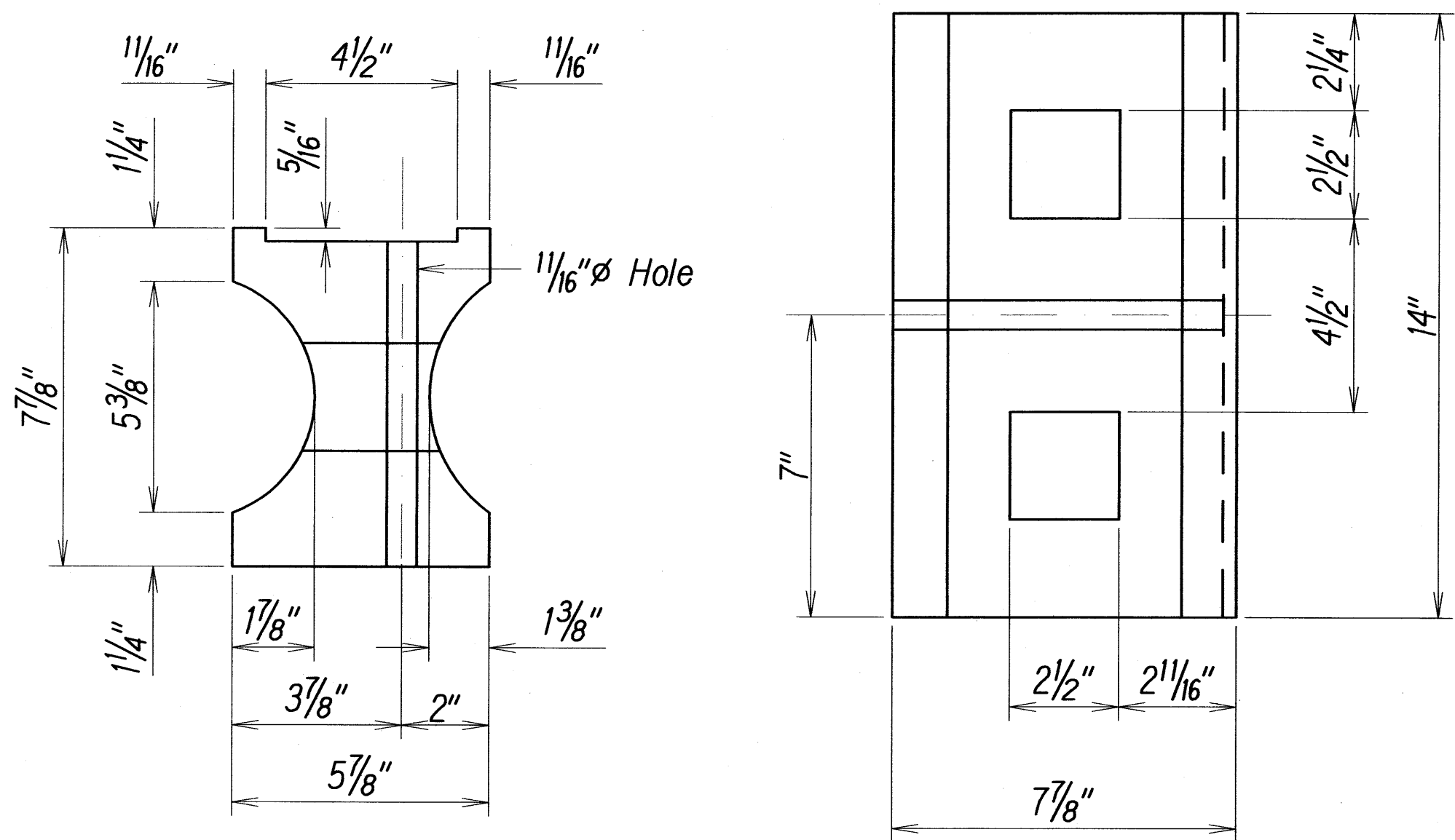


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(38)	2010	89	213

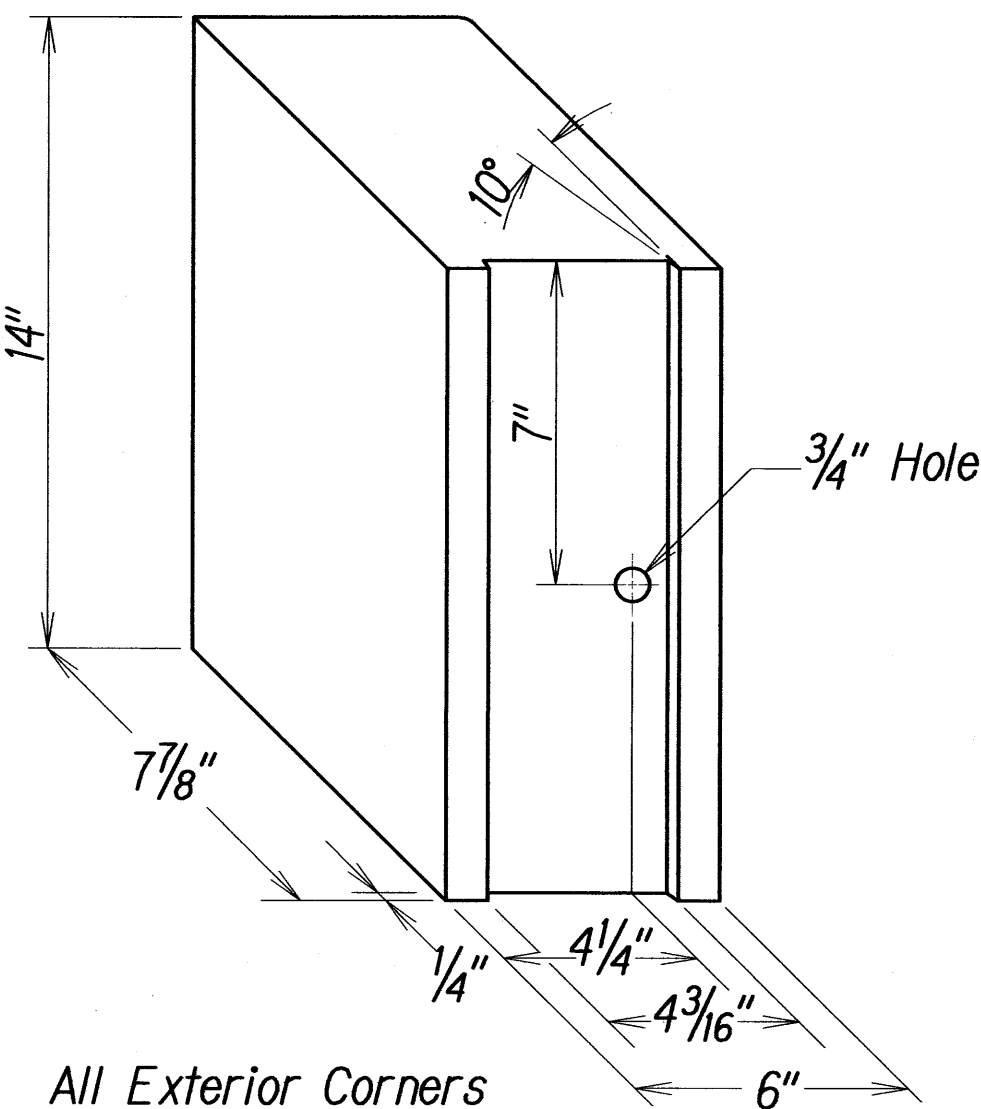
General Notes:

- 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.

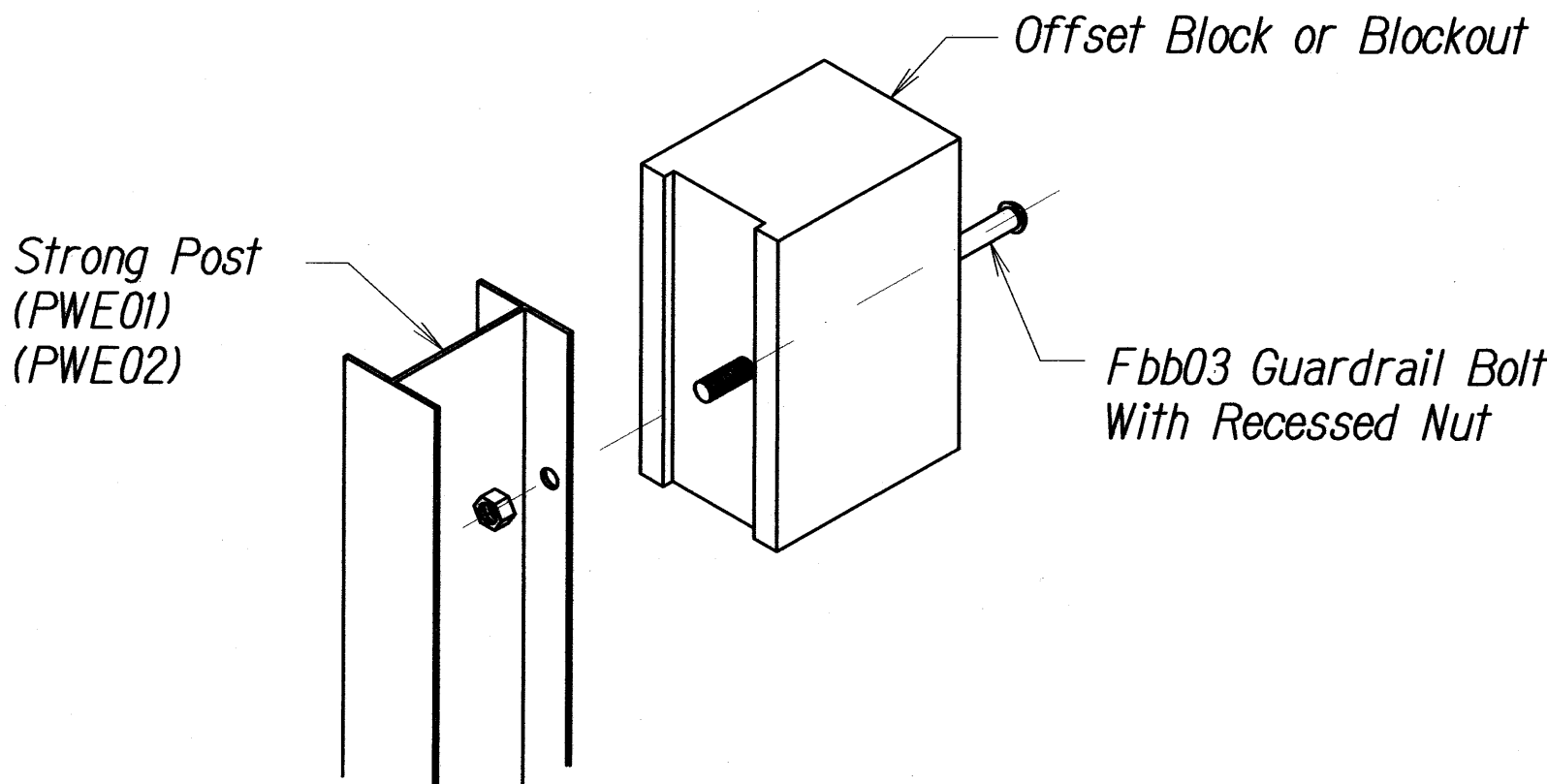
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 ⁵ / ₈ "	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



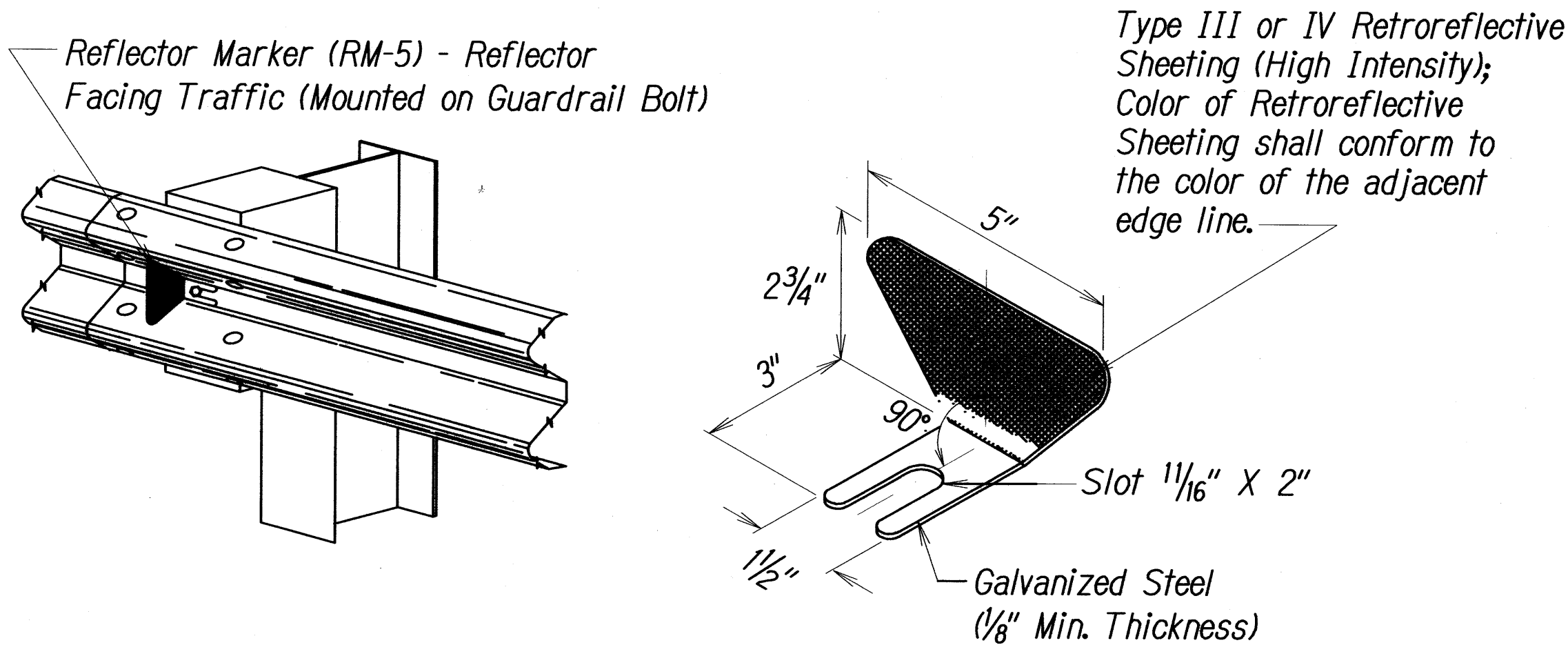
RECYCLED PLASTIC BLOCKOUT (TYPE I)



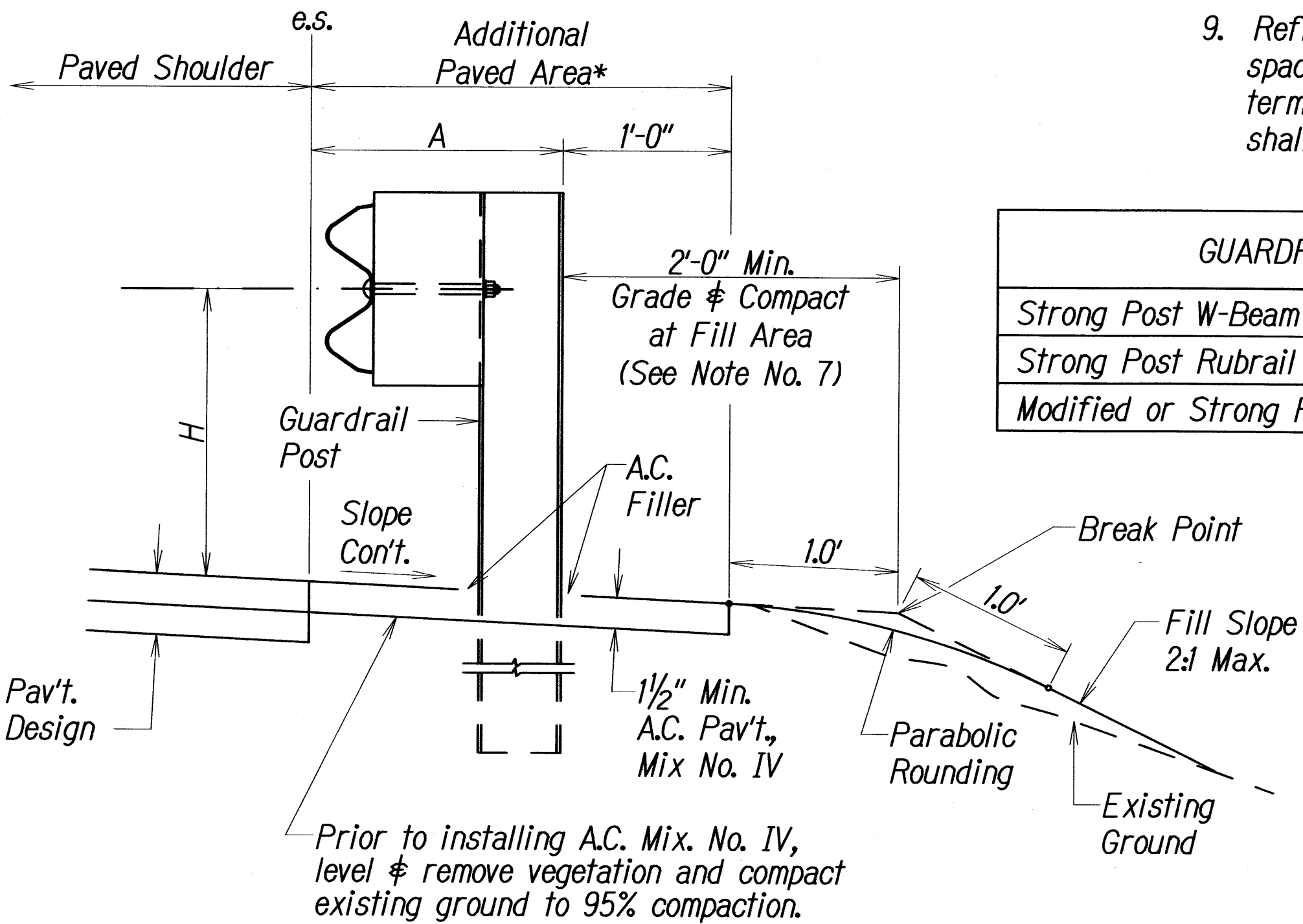
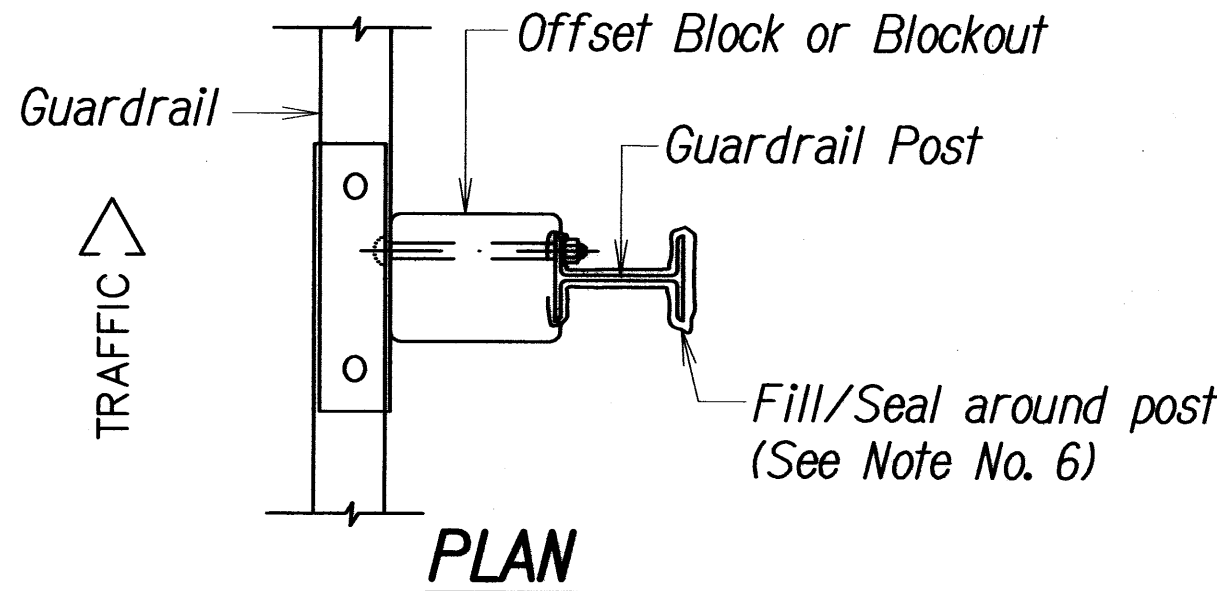
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)



**EXPLODED VIEW
(RAIL AND WASHER NOT SHOWN)
STEEL POST AND BLOCK DETAIL**



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



**ELEVATION
TYPICAL GUARDRAIL INSTALLATION**



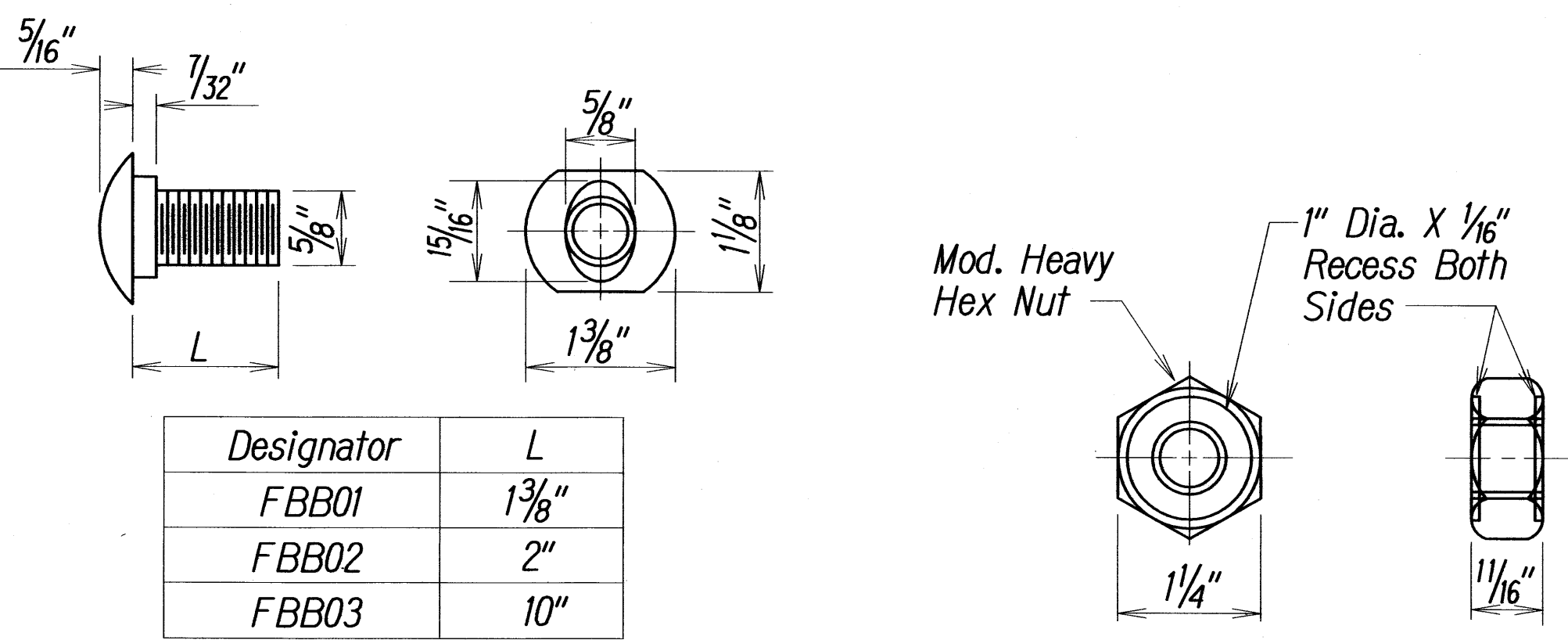
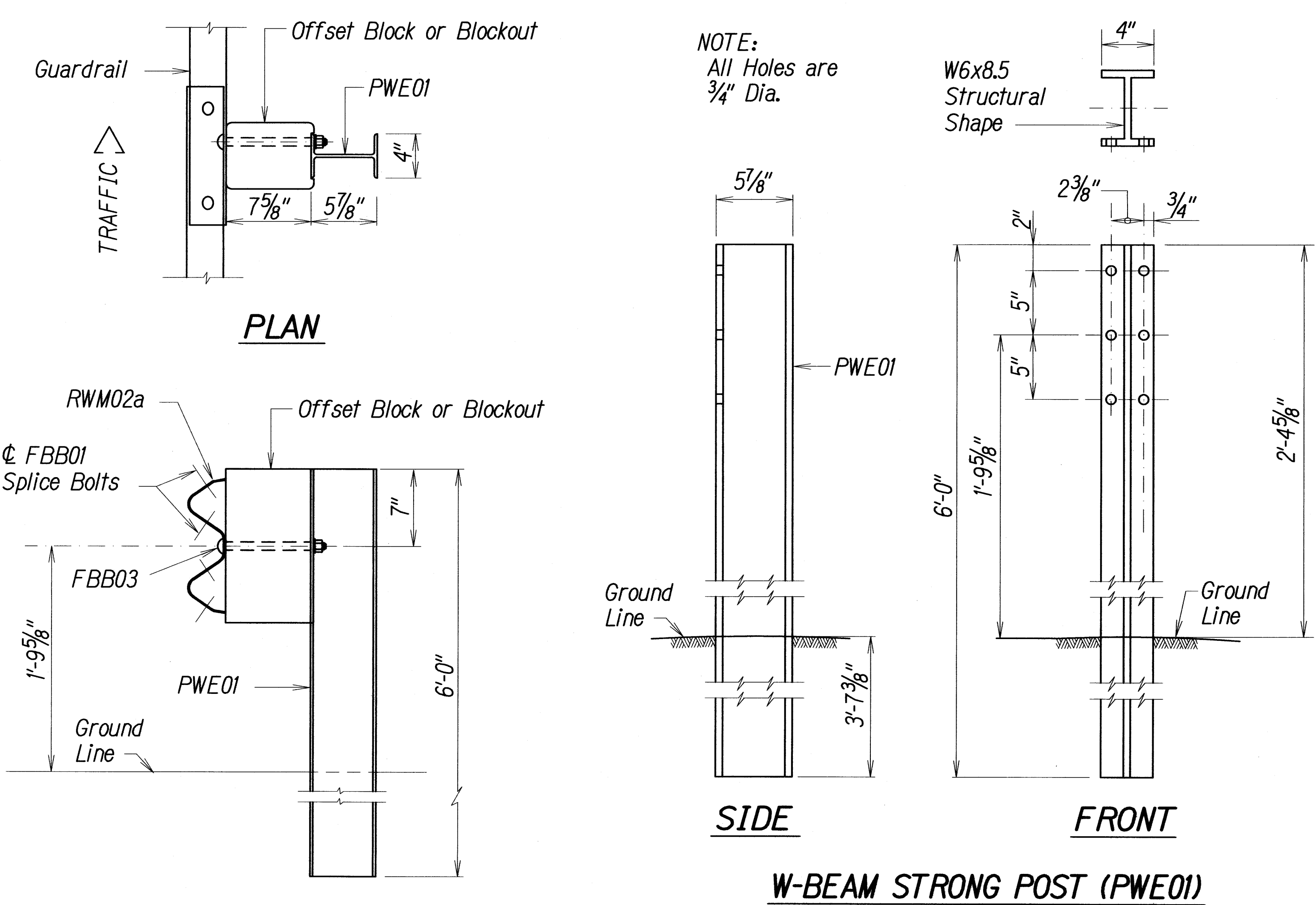
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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

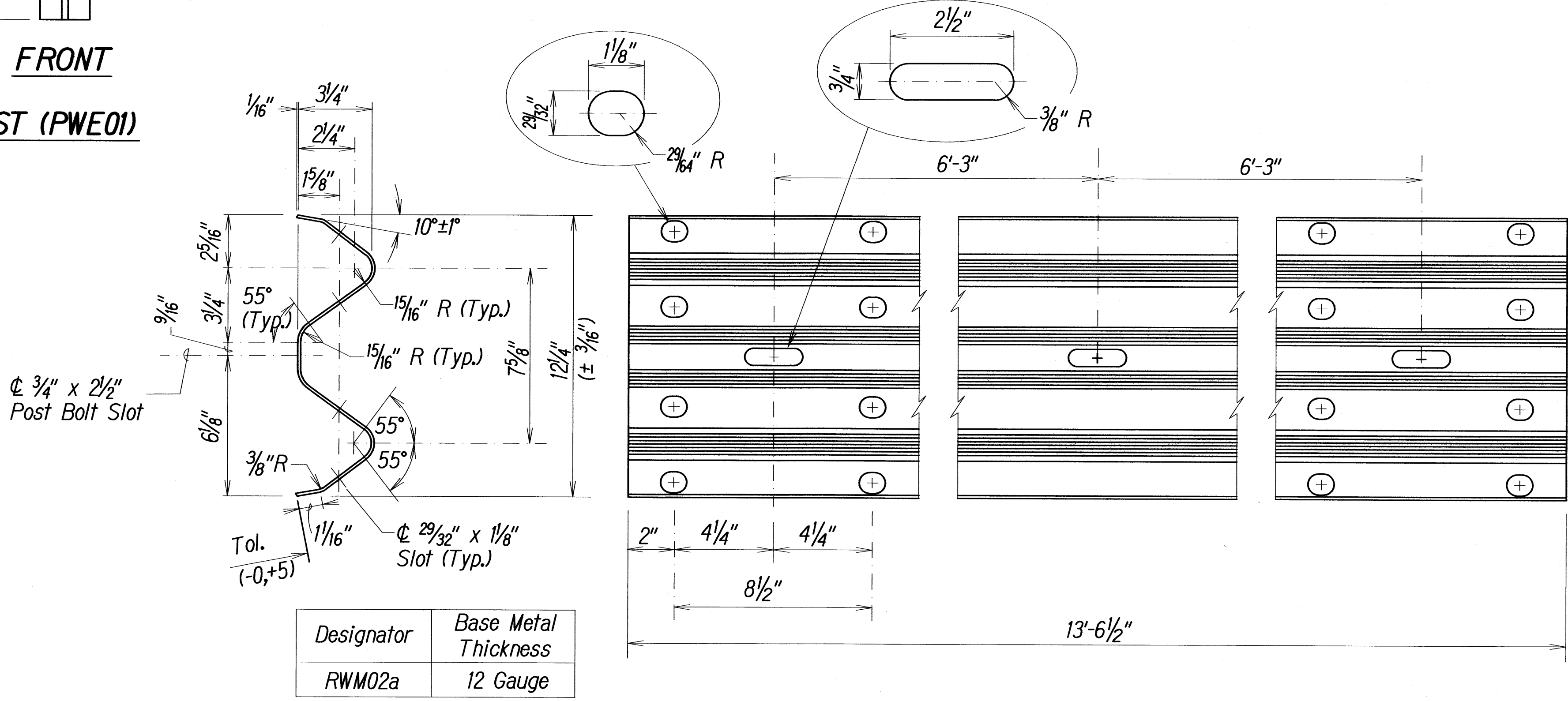
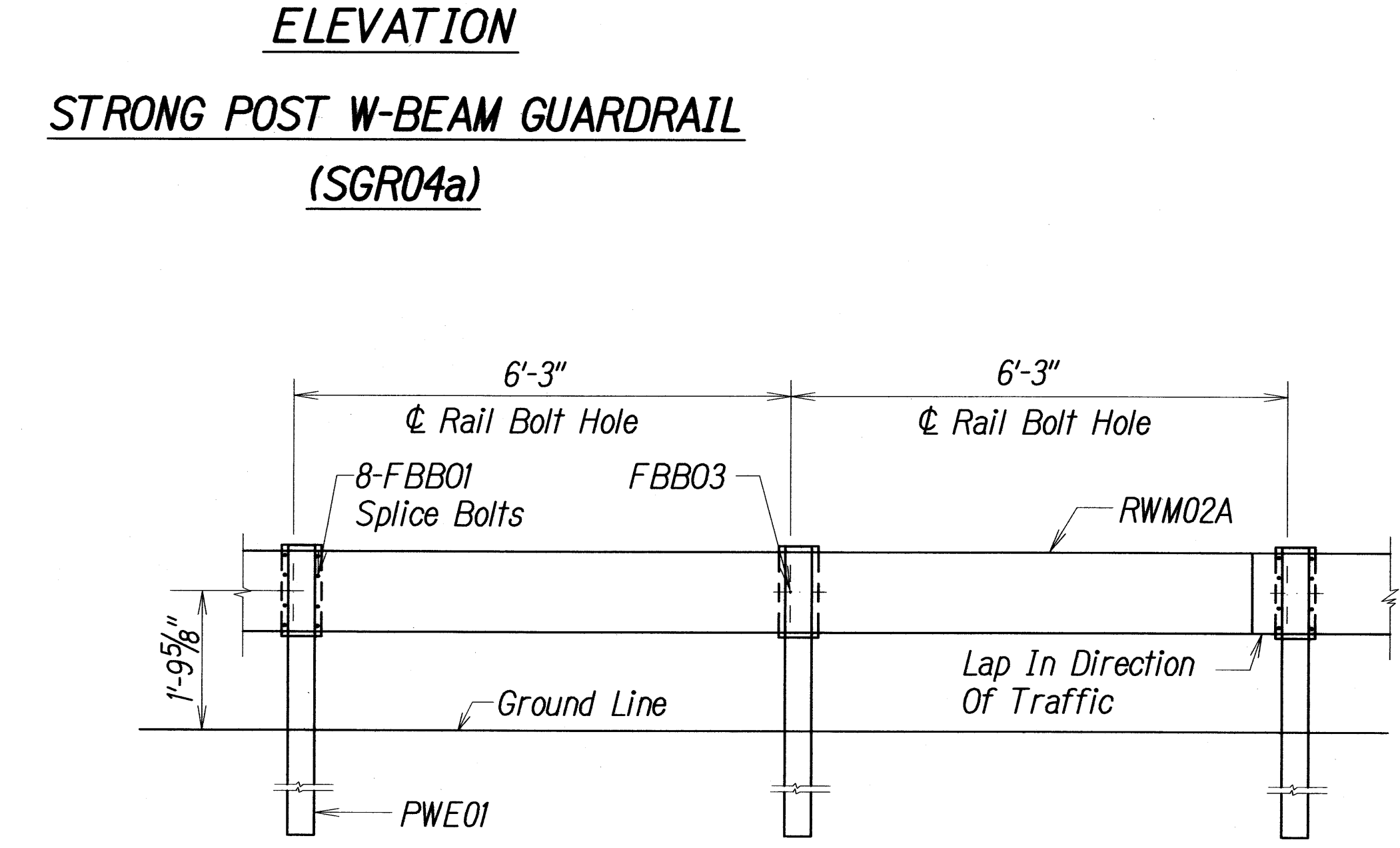
GUARDRAIL DETAILS & NOTES

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-1(38)
Scale: NTS Date: November 23, 2009

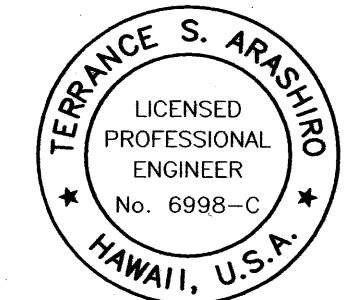
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K38	2010	90	213



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



Designator	Base Metal Thickness
RWM02a	12 Gauge

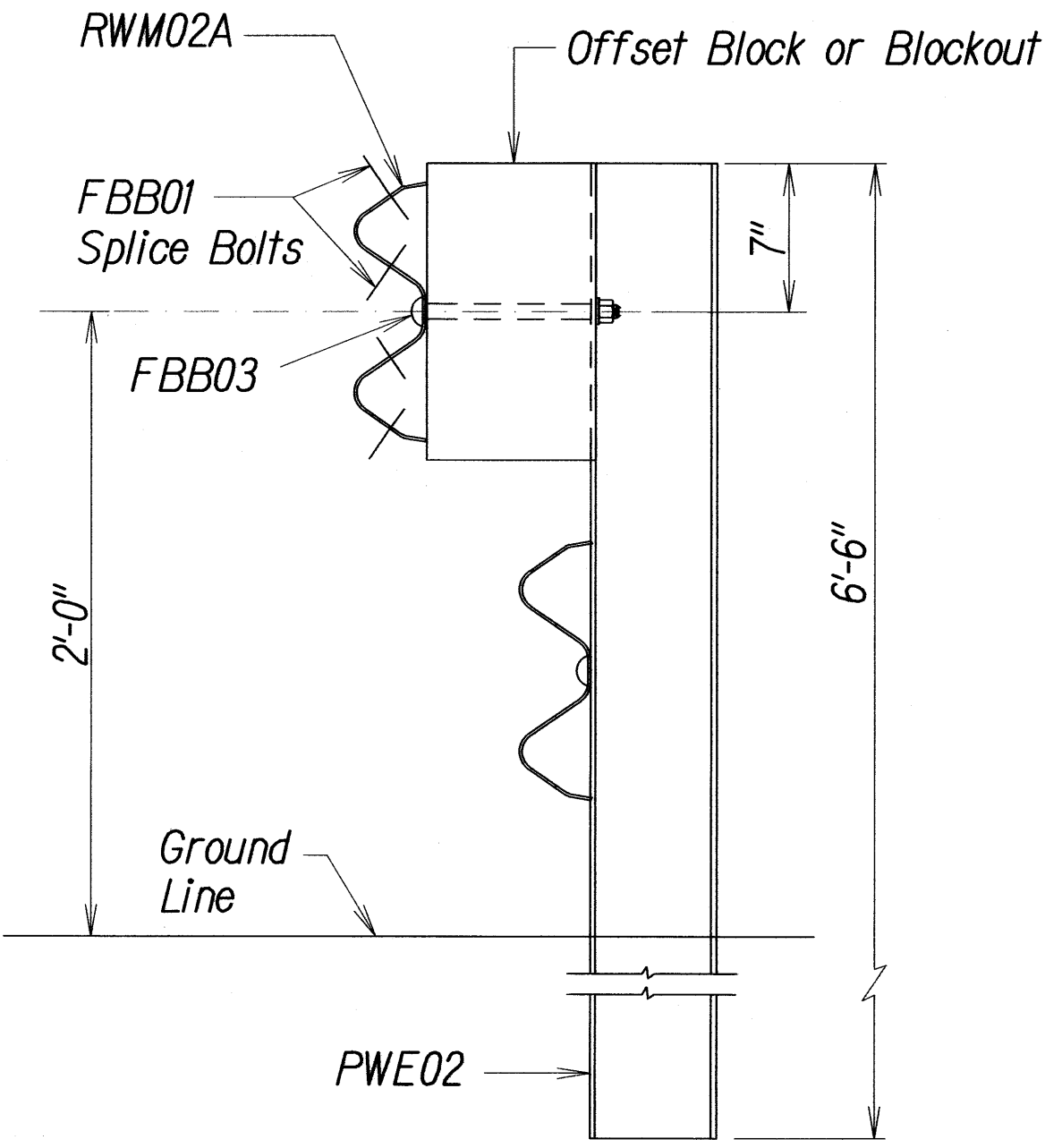


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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**STRONG POST
W-BEAM GUARDRAIL**
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K38
Scale: NTS Date: November 23, 2009

SHEET No. 2 OF 11 SHEETS
90

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K(38)	2010	91	213

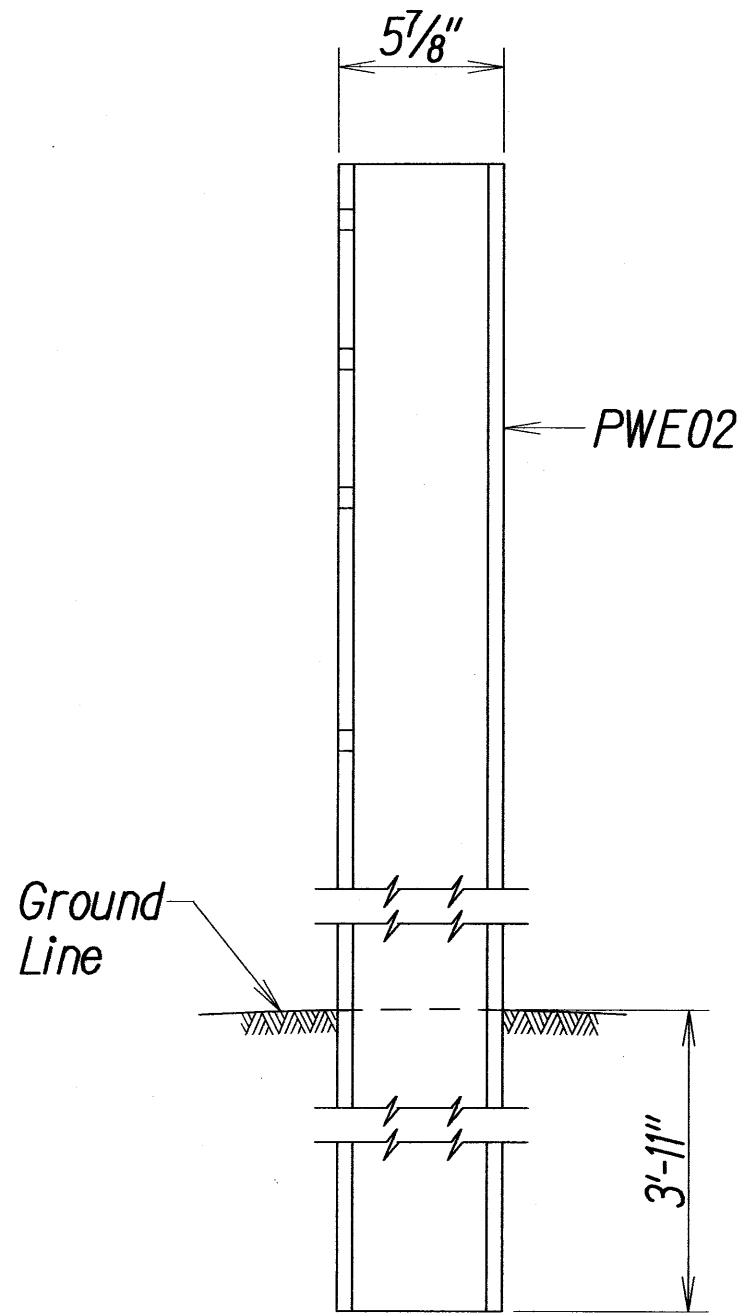


ELEVATION

STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL

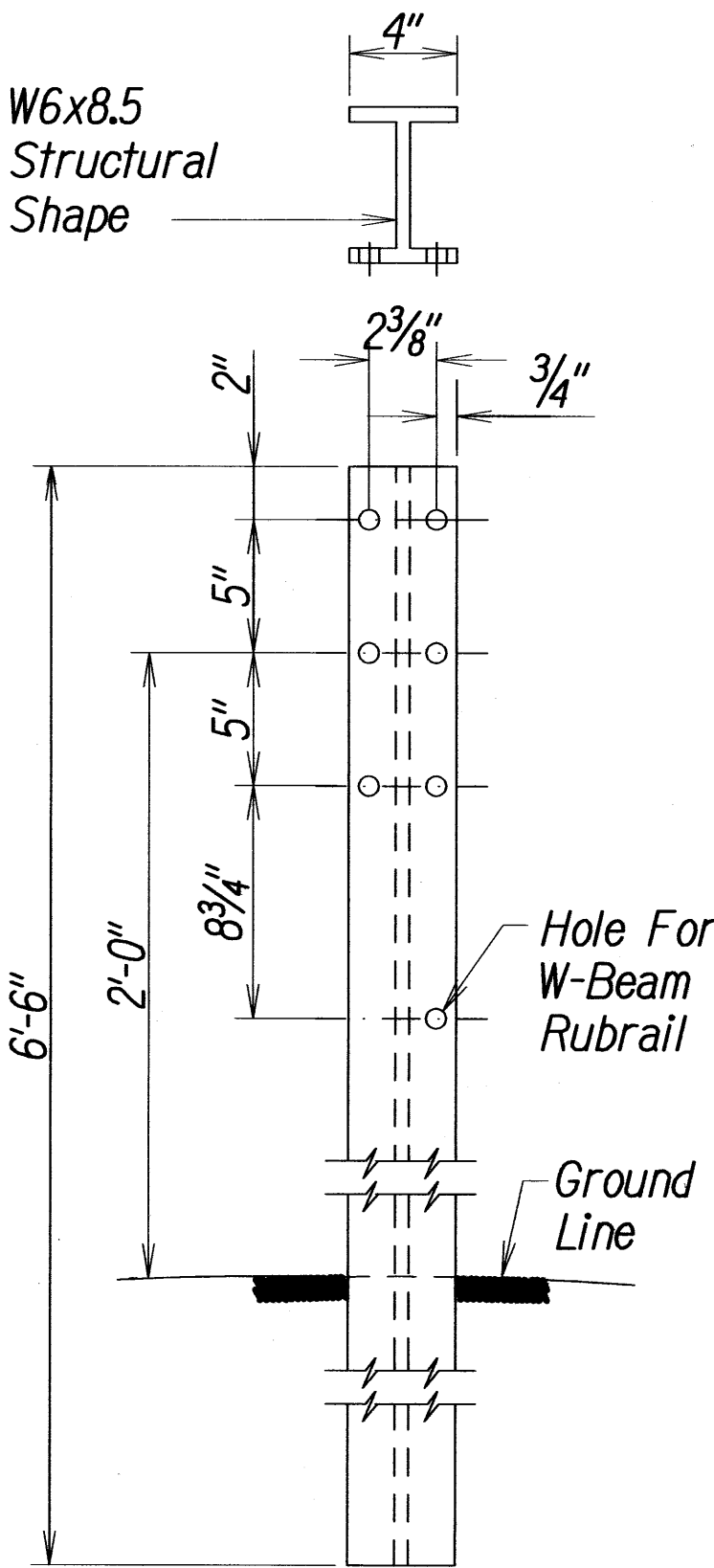
NOTE:
All Holes Are 3/4" Dia.

W6x8.5
Structural
Shape

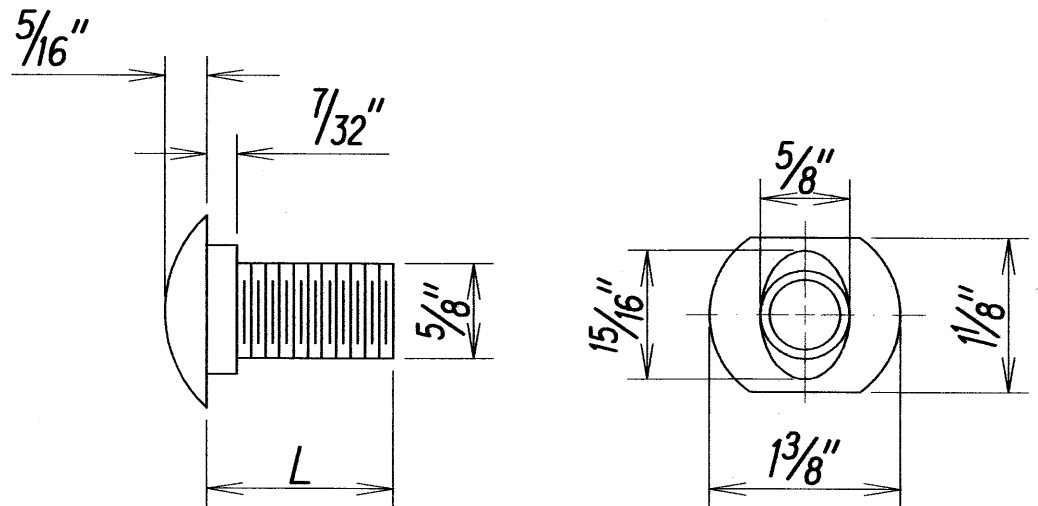


SIDE

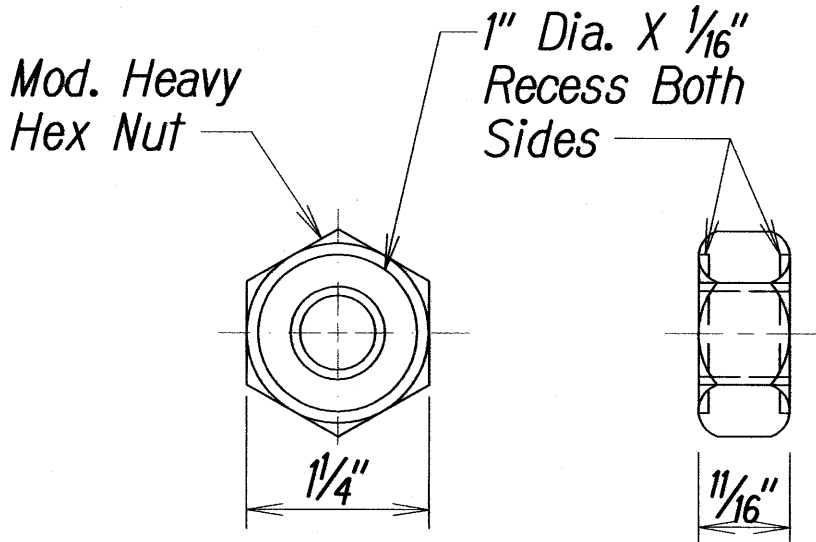
W-BEAM STRONG POST (PWE02)



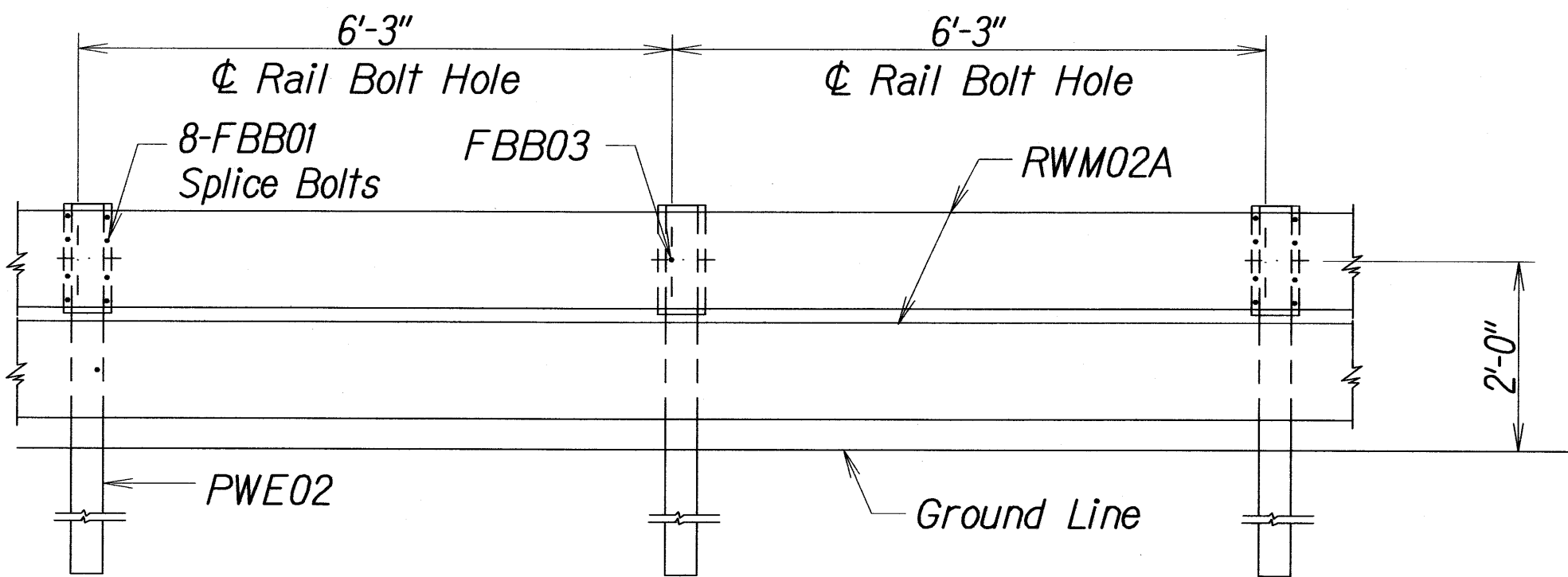
FRONT



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

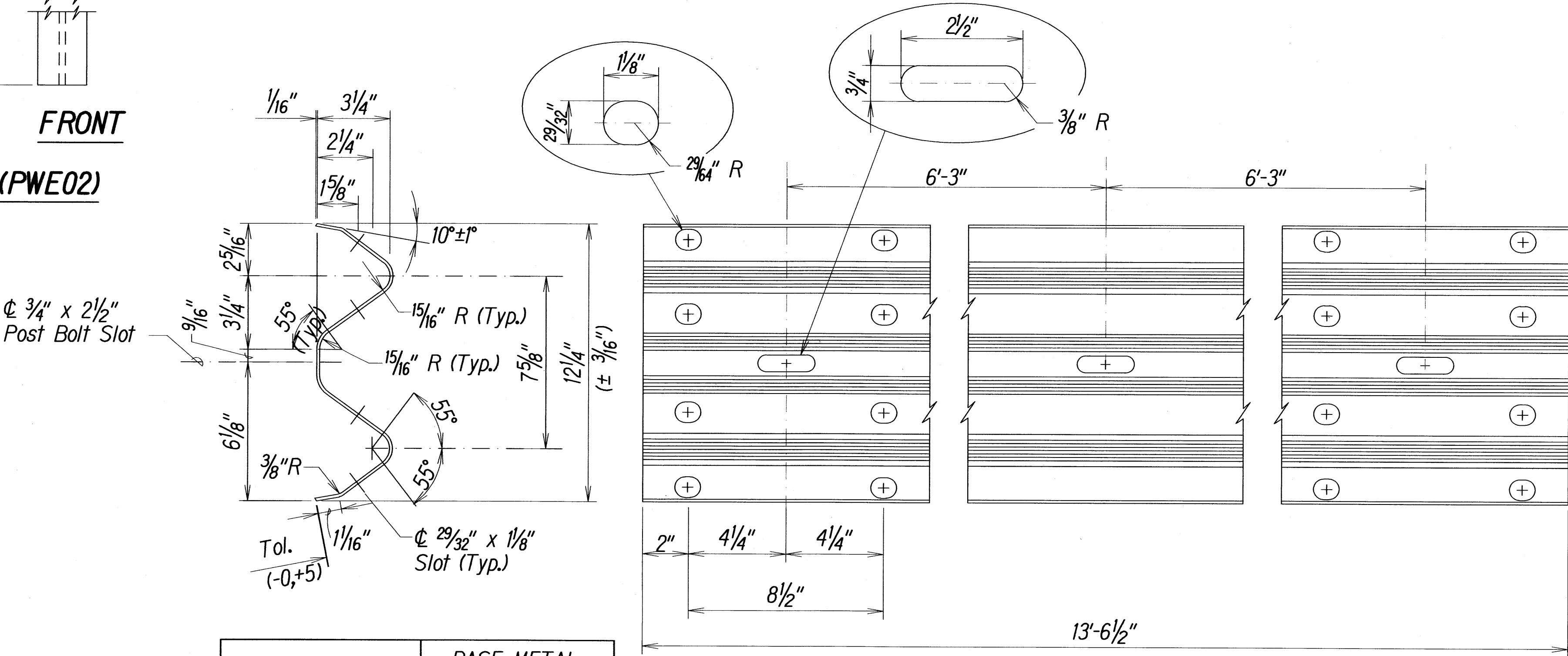


GUARDRAIL BOLTS AND RECESSED NUT



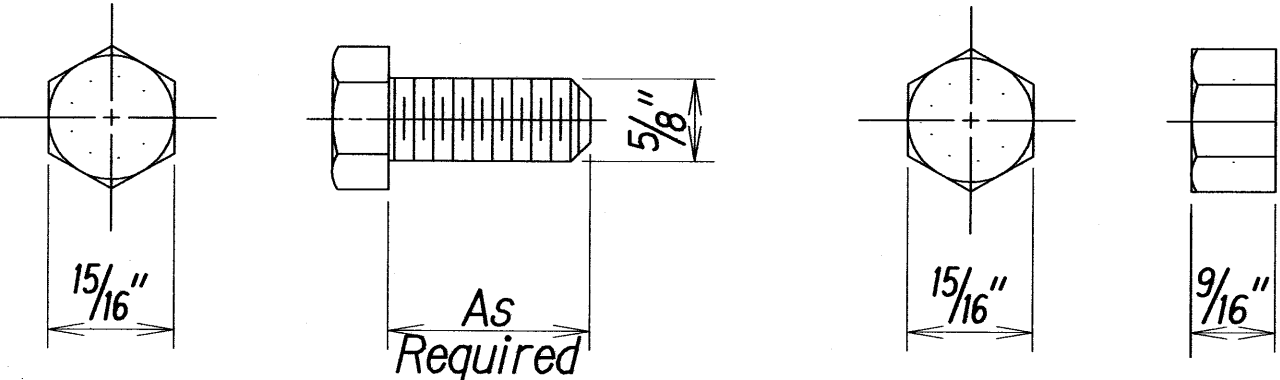
ELEVATION

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)



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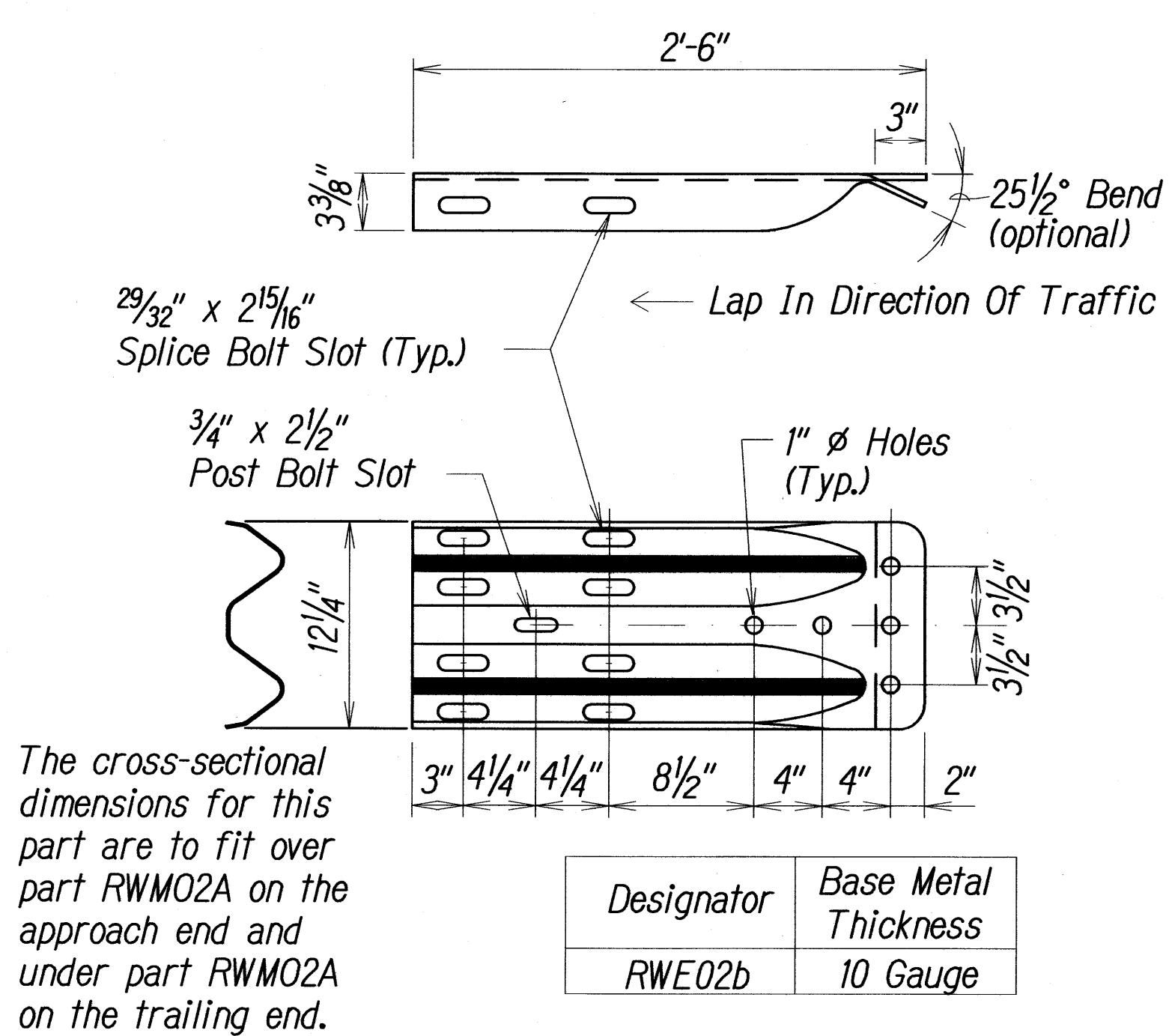
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K(38)

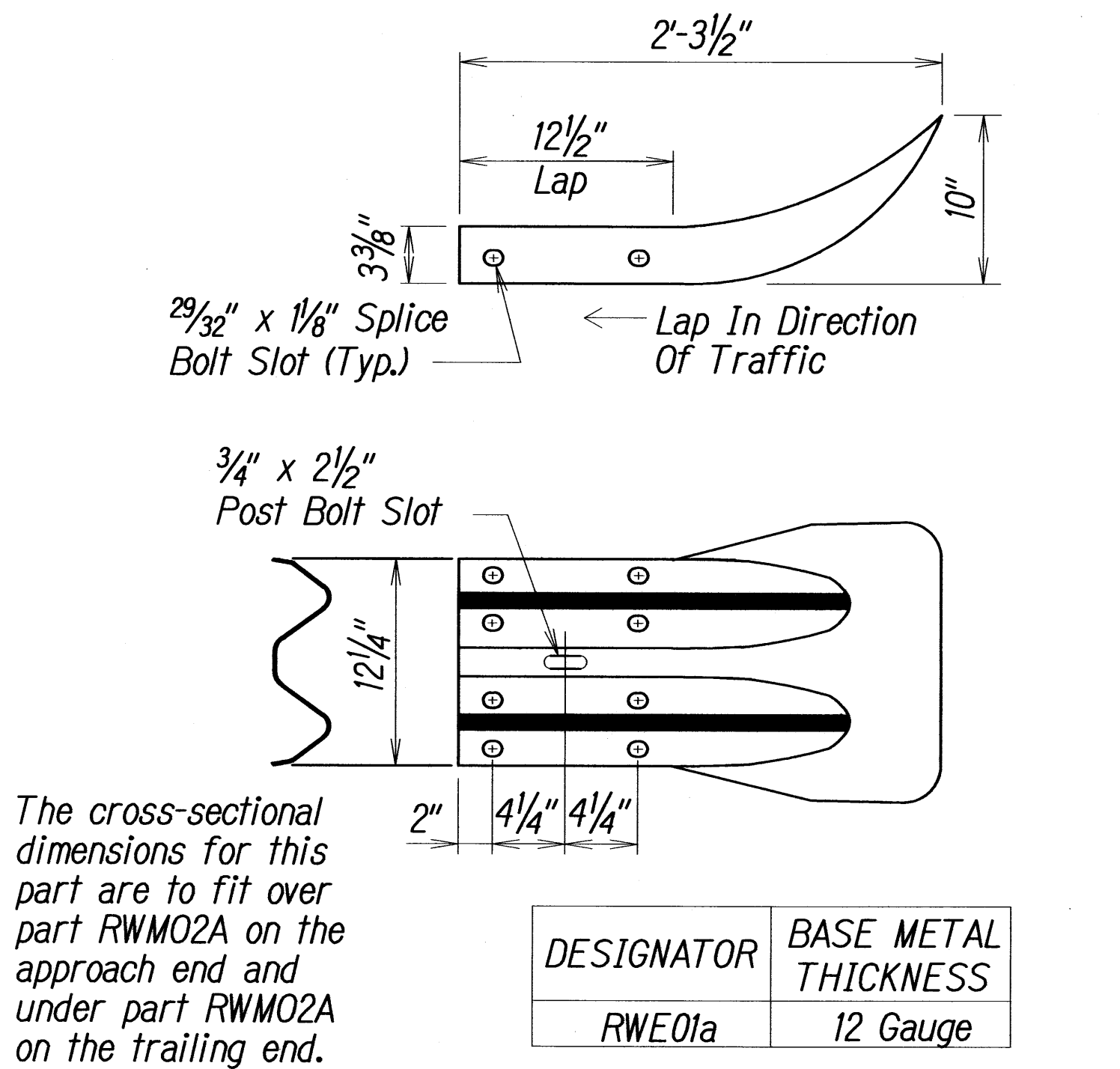
Scale: NTS

Date: November 23, 2009

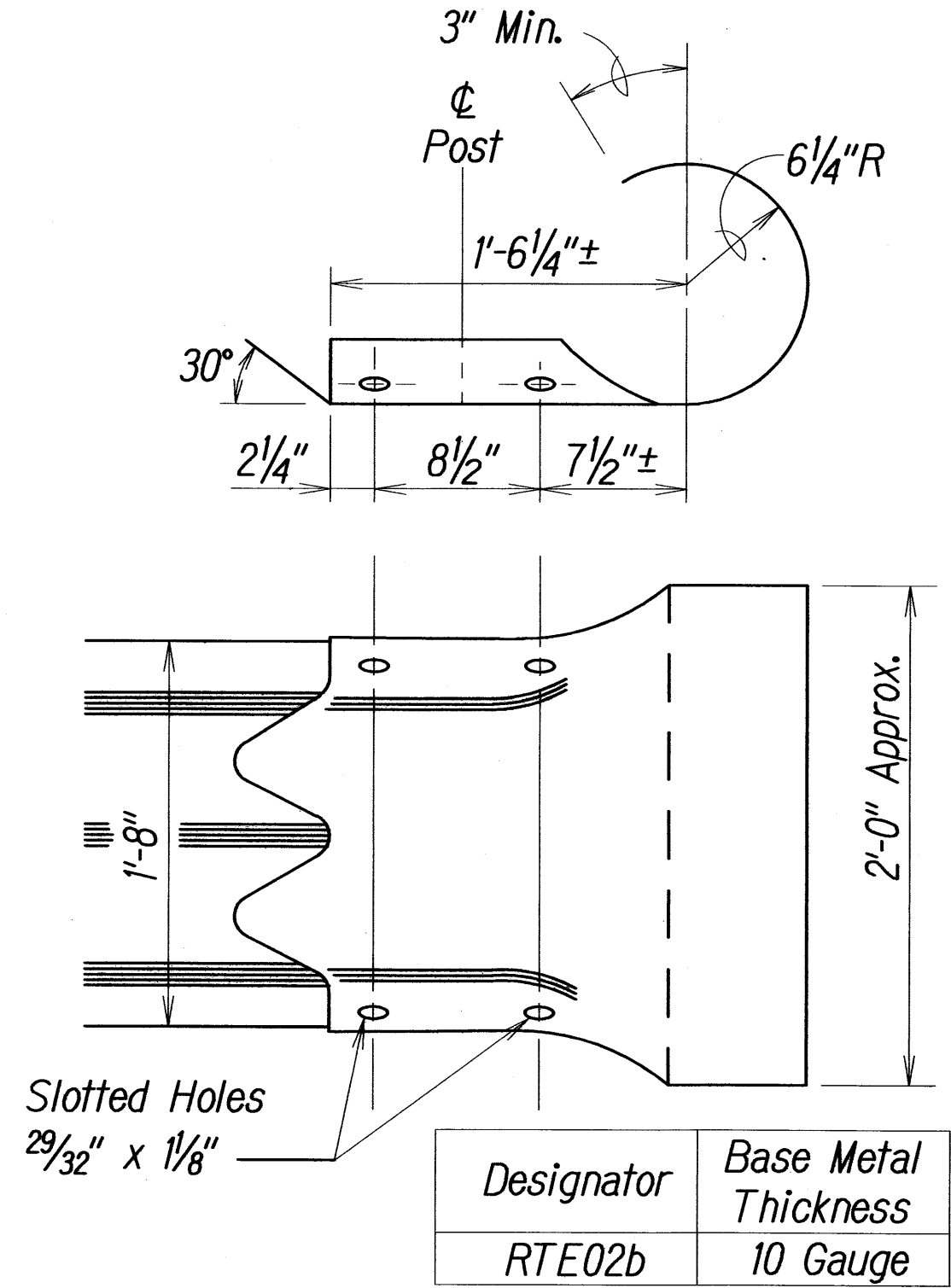
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(38)	2010	93	213



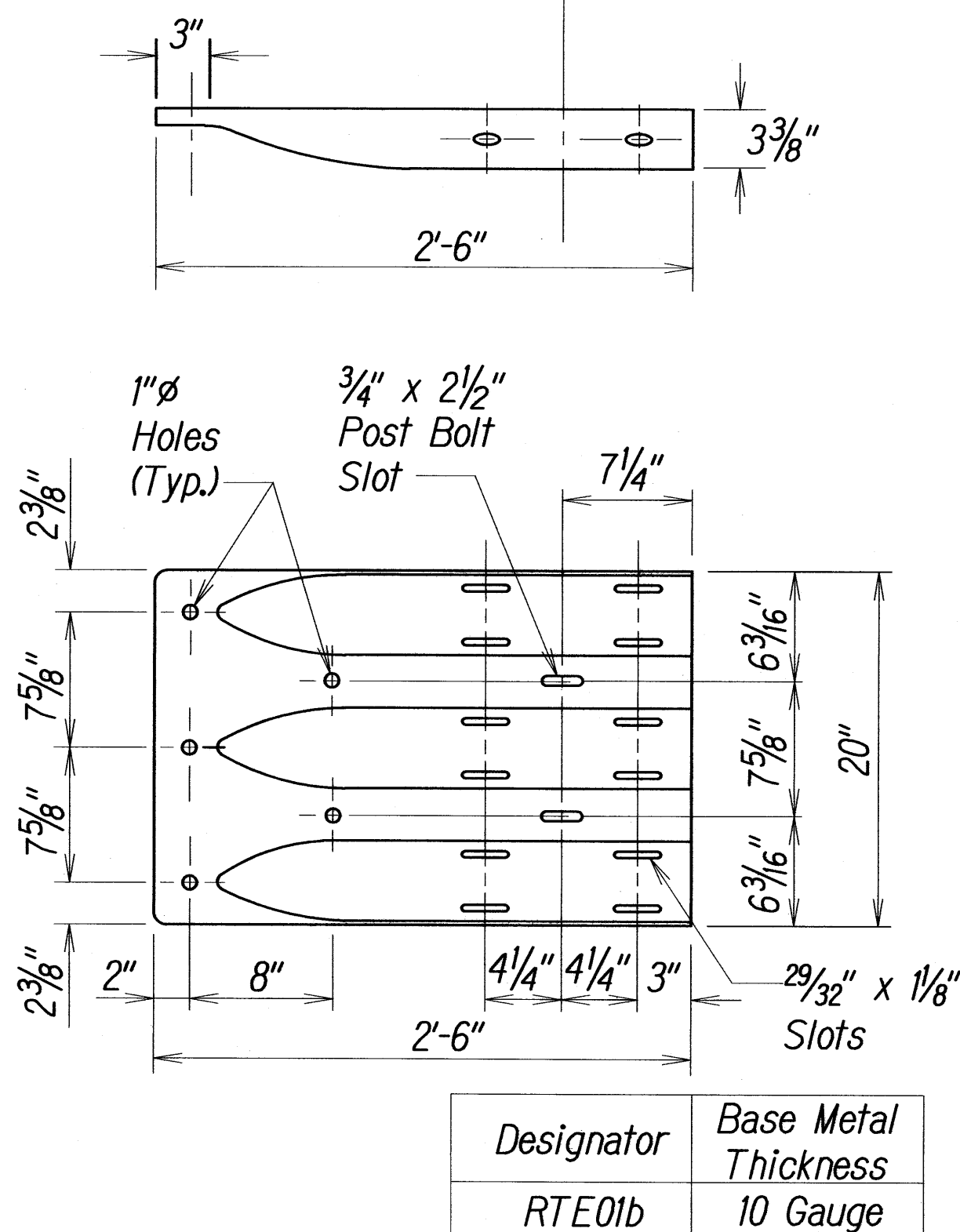
W-BEAM TERMINAL CONNECTOR (RWE02B)



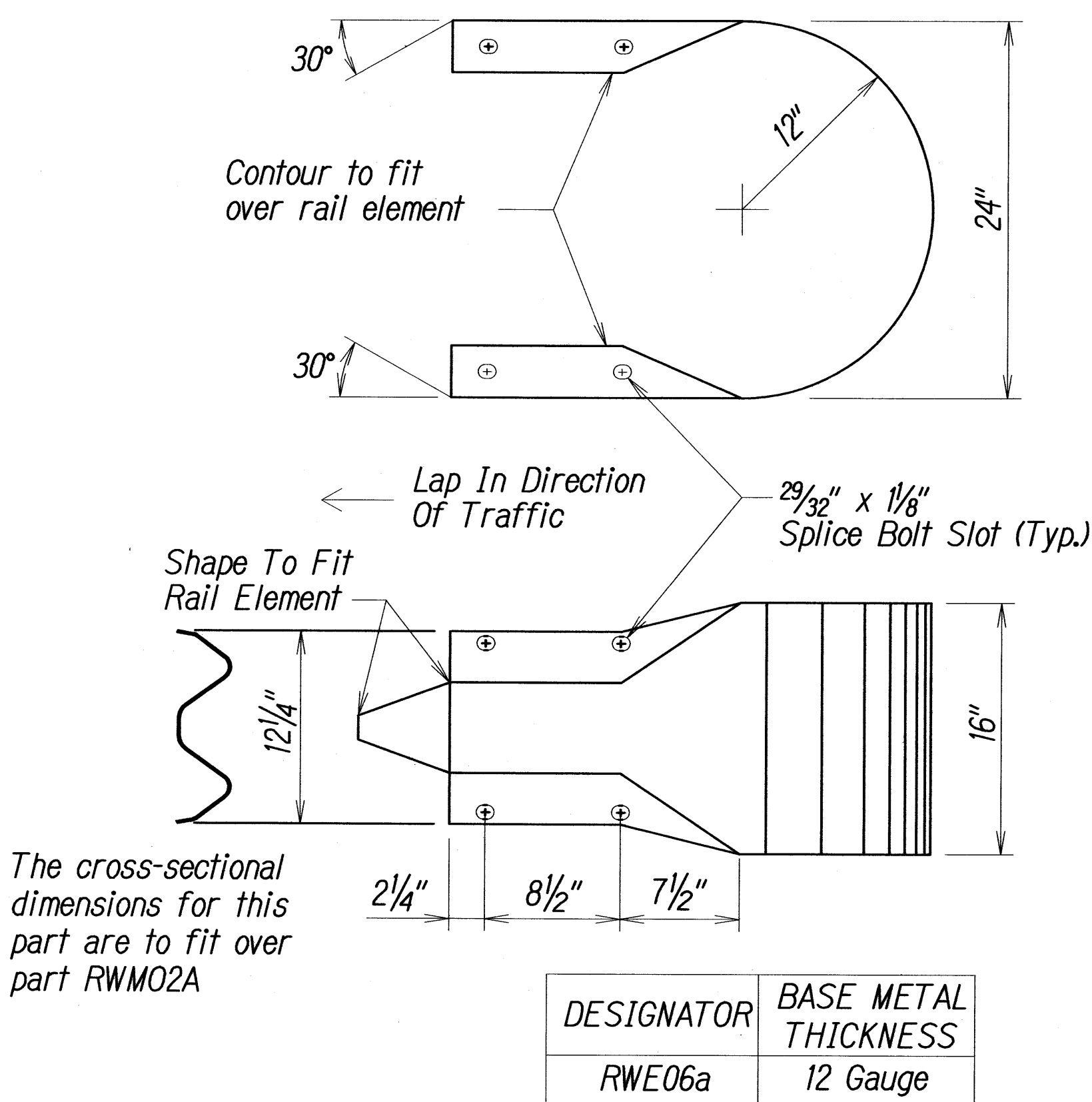
W-BEAM END SECTION (FLARED RWE01A)



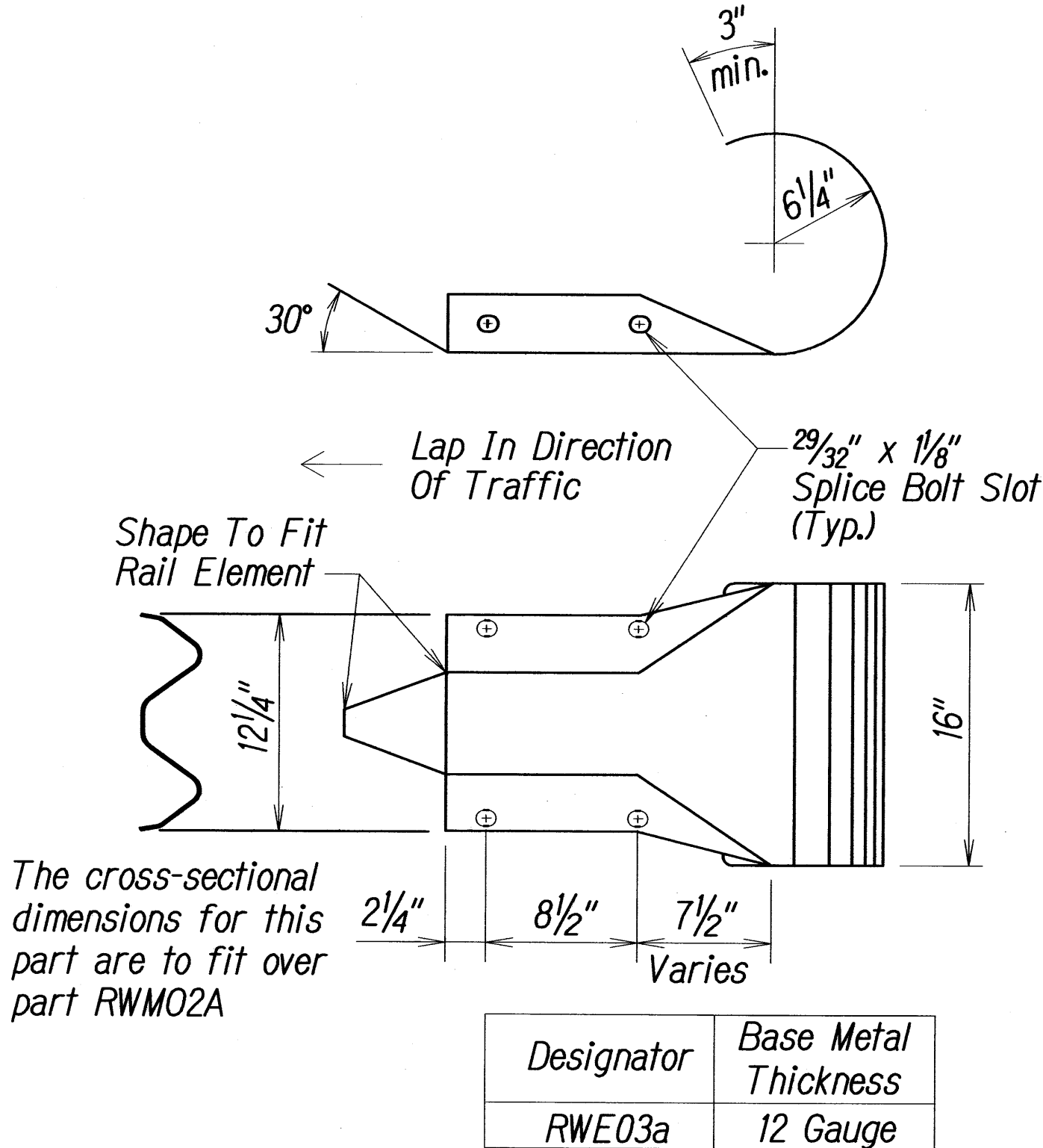
THRIE-BEAM SECTION (ROUNDED) (RTE02B)



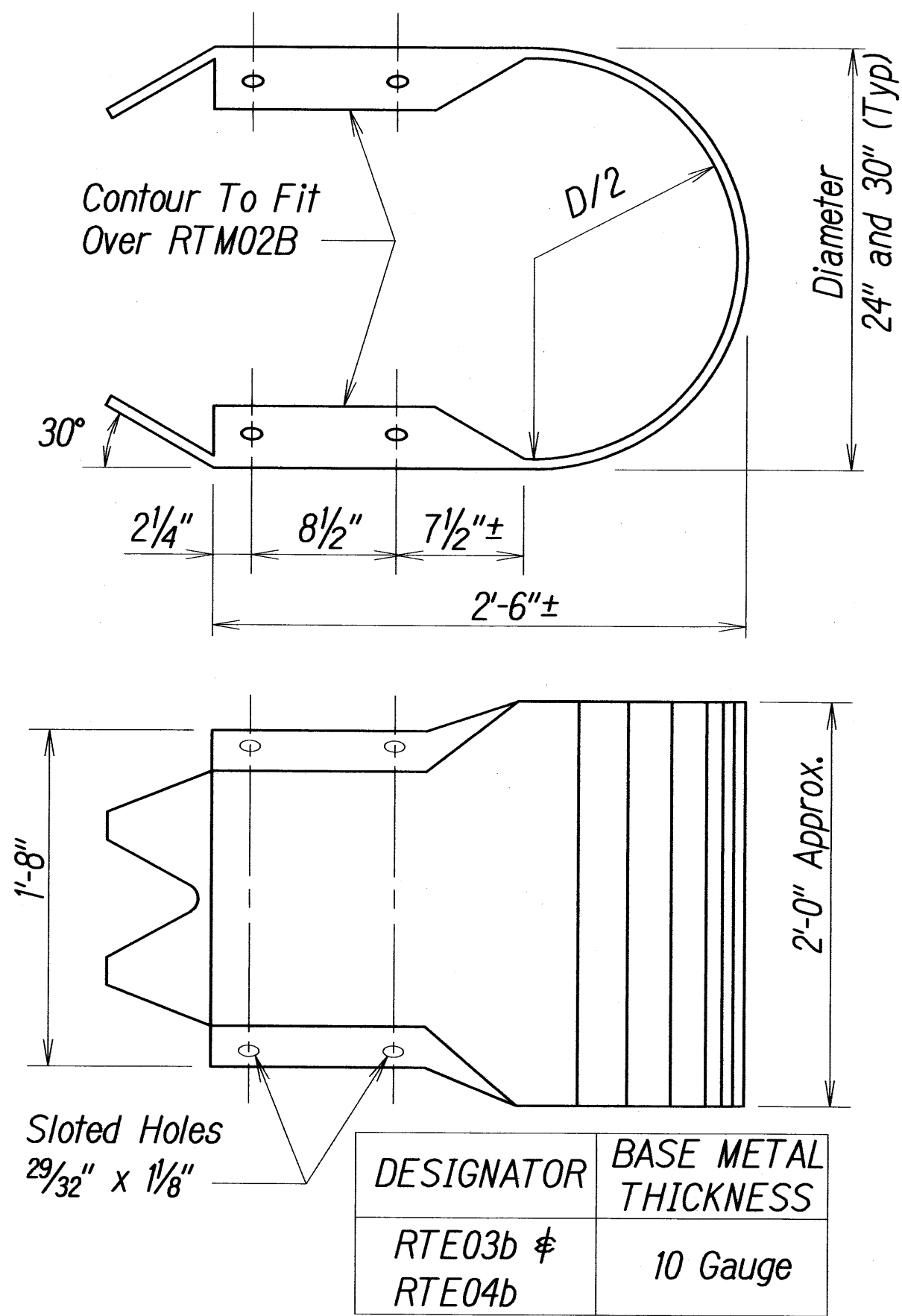
THRIE-BEAM TERMINAL CONNECTOR (RTE01B)



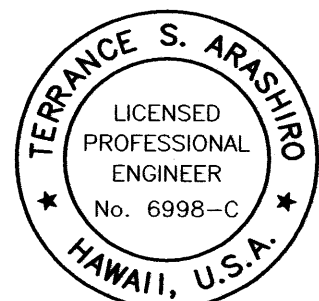
W-BEAM END SECTION (BUFFER RWE06A)



W-BEAM END SECTION (ROUNDED RWE03A)



THRIE-BEAM END SECTION (BUFFER RTE03B or RTE04B)

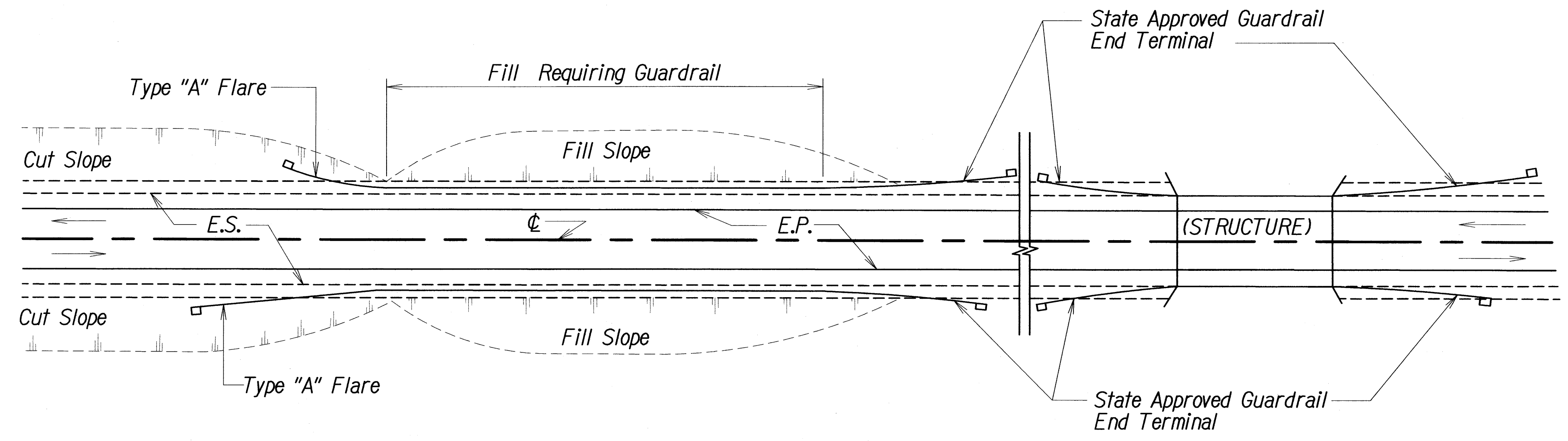


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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL TERMINAL CONNECTORS & END SECTIONS
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
LahainaIuna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-1(38)
Scale: NTS
Date: November 23, 2009

SHEET No. 5 OF 11 SHEETS

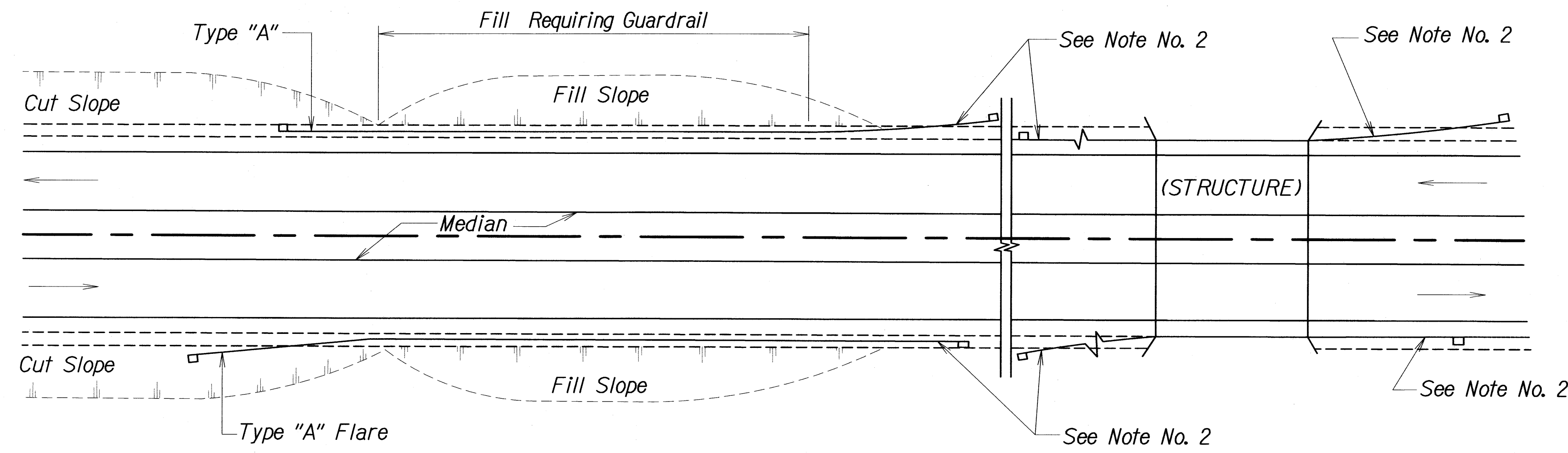
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K(38)	2010	94	213



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)



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

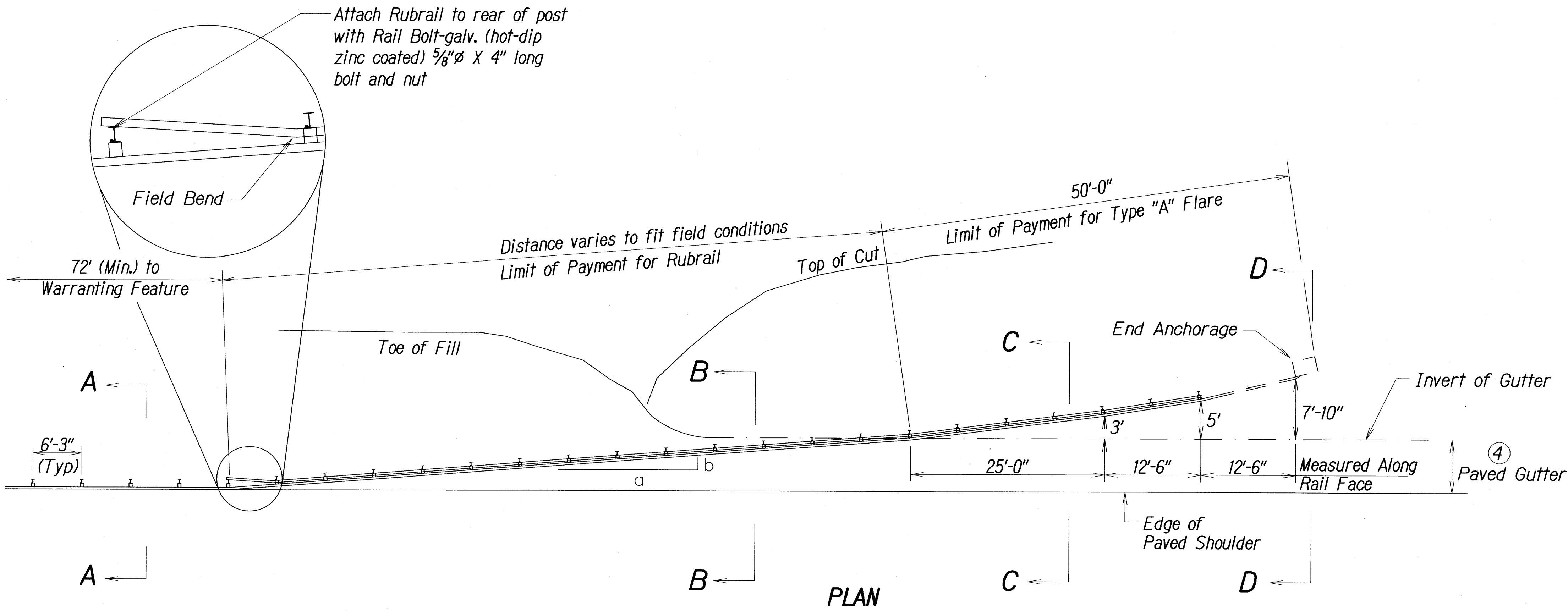
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K(38)

Scale: NTS Date: November 23, 2009

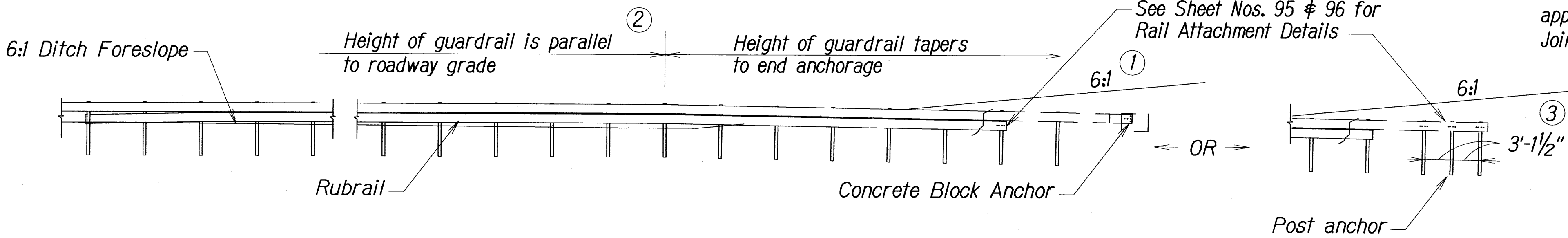
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K38	2010	95	213

GENERAL NOTES:

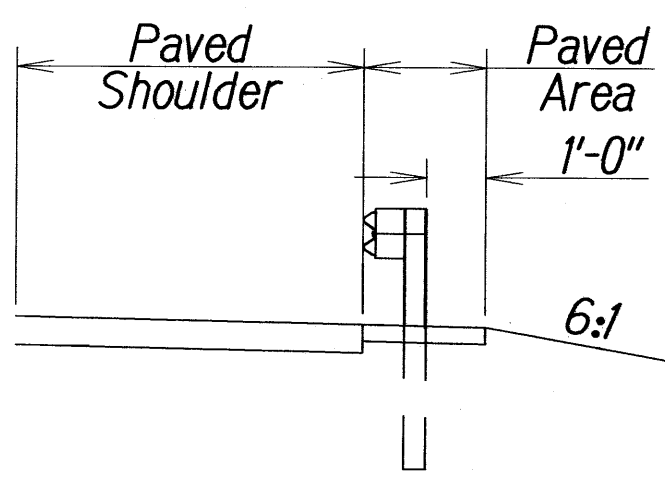
1. A 6:1 or flatter slope is desirable. however, a steeper or flatter existing slope may be used.
2. Height of guardrail may be tapered down in elevation to maintain 3'-8" maximum height.
3. All posts are 8'-0" in length from where the guardrail flares away from the shoulder back to the post anchor. 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.



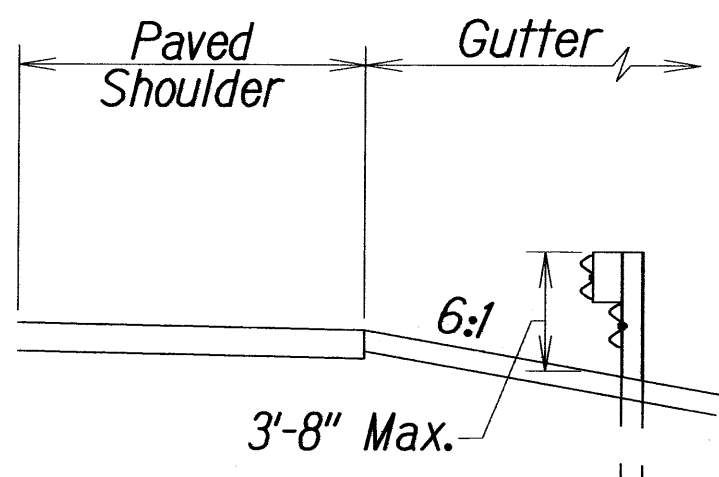
Design Speed MPH	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



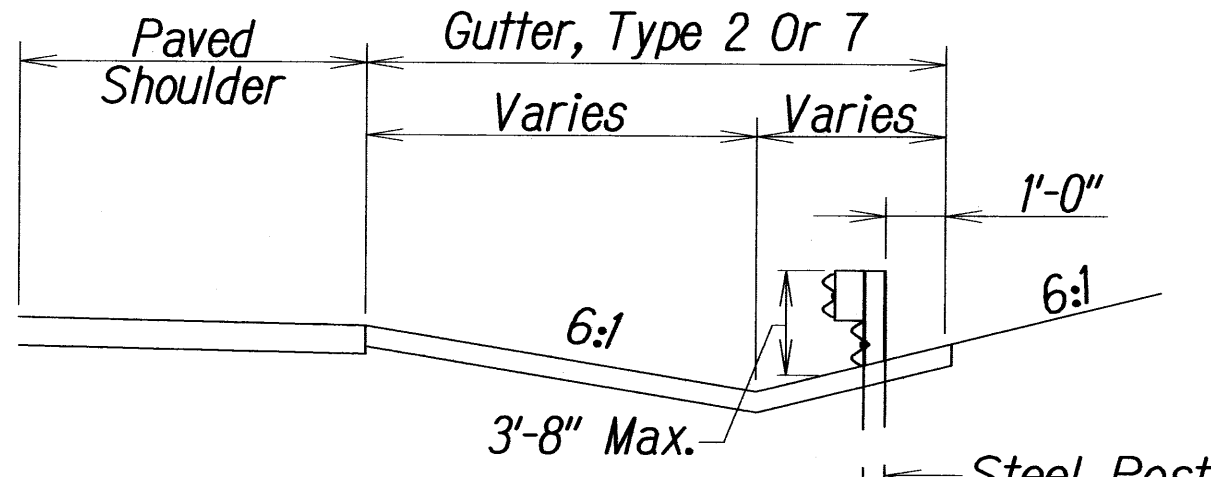
ELEVATION (Profile Along Rail)



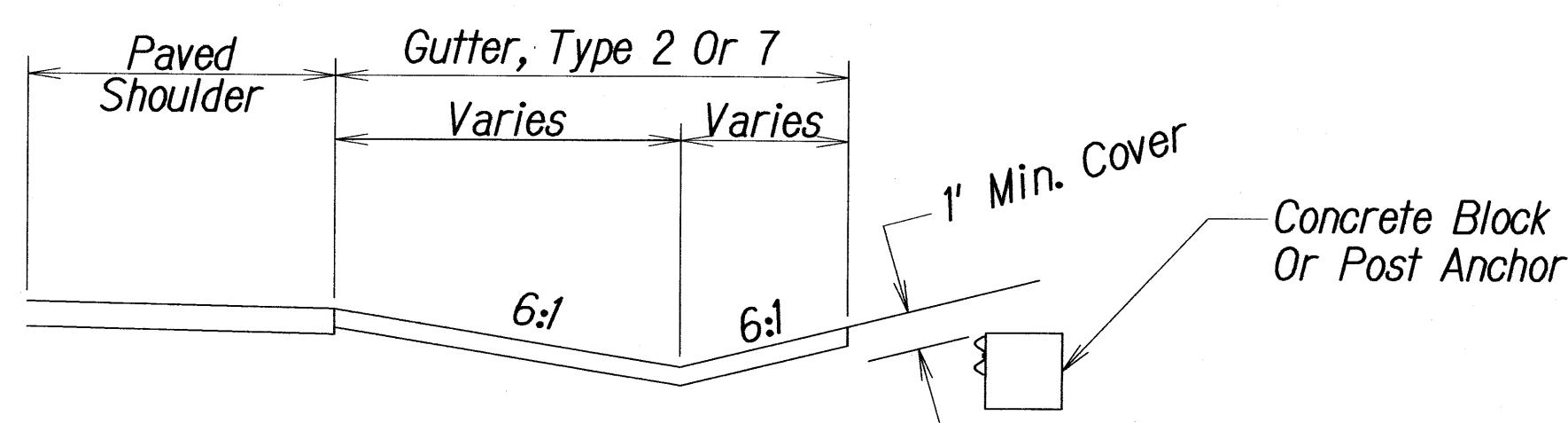
SECTION A - A



**SECTION B - B
(WITH RUBRAIL)**

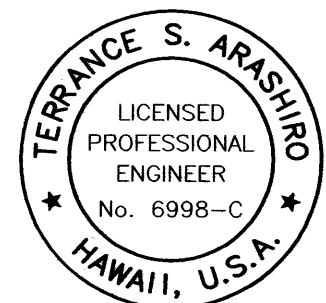


**SECTION C - C
(WITH RUBRAIL)**



SECTION D - D

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

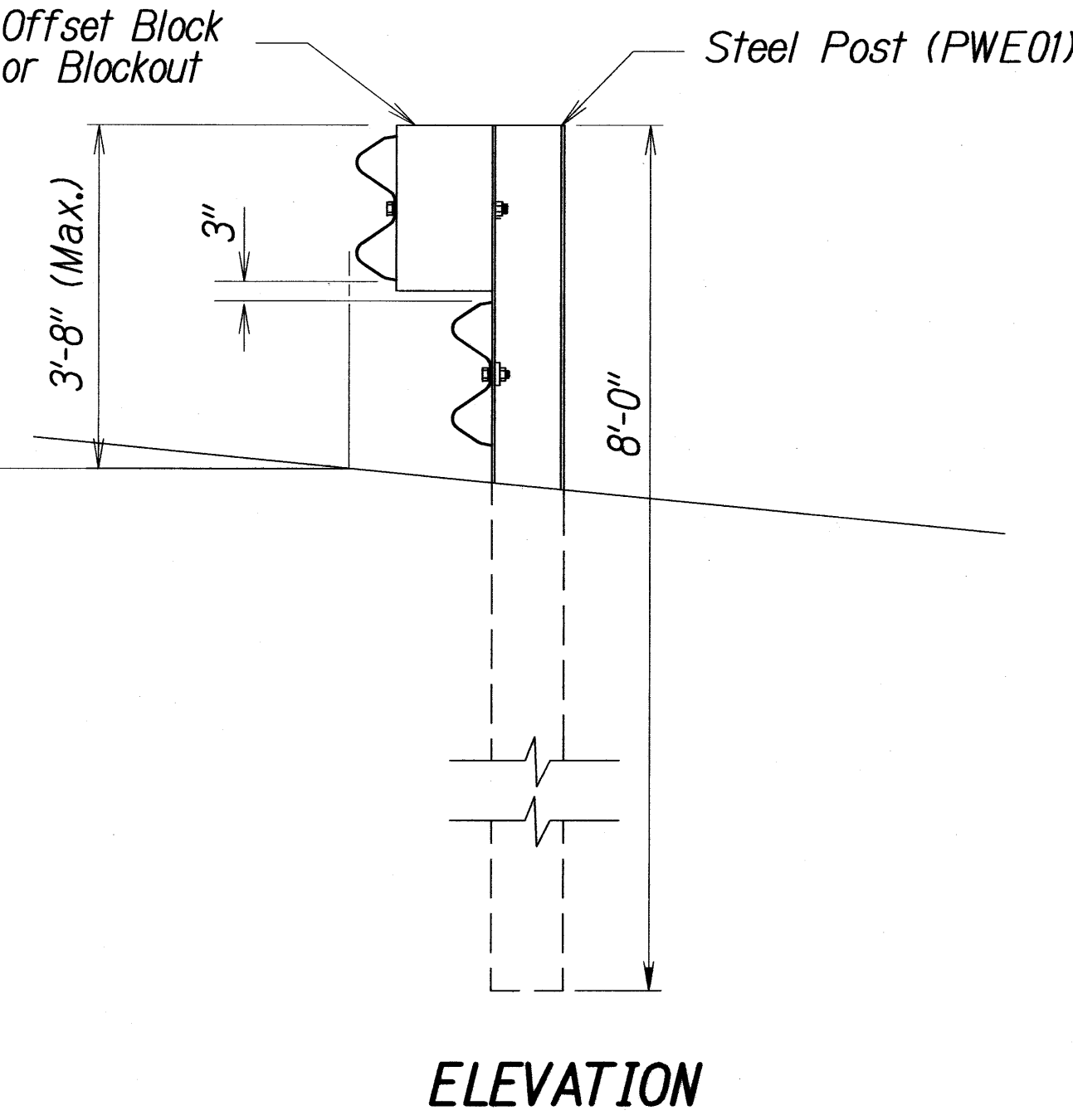
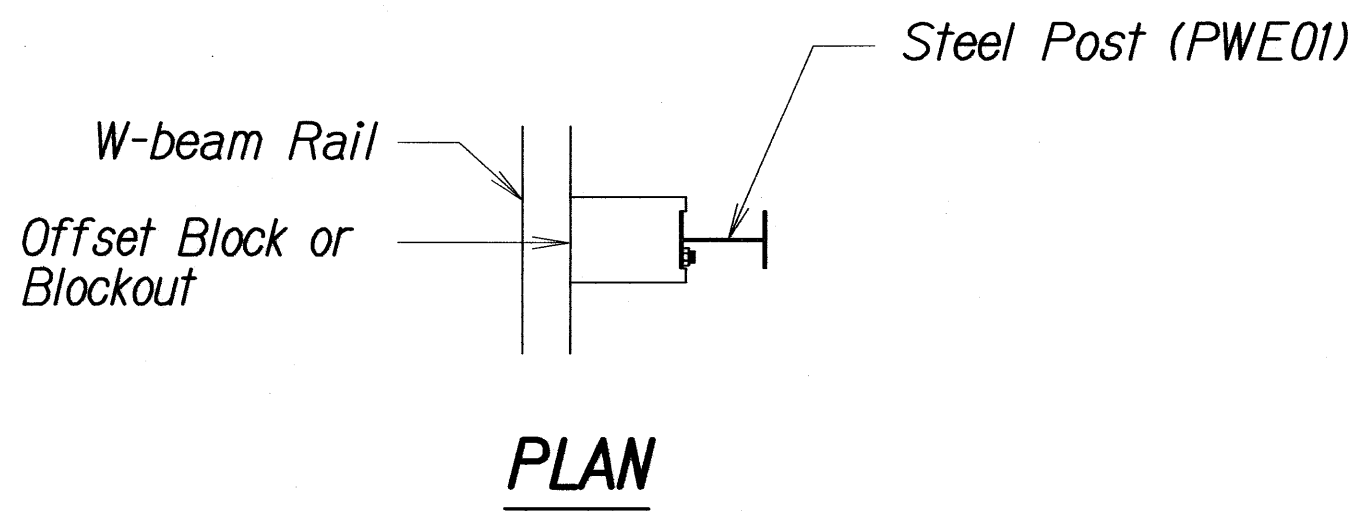


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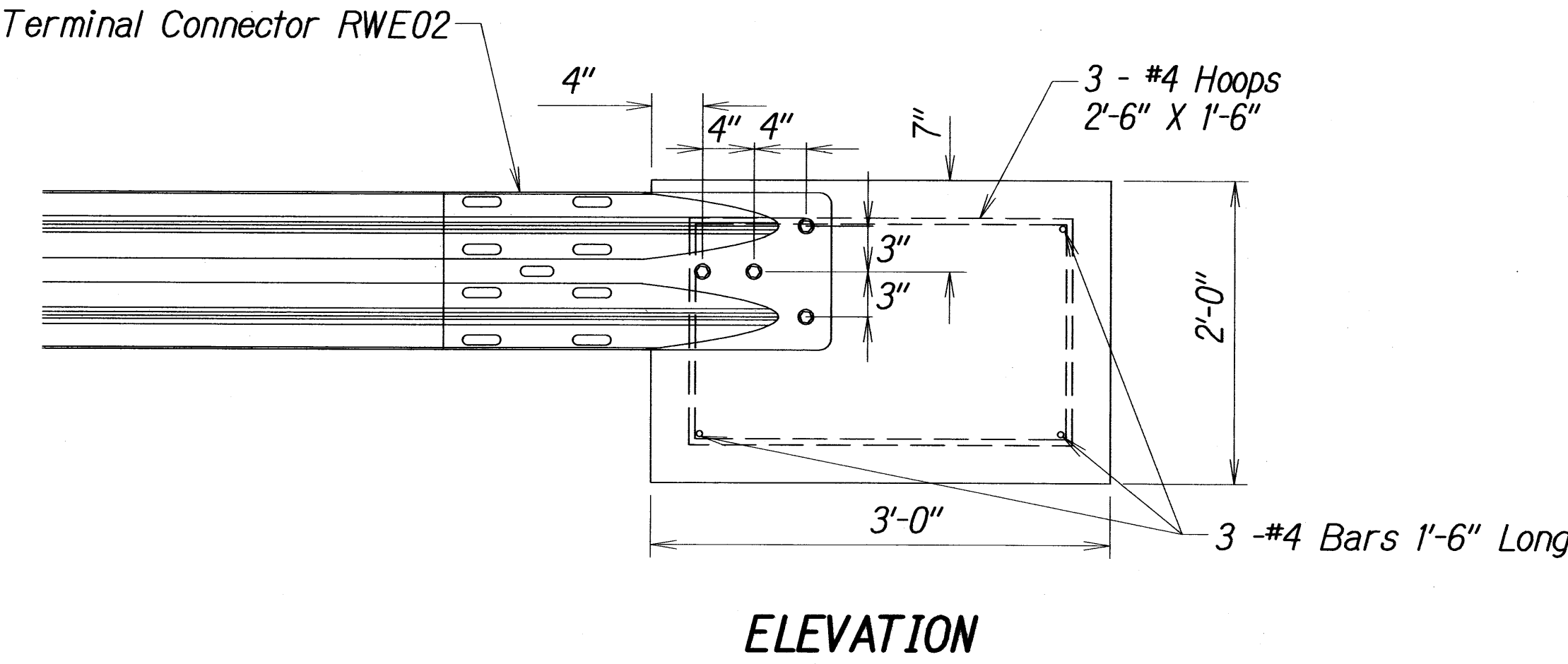
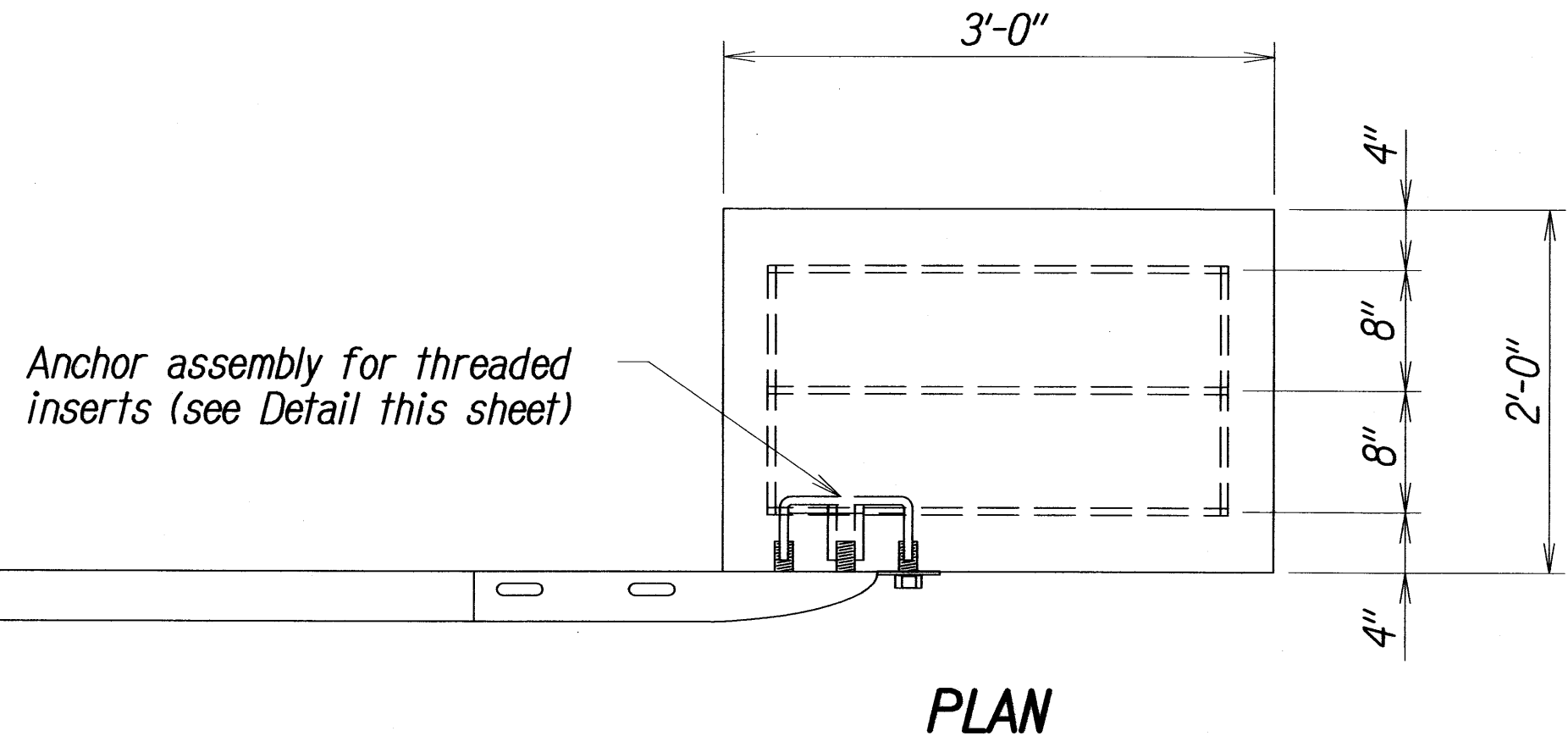
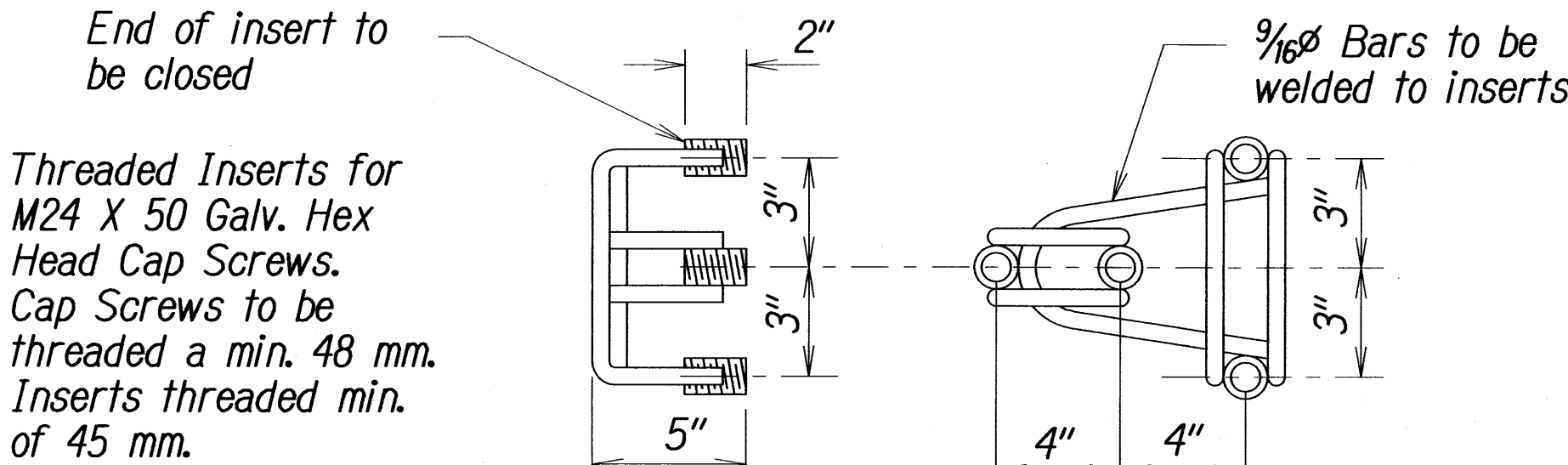
STATE OF HAWAII
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HIGHWAYS DIVISION

TYPE "A" FLARE
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K38
Scale: NTS Date: November 23, 2009

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K(38)	2010	96	213



**STEEL POST GUARDRAIL
WITH RUBRAIL**



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

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



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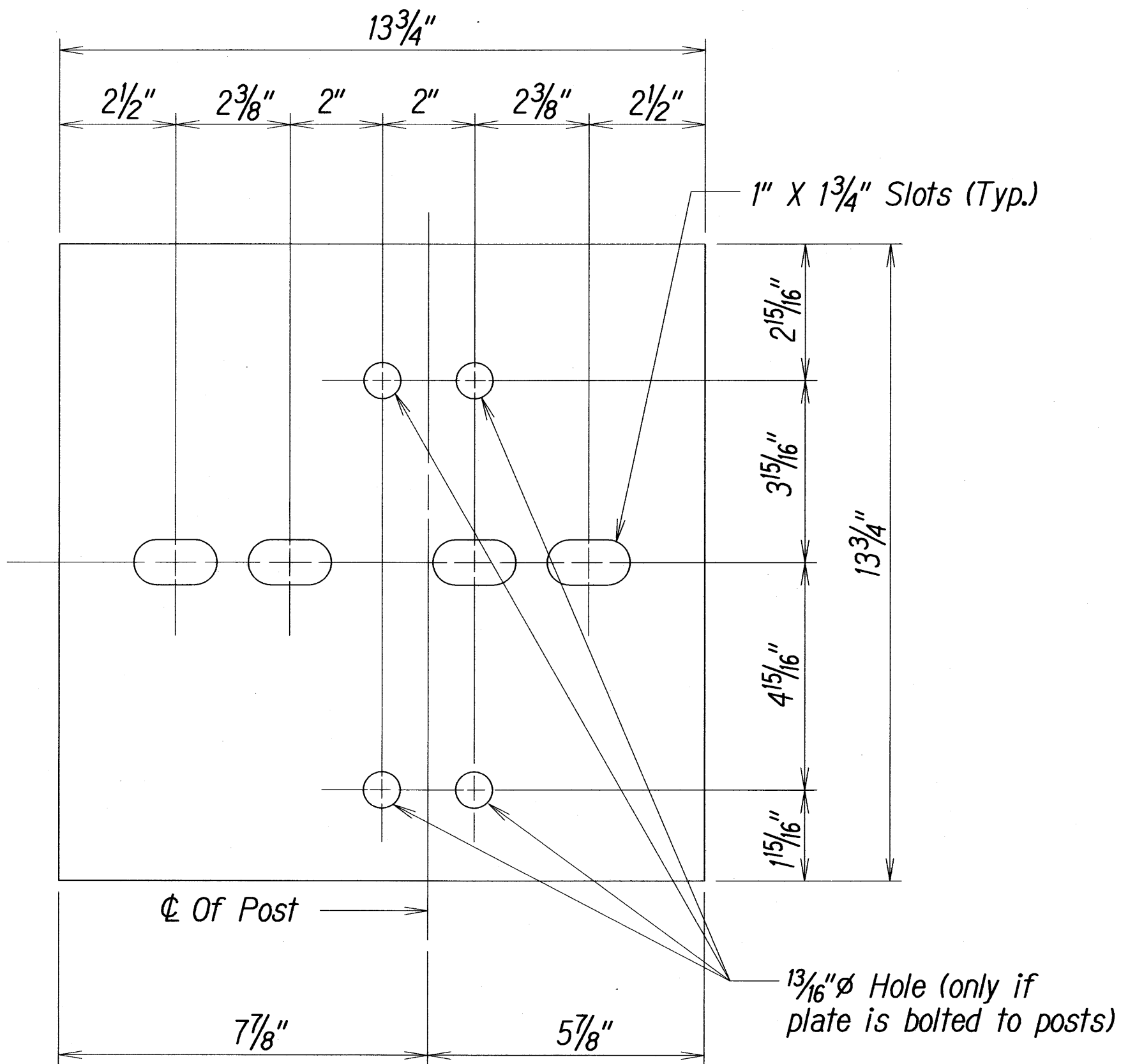
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

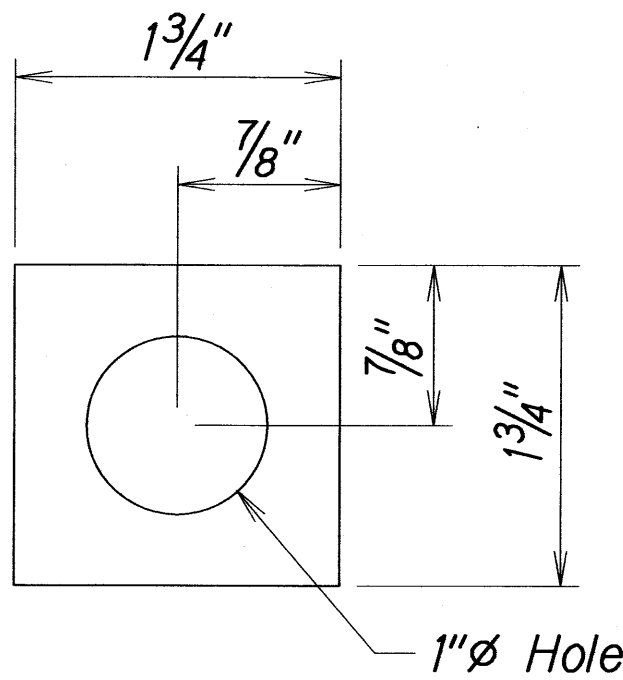
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K(38)

Scale: NTS
Date: November 23, 2009

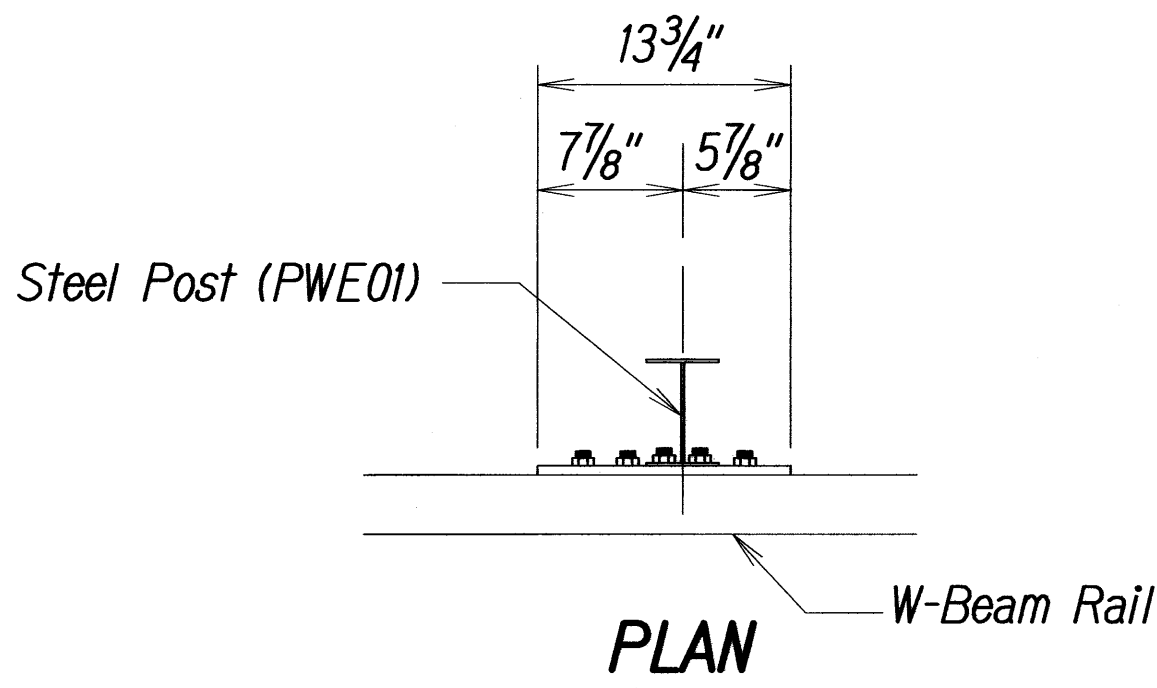
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K38	2010	97	213



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

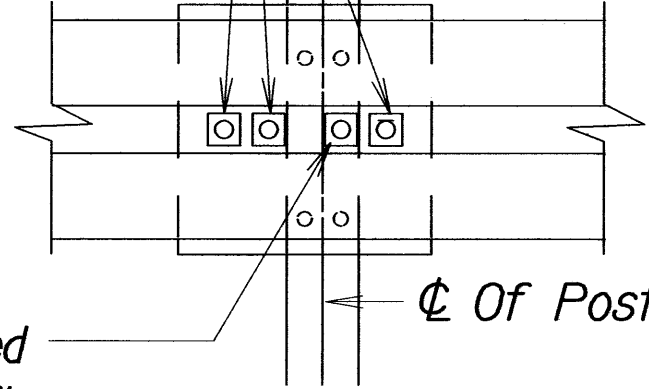


SQUARE WASHER
(3/16" Thick - Hot-dip
Zinc Coated Galvanized)

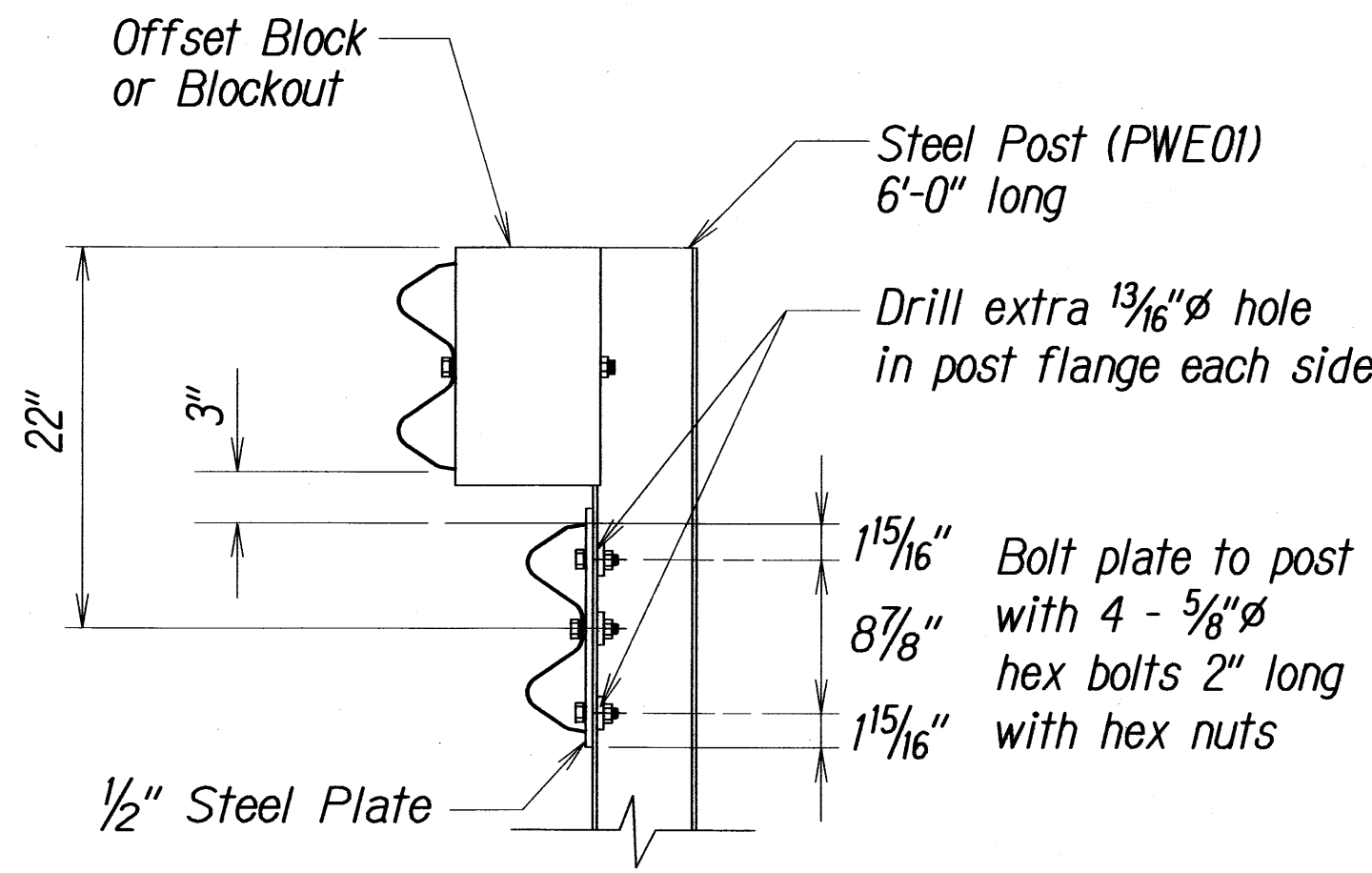


PLAN

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

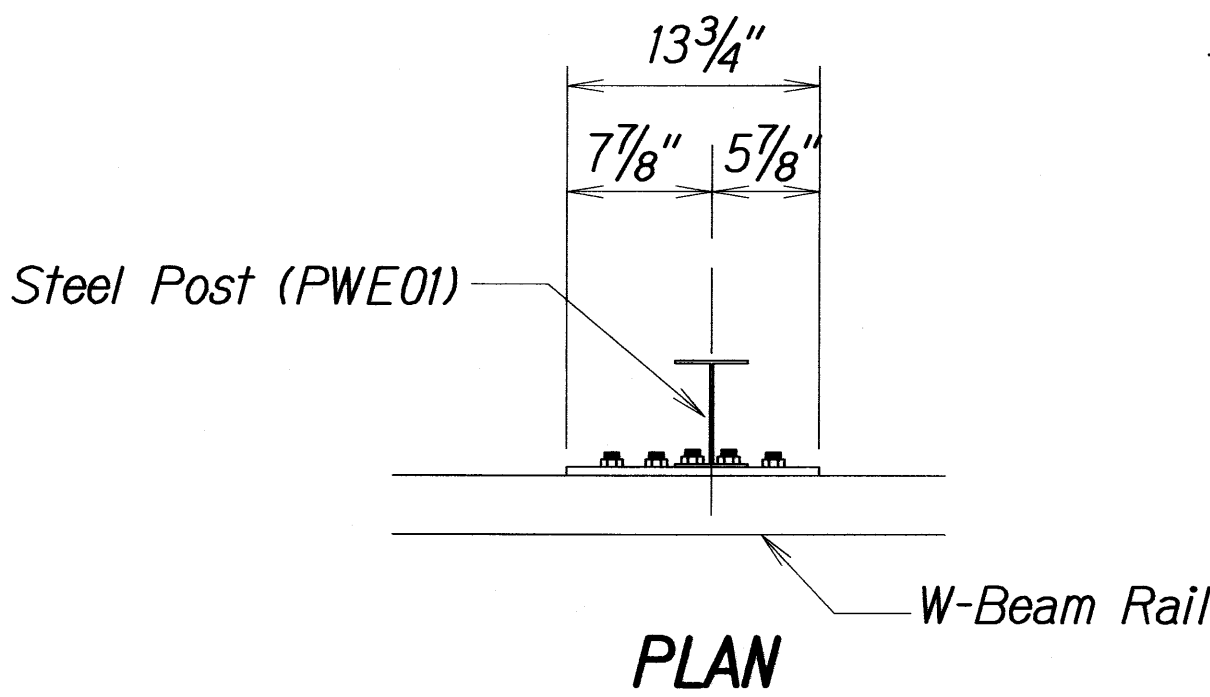


FRONT VIEW



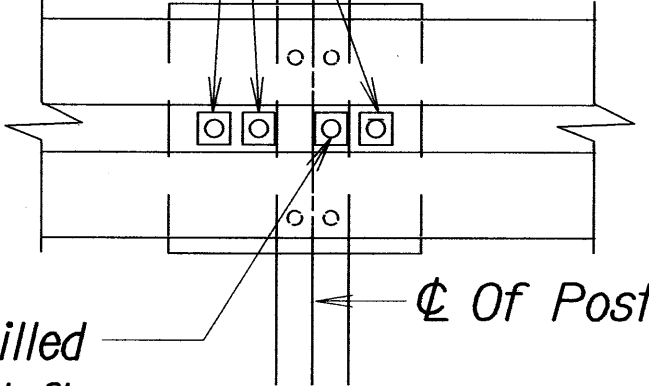
ELEVATION

RUBRAIL ANCHOR DETAILS

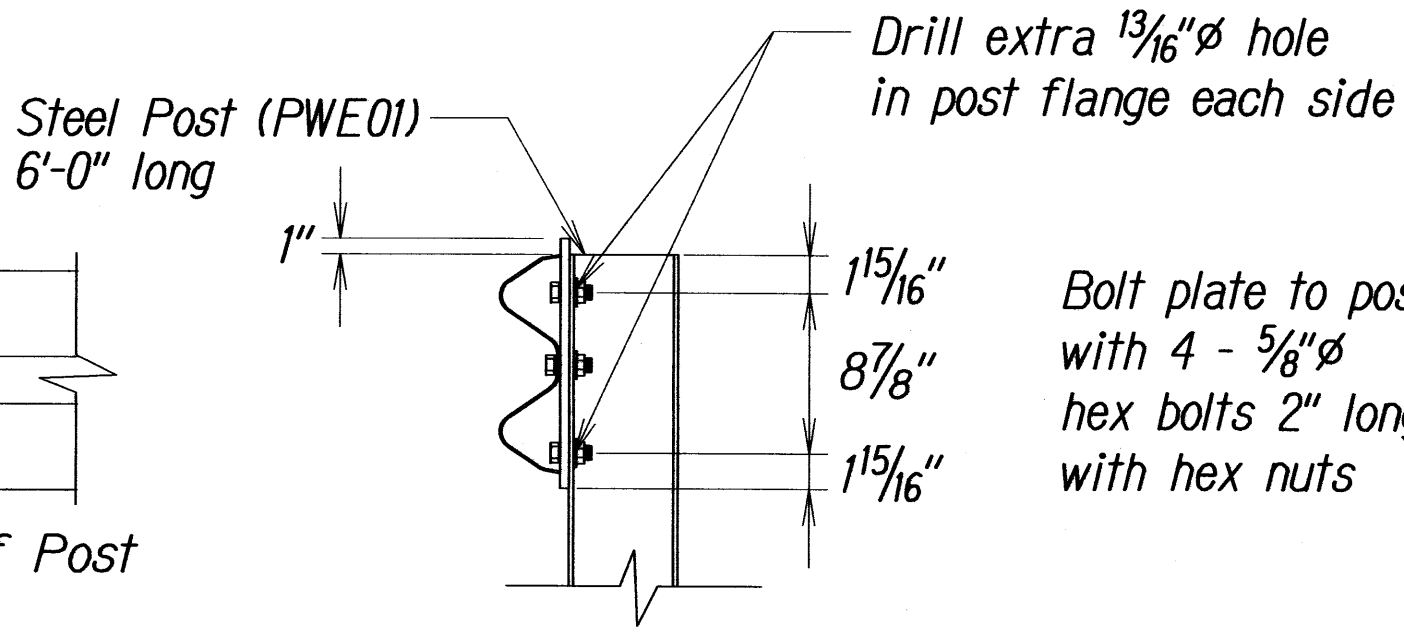


PLAN

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



FRONT VIEW



ELEVATION

POST ANCHOR DETAILS

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS
TYPE "A" FLARE

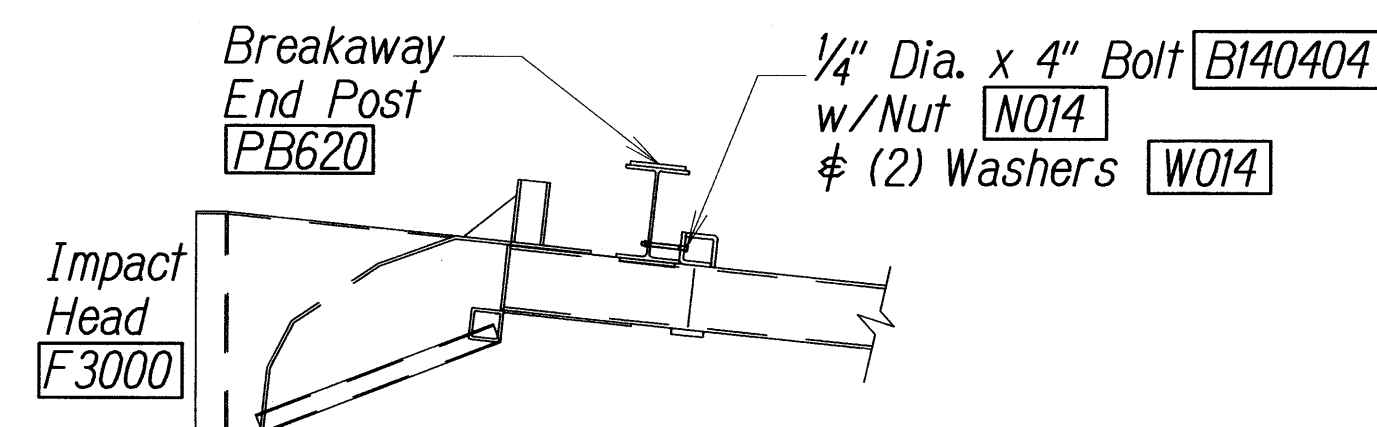
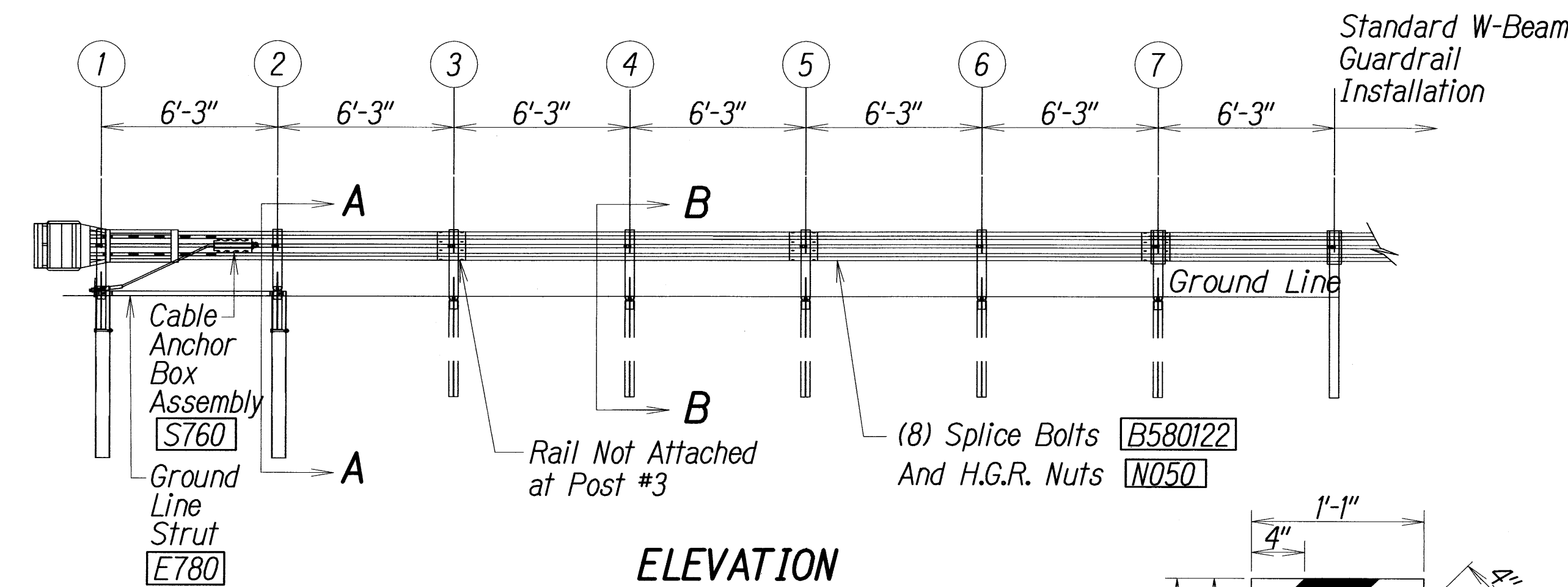
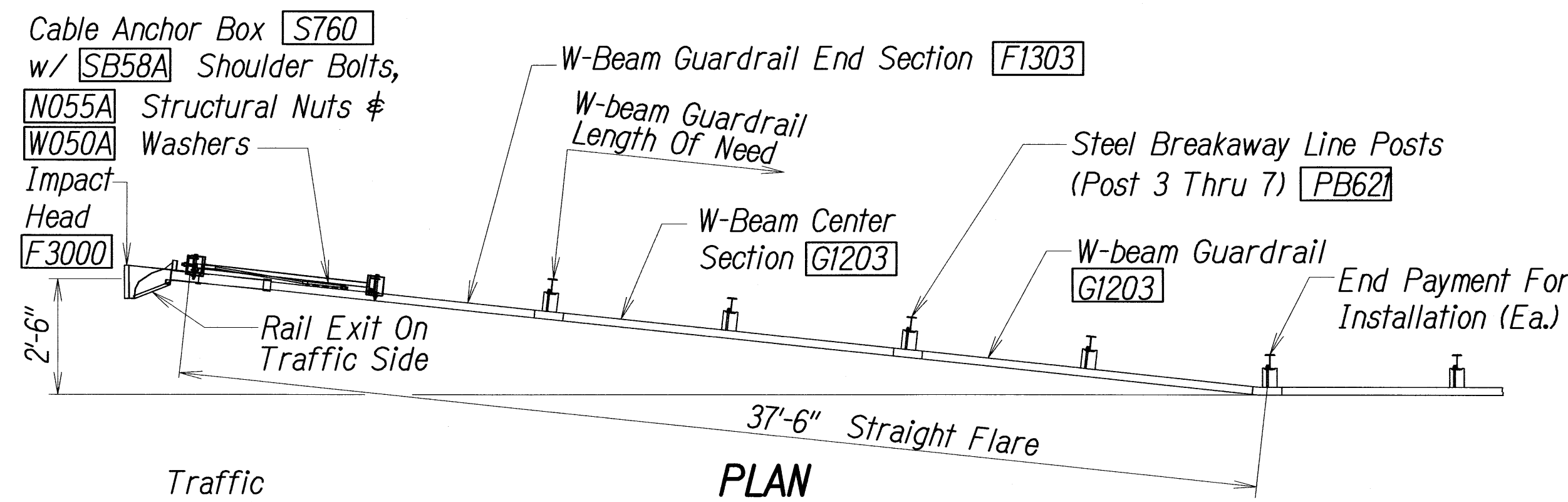


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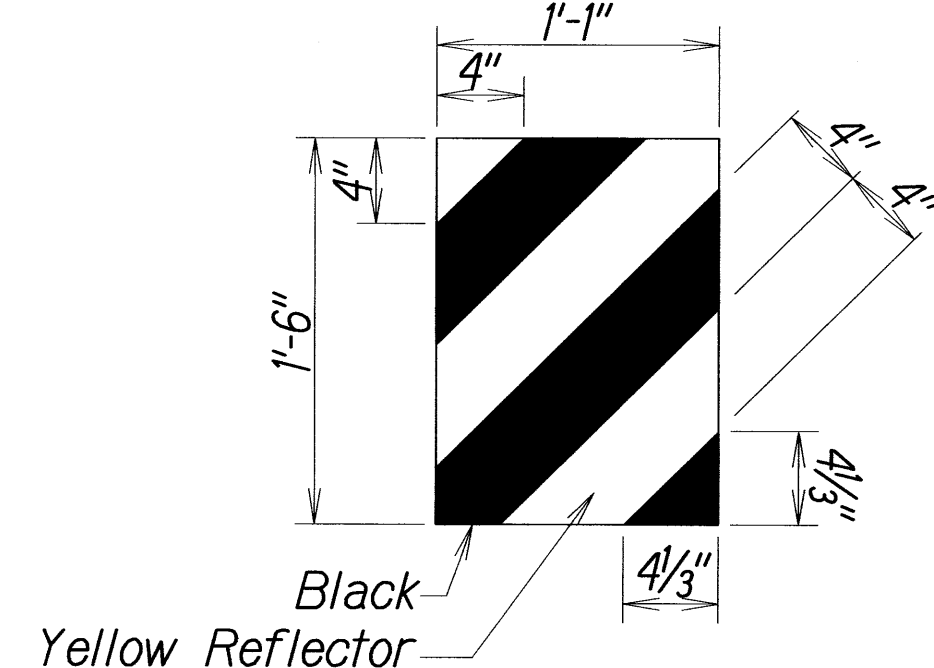
Note:
All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide To Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee.

STATE OF HAWAII
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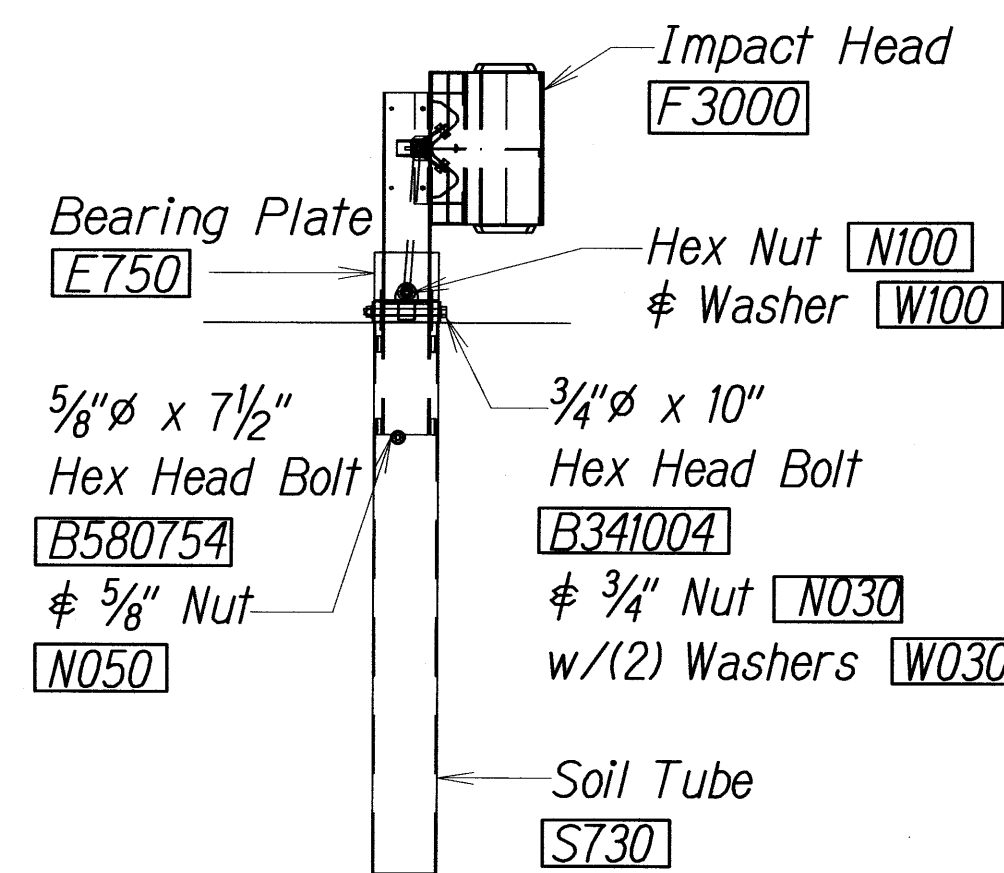
TYPE "A" FLARE
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-K38
Scale: NTS Date: November 23, 2009



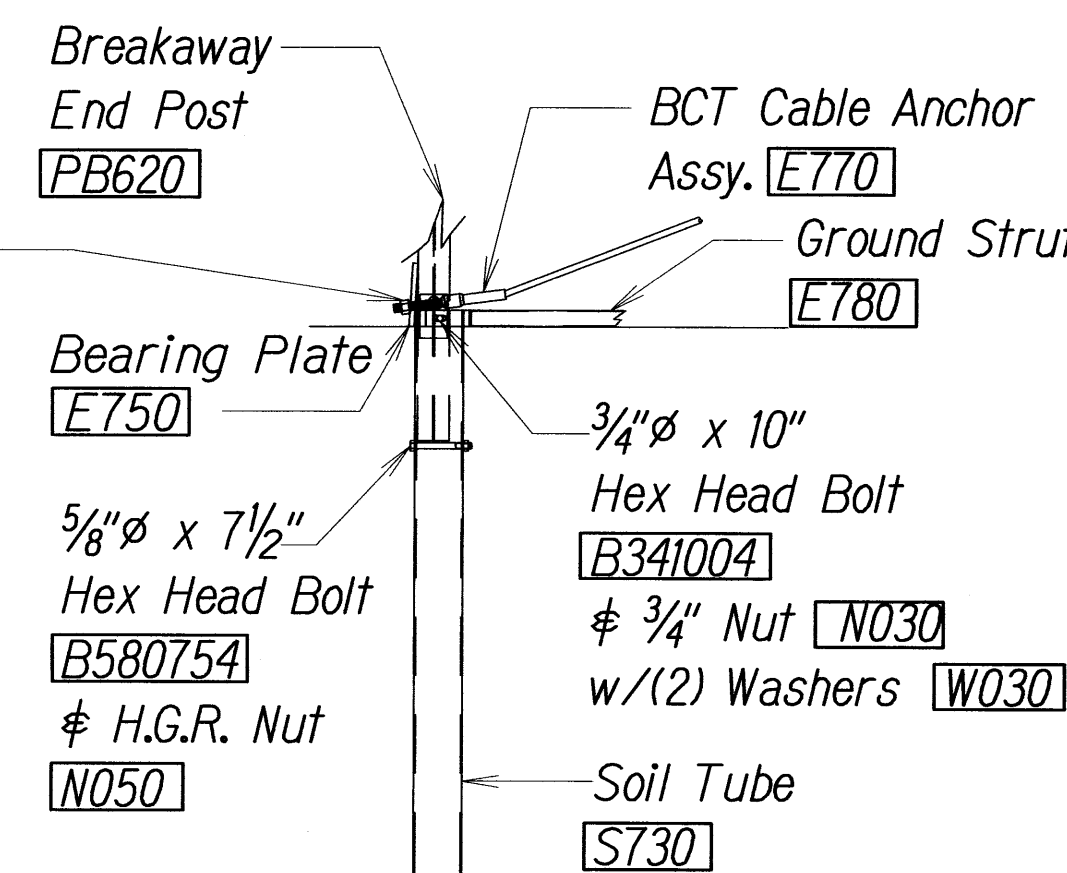
IMPACT HEAD CONNECTING DETAIL



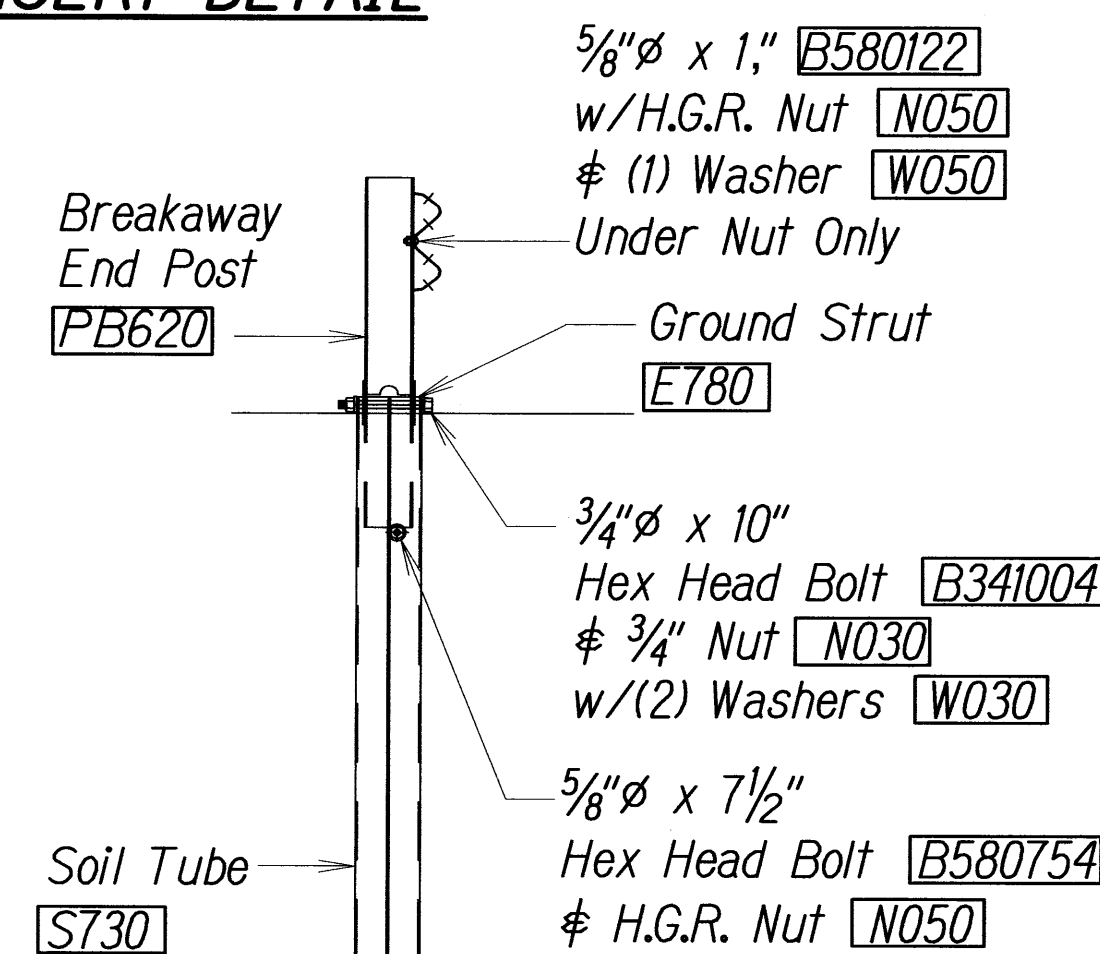
IMPACT HEAD REFLECTOR MARKER INSERT DETAIL



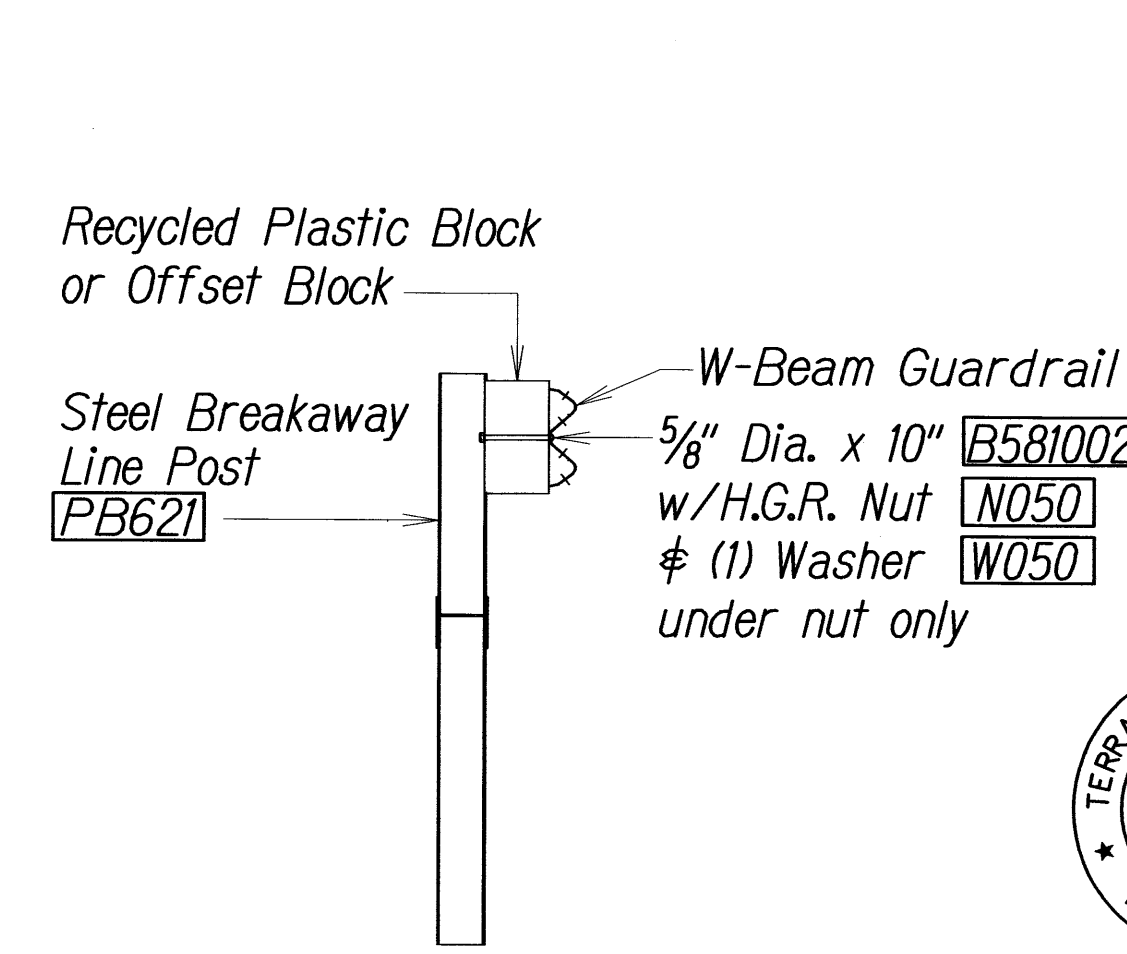
FRONT VIEW OF POST 1



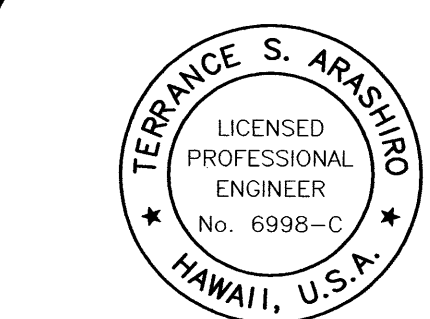
PARTIAL VIEW OF POST 1



SECTION A - A
At Post #2



SECTION B - B
(Typical @ Post 3 - 7)
Note: Rail Not Bolted @ Post #3



THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION AND
CONSTRUCTION OF THIS PROJECT
WILL BE UNDER MY OBSERVATION

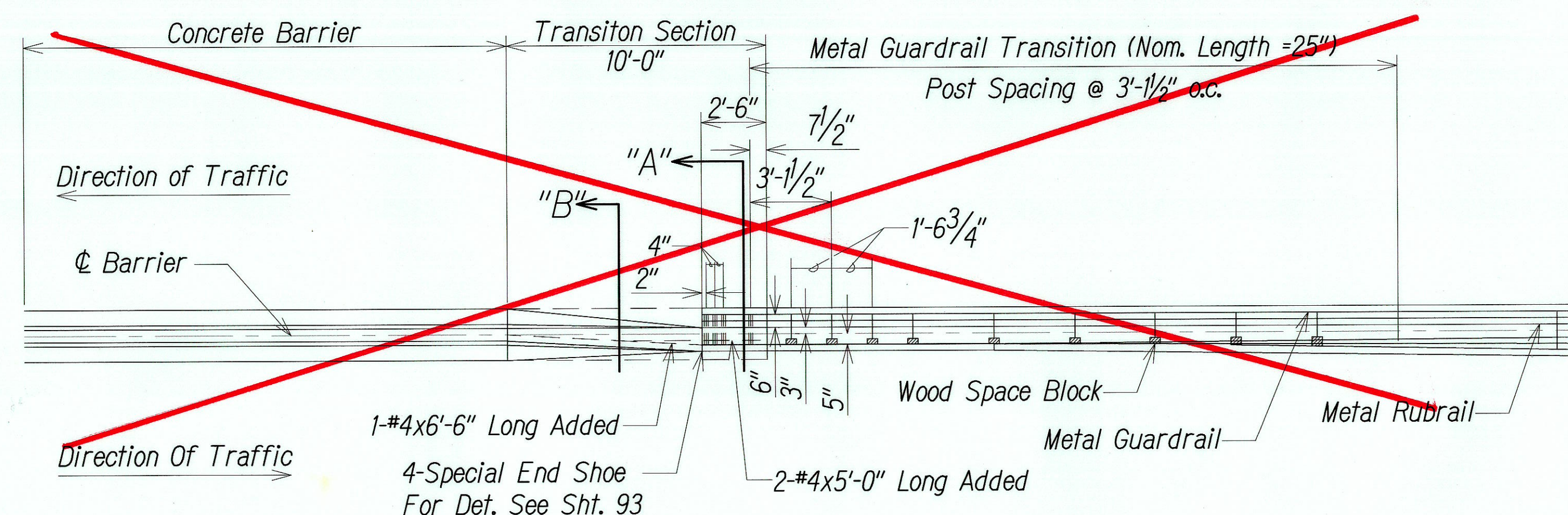
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-K38	2010	98	213

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 (I)
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

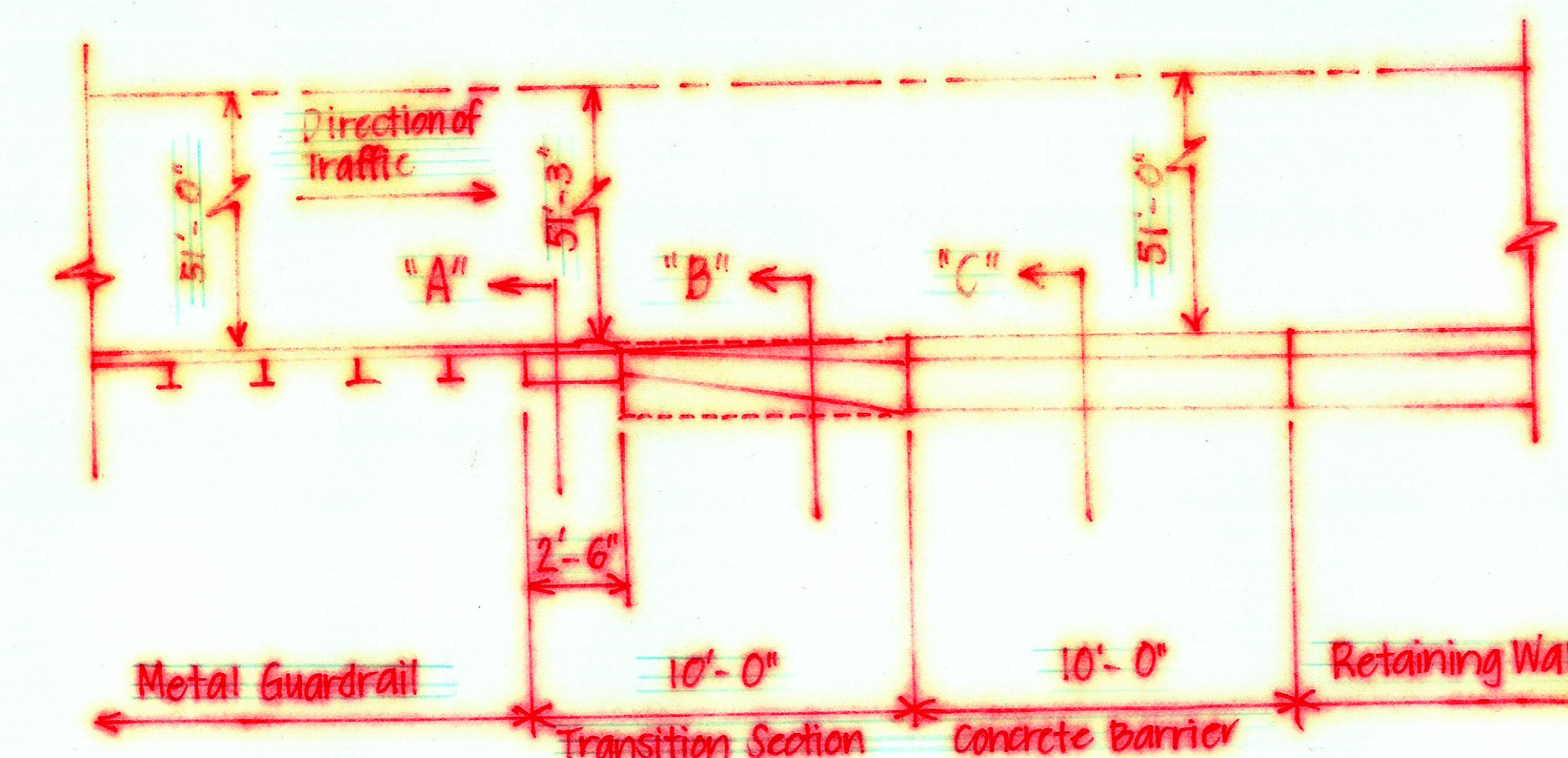
Foundation Tube Options For Posts 1 & 2
 *6'-0" Split Foundation Tubes S730
 *6'-0" Solid Foundation Tubes E731
 *5'-0" Foundation Tubes S735 W/soil Plates Sp600
 *4'-6" Foundation Tubes E735 W/soil Plates Sp600

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
FLEAT-350 FLARED
ENERGY ABSORBING TERMINAL
 HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
 Lahainaluna Rd. to Hokiokio Pl.
 Federal Aid Project NO. NH-030-K38
 Scale: Date: November 23, 2009

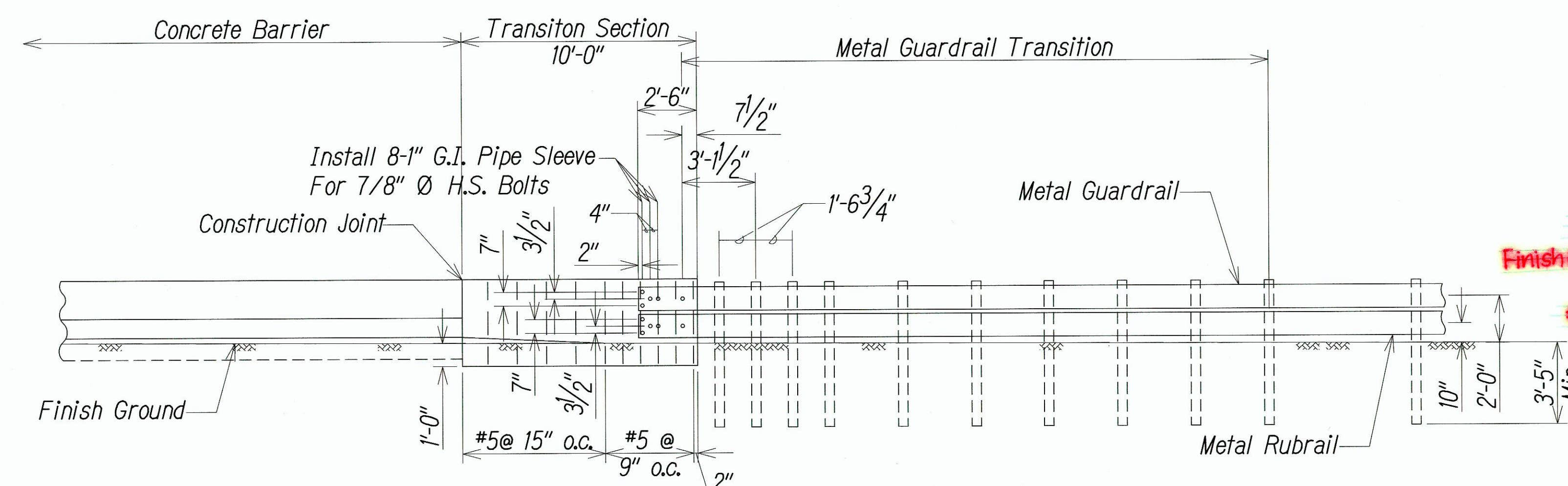
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(38)	2010	99	213



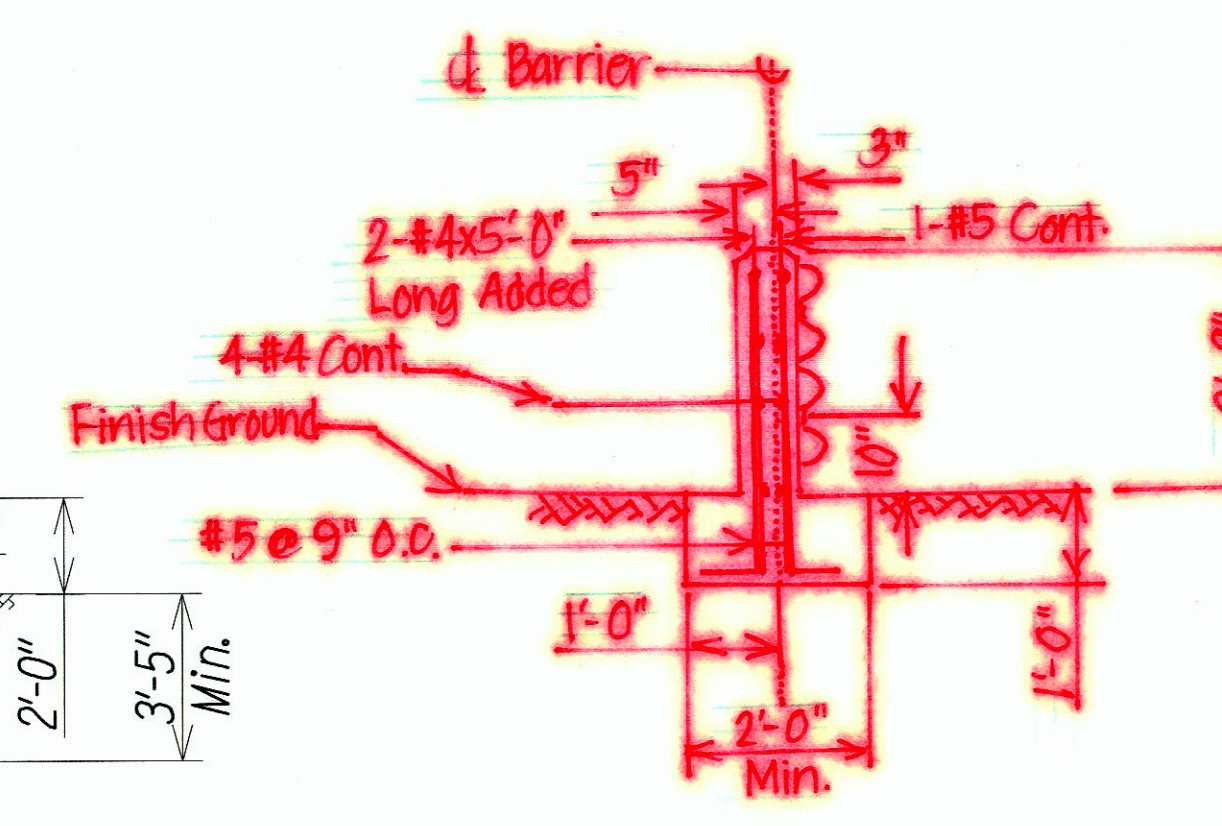
PLAN
Not To Scale



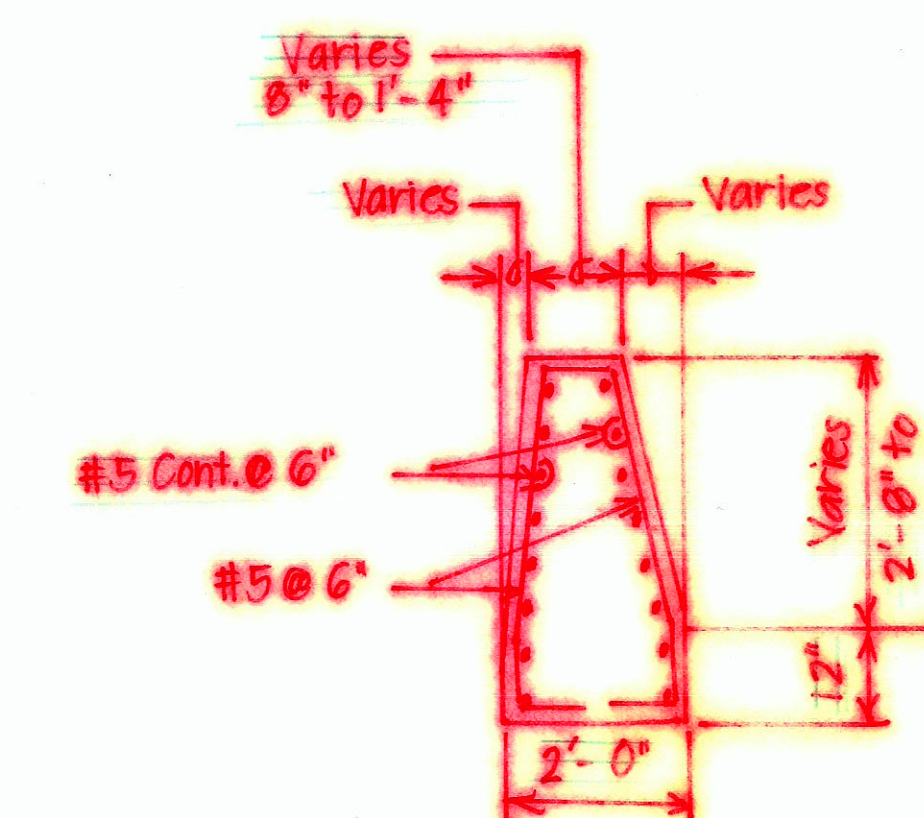
PLAN
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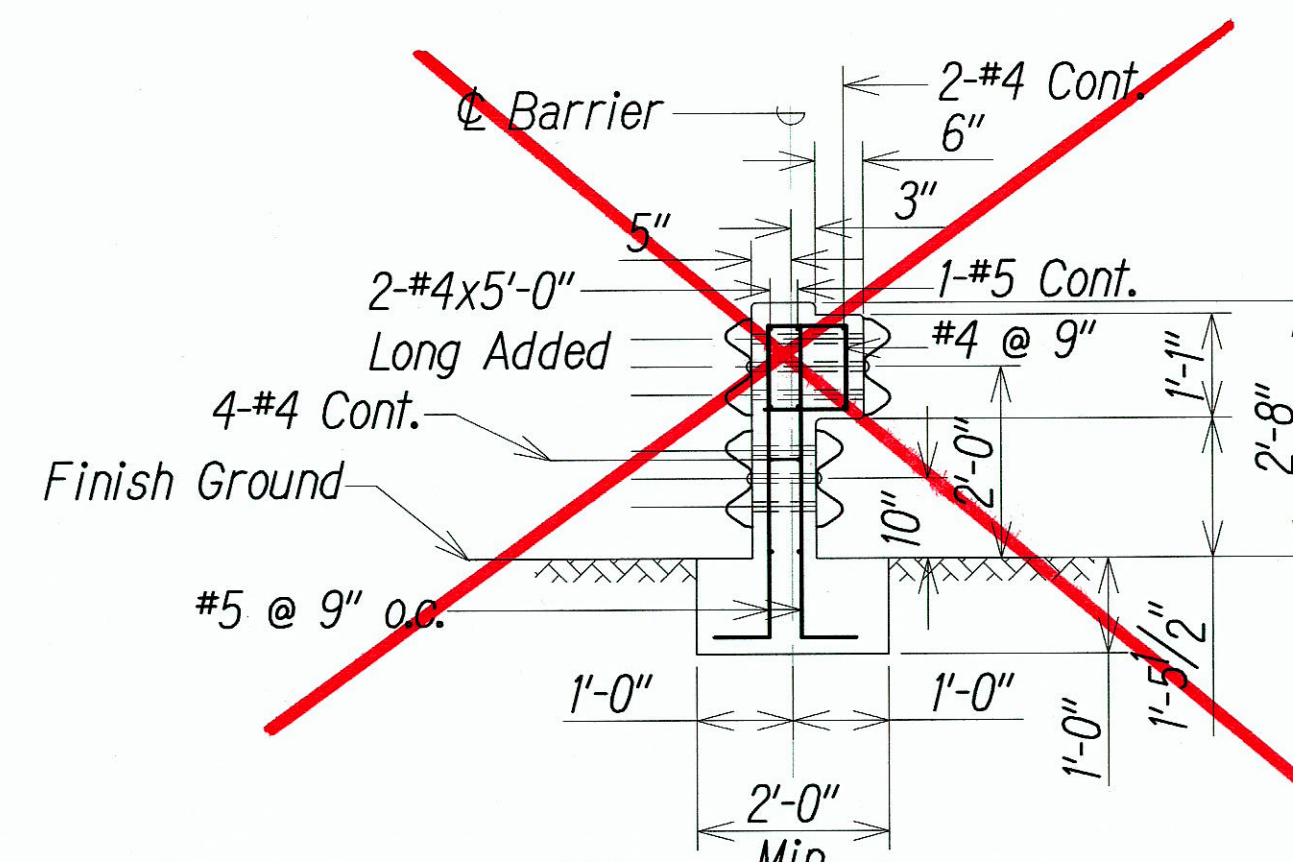
ELEVATION
Not To Scale



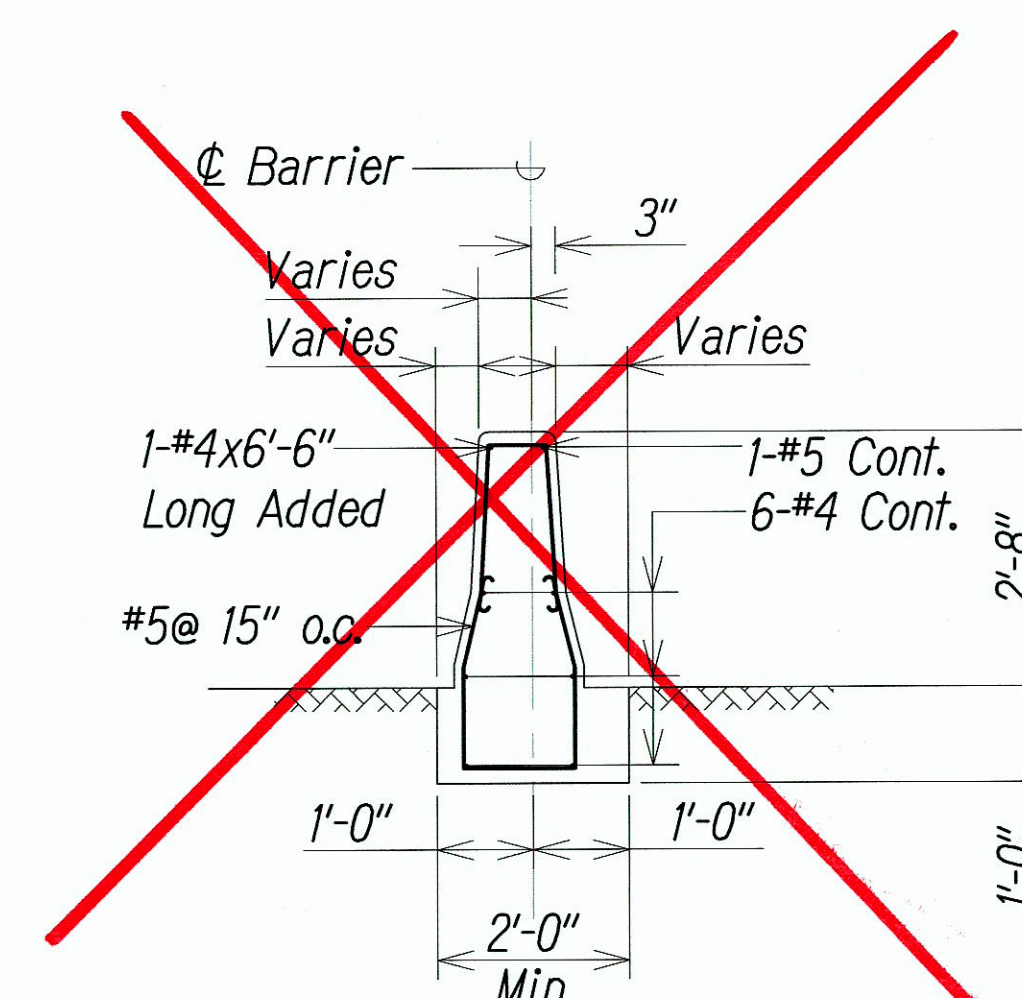
SECTION "A"
Not To Scale



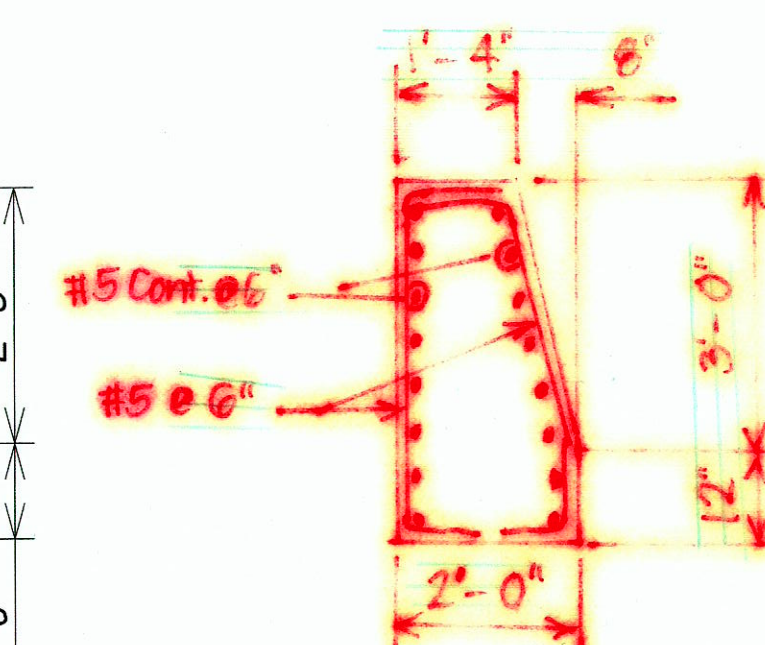
SECTION "B"
Not To Scale



SECTION "A"
Not To Scale



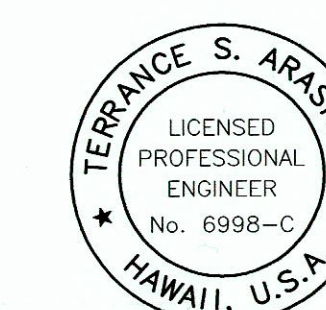
SECTION "B"
Not To Scale



SECTION "C"
Not To Scale

Notes:

- For anchoring metal guardrail elements to Concrete Barrier, the Contractor shall furnish and install reinforcing steel, bolts of appropriate lengths and size with appurtenant washers, nuts, wooden blocks and pipe sleeves. (payments shall be incidental to Concrete Barrier)



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
METAL GUARDRAIL CONNECTION TO CONCRETE BARRIER

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
Lahainaluna Rd. to Hokiokio Pl.
Federal Aid Project NO. NH-030-1(38)

Scale: Date: November 23, 2009

SHEET No. 11 OF 11 SHEETS

"AS-BUILT"