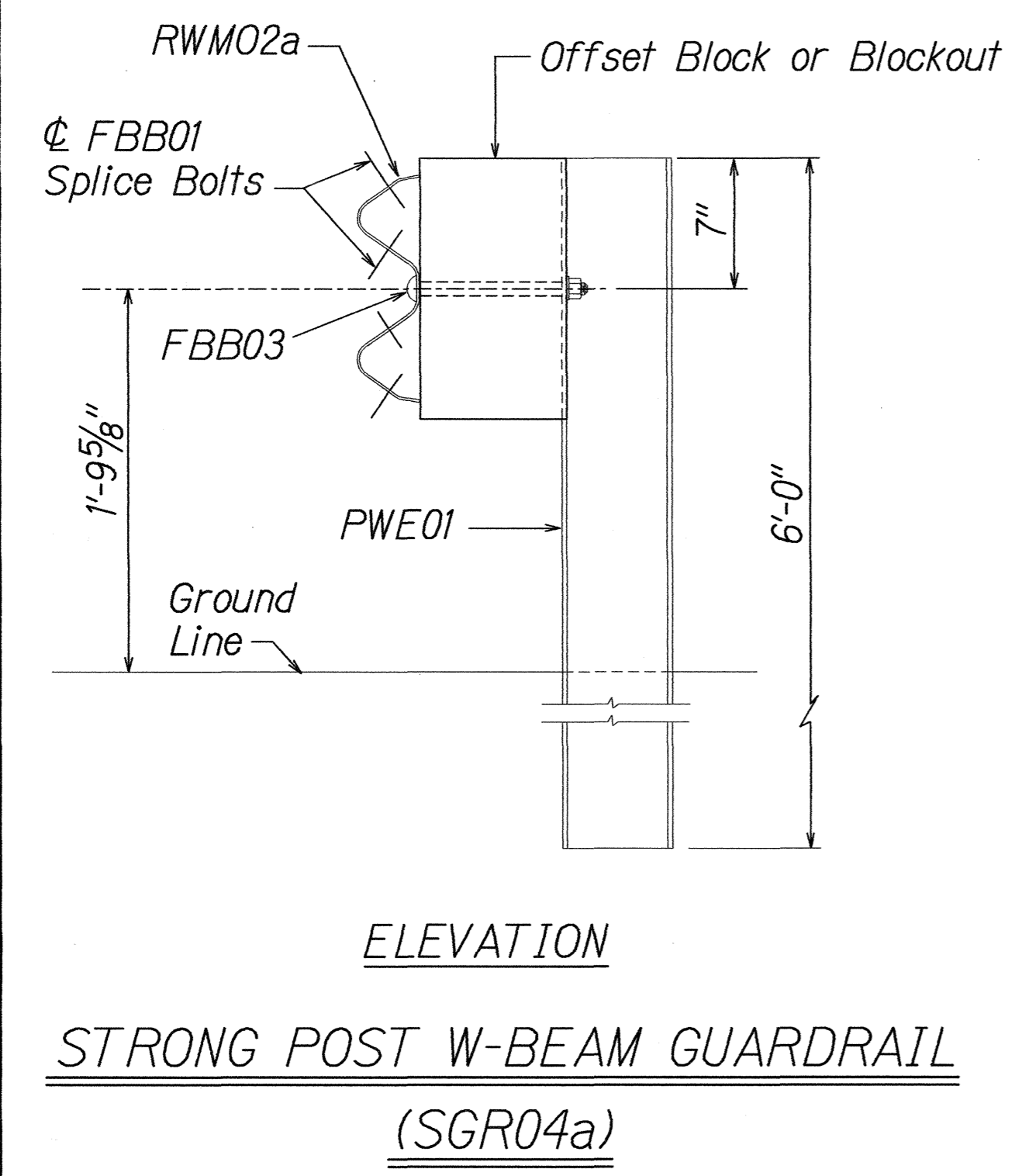
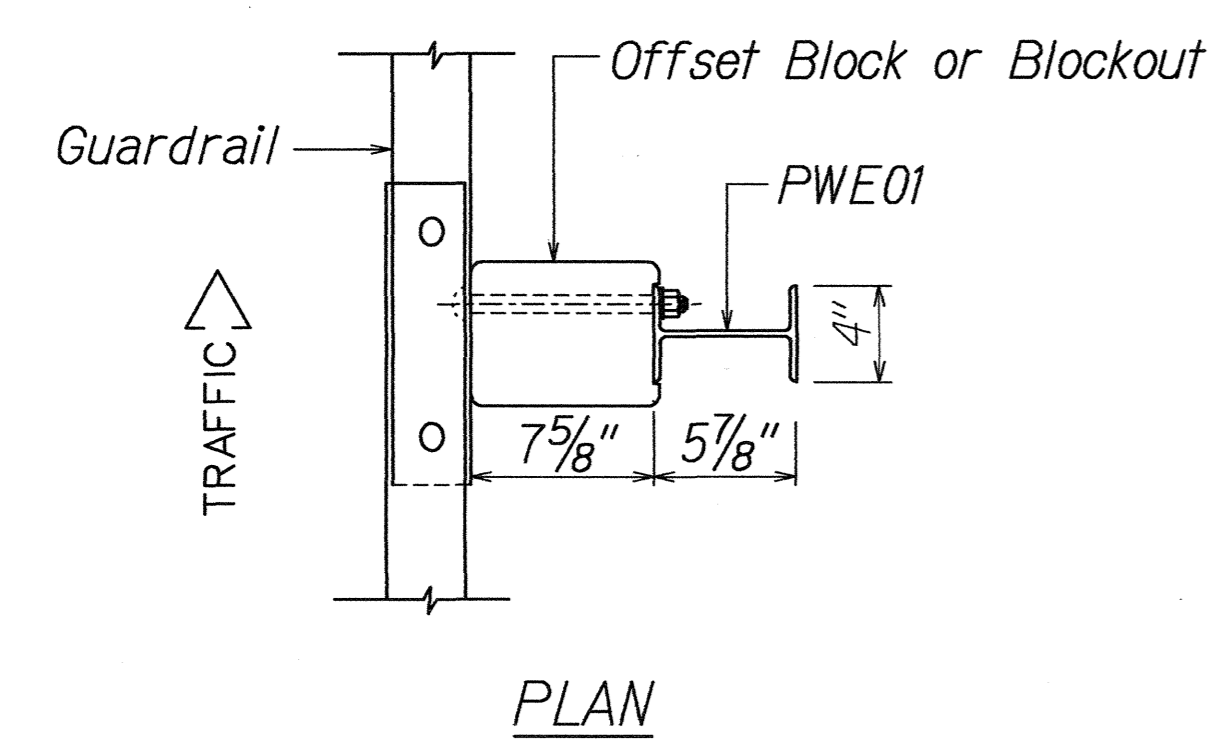
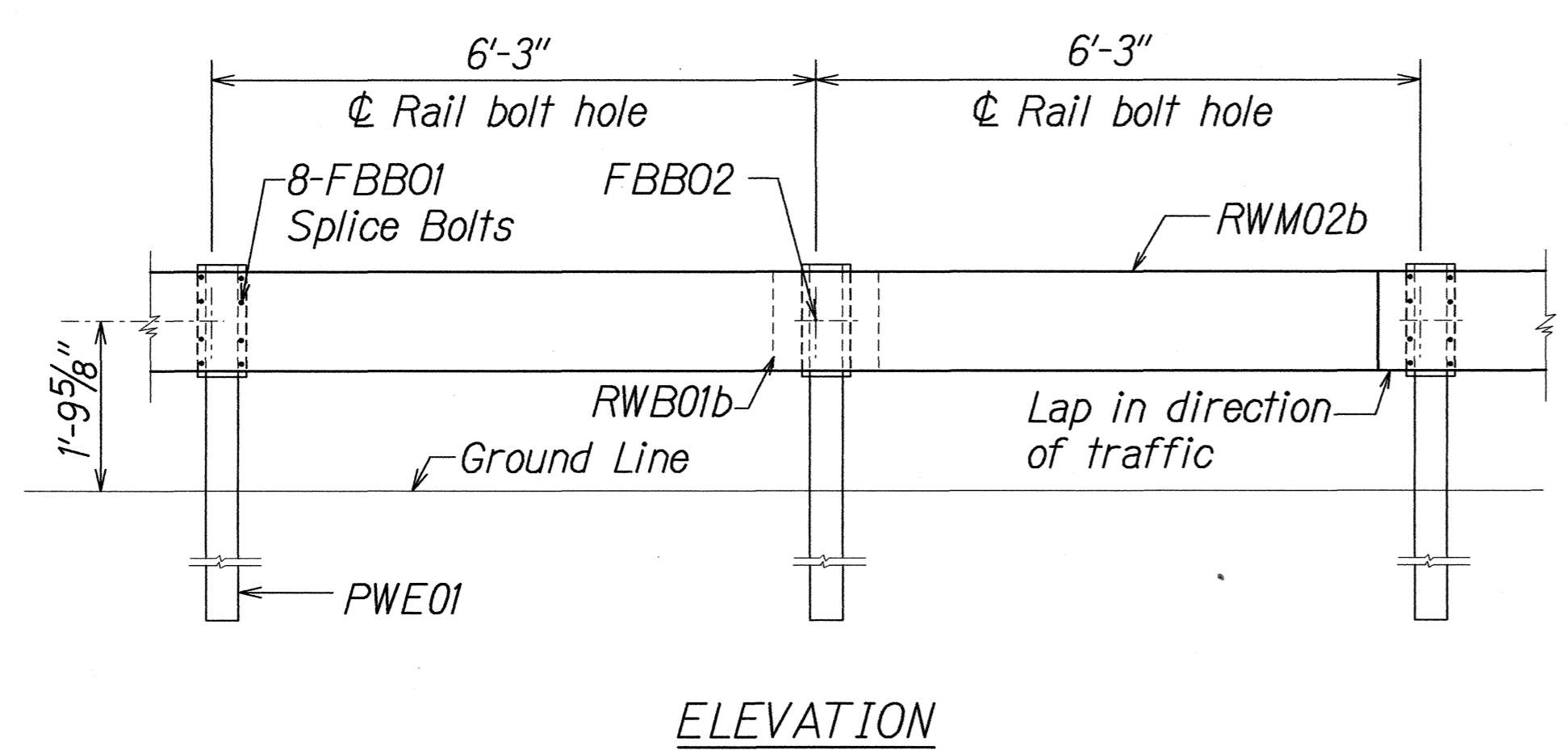


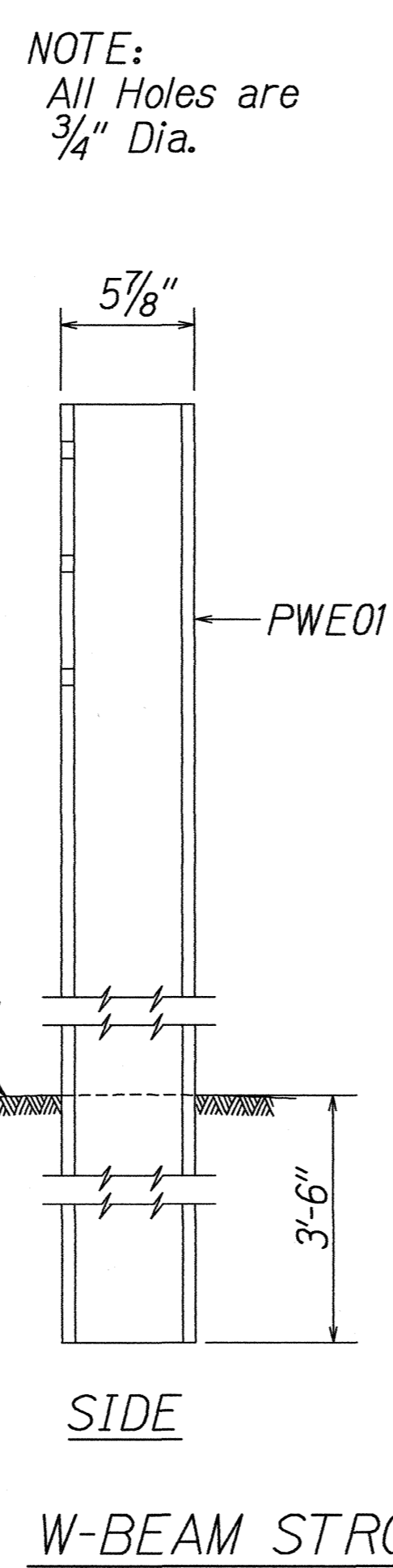
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-01-99M	1999	15	32



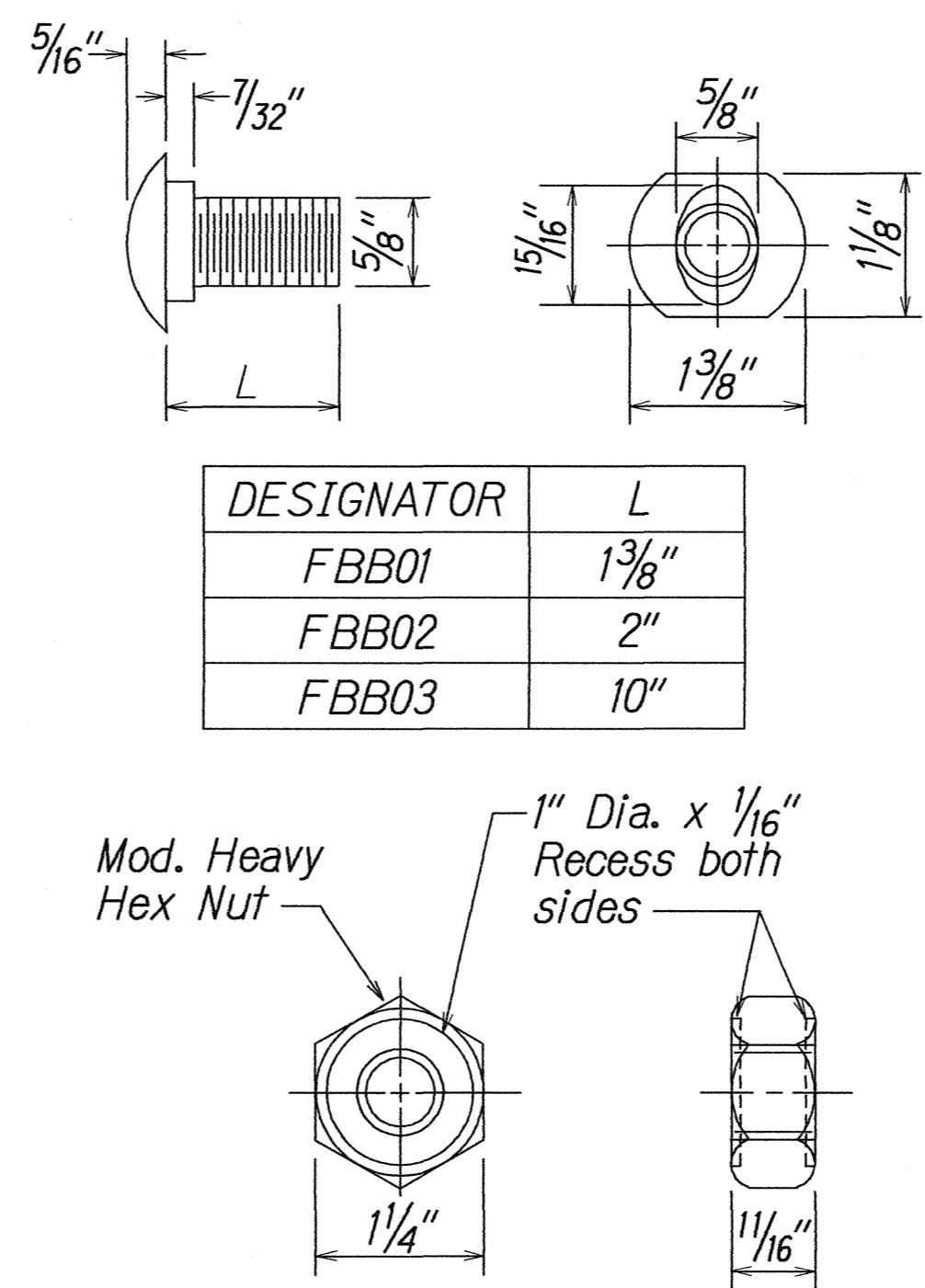
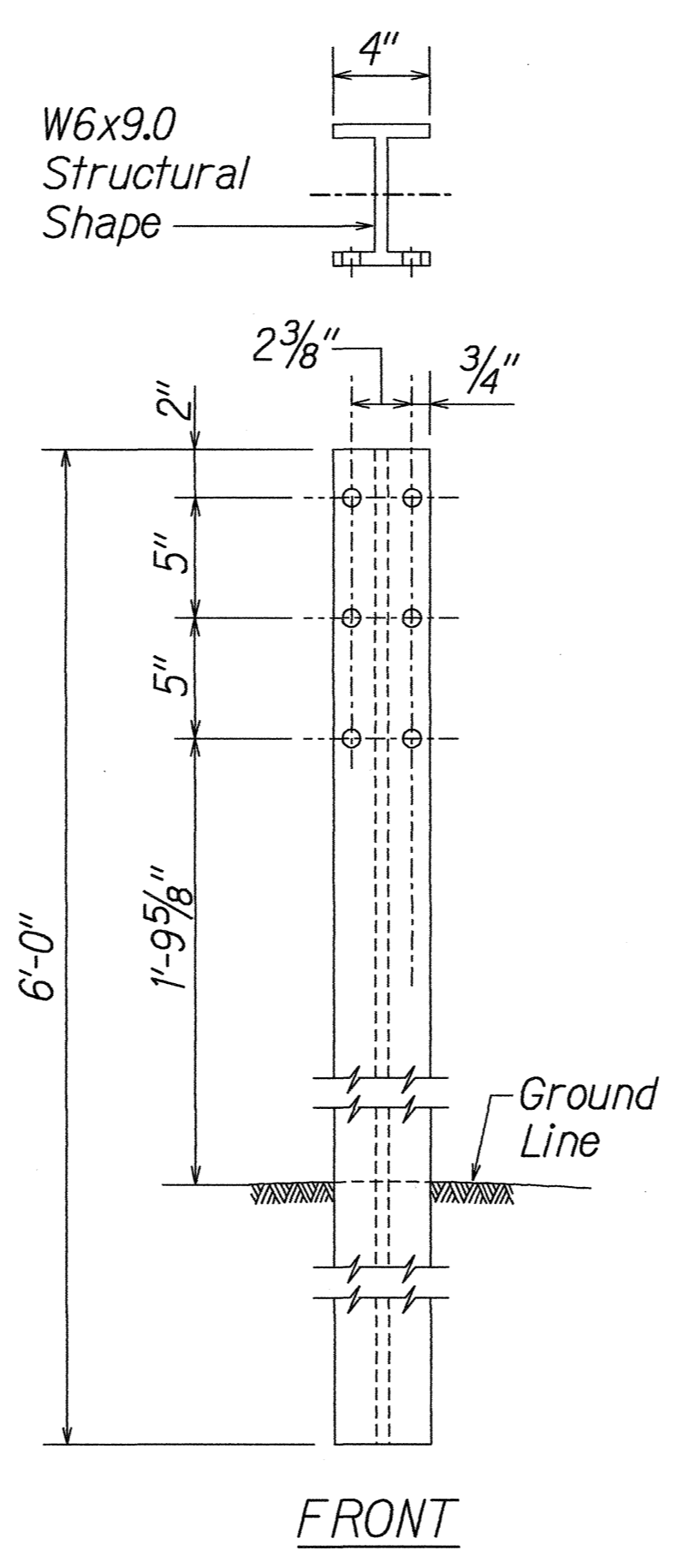
STRONG POST W-BEAM GUARDRAIL
(SGR04a)



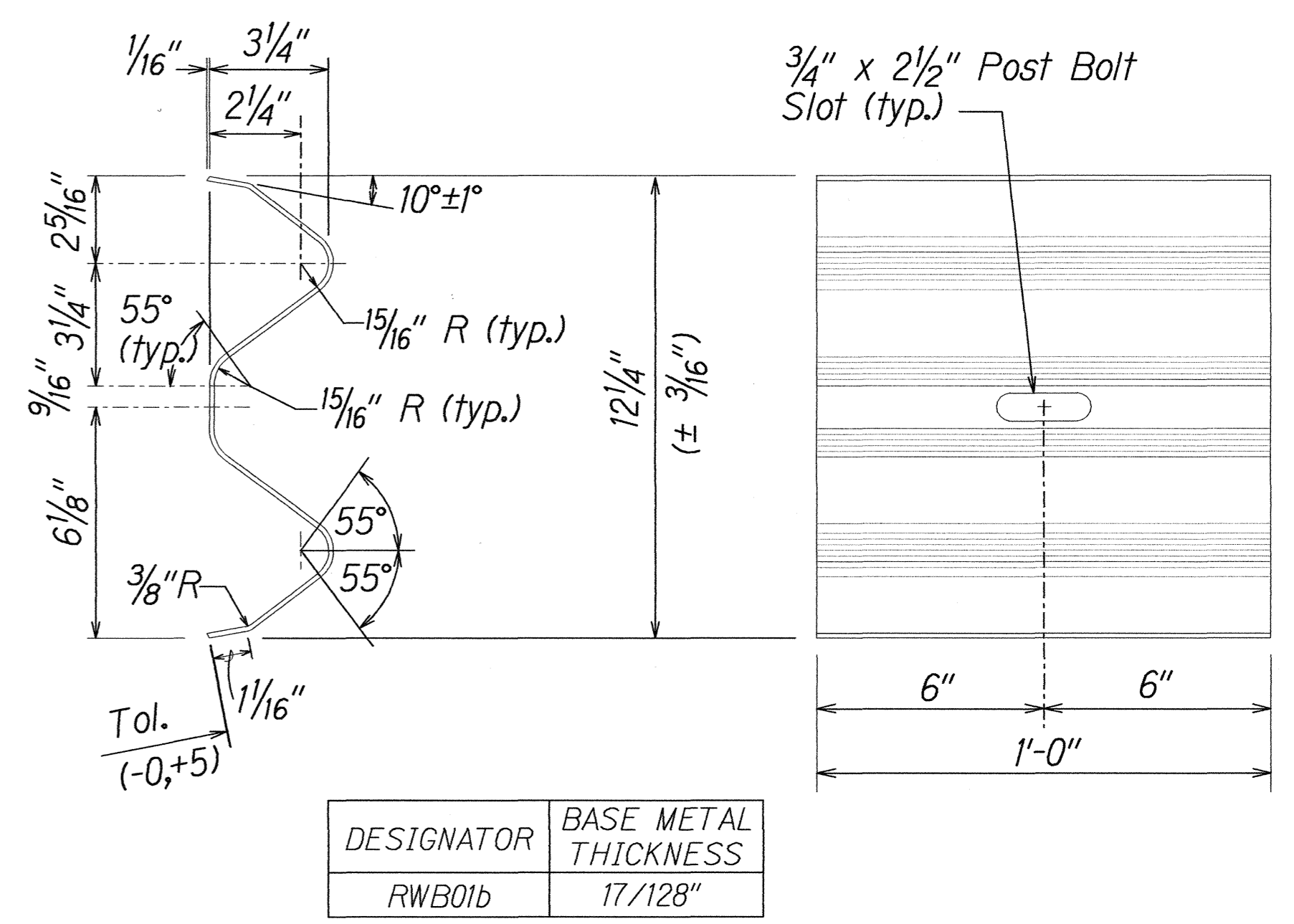
STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



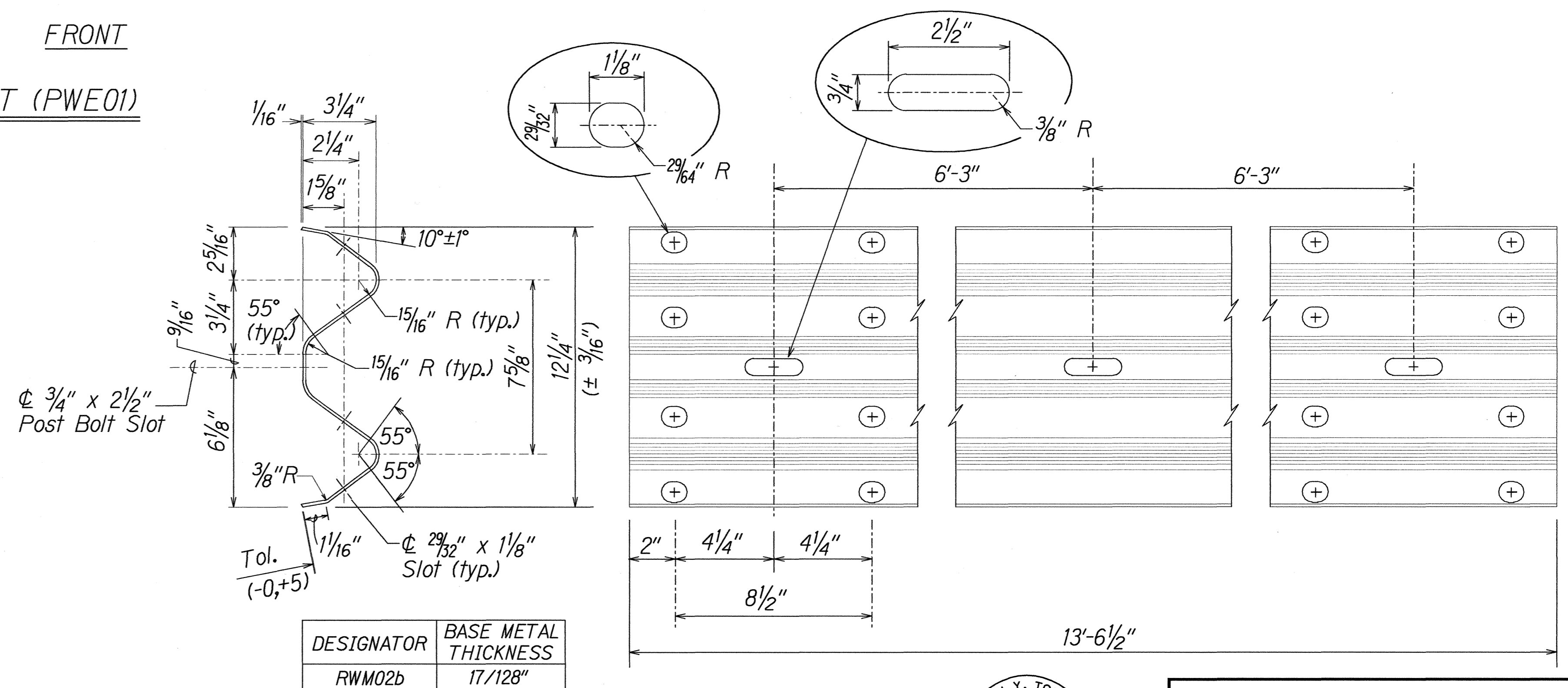
W-BEAM STRONG POST (PWE01)



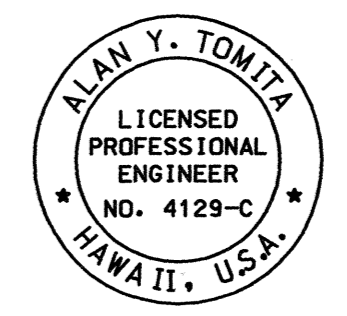
GUARDRAIL BOLTS AND
RECESSED NUT



W-BEAM BACK-UP-PLATE (RWB01b)



2 SPACE W-BEAM GUARDRAIL (RWM02b)



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Alan Y. Tomita

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

HAWAII BELT ROAD RESURFACING

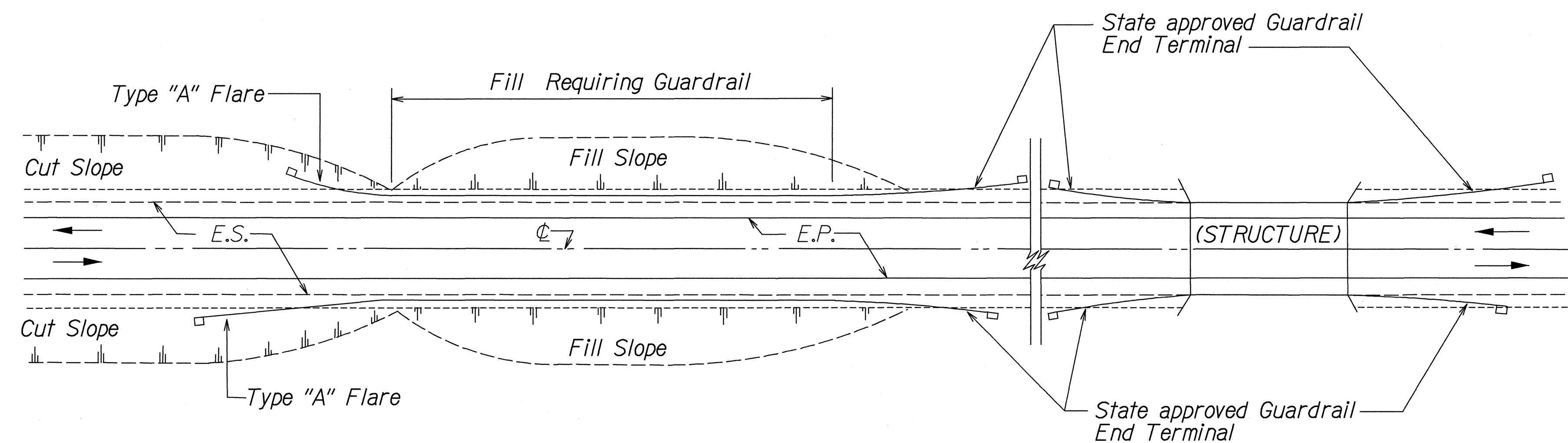
Vicinity of Maipunalei to Kilauea Gulch

Project No. 19H-01-99M

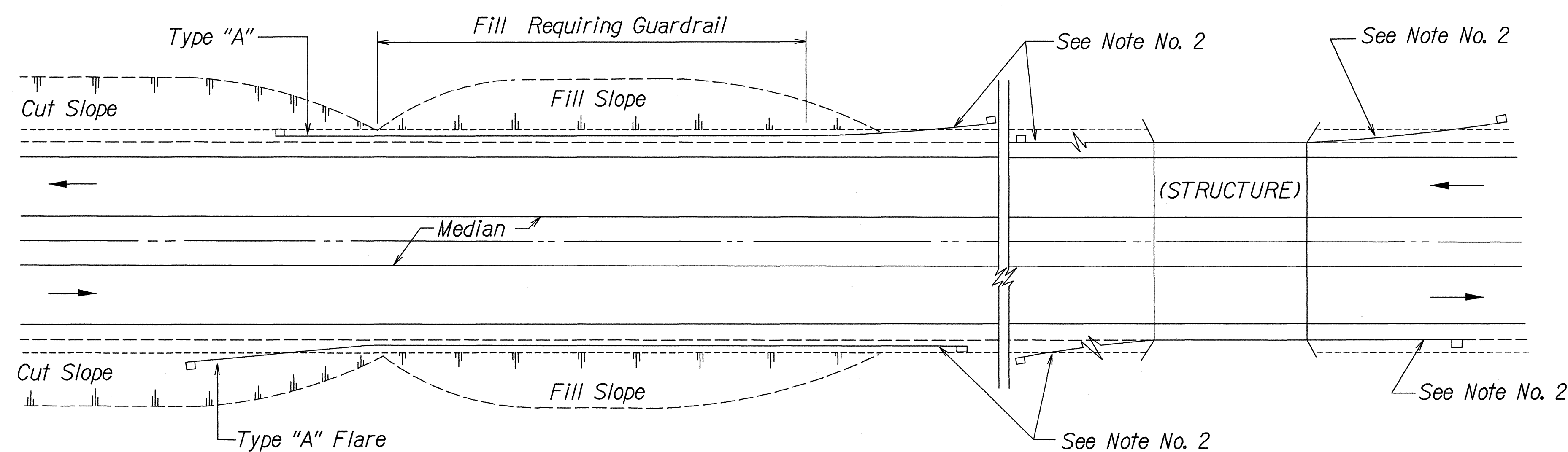
Scale: NTS

Date: May, 1999

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-01-99M	1999	16	32



PLAN
TWO WAY ROADWAY



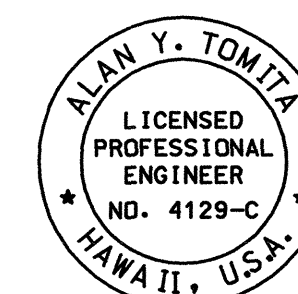
PLAN
ONE WAY ROADWAY (DIVIDED HIGHWAY)

NOTES:

1. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
2. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.
3. The exact limits and locations of the guardrail and end treatments to be removed and to be installed shall be determined by the Engineer in the field. The Contractor shall layout the locations in the field, as shown on the plans or as directed by the Engineer, for the Engineer's approval prior to beginning any guardrail work.

ORIGINAL PLAN	DATE
NOTED BY	
DESIGNED BY	
CHECKED BY	
DATE	

3/01/99 hdlrby/guardrail/1958rwdgpn (standard plan TE-58 r07.01/98)



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Alan Y. Tomita

6/3/99	Deleted Note No. 1 For Metal Guardrail Connection to Conc. Structures
Date	Revision

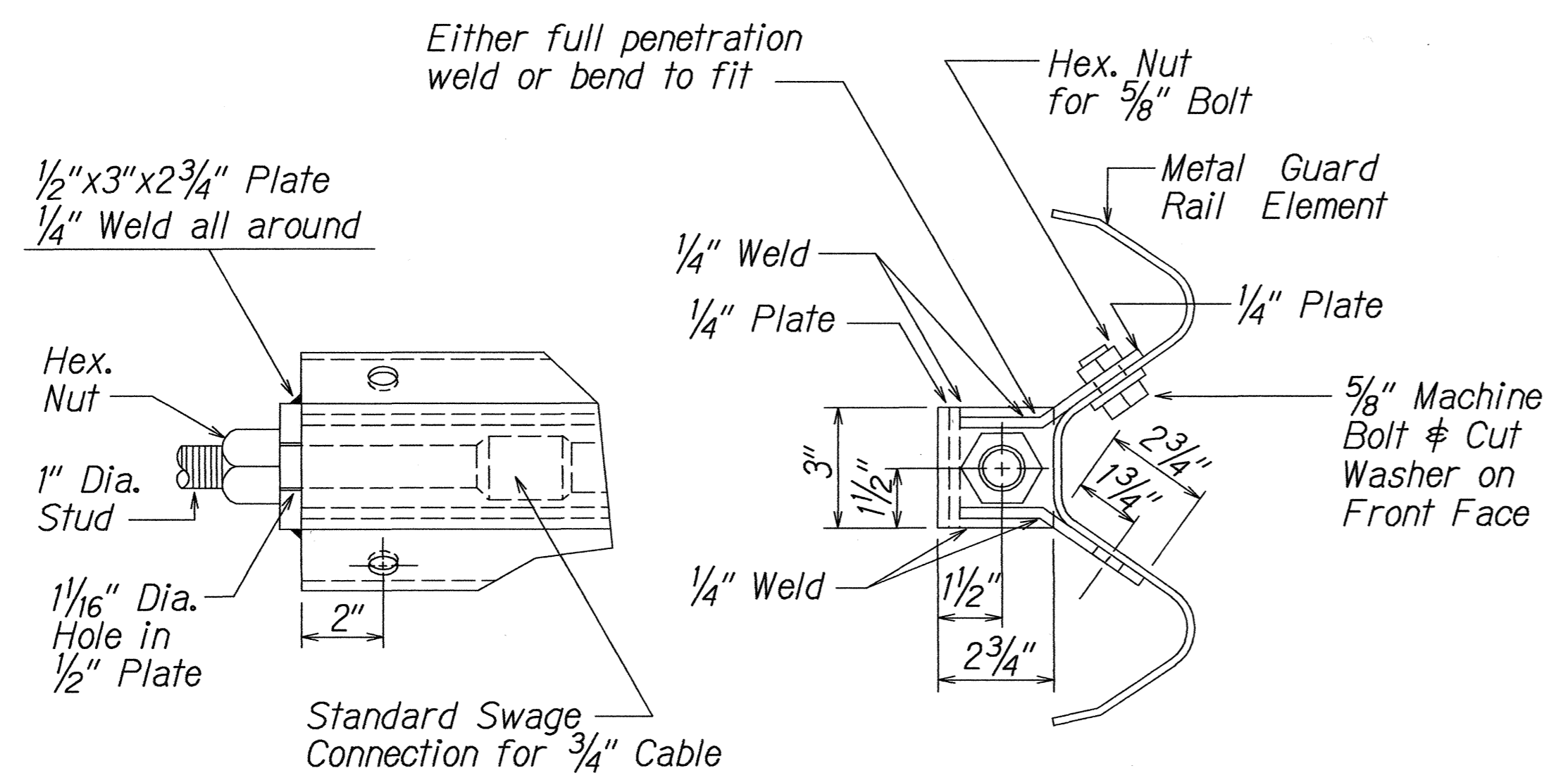
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

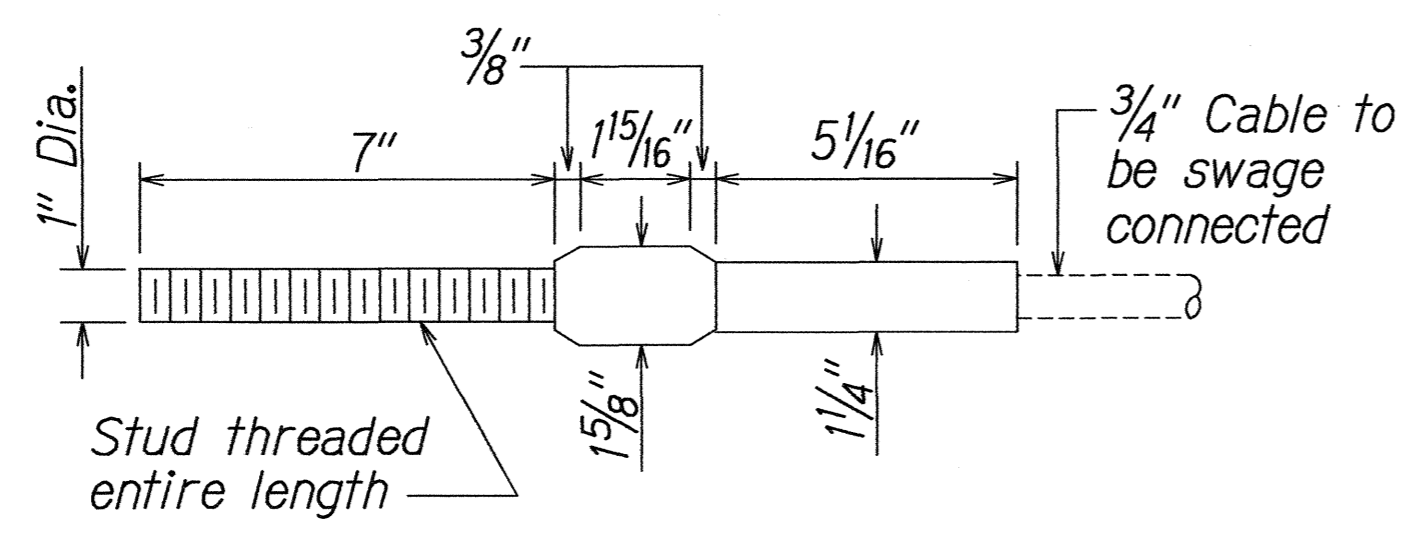
HAWAII BELT ROAD RESURFACING
Vicinity of Waipunaiei to Kilau Gulch
Project No. 19H-01-99M
Scale: NTS Date: June, 1999

SHEET No. 3 OF 6 SHEETS

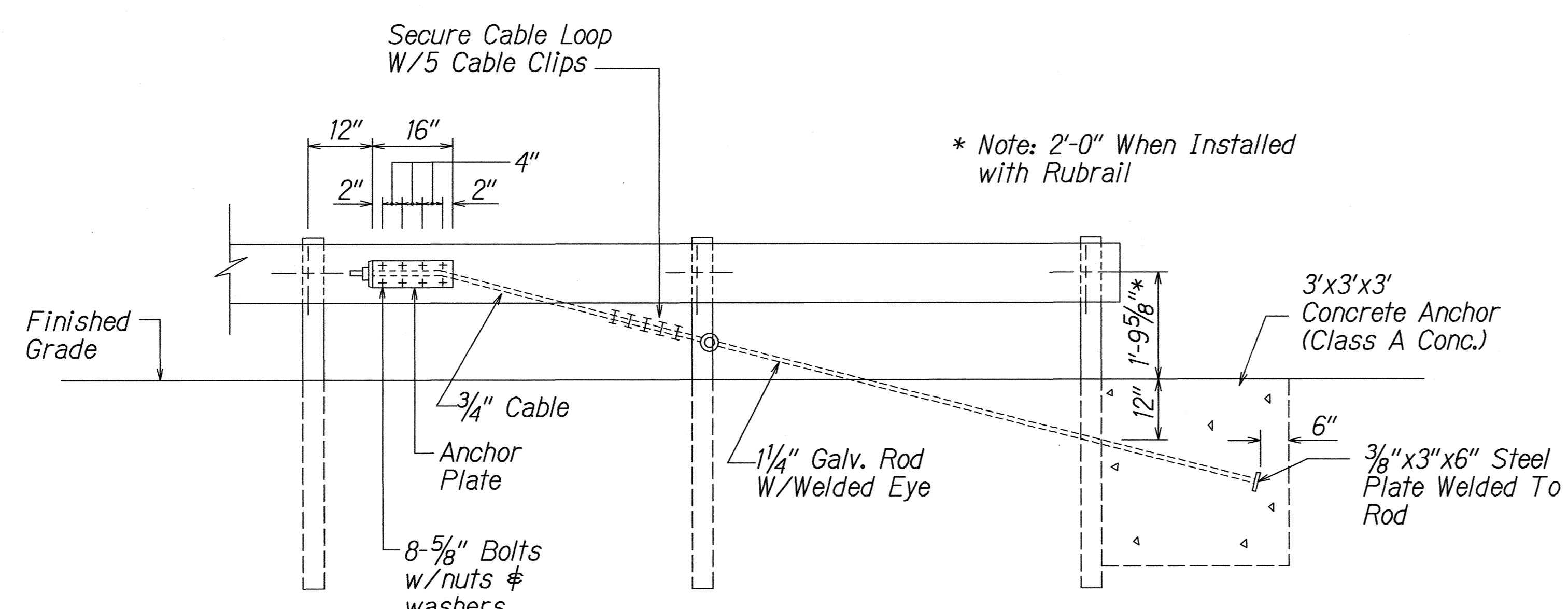
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-01-99M	1999	17	32



ANCHOR PLATE DETAILS

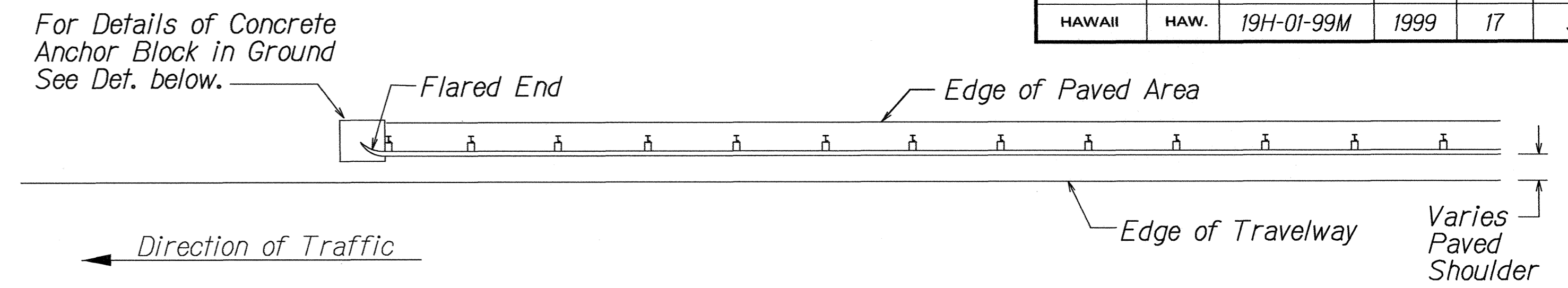


STANDARD SWAGED FITTING AND STUD

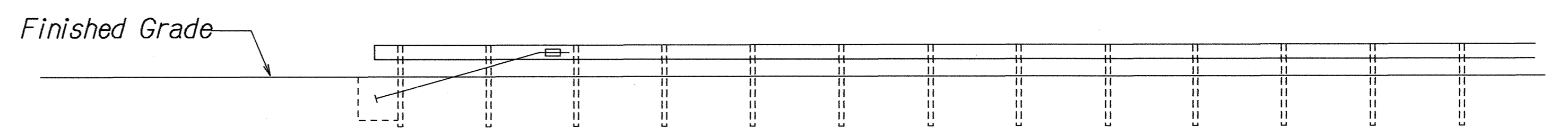


ANCHOR BLOCK DETAIL

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



PLAN



ELEVATION

TYPE "G" FLARE END TERMINAL

NOTE:

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 ordering of materials.

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	

13/01/99 141-ruby/guardrail/1459-01-99M (Standard plan TE-59 11/03/89)

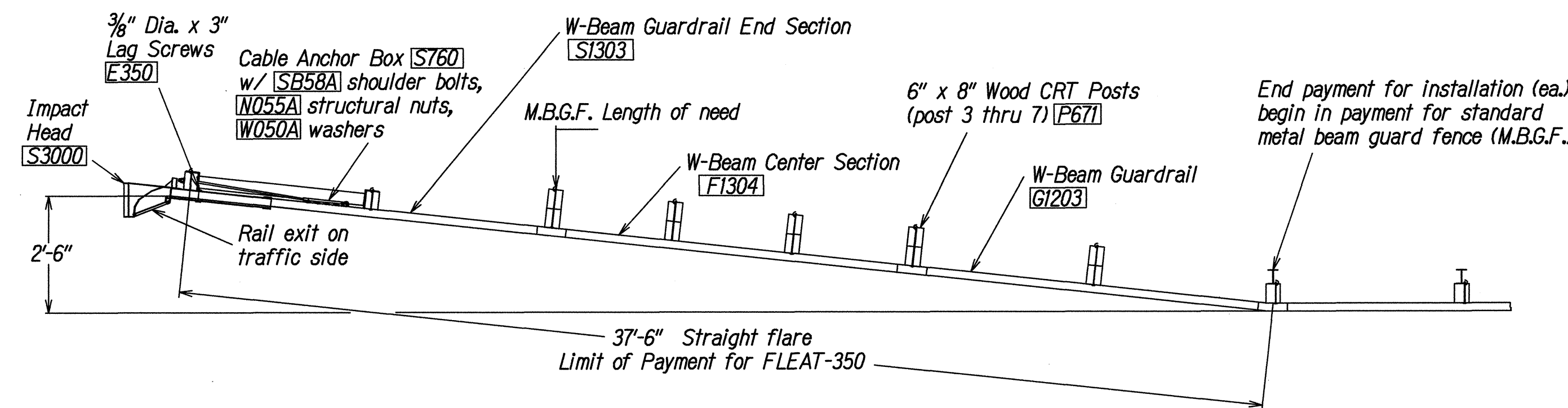
ALAN Y. TOMITA
LICENSED PROFESSIONAL ENGINEER
NO. 4129-C
HAWAII, U.S.A.

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OR UNDER MY SUPERVISION.

Alan Y. Tomita

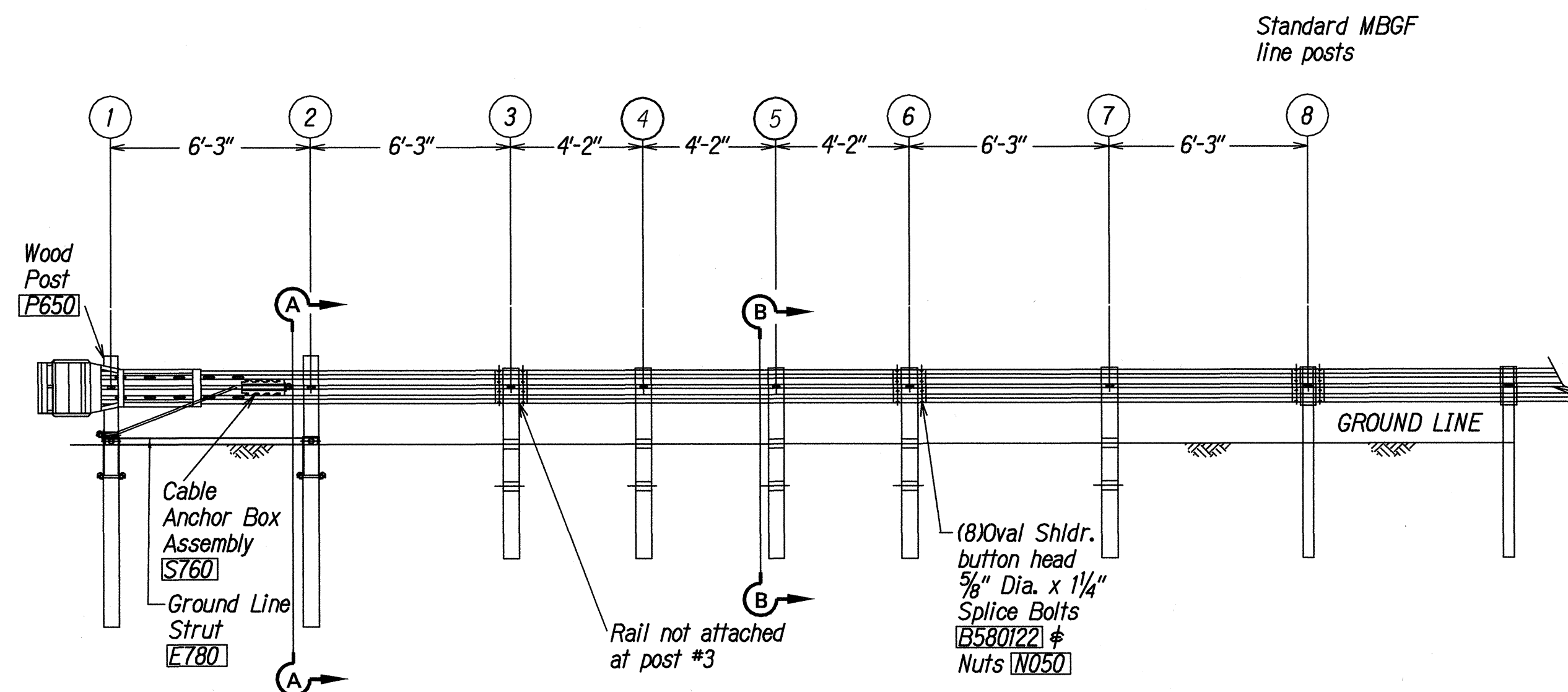
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL DETAILS
HAWAII BELT ROAD RESURFACING
Vicinity of Waipunaiei to Kilauea Gulch
Project No. 19H-01-99M
Scale: Scale: Date: May, 1999
SHEET No. 4 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19H-01-99M	1999	19	32



PLAN

TRAFFIC →



ELEVATION

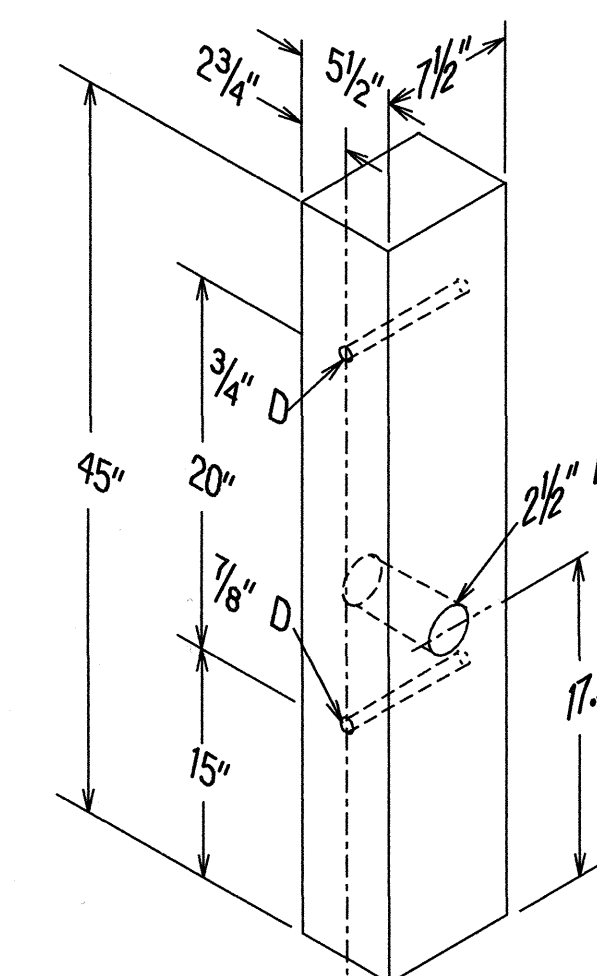
GENERAL NOTES

1. Wood posts are required with the fleat.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. 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.
4. The soil tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the soil 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. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
8. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will require field drilling new holes to accommodate the rail to the post connecting bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the engineer.

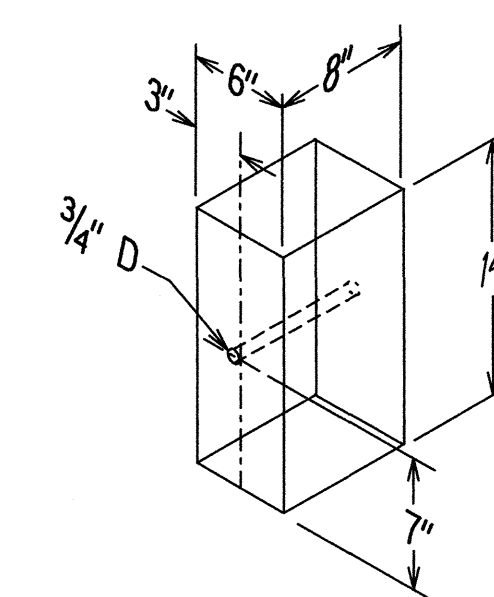
ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SEC., 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'
E740	1	PIPE SLEEVE
E750	1	BEARING PLATE, 8" x 8" x 5/8"
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
P650	2	5.5" x 7.5" x 45" WOOD POSTS
P671	5	6" x 8" x 6' WOOD CRT POST
P675	5	6" x 8" x 14" TIMBER BLOCKOUT
HARDWARE		
B580122	24	5/8" Dia. x 1 1/4" SPLICE BOLT
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B581004	2	5/8" Dia. x 10" HEX BOLT
B581002	1	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	5	5/8" Dia. x 18" H.G.R. BOLT (POST 3-7)
N050	34	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, STRUT 2, POST 2, 1/2 POST 3 THRU 7, 5)
W050	10	5/8" Dia. H.G.R. WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
E350	2	3/8" x 3" LAG SCREW
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
W050A	16	1 1/16" OD X 9/16" ID A325 STR. WASHER

Foundation Tube Options For Posts 1 & 2

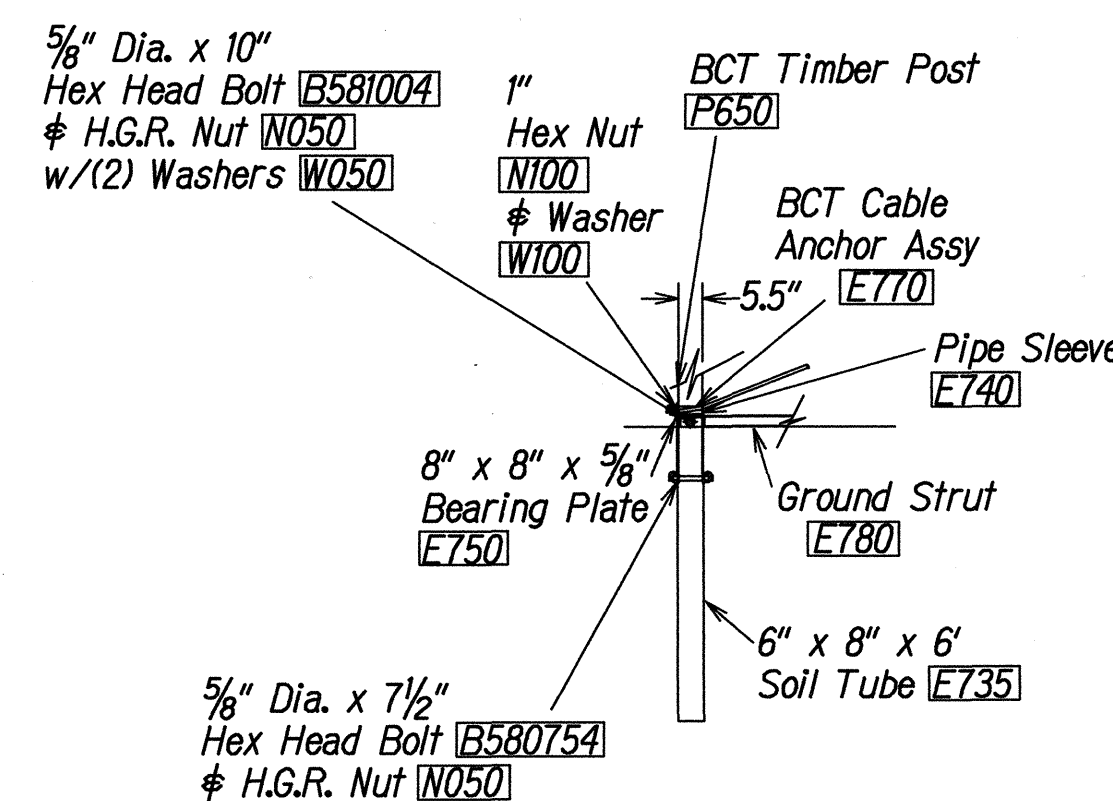
- *6'-0" Split Foundation Tubes S730
- *6'-0" Solid Foundation Tubes E731
- *5'-0" Foundation Tubes S735 W/Soil Plates SP600
- *4'-6" Foundation Tubes E735 W/Soil Plates SP600



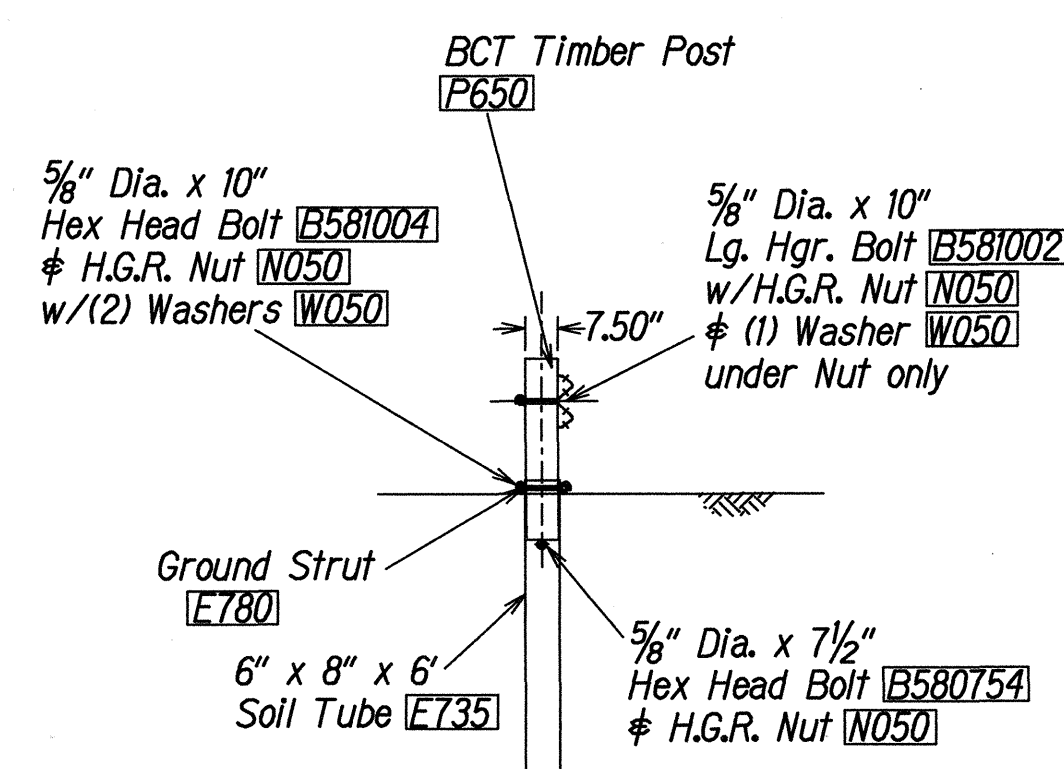
POSTS 1 & 2



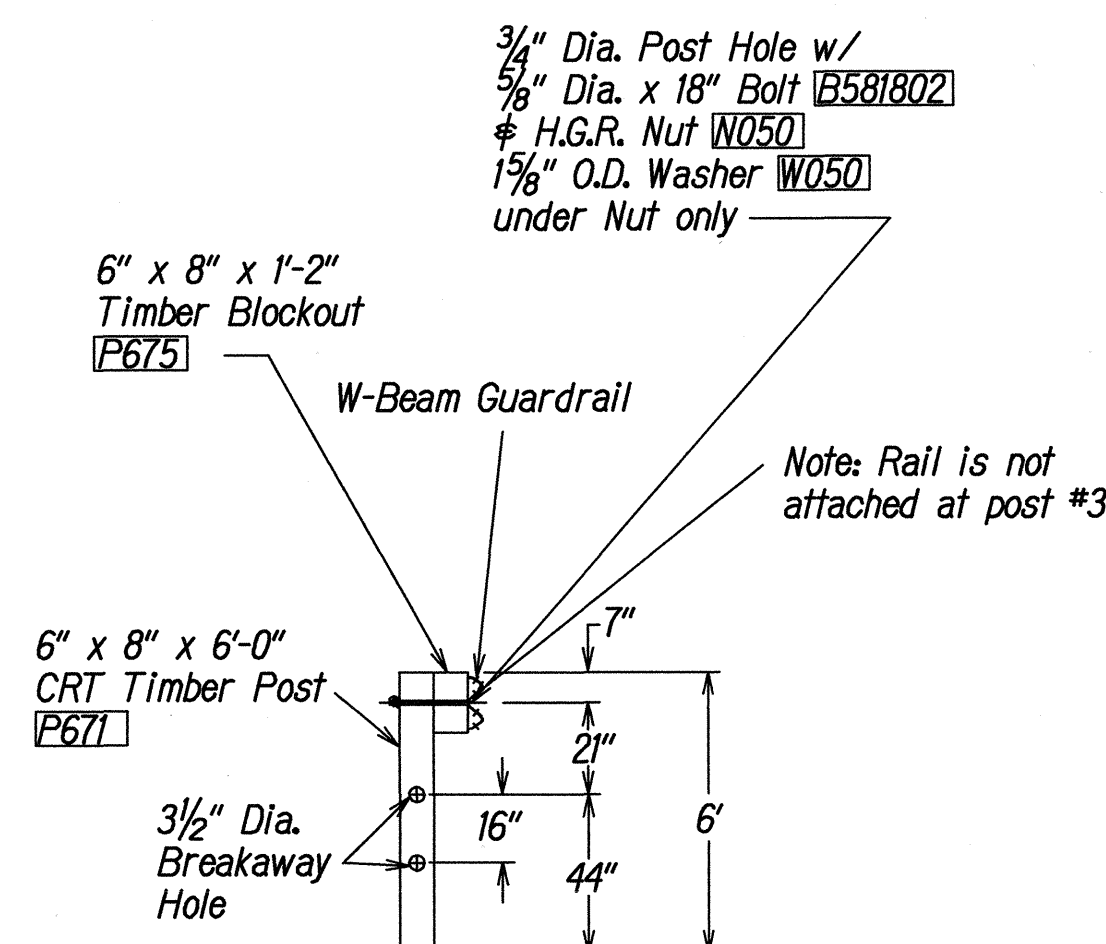
TIMBER BLOCKOUT



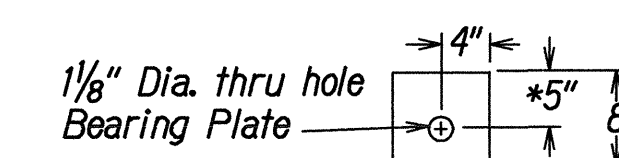
PARTIAL VIEW OF POST 1



SECTION A-A
at Post #2

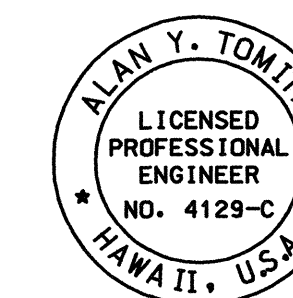


SECTION B-B
typical @ Post 3 - 7



*for bearing plate placement, the 5" side should be installed up

BEARING PLATE E750



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Alan Y. Tomita

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350

FLARED ENERGY ABSORBING TERMINAL

HAWAII BELT ROAD RESURFACING
Vicinity of Maipunalei to Kilau Gulch
Project No. 19H-01-99M

Scale: NTS Date: May, 1999

SHEET No. 6 OF 6 SHEETS

19

DESIGNED BY	DATE
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	