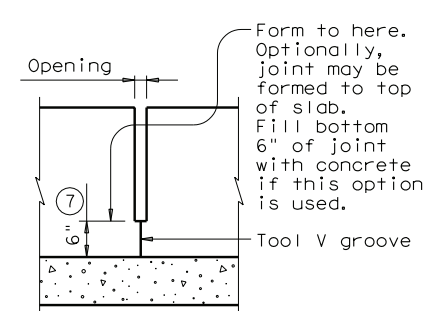
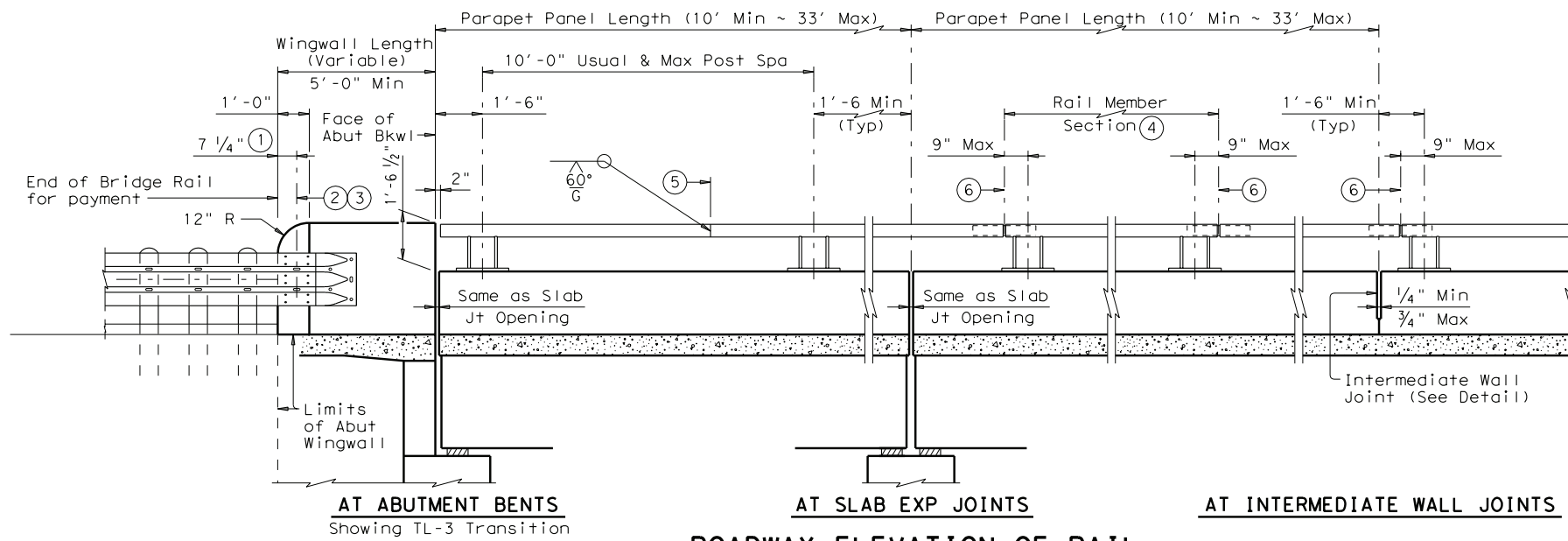
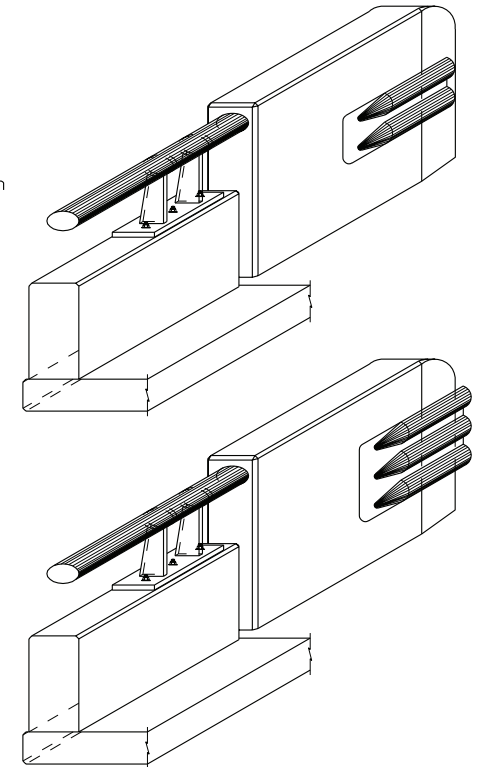


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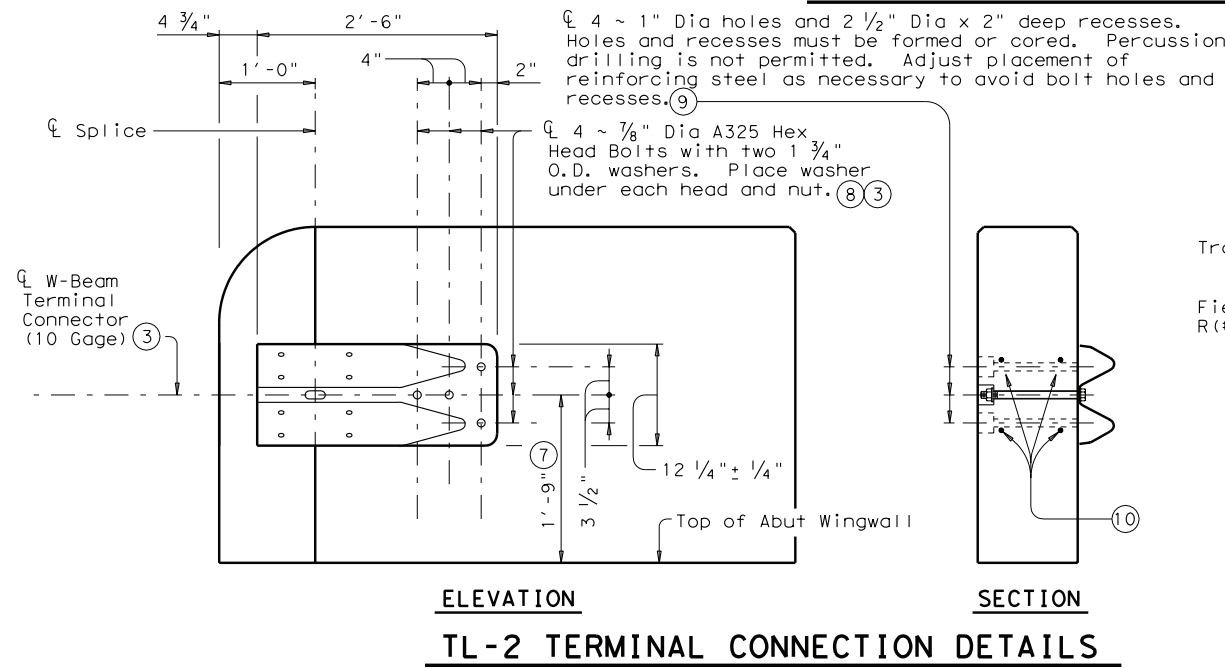


**INTERMEDIATE WALL JOINT DETAIL**

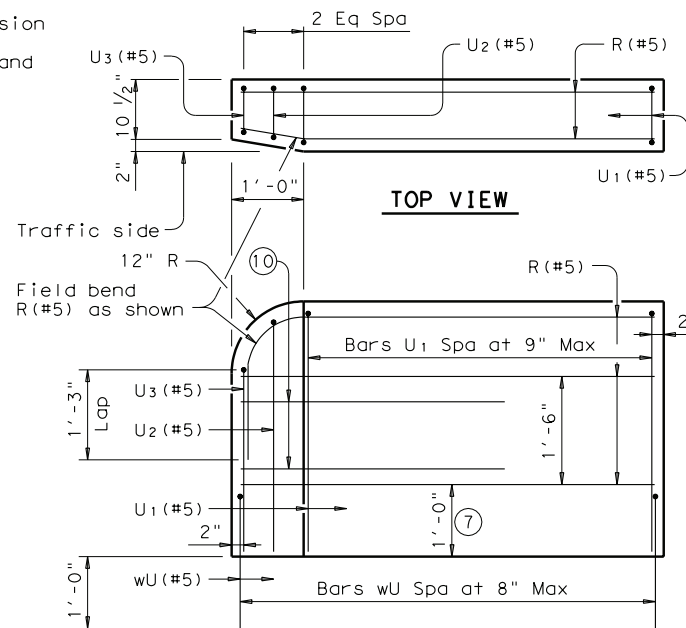
Note: Provide intermediate wall joints over all slab construction joints, over interior supports on continuous units, and at equal intervals in between as necessary to maintain a 33' maximum length of unbroken wall.



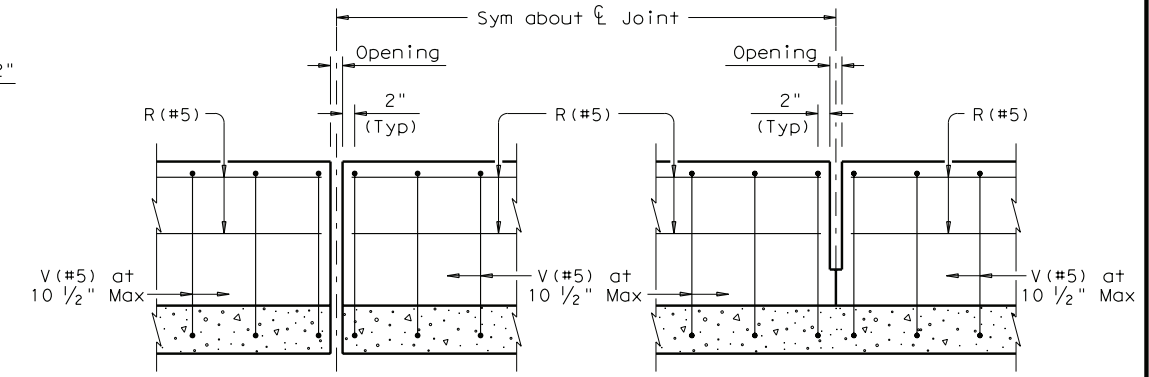
**ISOMETRIC VIEW AT END OF BRIDGE**



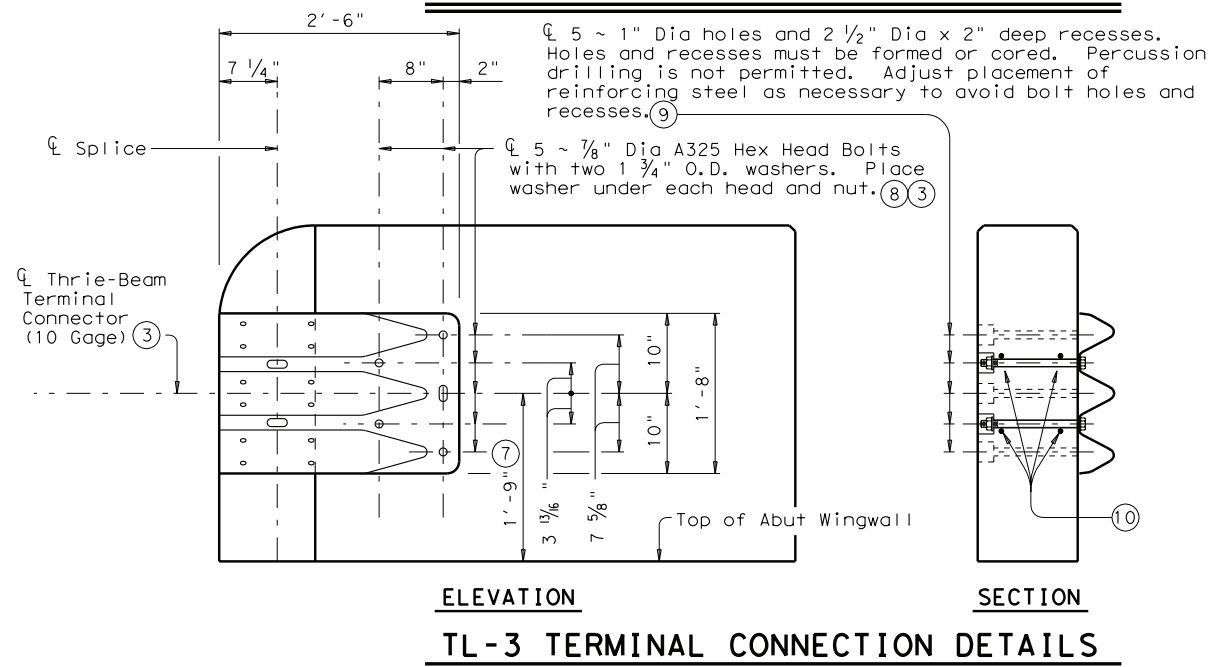
**TL-2 TERMINAL CONNECTION DETAILS**



**AT ABUT WINGWALL**



**ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT**



**TL-3 TERMINAL CONNECTION DETAILS**

- (1) Showing TL-3 Splice location, TL-2 Splice location is 1'-0".
- (2) C Splice ~ Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless otherwise shown in the plans.
- (3) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence".
- (4) Rail member sections shall have at least two post but not more than four.
- (5) One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- (6) C Exp Jt or Splice Jt as required.
- (7) Increase 2" for structures with overlay.
- (8) Bolts shall be of sufficient length to extend 1/2" to 3/4" beyond nut.

- (9) Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.
- (10) 4 additional Bars R (#5) 3'-8" in length shall be placed inside Bars U (#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.

**TRAFFIC RAIL**

**TYPE T402**

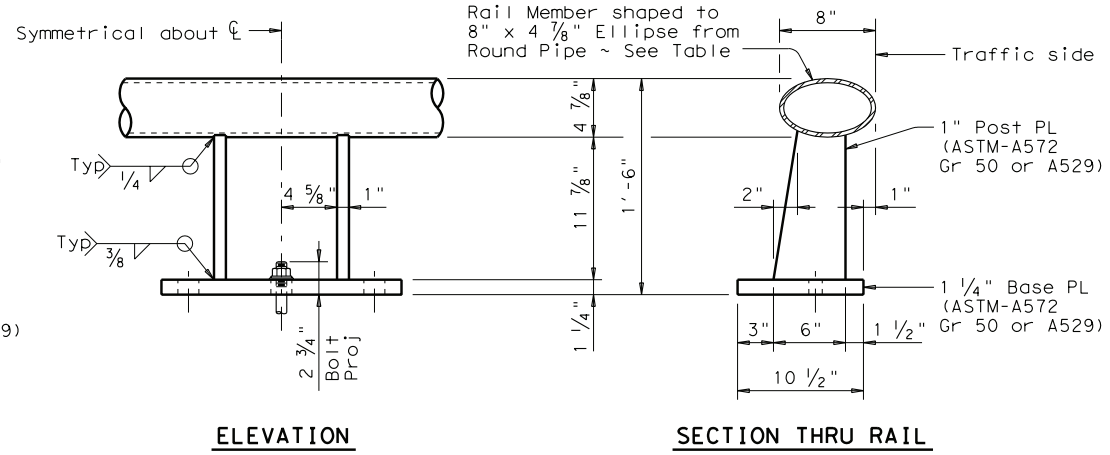
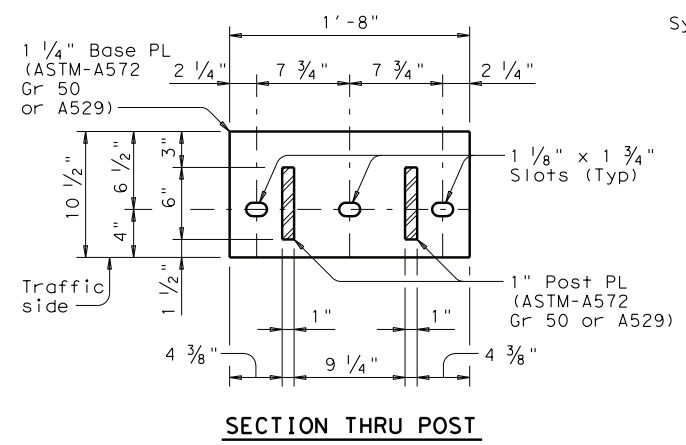
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REVISIONS				
03-06: Added R Bars to the Optional Side Slot Drain Detail and changed Bars S dimension.	COUNTY	CONTROL SECT	JOB	HIGHWAY

LEVELS DISPLAYED

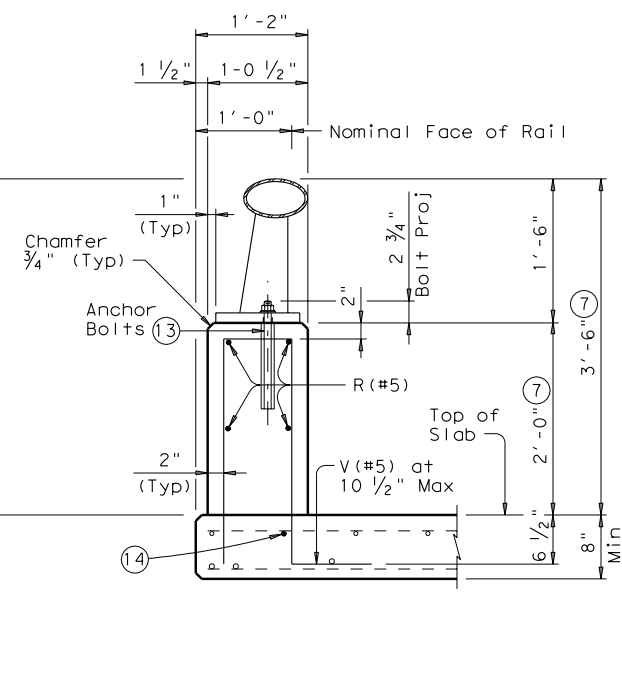
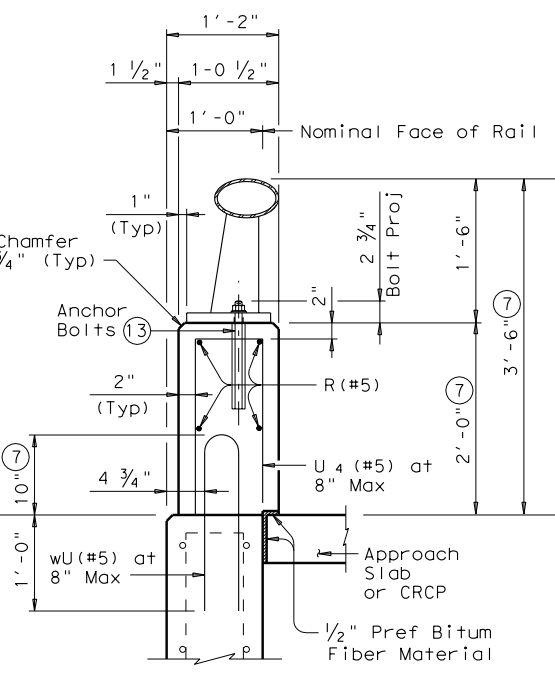
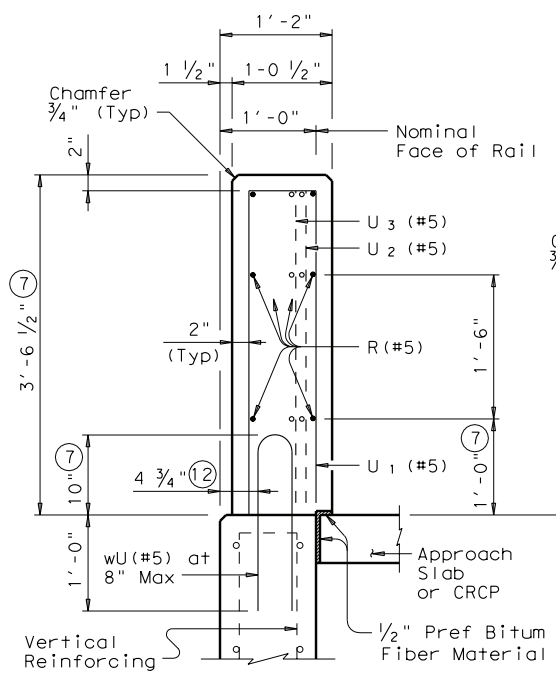
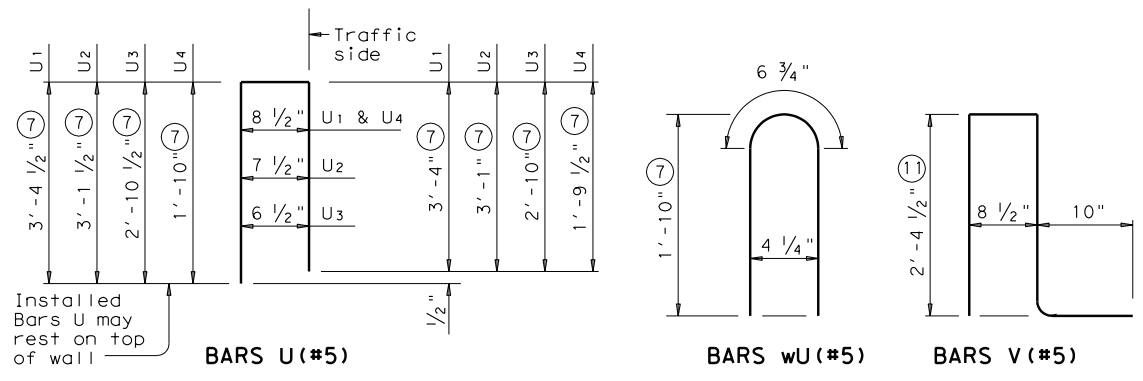
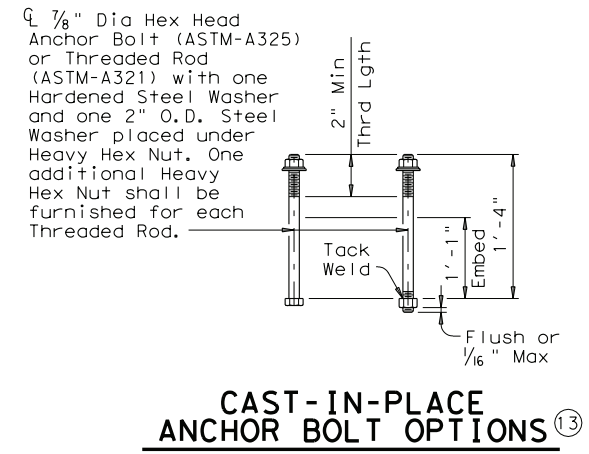
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**RAIL POST & ANCHORAGE DETAILS**



**SECTIONS THRU RAIL**

- ⑦ Increase 2" for structures with overlay.
- ① Length shown for 6 1/2" Min bar embedment with no overlay. Adjust as required.
- ⑫ 5 1/2" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.
- ⑬ See "General Notes" for anchor bolt information.
- ⑭ Top longitudinal slab bar may be adjusted laterally 3" ± to tie reinforcing.



**TRAFFIC RAIL**

**TYPE T402**

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REVISIONS				
03-06: Added R Bars to the Optional Side Slot Drain Detail and changed Bars S dimension.				
COUNTY	CONTROL	SECT	JOB	HIGHWAY

# 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 (16)
	Over 700' thru 1400'	7'-3"	or to chords shown (16)
	Thru 700'	Zero	To required radius (16)

### GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-3 criteria. This rail can be used for design speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for design speeds of 45 mph and less.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

This rail may be slip-formed if approved by the Engineer when epoxy adhesive anchor bolts are used.

Galvanize all steel components except reinforcing steel. Round or chamfer all exposed edges of steel components 1/16" by grinding prior to galvanizing.

Cap all open ends of tubular steel sections.

Erection drawings showing panel lengths, rail post spacing, and anchor bolt setting shall be submitted to the Engineer for approval.

Anchor bolts shall be 7/8" Dia ASTM A193 Grade B7 threaded rods with heavy hex nuts, one hardened washer and one (2" OD) washer each. Embed threaded rods into parapet wall with an epoxy anchorage system. Estimated required embedment depth is 8". Core drill holes (percussion drilling not permitted). Anchorage system chosen must be able to achieve an ultimate tensile resistance of 34 kips. The Contractor must provide evidence to the Engineer that this can be achieved. Evidence of adequate tensile resistance can be based on the manufacturer's published values of ultimate tensile strength (anchor spacing and edge distance must be accounted for). Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the manufacturer's recommendations.

At the contractor's option anchor bolts may be cast with the parapet (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts shall be 7/8" Dia ASTM A325 bolts (or A321 threaded rods with one tack welded heavy hex nut each) with one heavy hex nut and one hardened steel washer plus one 2" O.D. steel washer at each bolt. Nuts shall conform to A563 requirements. The untapped blanks shall be galvanized prior to cutting the threads. Threads for bolts and nuts shall have Class 2A and 2B fit tolerances in accordance with ASME B1.1.

Slip-forming parapet is not allowed if anchor bolts are cast with parapet wall.

Concrete shall be Class "C". Chamfer all exposed corners. Reinforcing steel shall be Grade 60.

Epoxy coat Bars V and W if slab reinforcement is epoxy coated.

Rail parapet shall be plumb unless otherwise approved by the Engineer. Steel posts shall be square to the top of parapet.

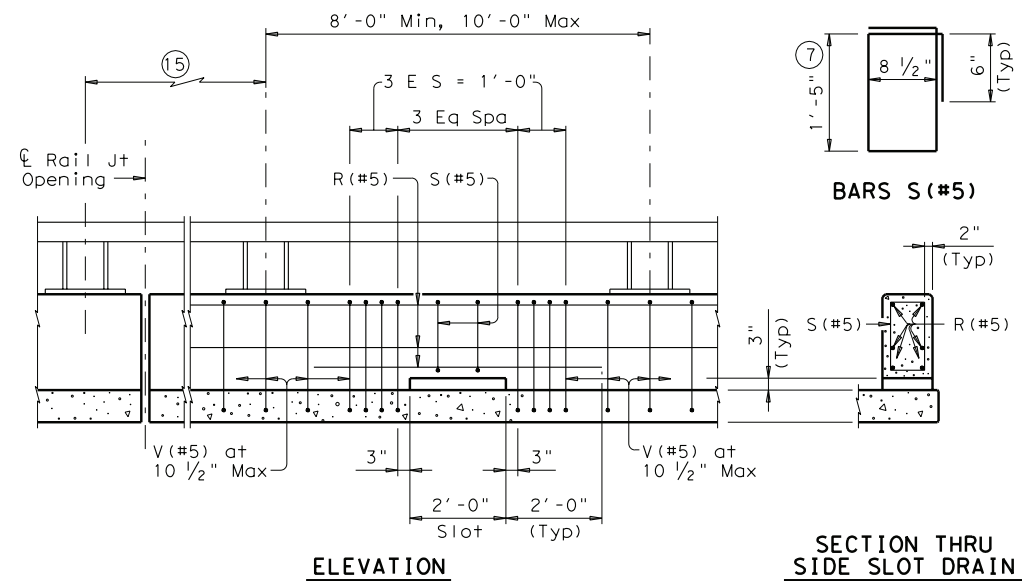
Grout may be used under post base plates if necessary.

Rail member sections shall have at least two posts but not more than four.

Average weight of railing with no overlay: 343 plf total

313 plf (Conc)

30 plf (Steel).

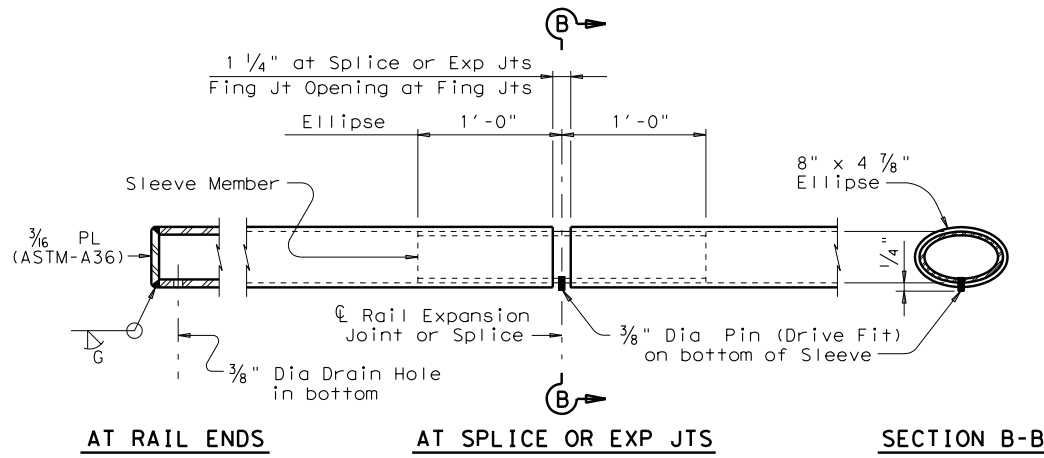


ELEVATION

SECTION THRU SIDE SLOT DRAIN

### 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 will not be permitted.



AT RAIL ENDS

AT SPLICE OR EXP JTS

SECTION B-B

### TUBE FABRICATION DETAILS

#### TUBE & SLEEVE MEMBERS FOR MAIN RAIL

8" x 4 7/8" Ellipse	Sleeve Member	
Material	Material	Thickness
6" Dia Std Pipe ASTM-A53 (E or S Gr B)	ASTM-A53 Gr B	0.353"
	ASTM-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"
	ASTM-A36 or A500 Gr B	0.325"
	API-5LX52	0.188"

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

- (7) Increase 2" for structures with overlay.
- (15) Slots are not allowed in areas where there is a joint in the concrete parapet between rail post.
- (16) Shop drawings required for tubular steel sections (may be submitted as 11"x 17" prints, provided they are clearly legible).

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REVISIONS				
03-06: Added R Bars to the Optional Side Slot Drain Detail and changed Bars S dimension.	COUNTY	CONTROL	SECT	JOB HIGHWAY