## NOTES

APPLICABILITY NOTE TO DESIGNER:

This Index is not approved for use on bridges. This railing is not applicable for shielding drop-off hazards for vehicular traffic. This railing is applicable for all cases where a pedestrian or bicyclist drop-off hazards do not exceed 2'-6", Pedestrian/Bicycle Railings for customary applications are provided in Index No's. 850 or 860. Also applicable for select uses on sidewalks within service areas and similar locations or maintenance areas where the drop off exceeds 2'-6". Adequate foundation support shall be provided for anchorage and stability against overturning. For unusual site conditions a site specific railing is to be designed by the responsible engineer. Refer to FDOT Plans Preparation Manual (Volume I) Chapters 4 & 8, for the definition of vehicular, pedestrian and bicyclist "drop-off hazards".

ALTERNATE DESIGN:

Manufacturers seeking approval of proprietary railing systems for inclusion on the Qualified Products List as pre-approved alternate designs must submit application along with design documentation showing the proprietary railing system is designed to meet the live load and geometric requirements specified herein, provides a minimum 50 year design life and that deflections due to the Design Live Loads do not exceed 1½" at midspan of the top rail. All fixed joints are to be either welded or commercially designed fixed joint systems. Each field section of railing must be identified with a permanently affixed label with the manufacturer's name and the FDOT QPL approval number. Labels must be a maximum of 1½" by 3" and located at the base of a post within the field section. Project specific shop drawings are required for QPL approved railings, see Shop Drawings note.

In lieu of design calculations, submit certified test reports from an approved independent testing agency. Test railing systems in accordance with ASTM E935 (Test Method A & C) using test loads at least 175% of the design load. Test proprietary or nonstandard anchorage systems in accordance with ASTM E894 (Flexural Test). Anchorage systems must resist the minimum of 175% of the design load for failure of the steel anchors or 220% of the design load for failure in the concrete foundation.

PIPE RAILING & POSTS:

Pipe Rails and Posts shall be in accordance with ASTM A53 Grade B for standard weight pipe and ASTM A500 Grade B, C or D or ASTM A501 for structural tube. Bars for handrail supports shall be ASTM A36. Posts and End Rails shall be fabricated and installed plumb, ± 1" tolerance when measured at 3'-6" above the foundation. 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. For changes in tangential longitudinal alignment greater than 45°, posts shall be positioned at a maximum distance of 2'-0" each side of the corner and shall not be located at the corner apex. For curved longitudinal alignments the top and bottom rails and handrails shall be shop bent to match the alignment radius.

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) | 1.315" | 0.133" |
| Handrails | 1½" NPS (Sch. 40) | 1.900" | 0.145" |
| Handrail Support Bar | 1" Ø Round Bar | 1.000" | N/A |

BASE PLATES:

Base Plates shall be in accordance with ASTM A36 or ASTM A709 Grade 36.

SHIM PLATES:

Shim Plates shall be aluminum in accordance with ASTM B209, Alloy 6061 or 6063. Shim plates shall be used for foundation height adjustments greater than ¼" and localized irregularities greater than ⅛". Field trim shim plates when necessary to match the contours of the foundation. Bevelled shim plates may be used in lieu of trimmed flat shim plates shown. Stacked shim plates must be bonded together with adhesive bonding material and limited to a maximum total thickness of ½", unless longer anchor bolts are provided for the exposed thread length.

COATINGS:

The railing shall be hot-dip galvanized after fabrication in accordance with Section 962 of the Specifications. All nuts, bolts and washers shall be hot-dip galvanized in accordance with Section 962 of the Specifications.

ANCHOR BOLTS:

Anchor bolts shall be in accordance with ASTM F1554 Grade 36. Headless anchor bolts for Adhesive Anchors shall be threaded full length. Cutting of reinforcing steel is permitted for drilled hole installation. All anchor bolts shall have single self-locking hex nuts. Tack welding of the nut to the anchor bolt may be used in lieu of self-locking nuts. All nuts shall be 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 tack welds shall be coated with a galvanizing compound in accordance with the Specifications.

RESILIENT AND NEOPRENE PADS:

Resilient and Neoprene pads shall be in accordance with Specification Section 932, except that testing of the finished pads shall not be required. Neoprene pads shall be durometer hardness 60 or 70.

JOINTS:

All fixed joints are to be welded all around and ground smooth. Expansion Joints shall be spaced at a maximum of 30'-0". Field splices similar to the expansion joint detail may be approved by the Engineer to facilitate shipping and handling, but rails must be continuous across a minimum of two posts. Only use the Continuity Field Splice (Detail "E") to make the railing continuous for unforeseen field adjustments.

WELDING:

All welding shall be in accordance with the American Welding Society Structural Welding Code (Steel) ANSI/AWS D1.1 (current edition). Weld metal shall be E60XX or E70XX. Nondestructive testing of welds is not required.

SHOP DRAWINGS:

Complete details addressing project specific geometry (line & grade) showing post and expansion joint locations must be submitted by the Contractor for the Engineer's approval prior to fabrication of the railing. Shop drawings shall be in accordance with the Specifications.

PAYMENT:

Guiderail shall be paid for under the contract unit price for Pipe Guiderail (Steel), LF (Item No. 515-1-1). Payment for the Guiderail will be plan quantity measured as the length along the center line of the top rail, and includes rails, posts, rail splice assembly, base plates, anchor bolts, nuts, washers, resilient or neoprene pads and all incidental materials and labor required to complete installation of the Guiderail.

REVISIONS

| DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION |
|---|---|---|---|---|---|
| 07/01/10 | SJN | Deleted Design Criteria Notes. | | | |

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

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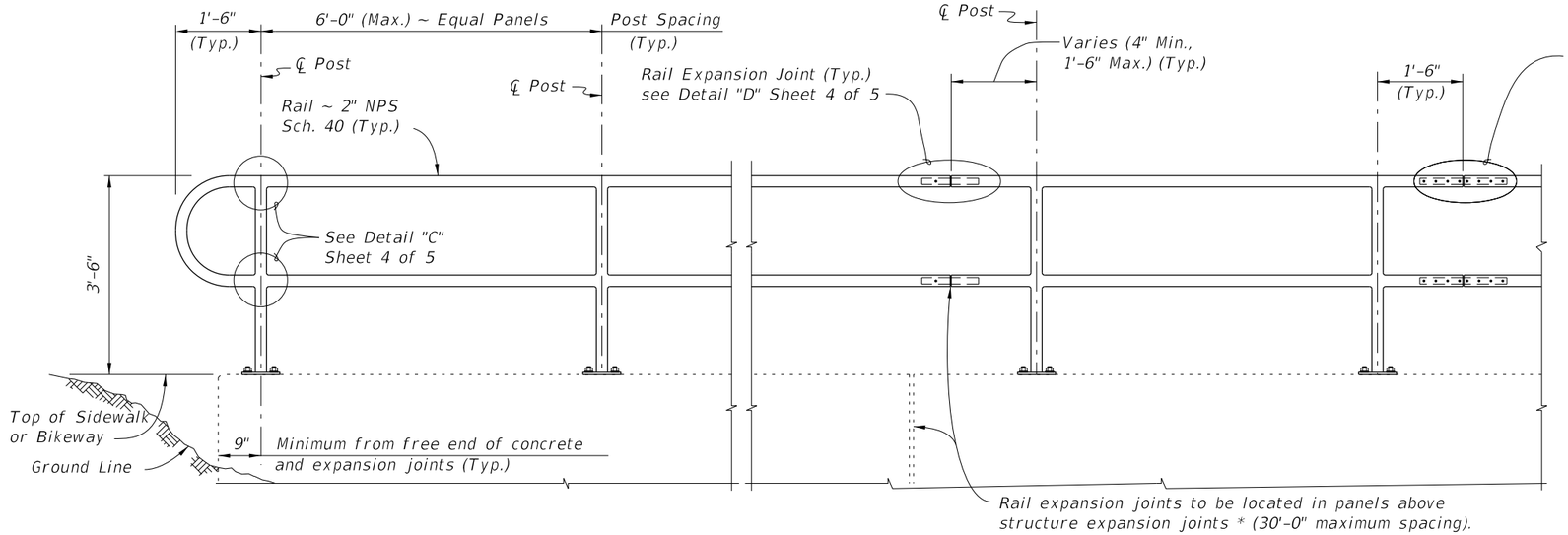
# STEEL PIPE GUIDERAIL

Interim Date 07/01/10

Sheet No. 1 of 5

Index No. 880



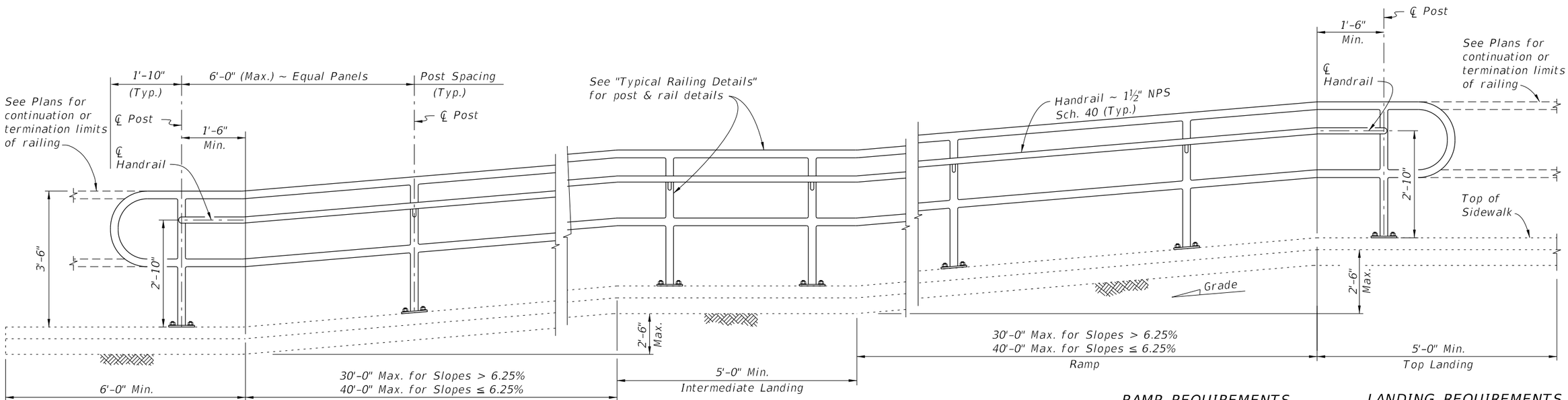

ELEVATION

NOTES:
NPS = Nominal Pipe Size

STRUCTURES EXPANSION JOINTS NOTE:
* Keyed construction joints in Index No. 520 Gravity Wall are not considered to be expansion joints.

CROSS REFERENCE:
For Details "C", "D" and "E", see Sheet 4 of 5.

## 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%

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION |
| 07/01/10 | SJN | Added 2'-10" dimension to mid-height of handrail. | | | |

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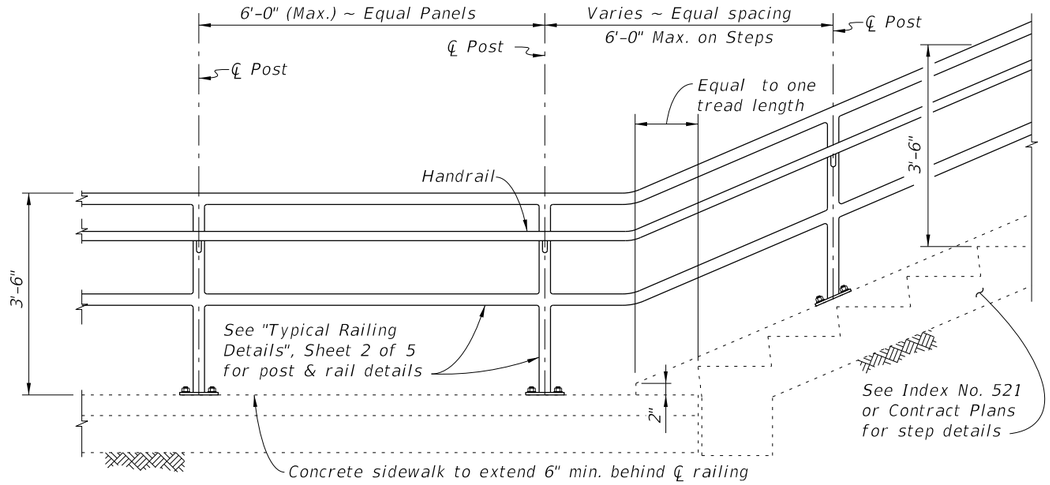
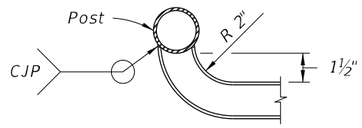
# STEEL PIPE GUIDERAIL

| Interim Date | Sheet No. |
|---|---|
| 07/01/10 | 2 of 5 |

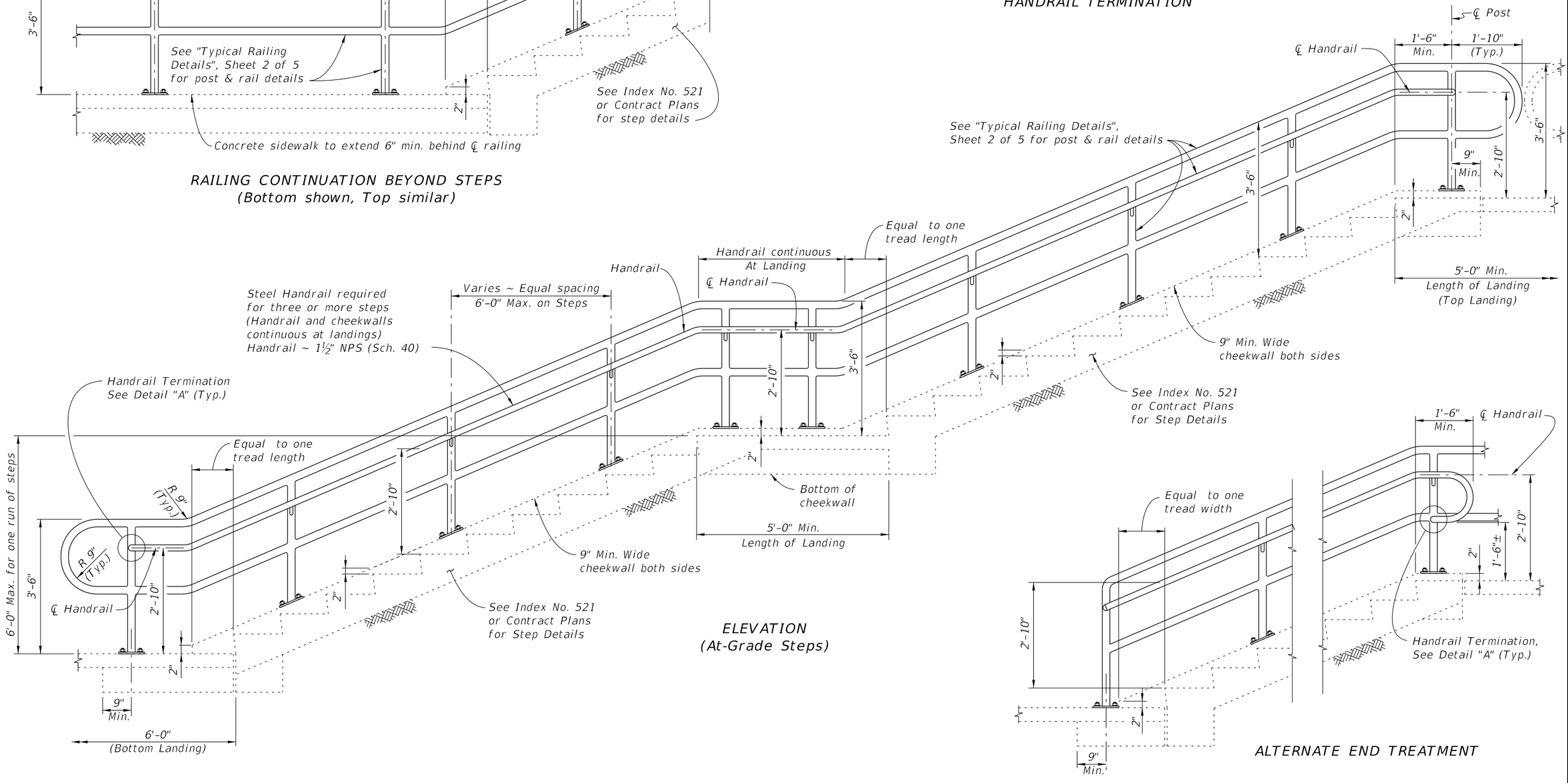
Index No. 880




*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*

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION |
| 07/01/10 | SJN | Deleted minimum extension of handrail at base of steps. Changed 2'-10" dimension to mid-height of handrail. | | | |

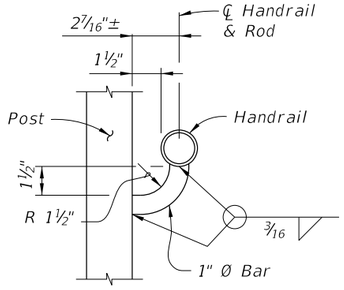
2010 Interim Design Standard

# STEEL PIPE GUIDERAIL

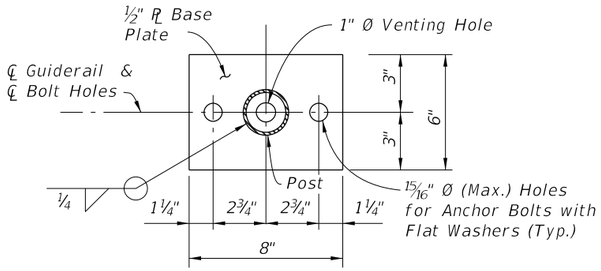
Interim Date 07/01/10

Sheet No. 3 of 5

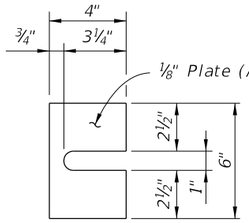
Index No. 880




SECTION B-B
(Handrail Connection)




SECTION C-C
BASE PLATE DETAIL




SHIM PLATE
DETAIL

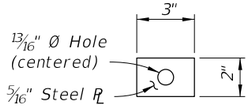
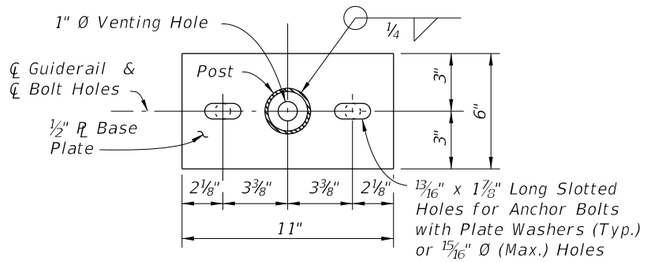
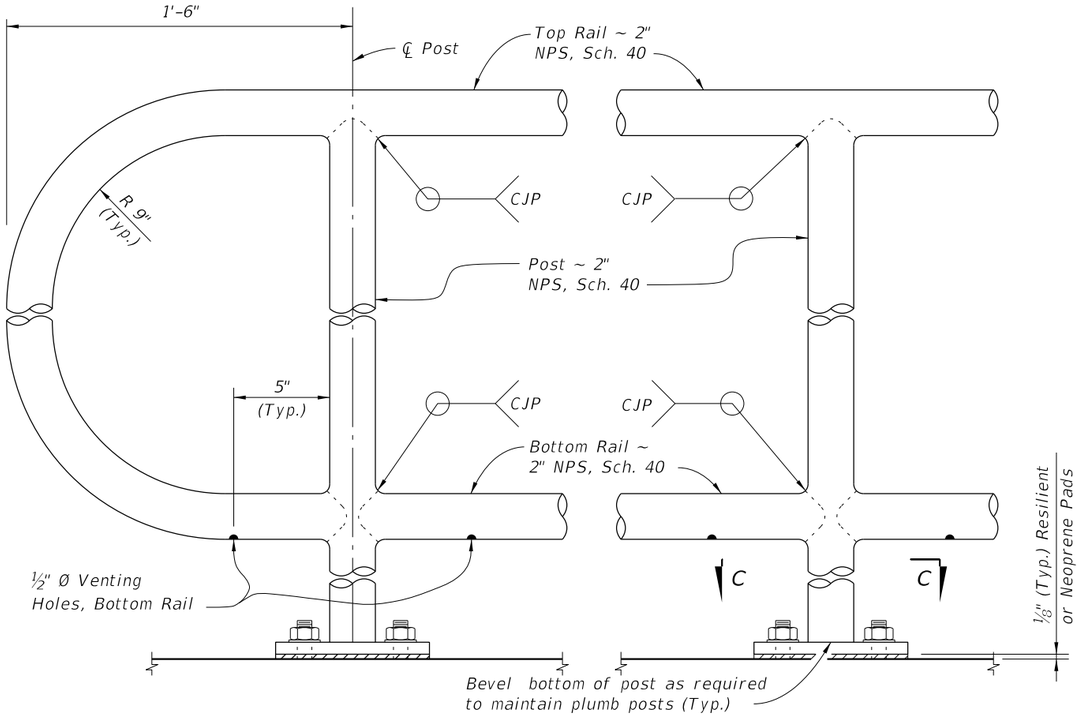


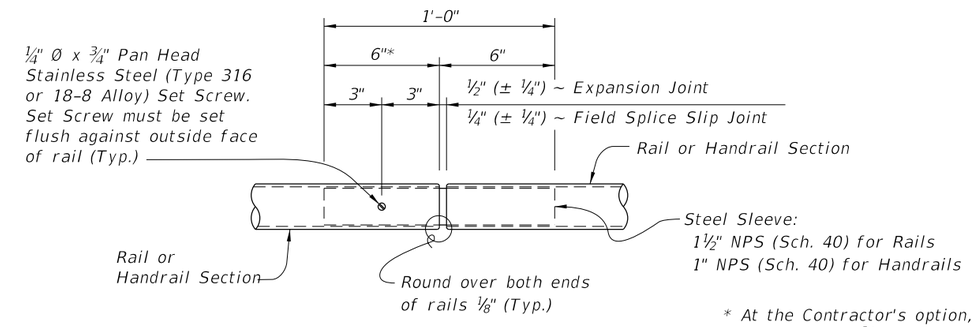

PLATE WASHER
DETAIL




ALTERNATE BASE
PLATE DETAIL
(Recommended for Top of Step Cheekwalls)

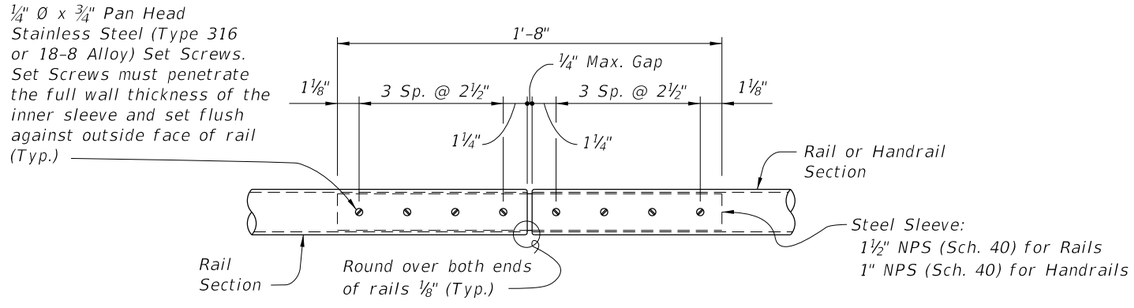



DETAIL "C" - RAIL CONNECTIONS
(Handrail Not Shown)

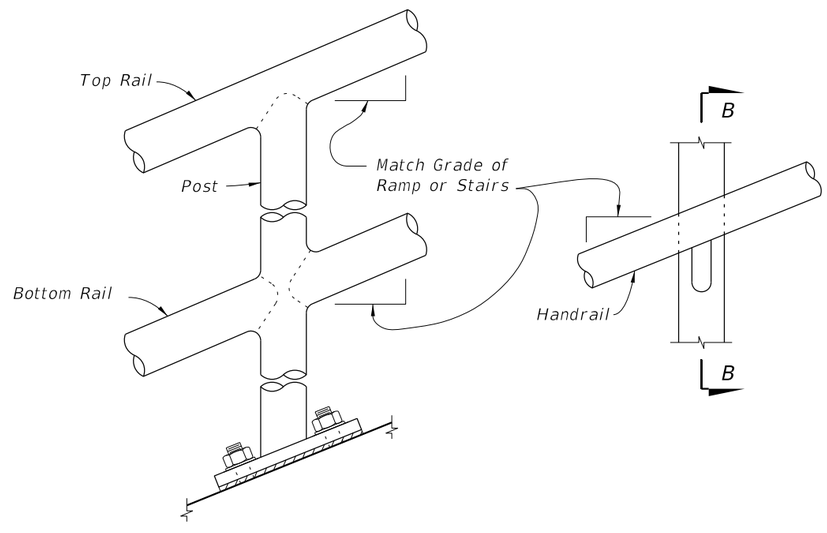



DETAIL "D" - EXPANSION JOINT
(FIELD SPLICE SLIP JOINT SIMILAR)

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




DETAIL "E" - CONTINUITY
FIELD SPLICE




DETAIL "B" - RAIL AND HANDRAIL
(Showing Sloped Condition for Stairs or Ramp)

CROSS REFERENCE:
For locations of Details "C", "D" and "E", see Sheet 2 of 5.

REVISIONS

| DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION |
|---|---|---|---|---|---|
| 07/01/10 | SJN | No Change | | | |

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# STEEL PIPE GUIDERAIL

Interim Date 07/01/10

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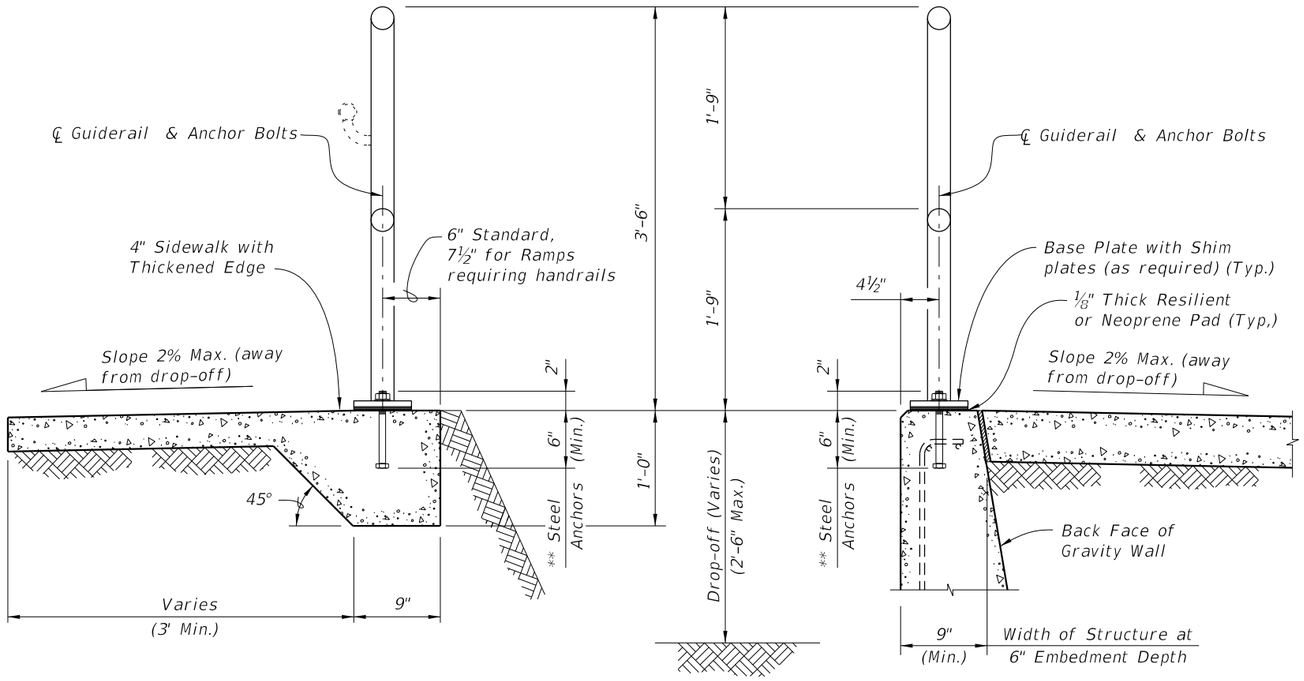
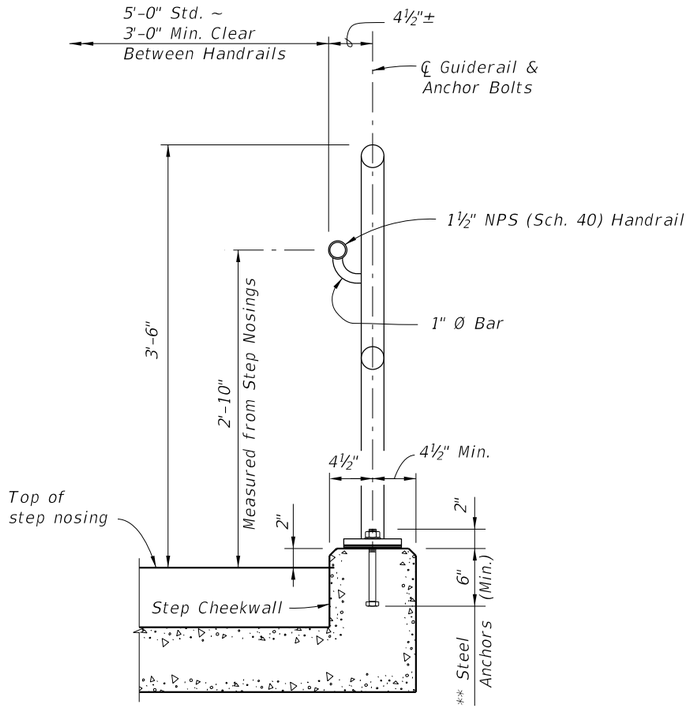
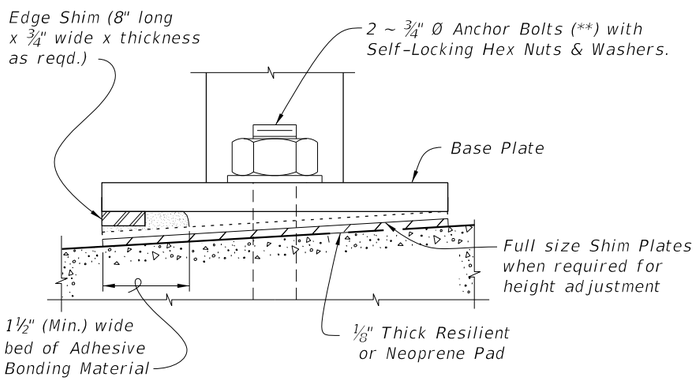



TYPICAL SECTION ON CONCRETE SIDEWALK

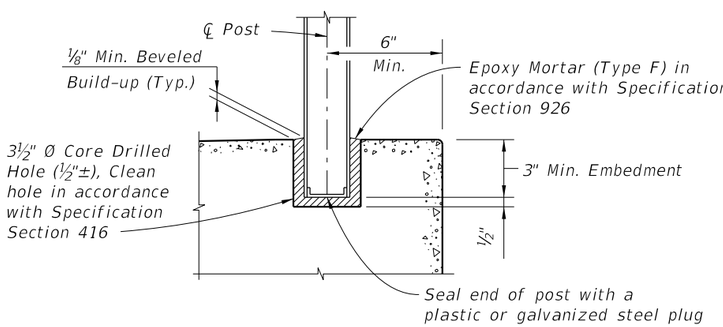
TYPICAL SECTION ON GRAVITY WALL
(Other Retaining Walls Similar)




TYPICAL SECTION ON STEPS & STAIRS




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




OPTIONAL SIDEWALK ANCHORAGE DETAIL

NOTES:
** 2 ~ ¾" Ø x 8" Steel Anchors:
Galvanized Steel Bolts (As Shown) (C-I-P); Galvanized U-Bolts Permitted (C-I-P); Galvanized Adhesive Anchors Permitted (***); Expansion Anchors Not Permitted.
*** Adhesive anchors shall be fully threaded headless anchor bolts set in drilled holes (manufacturer recommended diameter) with an Adhesive Bonding Material System in accordance with Specification Section 937 and installed in accordance with Specification Section 416. The minimum embedment is 6".

REVISIONS

| DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION |
|---|---|---|---|---|---|
| 07/01/10 | SJN | Changed 2'-10" dimension to mid-height of handrail. | | | |

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# STEEL PIPE GUIDERAIL

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