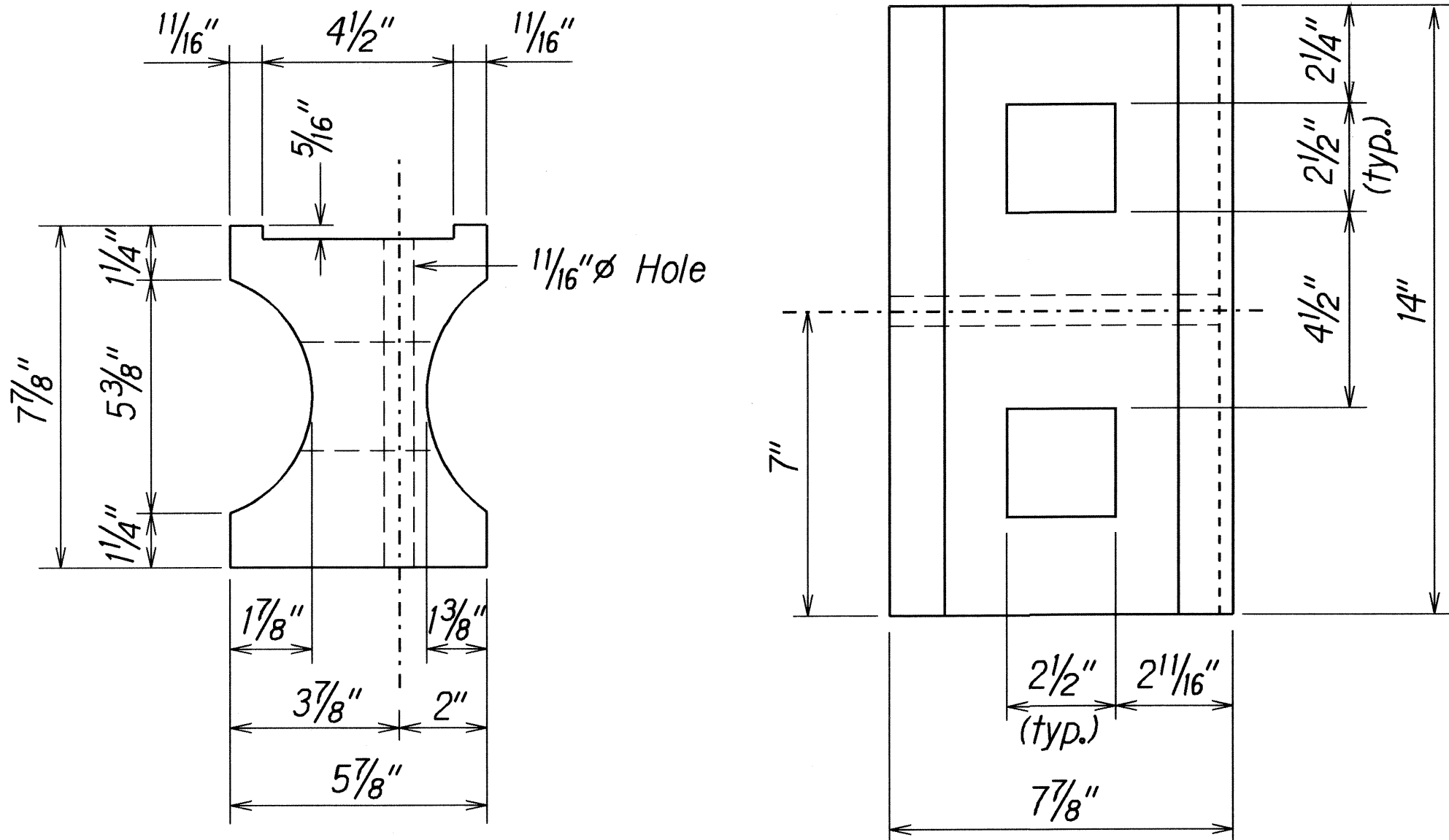


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(36)	2009	6	27

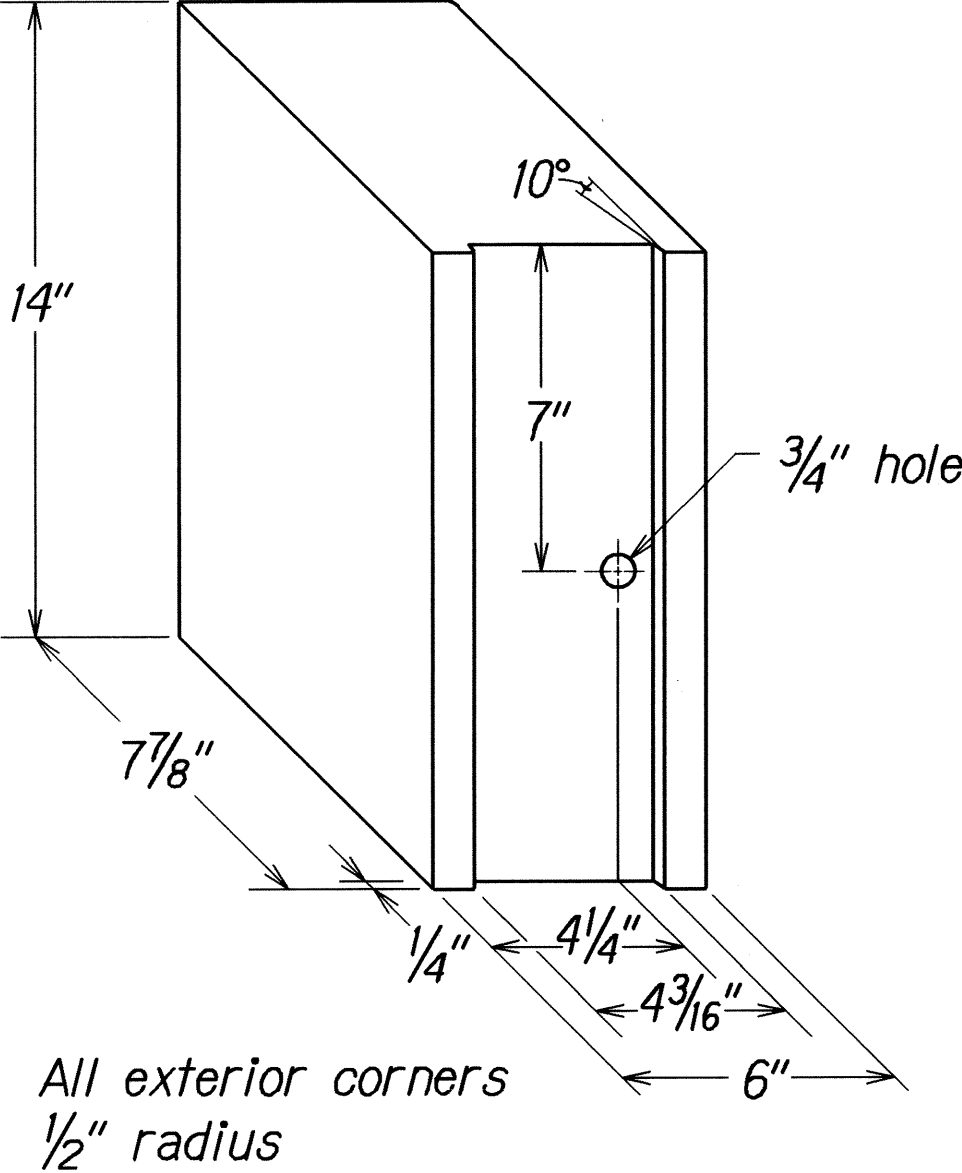
GENERAL NOTES

- 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.

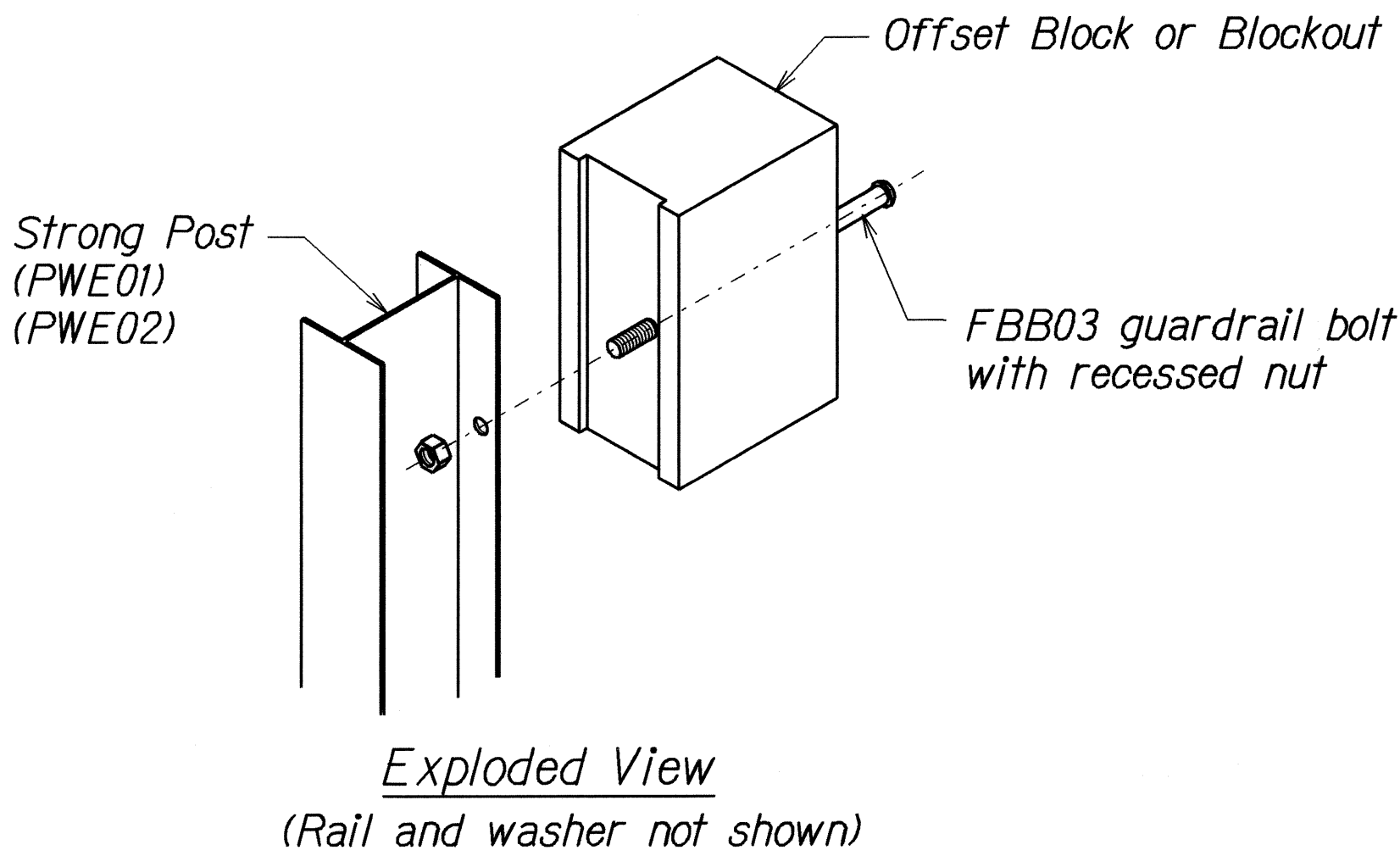
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 <sup>5</sup> / <sub>8</sub> "	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



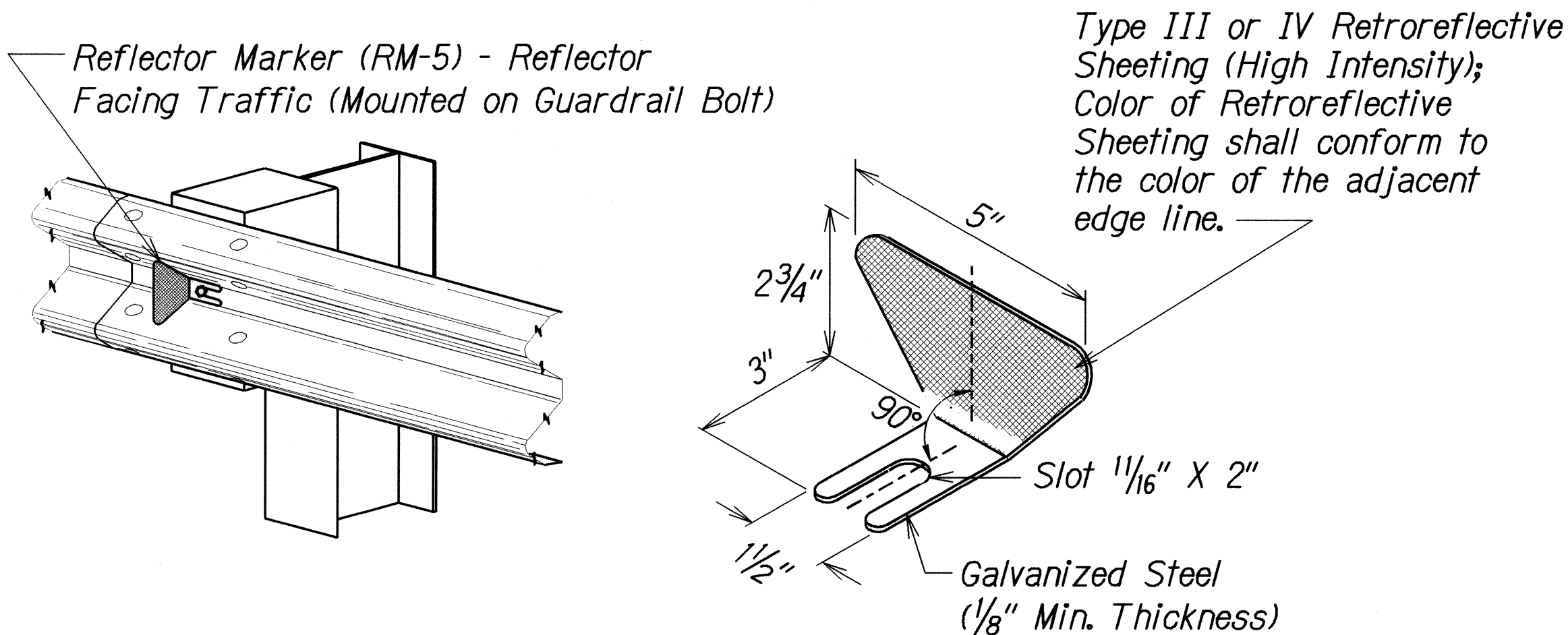
TOP  
SIDE  
RECYCLED PLASTIC BLOCKOUT (TYPE I)



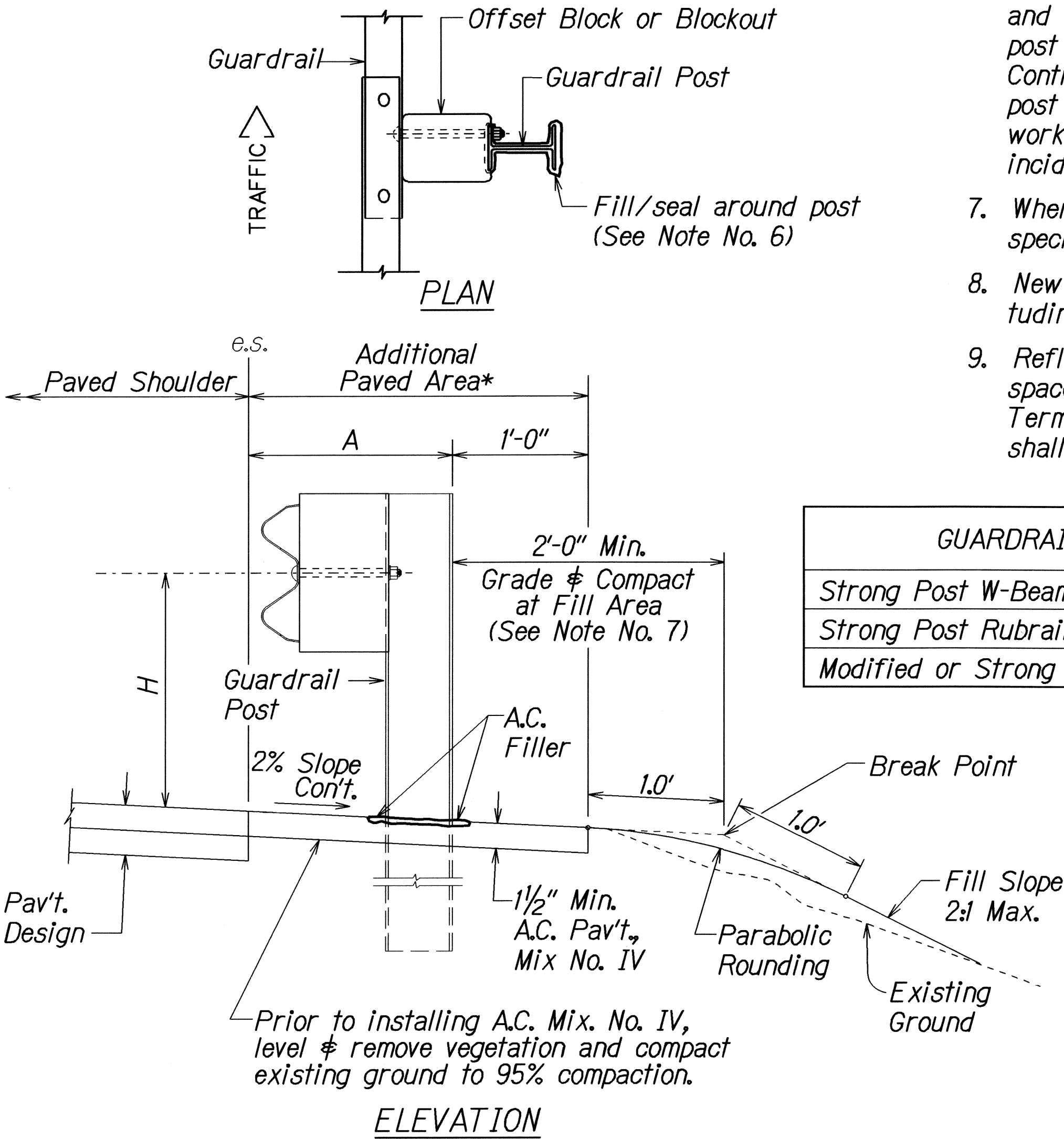
RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



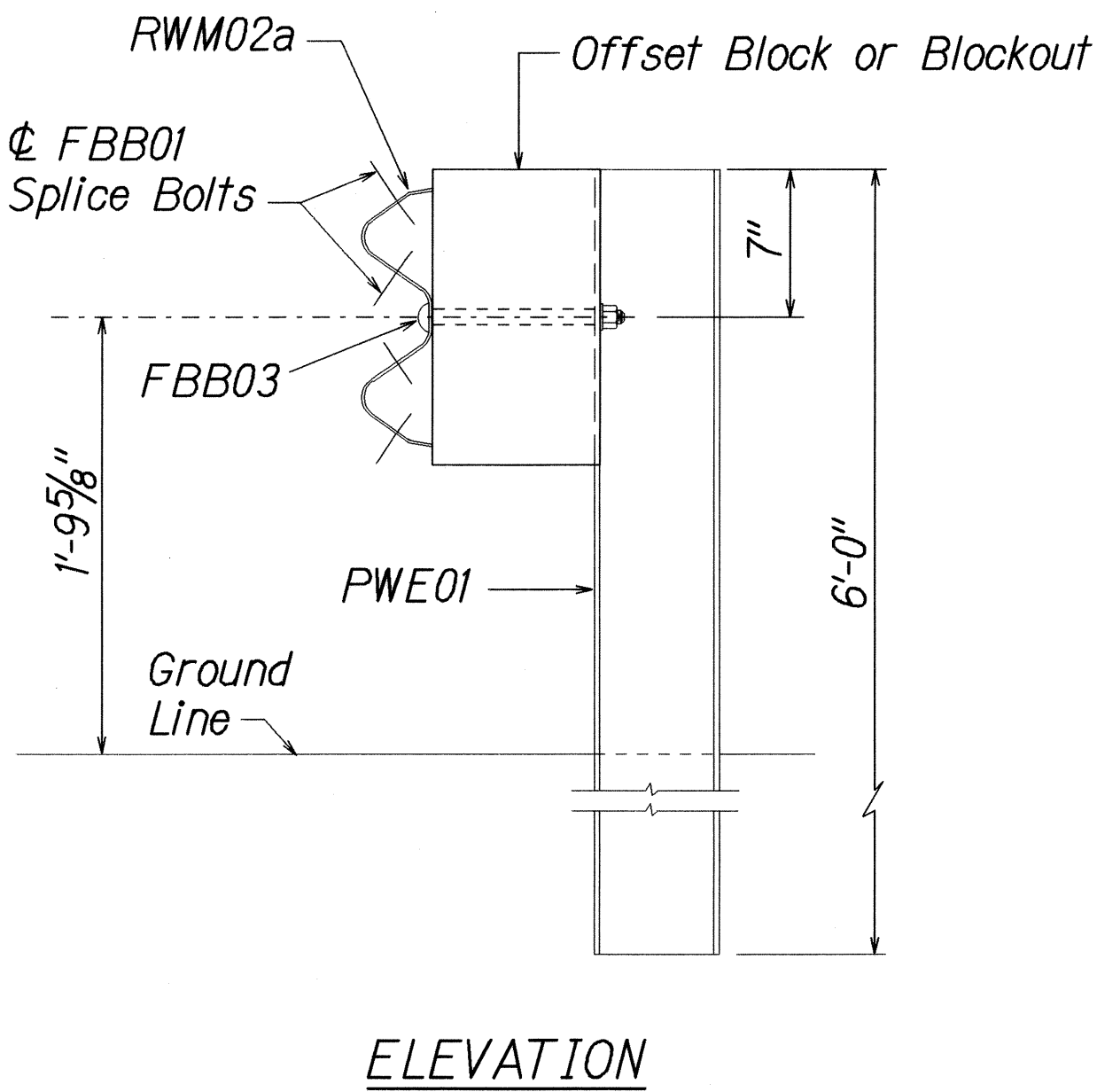
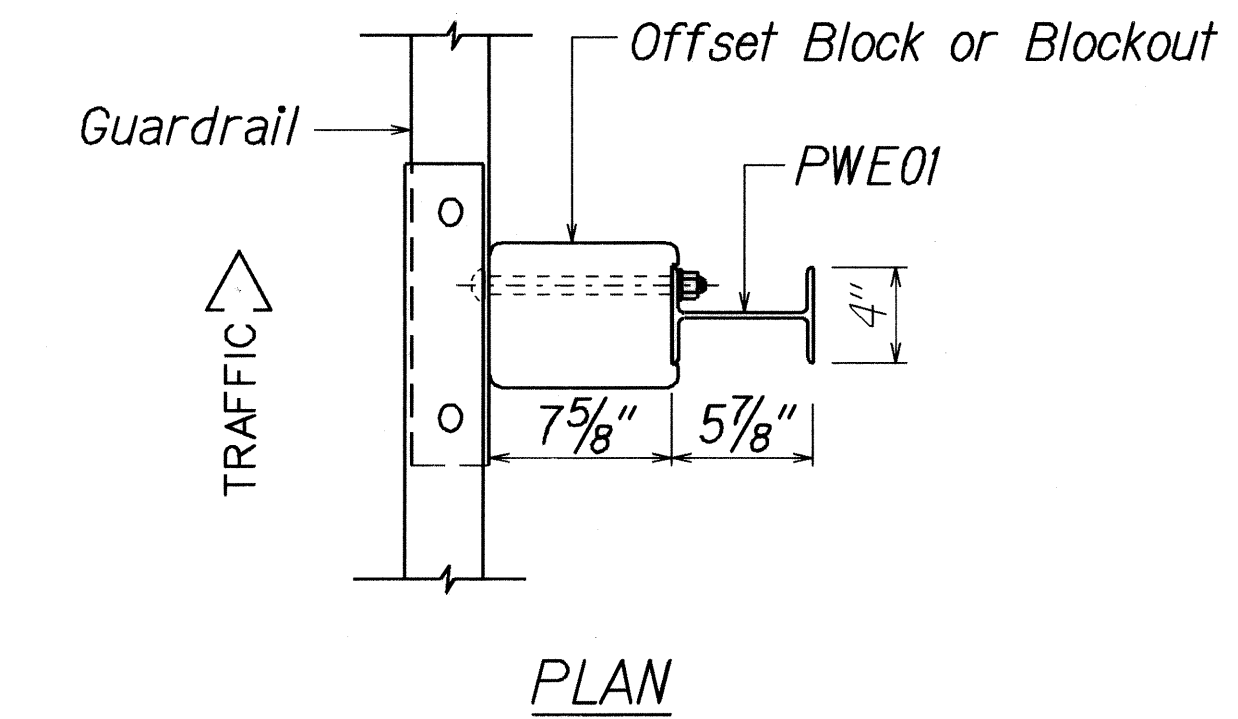
TYPICAL GUARDRAIL INSTALLATION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

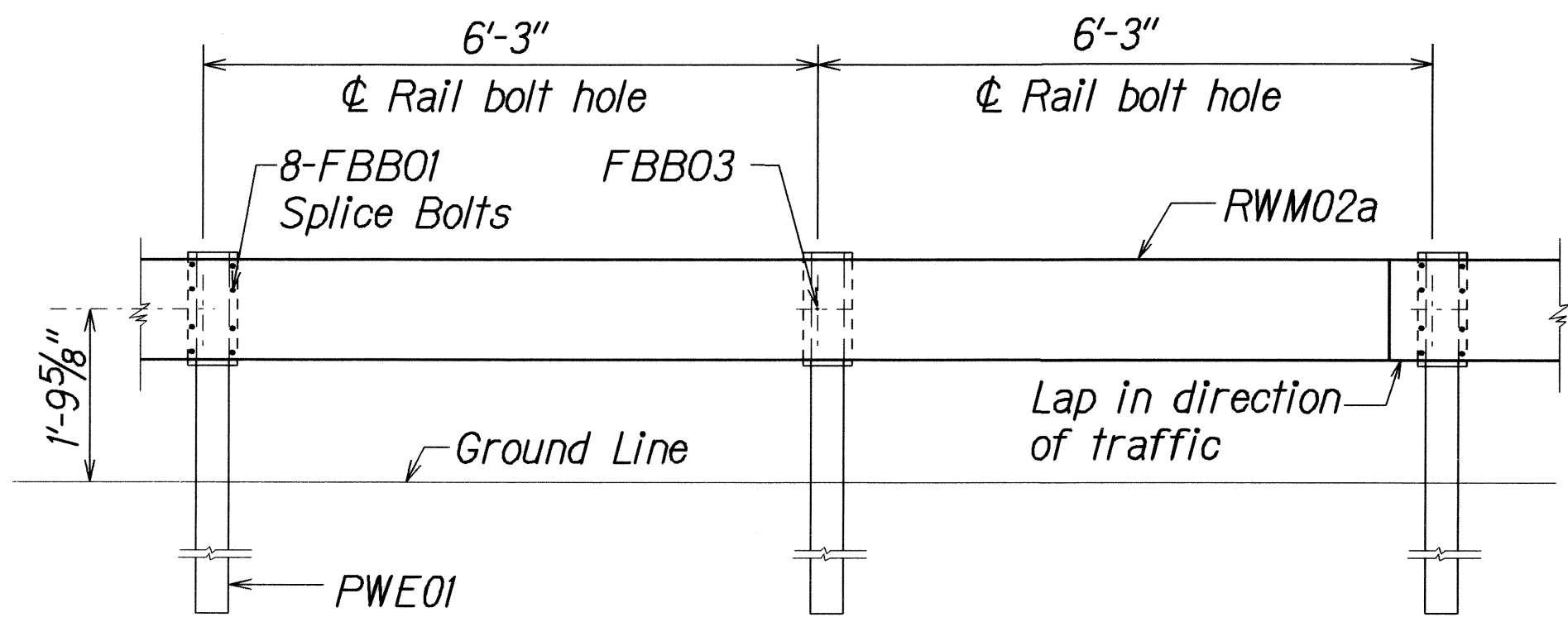
**GUARDRAIL DETAILS & NOTES**  
HAWAII BELT ROAD GUARDRAIL  
AND SHOULDER IMPROVEMENTS  
Paauhau Road to Pakalana Street  
Federal Aid Project No. NH-019-1(36)  
Scale: NTS Date: May, 2007

SHEET No. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(36)	2009	7	27

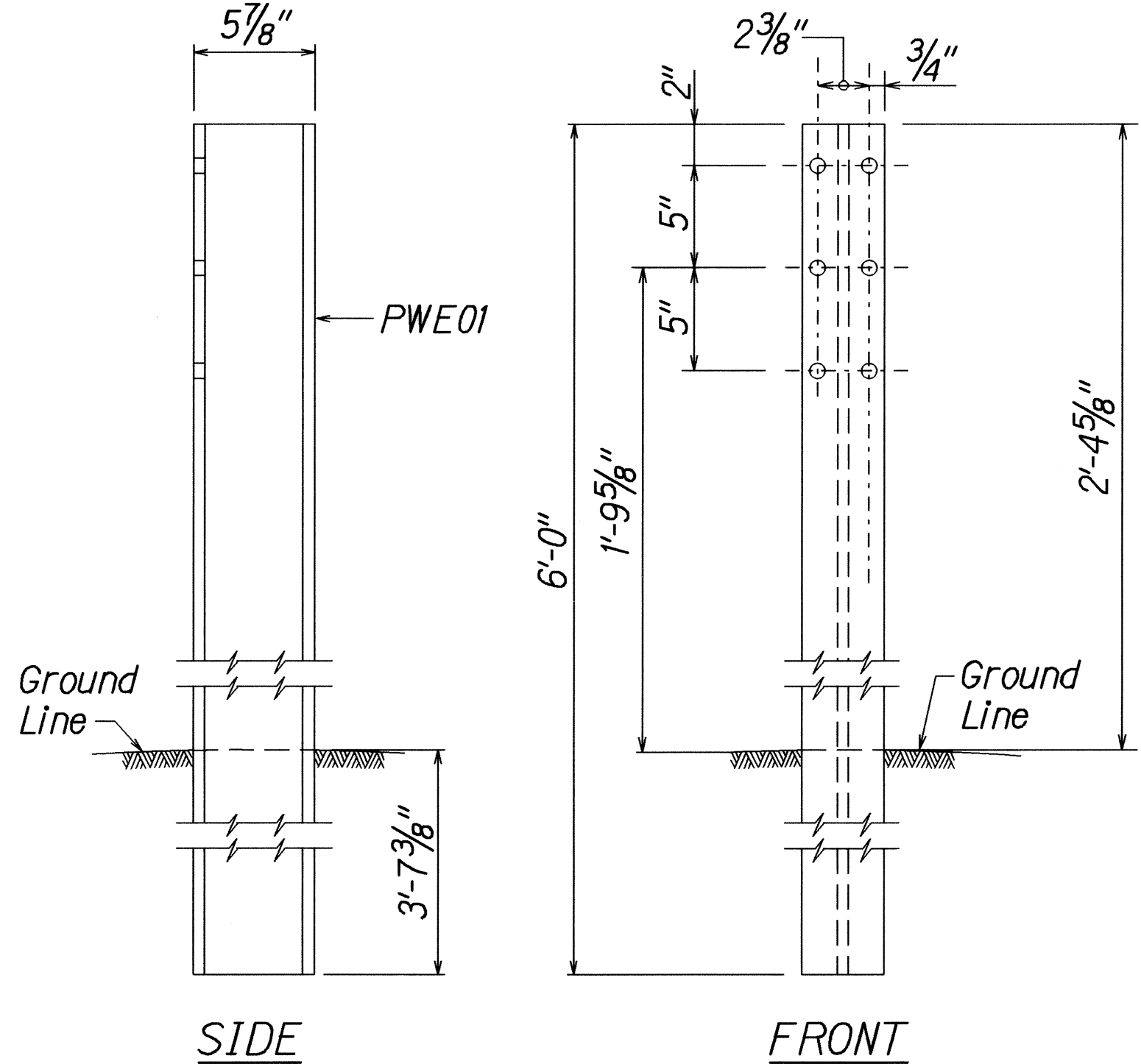


**STRONG POST W-BEAM GUARDRAIL**  
**(SGR04a)**

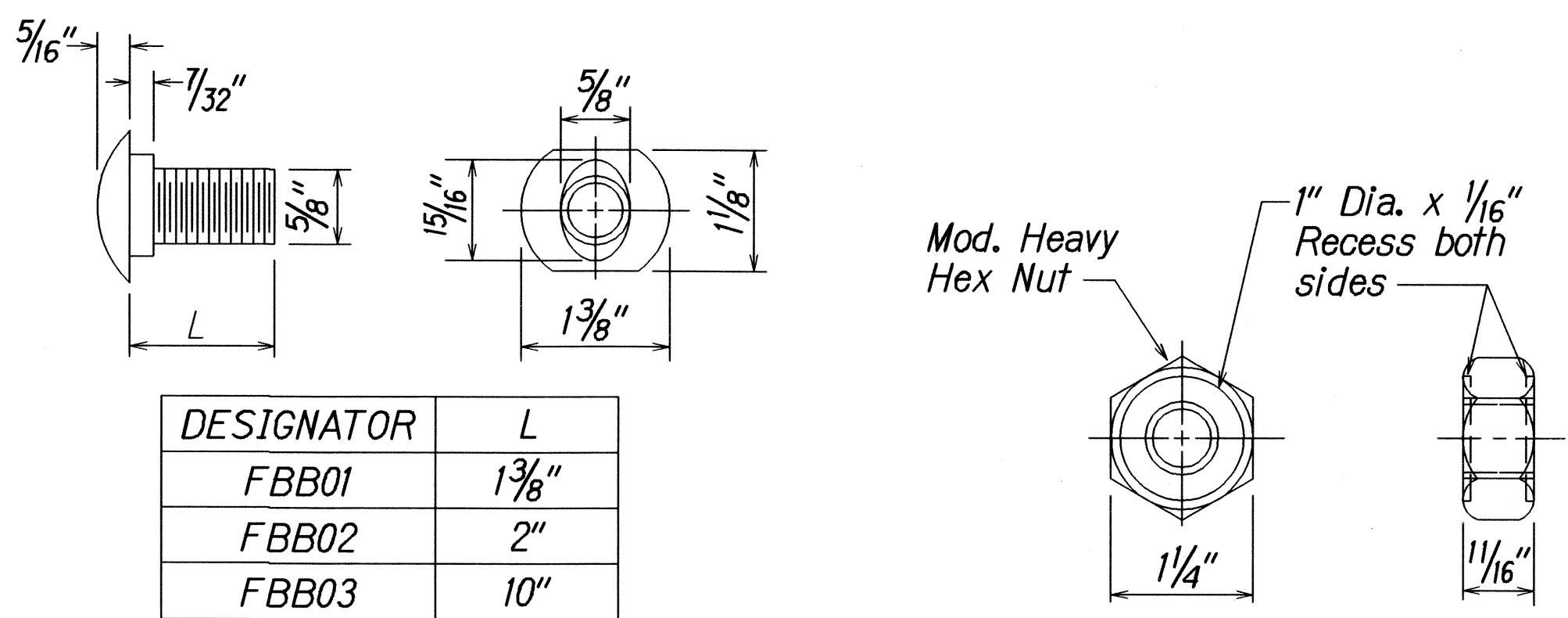


**STRONG POST W-BEAM GUARDRAIL WITH**  
**RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**

NOTE:  
All Holes are  
3/4" Dia.

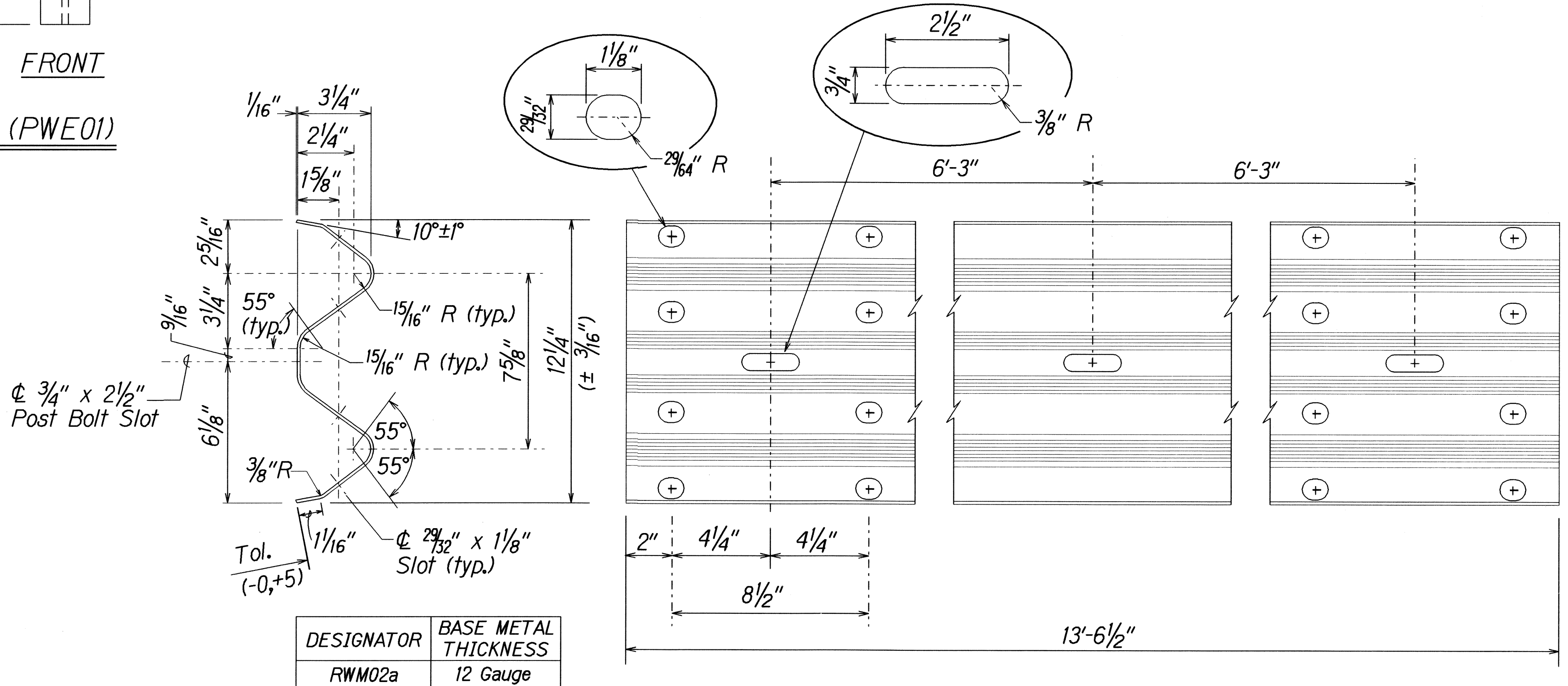


**W-BEAM STRONG POST (PWE01)**



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

**GUARDRAIL BOLTS AND RECESSED NUT**



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

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

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

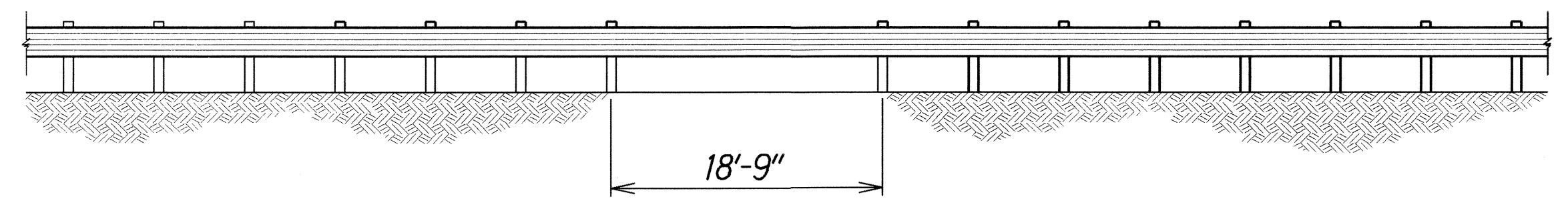
**STRONG POST W-BEAM GUARDRAIL**  
**HAWAII BELT ROAD GUARDRAIL**  
**AND SHOULDER IMPROVEMENTS**  
**Paauihau Road to Pakalana Street**  
**Federal-Aid Project No. NH-019-1(36)**  
Scale: NTS

Date: May, 2007

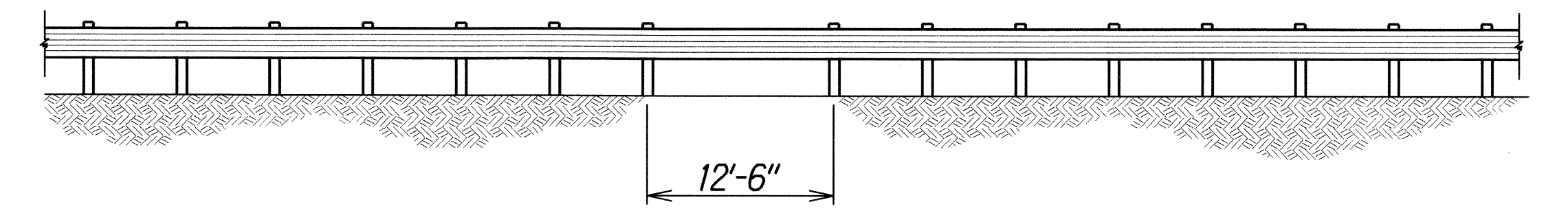




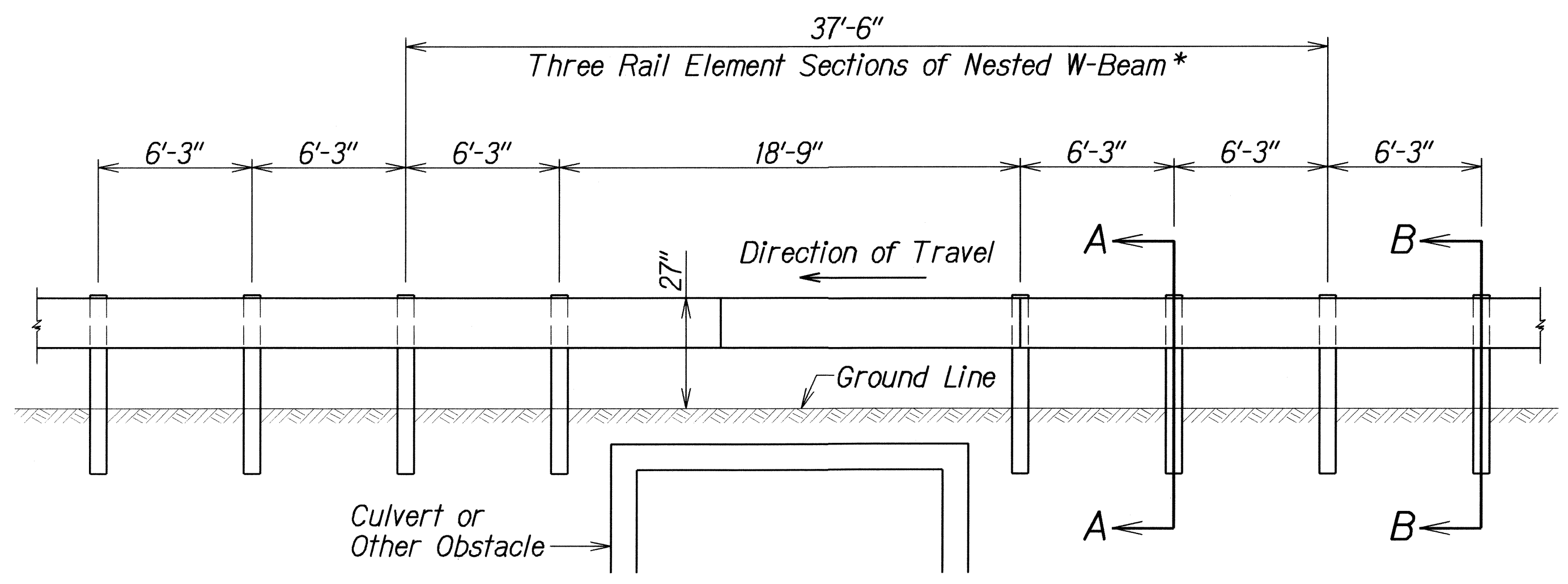
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(36)	2009	9	27



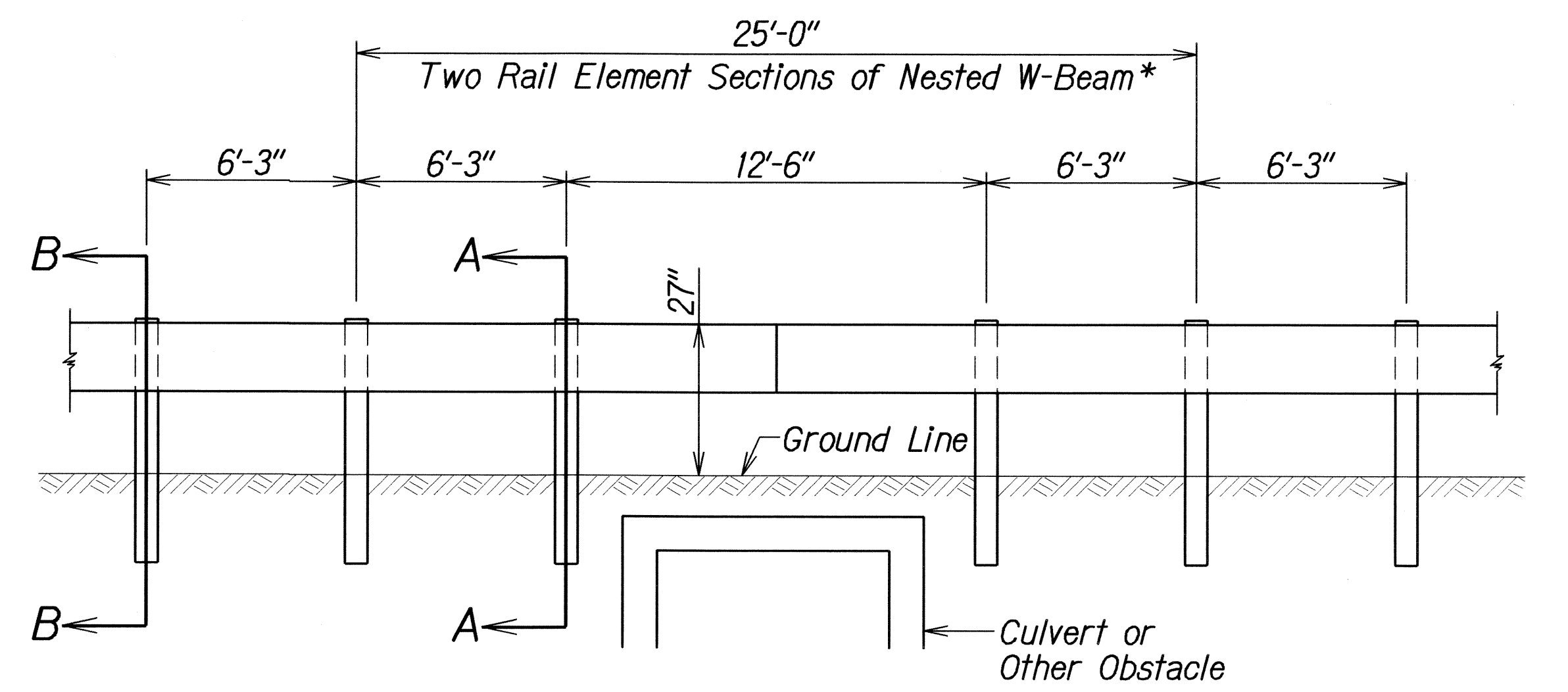
LONG SPAN OVER CULVERT



LONG SPAN OVER CULVERT



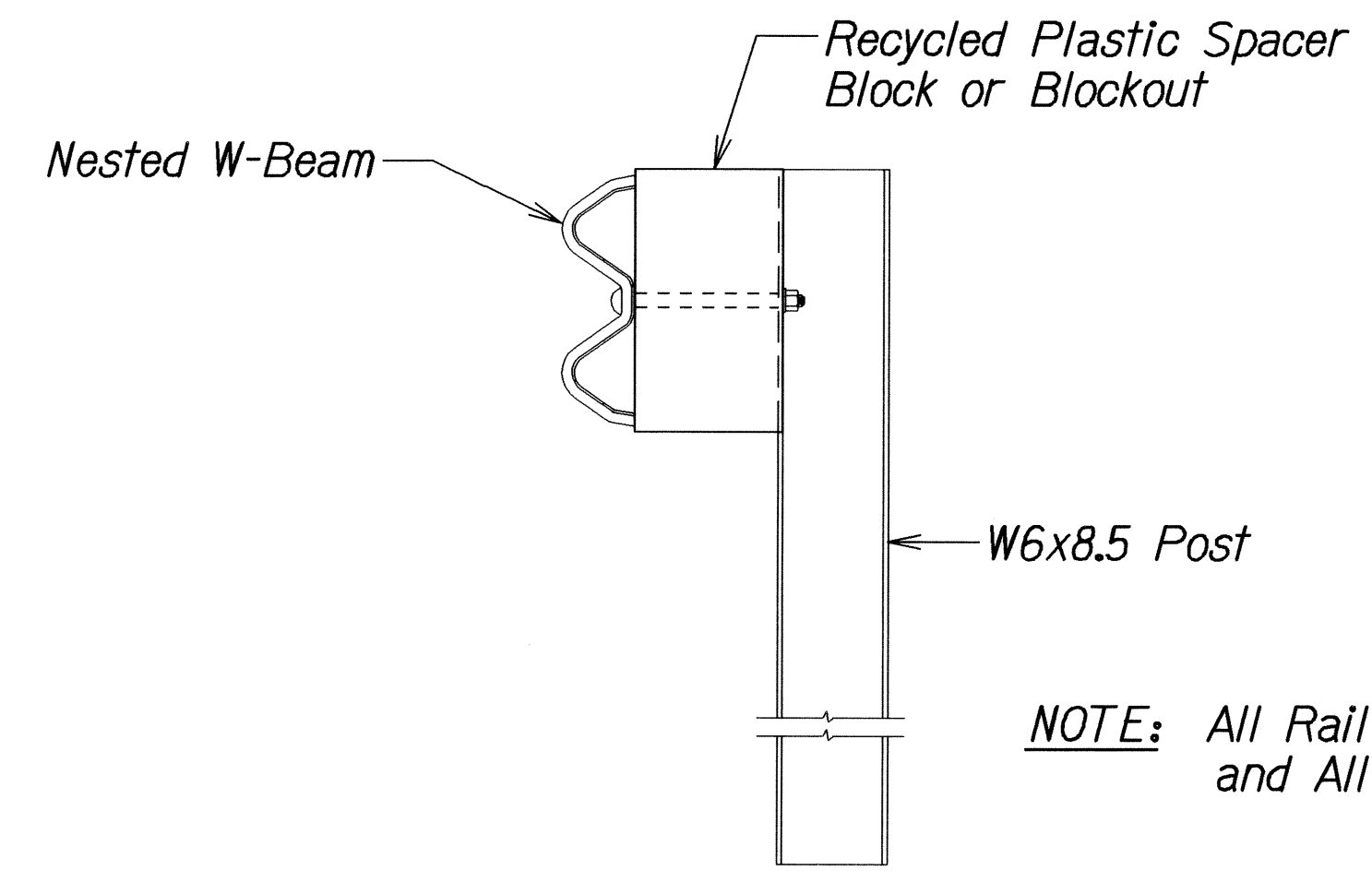
NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 18'-9" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)



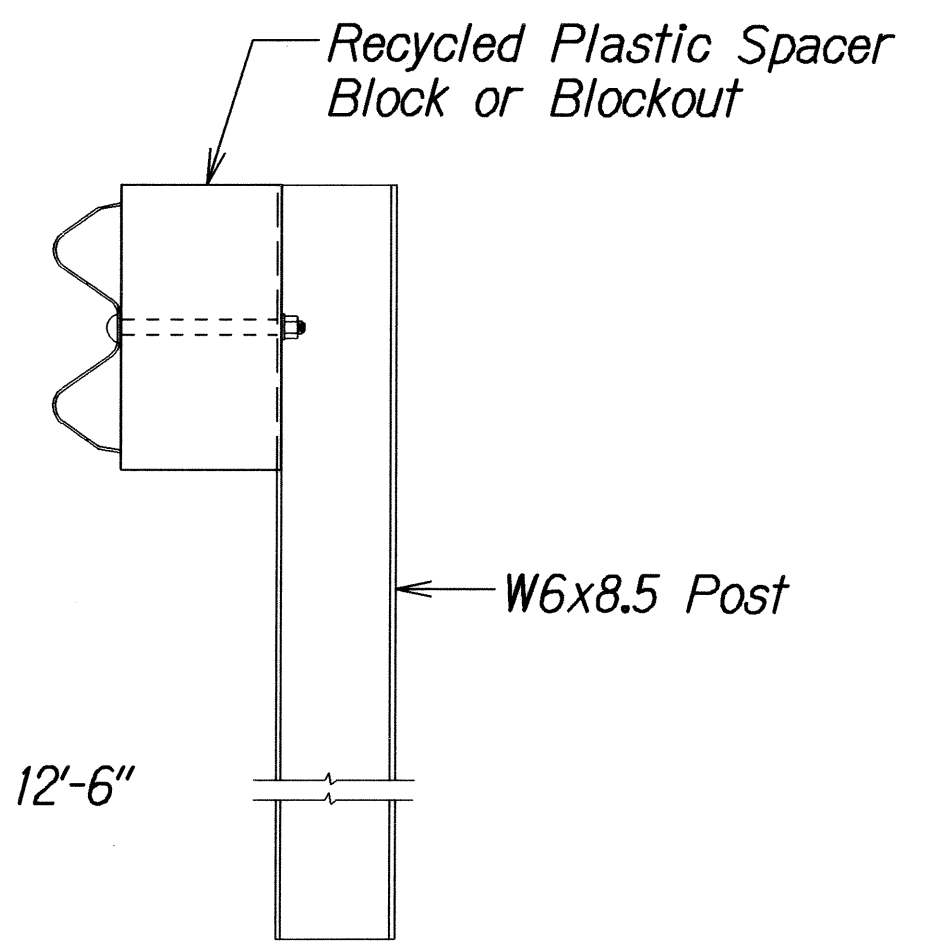
(SPlice IN CENTER OF 12'-6" SPACING)

NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 12'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.1 FT.)

\*Note: All nested W-Beam splices points shall be staggered.



SECTION A-A



SECTION B-B

NOTE: All Rail Elements Sections are 12'-6" and All Posts are 6' Long

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

4/22/04 ad2chms09.dgn

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER CULVERT**  
HAWAII BELT ROAD GUARDRAIL  
AND SHOULDER IMPROVEMENTS  
Paauhau Road to Pakalana Street  
Federal-Aid Project No. NH-019-1(36)  
Scale: NTS Date: May, 2007

SHEET No. 9 OF 10 SHEETS



*General Notes*

- 
- Technical cross-section diagram of a guardrail on a cut slope. The diagram shows a metal guardrail on top of a metal rubrail (when applicable). Below the rubrail is a layer of grouted rubble paving, which is supported by backfill. A 3'x3'x3' concrete anchor block is embedded in the backfill. The cut slope is shown with a 12-inch minimum width and a 9-inch height. The cut slope varies. The guardrail is 1'-9 5/8 inches high. The cut slope varies.
- Labels and dimensions in the diagram include:
- Guardrail
  - 1'-9 5/8"
  - Cut Slope
  - Varies
  - 12" Min.
  - Cut Slope (varies)
  - 9"
  - Grouted Rubble Paving
  - Backfill
  - 3'x3'x3' Conc. Anchor Block
  - Metal Guardrail
  - Metal Rubrail (when applicable)

ANCHOR BLOCK IN CUT SECTION

Field bend

Attach rubrail to rear of post with Rail bolt-Galv. (hot-dip zinc coated)  $\frac{5}{8}$ "Ø x 4" long bolt and nut

Location of End Anchorage Block when offset distance from tangent rail section to bank is 0'-0" to 4'-7".

Location of End Anchorage Block when offset distance from tangent rail section to bank is 4'-8" to 6'-7".

Location of End Anchorage Block when offset distance from tangent rail section to bank is 6'-8" to 9'-5".

Location of End Anchorage Block when offset distance from tangent rail section to bank is greater than 9'-5".

Invert of Gutter

Measured along rail face

Double Nested W-Beam (see elevation plan for post spacing)

25'-0"

25'-0" Minimum Distance varies to fit field conditions Limit of Payment for Rubrail

Toe of Fill

Top of Cut

Edge of Paved Shoulder

6'-3" (typ)

72' (min.) to Warranting Feature

A

B

a

b

7'-10"

5'-10"

3'-10"

12'-6"

12'-6"

PLAN

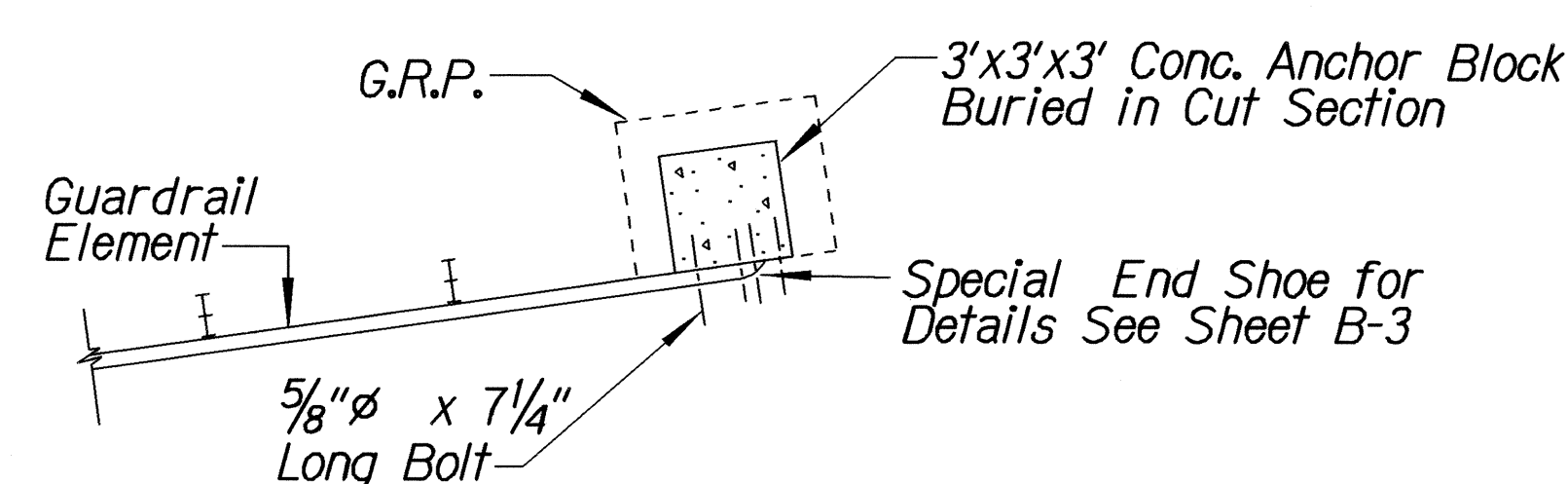
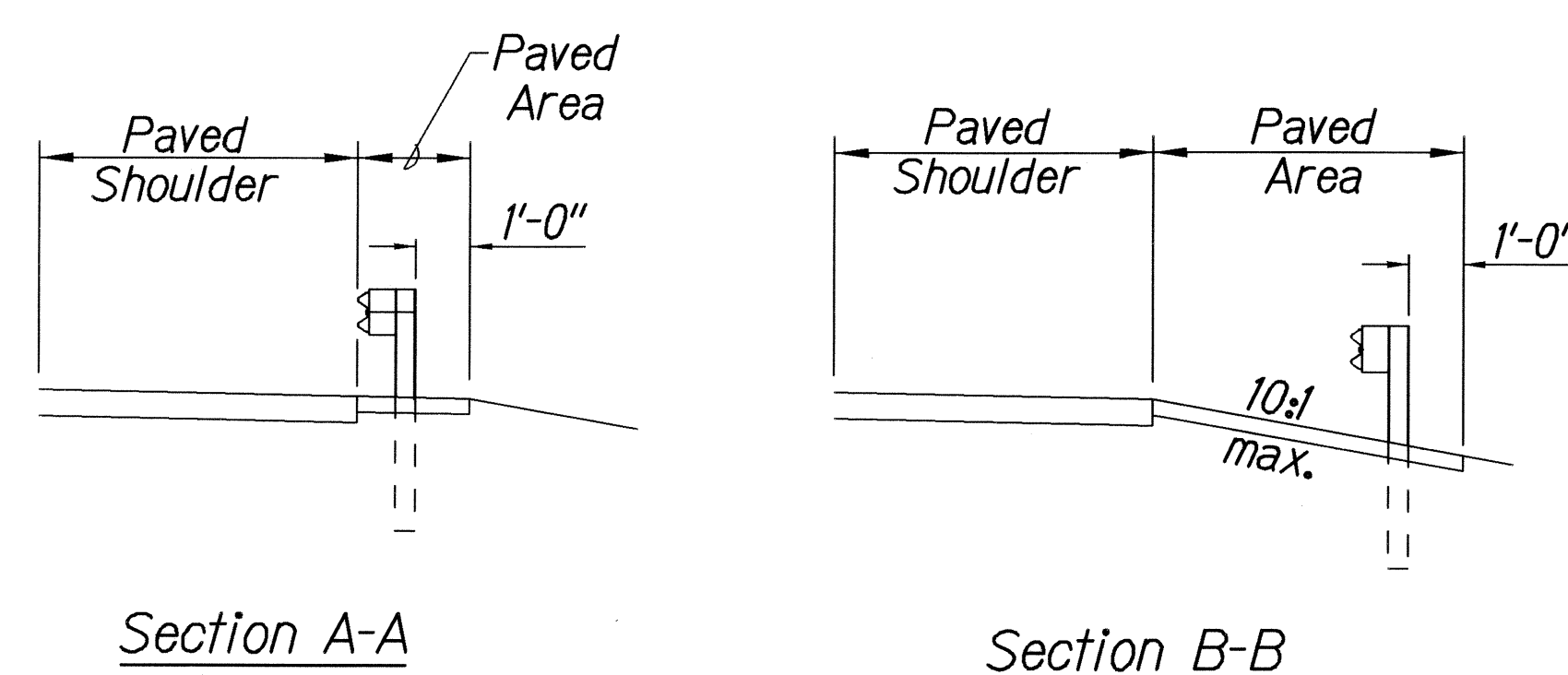
*PLAN*

<i>Design speed mph</i>	<i>a:b</i>
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)

\* Posts at 3'-1½" o.c.  
\*\* Posts at 1'-6¾" o.c.

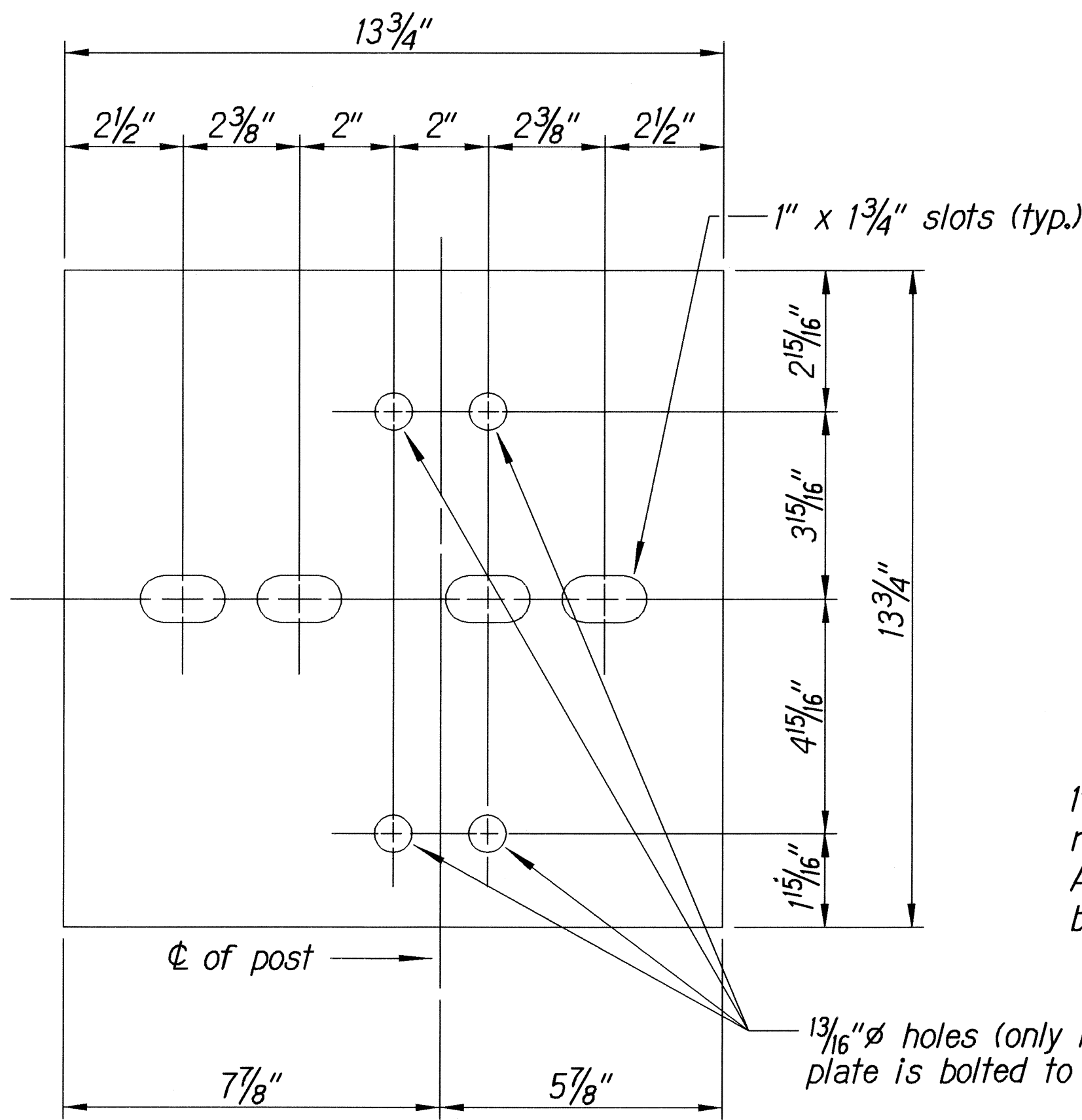
PLAN - ANCHOR BLOCK IN CUT SECTION



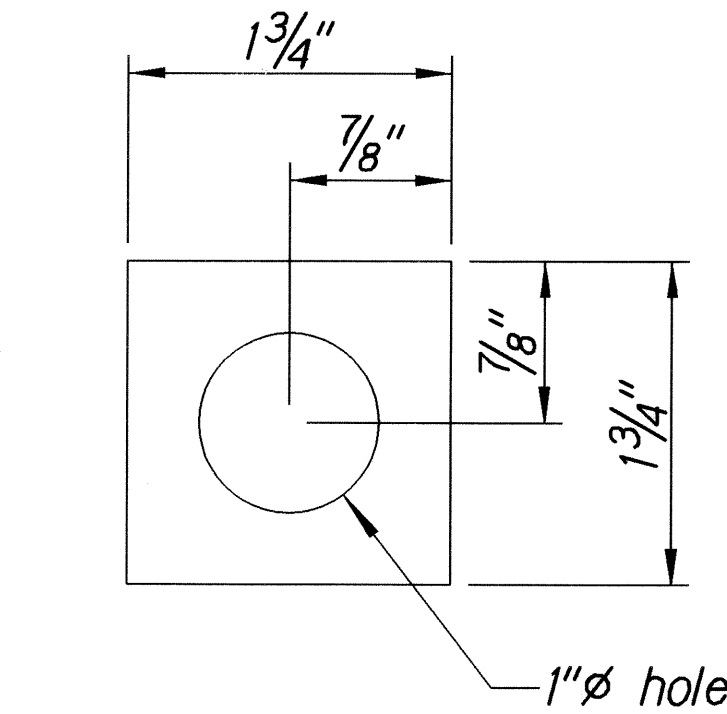




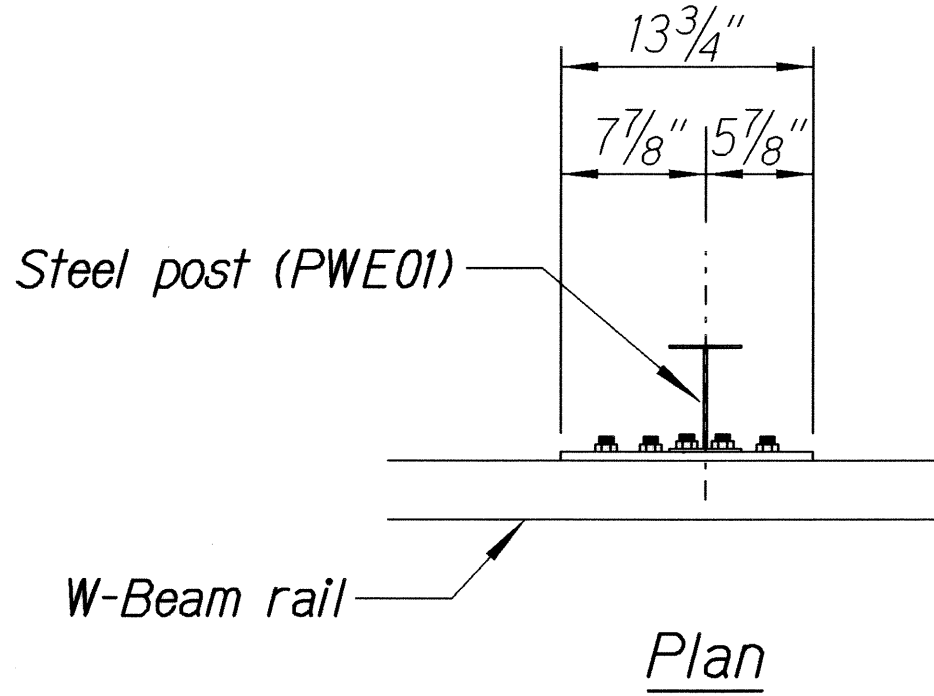
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-1(36)	2009	12	26



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



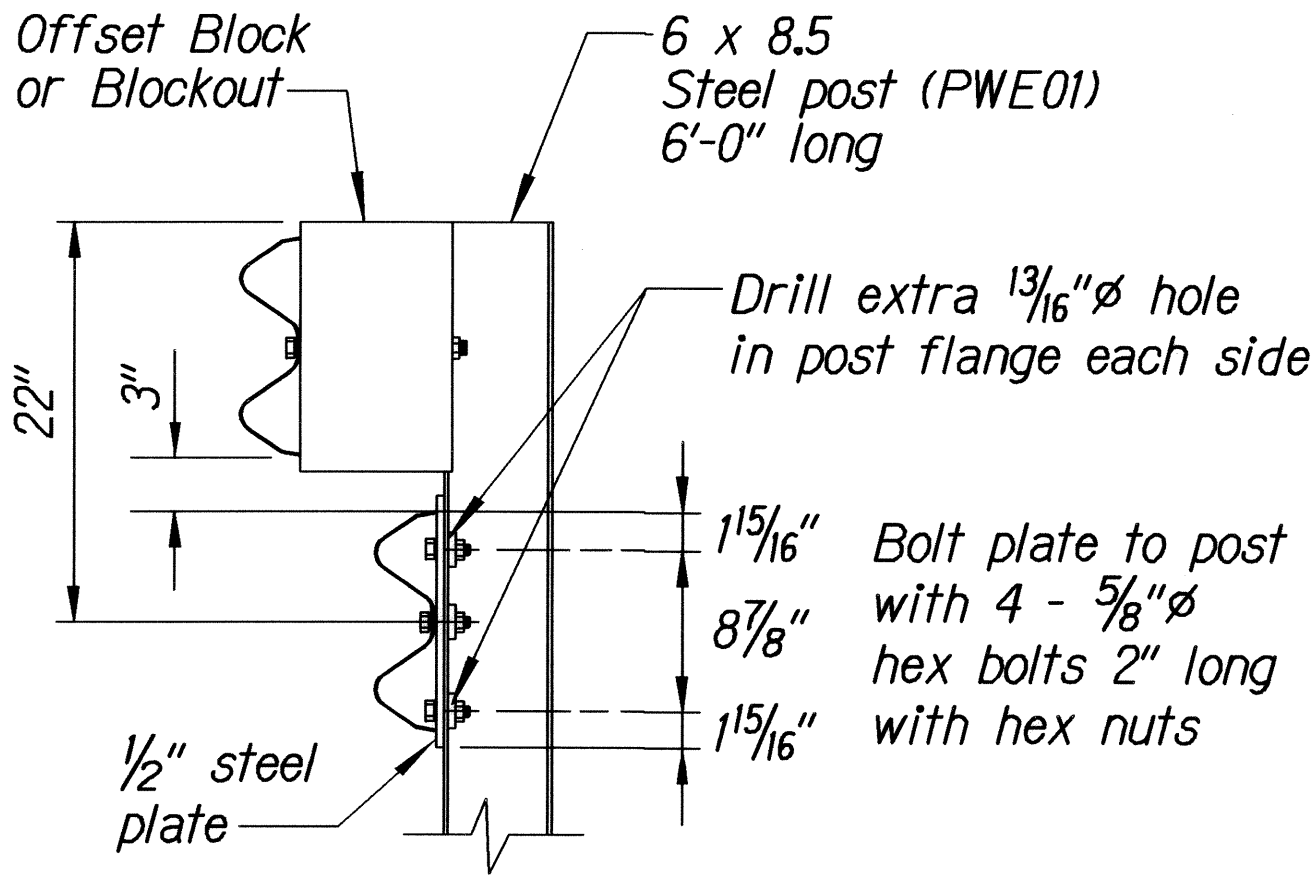
**Square Washer**  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)



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

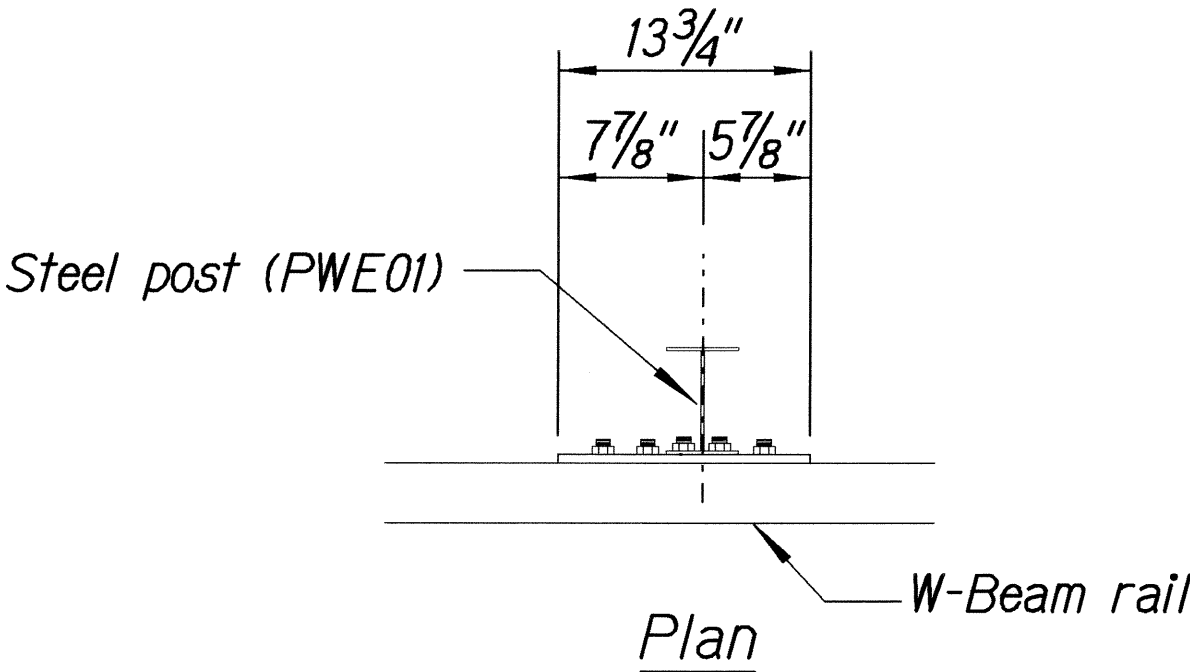
1"  $\phi$  holes to be field drilled in  
rail and through post flange.  
Attach to steel plate with 7/8"  $\phi$  hex  
bolts 2" long with square washer

**Front View**



**Elevation**

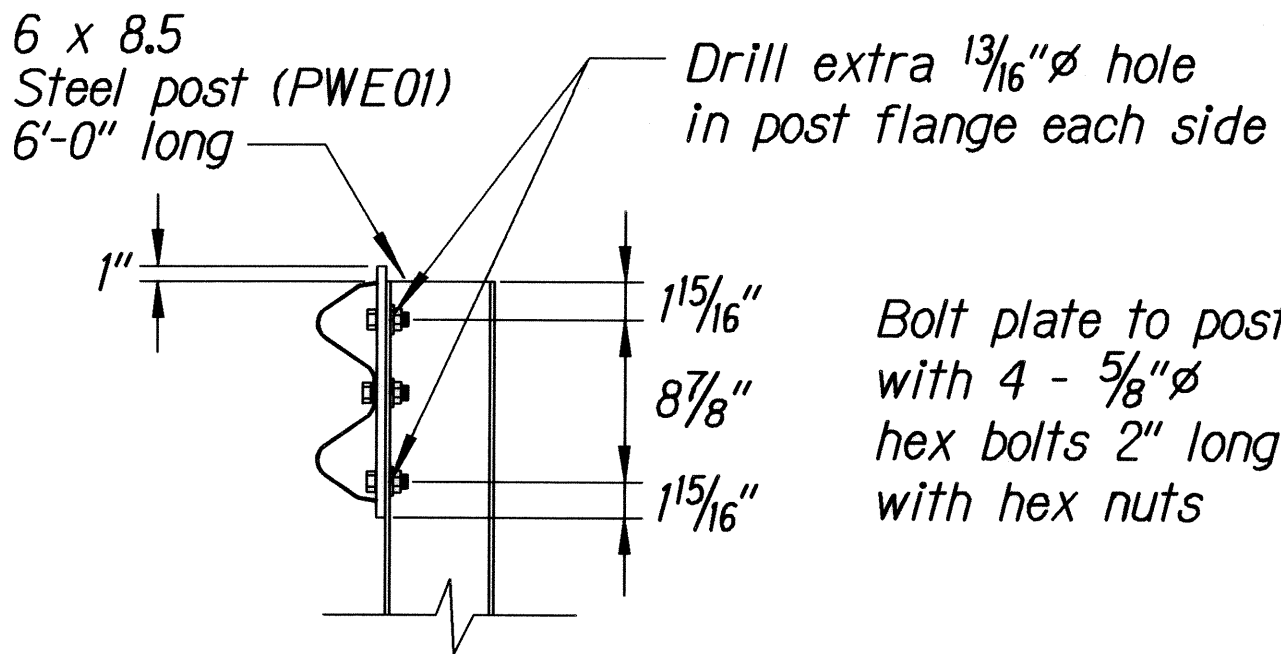
**RUBRAIL ANCHOR DETAILS**



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

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

**Front View**

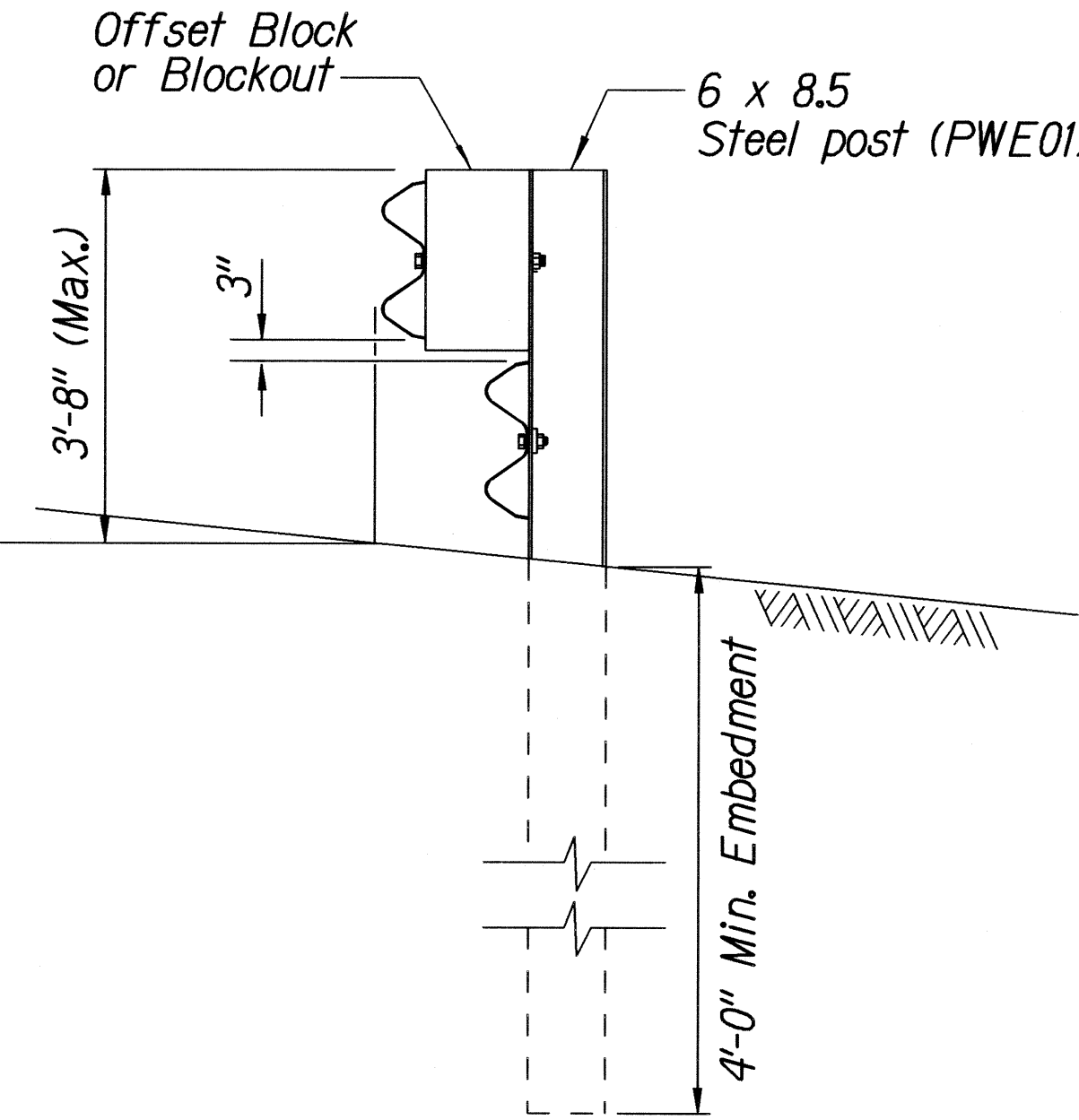
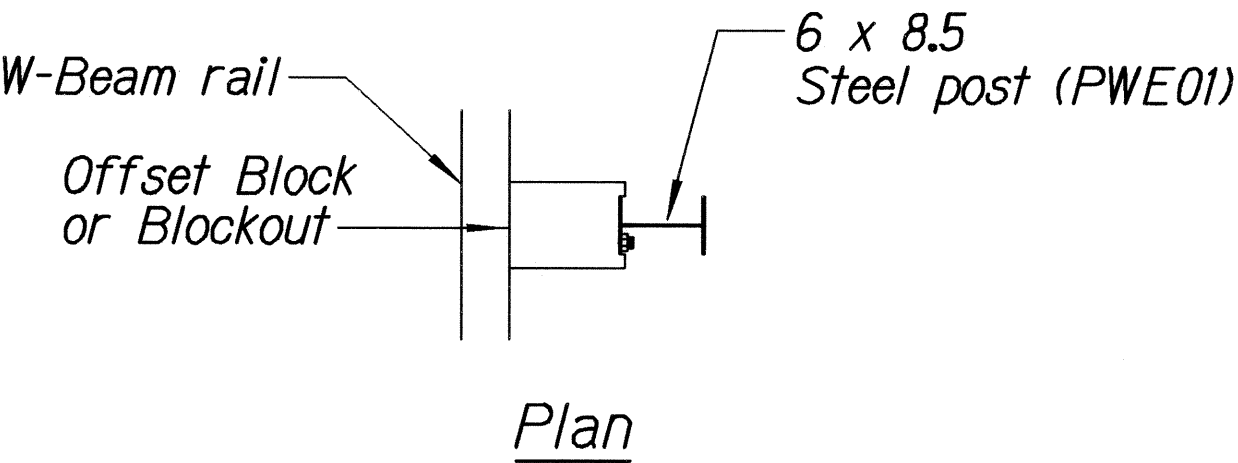


**Elevation**

**POST ANCHOR DETAILS**

**RUBRAIL DETAIL FOR MODIFIED TYPE "A-1" FLARE  
(WHEN CALLED FOR IN PLANS)**

**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.



**Elevation**

**STEEL POST GUARDRAIL  
WITH RUBRAIL**

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**MODIFIED TYPE "A-1" FLARE**  
**RUBRAIL DETAILS**  
HAWAII BELT ROAD GUARDRAIL  
AND SHOULDER IMPROVEMENTS  
Paauhau Road to Pakalana Street  
Federal-Aid Project No. NH-019-1(36)  
Scale: As Noted Date: May, 2007

SHEET No. 3 OF 3 SHEETS