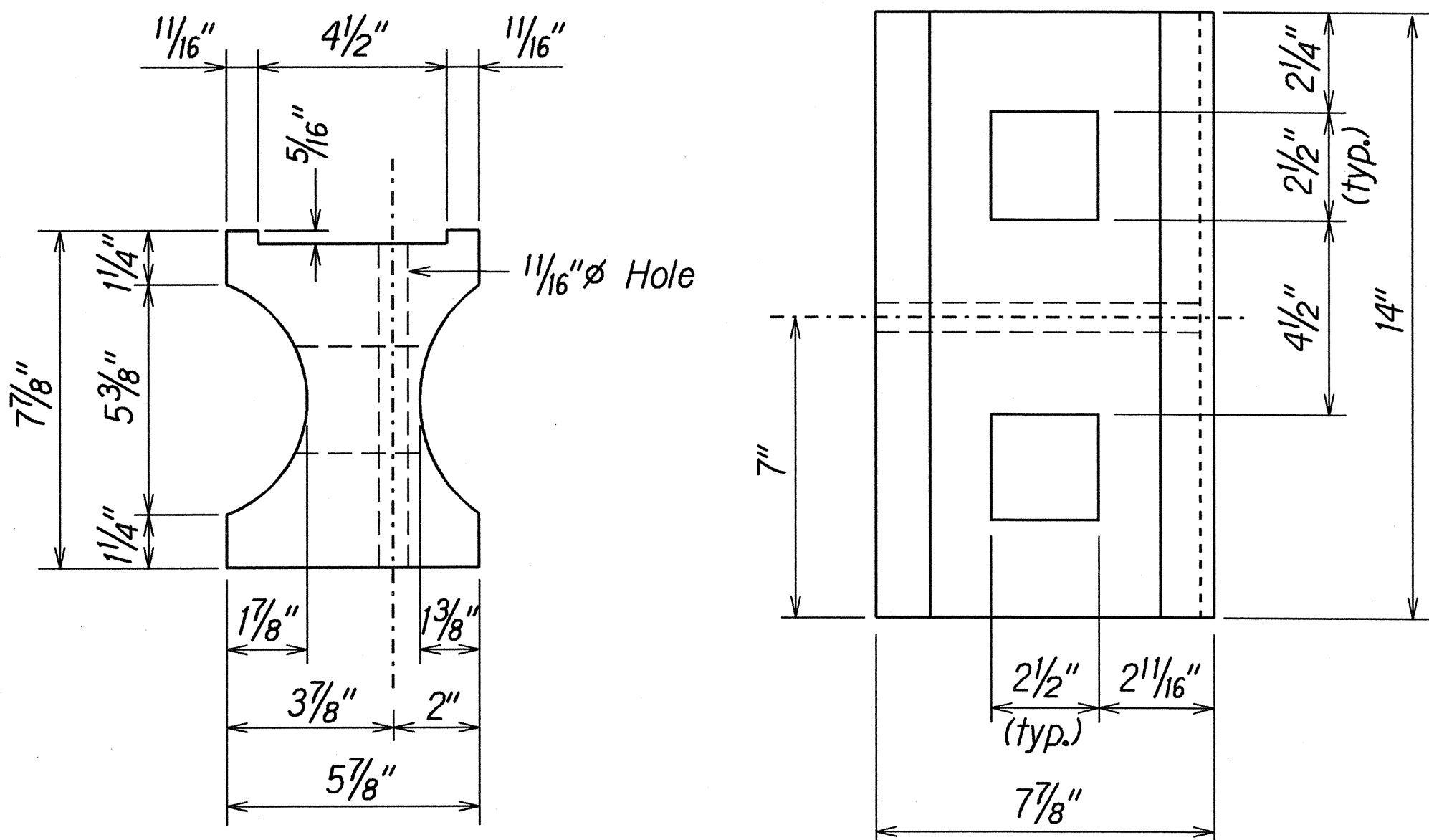


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	12	47

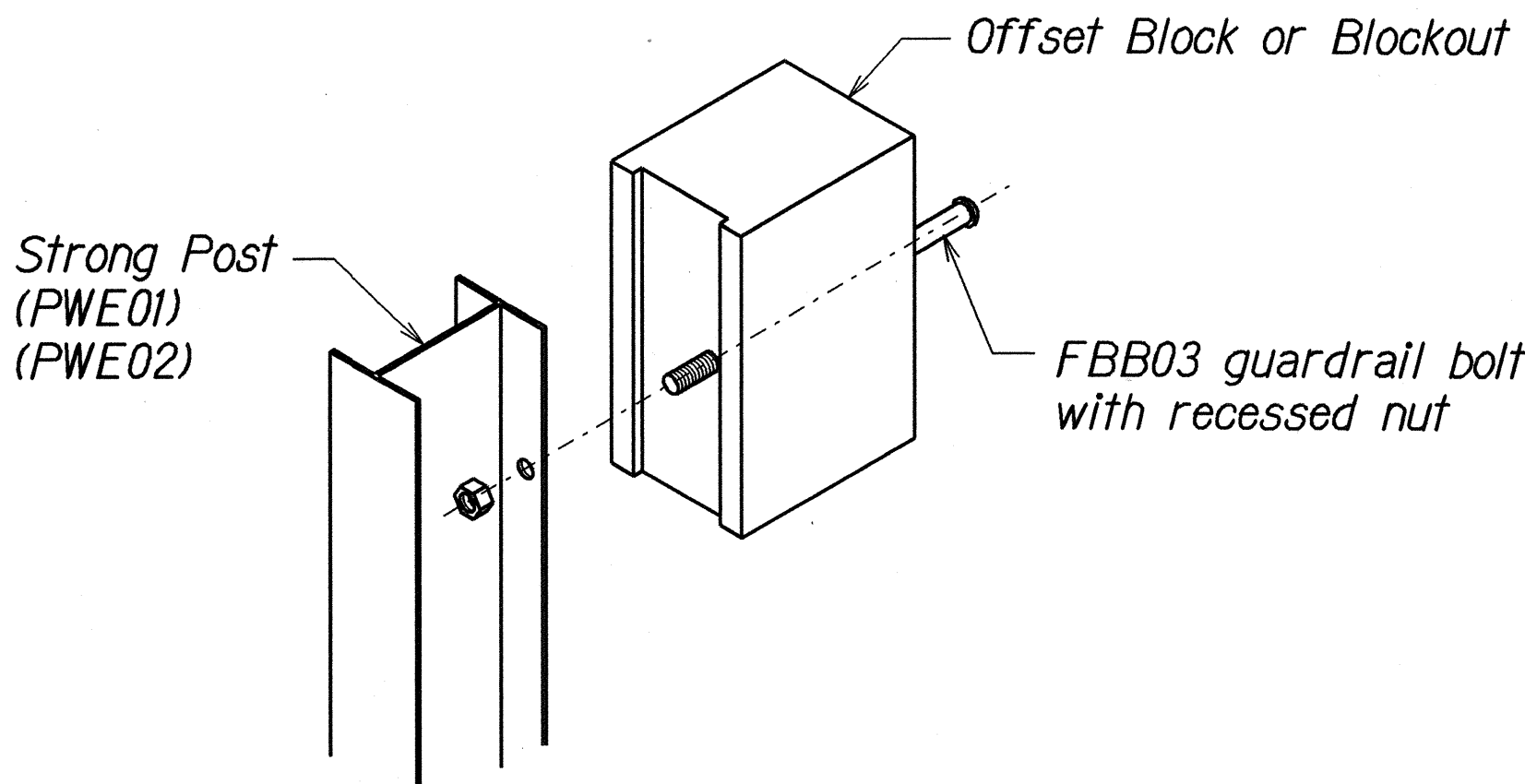
GENERAL NOTES

- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- 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.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
- 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.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. RM-5's shall not be installed on Terminal Sections. Furnishing and installing of each RM-5 shall be considered incidental to the adjacent guardrail system.

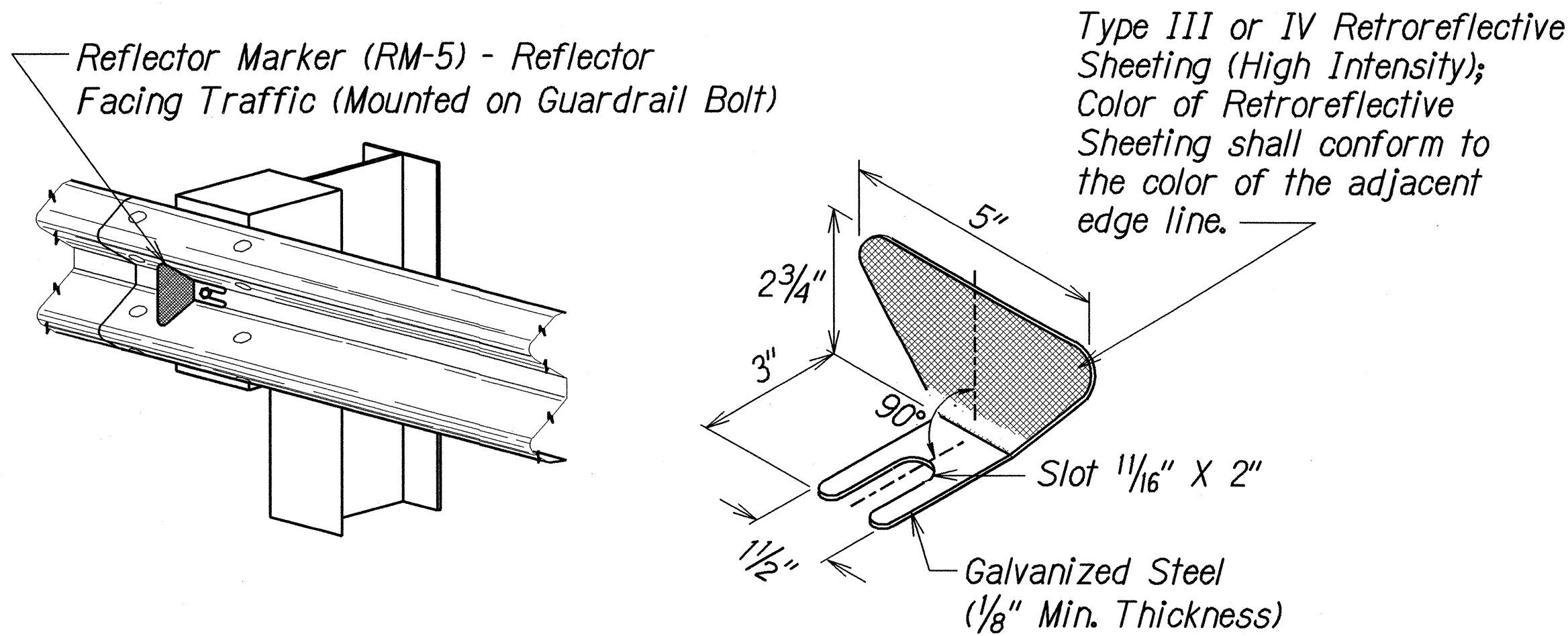
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 ⁵ / ₈ "	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



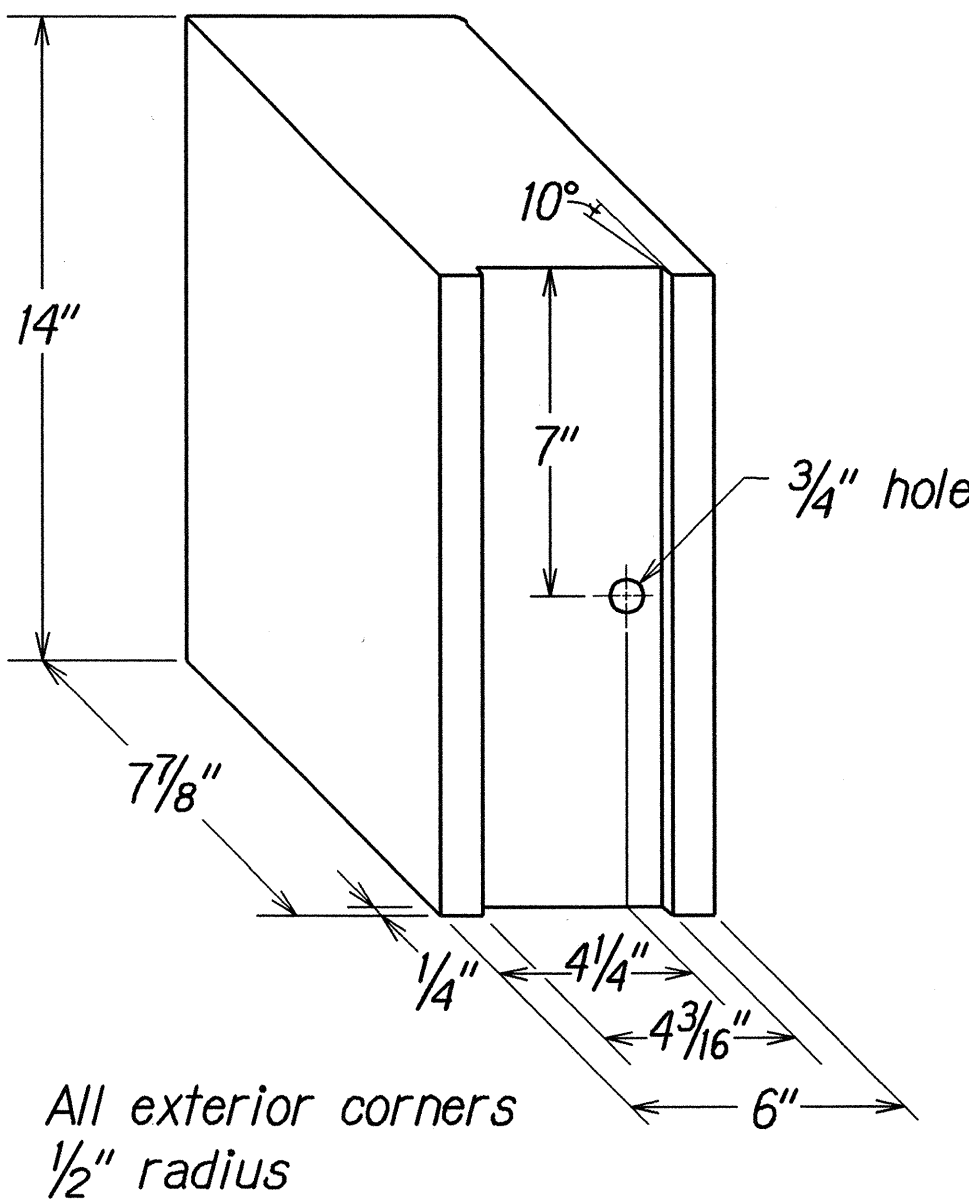
TOP
SIDE
RECYCLED PLASTIC BLOCKOUT (TYPE I)



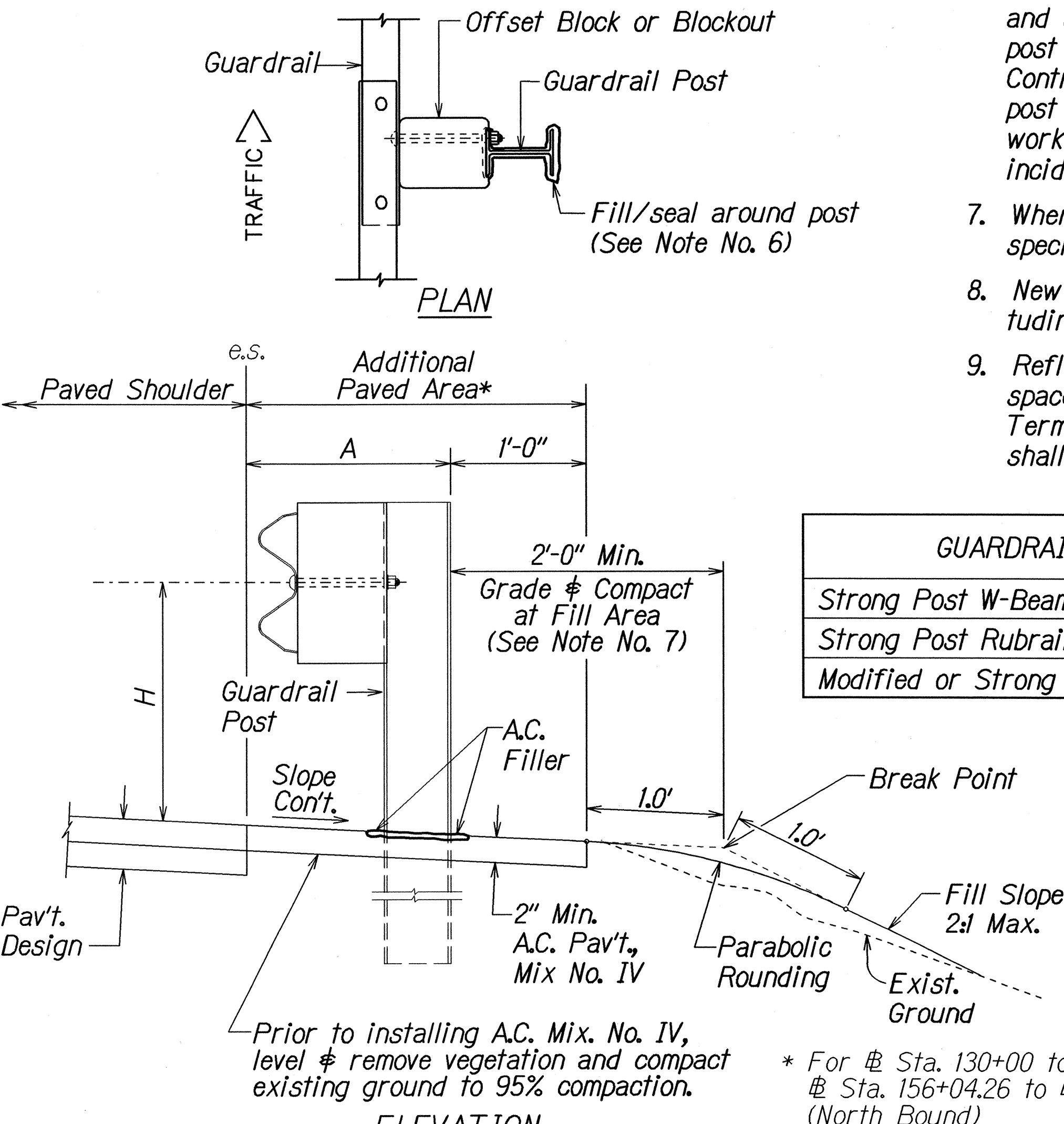
Exploded View
(Rail and washer not shown)
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)



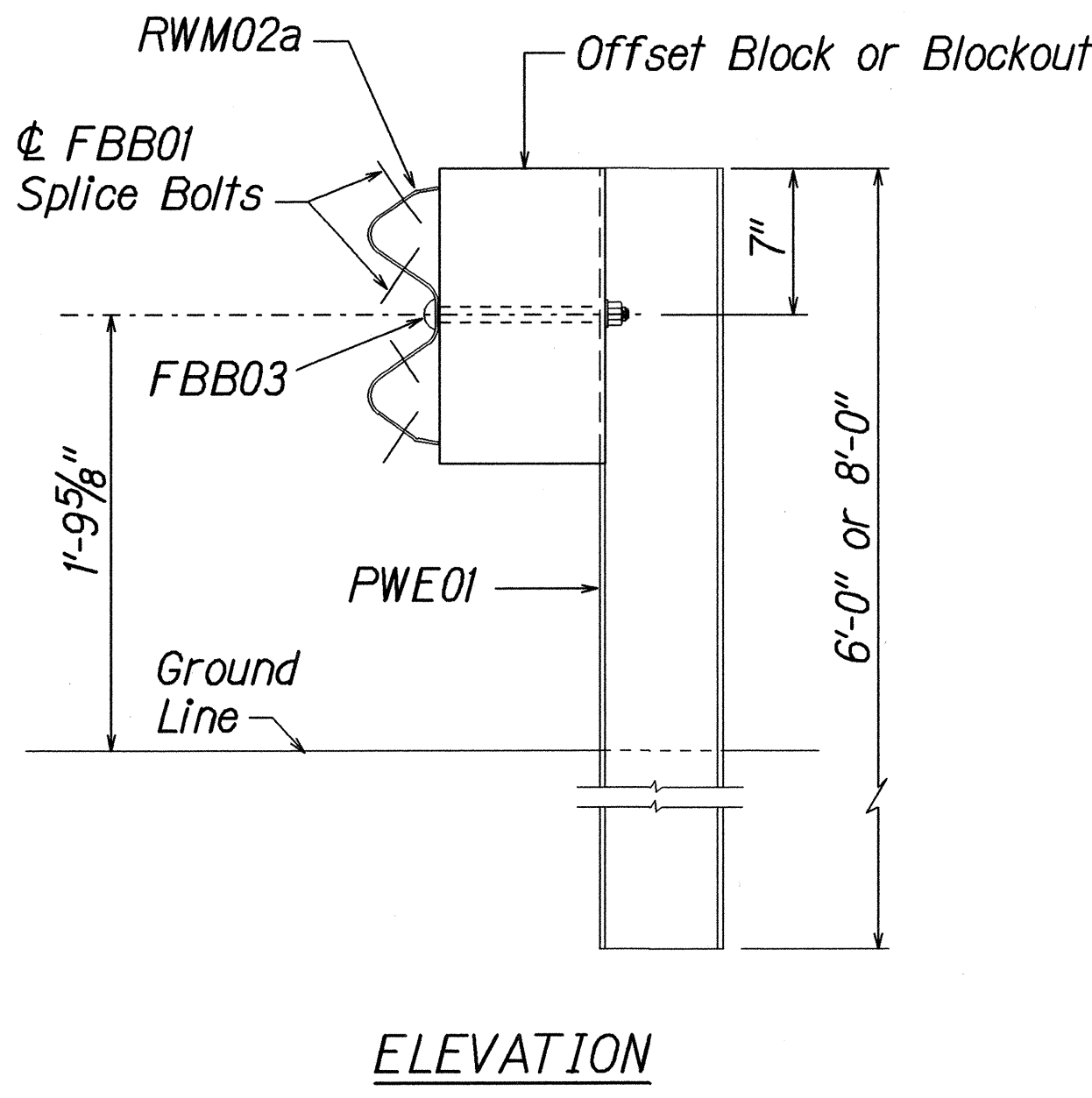
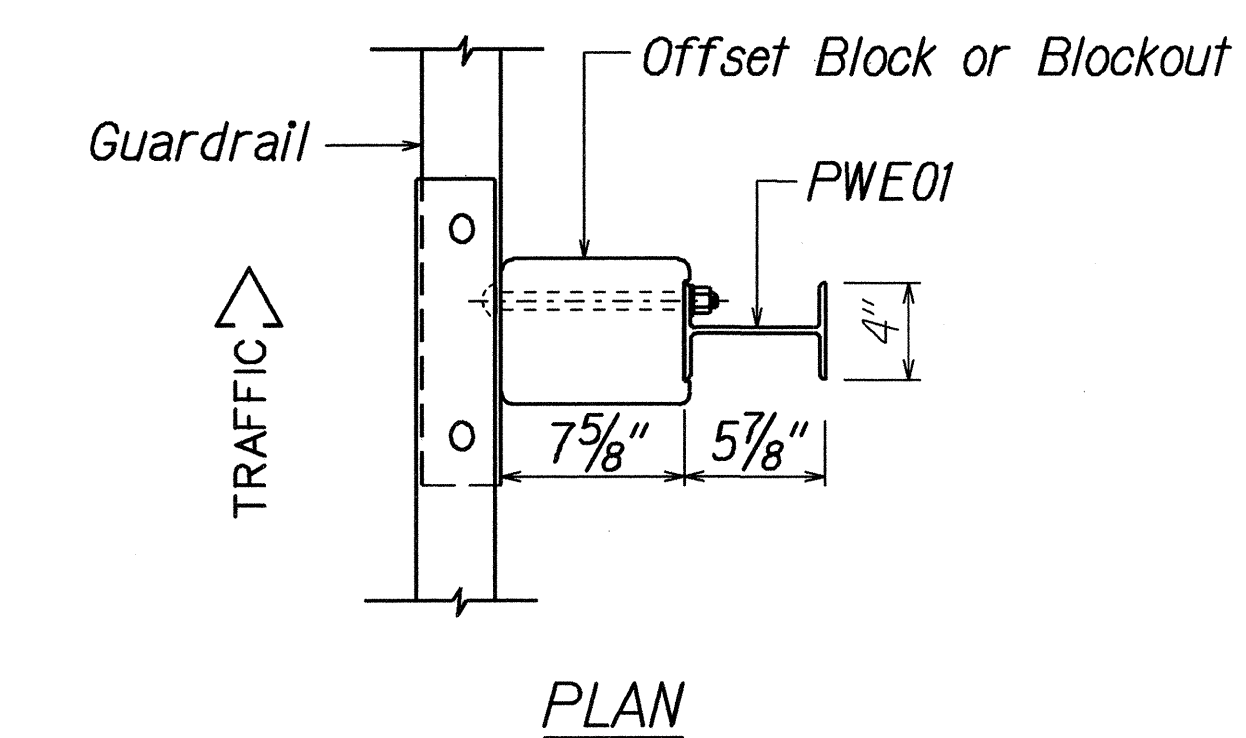
ELEVATION
TYPICAL NEW GUARDRAIL INSTALLATION
WHERE SHOWN ON PLANS

* For Sta. 130+00 to Sta. 135+75 & Sta. 156+04.26 to Sta. 157+66.76 (North Bound)

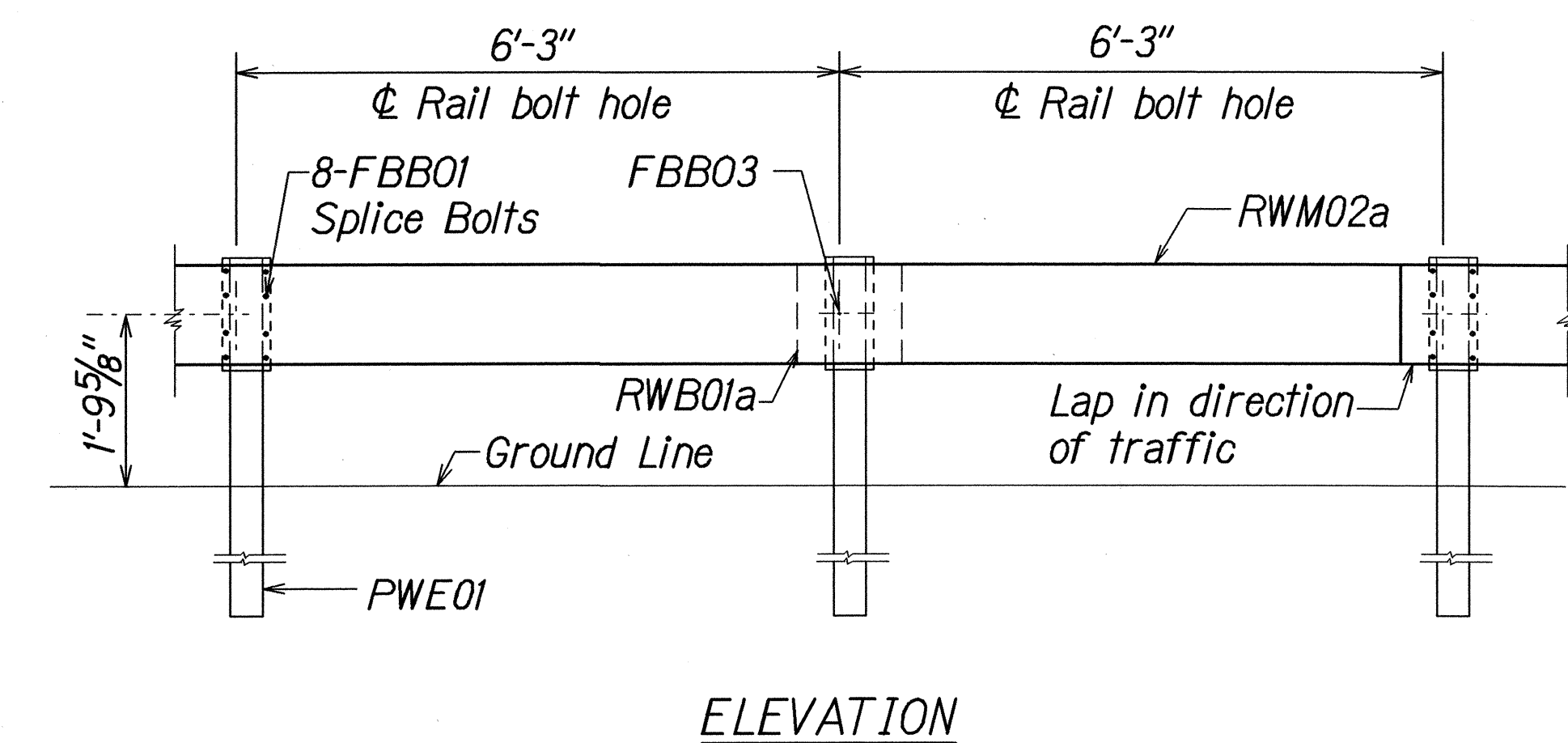
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL DETAILS & NOTES
KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Pali Highway
Project No. 83G-01-03M

Scale: NTS Date: January, 2005
SHEET No. 1 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	13	47

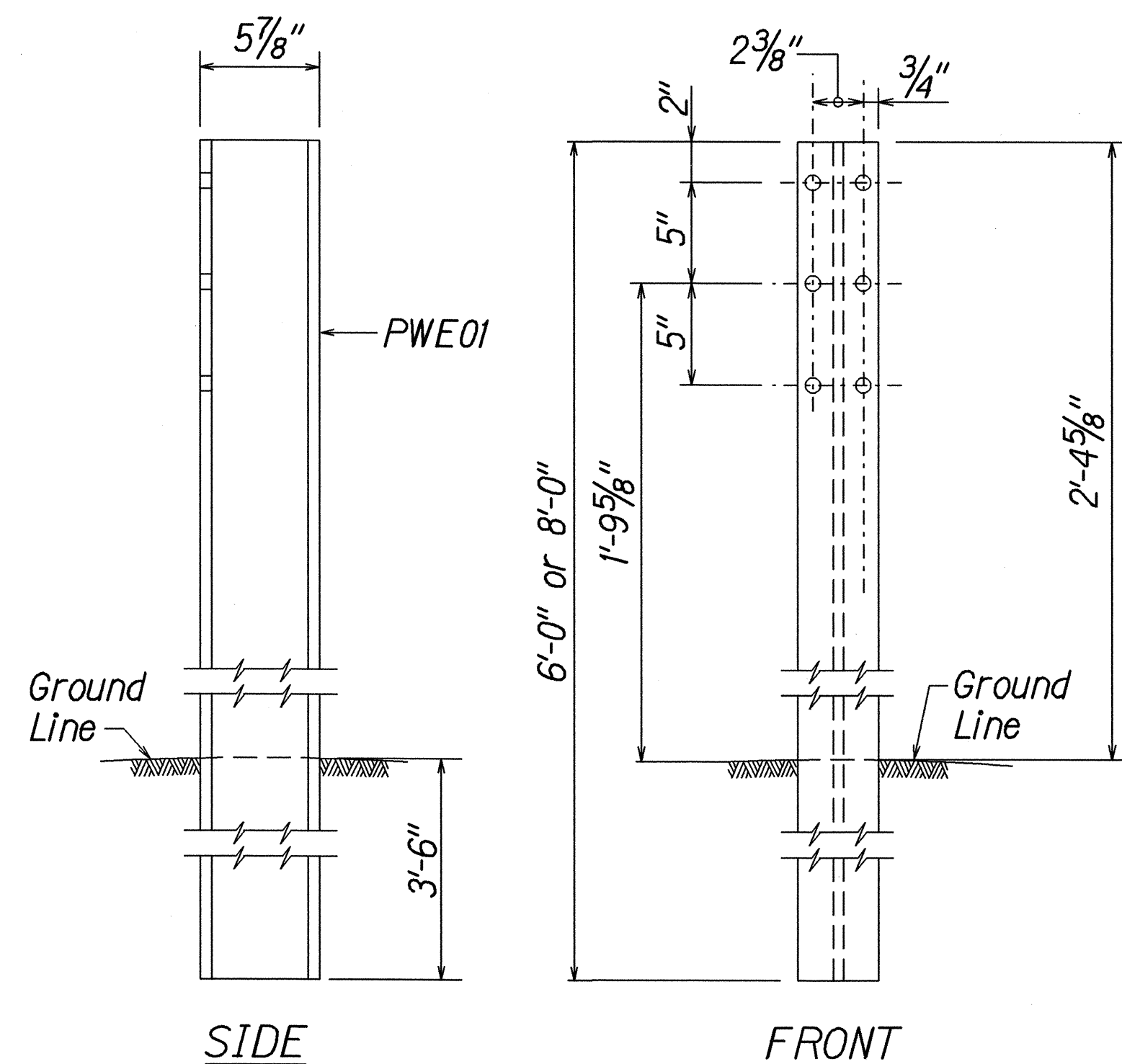


STRONG POST W-BEAM GUARDRAIL (SGR04a)

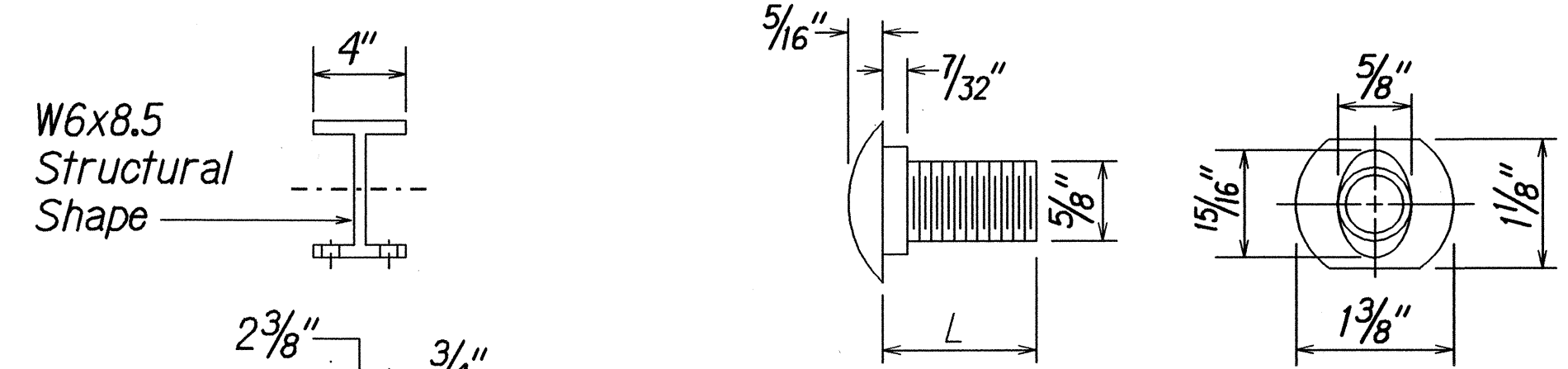


STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

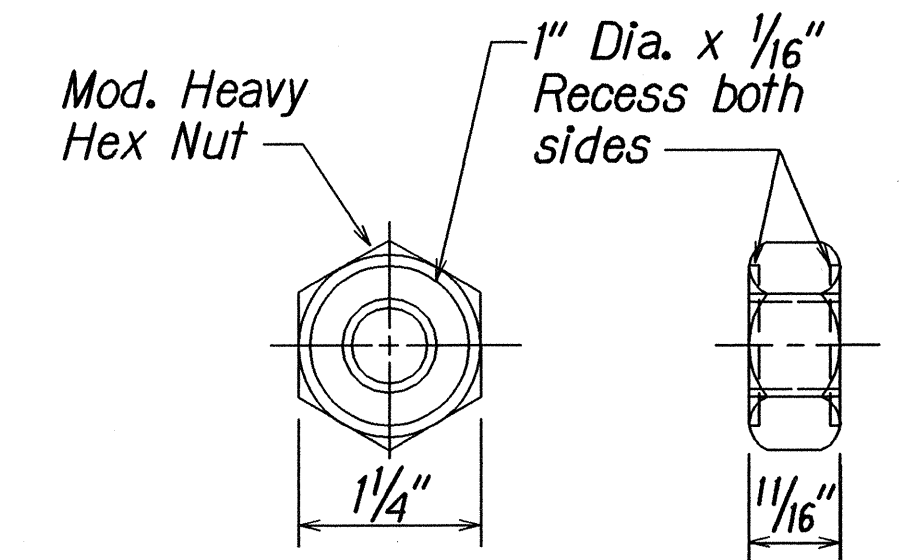
NOTE:
All Holes are 3/4" Dia.



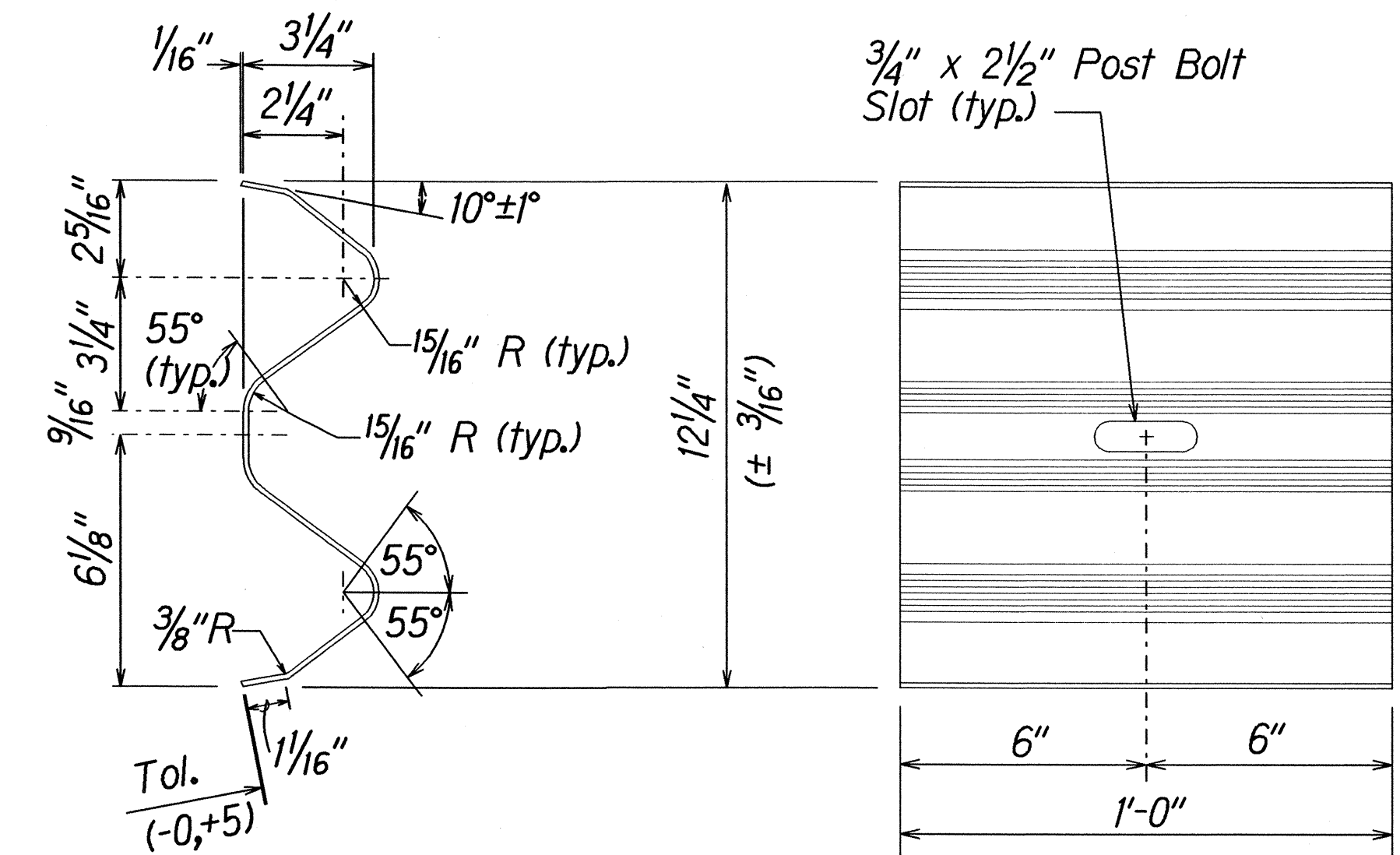
W-BEAM STRONG POST (PWE01)



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

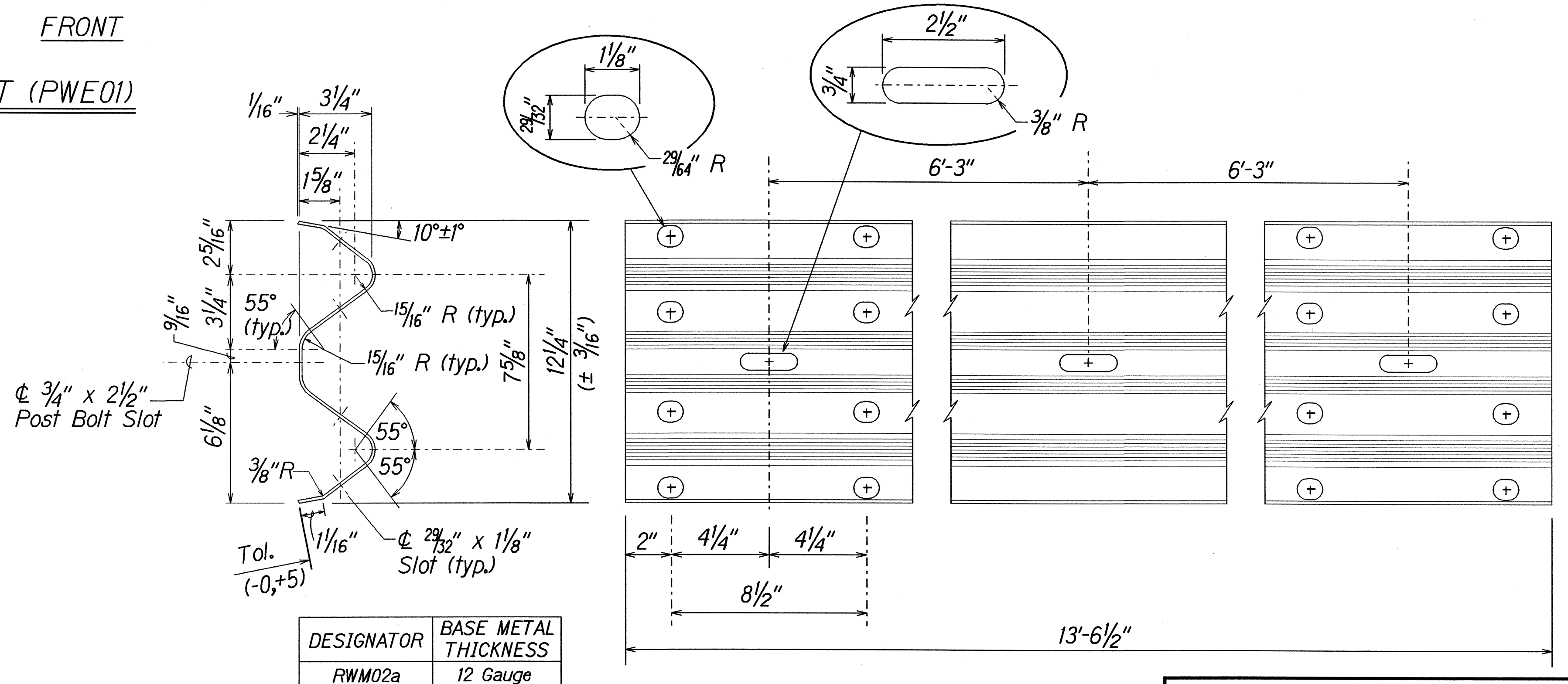


GUARDRAIL BOLTS AND RECESSED NUT



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)

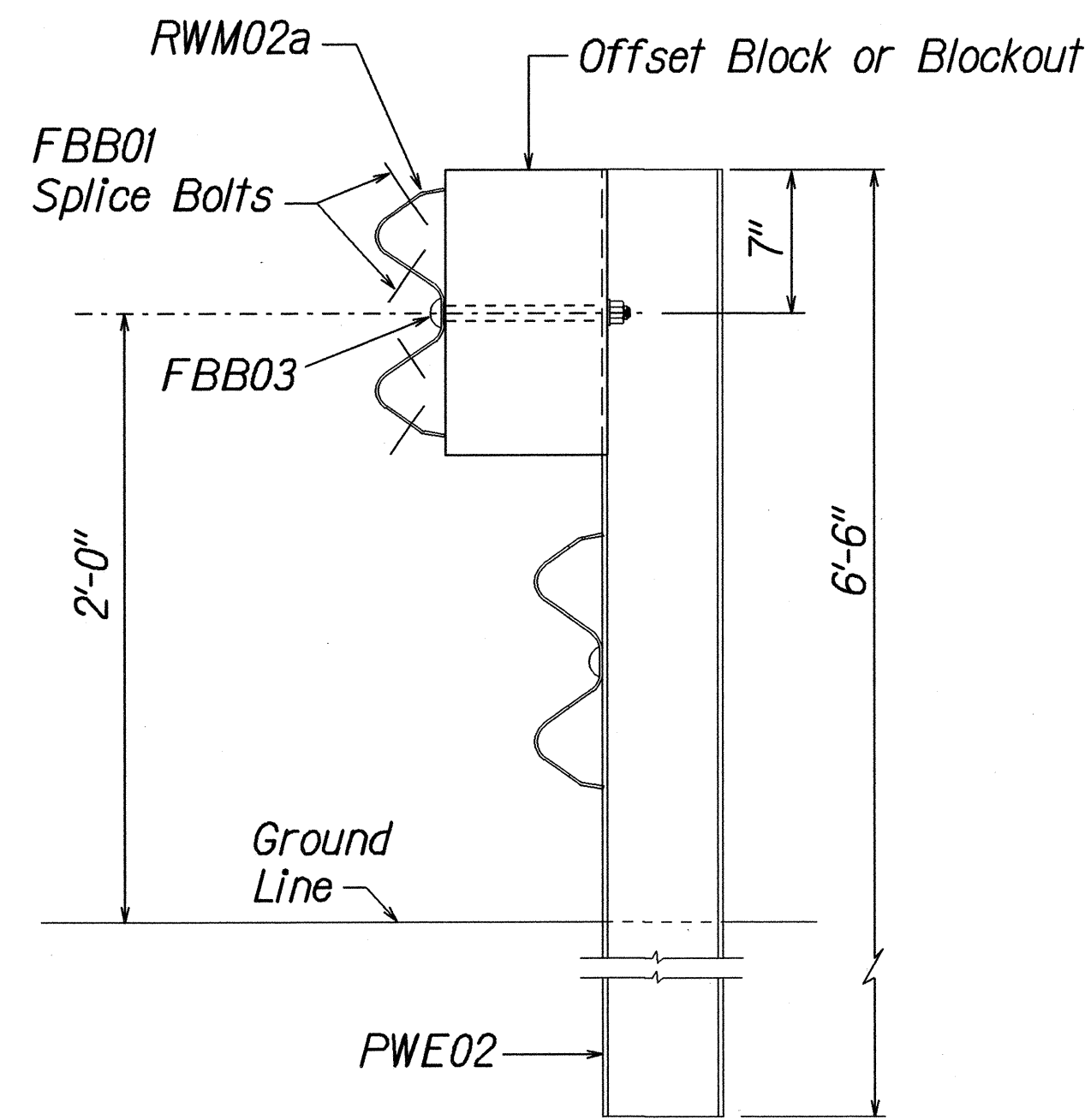
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRONG POST W-BEAM GUARDRAIL
KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Pali Highway
Project No. 83G-01-03M

Scale: NTS Date: January, 2005
SHEET No. 2 OF 7 SHEETS

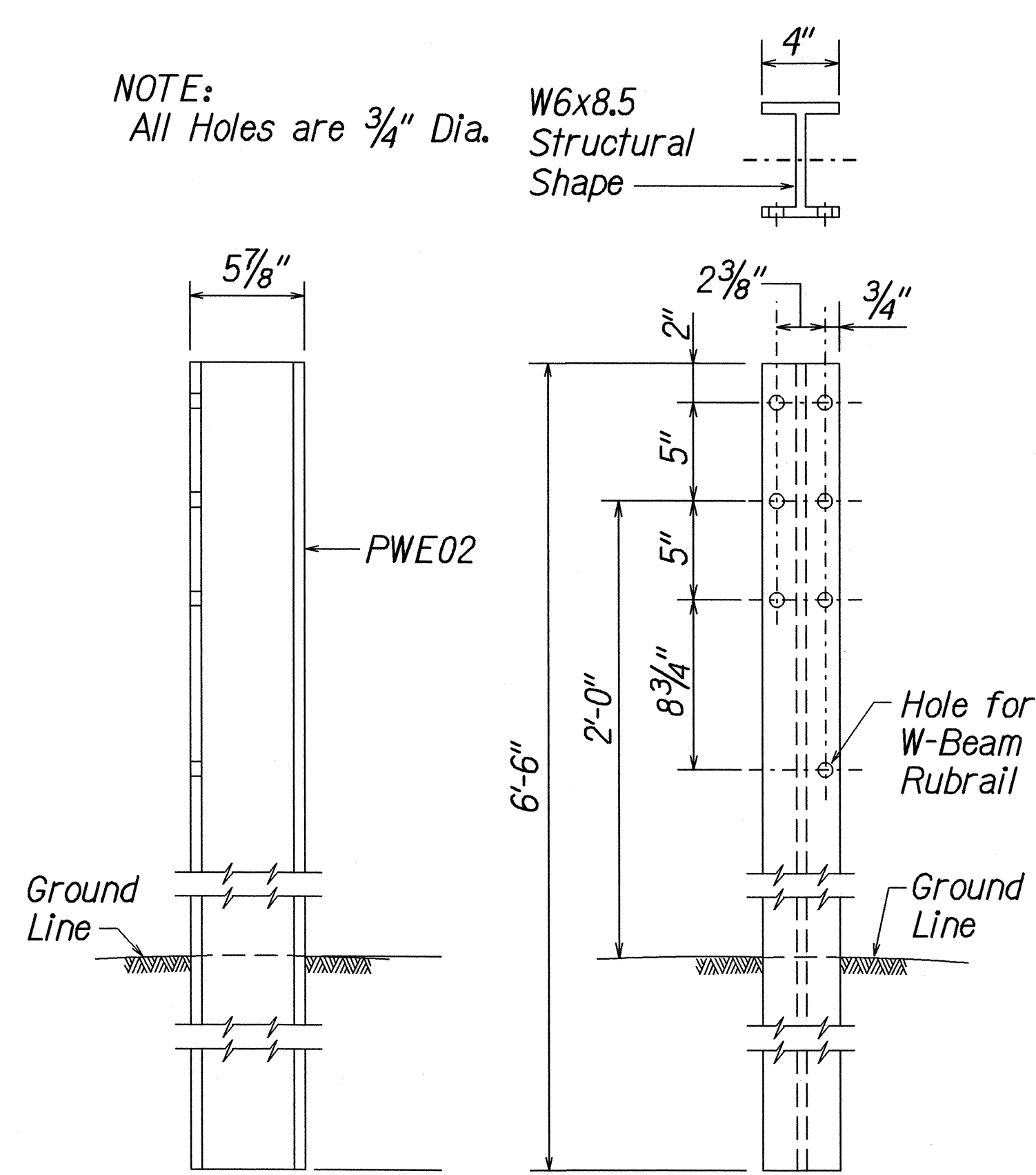
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
TRACED BY	
CHECKED BY	
NOTED BY	
DESIGNED BY	
APPROVED BY	

13/24/03 10:01:00 guardrail/wbeamsdgn (Standard Plan TF-50 r03/06/07)

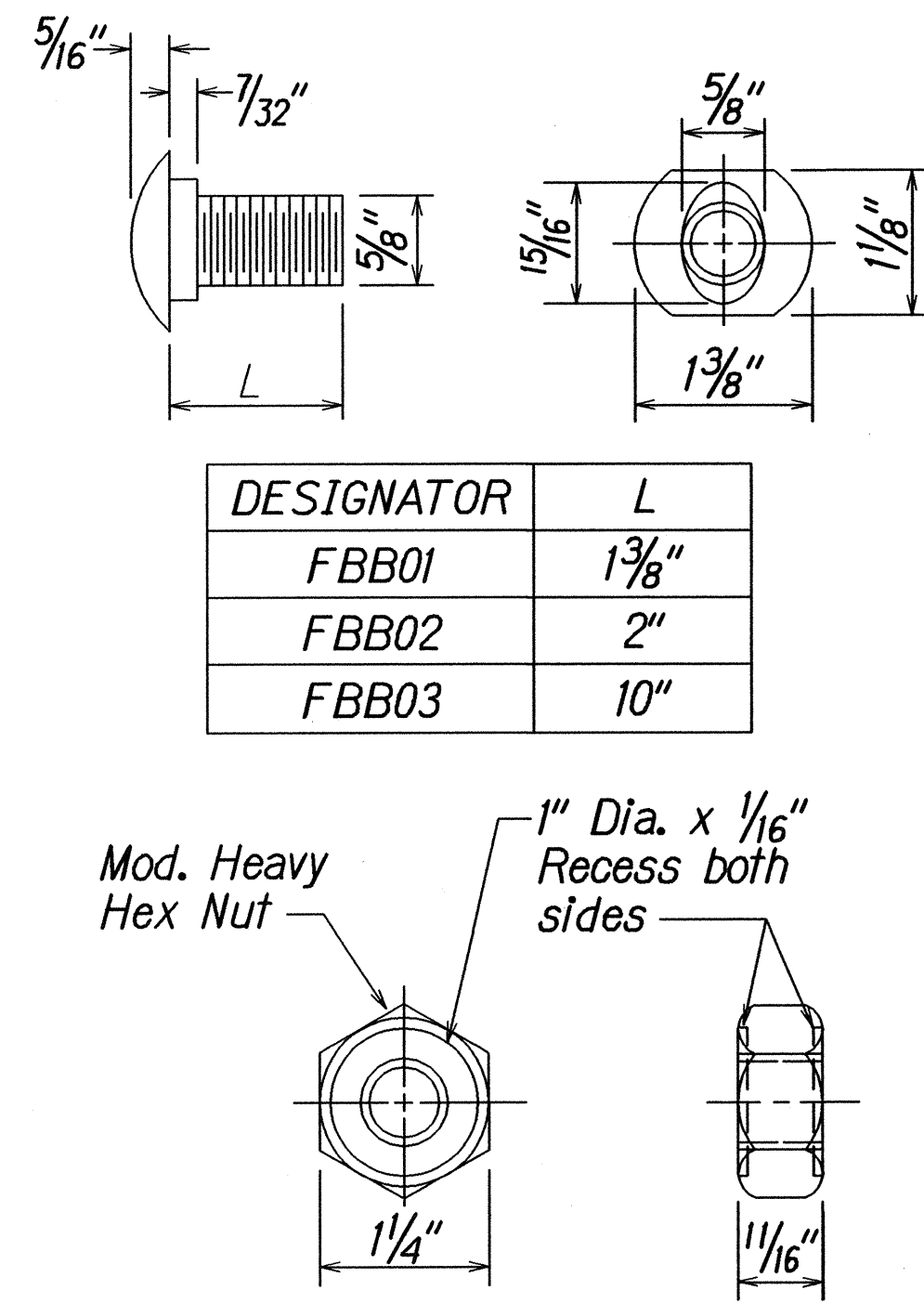
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	14	47



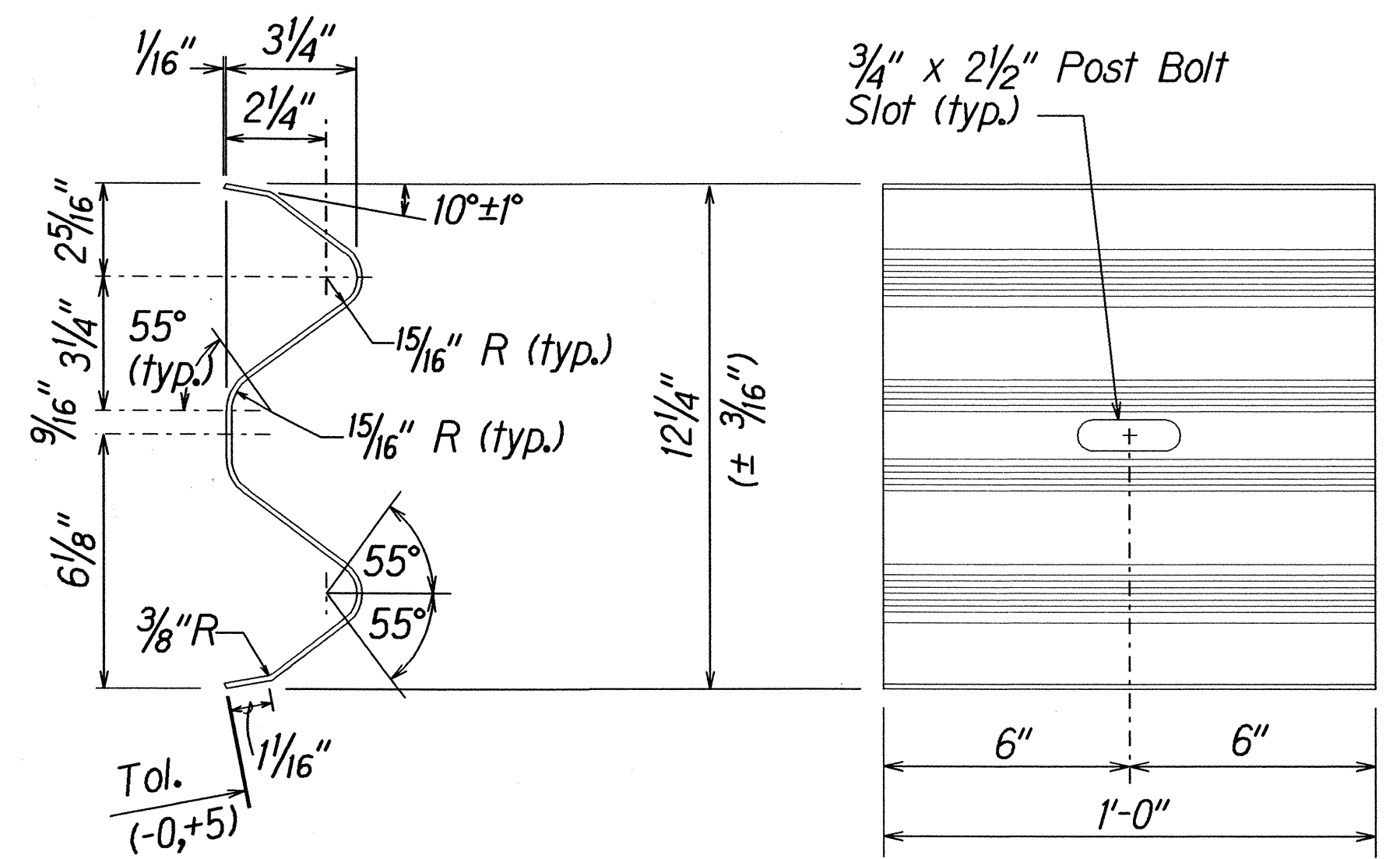
ELEVATION
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL



SIDE
FRONT
W-BEAM STRONG POST (PWE02)

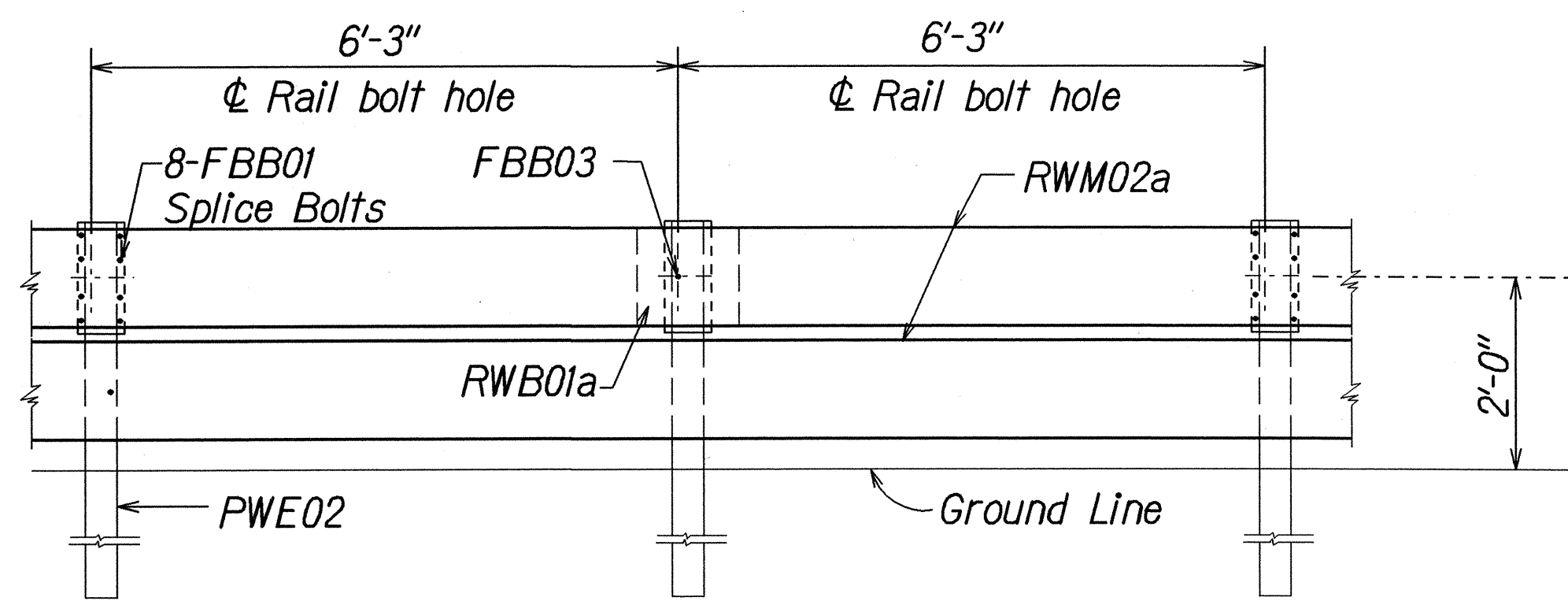


GUARDRAIL BOLTS AND
RECESSED NUT

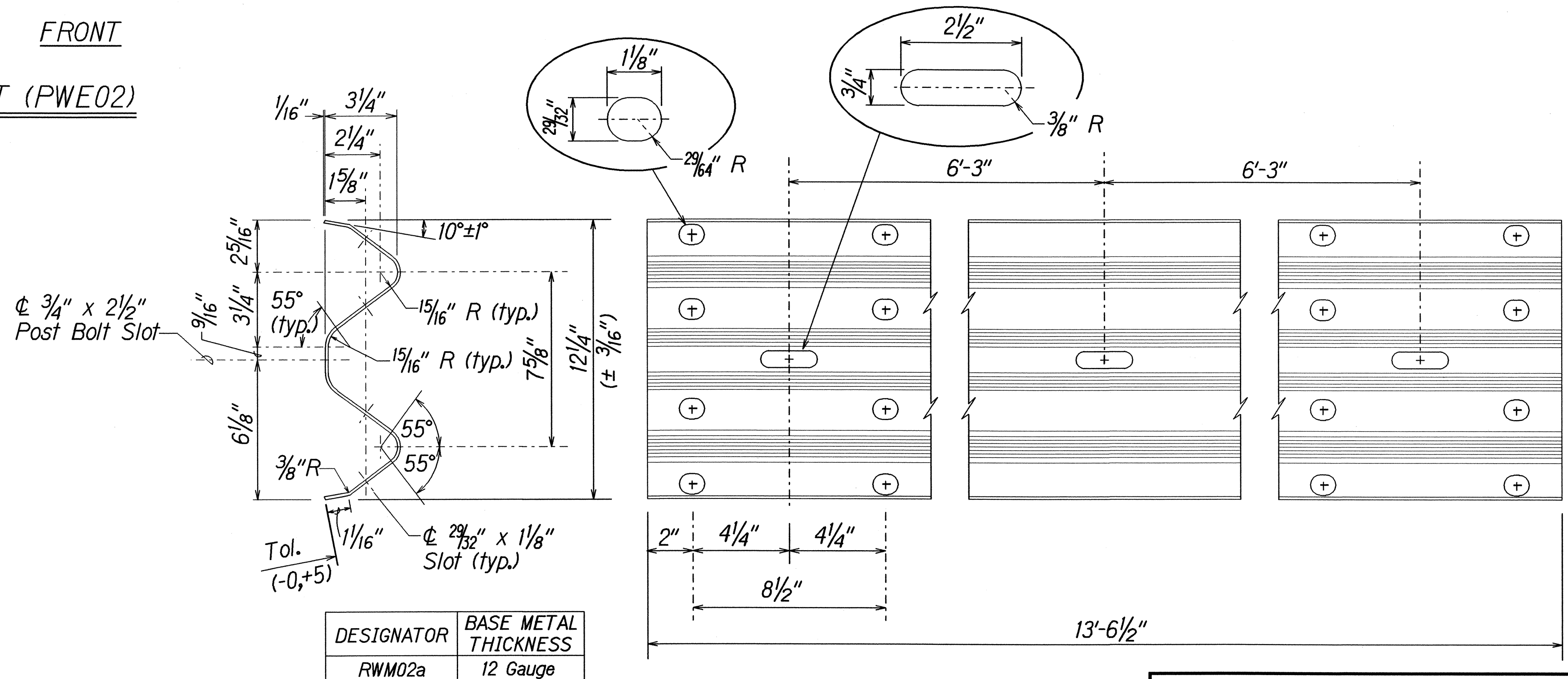


DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)

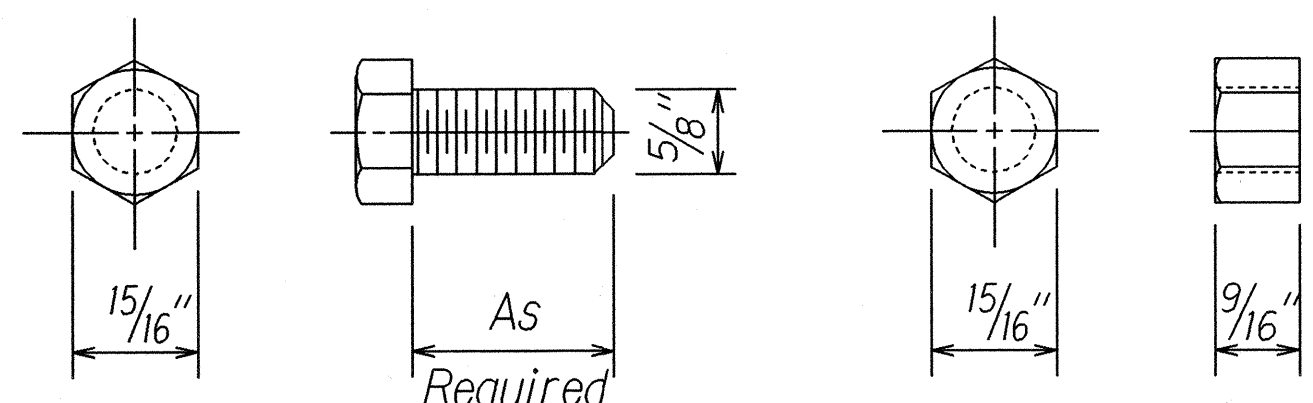


ELEVATION
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)



HEX BOLT & NUT (FBX16a)

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
TRACED BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	

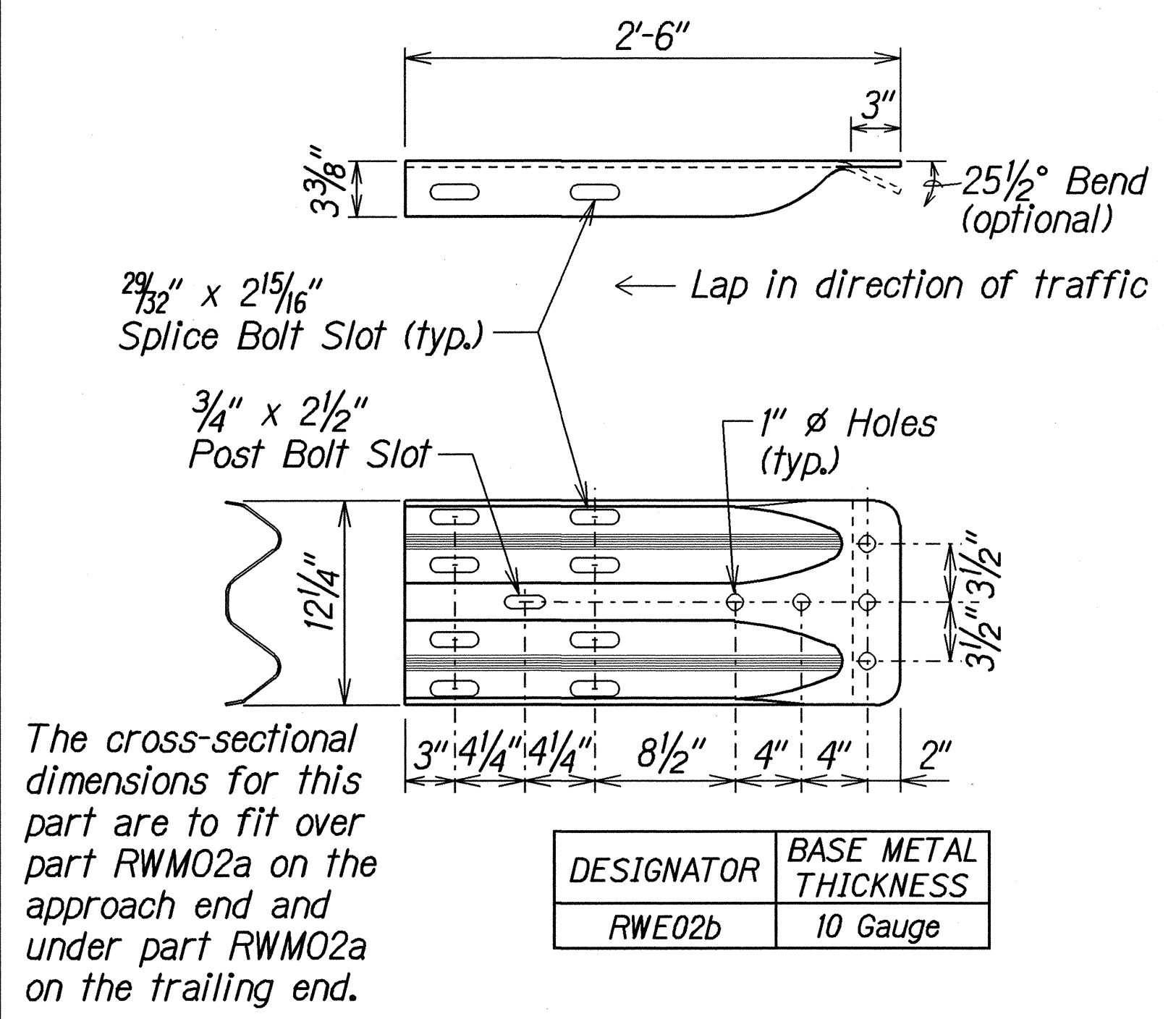
13/24/03 101-rub/guardrail/rubrail.dgn Standard plan TE-52 r1/03/89

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

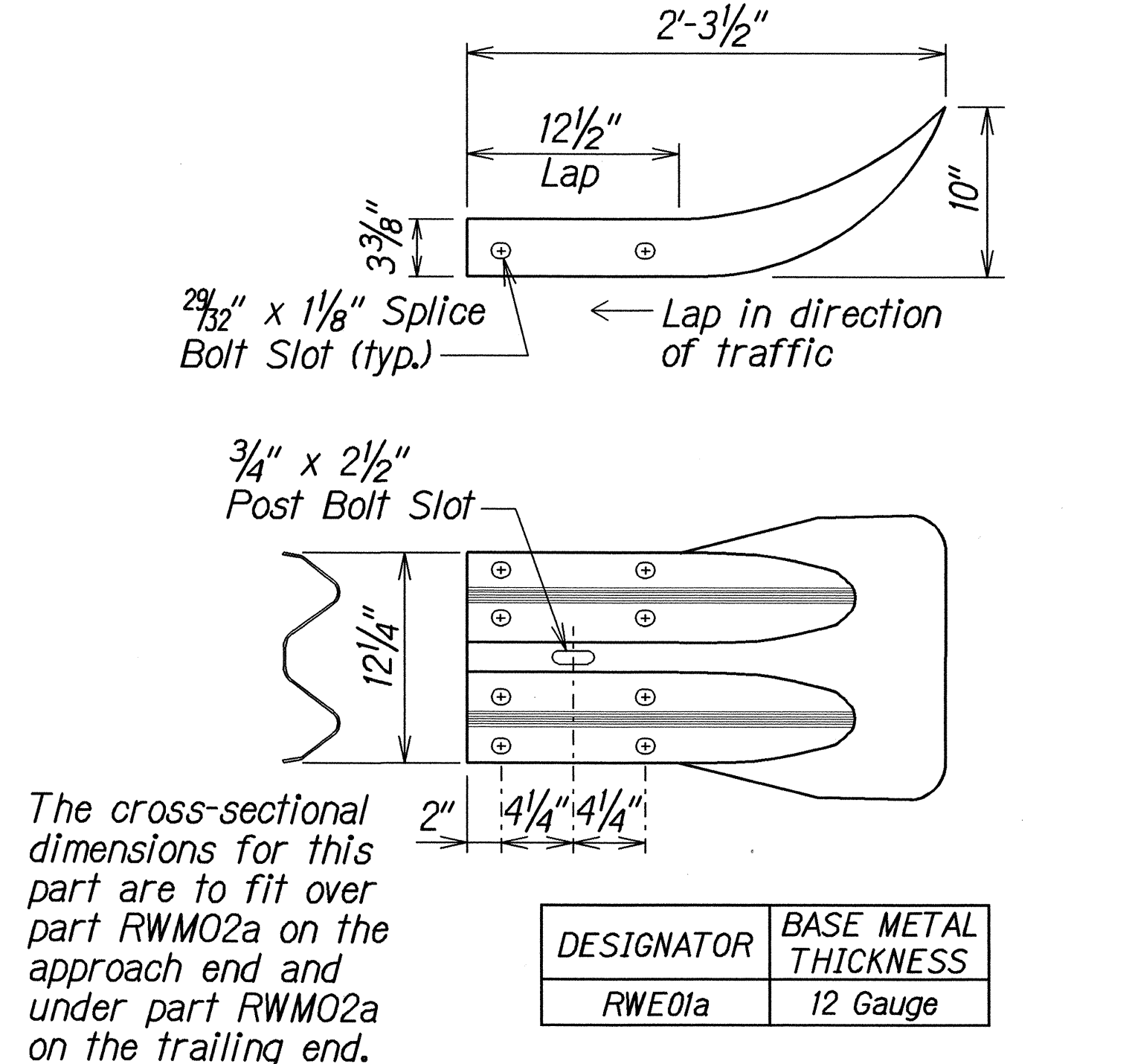
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL
KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Pali Highway
Project No. 83G-01-03M
Scale: NTS
Date: January, 2005

SHEET No. 3 OF 7 SHEETS

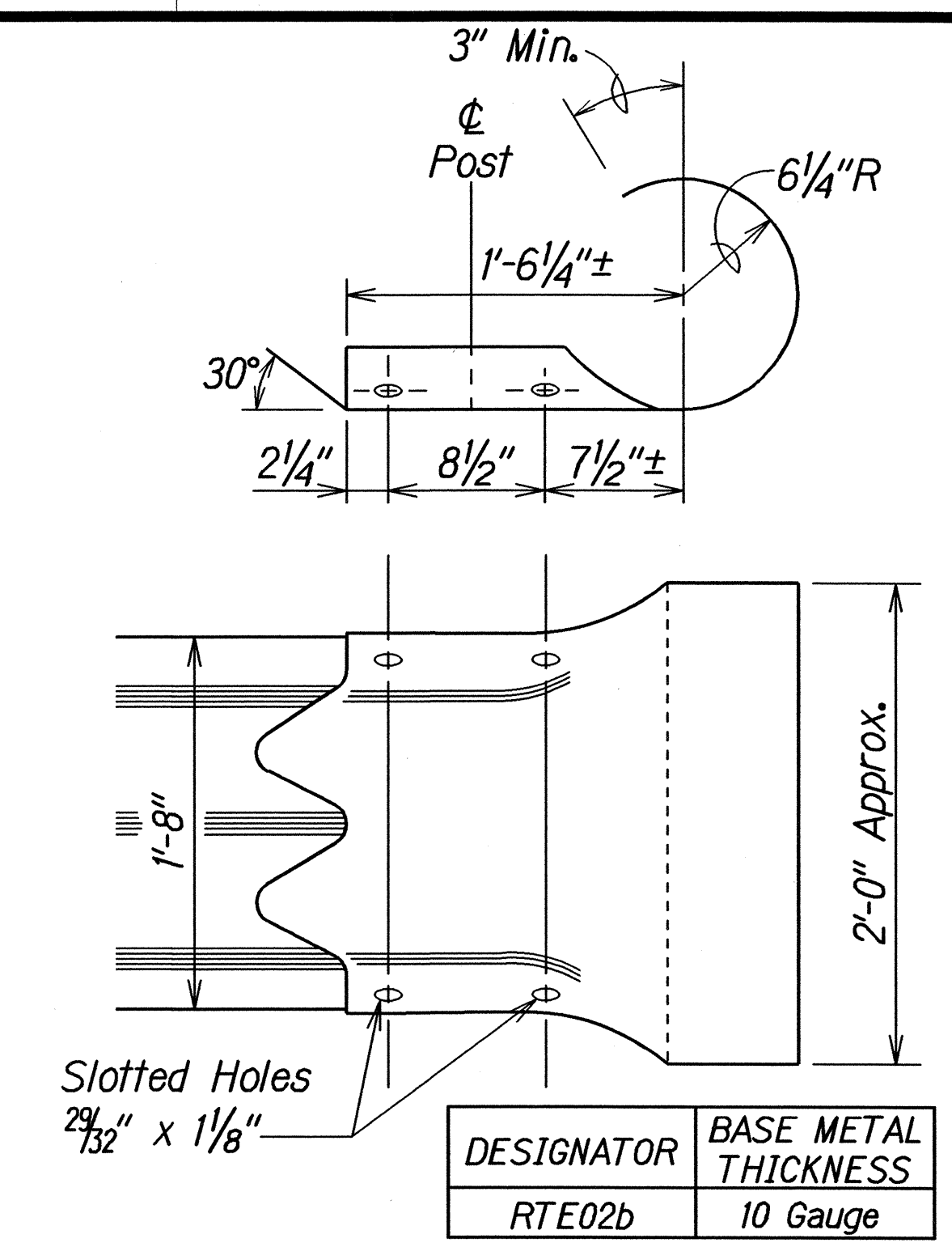
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	15	47



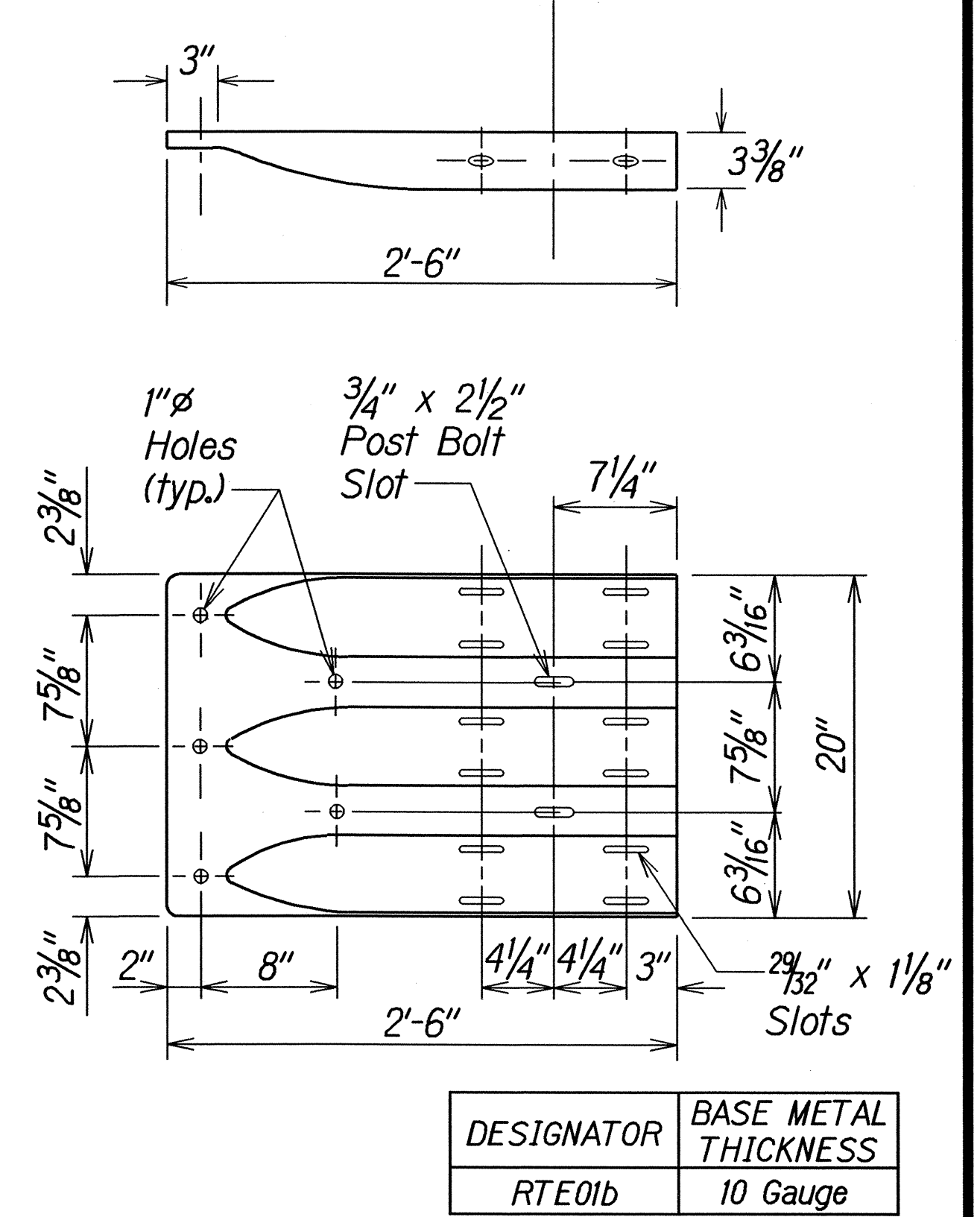
W-BEAM TERMINAL CONNECTOR (RWE02b)



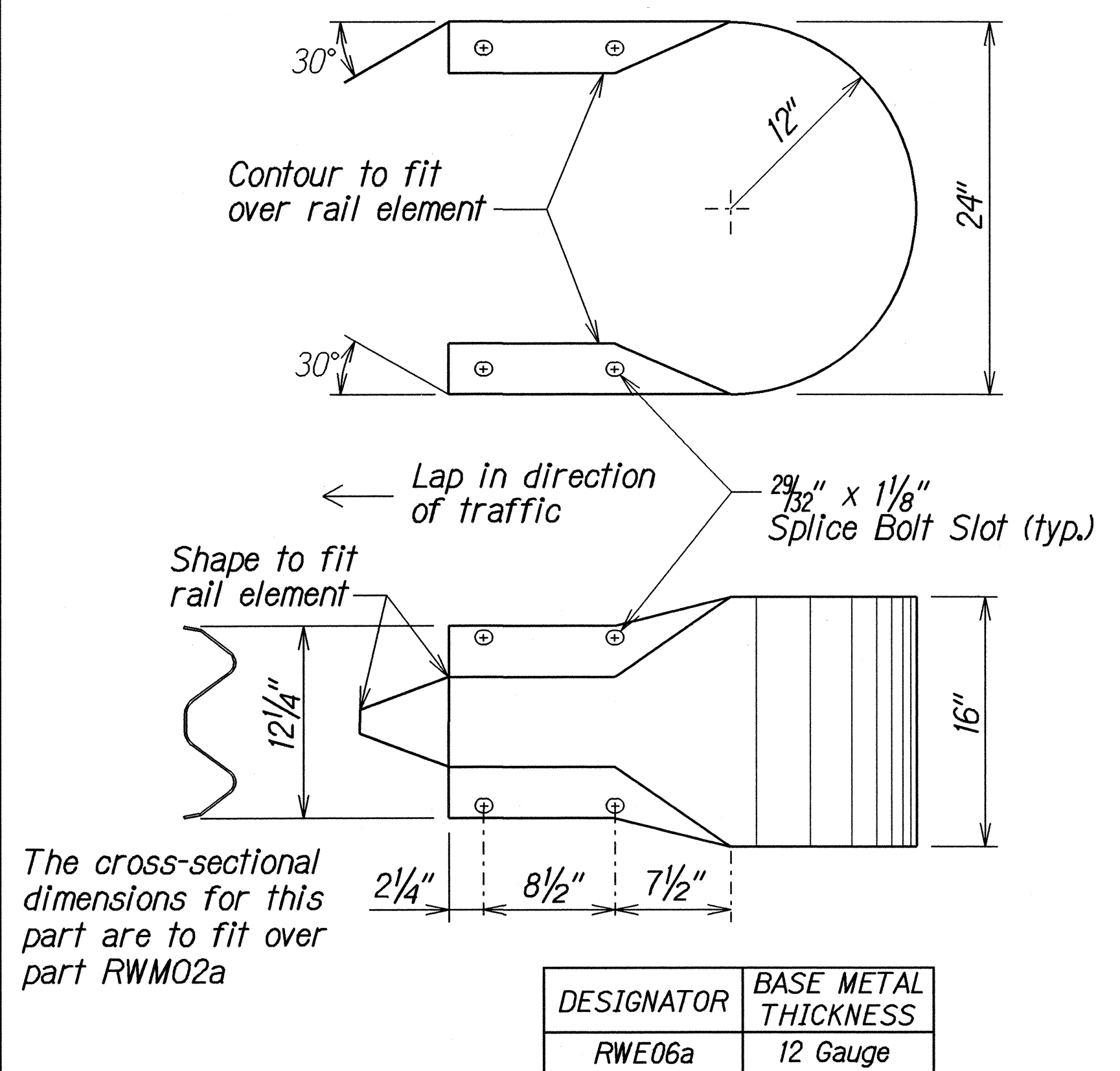
W-BEAM END SECTION (FLARED RWE01a)



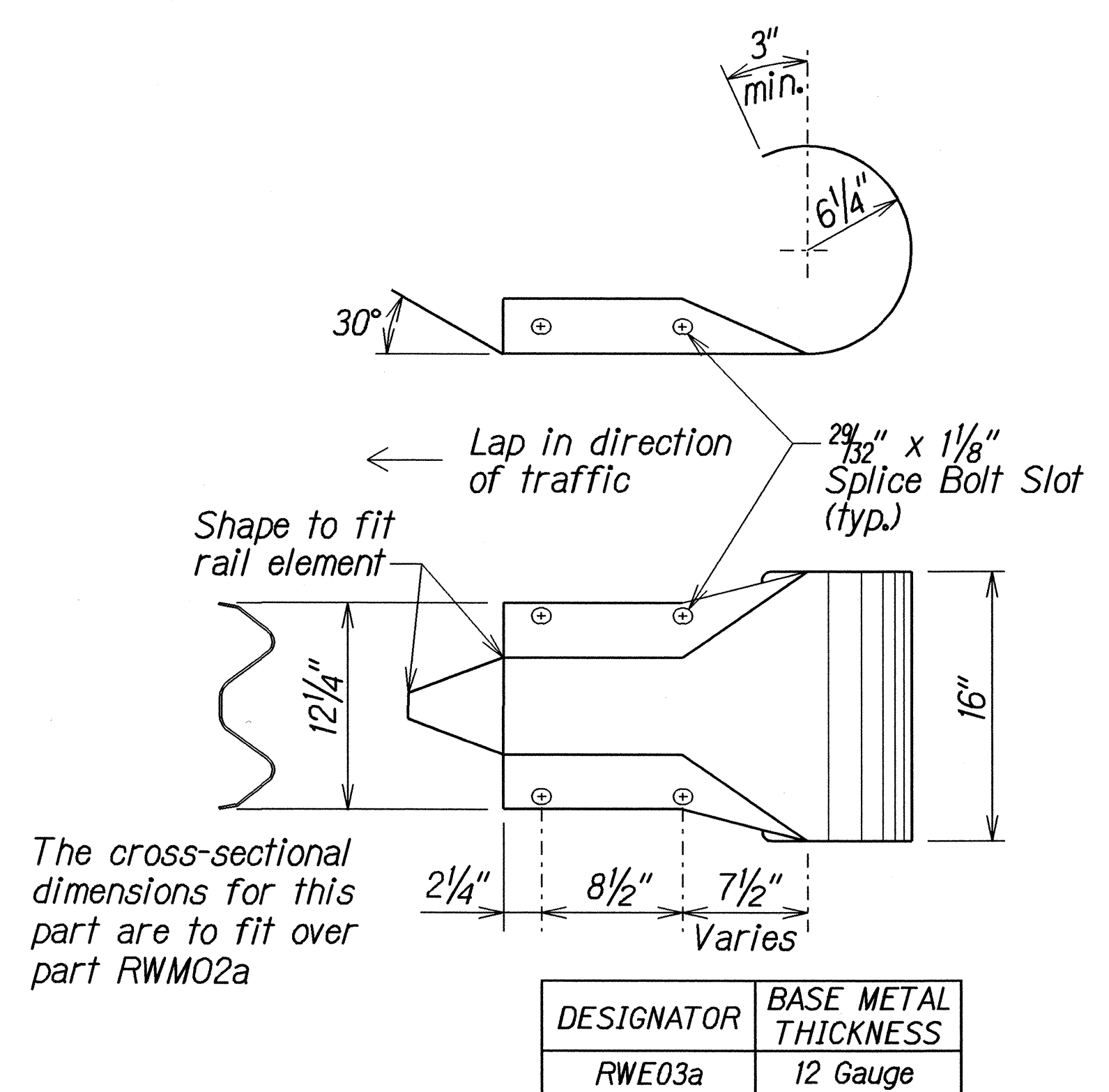
THRIE-BEAM SECTION (ROUNDED) (RTE02b)



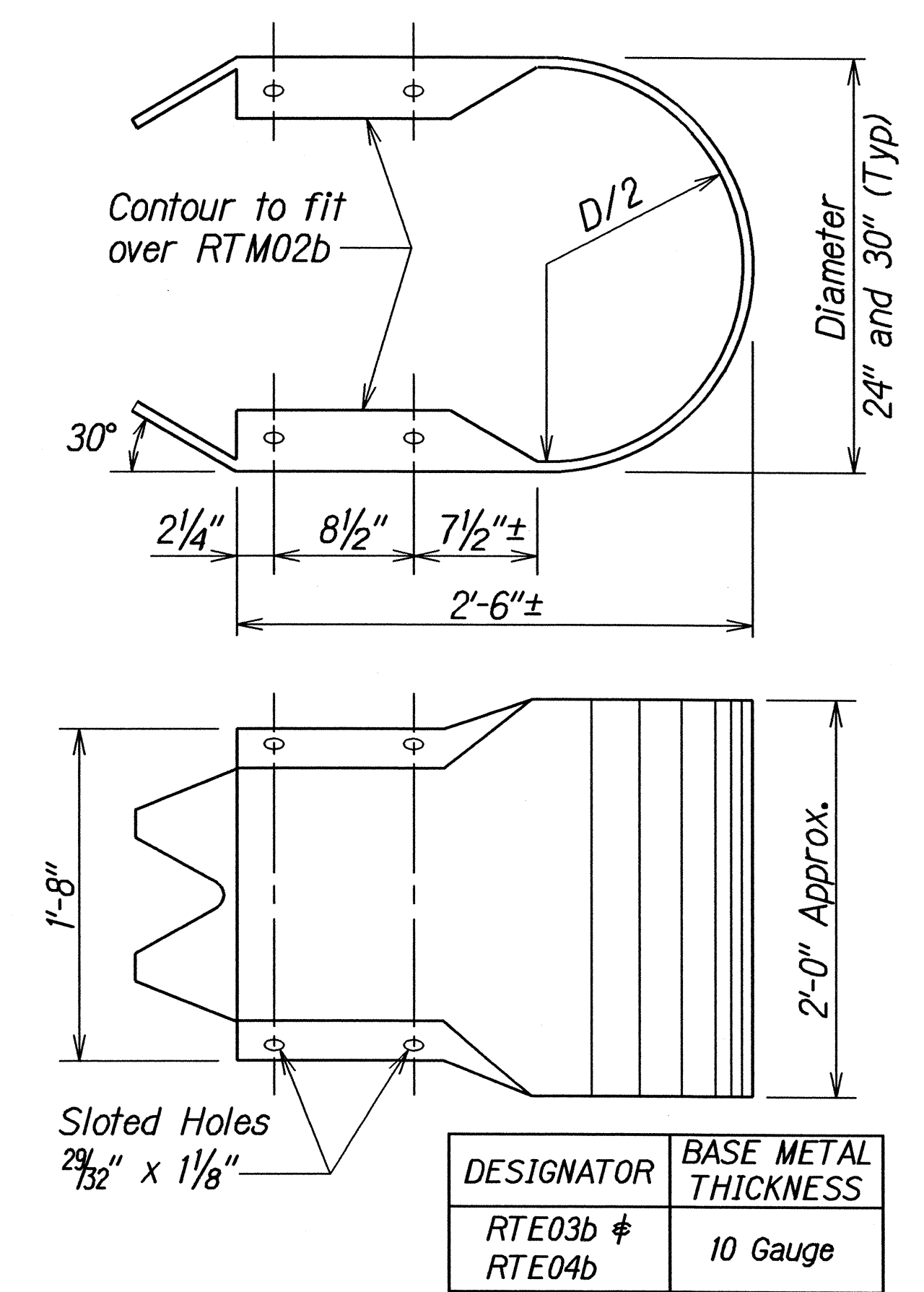
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
DRAWN BY		
DESIGNED BY		
CHECKED BY		
DATE		

Standard Plan TE-51 (08/01/87)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

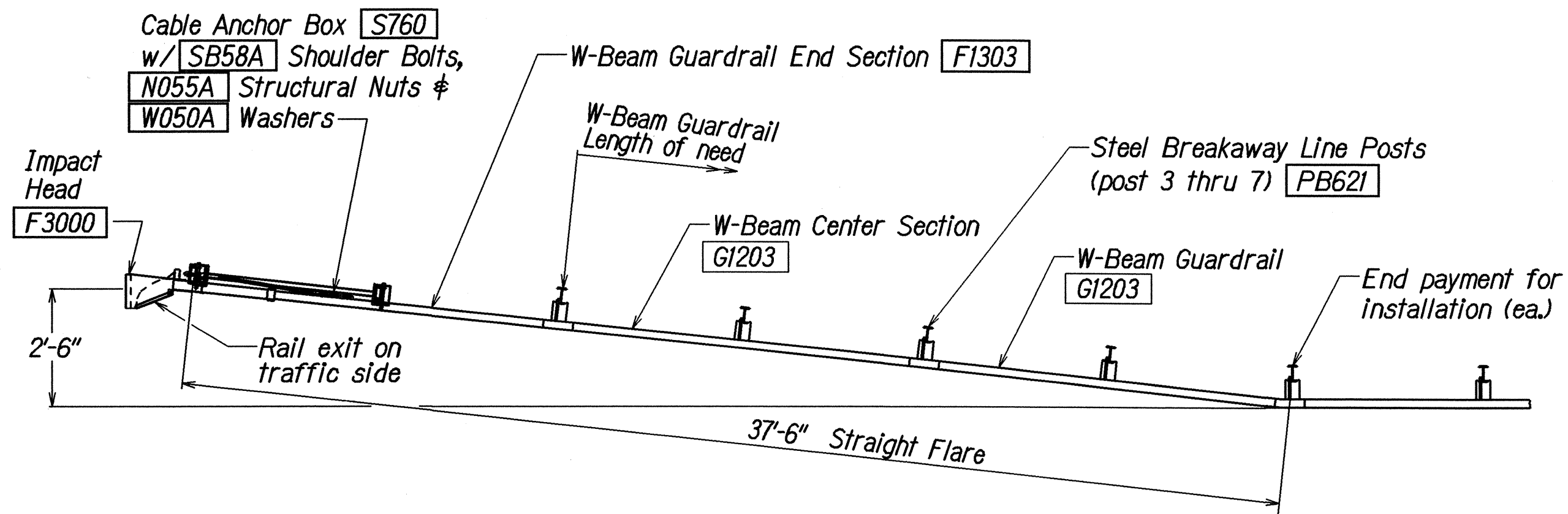
GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Palii Highway
Project No. 83G-01-03M

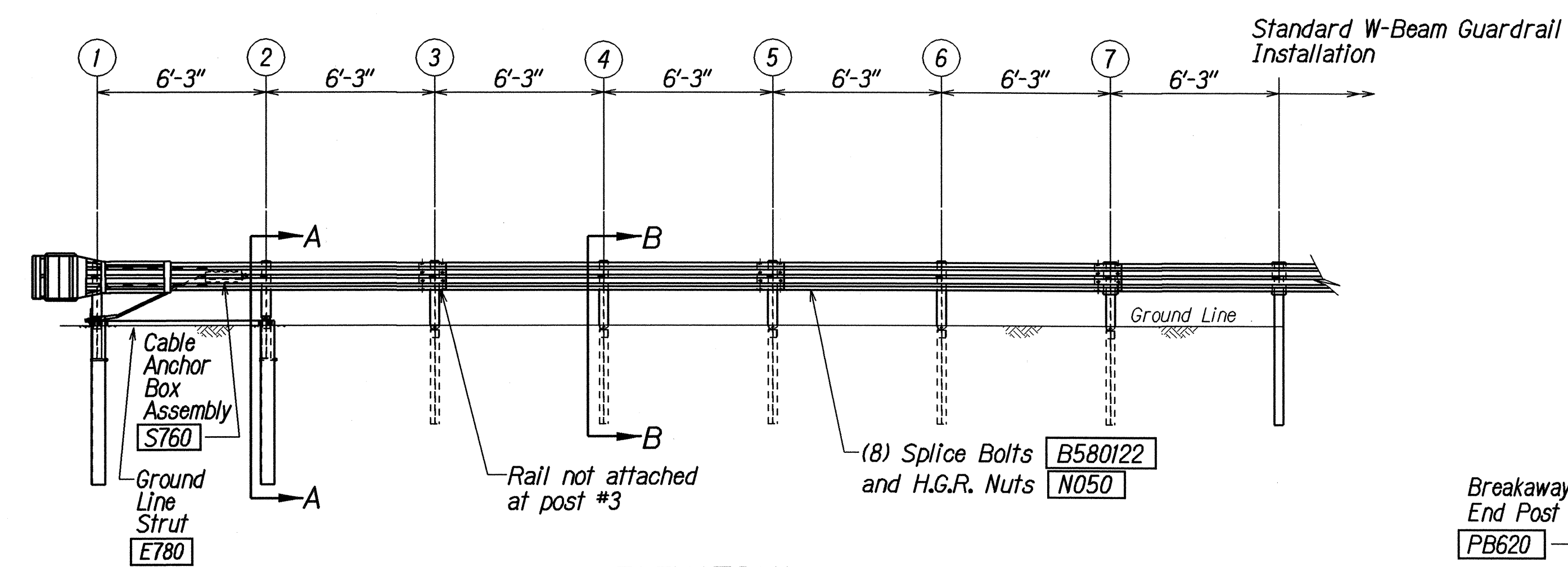
Scale: NTS Date: January, 2005

SHEET No. 4 OF 7 SHEETS

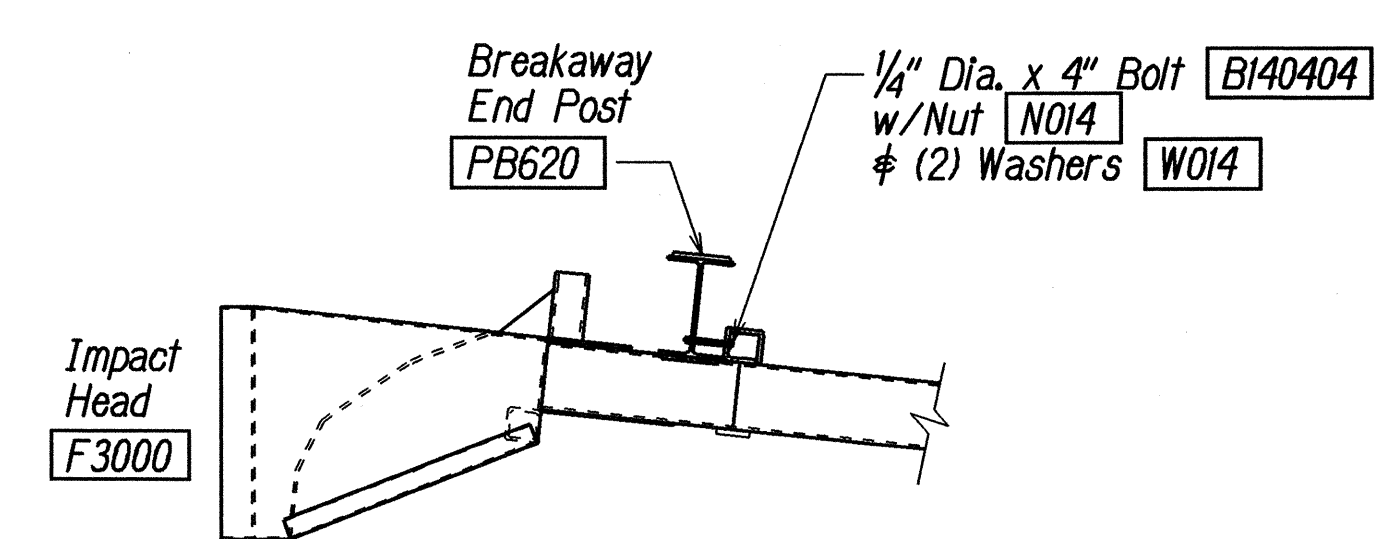
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	17	47



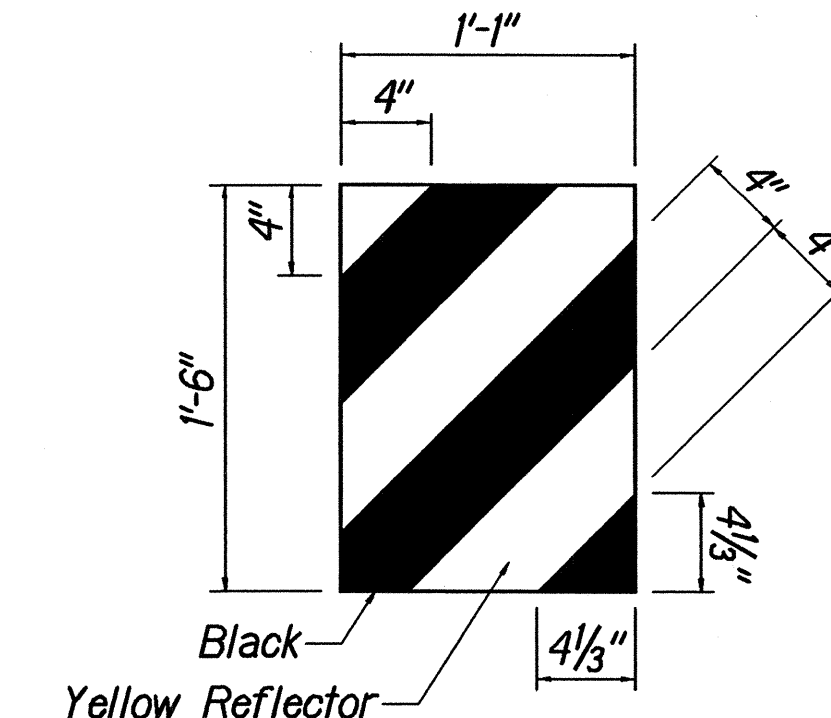
PLAN



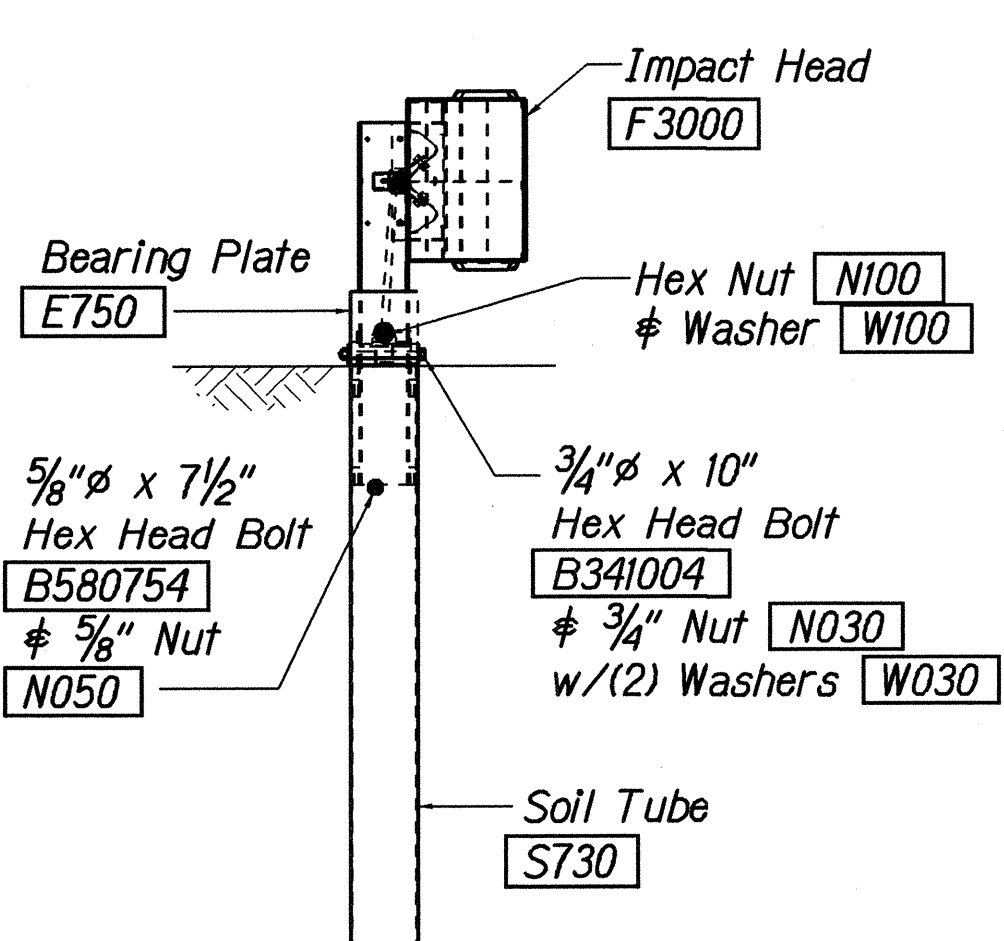
ELEVATION



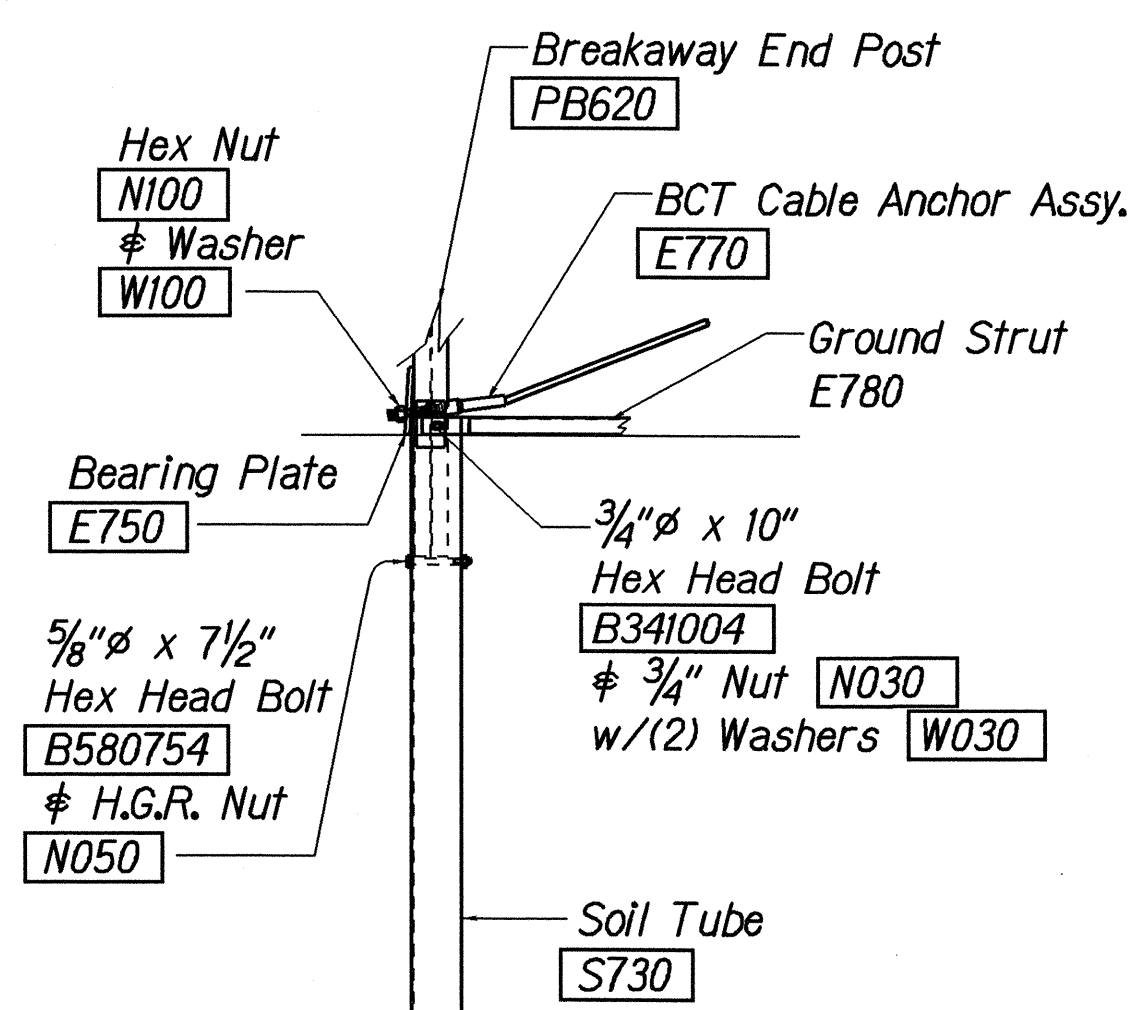
IMPACT HEAD CONNECTING DETAIL



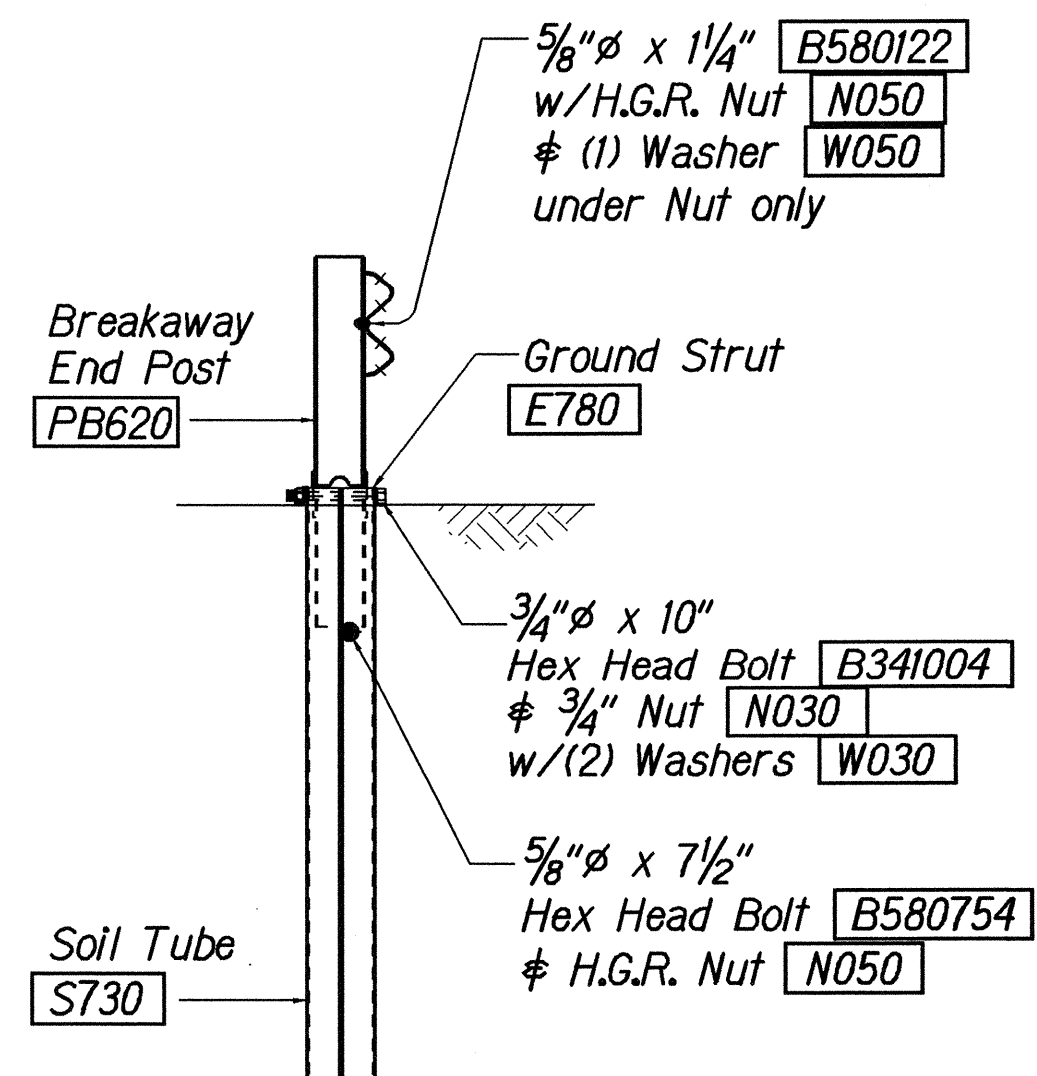
IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL



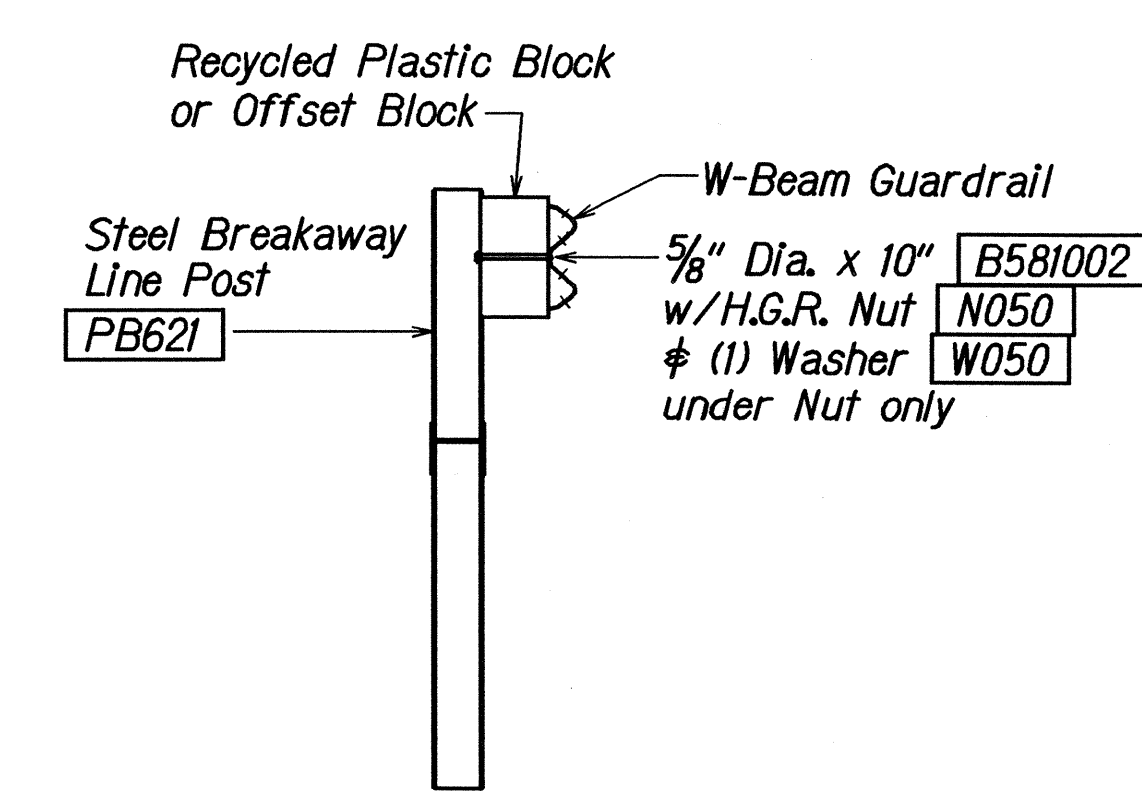
FRONT VIEW OF POST 1



PARTIAL VIEW OF POST 1



SECTION A-A
at Post #2



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

- GENERAL NOTES**
- Breakaway steel posts are required with the FLEAT Terminal.
 - All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
 - 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.
 - The soil tubes may be driven with an approved driving head. Soil tubes shall 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.
 - (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
 - 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.
G1203	2	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
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
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

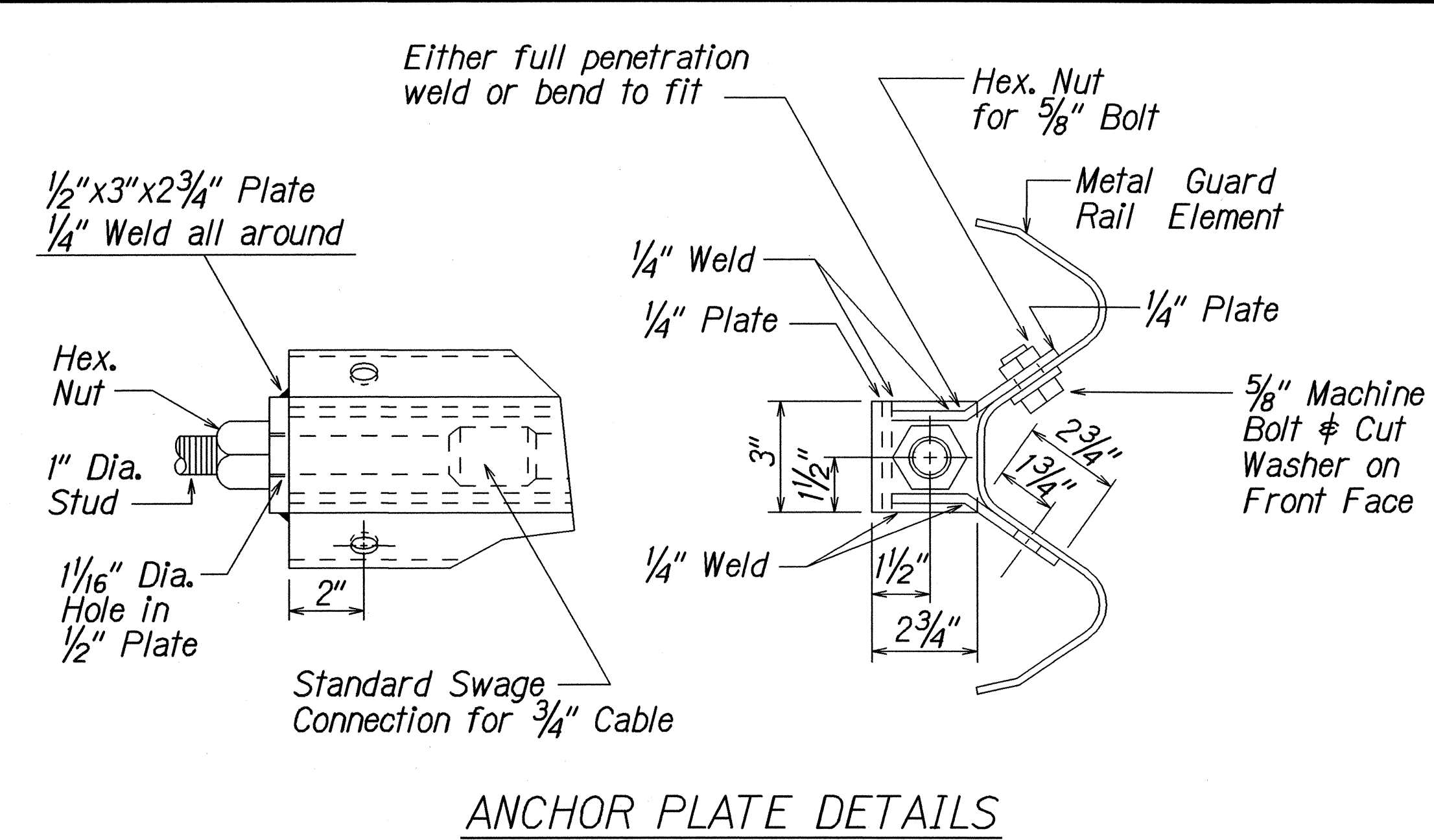
Foundation Tube Options For Posts 1 & 2
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil Plates SP600
*4'-6" Foundation Tubes E735 W/Soil Plates SP600

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
FLEAT-350
FLARED ENERGY ABSORBING TERMINAL
KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Pali Highway
Project No. 83G-01-03M
Not to Scale Date: January, 2005
SHEET No. 6 OF 7 SHEETS

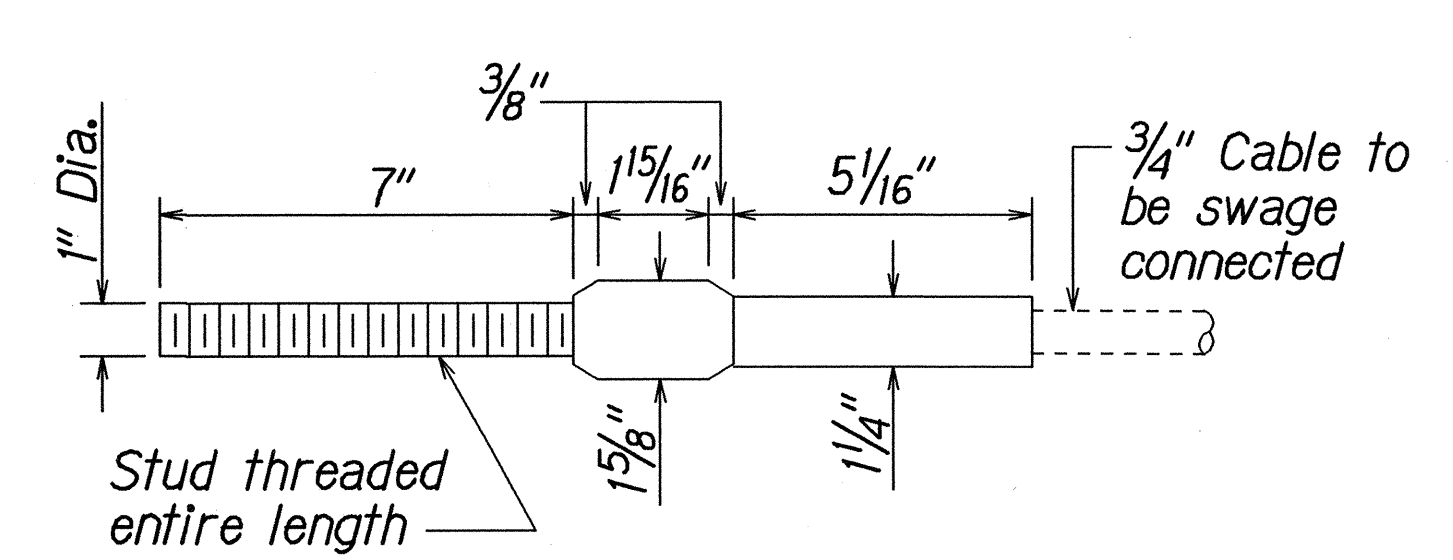
ORIGINAL PLAN	DATE	BY
NOTE BOOK		
QUANTITIES BY		
CHECKED BY		

18/12/02 1d/ruby/guardrail/fleat350.dgn (Standard Plan T.E-61 11/03/89 & T.E-62 09/01/87)

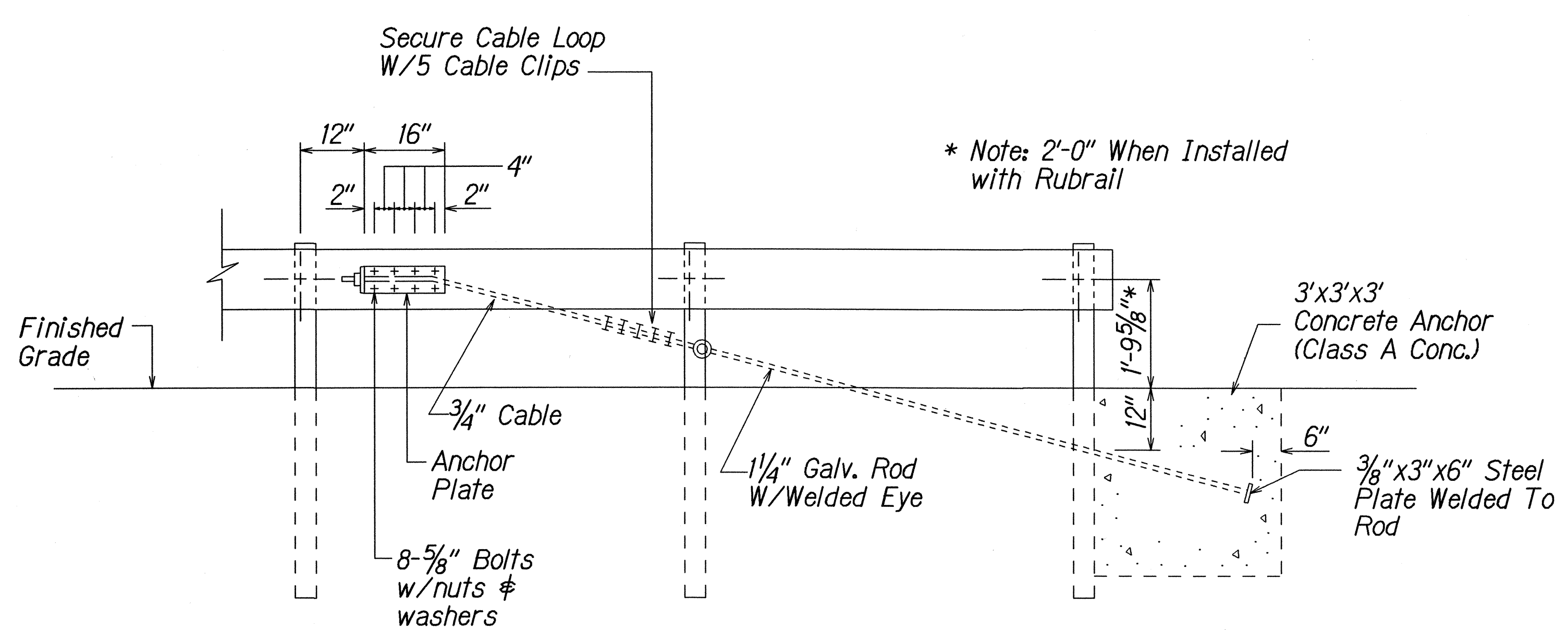
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	83G-01-03M	2005	18	47



ANCHOR PLATE DETAILS

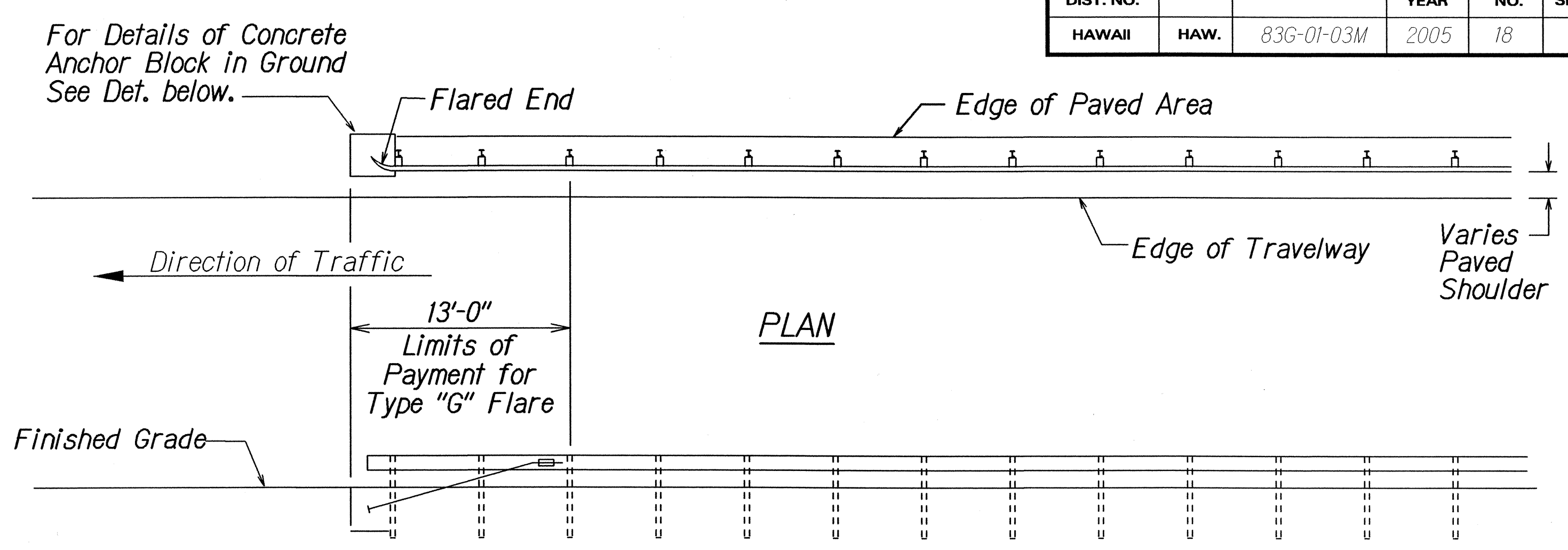


STANDARD SWAGED FITTING
AND STUD



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 installation.

ORIGINAL	SURVEY PLOTTED BY	DATE
PLAN	DRAWN BY	
NOTE BOOK	TRACED BY	
001/10/2005	DESIGNED BY	
001/10/2005	CHECKED BY	

101rubby/guardrail/res9rev.dgn (Standard, Plan TE-59 r11/03/05)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS
KAMEHAMEHA HIGHWAY RESURFACING
Kahiko Street to Pali Highway
Project No. 83G-01-03M

Scale: NTS
Date: January, 2005

SHEET No. 7 OF 7 SHEETS