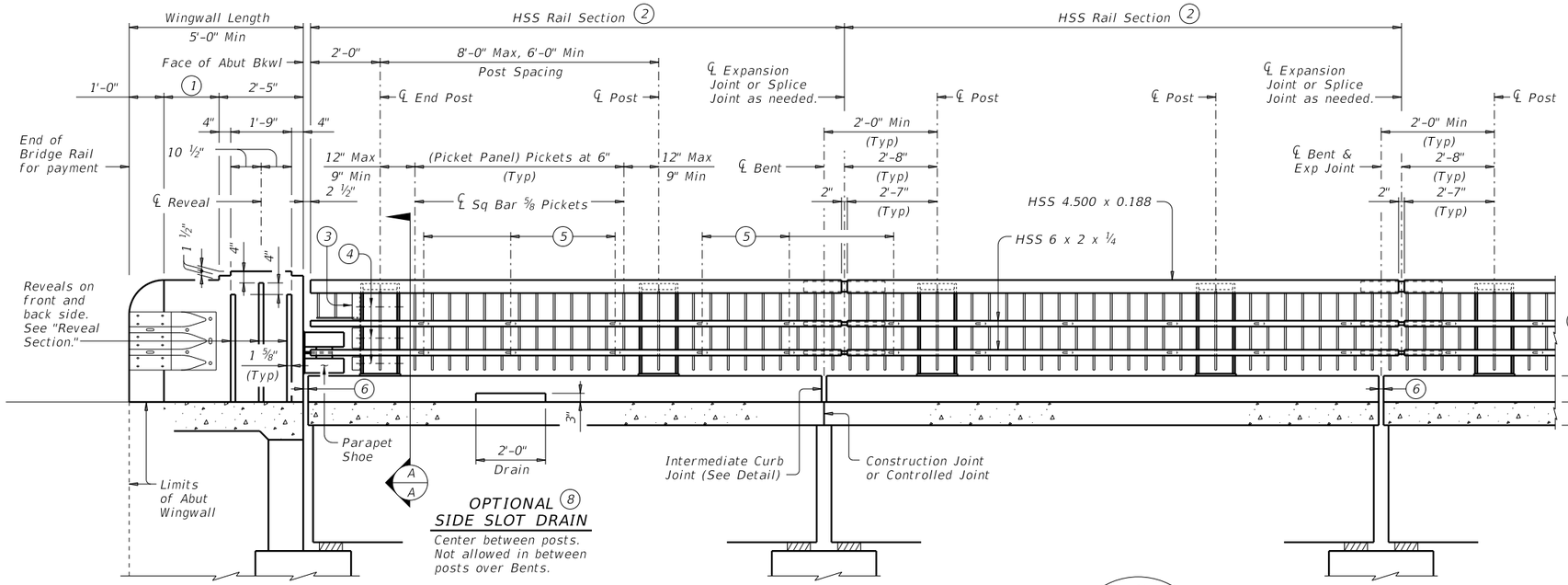
DATE:
FILE:



AT ABUTMENTS

AT BENTS WITHOUT SLAB EXP JOINTS

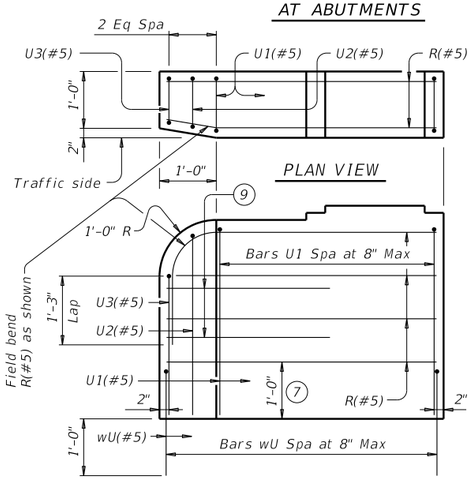
AT BENTS WITH SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

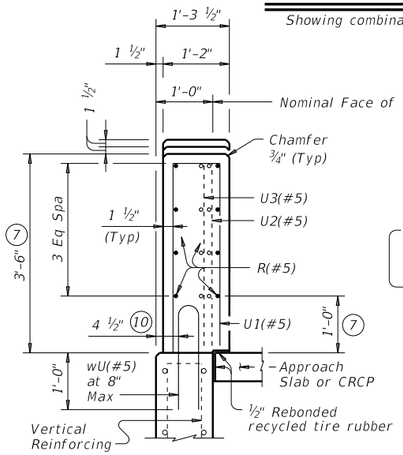
Showing combination rail without raised sidewalk.

OPTIONAL (8) SIDE SLOT DRAIN

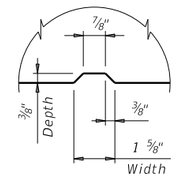
Center between posts. Not allowed in between posts over Bents.



AT ABUTMENT WINGWALLS OR CIP RETAINING WALLS

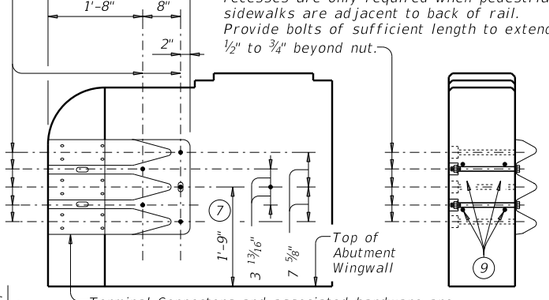


SECTION AT ABUTMENT WINGWALLS OR CIP RETAINING WALLS



REVEAL SECTION

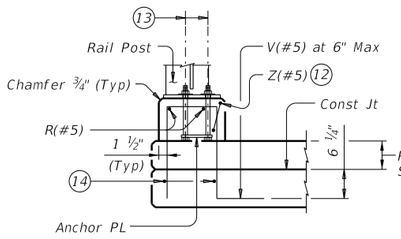
(Showing reveal dimensions)



ELEVATION SECTION

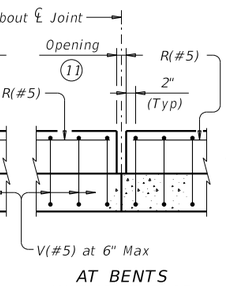
TERMINAL CONNECTION DETAILS

Reveals not shown for clarity.

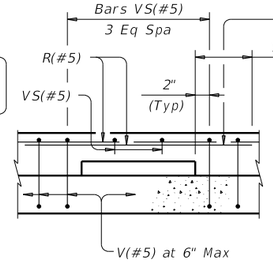


SECTION THRU RAIL WITH RAISED SIDEWALK

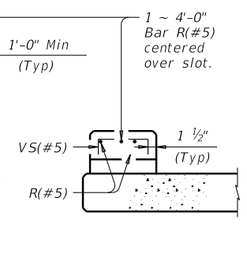
AT BENTS WITH SLAB EXPANSION JOINTS



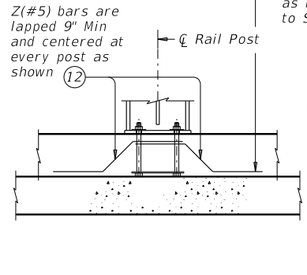
AT BENTS WITHOUT SLAB EXPANSION JOINTS



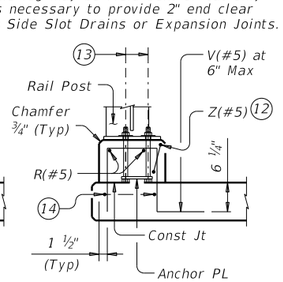
AT OPTIONAL DRAIN



SECTION AT OPTIONAL DRAIN



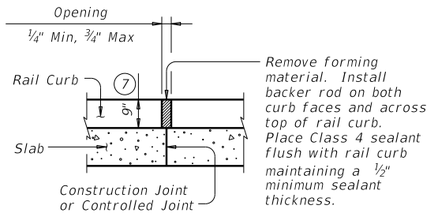
AT POST



SECTION AT POST

Bars V and R omitted for clarity.

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT WITHOUT RAISED SIDEWALK



INTERMEDIATE CURB JOINT DETAIL

Showing without raised sidewalk. Provide at all interior bents without slab expansion joints.

(1) *Wingwall length minus 3'-5" (Variable) 1'-7" Min.*

(2) *HSS rail sections must have at least two posts but not more than four.*

(3) *See "Picket End Panel Detail."*

(4) *℄ Bolt locations for attaching picket end panel to end post.*

(5) *℄ Bolt locations for attaching picket panel to back of HSS 6 x 2 x ¼. See "Section M-M."*

(6) *Same as slab joint opening. (5" Max Expansion Joint)*

(7) *Increase 2" for structures with overlay.*

(8) *Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway and a sidewalk, side slot drains are not permitted.*

(9) *Place 4 additional Bars R(#5) 3'-8" in length inside Bars U(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.*

(10) *5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.*

(11) *¼" Min, ¾" Max.*

(12) *Adjust Bars Z(#5) as necessary to avoid Bars V(#5).*

(13) *℄ ⅞" Dia Anchor Bolts. See "Anchor Bolt Assembly Details."*

(14) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

SHEET 1 OF 4

Texas Department of Transportation

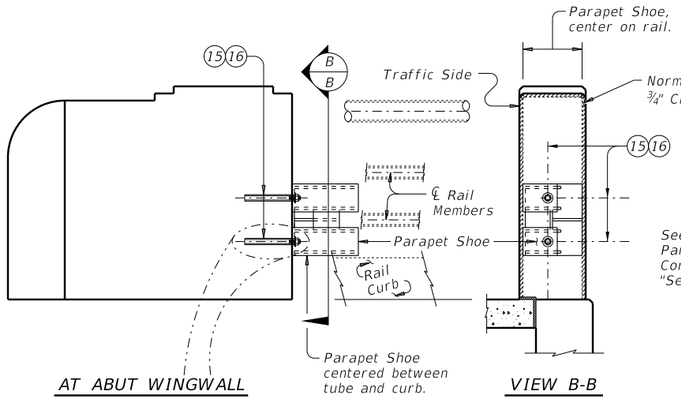
Bridge Division Standard

COMBINATION RAIL

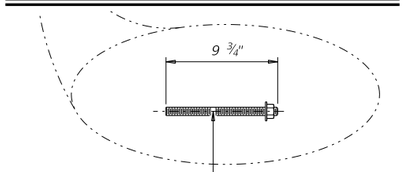
TYPE C2P

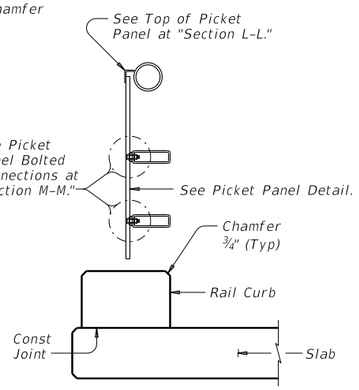
FILE: RL-C2P-19.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DATE:
FILE:



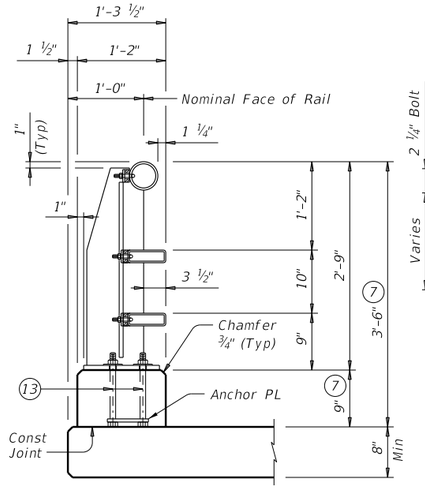
PARAPET SHOE INSTALLATION





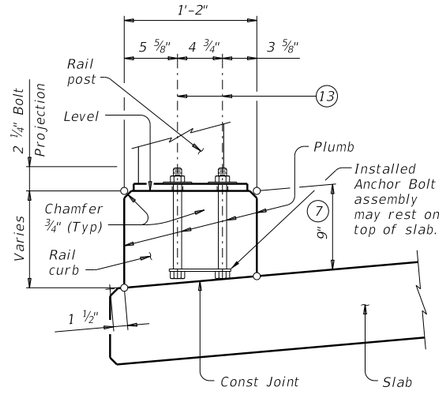
SECTION THRU BRIDGE RAIL IN BETWEEN POSTS

Reinforcing steel not shown for clarity.
Shown without raised sidewalk.

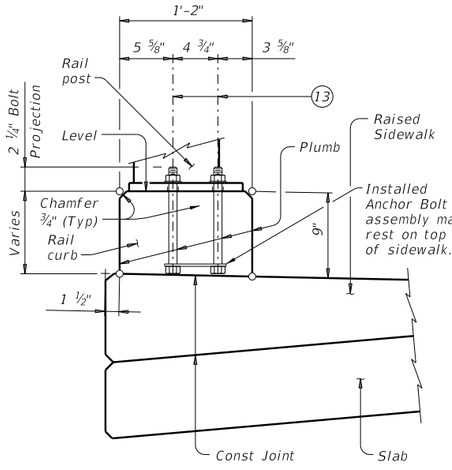


SECTION THRU BRIDGE RAIL AT POST

Reinforcing steel not shown for clarity.
Shown without raised sidewalk.



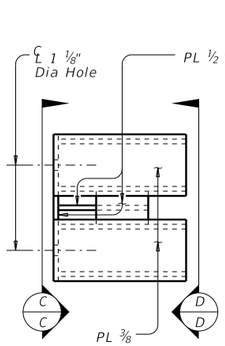
WITHOUT RAISED SIDEWALK



WITH RAISED SIDEWALK

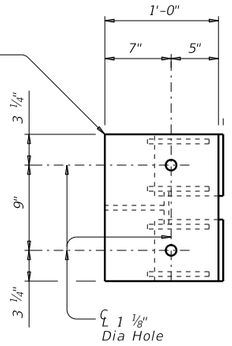
RAIL CURB FORMING DETAIL

Reinforcing steel not shown for clarity.

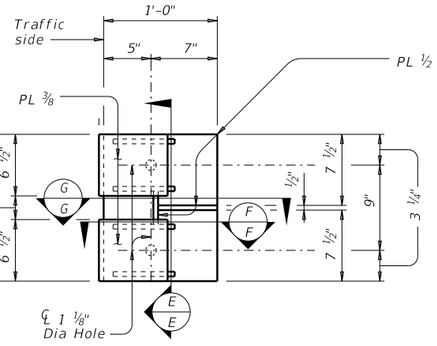


PARAPET SHOE

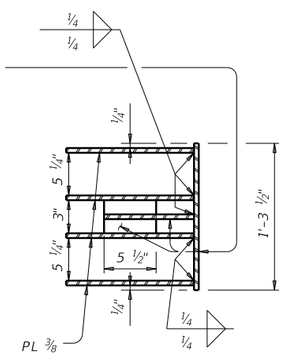
Parapet Shoe weight = 78 lb each, for contractor's information only.



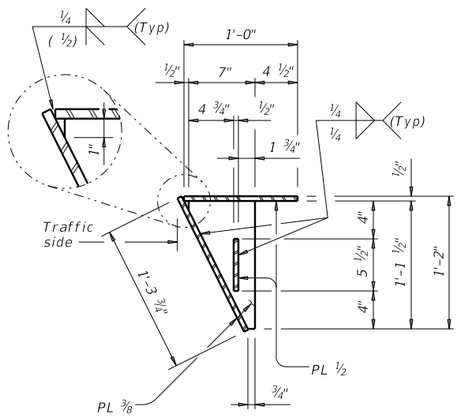
VIEW C-C



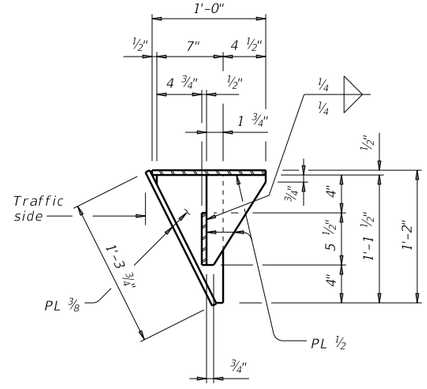
VIEW D-D



SECTION E-E



SECTION F-F



SECTION G-G

(7) Increase 2" for structures with overlay.

(13) ℄ ⅞" Dia Anchor Bolts. See "Anchor Bolt Assembly Details."

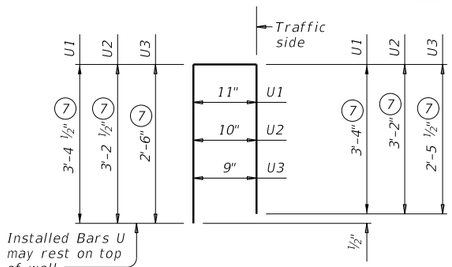
(15) Anchor bolts must be ⅞" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with heavy hex nuts and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(16) Install Parapet Shoe after rail has been placed. To ease installation, temporarily brace parapet shoe until the anchorage system achieves manufacturer's recommended curing time. Anchorage system must be assembled with one hardened steel washer (ASTM F436) and one heavy hex nut (ASTM A563) each. Remove temporary bracing after anchorage systems has been firmly tightened.

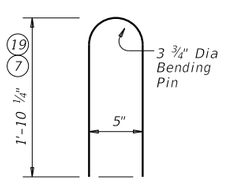
(17) Length shown for 6 ¼" Min bar embedment with no overlay. Adjust as required.

(18) Increase 2 ¾" for structures with overlay.

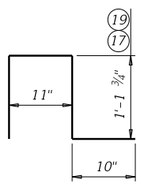
(19) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.



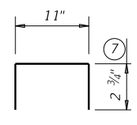
BARS U(#5)



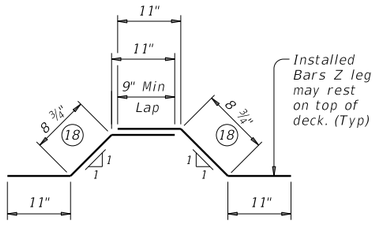
BARS wU(#5)



BARS V(#5)



BARS VS(#5)



BARS Z(#5)

SHEET 2 OF 4

Texas Department of Transportation

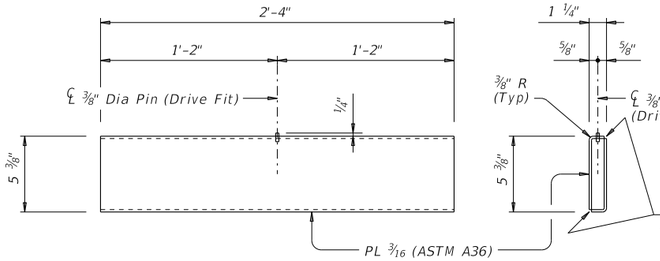
Bridge Division Standard

COMBINATION RAIL

TYPE C2P

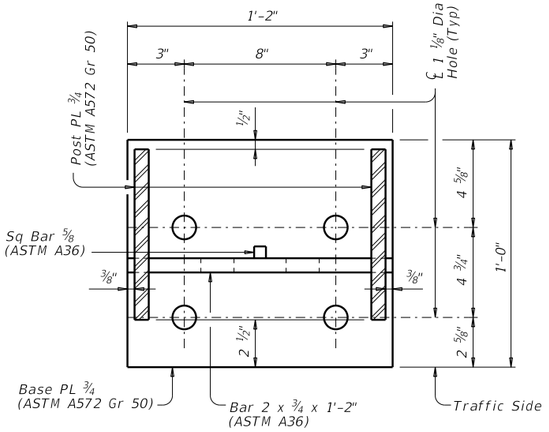
FILE: RL-C2P-19.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT.	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

DATE:
FILE:

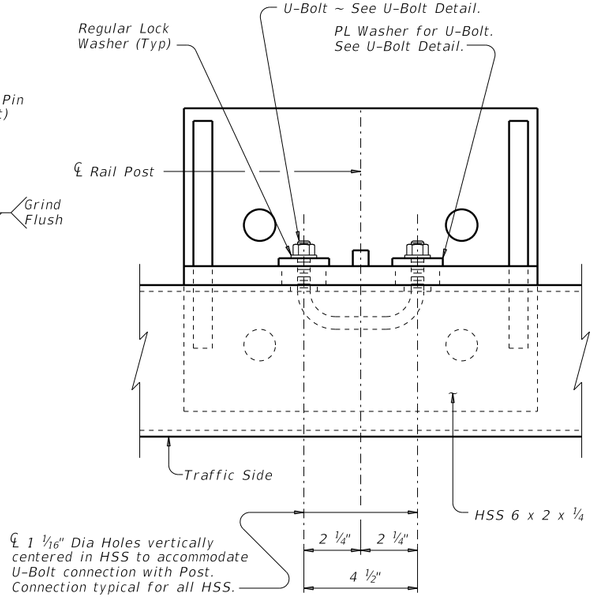


PLAN END VIEW

RECTANGULAR SLEEVE MEMBER

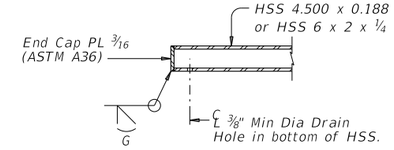


SECTION I-I

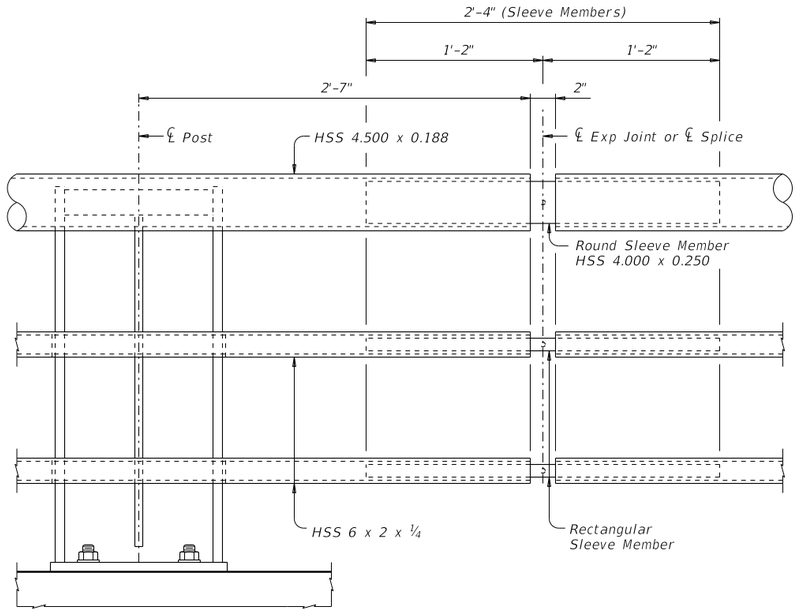


TOP VIEW OF RAIL POST

Showing connection for rail post and HSS 6 x 2 x 1/4.
HSS 4.5 x 0.188 not shown for clarity.
HSS 4.5 x 0.188 connection similar.

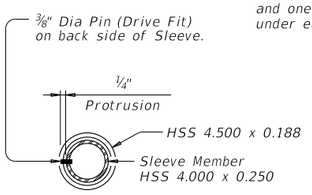


END CAP DETAIL

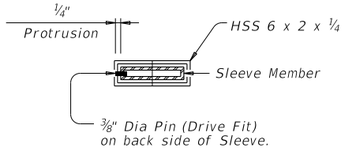


EXPANSION JOINT OR SPLICE

Picket panels not shown for clarity.



ROUND SLEEVE MEMBER



RECTANGULAR SLEEVE MEMBER

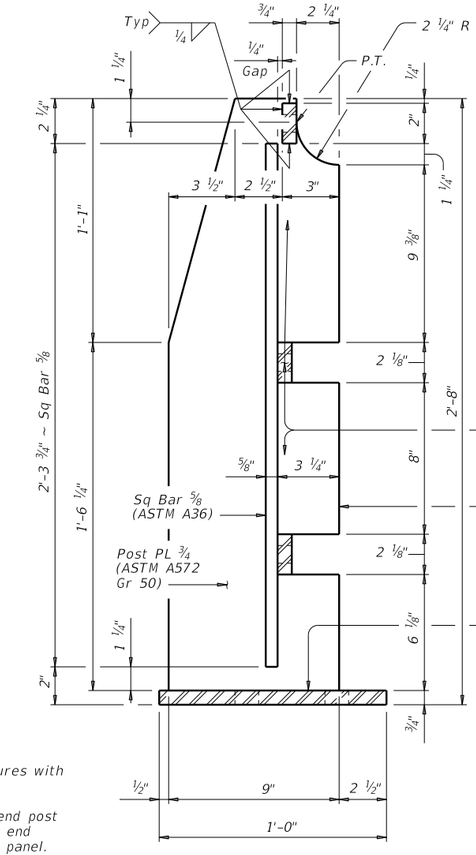
SECTIONS THRU SLEEVE MEMBERS

Sections shown at ℄ Exp Jt or ℄ Splice

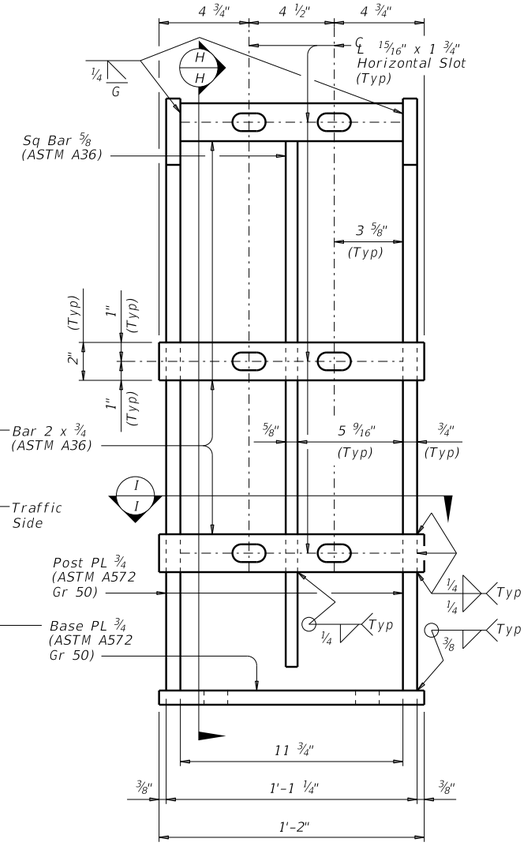
(7) Increase 2" for structures with overlay.

(20) See "Section A-A" for end post hole placement in each end post PL for picket end panel.

(21) ℄ 3 ~ 5/8" Dia holes in each end post PL. Attach picket end panel with 3 ~ 1/2" Dia hex head bolts (ASTM F3125 Gr A325) with one hardened steel washer (ASTM F436) placed under each hex head and one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut (ASTM A563).

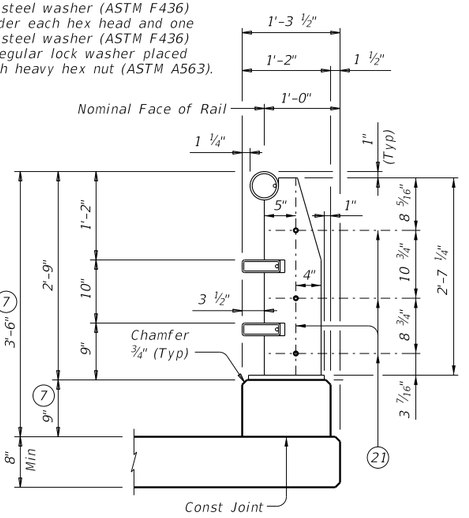


SECTION H-H (20)



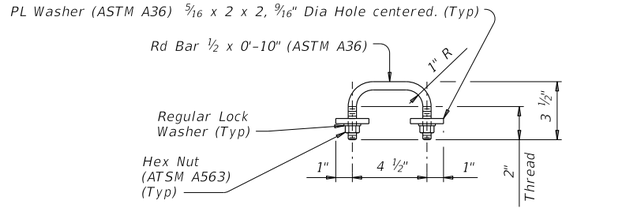
POST DETAIL (20)

Showing Traffic Side of Post



SECTION A-A

Showing end post 5/8" Dia hole placement in each post PL for picket end panel. Shown without raised sidewalk. Reinforcing steel not shown for clarity.



U-BOLT DETAIL

(Showing U-Bolt for rail post and HSS)

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C2P

FILE: RL-C2P-19.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

DATE:
FILE:

(7) Increase 2" for structures with overlay.

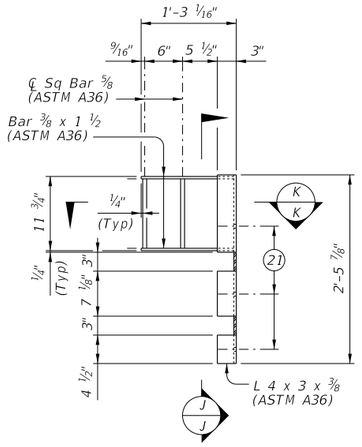
(21) ℄ 3 ~ ⅝" Dia holes. Attach picket end panel to end post with 3 ~ ½" Dia heavy hex head bolts (ASTM F3125 Gr A325) with one hardened steel washer (ASTM F436) placed under each hex head and one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut (ASTM A563).

(22) ℄ Sq Bar ⅝ (ASTM A36) spaced at 6".

(23) ℄ Bolt locations for attaching picket panel to back of HSS 6 x 2 x ¼. Six ½" Dia heavy hex head bolts (ASTM F3125 Gr A325) with one hardened steel washer (ASTM F436) placed under each hex head and one hardened steel washer (ASTM F436) placed under each heavy hex nut (ASTM A563) required per picket panel. ℄ 9⁄16" x 3 ½" Horizontal Slot in ⅜ x 1 ½ Bar for ½" Dia heavy hex head bolts (ASTM F3125 Gr A325). See "Section M-M."

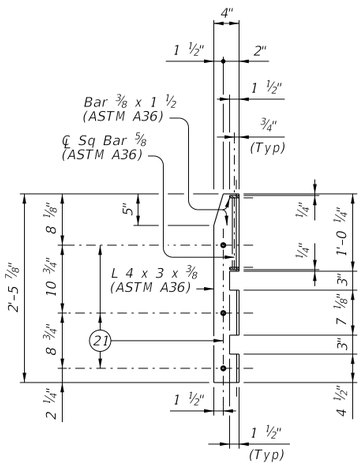
(24) ℄ Bolt locations at ends of picket panel as shown. See "Roadway Elevation Of Rail."

(25) ℄ Bolt locations for attaching picket panel must always be in next adjacent picket panel bay from end of sleeve members to allow for joint movement, when sleeve members are present.

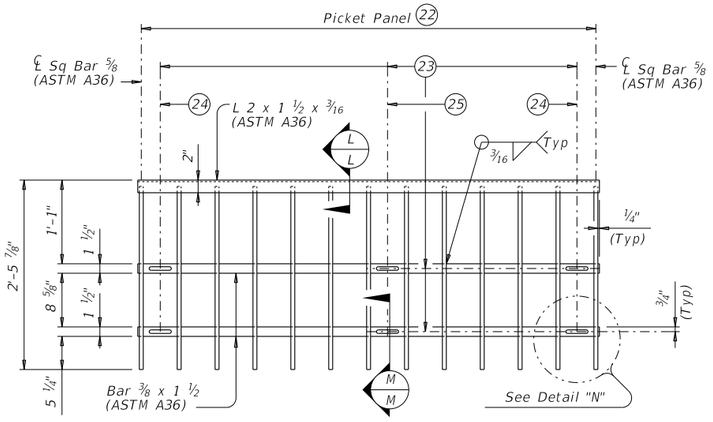


PICKET END PANEL DETAIL

Showing traffic side of picket end panel. Picket end panel is detailed for one side only, other side similar. For other side picket end panel must be built for opposite hand. Picket end panel weight = 27 lb each, for contractor's information only.

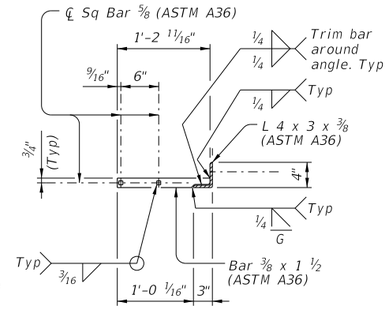


SECTION J-J

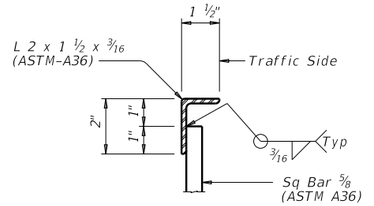


PICKET PANEL DETAIL

Showing field side of picket panel. 6'-0" Max picket panel weight = 70 lb each, for contractor's information only.



SECTION K-K



SECTION L-L

CONSTRUCTION NOTES:

The face of tubular sections and rail curb must be plumb unless otherwise approved by the Engineer. Steel posts must be square to the top of curb. Use epoxy mortar under post base plates if gaps larger than 1⁄16" exist.

Bend tubes to required radius for curved rails. Shop drawings for approval are required for curved rails.

One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single V groove. Grind smooth.

Cap all ends of HSS at parapet.

Round or chamfer exposed edges of rail members and rail posts to approximately 1⁄16" by grinding.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide ASTM A1085 or A500 Gr B for all HSS.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel." Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Provide ⅞" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Provide ½" Dia ASTM F3125 Gr A325 hex head bolts with one hardened steel washer (ASTM F436) placed under each hex head and one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut (ASTM A563).

Provide ½" Dia round bar U-bolts (ASTM A36) with plate washers (ASTM A36) and regular lock washers placed under hex nuts that conform to ASTM A563 requirements. See "U-Bolt Detail."

Provide Class "S" concrete. When Class "S" concrete for slab is HPC, include a minimum of 3 gallons of calcium nitrite inorganic corrosion inhibitor per cubic yard of Class "S" concrete.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for 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 speeds of 45 mph and less.

This railing cannot be used on bridges with expansion joints providing more than 5" movement or on cast-in-place retaining walls, unless otherwise noted.

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

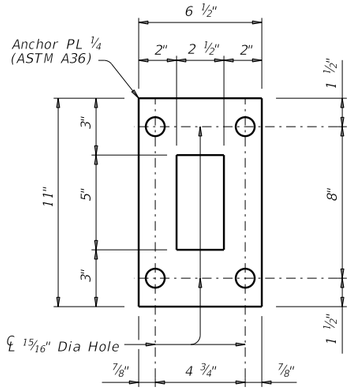
Submit erection drawings showing panel lengths, rail post spacing, and anchor bolt setting, to the Engineer for approval.

Average weight of railing with no overlay:

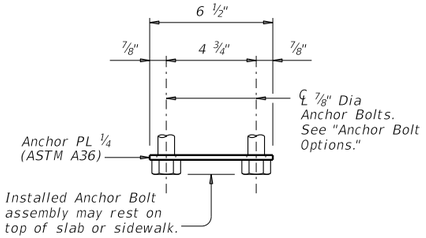
203 plf total
131 plf (Conc)
72 plf (Steel).

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

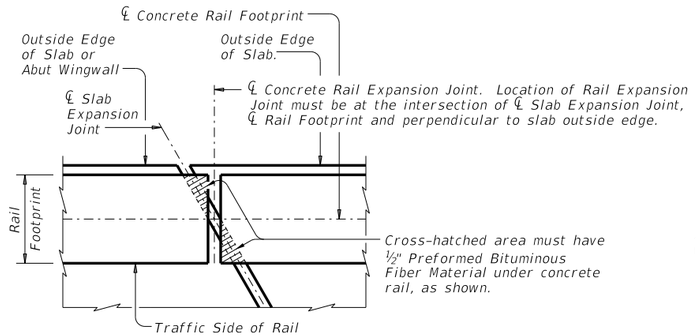


PLAN OF ANCHOR PLATE



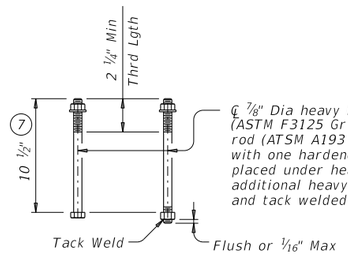
ELEVATION

ANCHOR BOLT ASSEMBLY DETAILS



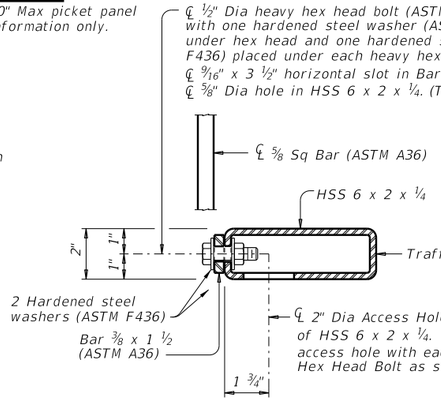
PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.



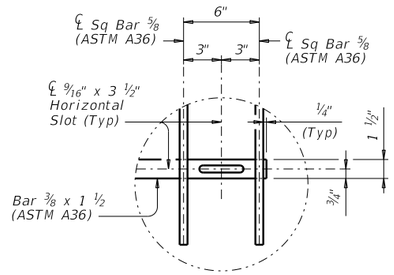
ANCHOR BOLT OPTIONS

(Showing Anchor Bolts for Base Plate)



SECTION M-M

Showing Picket Panel connecting to HSS 6 x 2 x ¼. (Typ)



DETAIL "N"

SHEET 4 OF 4

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C2P

FILE: RL-C2P-19.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.