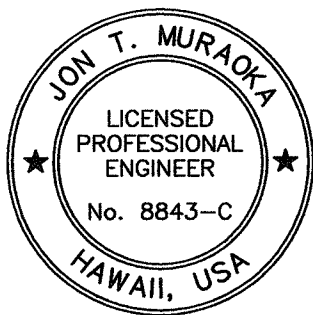


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	ADD. 107	166

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 longi- tudinally beyond terminal ends.
9. 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/W Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail	2'-0"	1'-6"
Modified Thrie Beam	2'-0"	2'-0"



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*[Signature]*  
FUKUNAGA & ASSOCIATES, INC. APRIL 30, 2014  
LIC. EXP. DATE

4

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

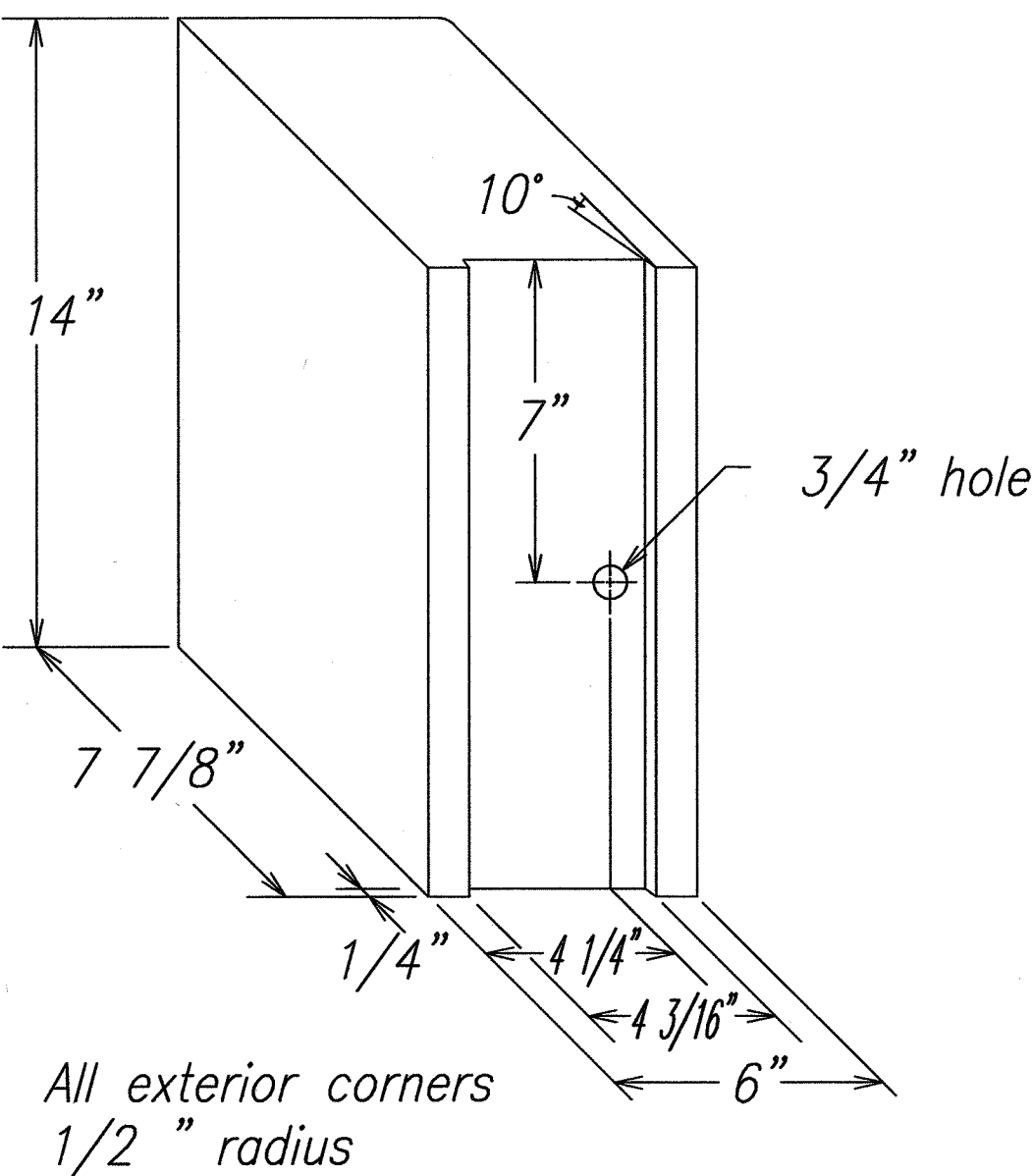
GUARDRAIL DETAILS & NOTES

KAHULUI AIRPORT  
ACCESS ROAD, PHASE I

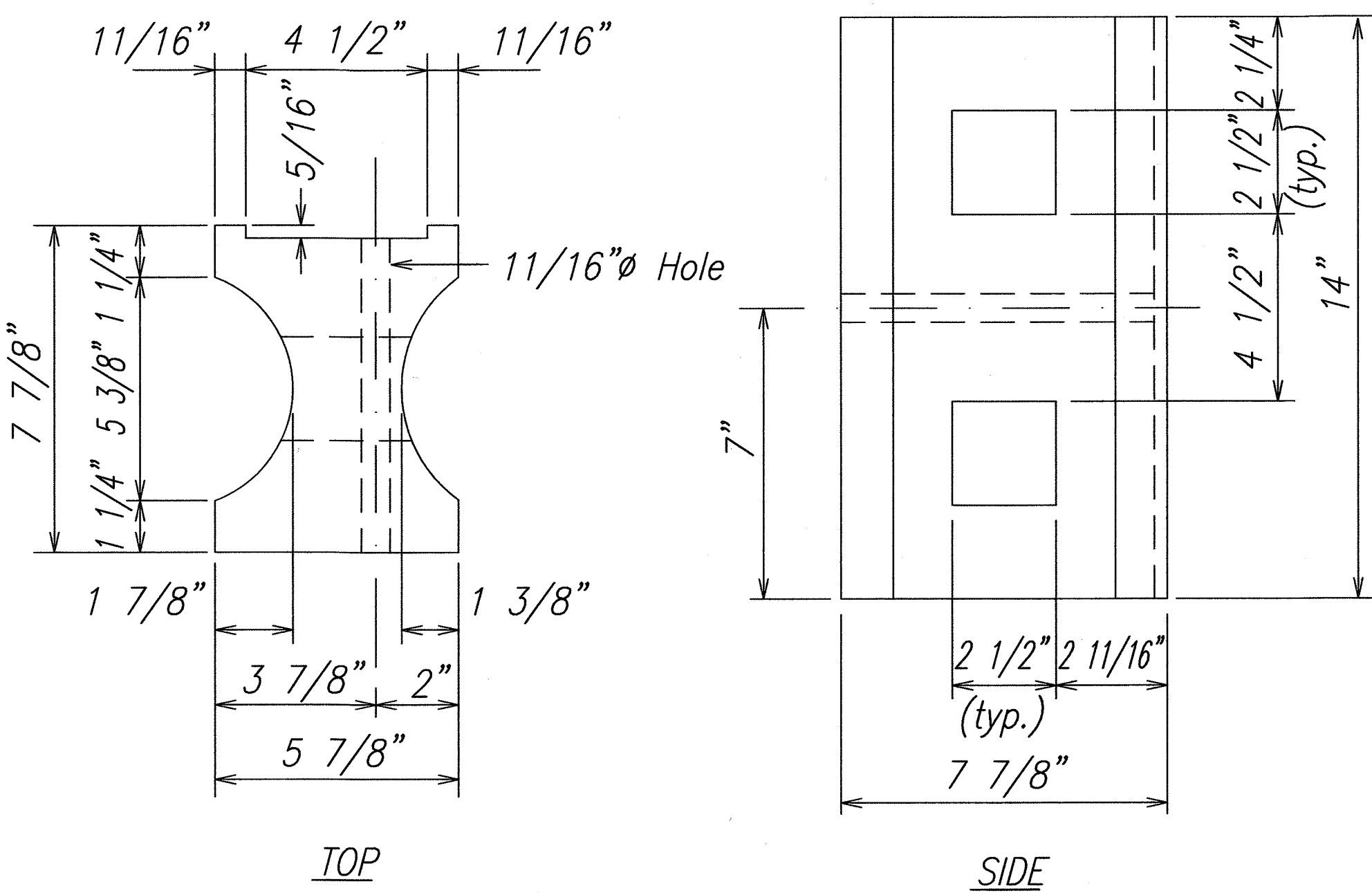
Federal Aid Project No. NH-0380(10)

Scale: None      Date: February 2013

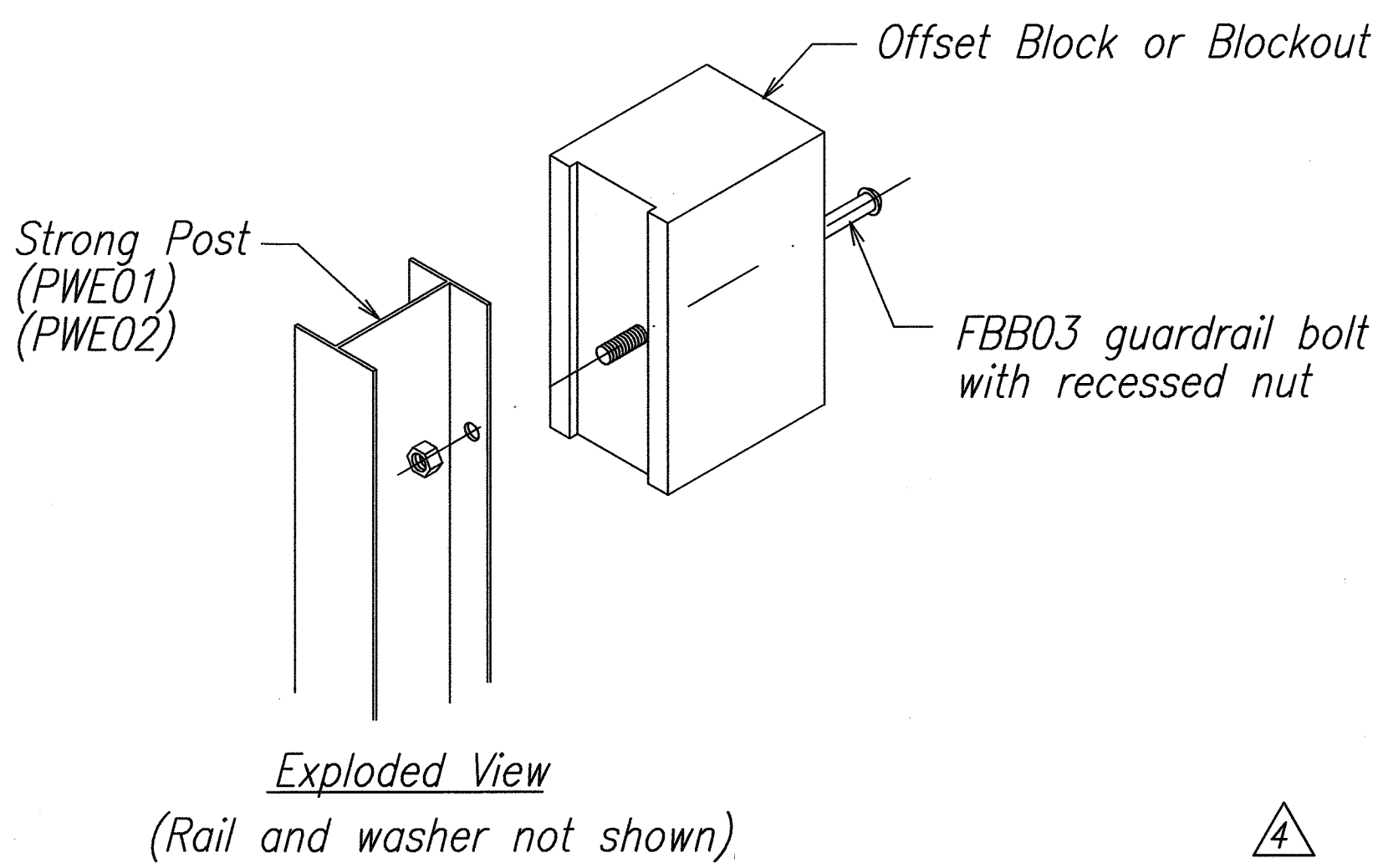
SHEET No. *BJ* OF 10 SHEETS



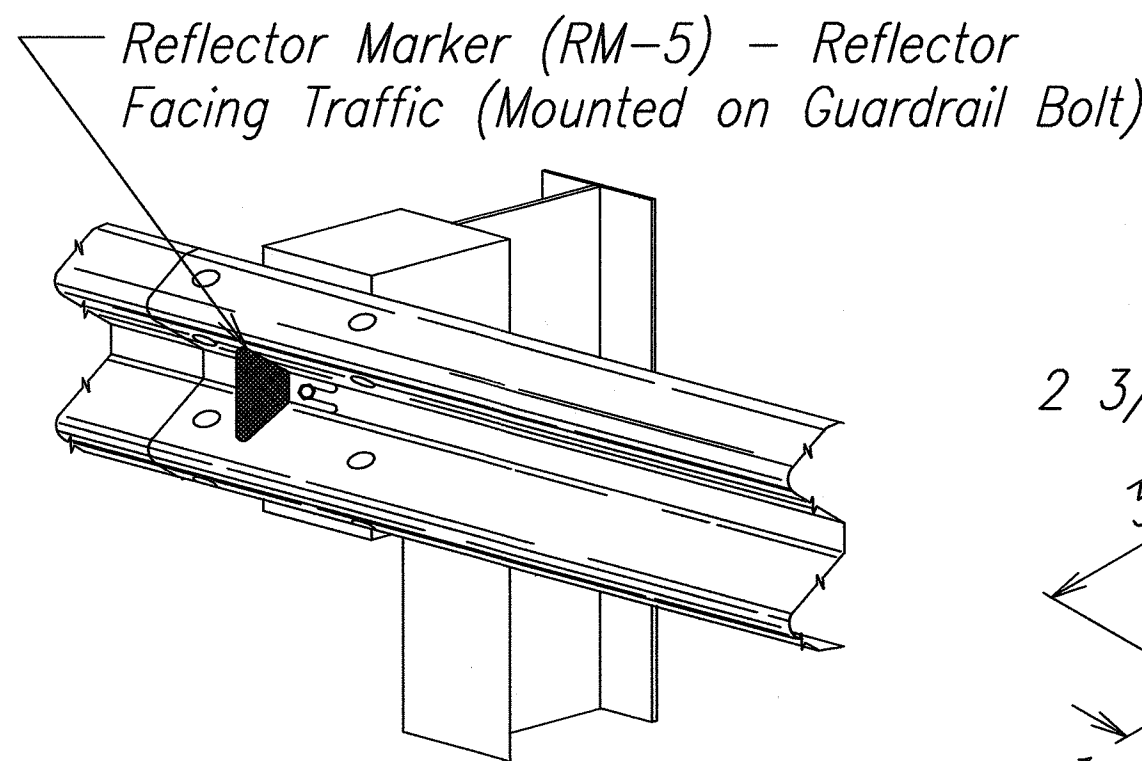
RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



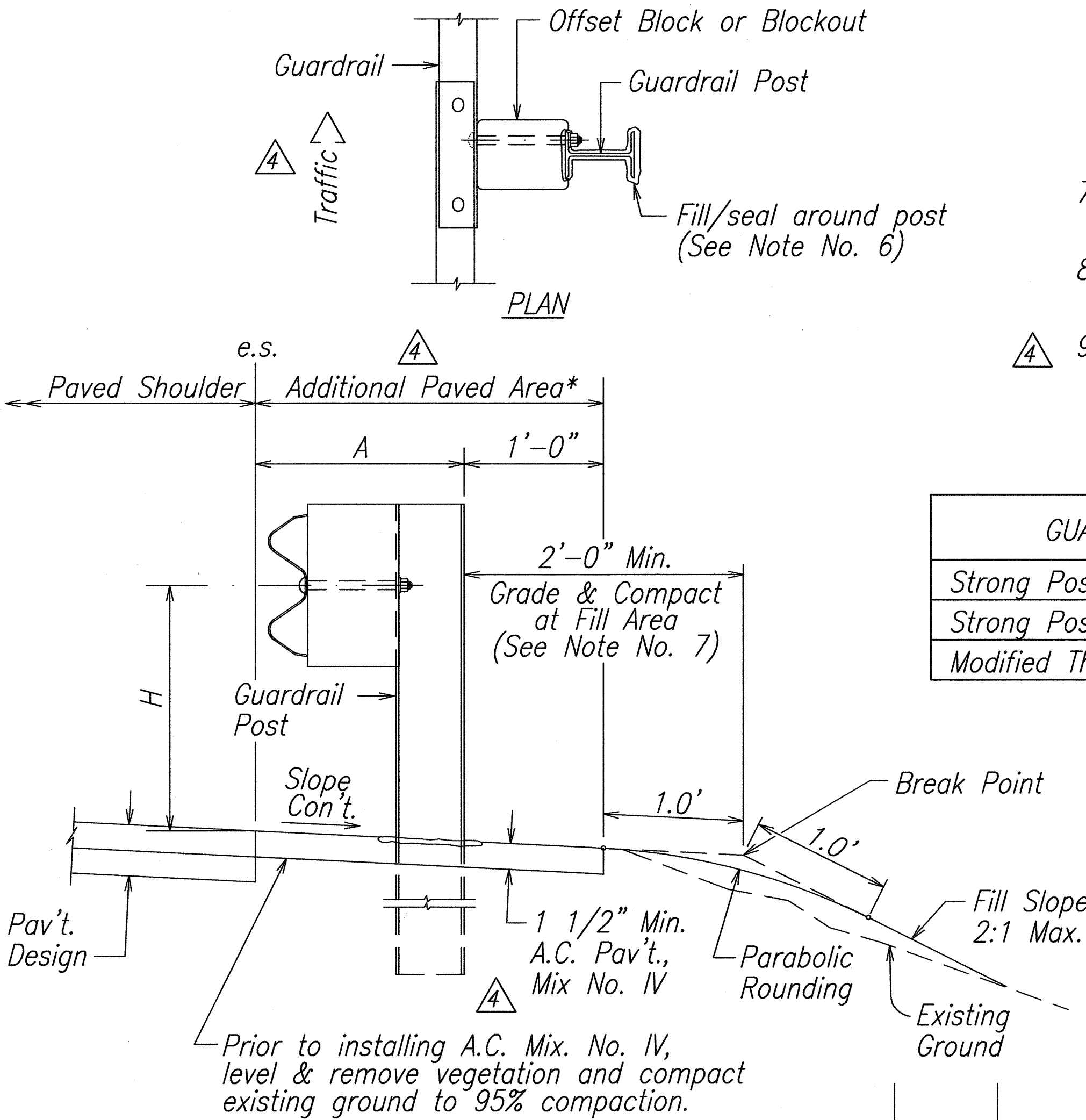
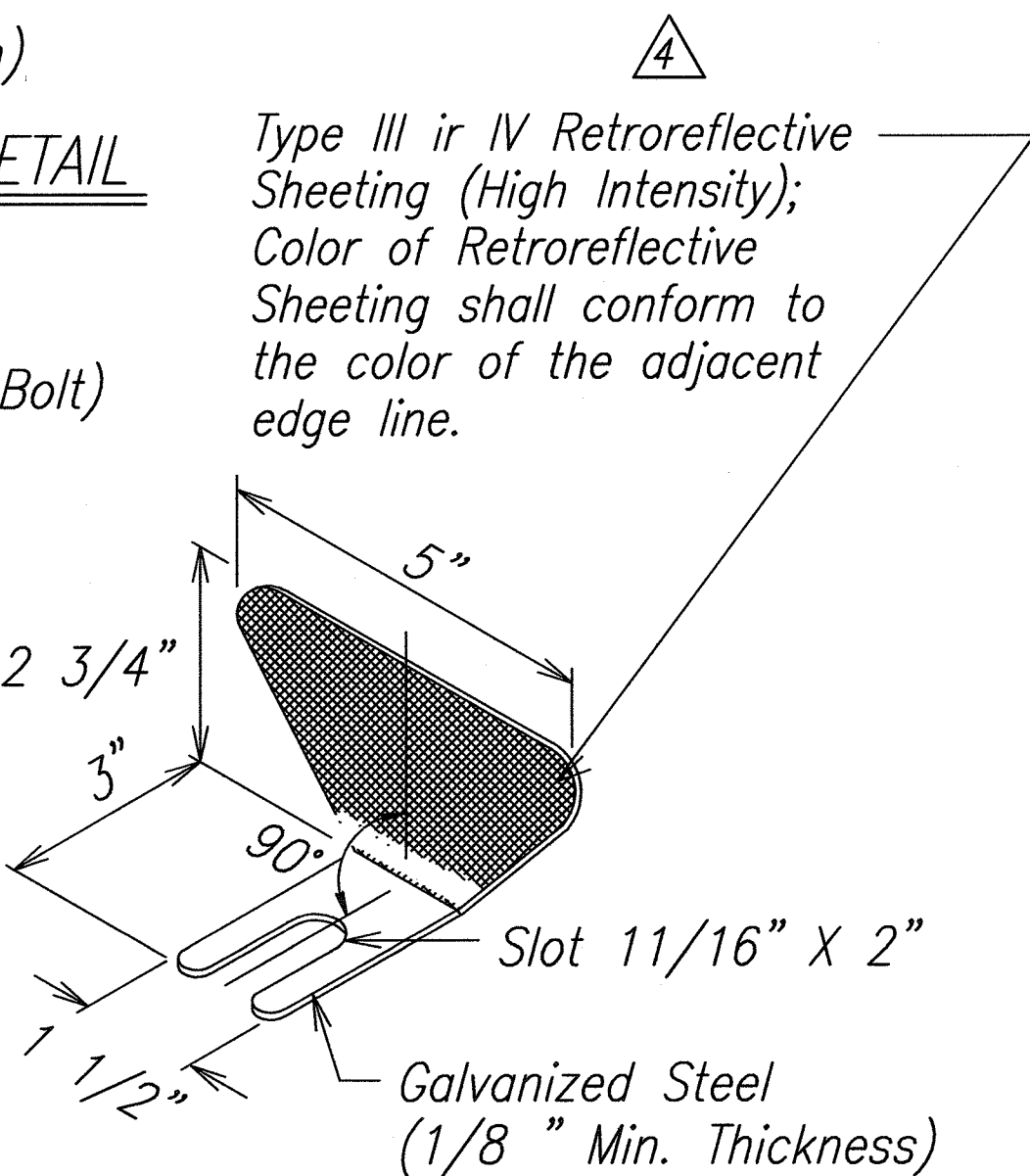
RECYCLED PLASTIC BLOCKOUT (TYPE I)



STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



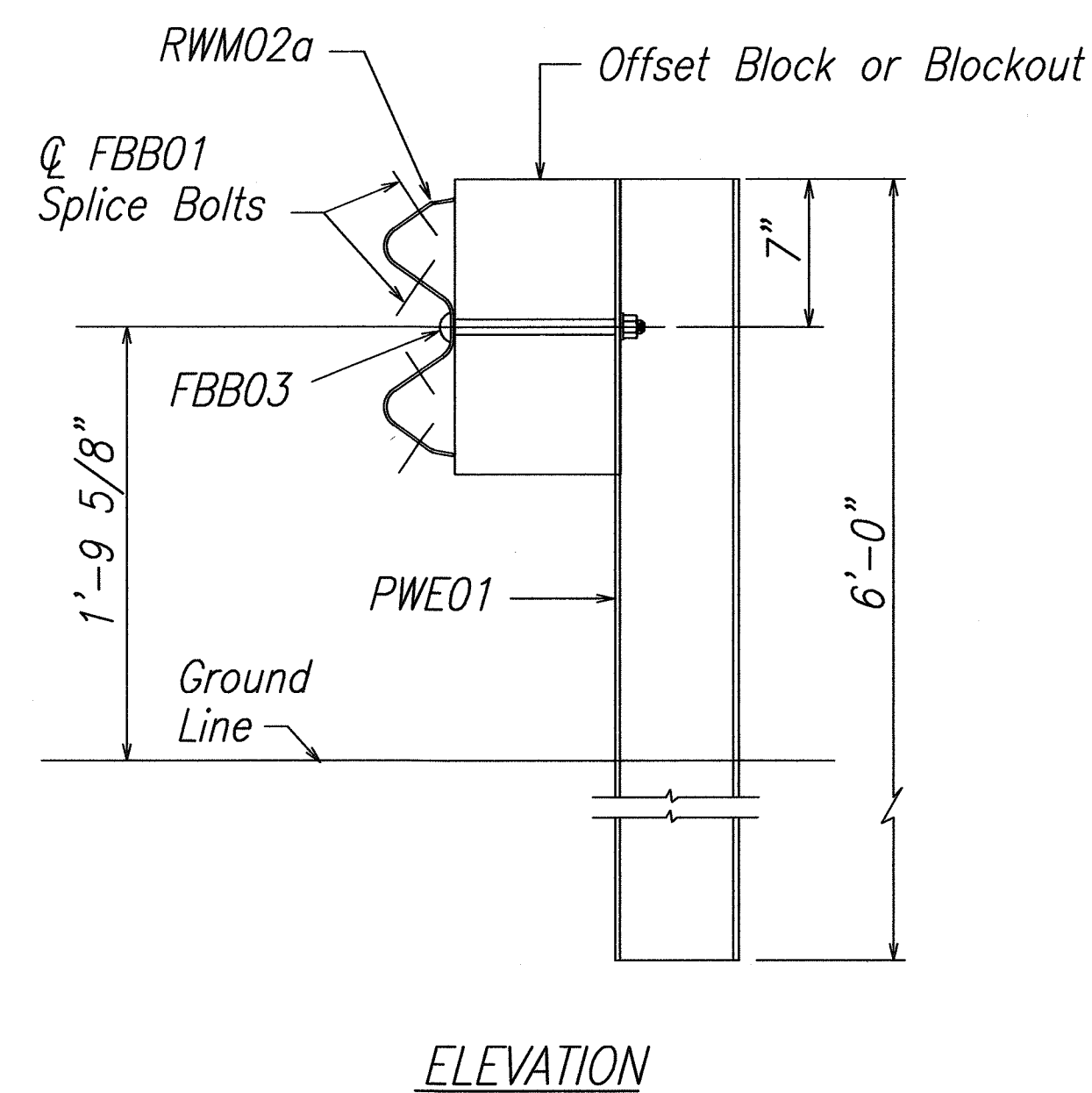
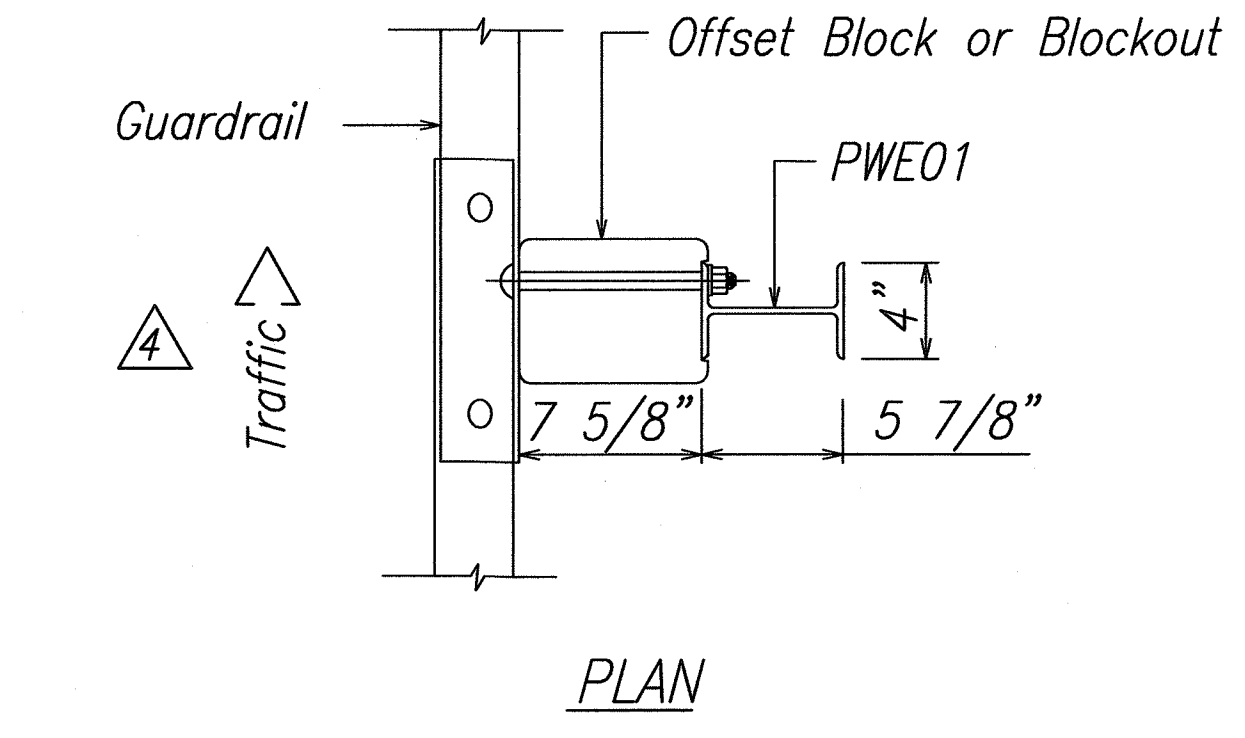
ELEVATION  
TYPICAL GUARDRAIL INSTALLATION

DATE	REVISION
4-12-13	Delete Graphic Scale
4-12-13	Revise Per Latest DOT Guardrail Details

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

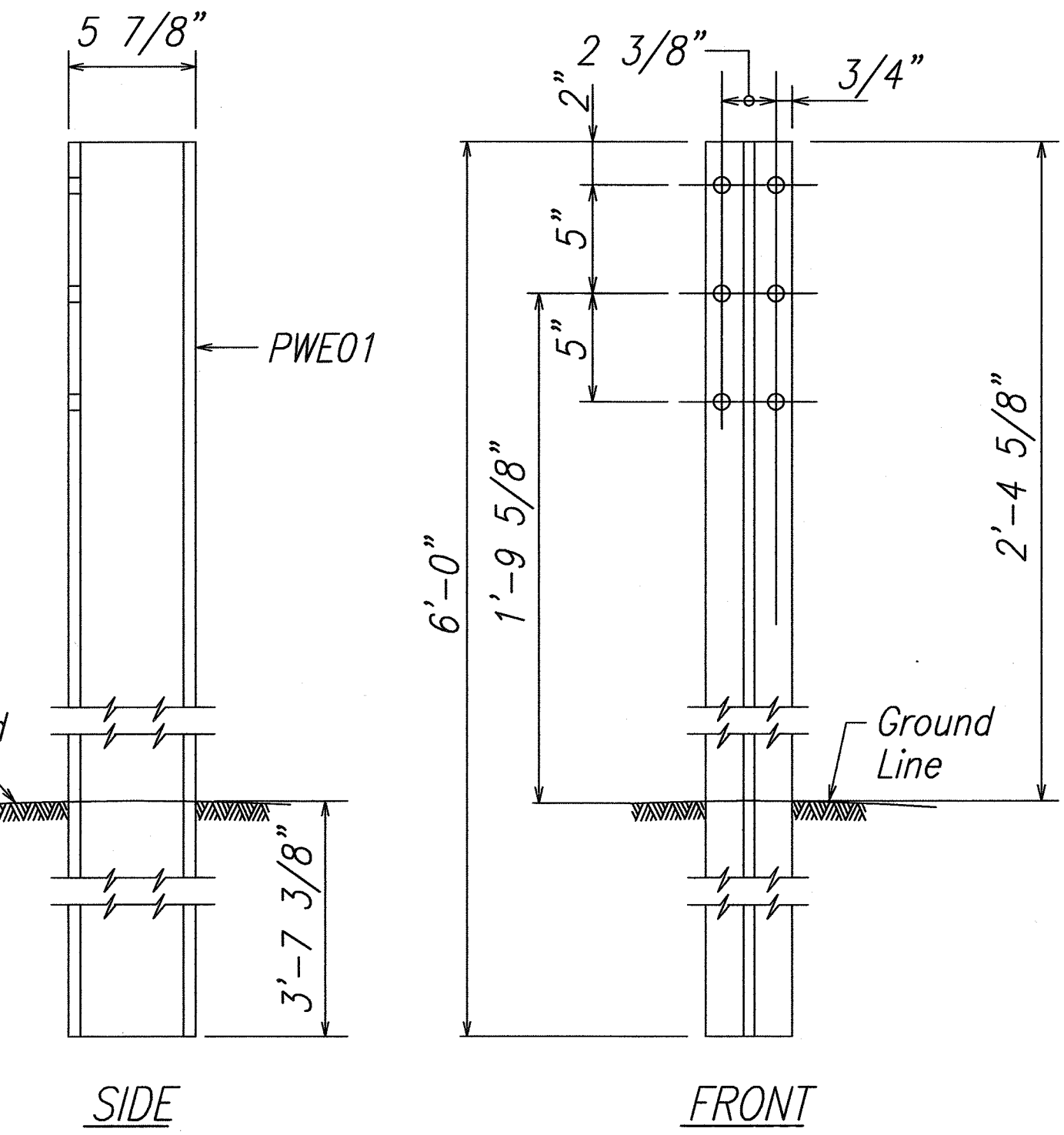
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	ADD. 108	166

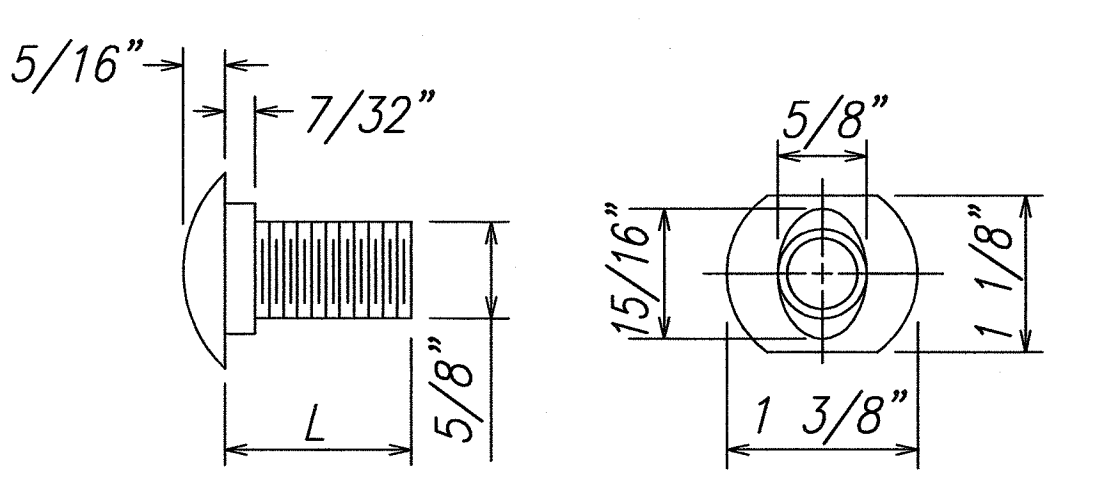


**STRONG POST W-BEAM GUARDRAIL (SGR04a)**

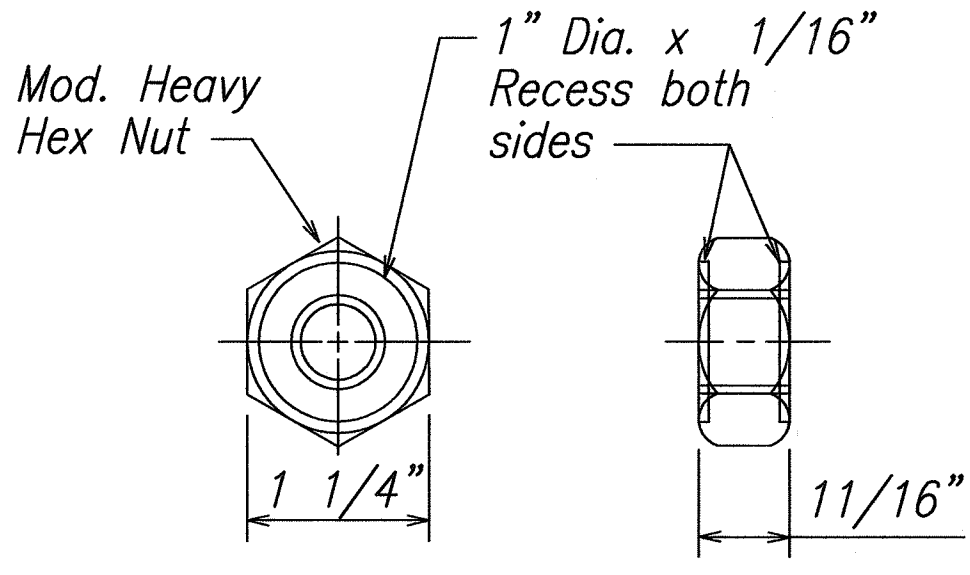
NOTE:  
All Holes are  
3/4" Dia.



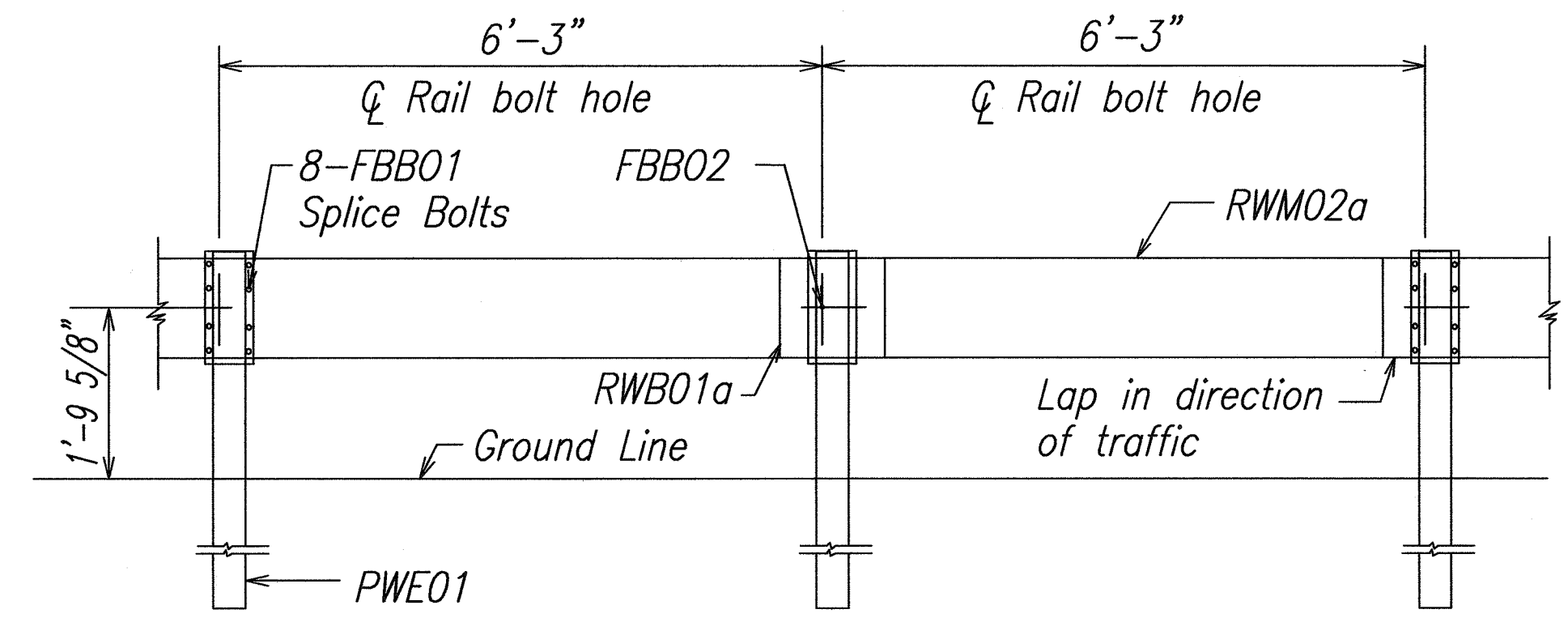
**W-BEAM STRONG POST (PWE01)**



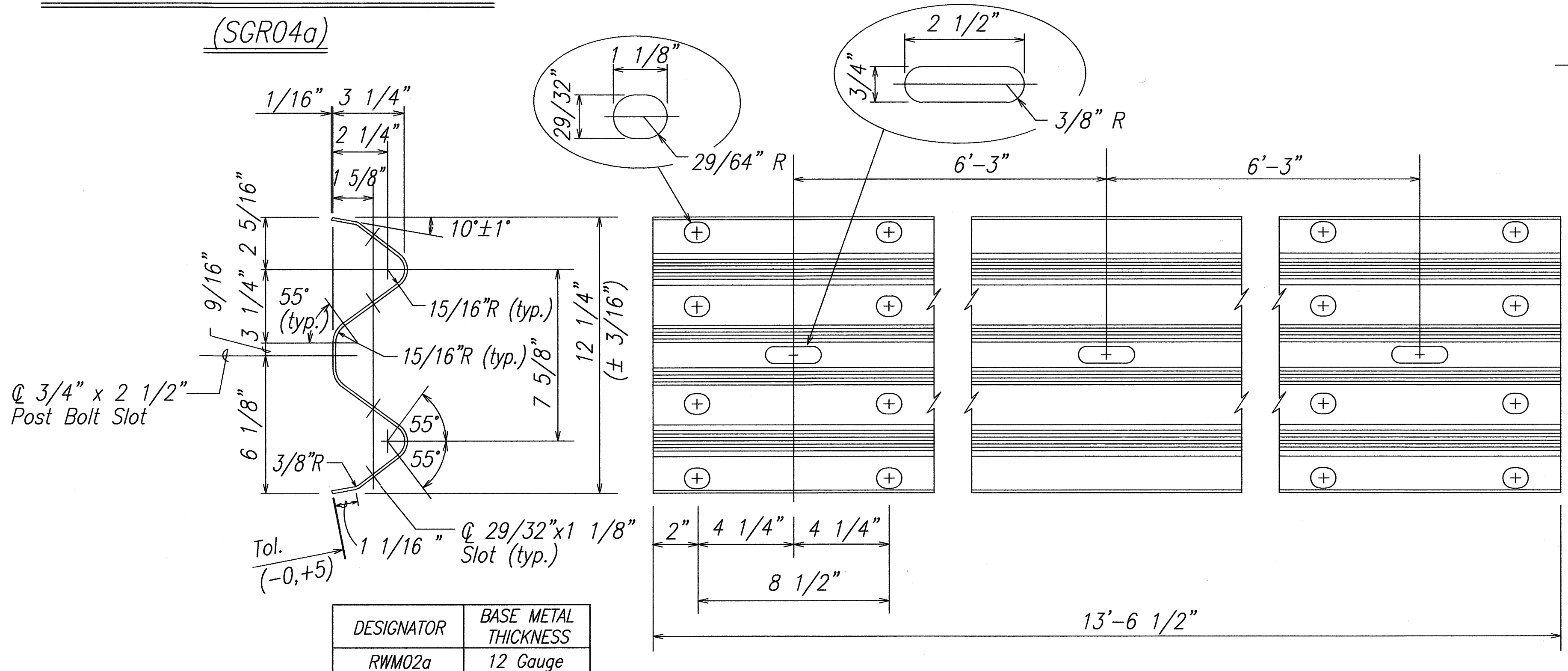
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



**GUARDRAIL BOLTS AND RECESSED NUT**



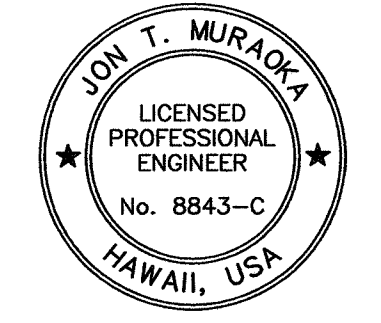
**STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**



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

DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

DATE	REVISION
4-12-13	Delete Graphic Scale
4-12-13	Delete Back-Up-Plate
4-12-13	Revise Per Latest DOT Guardrail Details



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*[Signature]*  
FUKUNAGA & ASSOCIATES, INC. APRIL 30, 2014  
LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**STRONG POST W-BEAM GUARDRAIL**  
  
KAHULUI AIRPORT  
ACCESS ROAD, PHASE I  
Federal Aid Project No. NH-0380(10)  
Scale: None Date: February 2013  
SHEET No. B2 OF 10 SHEETS

ADD. 108

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
NO.	

DRAWING NAME: C:\PROJECTS\KAHULUI-2011\PLANS\26-GUARDRAIL DETAILS\B2.DWG PLOT TIME: 04-23-13, 1:52 PM



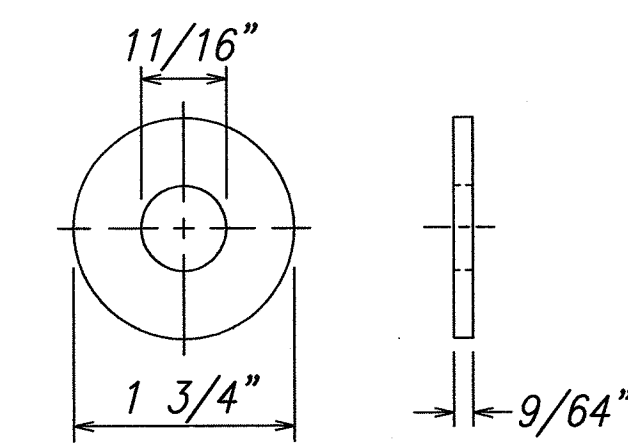
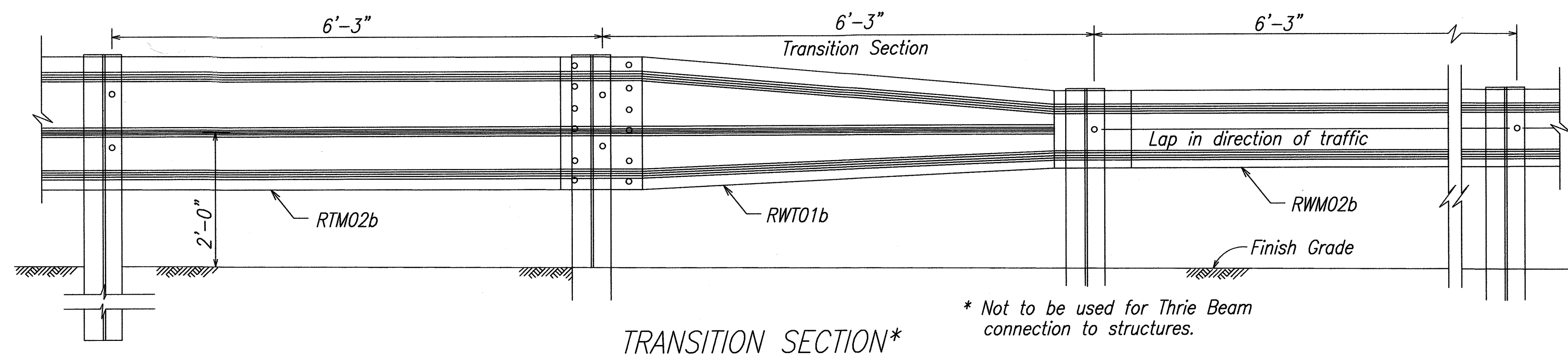




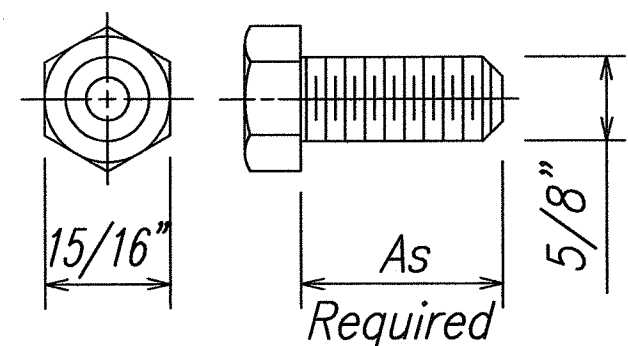




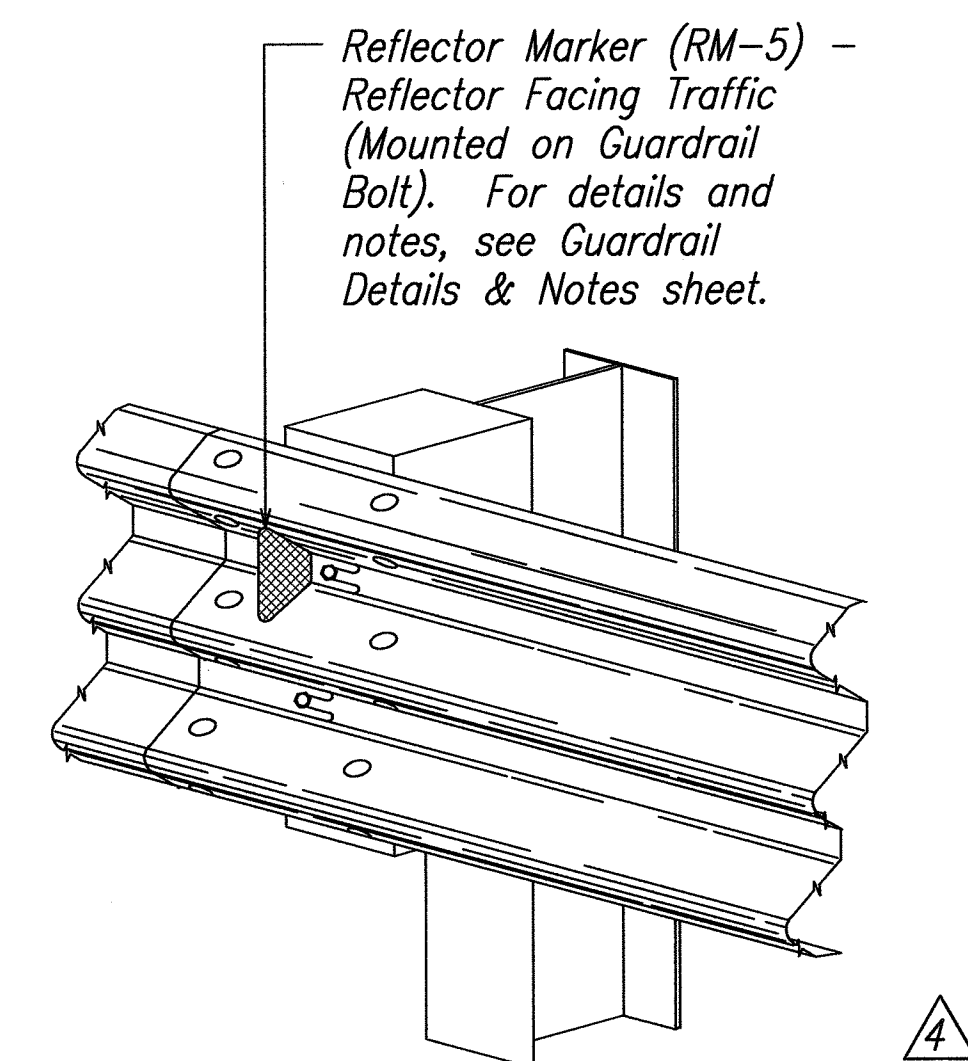
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	ADD. 111	166



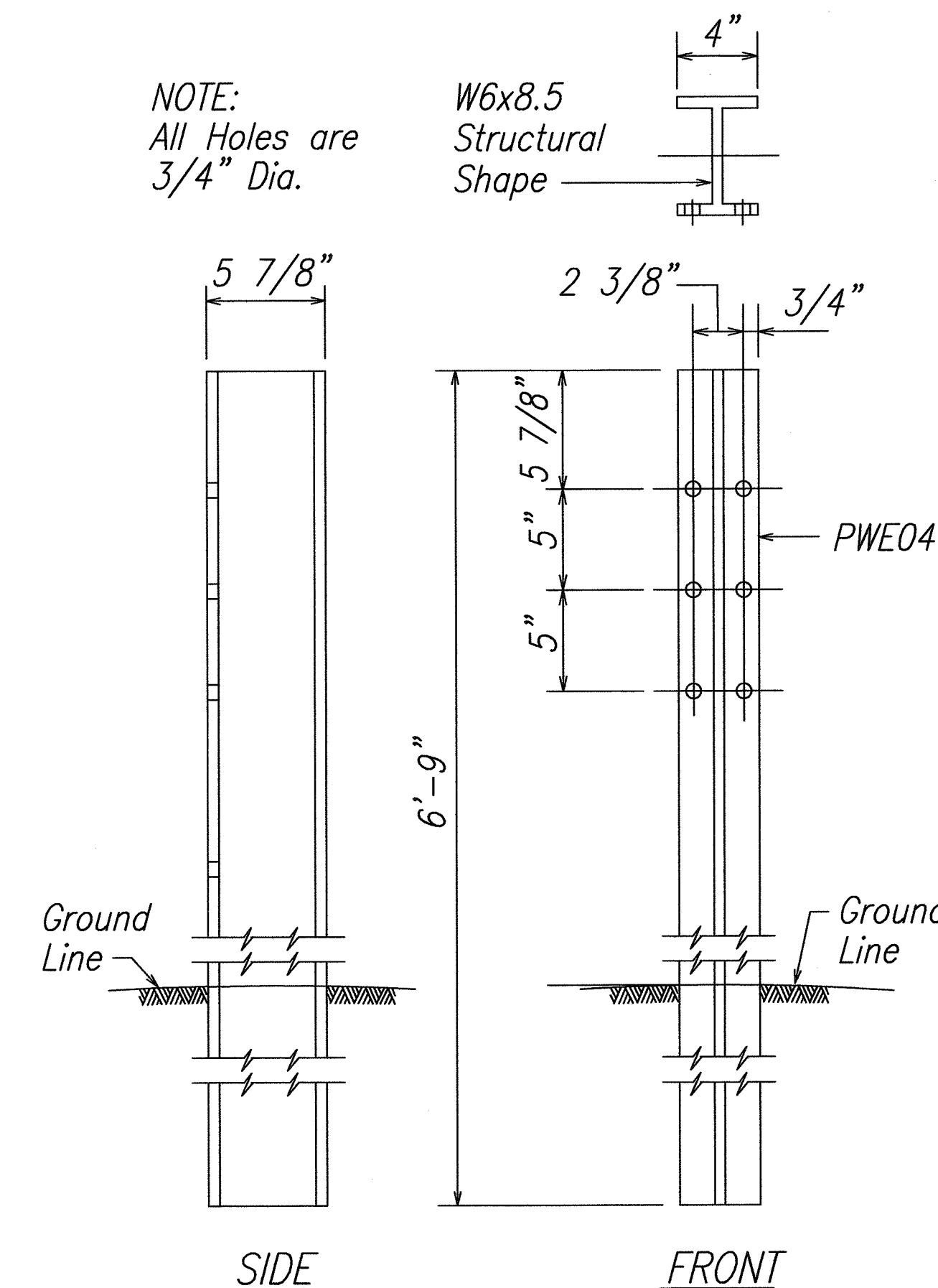
STEEL WASHER  
FOR 5/8" BOLT



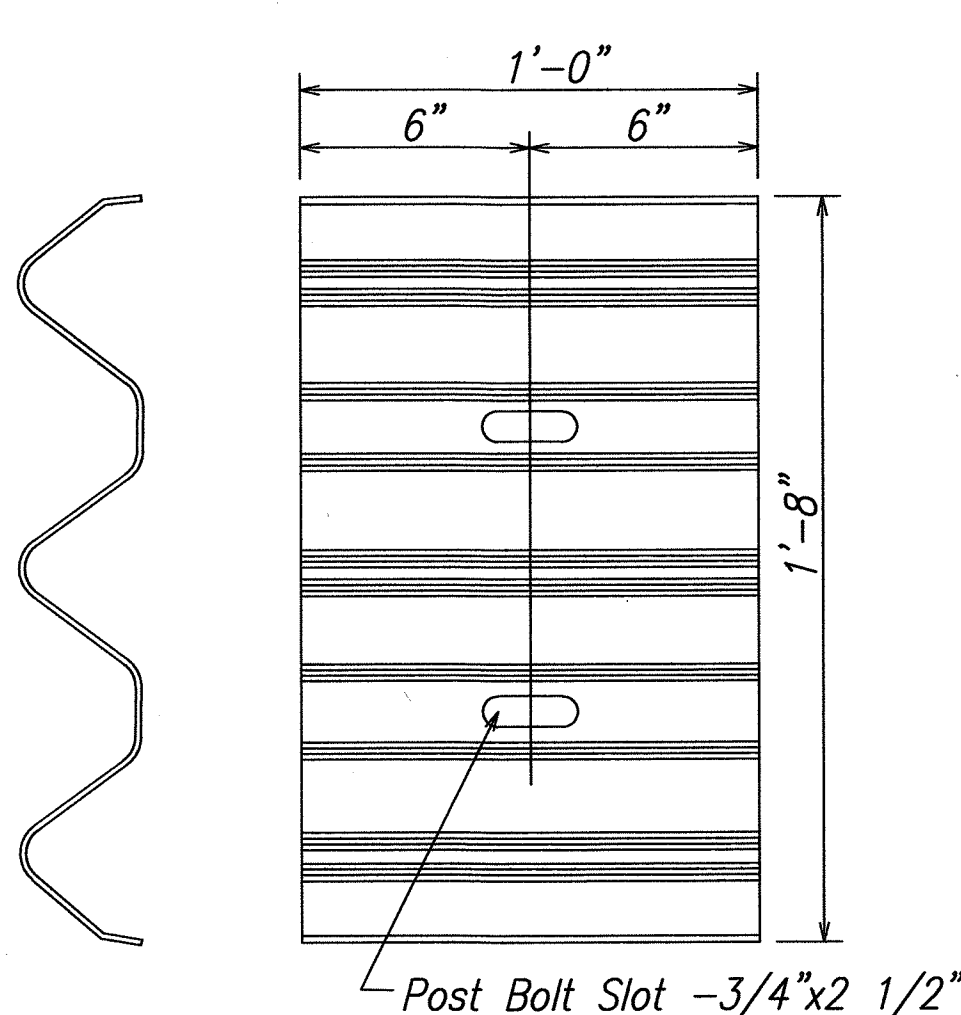
HEX BOLT & NUT  
(FBX16a)



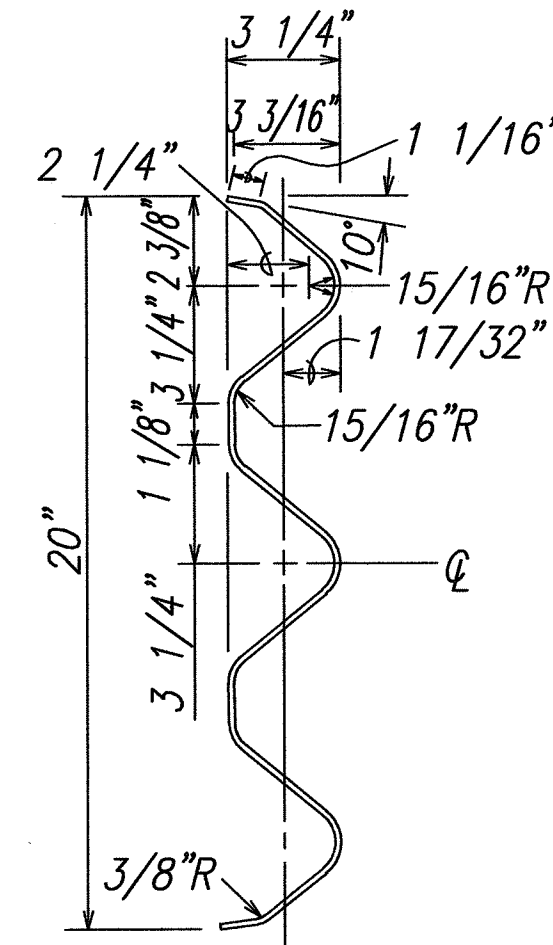
TYPICAL INSTALLATION OF  
REFLECTOR MARKER (RM-5)



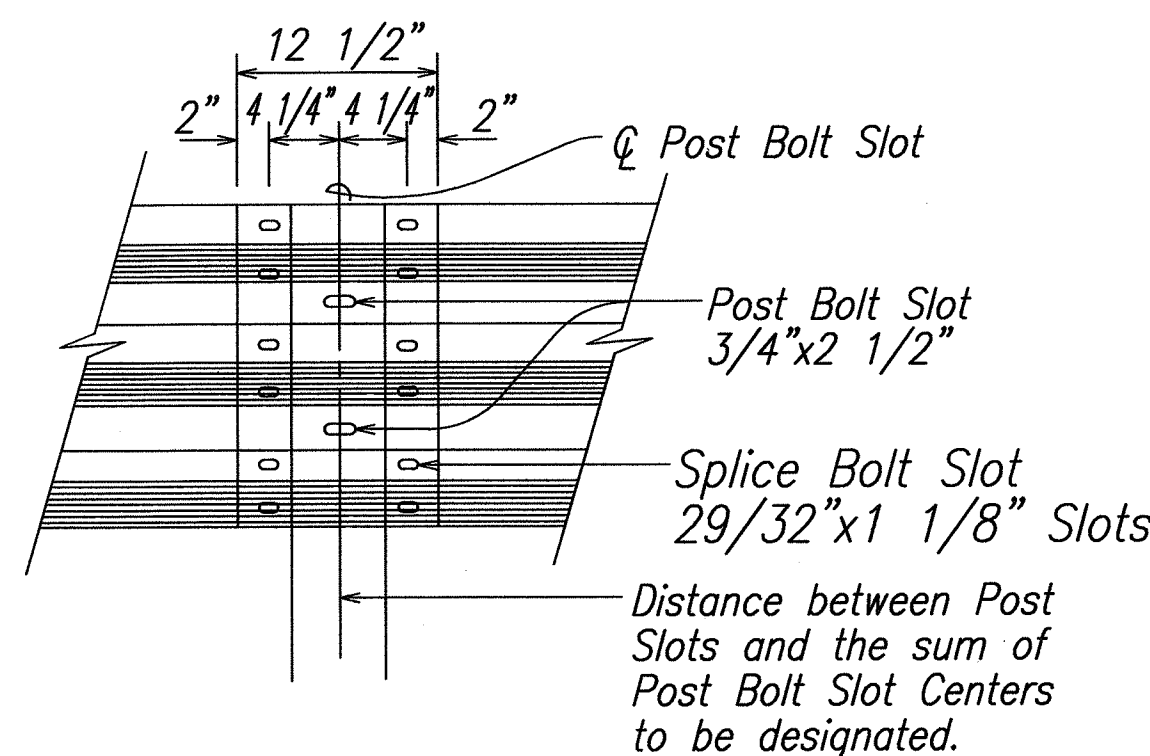
W-BEAM STRONG POST (PWE04)



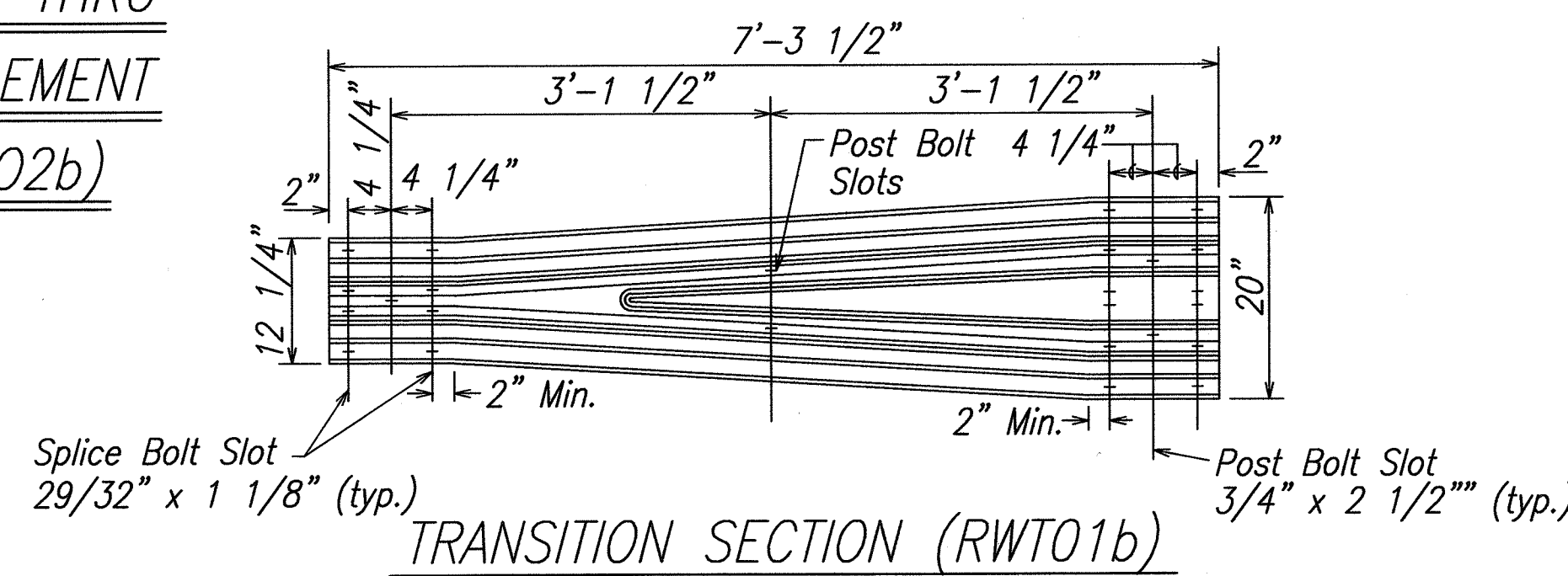
BACKUP PLATE  
(RTB01b)  
(Use at Posts where  
Splices do not occur)



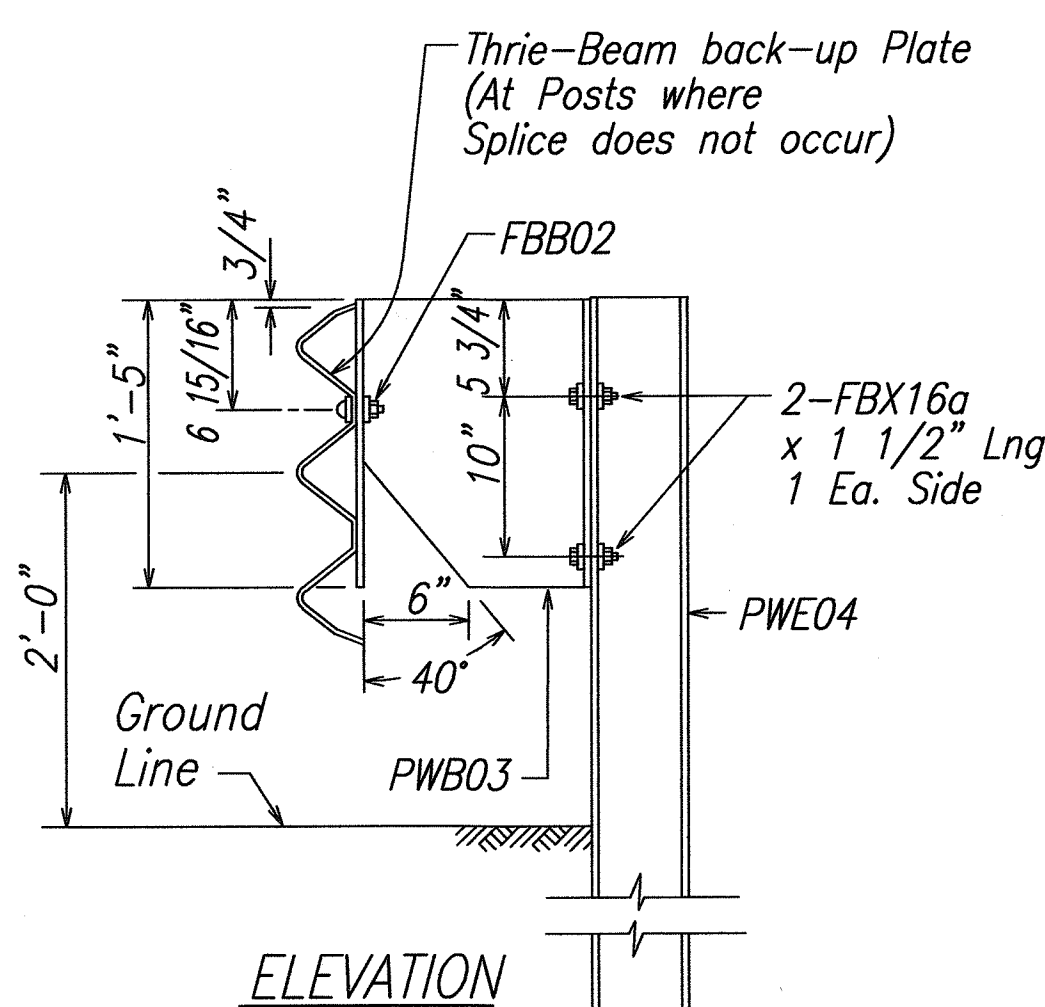
SECTION THRU  
RAIL ELEMENT  
(RTM02b)



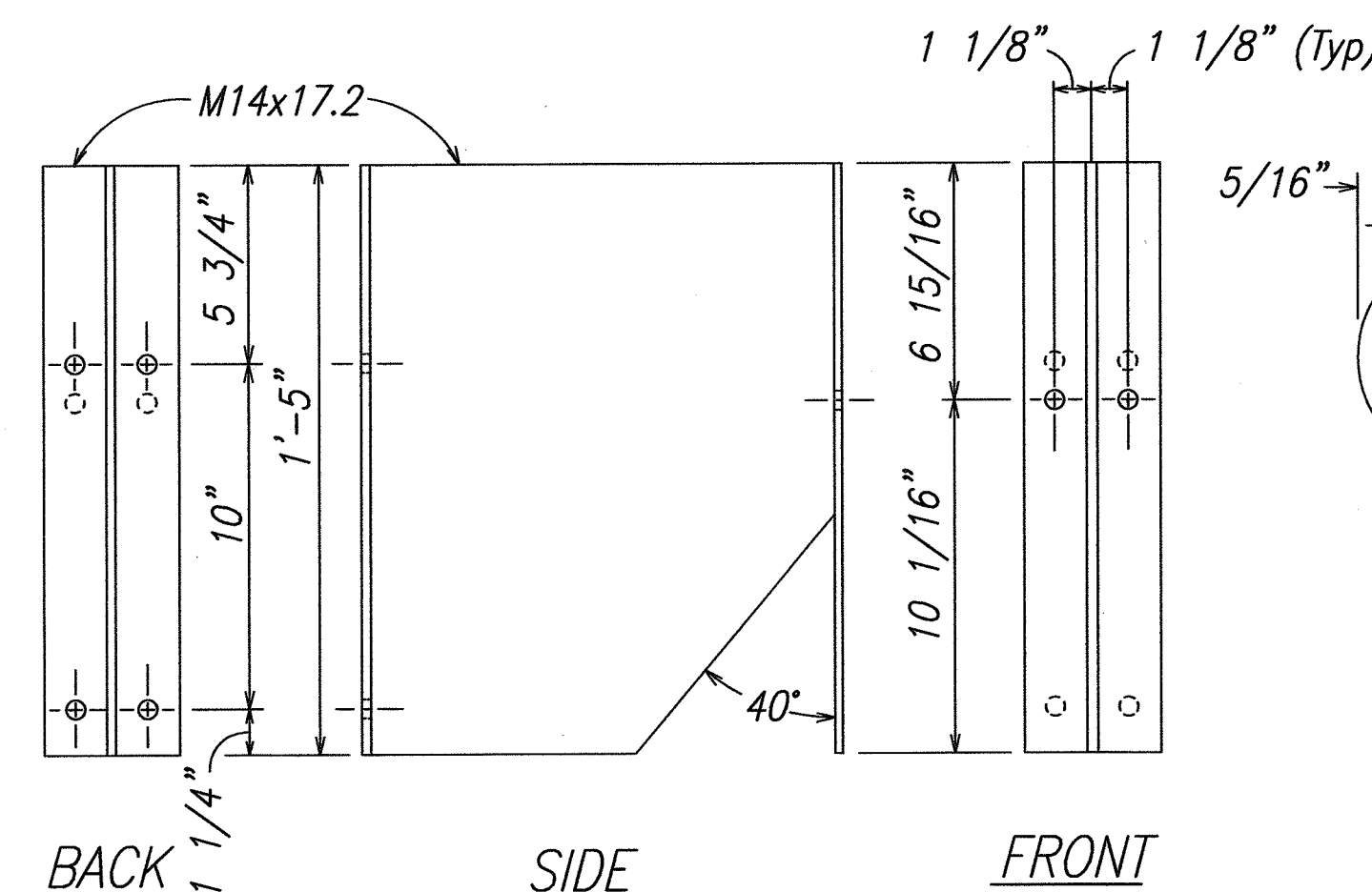
RAIL SPLICE



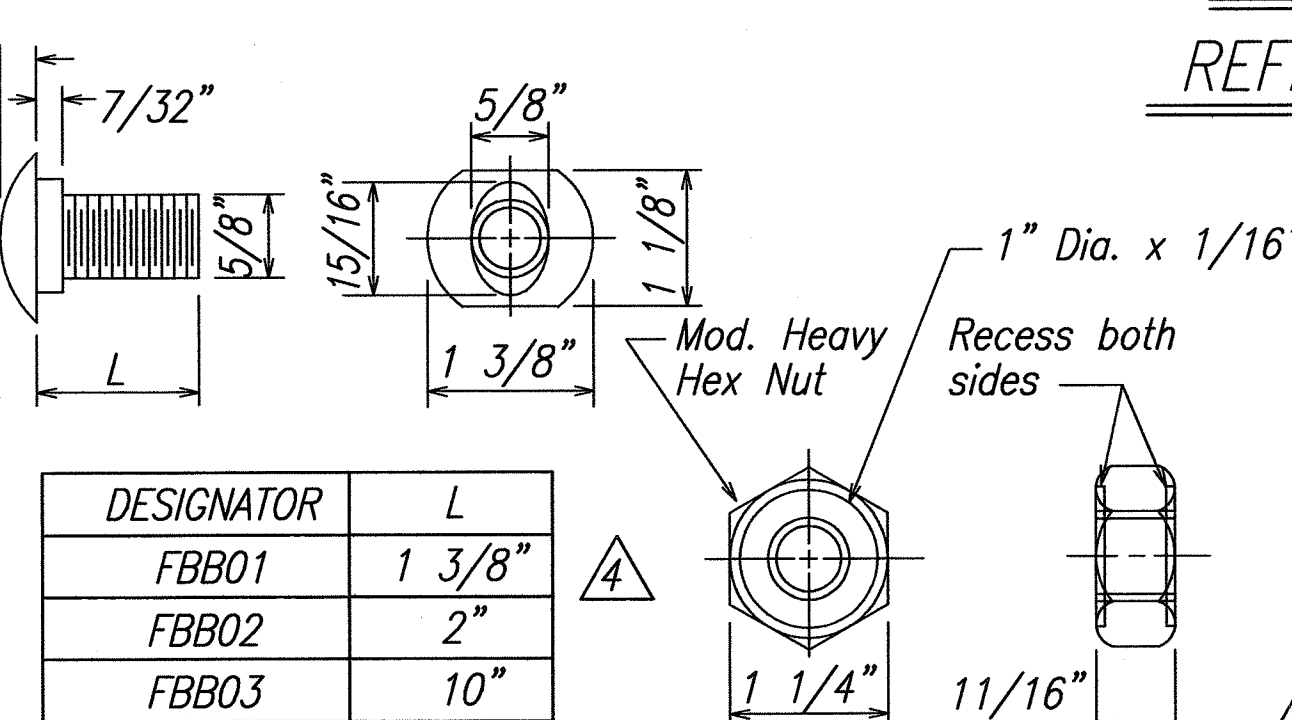
TRANSITION SECTION (RWT01b)



STRONG POST MODIFIED  
THRIE-BEAM GUARDRAIL  
(SGR09b)



SPACER BLOCK PWB03



GUARDRAIL BOLTS AND RECESSED NUT

DESIGNATOR	L
FBX01	1 3/8"
FBX02	2"
FBX03	10"

DATE	REVISION
4-12-13	Delete Graphic Scale
4-12-13	Revise Per Latest DOT Guardrail Details

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRONG POST MODIFIED  
THRIE-BEAM GUARDRAIL**

KAHULUI AIRPORT  
ACCESS ROAD, PHASE I  
Federal Aid Project No. NH-0380(10)  
Scale: None Date: February 2013

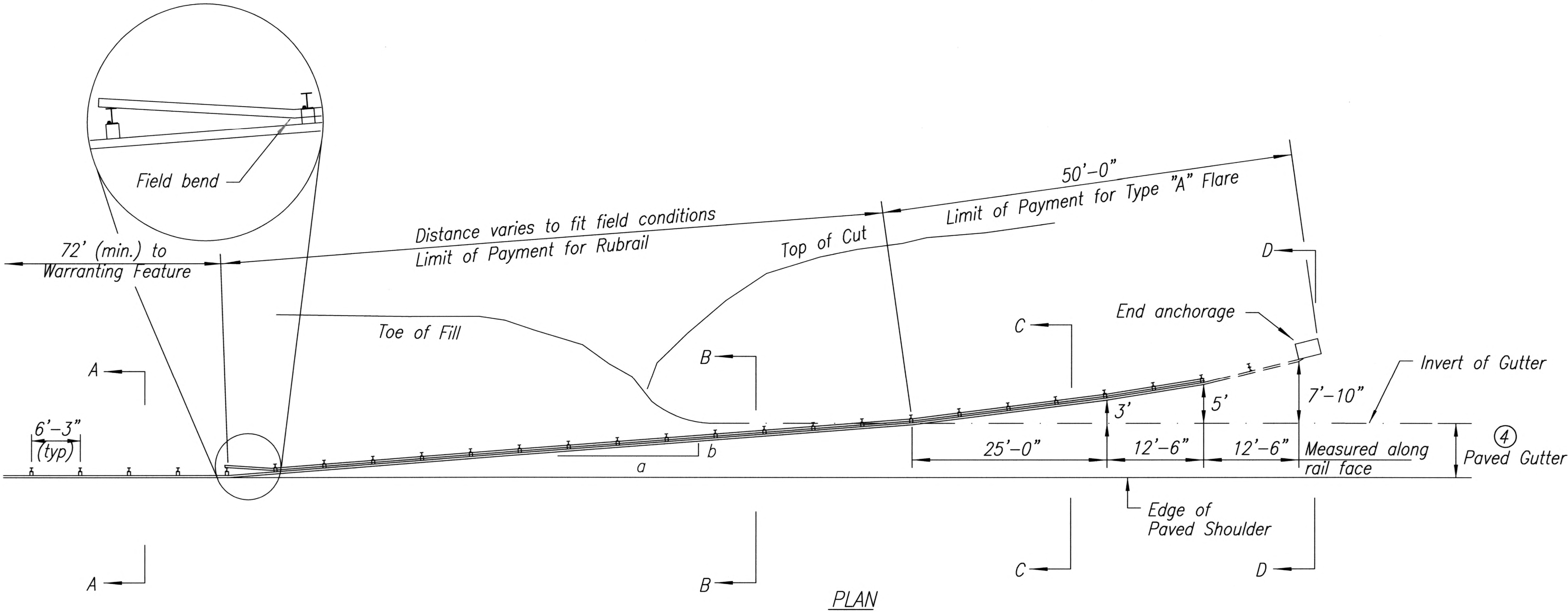
SHEET No. B5A OF 10 SHEETS



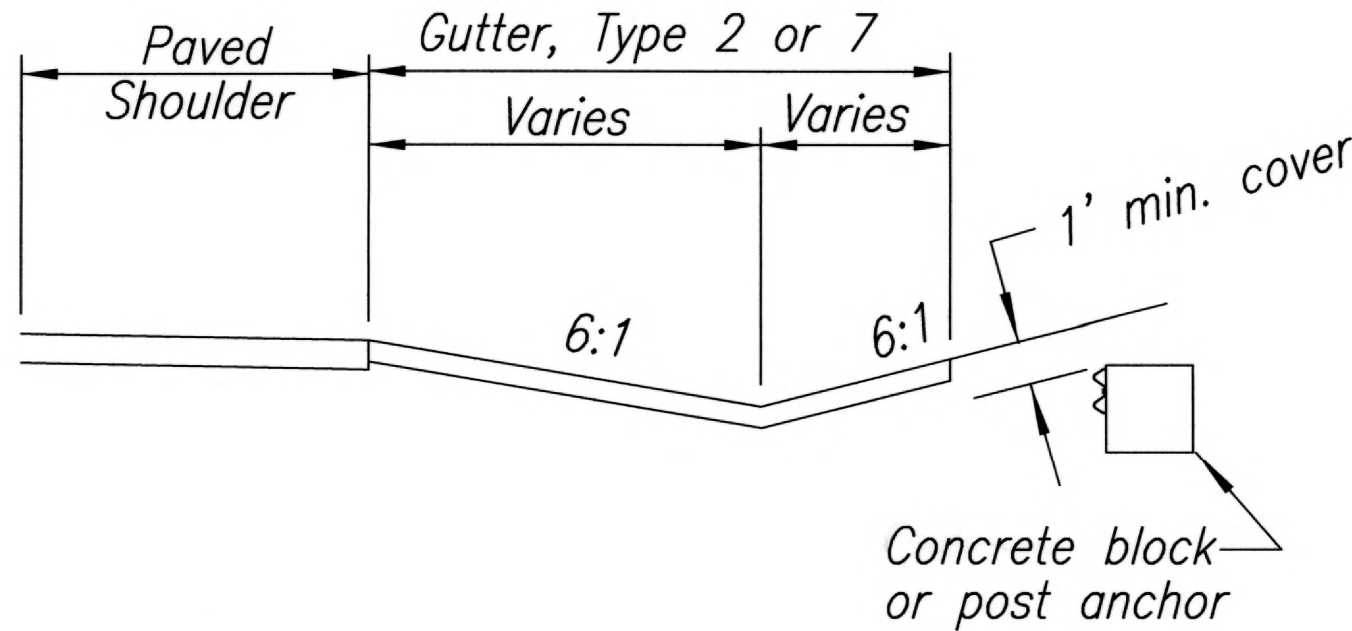
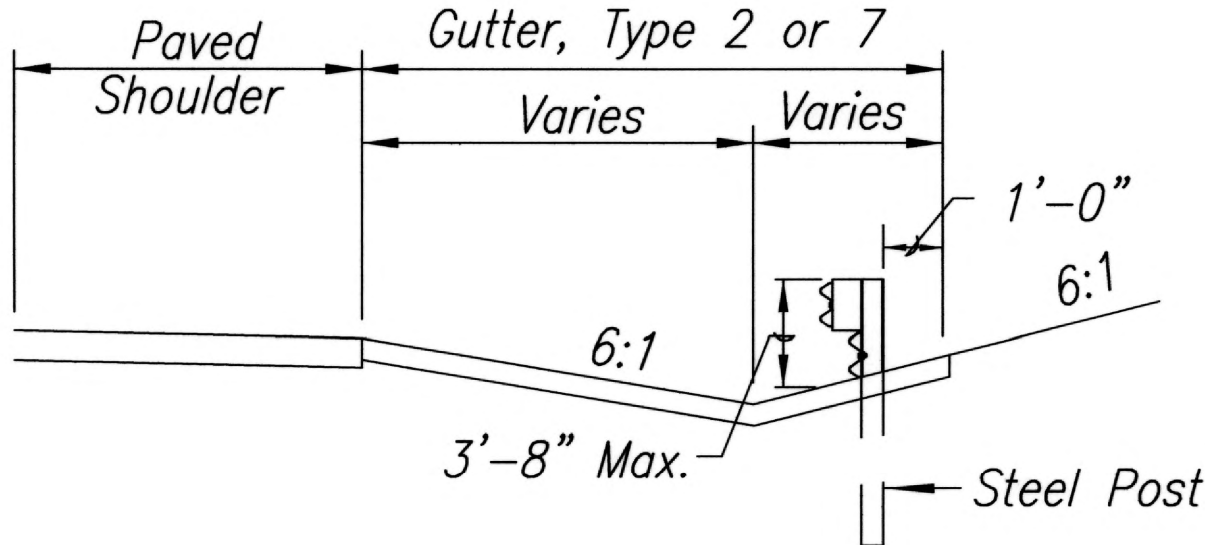
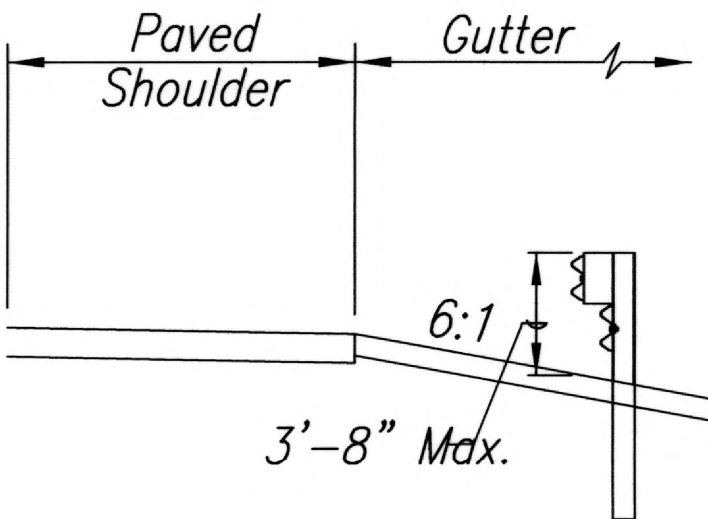
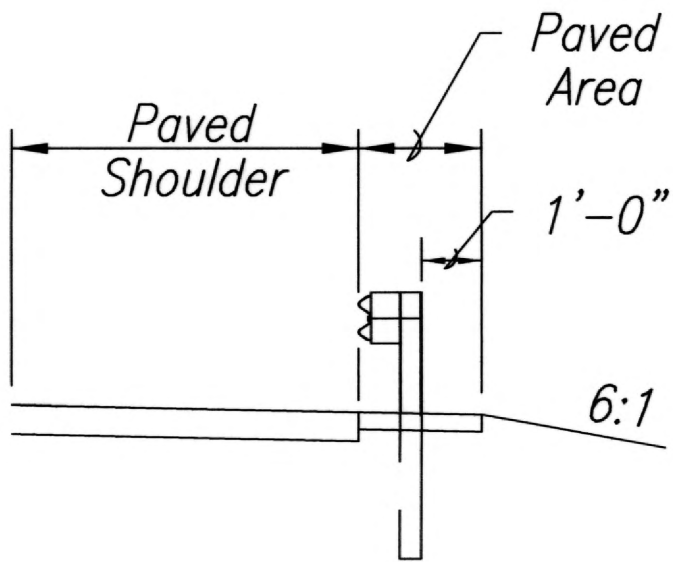
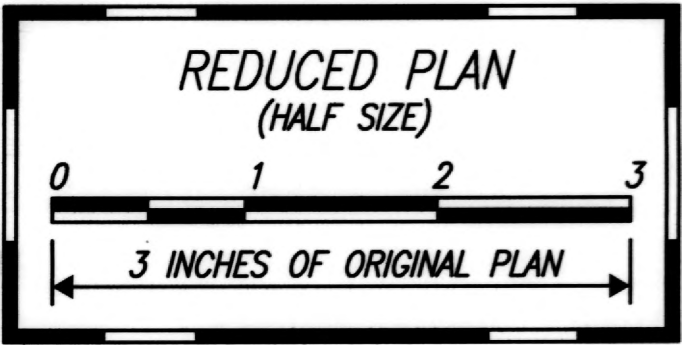
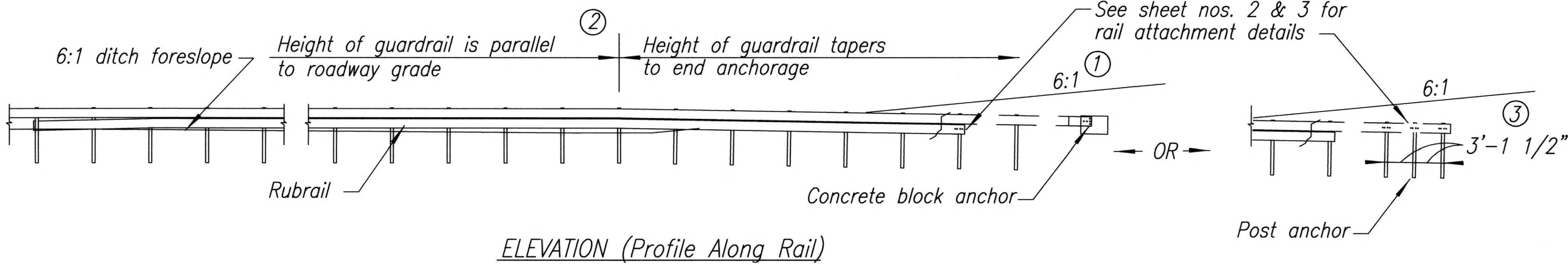
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	112	166

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



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



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*[Signature]*  
FUKUNAGA & ASSOCIATES, INC. APRIL 30, 2014  
LUC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPE "A" FLARE**

**KAHULUI AIRPORT**  
**ACCESS ROAD, PHASE I**  
**Federal Aid Project No. NH-0380(10)**  
Scale: None Date: February 2013

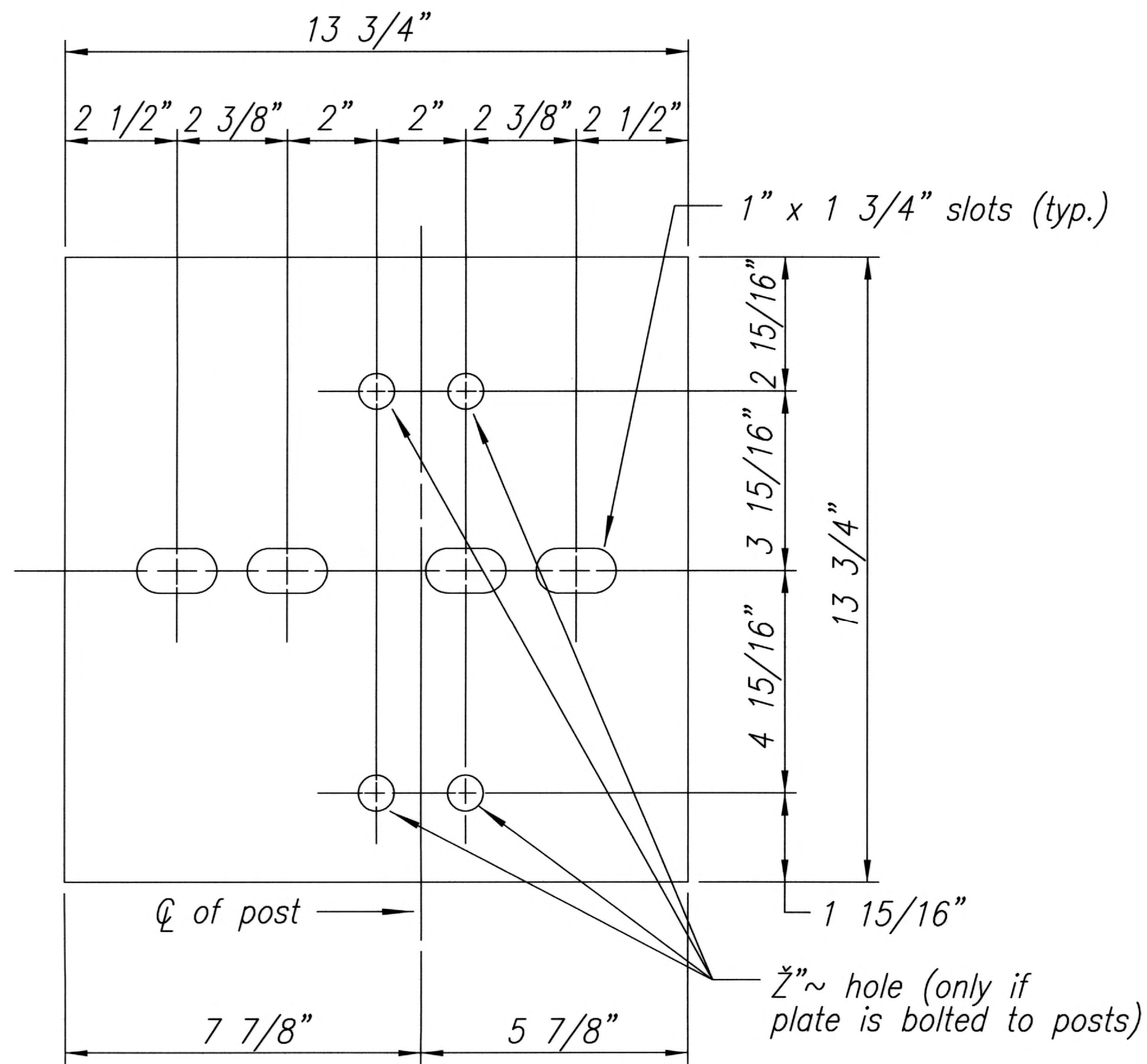
SHEET No. B9A OF 10 SHEETS

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

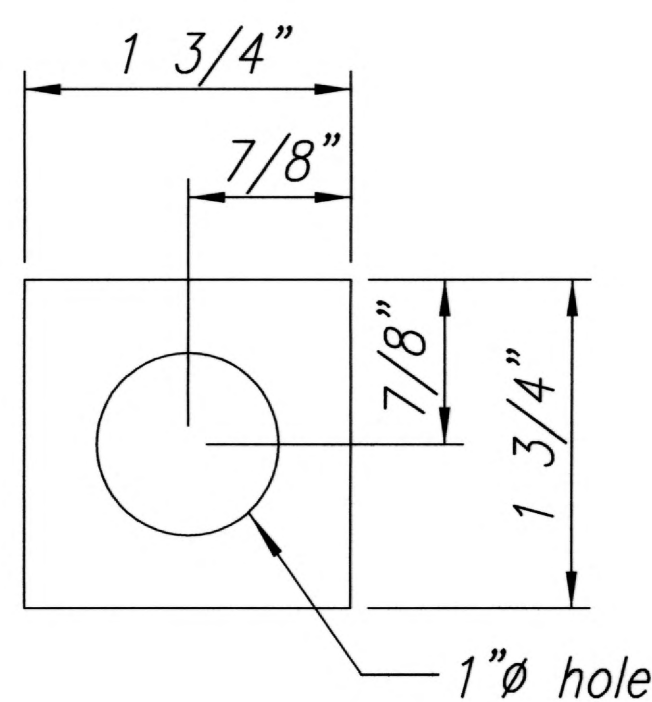
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	113	166



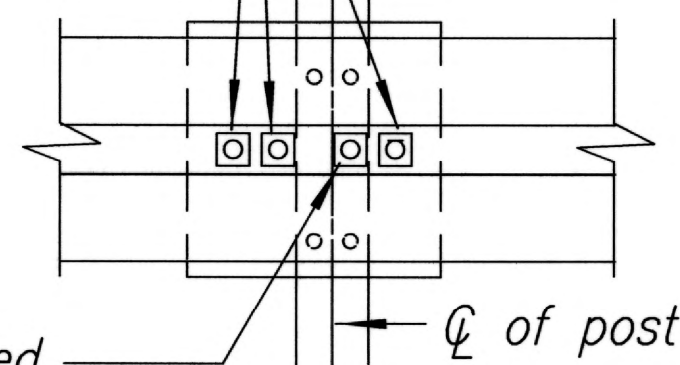
Steel Plate - 1/2"  
(Hot-dip Zinc Coated Galvanized  
Welded or Bolted to Post)



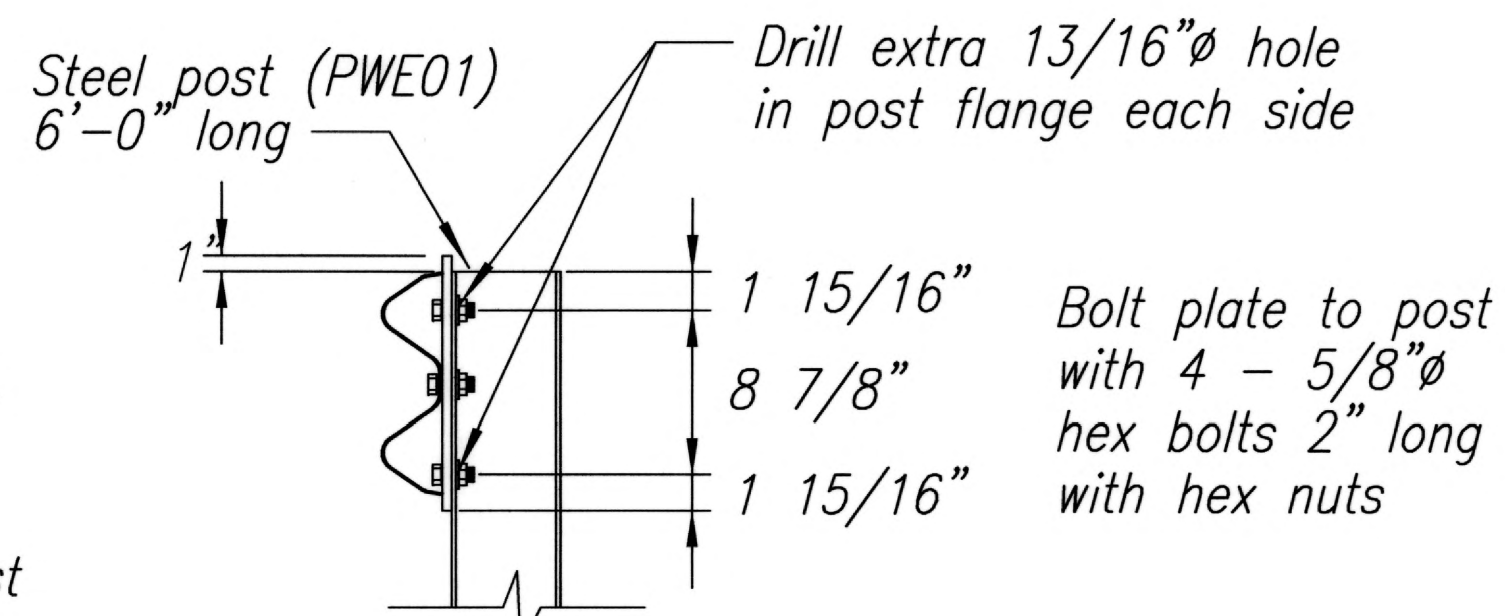
Square Washer  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)

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

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



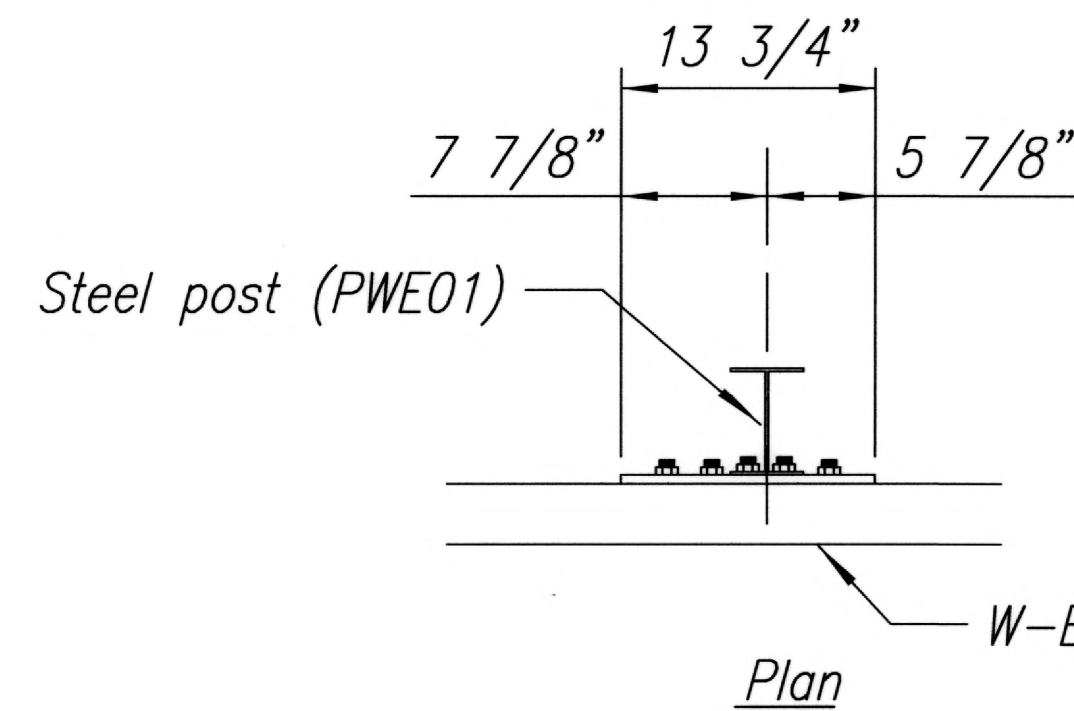
Front View



Elevation

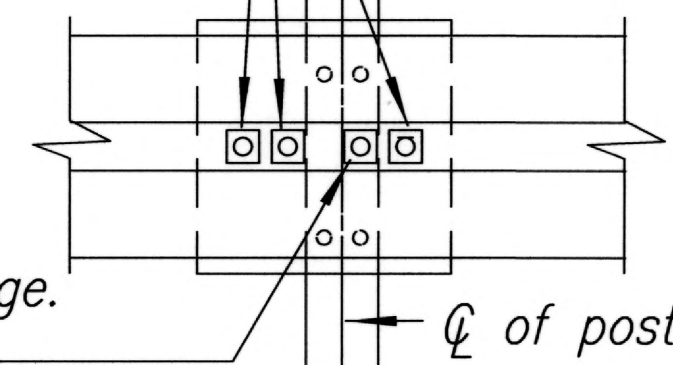
POST ANCHOR DETAILS

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS  
TYPE "A" FLARE

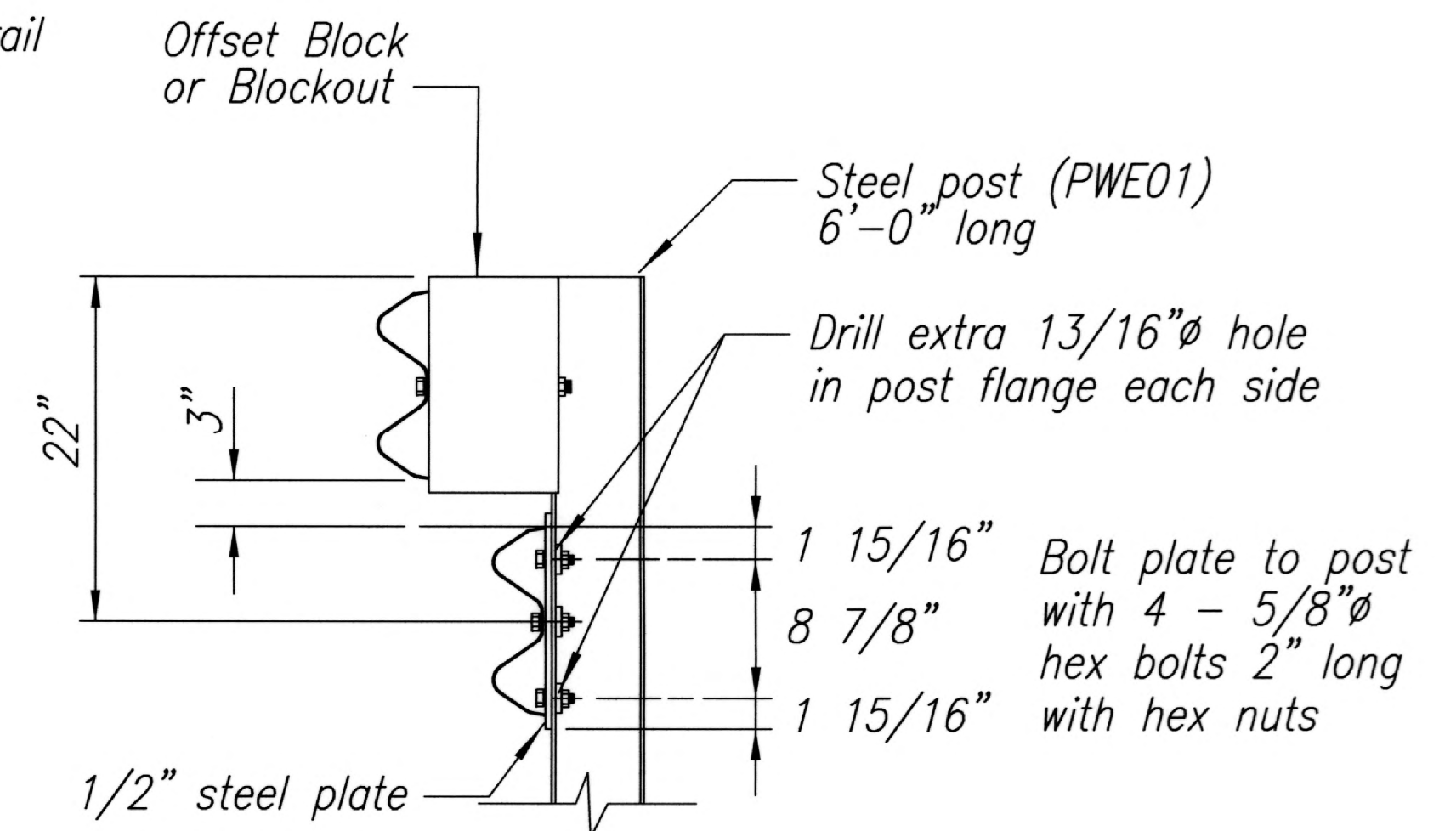


Plan

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



Front View



Elevation

RUBRAIL ANCHOR DETAILS

Note:

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



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FUMINAGA & ASSOCIATES, INC. APRIL 30, 2014  
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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

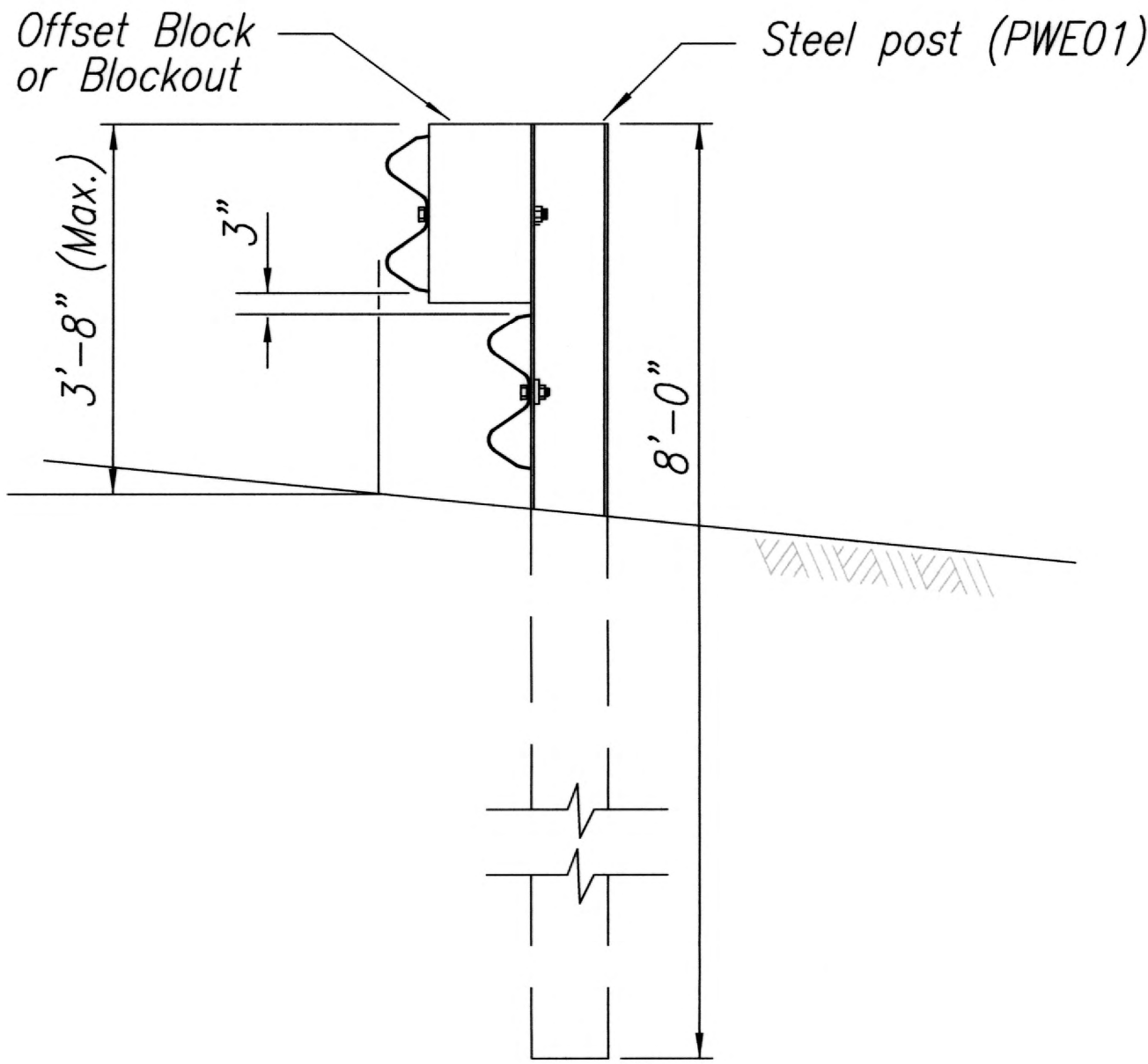
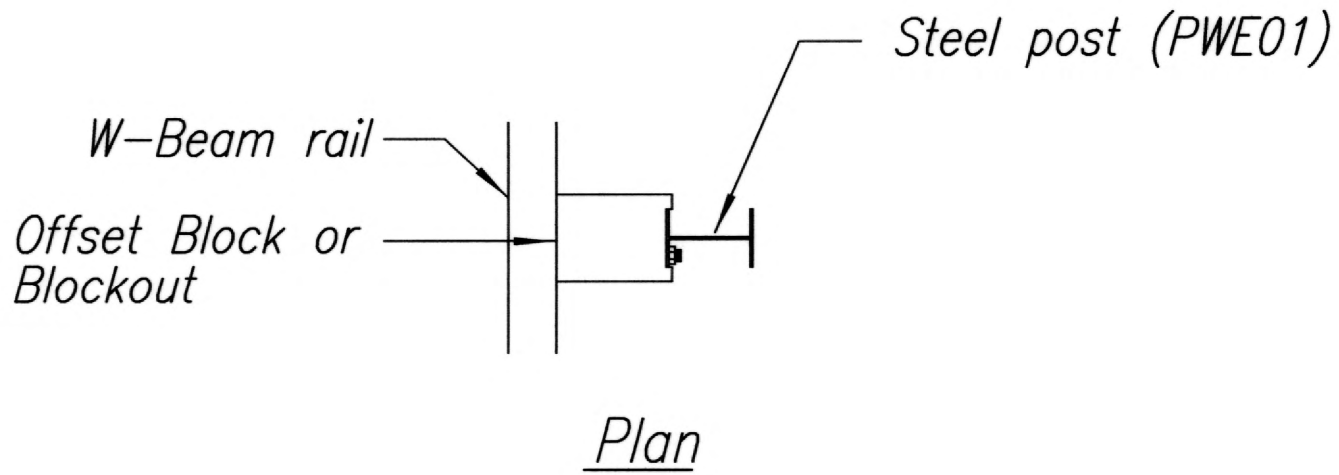
TYPE "A" FLARE

KAHULUI AIRPORT  
ACCESS ROAD, PHASE 1  
Federal Aid Project No. NH-0380(10)  
Scale: None Date: February 2013

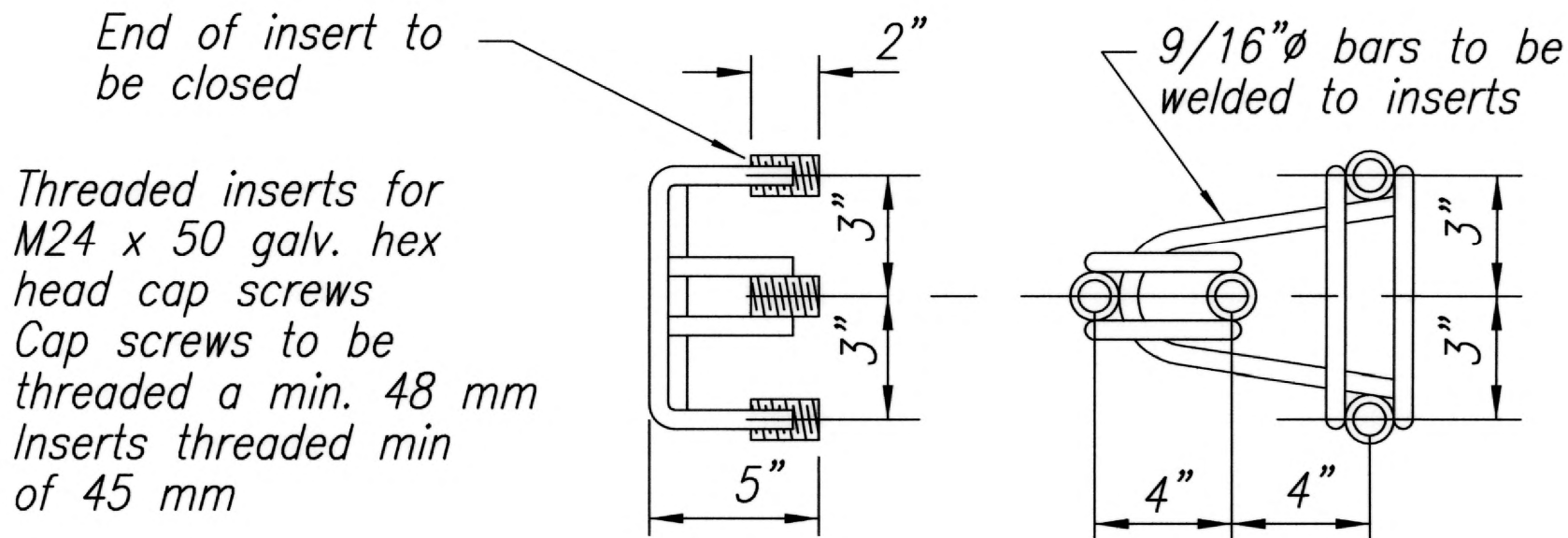
SHEET No. B9B OF 10 SHEETS



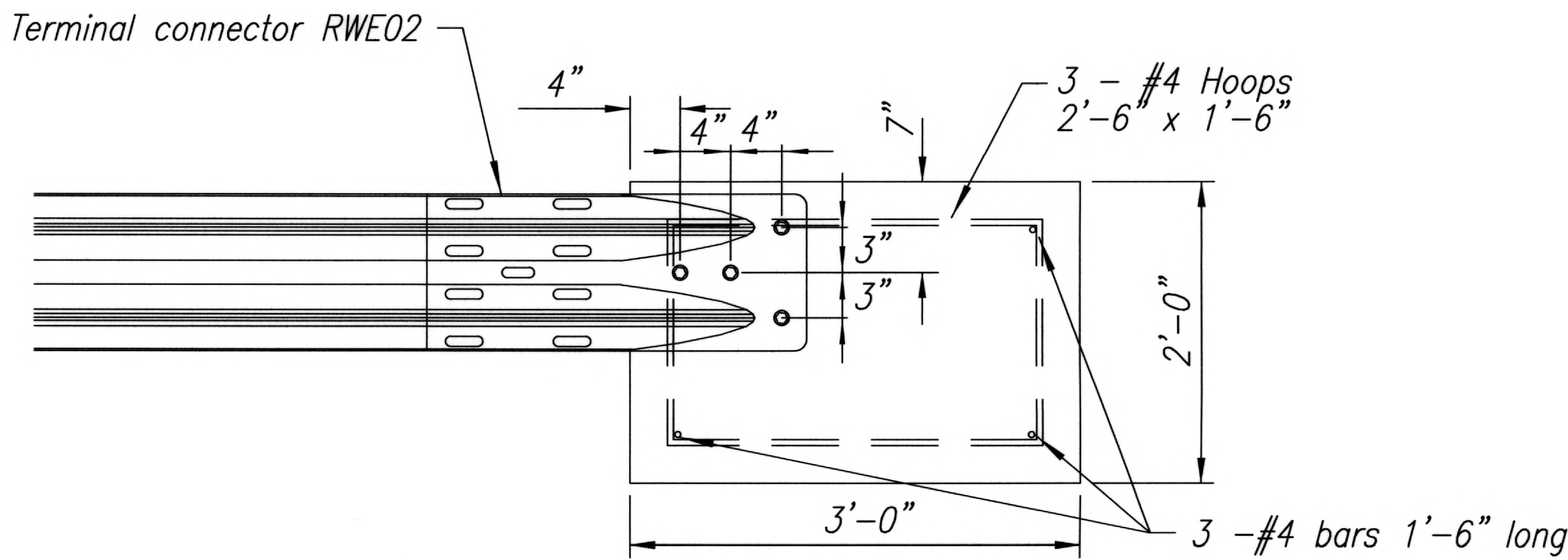
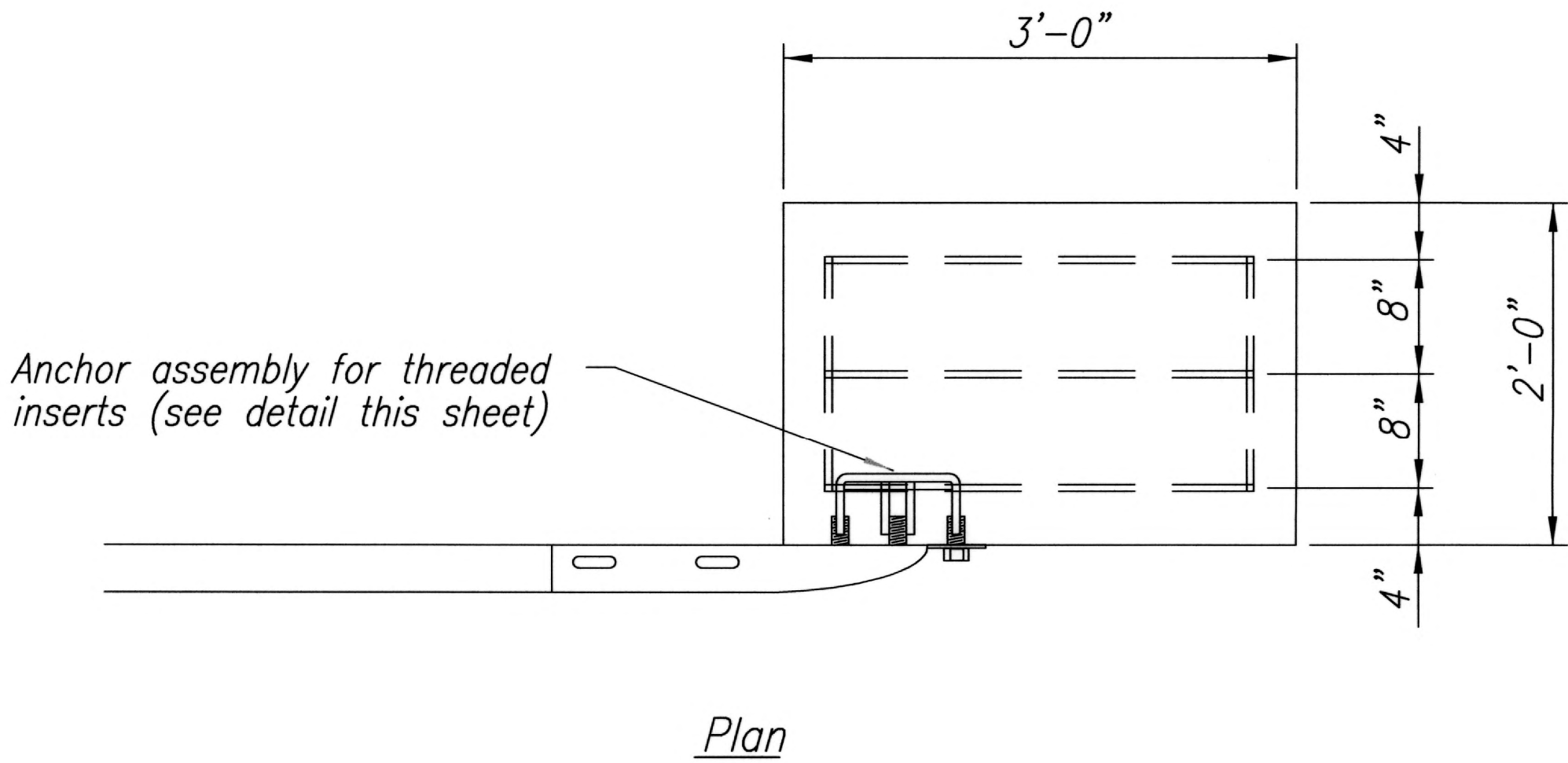
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	114	166



STEEL POST GUARDRAIL  
WITH RUBRAIL



ANCHOR ASSEMBLY  
CONCRETE BLOCK ANCHOR



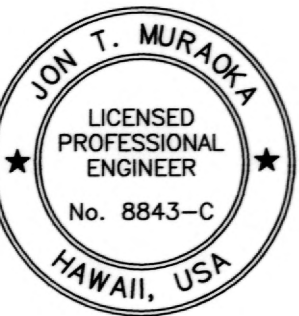
CONCRETE BLOCK ANCHOR  
(2' X 2' X 3')

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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*[Signature]* APRIL 30, 2014  
FUKUNAGA & ASSOCIATES, INC. L.I.C. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPE "A" FLARE**

**KAHULUI AIRPORT**  
**ACCESS ROAD, PHASE I**  
Federal Aid Project No. NH-0380(10)  
Scale: None Date: February 2013

SHEET No. B9C OF 10 SHEETS

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

DRAWING NAME: C:\PROJECTS\KAHULUI-2011\PLANS\26-GUARDRAIL DETAILS\B9C.DWG PLOT TIME: 02-22-13, 3:43 PM



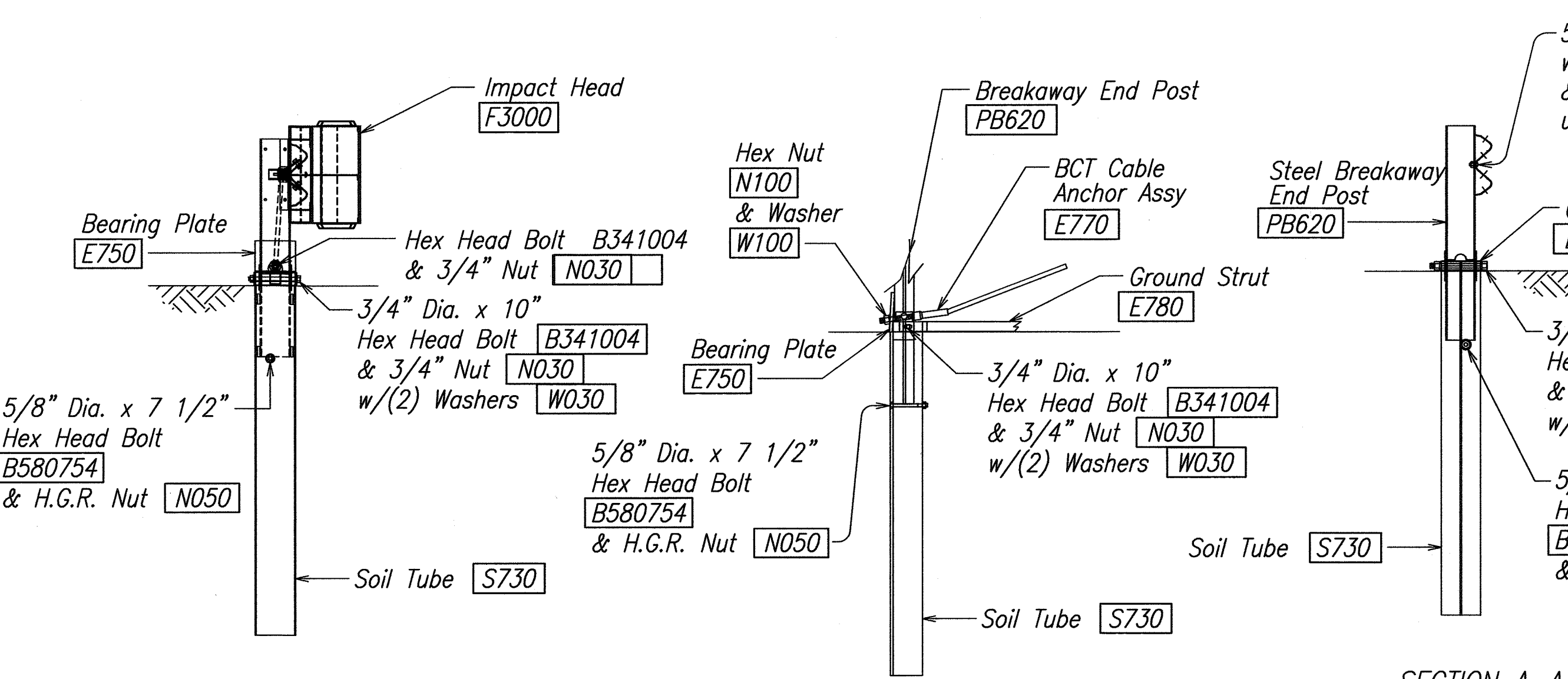
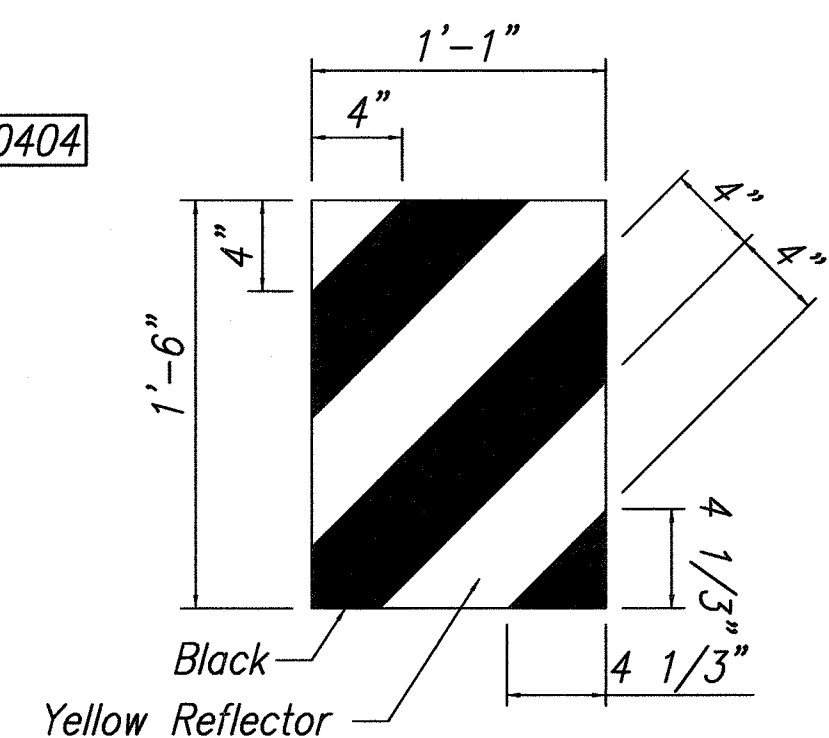
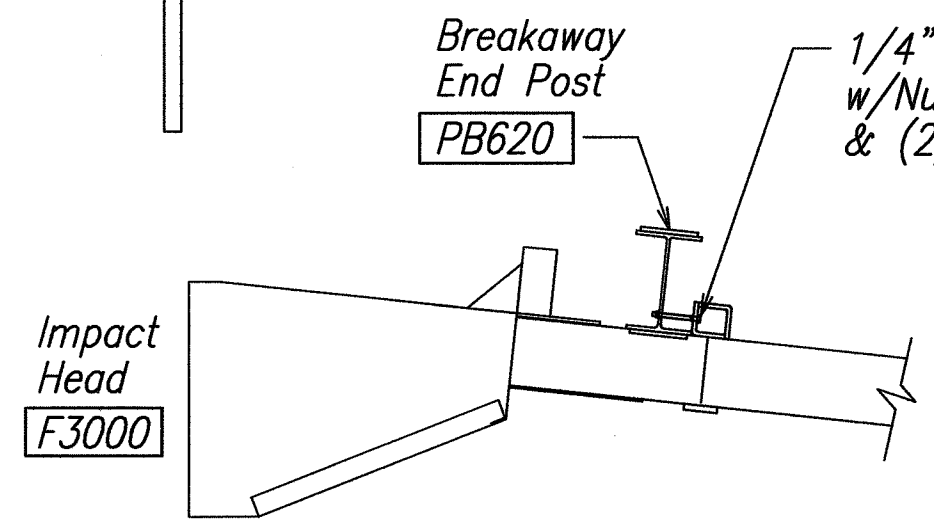
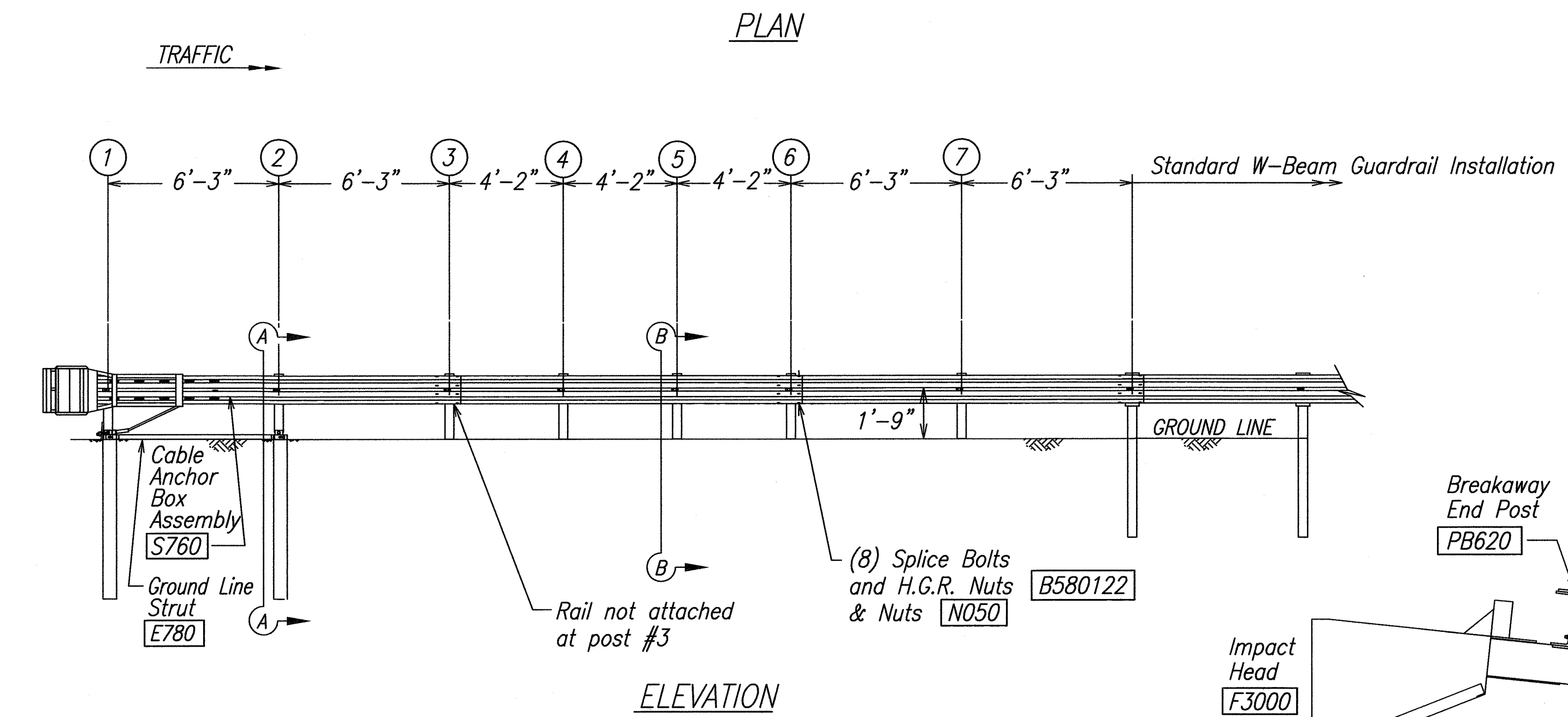
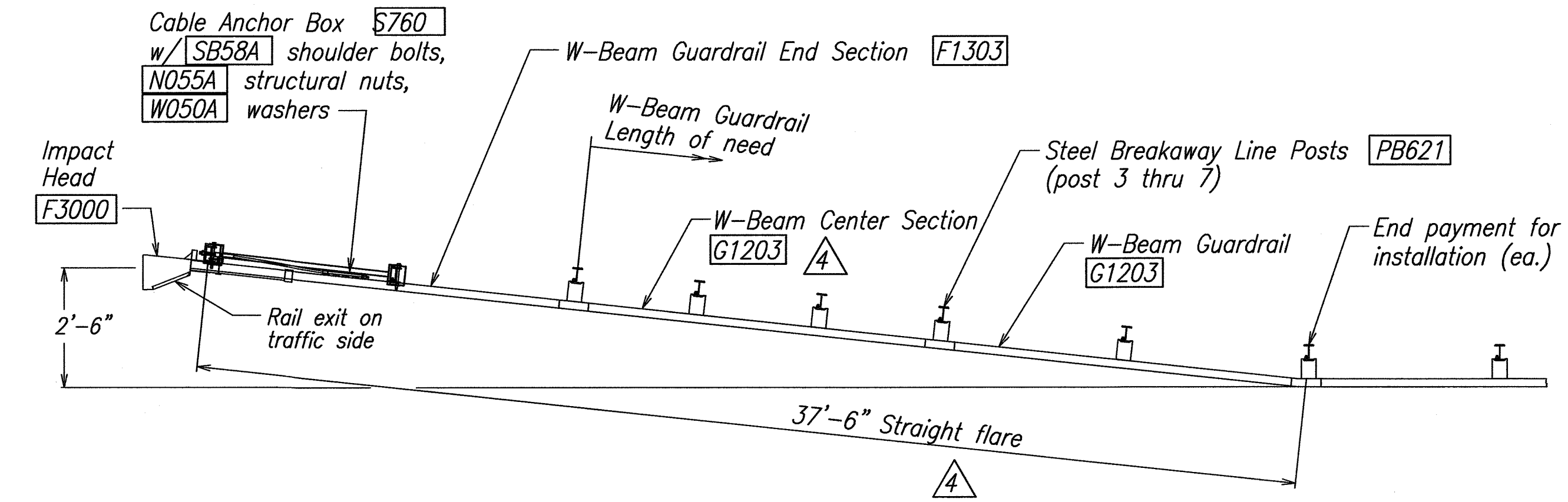
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	ADD. 115	166

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 (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 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

# GENERAL NOTES

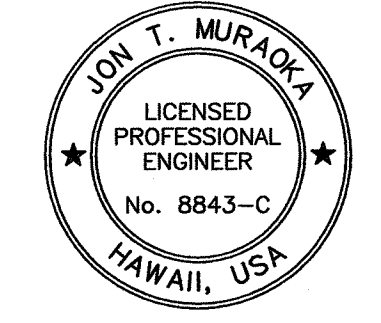
1. Breakaway steel posts are required with the FLEAT Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. 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.
5. 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.
6. 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.
7. (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
8. The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.



## SECTION A-A (@ Post #2)

## SECTION B-B (Typical @ Post 3 - 7) NOTE: RAIL NOT BOLTED @ POST #3

DATE	REVISION
4-12-13	Delete Graphic Scale
4-12-13	Revise Per Latest DOT Guardrail Details



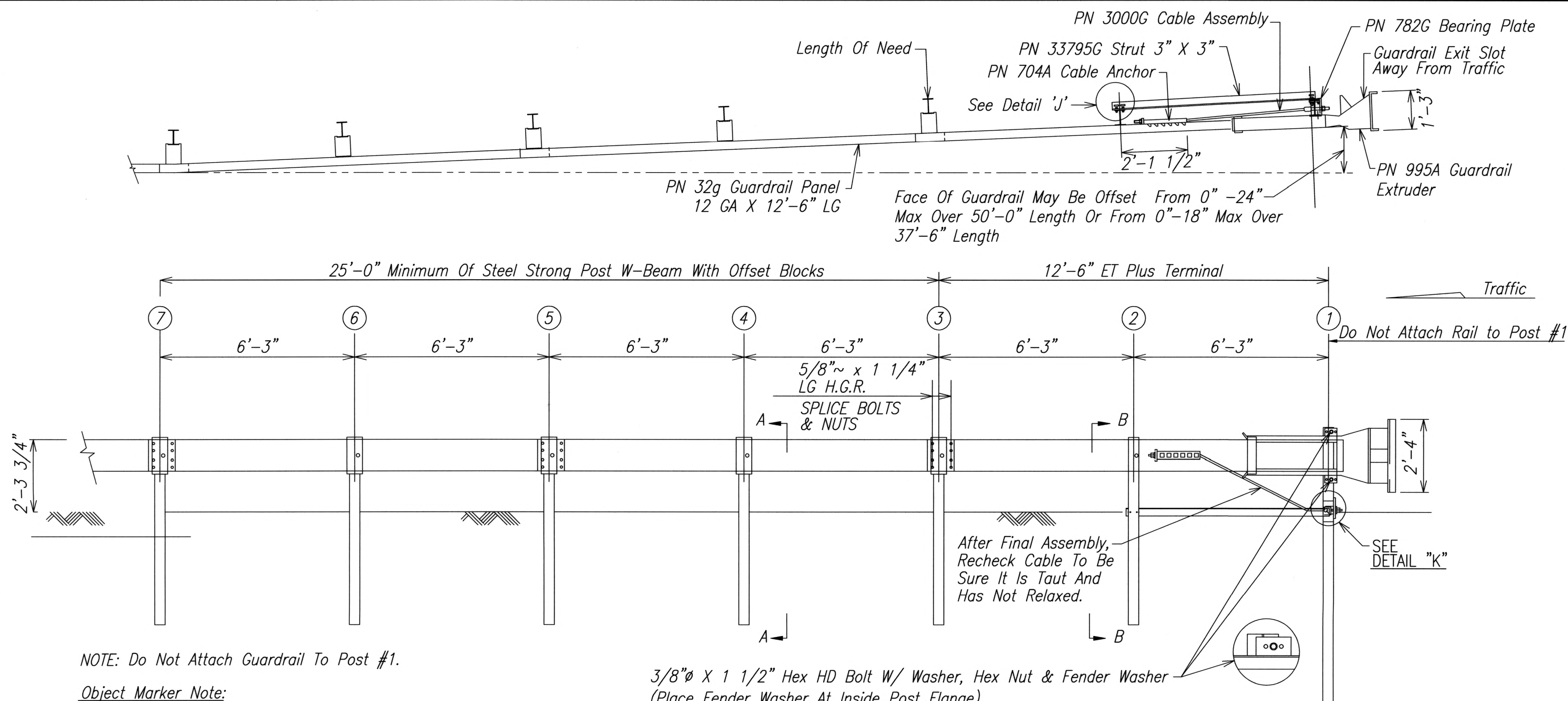
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.  
 APRIL 30, 2014  
 FUKUNAGA & ASSOCIATES, INC. LIC. EXP. DATE

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**FLEAT-350  
 FLARED ENERGY  
 ABSORBING TERMINAL**  
 KAHULUI AIRPORT  
 ACCESS ROAD, PHASE I  
 Federal Aid Project No. NH-0380(10)  
 Scale: None Date: February 2013  
 SHEET No. B11 OF 10 SHEETS



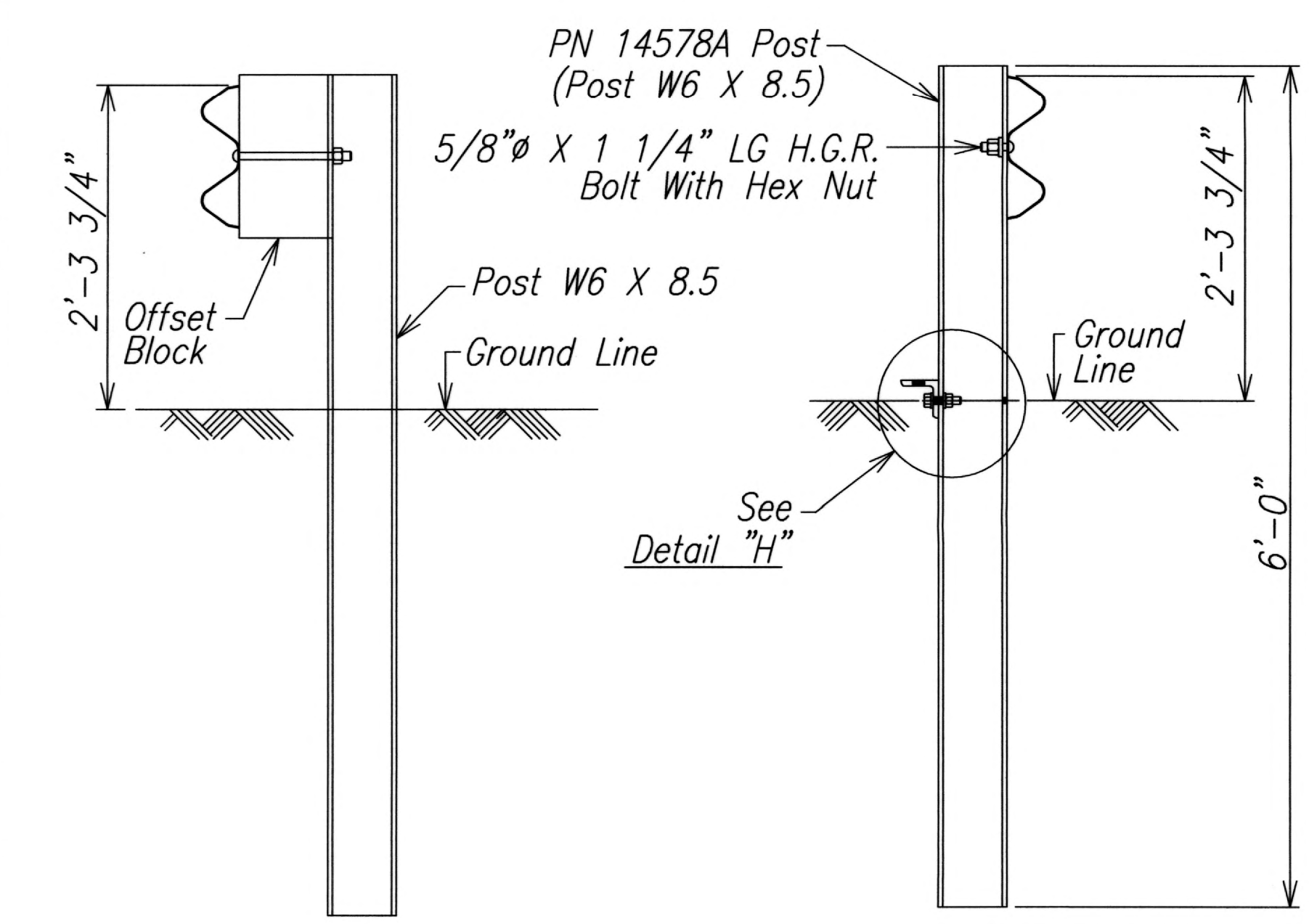
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0380(10)	2013	116	166

Bill Of Material		
PN	Qty	Description
32G	1	12/12'-6/6'3/s ANC (guardrail)
704A	1	Cable Anchor Bracket
995A	1	ET-Plus Extruder
3000G	1	Cable 3/4 X 6'6"
3340G	9	5/8" Hex Nut
3360G	9	5/8"Ø X 1 1/4" Splice Bolt
3701G	2	3/4" Flat Washer
3704G	2	3/4" Hex Nut
3717G	2	3/4"Ø X 2 1/2" Hex HD Bolt
3900G	2	1" Flat Washer
3910G	2	1" Hex Nut
4254G	4	3/8" Flat Washer
4255G	2	3/8" Fender Washer (1 1/2 OD)
4258G	2	3/8" Lockwasher
4261G	2	3/8"Ø X 1 1/2" Hex HD Bolt
4389G	2	7/16" Flat Washer
4390G	2	7/16"Ø X 1 1/2" Hex Hd Bolt
4393G	2	7/16" Lock Washer
4396G	2	7/16" Hex Nut
4699G	2	3/4" Lock Washer
6321G	2	3/8"Ø X 2" Hex HD Bolt
6405G	4	3/8" Hex Nut
6668B	1	Object Marker
14578G	1	Post SYT #2
19258A	1	5/8" X 8" X 8" Bearing Plate
33795G	1	Angle Strut (ET/SYTP/HBA)
33871A	1	Post Et Plus Hba #1 Top
33873A	1	Post Et Plus Hba #1 Bottom



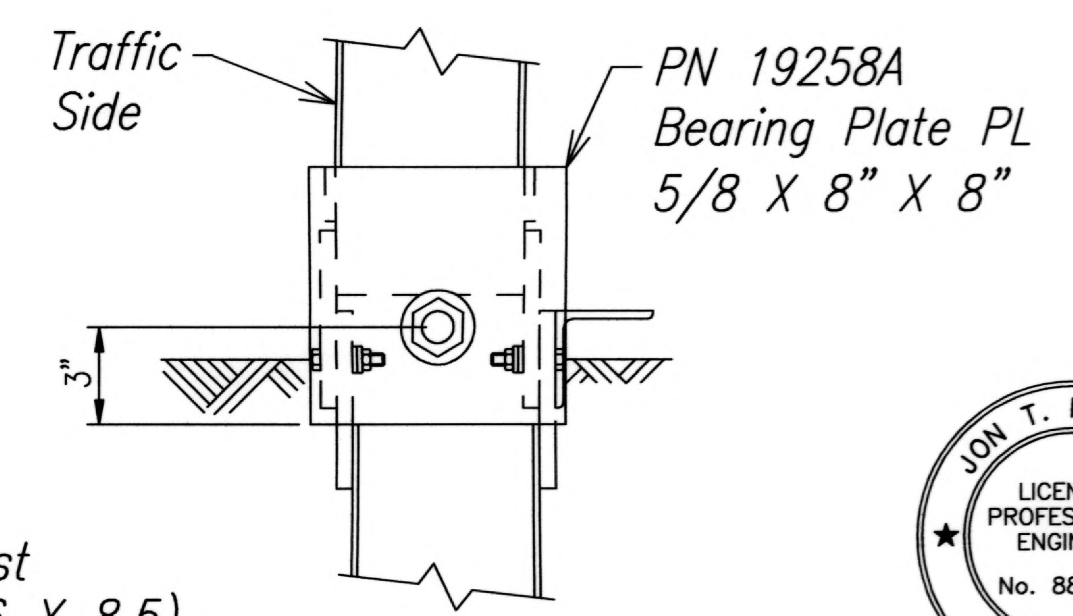
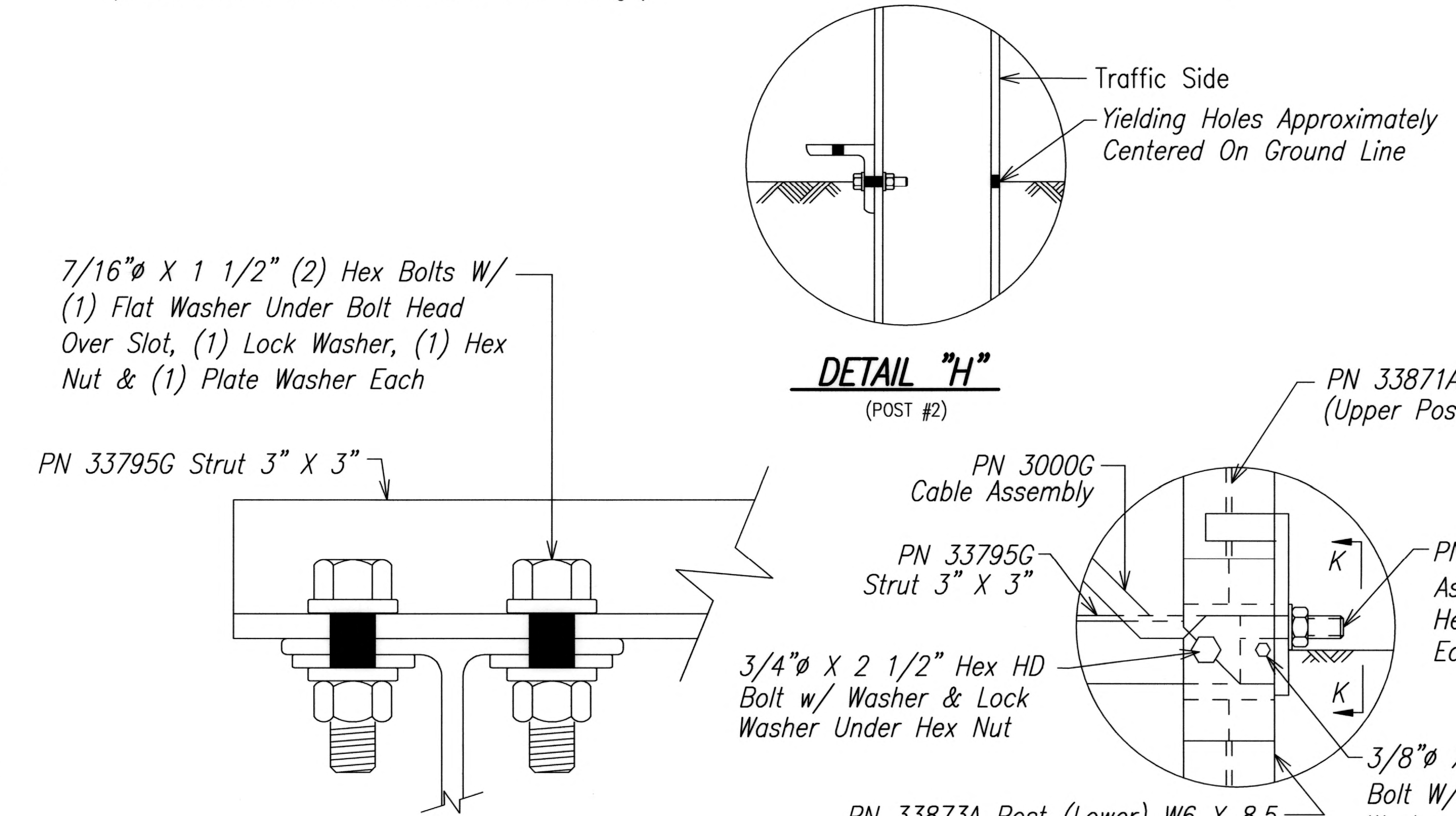
NOTE: Do Not Attach Guardrail To Post #1.

Object Marker Note:  
The Stripes For Object Marker Shall Slope Downward At An Angle Of 45° Towards The Sides Of The Extruder Head Where Traffic Is To Pass.



**SECTION "A-A"**  
(TYP @ POSTS # 3 AND BEYOND)

**SECTION "B-B"**  
(POST #2)



**VIEW "K-K"**



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.  
APR 30, 2014  
FUKUNAGA & ASSOCIATES, INC. LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**ET-PLUS (TL-3)**  
  
**KAHULUI AIRPORT**  
**ACCESS ROAD, PHASE I**  
Federal Aid Project No. NH-0380(10)  
Scale: None Date: February 2013

SHEET No. B13 OF 10 SHEETS

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

DRAWING NAME: C:\PROJECTS\WAHULUI-2011\PLANS\26-GUARDRAIL DETAILS\B13.DWG PLOT TIME: 02-22-13, 3:45 PM