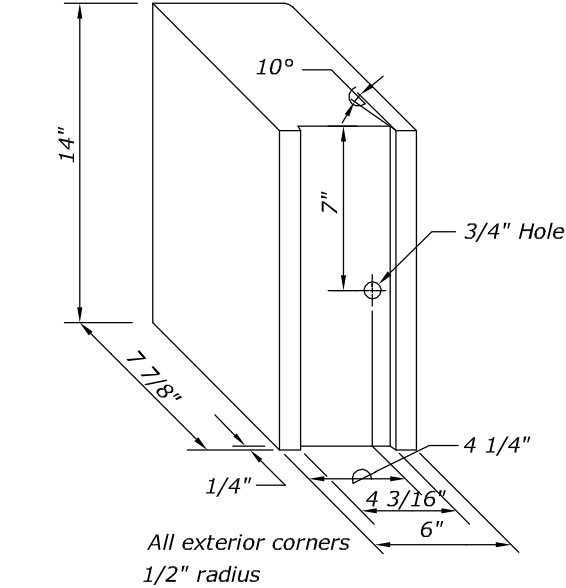


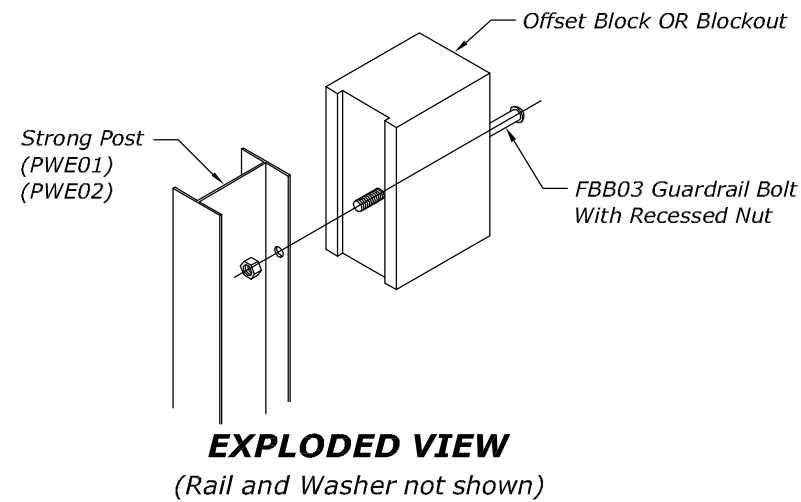
RECYCLED PLASTIC BLOCKOUT (TYPE I)



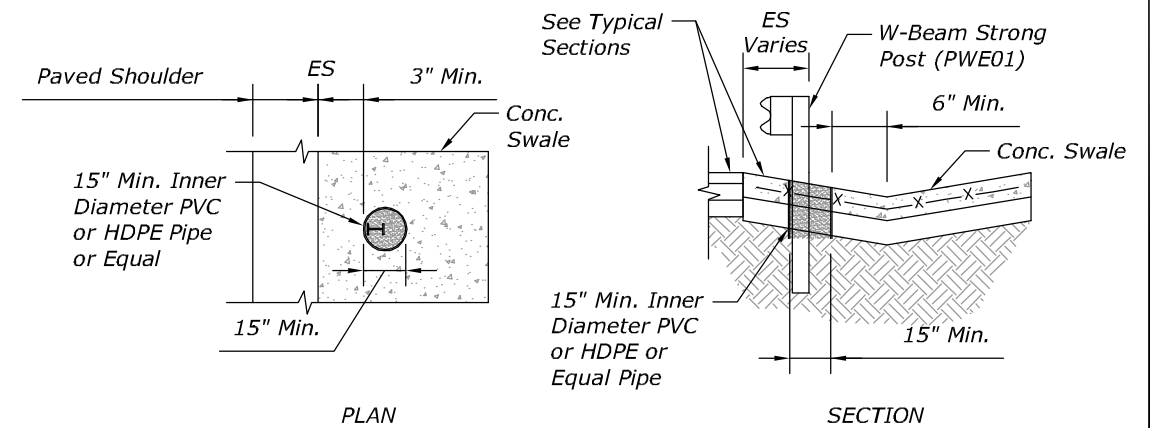
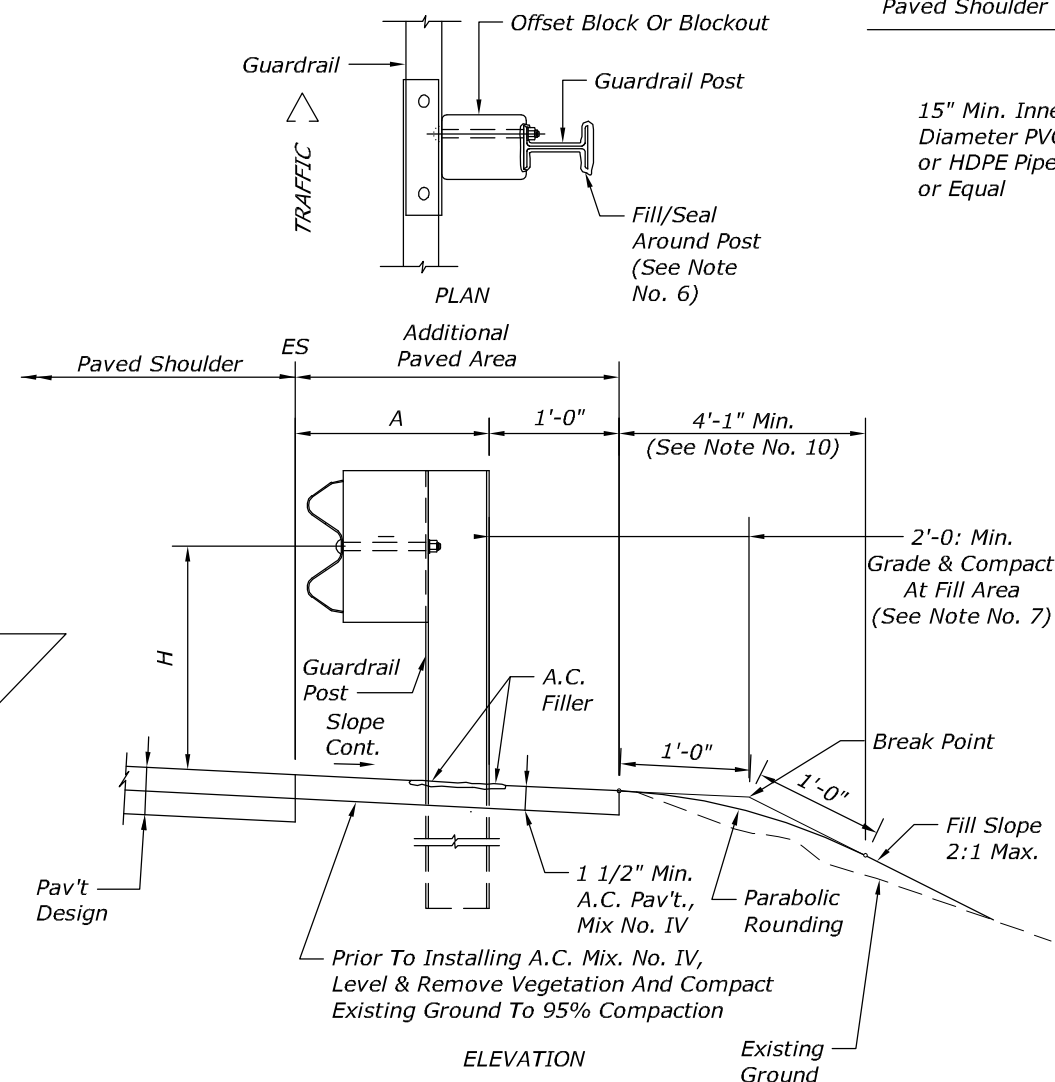
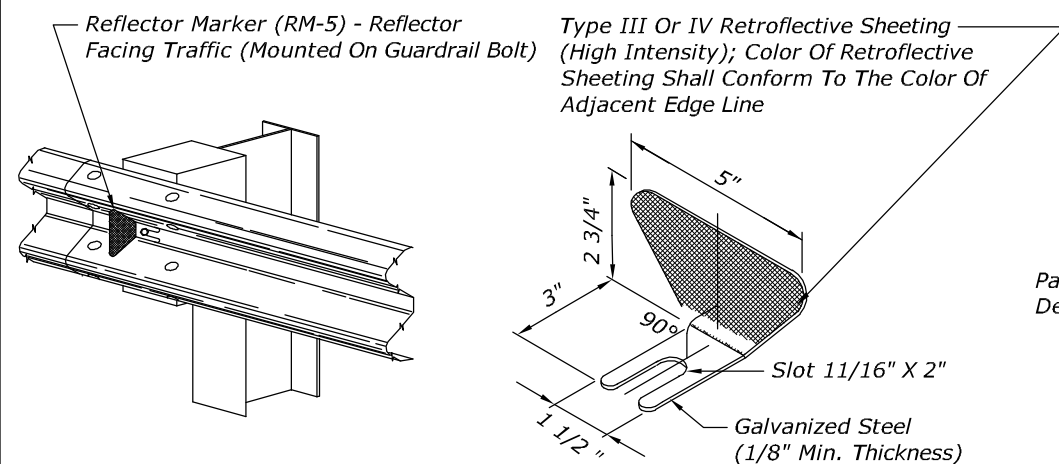
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

GENERAL NOTES

1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified.
3. All fasteners, posts, and rail elements (i.e., FBB03, PWE01, RWM02b, etc.) shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware", a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fasteners, posts and rail elements have been converted from metric units into their present form.
4. The Recycled Plastic Block or Offset Block shall be approved by the State.
5. All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
6. After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area caused during the guardrail post installation. If required by the Inspector/Engineer, the Contractor shall tamp the paved area around the guardrail post prior to filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
7. When standards for the fill slope area cannot be met, a site specific, Engineer-approved design may be used.
8. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
9. Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. Spacing of RM-5's on Horizontal Curves shall comply with Table III-1 of the MUTCD. RM-5's shall not be installed on Terminal Sections.
10. Minimum working width (clear distance) between back of MGS post to any fixed object is 4'-1" (49").



STEEL POST AND BLOCK DETAIL



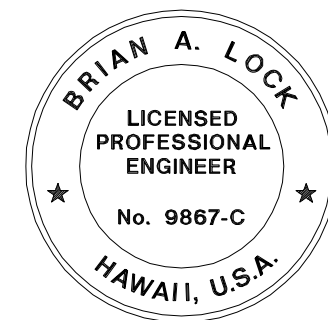
Soil  
ASTM C33 Coarse Aggregate, Size No. 57

NOTES:

1. Backfill of drilled holes shall be with compressible material, ASTM C33 Coarse Aggregate, Size No. 57.

STRONG POST W-BEAM GUARDRAIL LEAVE-OUT

GUARDRAIL TYPE	DIMENSION	
	H	A
MGS w/ Standard 8" Offset Block	2'-1"	1'-6"
MGS w/ No Blockout	2'-7/8"	9'-1/4"



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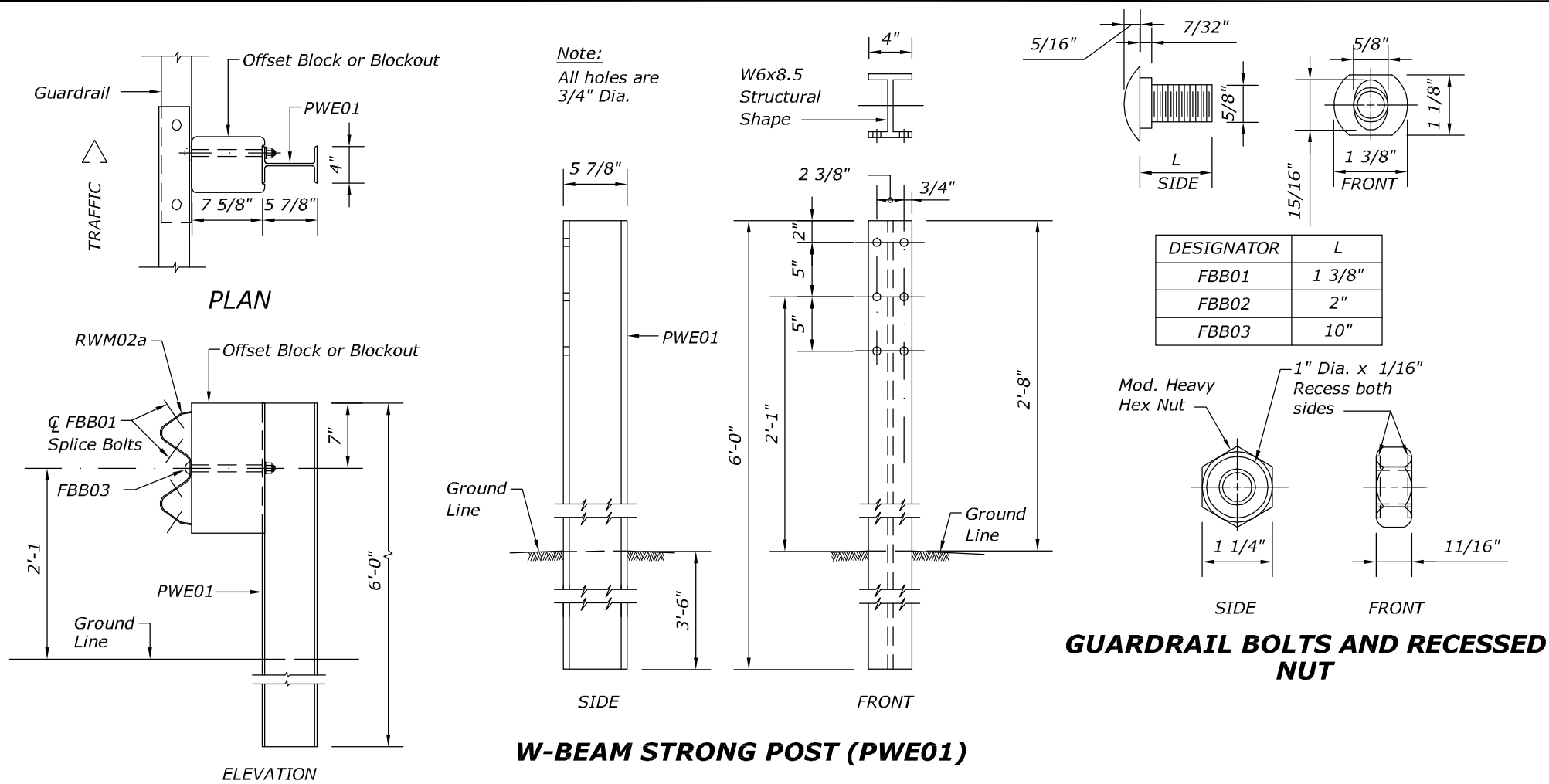
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

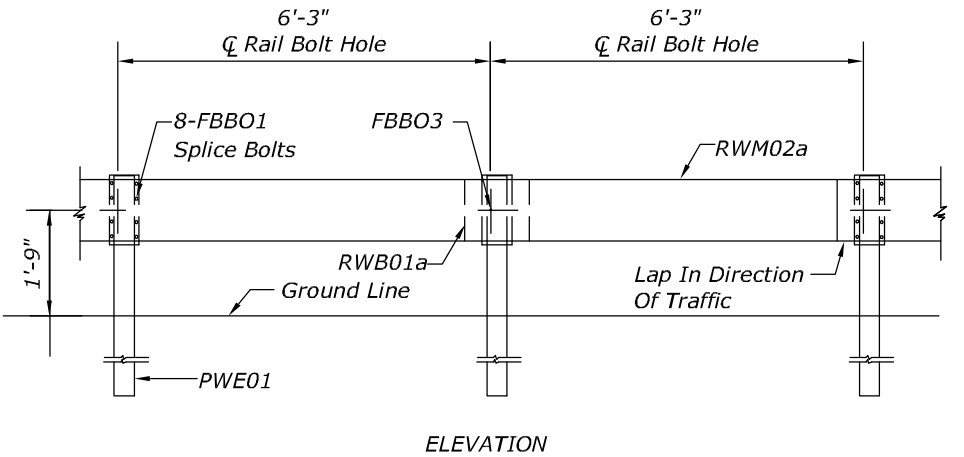
GUARDRAIL DETAILS

SPECIAL

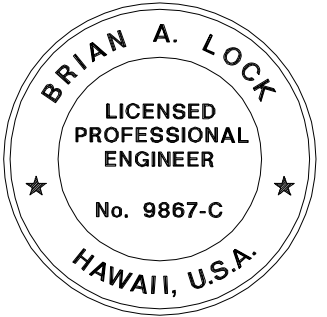
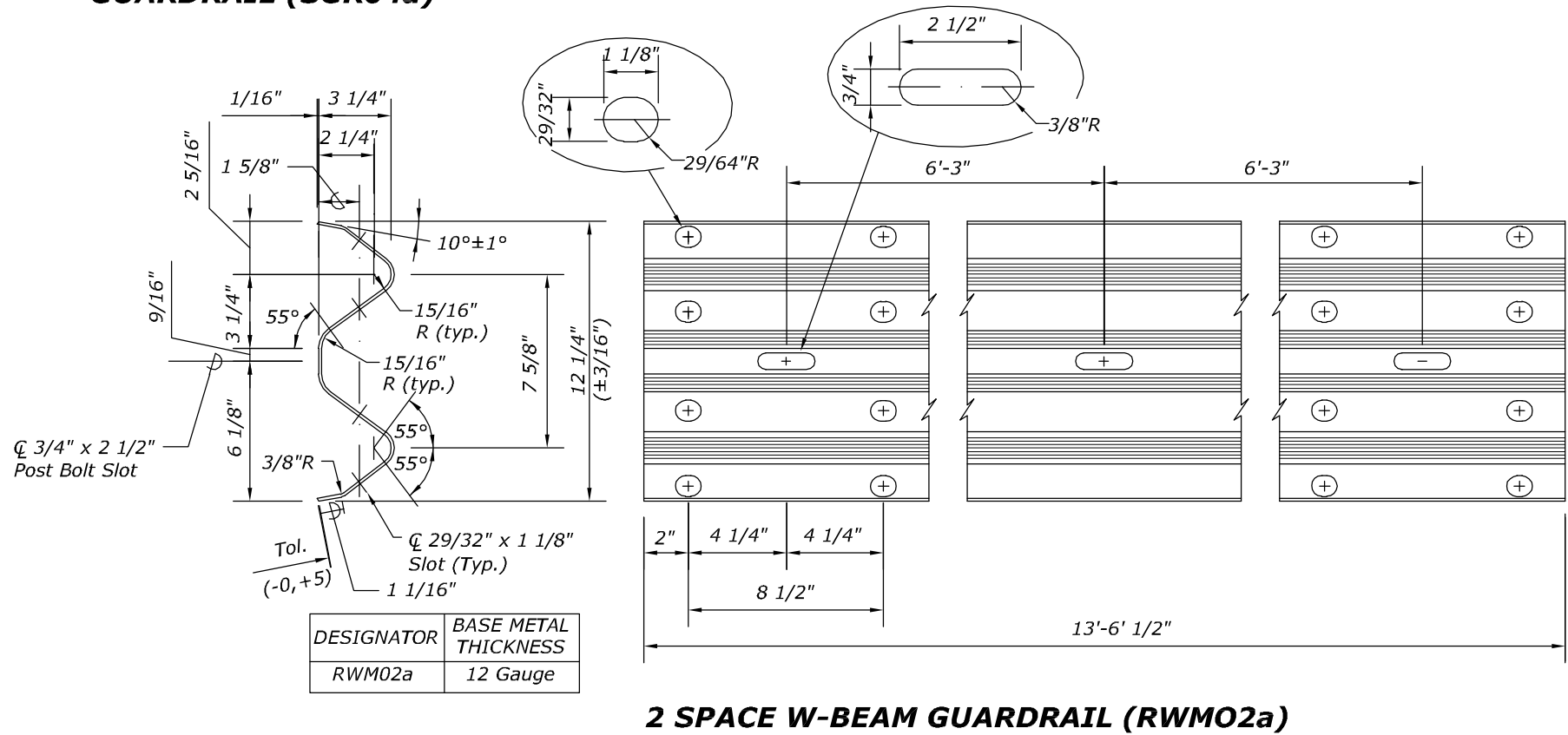
DRAWING NO.:



STRONG POST W-BEAM  
GUARDRAIL (SGR04a)



STRONG POST W-BEAM  
GUARDRAIL WITH RECYCLED  
OFFSET BLOCK OR PLASTIC  
BLOCKOUT



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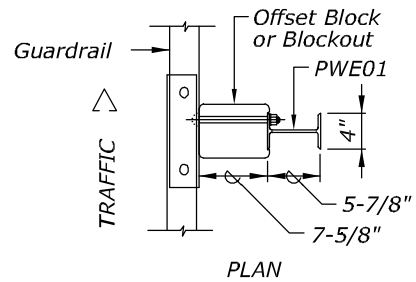
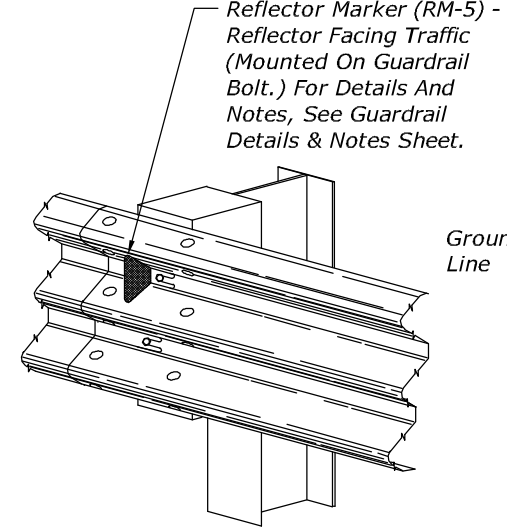
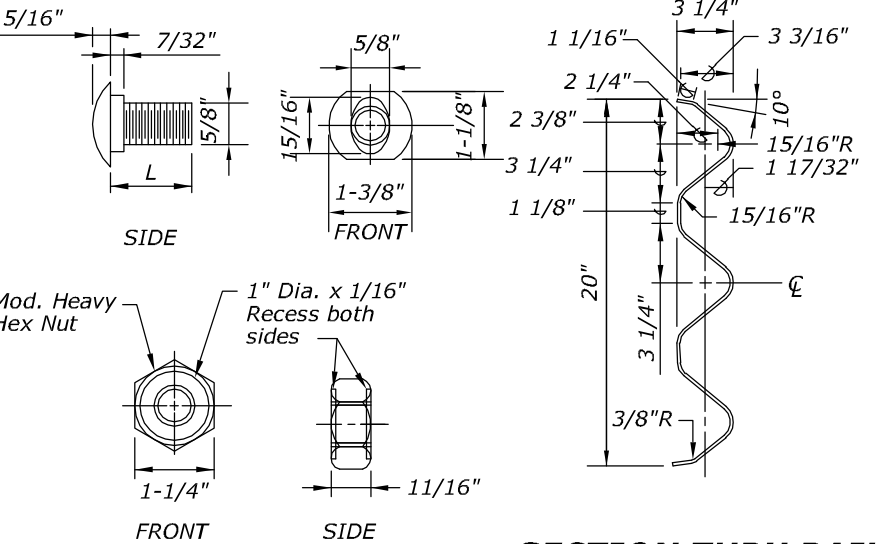
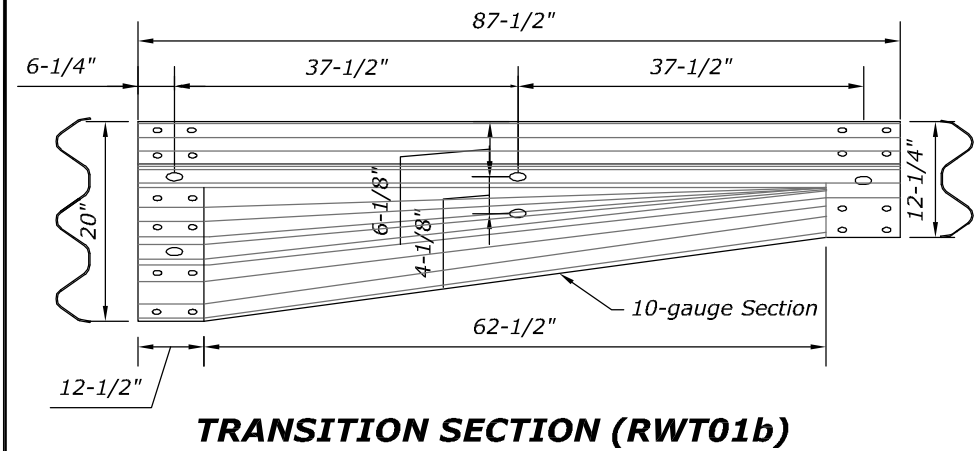
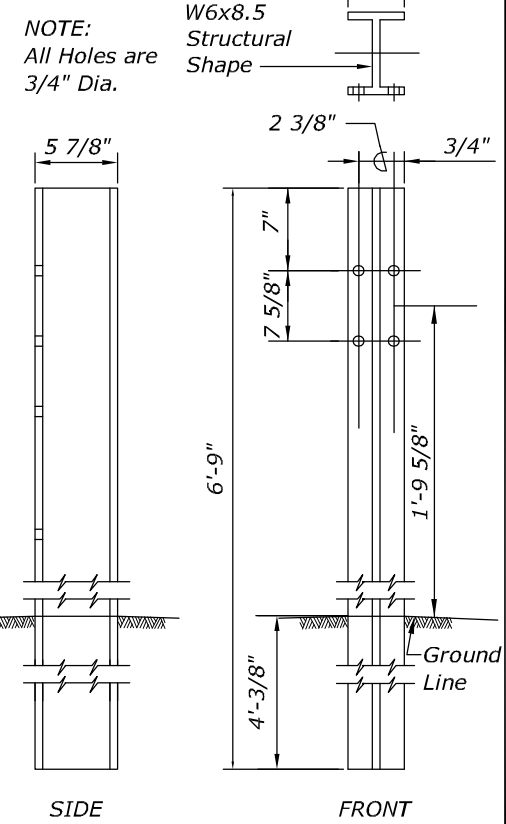
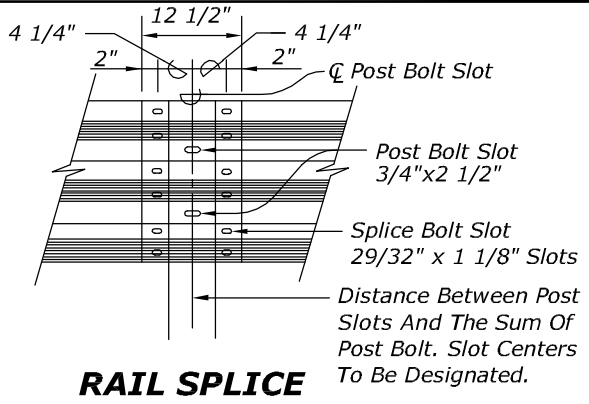
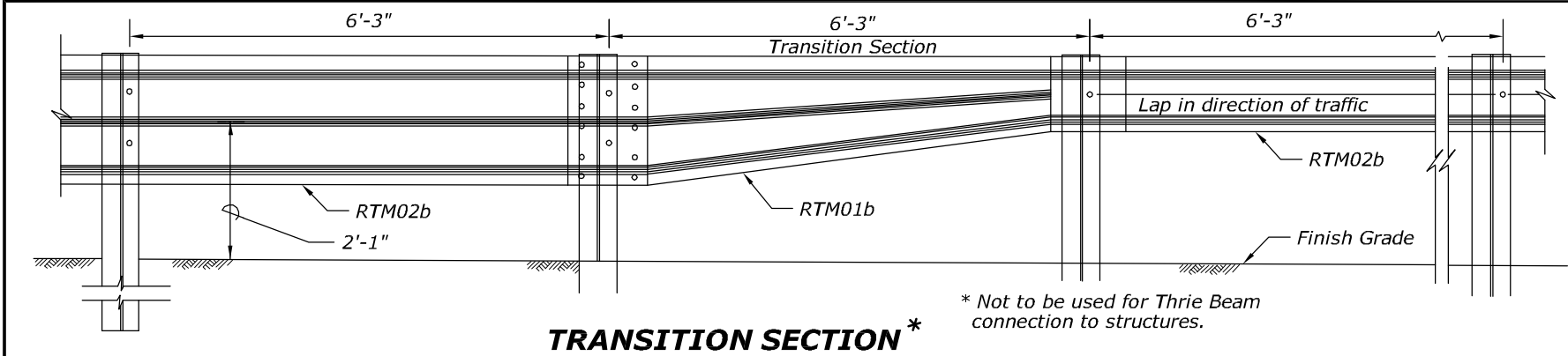
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GUARDRAIL DETAILS  
STRONG POST W-BEAM

SPECIAL

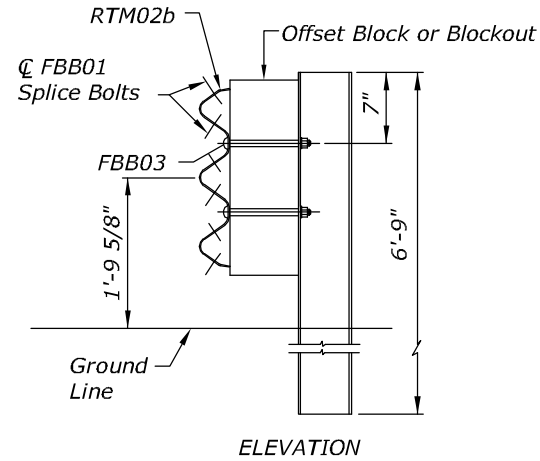
NO SCALE

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T78

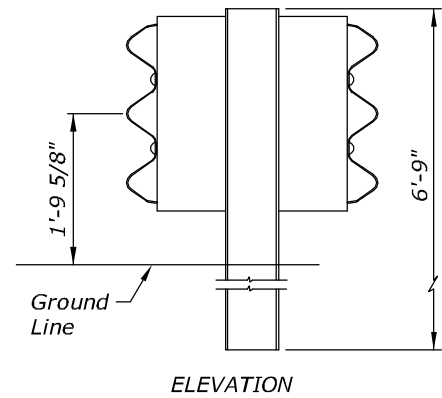


GUARDRAIL BOLTS AND RECESSED NUT

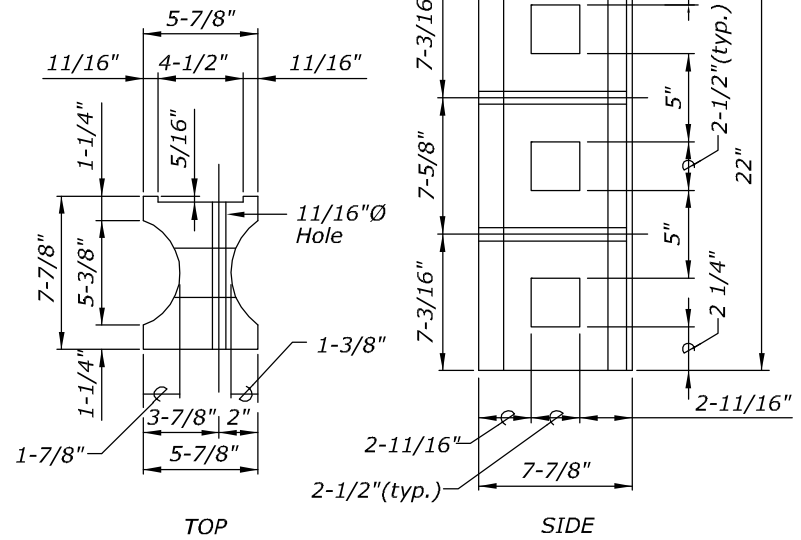
DESIGNATOR	L
FBB01	1-3/8"
FBB02	2"
FBB03	10"



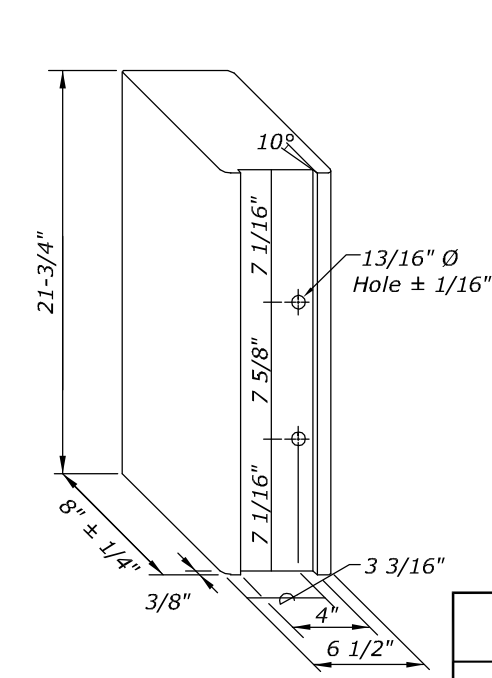
STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)



STRONG POST THRIE-BEAM MEDIAN GUARDRAIL (SGM09a)

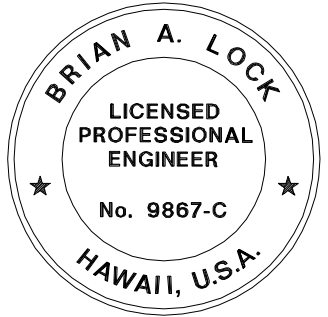


MODIFIED 6X8X22 PLASTIC BLOCKOUT (TYPE I - THRIE)



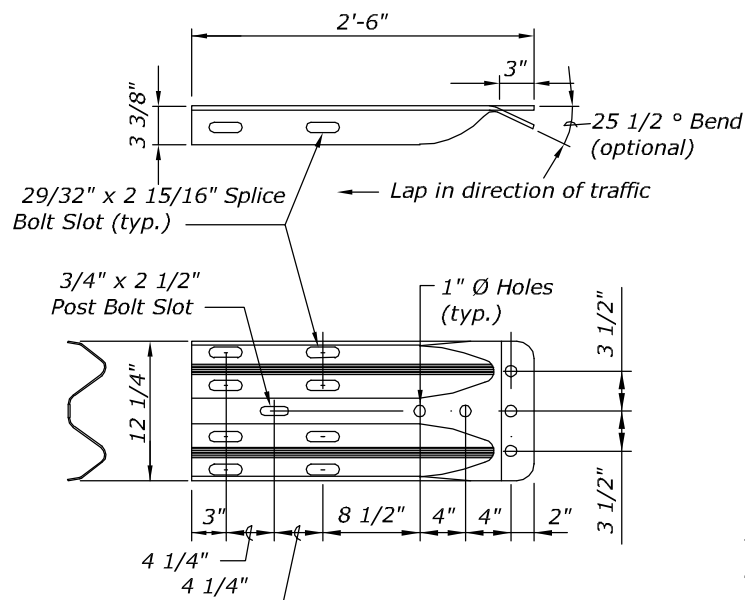
RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)

NO SCALE



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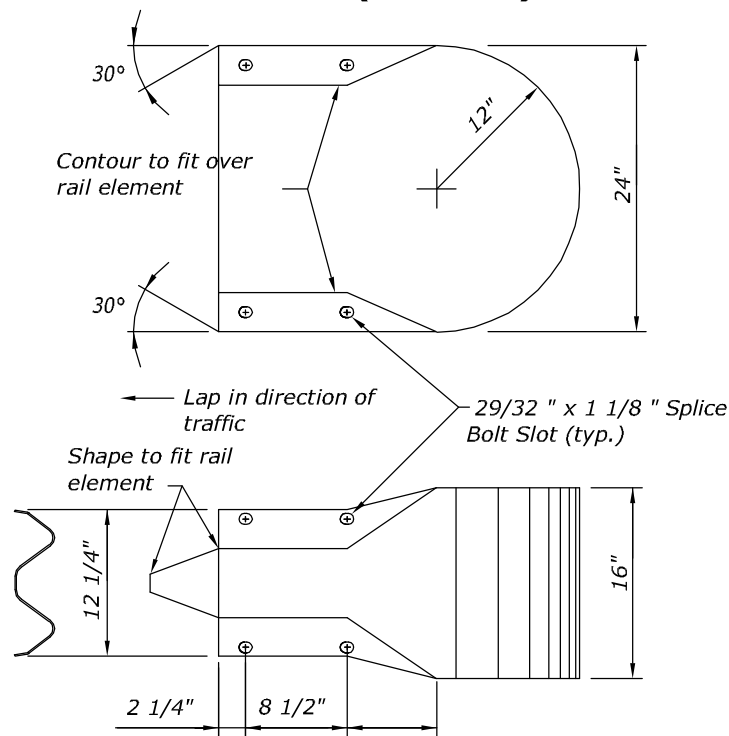
GUARDRAIL DETAILS



The cross-sectional dimensions for this part are to fit over part RWMO2a on the approach end and under part RWMO2a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

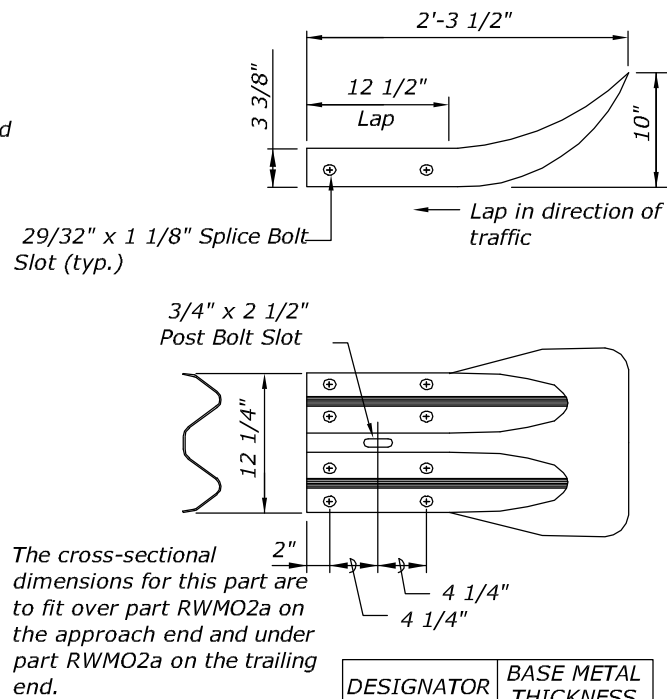
### W-BEAM TERMINAL CONNECTOR (RWE02b)



The cross-sectional dimensions for this part are to fit over part RWMO2a.

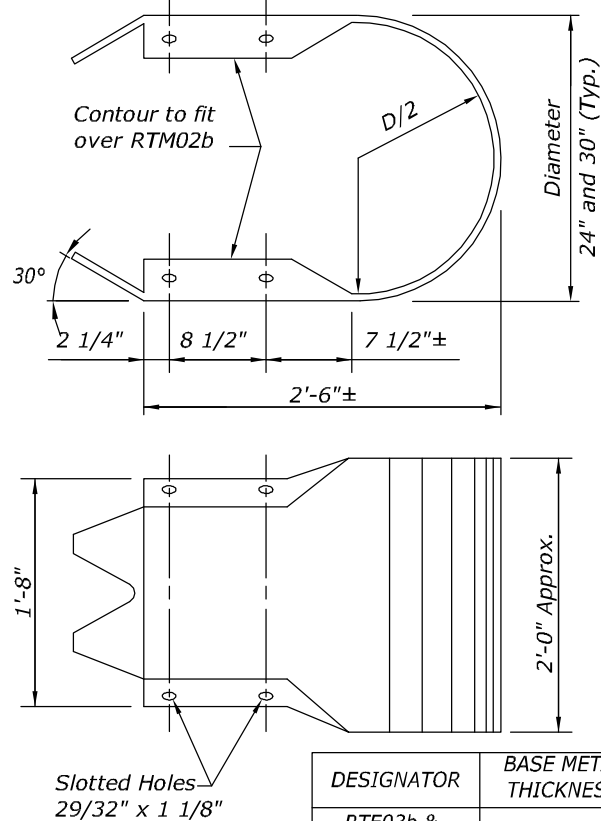
DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

### W-BEAM END SECTION (BUFFER RWE06a)



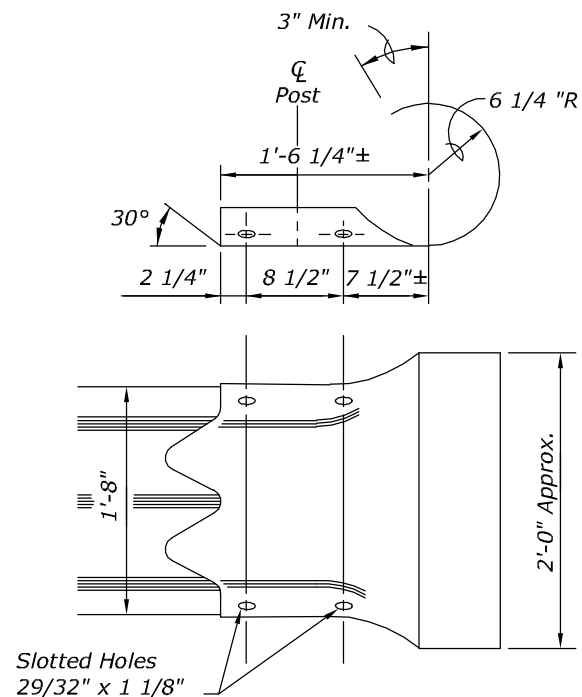
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

### W-BEAM END SECTION (FLARED RWE01a)



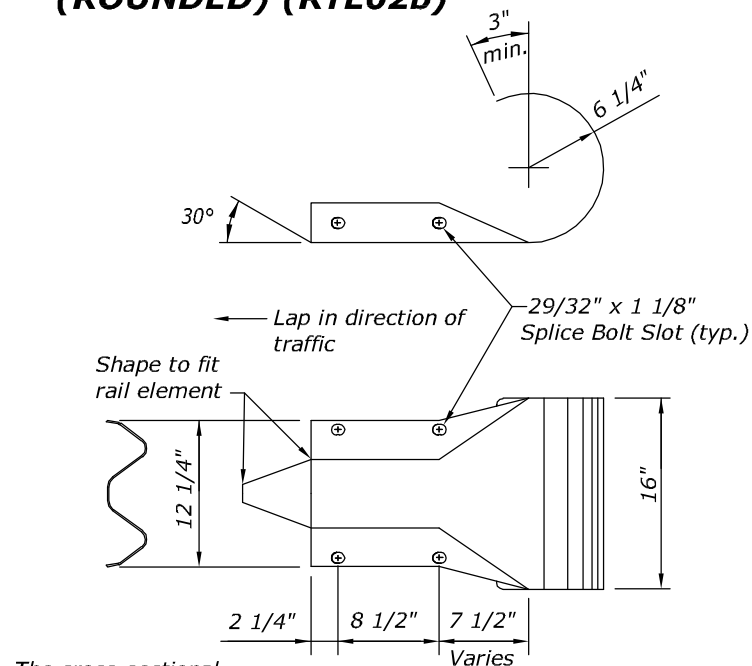
DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

### THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)



DESIGNATOR	BASE METAL THICKNESS
RTE02b	10 Gauge

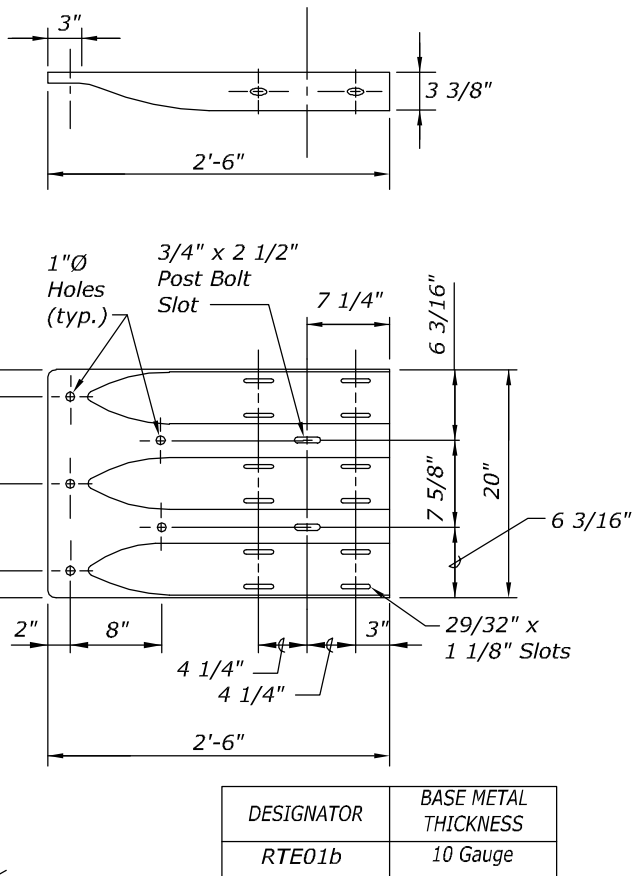
### THRIE-BEAM SECTION (ROUNDED) (RTE02b)



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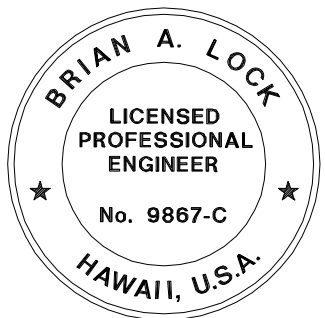
DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

### W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

### THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



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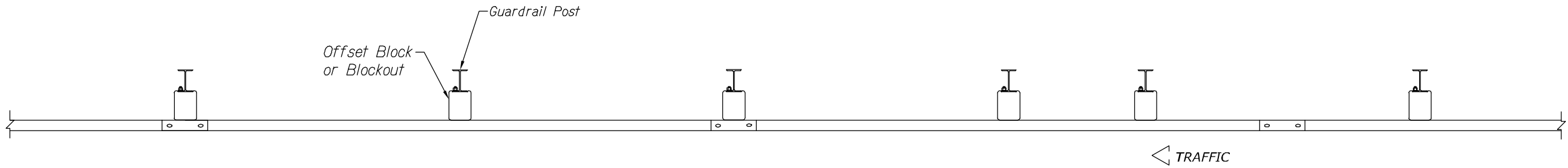
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FEDERAL HIGHWAY ADMINISTRATION  
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

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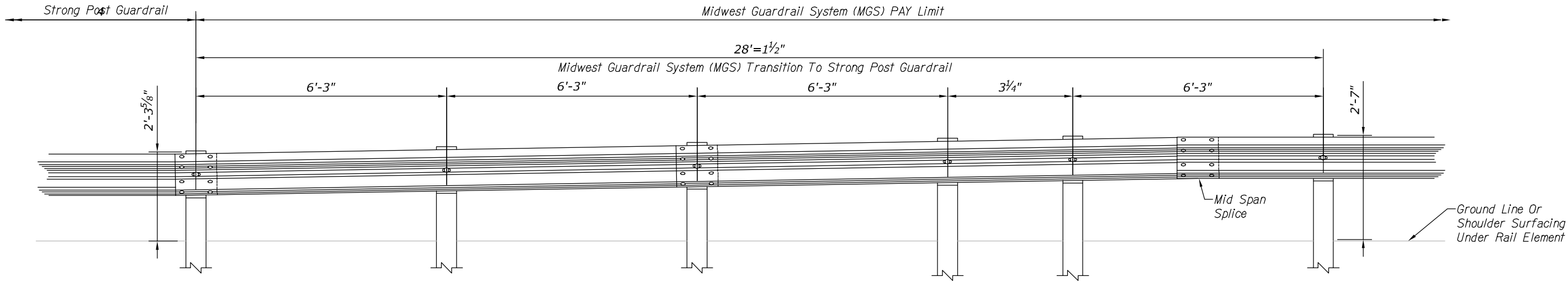
### GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

NO SCALE

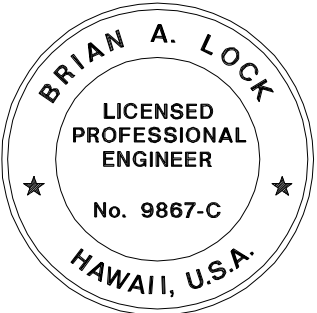
STATE	PROJECT	SHEET NO.
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PLAN



ELEVATION



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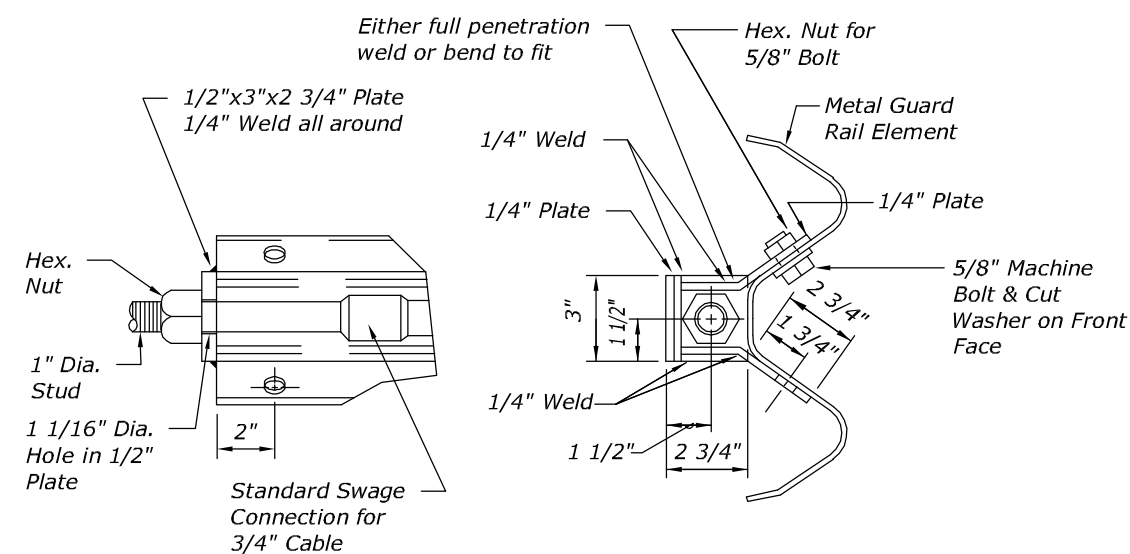
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

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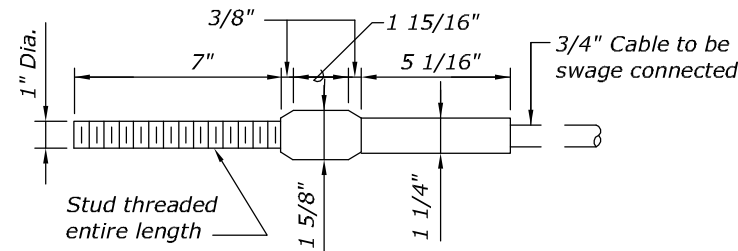
**GUARDRAIL DETAILS**

SPECIAL

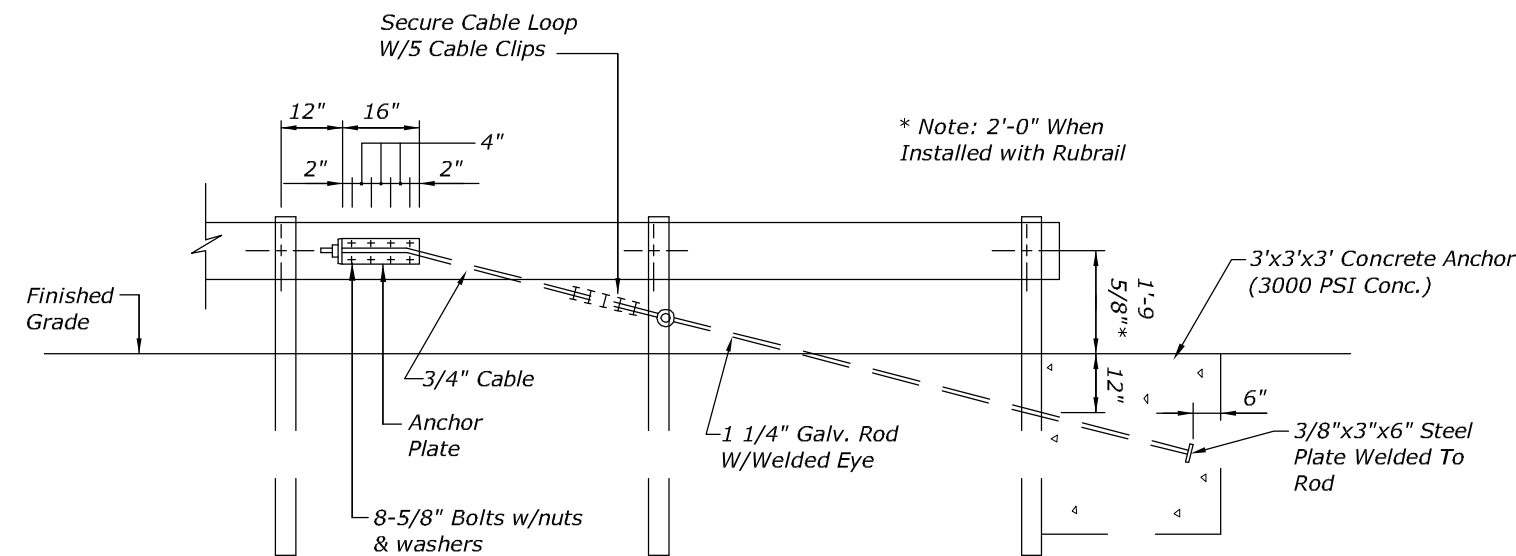
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T81



**ANCHOR PLATE DETAILS**



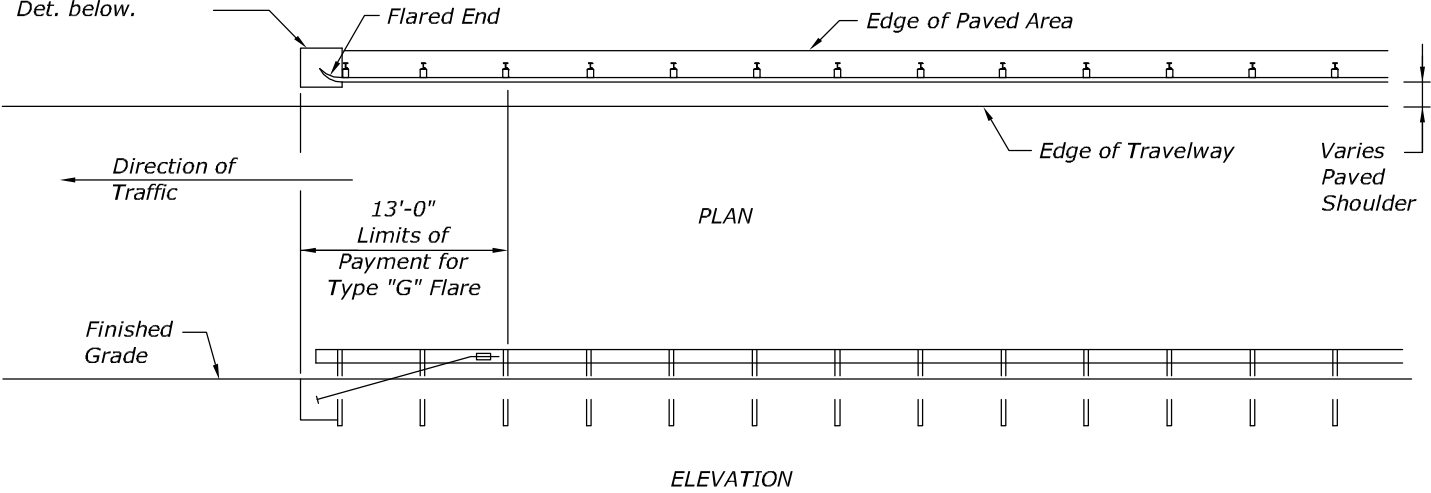
**STANDARD SWAGED FITTING AND STUD**



**ANCHOR BLOCK DETAIL**

1. Concrete, grouted rubble pavement, excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.

For Details of Concrete Anchor Block in Ground See Det. below.



**TYPE "G" FLARE END TERMINAL**

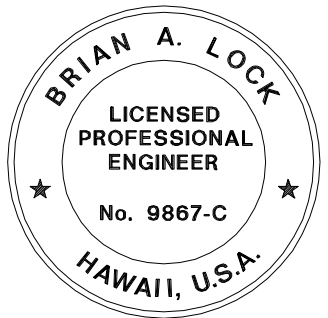
**NOTES:**

Type "G" Modified End Terminal is a site specific end terminal with a taper and radial termini. A site specific detailed drawing is required for all Type "G" Modified End Terminals and must receive the Engineer's approval.

The taper (flare rate) of the guardrail shall follow the latest edition of AASHTO'S Roadside Design Guide (currently, Table 5.6 - Suggested Flare Rate for Barrier Design, page 5-21, 2011).

The radius of the radial termini is an Engineer's judgment based on the site evaluation. The Engineer shall consider safety (minimize the spearing & blunt end situation); degree and potential seriousness of the hazard; bicycle and pedestrian accessibility; maintenance equipment accessibility; Right-of-Way availability; the smallest radii the metal w-beam/thrie-beam railing can be constructed (check with supplier/contractor); posted speed limit; angle of vehicle impact; and aesthetics when designing the Type "G" Modified End Terminal.

During construction, the Contractor shall layout the proposed Type "G" Modified End Terminal and receive approval from the Construction Engineer prior to installation.



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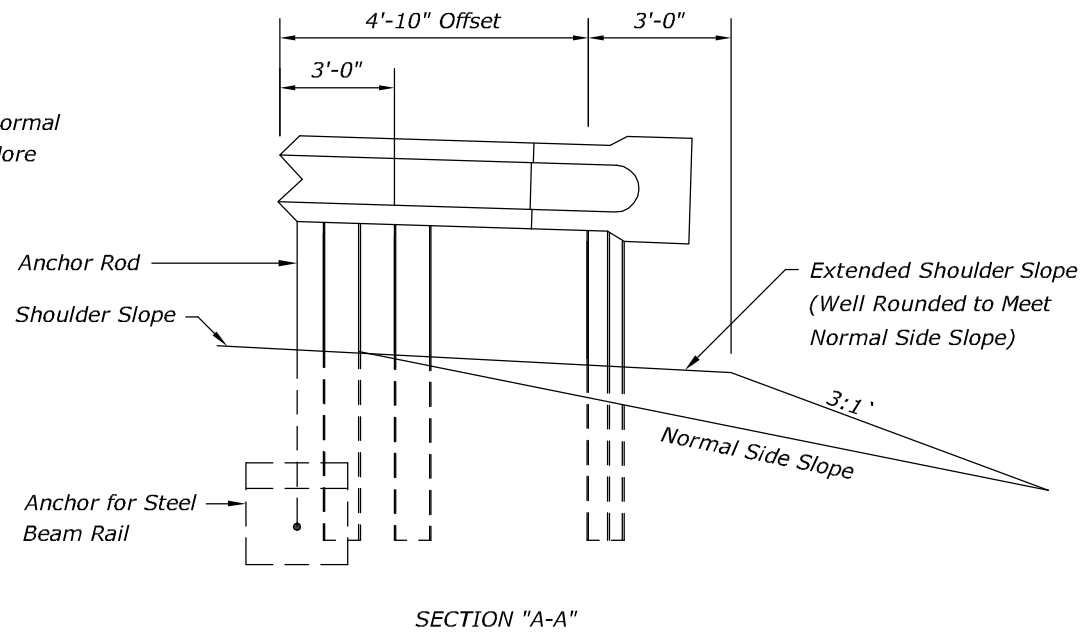
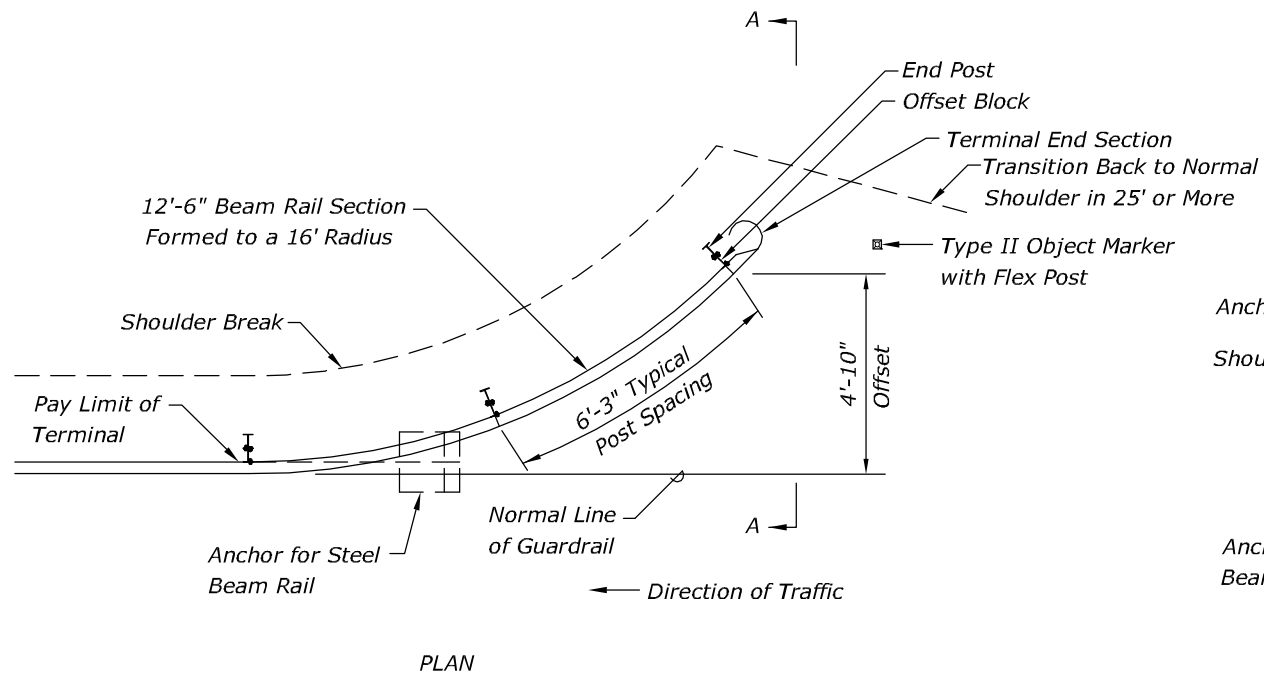
**GUARDRAIL DETAILS  
TYPE G END TERMINAL**

SPECIAL

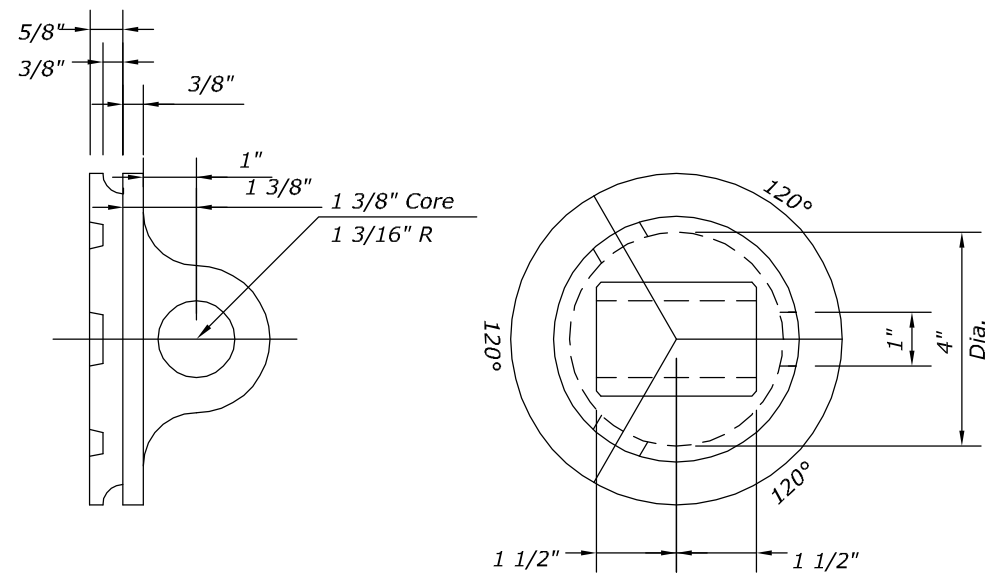
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DRAWING NO.:

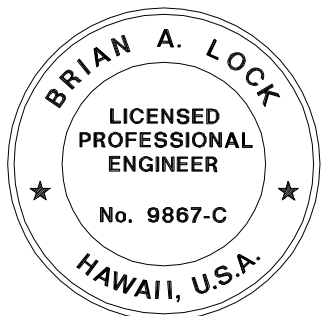
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T82



**APPROACH END DETAIL**  
**(Approved for use where  $V < 45$  MPH)**



**ANCHOR ROD CONNECTOR**  
**(Malleable Iron Casting or Equal)**



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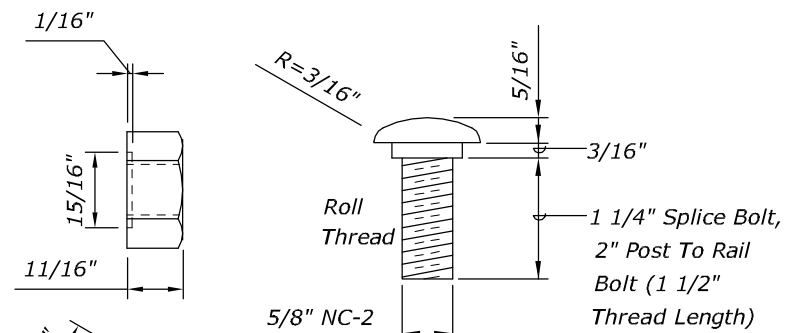
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**GUARDRAIL DETAILS**  
**MODIFIED TYPE G END**  
**TERMINAL**

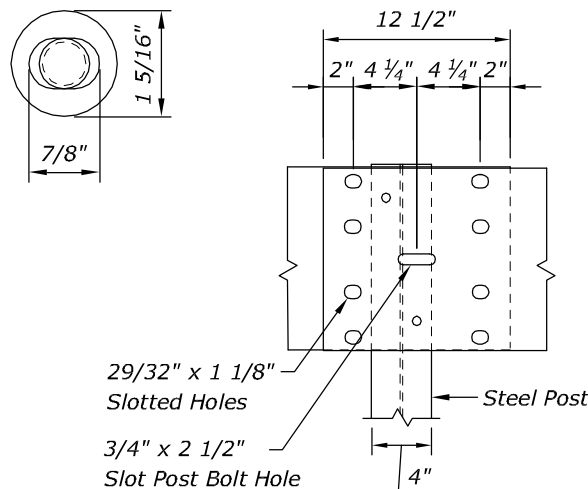
SPECIAL

NO SCALE

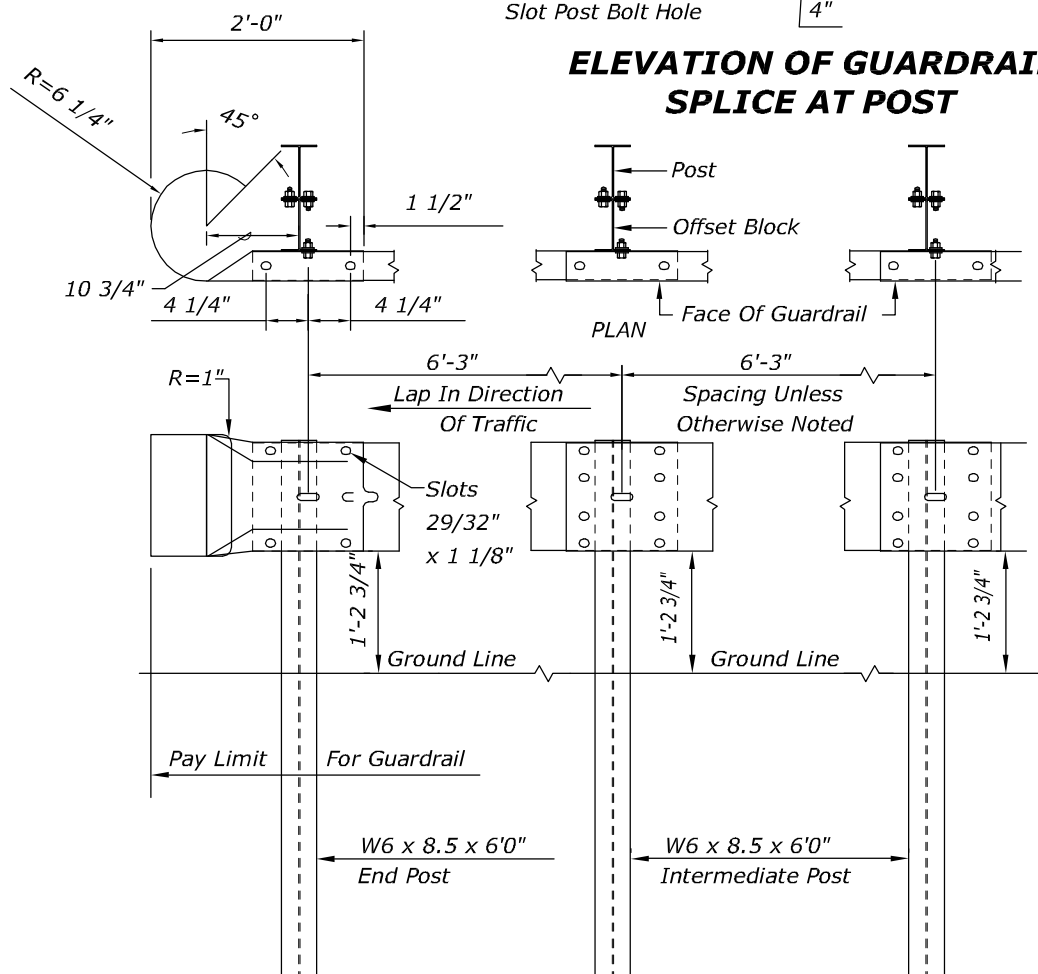
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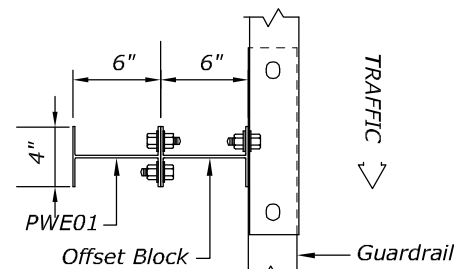
The Nut Must Be Free  
Running Fit On The Bolt  
After Galvanization.



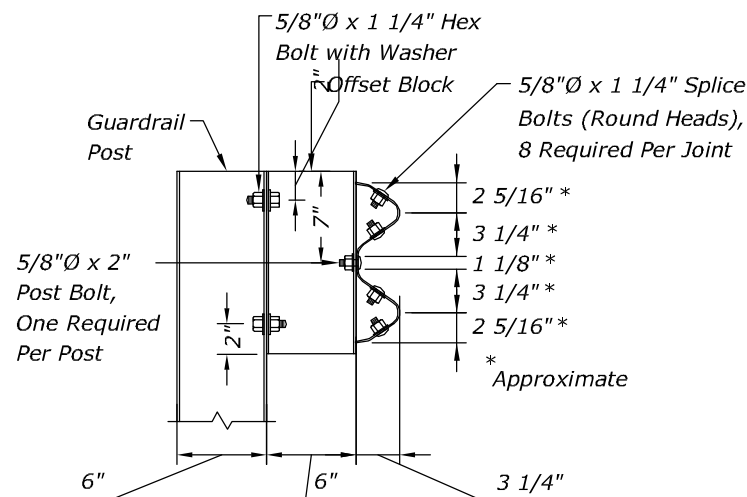
**ELEVATION OF GUARDRAIL  
SPLICE AT POST**



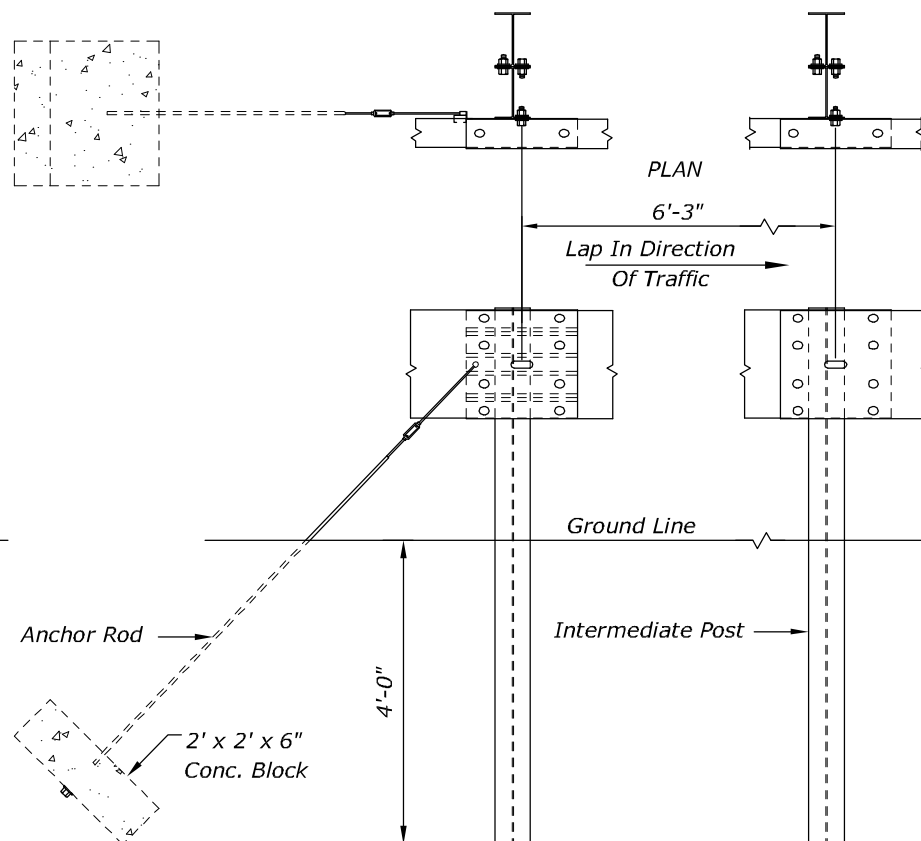
**ASSEMBLY ELEVATION**



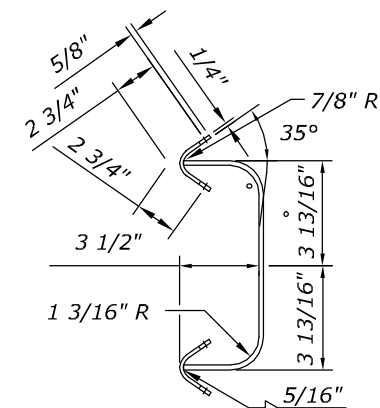
**PLAN**



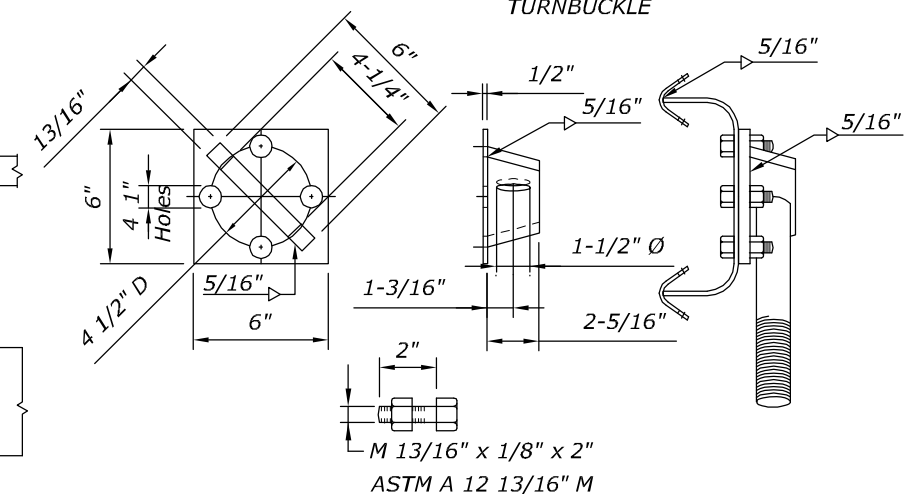
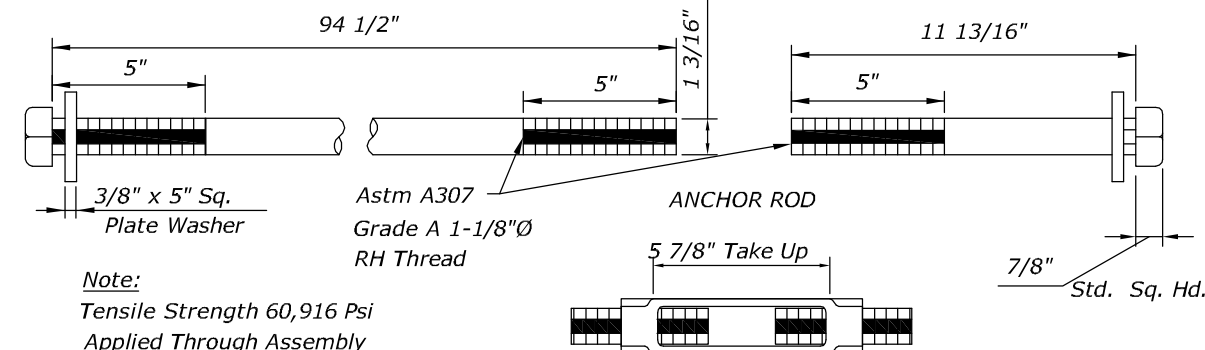
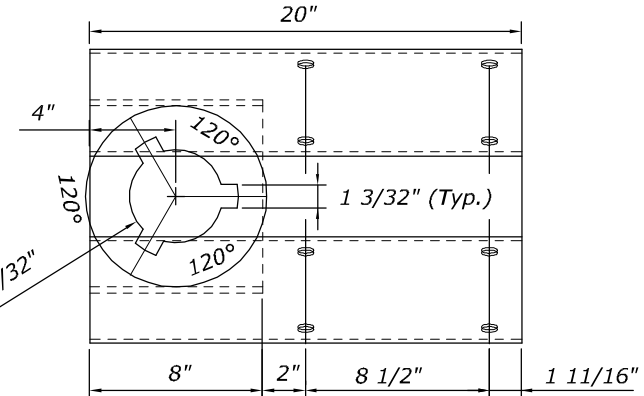
**CROSS SECTION  
GUARDRAIL SPLICE**



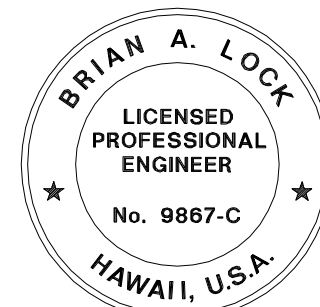
**ANCHOR FOR STEEL BEAM RAIL**



**ANCHOR SPIDER**



**ALTERNATE ANCHOR ROD CONNECTOR**



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NO SCALE

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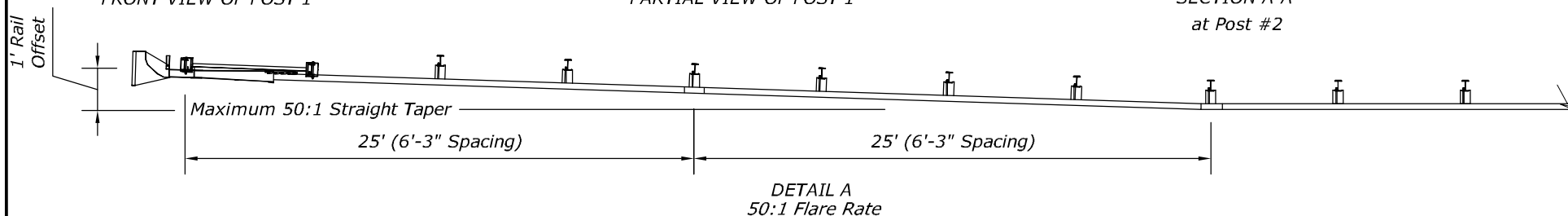
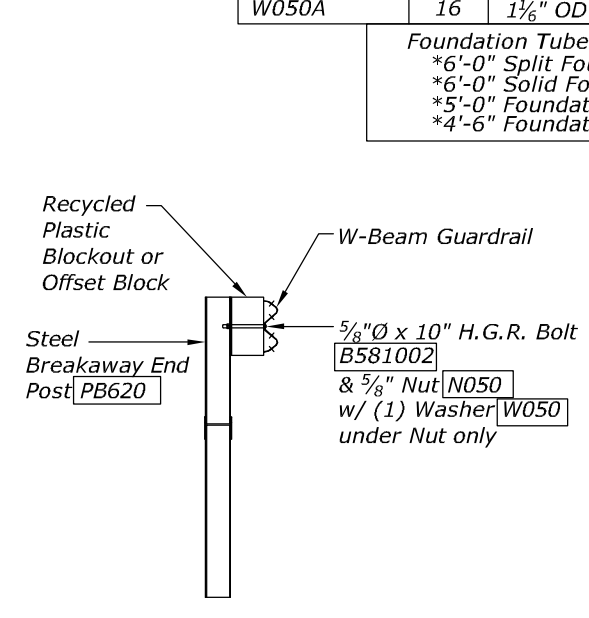
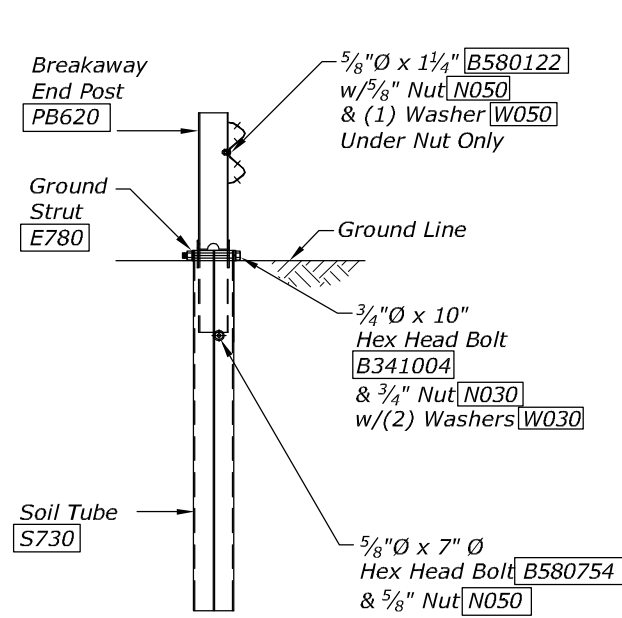
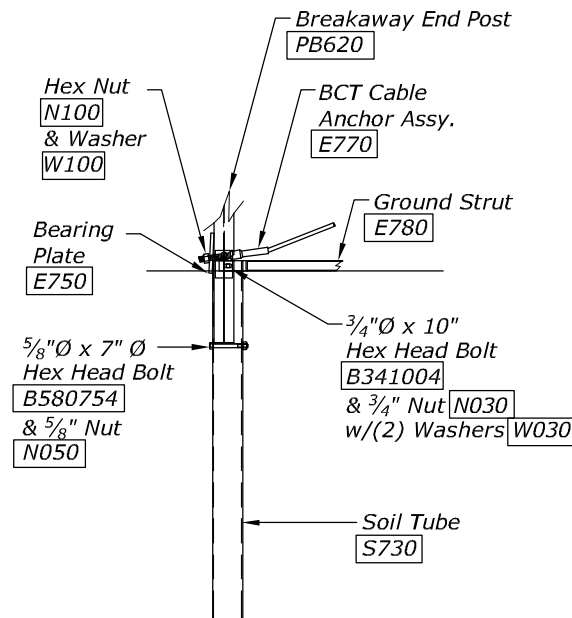
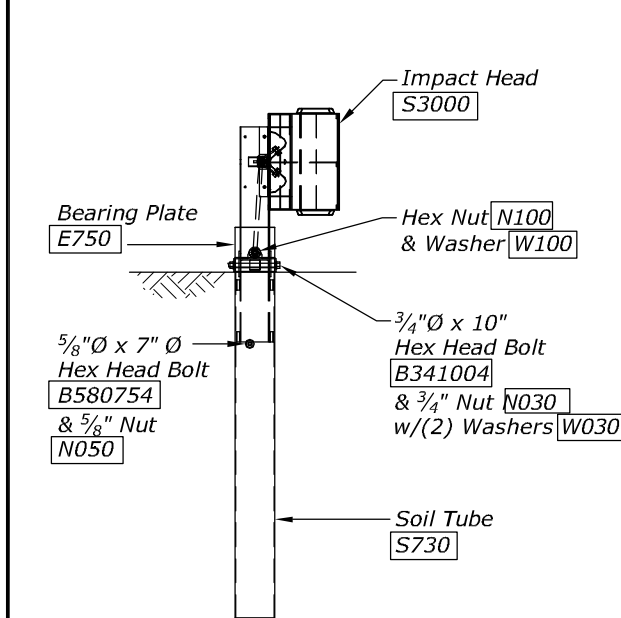
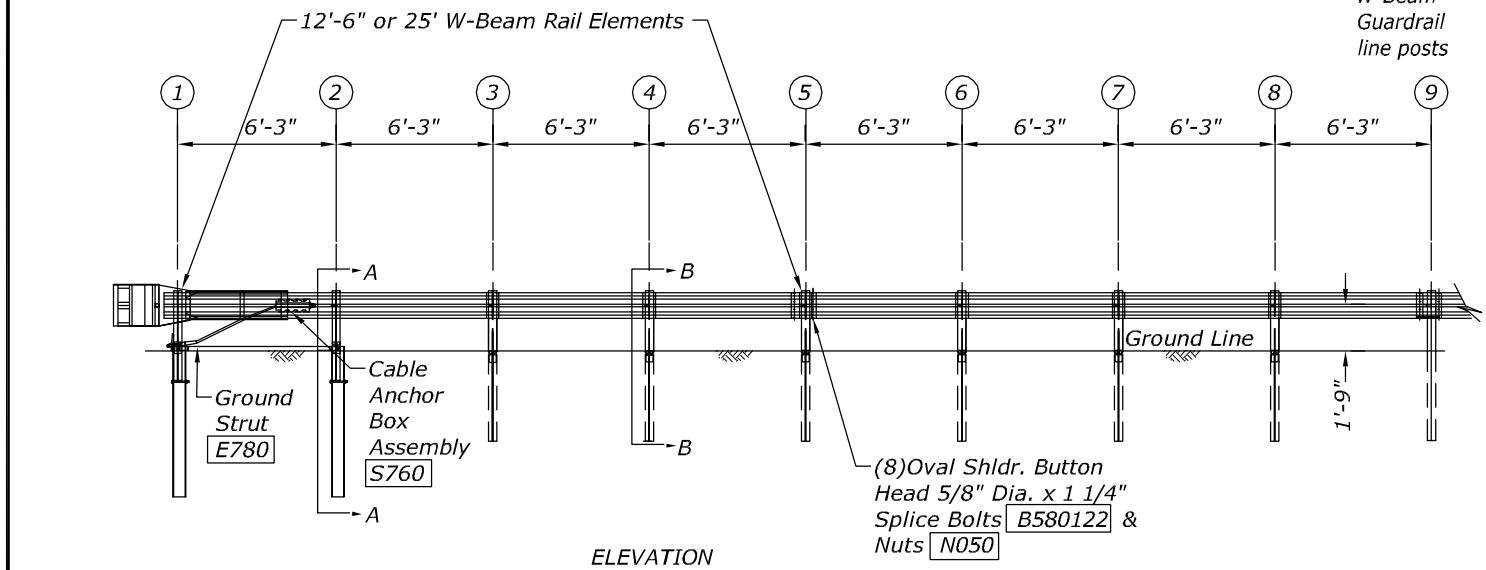
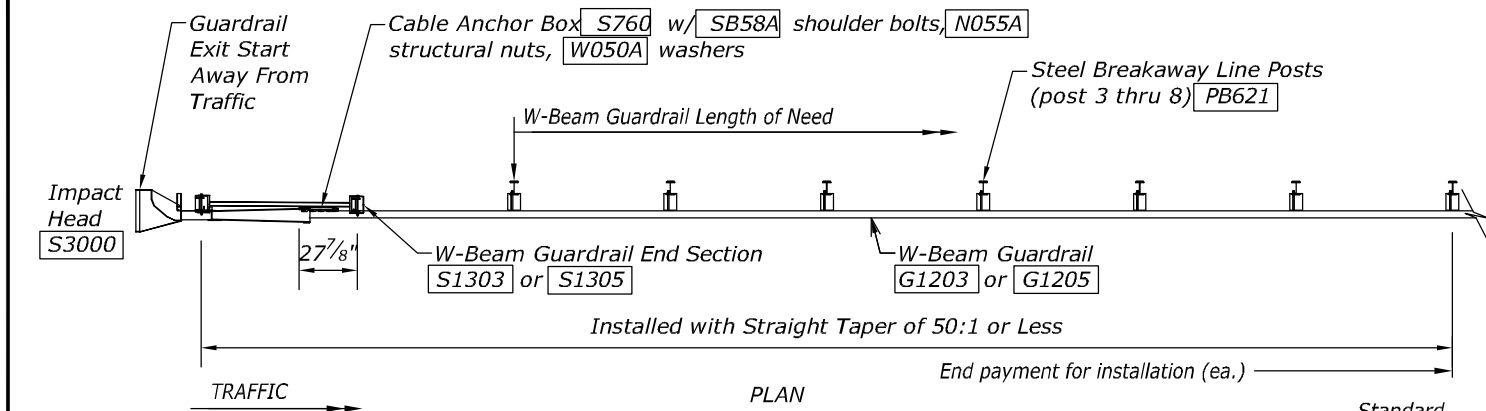
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**GUARDRAIL DETAILS  
MODIFIED TYPE G END  
TERMINAL**

SPECIAL

DRAWING NO.:





- GENERAL NOTES:**
- Breakaway steel posts are required with the Sequential Kinking Terminal.
  - All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
  - When the Sequential Kinking Terminal is selected as the end treatment for W-Beam Guardrail installation, the W-Beam Guardrail will be flared at a rate of 50:1 to prevent the impact head from encroaching on the shoulder. The flare is not required and may be decreased or eliminated for specific installations.
  - The soil tube shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
  - The soil tubes may be driven with an approved driving head. They shall not be driven with the post in the tube. If the soil tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
  - When rock is encountered during excavation, a 12" dia. post hole, 20" deep, may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approx. 2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
  - The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
  - A special site evaluation should be considered prior to using the Sequential Kinking Terminal where there is less than 25' between the outlet side of the Sequential Kinking Terminal and any adjacent driving lane.
  - (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
  - The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.

ITEM NO.	QTY.	BILL OF MATERIALS
S3000	1	IMPACT HEAD
S1303/S1305	1	W-BEAM GUARDRAIL END SECTION <sup>12 GA.</sup> 12.5' or 25'
G1203/G1205	3/1	W-BEAM GUARDRAIL, 12 GA., 12.5' or 25'
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POSTS
PB621	6	STEEL BREAKAWAY LINE POSTS
	6	RECYCLED PLASTIC BLOCKOUTS OR OFFSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
HARDWARE		
B580122	17/33	5/8" Dia. x 1 1/4" SPLICE BOLTS, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLTS
B341004	2	3/4" Dia. x 10" HEX BOLTS
B341002	6	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	6	5/8" Dia. x 18" H.G.R. BOLT (POST 3 THRU 8)
N050	26/42	5/8" Dia. H.G.R. NUT <sup>(SPLICE 17/33, SOIL TUBES 2, POST 2 THRU 8)</sup>
N030	2	3/4" Dia. HEX NUTS
W050	7	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
W050A	16	1 1/2" OD x 9/16" ID A325 STR. WASHER

Foundation Tube Options For Posts 1 & 2  
\*6'-0" Split Foundation Tubes S730  
\*6'-0" Solid Foundation Tubes E731  
\*5'-0" Foundation Tubes S735 W/Soil Plates SP600  
\*4'-6" Foundation Tubes E735 W/Soil Plates SP600



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WILSON OKAMOTO CORPORATION  
APRIL 30, 2020  
LIC. EXP. DATE

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

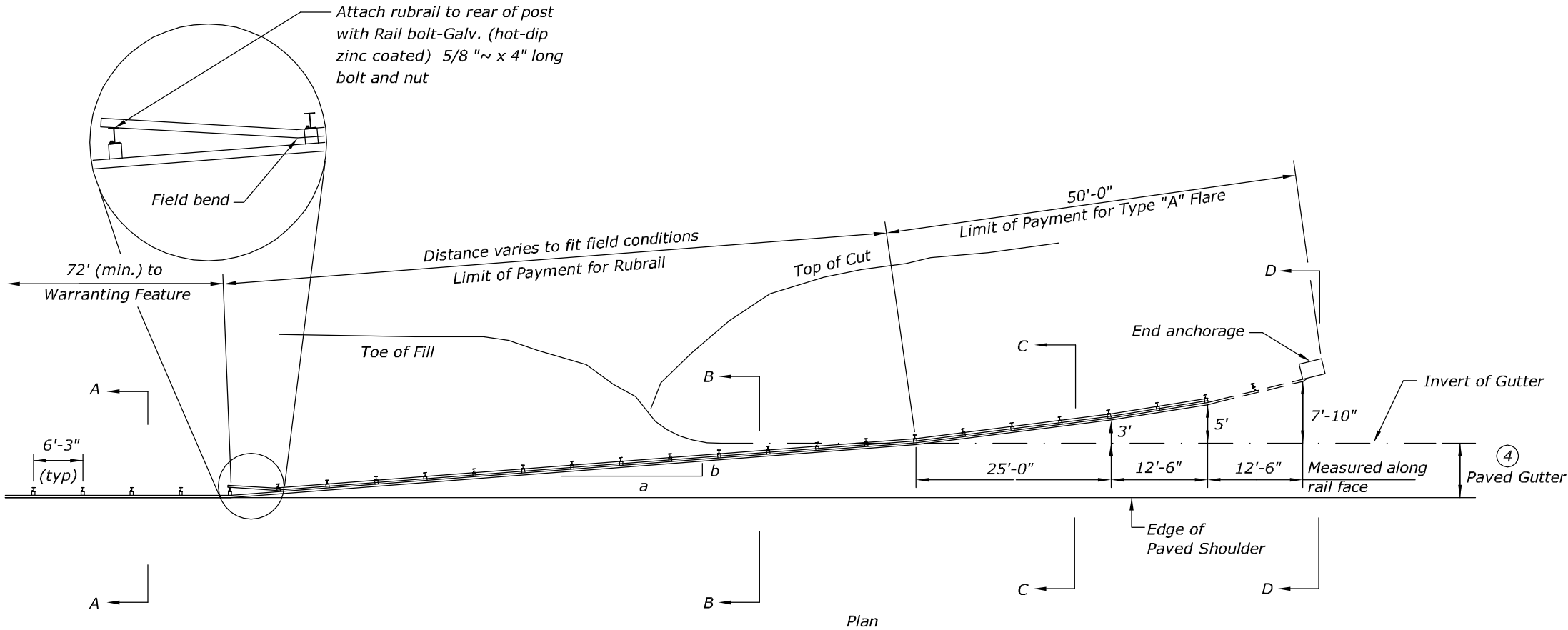
**SKT-350  
SEQUENTIAL KINKING  
TERMINAL**

SPECIAL

NO SCALE

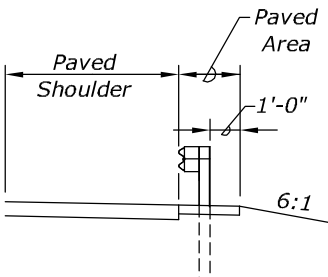
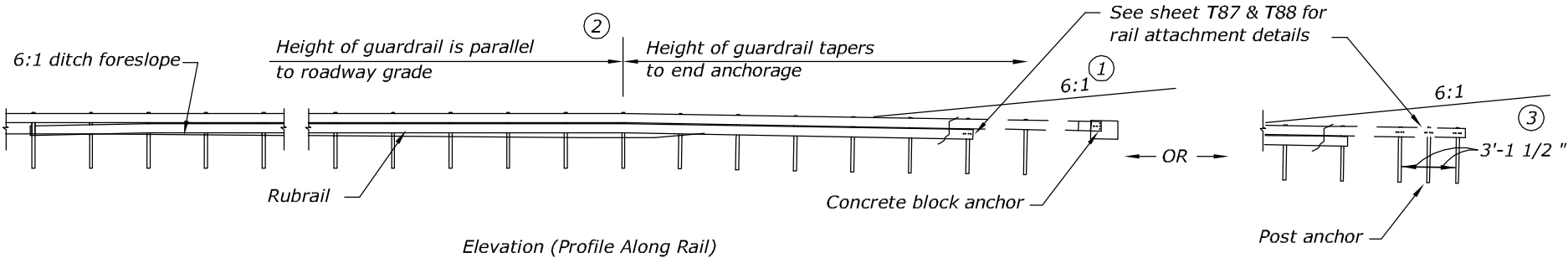
DRAWING NO.:



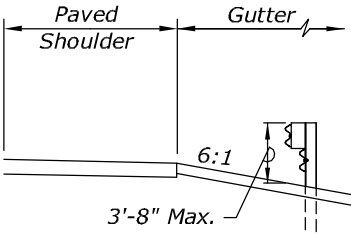


- General Notes**
1. A 6:1 or flatter slope is desirable. However, a steeper or flatter existing slope may be used.
  2. Height of guardrail may be tapered down in elevation to maintain 3'-8" maximum height.
  3. All posts are 8'-0" in length from where the guardrail flares away from the shoulder back to the post anchor. Posts for the post anchor are 6'-0" long.
  4. Variable Paved Gutter offsets may be used to fit field conditions.
  5. The Guardrail Posts shall be located away from the gutter/swale invert.
  6. All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee.

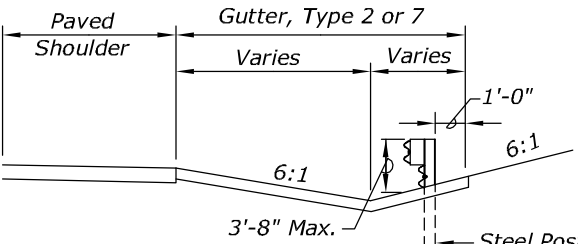
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



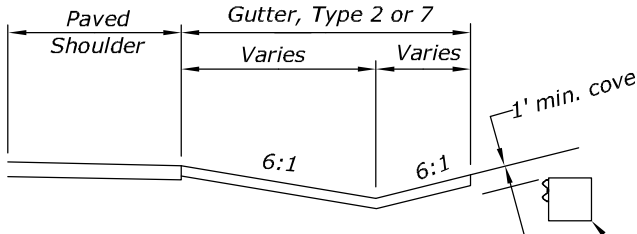
Section A-A



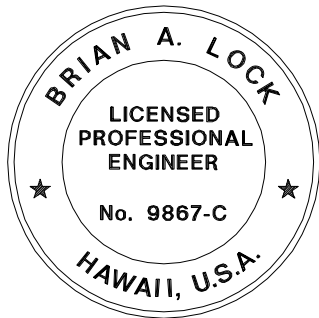
Section B-B (With Rubrail)



Section C-C (With Rubrail)



Concrete block or post anchor



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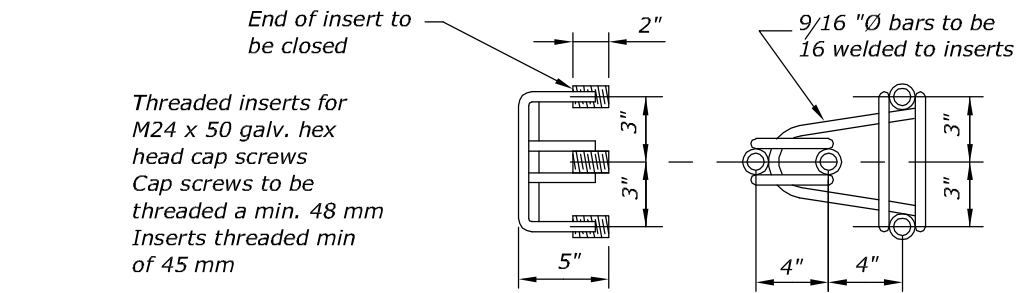
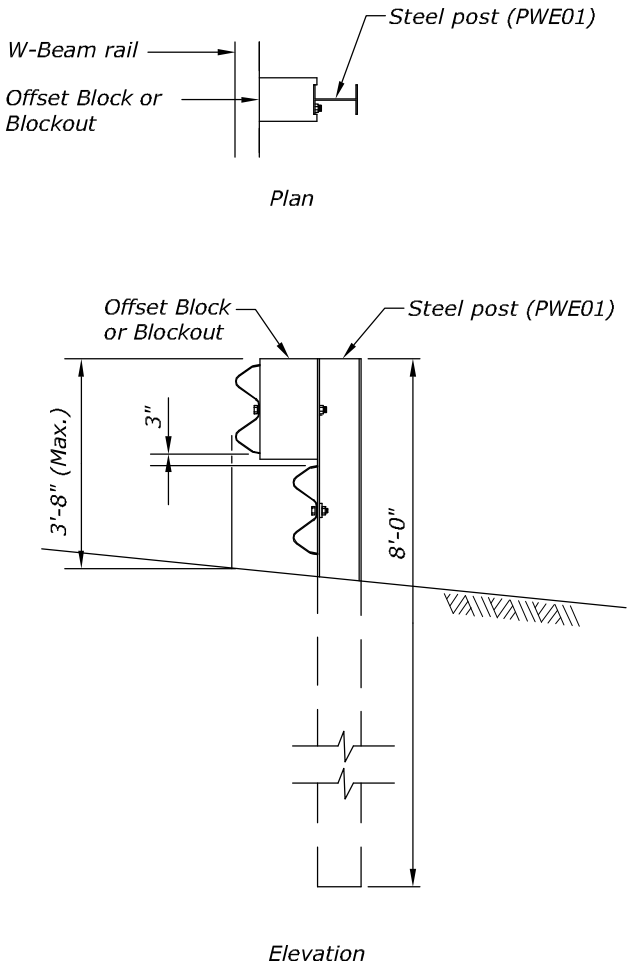
**GUARDRAIL DETAILS  
TYPE A END TERMINAL**

SPECIAL

**BACKSLOPE ANCHOR TERMINAL (WITH 6:1 PAVED GUTTER AND TYPE "A" FLARE)**

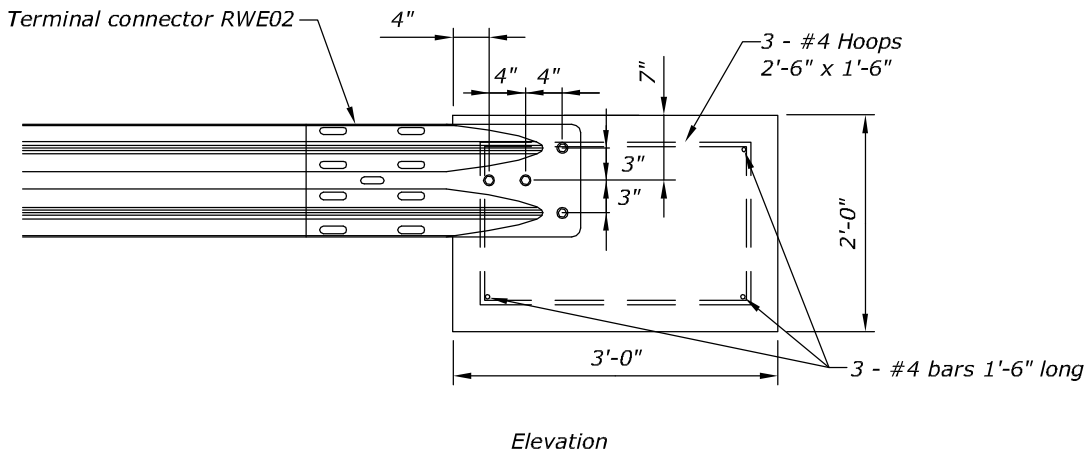
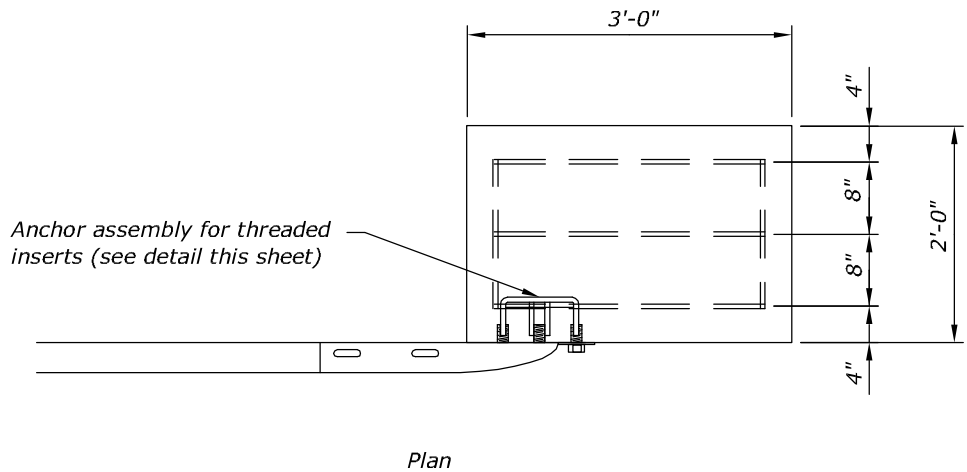
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STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T87

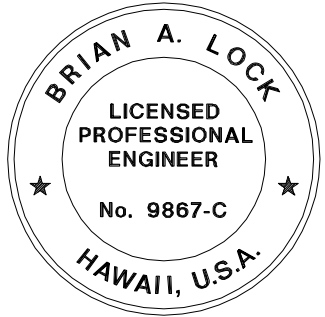


Note:

All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee.



**BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS TYPE "A" FLARE**



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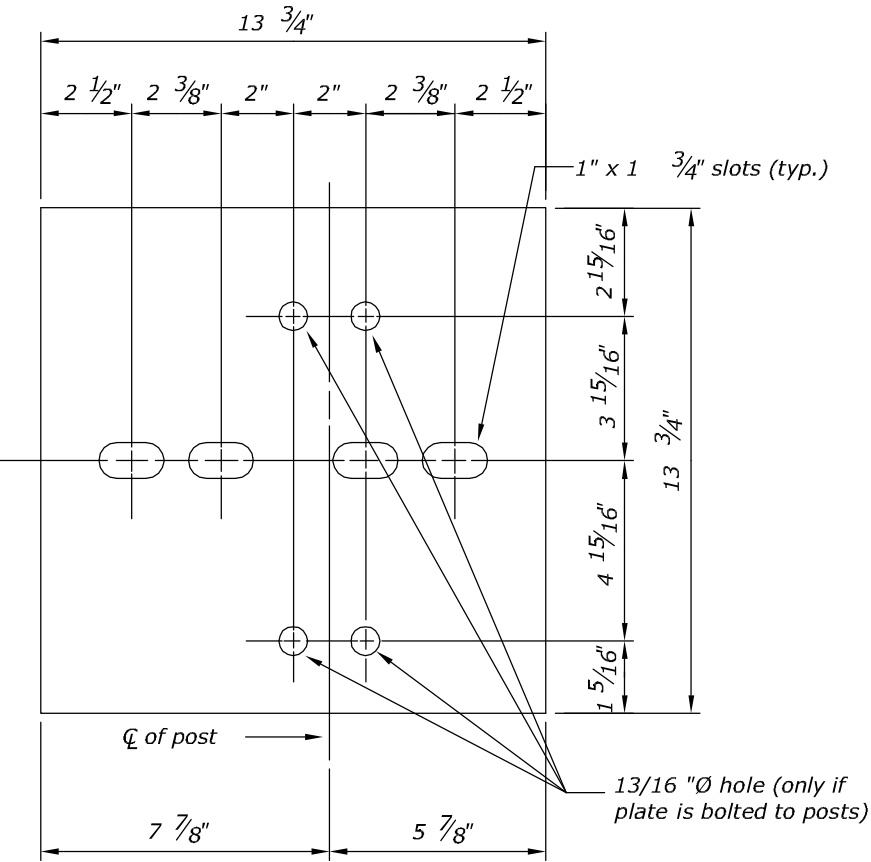
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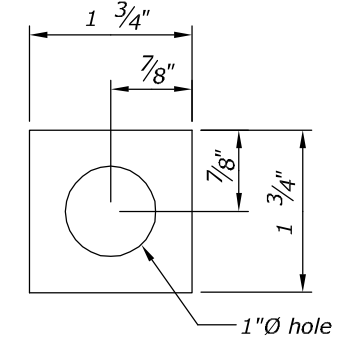
**GUARDRAIL DETAILS  
TYPE A END TERMINAL**

NO SCALE

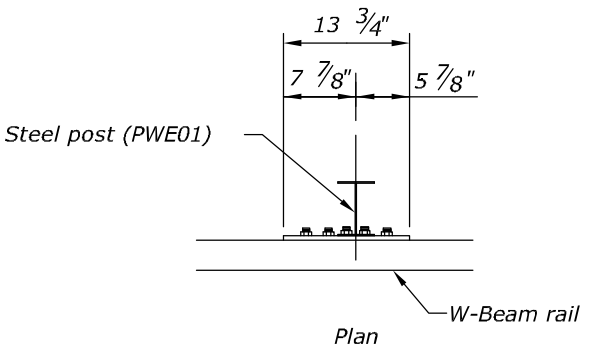
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T88



**Steel Plate - 1/2"**  
(Hot-dip Zinc Coated Galvanized  
Welded or Bolted to Post)

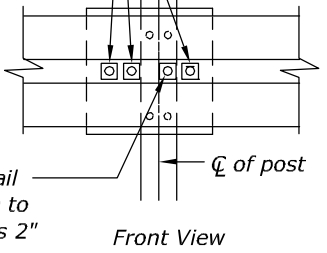


**Square Washer**  
(3/16" Thick - Hot-dip Zinc  
Coated Galvanized)

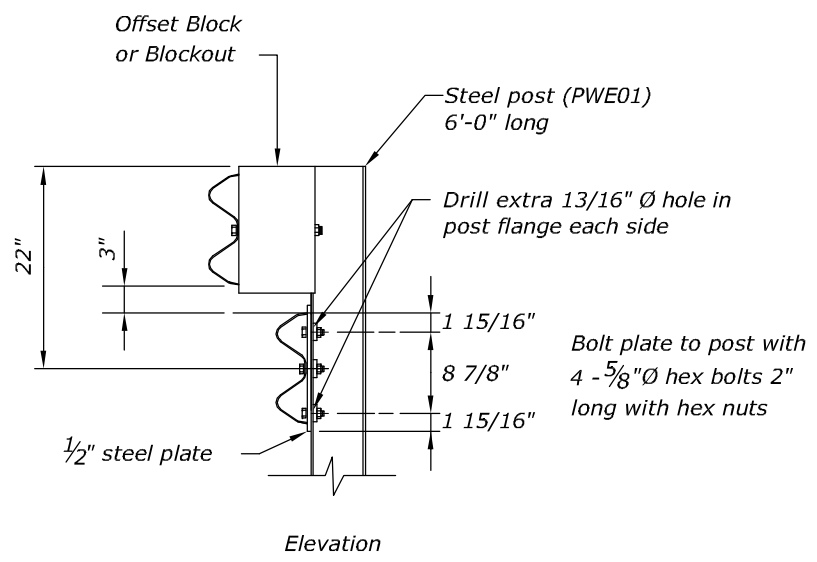


3-7/8" Ø holes to be field drilled in rail and attached to steel plate with 7/8" Ø hex bolts 1 15/16" long with square washer

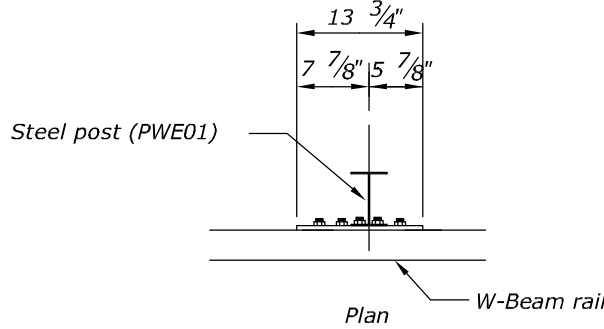
1"Ø holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8" Ø hex bolts 2" long with square washer



**RUBRAIL ANCHOR DETAILS**

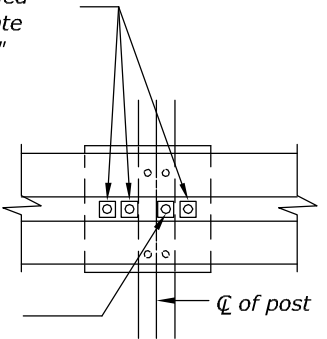


Bolt plate to post with 4 - 5/8"Ø hex bolts 2" long with hex nuts

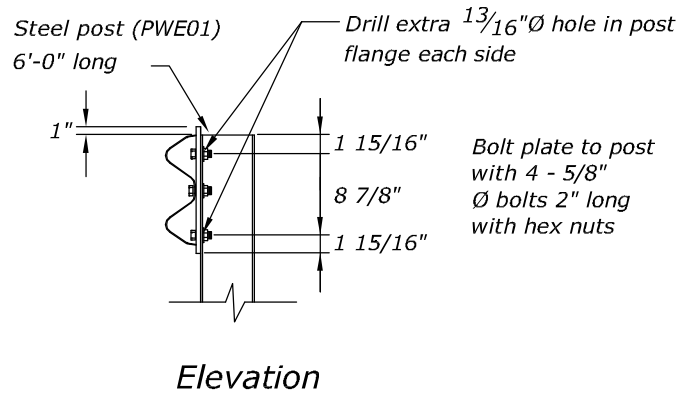


3 - 7/8" Ø holes to be field drilled in rail and attached to steel plate with 7/8" Ø hex bolts 1- 15/16" long with square washer

1"Ø holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8" Ø hex bolts 2" long with square washer

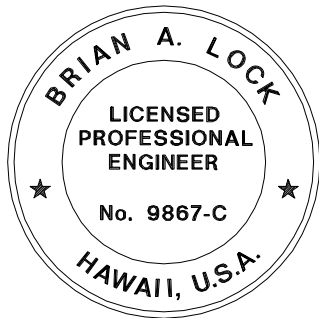


**POST ANCHOR DETAILS**



Bolt plate to post with 4 - 5/8" Ø bolts 2" long with hex nuts

Note:  
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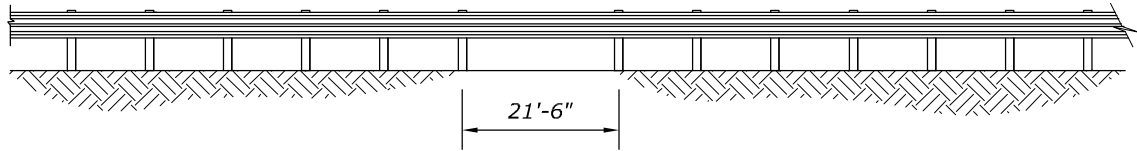
**GUARDRAIL DETAILS  
TYPE A END TERMINAL**

SPECIAL

**BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS TYPE "A" FLARE**

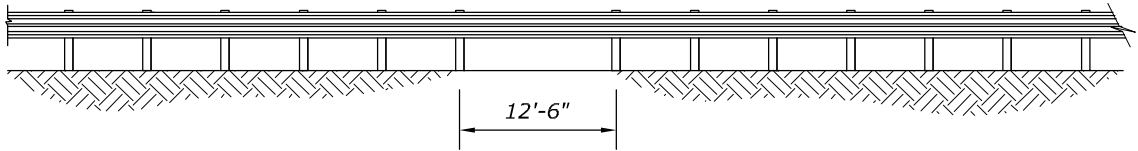
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STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	T89



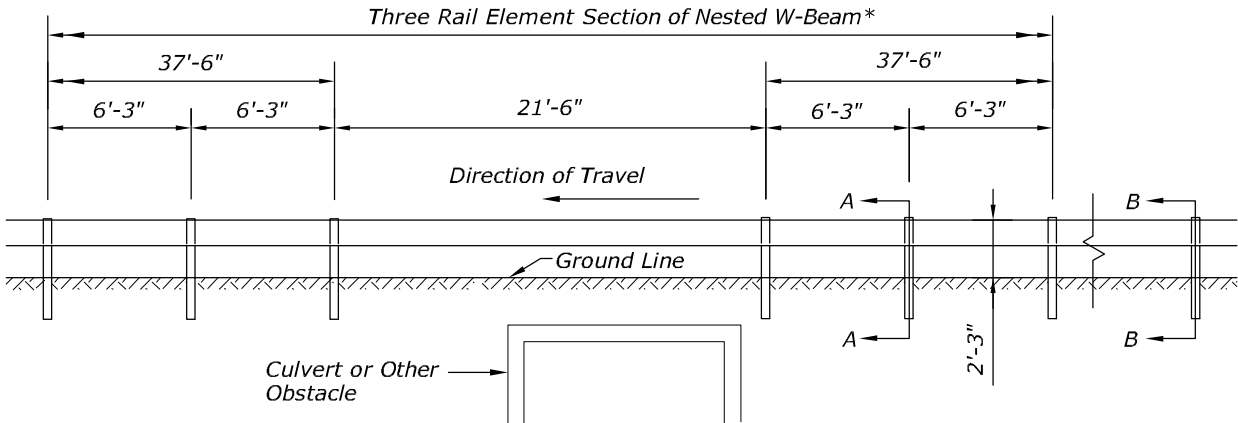
LONG SPAN OVER CULVERT

\*Note: All Nested W-Beam splices points shall be staggered.

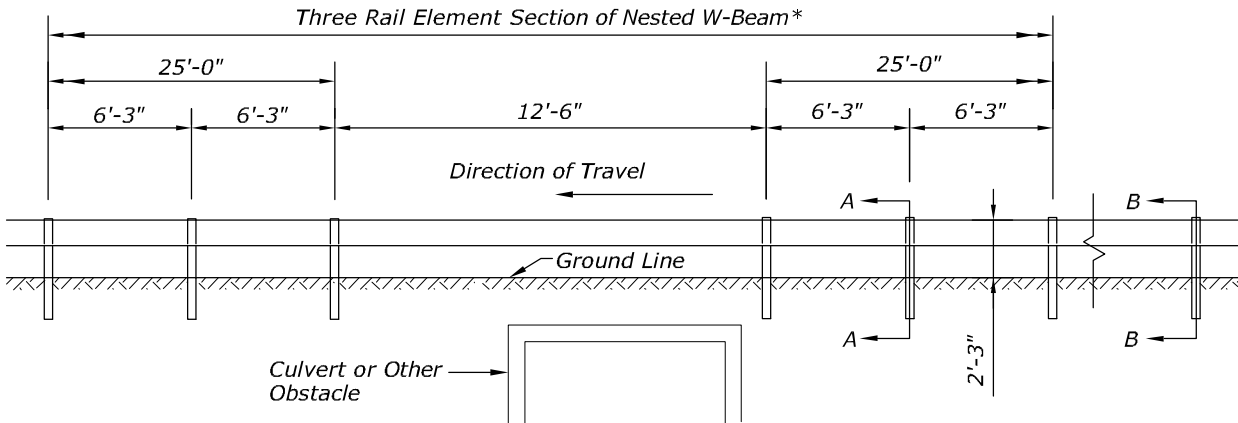


LONG SPAN OVER CULVERT

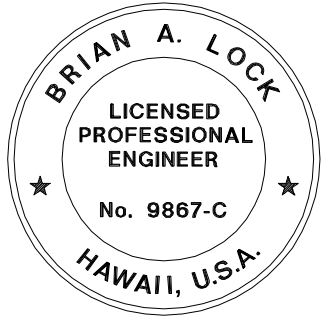
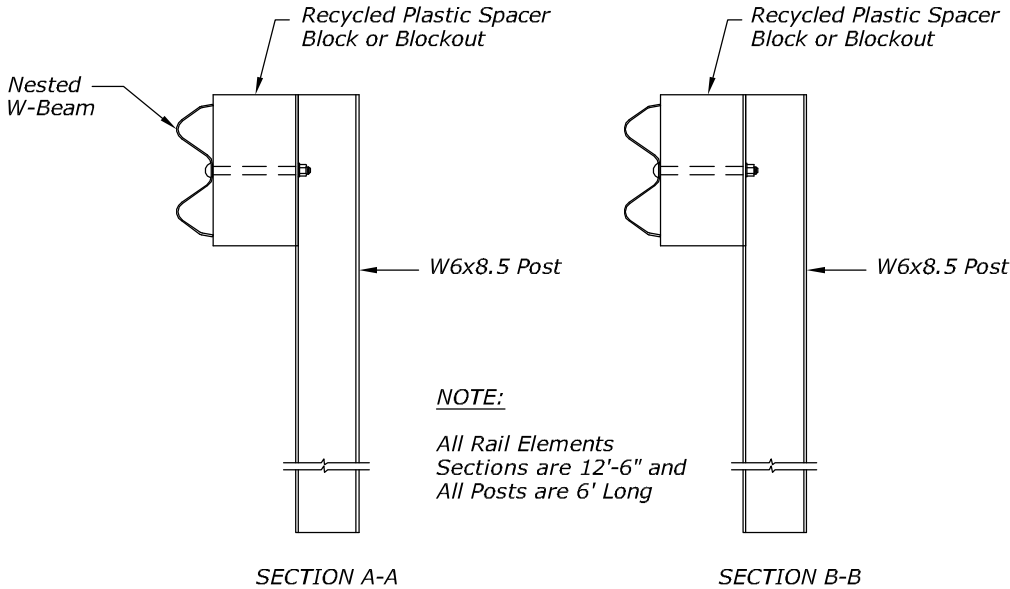
\*Note: All Nested W-Beam splices points shall be staggered.



NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 21'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)



NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 12'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.1 FT.)



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GUARDRAIL DETAILS  
LONG SPAN

SPECIAL

NO SCALE