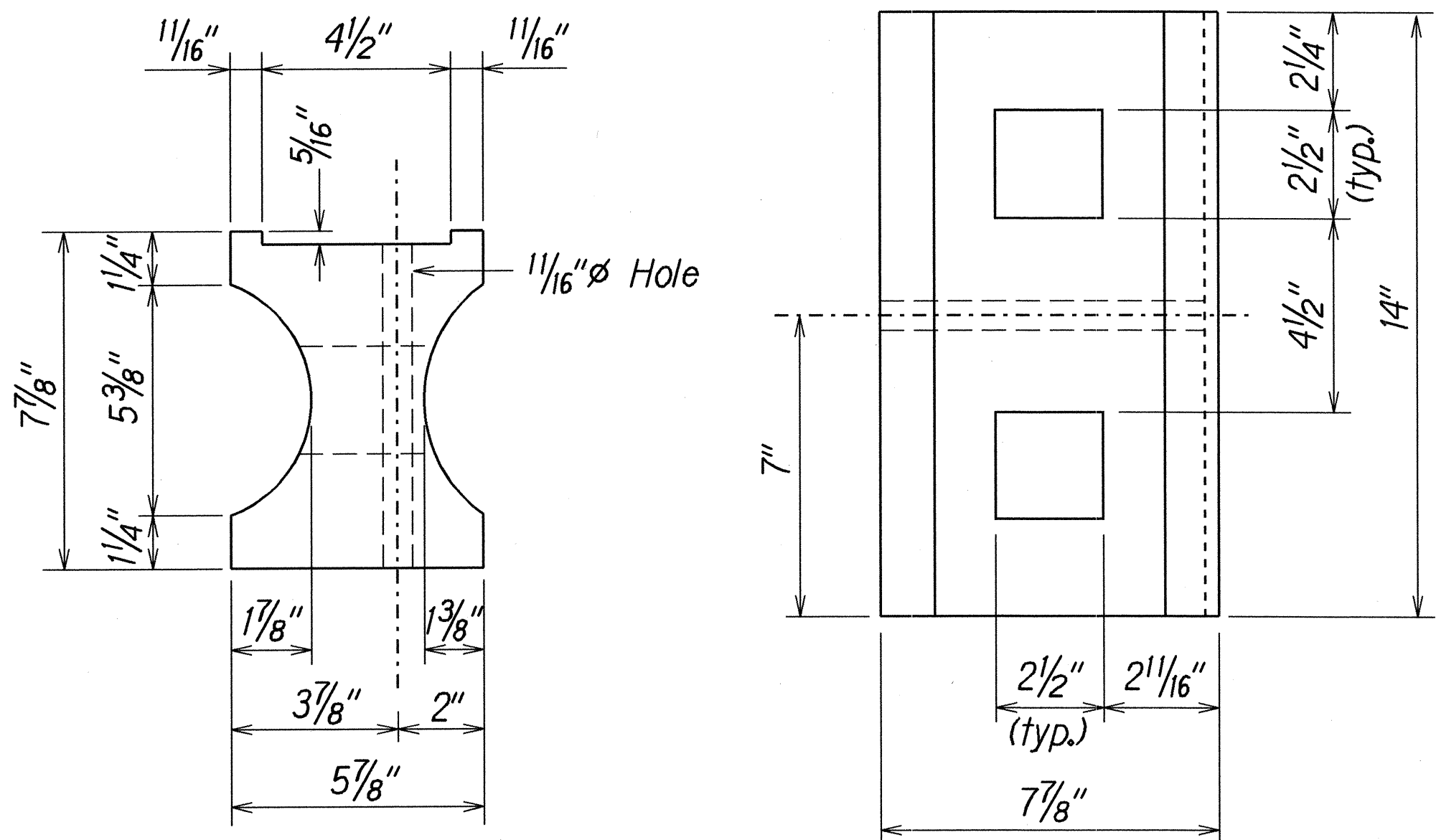


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	13	18

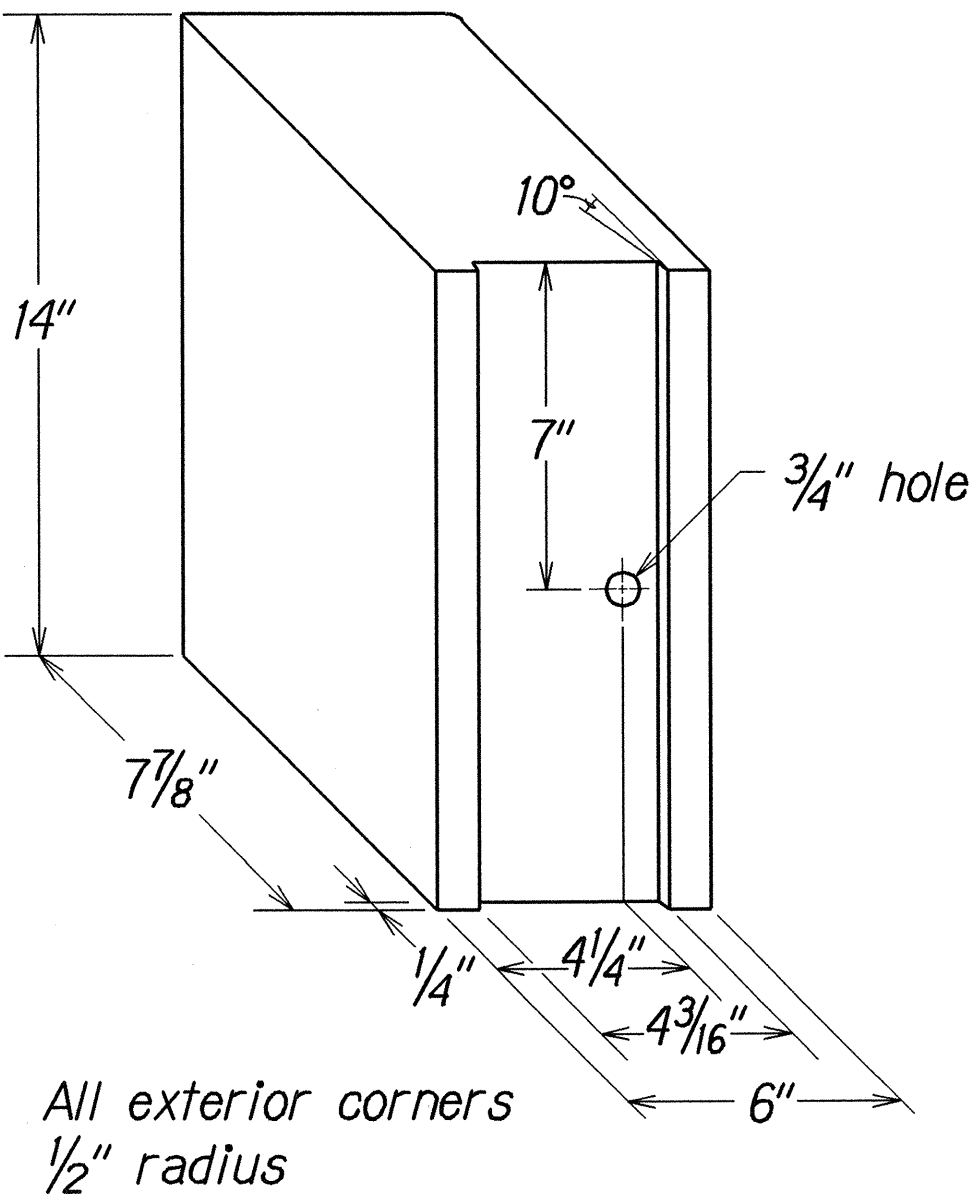
GENERAL NOTES

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 fastners, 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 tamper 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 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.

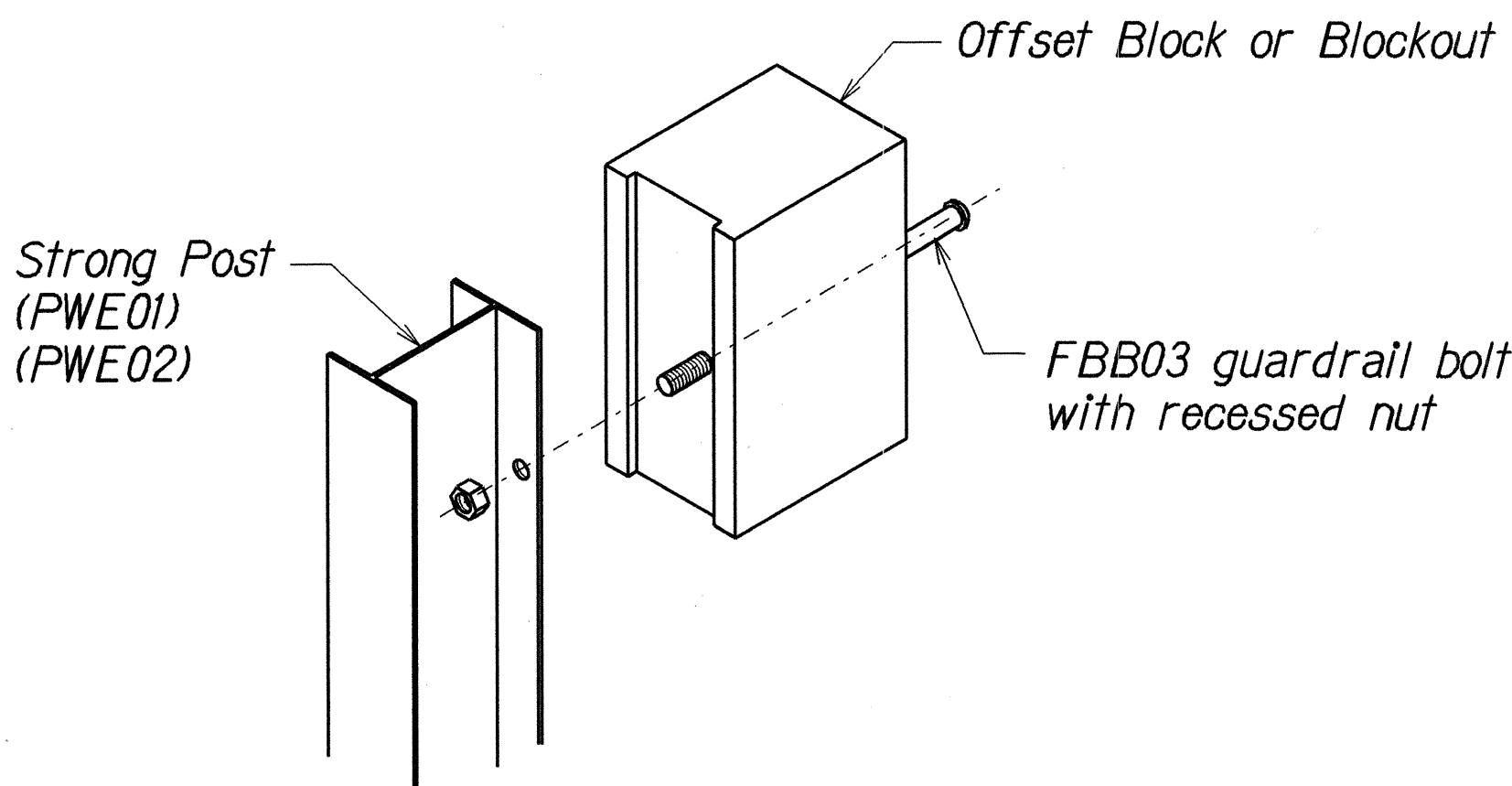
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post w/W Beam	1'-9 <sup>5</sup> / <sub>8</sub> "	1'-6"
Rubrail	2'-0"	1'-6"
Modified Thrie Beam	2'-0"	2'-0"



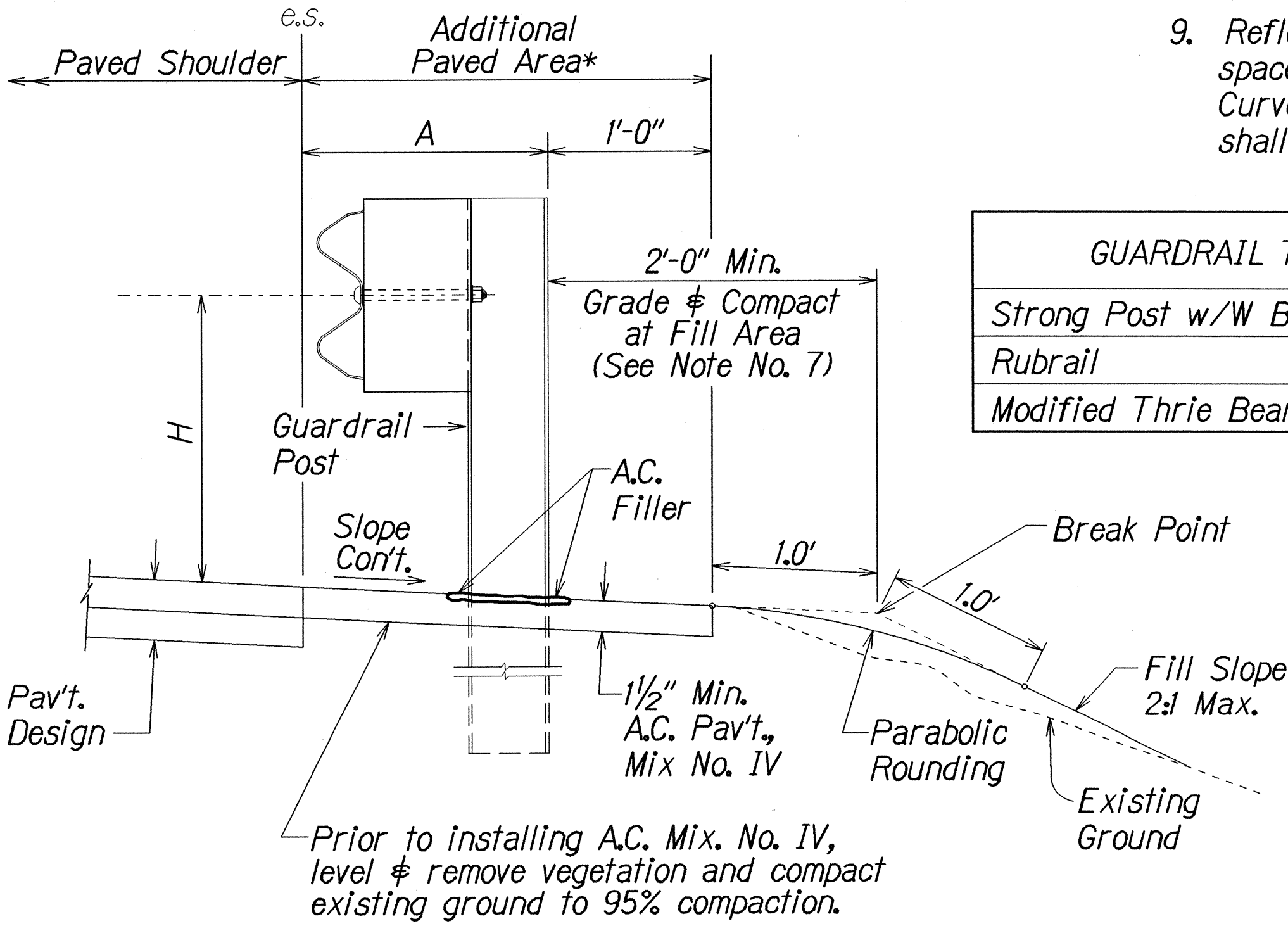
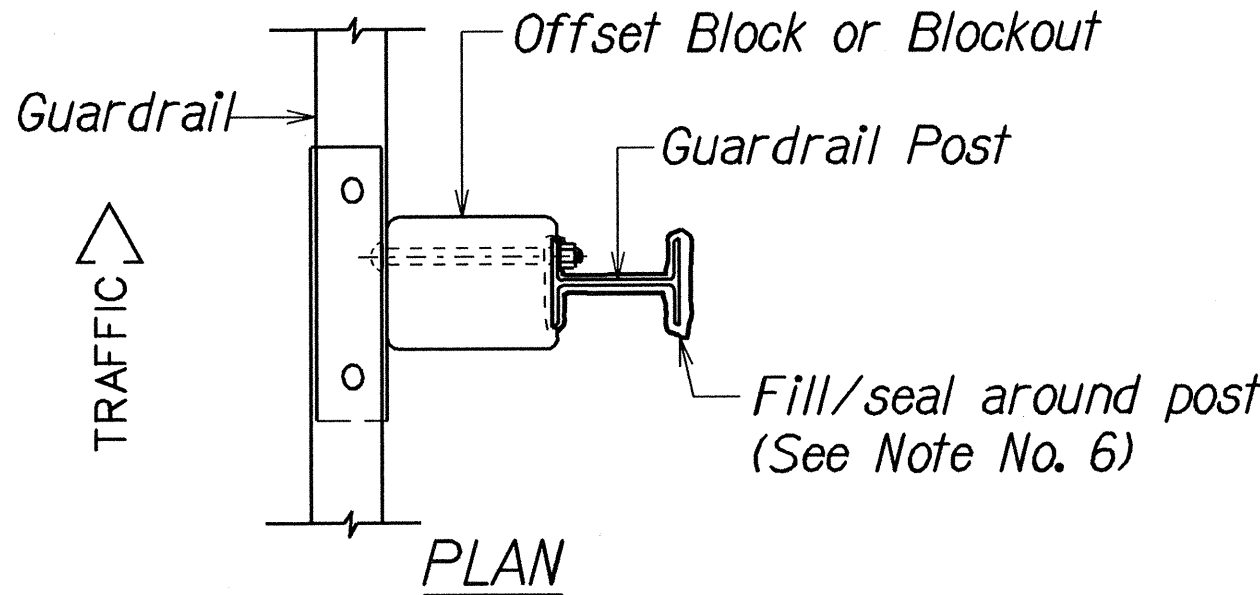
TOP  
SIDE  
RECYCLED PLASTIC BLOCKOUT (TYPE I)



RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)

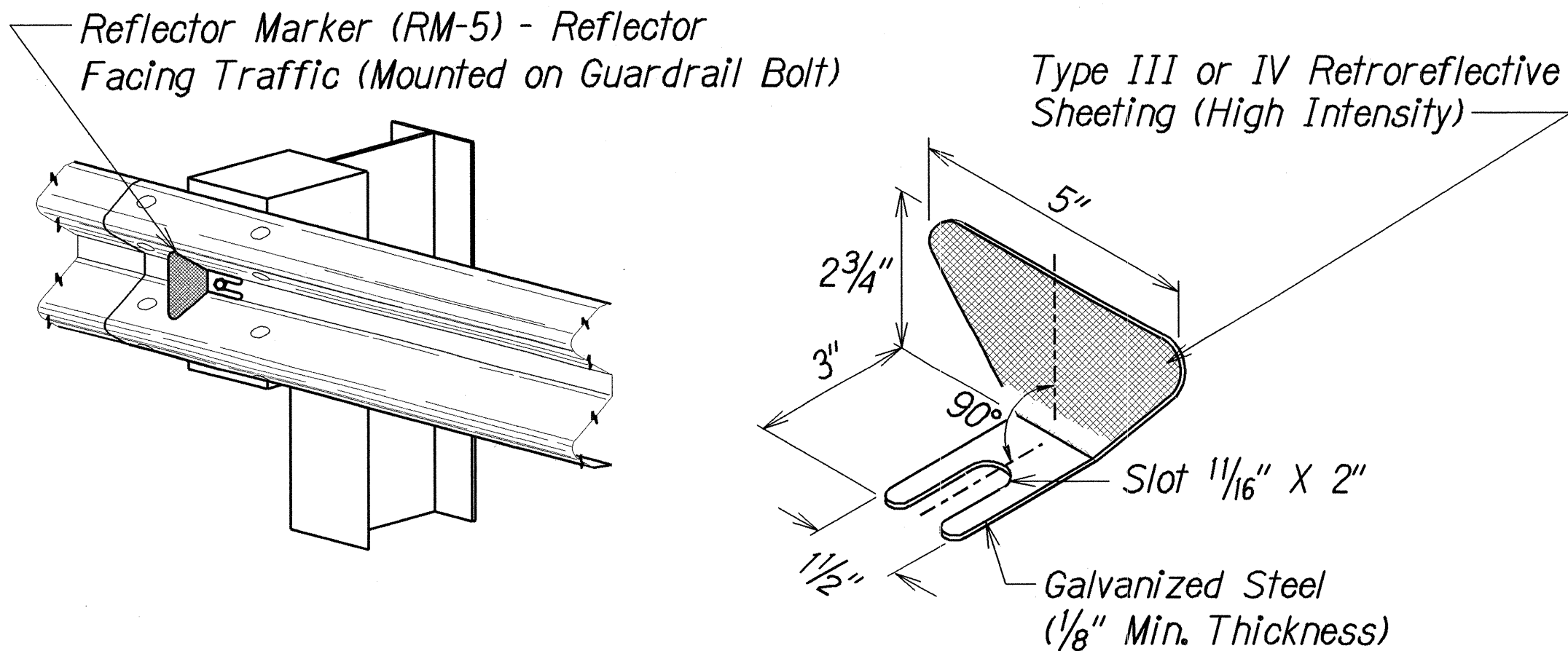


Exploded View  
(Rail and washer not shown)  
STEEL POST AND BLOCK DETAIL



ELEVATION

TYPICAL GUARDRAIL INSTALLATION



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS & NOTES**  
QUEEN KAAHUMANU HIGHWAY  
DRAINAGE IMPROVEMENTS  
Vicinity of Mauna Kea Beach Hotel  
Federal-Aid Project No. STP-019-1(27)  
Scale: NTS Date: July, 2001

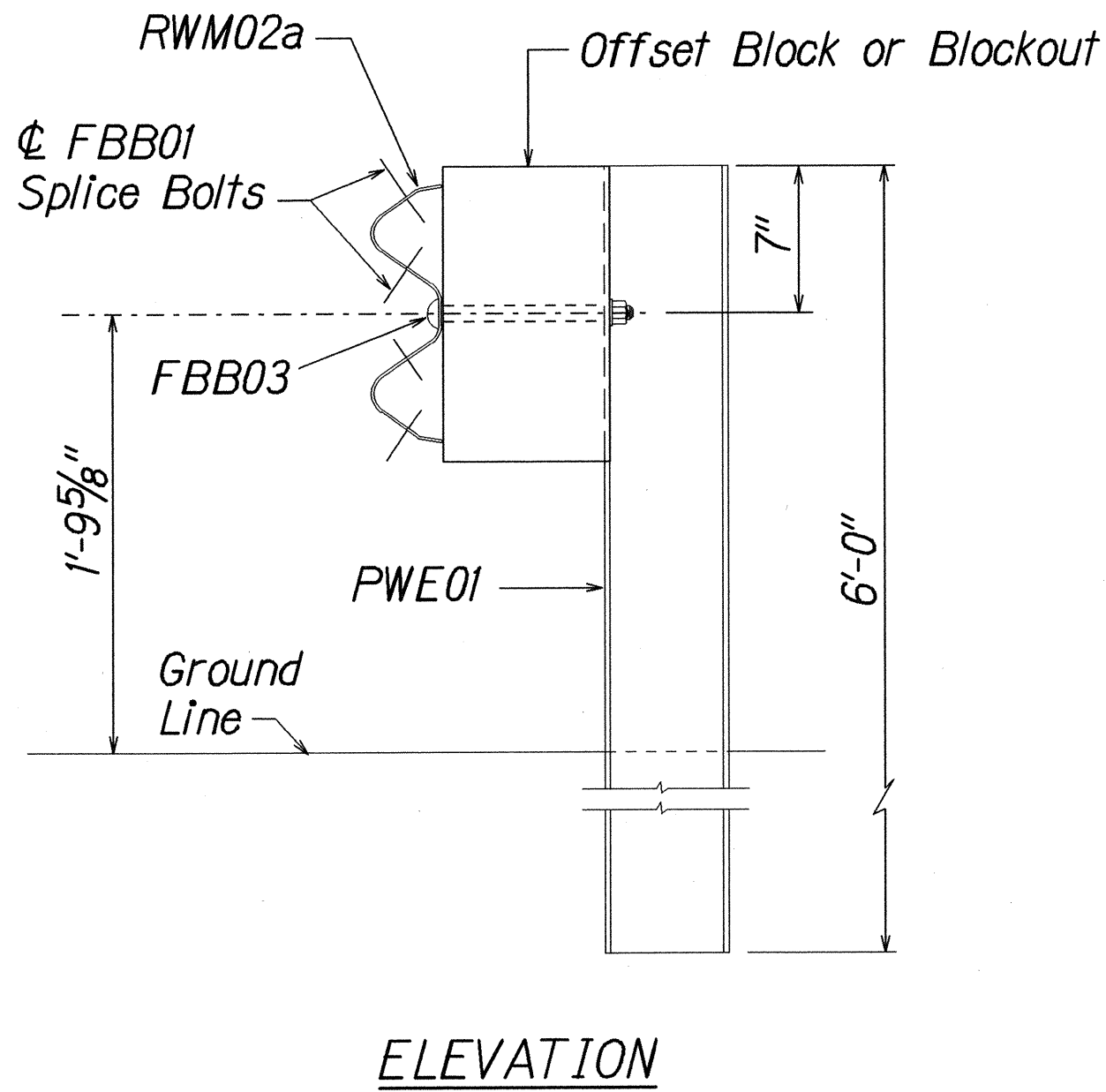
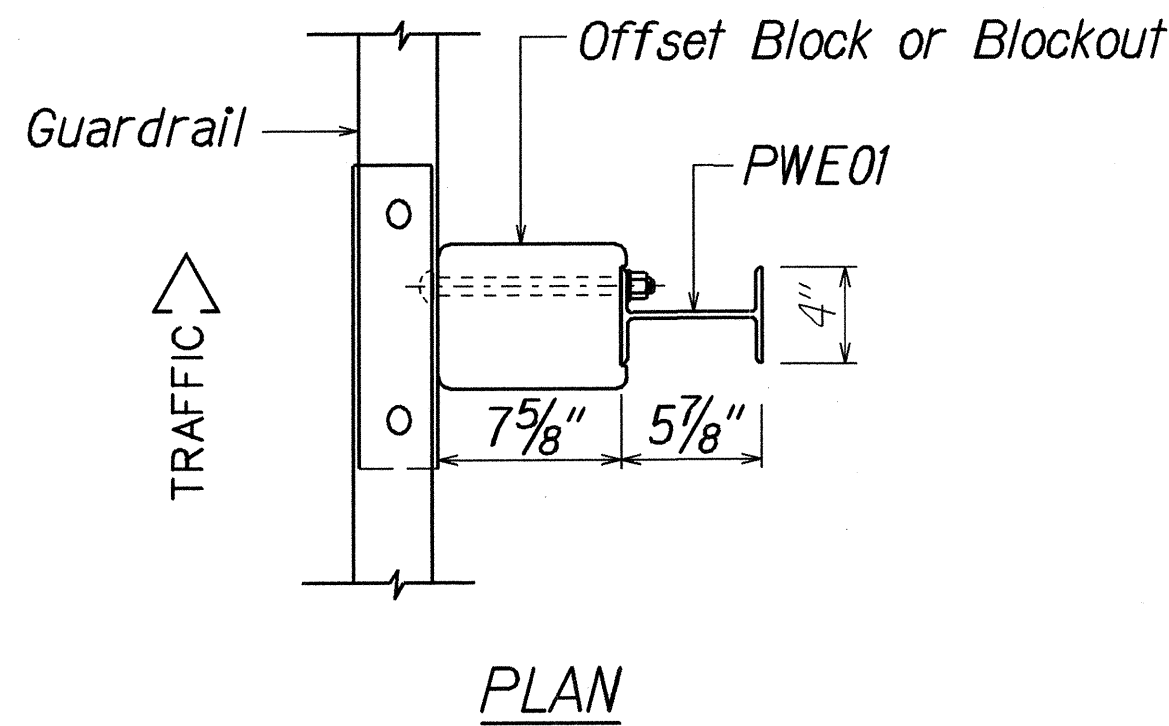
SHEET No. 1 OF 6 SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTE BOOK	
NO.	

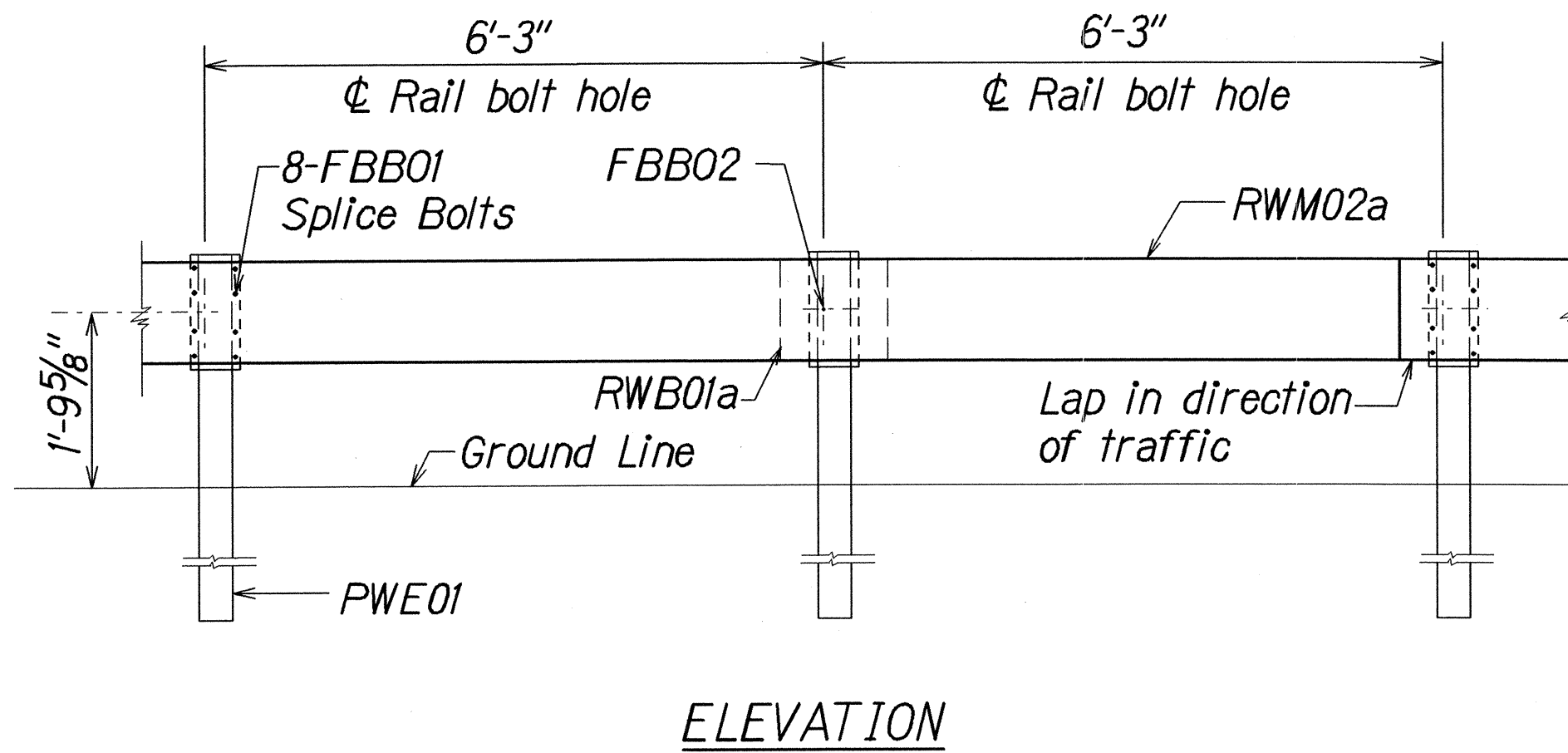
101-rubby/guardrail/rev50rev.dgn (Standard plan TE-50 r03/06/87)

7-3-01-99

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	14	18

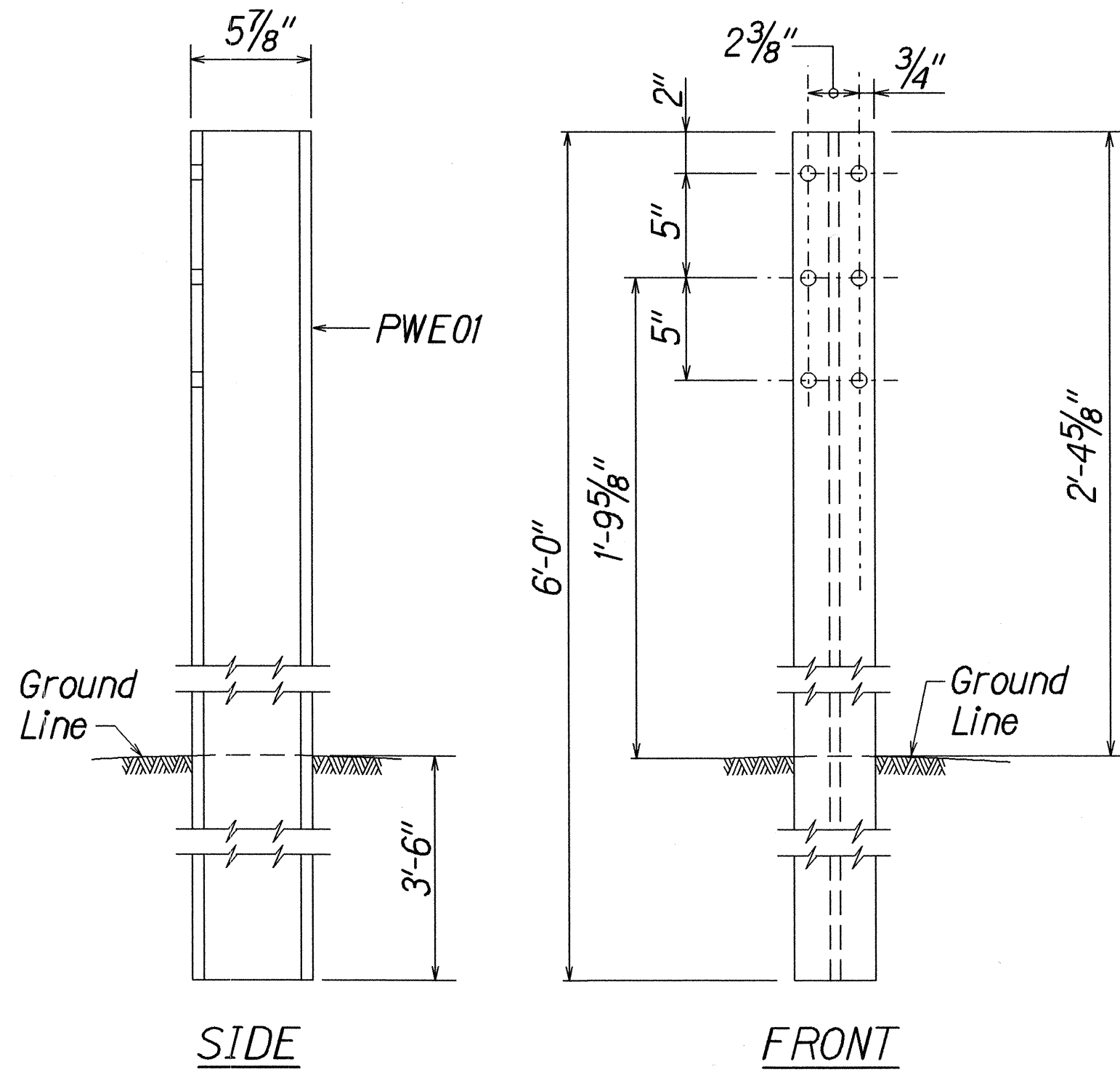


STRONG POST W-BEAM GUARDRAIL  
(SGR04a)

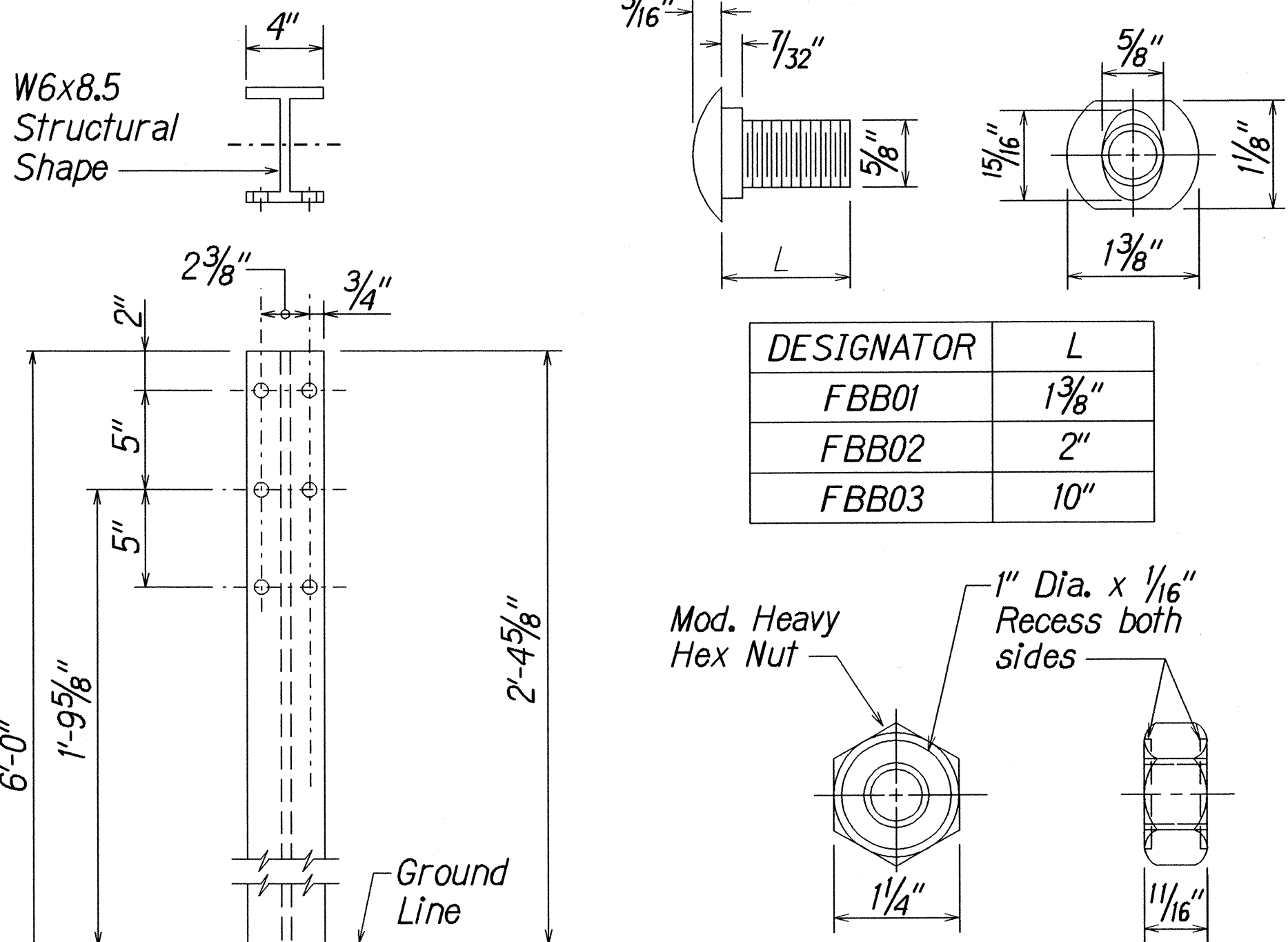


STRONG POST W-BEAM GUARDRAIL WITH  
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

NOTE:  
All Holes are  
3/4" Dia.

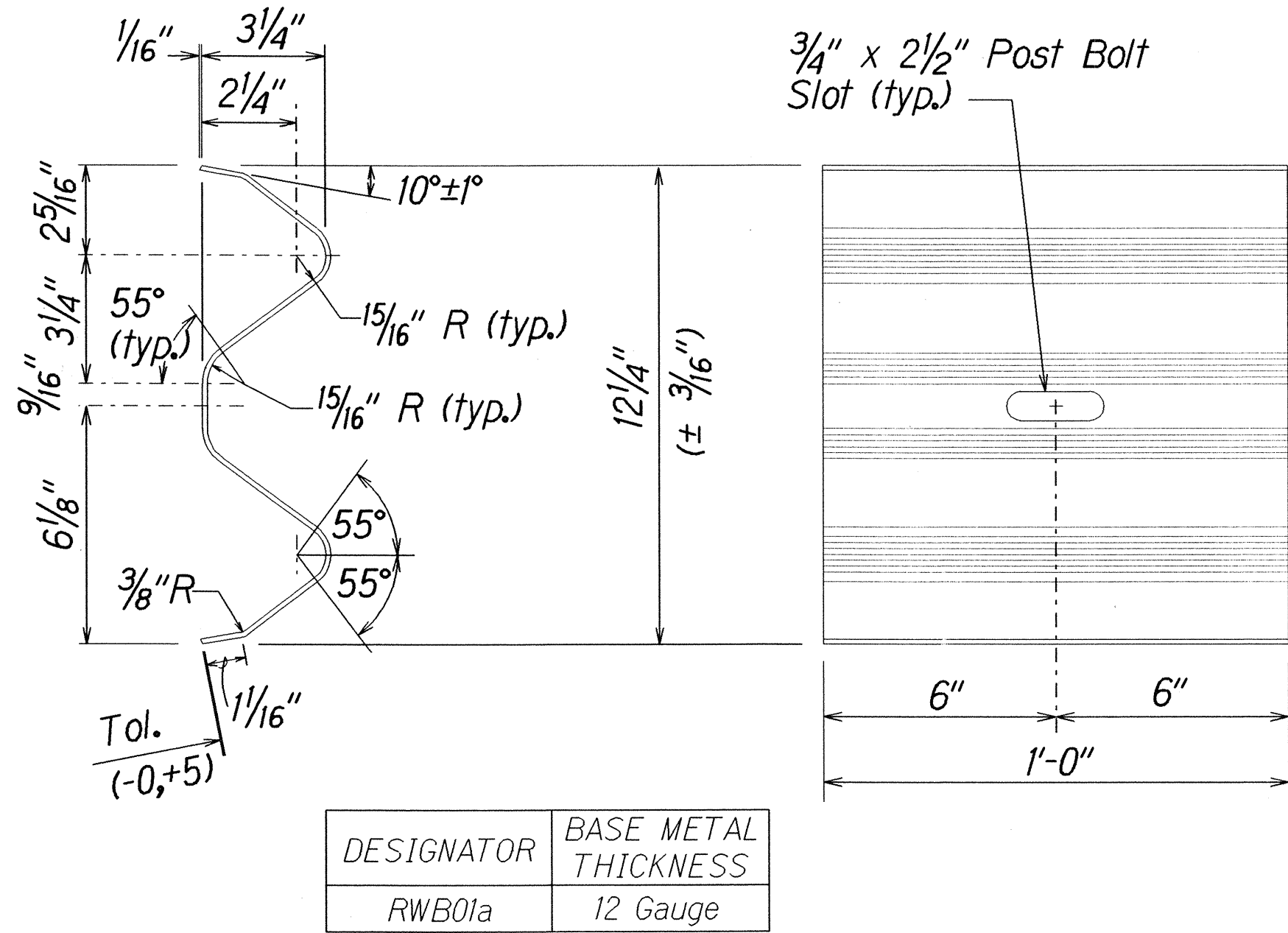


W-BEAM STRONG POST (PWE01)



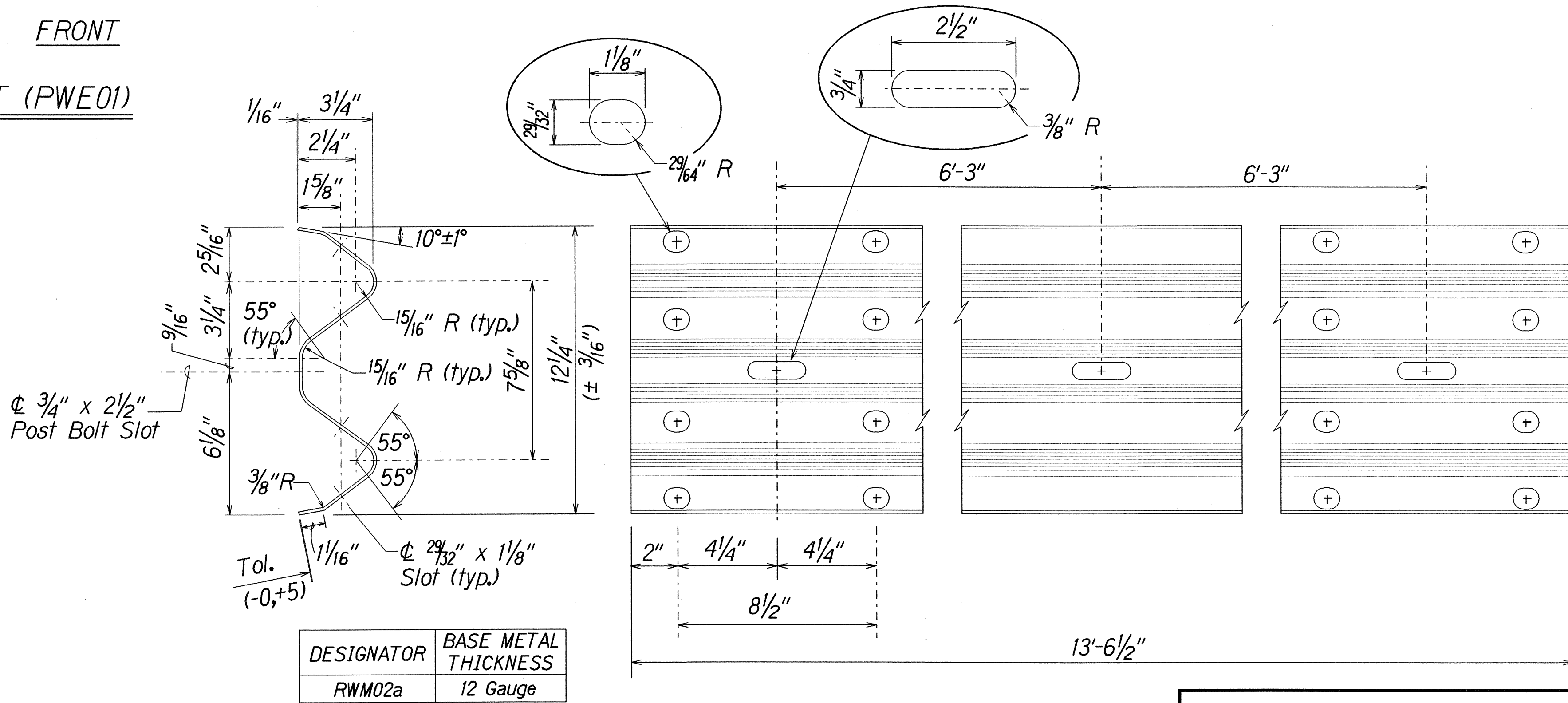
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND  
RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)

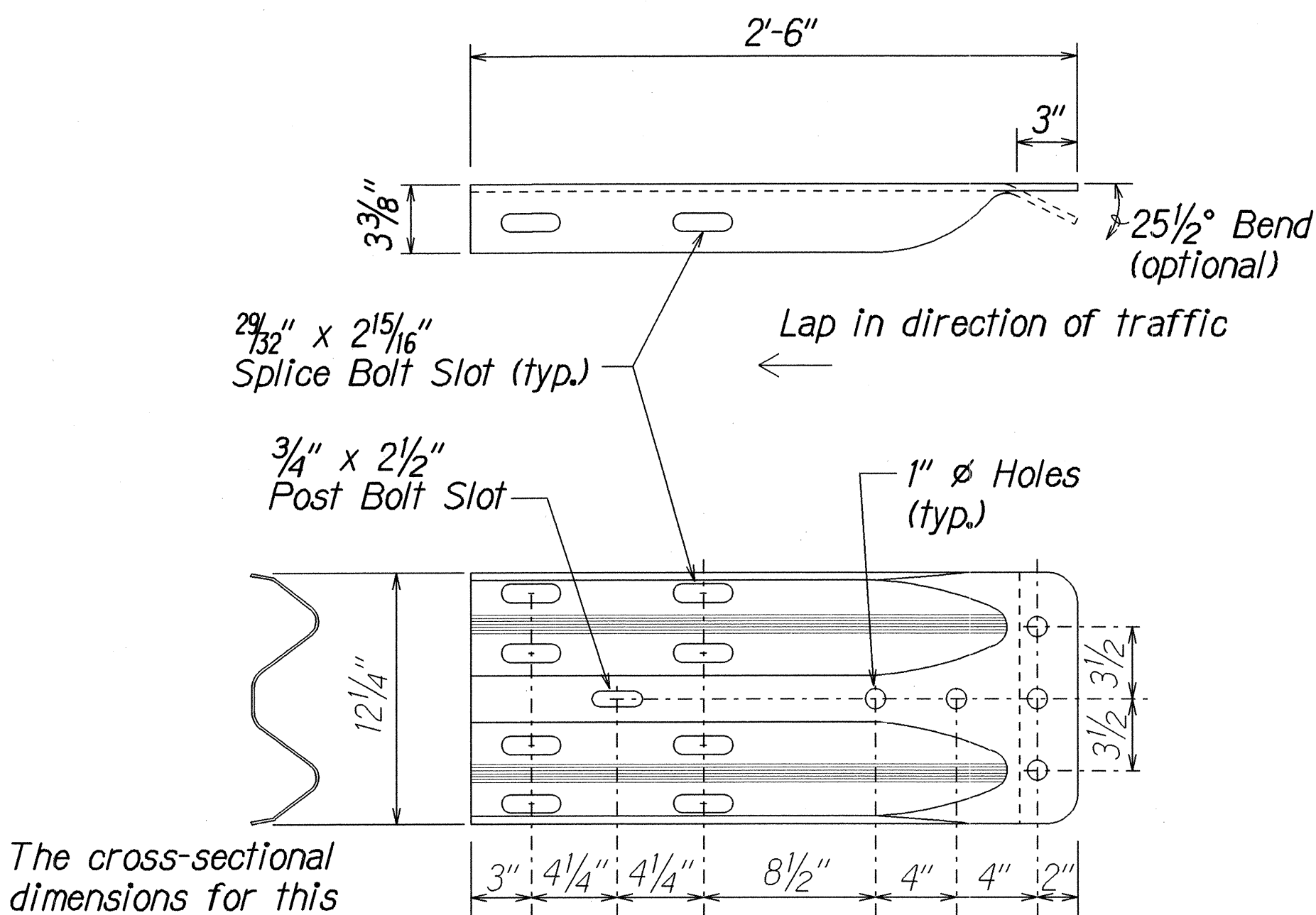
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRONG POST W-BEAM GUARDRAIL**  
**QUEEN KAAHUMANU HIGHWAY**  
**DRAINAGE IMPROVEMENTS**  
**Vicinity of Mauna Kea Beach Hotel**  
**Federal-Aid Project No. STP-019-1(27)**  
Scale: NTS Date: July, 2001

SHEET No. 2 OF 6 SHEETS



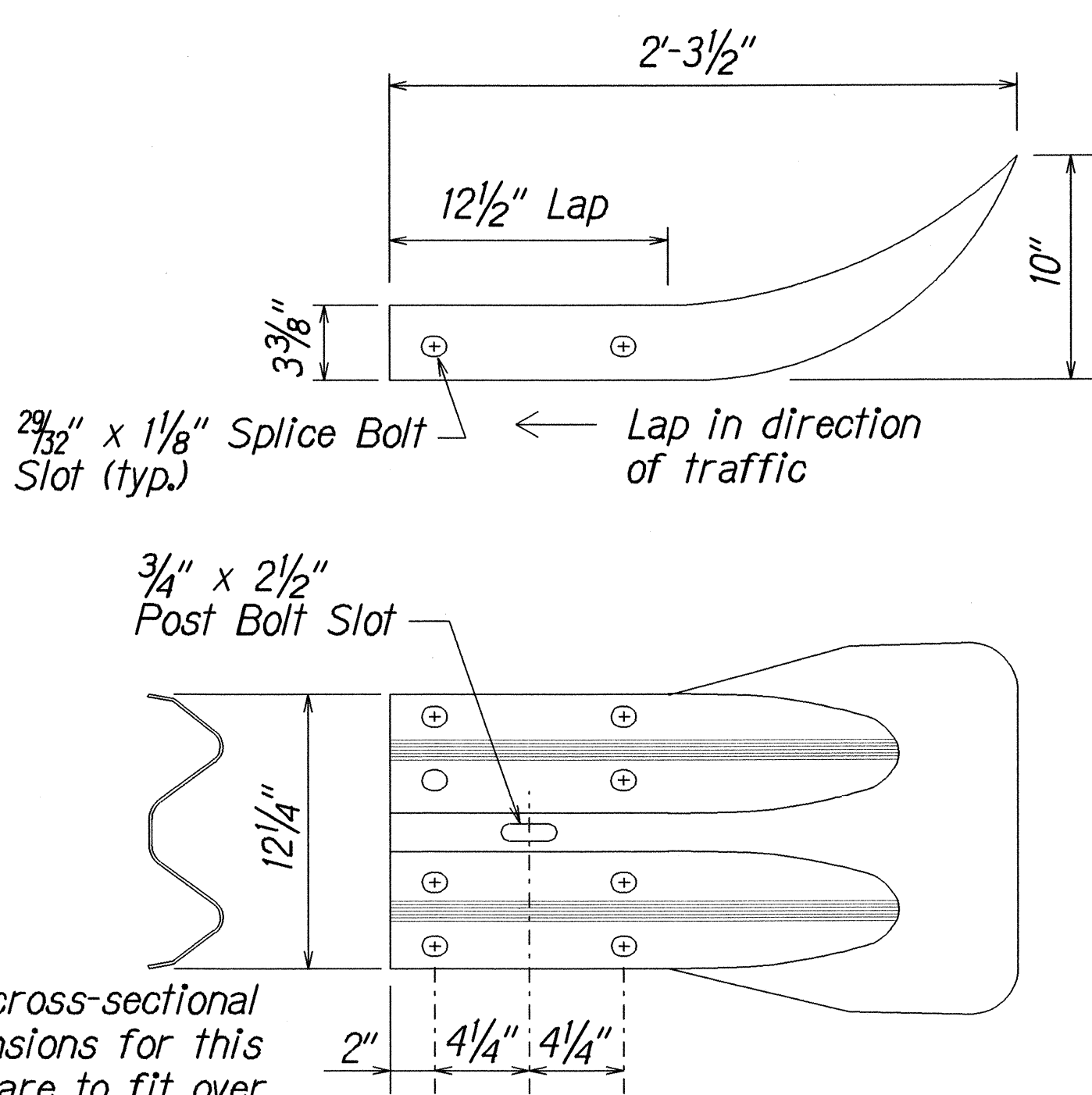
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	15	18



The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

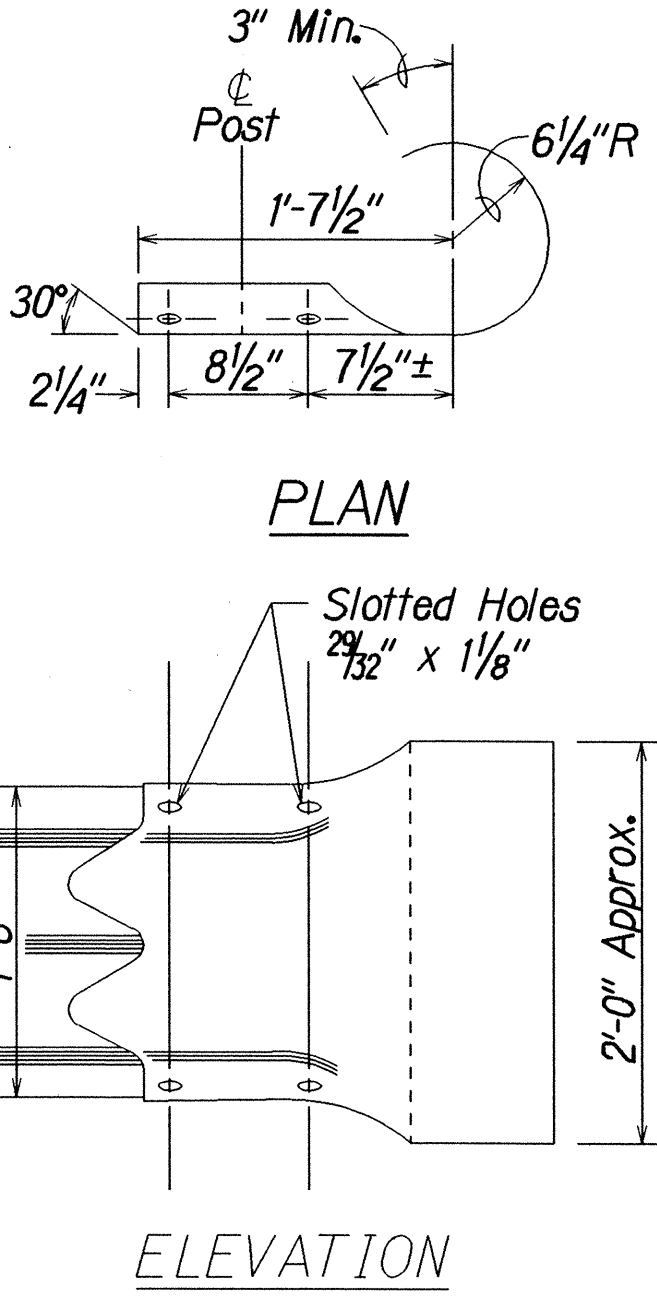
W-BEAM TERMINAL CONNECTOR (RWE02b)



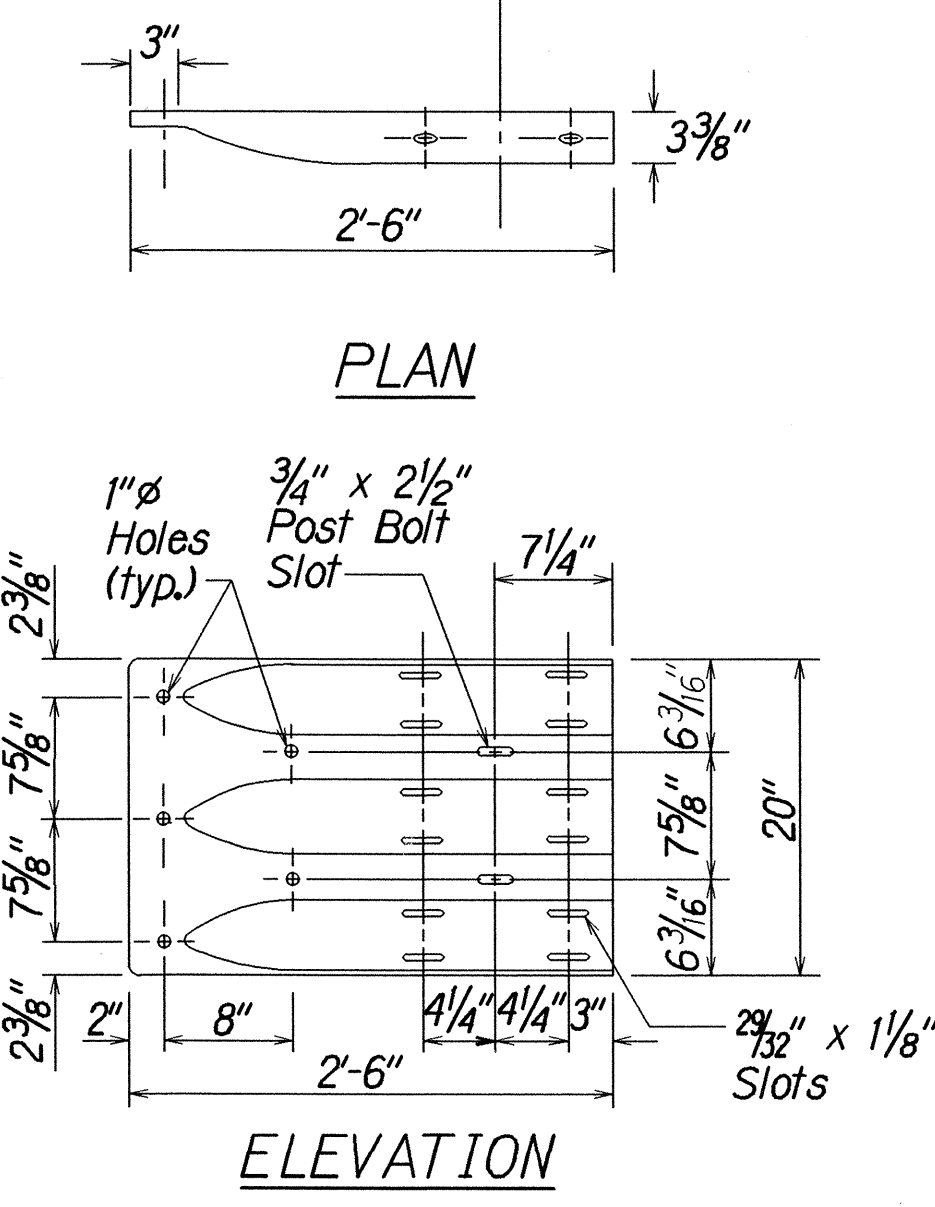
The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)

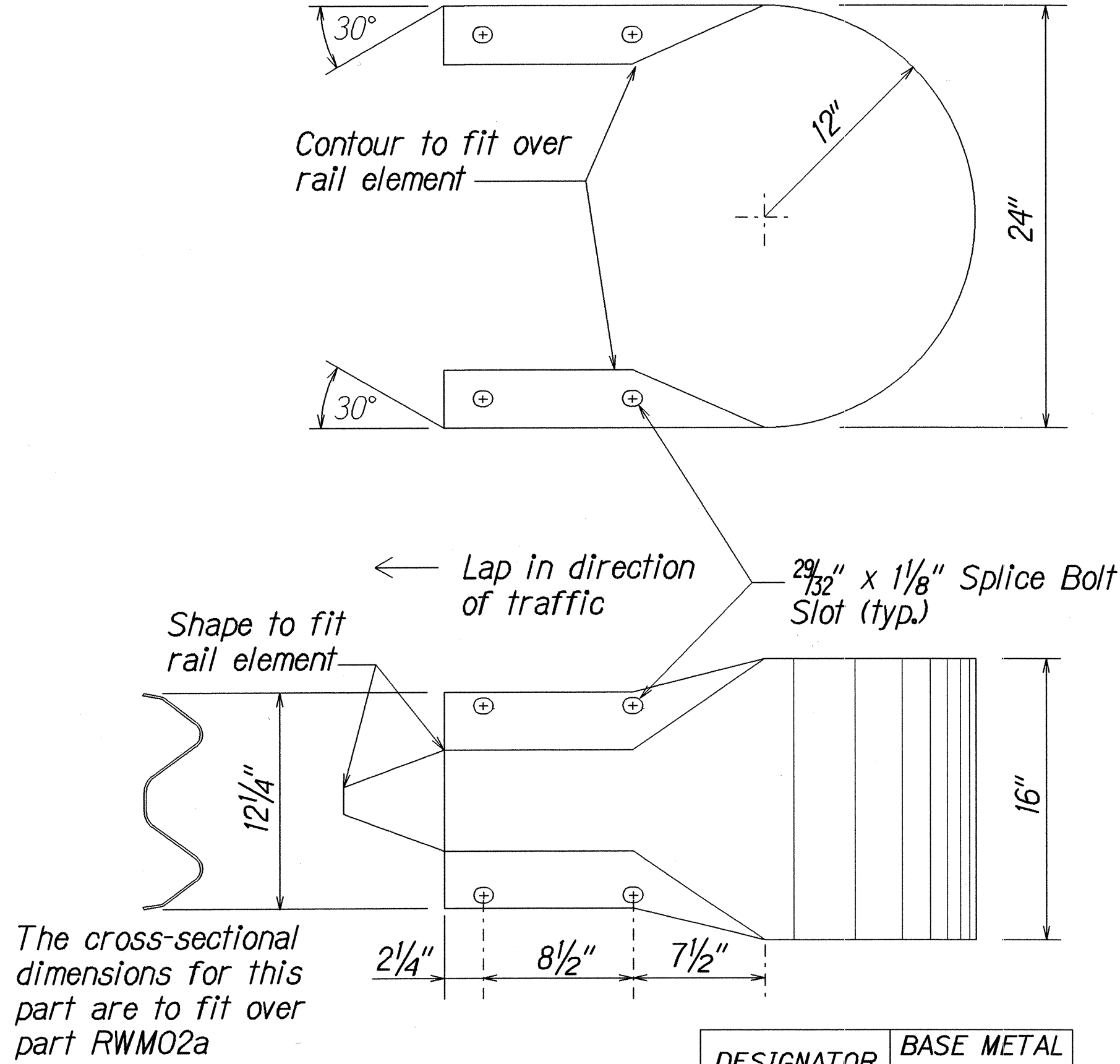


THRIE-BEAM SECTION (ROUNDED) (RTE02b)



DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

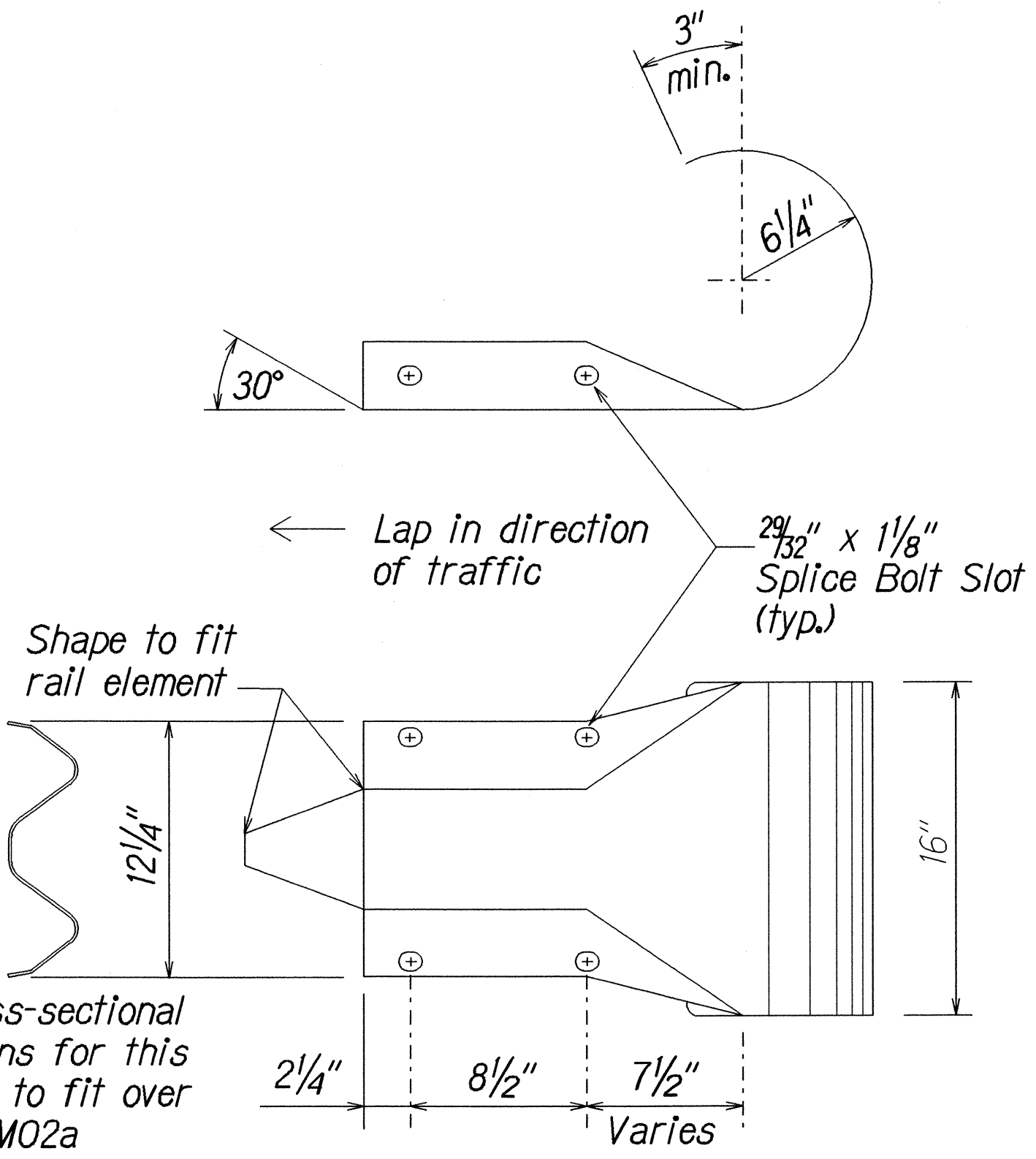
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

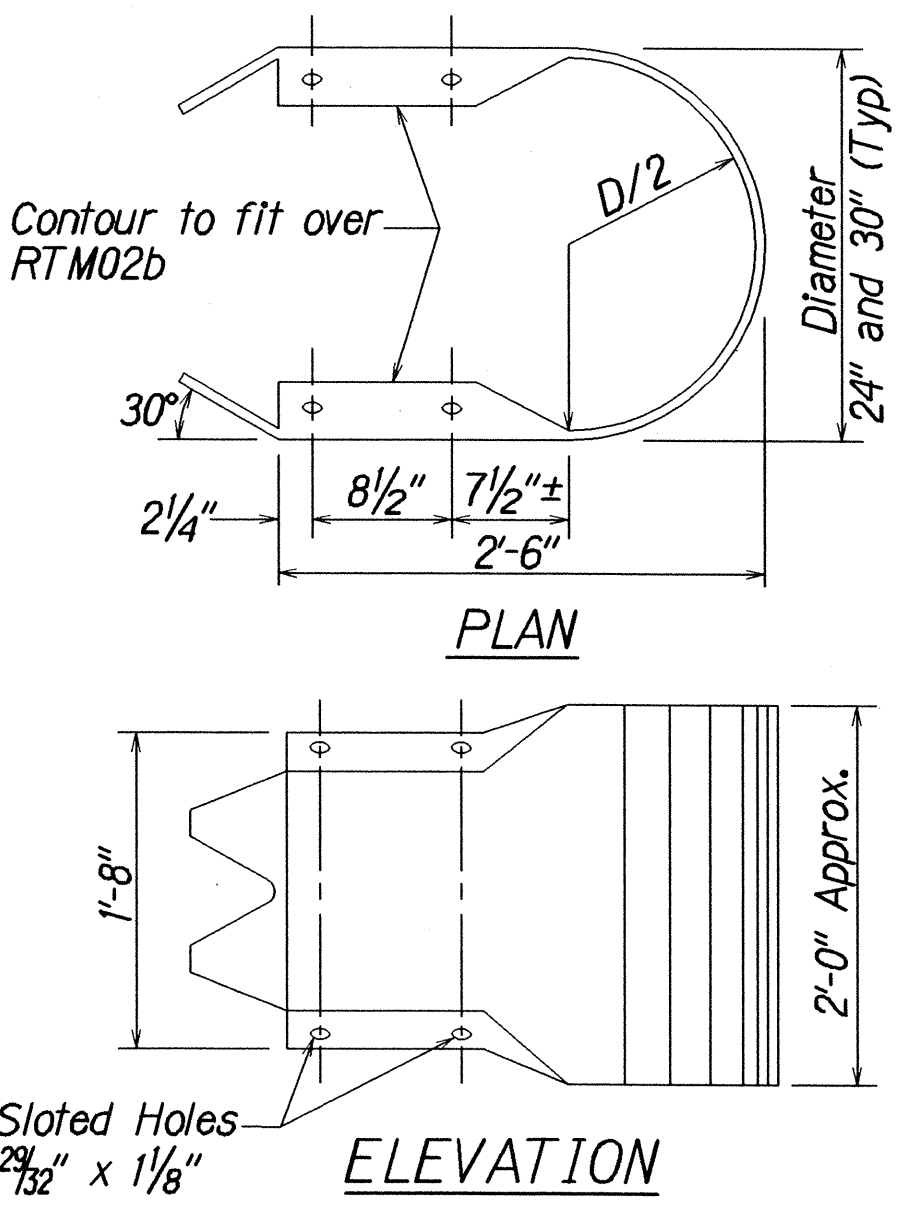
W-BEAM END SECTION (BUFFER RWE06a)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

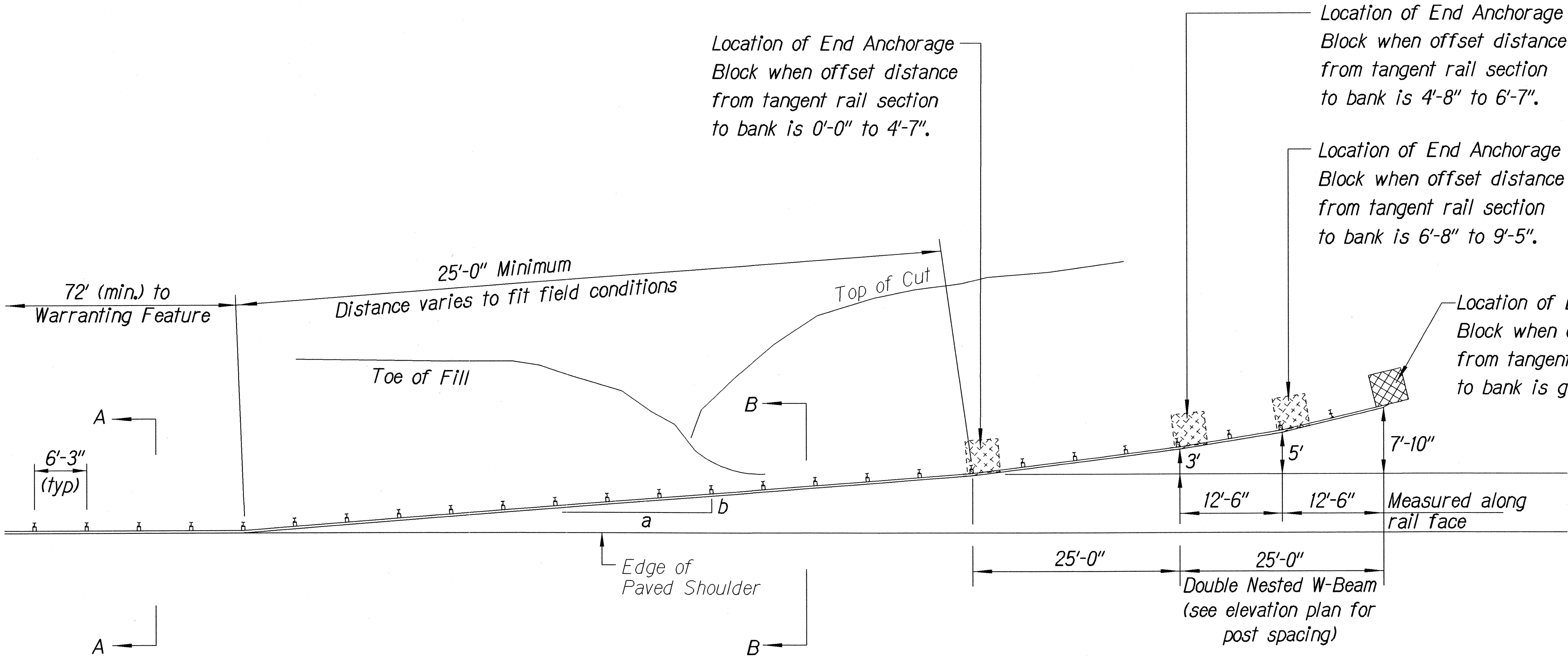
**STRONG POST W-BEAM GUARDRAIL**  
**QUEEN KAAHUMANU HIGHWAY**  
**DRAINAGE IMPROVEMENTS**  
**Vicinity of Mauna Kea Beach Hotel**  
**Federal-Aid Project No. STP-019-1(27)**

Scale: NTS Date: July, 2001

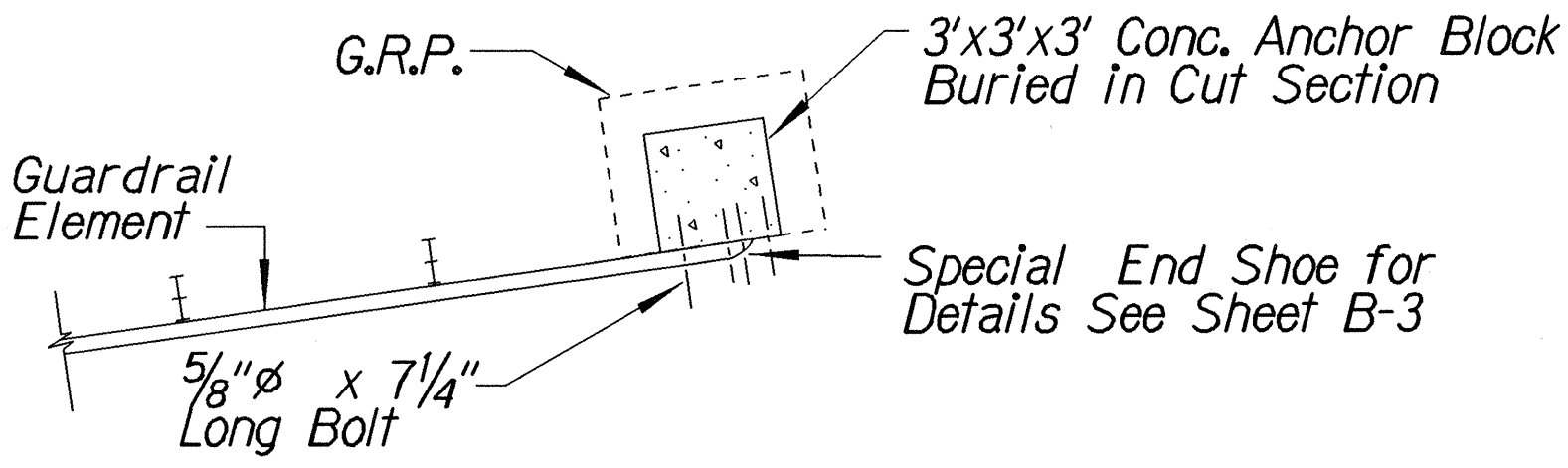
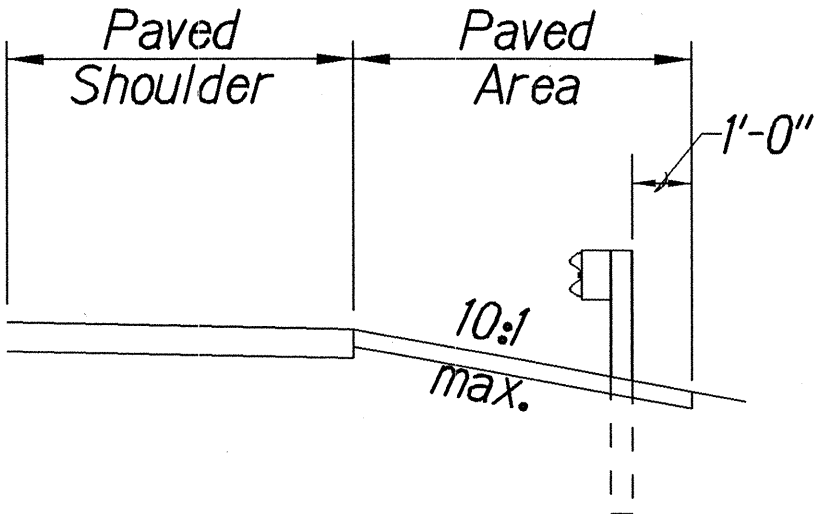
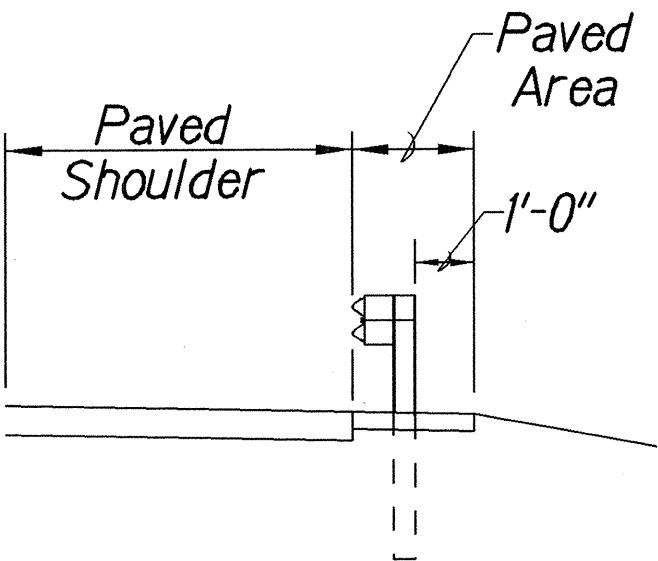
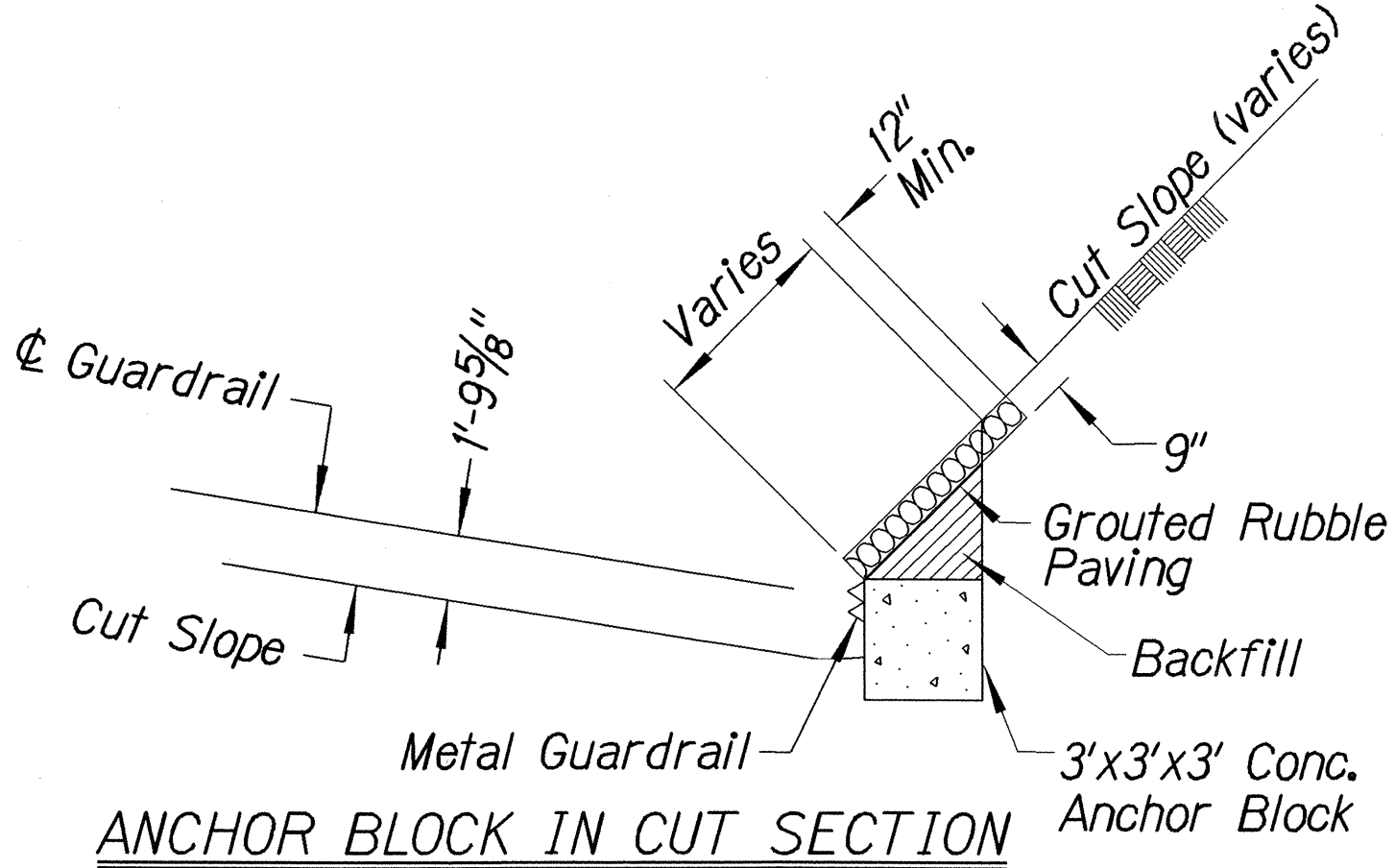
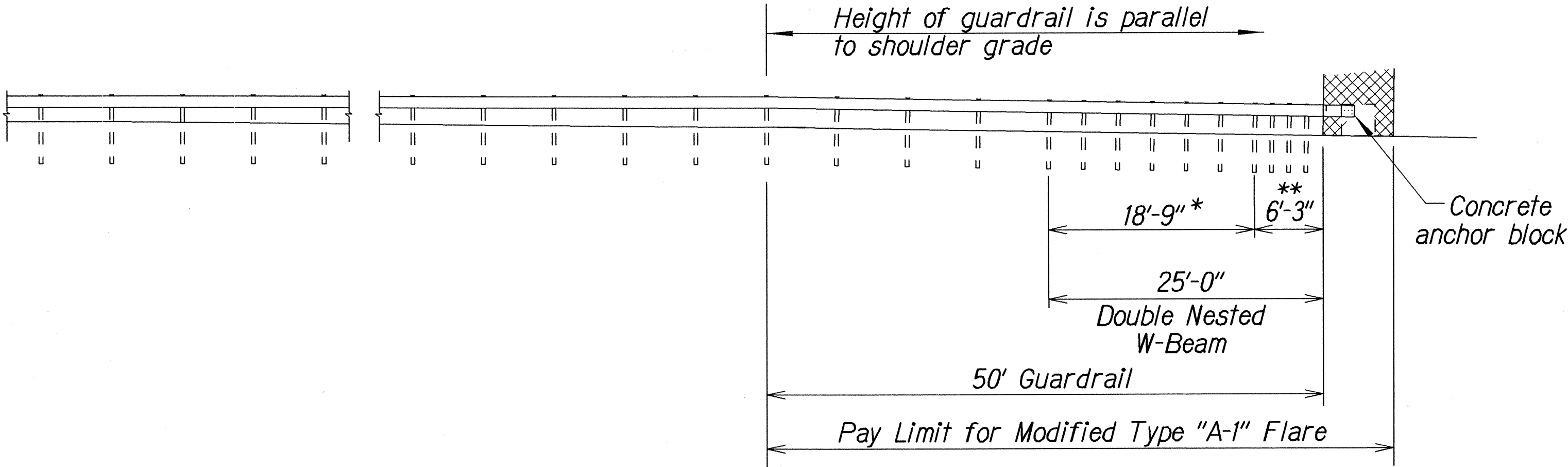
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	16	18

General Notes

1. All posts are 8'-0" in length within the 50'-0" pay limit for the Modified Type "A-1" Flare.
2. 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. Limit of payment for Modified Type "A-1" Flare shall be 50'-0" from End Shoe including Anchor Block and GRP work.
4. Excavation, Anchor Block, Backfill and GRP work shall be considered incidental to the Modified Type "A-1" Flare.



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



\* Posts at 3'-1 1/2" o.c.  
 \*\* Posts at 1'-6 3/4" o.c.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

MODIFIED TYPE "A-1" FLARE

QUEEN KAAHUMANU HIGHWAY

DRAINAGE IMPROVEMENTS

Vicinity of Mauna Kea Beach Hotel

Federal-Aid Project No. STP-019-1(27)

Scale: Noted

Date: Jan., 2000

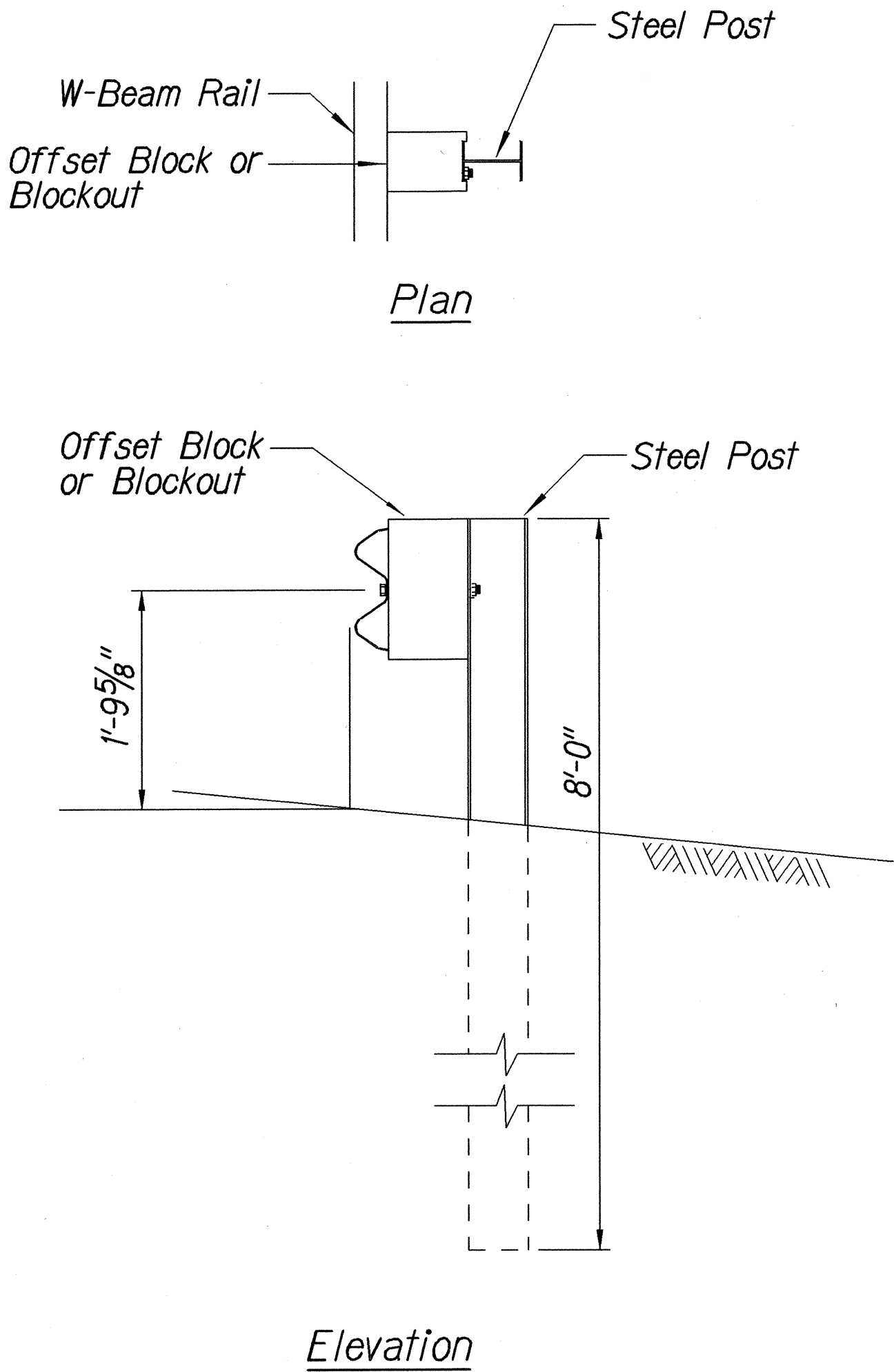
SHEET No. 4 OF 6 SHEETS

DESIGNED BY	DATE
DRAWN BY	3-31-99
CHECKED BY	
NOTED BY	
APPROVED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	X

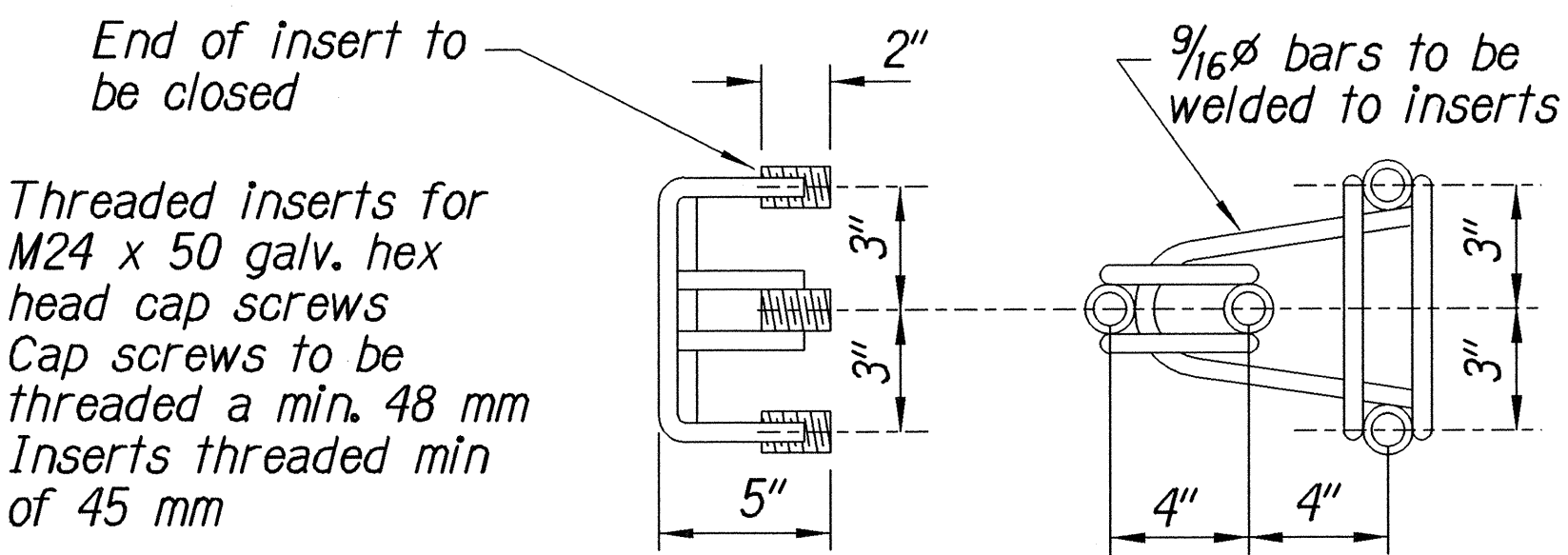
7/10/99 telcub/guardrail/flare.al.ldgn (standard plan TE-58 07/01/86, TE-59 rl/03/89 & TE-60 07/01/86)



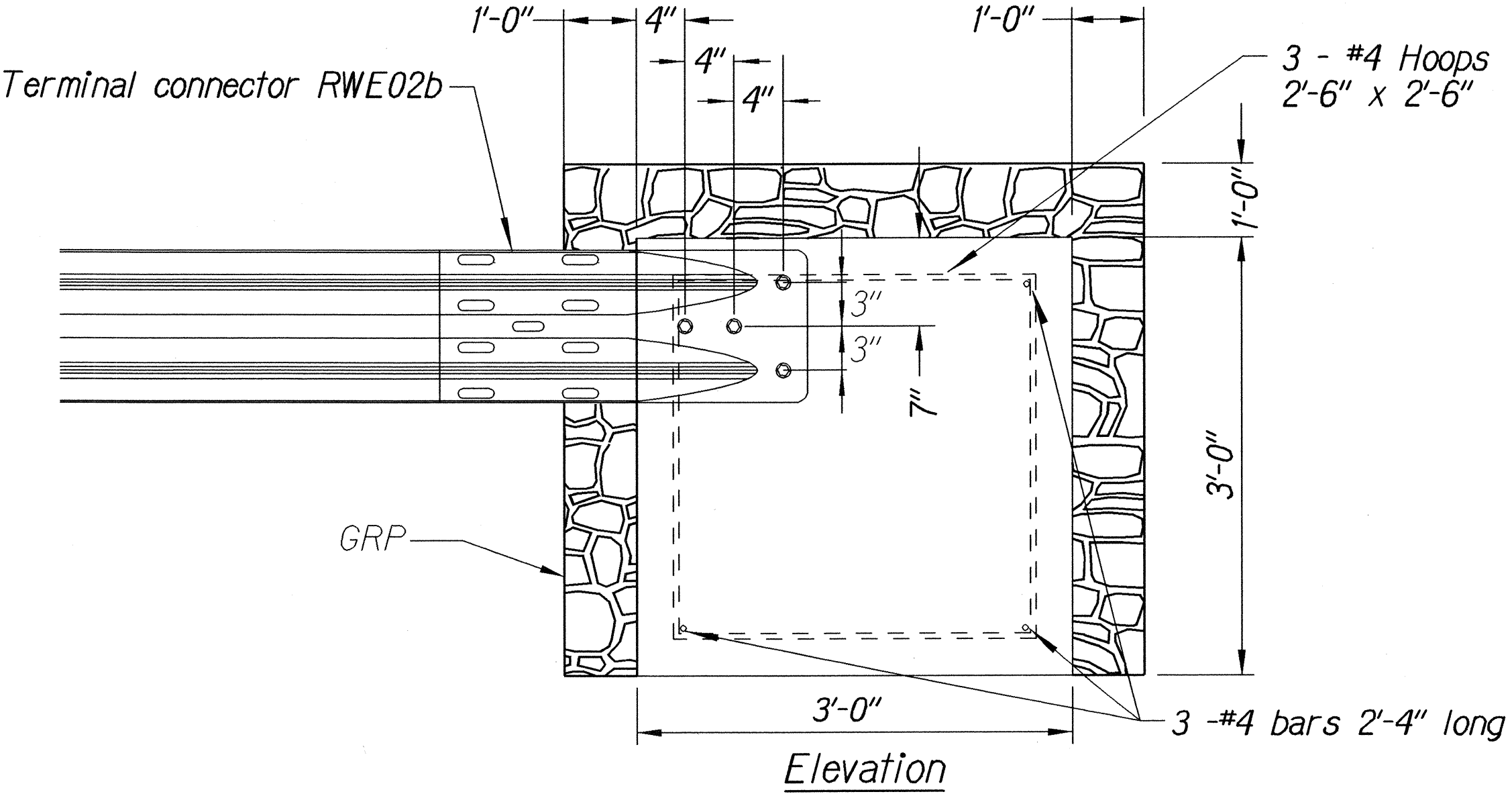
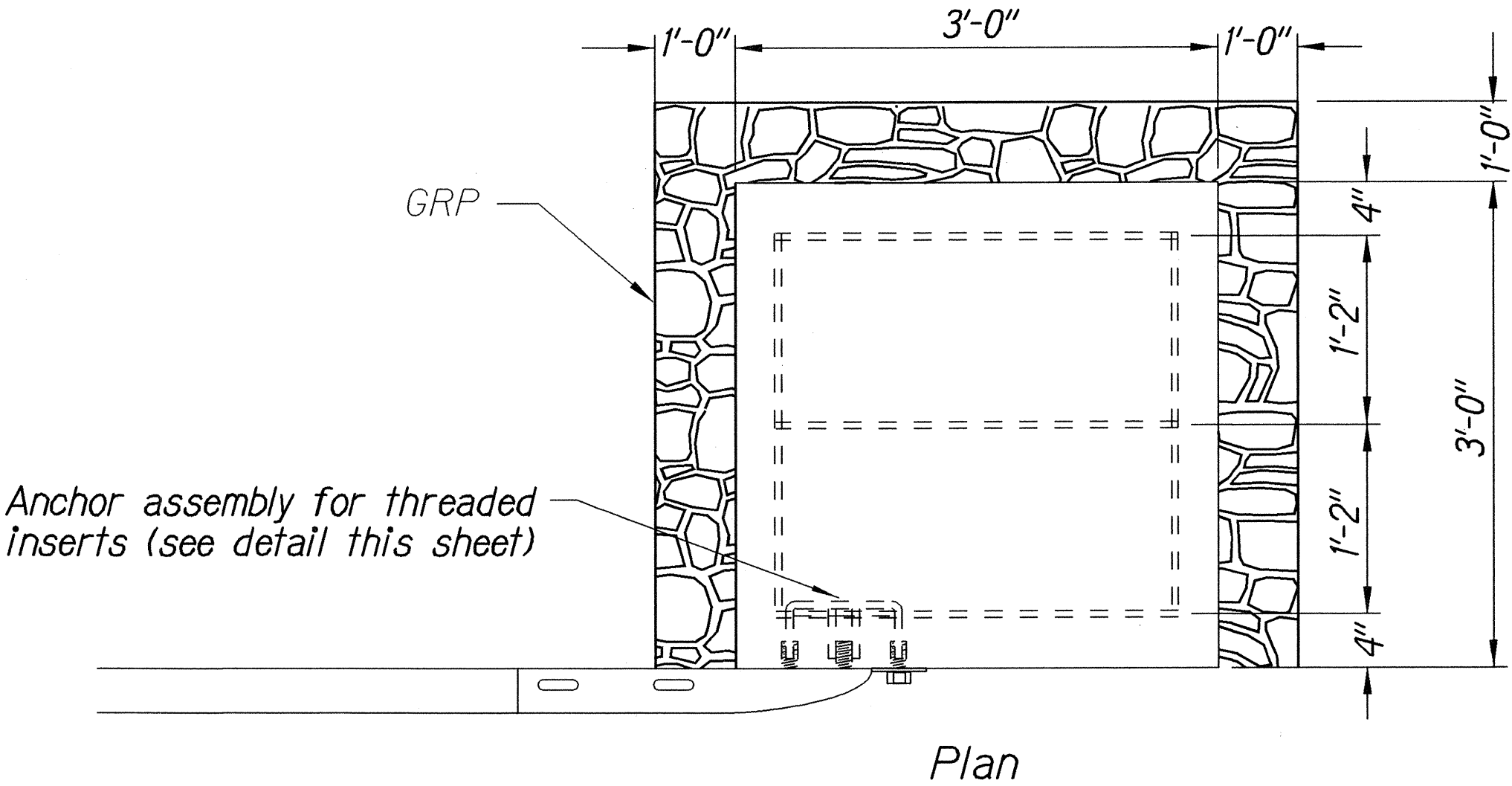
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	17	18



STRONG POST W-BEAM GUARDRAIL



ANCHOR ASSEMBLY  
CONCRETE BLOCK ANCHOR



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

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS  
MODIFIED TYPE "A-1" 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.

ORIGINAL PLAN	DATE
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	

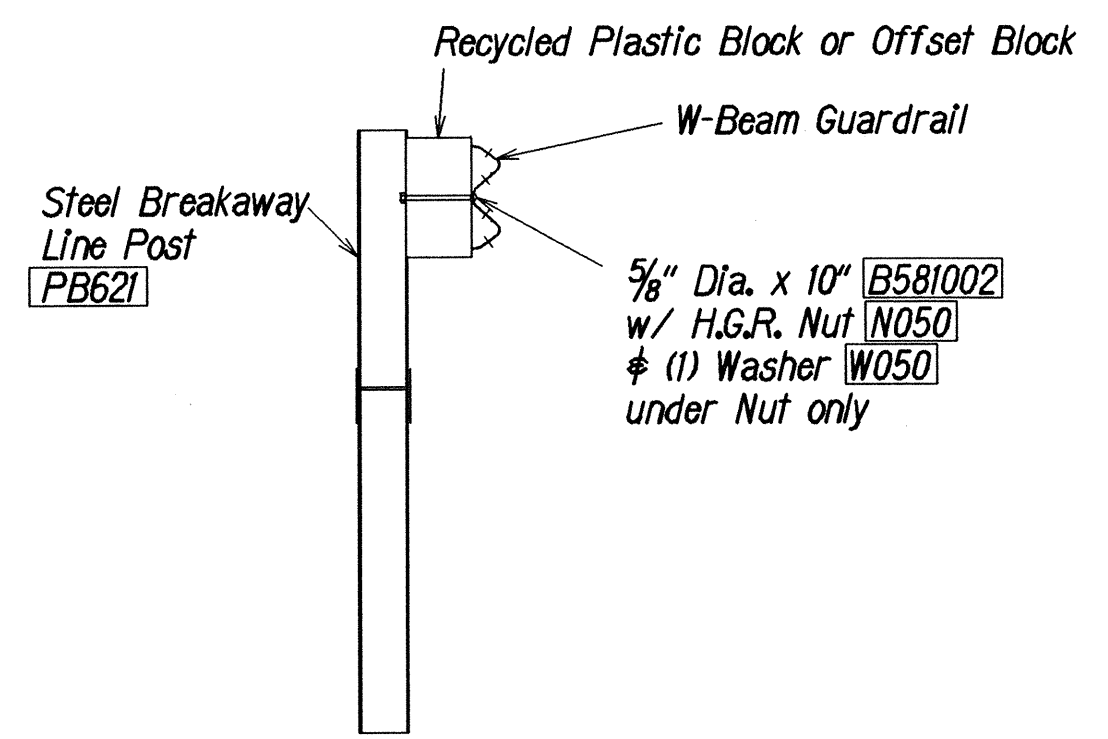
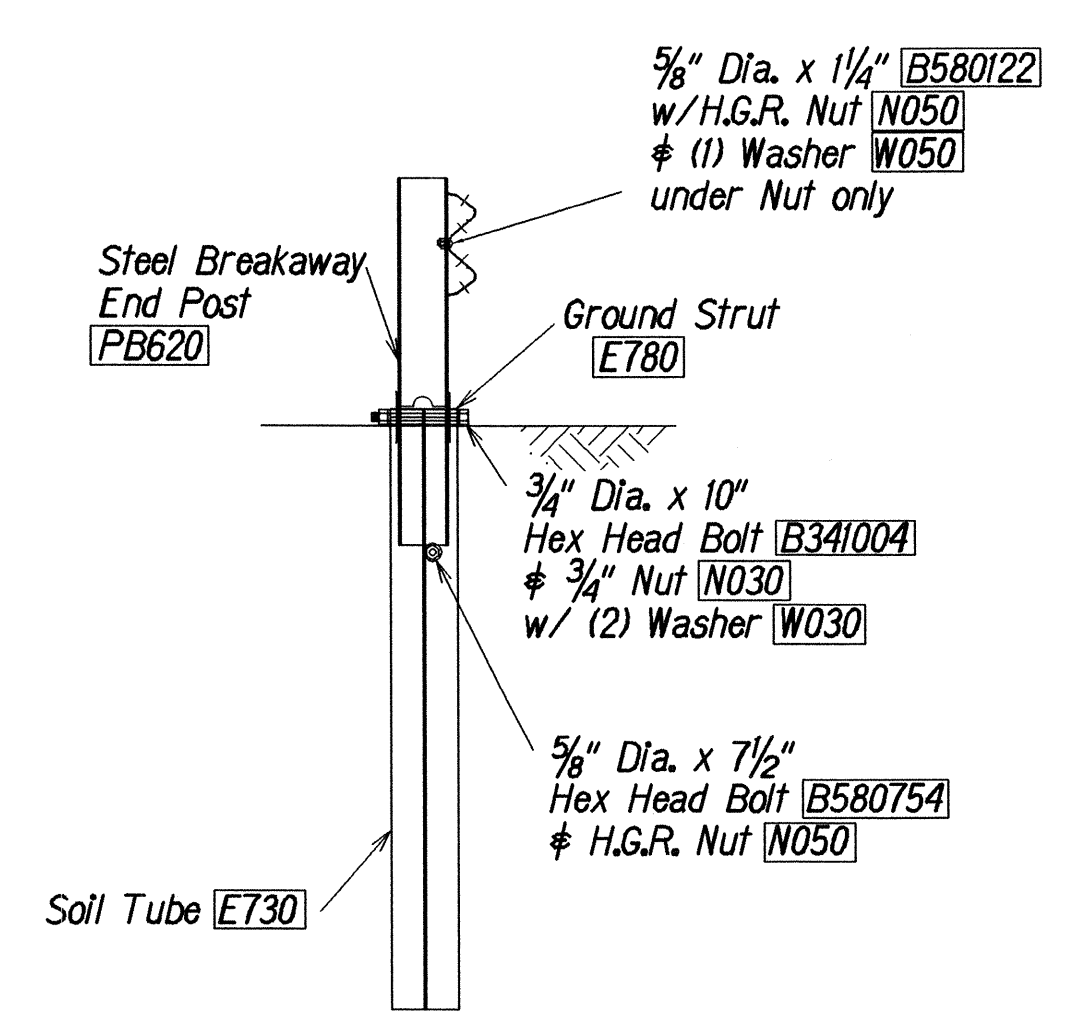
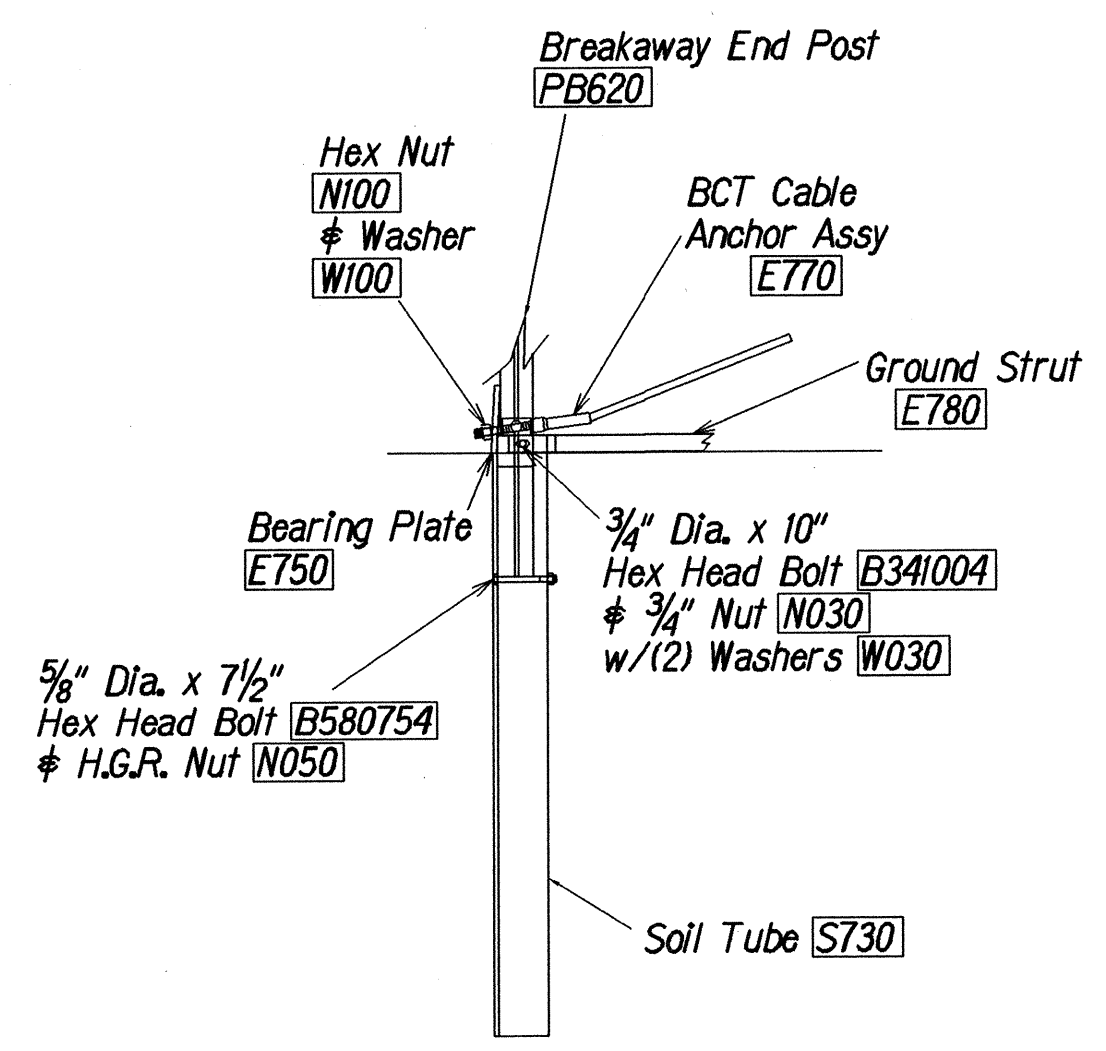
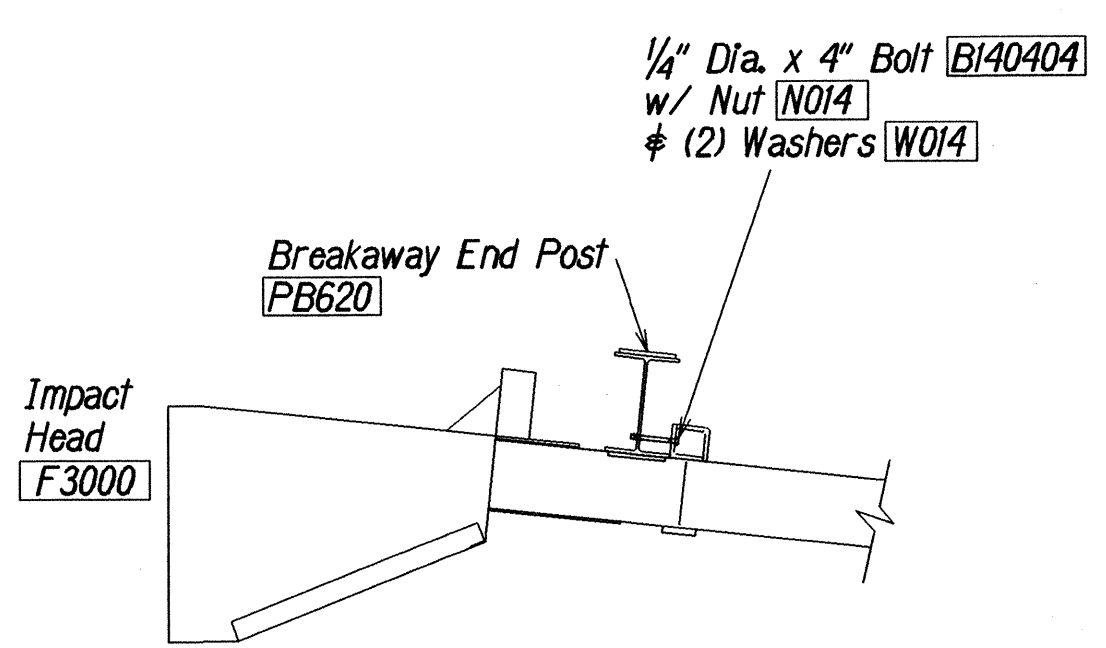
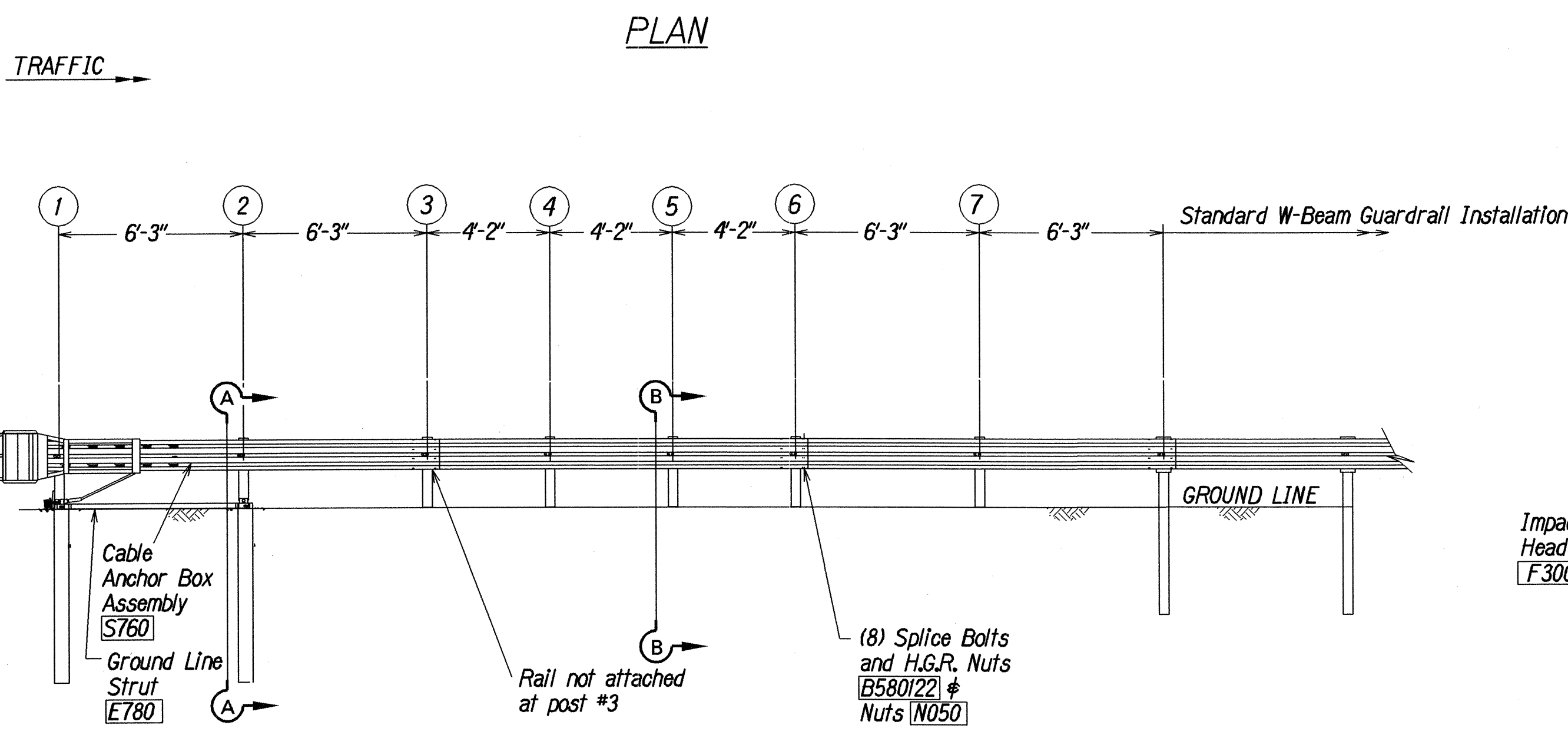
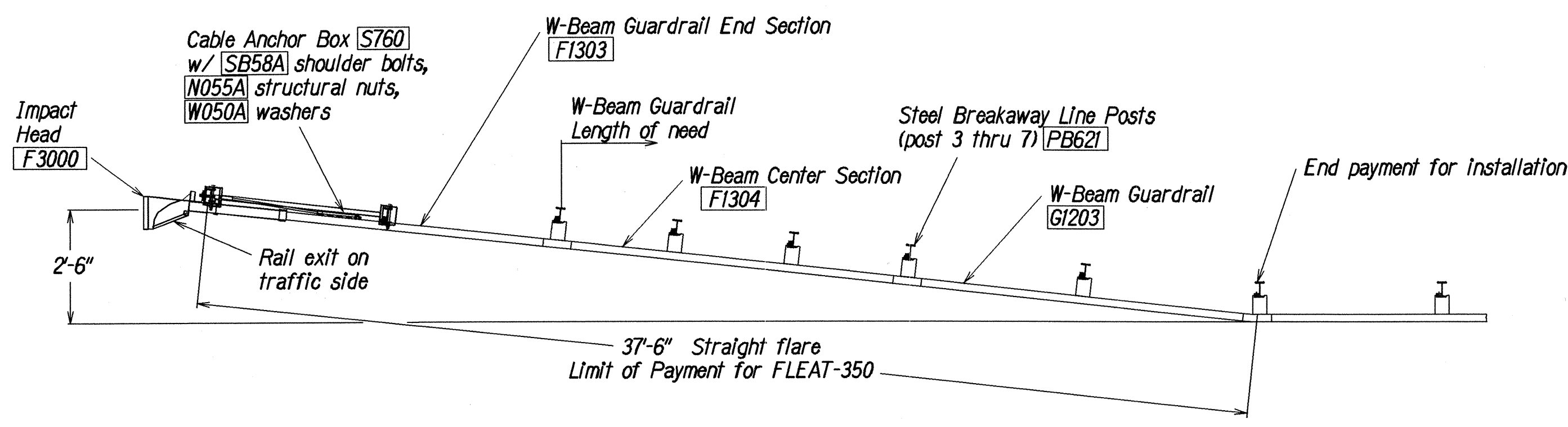
17/01/99 tdr/cub/guardrail/flare.al.2.dgn (standard plan TE-58 07/01/86, TE-59 rev 03/89 # TE-60 07/01/86)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MODIFIED TYPE "A-1" FLARE**  
**QUEEN KAAHUMANU HIGHWAY**  
**DRAINAGE IMPROVEMENTS**  
**Vicinity of Mauna Kea Beach Hotel**  
**Federal-Aid Project No. STP-019-1(27)**  
Scale: NTS Date: Jan., 2000

SHEET No. 5 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-019-1(27)	2002	18	18



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

- GENERAL NOTES**
1. Breakaway 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 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.
  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.

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 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

DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
DATE	

16/21/2000 tdlrubby/guardrail/Fleat350.dgn (standard plan TE-61 r11/03/89 & TE-62 r09/01/87)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**FLEAT-350**

**FLARED ENERGY ABSORBING TERMINAL**

**QUEEN KAAHUMANU HIGHWAY**

**DRAINAGE IMPROVEMENTS**

**Vicinity of Mauna Kea Beach Hotel**

Scale: NTS Date: June, 2000

SHEET No. 6 OF 6 SHEETS