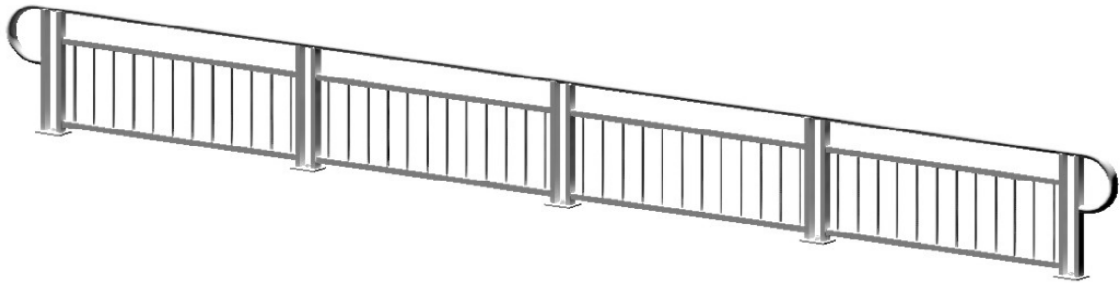


STEEL PEDESTRIAN/BICYCLE RAILING DESIGN REQUIREMENTS



1. GENERAL

For this project, provide a vertical 48" height steel pedestrian/bicycle railing on the outside of the shared use path on the bridge deck and on the outside of the path where warranted on the roadway approaches, using all dimensions and component sizes as shown. Immediately off of bridge approach slab ends, where drop-off hazards are present, provide a concrete shared-use path per the Typical Section shown on attached plan sheet 2. Where shoulder cross-slope is provided for the path clear zone, provide an asphalt shared-use path in accordance with Exhibit 4a and the Roadway Typical Sections shown in Attachment B – Roadway.

2. MATERIALS

Use materials as shown. Galvanize all steel components of the steel rail system in accordance with Section 705.2.3.2 of the Standard Specifications and as shown.

3. RAILING DESIGN

Design railing according to AASHTO LRFD 9th Edition and the below criteria. A 75-year target service life is required.

4. DESIGN LIVE LOADS

Top and Bottom Rails, Posts and Base Plates are to be designed per AASHTO LRFD 9th Edition, Chapter 13.

Pickets for Infill Areas are to be designed using an applied transverse loading of 200 lb over an area of 1 square foot.

5. DEFLECTIONS

Total combined deflection of the pedestrian railing system including the neoprene pads, due to the top rail design live loads, shall not exceed 1.5" when measured at midspan of the top rail.

6. INFILL PANELS

Use Picket Infill Panels as shown.

7. MAXIMUM OPENINGS

4" Sphere Rule – Clear openings of the railing below 42" height shall reject the passage of a 4" diameter sphere and clear openings above 42" height shall reject the passage of an 8" diameter sphere.

The lower most clear opening of the railing shall reject the passage of a 2" diameter sphere.

8. EXPANSION JOINTS

Expansion joints in railing shall be spaced at a maximum of 40'-0". Railings shall be continuous across a minimum of two posts.

9. HANDRAIL

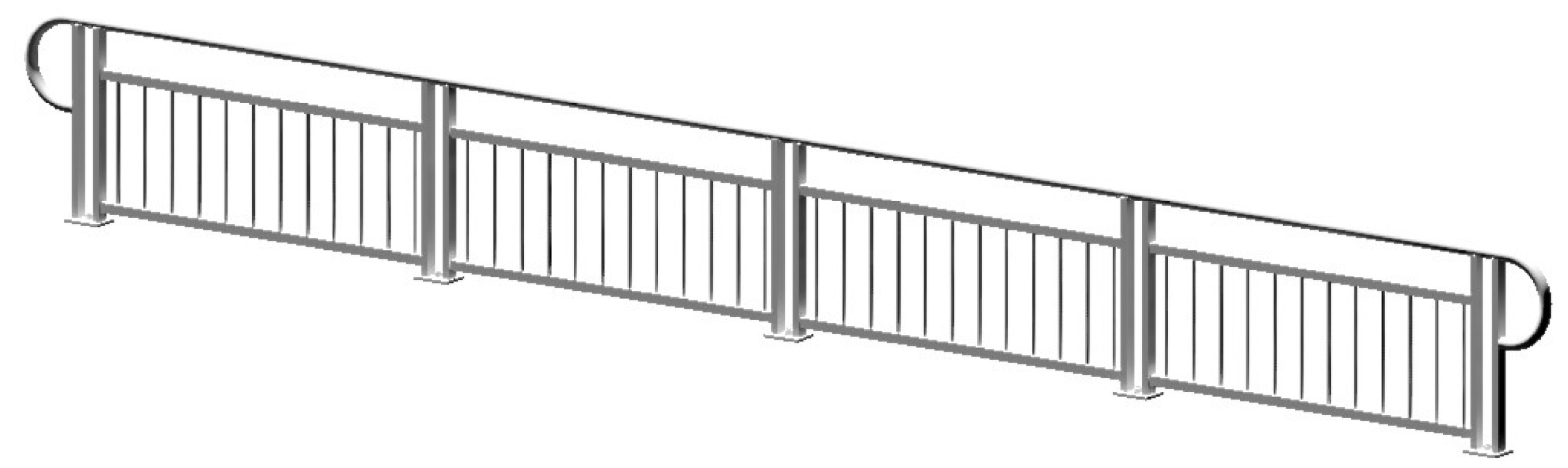
Handrails are not required for this project.

10. RAILING ANCHORAGE

Railing shall be directly mounted on the top of bridge deck and approach slabs. Railing shall be directly mounted on thickened edge slabs for the shared use path approaches. A steel base plate (ASTM A36 or ASTM A709 Grade 36) is required underneath all posts. A minimum 1/8" thick plain neoprene bearing pad is required between the top of concrete and steel plate/shim. Neoprene bearing and beveled plates/shims width and length shall match the width and length of the steel base plate. Grout pads are not allowed for this project. Adhesively bonded dowels/anchors are allowed. Design adhesively bonded dowels/anchors per Bridge Design Memorandum - DM0408. Field testing of adhesively bonded dowels/anchors is required.

11. SHOP DRAWINGS

Shop Drawings shall be provided in accordance with Section 725 of the Standard Specifications.



3D VIEW OF RAILING WITH PICKET INFILL PANEL

TABLE 1 - RAILING MEMBERS

MEMBER	DESIGNATION	OUTSIDE DIMENSION	WALL THICKNESS
Post	HSS 2½ x 1½ x 3/16	2.50" x 1.50"	0.188"
Top Rail	2½" NPS (Sch. 10)	2.875"	0.120"
	HSS 3.000 x 0.120	3.000"	0.120"
End Hoops	2½" NPS (Sch. 10)	2.875"	0.120"
	HSS 3.000 x 0.120	3.000"	0.120"
Top Rail Joint/Splice Sleeves	HSS 2.500 x 0.125	2.500"	0.125"
Intermediate & Bottom Rail	HSS 2 x 2 x 3/16	2.00" x 2.00"	0.188" (1)
Int. & Bottom Rail Post Connection Sleeve	HSS 1.500 x 0.125	1.500"	0.125" (1)
Pickets (Infill Panel)	¾" Ø Round Bar	0.750"	N/A

NOTES

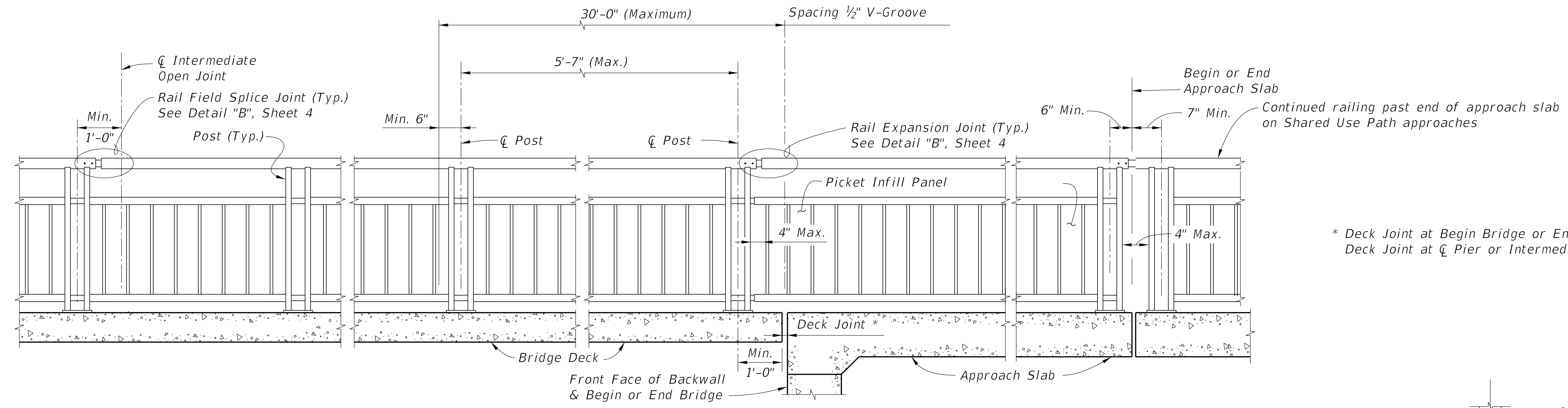
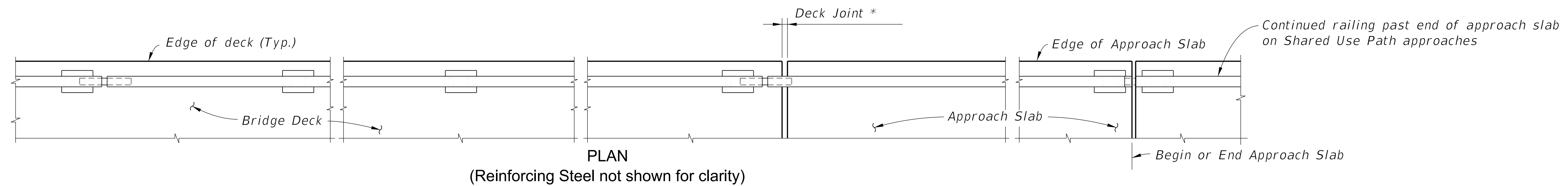
- Notes:
- Shop Drawings are required
 - Materials:
 - Pipe Rails and Pickets: ASTM A500 Grade B, C or D, or ASTM A53 Grade B for standard weight pipe (Schedule 40) and ASTM A36 for bars.
 - Structural Tube: ASTM A500 Grade A, B, C, or D or ASTM A501
 - Steel Plate: ASTM A36 or ASTM A709 Grade 36
 - U-Channels and filler plates: ASTM A36 or ASTM A1011 (Grade 36).
 - Stainless steel (SS) screws: Type 316 or 18-8 Alloy
 - Galvanized Steel Fasteners: coated in accordance with Standard Specifications.
 - Hex Head Bolts: ASTM A 307
 - Adhesive Anchors: ASTM F1554 fully threaded rods
 - Hex Nuts: ASTM A563
 - Flat Washers: ASTM F436
 - Plate Washers: ASTM A36 or ASTM A706 Grade 36.
 - Shims: ASTM B209 Alloy 6061
 - Bearing Pads: 1/8" Plain, Fabric Reinforced or Fabric Laminated pads that meet the requirements of the Standard Specifications
 - Bottle-guard L-shape: ASTM A36
 - Fabricate pickets and vertical panel elements parallel to the posts. Maintain a maximum clear opening of 4".
 - Maximum spacing between expansion joints is 40'-0". Locate an Expansion Joint between the posts on either side of the Deck Expansion Joint.
 - Field splices are similar to the Expansion Joint Detail and may be approved by the Engineer to facilitate handling; but the top rail must be continuous across a minimum of two posts.
 - Make corners and changes in tangential longitudinal alignment with a 9" bend radius or terminate adjoining sections with mitered end sections when handrails are not required.
 - For changes in tangential longitudinal alignment greater than 45°, position posts a maximum of 2'-0" each side of the corner but not at the corner apex.
 - For curved longitudinal alignments, shop bend the top and bottom rails and handrails to match the alignment radius.
 - Installation: Cutting of deck reinforcing steel is permitted for post installed anchors.

REVIEWED

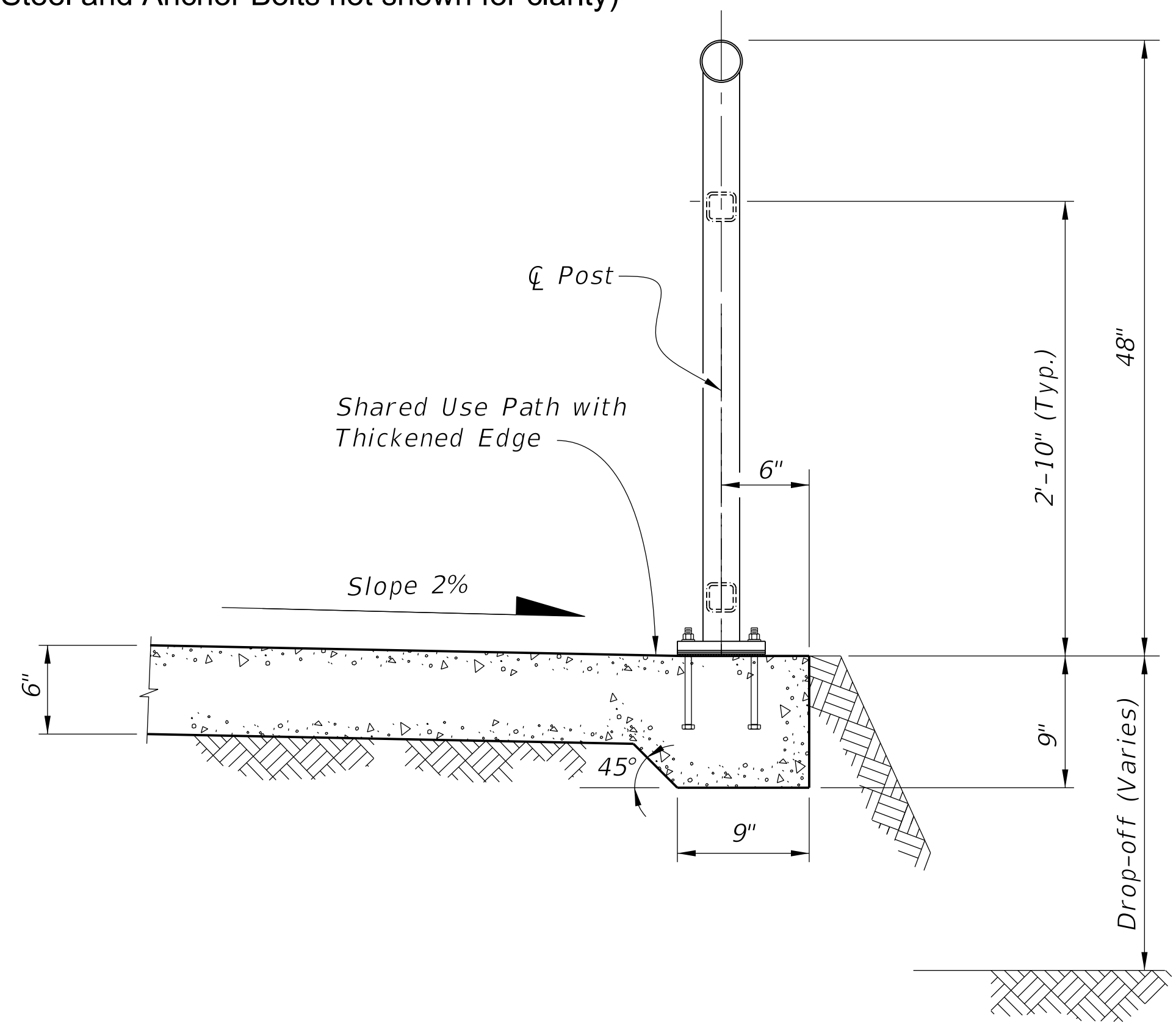
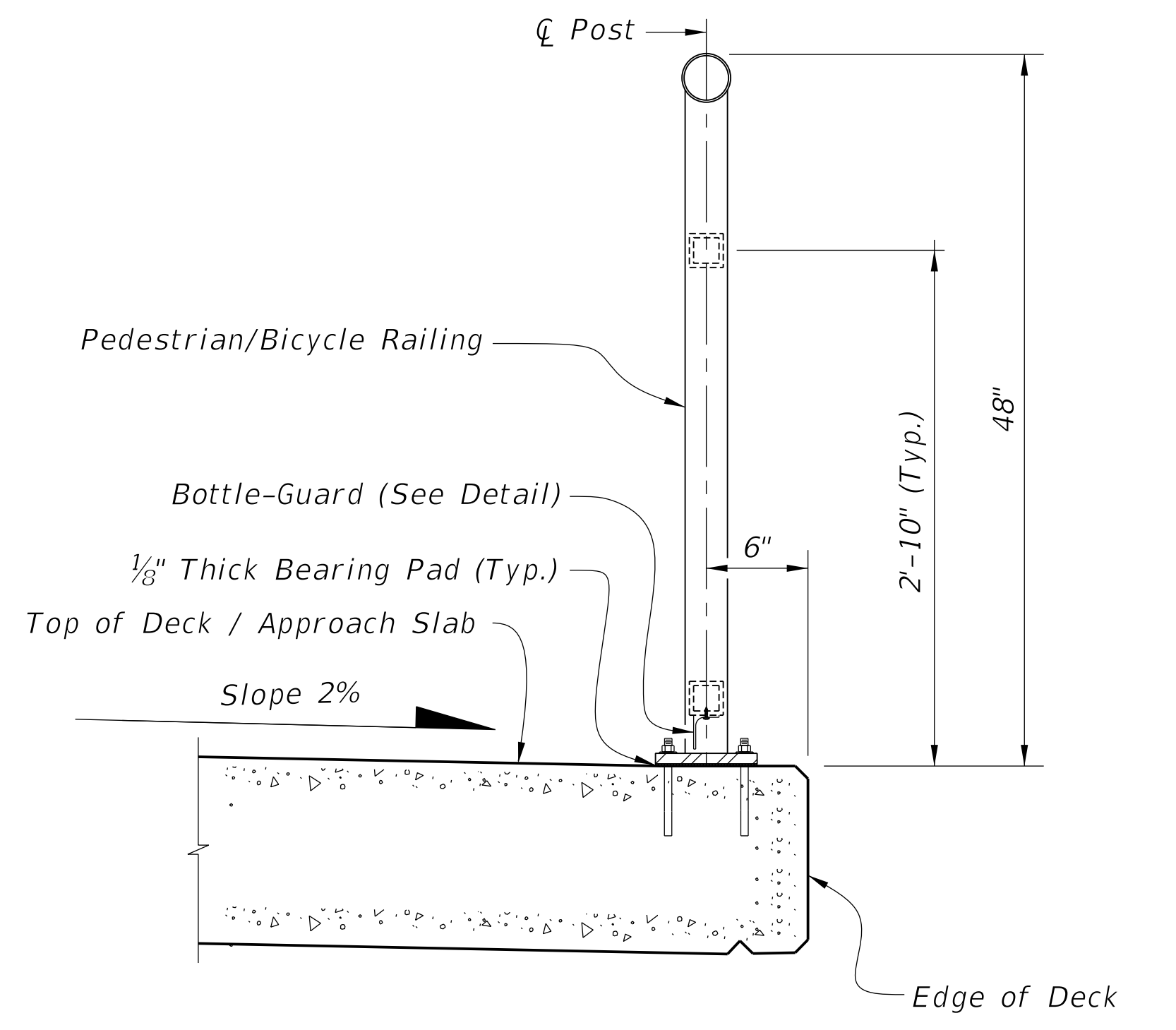
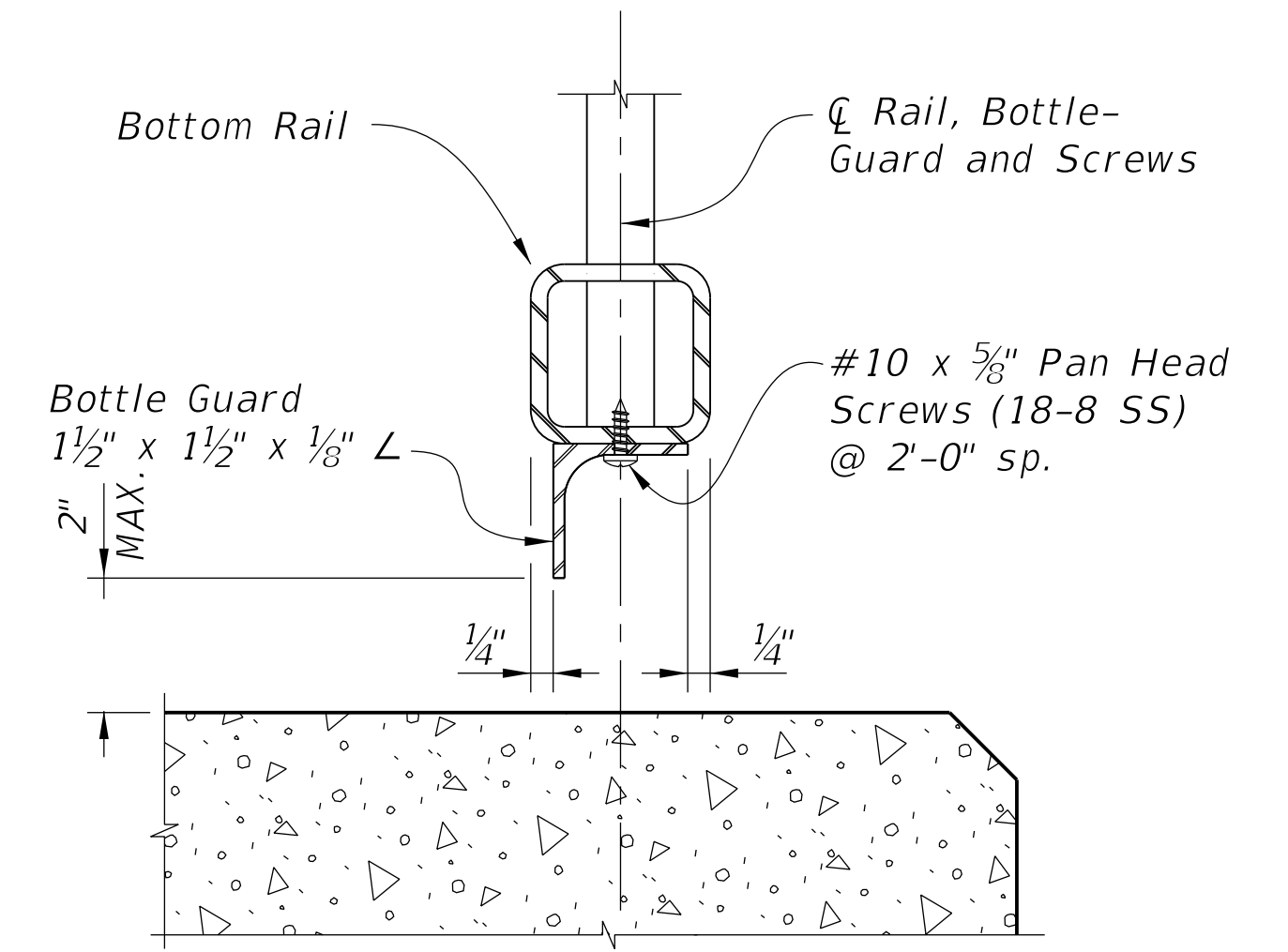
QUAN.	BY	CHK.	DATE
DR.	BY	CHK.	DATE
DES.			

DESCRIPTION OF REVISION

CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
STEEL PEDESTRIAN AND BICYCLE RAILING (1 OF 4)	
COUNTY: CLARENDON/ORANGEBURG	ROUTE: I-95



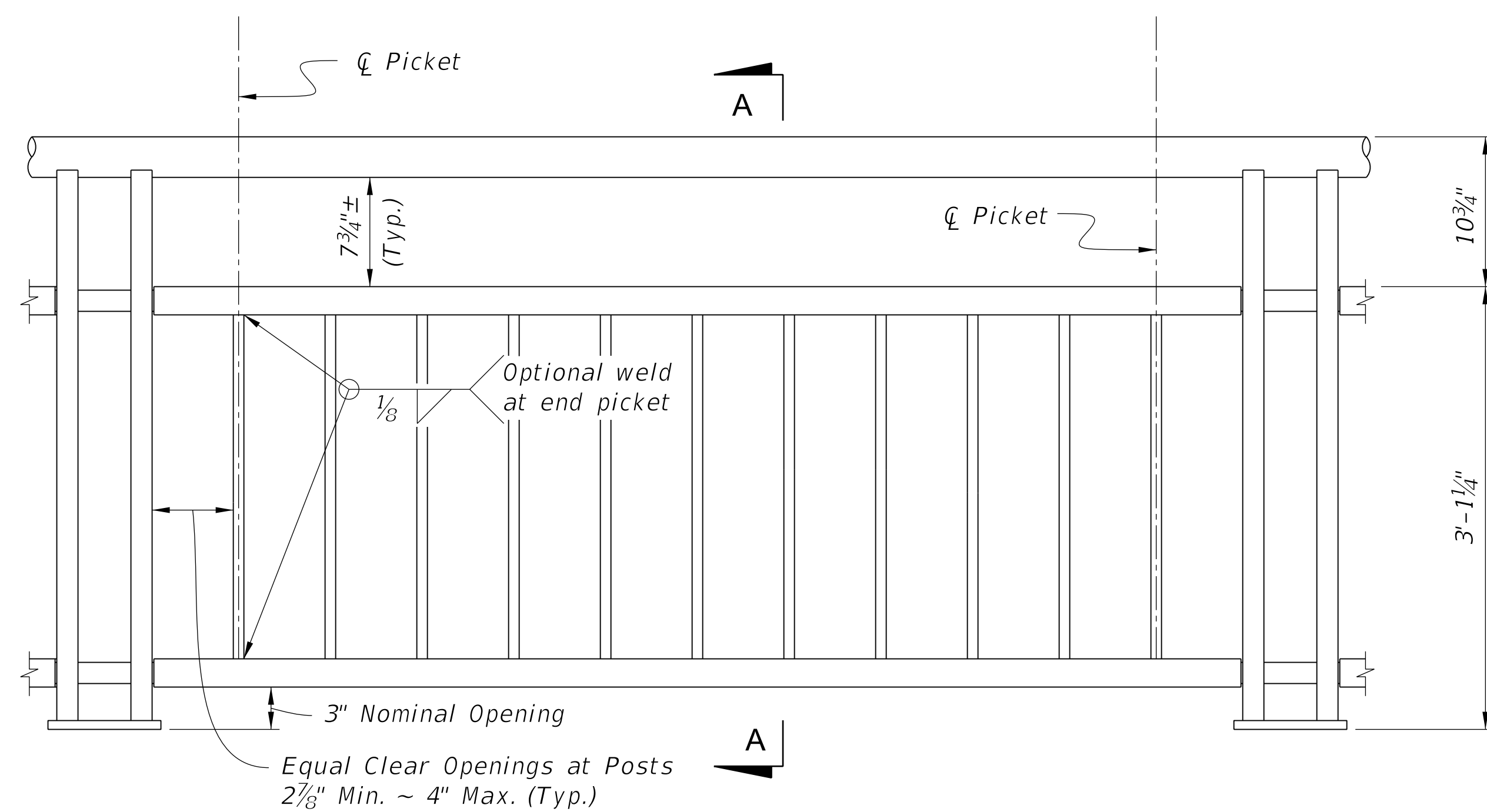
* Deck Joint at Begin Bridge or End Bridge shown; Deck Joint at ϕ Pier or Intermediate Bent similar.



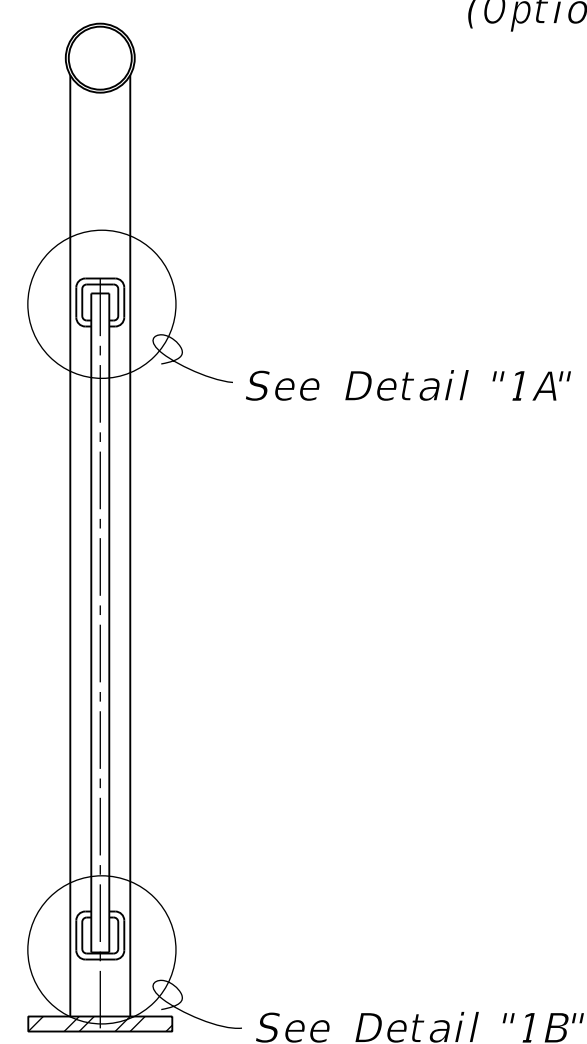
REV.	QUAN.	DATE	DESCRIPTION OF REVISION

REVIEWED	BY	CHK.	DATE

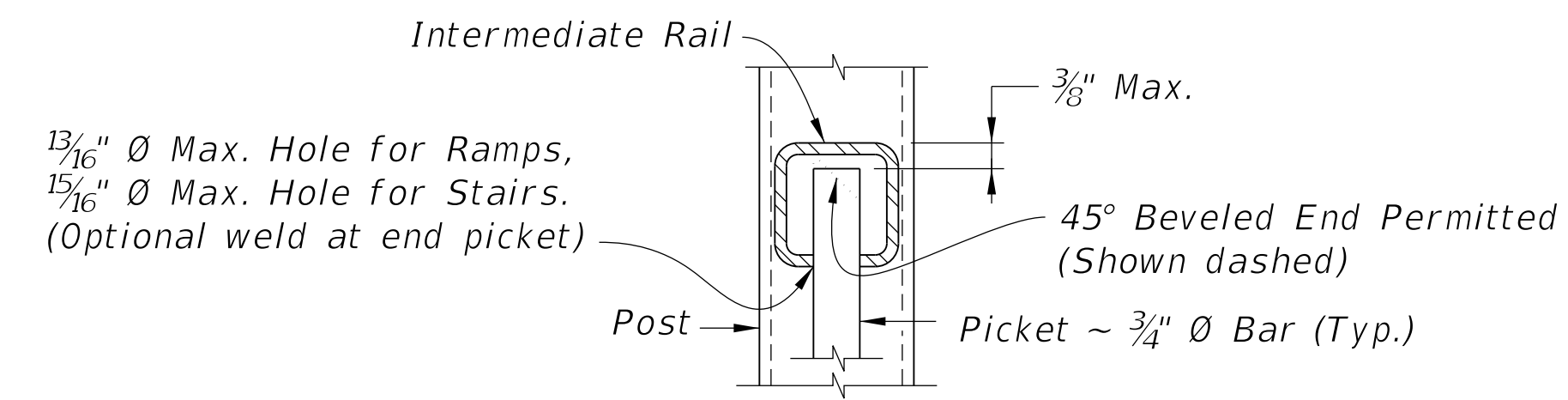
CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
STEEL PEDESTRIAN AND BICYCLE RAILING (2 OF 4)	
COUNTY: CLARENDON/ORANGEBURG	ROUTE: I-95



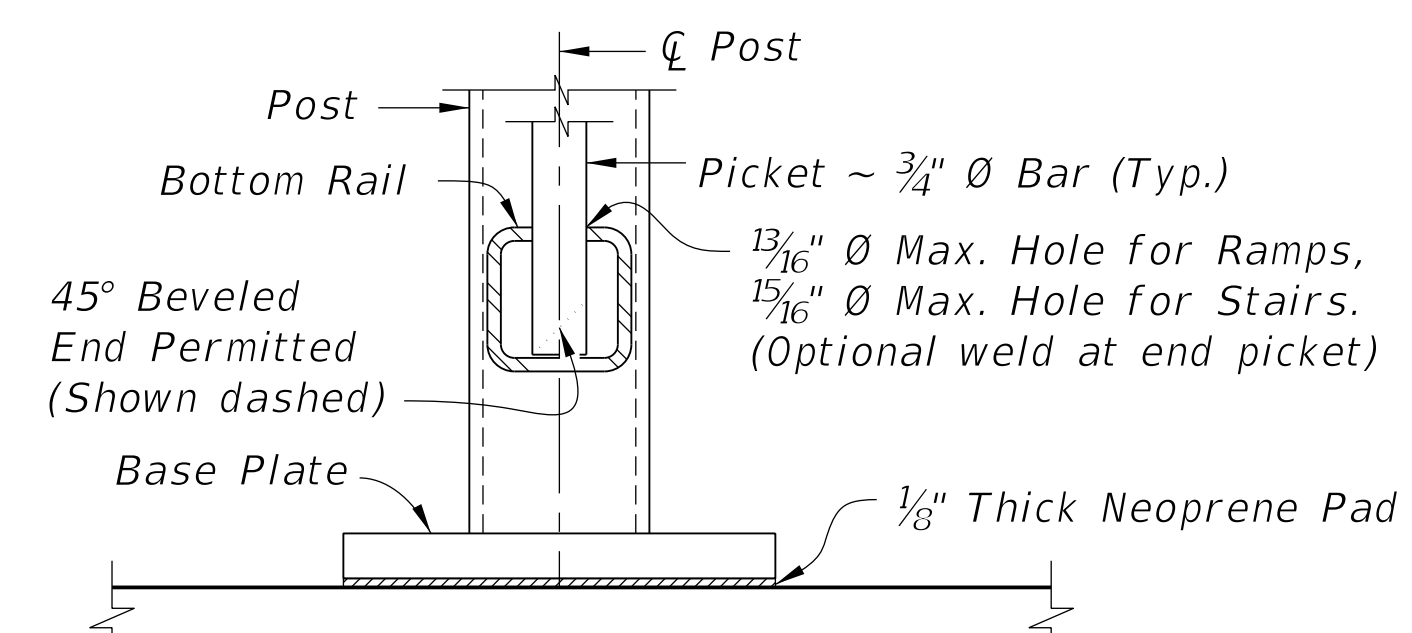
PICKET INFILL PANEL
(Anchor Bolts not shown)



SECTION A-A



DETAIL "1A"
(Top of Picket Connection)



DETAIL "1B"
(Bottom of Picket Connection, Anchor Bolts not shown)

REVIEWED

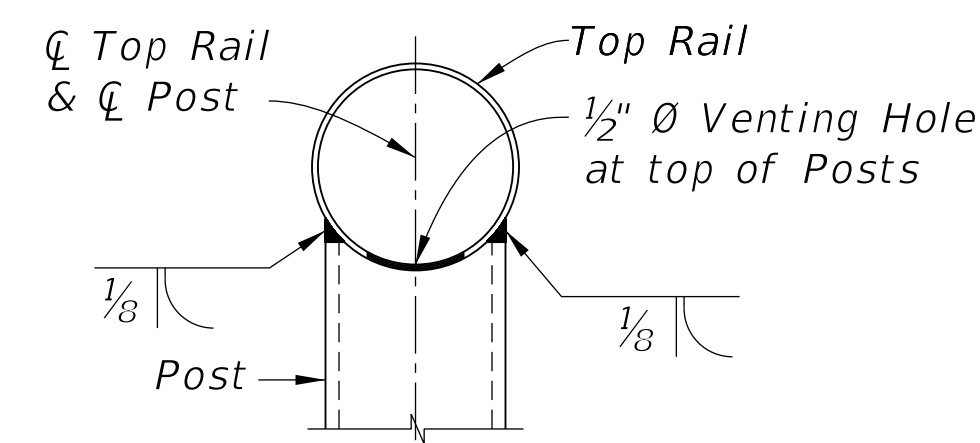
QUAN.	DR.	DES.	BY	CHK.	DATE

SSPRINT_PROPRTIESSS

REV.	BY	CHK.	DATE	DESCRIPTION OF REVISION

QUAN.	DR.	DES.	BY	CHK.	DATE

CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
STEEL PEDESTRIAN AND BICYCLE RAILING (3 OF 4)	
COUNTY: CLARENDON/ORANGEBURG	ROUTE: I-95



SECTION A-A
(Top Rail Connection)

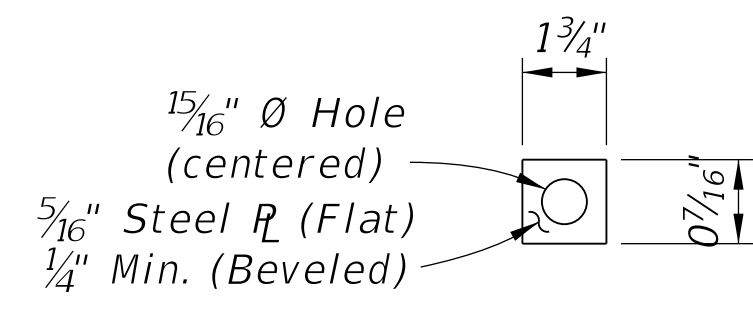
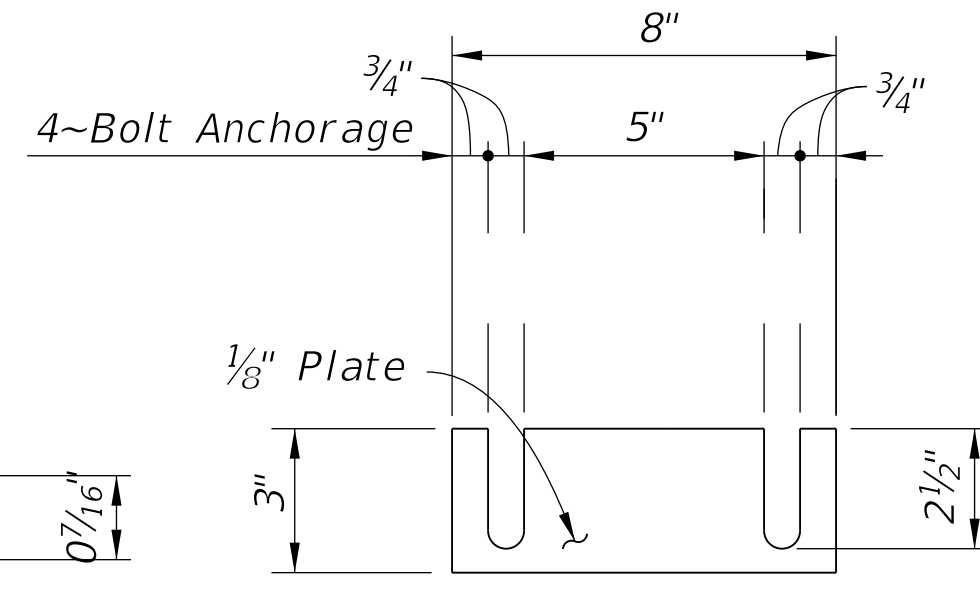
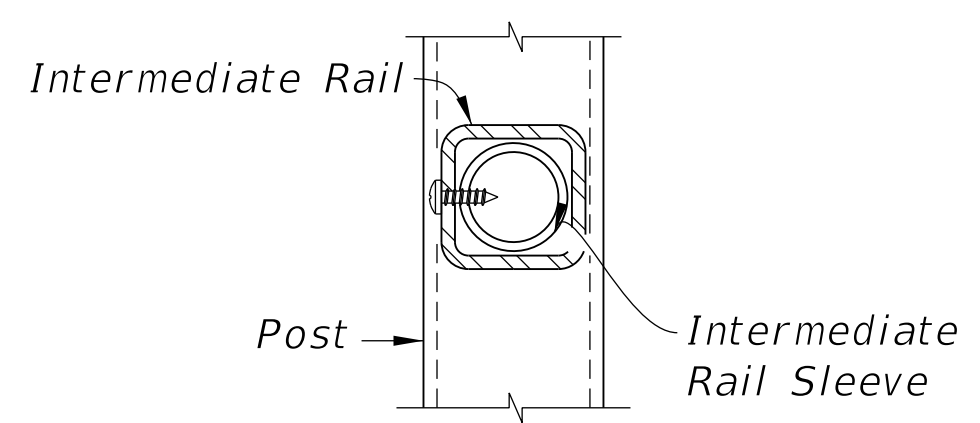


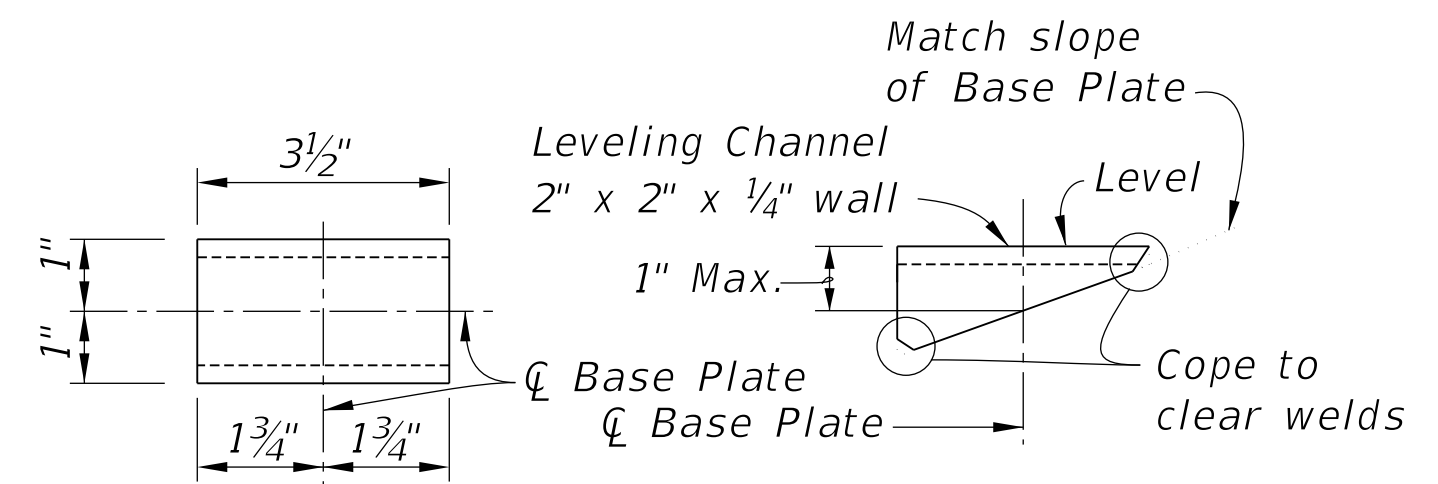
PLATE WASHER
DETAIL



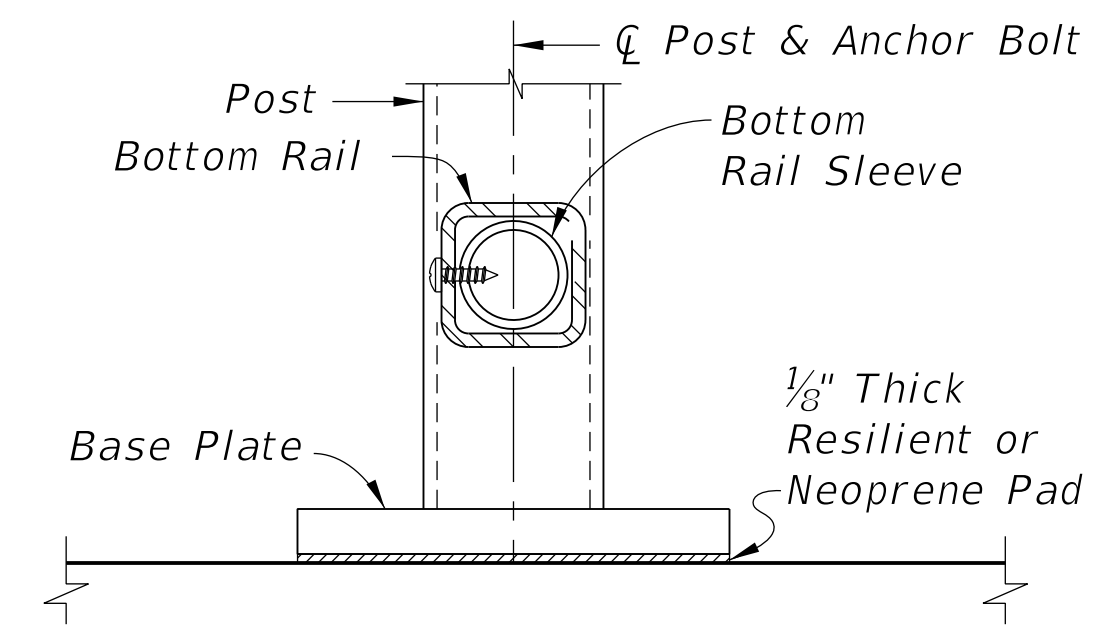
SHIM PLATE
DETAIL



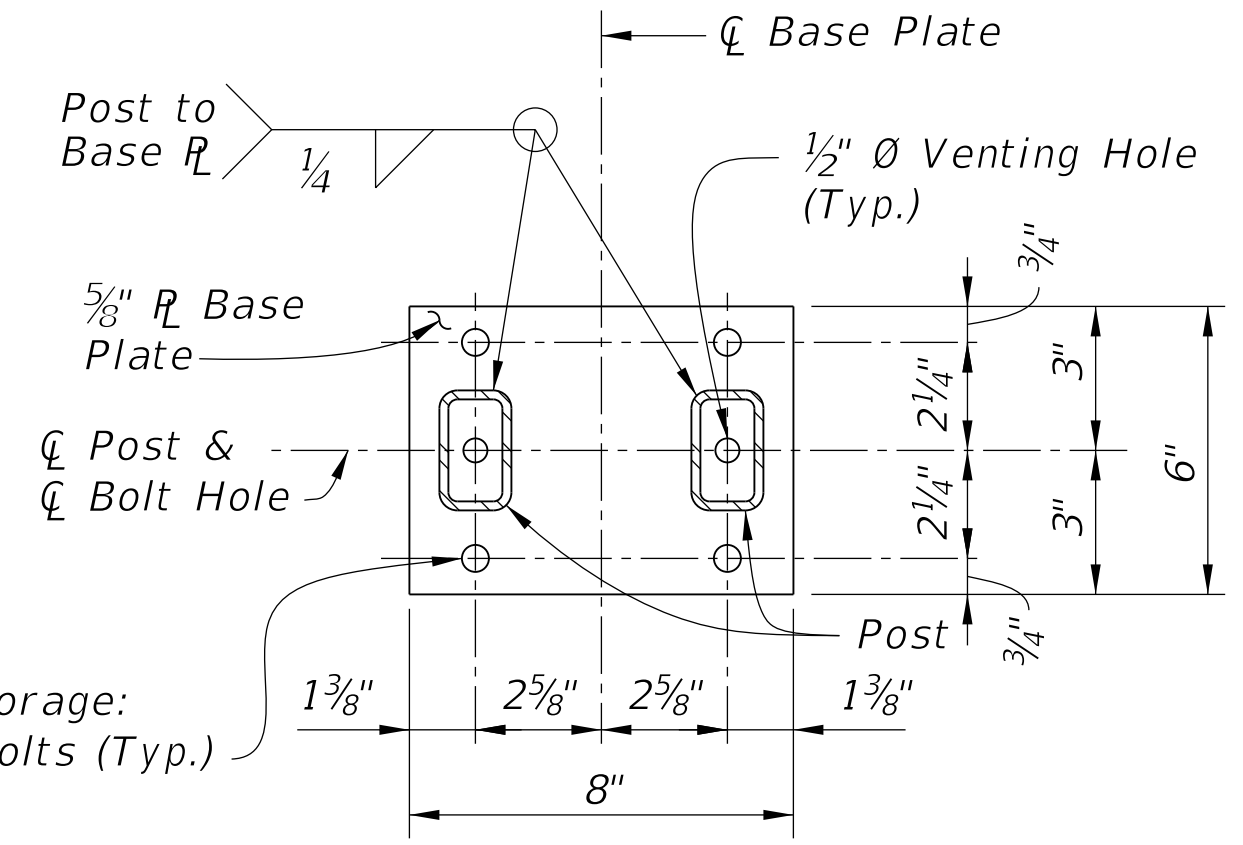
SECTION C-C
(Intermediate Rail Connection)



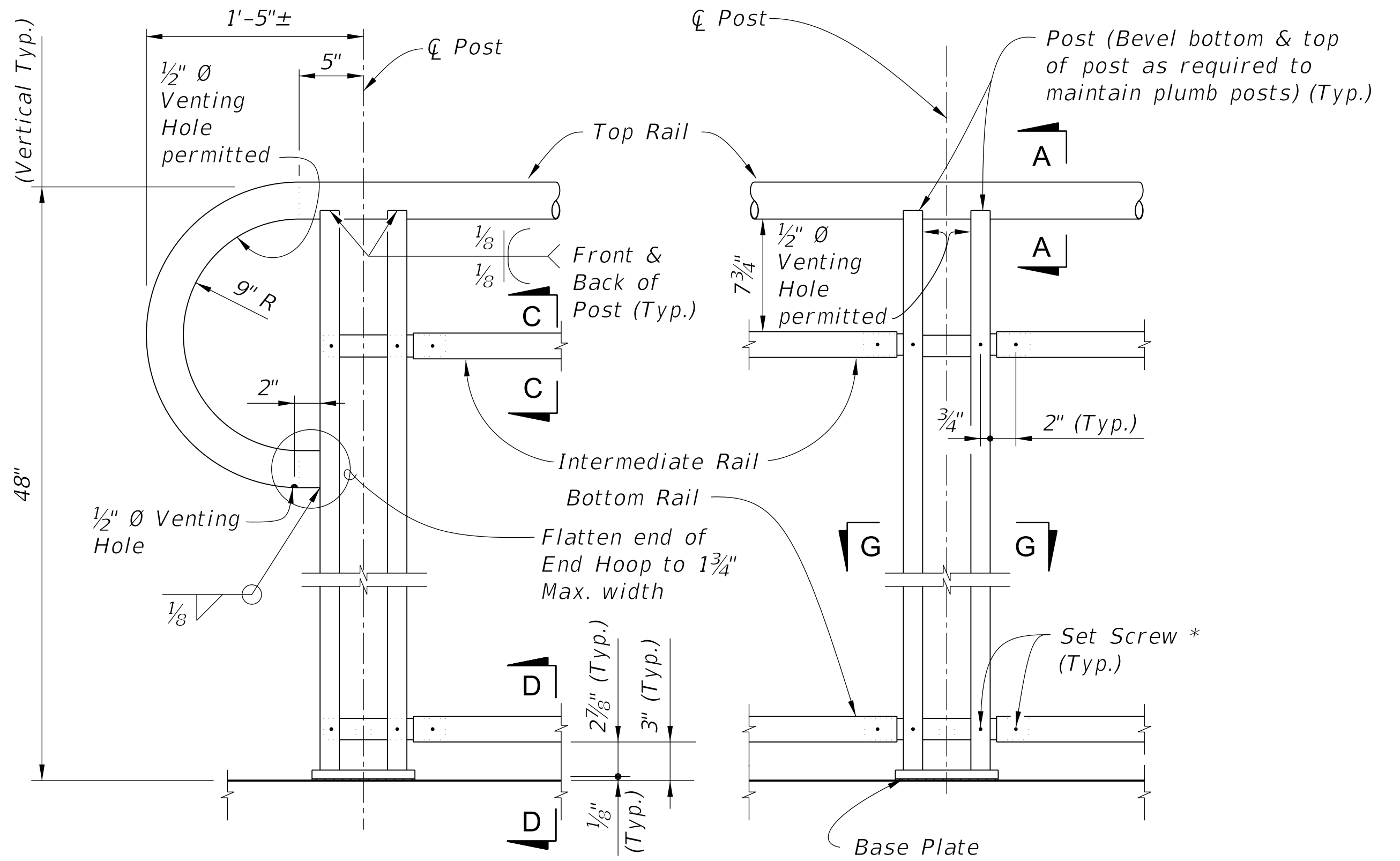
TOP VIEW
SIDE VIEW
LEVELING CHANNEL
DETAIL



SECTION D-D
(Bottom Rail Connection -
Anchor Bolts not Shown)

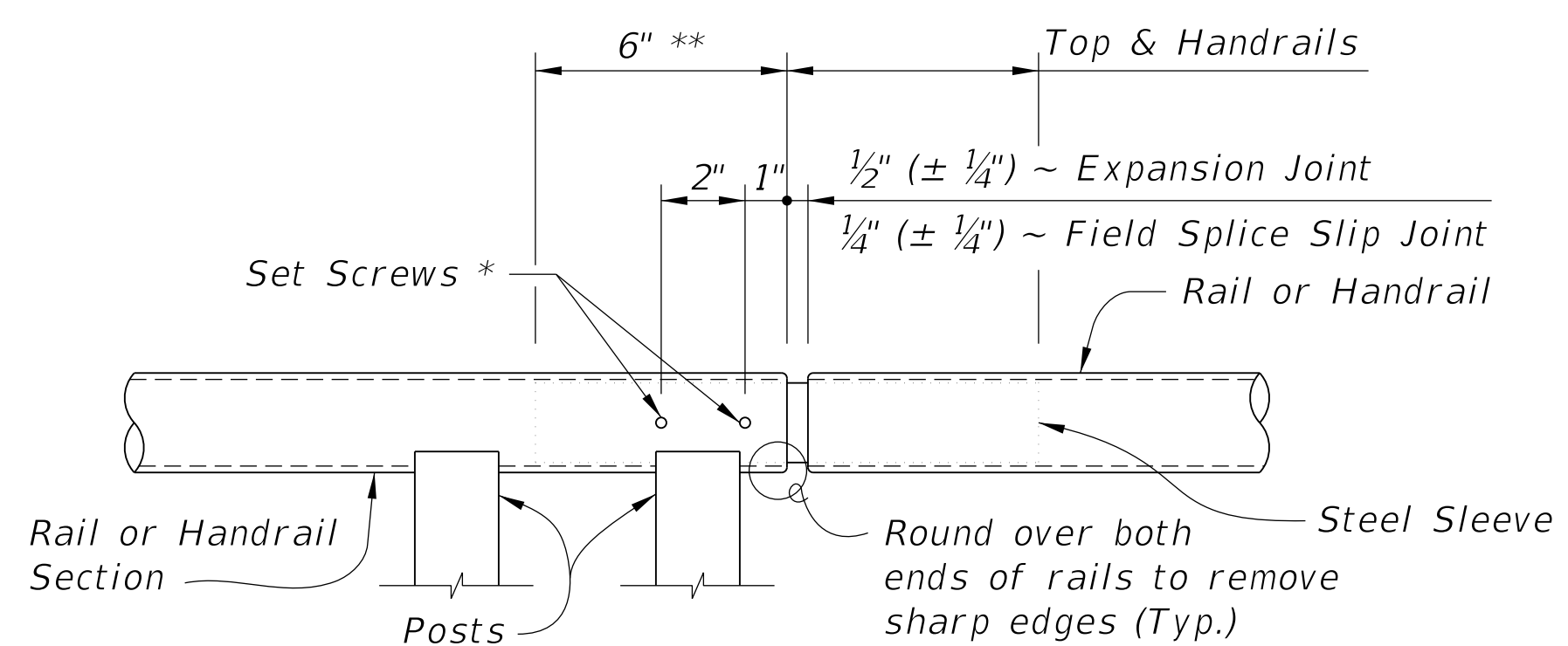


SECTION G-G - BASE PLATE
DETAILS

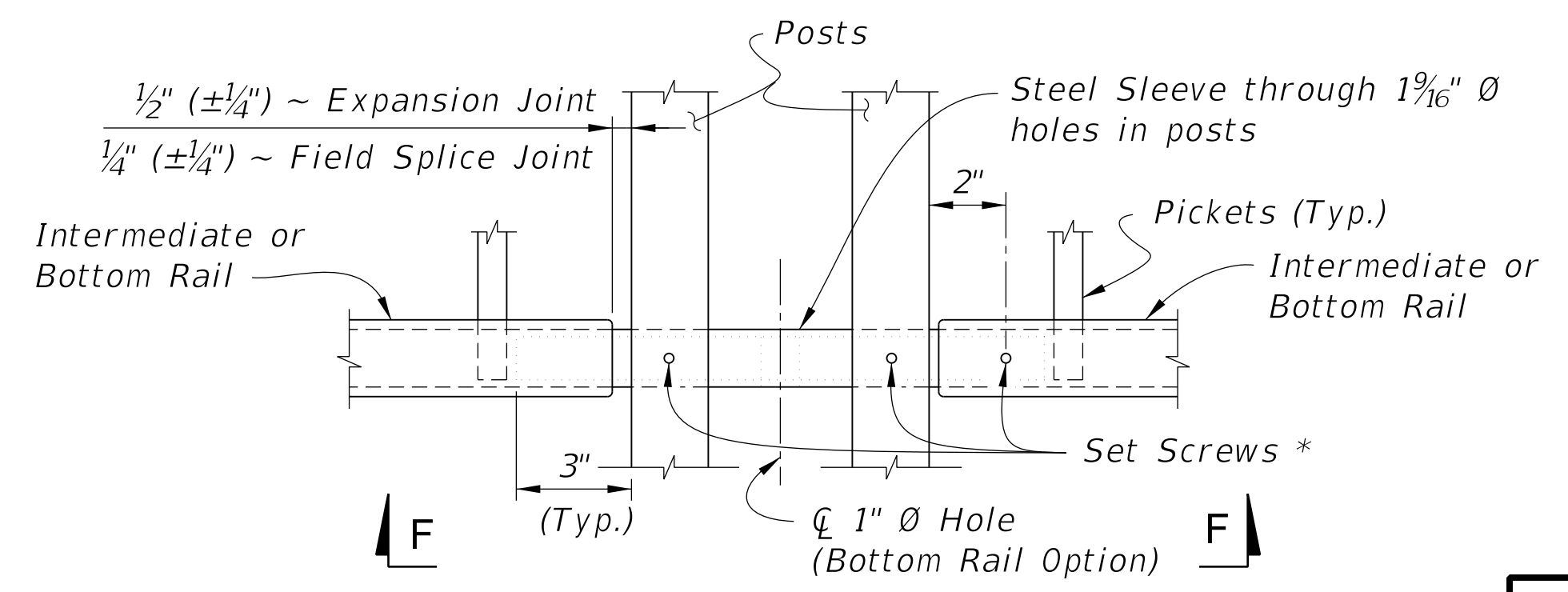


DETAIL "A" - RAIL CONNECTIONS
(Pickets/Panels and Anchor Bolts
Not Shown for Clarity)

NOTES:
* 1/4" Ø x 3/4" Pan Head Stainless Steel (Type 316 or 18-8 Alloy) Set Screws. Screws must be set flush against the outside face of rails & posts and underside of handrails. 1/2" Ø plug welds may be substituted for the Set Screws. Do not provide Set Screws for Rails at free end of Expansion Joints.
** Embedded length may be 4" for plug welded connection.

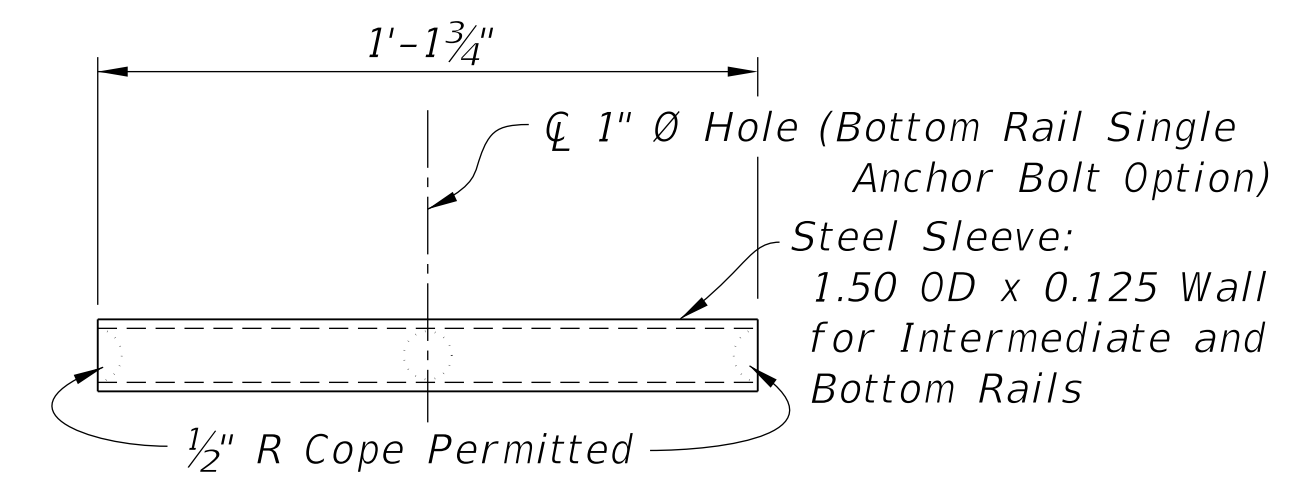


ROUND RAILS - TOP RAIL OR HANDRAIL
(Top Rail at Expansion Joint Shown)



SQUARE RAILS - INTERMEDIATE OR BOTTOM RAIL
(Bottom Rail at Expansion Joint Shown)

DETAIL "B" - EXPANSION JOINT (FIELD SPLICE SLIP JOINT SIMILAR)



VIEW F-F
INTERMEDIATE OR BOTTOM RAIL -
STEEL SLEEVE DETAIL (Bottom Side Shown)

SSPRINT_PROPERTIES					
REV.	QUAN.	BY	CHK.	DATE	DESCRIPTION OF REVISION

REVIEWED	BY	CHK.	DATE

CONSULTANT NAME/LOGO

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

**STEEL PEDESTRIAN AND
BICYCLE RAILING (4 OF 4)**

COUNTY: CLARENDON/ORANGEBURG | ROUTE: I-95