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PID 77332/85531

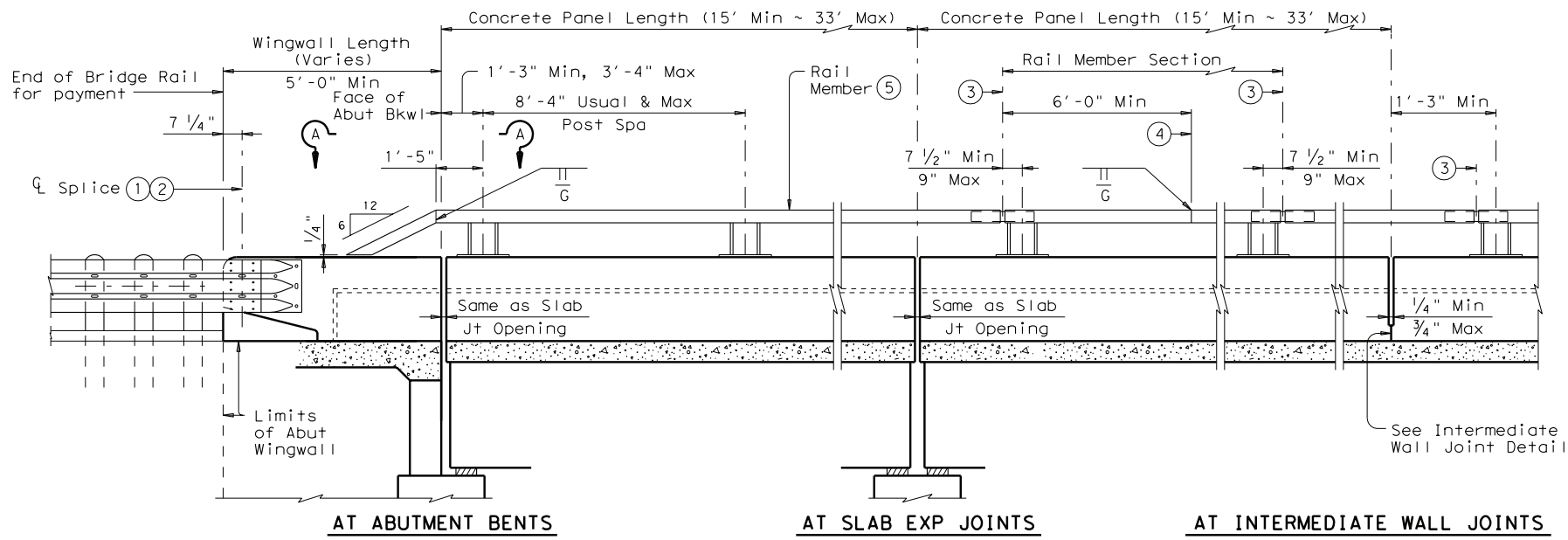
APPENDIX ST-06

**Texas Type HT Drawings
(Contract Document)**

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

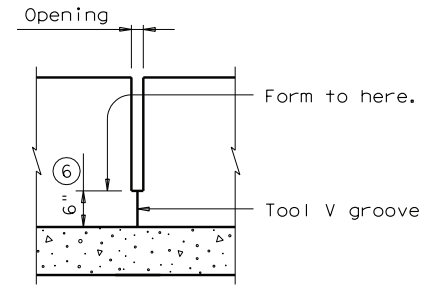
**Innerbelt Bridge
Construction Contract Group 1 (CCG1)**

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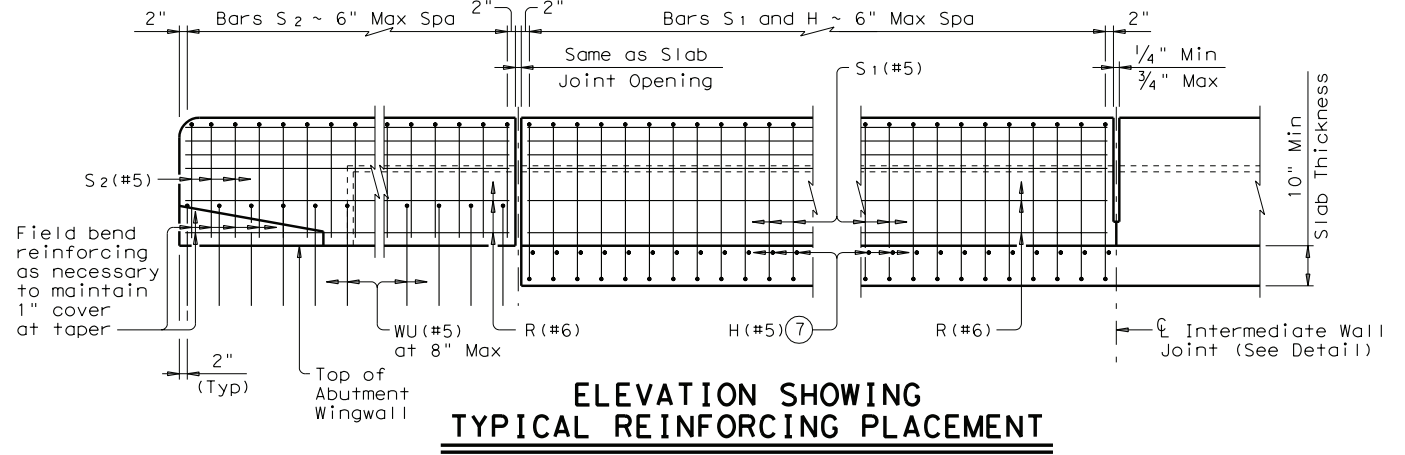
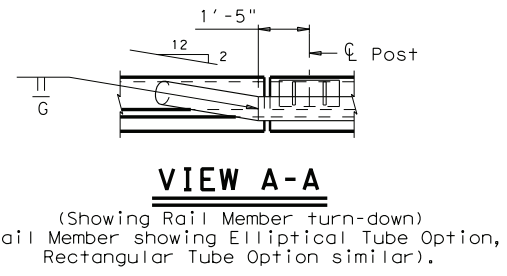
ROADWAY ELEVATION OF RAIL

(Rail Member showing Elliptical Tube Option, Rectangular Tube Option similar).



INTERMEDIATE WALL JOINT DETAIL

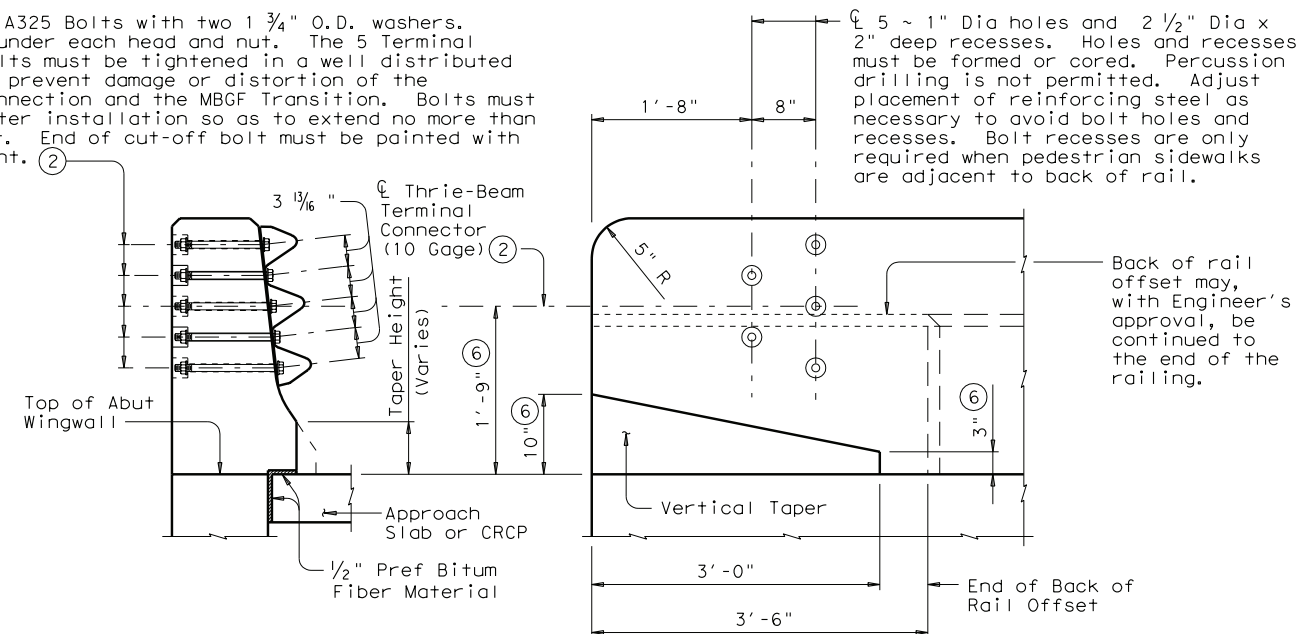
Note: Provide intermediate wall joints over all slab construction joints, over interior supports on continuous units, and at equal intervals in between as necessary to maintain a 33' maximum length of unbroken wall.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

① 5 ~ 7/8" Dia A325 Bolts with two 1 3/4" O.D. washers. Place washer under each head and nut. The 5 Terminal Connection Bolts must be tightened in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Bolts must be cut off after installation so as to extend no more than 3/4" beyond nut. End of cut-off bolt must be painted with Zinc-rich paint. ②

③ 5 ~ 1" Dia holes and 2 1/2" Dia x 2" deep recesses. Holes and recesses must be formed or cored. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.



SECTION and ELEVATION TL-3 TERMINAL CONNECTION DETAILS

- ① Showing TL-3 Splice location. Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless otherwise shown in the plans.
- ② Terminal Connector and associated hardware are to be paid for under the Item "Metal Beam Guard Fence".
- ③ Exp Jt or Splice Jt as required.
- ④ One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove, double vee groove, or single groove. Grind smooth.
- ⑤ Unless directed otherwise by the Engineer, the fabricator may use the rectangular tube in lieu of the elliptical tube for the rail member.
- ⑥ Increase 2" for structures with Overlay.
- ⑦ Bars H(#5) are part of rail reinforcing and are included in unit price bid for railing. Extend Bars H 2'-0" Min past ϕ of beam/girder. Space with Bars S1. Bars H match slab bar cover. Bars H may be bundled with top slab reinforcing if spacing is equivalent. Omit Bars H when top slab reinforcement is spaced less than 4".

SHEET 1 OF 3

Texas Department of Transportation
 Bridge Division
TRAFFIC RAIL
TYPE T80HT

FILE: r1std015.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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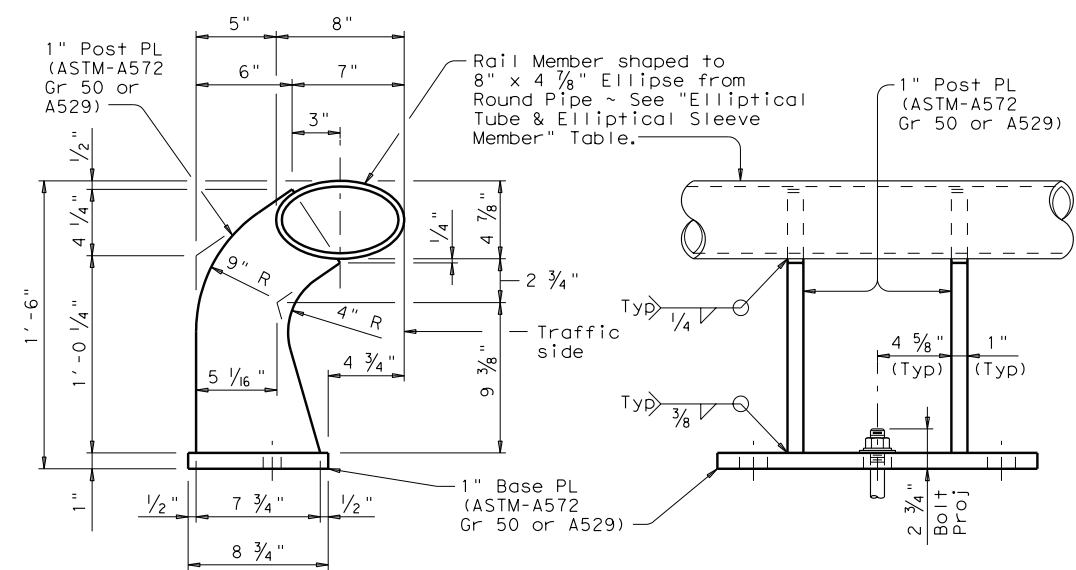
LEVELS DISPLAYED

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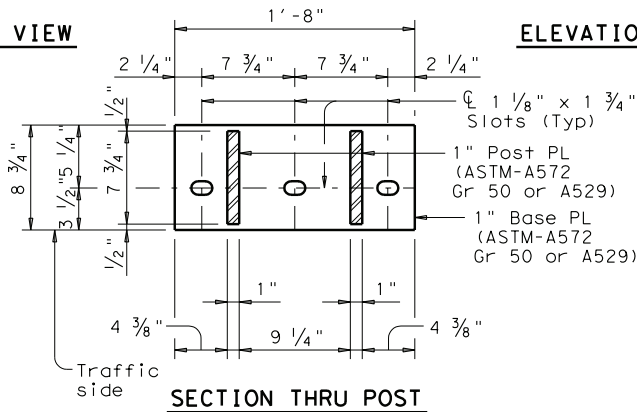
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LEVELS DISPLAYED

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SIDE VIEW **ELEVATION**

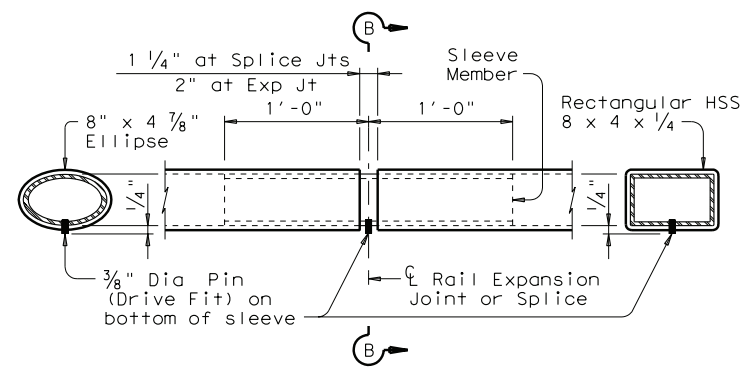


SECTION THRU POST
ELLIPTICAL TUBE WITH RAIL POST AND ANCHORAGE DETAILS
(Showing Elliptical Tube Option)

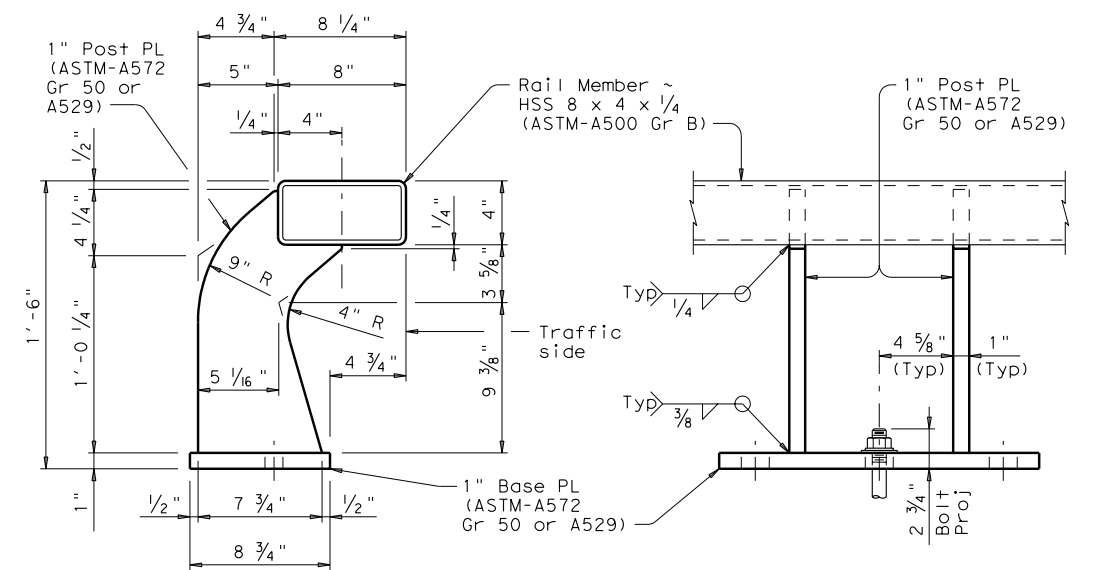
ELLIPTICAL TUBE & ELLIPTICAL SLEEVE MEMBER

Material	Material	Thickness
8" x 4 7/8" Ellipse	Elliptical Sleeve Member	
6" Dia Std Pipe ASTM-A53 E or S Gr B	ASTM-A53 Gr B	0.353"
	A36 or A500 Gr B	0.339"
	API-5LX52	0.224"
6 5/8" O.D. Pipe x 0.188" API-5LX52	ASTM-A53 Gr B	0.339"
	A36 or A500 Gr B	0.325"
	API-5LX52	0.188"

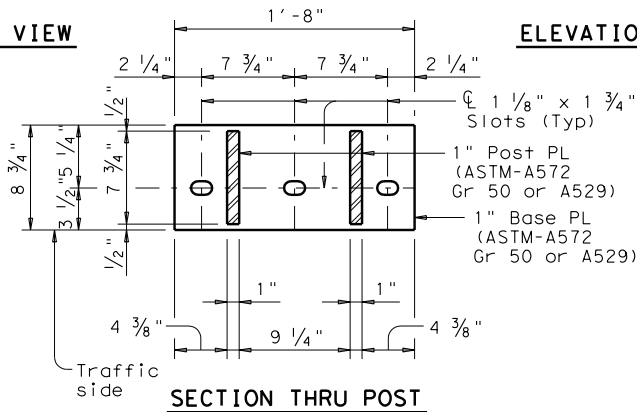
Notes: Other sections of equal or greater strength are acceptable for elliptical sleeves. The major and minor diameters of the rail member may vary +/- 0.1875" from plan dimension. However, the difference between the outside diameters of the elliptical sleeve and the inside diameters of the rail member must not exceed 0.25 inches.



SECTION B-B AT SPLICE OR EXP JTS
(Showing Elliptical Tube Option)
TUBE SPLICE DETAIL ⑤
(Showing Rectangular Tube Option)

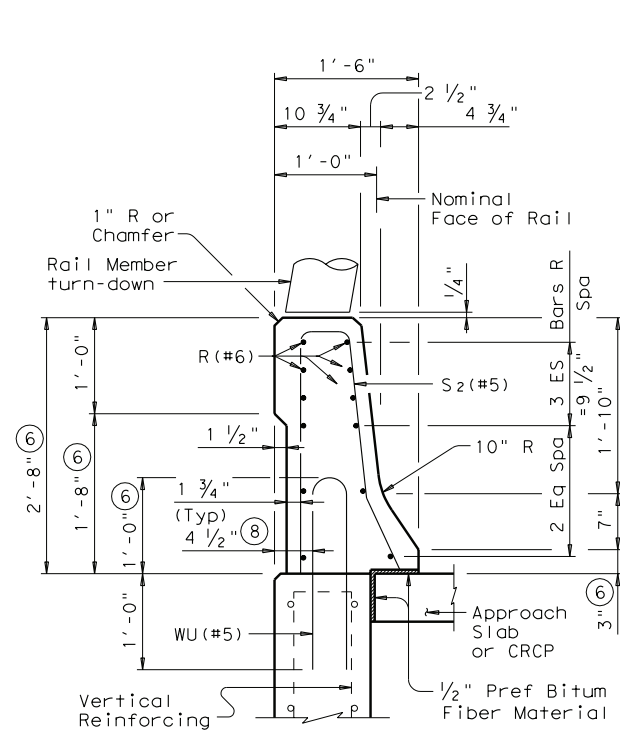


SIDE VIEW **ELEVATION**

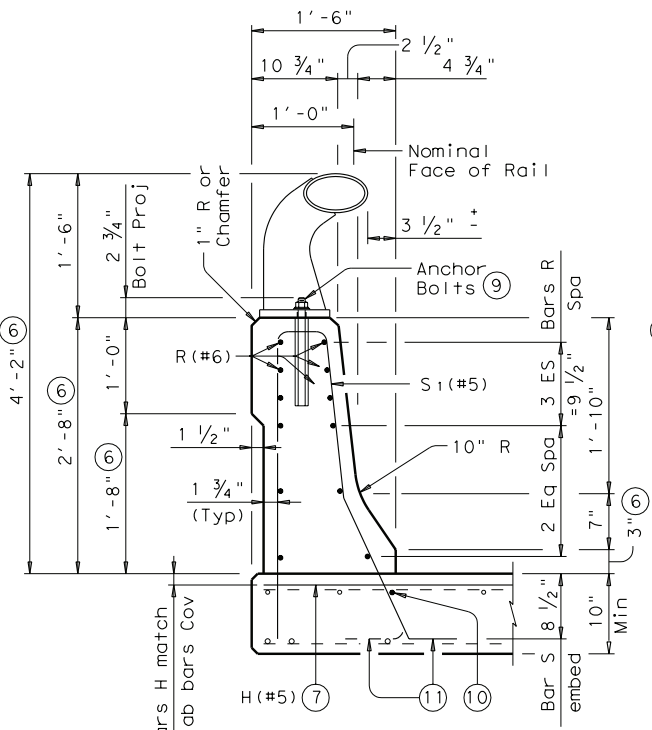


SECTION THRU POST
RECTANGULAR TUBE WITH RAIL POST AND ANCHORAGE DETAILS ⑤
(Showing Rectangular Tube Option)

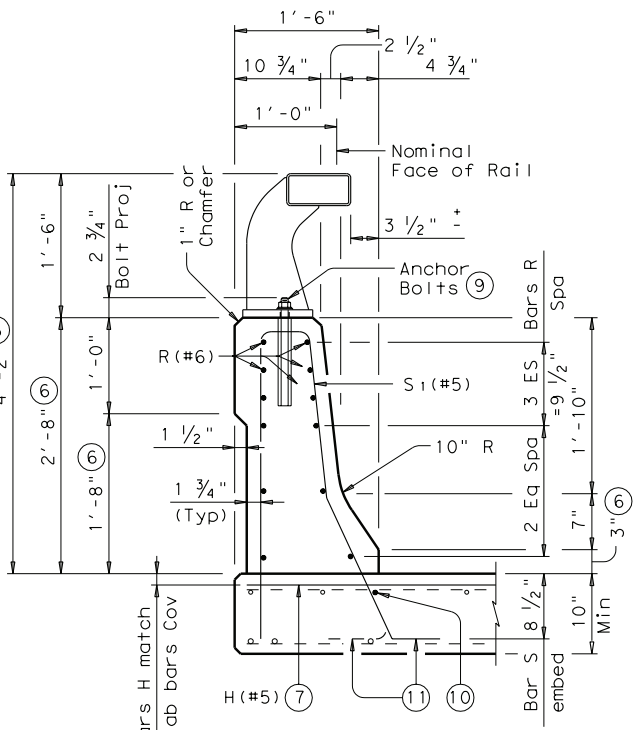
- ⑤ Unless directed otherwise by the Engineer, the fabricator may use the rectangular tube in lieu of the elliptical tube for the rail member.
- ⑥ Increase 2" for structures with Overlay.
- ⑦ Bars H(#5) are part of rail reinforcing and are included in unit price bid for railing. Extend Bars H 2'-0" Min past ℓ of beam/girder. Space with Bars S1. Bars H match slab bar cover. Bars H may be bundled with top slab reinforcing if spacing is equivalent. Omit Bars H when top slab reinforcement is spaced less than 4".
- ⑧ 5 1/2" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall.
- ⑨ See "General Notes" for Anchor Bolt information.
- ⑩ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑪ Bar may be bent or adjusted as shown.
- ⑫ Mounting this rail to retaining walls requires additional details not covered by this standard.



ON ABUTMENT WINGWALLS ⑫



ON BRIDGE SLAB
(Showing Elliptical Tube Option)



ON BRIDGE SLAB
(Showing Rectangular Tube Option)

SECTIONS THRU RAIL ⑤ ⑫



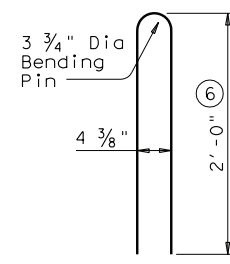
TRAFFIC RAIL

TYPE T80HT

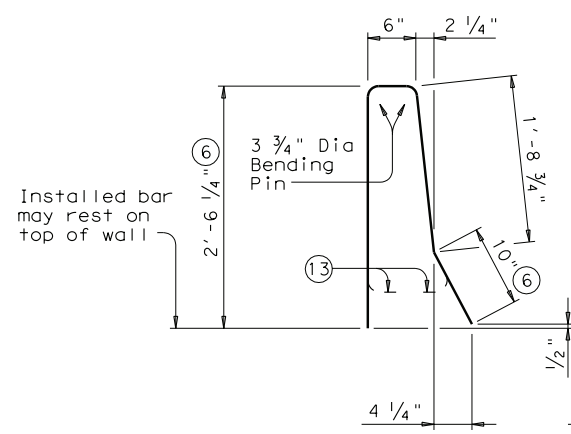
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RAIL DATA FOR HORIZONTAL CURVES

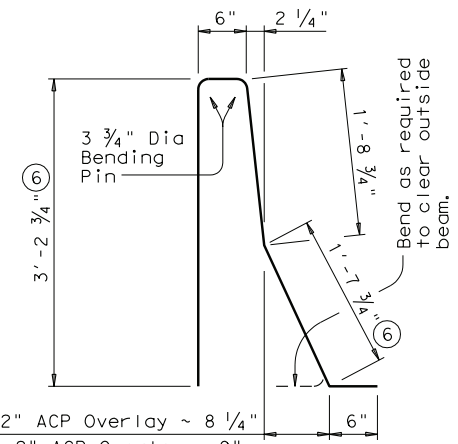
	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
Rail Members	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius (15)
	Over 700' thru 1400'	7'-3"	or to chords shown (15)
	Thru 700'	Zero	To required radius (15)



BAR S WU (#5)



BAR S 2 (#5)

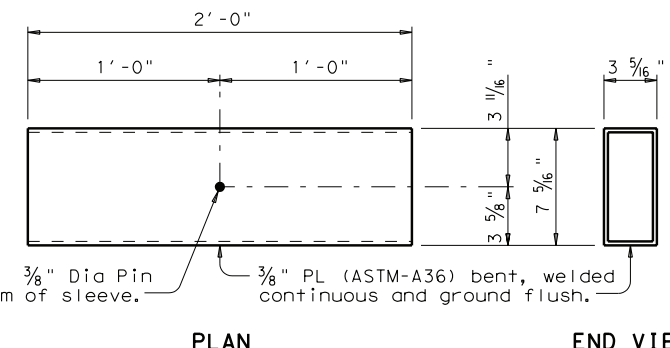


BAR S 1 (#5)

CONSTRUCTION NOTES:
 This rail may be slip-formed if approved by the Engineer when epoxy adhesive anchor bolts are used. Slip-forming parapet is not allowed if anchor bolts are cast with parapet wall. At the contractor's option anchor bolts may be cast with the parapet (See Cast-in-Place Anchor Bolt Options). Rail parapet must be plumb unless otherwise approved by the Engineer. Steel posts must be square to the top of parapet. Use epoxy mortar under post base plates if gaps larger than 1/16" exist. Panel lengths of tube members must be attached continuously to a minimum of three posts. Round or chamfer all exposed edges of steel components 1/16" by grinding prior to galvanizing.

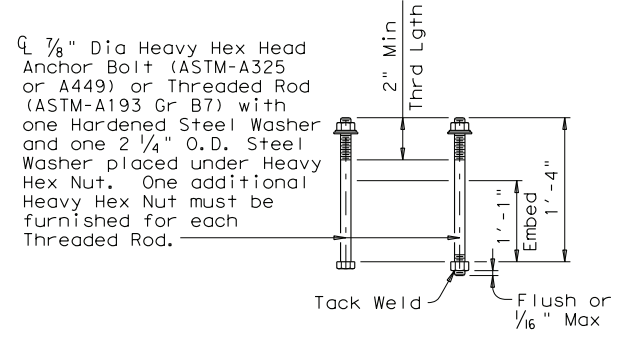
MATERIAL NOTES:
 Galvanize all steel components except reinforcing steel. Anchor bolts must be 7/8" Dia A193 Gr B7 fully threaded rods with heavy hex nuts, one hardened washer and one 2 1/4" O.D. washer each. Embed threaded rods 10 1/2" Min into concrete parapet using a Type III, Class C epoxy adhesive anchorage system capable of obtaining an ultimate load, per threaded rod, of 34 kips in tension, considering spacing and edge distance. Submit evidence of the proposed epoxy adhesive anchorage system's ability to develop this load to the Engineer for approval prior to use (Hilti HIT RE 500 is known to achieve the necessary ultimate loads through physical testing and need not be submitted for approval if used). Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the manufacturer's instructions. Optional cast-in-place anchor bolts must be 7/8" Dia ASTM A325 or A449 bolts (or A193 Gr B7 threaded rods with one tack welded heavy hex nut each) with one heavy hex nut and one hardened steel washer plus one 2 1/4" O.D. steel washer at each bolt. Nuts must conform to A563 requirements. Use Class "C" concrete. Use Class "C" (HPC) if required elsewhere. Chamfer all exposed corners. Reinforcing steel must be Grade 60. Welded Wire Reinforcing will not be permitted in this rail. Epoxy coat all rail reinforcement if slab bars are epoxy coated.

GENERAL NOTES:
 This rail was evaluated based on the results of previous crash tests and approved for a NCHRP Report 350 TL-5 rating. This rail can be used for design speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. This railing cannot be used on bridges with expansion joints providing more than 5" movement. This rail requires a 10" Min slab thickness. Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications. The T80HT Rail may terminate on the structure if safety considerations so allow. In this case, there must be a custom section, detailed elsewhere in the plans, transitioning between this and a normal traffic railing such as T551. See Bridge Layout for limits. Erection drawings showing panel lengths, rail post spacing, and anchor bolt setting must be submitted to the Engineer for approval. Average weight of railing with no overlay: 447 plf total (145 plf Conc) 302 plf (Steel).

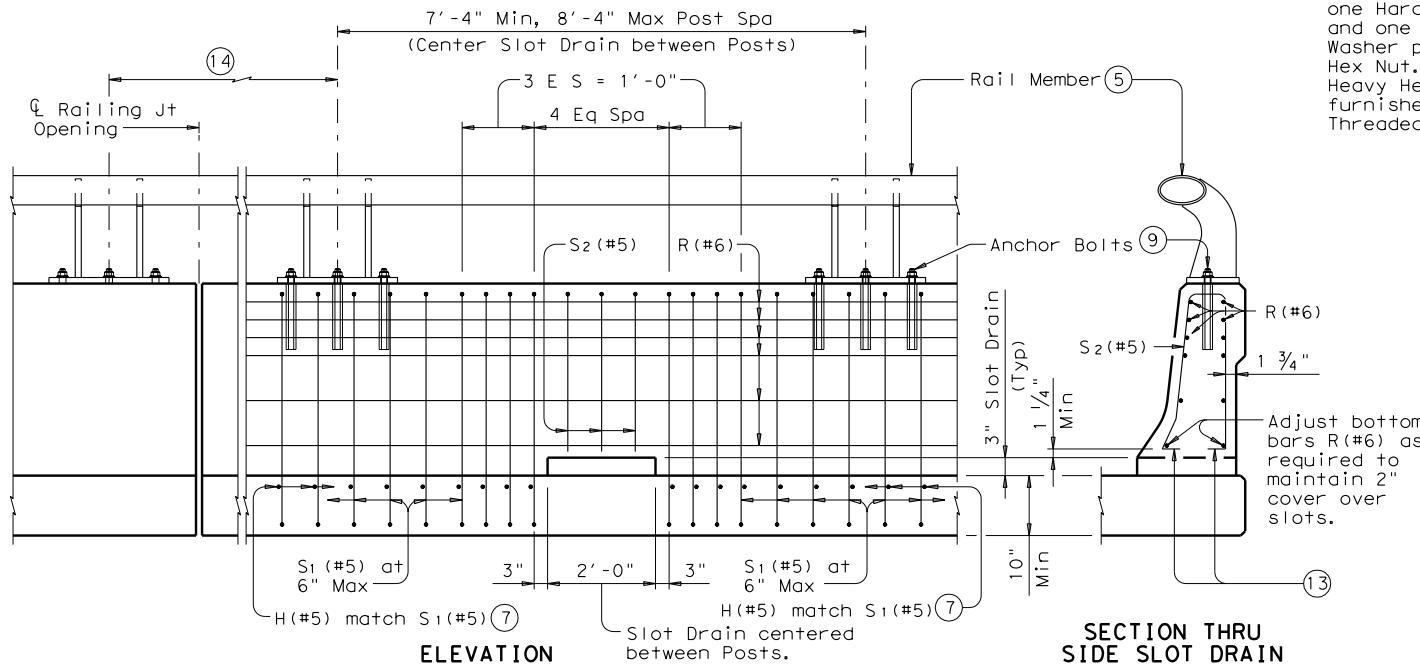


RECTANGULAR TUBE SLEEVE MEMBER DETAIL
 (See Tube Splice Detail)

- (5) Unless directed otherwise by the Engineer, the fabricator may use the rectangular tube in lieu of the elliptical tube for the rail member.
- (6) Increase 2" for structures with Overlay.
- (7) Bars H (#5) are part of rail reinforcing and are included in unit price bid for railing. Extend Bars H 2'-0" Min past ϕ of beam/girder. Space with Bars S1. Bars H may be bundled with top slab reinforcing if spacing is equivalent. Omit Bars H when top slab reinforcement is spaced less than 4".
- (9) See "General Notes" for Anchor Bolt information.
- (13) Bend or cut bars as required to clear drain slots.
- (14) Slots are not allowed in areas where there is a joint in the concrete panel between rail posts.
- (15) Shop drawings for approval are required for tubular steel sections.



CAST-IN-PLACE ANCHOR BOLT OPTIONS (9)



OPTIONAL SIDE SLOT DRAIN DETAILS

Note: Side Slot Drains must be centered between rail posts within the limits shown. Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots are not permitted.

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LEVELS DISPLAYED	PATH:
1	



TRAFFIC RAIL

TYPE T80HT

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