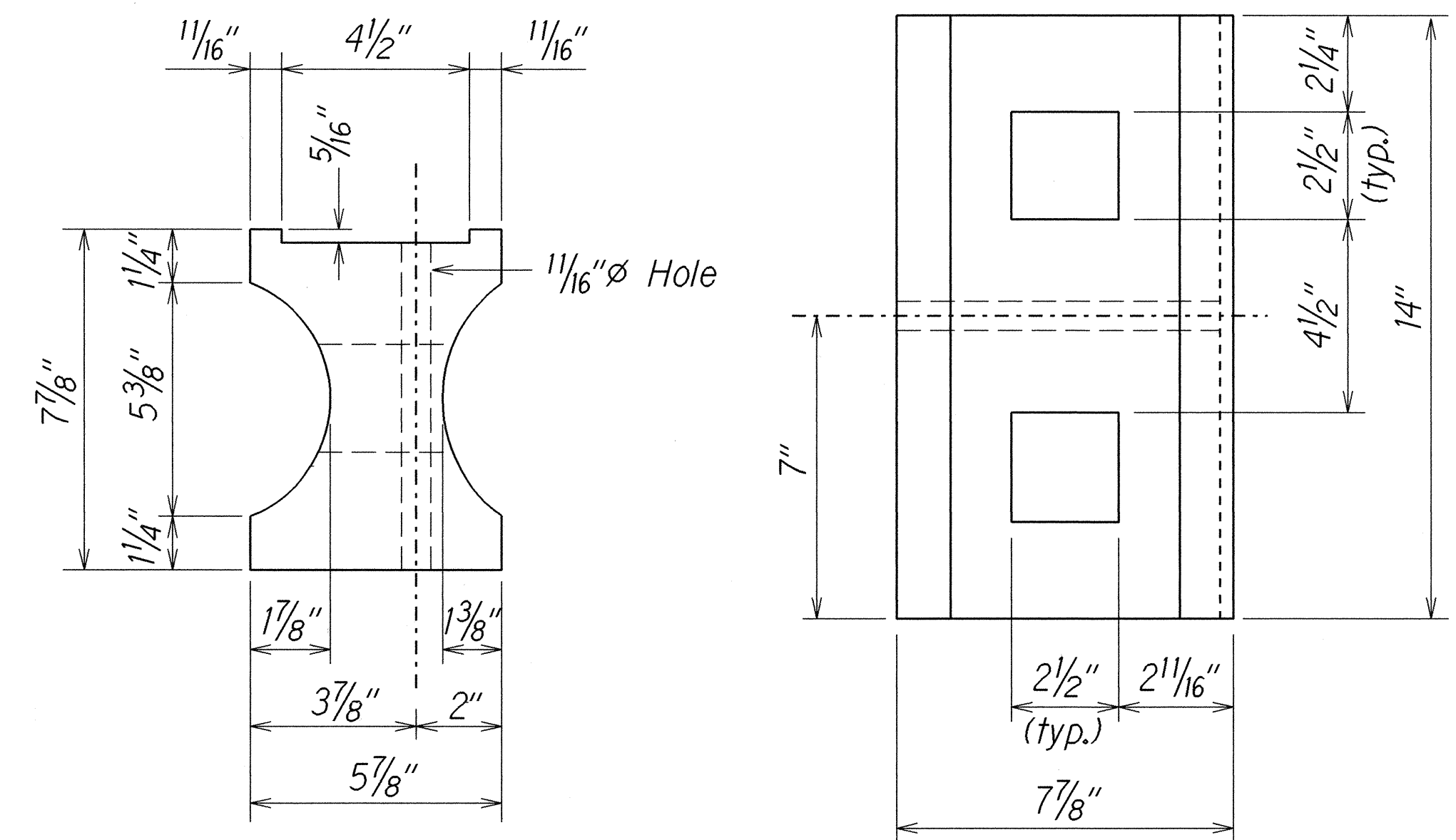
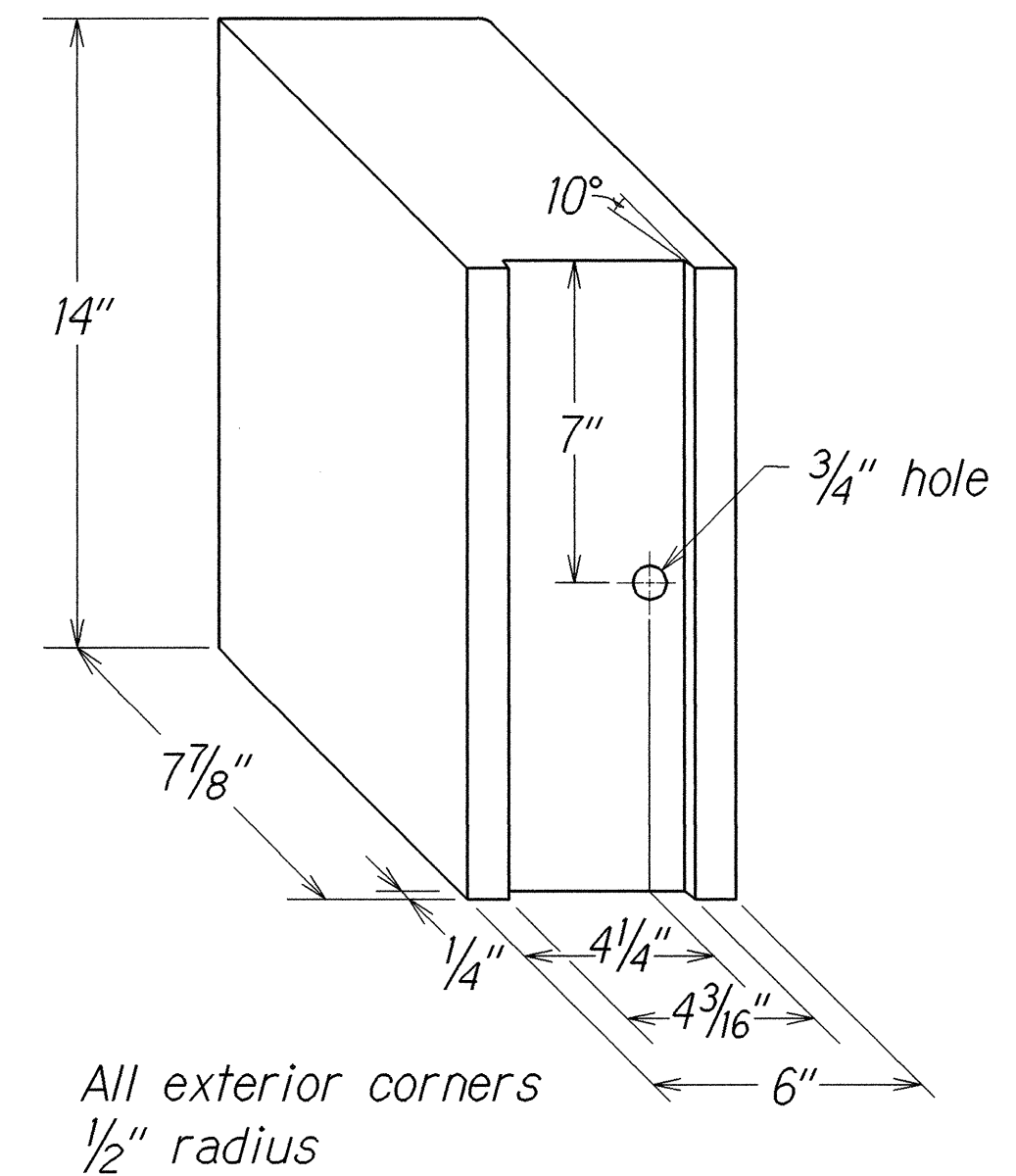


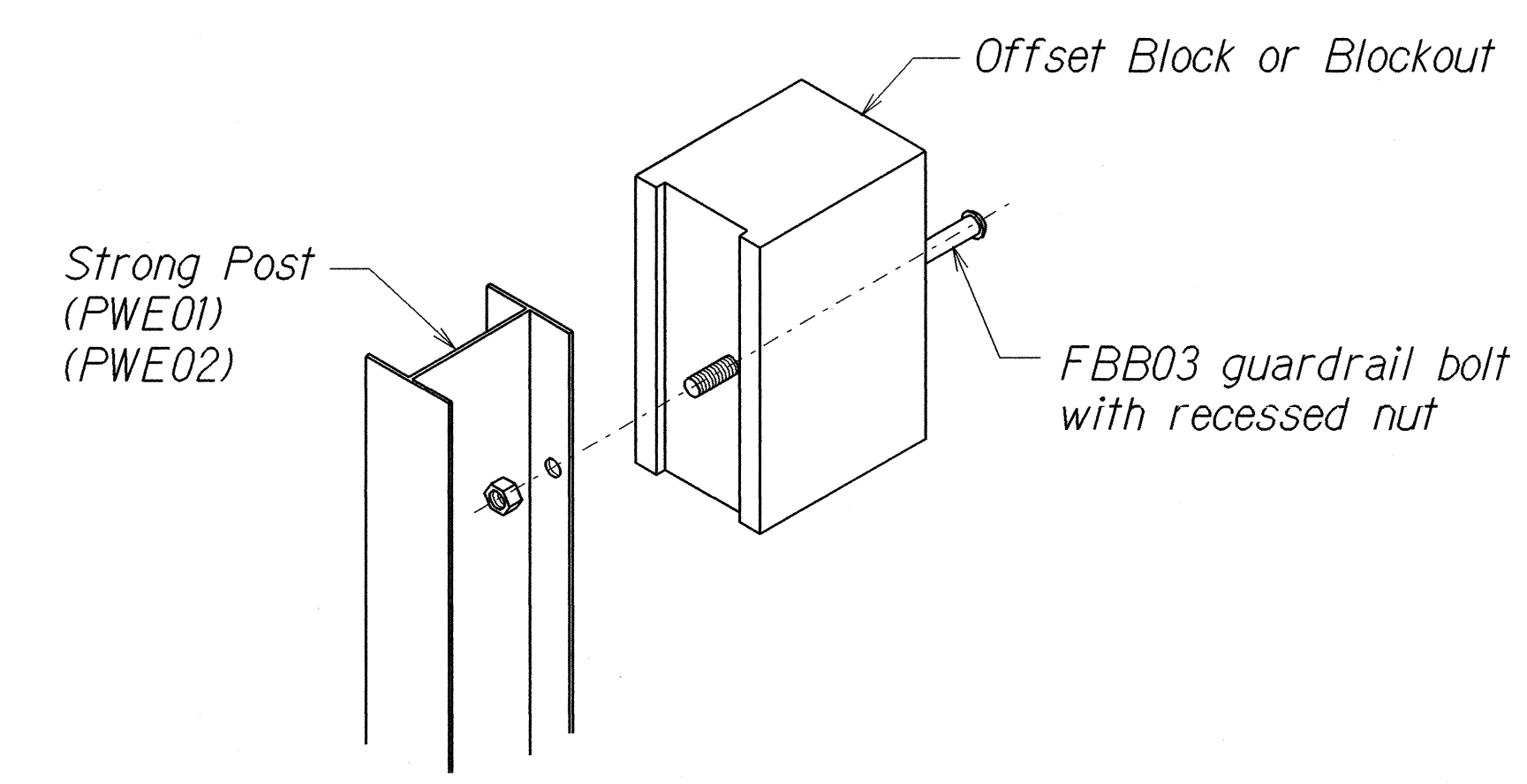
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	7	42



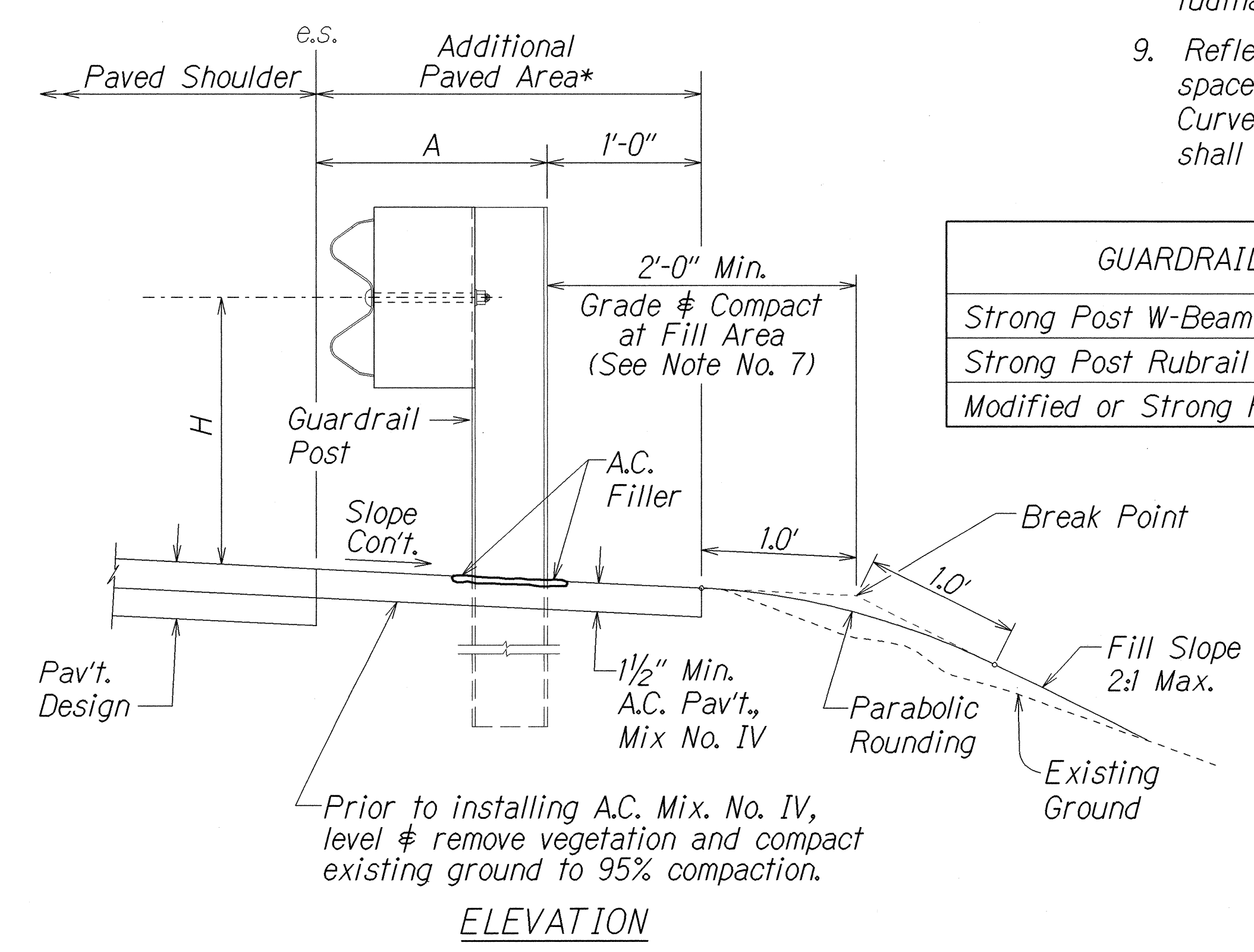
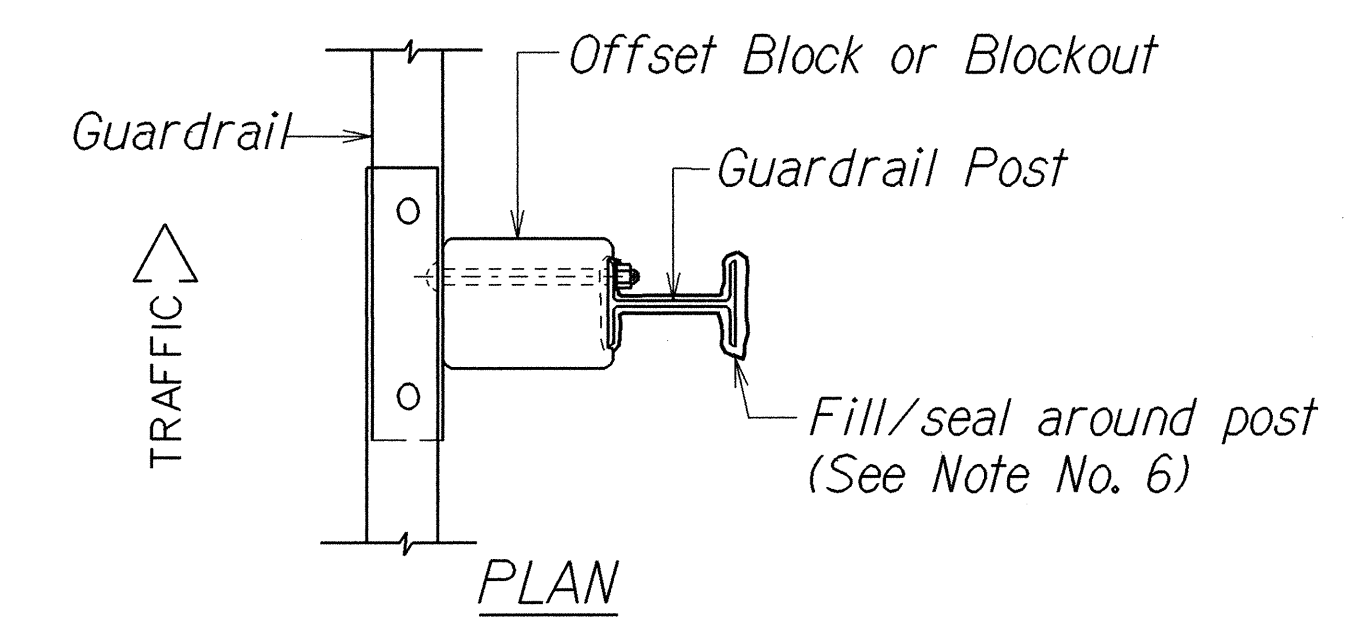
TOP
SIDE
RECYCLED PLASTIC BLOCKOUT (TYPE I)



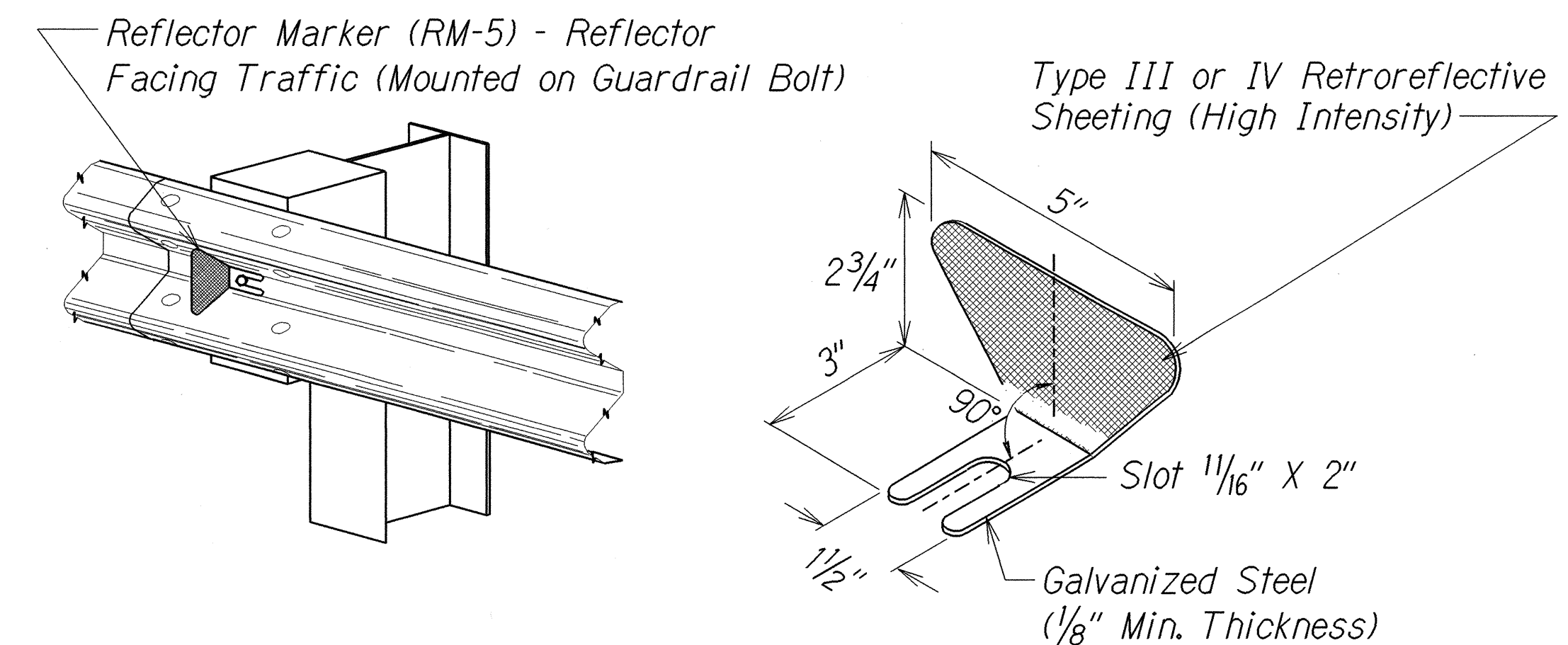
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)



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



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"



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

TYPICAL GUARDRAIL INSTALLATION

- 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. All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
 6. 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.
 7. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
 8. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
 9. Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. Spacing of RM-5's on Horizontal Curves shall comply with Table III-1 of the MUTCD. RM-5's shall not be installed on Terminal Sections.

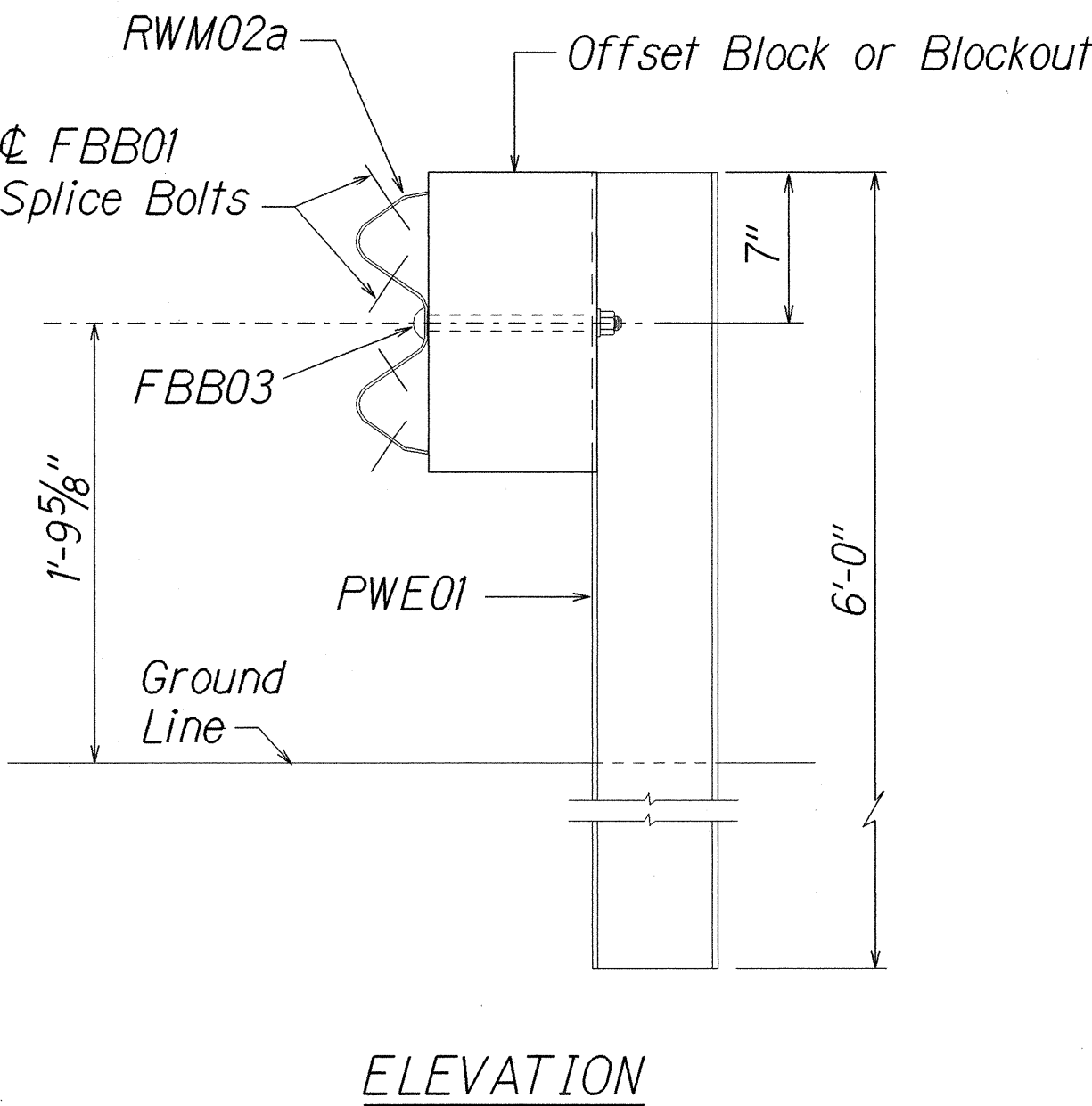
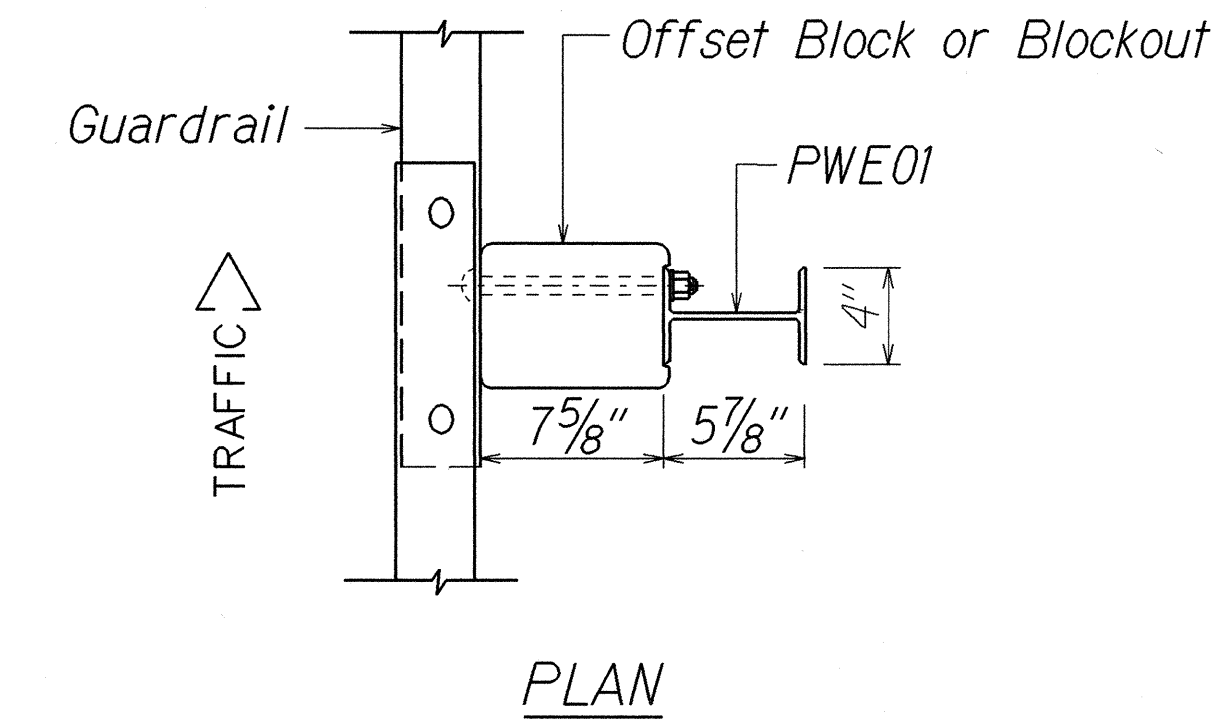
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES
HONOAPIILANI HIGHWAY RESURFACING
Honokahua to Honokohau
Project No. 30A-01-03M
Scale: NTS Date: December, 2002
SHEET No. 1 OF 9 SHEETS

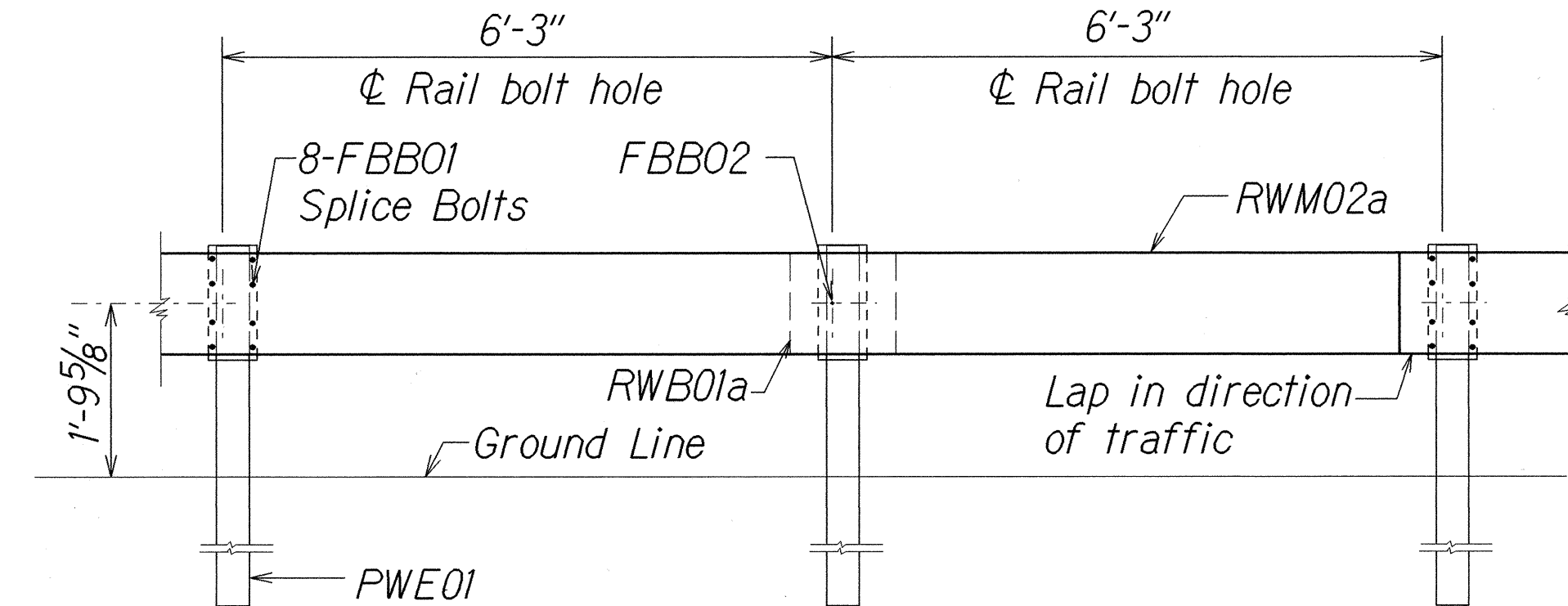
SURVEY PROVIDED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	

Standard Plan TE-50-109.01.000

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	8	42

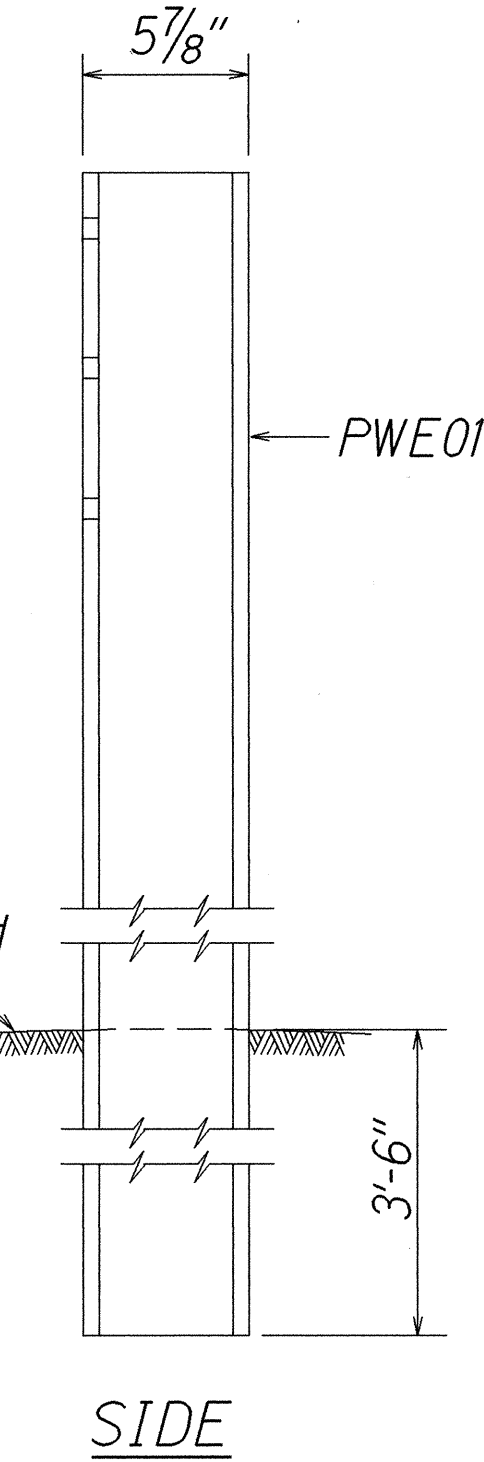


STRONG POST W-BEAM GUARDRAIL
(SGR04a)

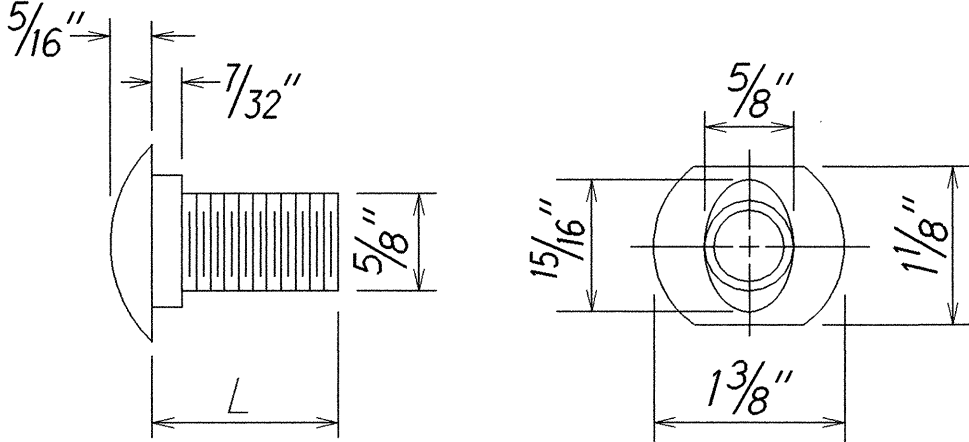
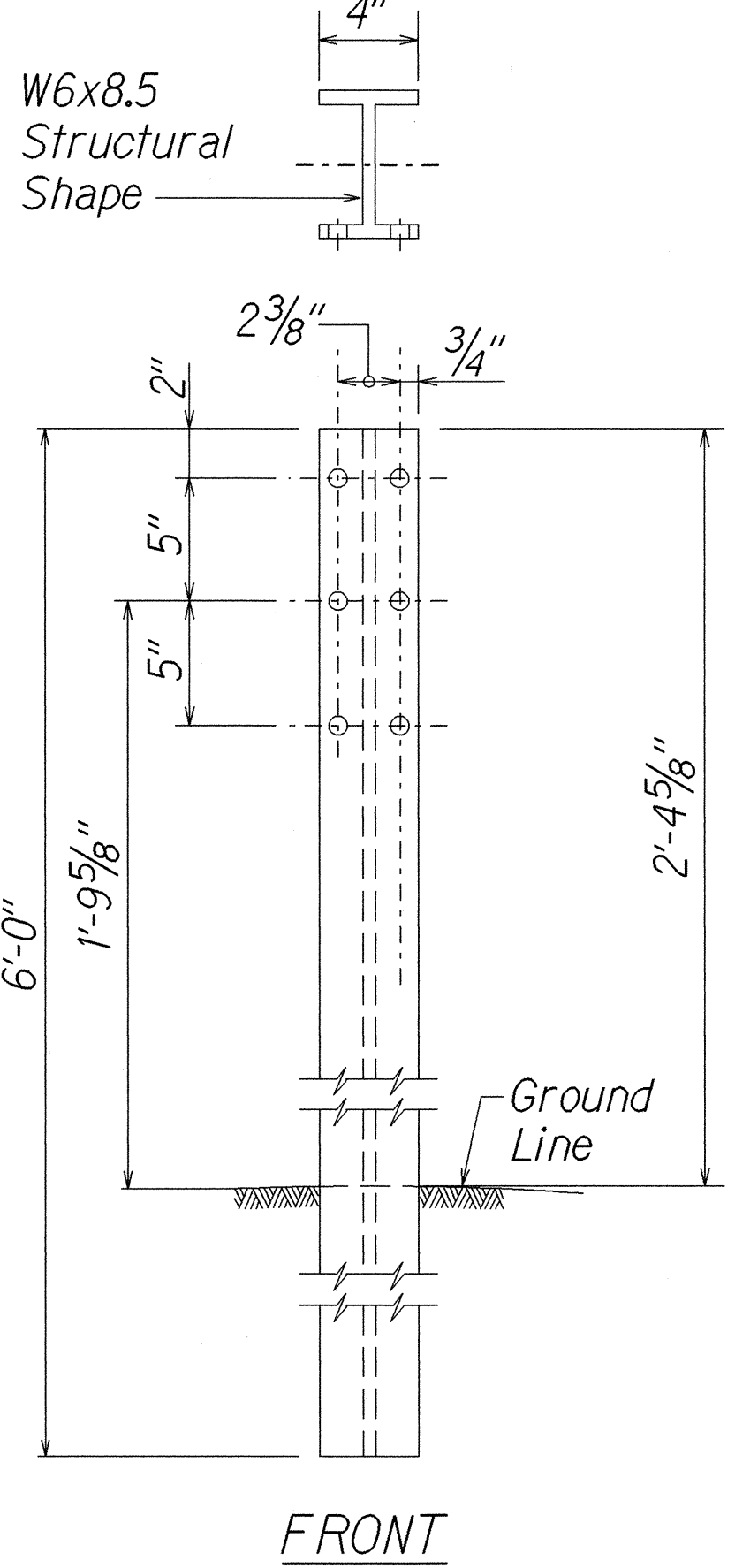


STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

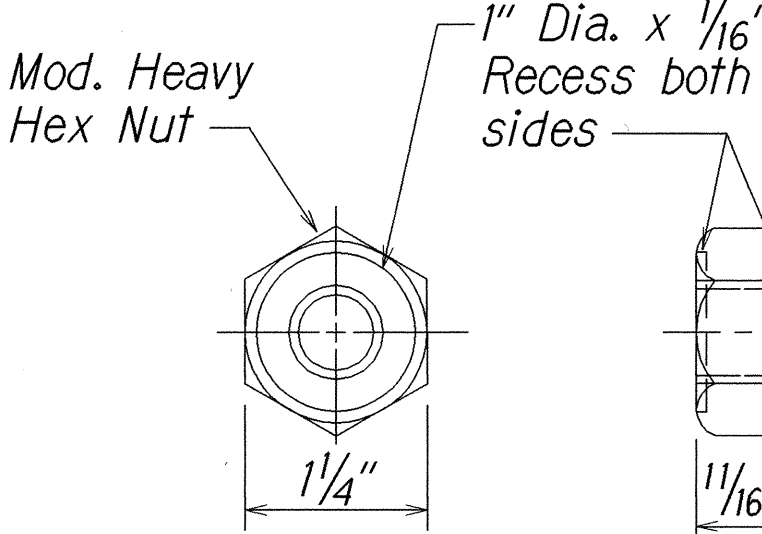
NOTE:
All Holes are
3/4" Dia.



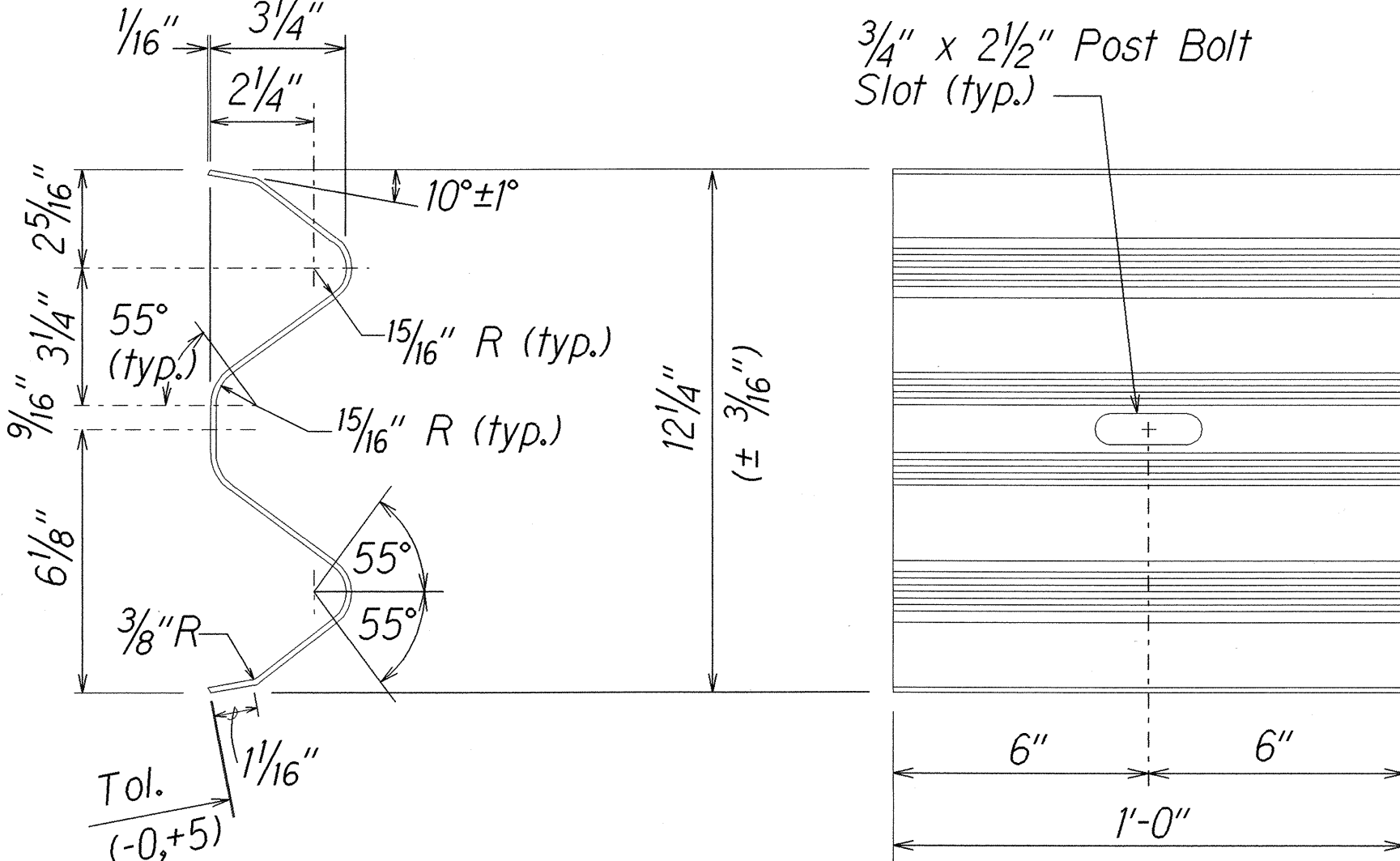
W-BEAM STRONG POST (PWE01)



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

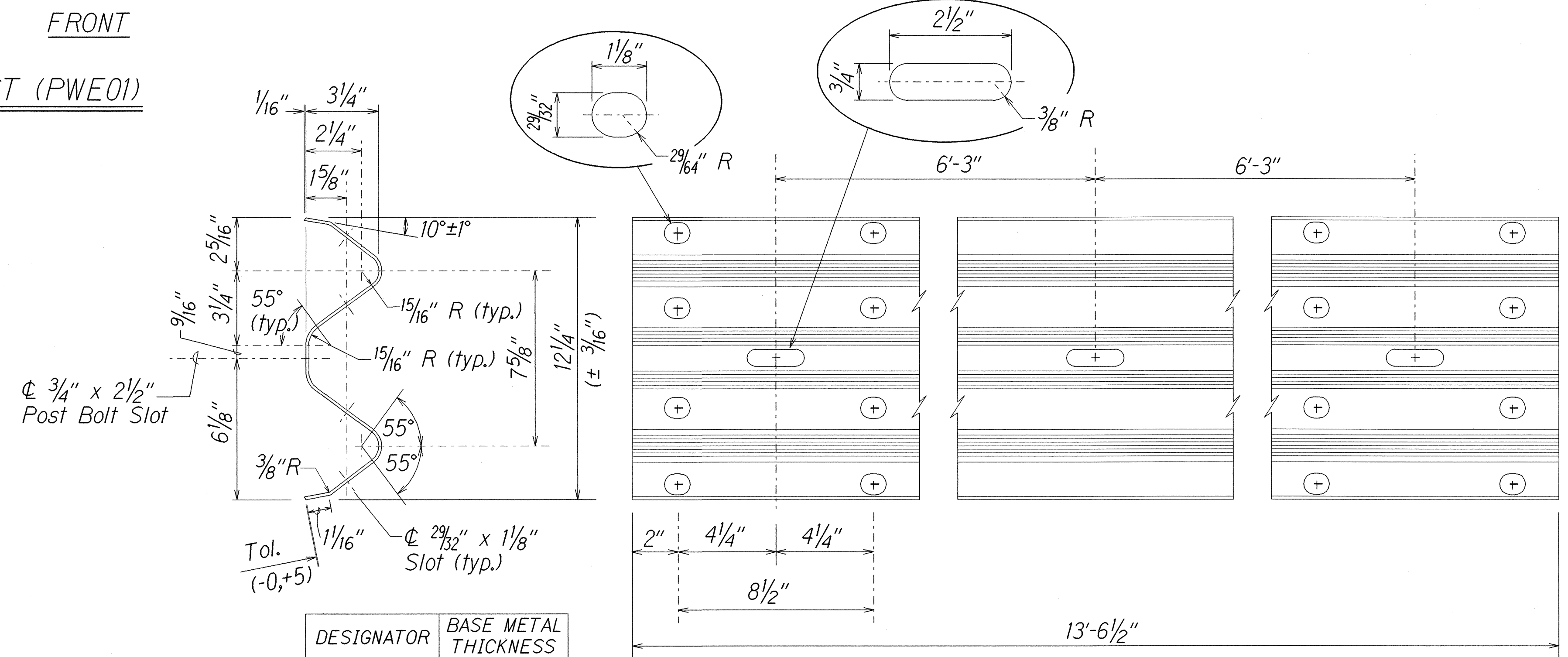


GUARDRAIL BOLTS AND
RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)



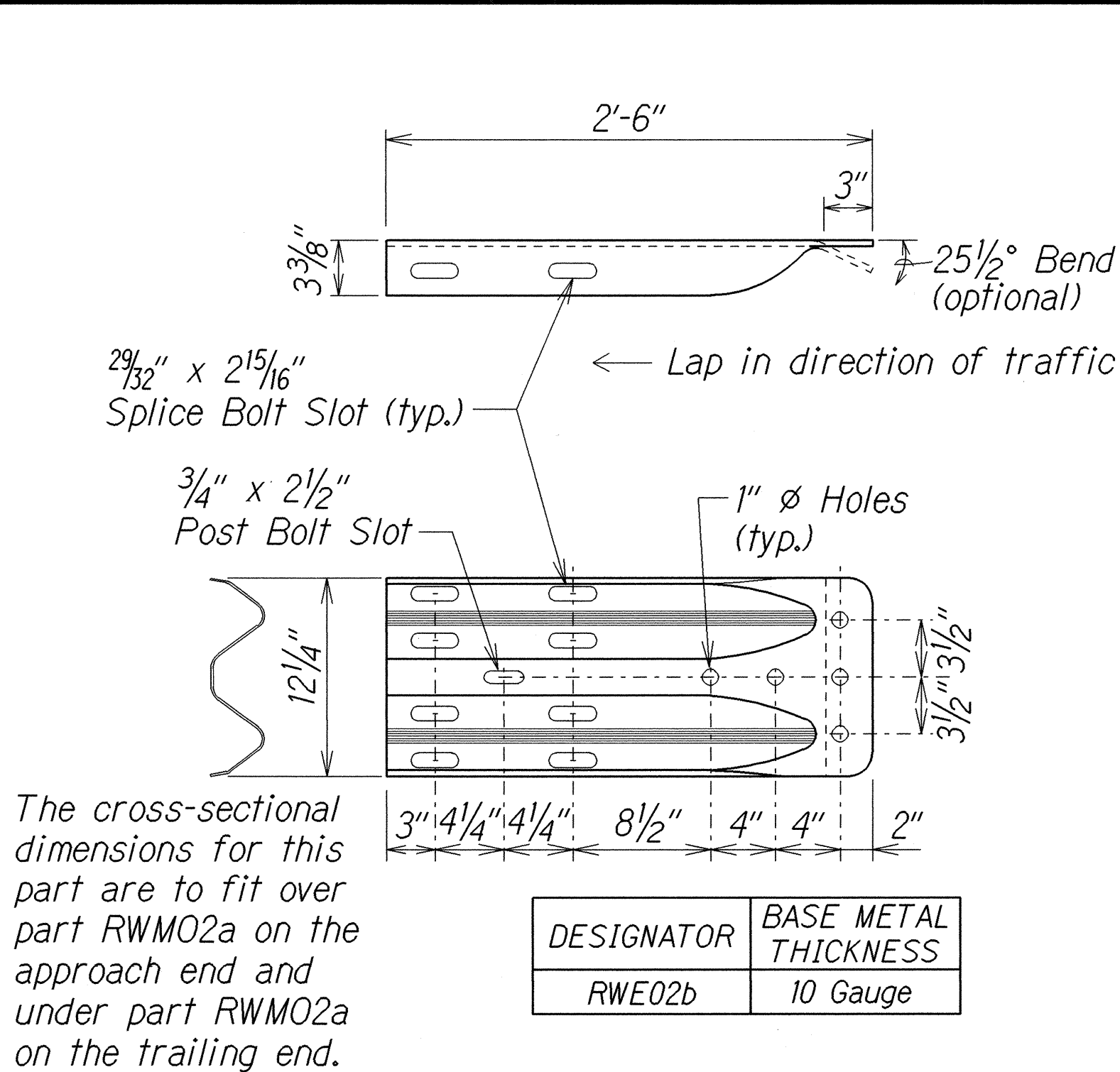
DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)

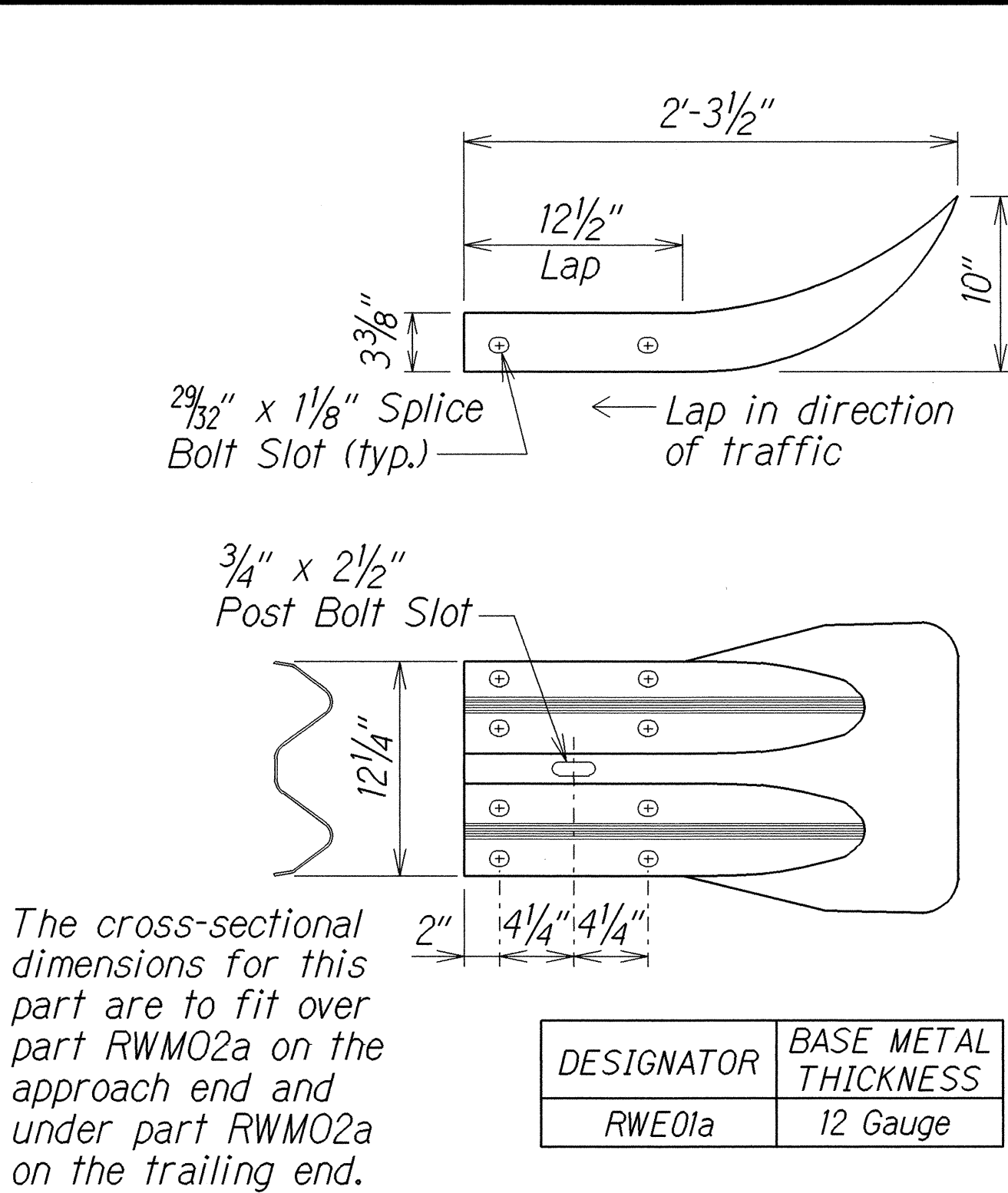
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL
HONOAPIILANI HIGHWAY RESURFACING
Honokahua to Honokohau
Project No. 30A-01-03M
Scale: NTS
Date: December, 2002

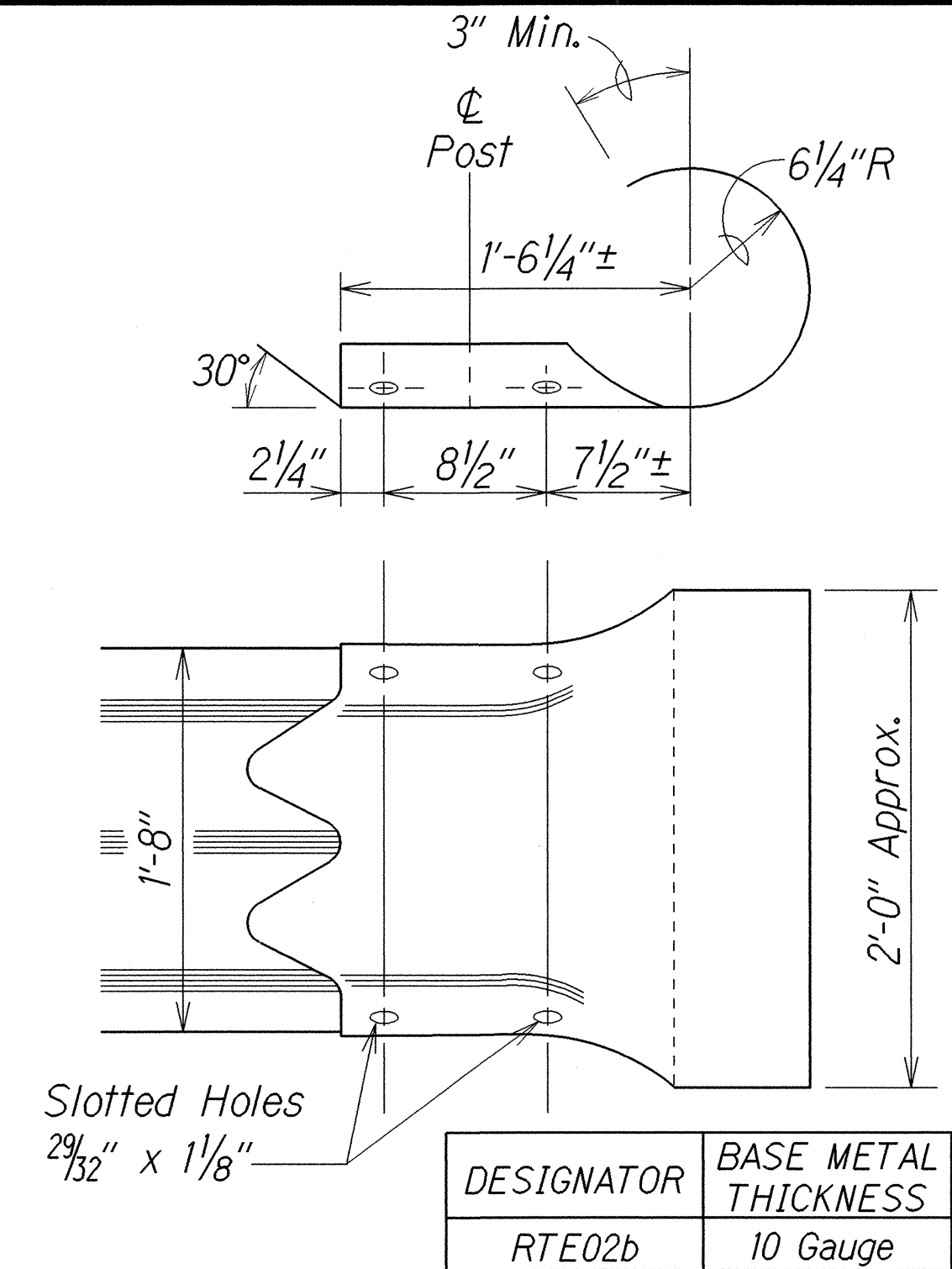
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	9	42



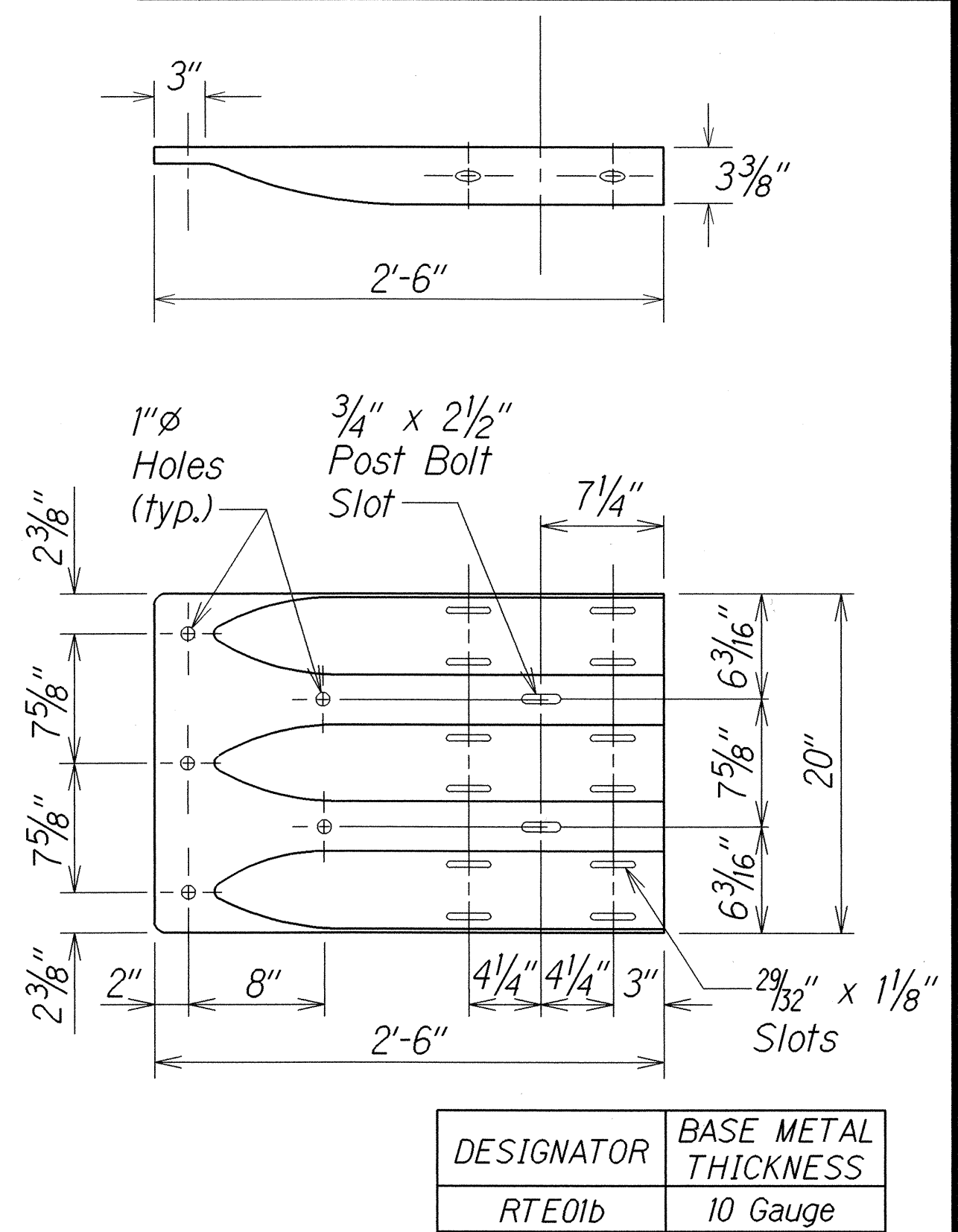
W-BEAM TERMINAL CONNECTOR (RWE02b)



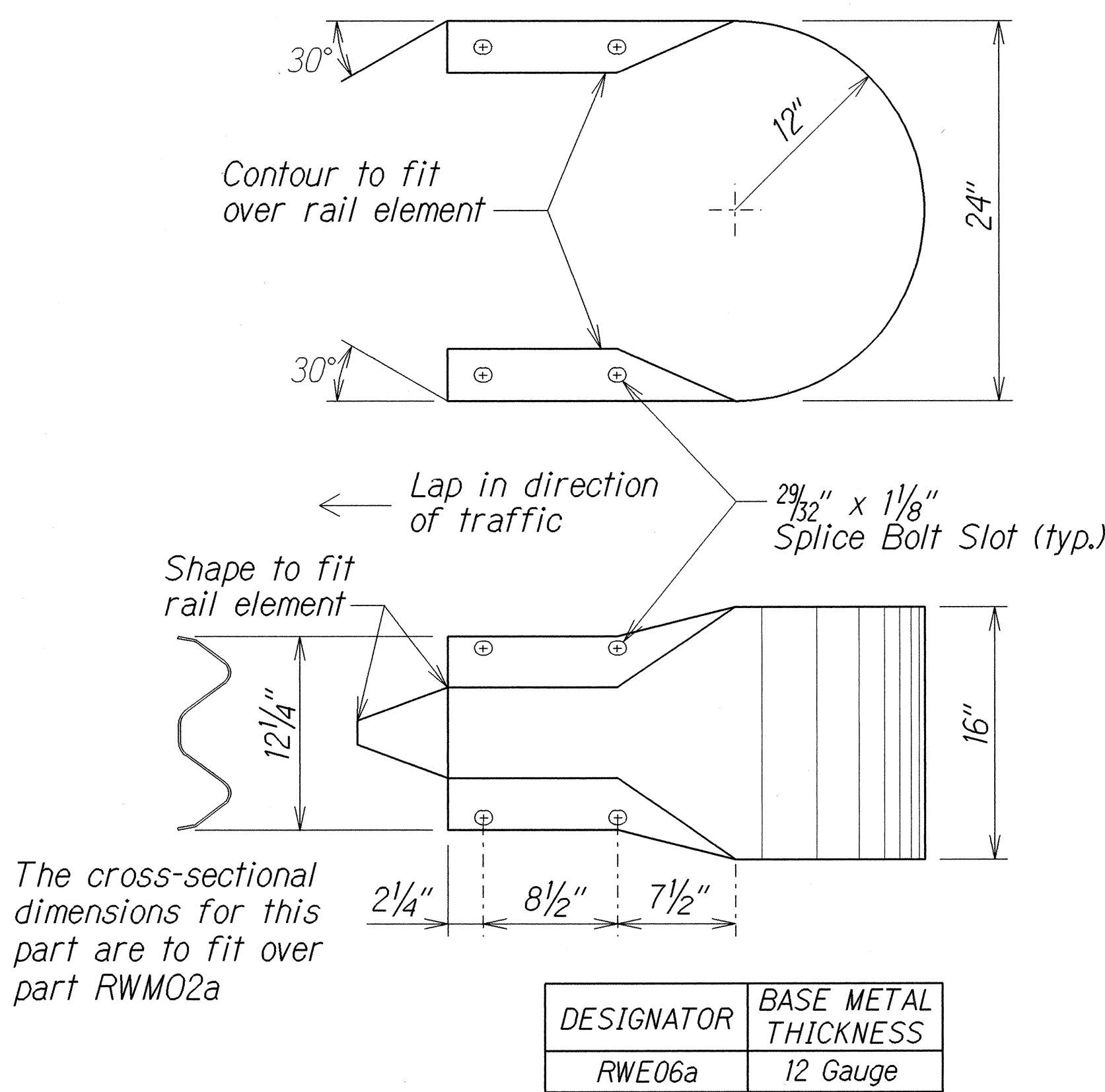
W-BEAM END SECTION (FLARED RWE01a)



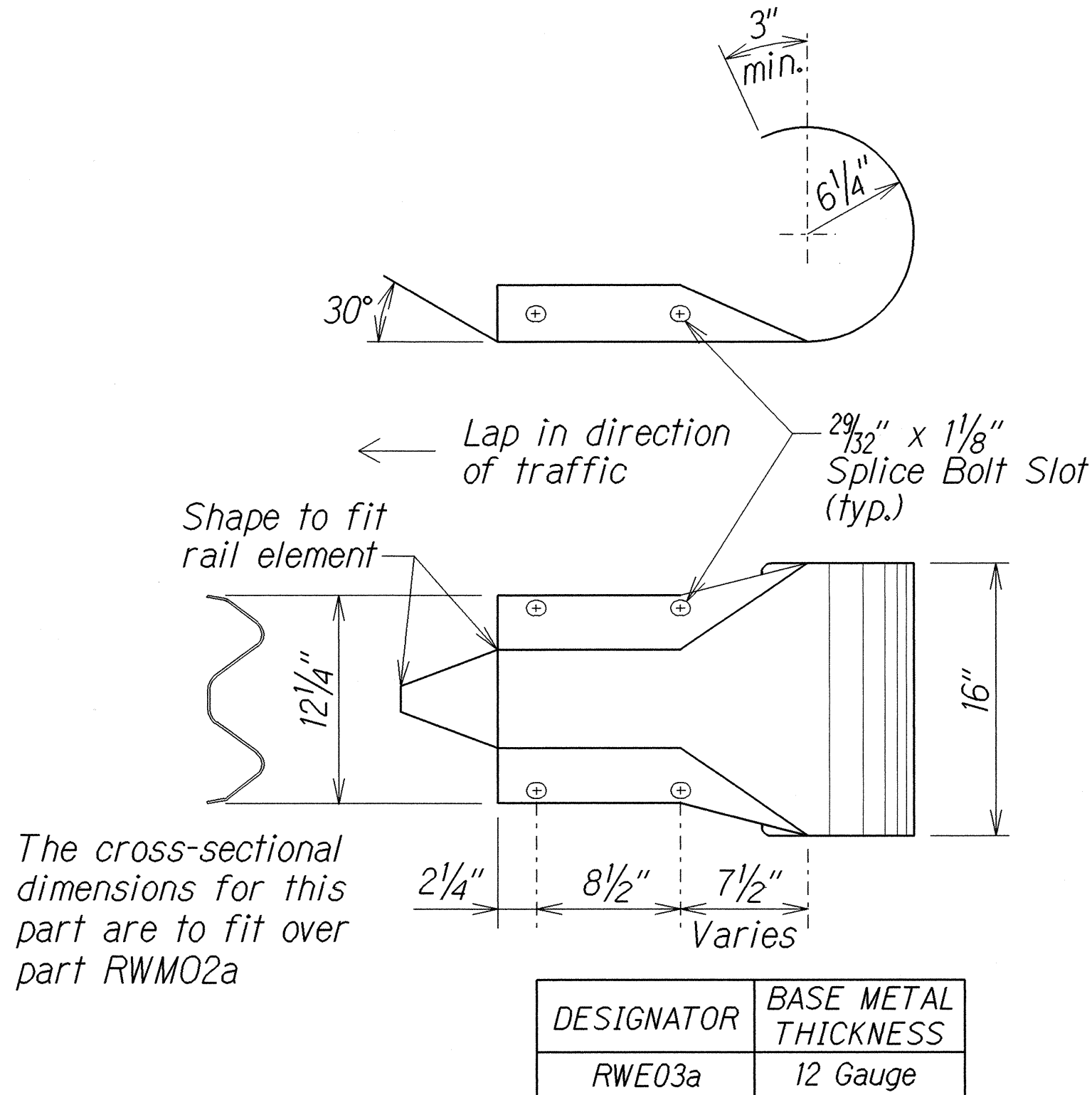
THRIE-BEAM SECTION (ROUNDED) (RTE02b)



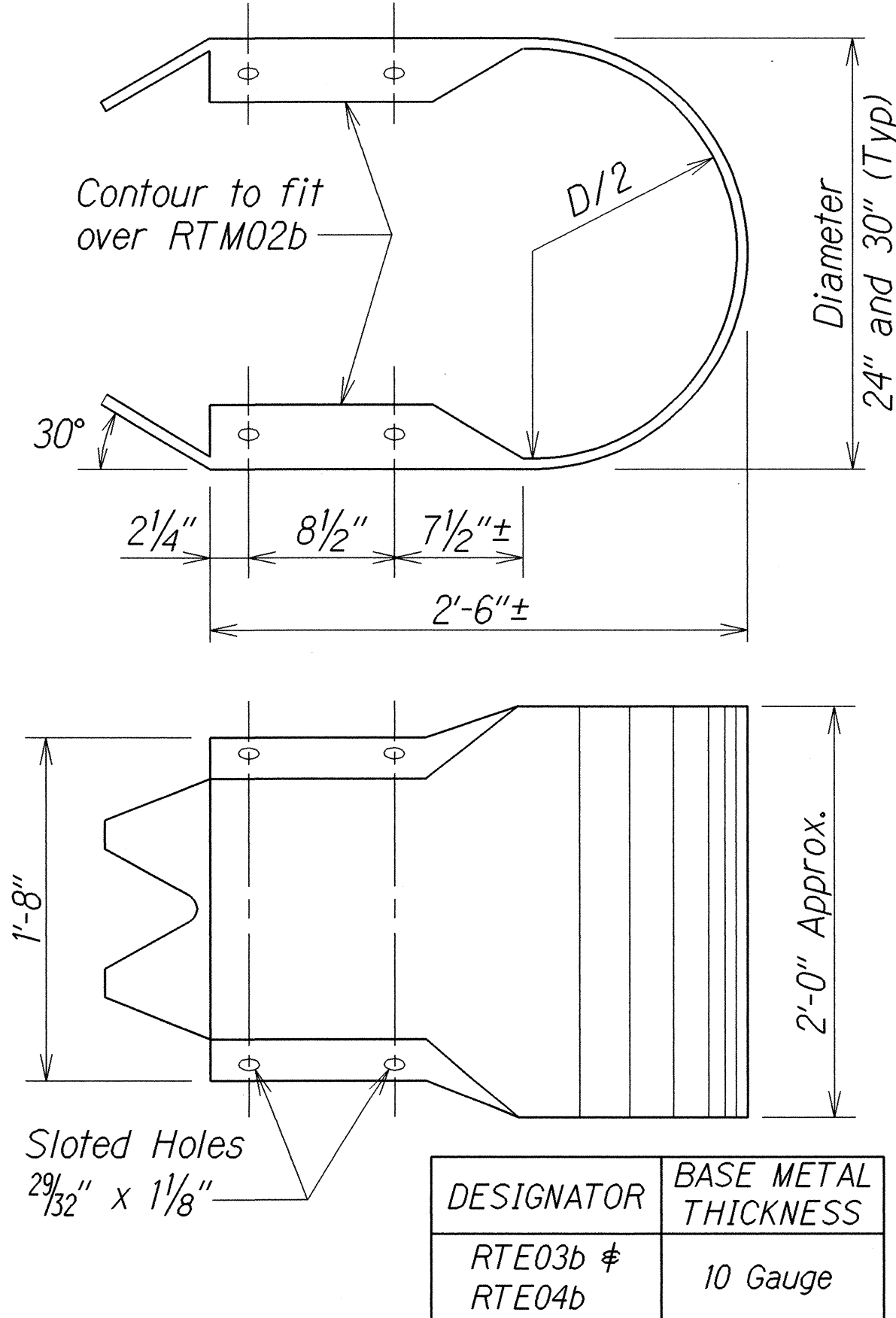
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

HONOAPIILANI HIGHWAY RESURFACING

Honokahua to Honokohau

Project No. 30A-01-03M

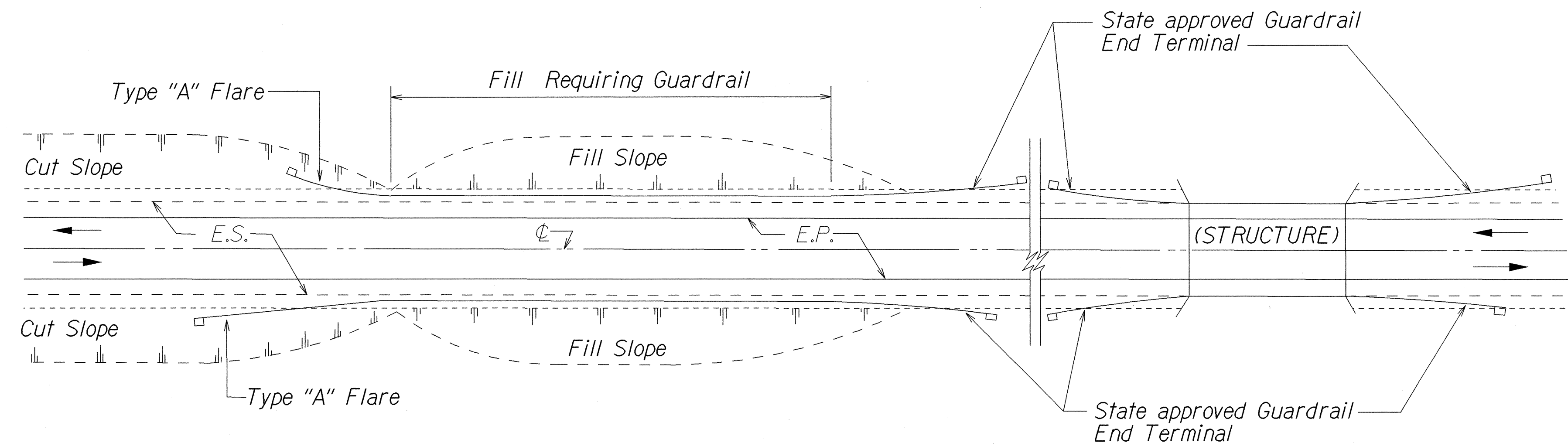
Scale: NTS Date: December, 2002

SHEET No. 3 OF 9 SHEETS

DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
IN CHARGE	
NOTE BOOK	
QUANTITIES BY	
REVISIONS	

16/21/01 tdr:ubj/guardrail/rteRev.dgn Standard Plan TE-51 (09/01/87)

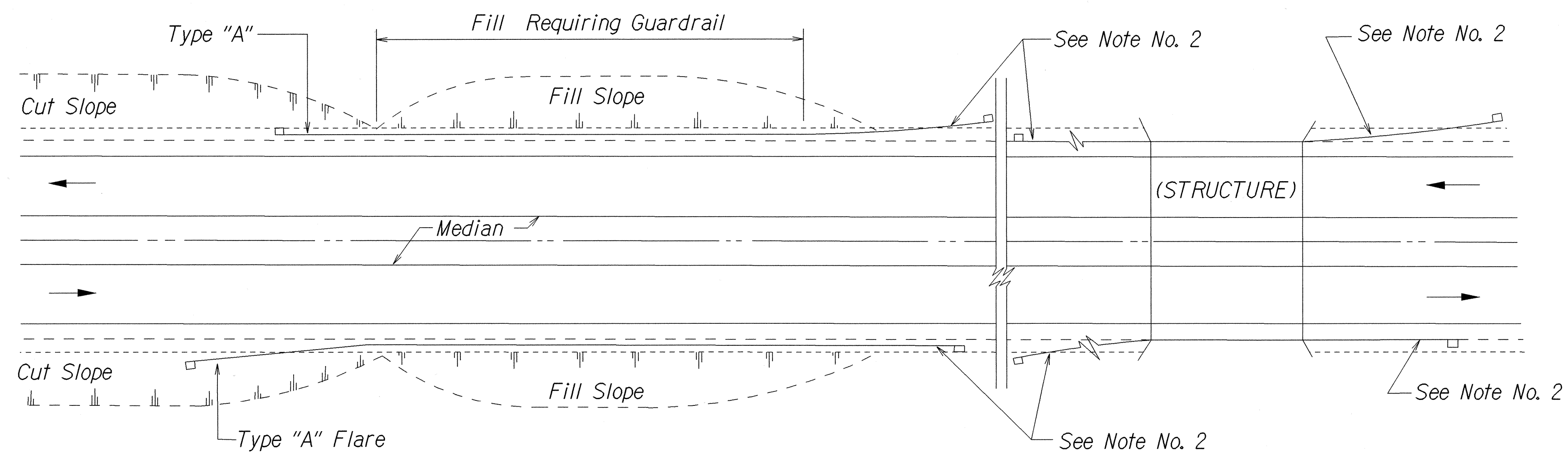
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	11	42



PLAN
TWO WAY ROADWAY

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.



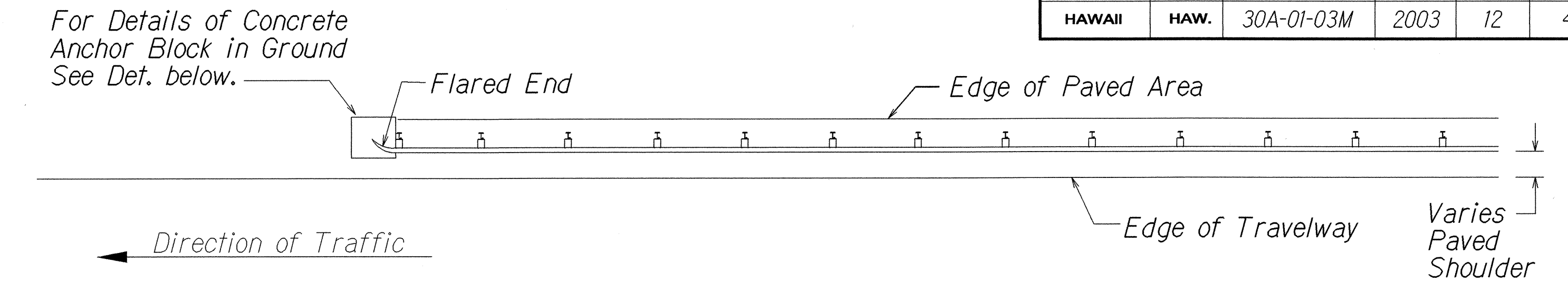
PLAN
ONE WAY ROADWAY (DIVIDED HIGHWAY)

ORIGINAL	DATE
PLAN	
NOTE BOOK	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

r3/01/99 tdt/cub/guardrail/tes8rev.dgn (standard plan TE-58 RD/01/98)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL DETAILS
HONOAPIILANI HIGHWAY RESURFACING
Honokahua to Honokohau
Project No. 30A-01-03M
Scale: NTS Date: December, 2002
SHEET No. 5 OF 9 SHEETS

3/01/99 tdl.ruby/guardrail/te59rev.dgn (standard plan TE-59 r11/03/89)

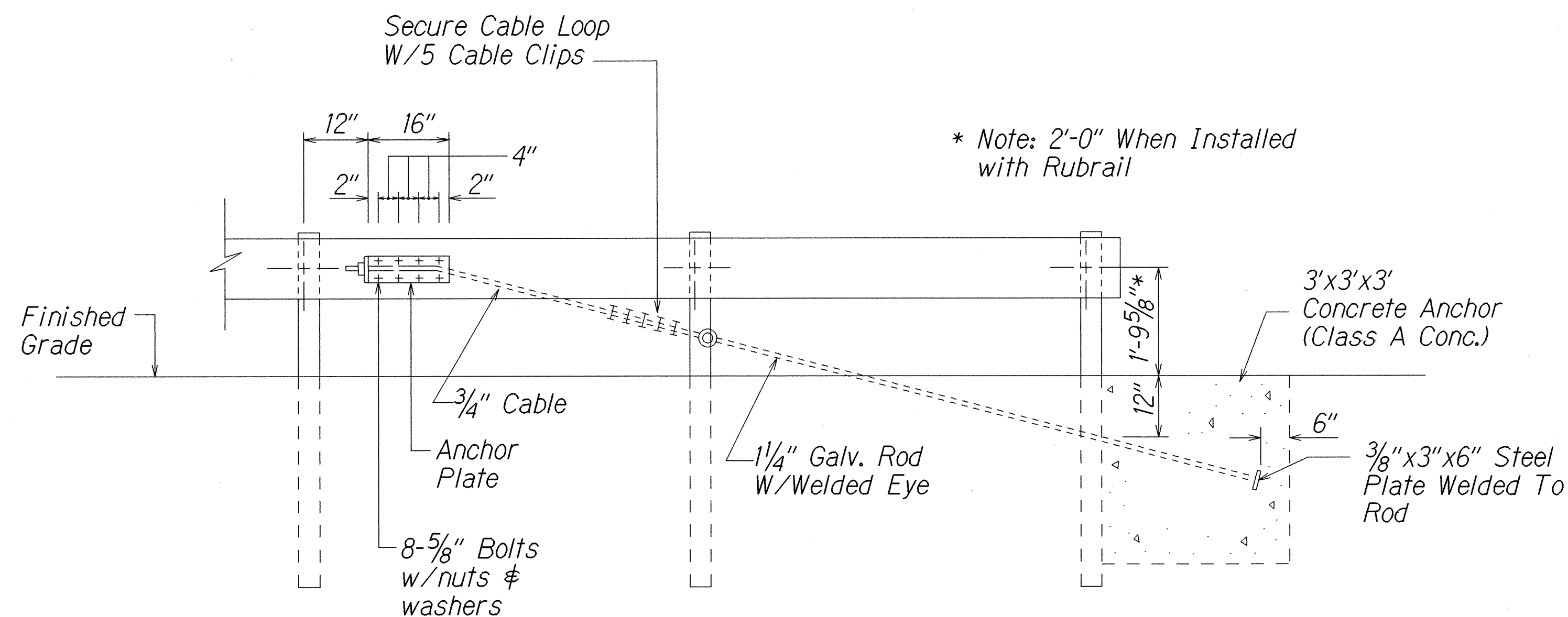


PLAN

ELEVATION

NOTE:

During construction, the Contractor shall layout the proposed Type "G" Modified End Terminal and receive approval from the Construction Engineer prior to installation.



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.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

HONOAPIILANI HIGHWAY RESURFACING
Honokahua to Honokohau
Project No. 30A-01-03M

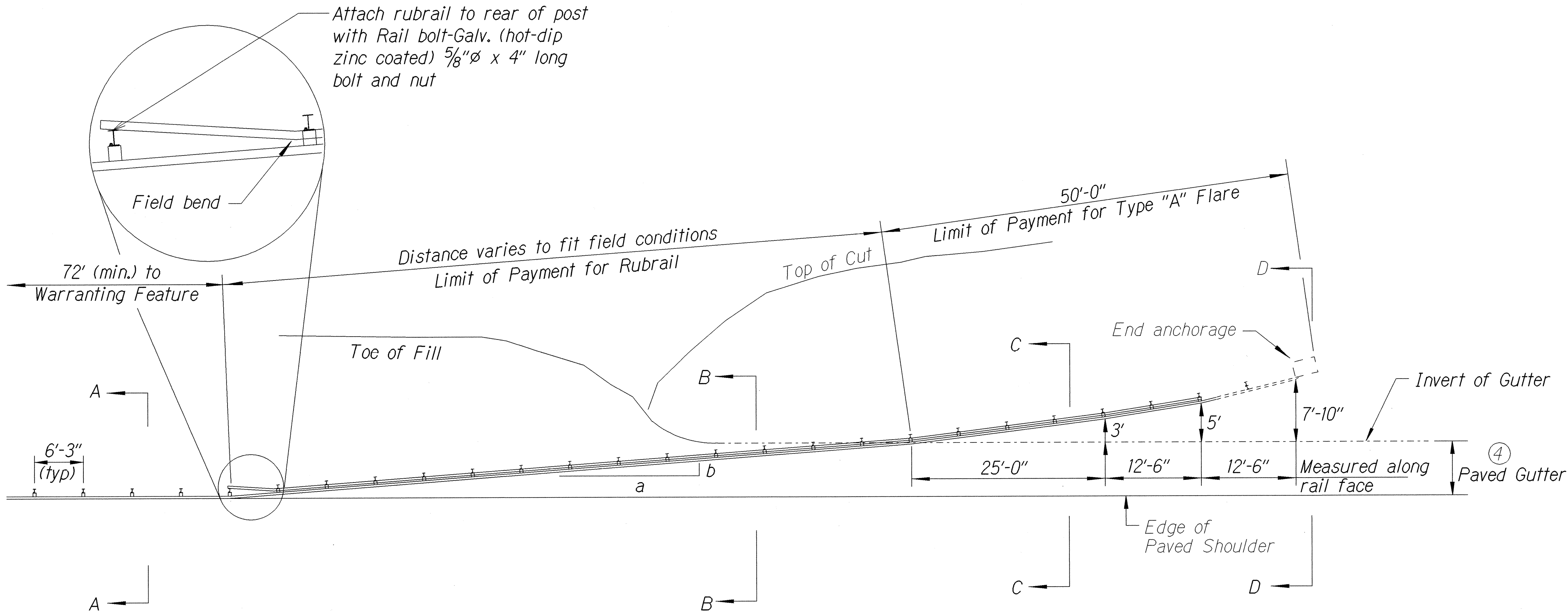
Scale: *NTS* Date: *December, 2002*

SHEET No. 6 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	13	42

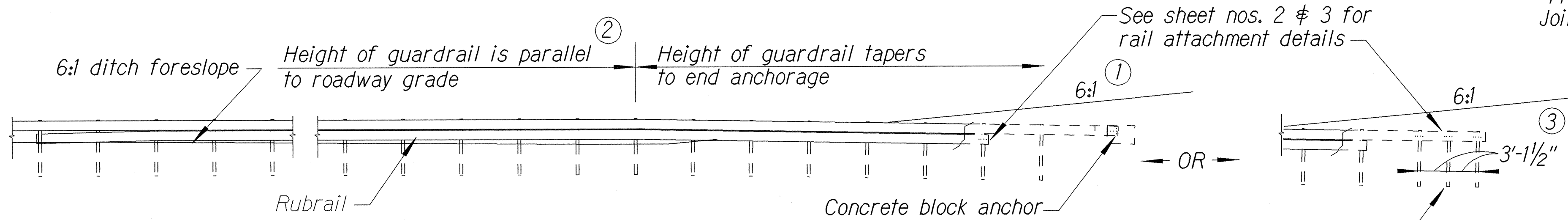
General Notes

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.

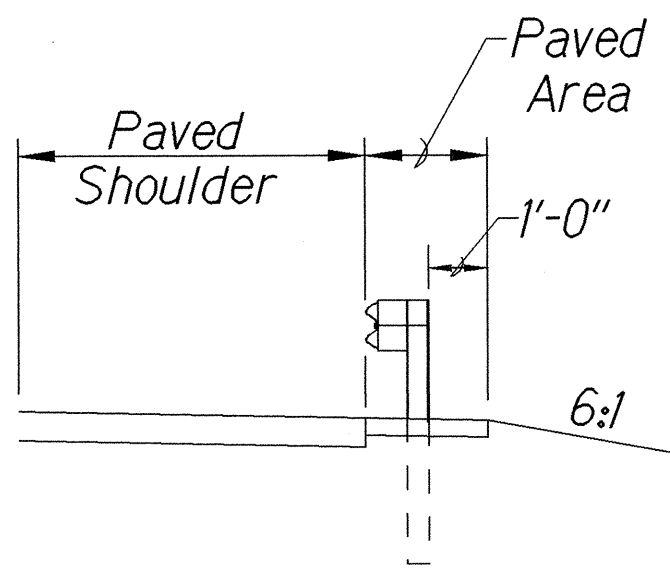


PLAN

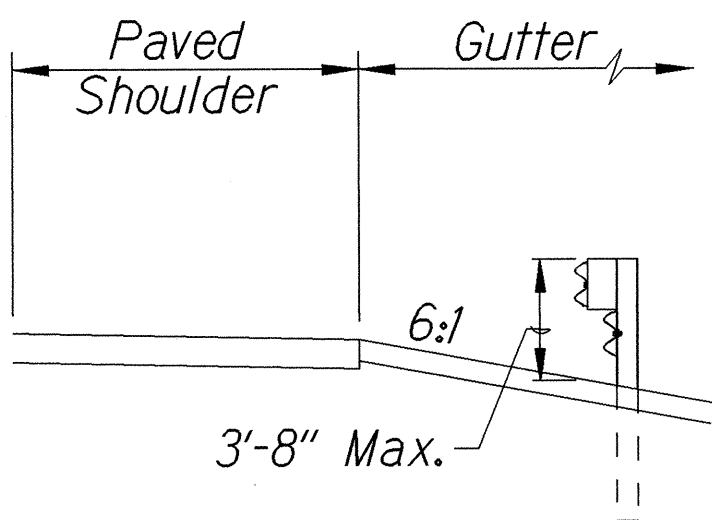
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



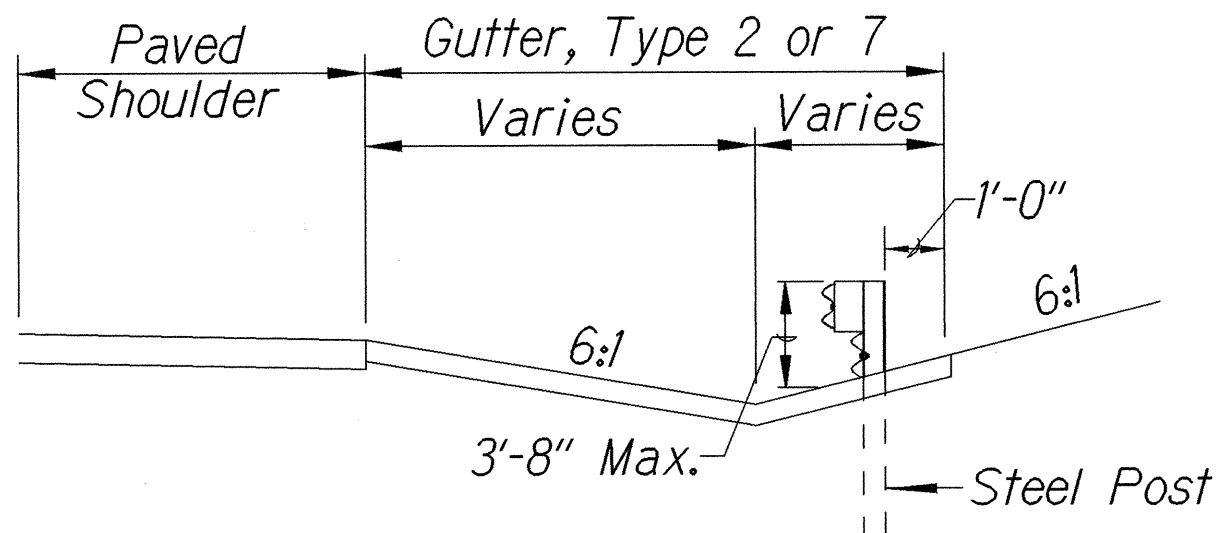
ELEVATION (Profile Along Rail)



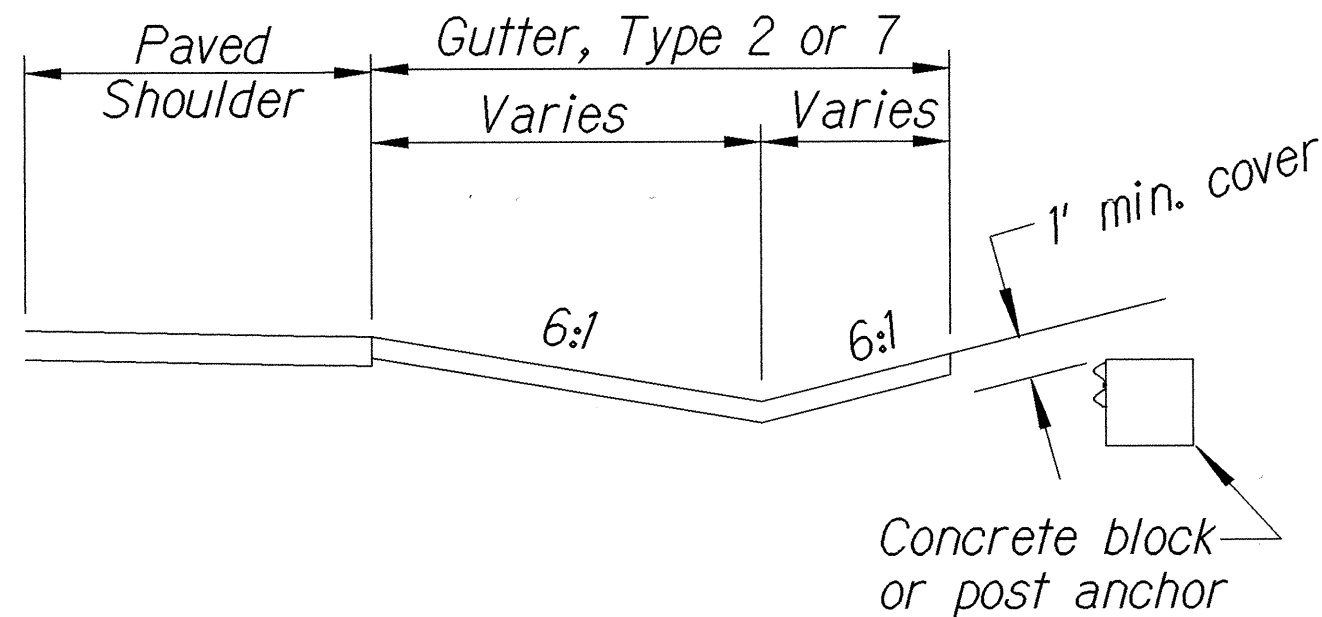
Section A-A



Section B-B
(With Rubrail)



Section C-C
(With Rubrail)



Concrete block
or post anchor

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

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

TYPE "A" FLARE

HONOAPIILANI HIGHWAY RESURFACING

Honokahua to Honokohau

Project No. 30A-01-03M

Scale: NTS

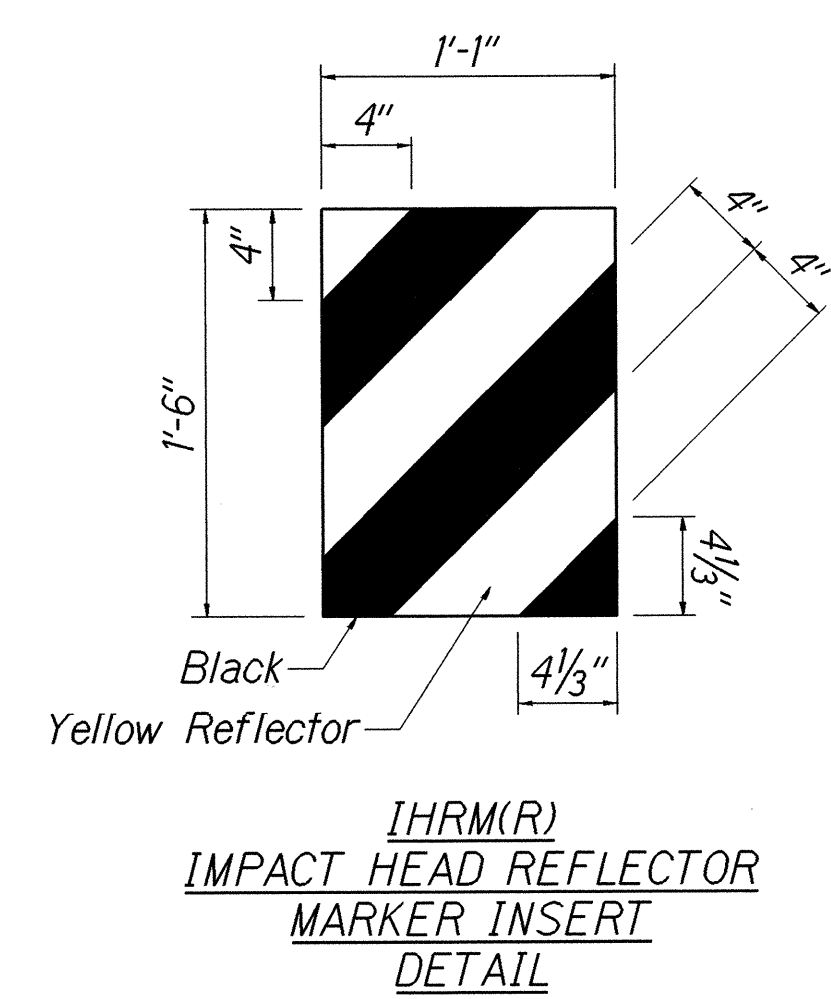
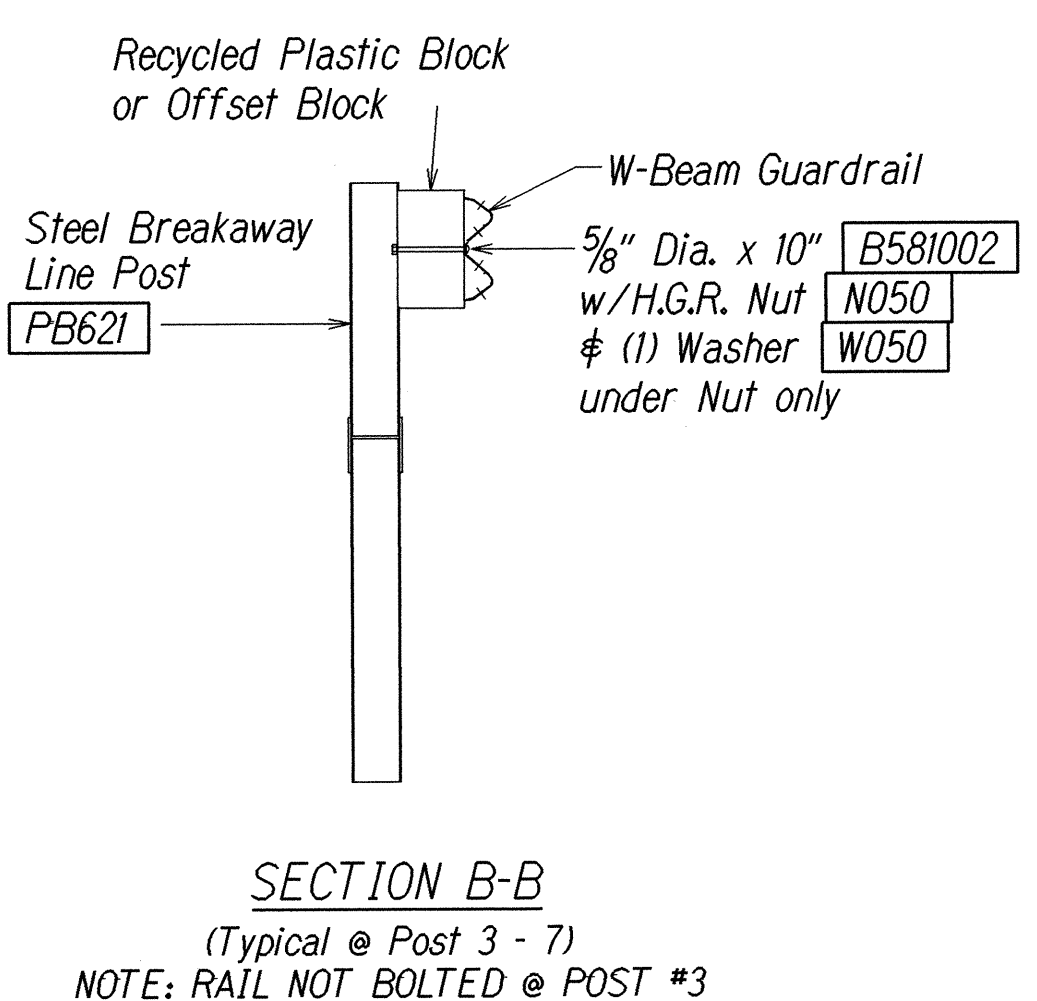
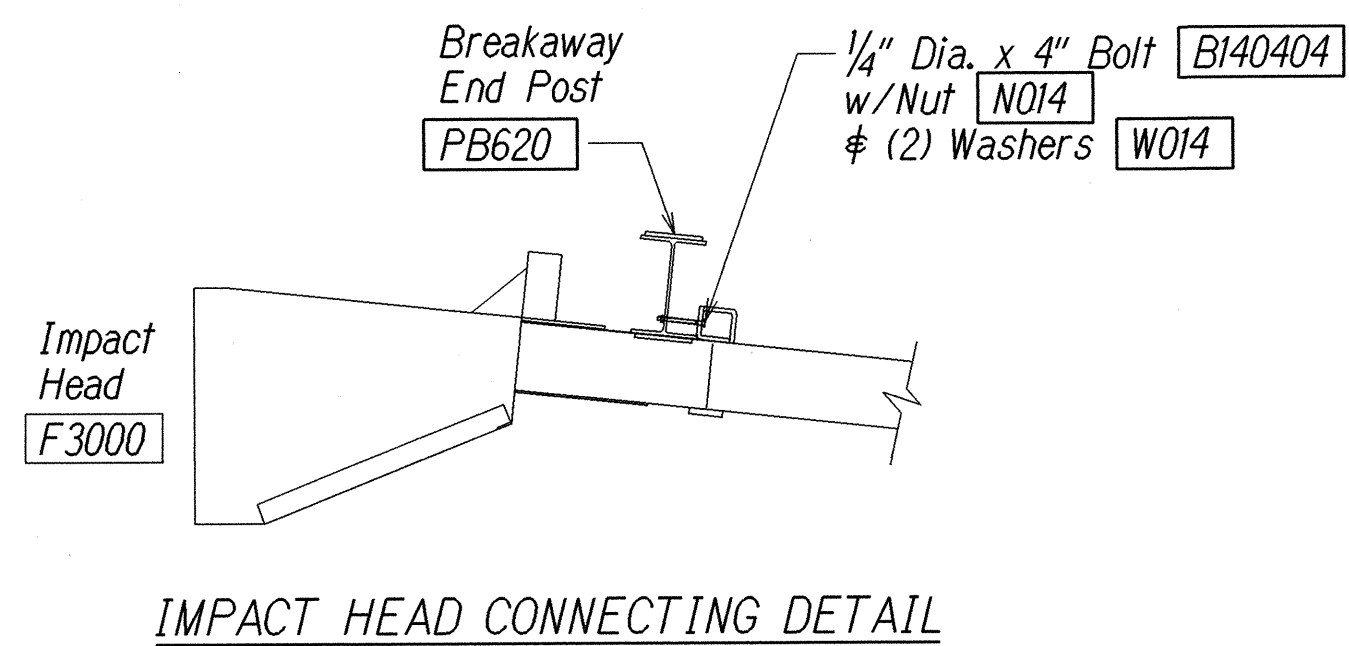
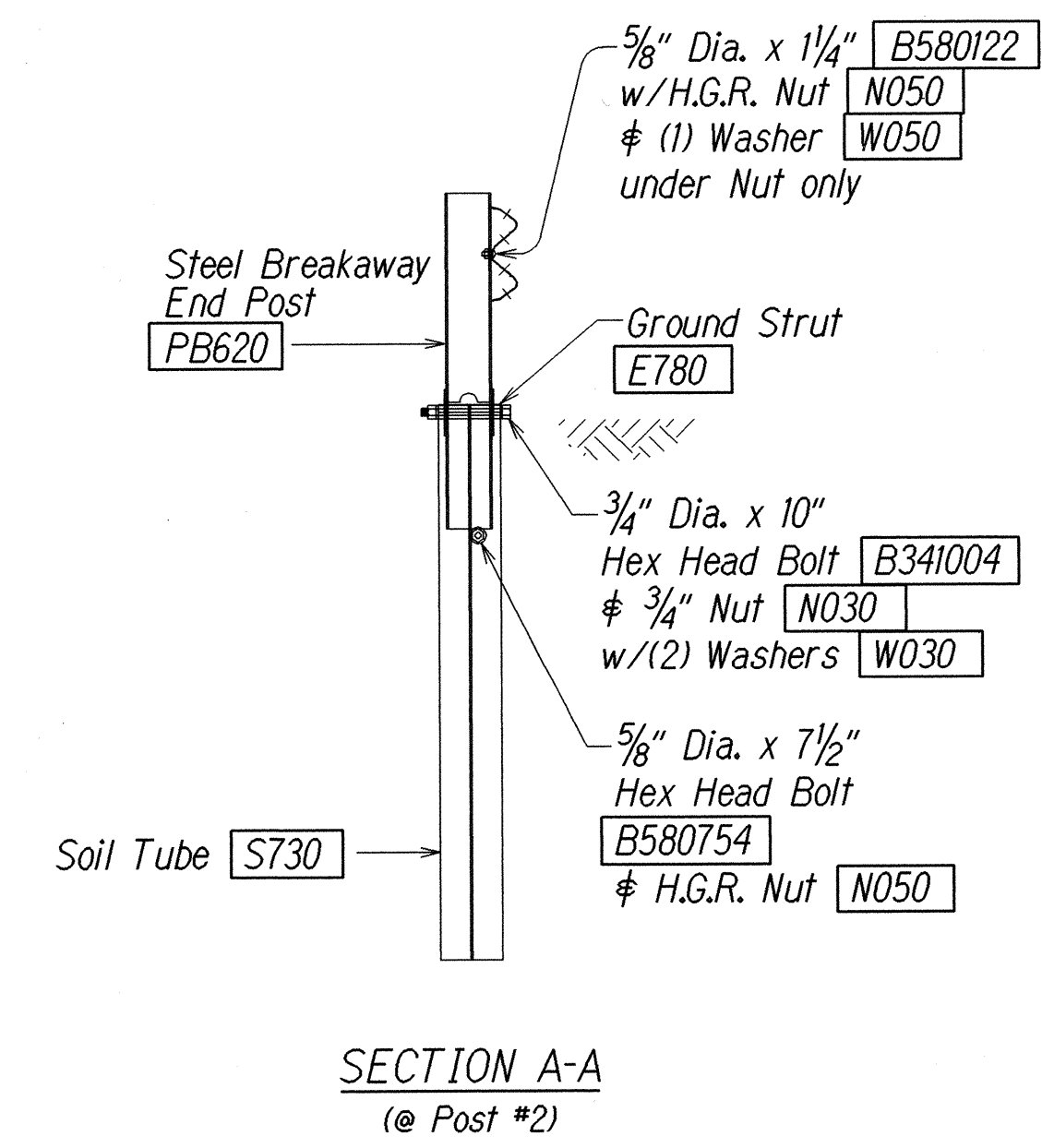
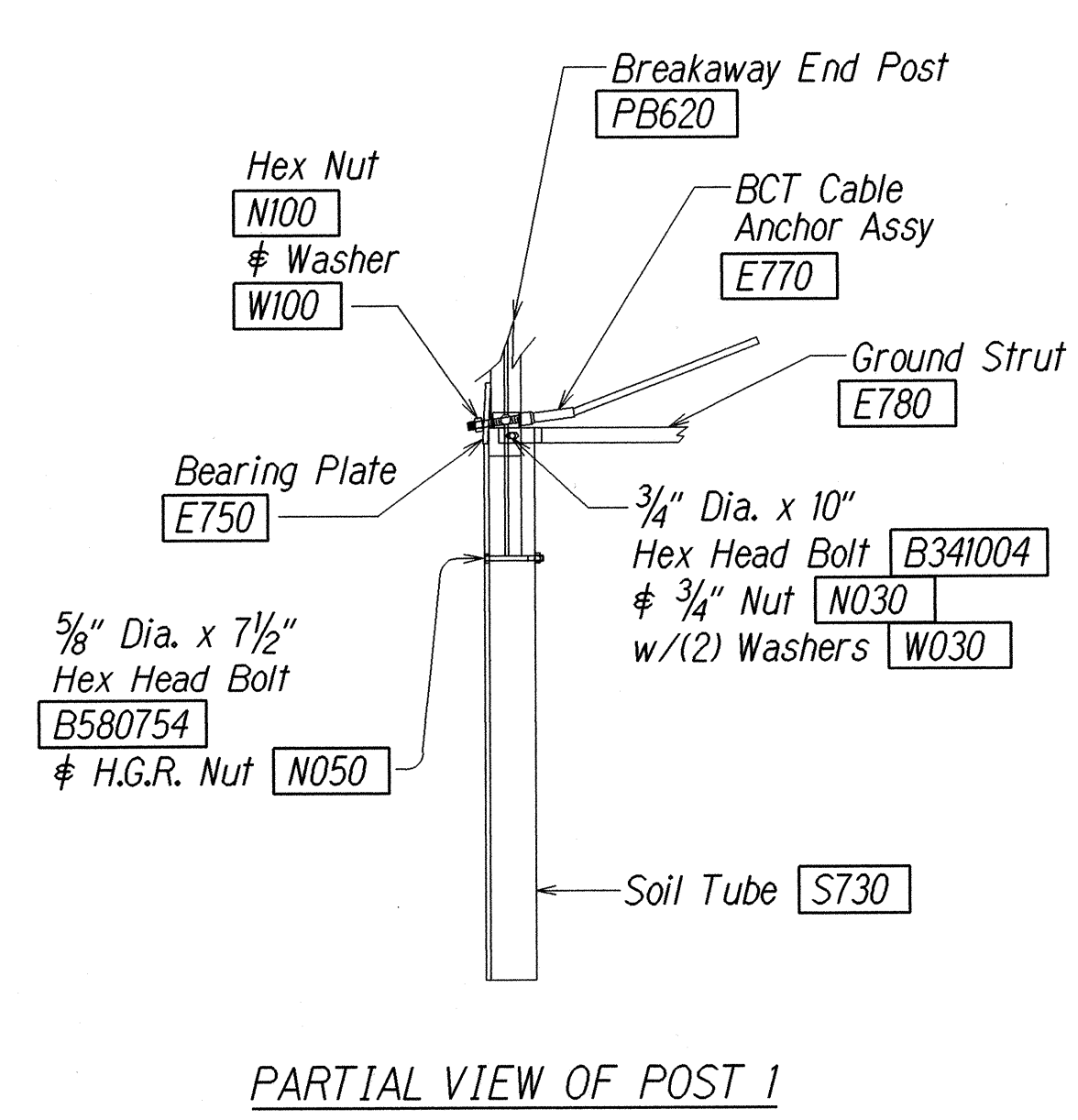
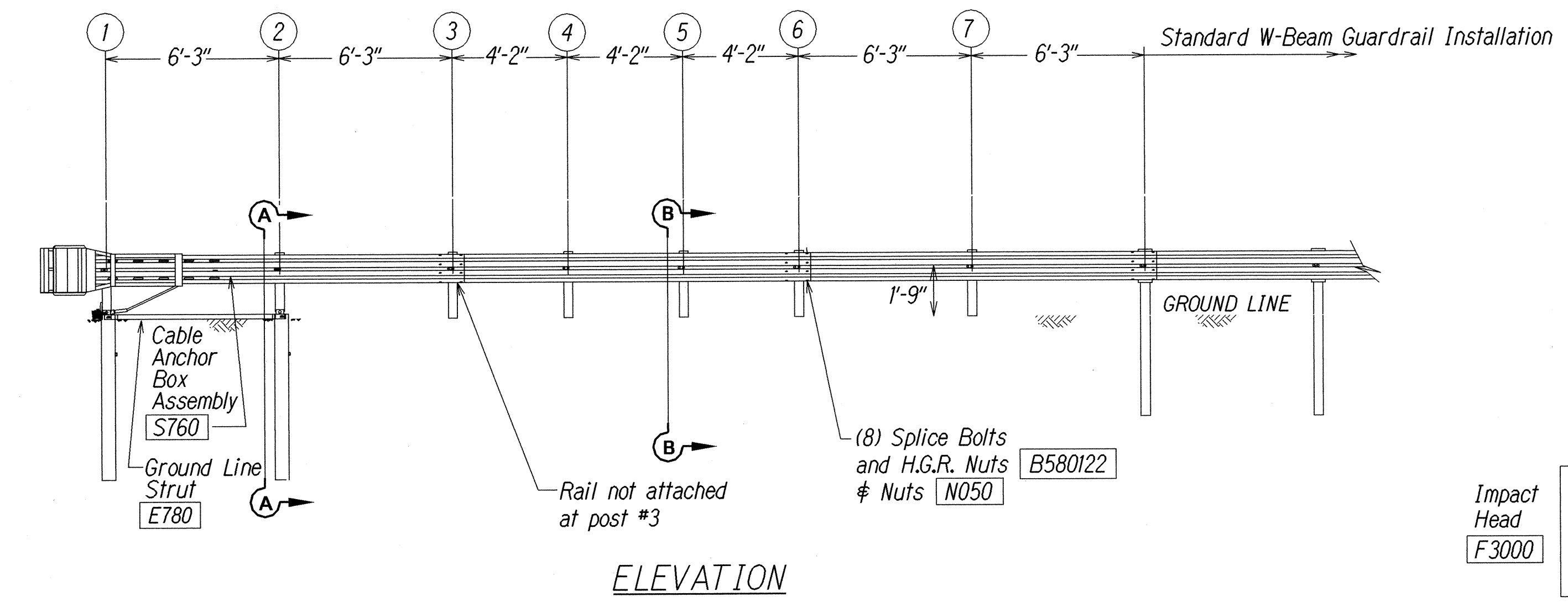
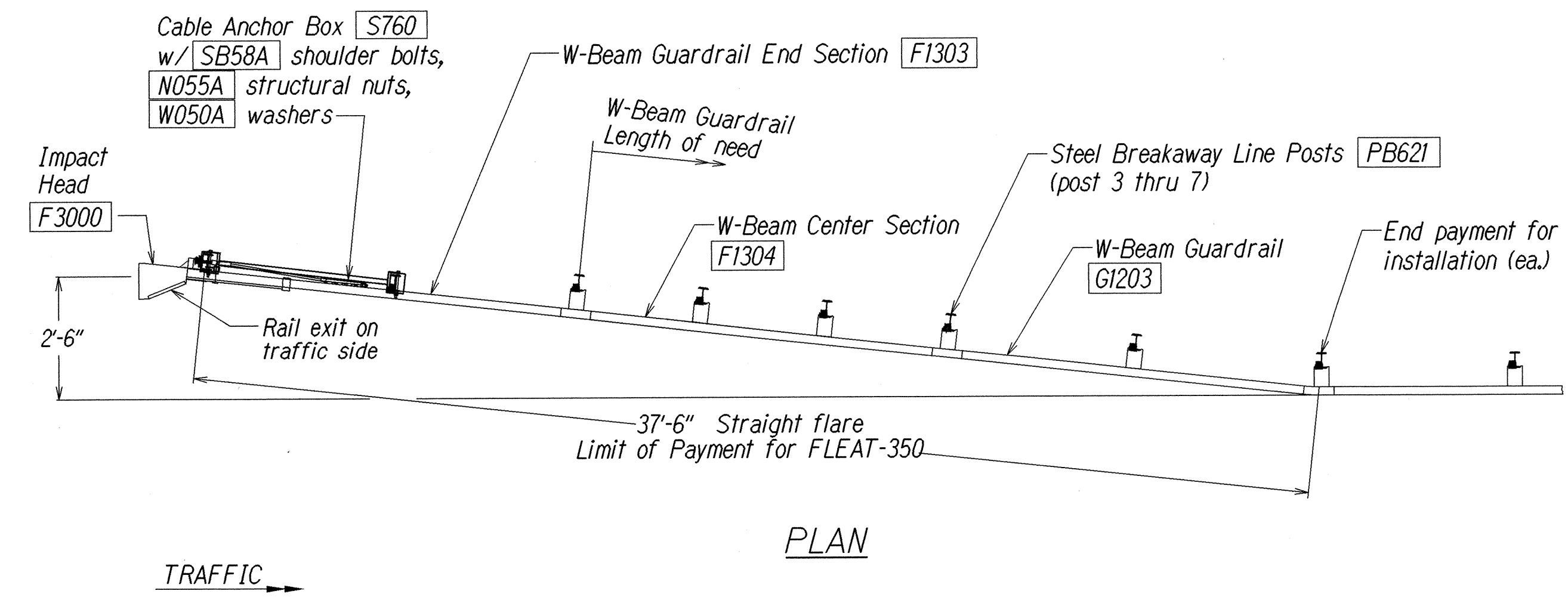
Date: December, 2002

SHEET No. 7

OF 9

SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	14	42



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

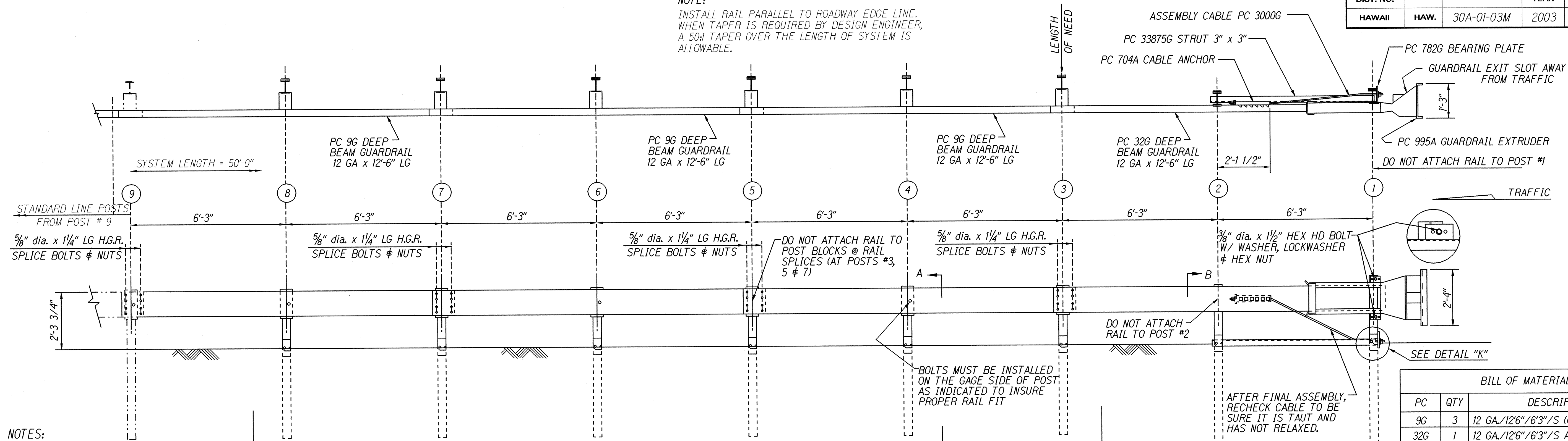
- GENERAL NOTES**
- Breakaway steel posts are required with the FLEAT Terminal.
 - All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
 - The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet 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.
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
	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 3/16" ID A325 STR. WASHER

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
FLEAT-350
 FLARED ENERGY ABSORBING TERMINAL
 HONOAPIILANI HIGHWAY RESURFACING
 Honokahua to Honokohau
 Project No. 30A-01-03M
 Not to Scale Date: December, 2002
 SHEET No. 8 OF 9 SHEETS

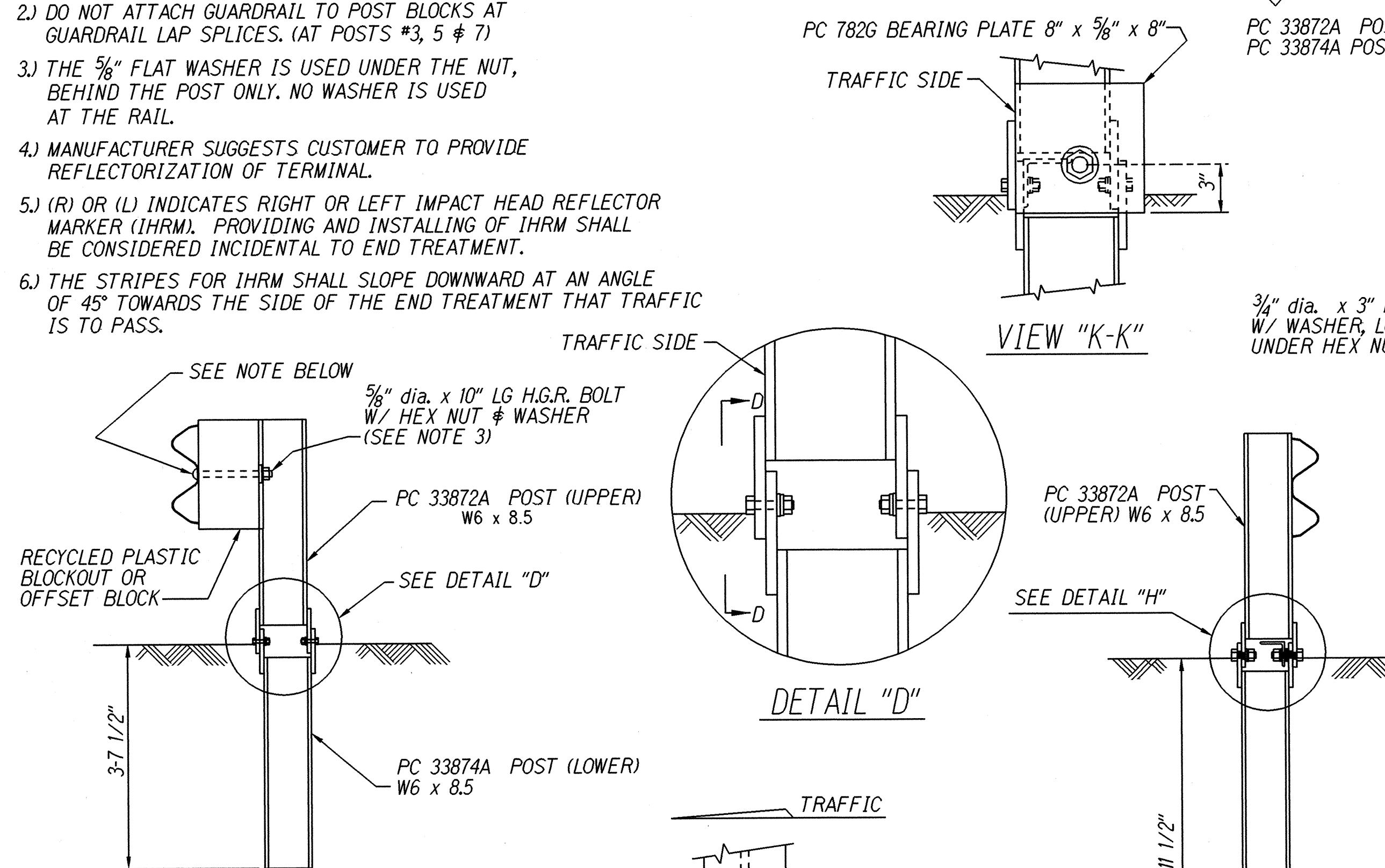
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-01-03M	2003	15	42

NOTE:
INSTALL RAIL PARALLEL TO ROADWAY EDGE LINE.
WHEN TAPER IS REQUIRED BY DESIGN ENGINEER,
A 50:1 TAPER OVER THE LENGTH OF SYSTEM IS
ALLOWABLE.



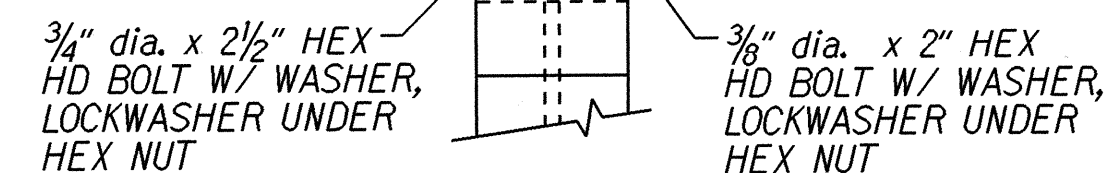
- NOTES:

- 1.) DO NOT ATTACH GUARDRAIL TO POST #1.
- 2.) DO NOT ATTACH GUARDRAIL TO POST BLOCKS AT GUARDRAIL LAP SPLICES. (AT POSTS #3, 5 & 7)
- 3.) THE 5/8" FLAT WASHER IS USED UNDER THE NUT, BEHIND THE POST ONLY. NO WASHER IS USED AT THE RAIL.
- 4.) MANUFACTURER SUGGESTS CUSTOMER TO PROVIDE REFLECTORIZATION OF TERMINAL.
- 5.) (R) OR (L) INDICATES RIGHT OR LEFT IMPACT HEAD REFLECTOR MARKER (IHRM). PROVIDING AND INSTALLING OF IHRM SHALL BE CONSIDERED INCIDENTAL TO END TREATMENT.
- 6.) THE STRIPES FOR IHRM SHALL SLOPE DOWNWARD AT AN ANGLE OF 45° TOWARDS THE SIDE OF THE END TREATMENT THAT TRAFFIC IS TO PASS.

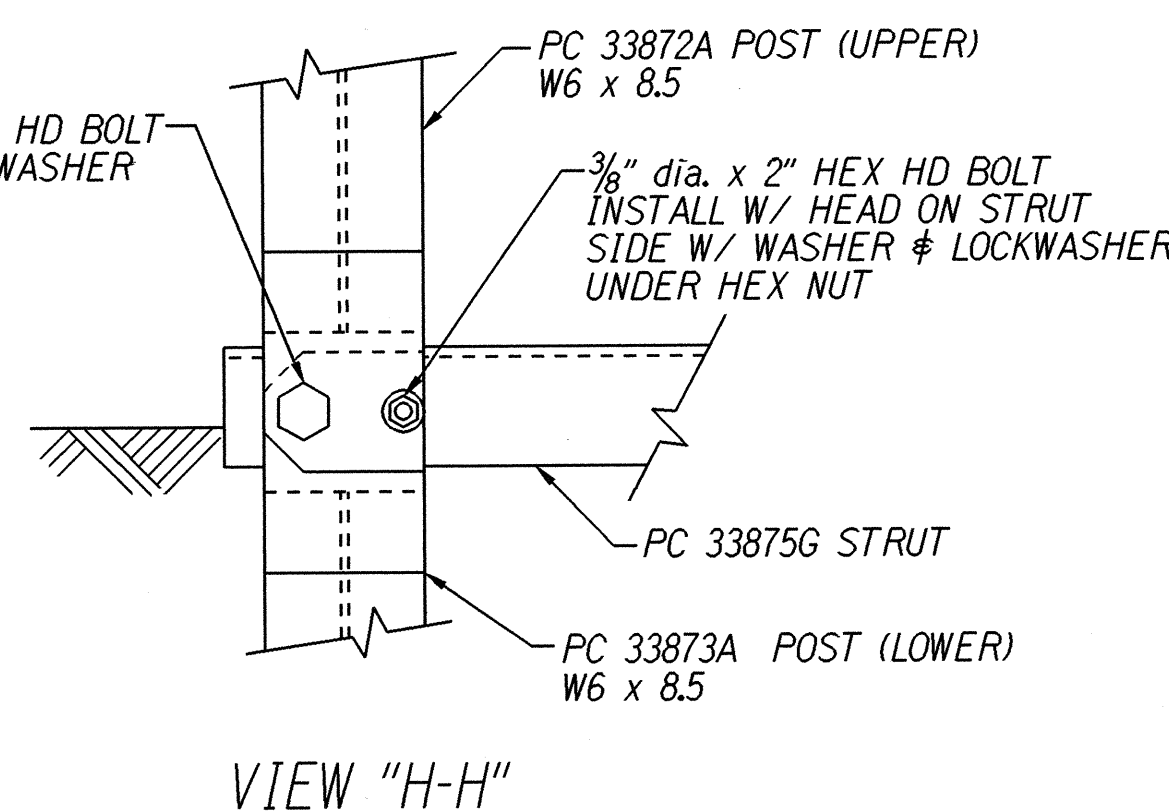


NOTE:
SECTION "A-A" IS SIMILAR @ POST #3, 5 & 7.
EXCEPT RAIL IS NOT ATTACHED.

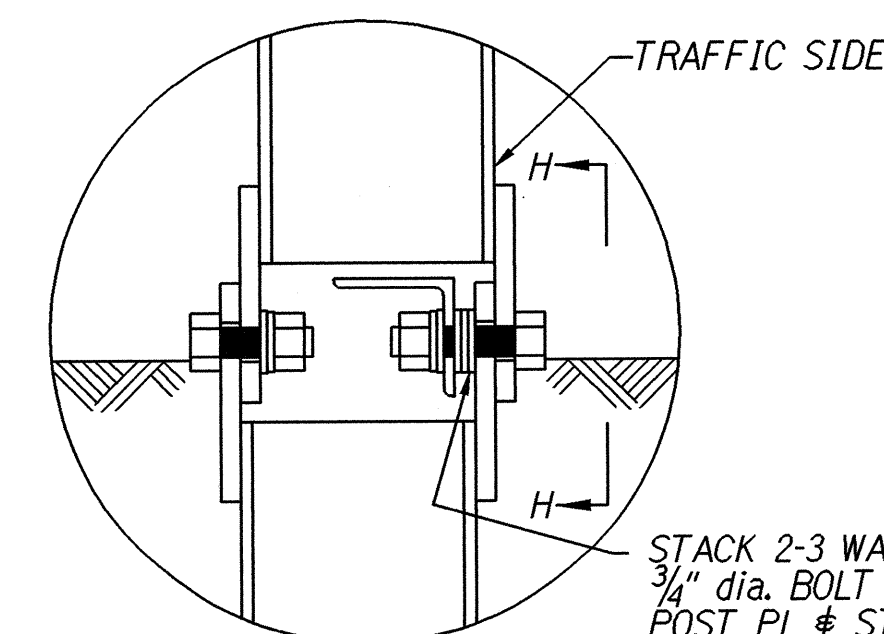
SECTION "A-A"
(TYP @ POSTS #4, 6 & 8)



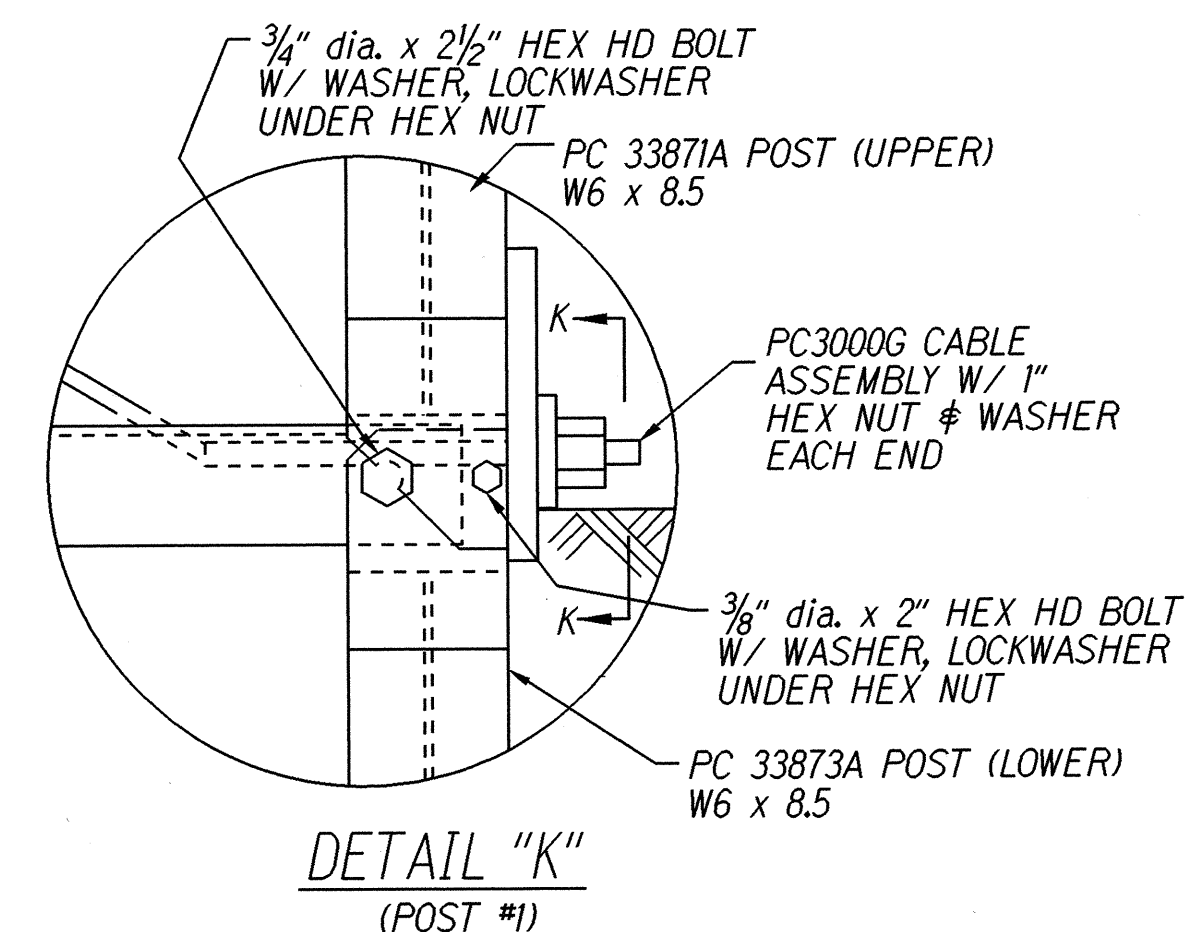
VIEW "D-D"



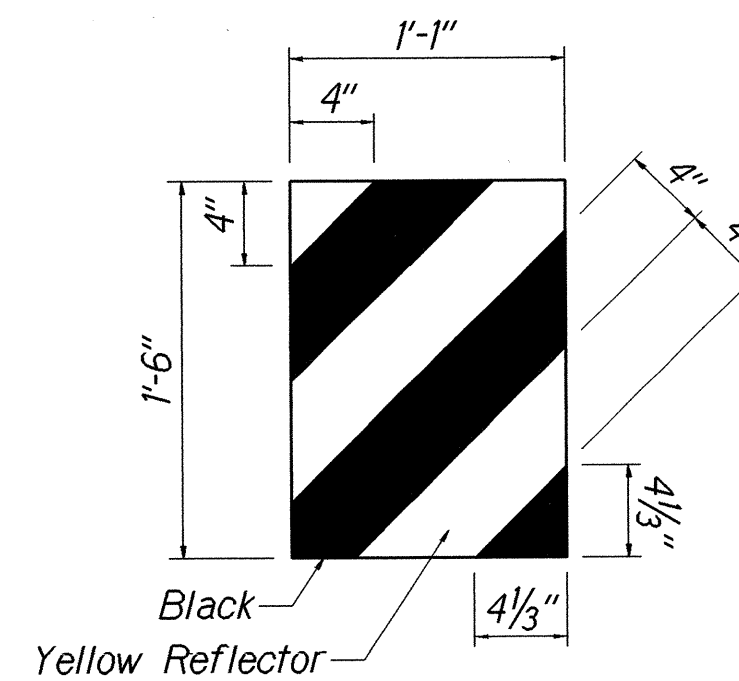
VIEW "H-H"



DETAIL "H"
(POST #2)



DETAIL "K"
(POST #1)



IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL

BILL OF MATERIAL		
PC	QTY	DESCRIPTION
9G	3	12 GA./126"/63"/S (GUARDRAIL)
32G	1	12 GA./126"/63"/S ANC (GUARDRAIL)
704A	1	CABLE ANCHOR BRACKET
782G	1	5/8" x 8" x 8" BEARING PLATE
995A	1	ET-2000 PLUS EXTRUDER
3000G	1	CABLE 3/4" x 6'6"
3300G	6	5/8" WASHER
3340G	38	5/8" HEX NUT
3360G	32	5/8" dia. x 1 1/4" SPLICE BOLT
3500G	6	5/8" dia. x 10" POST BOLT
3701G	19	3/4" WASHER
3704G	16	3/4" HEX NUT
3717G	15	3/4" dia. x 2 1/2" HEX HD BOLT
3718G	1	3/4" dia. x 3" HEX HD BOLT
3900G	2	1" WASHER
3910G	2	1" HEX NUT
5326B	6	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
4254G	18	3/8" WASHER
4255G	2	3/8" FENDER WASHERS
4258G	16	3/8" LOCKWASHER
4261G	2	3/8" dia. x 1 1/2" HEX HD BOLT
4699G	16	3/4" LOCKWASHER
6321G	16	3/8" dia. x 2" HEX HD BOLT
6405G	18	3/8" HEX NUT
33871A	1	ET2000 HBA POST #1 TOP
33872A	7	ET2000 HBA POST #2-#8 TOP
33873A	2	ET2000 HBA POST #1-#2 BOTTOM
33874A	6	ET2000 HBA POST #3-#8 BOTTOM
33875G	1	6'-6" ANGLE STRUT ET HBA
	1	IMPACT HEAD REFLECTOR MARKER - (IHRMIR) OR (U)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ET-2000 PLUS

HONOAPIILANI HIGHWAY RESURFACING

Honokahua to Honokohau

Project No. 30A-01-03M

Scale: NTS

Date: December, 2002

SHEET No. 9 OF 9 SHEETS