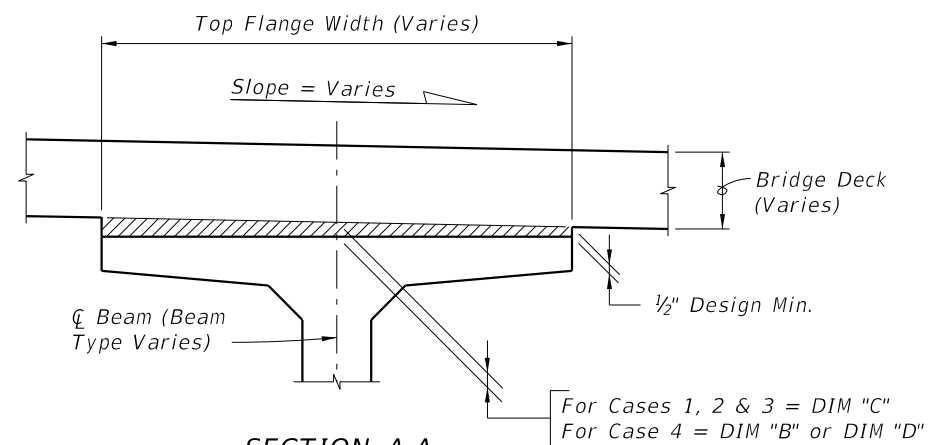
**BEAM CAMBER AND BUILD-UP NOTES:**

The build-up values given in the Data 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 +/- 1" 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**

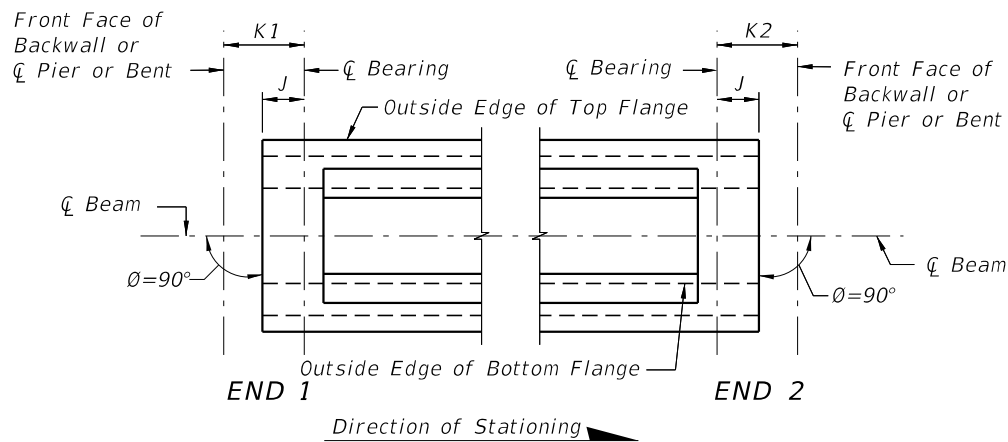


**SECTION A-A  
BUILD-UP OVER BEAMS  
(Florida-I Beam Shown  
AASHTO Type II Similar)**

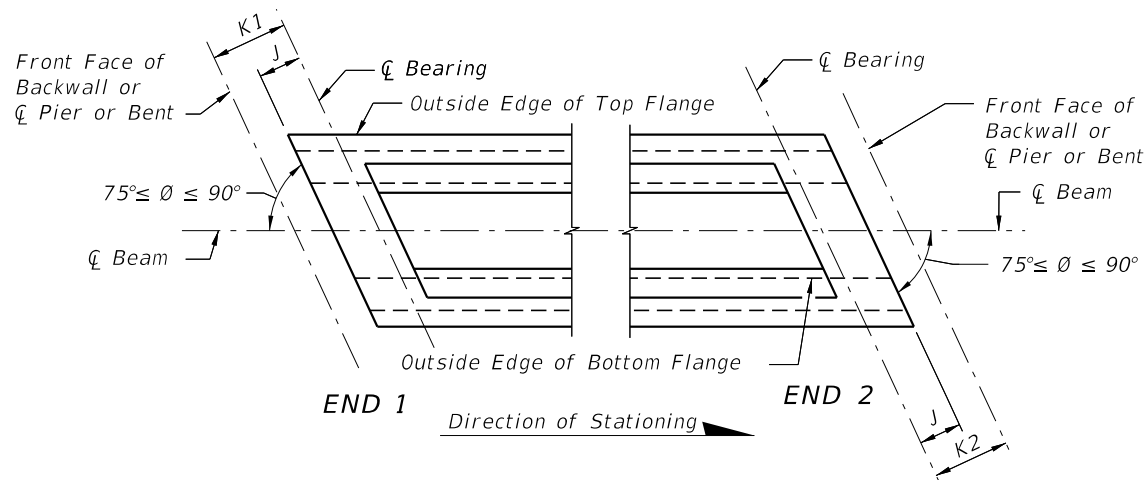
\* NOTE:  
Work this Index with the Build-up and Deflection Data Table for Florida-I and AASHTO Type II Beams in Structures Plans.

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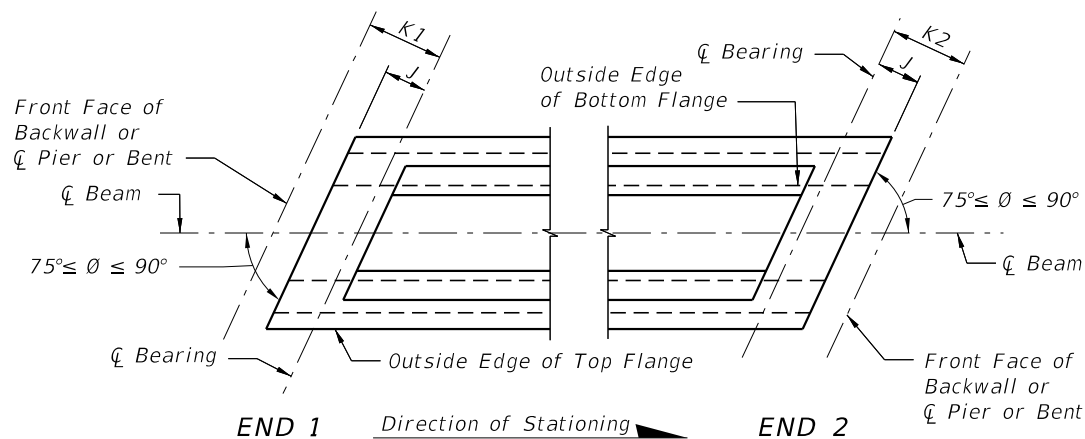
LAST REVISION 11/01/21	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	PRESTRESSED I-BEAMS BUILD-UP & DEFLECTION DATA	INDEX 450-199	SHEET 1 of 1
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CASE 1



CASE 2



CASE 3

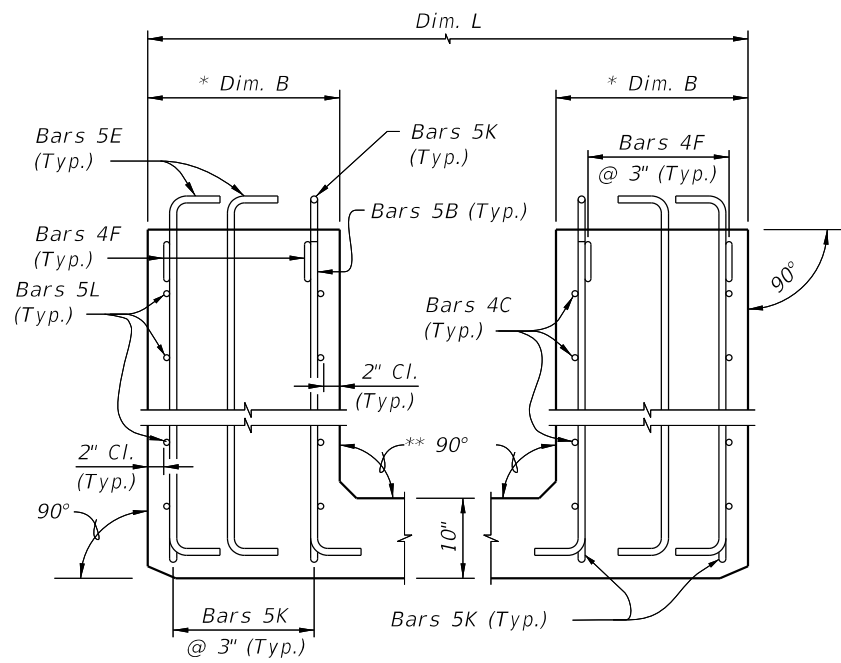
SCHEMATIC PLAN VIEWS AT BEAM ENDS

BEAM NOTES

1. Work this Index with the Florida-U Beam Standard Details (Index 450-248, 450-254, 450-263 and 450-272) and the Table of Beam Variables in Structures Plans.
2. All bar bend dimensions are out-to-out.
3. Concrete cover: 2 inches minimum. Maximum aggregate size is a No. 67.
4. Concrete face may be sloped with a maximum 1:24 draft to facilitate formwork removal.
5. Strands N:  $\frac{3}{8}$ "  $\phi$  minimum, stressed to 10,000 lbs. each.
6. Tie Bars 5K to the fully bonded strands in the bottom row (see "STRAND PATTERN" on the Table of Beam Variables sheet in Structures Plans).
7. For beams without skewed ends or vertically beveled end conditions (see Note 8) the Engineer may approve the use of deformed WWR in lieu of Bars 6A1, 4A2, 5B, 4C, 3D, 5E, 4F, 4G, 4H, 5K, 5L and 4M. The spacing and sizes of deformed WWR must match the reinforcing sizes shown on the Florida-U Beam Standard Details sheets.
8. For Beams with vertically beveled end conditions, where "Dim. P" exceeds 1", place Bars 5E, and the first Bars 4F and 5K parallel to the end of the beam. Fan the remaining Bars 4F and 5K within the limits of "Dim. B" (End Diaphragm) at equal spaces until vertical.
9. Embedment of Safety Line Anchorage Devices are permitted in the top flange to accommodate fall protection systems. See shop drawings for details and spacing of any anchorage devices or other required embedded hardware.
10. Intermediate diaphragms must be cast and concrete release strength obtained prior to removing the beam from casting bed.
11. Place drains pipes adjacent to each web at each beam end (four drains per beam).
  - A. Drain Pipe: 2" NPS Schedule 80 PVC.
  - B. Cover, wrap and secure wire screen around the end of the pipe prior to casting. Extend screen a minimum of 1" down the pipe sides.
  - C. Provide removable pipe plugs during casting. Remove plugs from the inside of pipes after casting.
12. Protection of Strands:
  - A. Provide a 2" deep recess around all strands (including dormant) or strand groups. Extend the recessed blockout to the web face and bottom of the flange for the bottom row of strands.
  - B. After detensioning, cut strands  $\frac{1}{2}$ " from recessed surface and fill the blockout to protect strands with Type F-2 or Q Epoxy Compound in accordance with Specification Section 926.
13. Use Stay-In-Place metal deck forms inside the beams.
14. Prior to deck placement, provide temporary blocking under each web at both ends of every beam. Ensure the temporary blocking is adequate to resist movements and rotations during deck placement. Leave temporary blocking and bracing in place for a minimum of four days after the deck is placed.
15. Based on the deck forming system and deck placement sequence, evaluate and provide any required temporary bracing between the U Beams.

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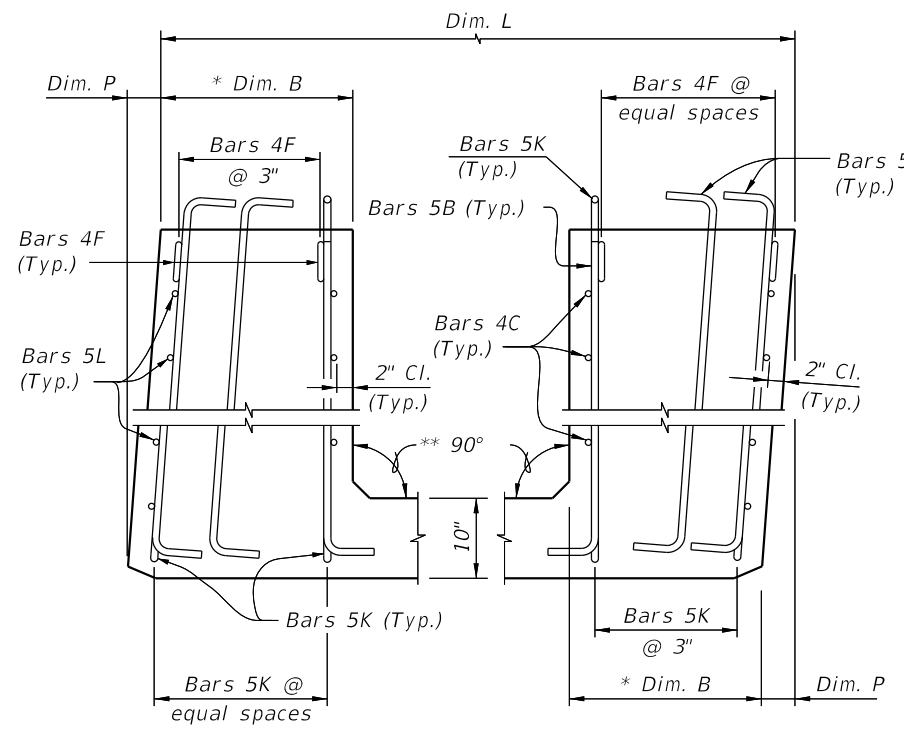
LAST REVISION 11/01/16	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U BEAM - TYPICAL DETAILS & NOTES	INDEX 450-210	SHEET 1 of 2
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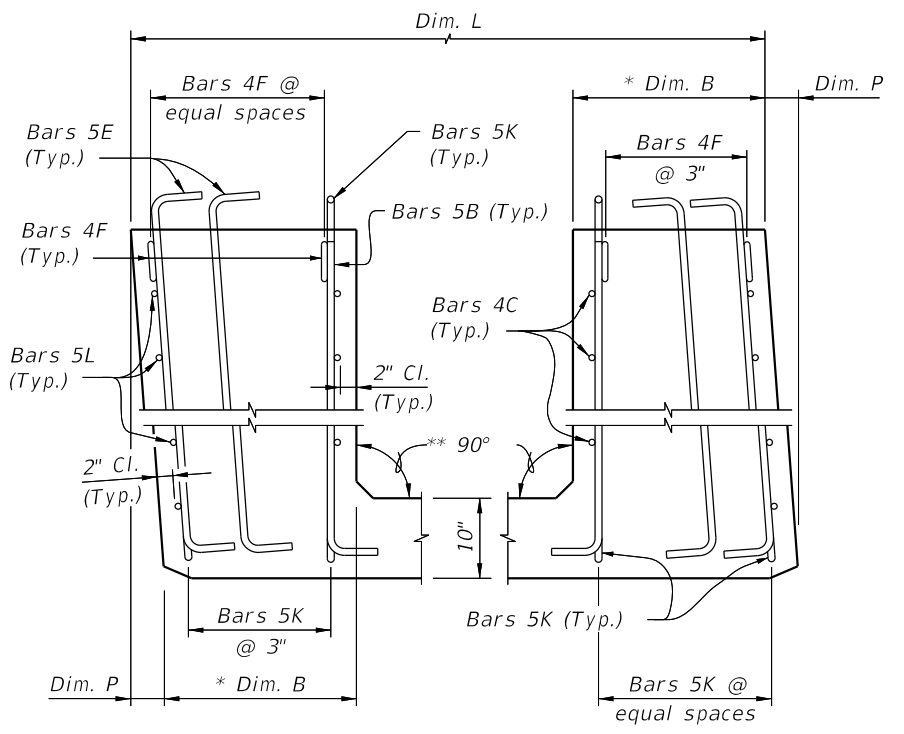
\* Dim. B is 1'-6" for Florida-U 48 and 54 Beams and 2'-0" for Florida-U 63 and 72 Beams.

\*\* Note 4, Sheet 1.

**CONDITION 1**  
(P = 0.0)

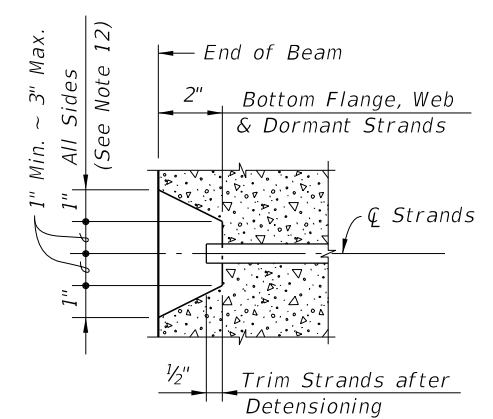


**CONDITION 2**

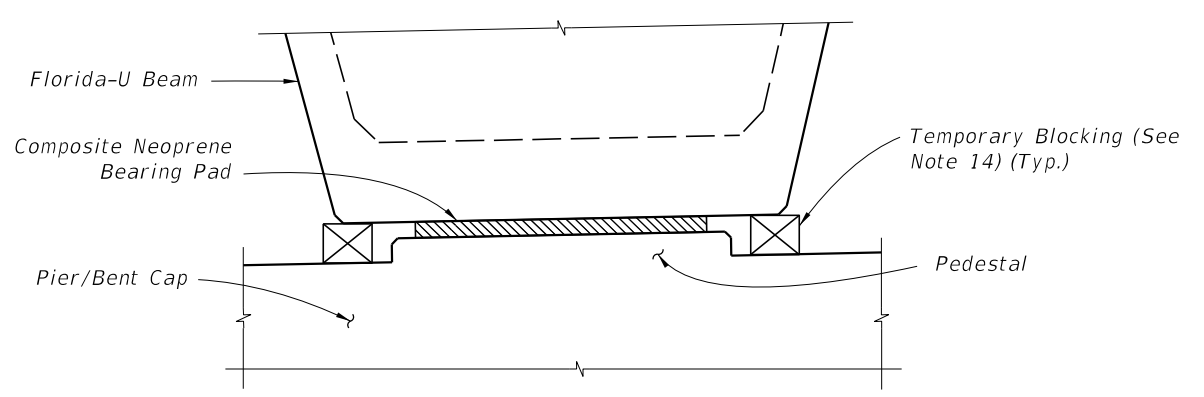


**CONDITION 3**

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



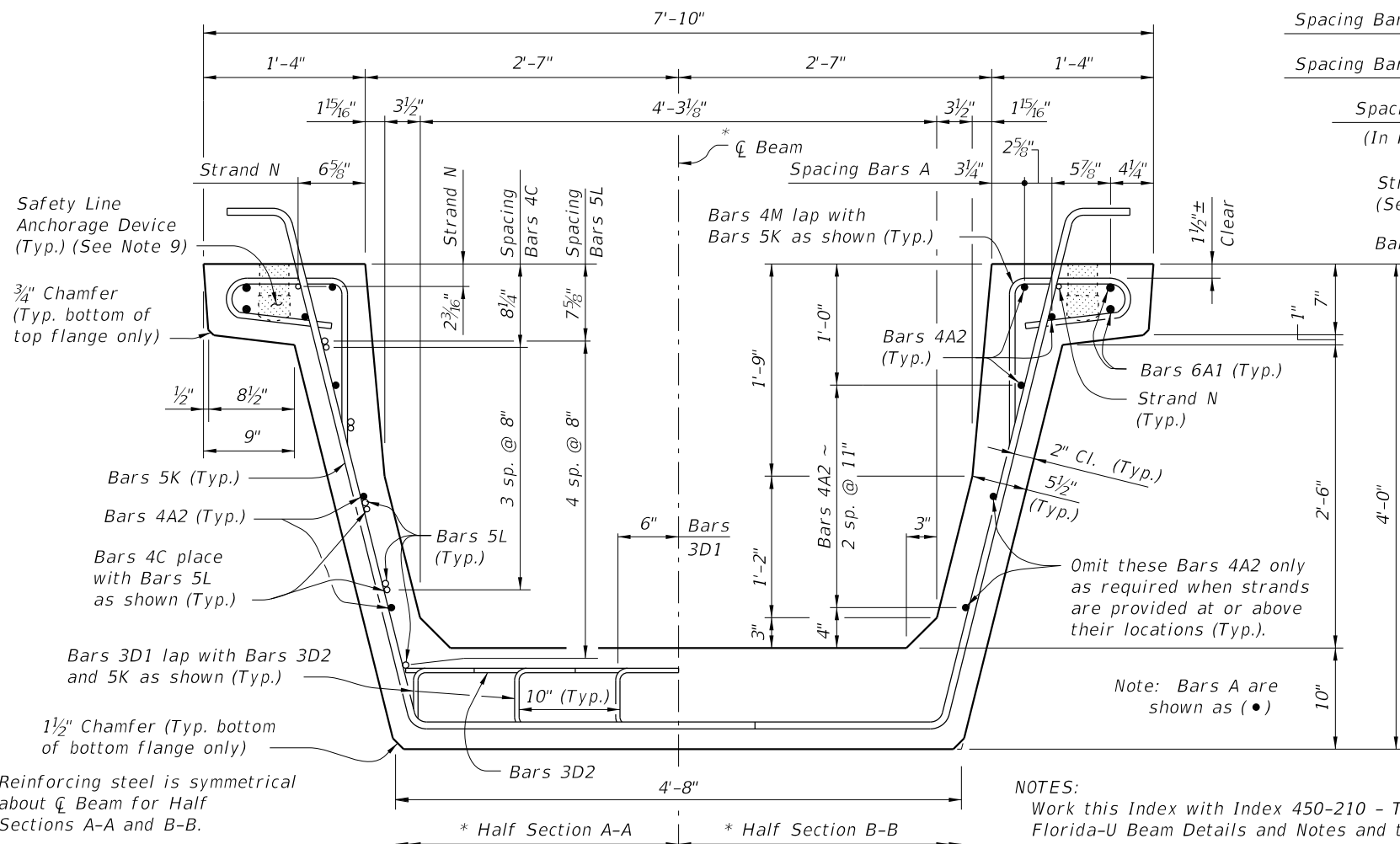
**TYPICAL STRAND BLOCKOUT DETAIL**



**TEMPORARY BLOCKING OF BEAM ENDS**

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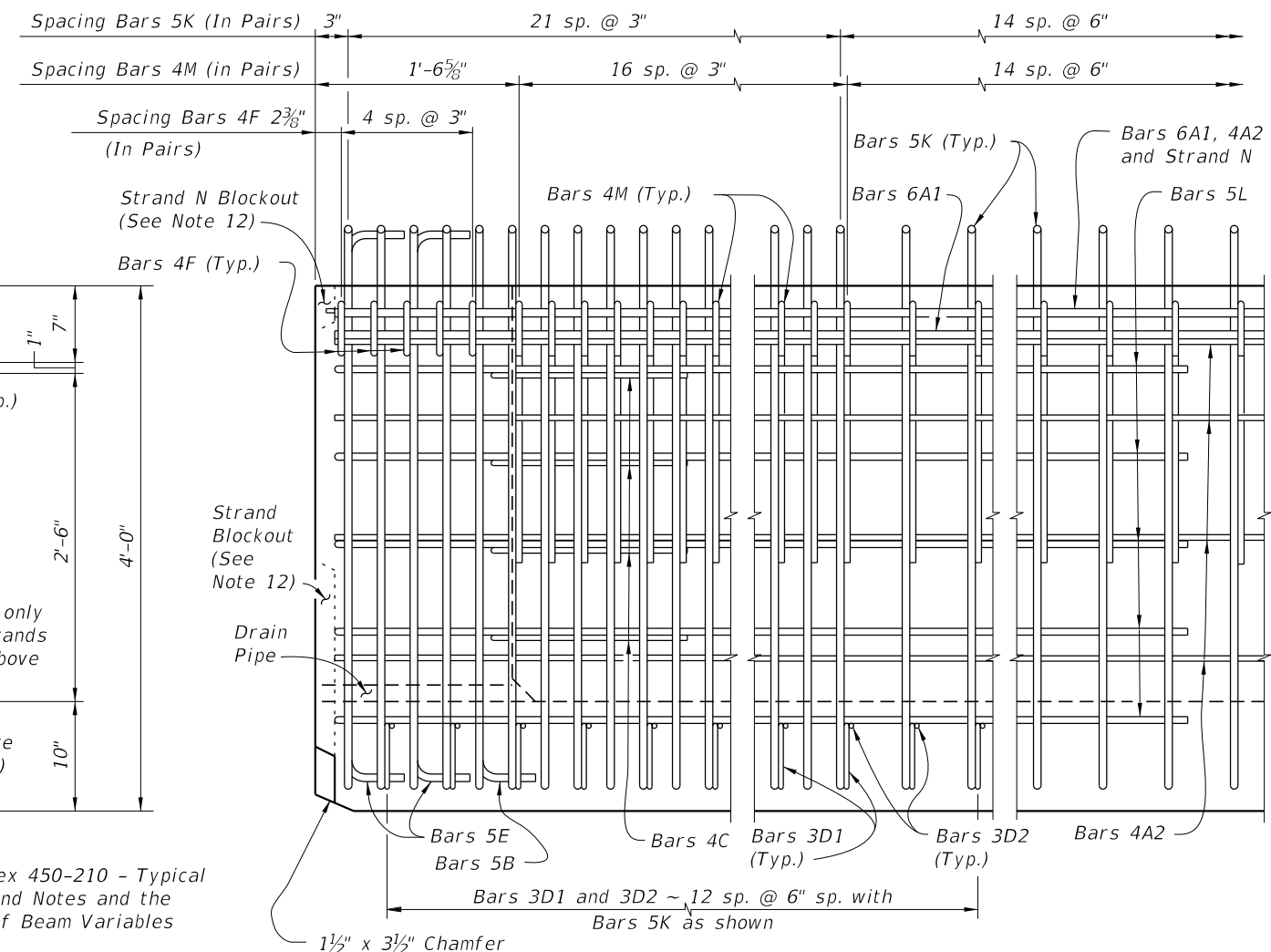
LAST REVISION 11/01/16	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>FLORIDA-U BEAM - TYPICAL DETAILS &amp; NOTES</b>	INDEX 450-210	SHEET 2 of 2
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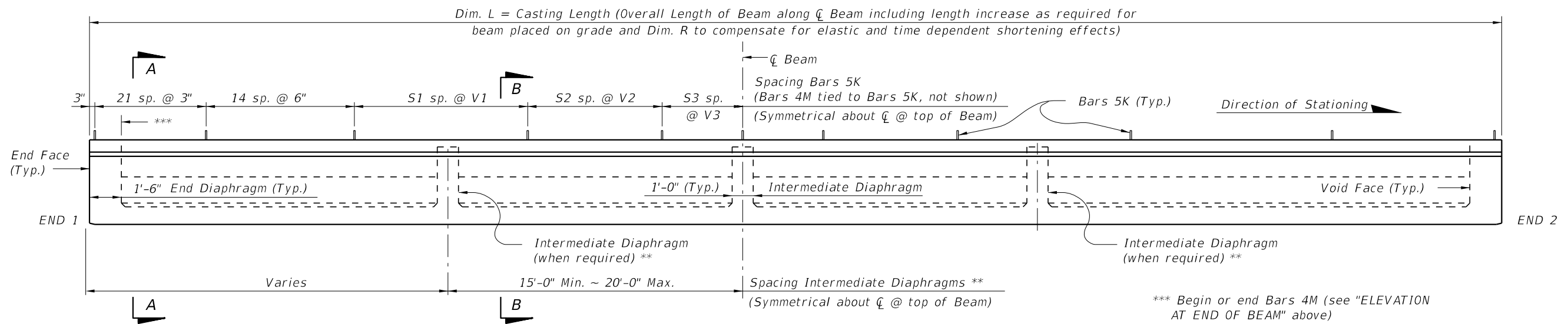
TYPICAL SECTION

\* Reinforcing steel is symmetrical about  $\bar{C}$  Beam for Half Sections A-A and B-B.  
 \*\* Intermediate Diaphragms shall be provided:  
 (1) - At midspan.  
 (2) - At 20'-0" Max. from midspan when beam length (L) exceeds 60 Ft.

NOTES:  
 Work this Index with Index 450-210 - Typical Florida-U Beam Details and Notes and the Florida-U Beam - Table of Beam Variables in Structures Plans.  
 For referenced notes see Index 450-210.



ELEVATION AT END OF BEAM

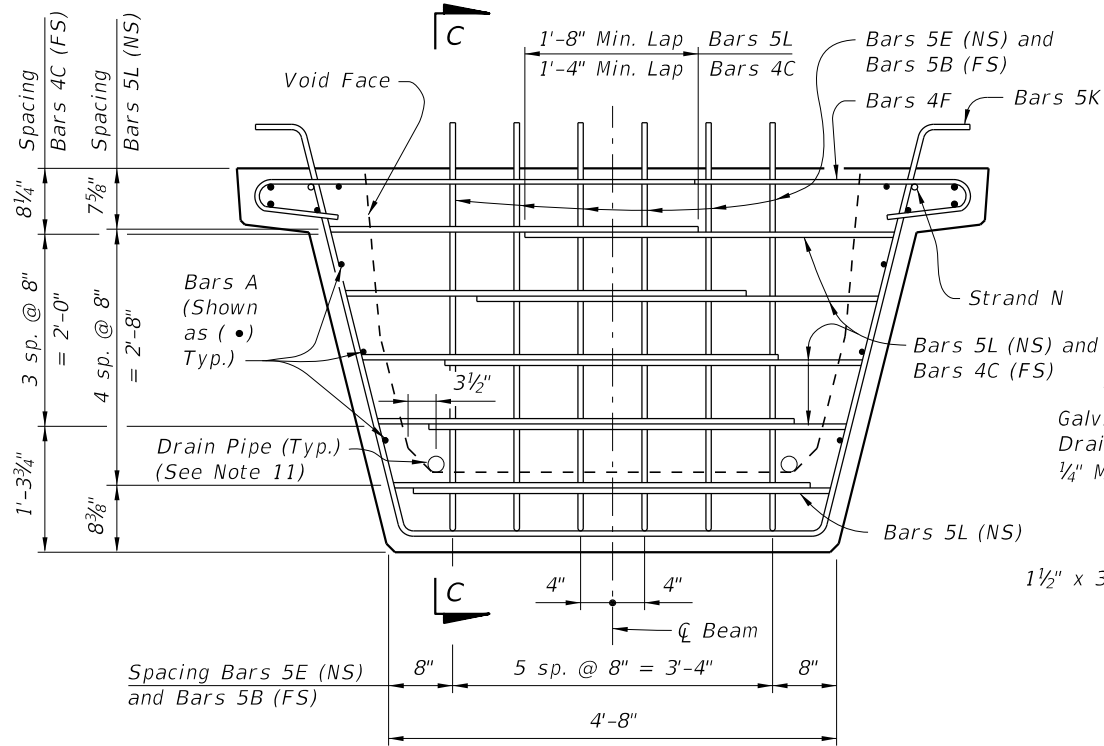


ELEVATION

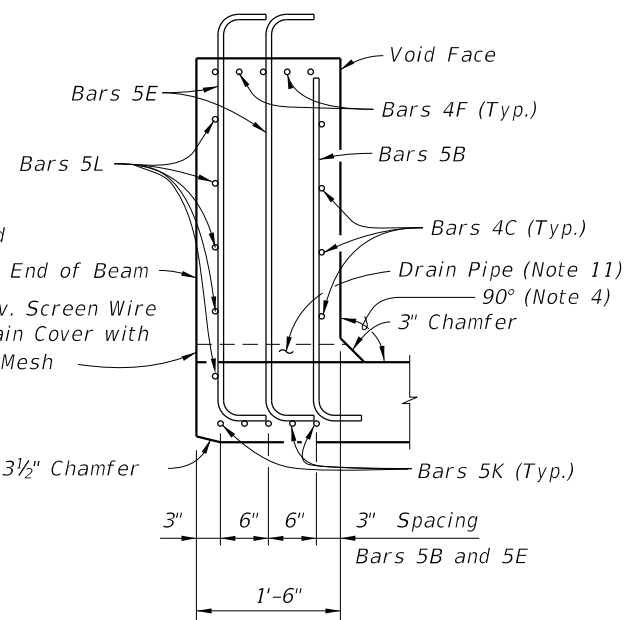
\*\*\* Begin or end Bars 4M (see "ELEVATION AT END OF BEAM" above)

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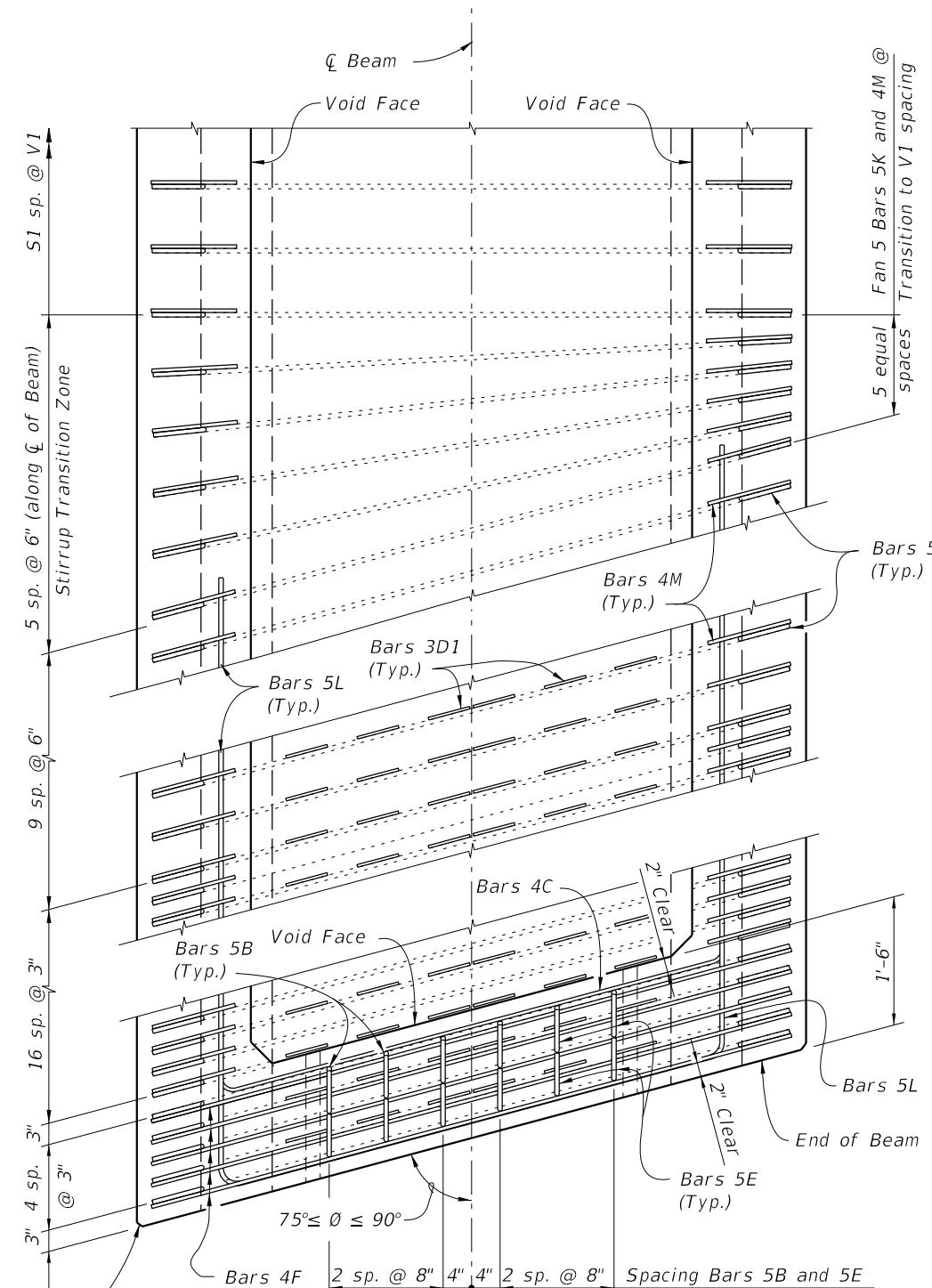
LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 48 BEAM - STANDARD DETAILS	INDEX 450-248	SHEET 1 of 3
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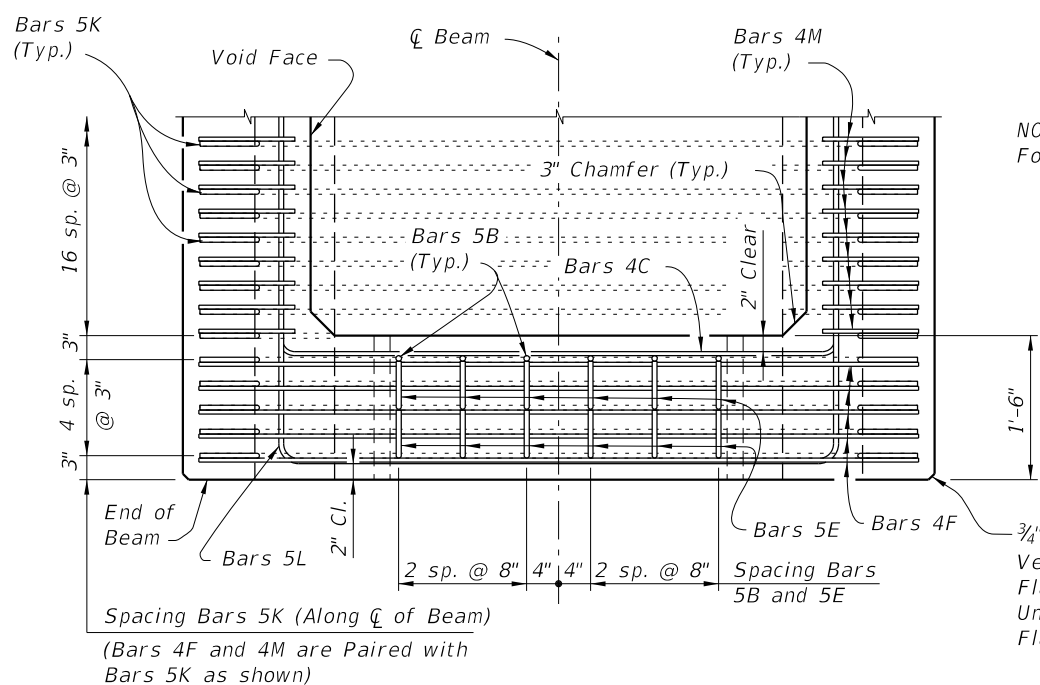
END VIEW AT END DIAPHRAGM



SECTION C-C



TOP VIEW OF SKEWED END DIAPHRAGM AND STIRRUP TRANSITION ZONE (Bars 3D2 Not Shown For Clarity)



TOP VIEW OF END DIAPHRAGM (Bars 3D1 And 3D2 Not Shown For Clarity)

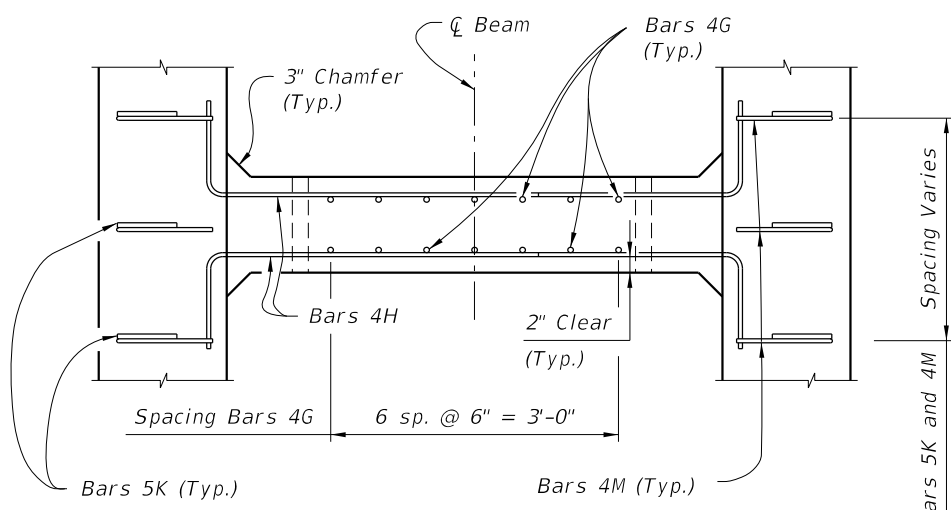
NOTES:  
For referenced notes see Index 450-210.

Spacing Bars 5K (Along  $\bar{C}$  of Beam)  
(Bars 4F and 4M are Paired with Bars 5K as shown)

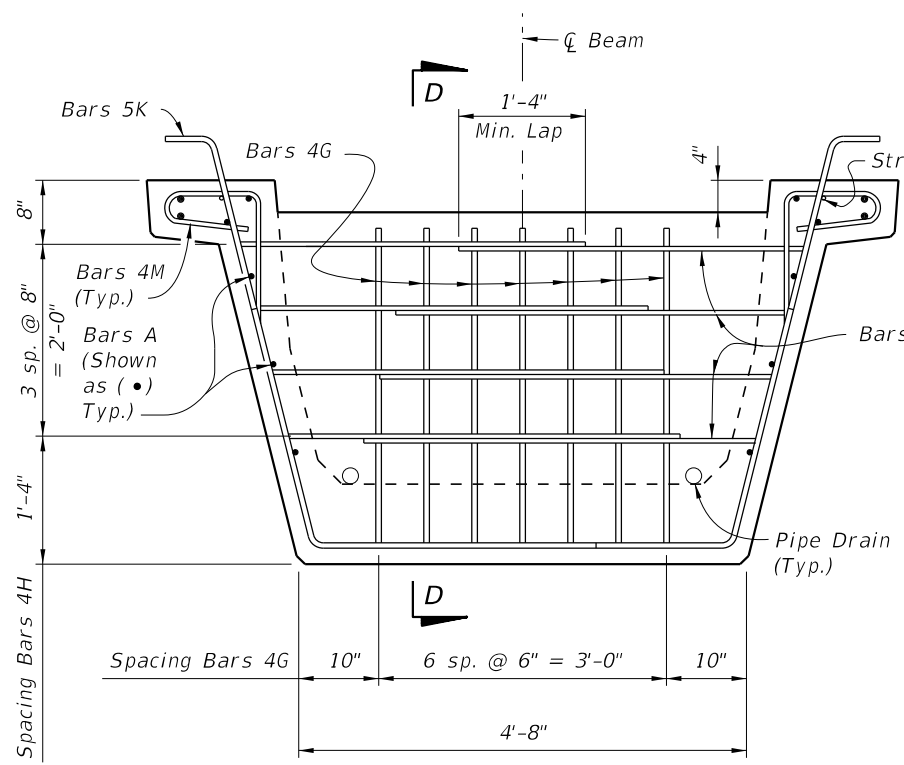
3/4" Chamfer along the Vertical Face of the Top Flange and Web and Underside of the Top Flange (Typ.)

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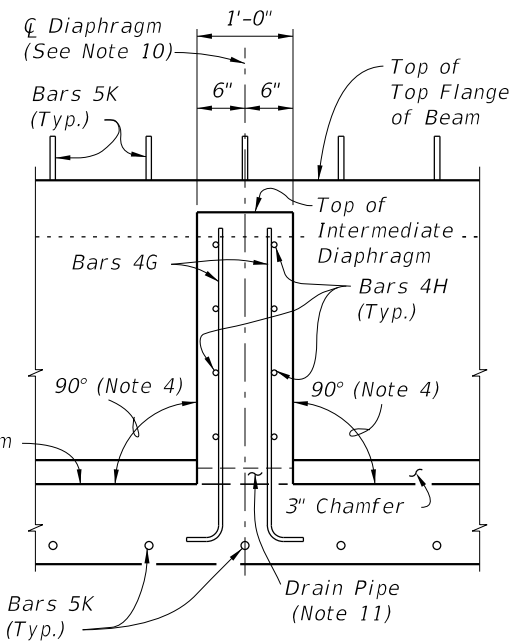
LAST REVISION 11/01/16	DESCRIPTION:
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TOP VIEW OF INTERMEDIATE DIAPHRAGM



SECTION AT INTERMEDIATE DIAPHRAGM

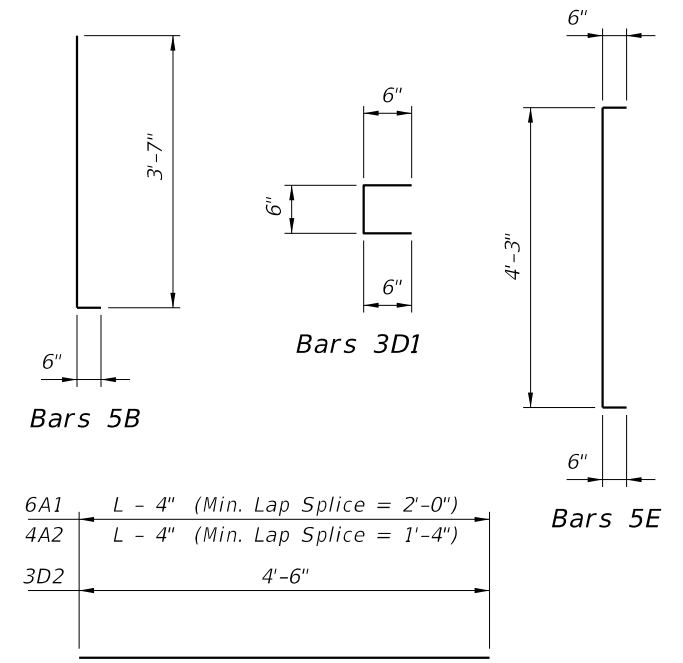


SECTION D-D

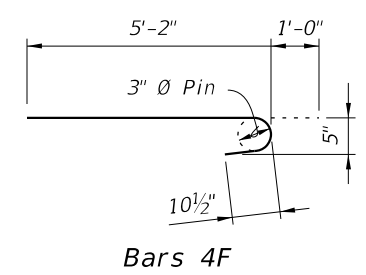
NOTES:  
For referenced notes see Index 450-210.

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

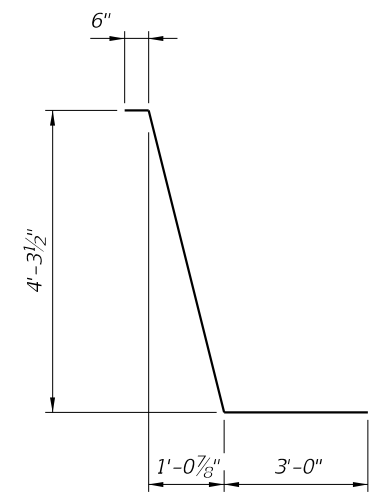
BILL OF REINFORCING STEEL FOR ONE BEAM ONLY			
MARK	SIZE	NO. REQD.	LENGTH
A1	6	4	Dim. L - 4"
A2	4	10	Dim. L - 4"
B	5	12	4'-1"
C	4	16	5'-1"
D1	3	156	1'-6"
D2	3	26	4'-6"
E	5	24	5'-3"
F	4	20	6'-2"
G	4	See Table	4'-0"
H	4	See Table	4'-7"
K	5	See Table	8'-0"
L	5	20	14'-0"
M	4	See Table	3'-11"
N	3/8" Ø Strand	2	Dim. L - 3"



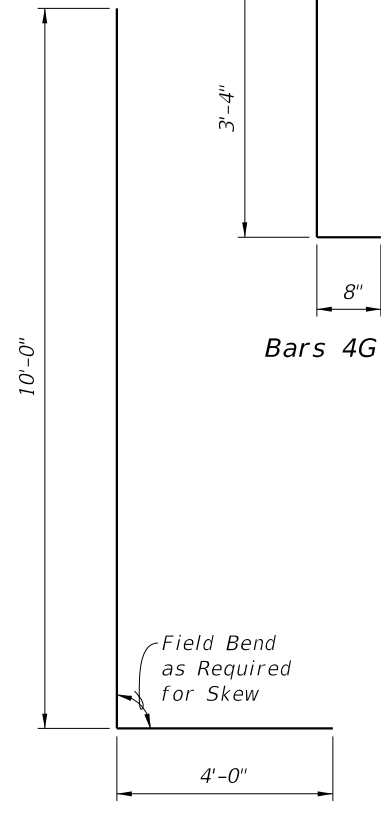
Bars 6A1, 4A2 and 3D2



Bars 4F

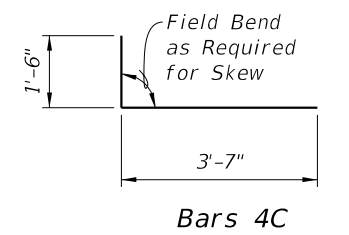


Bars 5K

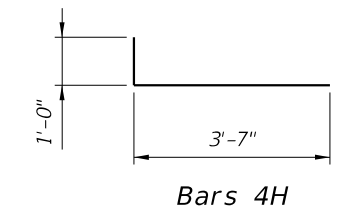


Bars 4G

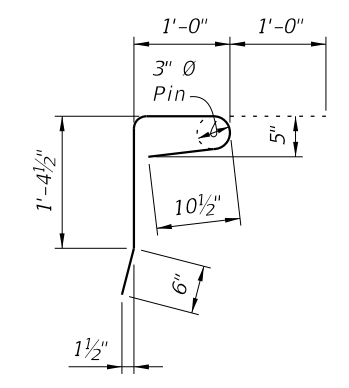
Bars 5L



Bars 4C



Bars 4H



Bars 4M

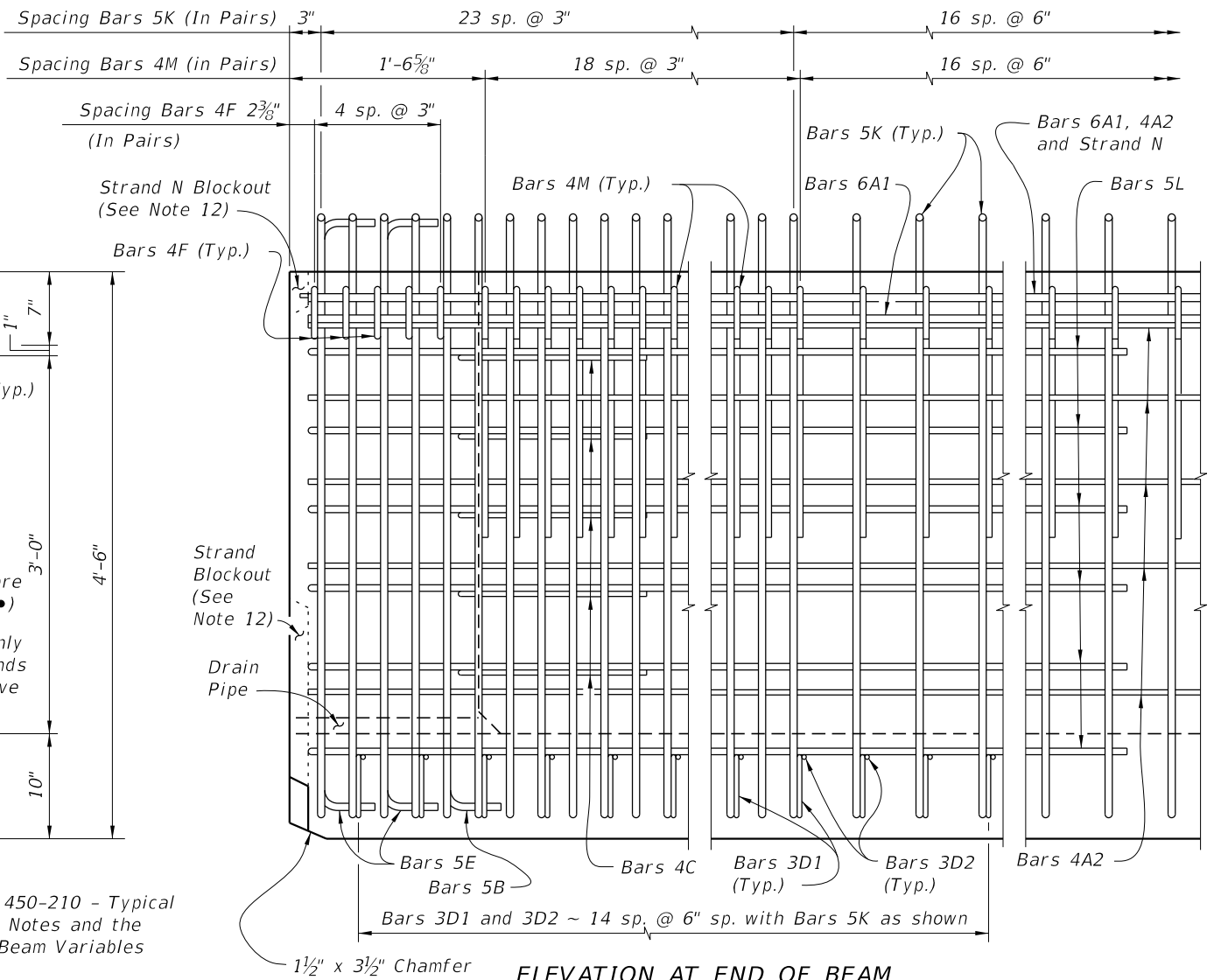
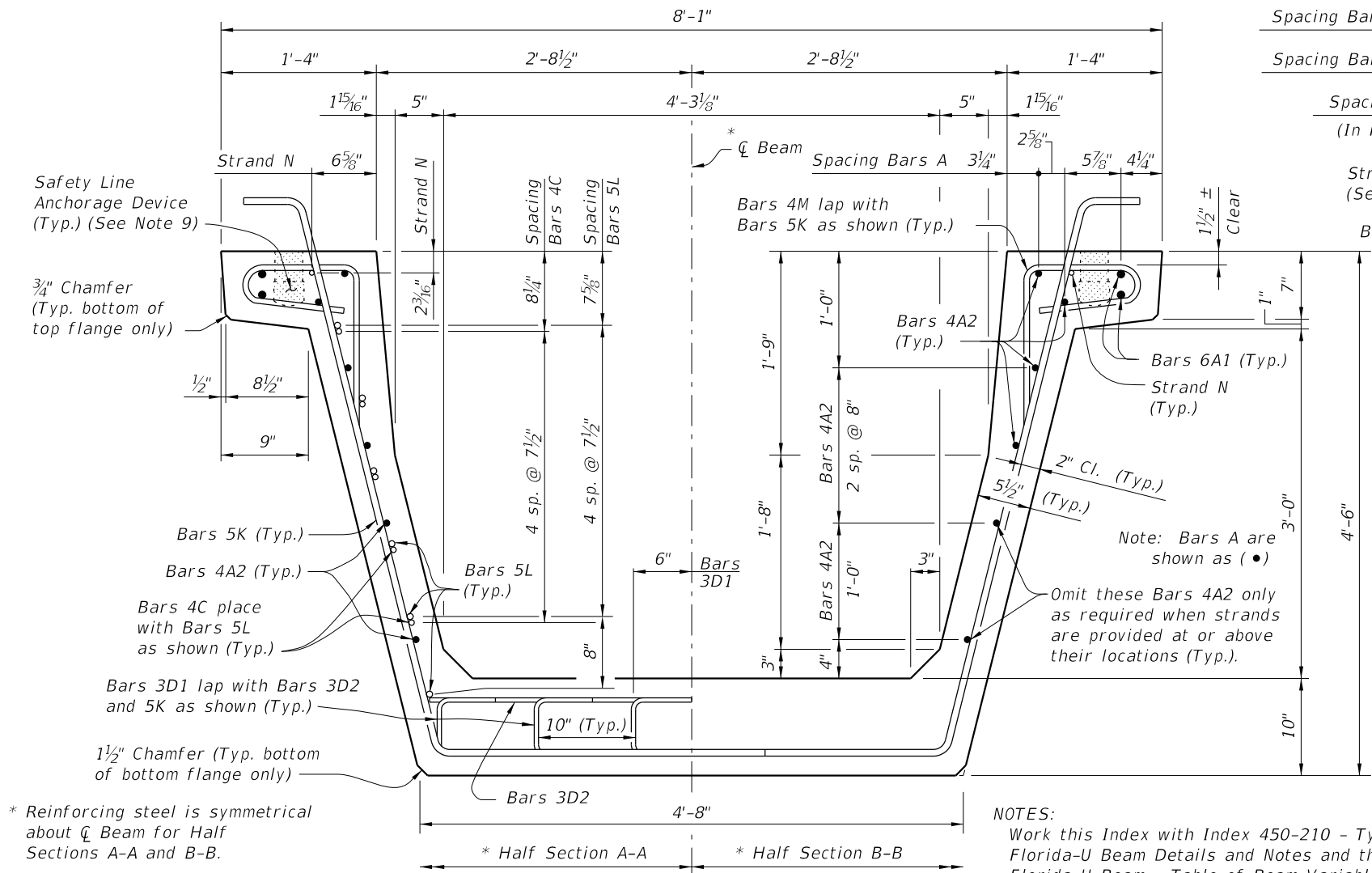
9/23/2021 9:53:54 AM

LAST REVISION 11/01/16	DESCRIPTION:
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**FY 2022-23  
STANDARD PLANS**

**FLORIDA-U 48 BEAM - STANDARD DETAILS**

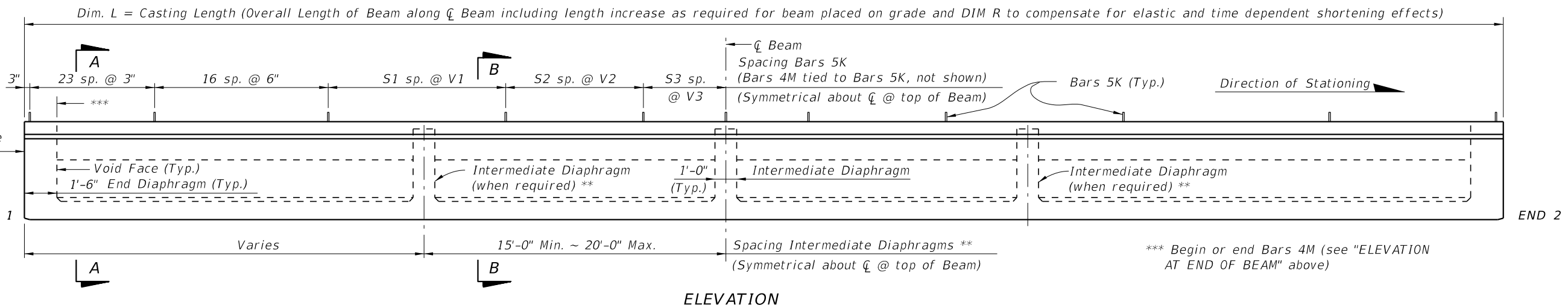
INDEX 450-248	SHEET 3 of 3
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\* Reinforcing steel is symmetrical about  $\bar{C}$  Beam for Half Sections A-A and B-B.

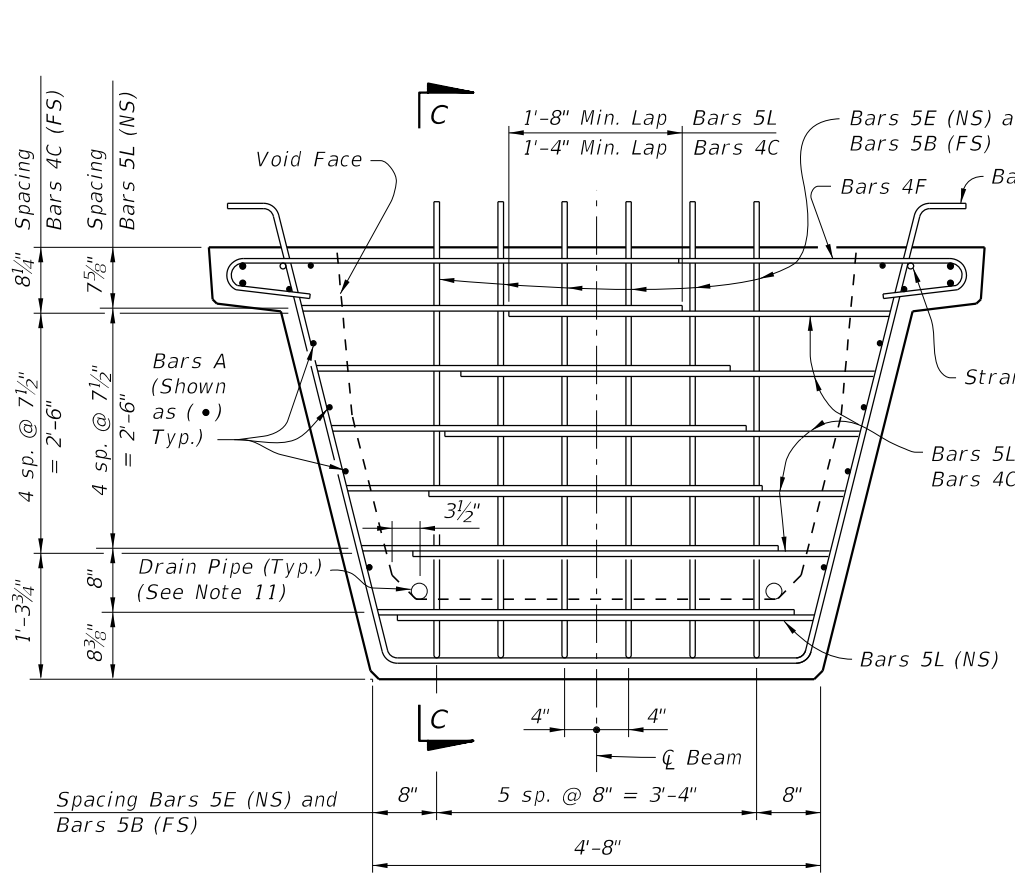
\*\* Intermediate Diaphragms shall be provided:  
 (1) - At midspan.  
 (2) - At 20'-0" Max. from midspan when beam length (L) exceeds 60 Ft.

NOTES:  
 Work this Index with Index 450-210 - Typical Florida-U Beam Details and Notes and the Florida-U Beam - Table of Beam Variables in Structures Plans.  
 For referenced notes see Index 450-210.

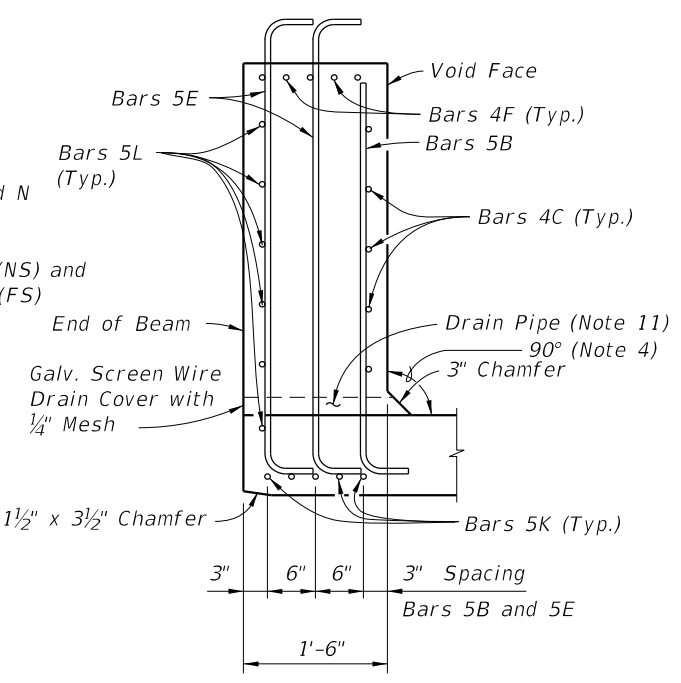


9/23/2021 9:53:55 AM

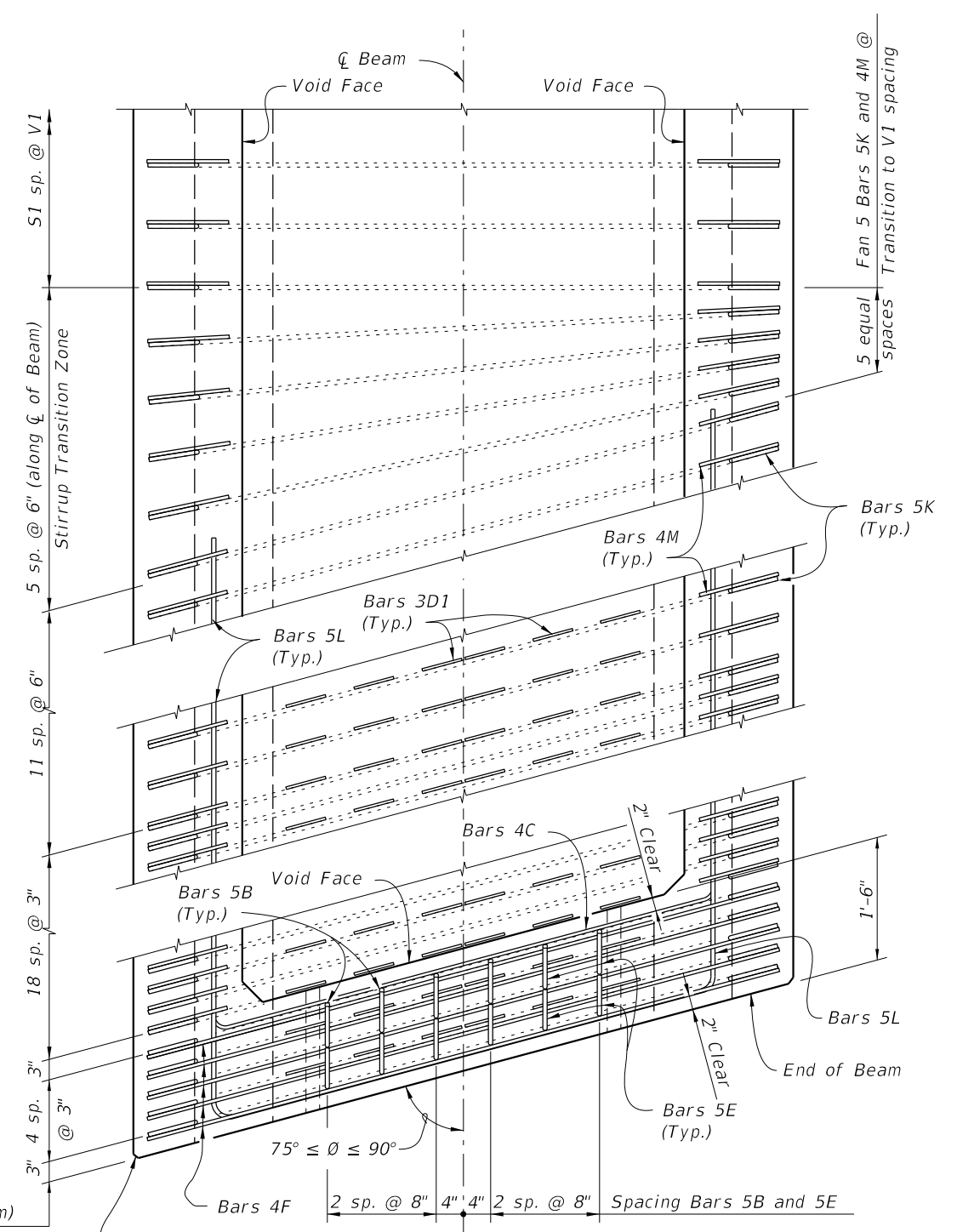
LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 54 BEAM - STANDARD DETAILS	INDEX 450-254	SHEET 1 of 3
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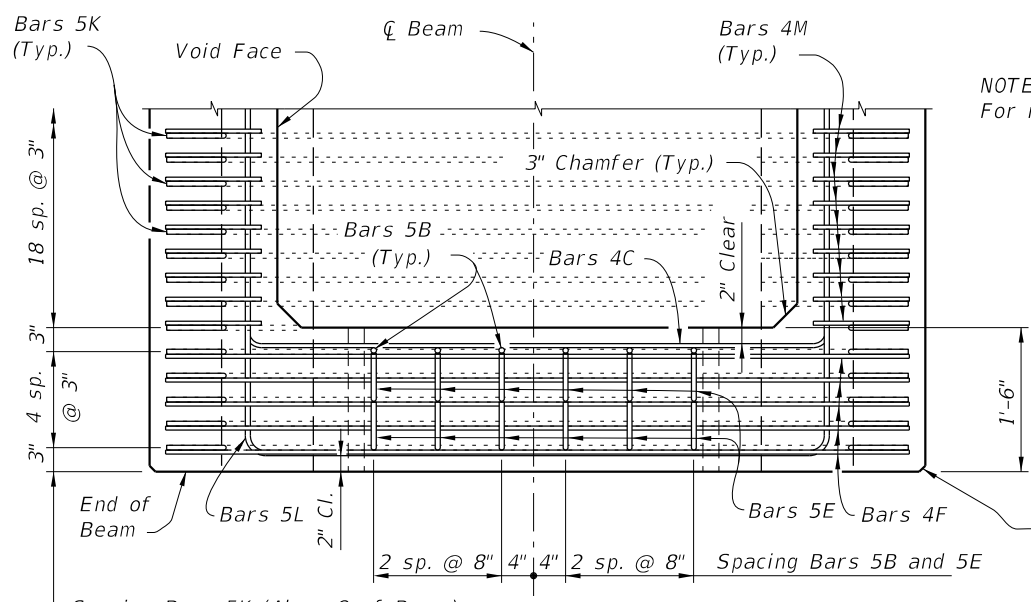
END VIEW AT END DIAPHRAGM



SECTION C-C



TOP VIEW OF SKEWED END DIAPHRAGM AND STIRRUP TRANSITION ZONE (Bars 3D2 Not Shown For Clarity)



TOP VIEW OF END DIAPHRAGM (Bars 3D1 And 3D2 Not Shown For Clarity)

NOTES:  
For referenced notes see Index 450-210.

Spacing Bars 5K (Along  $\phi$  of Beam)  
(Bars 4F and 4M are Paired with Bars 5K as shown)

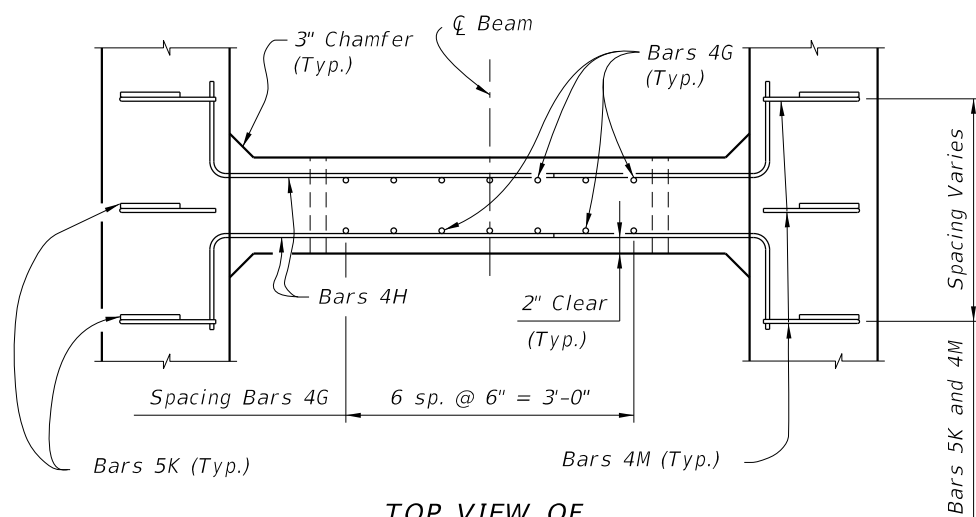
$\frac{3}{4}$ " Chamfer along the Vertical Face of the Top Flange and Web and Underside of the Top Flange (Typ.)

$\frac{3}{4}$ " Chamfer along the Vertical Face of the Top Flange and Web and Underside of the Top Flange (Typ.)

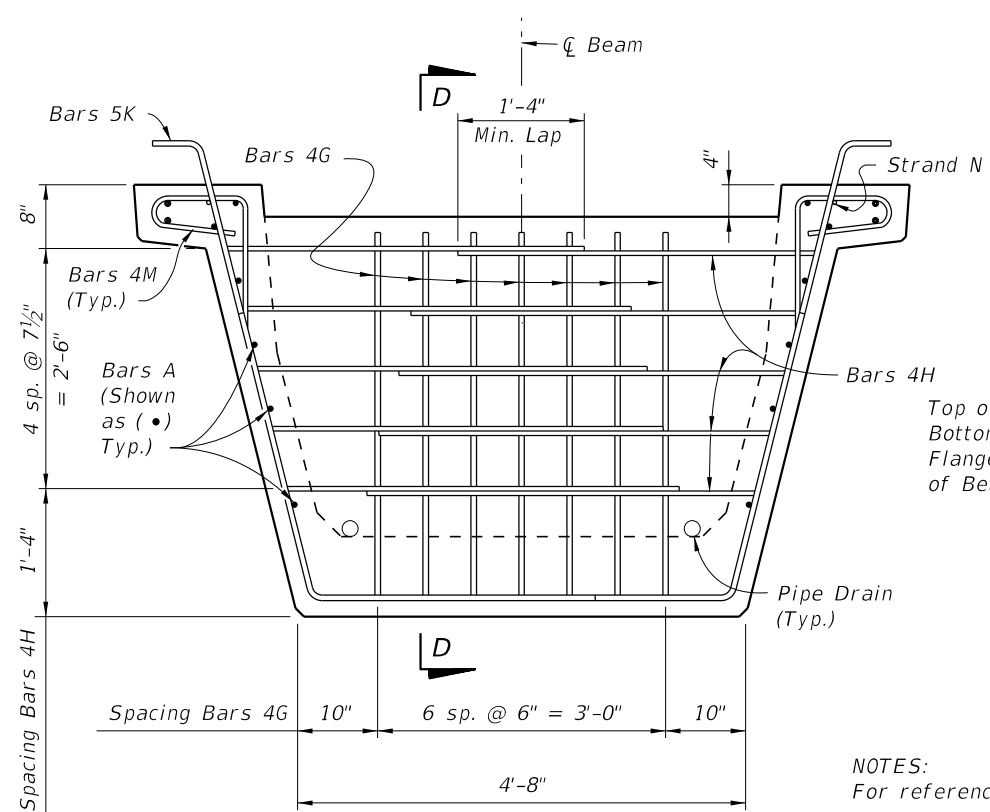
9/23/2021 9:53:56 AM

LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 54 BEAM - STANDARD DETAILS	INDEX 450-254	SHEET 2 of 3
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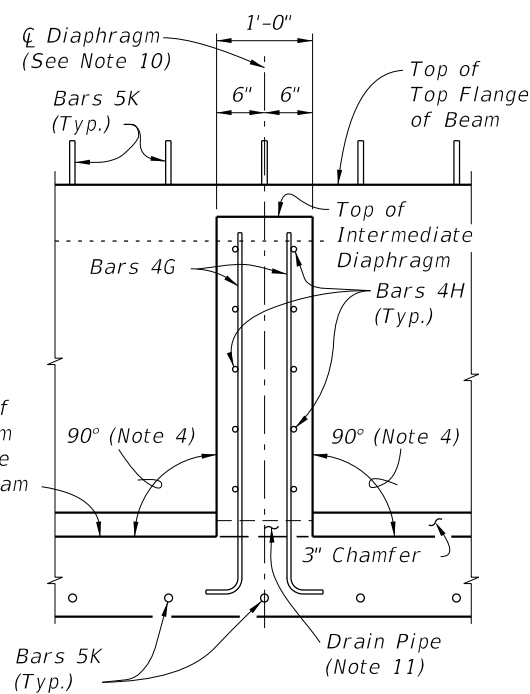




TOP VIEW OF INTERMEDIATE DIAPHRAGM



SECTION AT INTERMEDIATE DIAPHRAGM



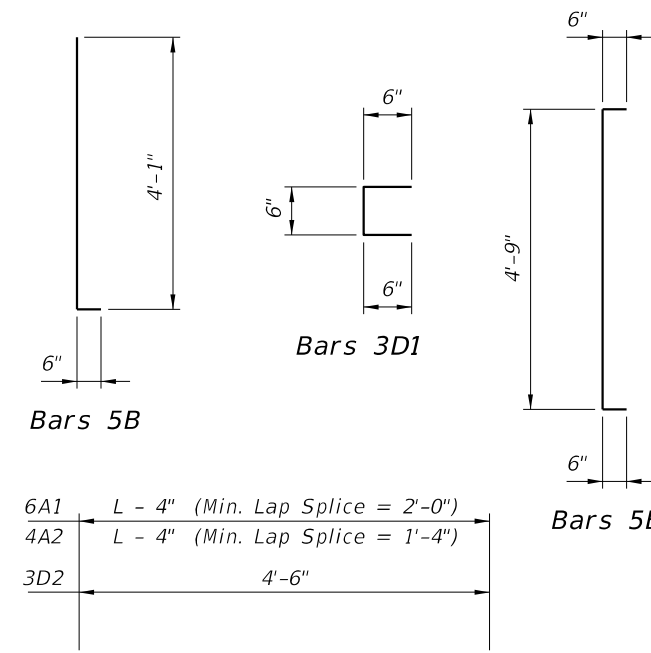
SECTION D-D

NOTES:  
For referenced note see Index 450-210.

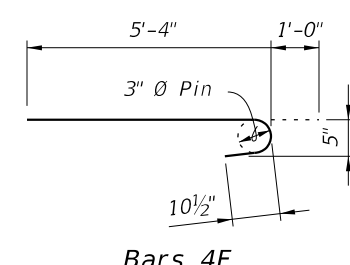
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL FOR ONE BEAM ONLY

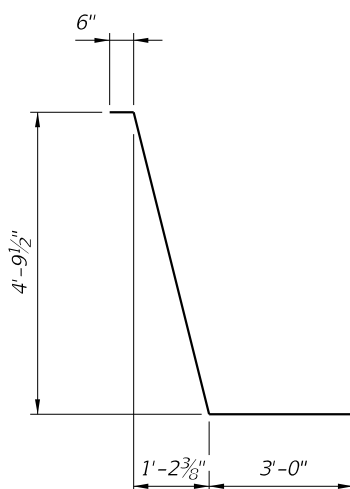
MARK	SIZE	NO. REQD.	LENGTH
A1	6	4	Dim. L - 4"
A2	4	12	Dim. L - 4"
B	5	12	4'-7"
C	4	20	5'-3"
D1	3	180	1'-6"
D2	3	30	4'-6"
E	5	24	5'-9"
F	4	20	6'-4"
G	4	See Table	4'-6"
H	4	See Table	4'-9"
K	5	See Table	8'-6"
L	5	24	16'-2"
M	4	See Table	3'-11"
N	3/8" Ø Strand	2	Dim. L - 3"



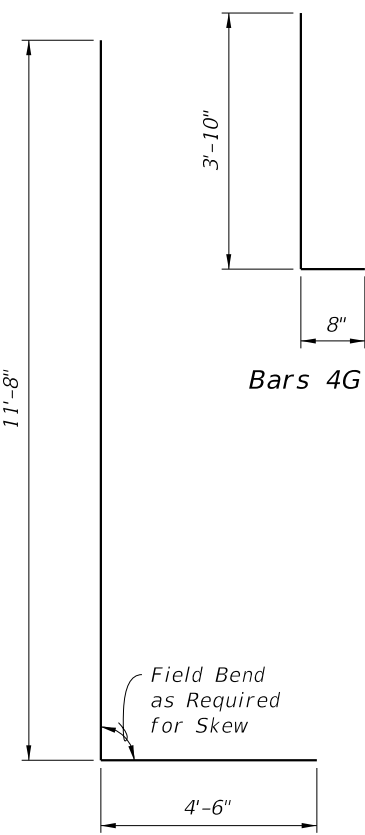
Bars 6A1, 4A2 and 3D2



Bars 4F

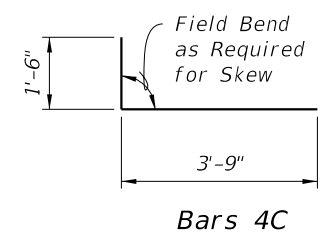


Bars 5K

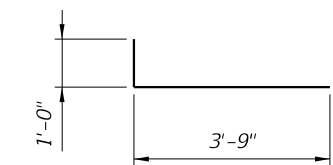


Bars 4G

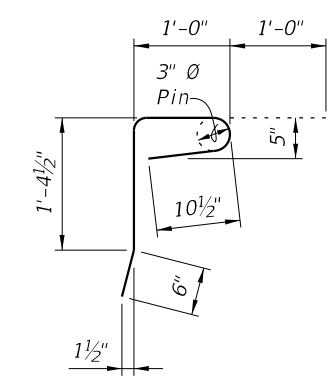
Bars 5L



Bars 4C



Bars 4H



Bars 4M

9/23/2021 9:53:57 AM

LAST REVISION 11/01/16	DESCRIPTION:
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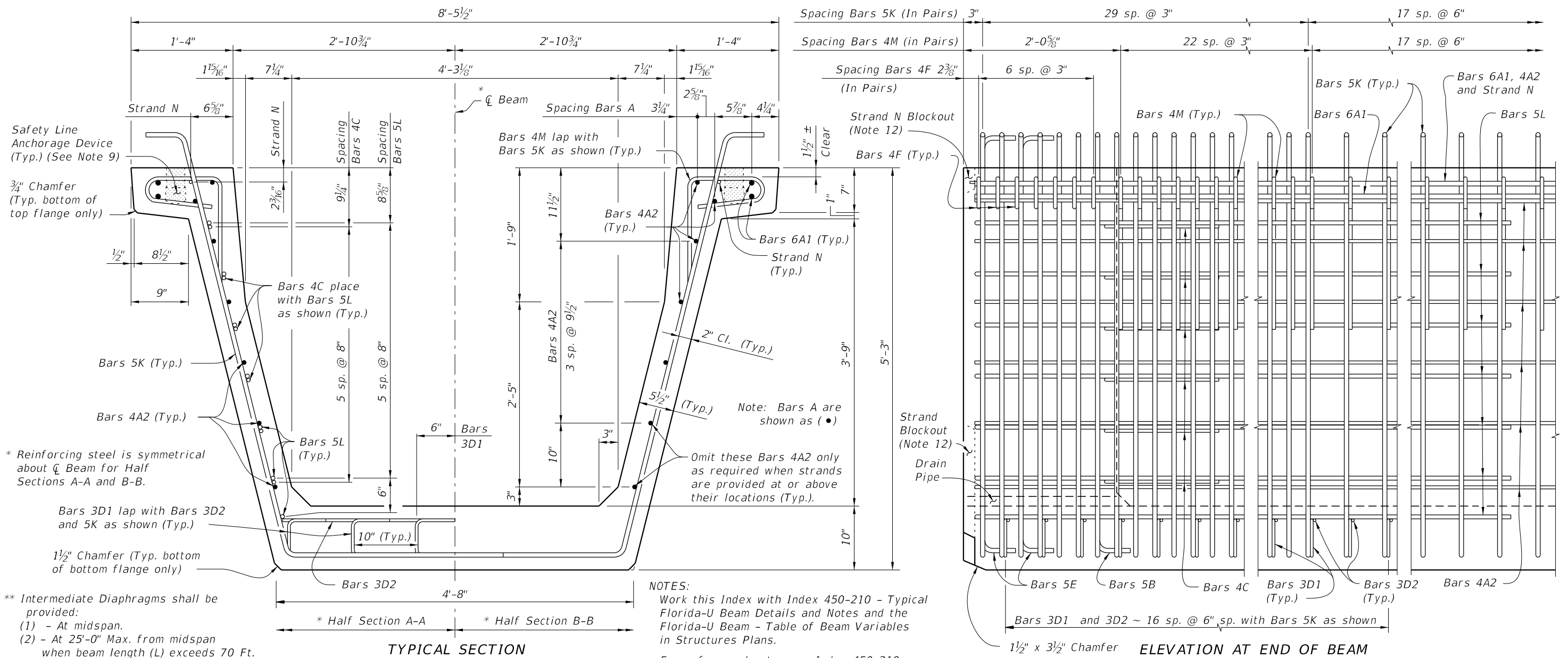


FY 2022-23  
STANDARD PLANS

FLORIDA-U 54 BEAM - STANDARD DETAILS

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SHEET  
3 of 3



Safety Line Anchorage Device (Typ.) (See Note 9)

3/4" Chamfer (Typ. bottom of top flange only)

\* Reinforcing steel is symmetrical about  $\bar{C}$  Beam for Half Sections A-A and B-B.

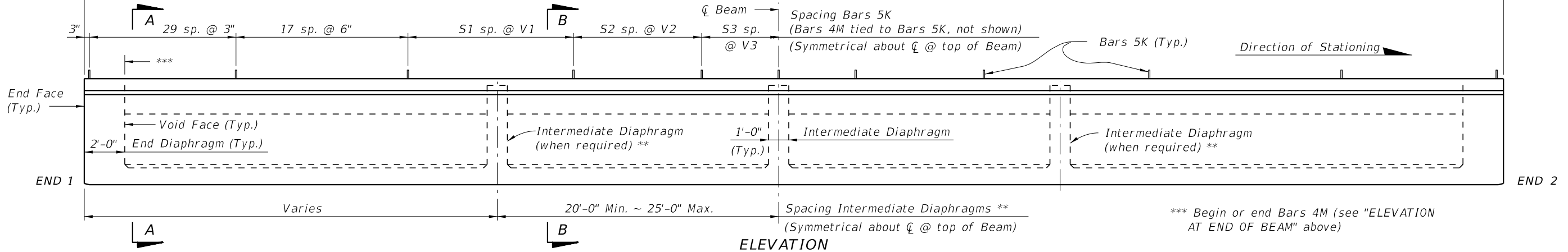
Bars 3D1 lap with Bars 3D2 and 5K as shown (Typ.)

1 1/2" Chamfer (Typ. bottom of bottom flange only)

\*\* Intermediate Diaphragms shall be provided:  
 (1) - At midspan.  
 (2) - At 25'-0" Max. from midspan when beam length (L) exceeds 70 Ft.

NOTES:  
 Work this Index with Index 450-210 - Typical Florida-U Beam Details and Notes and the Florida-U Beam - Table of Beam Variables in Structures Plans.  
 For referenced notes see Index 450-210.

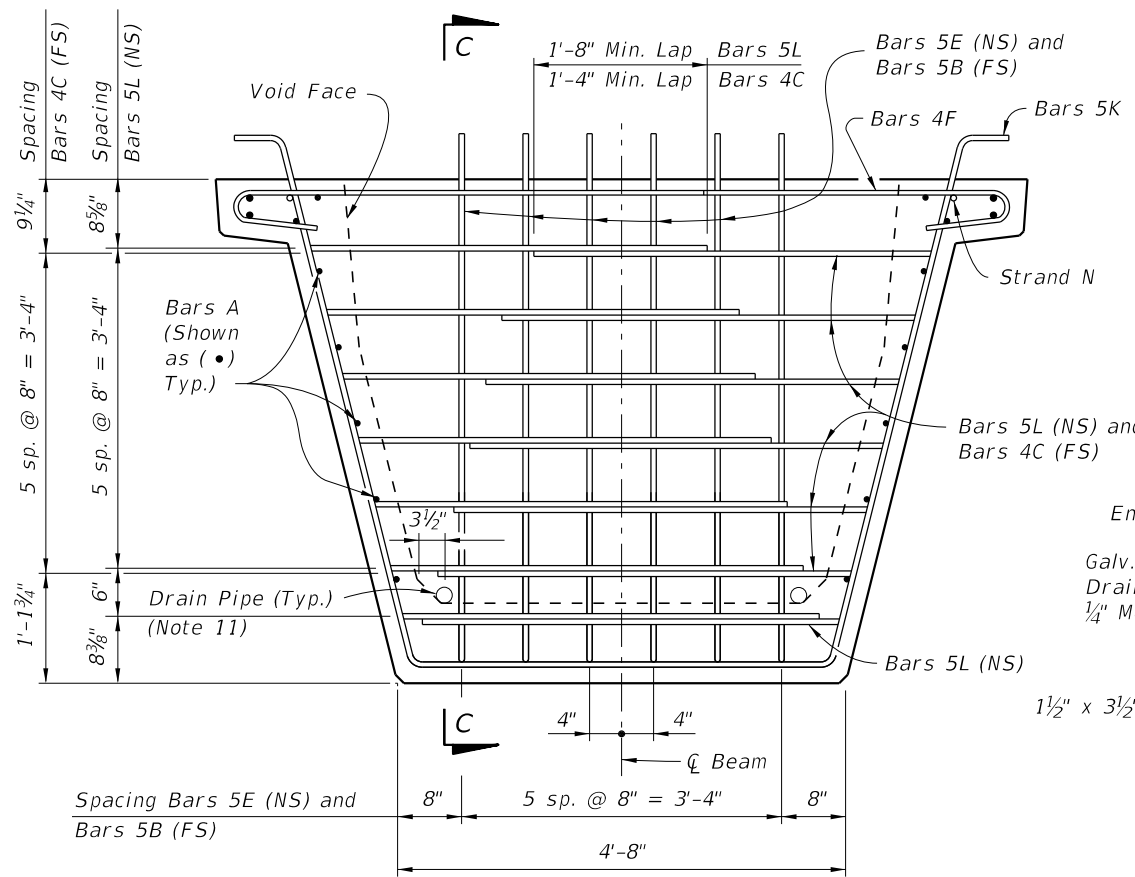
Dim. L = Casting Length (Overall Length of Beam along  $\bar{C}$  Beam including length increase as required for beam placed on grade and DIM R to compensate for elastic and time dependent shortening effects)



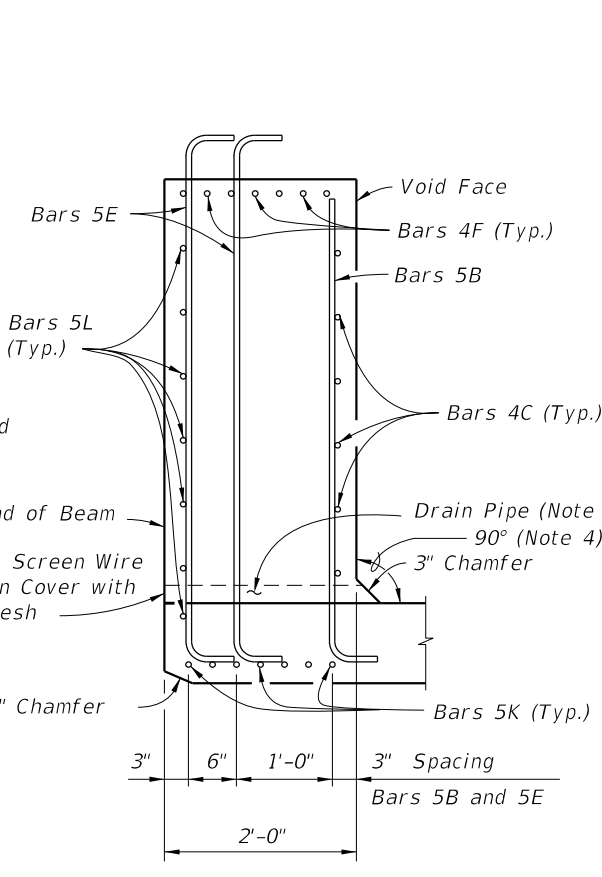
\*\*\* Begin or end Bars 4M (see "ELEVATION AT END OF BEAM" above)

9/23/2021 9:53:59 AM

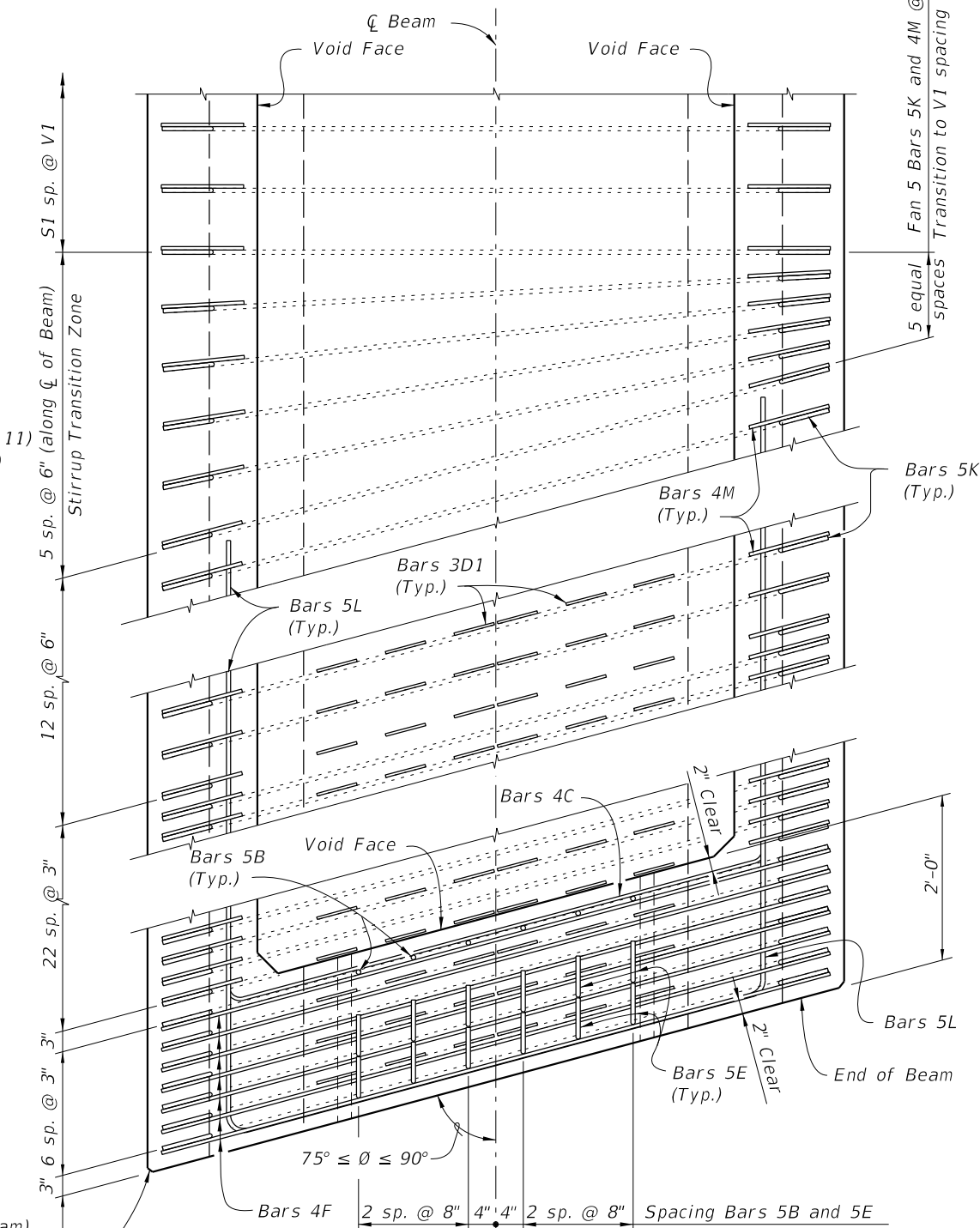
LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 63 BEAM - STANDARD DETAILS	INDEX 450-263	SHEET 1 of 3
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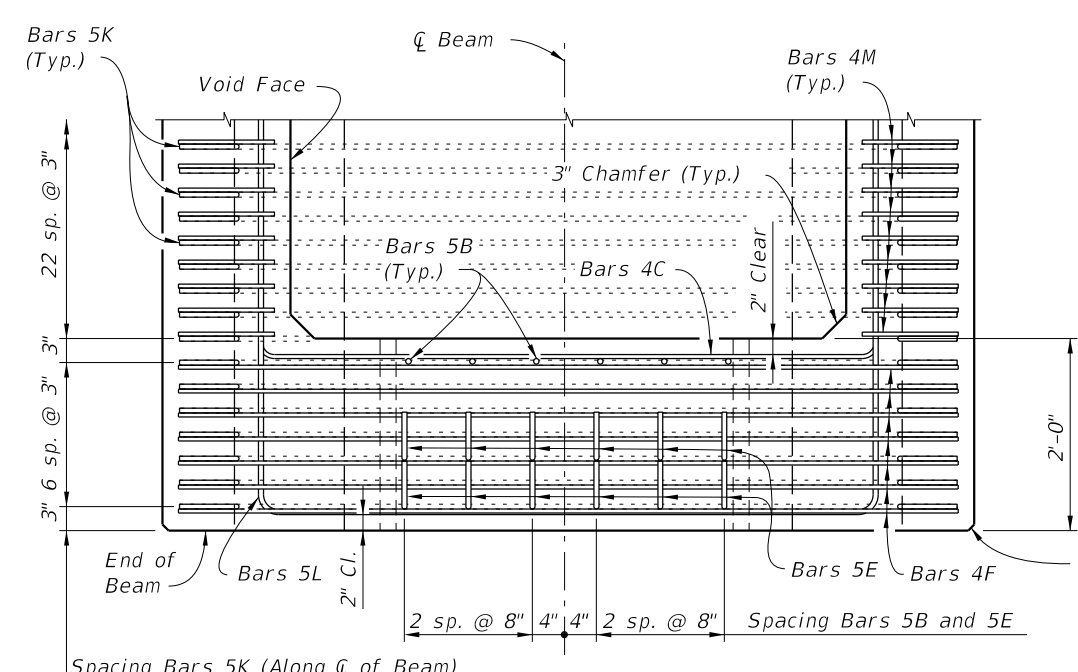
END VIEW AT END DIAPHRAGM



SECTION C-C



TOP VIEW OF SKEWED END DIAPHRAGM AND STIRRUP TRANSITION ZONE (Bars 3D2 Not Shown For Clarity)



TOP VIEW OF END DIAPHRAGM (Bars 3D1 And 3D2 Not Shown For Clarity)

Spacing Bars 5K (Along  $\bar{C}$  of Beam)  
(Bars 4F and 4M are Paired with Bars 5K as shown)

$\frac{3}{4}$ " Chamfer along the Vertical Face of the Top Flange and Web and Underside of the Top Flange (Typ.)

NOTES:  
For referenced note see Index 450-210.

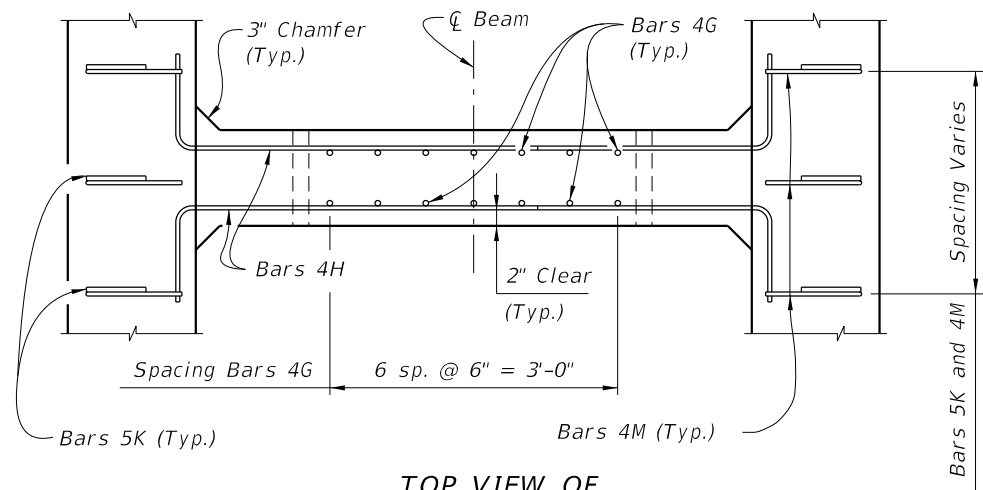
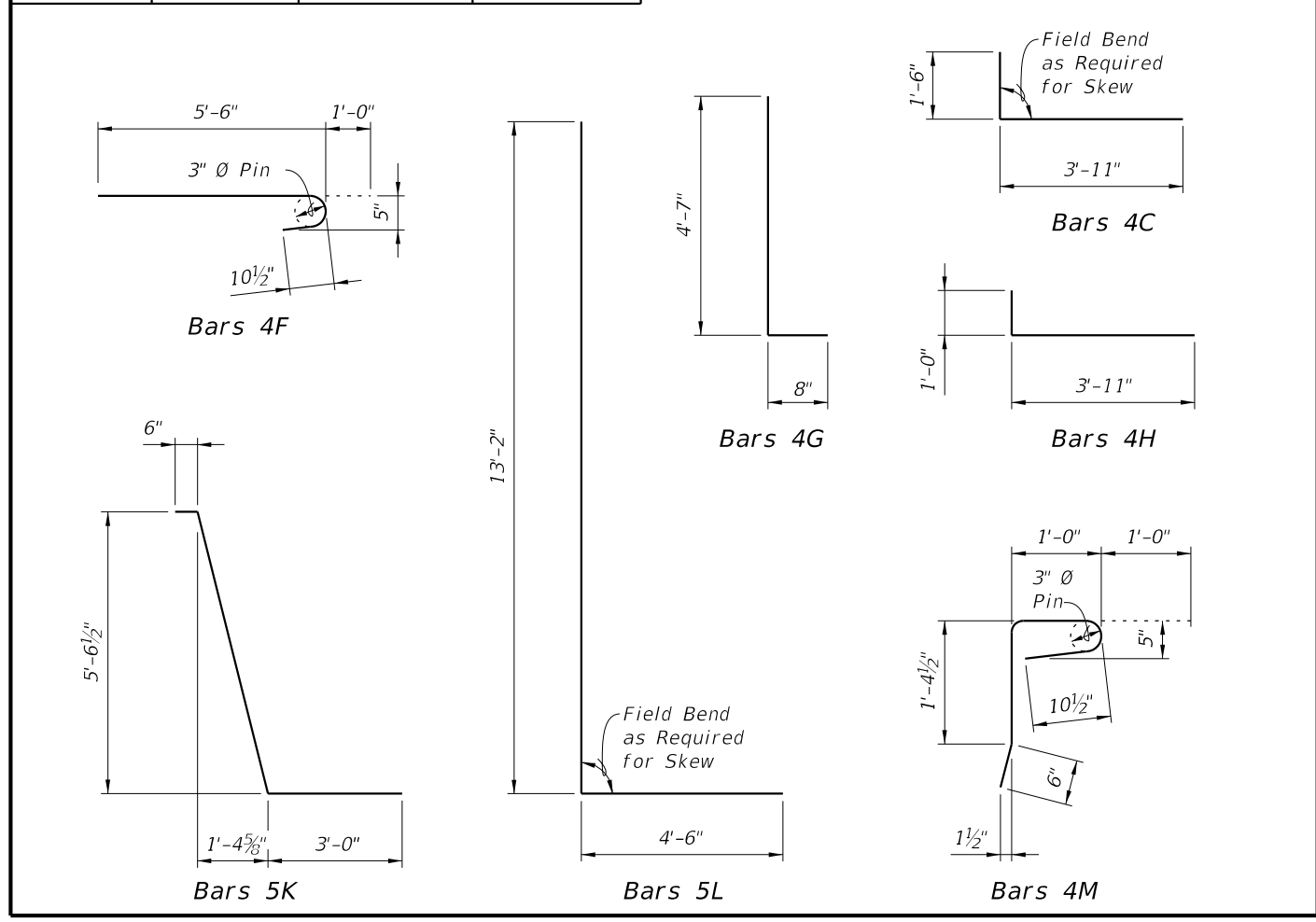
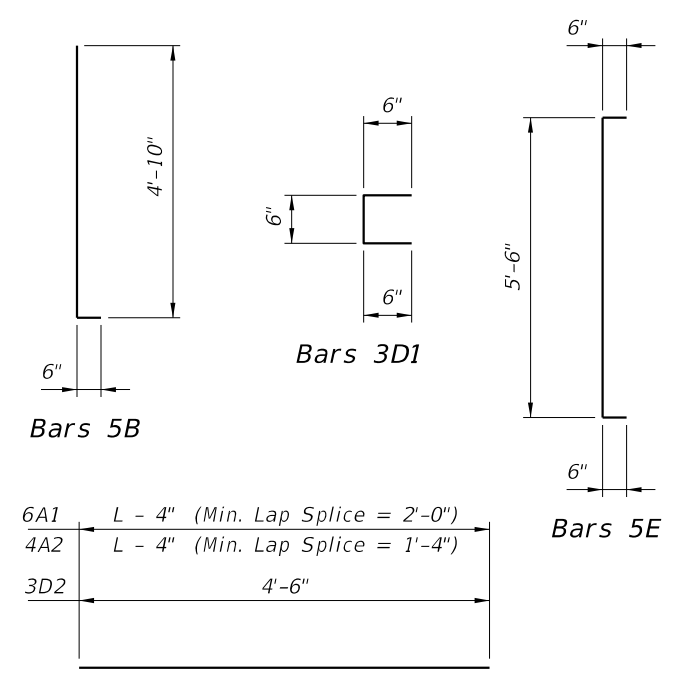
9/23/2021 9:54:00 AM

LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 63 BEAM - STANDARD DETAILS	INDEX 450-263	SHEET 2 of 3
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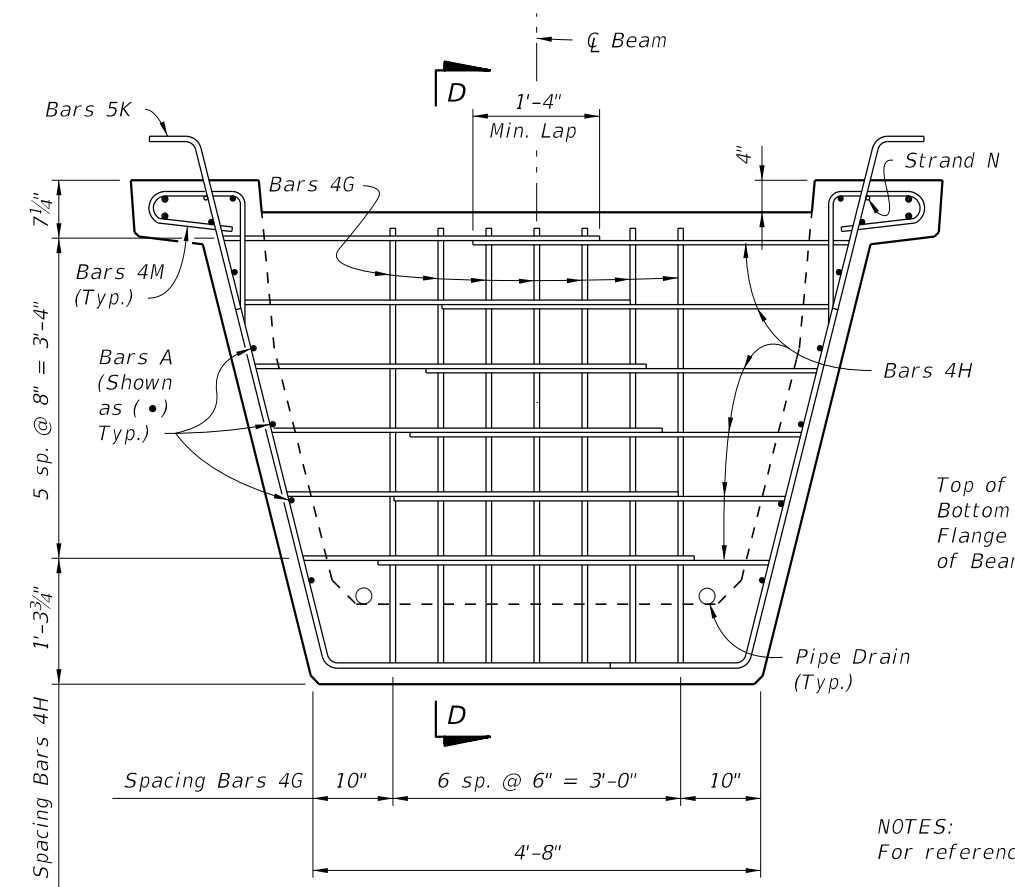
CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

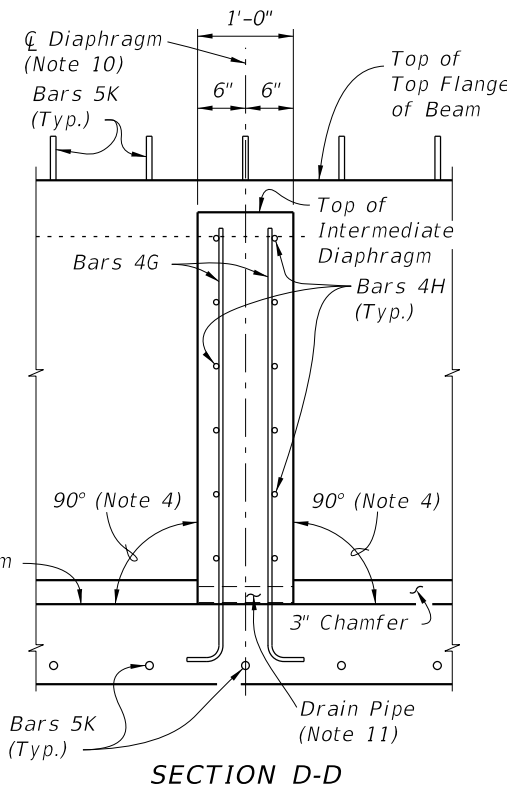
MARK	SIZE	NO. REQD.	LENGTH
A1	6	4	Dim. L - 4"
A2	4	12	Dim. L - 4"
B	5	12	5'-4"
C	4	24	5'-5"
D1	3	204	1'-6"
D2	3	34	4'-6"
E	5	24	6'-6"
F	4	28	6'-6"
G	4	See Table	5'-3"
H	4	See Table	4'-11"
K	5	See Table	9'-2½"
L	5	28	17'-8"
M	4	See Table	3'-11"
N	¾" Ø Strand	2	Dim. L - 3"



TOP VIEW OF INTERMEDIATE DIAPHRAGM



SECTION AT INTERMEDIATE DIAPHRAGM

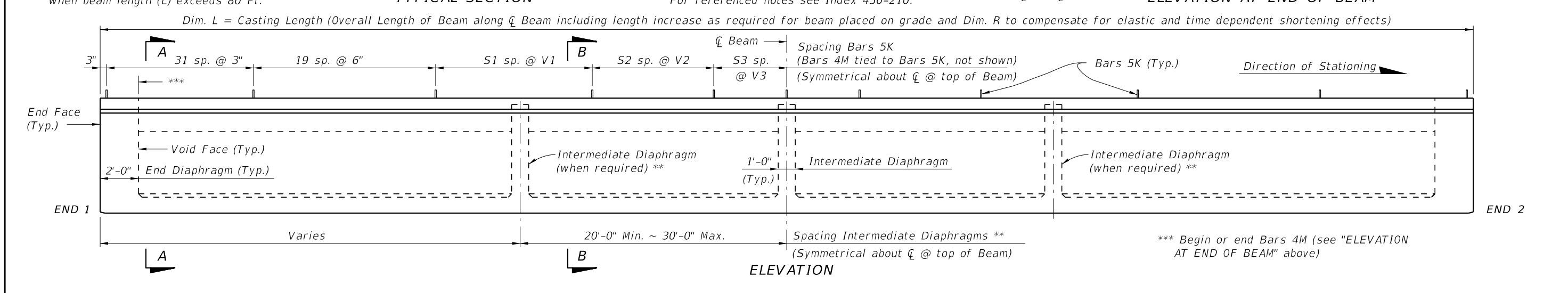
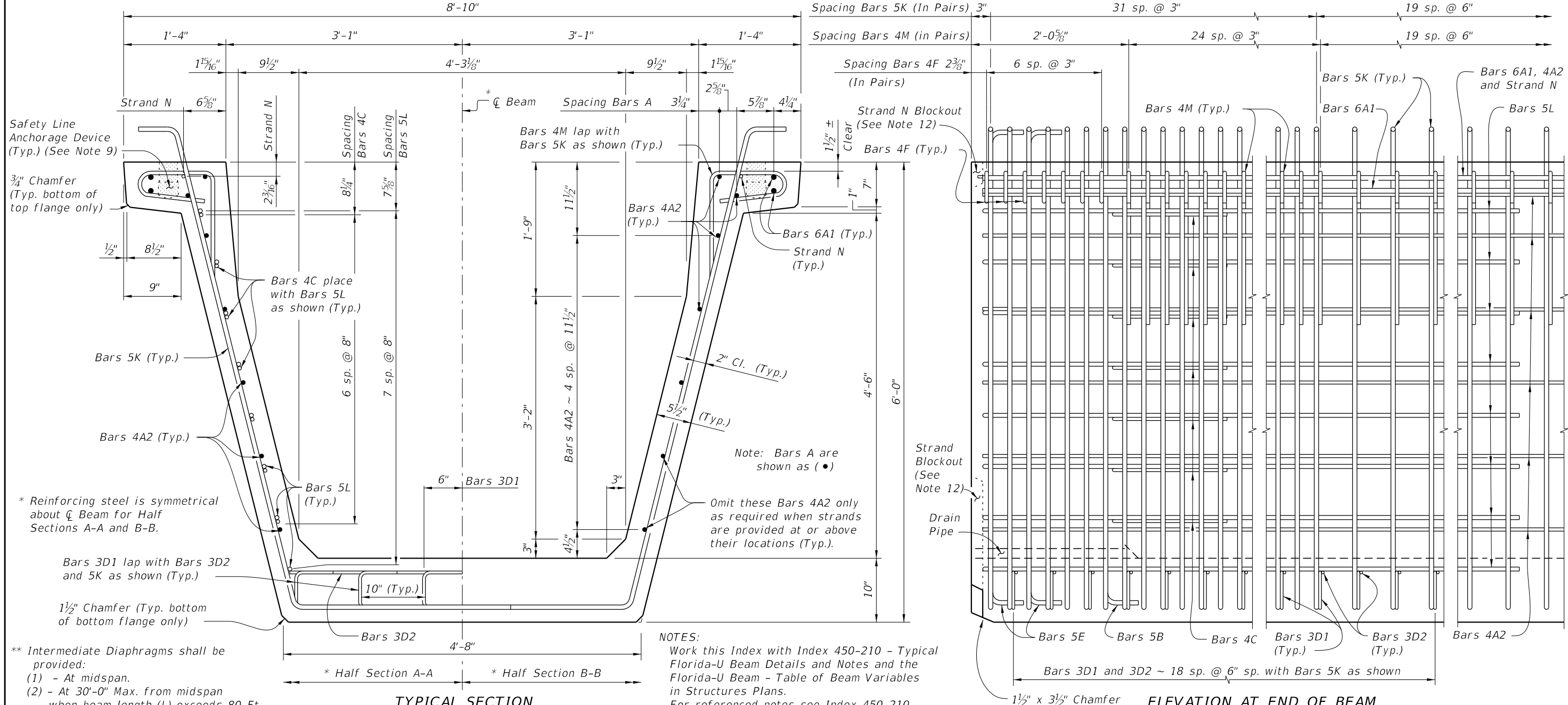


SECTION D-D

NOTES:  
For referenced notes see Index 450-210.

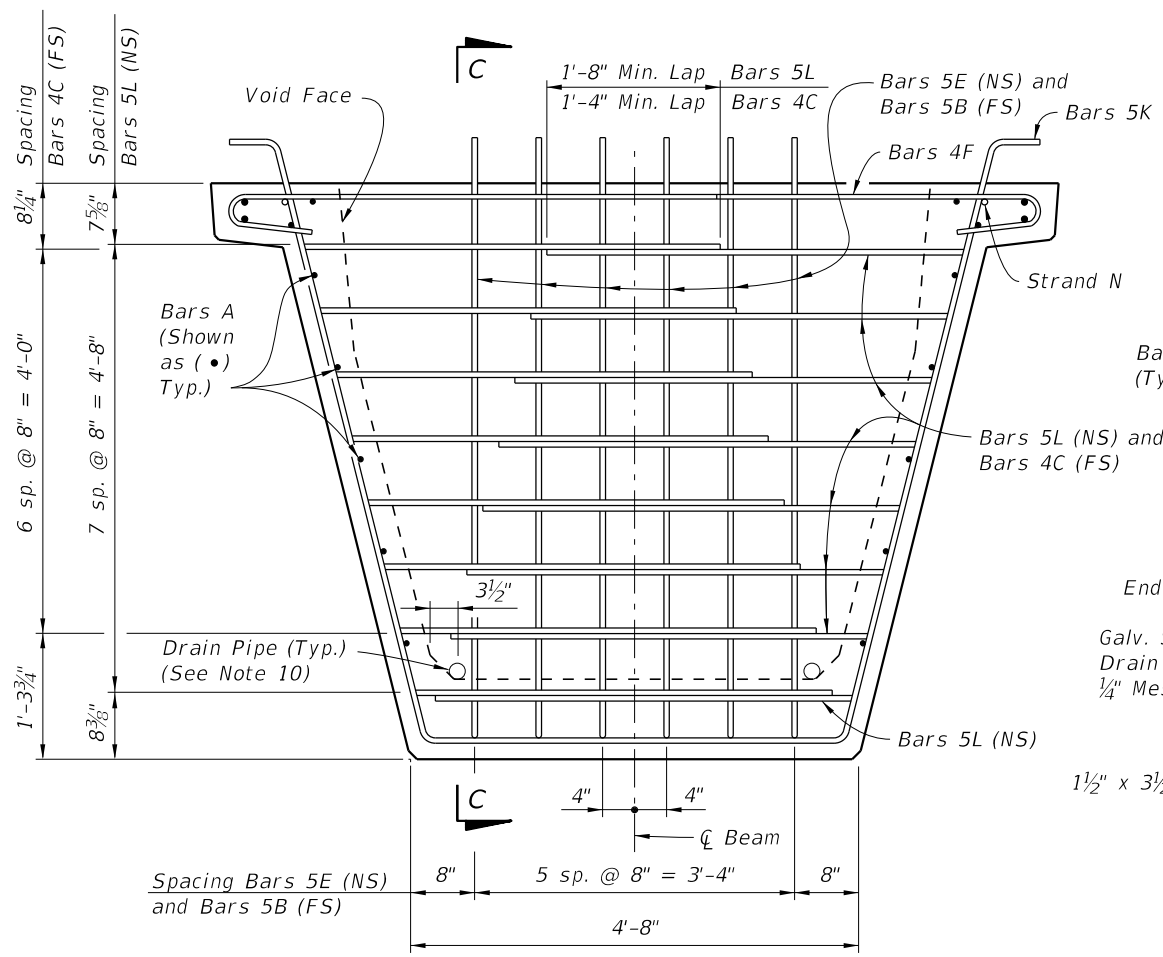
9/23/2021 9:54:01 AM

LAST REVISION	DESCRIPTION:
11/01/16	

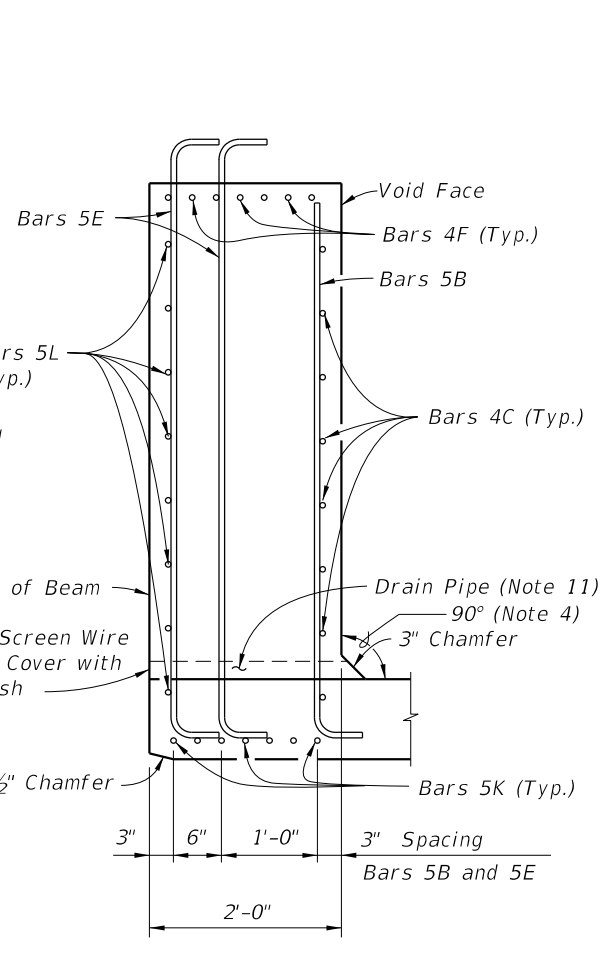


9/23/2021 9:54:02 AM

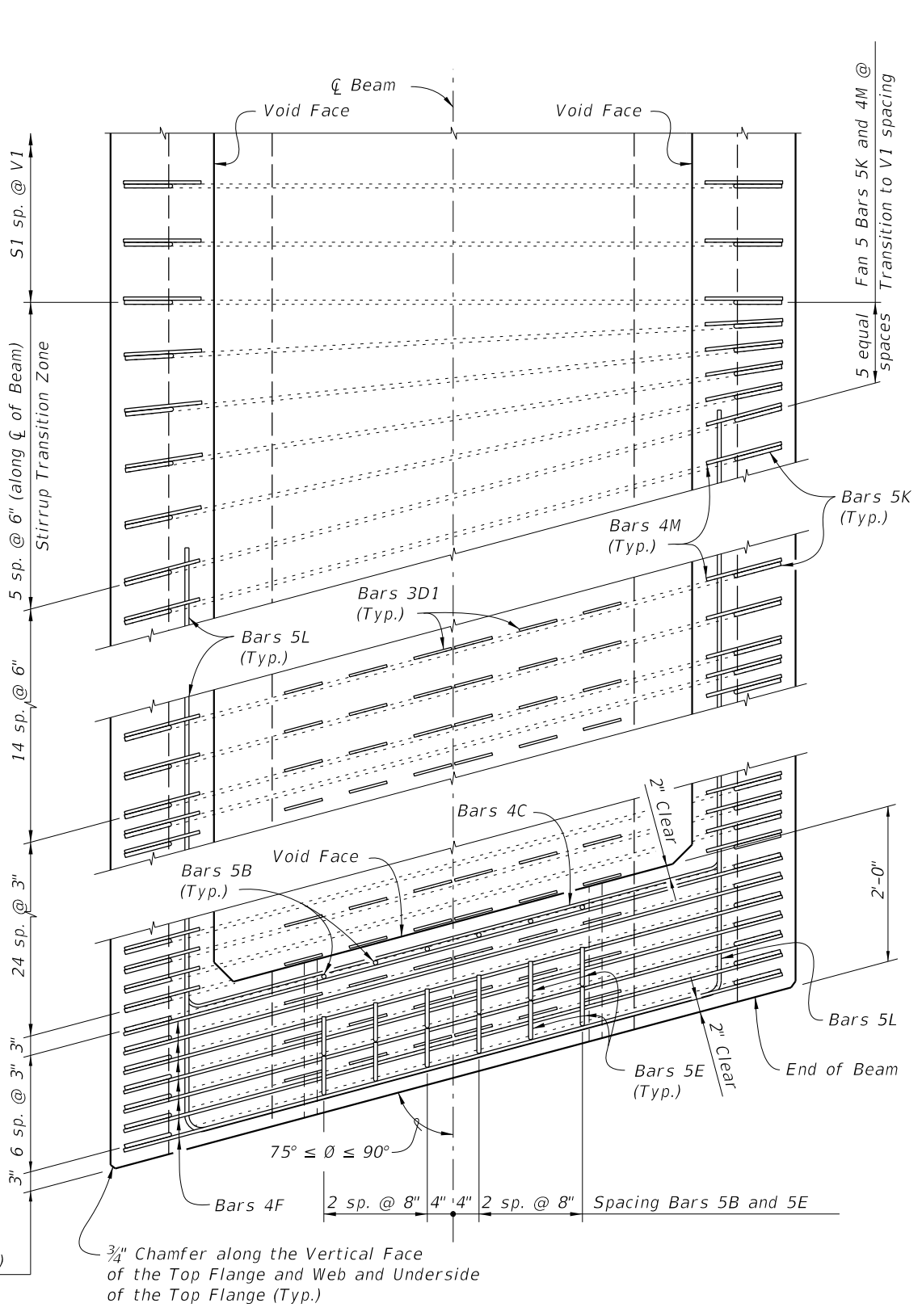
LAST REVISION 11/01/16	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>FLORIDA-U 72 BEAM - STANDARD DETAILS</b>	INDEX <b>450-272</b>	SHEET <b>1 of 3</b>
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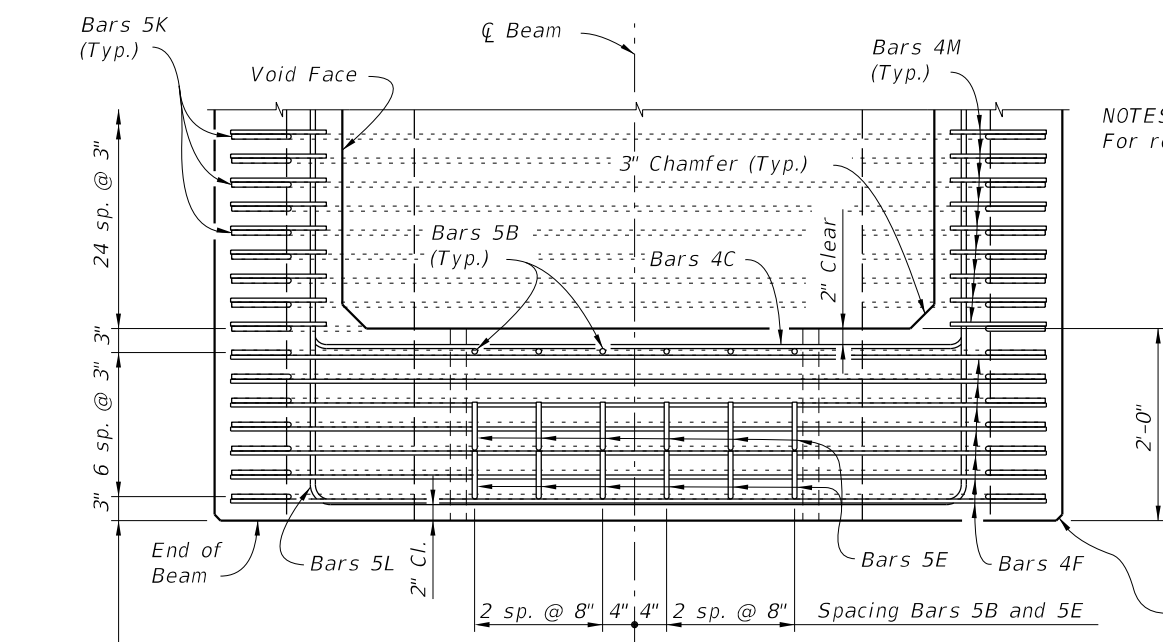
END VIEW AT END DIAPHRAGM



SECTION C-C



TOP VIEW OF SKEWED END DIAPHRAGM AND STIRRUP TRANSITION ZONE (Bars 3D2 Not Shown For Clarity)



TOP VIEW OF END DIAPHRAGM (Bars 3D1 And 3D2 Not Shown For Clarity)

NOTES:  
For referenced notes see Index 450-210.

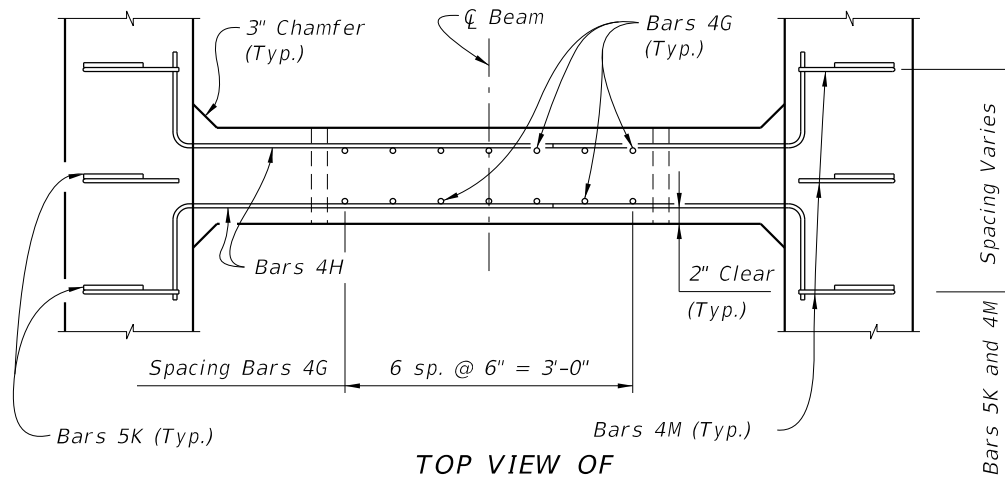
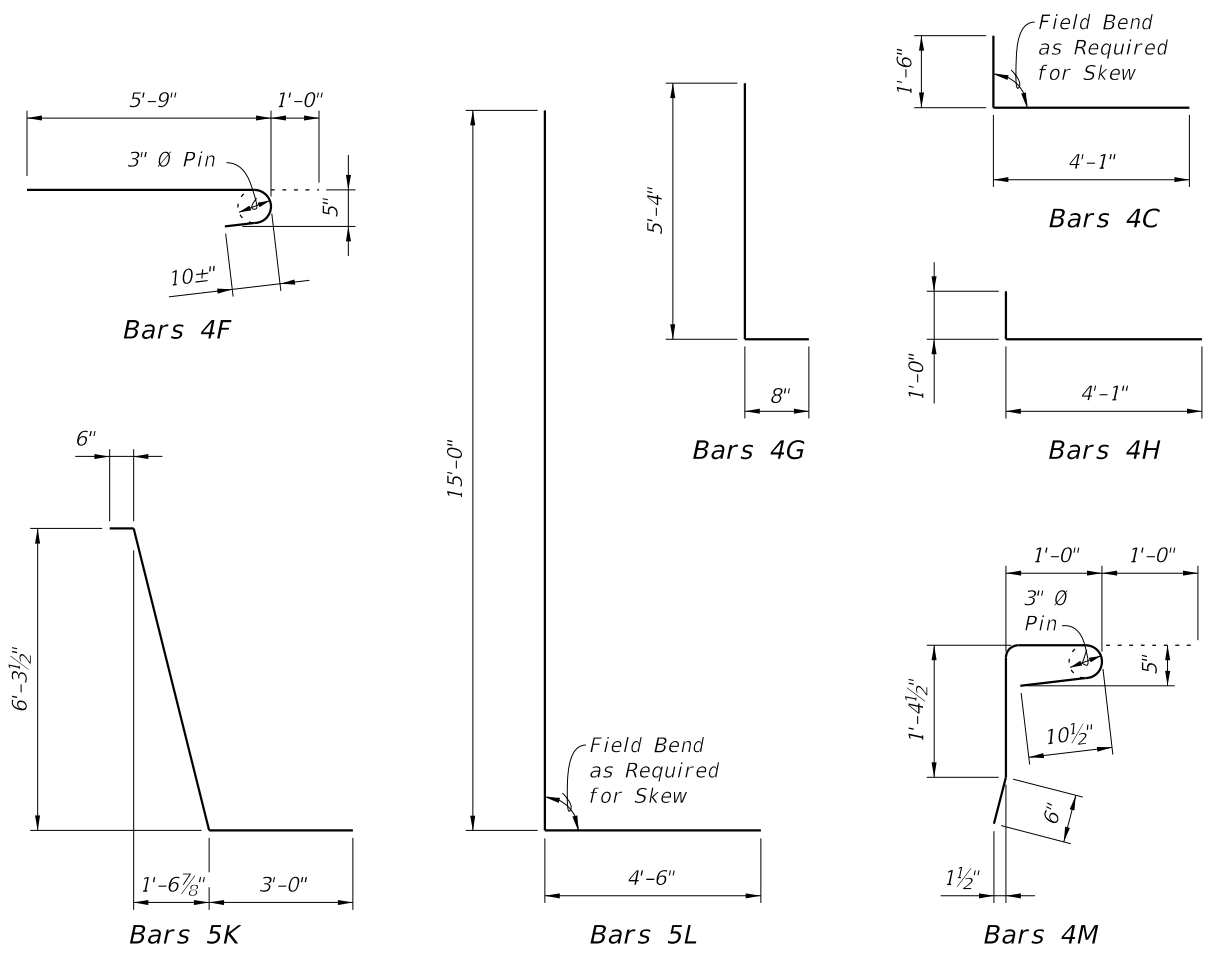
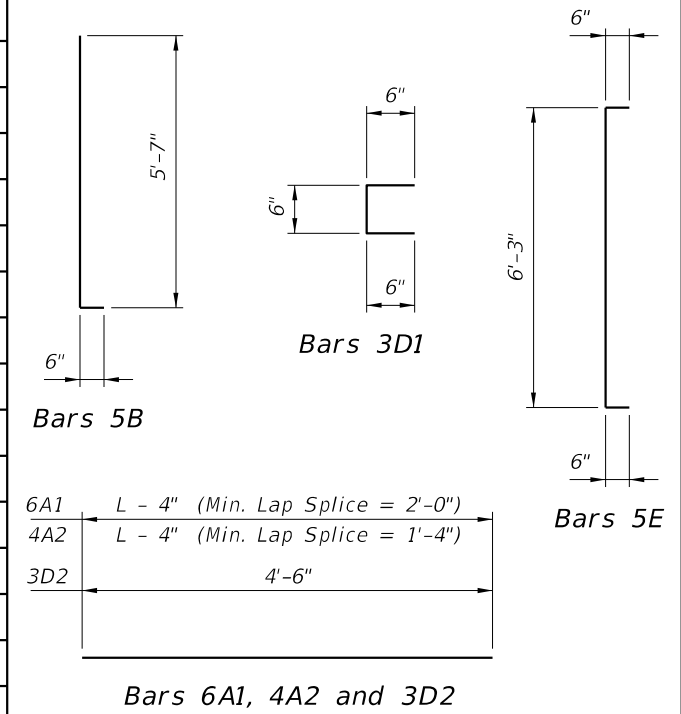
Spacing Bars 5K (Along C of Beam)  
(Bars 4F and 4M are Paired with Bars 5K as shown)

9/23/2021 9:54:03 AM

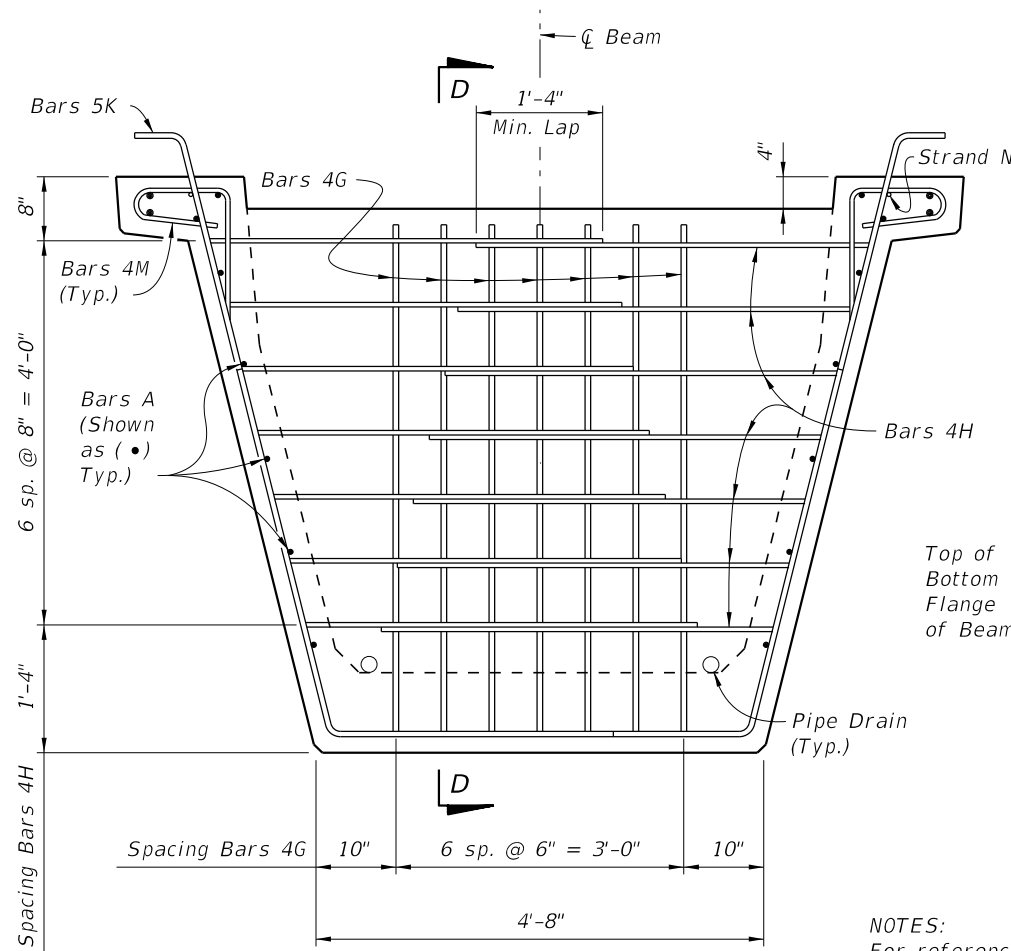
LAST REVISION 11/01/16	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FLORIDA-U 72 BEAM - STANDARD DETAILS	INDEX 450-272	SHEET 2 of 3
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BILL OF REINFORCING STEEL FOR ONE BEAM ONLY

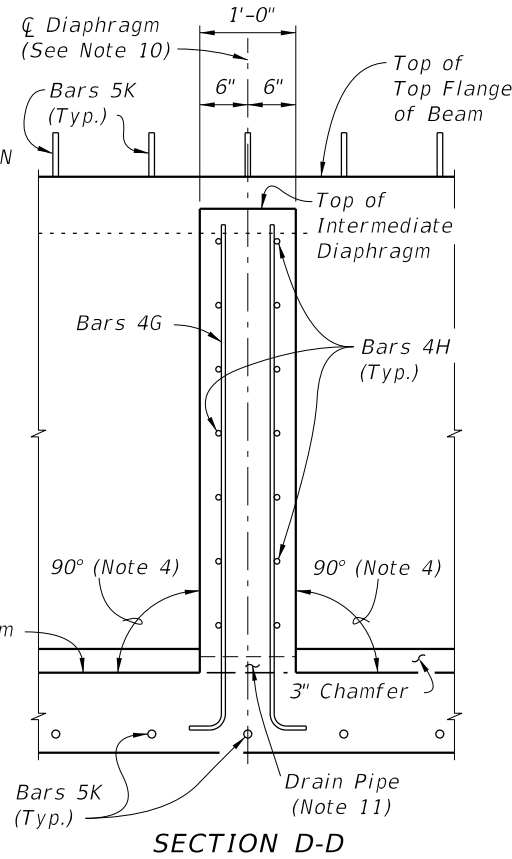
MARK	SIZE	NO. REQD.	LENGTH
A1	6	4	Dim. L - 4"
A2	4	14	Dim. L - 4"
B	5	12	6'-1"
C	4	28	5'-7"
D1	3	228	1'-6"
D2	3	38	4'-6"
E	5	24	7'-3"
F	4	28	6'-9"
G	4	See Table	6'-0"
H	4	See Table	5'-1"
K	5	See Table	10'-0"
L	5	32	19'-6"
M	4	See Table	3'-11"
N	3/8" Ø Strand	2	Dim. L - 3"



TOP VIEW OF INTERMEDIATE DIAPHRAGM



SECTION AT INTERMEDIATE DIAPHRAGM



SECTION D-D

NOTES:  
For referenced notes see Index 450-210.

9/23/2021 9:54:04 AM

LAST REVISION	DESCRIPTION:
11/01/16	

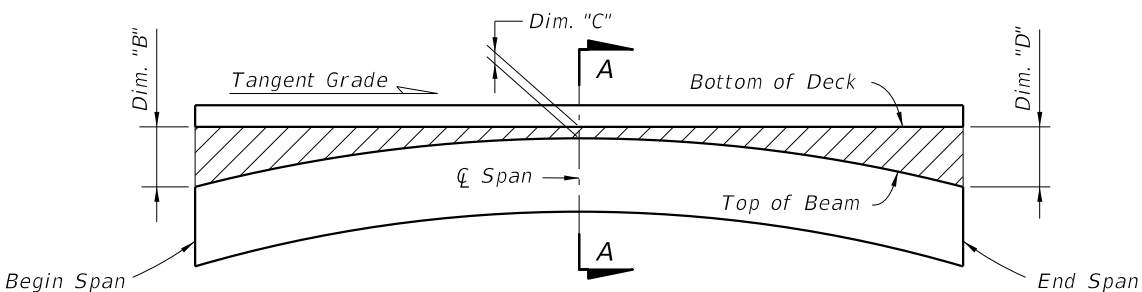


FY 2022-23  
STANDARD PLANS

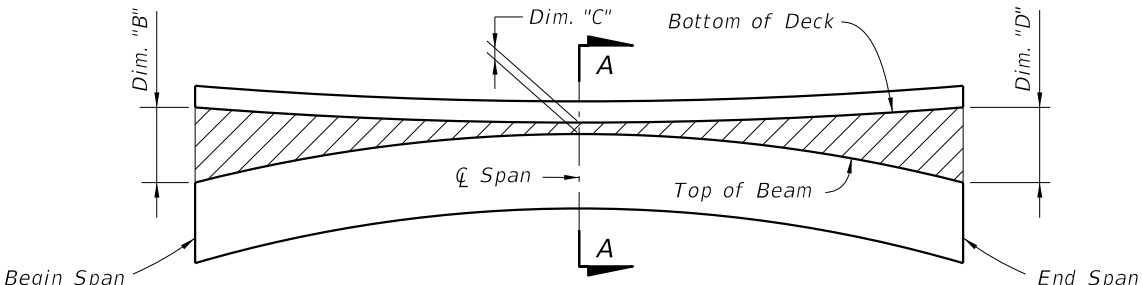
FLORIDA-U 72 BEAM - STANDARD DETAILS

INDEX  
450-272

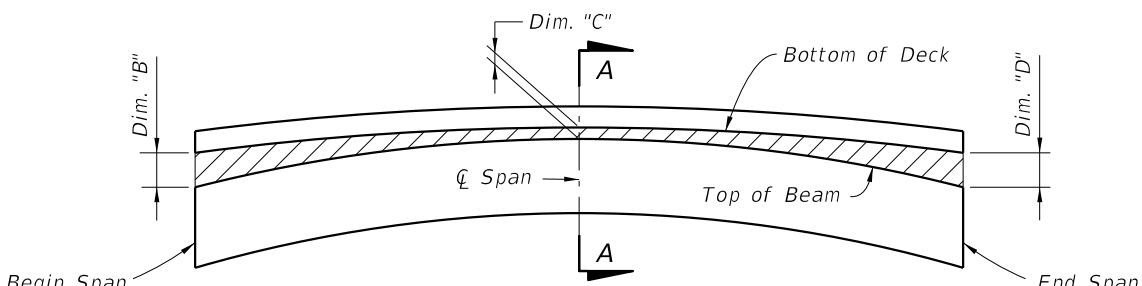
SHEET  
3 of 3



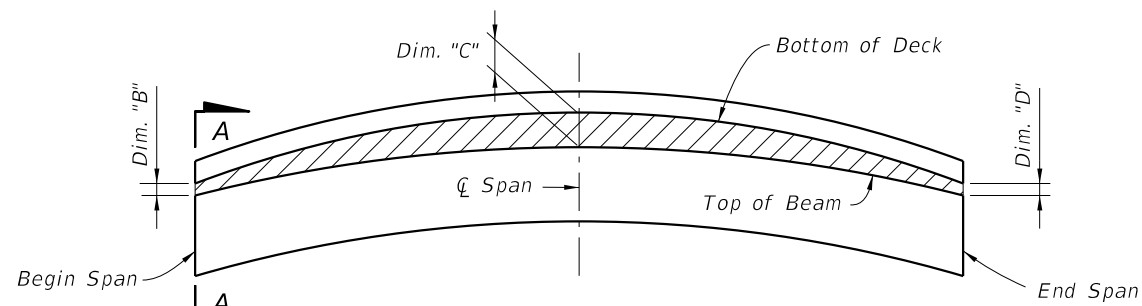
**BUILD-UP DIAGRAM FOR TANGENT SPANS  
(ALONG Q FLANGE) (CASE 1)**



**BUILD-UP DIAGRAM FOR SAG VERTICAL CURVE & HORIZONTAL CURVE SPANS  
(ALONG Q FLANGE) (CASE 2)**



**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS  
- CONTROL AT Q SPAN  
(ALONG Q FLANGE) (CASE 3)**

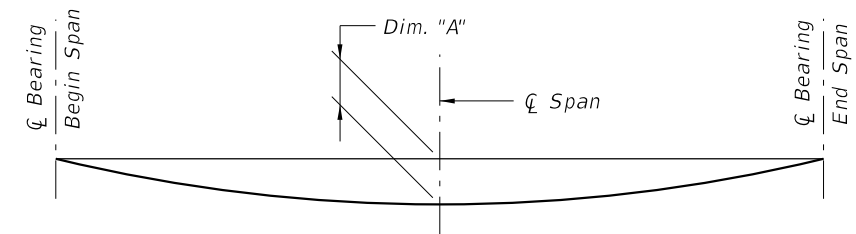


**BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS  
- CONTROL AT BEGIN OR END SPAN  
(ALONG Q FLANGE) (CASE 4)**

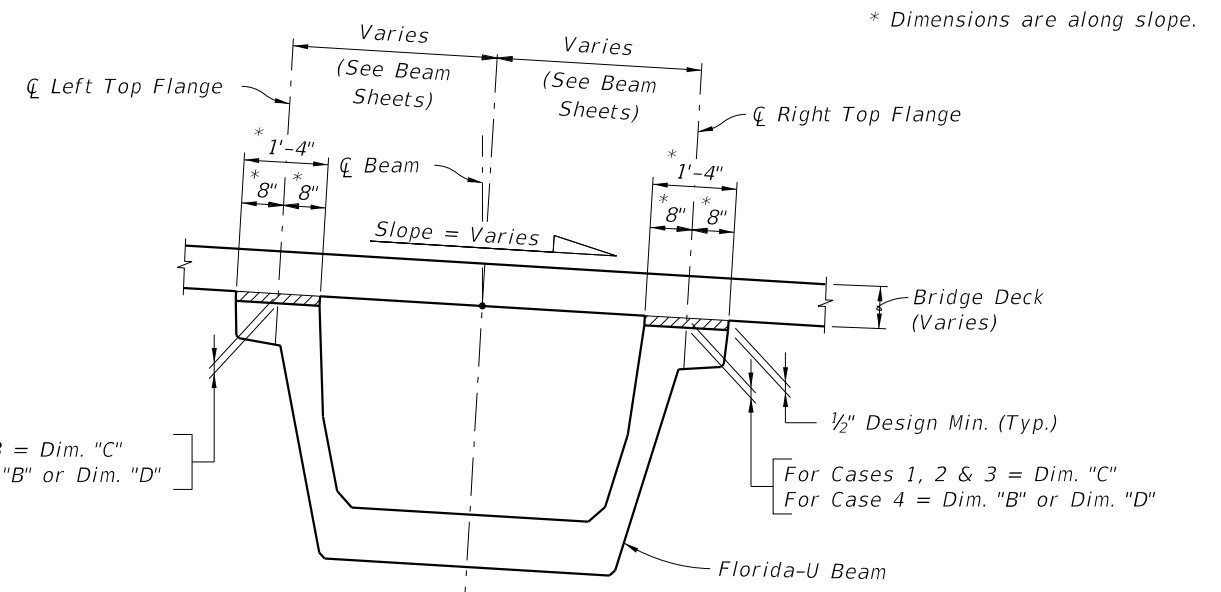
**BEAM CAMBER AND BUILD-UP NOTES:**

The build-up values given in the Data 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 +/- 1/2" 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  
(ALONG Q BEAM)**



For Cases 1, 2 & 3 = Dim. "C"  
For Case 4 = Dim. "B" or Dim. "D"

For Cases 1, 2 & 3 = Dim. "C"  
For Case 4 = Dim. "B" or Dim. "D"

\* NOTE:  
Work this Index with the Build-up and Deflection Data Table for Florida-U Beams in Structures Plans.

**SECTION A-A  
BUILD-UP OVER BEAMS  
(LOOKING AHEAD STATION)**

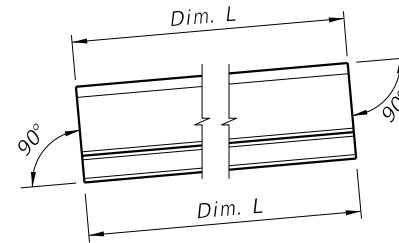
9/23/2021 9:54:04 AM

LAST REVISION 07/01/15	REVISION	DESCRIPTION:		<b>FY 2022-23 STANDARD PLANS</b>	<b>FLORIDA-U BEAMS - BUILD-UP &amp; DEFLECTION DATA</b>	INDEX 450-299	SHEET 1 of 1
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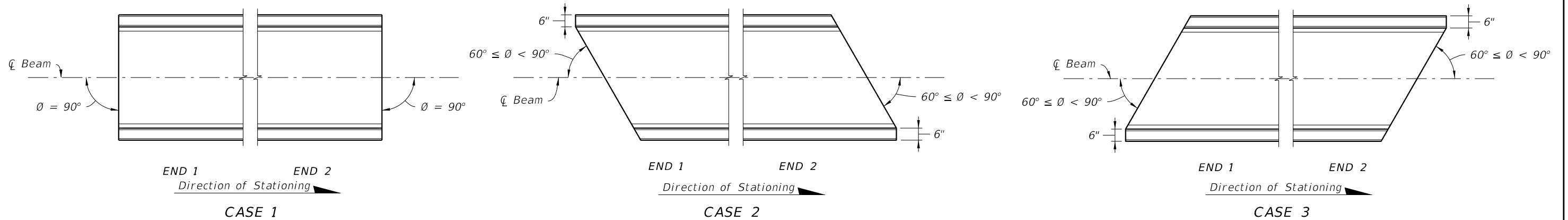


**FABRICATION NOTES**

1. The abbreviated FSB designation for depth and width is FSB "depth" x "width", e.g. FSB 12 x 48.
2. All bar dimensions are out-to-out.
3. Strands N shall be ASTM A416, Grade 250 or 270,  $\frac{3}{8}$ "  $\emptyset$  or larger strands, stressed to 10,000 lbs. each.
4. Unless otherwise noted, the minimum concrete cover for reinforcing steel shall be 2".
5. For referenced Dimensions, Angles and Case Numbers, see Florida Slab Beam - Table of Variables in Structures Plans.
6. Bars 4D1 & 6Y1 correspond to END 1, and 4D2 & 6Y2 correspond to END 2.
7. Bars 5E1 correspond to interior FSBs, and 5E2 correspond to exterior FSBs.
8. Rake the top surface of the Slab Beams transversely to provide a roughened surface with  $\frac{1}{4}$ " amplitude.
9. Embedment of Safety Line Anchorage Devices are permitted to accommodate full protection systems. See shop drawings for details and spacings.




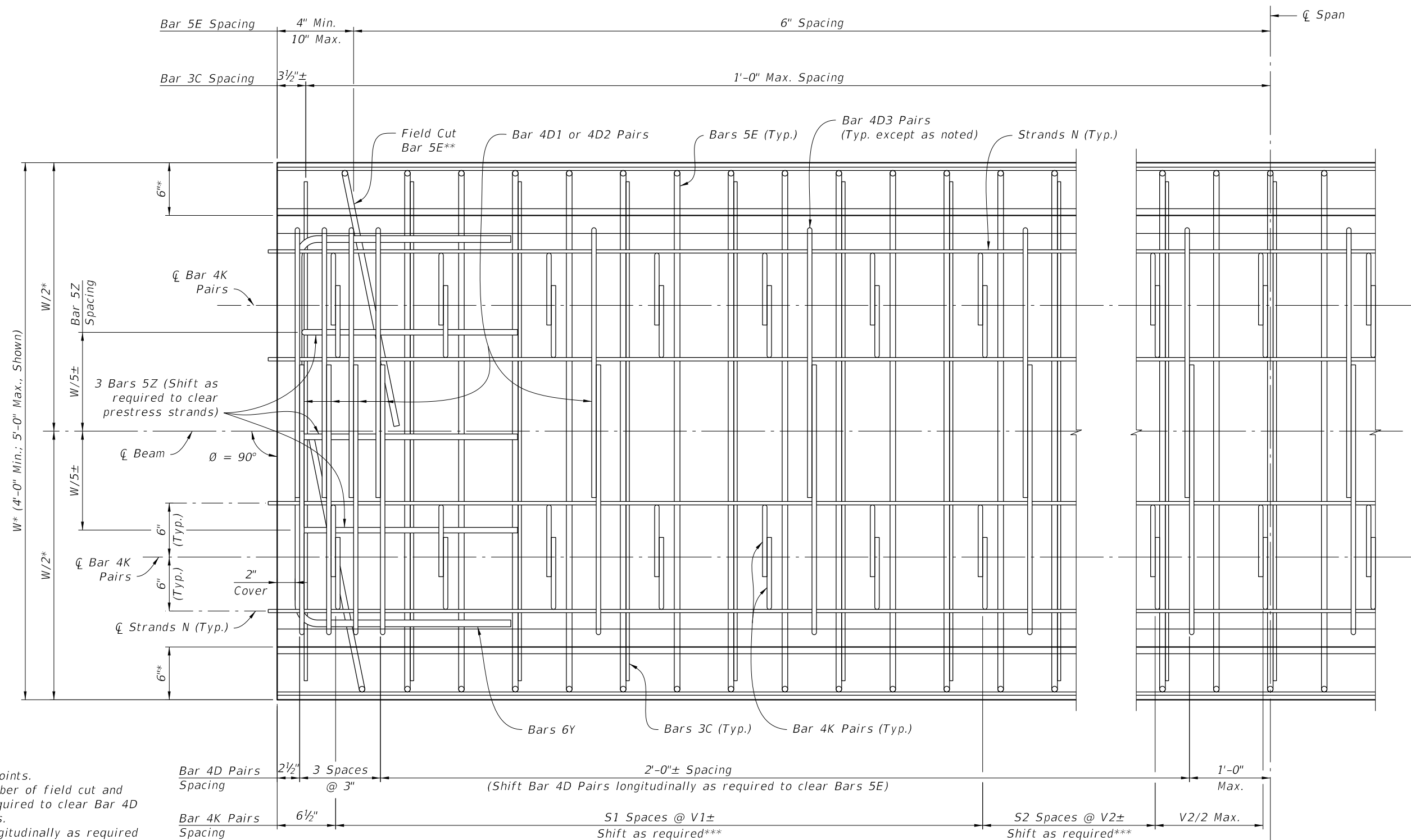
**SCHMATIC SIDE ELEVATION OF BEAM**  
 (Beam on a Positive Grade shown; Beam on a Negative Grade or Horizontal Grade similar.)



**SCHMATIC PLAN VIEWS AT BEAM ENDS**

9/23/2021 9:54:05 AM

LAST REVISION 11/01/20	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FLORIDA SLAB BEAM TYPICAL DETAILS AND NOTES	INDEX 450-450	SHEET 1 of 3
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- \* Measured to Working Points.
- \*\* At Beam ends, use number of field cut and rotated Bars 5E as required to clear Bar 4D Pairs and Bar 4K Pairs.
- \*\*\* Shift Bar 4K Pairs longitudinally as required to clear Bar 4D Pairs and Bars 3C and 5E.

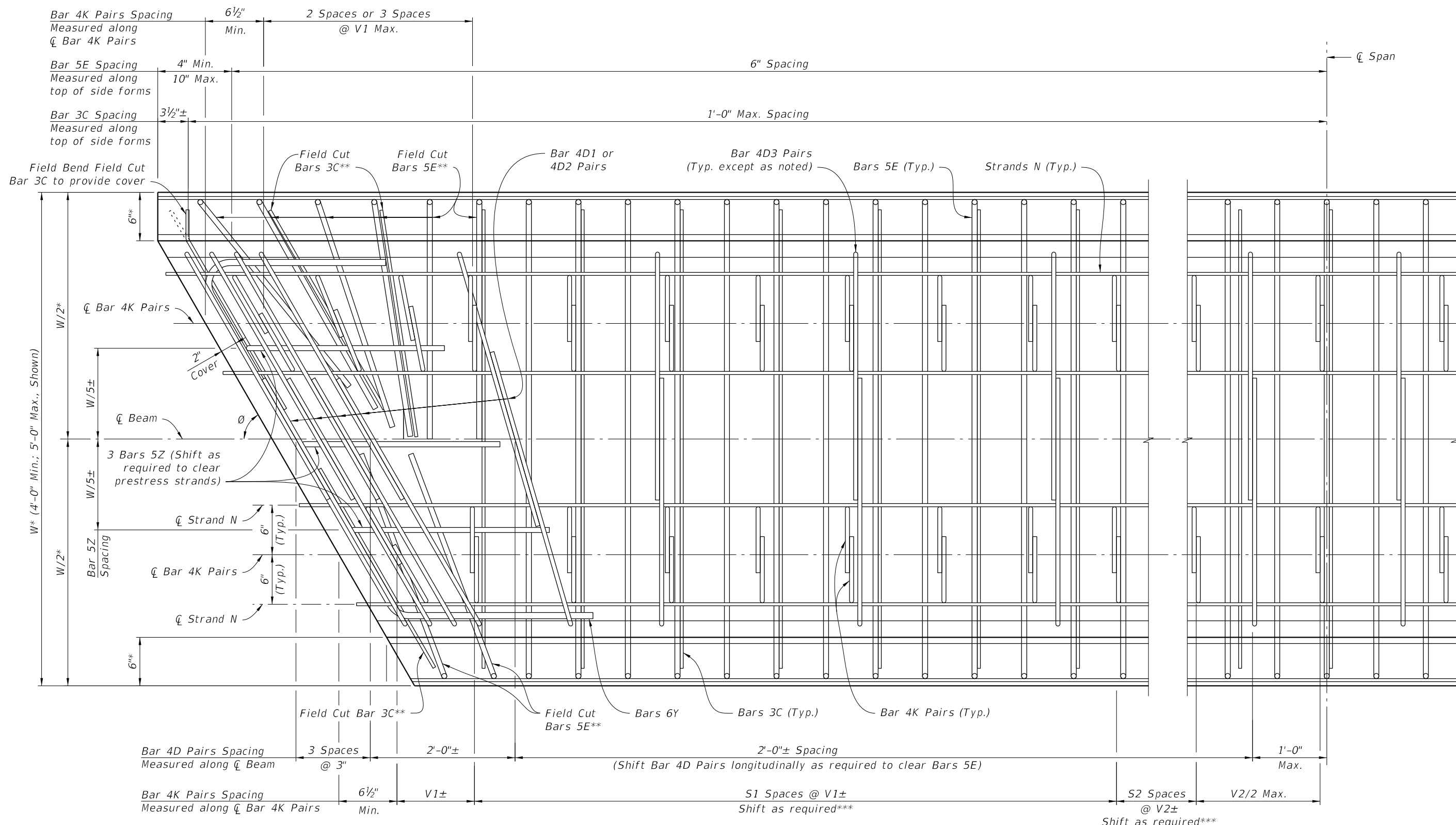
CROSS REFERENCE:  
 For Dimensions V1, V2 & W and number of spaces S1 & S2, see Florida Slab Beam - Table of Variables in Structures Plans.

See Indexes 450-451, 450-452 and 450-453 for Bars 5E Details.

**PARTIAL PLAN VIEW  $\theta = 90^\circ$**   
 (END 1 SHOWN, END 2 SIMILAR)  
 (INTERIOR BEAM SHOWN, EXTERIOR BEAM SIMILAR, SEE BARS 5E DETAILS)

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LAST REVISION 11/01/20	REVISION	DESCRIPTION:	 <b>FY 2022-23</b> <b>STANDARD PLANS</b>	<b>FLORIDA SLAB BEAM TYPICAL</b> <b>DETAILS AND NOTES</b>	INDEX <b>450-450</b>	SHEET <b>2 of 3</b>
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**PARTIAL PLAN VIEW  $60^\circ \leq \theta < 90^\circ$**

(END 1 SHOWN, END 2 SIMILAR)  
(INTERIOR BEAM SHOWN, EXTERIOR BEAM SIMILAR, SEE BARS 5E DETAILS)

**CROSS REFERENCE:**  
For Dimensions V1, V2 & W, Angle  $\theta$  and number of spaces S1 & S2, see Florida Slab Beam - Table of Variables in Structures Plans.

See Indexes 450-451, 450-452 and 450-453 for Bars 5E Details.

\* Measured to Working Points.  
\*\* At Beam ends, use number of field cut and rotated Bars 3C and 5E as required to clear Bar 4D Pairs and Bar 4K Pairs.  
\*\*\* Shift Bar 4K Pairs longitudinally as required to clear Bar 4D Pairs and Bars 3C and 5E.

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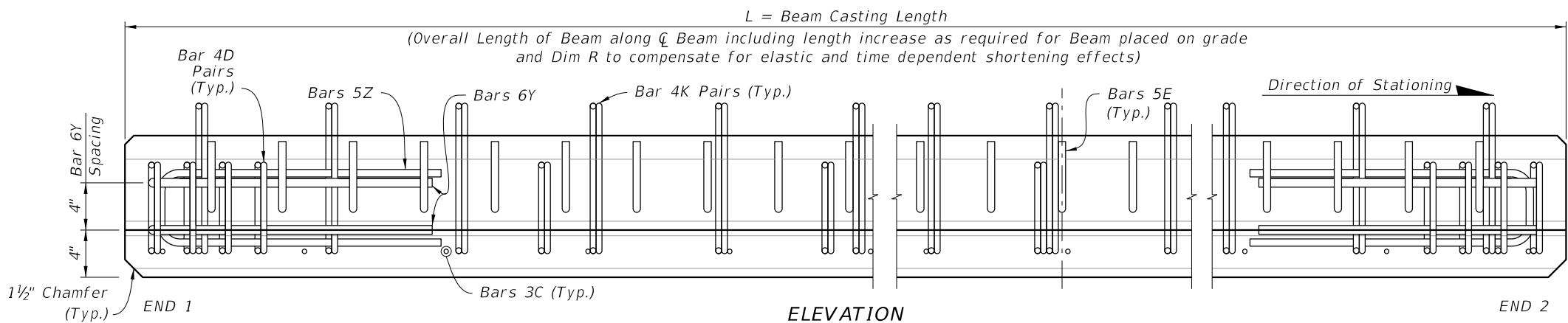
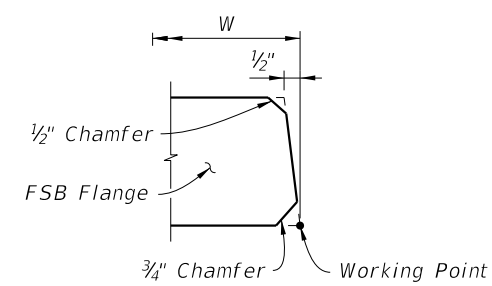
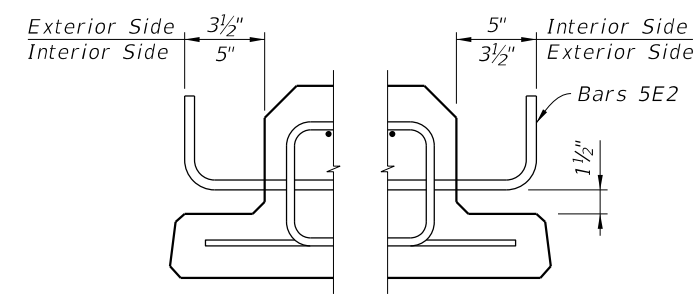
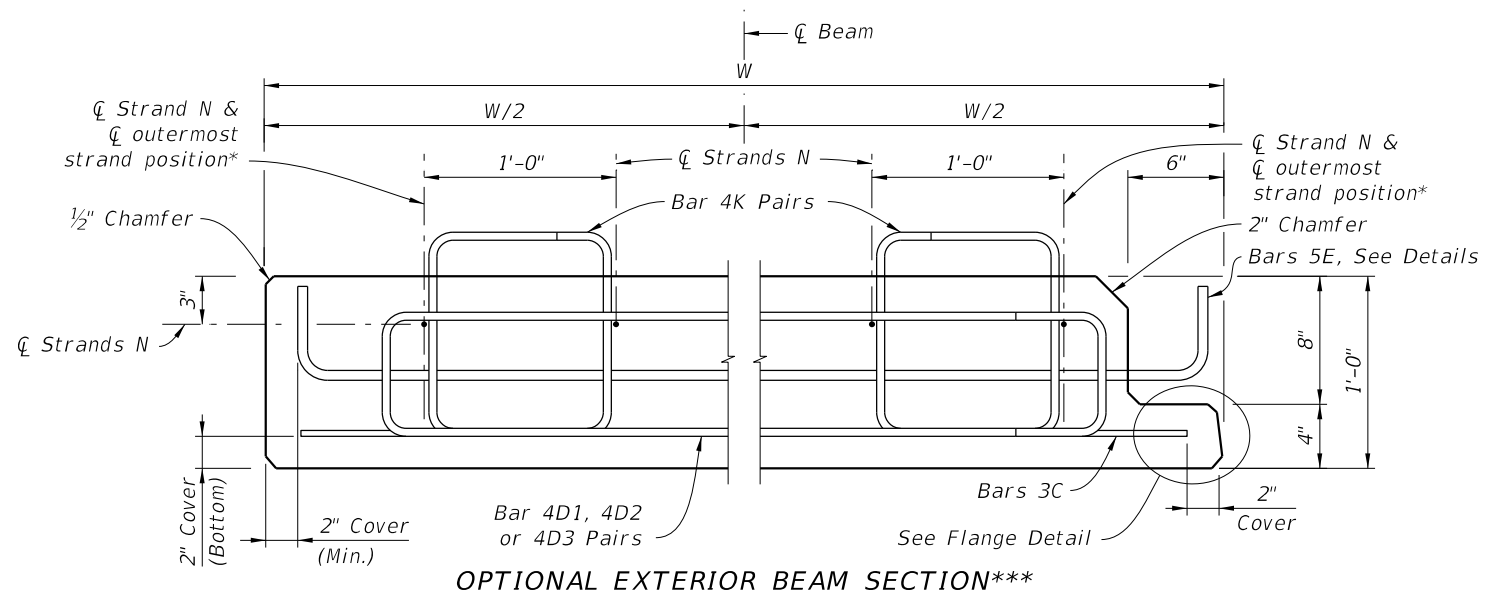
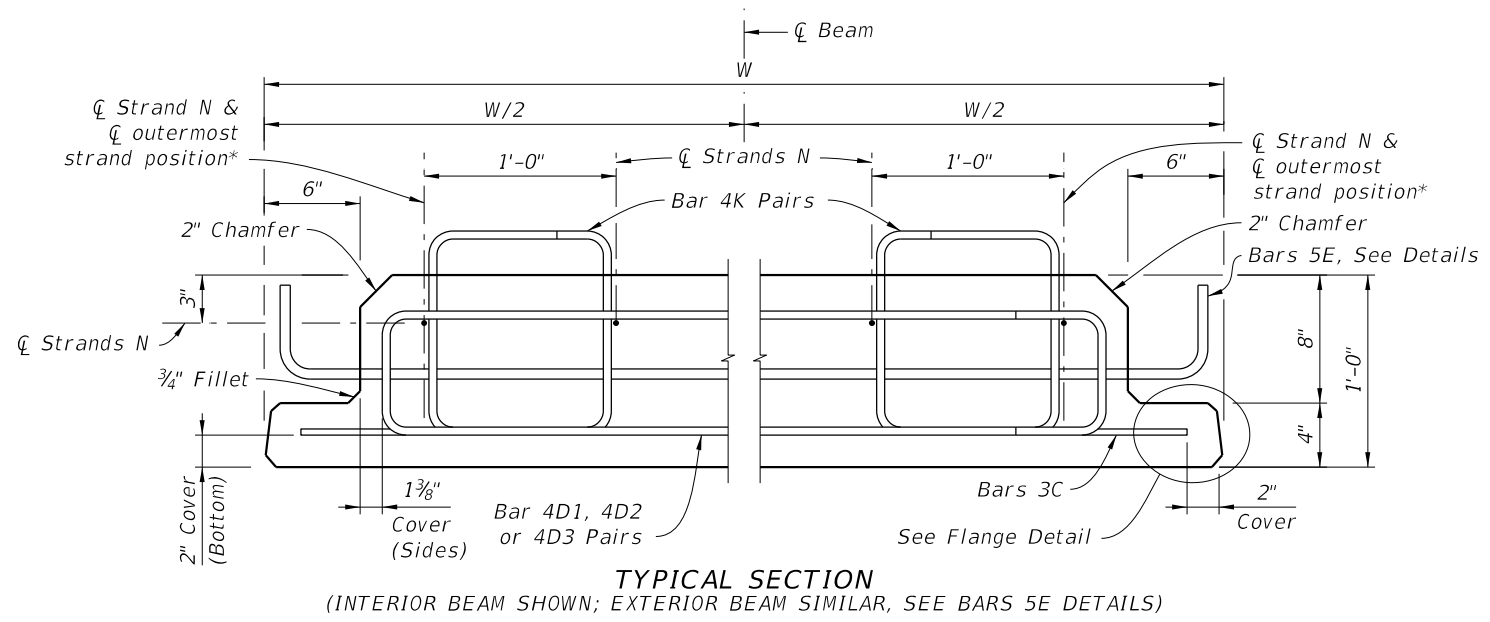
LAST REVISION 11/01/20	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>FLORIDA SLAB BEAM TYPICAL DETAILS AND NOTES</b>	INDEX <b>450-450</b>	SHEET <b>3 of 3</b>
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**NOTES:**  
 Work this Index with Index 450-450 and Florida Slab Beams - Table of Variables in Structures Plans.  
 For Dimensions C, D, E, L, R, W & Y and Angle  $\theta$ , see Florida Slab Beam - Table of Variables in Structures Plans.  
 For referenced notes, see Index 450-450, Sheet 1.

\* For  $\phi$  of outermost strand positions, see corresponding Strand Pattern on Florida Slab Beams - Table of Variables in Structures Plans.

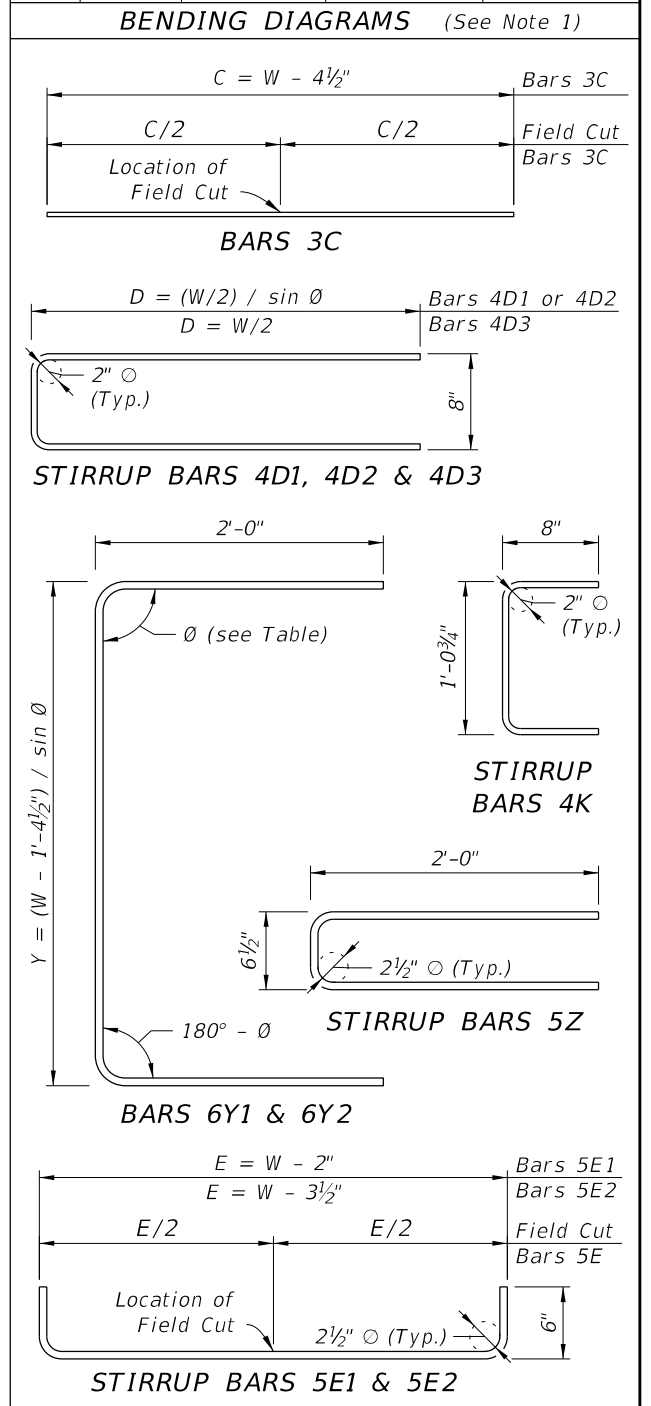
\*\* At the Contractor's option, the Detail as shown for Interior Beams may be used for Exterior Beams and the Bars 5E field bent on the exterior side of the Beam to provide the specified cover to the coping line.

\*\*\* At the Contractor's option, the Optional Exterior Beam Section may be used.

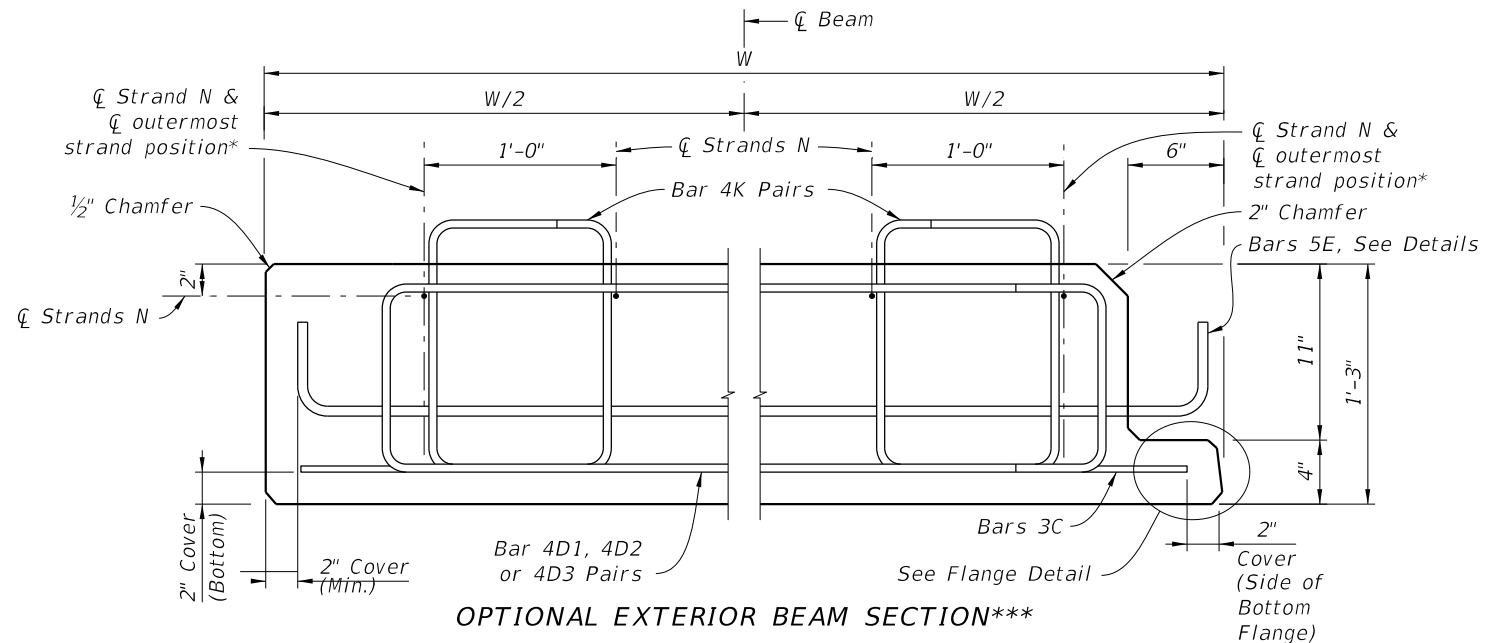
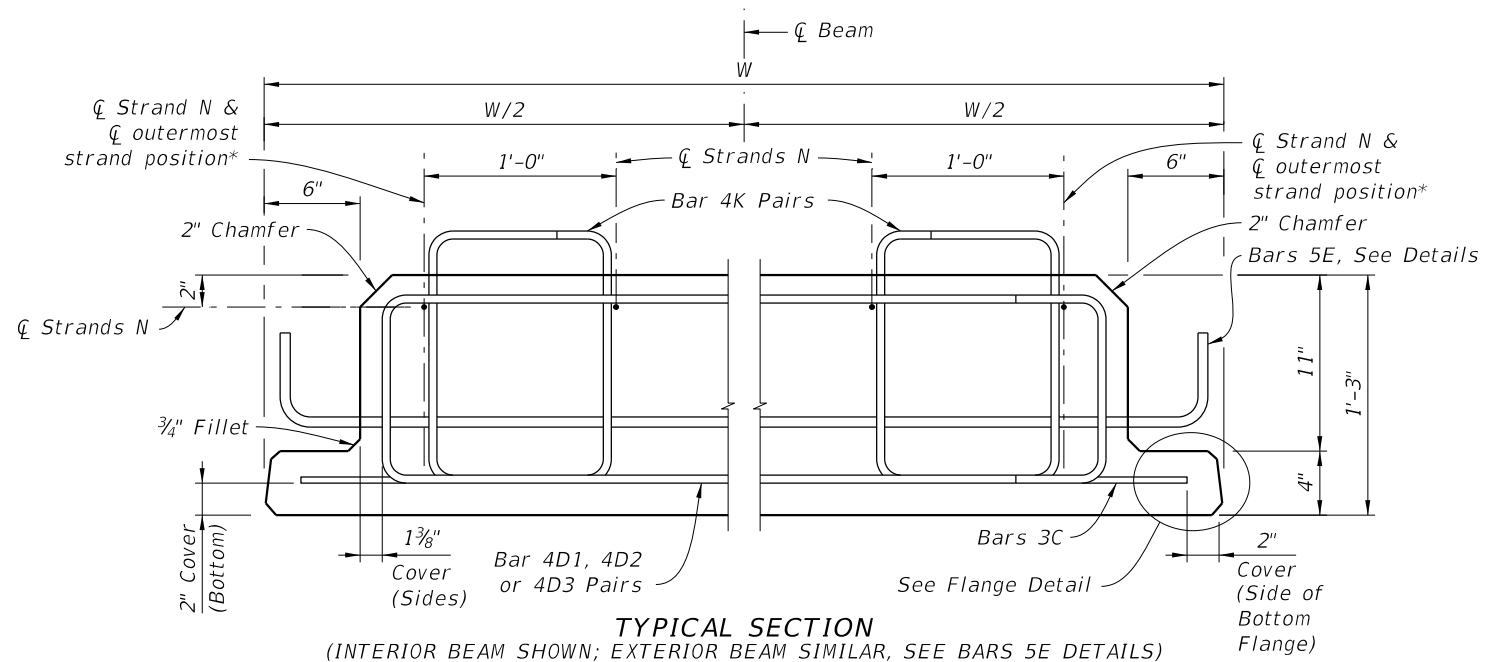


**BILL OF REINFORCING BARS FOR ONE BEAM ONLY**

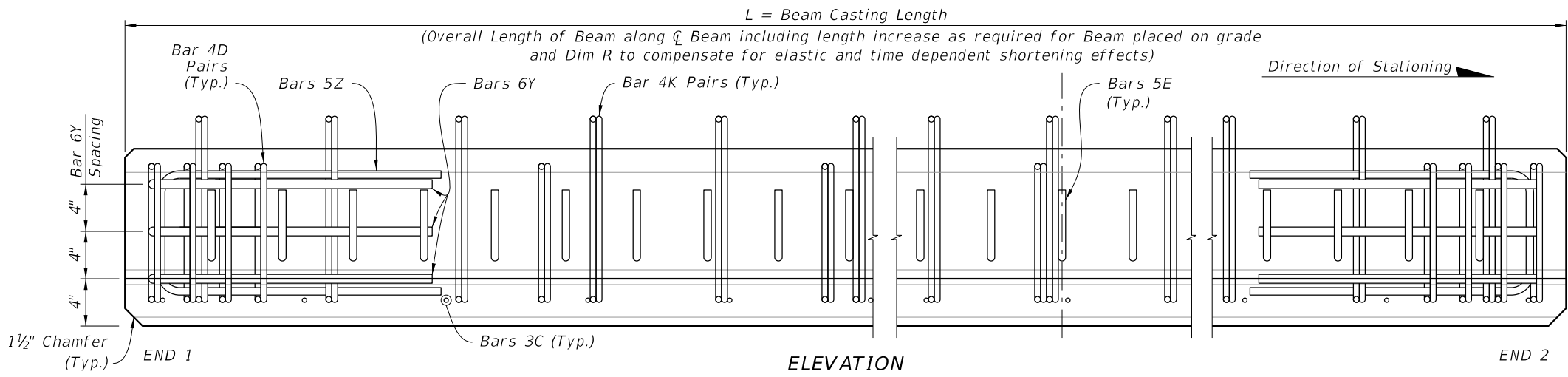
MARK	SIZE	NOTE NUMBERS	NUMBER REQUIRED	LENGTH (NOTE 1)
C	3		See Table	Varies
D1	4	6	10 (End 1)	Varies
D2	4	6	10 (End 2)	Varies
D3	4		See Table	Varies
E1	5	7	See Table	Varies
E2	5	7	See Table	Varies
K	4		See Table	2'-5"
N	See Note 3	3	4	Varies
Y1	6	6	2 (End 1)	Varies
Y2	6	6	2 (End 2)	Varies
Z	5		6	4'-6 1/2"



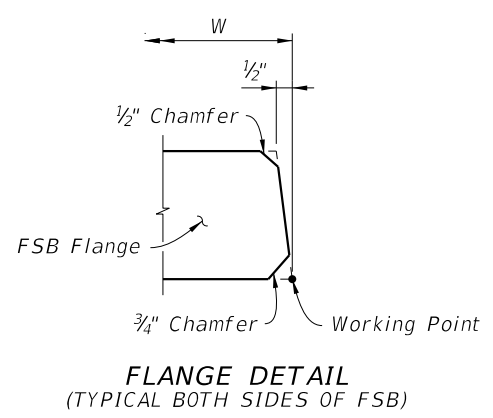
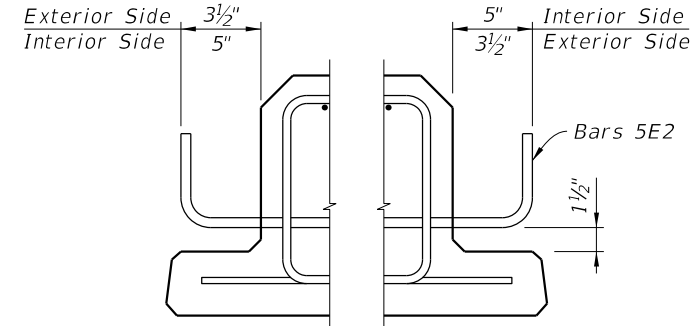
9/23/2021 9:54:08 AM



\*\*\* At the Contractor's option, the Optional Exterior Beam Section may be used.



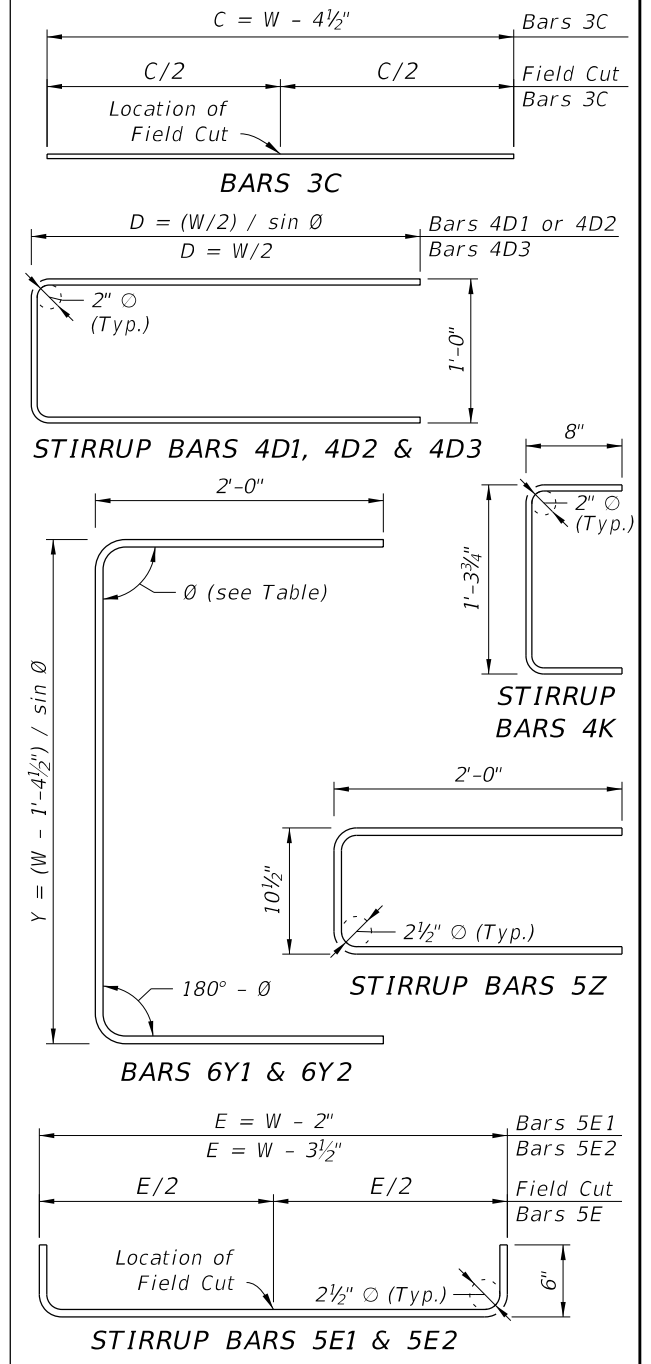
**NOTES:**  
 Work this Index with Index 450-450 and Florida Slab Beams - Table of Variables in Structures Plans.  
 For Dimensions C, D, E, L, R, W & Y and Angle  $\theta$ , see Florida Slab Beam - Table of Variables in Structures Plans.  
 For referenced notes, see Index 450-450, Sheet 1.  
 \* For  $\phi$  of outermost strand positions, see corresponding Strand Pattern on Florida Slab Beams - Table of Variables in Structures Plans.  
 \*\* At the Contractor's option, the Detail as shown for Interior Beams may be used for Exterior Beams and the Bars 5E field bent on the exterior side of the Beam to provide the specified cover to the coping line.



**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

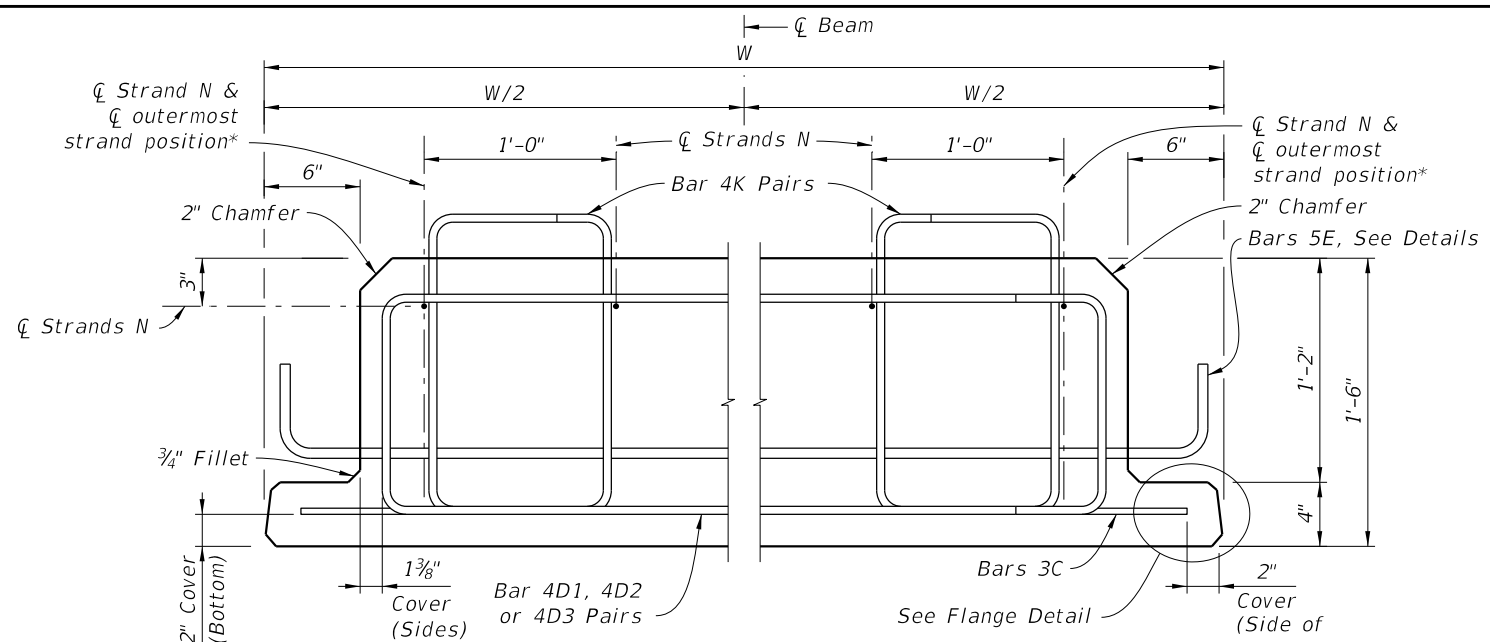
MARK	SIZE	NOTE NUMBERS	NUMBER REQUIRED	LENGTH (NOTE 1)
C	3		See Table	Varies
D1	4	6	10 (End 1)	Varies
D2	4	6	10 (End 2)	Varies
D3	4		See Table	Varies
E1	5	7	See Table	Varies
E2	5	7	See Table	Varies
K	4		See Table	2'-8"
N	See Note 3	3	4	Varies
Y1	6	6	3 (End 1)	Varies
Y2	6	6	3 (End 2)	Varies
Z	5		6	4'-10 1/2"

**BENDING DIAGRAMS (See Note 1)**

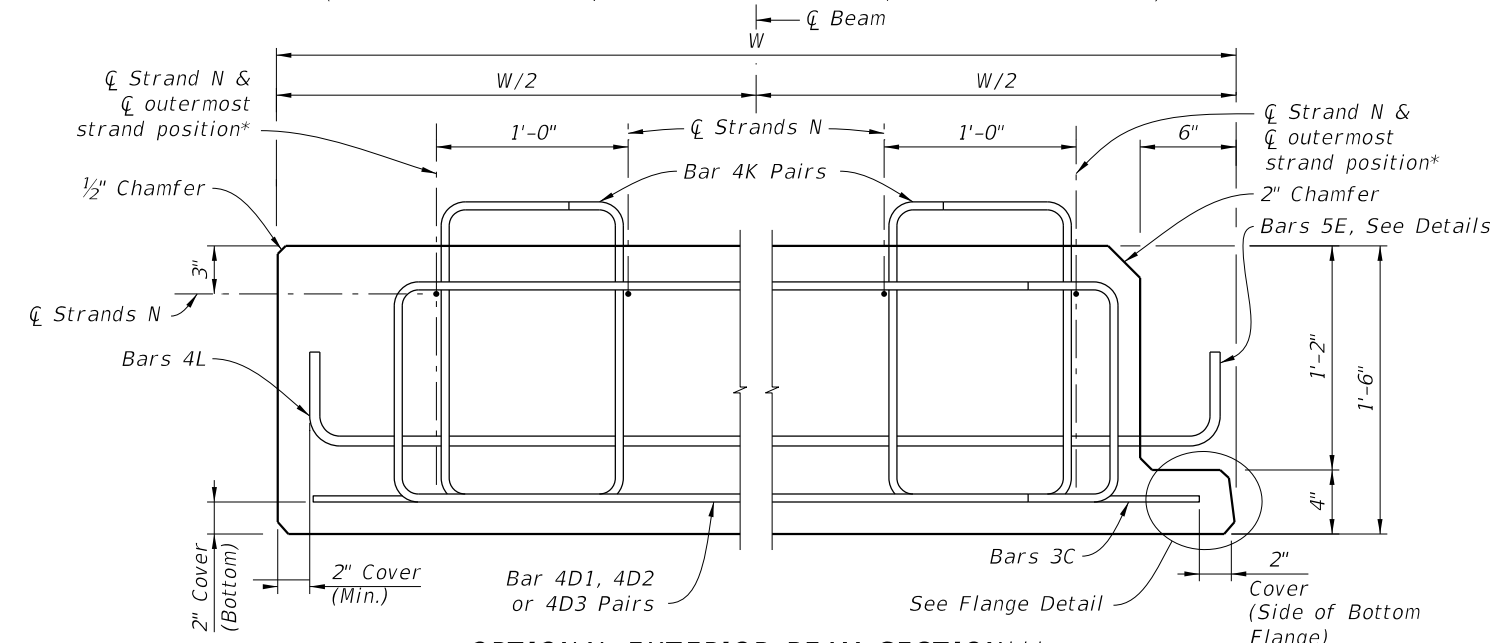


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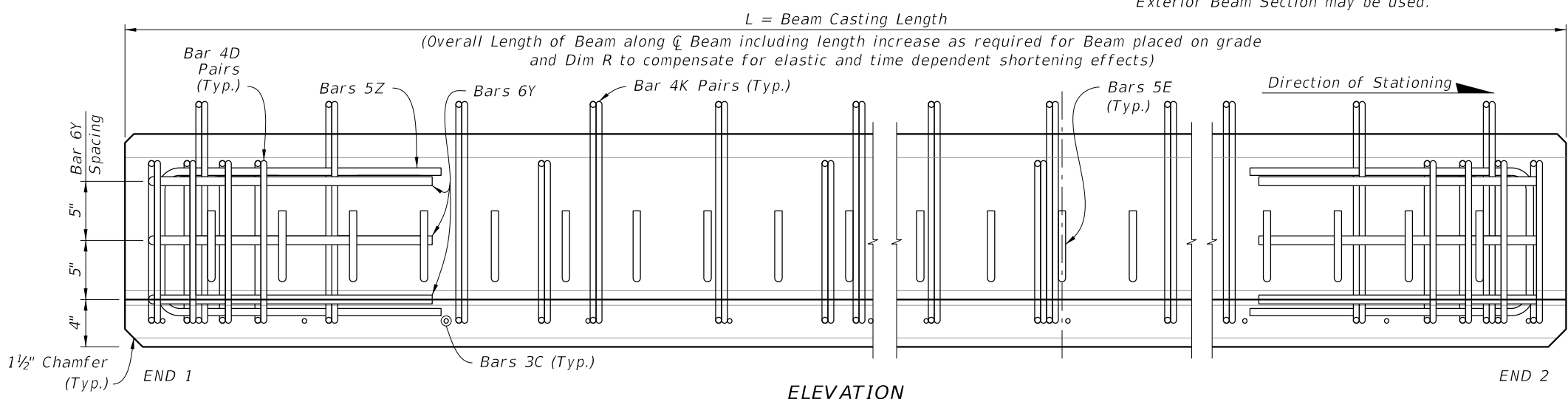
LAST REVISION 11/01/20	DESCRIPTION:
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**TYPICAL SECTION**  
(INTERIOR BEAM SHOWN; EXTERIOR BEAM SIMILAR, SEE BARS 5E DETAILS)



**OPTIONAL EXTERIOR BEAM SECTION\*\*\***

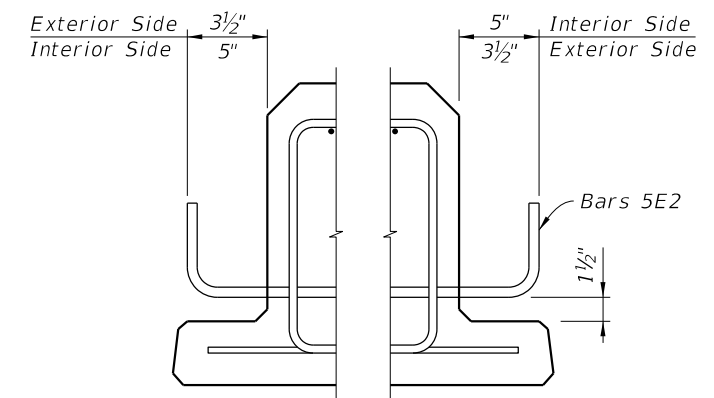


**ELEVATION**

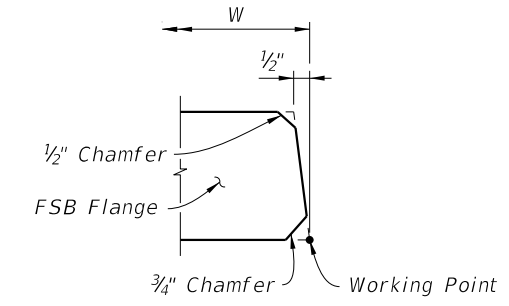
**NOTES:**  
Work this Index with Index 450-450 and Florida Slab Beams - Table of Variables in Structures Plans.  
For Dimensions C, D, E, L, R, W & Y and Angle  $\theta$ , see Florida Slab Beam - Table of Variables in Structures Plans.  
For referenced notes, see Index 450-450, Sheet 1.

\* For  $\phi$  of outermost strand positions, see corresponding Strand Pattern on Florida Slab Beams - Table of Variables in Structures Plans.

\*\* At the Contractor's option, the Detail as shown for Interior Beams may be used for Exterior Beams and the Bars 5E field bent on the exterior side of the Beam to provide the specified cover to the coping line.



**EXTERIOR BEAMS\*\***



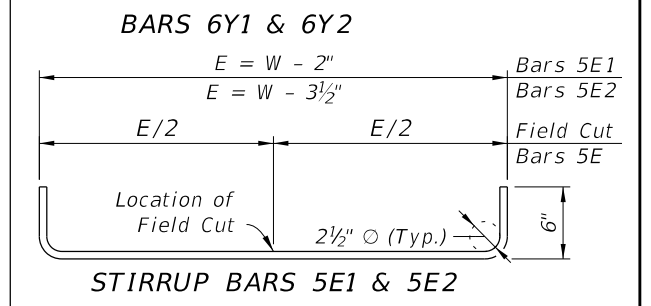
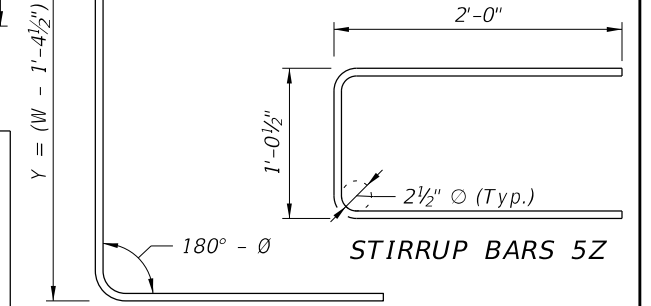
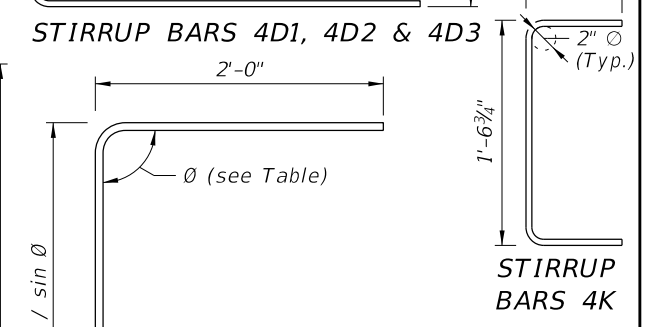
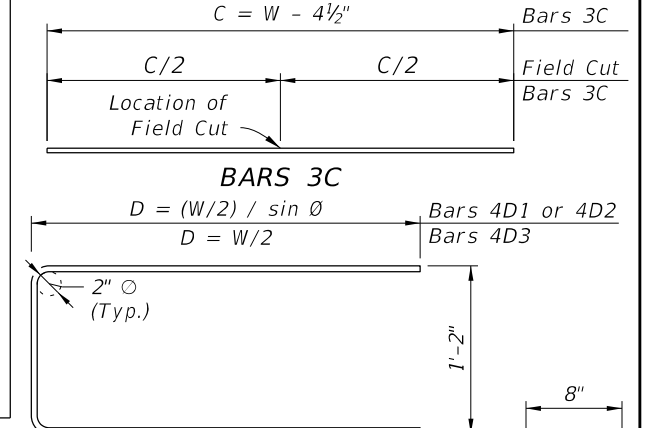
**FLANGE DETAIL**  
(TYPICAL BOTH SIDES OF FSB)

\*\*\* At the Contractor's option, the Optional Exterior Beam Section may be used.

**BILL OF REINFORCING STEEL FOR ONE BEAM ONLY**

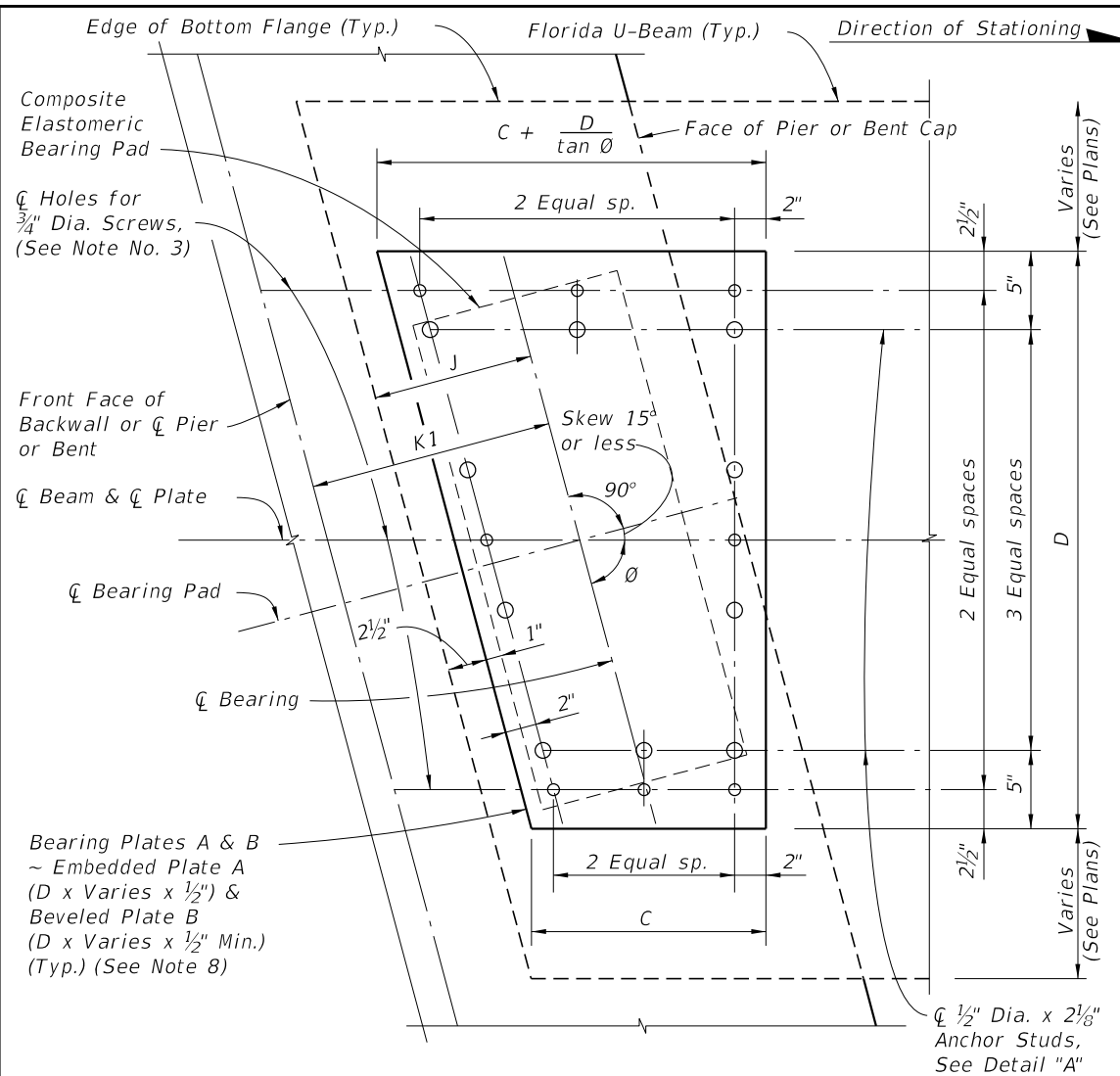
MARK	SIZE	NOTE NUMBERS	NUMBER REQUIRED	LENGTH (NOTE 1)
C	3		See Table	Varies
D1	4	6	10 (End 1)	Varies
D2	4	6	10 (End 2)	Varies
D3	4		See Table	Varies
E1	5	7	See Table	Varies
E2	5	7	See Table	Varies
K	4		See Table	2'-11"
N	See Note 3	3	4	Varies
Y1	6	6	3 (End 1)	Varies
Y2	6	6	3 (End 2)	Varies
Z	5		6	5'-0 1/2"

**BENDING DIAGRAMS (See Note 1)**

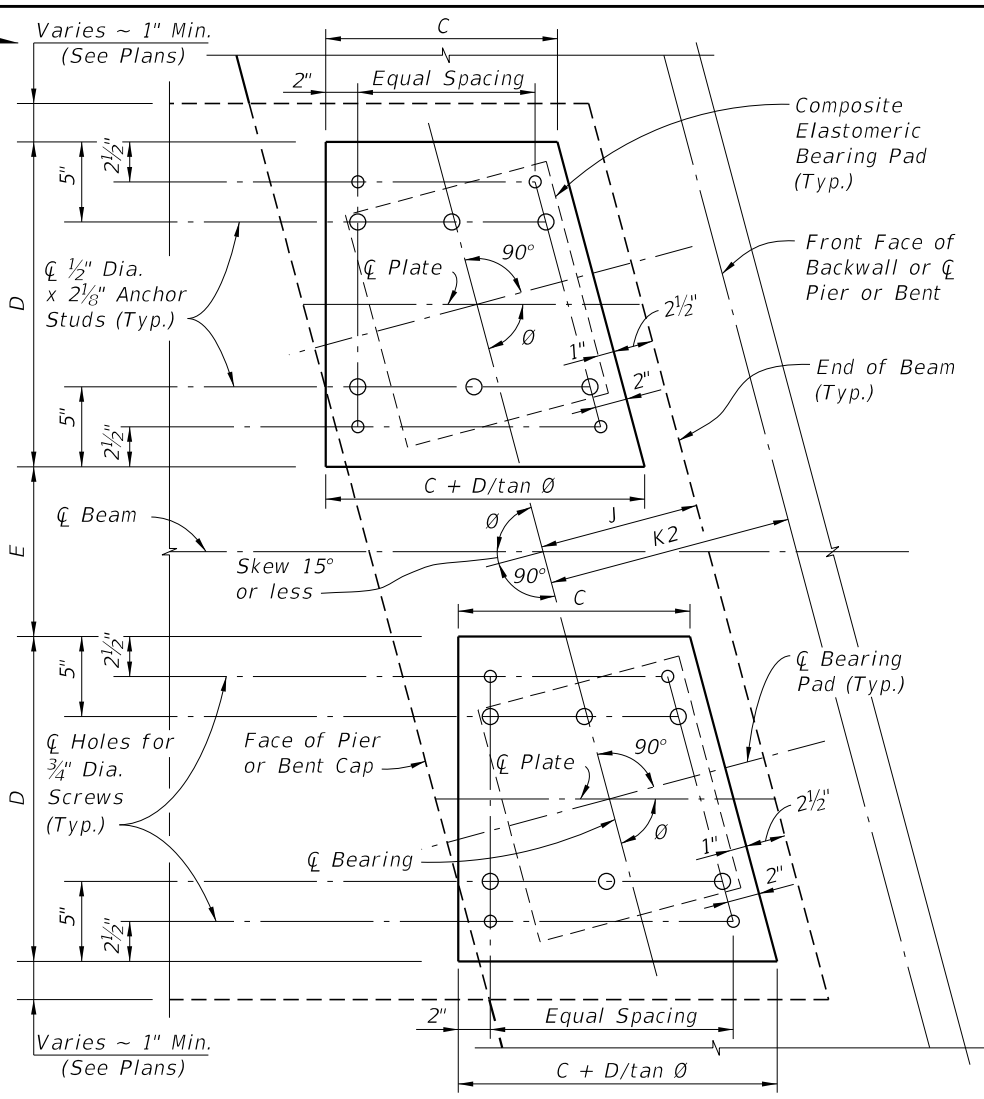


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LAST REVISION 11/01/20	DESCRIPTION:
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PLAN VIEW OF TYPICAL SINGLE BEARING

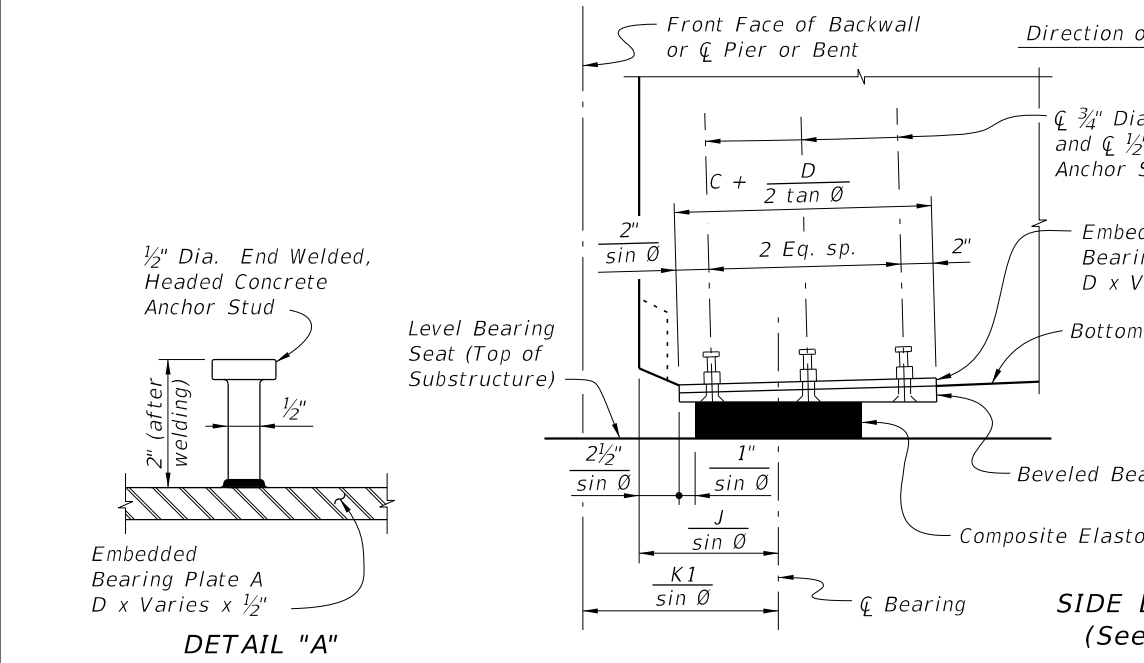


PLAN VIEW OF TYPICAL DOUBLE BEARING

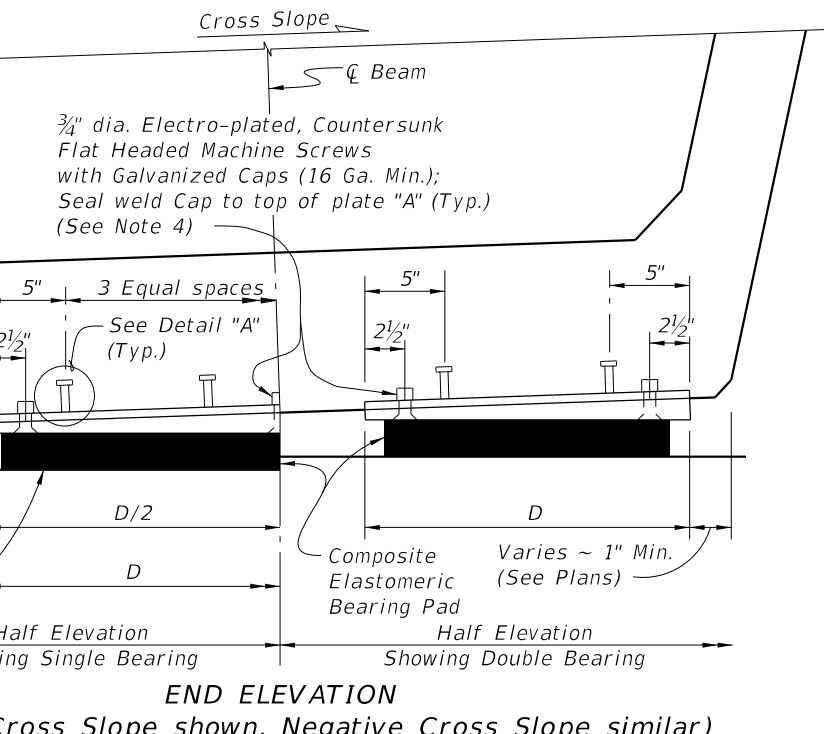
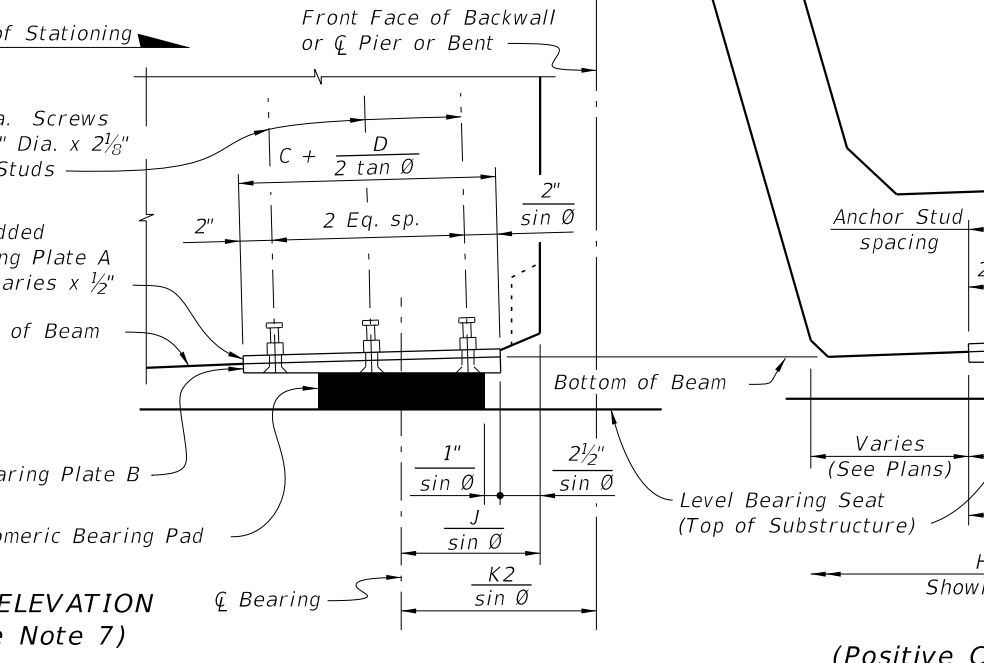
NOTES:

1. Work this sheet with the 'BEVELED BEARING PLATE DATA TABLE' in the plans.
2. Beveled Bearing Plates B with Embedded Bearing Plates A are required for beams only as scheduled in the 'TABLE OF BEAM VARIABLES' on Beam Sheets.
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 galvanized Bearing Plates A & B after fabrication except 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. Drill and thread holes perpendicular to 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 B 633, SC 2, Type 1. Provide screws long enough to maintain a 3/4" minimum embedment into Embedded Bearing Plate A and Galvanized Cap. Provide steel Galvanized Caps with 1/2" Min. to 1 1/2" Max. height and nominal 1" inside diameter.
5. Include the cost of Beveled Bearing Plates in the pay item for Prestressed Beams (Florida U-Beams).
6. For Dimensions C and D, see 'BEVELED BEARING PLATE DATA TABLE' in the Structures Plans. For Dimensions J, K1 and K2, see 'TABLE OF BEAM VARIABLES' on Beam Sheets.
7. All details and dimensions shown are along C Beam for single bearings or C Plate parallel to C Beam for double bearings, except for dimensions for 3/4" Dia. Screws and 1/2" Dia. x 2 1/8" Anchor Studs, which are along C Screws or C Anchor Studs. Positive Slope shown, Negative Slope similar.
8. When Skew = 0°, dimensions for Embedded Bearing Plate A are D x C x 1/2" and for Beveled Plate B are D x C x 1/2" Min.

(0° < Skew ≤ 15° shown, Skew = 0° Similar)



SIDE ELEVATION (See Note 7)



END ELEVATION

(Positive Cross Slope shown, Negative Cross Slope similar)

LAST REVISION	DESCRIPTION:
01/01/10	

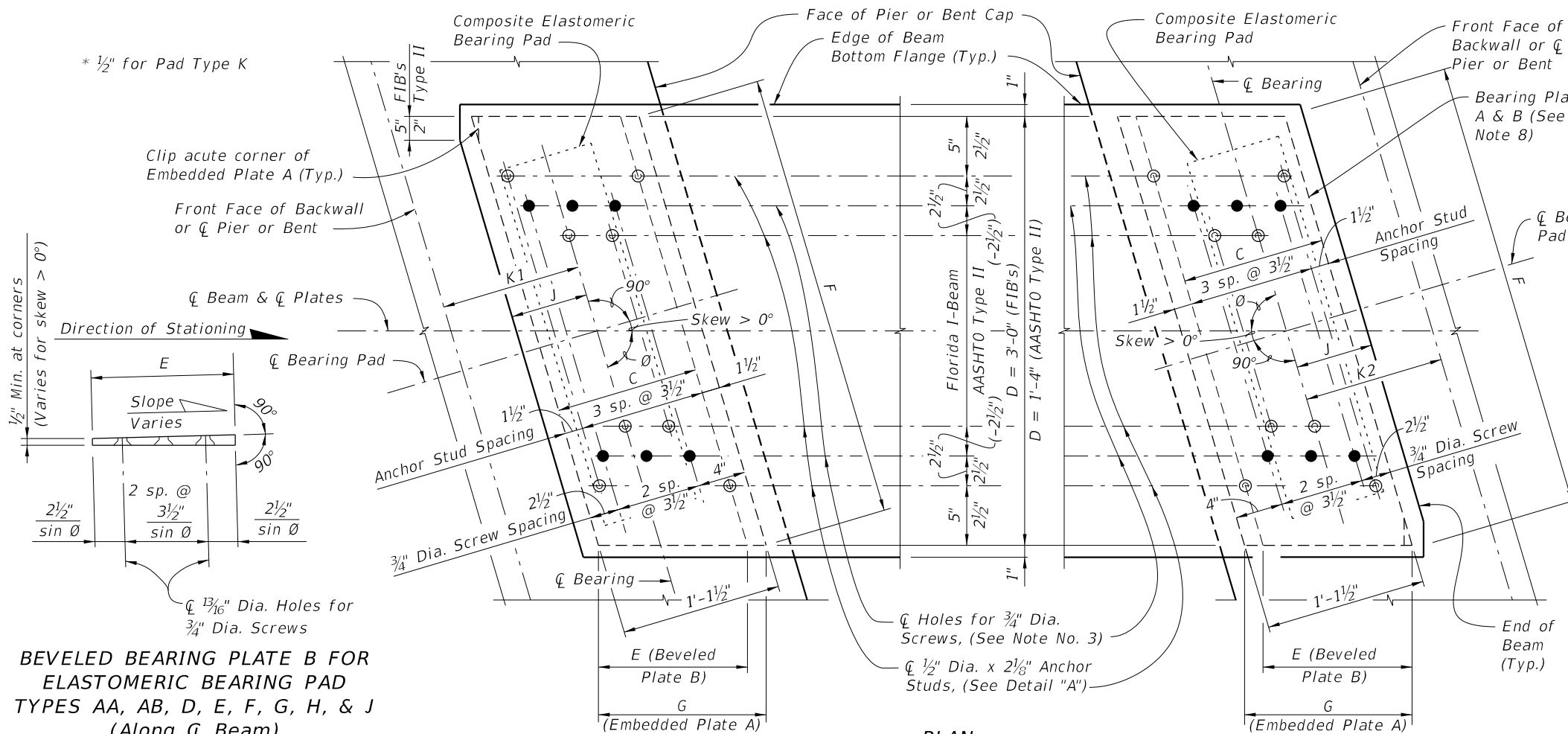
FY 2022-23  
STANDARD PLANS

BEVELED BEARING PLATE DETAILS -  
PRESTRESSED FLORIDA-U BEAMS

INDEX	SHEET
450-502	1 of 1

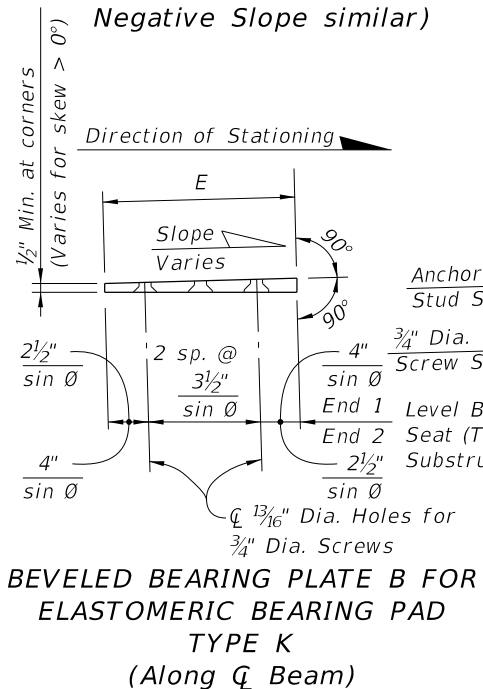
9/23/2021 9:54:16 AM

Direction of Stationing

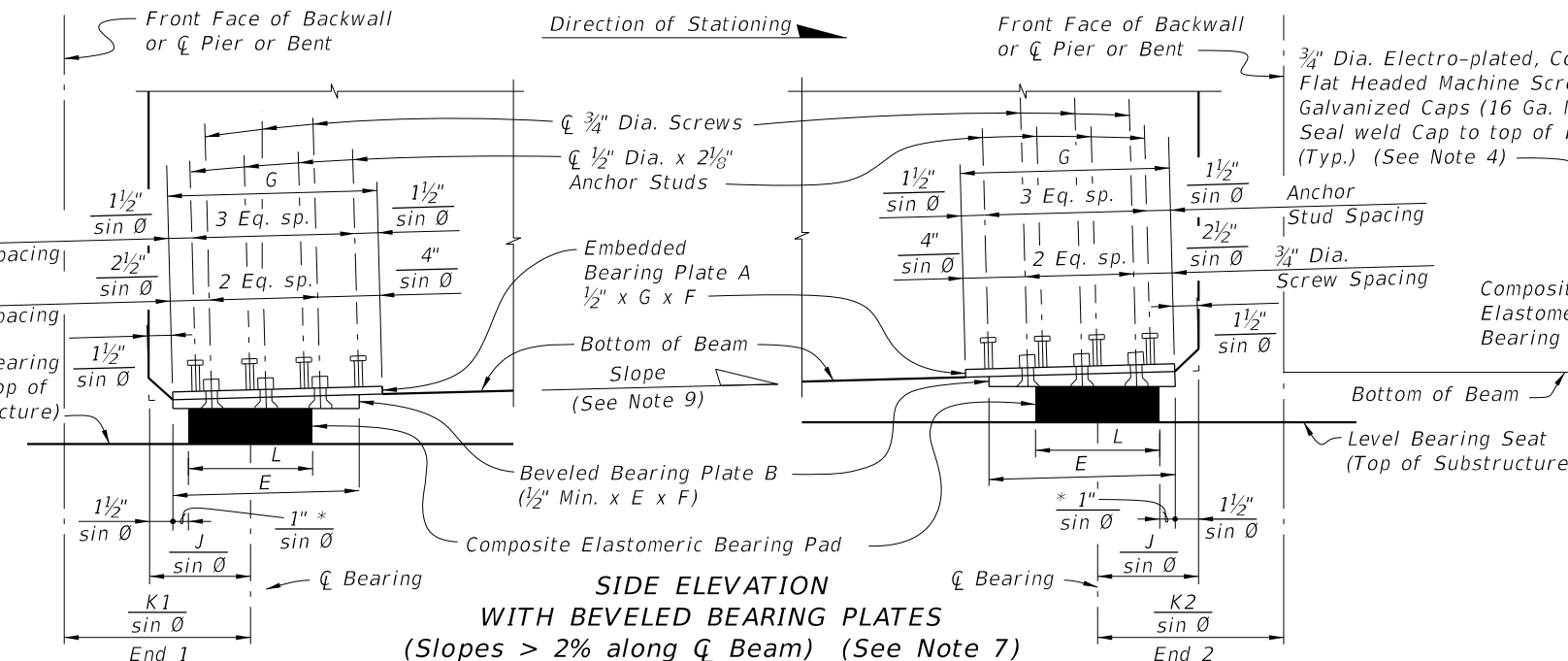


**BEVELED BEARING PLATE B FOR ELASTOMERIC BEARING PAD TYPES AA, AB, D, E, F, G, H, & J (Along  $\bar{C}$  Beam)**  
(Positive Slope shown; Negative Slope similar)

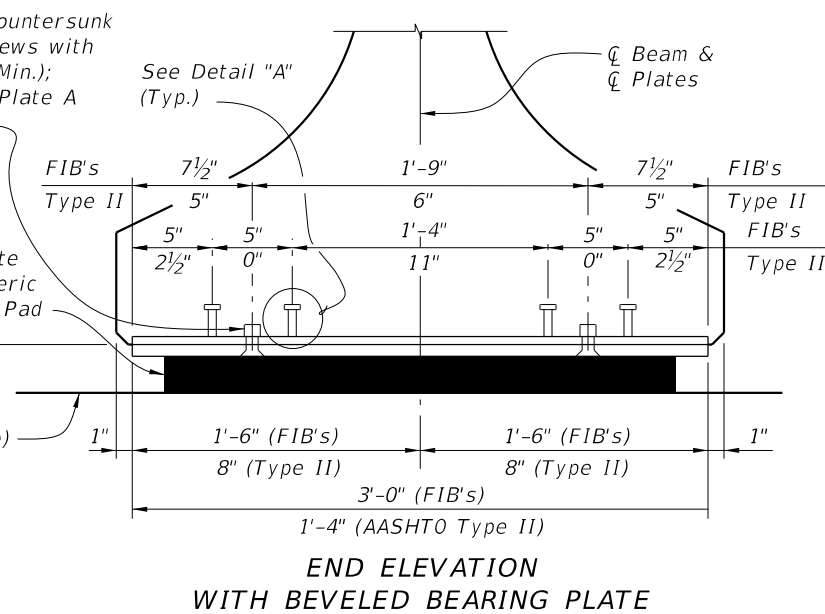
**PLAN**  
( $0^\circ < \text{Skew} \leq 45^\circ$  FIB Shown, Skew =  $0^\circ$  and AASHTO Type II Similar)



**BEVELED BEARING PLATE B FOR ELASTOMERIC BEARING PAD TYPE K (Along  $\bar{C}$  Beam)**



**SIDE ELEVATION WITH BEVELED BEARING PLATES**  
(Slopes > 2% along  $\bar{C}$  Beam) (See Note 7)



**END ELEVATION WITH BEVELED BEARING PLATE**

NOTES:

1. Work this sheet with Index 400-510 - Composite Elastomeric Bearing Pads, and the '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 Embedded Plate A and prior to plates being galvanized (ASTM A 123).
4. Provide Electroplated, Flat 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  $\frac{3}{4}$ " minimum embedment into Embedded Bearing Plate A and Galvanized Cap. Provide steel Galvanized Caps with  $\frac{1}{2}$ " Min. to  $1\frac{1}{2}$ " Max. height and nominal 1" inside diameter.
5. Include the cost of Bearing Plates in the pay item for Prestressed Beams.
6. For Pad Type and Dimensions C, D, E, F and G, see 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  $\bar{C}$  Beam, except for dimensions to  $\frac{3}{4}$ " Dia. Screws and  $\frac{1}{2}$ " Dia. x  $2\frac{1}{8}$ " Anchor Studs, which are along  $\bar{C}$  Screws or  $\bar{C}$  Anchor Studs. Positive Slope shown, Negative Slope similar.
8. When Skew =  $0^\circ$ , F = D = 3'-0" (Florida-I Beams) or 1'-4" (AASHTO Type II Beams) E = C, and G = 1'-1 $\frac{1}{2}$ ".
9. Slope is determined along  $\bar{C}$  Beam at  $\bar{C}$  Bearing. See 'BEARING PLATE DATA TABLE' in the Structures Plans for Slope and Angle  $\theta$ .

CROSS REFERENCE:  
See Sheet 2 for Detail "A".

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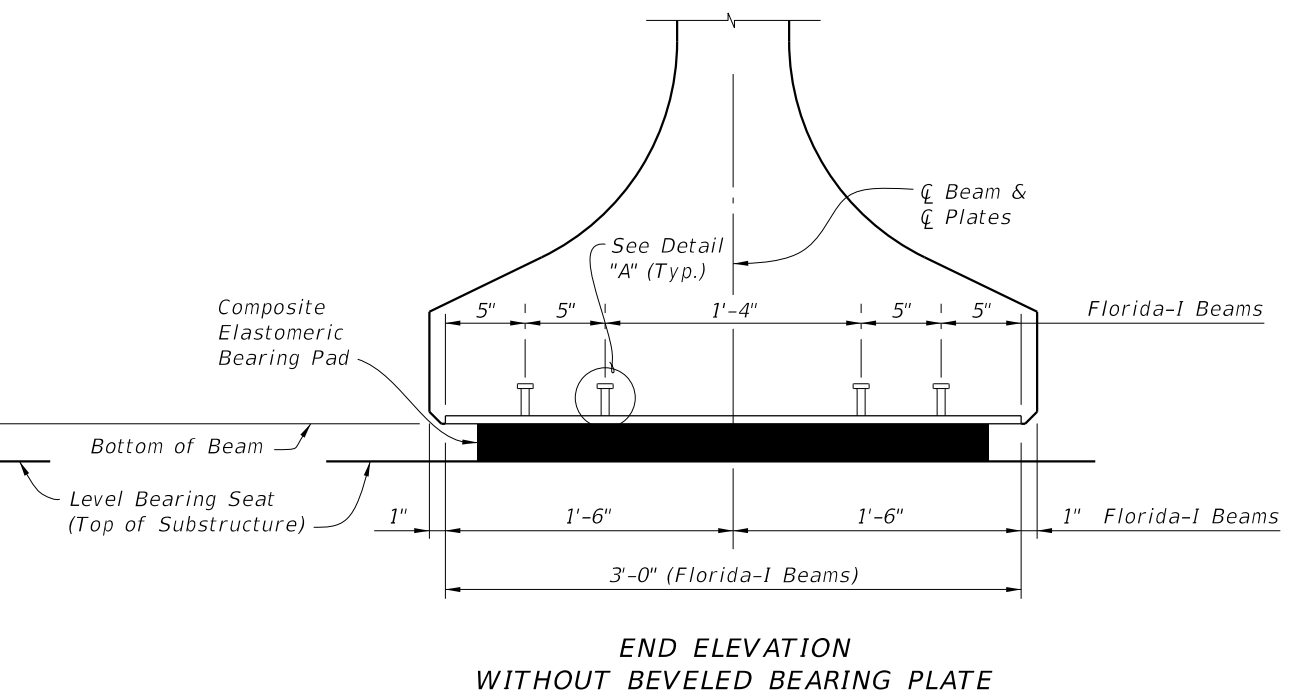
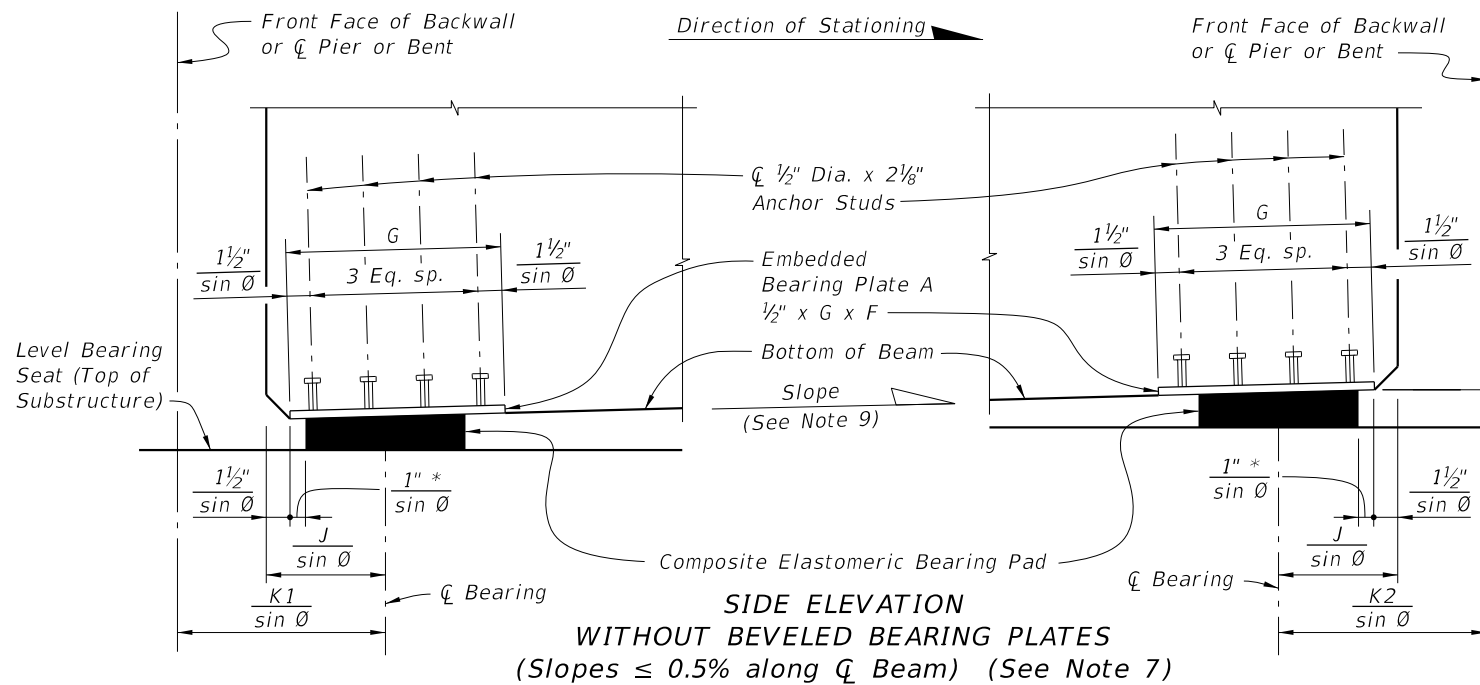
LAST REVISION 07/01/14	DESCRIPTION:
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FY 2022-23  
STANDARD PLANS

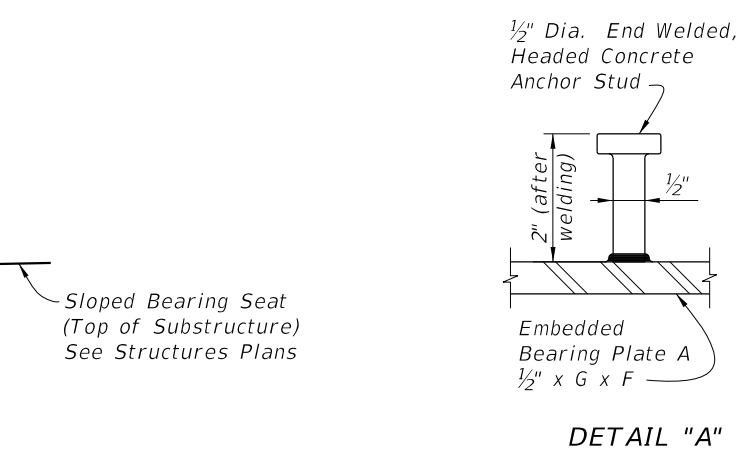
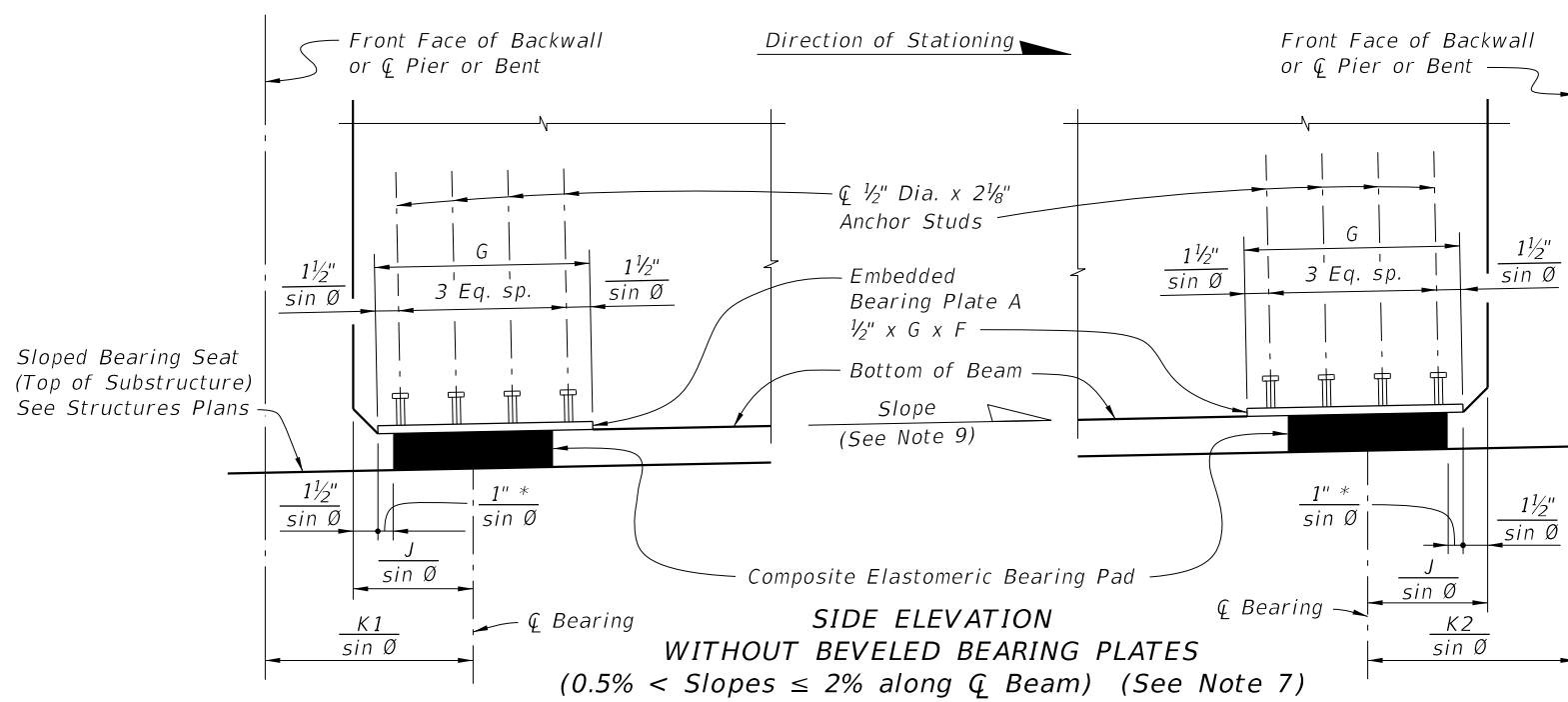
BEARING PLATES (TYPE 1) - PRESTRESSED  
FLORIDA-I AND AASHTO TYPE II BEAMS

INDEX 450-511	SHEET 1 of 2
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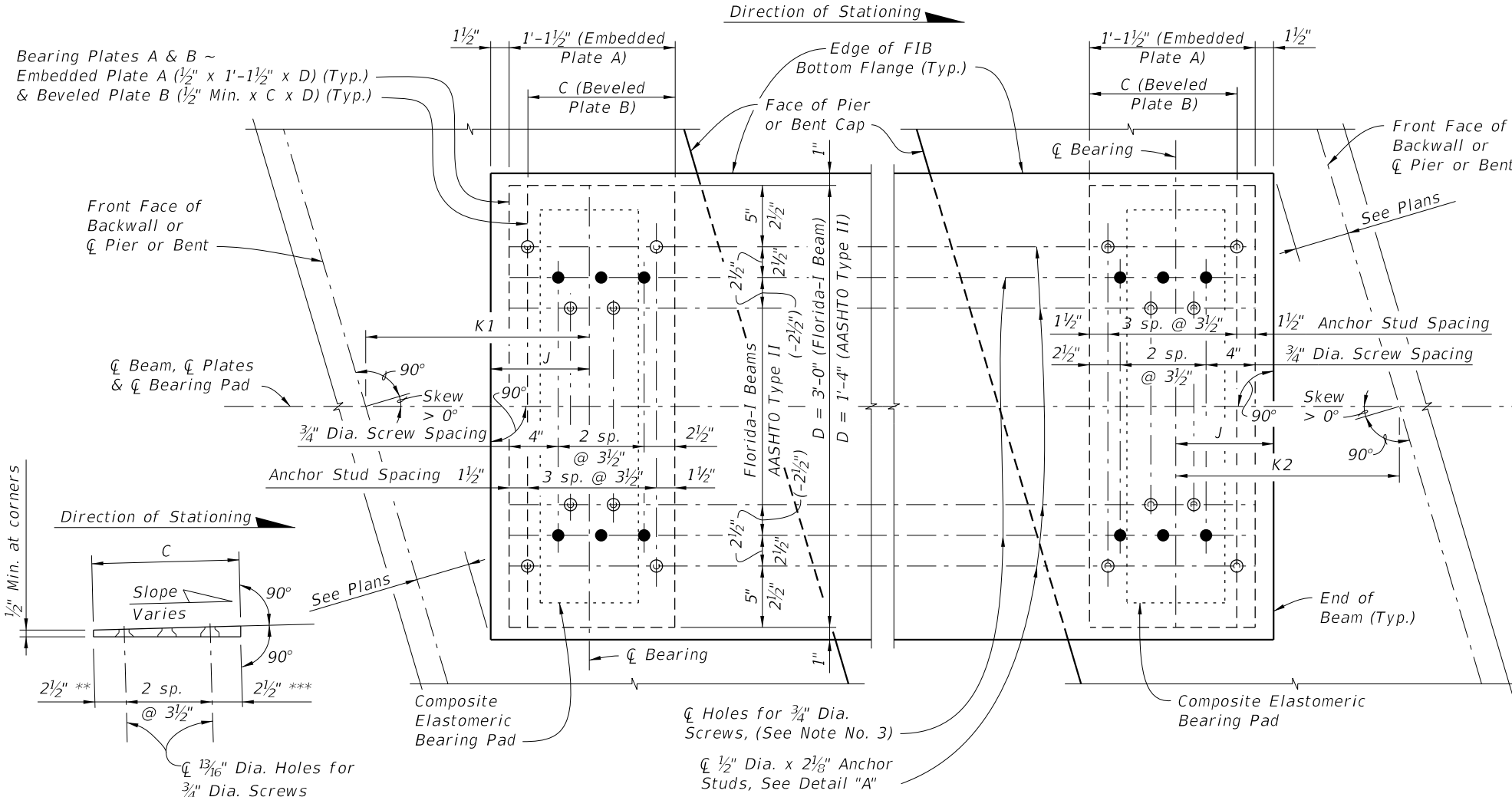
\* 1/2" Pad Type K



CROSS REFERENCE:  
See Sheet 1 for Notes.

9/23/2021 9:54:18 AM

LAST REVISION 11/01/20	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	BEARING PLATES (TYPE 1) - PRESTRESSED FLORIDA-I AND AASHTO TYPE II BEAMS	INDEX 450-511	SHEET 2 of 2
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**BEVELED BEARING PLATE B**  
(Along  $\bar{C}$  Beam)  
(Positive Slope shown;  
Negative Slope similar)

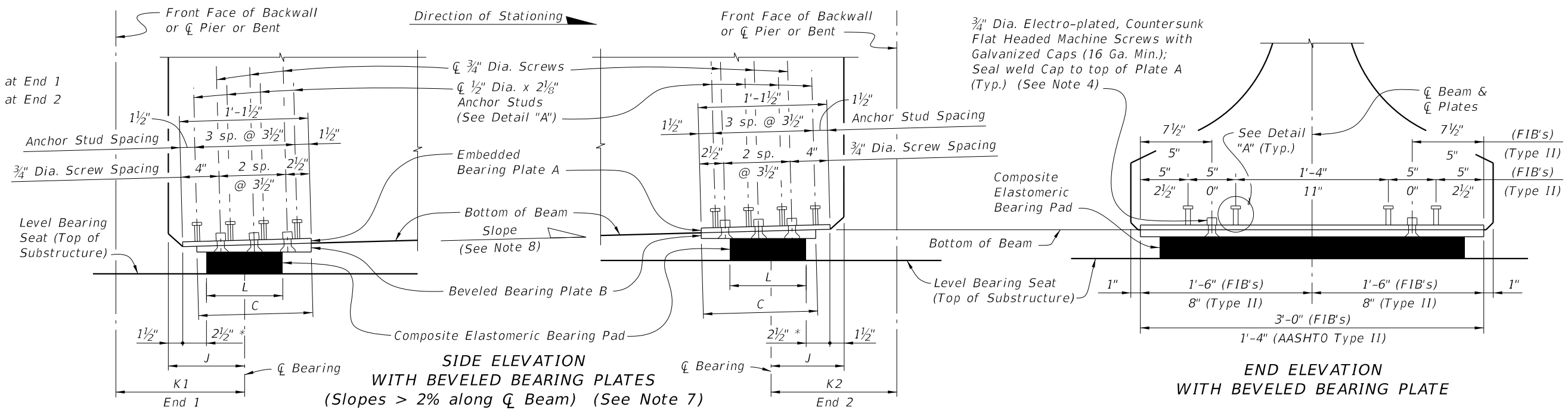
**PLAN**  
(FIB Skewed Alignment Shown, Skew = 0° and AASHTO Type II Similar)

**NOTES:**

1. Work this sheet with Index 400-510 - 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 Embedded Plate A and prior to plates being galvanized (ASTM A 123).
4. Provide Electroplated, Flat 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 3/4" minimum embedment into Embedded Bearing Plate A and Galvanized Cap. Provide steel Galvanized Caps with 1/2" Min. to 1 1/2" Max. height and nominal 1" inside diameter.
5. Include the cost of Bearing Plates in the pay item for Prestressed Beams.
6. For Pad Type and Dimension C, see 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  $\bar{C}$  Beam. Positive Slope shown, Negative Slope similar.
8. Slope is determined along  $\bar{C}$  Beam at  $\bar{C}$  Bearing. See 'BEARING PLATE DATA TABLE' in the Structures Plans for Slope.

**CROSS REFERENCE:**  
See Sheet 2 for Detail "A"

- LEGEND:**
- \* 1/2" for Pad Type K
  - \*\* 4" for Pad Type K at End 1
  - \*\*\* 4" for Pad Type K at End 2

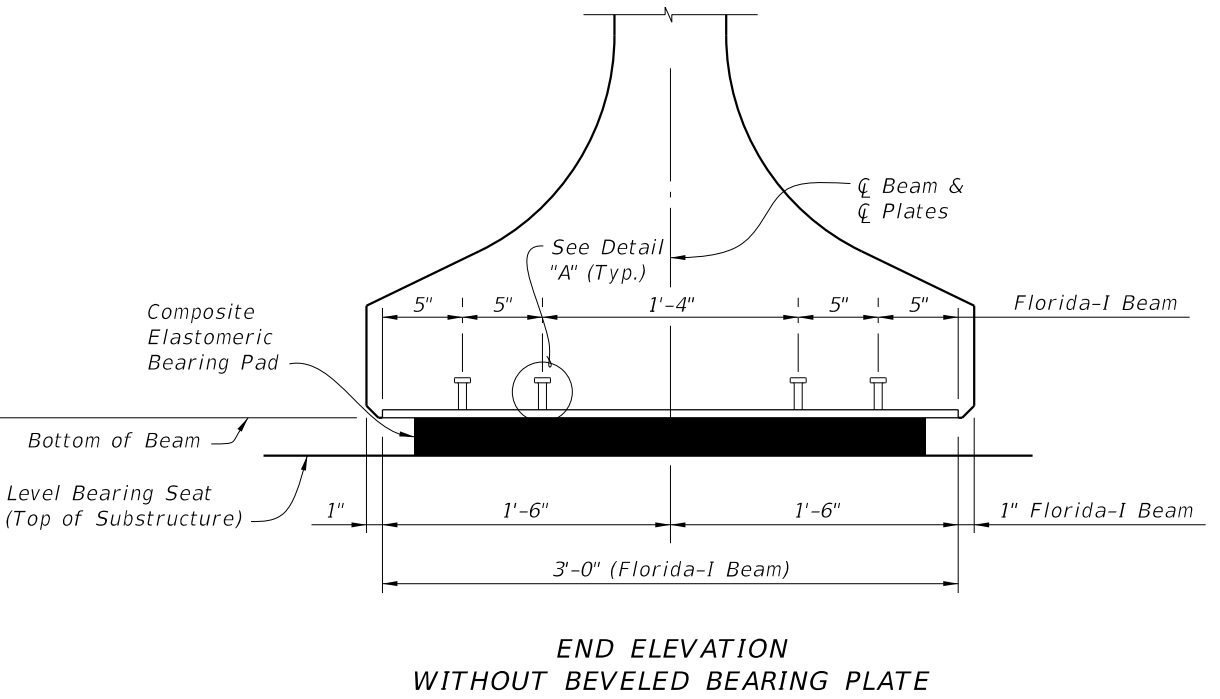
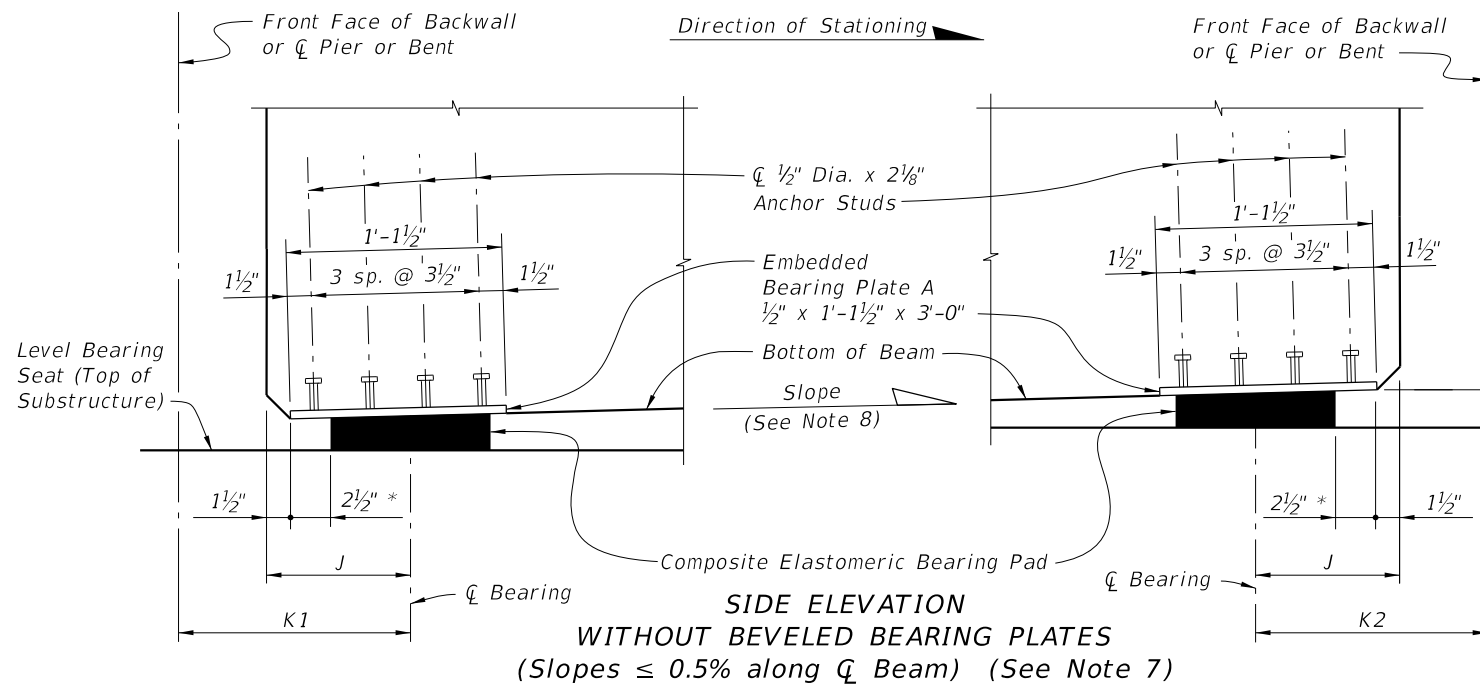


**SIDE ELEVATION**  
**WITH BEVELED BEARING PLATES**  
(Slopes > 2% along  $\bar{C}$  Beam) (See Note 7)

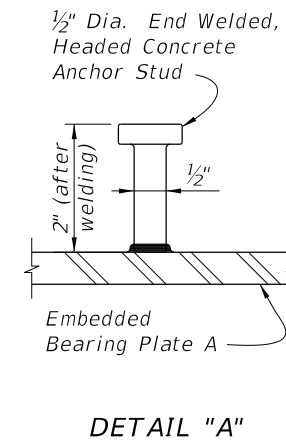
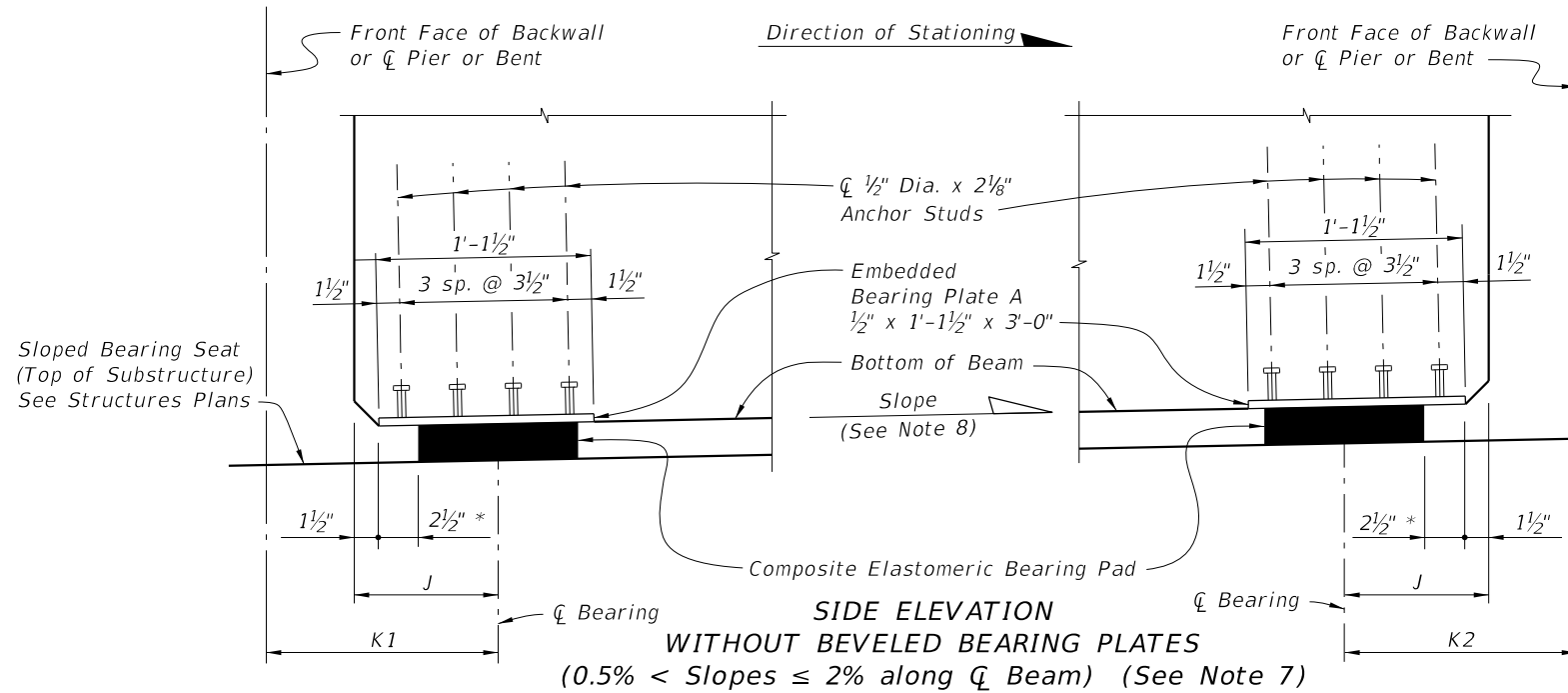
**END ELEVATION**  
**WITH BEVELED BEARING PLATE**

9/23/2021 9:54:19 AM

LAST REVISION 07/01/14	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>BEARING PLATES (TYPE 2) - PRESTRESSED</b> <b>FLORIDA-I AND AASHTO TYPE II BEAMS</b>	INDEX 450-512	SHEET 1 of 2
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\* 1/2" for Pad Type K



CROSS REFERENCE:  
See Sheet 1 for Notes.

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LAST REVISION 07/01/14	REVISION	DESCRIPTION:
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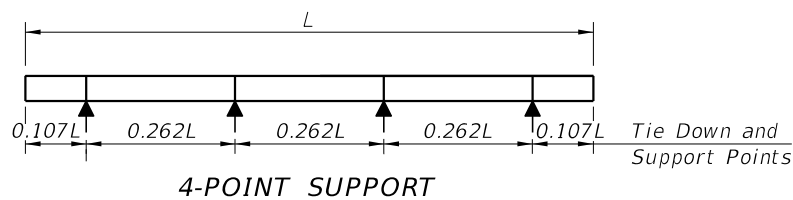
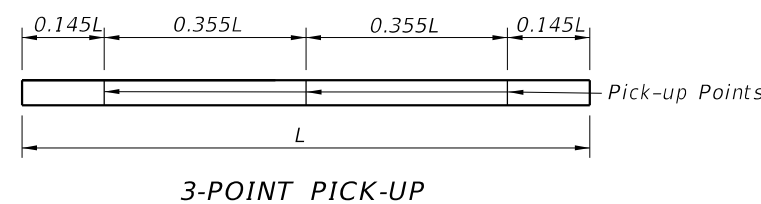
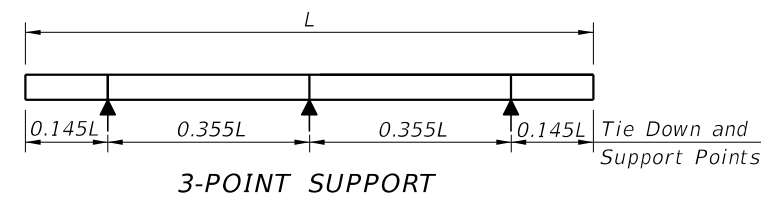
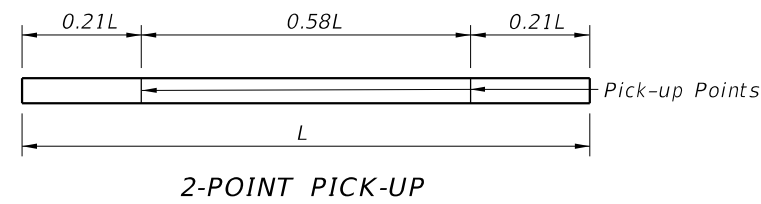
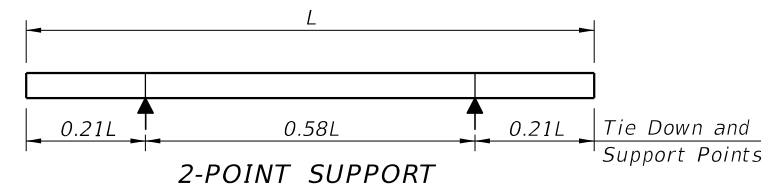
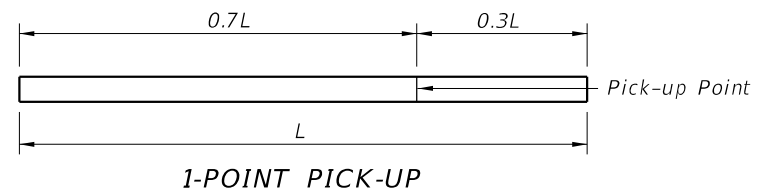
FDOT  
FY 2022-23  
STANDARD PLANS

BEARING PLATES (TYPE 2) - PRESTRESSED  
FLORIDA-I AND AASHTO TYPE II BEAMS

INDEX 450-512	SHEET 2 of 2
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**PRESTRESSED CONCRETE PILE NOTES:**

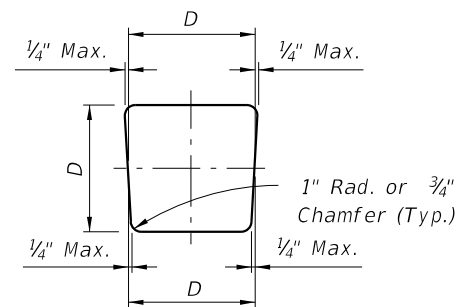
1. Work this Index with the Square Prestressed Concrete Pile Splices (Index 455-002), the Prestressed Concrete Pile Standards (Index 455-012 thru 455-030), the High Moment Capacity Square Prestressed Concrete Pile (Index 455-031) and the Pile Data Table in the Structures Plans.
2. Concrete:
  - A. Piles: Class V (Special), except use Class VI for High Moment Capacity Pile (Index 455-031).
  - B. High Capacity Splice Collar: Class V (Special).
  - C. See "GENERAL NOTES" in the Structures Plans for locations where the use of Highly Reactive Pozzolans is required.
3. Concrete strength at time of prestress transfer:
  - A. Piles: 4,000 psi minimum.
  - B. High Moment Capacity Piles: 6,500 psi minimum.
4. Carbon-Steel Reinforcing:
  - A. Bars: Meet the requirements of Specification Section 415.
  - B. Prestressing Strands: Meet the requirements of Specification Section 933.
  - C. Protect all strands permanently exposed to the environment and not embedded under final conditions in accordance with Specification Section 450.
5. Spiral Ties:
  - A. Tie each wrap of the spiral strand to a minimum of two corner strands.
  - B. One full turn required for spiral splices.
6. Pile Splices: Fill dowel holes and form the joint between pile sections with a Type AB Epoxy Compound in accordance with Specification Section 962. Use an Epoxy Bonding Compound or an Epoxy Mortar as recommended by the Manufacturer.



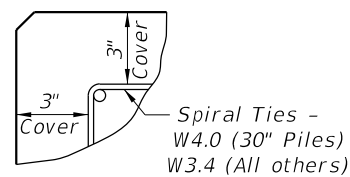
PILE PICK-UP DETAILS

STORAGE AND TRANSPORTATION SUPPORT DETAILS

TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS							
	D = Square Pile Size (inches)					Required Storage and Transportation Detail	Pick-Up Detail
	12	14	18	24	30		
Maximum Pile Length (Feet)	48	52	59	68	87	2, 3, or 4 point	1 Point
	69	75	85	98	124	2, 3, or 4 point	2 Point
	99	107	121	140	178	3 or 4 point	3 Point



TYPICAL PILE SHAPE FOR MOLD FORMS

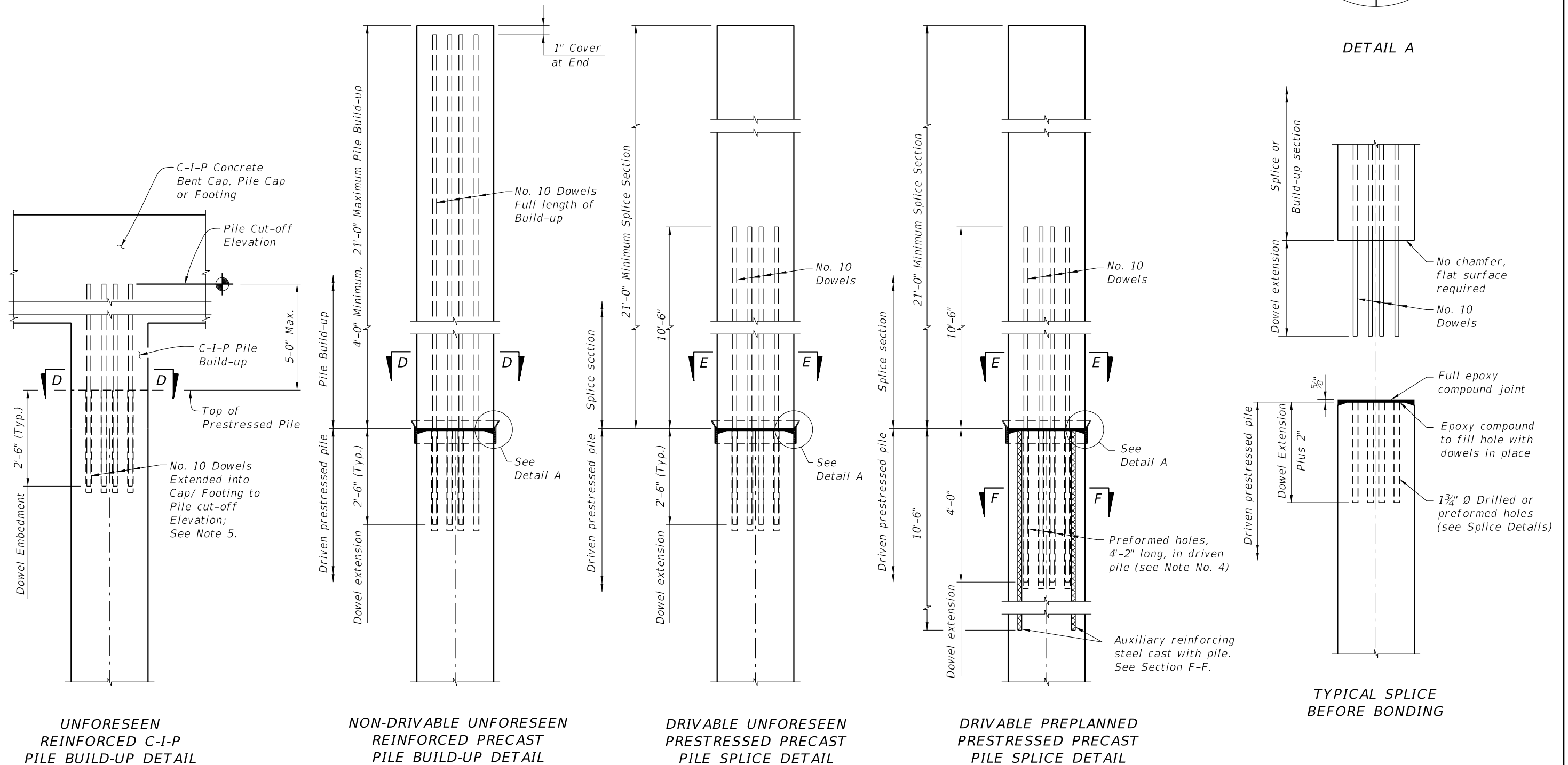
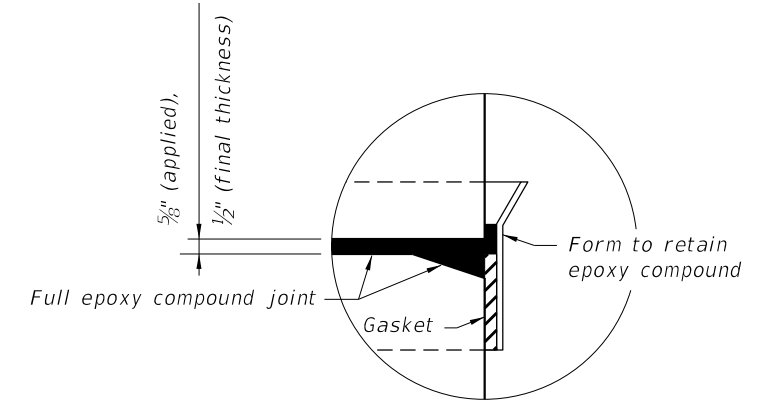


DETAIL SHOWING TYPICAL COVER

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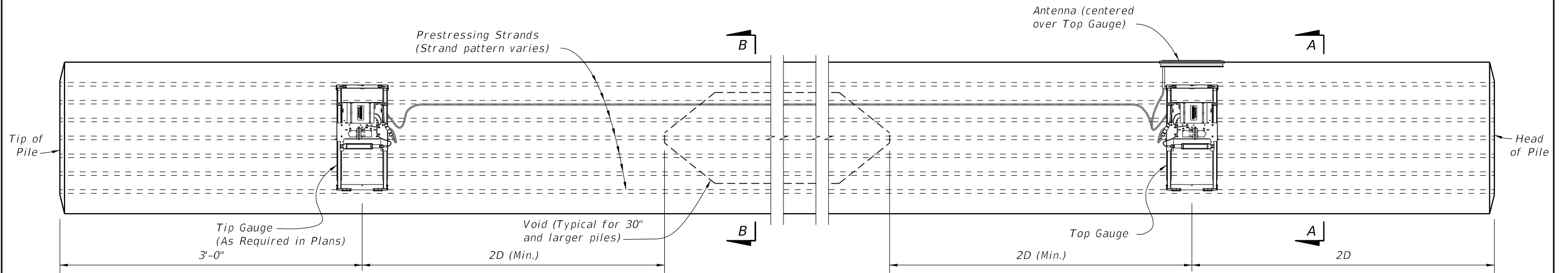
NOTES:

1. For Sections D-D, E-E, & F-F see Index 455-012 thru 455-030 for applicable concrete pile size and Pile Splice Reinforcement Details.
2. Prestressing strands, spiral ties and/or reinforcement are not shown for clarity.
3. In cases where pile splices are desired due to length limitations in shipping and/or handling, the "Drivable Preplanned Prestressed Precast Splice Detail" shall be used. Mechanical Pile Splices contained on the Approved Products List (APL) may also be used.
4. When preformed dowel holes are utilized, the 1" spiral tie pitch shall be continued to 4'-0" below the head of the pile. See Index 455-018, 455-020 & 455-024. Preformed holes shall utilize either removable preforming material or stay-in-place corrugated galvanized steel ducts. Stay-in-place ducts shall be fabricated from galvanized sheet steel meeting the requirements of ASTM A653, Coating Designation G90, 26 gauge. Ducts shall be 2" diameter with a minimum corrugation (rib) height of 0.12 in. Ducts shall be fabricated with either welded or interlocked seams. Galvanizing of welded seams will not be required.
5. For tension piles where top of Prestressed Pile is less than 3 feet below Pile Cut-off Elevation, extend No. 10 Dowels into cap beyond Pile Cut-off Elevation to achieve development as approved by the Engineer.

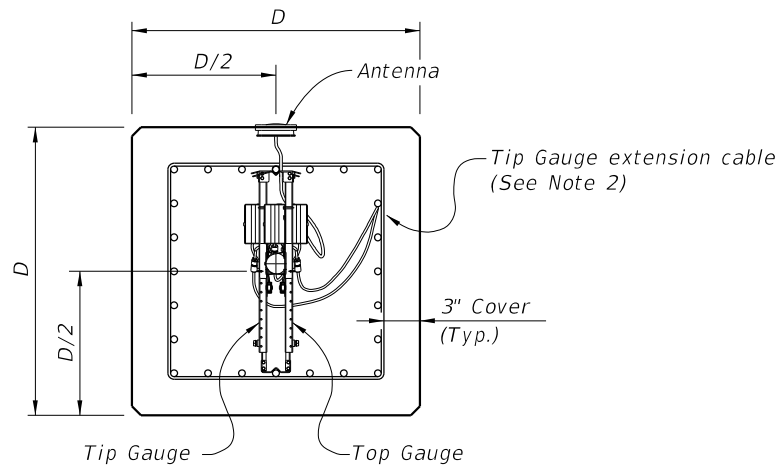


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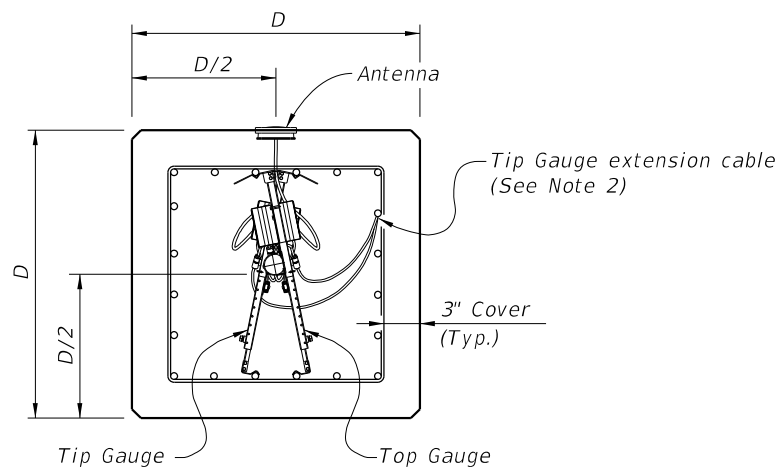
LAST REVISION 07/01/14	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	SQUARE PRESTRESSED CONCRETE PILE SPLICES	INDEX 455-002	SHEET 1 of 1
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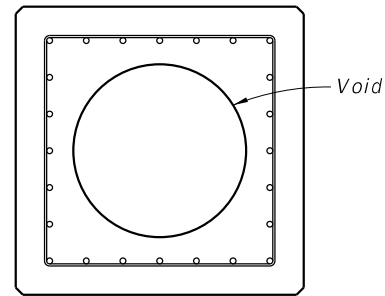
ELEVATION



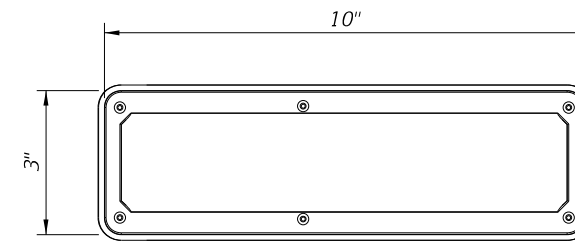
SECTION A-A  
(Strand Pattern with odd number of strands per face)



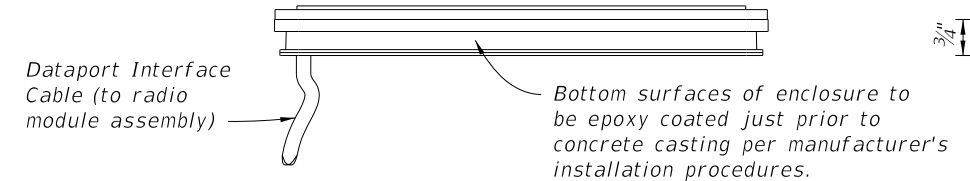
SECTION A-A  
(Strand Pattern with even number of strands per face)



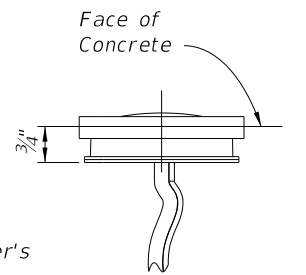
SECTION B-B  
(Showing Voided Pile,  
Solid Pile Similar)



ANTENNA TOP VIEW



ANTENNA SIDE VIEW




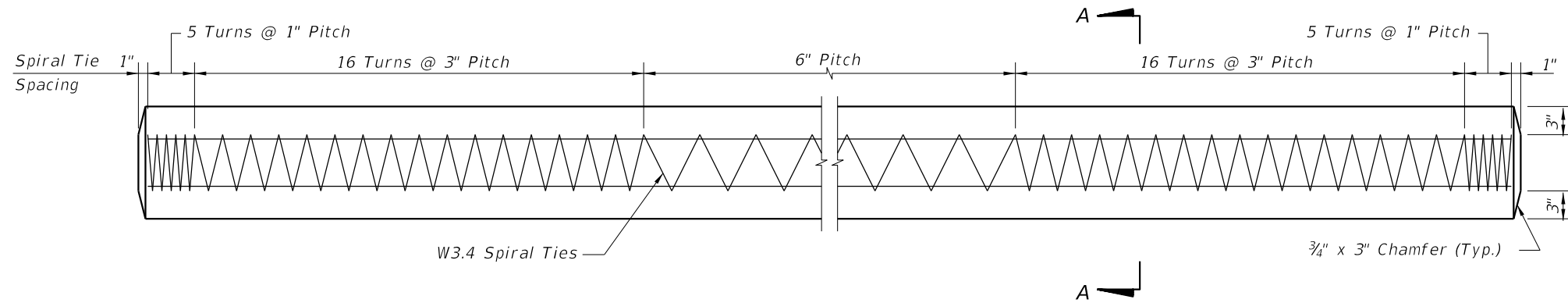
ANTENNA END VIEW

NOTES:

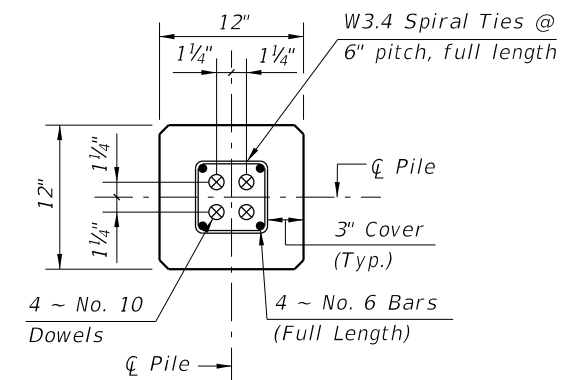
1. For piles 18" and larger installed for bridge foundations, provide EDC Instrumentation in accordance with Specification Section 455.
2. Attach Tip Gauge extension cable to the underside of the strand shown in Section A-A. Secure cable to strand with nylon wire ties spaced a maximum of 6ft. along cable.

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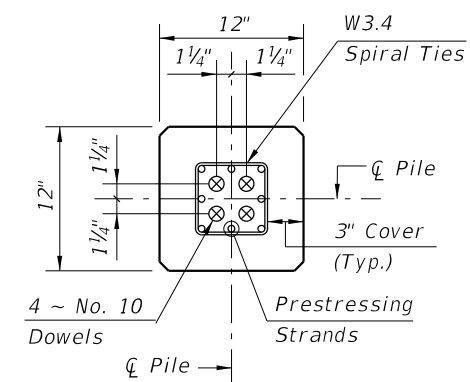
LAST REVISION 11/01/20	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	SQUARE PRESTRESSED CONCRETE PILES - EDC INSTRUMENTATION	INDEX 455-003	SHEET 1 of 1
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ELEVATION



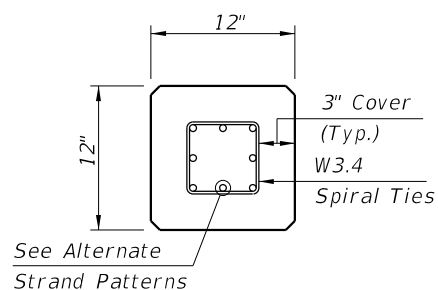
SECTION D-D  
(See Non-Drivable Unforescen Reinforced Precast Pile Splice Detail)



SECTION E-E  
(See Drivable Unforescen Prestressed Precast Pile Splice Detail)

ALTERNATE STRAND PATTERNS

- 4 ~ 0.6" Ø, Grade 270 LRS, at 44 kips
- 8 ~ 1/2" Ø (Special), Grade 270 LRS, at 25 kips
- 8 ~ 1/2" Ø, Grade 270 LRS, at 24 kips
- 8 ~ 7/16" Ø, Grade 270 LRS, at 23 kips
- 12 ~ 3/8" Ø, Grade 270 LRS, at 16 kips



SECTION A-A

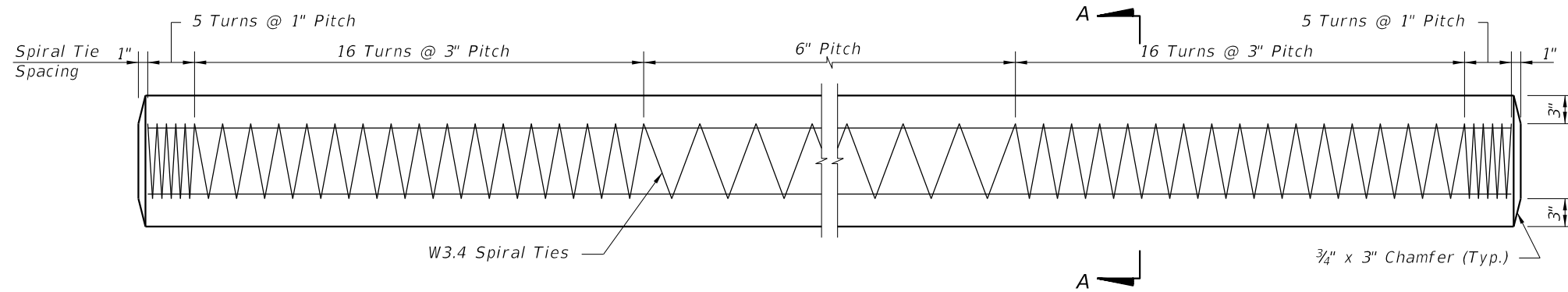
PILE SPLICE REINFORCEMENT DETAILS

NOTES:

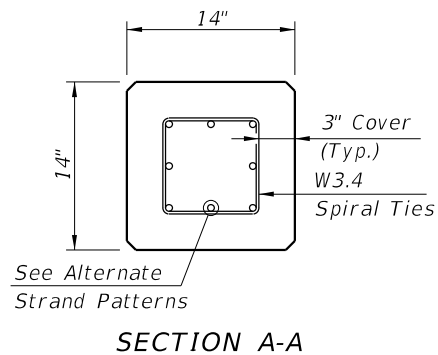
1. Work this Index with Index 450-001 - Typical Details and Notes for Square Prestressed Concrete Piles and Index 455-002 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.

9/23/2021 9:54:24 AM

LAST REVISION 01/01/12	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	12" SQUARE PRESTRESSED CONCRETE PILE	INDEX 455-012	SHEET 1 of 1
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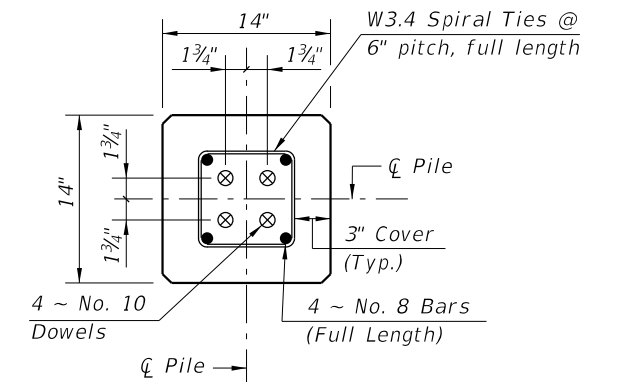
ELEVATION



SECTION A-A

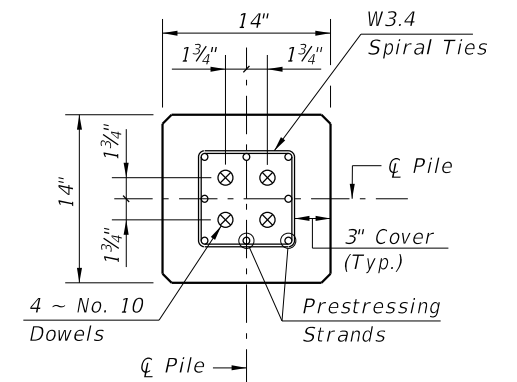
**ALTERNATE STRAND PATTERNS**

- 8 ~ 0.6" Ø, Grade 270 LRS, at 33 kips
- 8 ~ 1/2" Ø (Special), Grade 270 LRS, at 31 kips
- 8 ~ 1/2" Ø, Grade 270 LRS, at 31 kips
- 12 ~ 7/16" Ø, Grade 270 LRS, at 21 kips
- 16 ~ 3/8" Ø, Grade 270 LRS, at 16 kips



SECTION D-D

(See Non-Drivable Unforeseen Reinforced Precast Splice Detail)



SECTION E-E

(See Drivable Unforeseen Prestressed Precast Splice Detail)

**PILE SPLICE REINFORCEMENT DETAILS**

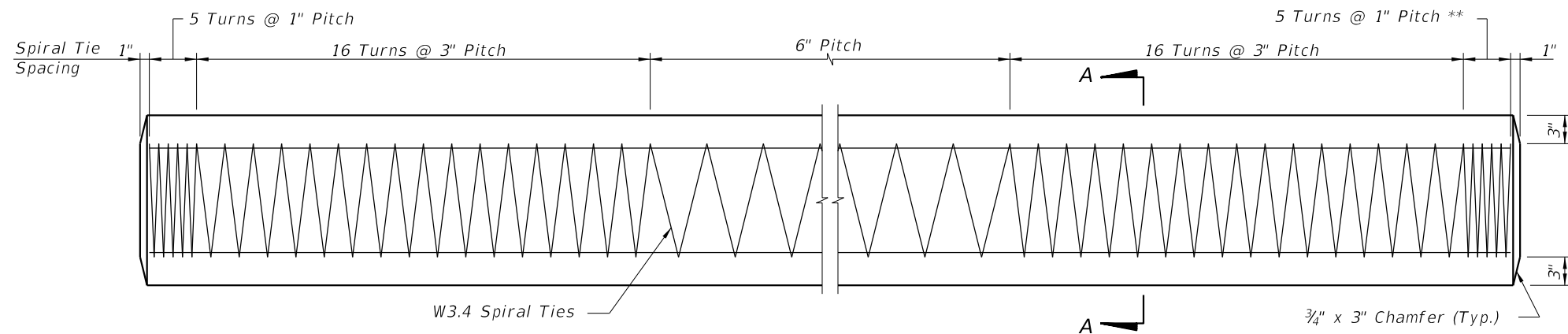
**NOTES:**

1. Work this Index with Index 455-001 - Typical Details and Notes for Square Prestressed Concrete Piles and Index 455-002 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
The total strand pattern shall be concentric with the nominal concrete section of the pile.

9/23/2021 9:54:25 AM

LAST REVISION 01/01/12	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	14" SQUARE PRESTRESSED CONCRETE PILE	INDEX 455-014	SHEET 1 of 1
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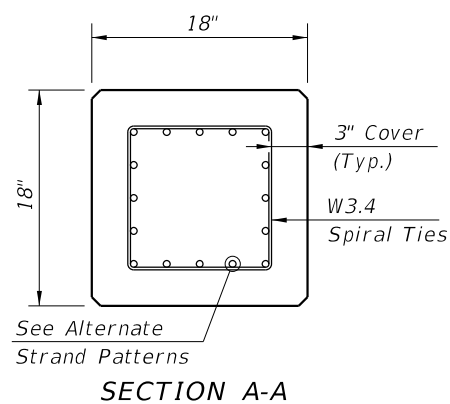


ELEVATION

\*\* See Note 4 on Index 455-002

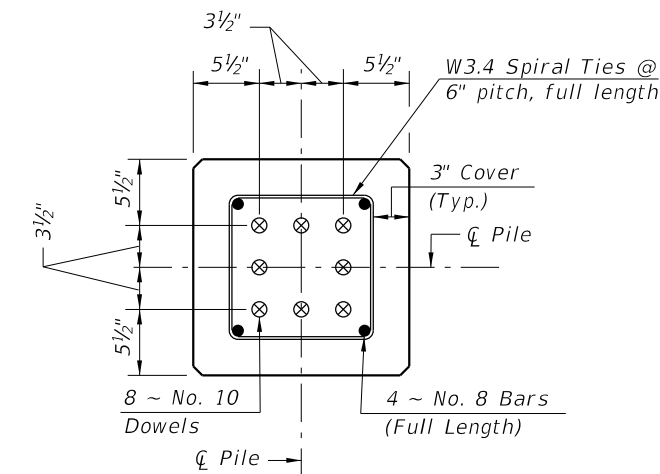
ALTERNATE STRAND PATTERNS

- 12 ~ 0.6" Ø, Grade 270 LRS, at 35 kips
- 12 ~ 1/2" Ø (Special), Grade 270 LRS, at 34 kips
- 16 ~ 1/2" Ø, Grade 270 LRS, at 26 kips
- 20 ~ 7/16" Ø, Grade 270 LRS, at 21 kips
- 24 ~ 3/8" Ø, Grade 270 LRS, at 17 kips

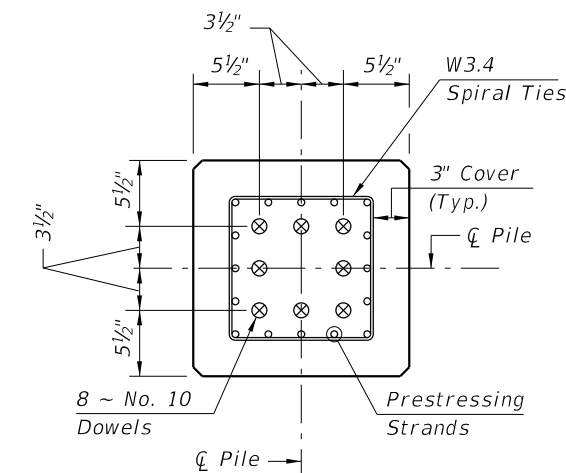


NOTES:

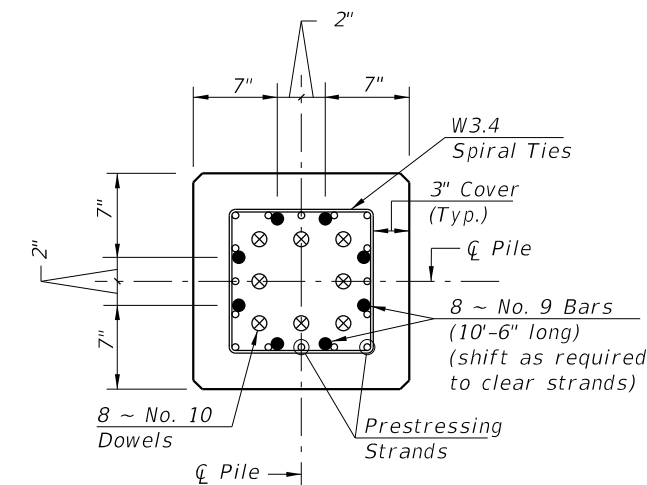
1. Work this Index with Index 455-001 - Typical Details and Notes for Square Prestressed Concrete Piles and Index 455-002 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
The total strand pattern shall be concentric with the nominal concrete section of the pile.



SECTION D-D  
(See Non-Drivable Unforeseen Reinforced Precast Splice Detail)



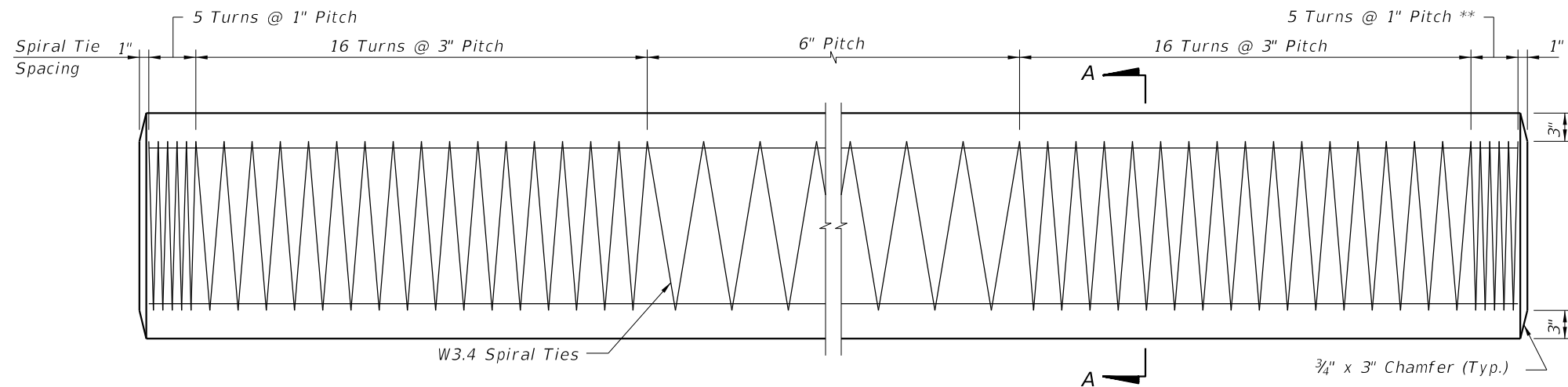
SECTION E-E  
(See Drivable Prestressed Precast Splice Detail)



SECTION F-F  
(See Drivable Preplanned Splice Detail)  
PILE SPLICE REINFORCEMENT DETAILS

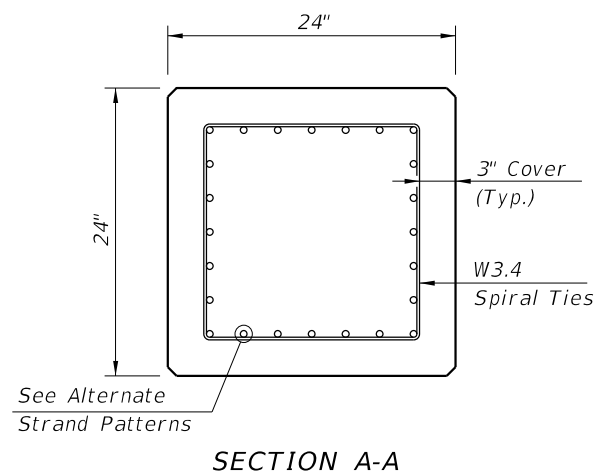
9/23/2021 9:54:26 AM

LAST REVISION	01/01/12	REVISION	DESCRIPTION:
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ELEVATION

\*\* See Note 4 on Index 455-002



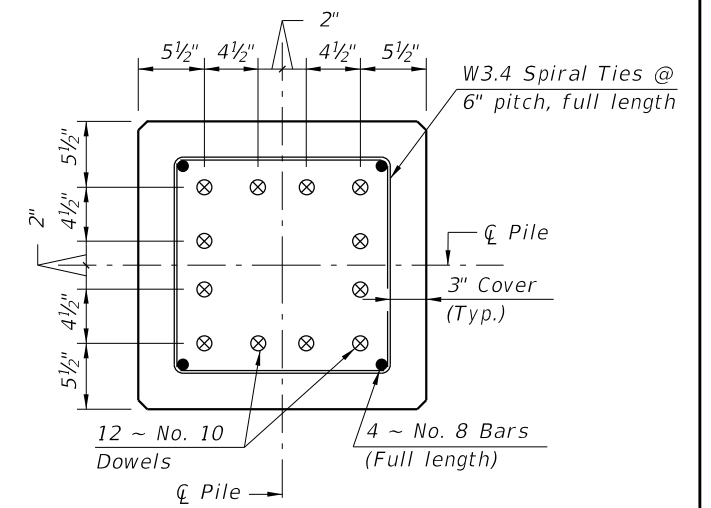
SECTION A-A

**ALTERNATE STRAND PATTERNS**

- 16 ~ 0.6" Ø, Grade 270 LRS, at 44 kips
- 20 ~ 1/2" Ø (Special), Grade 270 LRS, at 34 kips
- 24 ~ 1/2" Ø, Grade 270 LRS, at 31 kips

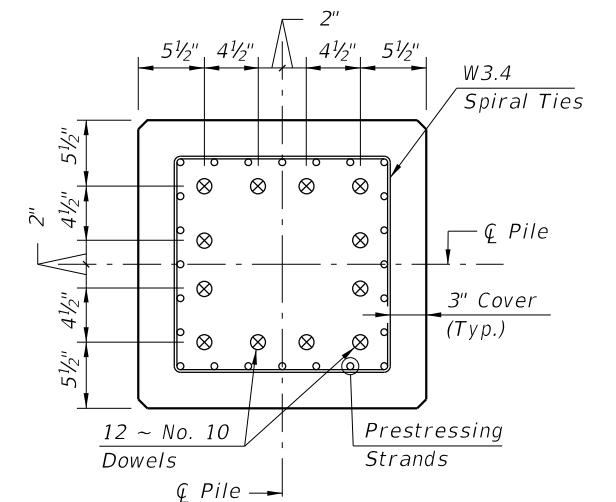
**NOTES:**

1. Work this Index with Index 455-001 - Typical Details and Notes for Square Prestressed Concrete Piles and Index 455-002 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
The total strand pattern shall be concentric with the nominal concrete section of the pile.



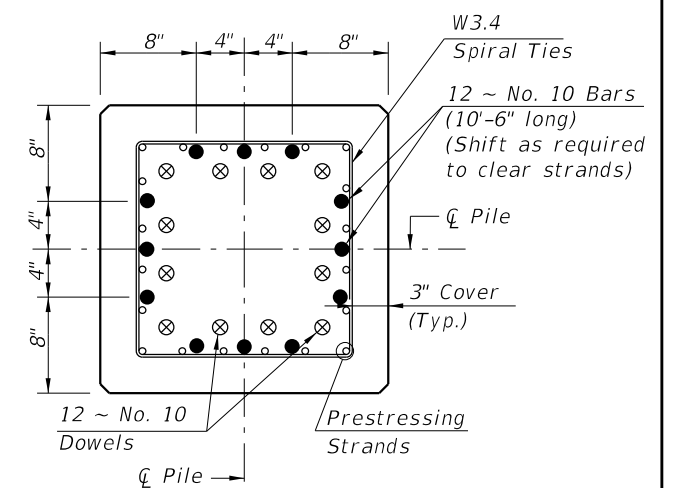
SECTION D-D

(See Non-Drivable Unforescen Reinforced Precast Pile Splice Detail)



SECTION E-E

(See Drivable Prestressed Precast Pile Splice Detail)

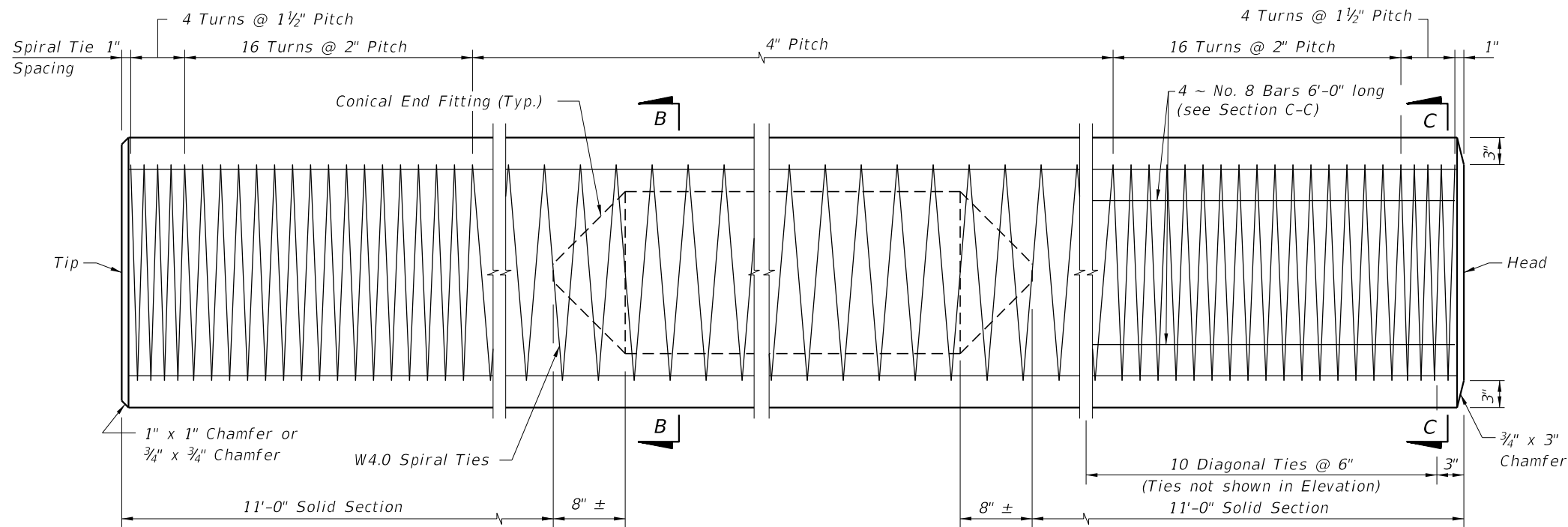


SECTION F-F

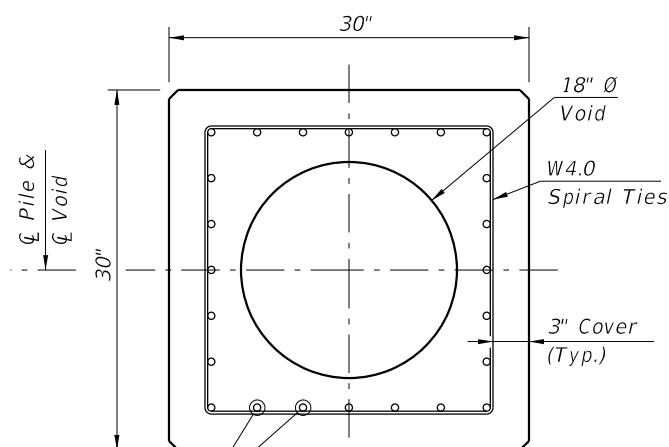
(See Drivable Preplanned Pile Splice Detail)

9/23/2021 9:54:27 AM

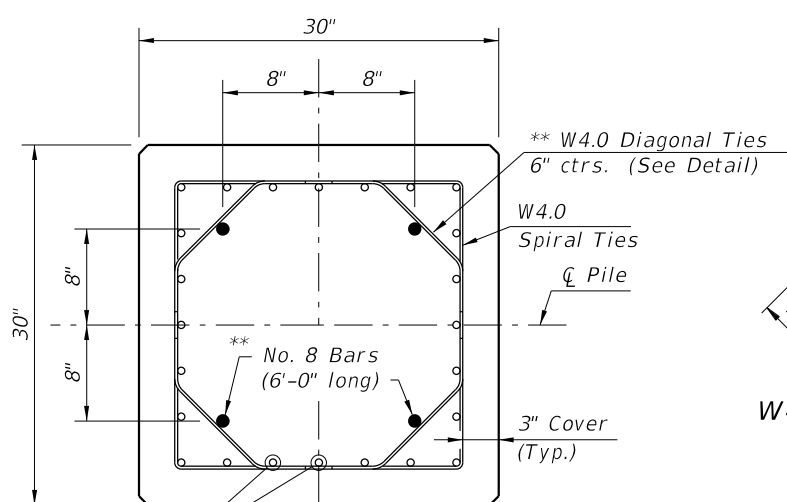
LAST REVISION 01/01/12	REVISION	DESCRIPTION:		<b>FY 2022-23 STANDARD PLANS</b>	<b>24" SQUARE PRESTRESSED CONCRETE PILE</b>	INDEX <b>455-024</b>	SHEET <b>1 of 1</b>
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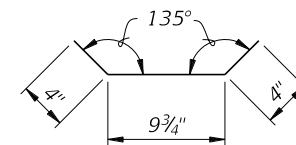
ELEVATION



SECTION B-B  
(See Pile Splice Reinforcement Details)



SECTION C-C  
(See Pile Splice Reinforcement Details)

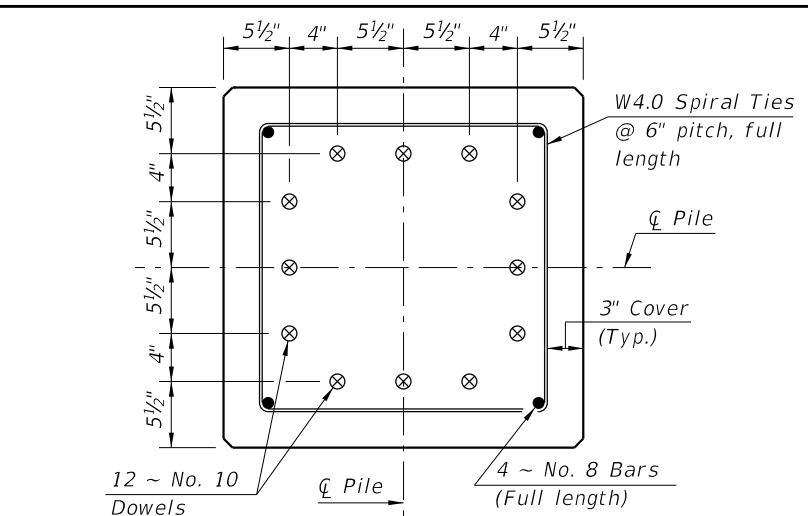


W4.0 DIAGONAL TIE  
DETAIL

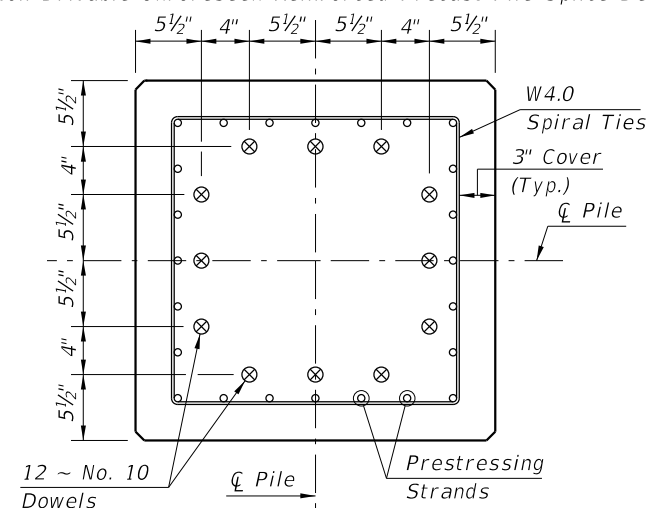
\*\* Omit 4 ~ No. 8 Bars and Diagonal Ties in pre-planned mechanical splice.

NOTES:

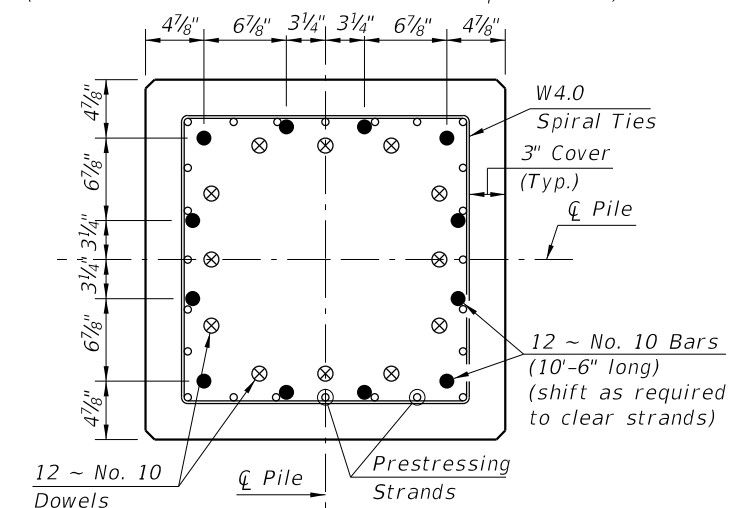
- Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows: Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.
- CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" Ø void. In this event, the Contractor shall submit calculations for approval and a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the Diagonal Ties, to maintain the position of the 4 ~ #8 Bars, may be approved by the Engineer.
- Work this Index with Index 455-001 - Typical Details and Notes for Square Prestressed Concrete Piles and Index 455-002 - Square Prestressed Concrete Pile Splices.



SECTION D-D  
(See Non-Drivable Unforeseen Reinforced Precast Pile Splice Detail)



SECTION E-E  
(See Drivable Prestressed Precast Pile Splice Detail)



SECTION F-F  
(See Drivable Preplanned Pile Splice Detail)

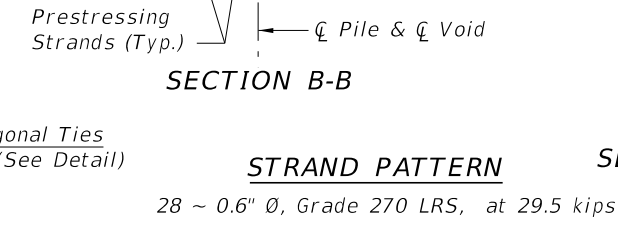
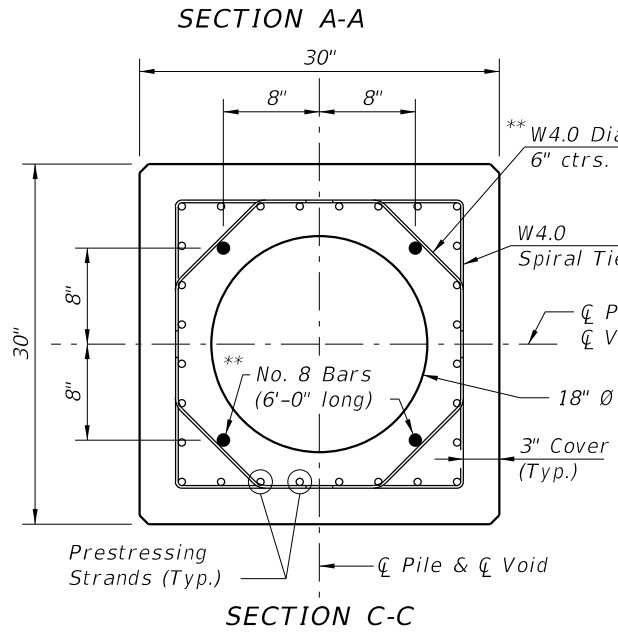
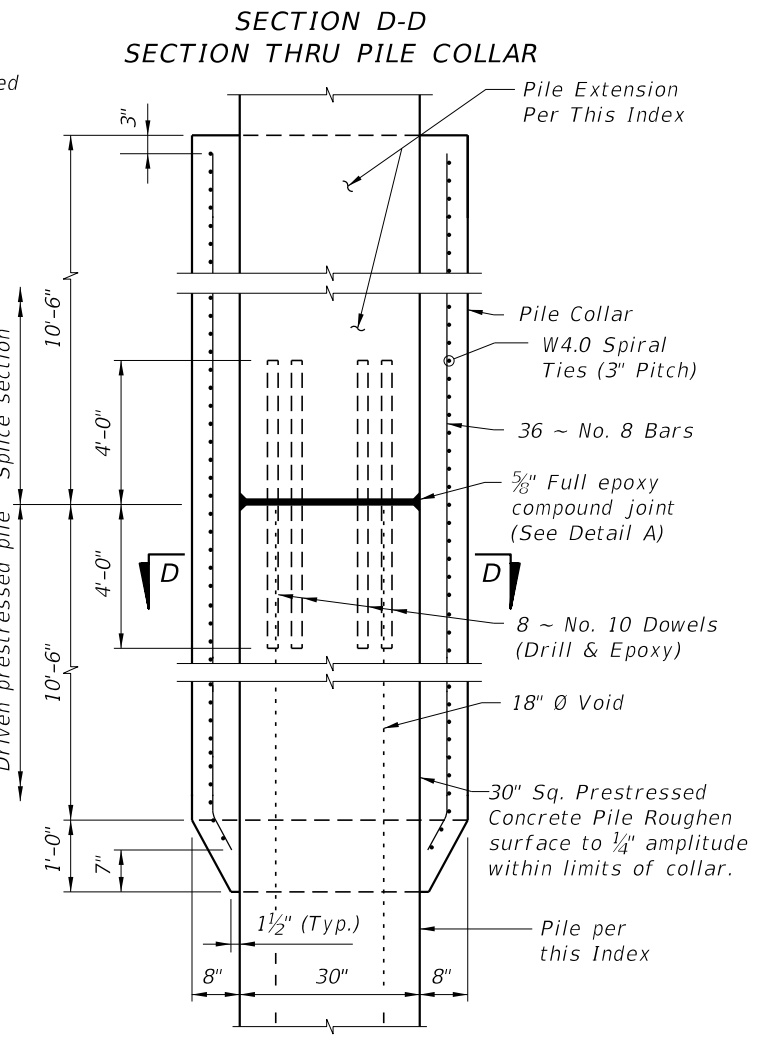
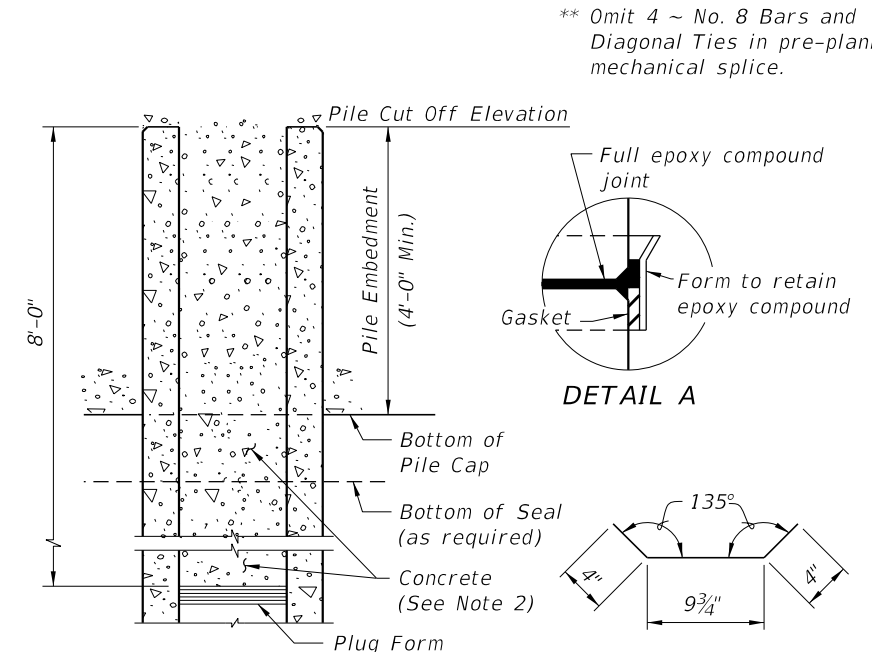
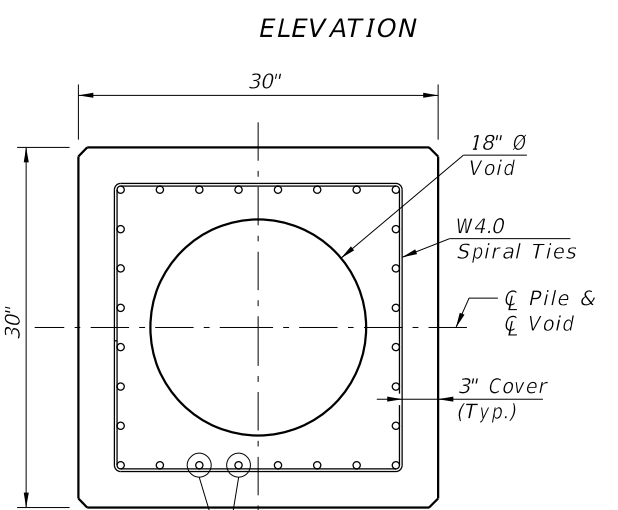
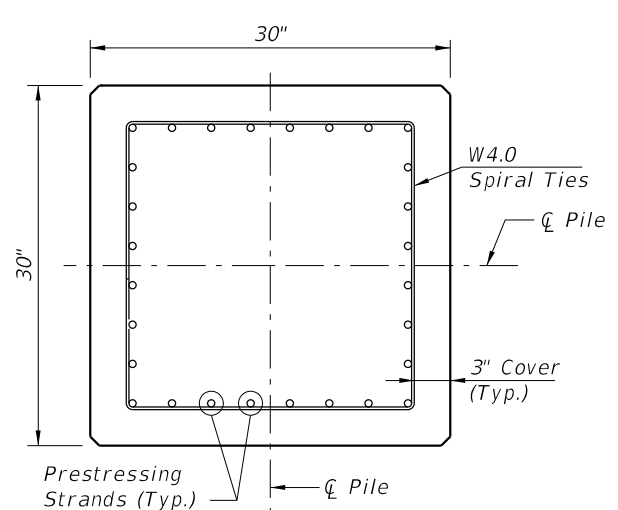
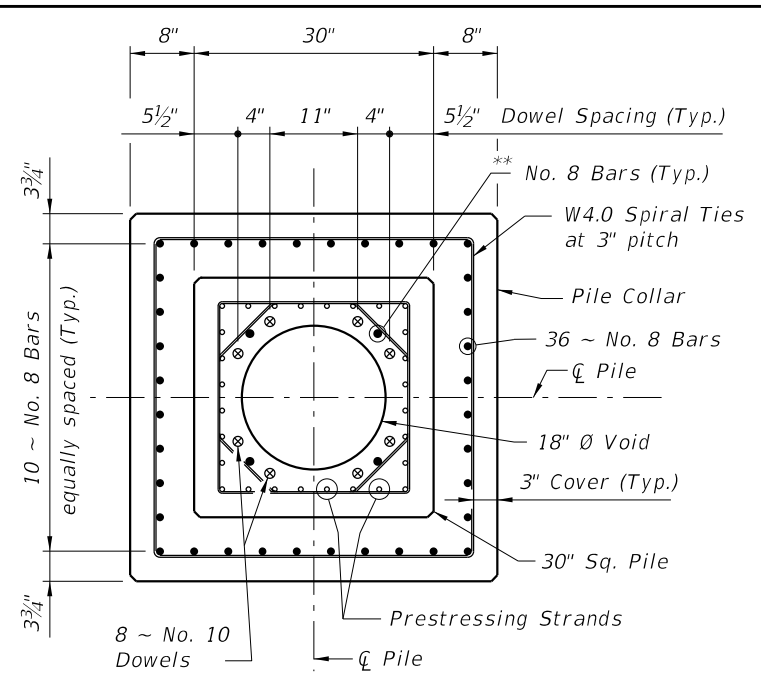
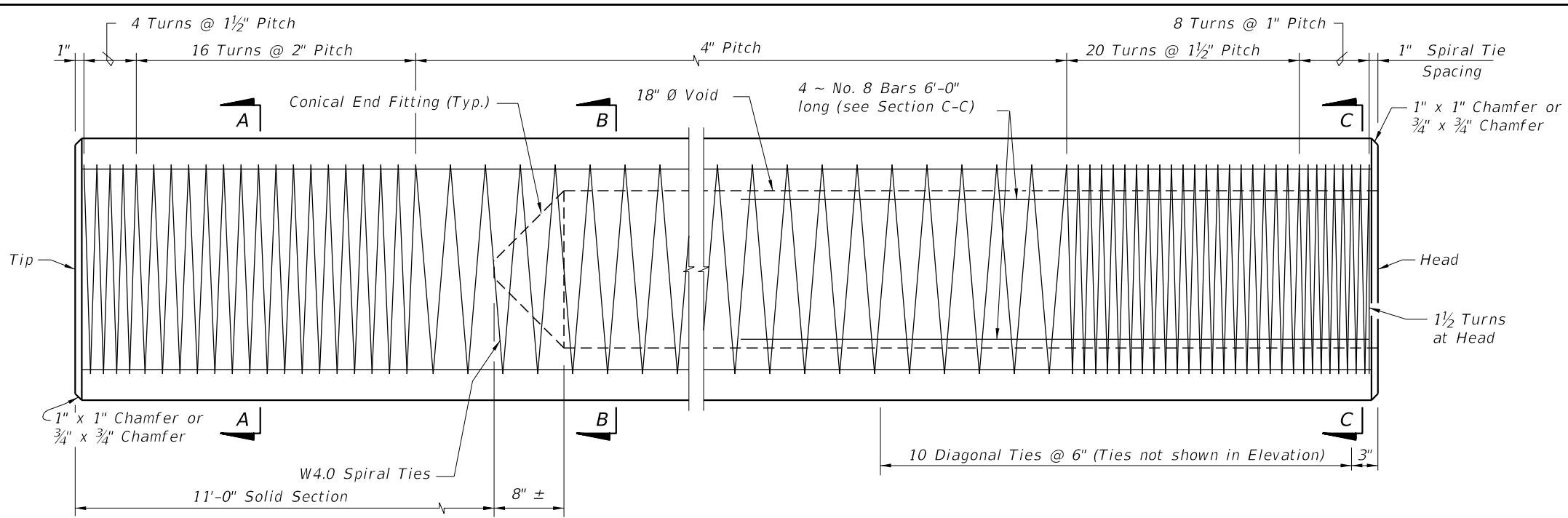
PILE SPLICE DETAILS

ALTERNATE STRAND PATTERNS

- 20 ~ 0.6" Ø, Grade 270 LRS, at 41 kips
- 24 ~ 1/2" Ø (Special), Grade 270 LRS, at 34 kips
- 28 ~ 1/2" Ø, Grade 270 LRS, at 29 kips

9/23/2021 9:54:28 AM

LAST REVISION 07/01/15	DESCRIPTION:	FDOT FY 2022-23 STANDARD PLANS	30" SQUARE PRESTRESSED CONCRETE PILE	INDEX 455-030	SHEET 1 of 1
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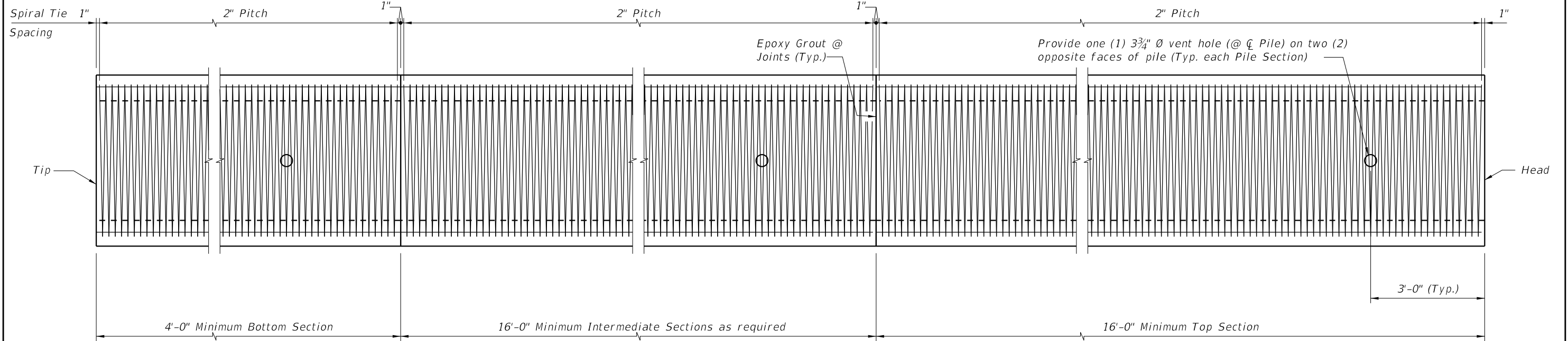


- NOTES:  
1. After the pile is driven and cut to grade, the top 8'-0" of the 18" Ø Void shall be filled with concrete. Prior to filling the top 8'-0" of the 18" Ø Void with concrete, strip the cardboard form material from the void and sand/water blast all interface surfaces. Seal void and fill with potable water for 4-5 hours. Remove water to a surface-saturated-dry condition prior to making the concrete pour. In lieu of the cardboard form material and the surface preparation requirements described above, a stay-in-place corrugated thin wall galvanized pipe may be used. The concrete fill material shall be of the same type and strength as called for in the pile cap and paid for as substructure concrete.  
2. Collar concrete shall reach a strength of 6,000 psi before pile driving is resumed.  
3. Work this Index with Index 455-001 - Typical Details and Notes for Square Prestressed Concrete Piles.

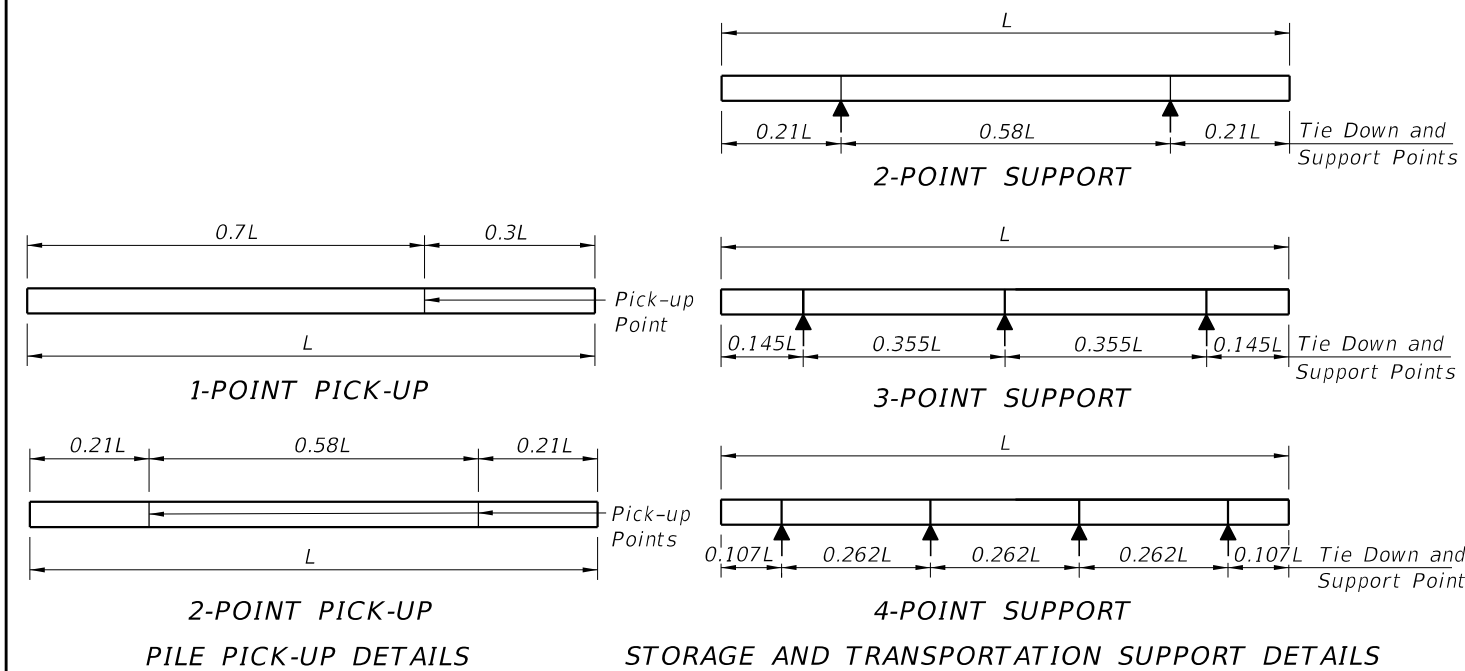
DETAIL OF PILE COLLAR FOR HIGH MOMENT CAPACITY 30" SQUARE PRESTRESSED PILE - PILE SPLICE DETAIL-

9/23/2021 9:54:29 AM

LAST REVISION 07/01/15	DESCRIPTION:	FDOT	FY 2022-23 STANDARD PLANS	30" SQUARE PRESTRESSED CONCRETE PILE - HIGH MOMENT CAPACITY	INDEX 455-031	SHEET 1 of 1
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ELEVATION



NOTES

- Work this Index with the Pile Data Table in the Structures Plans.
- Concrete:
  - Piles: Class V (Special).
  - Splice: Class IV.
  - See "GENERAL NOTES" in Structures Plans for locations where the use of Highly Reactive Pozzolans is required.
- Concrete Strength at time of prestress transfer:
  - Piles: 6,000 psi minimum.
- Carbon-Steel Reinforcing:
  - Bars: Meet the requirements of Specification Section 415.
  - Prestressing Strands: Meet the requirements of Specification Section 933.
  - Tendons: Two seven-wire 1/2" dia. (Special) Grade 270, low-relaxation strands tensioned to 33.8 kips.
  - Protect all carbon-steel strands permanently exposed to the environment and not embedded under final conditions in accordance with Specification Section 450.
  - Spiral Ties:
    - One half turn is required for carbon-steel spiral splice.
    - One full turn is required at the pile head and tip.
- Pile Splices:
  - Epoxy: Type AB Epoxy Compound or Mortar must meet the requirements of Specification Section 926.
    - Use a Type AB Epoxy Bonding Compound or Epoxy Mortar, as recommended by the Manufacturer, to form the joint between pile sections
    - Use a Type AB Epoxy Bonding Compound as a bonding agent on internal pile surfaces.
  - Driving: Resume pile driving after splice concrete reaches a minimum strength of 5,500 psi.
- Mark piles at the pick-up points to indicate the proper points for attaching handling lines.

TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS

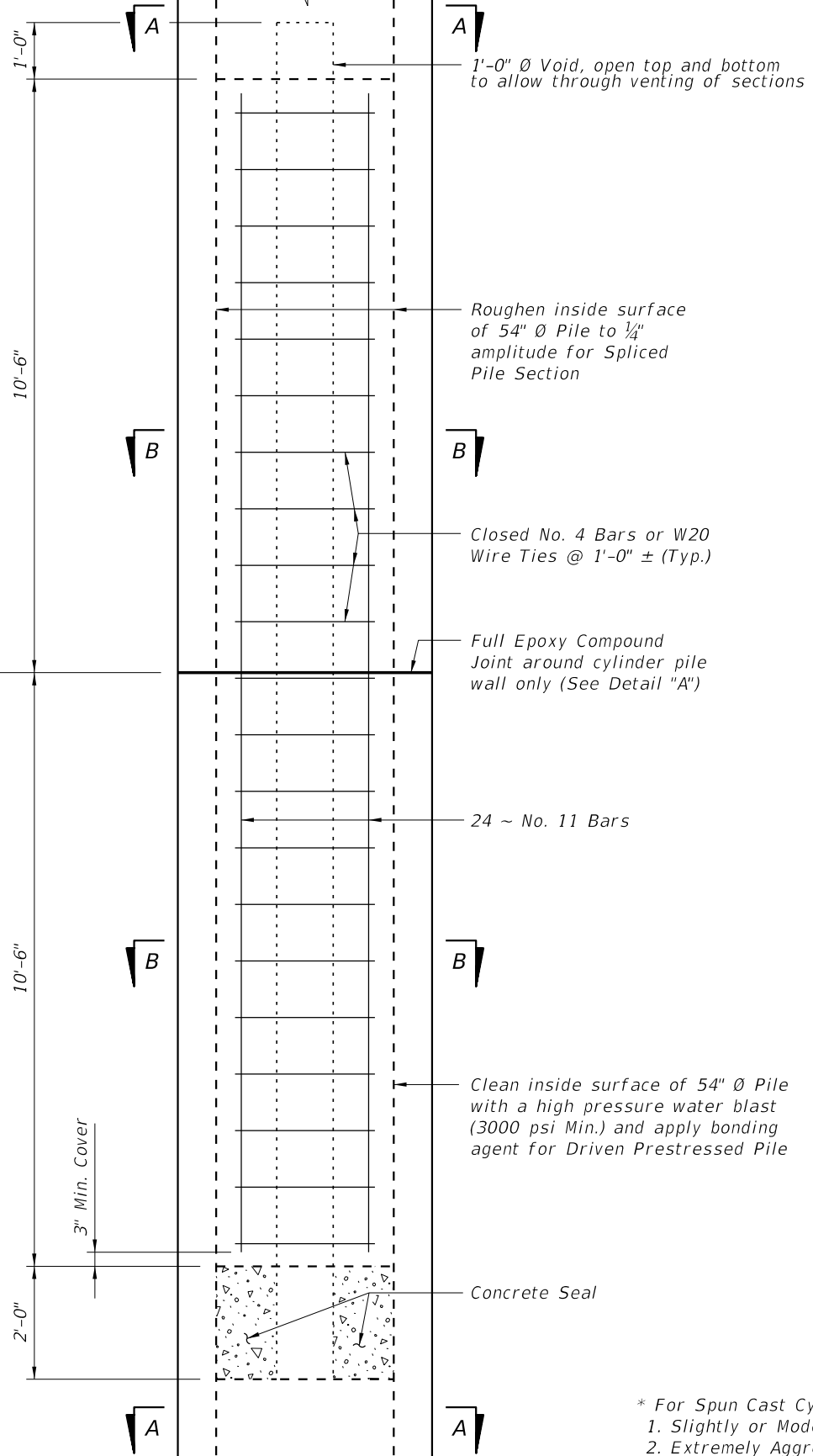
Maximum Pile Length (Feet)	Required Storage and Transportation Detail	Pick-Up Detail
119	2, 3, or 4 point	1 Point
170	2, 3, or 4 point	2 Point

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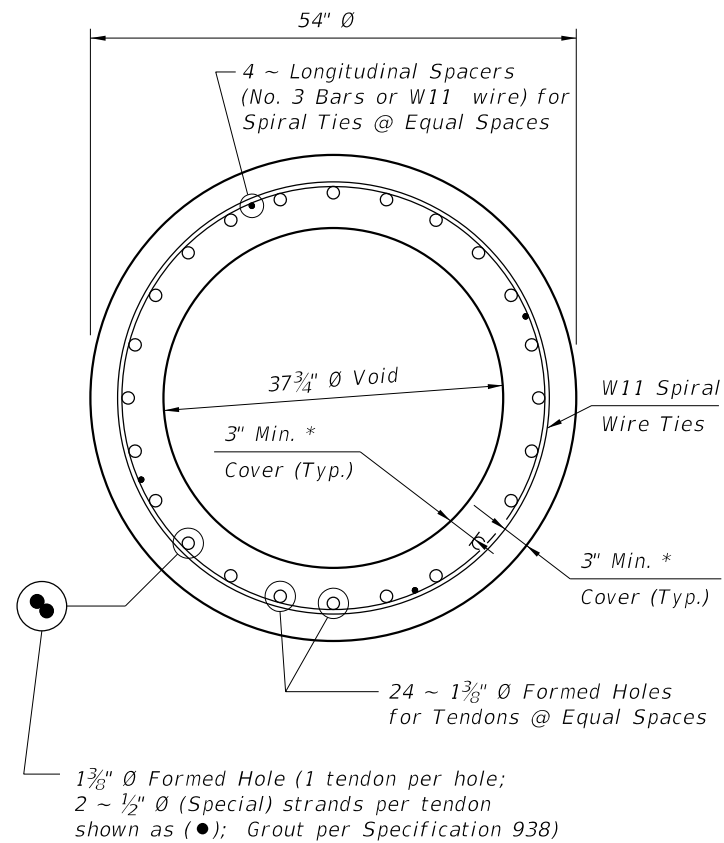
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Spliced Precast/Post-Tensioned Pile Section

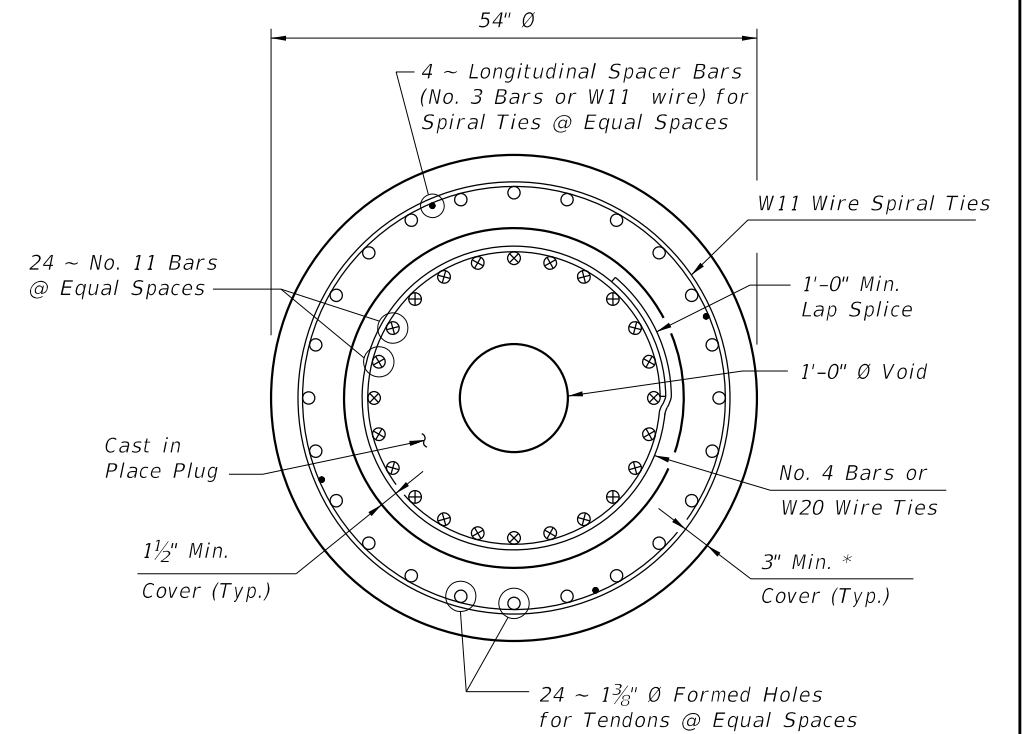
Driven Precast/Post-Tensioned Pile



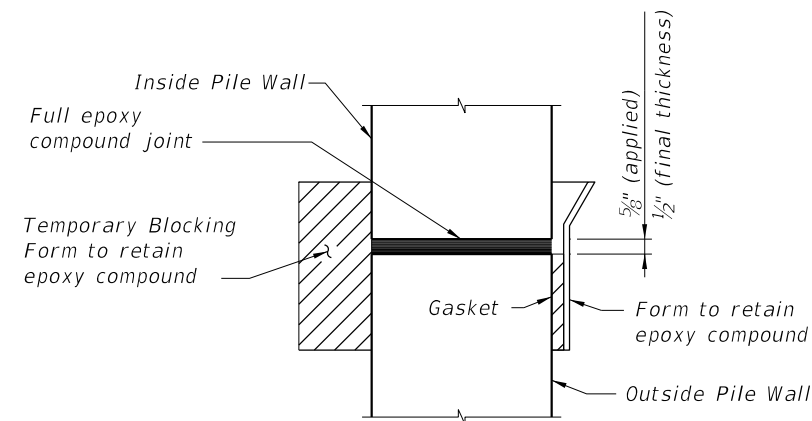
**DRIVABLE UNFORESEEN FIELD SPLICE DETAIL**  
(Cast-In-Place Plug)



**SECTION A-A**



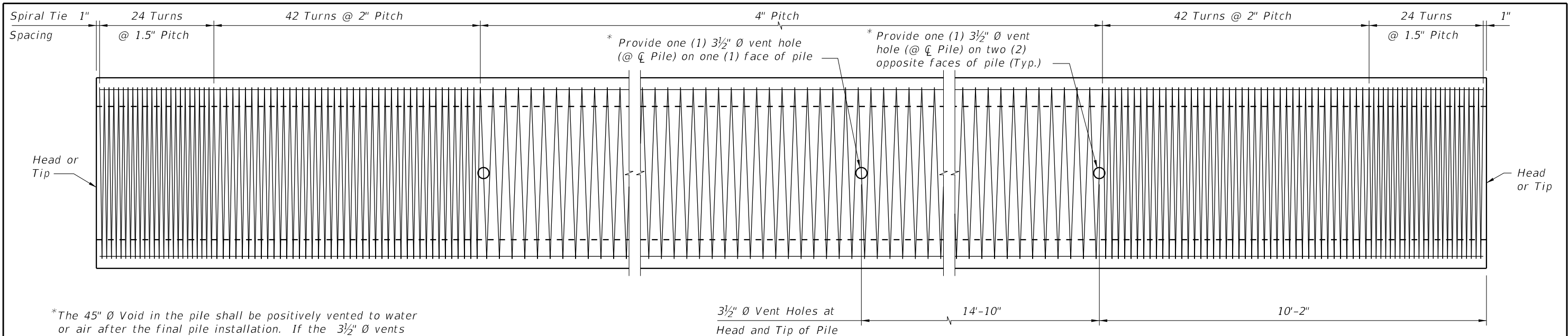
**SECTION B-B**



**DETAIL "A"**

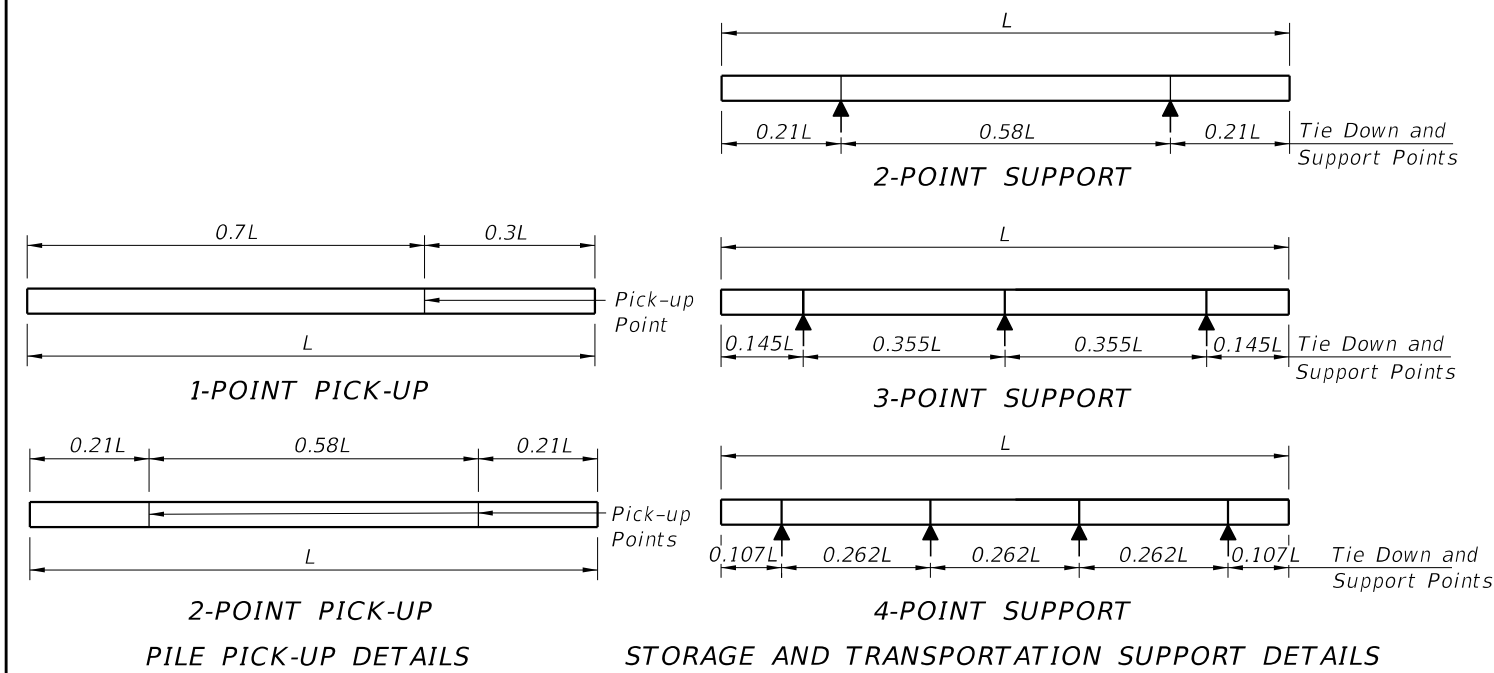
\* For Spun Cast Cylinder Piles, the following requirements for concrete cover apply:  
 1. Slightly or Moderately Aggressive Environments: The concrete cover may be reduced to 2 inches.  
 2. Extremely Aggressive Environments: The concrete cover may be reduced to 2 inches as long as the concrete has a documented chloride ion penetration apparent diffusion coefficient with a mean value of 0.005 in<sup>2</sup> per year or less; otherwise, a 3-inch concrete cover is required.

LAST REVISION 07/01/13	DESCRIPTION:
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\*The 45" Ø Void in the pile shall be positively vented to water or air after the final pile installation. If the 3 1/2" Ø vents are included in the pile cut-off section, then venting shall be provided by the use of a 1" Ø PVC conduit through the substructure cap or column.

ELEVATION



NOTES

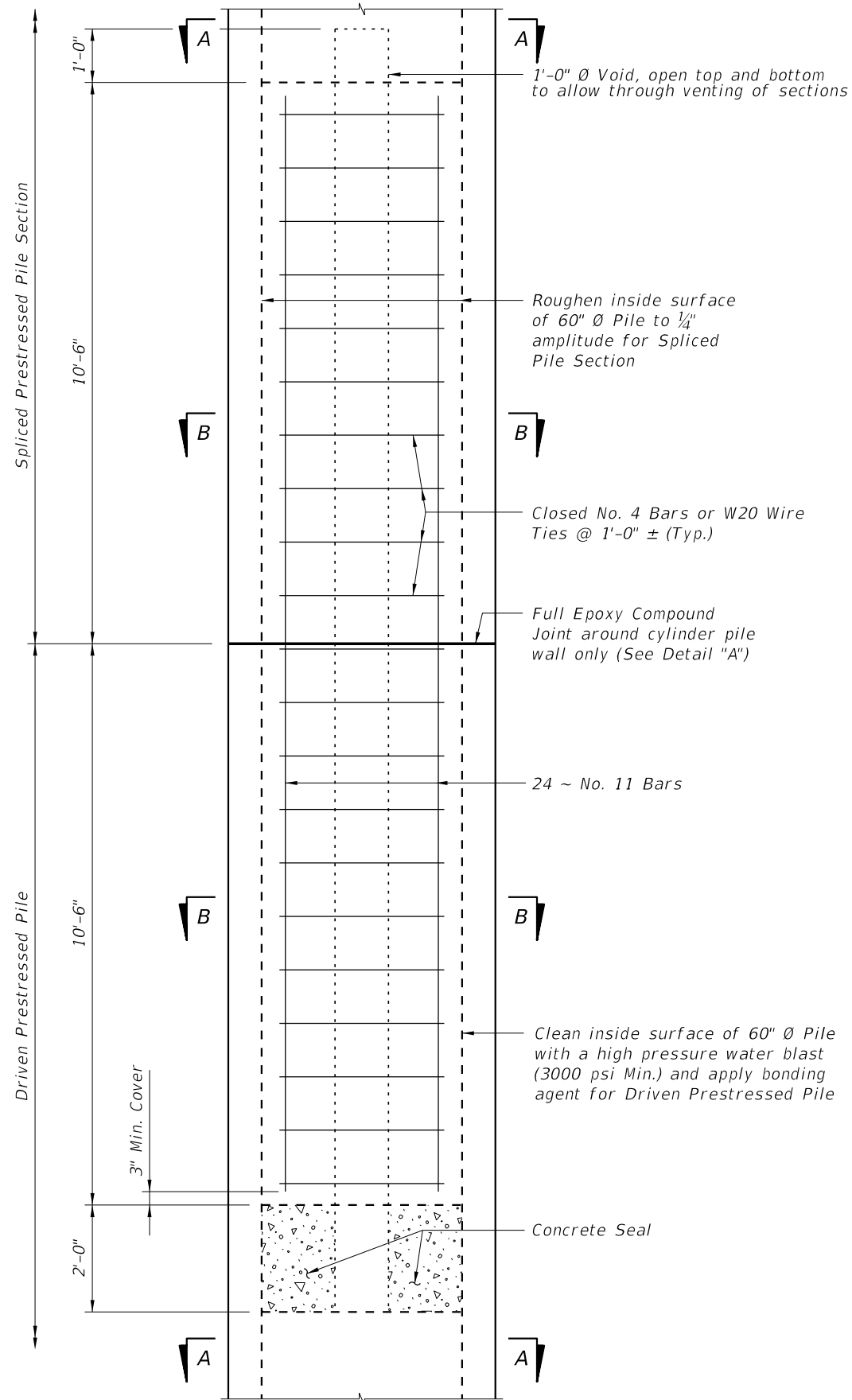
- Work this Index with the Pile Data Table in the Structures Plans.
- Concrete:
  - Piles: Class V (Special)
  - Splice Collar: Class IV
  - See "GENERAL NOTES" in the Structures Plans for locations where the use of Highly Reactive Pozzolans is required.
- Concrete Strength at time of prestress transfer:
  - Piles: 4,000 psi minimum.
- Carbon-Steel Reinforcing:
  - Bars: Meet the requirements of Specification Section 415
  - Prestressing Strands: Use 0.6 dia. carbon-steel, Grade 270, low-relaxation strand stressed to 44.0 kips that meets the requirements of Specification Section 933.
  - Protect all carbon-steel strands permanently exposed to the environment and not embedded under final conditions in accordance with Specification Section 450.
- Spiral Ties:
  - One half turn is required for carbon-steel spiral splices
  - One full turn is required at the head and tip of each pile
- Pile Splices:
  - Epoxy: Type AB Epoxy Compound or Epoxy Mortar must meet the requirements of Specification Section 926.
    - Use a Type AB Epoxy Bonding Compound or Epoxy Mortar, as recommended by the Manufacturer, to form the joint between pile sections.
    - Use a Type AB Epoxy Bonding Compound as a bonding agent on internal pile surfaces.
  - Splices: Resume pile driving after the splice concrete reaches a minimum strength of 5,500 psi.
- Mark piles at the pick-up points to indicate the proper points for attaching handling lines.

TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS

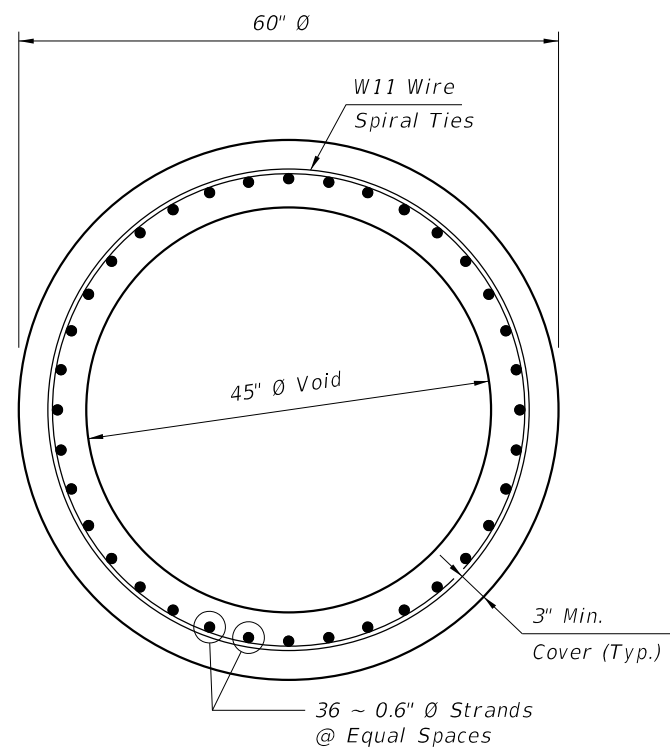
Maximum Pile Length (Feet)	Required Storage and Transportation Detail	Pick-Up Detail
122	2, 3, or 4 point	1 Point
174	2, 3, or 4 point	2 Point

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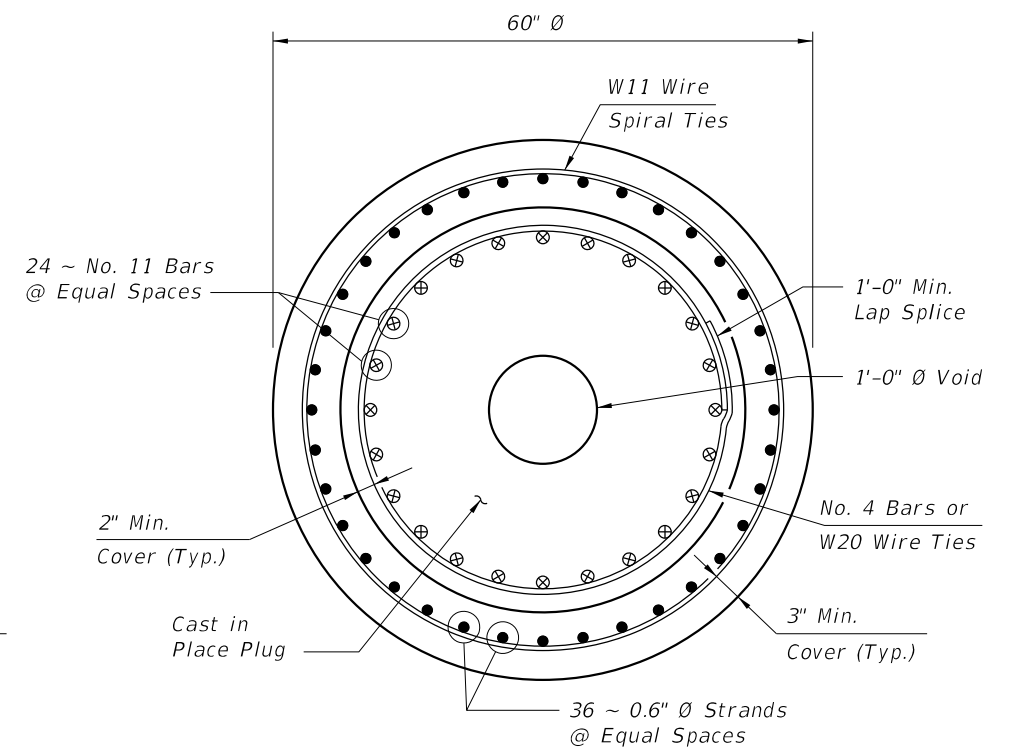
LAST REVISION 11/01/20	DESCRIPTION:
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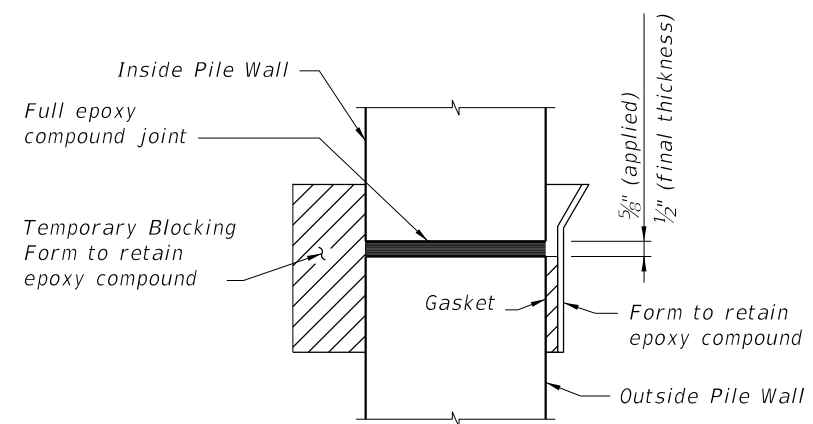
DRIVABLE UNFORESEEN FIELD SPLICE DETAIL  
(Cast in Place Plug)



SECTION A-A



SECTION B-B



DETAIL "A"

9/23/2021 9:54:32 AM

LAST REVISION 01/01/12	DESCRIPTION:
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FY 2022-23  
STANDARD PLANS

60" PRESTRESSED CONCRETE CYLINDER PILE

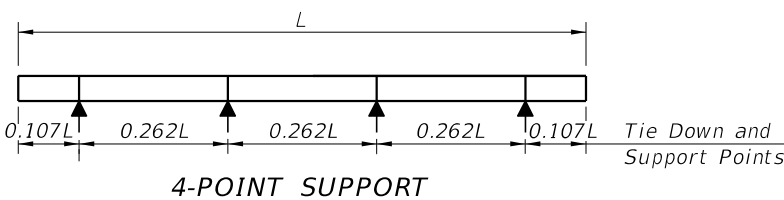
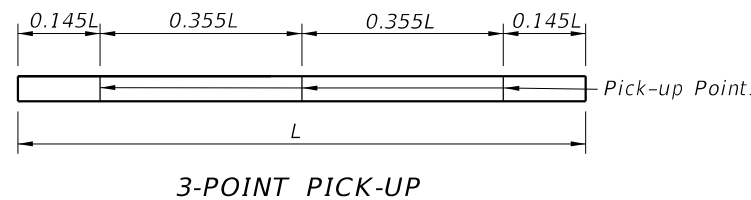
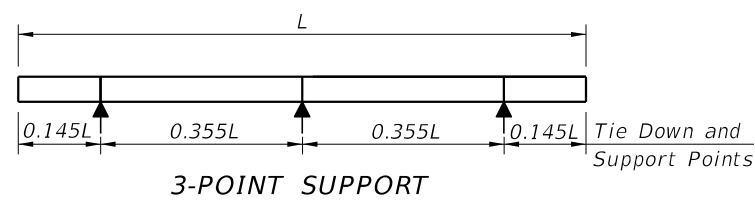
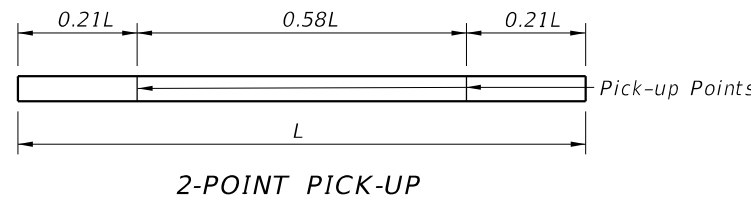
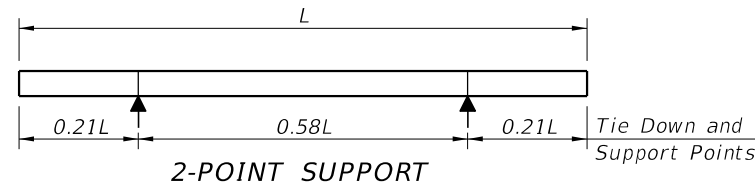
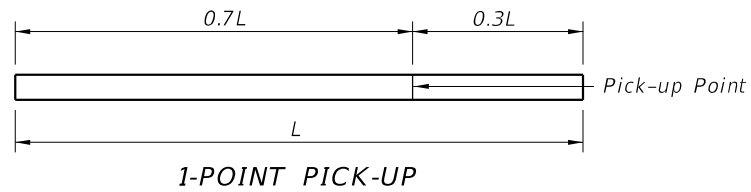
INDEX  
455-060

SHEET  
2 of 2



**PRESTRESSED CONCRETE PILE NOTES:**

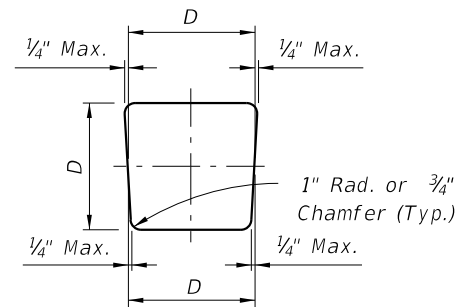
1. Work this Index with the Square Prestressed Concrete Pile Splices (Index 455-102), the Prestressed Concrete Pile Standards (Index 455-112, 455-114, 455-118, 455-124, 455-130, and the Pile Data Table in the Structures Plans.
2. Concrete:
  - A. Piles: Class V (Special)
  - B. See "GENERAL NOTES" in the Structures Plans for locations where the use of Highly Reactive Pozzolans is required for options using stainless steel strand and reinforcing.
3. Concrete strength at time of prestress transfer:
  - A. Piles: 4,000 psi minimum.
4. Reinforcing:
  - A. Bars:
    - a. Stainless Steel: Meet the requirements of Specification Section 931 for Type 304, Grade 75.
    - b. Carbon FRP: Meet the requirements of Specification Section 932.
  - B. Prestressing Strands:
    - a. Stainless Steel: Seven-wire HSSS, Grade 240 strand, meeting the requirements of Specification Section 933.
    - b. Carbon FRP: Meet the requirements of Specification Section 933.
5. Spiral Ties:
  - A. Tie each wrap of the spiral strand to a minimum of two corner strands.
  - B. One full turn required for spiral splices.
6. Pile Splices: Fill dowel holes and form the joint between pile sections with a Type AB Epoxy Compound in accordance with Specification Section 926. Use an Epoxy Bonding Compound or an Epoxy Mortar as recommended by the Manufacturer.



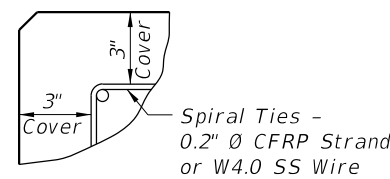
PILE PICK-UP DETAILS

STORAGE AND TRANSPORTATION SUPPORT DETAILS

TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS							
	D = Square Pile Size (inches)					Required Storage and Transportation Detail	Pick-Up Detail
	12	14	18	24	30		
Maximum Pile Length (Feet)	48	52	59	68	87	2, 3, or 4 point	1 Point
	69	75	85	98	124	2, 3, or 4 point	2 Point
	99	107	121	140	178	3 or 4 point	3 Point



TYPICAL PILE SHAPE FOR MOLD FORMS

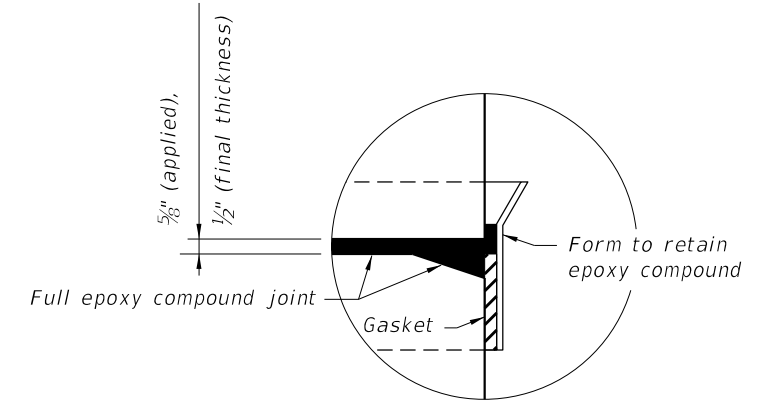


DETAIL SHOWING TYPICAL COVER

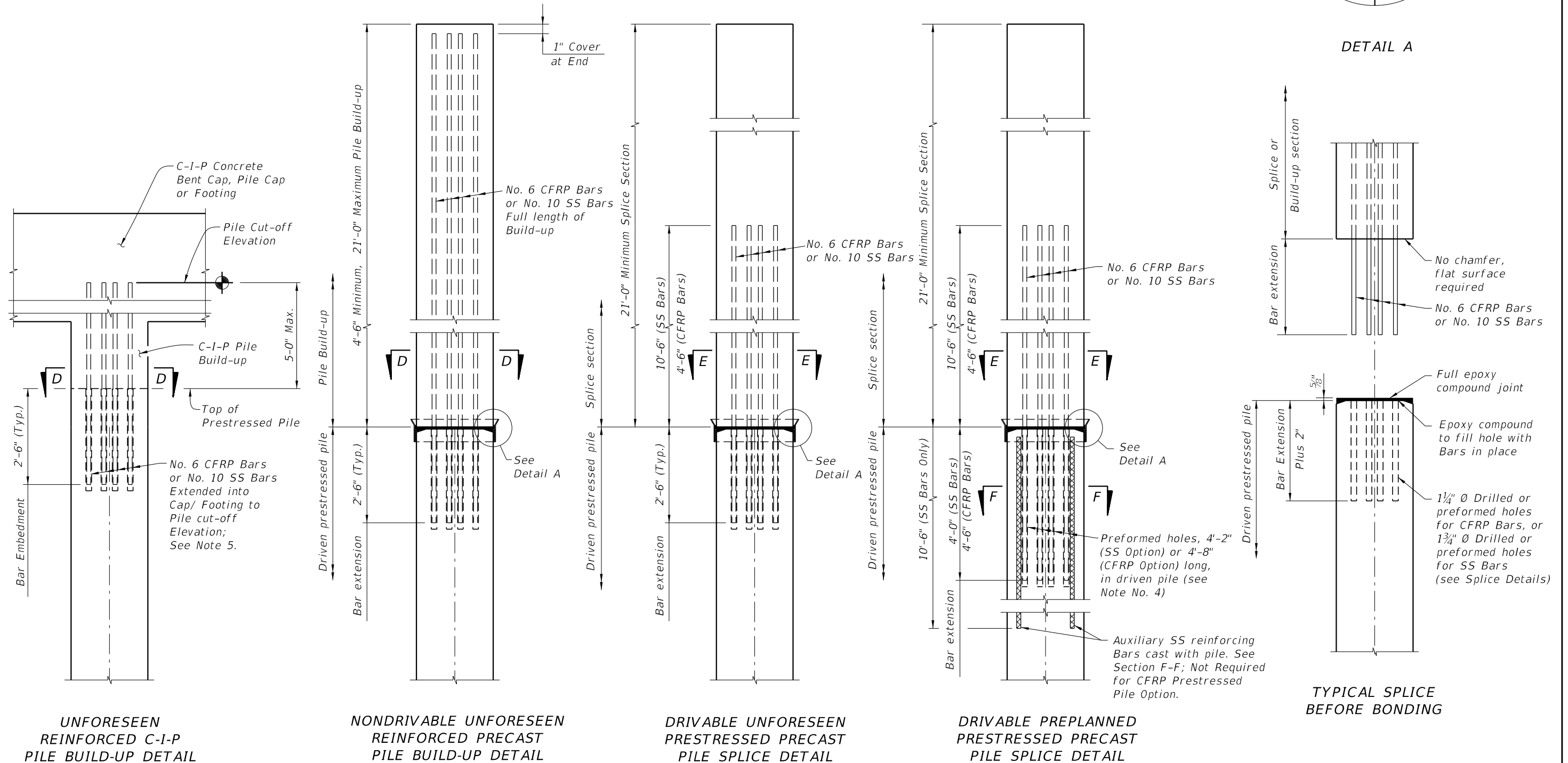
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NOTES:

1. For Sections D-D, & E-E, see Index 455-112, 455-114, 455-118, 455-124 or 455-130 for applicable concrete pile size and Pile Splice Reinforcement Details.
2. Prestressing strands, spiral ties and/or reinforcement are not shown for clarity.
3. In cases where pile splices are desired due to length limitations in shipping and/or handling, the "Drivable Preplanned Prestressed Precast Splice Detail" shall be used.
4. When preformed dowel holes are utilized, the 1" spiral tie pitch shall be continued to 4'-0" below the head of the pile, See Index 455-118, 455-124. Preformed holes shall utilize either removable preforming material or stay-in-place corrugated galvanized steel ducts. Stay-in-place ducts shall be fabricated from galvanized sheet steel meeting the requirements of ASTM A653, Coating Designation G90, 26 gauge. Ducts shall be 1½" diameter for CFRP Bars, and 2" diameter for SS Bars with a minimum corrugation (rib) height of 0.12 in. Ducts shall be fabricated with either welded or interlocked seams. Galvanizing of welded seams will not be required.
5. For tension piles where top of Prestressed Pile is less than 3 feet below Pile Cut-off Elevation, extend No. 6 CFRP Bars or No. 10 SS into cap beyond Pile Cut-off Elevation to achieve development as approved by the Engineer.

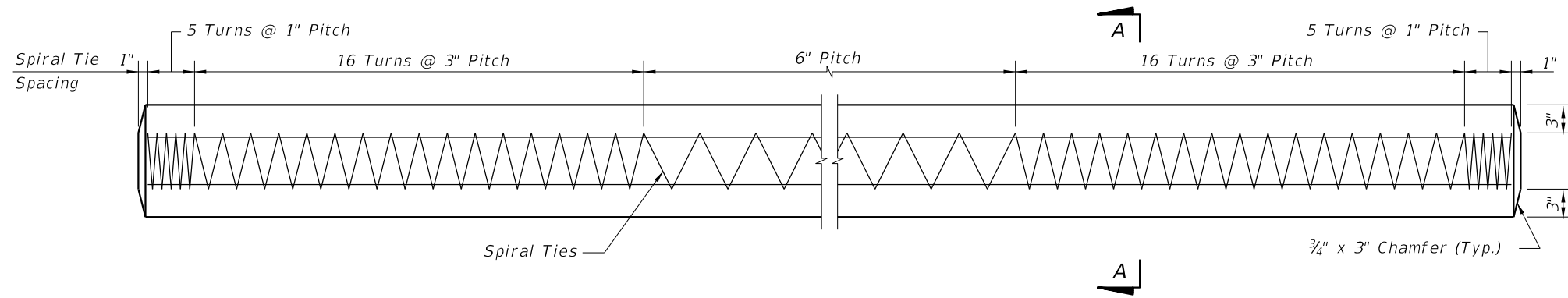


DETAIL A



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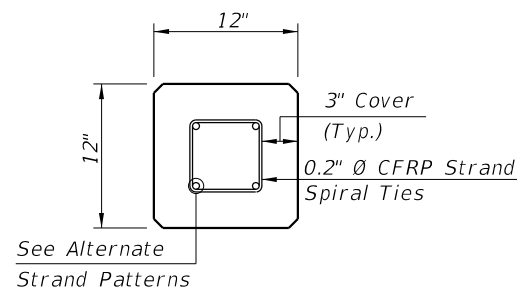
LAST REVISION 01/01/16	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	SQUARE CFRP & SS PRESTRESSED CONCRETE PILE SPLICES	INDEX 455-102	SHEET 1 of 1
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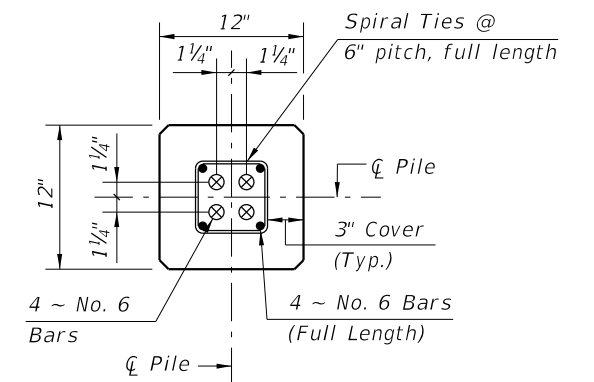
ELEVATION

**ALTERNATE STRAND PATTERNS**

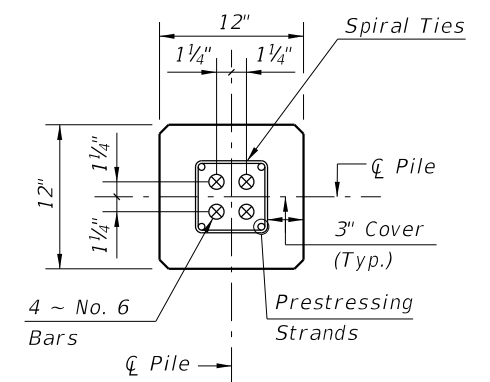
- 4 ~ 0.6" Ø, CFRP 7-Strand, at 42 kips
- 4 ~ 1/2" Ø, CFRP Single-Strand, at 41 kips



SECTION A-A



SECTION D-D  
(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E  
(See Drivable Unforeseen Prestressed Precast Pile Splice Detail)

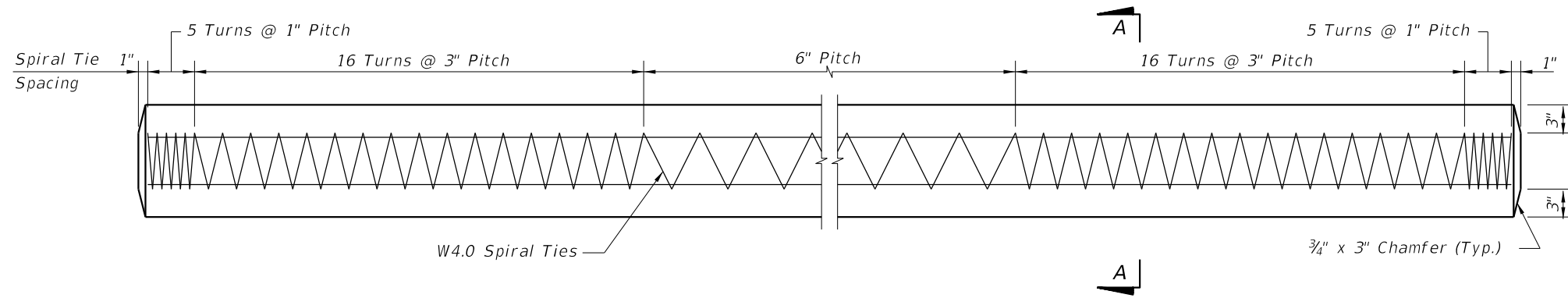
**CFRP PILE SPLICE REINFORCEMENT DETAILS**

- NOTES:
1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
  2. Any of the given Alternate Strand Patterns may be utilized.

CFRP PRESTRESSED PILE DETAILS

9/23/2021 9:54:37 AM

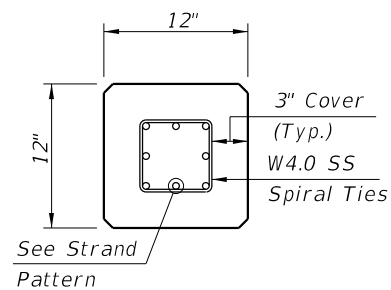
LAST REVISION 11/01/16	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	12" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX 455-112	SHEET 1 of 2
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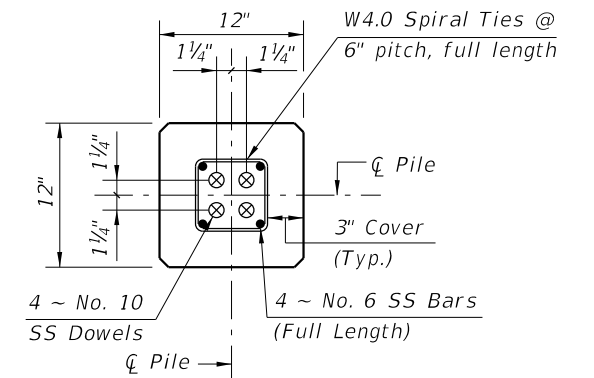
ELEVATION

**STRAND PATTERN**

8 ~ 1/2" Ø, HSSS at 24 kips  
 8 ~ 0.6" Ø, HSSS at 26 kips

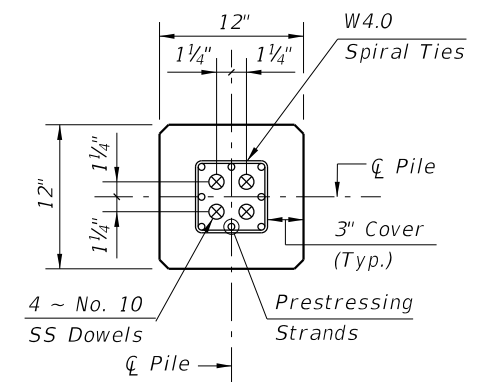


SECTION A-A



SECTION D-D

(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E

(See Drivable Unforeseen Prestressed Precast Pile Splice Detail)

**SS PILE SPLICE REINFORCEMENT DETAILS**

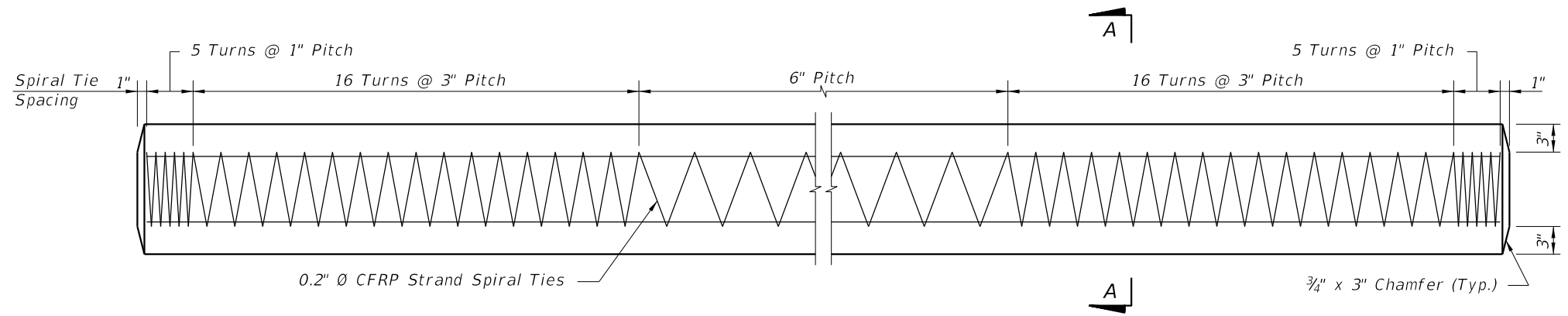
**NOTES:**

1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
2. Any of the given Strand Patterns may be utilized.  
 The strands shall be located as follows:  
 Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
 The total strand pattern shall be concentric with the nominal concrete section of the pile.

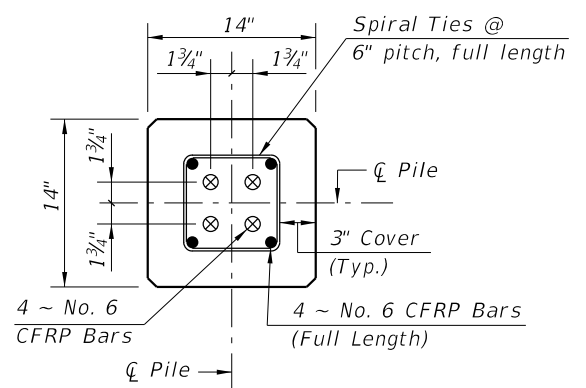
**SS PRESTRESSED PILE DETAILS**

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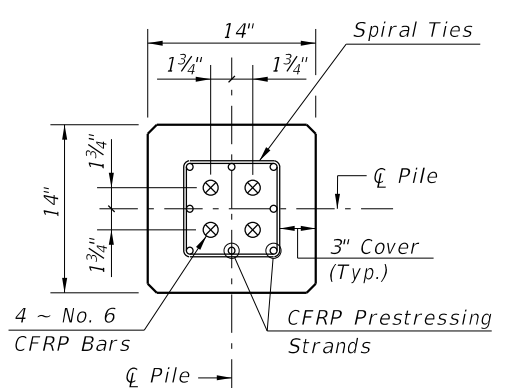
LAST REVISION 11/01/20	DESCRIPTION:		FY 2022-23 STANDARD PLANS	12" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX	SHEET
					455-112	2 of 2



ELEVATION



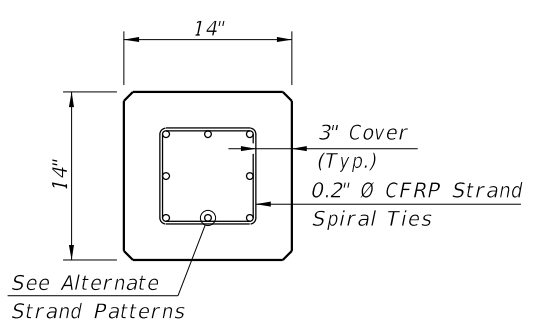
SECTION D-D  
(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E  
(See Drivable Unforeseen Prestressed Precast Pile Splice Detail)

ALTERNATE STRAND PATTERNS

- 8 ~ 0.6" Ø, CFRP 7-Strand, at 31.5 kips
- 8 ~ 1/2" Ø, CFRP Single-Strand, at 30.5 kips



SECTION A-A

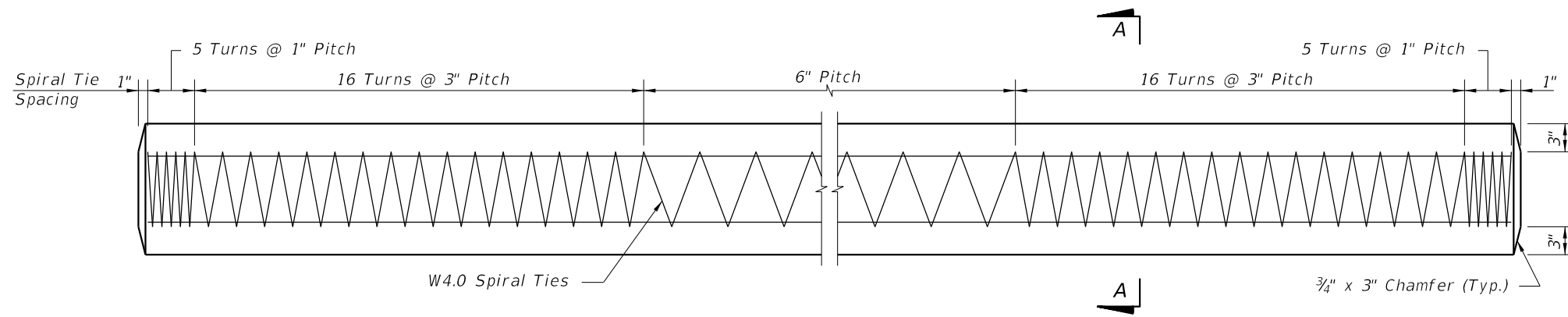
CFRP PILE SPLICE REINFORCEMENT DETAILS

- NOTES:
- Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
  - Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
Place one strand at each corner and equally space the remaining strands between the corner strands.  
The total strand pattern shall be concentric with the nominal concrete section of the pile.

CFRP PRESTRESSED PILE DETAILS

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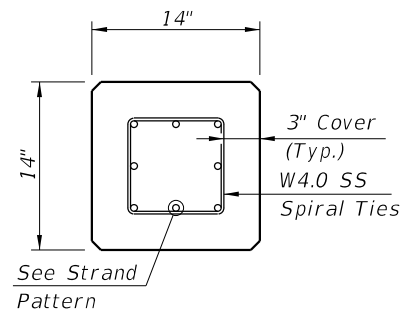
LAST REVISION 11/01/16	DESCRIPTION:		FY 2022-23 STANDARD PLANS	14" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX 455-114	SHEET 1 of 2
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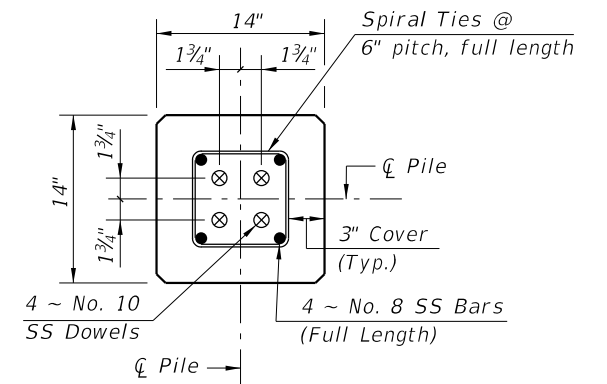
ELEVATION

**STRAND PATTERN**

12 ~ 1/2" Ø, HSSS at 23 kips  
 8 ~ 0.6" Ø, HSSS at 35 kips

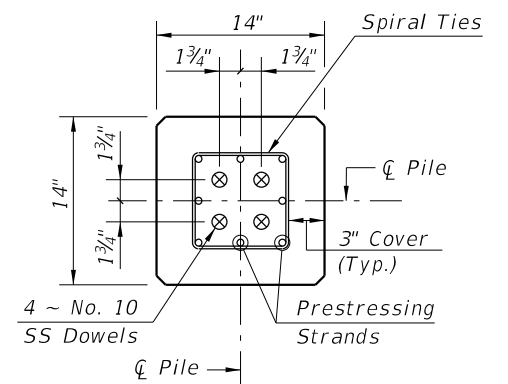


SECTION A-A



SECTION D-D

(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E

(See Drivable Unforeseen Prestressed Precast Splice Detail)

**SS PILE SPLICE REINFORCEMENT DETAILS**

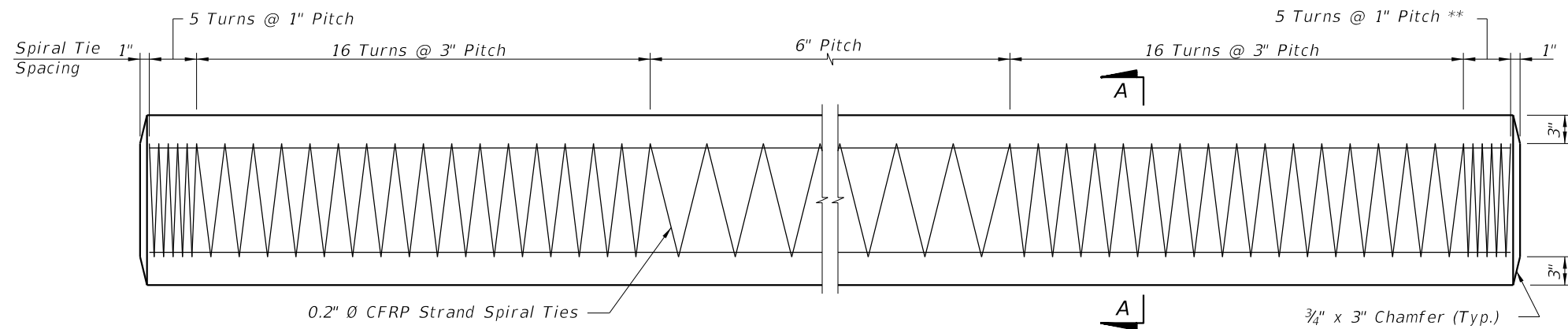
**NOTES:**

1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:  
 Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
 The total strand pattern shall be concentric with the nominal concrete section of the pile.

**SS PRESTRESSED PILE DETAILS**

9/23/2021 9:54:40 AM

LAST REVISION 11/01/20	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	14" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX 455-114	SHEET 2 of 2
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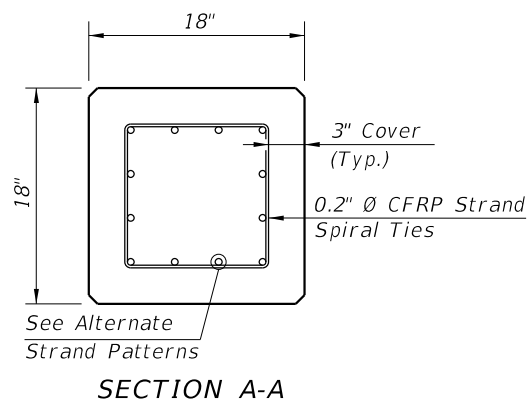


ELEVATION

\*\* See Note 4 on Index 455-102

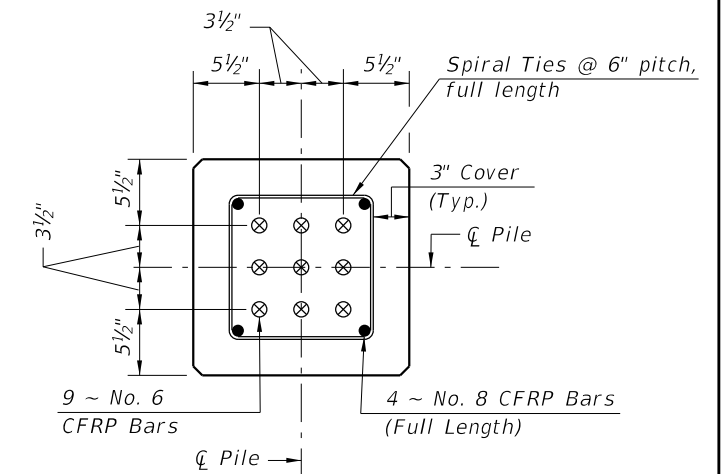
ALTERNATE STRAND PATTERNS

- 12 ~ 0.6" Ø, CFRP 7-Strand, at 34 kips
- 12 ~ 1/2" Ø, CFRP Single-Strand, at 33 kips



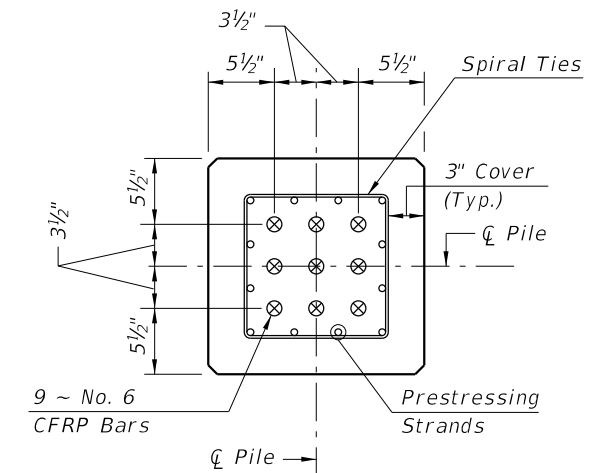
NOTES:

- Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
- Any of the given Strand Patterns may be utilized.  
The strands shall be located as follows:  
Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
The total strand pattern shall be concentric with the nominal concrete section of the pile.



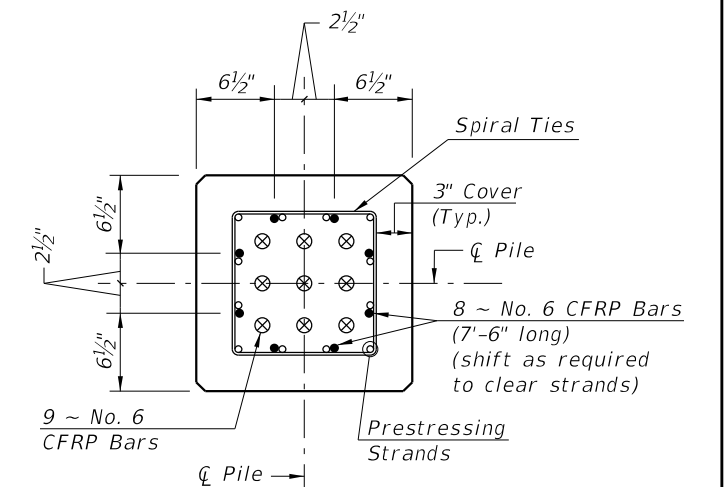
SECTION D-D

(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E

(See Drivable Prestressed Precast Splice Detail)



SECTION F-F

(See Drivable Preplanned Prestressed Precast Splice Detail)

CFRP PILE SPLICE REINFORCEMENT DETAILS

CFRP PRESTRESSED PILE DETAILS

9/23/2021 9:54:40 AM

LAST REVISION 11/01/16	DESCRIPTION:
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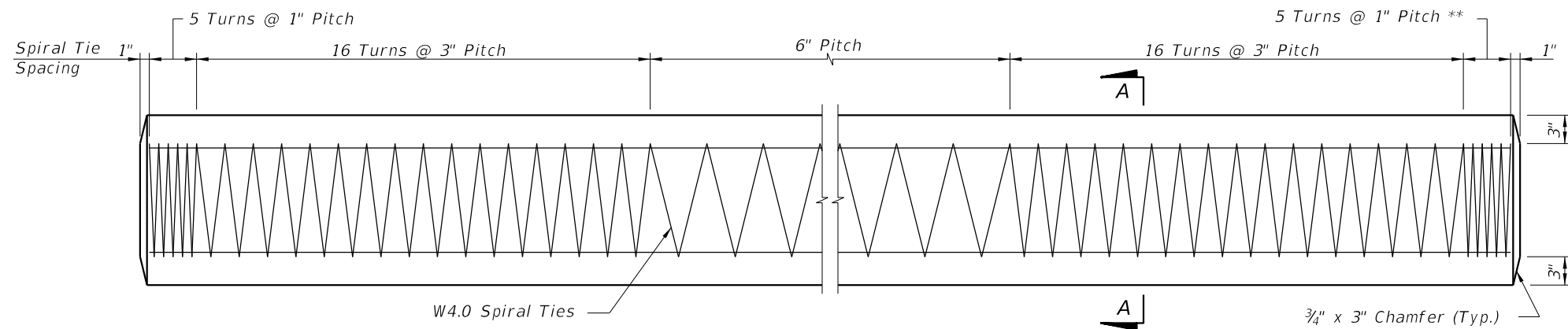


FY 2022-23  
STANDARD PLANS

18" SQUARE CFRP & SS PRESTRESSED  
CONCRETE PILE

INDEX  
455-118

SHEET  
1 of 2

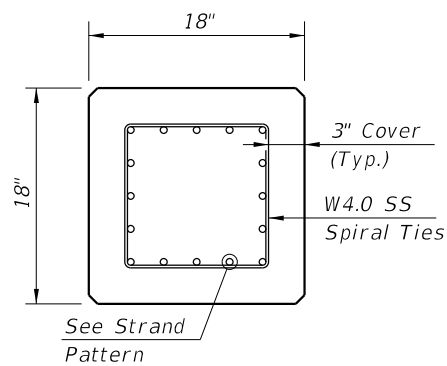


ELEVATION

\*\* See Note 4 on Index 455-102

**STRAND PATTERN**

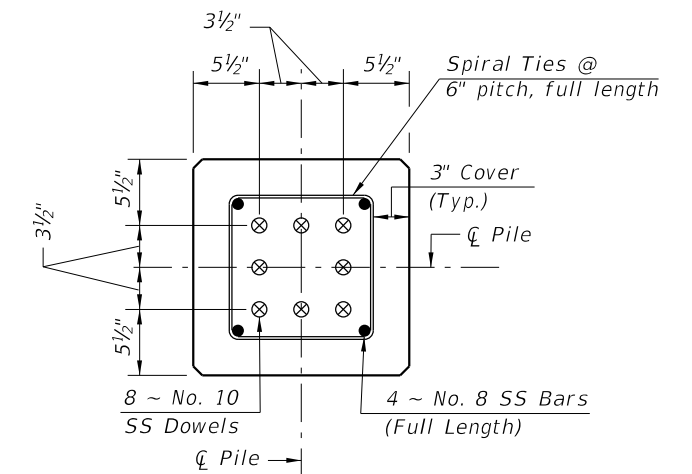
16 ~ 1/2" Ø, HSSS, at 26 kips  
 12 ~ 0.6" Ø, HSSS, at 35 kips



SECTION A-A

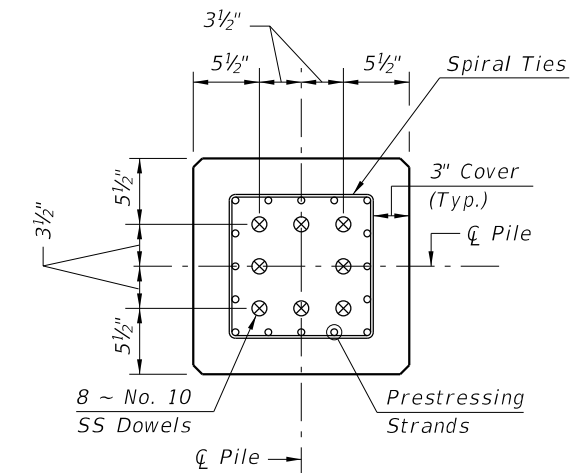
**NOTES:**

1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
2. Any of the given Strand Patterns may be utilized.  
 The strands shall be located as follows:  
 Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
 The total strand pattern shall be concentric with the nominal concrete section of the pile.



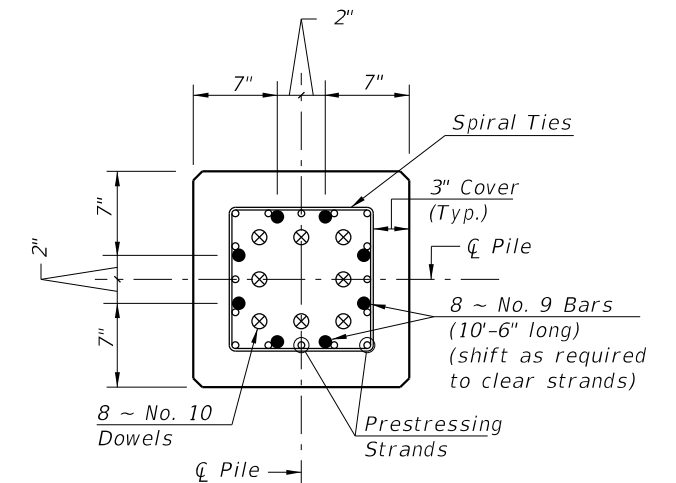
SECTION D-D

(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E

(See Drivable Prestressed Precast Splice Detail)



SECTION F-F

(See Drivable Preplanned Prestressed Precast Splice Detail)

**SS PILE SPLICE REINFORCEMENT DETAILS**

**SS PRESTRESSED PILE DETAILS**

9/23/2021 9:54:41 AM

LAST REVISION 11/01/20	DESCRIPTION:
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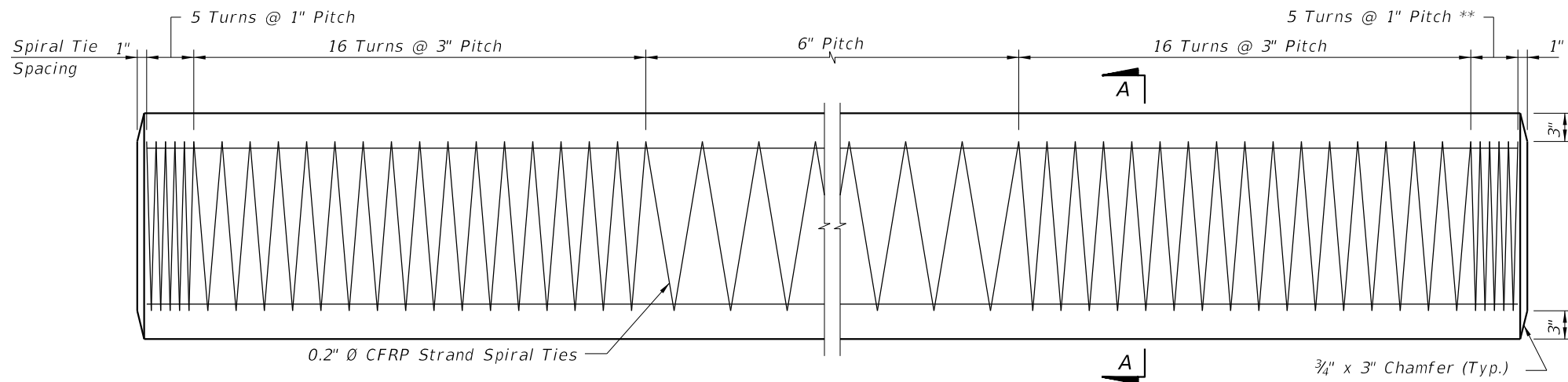
FY 2022-23  
STANDARD PLANS

18" SQUARE CFRP & SS PRESTRESSED  
CONCRETE PILE

INDEX  
455-118

SHEET  
2 of 2



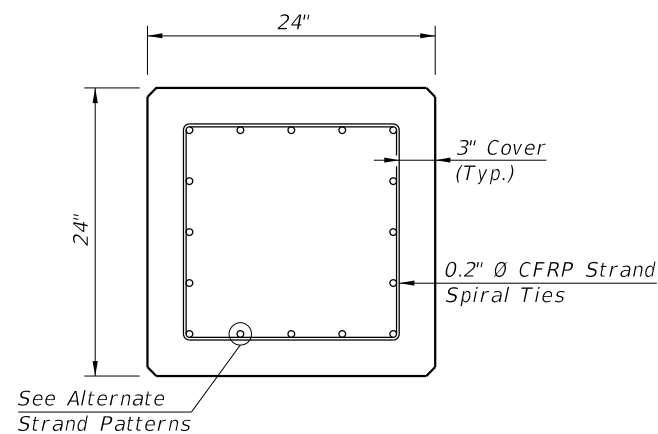


**SPIRAL TIE ELEVATION**

\*\* See Note 4 on Index 455-102

**ALTERNATE STRAND PATTERNS**

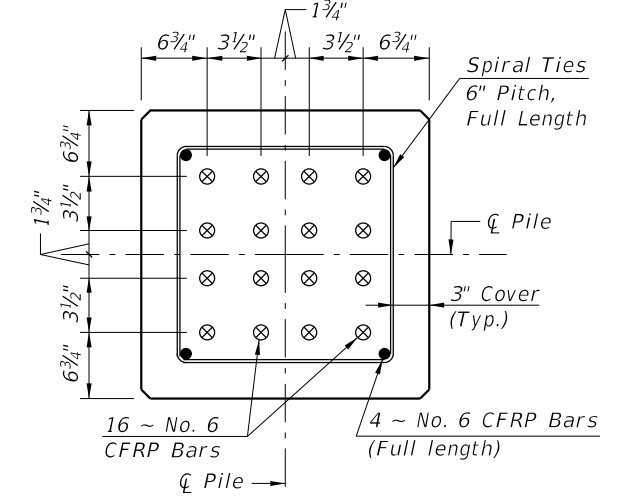
16 ~ 0.6" Ø, CFRP 7-Strand, at 42 kips  
 20 ~ 1/2" Ø, CFRP Single-Strand, at 35 kips



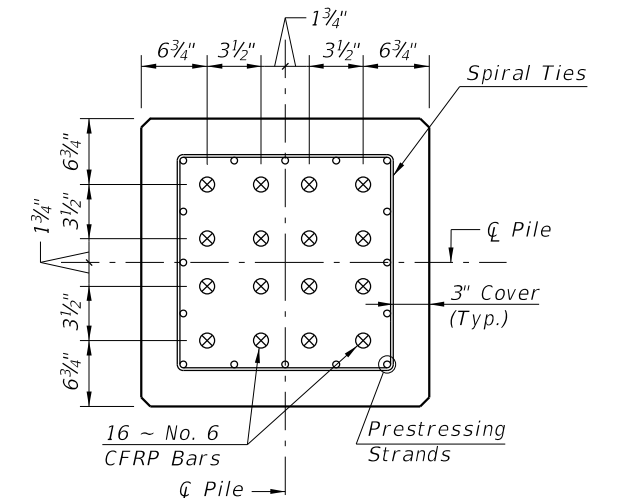
**SECTION A-A**

**NOTES:**

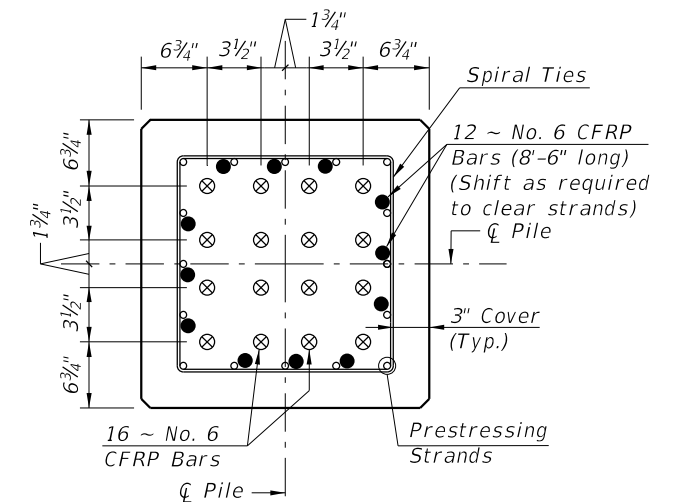
1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
2. Any of the given Strand Patterns may be utilized.  
 The strands shall be located as follows:  
 Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
 The total strand pattern shall be concentric with the nominal concrete section of the pile.



**SECTION D-D**  
 (See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



**SECTION E-E**  
 (See Drivable Prestressed Precast Pile Splice Detail)

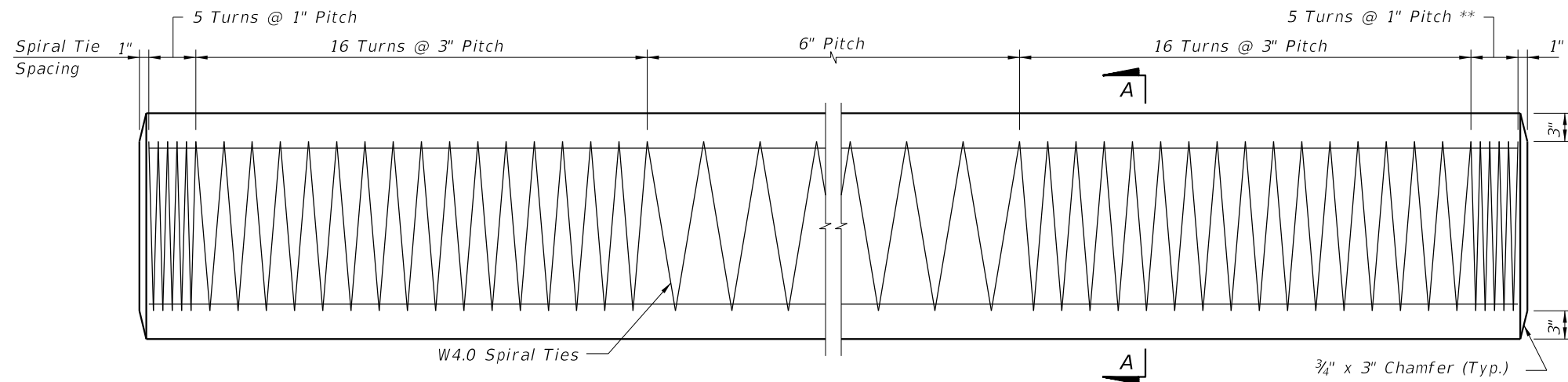


**SECTION F-F**  
 (See Drivable Preplanned Prestressed Precast Pile Splice Detail)  
**CFRP PILE SPLICE REINFORCEMENT DETAILS**

**CFRP PRESTRESSED PILE DETAILS**

9/23/2021 9:54:42 AM

LAST REVISION 11/01/20	REVISION	DESCRIPTION:		<b>FY 2022-23 STANDARD PLANS</b>	<b>24" SQUARE CFRP &amp; SS PRESTRESSED CONCRETE PILE</b>	INDEX <b>455-124</b>	SHEET <b>1 of 2</b>
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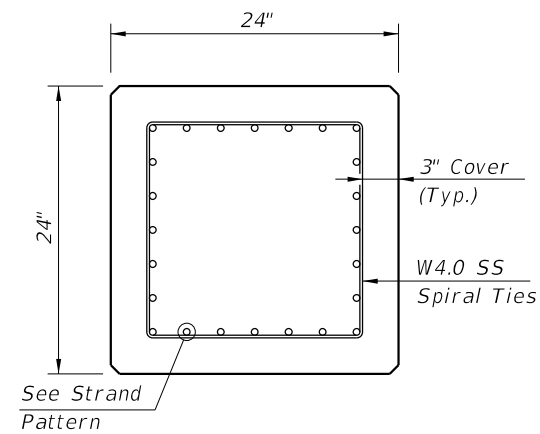


ELEVATION

\*\* See Note 4 on Index 455-102

**STRAND PATTERN**

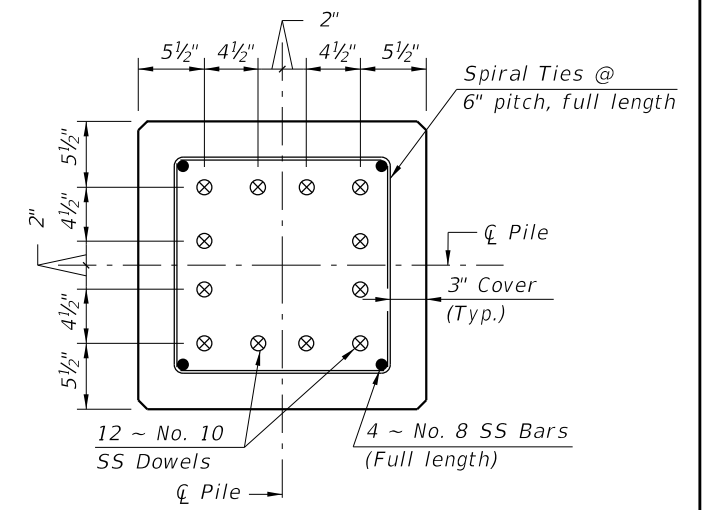
28 ~ 1/2" Ø, HSSS at 26 kips  
 20 ~ 0.6" Ø, HSSS at 35 kips



SECTION A-A

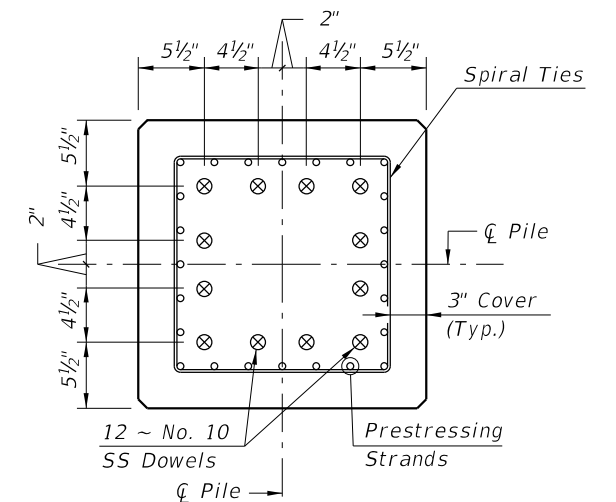
**NOTES:**

1. Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.
2. Any of the given Strand Patterns may be utilized.  
 The strands shall be located as follows:  
 Place one strand at each corner and place the remaining strands equally spaced between the corner strands.  
 The total strand pattern shall be concentric with the nominal concrete section of the pile.



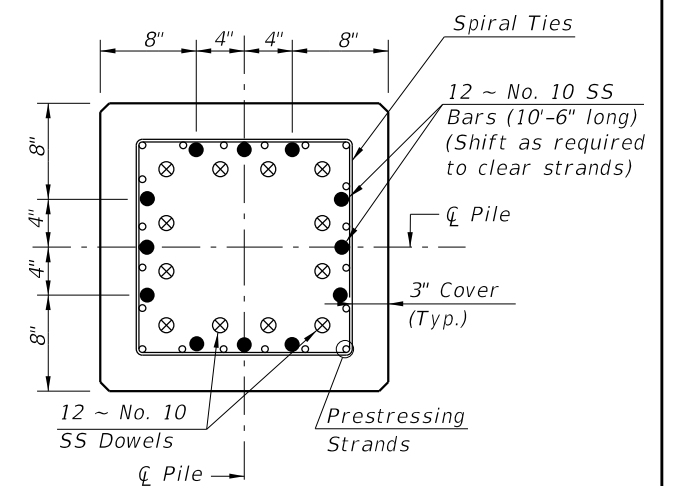
SECTION D-D

(See Non-Drivable Unforescen Reinforced Precast Pile Build-Up Detail)



SECTION E-E

(See Drivable Prestressed Precast Pile Splice Detail)



SECTION F-F

(See Drivable Preplanned Pile Splice Detail)

**SS PILE SPLICE REINFORCEMENT DETAILS**

**SS PRESTRESSED PILE DETAILS**

9/23/2021 9:54:43 AM

LAST REVISION 11/01/20	DESCRIPTION:
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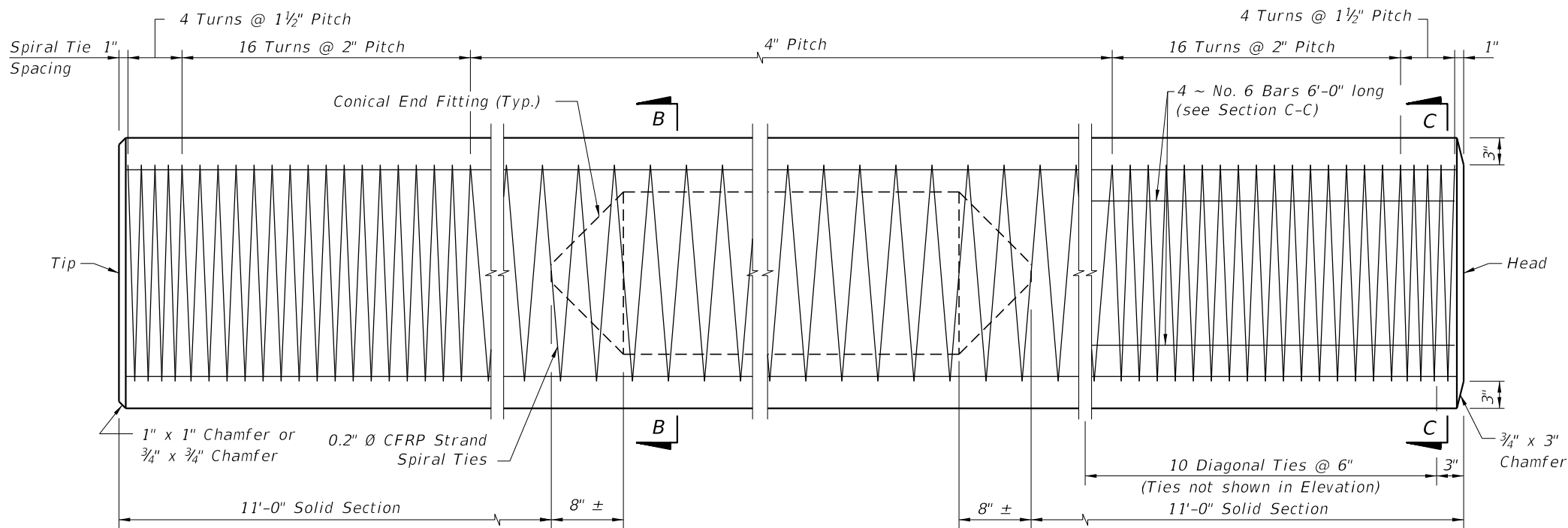


FY 2022-23  
 STANDARD PLANS

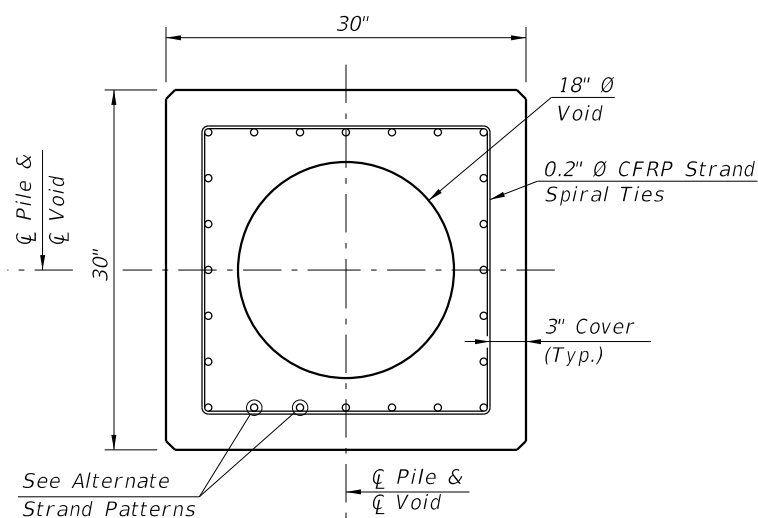
24" SQUARE CFRP & SS PRESTRESSED  
 CONCRETE PILE

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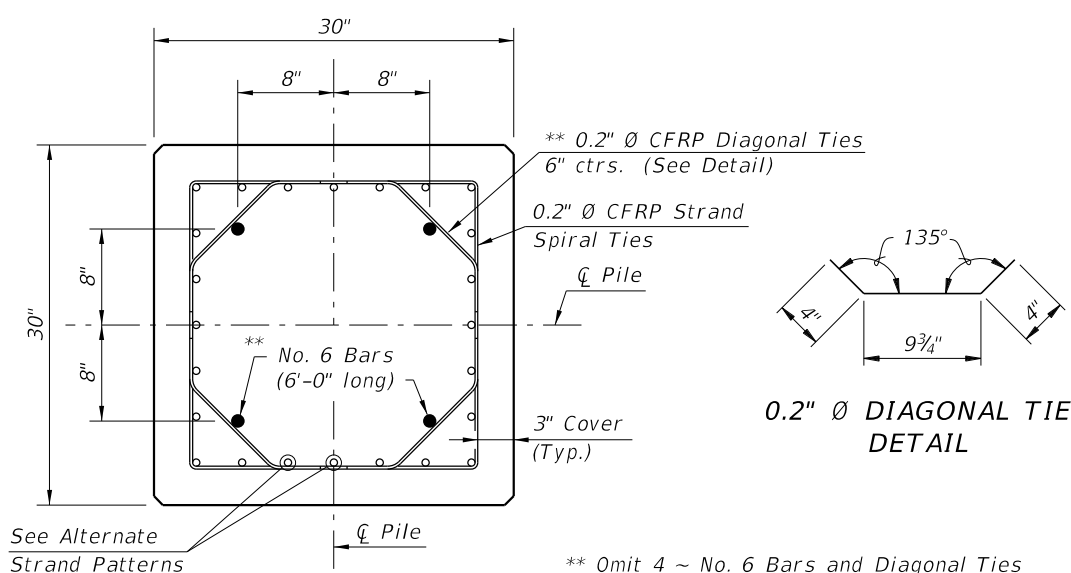
SHEET  
 2 of 2



ELEVATION

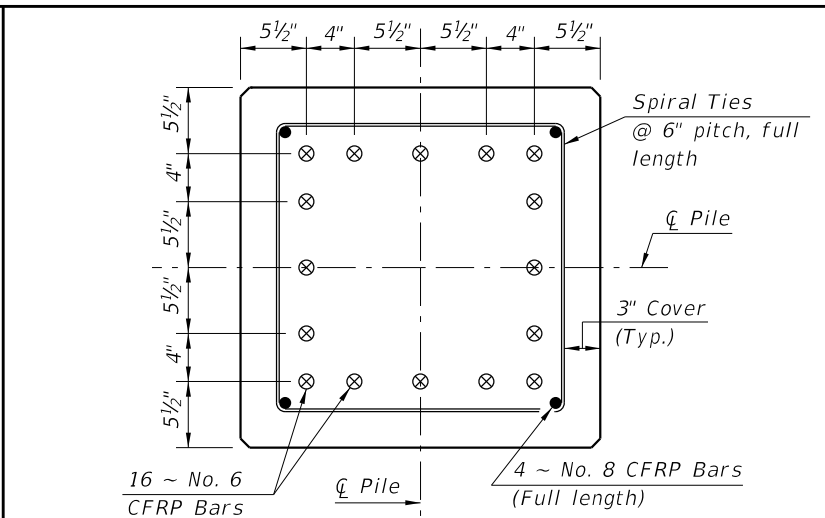


SECTION B-B  
(See Pile Splice Reinforcement Details)

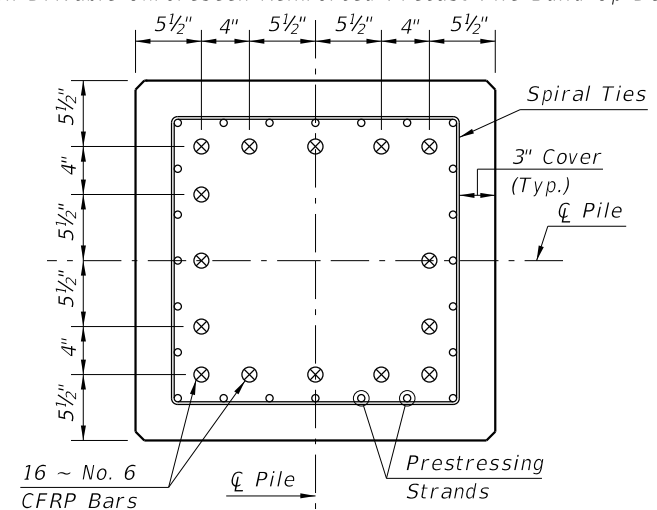


SECTION C-C  
(See Pile Splice Reinforcement Details)

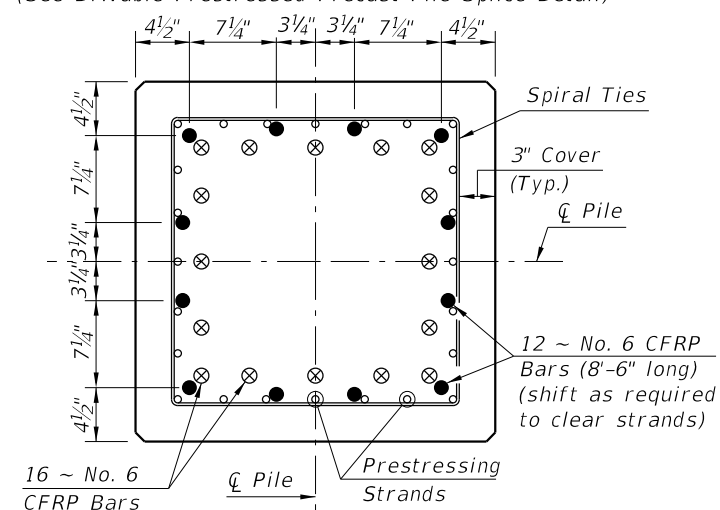
\*\* Omit 4 ~ No. 6 Bars and Diagonal Ties in pre-planned mechanical splice.



SECTION D-D  
(See Non-Drivable Unforeseen Reinforced Precast Pile Build-Up Detail)



SECTION E-E  
(See Drivable Prestressed Precast Pile Splice Detail)



SECTION F-F  
(See Drivable Preplanned Prestressed Precast Pile Splice Detail)

CFRP PILE SPLICE DETAILS

ALTERNATE STRAND PATTERNS

- 20 ~ 0.6" Ø, CFRP 7-Strand at 38 kips
- 20 ~ 1/2" Ø, CFRP Single-Strand at 37 kips

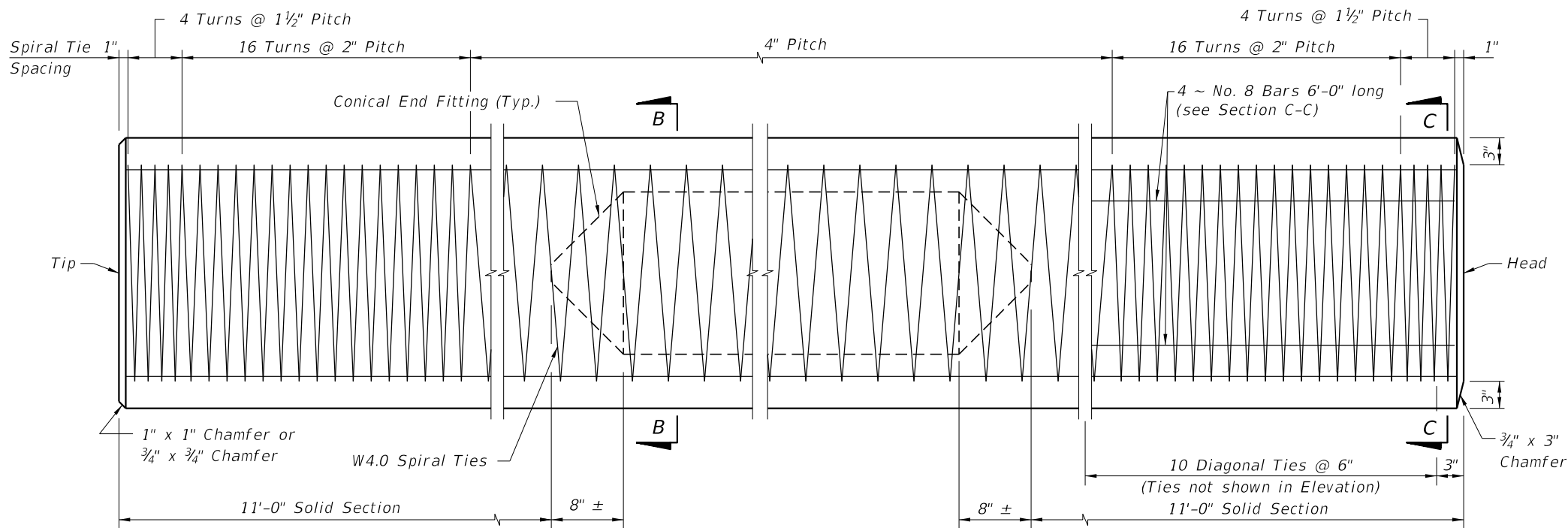
NOTES:

- Any of the given Strand Patterns may be utilized. The strands shall be located as follows: Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.
- CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" Ø void. In this event, the Contractor shall submit calculations for approval and a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the Diagonal Ties, to maintain the position of the 4 ~ #6 Bars, may be approved by the Engineer.
- Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.

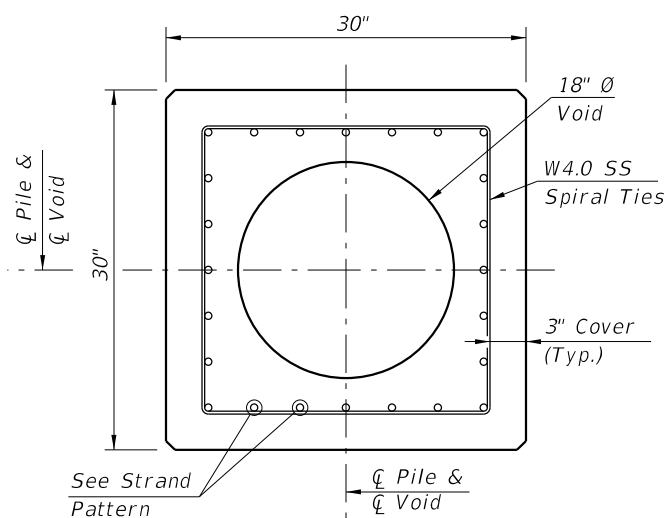
CFRP PRESTRESSED PILE DETAILS

9/23/2021 9:54:44 AM

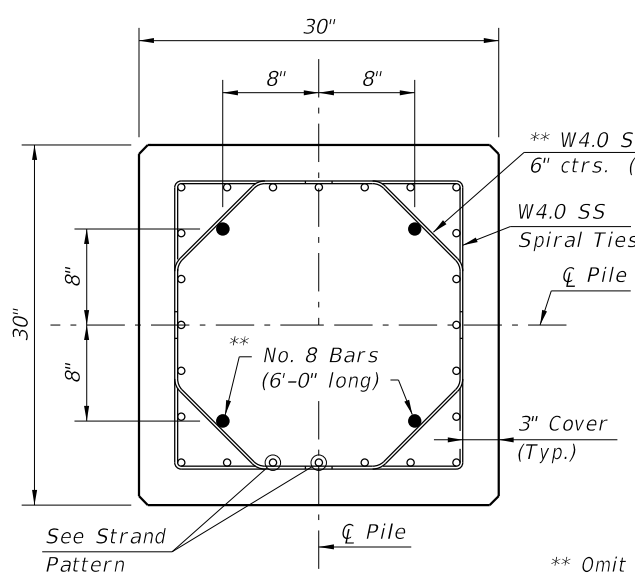
LAST REVISION 11/01/16	DESCRIPTION:	FDOT	FY 2022-23 STANDARD PLANS	30" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX 455-130	SHEET 1 of 2
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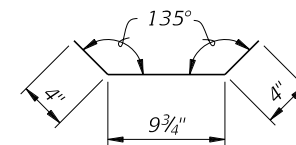
ELEVATION



SECTION B-B  
(See Pile Splice Reinforcement Details)



SECTION C-C  
(See Pile Splice Reinforcement Details)



W4.0 DIAGONAL TIE  
DETAIL

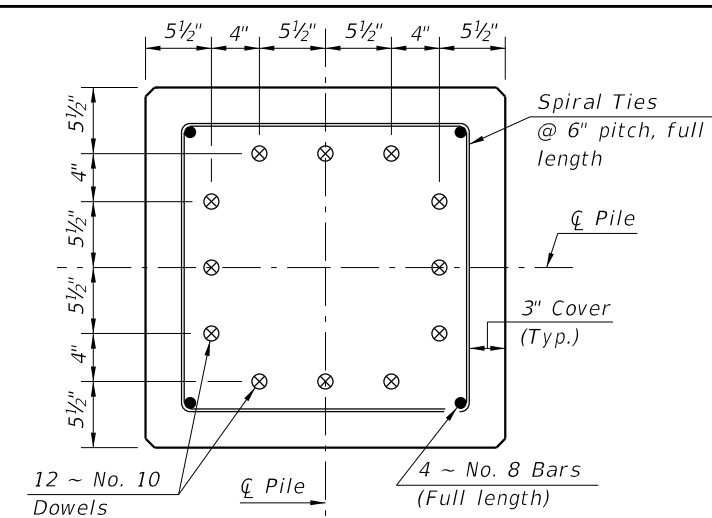
\*\* Omit 4 ~ No. 8 Bars and Diagonal Ties in pre-planned mechanical splice.

NOTES:

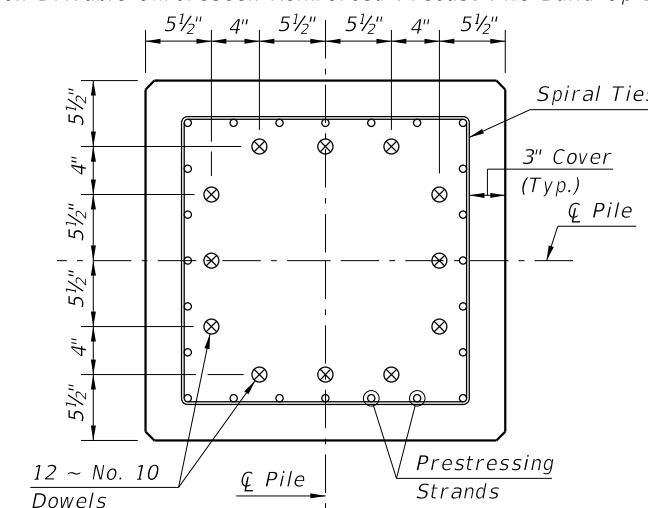
- Any of the given Strand Patterns may be utilized. The strands shall be located as follows: Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.
- CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" Ø void. In this event, the Contractor shall submit calculations for approval and a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the Diagonal Ties, to maintain the position of the 4 ~ #8 Bars, may be approved by the Engineer.
- Work this Index with Index 455-101 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Piles and Index 455-102 - Square CFRP & SS Prestressed Concrete Pile Splices.

STRAND PATTERN

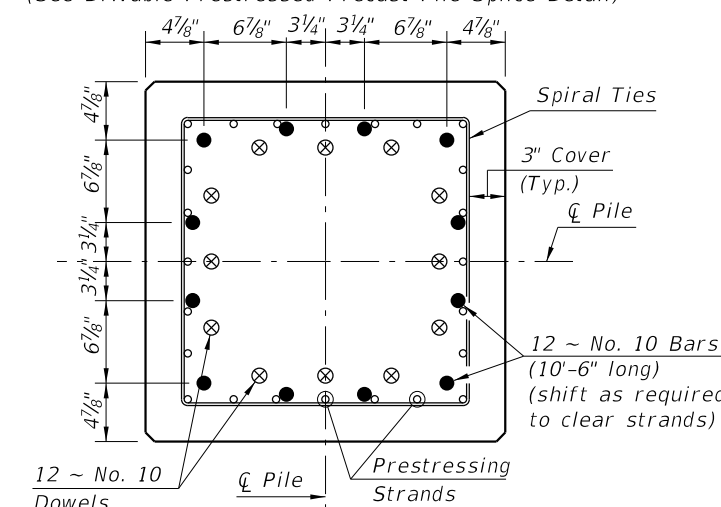
- 32 ~ 1/2" Ø, HSSS at 26 kips
- 24 ~ 0.6" Ø, HSSS at 35 kips



SECTION D-D  
(See Non-Drivable Unforescen Reinforced Precast Pile Build-Up Detail)



SECTION E-E  
(See Drivable Prestressed Precast Pile Splice Detail)



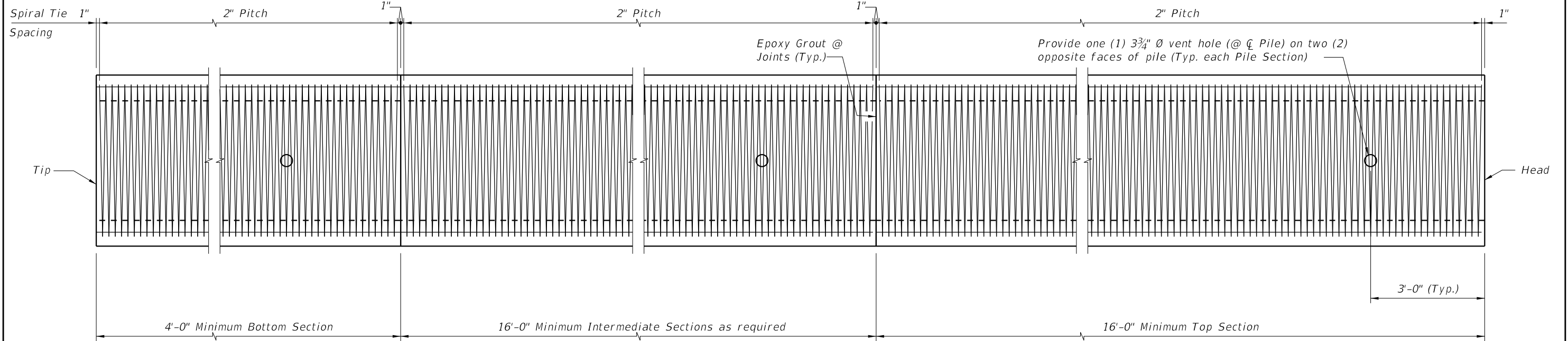
SECTION F-F  
(See Drivable Preplanned Prestressed Precast Pile Splice Detail)

SS PILE SPLICE DETAILS

SS PRESTRESSED PILE DETAILS

9/23/2021 9:54:50 AM

LAST REVISION 11/01/20	DESCRIPTION:		FY 2022-23 STANDARD PLANS	30" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE	INDEX	SHEET
					455-130	2 of 2



ELEVATION

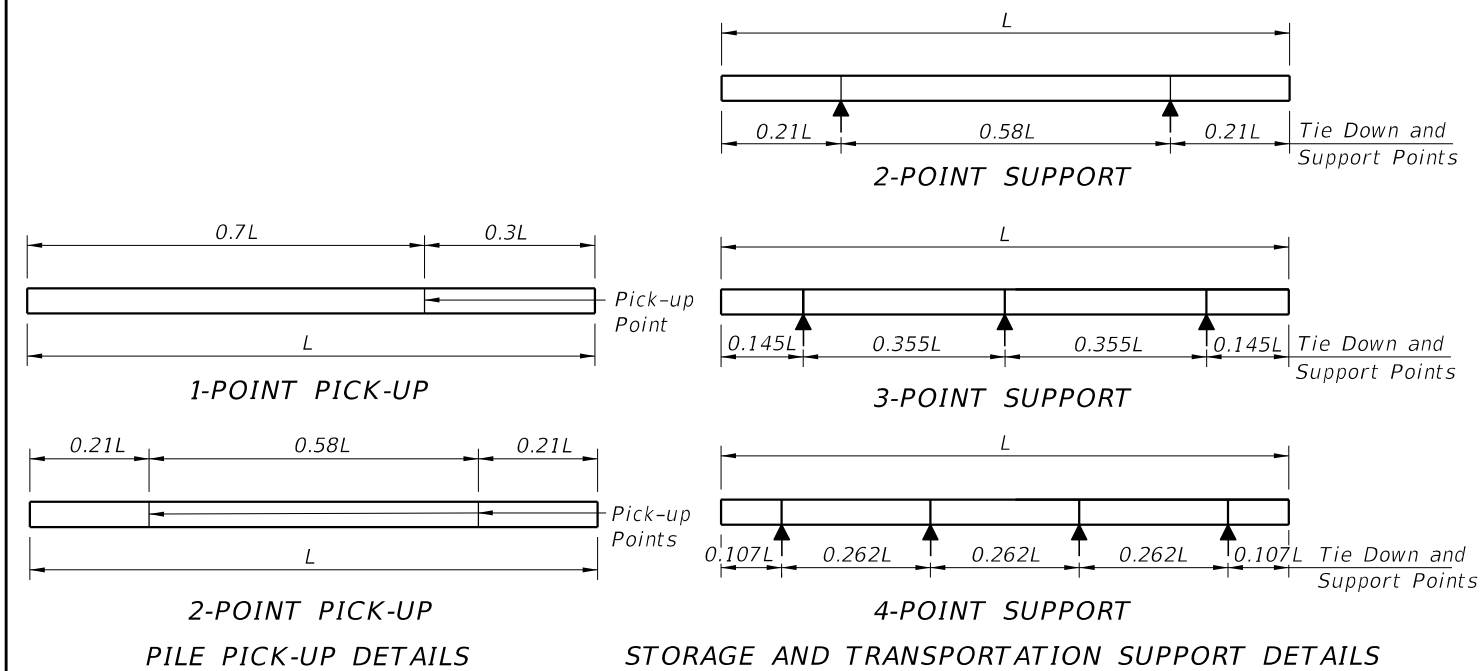


TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS		
Maximum Pile Length (Feet)	Required Storage and Transportation Detail	Pick-Up Detail
119	2, 3, or 4 point	1 Point
170	2, 3, or 4 point	2 Point

NOTES

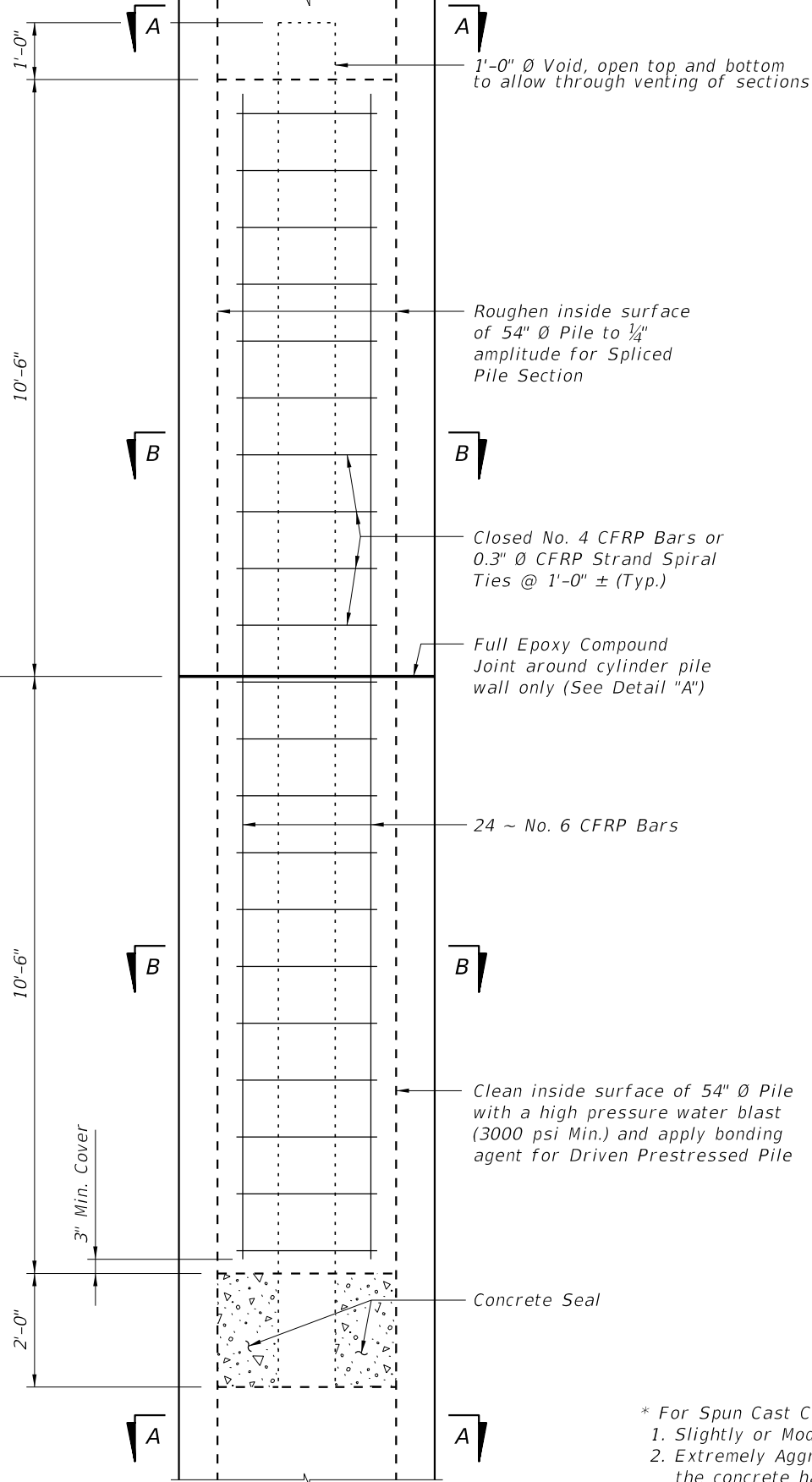
- Work this Index with the Pile Data Table in the Structures Plans.
- Concrete:
  - Piles: Class V (Special)
  - Splice: Class IV
  - See "GENERAL NOTES" in Structures Plans for locations where the use of Highly Reactive Pozzolans is required for options using stainless steel strand and reinforcing.
- Concrete Strength at time of prestress transfer:
  - Piles: 6,000 psi minimum.
- Reinforcing:
  - Bars:
    - Stainless Steel: Meet the requirements of Specification Section 931 for Type 304, Grade 75.
    - Carbon FRP: Meet the requirements of Specification Section 932.
  - Prestressing Strands:
    - Stainless Steel: Seven-wire HSSS, UNS S32205 (Type 2205) or UNS S31803 strand, meeting the requirements of Specification Section 933.
    - Carbon FRP: Meet the requirements of Specification Section 933.
  - Spiral Ties:
    - One half turn is required for carbon steel spiral splice.
    - One full turn is required at the pile head and tip.
- Pile Splices:
  - Epoxy: Type AB Epoxy Compound or Mortar must meet the requirements of Specification Section 926.
    - Use a Type AB Epoxy Bonding Compound or Epoxy Mortar, as recommended by the Manufacturer, to form the joint between pile sections.
    - Use a Type AB Epoxy Bonding Compound as a bonding agent on internal pile surfaces.
  - Driving: Resume pile driving after splice concrete reaches a minimum strength of 5,500 psi.
- Mark piles at the pick-up points to indicate the proper points for attaching handling lines.

9/23/2021 9:54:50 AM

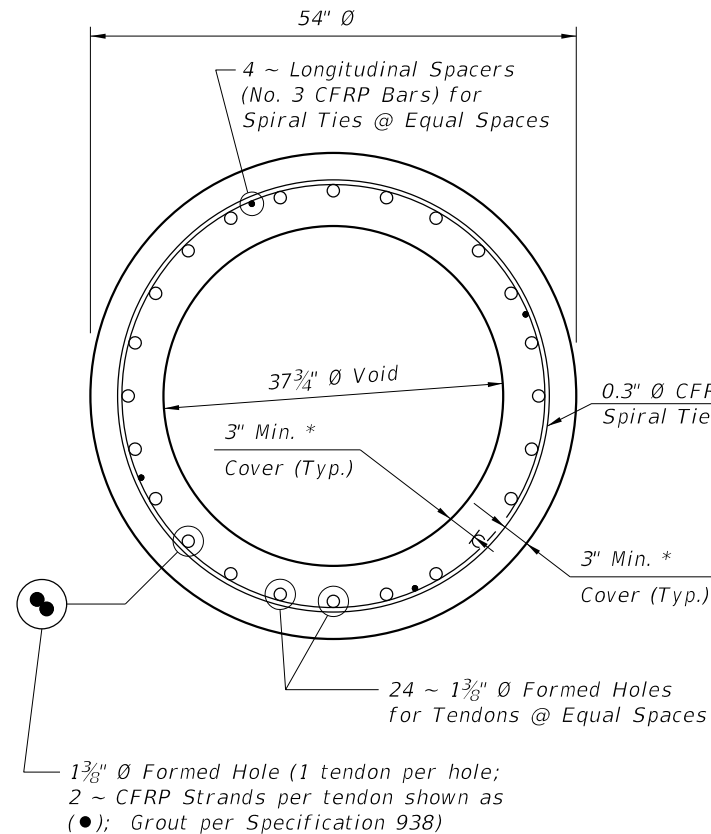
9/23/2021 9:54:52 AM

Spliced Precast/Post-Tensioned Pile Section

Driven Precast/Post-Tensioned Pile



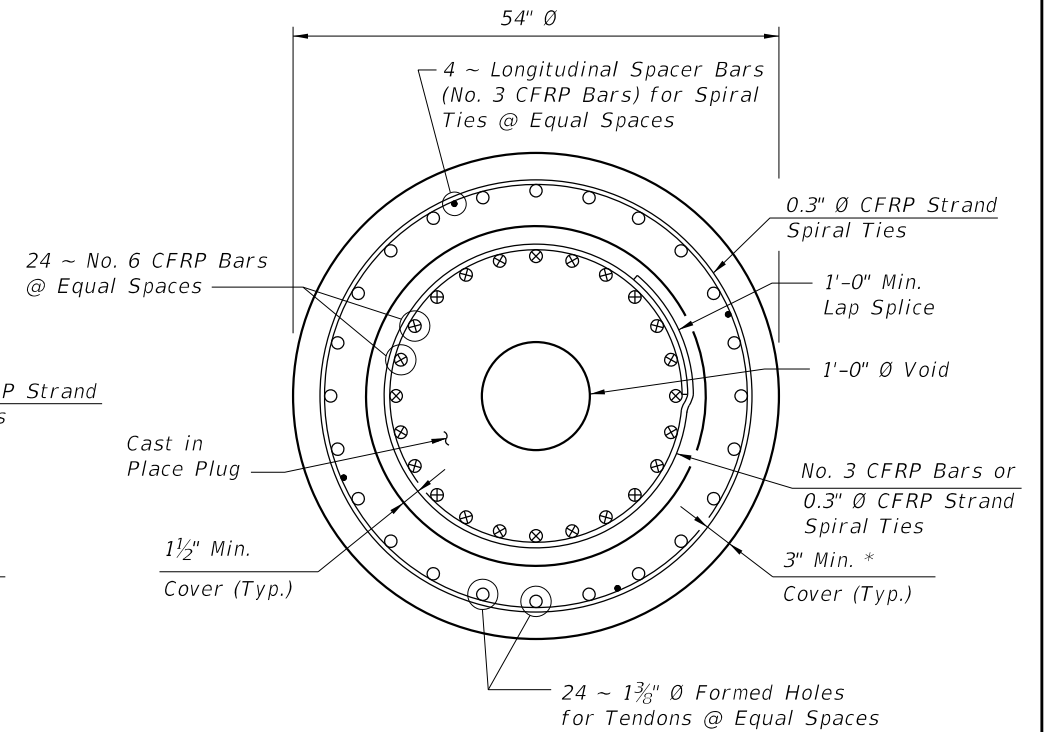
**DRIVABLE UNFORESEEN FIELD SPLICE DETAIL**  
(Cast-In-Place Plug)



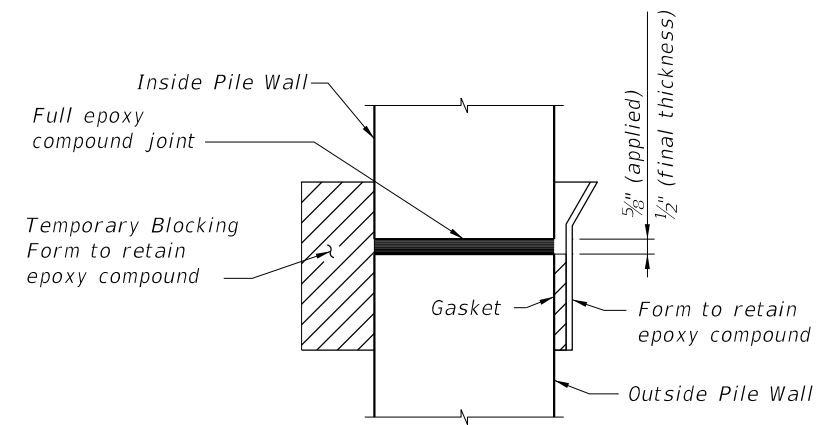
**SECTION A-A**

**ALTERNATE STRAND PATTERNS**

- 48 ~ 0.5" Ø, Single-Strand, at 28 kips
- 48 ~ 0.6" Ø, 7-Strand, at 29 kips



**SECTION B-B**



**DETAIL "A"**

\* For Spun Cast Cylinder Piles, the following requirements for concrete cover apply:  
 1. Slightly or Moderately Aggressive Environments: The concrete cover may be reduced to 2 inches.  
 2. Extremely Aggressive Environments: The concrete cover may be reduced to 2 inches as long as the concrete has a documented chloride ion penetration apparent diffusion coefficient with a mean value of 0.005 in<sup>2</sup> per year or less; otherwise, a 3-inch concrete cover is required.

**CFRP POST-TENSIONED PILE DETAILS**

LAST REVISION 01/01/16	DESCRIPTION:
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FY 2022-23  
STANDARD PLANS

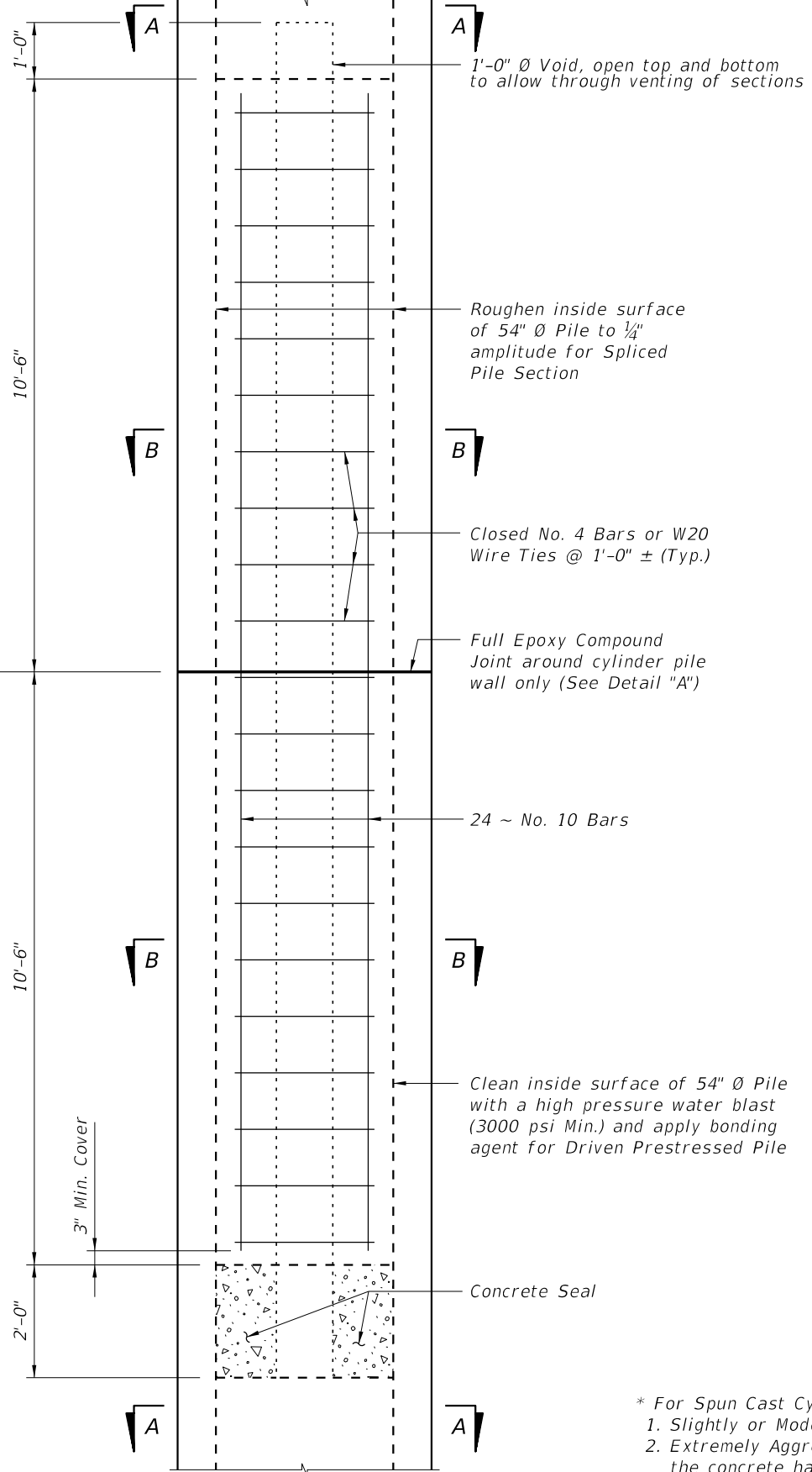
54" PRECAST/POST-TENSIONED CFRP & SS  
CONCRETE CYLINDER PILE

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455-154

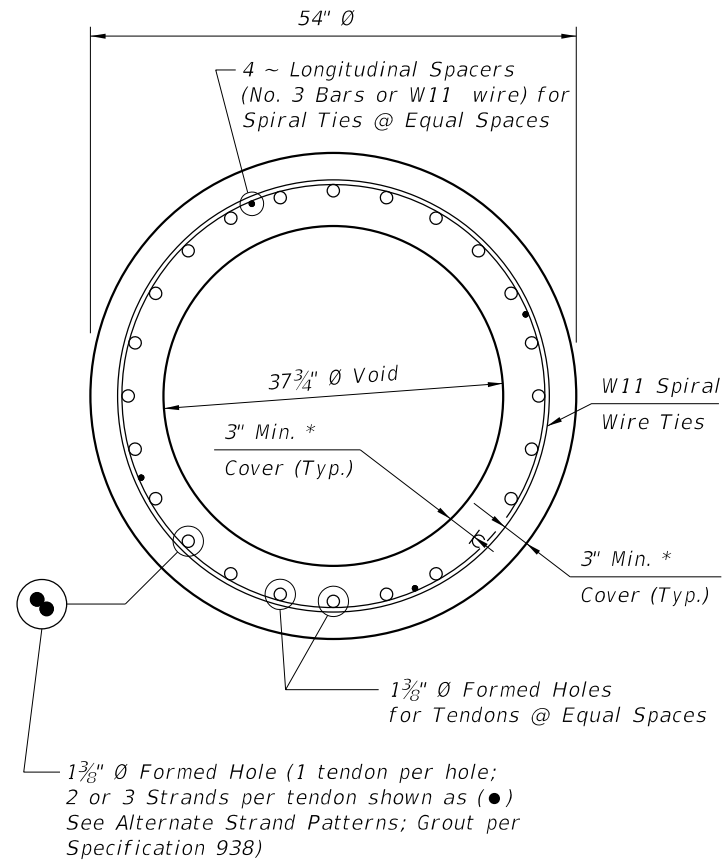
SHEET  
2 of 3

Spliced Precast/Post-Tensioned Pile Section

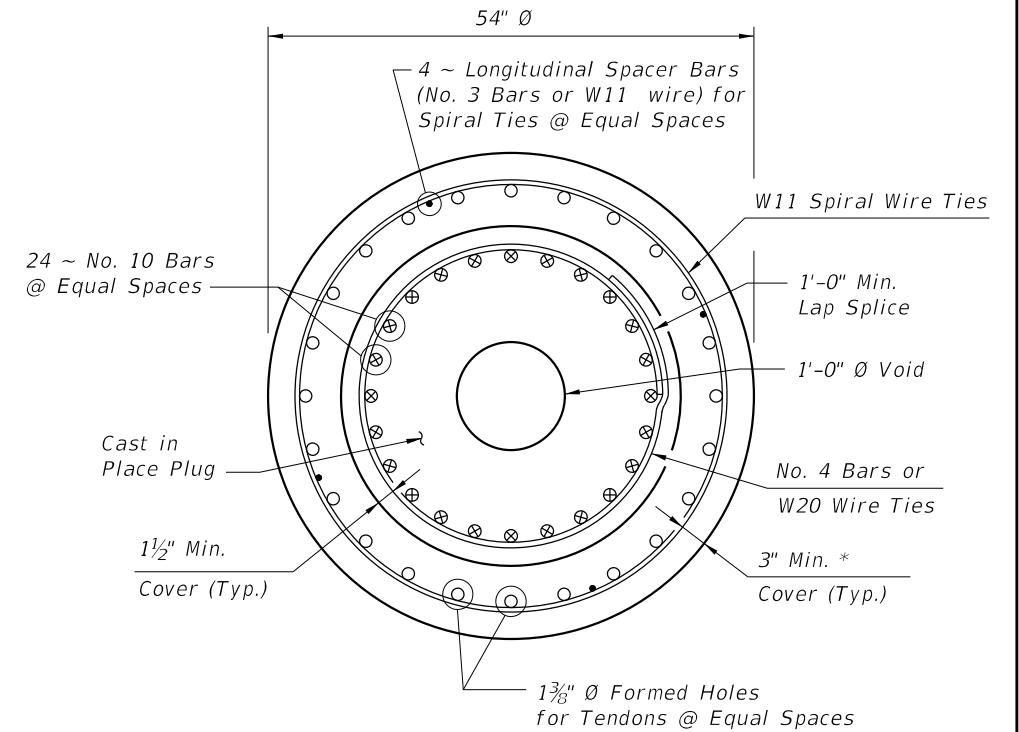
Driven Precast/Post-Tensioned Pile



**DRIVABLE UNFORESEEN FIELD SPLICE DETAIL**  
(Cast-In-Place Plug)



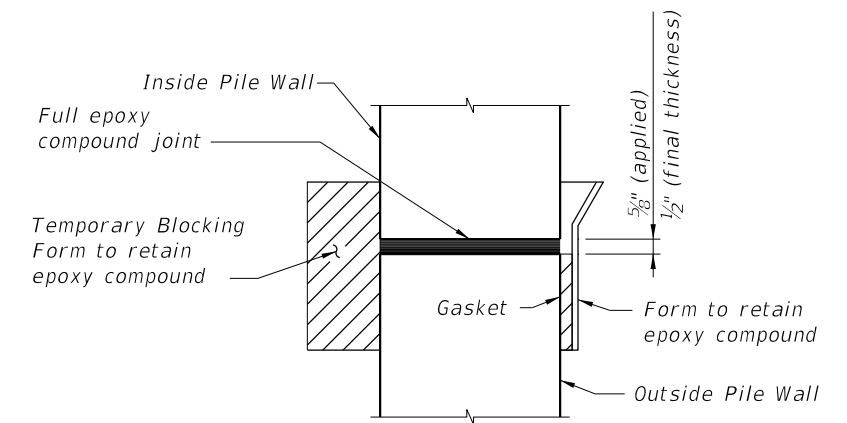
**SECTION A-A**



**SECTION B-B**

**ALTERNATE STRAND PATTERNS**

- 72 ~ 1/2" Ø, HSSS Strands, at 21 kips (24~3 strand tendons)
- 58 ~ 1/2" Ø, HSSS Strands, at 24 kips (29~2 strand tendons)
- 48 ~ 0.6" Ø, HSSS Strands, at 32 kips (24~2 strand tendons)



**DETAIL "A"**

\* For Spun Cast Cylinder Piles, the following requirements for concrete cover apply:  
 1. Slightly or Moderately Aggressive Environments: The concrete cover may be reduced to 2 inches.  
 2. Extremely Aggressive Environments: The concrete cover may be reduced to 2 inches as long as the concrete has a documented chloride ion penetration apparent diffusion coefficient with a mean value of 0.005 in<sup>2</sup> per year or less; otherwise, a 3-inch concrete cover is required.

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LAST REVISION	01/01/16	DESCRIPTION:
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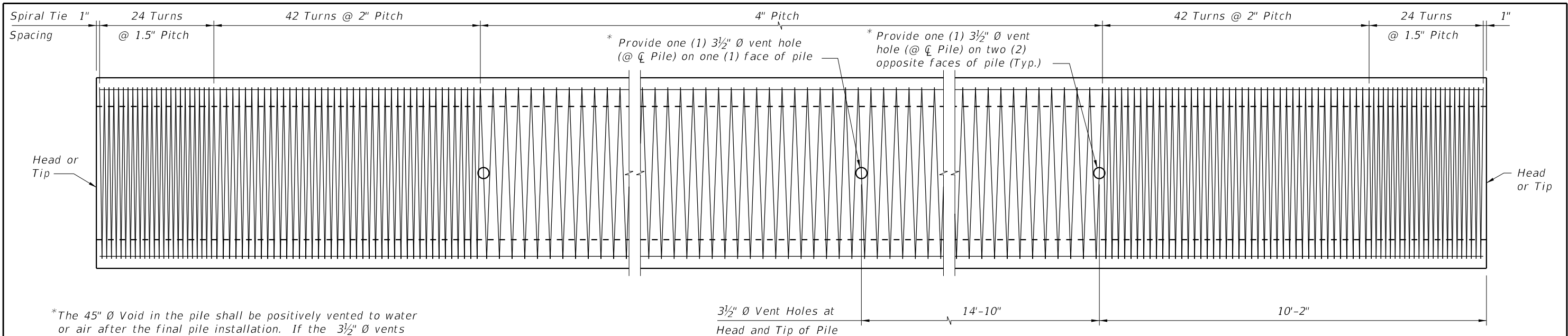
FY 2022-23  
STANDARD PLANS

54" PRECAST/POST-TENSIONED CFRP & SS  
CONCRETE CYLINDER PILE

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455-154

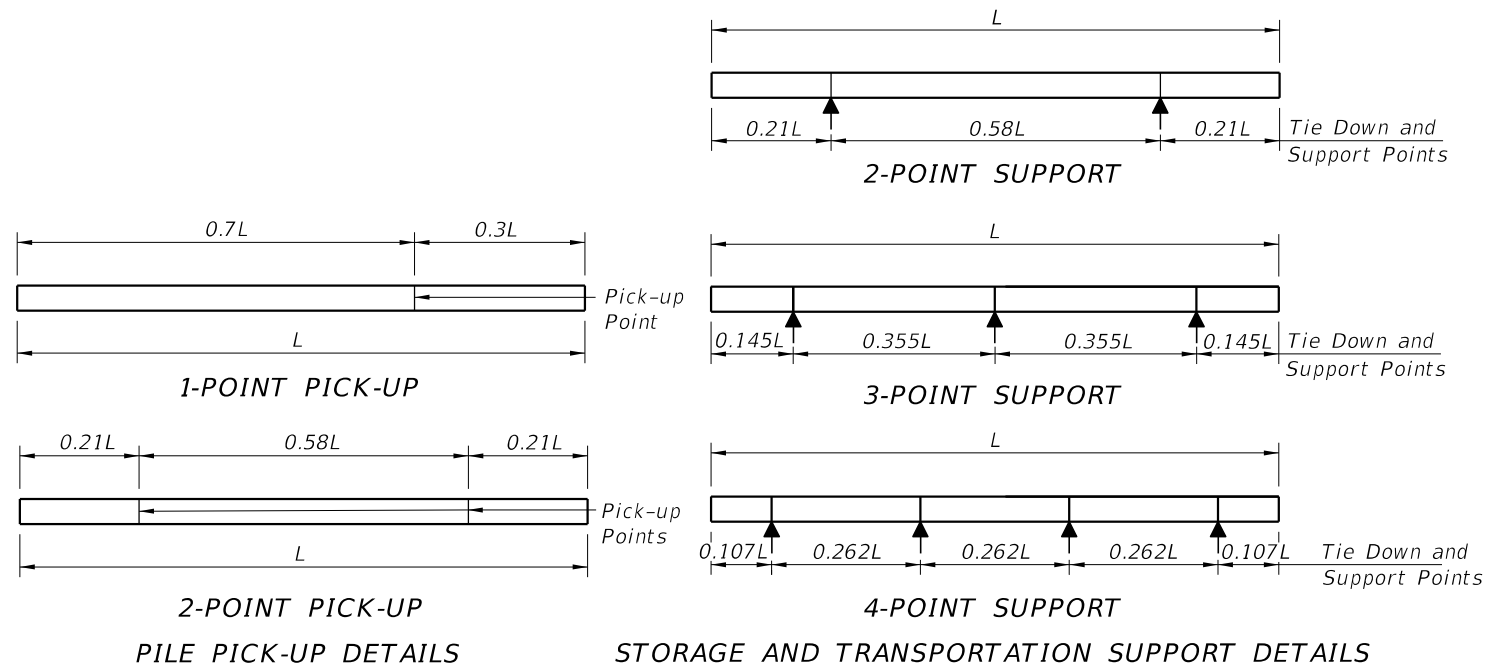
SHEET  
3 of 3

SS POST-TENSIONED PILE DETAILS



ELEVATION

\*The 45"  $\emptyset$  Void in the pile shall be positively vented to water or air after the final pile installation. If the 3 1/2"  $\emptyset$  vents are included in the pile cut-off section, then venting shall be provided by the use of a 1"  $\emptyset$  PVC conduit through the substructure cap or column.



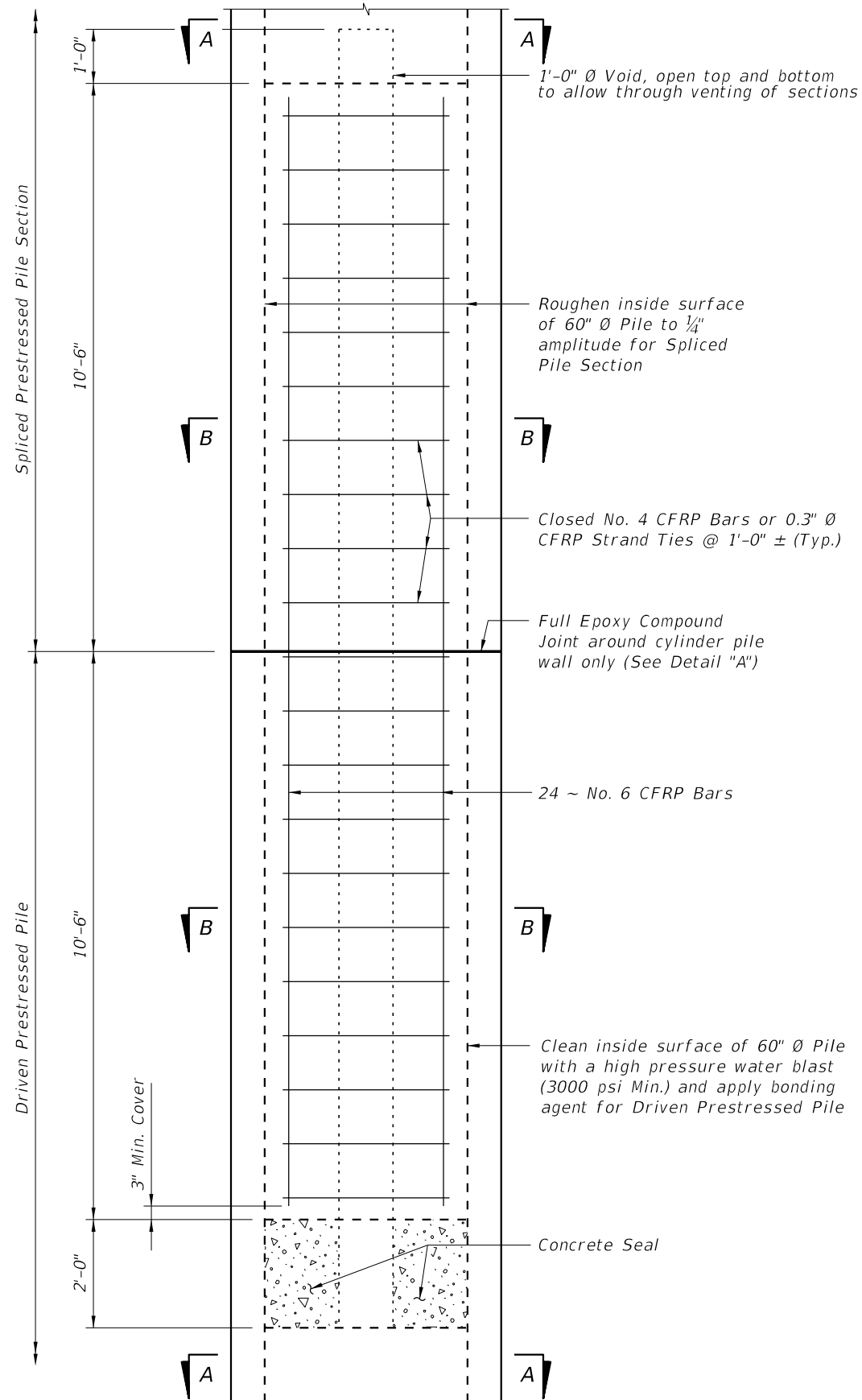
NOTES

- Work this Index with the Pile Data Table in the Structures Plans.
- Concrete:
  - Piles: Class V (Special)
  - Splice Collar: Class IV
  - See "GENERAL NOTES" in the Structures Plans for locations where the use of Highly Reactive Pozzolans is required.
- Concrete Strength at time of prestress transfer:
  - Piles: 4,000 psi minimum.
- Reinforcing:
  - Bars:
    - Stainless Steel: Meet the requirements of Specification Section 931 for Type 304, Grade 75.
    - Carbon FRP: Meet the requirements of Specification Section 932.
  - Prestressing Strands:
    - Stainless Steel: Seven-wire HSSS, UNS S32205 (Type 2205) or UNS S31803 strand, meeting the requirements of Specification Section 933.
    - Carbon FRP: Meet the requirements of Specification Section 933.
  - Spiral Ties:
    - One half turn is required for carbon steel spiral splice.
    - One full turn is required at the pile head and tip.
- Pile Splices:
  - Epoxy: Type AB Epoxy Compound or Epoxy Mortar must meet the requirements of Specification Section 926.
    - Use a Type AB Epoxy Bonding Compound or Epoxy Mortar, as recommended by the Manufacturer, to form the joint between pile sections
    - Use a Type AB Epoxy Bonding Compound as a bonding agent on internal pile surfaces.
  - Splices: Resume pile driving after the splice concrete reaches a minimum strength of 5,500 psi.
- Mark piles at the pick-up points to indicate the proper points for attaching handling lines.

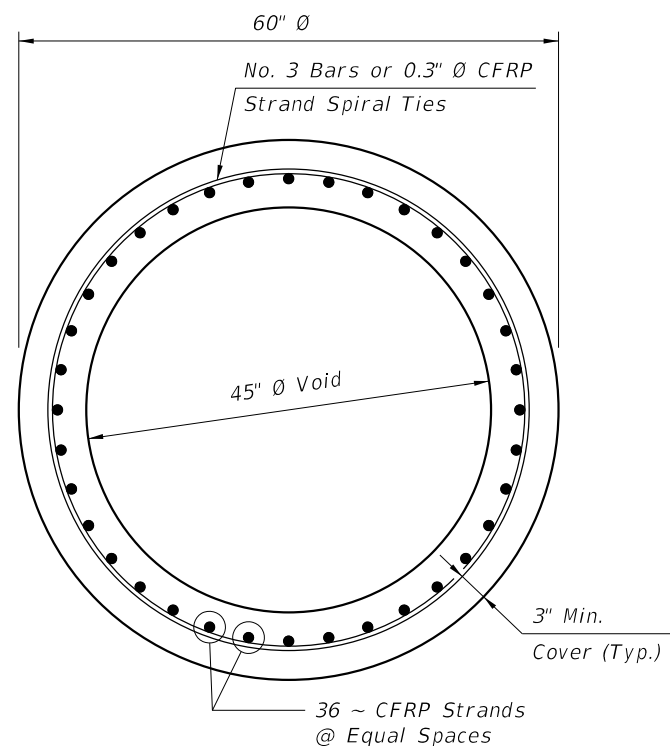
TABLE OF MAXIMUM PILE PICK-UP AND SUPPORT LENGTHS		
Maximum Pile Length (Feet)	Required Storage and Transportation Detail	Pick-Up Detail
122	2, 3, or 4 point	1 Point
174	2, 3, or 4 point	2 Point

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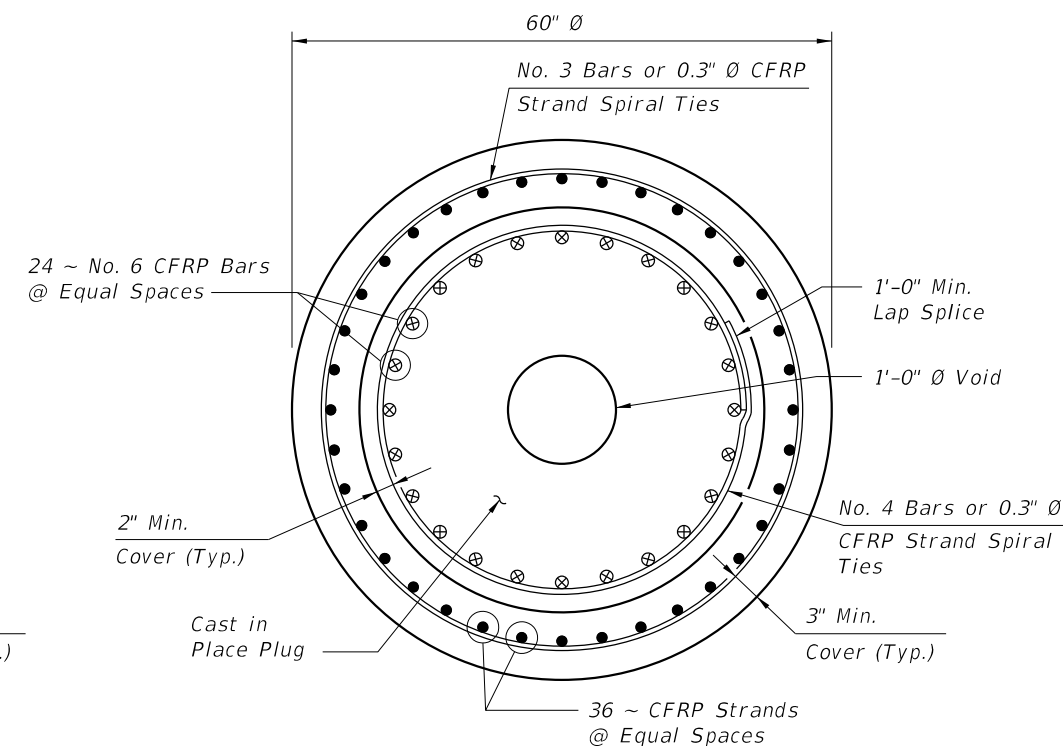




DRIVABLE UNFORESEEN FIELD SPLICE DETAIL  
(Cast in Place Plug)



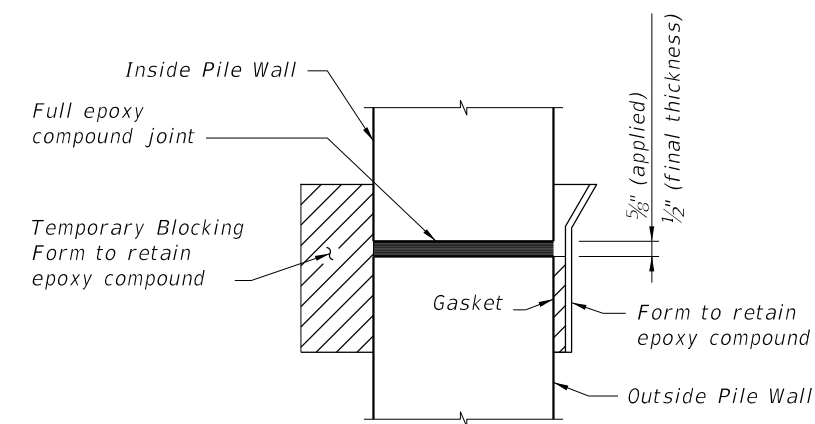
SECTION A-A



SECTION B-B

**ALTERNATE STRAND PATTERNS**

- 0.5" Ø, CFRP Single-Strand, at 39 kips
- 0.6" Ø, CFRP 7-Strand, at 40 kips



DETAIL "A"

9/23/2021 9:54:55 AM

LAST REVISION	01/01/16	DESCRIPTION:
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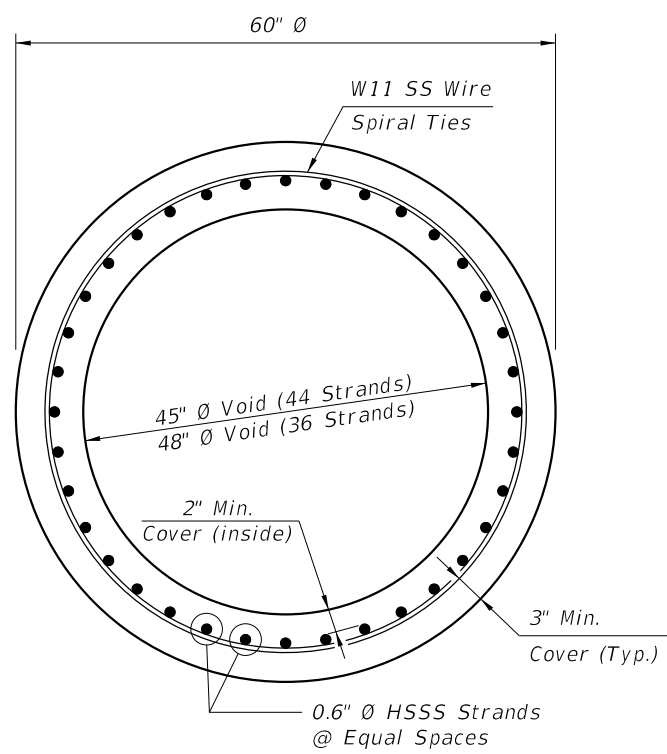
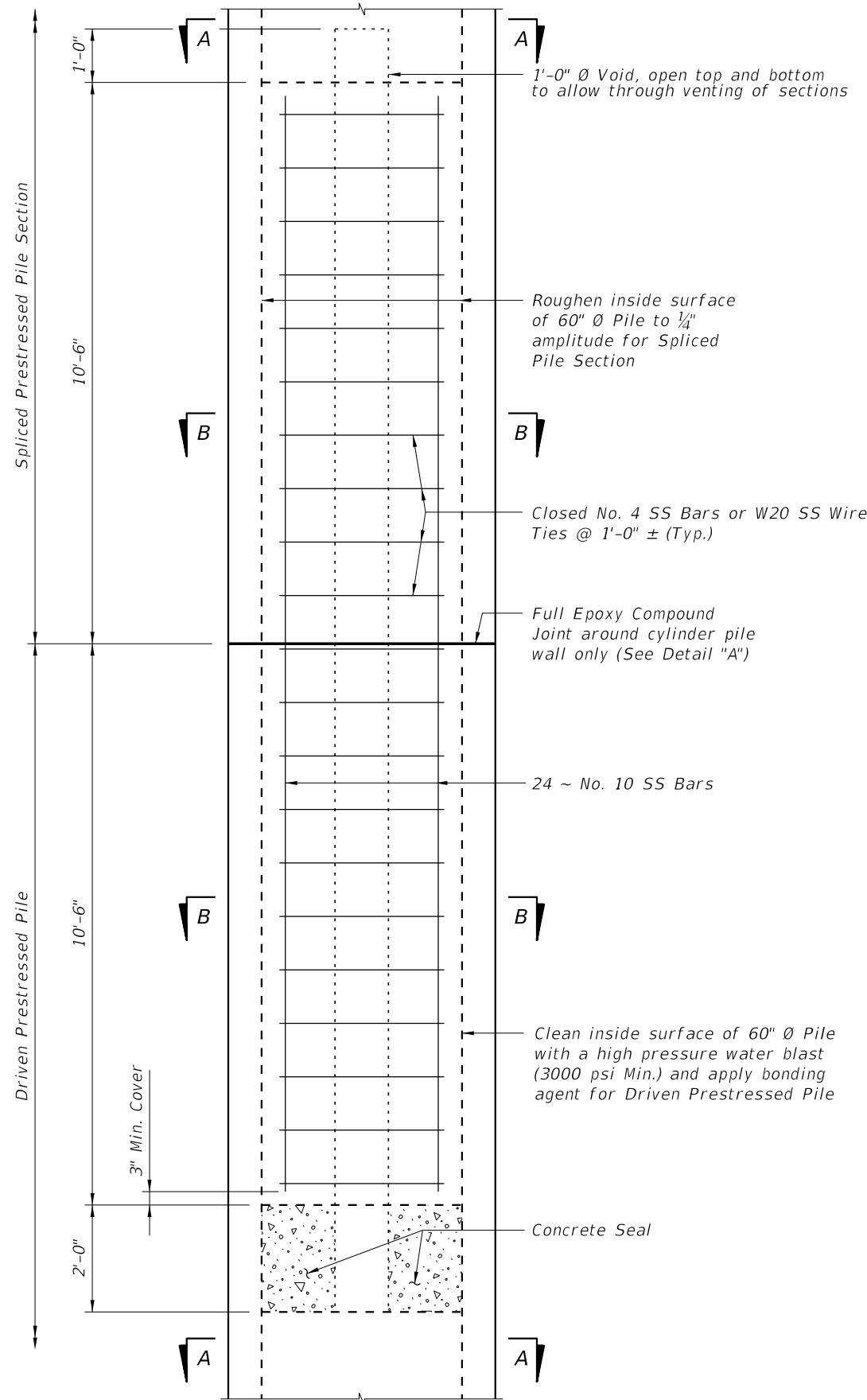
FY 2022-23  
STANDARD PLANS

60" PRESTRESSED CFRP & SS CONCRETE  
CYLINDER PILE

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2 of 3

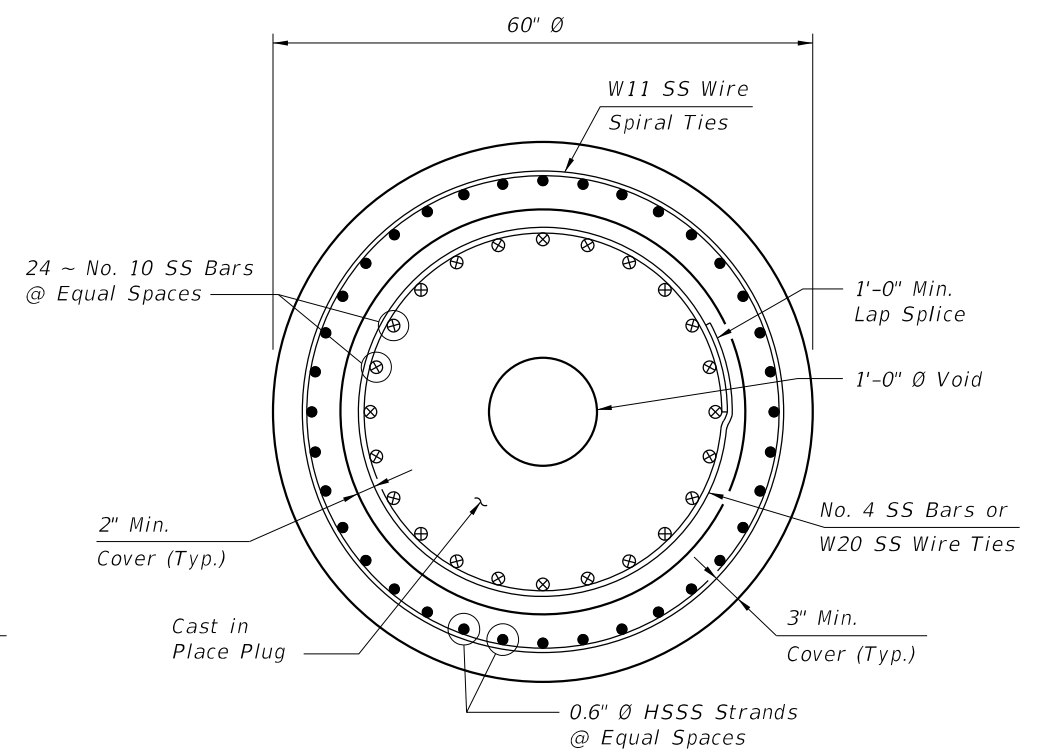
CFRP PRESTRESSED PILE DETAILS



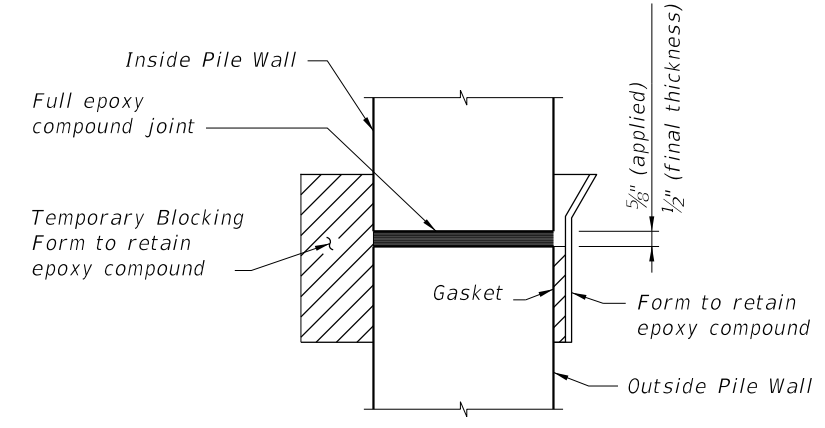
SECTION A-A

**ALTERNATE STRAND PATTERNS**

- 44 ~ 0.6"  $\emptyset$ , HSSS Strand, at 36 kips
- 36 ~ 0.6"  $\emptyset$ , HSSS Strand, at 36 kips



SECTION B-B

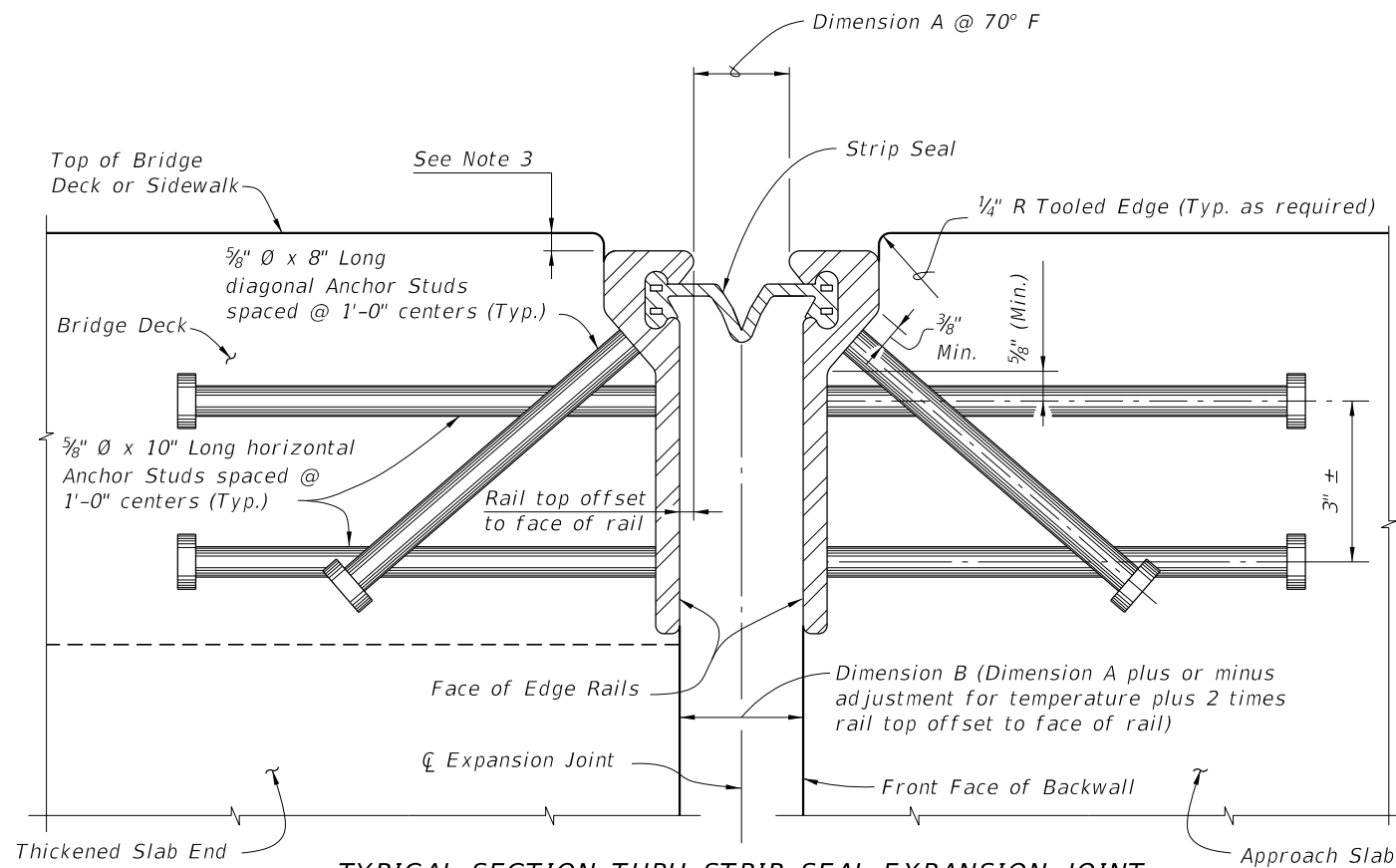


DETAIL "A"

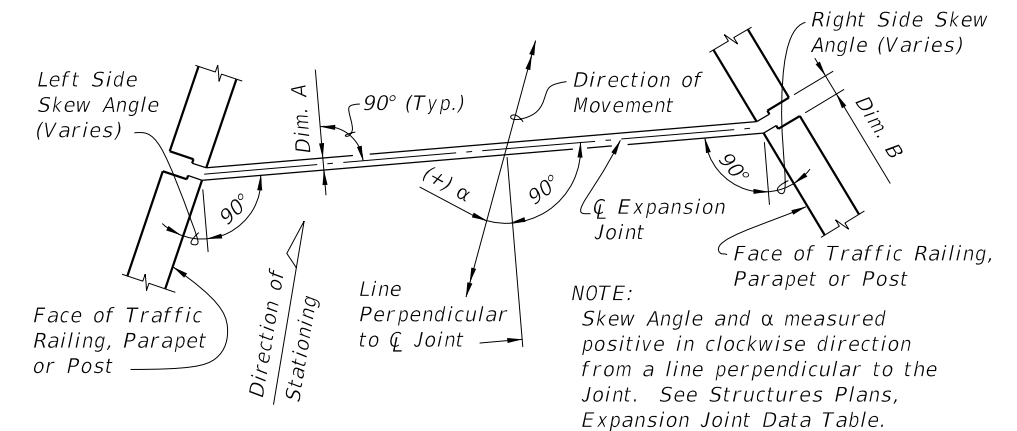
**DRIVABLE UNFORESEEN FIELD SPLICE DETAIL**  
(Cast in Place Plug)

9/23/2021 9:54:55 AM

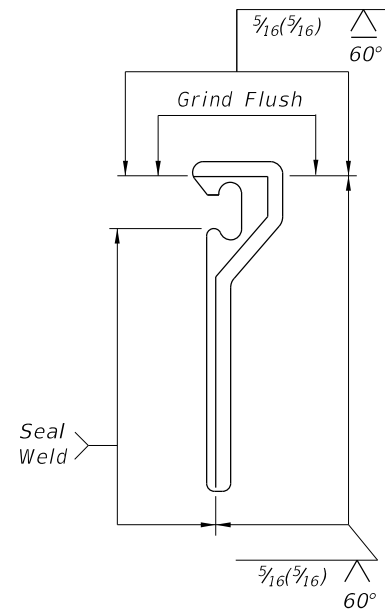
LAST REVISION 01/01/16	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>60" PRESTRESSED CFRP &amp; SS CONCRETE          CYLINDER PILE</b>	INDEX 455-160	SHEET 3 of 3
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**TYPICAL SECTION THRU STRIP SEAL EXPANSION JOINT**  
 (Begin or End Concrete Girder Bridge shown,  
 Intermediate Supports and Steel Girder Bridge similar.)  
 Reinforcing Steel and Girder details not shown for clarity.)



**MOVEMENT SCHEMATIC**



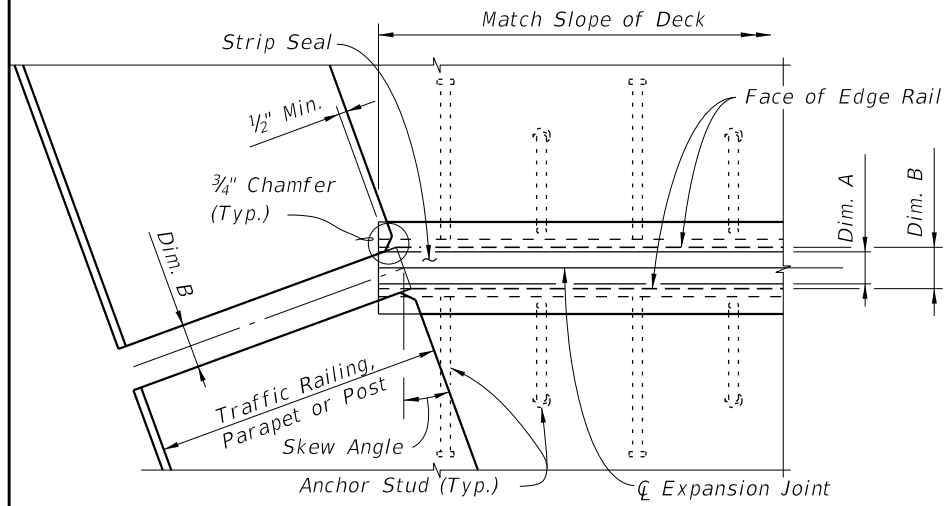
**SHOP SPLICE DETAIL**

**GENERAL NOTES:**

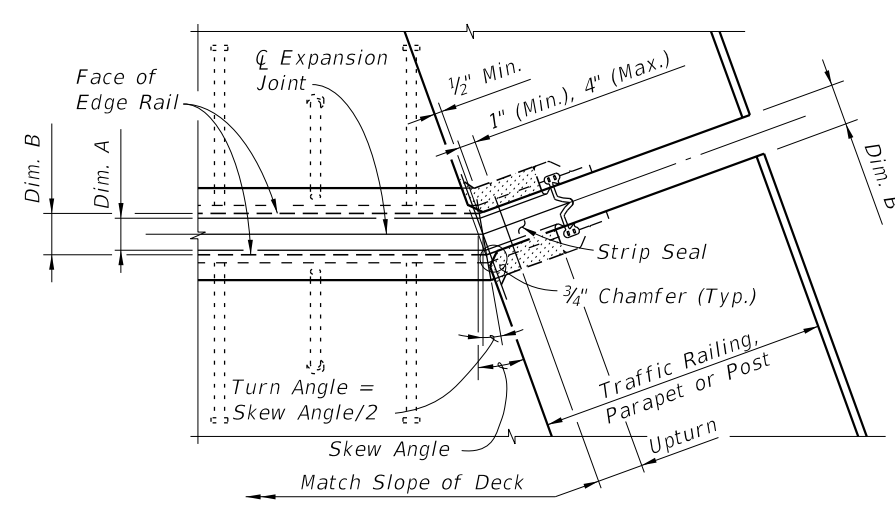
1. Furnish Strip Seal Expansion Joint Systems in accordance with Specification Section 458.
2. Shape of Edge Rail shown is representative, minor variations depending on manufacturer are permitted.
3. Recess the Edge Rail below the concrete surface in accordance with Specification Section 458.
4. Refer to the Expansion Joint Data Table in the Structures Plans for joint movement and Dimension A.
5. Refer to Specification Section 458 for installation and fabrication requirements.

9/23/2021 9:55:01 AM

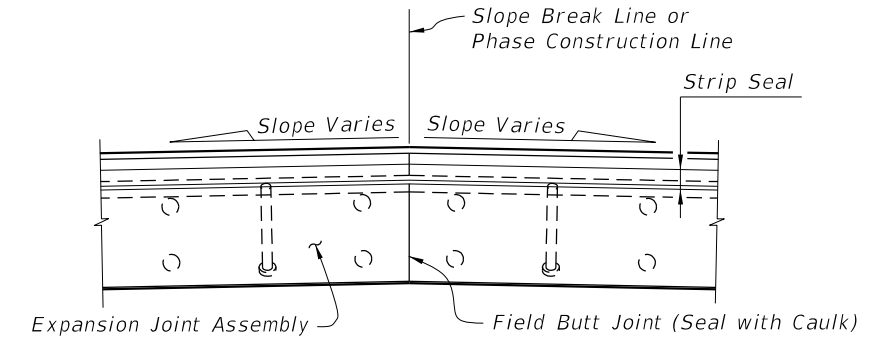
LAST REVISION 11/01/19	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>EXPANSION JOINT SYSTEM - STRIP SEAL</b>	INDEX <b>458-100</b>	SHEET <b>1 of 3</b>
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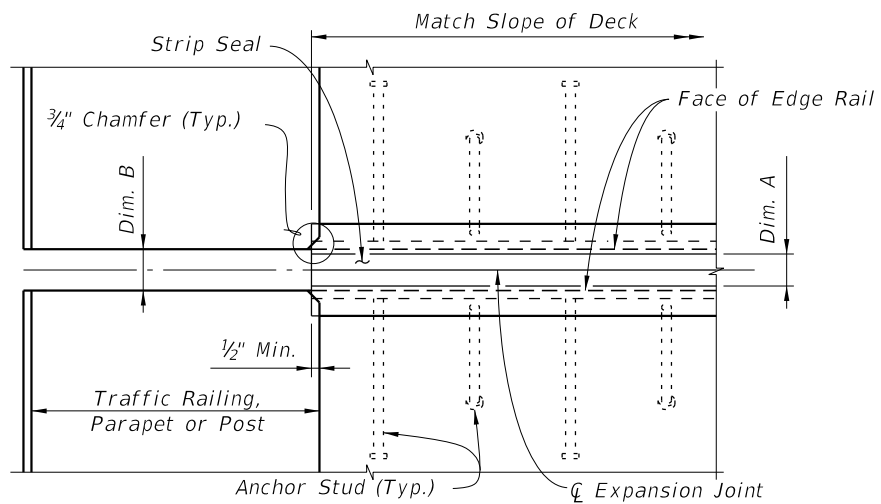
PARTIAL PLAN VIEW OF SKEWED JOINTS



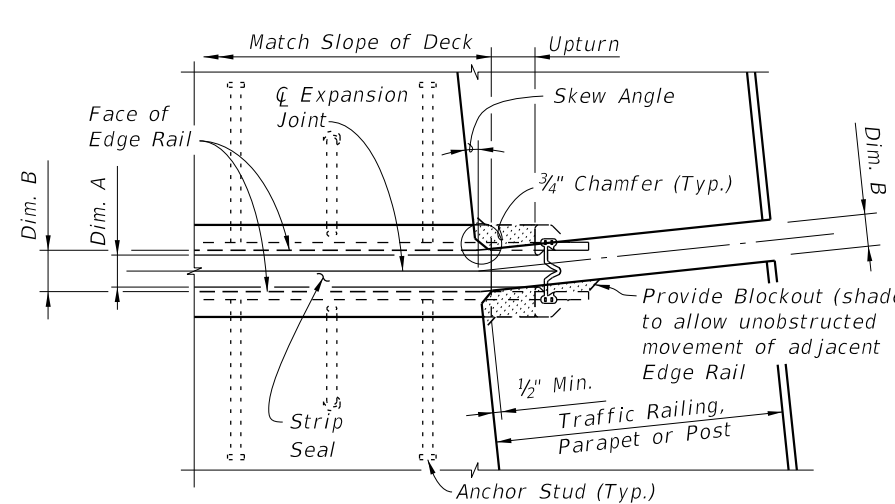
PARTIAL PLAN VIEW OF JOINTS SKEWED GREATER THAN 6°



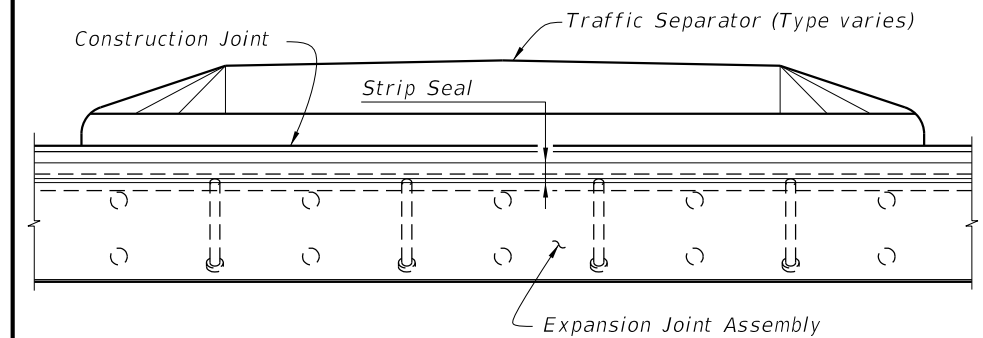
PARTIAL SECTION ALONG Q JOINT AT FIELD BUTT JOINT LOCATION (CROWNED DECK OR SLAB SHOWN)



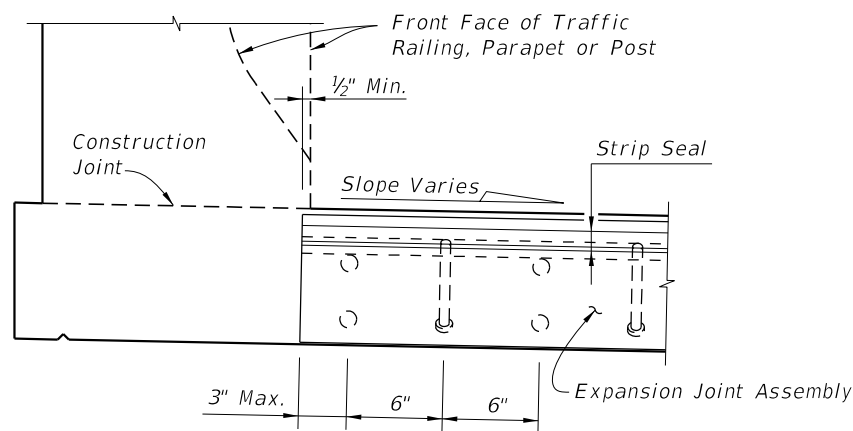
PARTIAL PLAN VIEW OF NONSKEWED JOINTS



PARTIAL PLAN VIEW OF NONSKEWED JOINTS & JOINTS SKEWED 6° OR LESS



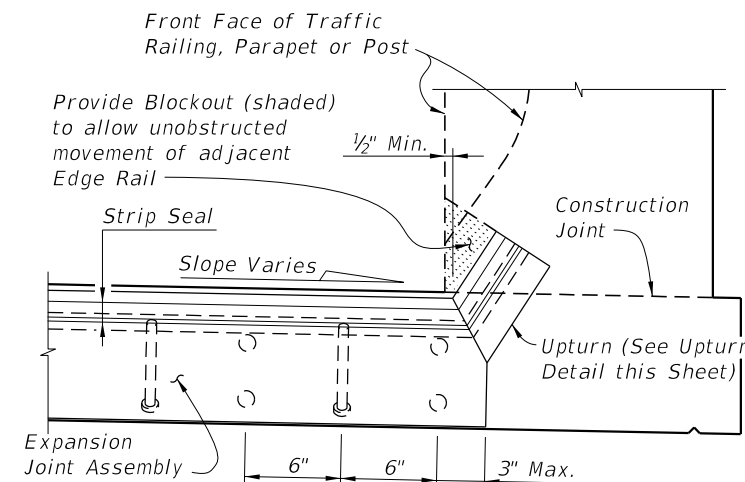
PARTIAL SECTION ALONG Q JOINT THRU TRAFFIC SEPARATOR



PARTIAL SECTION ALONG Q JOINT

JOINT TREATMENT AT HIGH SIDE OF DECK WITH SLOPE ≥ 1%

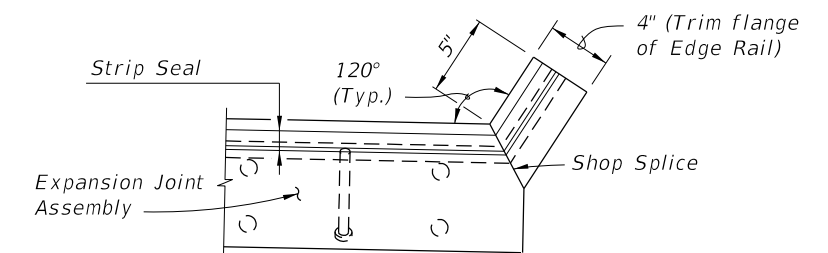
(Sidewalk Cover Plate where applicable not shown for clarity)



PARTIAL SECTION ALONG Q JOINT

JOINT TREATMENT AT LOW SIDE OF DECK & HIGH SIDE OF DECK WITH SLOPE < 1%

(Sidewalk Cover Plate where applicable not shown for clarity)



UPTURN DETAIL (TYPICAL AT TRAFFIC BARRIERS AND PARAPETS)

9/23/2021 9:55:02 AM

LAST REVISION 11/01/19	REVISION	DESCRIPTION:
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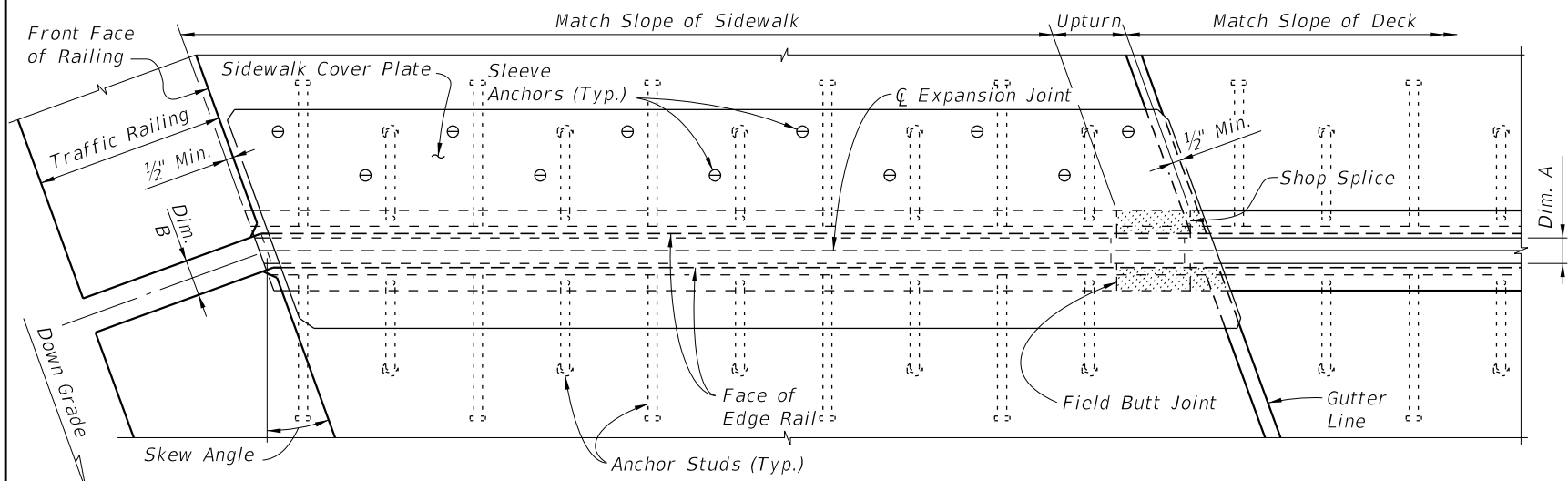


FY 2022-23  
STANDARD PLANS

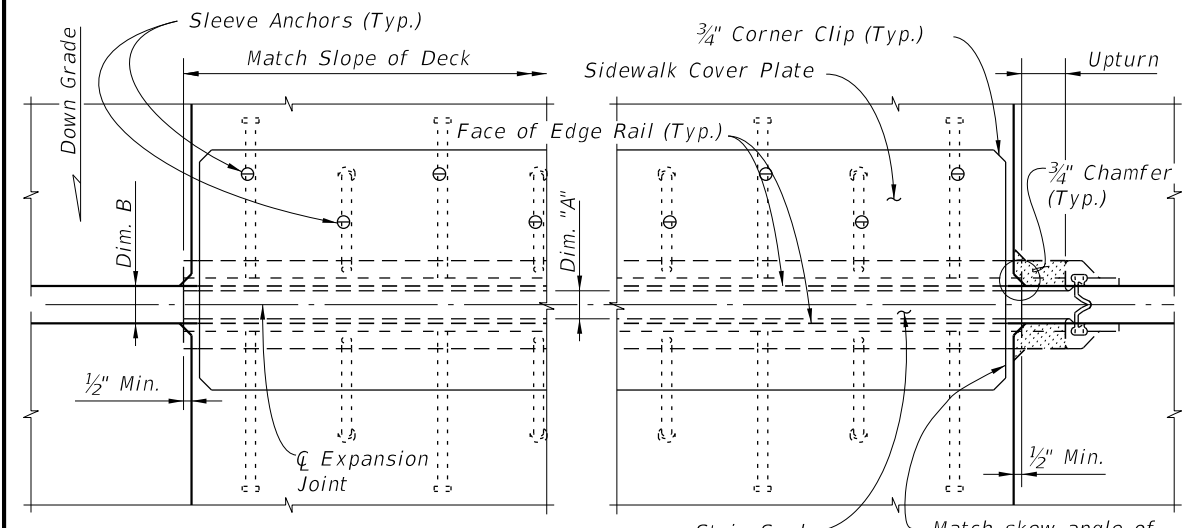
EXPANSION JOINT SYSTEM -  
STRIP SEAL

INDEX  
458-100

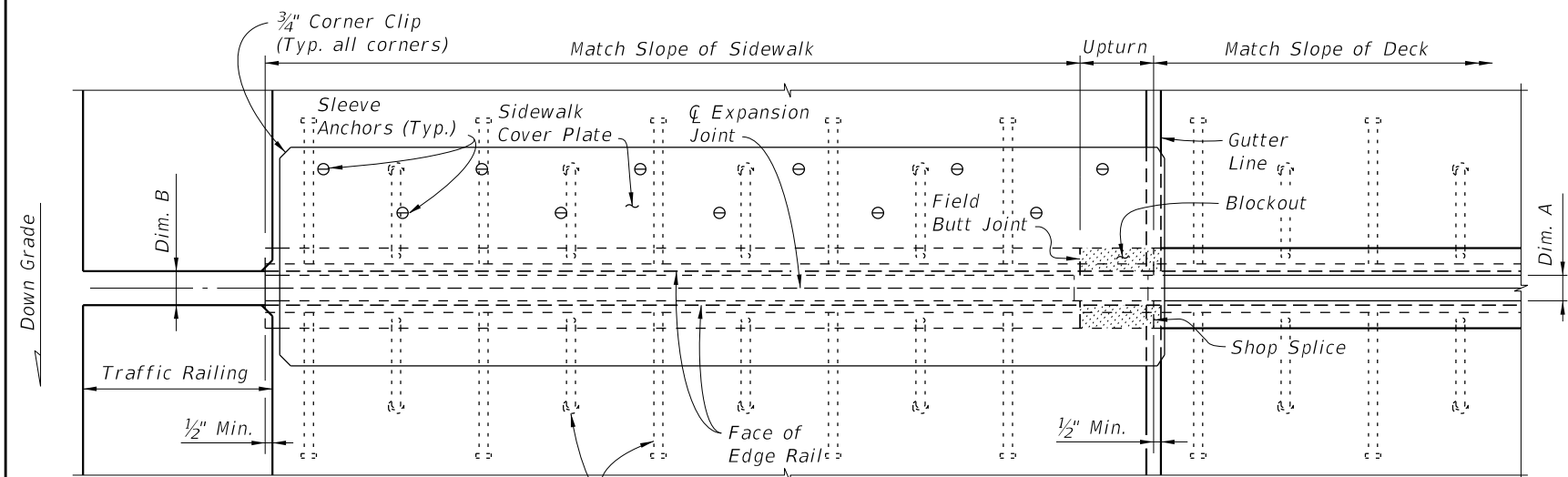
SHEET  
2 of 3



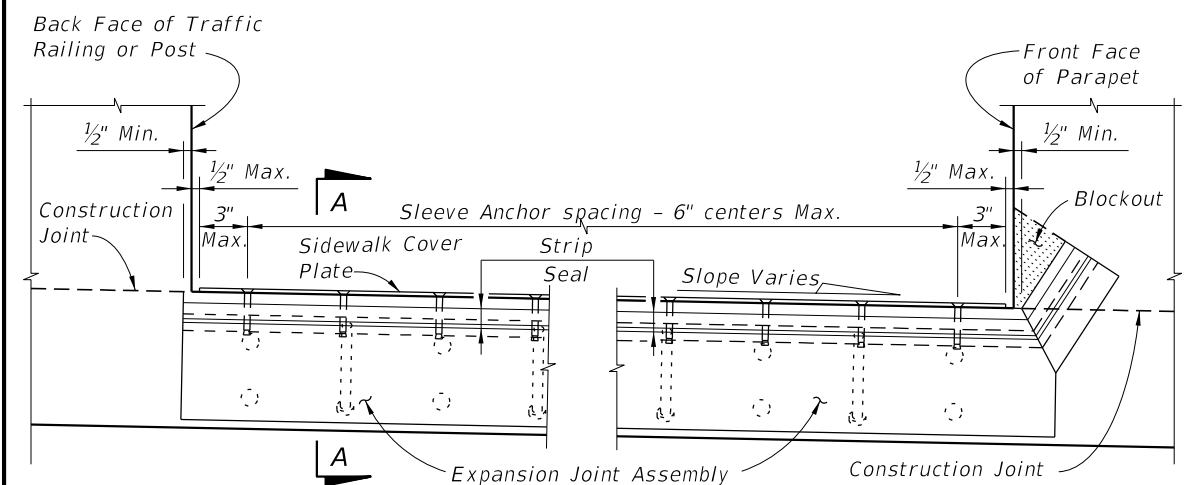
PARTIAL PLAN VIEW OF SKEWED JOINTS



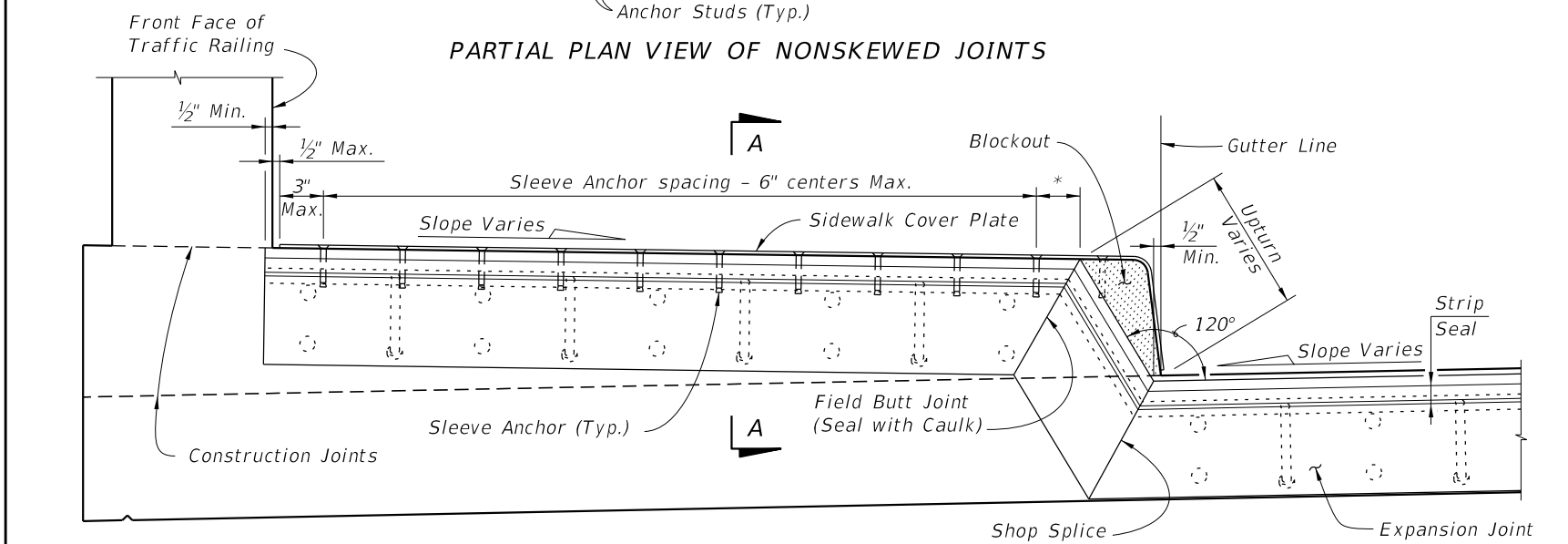
PARTIAL PLAN VIEW



PARTIAL PLAN VIEW OF NONSKEWED JOINTS

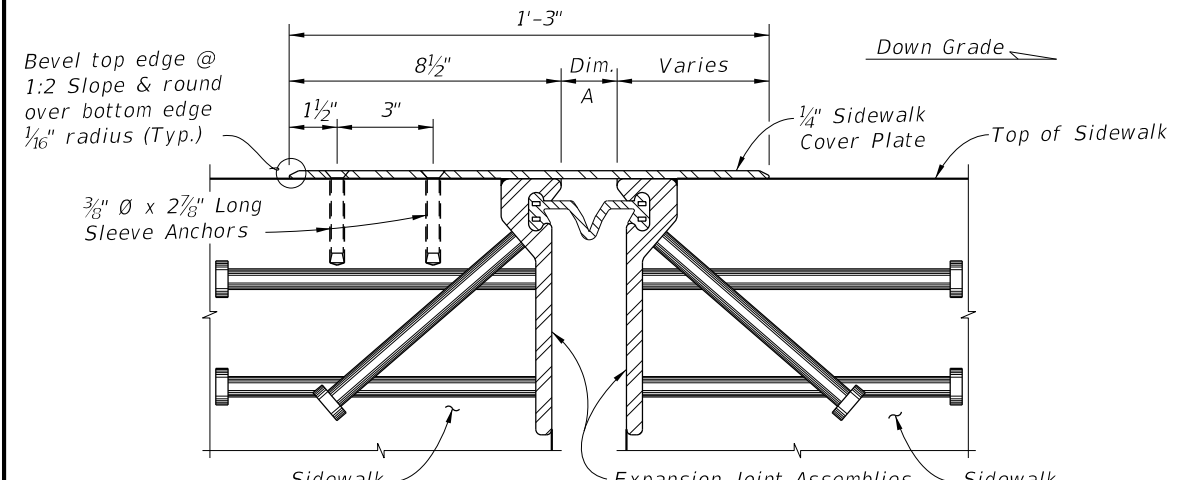


PARTIAL SECTION ALONG Q JOINT



PARTIAL SECTION ALONG Q JOINT

RAISED SIDEWALK DETAIL

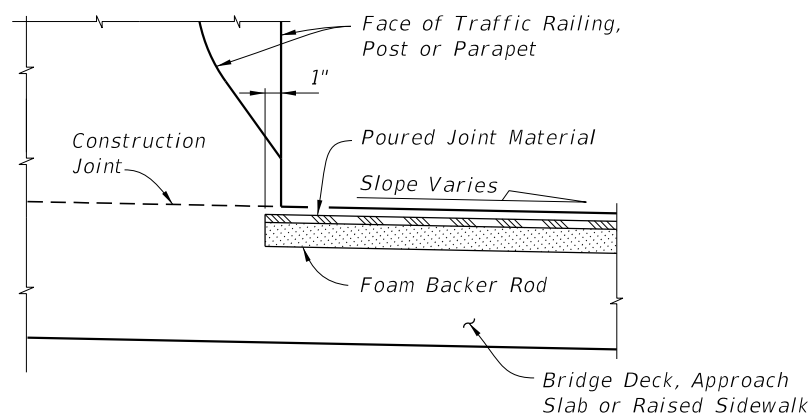


SECTION A-A

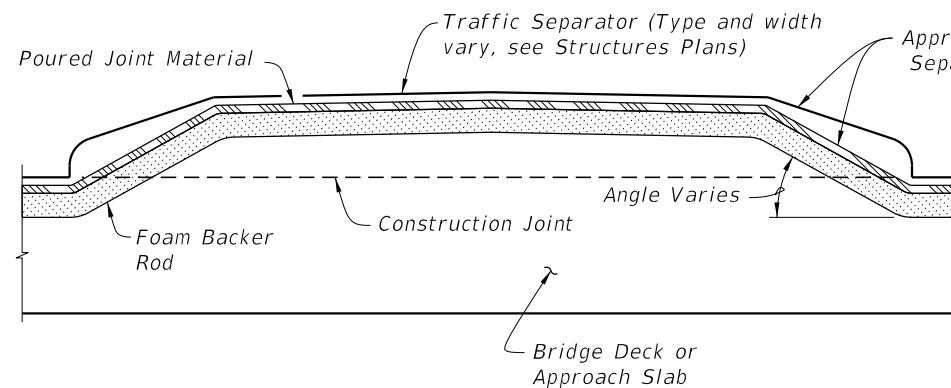
\* Distance from Q Sleeve Anchor to edge of concrete is 2 inches minimum, 3 inches maximum.

9/23/2021 9:55:03 AM

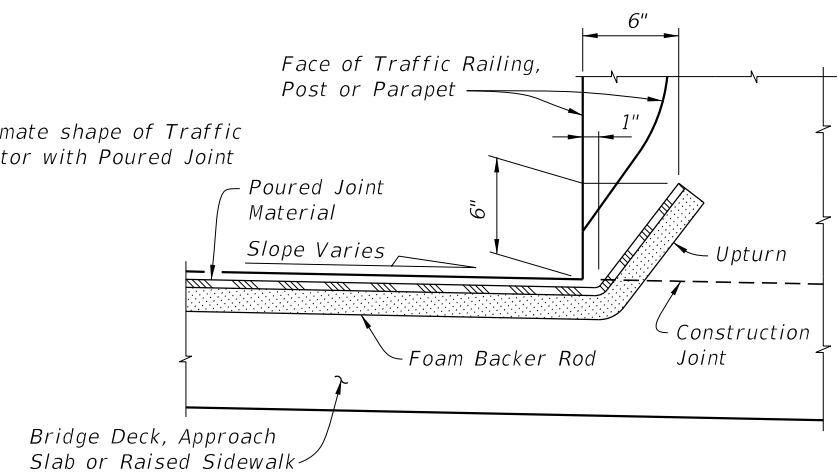
LAST REVISION	DESCRIPTION:
11/01/19	



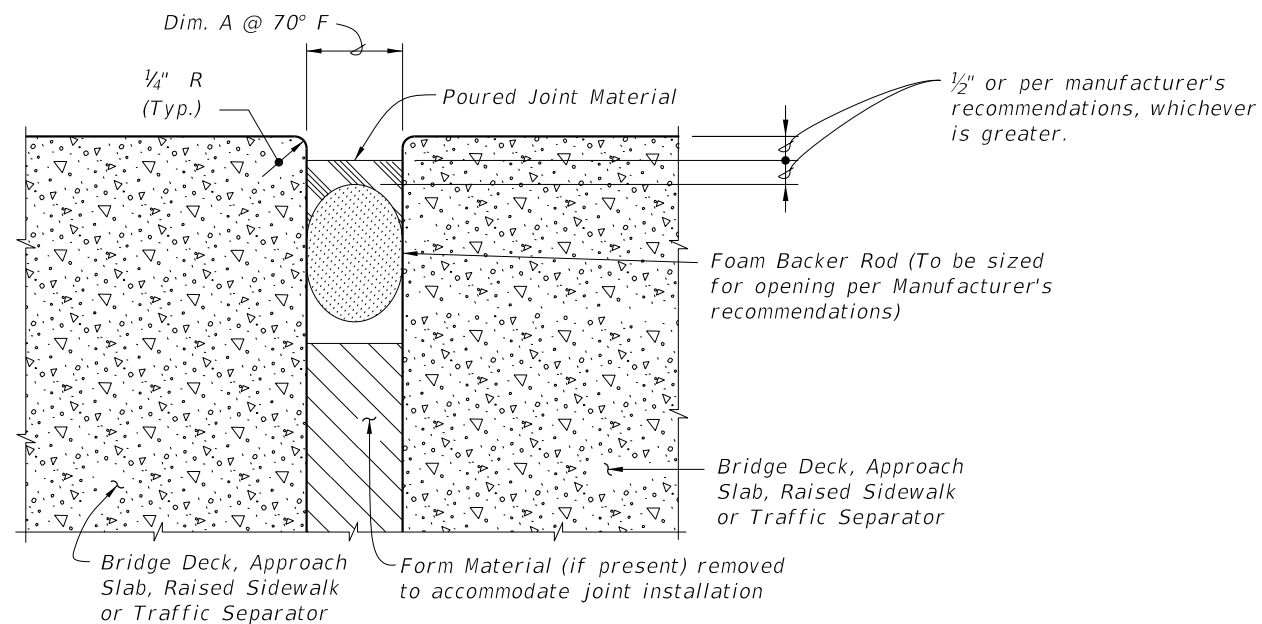
PARTIAL SECTION ALONG Q̄ JOINT  
JOINT TREATMENT AT HIGH SIDE OF  
DECK WITH SLOPES 1% OR GREATER



PARTIAL SECTION ALONG Q̄ JOINT,  
JOINT TREATMENT AT TRAFFIC SEPARATOR



PARTIAL SECTION ALONG Q̄ JOINT  
JOINT TREATMENT AT LOW SIDE OF DECK OR  
HIGH SIDE OF DECK WITH SLOPES < 1%




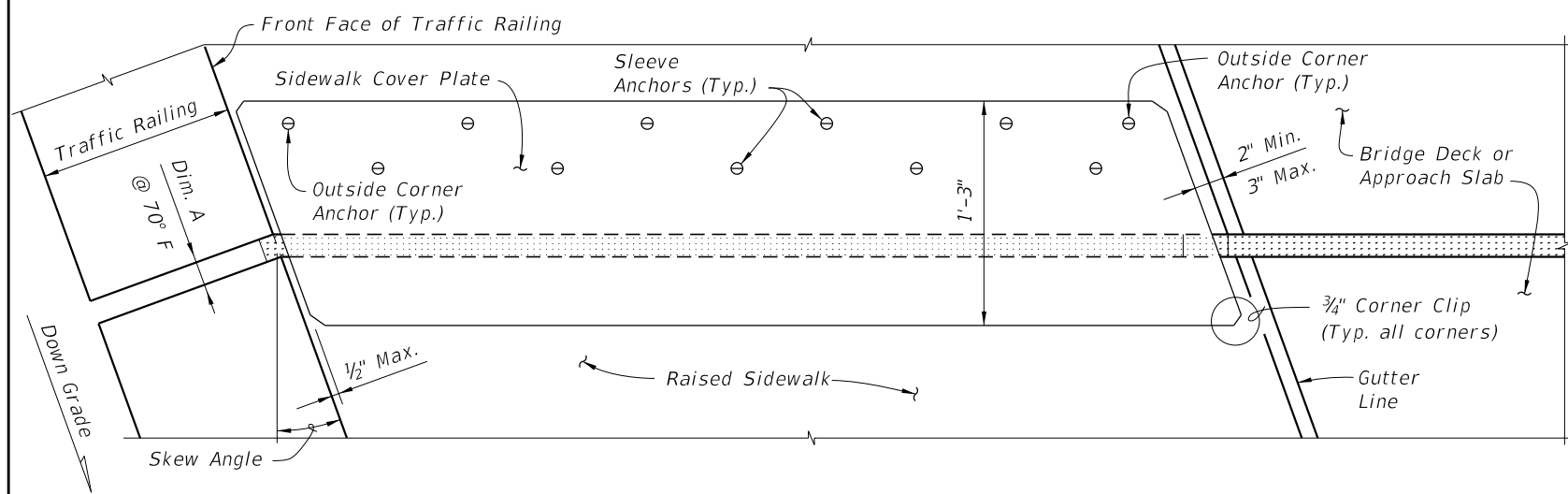
TYPICAL SECTION THRU JOINT

GENERAL NOTES:

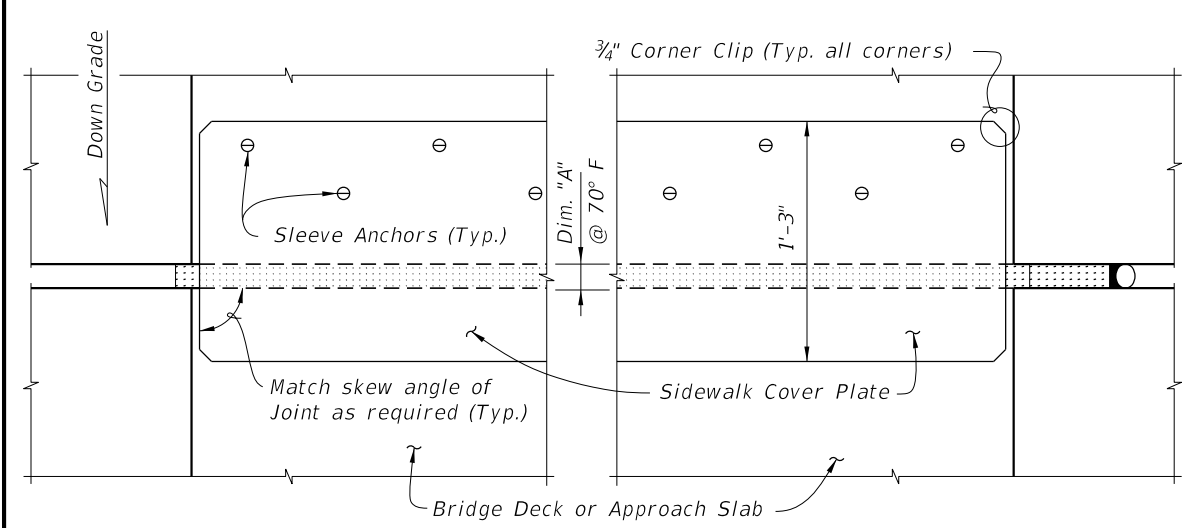
1. Furnish and install Poured Joint With Backer Rod Expansion Joint Systems in accordance with Specification Sections 458 and 932 using Type D silicone sealant material.
2. Refer to the Structures Plans, Poured Expansion Joint Data Table for Dim. A @ 70° F.

9/23/2021 9:55:04 AM

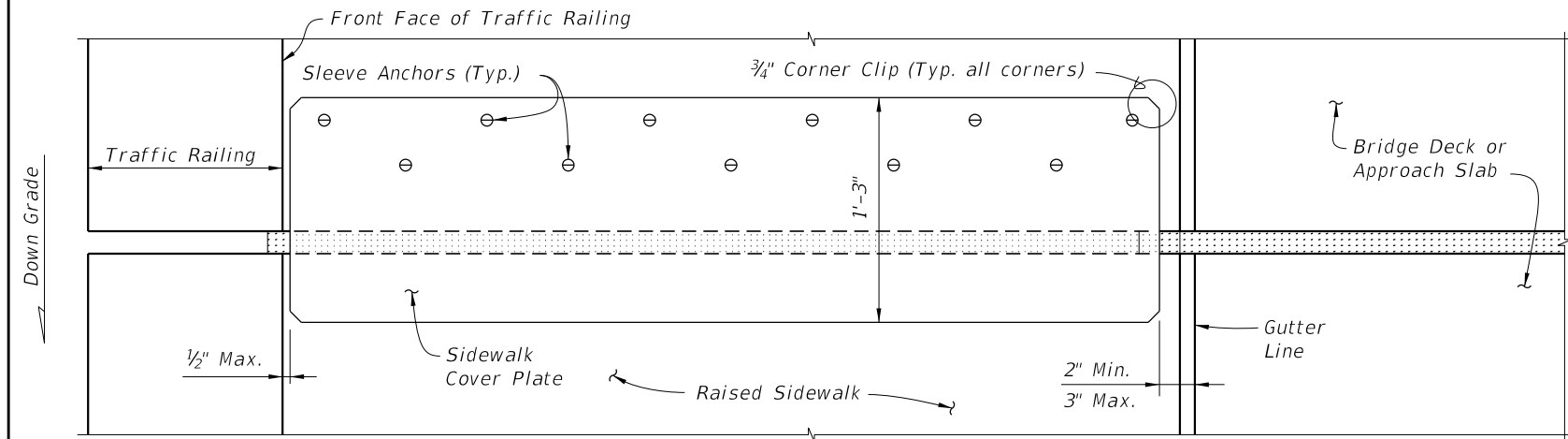
LAST REVISION 07/01/14	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	EXPANSION JOINT SYSTEM - Poured Joint With Backer Rod	INDEX 458-110	SHEET 1 of 2
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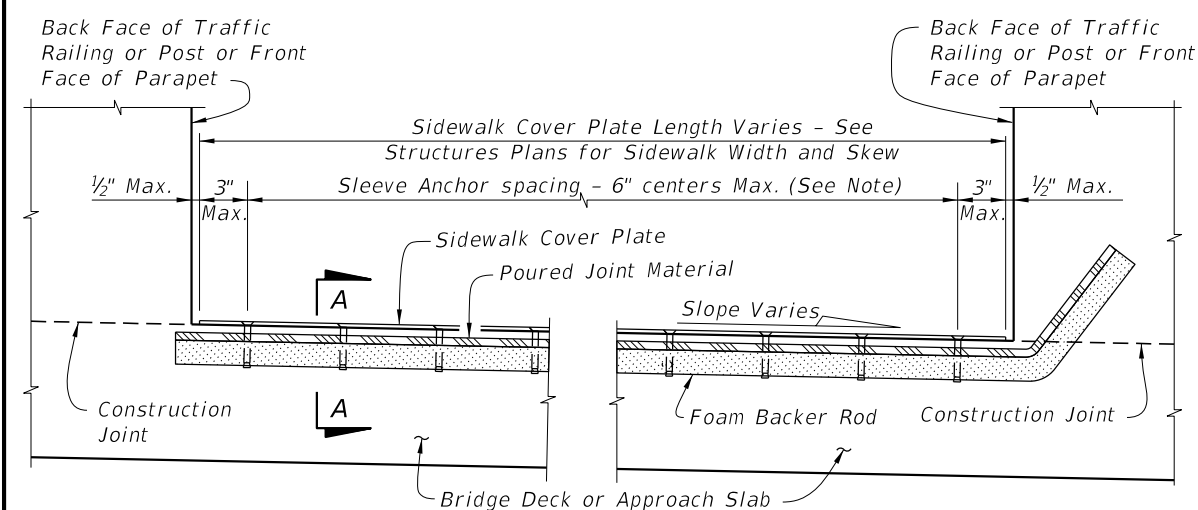
PARTIAL PLAN VIEW OF SKEWED JOINTS



PARTIAL PLAN VIEW

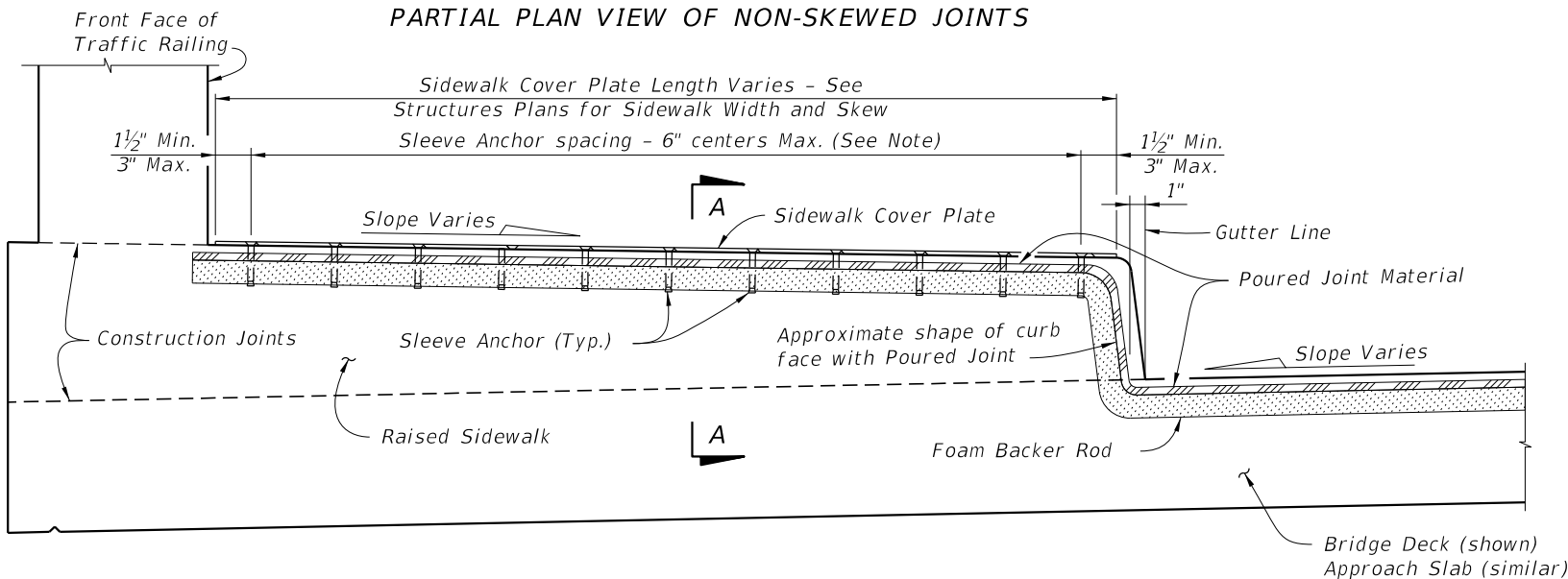


PARTIAL PLAN VIEW OF NON-SKEWED JOINTS



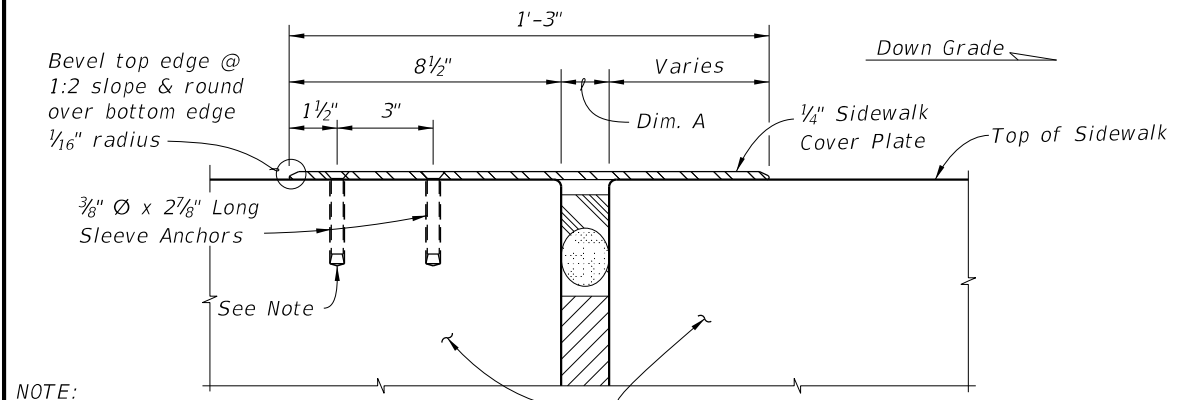
PARTIAL SECTION ALONG Q-JOINT

FLUSH SIDEWALK DETAIL



PARTIAL SECTION ALONG Q-JOINT


RAISED SIDEWALK DETAIL

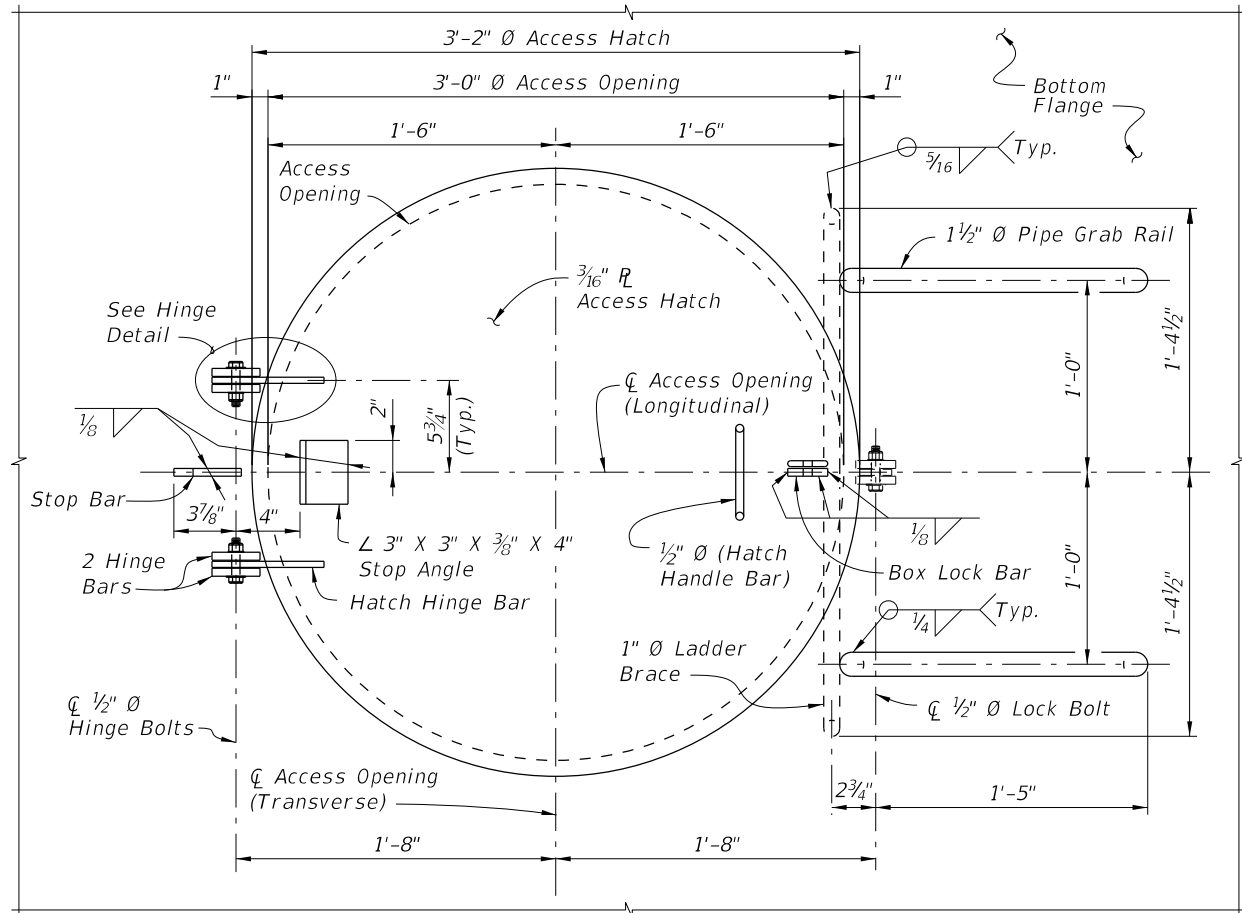


NOTE: Sleeve Anchors are required at the two outside corners of the Sidewalk Cover Plate. Space Sleeve Anchors uniformly between the corner anchors.

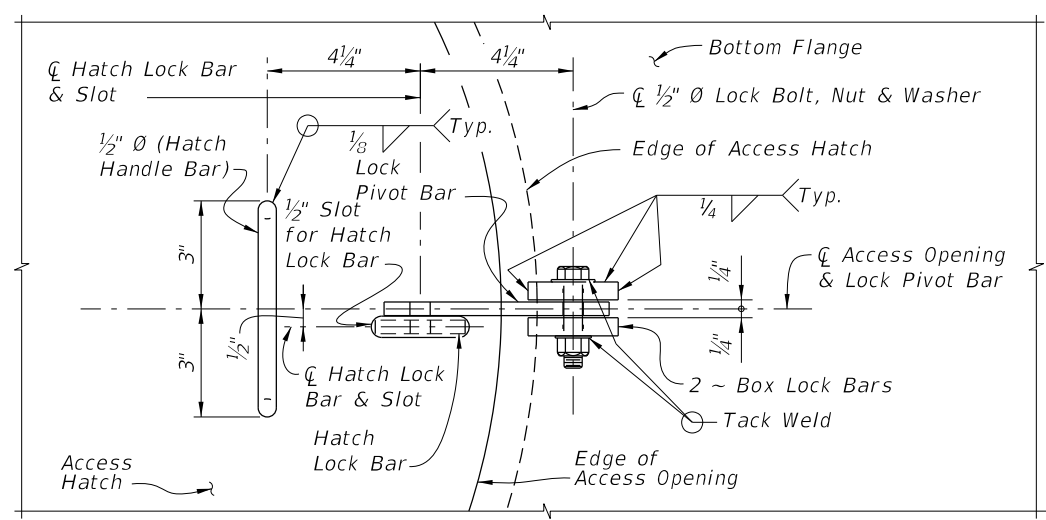
SECTION A-A

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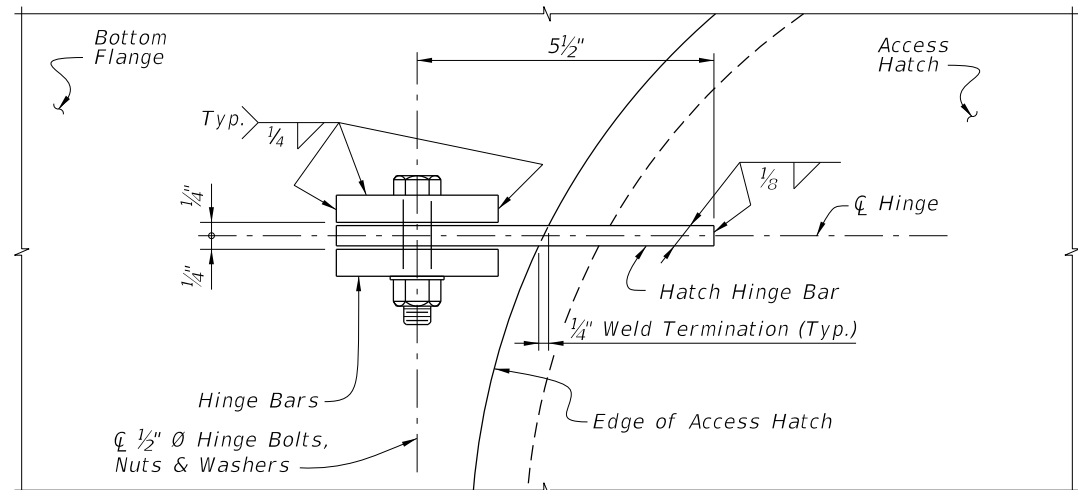
LAST REVISION 07/01/13	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>EXPANSION JOINT SYSTEM -          Poured Joint with Backer Rod</b>	INDEX 458-110	SHEET 2 of 2
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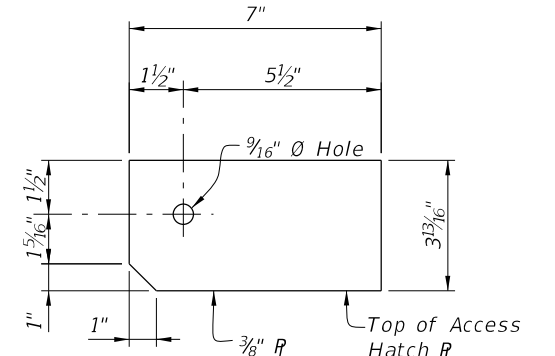
PLAN VIEW OF ACCESS HATCH ASSEMBLY



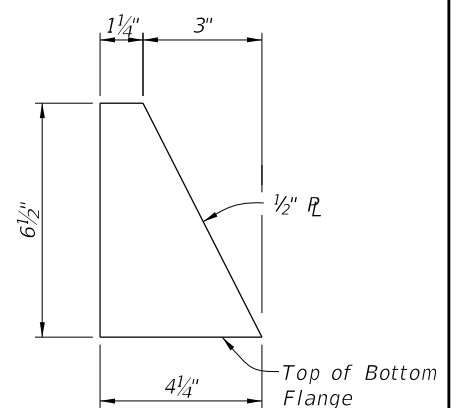
VIEW A-A



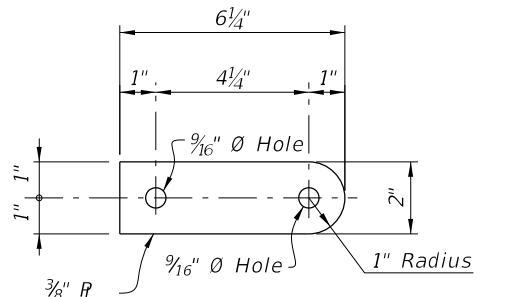
HINGE DETAIL



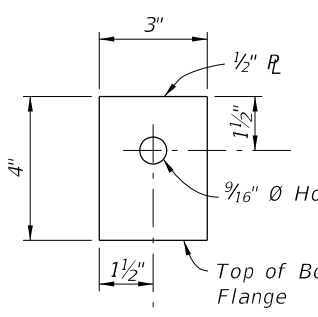
HATCH HINGE BAR DETAIL



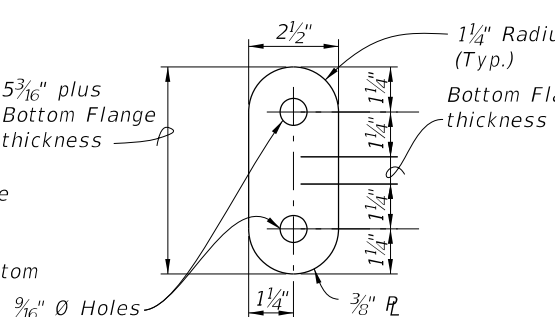
STOP BAR DETAIL



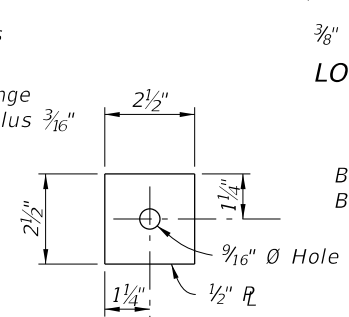
LOCK PIVOT BAR DETAIL



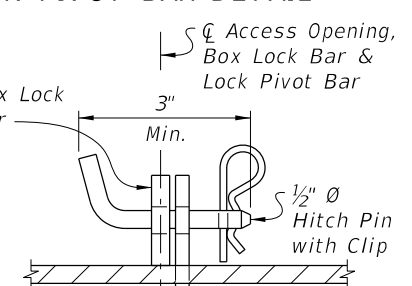
HINGE BAR DETAIL



HATCH LOCK BAR DETAIL

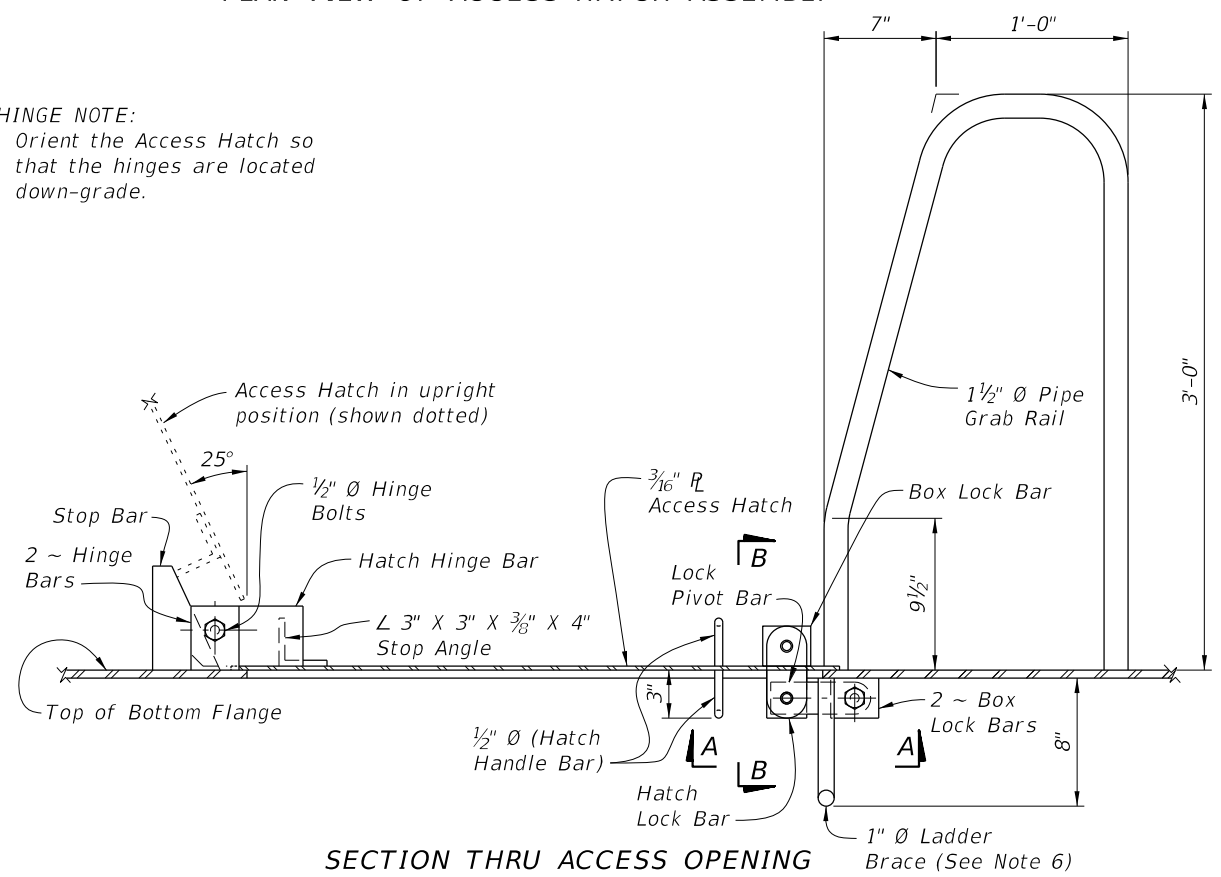


BOX LOCK BAR DETAIL



VIEW B-B HATCH LOCK ASSEMBLY DETAIL

HINGE NOTE:  
Orient the Access Hatch so that the hinges are located down-grade.



SECTION THRU ACCESS OPENING

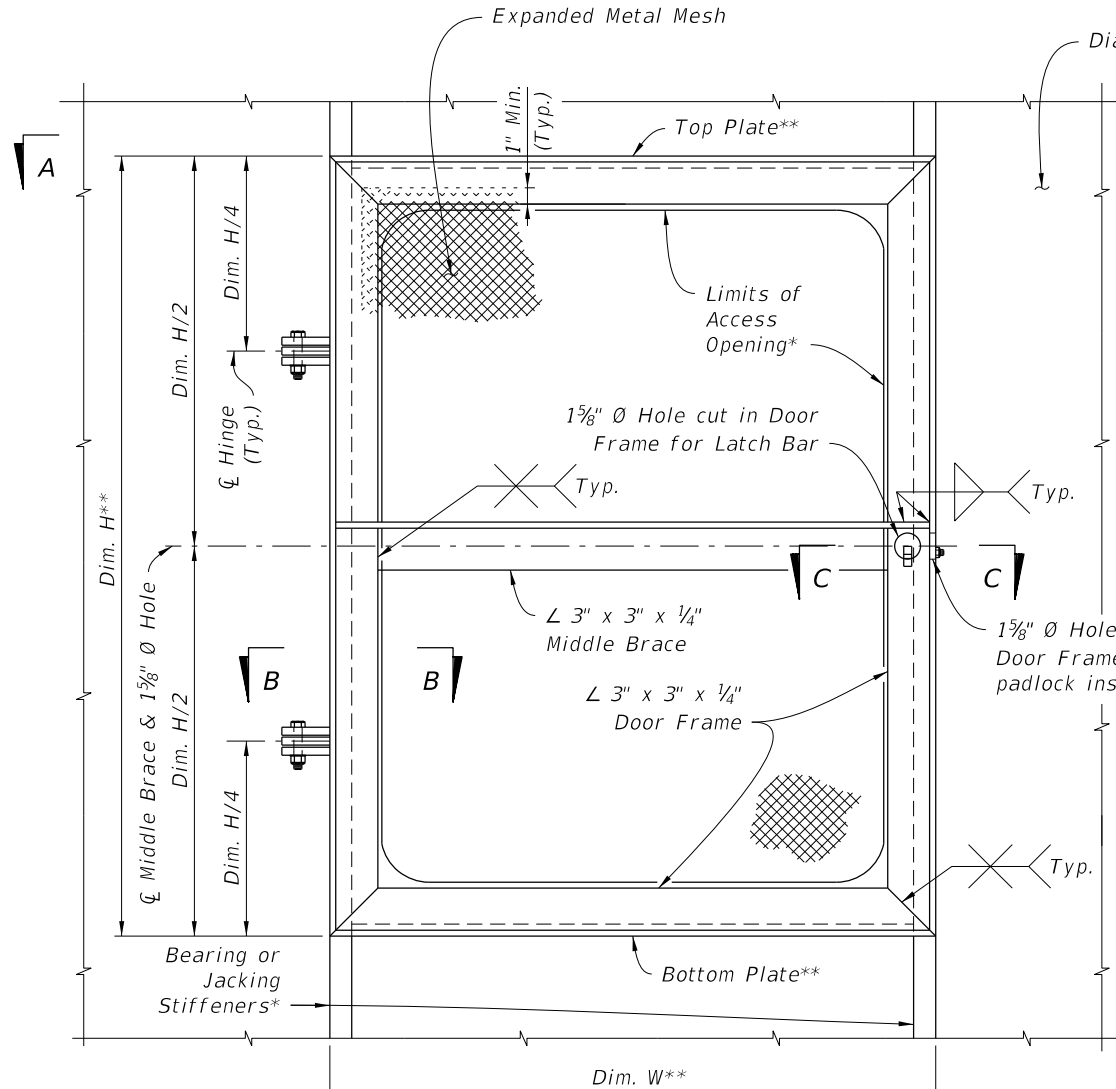
- NOTES:
- All Structural Steel material in Access Hatch Assemblies shall conform to ASTM A709 Grade 36.
  - 1 1/2" Ø Pipe Grab Rail shall be in accordance with ASTM A53 Grade B for standard weight pipe (Schedule 40).
  - 1/2" Ø Hatch Handle Bar, Hitch Pin and 1" Ø Ladder Brace shall be in accordance with ASTM A36.
  - All bolts shall conform to ASTM A307 or A449. All nuts shall conform to ASTM A563 and all washers shall conform to ASTM F-436.
  - All exposed edges of plates and openings shall be ground smooth.
  - Place Ladder Brace near the End Bents exclusively and only when the height is reasonable for access by a Ladder.
  - See Framing Plan sheets for locations of Access Hatch Openings.
  - Coat structural steel in accordance with Specification Section 560.
  - Include the cost of the Access Hatch Assembly and incidental items in the cost of the Steel Box Girders. No separate payment will be made for coating structural steel.

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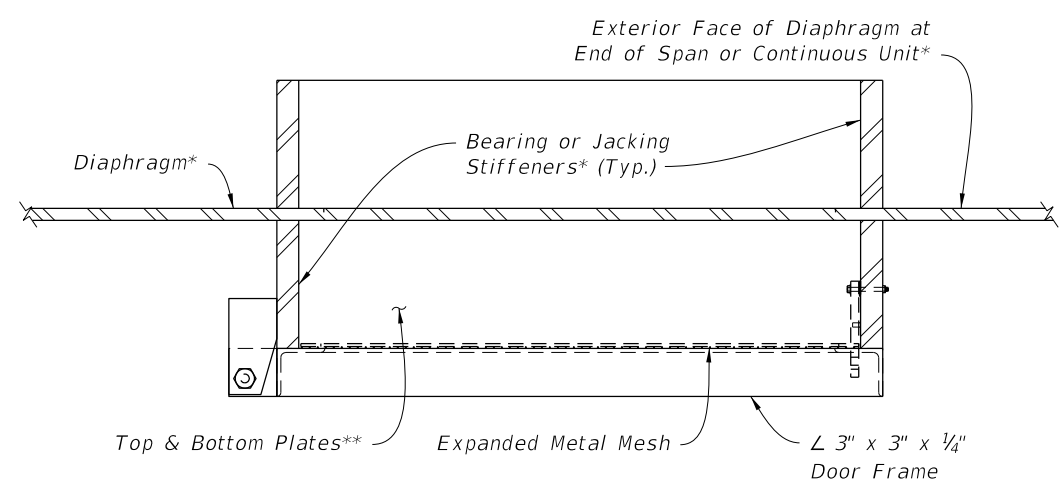
LAST REVISION 07/01/15	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	ACCESS HATCH ASSEMBLY FOR STEEL BOX SECTIONS	INDEX 460-250	SHEET 1 of 1
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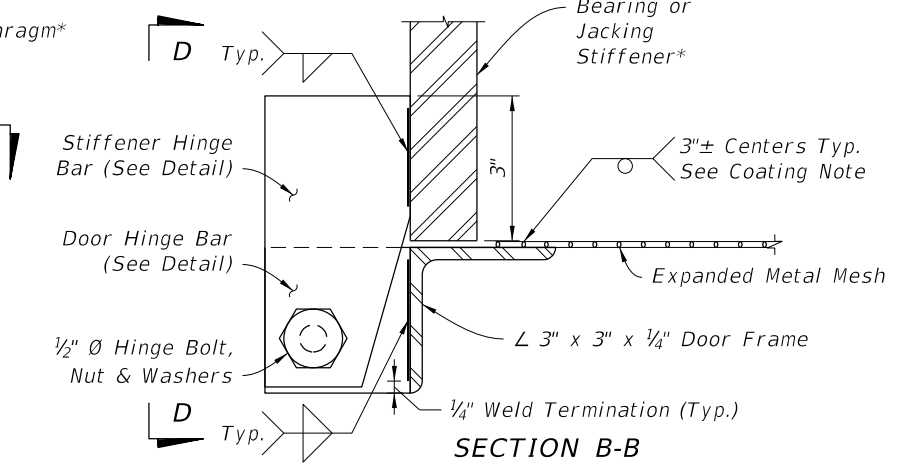




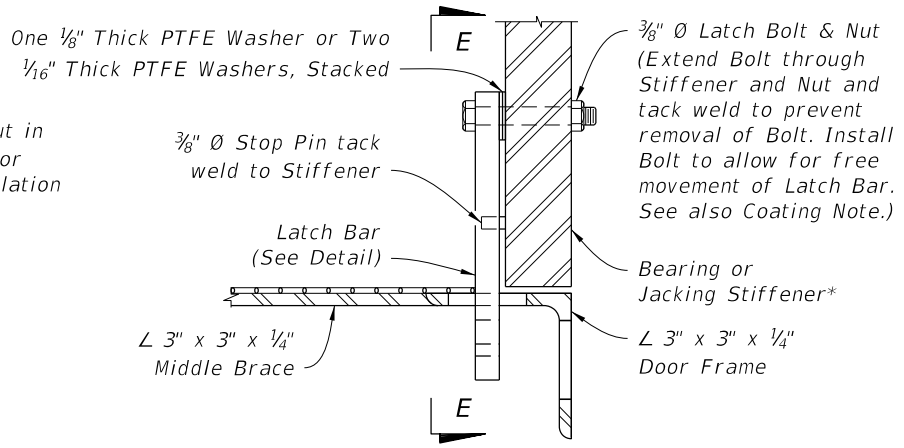
**ELEVATION VIEW OF ACCESS DOOR ASSEMBLY**  
 (At Access Opening in End Internal Diaphragm as seen from inside the Box Girder. Right Hand Door shown; Left Hand Door opposite hand)



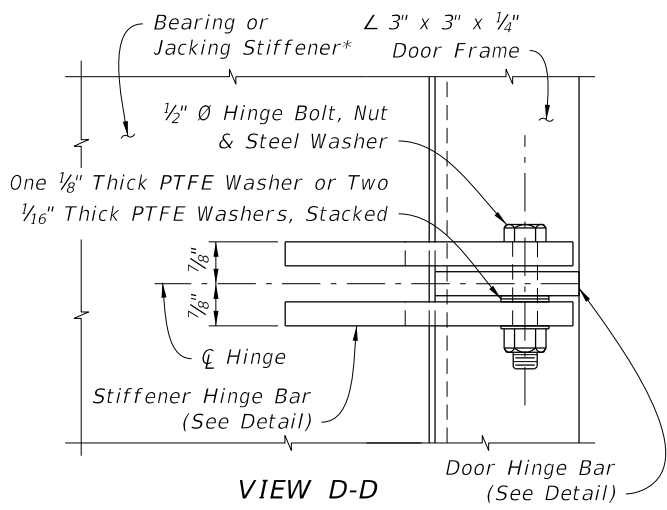
**SECTION A-A**



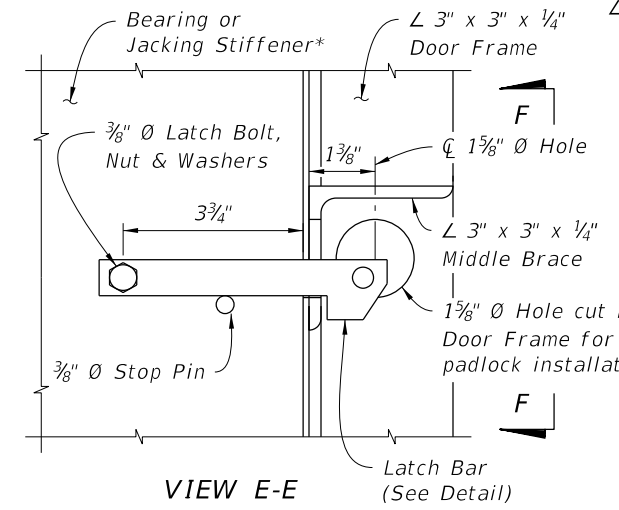
**SECTION B-B**



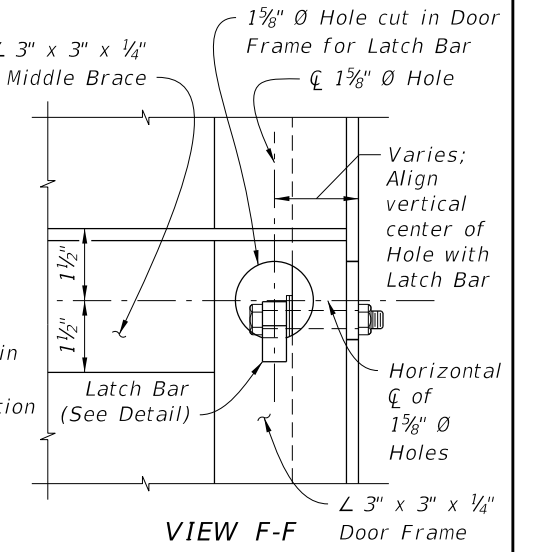
**SECTION C-C**



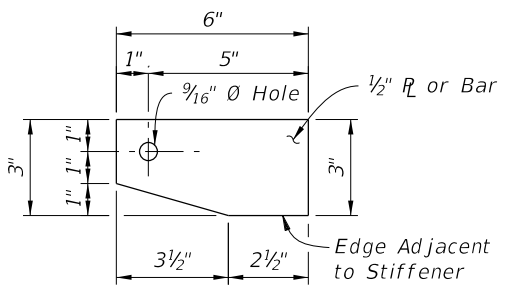
**VIEW D-D**



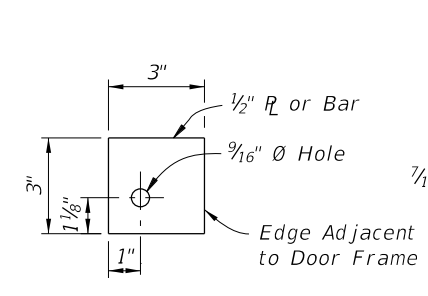
**VIEW E-E**



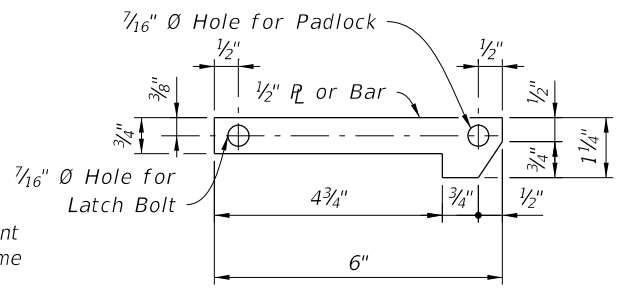
**VIEW F-F**



**STIFFENER HINGE BAR DETAIL**



**DOOR HINGE BAR DETAIL**



**LATCH BAR DETAIL**

**ACCESS DOOR NOTES:**

**STRUCTURAL STEEL:**  
 Fabricate Door Assemblies using structural steel in accordance with Specification 962, any grade. Grind all exposed edges and burs smooth. Non-destructive testing of welds is not required. See Plans for details of Diaphragm, Stiffeners and Top and Bottom Plates.

**EXPANDED METAL MESH:**  
 Expanded metal mesh shall be 1/2" No. 16 expanded carbon steel metal mesh in accordance with ASTM F1267, Type I or II, Class 2, Grade A.

**BOLTS, NUTS AND STEEL WASHERS:**  
 Bolts shall be stainless steel hex head bolts meeting the requirements of ASTM F593, Type 316. Nuts shall be ASTM F594, Type 316. Steel washers shall be stainless steel compatible with the bolts and nuts.

**PTFE WASHERS:**  
 PTFE washers shall be 3/4" or 1" O.D. (nominal), 1/16" or 1/8" thick, sized for use with 3/8" or 1/2" diameter bolts as shown.

**COATING:**  
 Coat Access Door Assemblies after complete fabrication, including the expanded metal mesh, using an Interior Box Girder Coating System in accordance with Specification 975. Weld expanded metal mesh to the door frame after the door frame has been abrasive blast cleaned and prior to coating. Install Bolts and PTFE Washers after coating. Touch-up tack weld on Latch Bolt after welding.

**DOOR HINGE LOCATION:**  
 Place door hinges on the transverse downward side of the access opening.

**PADLOCKS:**  
 Provide a suitable keyed commercial grade, weather resistant padlock with a 2" shackle for each Access Door Assembly located at Bridge Abutments. Key all padlocks for Access Door Assemblies and Access Hatches (if present) on an individual bridge alike.

9/23/2021 9:55:09 AM

\* See Plans for dimensions and details.  
 \*\* See Access Door Assembly for Steel Box Girders Data Table in the Plans for Dim. H & Dim. W.

LAST REVISION 07/01/15	DESCRIPTION:		<b>FY 2022-23 STANDARD PLANS</b>	<b>ACCESS DOOR ASSEMBLY FOR STEEL BOX SECTIONS</b>	INDEX <b>460-252</b>	SHEET <b>1 of 1</b>
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**TRAFFIC RAILING NOTES**

*This Traffic Railing Retrofit has been structurally evaluated to be equivalent or greater in strength to a design which has been successfully crash tested in accordance with NCHRP Report 350 TL-4 criteria.*

**CONCRETE:** Concrete for Transition Blocks and Curbs shall be Class II (Bridge Deck).

**REINFORCING STEEL:** Reinforcing steel shall be ASTM A615, Grade 60.

**THRIE-BEAM GUARDRAIL:** Steel Thrie-Beam Elements shall meet the requirements for Class B (10 Gauge) Guardrail of AASHTO M 180, Type II (Zinc coated). The minimum panel length for Thrie-Beam Elements shall be 12'-6". Field drilled holes for Post connections shall be 3/4" by 2 1/2" slotted holes.

**GUARDRAIL BOLTS:** Guardrail bolts, nuts and washers shall be in accordance with AASHTO M180.

**GUARDRAIL POSTS AND BASE PLATES:** Posts and Base Plates shall be in accordance with ASTM A36 or ASTM A709 Grade 36.

**ANCHOR BOLTS, NUTS AND WASHERS:** Adhesive-Bonded Anchors and Anchor Bolts shall be fully threaded rods in accordance with ASTM F1554 Grade 105 or ASTM A193 Grade B7. At the Contractor's option, Anchor Bolts for through bolting may be in accordance with ASTM A449. All Nuts shall be single self-locking hex nuts and in accordance with ASTM A563 or ASTM A194. Flat Washers shall be in accordance with ASTM F436 and Plate Washers (for long slotted holes only) shall be in accordance with ASTM A36 or ASTM A709 Grade 36. After the nuts have been snug tightened, the anchor bolt threads shall be distorted to prevent removal of the nuts. Distorted threads and the exposed trimmed ends of anchors shall be coated with a galvanizing compound in accordance with the Specifications.

**COATINGS:** All Nuts, Bolts, Anchors, Washers, Guardrail Posts, Anchor Plates and Base Plates shall be hot-dip galvanized in accordance with the Specifications. Guardrail Post Assemblies shall be hot-dip galvanized after fabrication.

**ADHESIVE-BONDED ANCHORS AND DOWELS:** Adhesive Bonding Material Systems for Anchors and Dowels shall comply with Specification Section 937 and be installed in accordance with Specification Section 416. The field testing proof loads required by Specification Section 416 shall be 15,000 lbs. for 7/8" Ø anchor bolts; 55,000 lbs. for the 1 1/4" anchor bolts with 13" embedment; and 30,500 lbs. for the 1 1/4" Ø anchor bolts with 5" embedment.

**BRIDGES ON CURVED ALIGNMENTS:** The details presented in these Indexes are shown for bridges on tangent alignments. Details for bridges on horizontally curved alignments are similar.

**POST SPACING:** Posts shall be located along the length of the bridge at typical 6'-3" or 3'-1 1/2" spaces. Utilize the Modified Post Spacing at Intermediate Deck Joints Details as required to clear deck joints. Establish post spacing along the bridge and Roadway Guardrail Transition beginning with the Key Post. The variable post spacings located near begin and end bridge may be utilized to optimize the typical post spacing. Variable lengths of guardrail overlap are also permitted to optimize the typical post spacing. Symmetry of post spacing is not necessary.

**THRIE-BEAM EXPANSION SECTION:** Thrie-Beam Expansion Sections shall be installed at locations shown in the Plans. Install nuts for splice bolts finger-tight at 2 1/2" slots in thrie beam expansion sections. Nuts shall fully engage bolts with a minimum of one bolt thread extending beyond the nuts. Distort the first thread on the outside of the nut to prevent loosening. Tighten guardrail bolts in 3 3/4" slots at guardrail post(s) that lie between the slotted expansion splice and bridge deck joint so that the bolt heads are in full contact with thrie-beam elements, but not so tight as to impede movement due to expansion.

**BEARING PADS:** Provide plain Neoprene pads with a durometer hardness of 60 or 70 and meeting the requirements of Specification Section 932, for ancillary structures.

**ELEVATION MARKERS:** Elevation Markers need not be replaced when portions of the existing traffic railing carrying existing elevation markers are removed.


**BARRIER DELINEATORS:** Install Barrier Delineators at the top of the guardrail offset blocks in accordance with Specification Section 705. Match the Barrier Delineators color (white or yellow) to the near edgeline.

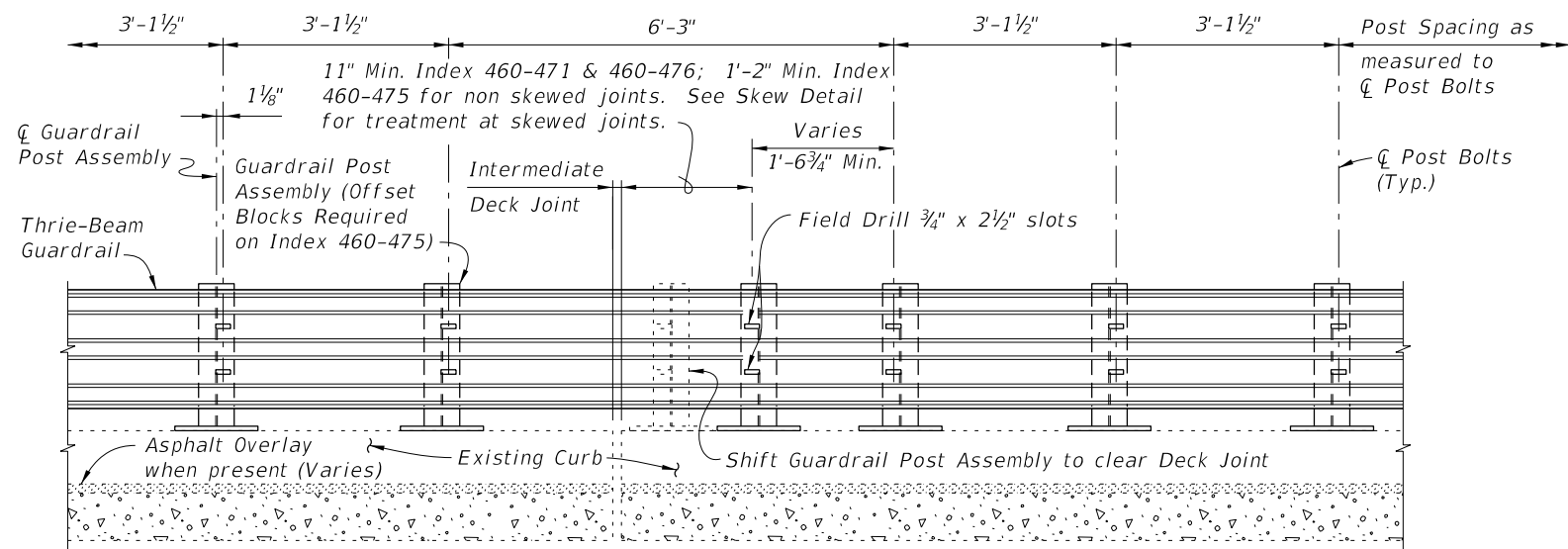
**PEDESTRIAN SAFETY TREATMENTS:** Pedestrian Safety Treatment is required when called for in the Plans. See Index 536-001 for details.

**BRIDGE NAME PLATE:** If a portion of the existing Traffic Railing is to be removed that carries the bridge name, number and or date, or if the installation of the Traffic Railing (Thrie Beam Retrofit) will obscure the bridge name, number and or date, then replace the information that has been removed or obscured, with 3" tall black lettering on white nonreflective sheeting applied to the top of the adjacent guardrail. The information must be clearly visible from the right side of the approaching travel lane. The sheeting and adhesive backing shall comply with Specification Section 994 and may comprise of individual decals of letters and numbers.

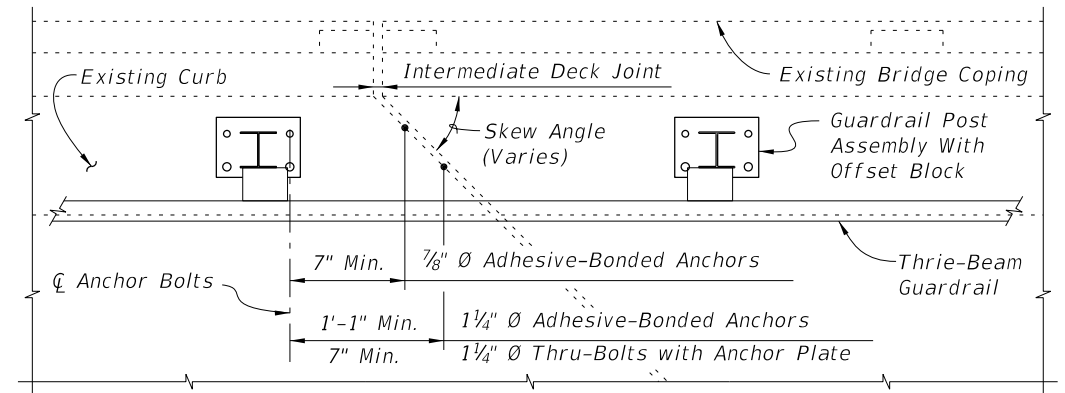
**PAYMENT:** Payment will be made under Metal Traffic Railing (Thrie-Beam Retrofit) which shall include all materials and labor required to fabricate and install the barrier and lapped guardrail where necessary to maintain post spacing. Transition Blocks and Curbs, Bridge Name Plate and Barrier Delineators and installation of Elevation Markers, where required, will not be paid for directly but shall be considered as incidental work.

9/23/2021 9:55:10 AM

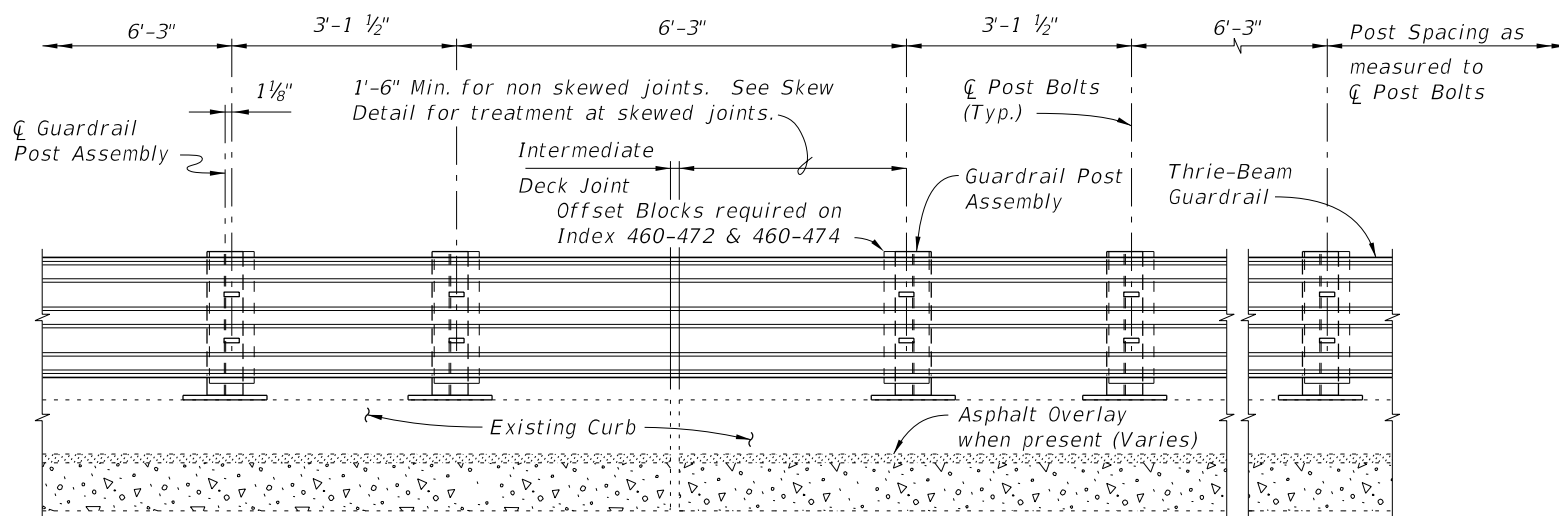
LAST REVISION 11/01/19	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) TYPICAL DETAILS &amp; NOTES</b>	INDEX <b>460-470</b>	SHEET <b>1 of 3</b>
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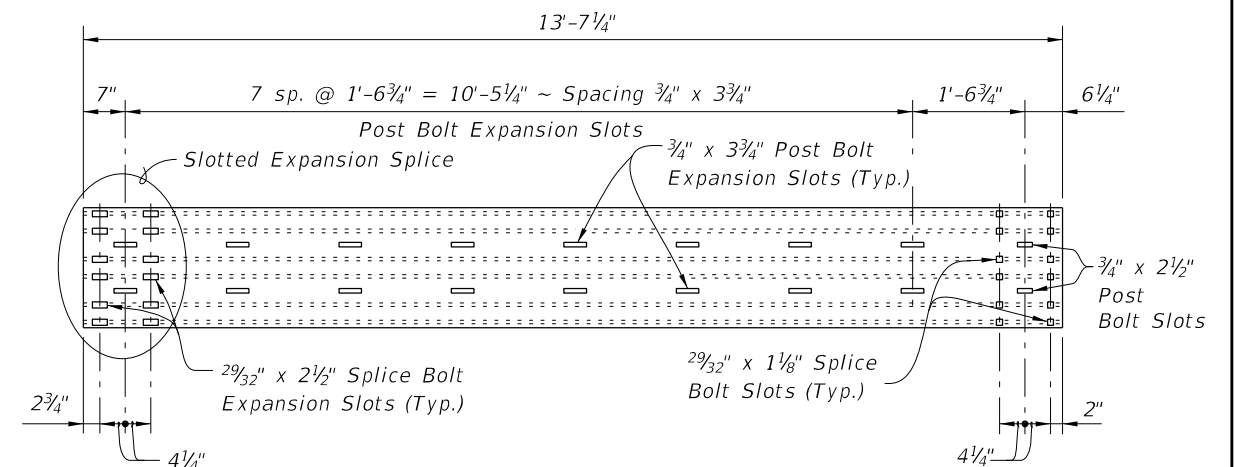
PARTIAL ELEVATION OF INSIDE FACE OF RAILING  
 MODIFIED POST SPACING AT INTERMEDIATE DECK JOINTS DETAIL  
 FOR INDEX 460-471, 460-475 & 460-476



PARTIAL PLAN  
 INTERMEDIATE JOINT SKEW DETAIL




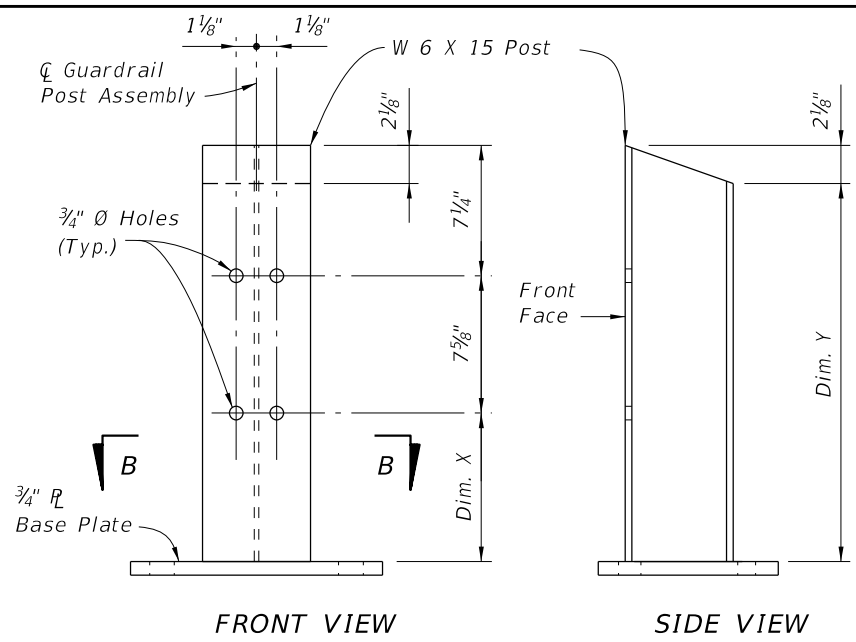
PARTIAL ELEVATION OF INSIDE FACE OF RAILING  
 MODIFIED POST SPACING AT INTERMEDIATE DECK JOINTS DETAIL  
 FOR INDEX 460-472, 460-473 & 460-474



THRIE-BEAM EXPANSION SECTION

9/23/2021 9:55:11 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	TRAFFIC RAILING - (THRIE-BEAM RETROFIT) TYPICAL DETAILS & NOTES	INDEX 460-470	SHEET 2 of 3
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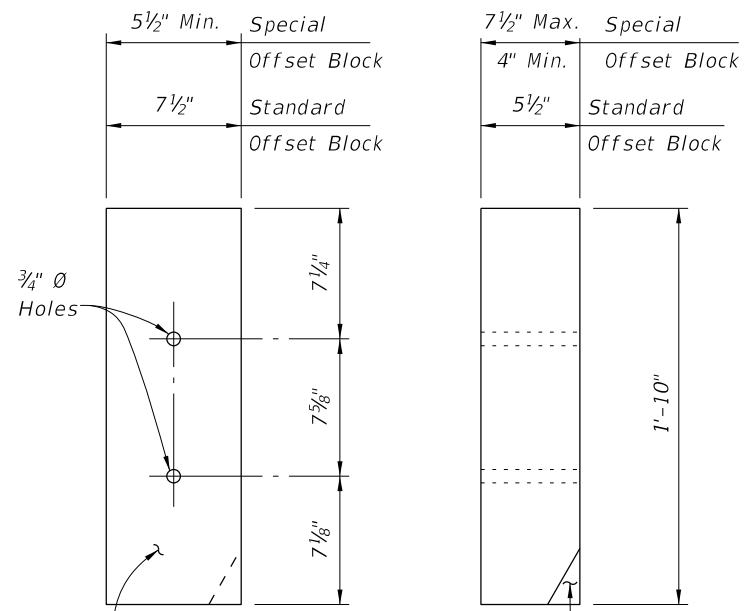


**FRONT VIEW** **SIDE VIEW**

POST DIMENSION TABLE			
POST	CURB HEIGHT (DIM. A)	DIM. X	DIM. Y
Post "A"	5" to 7"	11 1/4"	2'-0"
Post "B"	> 7" to 10"	9 1/4"	1'-10"
Post "C"	> 10" to 1'-0"	7 1/4"	1'-8"

Note: Dim. A is equal to the exposed curb height. For location of Dim. A see Index 460-471 thru 460-476, Sheet 1.

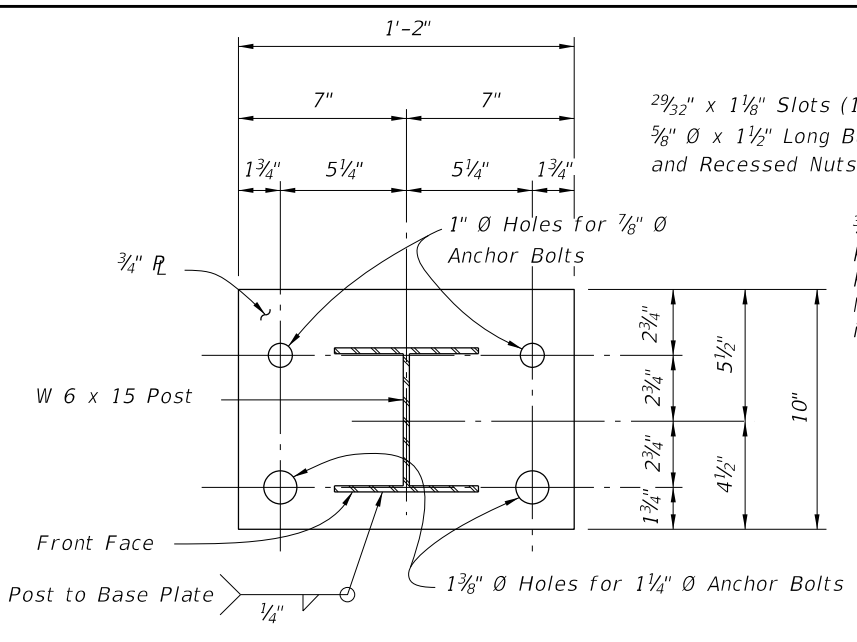
**GUARDRAIL POST ASSEMBLY DETAIL**



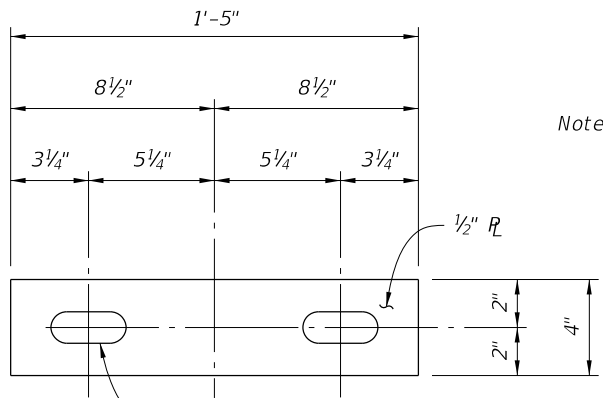
**FRONT VIEW** **SIDE VIEW**

**OFFSET BLOCK DETAIL**

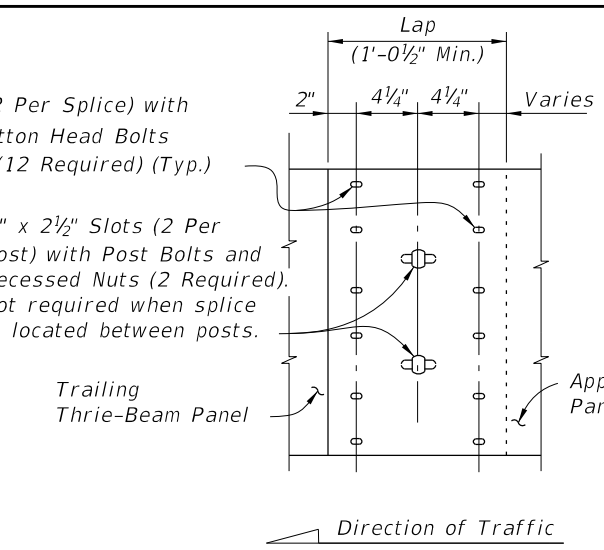
- OFFSET BLOCK NOTES:**
1. Offset blocks shall be timber or Approved Alternate. Uniformity of block size and alignment of guardrail shall be maintained along length of retrofit.
  2. Post bolt holes in offset blocks to be centered ( $\pm 1/4$ ").
  3. Timber offset blocks shall be dressed on all four sides (S4S).
  4. Block assemblies for Special Offset Blocks can be made up of 2 or 3 Special or Standard Offset Blocks, field dressed as required.



**SECTION B-B**



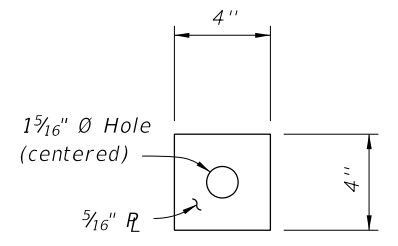
**ANCHOR PLATE DETAIL**



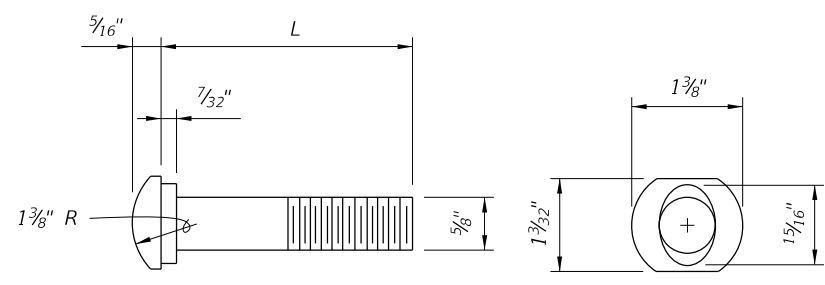
**THRIE-BEAM GUARDRAIL SPLICE**

Note: All Thrie Beam Panels shall be lapped in the direction of adjacent traffic. At the Contractor's option, laps may be extended. Field drill holes in Trailing Thrie Beam Guardrail Panel as required.

Note: The Anchor Plate and Plate Washer are applicable only to 1 1/4 inch diameter anchor bolts that are to be thru-bolted for Index 460-471 & 460-476.

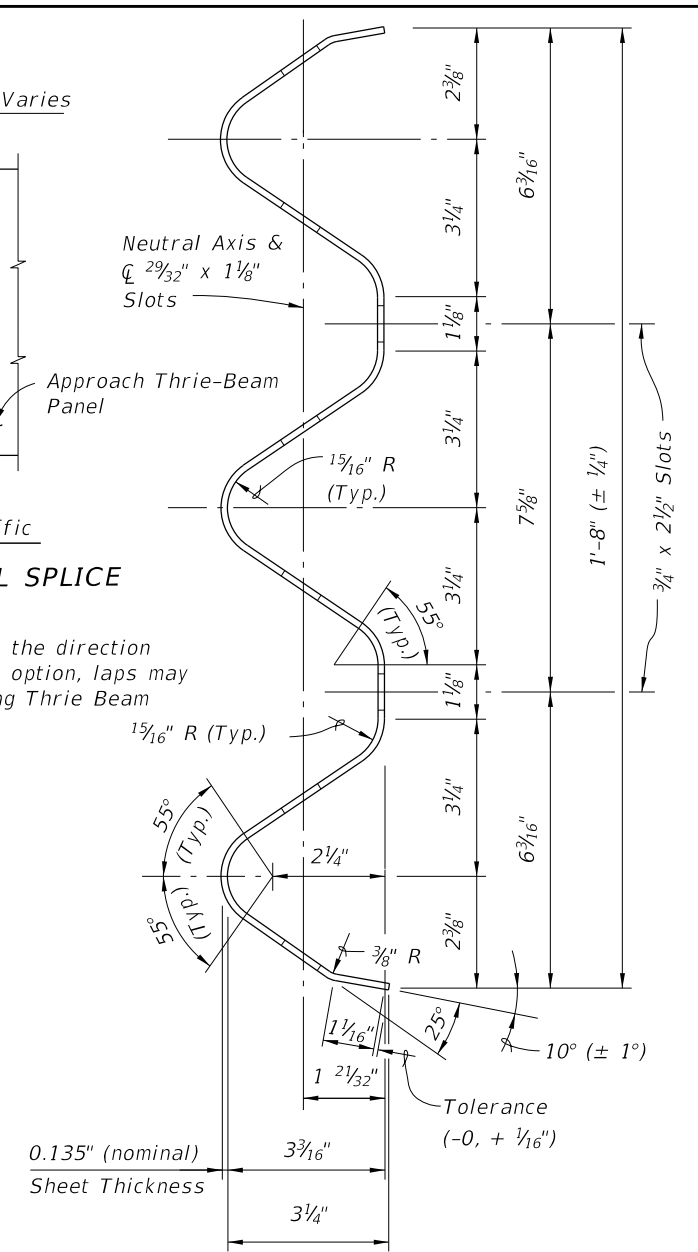


**PLATE WASHER DETAIL**

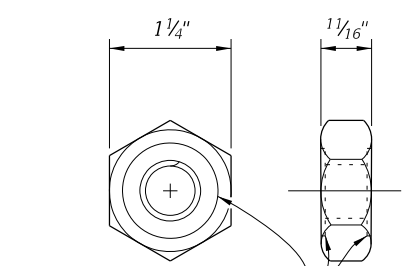


**5/8" OVAL SHOULDER BUTTON HEAD BOLT**

L	THREAD LENGTH	APPLICATION
1 1/2"	Full Length	Rail Splice Bolt, Post Bolt for Index 460-471, 460-473 & 460-476
Varies (8" Min.)	4" Min.	Post Bolt for Index 460-472, 460-473, 460-474, 460-475 & 460-476

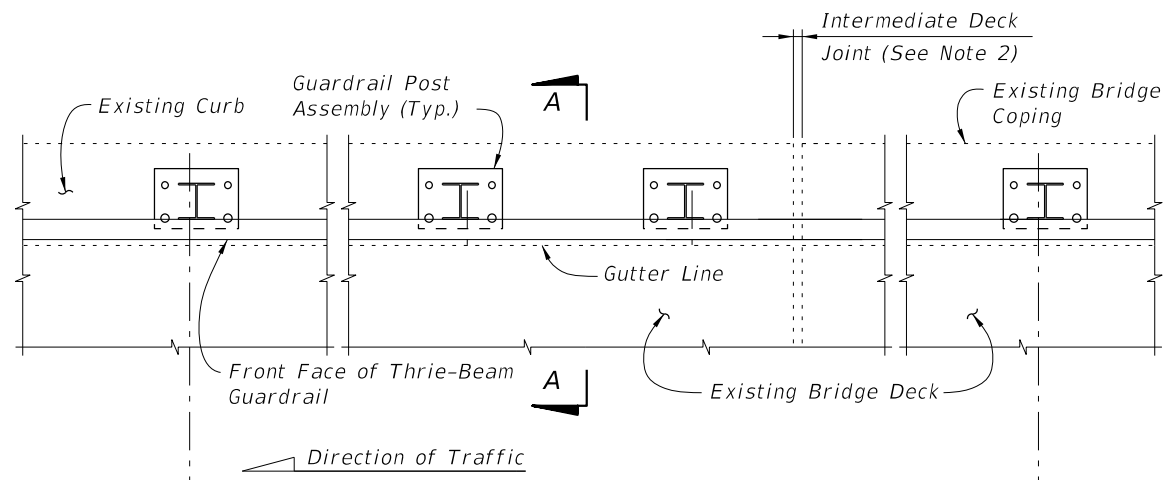


**TYPICAL SECTION THRU THRIE-BEAM GUARDRAIL (EXPANSION SECTION SIMILAR)**



**5/8" MODIFIED HEAVY HEX NUT (RECESSED NUT)**

9/23/2021 9:55:12 AM

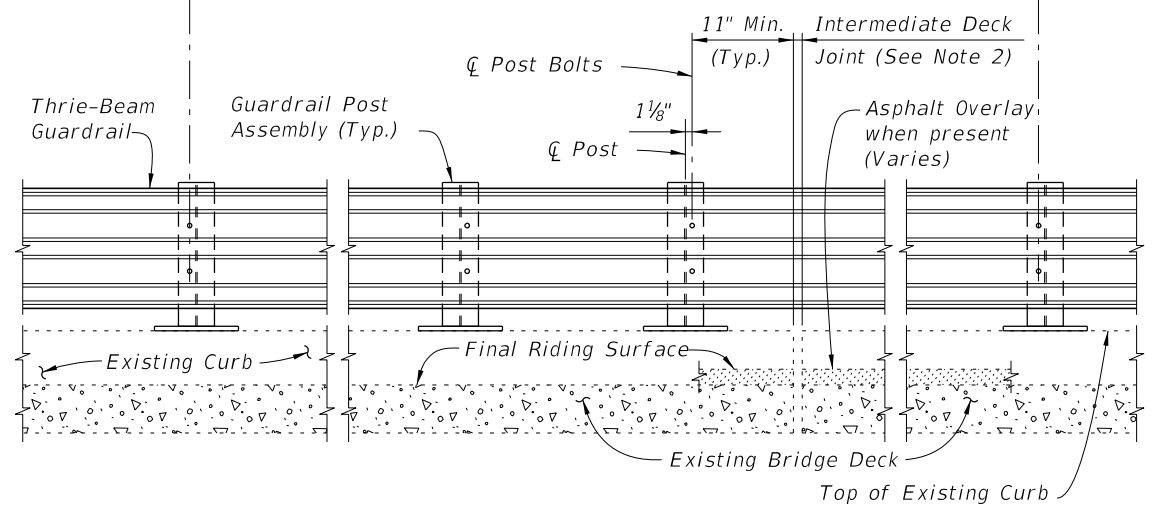


PARTIAL PLAN OF RAILING

☐ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

☐ Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

3'-1/2" spacing (Typ. except as noted along bridge, see Note 2)



PARTIAL ELEVATION OF INSIDE FACE OF RAILING

==== TYPICAL TREATMENT OF RAILING ALONG BRIDGE ====

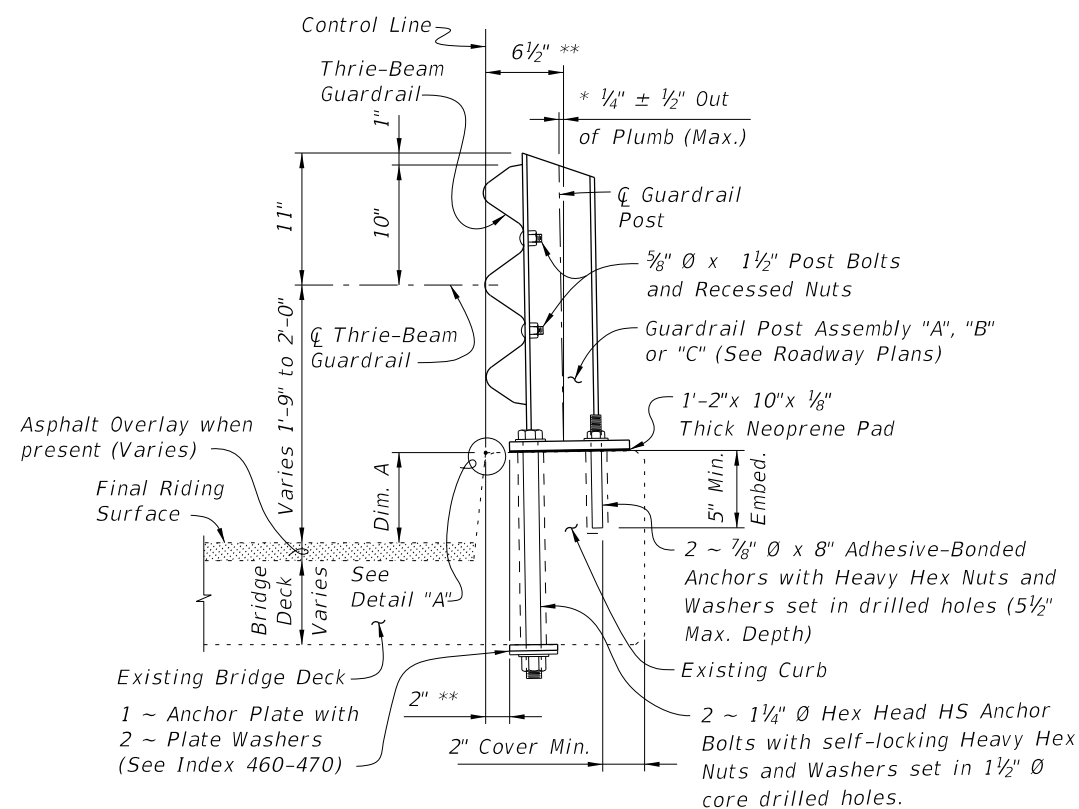
NOTES:

1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

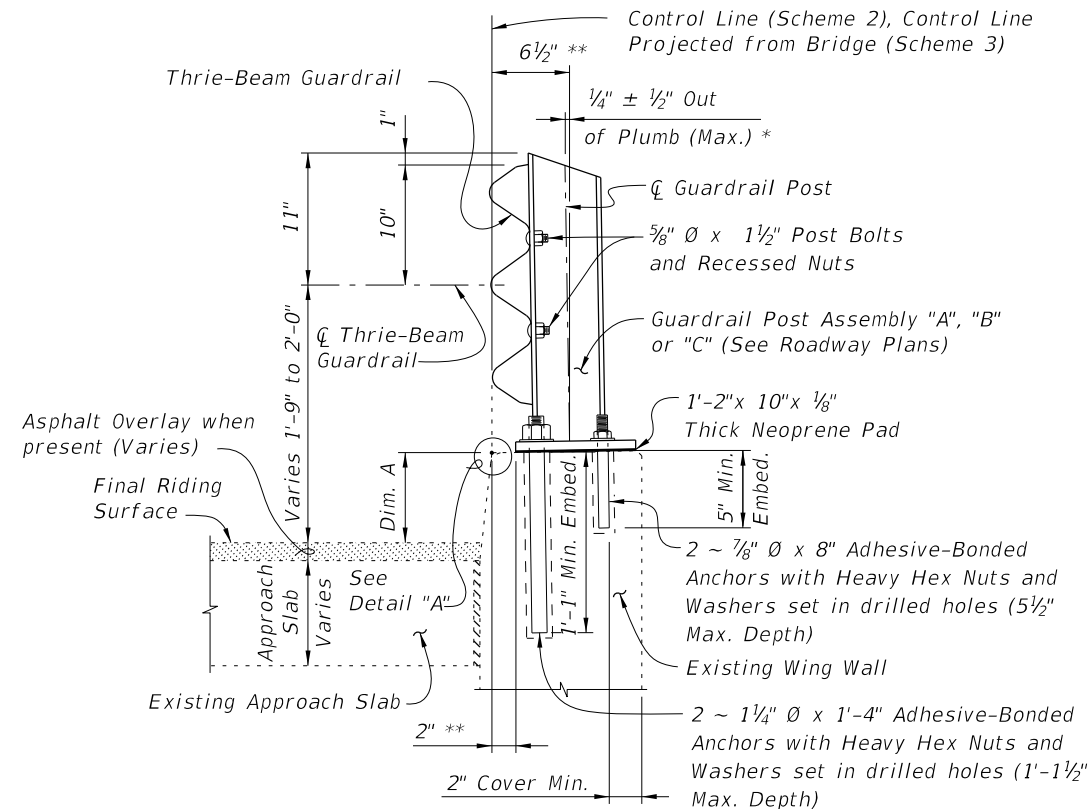
CROSS REFERENCES:  
 For Section A-A see Sheet 2.  
 For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:13 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)          NARROW CURB</b>	INDEX <b>460-471</b>	SHEET <b>1 of 4</b>
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**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK



**SECTION B-B**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB  
(SCHEME 2 SHOWN, SCHEME 3 SIMILAR)

\* Shim with washers around Anchors as required to maintain tolerance.  
 \*\* Offset may vary  $\pm 1$ " for Adhesive-Bonded Anchors to clear existing curb reinforcing and provide minimum edge clearance. Offset shall be consistent along length of bridge.

BILL OF REINFORCING STEEL			BAR BENDING DIAGRAMS	
MARK	SIZE	LENGTH		
A	4	AS REQUIRED		
D	4	1'-11"		
L	4	4'-1"		

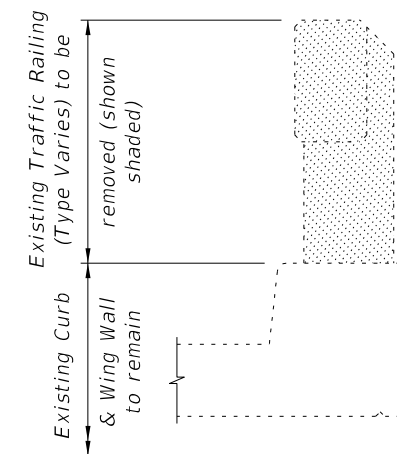
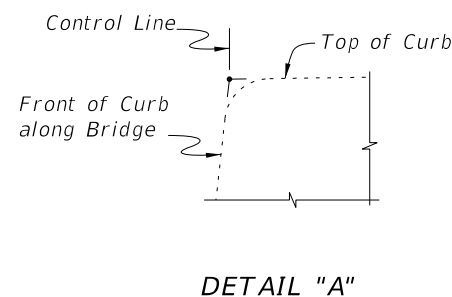
**BAR 4A**

**Dowel Bar 4D**  
(Standard 180° Hook)

**DOWEL BAR 4L**

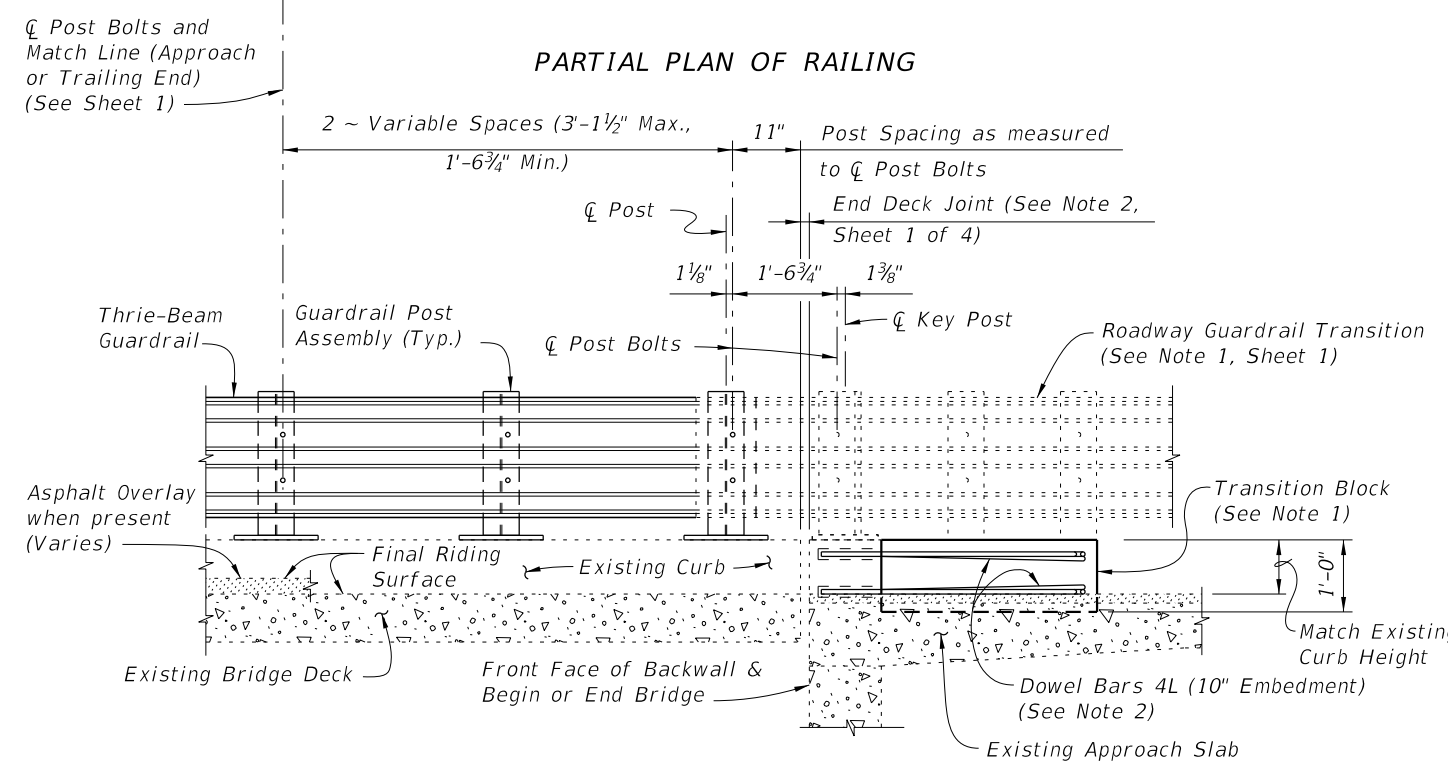
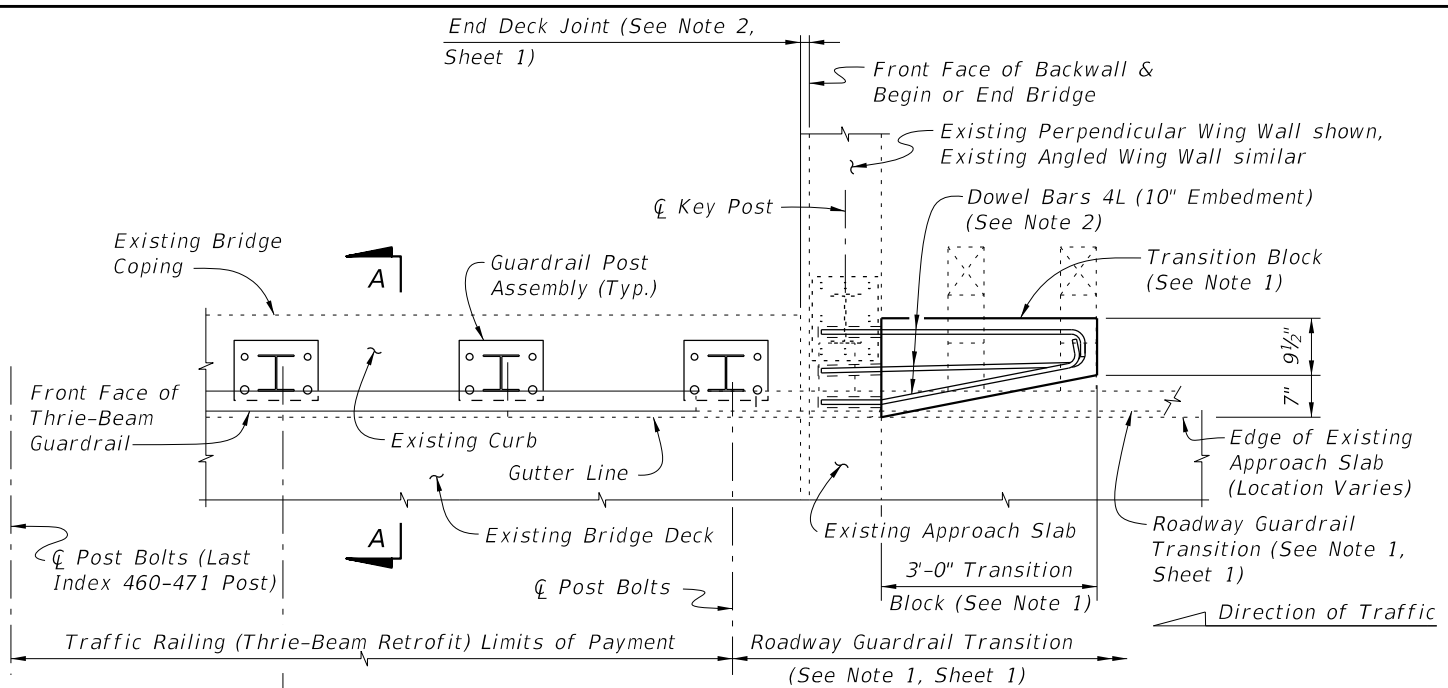
**NOTES:**  
 1. All bar dimensions are out to out.  
 2. The 1'-2" vertical dimension shown for Bar 4D is based on a curb height of 9". If curb height is less or more than 9", decrease or increase this dimension by an amount equal to the difference in curb height.



**TYPICAL SECTION THRU EXISTING TRAFFIC RAILING SHOWING LIMITS OF REMOVAL (BRIDGE DECK SHOWN, WING WALL SIMILAR)**

**CROSS REFERENCES:**  
 For location of Section A-A see Sheets 1, 3 & 4.  
 For location of Section B-B see Sheets 3 & 4.  
 For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

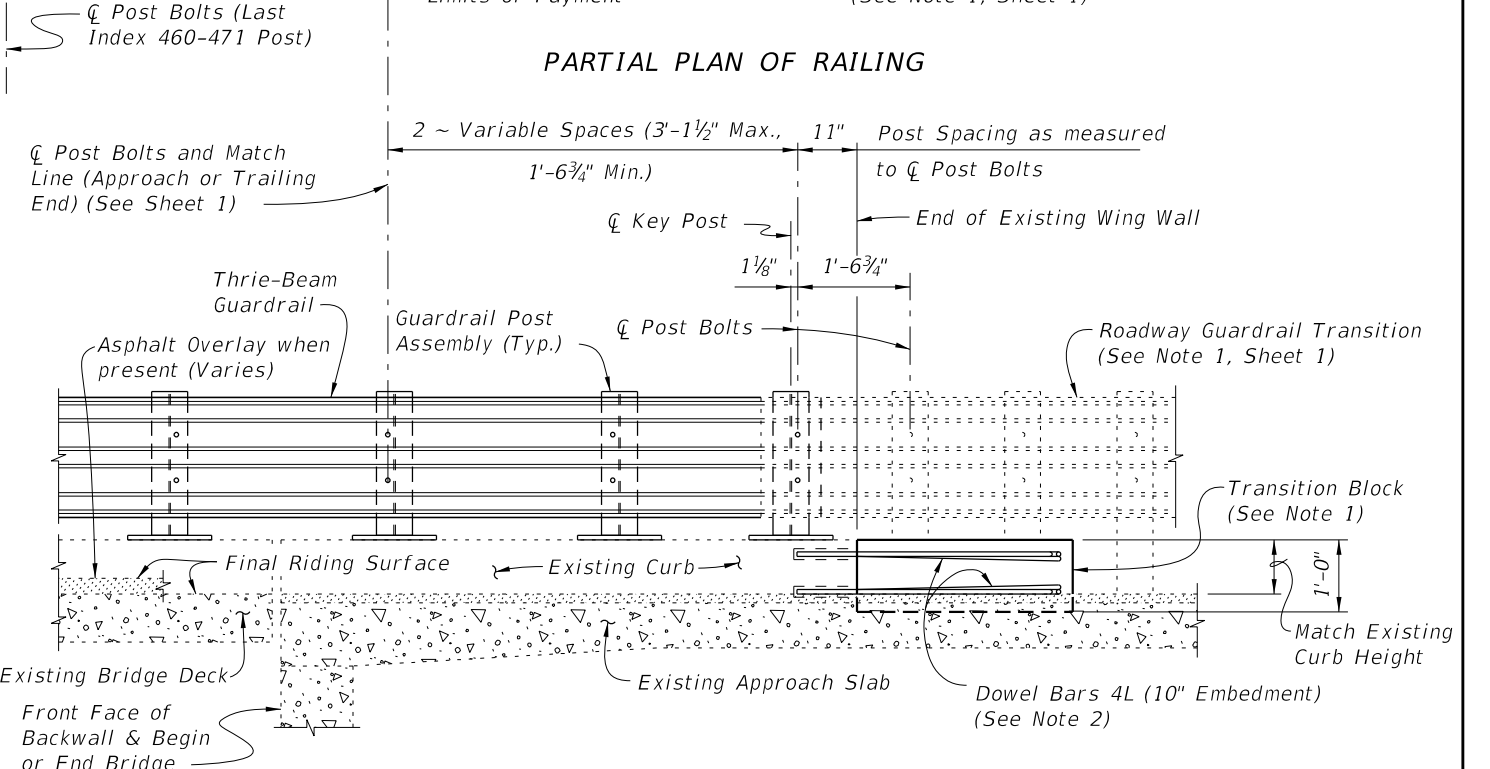
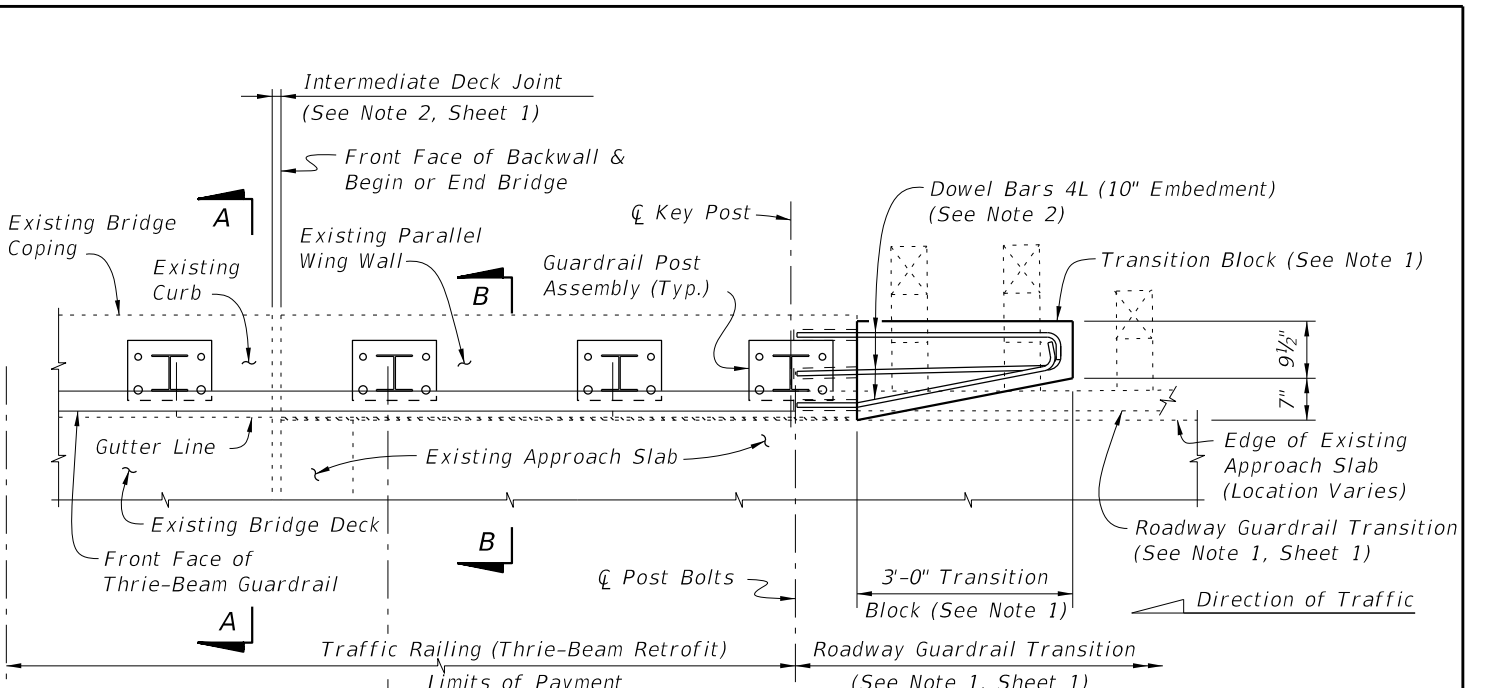
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**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

**SCHEME 1**

**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

**SCHEME 2**

**RAILING END TREATMENT FOR PARALLEL WING WALLS**

**SCHEME 1 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

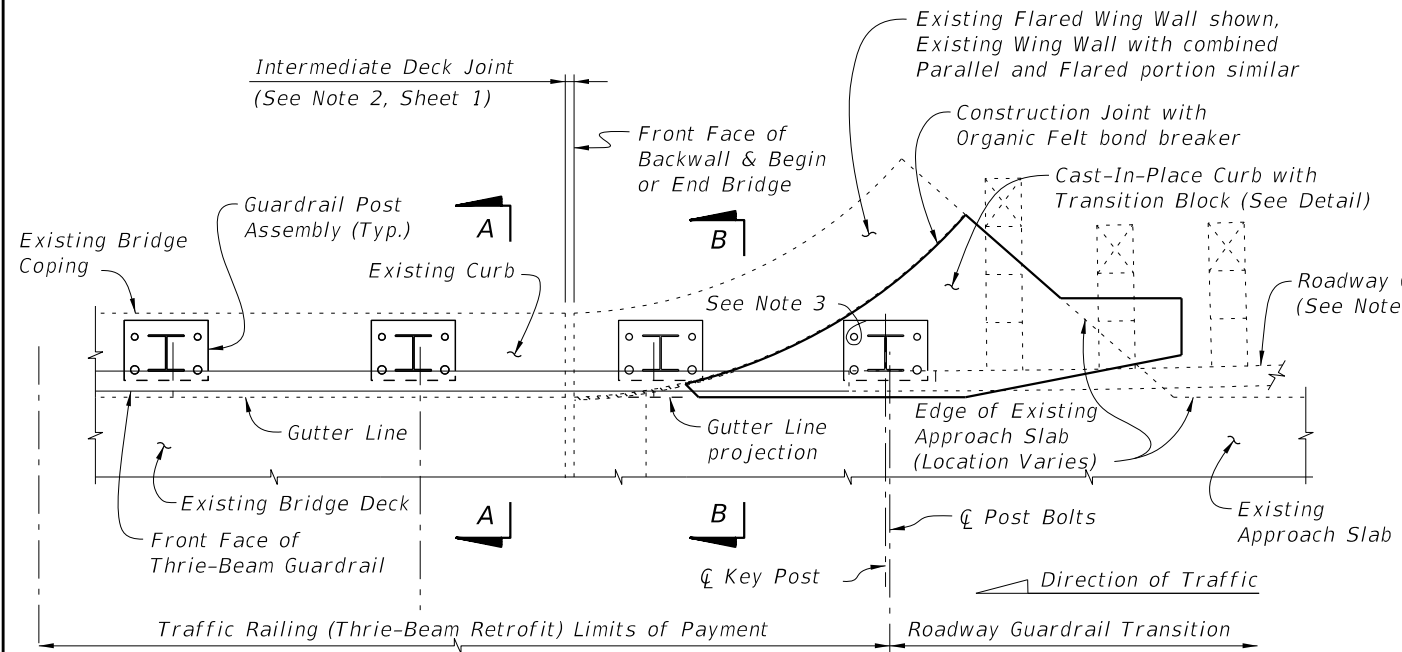
**SCHEME 2 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

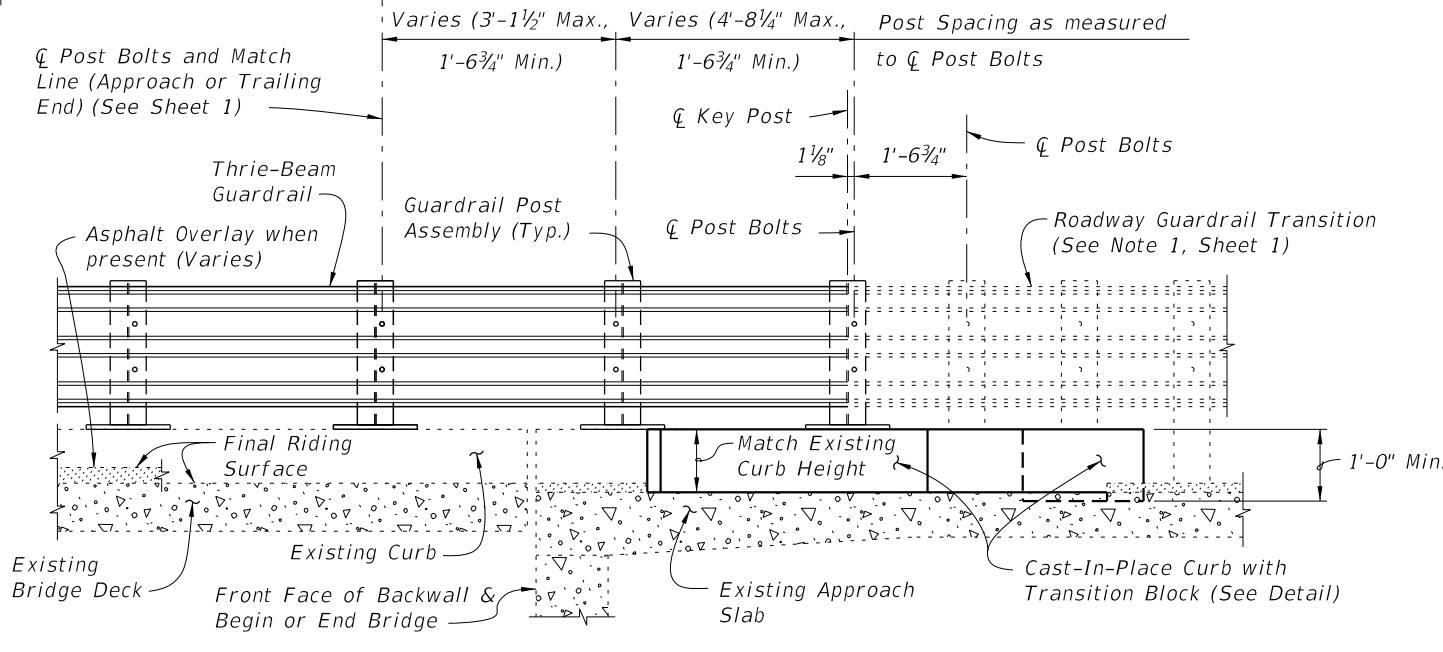
9/23/2021 9:55:16 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:		FY 2022-23 <b>STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)          NARROW CURB</b>	INDEX <b>460-471</b>	SHEET <b>3 of 4</b>
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**PARTIAL PLAN OF RAILING**

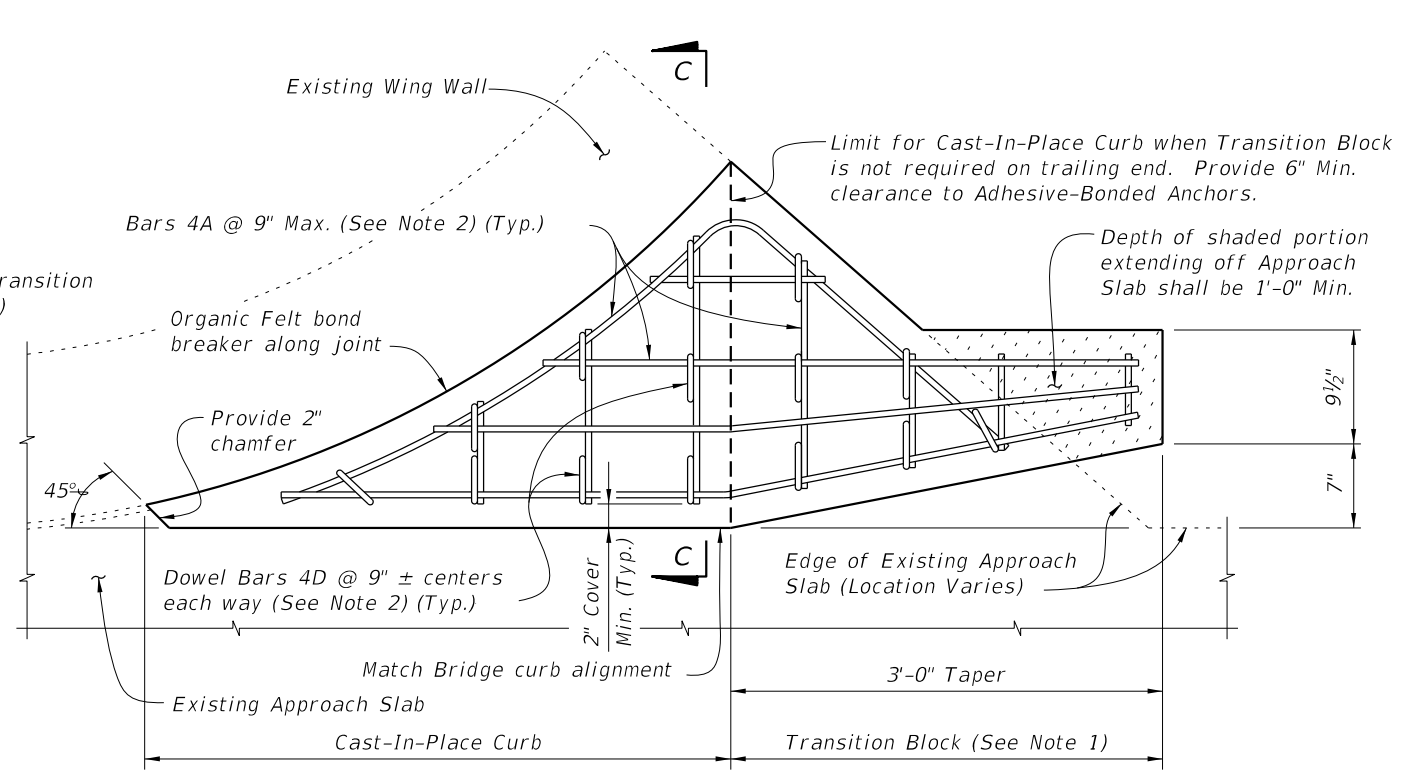


**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

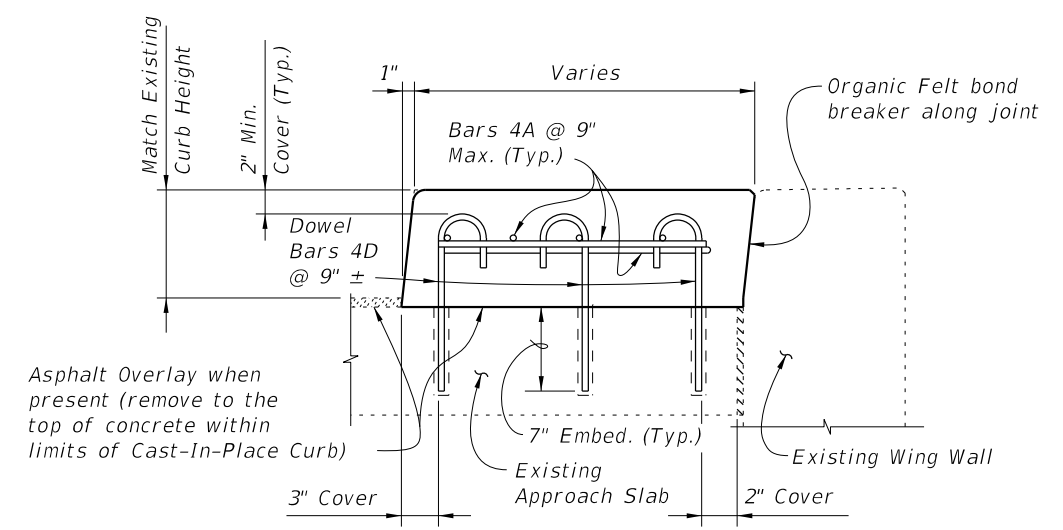
**SCHEME 3  
RAILING END TREATMENT FOR FLARED WING WALLS**

**SCHEME 3 NOTES:**

1. Provide Cast-In-Place Curb as shown. Shape and height of Transition Block and Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field cut and bend Bars 4A and rotate Dowel Bars 4B within Curb and Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.
3. A single 7/8" Ø x 8" Adhesive-Bonded Anchor may be omitted as shown when 2" clear cover cannot be provided.



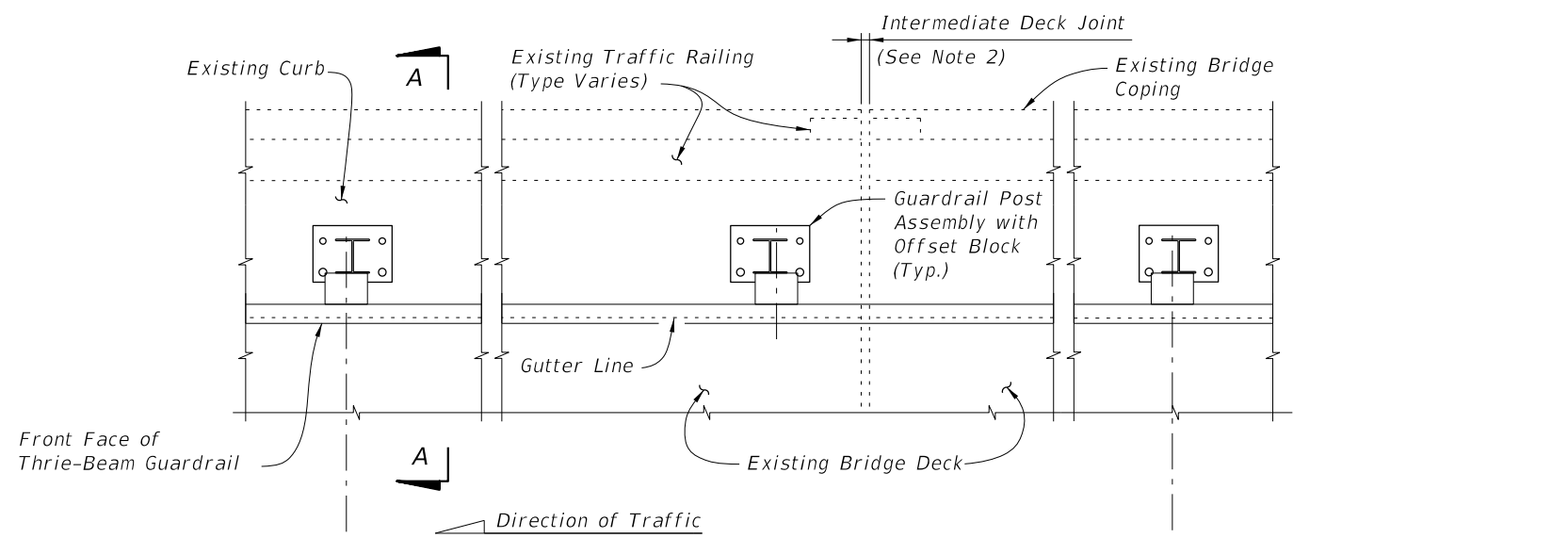
**PLAN OF CAST-IN-PLACE CURB & TRANSITION BLOCK DETAIL  
(Approach End with Transition Block Shown, Trailing End without Transition Block Similar)**



**SECTION C-C**

9/23/2021 9:55:17 AM

LAST REVISION 11/01/16	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) NARROW CURB</b>	INDEX 460-471	SHEET 4 of 4
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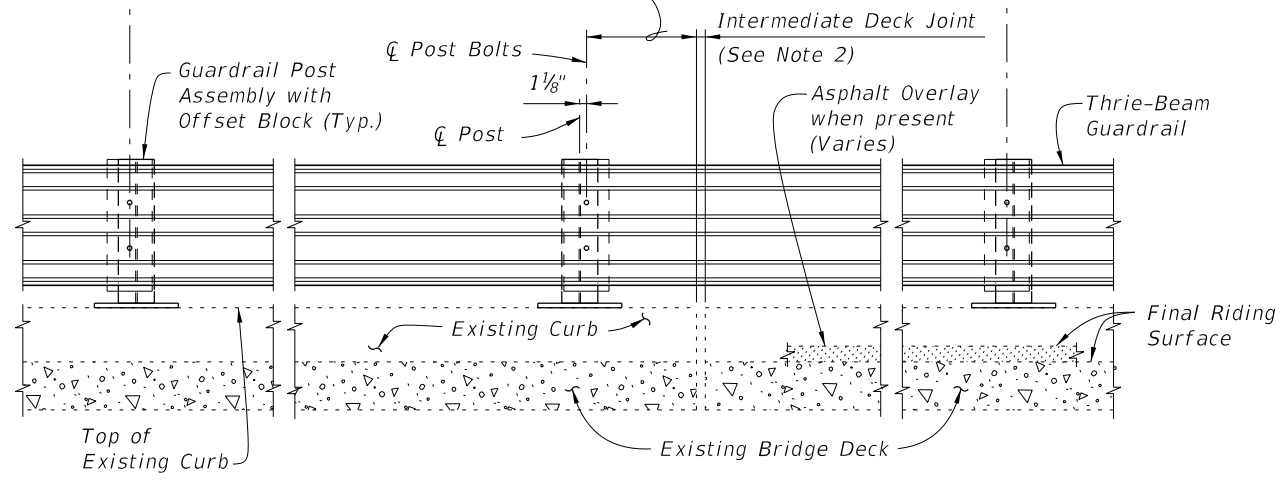
**PARTIAL PLAN OF RAILING**

☐ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

☐ Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

6'-3" spacing (Typ. except as noted along Bridge, see Note 2)

1'-6" Min. for non skewed joints. For treatment of skewed Intermediate Deck Joints see Skew Detail Index 460-470, Sheet 2 (Typ.)



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Traffic Railing not shown for clarity)

==== TYPICAL TREATMENT OF RAILING ALONG BRIDGE ====

**NOTES:**

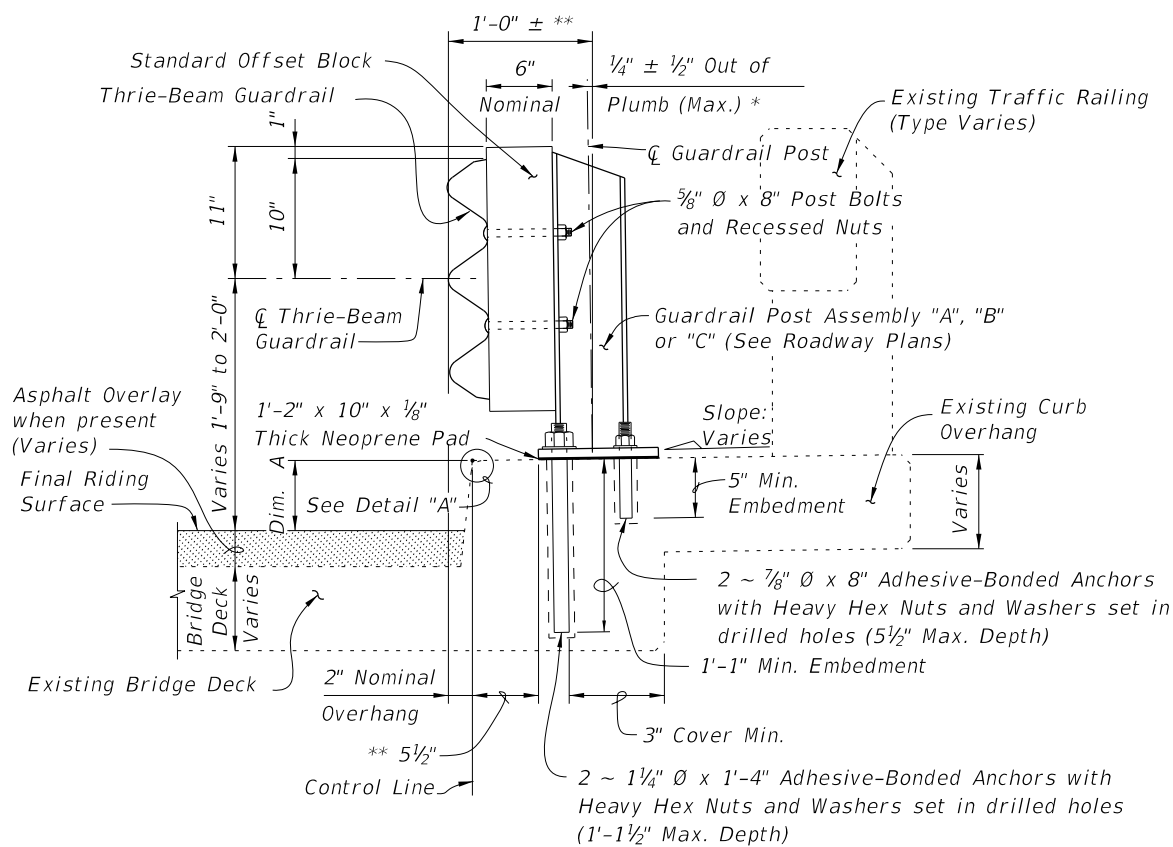
1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

**CROSS REFERENCES:**

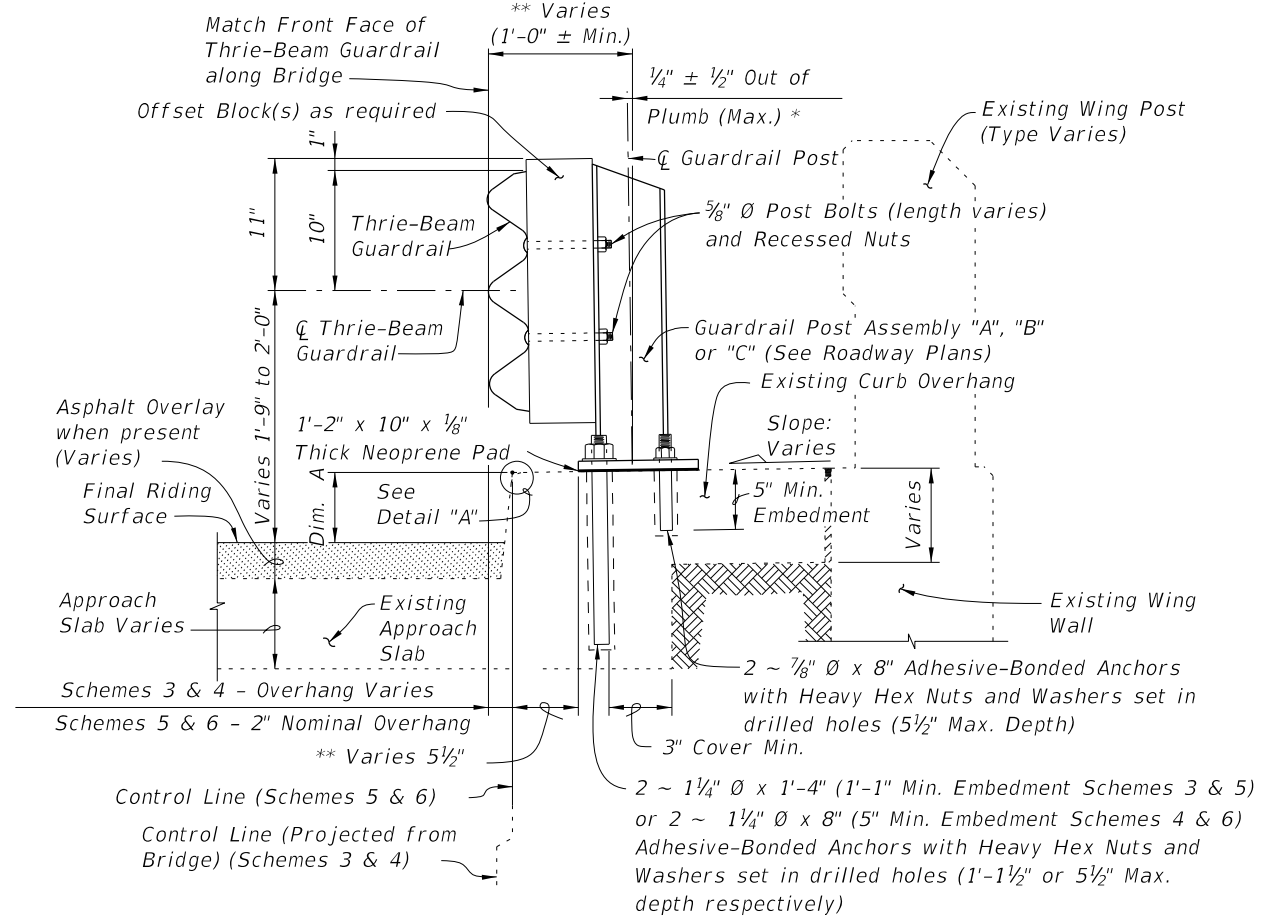
For Section A-A see Sheet 2.  
For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:18 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE STRONG CURB TYPE 1</b>	INDEX <b>460-472</b>	SHEET <b>1 of 4</b>
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**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK



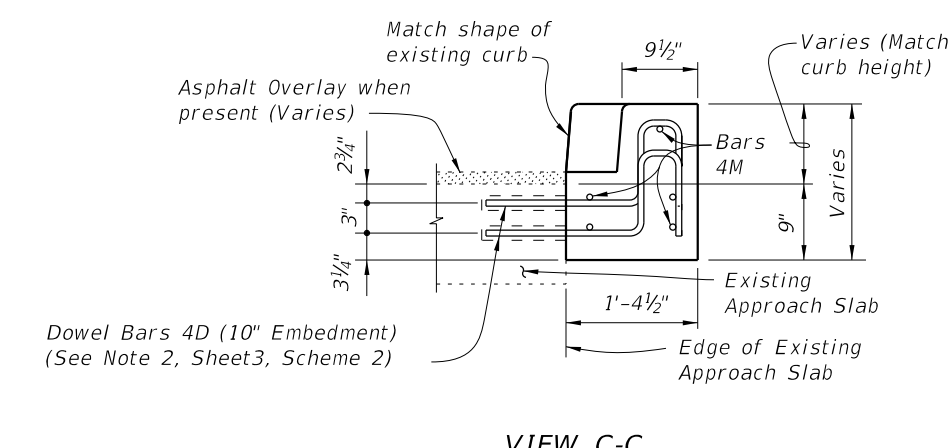
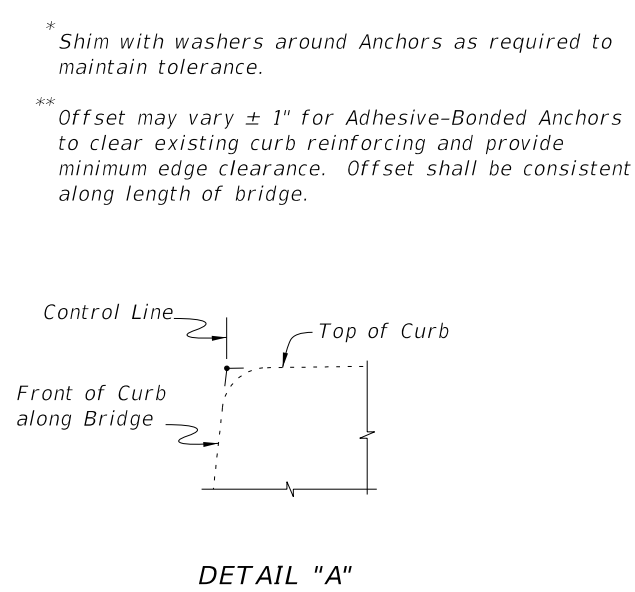
**SECTION B-B**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB  
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

BILL OF REINFORCING STEEL			BAR BENDING DIAGRAMS	
MARK	SIZE	LENGTH		
D	4	3'-7"		
L	4	4'-1"		
M	4	2'-8"		

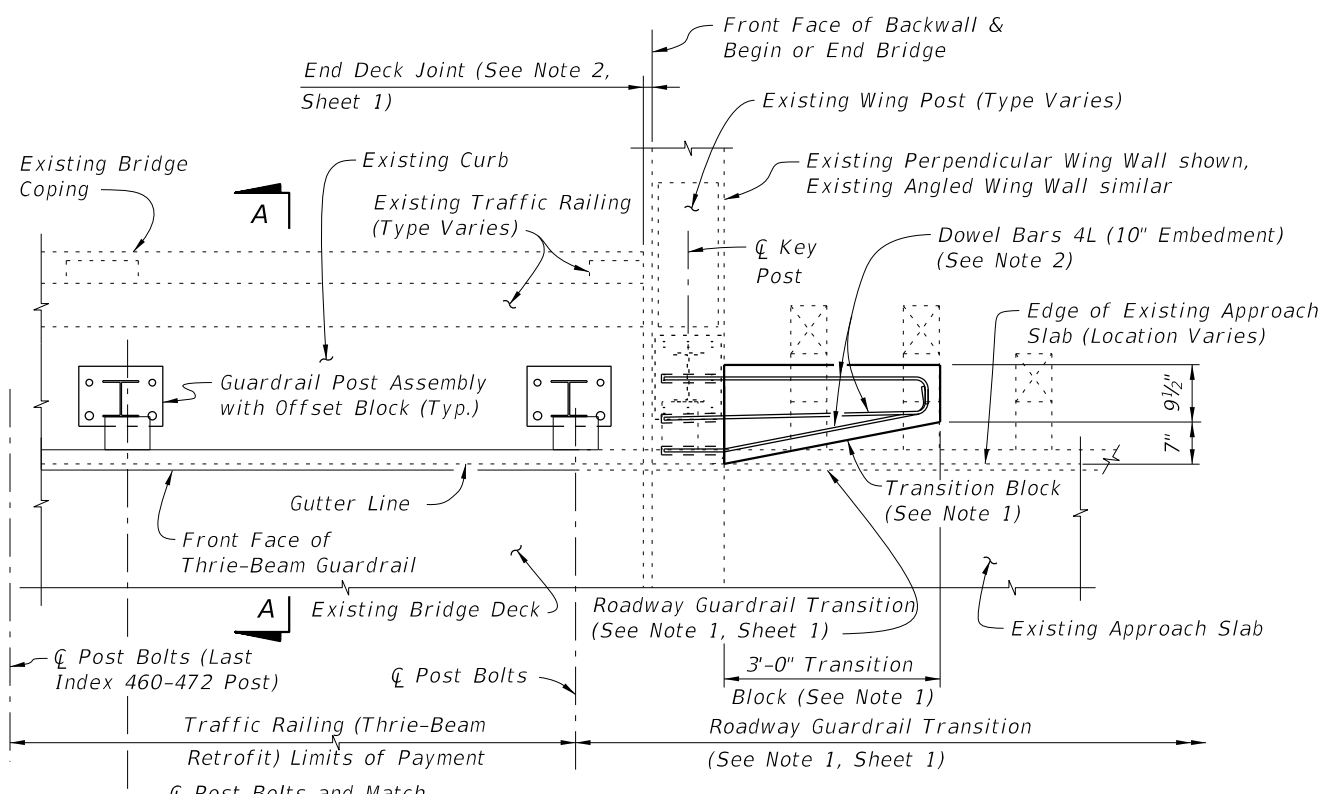
DOWEL BAR 4L	BAR 4M

NOTE: All bar dimensions are out to out.

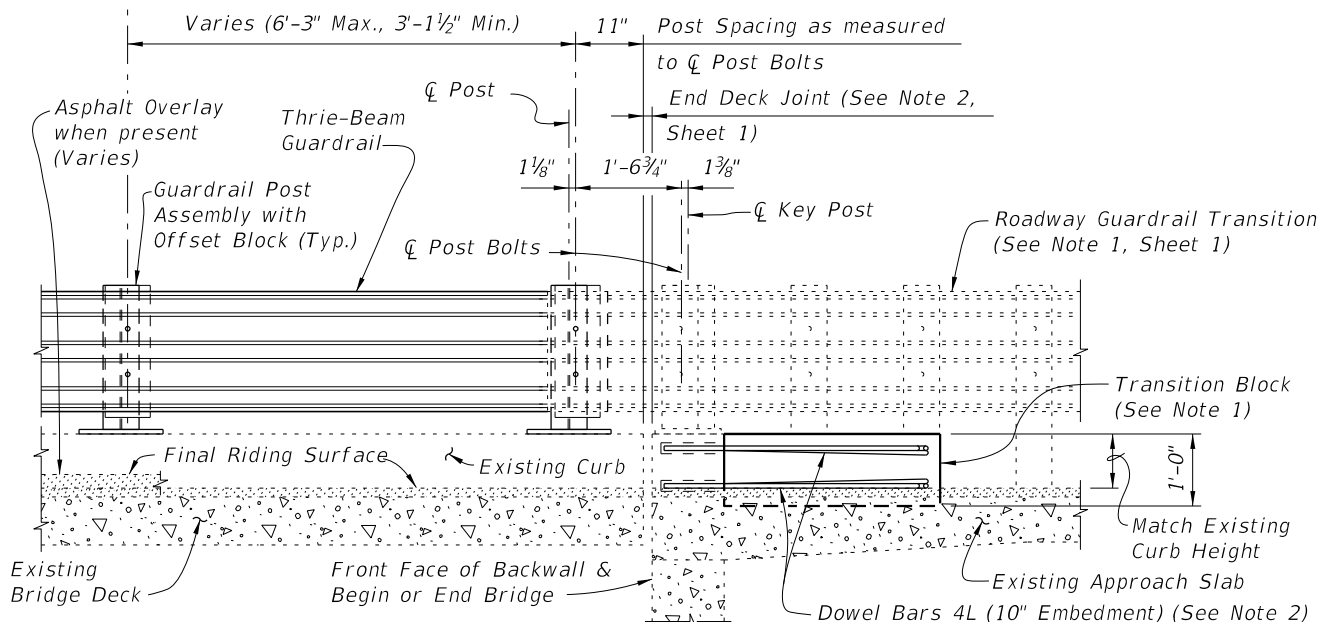


**CROSS REFERENCES:**  
 For location of Section A-A see Sheets 1, 3 & 4.  
 For location of Section B-B see Sheet 4.  
 For location of View C-C see Sheet 3.  
 For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

9/23/2021 9:55:19 AM



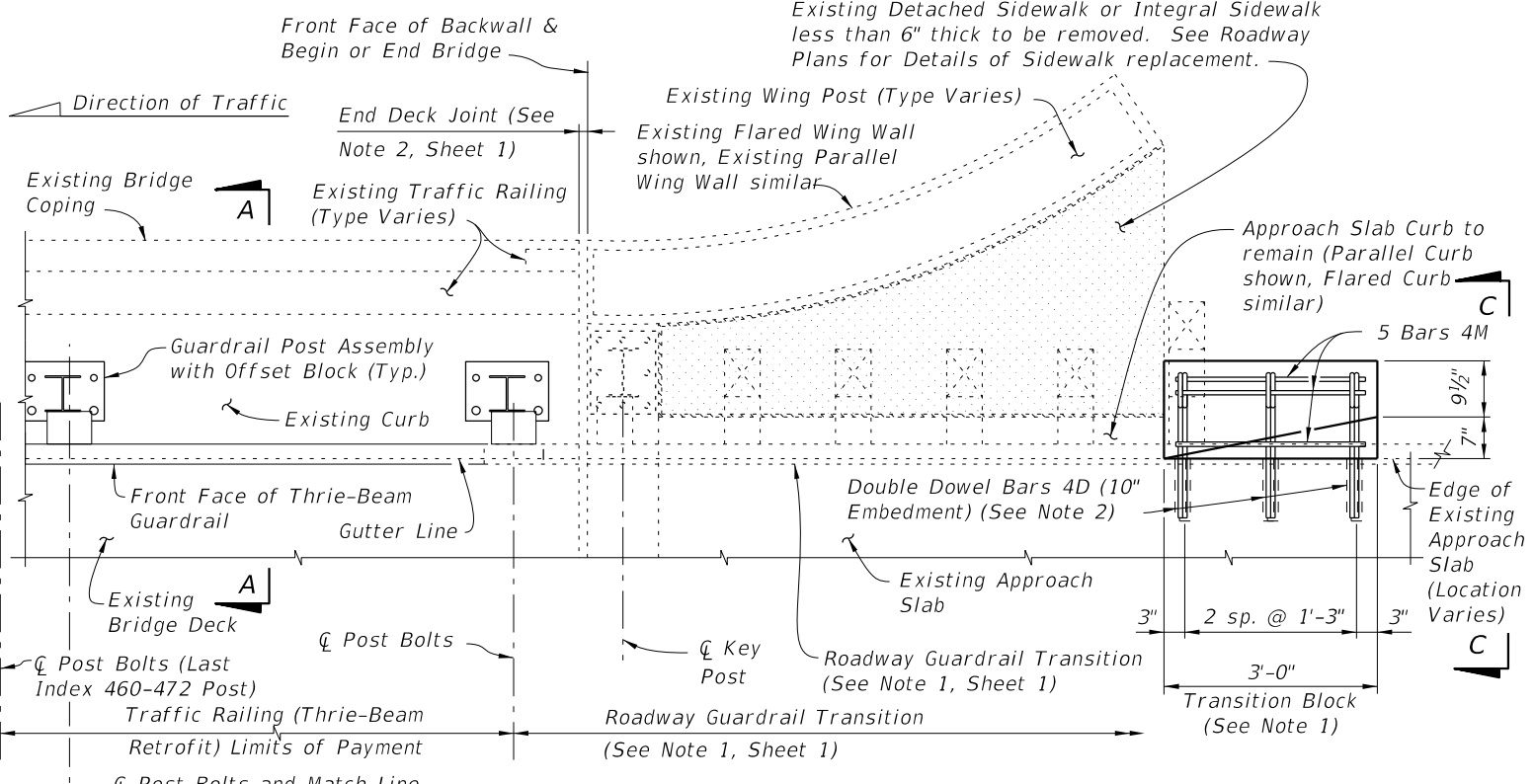
**PARTIAL PLAN OF RAILING**



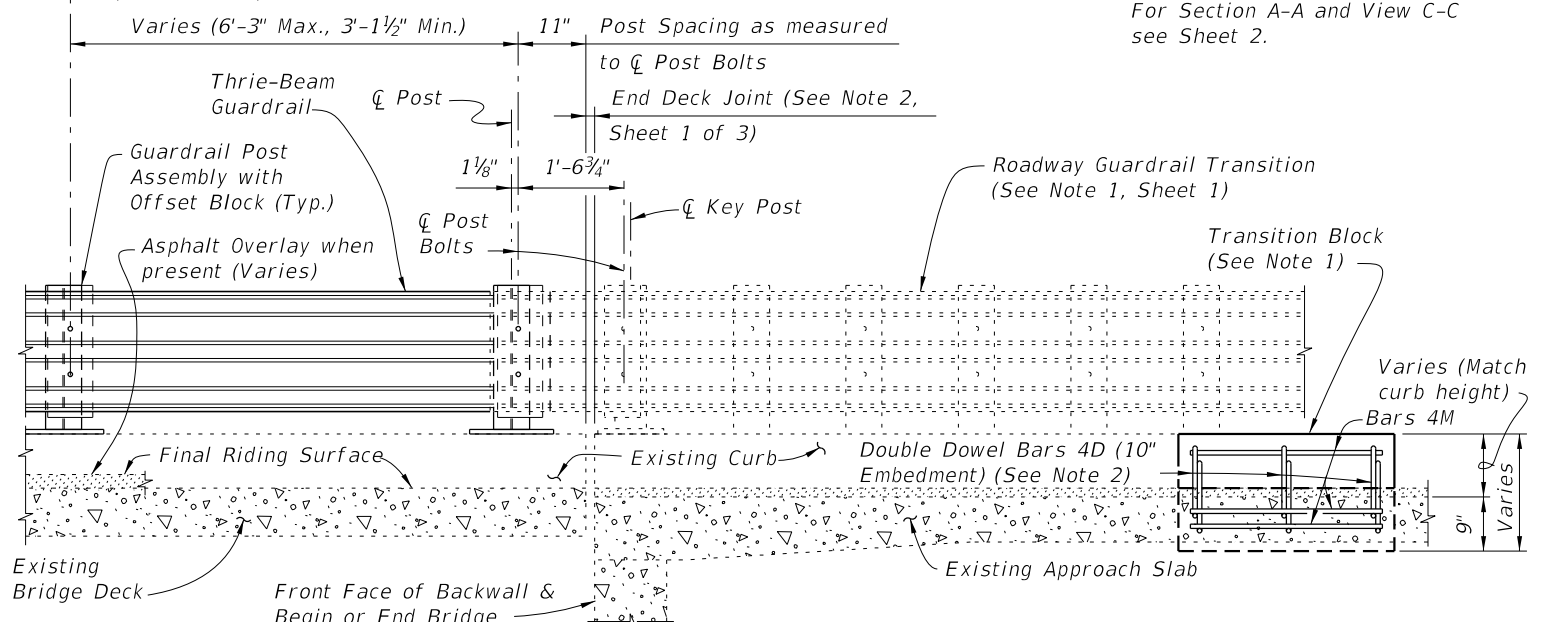
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEME 1**  
**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

- SCHEME 1 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
  2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.



**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

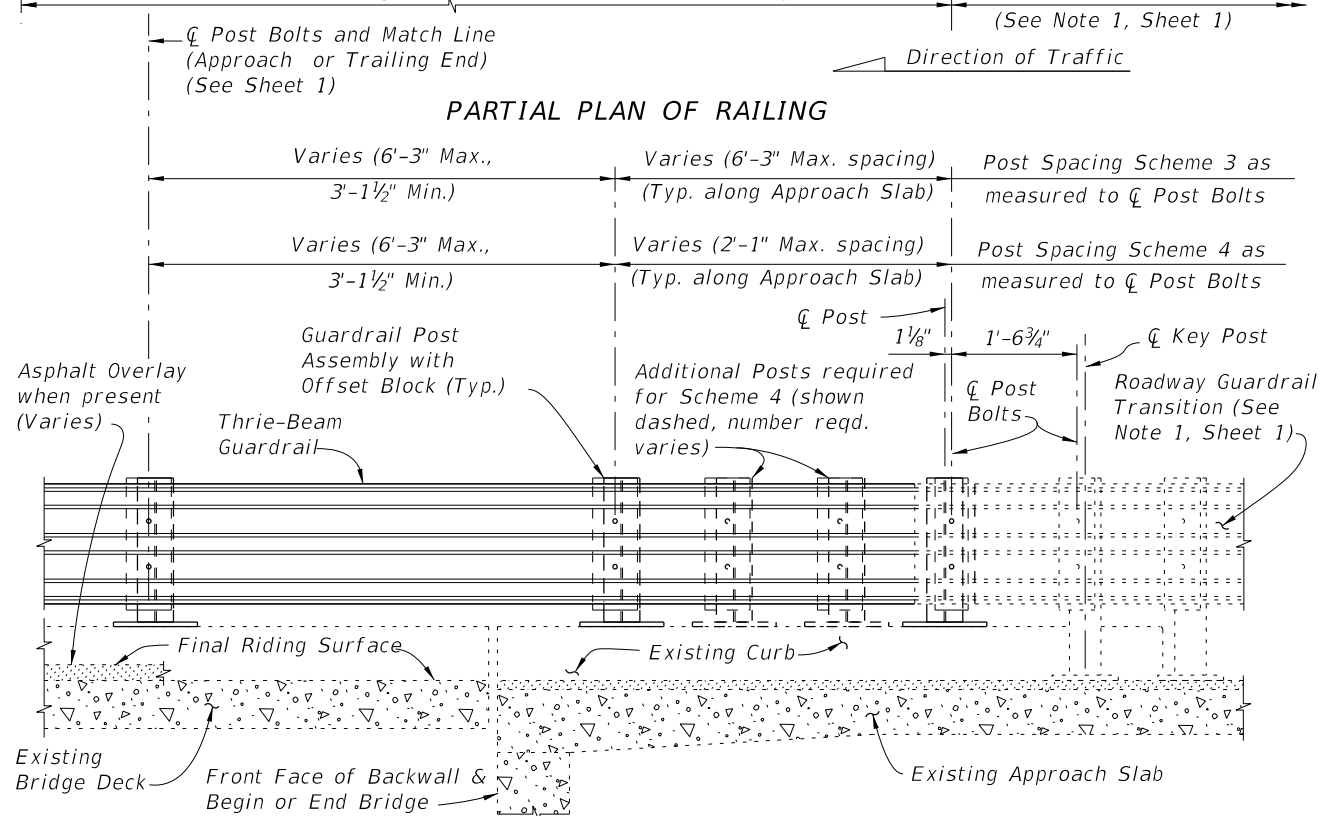
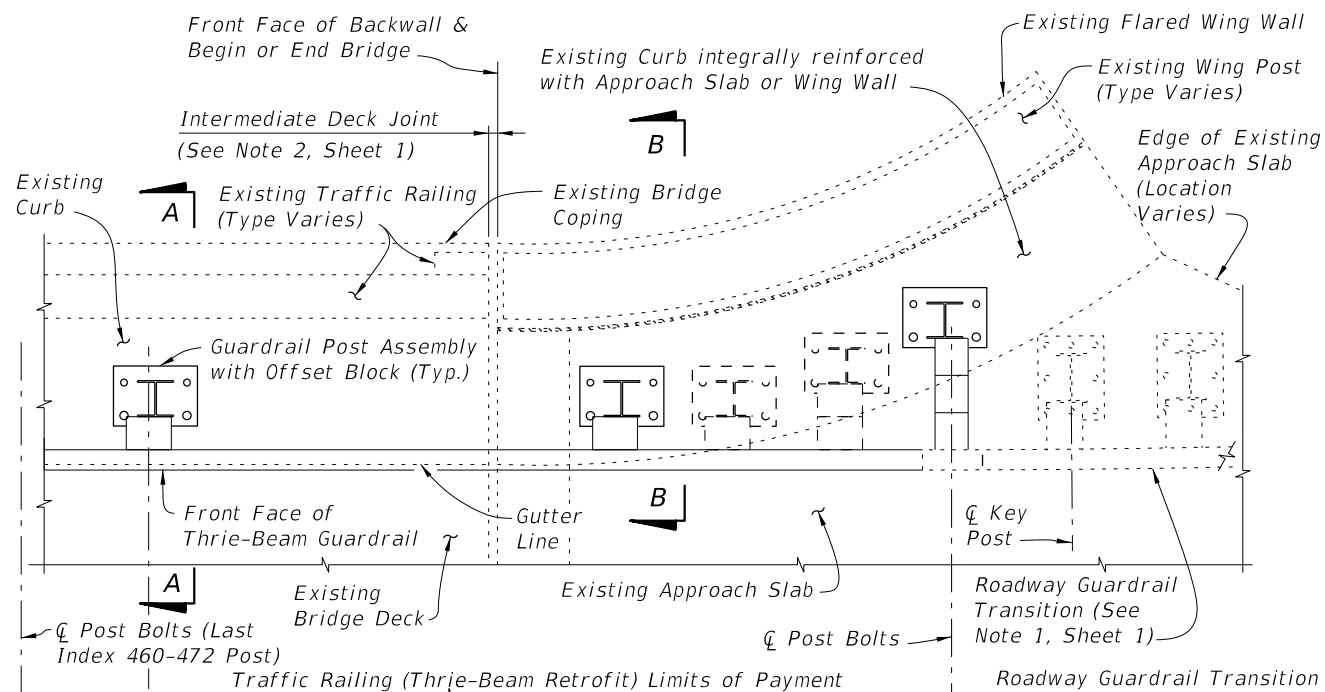
**SCHEME 2**  
**RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALKS LESS THAN 6" THICK**

- SCHEME 2 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curbs.
  2. Field bend or tilt Dowel Bars 4D and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

**CROSS REFERENCES:**  
For Section A-A and View C-C see Sheet 2.

9/23/2021 9:55:22 AM

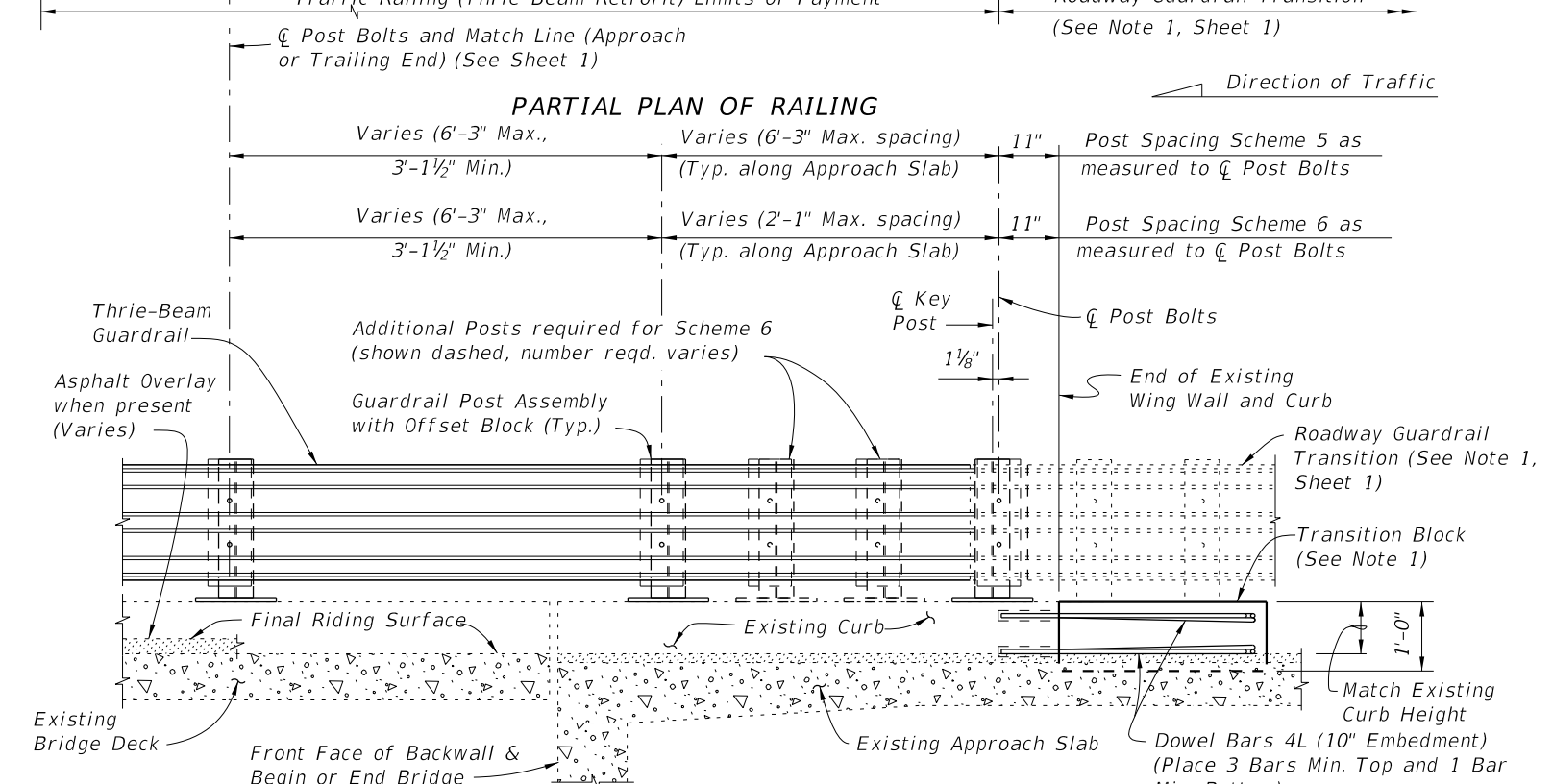
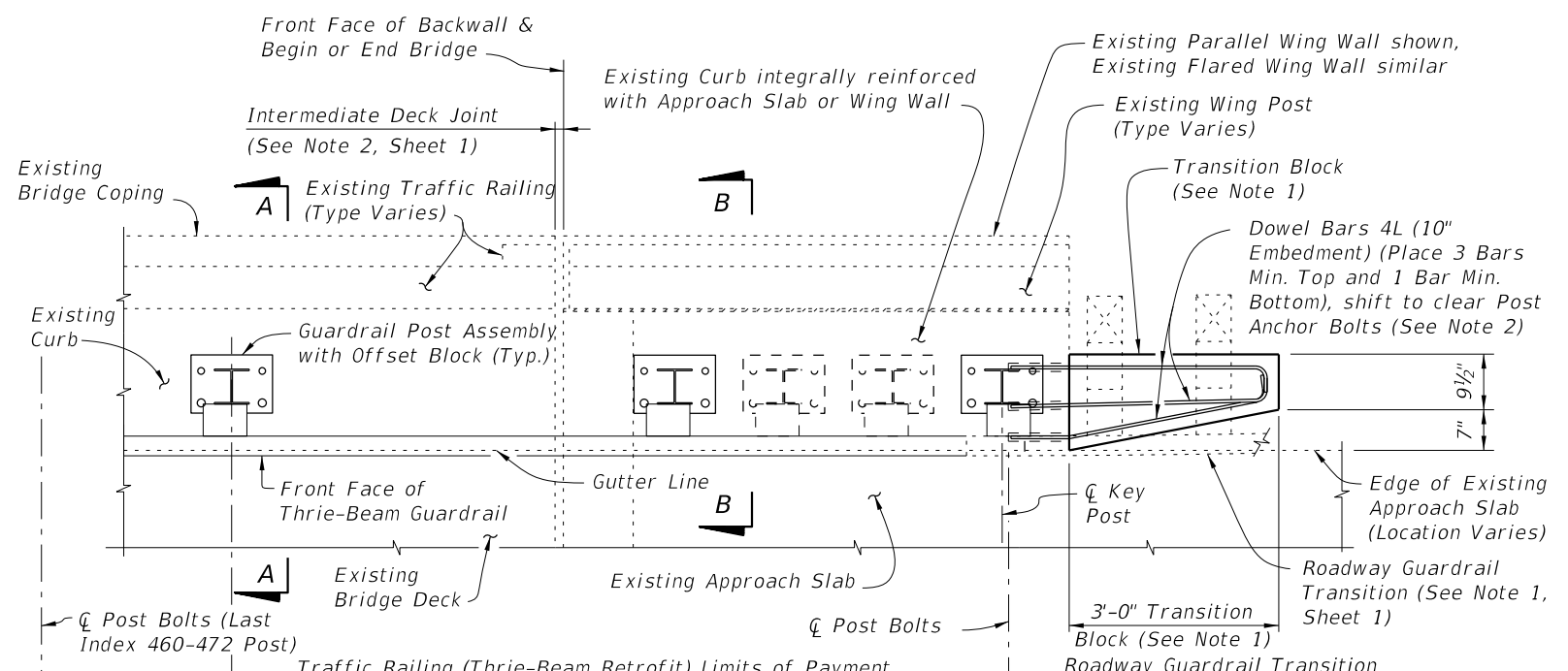
LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE STRONG CURB TYPE 1</b>	INDEX 460-472	SHEET 3 of 4
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**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEMES 3 AND 4**

**RAILING END TREATMENT FOR FLARED INTEGRAL CURBS**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEMES 5 AND 6**

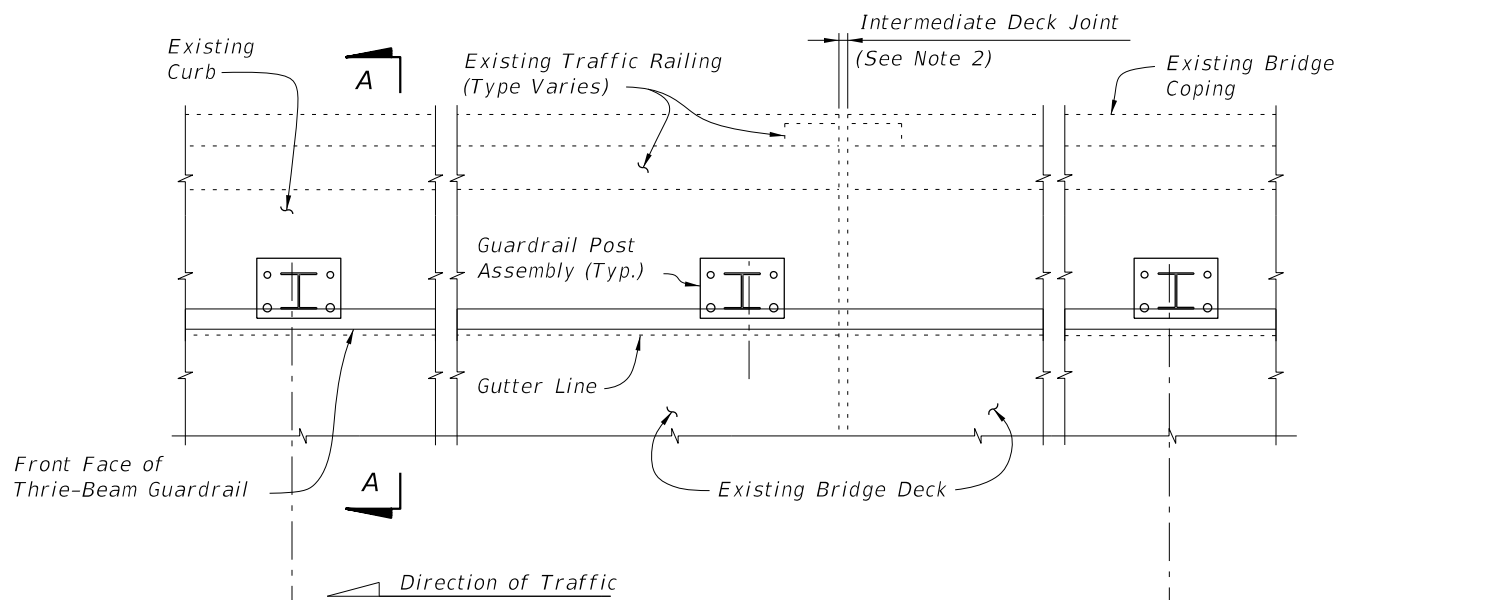
**RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS**

**SCHEMES 5 AND 6 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

9/23/2021 9:55:23 AM

LAST REVISION 01/01/08	DESCRIPTION:	 <b>FY 2022-23</b> <b>STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE STRONG CURB TYPE 1</b>	INDEX 460-472	SHEET 4 of 4
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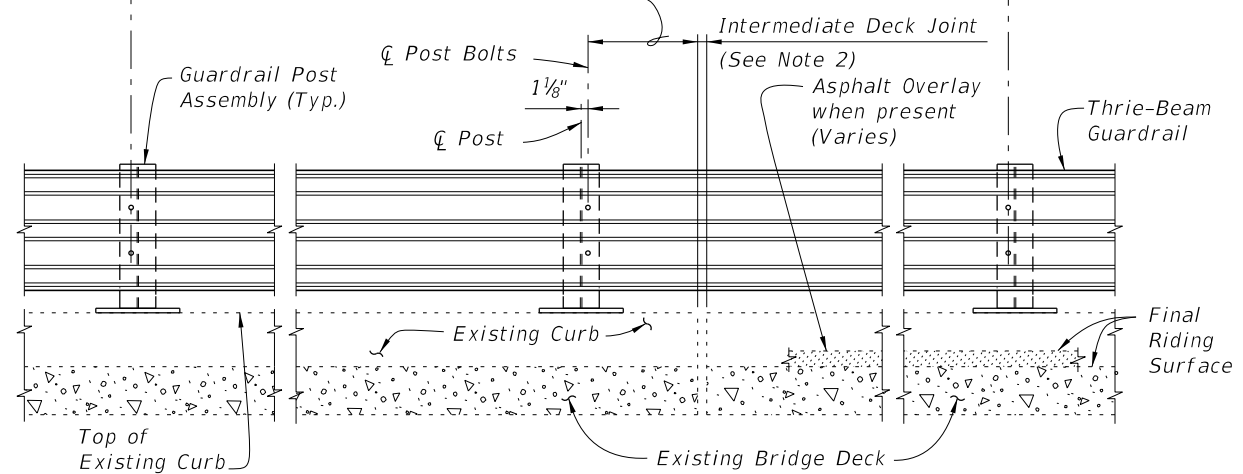
PARTIAL PLAN OF RAILING

☉ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

☉ Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

6'-3" spacing (Typ. except as noted along Bridge, see Note 2)

1'-6" Min. for non skewed joints. For treatment of skewed Intermediate Deck Joints see Skew Detail Index 460-470, Sheet 2 (Typ.)



PARTIAL ELEVATION OF INSIDE FACE OF RAILING  
(Existing Traffic Railing not shown for clarity)

==== TYPICAL TREATMENT OF RAILING ALONG BRIDGE ====


NOTES:

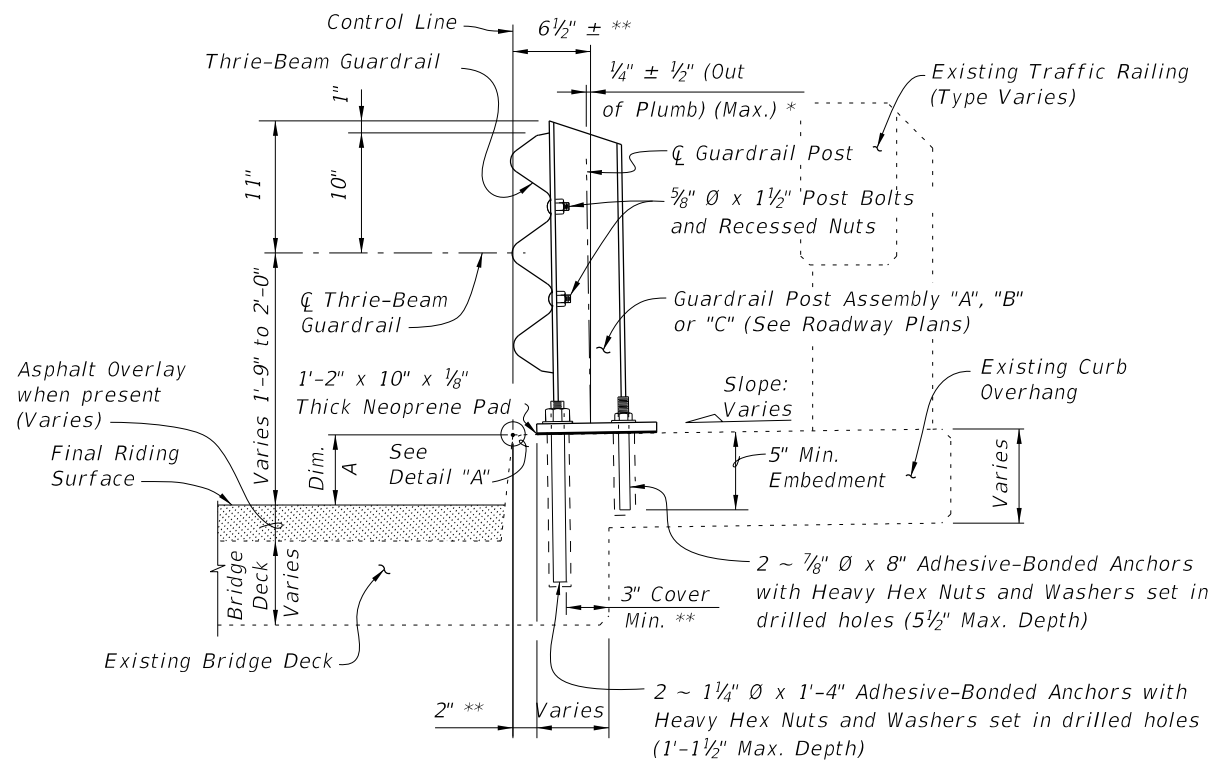
1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

CROSS REFERENCES:

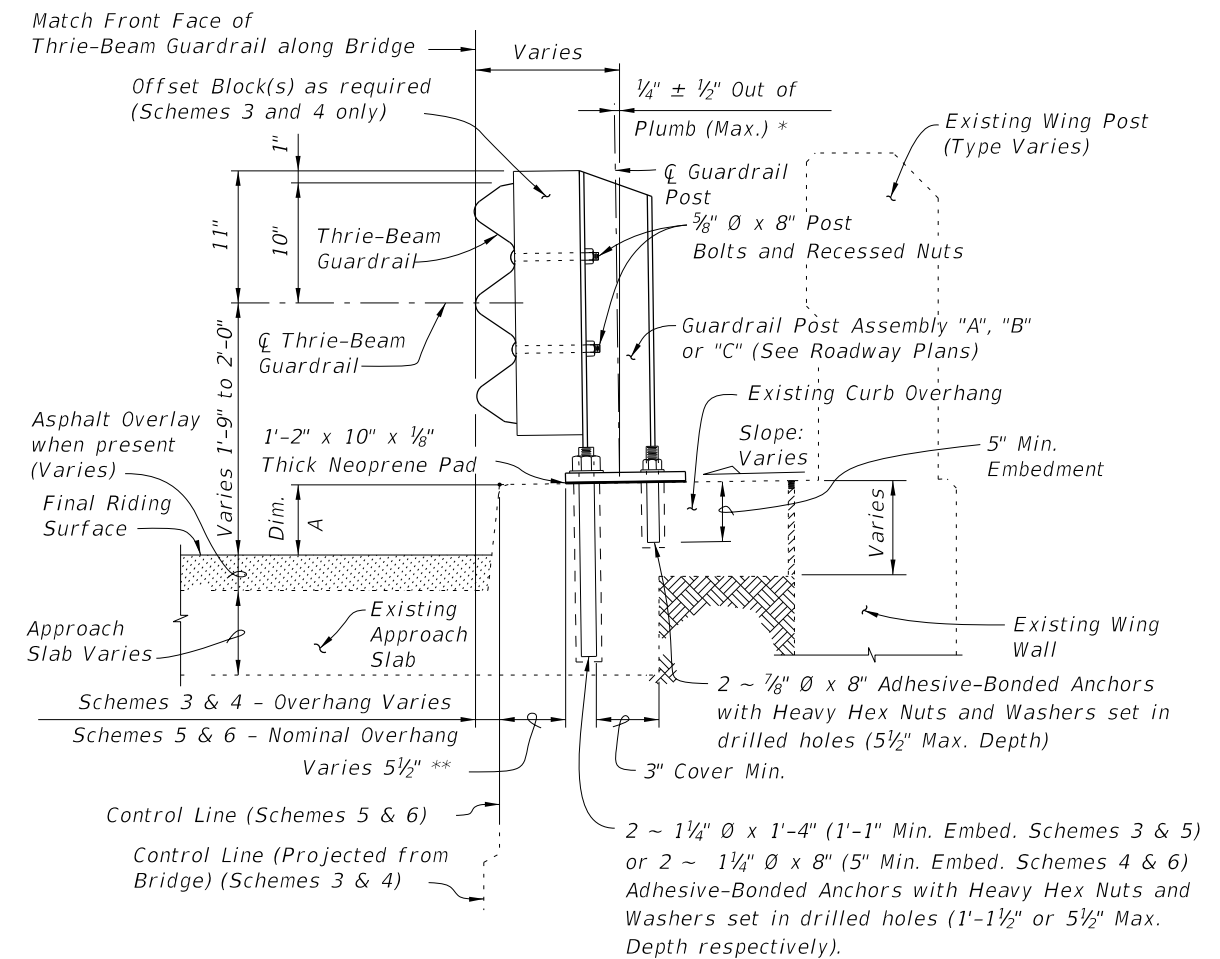
For Section A-A see Sheet 2.  
For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:24 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	TRAFFIC RAILING - (THRIE-BEAM RETROFIT) WIDE STRONG CURB TYPE 2	INDEX 460-473	SHEET 1 of 4
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**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

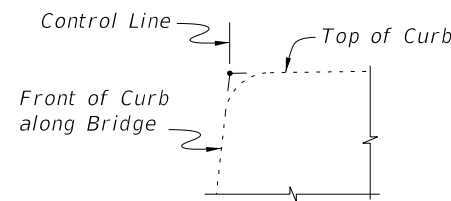


**SECTION B-B**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB  
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

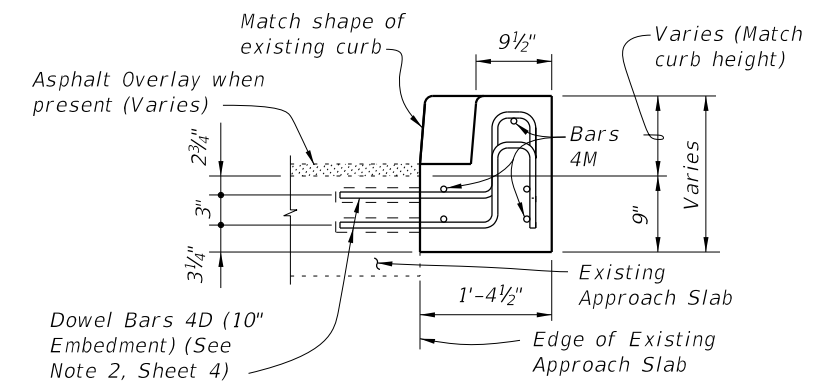
BILL OF REINFORCING STEEL			BAR BENDING DIAGRAMS	
MARK	SIZE	LENGTH		
D	4	3'-7"		
L	4	4'-1"		
M	4	2'-8"		

NOTE: All bar dimensions are out to out.

\* Shim with washers around Anchor Bolts and Anchors as required to maintain tolerance.  
 \*\* Offset may vary  $\pm 1$ " for Adhesive-Bonded Anchors and Anchor Bolts to clear existing curb reinforcing and provide minimum edge clearance. Offset shall be consistent along length of bridge.



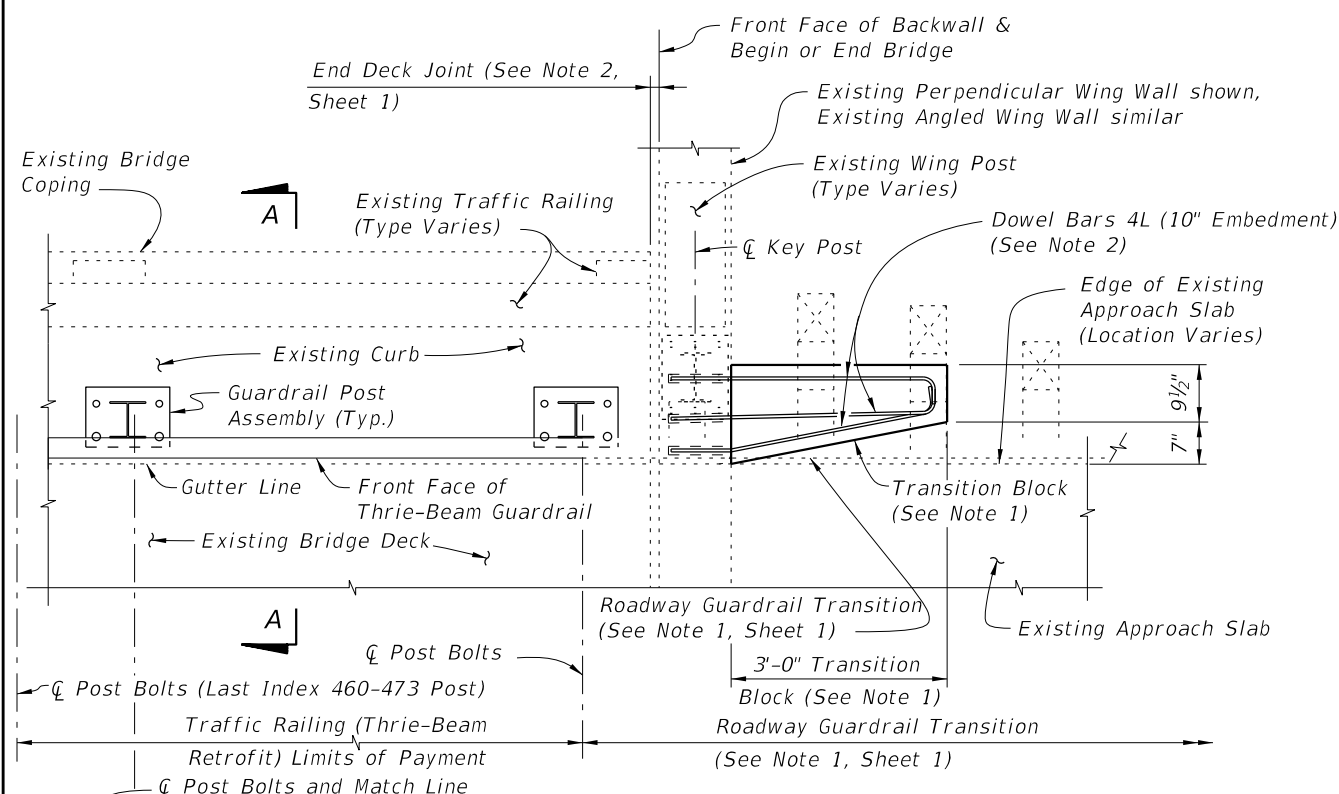
DETAIL "A"



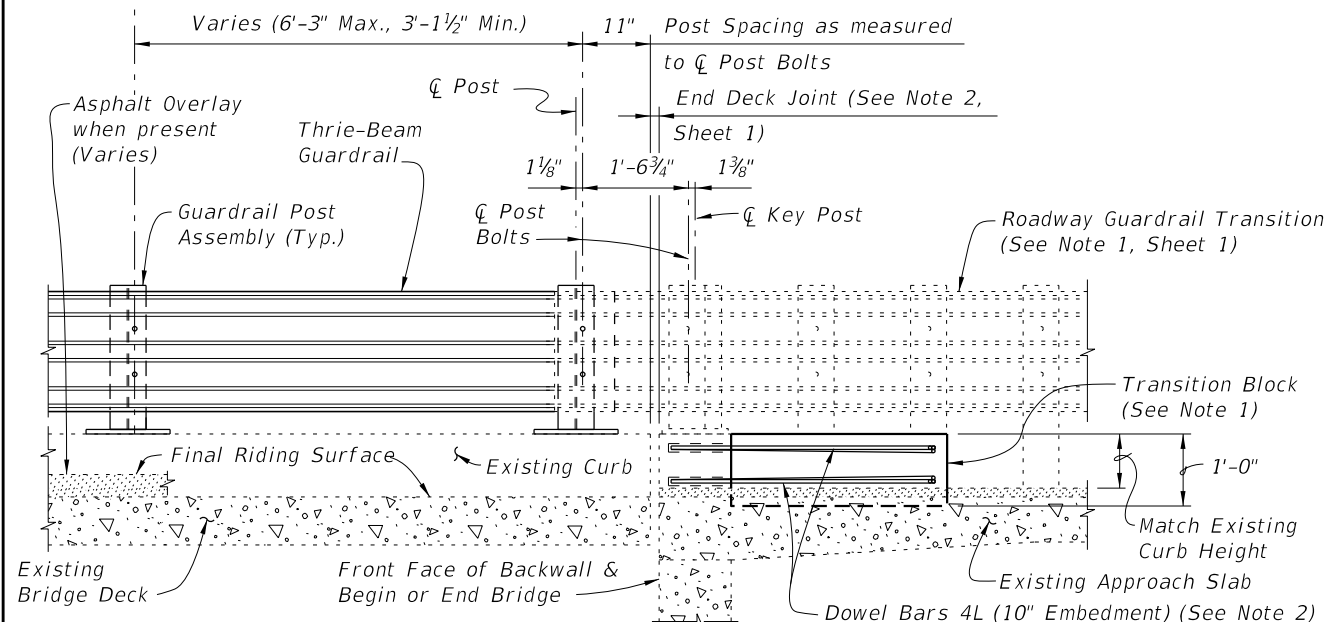
VIEW C-C

CROSS REFERENCES:  
 For location of Section A-A see Sheet 1, 3 and 4.  
 For location of Section B-B see Sheet 4.  
 For location of View C-C see Sheet 3.  
 For Traffic Railing Notes and Details see Index 460-470.  
 For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

9/23/2021 9:55:25 AM



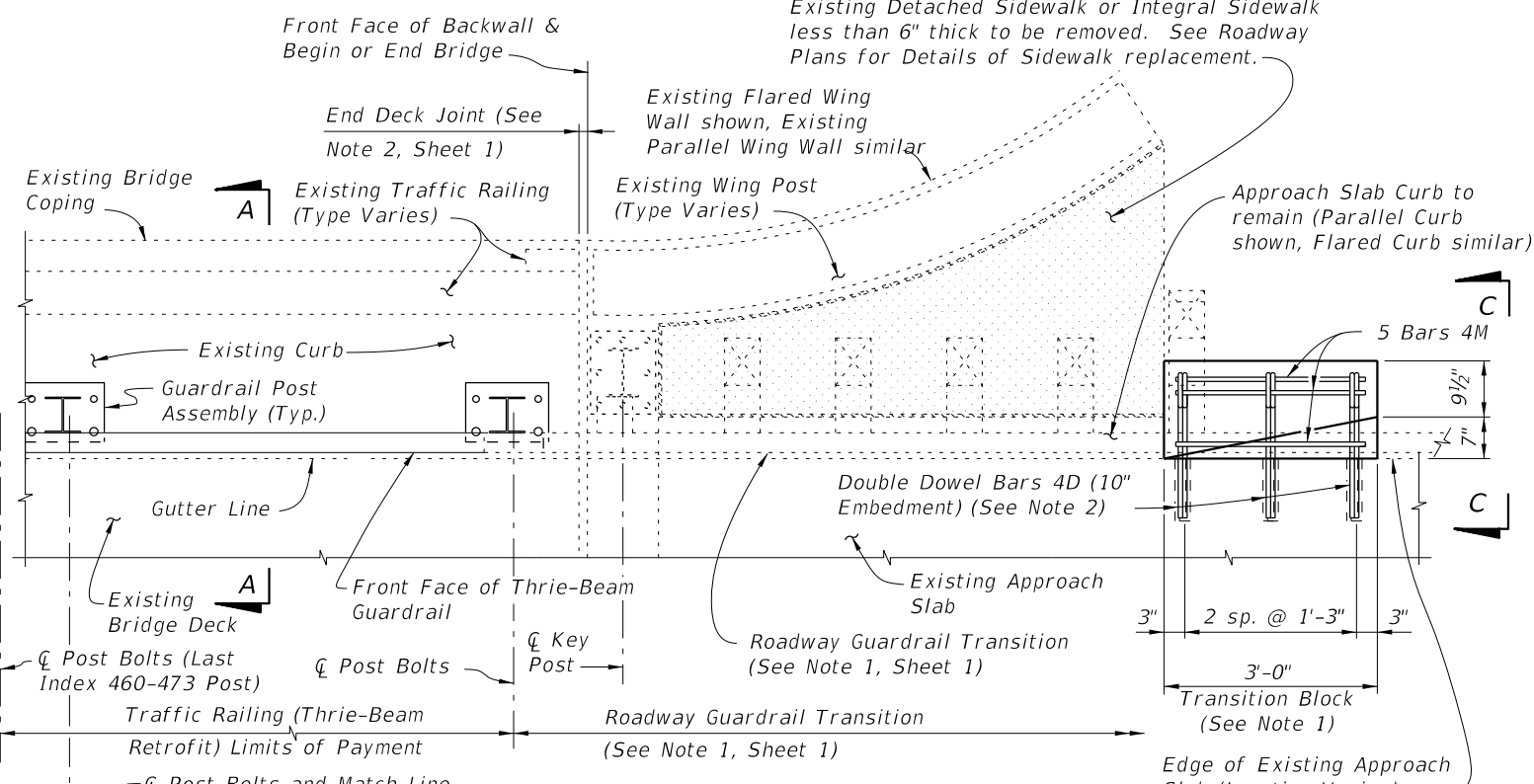
**PARTIAL PLAN OF RAILING**



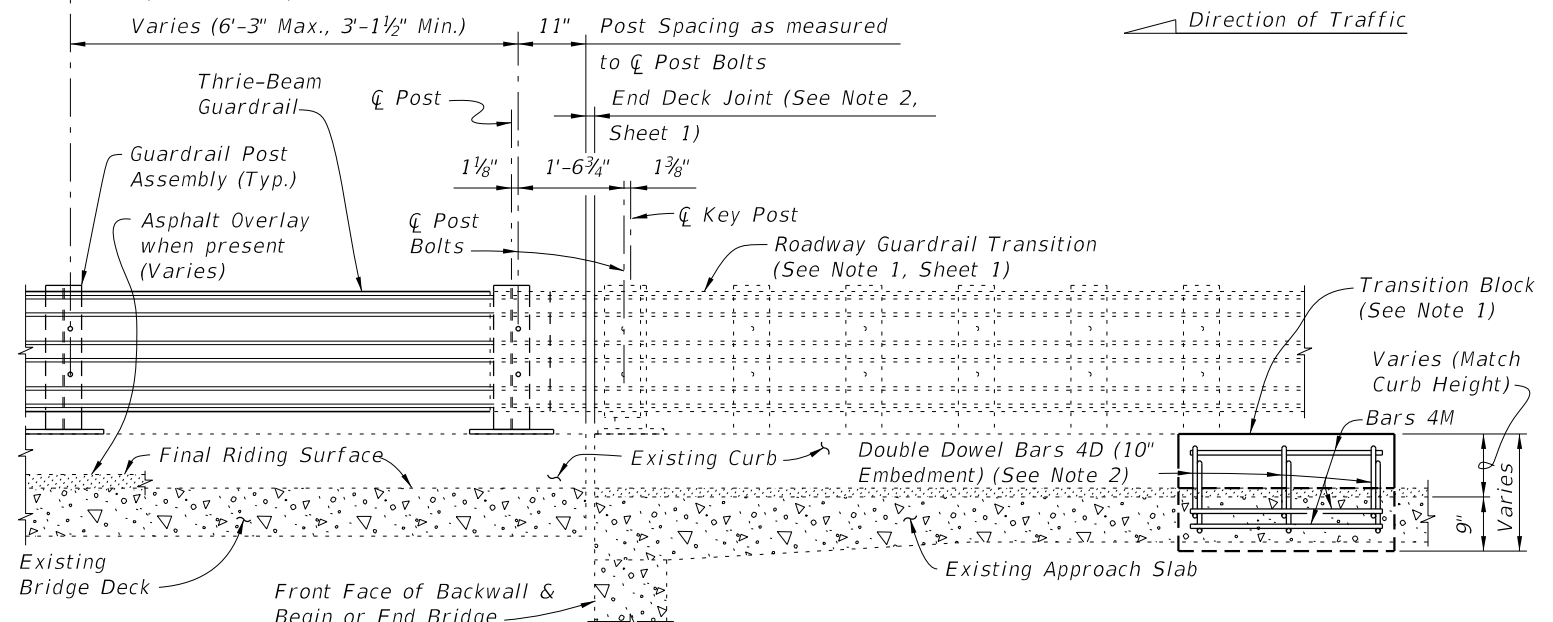
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEME 1**  
**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

- SCHEME 1 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
  2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.



**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

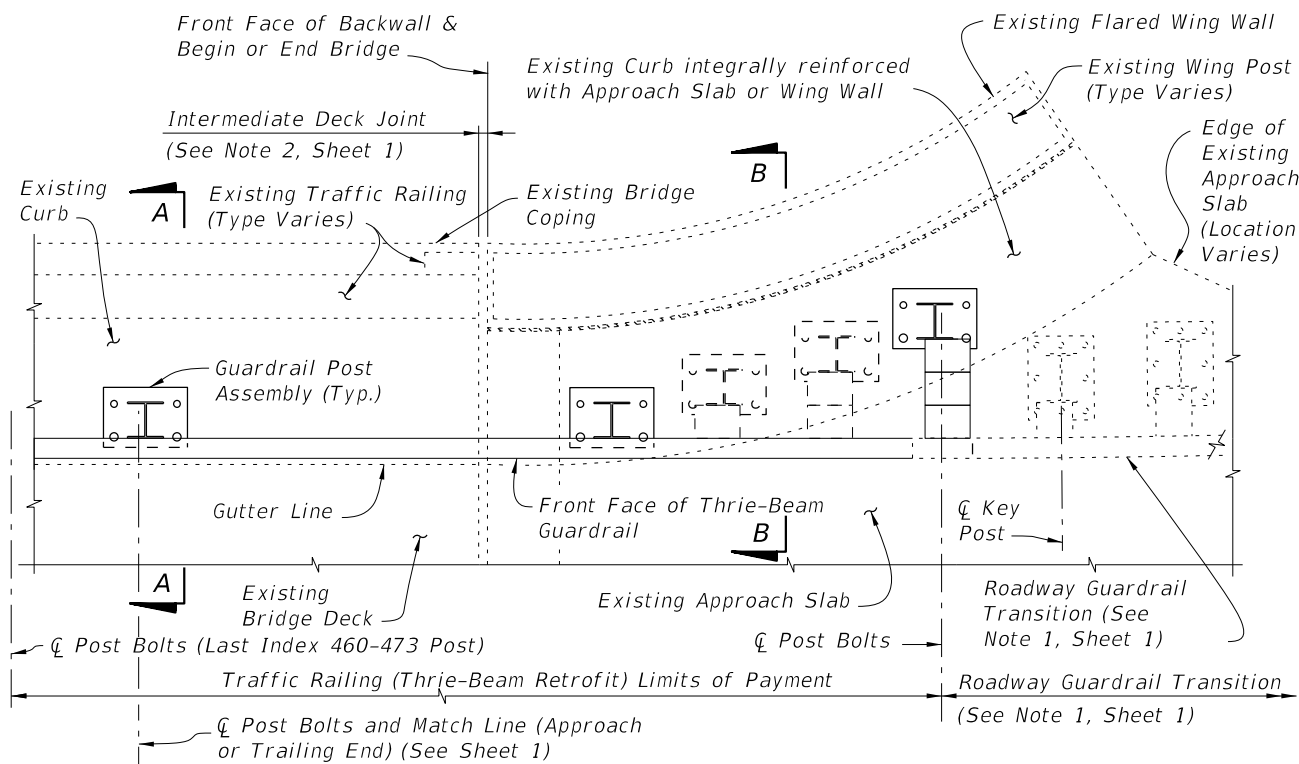
**SCHEME 2**  
**RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALK LESS THAN 6" THICK**

- SCHEME 2 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curbs.
  2. Field bend or tilt Dowel Bars 4D and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

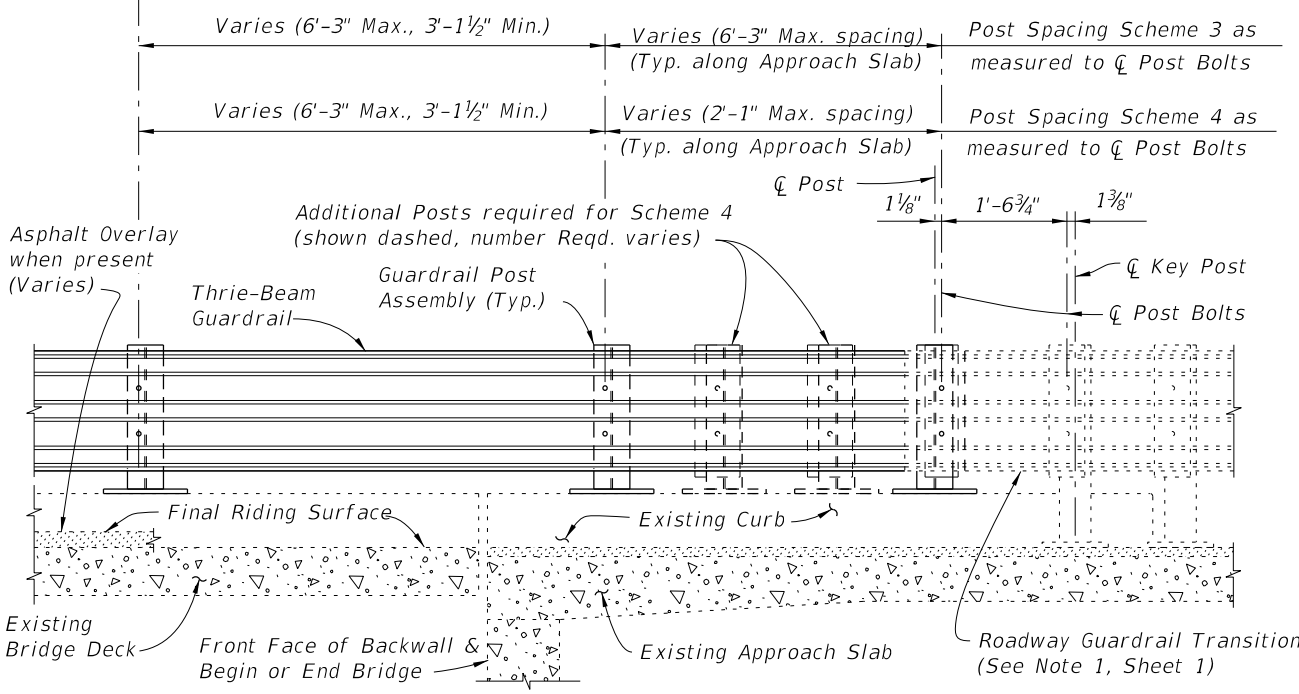
9/23/2021 9:55:26 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23</b> <b>STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE STRONG CURB TYPE 2</b>	INDEX 460-473	SHEET 3 of 4
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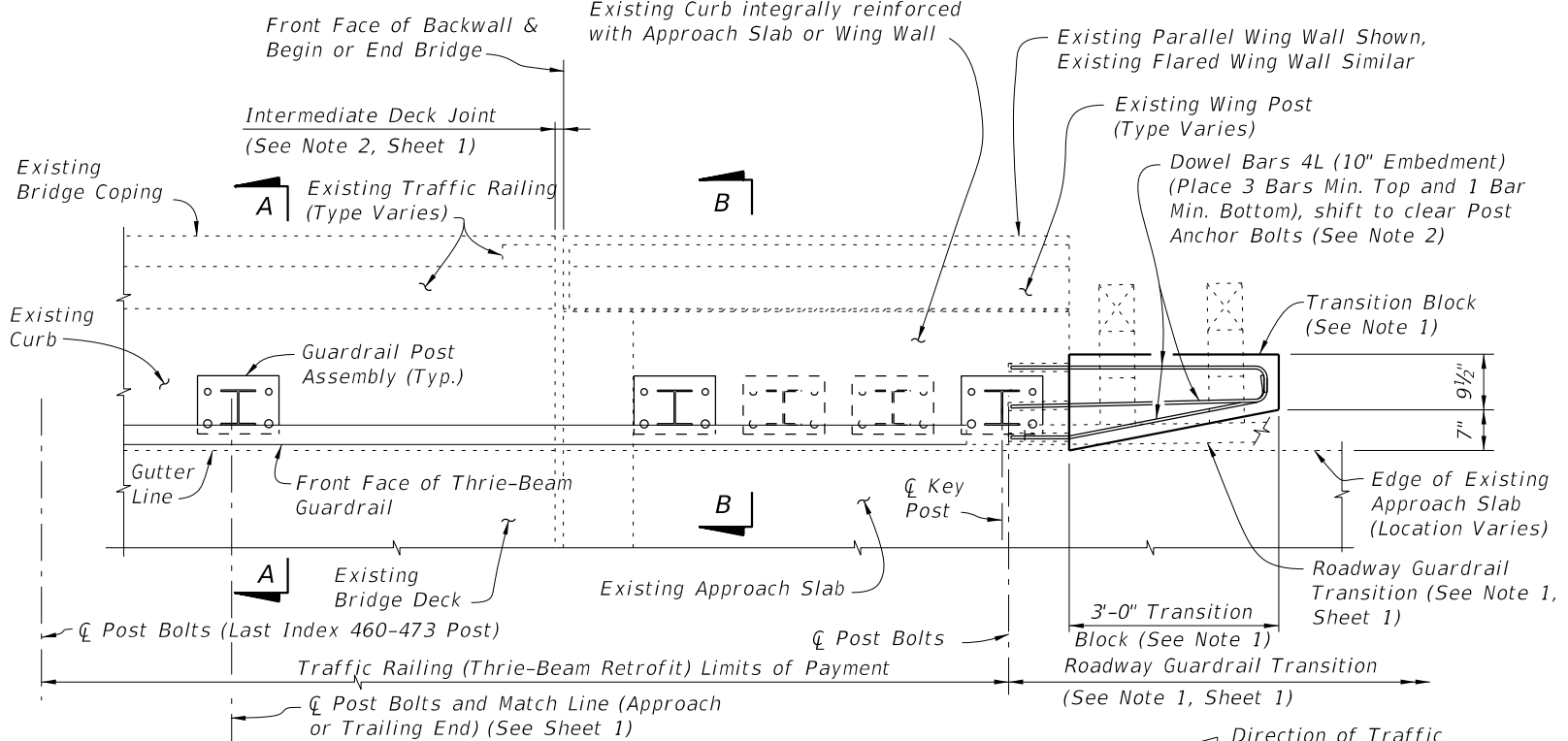
**PARTIAL PLAN OF RAILING**



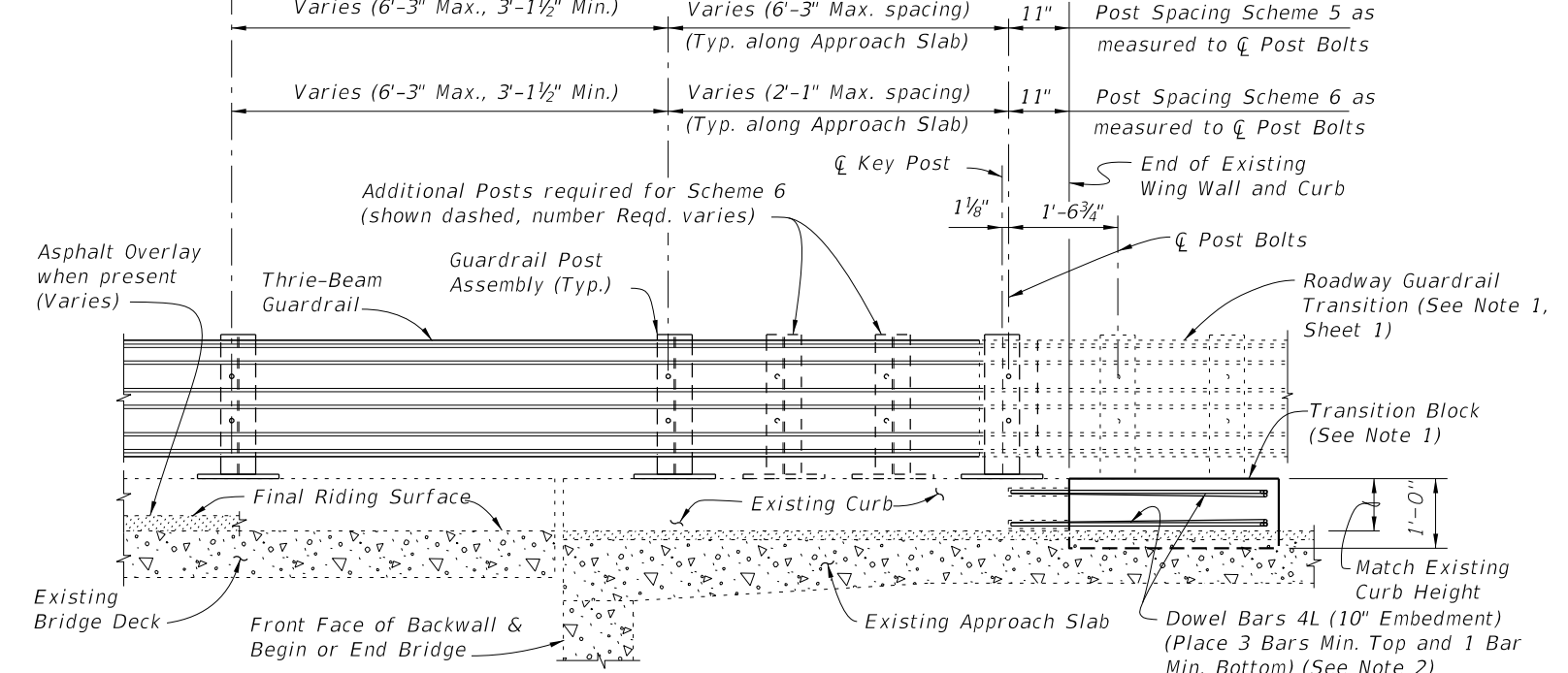
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEMES 3 AND 4**

**RAILING END TREATMENT FOR FLARED INTEGRAL CURBS**



**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

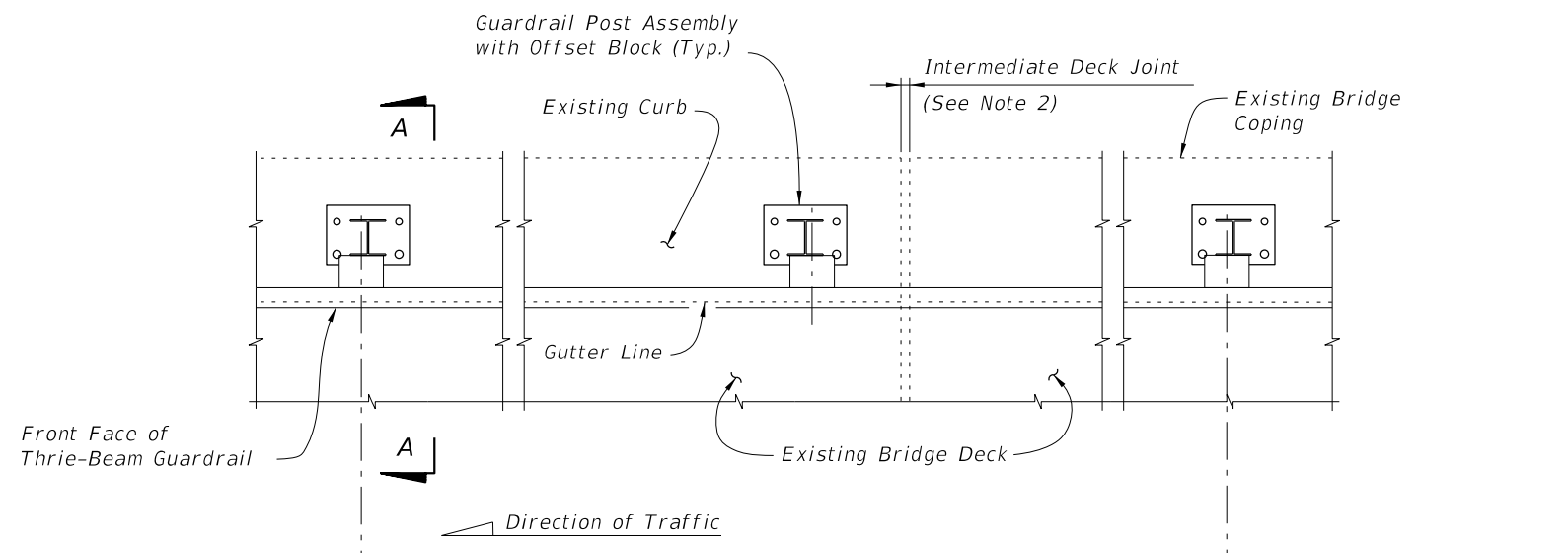
**SCHEMES 5 AND 6**

**RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS**

- SCHEMES 5 AND 6 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
  2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

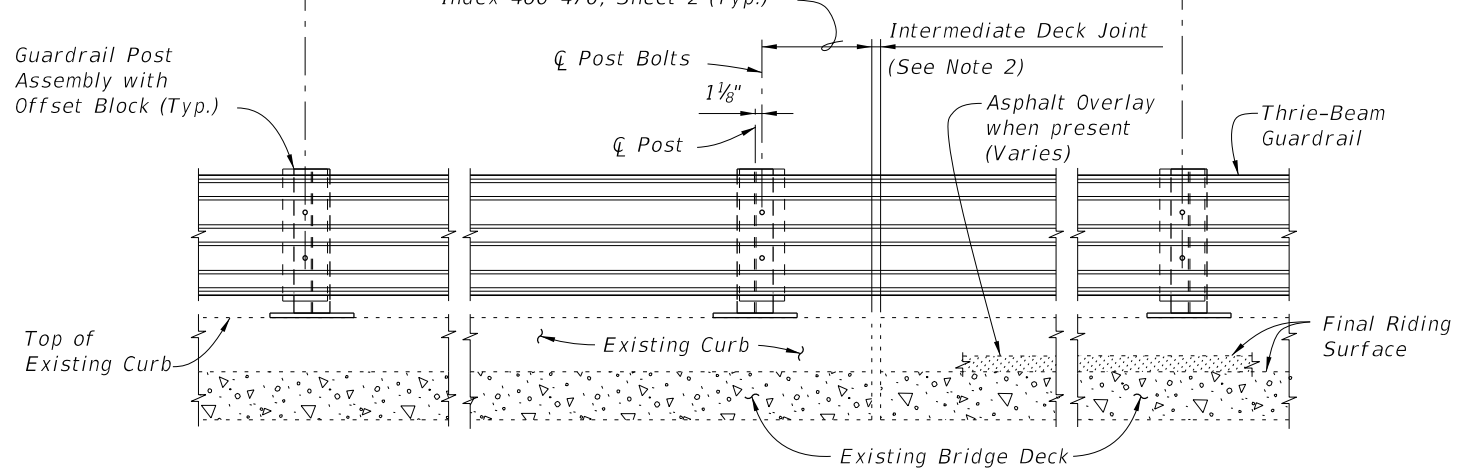
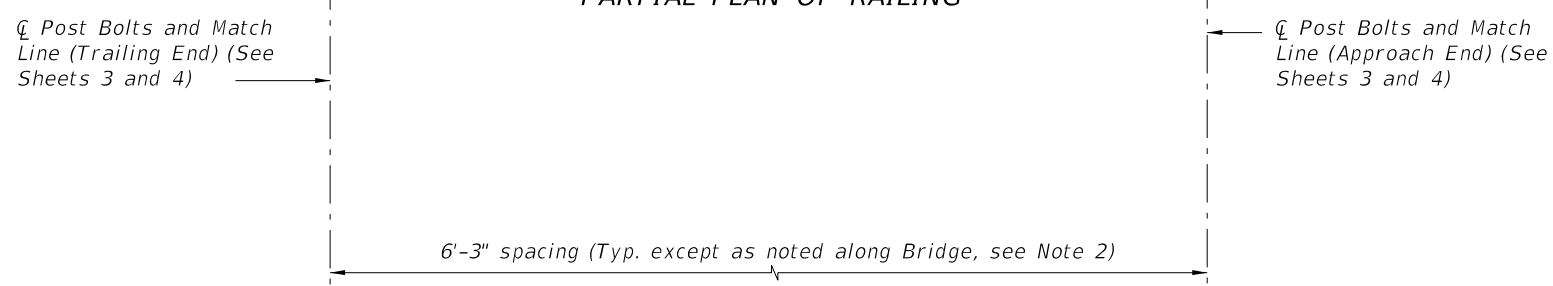
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LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) WIDE STRONG CURB TYPE 2</b>	INDEX 460-473	SHEET 4 of 4
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**PARTIAL PLAN OF RAILING**

- NOTES:**
1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
  2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
  3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.



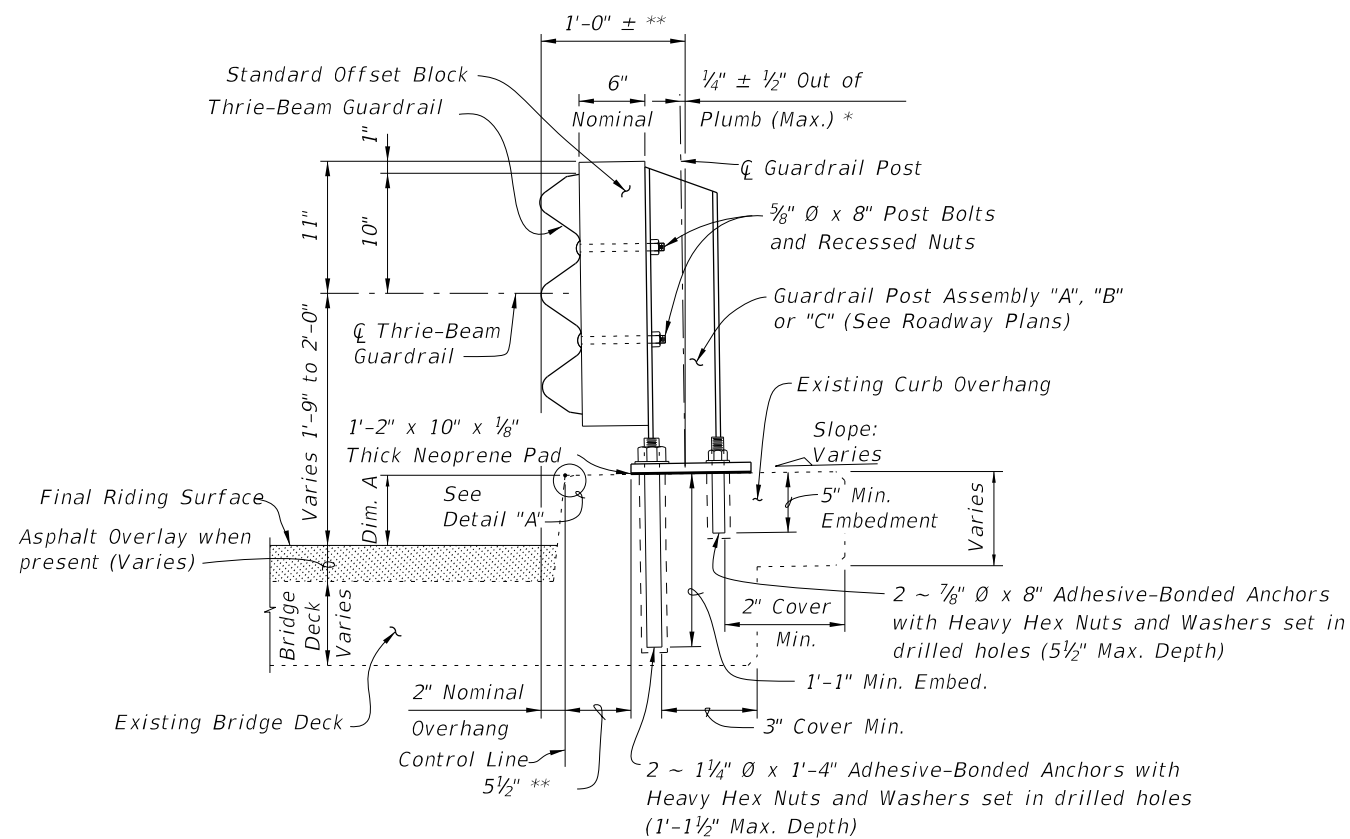
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

**TYPICAL TREATMENT OF RAILING ALONG BRIDGE**

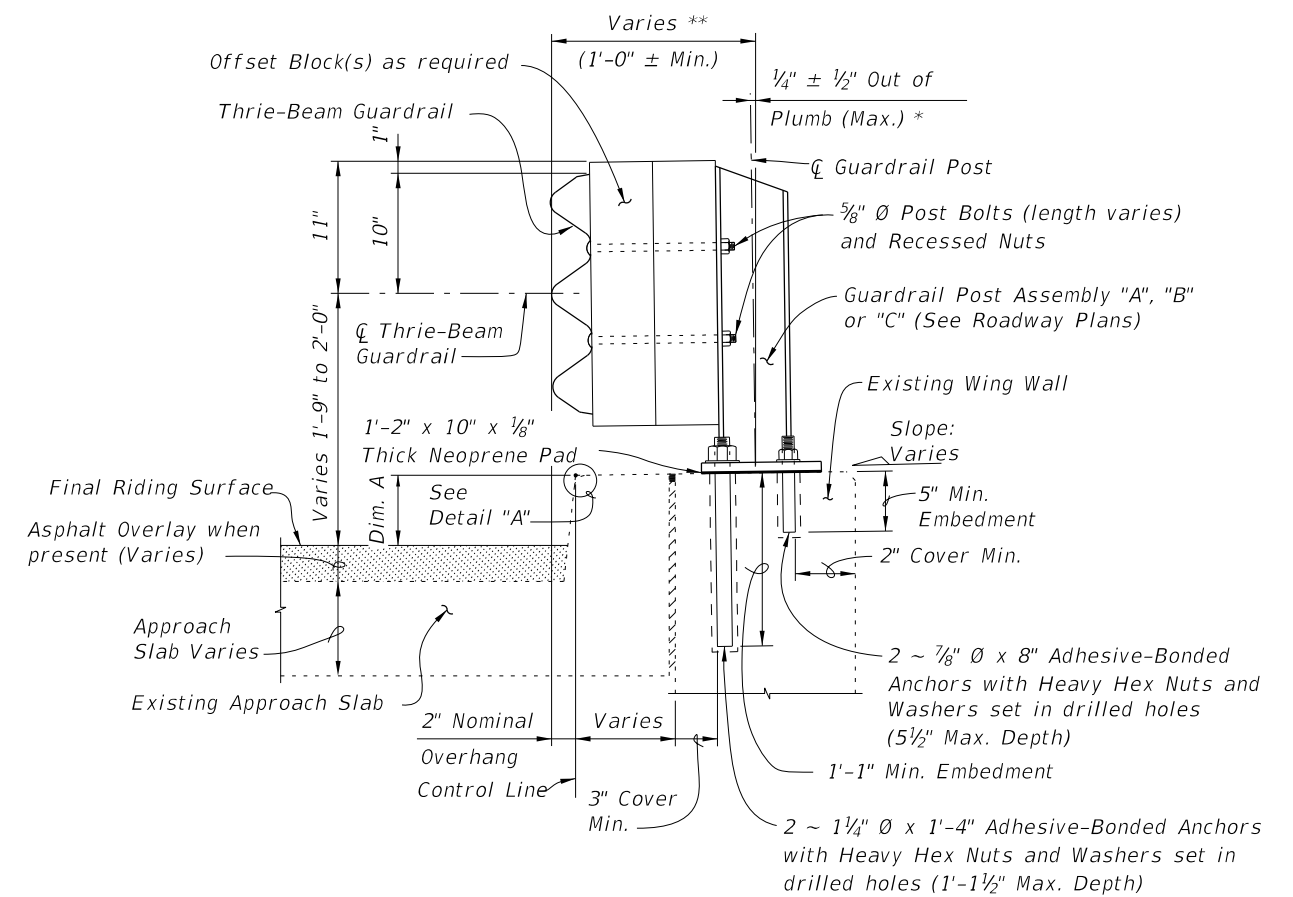
**CROSS REFERENCES:**  
 For Match Line see Sheets 3 & 4.  
 For Section A-A see Sheet 2.  
 For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:28 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) INTERMEDIATE CURB</b>	INDEX <b>460-474</b>	SHEET <b>1 of 4</b>
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**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

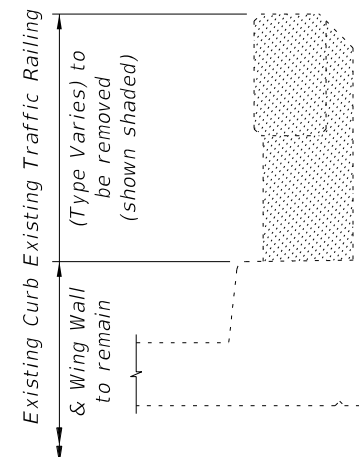


**SECTION B-B (SCHEME 2)**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB

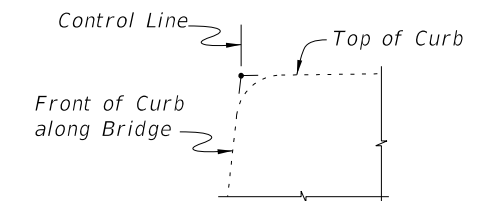
\* Shim with washers around Anchor Bolts and Anchors as required to maintain tolerance.

\*\* Offset may vary  $\pm 1$ " for Adhesive-Bonded Anchors to clear existing curb reinforcing and provide minimum edge clearance. Offset shall be consistent along length of bridge.

BILL OF REINFORCING STEEL		
MARK	SIZE	LENGTH
L	4	4'-1"
BAR BENDING DIAGRAM		
DOWEL BAR 4L		
NOTE: All bar dimensions are out to out.		



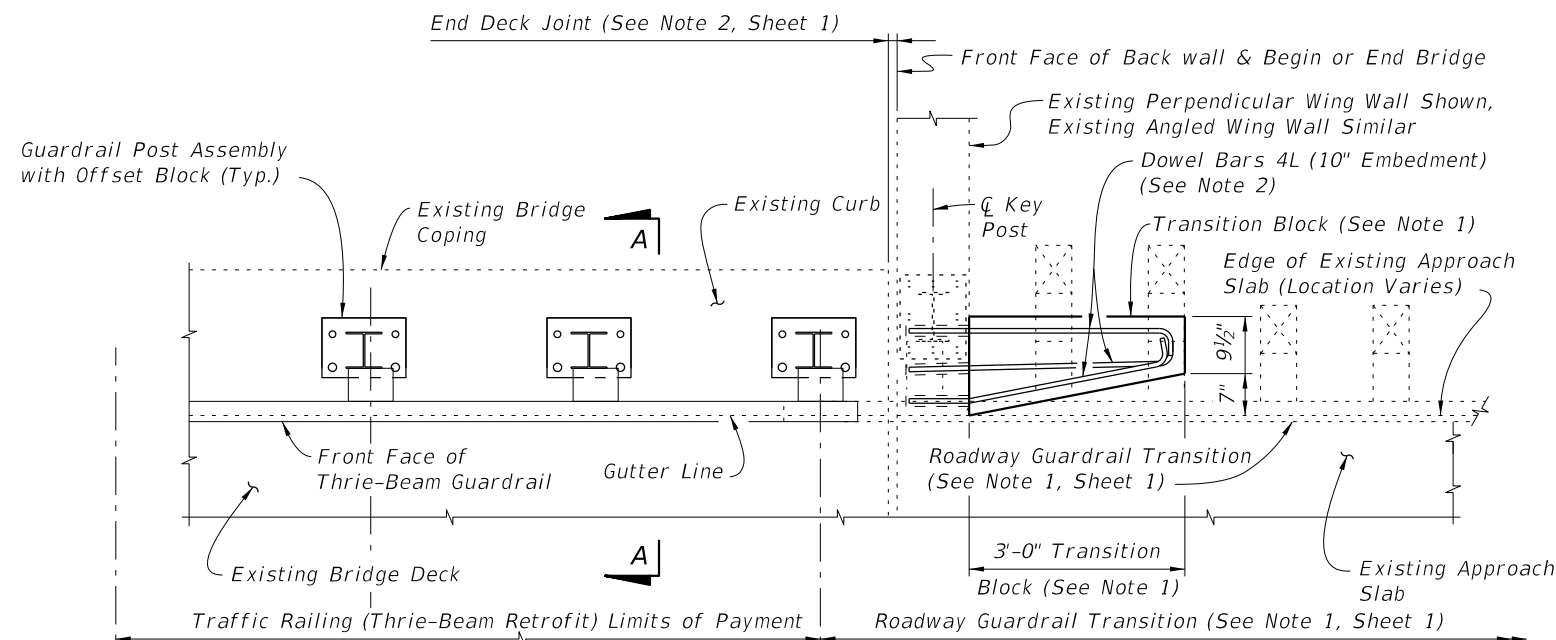
TYPICAL SECTION THRU EXISTING TRAFFIC RAILING SHOWING LIMITS OF REMOVAL (BRIDGE DECK SHOWN, WING WALL SIMILAR)



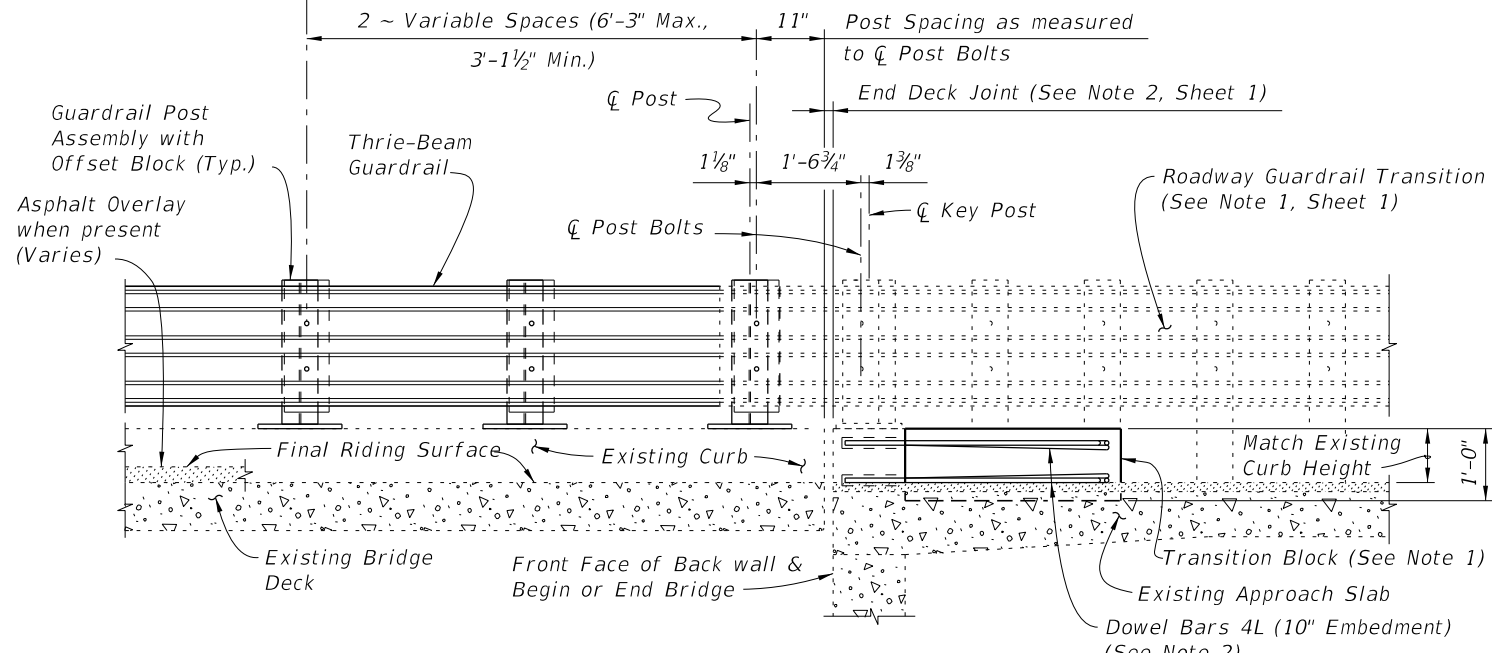
DETAIL "A"

CROSS REFERENCES:  
For location of Section A-A see Sheet 1 and 3.  
For location of Section B-B see Sheet 3  
For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

9/23/2021 9:55:32 AM



**PARTIAL PLAN OF RAILING**

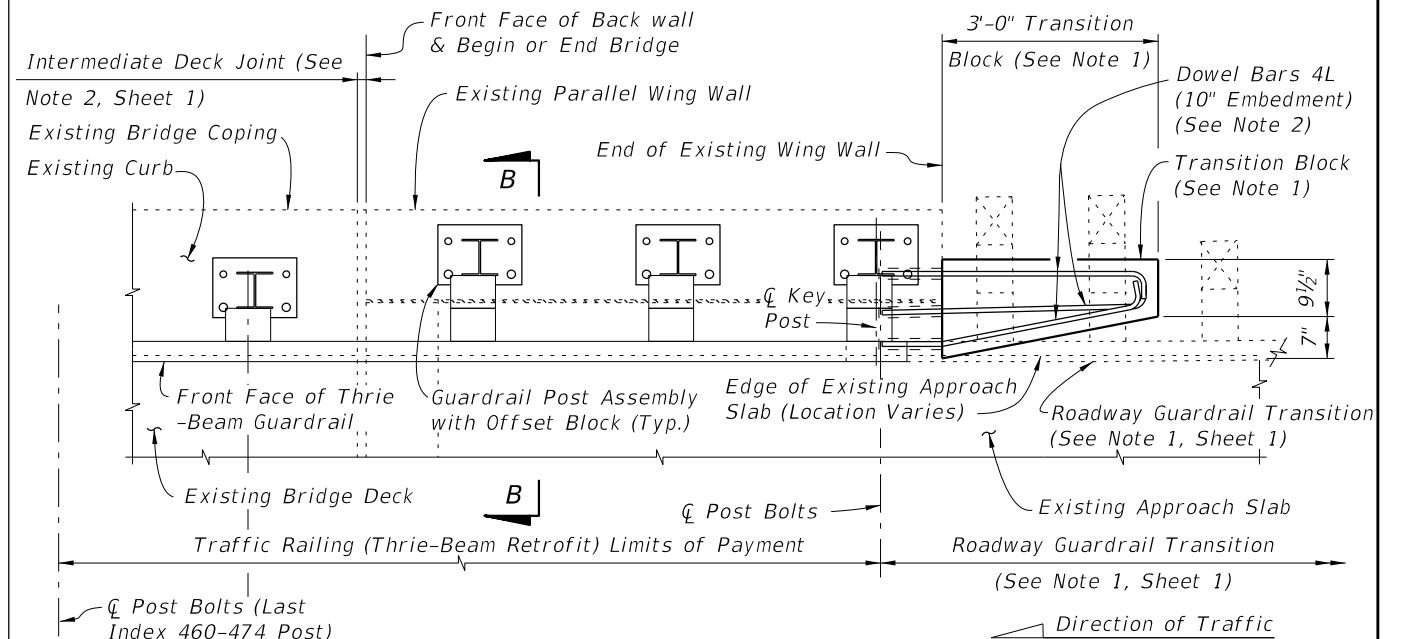


**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

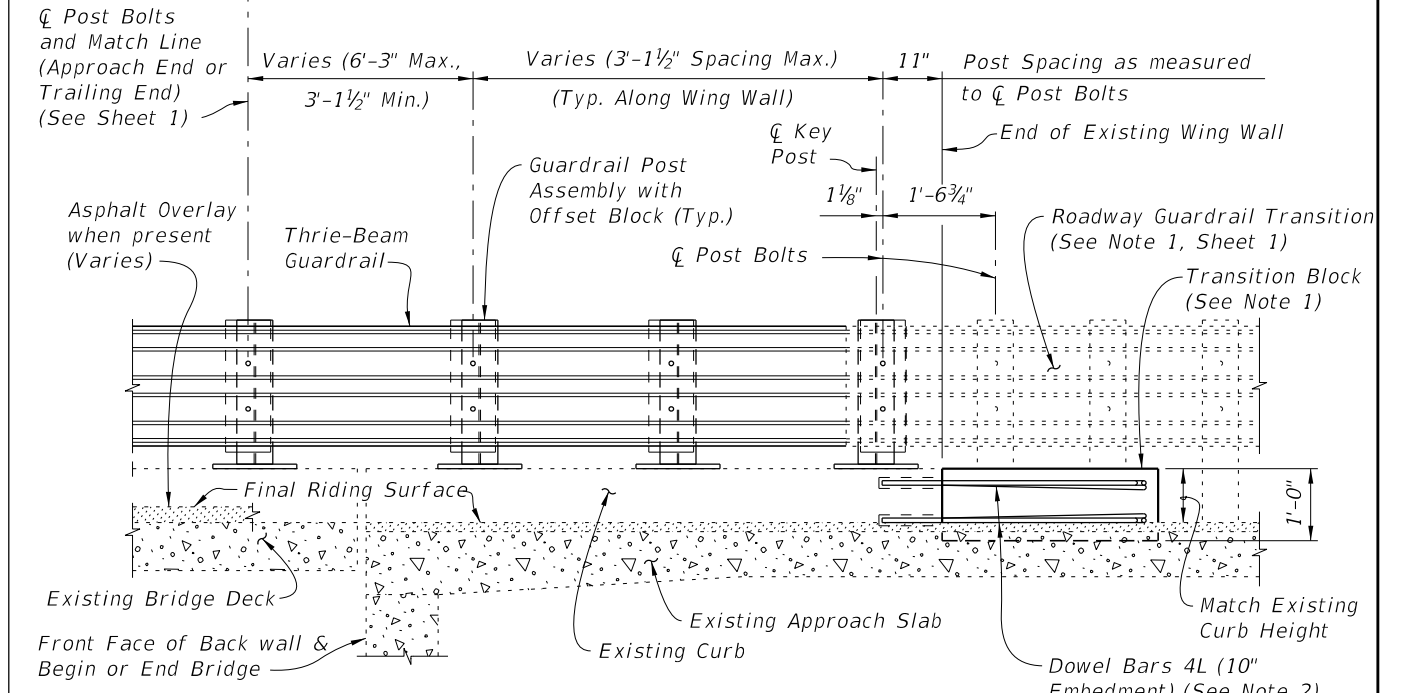
**SCHEME 1**  
**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

**SCHEME 1 NOTES:**

1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.



**PARTIAL PLAN OF RAILING**




**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

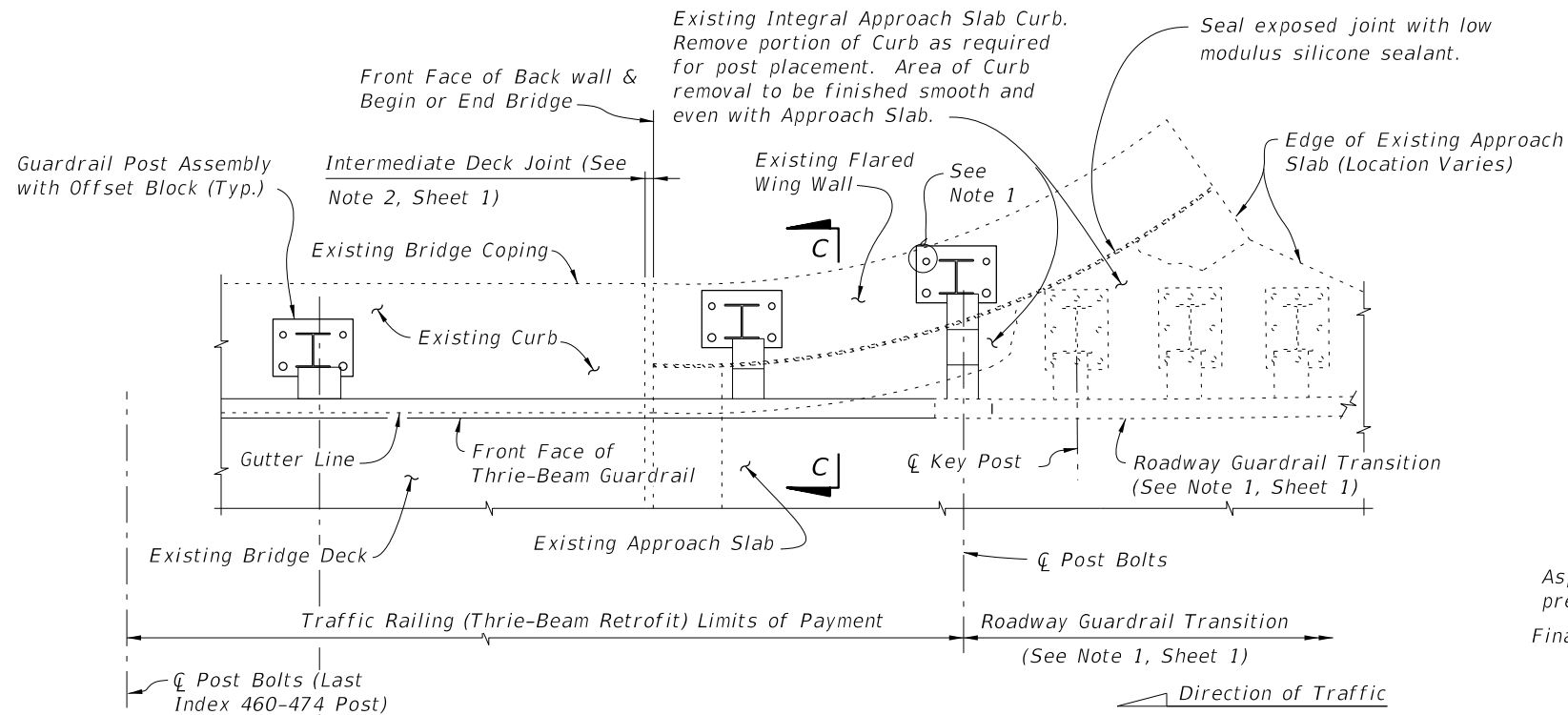
**SCHEME 2**  
**RAILING END TREATMENT FOR PARALLEL WING WALLS**

**SCHEME 2 NOTES:**

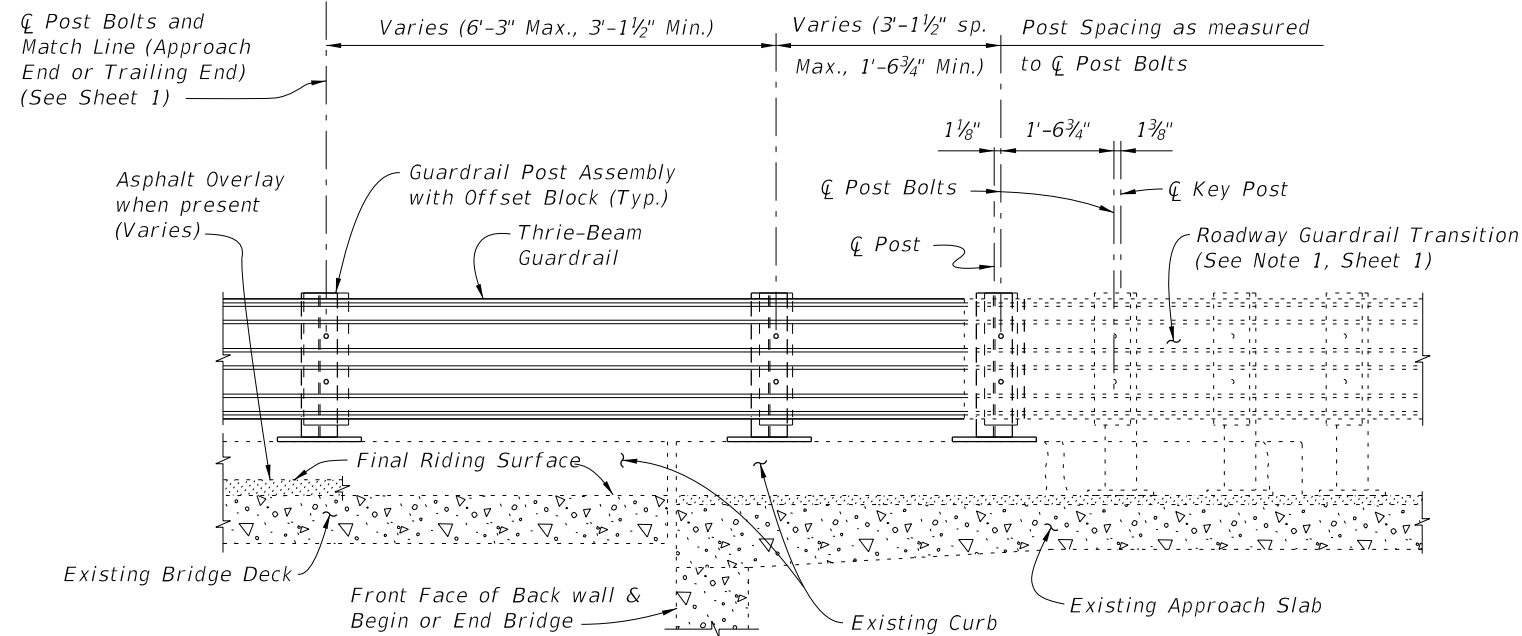
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

9/23/2021 9:55:33 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23</b> <b>STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>INTERMEDIATE CURB</b>	INDEX 460-474	SHEET 3 of 4
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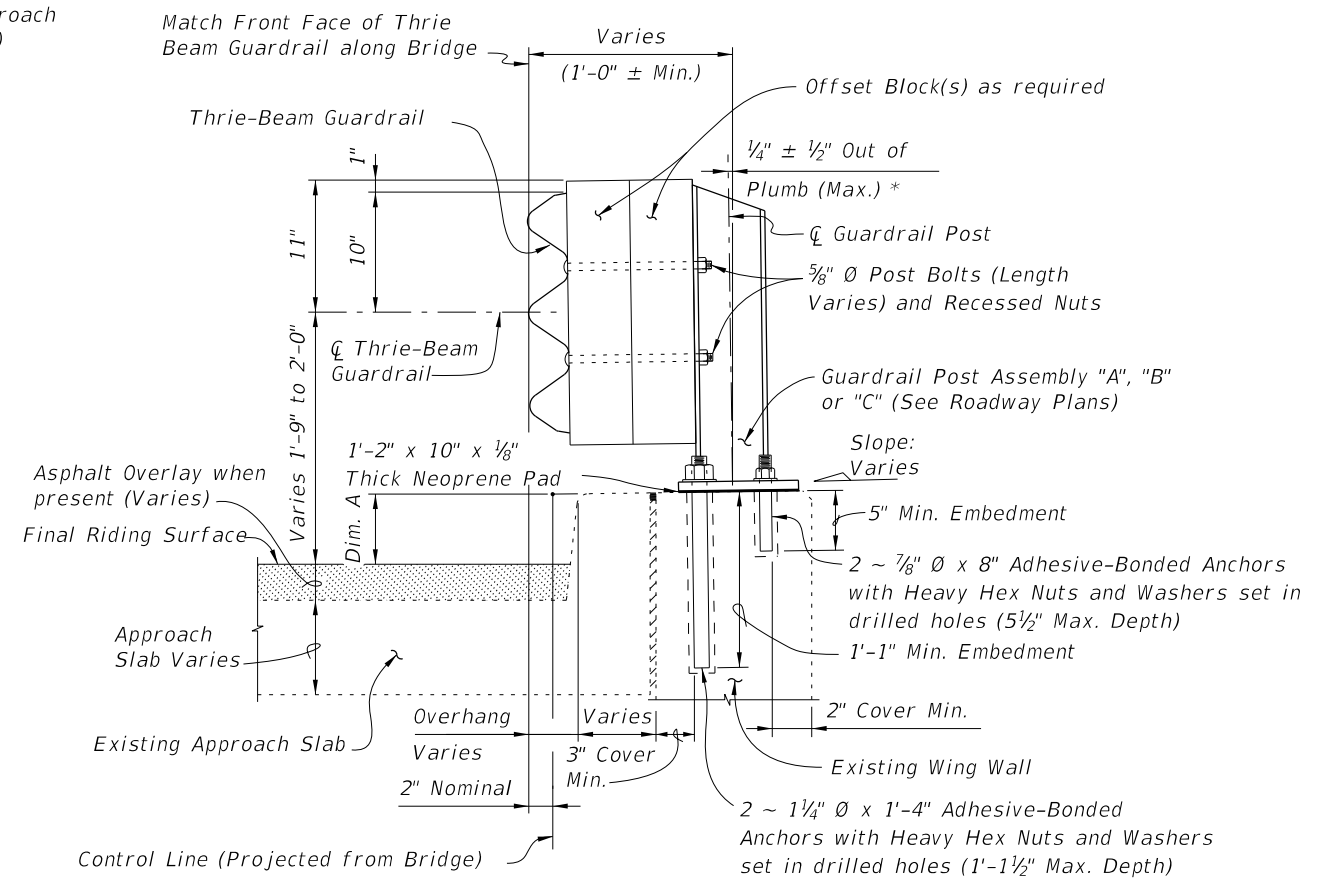


**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**

**SCHEME 3  
RAILING END TREATMENT FOR FLARED WING WALLS**



**SECTION C-C (SCHEME 3)  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB**


**SCHEME 3 NOTE:**

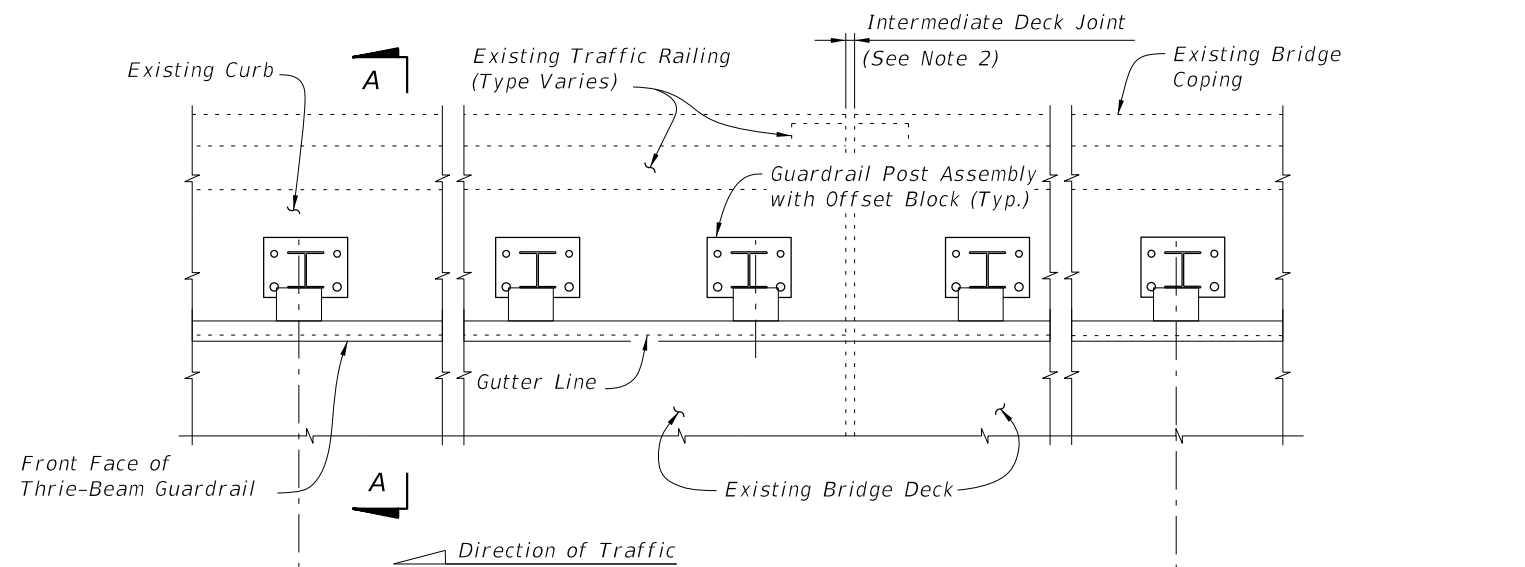
1. A single  $\frac{7}{8}$ "  $\varnothing$  x 8" Adhesive-Bonded Anchor may be omitted as shown when 2" clear cover cannot be provided (see Section C-C).

**CROSS REFERENCE:**

For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

9/23/2021 9:55:34 AM

LAST REVISION 07/01/09	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) INTERMEDIATE CURB</b>	INDEX <b>460-474</b>	SHEET <b>4 of 4</b>
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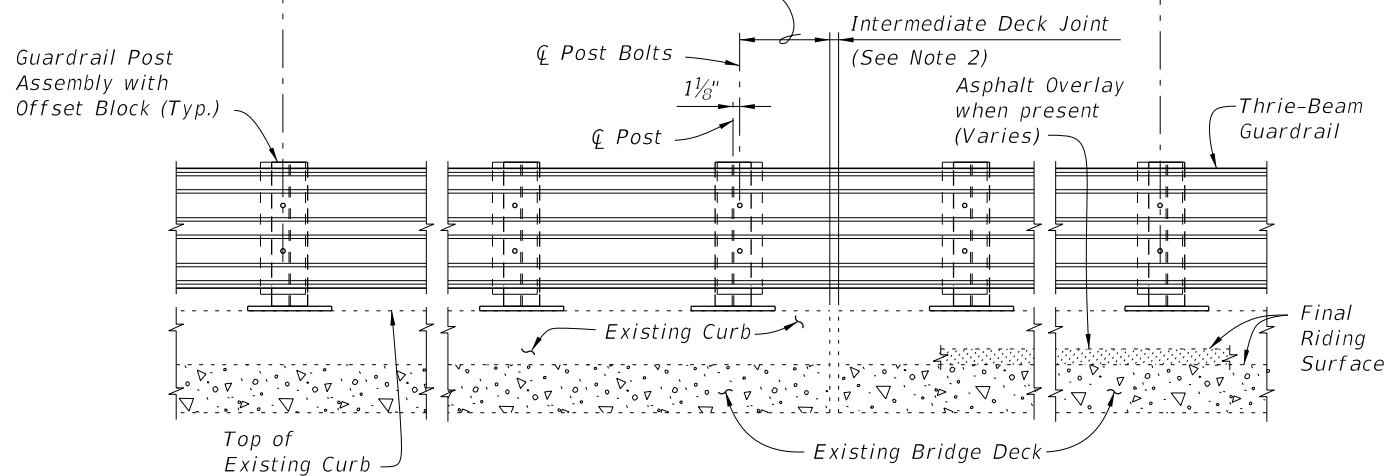
**PARTIAL PLAN OF RAILING**

☉ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

☉ Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

3'-1½" spacing (Typ. except as noted along Bridge, see Note 2)

1'-2" Min. for non skewed joints. For treatment of skewed Intermediate Deck Joints (see Skew Detail Index 460-470, Sheet 2) (Typ.)



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Traffic Railing not shown for clarity)

==== TYPICAL TREATMENT OF RAILING ALONG BRIDGE ====

**NOTES:**

1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

**CROSS REFERENCES:**

For Section A-A see Sheet 2.  
For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:35 AM

LAST REVISION	01/01/08	REVISION	DESCRIPTION:
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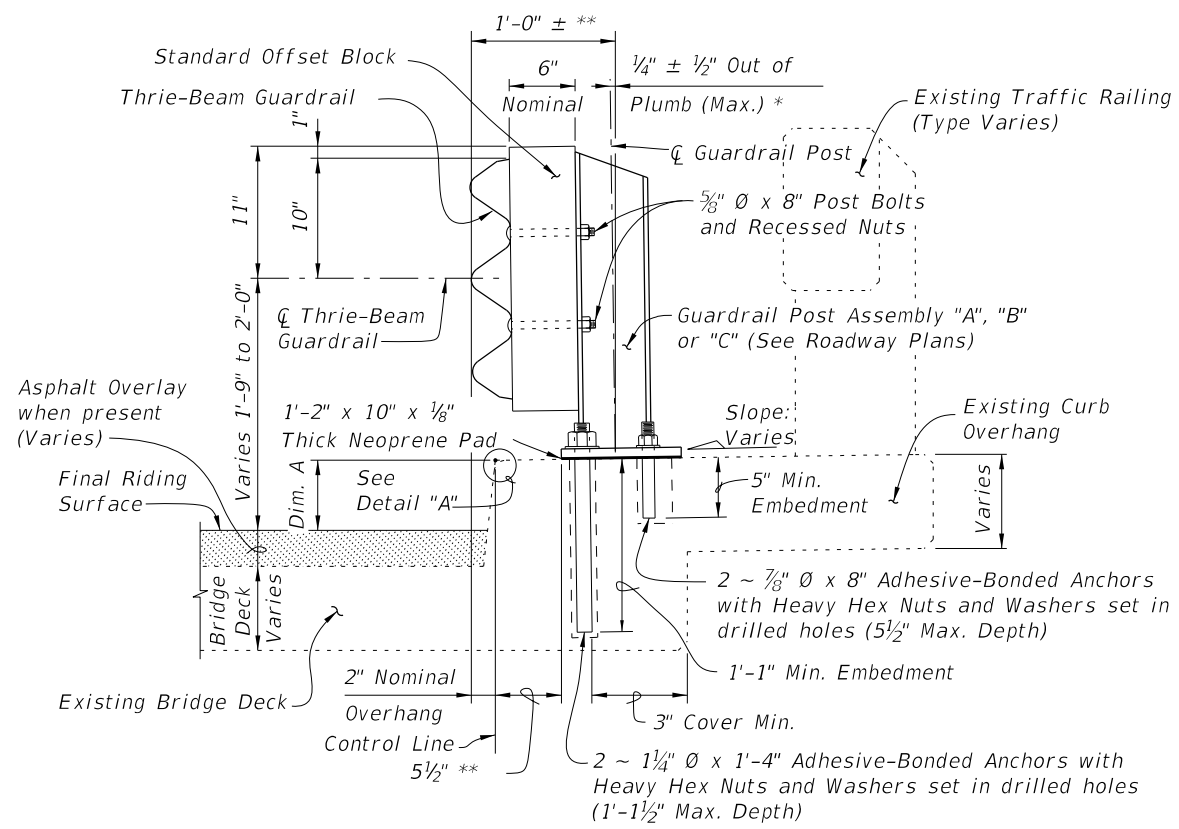


FY 2022-23  
STANDARD PLANS

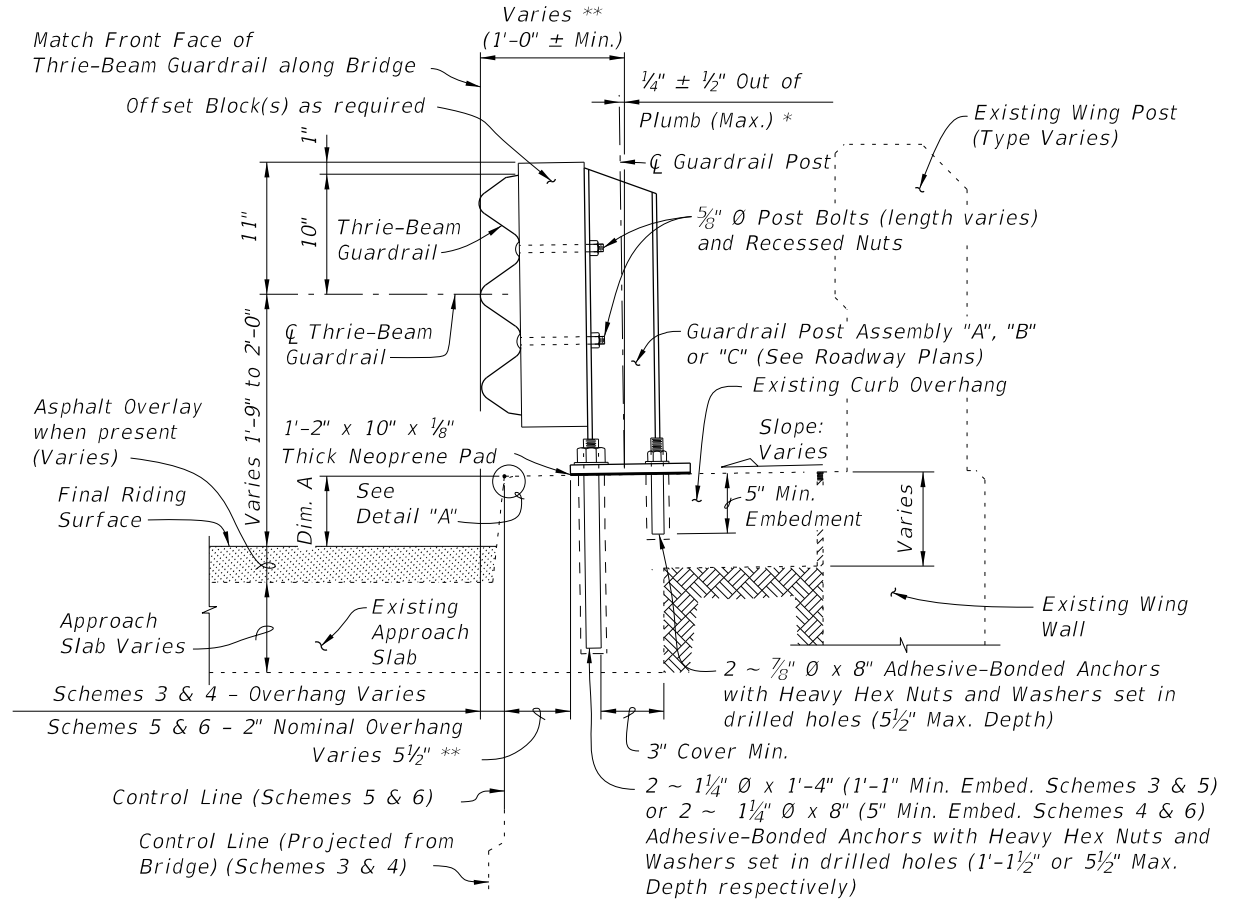
TRAFFIC RAILING - (THRIE-BEAM RETROFIT)  
WIDE CURB TYPE 1

INDEX  
460-475

SHEET  
1 of 4



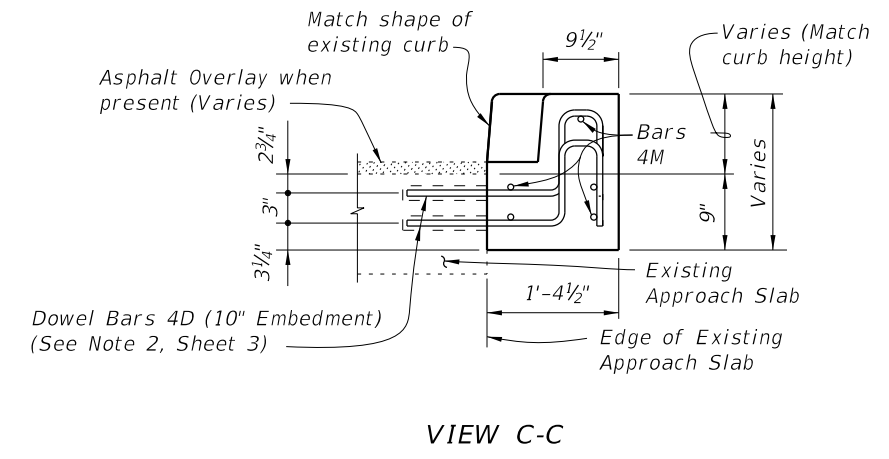
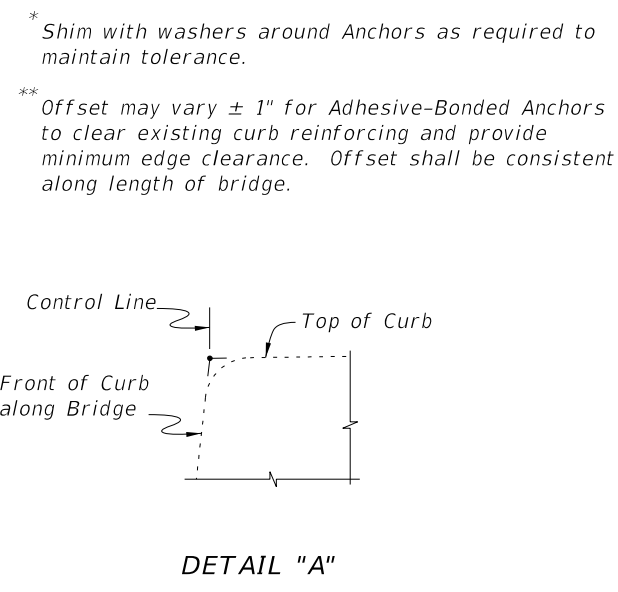
**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK



**SECTION B-B**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB  
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

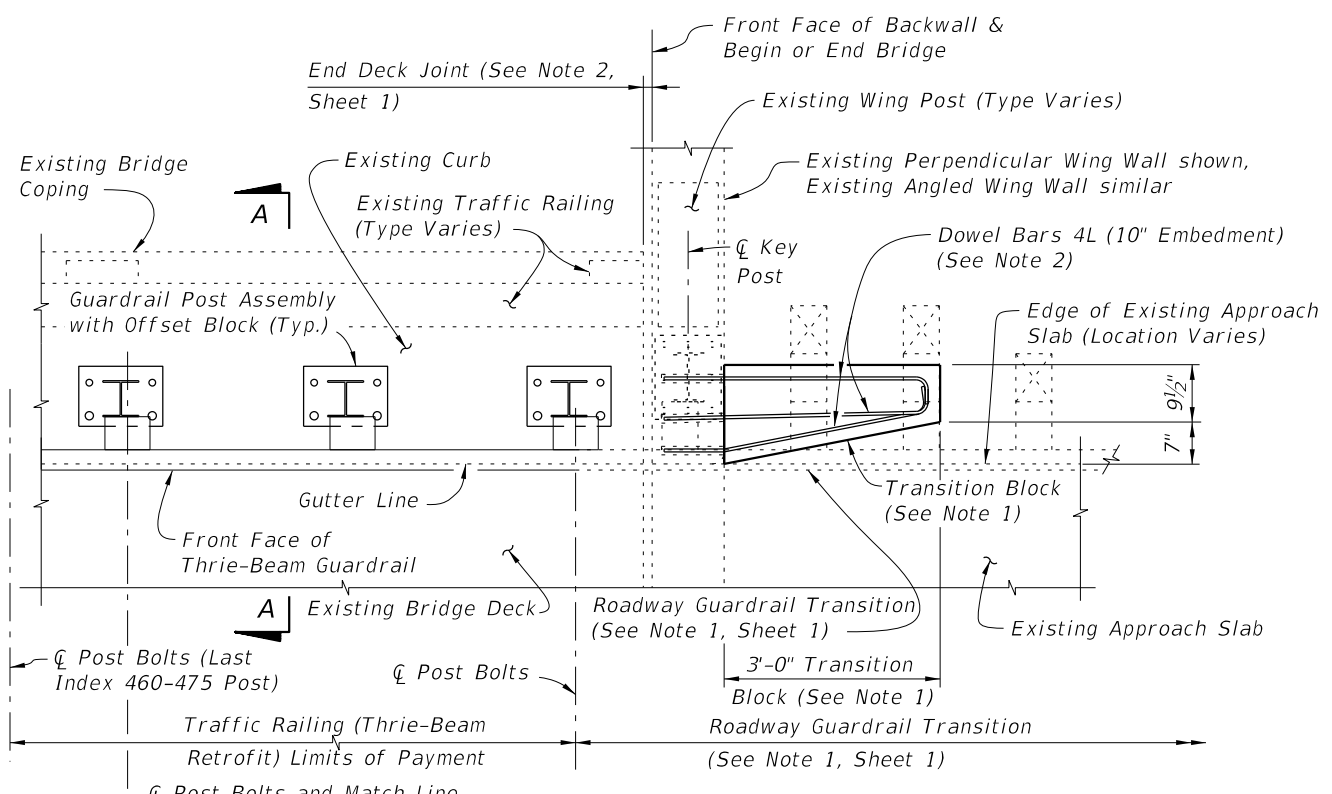
BILL OF REINFORCING STEEL			BAR BENDING DIAGRAMS	
MARK	SIZE	LENGTH		
D	4	3'-7"		
L	4	4'-1"		
M	4	2'-8"		

NOTE: All bar dimensions are out to out.

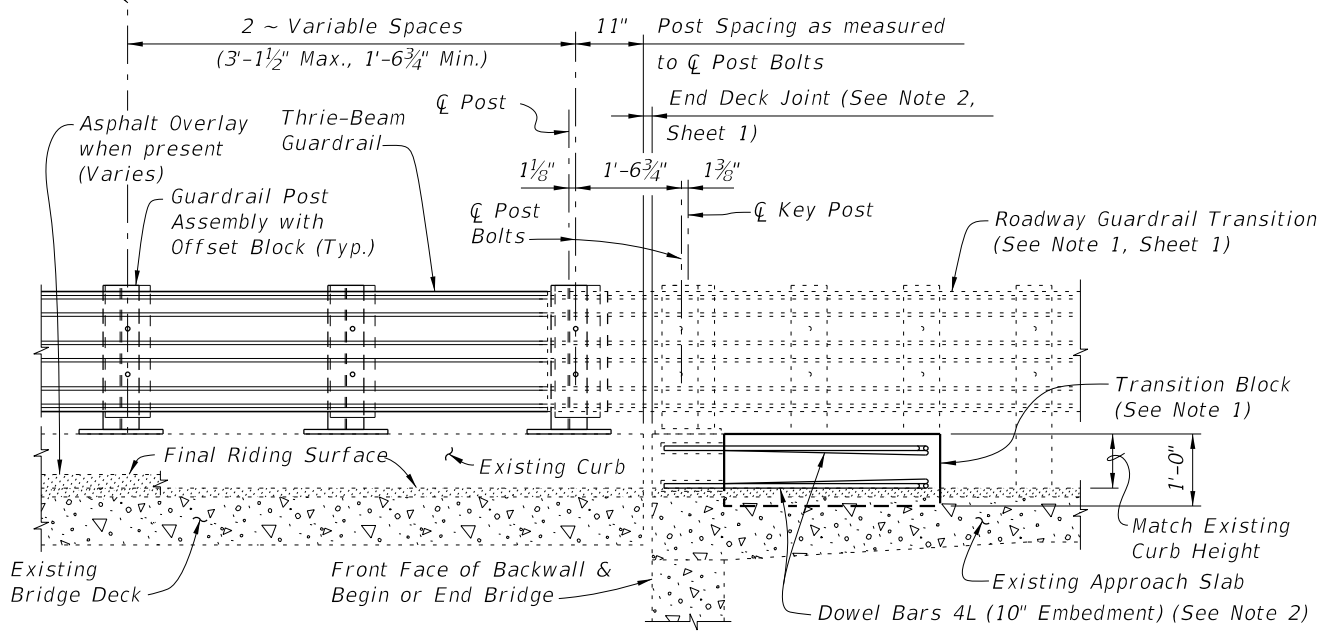


**CROSS REFERENCES:**  
 For location of Section A-A see Sheet 1, 3 & 4.  
 For location of Section B-B see Sheet 4.  
 For location of View C-C see Sheet 3.  
 For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

9/23/2021 9:55:36 AM



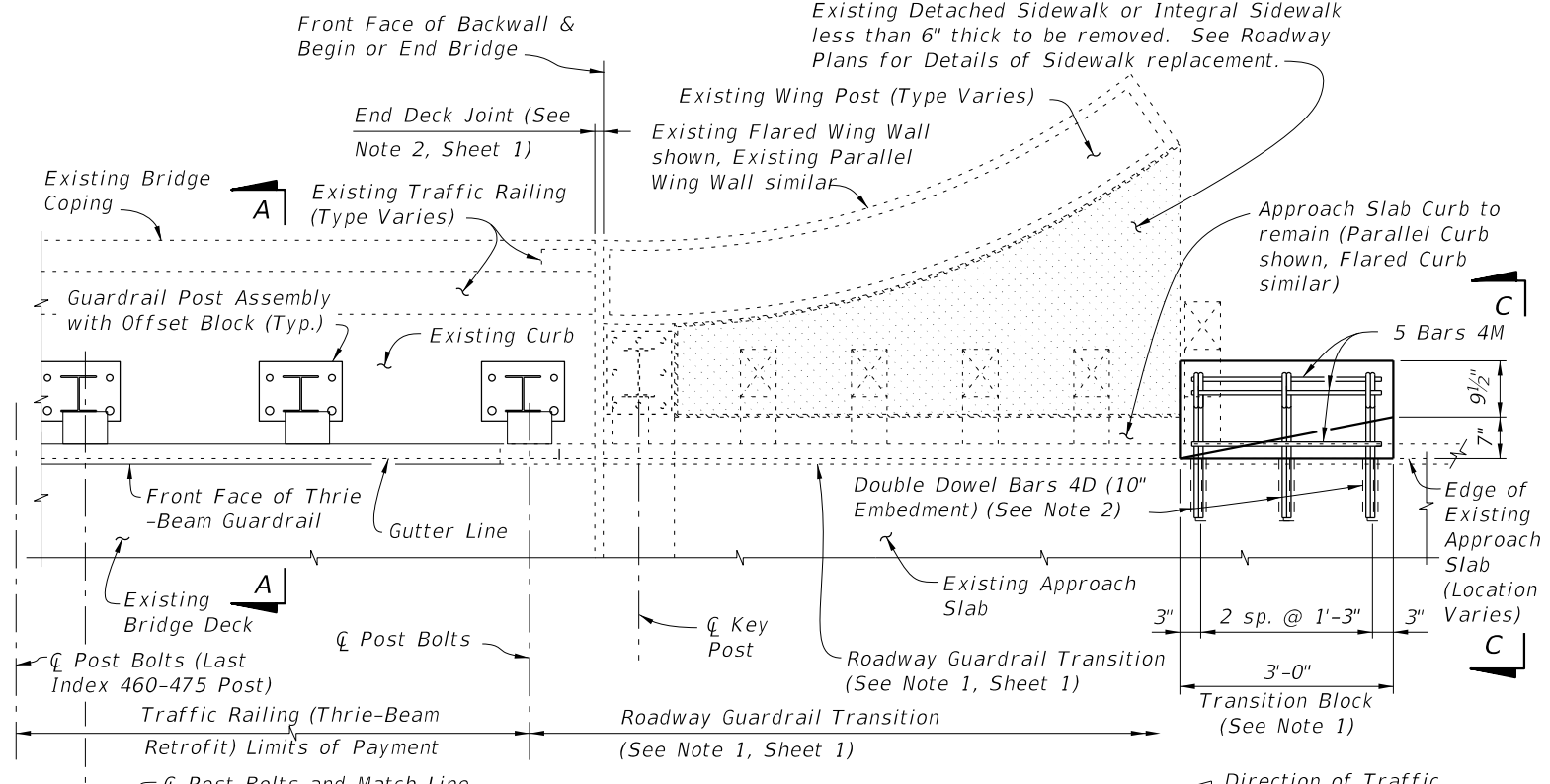
**PARTIAL PLAN OF RAILING**



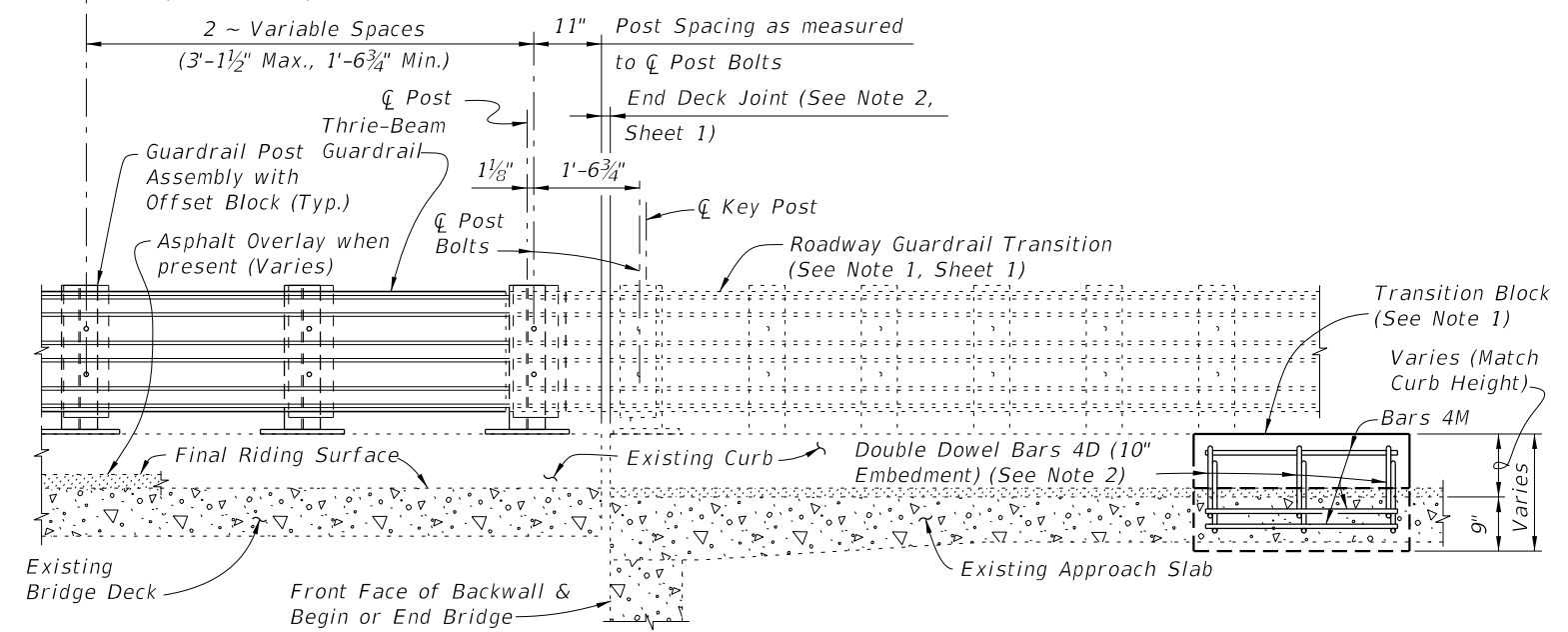
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEME 1**  
**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

- SCHEME 1 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
  2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.



**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

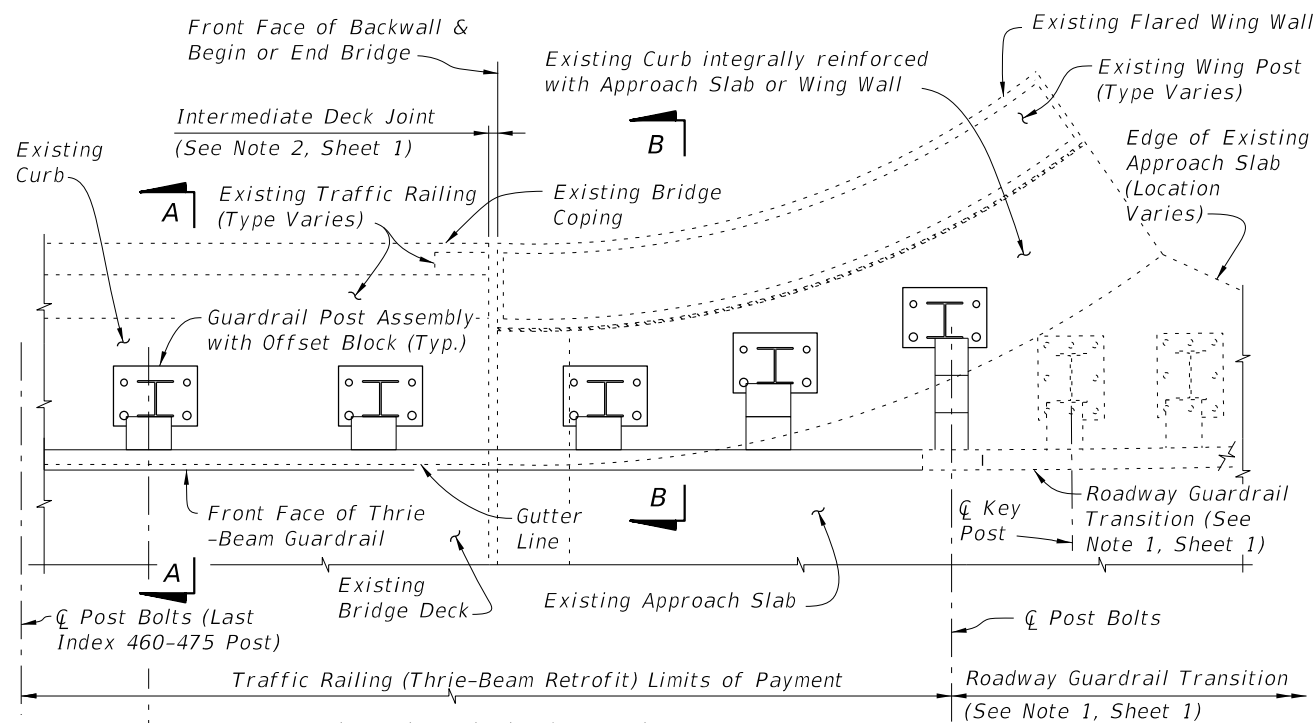
**SCHEME 2**  
**RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALKS LESS THAN 6" THICK**

- SCHEME 2 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curbs.
  2. Field bend or tilt Dowel Bars 4D and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

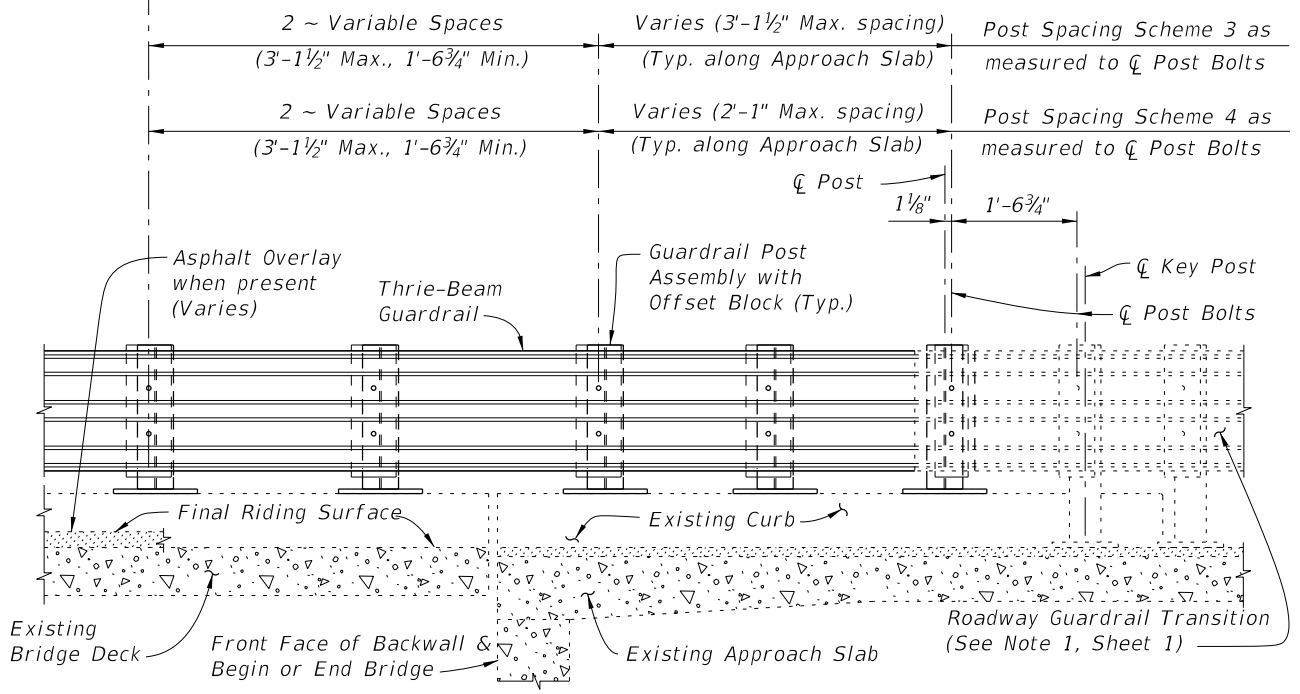
9/23/2021 9:55:37 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23</b> <b>STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE CURB TYPE 1</b>	INDEX 460-475	SHEET 3 of 4
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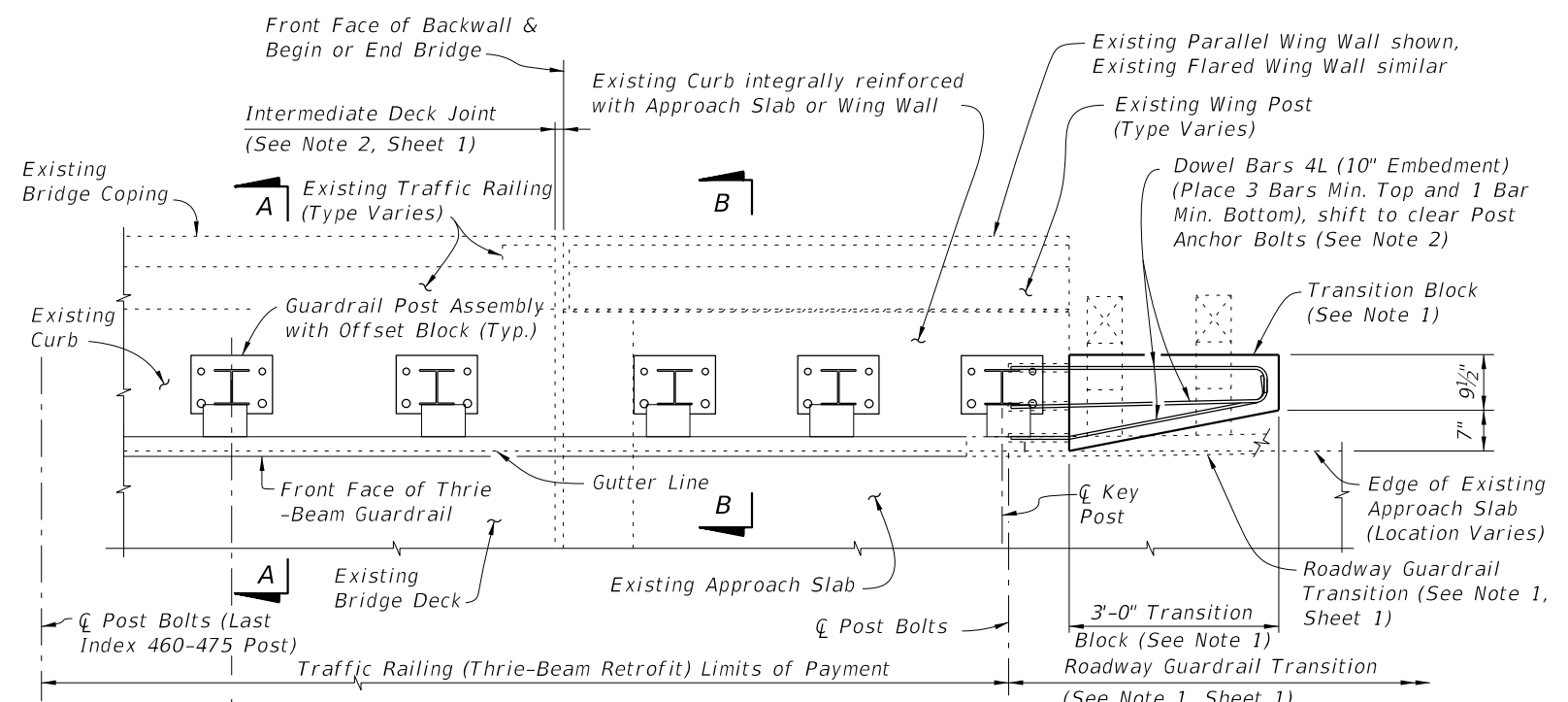


**PARTIAL PLAN OF RAILING**

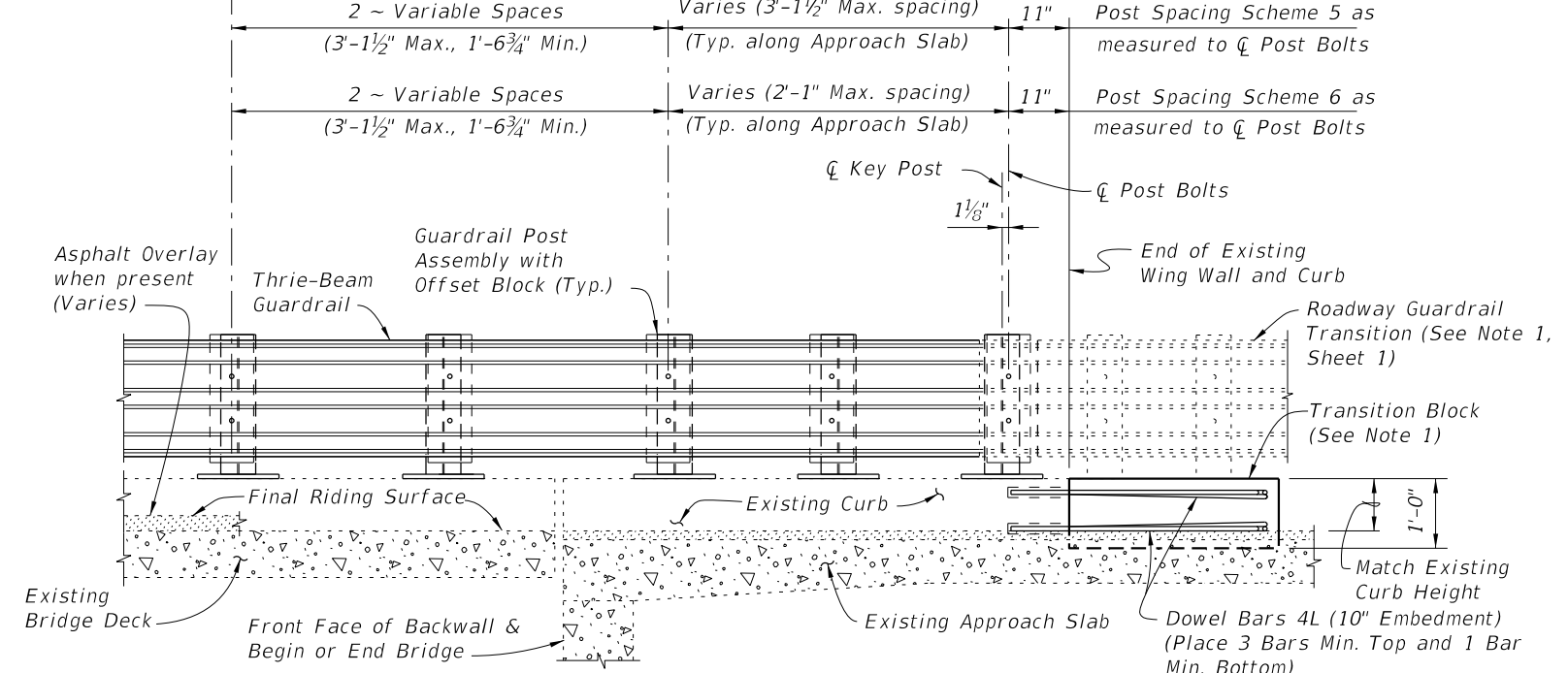


**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHMES 3 AND 4**  
**RAILING END TREATMENT FOR FLARED INTEGRAL CURBS**



**PARTIAL PLAN OF RAILING**



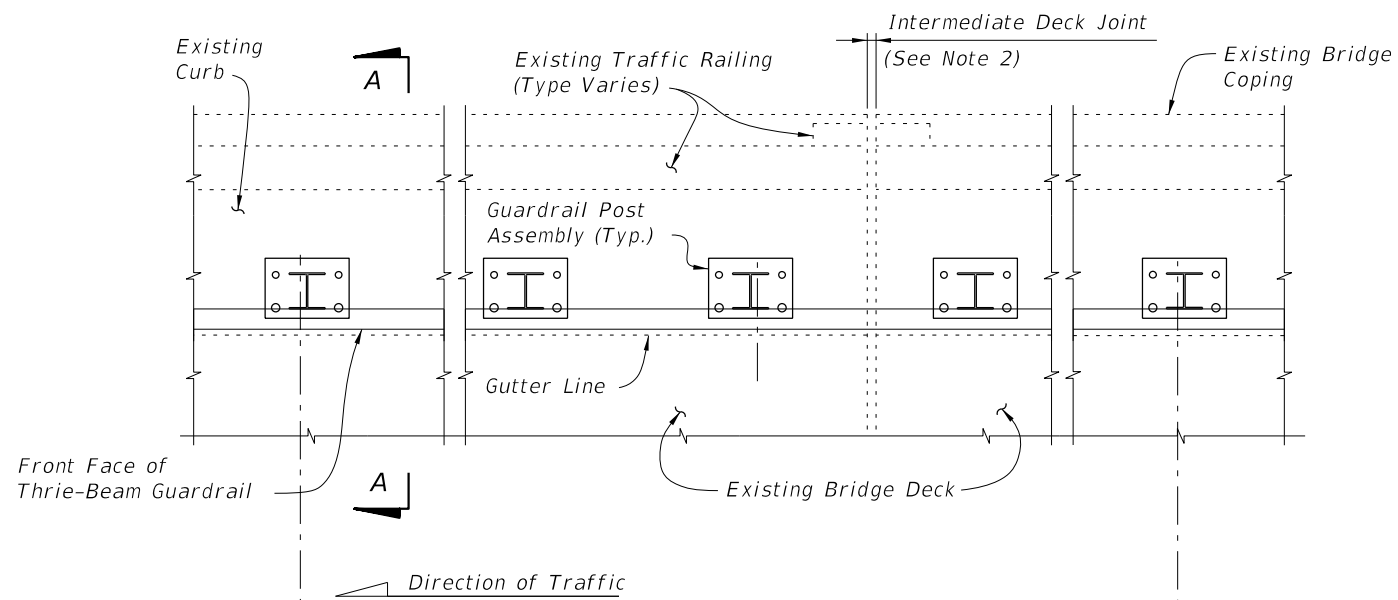
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHMES 5 AND 6**  
**RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS**

**SCHMES 5 AND 6 NOTES:**  
 1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.  
 2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

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LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE CURB TYPE 1</b>	INDEX 460-475	SHEET 4 of 4
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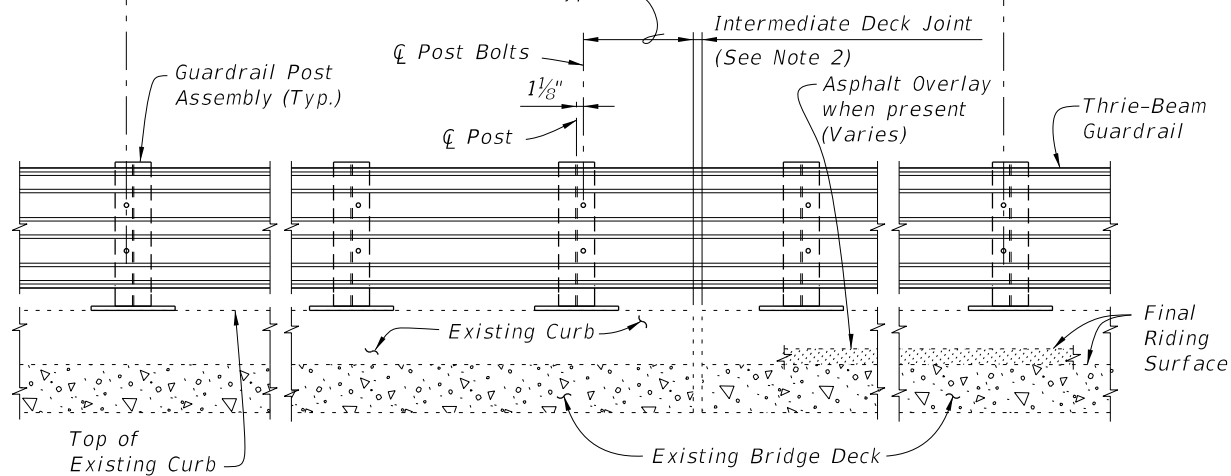
**PARTIAL PLAN OF RAILING**

☐ Post Bolts and Match Line (Trailing End) (See Sheets 3 and 4)

☐ Post Bolts and Match Line (Approach End) (See Sheets 3 and 4)

3'-1 1/2" spacing (Typ. except as noted along Bridge, see Note 2)

11" Min. for non skewed joints. For treatment of skewed Intermediate Deck Joints (see Skew Detail Index 460-470, Sheet 2) (Typ.)



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Traffic Railing not shown for clarity)

===== TYPICAL TREATMENT OF RAILING ALONG BRIDGE =====

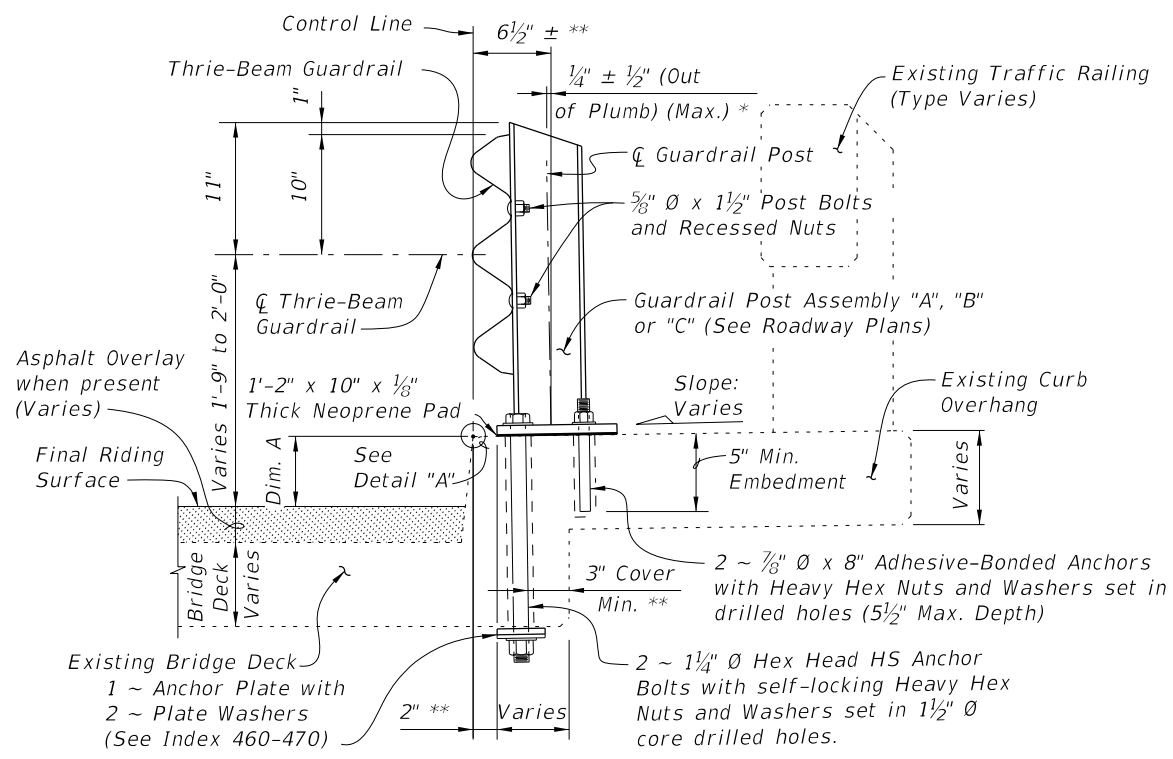
**NOTES:**

1. On approach end provide Index 536-002 (as shown) or other site specific treatment, see Roadway Plans. For treatment of trailing end see Roadway Plans.
2. Actual joint dimension and orientation vary. For Intermediate Deck Joints use the Modified Post Spacing at Intermediate Deck Joints Detail, Index 460-470, Sheet 2, as required.
3. Areas where existing structure has been removed shall match adjoining areas and shall be finished flat by grouting or grinding as required. Exposed existing reinforcing steel shall be burned off 1" below existing concrete and grouted over.

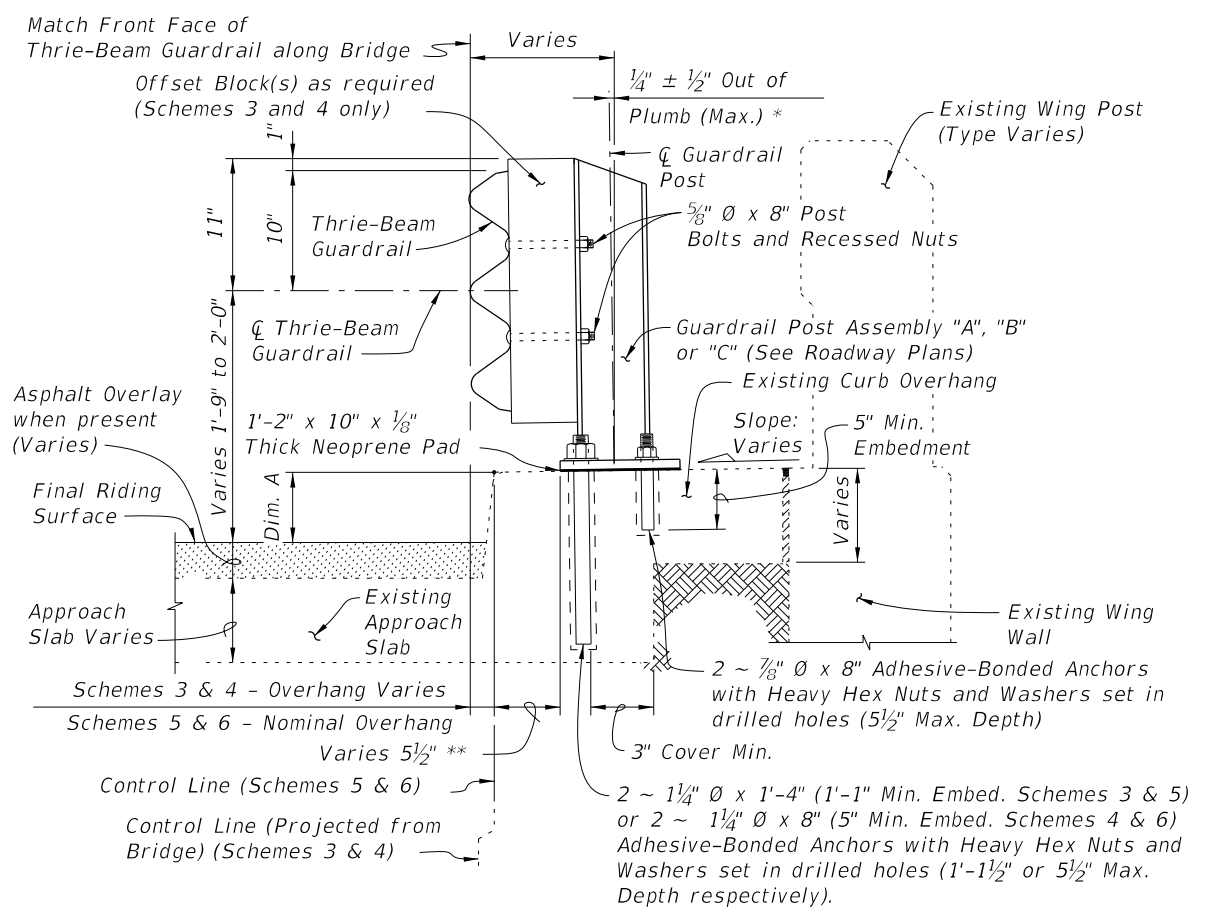
**CROSS REFERENCES:**  
For Section A-A see Sheet 2.  
For Traffic Railing Notes and Details see Index 460-470.

9/23/2021 9:55:39 AM

LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE CURB TYPE 2</b>	INDEX <b>460-476</b>	SHEET <b>1 of 4</b>
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**SECTION A-A**  
TYPICAL SECTION THRU RAILING ON BRIDGE DECK

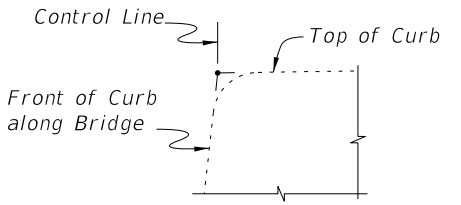


**SECTION B-B**  
TYPICAL SECTION THRU RAILING ALONG APPROACH SLAB  
(SCHEMES 5 AND 6 SHOWN, SCHEMES 3 AND 4 SIMILAR)

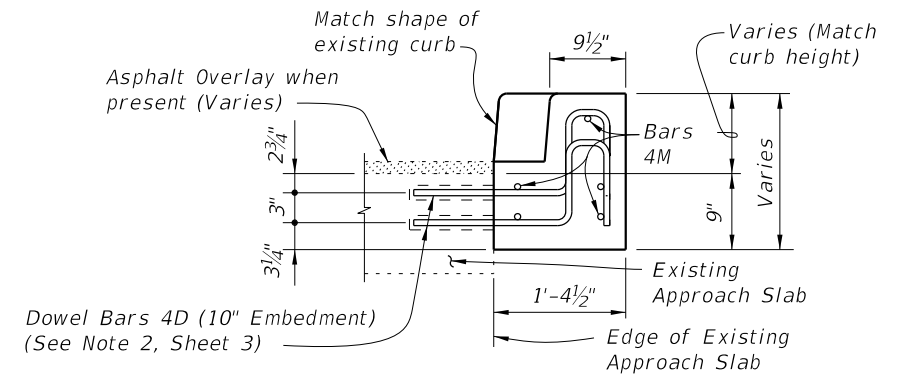
BILL OF REINFORCING STEEL			BAR BENDING DIAGRAMS	
MARK	SIZE	LENGTH		
D	4	3'-7"		<b>DOWEL BAR 4D</b>
L	4	4'-1"		<b>DOWEL BAR 4L</b>
M	4	2'-8"		<b>BAR 4M</b>

NOTE: All bar dimensions are out to out.

\* Shim with washers around Anchors as required to maintain tolerance.  
 \*\* Offset may vary  $\pm 1"$  for Adhesive-Bonded Anchors to clear existing curb reinforcing and provide minimum edge clearance. Offset shall be consistent along length of bridge.



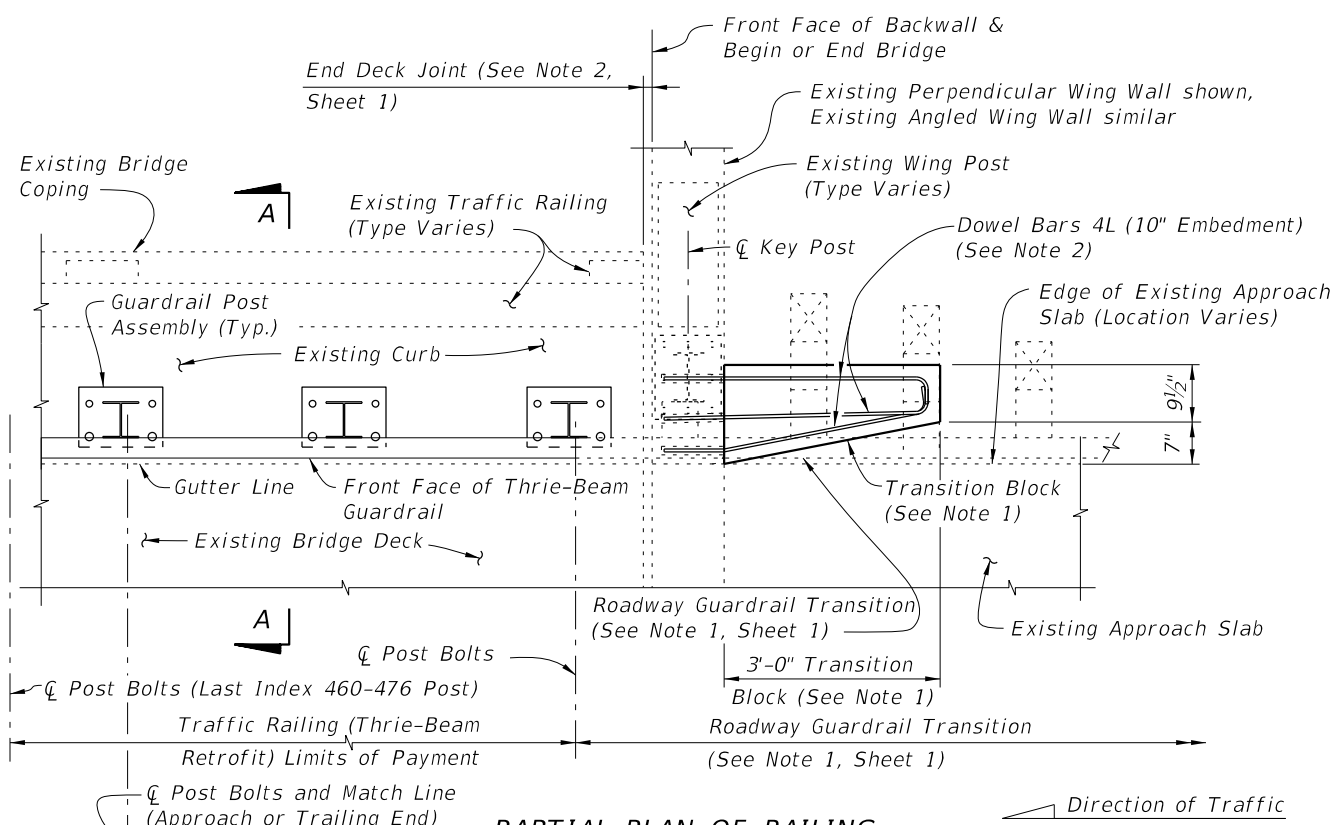
**DETAIL "A"**



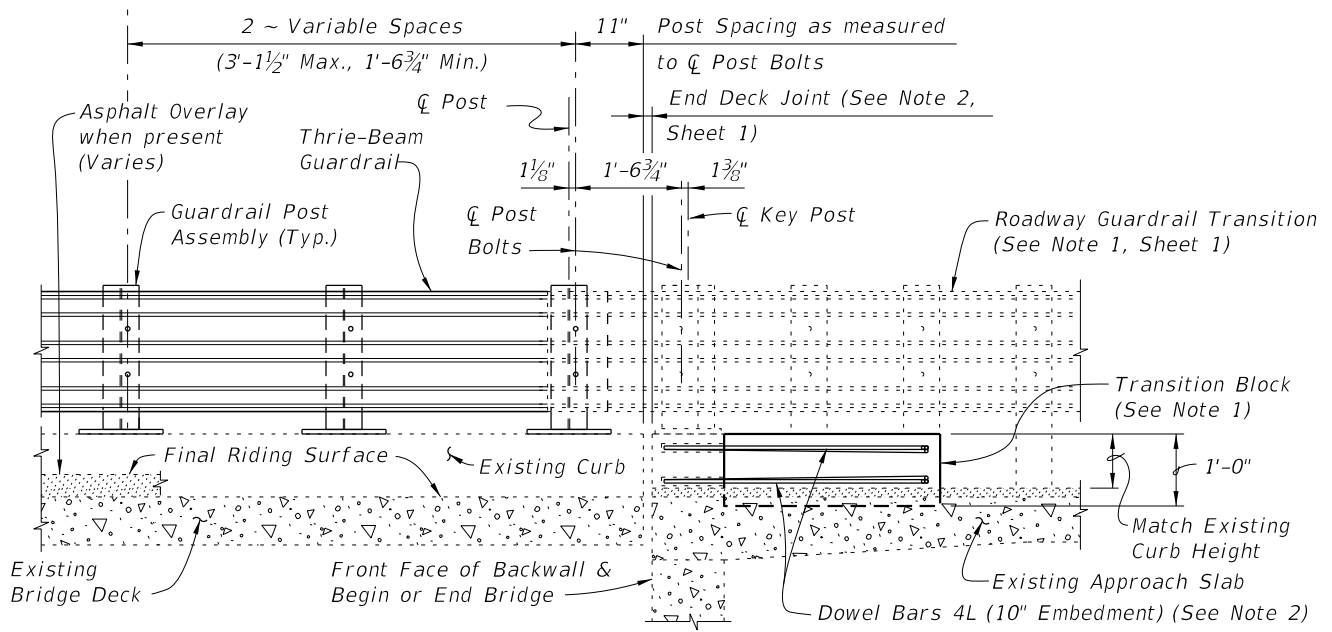
**VIEW C-C**

**CROSS REFERENCES:**  
 For location of Section A-A see Sheet 1, 3 & 4.  
 For location of Section B-B see Sheet 4.  
 For location of Section C-C see Sheet 3.  
 For application of Dim. A see Post Dimension Table on Index 460-470, Sheet 3.

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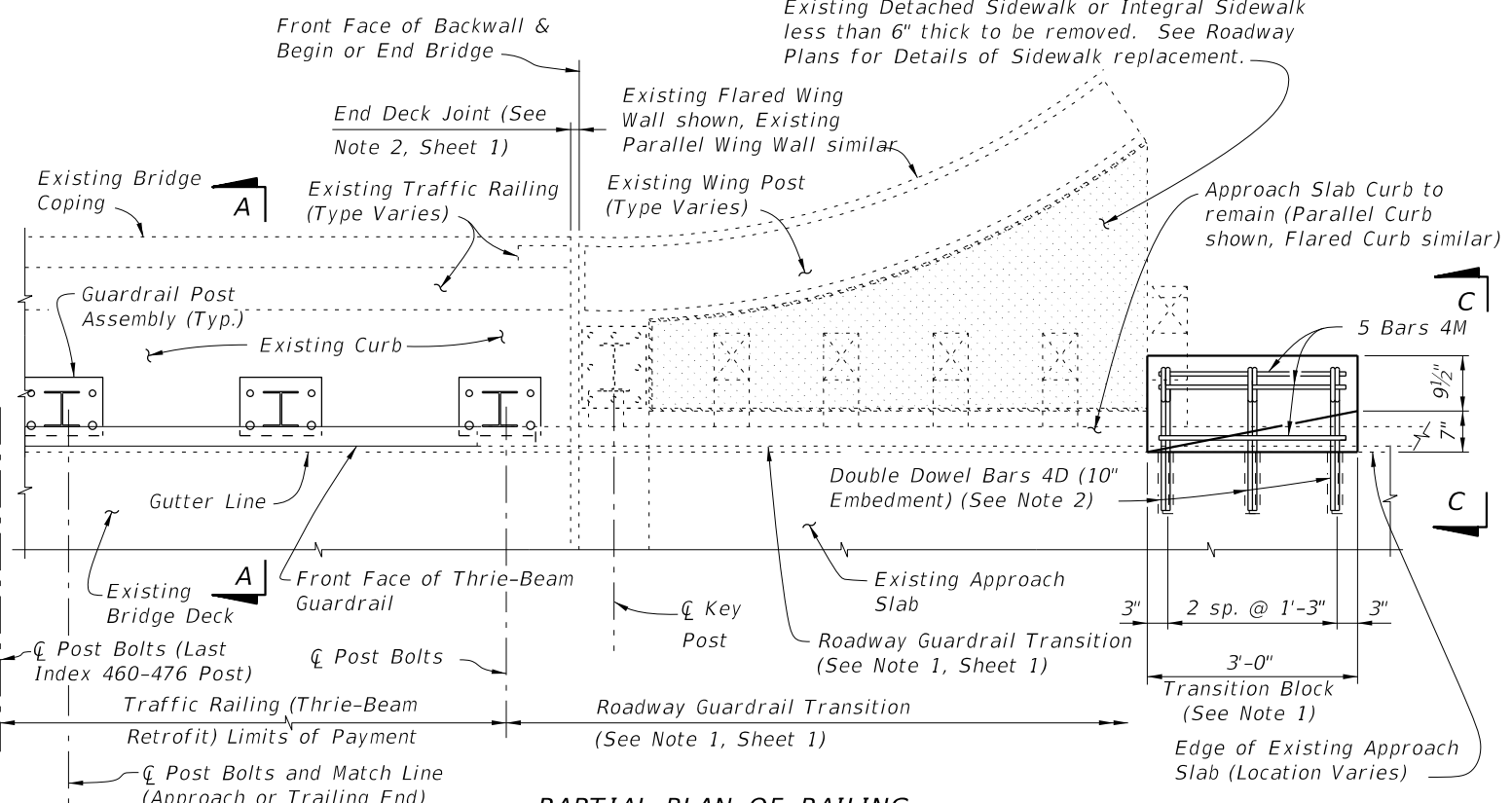
**PARTIAL PLAN OF RAILING**



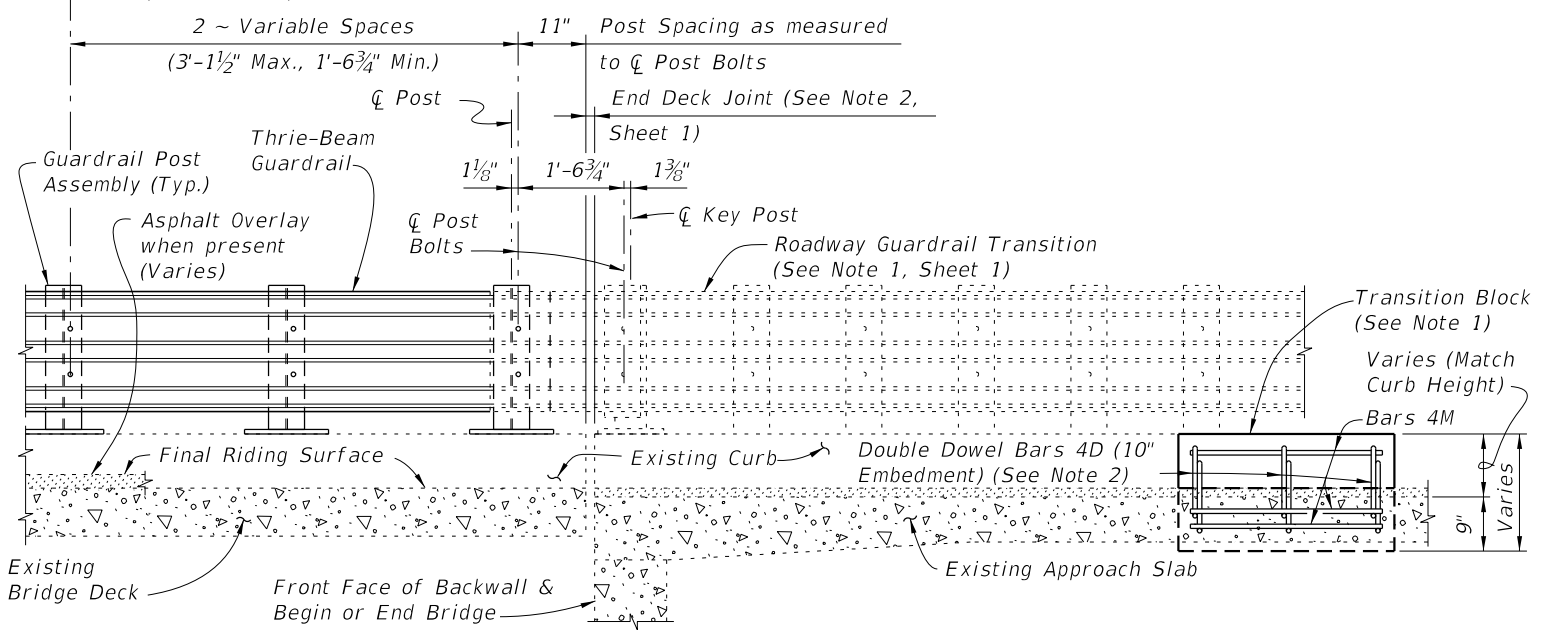
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEME 1**  
**RAILING END TREATMENT FOR PERPENDICULAR OR ANGLED WING WALLS**

- SCHEME 1 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab does not have a curb, see Roadway Plans. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.
  2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.



**PARTIAL PLAN OF RAILING**



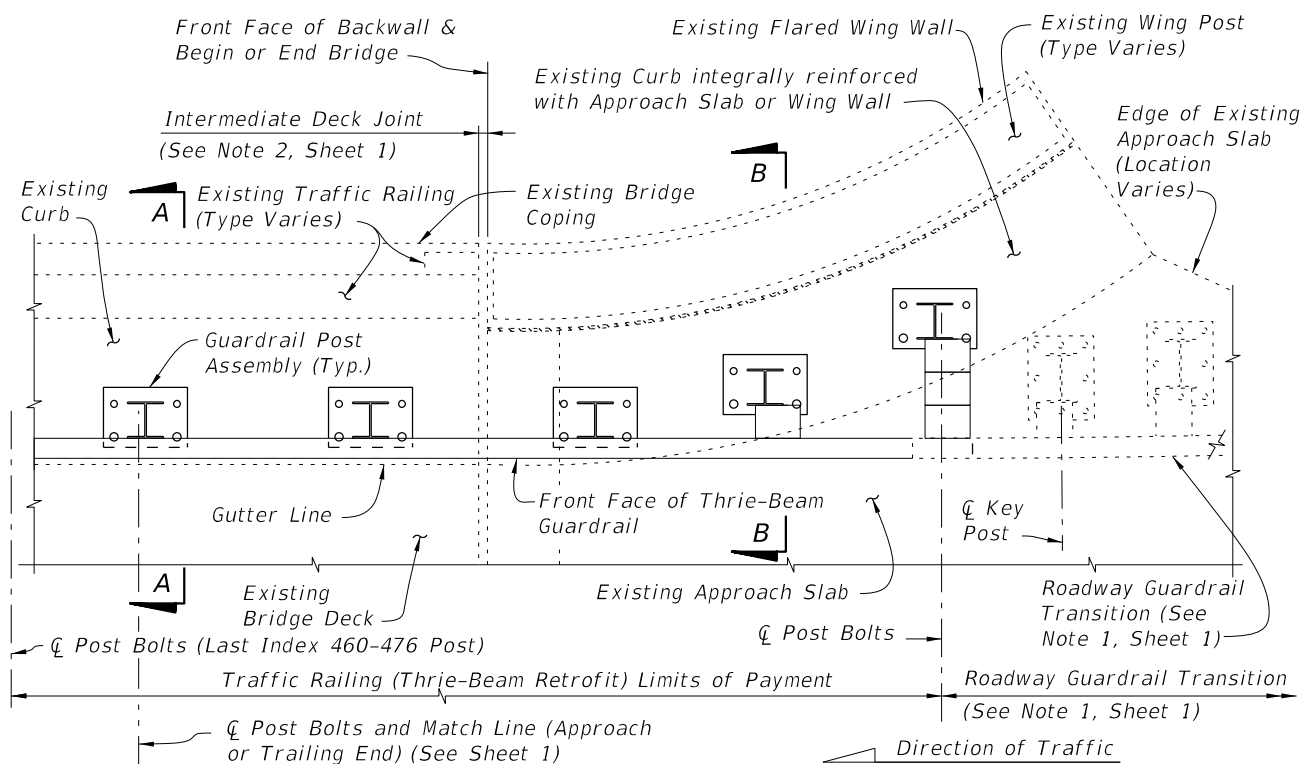
**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)

**SCHEME 2**  
**RAILING END TREATMENT FOR PARALLEL OR FLARED CURBS WITH DETACHED SIDEWALKS OR INTEGRAL SIDEWALK LESS THAN 6" THICK**

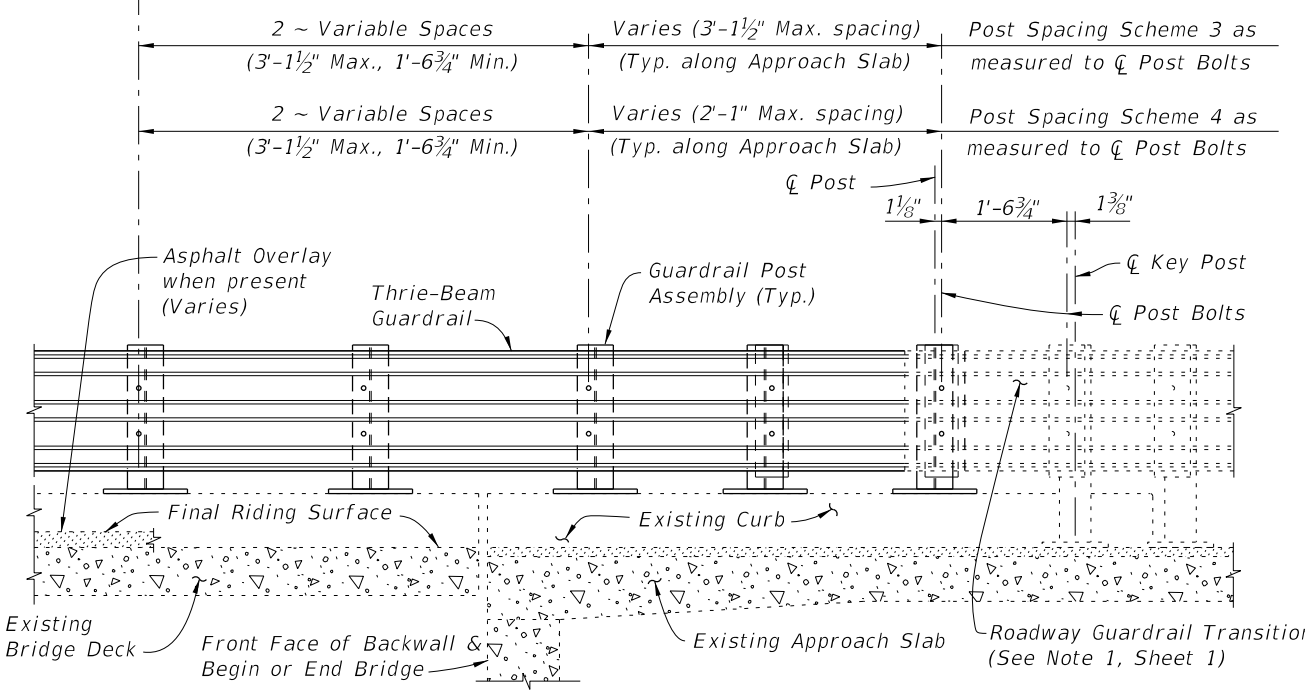
- SCHEME 2 NOTES:**
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic and on bridges with flared Approach Slab Curbs.
  2. Field bend or tilt Dowel Bars 4D and Bars 4M within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

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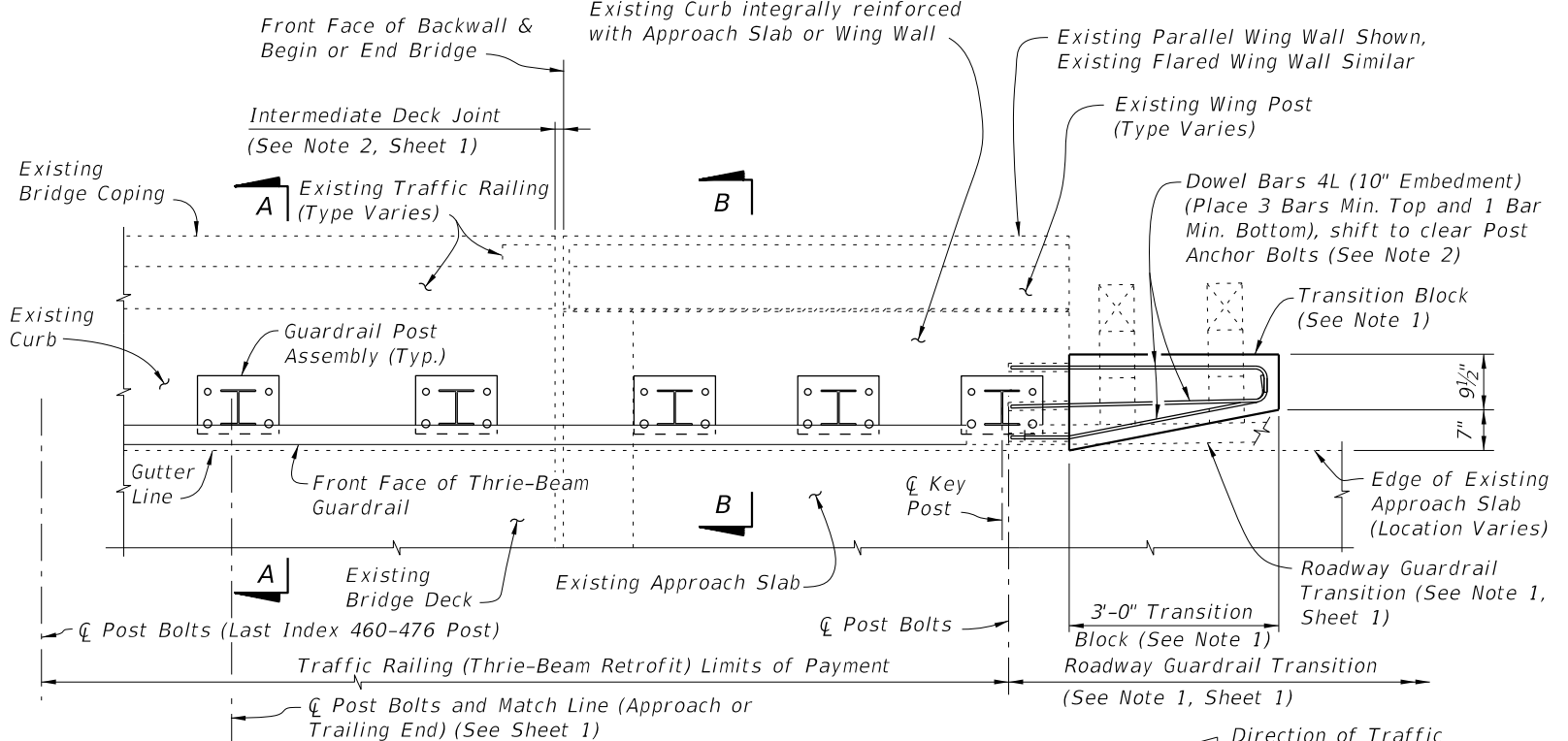
LAST REVISION 01/01/08	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT) WIDE CURB TYPE 2</b>	INDEX 460-476	SHEET 3 of 4
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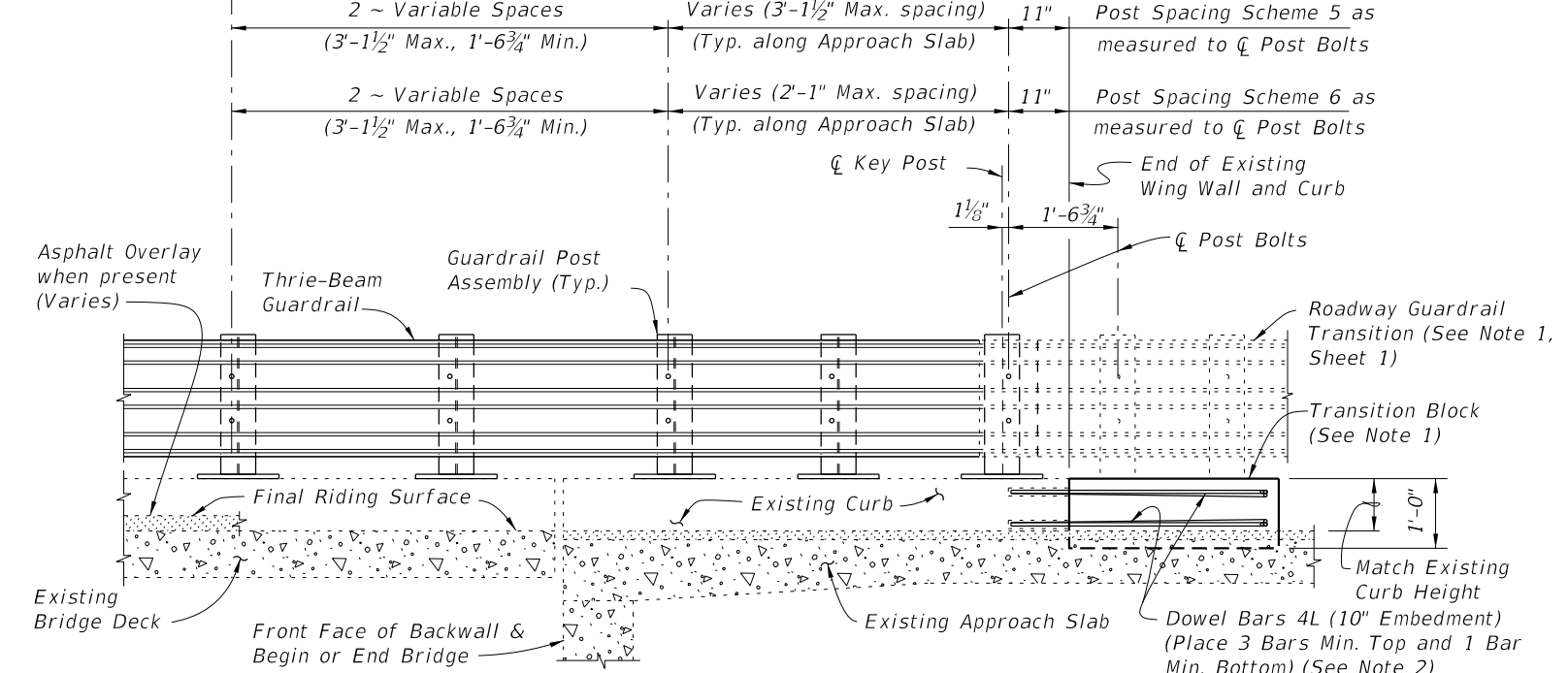
**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)  
**SCHEMES 3 AND 4**  
**RAILING END TREATMENT FOR FLARED INTEGRAL CURBS**



**PARTIAL PLAN OF RAILING**



**PARTIAL ELEVATION OF INSIDE FACE OF RAILING**  
(Existing Wing Post and Traffic Railing not shown for clarity)  
**SCHEMES 5 AND 6**  
**RAILING END TREATMENT FOR PARALLEL INTEGRAL CURBS**

**SCHEMES 5 AND 6 NOTES:**  
1. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of Transition Block or Curb shall match existing bridge curb. Transition Block may be omitted on trailing ends with no opposing traffic.  
2. Field bend Dowel Bars 4L within Transition Block as required to maintain 2" top and side clearance and 3" bottom clearance.

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LAST REVISION 01/01/08	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	<b>TRAFFIC RAILING - (THRIE-BEAM RETROFIT)</b> <b>WIDE CURB TYPE 2</b>	INDEX 460-476	SHEET 4 of 4
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**TRAFFIC RAILING RETROFIT NOTES**

See Index 536-001 for component details, geometric layouts and associated notes not fully detailed herein.

**CONCRETE:** Concrete for Transition Blocks shall be Class II (Bridge Deck).

**THRIE-BEAM PANEL:** Steel Thrie-Beam Elements shall meet the requirements for Class B (10 Gauge) Guardrail of AASHTO M 180, Type II (Zinc coated). The minimum panel length for Thrie-Beam Elements shall be 12'-6". Field drilled holes for Post connections shall be 3/4" by 2 1/2" slotted holes.

**BOLTS, NUTS AND WASHERS:** Bolts, nuts and round washers shall be in accordance with AASHTO M180. Plate Washers shall be in accordance with ASTM A36 or ASTM A709 Grade 36.

**COATINGS:** All Nuts, Bolts, Anchors, and Washers shall be hot-dip galvanized in accordance with the Specifications.

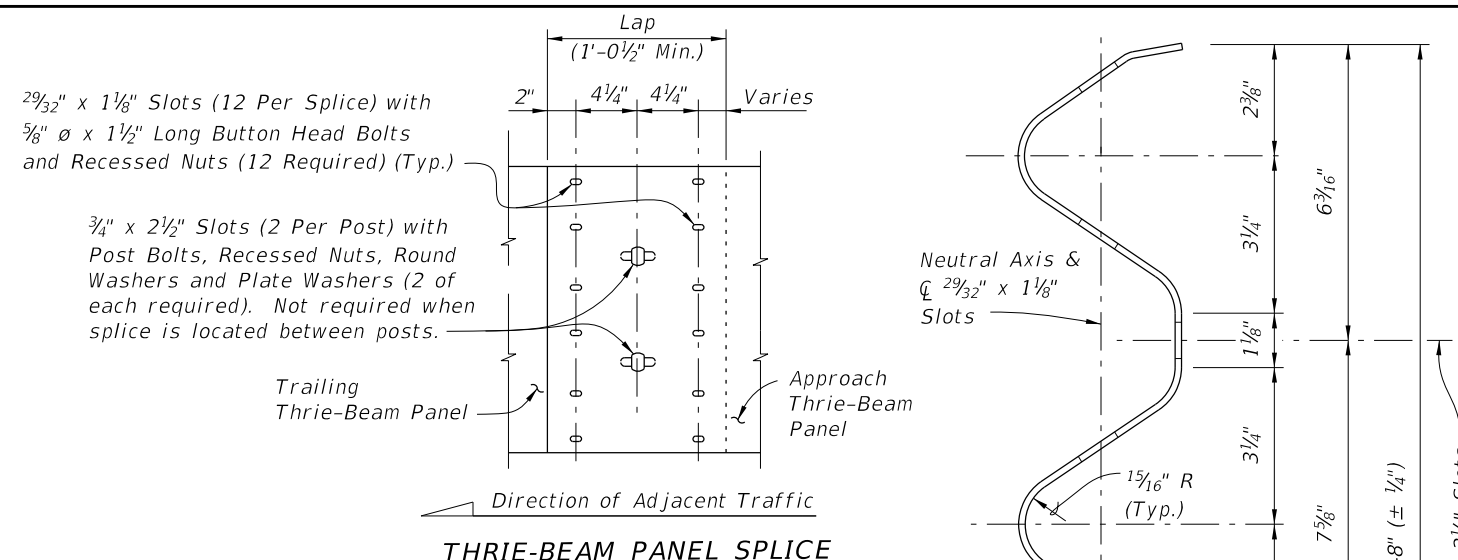
**BRIDGES ON CURVED ALIGNMENTS:** The details presented herein are shown for bridges on tangent alignments. Details for bridges on horizontally curved alignments are similar.

**THRIE-BEAM EXPANSION SECTION:** Thrie-Beam Expansion Sections shall be installed at locations shown in the Plans. Install nuts for splice bolts finger-tight at 2 1/2" slots in thrie-beam expansion sections. Nuts shall fully engage bolts with a minimum of one bolt thread extending beyond the nuts. Distort the first thread on the outside of the nut to prevent loosening. Tighten bolts in 3 3/4" slots at guardrail post(s) that lie between the slotted expansion splice and bridge deck joint so that the bolt heads are in full contact with thrie-beam elements, but not so tight as to impede movement due to expansion.

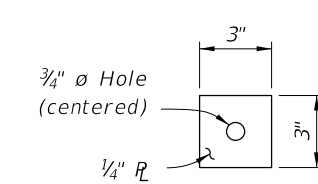
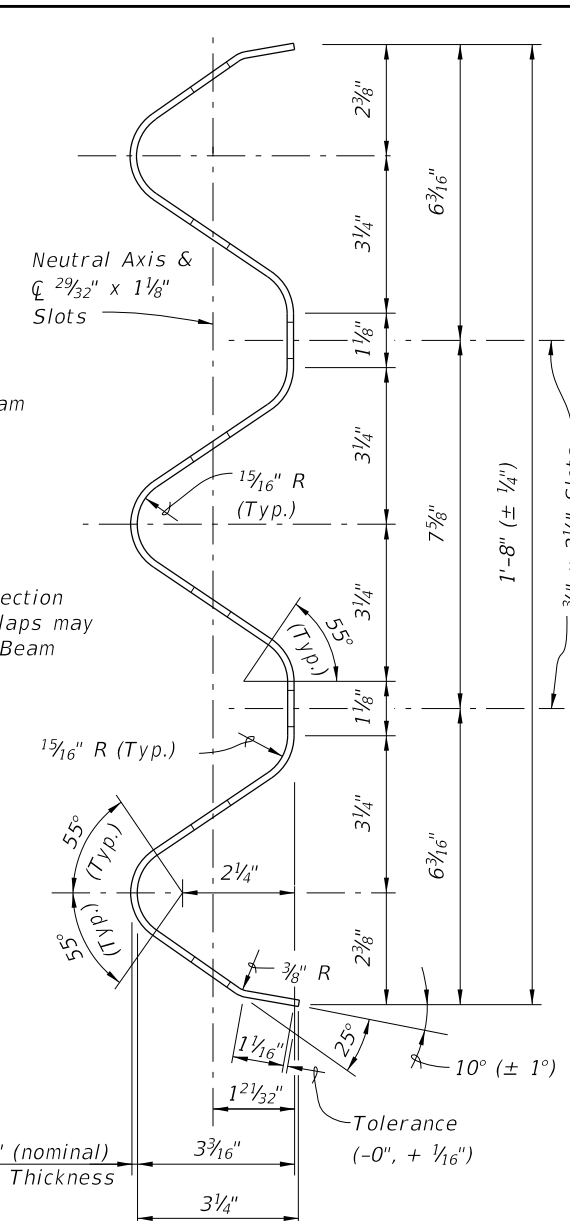
**WOOD BLOCKS:** All wood blocks, including required wedge shaped blocks shall be Pressure Treated Lumber in accordance with Specifications Section 955. Bolt holes in blocks to be centered (±1/4").

**BRIDGE NAME PLATE:** If a portion of the existing Traffic Railing is to be removed that carries the bridge name, number and or date, or if the installation of the Traffic Railing (Thrie-Beam Retrofit) will obscure the bridge name, number and or date, then replace the information that has been removed or obscured, with 3" tall black lettering on white nonreflective sheeting applied to the top of the adjacent guardrail. The information must be clearly visible from the right side of the approaching travel lane. The sheeting and adhesive backing shall comply with Specification Section 994 and may comprise of individual decals of letters and numbers.

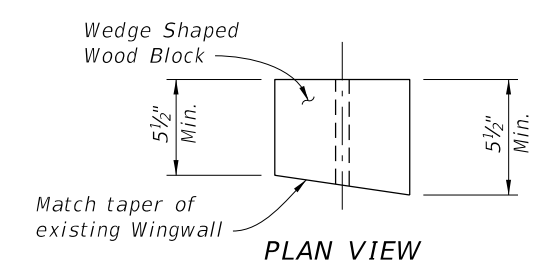
**PAYMENT:** Payment will be made under Thrie-Beam Panel Retrofit which shall include all materials and labor required to fabricate and install the retrofit railing. Transition Blocks and Curbs, Bridge Name Plate and Barrier Delineators, where required, will not be paid for directly but shall be considered incidental work.



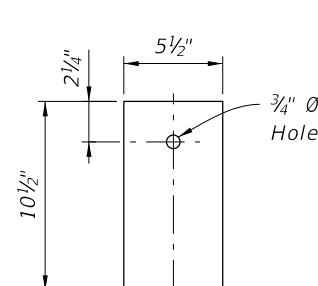
**NOTE:** All Thrie Beam Panels shall be lapped in the direction of adjacent traffic. At the Contractor's option, laps may be extended. Field drill holes in Trailing Thrie-Beam Panel as required.



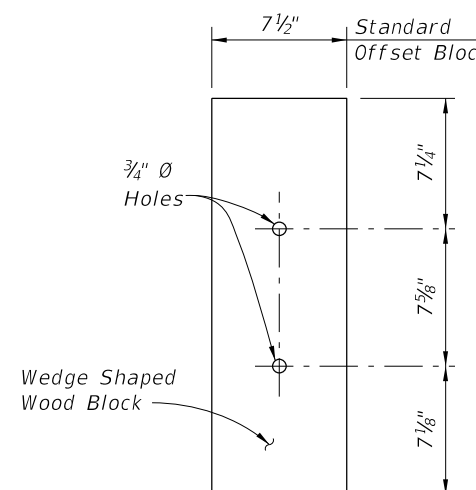
**PLATE WASHER DETAIL**



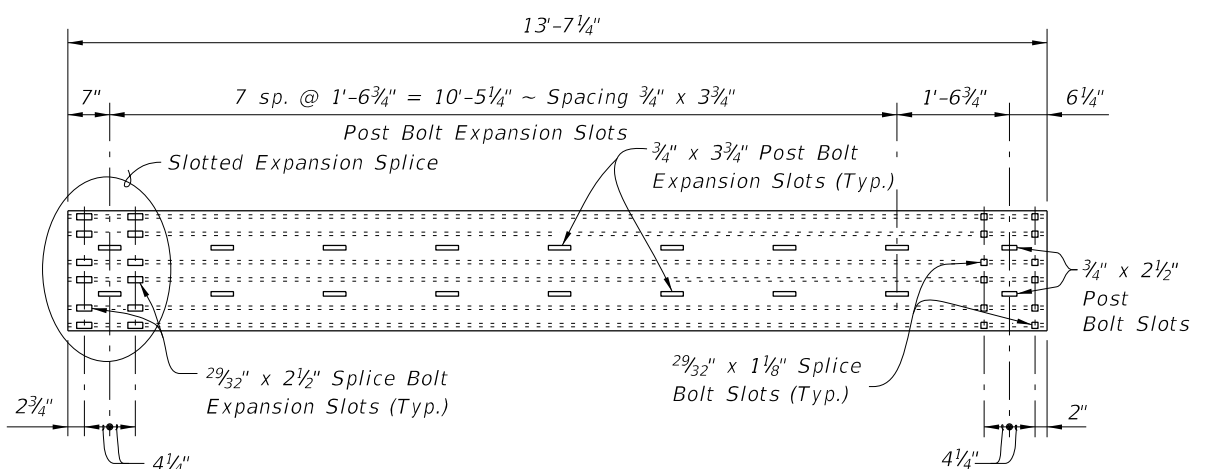
**PLAN VIEW**



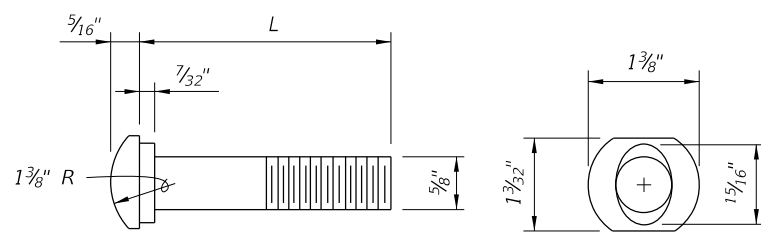
**1" WOOD BLOCK**



**FRONT VIEW  
WEDGE SHAPED BLOCK DETAIL**



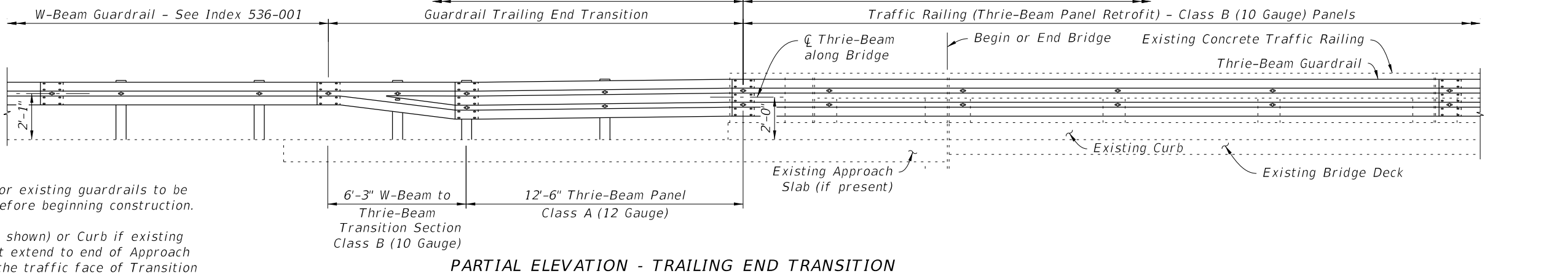
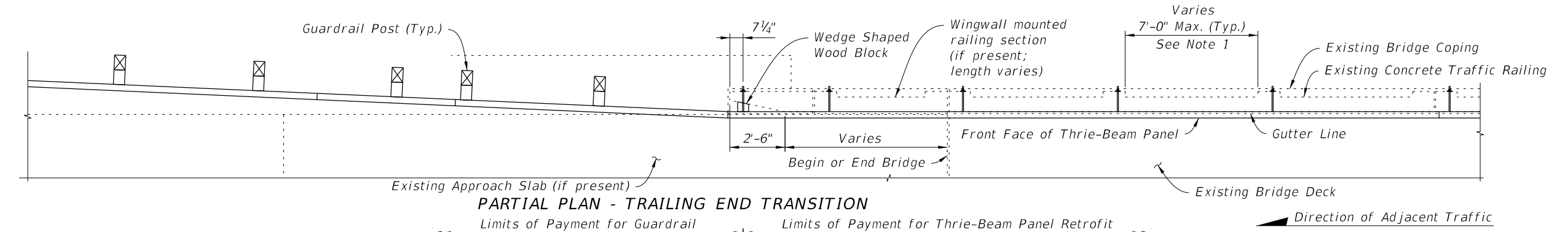
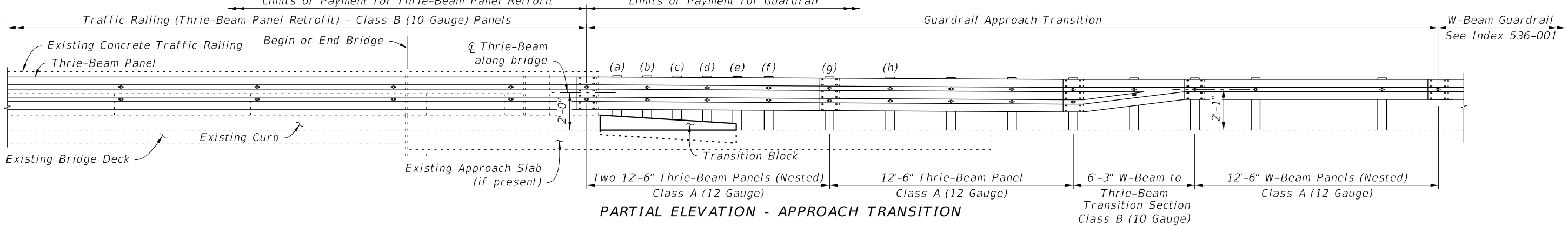
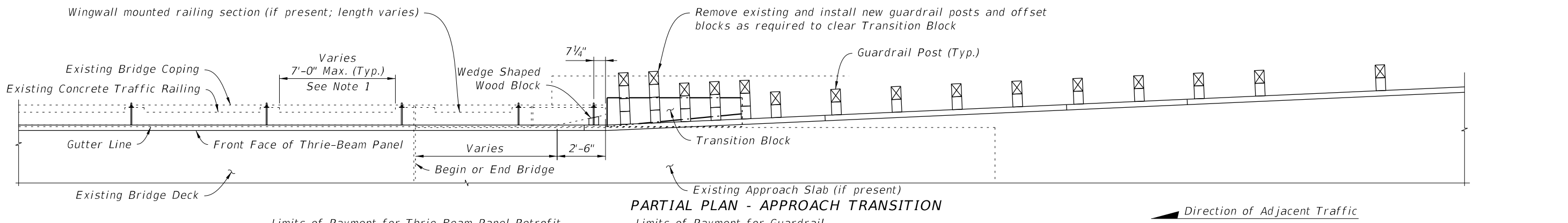
**THRIE-BEAM EXPANSION SECTION**



**5/8" OVAL SHOULDER BUTTON HEAD BOLT**

L (in)	THREAD LENGTH (in)	APPLICATION
1 1/2	Full Length	Splice Bolt
14	4	Post Bolt

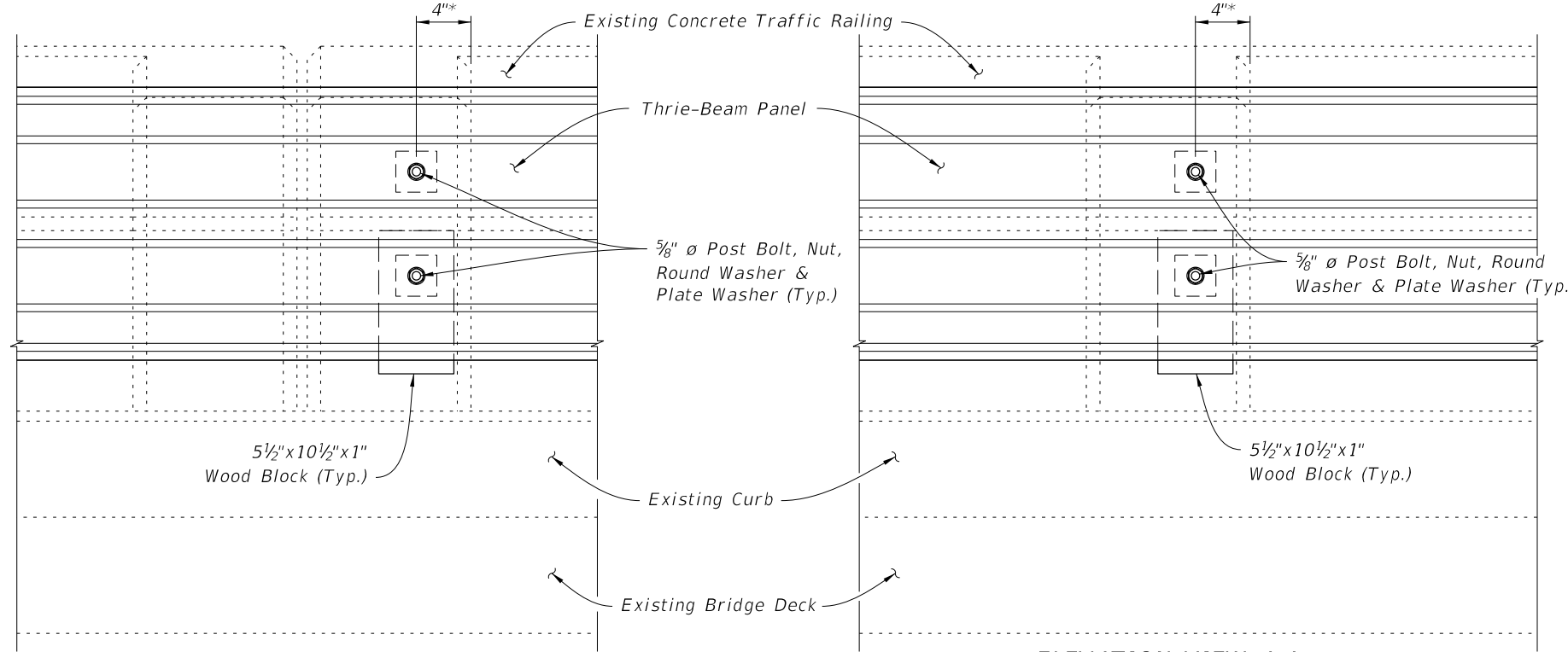
9/23/2021 9:56:01 AM



- NOTES:
1. Dimensions and elevations for existing guardrails to be verified by the Contractor before beginning construction.
  2. Provide Transition Block (as shown) or Curb if existing Approach Slab Curb does not extend to end of Approach Slab. Shape and height of the traffic face of Transition Block or Curb shall match existing bridge curb. See Sheet 4 for Transition Block details. Block may be omitted on trailing ends with no opposing traffic.
  3. Do not bolt nested rails to the blocks and posts at posts (a), (c) & (e).

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LAST REVISION	01/01/14	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>THRIE-BEAM PANEL RETROFIT</b> (CONCRETE HANDRAIL)	INDEX	SHEET
					460-477	2 of 4

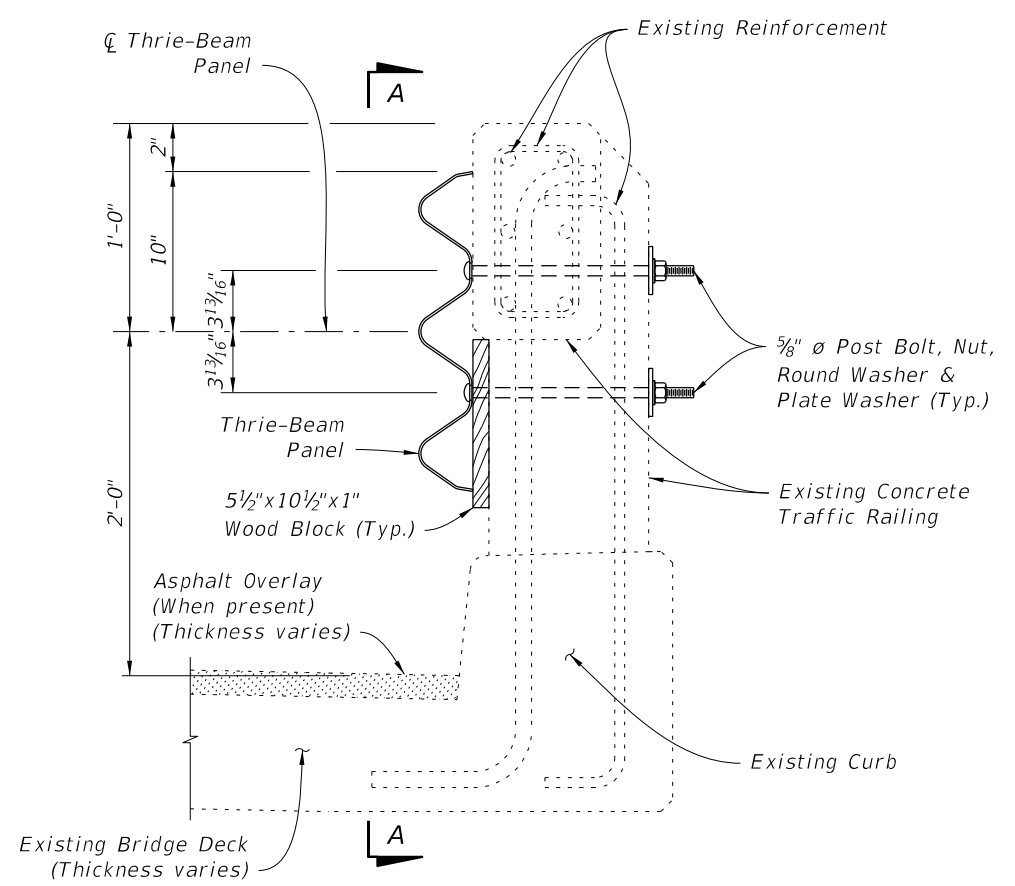


**ELEVATION VIEW A-A  
(At Double Posts)**

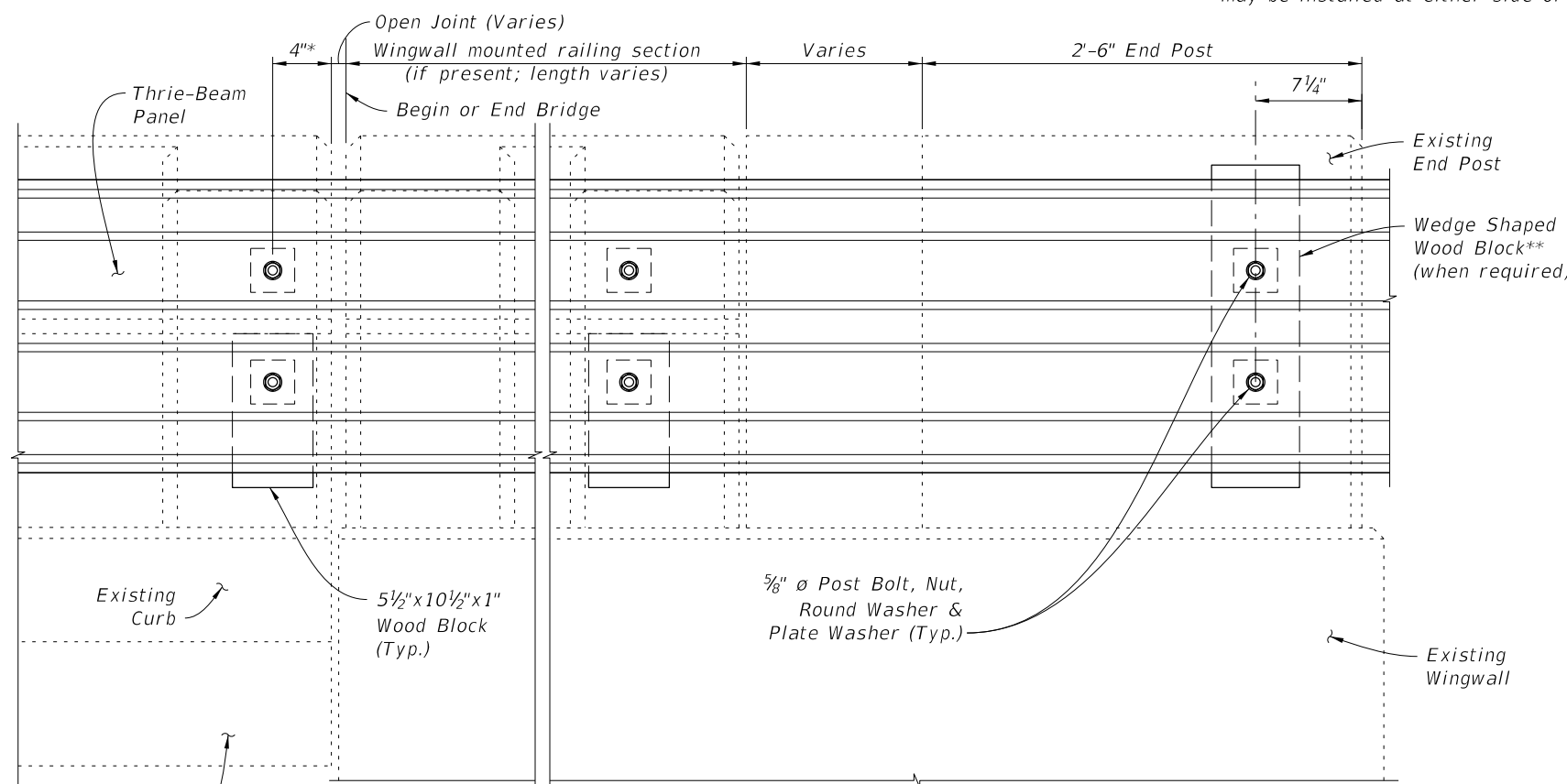
(View at Intermediate Double Posts shown;  
View at Expansion Joints similar)

**ELEVATION VIEW A-A  
(At Single Post)**

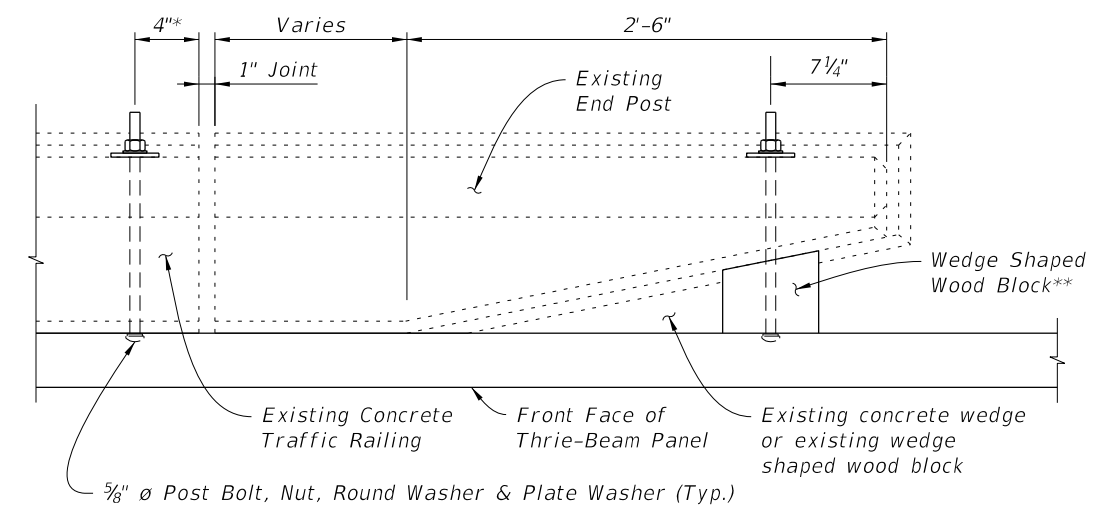
\* Measured from edge of existing Post. Bolts may be installed at either side of any Post.



**TYPICAL SECTION THRU RAILING POST ON BRIDGE DECK**



**ELEVATION VIEW A-A  
(At End Post)**



**PLAN OF END POST**

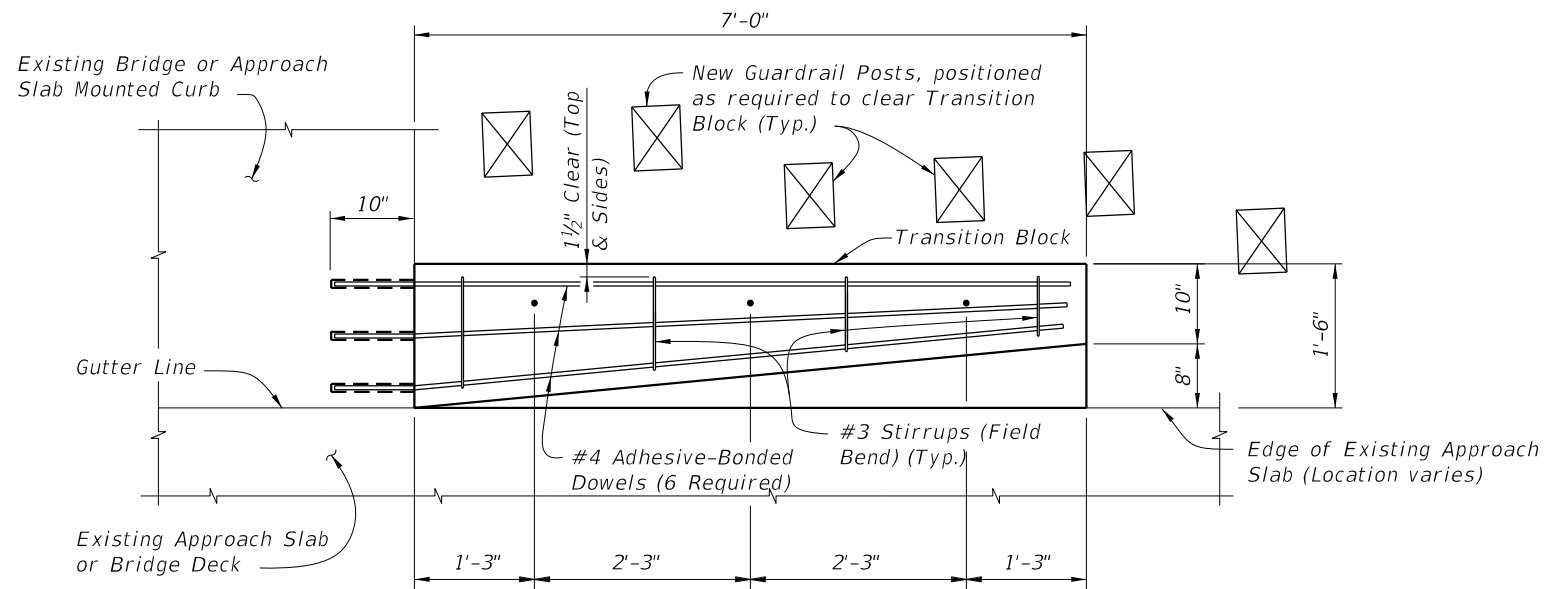
\*\* For End Posts with an existing wedge shaped wood block, remove existing wood block and replace with new Wedge Shaped Wood Block (See Sheet 1 for notes and details).

- NOTES:**
1. Post Bolts shall be 5/8" ø x 14" long set in 7/8" ø core drilled holes, see Sheet No. 1.
  2. Shift Post Bolt holes minimally inward toward center of posts if existing reinforcement is encountered during drilling of holes. If reinforcement is still encountered, notify the Engineer before proceeding with drilling.
  3. Post Bolt spacing not to exceed 8'-0" (± 1").

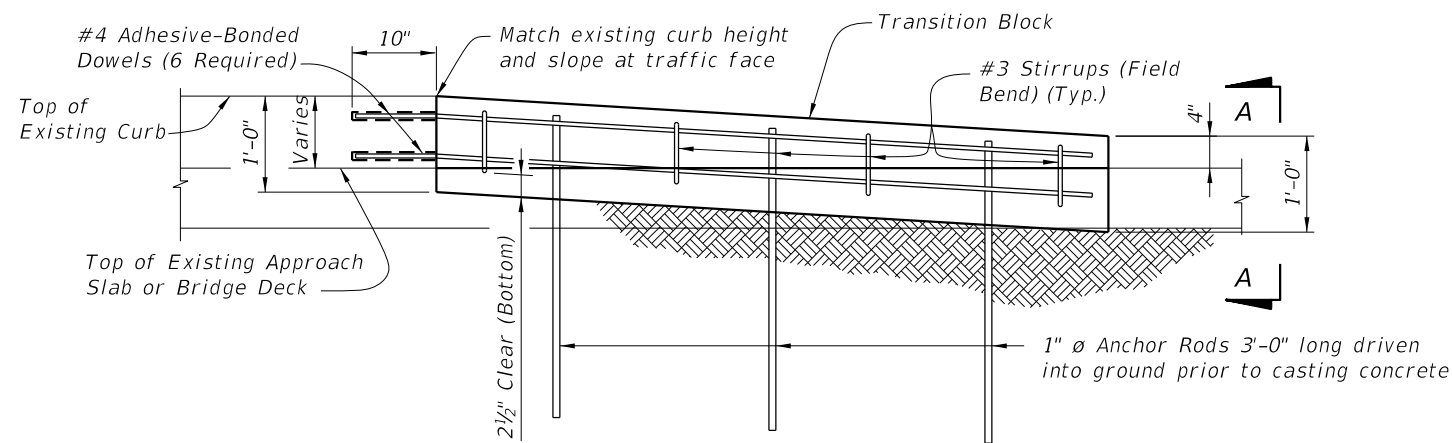
9/23/2021 9:56:07 AM

LAST REVISION 07/01/13	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	<b>THRIE-BEAM PANEL RETROFIT (CONCRETE HANDRAIL)</b>	INDEX 460-477	SHEET 3 of 4
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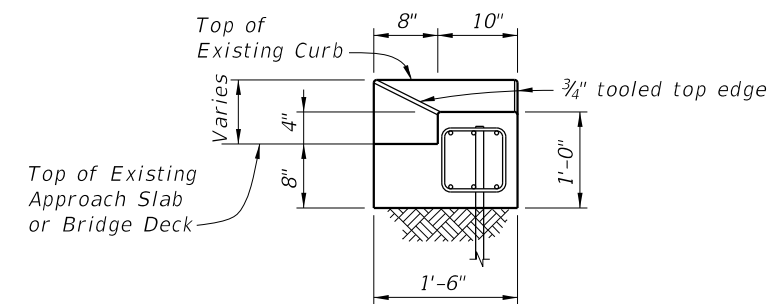




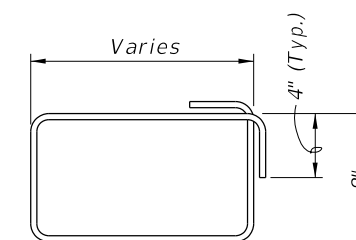
PLAN VIEW OF TRANSITION BLOCK  
(GUARDRAIL NOT SHOWN FOR CLARITY)



ELEVATION OF TRANSITION BLOCK  
(GUARDRAIL AND POSTS NOT SHOWN FOR CLARITY)



END VIEW A-A



#3 STIRRUP (FIELD BEND)

NOTES:

**ANCHOR RODS:** Steel Anchor Rods shall be ASTM A36, ASTM A709 Grade 36 or ASTM A615 Grade 60 hot-dip galvanized in accordance with Specification Section 962.

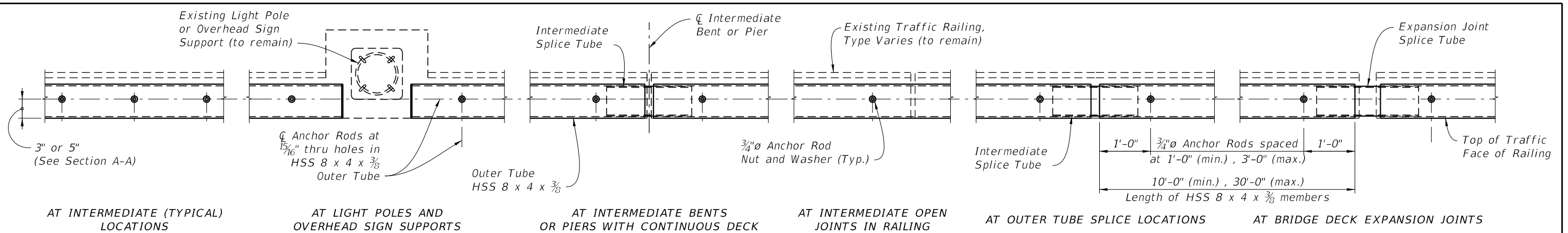
**ADHESIVE-BONDED DOWELS:** Adhesive Bonding Material Systems for Dowels shall comply with Specification Section 937 (Type HV) and be installed in accordance with Specification Section 416.

Adhesive Bonded Dowels are shown installed in an existing curb or sidewalk integrally reinforced with Approach Slab, Wingwall or Bridge Deck. For installations in existing detached curbs or sidewalks, install dowels in available sound concrete.

Shift bars (as needed) to install six dowels into existing bridge or approach slab mounted curb.

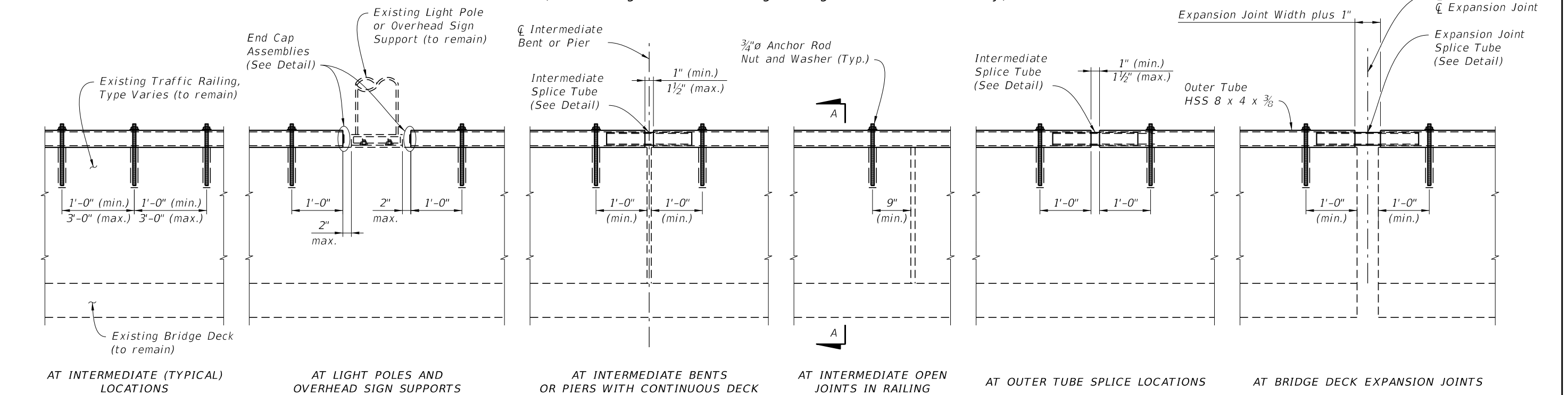
ESTIMATED QUANTITIES PER TRANSITION BLOCK		
ITEM	UNIT	QUANTITY
Concrete Class II (Bridge Deck)	CY	0.4
Reinforcing Steel	LB	61
Guardrail (Reset)	LF	12.5

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**PLAN**

(Reinforcing Steel in Existing Railing not shown for clarity)



**ELEVATION**

(Reinforcing Steel in Existing Railing not shown for clarity)  
 (Railing on Bridge Deck shown, Railing on Approach Slab and Retaining Wall similar)

**GENERAL NOTES**

**HSS TUBES:** HSS Tubes shall be ASTM A500 Grade B.

**END CAPS AND END TAPER ASSEMBLIES:** Steel plate for End Caps and End Taper Assemblies shall be ASTM A709 Grade 36.

**ANCHOR RODS, NUTS AND WASHERS:** Adhesive Bonded anchors shall be fully threaded rods in accordance with ASTM F1554 Grade 36 or ASTM A193 Grade B7. All Nuts shall be single self-locking hex nuts and in accordance with ASTM A563 or ASTM A194. Flat Washers shall be in accordance with ASTM F436. After the nuts have been snug tightened, distort the anchor rod threads to prevent removal of the nuts. Coat distorted threads and the exposed trimmed ends of anchor rods with a galvanizing compound in accordance with the Specifications.

**COATINGS:** Galvanize all Anchor Rods, Nuts, Bolts, Washers and HSS Tube Assemblies in accordance with the Specifications. Hot-dip HSS Tubes and Tube Assemblies after fabrication.


**ADHESIVE-BONDED ANCHORS AND DOWELS:** Adhesive Bonding Material Systems for Anchor Rods shall comply with Specification Section 937 and be installed in accordance with Specification Section 416. The field testing proof loads required by Specification Section 416 shall be 10,000 lbs.

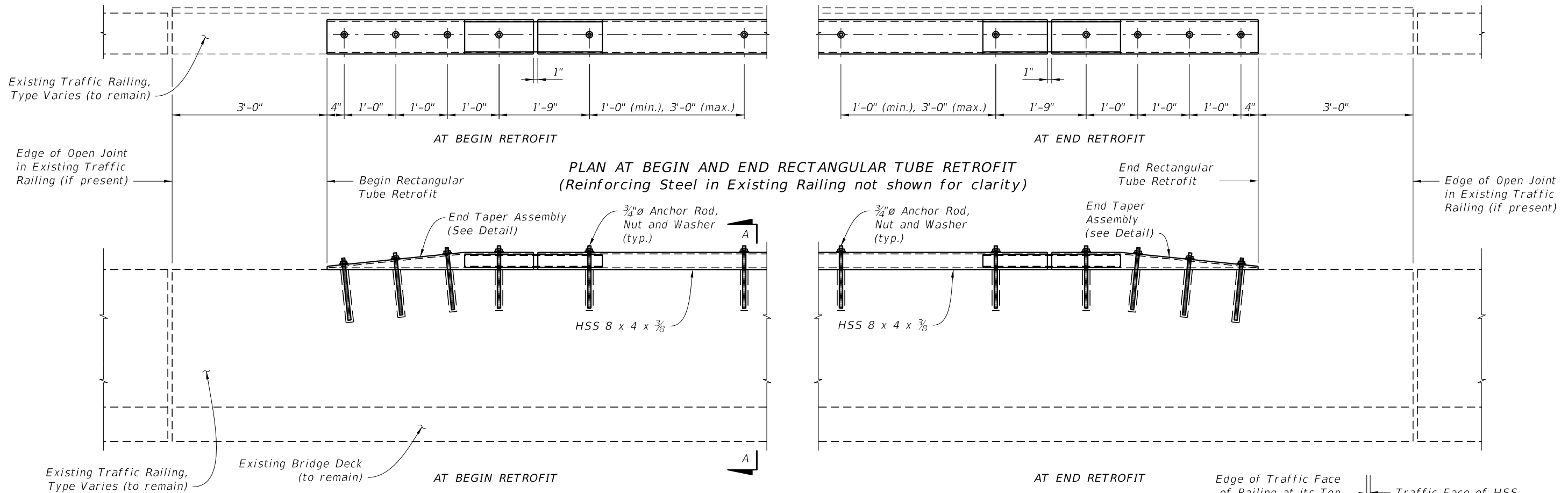
**INSTALLATIONS ON CURVED ALIGNMENTS AND GRADES:** The details presented in this Standard are shown for installations on tangent alignments and constant grades except as shown in the Offset Detail for Retrofit Installations on Horizontally Curved Alignments. Details for installations on horizontally curved alignments and or vertically curved profiles are similar. Straight sections of HSS Tube may be installed in a chorded manner within the offset limit shown in the Offset Detail for Retrofit Installations on Horizontally Curved Alignments. Shop bend HSS Tubes for use on horizontally curved alignments where the offset limit shown cannot be met using straight sections of HSS Tube. Straight and horizontally curved sections of HSS Tube may be field bent during installation for use on vertically curved profiles.

**SHOP DRAWINGS:** Submit shop drawings and obtain approval prior to fabrication in accordance with Specification Section 5. Show project specific geometry (line and grade) and bolt hole, expansion joint and splice locations. Include other project specific details as required.

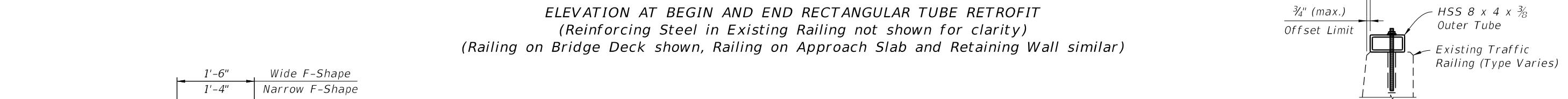
**PAYMENT:** Payment will be made under Metal Traffic Railing (Rectangular Tube Retrofit) which shall include all materials and labor required to fabricate and install the Rectangular Tube Retrofit.

9/23/2021 9:56:09 AM

LAST REVISION 11/01/17	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>TRAFFIC RAILING - (RECTANGULAR TUBE RETROFIT)</b>	INDEX <b>460-490</b>	SHEET <b>1 of 3</b>
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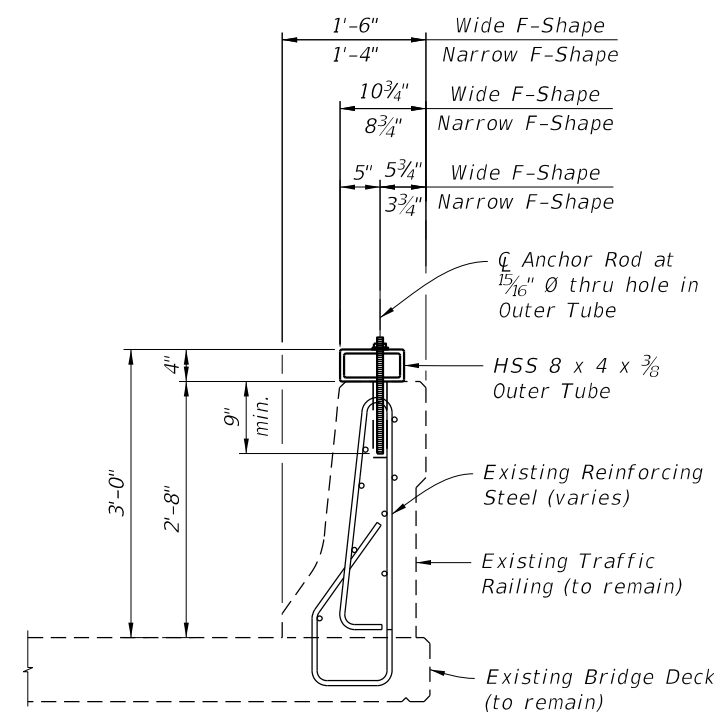


**PLAN AT BEGIN AND END RECTANGULAR TUBE RETROFIT**  
 (Reinforcing Steel in Existing Railing not shown for clarity)

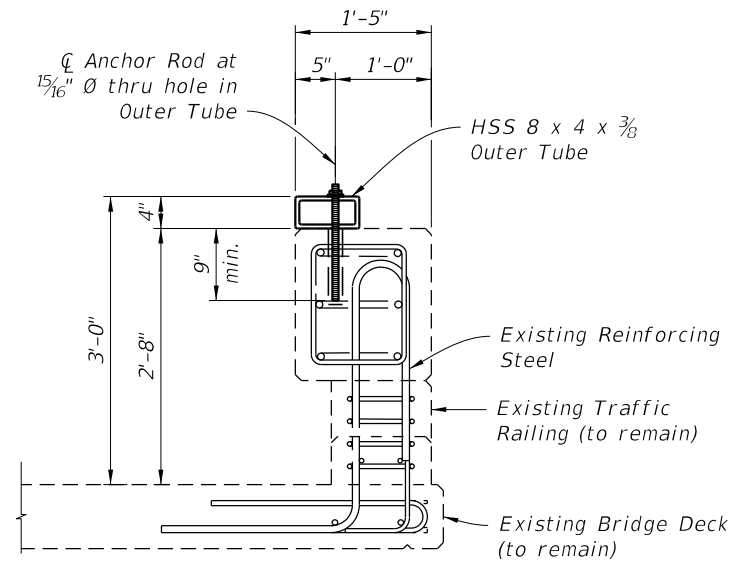


**ELEVATION AT BEGIN AND END RECTANGULAR TUBE RETROFIT**  
 (Reinforcing Steel in Existing Railing not shown for clarity)  
 (Railing on Bridge Deck shown, Railing on Approach Slab and Retaining Wall similar)

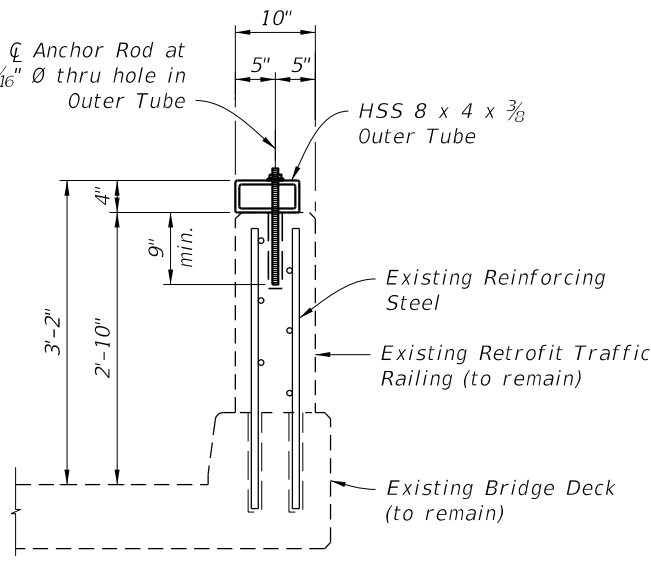
**OFFSET DETAIL FOR INSTALLATIONS ON HORIZONTAL CURVES**



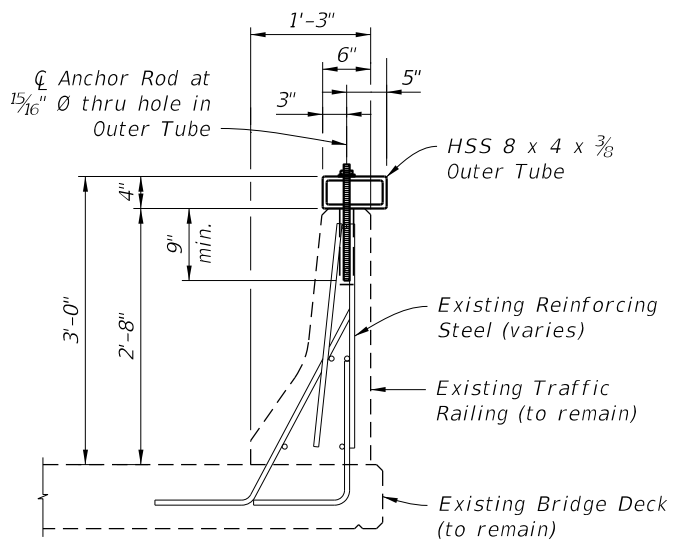
**SECTION A-A**  
 F-Shape Traffic Railing



**SECTION A-A**  
 Corral Shape Traffic Railing



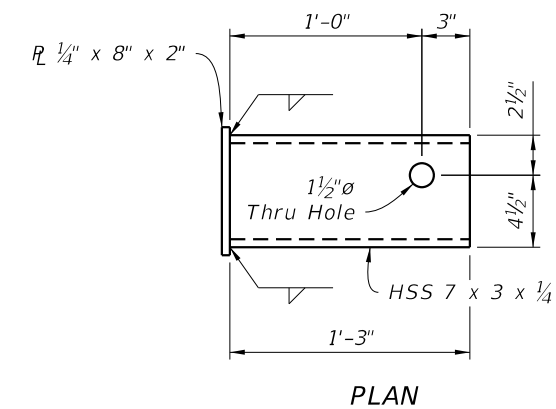
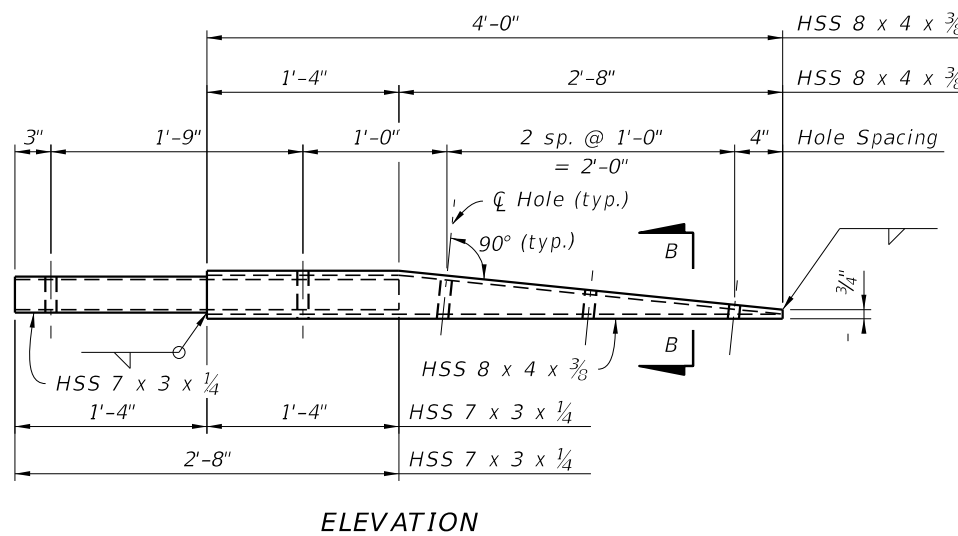
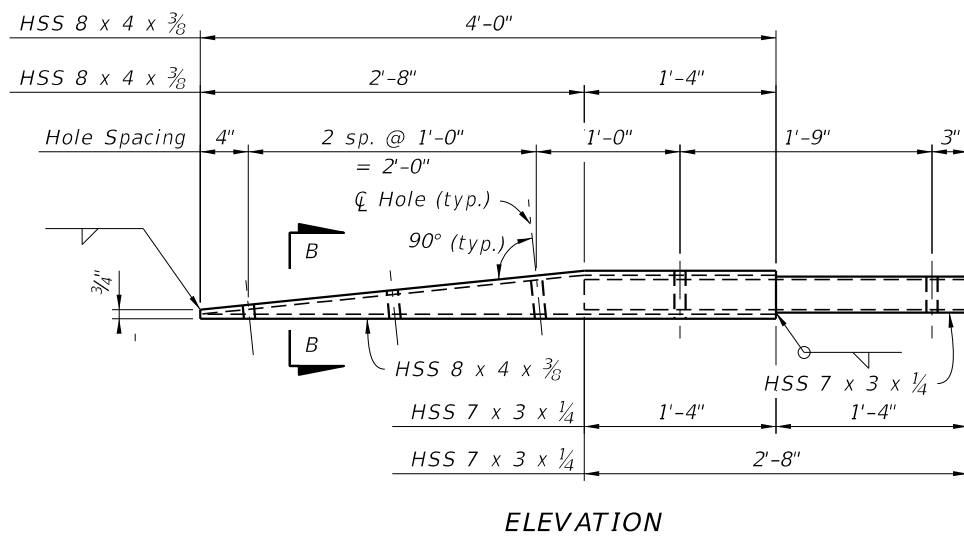
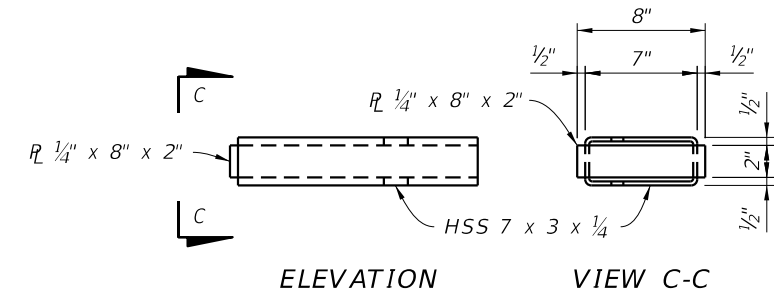
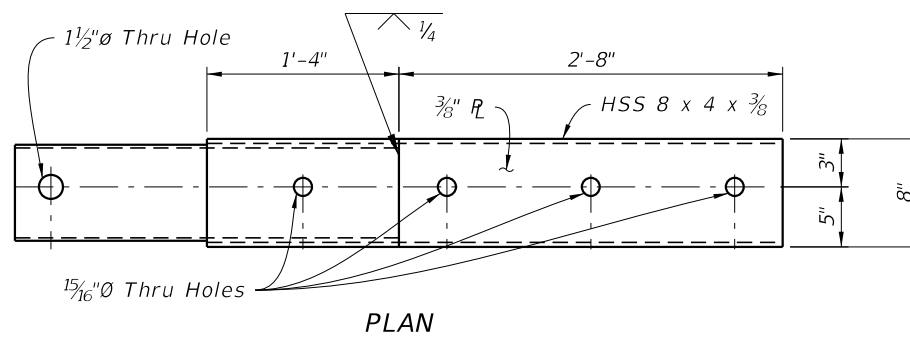
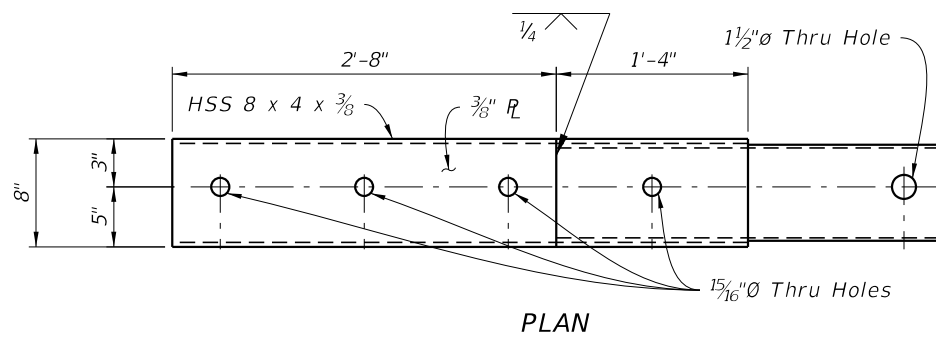
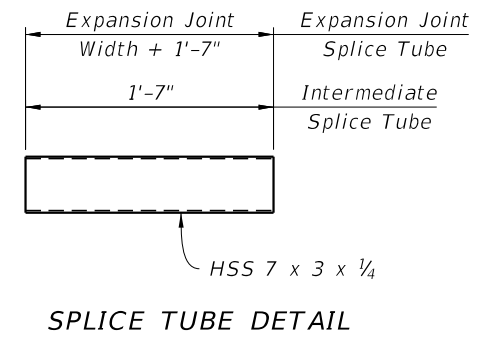
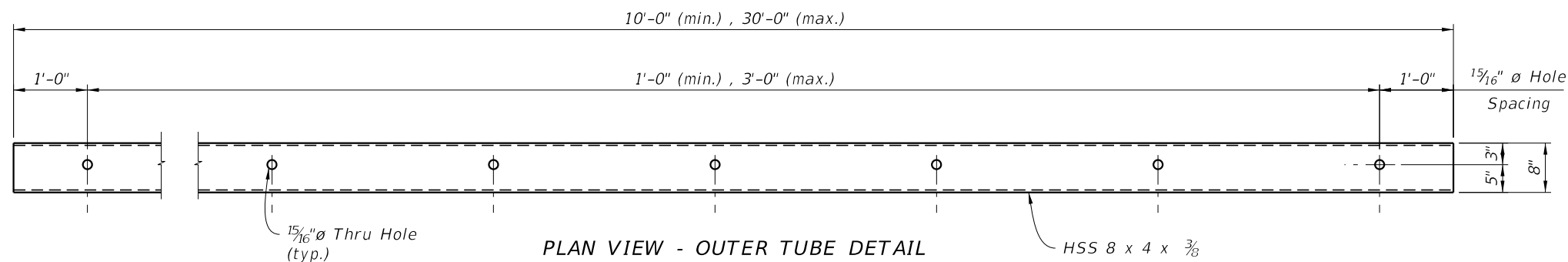
**SECTION A-A**  
 Vertical Face Retrofit Traffic Railing



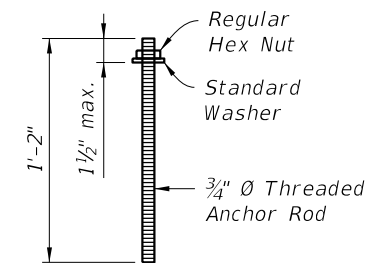
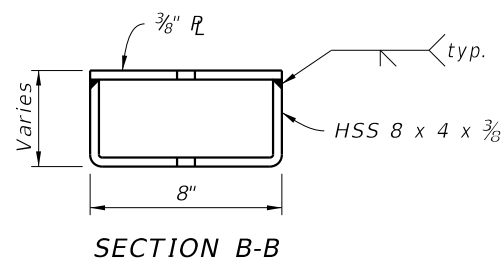
**SECTION A-A**  
 New Jersey Shape Traffic Railing

9/23/2021 9:56:11 AM

LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2022-23 STANDARD PLANS	TRAFFIC RAILING - (RECTANGULAR TUBE RETROFIT)	INDEX 460-490	SHEET 2 of 3
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END CAP ASSEMBLY DETAIL

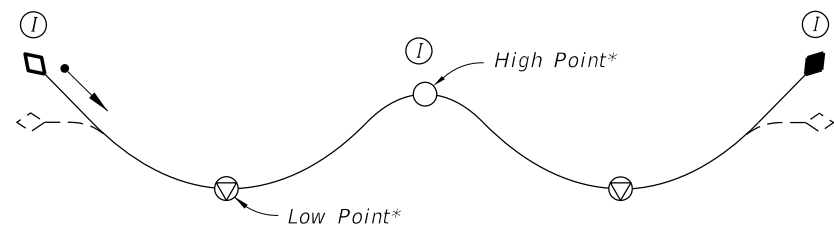


TAPERED END ASSEMBLY DETAIL

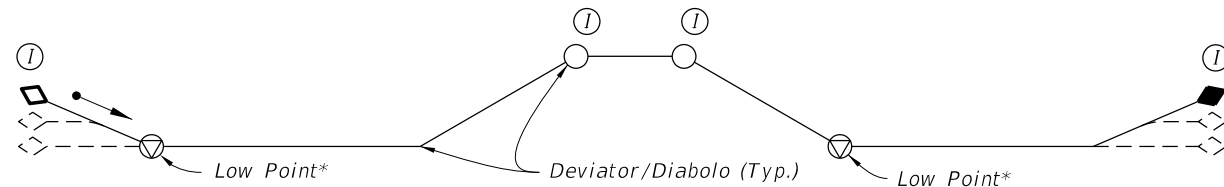
9/23/2021 9:56:12 AM

LAST REVISION 11/01/17	DESCRIPTION:		FY 2022-23 STANDARD PLANS	TRAFFIC RAILING - (RECTANGULAR TUBE RETROFIT)	INDEX 460-490	SHEET 3 of 3
REVISION						

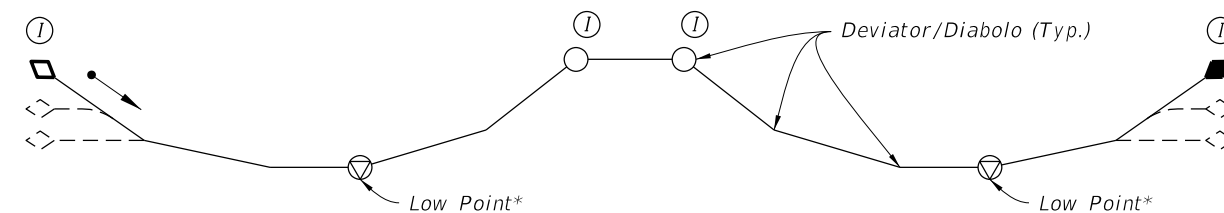
TYPICAL PROFILES FOR TENDONS WITH FLEXIBLE FILLER



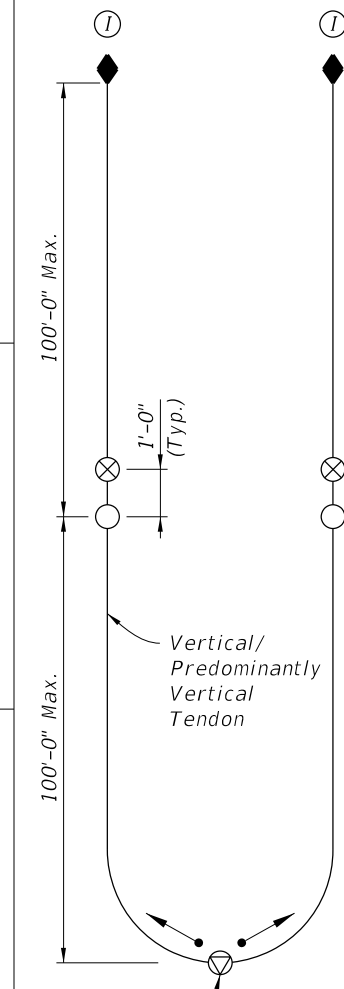
**Profile F1**  
(2 Span Profile shown; Profiles for 3 or more Spans similar)



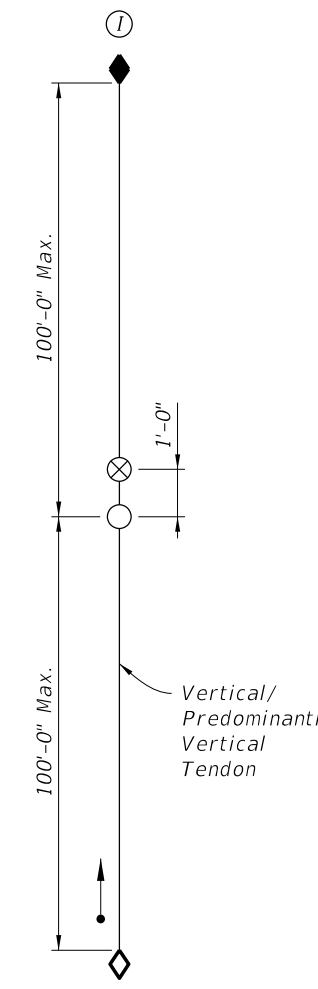
**Profile F2**  
(2 Span Profile shown; Profiles for 3 or more Spans similar)



**Profile F3**  
(2 Span Profile shown; Profiles for 3 or more Spans similar)



**Profile F8**  
Vertical/  
Predominantly  
Vertical  
Tendon

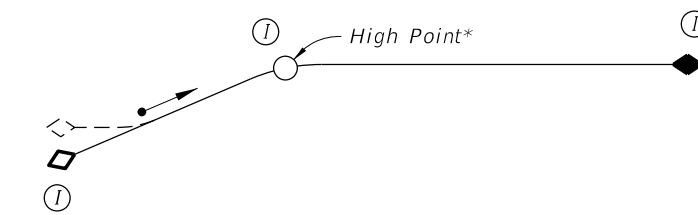


**Profile F9**  
Vertical/  
Predominantly  
Vertical  
Tendon

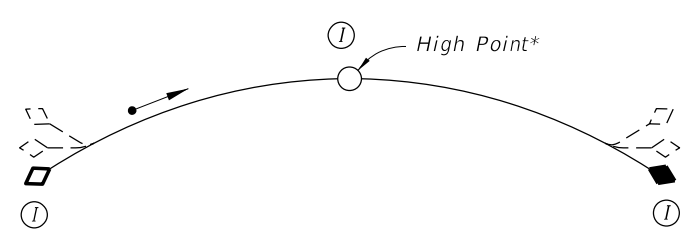
**LEGEND:**

- Strand, Wire or Bar Tendon
- ◊ Anchorage with Filler Inlet at lower end of Tendon
- ◆ Anchorage with Filler Outlet at higher end of Tendon
- ⋈ --- Alternate tendon profile immediately adjacent to Anchorage
- ⊗ Supplementary Filler Inlet
- Filler Port / Outlet
- ▽ Drain (See Specifications Section 462 for additional Drain location requirements)
- Direction of Filler Flow
- Ⓜ Inspection Location

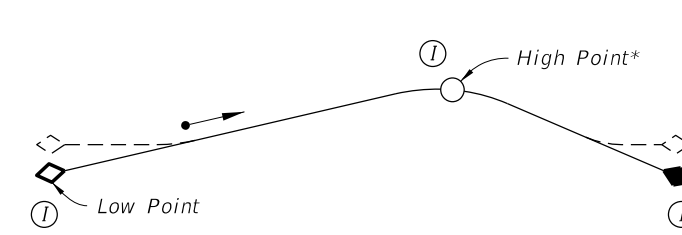
\* Adjust location to coincide with the true high or low point(s) of the tendon.



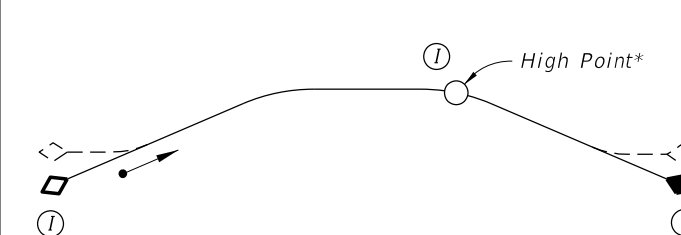
**Profile F12**



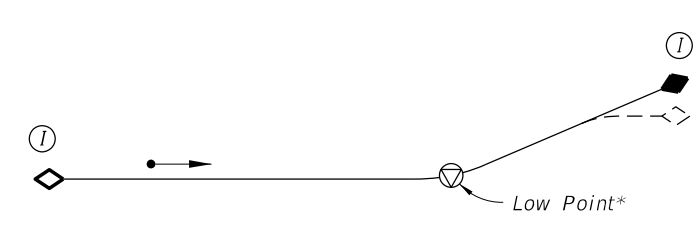
**Profile F4**



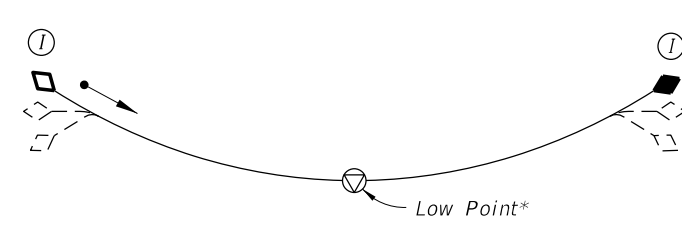
**Profile F6**



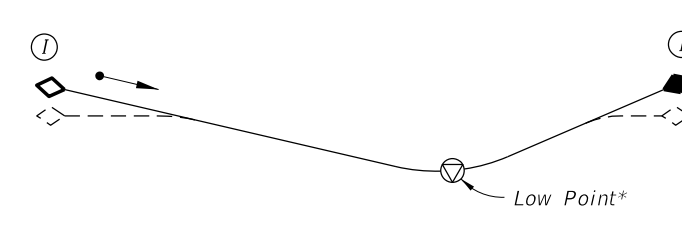
**Profile F10**



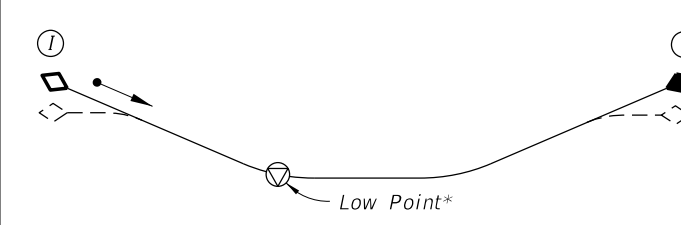
**Profile F13**



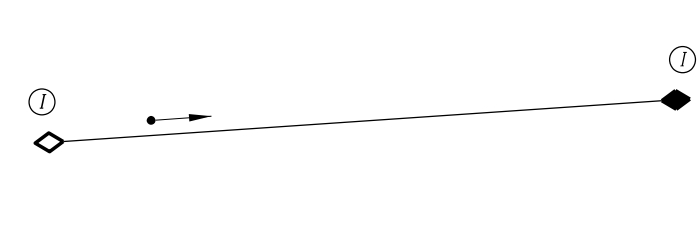
**Profile F5**



**Profile F7**



**Profile F11**



**Profile F14**

9/23/2021 9:56:13 AM

LAST REVISION	11/01/16	REVISION	DESCRIPTION:
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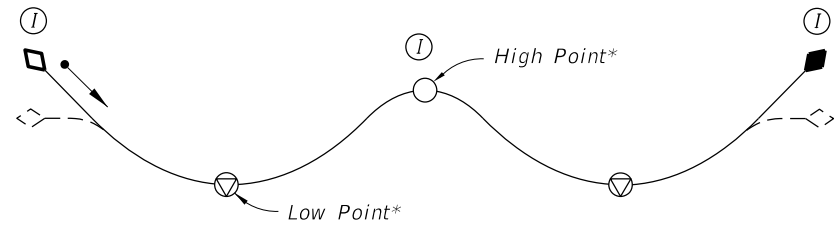
**FY 2022-23  
STANDARD PLANS**

**POST-TENSIONING TENDON PROFILES**

INDEX	SHEET
462-001	1 of 2

TYPICAL PROFILES FOR TENDONS WITH GROUT FILLER

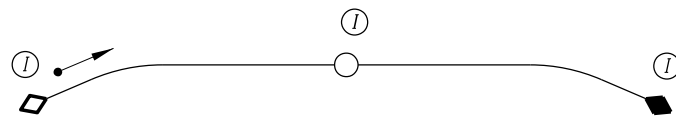
NOTE: See Sheet 1 of 2 for Typical Profiles for Tendons with Flexible Filler and for Legend of Symbols.



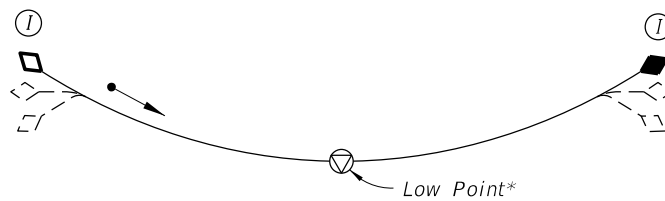
**Profile G1**  
(2 Span Profile shown; Profiles for 3 or more Spans similar)



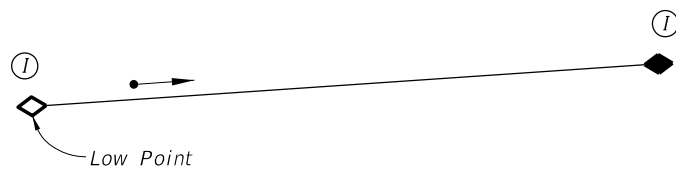
**Profile G2**  
(Profile for Single Cell Box shown; Profiles for Multiple Cell Boxes similar)



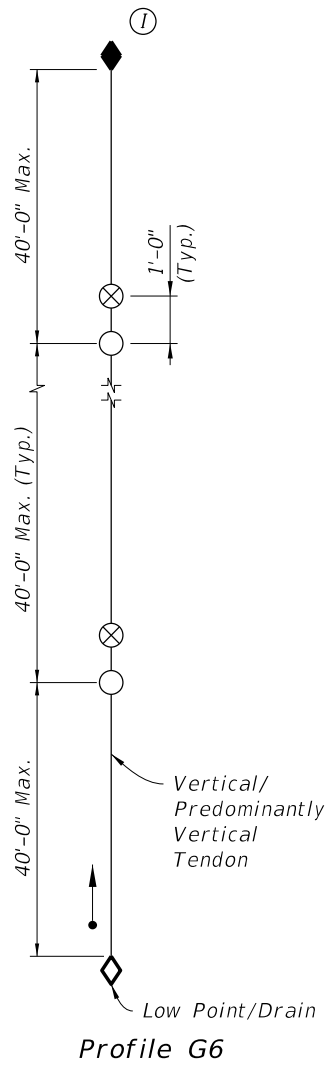
**Profile G3**



**Profile G4**



**Profile G5**



**Profile G6**

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LAST REVISION 7/22/16	REVISION	DESCRIPTION:
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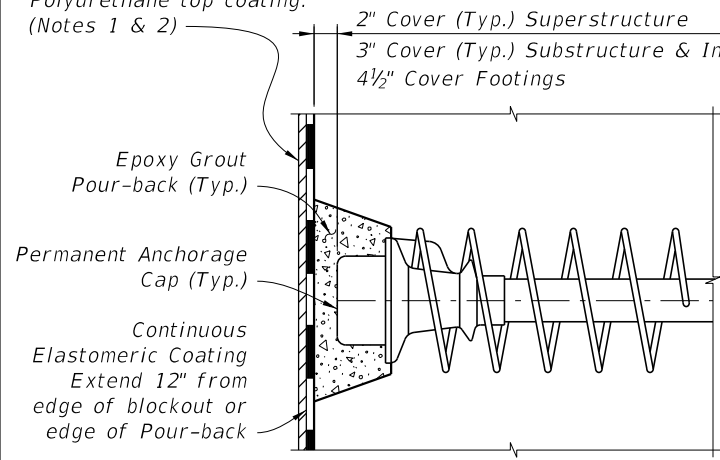
FY 2022-23  
STANDARD PLANS

POST-TENSIONING TENDON PROFILES

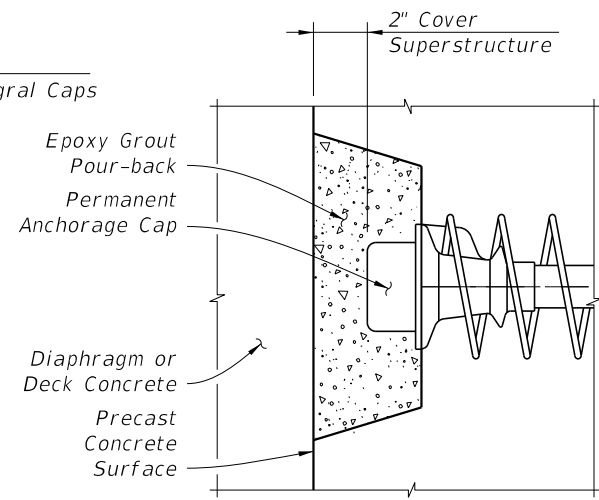
INDEX  
462-001

SHEET  
2 of 2

100% Acrylic Aliphatic Polyurethane top coating. (Notes 1 & 2)

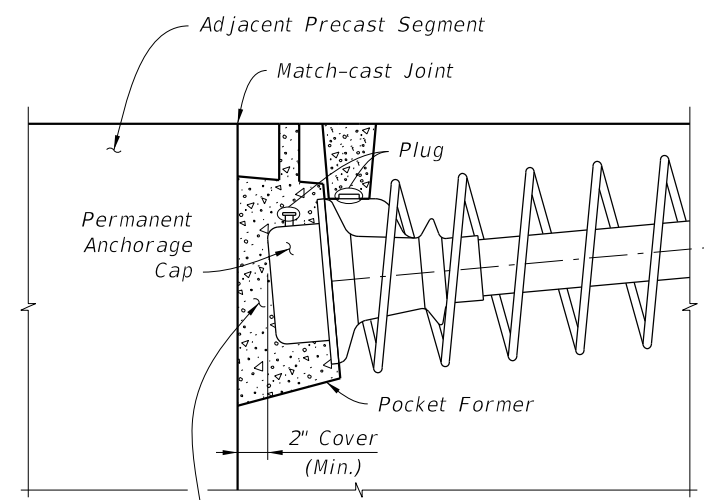


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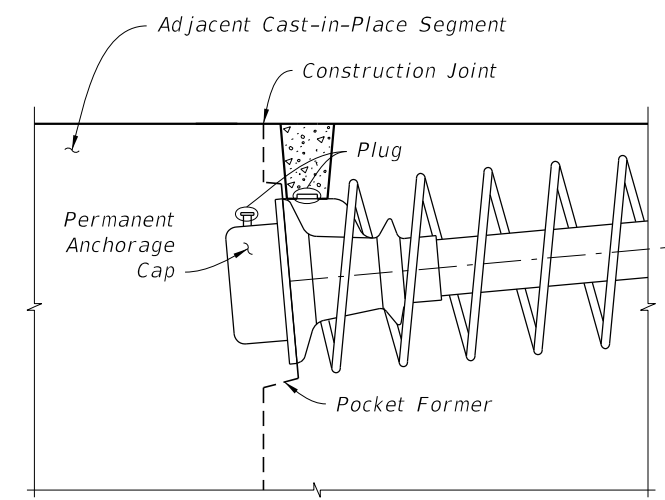


**TYPE 2**

Epoxy Grout Pour-back placed after permanent tendons anchored in adjacent segment have been stressed



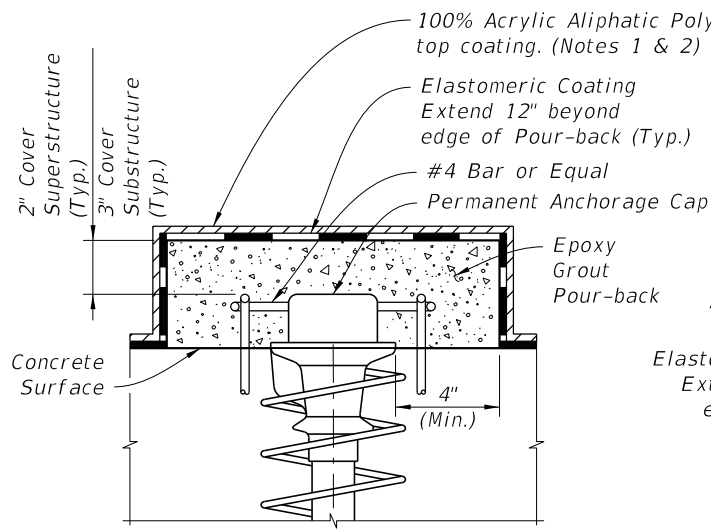
**TYPE 3A**



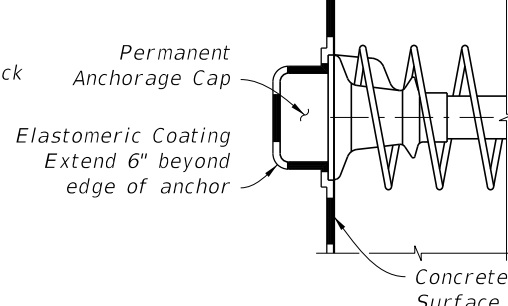
**TYPE 3B**

Notes:

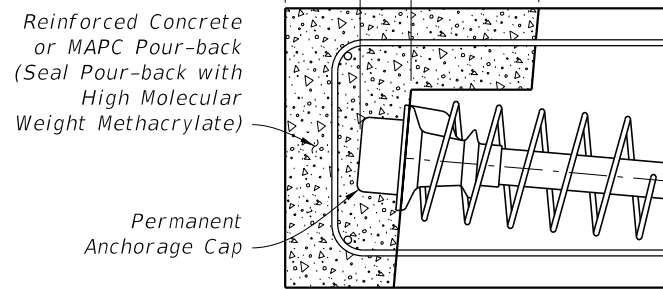
1. Meet the requirements of Specification Section 975-5.
2. Extend top coat 1" beyond limits of Elastomeric Coating.



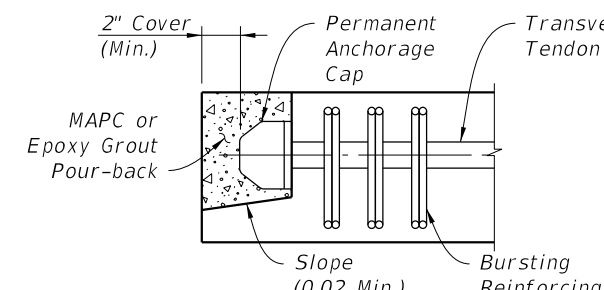
**TYPE 4**



**TYPE 5**



**TYPE 6**

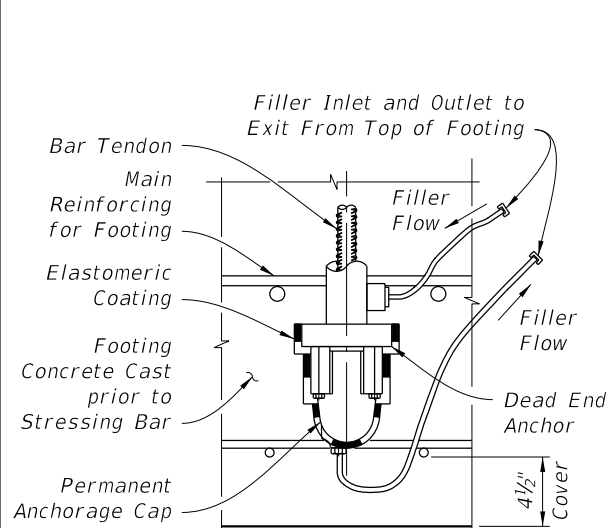


**TYPE 7**

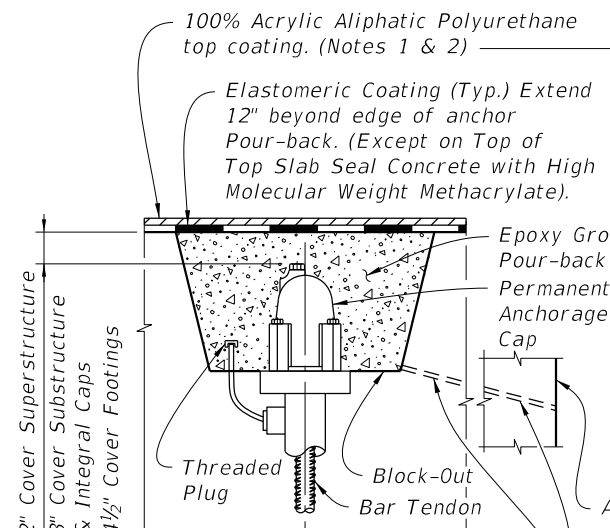
Type 7 Notes:

1. Traffic or Pedestrian/Bicycle Railing not shown for clarity.
2. Where Pour-back is not protected by Traffic or Pedestrian/Bicycle Railing, Coat Pour-back with High Molecular Weight Methacrylate.

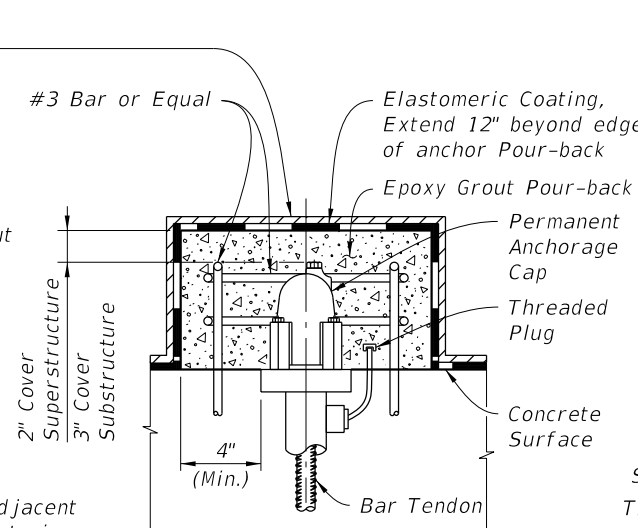
**ANCHORAGE PROTECTION FOR STRAND TENDONS**



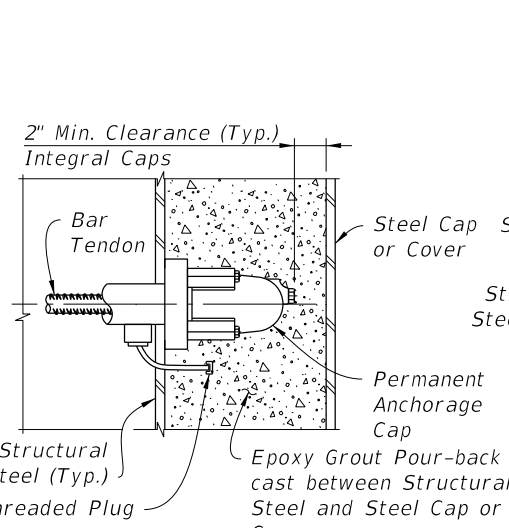
**TYPE 8**



**TYPE 9**

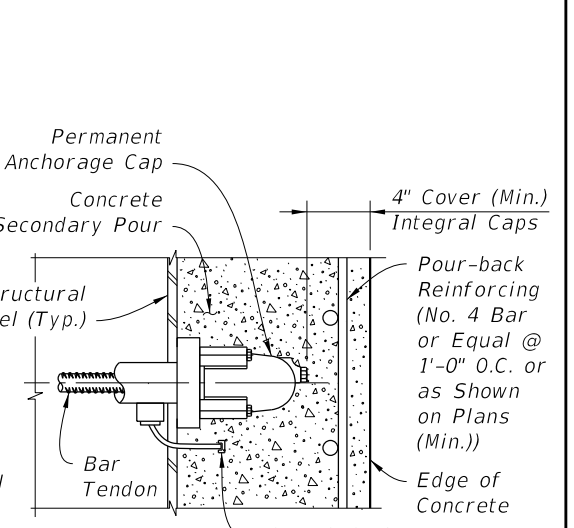


**TYPE 10**



**TYPE 11**

(Shear Studs not Shown for Clarity)




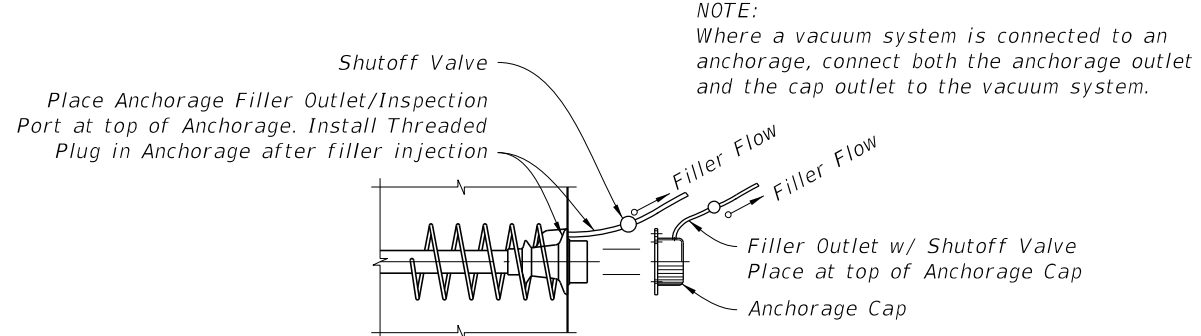
**TYPE 12**

(Shear Studs not Shown for Clarity)

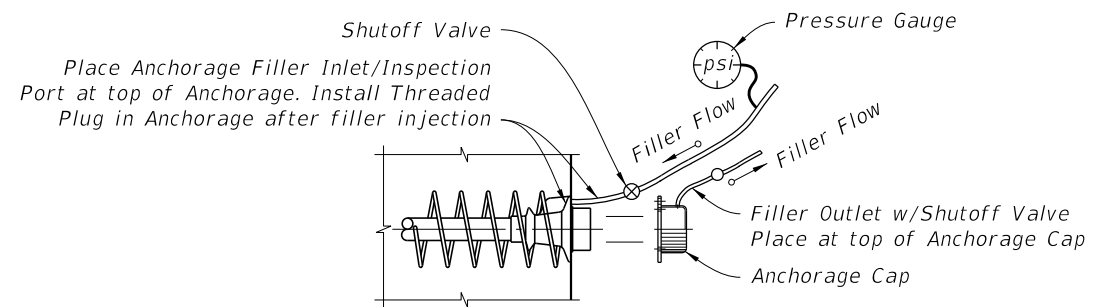
**ANCHORAGE PROTECTION FOR BAR TENDONS**

9/23/2021 9:56:14 AM

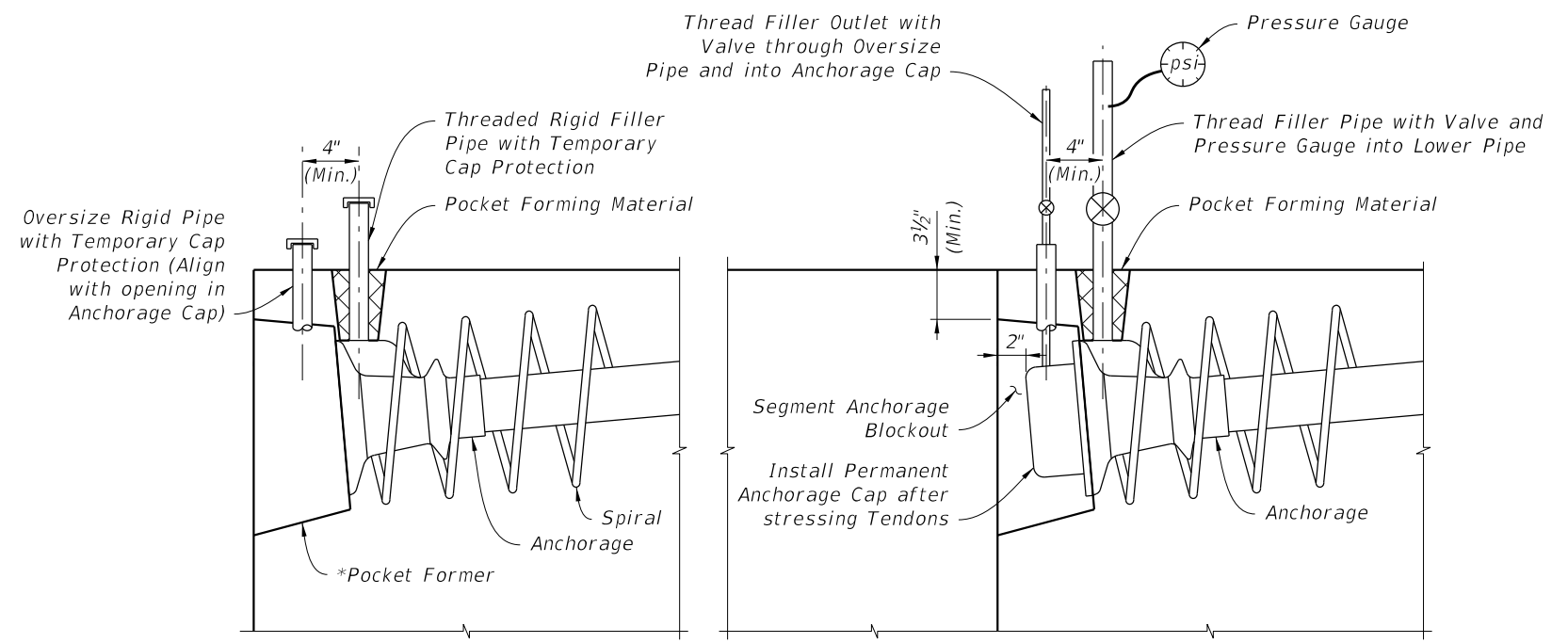
LAST REVISION 11/01/18	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>POST-TENSIONING ANCHORAGE PROTECTION</b>	INDEX 462-002	SHEET 1 of 1
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**FACE INSPECTED ANCHORAGE WITH FILLER OUTLET**

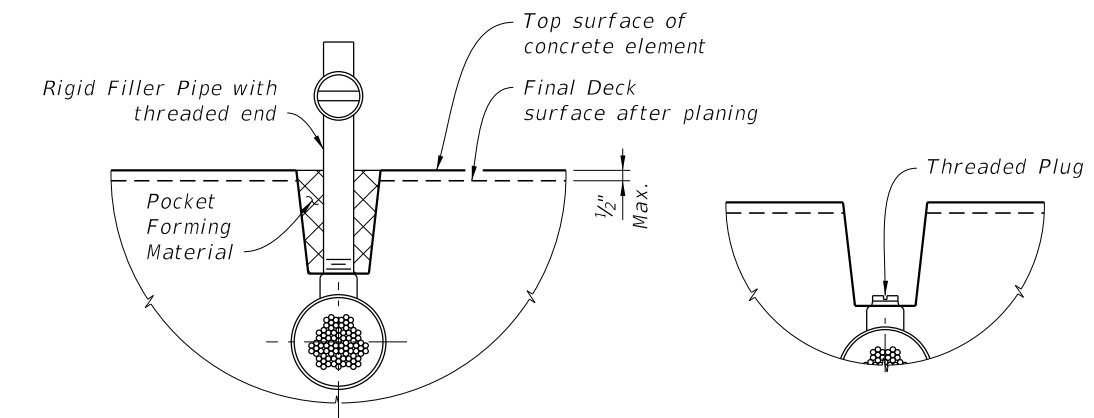


**FACE INSPECTED ANCHORAGE WITH FILLER INLET**



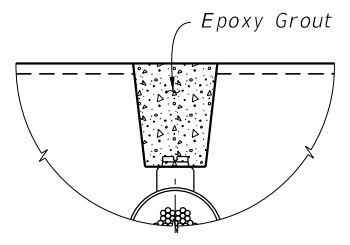
**1 INSTALLATION & SHIPPING**

**2 FILLER INJECTION**



**1 FILLER OUTLET CONNECTION TO DUCT**

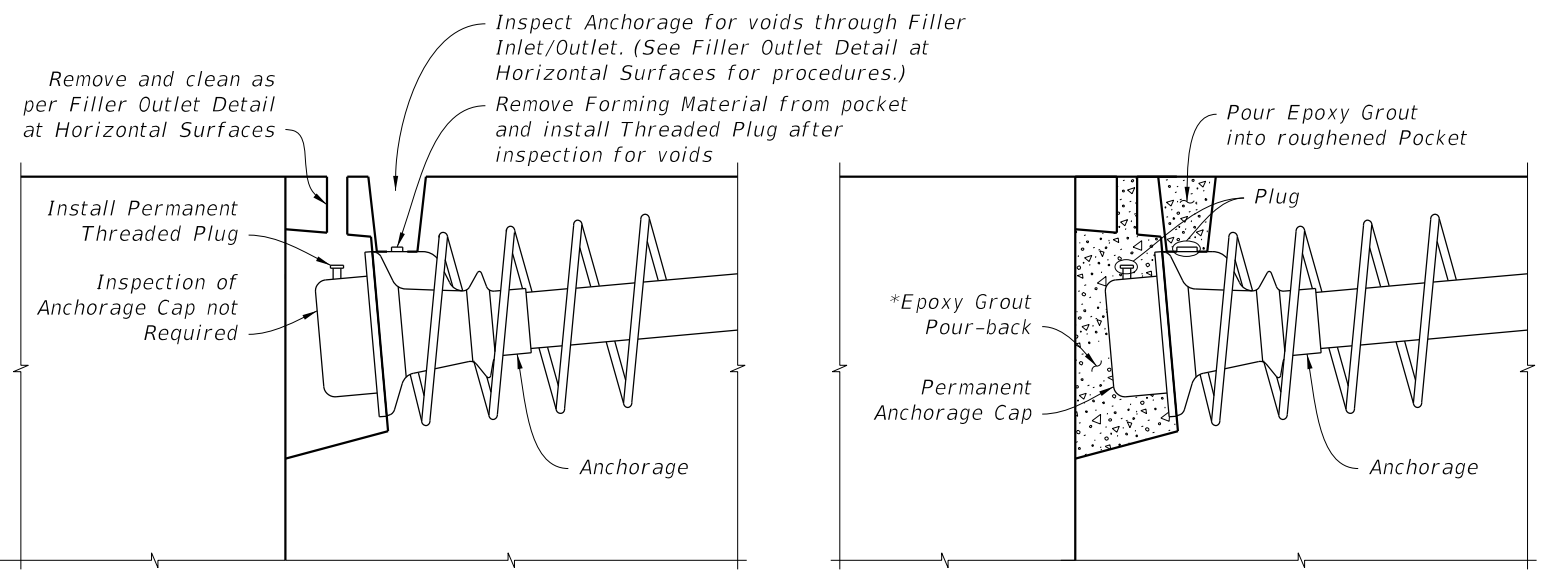
**2 POCKET PREPARATION**



**3 FILLING POCKET**

**PROCEDURE:**

1. After filler injection is completed, Remove Pocket Forming Material and Rigid Filler Pipe.
2. Inspect Tendon for voids as necessary.
3. Vacuum inject as required. If grout is used, allow grout to cure. If flexible filler is used, replace filler displaced by inspection. Remove pipe used for vacuum injecting.
4. Clean threads and rethread as required.
5. Install Threaded Plug into Outlet to form a tight fit.
6. Clean and roughen sides of pocket.
7. Fill Pocket with Epoxy Grout.



**3 INSPECTION**

**4 PROTECTION**

**TOP INSPECTED ANCHORAGE WITH FILLER INLET INSTALLATION, FILLER INJECTION, INSPECTION & PROTECTION**

**NOTES:**

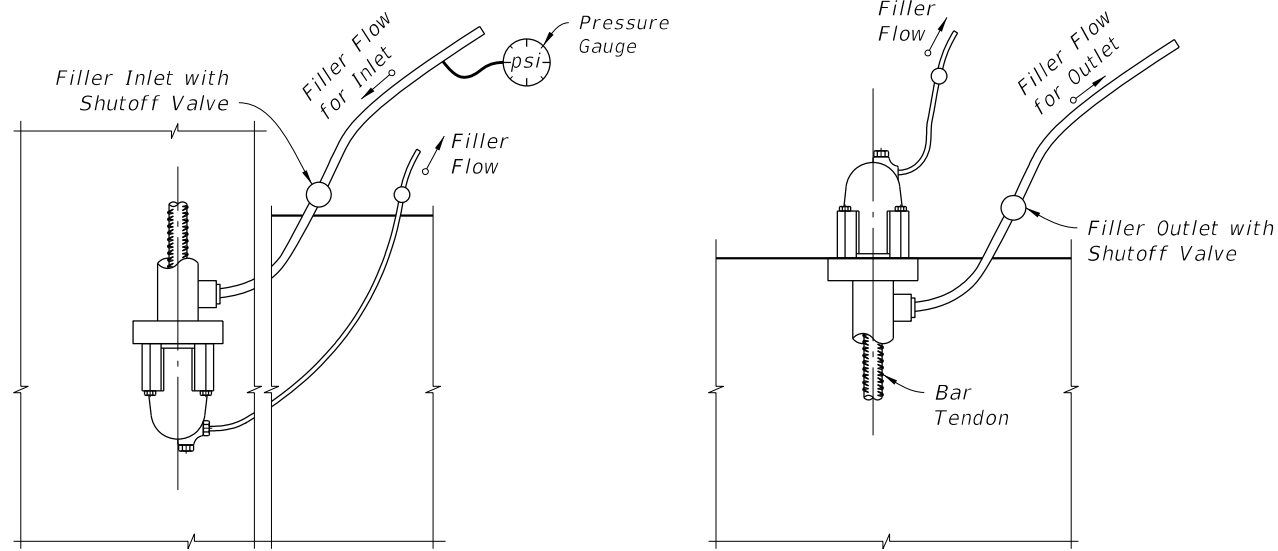
1. Holes used for the Inspection and Filler Inlets/Outlets may be formed using tapered pipes or mandrels.
  2. Where a vacuum system is connected to an anchorage, connect both the anchorage outlet and the cap outlet to the vacuum system.
- \* Round Pocket Former - Gravity fed placement of epoxy grout acceptable  
 Modified Square Pocket Former - Gravity fed placement of epoxy grout acceptable  
 Square Pocket Former - Vacuum epoxy grouting required

== FILLER OUTLET DETAIL AT HORIZONTAL SURFACES ==

9/23/2021 9:56:15 AM

LAST REVISION 11/01/18	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	POST-TENSIONING ANCHORAGE AND TENDON FILLING DETAILS	INDEX 462-003	SHEET 1 of 2
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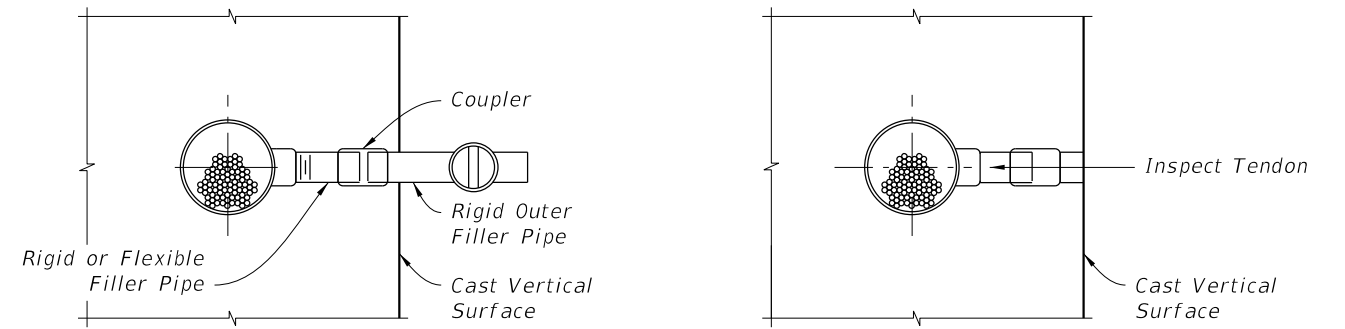


NOTES:  
 1. Anchor or Nut to allow for flow of Filler into Cap.  
 2. Where a vacuum system is connected to an anchorage, connect both the anchorage outlet and the cap outlet to the vacuum system.

**INLET END**  
 (EMBEDDED ANCHORAGE SHOWN; ANCHORAGE AT CONCRETE SURFACE SIMILAR)

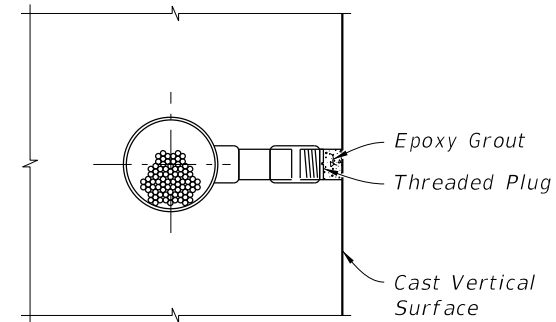
**OUTLET END**

**FILLER INLET AND OUTLET DETAILS FOR BAR TENDONS**  
 (VERTICALLY ORIENTED TENDON SHOWN; HORIZONTALLY ORIENTED TENDON SIMILAR)



**1 FILLER OUTLET CONNECTION TO TENDON**

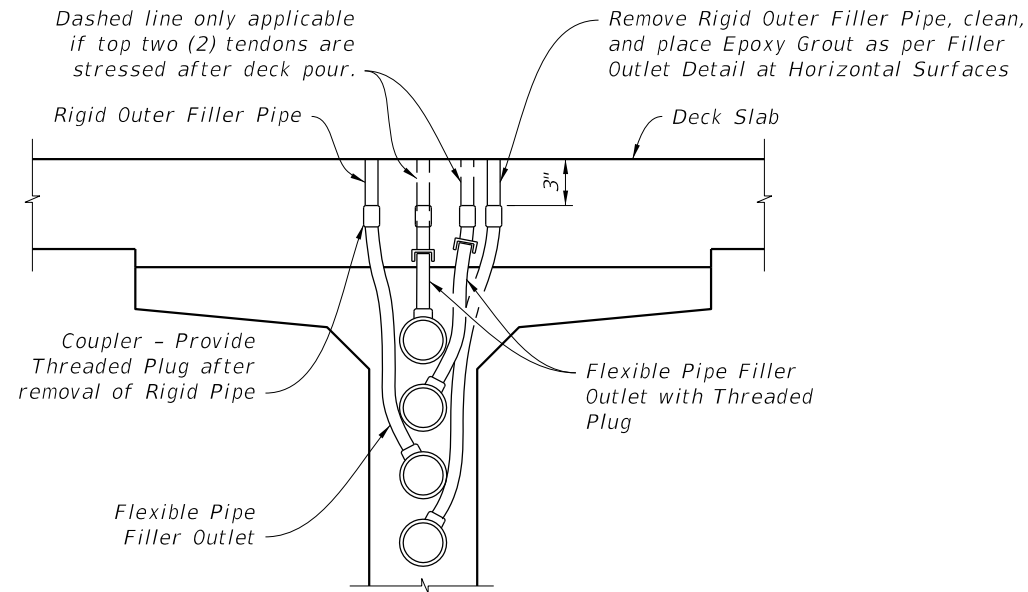
**2 POCKET PREPARATION**



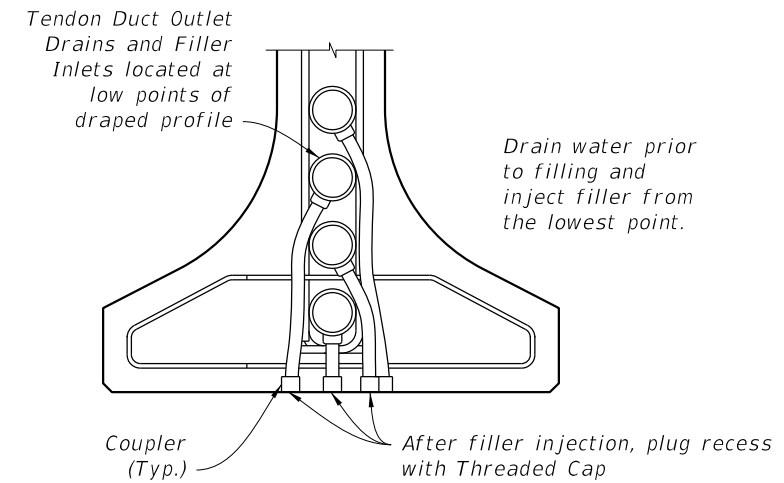
**3 FILLING POCKET**

PROCEDURE:  
 1. Remove Rigid Filler Pipe or drill Grout in flexible pipe.  
 2. Inspect tendon for voids.  
 3. Vacuum inject as required. If grout is used, allow grout to cure. If flexible filler is used, replace filler displaced by inspection. Remove pipe used for vacuum injecting.  
 4. Install Threaded Plug into Outlet to form a tight fit.  
 5. Over-ream hole ( $\frac{1}{4}$ "  $\varnothing$  over-ream). Clean and roughen sides.  
 6. Fill pocket with epoxy grout.

**FILLER OUTLET DETAIL AT VERTICAL SURFACES**



**TENDONS AT HIGH POINTS AND 3' FROM HIGH POINTS (FILLER OUTLET)**



**TENDONS AT LOW POINTS (FILLER INLET / DRAIN)**

**FILLER INLET AND OUTLET DETAILS FOR I-GIRDERS**  
 DETAILS FOR C.I.P. BOXES WITH INTERNAL TENDONS SIMILAR. WEB REINFORCING NOT SHOWN FOR CLARITY.

9/23/2021 9:56:16 AM

LAST REVISION 11/01/16	DESCRIPTION:		FY 2022-23 STANDARD PLANS	POST-TENSIONING ANCHORAGE AND TENDON FILLING DETAILS	INDEX	SHEET
					462-003	2 of 2

GENERAL NOTES:

U.S. COAST GUARD NOTIFICATION: Notify the local office of the U.S. Coast Guard at least 30 days prior to beginning of construction of the Fender System.

14" SQUARE PRESTRESSED CONCRETE PILES - Provide 14" Square Prestressed Concrete Piles of sufficient length to achieve a minimum embedment of 20' into soil having a blow count greater than or equal to 6 ( $N \geq 6$ ). Pile splices and build-ups are not permitted. Use only 14" Square Prestressed Concrete Piles with 8 - 1/2" diameter Low Relaxation Strands fabricated in accordance with Index 455-014.

PLASTIC LUMBER AND STRUCTURAL COMPOSITE LUMBER WALES: Provide only Plastic Lumber (Thermoplastic Structural Shapes) and Structural Composite Lumber (Reinforced Thermoplastic Structural Shapes) Wales in accordance with Specification Section 973. Wales shall be continuous and spliced only at locations shown on the plans.

PLASTIC LUMBER DECKING FOR CATWALKS: Provide Plastic Lumber decking for catwalks when called for in the Plans in accordance with Specification Section 973.

Install Plastic Lumber Decking according to manufacturer's recommendations using stainless steel #10 x 3" (minimum) deck screws.

FIBERGLASS OPEN GRATING FOR CATWALKS: Provide Fiberglass Open Grating for catwalks when called for in the Plans. Fiberglass Open Grating shall be a heavy duty design suitable for exterior installations. Maximum gap opening on the walkway surface shall be 1 1/2". Design live loads and deflections shall be a 50 psf uniformly distributed load with a maximum deflection of 3/8" or L/120 at the center of a simple span and a concentrated load of 250 pounds with a maximum deflection of 1/4" at the center of a simple span. Color of Fiberglass Open Grating shall be gray or black.

Install Fiberglass Open Grating according to manufacturer's recommendations using stainless steel hardware, screws, bolts, nuts and washers. Attach Fiberglass Open Grating to Wales and Deck Supports at a 2'-0" maximum spacing so as to resist pedestrian live loads and uplift forces from wind, buoyancy and wave action.

CLEARANCE GAUGE AND LIGHT: Clearance Gauge to be furnished and installed by the Contractor. Clearance Gauge width and numeral height is dependent on visibility distance. The required visibility distance shall be determined by the United States Coast Guard District Commander. Provide and install Clearance Gauge Light in accordance with Specification Section 510 and Index 510-001.

NAVIGATION LIGHTS: Provide and install Navigation Lights in accordance with Specification Section 510, Index 510-001 and/or project specific details. Provide and maintain Temporary Navigation Lights during construction until permanent Navigation Lights are operational.

BOLTS, THREADED BARS, NUTS, SCREWS AND WASHERS: Furnish stainless steel Bolts in accordance with ASTM F593 Type 316. Furnish stainless steel Threaded Bars in accordance with ASTM A193 Grade B8M. Furnish stainless steel Nuts in accordance with ASTM F594 Type 316. Furnish stainless steel Screws in accordance with ASTM F593 Type 305. Furnish stainless steel Washers compatible with Bolts, Threaded Rods and Nuts under heads and nuts. Torque Nuts on 1" diameter Bolts and Threaded Bars to 150 lb-ft. Keep threads on Bolts, Threaded Bars and Nuts free from dirt, coarse grime and sand to prevent galling and seizing during tightening.

SPLICE PLATES: Furnish Splice Plates in accordance with ASTM A240 Type 316.


WIRE ROPE: Provide wire rope meeting one of the following requirements:

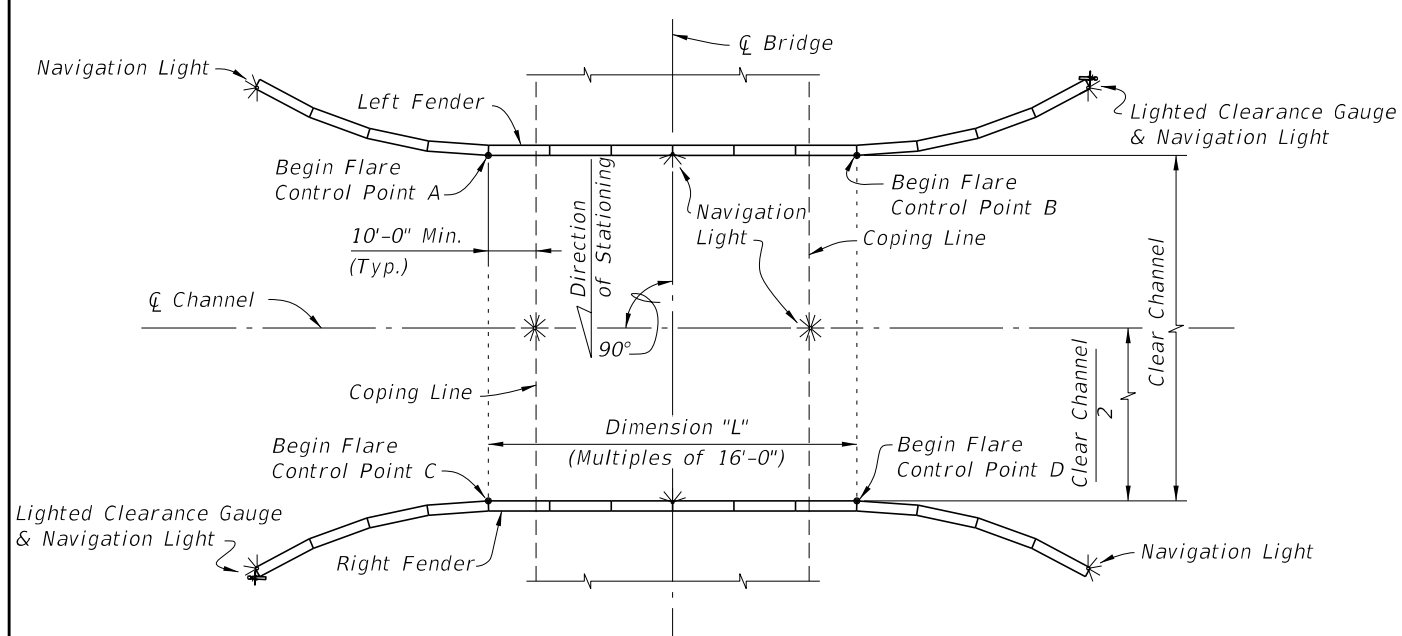
1. 1/2" diameter 6x19, 6x25 or 6x37 class IWRC Type 316 stainless steel wire rope with a minimum breaking strength of 18,000 lbs.
2. 1/2" diameter 6x19 galvanized wire rope with ultraviolet ray resistant polypropylene impregnation having an outside diameter of 5/8" with a minimum breaking strength of 22,000 lbs. Protect all ends with heat shrinkable end caps compatible with the rope's polypropylene that provide an effective water-tight seal.

FENDER SYSTEM ENERGY CAPACITY:  
Energy Capacity = 38 ft-k

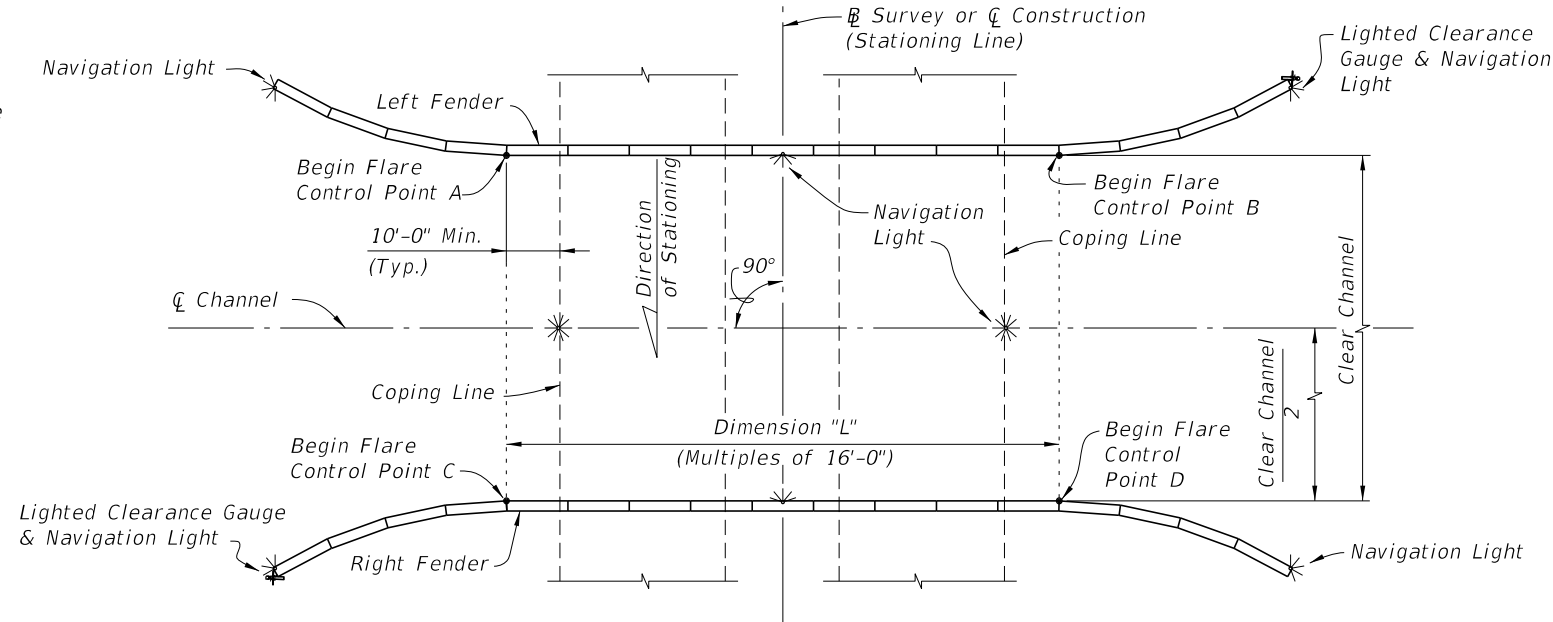
GENERAL NOTES

9/23/2021 9:56:17 AM

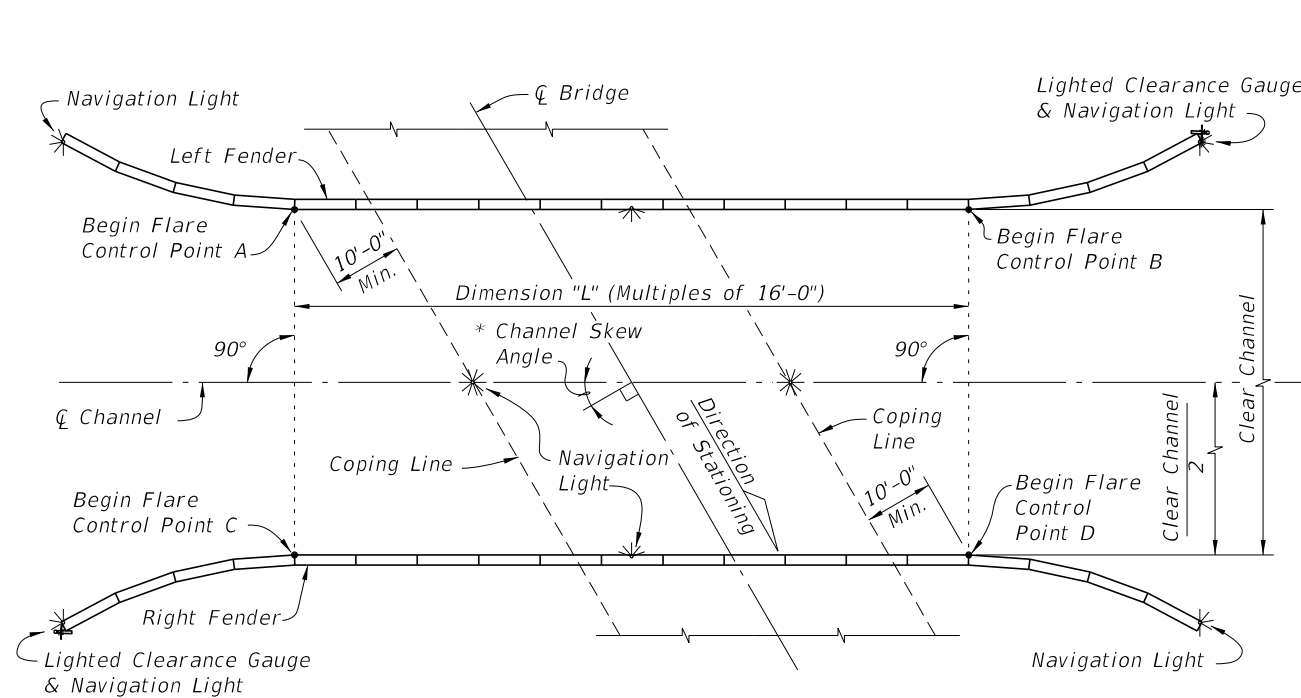
LAST REVISION 07/01/14	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FENDER SYSTEM - PRESTRESSED CONCRETE PILES & FRP WALES	INDEX 471-030	SHEET 1 of 7
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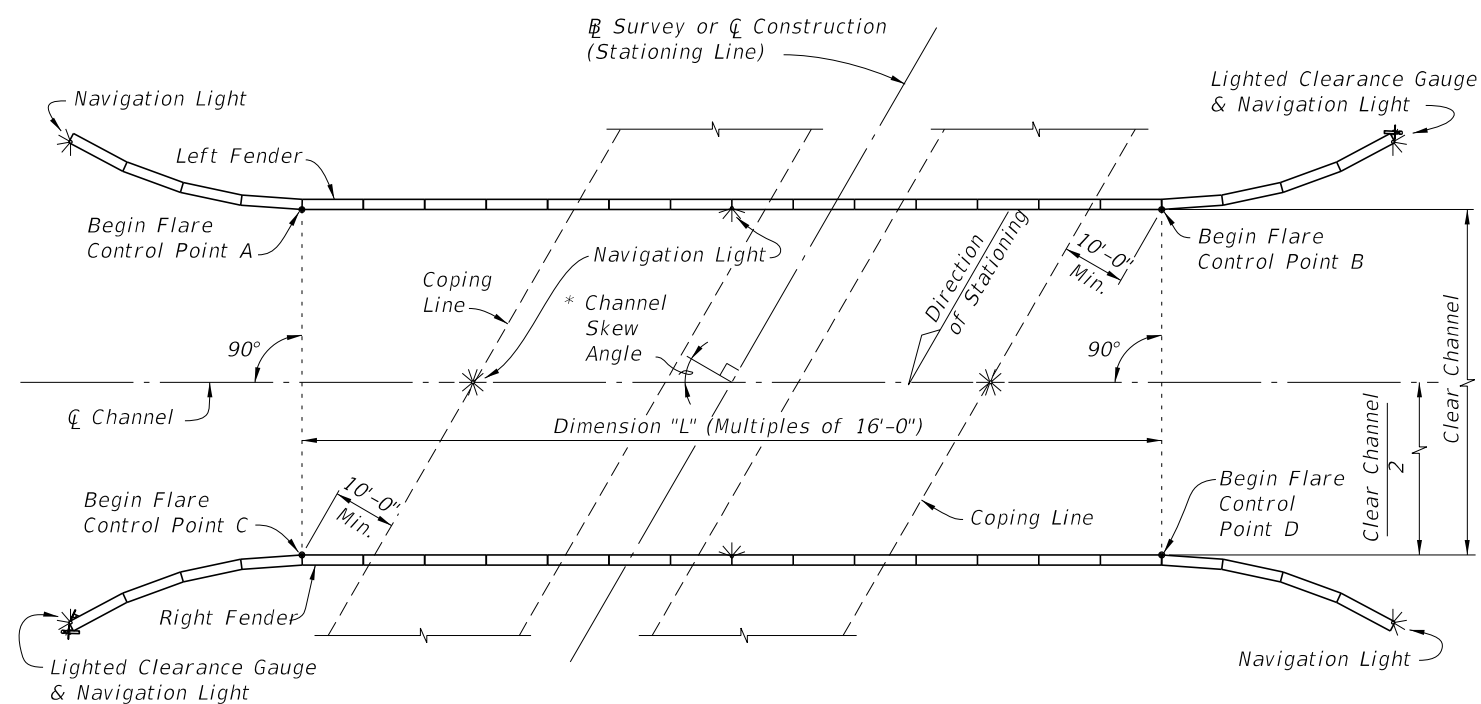
**SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF SINGLE FIXED BRIDGE WITH NONSKEWED CHANNEL**



**SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF DUAL FIXED BRIDGES WITH NONSKEWED CHANNEL (PARALLEL DUAL FIXED BRIDGES SHOWN, NONPARALLEL DUAL FIXED BRIDGES SIMILAR)**



**SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF SINGLE FIXED BRIDGE WITH SKEWED CHANNEL**




**SCHEMATIC OF FENDER SYSTEM SHOWING TREATMENT OF DUAL FIXED BRIDGES WITH SKEWED CHANNEL (PARALLEL DUAL FIXED BRIDGES SHOWN, NONPARALLEL DUAL FIXED BRIDGES SIMILAR)**

\* See Structures Plans, Plan and Elevation and Foundation Layout Sheets for magnitude and orientation of Channel Skew Angle.

**CROSS REFERENCES:**  
 For Stations and Offsets of referenced Control Points A, B, C and D,  
 Dimension "L" and Clear Channel Width see Fender System Table  
 of Variables in Structures Plans.  
 For Navigation Light Details see Design Standards Index 510-001.

LAYOUT GEOMETRY

9/23/2021 9:56:18 AM

LAST REVISION 07/01/11	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	<b>FENDER SYSTEM -          PRESTRESSED CONCRETE PILES &amp; FRP WALES</b>	INDEX 471-030	SHEET 2 of 7
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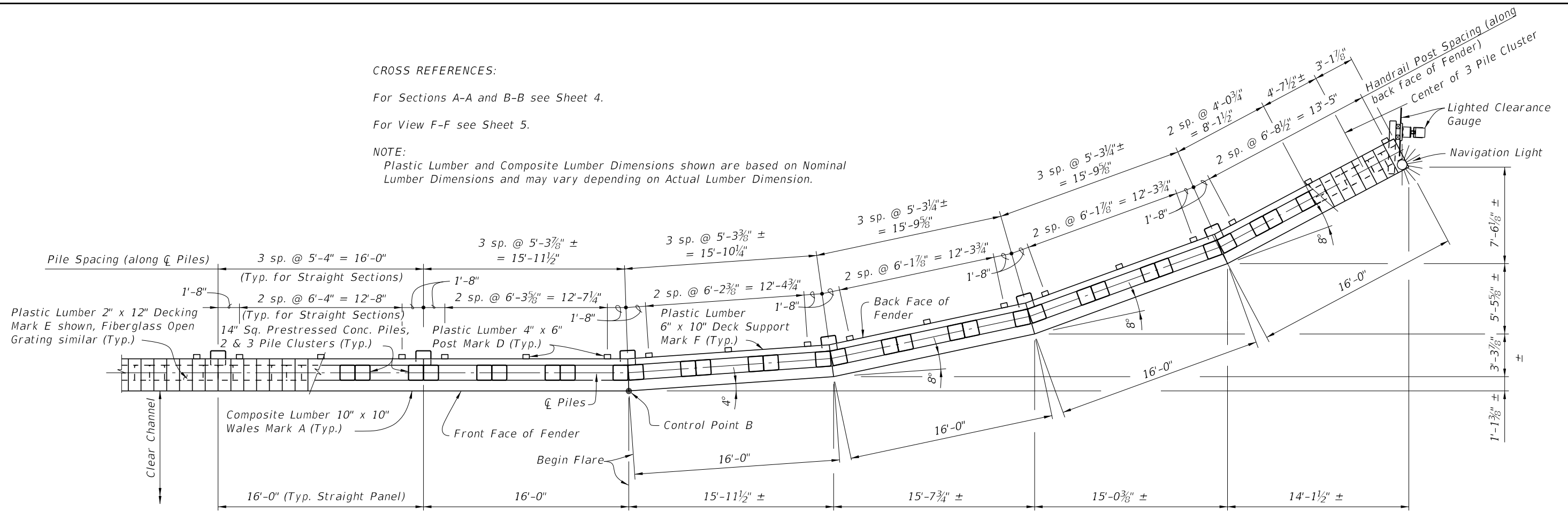
CROSS REFERENCES:

For Sections A-A and B-B see Sheet 4.

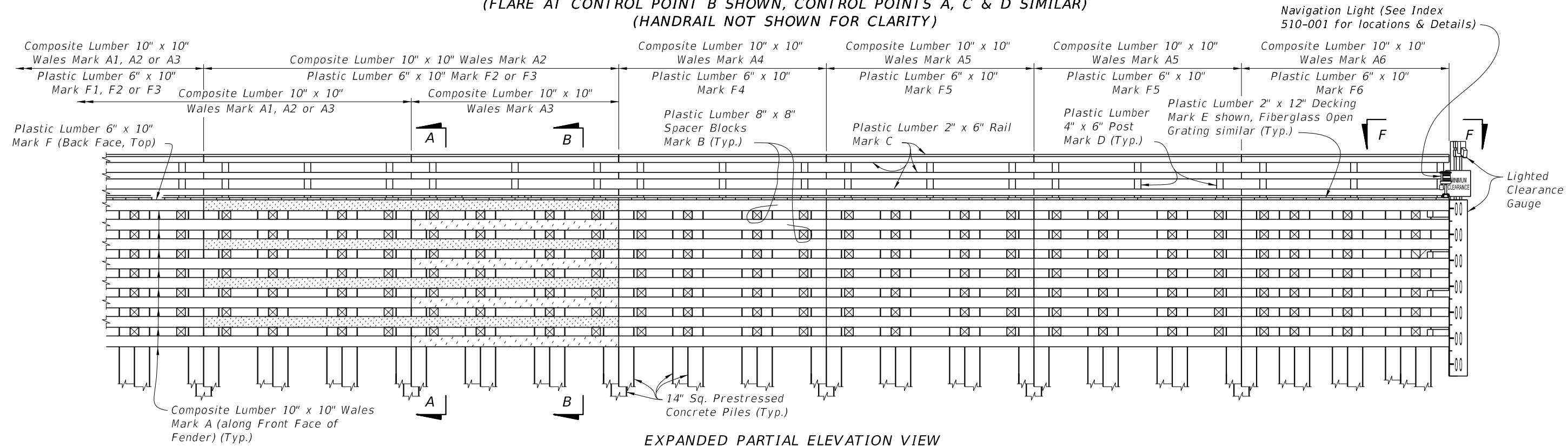
For View F-F see Sheet 5.

NOTE:

Plastic Lumber and Composite Lumber Dimensions shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.



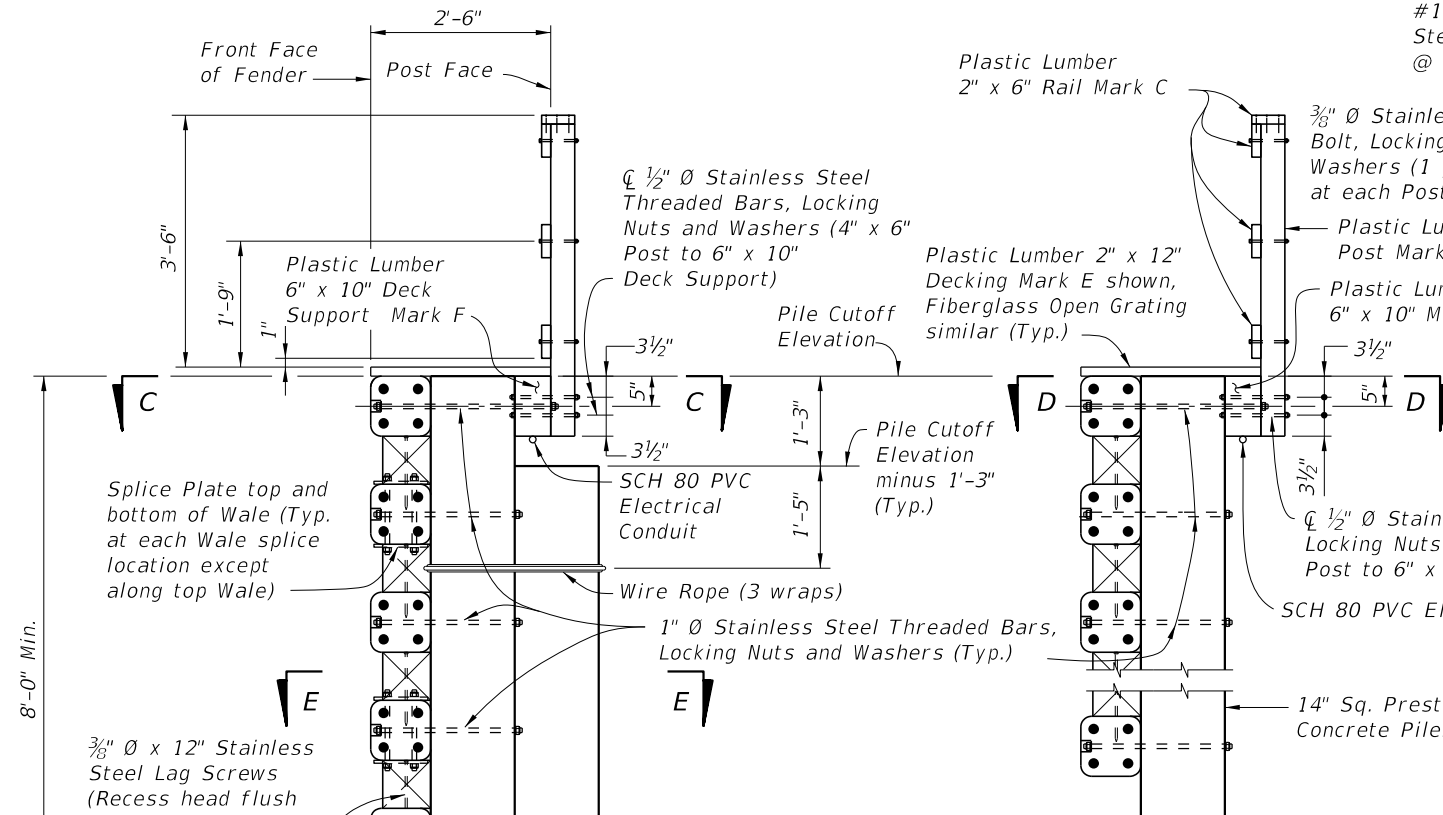
**PARTIAL PLAN VIEW (TYPICAL FLARE)**  
 (FLARE AT CONTROL POINT B SHOWN, CONTROL POINTS A, C & D SIMILAR)  
 (HANDRAIL NOT SHOWN FOR CLARITY)



**EXPANDED PARTIAL ELEVATION VIEW**

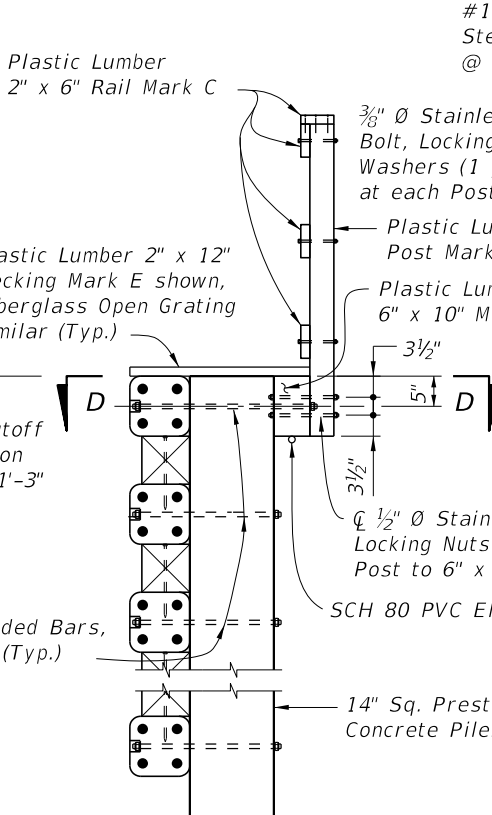
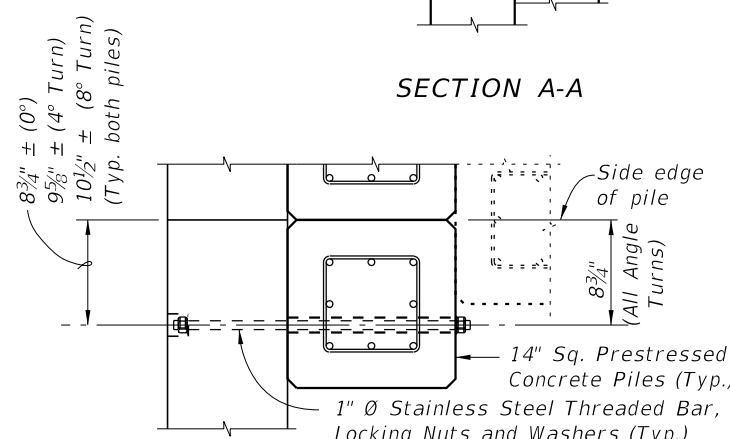
9/23/2021 9:56:19 AM

LAST REVISION 01/11/17	REVISION	DESCRIPTION:	 FY 2022-23 STANDARD PLANS	FENDER SYSTEM - PRESTRESSED CONCRETE PILES & FRP WALES	INDEX 471-030	SHEET 3 of 7
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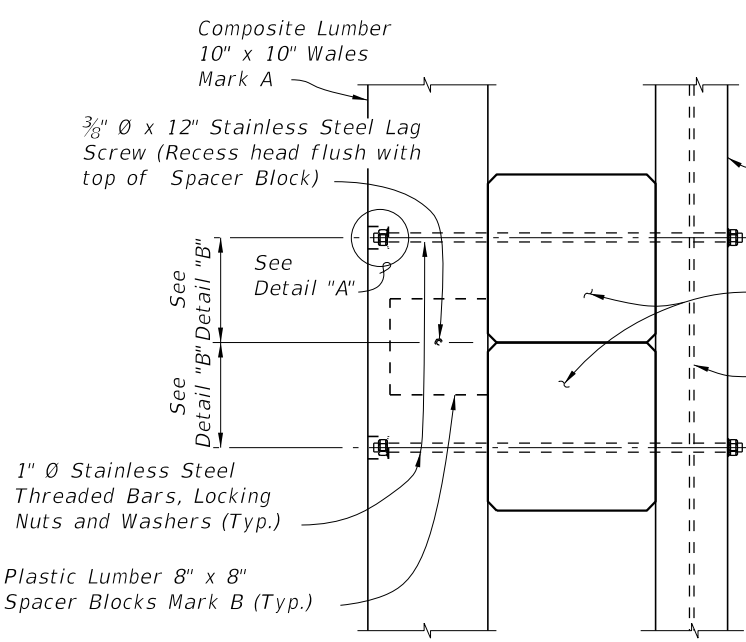
SECTION A-A

DETAIL "B" (SHOWING THREADED BAR LOCATION/RELATIONSHIP TO PILE PRESTRESSING STRANDS)



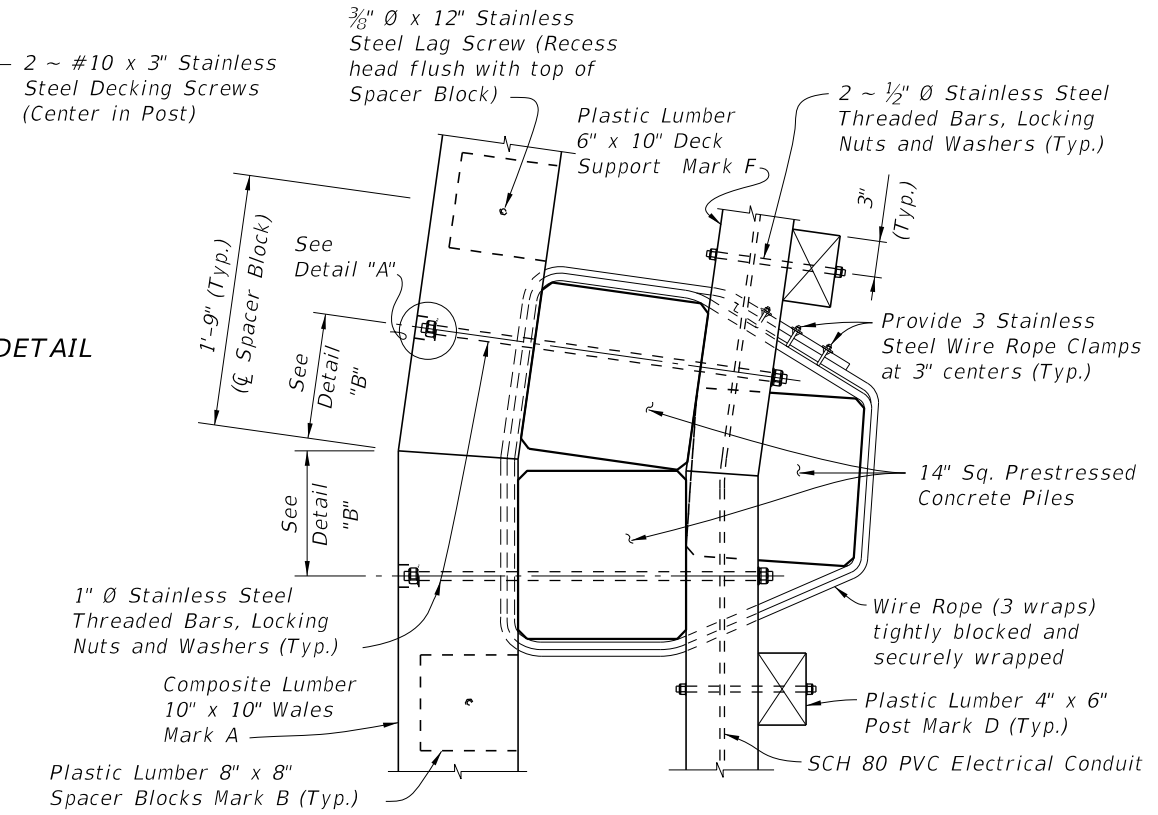
SECTION B-B

SECTION D-D TYPICAL AT INTERMEDIATE PILES

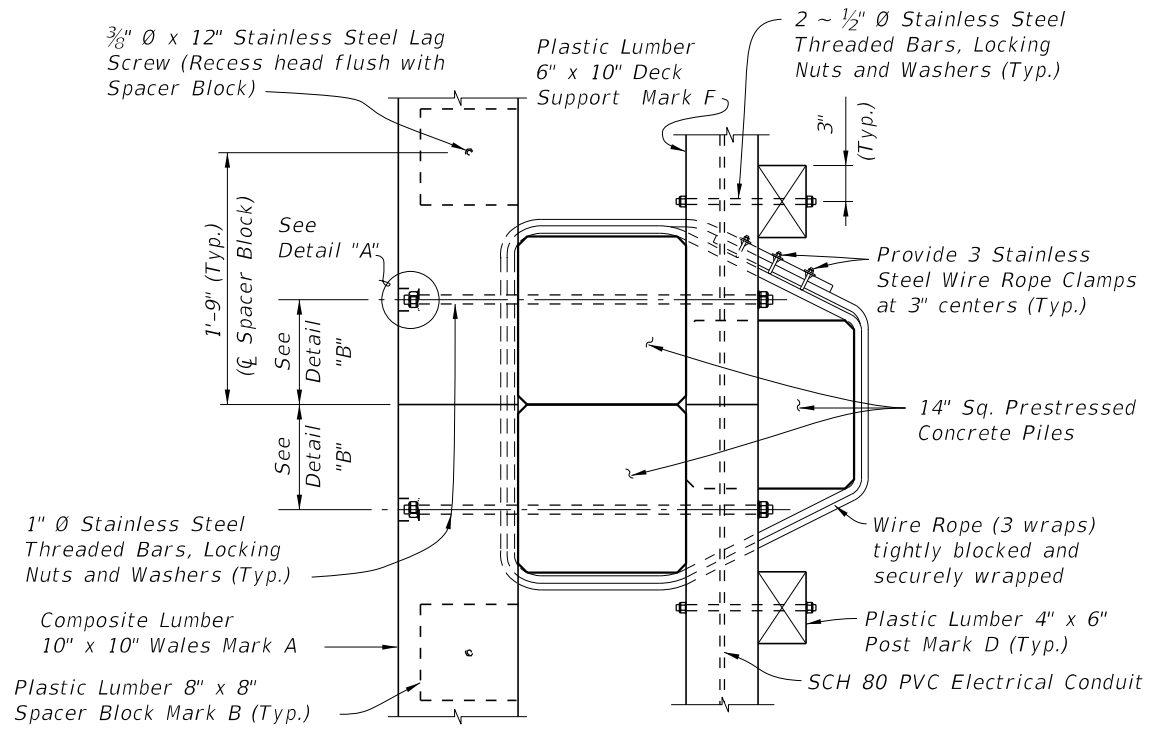


HANDRAIL DETAIL

CROSS REFERENCES:  
For location of Sections A-A and B-B see Sheet 3.  
For Section E-E and Detail "A" see Sheet 5.



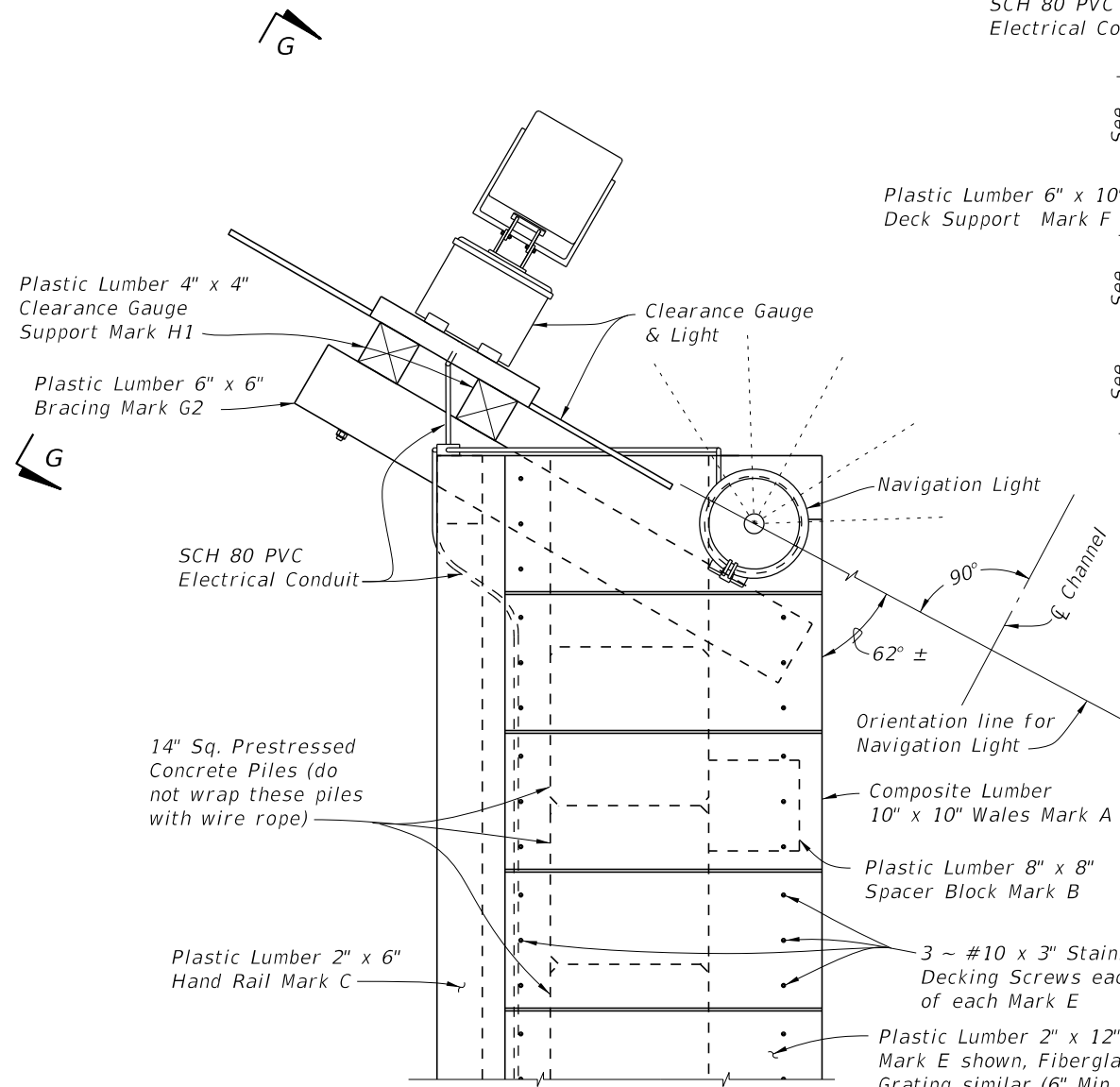
SECTION C-C TYPICAL FLARED SECTION (8° TURN SHOWN, 4° TURN SIMILAR)



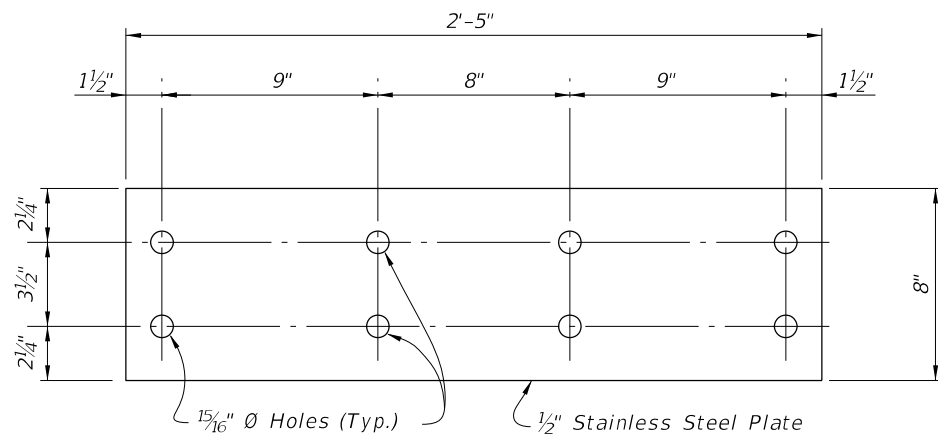
SECTION C-C TYPICAL STRAIGHT SECTION

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LAST REVISION	01/01/12	DESCRIPTION:		FY 2022-23 STANDARD PLANS	FENDER SYSTEM - PRESTRESSED CONCRETE PILES & FRP WALES	INDEX	SHEET
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**VIEW F-F  
(SHOWING FENDER END WITH CLEARANCE GAUGE)**



**SPLICE PLATE DETAIL**

**CROSS REFERENCES:**

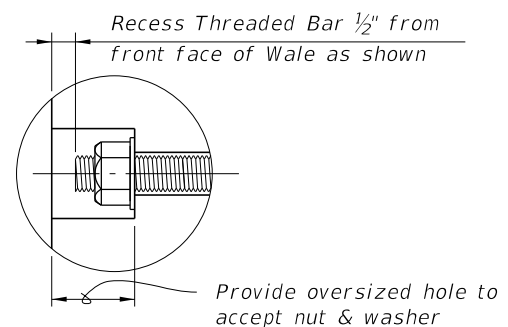
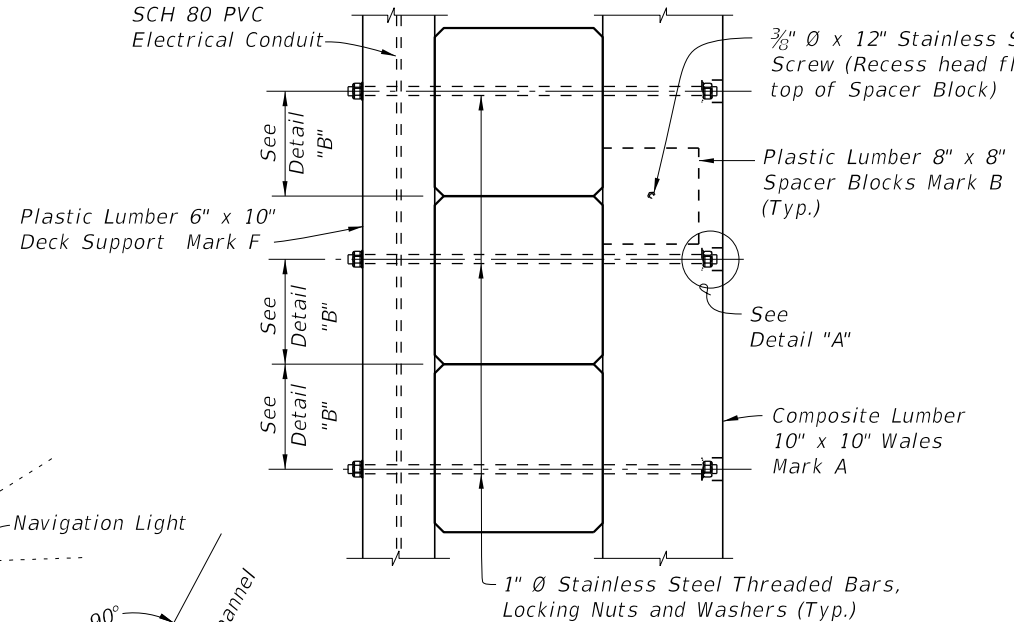
For Navigation Lights and SCH 80 PVC Electrical Conduit Details see Index 510-001.

For View G-G and Clearance Gauge Details see Sheet 4.

For Detail "B" and location of Section E-E see Sheet 2.

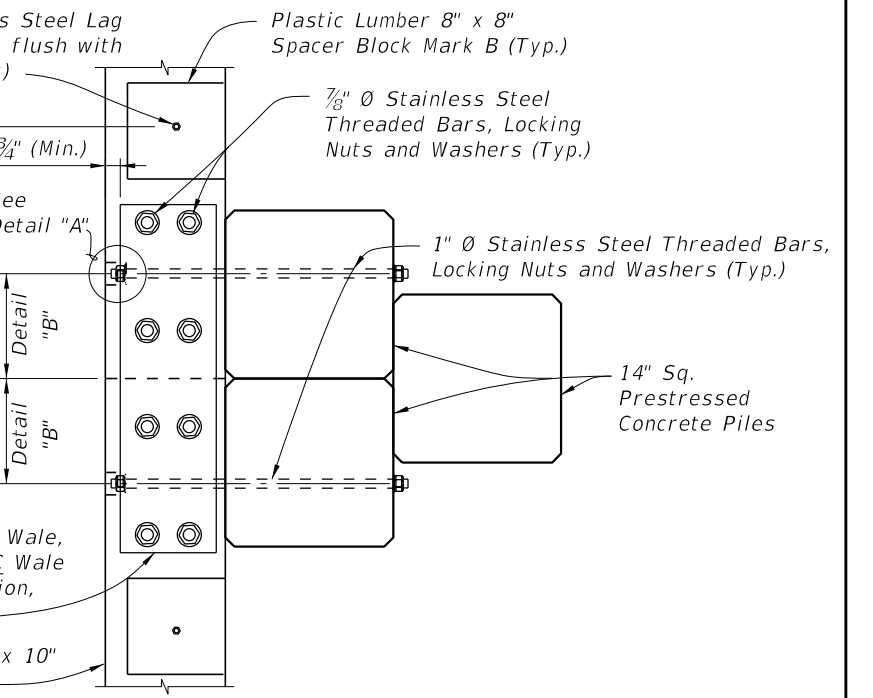
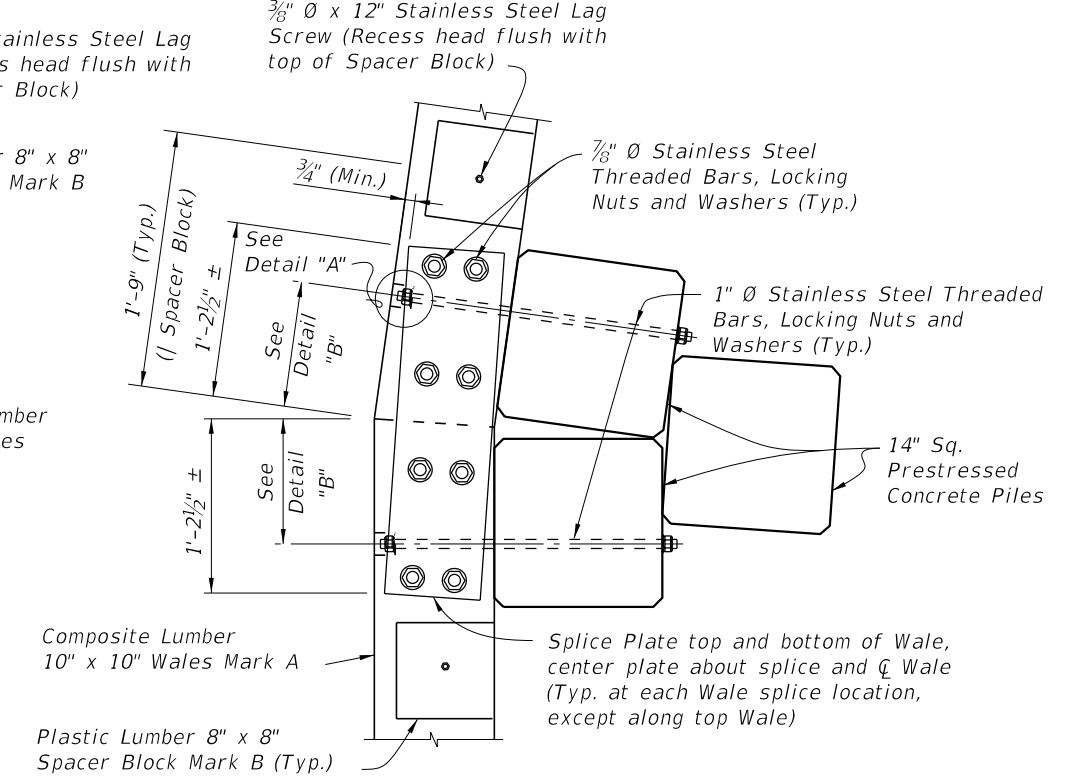
For location of View F-F see Sheet 1.

**PARTIAL VIEW F-F  
(SHOWING FENDER END; DECKING  
AND HANDRAIL NOT SHOWN  
FOR CLARITY)**



**DETAIL "A"**

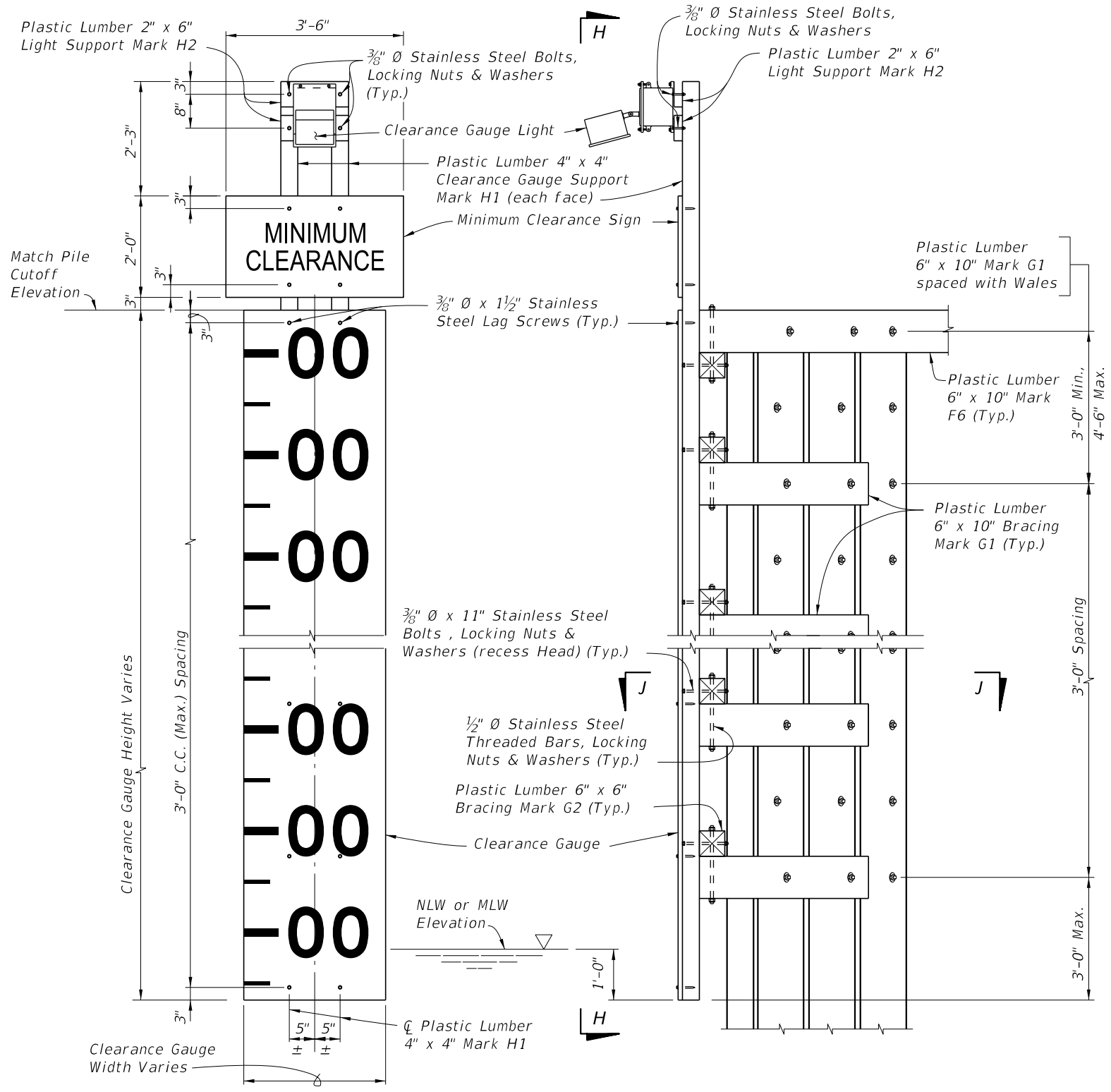
**SECTION E-E  
TYPICAL FLARED SECTION  
(8° TURN SHOWN, 4° TURN SIMILAR)**



**SECTION E-E  
TYPICAL STRAIGHT SECTION**

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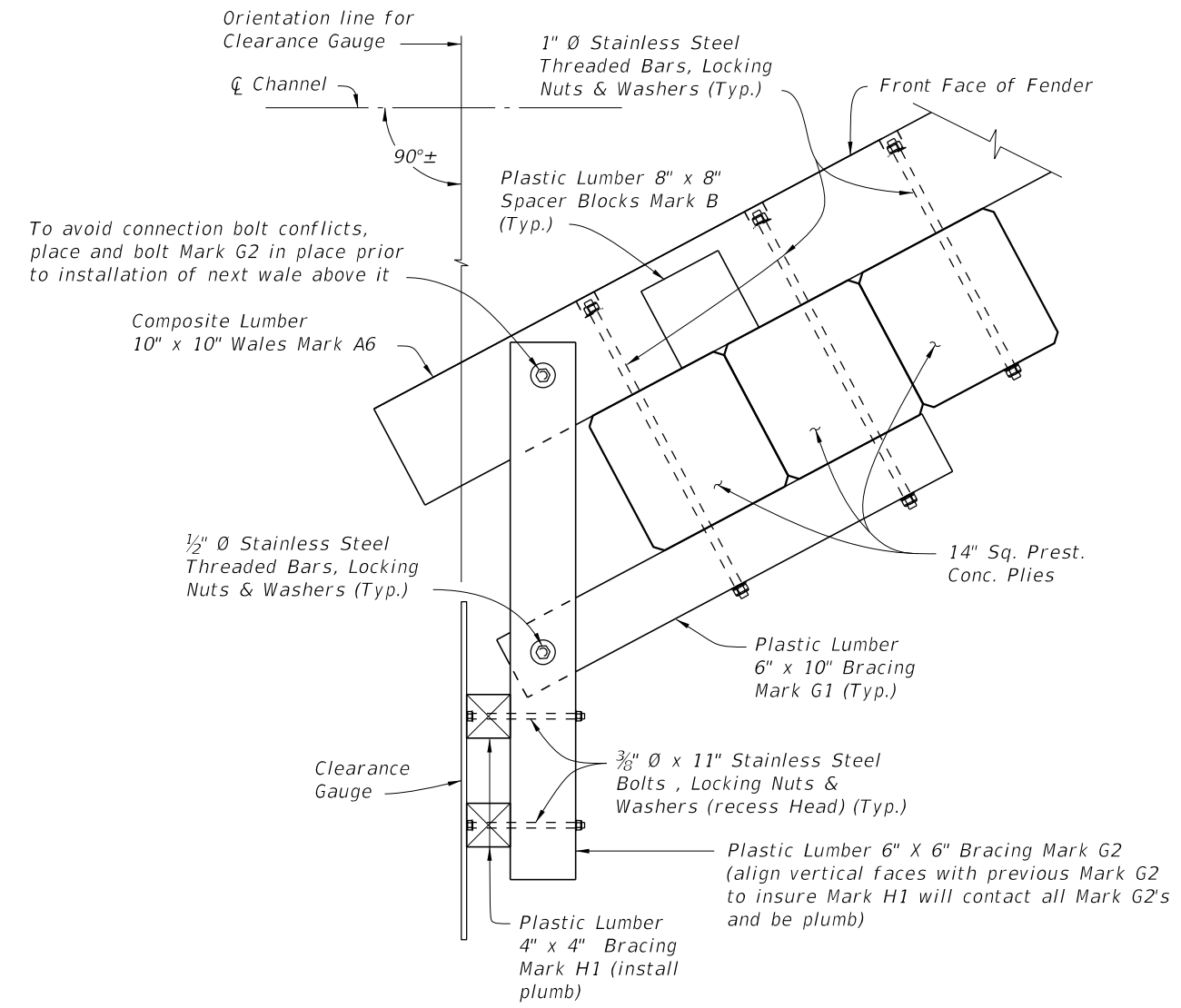
LAST REVISION 07/01/11	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>FENDER SYSTEM - PRESTRESSED CONCRETE PILES &amp; FRP WALES</b>	INDEX 471-030	SHEET 5 of 7
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**VIEW H-H**  
(WALES, PILES AND BRACING  
NOT SHOWN FOR CLARITY)

**VIEW G-G**  
(WALES, DECKING AND HANDRAIL  
NOT SHOWN FOR CLARITY)

**CLEARANCE GAUGE DETAILS**



**SECTION J-J**

**CROSS REFERENCES:**

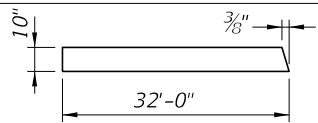
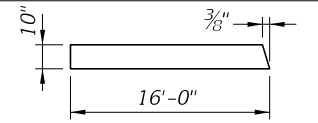
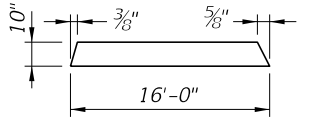
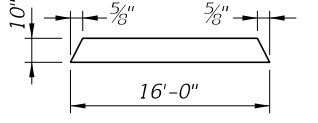
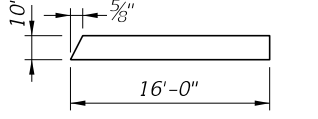
For Estimated Structural Composite and Plastic Lumber Bill of Materials Quantities and Fender System Table of Variables see Structures Plans.

For location of View G-G see Sheet 5.

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LAST REVISION 01/01/12	REVISION	DESCRIPTION:	 <b>FY 2022-23 STANDARD PLANS</b>	<b>FENDER SYSTEM - PRESTRESSED CONCRETE PILES &amp; FRP WALES</b>	INDEX 471-030	SHEET 6 of 7
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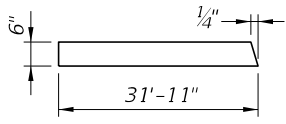
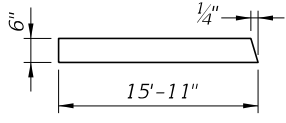
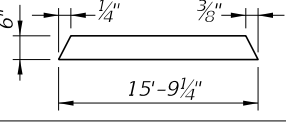
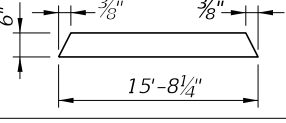
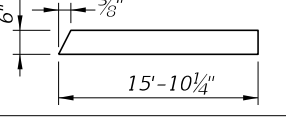
**\* STRUCTURAL COMPOSITE LUMBER BILL OF MATERIALS**

MARK	SIZE (NOMINAL)	DIMENSIONS	BOARD FT. PER EACH	NO. REQD.	QUANTITY
A1	10" X 10" COMPOSITE LUMBER	32'-0" (STRAIGHT)	266.6	See Estimated Structural Composite and Plastic Lumber Bill of Materials Table in Structures Plans	
A2	10" X 10" COMPOSITE LUMBER		266.6		
A3	10" X 10" COMPOSITE LUMBER		133.3		
A4	10" X 10" COMPOSITE LUMBER		133.3		
A5	10" X 10" COMPOSITE LUMBER		133.3		
A6	10" X 10" COMPOSITE LUMBER		133.3		

\* All Plastic Lumber and Composite Lumber Dimensions and Quantities shown are based on Nominal Lumber Dimensions and may vary depending on Actual Lumber Dimension.

\*\* Provide Fiberglass Open Grating in lieu of 2" X 12" Plastic Lumber when called for in the Plans. Mounting hardware shall be Stainless Steel, install per Manufacturer's recommendations. See Structures Plans for Notes and Details.

**\* PLASTIC LUMBER BILL OF MATERIALS**

MARK	SIZE (NOMINAL)	DIMENSIONS	BOARD FT. PER EACH	NO. REQD.	QUANTITY
B	8" X 8" PLASTIC LUMBER	8" (STRAIGHT)	3.6	See Estimated Structural Composite and Plastic Lumber Bill of Materials Table in Structures Plans	
C	2" X 6" PLASTIC LUMBER	16'-0" (STRAIGHT) (Trim & Miter Ends as required)	16.0		
D	4" X 6" PLASTIC LUMBER	4'-4" (STRAIGHT)	8.7		
** E	2" X 12" PLASTIC LUMBER	2'-6" (STRAIGHT) (Miter as required, 6" Min. width)	5.0		
F1	6" X 10" PLASTIC LUMBER	32'-0" (STRAIGHT)	160.0		
F2	6" X 10" PLASTIC LUMBER		159.6		
F3	6" X 10" PLASTIC LUMBER		79.6		
F4	6" X 10" PLASTIC LUMBER		78.8		
F5	6" X 10" PLASTIC LUMBER		78.4		
F6	6" X 10" PLASTIC LUMBER		79.3		
G1	6" X 10" PLASTIC LUMBER	3'-8" (STRAIGHT)	18.3		
G2	6" X 6" PLASTIC LUMBER	4'-1" (STRAIGHT)	12.3		
H1	4" X 4" PLASTIC LUMBER	PILE CUTOFF ELEV. MINUS NLW OR MLW ELEV. PLUS 5'-6" (STRAIGHT)	1.3 PER LF EACH		
H2	2" X 6" PLASTIC LUMBER	1'-2" (STRAIGHT)	1.2		

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LAST REVISION	07/01/11	REVISION	DESCRIPTION:
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**FY 2022-23  
STANDARD PLANS**

**FENDER SYSTEM -  
PRESTRESSED CONCRETE PILES & FRP WALES**

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