

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	6	27

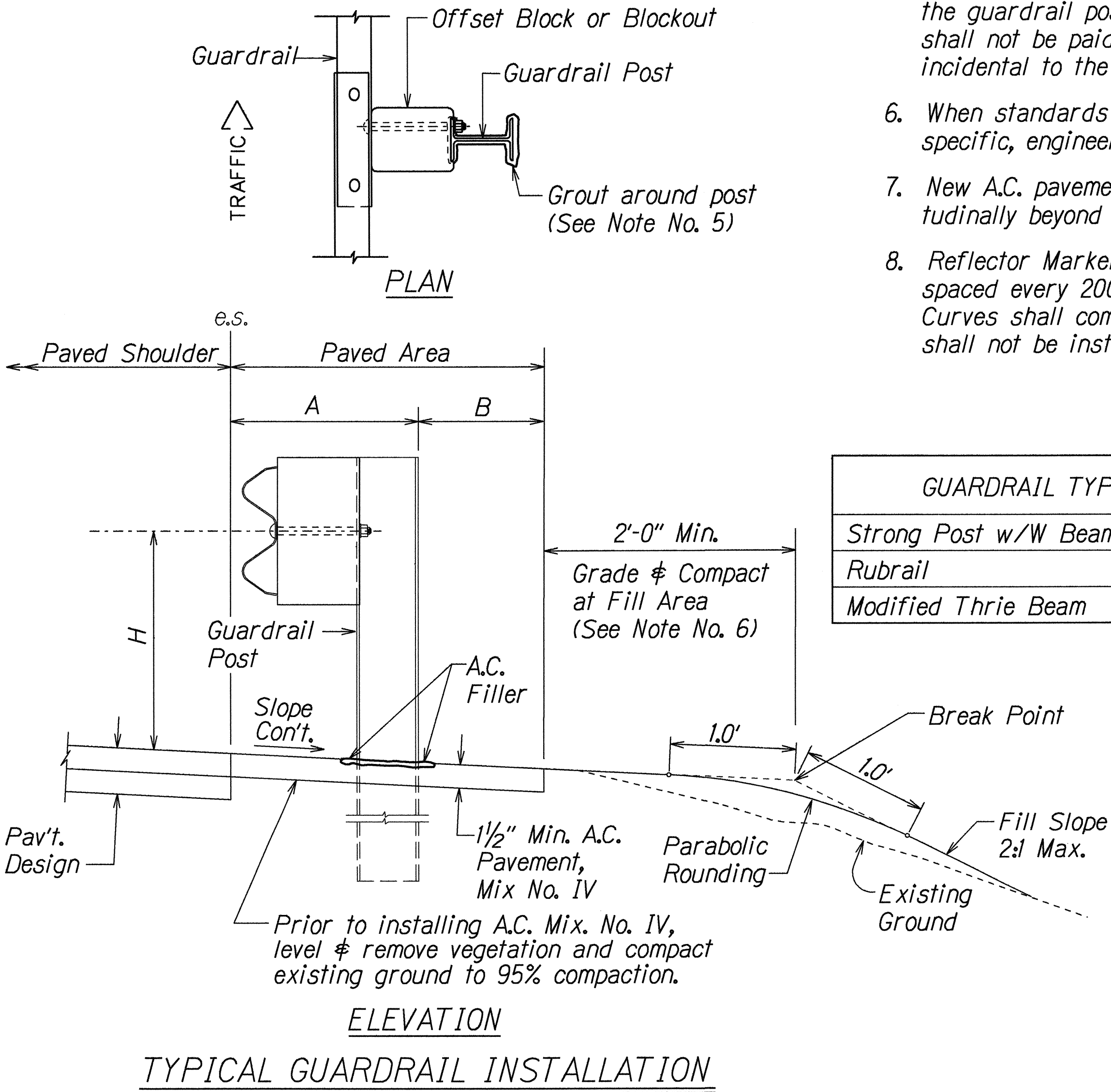
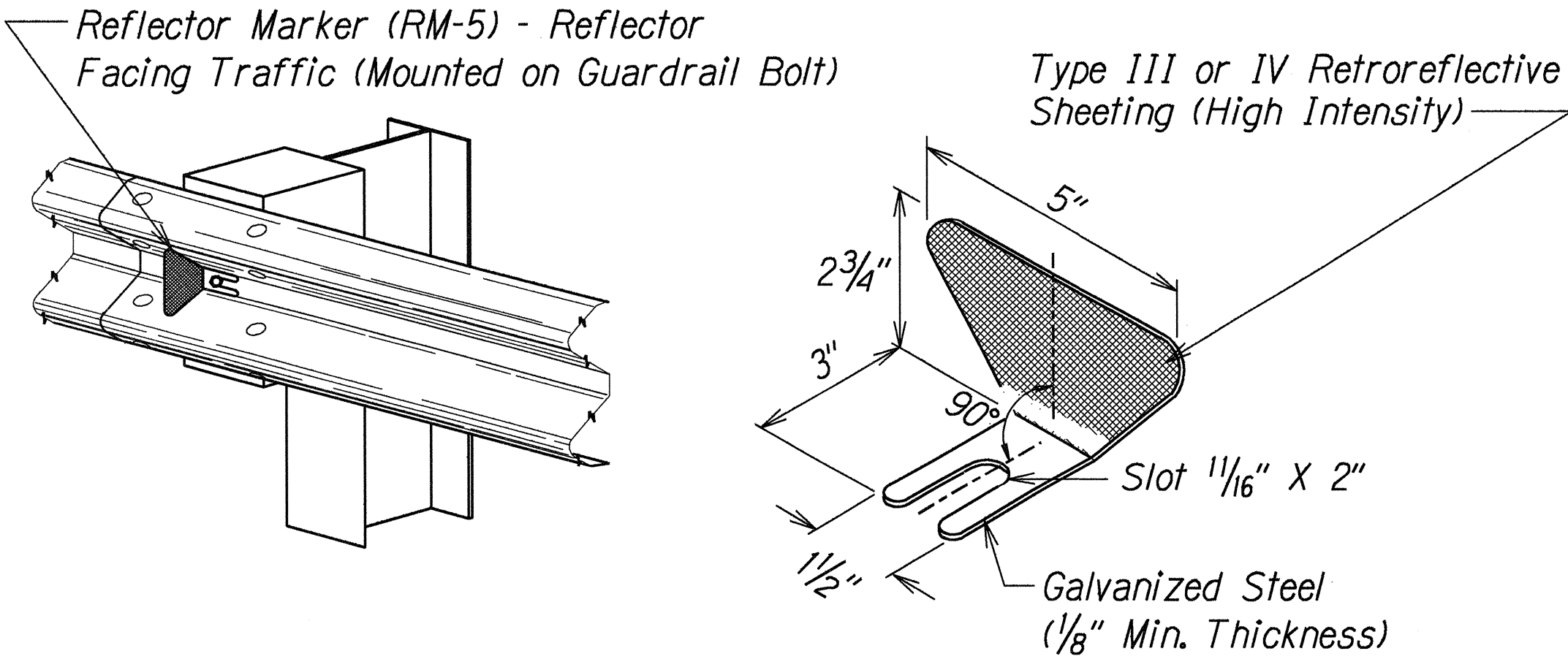
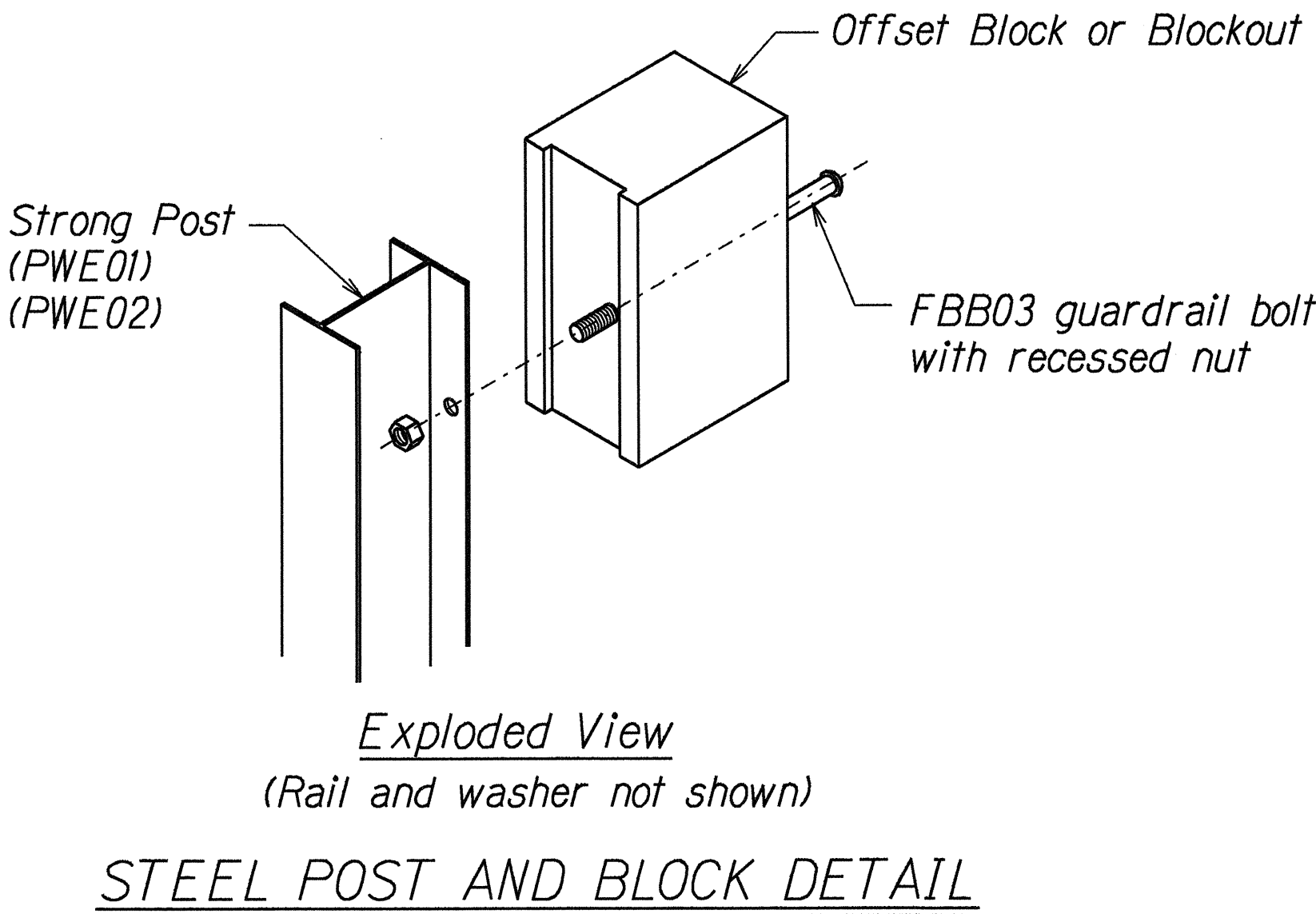
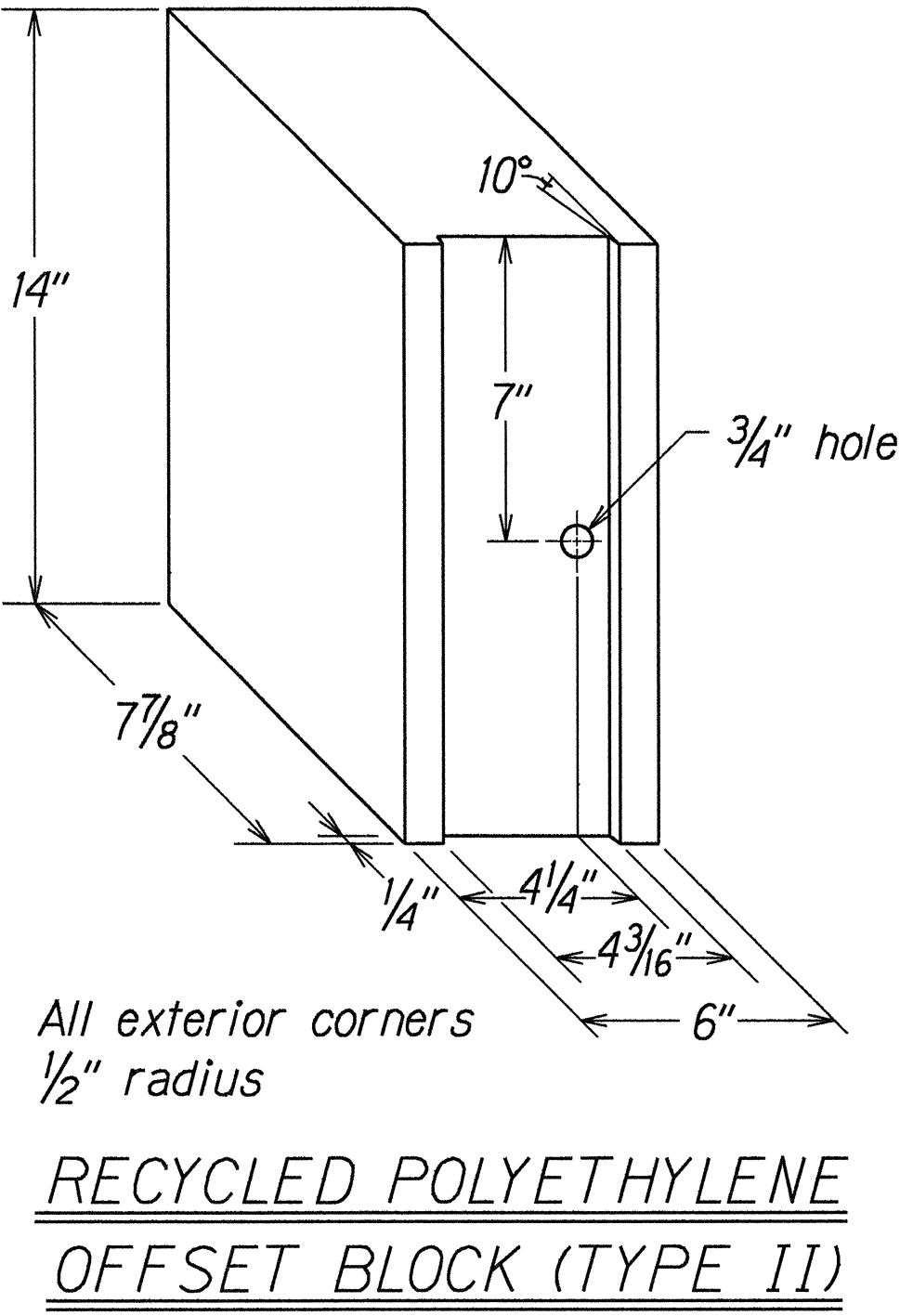
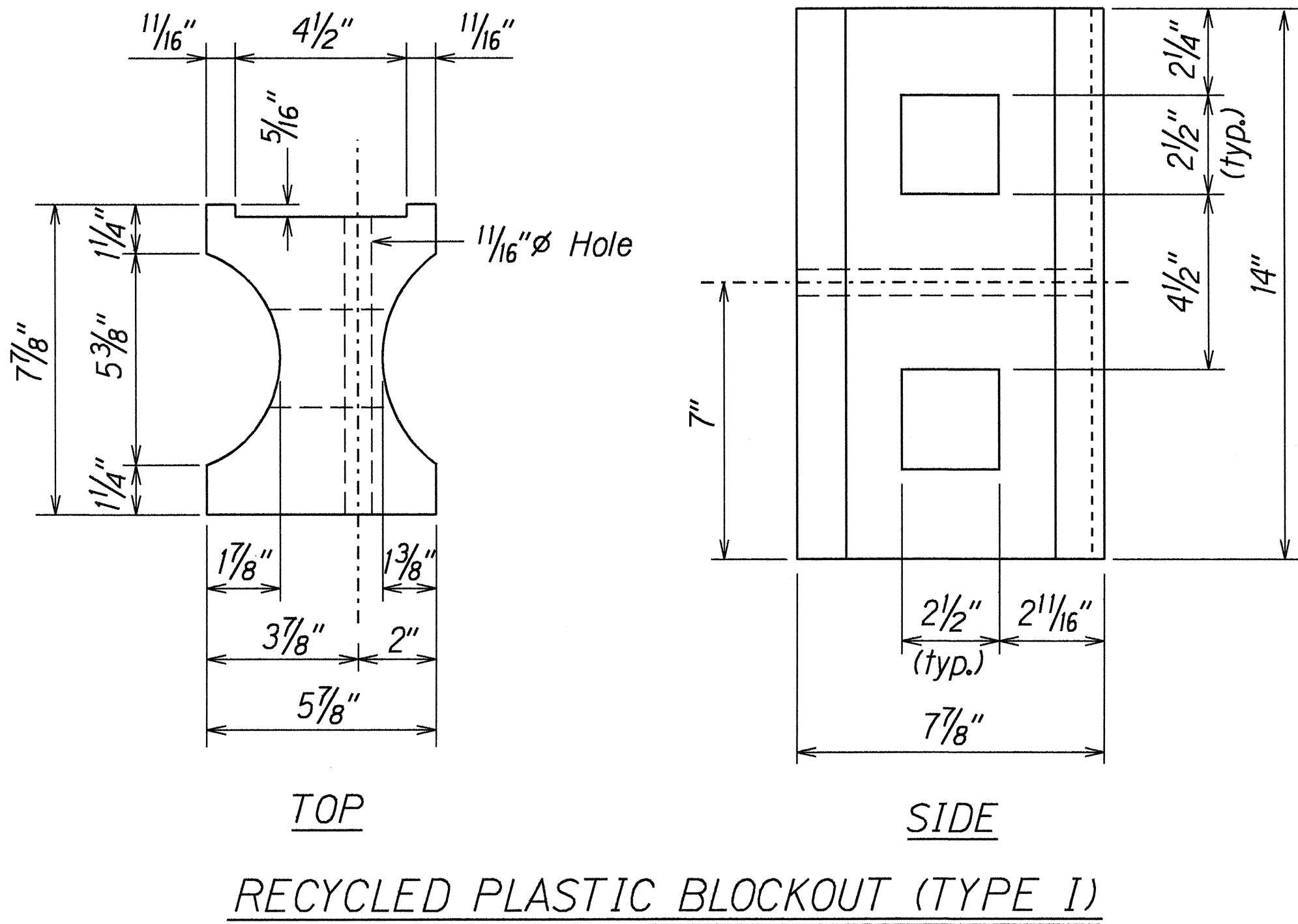
GENERAL NOTES

- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- 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 fastners, posts and rail elements have been converted from metric units into their present form.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- After the guardrail posts are installed in the paved area, the Contractor shall grout around the guardrail post and seal all cracks in the paved area that was caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to grouting. The cost for this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- Reflector Markers (RM-5) mounted on guardrails shall be spaced every 200 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.

GUARDRAIL TYPE	DIMENSION		
	H	A	B
Strong Post w/W Beam	1'-9 <sup>5</sup> / <sub>8</sub> "	1'-6"	1'-0"
Rubrail	2'-0"	1'-6"	2'-0"
Modified Thrie Beam	2'-0"	2'-0"	1'-0"

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

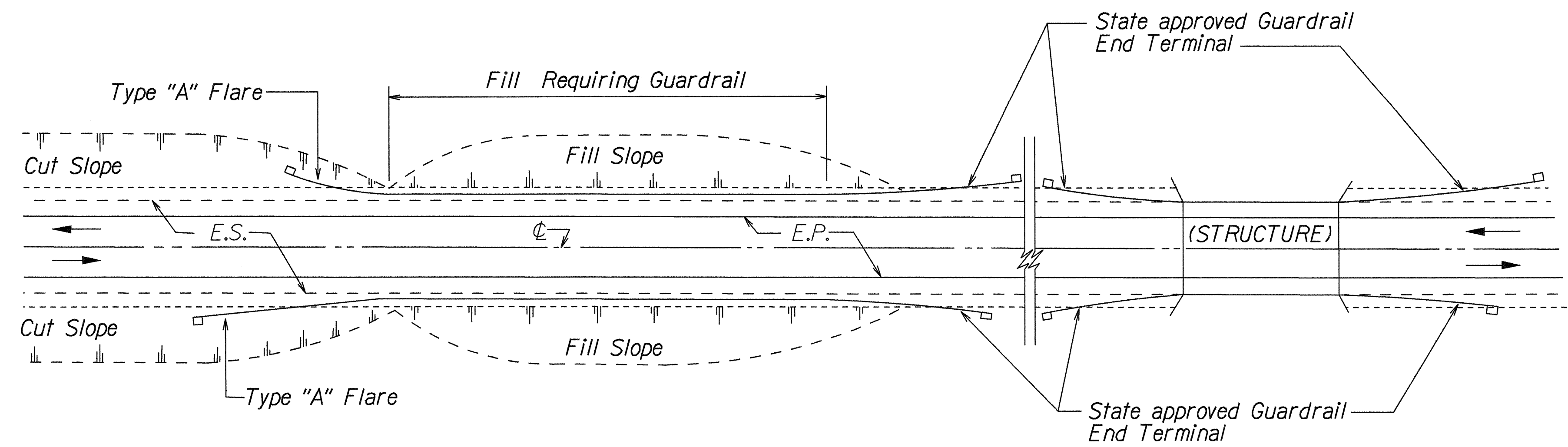
**GUARDRAIL DETAILS & NOTES**  
  
KUHIO HIGHWAY  
Intersection Improvements at Kalihwai Rd.  
Project No. 56D-01-99  
  
Scale: NTS                      Date: Aug. 2000  
SHEET No. 1 OF 1 SHEETS



DESIGNED BY	DATE
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QUANTITIES BY	
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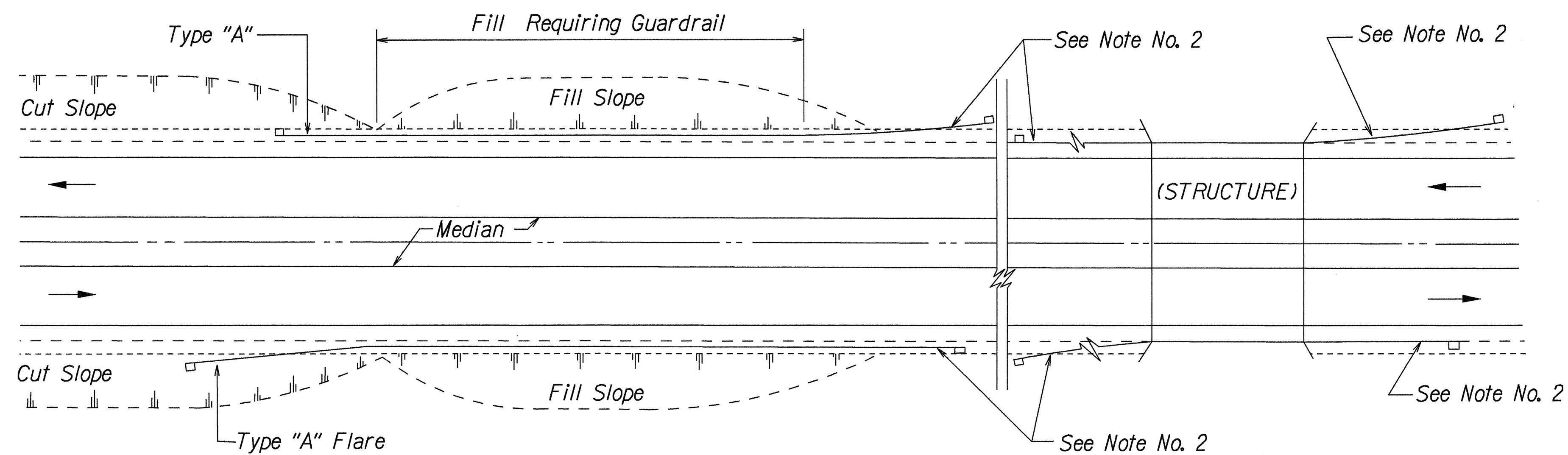
18-30-00 tdl/rub/guardrail/56D01-99 Standard plan TE-50 r09/01/00

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	7	27



PLAN

TWO WAY ROADWAY



PLAN

ONE WAY ROADWAY (DIVIDED HIGHWAY)

NOTES:

1. Metal Guardrail connection to concrete structures requires End Post Connection. See Structure Plans.
2. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
3. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.

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

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HIGHWAYS DIVISION

**GUARDRAIL DETAILS**

KUHIO HIGHWAY  
Intersection Improvements at Kalihiwai Rd.  
Project No. 56D-01-99

Scale: NTS Date: Aug. 2000

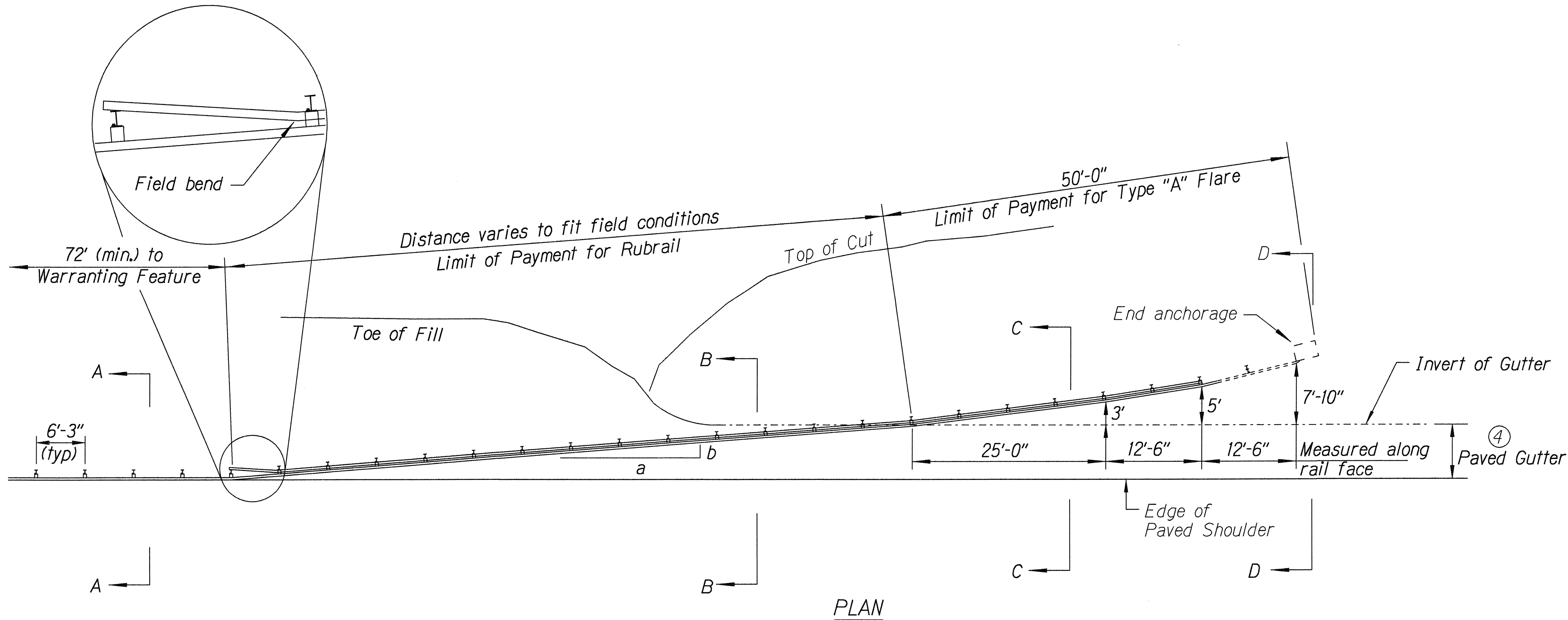
SHEET No. 1 OF 1 SHEETS



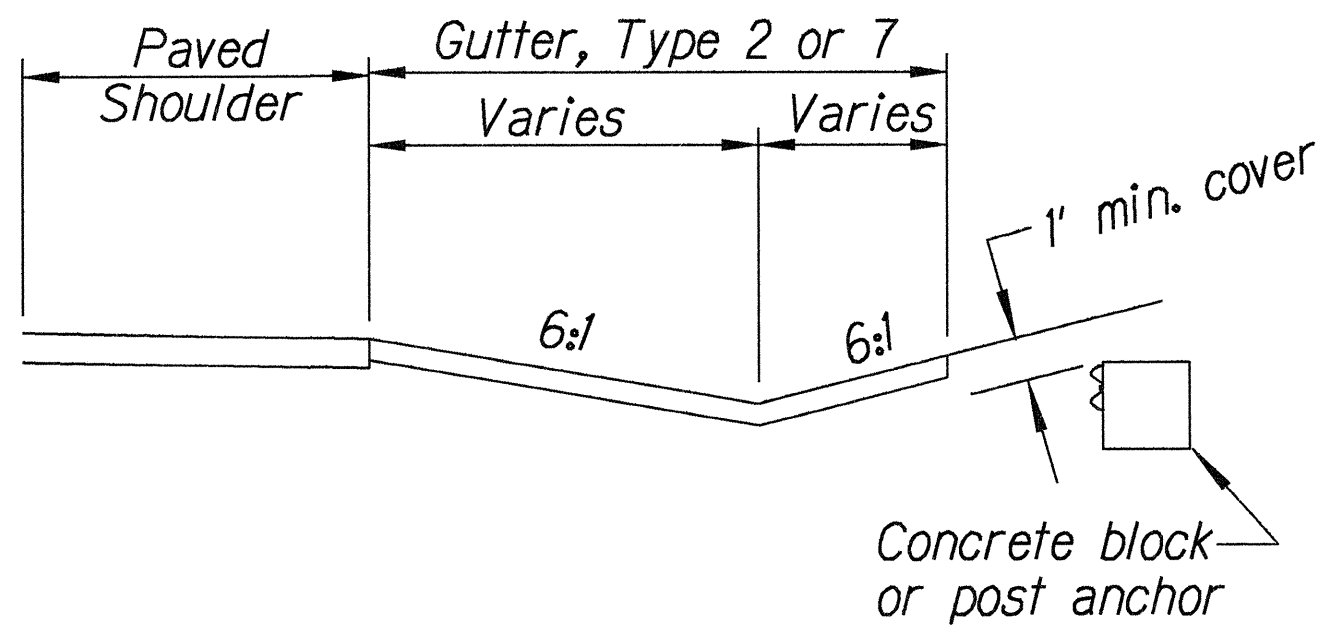
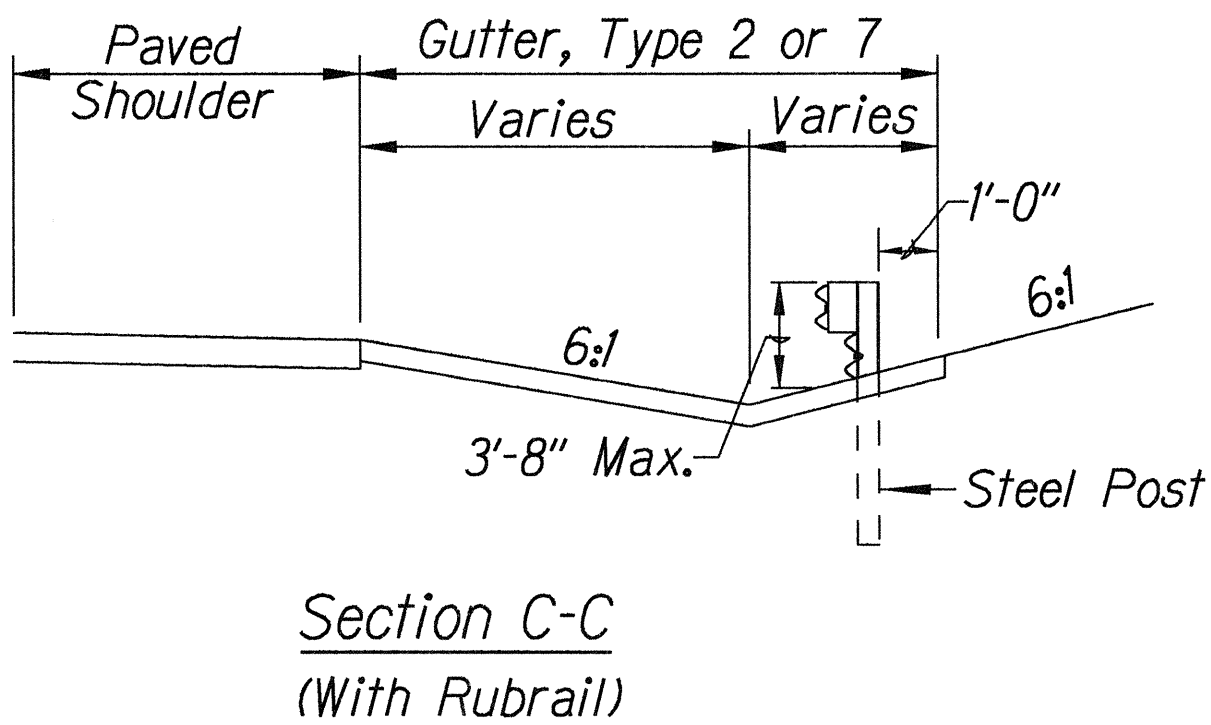
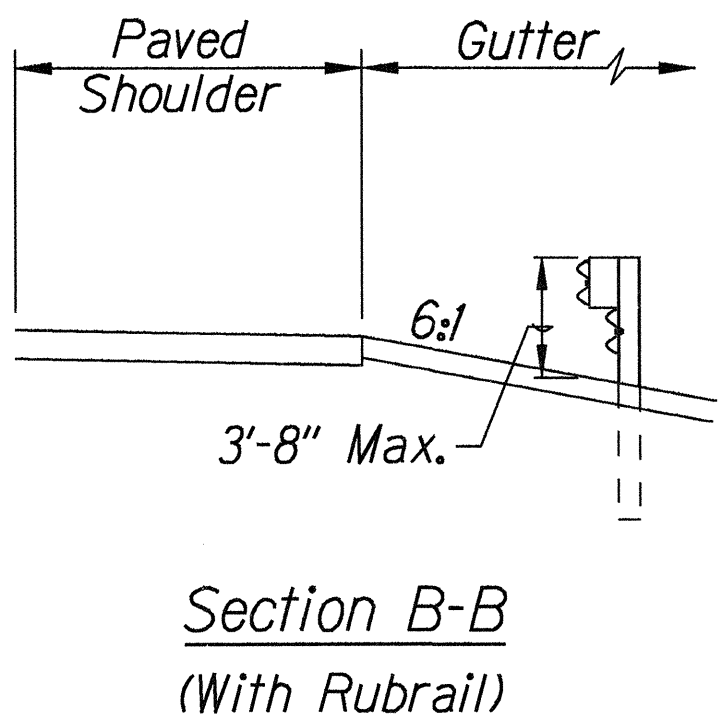
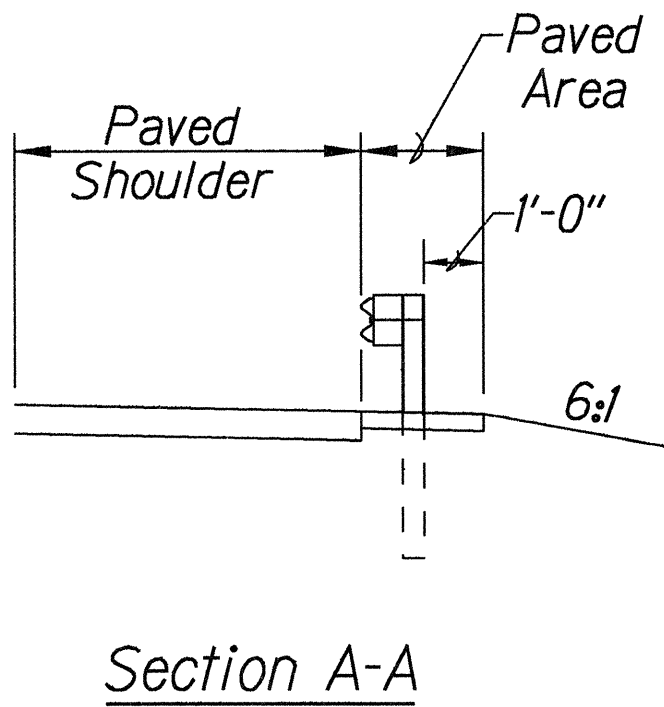
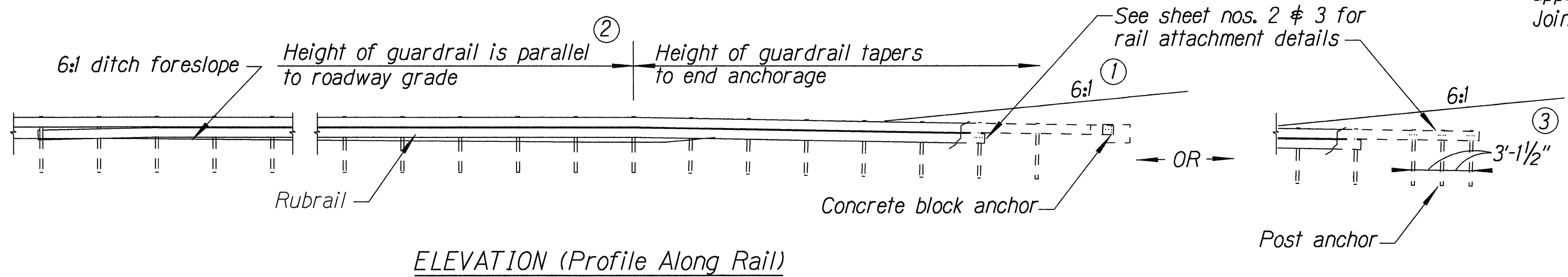
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	8	27

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

KUHIO HIGHWAY

Intersection Improvements at Kalihiwai Rd.

Project No. 56D-01-99

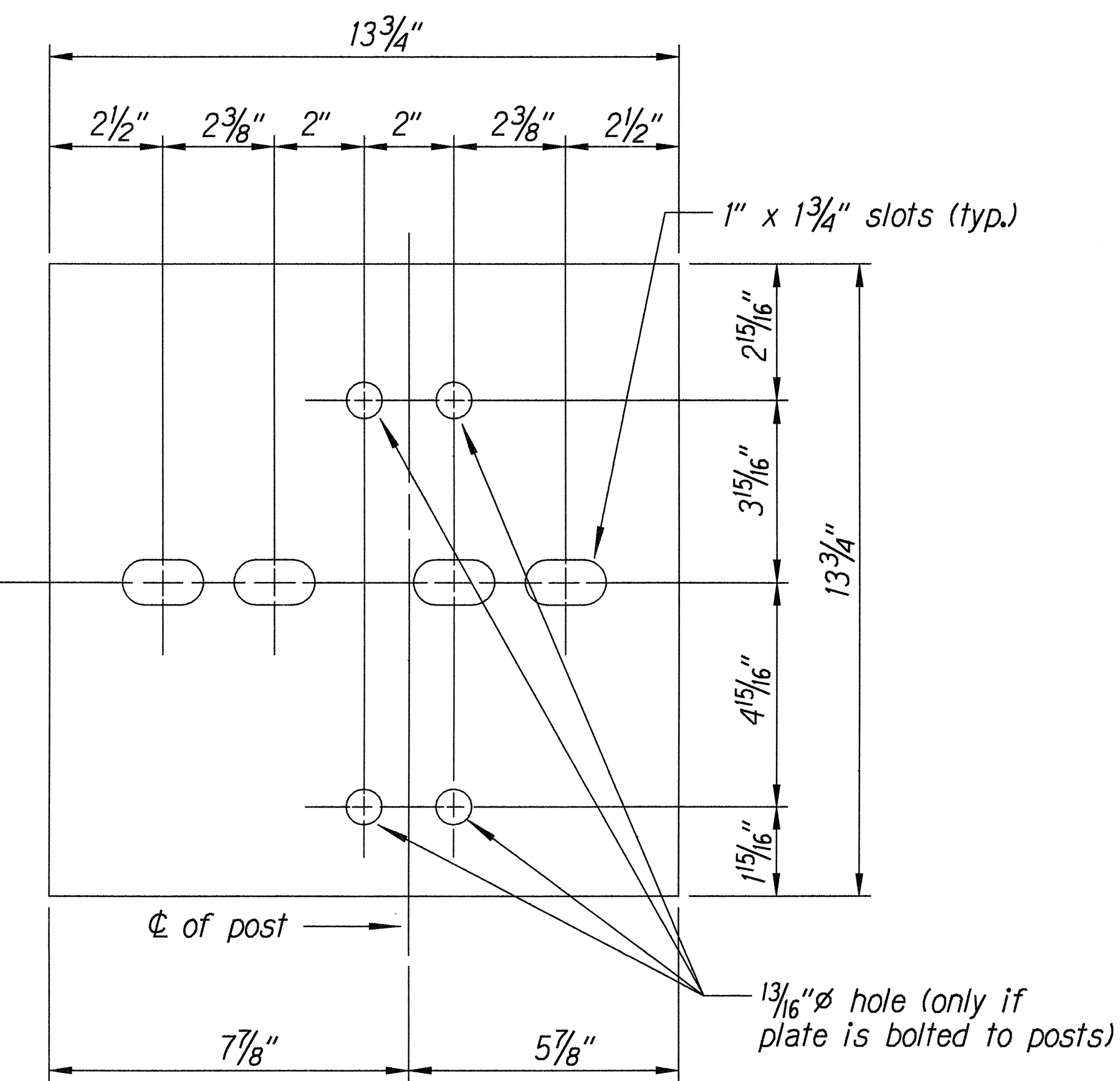
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Date: Aug. 2000

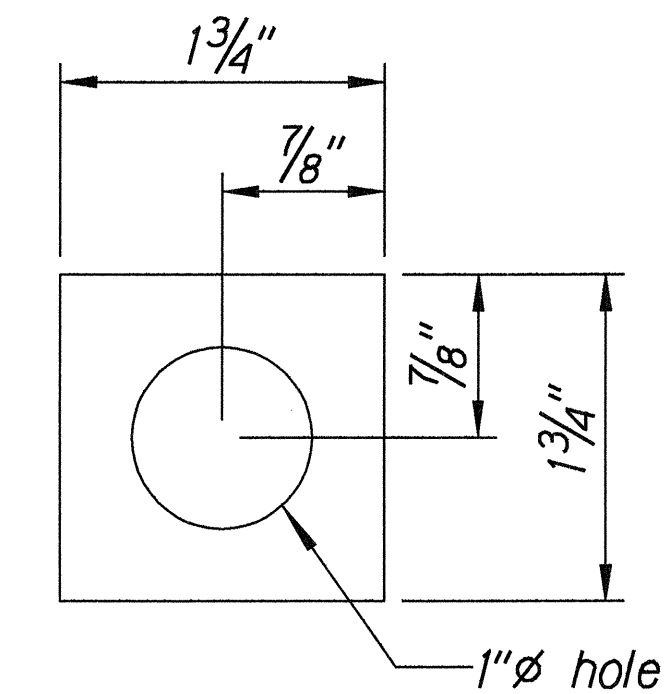
SHEET No. 1 OF 3 SHEETS

ORIGINAL PLAN	DATE
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APPROVED BY	
NOTED BY	
REVISIONS	
NO. OF REVISIONS	

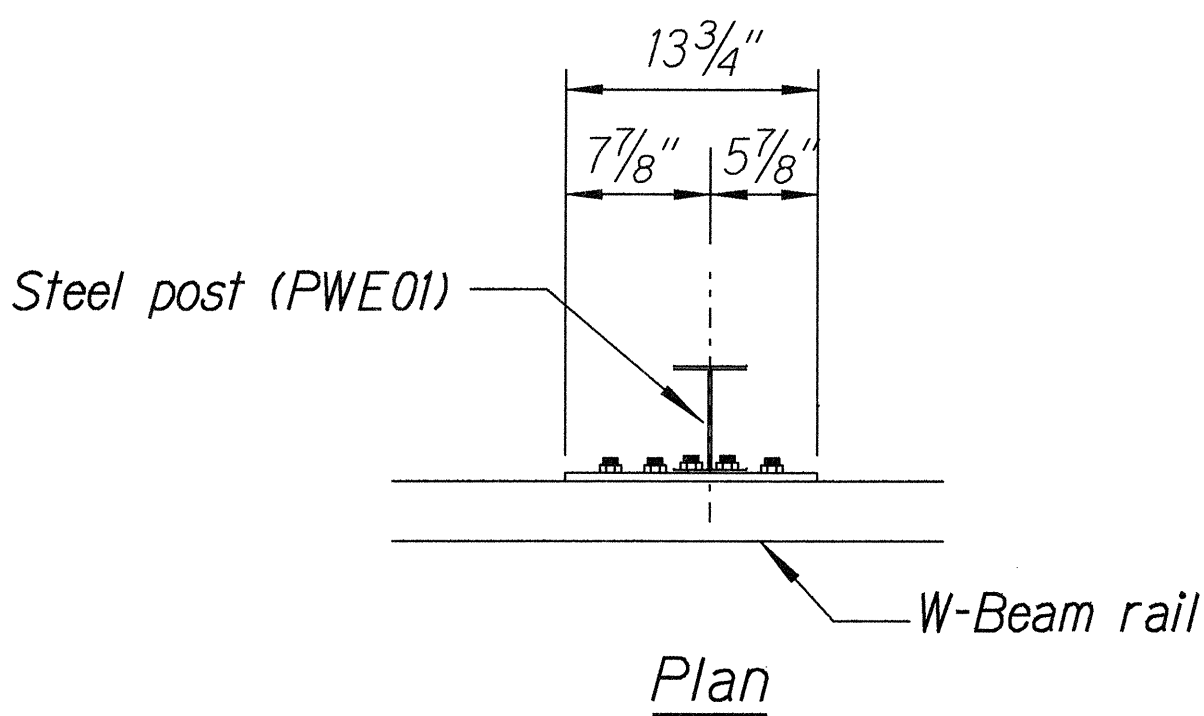
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	9	27



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

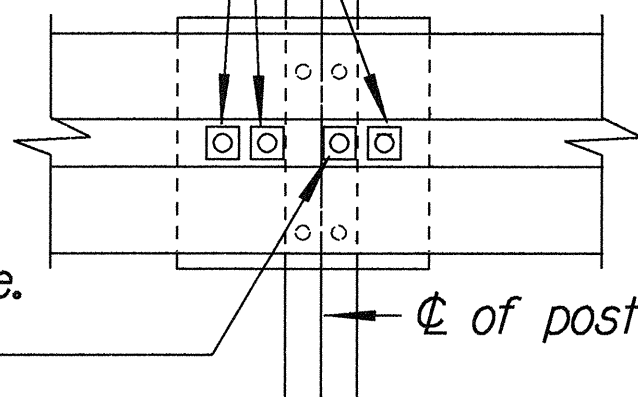


Square Washer  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)

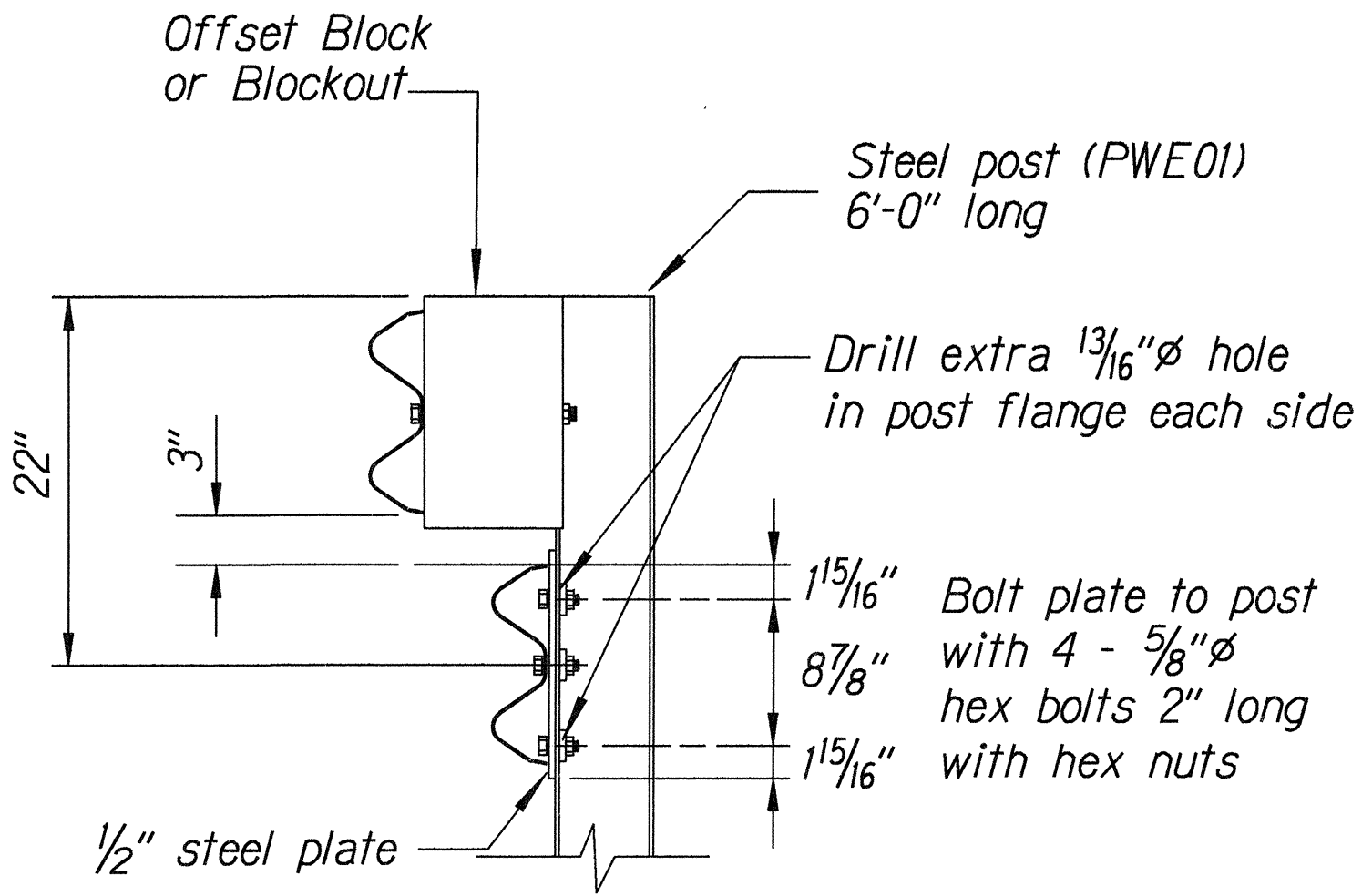


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

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

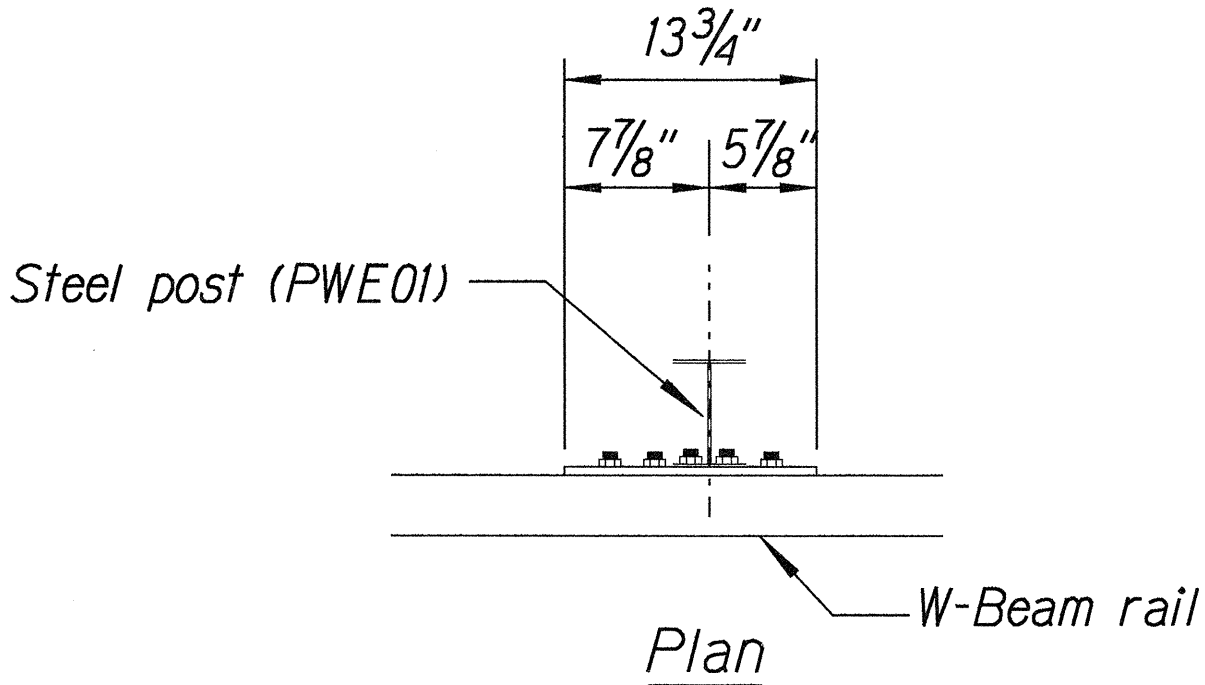


Elevation

RUBRAIL ANCHOR DETAILS

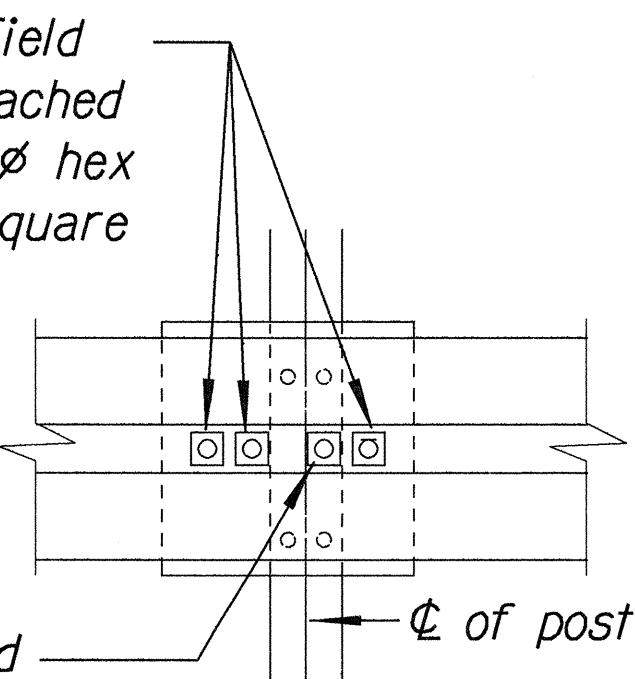
Note:

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.

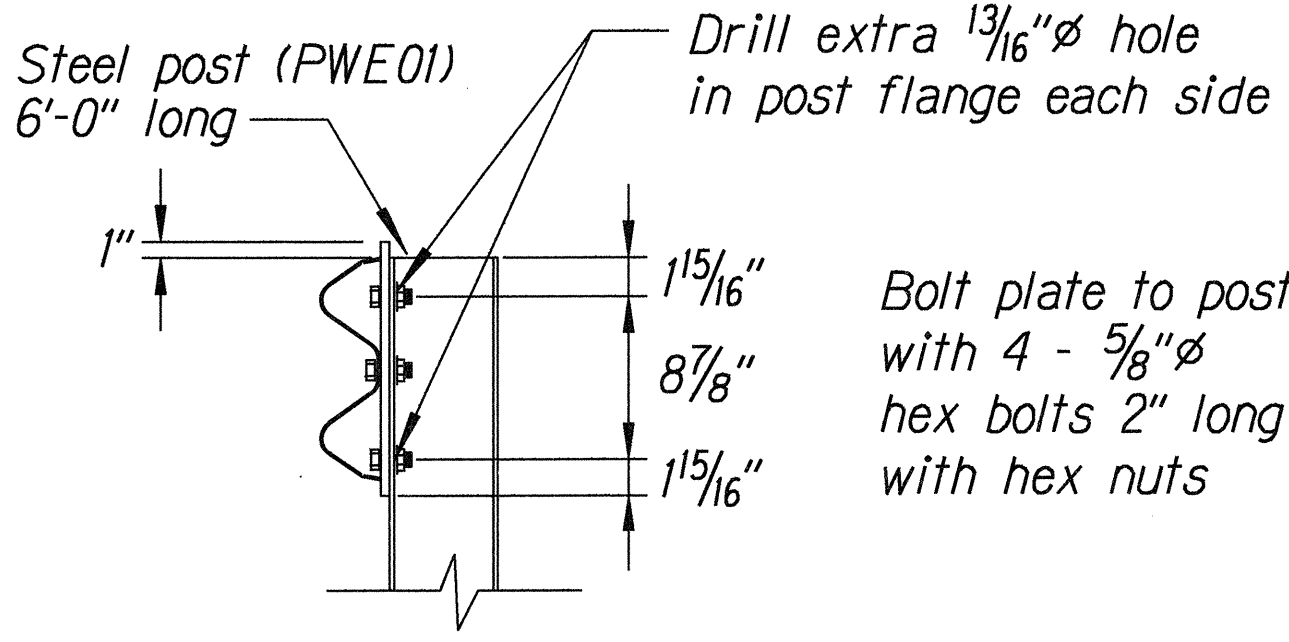


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

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)

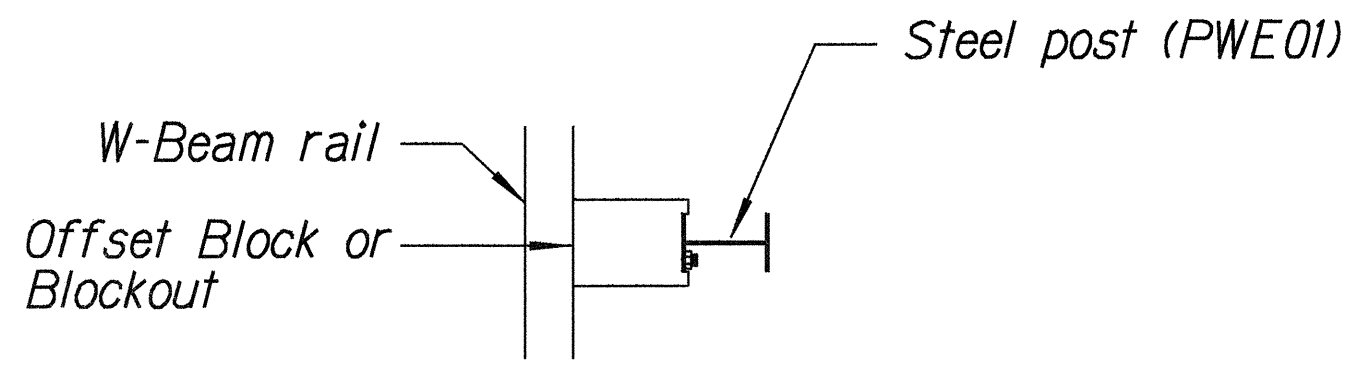
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPE "A" FLARE**  
  
**KUHIO HIGHWAY**  
Intersection Improvements at Kalihiwai Rd.  
Project No. 56D-01-99

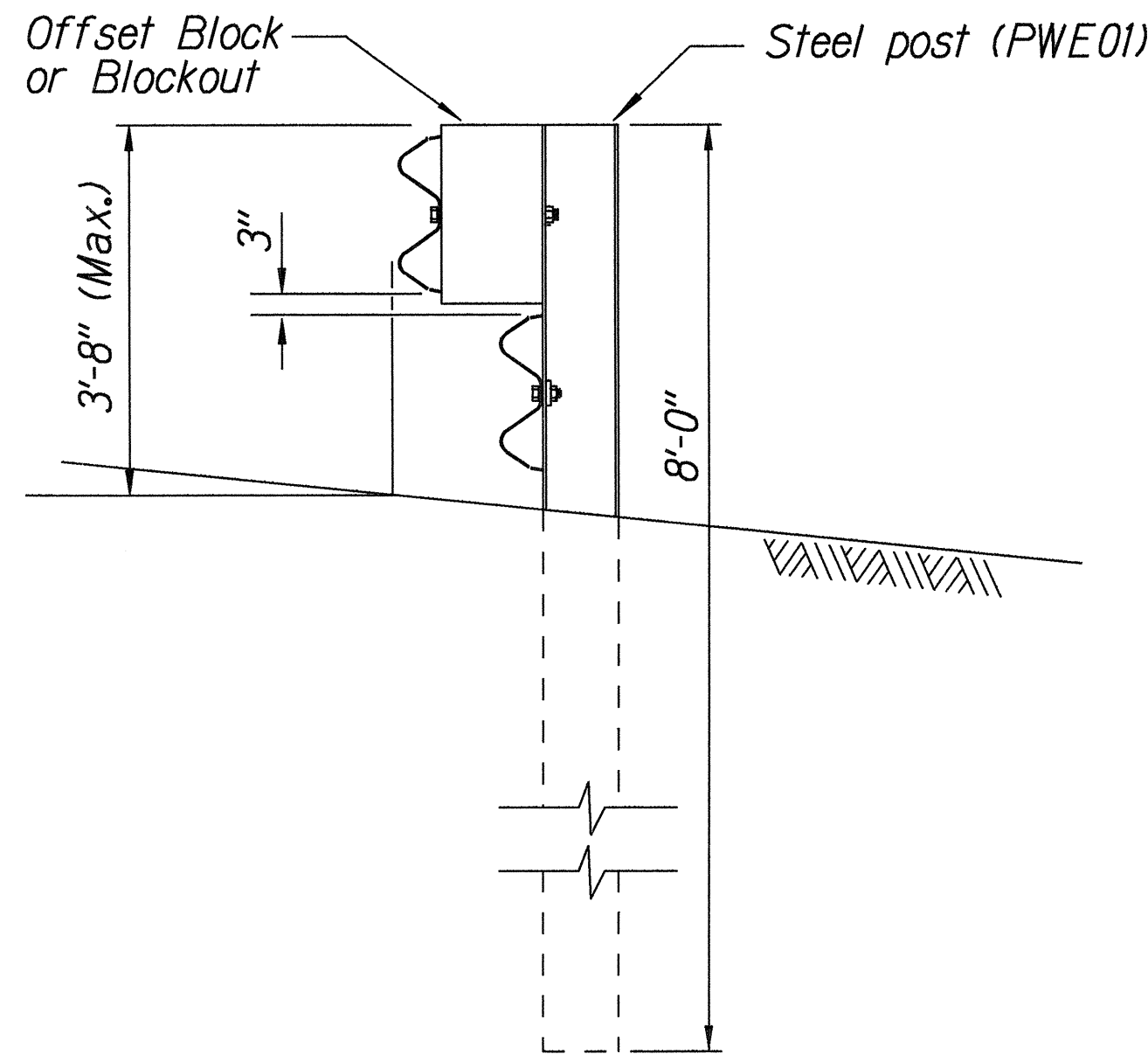
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Date: Aug. 2000

SHEET No. 2 OF 3 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	10	27

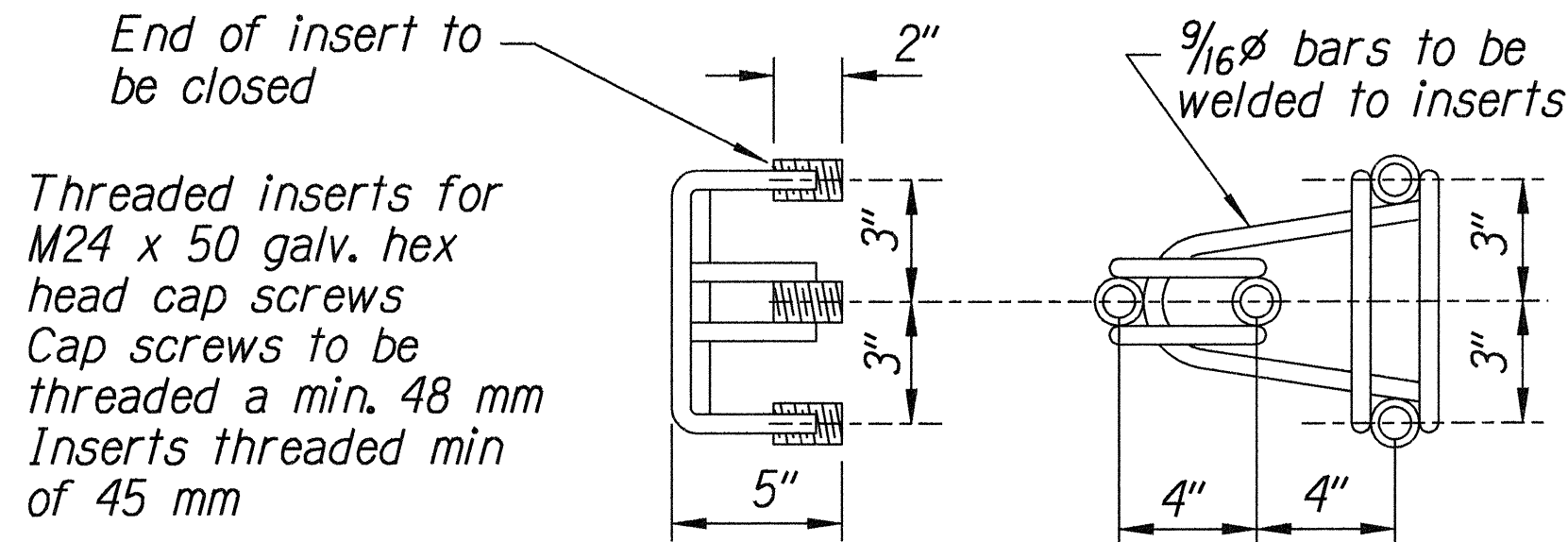


Plan

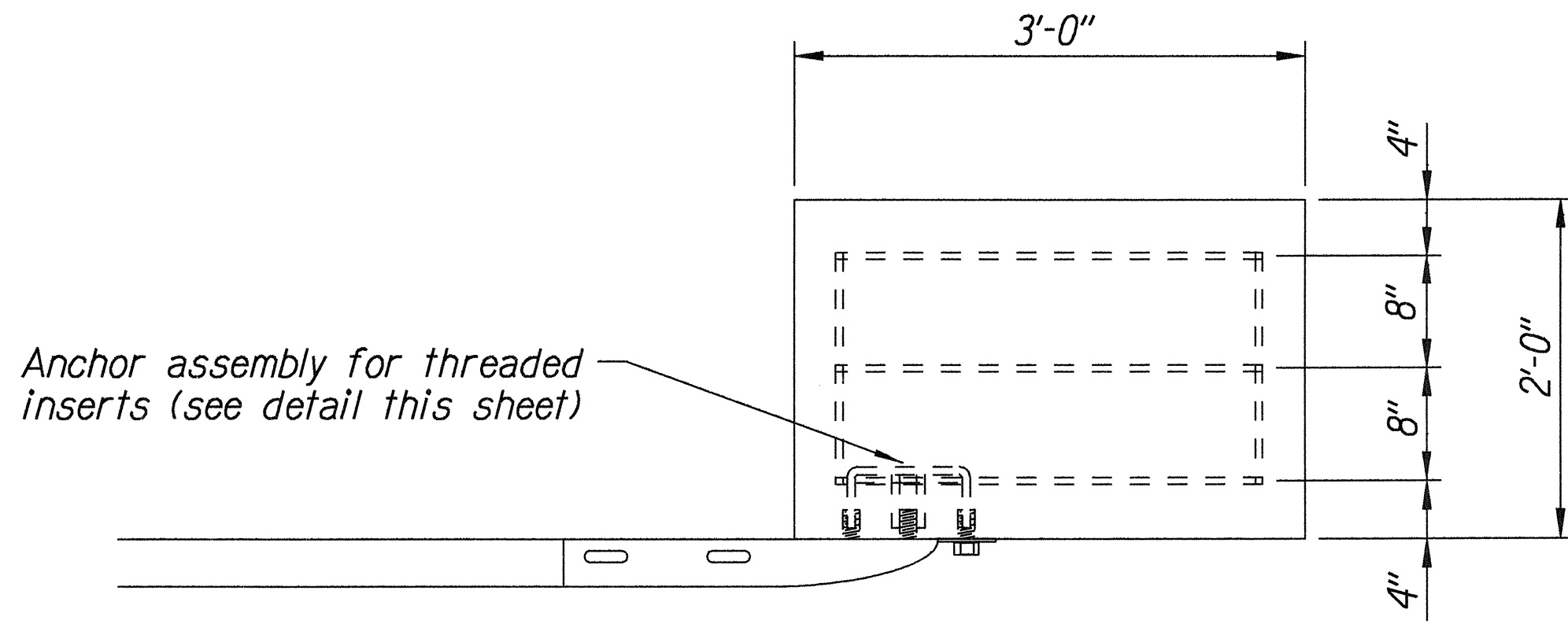


Elevation

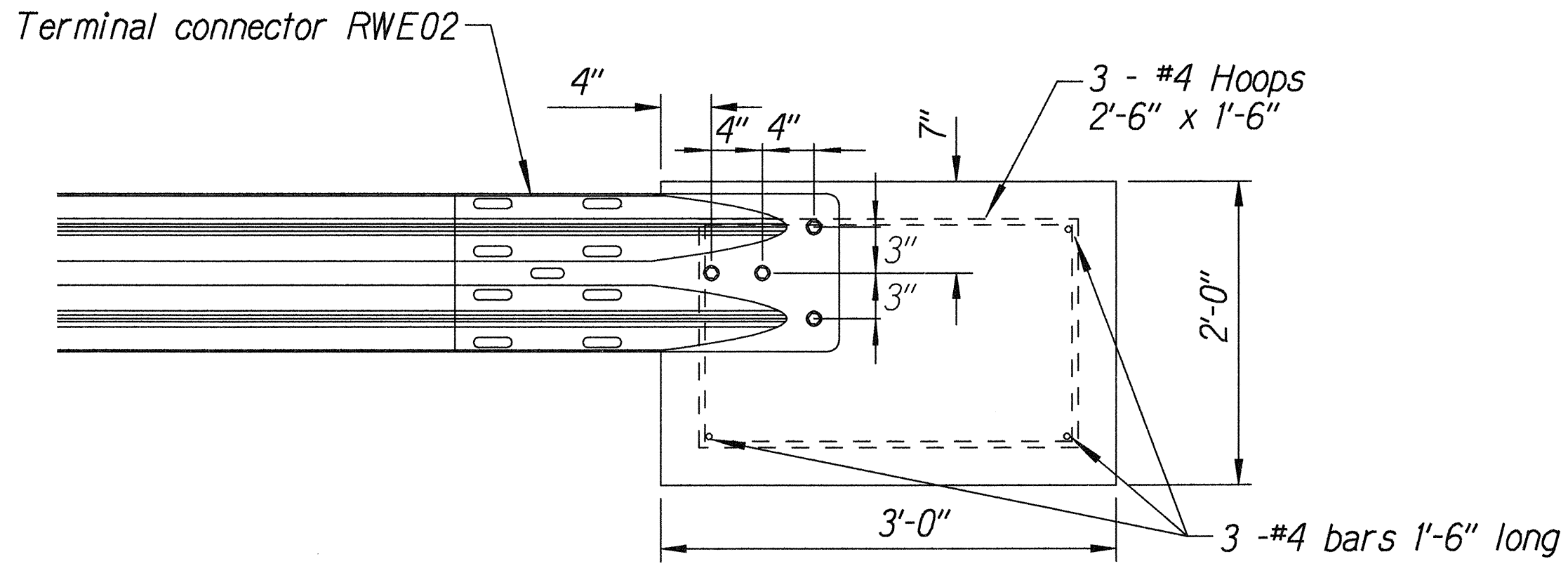
STEEL POST GUARDRAIL  
WITH RUBRAIL



ANCHOR ASSEMBLY  
CONCRETE BLOCK ANCHOR



Plan



Elevation

CONCRETE BLOCK ANCHOR  
(2' X 2' X 3')

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

Note:

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ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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04/01/01		

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPE "A" FLARE**

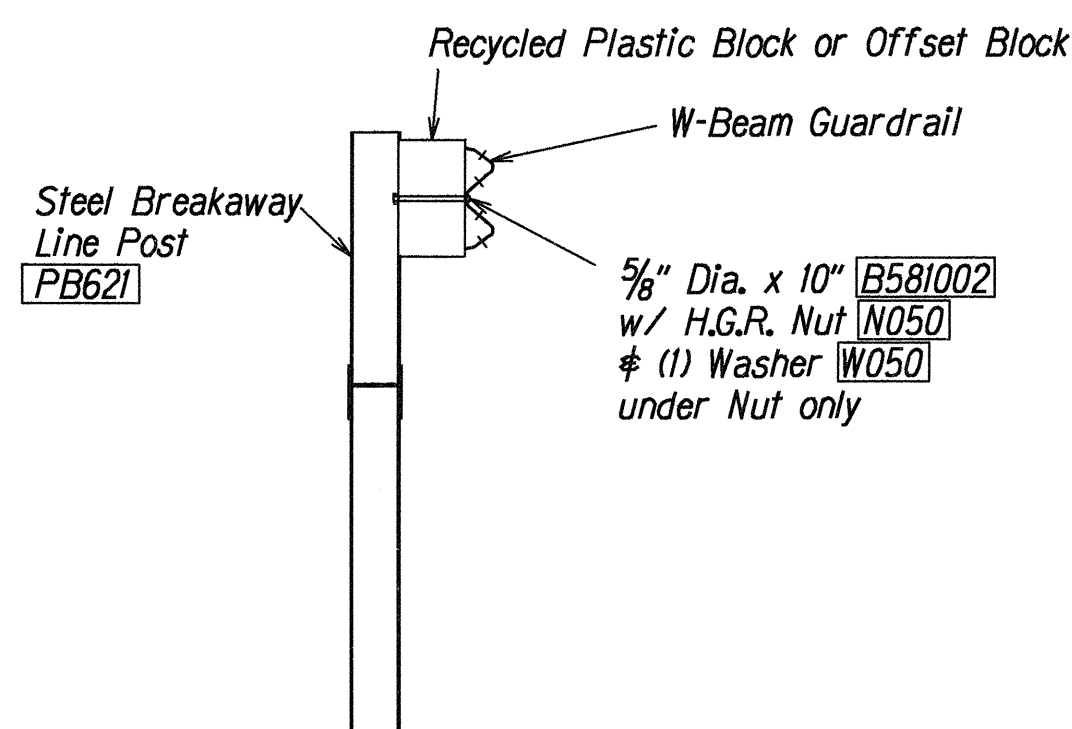
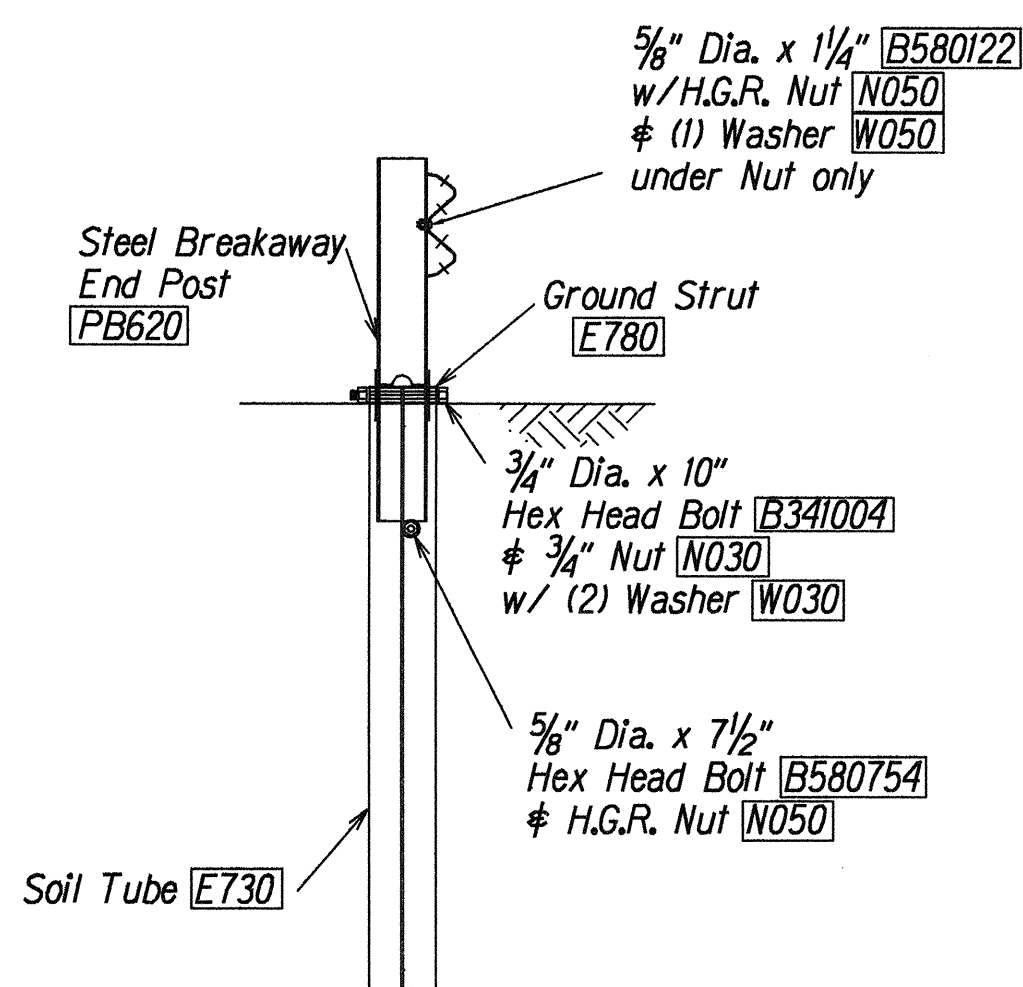
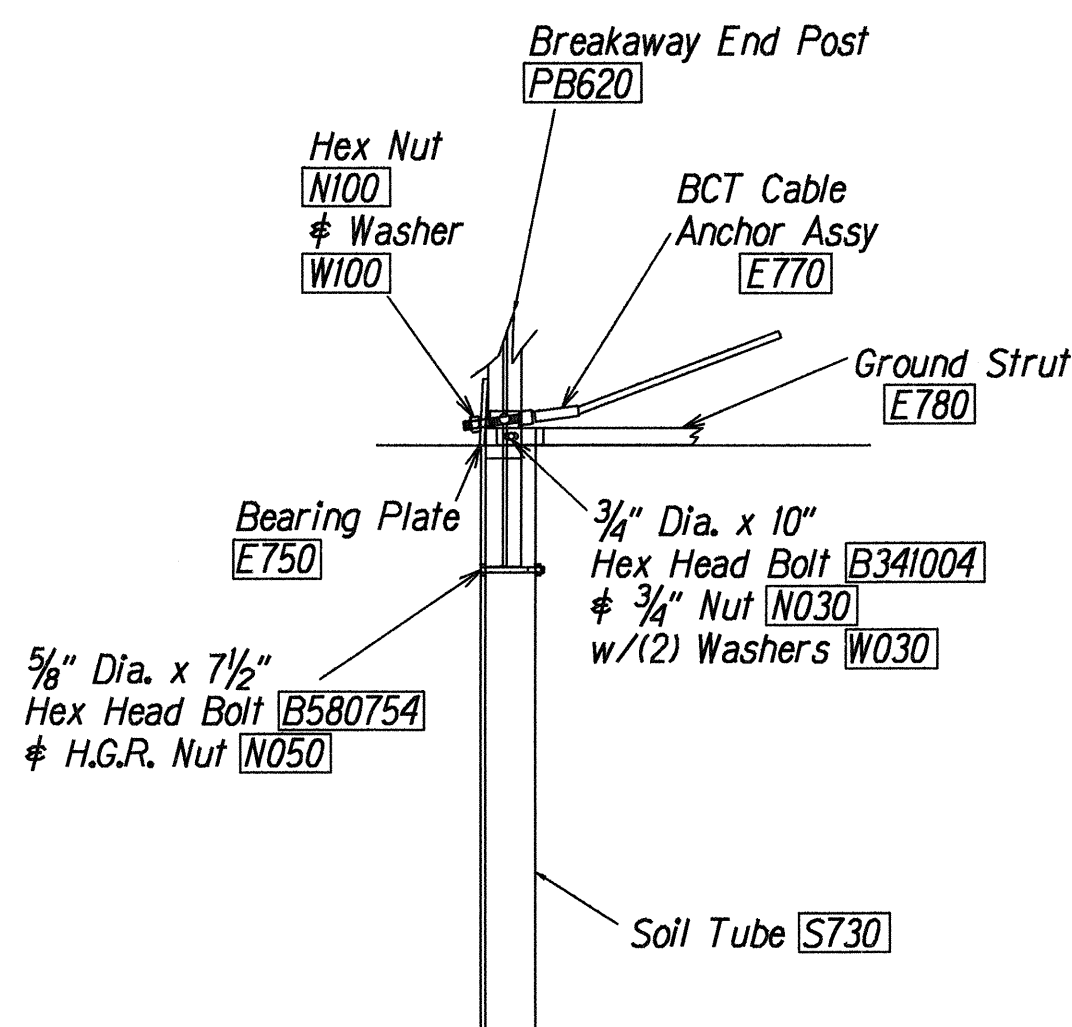
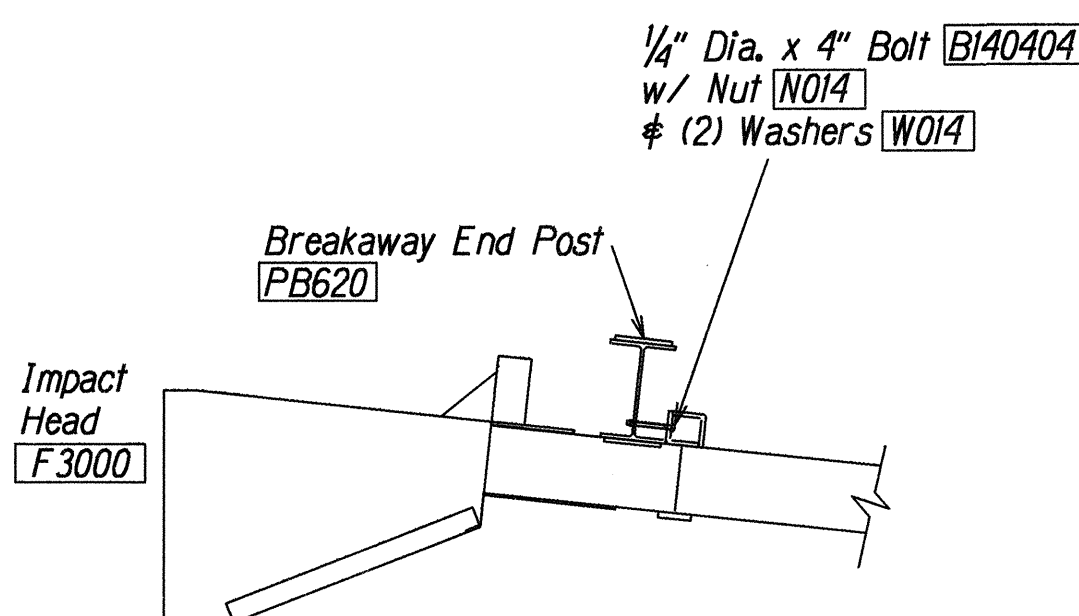
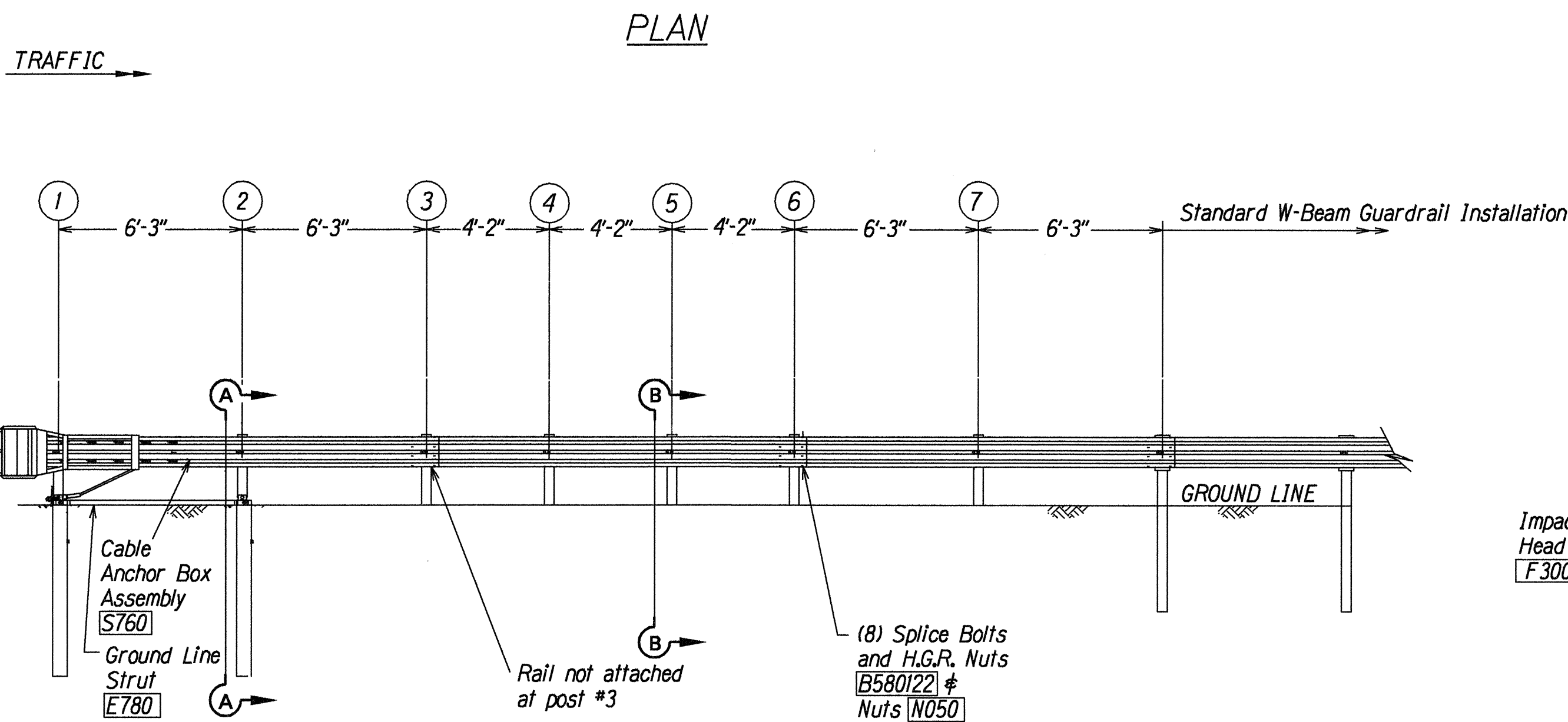
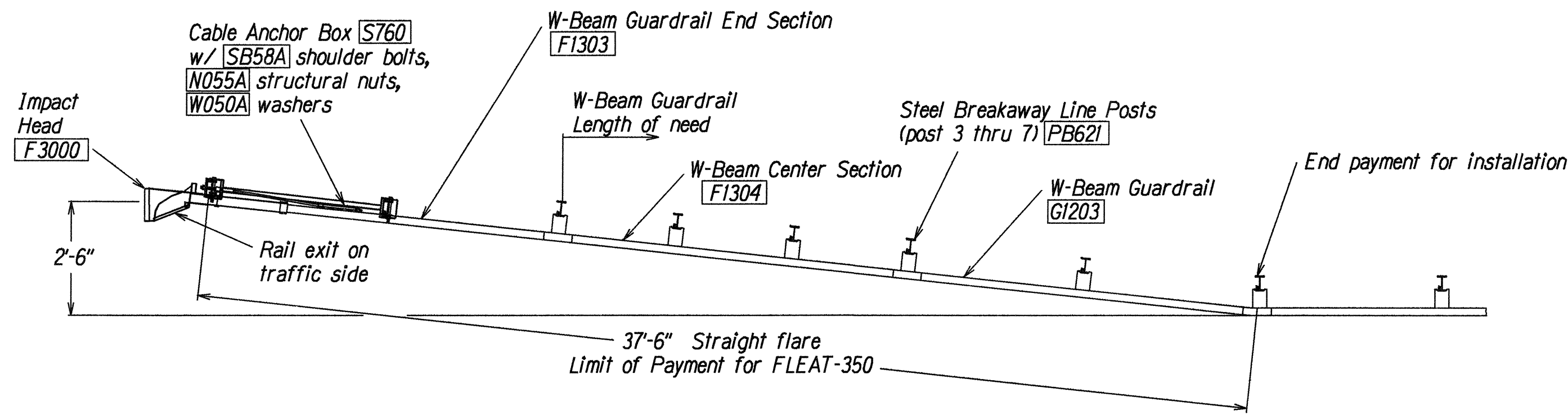
KUHIO HIGHWAY  
Intersection Improvements at Kalihiwai Rd.  
Project No. 56D-01-99

Scale: NTS Date: Aug. 2000

SHEET No. 3 OF 3 SHEETS



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56D-01-99	2001	11	27



SECTION B-B  
(Typical @ Post 3 - 7)  
NOTE: RAIL NOT BOLTED @ POST #3

#### GENERAL NOTES

- Breakaway posts are required with the FLEAT Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- 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.
- The soil tubes may be driven with an approved driving head. Soil tubes should 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.
- 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.
- 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.

ITEM NO.	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
G1203	1	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
HARDWARE		
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, 6)
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 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

ORIGINAL PLAN	DATE
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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**FLEAT-350**  
**FLARED ENERGY ABSORBING TERMINAL**  
**KUHIO HIGHWAY**  
**Intersection Improvements at Kalihiwai Rd.**  
**Project No. 56D-01-99**  
Not to Scale Date: Aug. 2000  
SHEET No. 1 OF 1 SHEETS