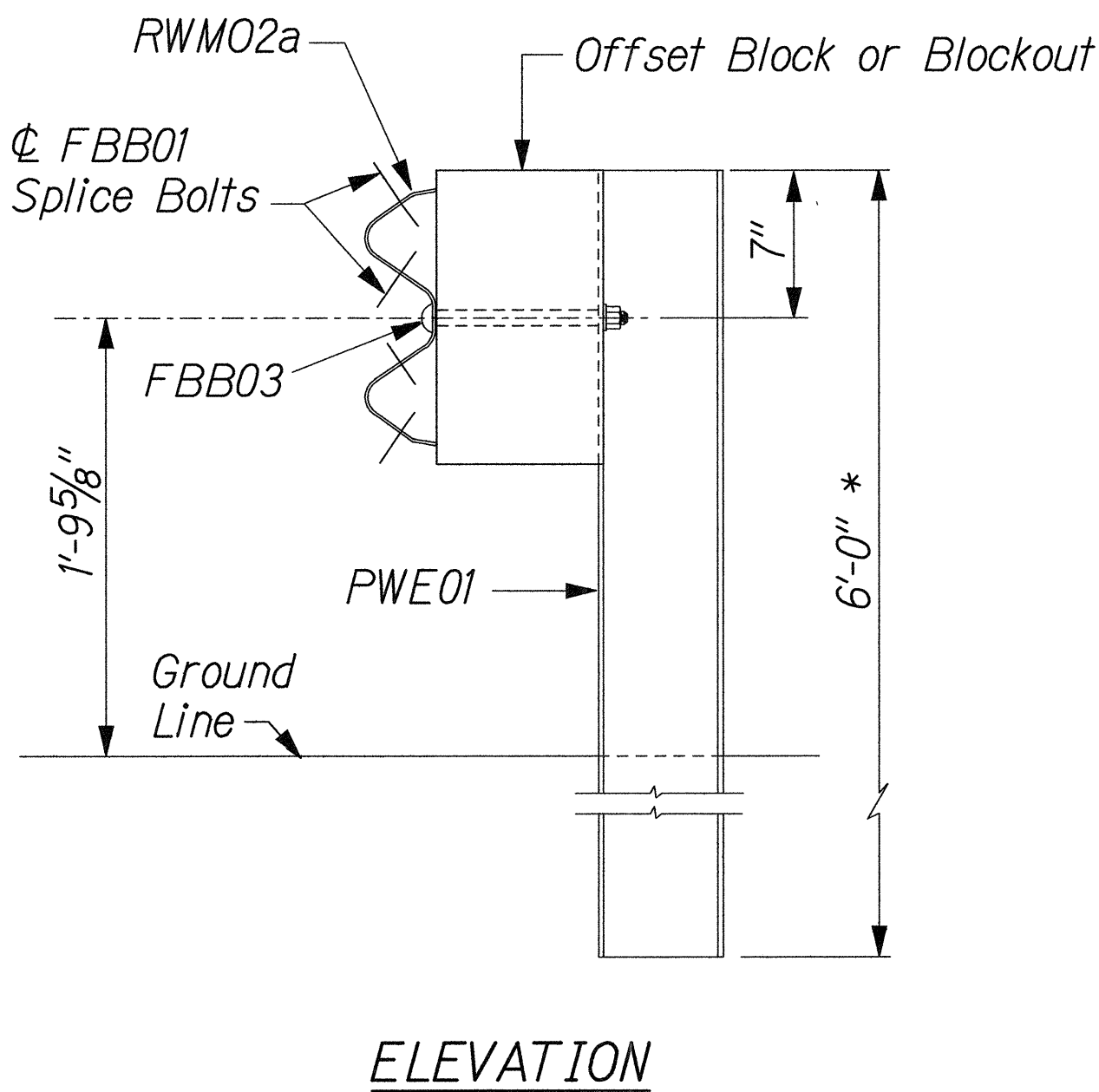
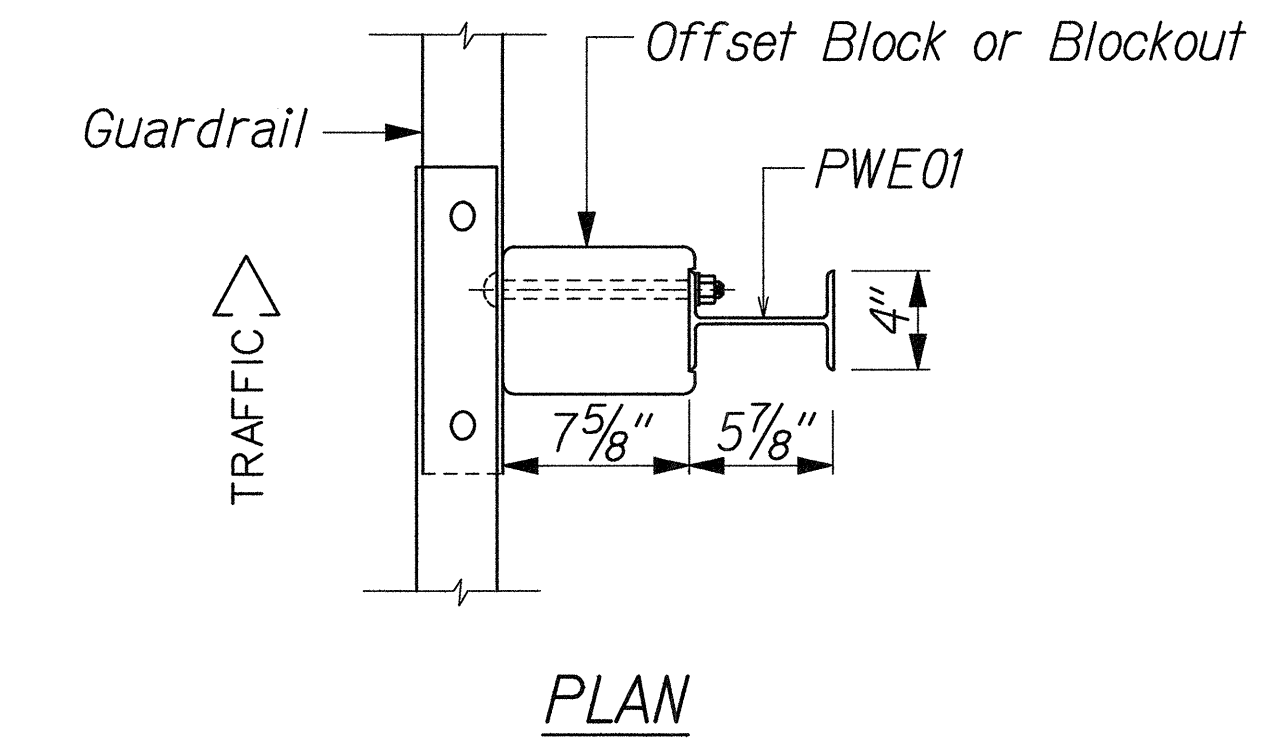
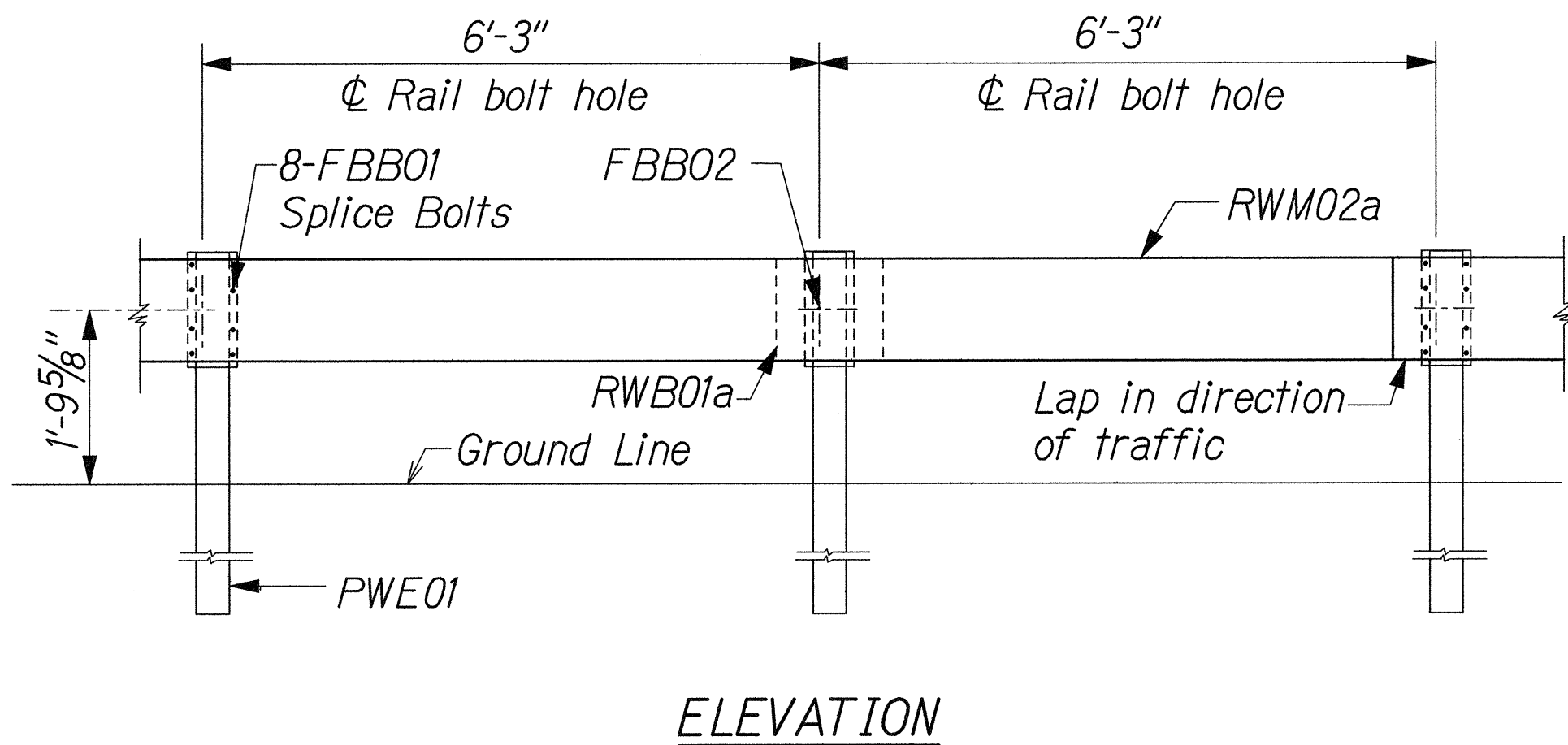


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FLH-0270(16) # FLH-0270(17)	2001	14	41

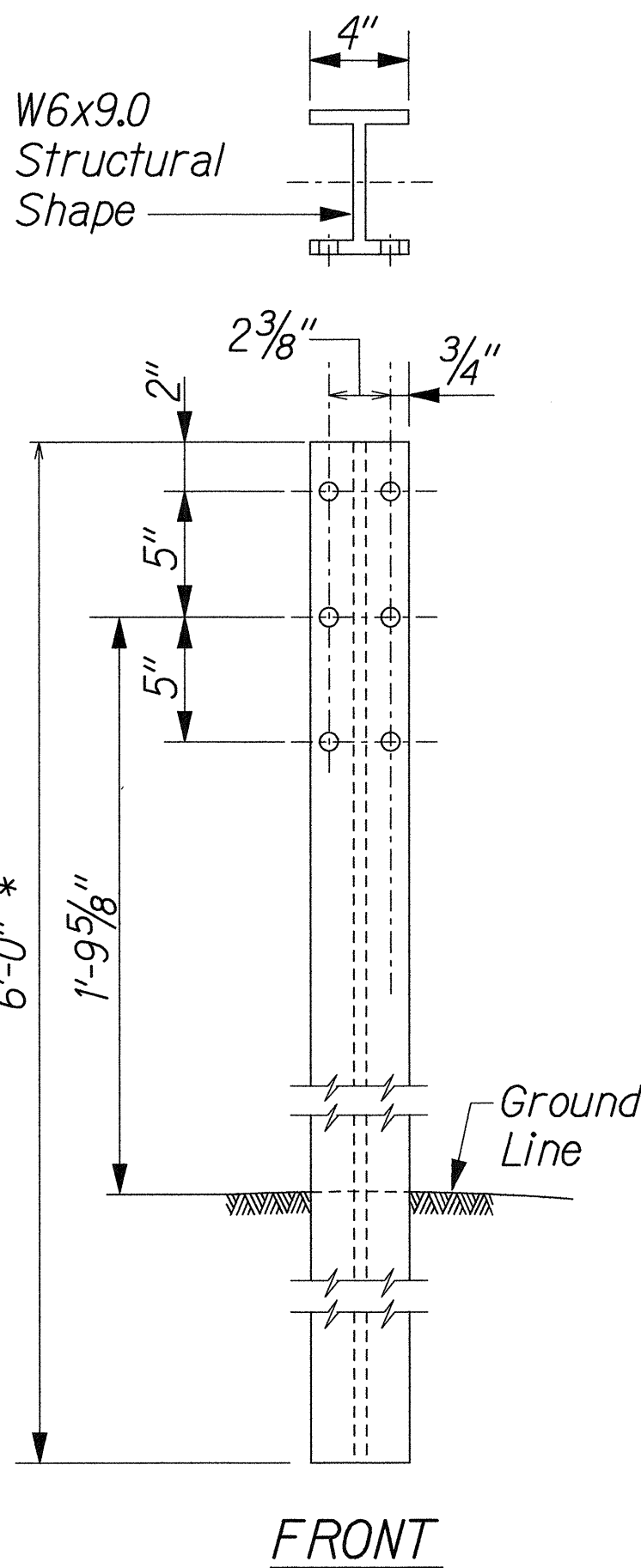


STRONG POST W-BEAM GUARDRAIL
(SGR04a)



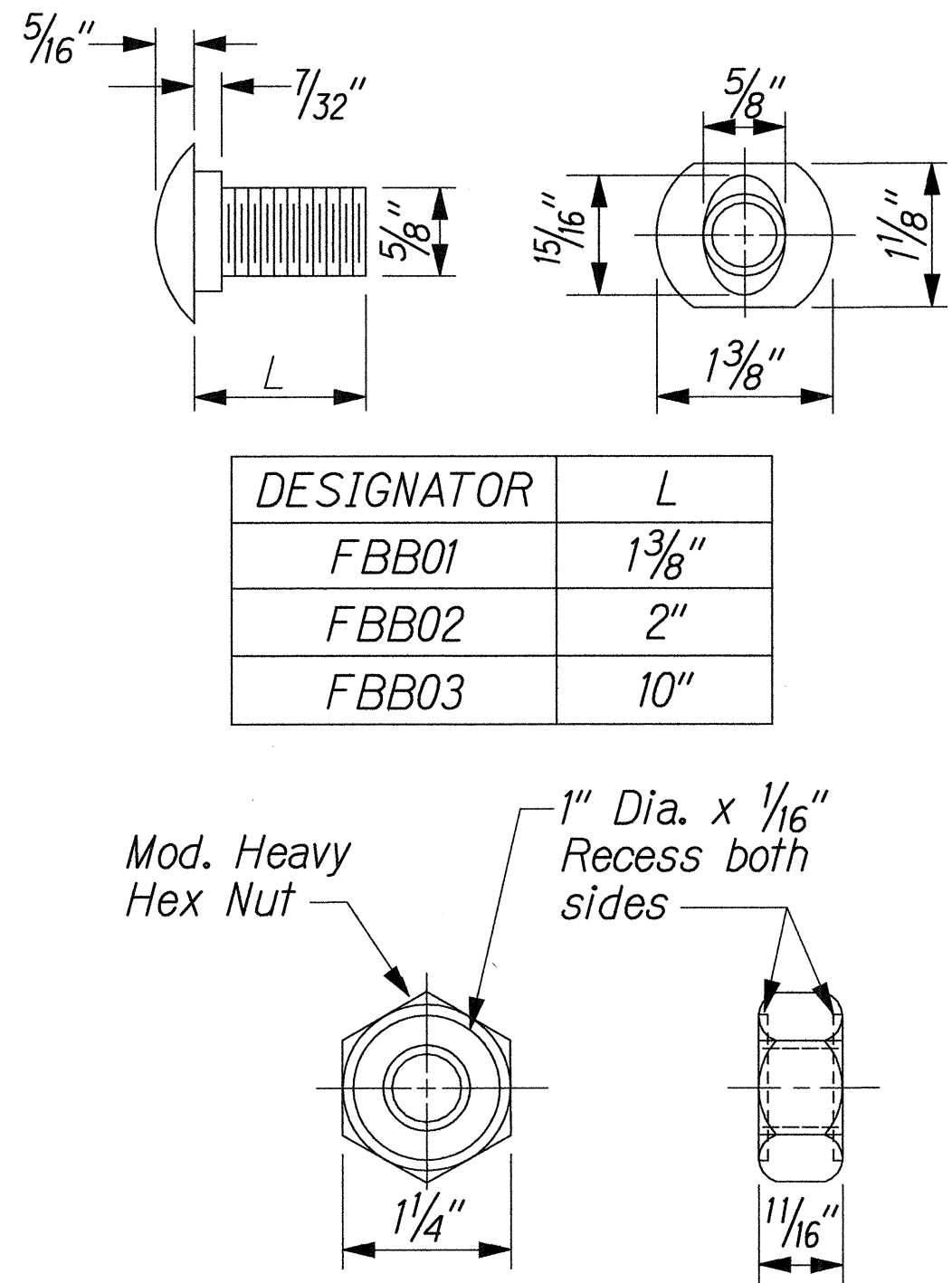
STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

NOTE:
All Holes are
3/4" Dia.



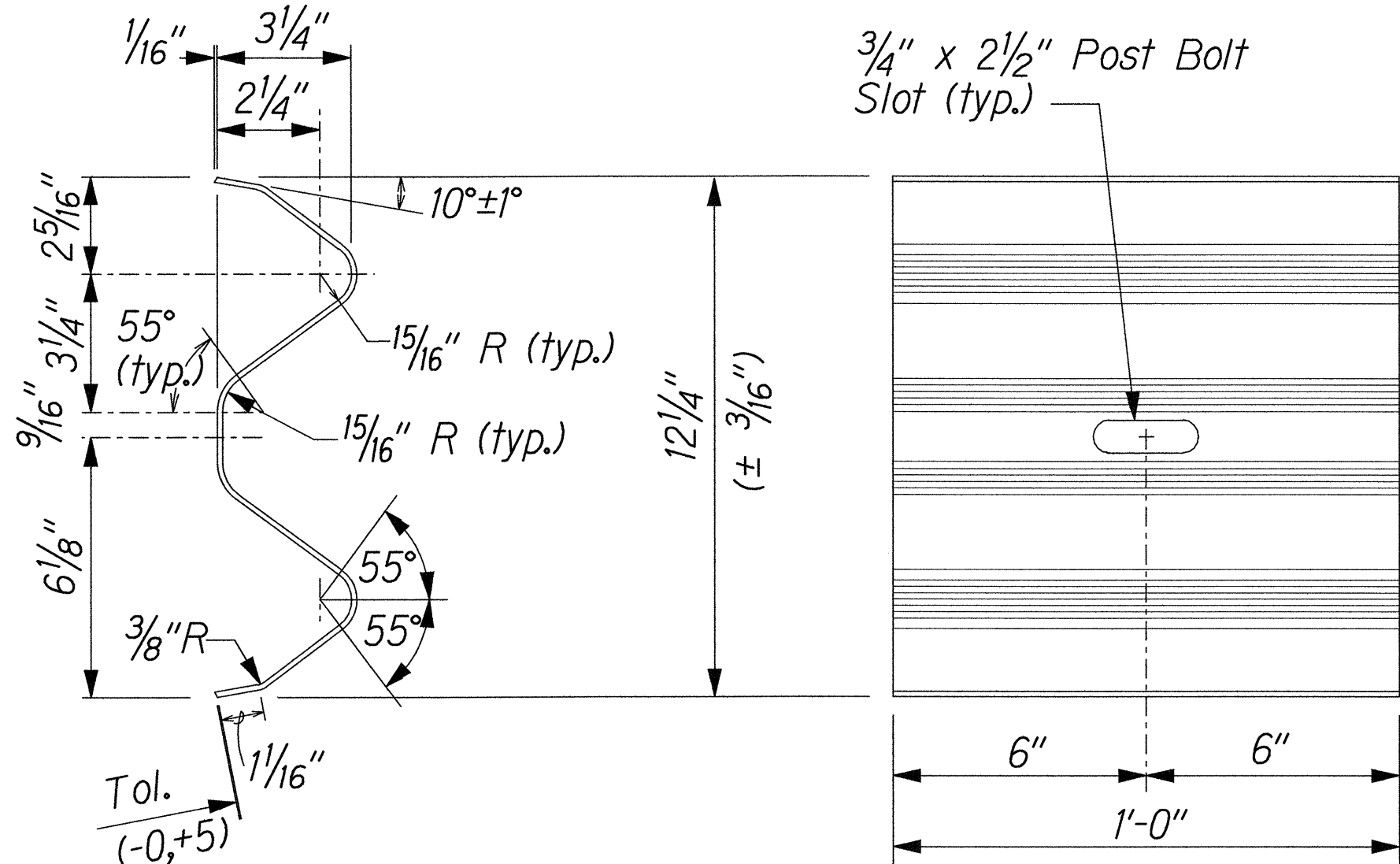
W-BEAM STRONG POST (PWE01)

*See General Note 2 on Sheet No. G1.



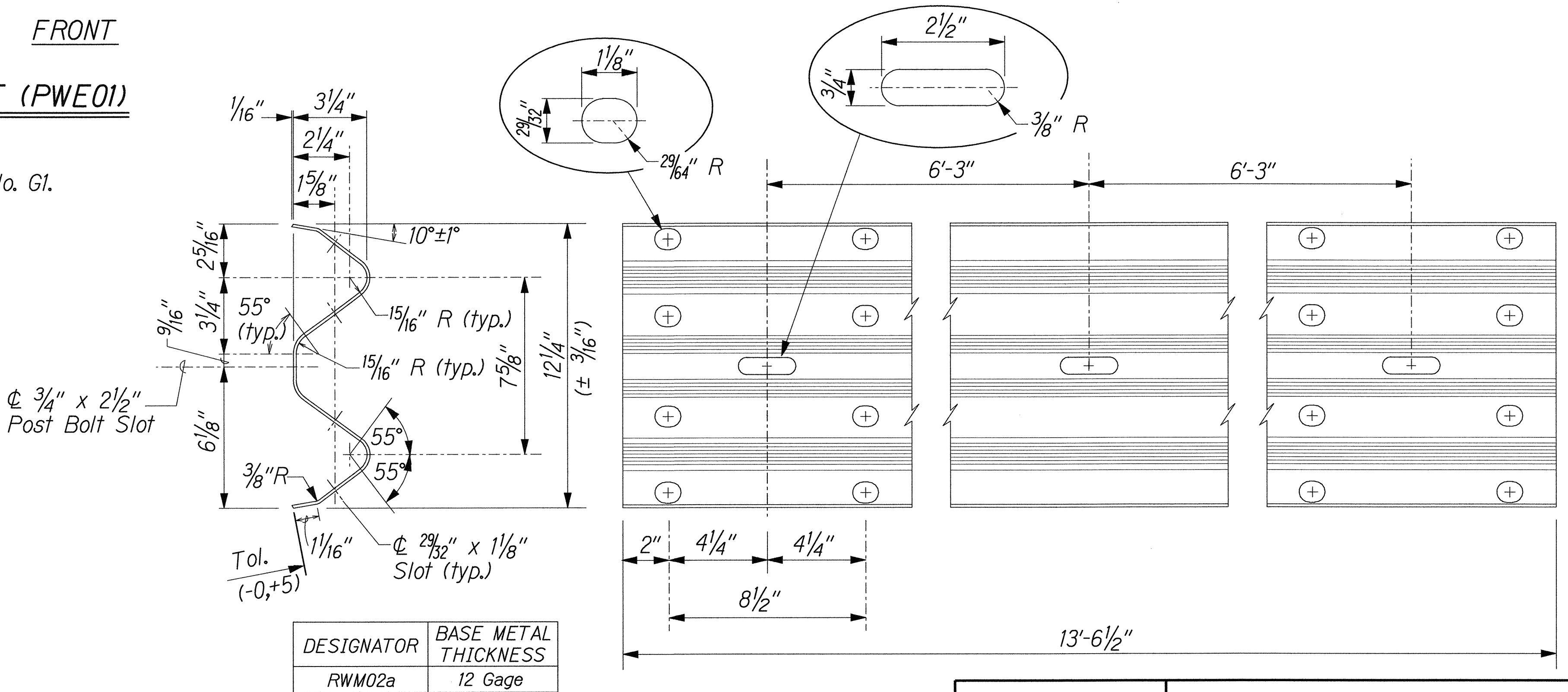
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND
RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gage

W-BEAM BACK-UP-PLATE (RWB01a)



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gage

2 SPACE W-BEAM GUARDRAIL (RWM02a)

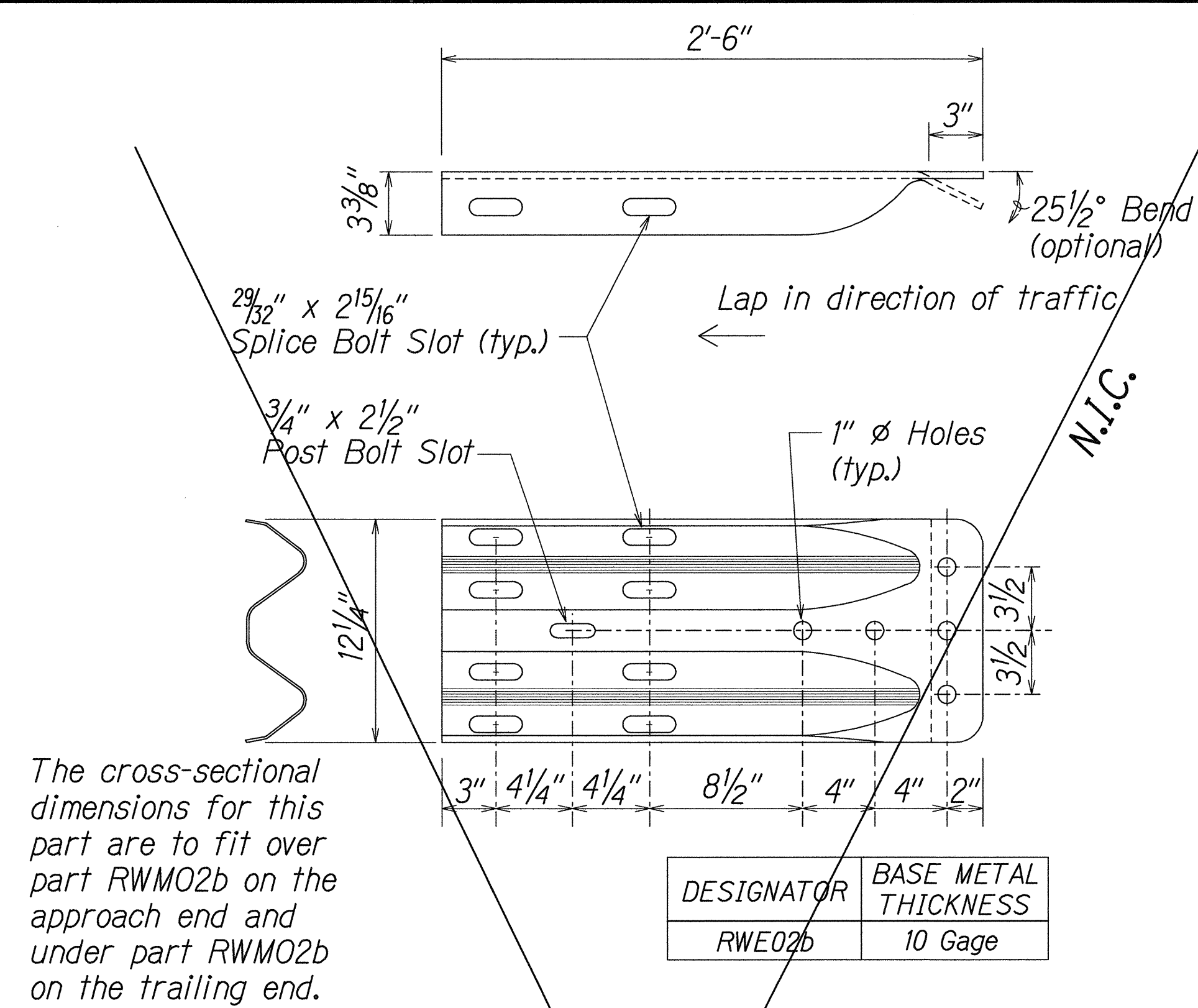
CLYDE T. SHIMIZU
LICENSED PROFESSIONAL ENGINEER
No. 5514-C
HAWAII, U.S.A.

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Clyde T. Shimizu

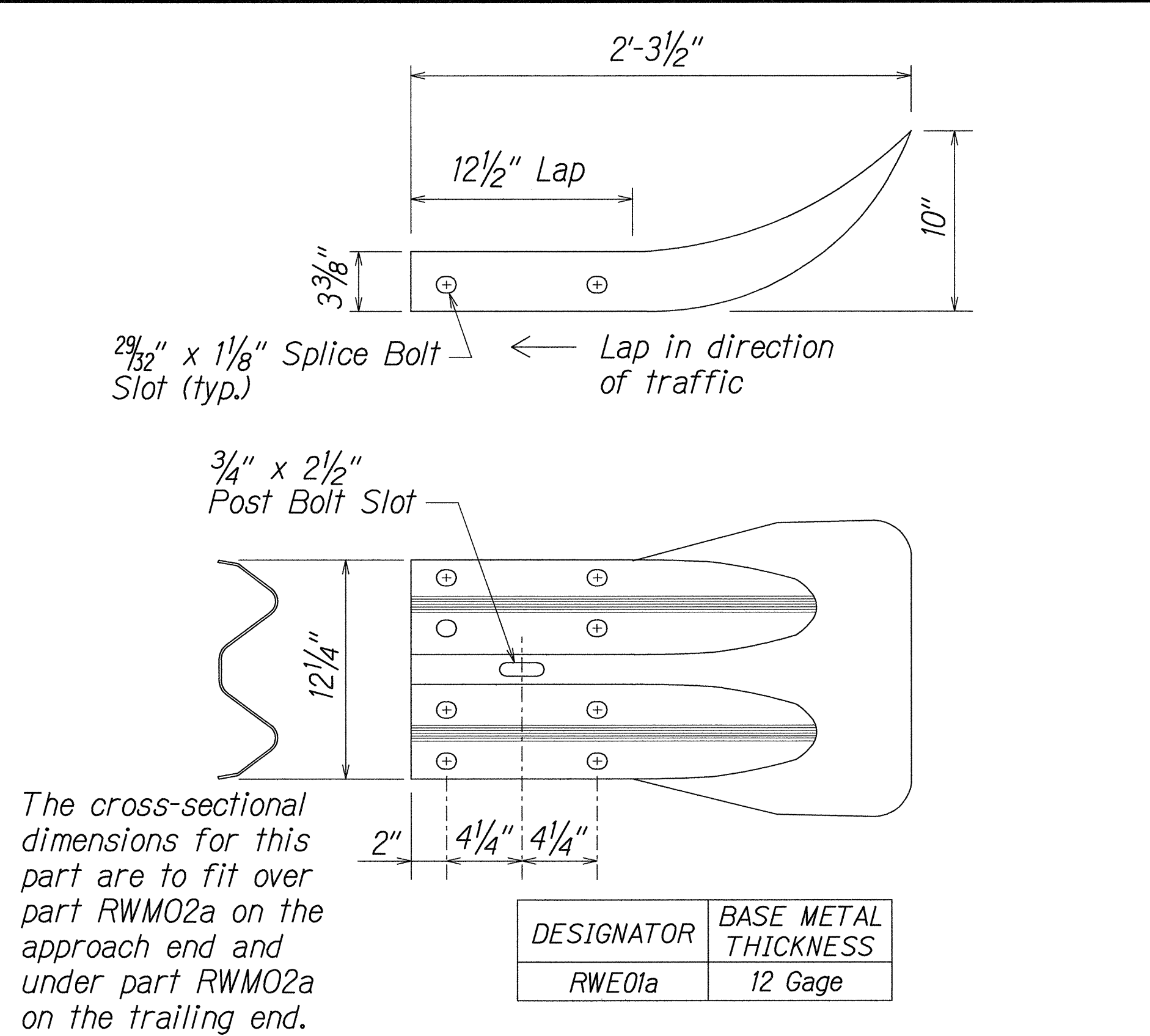
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

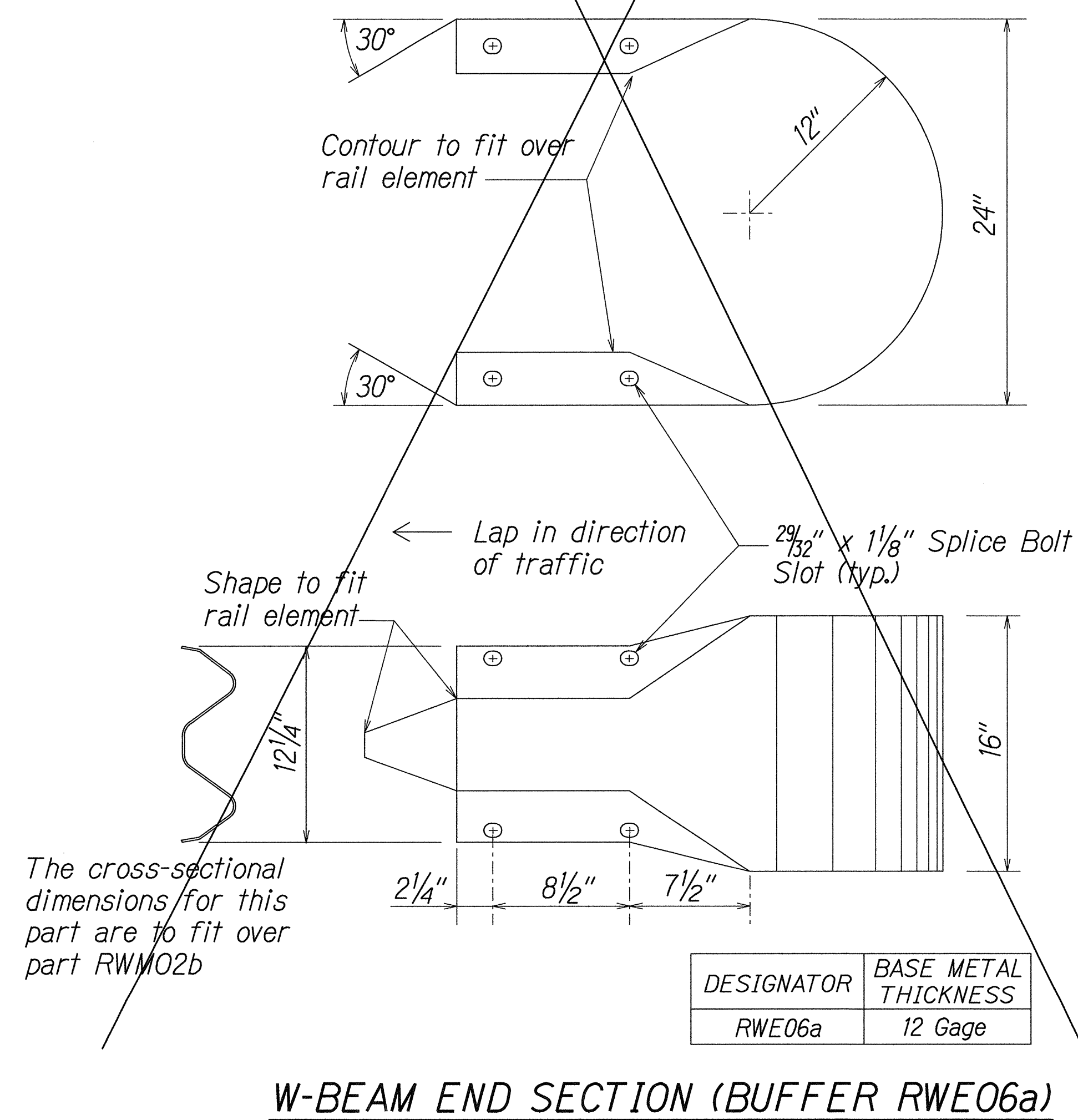
KAWAIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS
FAP NOS. FLH-0270(16) # FLH-0270(17)
Scale: None Date: Nov, 2000



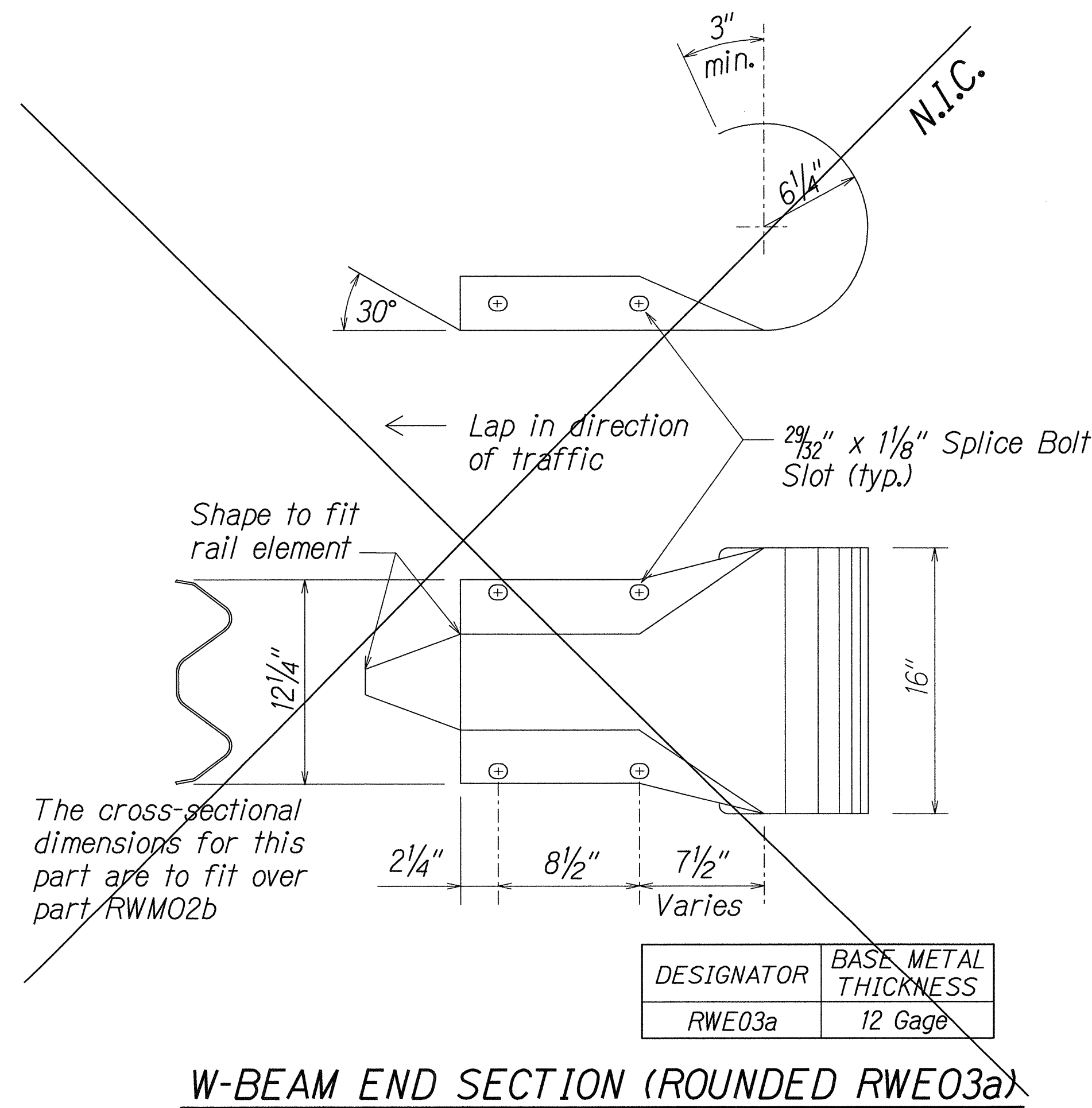
W-BEAM TERMINAL CONNECTOR (RWE02b)



W-BEAM END SECTION (FLARED RWE01a)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)

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

14/00E-PU'UKOHOLA/MSCT/REV1.dgn

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Clyde T. Shimizu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

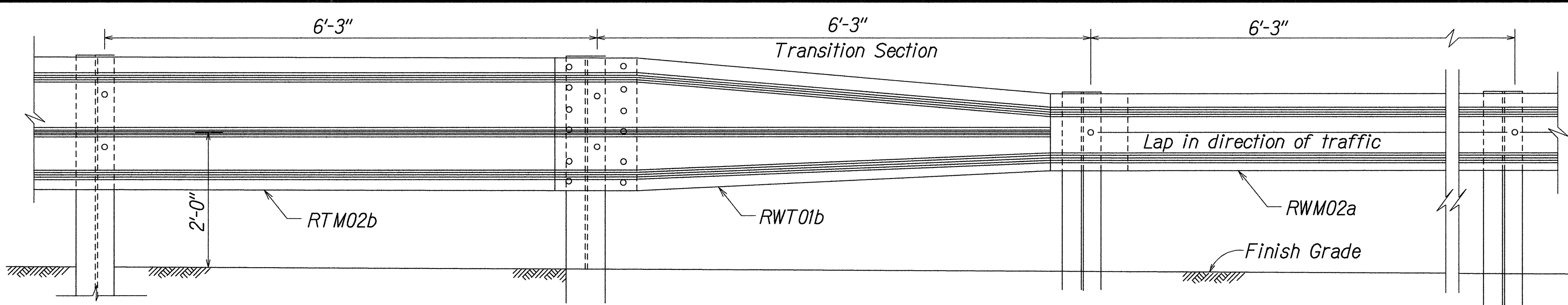
KAWAIIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS

FAP NOS. FLH-0270(16) & FLH-0270(17)

Scale: None Date: Nov, 2000

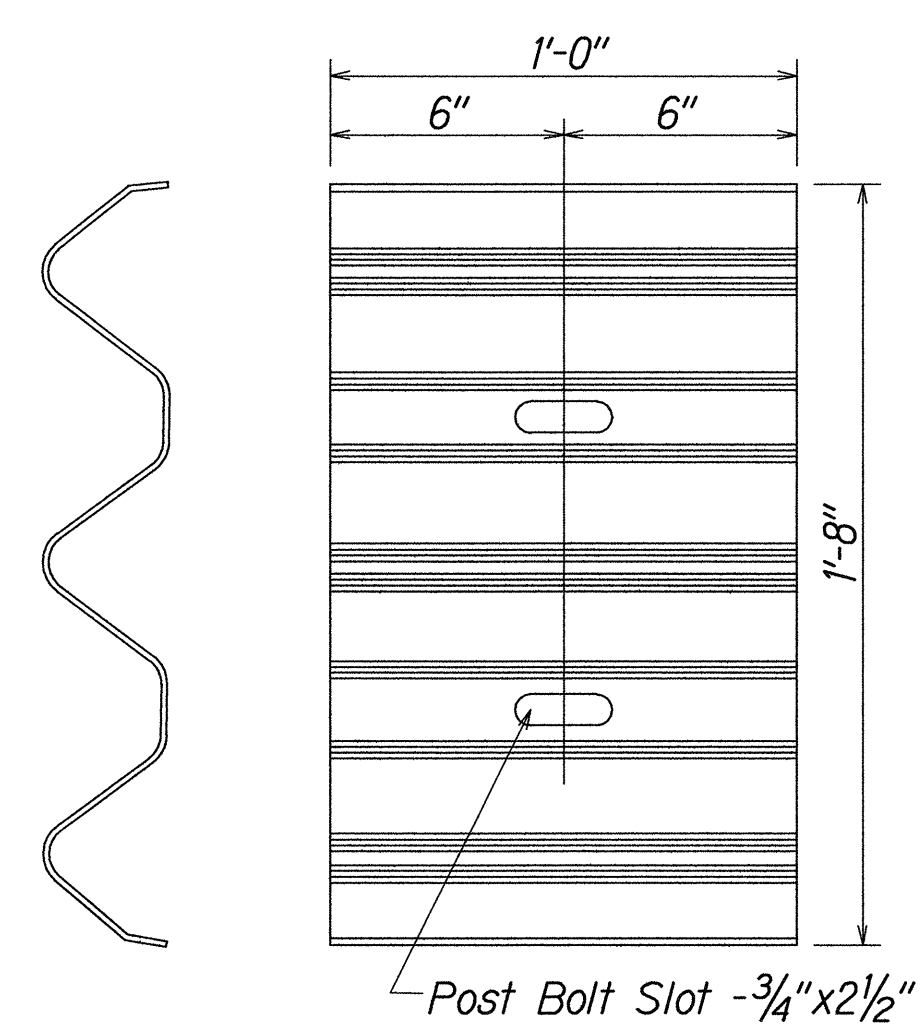
SHEET No. G3 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FLH-0270(16) & FLH-0270(17)	2001	16	41



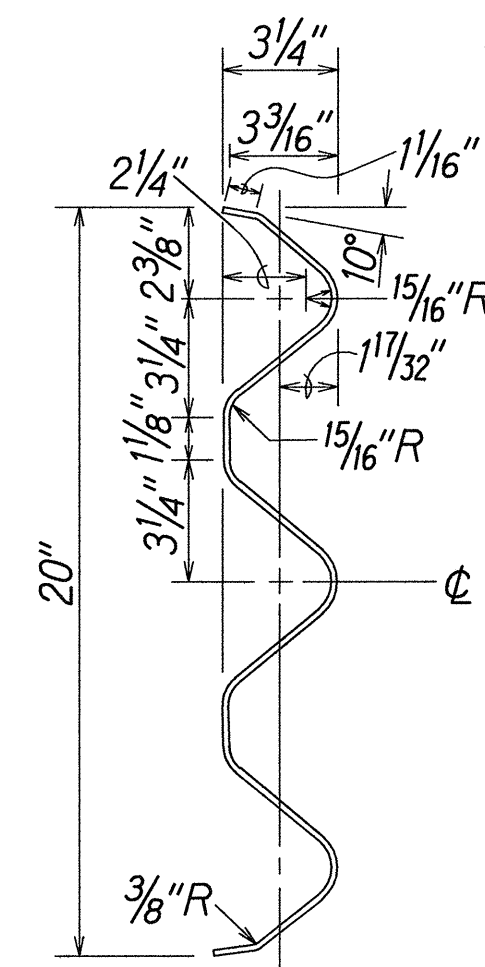
TRANSITION SECTION *

* Post spacing not to be used for Thrie Beam connection to structures.

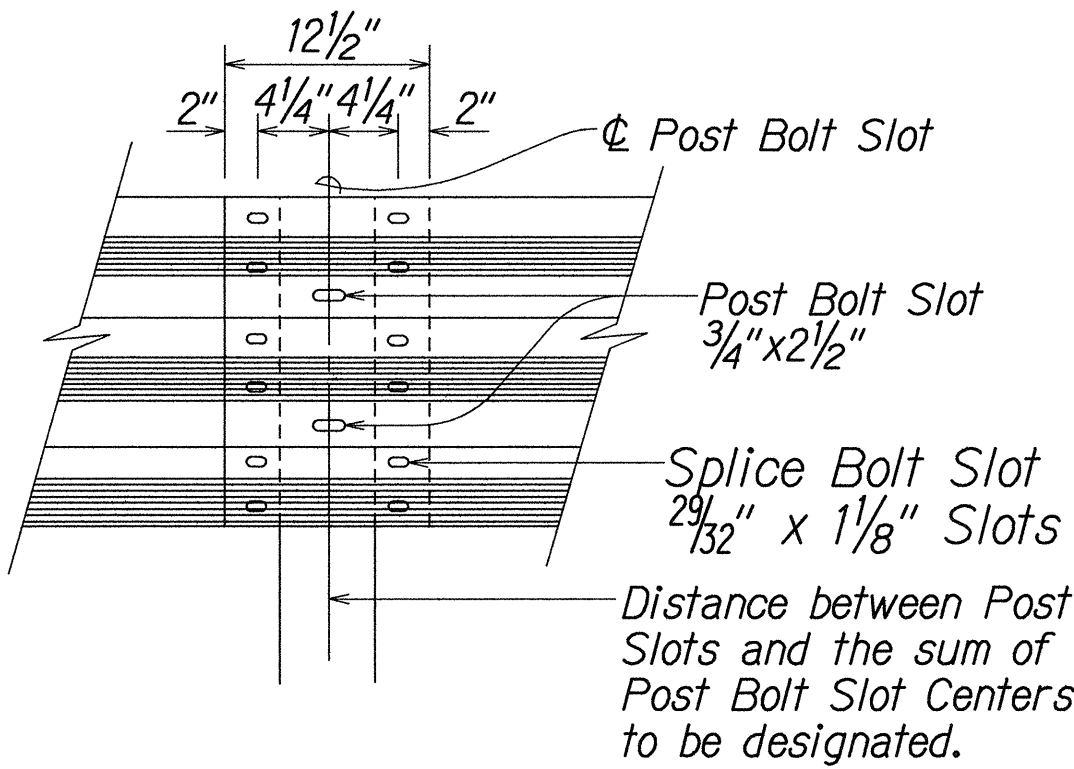


**BACKUP PLATE
(RTB01b)**

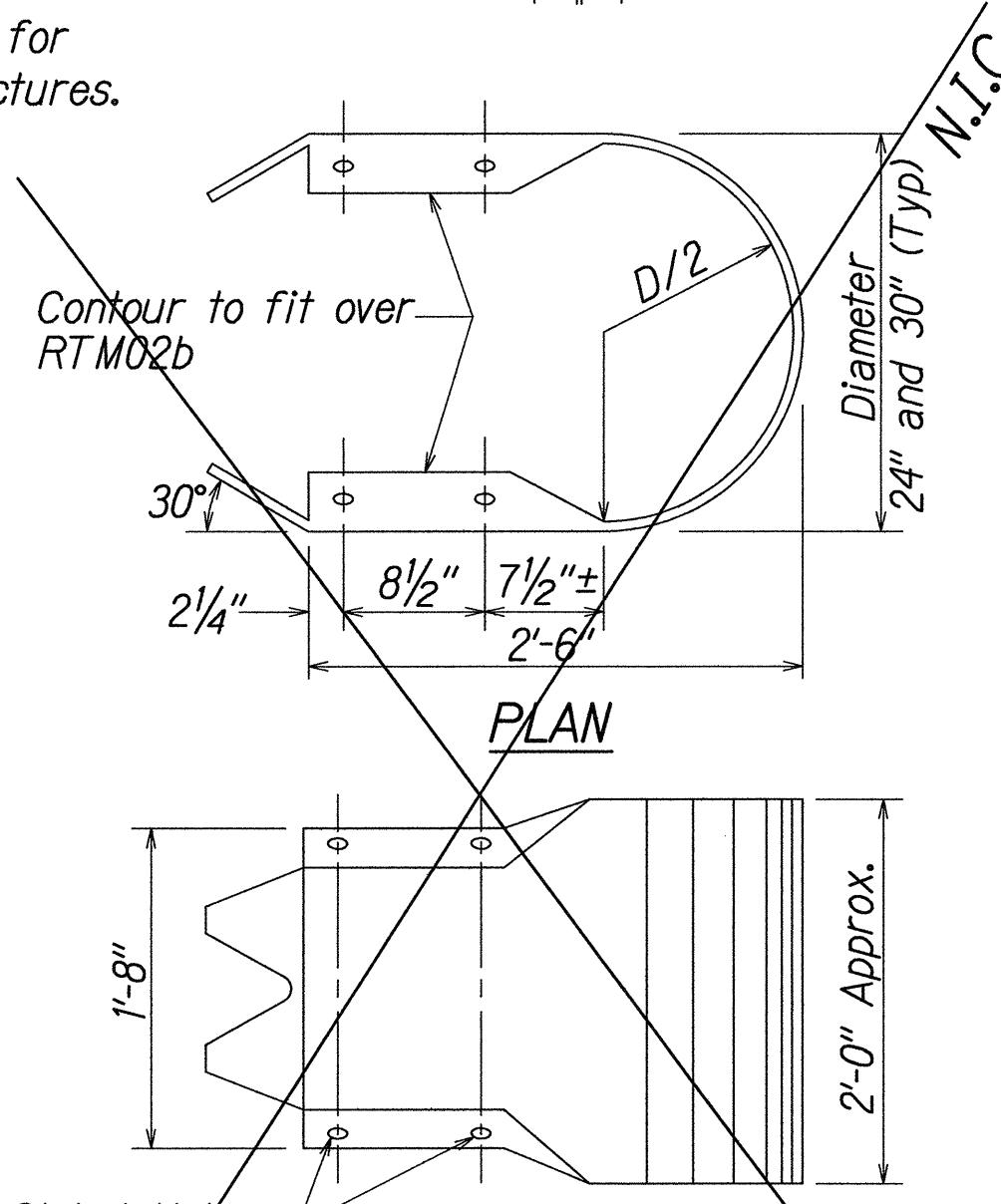
(Use at Posts where Splices do not occur)



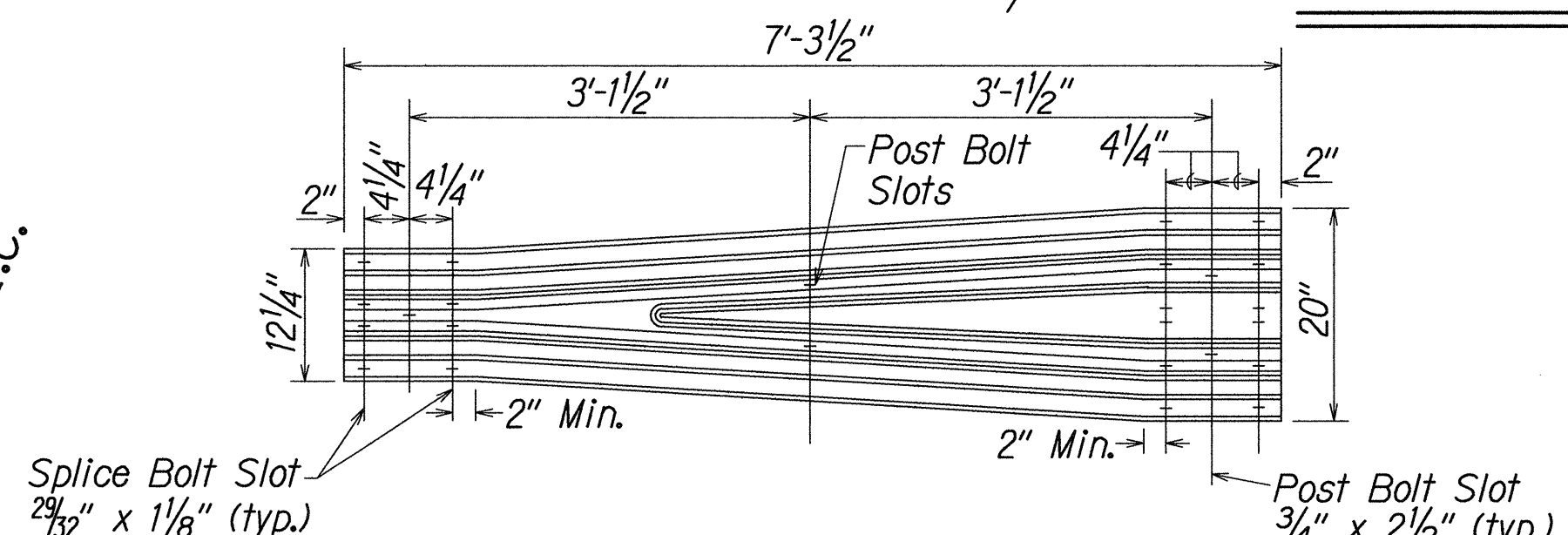
**SECTION THRU
RAIL ELEMENT
(RTM02b)**



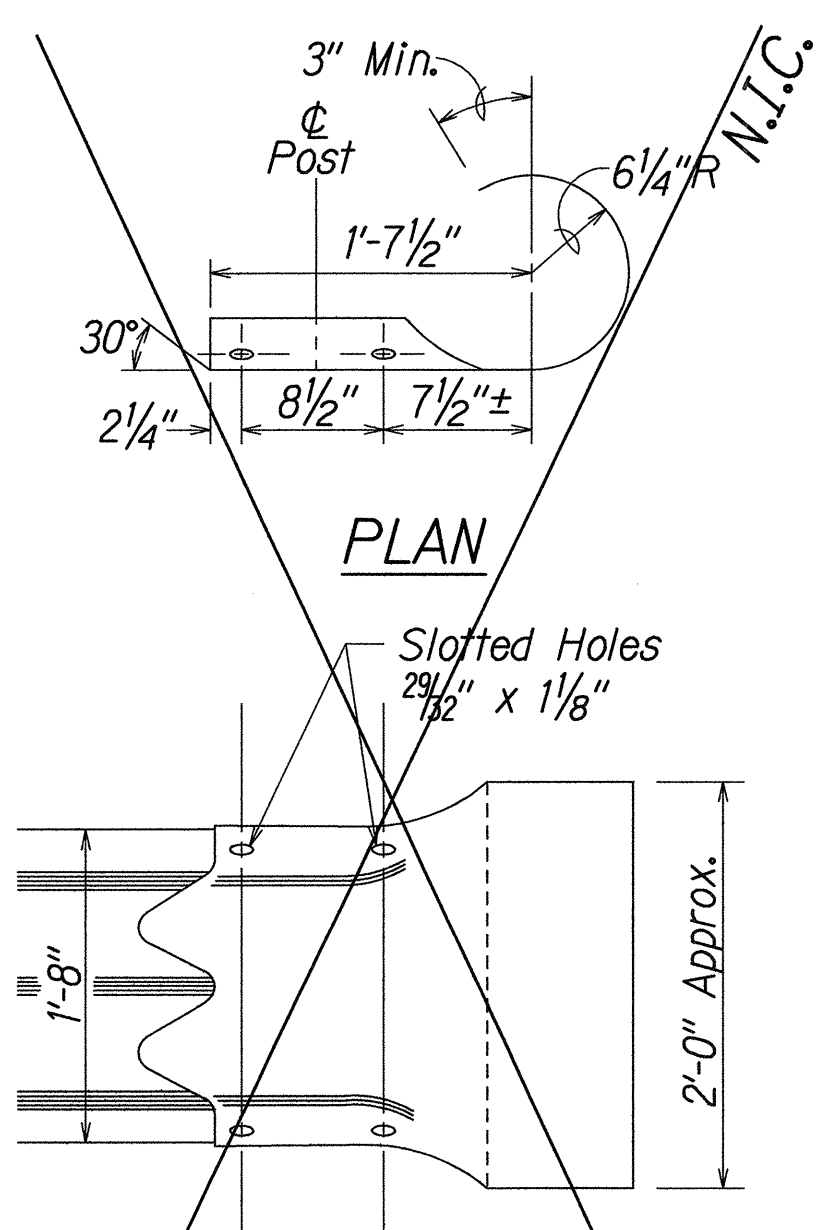
RAIL SPLICE



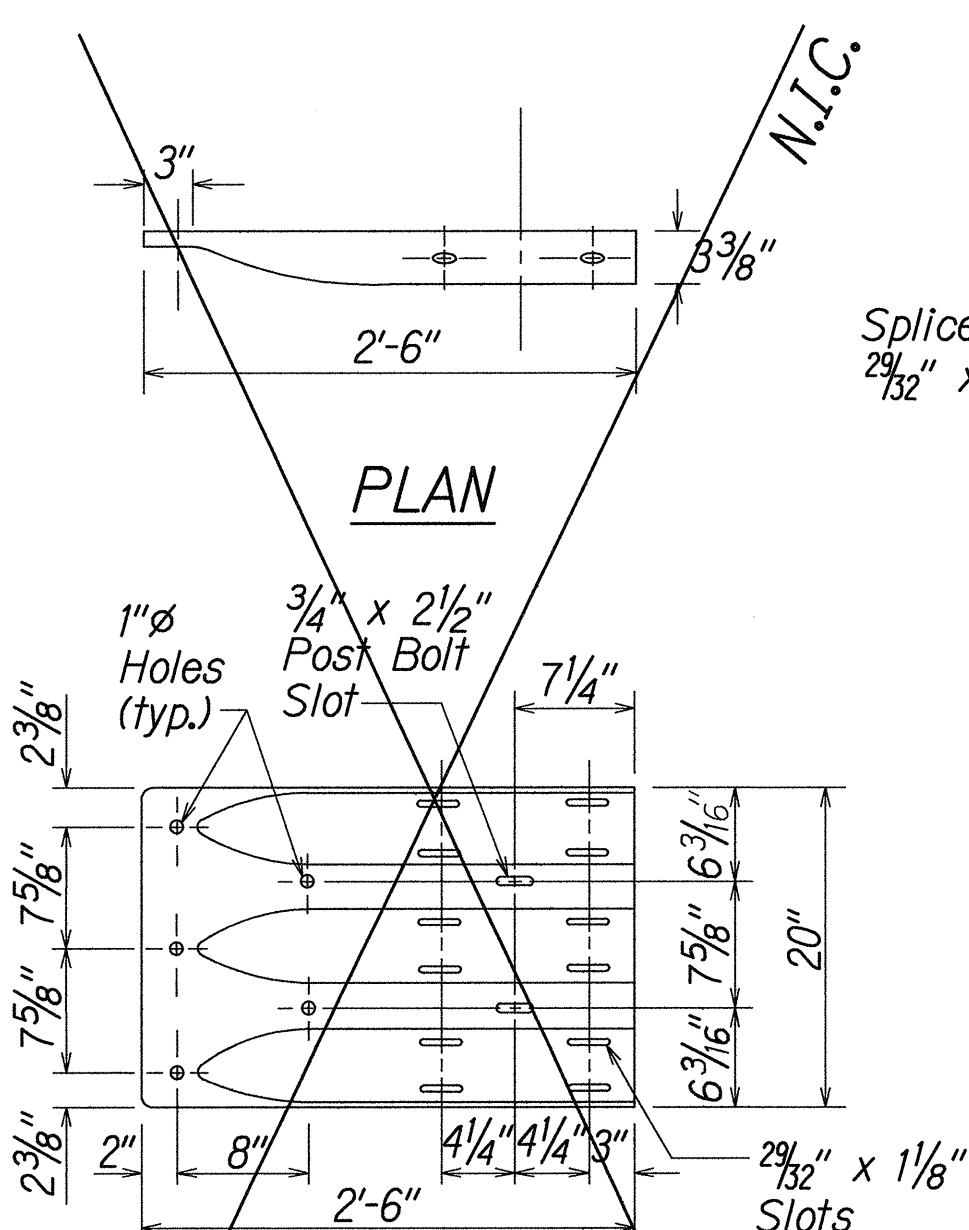
**END SECTION (BUFFER RTE03b
or RTE04b)**



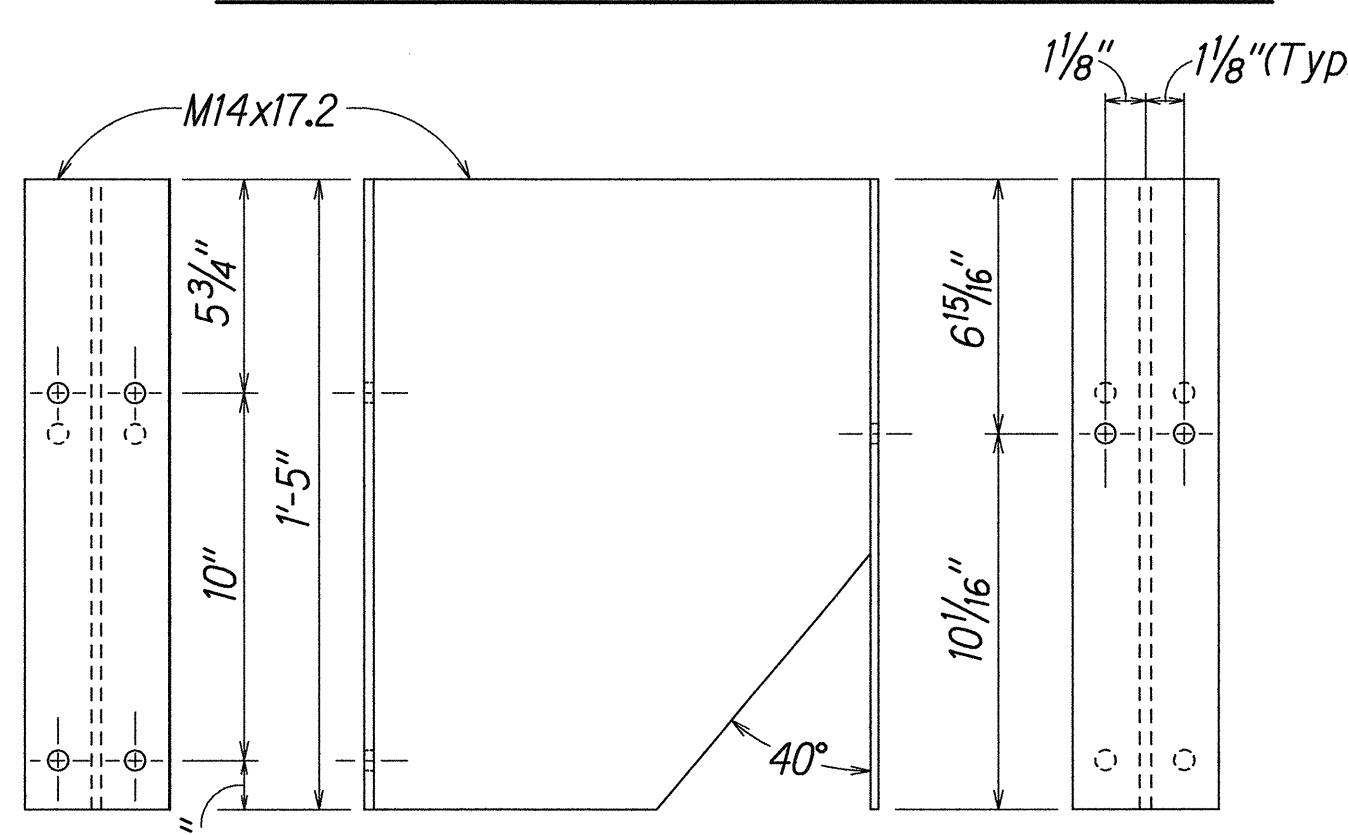
TRANSITION SECTION (RWT01b)



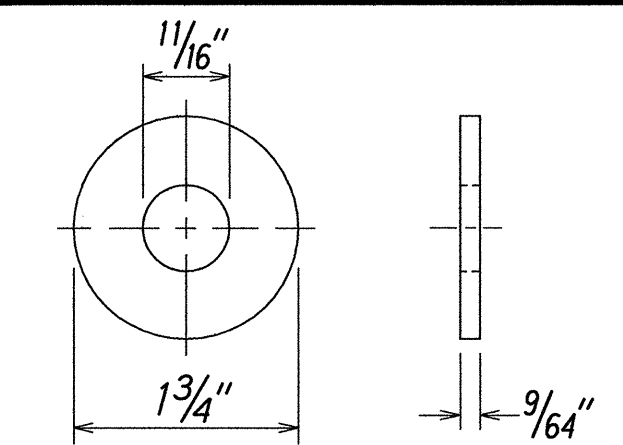
**SECTION (ROUNDED)
(RTE02b)**



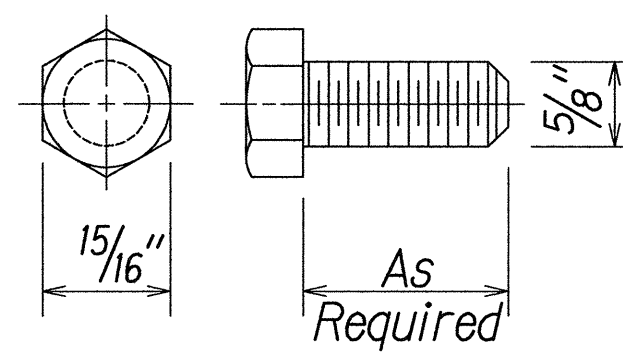
**TERMINAL CONNECTOR
(RTE01b)**



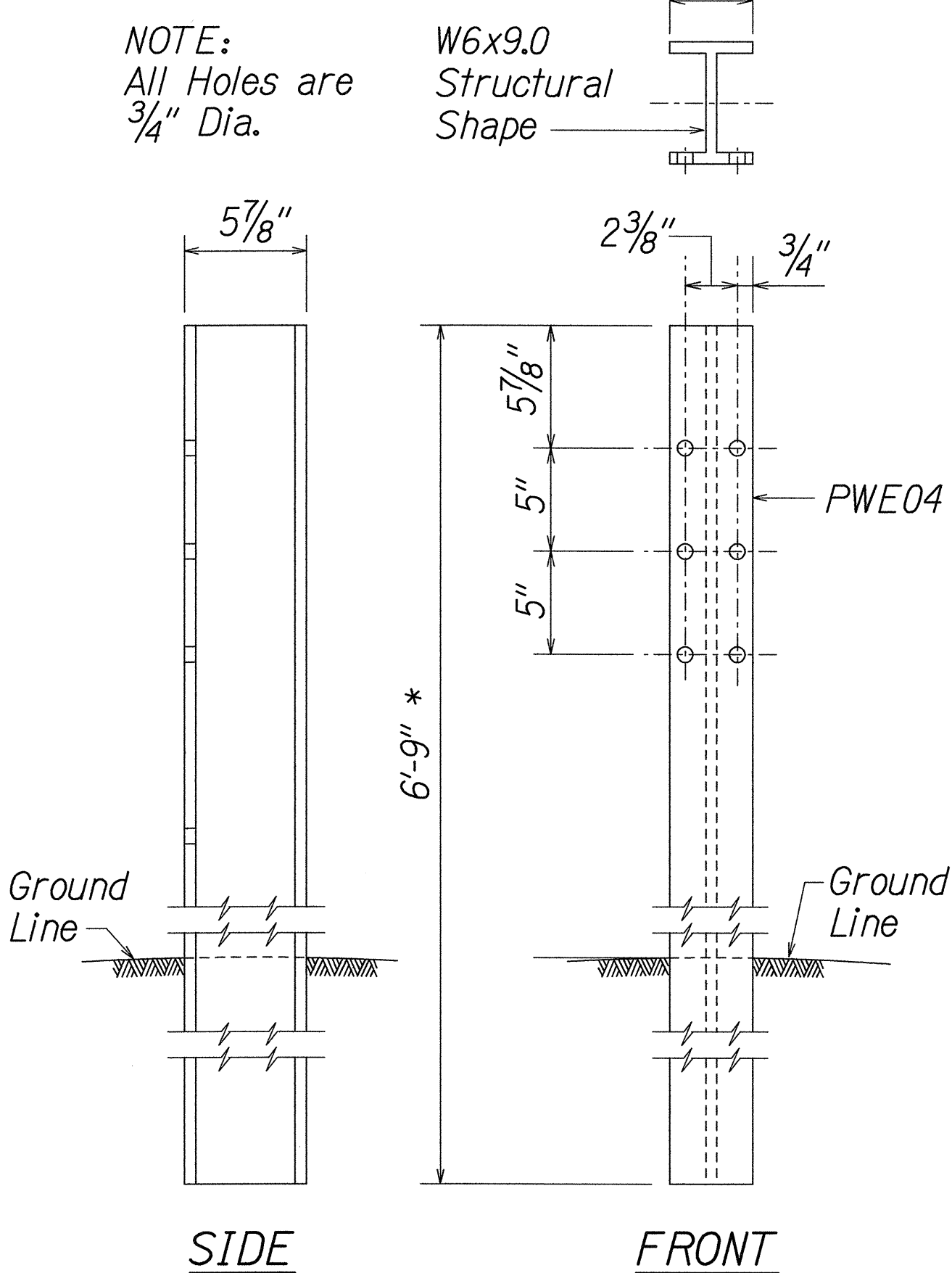
**BACK SIDE FRONT
SPACER BLOCK PWB03**



**STEEL WASHER
FOR 5/8" BOLT**

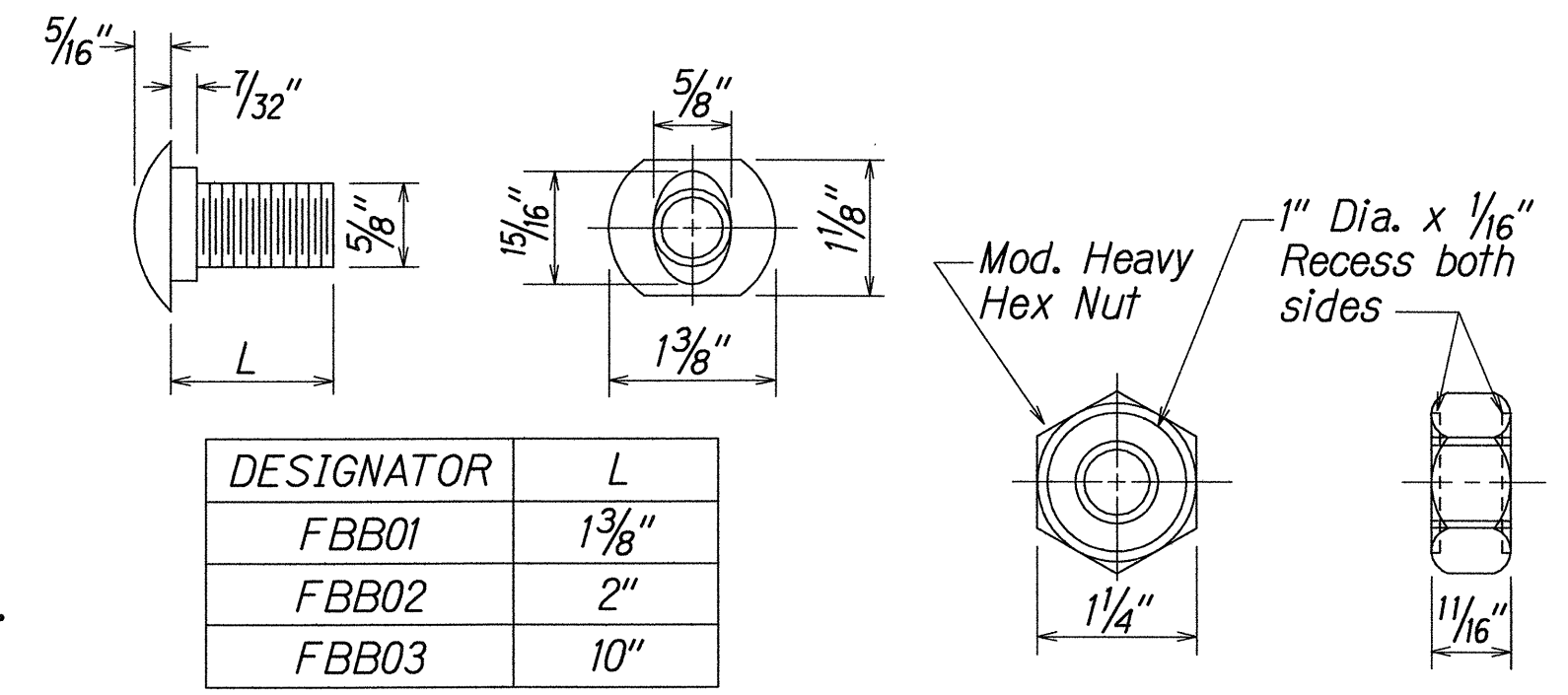


**HEX BOLT & NUT
(FBX16a)**

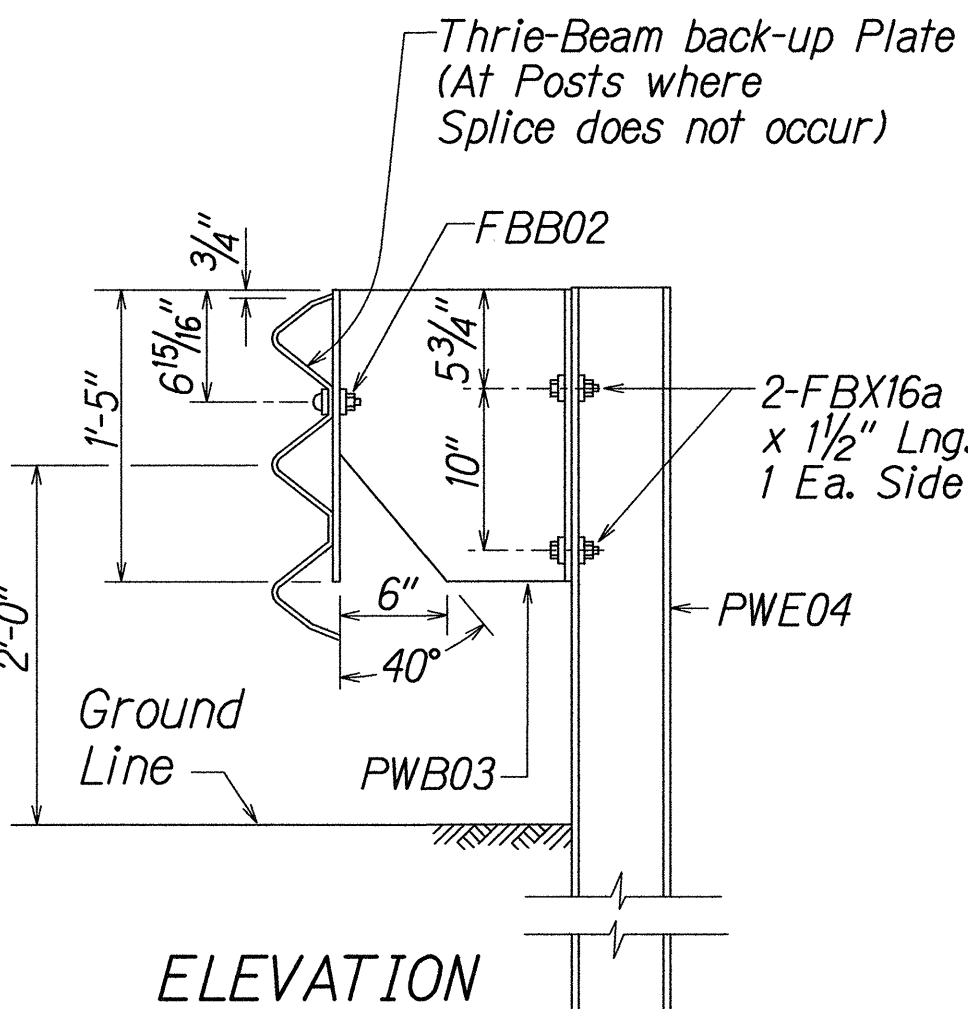


W-BEAM STRONG POST (PWE04)

*See General Note 2 on Sheet No. G1.



GUARDRAIL BOLTS AND RECESSED NUT



**STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL
(SGR09b)**

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Clyde T. Shimizu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL**

KAWAIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS

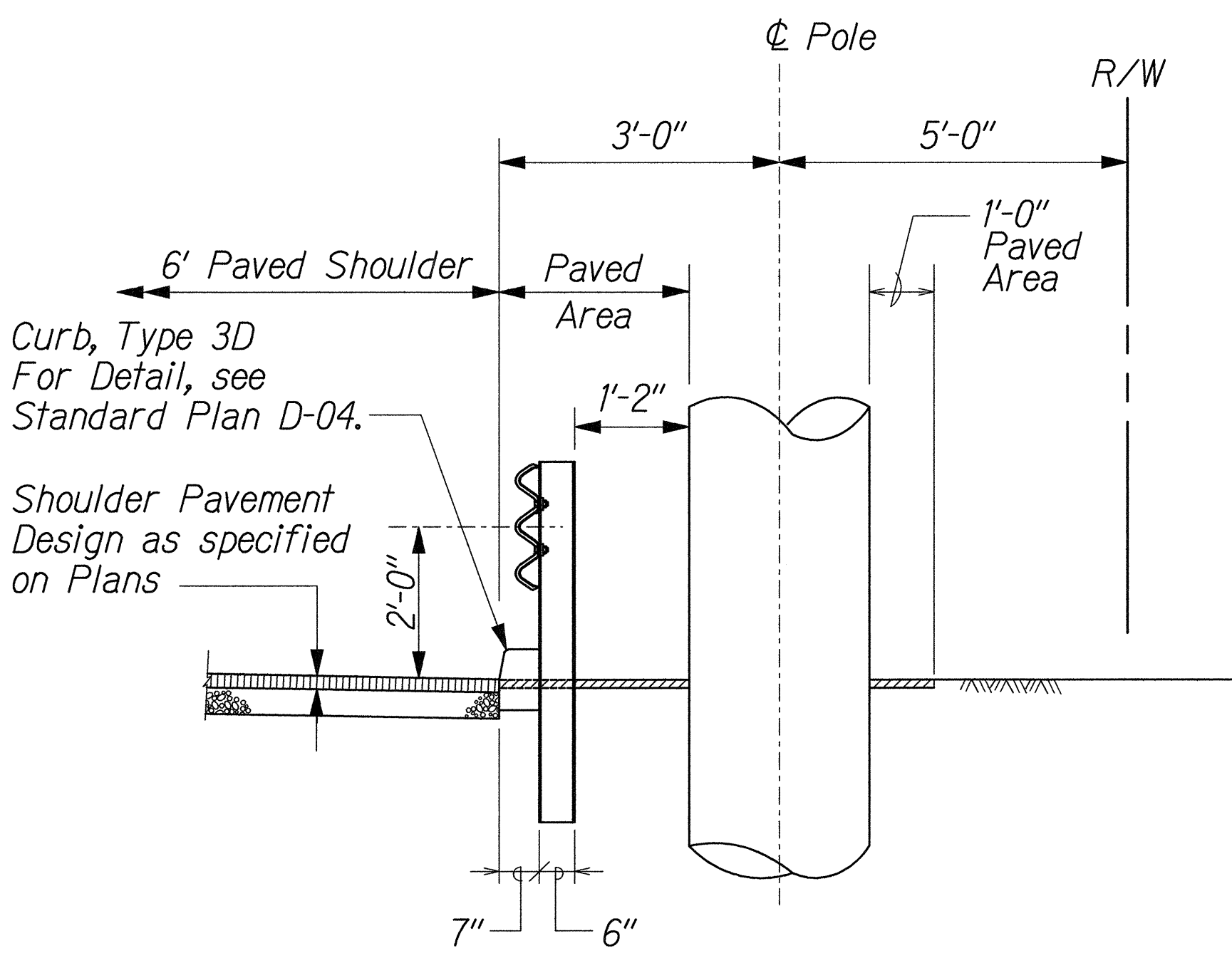
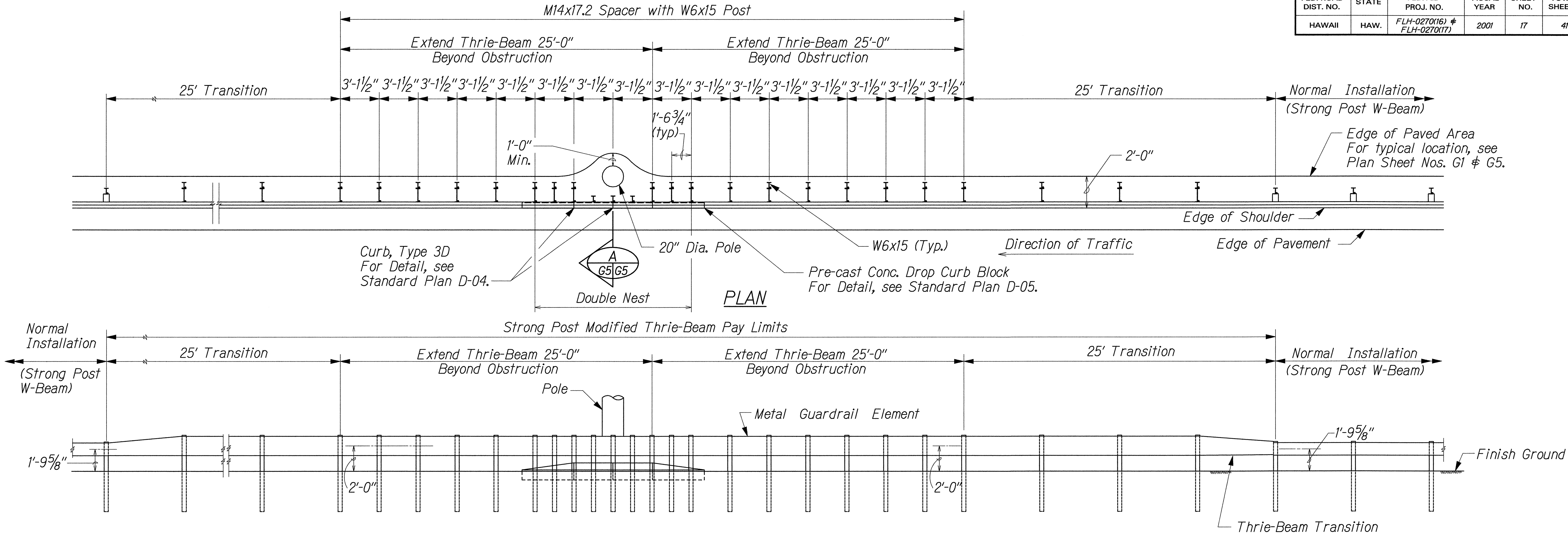
FAP NOS. FLH-0270(16) & FLH-0270(17)
Scale: None Date: Nov, 2000

SHEET No. G4 OF 7 SHEETS

DATE	
SURVEY PLOTTED BY	
DESIGNED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FLH-0270(16) & FLH-0270(17)	2001	17	41



TYPICAL SECTION AT OBSTRUCTION A
G5/G5

DETAIL OF STRONG POST MODIFIED THRIE-BEAM GUARDRAIL INSTALLATION AT OBSTRUCTION

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
IN CHARGE	

CLYDE T. SHIMIZU
LICENSED PROFESSIONAL ENGINEER
No. 5514-C
HAWAII, U.S.A.

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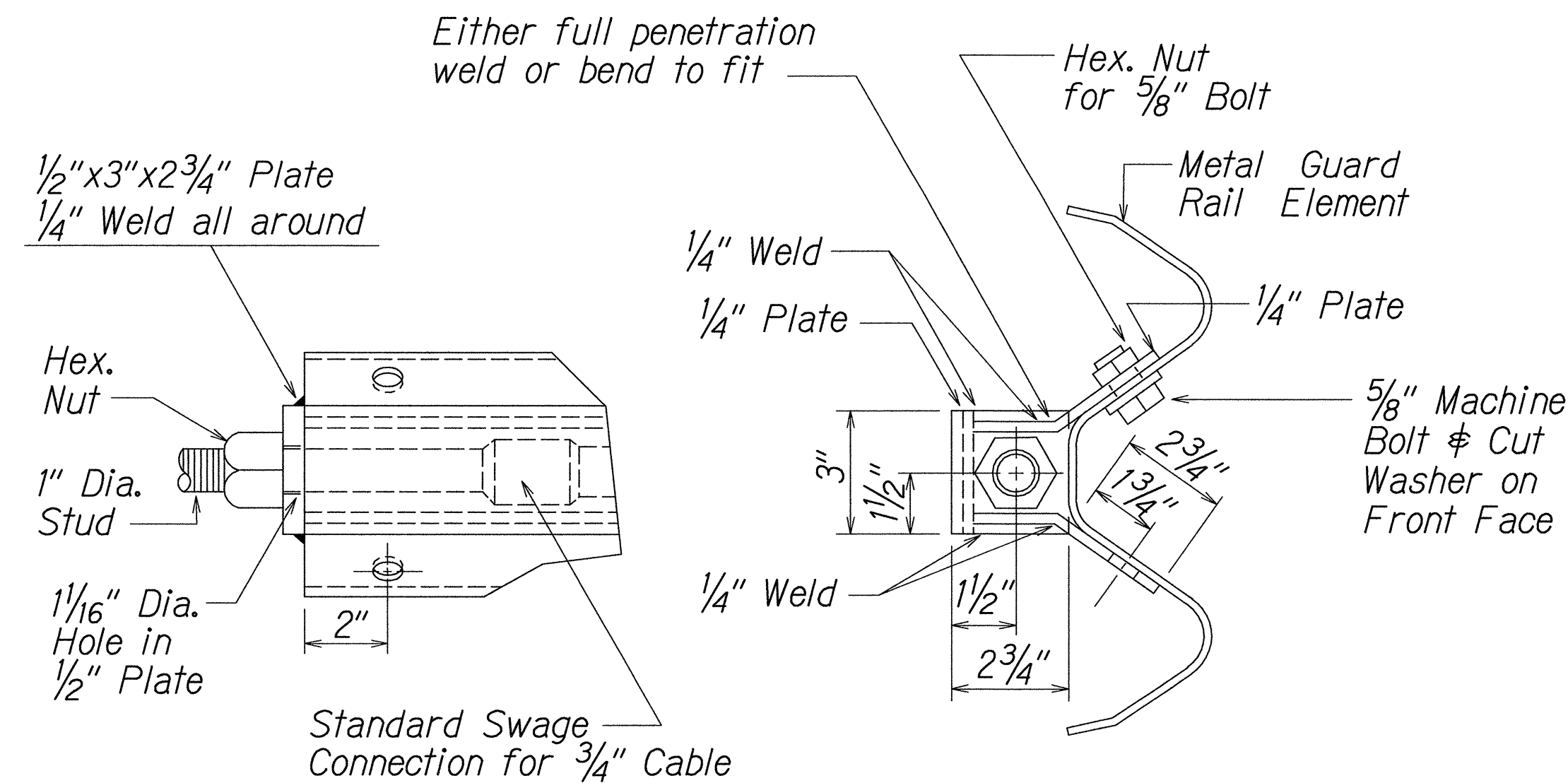
Clyde T. Shimizu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

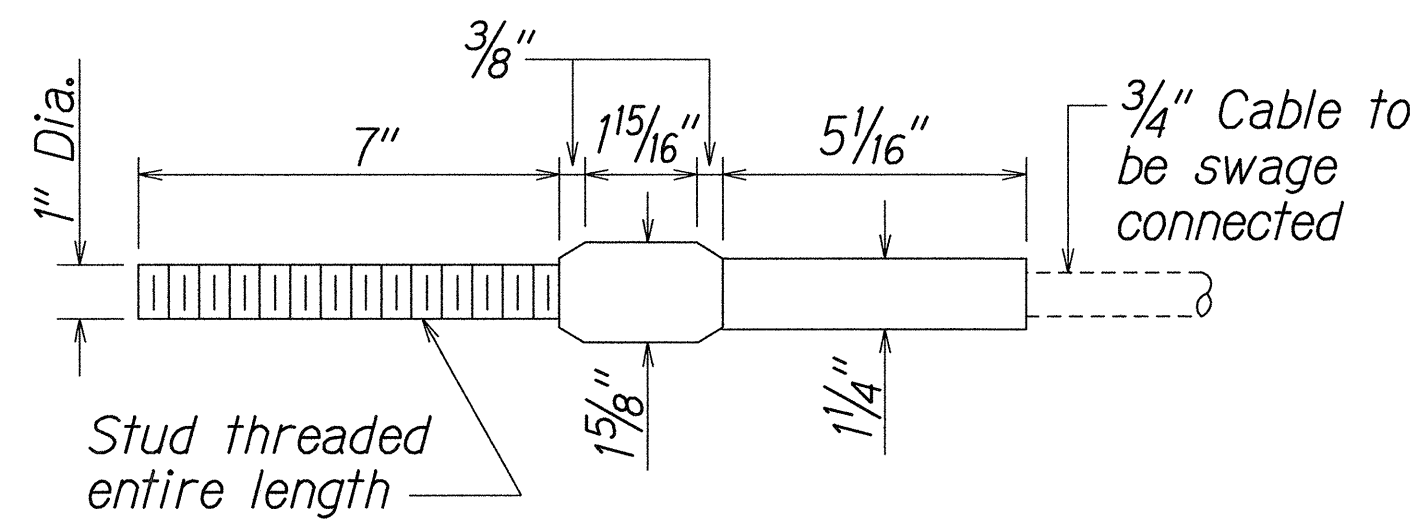
GUARDRAIL DETAILS

KAWAIIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS
FAP NOS. FLH-0270(16) & FLH-0270(17)
Scale: None Date: Nov, 2000

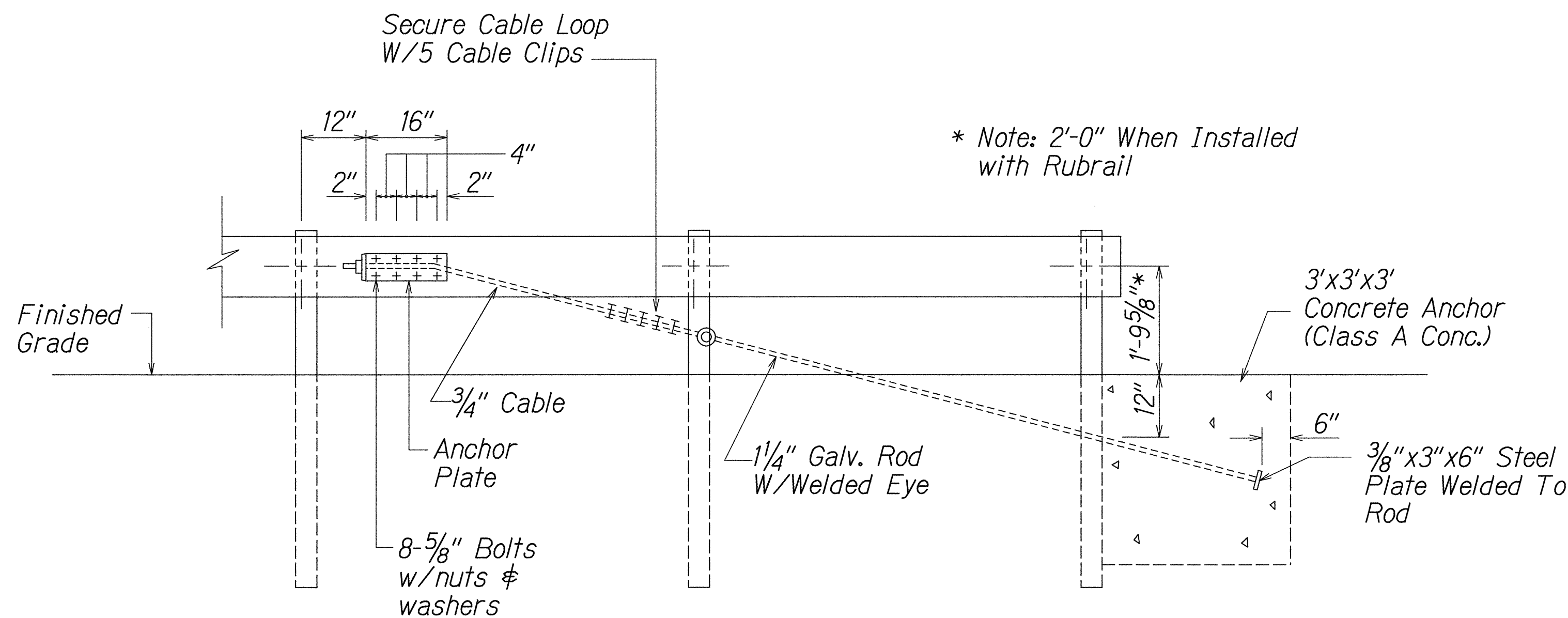
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FLH-0270(16) & FLH-0270(17)	2001	18	41



ANCHOR PLATE DETAILS



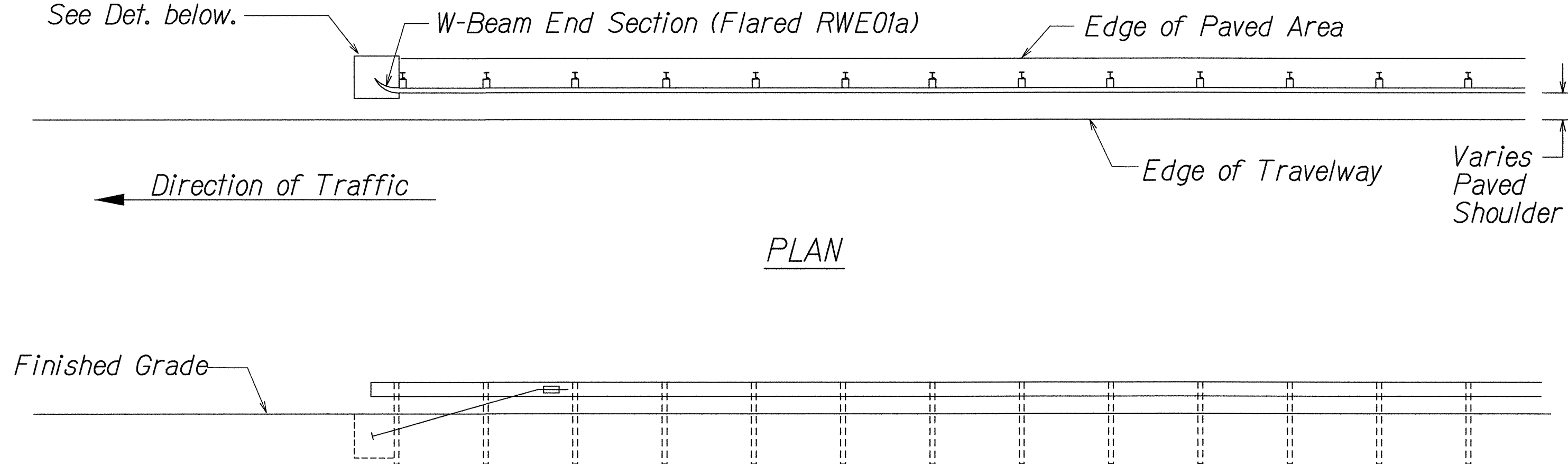
STANDARD SWAGED FITTING AND STUD



ANCHOR BLOCK DETAIL

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

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



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 installation.

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

J:\02E-PU'UKOHOLA\MS077\ES09REV.dgn

CLAUDE T. SHIMIZU
LICENSED PROFESSIONAL ENGINEER
No. 5514-C
HAWAII, U.S.A.

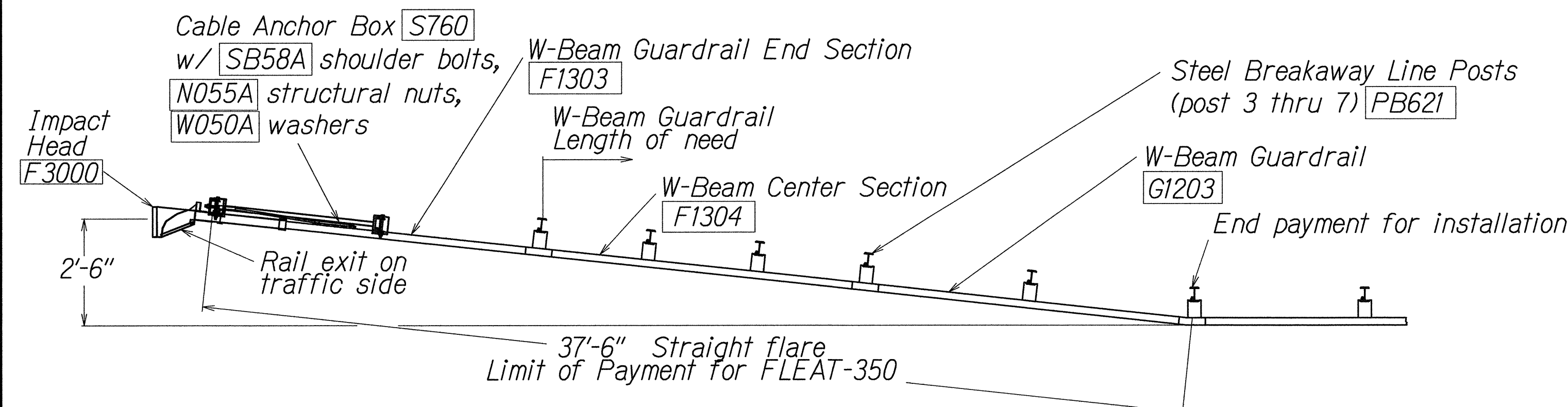
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Claude T. Shimizu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

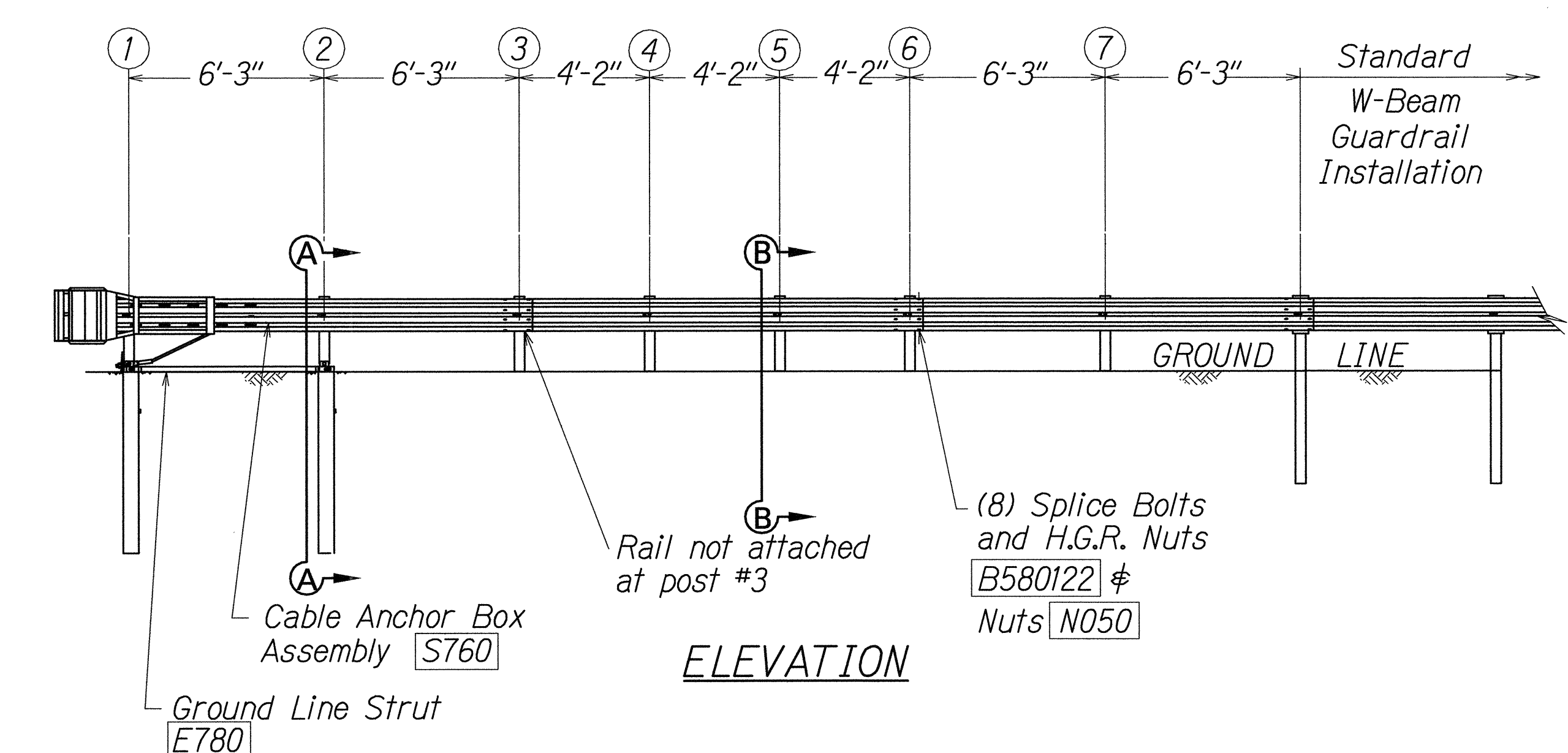
KAWAIIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS
FAP NOS. FLH-0270(16) & FLH-0270(17)
Scale: None Date: Nov, 2000

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FLH-0270(16) & FLH-0270(17)	2001	19	41

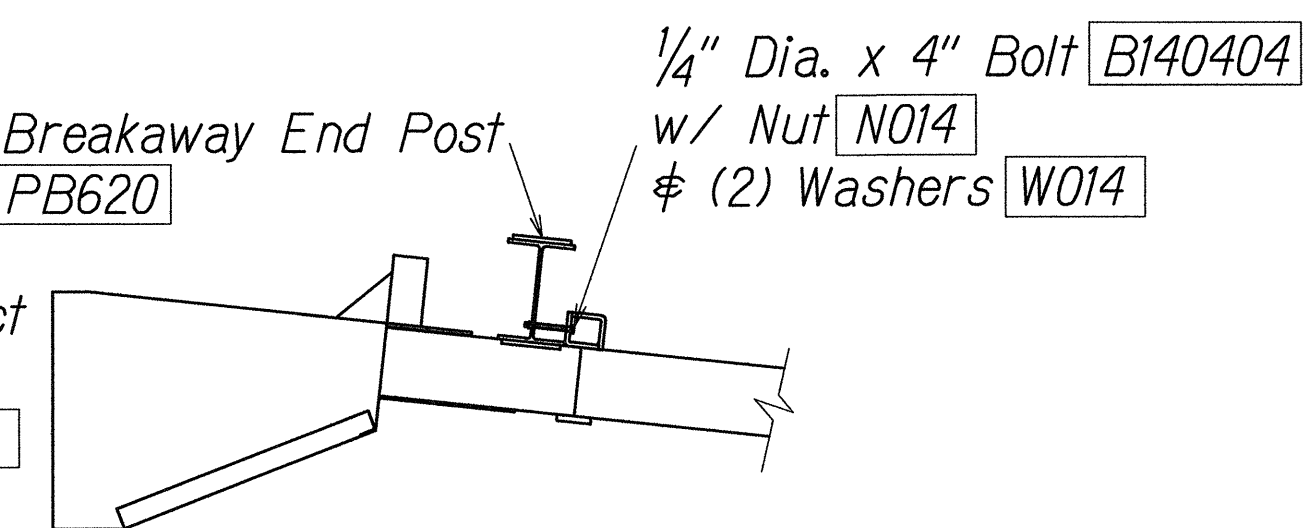


TRAFFIC →

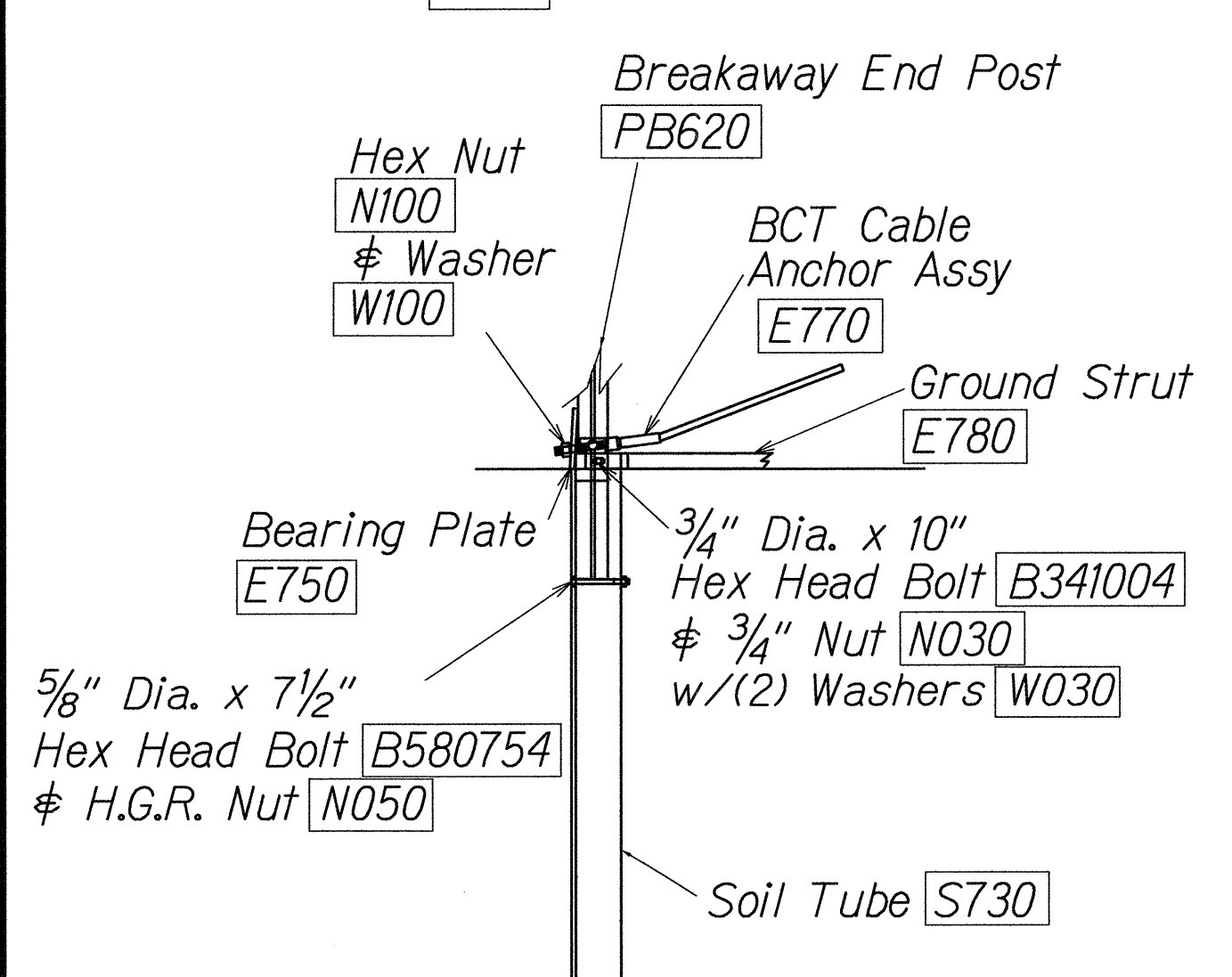
PLAN



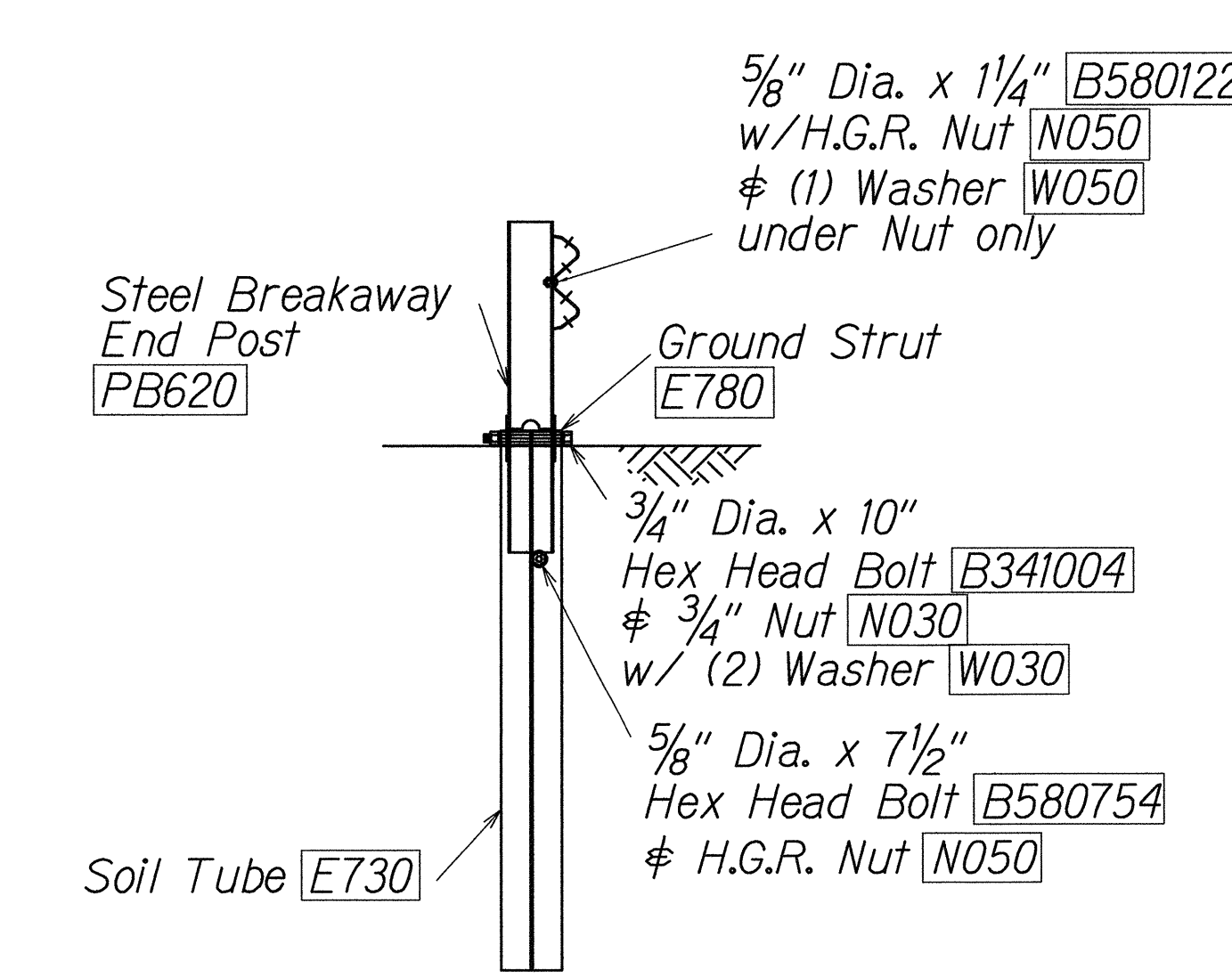
ELEVATION



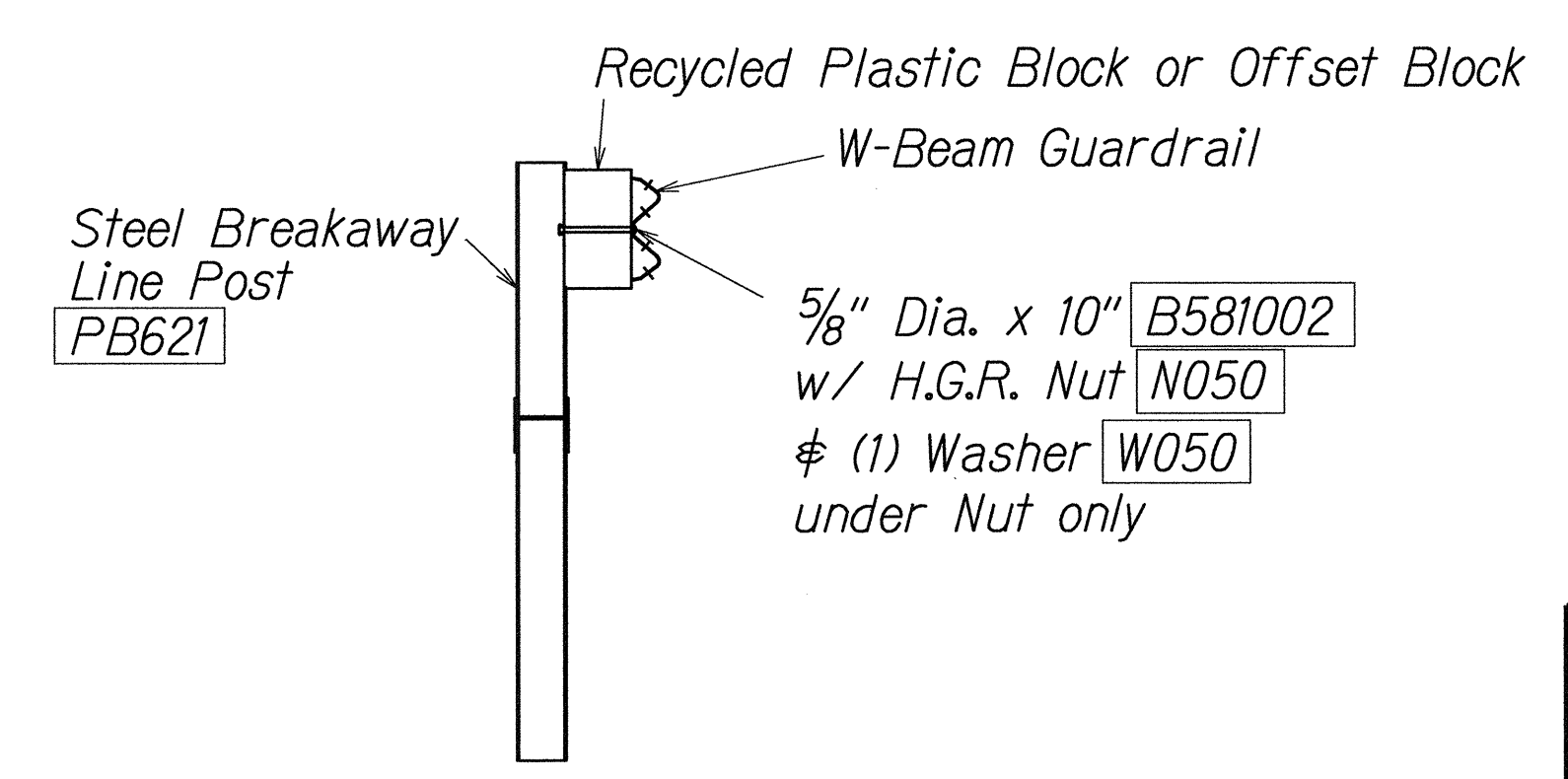
IMPACT HEAD CONNECTING DETAIL



PARTIAL VIEW OF POST 1



SECTION A-A
(@ Post #2)



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 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

DATE	_____
DESIGNED BY	_____
CHECKED BY	_____
NOTED BY	_____
QUANTITIES BY	_____
ORIGINAL PLAN	_____

14/COE-FUUKOHOLA/MSO/FLEAT-350.dgn

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Clyde T. Shimizu

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
FLEAT-350
FLARED ENERGY ABSORBING TERMINAL
KAWAIIHAE ROAD PU'UKOHOLA HEIAU NHS
INTERSECTION IMPROVEMENTS
FAP NOS. FLH-0270(16) & FLH-0270(17)
Scale: None Date: Nov, 2000