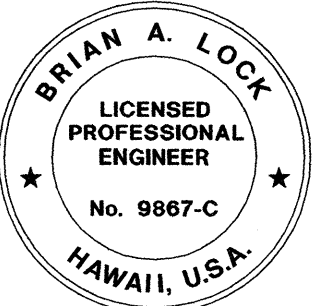


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	10	47

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

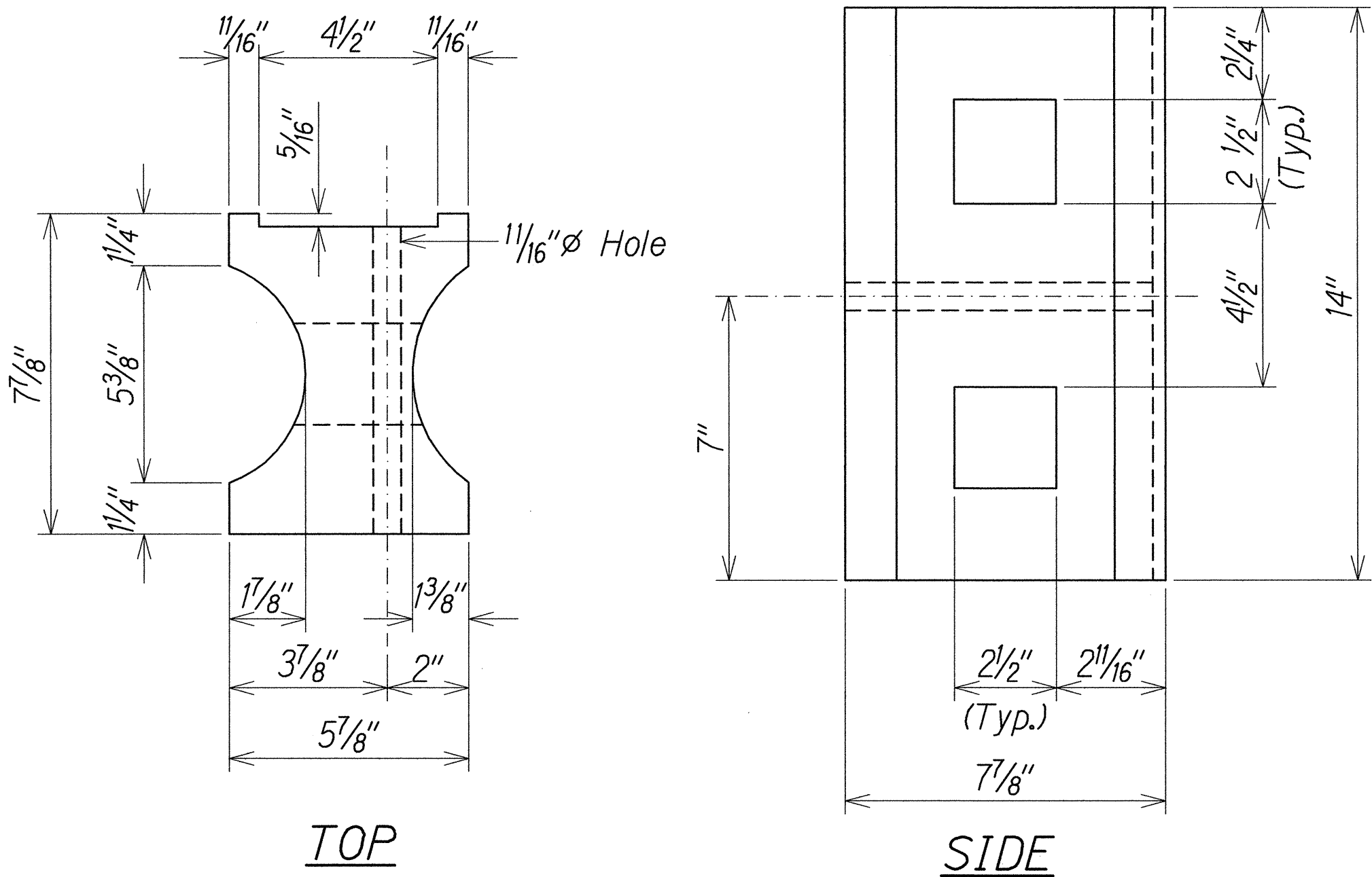


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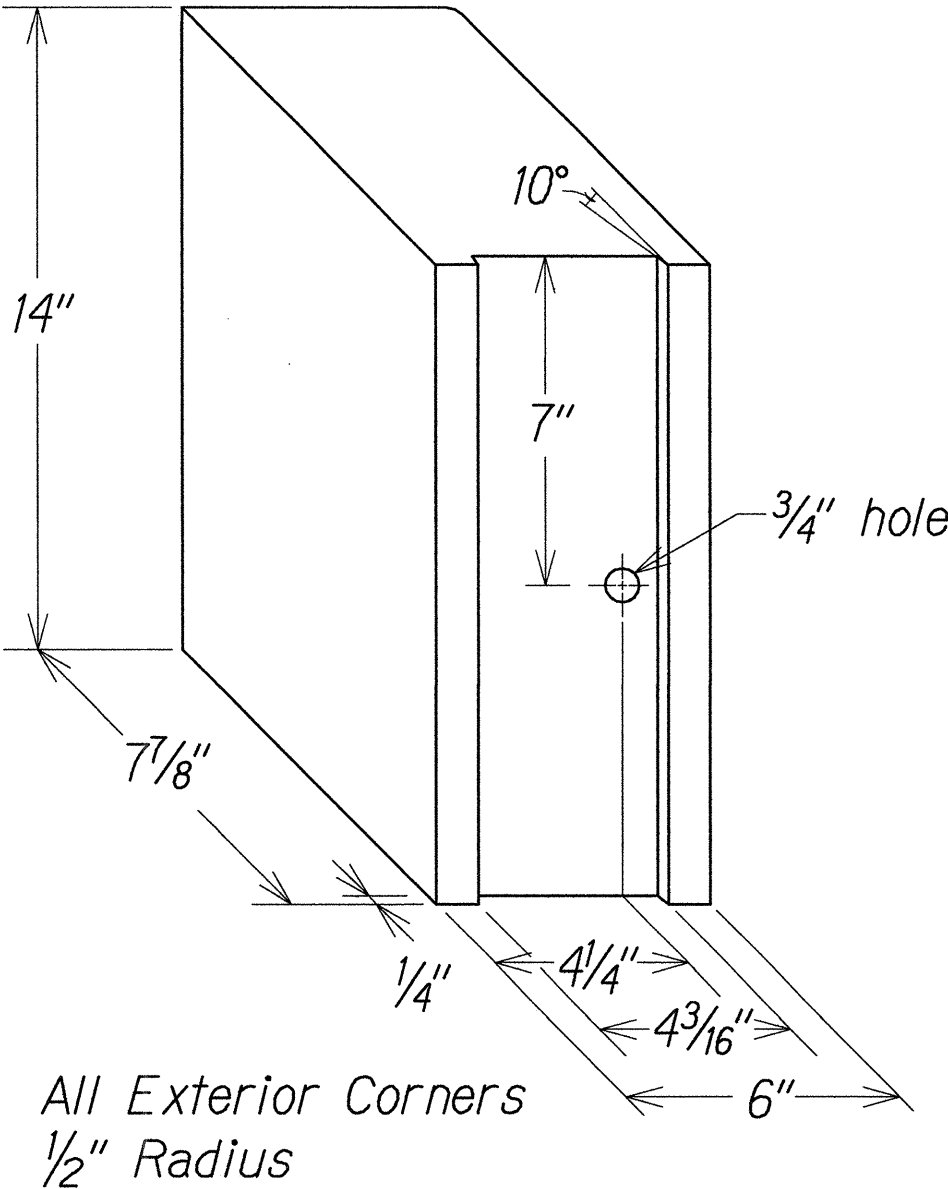
*Mark*  
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**GUARDRAIL DETAILS**  
AND NOTES  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Scale: None Date: April 2014  
SHEET No. GRD-1 OF 11 SHEETS

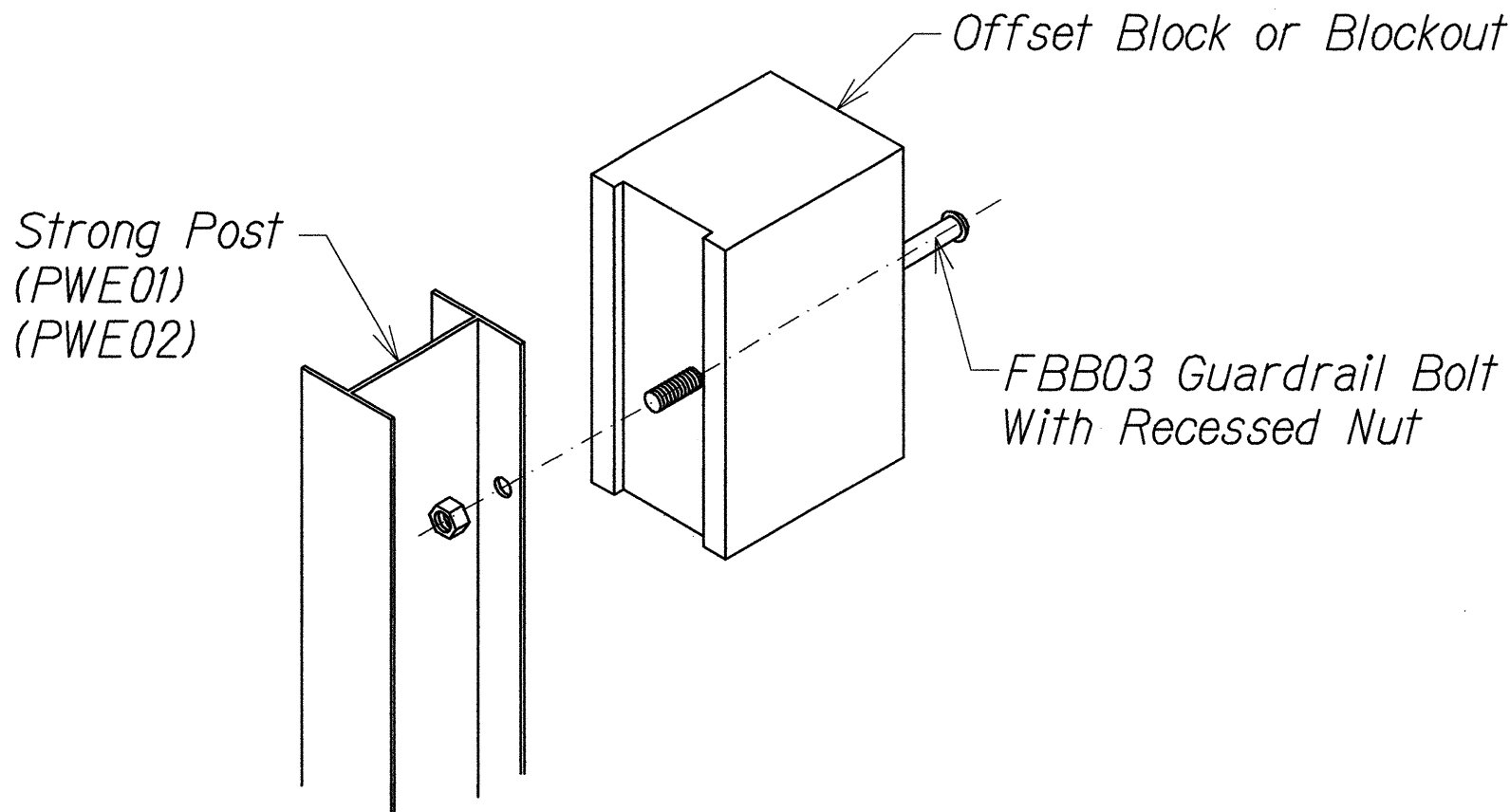
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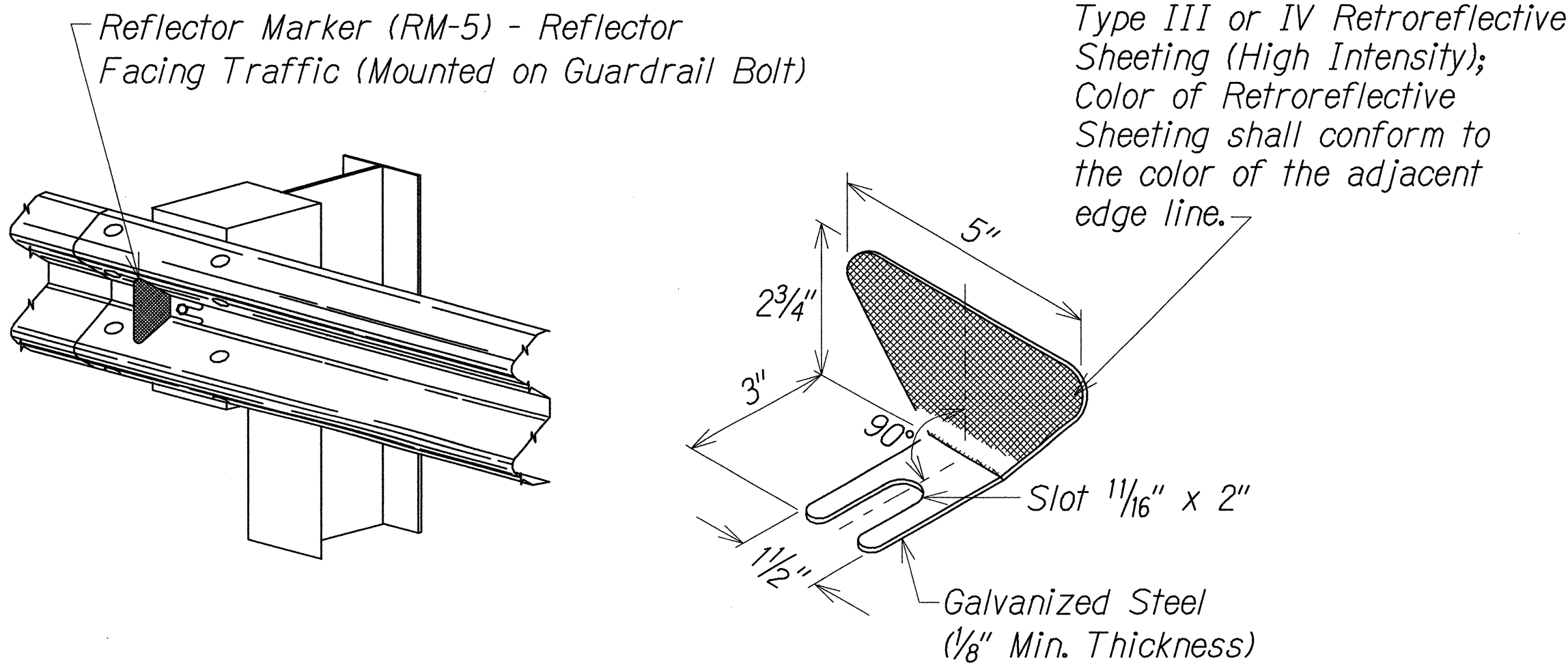
TOP  
SIDE  
RECYCLED PLASTIC BLOCKOUT (TYPE I)



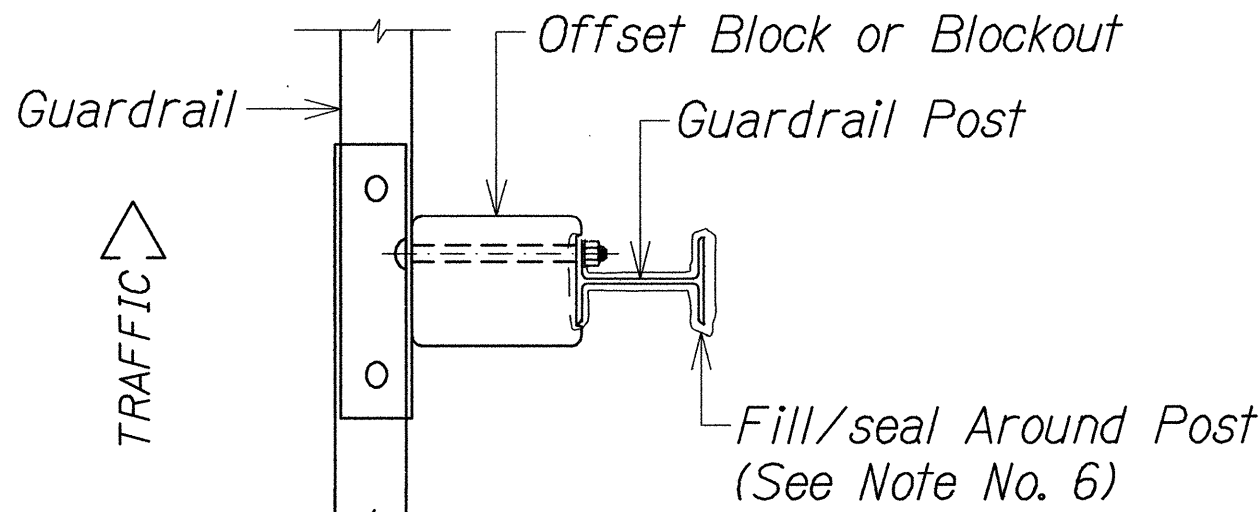
RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



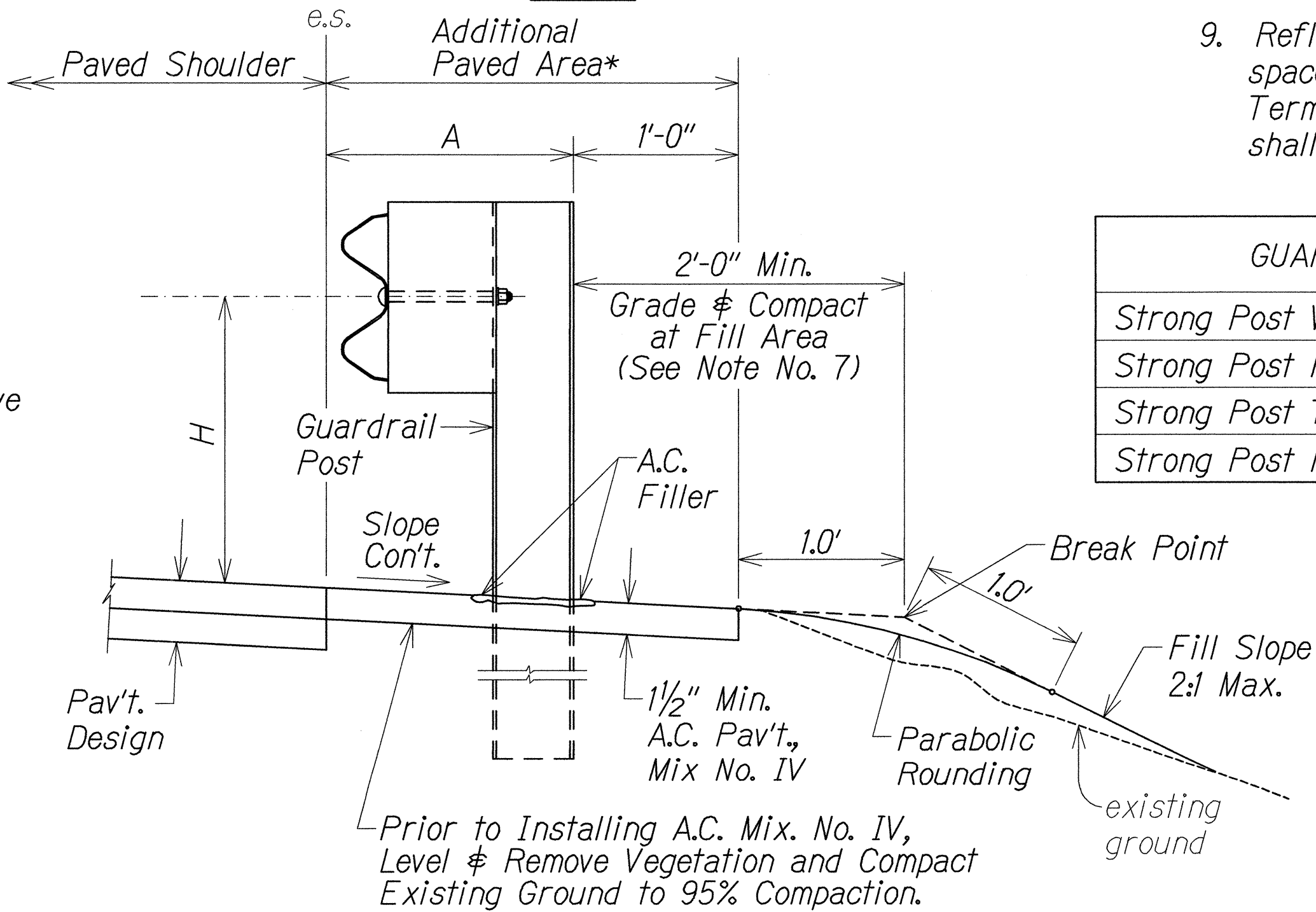
Exploded View  
(Rail and Washer Not Shown)  
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION TYPICAL GUARDRAIL INSTALLATION

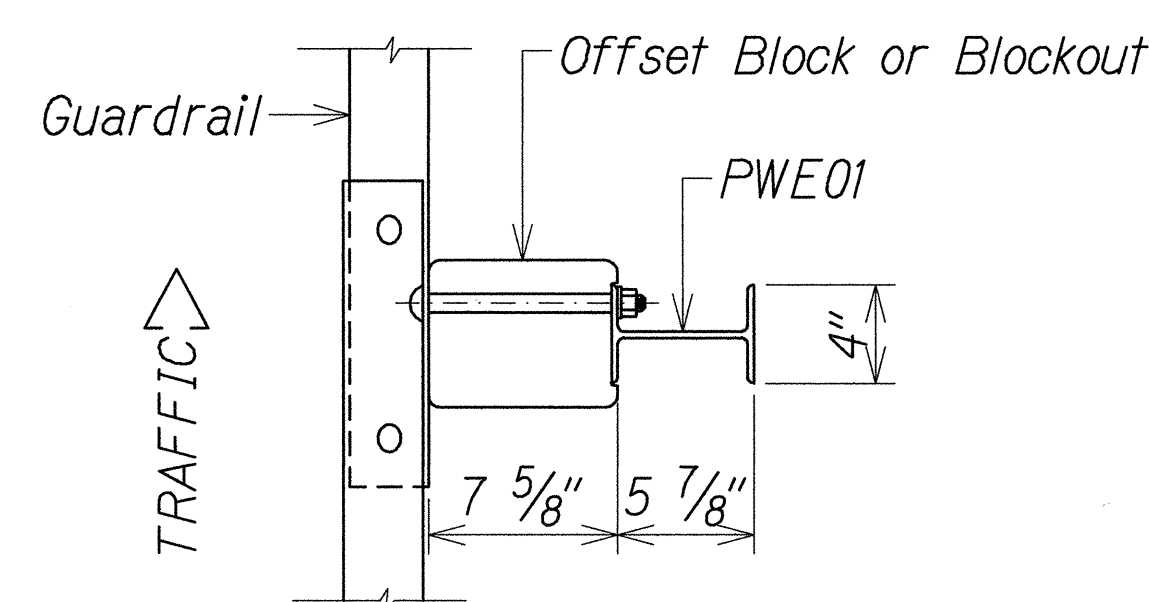


PLAN

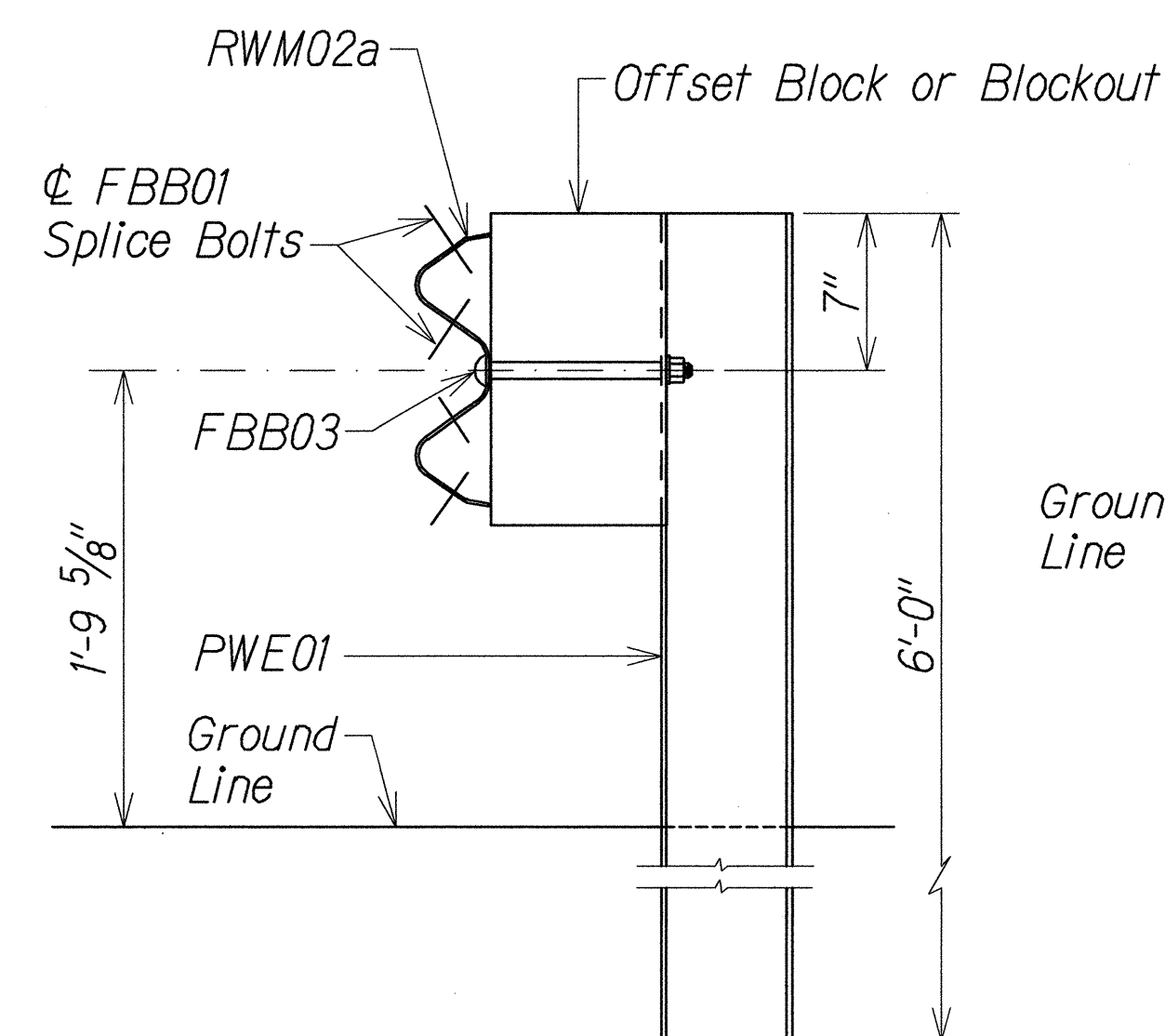
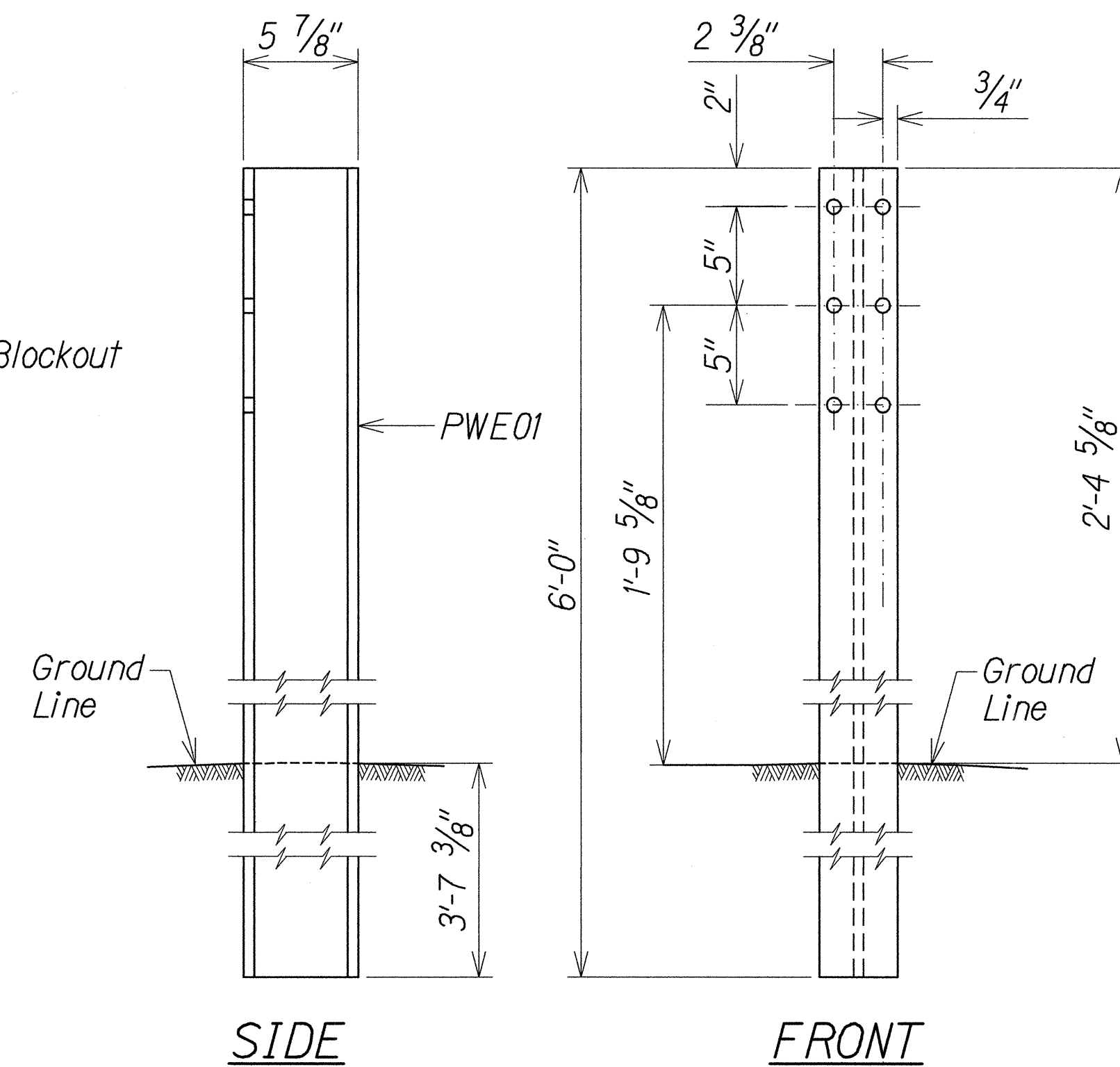


ELEVATION

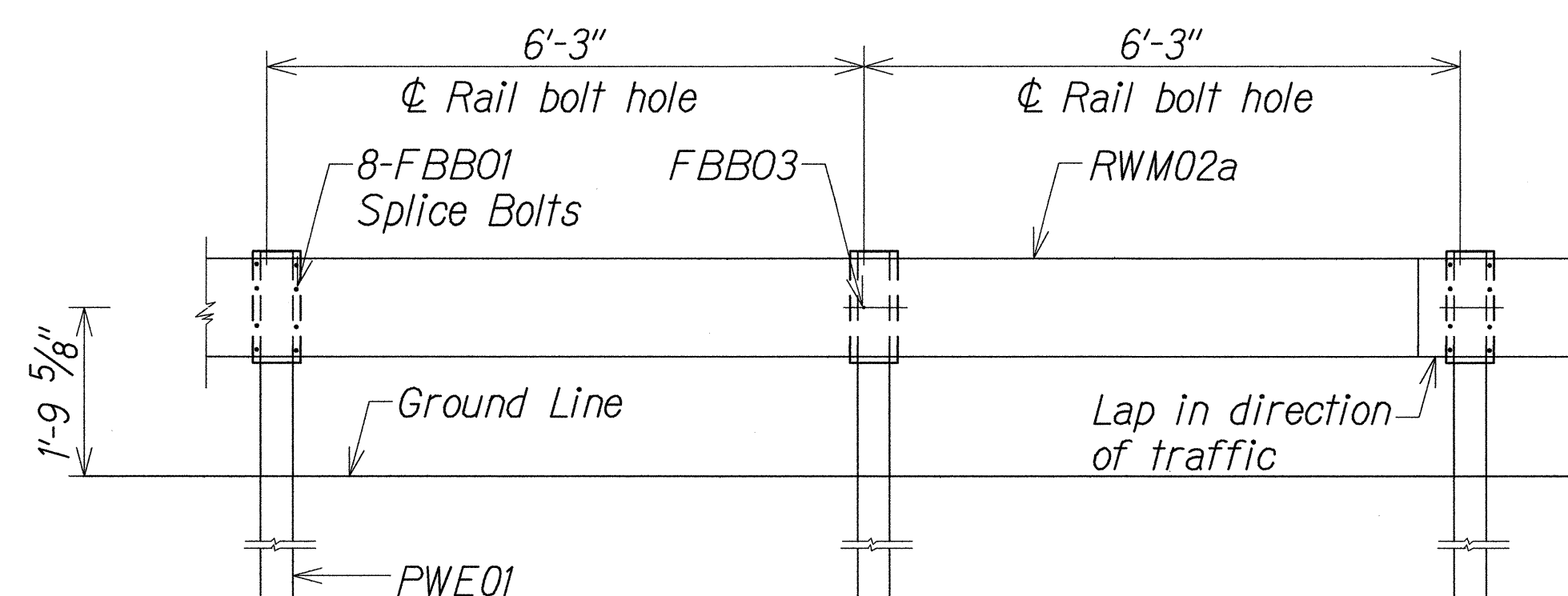
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DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	



PLAN

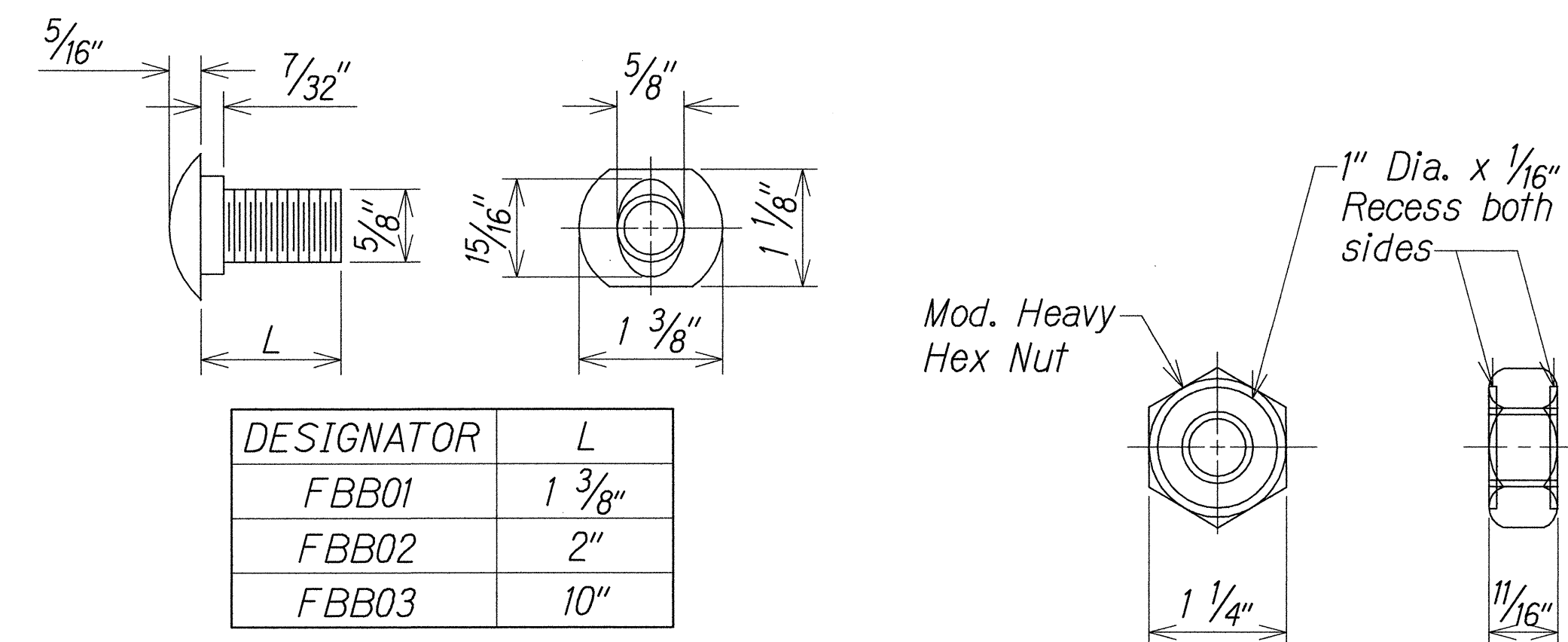
ELEVATION

W-BEAM STRONG POST (PWE01)



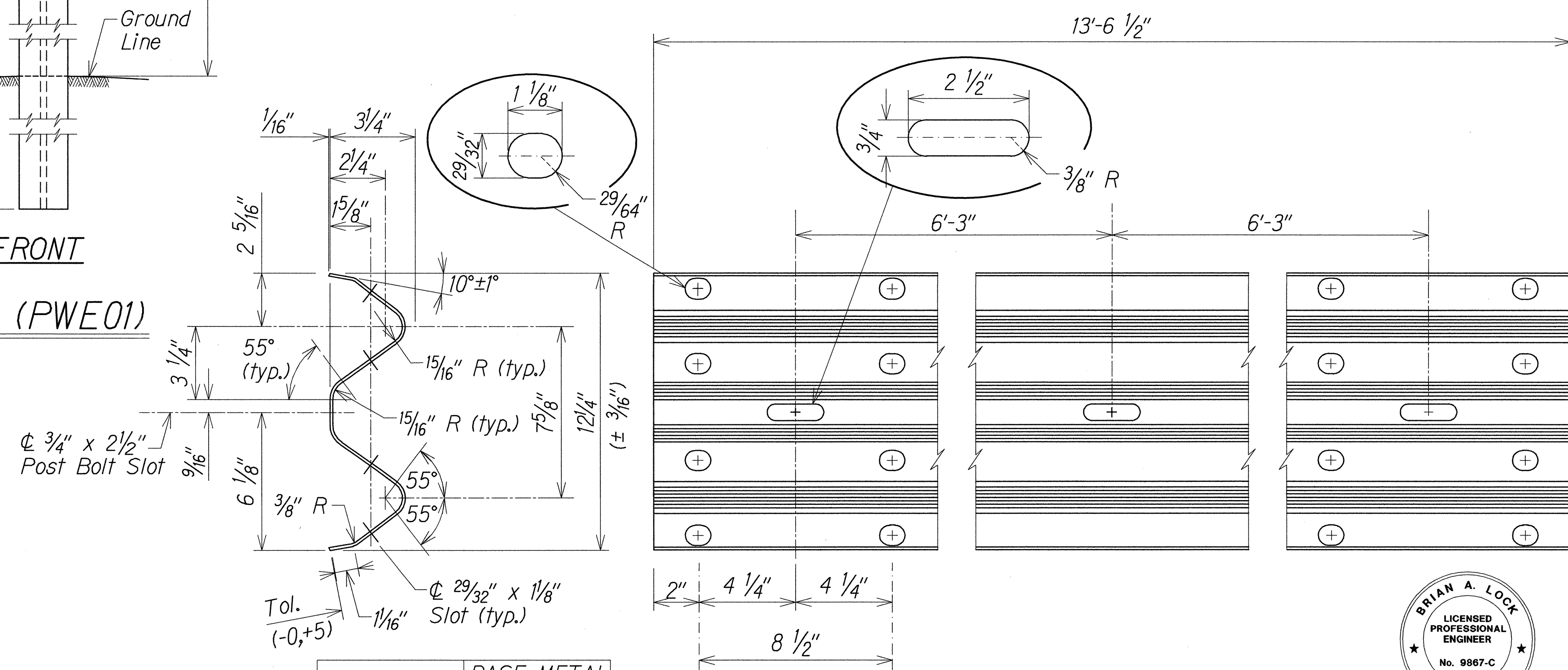
ELEVATION

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



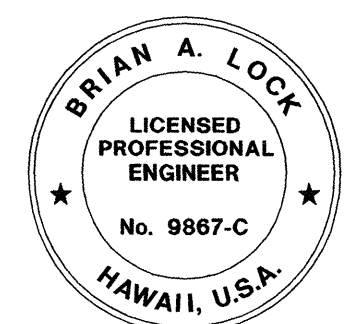
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

## GUARDRAIL BOLTS AND RECESSED NUT




DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

## 2 SPACE W-BEAM GUARDRAIL (RWM02a)



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 APRIL 30, 2016

WILSON OKAMOTO CORPORATION LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
*STRONG POST W-BEAM*  
*GUARDRAIL DETAILS*

HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A

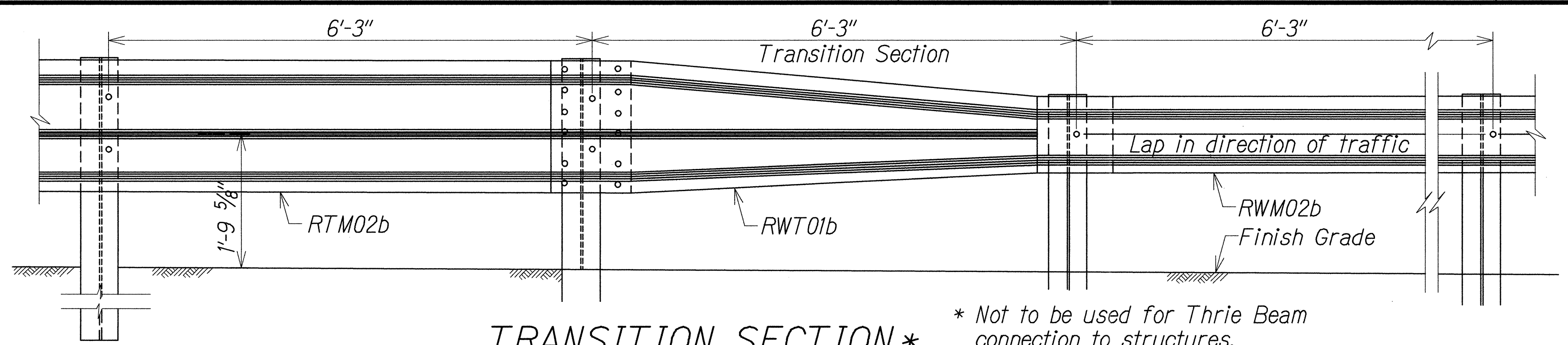
Project No. 360AB-01-09

Scale: None

*Date: April 2014*

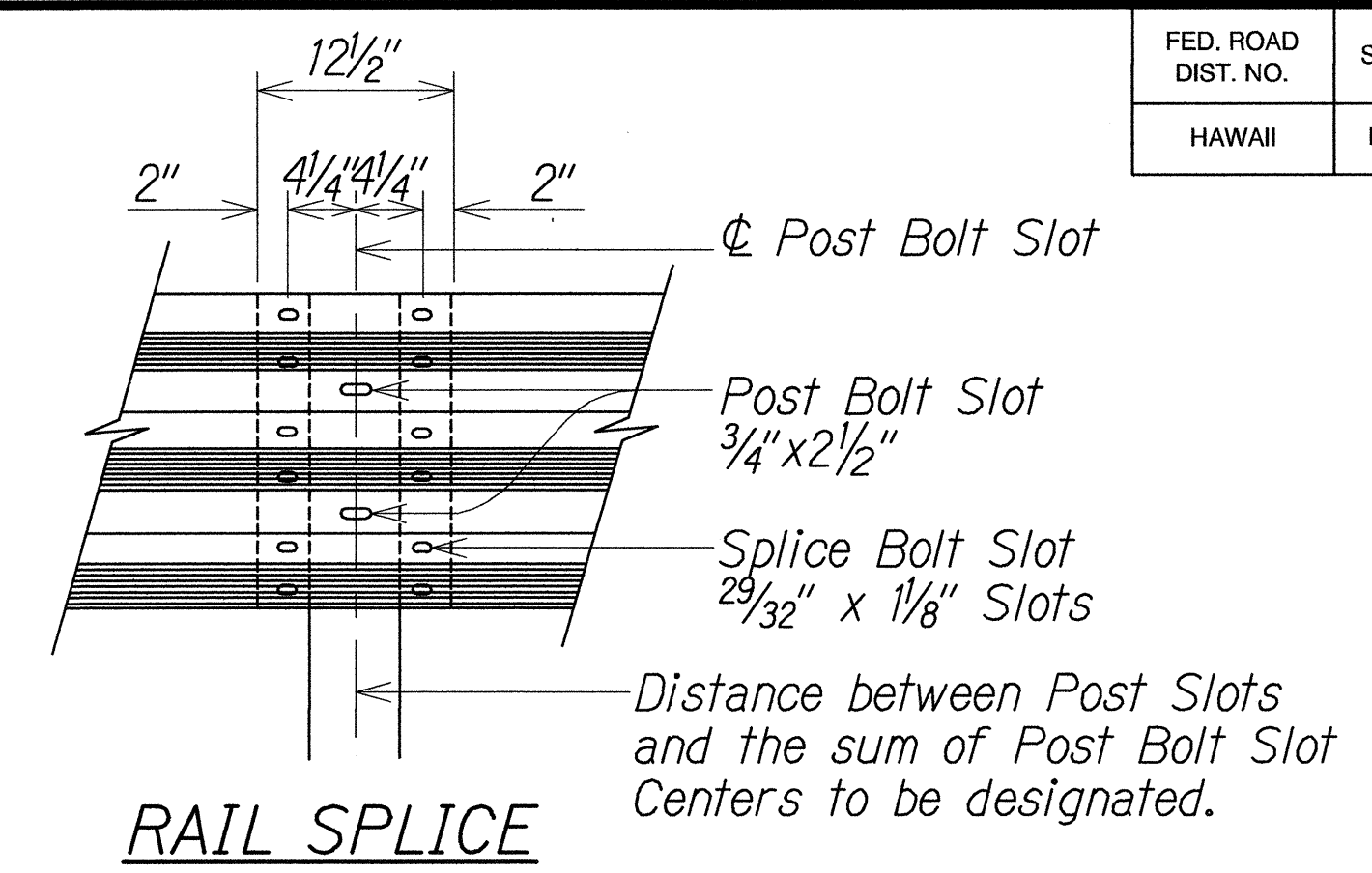
SHEET No. *GRD-2* OF *11* SHEETS



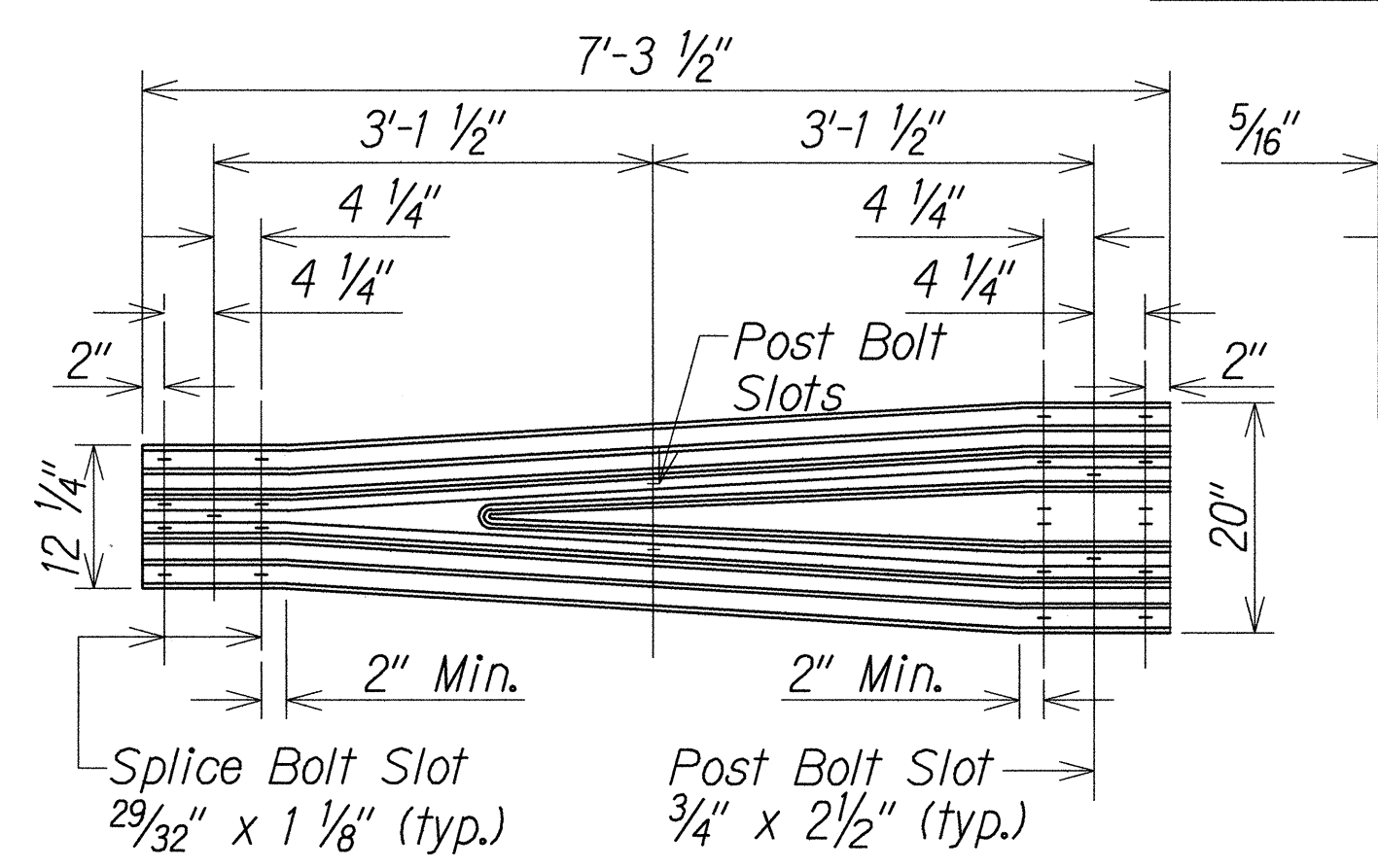


**TRANSITION SECTION \***

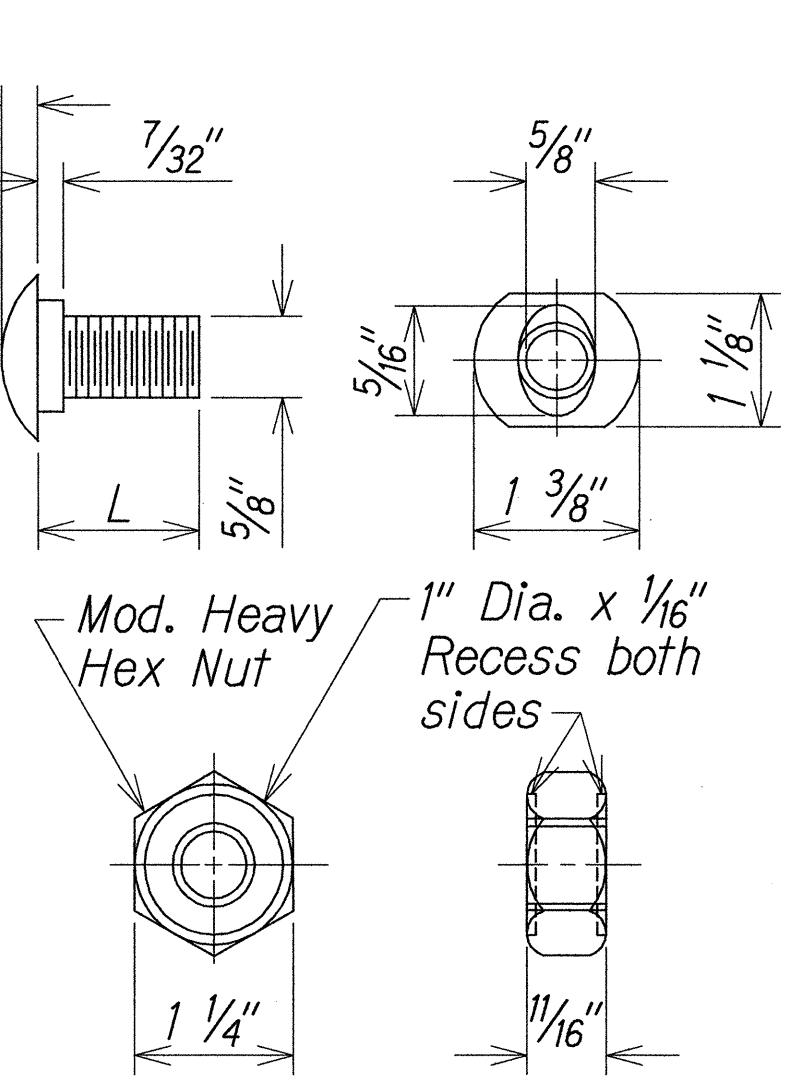
\* Not to be used for Thrie Beam connection to structures.



**RAIL SPLICE**

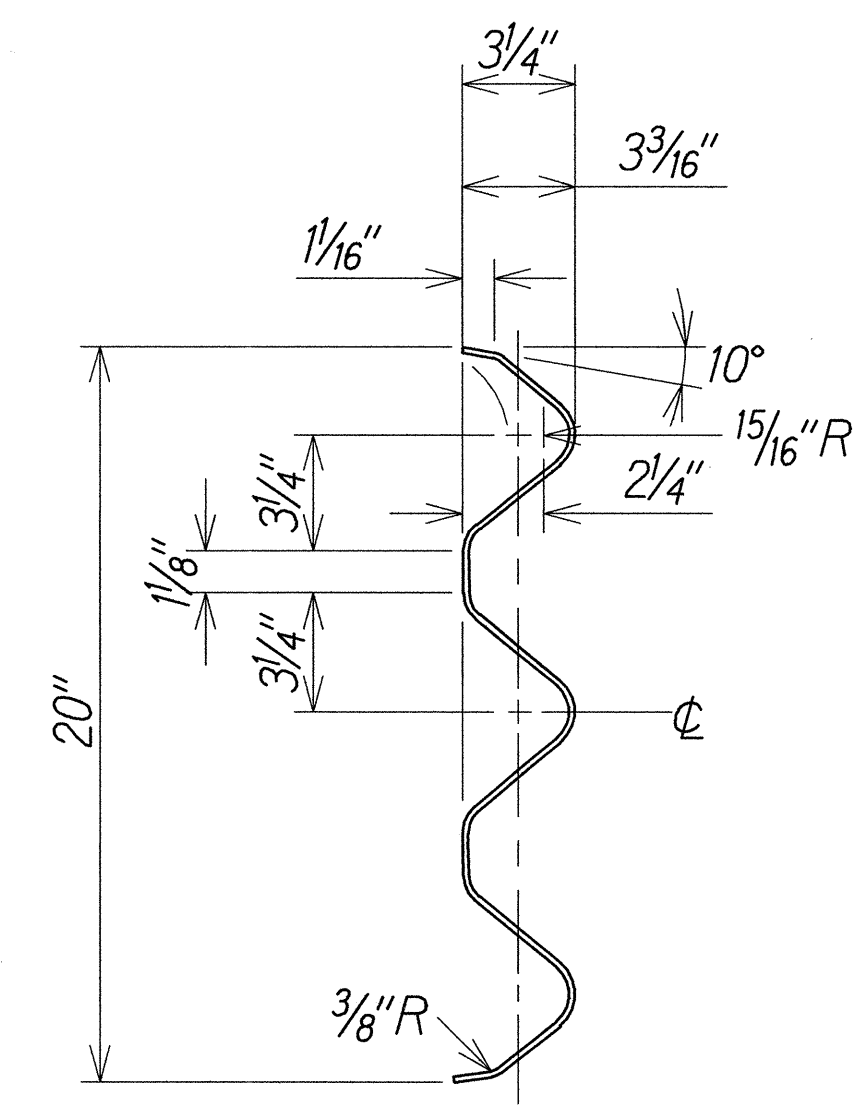


**TRANSITION SECTION (RWT01b)**

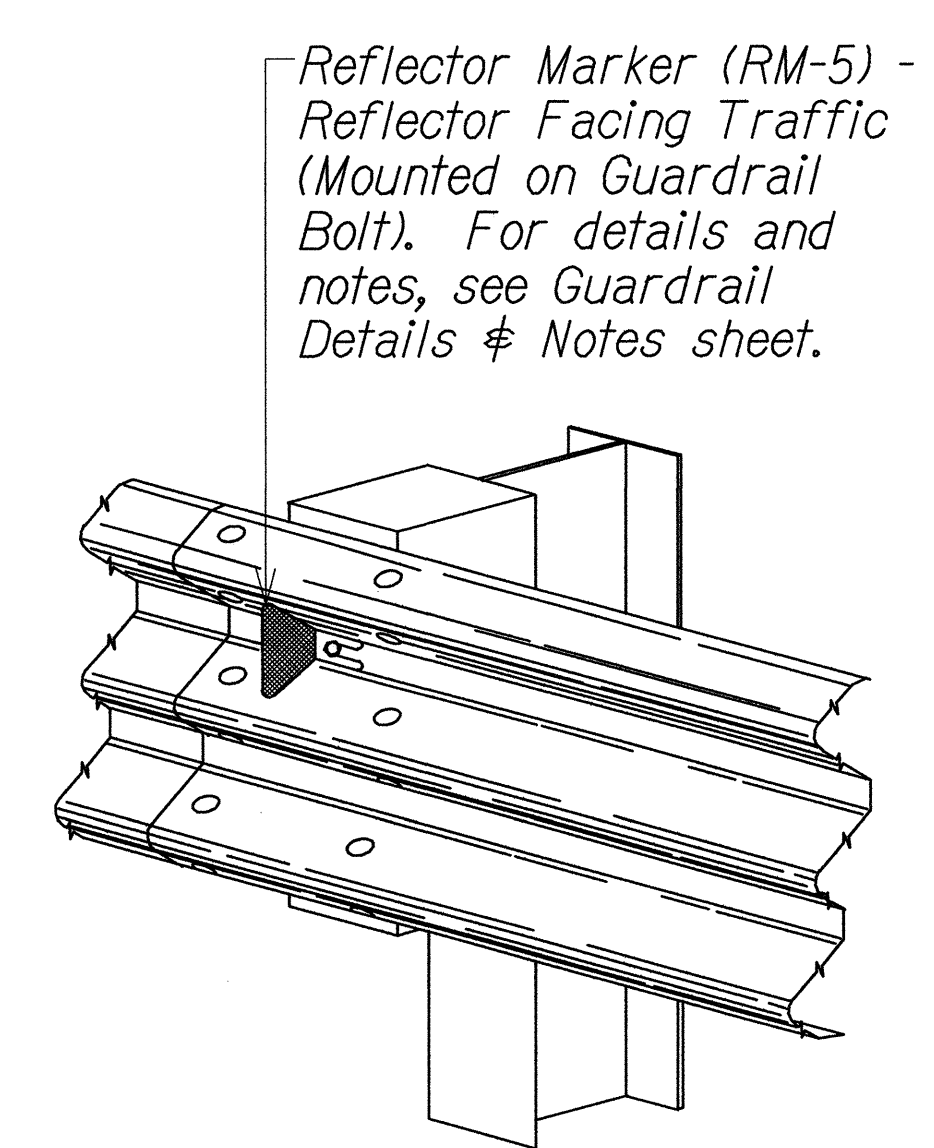


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

**GUARDRAIL BOLTS AND RECESSED NUT**

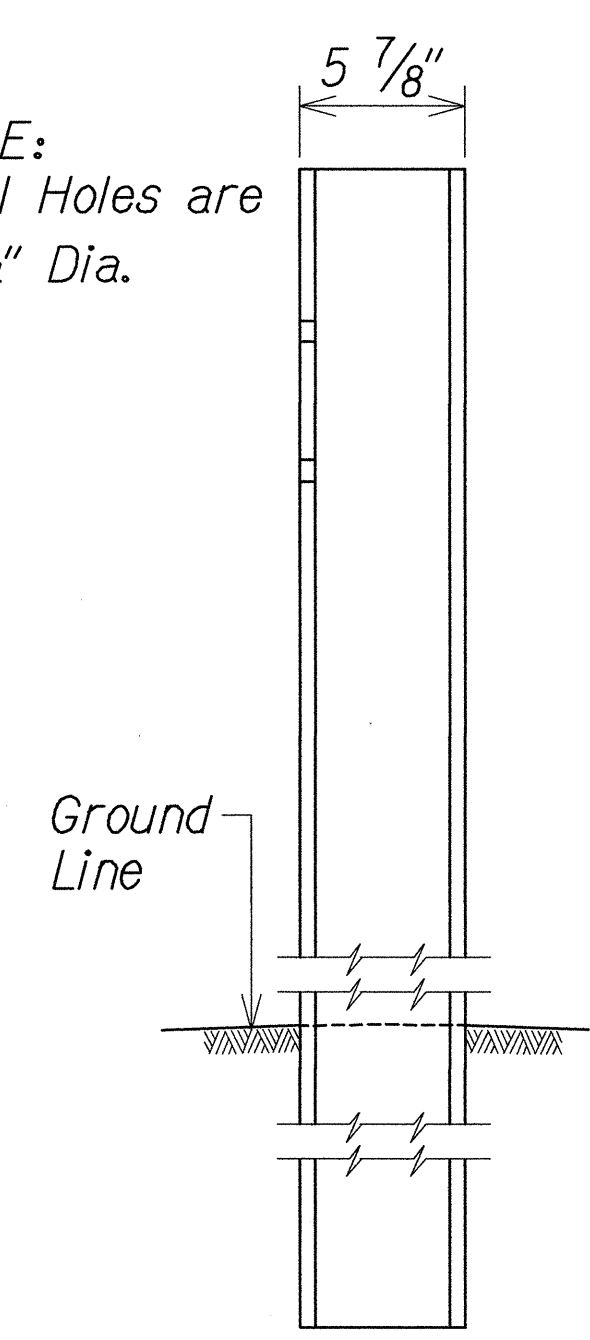


**SECTION THRU RAIL ELEMENT (RTM02b)**

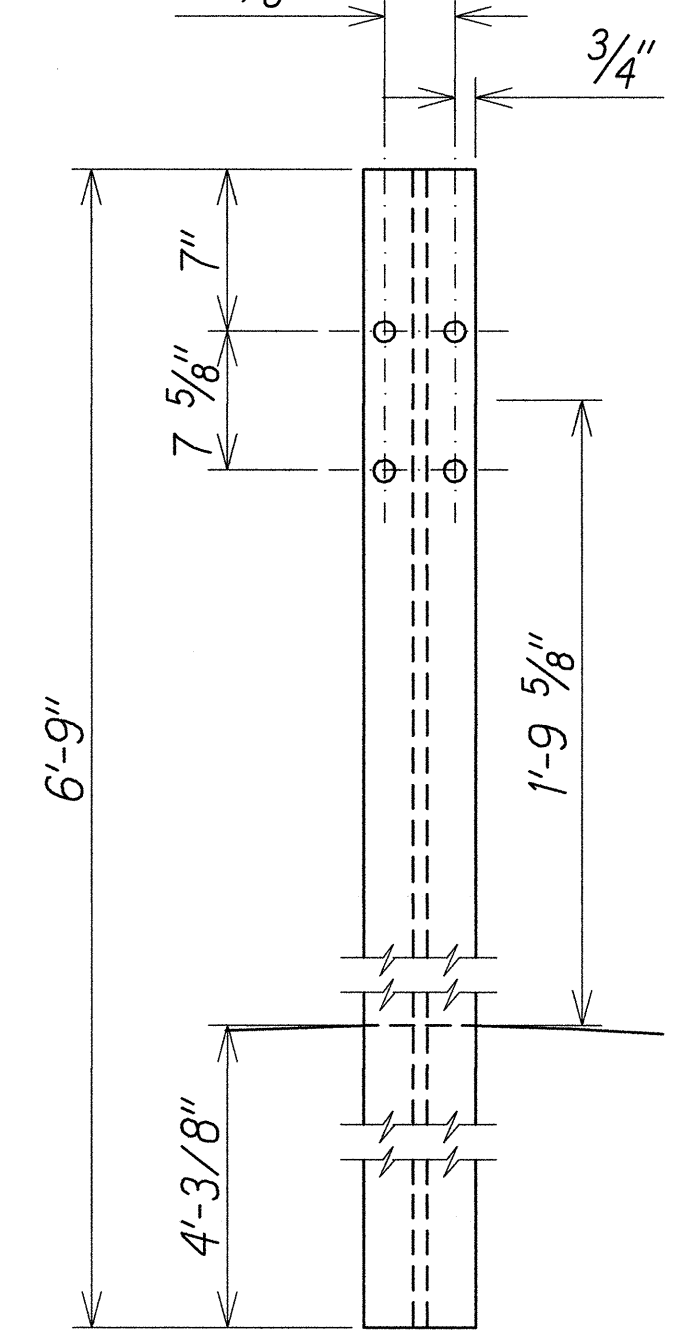


**TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)**

NOTE: All Holes are 3/4" Dia.

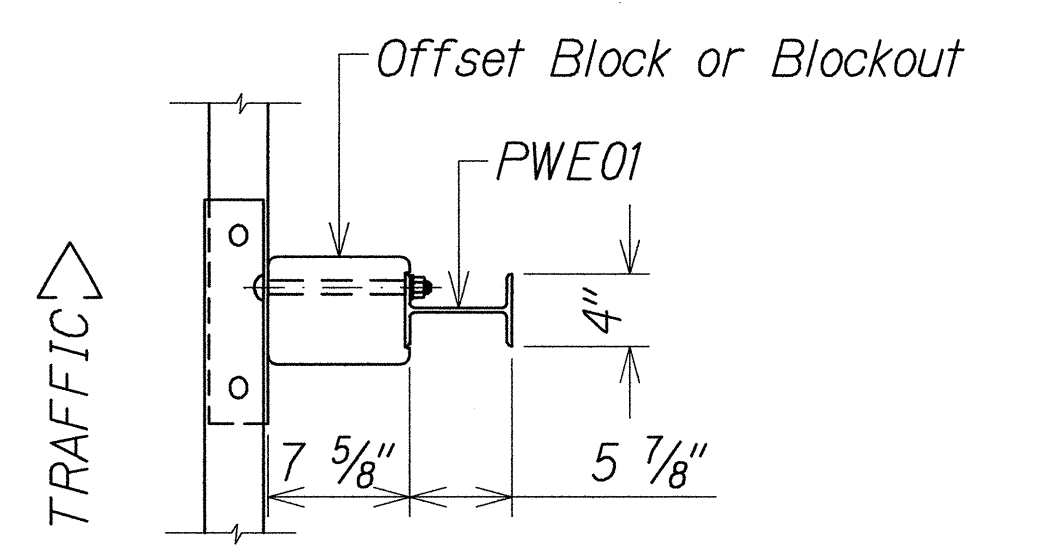


**SIDE**

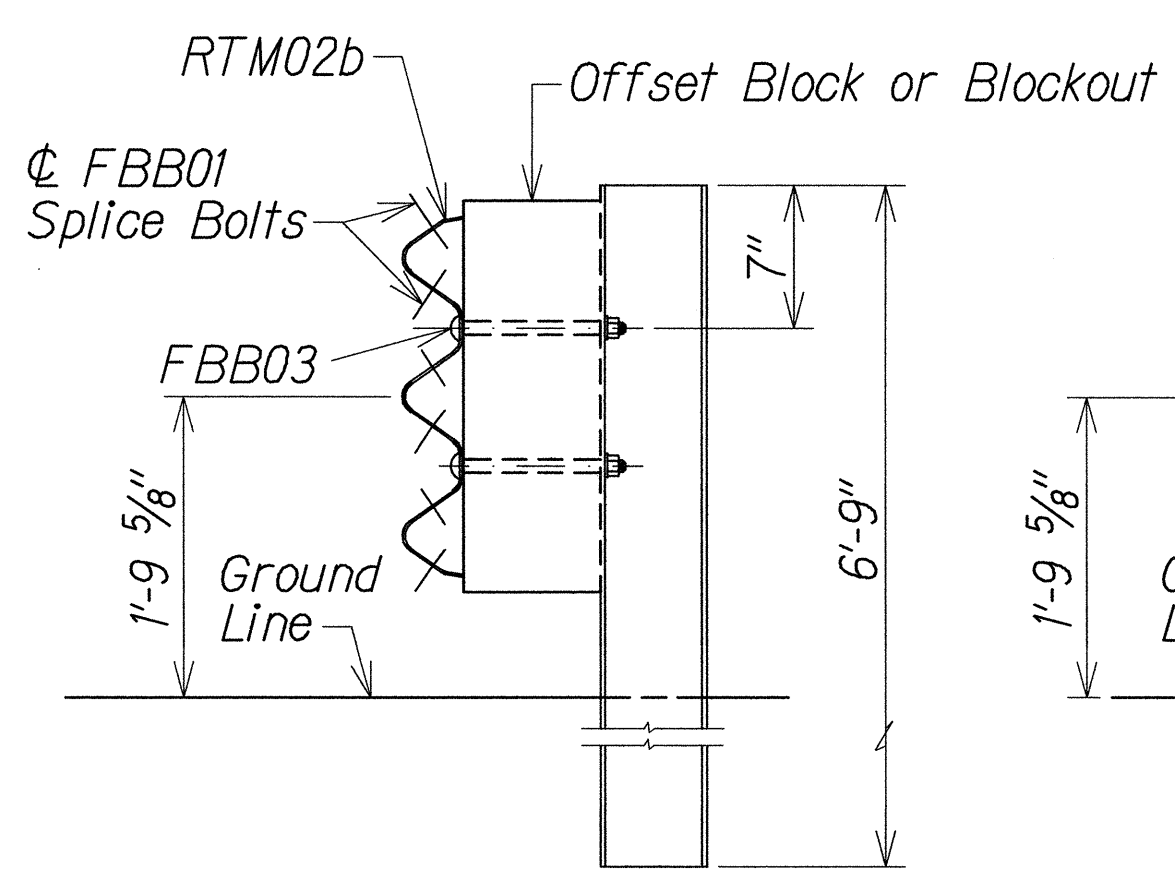


**FRONT**

**THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS**

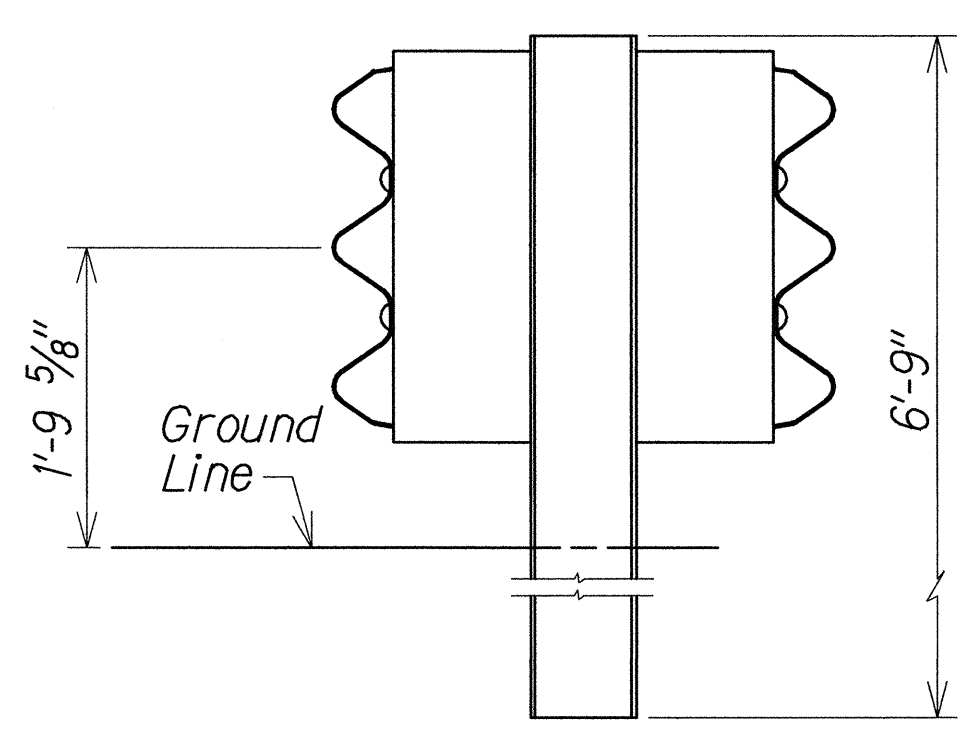


**PLAN**



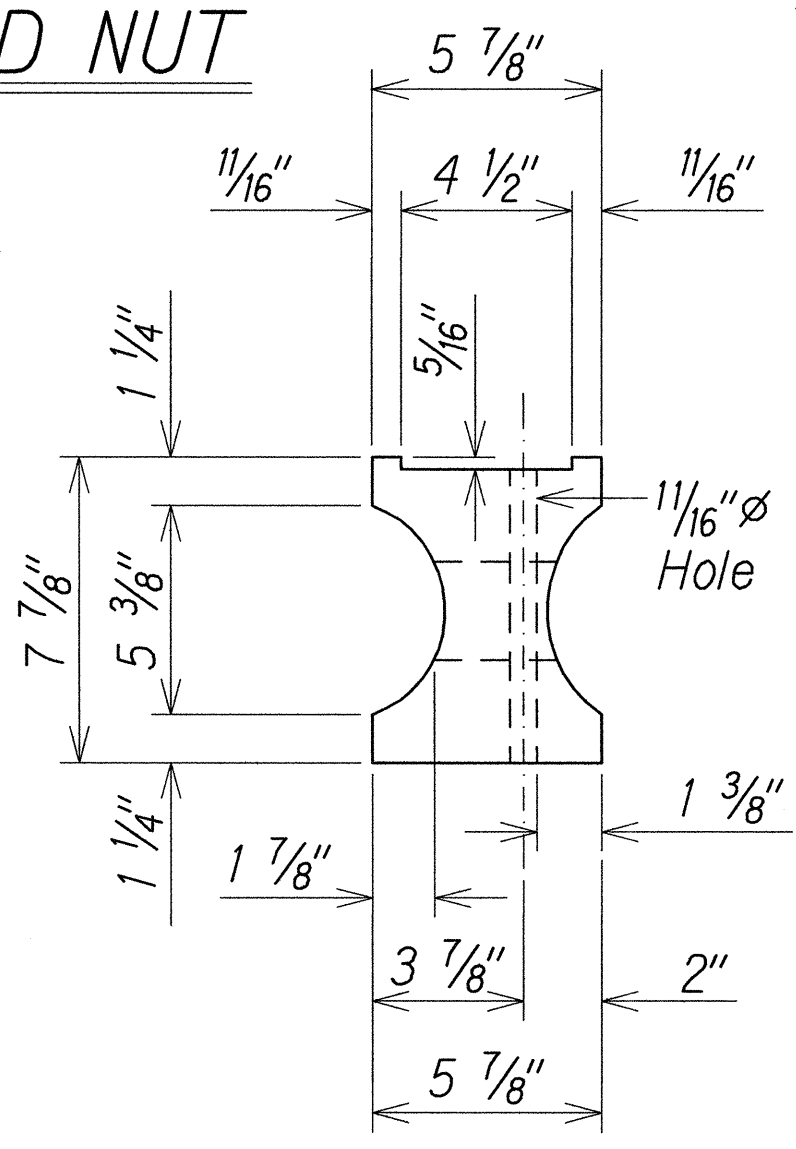
**ELEVATION**

**STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)**



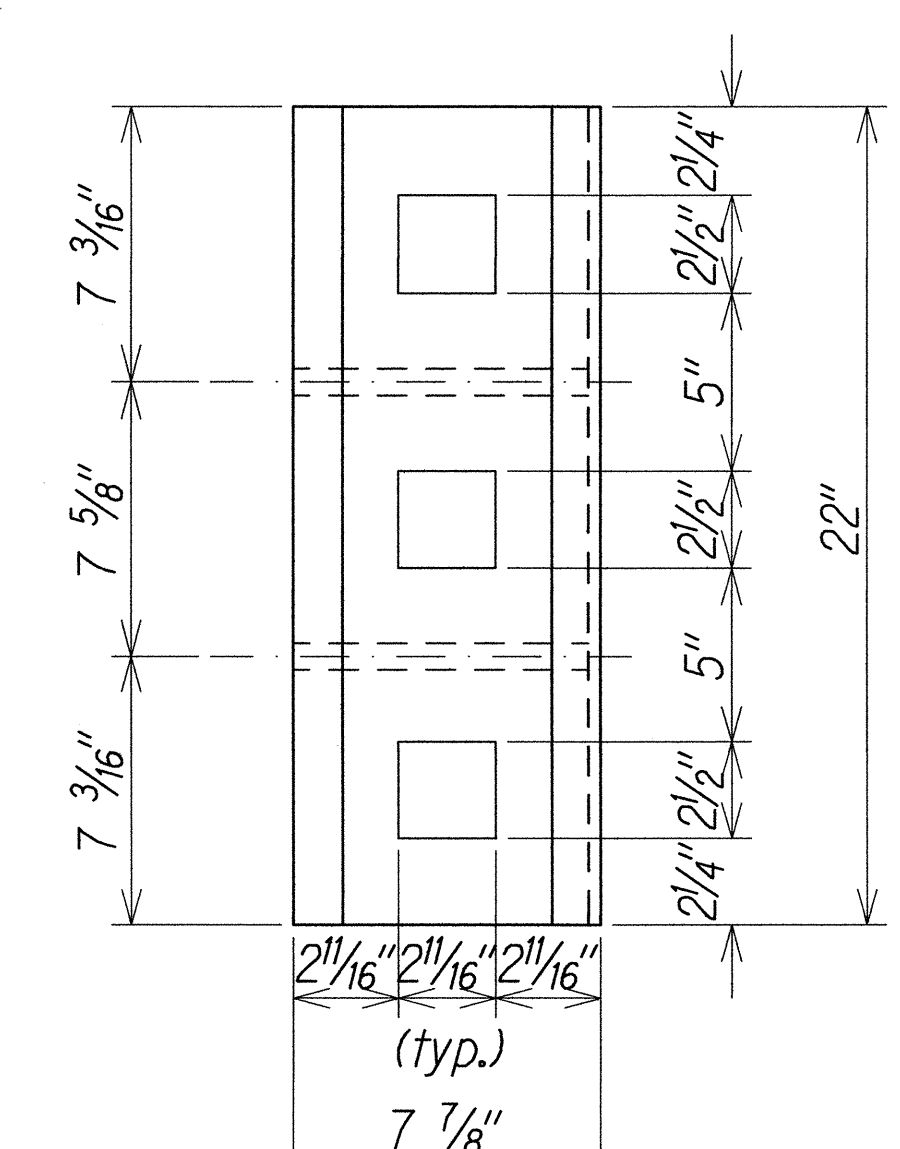
**ELEVATION**

**STRONG POST THRIE-BEAM MEDIAN GUARDRAIL (SGM09a)**

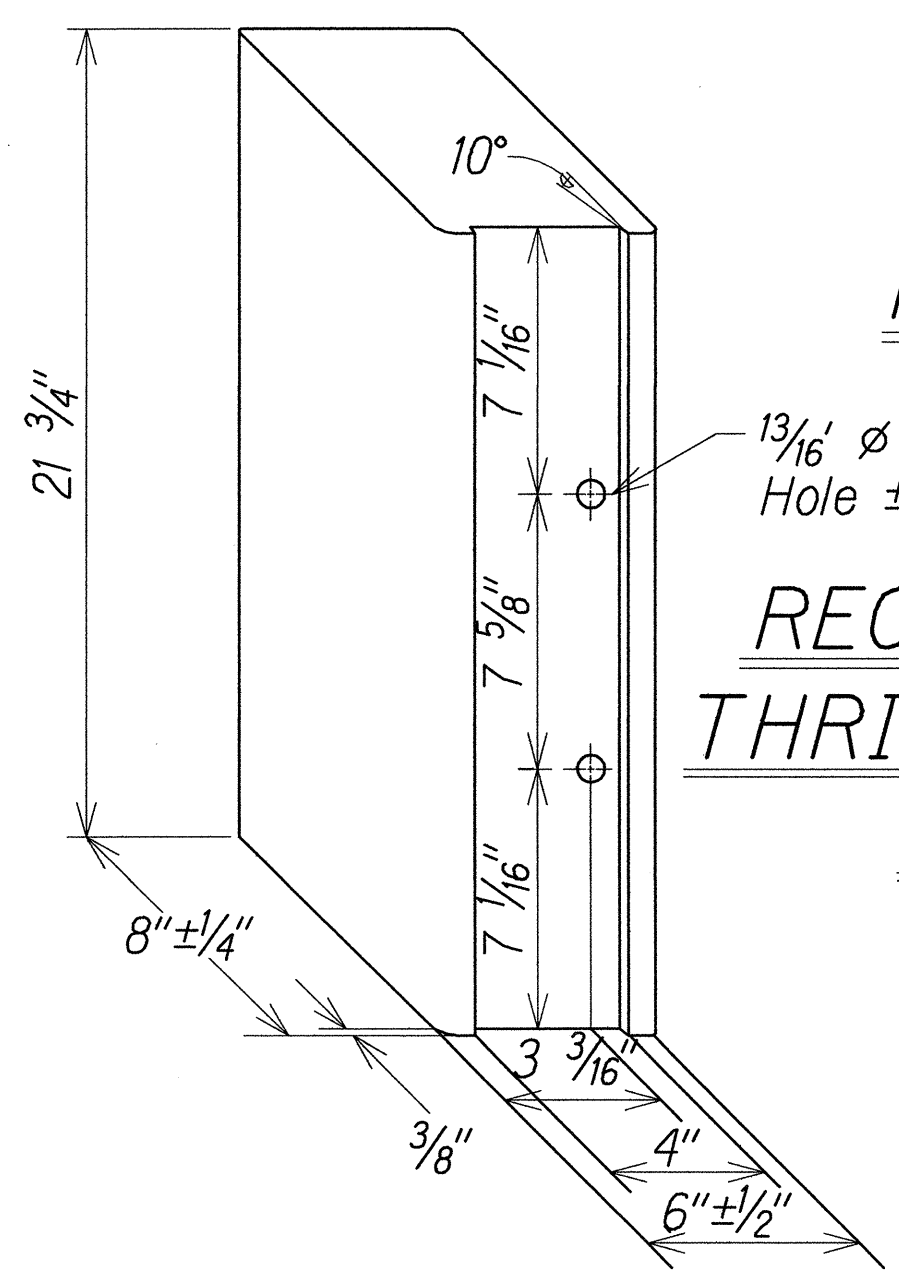


**TOP**

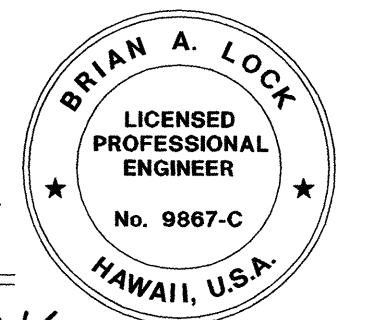
**MODIFIED 6X8X22 PLASTIC BLOCKOUT (TYPE I-THRIE)**



**SIDE**



**RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)**

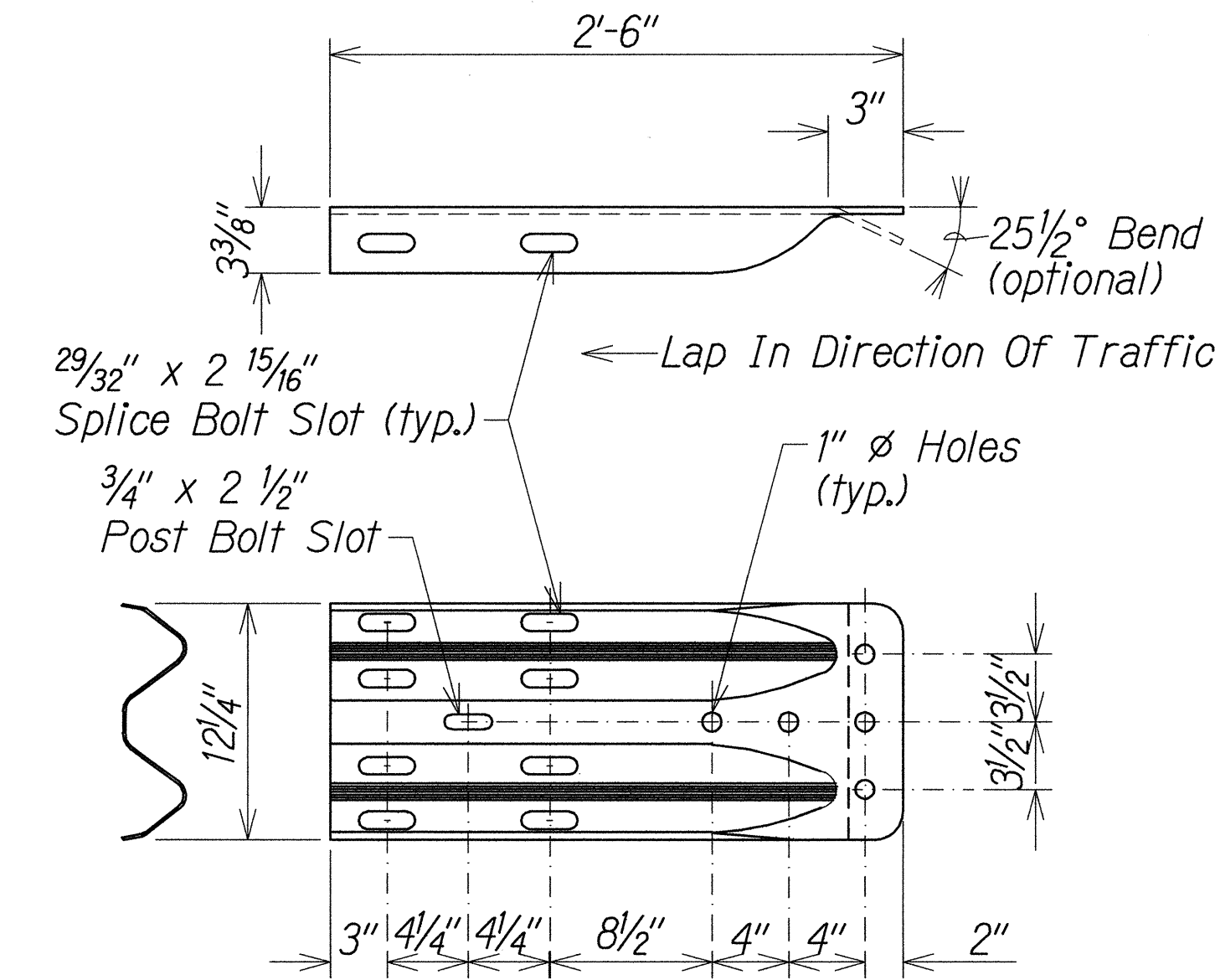


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STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**STRONG POST THRIE-BEAM GUARDRAIL**  
 HANA HIGHWAY IMPROVEMENTS, PHASE 2A  
 Huelo to Hana  
 Project No. 360AB-01-09  
 Scale: Date: April 2014  
 SHEET No. GRD-3 OF 11 SHEETS

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

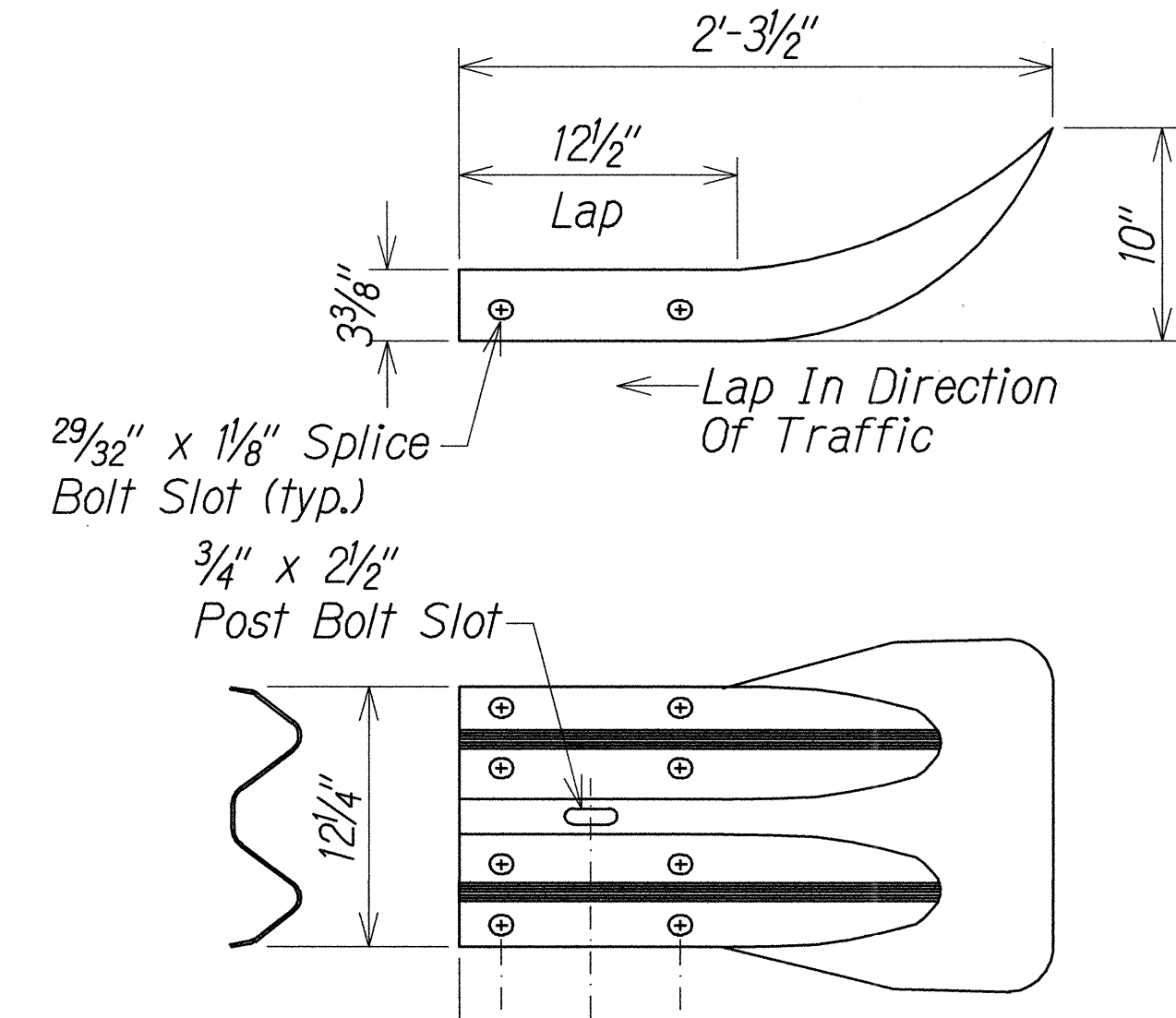
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	13	47



The Cross-sectional Dimensions For This Part Are To Fit Over Part RWM02a On The Approach End And Under Part RWM02a On The Trailing End.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

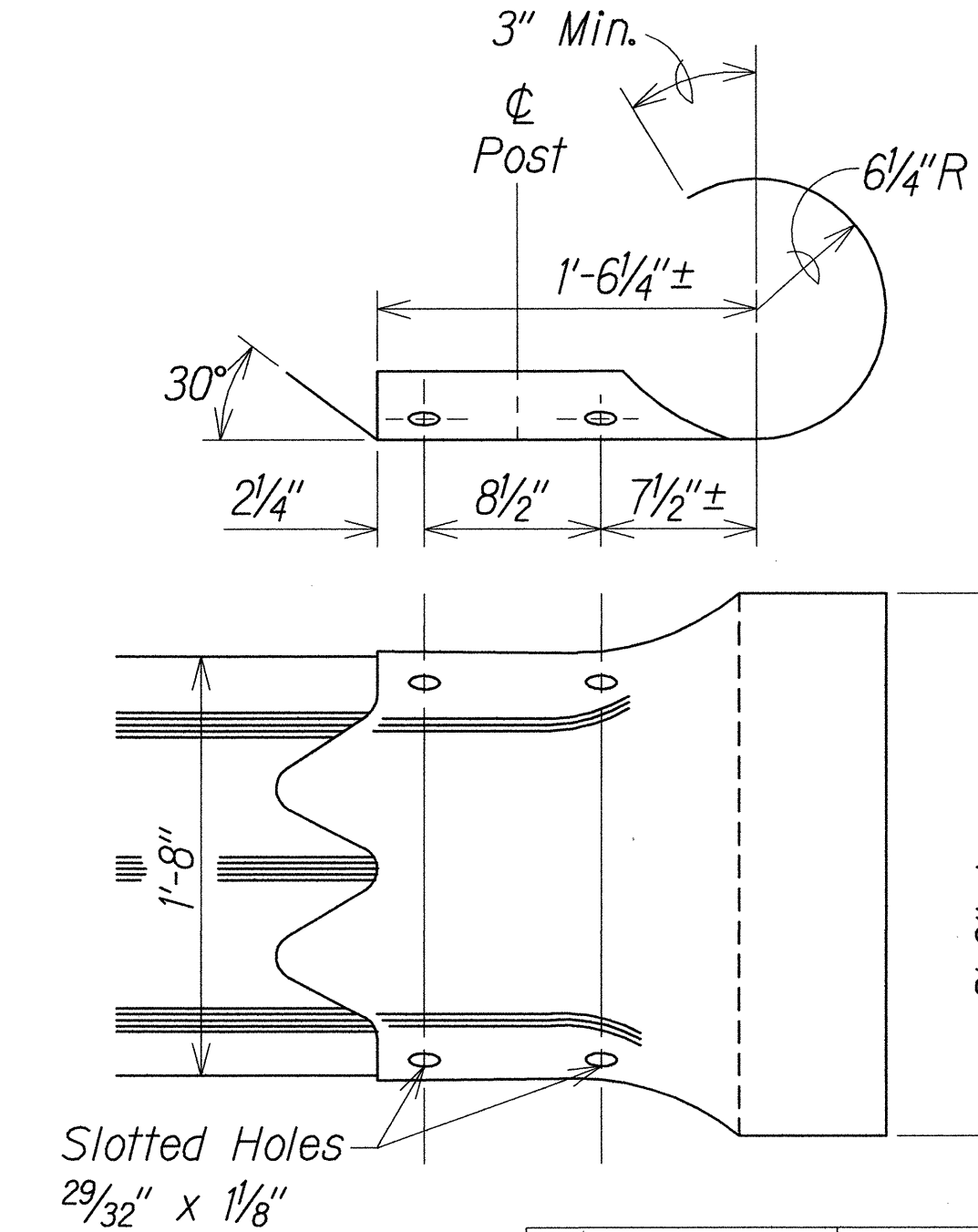
W-BEAM TERMINAL CONNECTOR (RWE02b)



The Cross-sectional Dimensions For This Part Are To Fit Over Part RWM02a On The Approach End And Under Part RWM02a On The Trailing End.

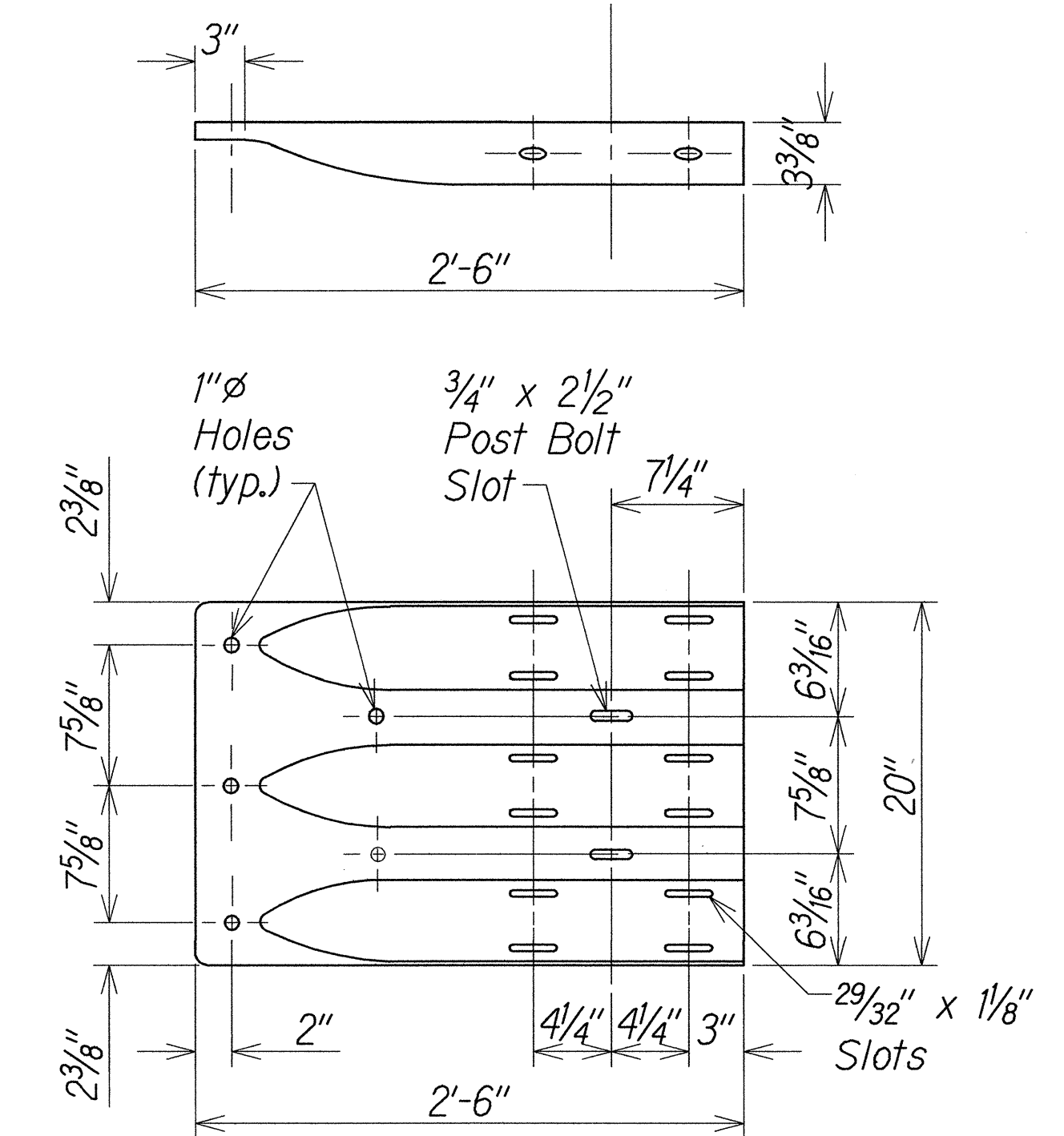
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)



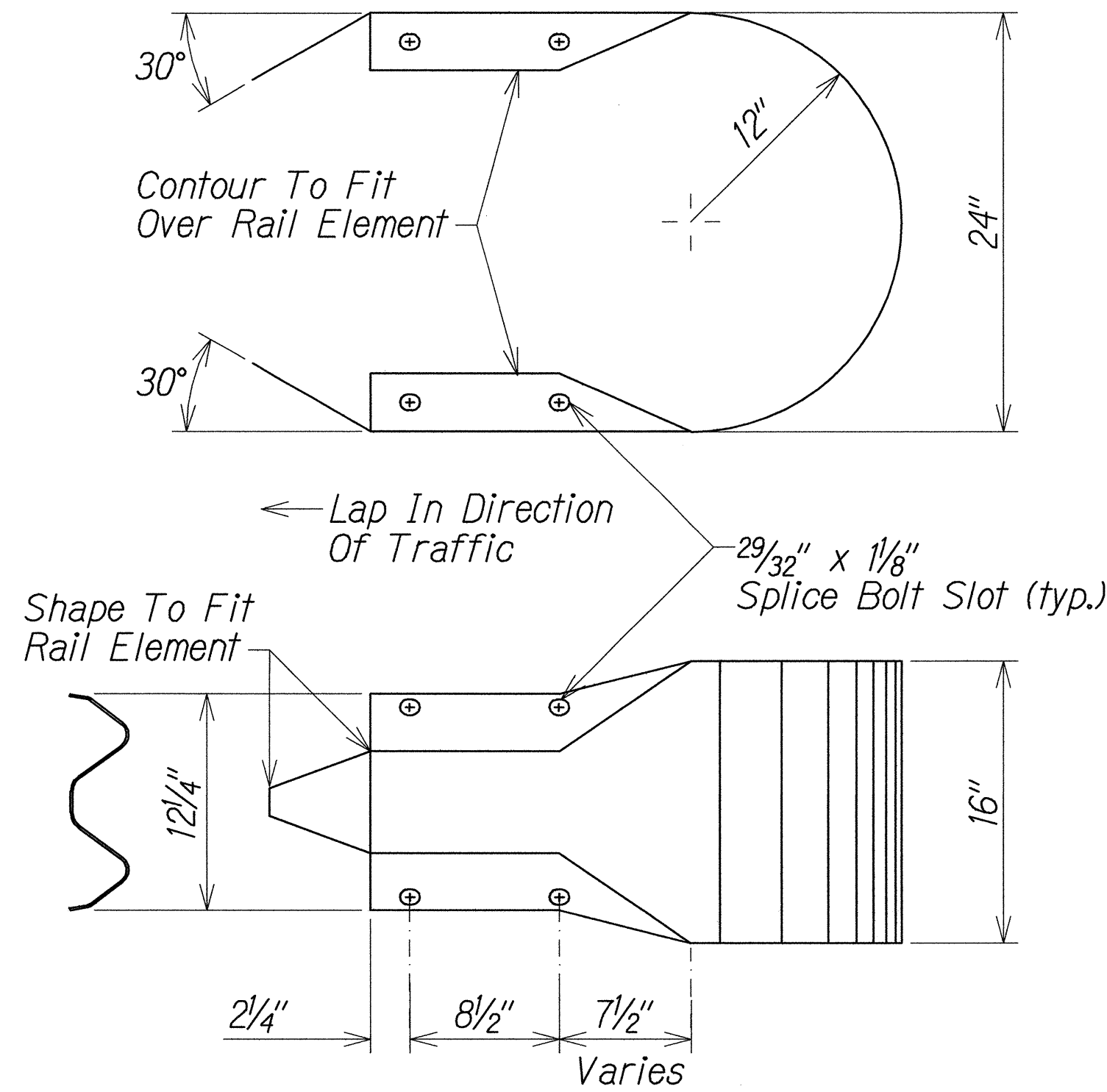
DESIGNATOR	BASE METAL THICKNESS
RTE02b	10 Gauge

THRIE-BEAM SECTION (ROUNDED)  
(RTE02b)



DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

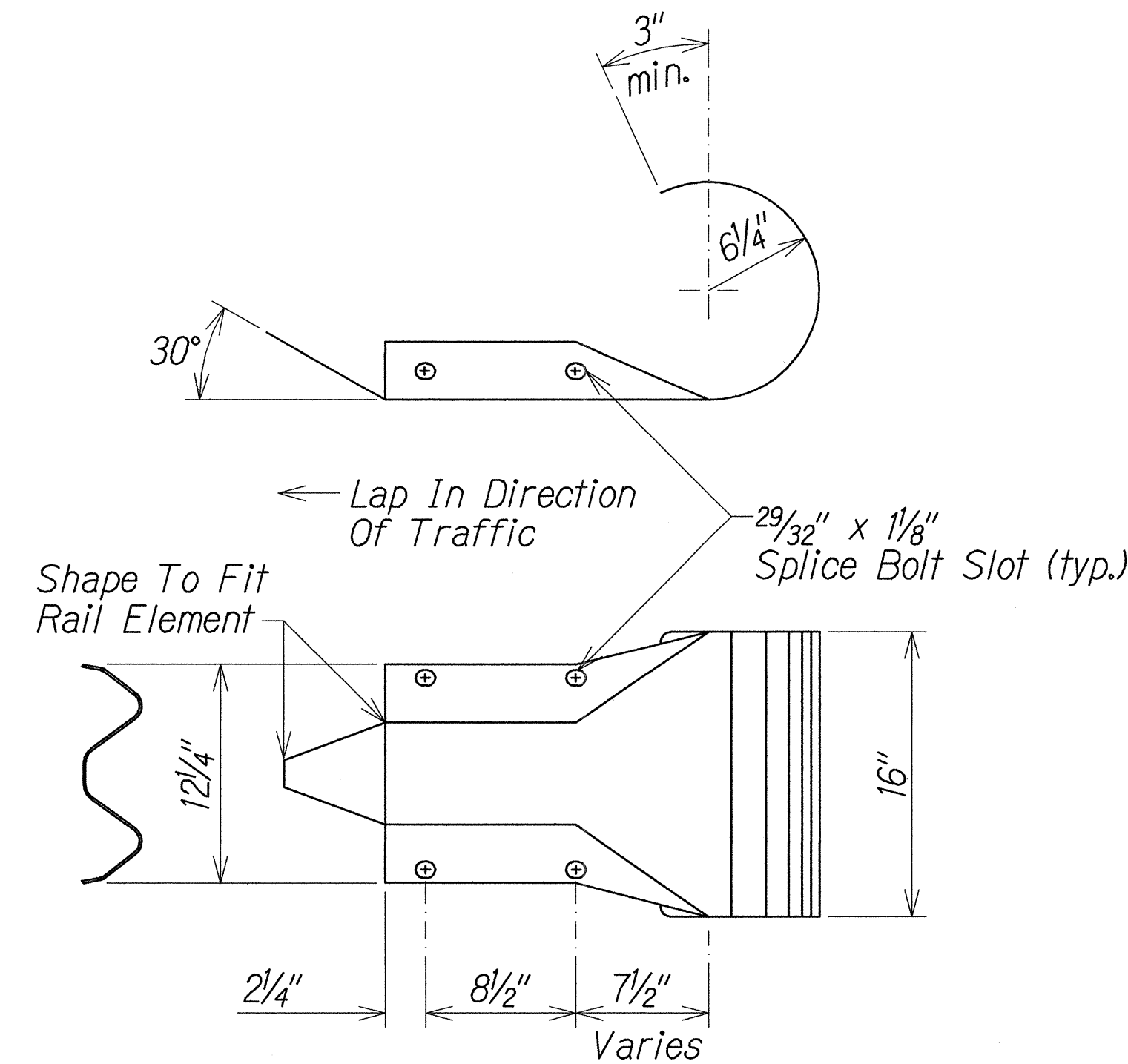
THRIE-BEAM  
TERMINAL CONNECTOR  
(RTE01b)



The Cross-sectional Dimensions For This Part Are To Fit Over Part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

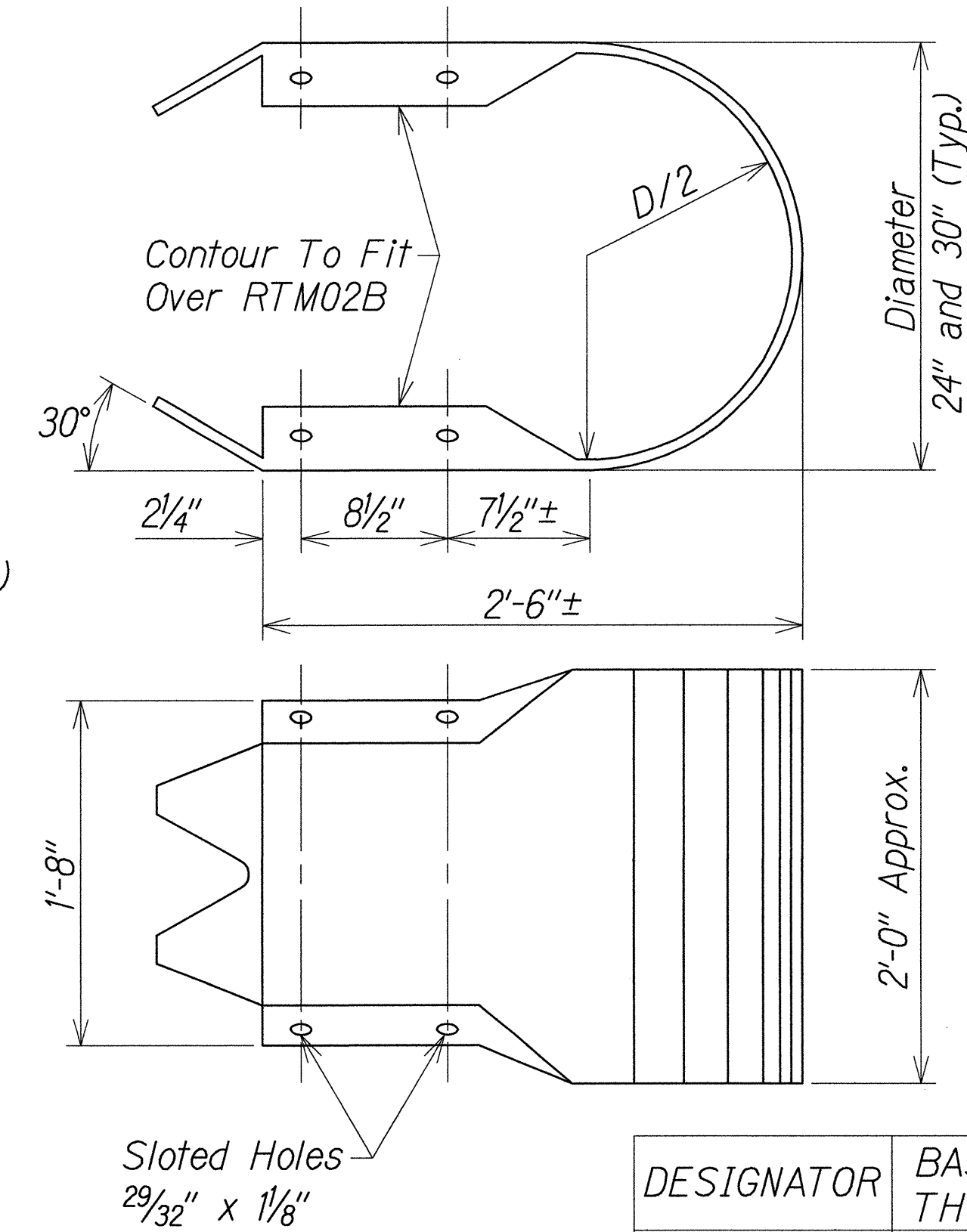
W-BEAM END SECTION (BUFFER RWE06a)



The Cross-sectional Dimensions For This Part Are To Fit Over Part RWM02a

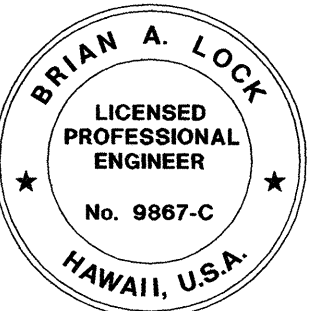
DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

THRIE-BEAM  
END SECTION  
(BUFFER RTE03b  
or RTE04b)



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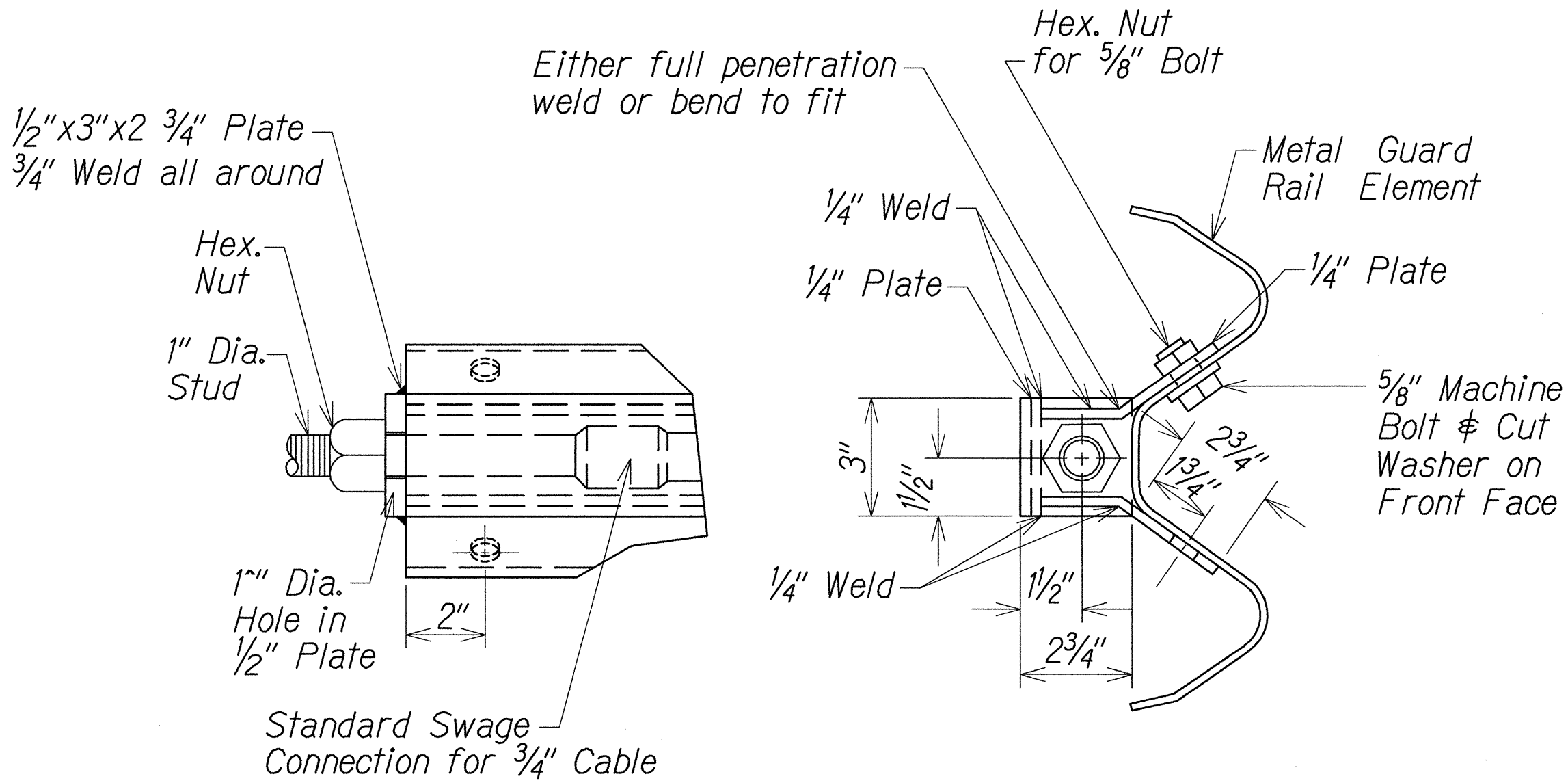
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS**  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Scale: Date: April 2014

SHEET No. GRD-4 of 11 SHEETS

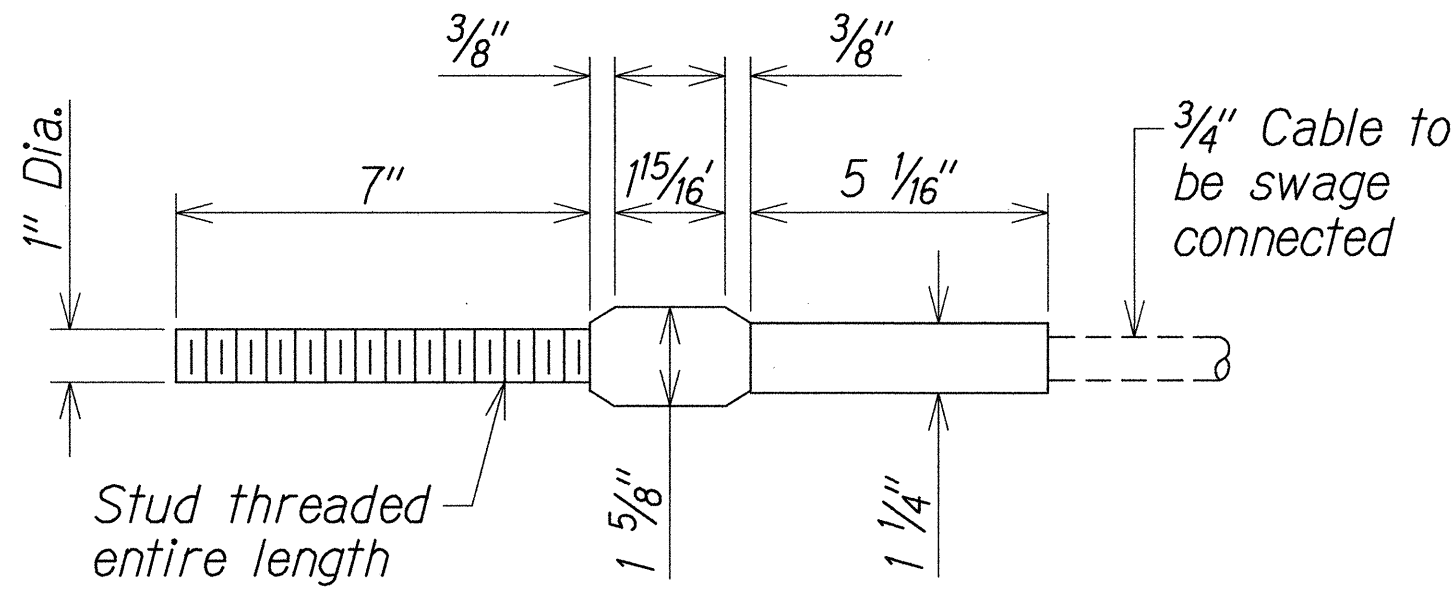
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NOTE BOOK	DRAWN BY	
No.	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	



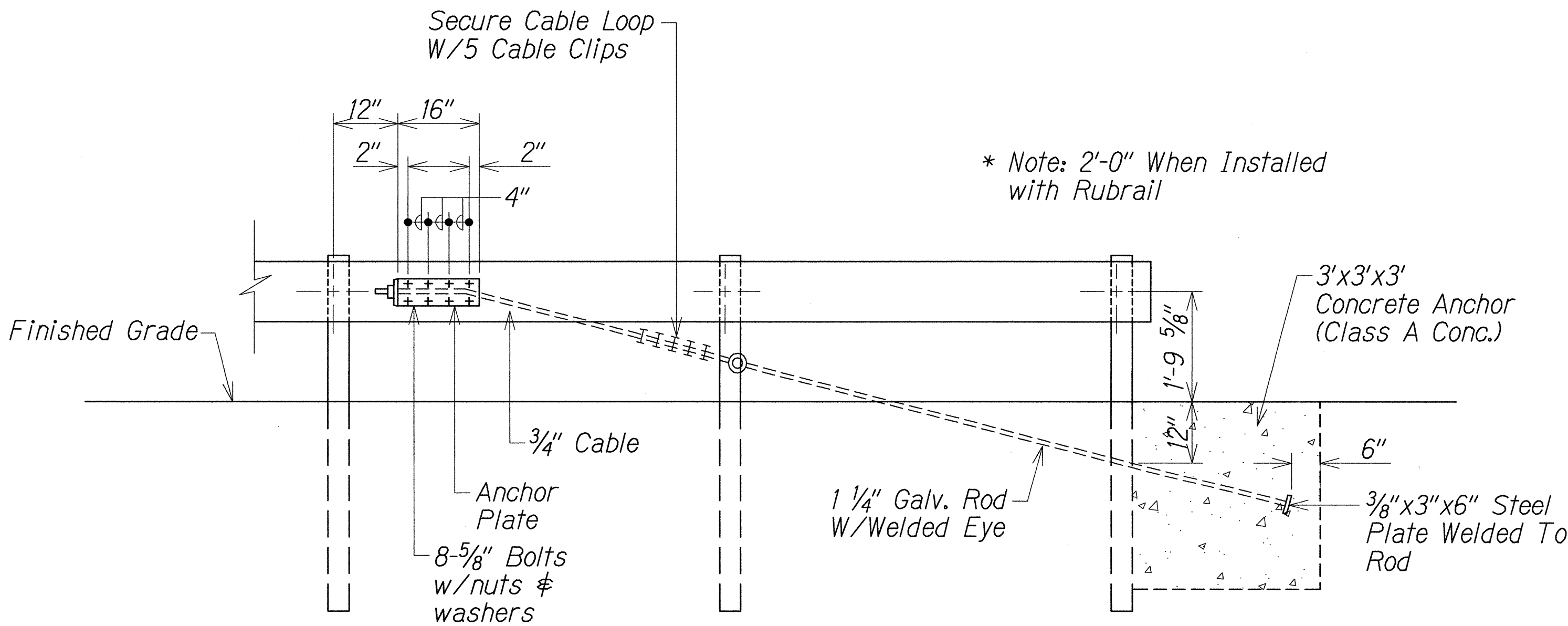
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	14	47



ANCHOR PLATE DETAILS

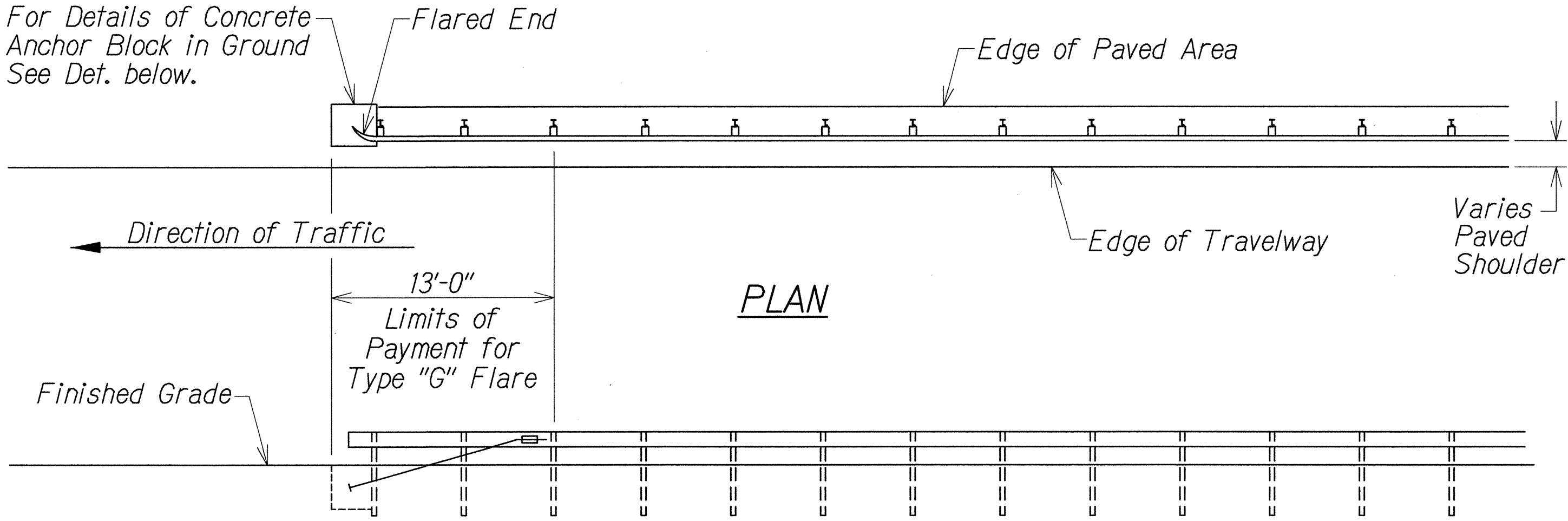


STANDARD SWAGED FITTING AND STUD



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.



ELEVATION

TYPE "G" FLARE END TERMINAL

NOTE:

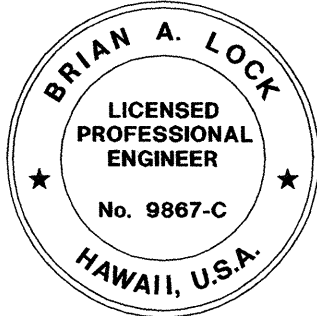
Type "G" Modified End Terminal is a site specific end terminal with a taper and radial termini. A site specific detailed drawing is required for all Type "G" Modified End Terminal and must receive Engineer's approval.

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



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*ma*  
 WILSON OKAMOTO CORPORATION LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

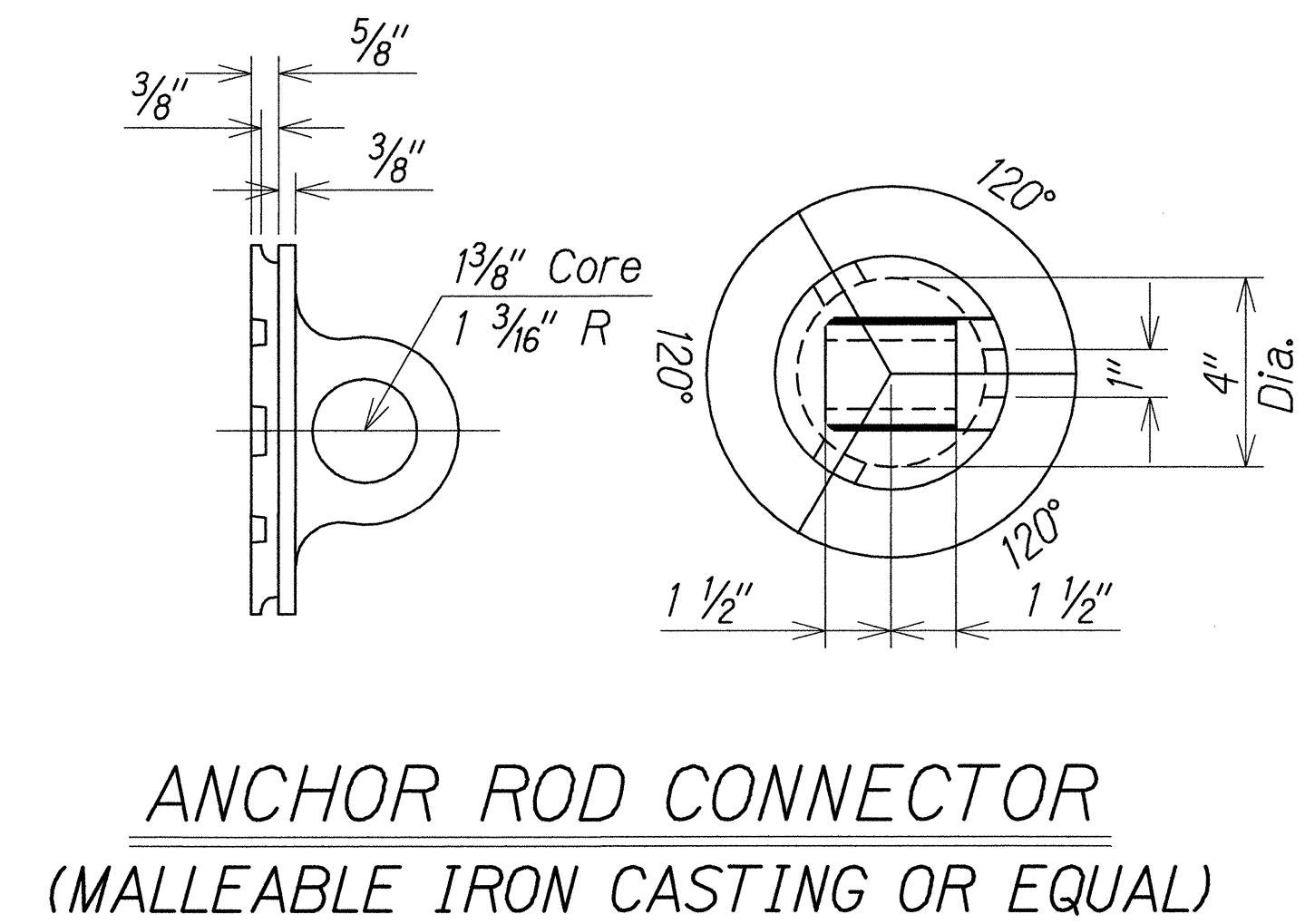
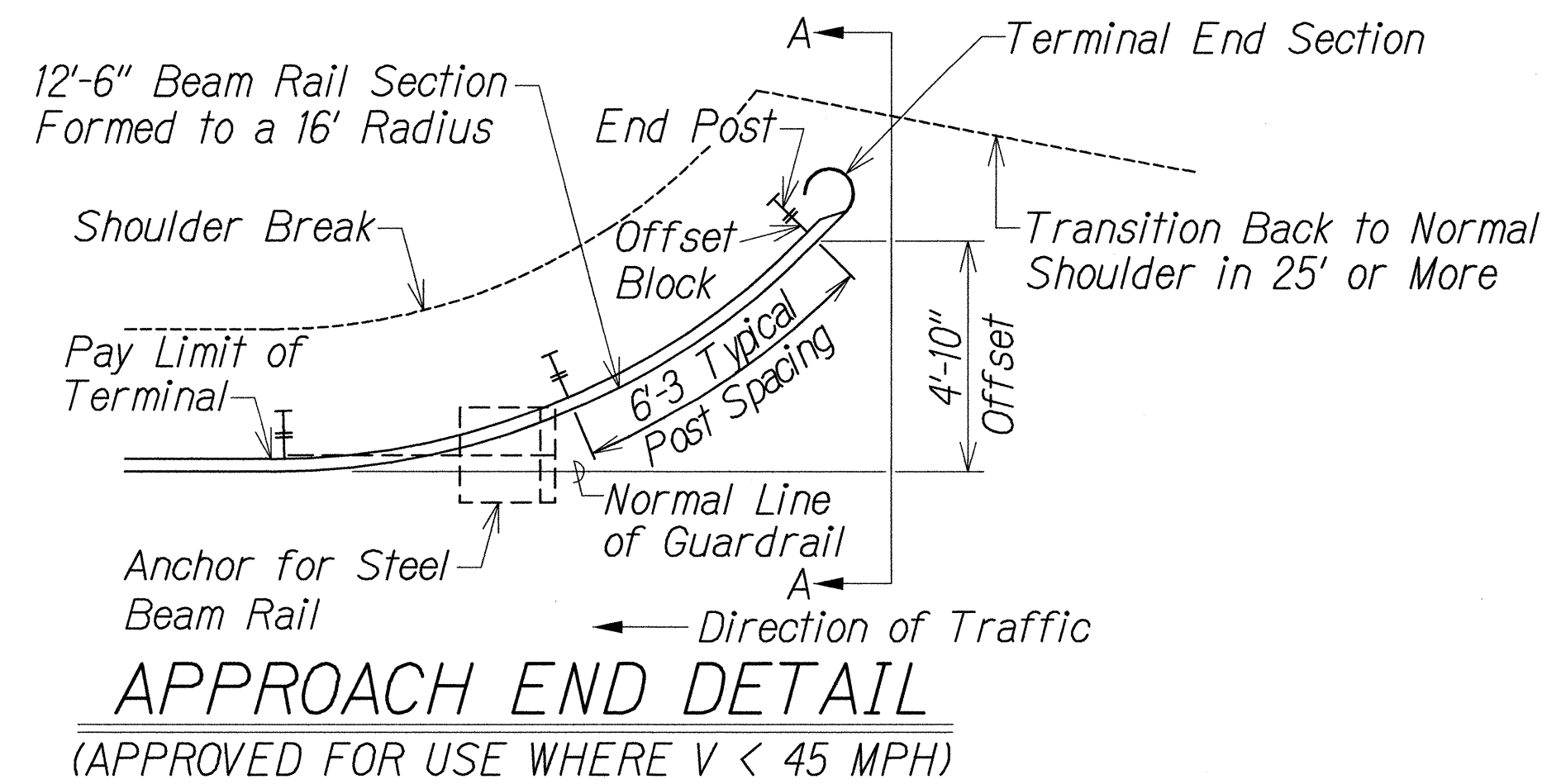
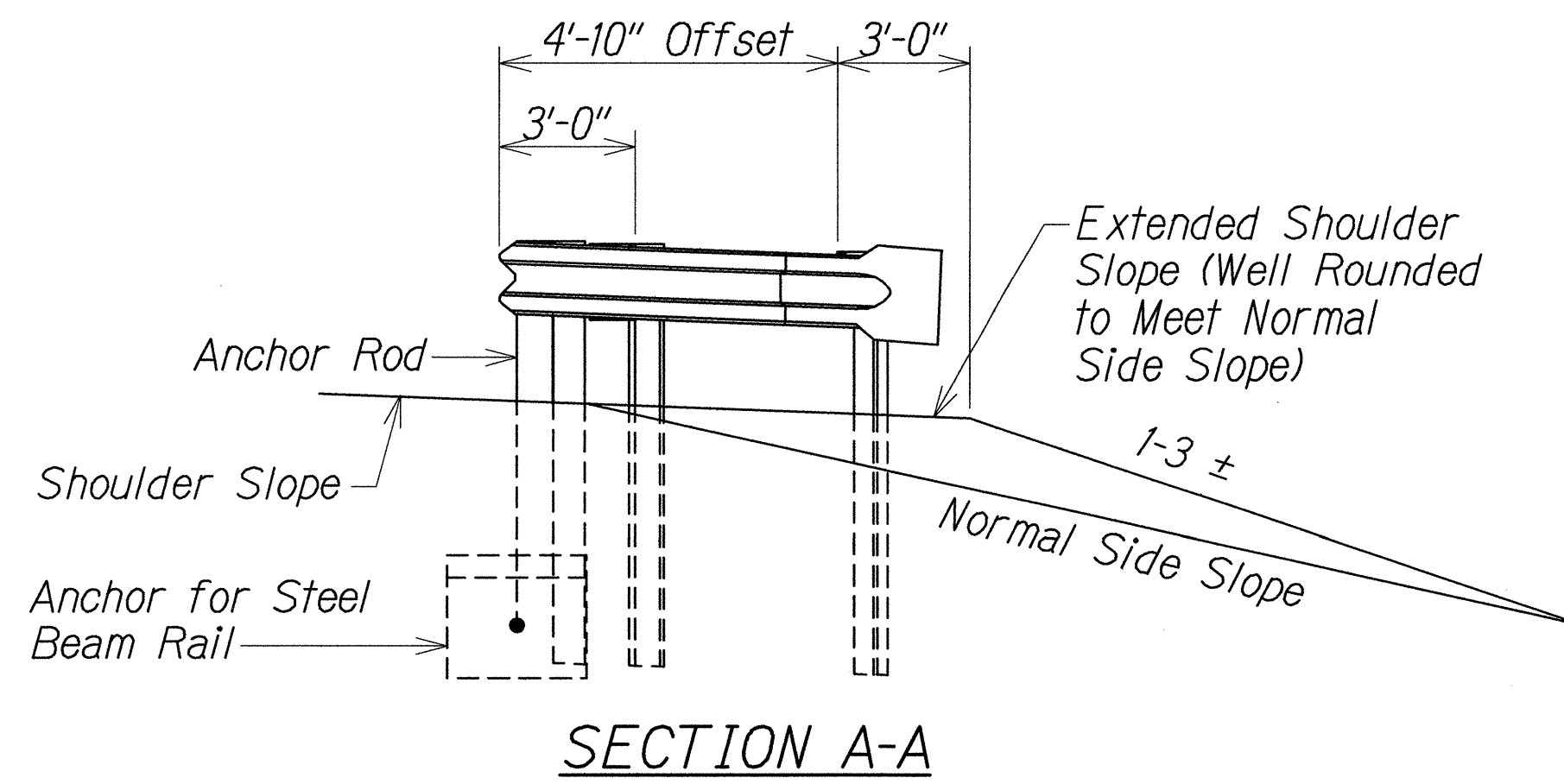
### GUARDRAIL DETAILS

HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09

Scale: Date: April 2014

SHEET No. GRD-5 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	15	47



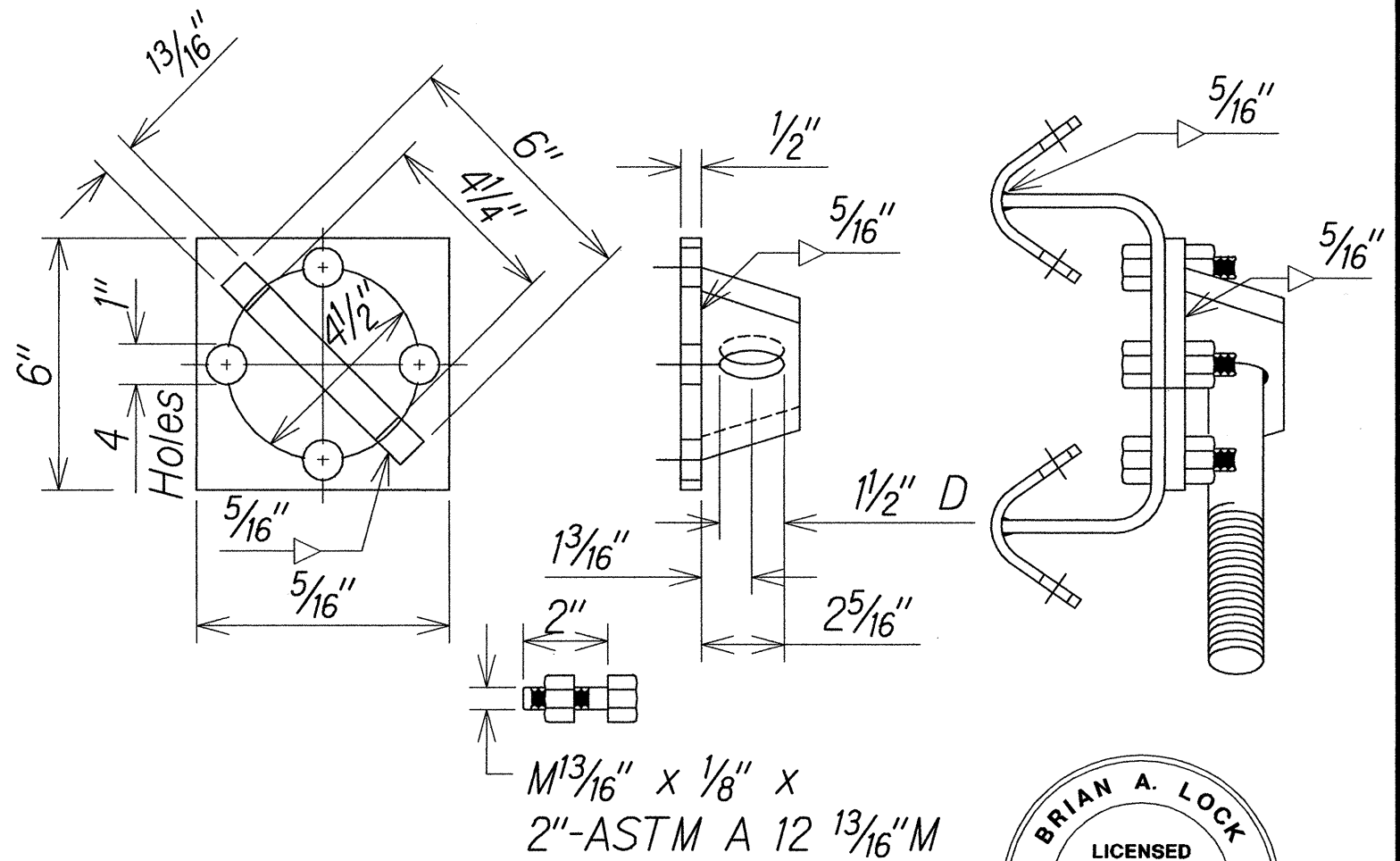
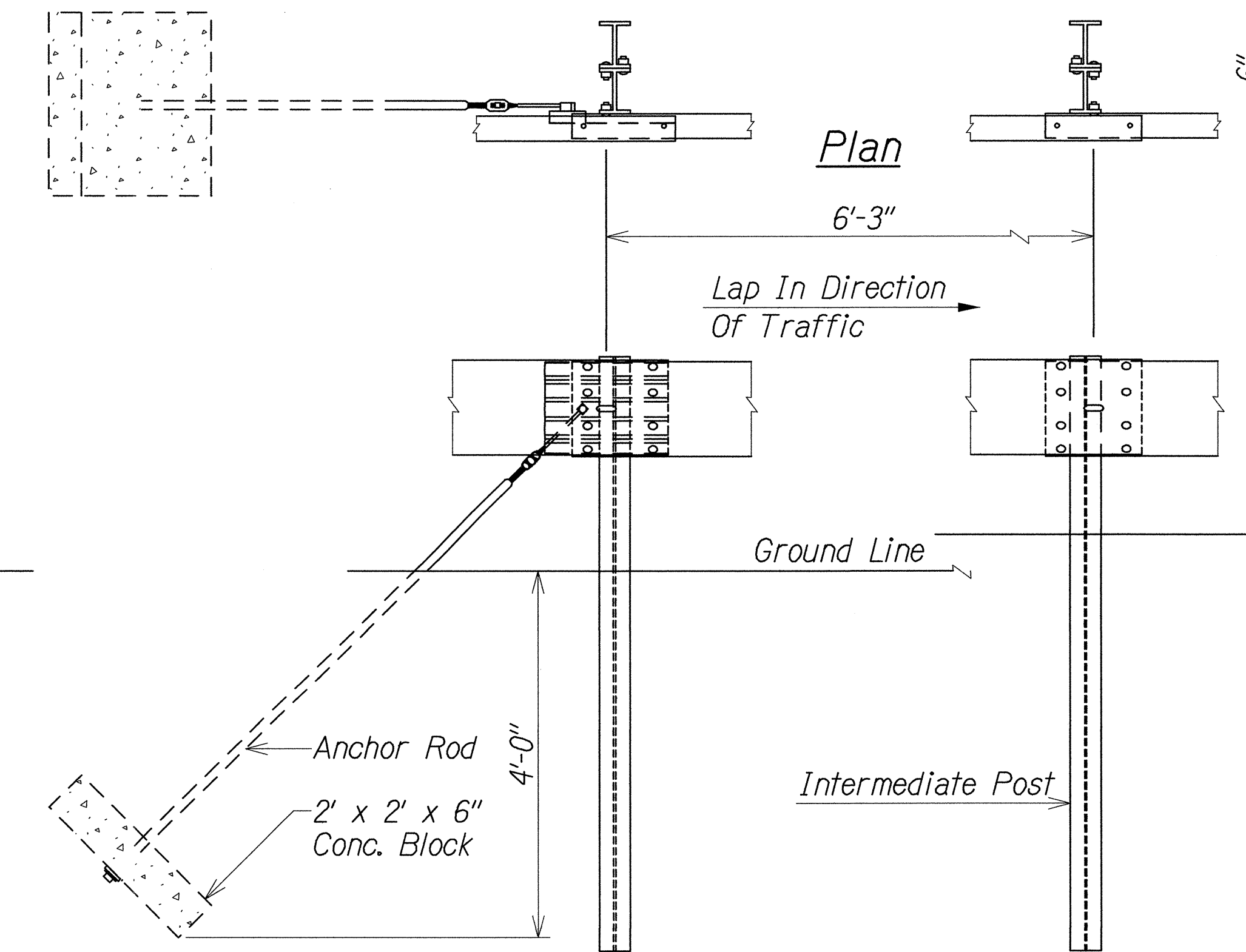
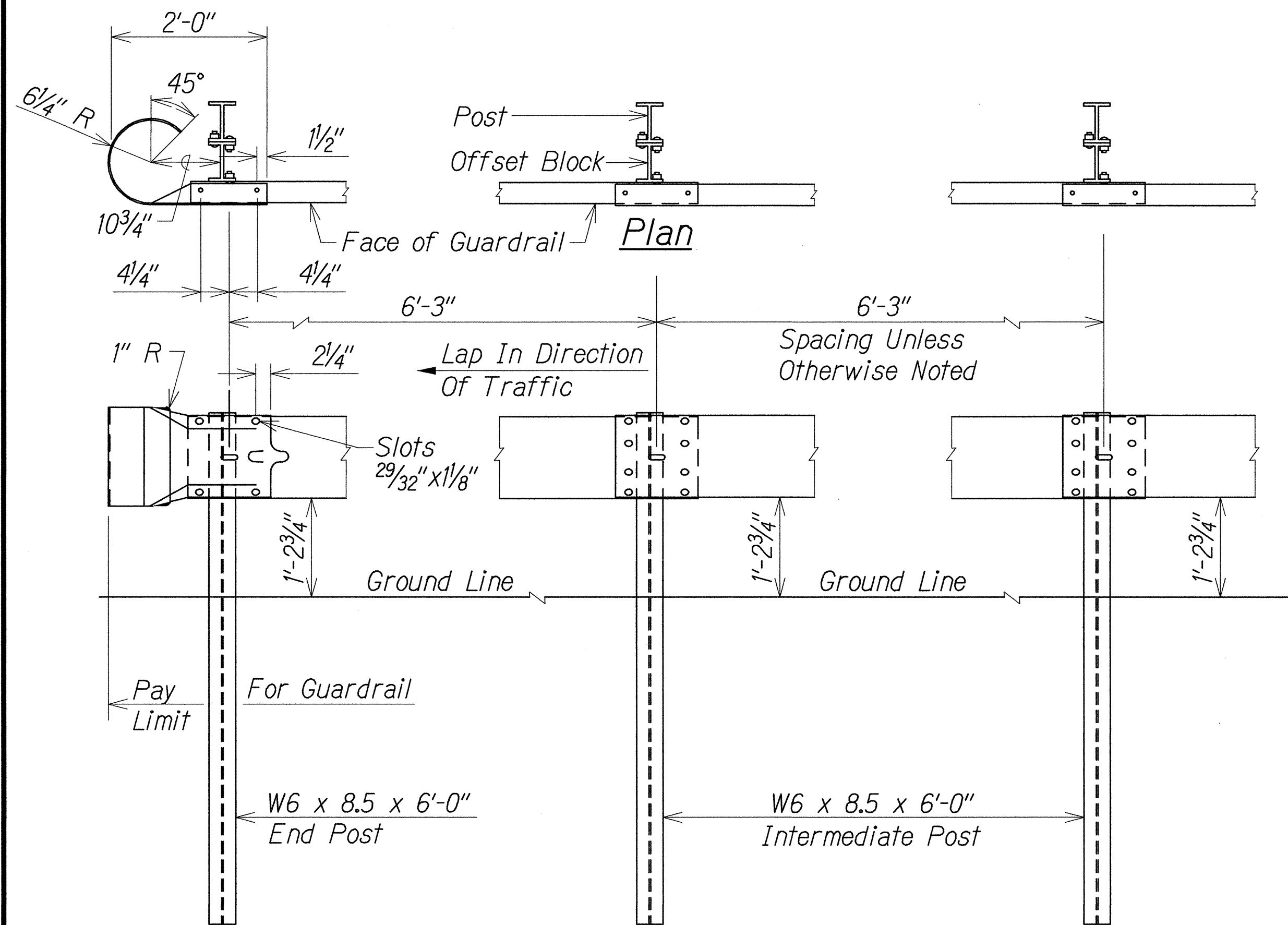
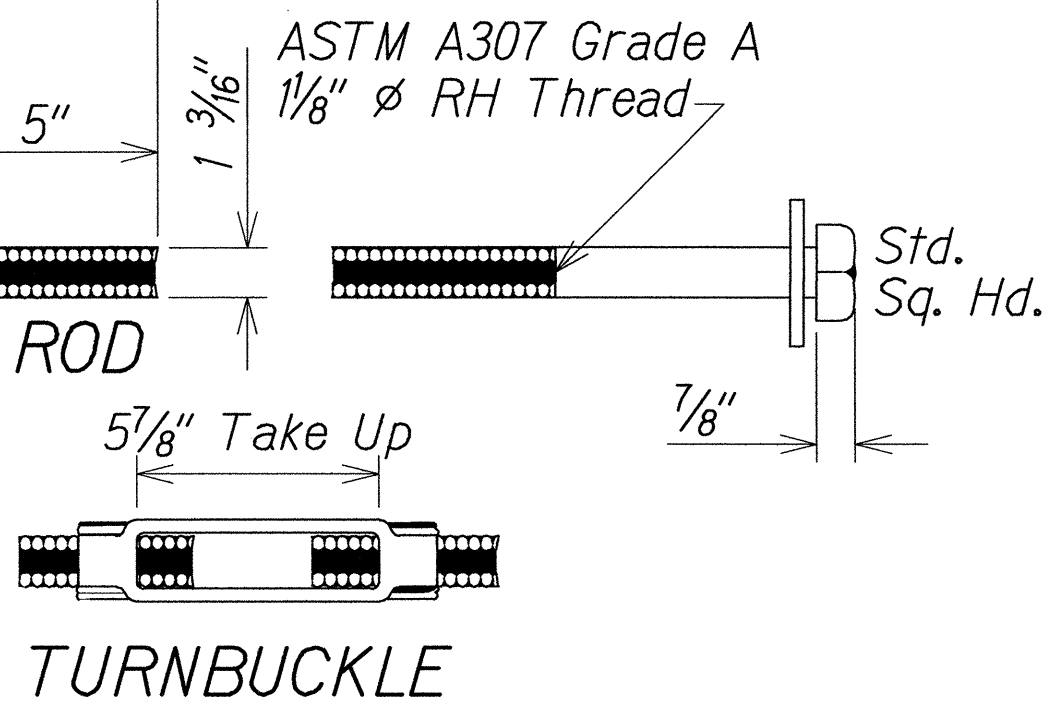
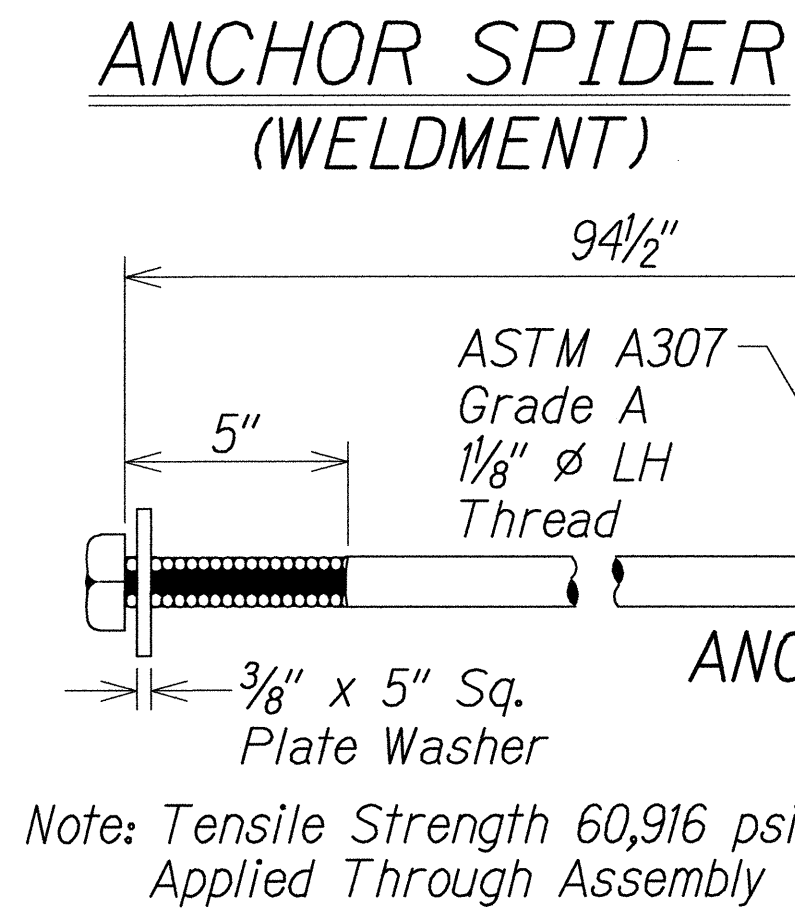
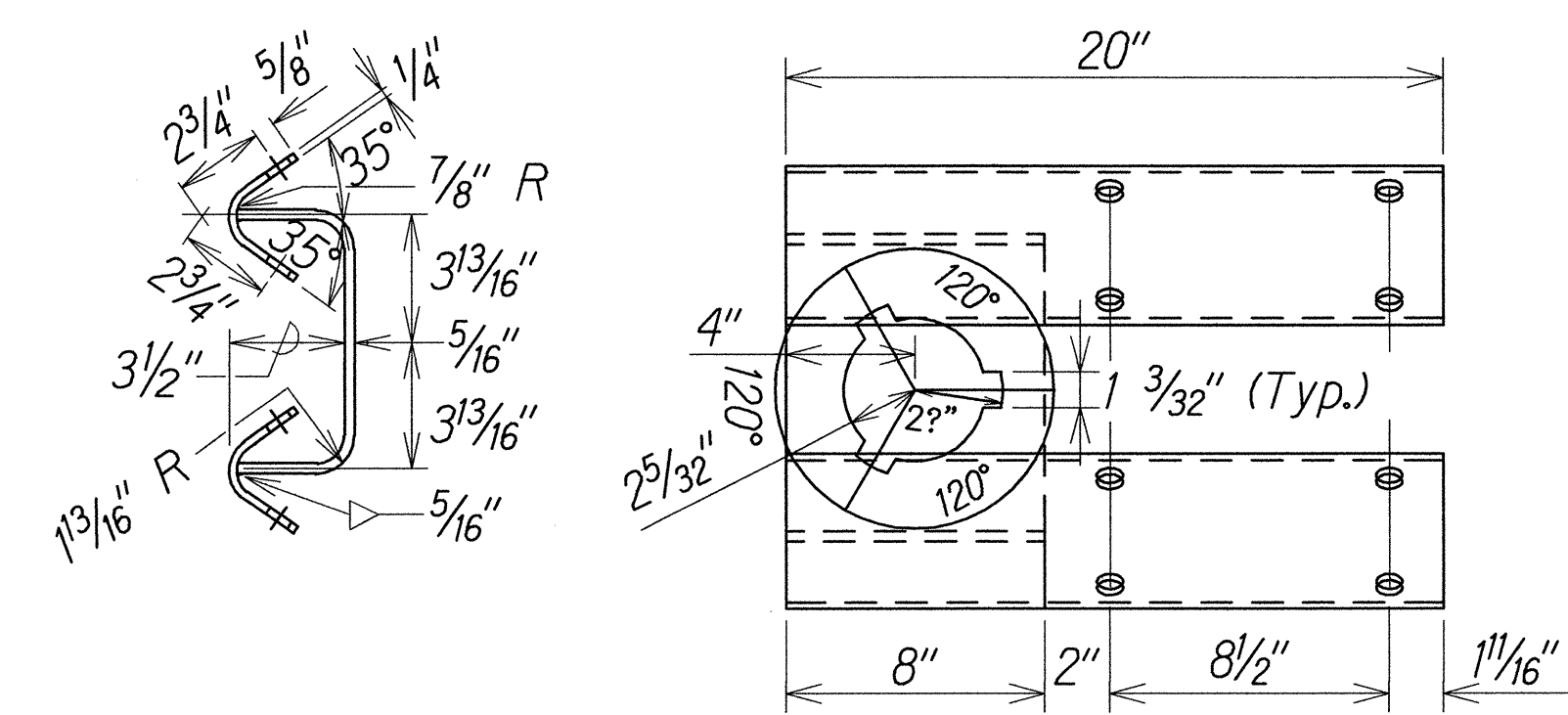
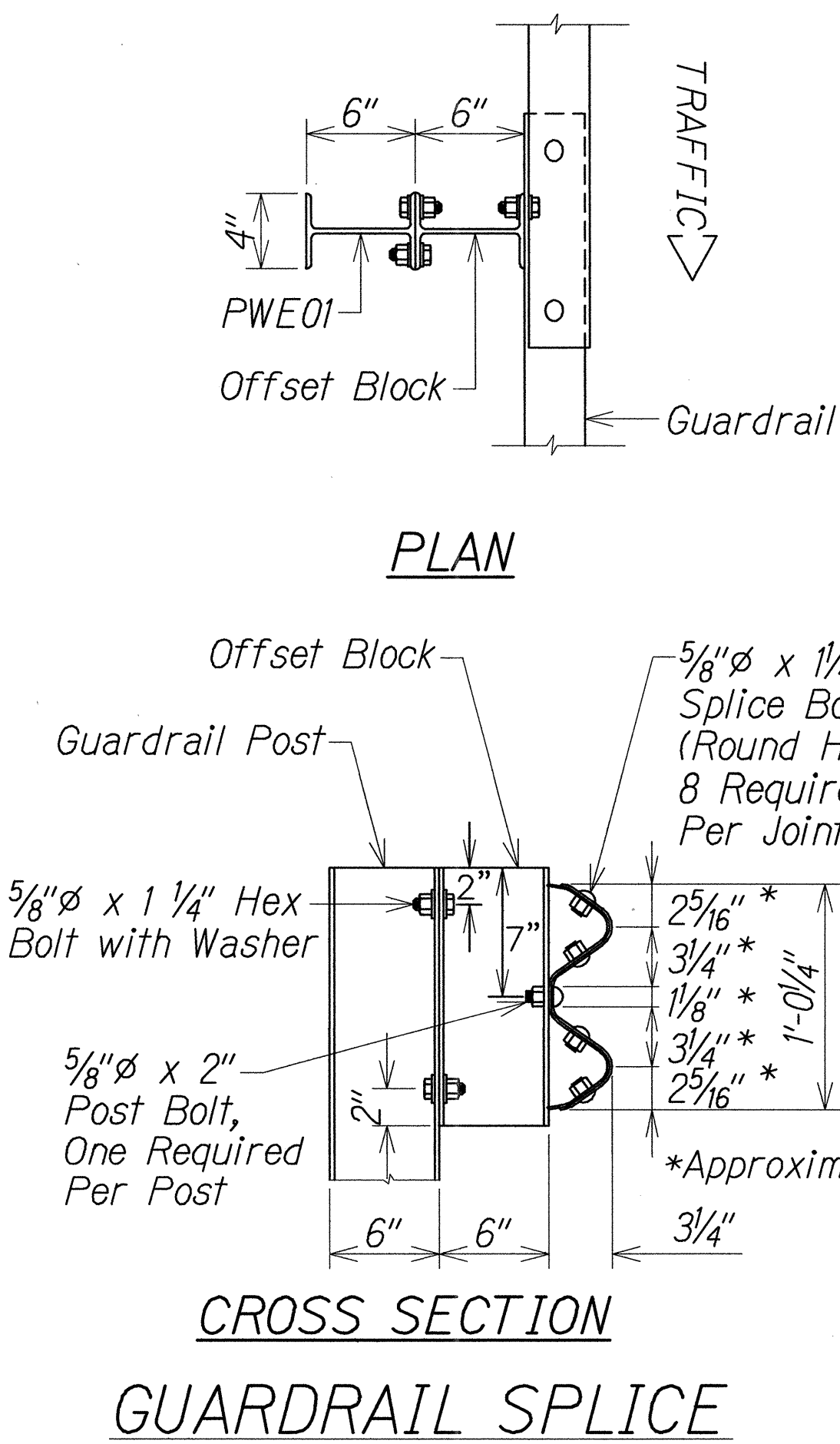
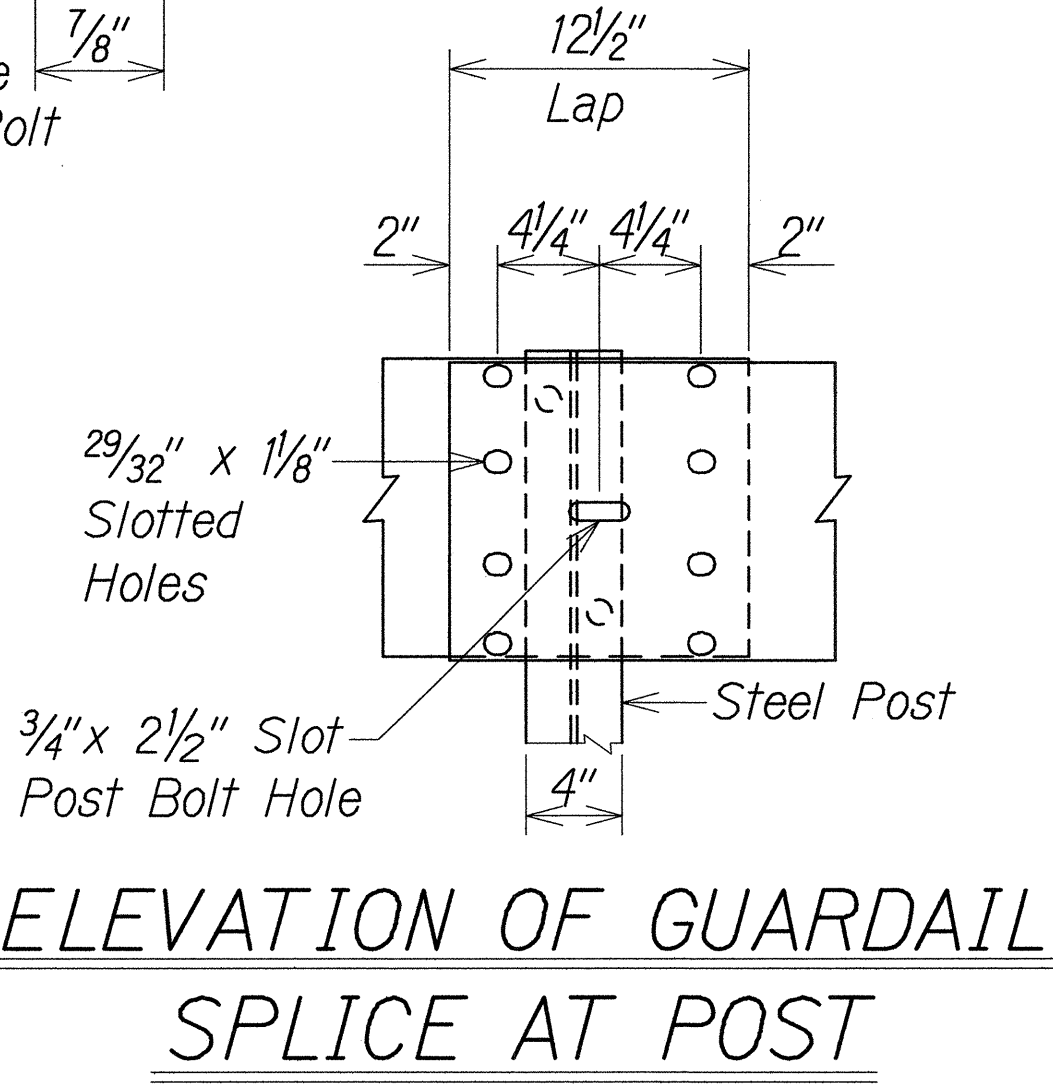
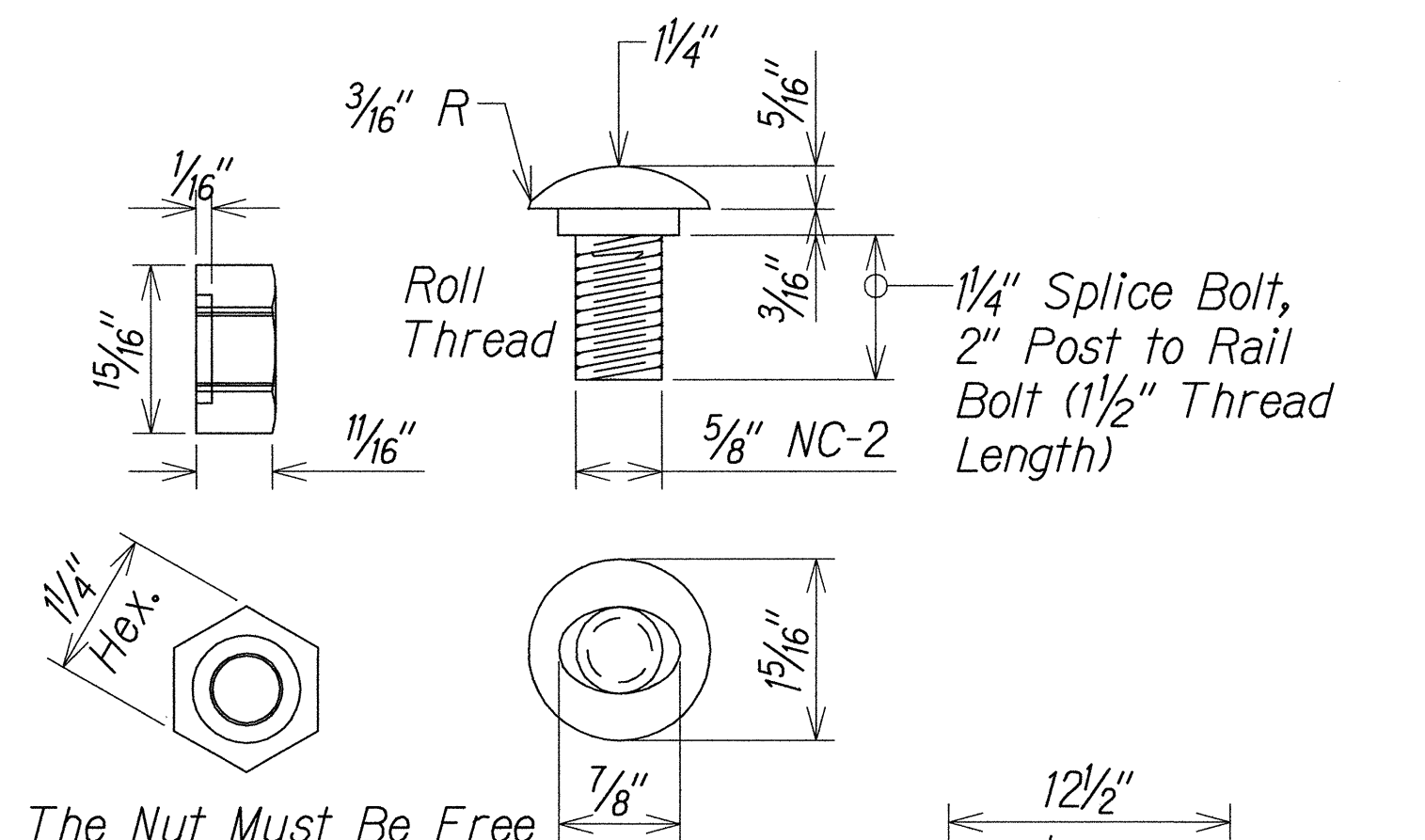
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NOTE BOOK	DRAWN BY	
No.	DESIGNED BY	
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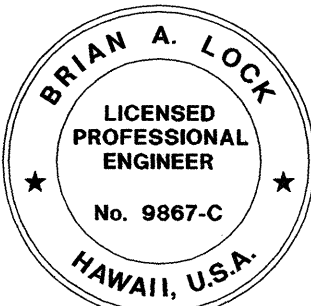
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*ma*  
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**MODIFIED TYPE "G"**  
**TERMINAL END**  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Scale: Date: April 2014  
SHEET No. GRD-6 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	16	47



ALTERNATE ANCHOR ROD CONNECTOR



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 WILSON OKAMOTO CORPORATION  
 APRIL 30, 2016  
 LIC. EXP. DATE

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

MODIFIED TYPE "G"

TERMINAL END

HANA HIGHWAY

IMPROVEMENTS, PHASE 2A

Huelo to Hana

Project No. 360AB-01-09

Scale:

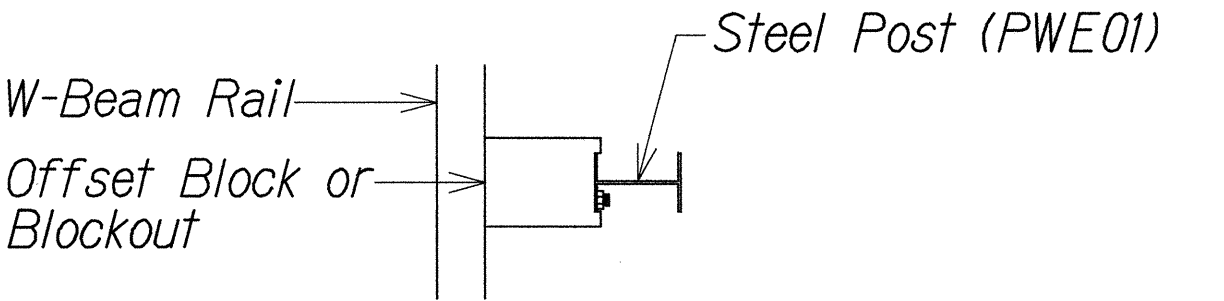
Date: April 2014

SHEET No. GRD-7 OF 11 SHEETS

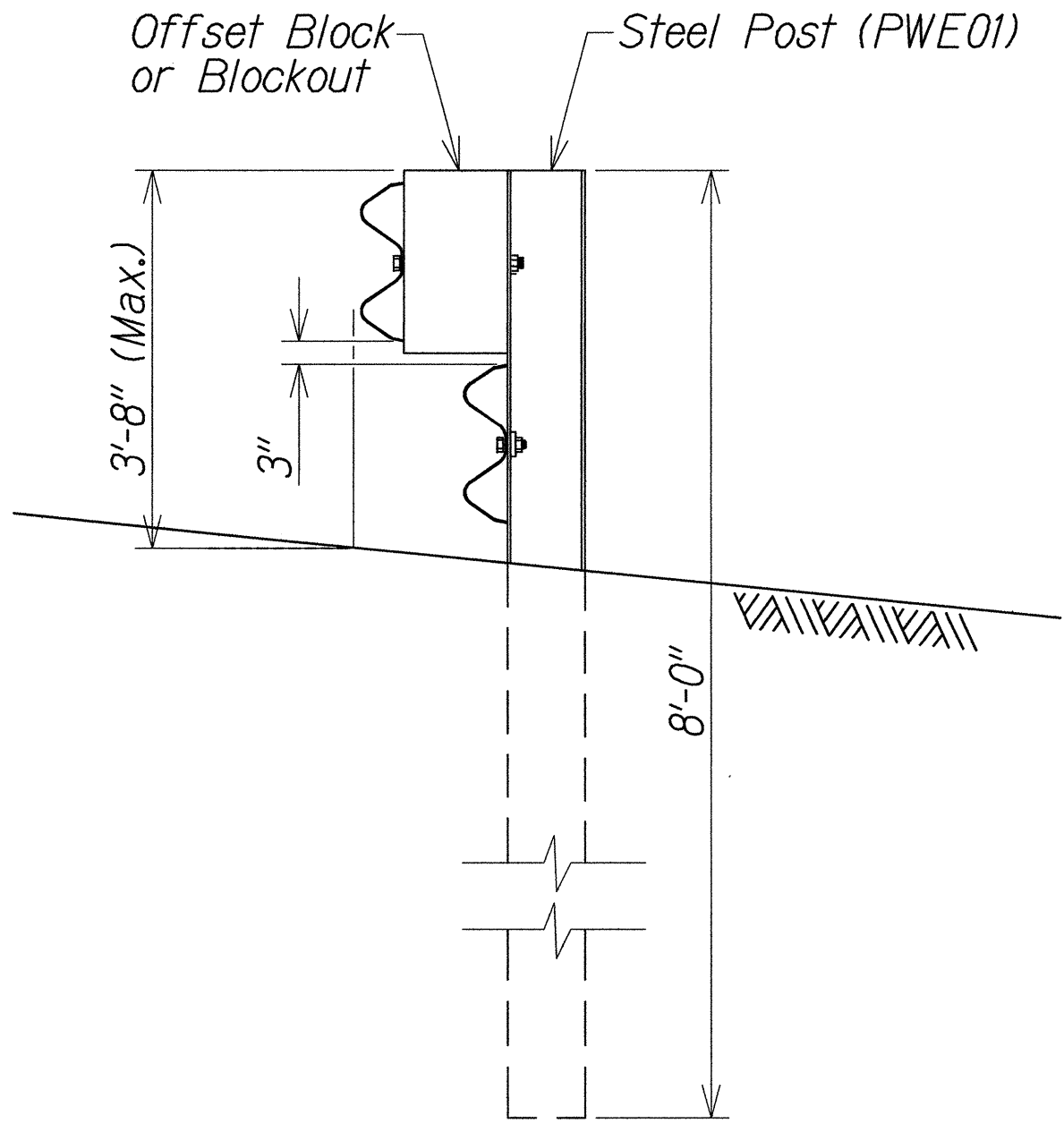
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	No.
NOTE BOOK	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	17	47

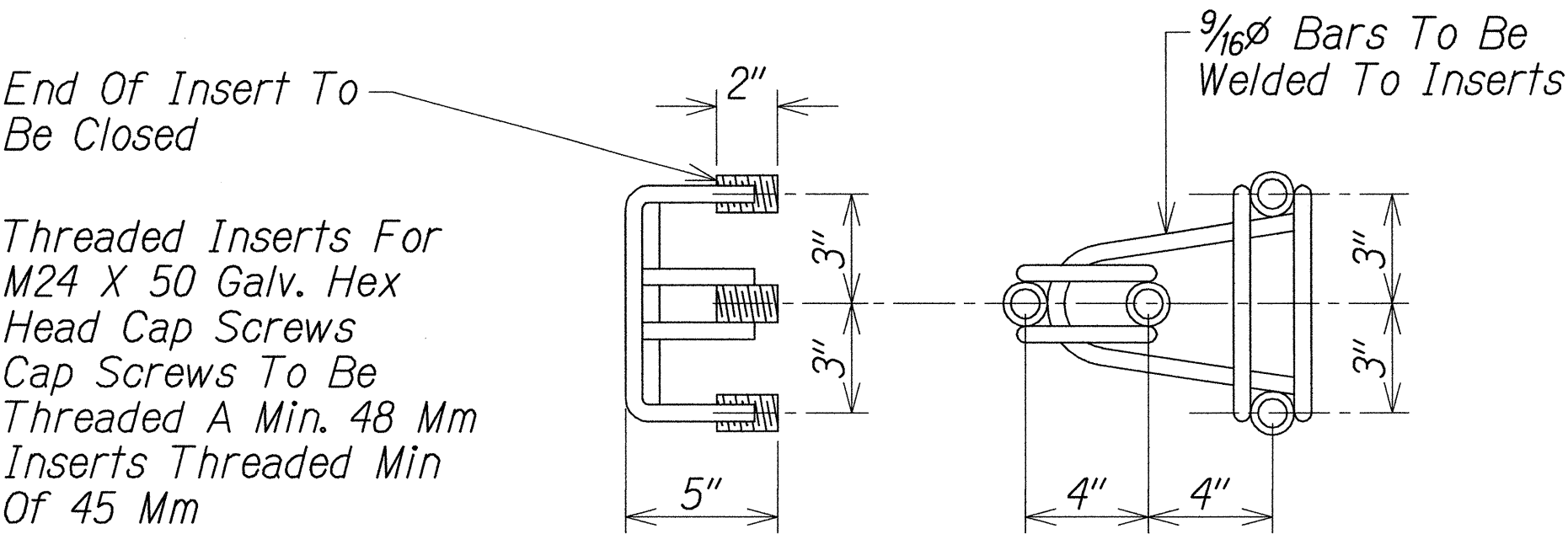


Plan

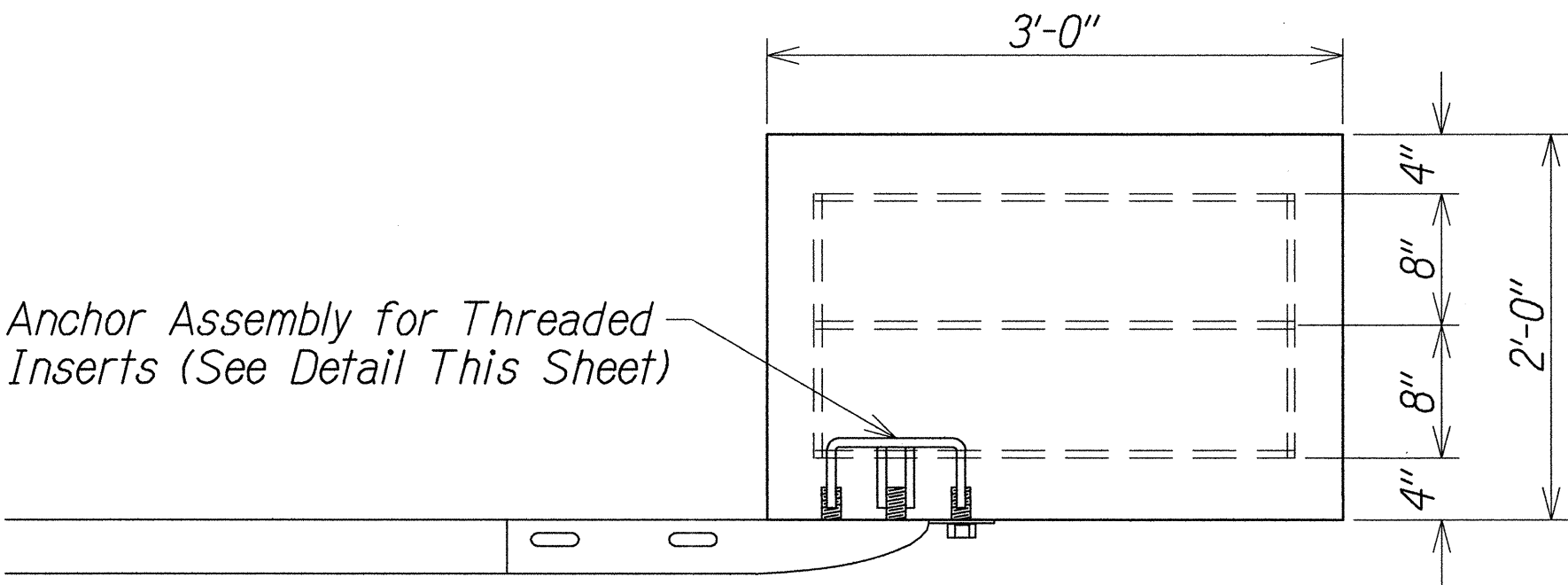


Elevation

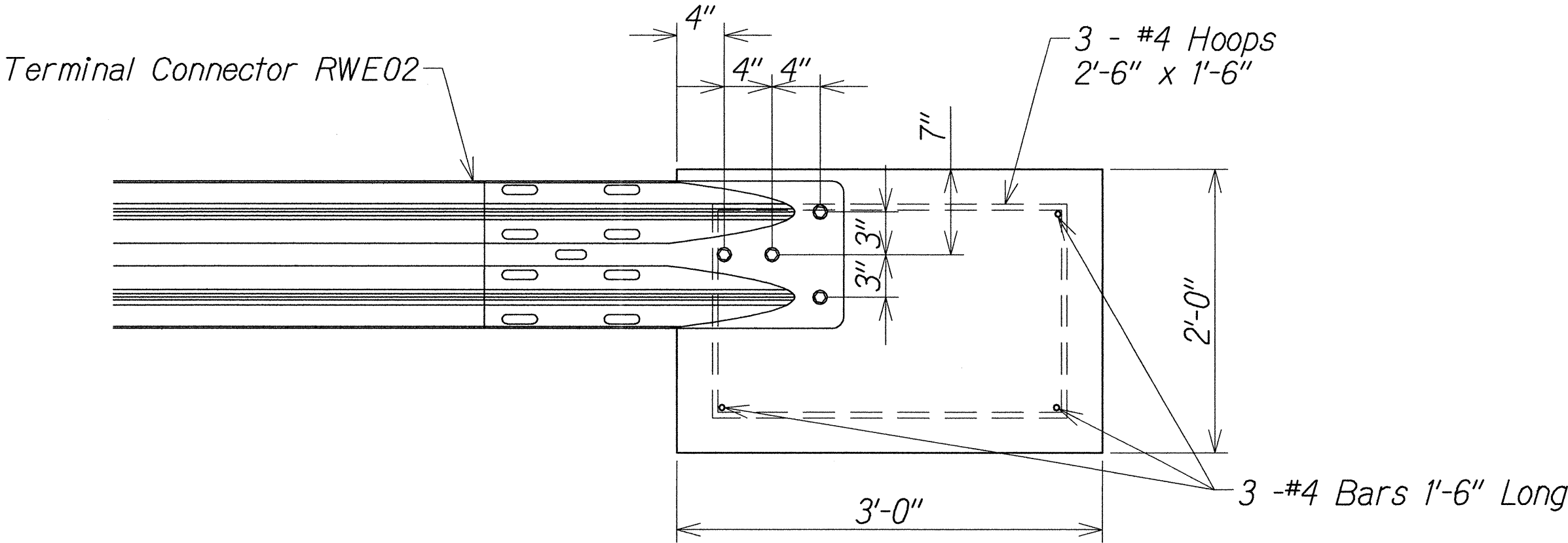
STEEL POST GUARDRAIL  
WITH RUBRAIL



ANCHOR ASSEMBLY  
CONCRETE BLOCK ANCHOR



Plan

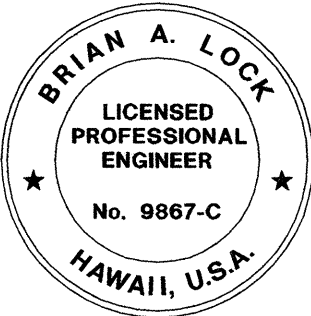


Elevation

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.



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*ma*  
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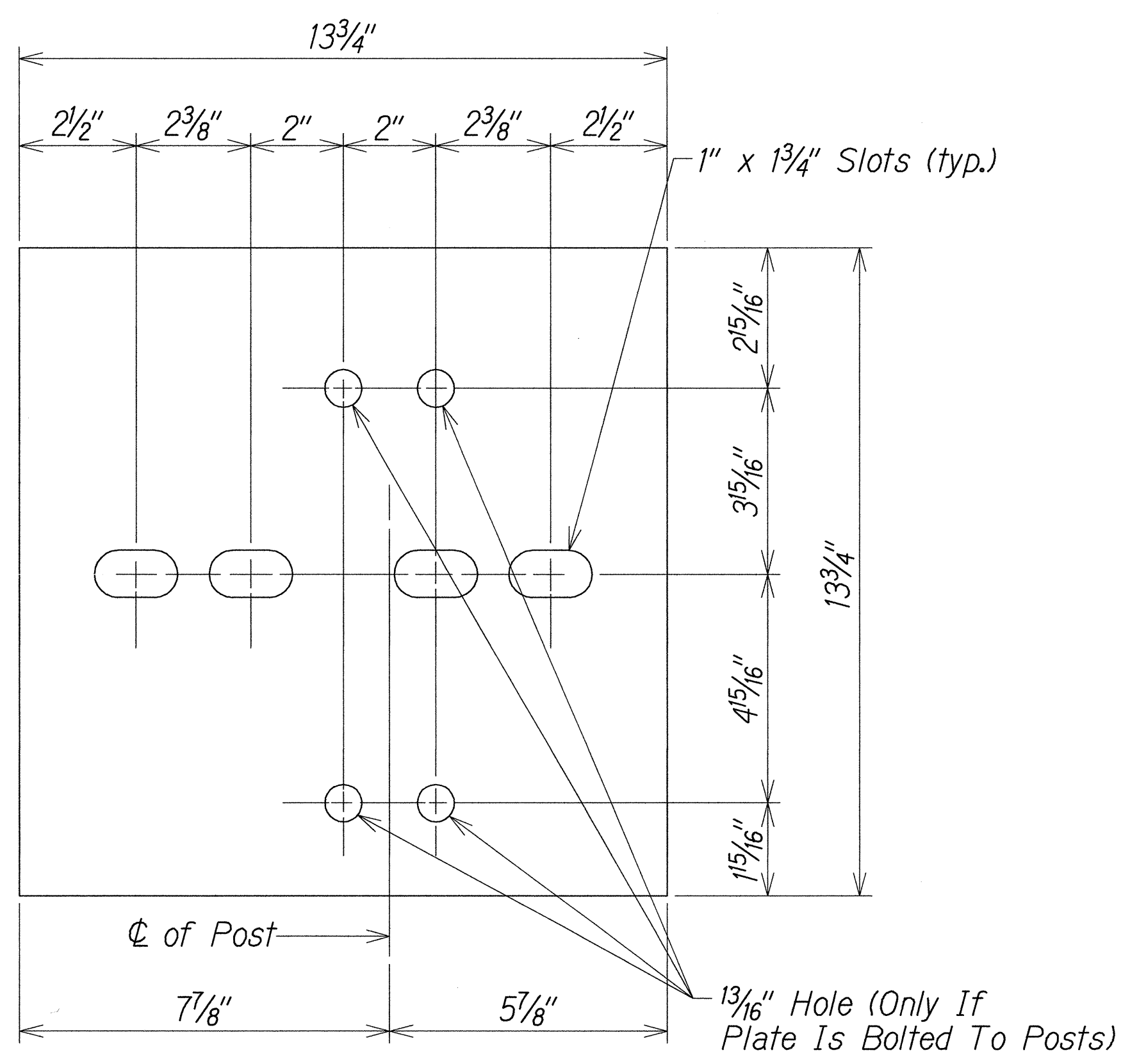
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
TYPE "A"  
GUARDRAIL DETAILS  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Date: April 2014

Scale:
SHEET No. GRD-8 OF 11 SHEETS

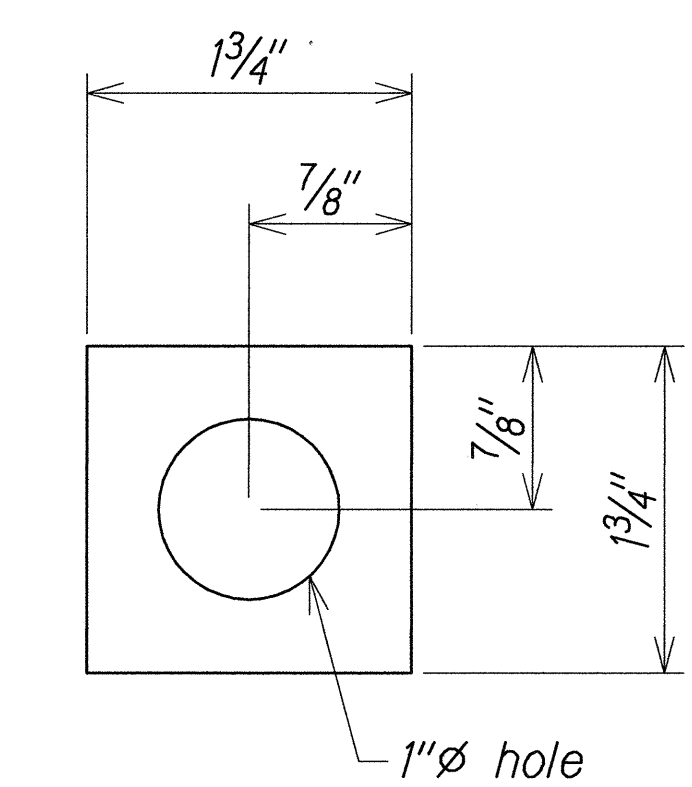
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
No.	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	



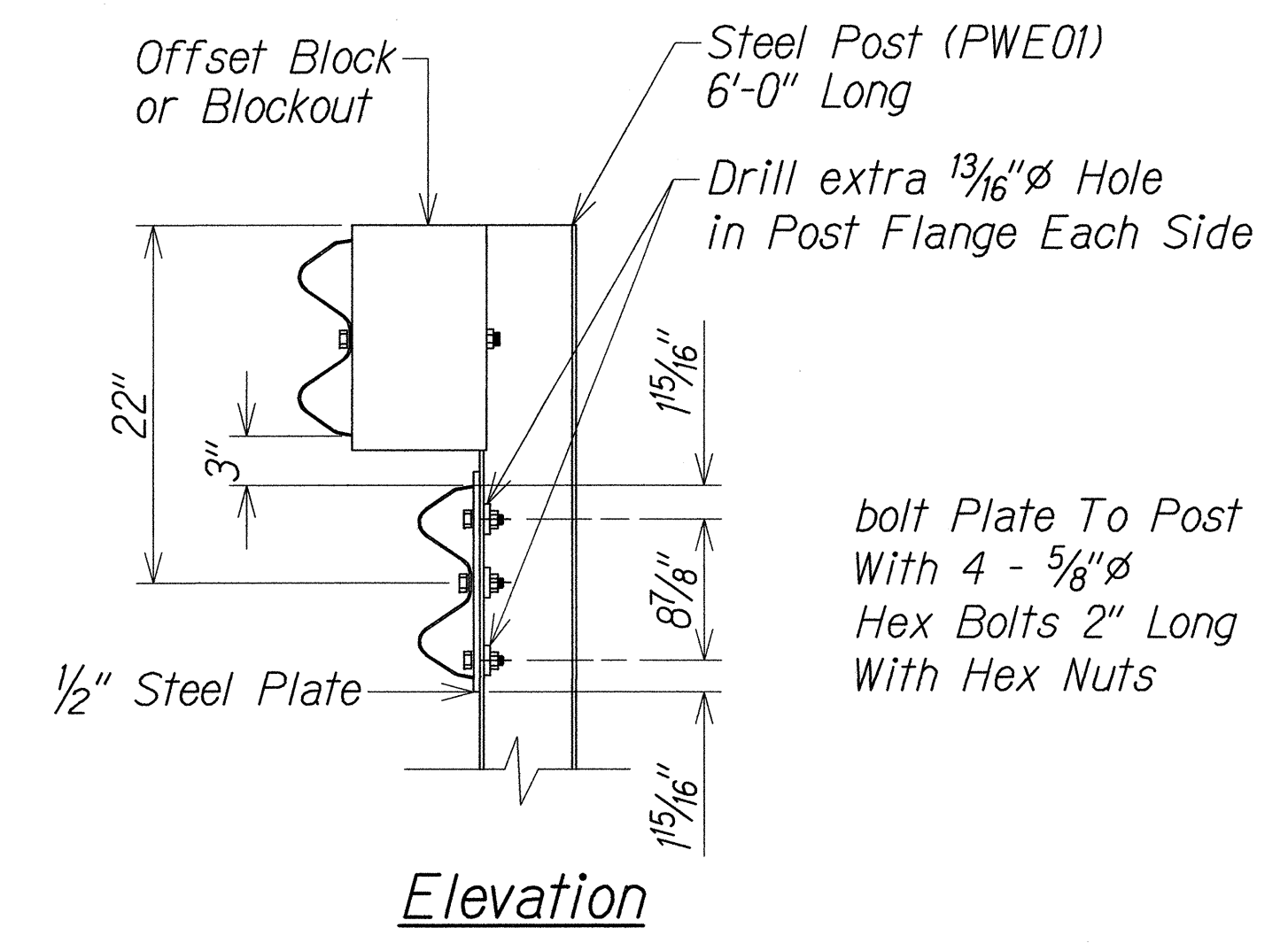
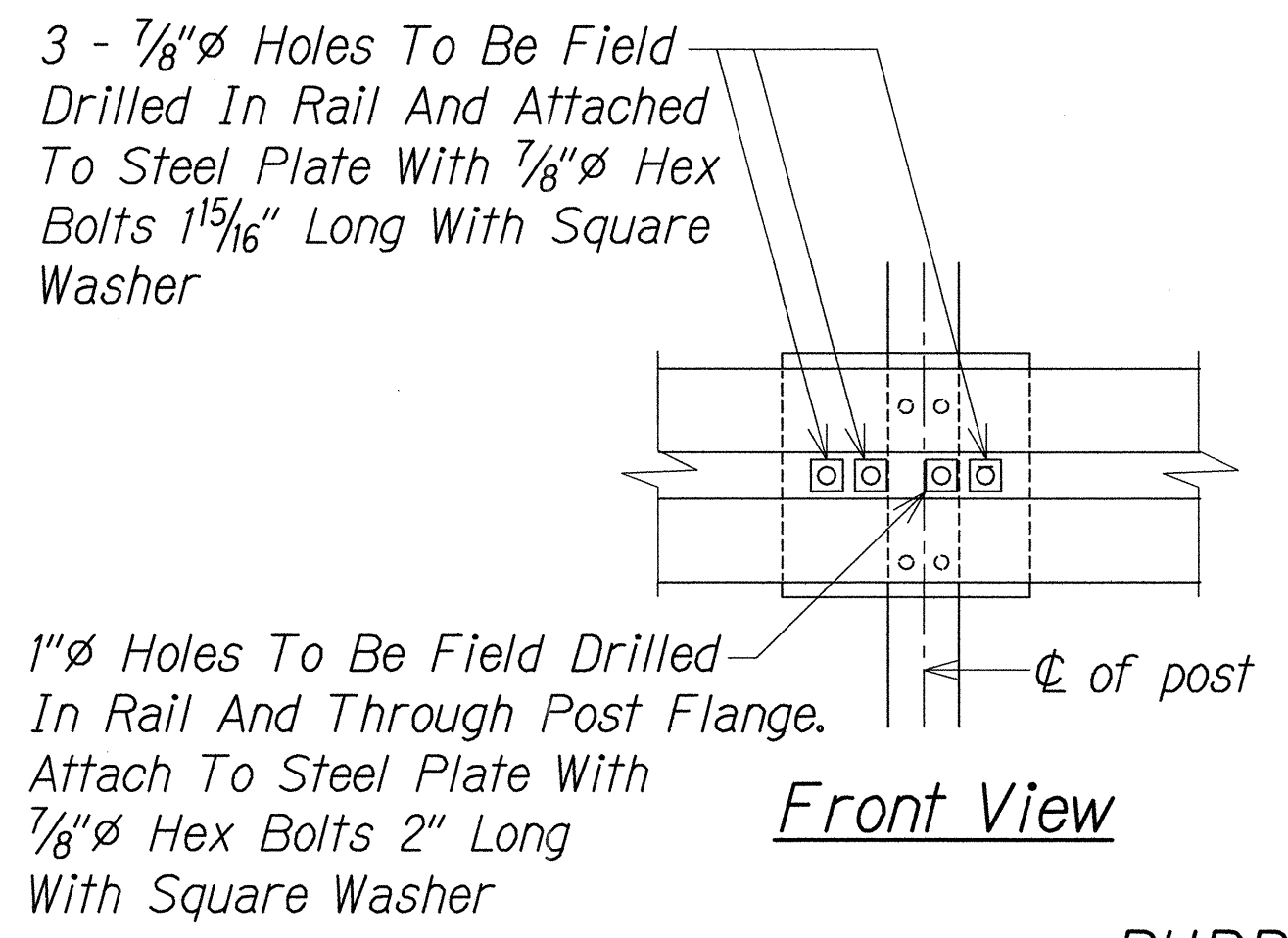
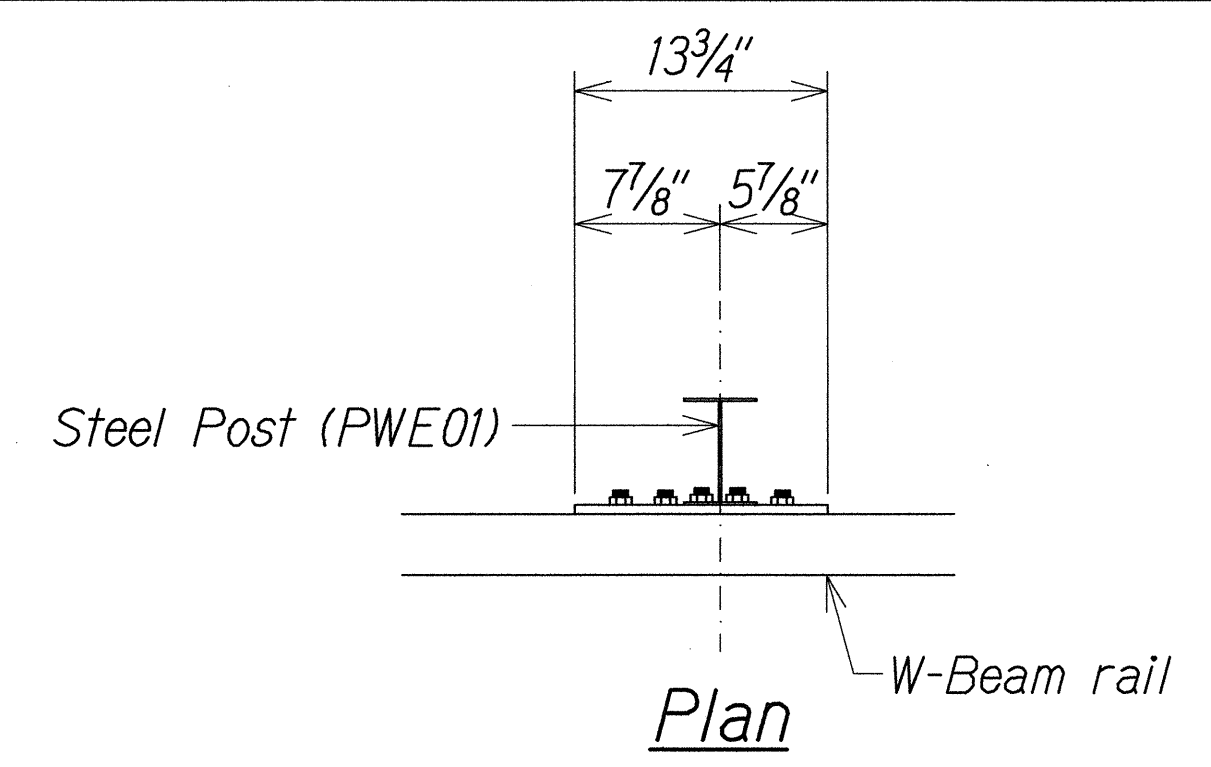
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-09	2014	18	47



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

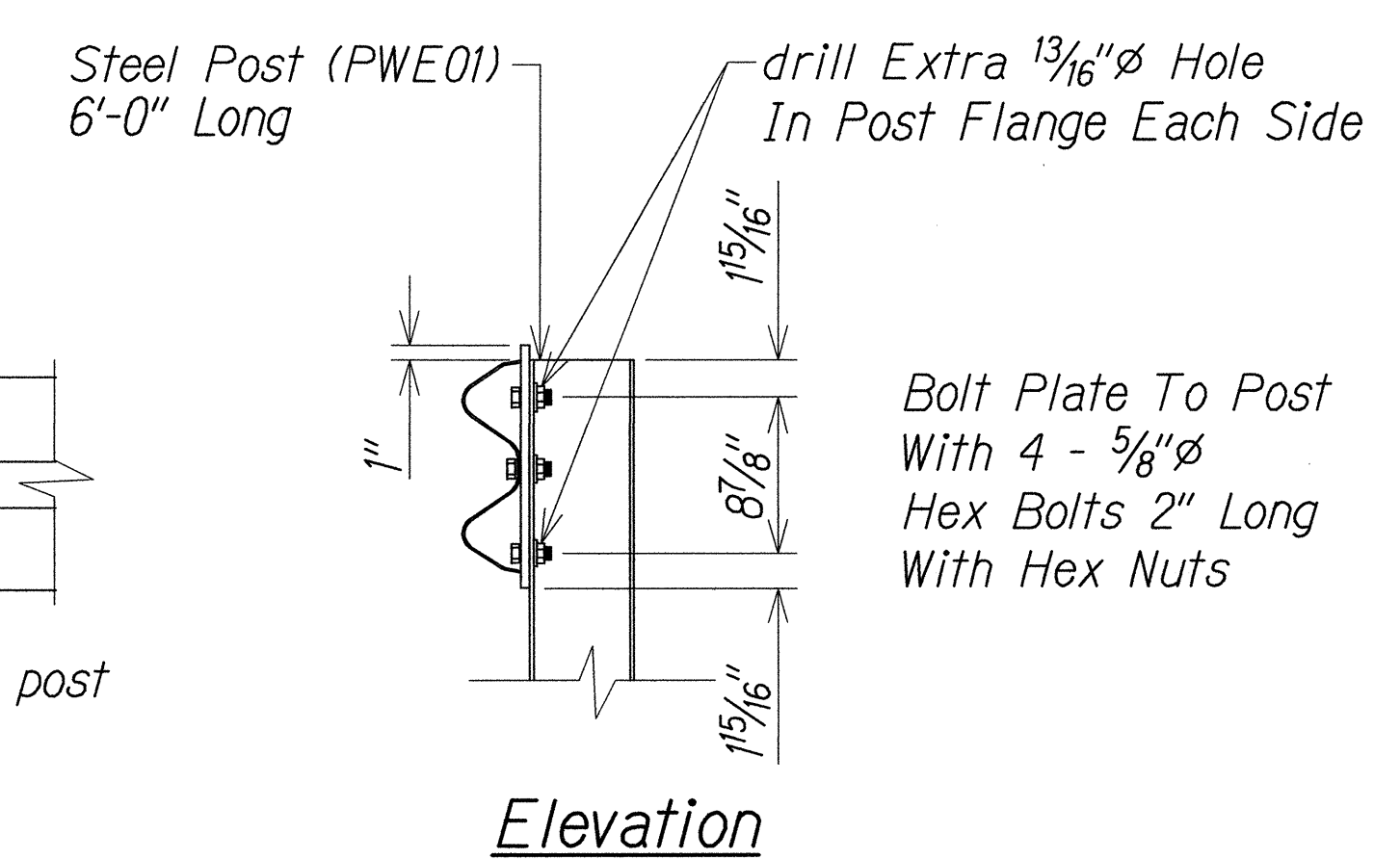
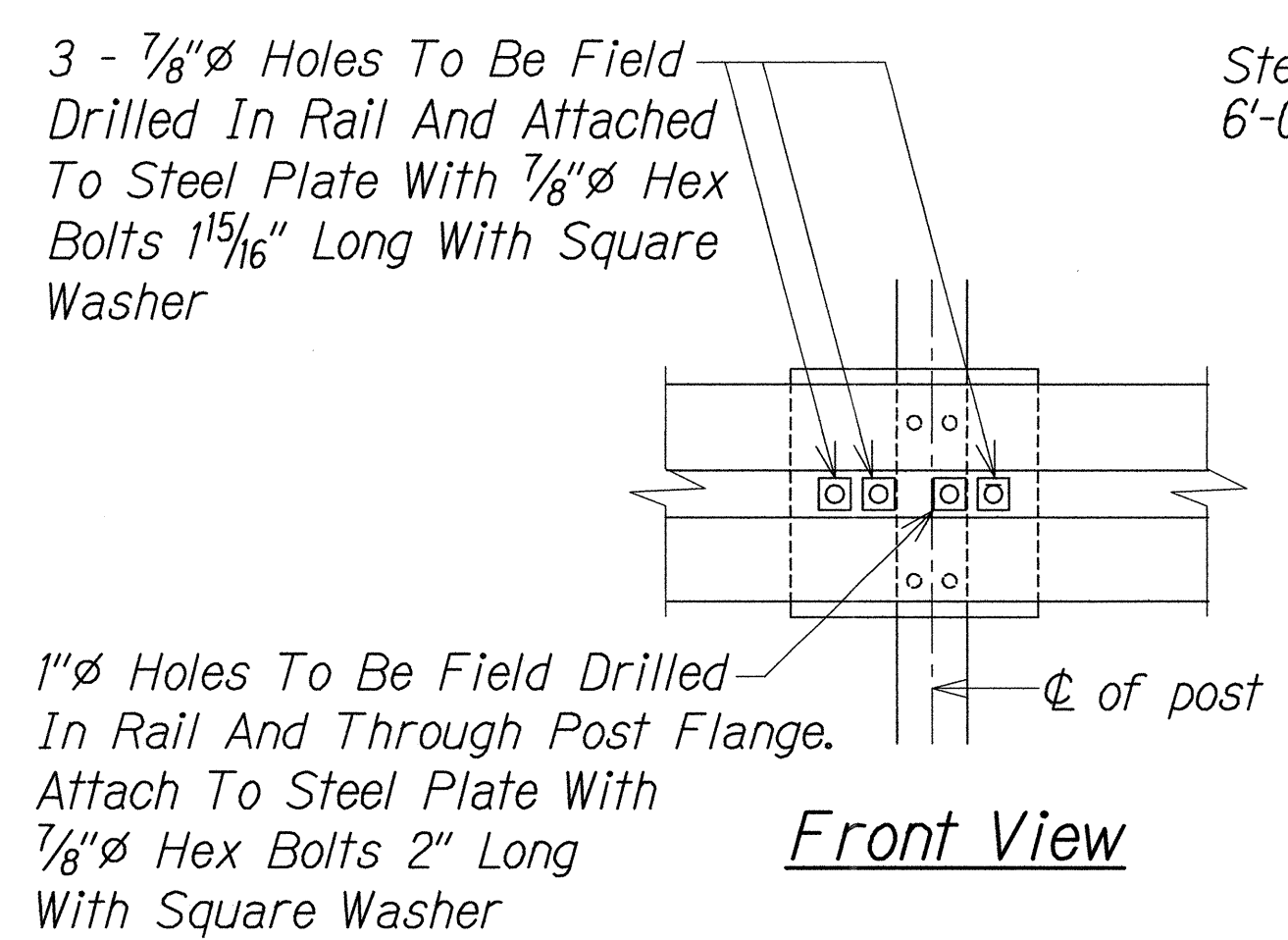
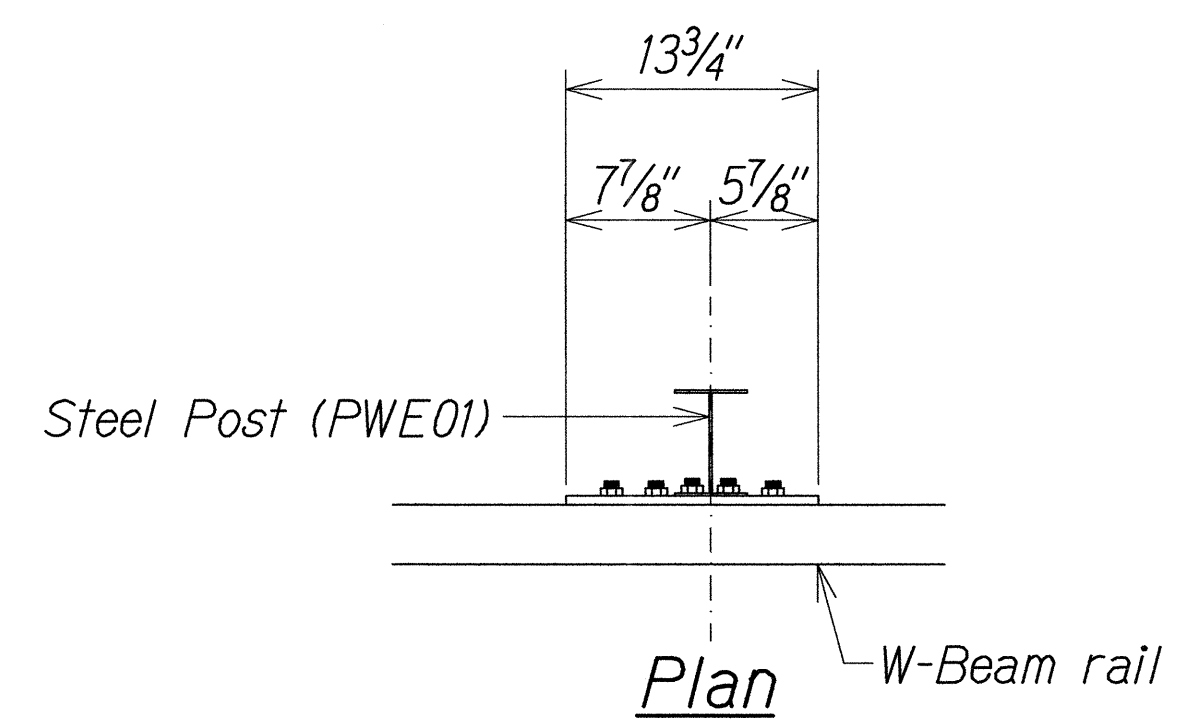


**Square Washer**  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)



**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.



**POST ANCHOR DETAILS**

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



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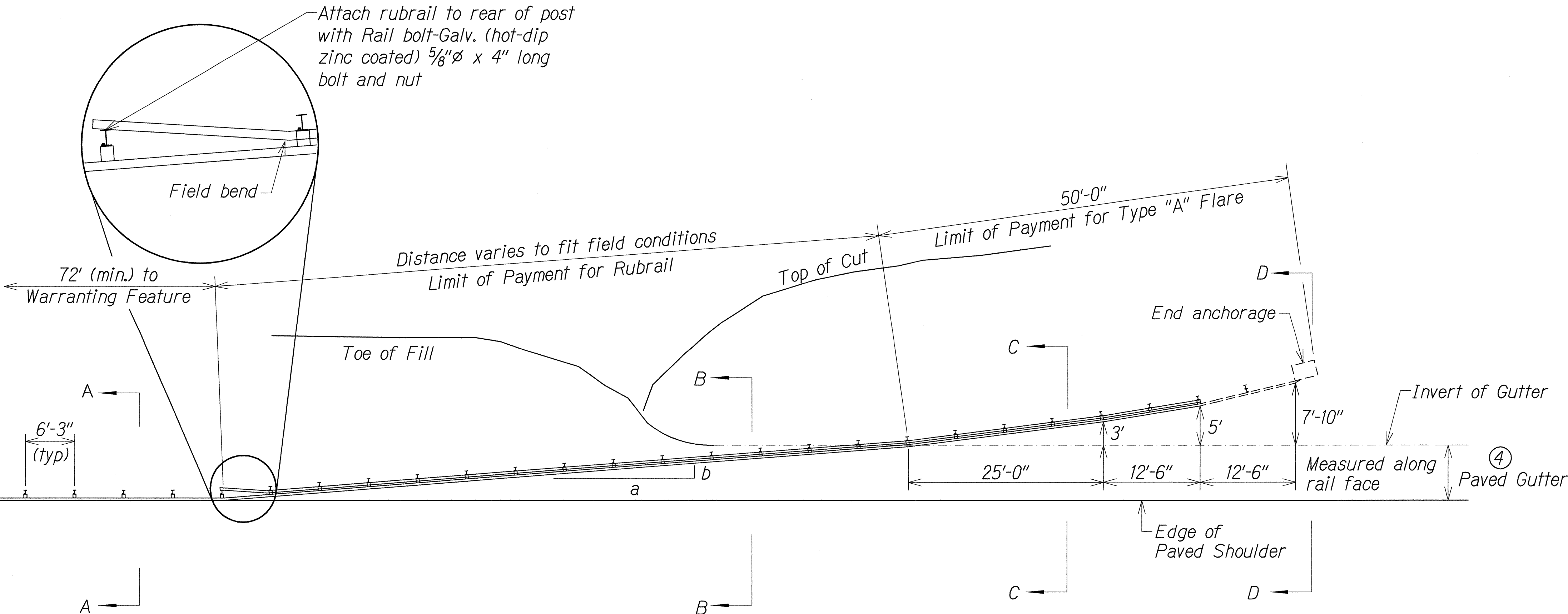
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**TYPE "A"**  
**GUARDRAIL DETAILS**  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Scale:
Date: April 2014

SHEET No. GRD-9 OF 11 SHEETS

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

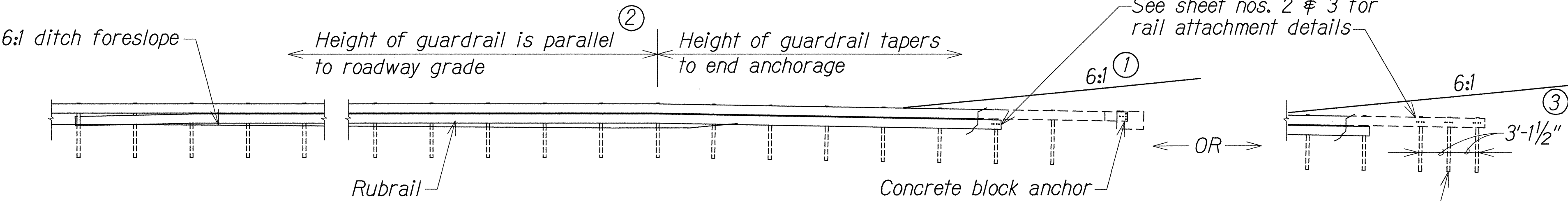
General Notes

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.

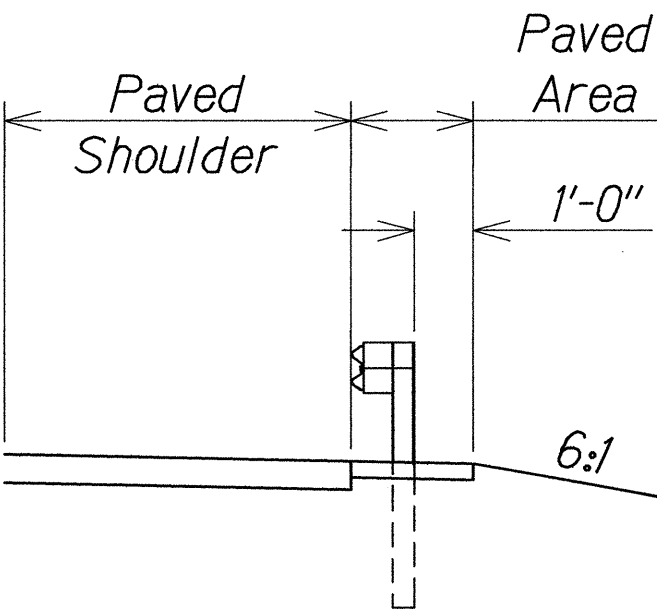


PLAN

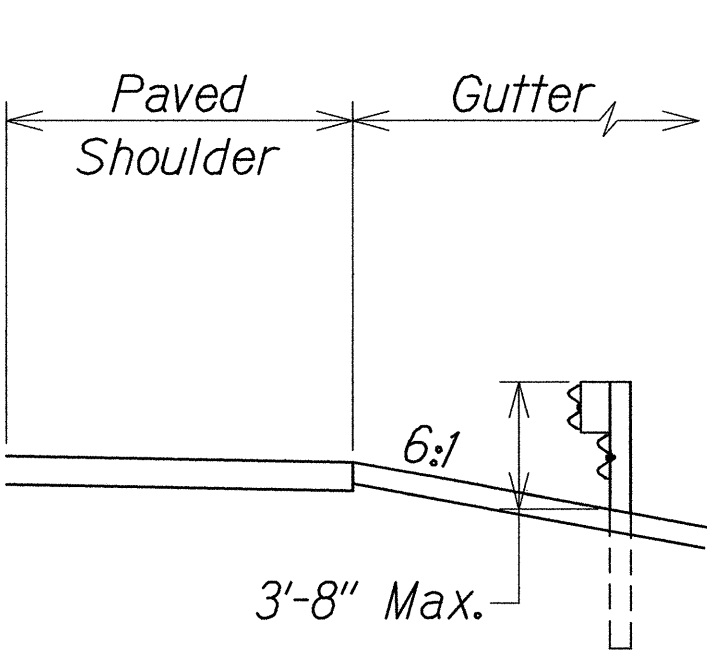
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



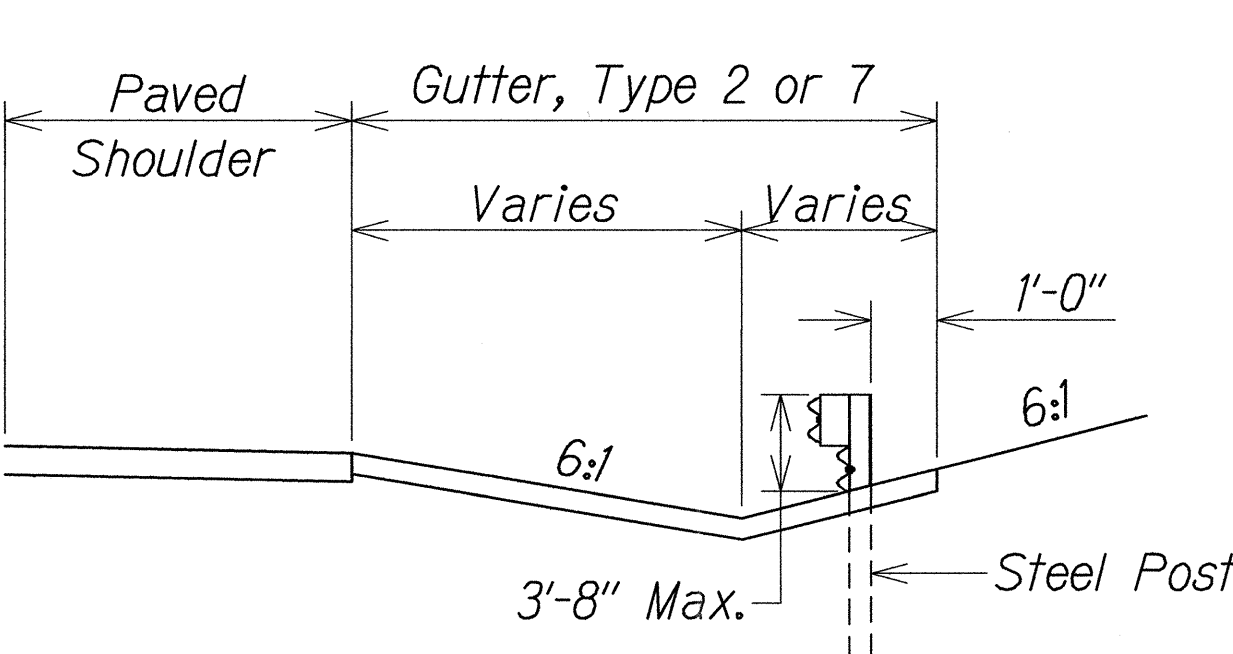
ELEVATION (Profile Along Rail)



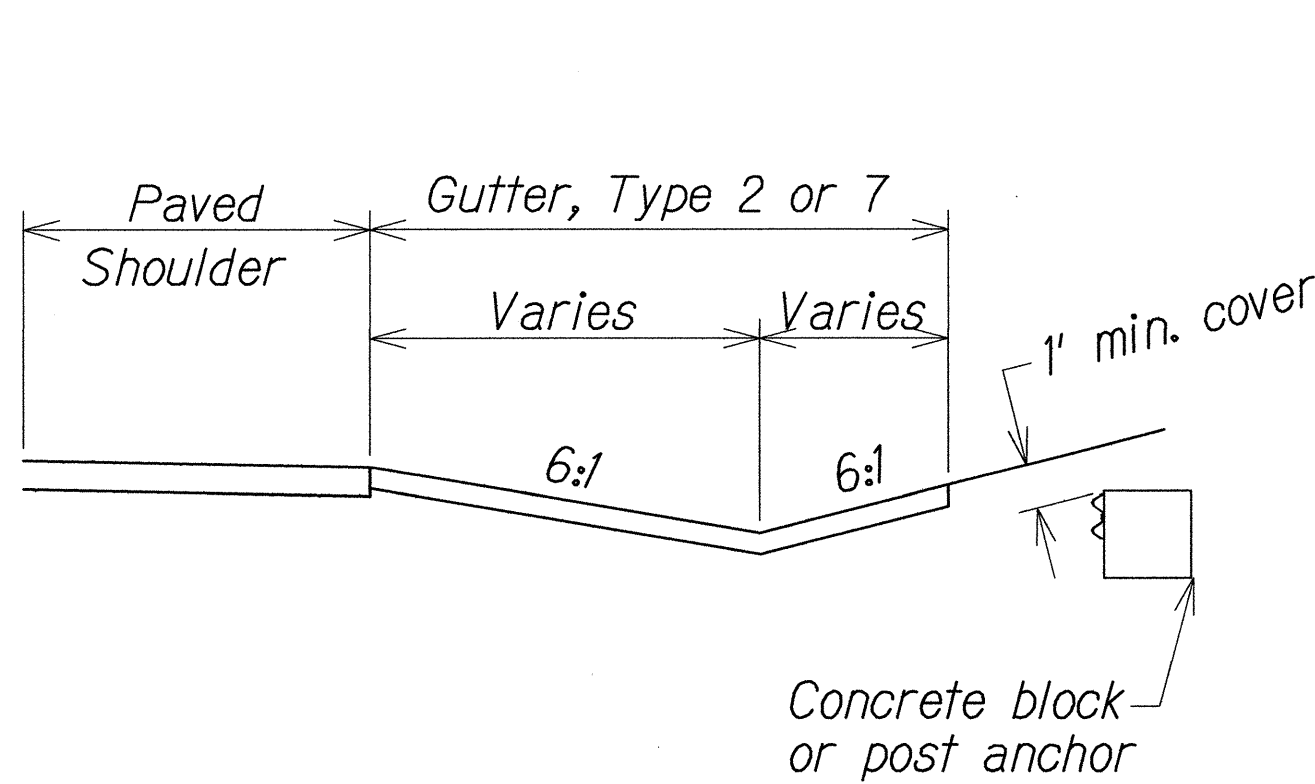
Section A-A



Section B-B  
(With Rubrail)

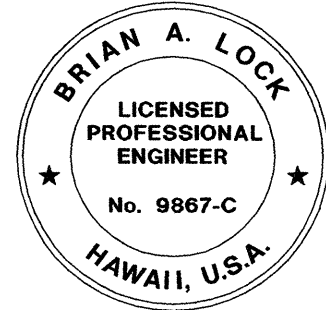


Section C-C  
(With Rubrail)



Concrete block  
or post anchor

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



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APRIL 30, 2016

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
TYPE "A"

GUARDRAIL DETAILS

HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09

Scale: Date: April 2014

SHEET No. GRD-100F 11 SHEETS

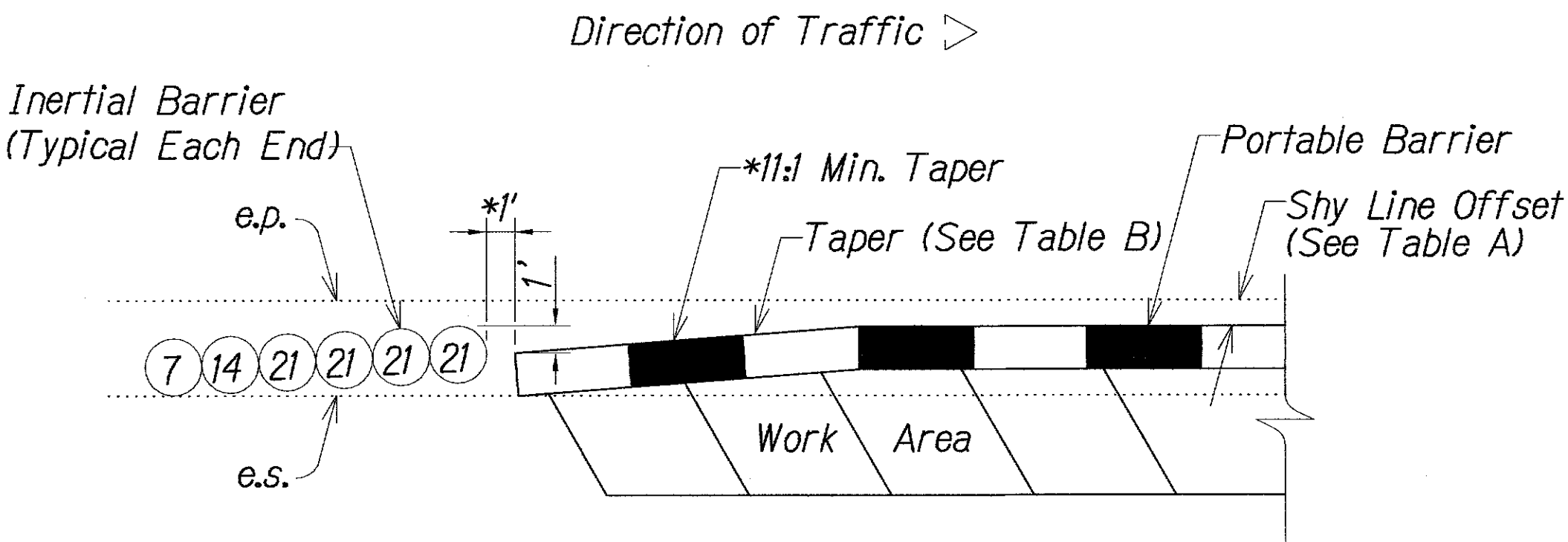


Notes

1. Typical layout will vary based on speed and manufacturer of system used. Installation shall conform to Manufacturer's recommendations..
2. Physical barriers shall be required whenever guardrails have been removed and will not be reinstalled at the end of the work day. See General Note No. 31 on Sht. N-1.
3. Physical barriers shall be portable concrete barriers.
4. Providing, transporting, placing, maintaining, relocating and removing portable concrete barriers shall be considered incidental to the various items of work. See Section 645, WORK ZONE TRAFFIC CONTROL of the Special Provisions. Upon project completion, remove and deliver portable concrete barriers to the Maui District baseyard or as instructed by the Engineer.
5. Ends of portable concrete barriers shall be hereon protected with Inertial Barriers as shown in the detail. The lead (first) inertial barrier shall have a retroreflective object marker attached to it. Furnishing and installing inertial barriers including retroreflective object markers, shall be considered incidental to the various contract items.
6. Furnishing and installing reflector markers (RM-3) over the portable barriers shall be considered incidental to the various contract items.

TABLE A SHY LINE OFFSETS*	
DESIGN SPEED (mph)	SHY LINE OFFSETS
30	3.5'
≤ 25	2.0'

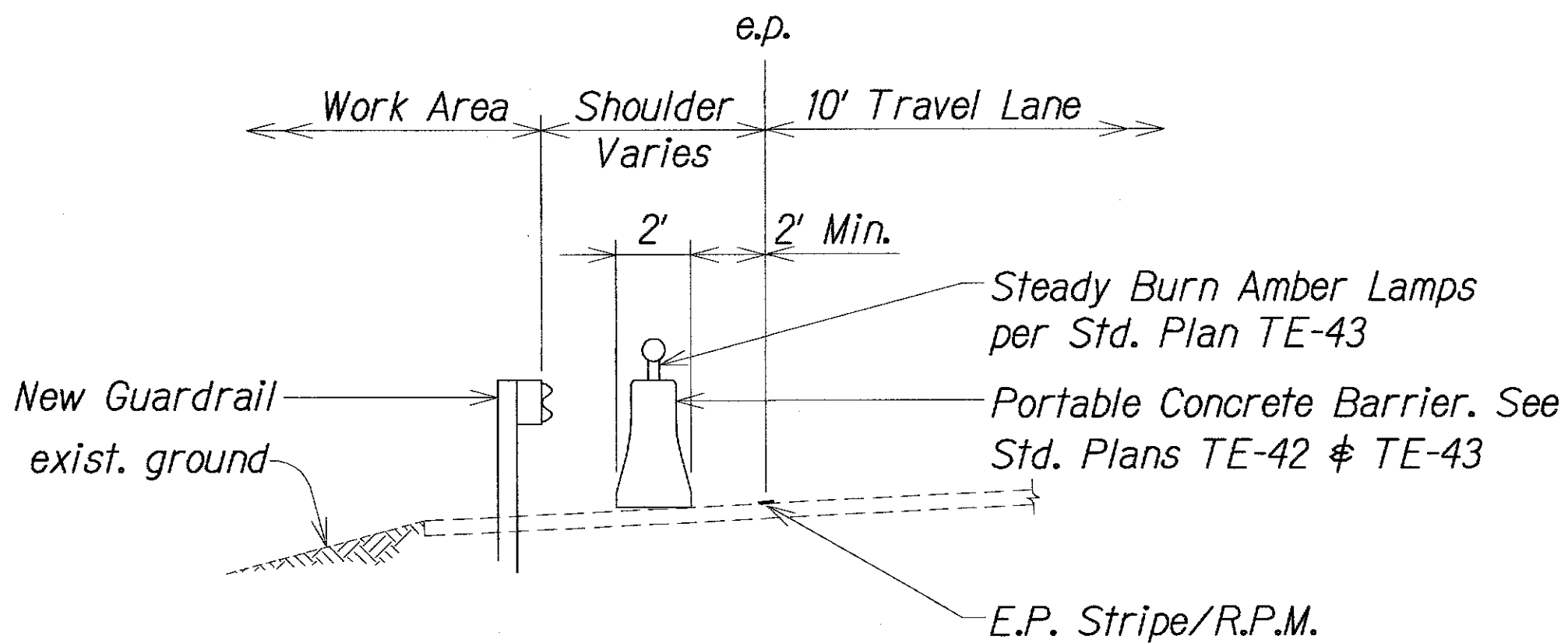
TABLE B MAXIMUM TAPERS FOR CONCRETE BARRIER*		
DESIGN SPEED (mph)	TAPER	
	INSIDE SHY LINE	BEYOND SHY LINE
35	15:1	9:1
≤ 30	13:1	8:1



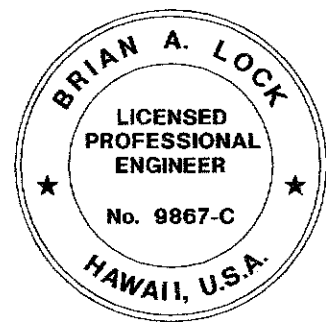
Note:

The numbers inside the circle indicate weight of sand in 100 lb unit. Installation shall conform to manufacturer's recommendation.

TYPICAL DETAIL  
△ INERTIAL BARRIER SYSTEM  
Not to Scale



TYPICAL DETAIL  
△ PORTABLE CONCRETE BARRIER  
Not to Scale



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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**PORTABLE  
BARRIER DETAILS**  
HANA HIGHWAY  
IMPROVEMENTS, PHASE 2A  
Huelo to Hana  
Project No. 360AB-01-09  
Scale: Date: April 2014  
SHEET No. GRD-11 OF 11 SHEETS

△ r6/10/14 REVISED CALLOUTS  
DATE REVISION