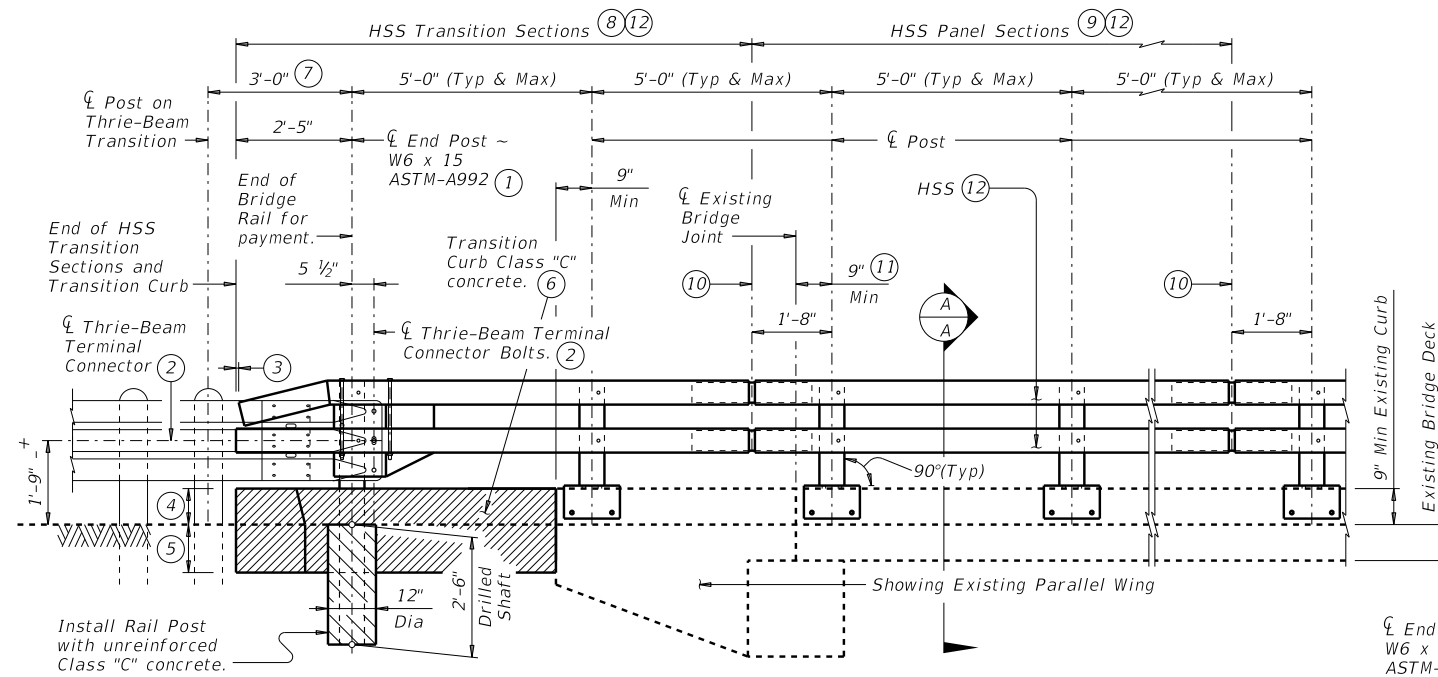
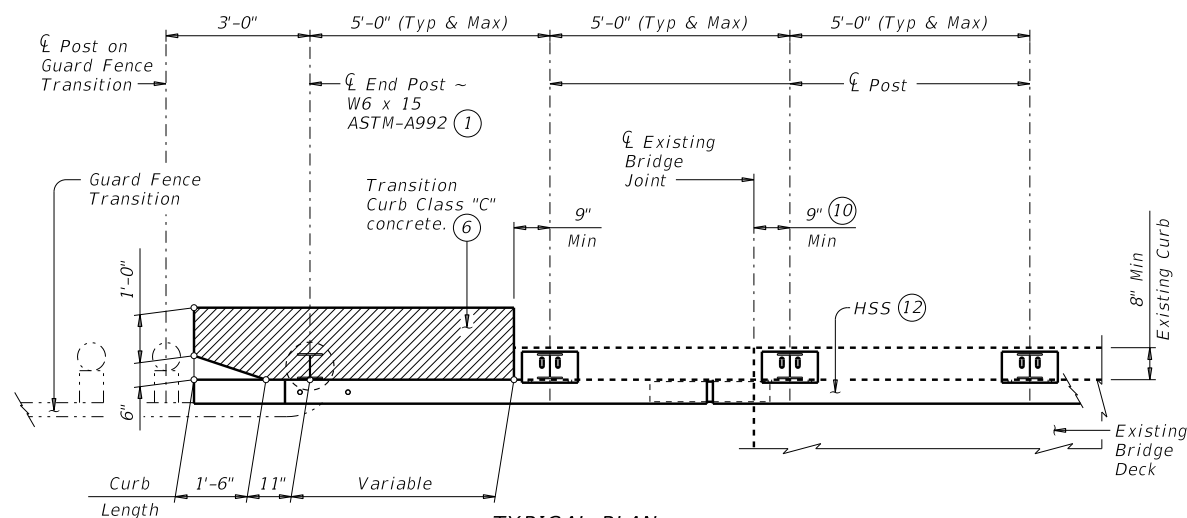


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TYPICAL ROADWAY ELEVATION

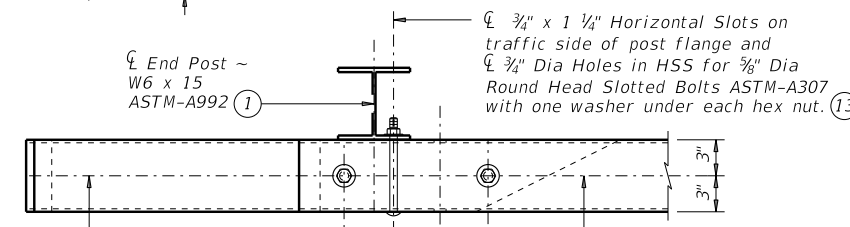


TYPICAL PLAN

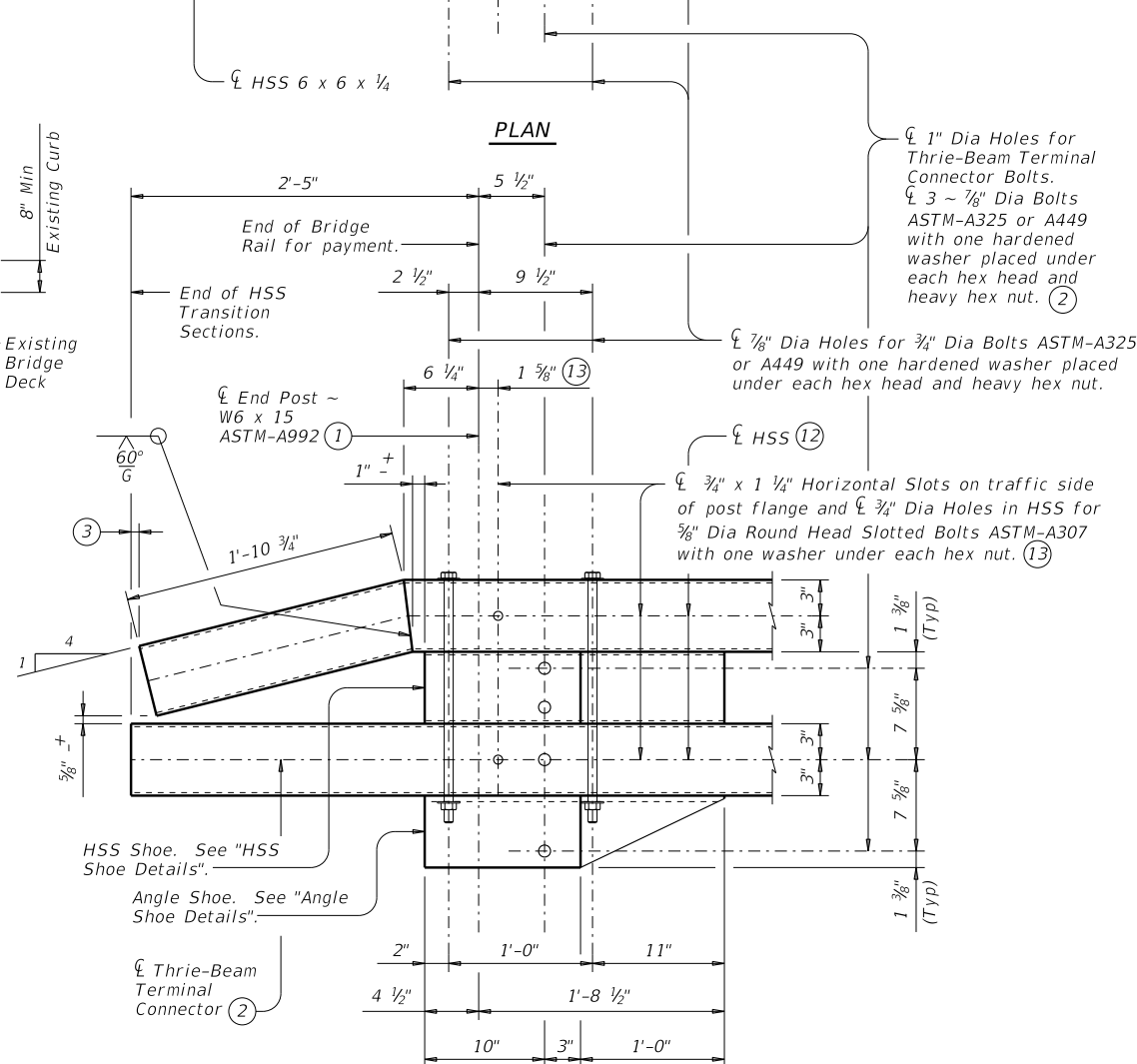
EXAMPLE "A" RETROFIT WITH PARALLEL WING

(Showing 9" high and 8" wide curbs, higher and wider curbs similar)

- 1 Post length = Top of rail elevation minus bottom of drilled shaft elevation.
- 2 Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach the appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal to the bridge rail using 3 bolts as shown, and extend along the embankment.
- 3 Top HSS can be shorter than bottom HSS 5/8" plus or minus.
- 4 Match existing bridge curb height.
- 5 Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.
- 6 Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 1'-6" taper will remain vertical.
- 7 Showing first post for a TL-3 rated guard fence transition. First post for a TL-2 rated guard fence transition or a guard fence downstream anchor terminal is 4'-4 3/4".
- 8 HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.
- 9 HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.
- 10 Existing HSS Expansion Joint or Existing HSS Splice Joint as required.
- 11 Use 9" minimum for both expansion joints and construction/controlled joints.
- 12 HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- 13 May be placed on either side of W6 x 15 web.



PLAN



ROADWAY ELEVATION

HSS TRANSITION SECTION END DETAILS

Thrie-Beam Terminal Connector not shown for clarity.

CONSTRUCTION NOTES:

- Provide Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.
- One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Round or chamfer exposed edges of HSS rail, rail post and plate to approximately 1/16" by grinding.
- Submit erection drawings showing panel lengths, splice locations, post placement, anchor bolt locations and adhesive anchor test data to demonstrate pullout strength to the Engineer for approval. Shop drawings will not be required.

MATERIAL NOTES:

- Galvanize all steel components except reinforcing steel.
- Provide Grade 60 reinforcing steel.
- Provide Class "C" concrete.
- Anchor bolts must be 3/4" Dia ASTM-A193 Gr B7 or ASTM-A449 fully threaded rods with one heavy hex nut and one hardened washer each. Embed threaded rods 6 3/4" Min into concrete curb using a Type III, Class C epoxy adhesive anchorage system capable of obtaining an ultimate load, per threaded rod, of 30 kips in tension. Submit evidence of the proposed epoxy adhesive anchorage system's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the manufacturer's instructions.

DESIGN NOTES:

- This retrofit railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This retrofit railing 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.
- Rail anchorage details shown on this guide may require modification for select structure types. See "Section A-A" for limits on existing overlay/seal coats thickness based on existing curb height.
- This rail is to be paid for as "Rail (Ty T131RC)" under Item 450 "Railing".
- Average weight with no overlay:
55 plf (9", 11" & 12" Curbs)
53 plf (18" Curbs)

Cover dimensions are clear dimensions, unless noted otherwise.

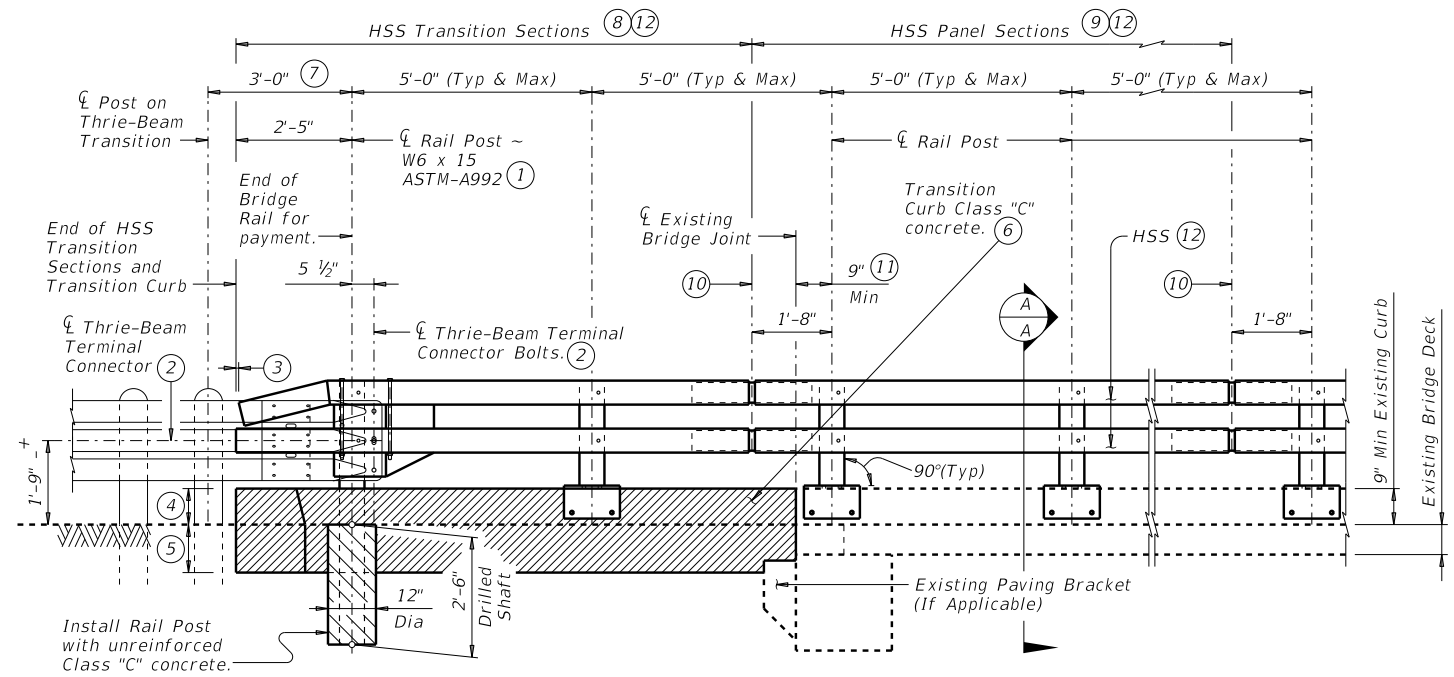
This sheet is to be used as a guide for preparing project-specific details to retrofit existing curved structures. Details with appropriate notes from this guide should be prepared for the specific application. Dimensions of existing slab thickness, curb widths, curb heights, curb slopes, and overlay/seal coats thickness, must be shown. Particular care should be taken in identifying the bridge abutment wingwall conditions and providing for proper reinforcement anchorage and approach guard fence post positioning. This sheet may not be used without modification. The details shown may need to be amended if the exact existing condition is not covered. In all cases, details and notes not required must be crossed out or eliminated, "(MOD)" added, the phrase "(Not to be used as a standard)" removed, and the sheet sealed and signed.

SHEET 1 OF 4

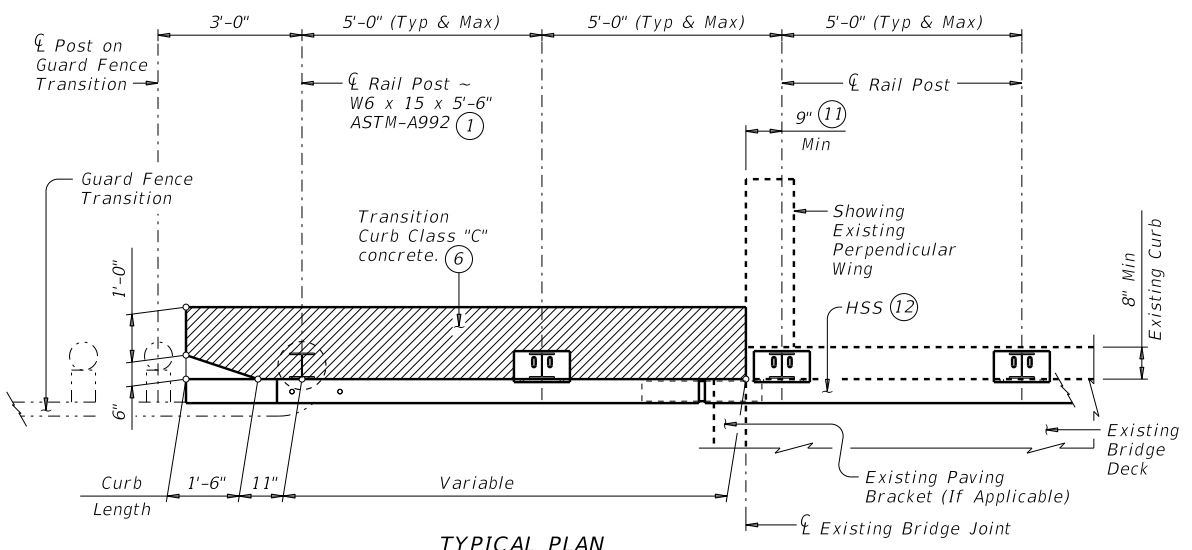
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RETROFIT GUIDE FOR T131RC RAIL ON CURBS			
(NOT TO BE USED AS A STANDARD)			
TYPE T131RC			
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TYPICAL ROADWAY ELEVATION

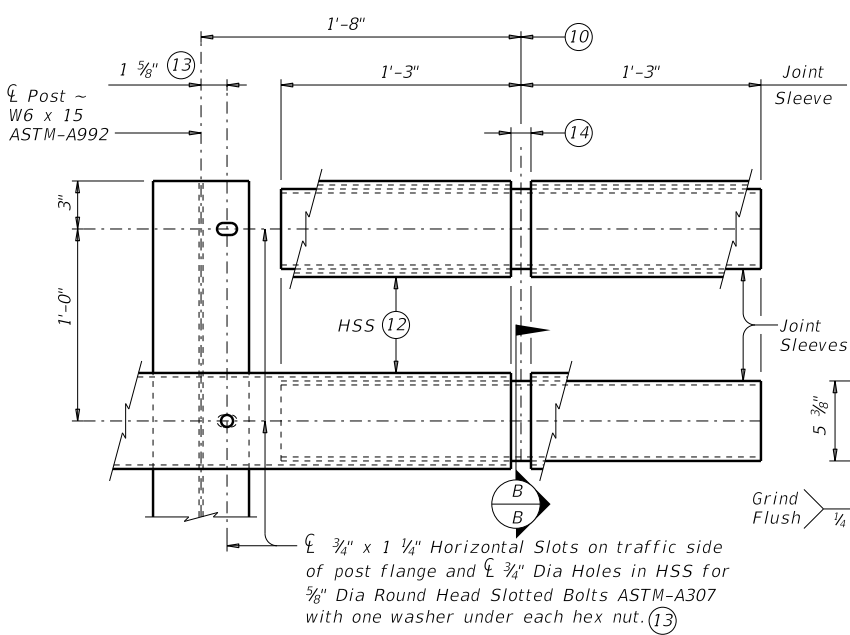


TYPICAL PLAN

EXAMPLE "B" RETROFIT WITH PERPENDICULAR WING

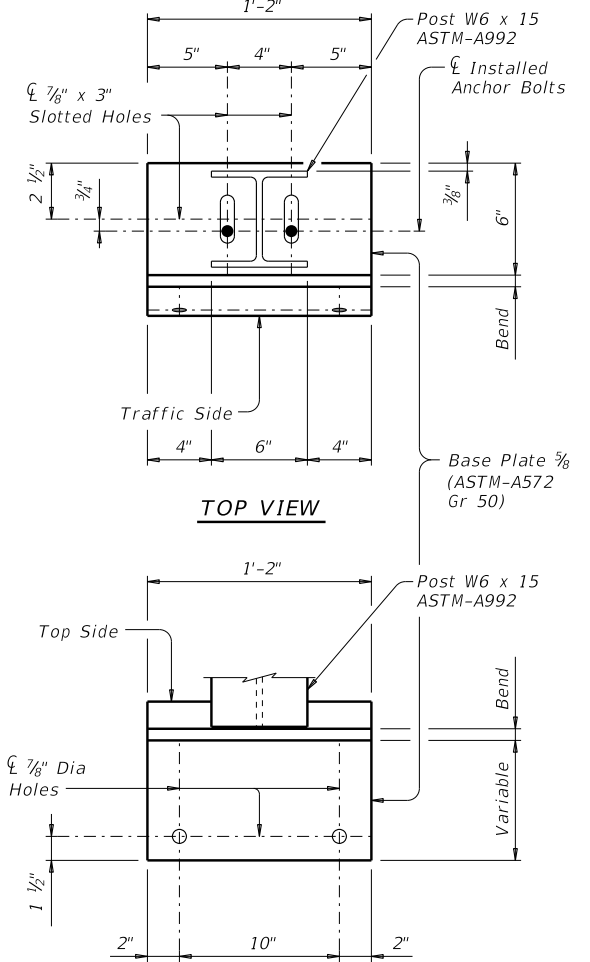
(Showing 9" high and 8" wide curbs, higher and wider curbs similar)

- ① Post length = Top of rail elevation minus bottom of drilled shaft elevation.
- ② Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach the appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal to the bridge rail using 3 bolts as shown, and extend along the embankment.
- ③ Top HSS can be shorter than bottom HSS 1/8" plus or minus.
- ④ Match existing bridge curb height.
- ⑤ Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.
- ⑥ Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 1'-6" taper will remain vertical.
- ⑦ Showing first post for a TL-3 rated guard fence transition. First post for a TL-2 rated guard fence transition or a guard fence downstream anchor terminal is 4'-4 3/4".
- ⑧ HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.
- ⑨ HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.
- ⑩ $\bar{\bar{C}}$ HSS Expansion Joint or $\bar{\bar{C}}$ HSS Splice Joint as required.
- ⑪ Use 9" minimum for both expansion joints and construction/controlled joints.
- ⑫ HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- ⑬ May be placed on either side of W6 x 15 web.
- ⑭ Place HSS Expansion Joints in rail at every slab Expansion Joint. Expansion Joints = Slab opening plus 1/2". Splice Joints = 1".

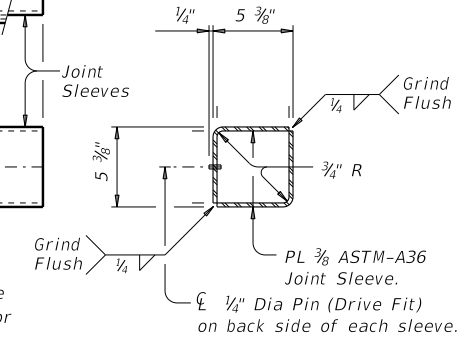


TYPICAL POST CONNECTION AND SPLICE DETAIL FOR HSS

Showing post with HSS and HSS splice.

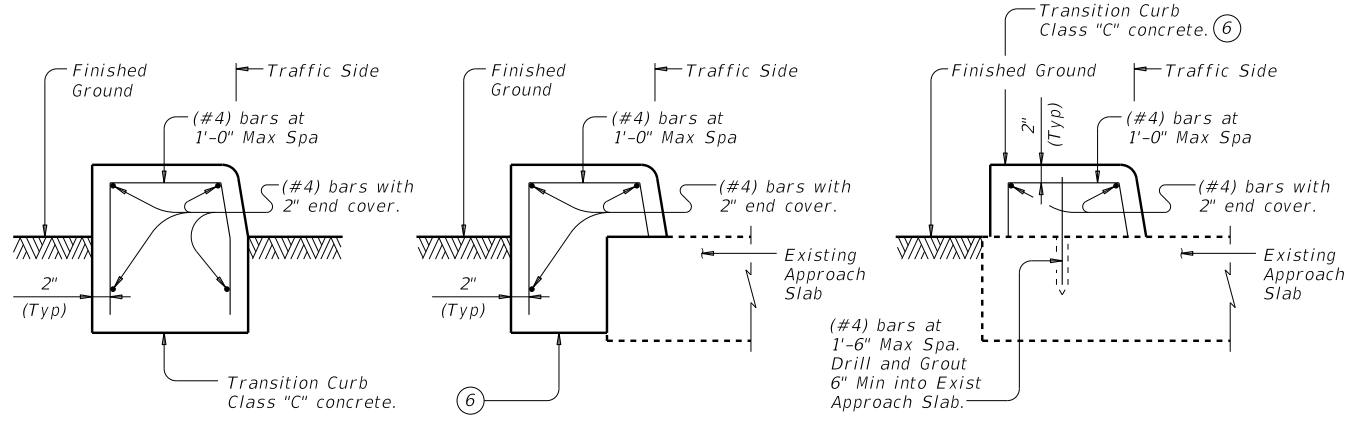


BASE PLATE DETAILS



SECTION B-B

Showing typical joint sleeve.

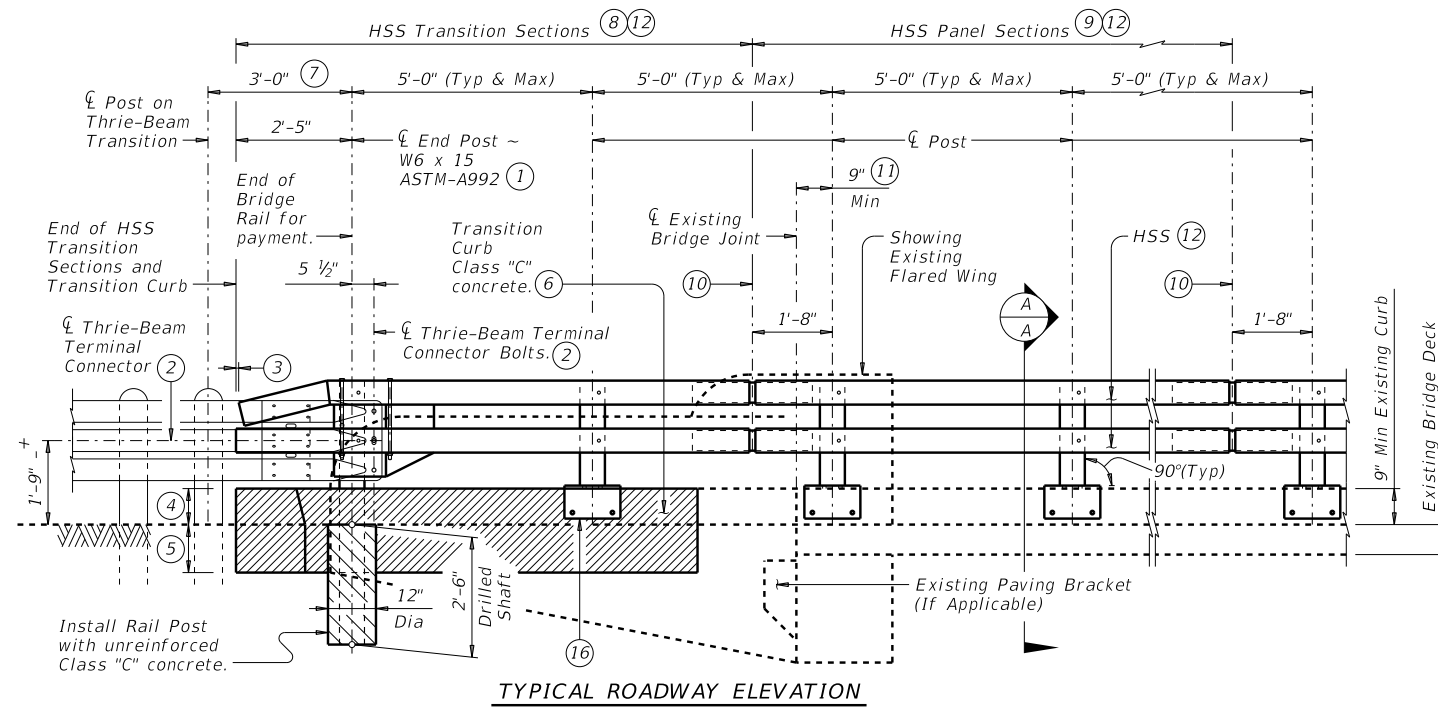


EXAMPLES OF TRANSITION CURB SECTIONS

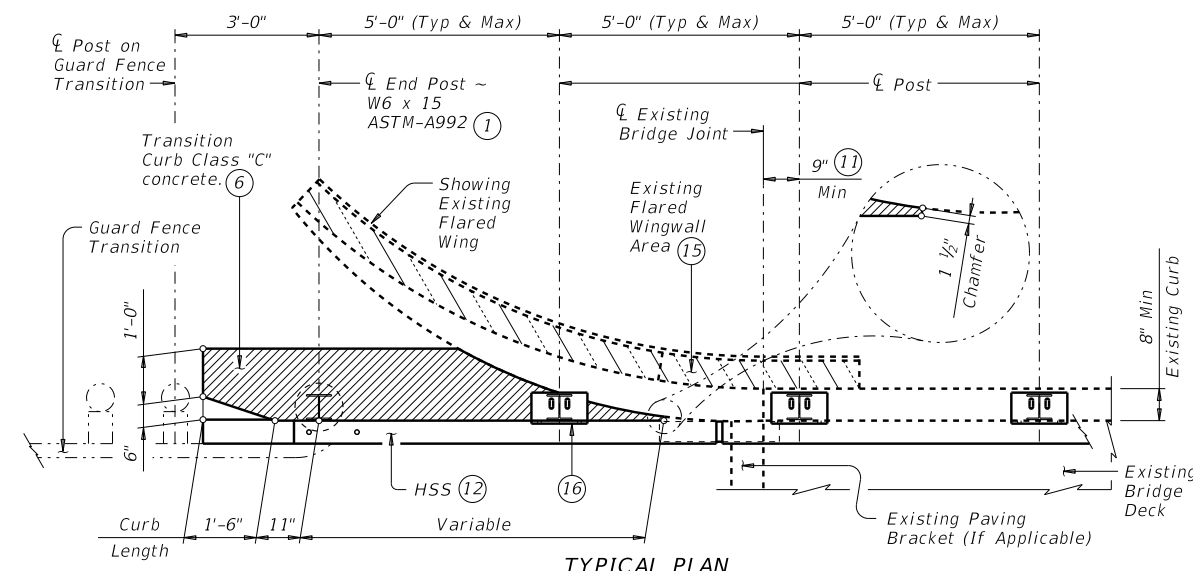
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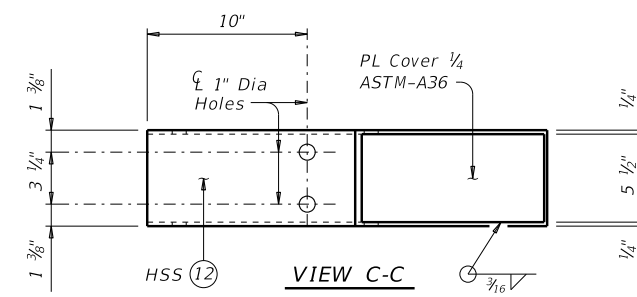
TYPICAL ROADWAY ELEVATION



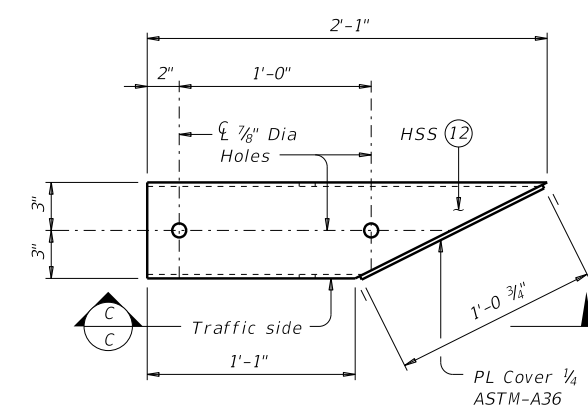
TYPICAL PLAN

EXAMPLE "C" RETROFIT WITH FLARED WING

(Showing 9" high and 8" wide curbs, higher and wider curbs similar)

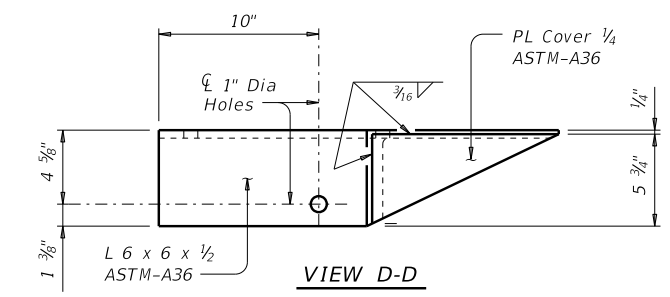


VIEW C-C

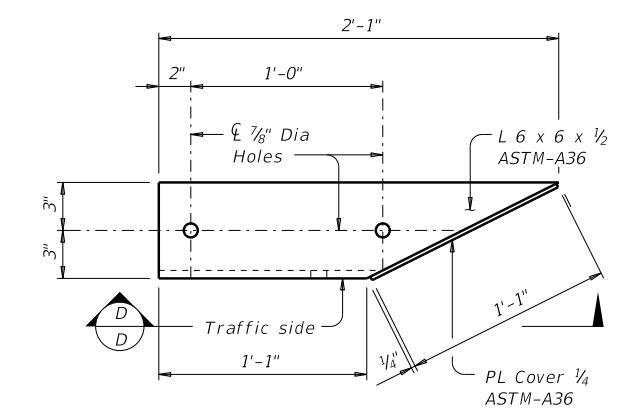


TOP VIEW

HSS SHOE DETAILS



VIEW D-D



TOP VIEW

ANGLE SHOE DETAILS

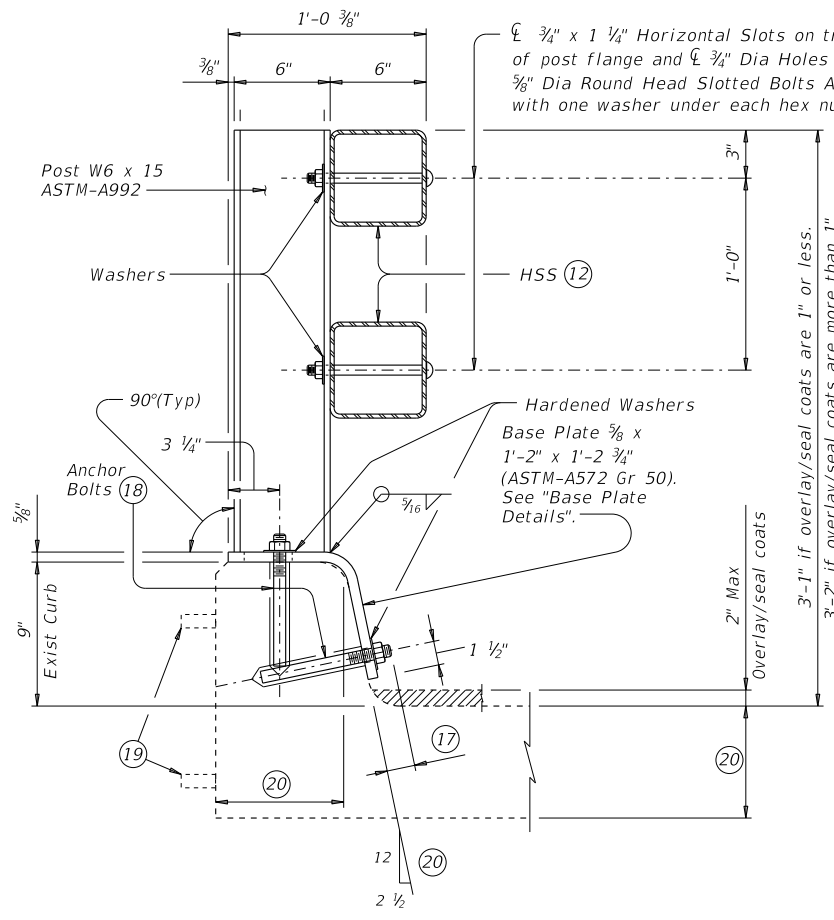
Angle Shoe shown is detailed for one side only, other side similar. For other side shoe must be built for opposite hand.

- ① Post length = Top of rail elevation minus bottom of drilled shaft elevation.
- ② Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". The appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal must be attached to the bridge rail and extended along the embankment.
- ③ Top HSS can be shorter than bottom HSS 5/8" plus or minus.
- ④ Match existing bridge curb height.
- ⑤ Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.
- ⑥ Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 6" taper will remain vertical.
- ⑦ Showing first post for a TL-3 rated guard fence transition. First post for a TL-2 rated guard fence transition or a guard fence downstream anchor terminal is 4'-4 3/4".
- ⑧ HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.
- ⑨ HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.
- ⑩ HSS Expansion Joint or HSS Splice Joint as required.
- ⑪ Use 9" minimum for both expansion joints and construction/controlled joints.
- ⑫ HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- ⑬ Remove all existing structure area from top of existing curb. Cut and grind flush all existing reinforcing extending from top of existing curb and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- ⑭ Only one post can be mounted to the transition curb as shown and the transition curb must be supported laterally by the existing wingwall/curb when doing so.

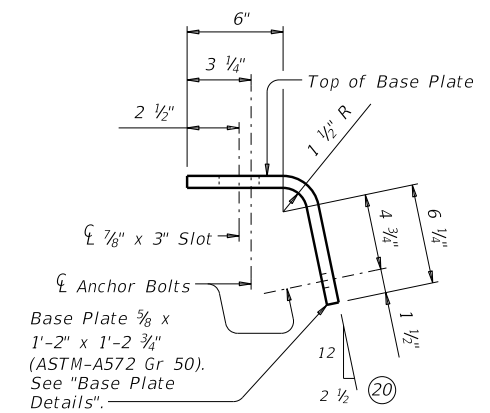
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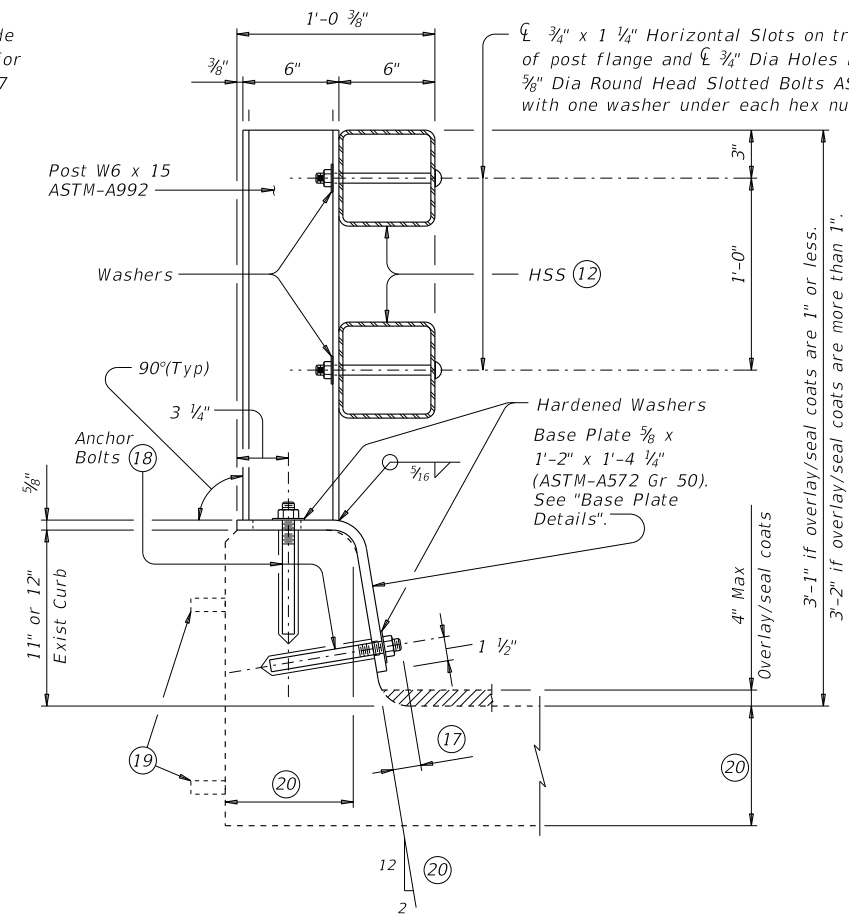
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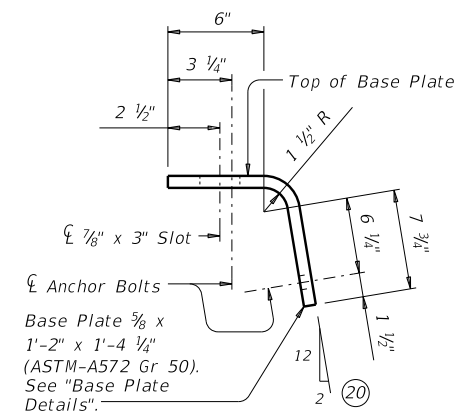
SECTION A-A OF 9" HIGH CURBS
(Showing example of 8" Min width curb, wider curbs similar)



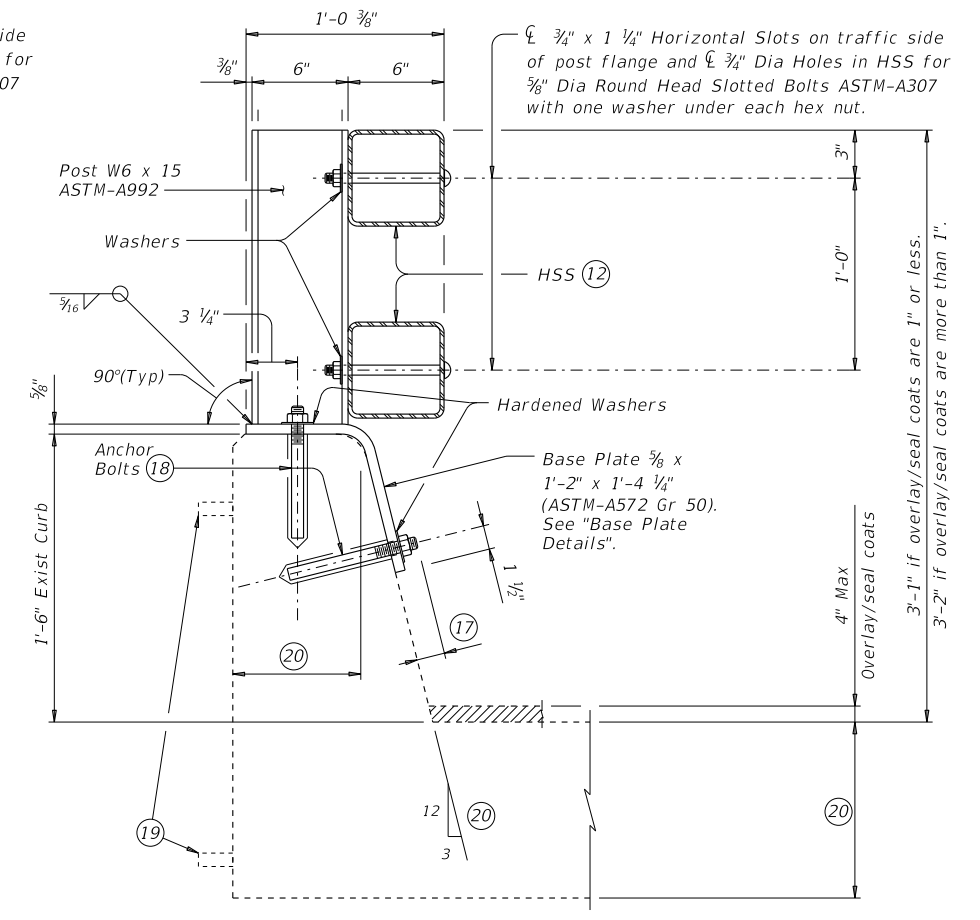
9" HIGH CURB BASE PLATE DETAIL



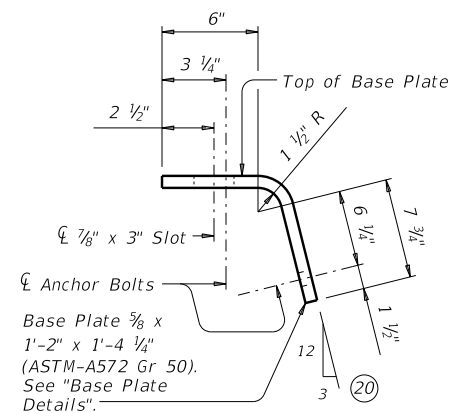
SECTION A-A OF 11" & 12" HIGH CURBS
(Showing example of 8" Min width curb, wider curbs similar)



11" & 12" HIGH CURB BASE PLATE DETAIL



SECTION A-A OF 18" HIGH CURBS
(Showing example of 8" Min width curb, wider curbs similar)



18" HIGH CURB BASE PLATE DETAIL

- ⑫ HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- ⑬ 1 3/4" Bolt Projection (Typ).
- ⑭ See "Material Notes" for anchor Bolt information.
- ⑮ Remove existing railing (including posts), cut and grind anchor bolts flush and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- ⑯ See elsewhere in plans for dimensions (curb width and height, slab and overlay thickness). Slope of curb may differ from what is shown. Adjust base plate as necessary to conform to curb face geometry.

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