

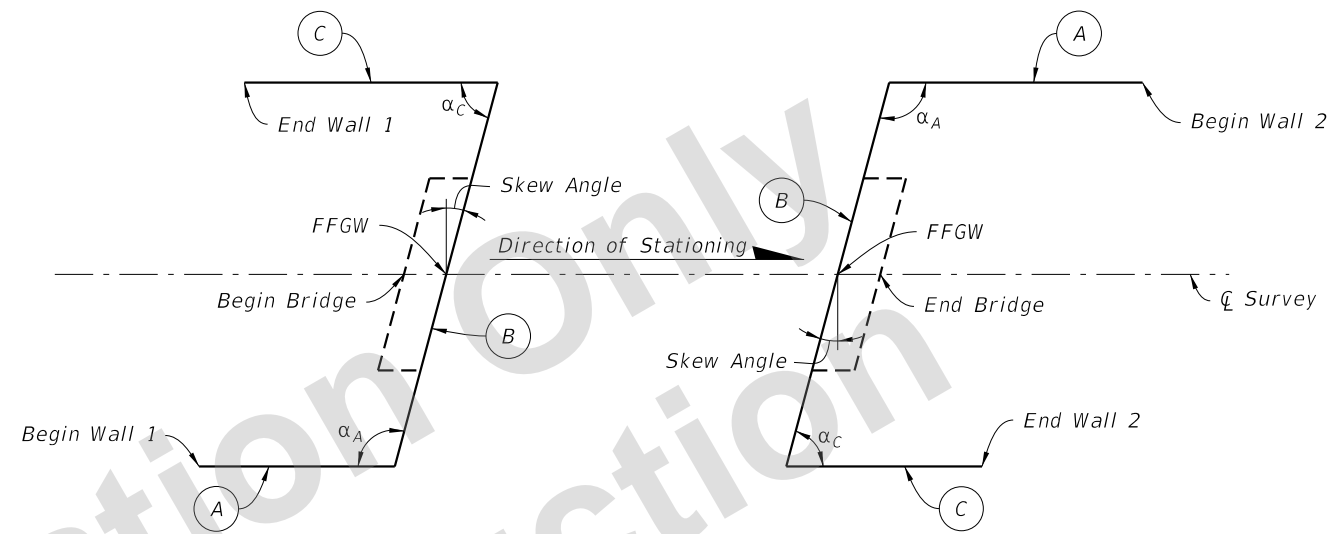
**GENERAL NOTES**

**CONSTRUCTION SPECIFICATIONS:**

Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", Current Edition and Supplements as amended. Construct GRS abutments and walls in accordance with Developmental Specification Section 549.

**DESIGN SPECIFICATIONS:**

Geosynthetic Reinforced Soil Integrated Bridge System Interim Implementation Guide, FHWA-HRT-11-026, January 2011 except as amended by the FDOT Structures Manual (current edition).



**WALL LABELING DIAGRAM**

**DEFINITION OF VARIABLES**

- $a_b$  = Set back distance between back of facing element and beam seat
- $B$  = Base length of reinforcement
- $b$  = Bearing width for bridge beam seat
- $B_r$  = Length of bearing bed reinforcement
- $B_{RSF}$  = Width of RSF
- $D_b$  = Depth of beam seat
- $d_e$  = Clear space from top of wall to bottom of superstructure
- $D_r$  = Depth of bearing bed
- $D_{RSF}$  = Depth of RSF below bottom of wall elevation
- $D_{tz}$  = Depth of GRS-GAB transition
- $h_{rb}$  = Height of road base (equals height of superstructure and pavement thickness)
- $H$  = GRS Design Height
- $L$  = Length of GRS Backfill Reinforcement
- $L_B$  = Abutment width
- $L_A, L_C$  = Wingwall length
- $S$  = Minimum distance from guardrail  $\zeta$  to back of CMU
- $X_{RSF}$  = Width of RSF in front of the abutment and wingwall wall face
- $\alpha_A, \alpha_C$  = Wingwall angle

**ABBREVIATIONS**

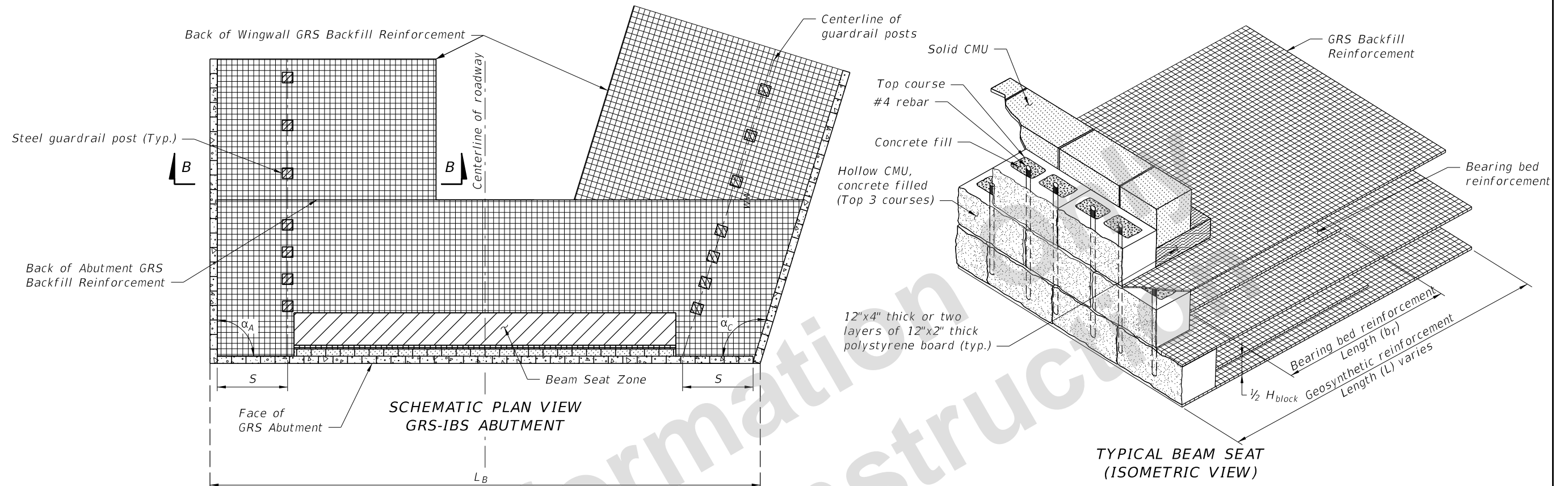
- AOS = Apparent Opening Size
- $B_b$  = Width of the bridge
- $B_{block}$  = Width of CMU =  $7\frac{5}{8}$ "
- CMU = Concrete masonry unit
- $d_{max}$  = Maximum particle diameter in GRS backfill
- FFGW = Front Face of GRS Wall
- GAB = Graded Aggregate Base
- GRS = Geosynthetic Reinforced Soil
- $H_{block}$  = Height of CMU =  $7\frac{5}{8}$ "
- IBS = Integrated Bridge System
- $L$  = Length of GRS Backfill Reinforcement
- $L_{block}$  = Length of CMU =  $15\frac{5}{8}$ "
- RSF = Reinforced soil foundation
- $T_{ult}$  = Design Standards Index 501 Ultimate Tensile Strength
- $T_{2\%}$  = Design Standards Index 501 2% Strain Tensile Strength

For Information Only  
Not for Construction

**GENERAL NOTES**

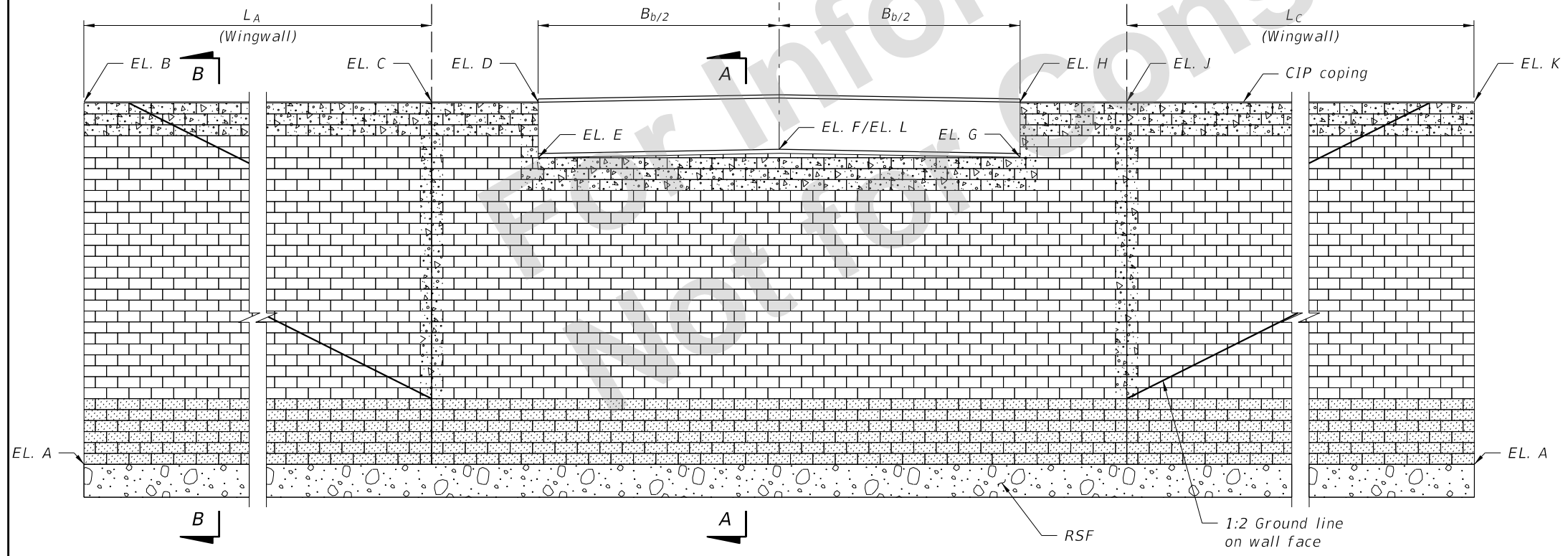
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**SCHEMATIC PLAN VIEW  
GRS-IBS ABUTMENT**

**TYPICAL BEAM SEAT  
(ISOMETRIC VIEW)**







**DEVELOPED SCHEMATIC ELEVATION VIEW  
GRS-IBS ABUTMENT  
Facing Block Schedule**

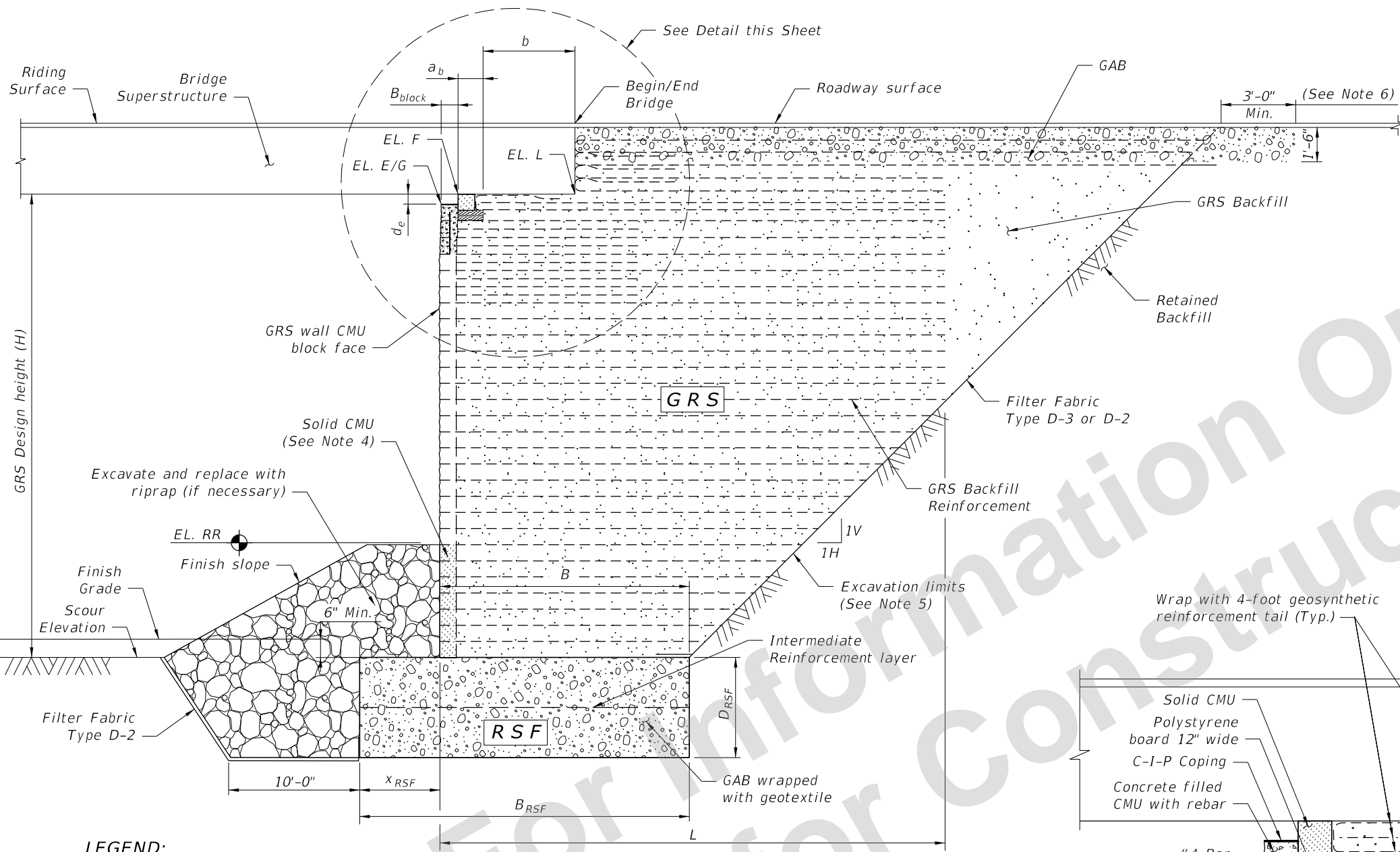
**NOTES:**

1. CMU blocks are running bond, including corners, so there are no vertical joints greater than one CMU course height.
2. Remove backfill and geotextile from hollow core of the top 3 courses of CMUs and corner CMUs, insert #4 bars, and fill with concrete.
3. Wingwalls are folded out for elevation view.

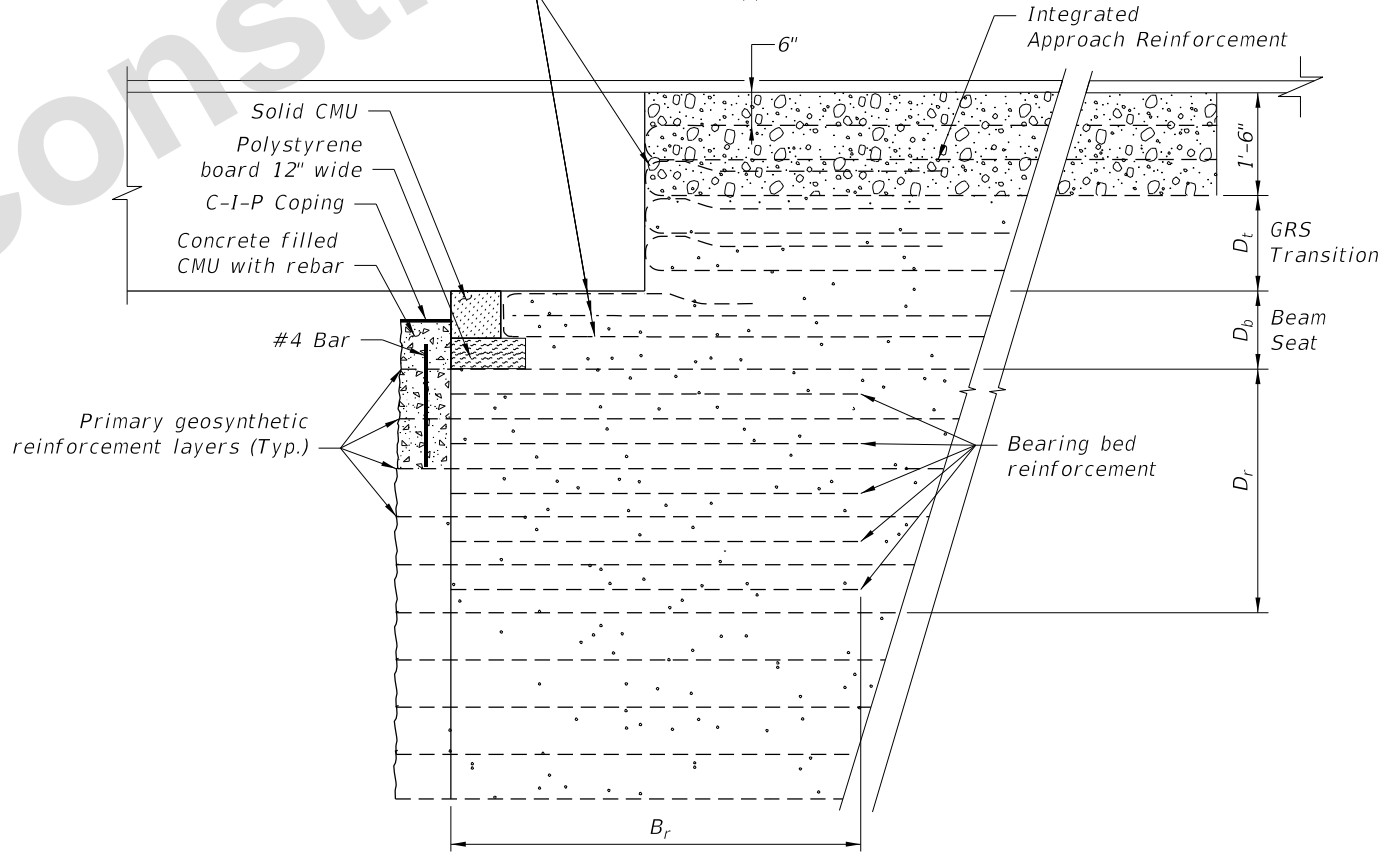
**LEGEND:**

-  Hollow, textured CMU filled with concrete and rebar
-  Hollow, textured CMU filled with GRS backfill
-  Solid, smooth-faced CMU
-  Graded Aggregate Base (GAB)

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- NOTES:
1. Remove backfill and geotextile from hollow core of the top 3 courses of CMUs and all corner CMUs, insert #4 Bars, and fill with concrete.
  2. Strike CMU concrete fill flush with top of CMUs under bridge girders, slope to drain.
  3. On the top course of CMUs create a CIP coping a minimum of  $\frac{3}{4}$ -inch thick.
  4. Provide Solid CMU Blocks behind riprap.
  5. Short term back slope ratio per OSHA Safety Regulations (29CFR, Part 1926, Subpart P, excavation). Shoring may be required if the short term back slope will be open more than 30 days or if the required short term back slope ratio specified cannot be obtained.
  6. Extend Integrated Approach layers past 1:1 Control Line as shown.
  7. Before constructing each wrapped geosynthetic layer cover exposed geosynthetic with 1 to 2 inches of aggregate backfill.
  8. Wall control drawings based on plumb wall facing. With the approval of the Engineer, segmental retaining wall unit facing blocks may be substituted for solid and hollow CMU facing blocks in accordance with Developmental Specification Section 549. Contractor's Specialty Engineer must submit shop drawings depicting revised RSF elevations for approval. If segmental retaining wall unit facing blocks require battered erection, Contractor's Specialty Engineer must submit shop drawings depicting revised bottom wall course locations for approval.



LEGEND:

- GRS Backfill
- Graded Aggregate Base (GAB)
- Riprap
- Solid, smooth faced CMU
- Hollow, textured CMU filled with GRS backfill
- Hollow, textured CMU filled with concrete and rebar

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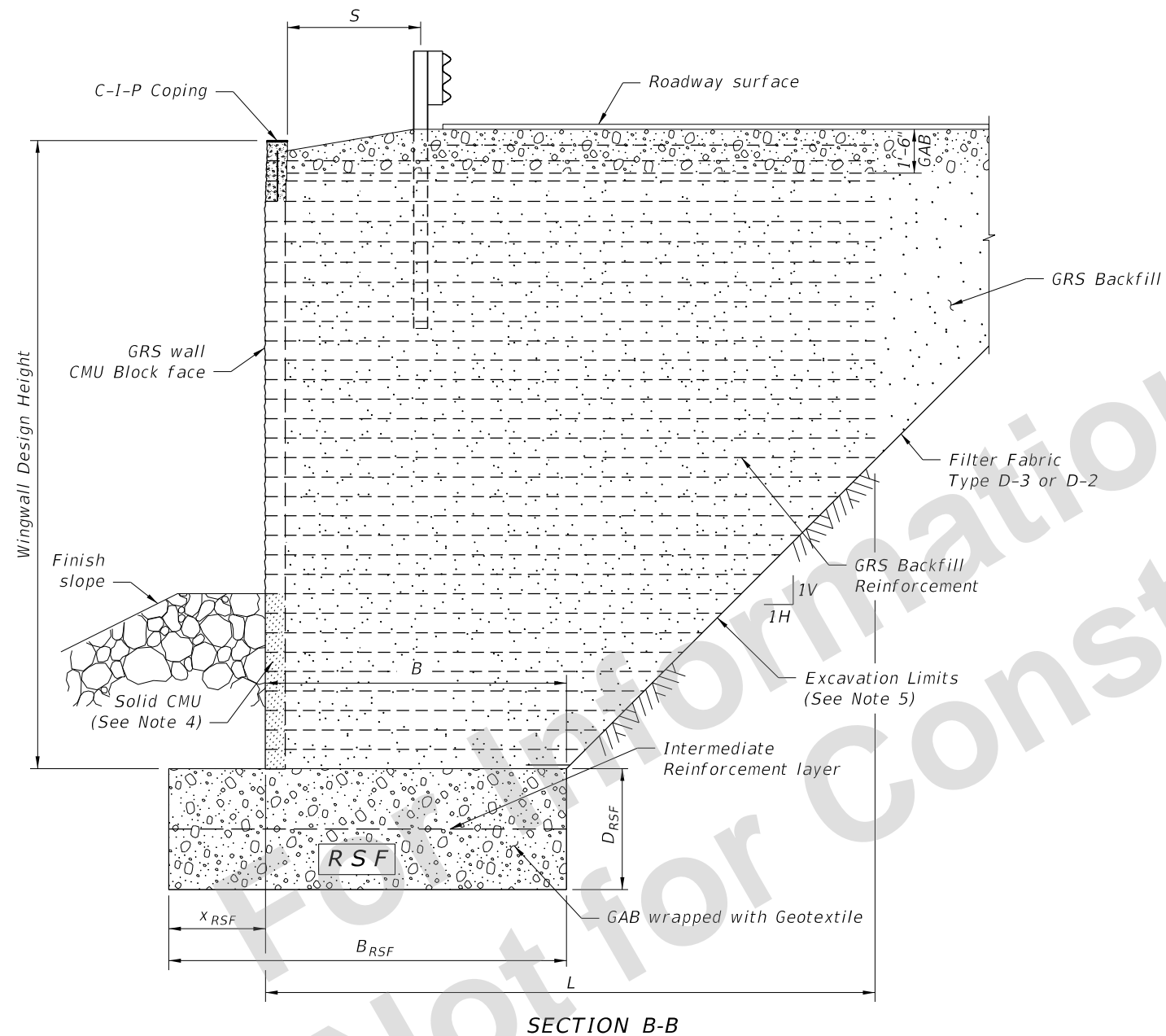
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**DEVELOPMENTAL STANDARD PLANS**

**GRS-IBS**

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DETAILS




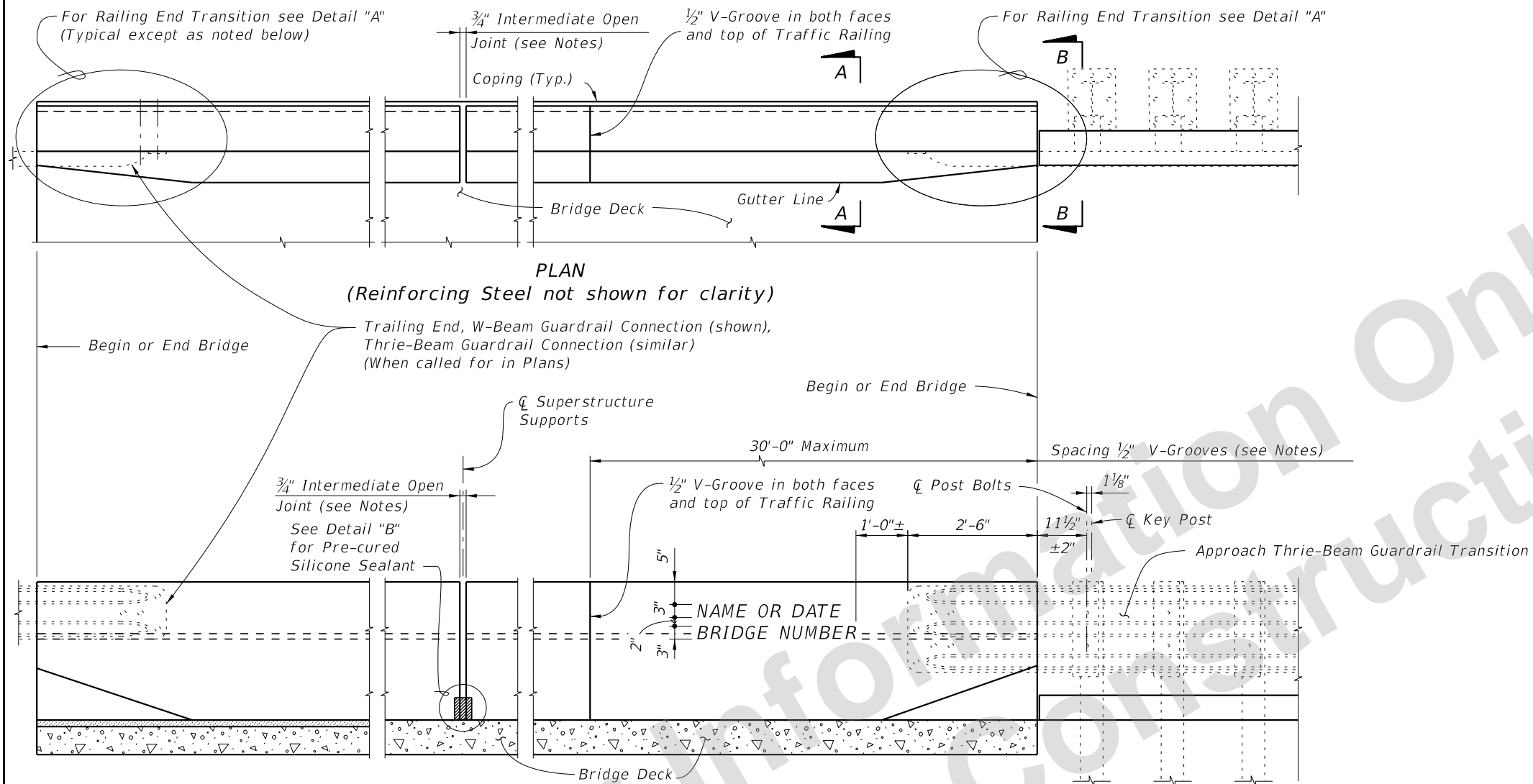
SECTION B-B

Cross References:  
See Sheet 3 for Notes.

SDATES STIMES

DETAILS

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ELEVATION OF INSIDE FACE OF RAILING  
(Reinforcing Steel not shown for clarity)

CROSS REFERENCE:  
For Section A-A, View B-B,  
Detail "A" and Detail "B",  
see Sheet 2. For Detail "C",  
see Sheet 4.

TRAFFIC RAILING NOTES

This railing has been structurally evaluated to be equivalent or greater in strength to other single-slope railings which have been crash tested to MASH TL-4 Criteria.

CONCRETE AND REINFORCING STEEL: See Structures Plans General Notes.

GUARDRAIL: For Guardrail Connection details see Index 536-001.

SUPERELEVATED BRIDGES: At the option of the Contractor the Traffic Railing on superelevated bridges may be constructed perpendicular to the roadway surface. If an adjoining railing is constructed plumb, transition the end of the Traffic Railing from perpendicular to plumb over a minimum distance of 20'-0". The cost of all modifications will be at the Contractor's expense.

PEDESTRIAN AND BICYCLE RAILING: See Index 515-021 and 515-022 for Notes, Details and post spacings for Traffic Railings with Pedestrian /Bicycle Bullet Railings.

V-GROOVES: Construct 1/2" V-Grooves plumb. Space V-Grooves equally between 3/4" Open Joints and/or Deck Joints and at V-Groove locations on Retaining Wall footings.

END TRANSITIONS: Provide the Railing End Transition as shown in Detail "A".

NAME, DATE AND BRIDGE NUMBER: The Name and Bridge Number shall be placed on the Traffic Railing so as to be seen on the driver's right side when approaching the bridge. The Date shall be placed on the driver's left side when approaching the bridge. The Name shall be as shown in the General Notes in the Structures Plans. The Date shall be the year the bridge is completed. For a widening when the existing railing is removed, use both the existing date and the year of the widening. Black plastic letters and figures 3" in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by 3/8" V-Grooves. V-Grooves shall be formed by preformed letters and figures.


BARRIER DELINEATORS: Install Barrier Delineators on top of the Traffic Railing 2" from the face on the traffic side in accordance with Specification Section 705. Match the Barrier Delineator to the color (white or yellow) of the near edgeline.

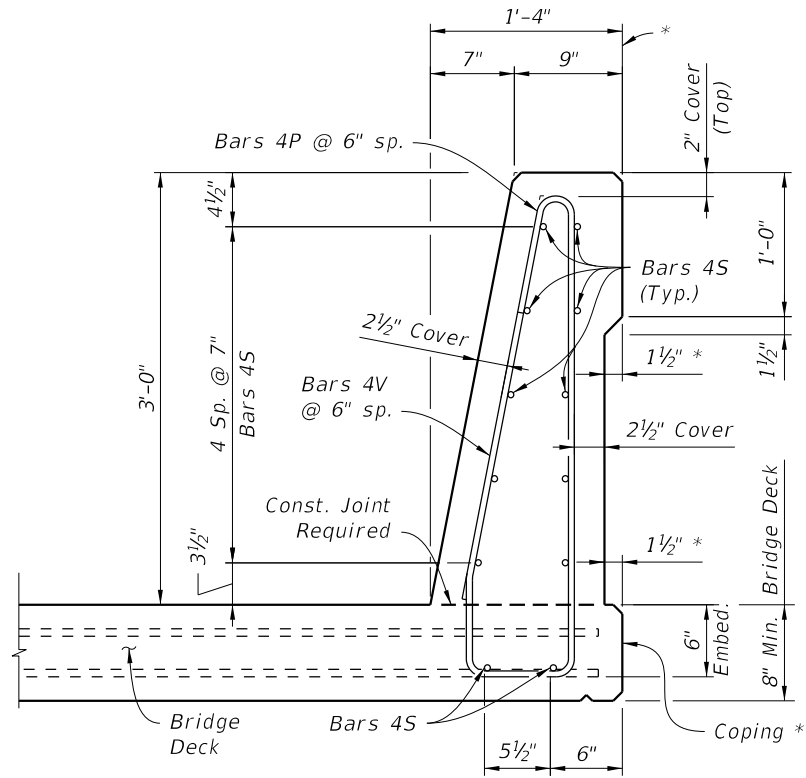
JOINTS: See Plans, Superstructure, Approach Slab and Retaining Walls Sheets for actual dimensions and joint orientation. Provide open Railing Joints at Deck Expansion Joint locations matching the dimensions of the Deck Joint. For treatment of Railings on skewed bridges see Sheet 7.

Provide 3/4" Intermediate Joints at:

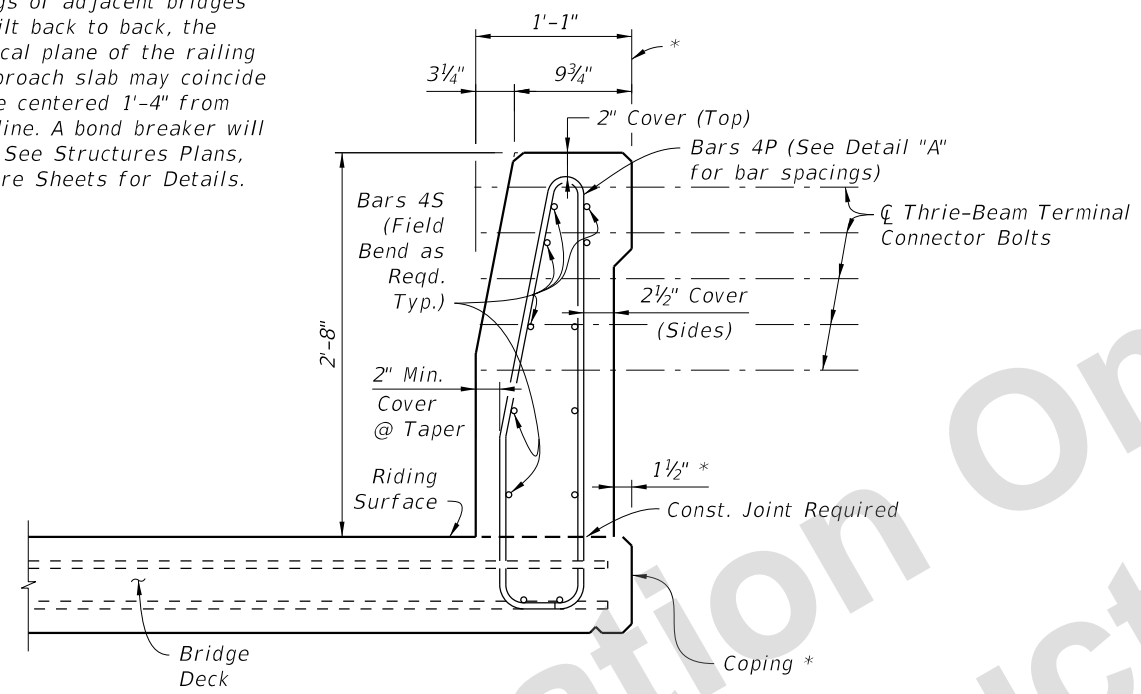
- (1) - Superstructure supports where slab is continuous.

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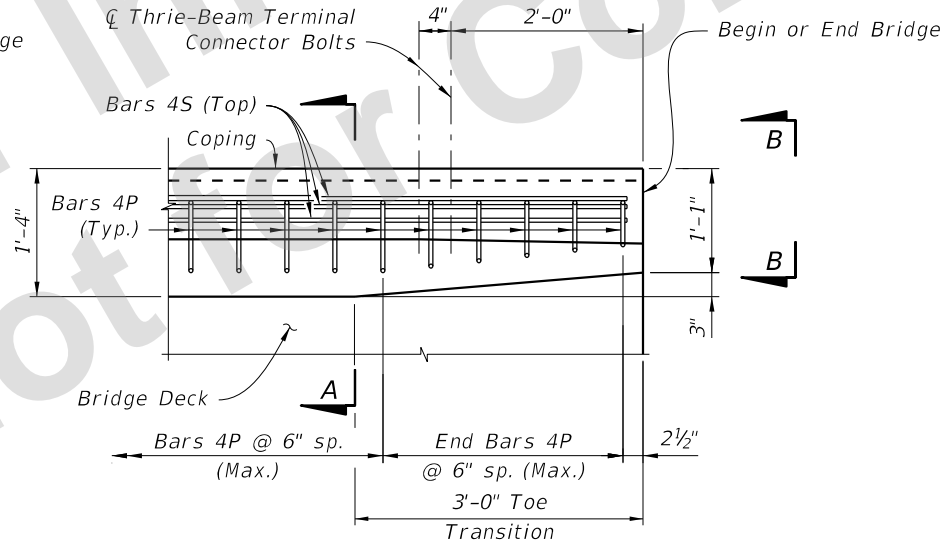
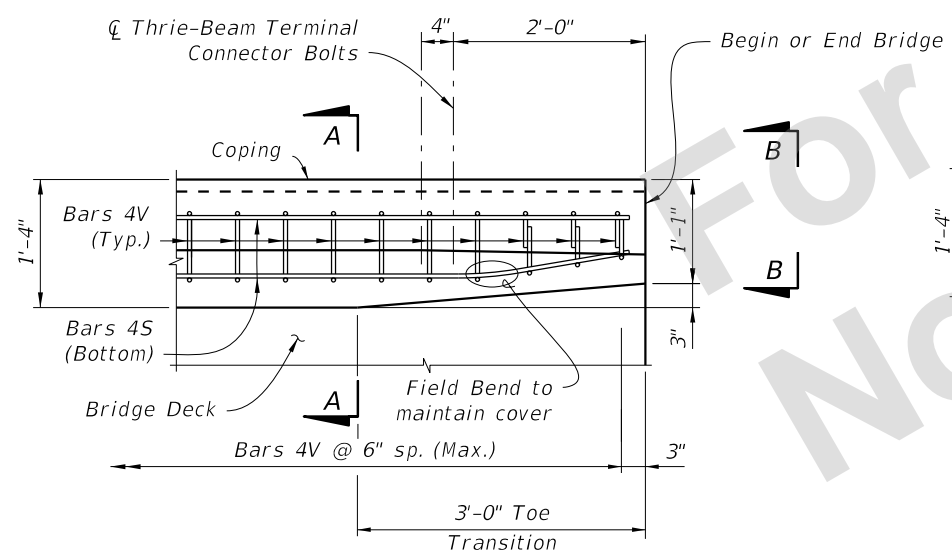


\* Where railings of adjacent bridges are to be built back to back, the outside vertical plane of the railing and deck/approach slab may coincide along a plane centered 1'-4" from each gutter line. A bond breaker will be required. See Structures Plans, Superstructure Sheets for Details.



**SECTION A-A**  
**TYPICAL SECTION THRU TRAFFIC RAILING**  
 (Section thru Bridge Deck shown, Section thru Approach Slab and Retaining Walls similar)

**VIEW B-B**  
**END TRANSITION**




CROSS REFERENCE:  
 For locations of Section A-A and View B-B see Sheet 5.

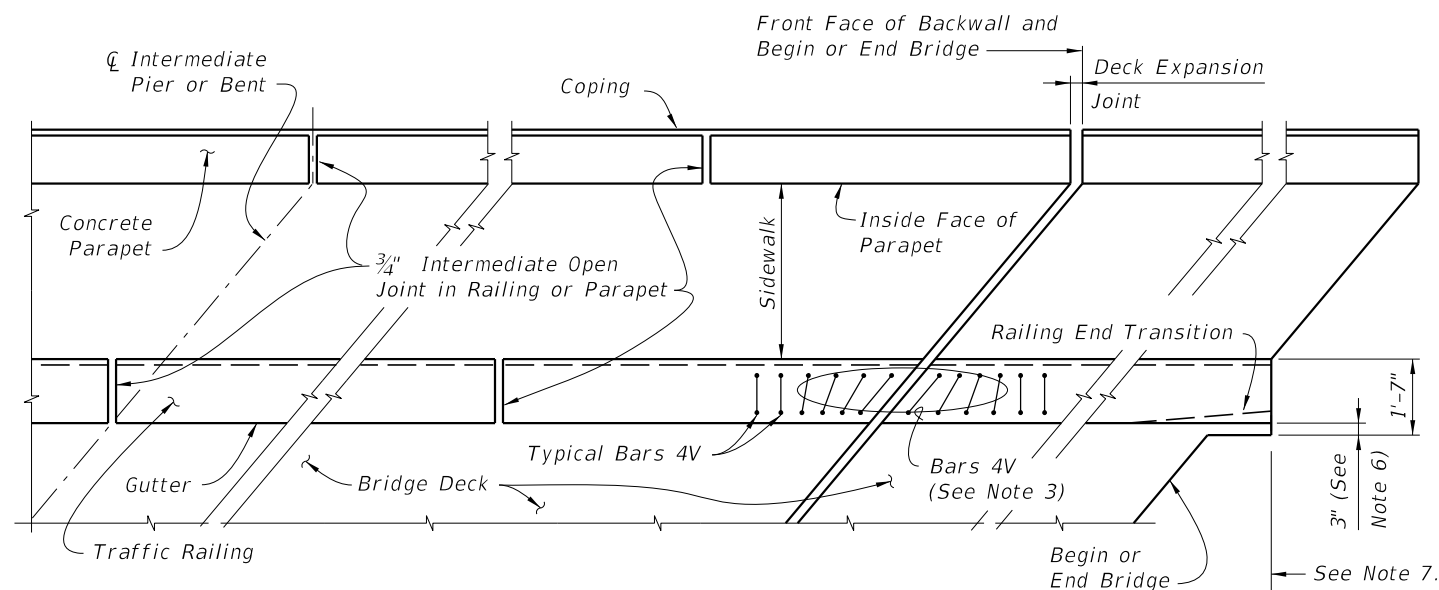
**PLAN - RAILING END TRANSITION**  
 (Showing Bars 4V and 4S)

**PLAN - RAILING END TRANSITION**  
 (Showing Bars 4P and 4S)

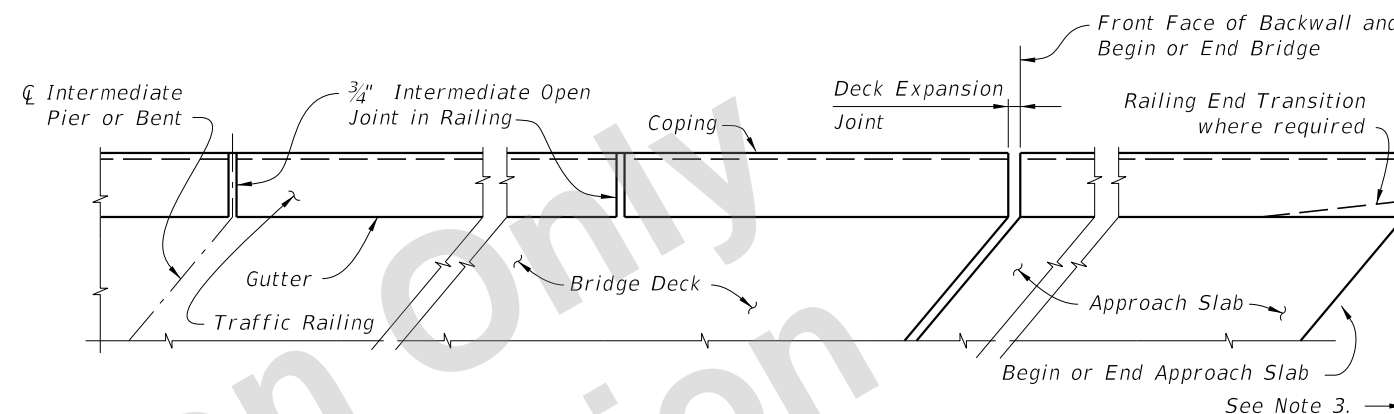
DETAIL "A"

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**PARTIAL PLAN VIEW OF SKEWED BRIDGE DECK AND APPROACH SLAB WITH SIDEWALK, SINGLE-SLOPE TRAFFIC RAILING AND PEDESTRIAN/BICYCLE RAILING  
INDEX 521-820 or 521-825, OTHER TRAFFIC RAILINGS SIMILAR**



**PARTIAL PLAN VIEW OF SKEWED BRIDGE DECK AND APPROACH SLAB WITH SINGLE-SLOPE TRAFFIC RAILING, OTHER TRAFFIC RAILINGS SIMILAR**

**NOTES:**

- 1) Concrete Parapet reinforcement is not effected by skew angle, see Index 521-820 for details.
- 2) Parapet expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure Sheets for details.
- 3) Traffic Railing reinforcement vertical Bars 4V & 4P may be shifted up to 1" (Max.) and rotated up to 10 degrees as required to allow proper placement. Bars 4V adjacent to expansion joints shall be field adjusted to maintain clearance and spacing, extra Bars 4V will be required. Cut bottom horizontal portion of 4V Bars to maintain maximum horizontal length to each vertical leg being placed. Discard the remainder of the bar. Rotate cut bars to maintain clearance.
- 4) Railing ends at deck expansion joints shall follow the deck joint with allowance for joint movement. Expansion joint at the inside face of parapet shall be turned perpendicular or radial to this line. See Structures Plans, Superstructure and Approach Slab Sheets for details.
- 5) 3/4" Intermediate Open Joints and V-Grooves in railing and parapet shall be placed perpendicular or radial to the gutter line or inside face of parapet line. See Structures Plans, Superstructure Sheets for locations.
- 6) At begin or end bridge extend slab at the railing ends 3" (gutter side or back face of railing as required) as shown to provide a base for casting of the railing. Field trim toe of Bars 4V by 1 inch as required to maintain concrete cover at edge of deck.
- 7) Begin placing Railing Bars 4P and 4V at the railing end and proceed toward Bridge to ensure placement of guardrail bolt holes.


**NOTES:**

- 1) Railing expansion joint shall match the deck expansion joint which shall be turned perpendicular or radial to the gutter line. See Structures Plans, Superstructure Sheets for details.
- 2) 3/4" Intermediate Open Joints and 1/2" V-Grooves in railing shall be placed perpendicular or radial to the gutter line. See Structures Plans, Superstructure and Approach Slab Sheets for locations.
- 3) Begin placing Railing Bars 4P and 4V at the railing end and proceed toward Bridge to ensure placement of guardrail bolt holes.

**GENERAL NOTES:**

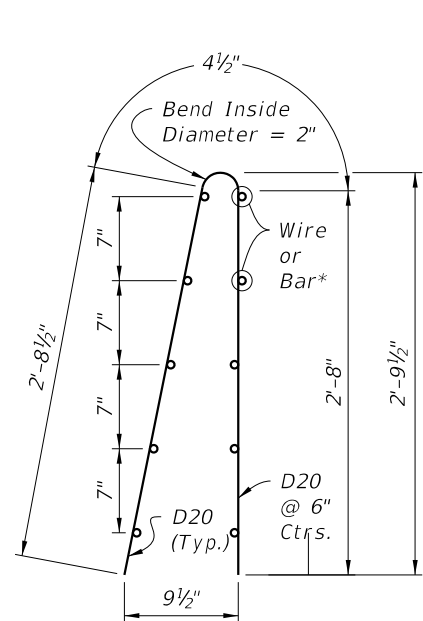
- 1) Work this Sheet with Traffic Railing, Pedestrian/Bicycle Railing as applicable.
- 2) Deck Expansion Joint at begin or end bridge shown. Deck Expansion Joints at  $\phi$  Pier or Intermediate Bents are similar.
- 3) Partial Plan Views shown are intended as guides only. See Structures Plans, Superstructure Sheet for skew angles, joint orientation, dimensions and details.
- 4) Railings on Raised Sidewalks shall be treated similar to the Partial Plan View of Bridge Deck with Traffic Railing.
- 5) If Welded Wire Reinforcement is used in lieu of conventional reinforcement, placement of the WWR vertical elements shall be similar to those shown above. Clipping of horizontal elements to facilitate placement shall be minimized where possible. When clipping is required, supplement horizontal elements by lap splicing with deformed bars having an equivalent area of steel.

SDATES

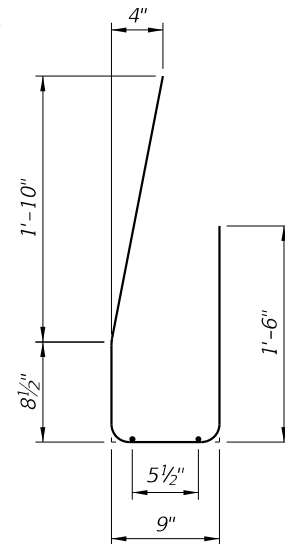
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ALTERNATE REINFORCING STEEL (WWR) DETAILS

CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS

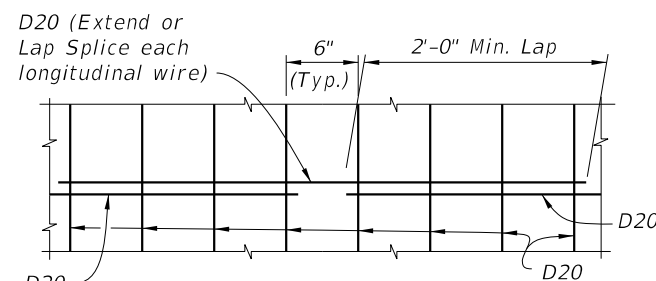


\* Longitudinal D20 Wires or #4 Bars may be tied.

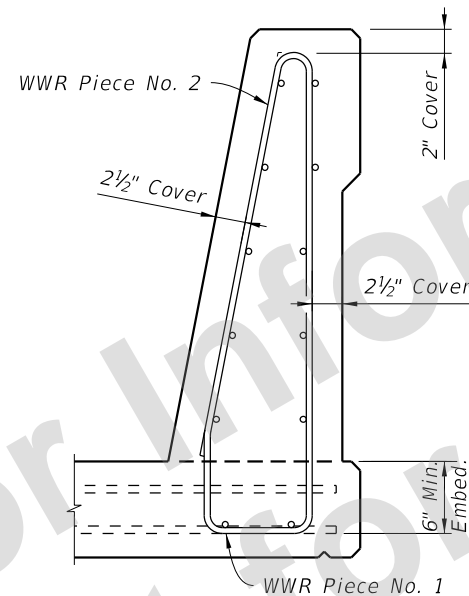


WWR Piece No. 1

WWR Piece No. 2



SPLICE DETAIL (Between WWR Sections)



WWR Piece No. 2

WWR Piece No. 1

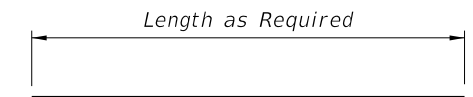
WELDED WIRE REINFORCEMENT NOTES:

- At the option of the Contractor deformed Welded Wire Reinforcement (WWR) may be utilized in lieu of all Bars 4P, 4S and 4V. WWR must consist of Deformed wire meeting the requirements of Specification Section 931.
- WWR at Railing End Transition shall be field bent inward as required (Piece 2) to maintain cover. The bottom of the vertical wires (D20) in Piece 2 shall be cut a maximum of 4 inches and the gutter side portion bent inward as required to allow placement.

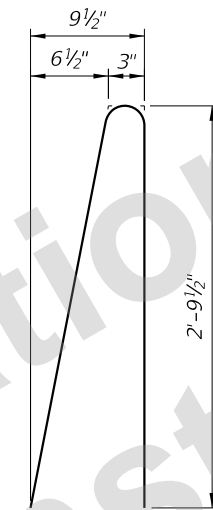
ROADWAY CROSS-SLOPE	LOW GUTTER	HIGH GUTTER
	ØB	ØB
0% to 2%	90°	90°
2% to 6%	87°	93°
6% to 10%	84°	96°

ØB shall be 90° if Contractor elects to place railing perpendicular to the deck and approach slabs.

BILL OF REINFORCING STEEL		
MARK	SIZE	LENGTH
P	4	5'-11"
S	4	As Req'd.
V	4	4'-10"



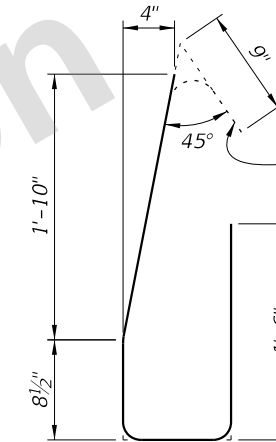
BAR 4S



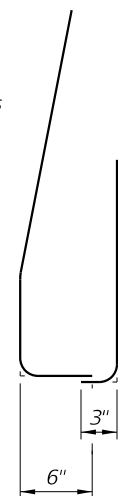
STIRRUP BAR 4P



END STIRRUP BAR 4P To Be Field Cut and Bent



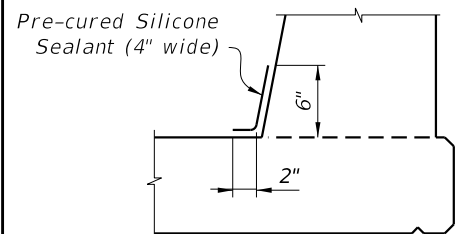
BAR 4V



END TRANSITION BAR 4V Field Cut and Lapped

REINFORCING STEEL NOTES:

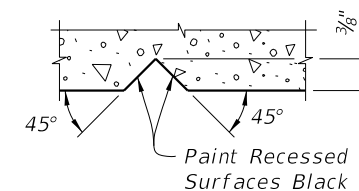
- All bar dimensions in the bending diagrams are out to out.
- The 8 1/2 vertical dimensions shown for Bar 4V is based on a 6 inch embedment into the bridge deck without a raised sidewalk. If a raised sidewalk is to be provided, increase this dimension to achieve a 6 inch minimum embedment into the bridge deck. See Structures Plans, Superstructure Sheets.
- All reinforcing steel at the open joints shall have a 2 inch minimum cover.
- Bars 4S may be continuous or spliced at the construction joints. Bar splices for Bars 4S shall be a minimum of 2'-0 inch.



DETAIL "C" - SECTION AT INTERMEDIATE OPEN JOINT

INTERMEDIATE JOINT SEAL NOTES:

- At Intermediate Open Joints, seal the lower 6 inch portion of the open joint with Pre-cured Silicone Sealant in accordance with Specification Section 932.
- Apply sealant prior to any Class V finish coating and remove all curing compound and loose material from the surface prior to application of bonding agent.
- Include the cost of the Pre-cured Silicone Sealant in the Contract Unit Price for the Traffic Railing.



SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

ESTIMATED TRAFFIC RAILING QUANTITIES		
ITEM	UNIT	QUANTITY
Concrete	CY/LF	0.107
Reinforcing Steel	LB/LF	24.78

(The above quantities are based on a 2% deck cross slope; railing on low side of deck.)

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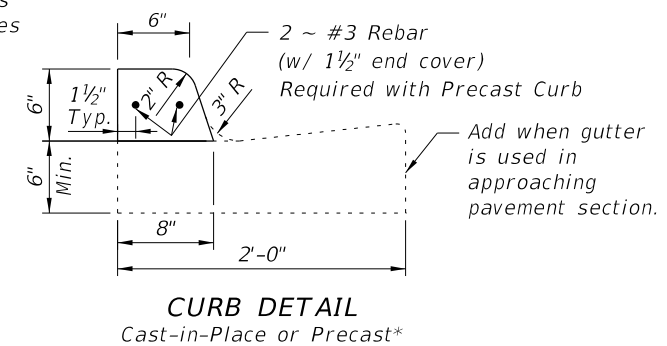
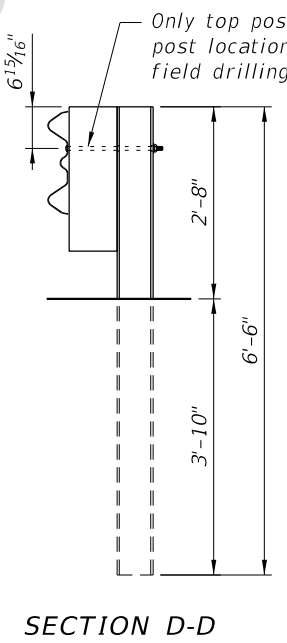
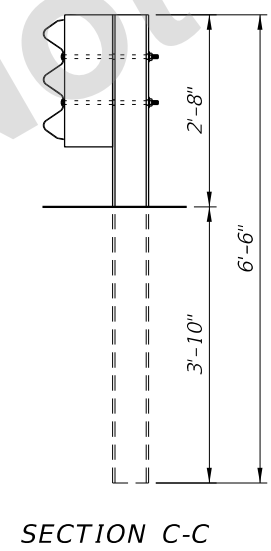
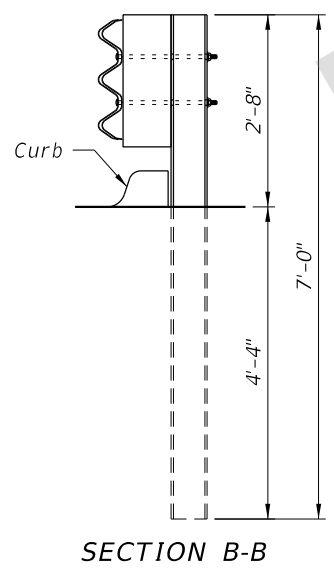
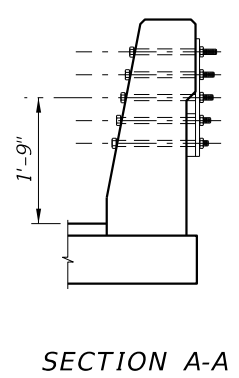
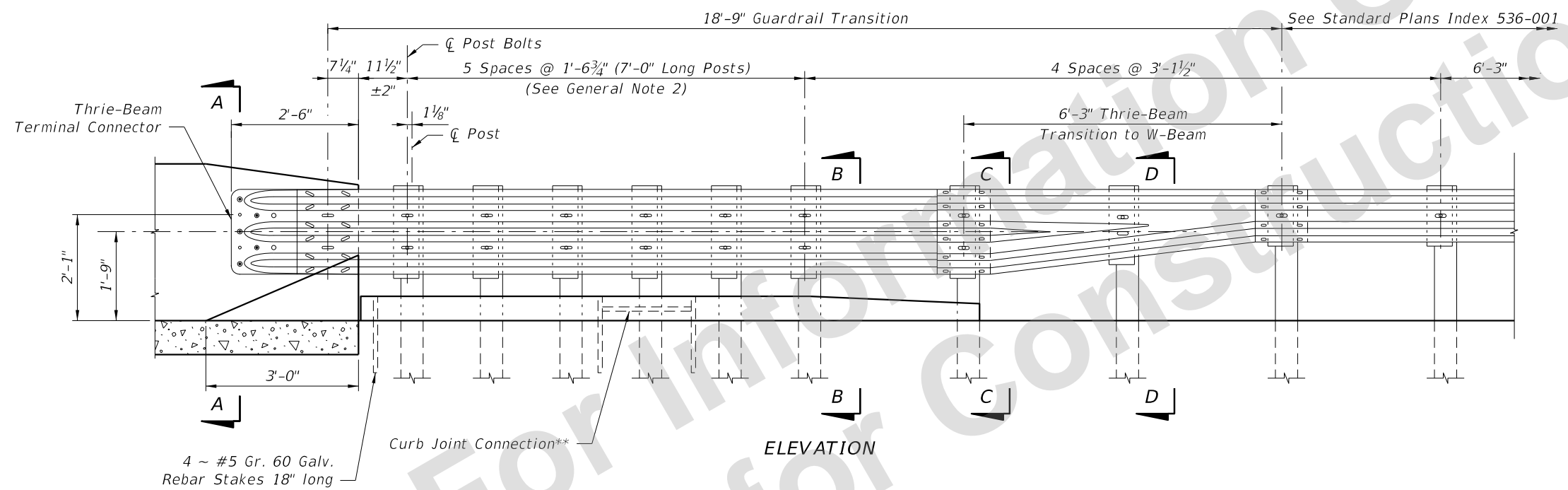
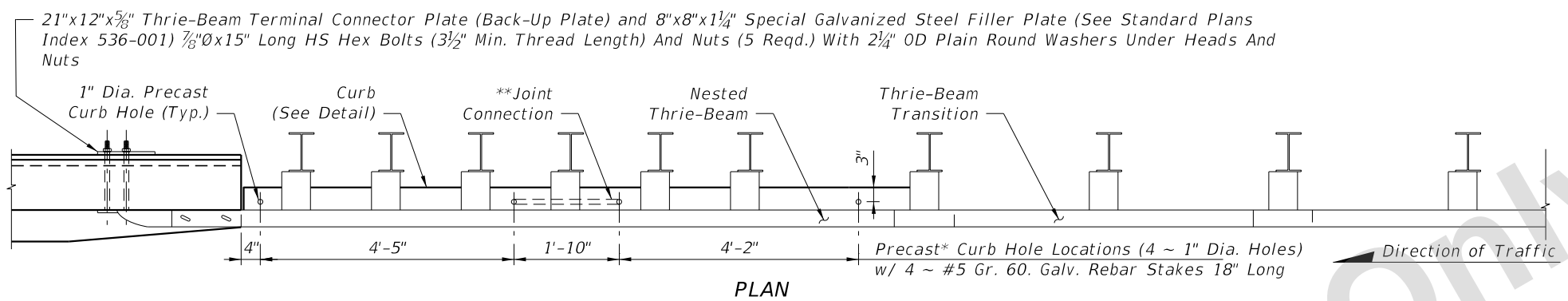
DEVELOPMENTAL STANDARD PLANS

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\* Precast Curb secured with 4 ~ #5 Gr. 60 Galv. Rebar Stakes 18" long. The 12'-2" section of curb may be cast in two sections:  
Section 1 = 5'-8" long  
Section 2 = 6'-6" long with the last 3'-6" of curb tapered to a 4" height.

\*\* Joint Connection is two 9" long 1" Dia. female ends connected with 1 ~ #5 Gr. 60 Galv. Rebar 18" long.

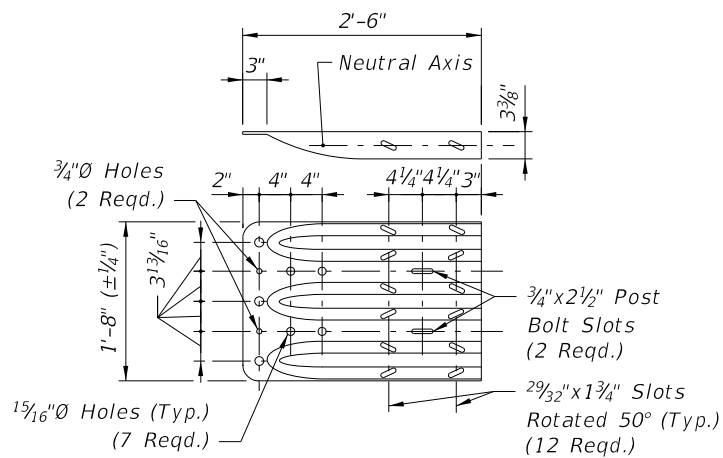
**General Notes:**

- Concrete curb may be cast-in-place or precast as shown on this sheet. Concrete curb shall be continuous to the seventh post.
- The post length shall be marked on all 7'-0" long posts by the Manufacturer. The mark shall be located within the top 1 ft. region of the post, at least  $\frac{5}{8}$ " in height, and visible after installation. Mark steel posts with a stencil before galvanizing.
- Preform post holes as required by punching only. Preforming post holes by drilling is not permitted.
- Rail elements shall meet the requirements of Standard Plans Index 536-001 except as modified herein.
- Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.
- The (24) plate washers required at the terminal connector splice are 1 $\frac{3}{4}$ "x 3"x  $\frac{3}{16}$ " plate washers with a  $\frac{1}{16}$ " x 1" hole.

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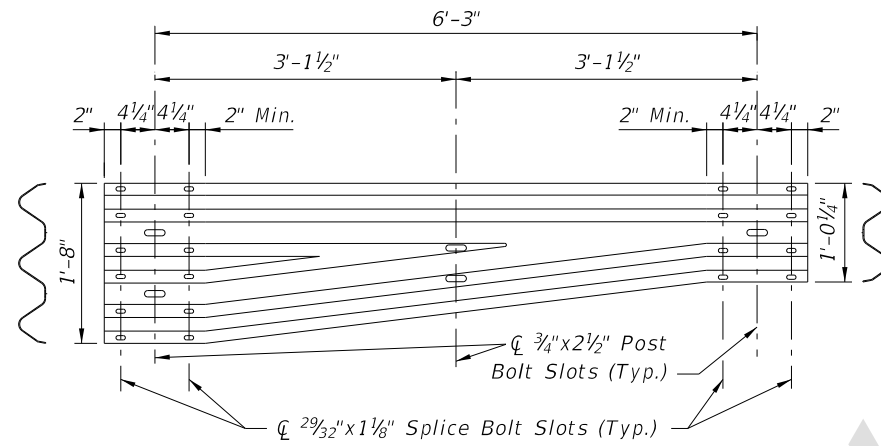
**THRIE-BEAM GUARDRAIL TRANSITION DETAILS**

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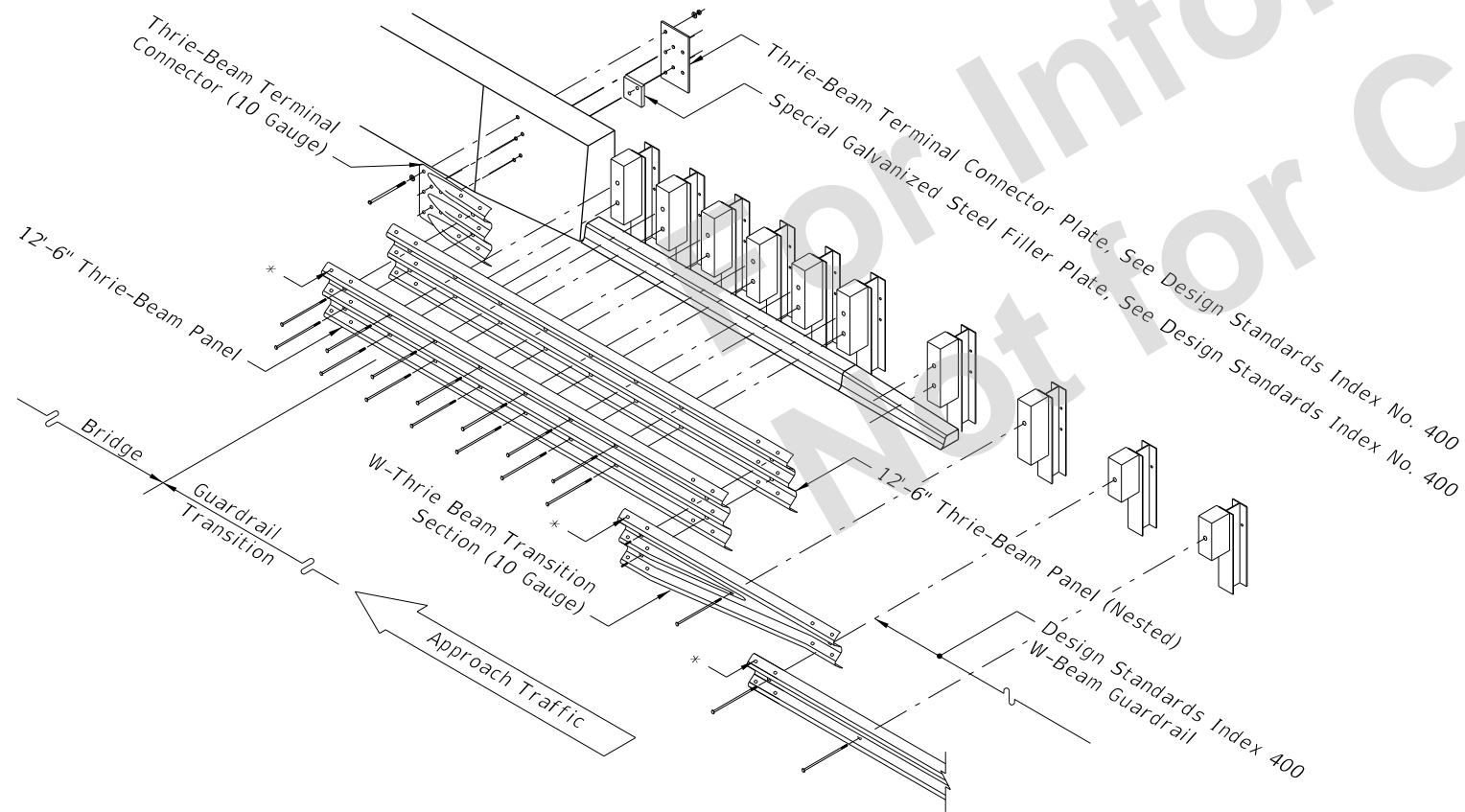


Note: 5/8"Ø steel washer required with splice bolts

**THRIE-BEAM TERMINAL CONNECTOR**  
(10 Gauge)



**W-THRIE BEAM TRANSITION SECTION**  
(10 Gauge)



\* Splice Location: Thrie-Beam - 12 Guardrail Splice Bolts And Recessed Nuts  
W-Beam - 8 Guardrail Splice Bolts And Recessed Nuts

**PICTORAL VIEW OF GUARDRAIL TRANSITION AND CONNECTIONS**

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