


**NOTES:**

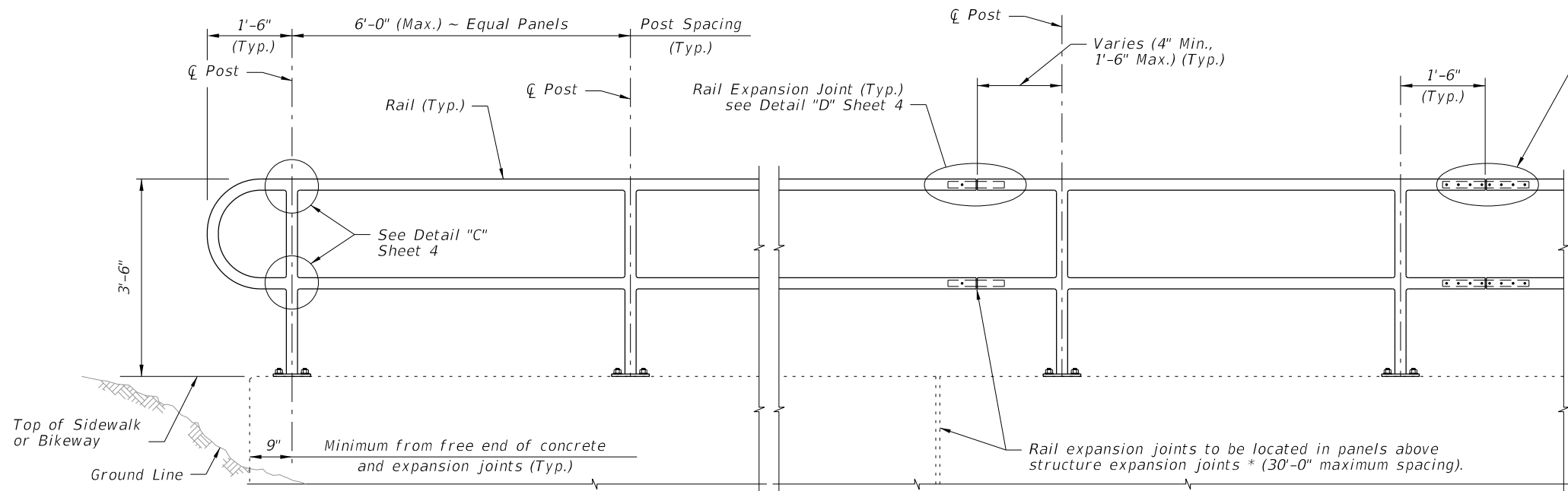
1. Shop Drawings are required.
2. Work with Specification 515.
3. Materials:
  - A. Pan Head Set Screws: Aluminum Alloy 2024-74 or 7075-T73 or Stainless Steel (SS) Type 316 or 18-8 Alloy.
  - B. Base Plates and Cap Plates: ASTM B209, Alloy 6061-T6
  - C. Structural Pipe Tube and Bars: ASTM B221 or ASTM B429, Alloy 6061-T6
  - D. End Rails 90° bends and corner bends with a maximum 4 foot spacing; Alloy 6063-T5 is permitted.

RAILING MEMBER DIMENSIONS TABLE			
MEMBER	DESIGNATION	OUTSIDE DIMENSION	WALL THICKNESS
Posts	2" NPS (Sch. 40)	2.375"	0.154"
Rails	2" NPS (Sch. 40)	2.375"	0.154"
Rail Joint/Splice Sleeves	1½" NPS (Sch. 40)	1.900"	0.145"
Handrails Joint/Splice Sleeves	1" NPS (Sch. 40) 1.50 ODx0.125 Wall	1.315" 1.500"	0.133" 0.125"
Handrails	1½" NPS (Sch. 40)	1.900"	0.145"
Handrail Support Bar	1" Ø Round Bar	1.000"	N/A

- E. Galvanized Steel Fasteners:
    - a. Hex Head Bolts: ASTM A 307 Type 1 or ASTM F1554 Grade 36
    - b. Adhesive Anchors: ASTM F1554 Grade 36 fully threaded rods
    - c. Hex Nuts: ASTM A563
    - d. Flat Washers: ASTM F436
  - F. Aluminum Shims: ASTM B209, Alloy 6061
  - G. Bearing Pads: Plain, Fabric Reinforced, or Fabric Laminated meeting requirements of Specifications 515 & 932.
4. Fabrication:
  - A. Place expansion joints at a maximum of 30'-0" spacing
  - B. Field splices are similar to the expansion joint detail and may be approved by the Engineer to facilitate handling; but top rail must be continuous across a minimum of two posts.
  - C. Continuity field splice (Detail "E"); only use to make the railing continuous for unforeseen field adjustments
  - D. Corners and changes in tangential longitudinal alignment may be made continuous with a 9" bend radius or terminated at adjoining sections with a standard end hoop when handrails are not required.
  - E. For curved longitudinal alignments, shop bend top and bottom rails and handrails to match the alignment radius.
  - F. For changes in tangential longitudinal alignment greater than 45°, position posts a maximum of 2'-0" each side of the corner, not at the corner apex.
5. Handrails are required and must be continuous at landings for:
  - A. Grades Steeper than 5%
  - B. Three or more steps
6. Cutting of reinforcing steel is permitted for post installed anchor bolts.

10/3/2023 12:51:10 PM

LAST REVISION 11/01/18	REVISION	DESCRIPTION:	 <b>FY 2024-25 STANDARD PLANS</b>	<b>PIPE GUIDERAIL (ALUMINUM)</b>	INDEX <b>515-070</b>	SHEET <b>1 of 5</b>
---------------------------	----------	--------------	---	----------------------------------	-------------------------	------------------------



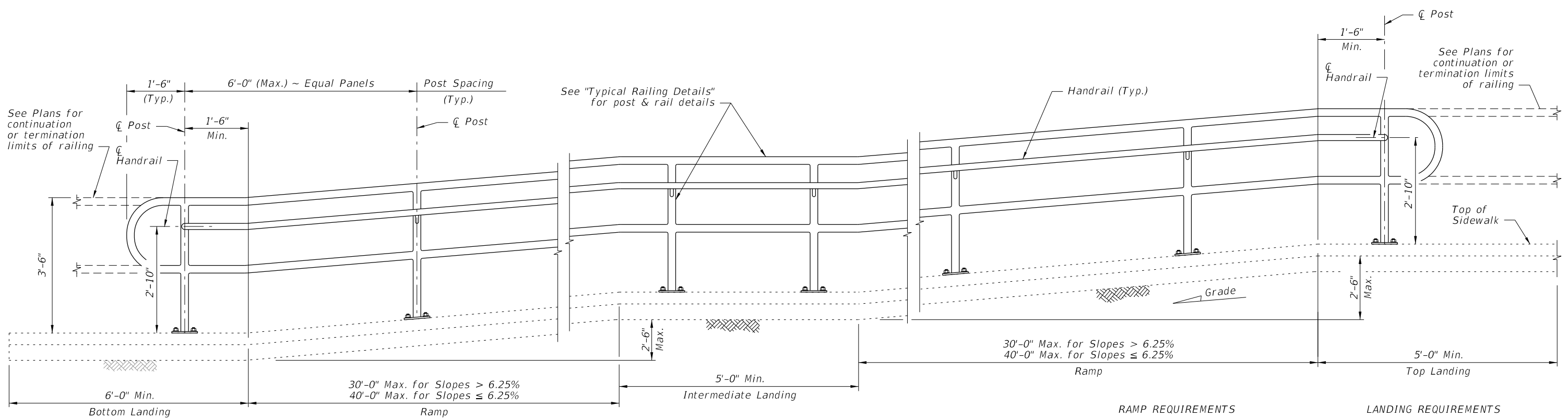
NOTES:  
 NPS = Nominal Pipe Size

STRUCTURES EXPANSION JOINTS NOTE:  
 \* Keyed construction joints in Index 400-011 Gravity Wall are not considered to be expansion joints.

CROSS REFERENCE:  
 For Details "C", "D" and "E", see Sheet 4.

ELEVATION

TYPICAL RAILING DETAILS & RAILINGS ON GRADES 0% TO 5%



ELEVATION  
 (Showing Inside Face of Railing)

RAMP REQUIREMENTS


For slopes greater than 5%:  
 Max. ramp slope = 8.33%  
 Max. ramp cross-slope = 2.0%

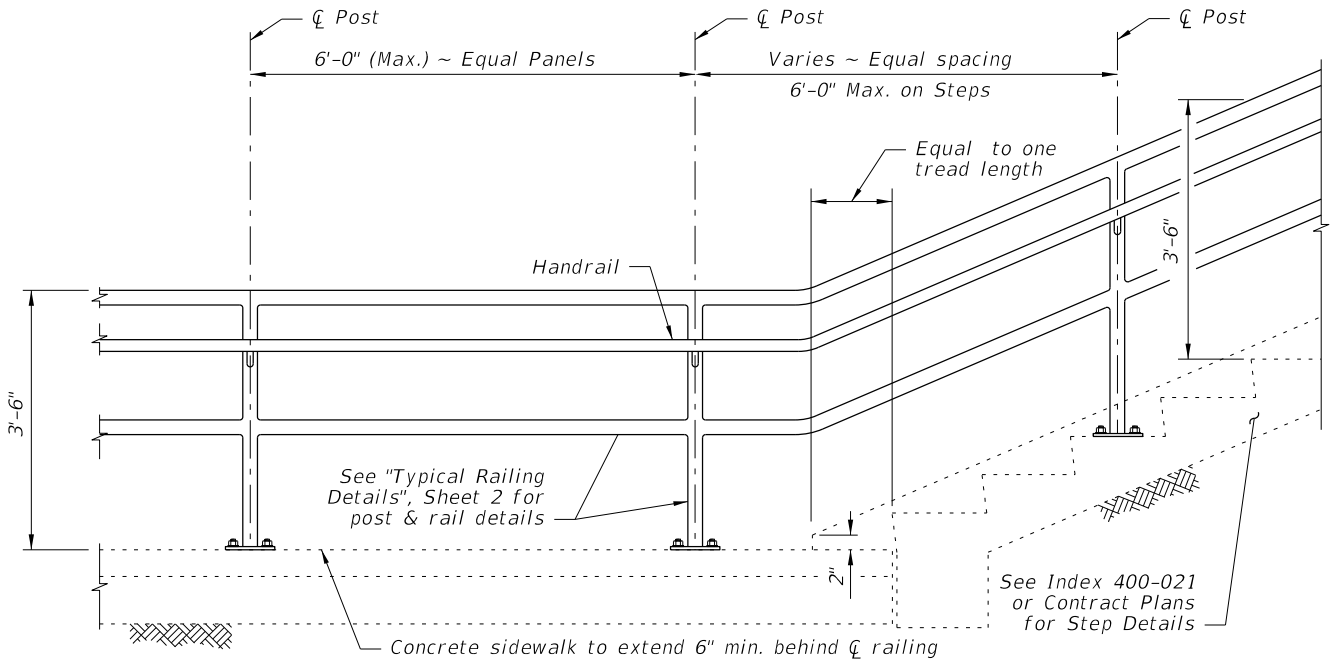
LANDING REQUIREMENTS

Max. landing slope = 2%  
 Max. landing cross-slope = 2%

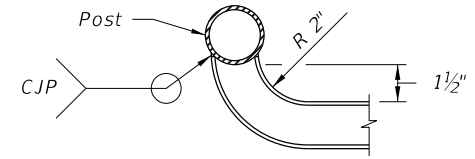
RAILINGS ON GRADES STEEPER THAN 5% TO 8.33%

10/3/2023 12:51:16 PM

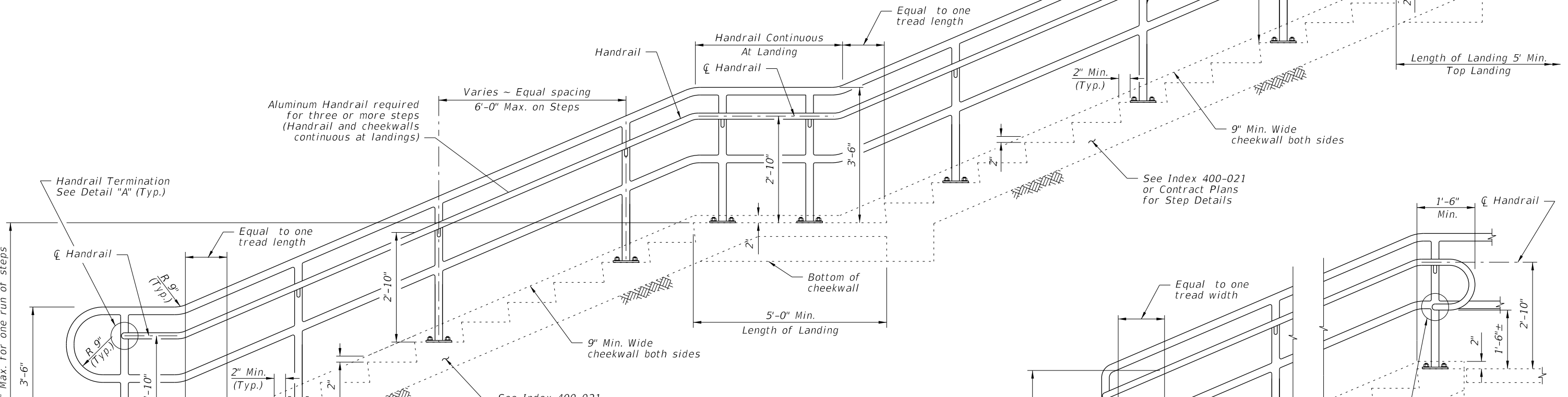
LAST REVISION 11/01/17	DESCRIPTION:		FY 2024-25 STANDARD PLANS	PIPE GUIDERAIL (ALUMINUM)	INDEX	SHEET
					515-070	2 of 5



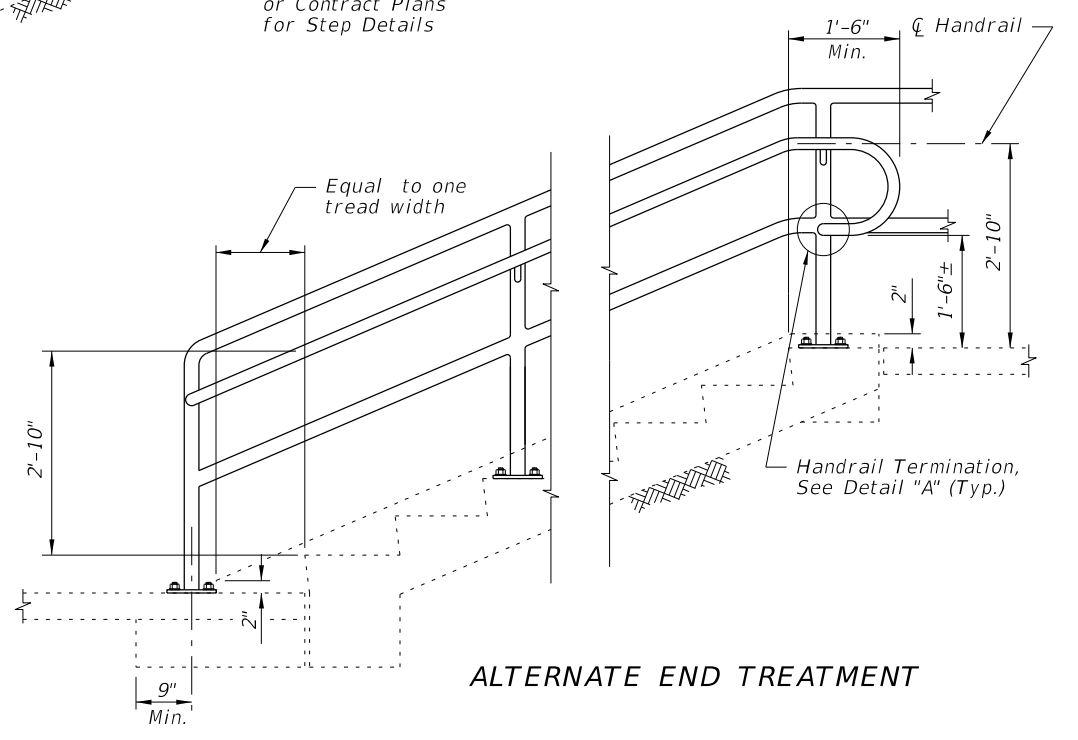
**RAILING CONTINUATION BEYOND STEPS**  
(Bottom shown, Top similar)



**DETAIL "A" - PLAN VIEW**  
**HANDRAIL TERMINATION**



**ELEVATION**  
(At-Grade Steps)

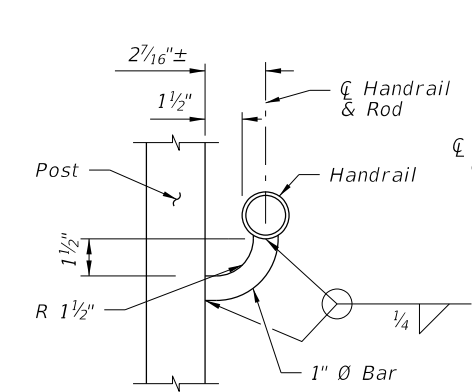


**ALTERNATE END TREATMENT**

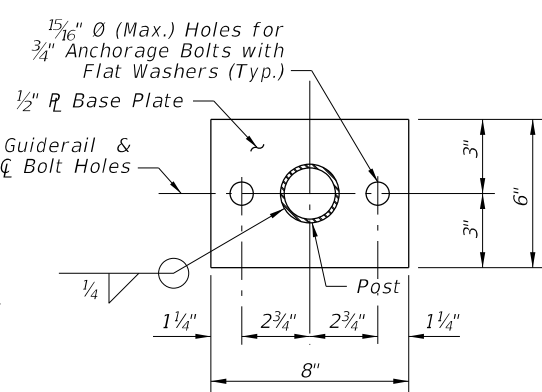
**GUIDERAIL ON STEPS & STAIRS**

10/3/2023 12:51:25 PM

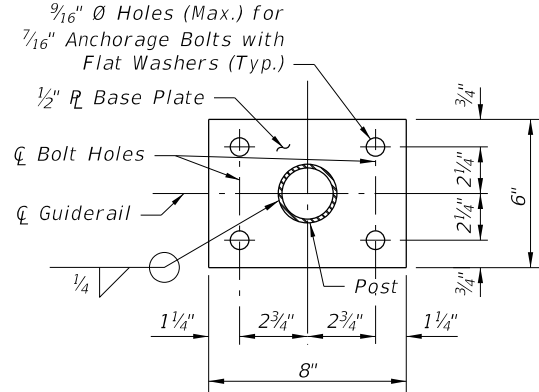
LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2024-25 STANDARD PLANS	PIPE GUIDERAIL (ALUMINUM)	INDEX 515-070	SHEET 3 of 5
---------------------------	----------	--------------	--	------------------------------	---------------------------	------------------	-----------------



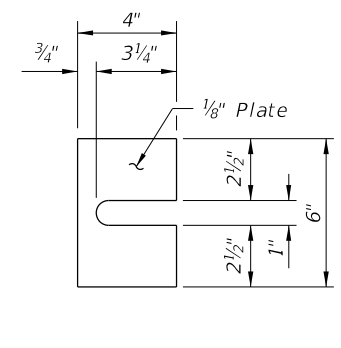
**SECTION B-B**  
(Handrail Connection)



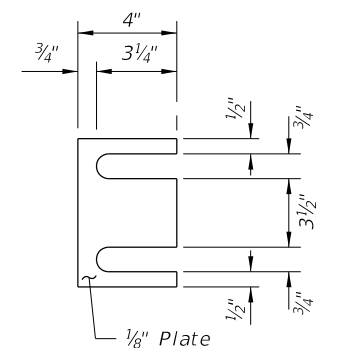
**SECTION C-C**  
BASE PLATE DETAIL  
(2~Bolt Anchorage)



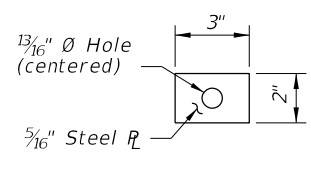
**SECTION C-C**  
BASE PLATE DETAIL  
(4~Bolt Anchorage)



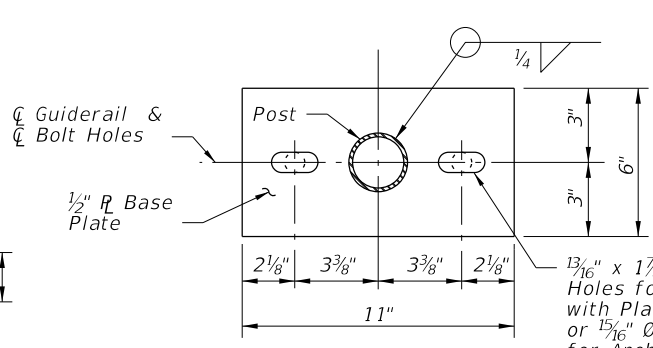
**SHIM PLATE DETAIL**  
(2~Bolt Anchorage)



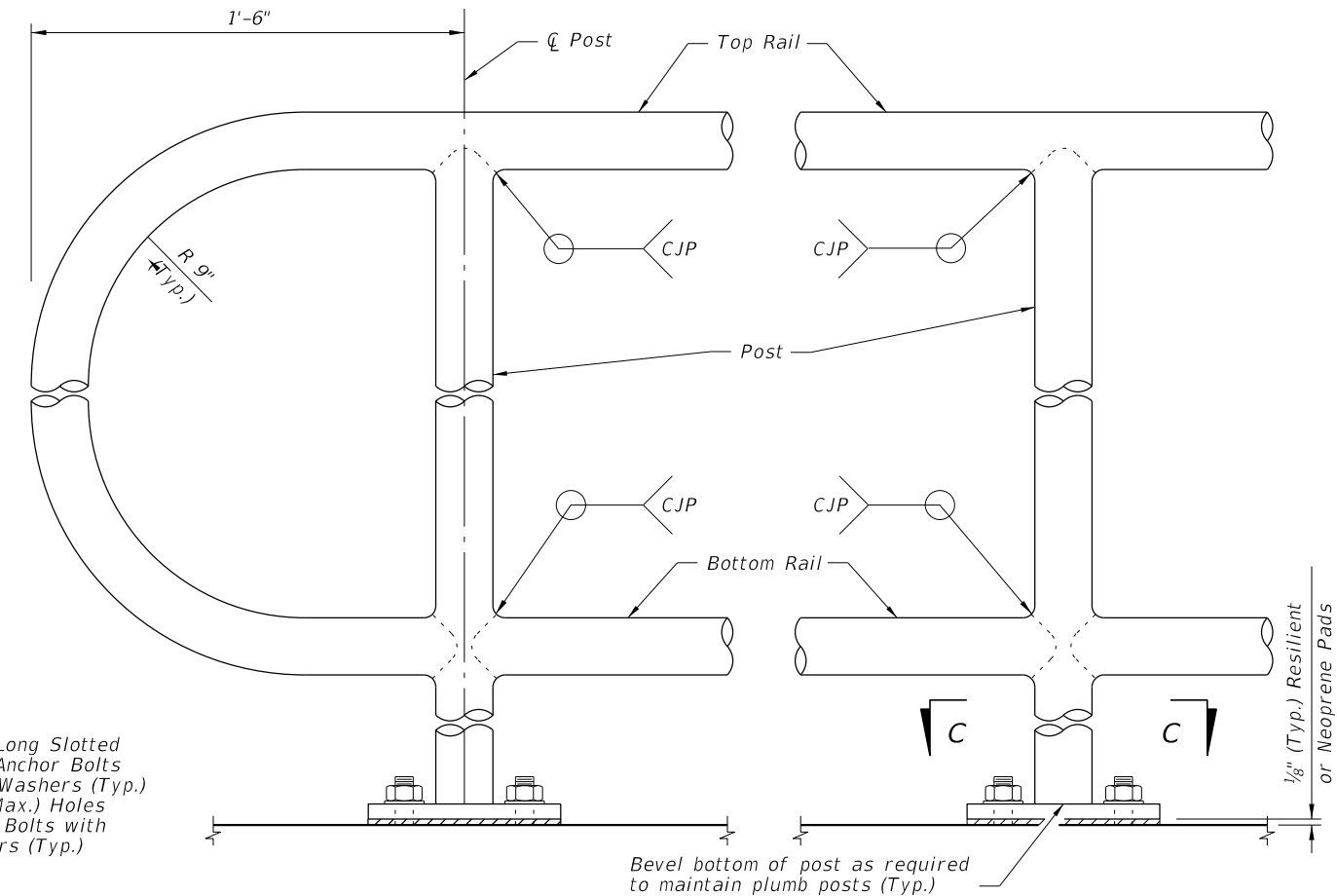
**SHIM PLATE DETAIL**  
(4~Bolt Anchorage)



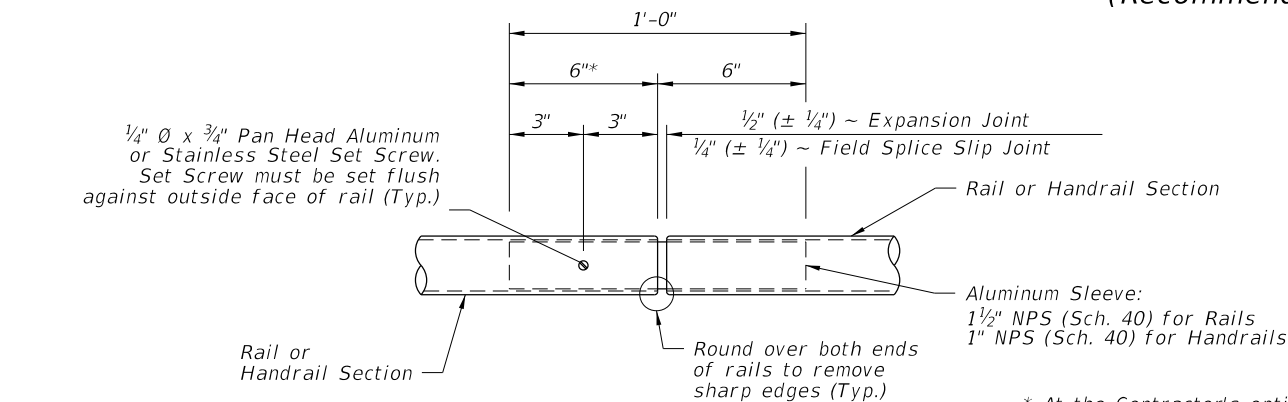
**PLATE WASHER**  
DETAIL



**ALTERNATE BASE**  
PLATE DETAIL  
(Recommended for Steep Slopes)

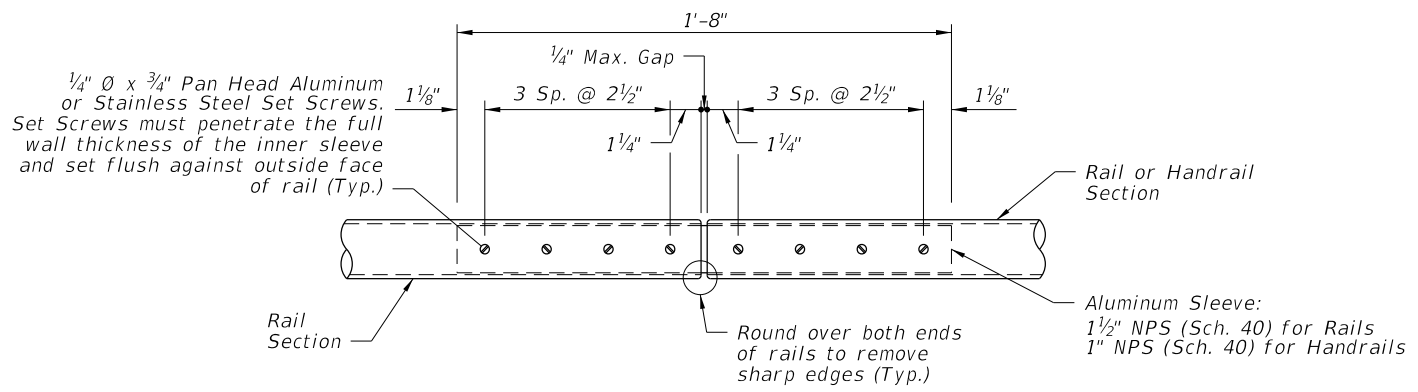


**DETAIL "C" - RAIL CONNECTIONS**  
(Handrail and 4~Bolt Anchorage Not Shown)

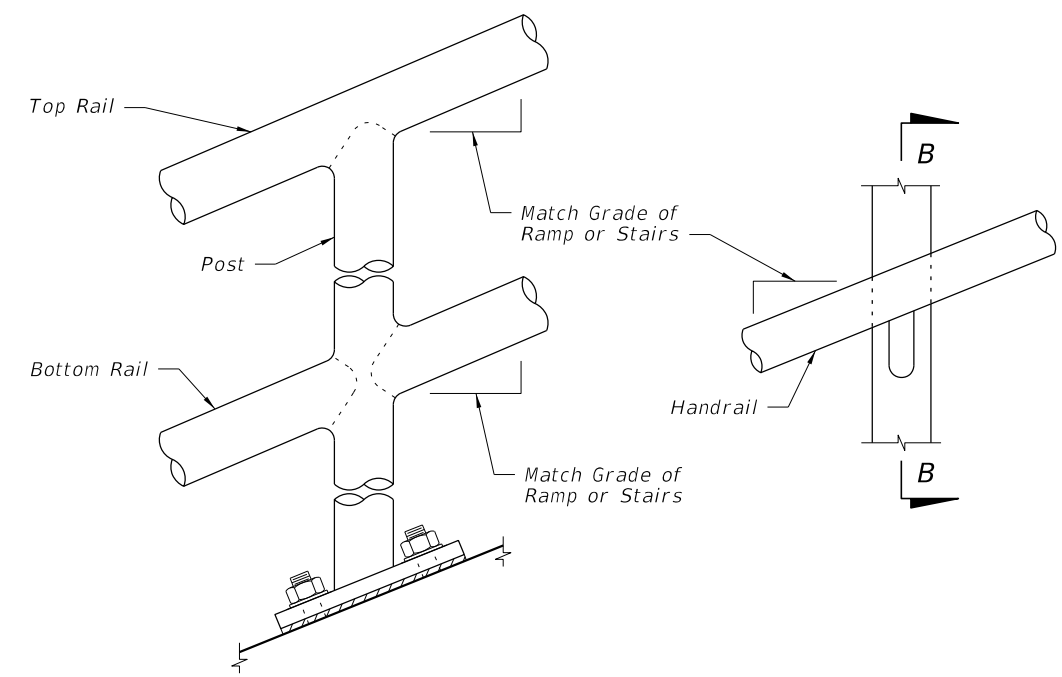


**DETAIL "D" - EXPANSION JOINT**  
(FIELD SPLICE SLIP JOINT SIMILAR)

\* At the Contractor's option, embedded length may be 4" when a 3/4" diameter plug weld is substituted for the 1/4" diameter set screw.



**DETAIL "E" - CONTINUITY**  
FIELD SPLICE

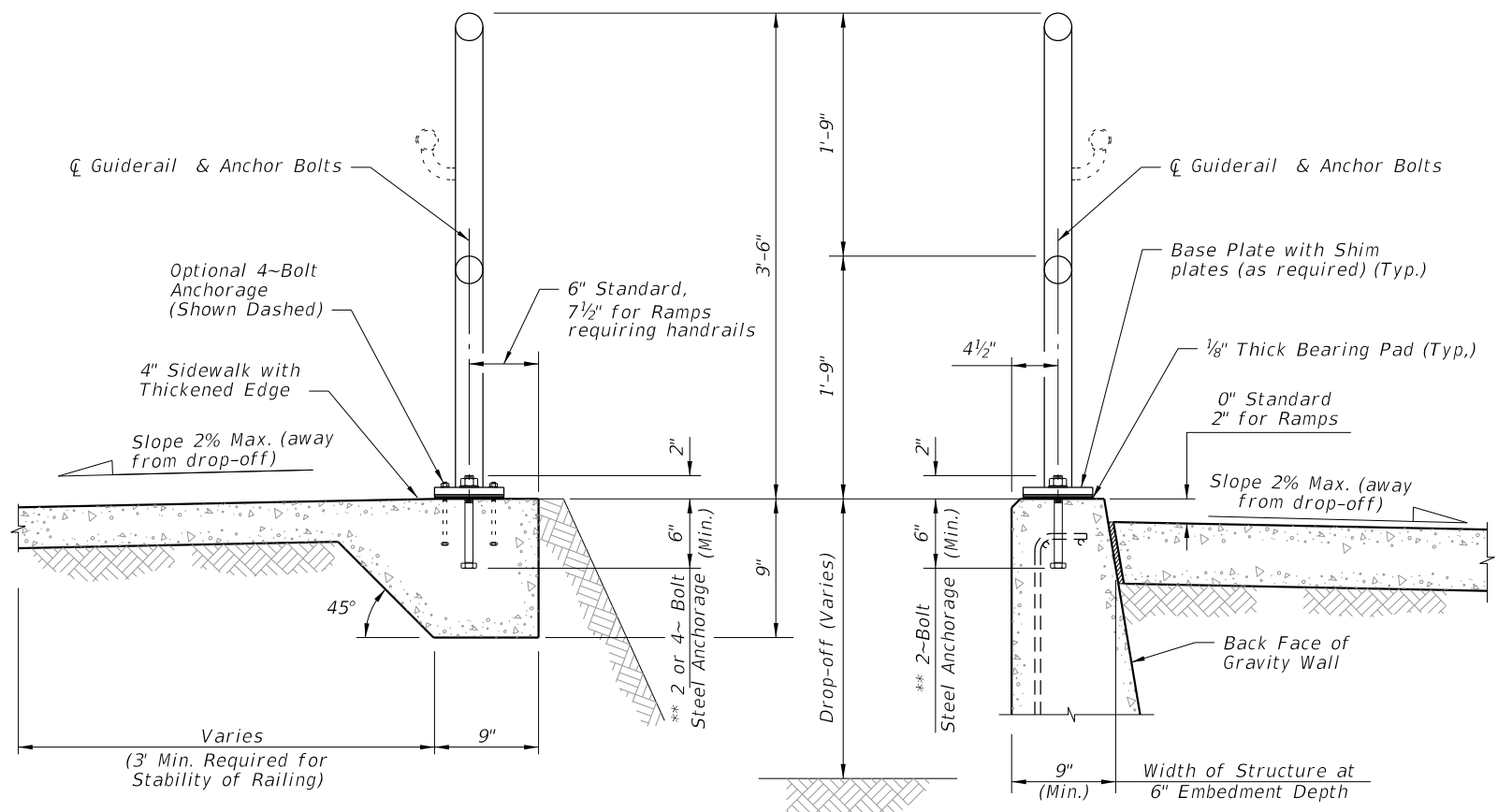


**DETAIL "B" - RAIL AND HANDRAIL**  
(Showing Sloped Condition for Ramps with 2~Bolt Anchorage)

CROSS REFERENCE:  
For locations of Details "C", "D" and "E", see Sheet 2.

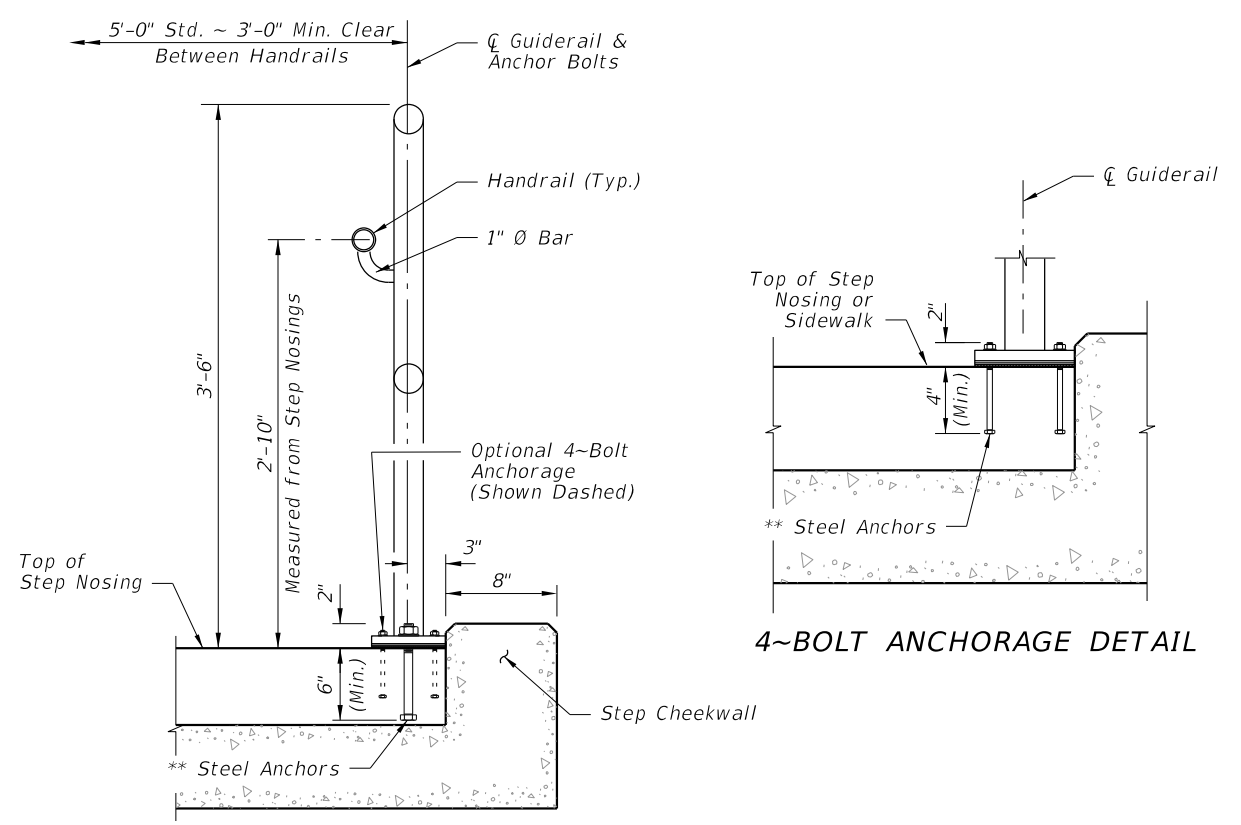
10/3/2023 12:51:31 PM

LAST REVISION 11/01/17	REVISION	DESCRIPTION:		FY 2024-25 STANDARD PLANS	PIPE GUIDERAIL (ALUMINUM)	INDEX 515-070	SHEET 4 of 5
---------------------------	----------	--------------	--	------------------------------	---------------------------	------------------	-----------------



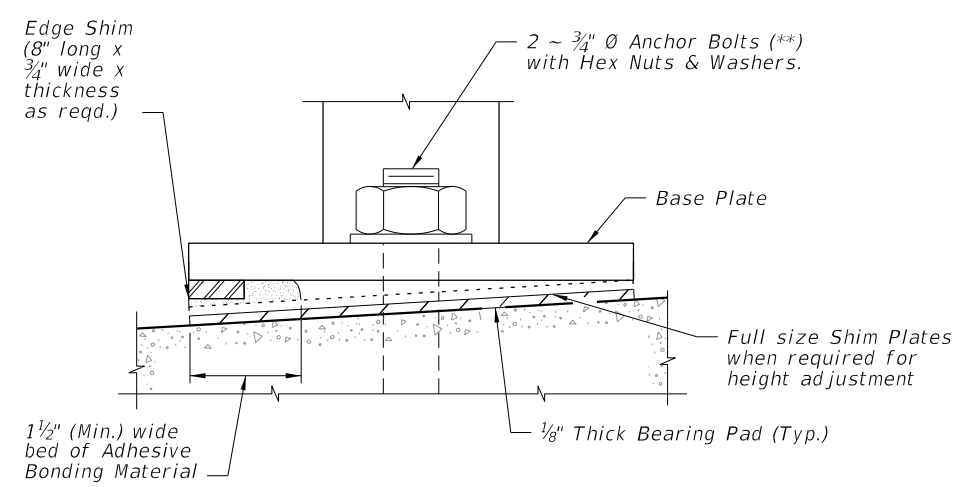
TYPICAL SECTION ON CONCRETE SIDEWALK

TYPICAL SECTION ON GRAVITY WALL  
(Other Retaining Walls Similar)

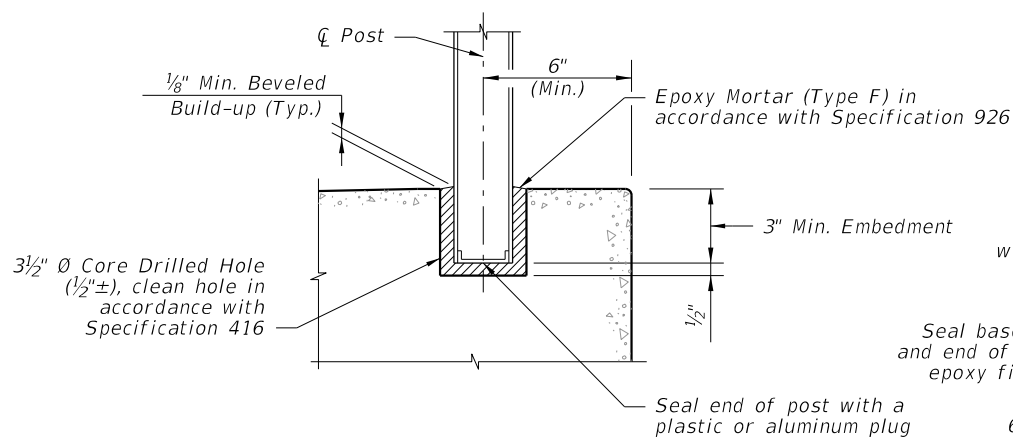


TYPICAL SECTION ON STEPS & STAIRS

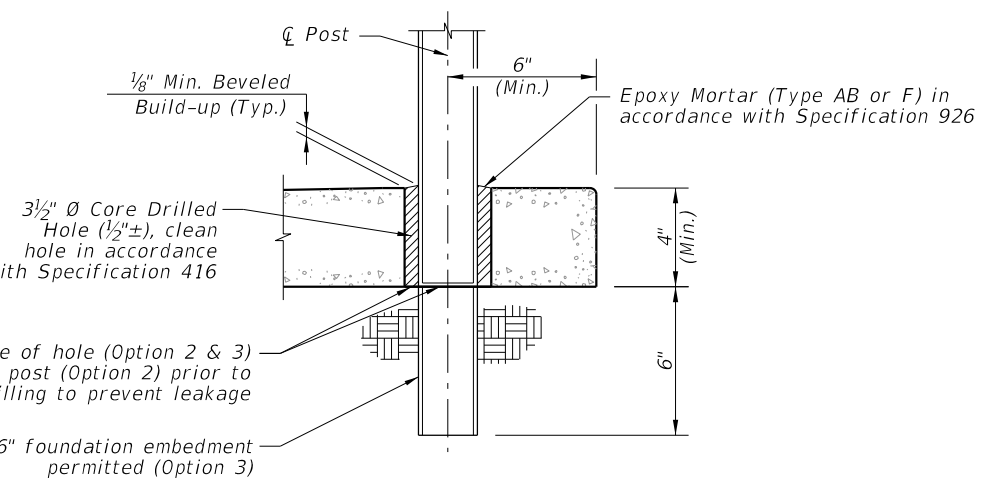
4~BOLT ANCHORAGE DETAIL



DETAIL "F" (OPTIONAL SHIMMING DETAIL FOR CROSS SLOPE CORRECTION)  
(Used in lieu of Beveled Shim Plates)



SIDEWALK ANCHORAGE DETAIL OPTION 1



SIDEWALK ANCHORAGE DETAIL OPTION 2 & 3

NOTES:  
 \*\* 2 - 3/4" Ø x 8" or 4 - 7/16" Ø x 6" Steel Anchors: Galvanized Steel Bolts (As Shown) (C-I-P); Galvanized U-Bolts Permitted (C-I-P); Galvanized Adhesive Anchors Permitted  
 \*\*\* The minimum embedment for Adhesive Anchors is 6" for 2-Bolt Anchorage or 4" for 4-Bolt Anchorage.

10/3/2023 12:51:38 PM

LAST REVISION 11/01/20	REVISION	DESCRIPTION:		FY 2024-25 STANDARD PLANS	PIPE GUIDERAIL (ALUMINUM)	INDEX 515-070	SHEET 5 of 5
---------------------------	----------	--------------	--	------------------------------	---------------------------	------------------	-----------------