

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	98	111

GENERAL NOTES

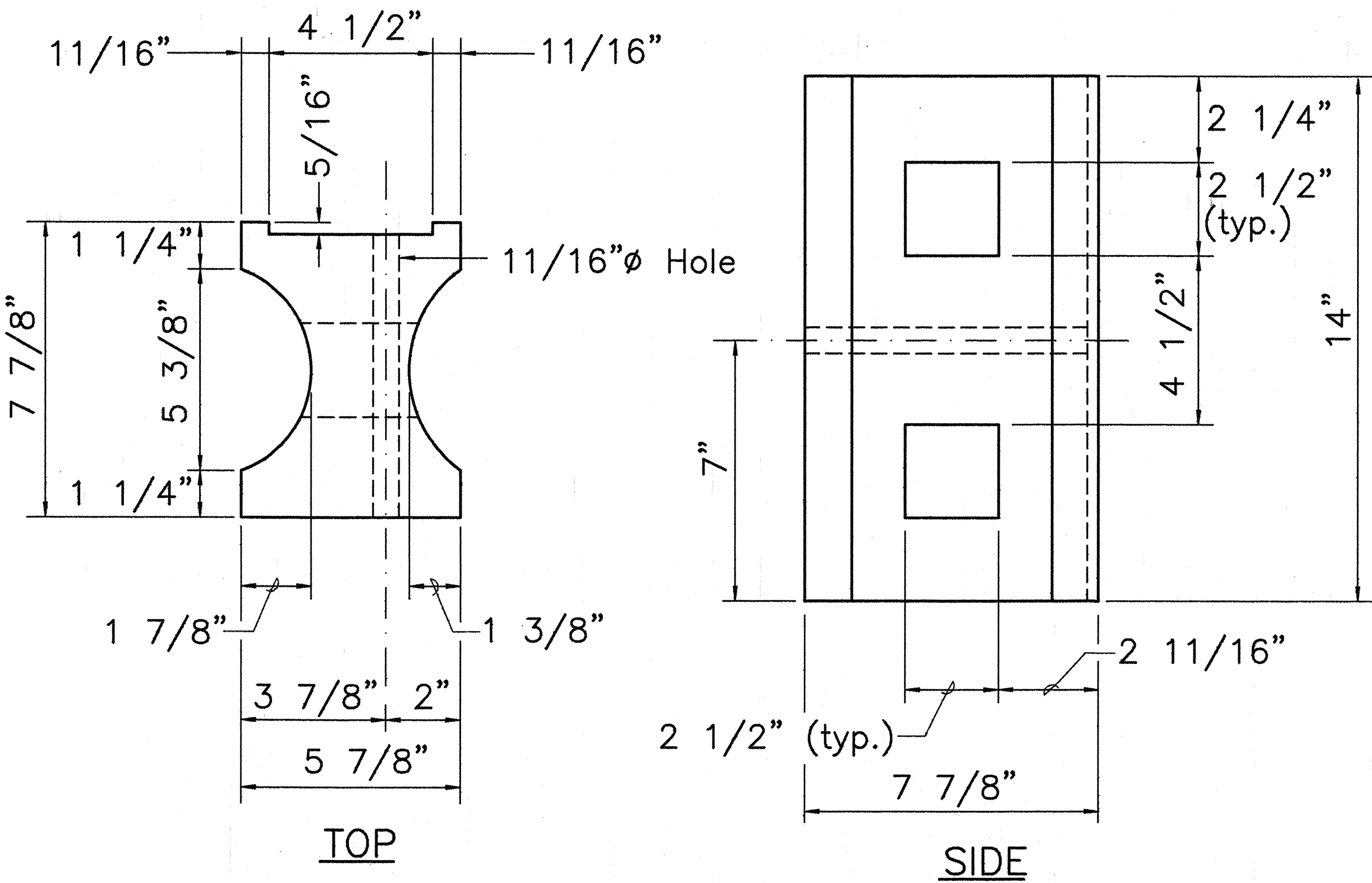
1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified.
3. All fasteners, posts, and rail elements (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. 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.
6. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.

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

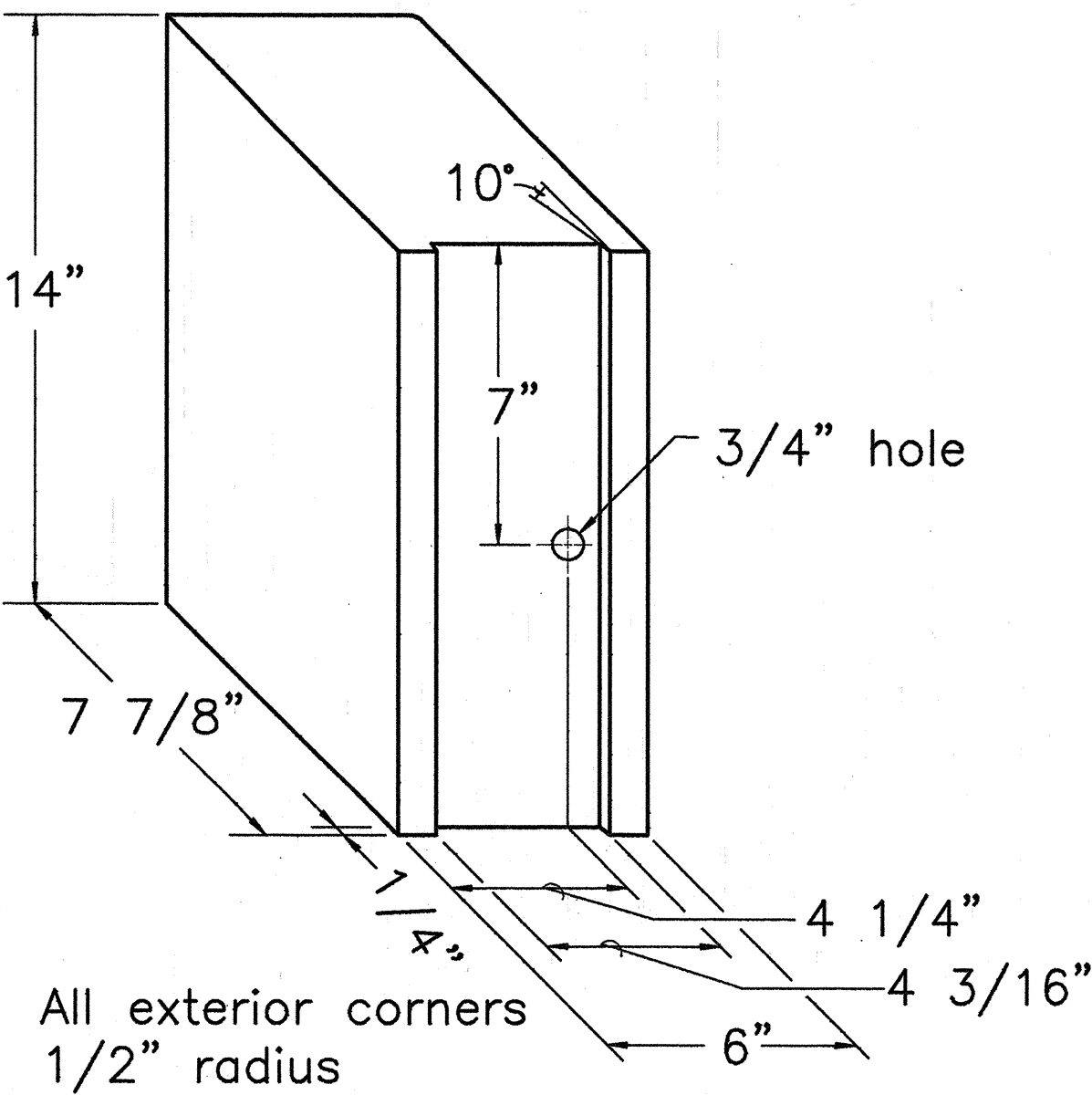
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS AND NOTES**  
**MAIN STREET RESURFACING**  
CENTRAL AVENUE TO KAAHUMANU AVENUE  
AND  
**KAAHUMANU AVENUE RESURFACING**  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

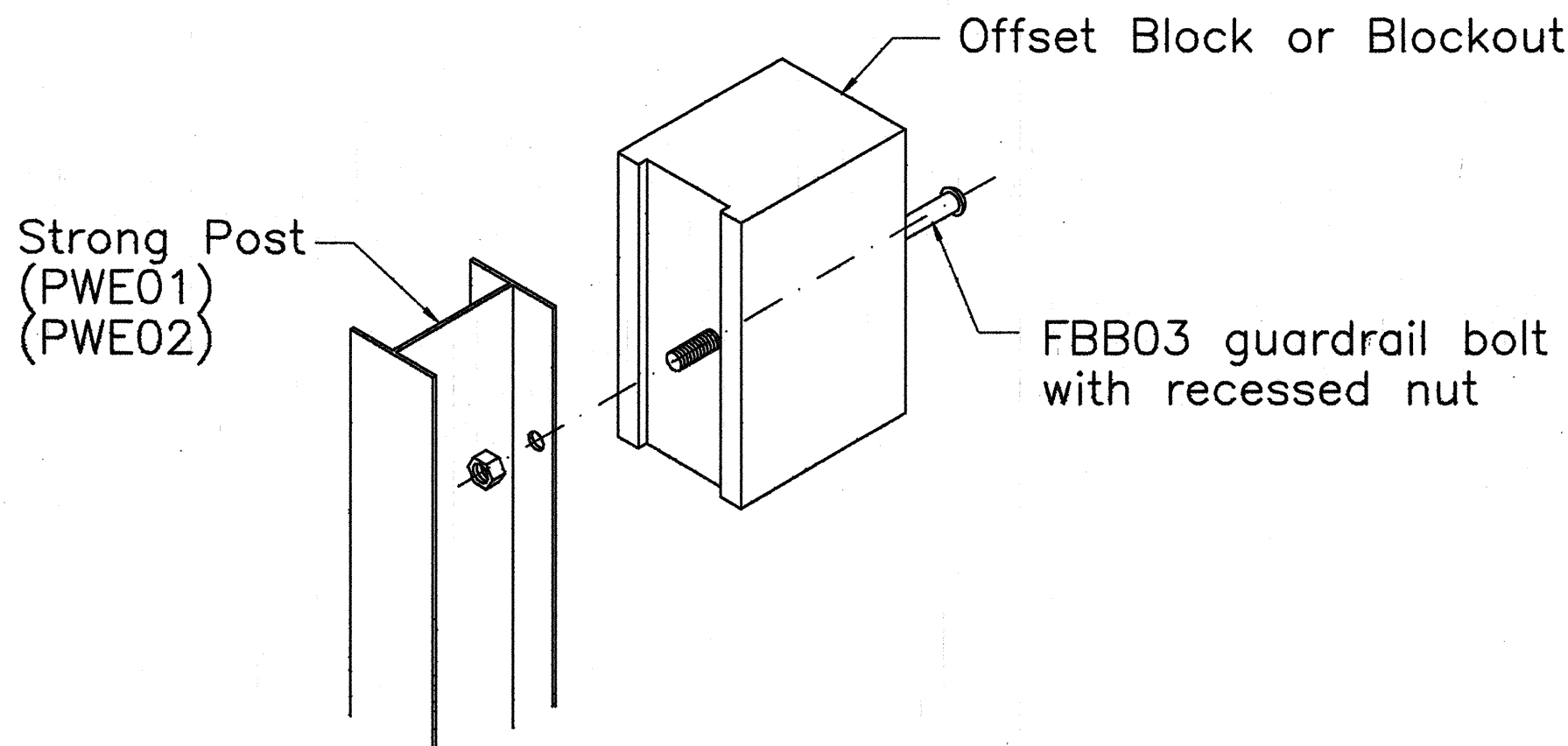
SCALE: AS NOTED  
SHEET No. 1 OF 7 SHEETS



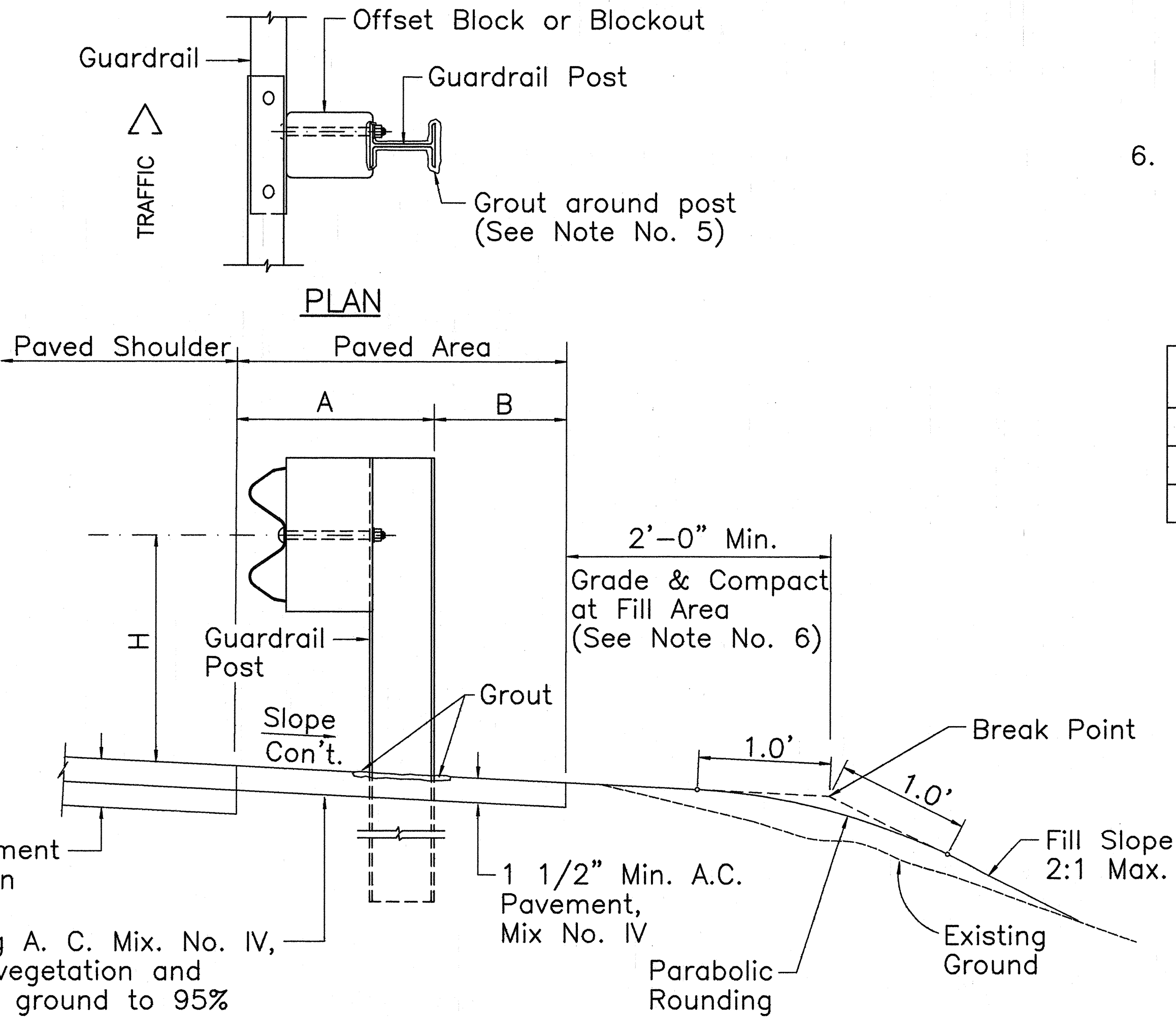
RECYCLED PLASTIC BLOCKOUT (TYPE I)



RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



STEEL POST AND BLOCK DETAIL

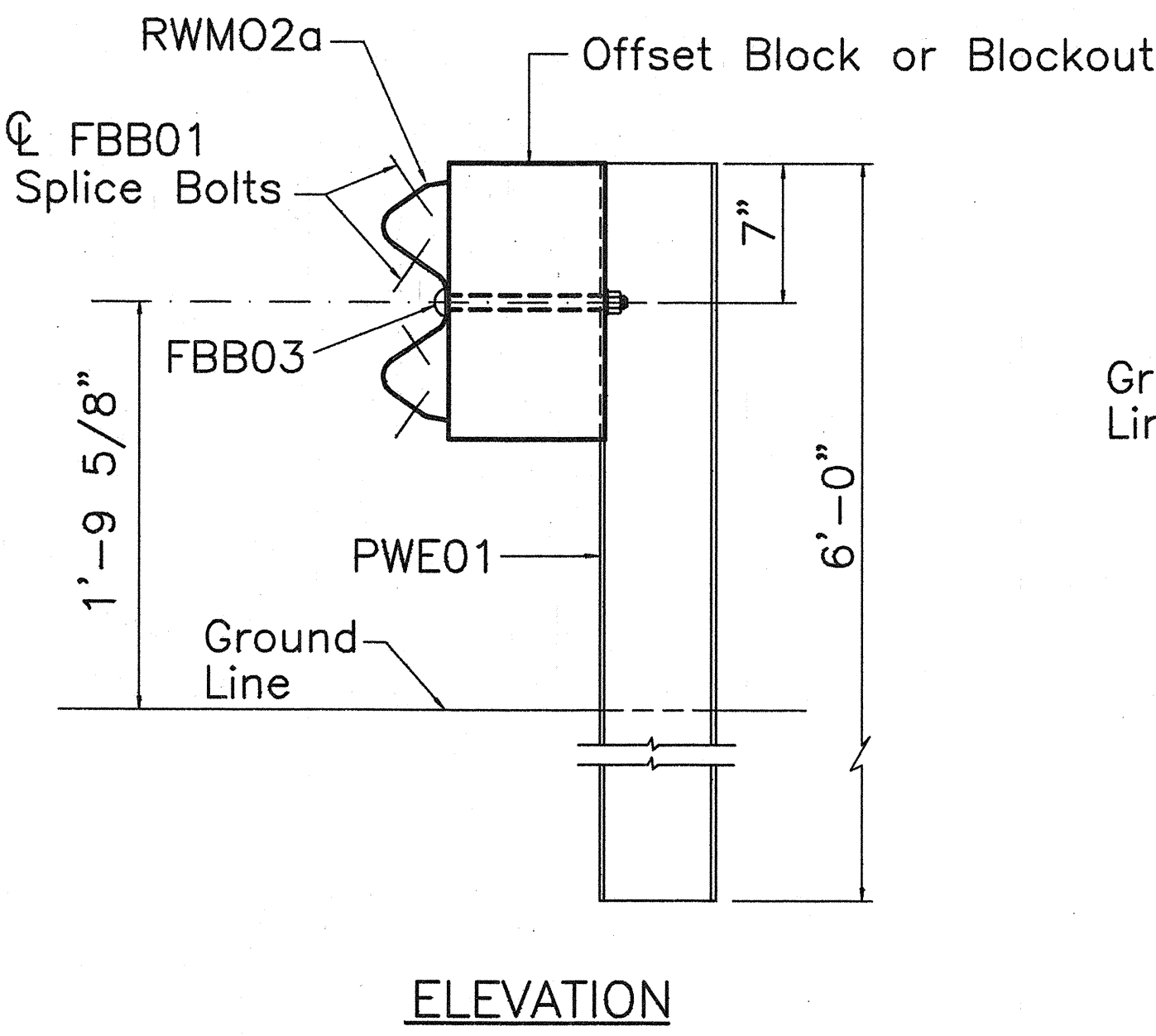
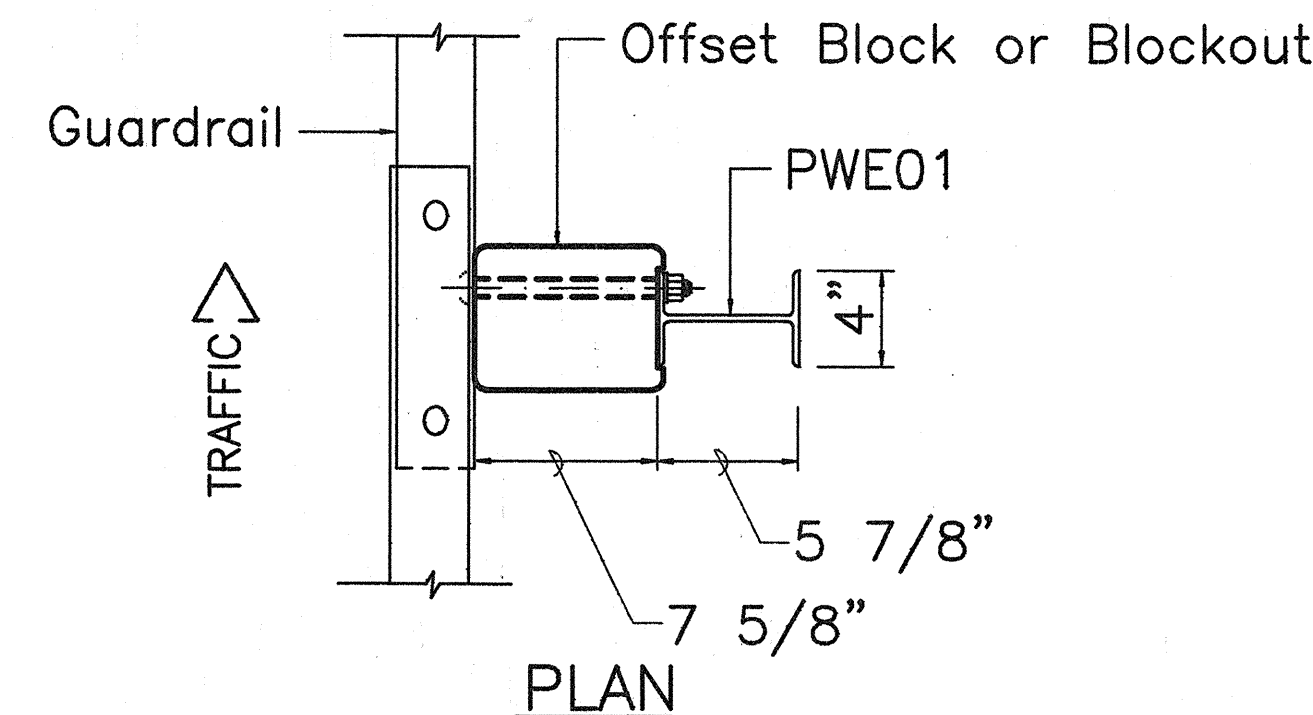


TYPICAL GUARDRAIL INSTALLATION

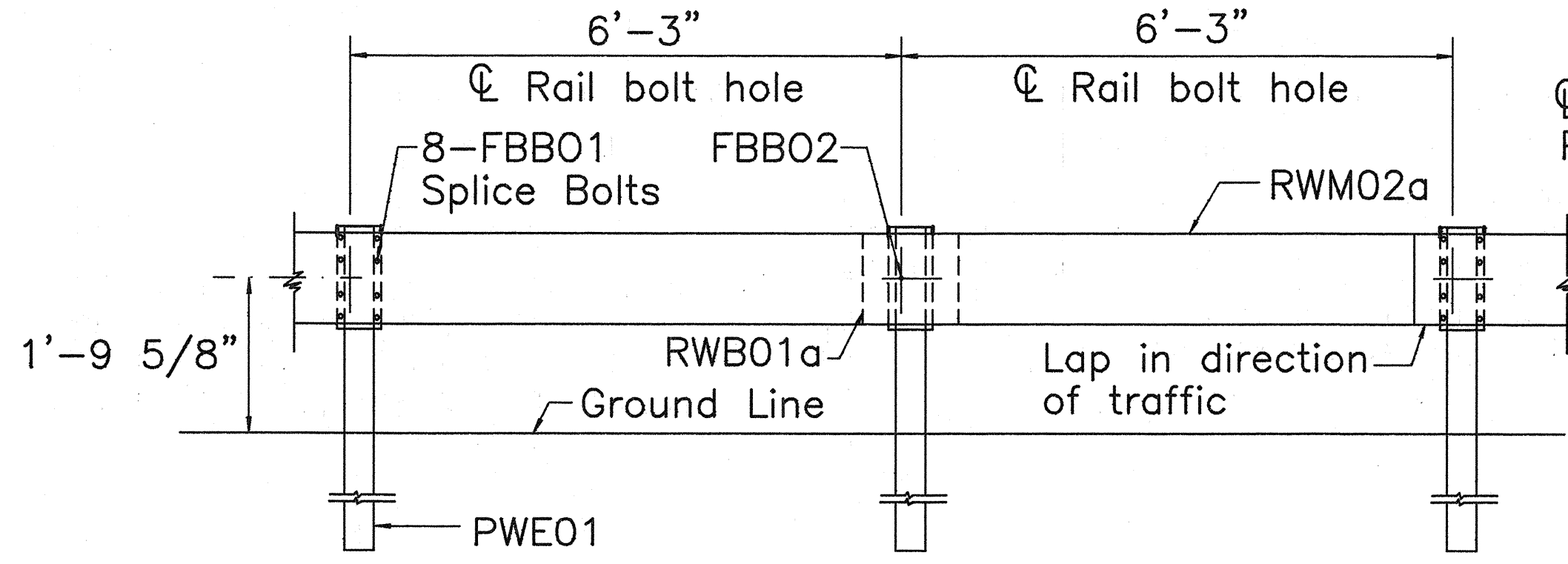
Prior to installing A. C. Mix. No. IV, level & remove vegetation and compact existing ground to 95% compaction.

DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
ORIGINAL	DATE
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	99	111

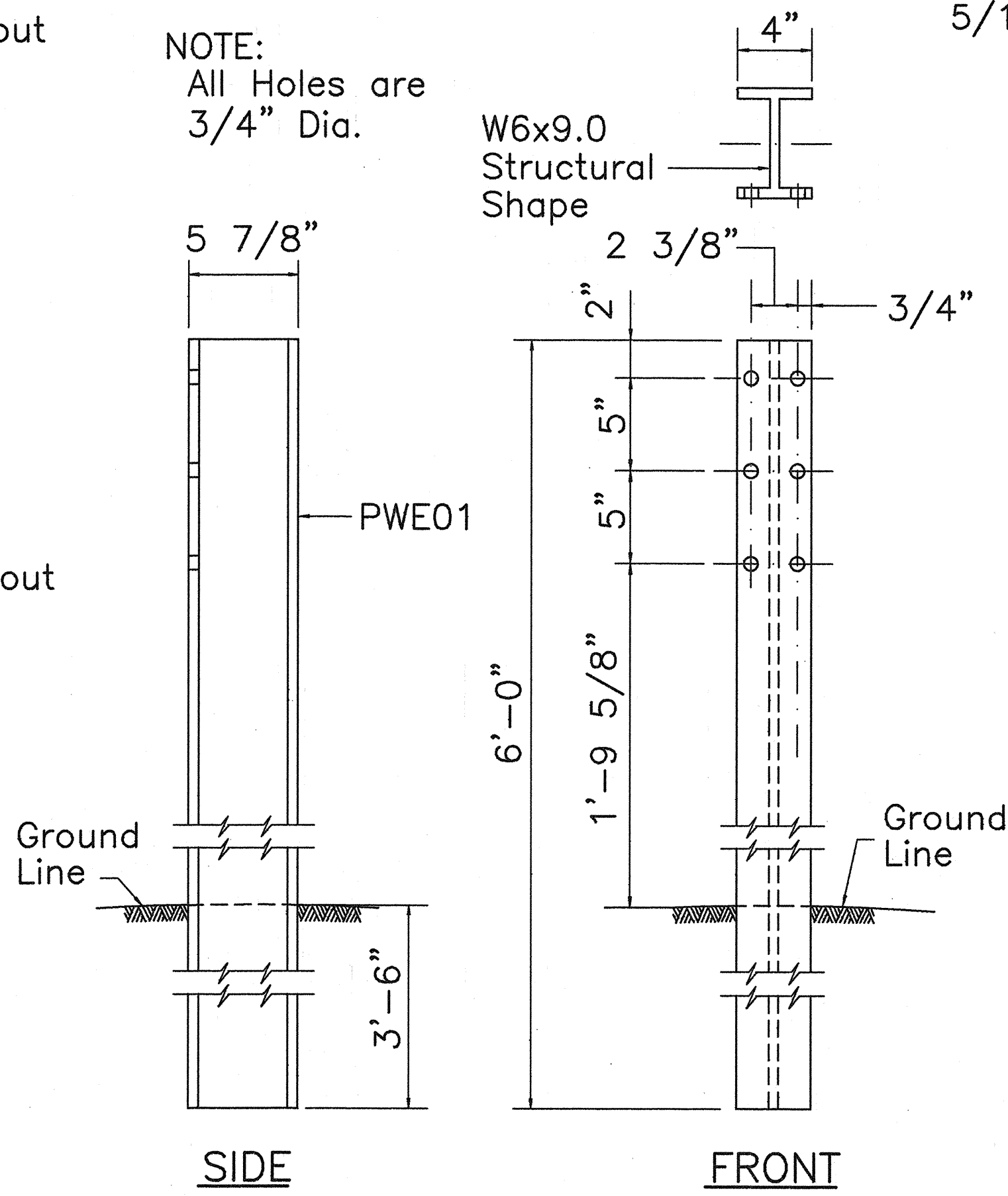


**STRONG POST W-BEAM GUARDRAIL (SGR04a)**



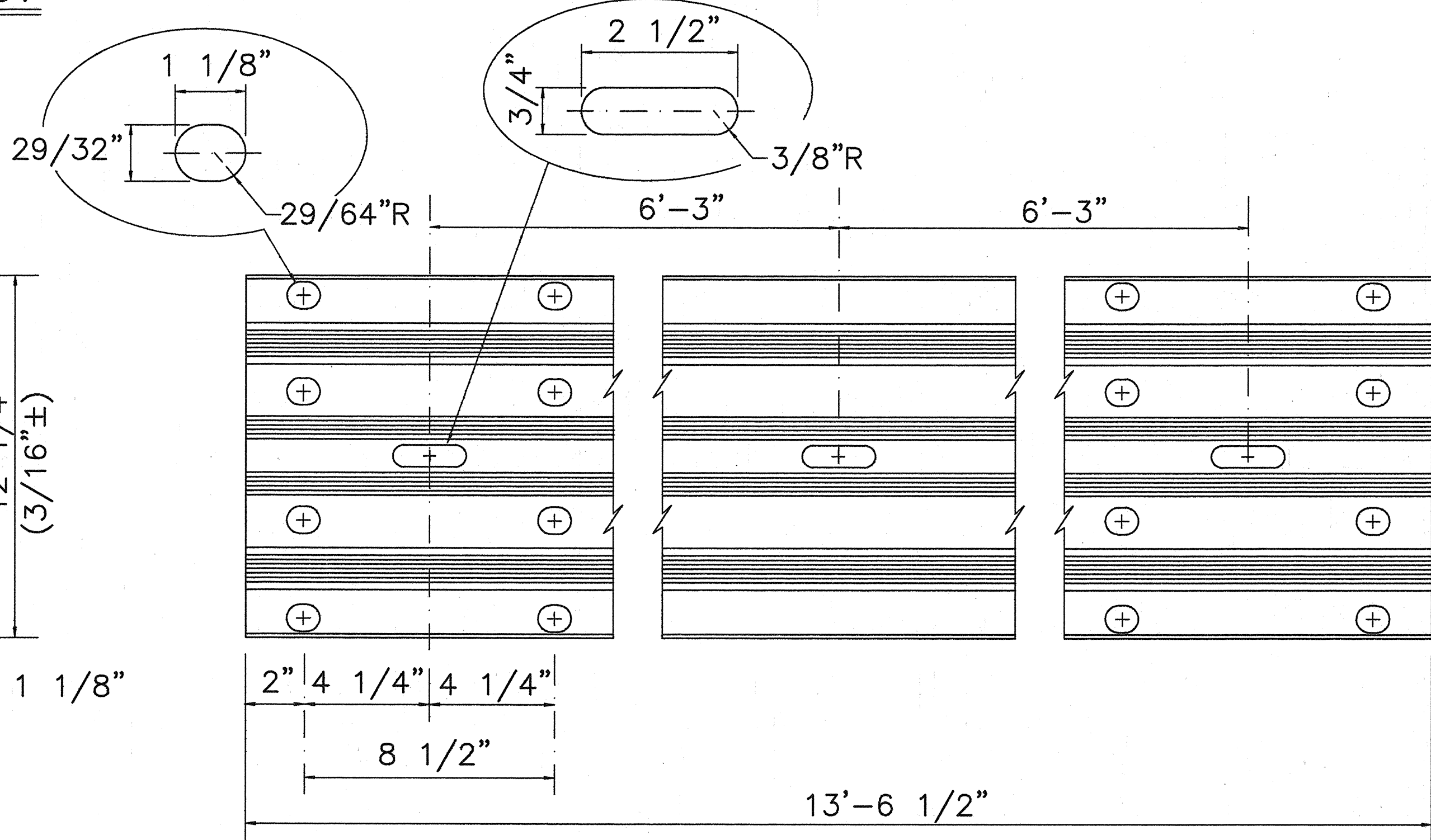
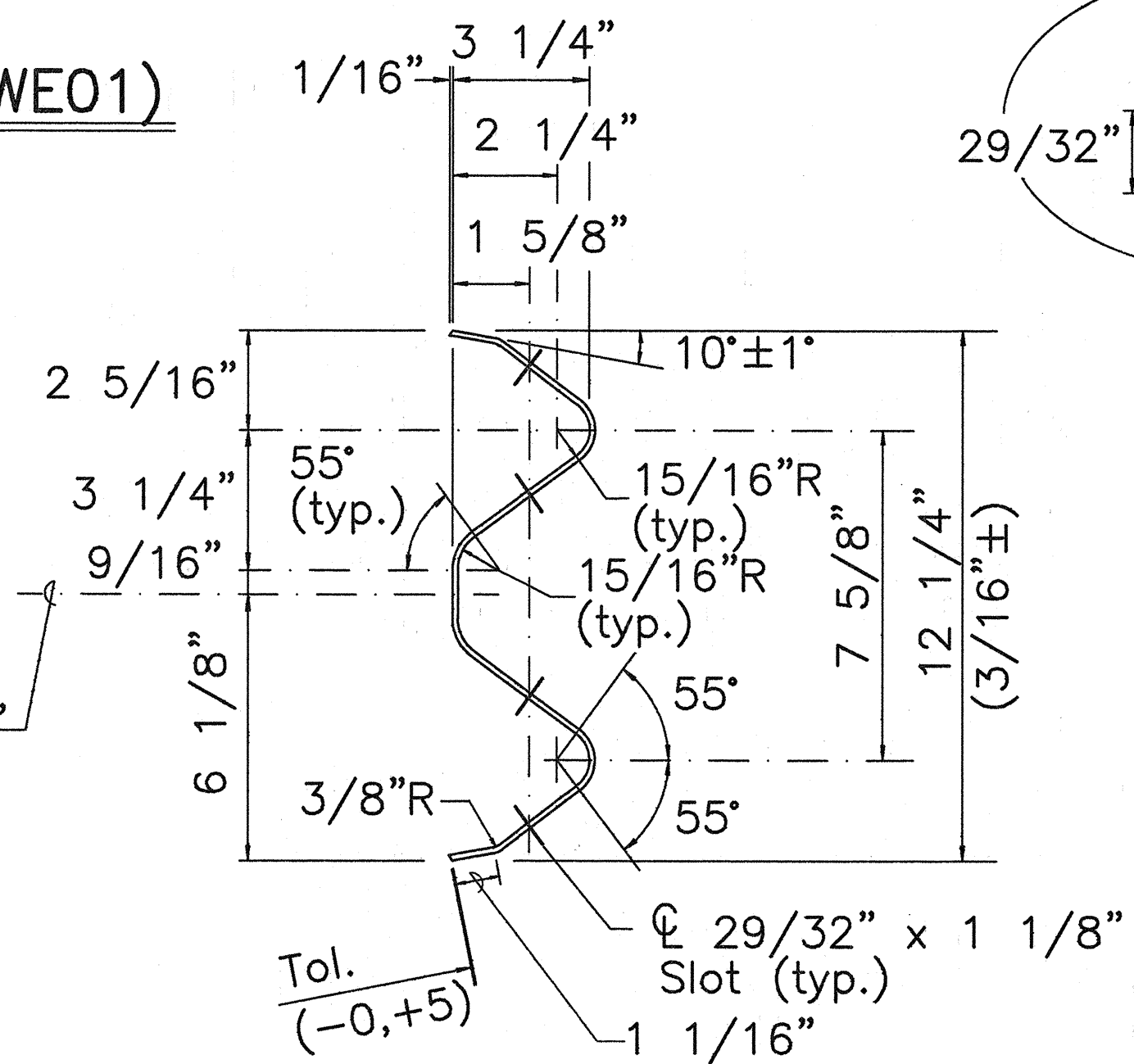
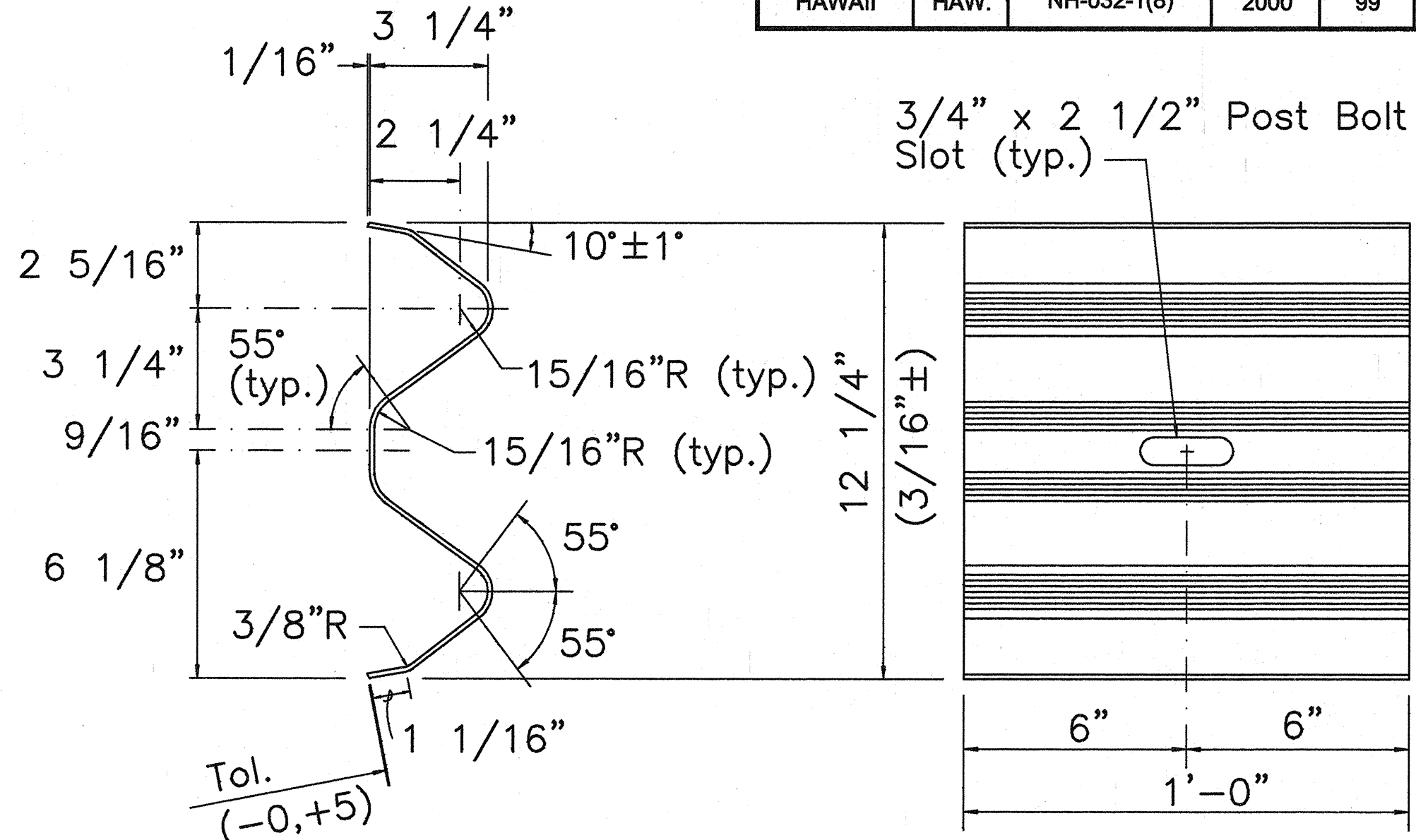
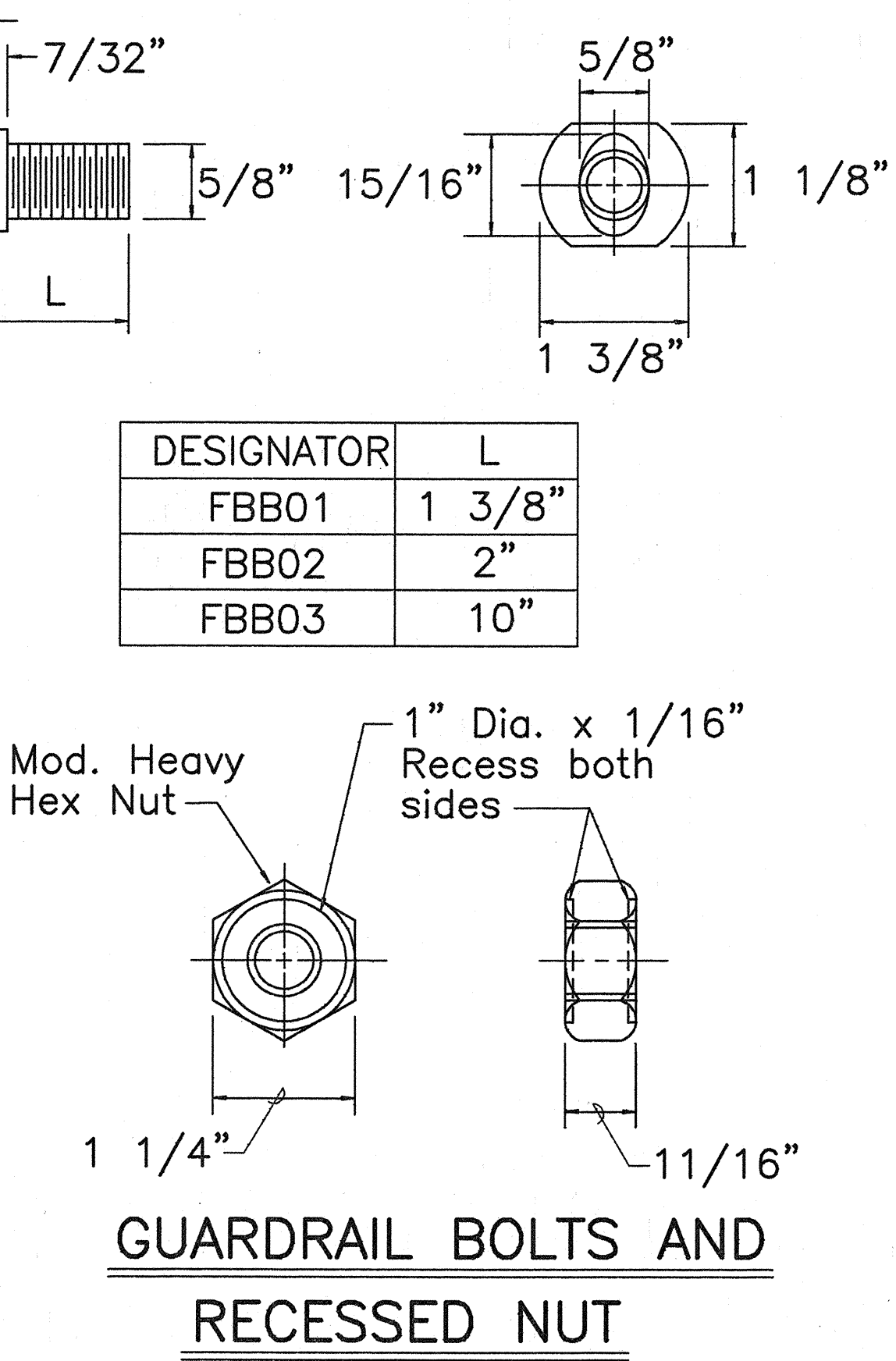
**STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**

NOTE:  
All Holes are 3/4" Dia.



**W-BEAM STRONG POST (PWE01)**

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



**2 SPACE W-BEAM GUARDRAIL (RWM02a)**

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRONG POST WITH BEAM GUARDRAIL**

MAIN STREET RESURFACING  
CENTRAL AVENUE TO KAHUMANU AVENUE  
AND  
KAHUMANU AVENUE RESURFACING  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

SCALE: AS NOTED

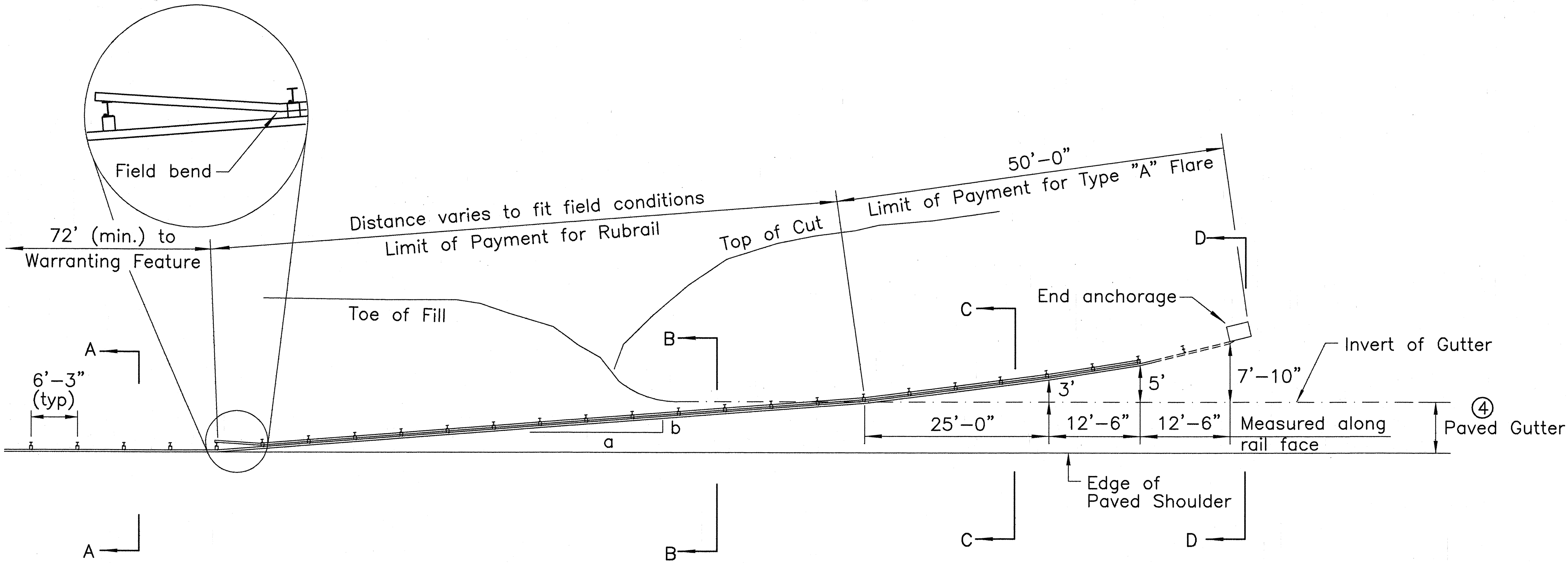
**SHEET No. 2 OF 7 SHEETS**



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	100	111

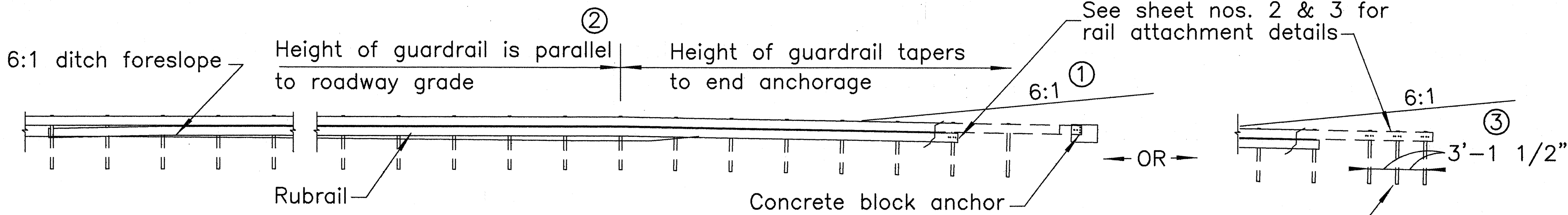
General Notes

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.

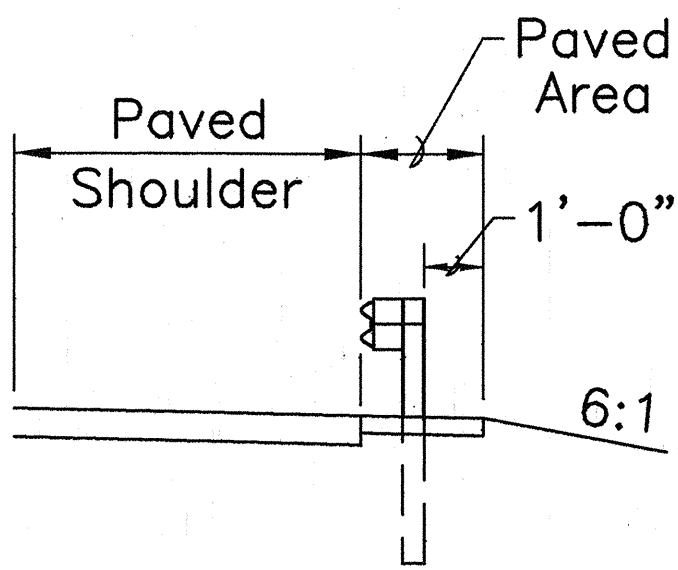


PLAN

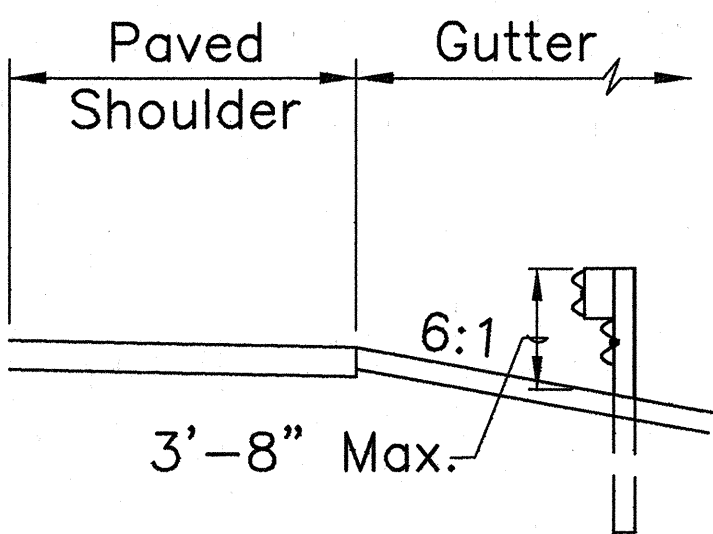
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



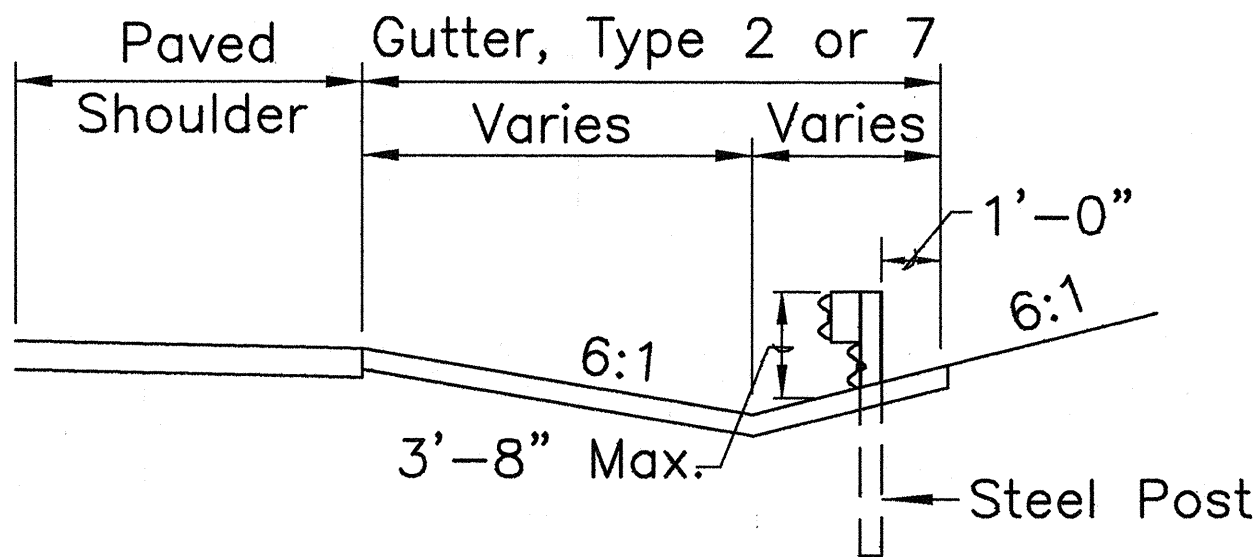
ELEVATION (Profile Along Rail)



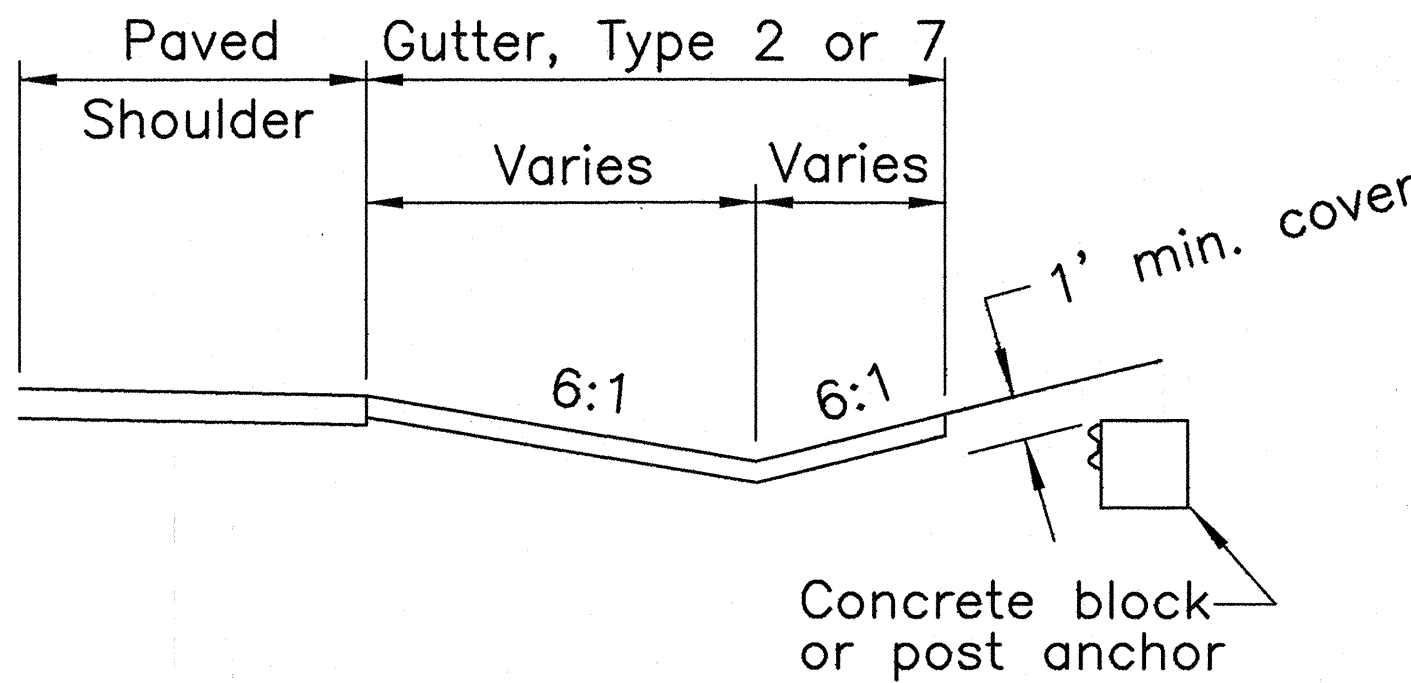
Section A-A



Section B-B  
(With Rubrail)



Section C-C  
(With Rubrail)



BACKSLOPE ANCHOR TERMINAL (WITH 6:1 PAVED GUTTER AND TYPE "A" FLARE)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

TYPE "A" FLARE

MAIN STREET RESURFACING  
CENTRAL AVENUE TO KAAHUMANU AVENUE  
AND  
KAAHUMANU AVENUE RESURFACING  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

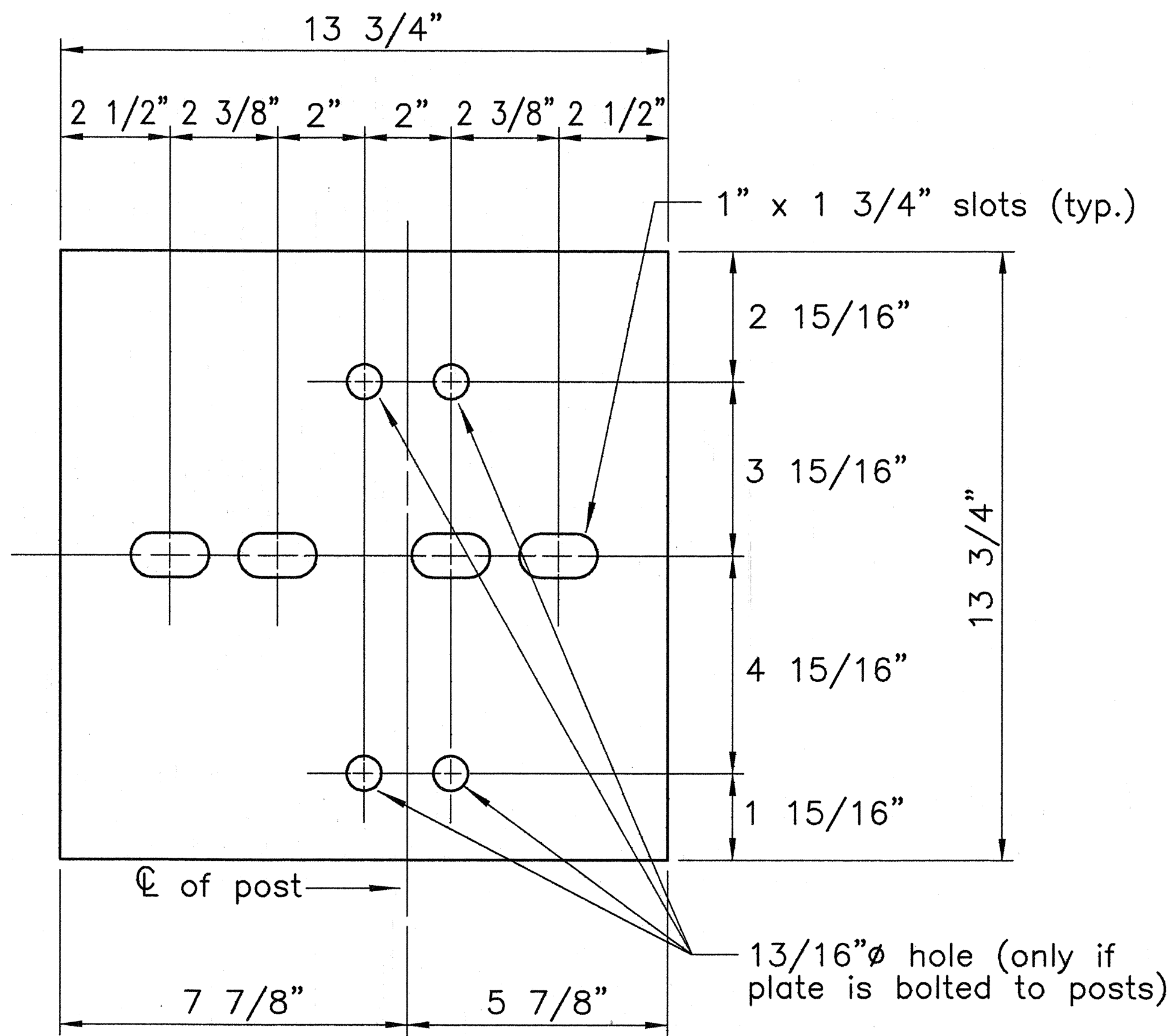
SCALE: AS NOTED

SHEET No. 3 OF 7 SHEETS

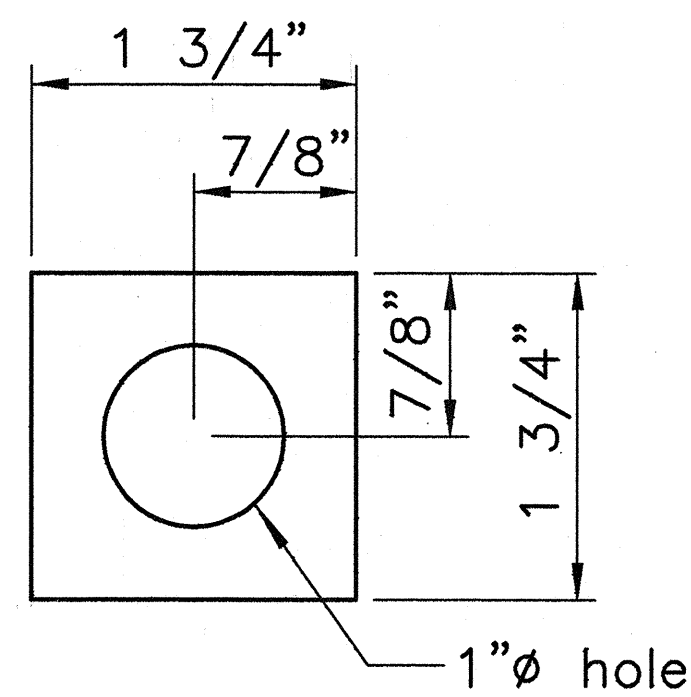
SURVEY PLOTTED BY	DATE
DESIGNED BY	DATE
QUANTITIES BY	DATE
CHECKED BY	DATE
ORIGINAL PLAN	DATE
NOTE BOOK	DATE
No.	

98proj/98049/compans/detguardrail.dwg

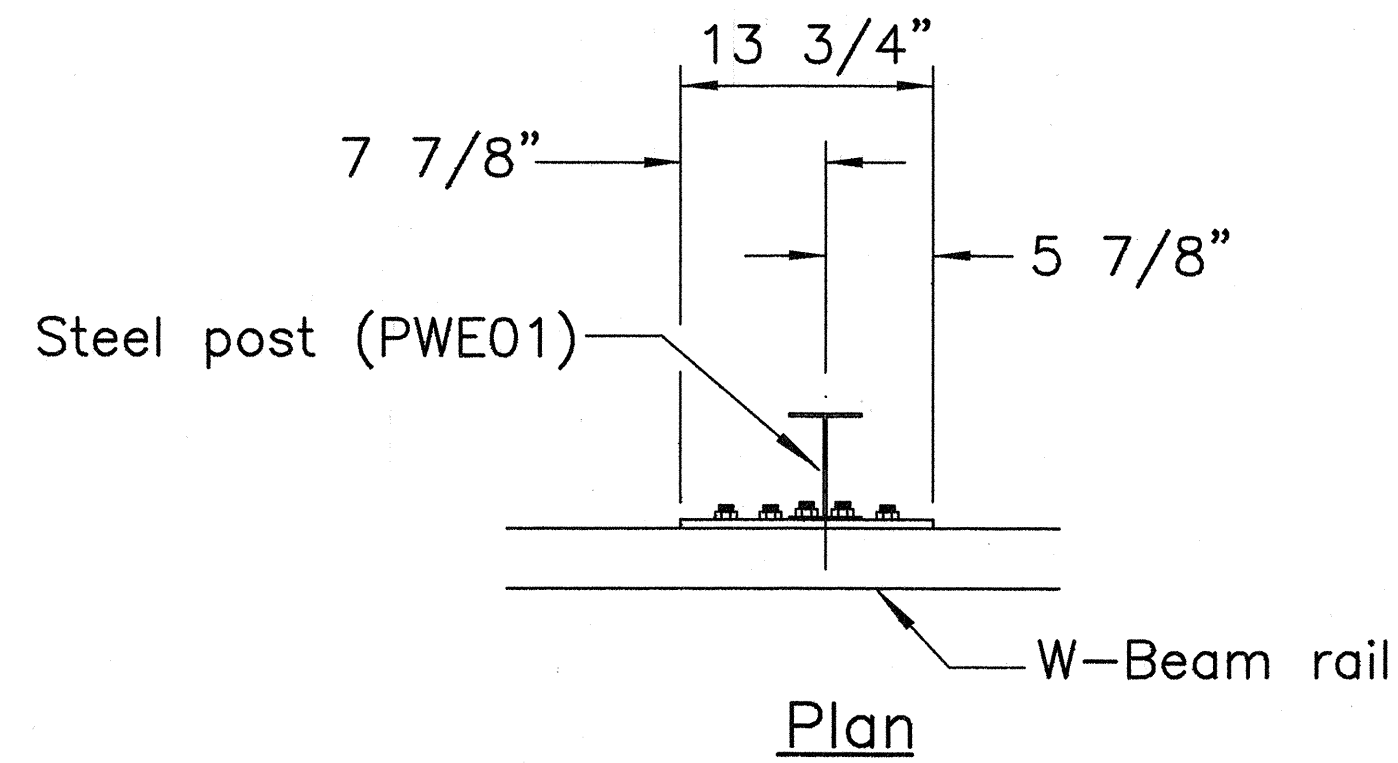
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	101	111



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

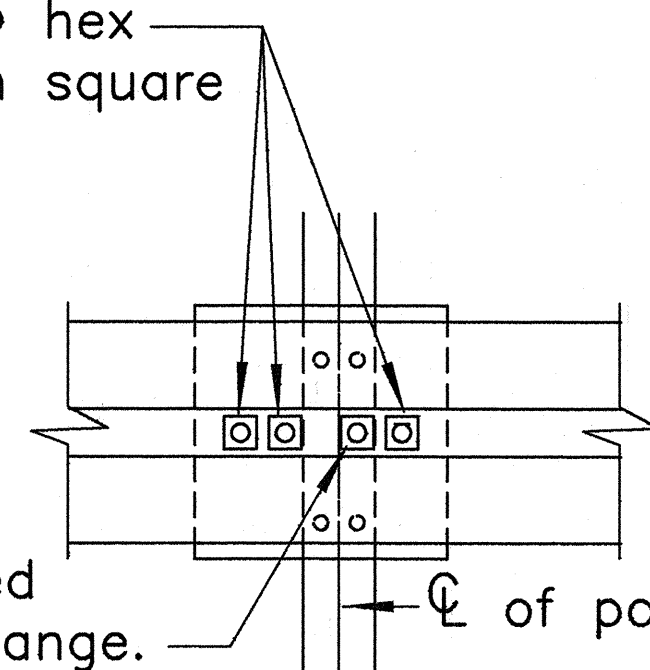


**Square Washer**  
(3/16" Thick – Hot-dip  
Zinc Coated Galvanized)

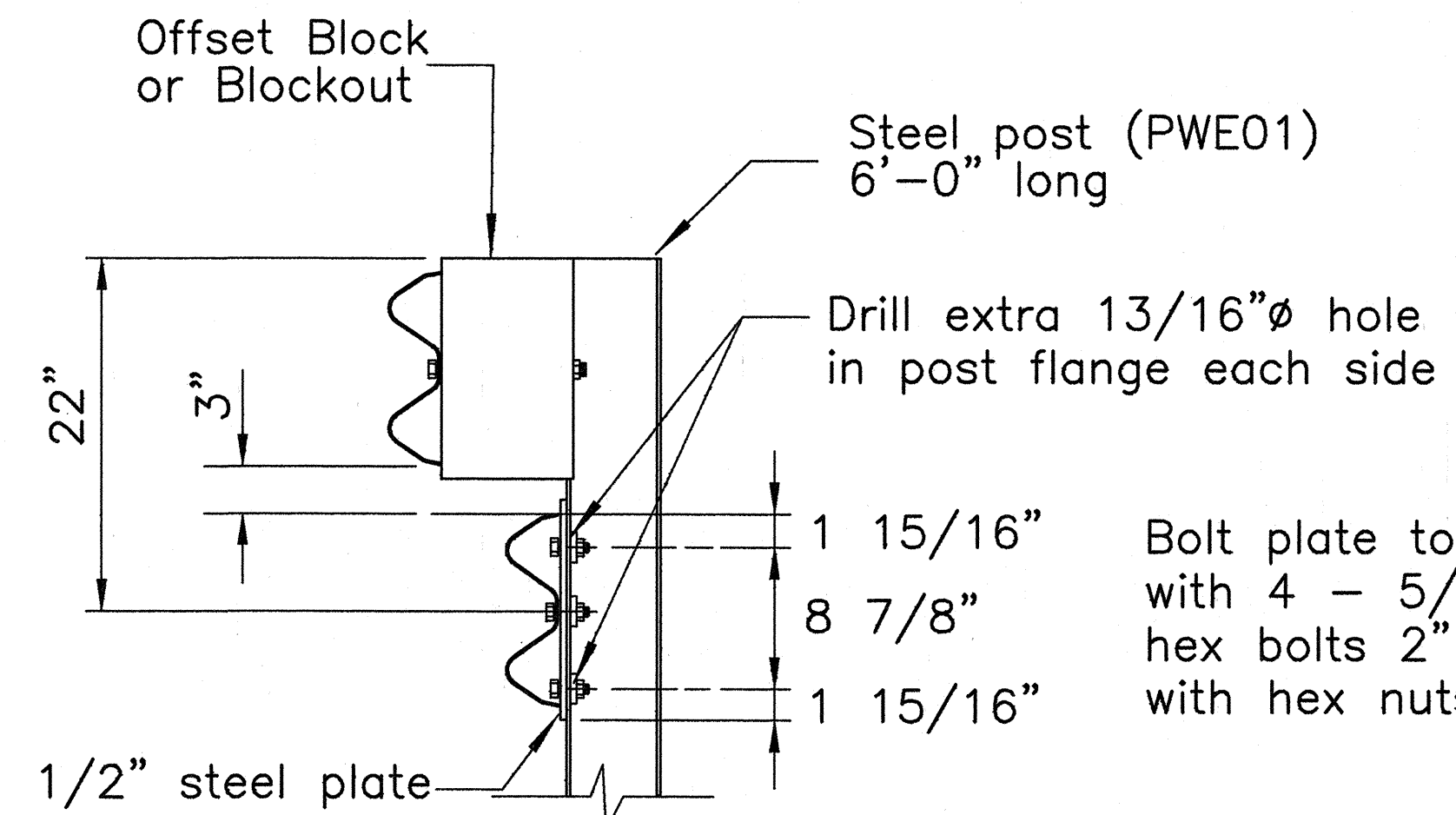


3 – 7/8"Ø holes to be field drilled in rail and attached to steel plate with 7/8"Ø hex bolts 1 15/16" long with square washer

1"Ø holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8"Ø hex bolts 2" long with square washer



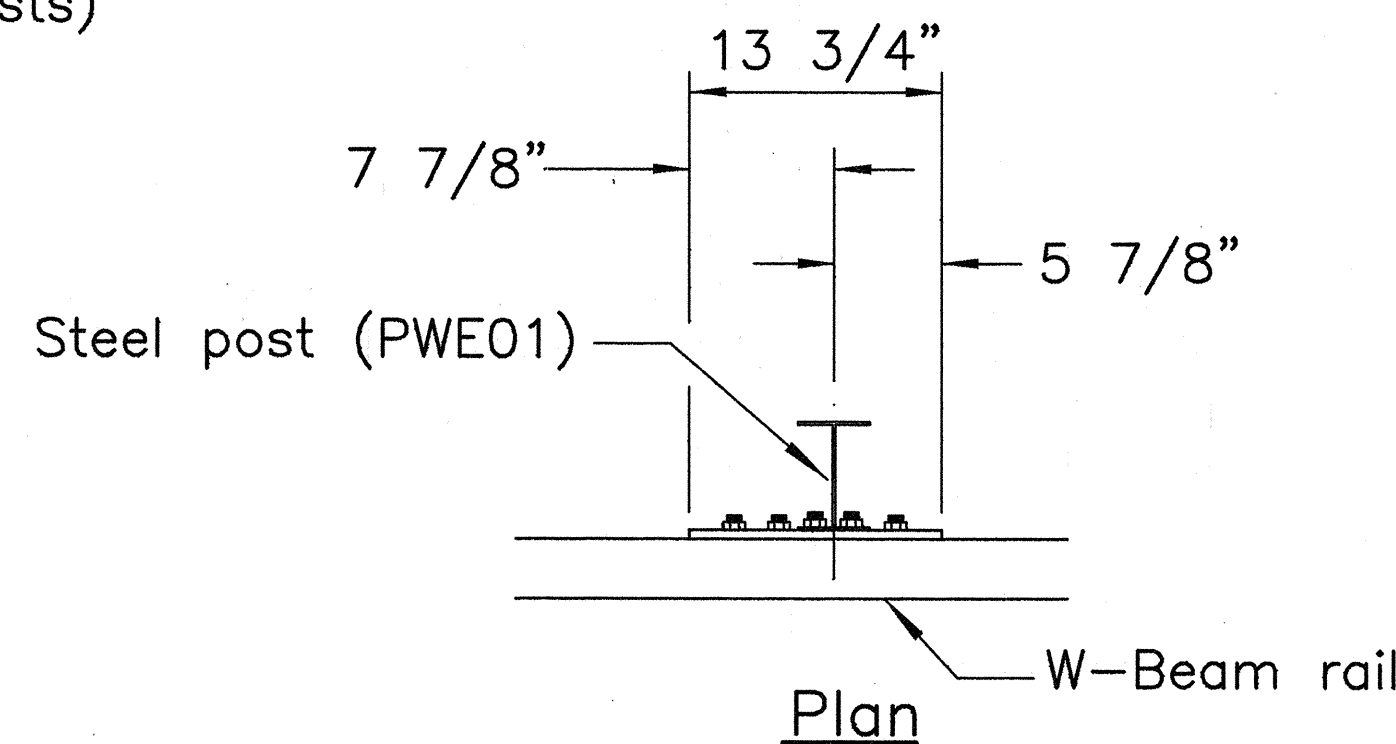
**Front View**



**Elevation**

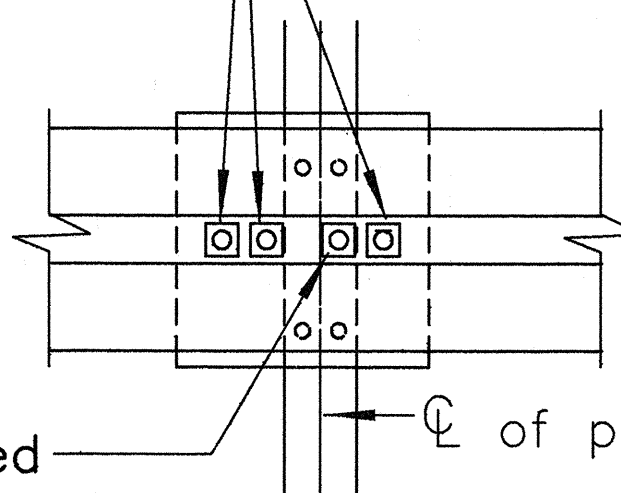
### RUBRAIL ANCHOR DETAILS

**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.

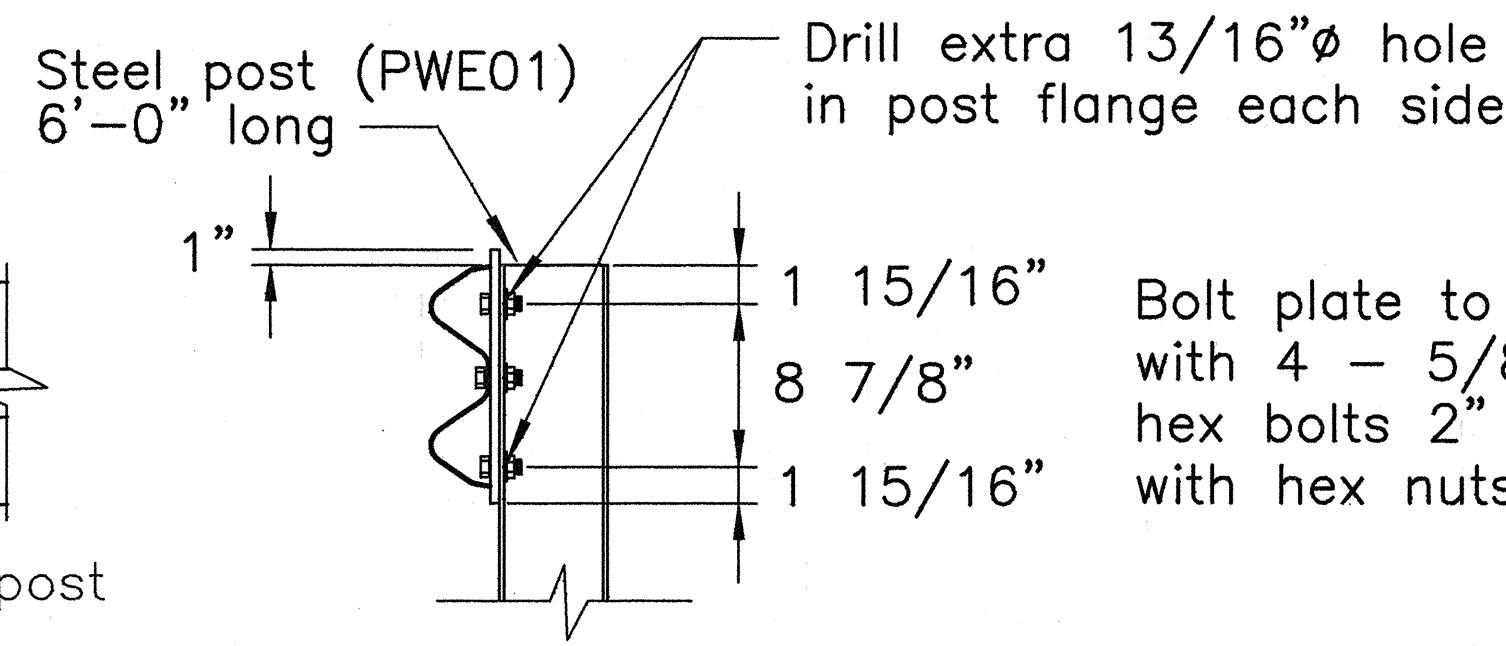


3 – 7/8"Ø holes to be field drilled in rail and attached to steel plate with 7/8"Ø hex bolts 1 15/16" long with square washer

1"Ø holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8"Ø hex bolts 2" long with square washer



**Front View**



**Elevation**

### POST ANCHOR DETAILS

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

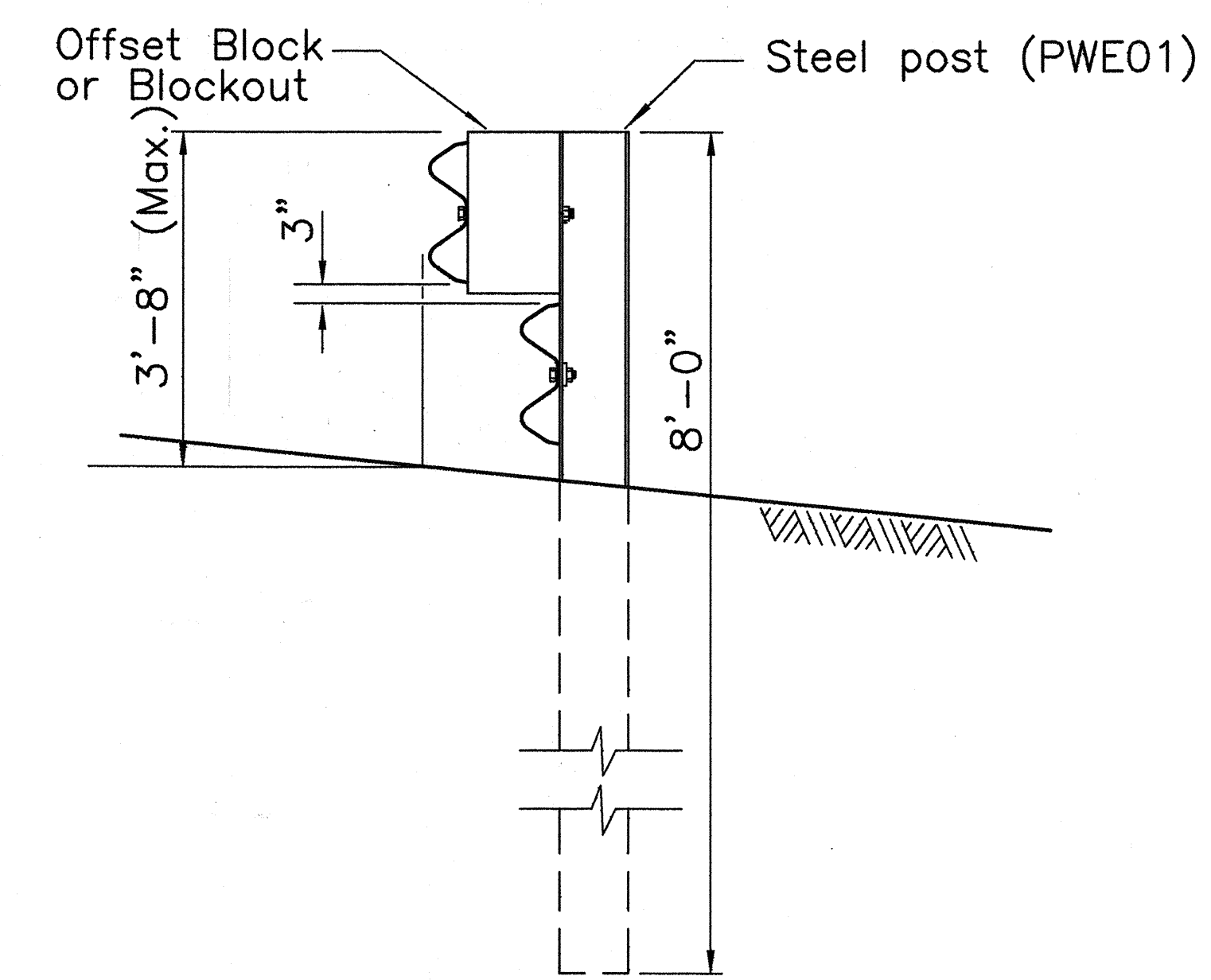
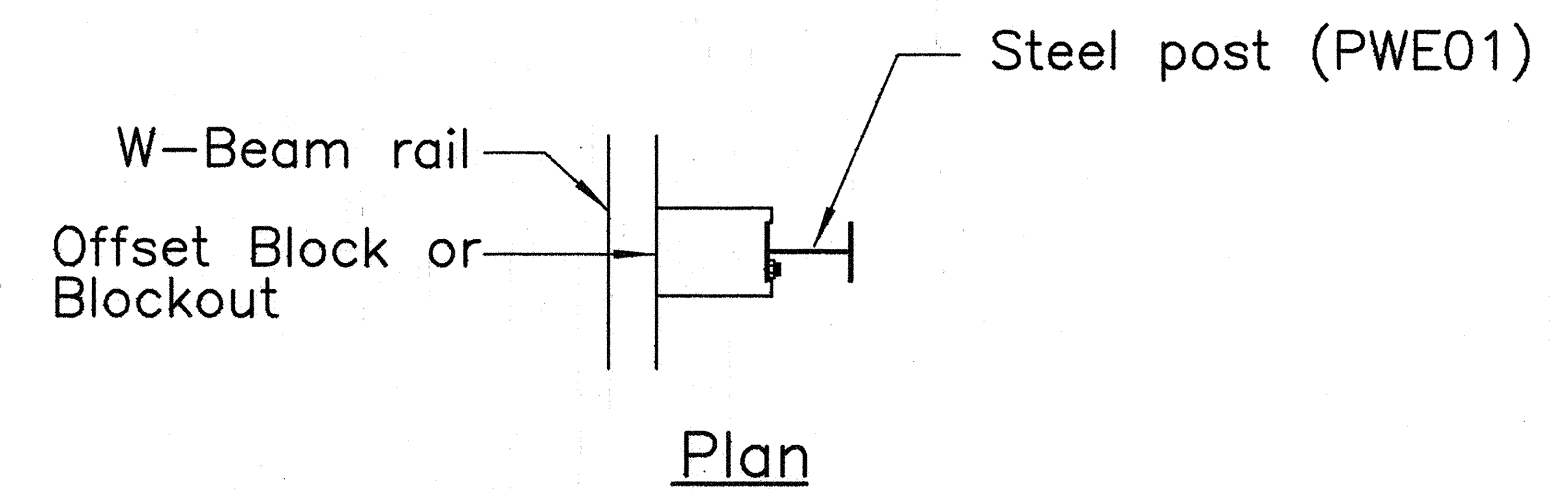
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**TYPE "A" FLARE**  
MAIN STREET RESURFACING  
CENTRAL AVENUE TO KAAHUMANU AVENUE  
AND  
KAAHUMANU AVENUE RESURFACING  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

SCALE: AS NOTED

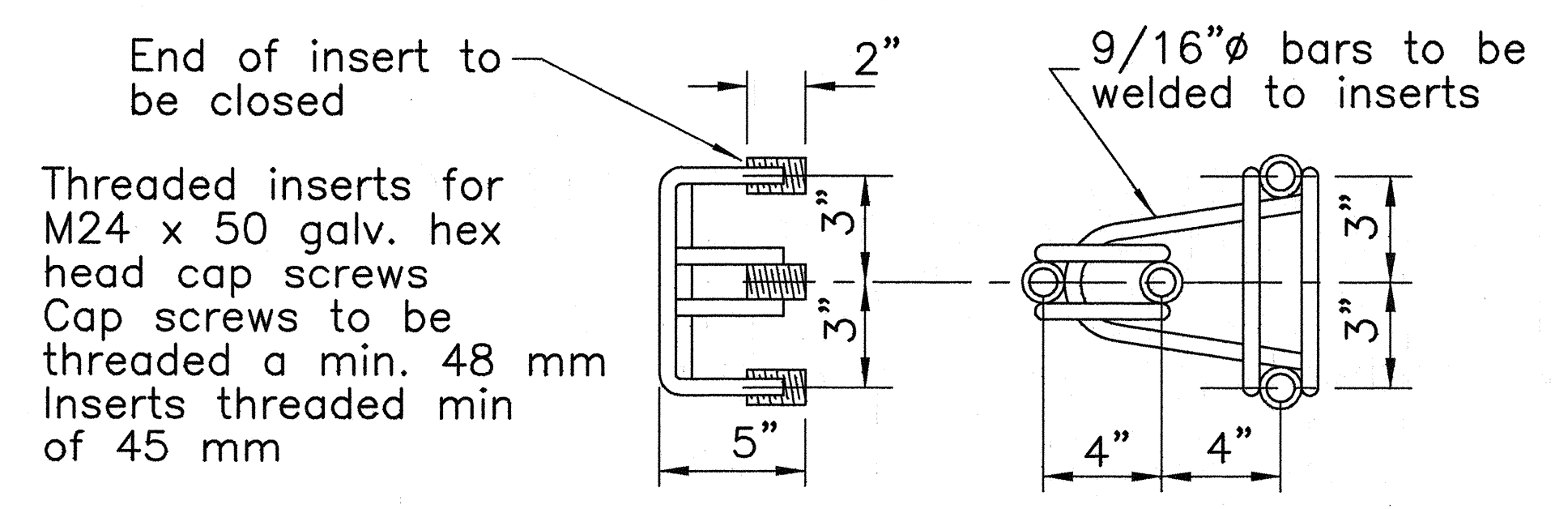
SHEET No. 4 OF 7 SHEETS



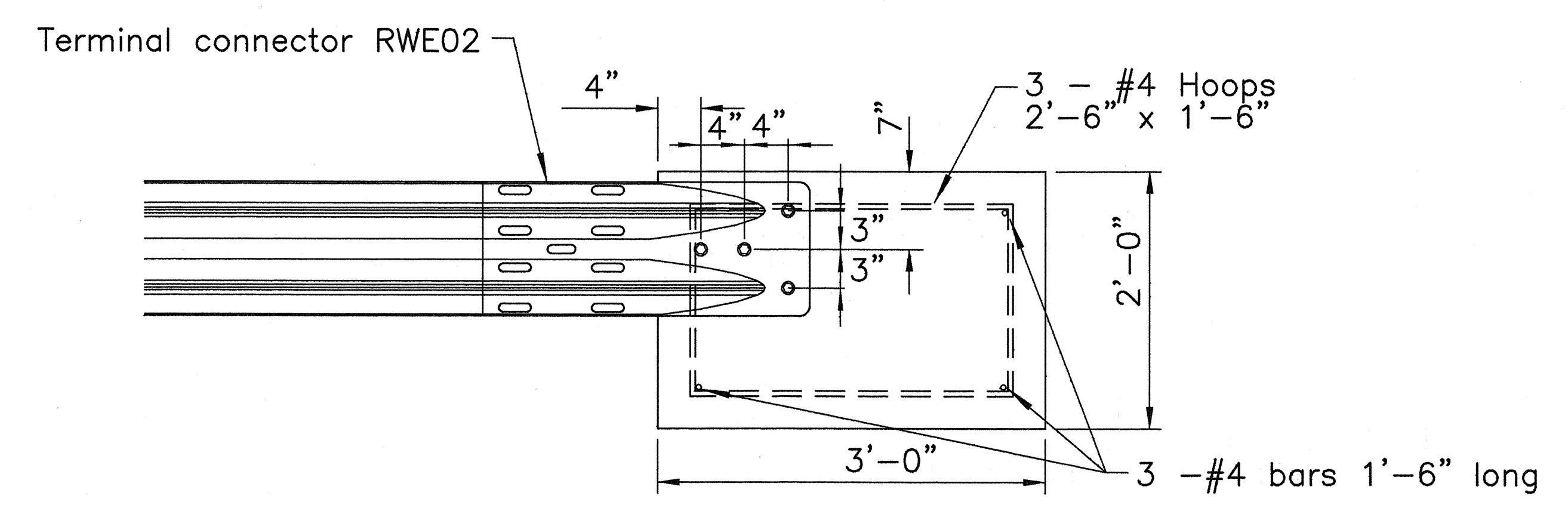
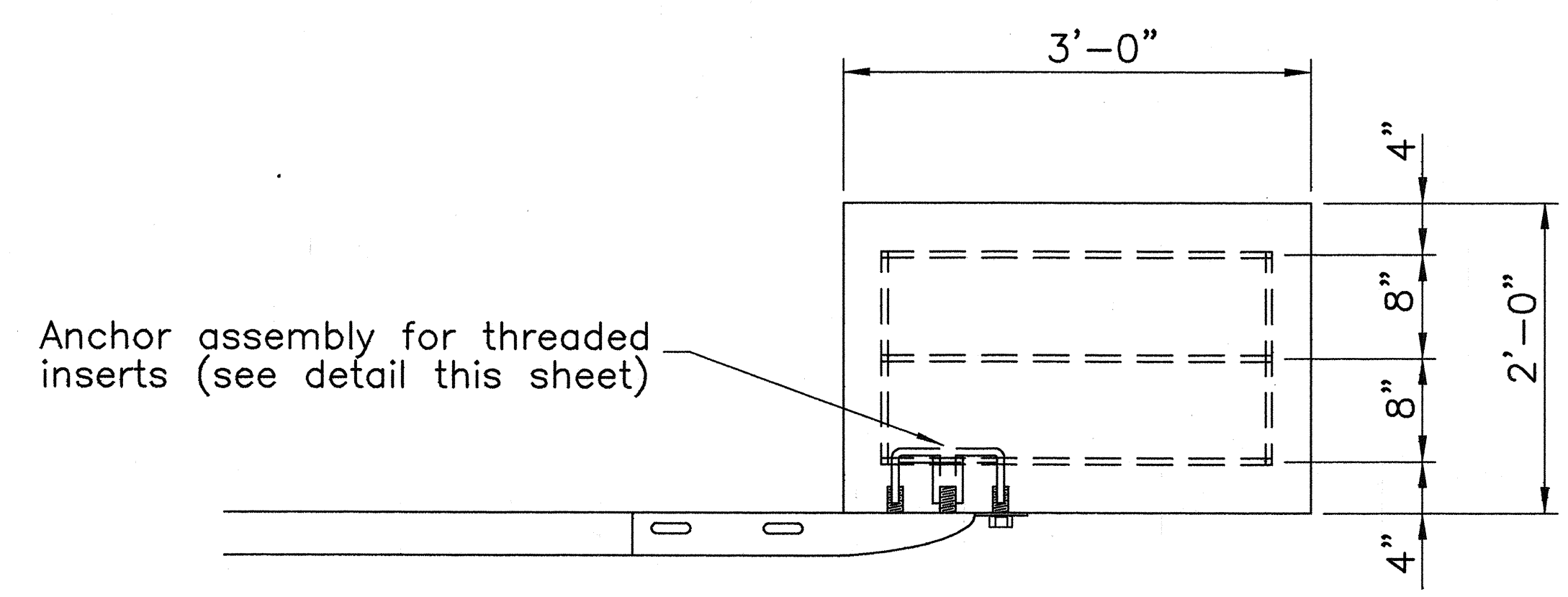
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	102	111



**STEEL POST GUARDRAIL  
WITH RUBRAIL**



**CONCRETE BLOCK ANCHOR**



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

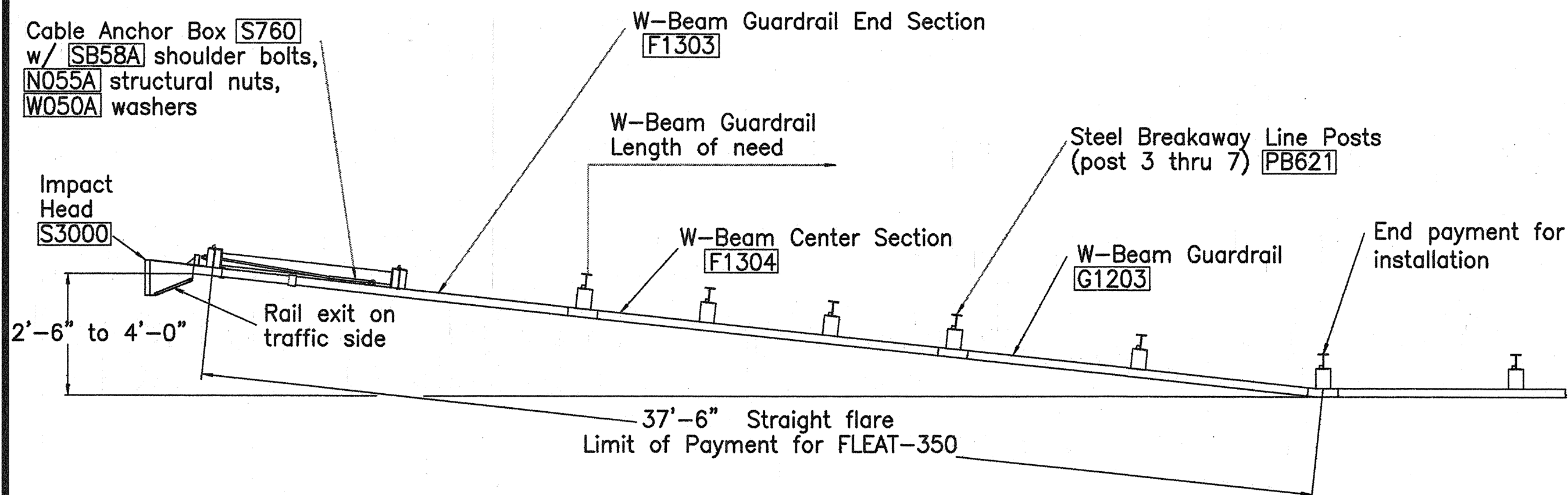
**BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS  
TYPE "A" FLARE)**

**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.

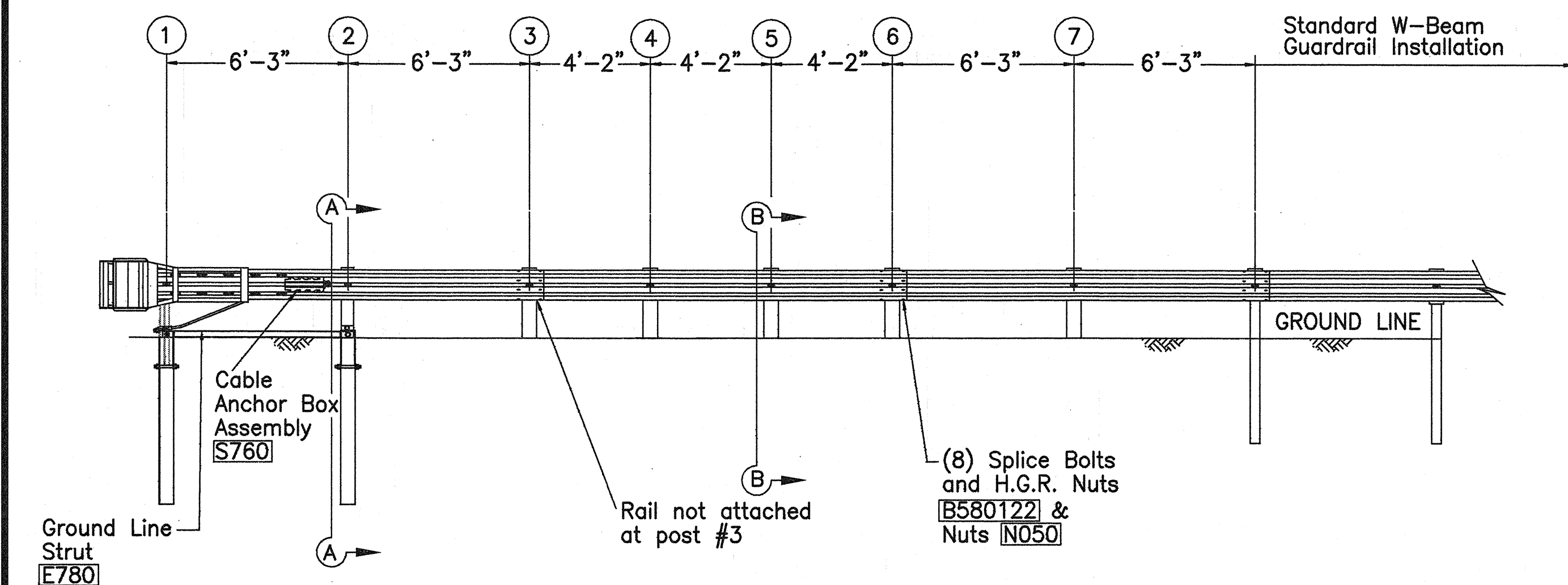
SURVEY PLOTTED BY	DATE
DRAWN BY	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
ORIGINAL PLAN	No.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**TYPE "A" FLARE**  
MAIN STREET RESURFACING  
CENTRAL AVENUE TO KAAHUMANU AVENUE  
AND  
KAAHUMANU AVENUE RESURFACING  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

SCALE: AS NOTED  
SHEET No. 5 OF 7 SHEETS



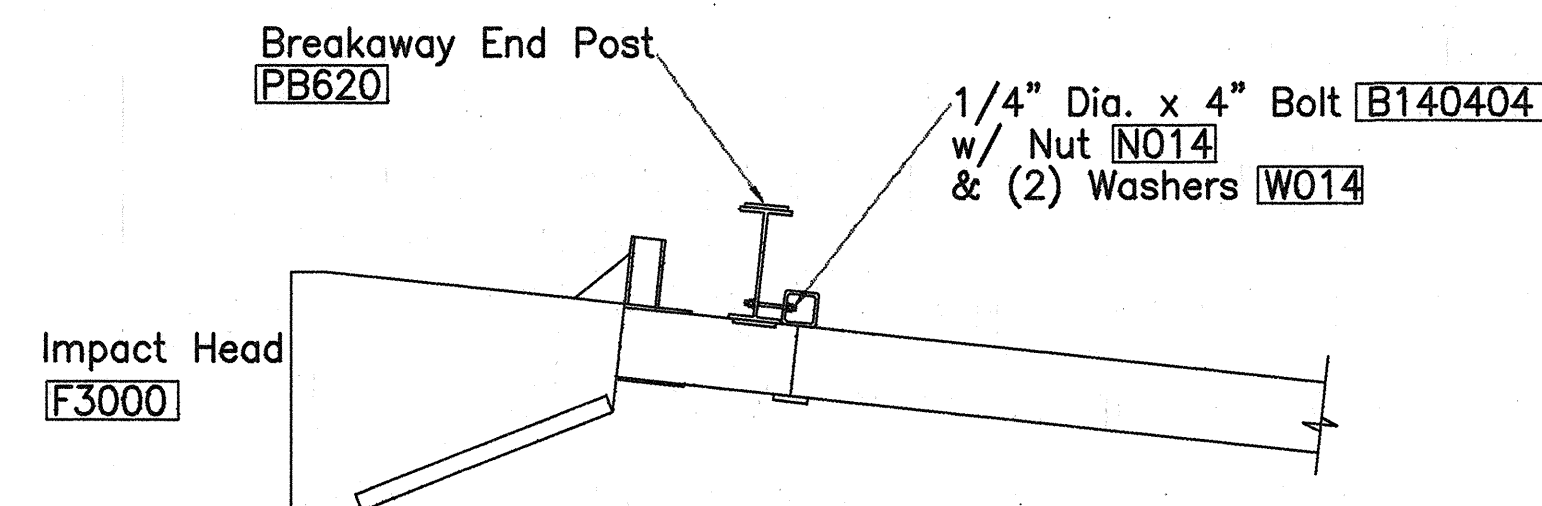
PLAN



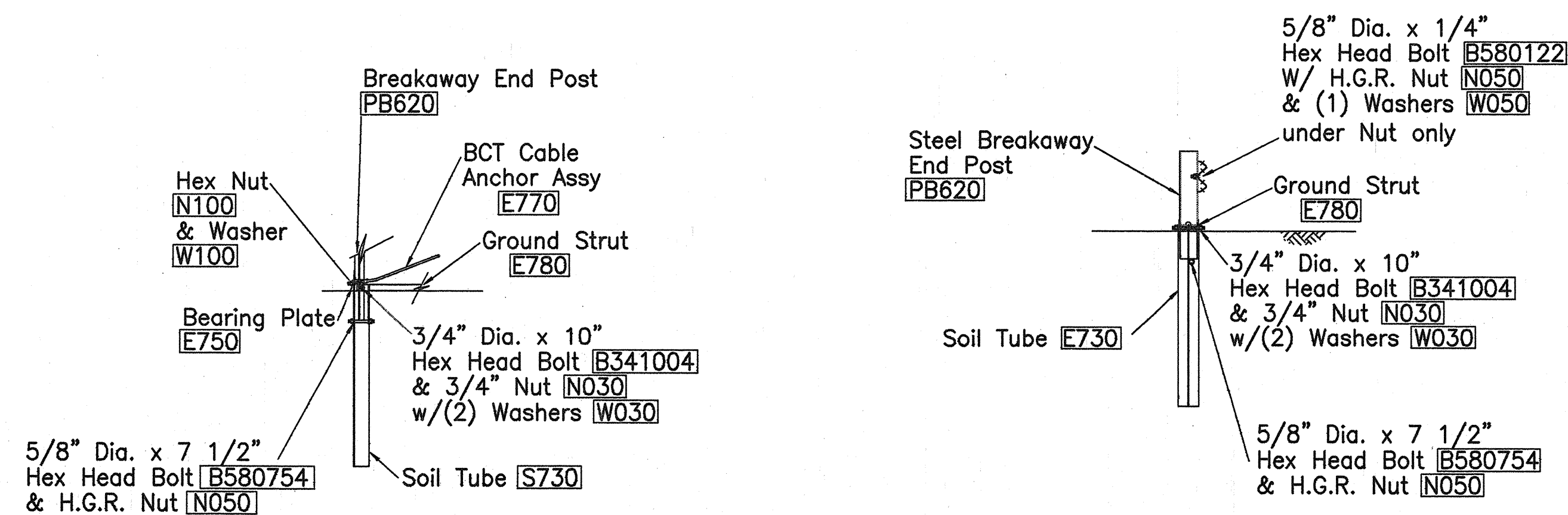
ELEVATION

# 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 tube 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.

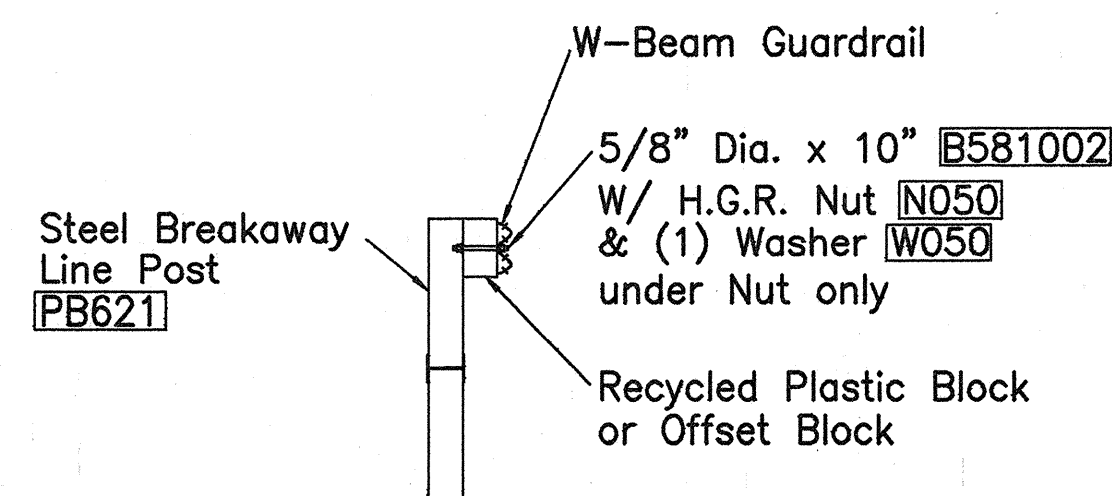


IMPACT HEAD CONNECTING DETAIL



PARTIAL VIEW OF POST 1

SECTION A-A  
at Post #2



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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	103	111

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'
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BRAEKAWAY END POST
PB621	5	STEEL BRAEKAWAY LINE POST
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLK.
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 (SPUCE 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

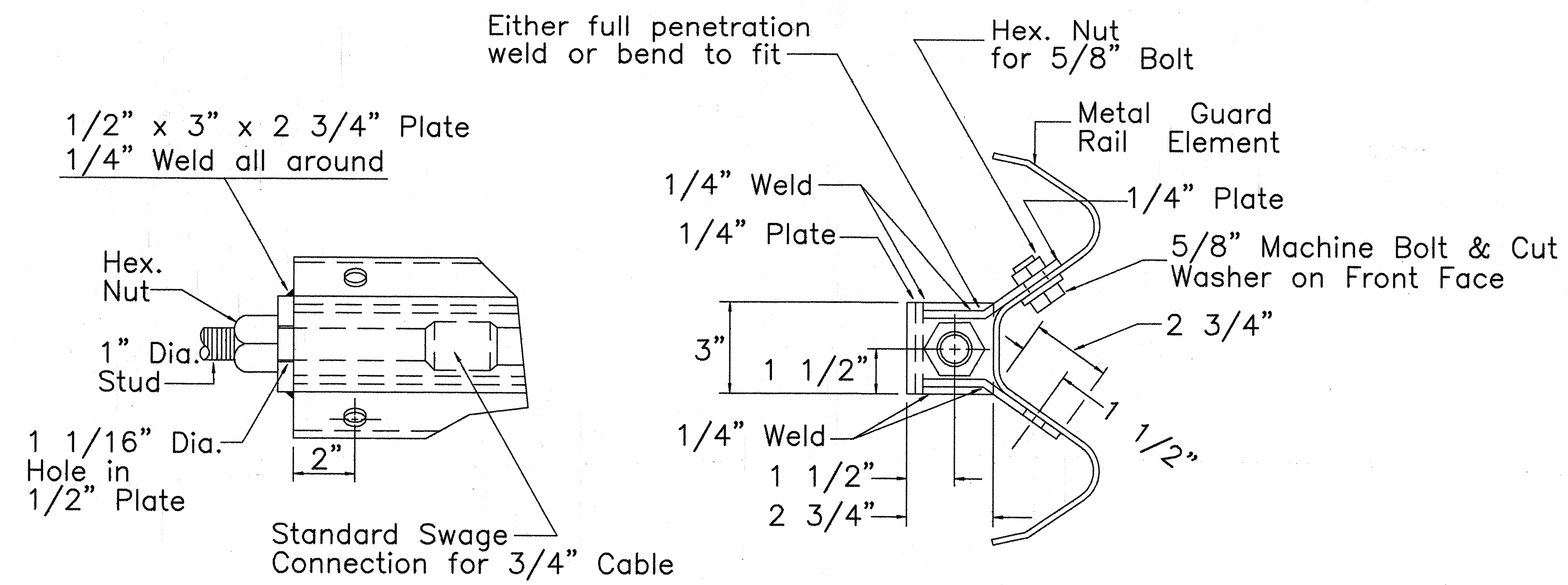
## Foundation Tube Options For Posts 1 & 2

- \*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

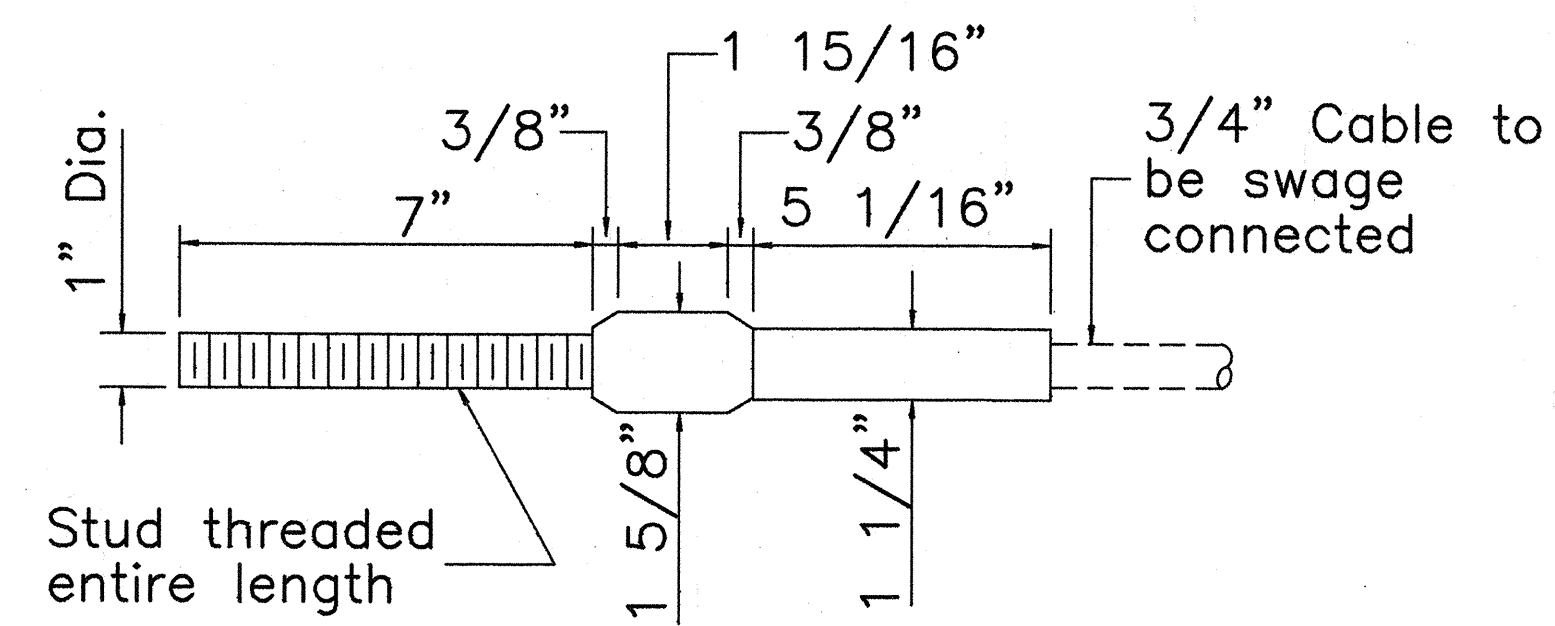
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION FLEAT-350 FLARED ENERGY ABSORBING TERMINAL MAIN STREET RESURFACING CENTRAL AVENUE TO KAAHUMANU AVENUE AND KAAHUMANU AVENUE RESURFACING MAIN STREET TO HOBSON AVENUE Fed. Aid Project No. NH-032-1(8) SCALE: AS NOTED
--



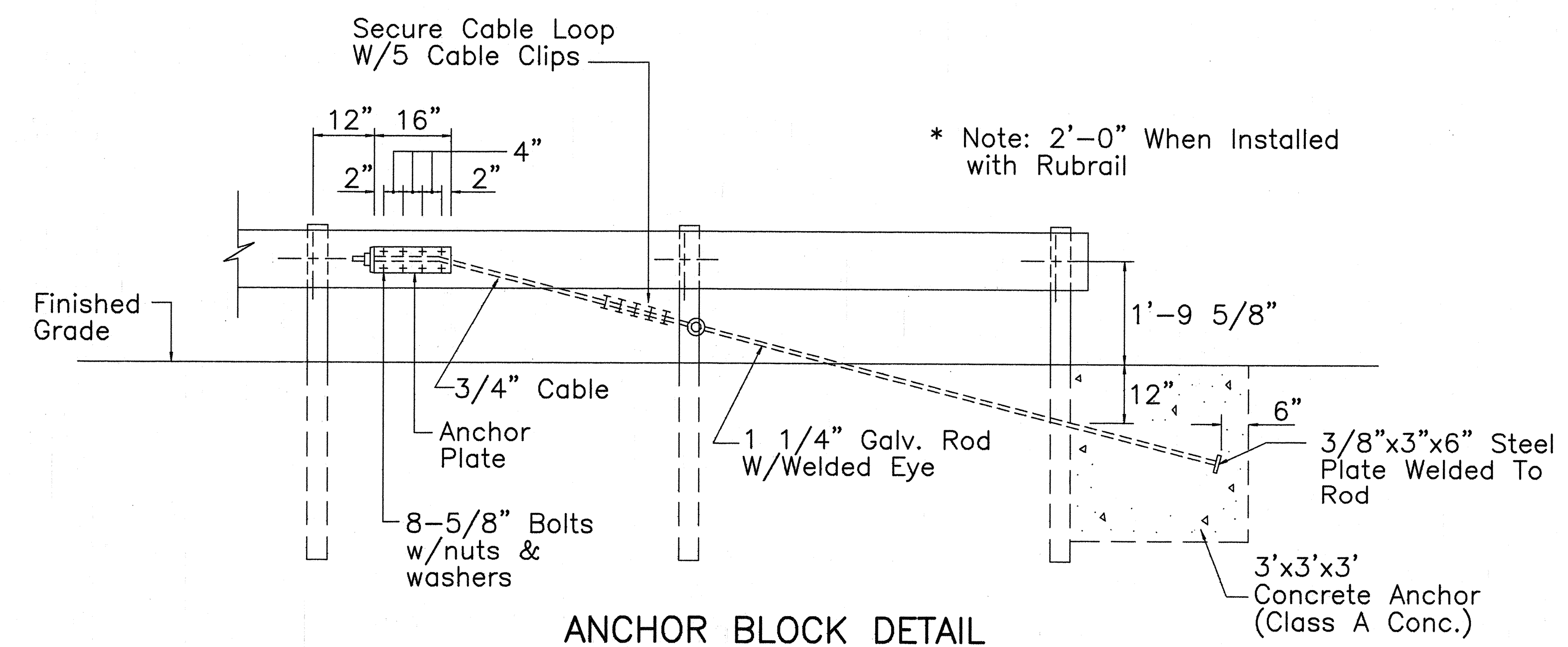
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-032-1(8)	2000	104	111



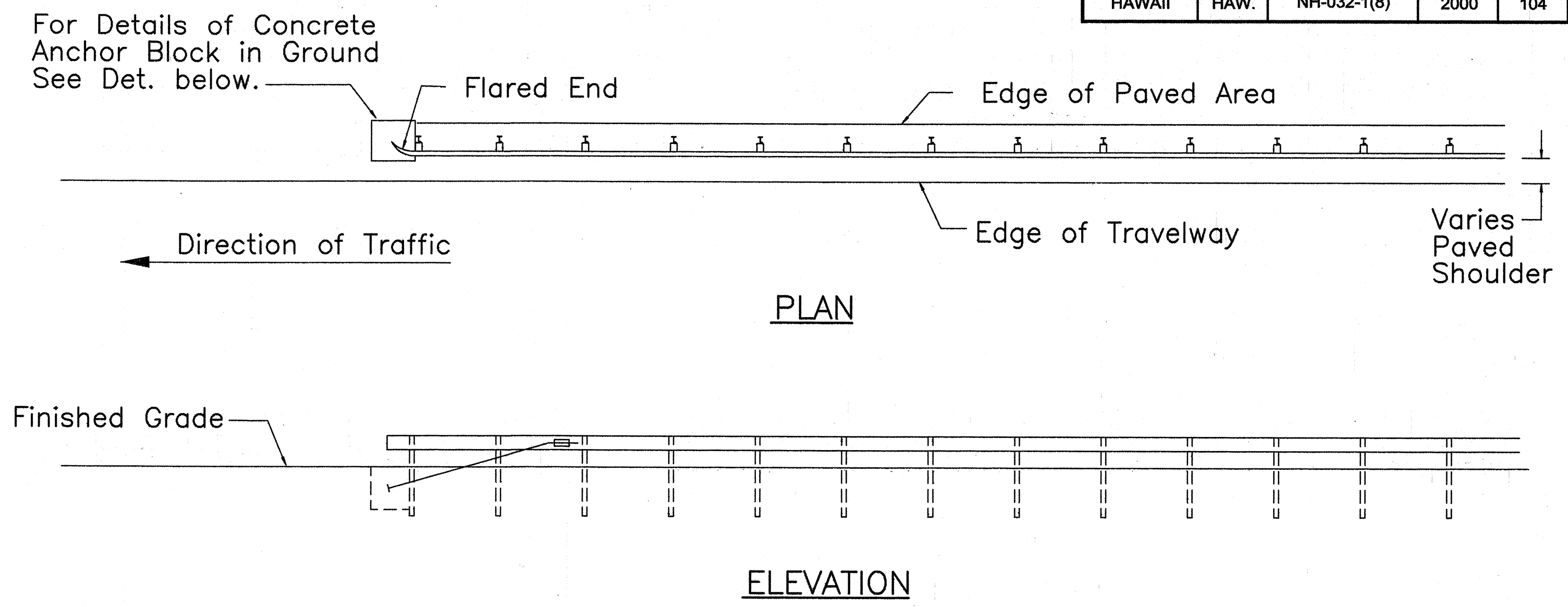
ANCHOR PLATE DETAILS



STANDARD SWAGED FITTING AND STUD



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



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.

DATE	DATE	DATE	DATE	DATE	DATE
DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY	DESIGNED BY
CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY	CHECKED BY
NO.	NO.	NO.	NO.	NO.	NO.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

TYPE "A" FLARE  
MAIN STREET RESURFACING  
CENTRAL AVENUE TO KAAHUMANU AVENUE  
AND  
KAAHUMANU AVENUE RESURFACING  
MAIN STREET TO HOBSON AVENUE  
Fed. Aid Project No. NH-032-1(8)

SCALE: AS NOTED

SHEET No. 7 OF 7 SHEETS