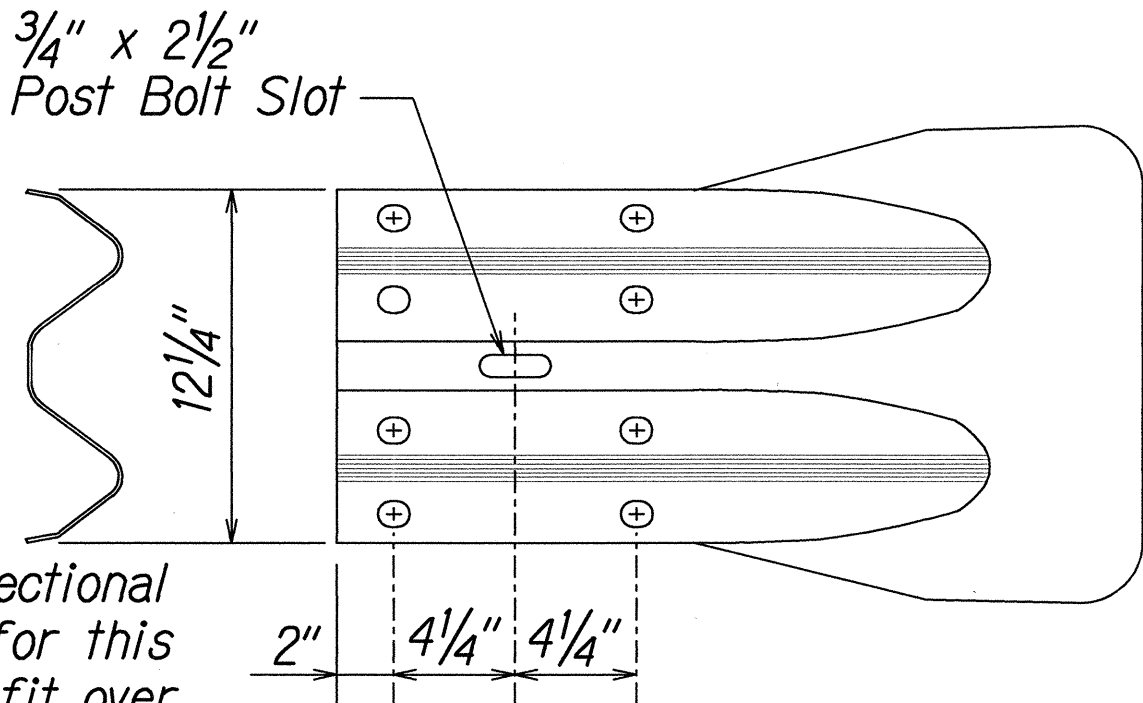
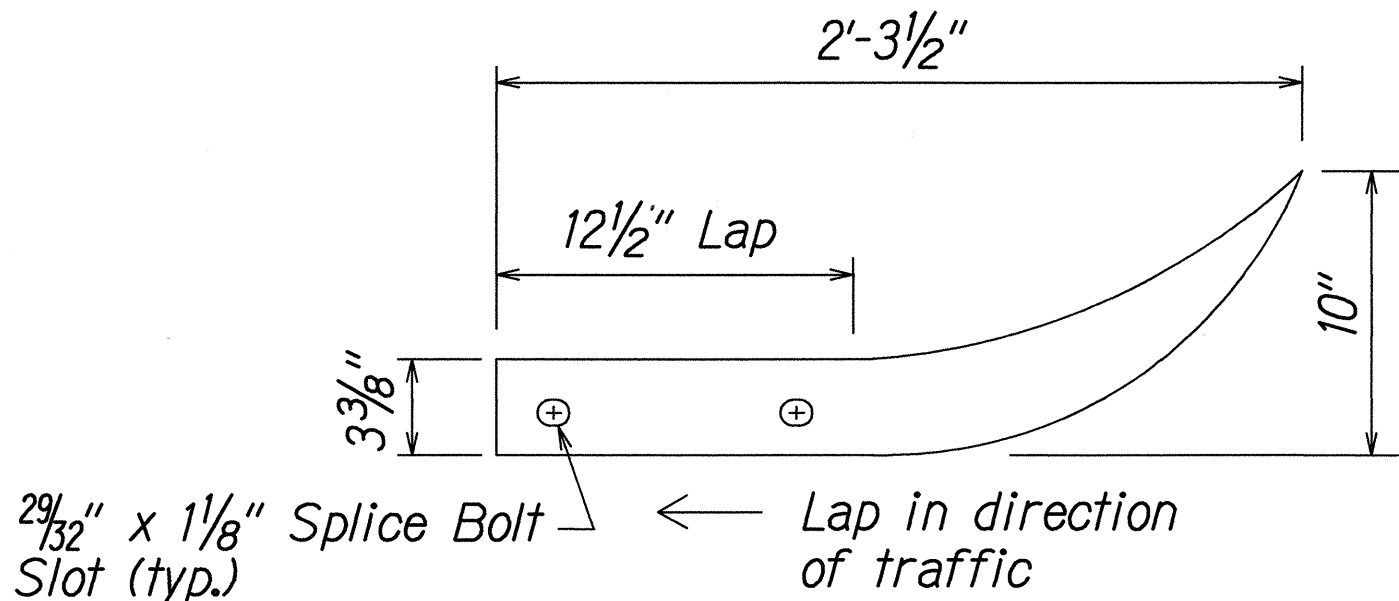








FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	65B-01-01M	2001	21	58



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.

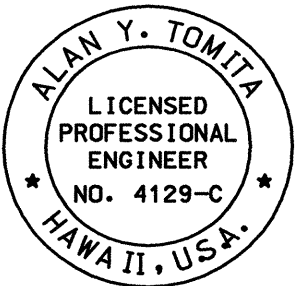
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)

Item No.	Description
RWE01a	W-Beam End Section (Flared), 12 Gauge
RWM02a	W-Beam, 12 Gauge

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

rl/31/2000 tdt/ruby/guardrail/tes/revdgn (standard plan TE-51 r09/01/87)



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*Alan Y. Tomita*

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

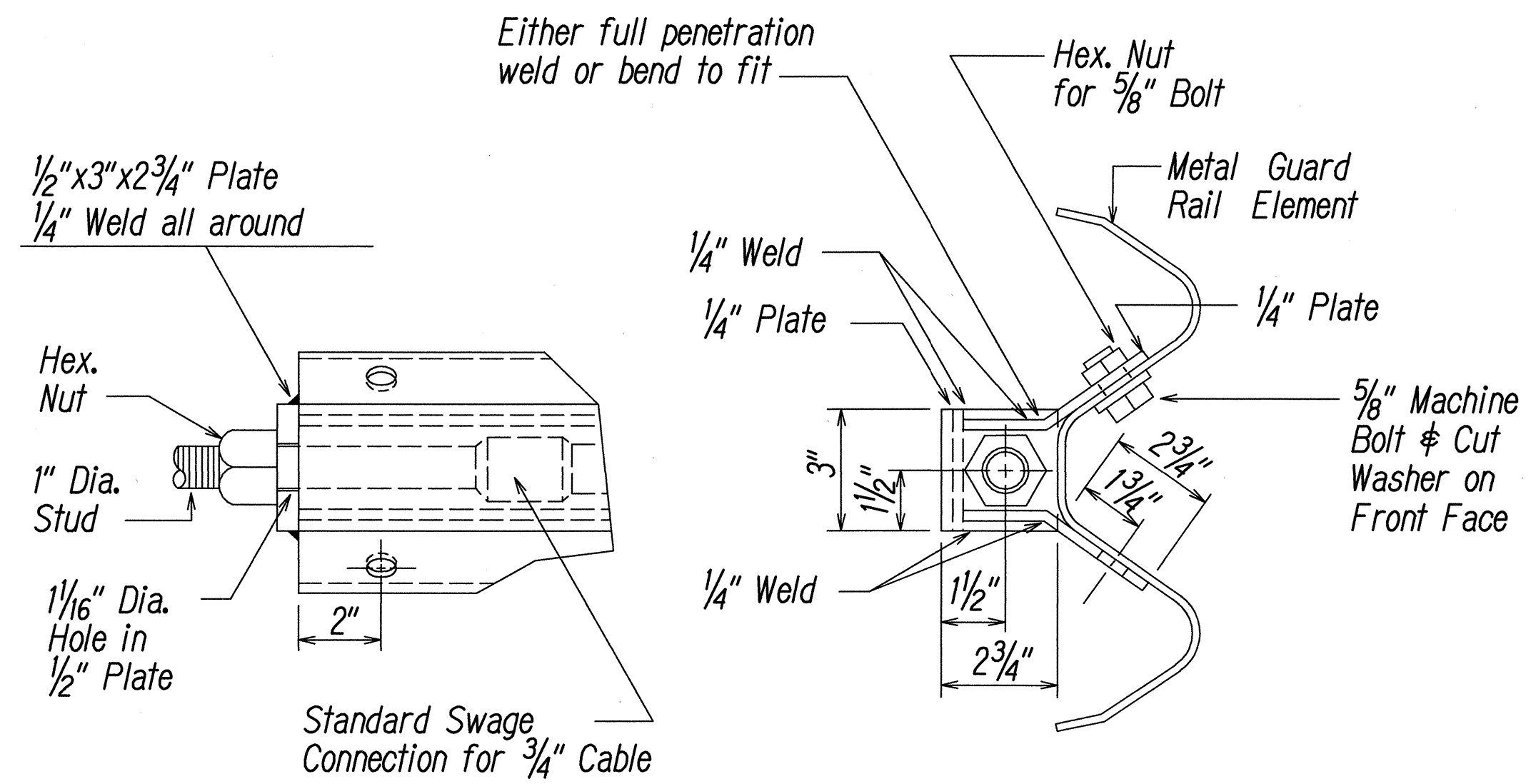
**MISCELLANEOUS GUARDRAIL DETAILS**

*MOKAPU SADDLE ROAD SLOPE STABILITY*  
*Vicinity of Mikiola Dr. to Kahinani Place*  
*Project No. 65B-01-01M*

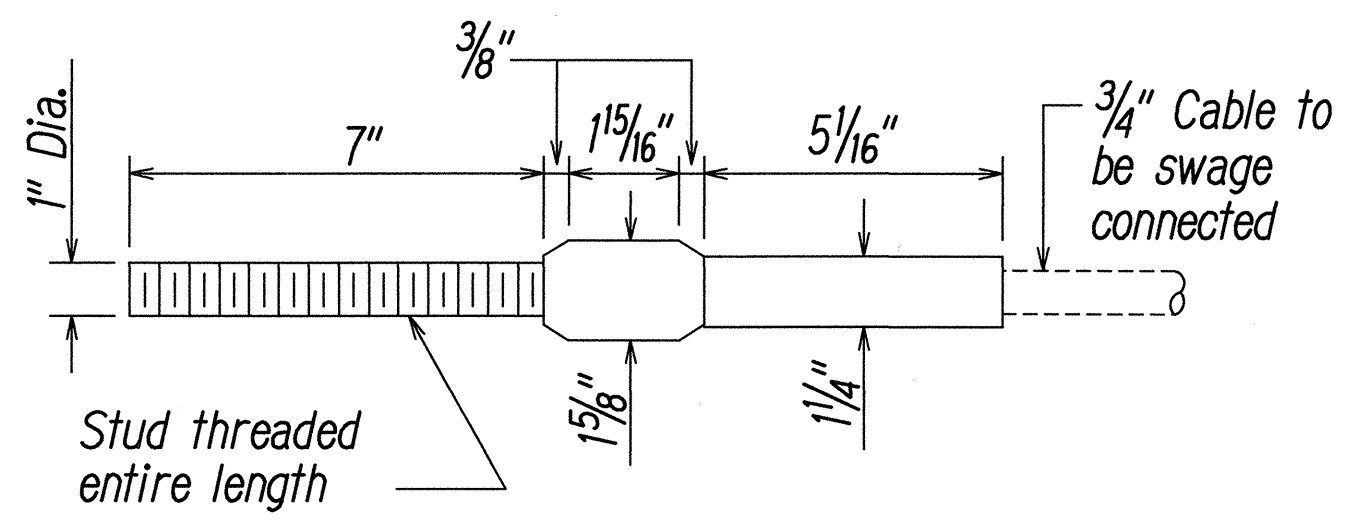
Scale: As Shown Date: May, 2001

SHEET No. 3 OF 7 SHEETS

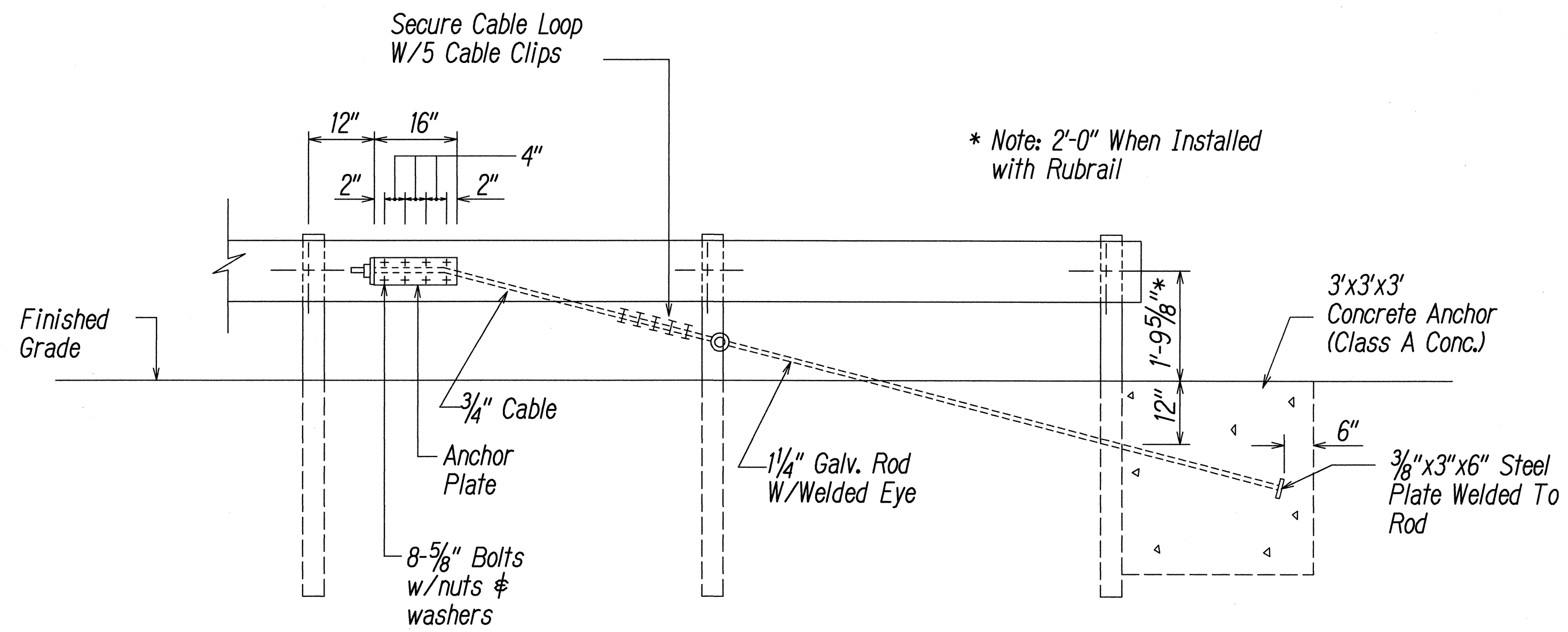
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	65B-01-01M	2001	22	58



ANCHOR PLATE DETAILS

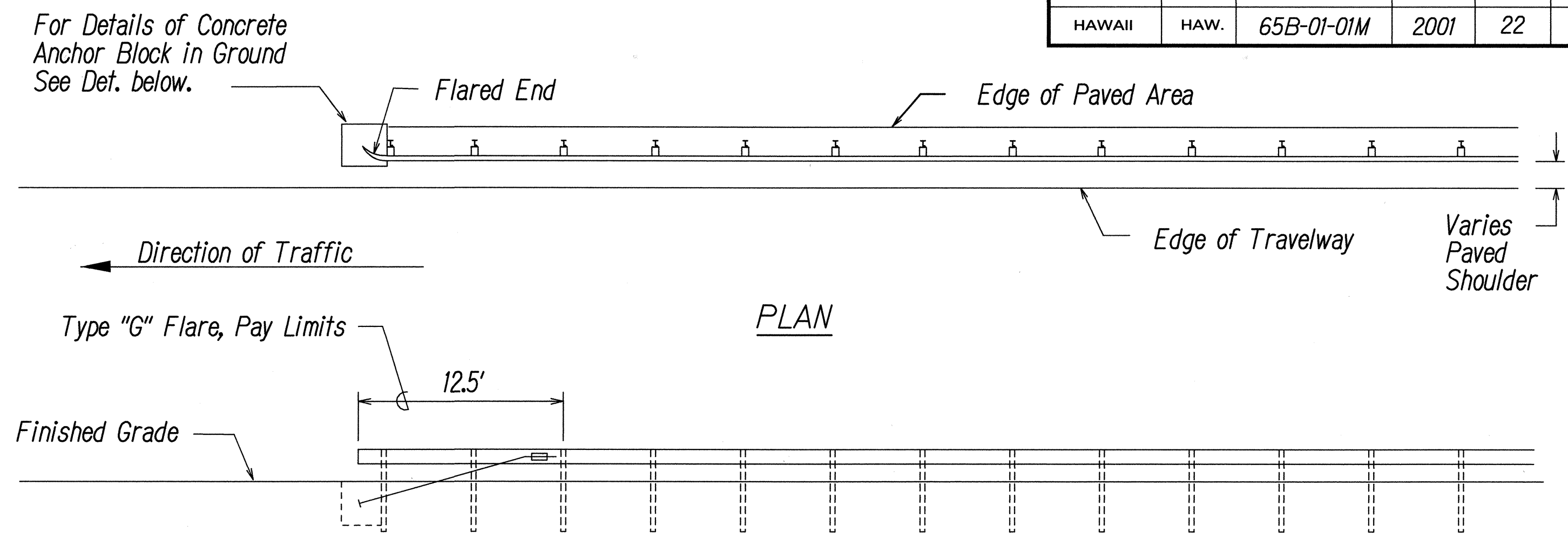


STANDARD SWAGED FITTING AND STUD



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.



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 installation.

13/01/99 1d1rubby/guardrail/1e59rev.dgn (Standard Plan T.E-59 11/03/89)

DATE: \_\_\_\_\_  
 SURVEY PLOTTED BY: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 DESIGNED BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 NO. \_\_\_\_\_

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

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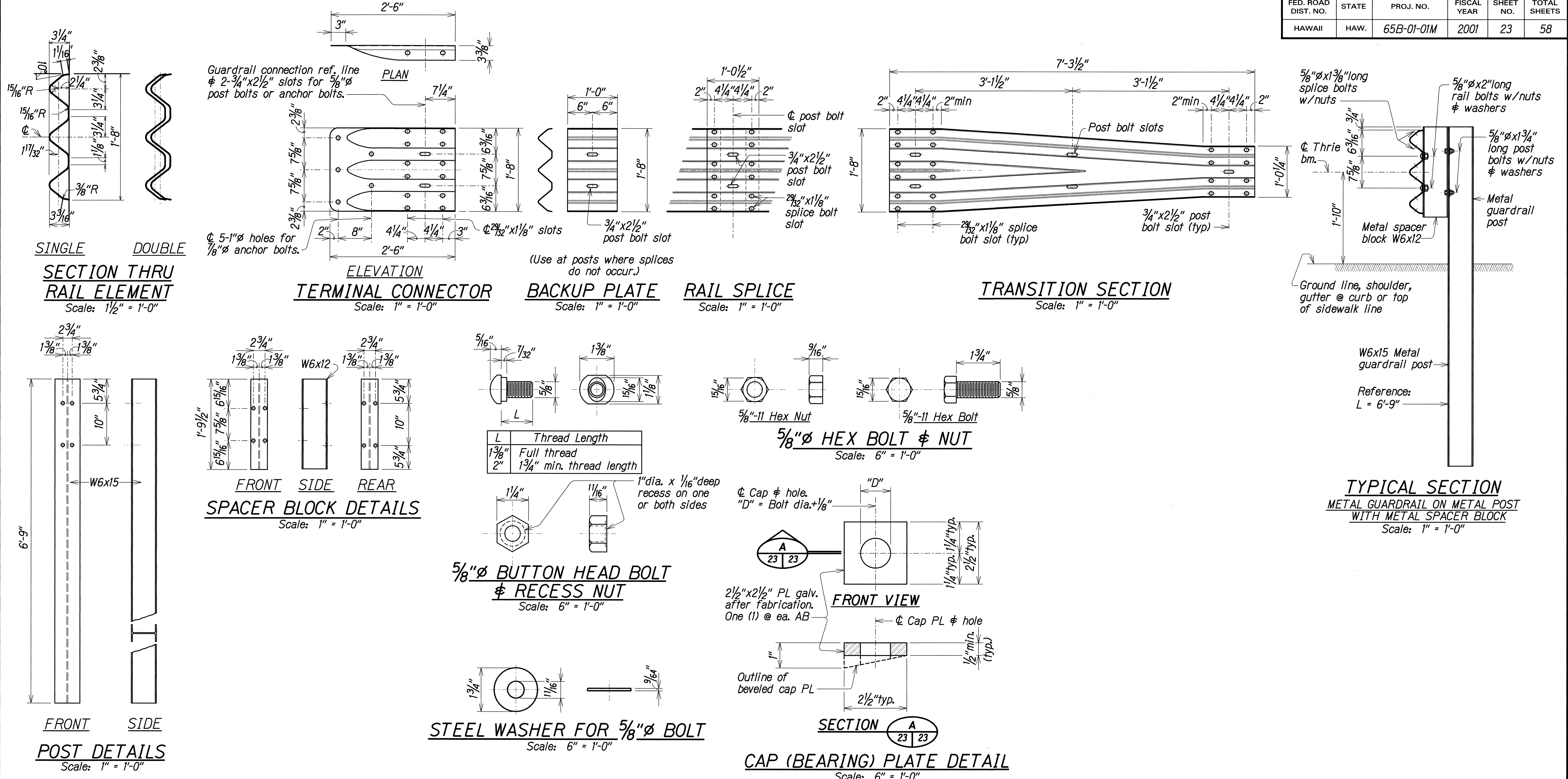
*Alan Y. Tomita*

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MISCELLANEOUS GUARDRAIL DETAILS**

MOKAPU SADDLE ROAD SLOPE STABILITY  
Vicinity of Mikiola Dr. to Kahinani Place  
Project No. 65B-01-01M  
Scale: NTS Date: May, 2001  
SHEET No. 4 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	65B-01-01M	2001	23	58



DATE	WAX 1999
SURVEY PLOTTED BY	KSG
DRAWN BY	ST
DESIGNED BY	ST
QUANTITIES BY	ST
CHECKED BY	ST

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

**ENDPOST**

**METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS**

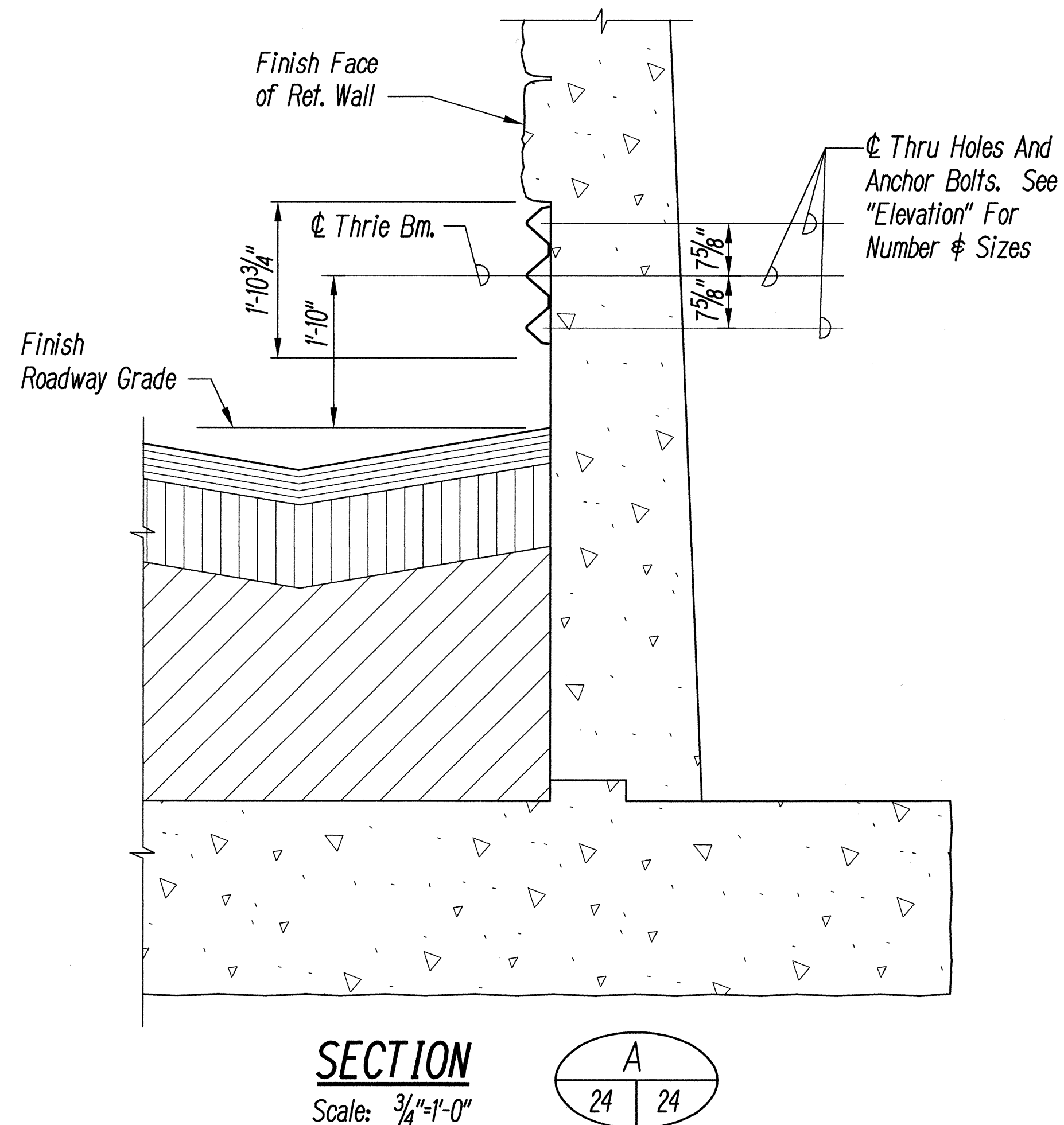
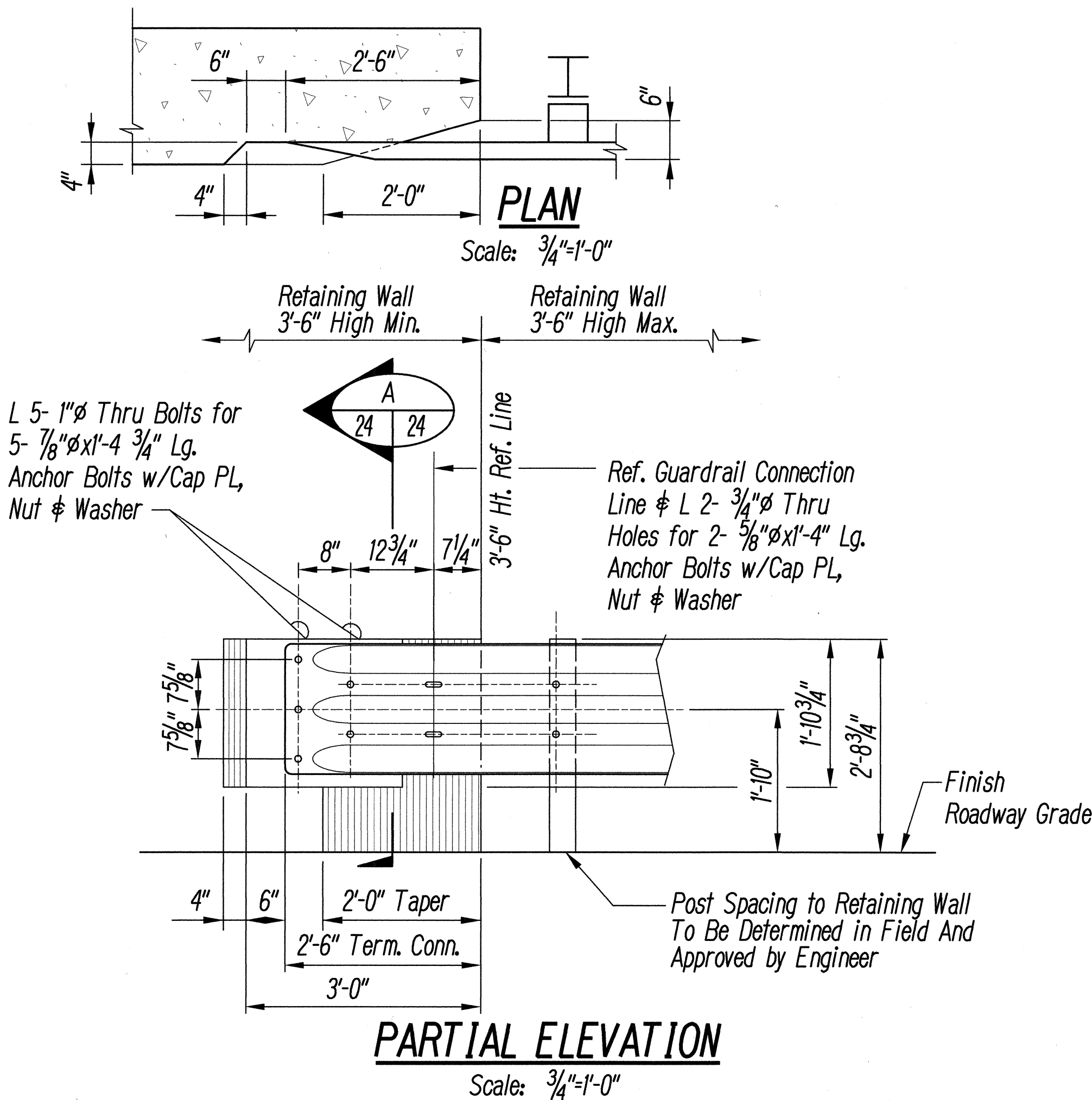
MOKAPU SADDLE ROAD SLOPE STABILITY  
Vicinity of Mikiola Dr. to Kahinani Place  
Project No. 65B-01-01M

Scale: As Shown Date: May, 2001

SHEET No. 5 OF 7 SHEETS

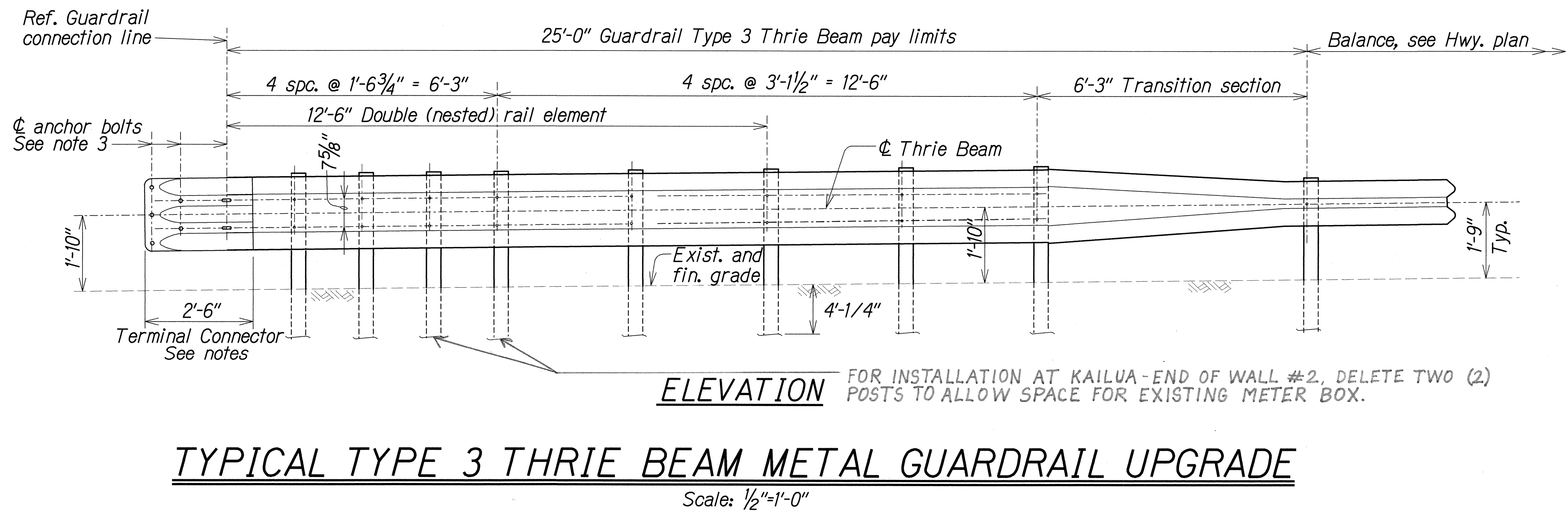


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	65B-01-01M	2001	24	58

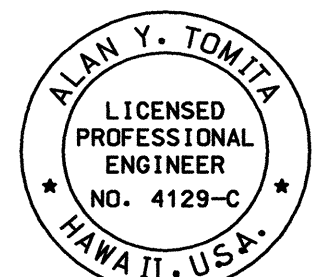


### NOTES:

- The work necessary to connect guardrail to concrete end post or metal spacer block shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.3112, Guardrail Type 3 Thrie Beam Transition to End Post or Jersey Barrier and will not be paid for separately.
- Terminal connector, guardrail post, spacer block, transition section and all other associated hardware will not be paid for separately and shall be considered incidental to Item No. 606.3112 - Guardrail Type 3 Thrie Beam Transition to End Post or Median Barrier.
- See "General Notes" on Sht. Q1 for additional jersey barrier, guardrail and drilling information.
- All anchor bolts shall be high strength bolts conforming to the requirements of AASHTO M 164. See Special Provisions.
- Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
- Terminal connector, Thrie Beam Metal Guardrail and Transition Section shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180 and shall be hot-dip galvanized after fabrication. See Special Provisions.
- Guardrail posts, spacer blocks, "terminal connectors" and all anchor bolts, cap PL, bolts, nuts, and washers shall be hot-dip galvanized after fabrication.
- Cap PL shall be fabricated from ASTM A 36.
- First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
- Double (nest 1st panel) thrie beam elements at all end post connections.
- Where double (nested) beam occur, 12" "Back-up Plate" not required.
- Heads of through anchor bolts shall be placed on the traffic side of the rail.
- Drilling of through holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.



## TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL UPGRADE



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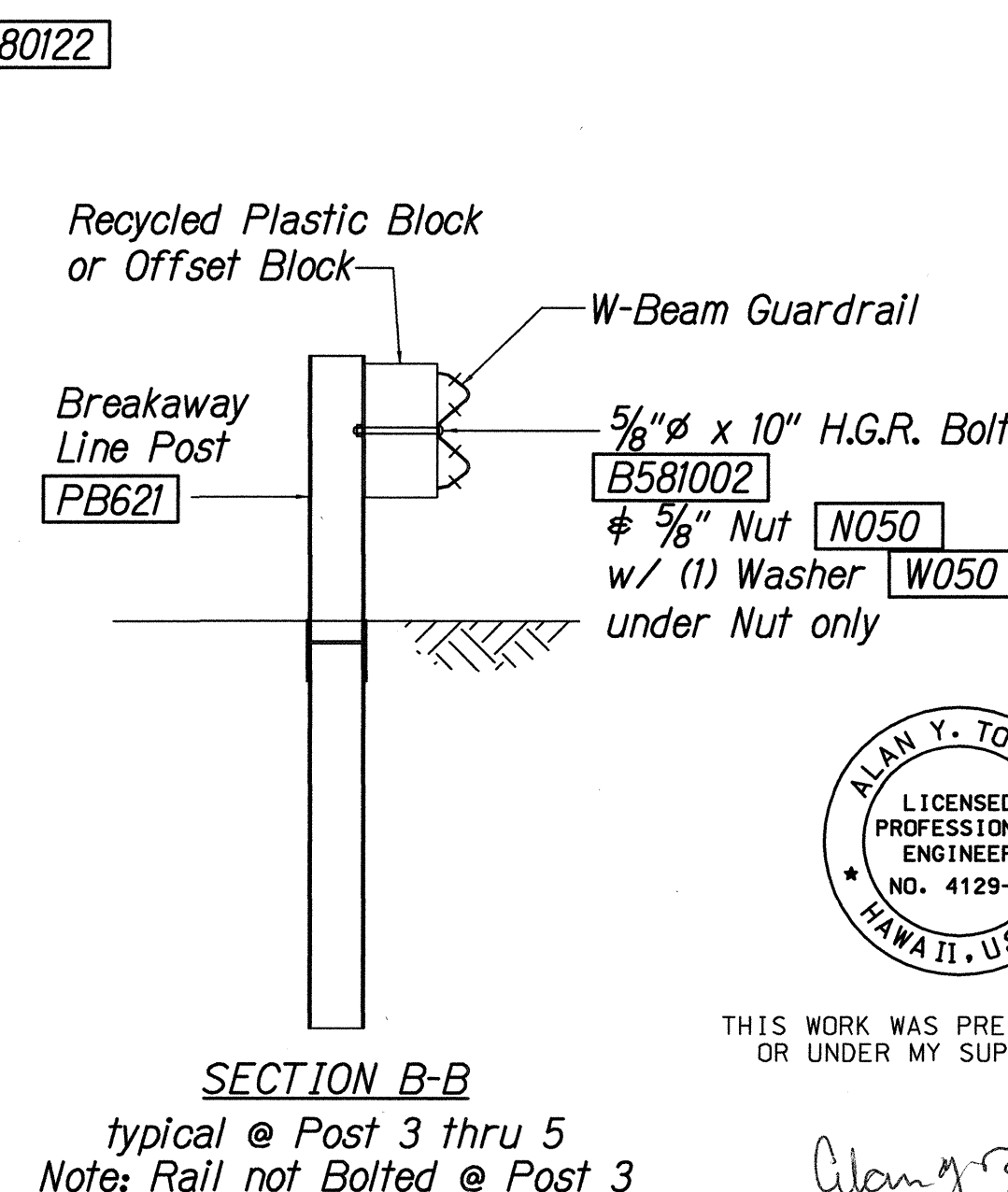
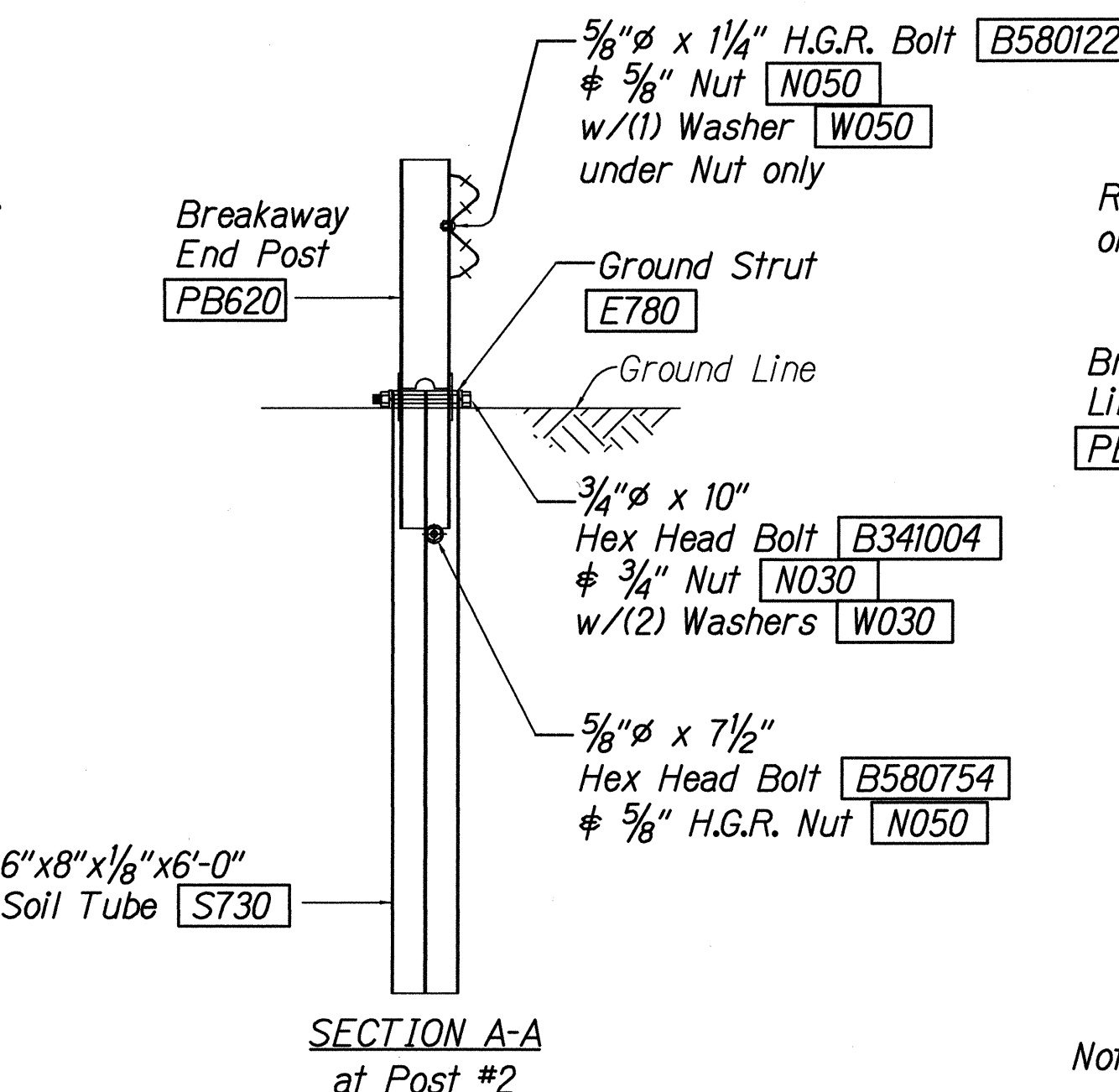
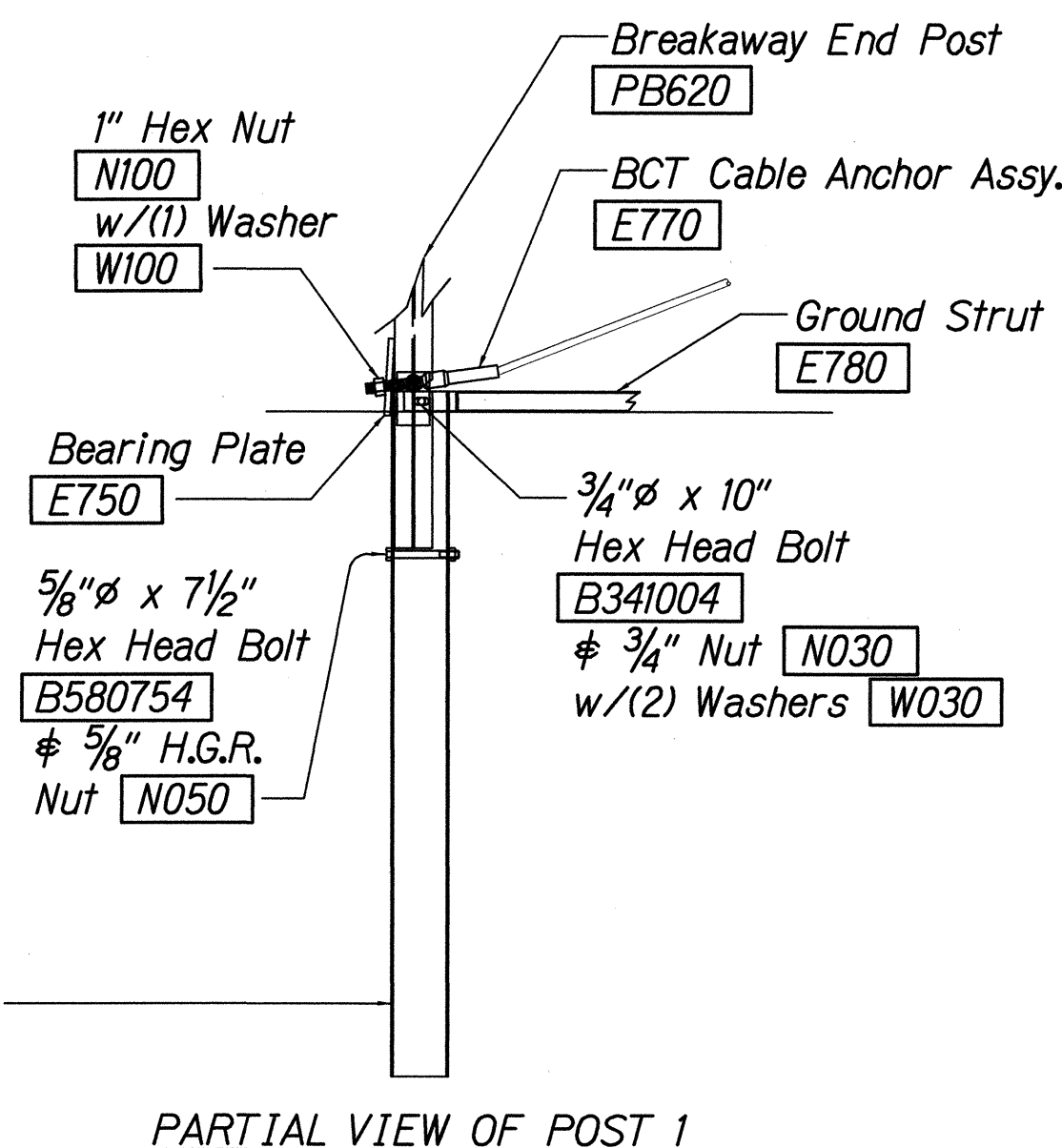
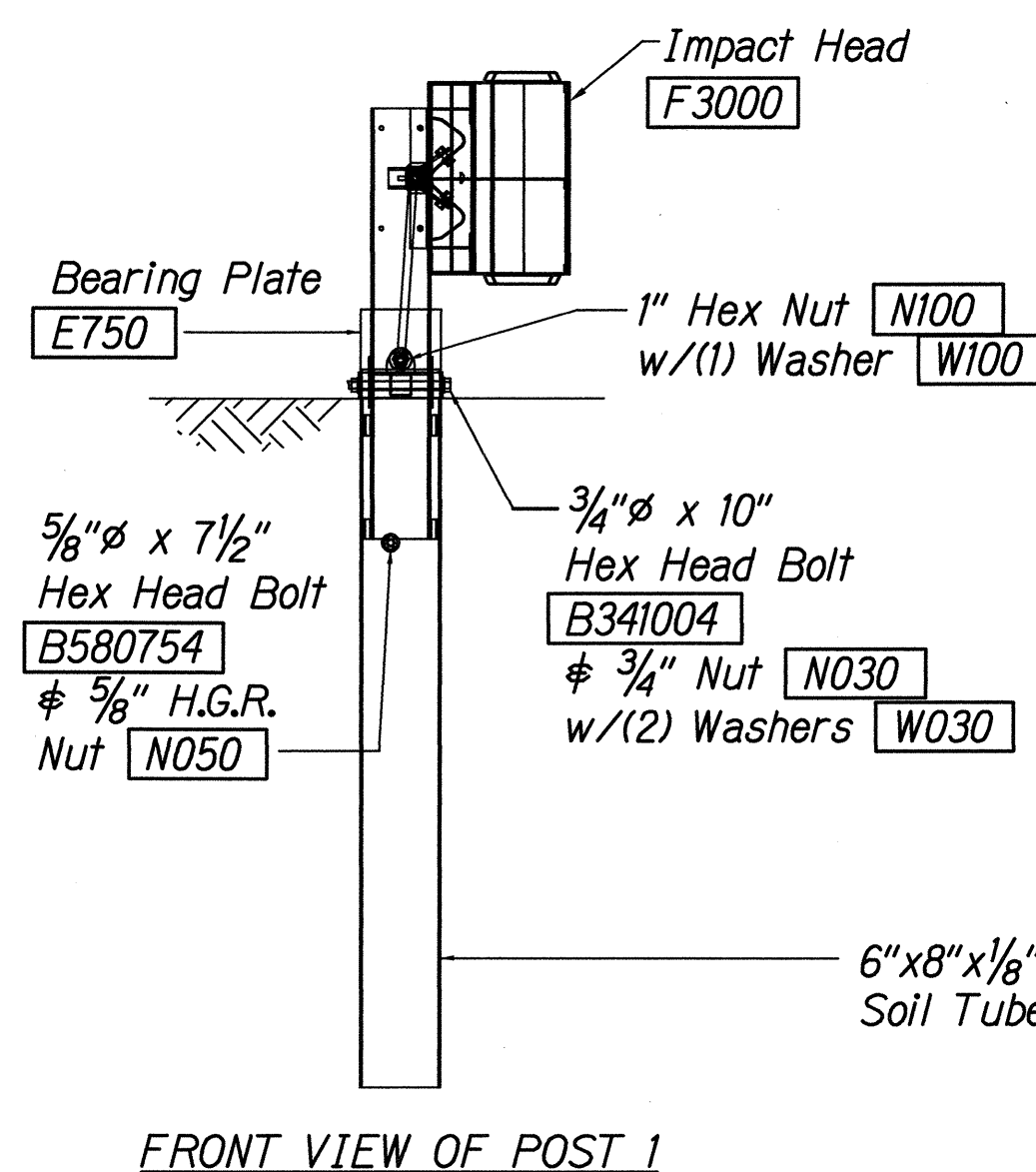
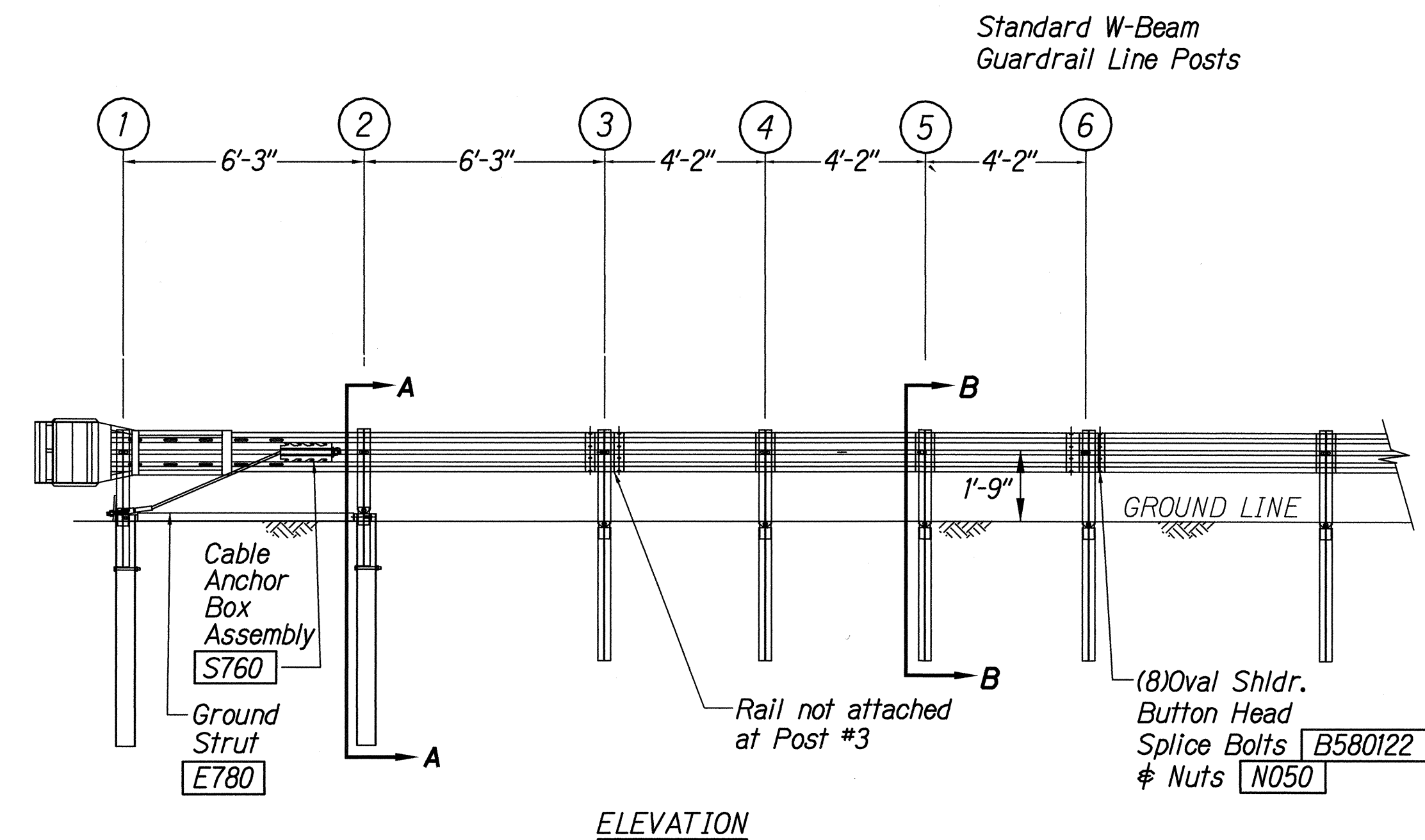
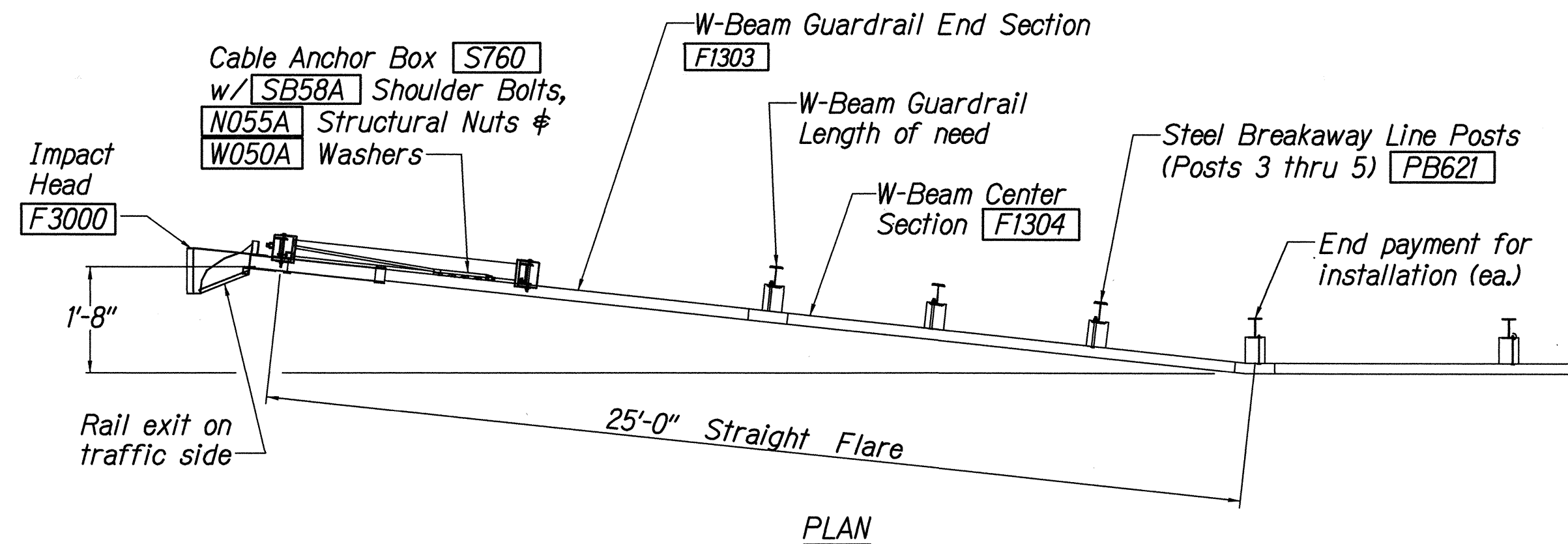
Alan Y. Tomita

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**ENDPOST**  
**METAL GUARDRAIL TYPE 3 THRIE BEAM  
AND APPURTENANCES DETAILS**  
MOKAPU SADDLE ROAD SLOPE STABILITY  
Vicinity of Mikiola Dr. to Kahinani Place  
Project No. 65B-01-01M  
Scale: As Shown Date: May, 2001

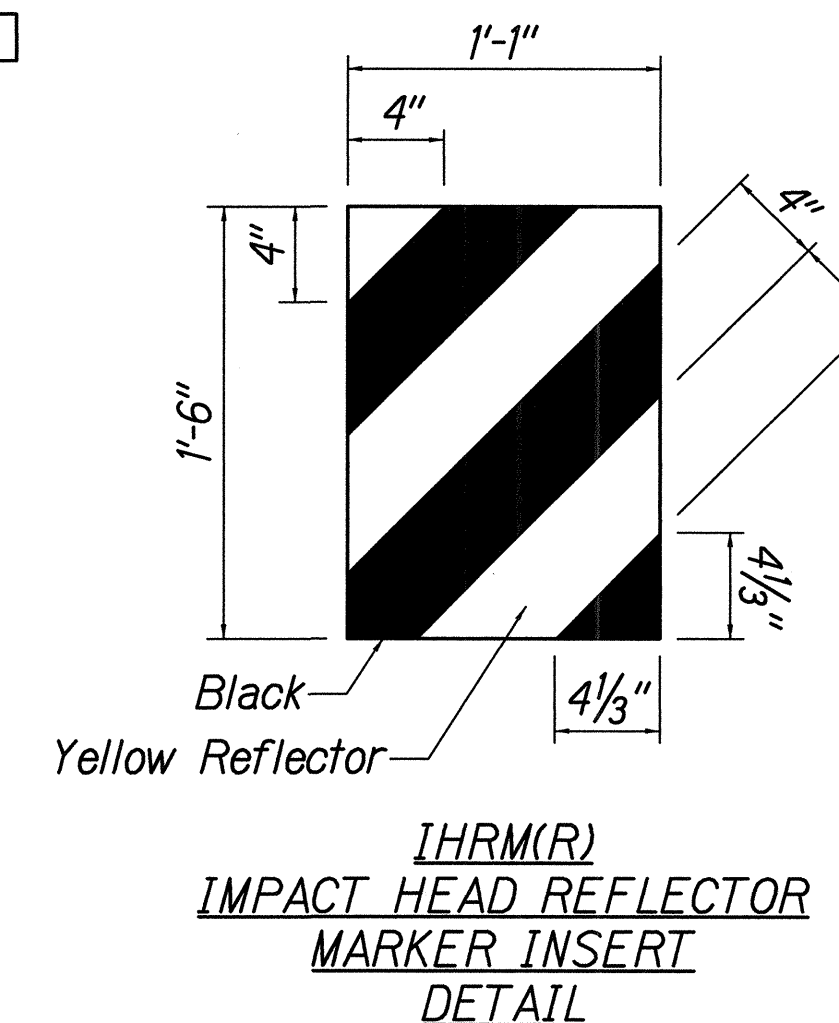
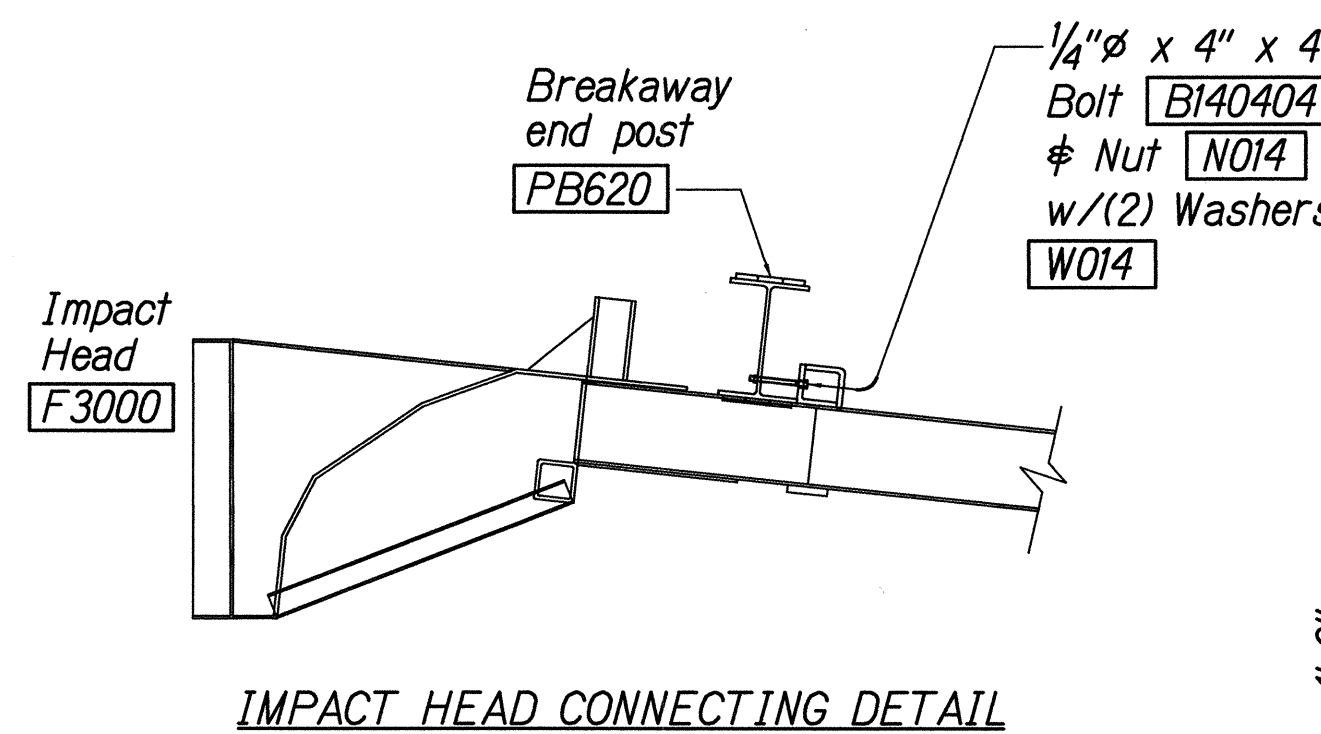
SHEET No. 6 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	65B-01-01M	2001	25	58



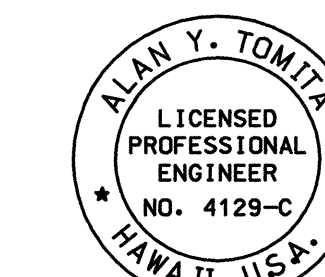
# GENERAL NOTES:

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 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 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. (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
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'-0"
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
PB620	2	BREAKAWAY END POST
PB621	3	BREAKAWAY LINE POST
	3	RECYCLED PLASTIC BLOCKOUT OR OFFSSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
HARDWARE		
B580122	17	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	3	5/8" Dia. x 10" H.G.R. BOLT (POSTS 3 THRU 5)
N030	2	3/4" Dia. HEX NUT
N050	22	5/8" Dia. H.G.R. NUT (SPLICE 16, SOIL TUBES 2, POSTS 2, 1; POSTS 3 THRU 5, 3)
W030	4	3/4" I.D. WASHER
W050	4	H.G.R. 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 Tube S730  
 \*6'-0" Solid Foundation Tube E731  
 \*5'-0" Foundation Tube S735 W/Soil Plate SP600  
 \*4'-6" Foundation Tube E735 W/Soil Plate SP600



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Scale: NTS Date: May, 2001

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**FLEAT TL-2**  
**FLARED ENERGY ABSORBING TERMINAL**  
 MOKAPU SADDLE ROAD SLOPE STABILITY  
 Vicinity of Mikiola Dr. to Kahinani Place  
 Project No. 65B-01-01M  
 Scale: NTS Date: May, 2001  
 SHEET No. 7 OF 7 SHEETS