

Technical drawings of a cable support bracket, showing two views: a perspective view (left) and a side view (right).

**Left View (Perspective):**

- Plate dimensions:  $\frac{1}{2}'' \times 3'' \times 2\frac{3}{4}''$
- Weld:  $\frac{1}{4}''$  Weld all around
- Hex. Nut
- 1" Dia. Stud
- 1 $\frac{1}{6}''$  Dia. Hole in  $\frac{1}{2}''$  Plate
- 2" dimension for the hole position
- Standard Swage Connection for  $\frac{3}{4}''$  Cable

**Right View (Side View):**

- Either full penetration weld or bend to fit
- Hex. Nut for  $\frac{5}{8}''$  Bolt
- Metal Guard Rail Element
- $\frac{1}{4}''$  Weld
- $\frac{1}{4}''$  Plate
- $\frac{1}{4}''$  Plate
- $\frac{5}{8}''$  Machine Bolt & Cut Washer on Front Face
- Dimensions: 3", 1 $\frac{1}{2}''$ , 1 $\frac{1}{2}''$ , 2 $\frac{3}{4}''$ , 1 $\frac{3}{4}''$

STATE	YEAR	NO.
HAWAII	HAW.	30A-01-10M
		2011
		8

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

Flared End

Edge of Paved Area

Edge of Travelway

Direction of Traffic

13'-0"

Limits of Payment for Type "G" Flare

Finished Grade

PLAN

Varies Paved Shoulder

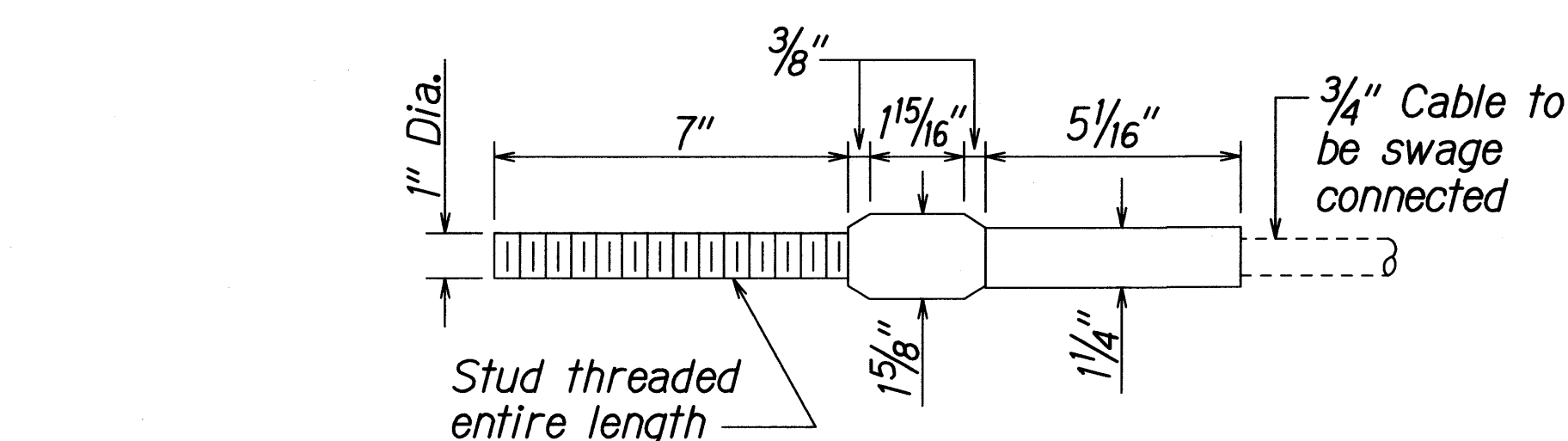
TYPE "G" FLARE END TERMINAL

*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 Terminal and must receive Engineer's approval.*

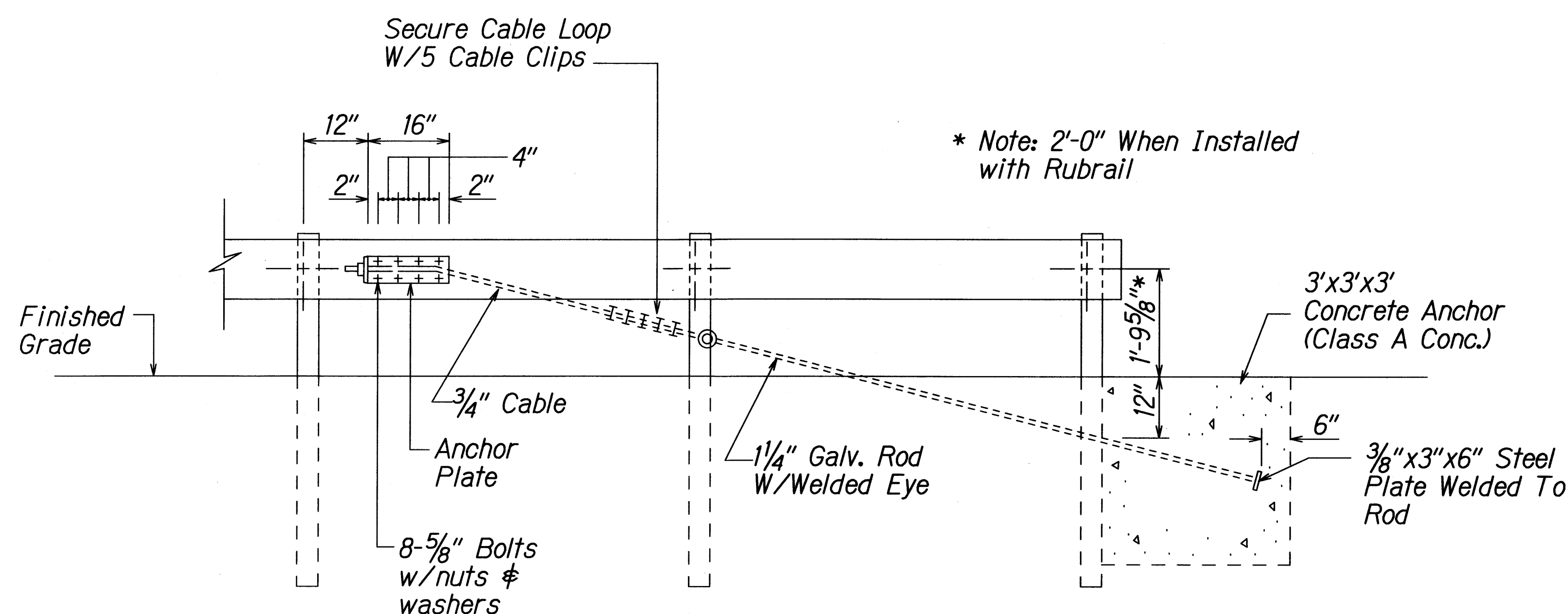
The taper (flare rate) of the guardrail shall follow the latest edition of AASHTO'S Roadside Design Guide (currently, Table 5.6 - Suggested Flare Rate for Barrier Design, page 5-21, Jan. 1996 edition).

The radius of the radial termini is an Engineer's judgement 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.



## STANDARD SWAGED FITTING AND STUD



ANCHOR BLOCK DETAIL

1. Concrete, G.R.P., excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.

ORIGINAL PLAN	SURVEY PLOTTED BY _____ DATE _____
NOTE BOOK	DRAWN BY <u>X</u> _____
	DESIGNED BY _____
	QUANTITIES BY _____
	CHECKED BY _____
No. _____	

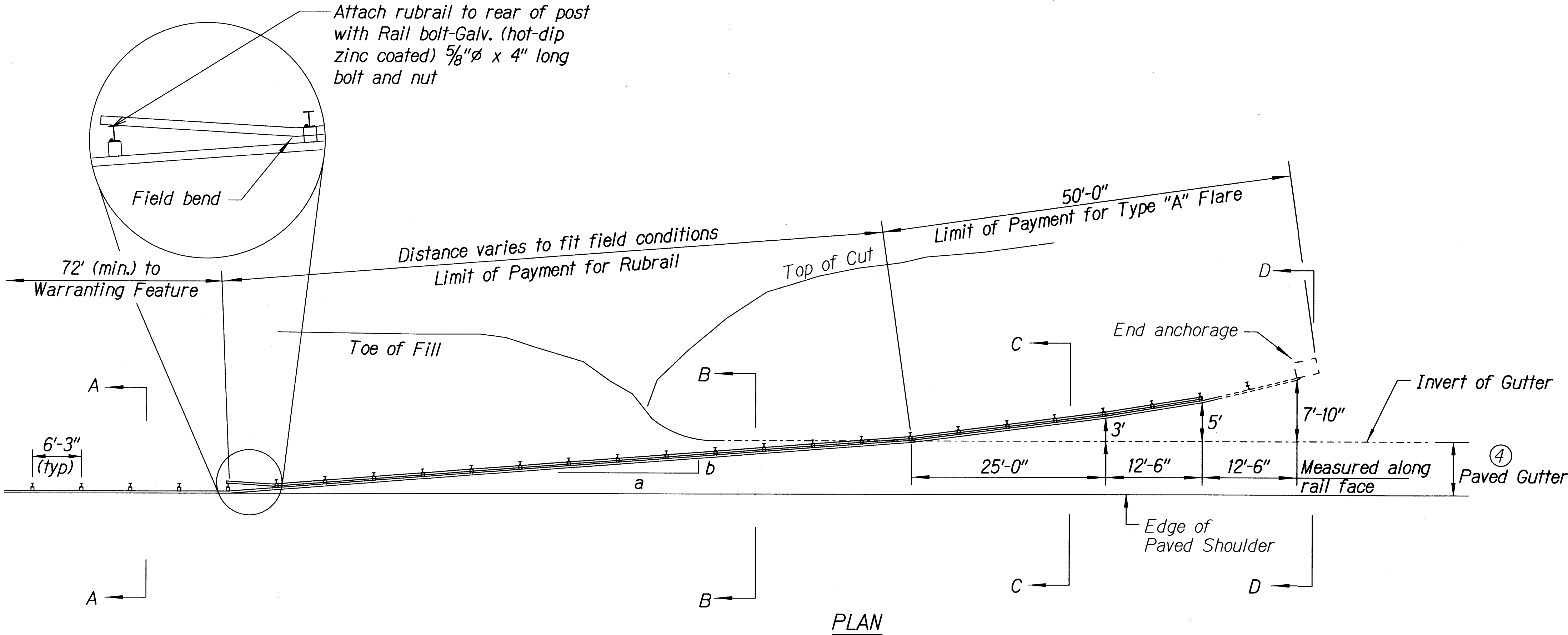
3/13/02  
tdl:ruby/quardrail/te59rev.dan  
(standard plan TF-59 r11/03/89)

8

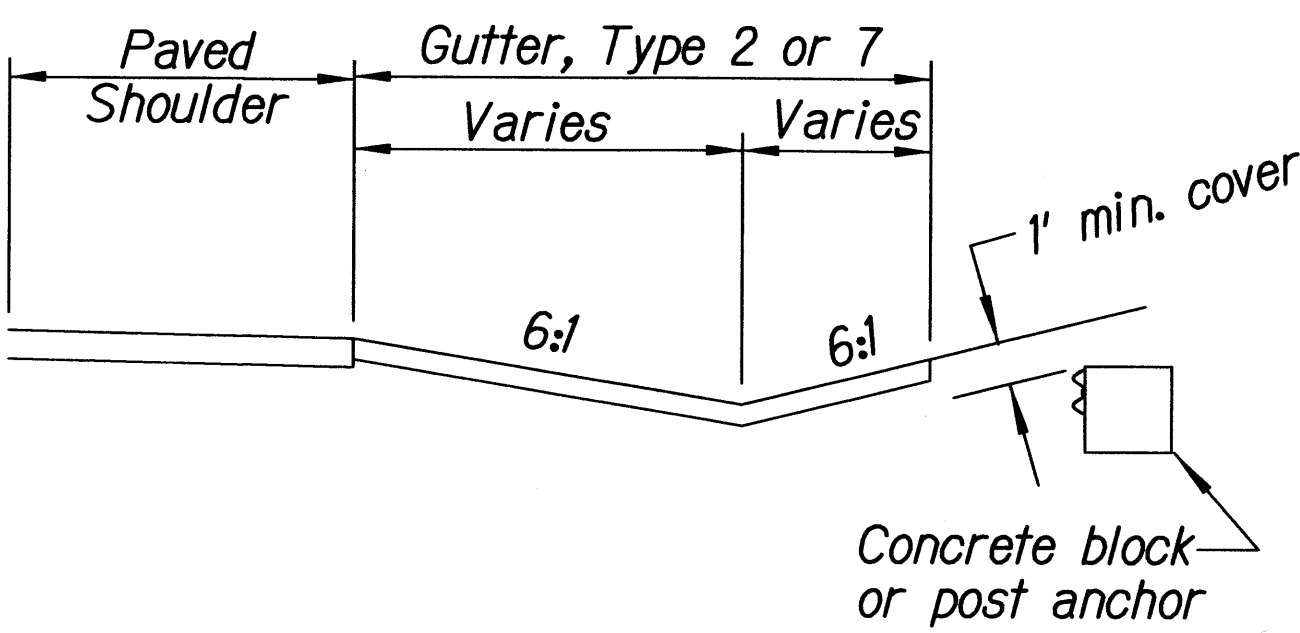
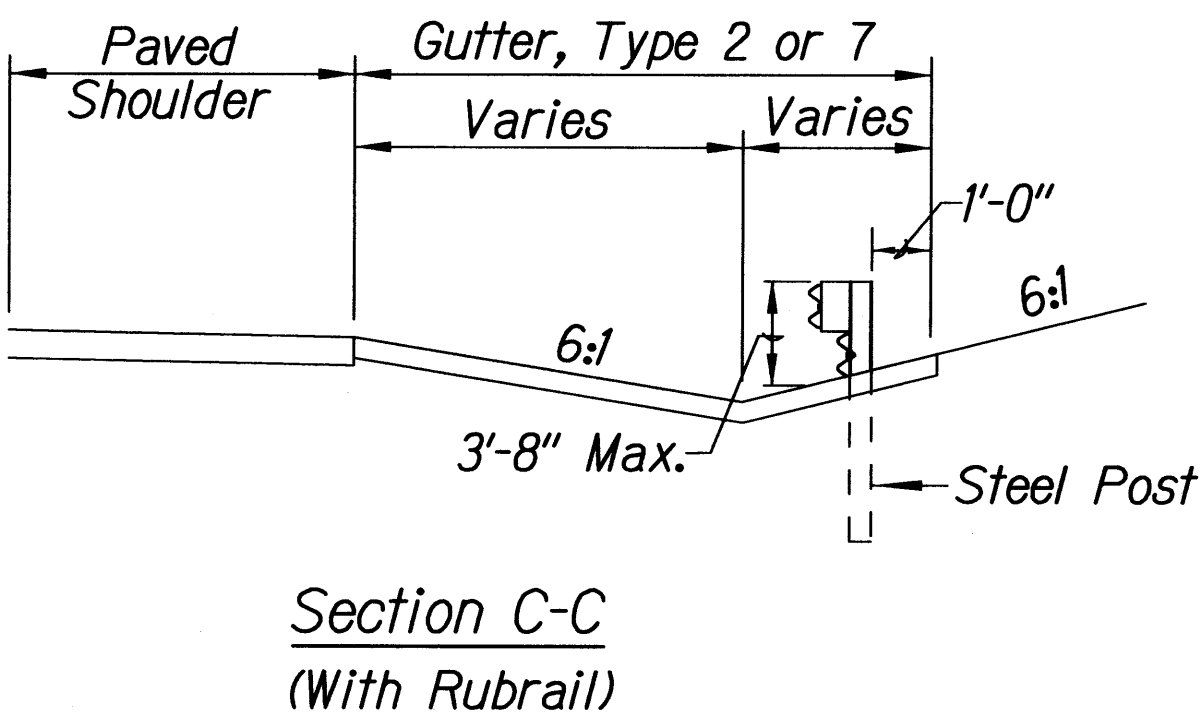
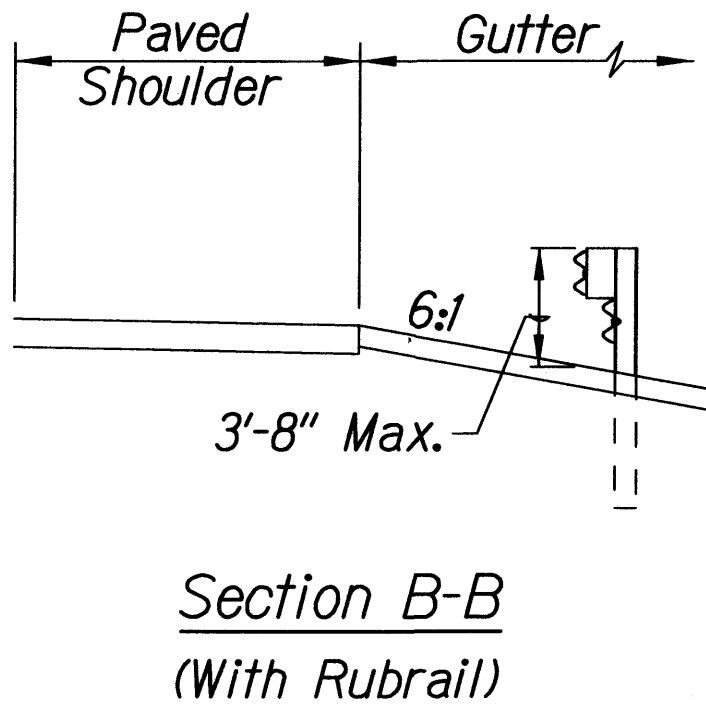
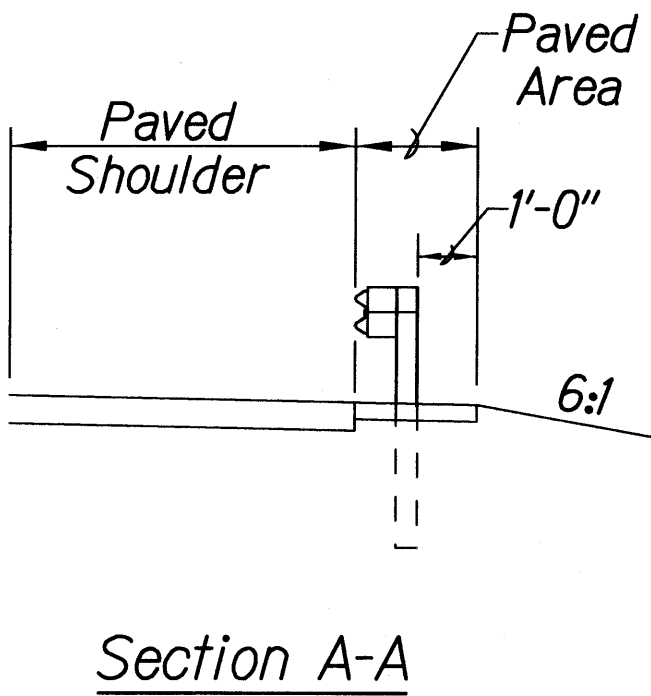
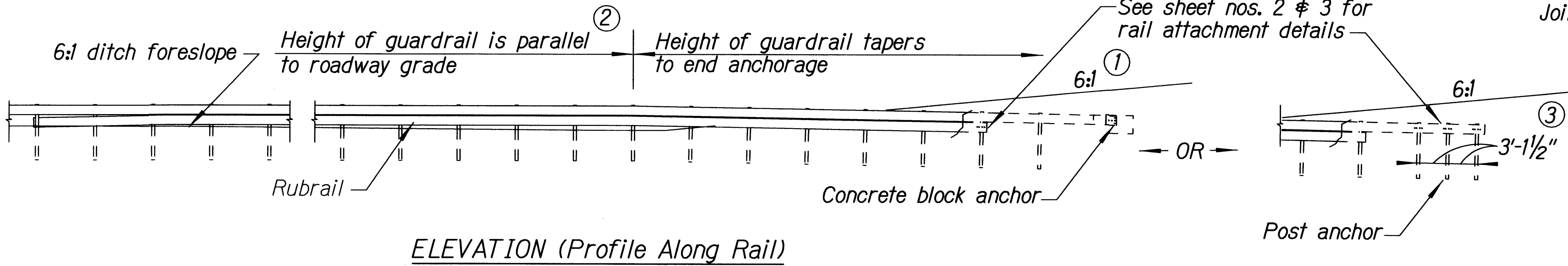
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-10M	2011	9	40

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



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

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

TYPE "A" FLARE

HONOAPIILANI HIGHWAY RESURFACING

Vicinity of Hooihui Road to Plantation Estates Golf Course

Project No. 30A-01-10M

Scale: NTS

Date: August, 2009

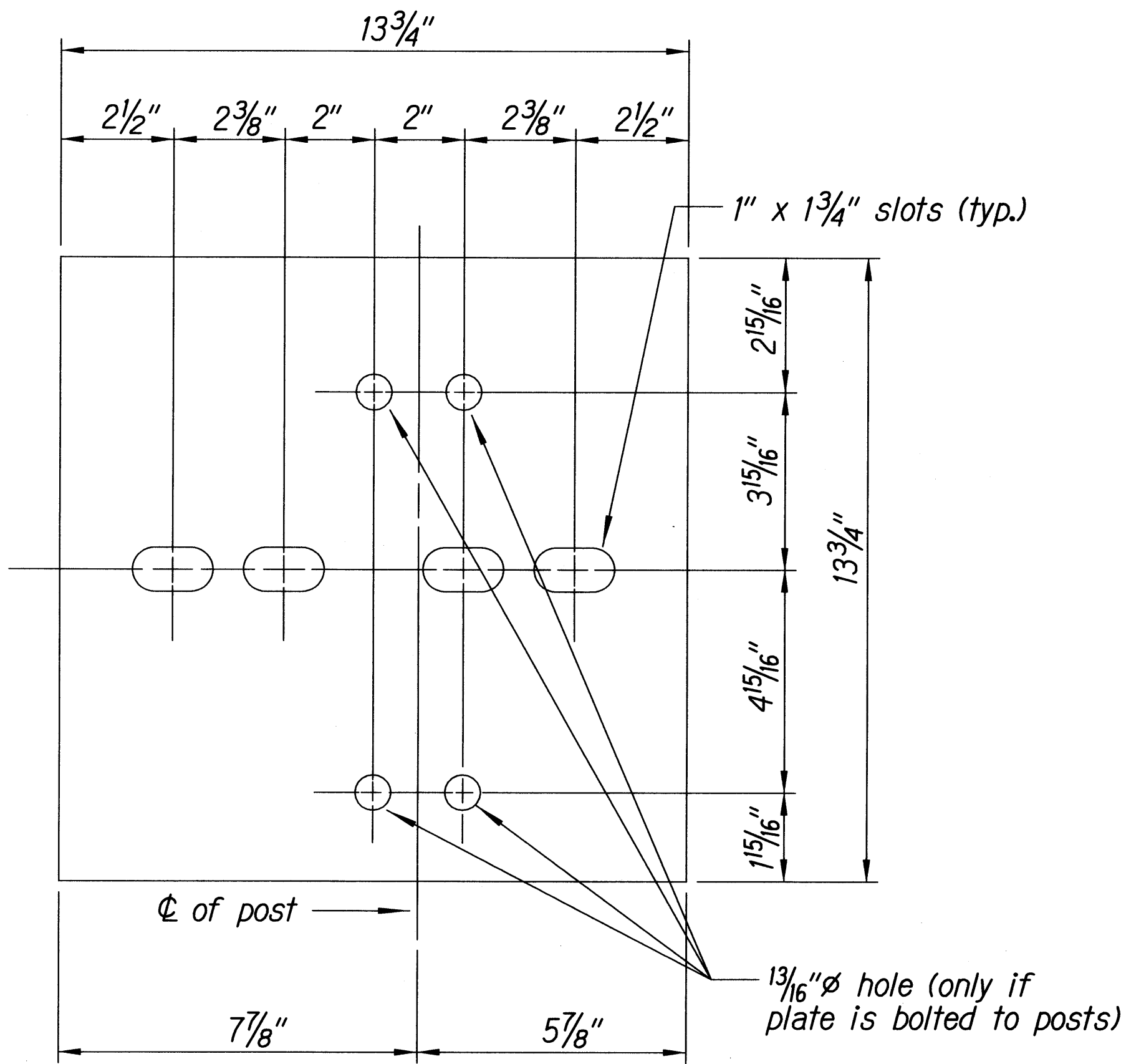
SHEET No. 2 OF 5 SHEETS

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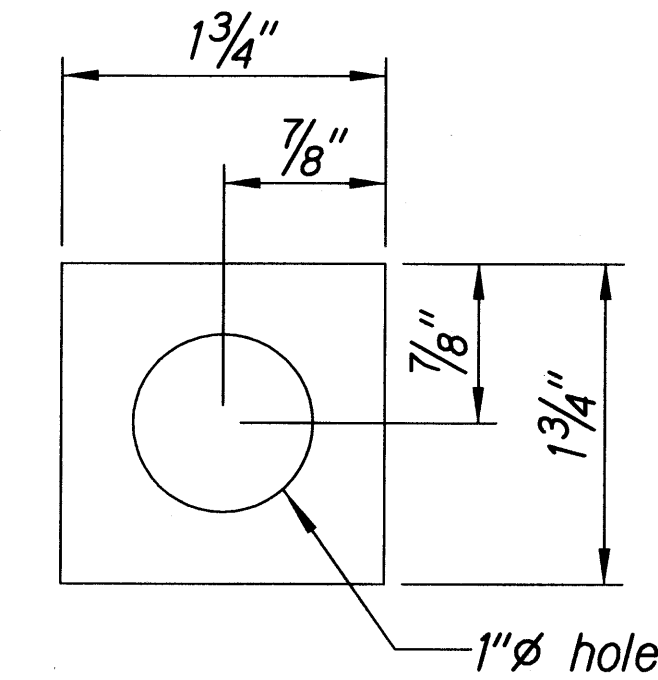
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	

18/21/01 tellubv guardrail/cgpreeditchdgn (standard plan TE-58 07/01/06, TE-59 11/03/89 & TE-60 07/01/86)

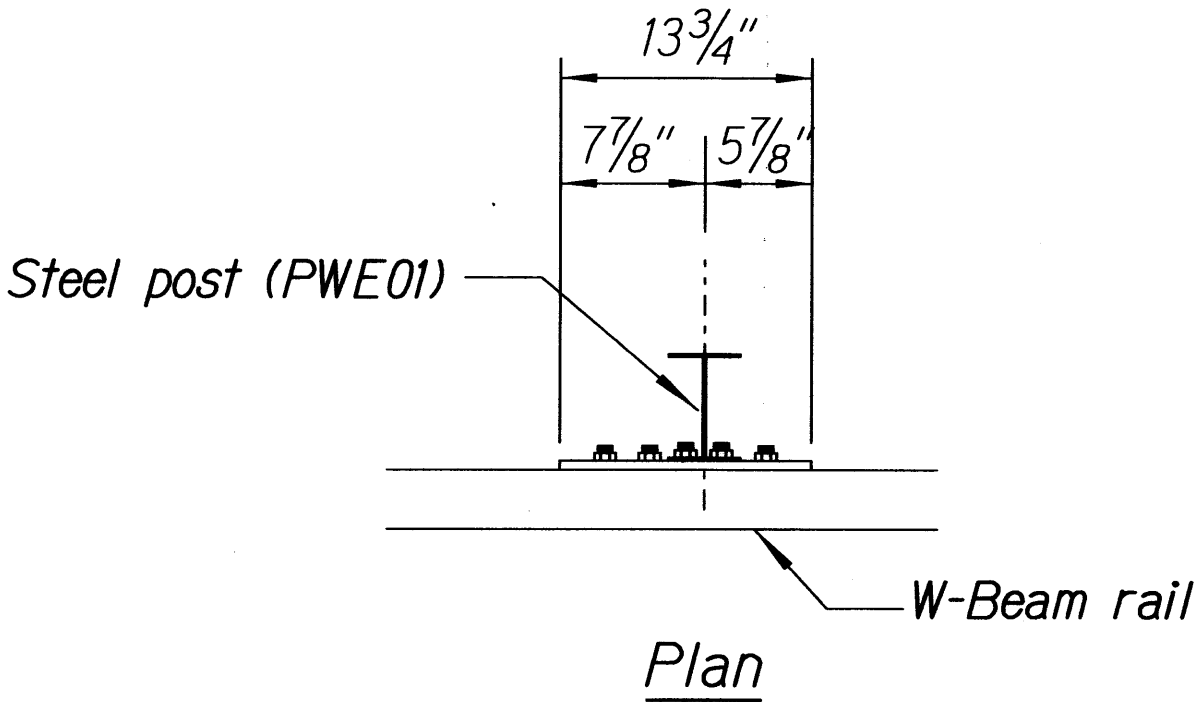
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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**Steel Plate - 1/2"**  
(Hot-dip Zinc Coated Galvanized  
Welded or Bolted to Post)

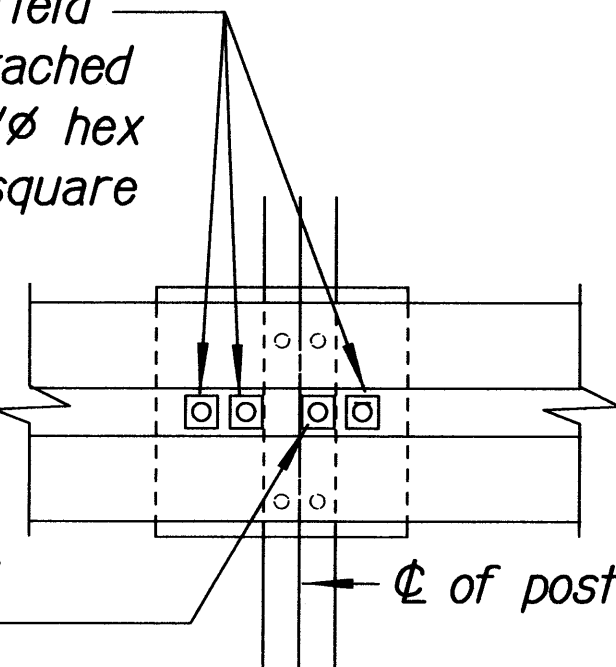


**Square Washer**  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)

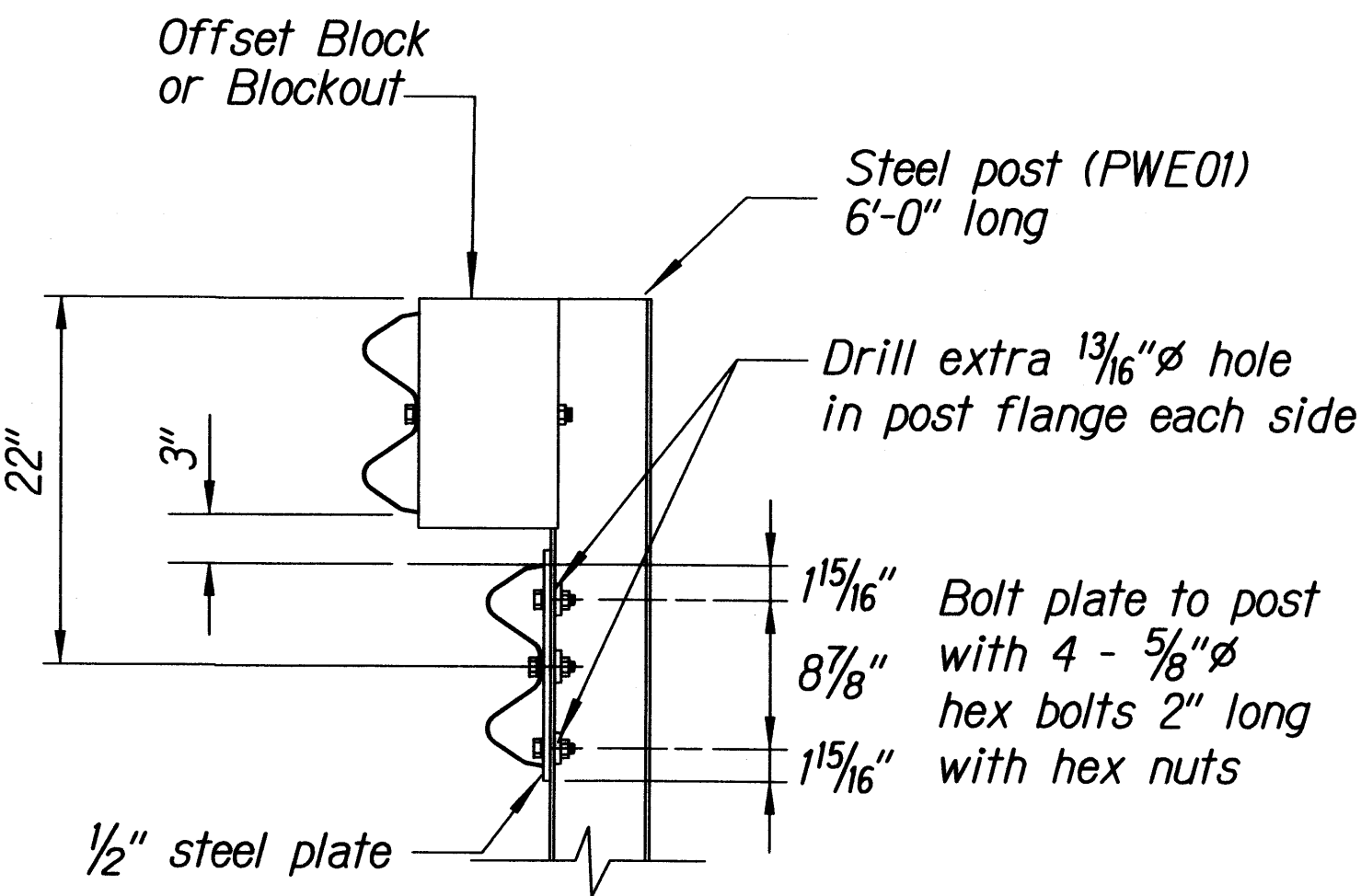


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

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

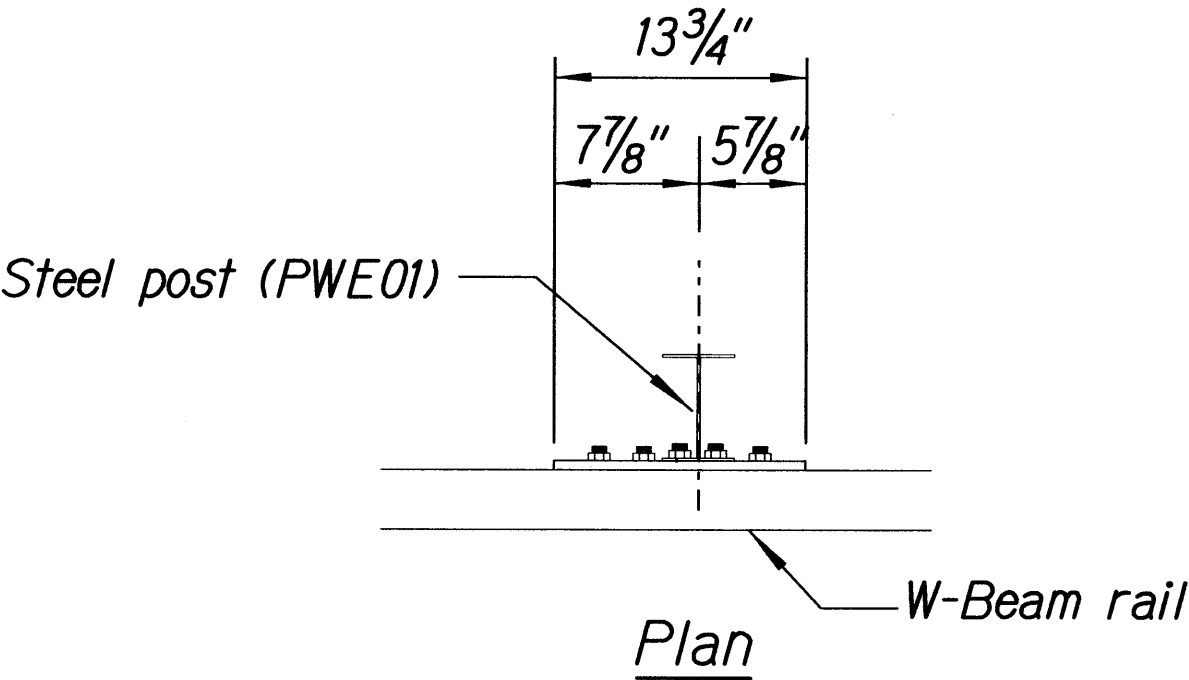


**Front View**



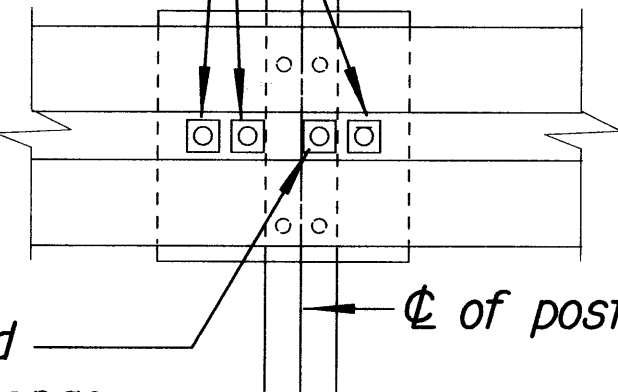
**Elevation**

### RUBRAIL ANCHOR DETAILS

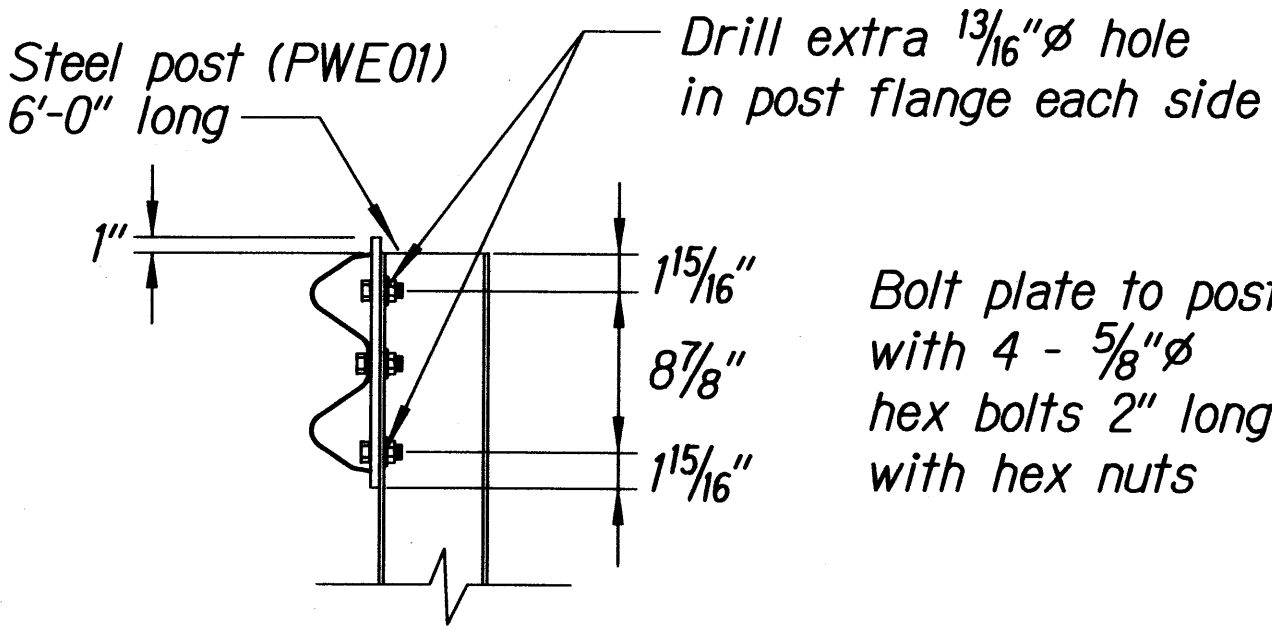


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

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



**Front View**



**Elevation**

### POST ANCHOR DETAILS

### BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS TYPE "A" FLARE)

**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.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

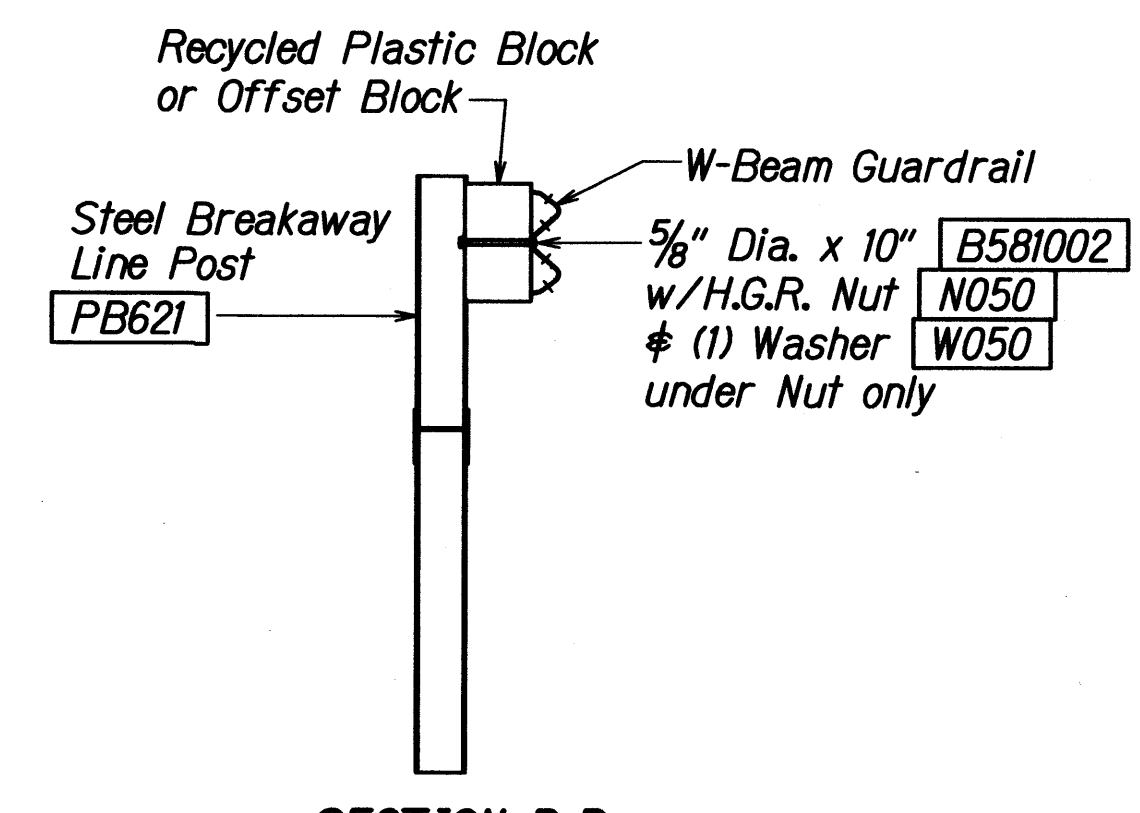
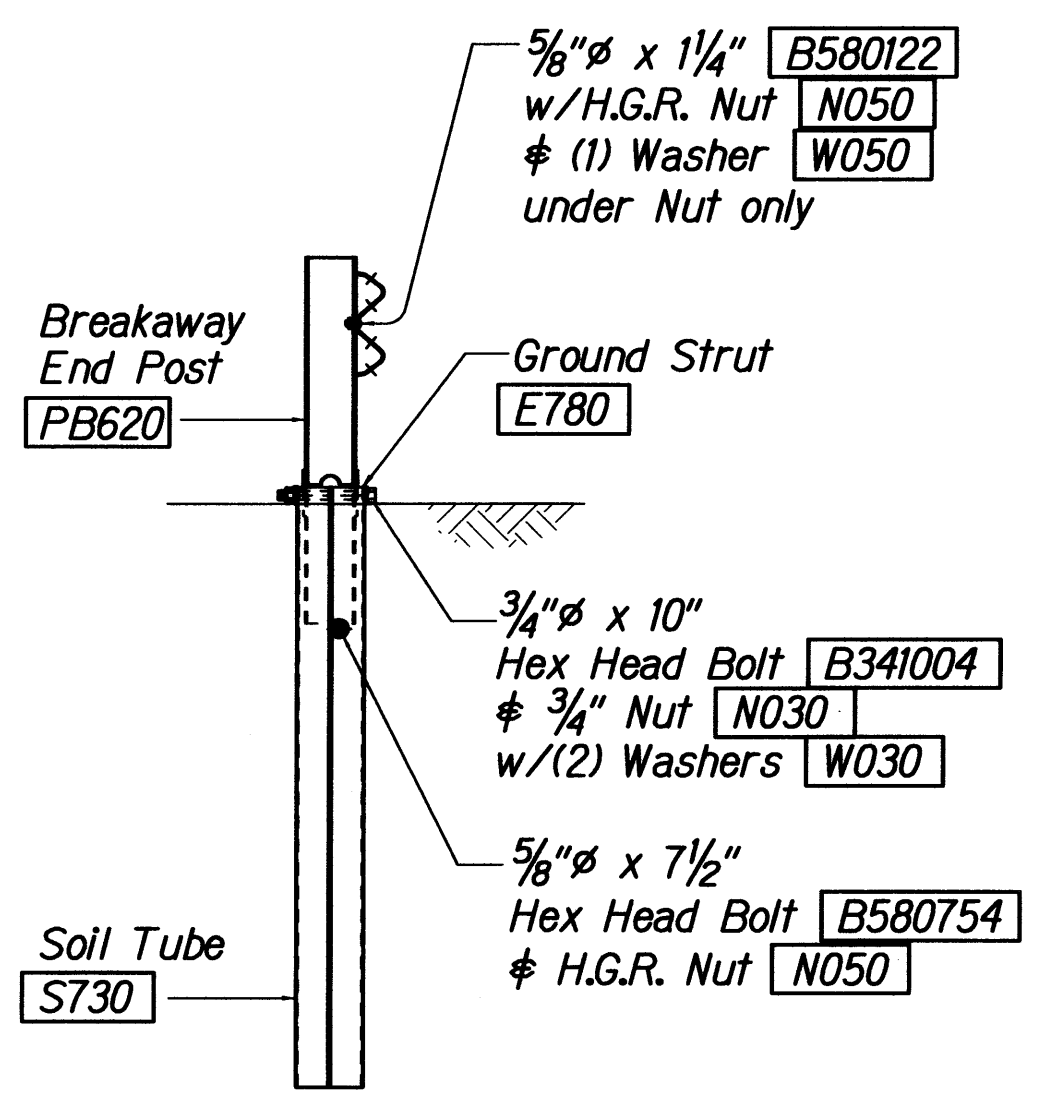
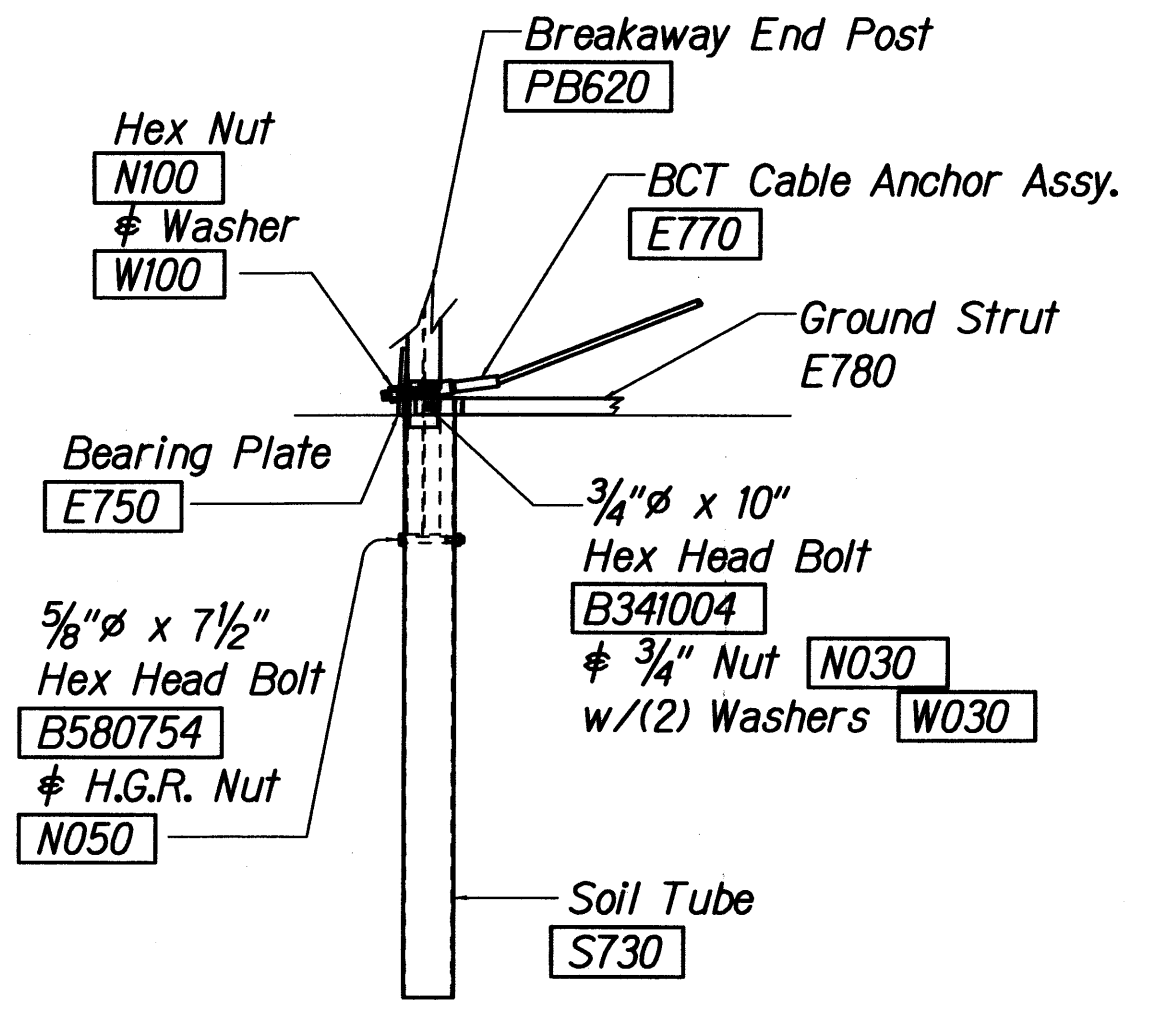
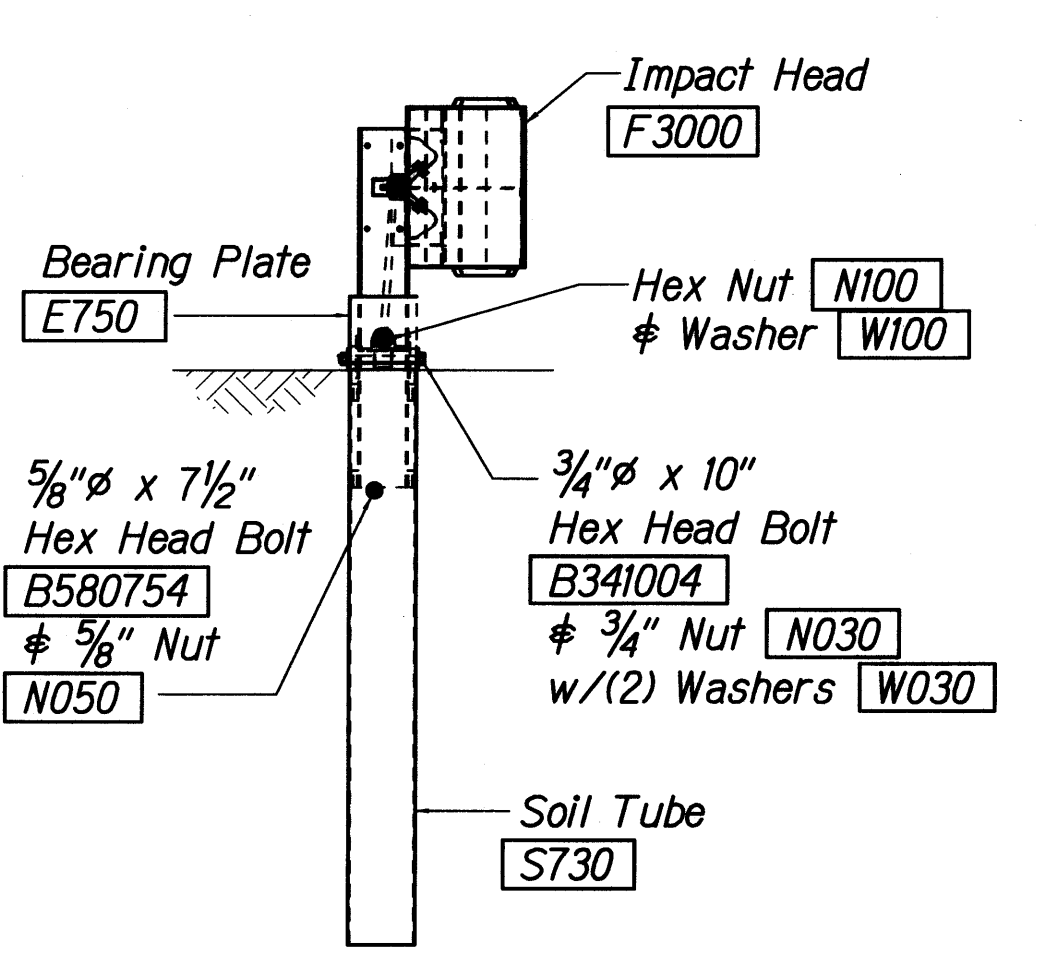
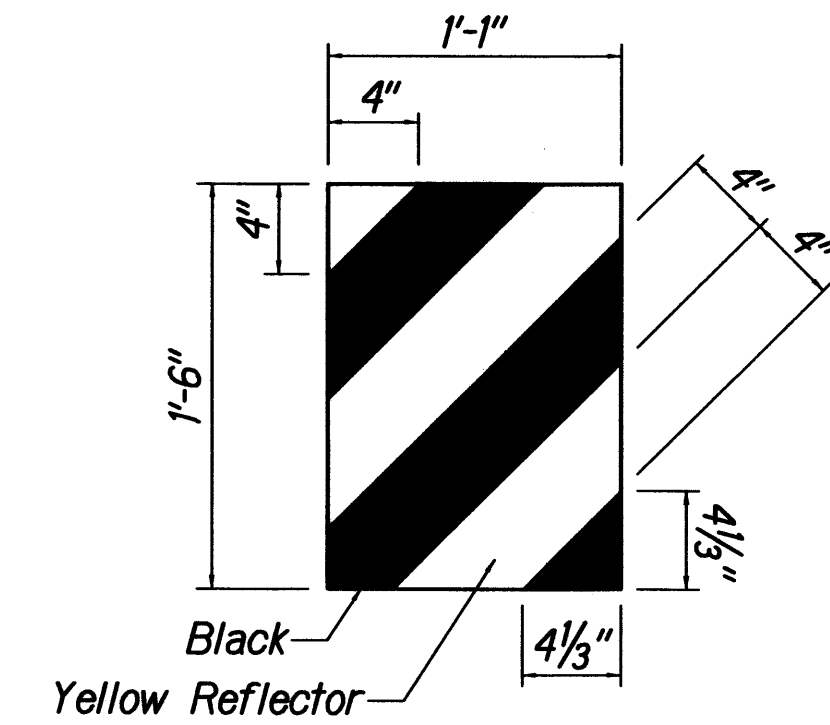
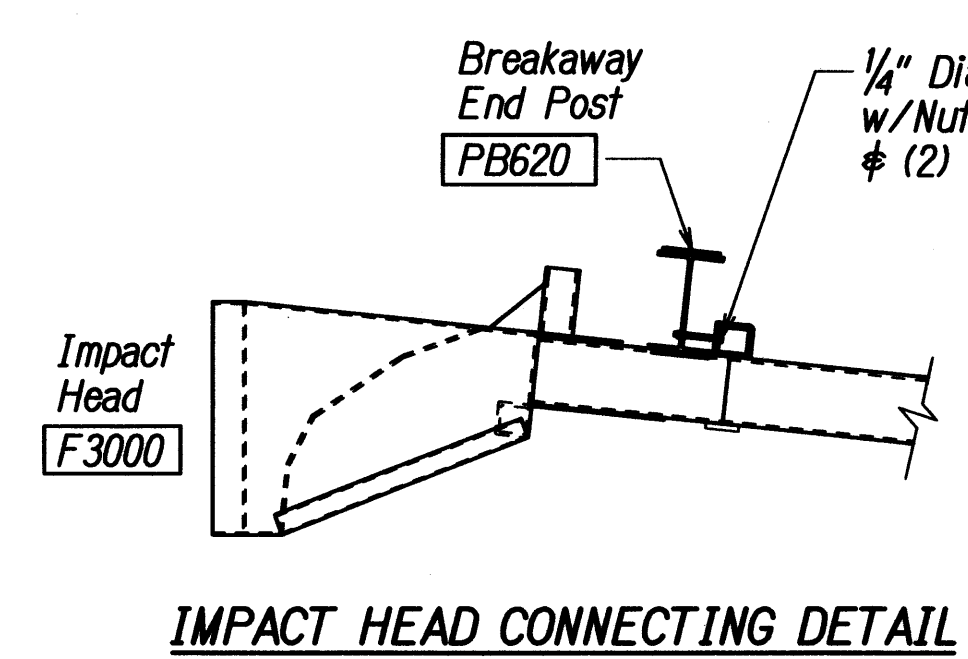
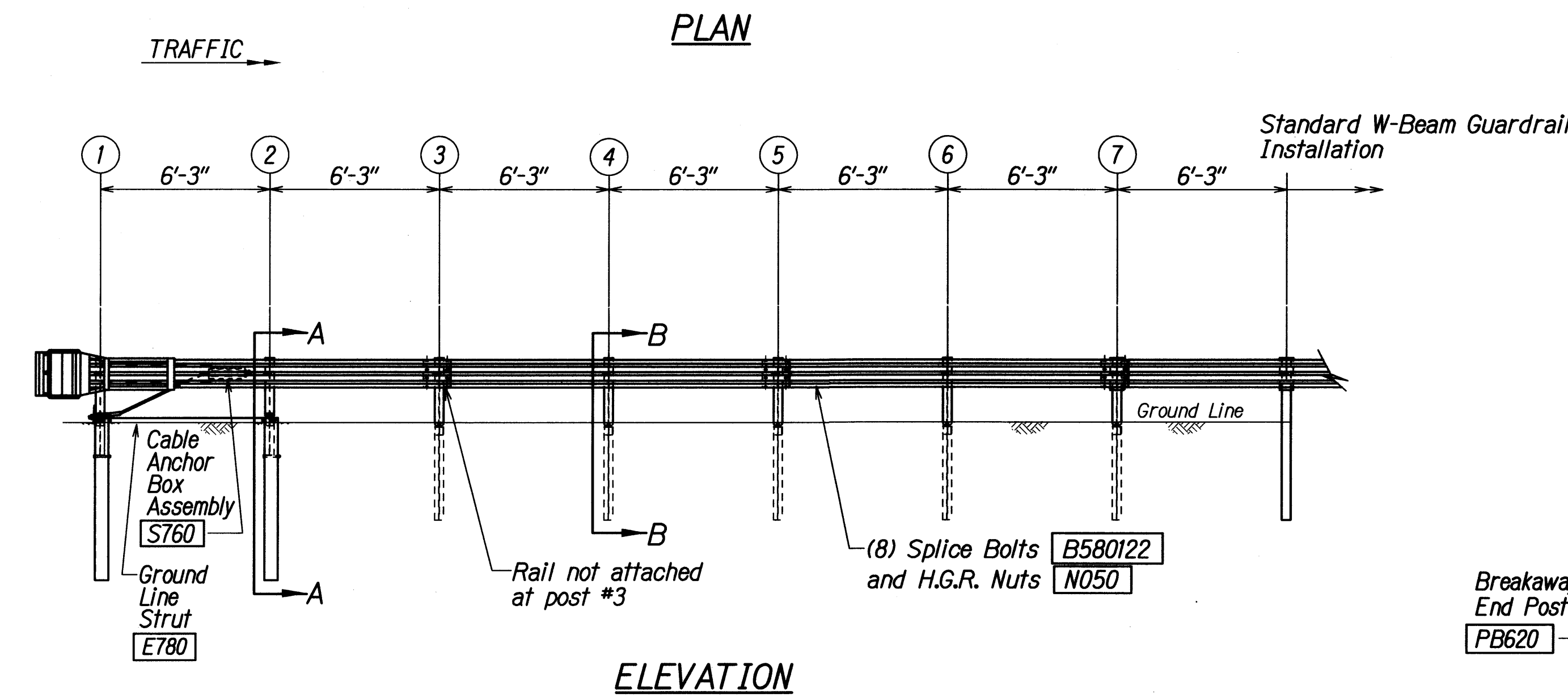
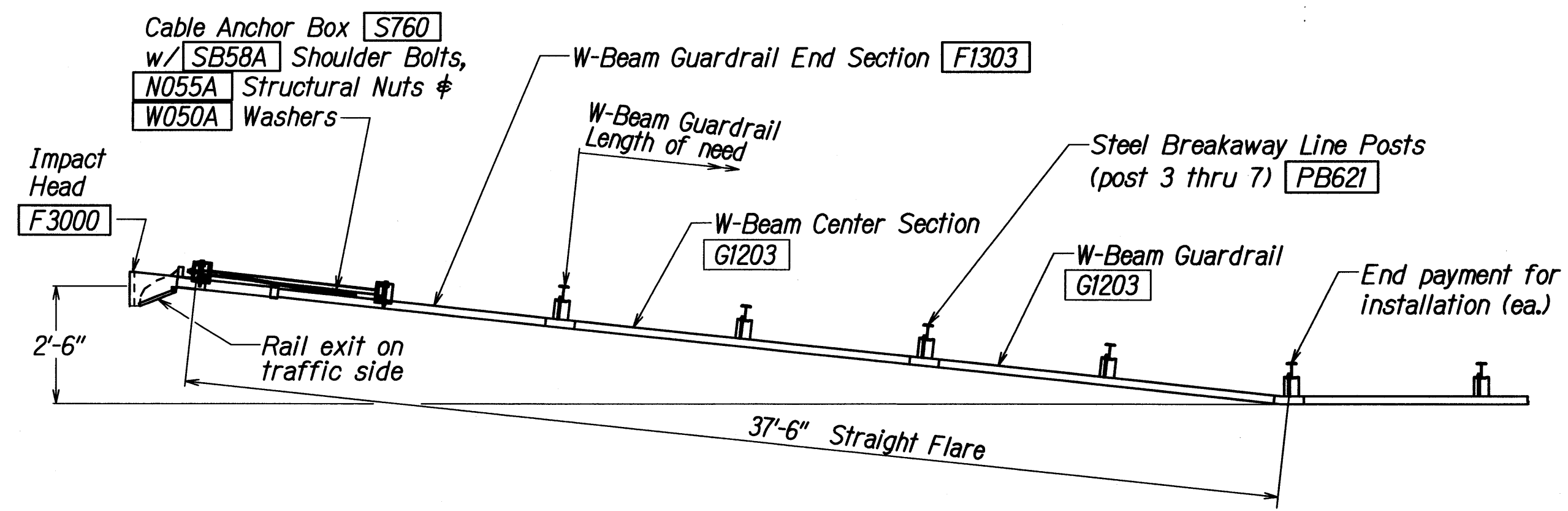
**TYPE "A" FLARE**  
**HONOAPIILANI HIGHWAY RESURFACING**  
**Vicinity of Hooihui Road to Plantation Estates Golf Course**  
**Project No. 30A-01-10M**  
Scale: NTS Date: August, 2009

SHEET No. 3 OF 5 SHEETS

13/01/09 1d1rby/guardrail/g4det2dgn (Standard plan TE-58 07/01/86, TE-59 11/03/89 & TE-60 07/01/86)







- GENERAL NOTES**
1. Breakaway steel posts are required with the FLEAT Terminal.
  2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
  3. The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
  4. The soil tubes may be driven with an approved driving head. Soil tubes shall not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
  5. 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 1/2" 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.
  6. 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.
  7. (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
  8. 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	FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
			HAWAII	HAW.	30A-01-10M	2011	12	40
F3000	1	IMPACT HEAD						
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.						
G1203	2	W-BEAM GUARDRAIL, 12 GA.						
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 POST						
PB621	5	STEEL BREAKAWAY LINE POST						
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK						
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)						
<b>HARDWARE</b>								
B580122	25	5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2						
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT						
B341004	2	3/4" Dia. x 10" HEX BOLT						
B581002	5	5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)						
N050	32	5/8" Dia. H.G.R. NUT (SPlice 24, SOIL TUBES 2, POST 2 THRU 7, 8)						
N030	2	3/4" Dia. HEX NUT						
W050	6	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 BOLT						
N055A	8	1/2" A325 STRUCTURAL NUT						
W050A	16	1 1/16" OD x 3/16" 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

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**FLEAT-350**  
**FLARED ENERGY ABSORBING TERMINAL**  
**HONOAPIILANI HIGHWAY RESURFACING**  
 Vicinity of Hooiui Road to Plantation Estates Golf Course  
 Project No. 30A-01-10M  
 Not to Scale Date: August, 2009  
 SHEET No. 5 OF 5 SHEETS

ORIGINAL PLAN  
 DATE  
 DRAWN BY  
 DESIGNED BY  
 CHECKED BY  
 SURVEY PLOTTED BY  
 TRACED BY  
 NOTE BOOK  
 QUANTITIES BY  
 CHECKED BY

Standard Plan TE-61 (11/03/88) & TE-62 (08/01/87)  
 tdlr:rubby/quadrail/fleat350.dgn  
 r8/12/02