

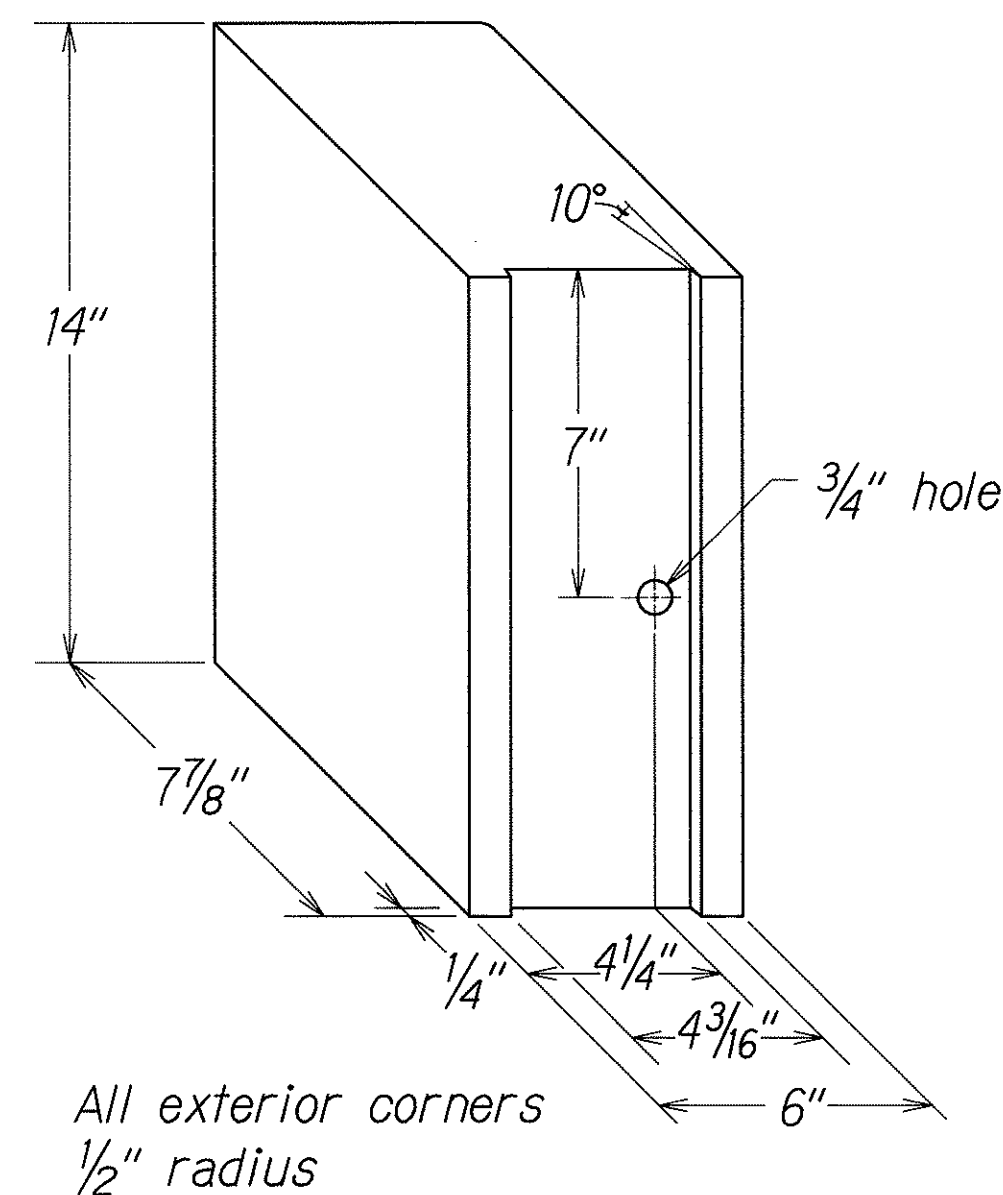
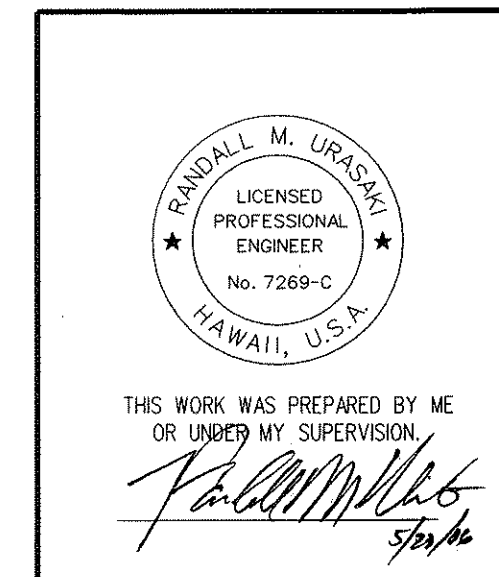
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(245)	2005	41	183

GENERAL NOTES

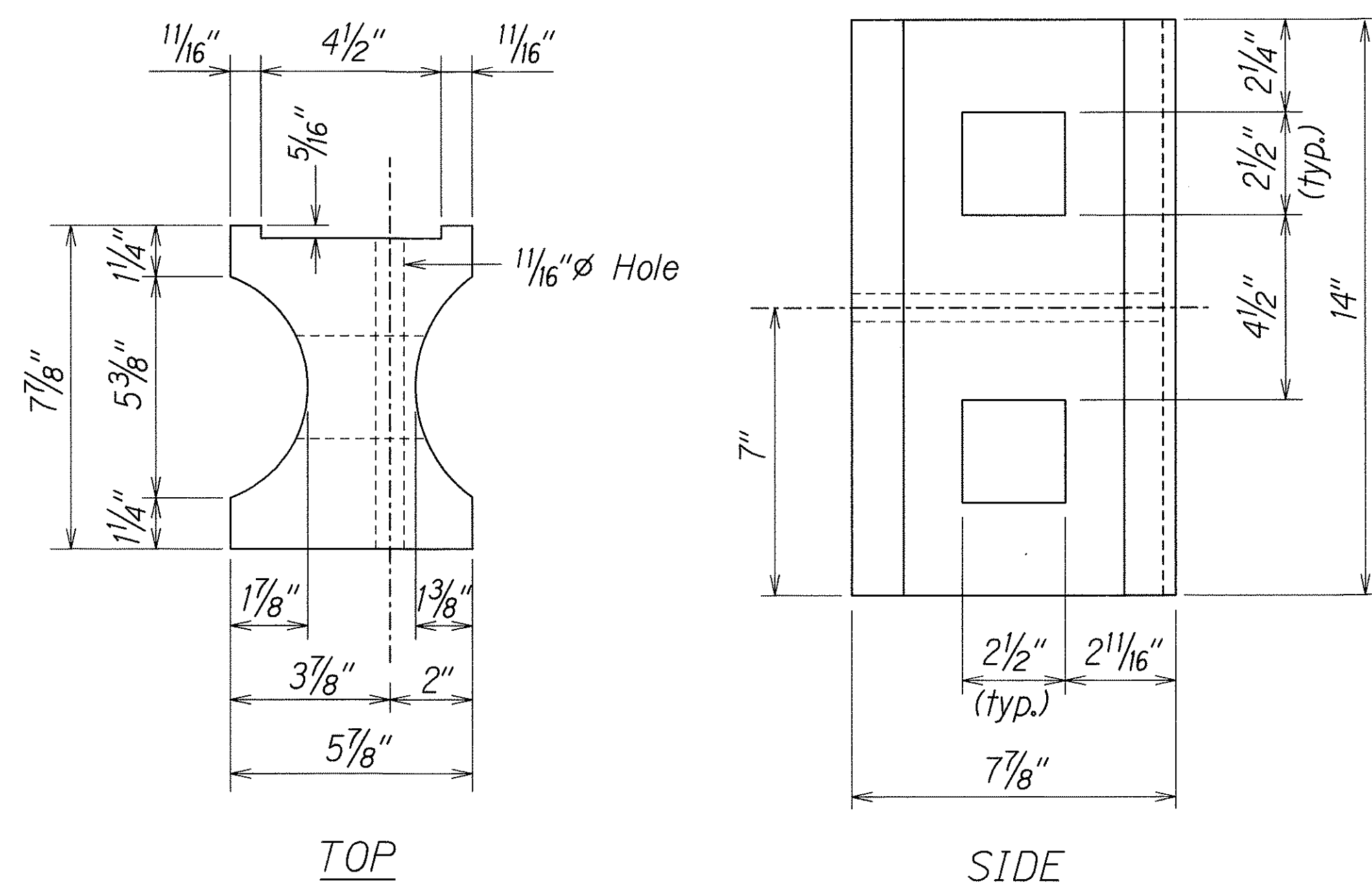
- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- All fasteners, posts, and rail elements (i.e. 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"

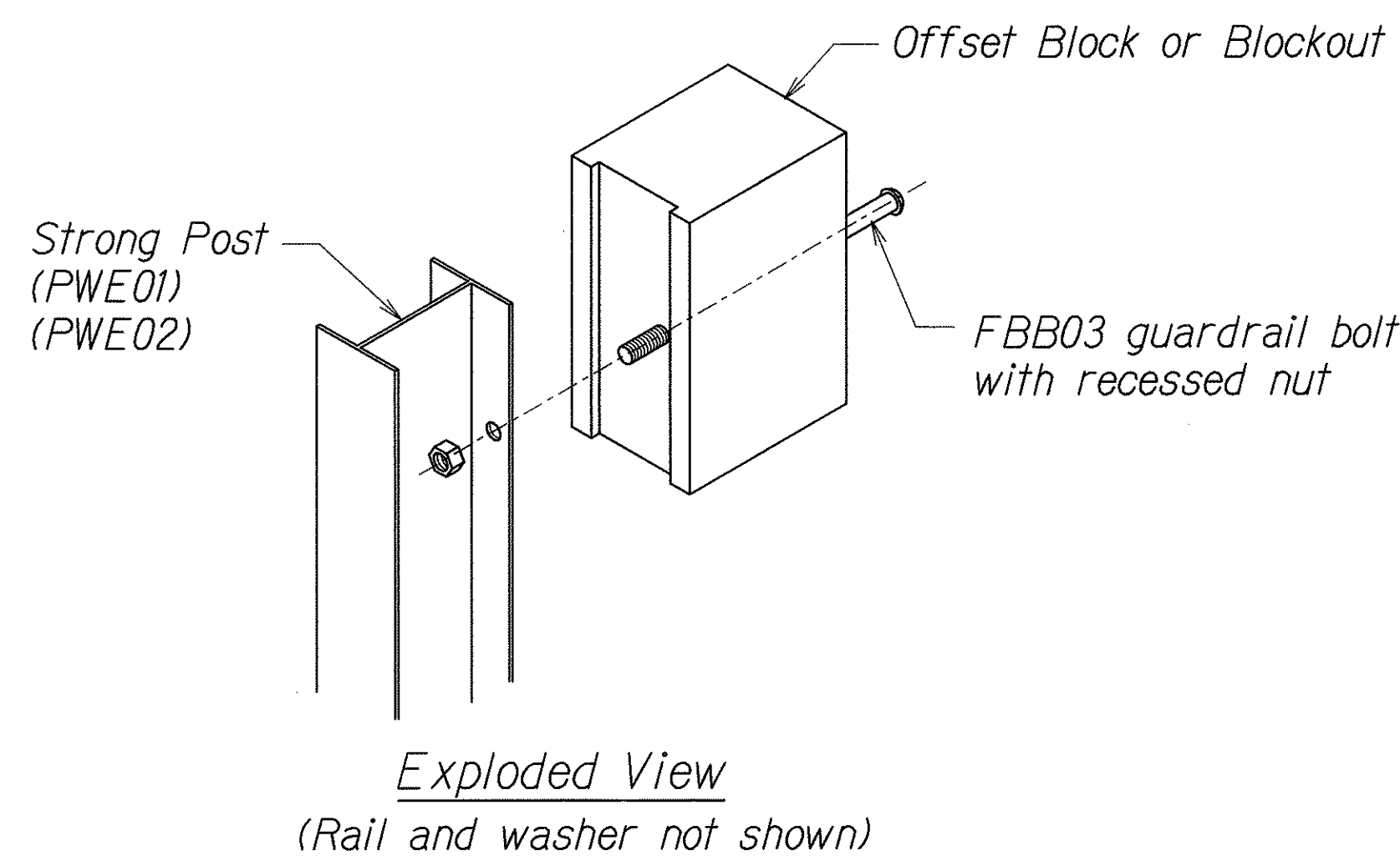
5/12/06	Revised Sheet
Date	Revision
<div>STATE OF HAWAII</div> <div>DEPARTMENT OF TRANSPORTATION</div> <div>HIGHWAYS DIVISION</div> <div>GUARDRAIL DETAILS & NOTES</div> <div>INTERSTATE ROUTE H-1 REHABILITATION</div> <div>EASTBOUND LANES</div> <div>WAI'AU INTERCHANGE TO KAIMAKANI STREET</div> <div>Scale: NTS</div> <div>Date: Jan. 24, 2006</div>	
SHEET No. C28 OF 39 SHEETS	



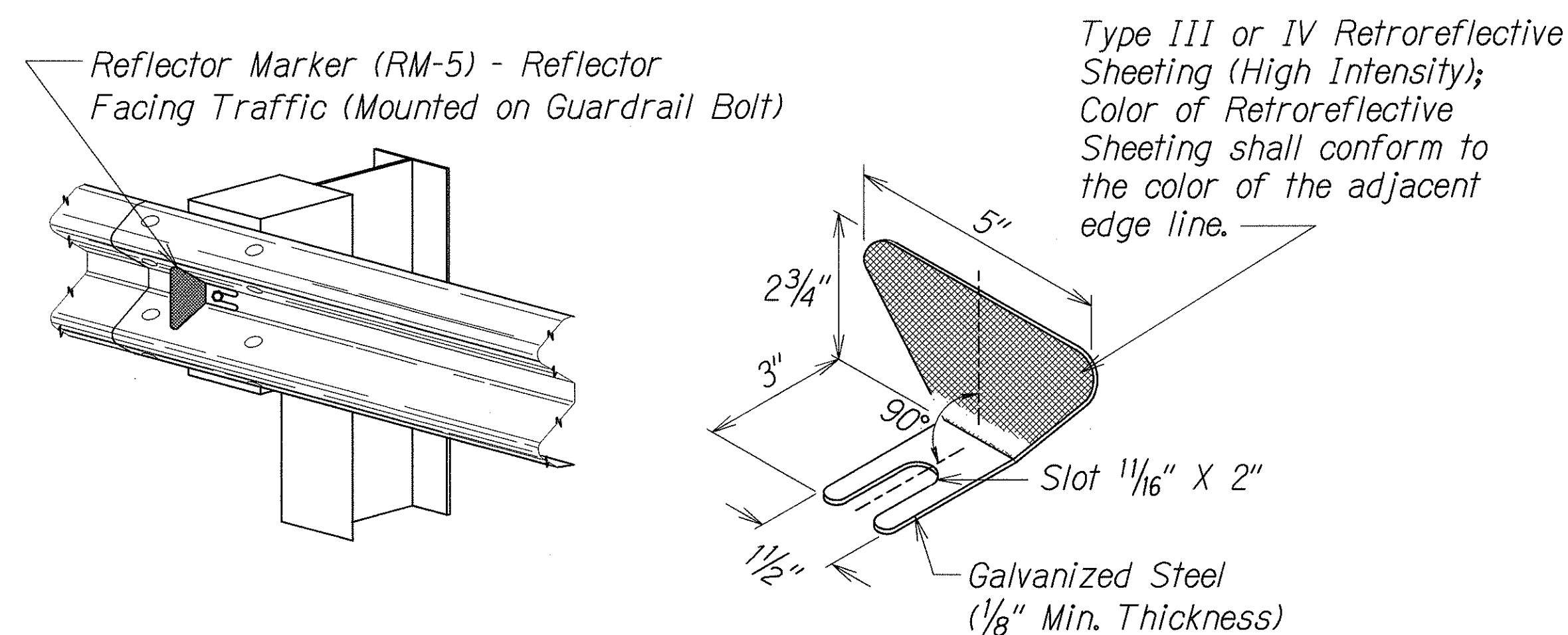
RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)



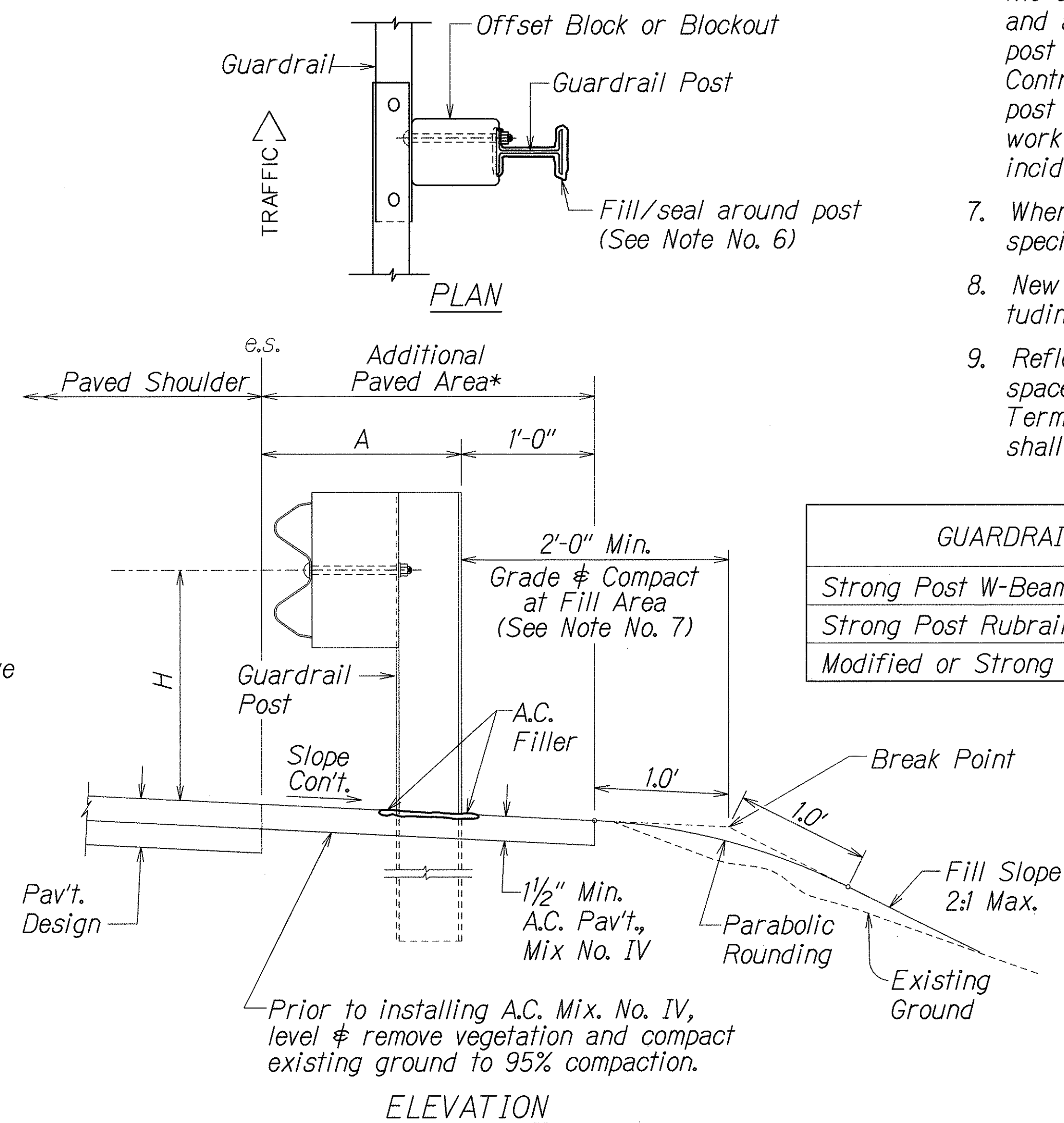
RECYCLED PLASTIC BLOCKOUT (TYPE I)



STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

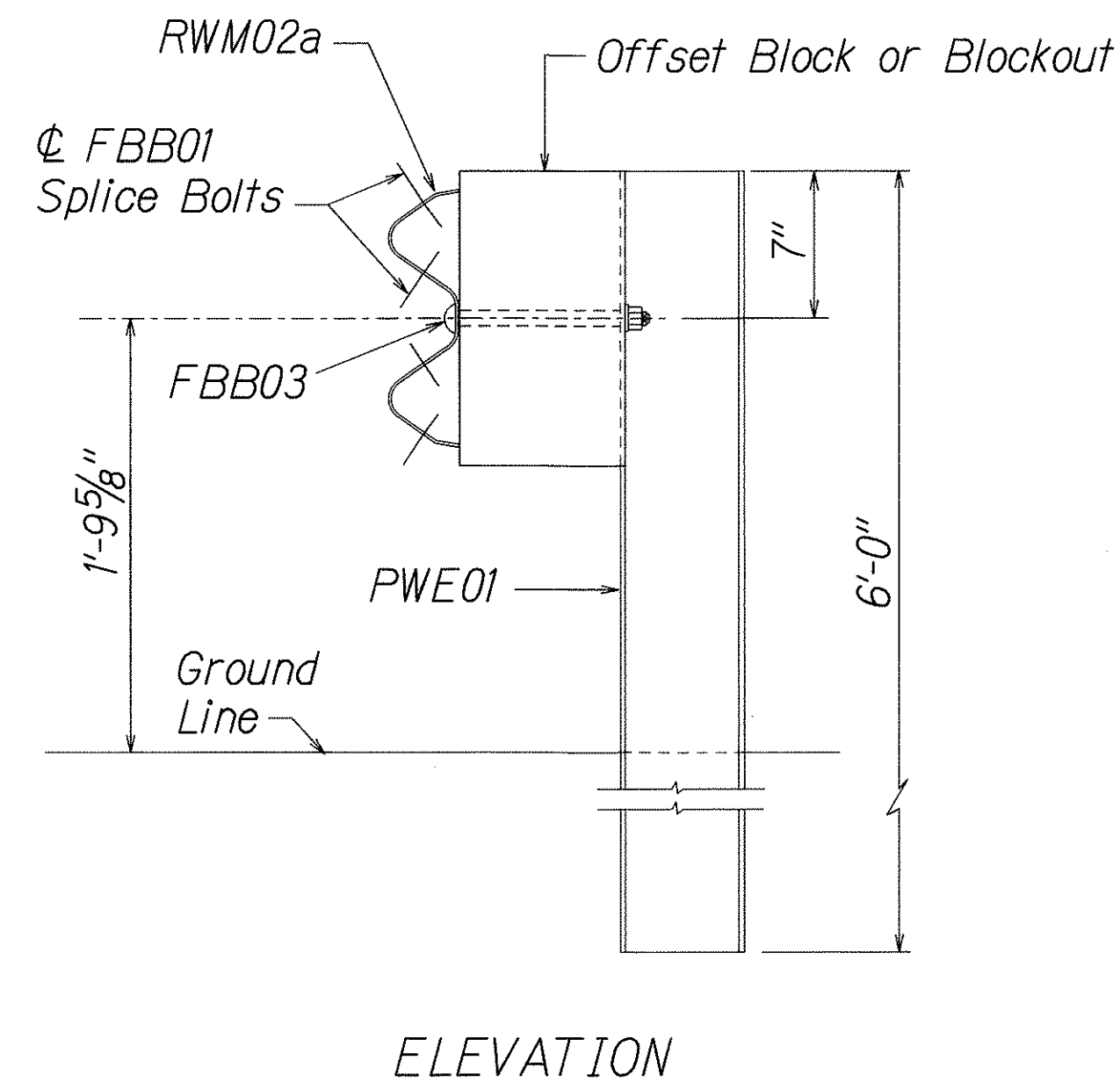
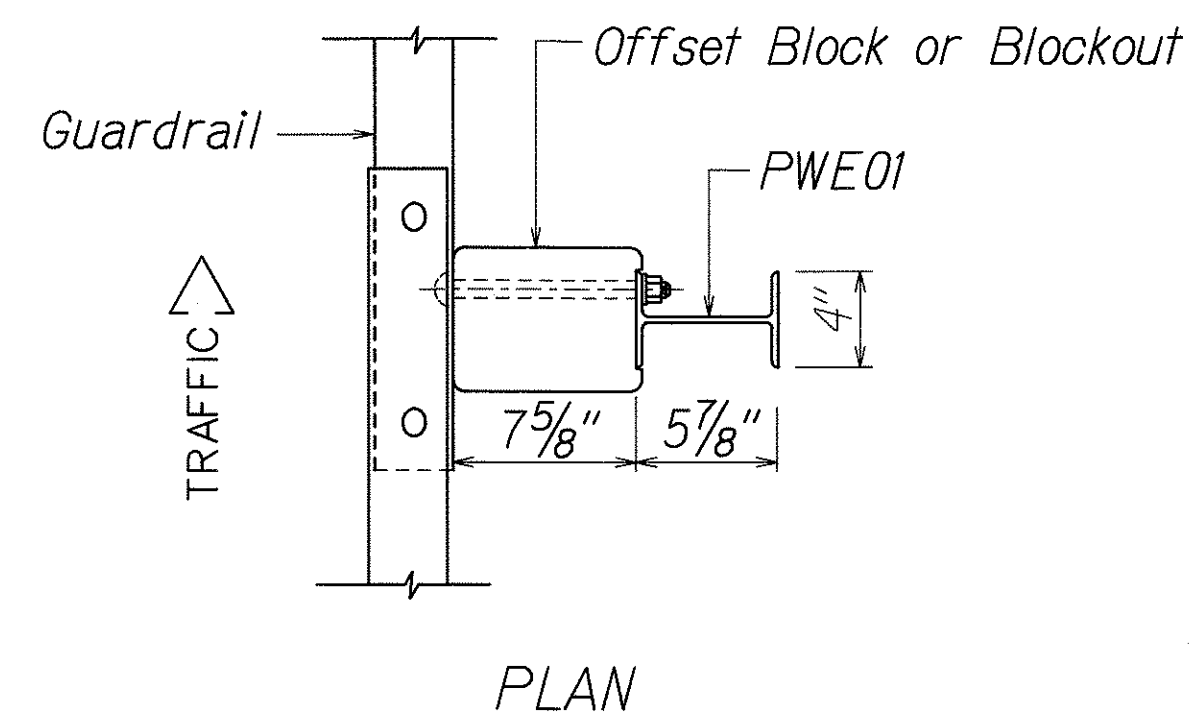


TYPICAL GUARDRAIL INSTALLATION

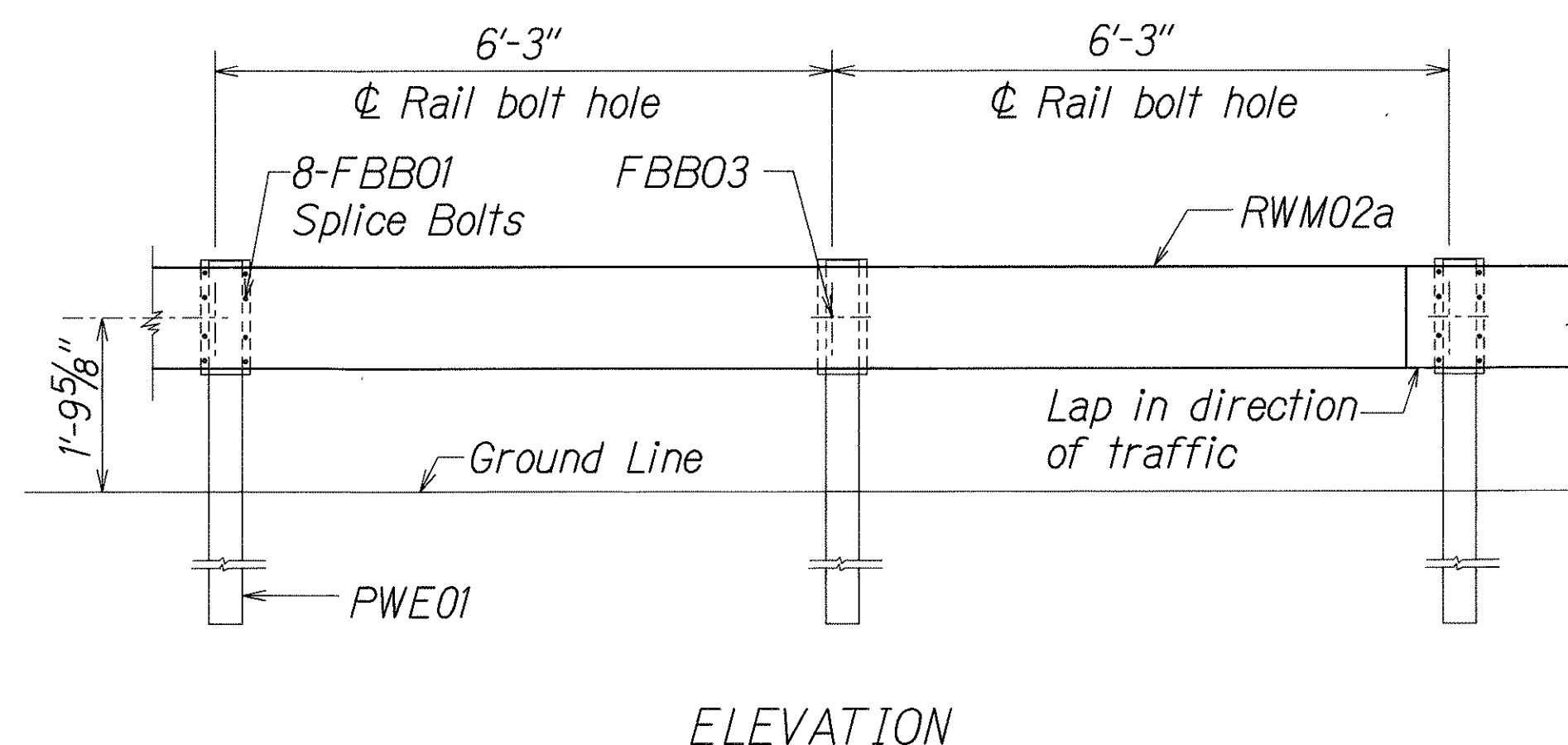
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

12/31/03 rd/ruby/guardrail/1650rev.dgn (standard plan TE-50 c09/01/00)

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(245)	2005	42	183

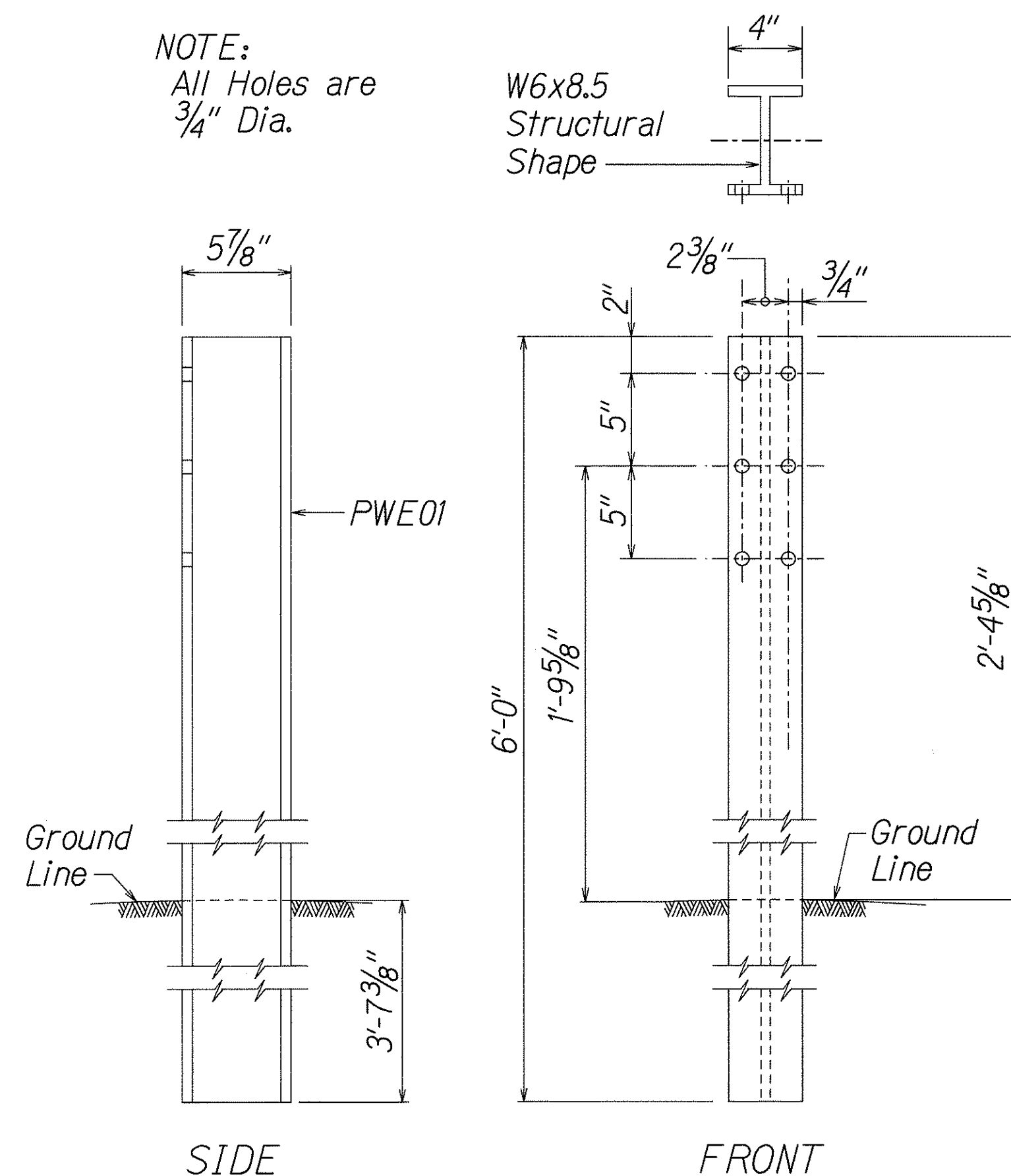


STRONG POST W-BEAM GUARDRAIL
(SGR04a)

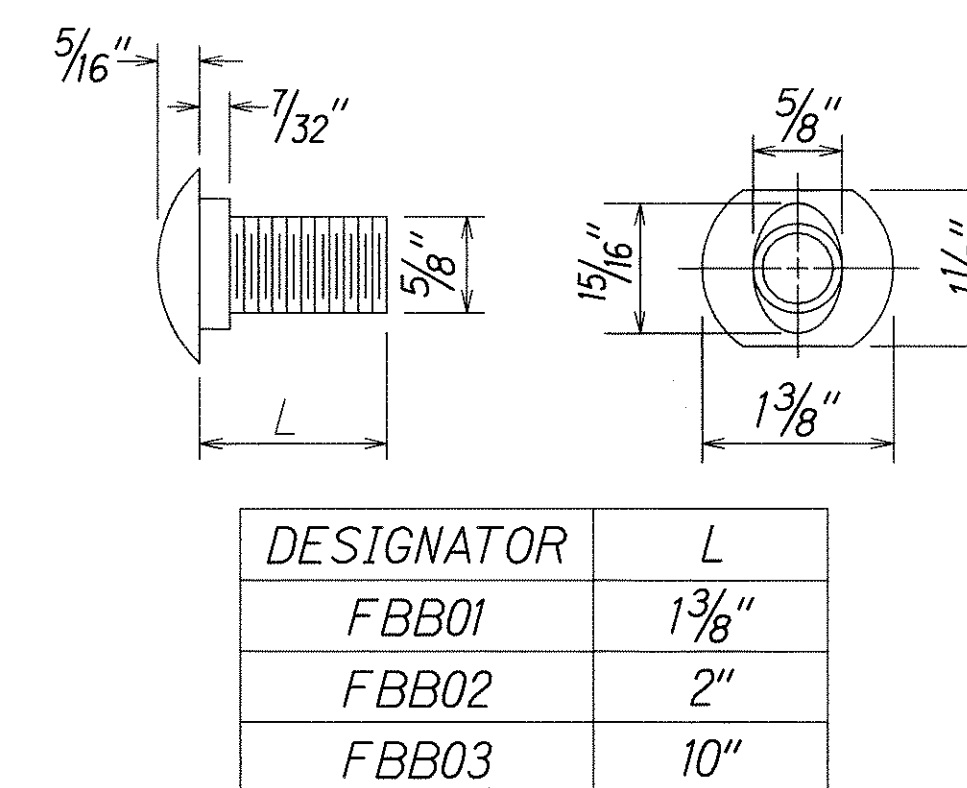


STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

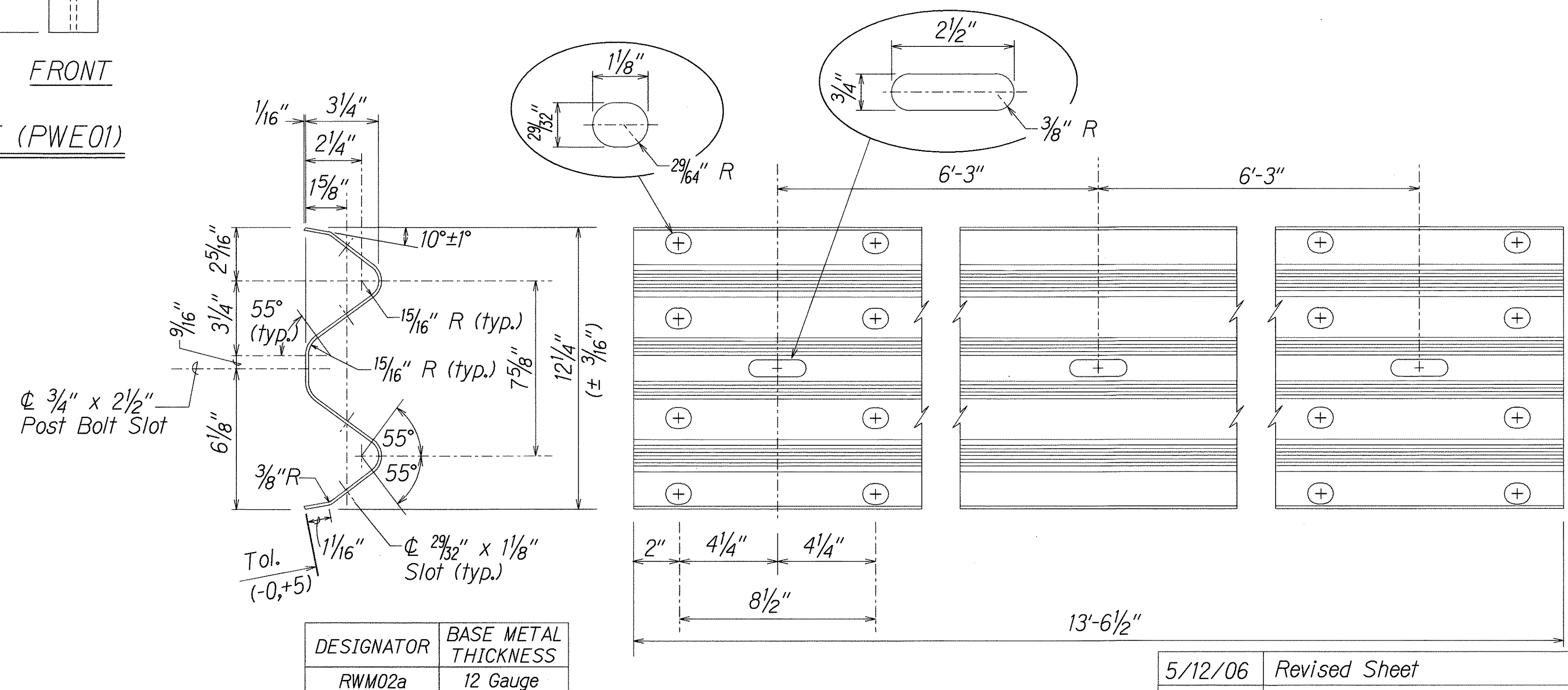
NOTE:
All Holes are
3/4" Dia.



W-BEAM STRONG POST (PWE01)



GUARDRAIL BOLTS AND RECESSED NUT



2 SPACE W-BEAM GUARDRAIL (RWM02a)

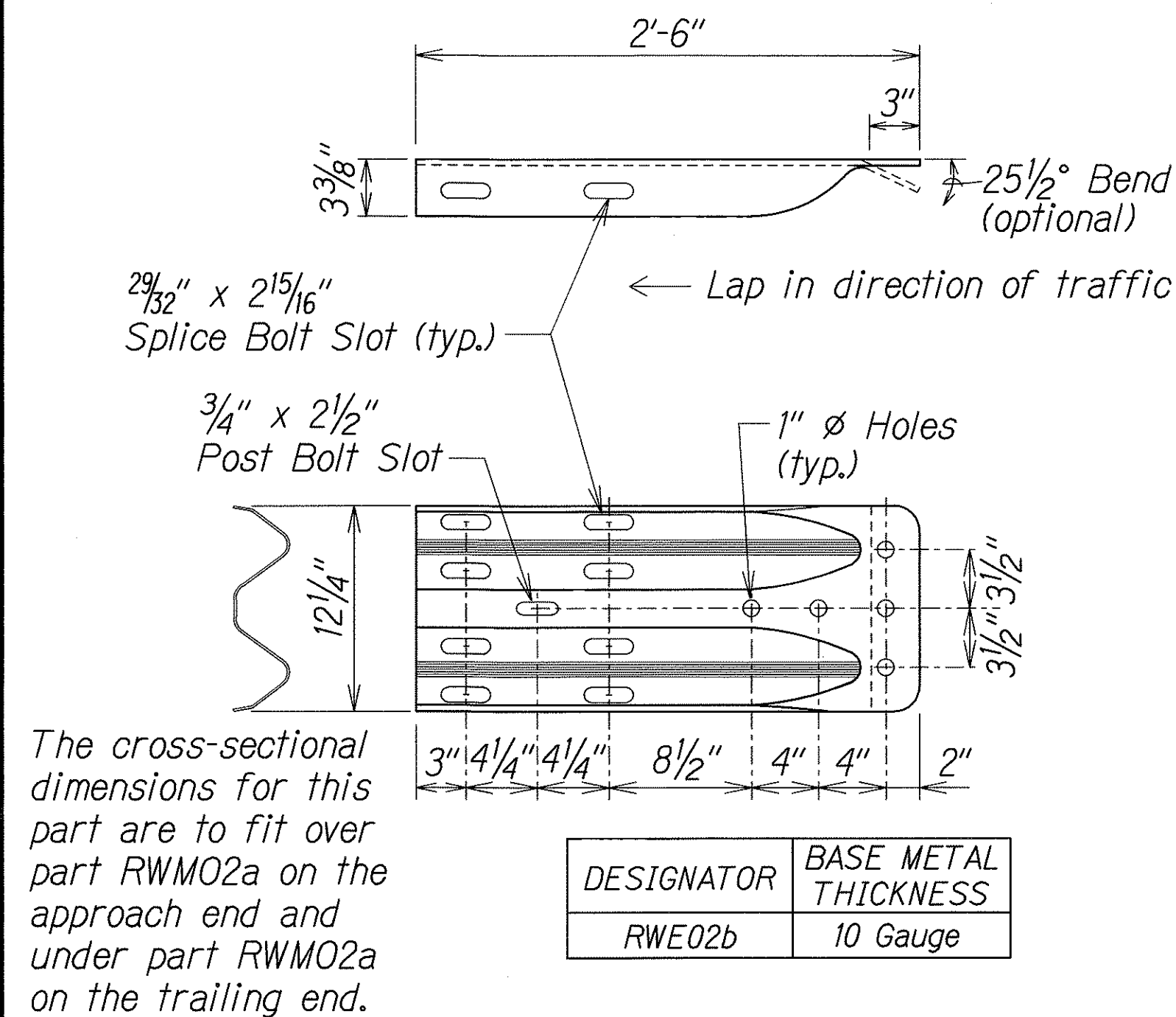
5/12/06	Revised Sheet
Date	Revision

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRONG POST
W-BEAM GUARDRAIL
INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET
Scale: NTS Date: Jan. 24, 2006

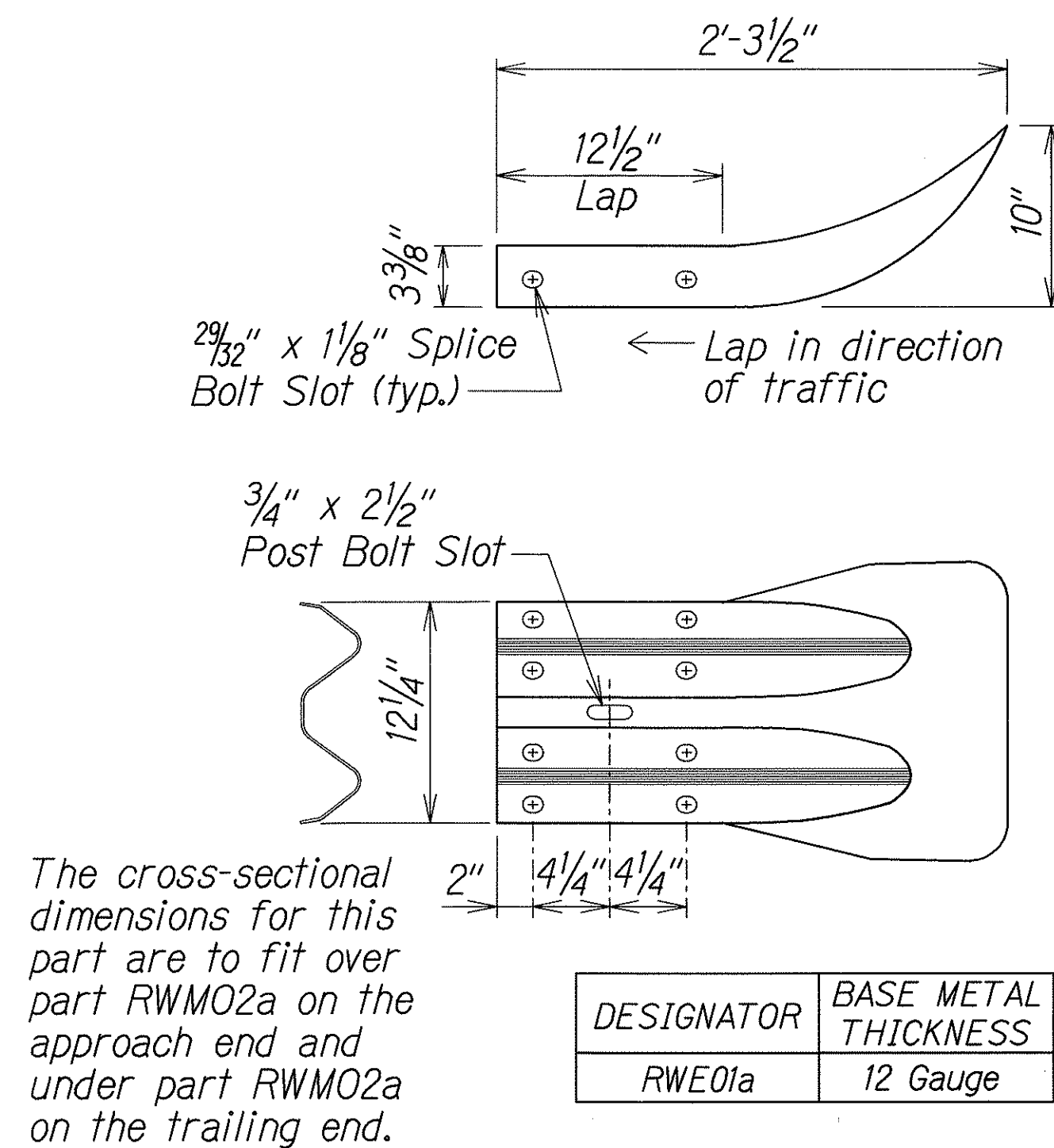
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	DESIGNED BY	
	CHECKED BY	

11/10/05 tdlrudy guardrail/wbeams.dgn (standard plan TE-50 r03/06/07)

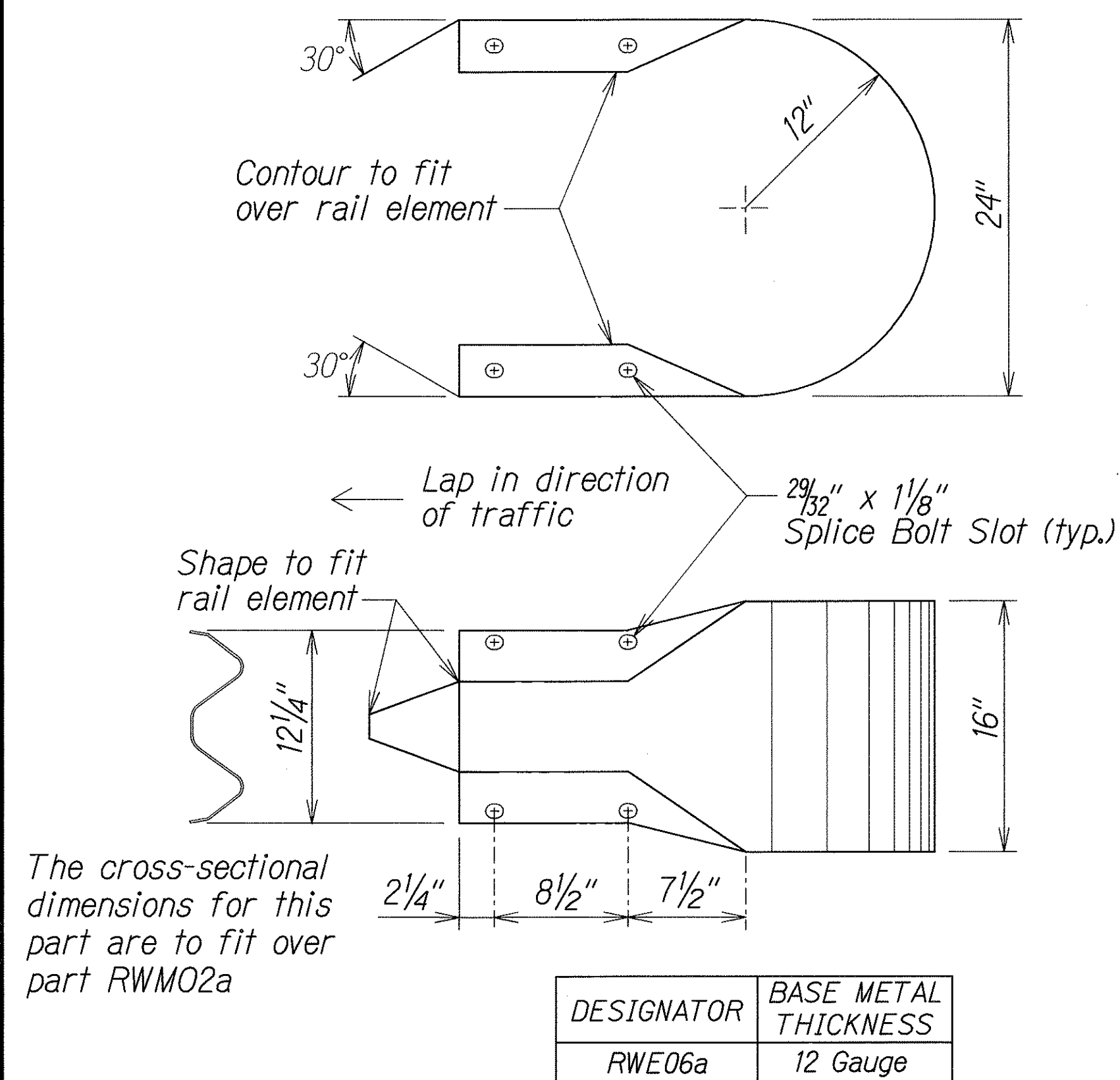
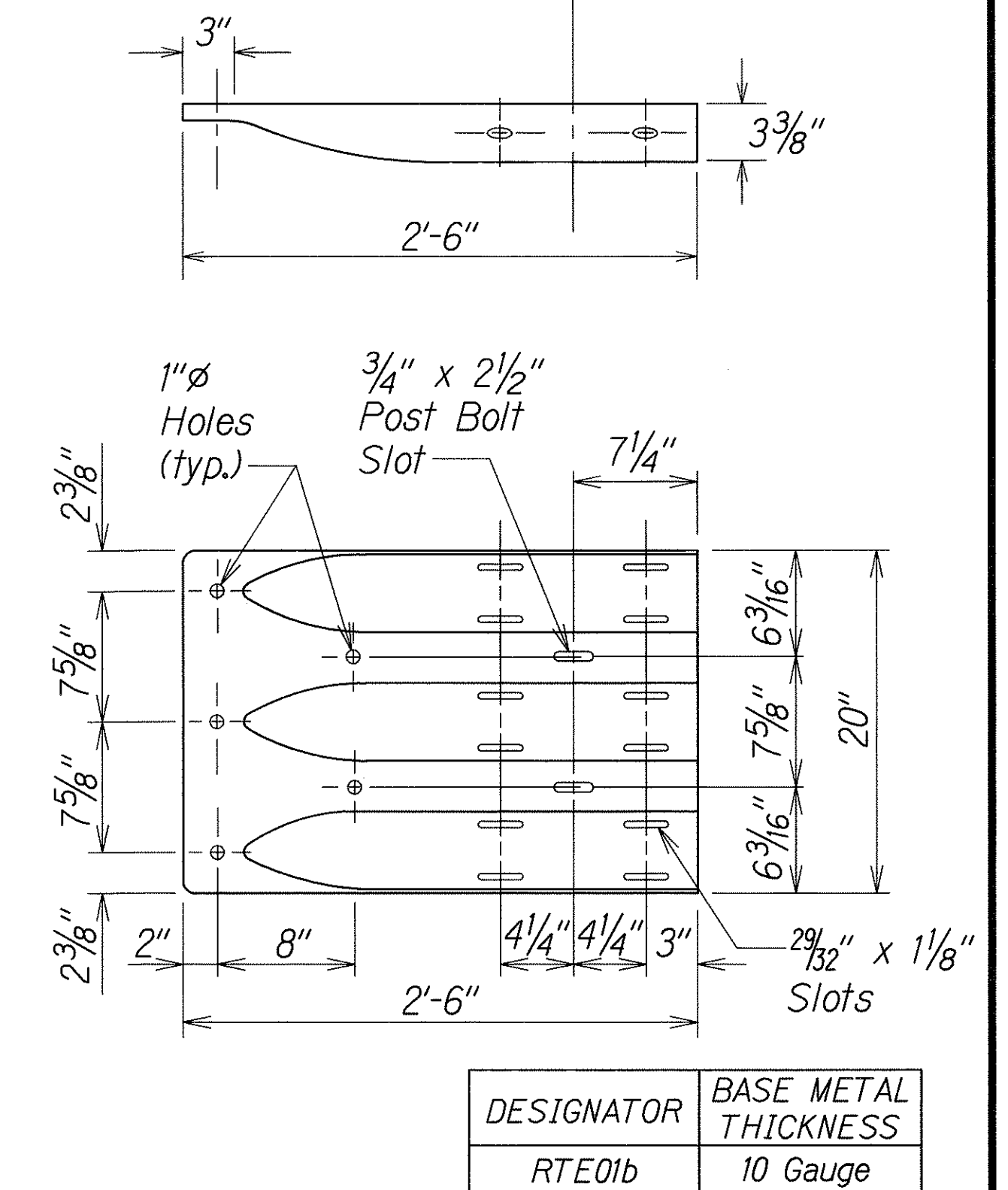
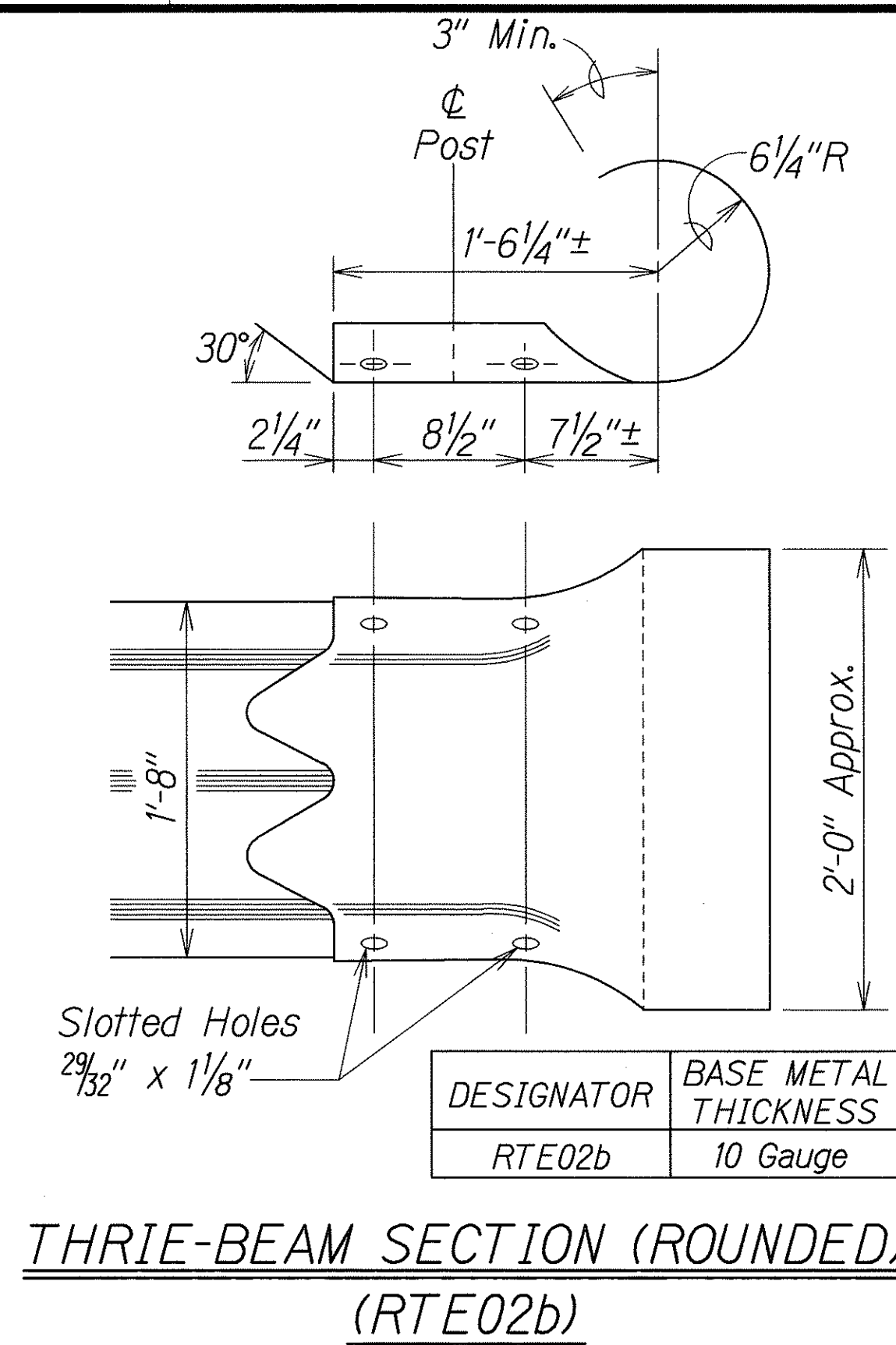
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(245)	2005	43	183



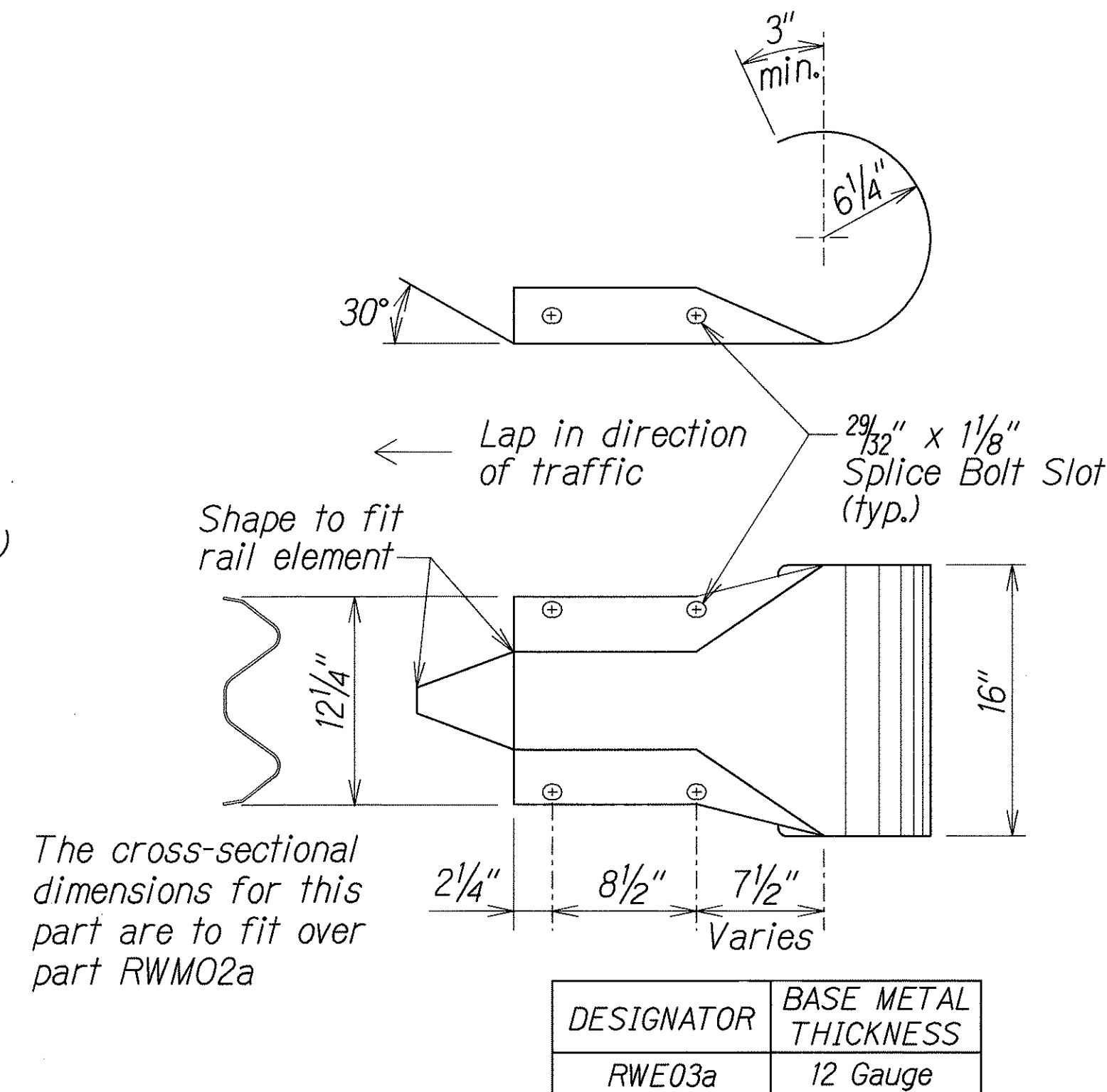
W-BEAM TERMINAL CONNECTOR (RWE02b)



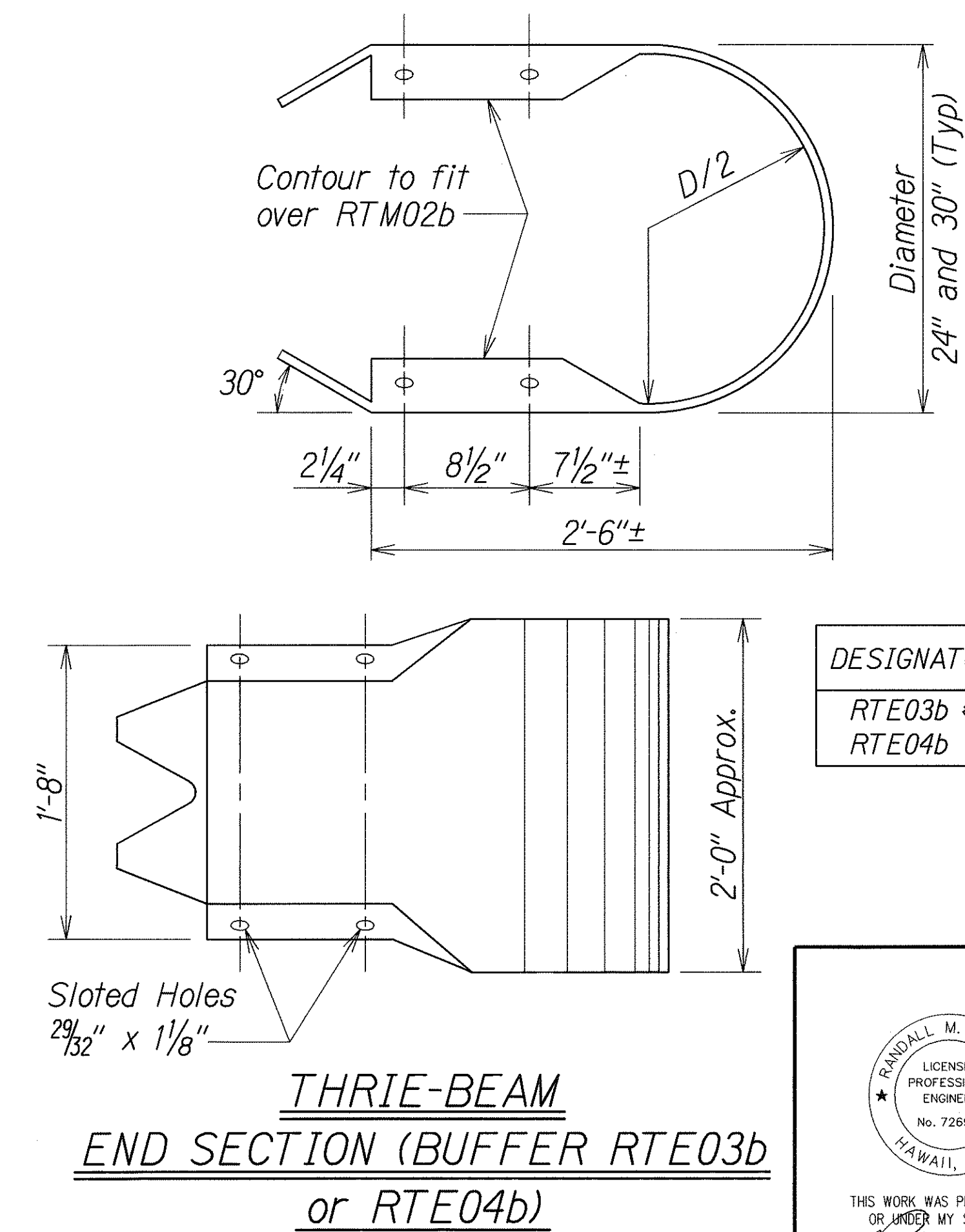
W-BEAM END SECTION (FLARED RWE01a)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

5/12/06	Revised Sheet
Date	Revision

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R. M. Uragami

5/12/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

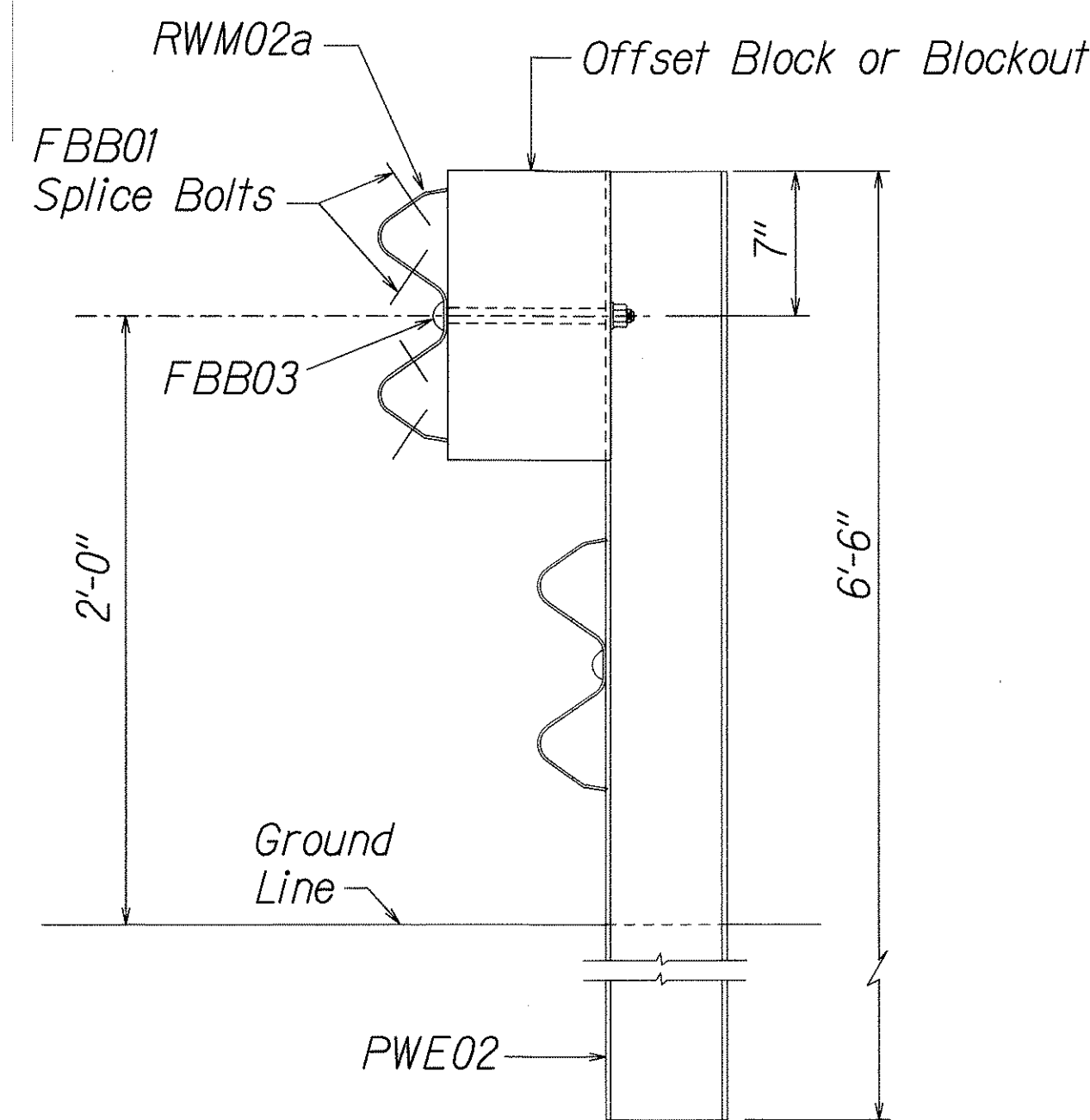
GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET

Scale: NTS Date: Jan. 24, 2006

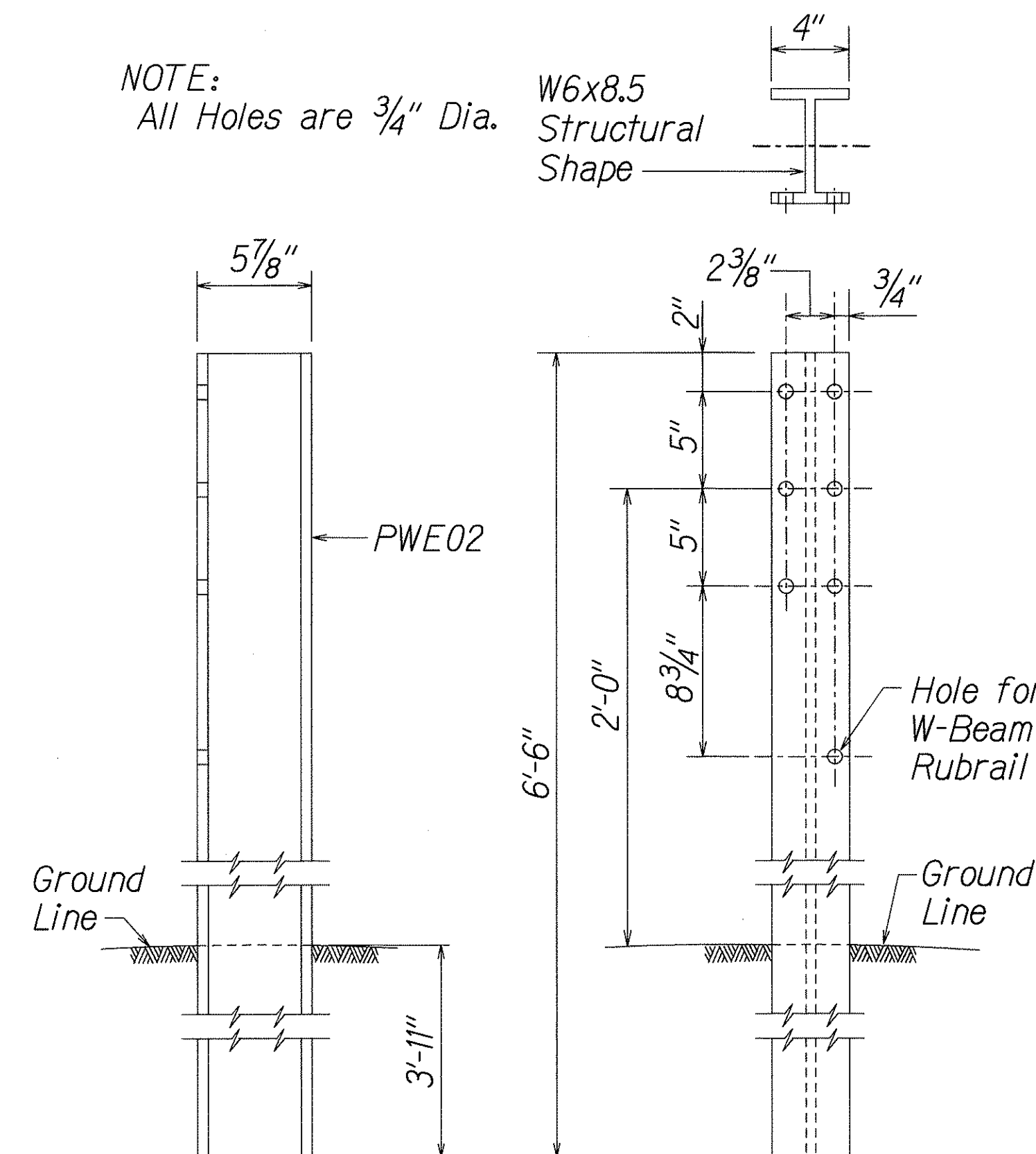
SHEET No. C30 OF 39 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(245)	2005	44	183

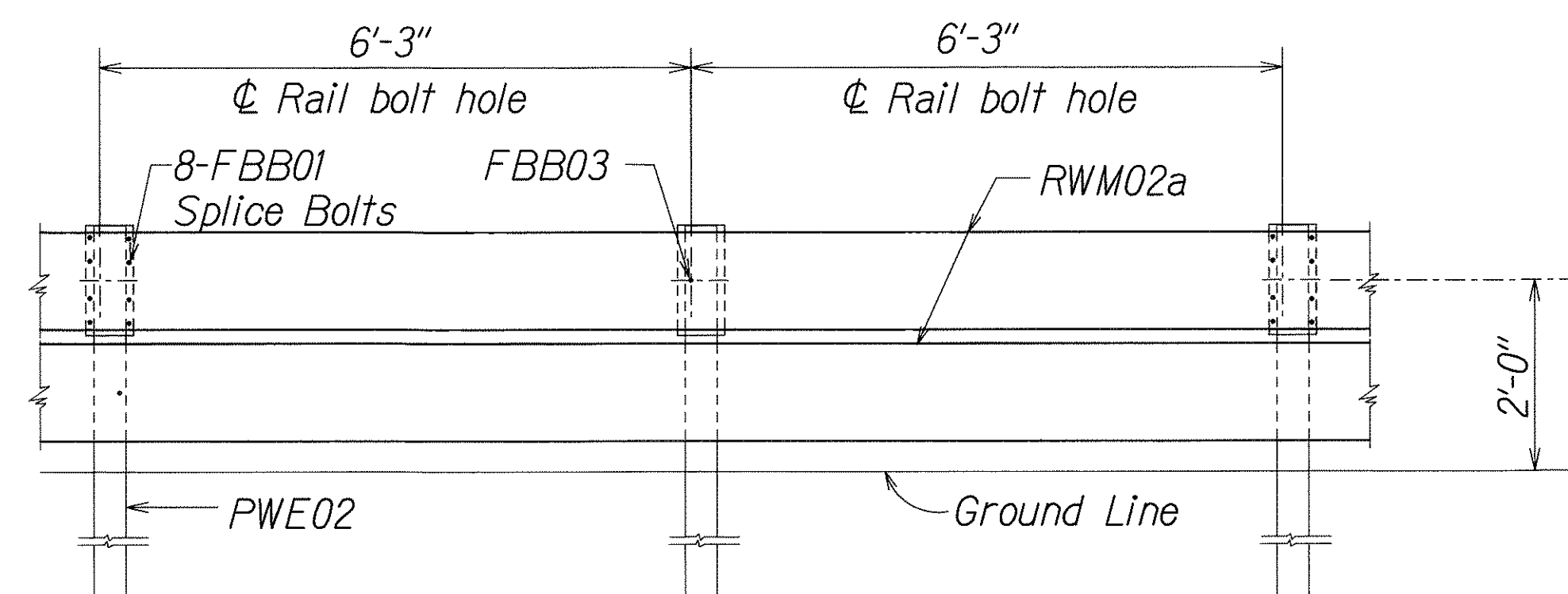


ELEVATION

STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL

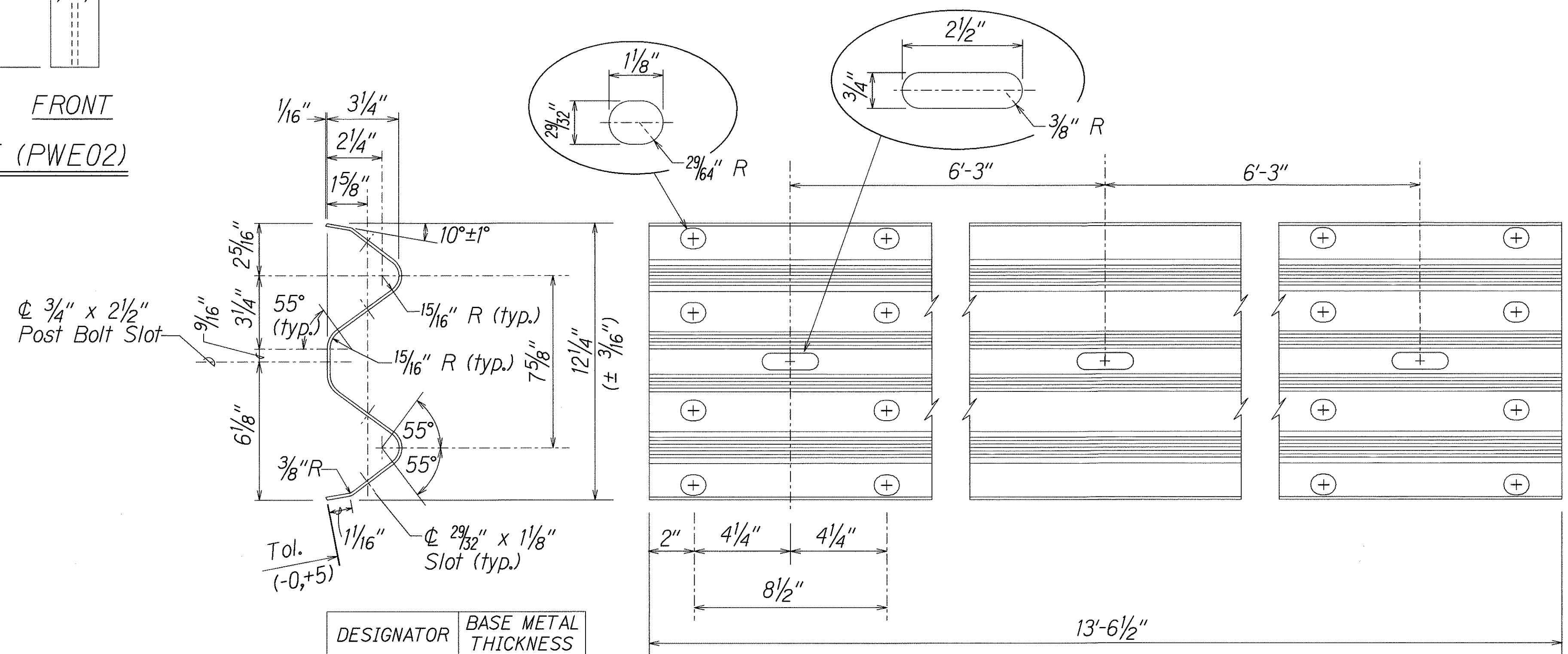


SIDE
FRONT
W-BEAM STRONG POST (PWE02)



ELEVATION

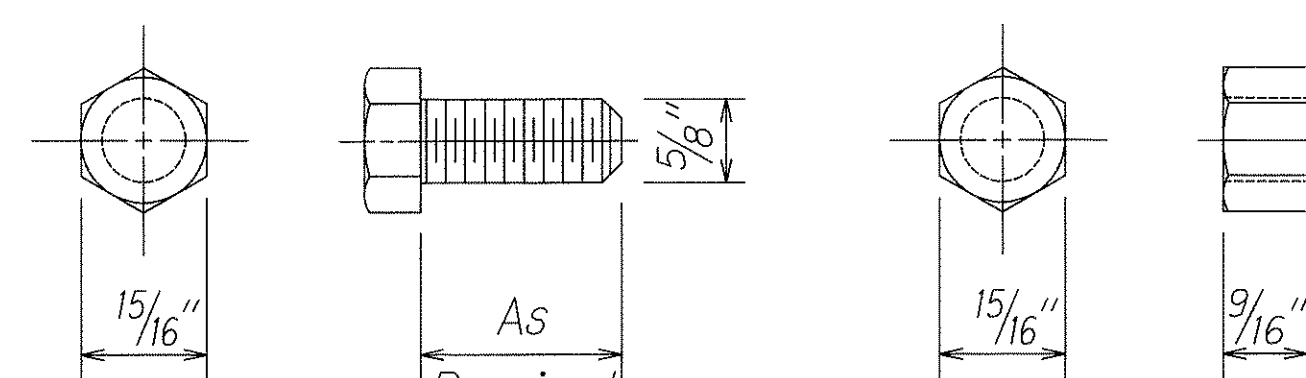
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)

5/12/06	Revised Sheet
Date	Revision



HEX BOLT & NUT (FBX16a)

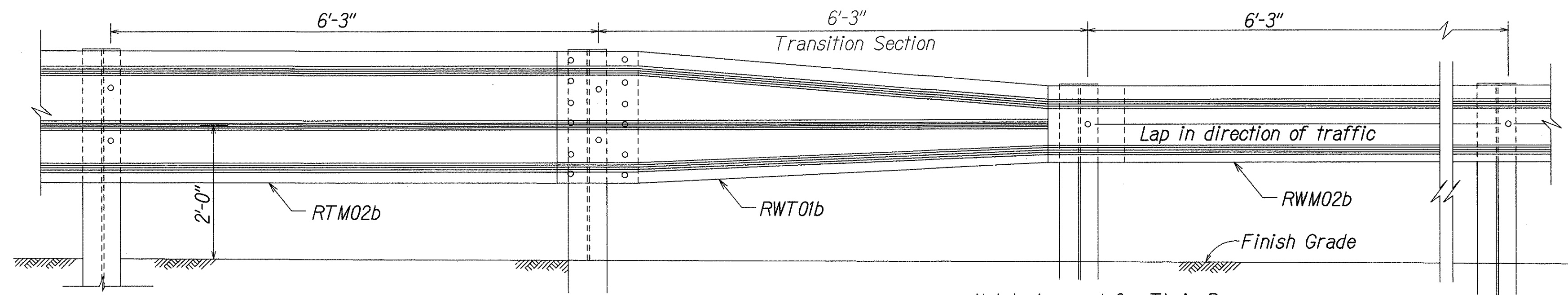
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

R. M. Urasaki 5/24/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

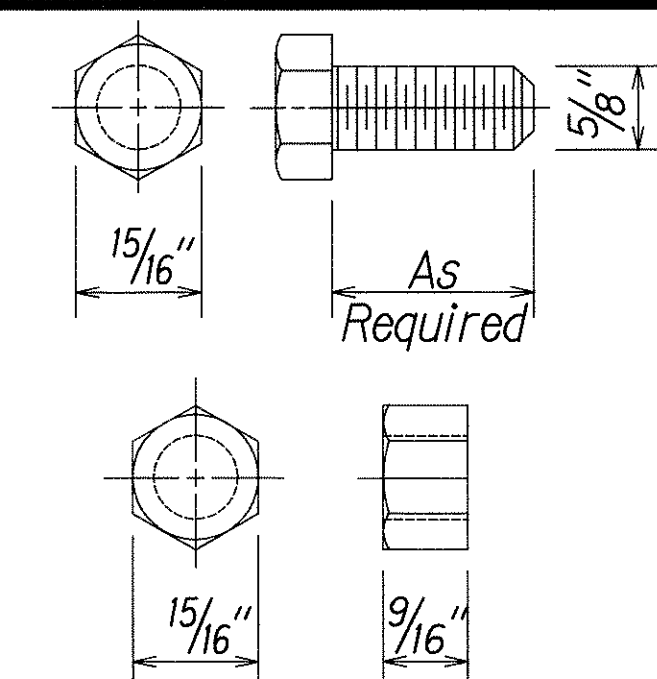
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL
INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET
Scale: NTS Date: Jan. 24, 2006

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-K(245)	2005	45	183

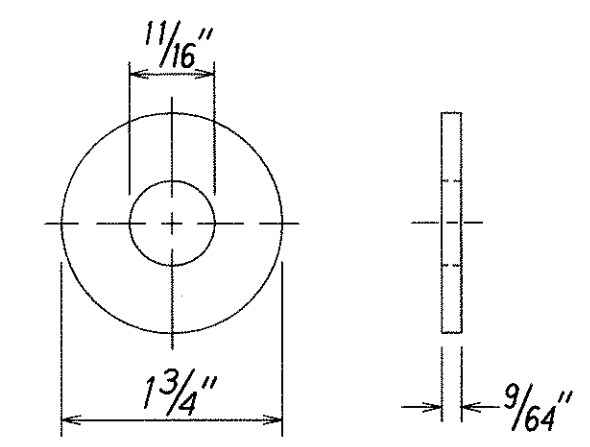


TRANSITION SECTION *

* Not to be used for Thrie Beam connection to structures.



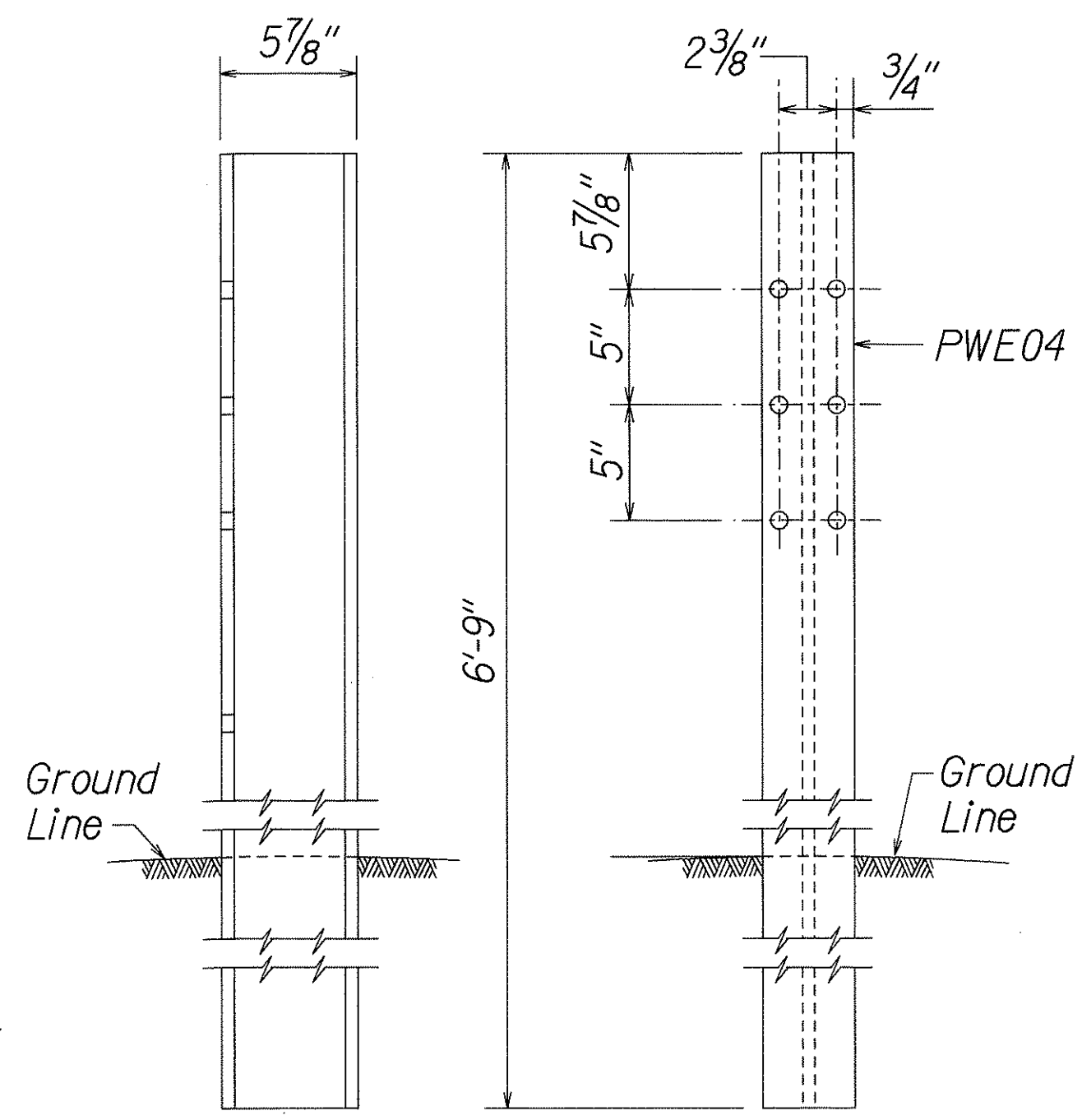
HEX BOLT & NUT
(FBX16a)



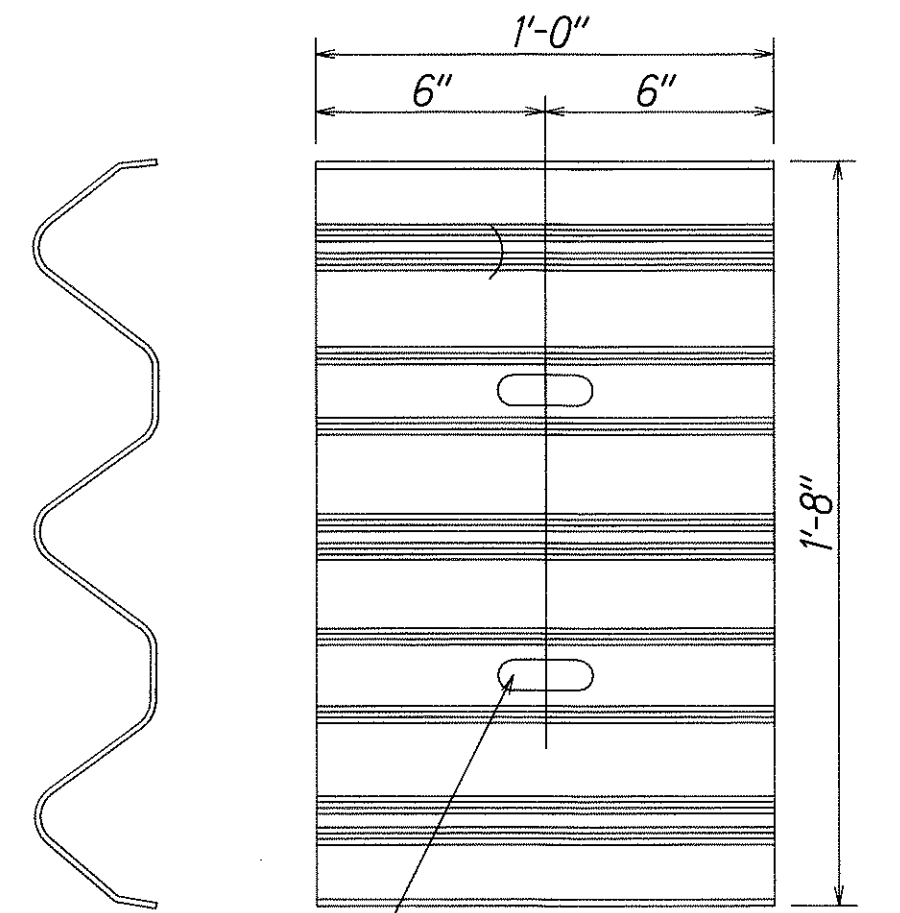
STEEL WASHER
FOR 5/8" BOLT

NOTE:
All Holes are
3/4" Dia.

W6x8.5
Structural
Shape

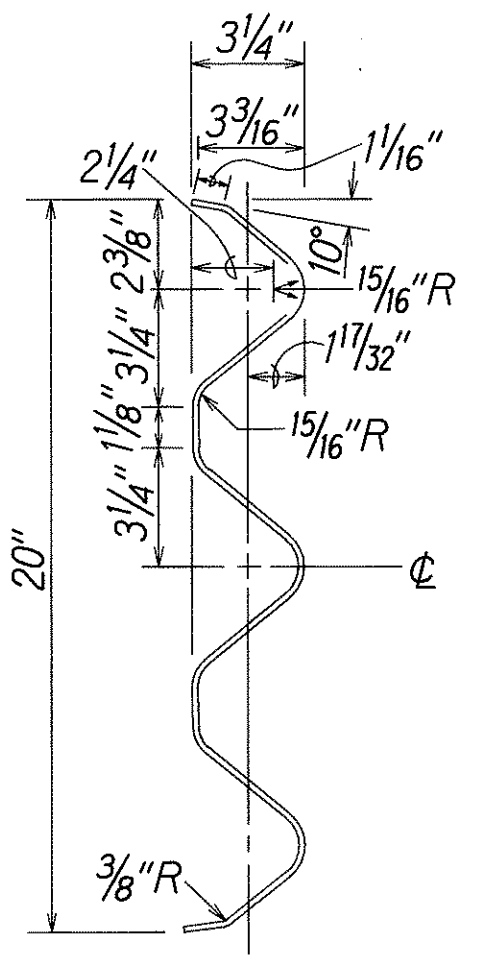


W-BEAM STRONG POST (PWE04)

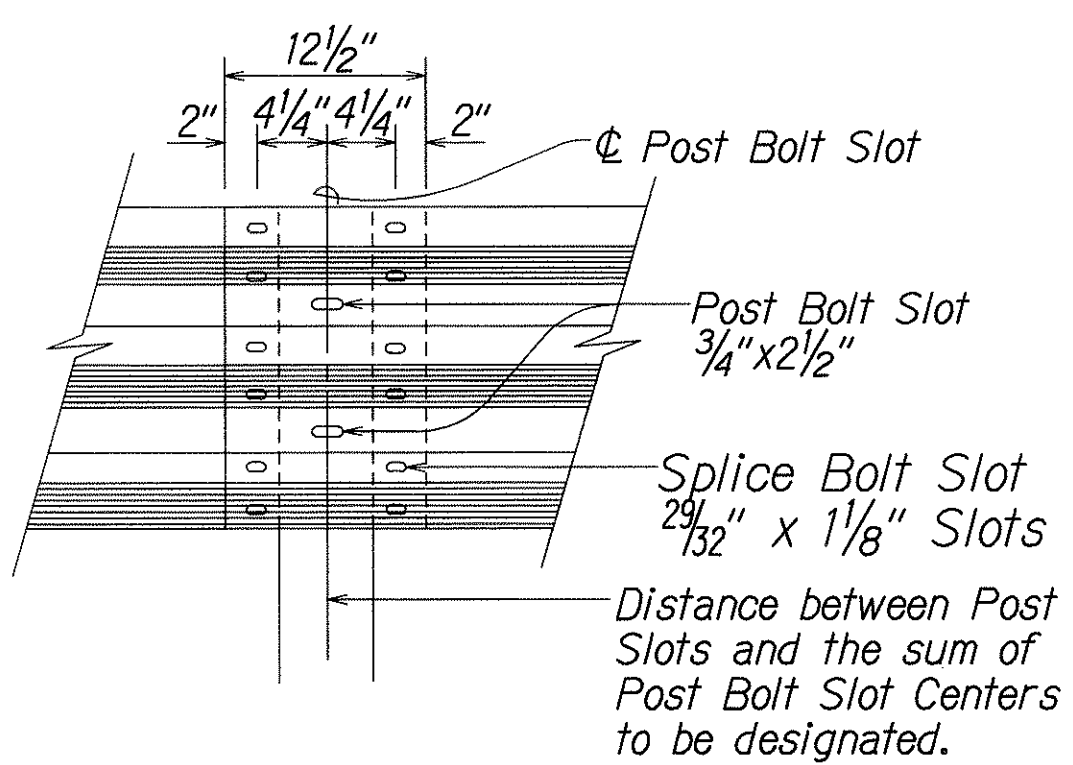


BACKUP PLATE
(RTB01b)

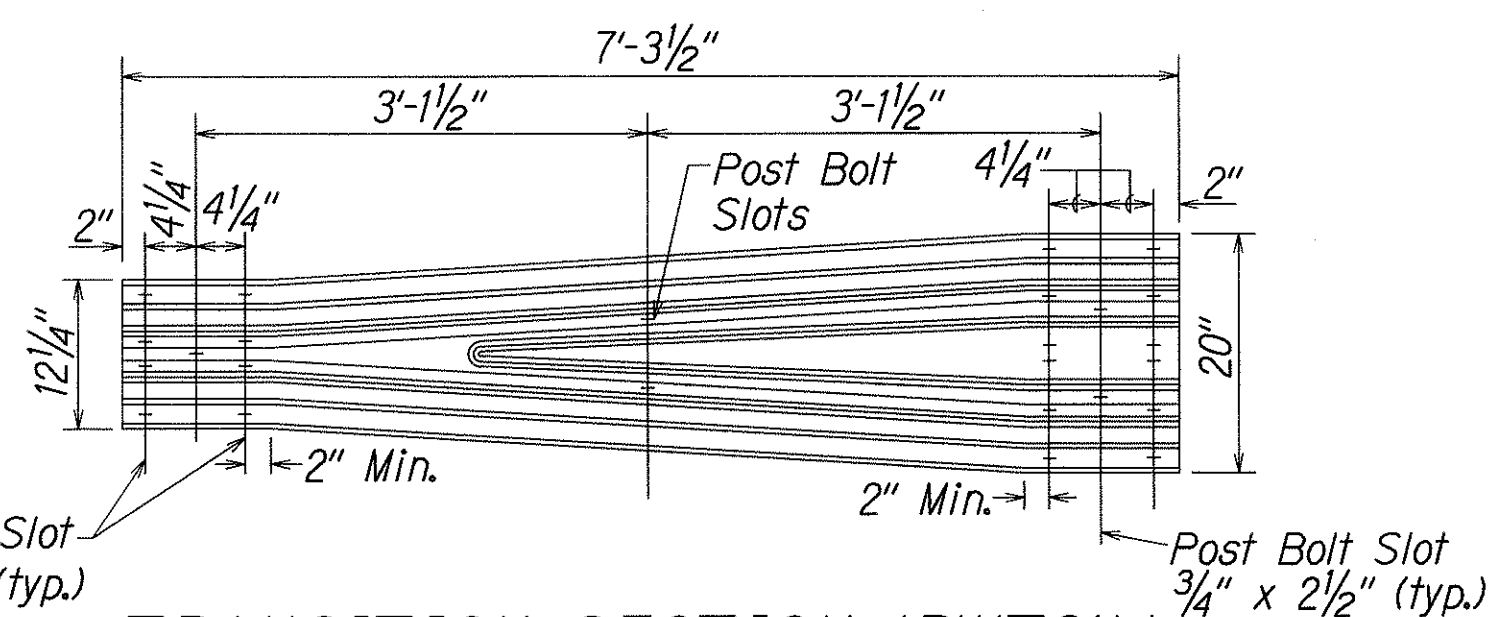
(Use at Posts where
Splices do not occur)



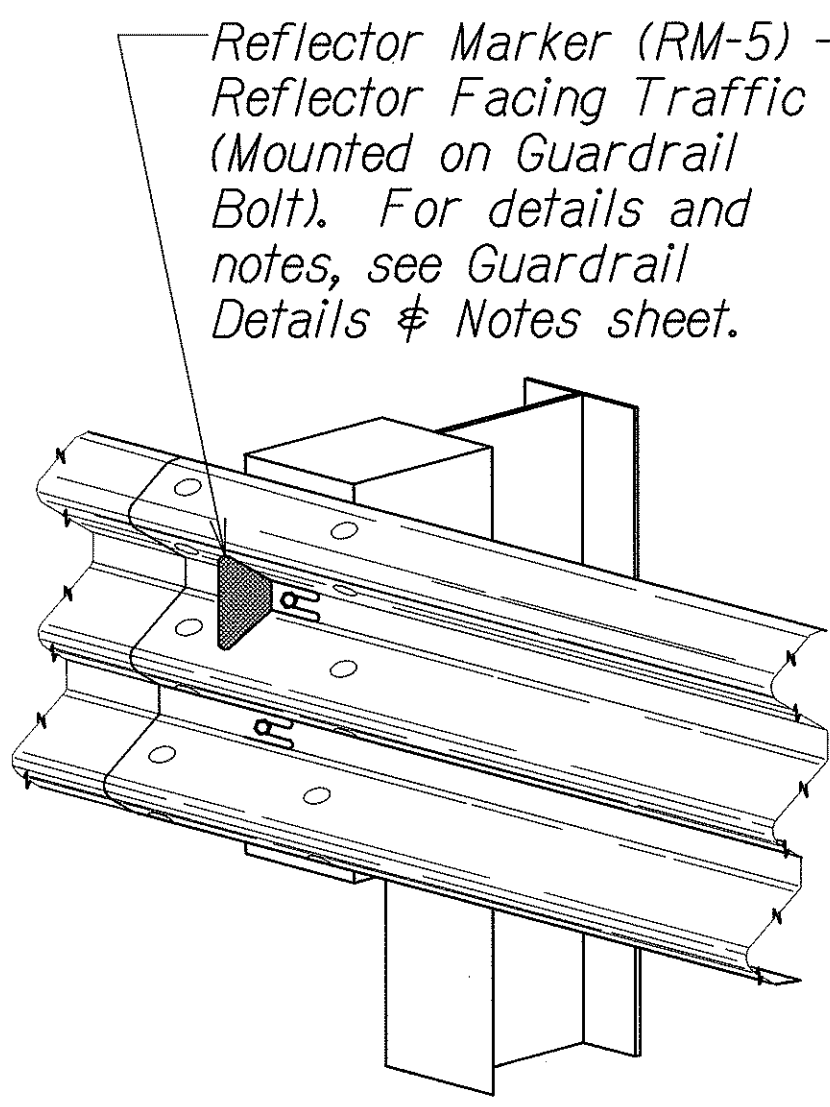
SECTION THRU
RAIL ELEMENT
(RTM02b)



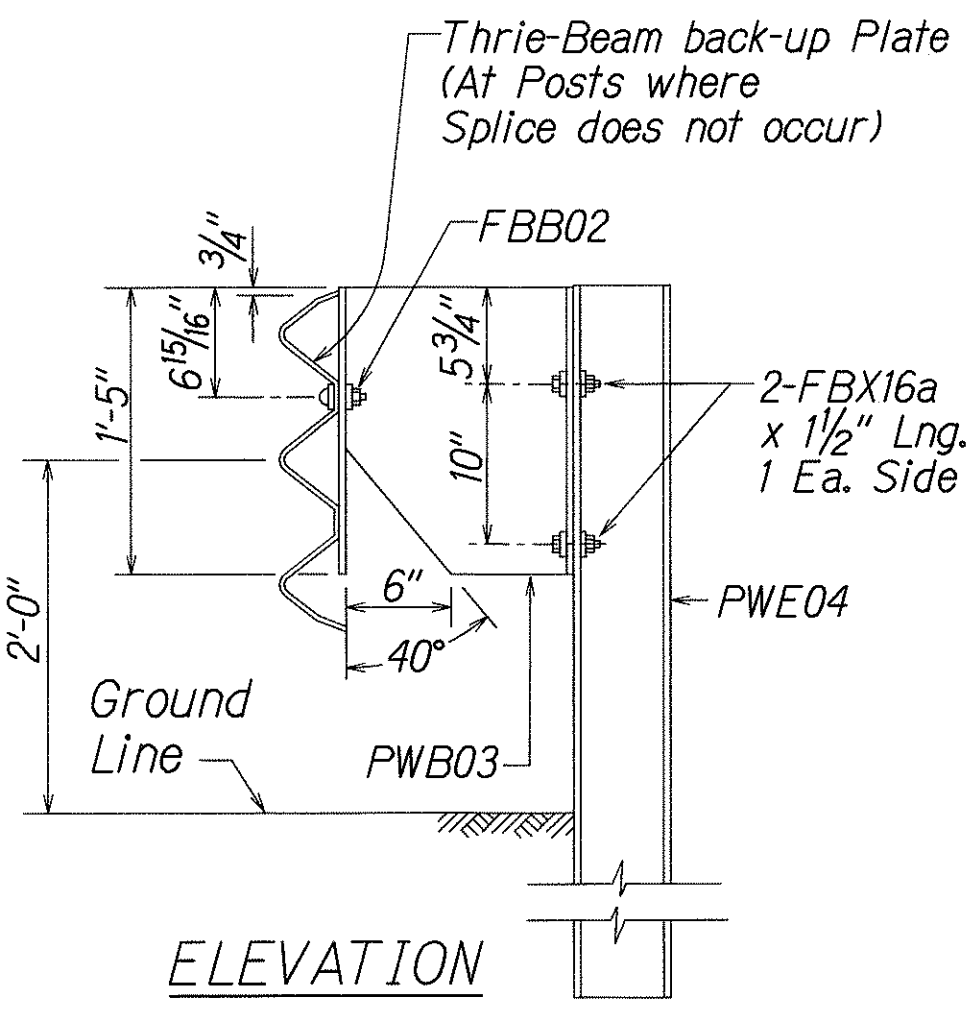
RAIL SPLICE



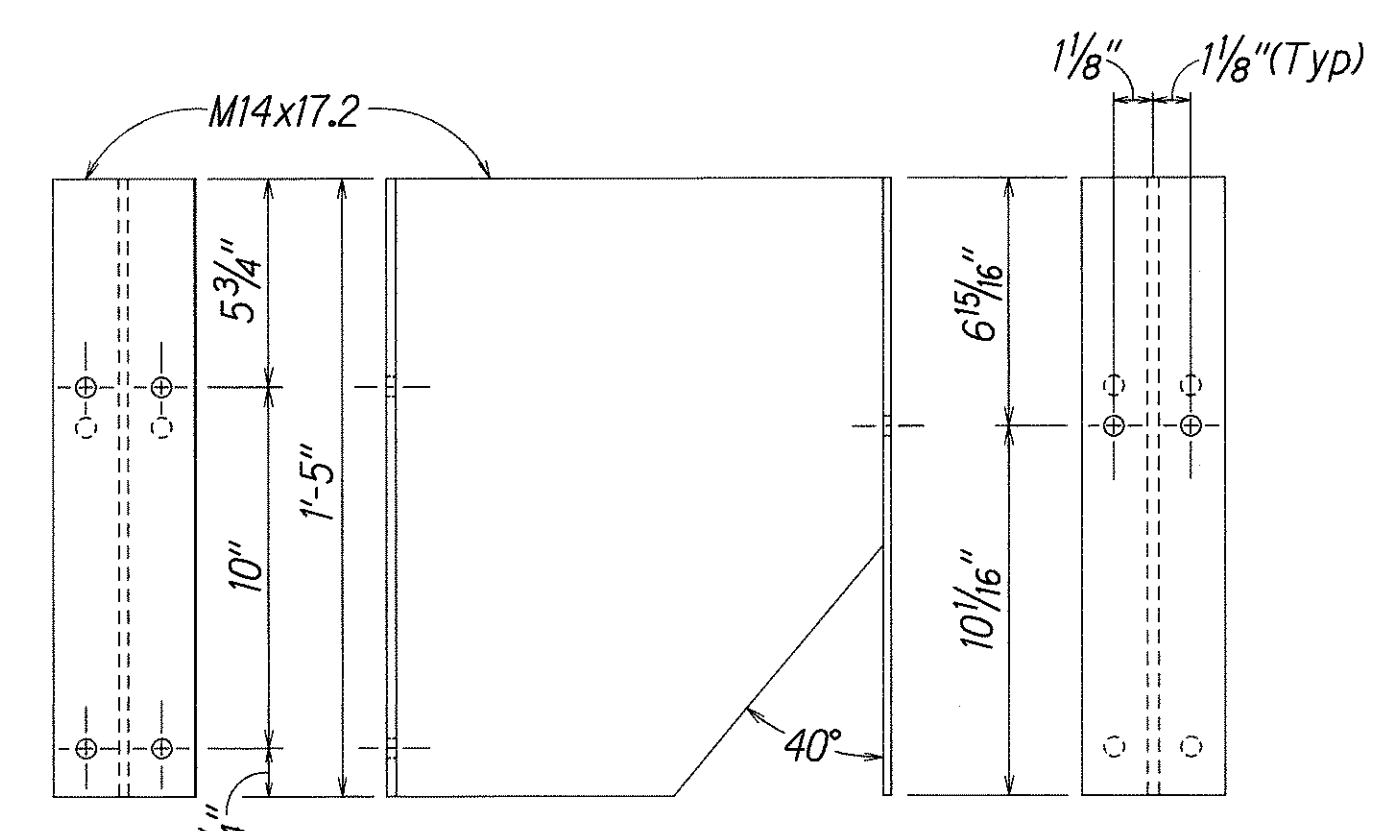
TRANSITION SECTION (RWT01b)



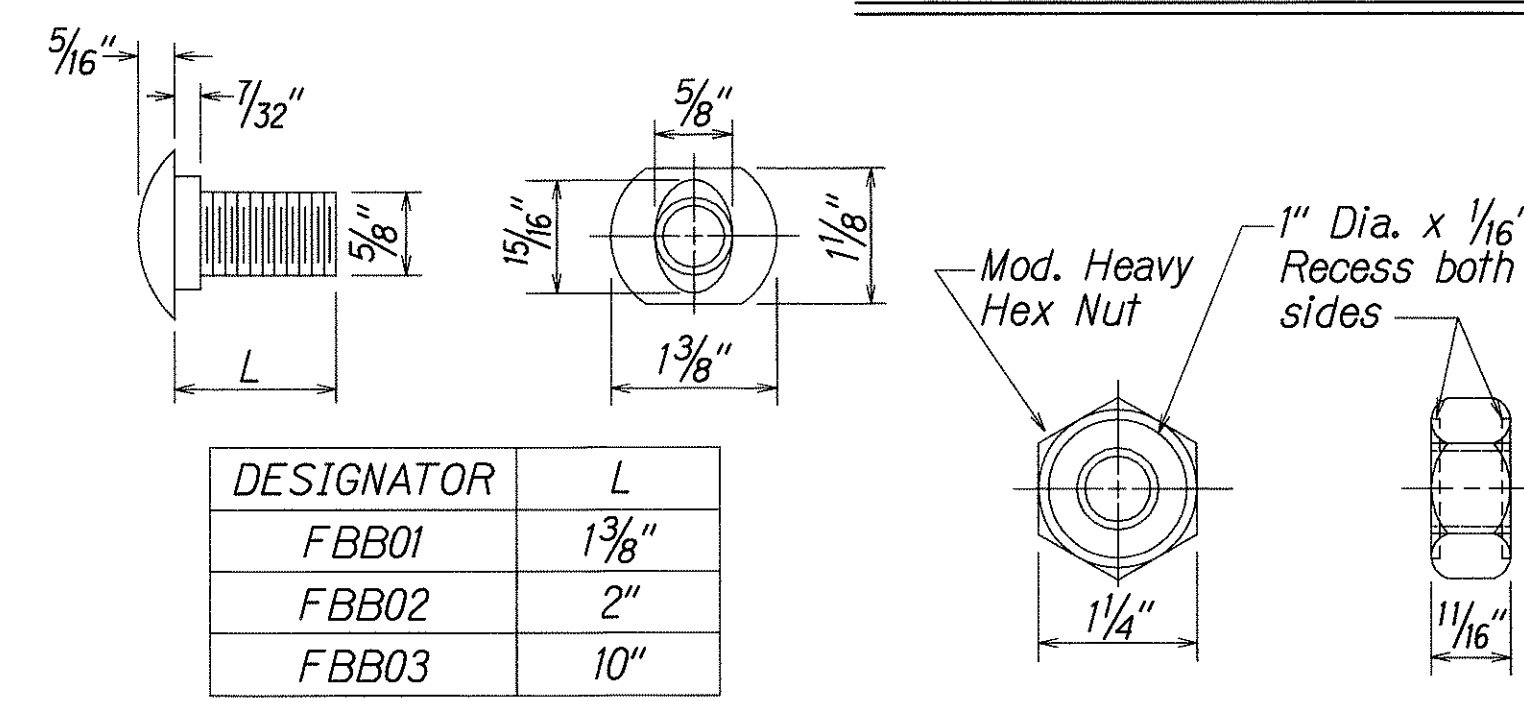
TYPICAL INSTALLATION OF
REFLECTOR MARKER (RM-5)



STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL
(SGR09b)

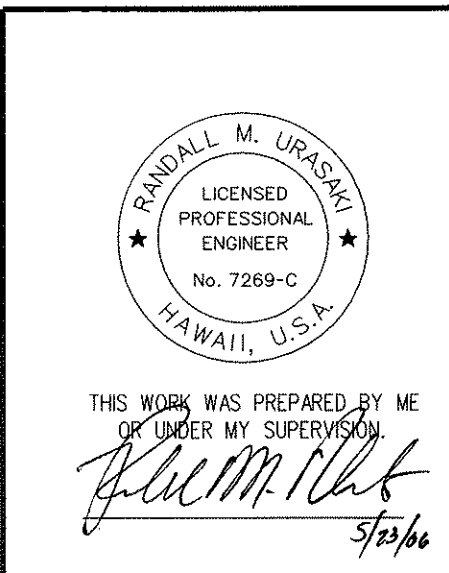


SPACER BLOCK PWB03



GUARDRAIL BOLTS AND RECESSED NUT

5/12/06	Revised Sheet
Date	Revision

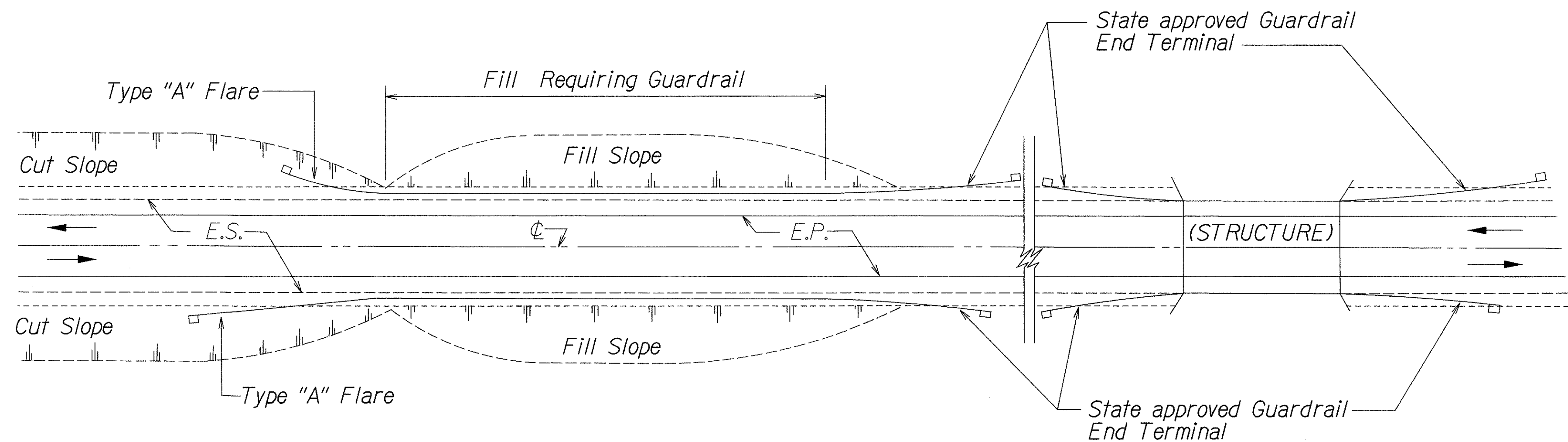


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL**
INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAIU INTERCHANGE TO KAIMAKANI STREET
Scale: NTS Date: Jan. 24, 2006

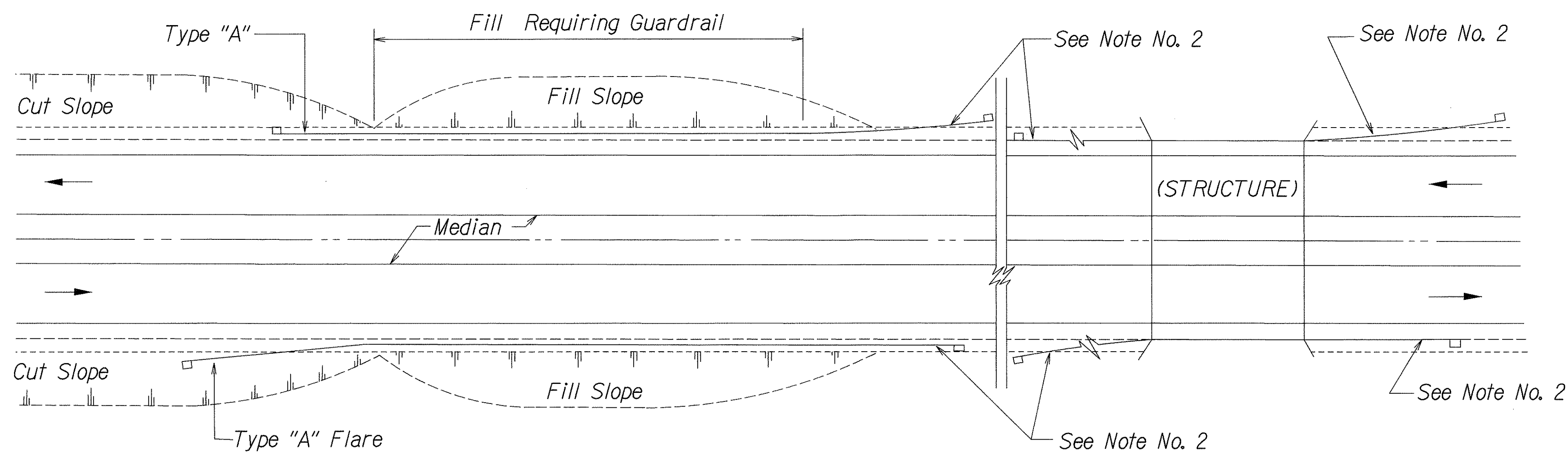
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

16/13/01 tdruby/guardrail/modthriedgn (standard plan TE-57 rll/03/89 & TE-57a rll/03/89)

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(245)	2005	46	183



PLAN
TWO WAY ROADWAY



PLAN
ONE WAY ROADWAY (DIVIDED HIGHWAY)

NOTES:

1. Metal Guardrail connection to concrete structures requires End Post Connection. See Structure Plans.
2. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
3. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.

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

13/01/99 16:00E H1 REHAB/ROAD/TE58REV.dgn (Standard Plan TE-58 RD/01/96)

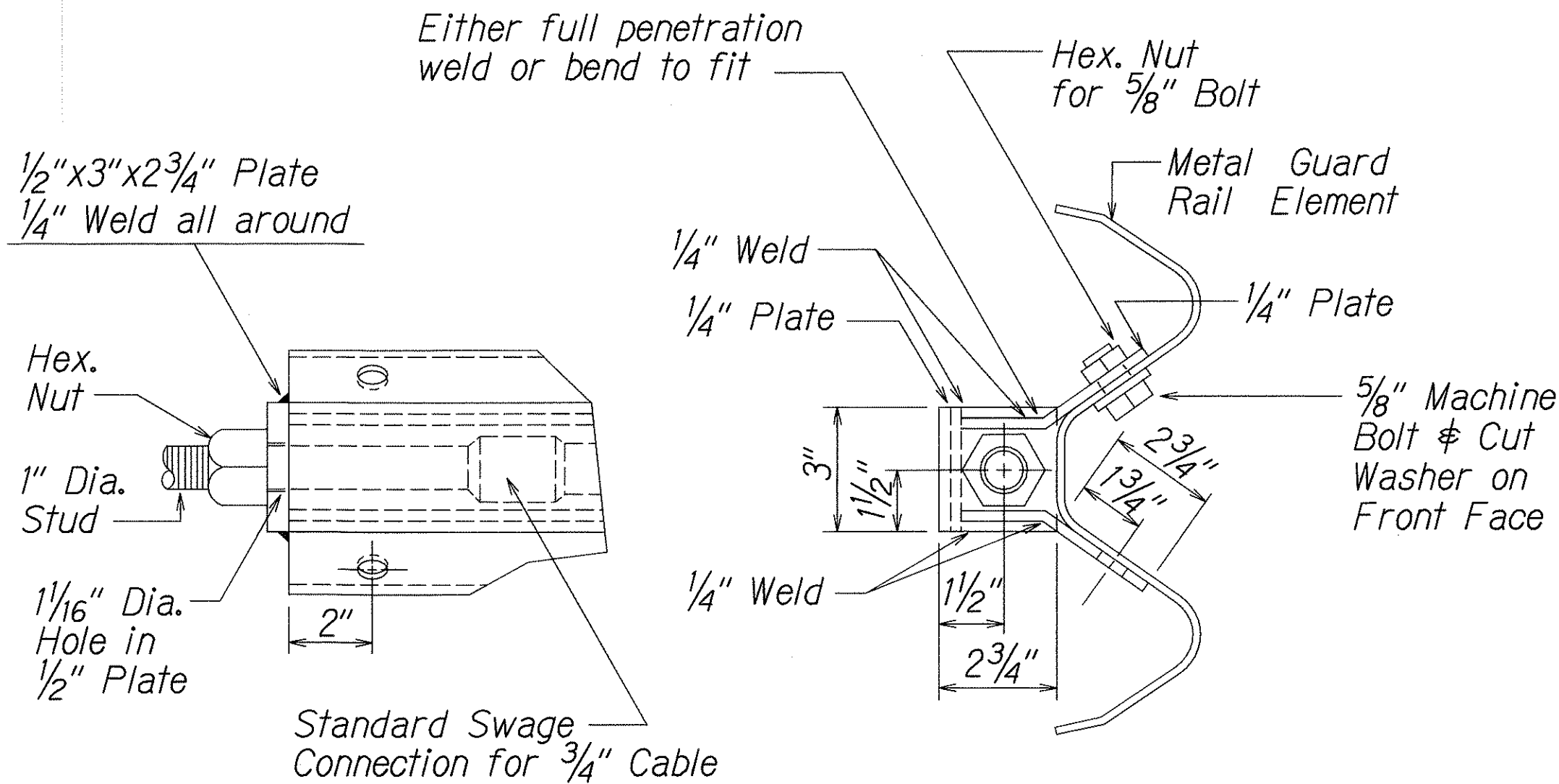
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
R. M. Urasak
1/24/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

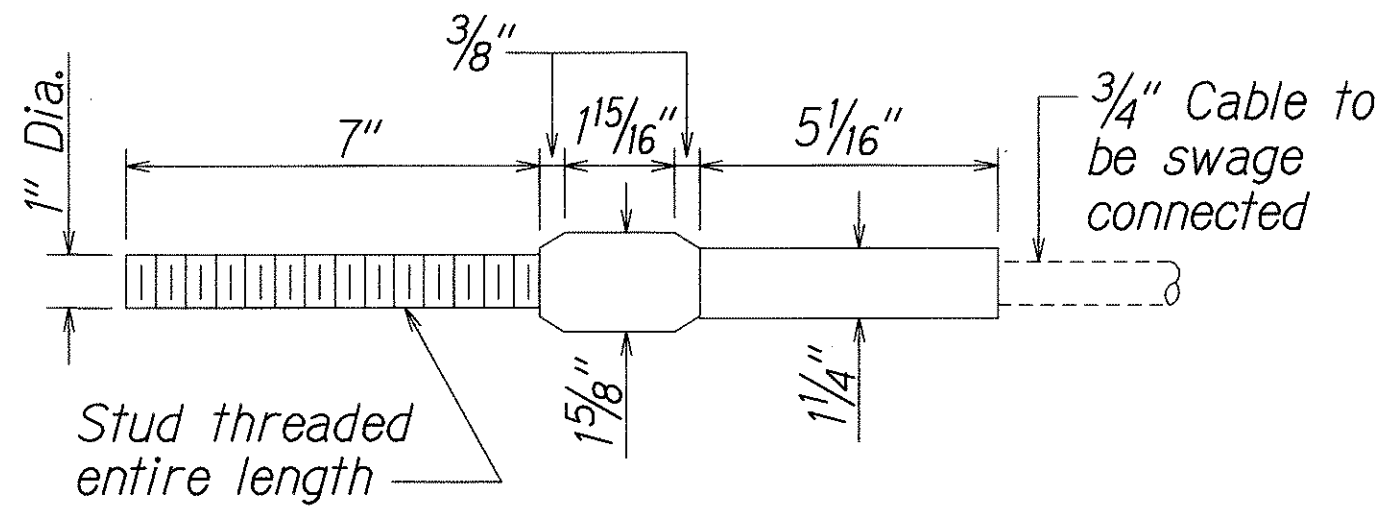
GUARDRAIL DETAILS

INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET
Scale: NTS Date: Jan. 24, 2006

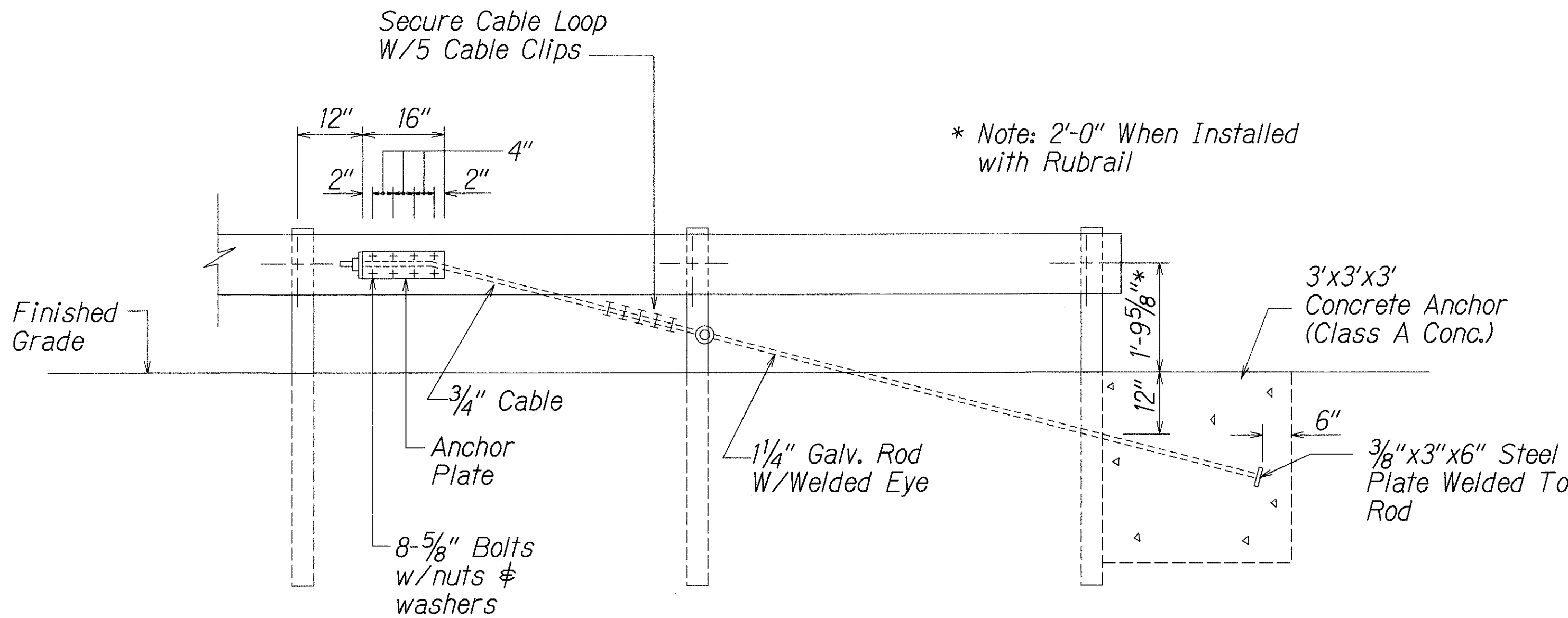
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(245)	2005	47	183



ANCHOR PLATE DETAILS

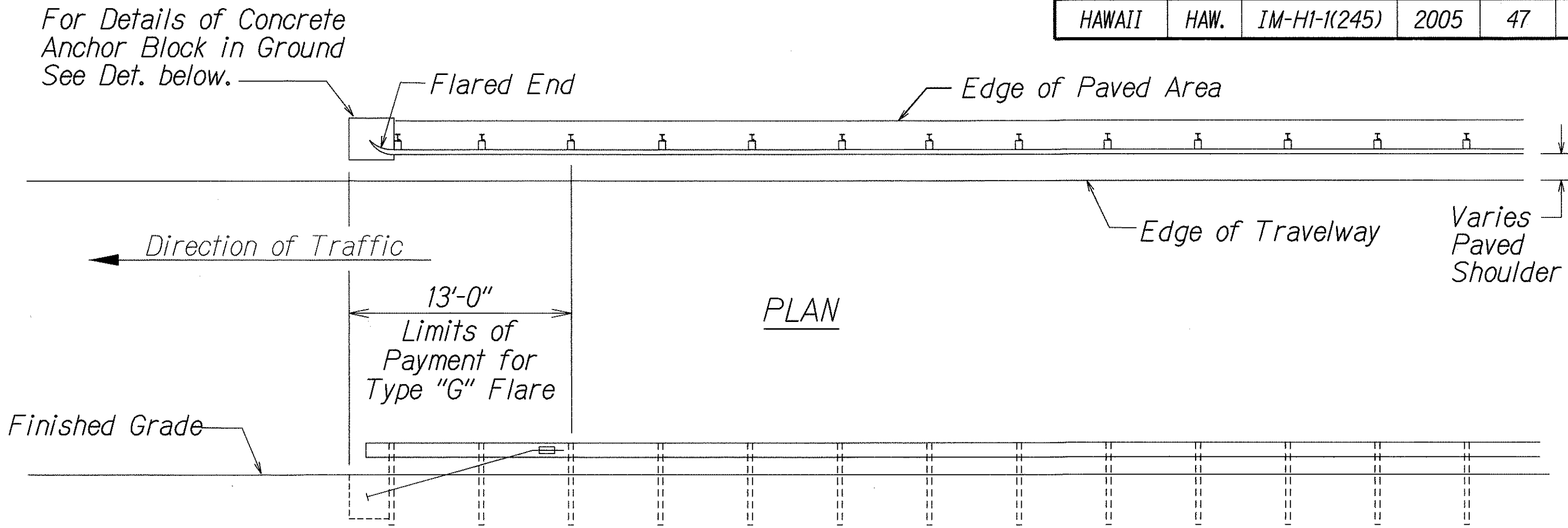


STANDARD SWAGED FITTING
AND STUD



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.



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.

DATE	BY
5/12/06	Revised Sheet
5/12/06	Revised Sheet

13/13/02 tdr:rub/guardrail/te59 r1/03/89

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5/13/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

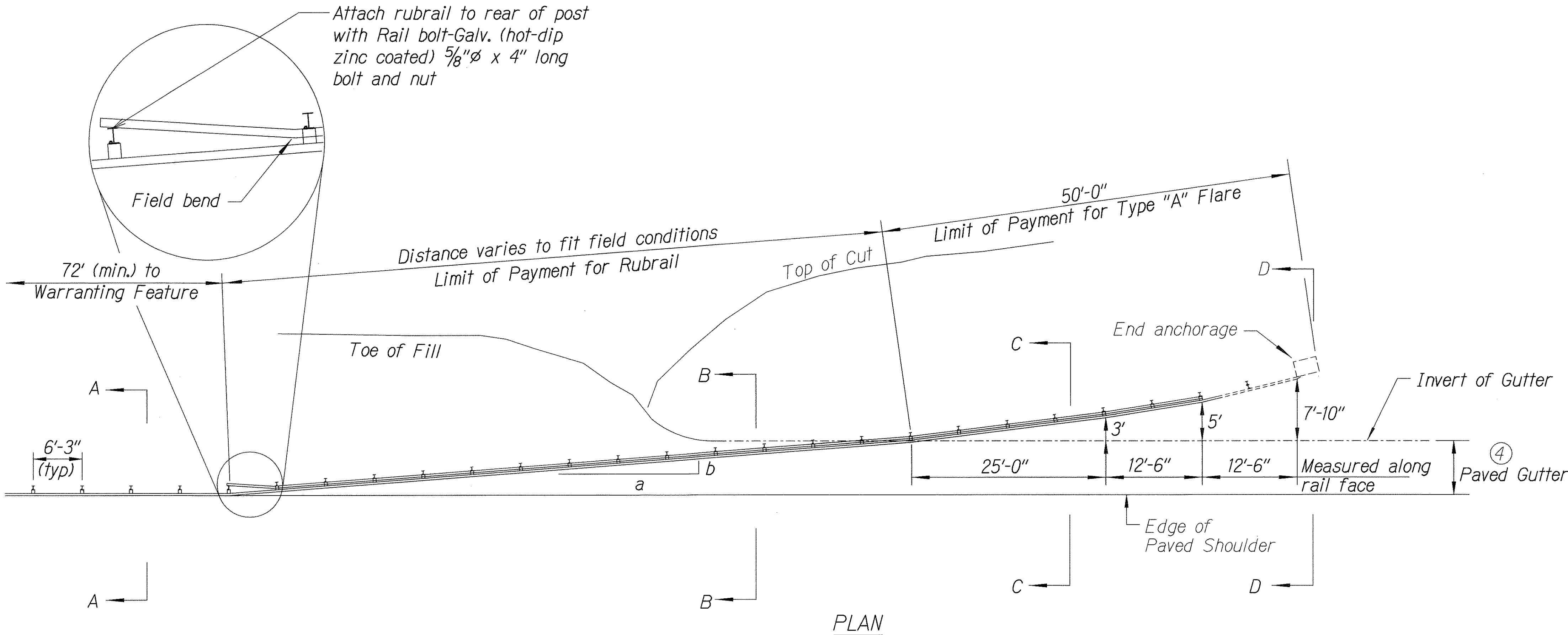
INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET

Scale: NTS Date: Jan. 24, 2006

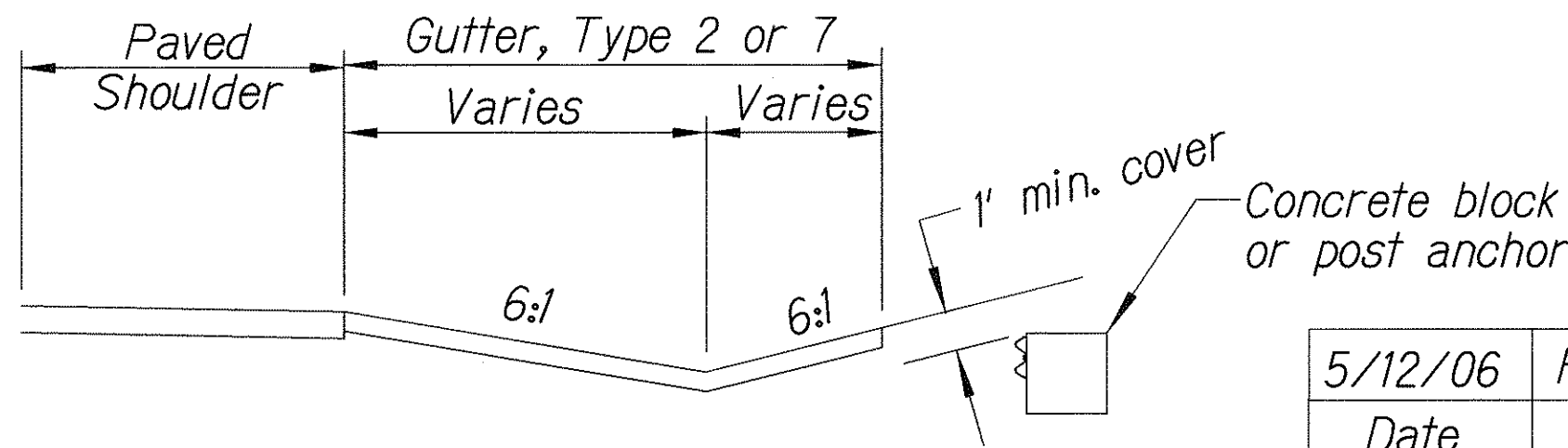
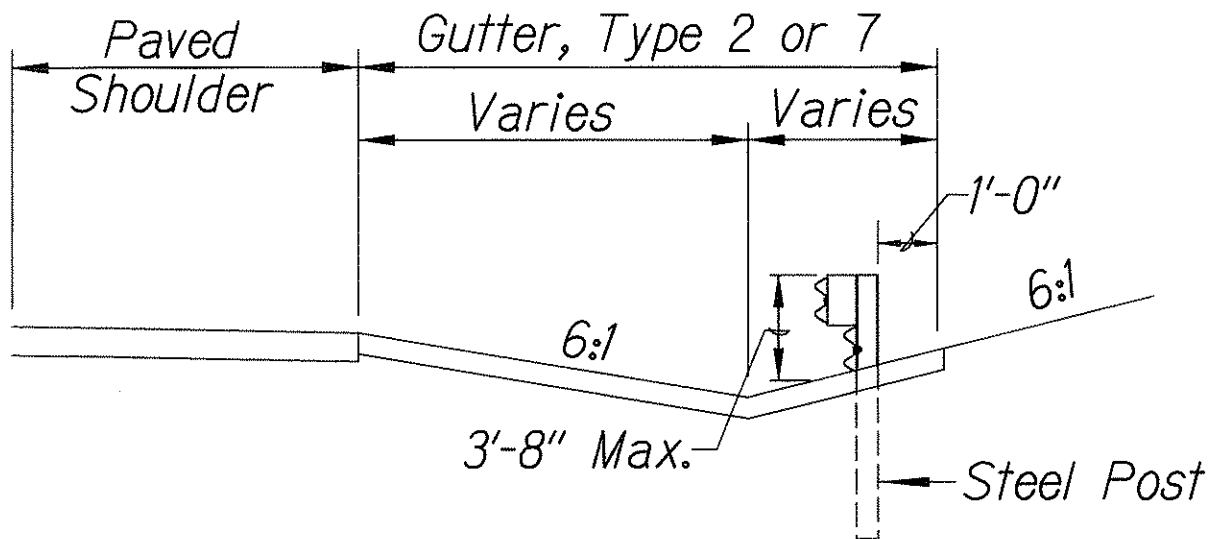
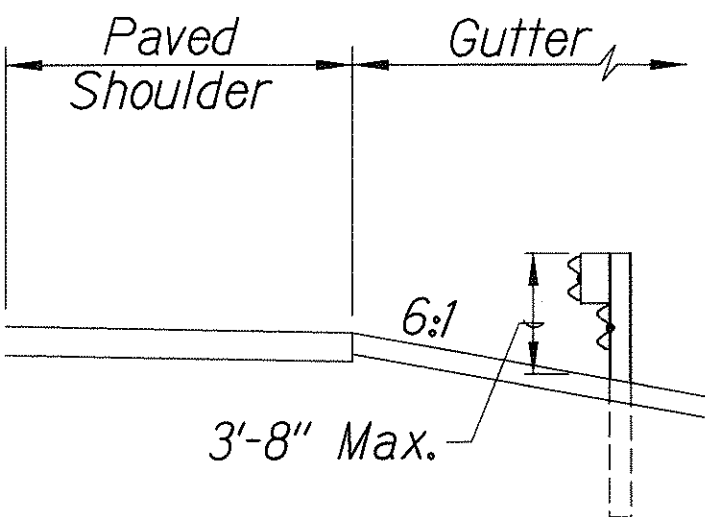
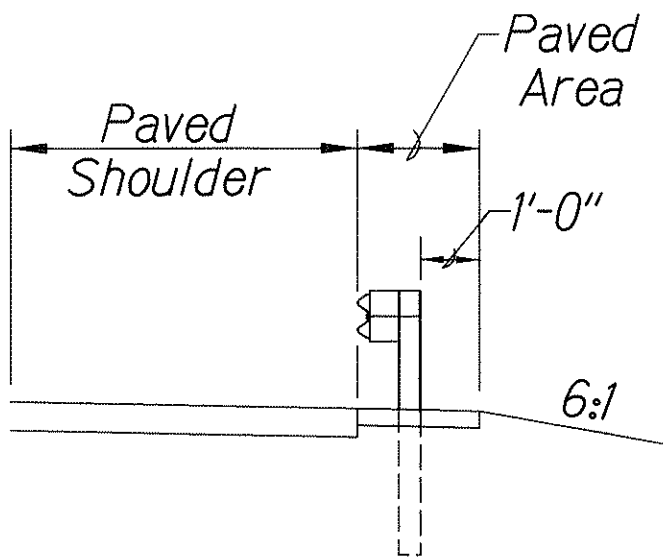
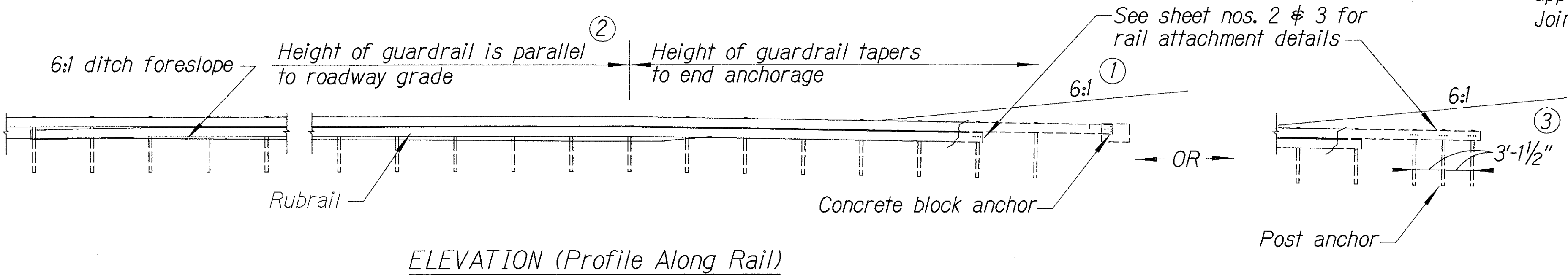
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	1M-H1-1(245)	2005	48	183

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.



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



5/12/06	Revised Sheet
Date	Revision

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Randall M. Urasaki

5/27/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

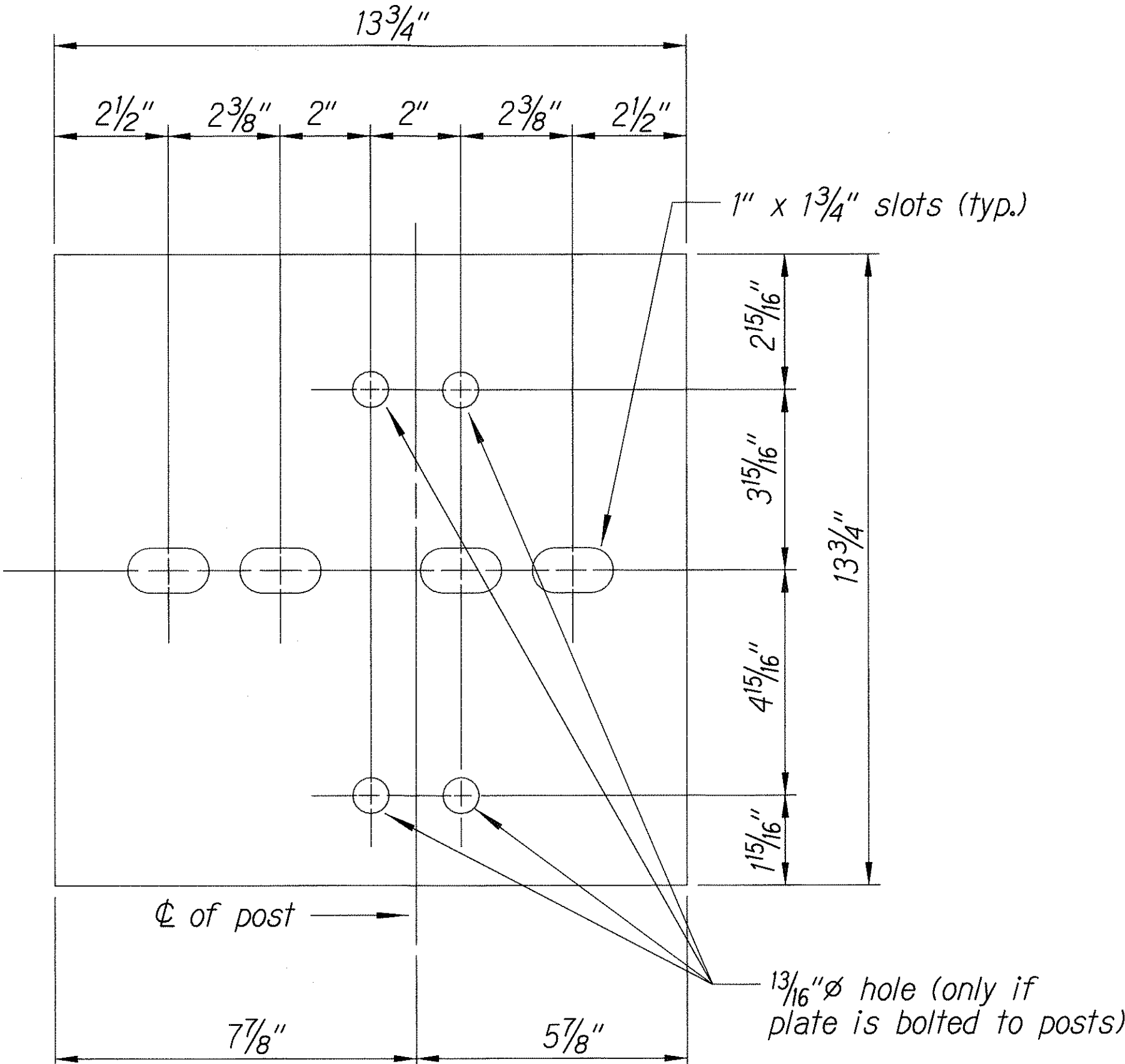
INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET

Scale: NTS Date: Jan. 24, 2006

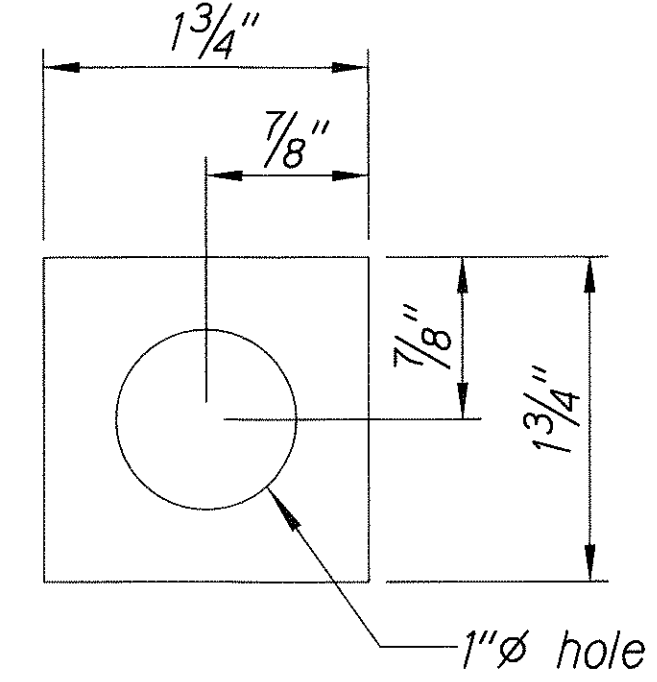
DESIGNED BY	DATE
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	

18/2/01 141 rubby/guardrail/44/tyred/14141gn. (standard plan TE-58 07/01/06, TE-59 rt/02/09 & TE-60 07/01/06)

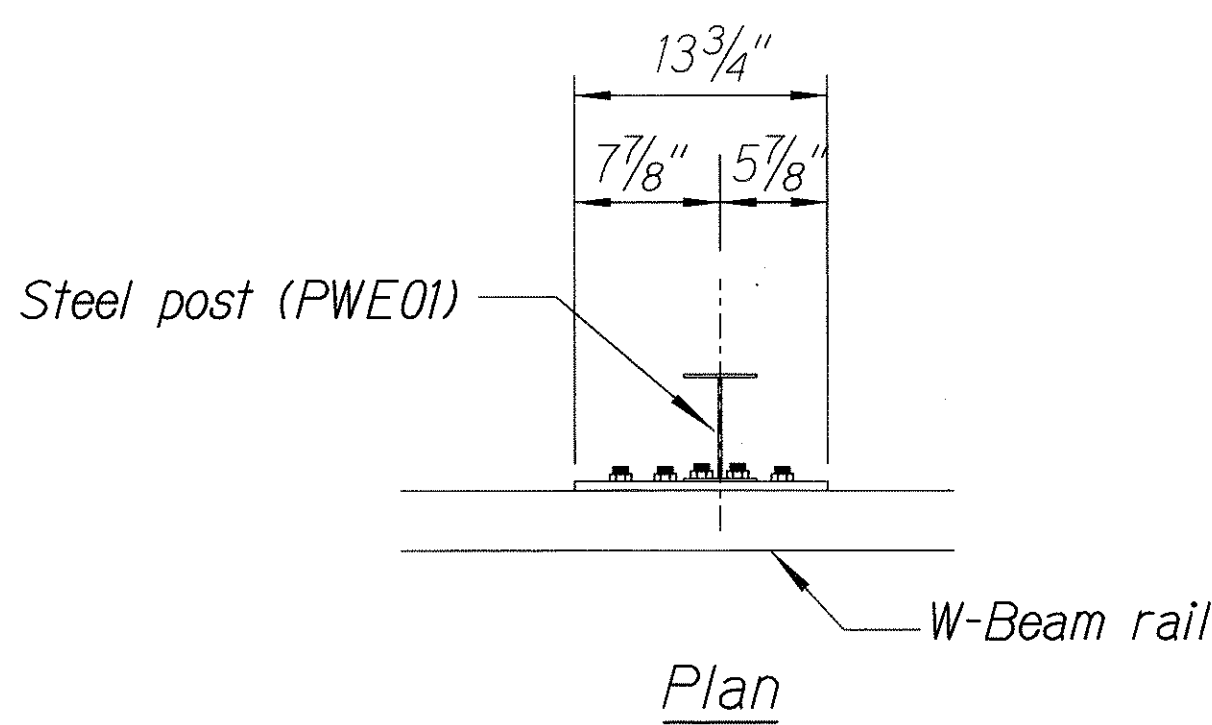
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(245)	2005	49	183



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

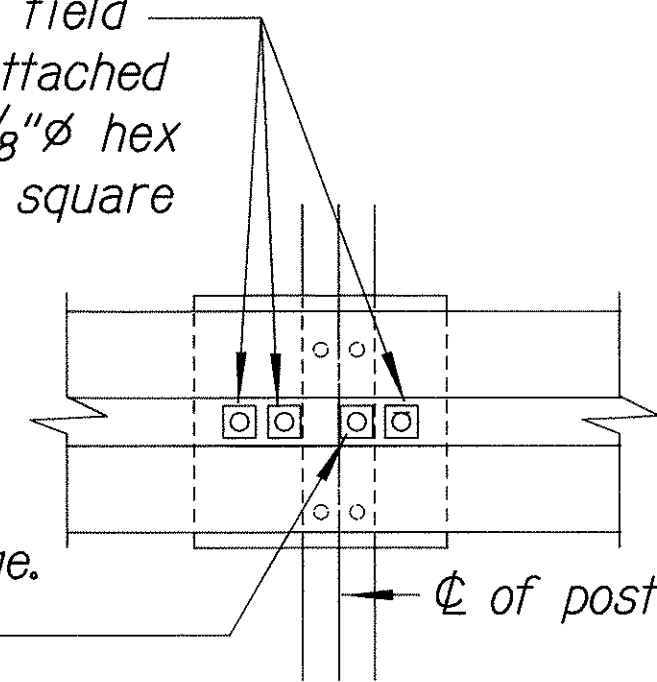


Square Washer
(3/16" Thick - Hot-dip
Zinc Coated Galvanized)

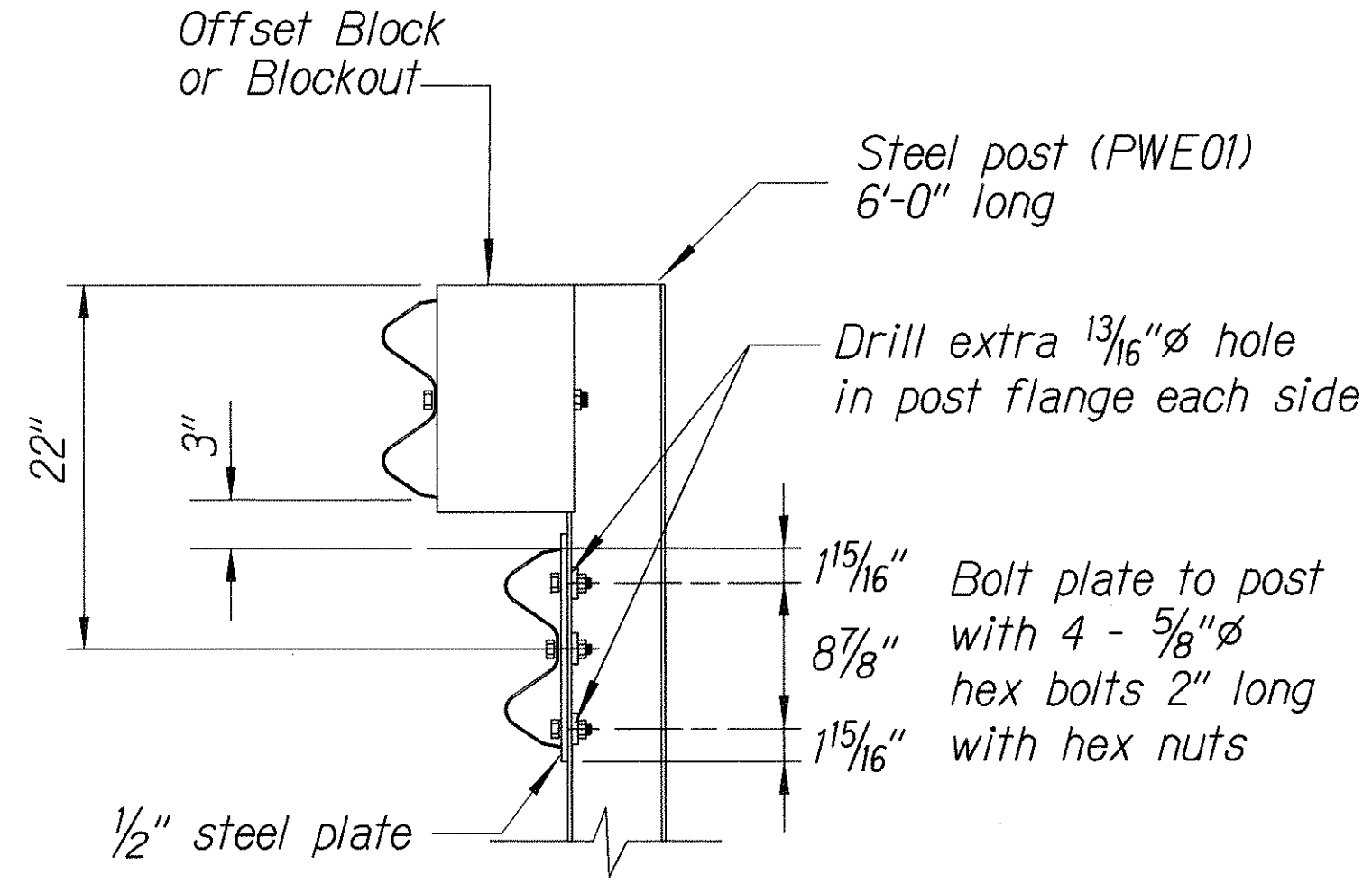


3 - 7/8" holes to be field drilled in rail and attached to steel plate with 7/8" hex bolts 1 5/16" long with square washer

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



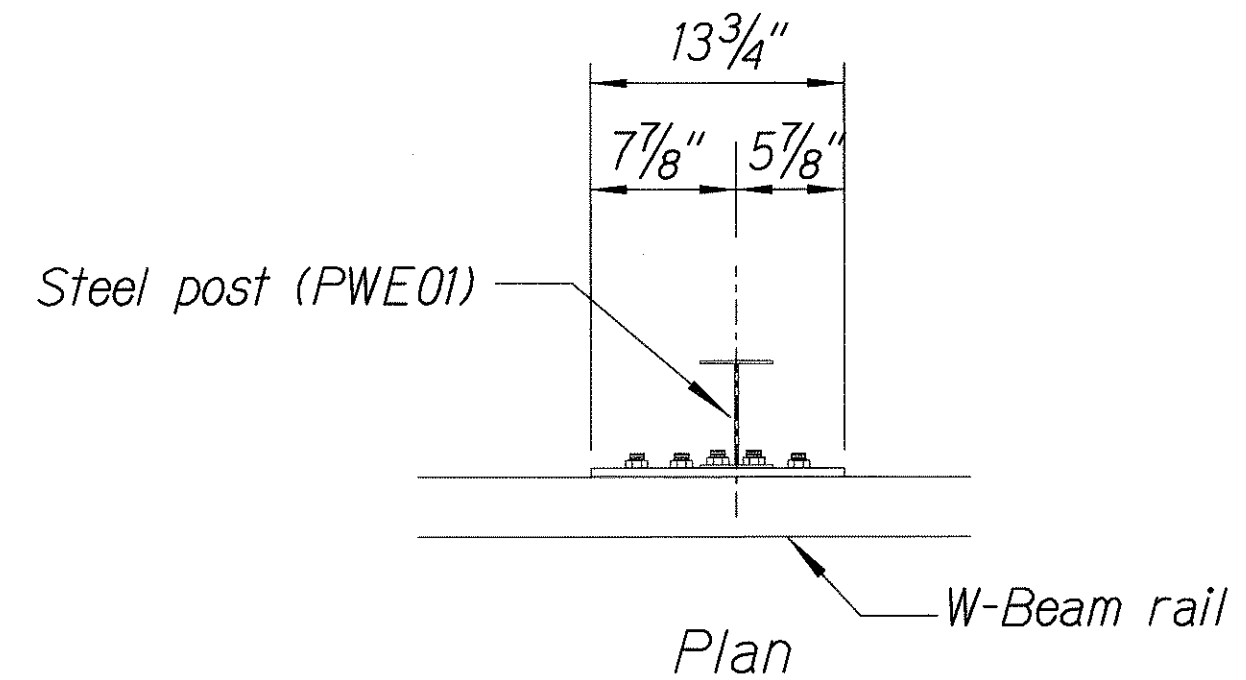
Front View



Elevation

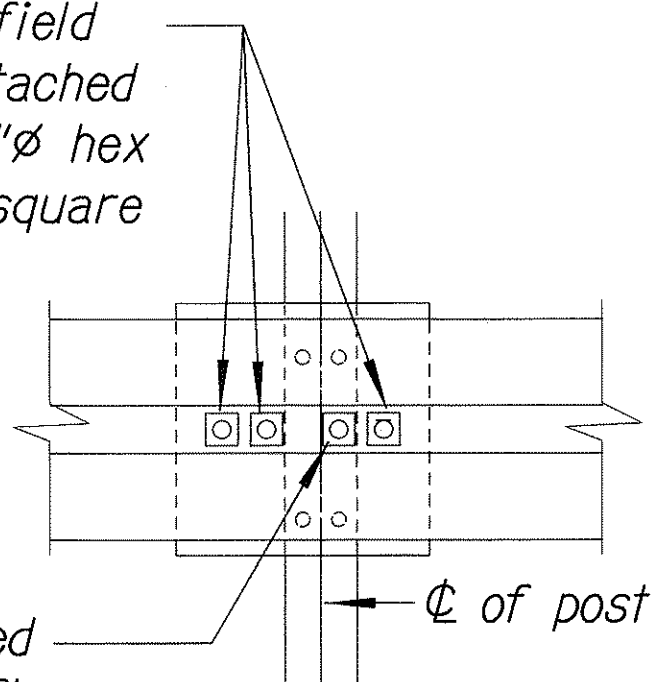
RUBRAIL ANCHOR DETAILS

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.

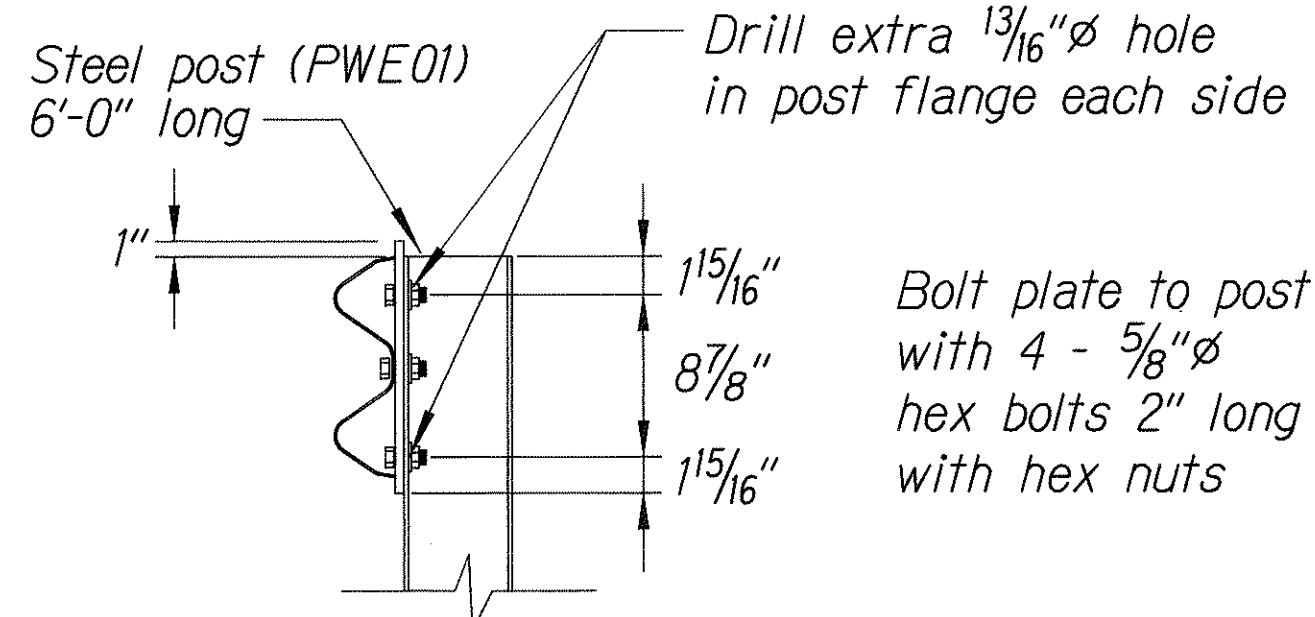


3 - 7/8" holes to be field drilled in rail and attached to steel plate with 7/8" hex bolts 1 5/16" long with square washer

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



Front View



Elevation

POST ANCHOR DETAILS

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

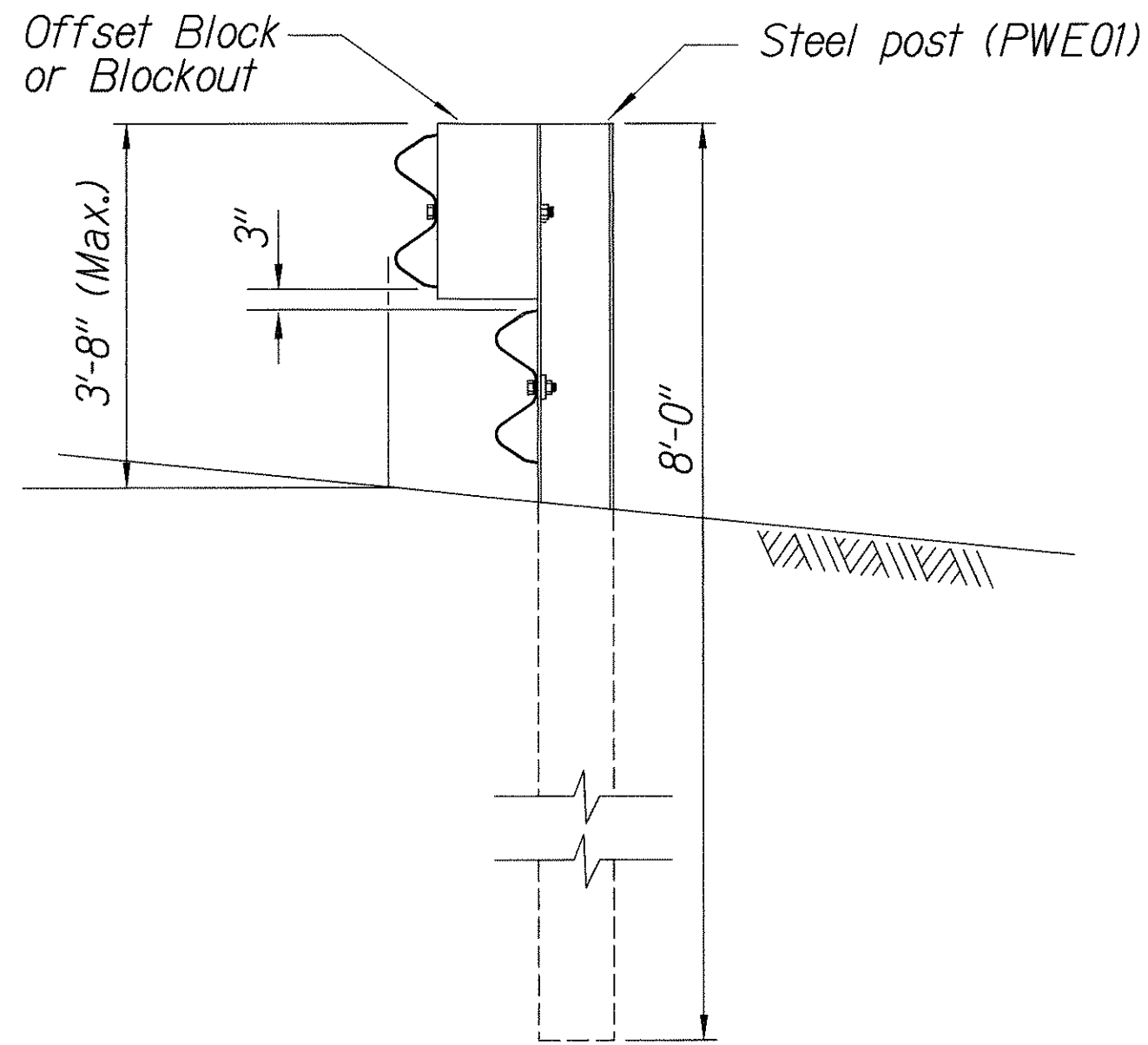
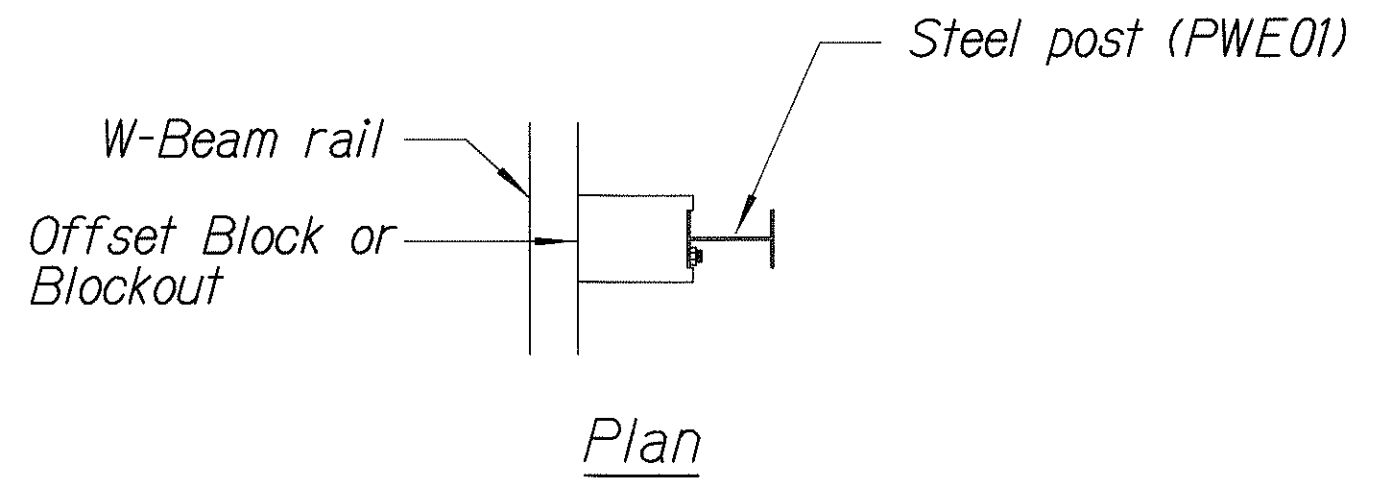
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
R. M. Urasak
1/24/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

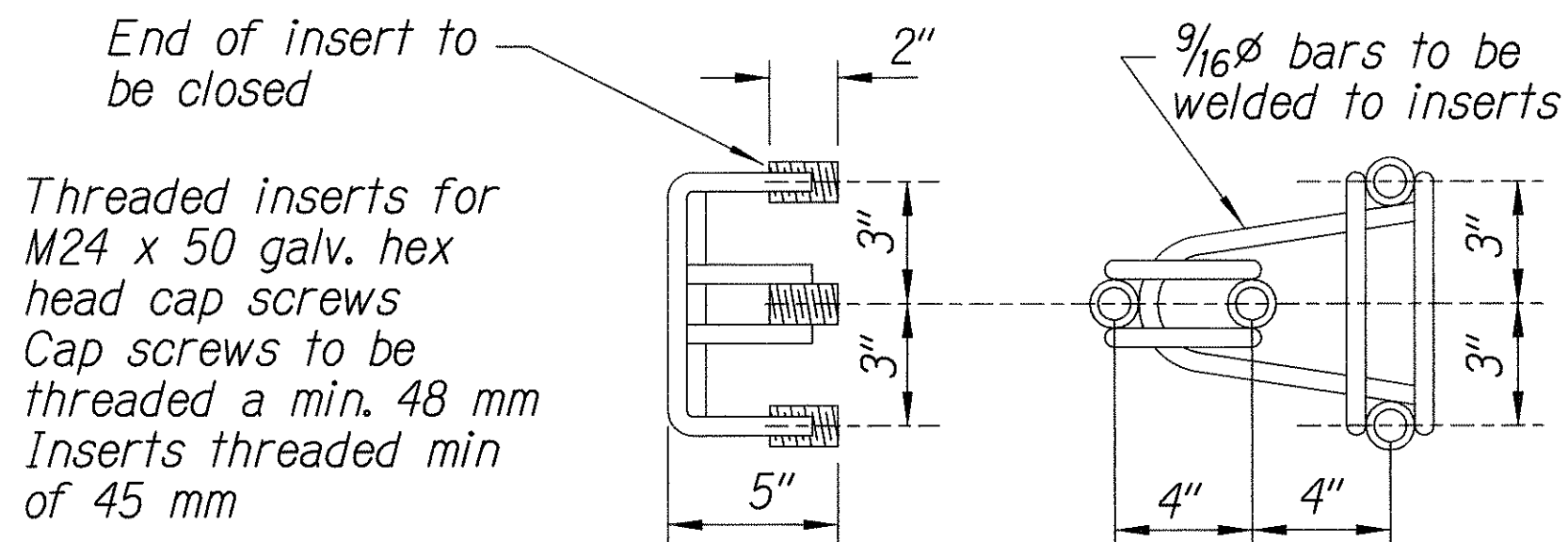
TYPE "A" FLARE

INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET
Scale: NTS Date: Jan. 24, 2006

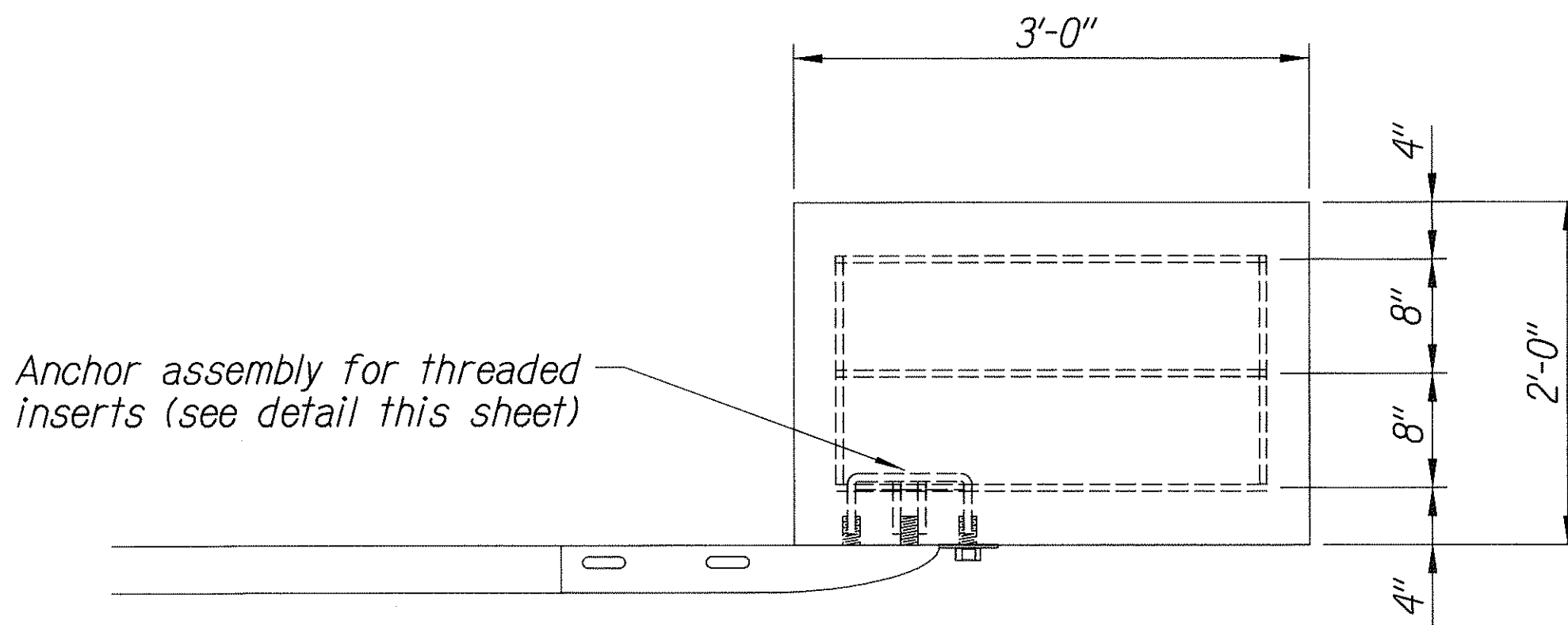
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-K(245)	2005	50	183



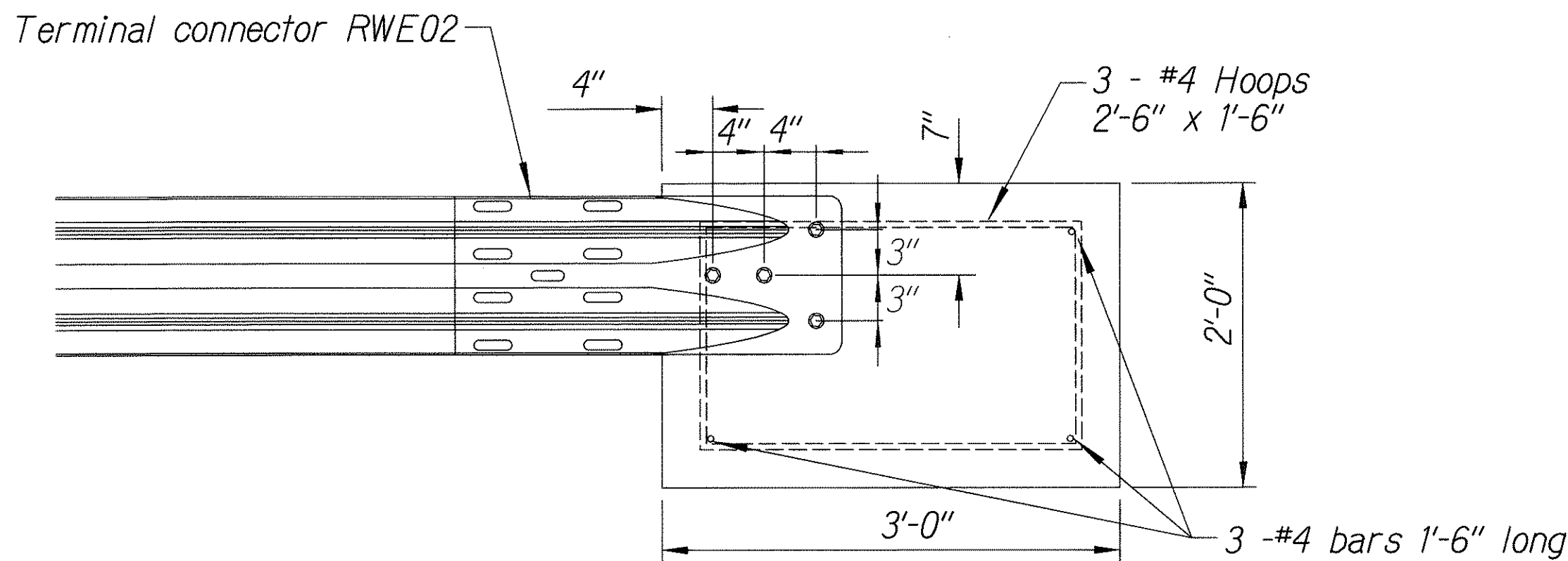
STEEL POST GUARDRAIL
WITH RUBRAIL



ANCHOR ASSEMBLY
CONCRETE BLOCK ANCHOR



Plan



Elevation

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.

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	X
DESIGNED BY	TRACED BY	X
QUANTITIES BY	DESIGNED BY	X
CHECKED BY	QUANTITIES BY	X
	CHECKED BY	X

13/01/99 JCCOE HI REHAB/ROAD/C40ET1000 (standard plan TE-58 07/01/96, TE-59 RIV/03/99, TE-60 07/01/96)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Randall M. Urashima

1/24/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

INTERSTATE ROUTE H-1 REHABILITATION
EASTBOUND LANES
WAI'AU INTERCHANGE TO KAIMAKANI STREET

Scale: NTS Date: Jan. 24, 2006