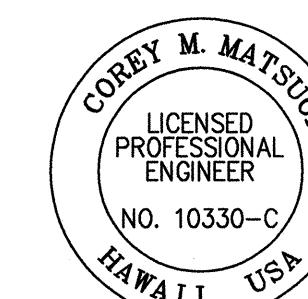


## GENERAL NOTES:

- 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"



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*Corey Matsuyoka*  
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EXPIRATION  
DATE OF THE  
LICENSE

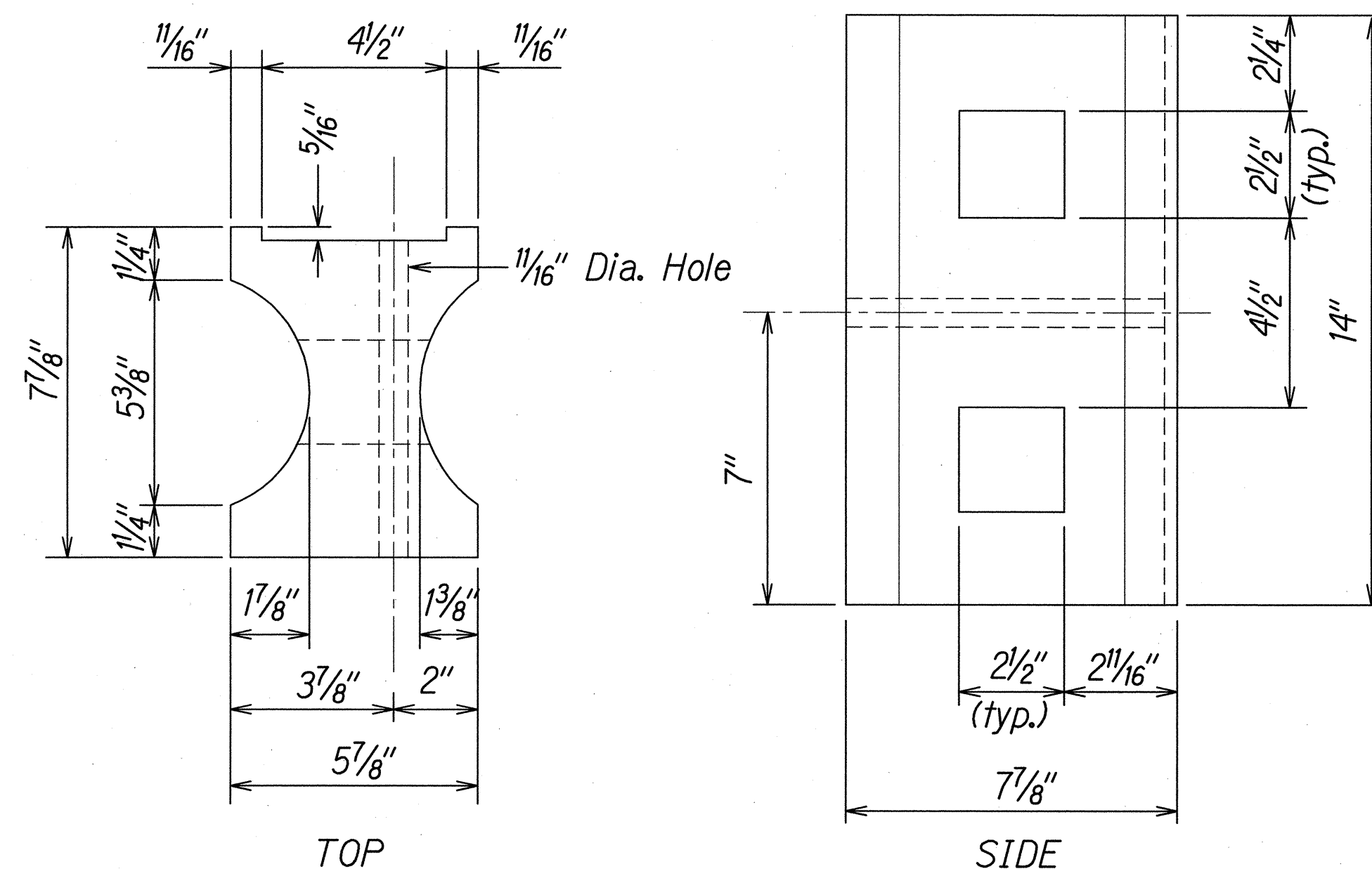
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

## GUARDRAIL DETAILS AND NOTES

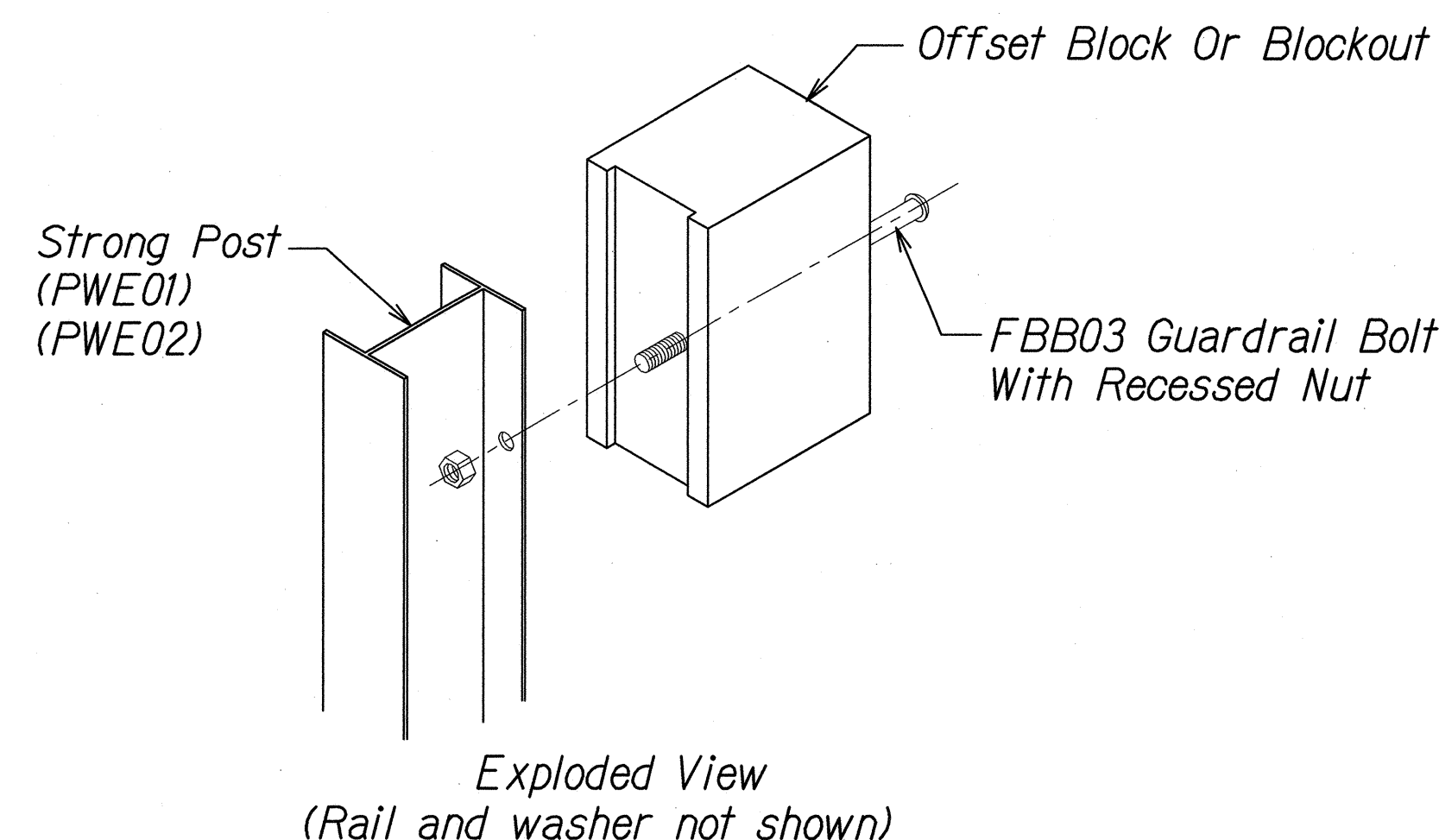
FARRINGTON HIGHWAY  
Replacement of Maipalaoa Bridge  
Federal Aid Project No. BR-093-1(21)

Scale: N.T.S. Date: JUNE 2015

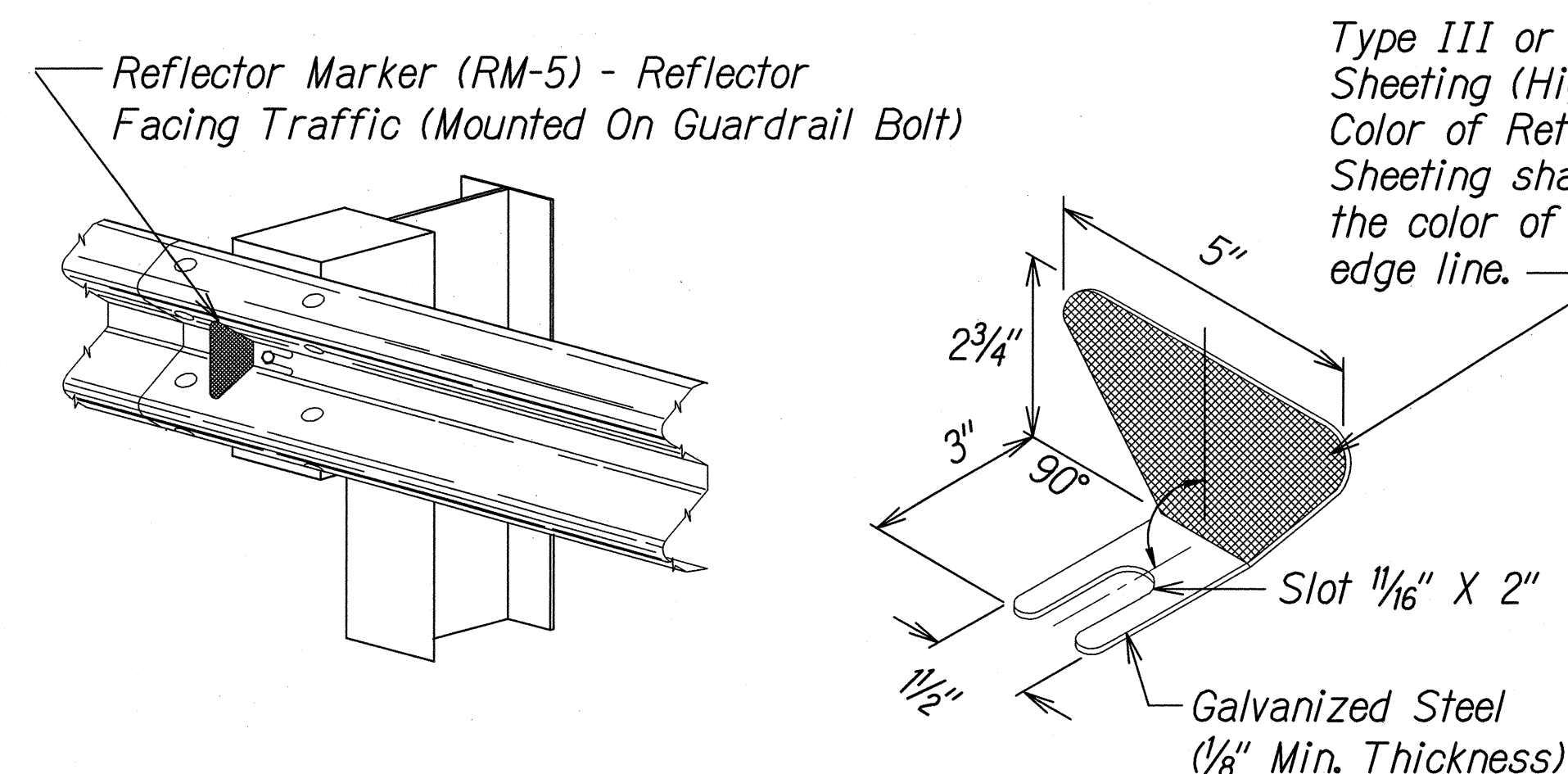
SHEET No. 1 OF 8 SHEETS



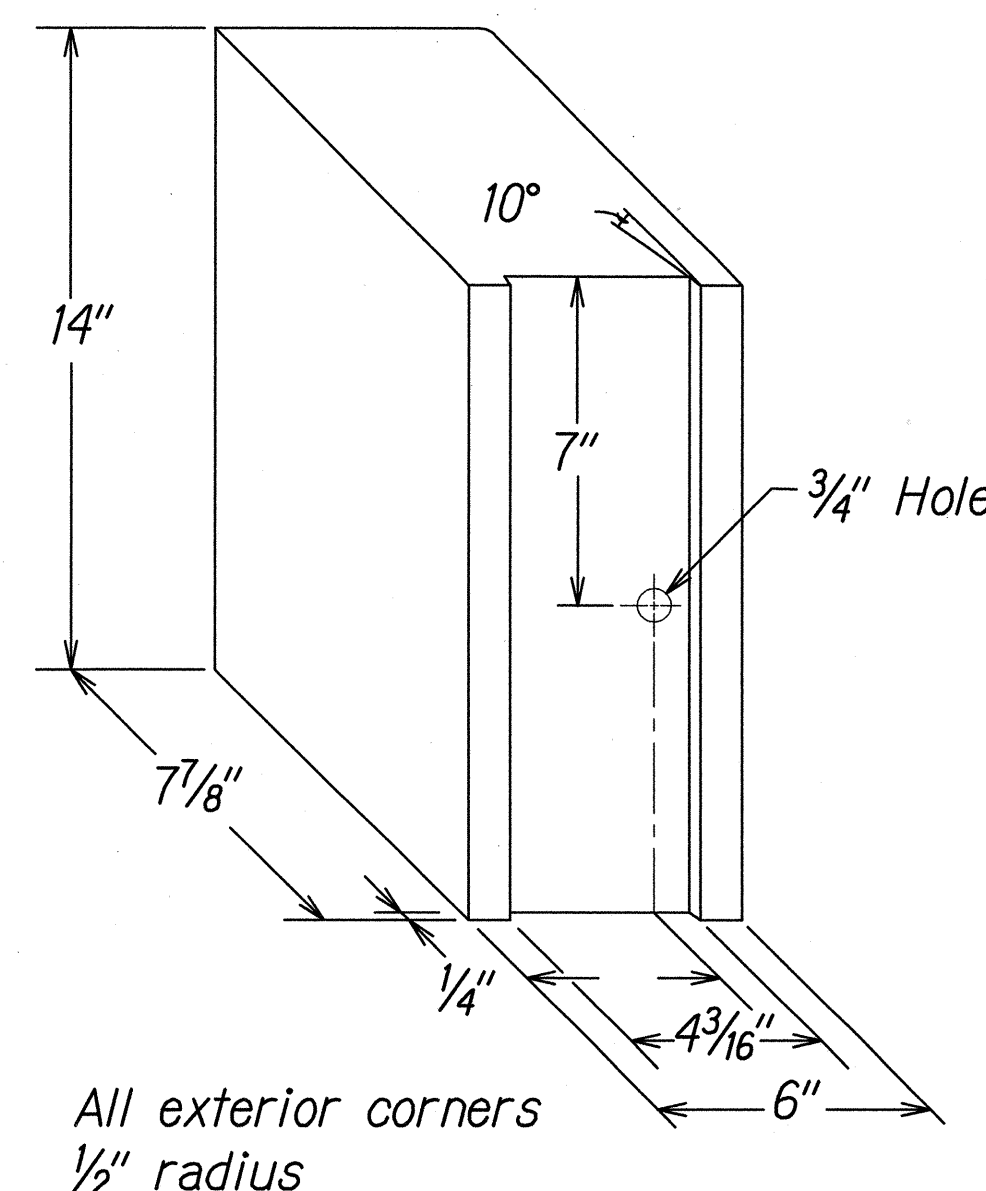
RECYCLED PLASTIC BLOCKOUT (TYPE I)



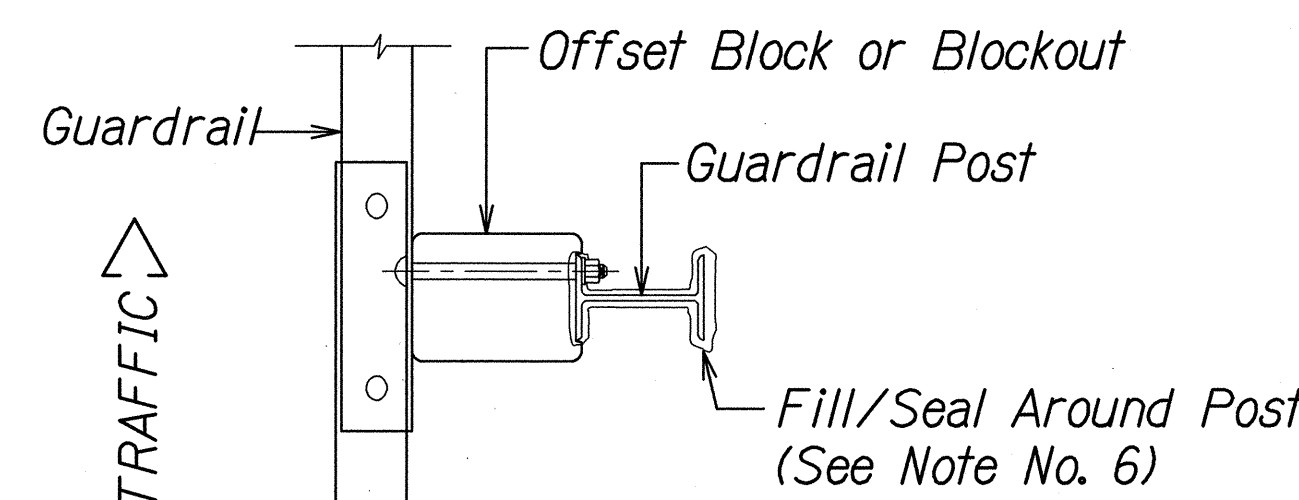
STEEL POST AND BLOCK DETAIL



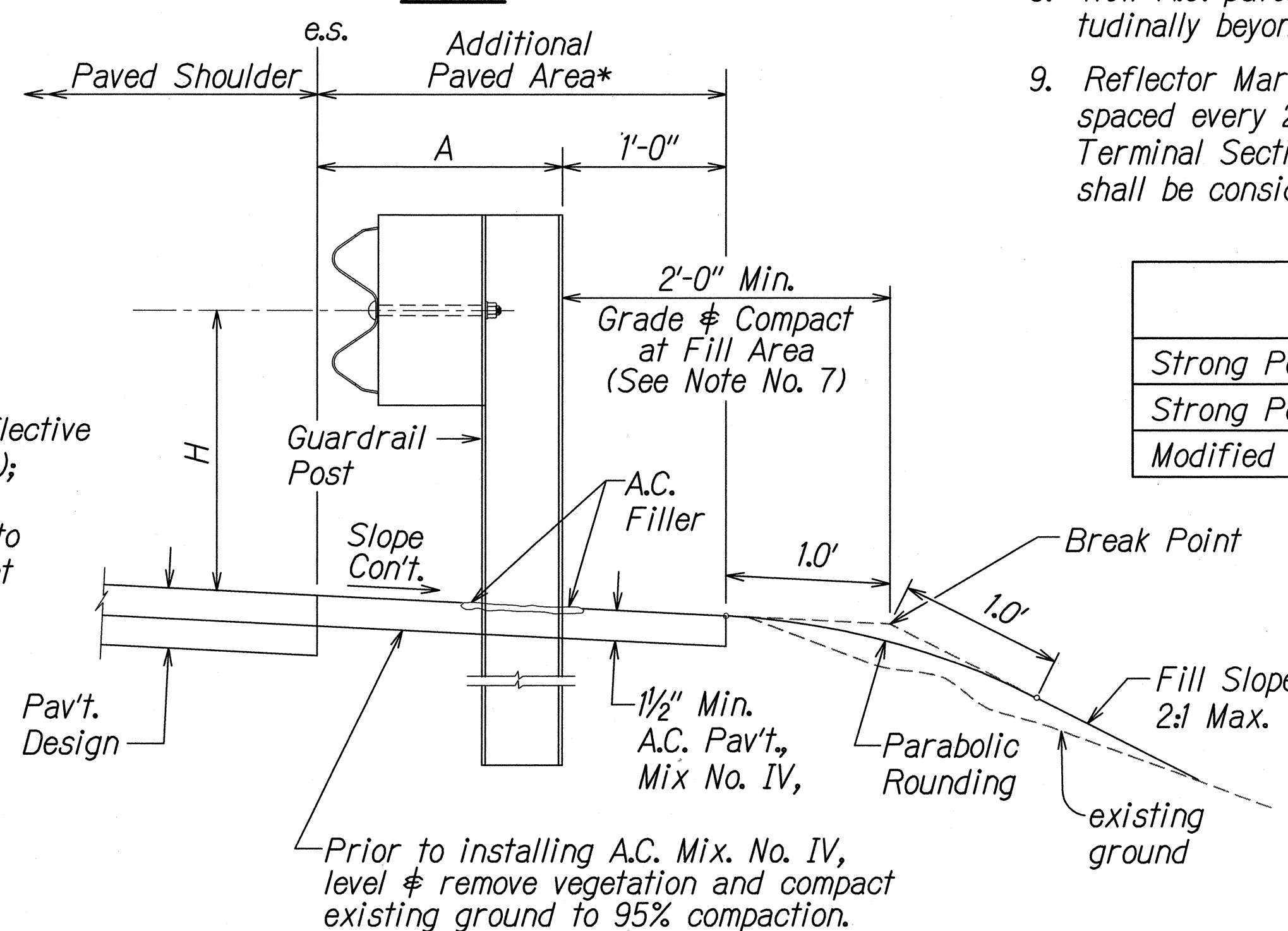
REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



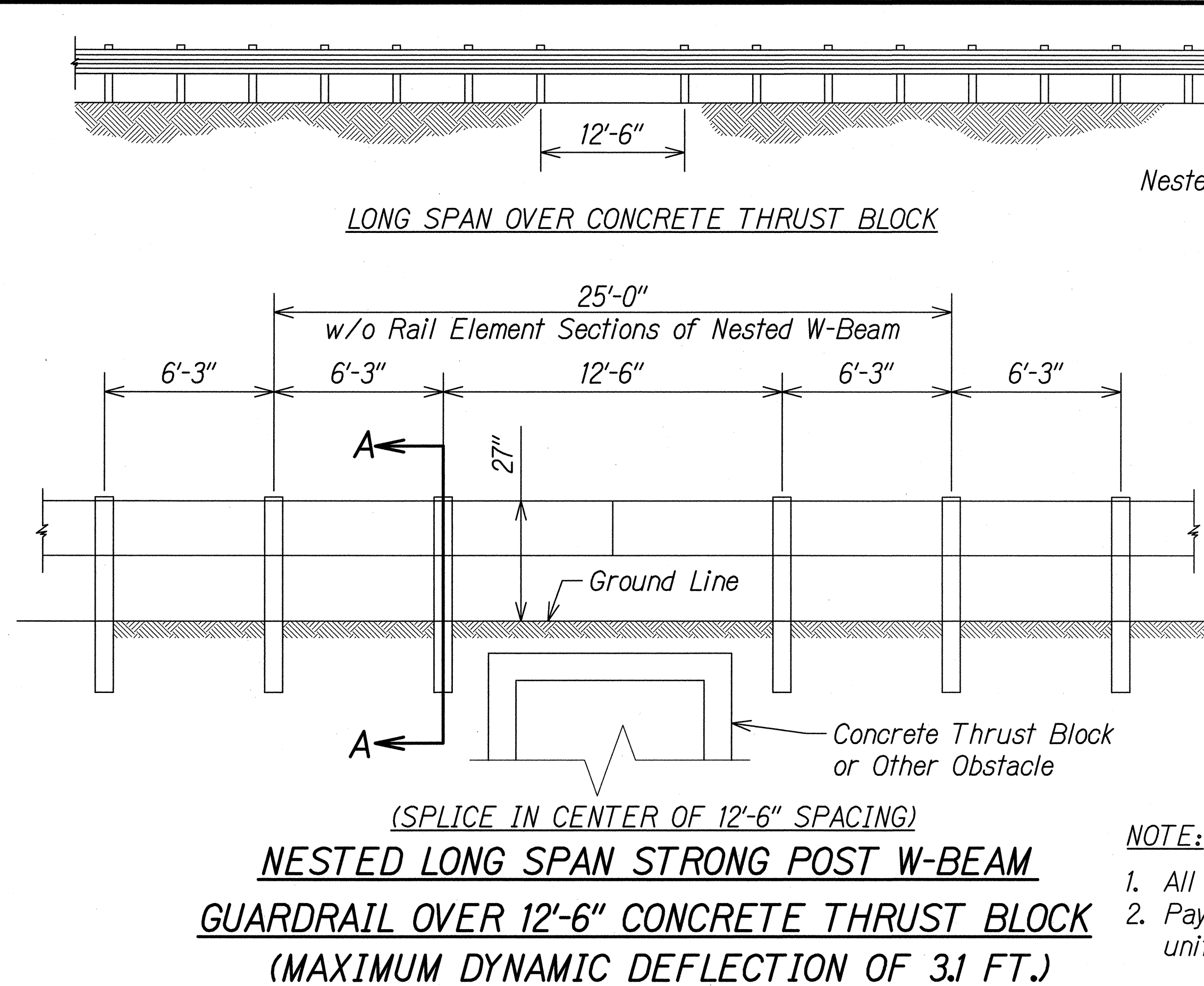
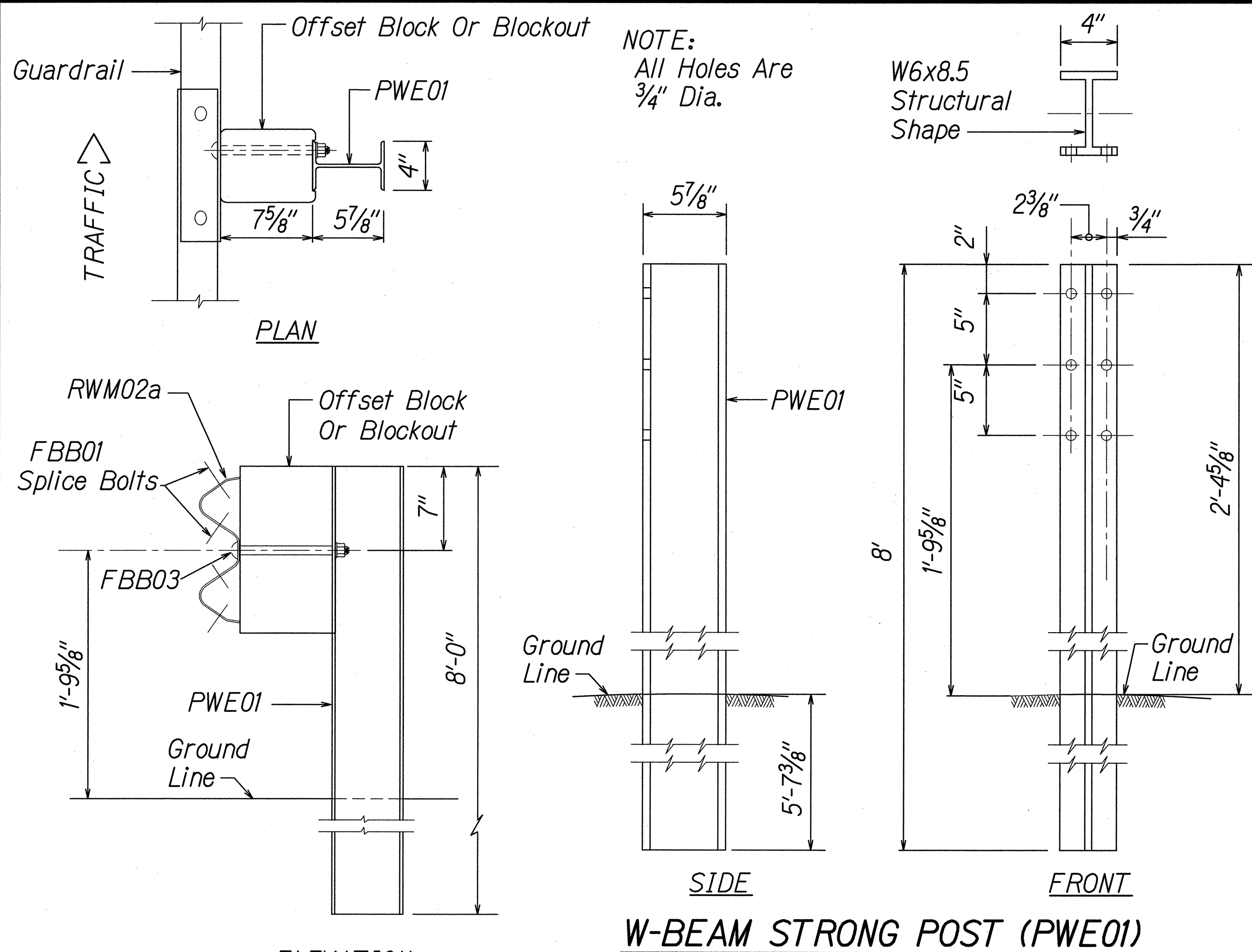
## PLAN



## ELEVATION

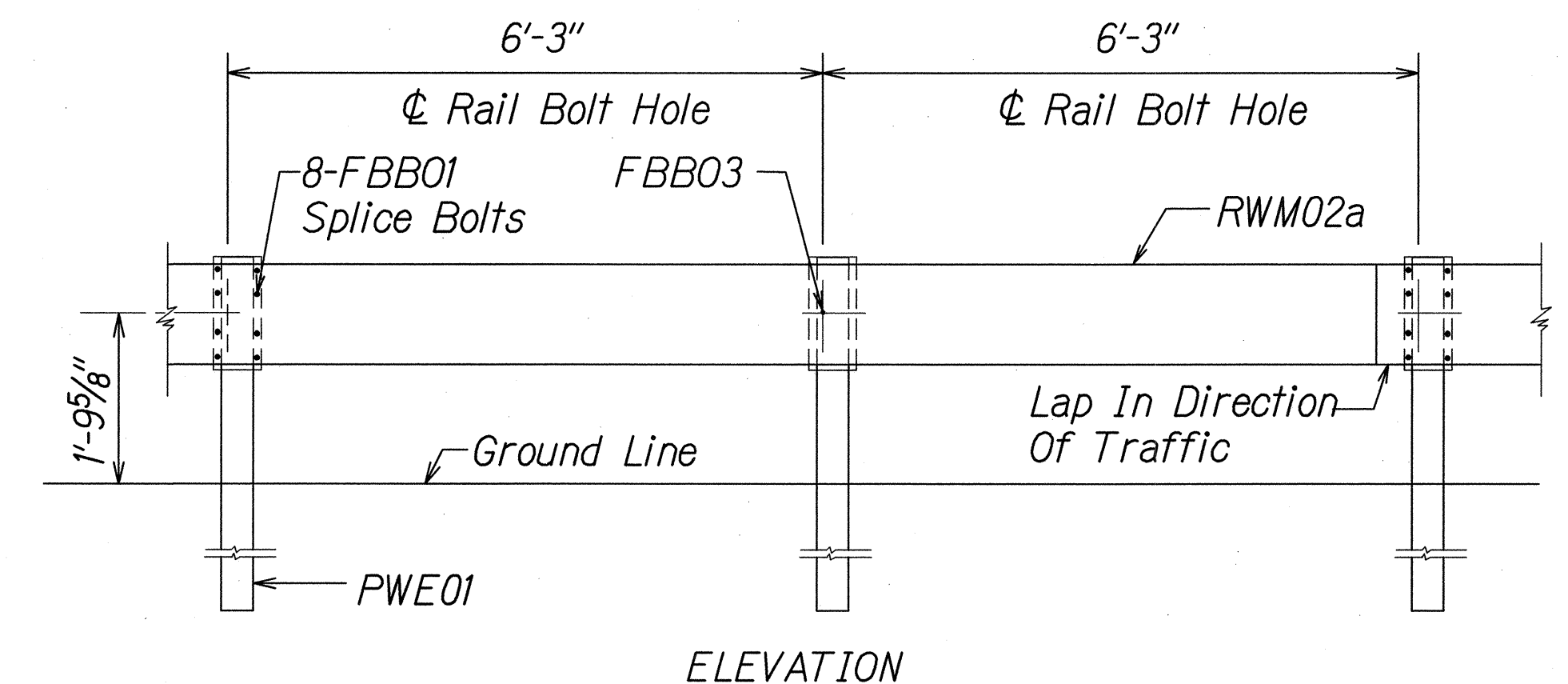
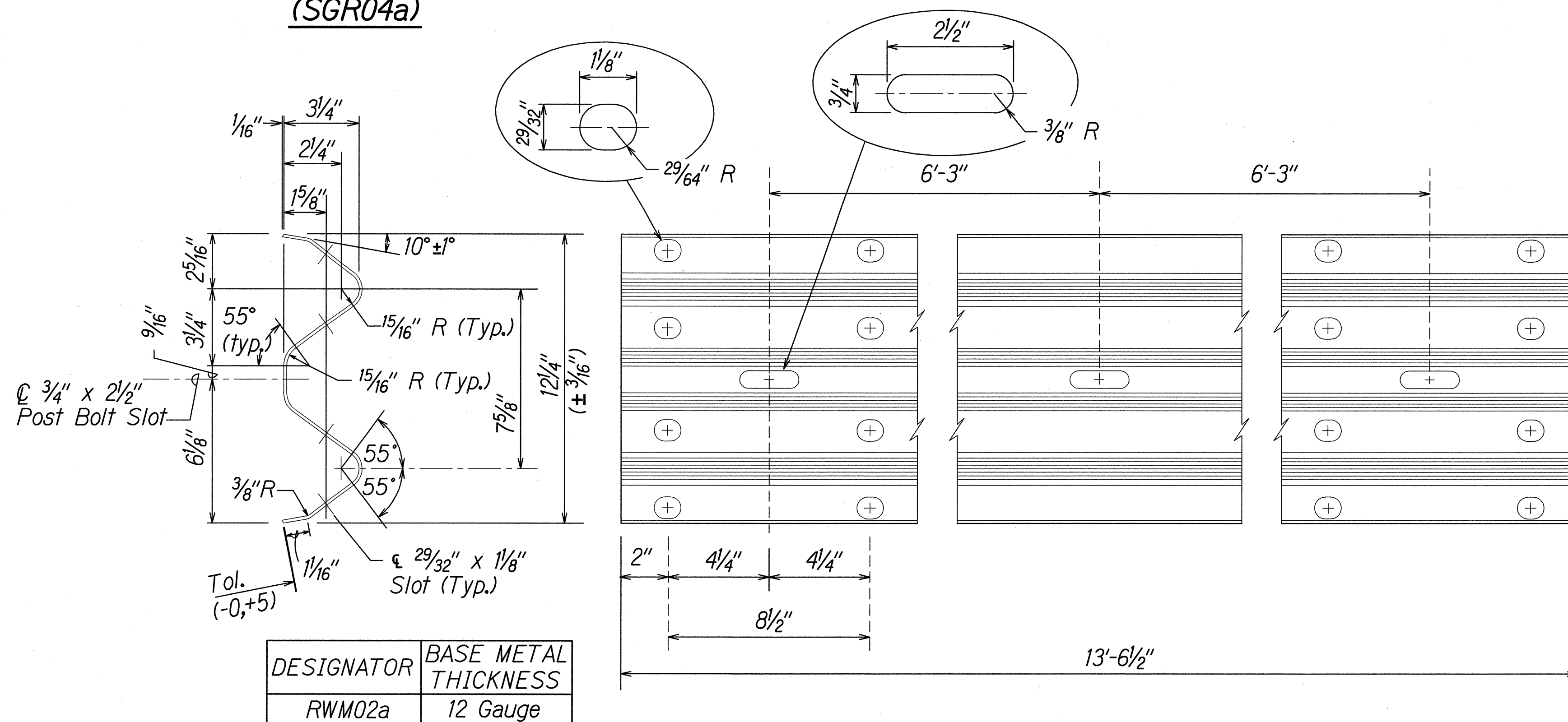
TYPICAL GUARDRAIL INSTALLATION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	21	99

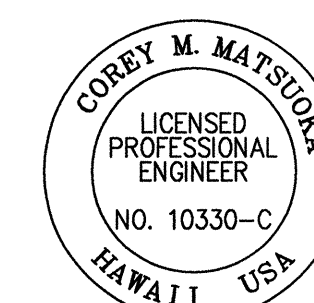


- NOTE:
1. All Nested W-Beam splices points shall be staggered.
  2. Payment for installation shall be included in the unit cost for Item No. 606.0100 - W-Beam Guardrail.

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



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



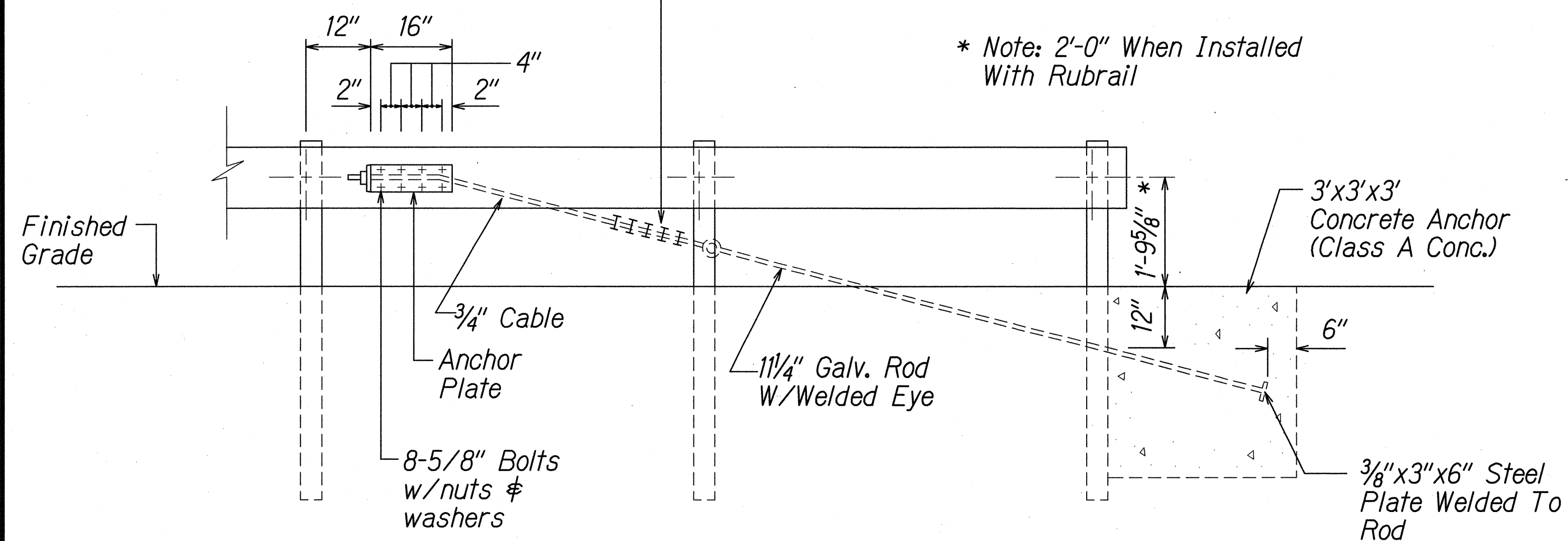
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Signature: *Corey Matsuda* 4/30/16  
 DATE OF THE LICENSE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GUARDRAIL DETAILS AND NOTES	
FARRINGTON HIGHWAY Replacement of Maipalaoa Bridge Federal Aid Project No. BR-093-1(21)	
Scale: N.T.S.	Date: JUNE 2015
SHEET No. 2 OF 8 SHEETS	

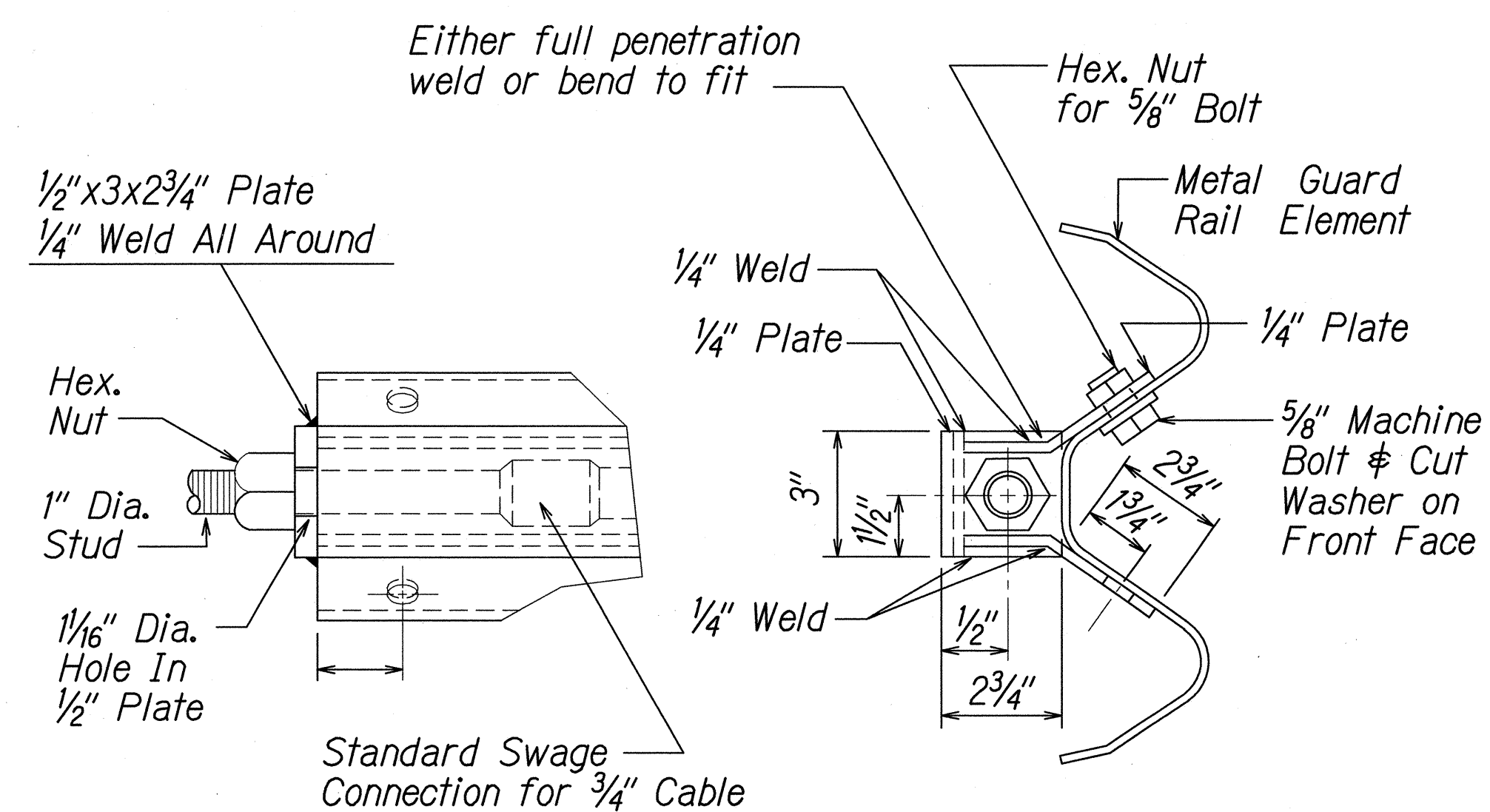


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	22	99

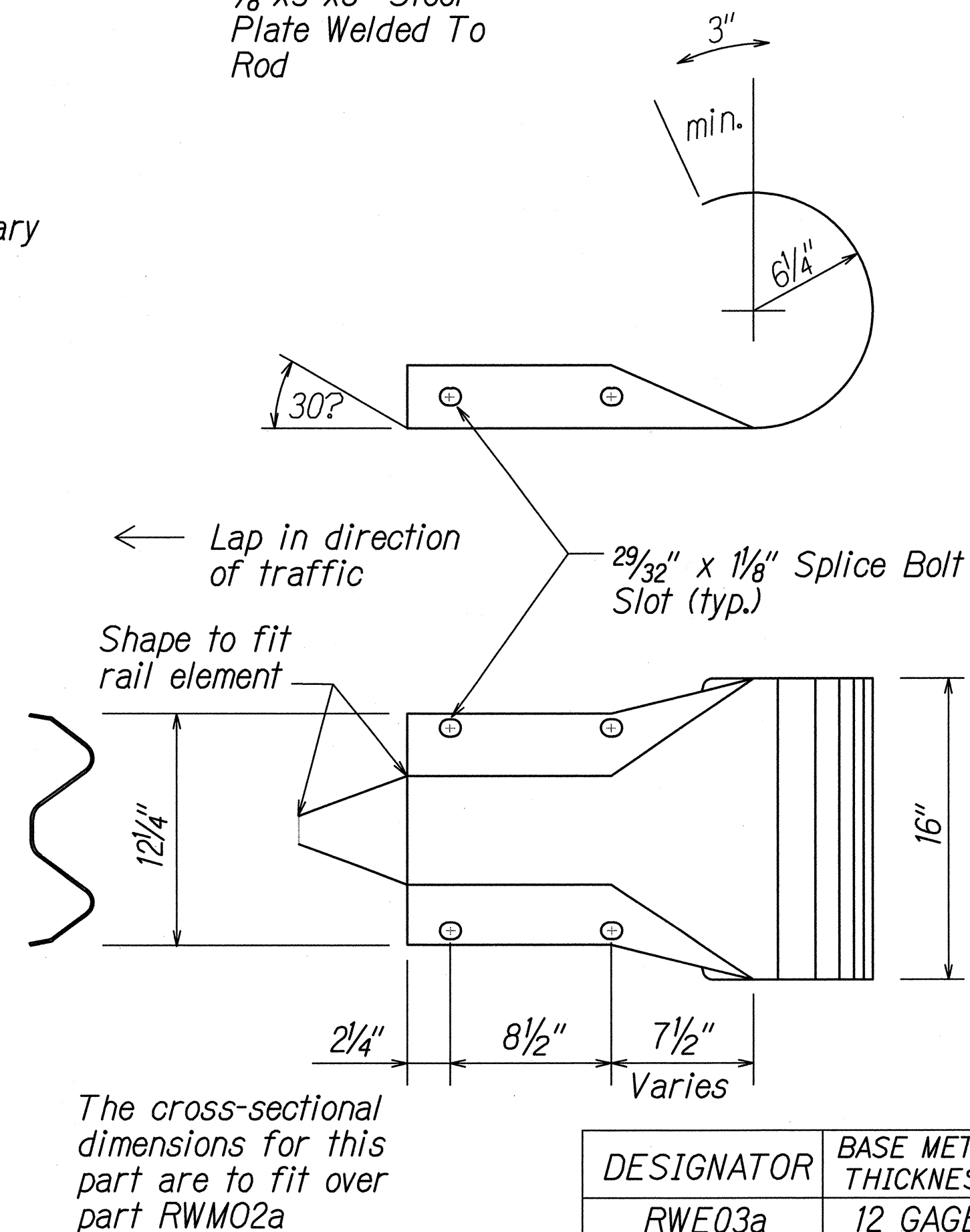


### ANCHOR BLOCK DETAIL

1. Concrete, G.R.P., excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.



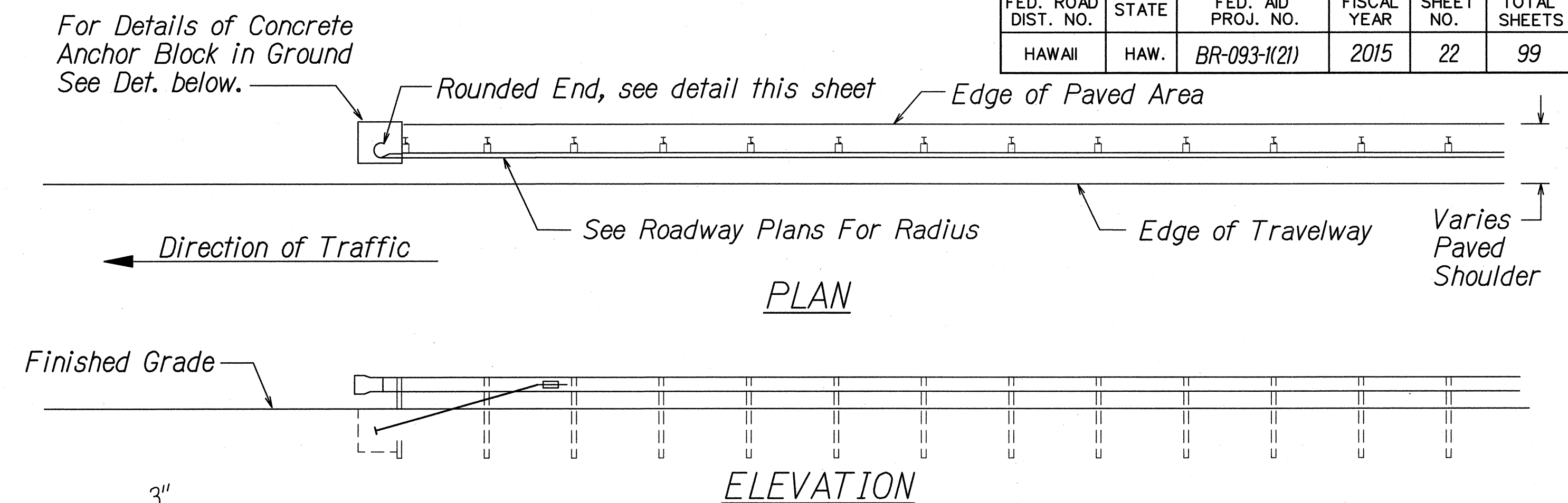
## ANCHOR PLATE DETAILS



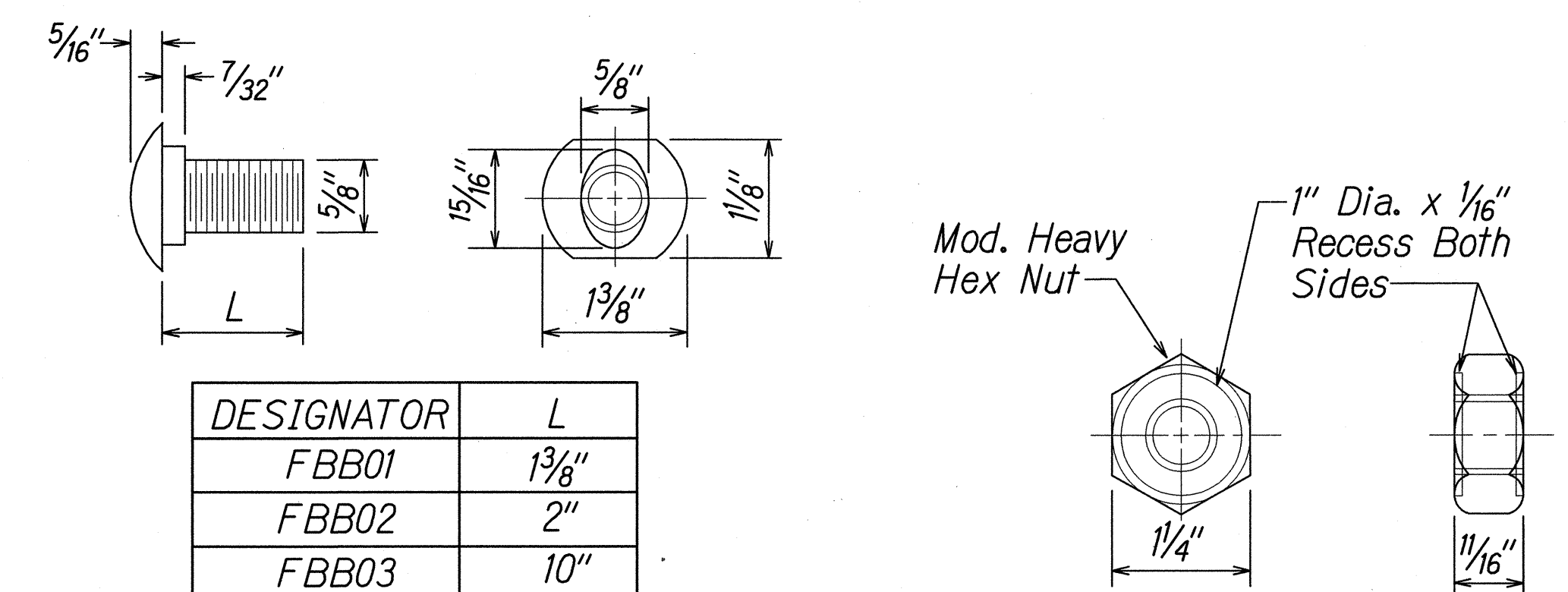
W-BEAM END SECTION (ROUNDED RWE03a)

NOTE:

1. *During construction, the Contractor shall layout the proposed Type 'G' Modified End Terminal and receive approval from the Construction Engineer prior to installation.*
2. *Strong Post, Offset Block or Blockout, and W Beam shall be paid under Item No, 606.1000 - GUARDRAIL, STRONG POST W-BEAM.*
3. *Concrete anchor block, excavation, anchor rod, rounded end and miscellaneous appurtenances necessary to anchor the guardrail ends shall be paid under Item No. 606.2000 - TERMINAL SECTION, MODIFIED TYPE 'G'.*

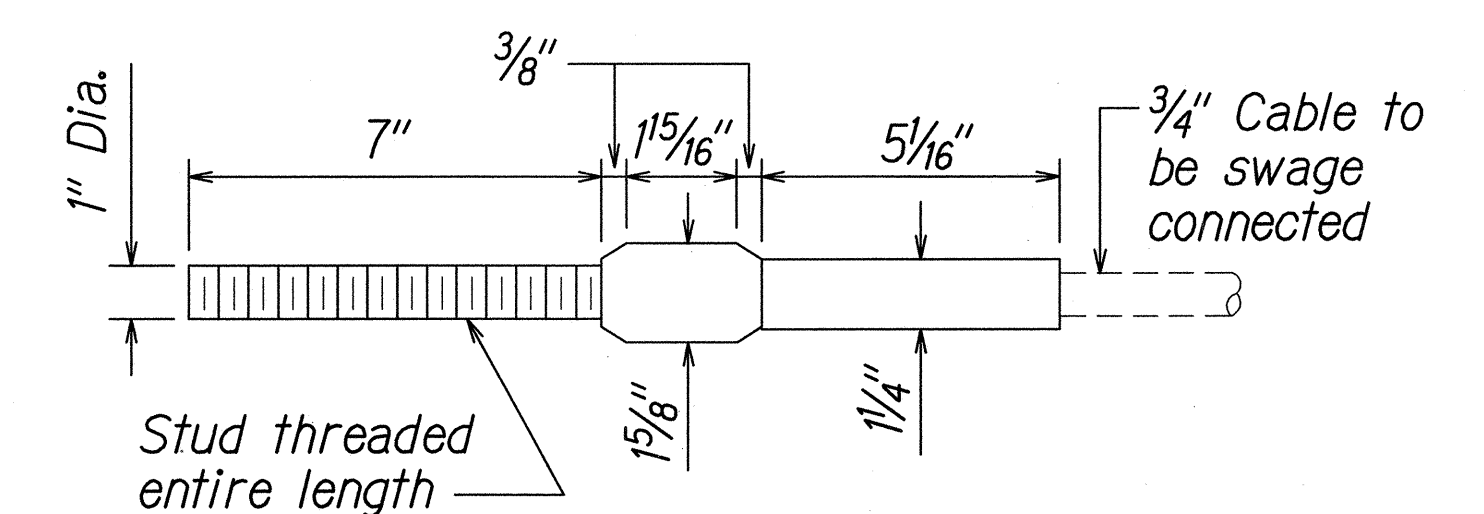


TERMINAL SECTION,  
MODIFIED TYPE 'G' WITH ROUNDED END

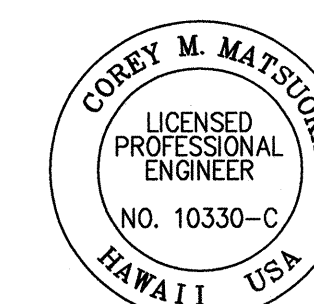


DESIGNATOR	L
FBB01	1 $\frac{3}{8}$ "
FBB02	2"
FBB03	10"

### GUARDRAIL BOLTS AND RECESSED NUT



## STANDARD SWAGED FITTING AND STUD



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Cheryl Wagonka 4/30/16  
SIGNATURE EXPIRATION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

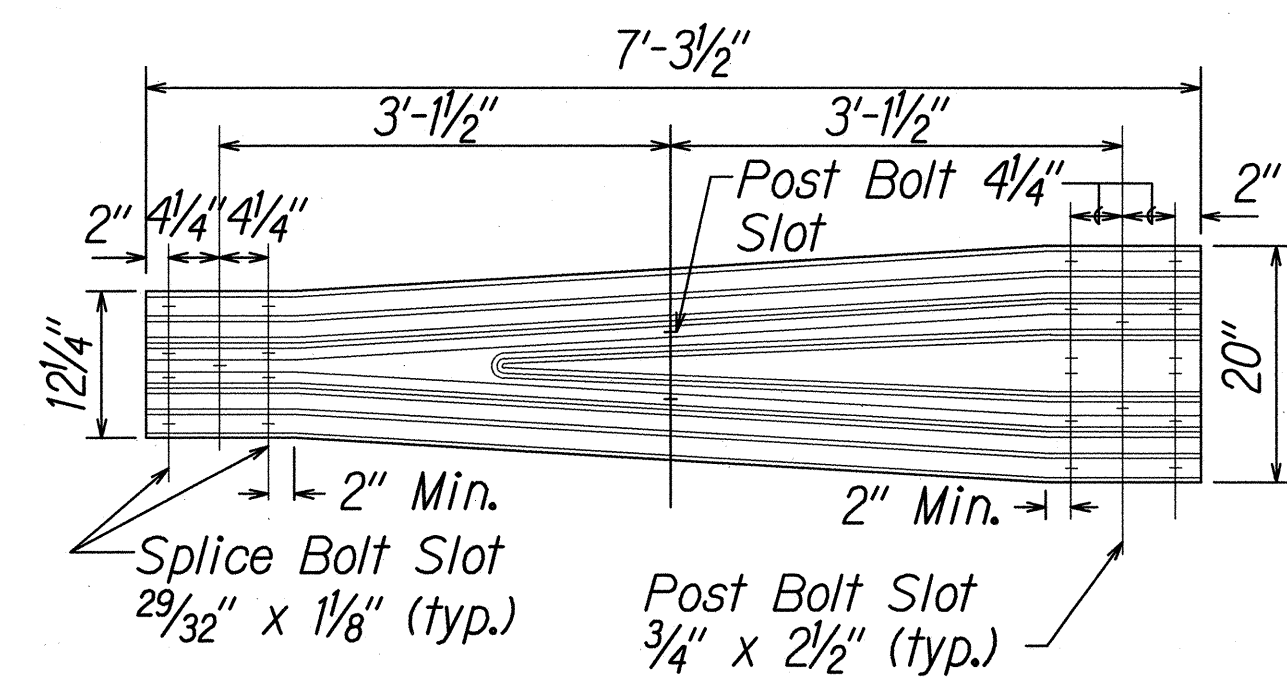
GUARDRAIL DETAILS AND NOTES

FARRINGTON HIGHWAY  
Replacement of Maipalaoa Bridge  
Federal Aid Project No. BR-093-1(21)

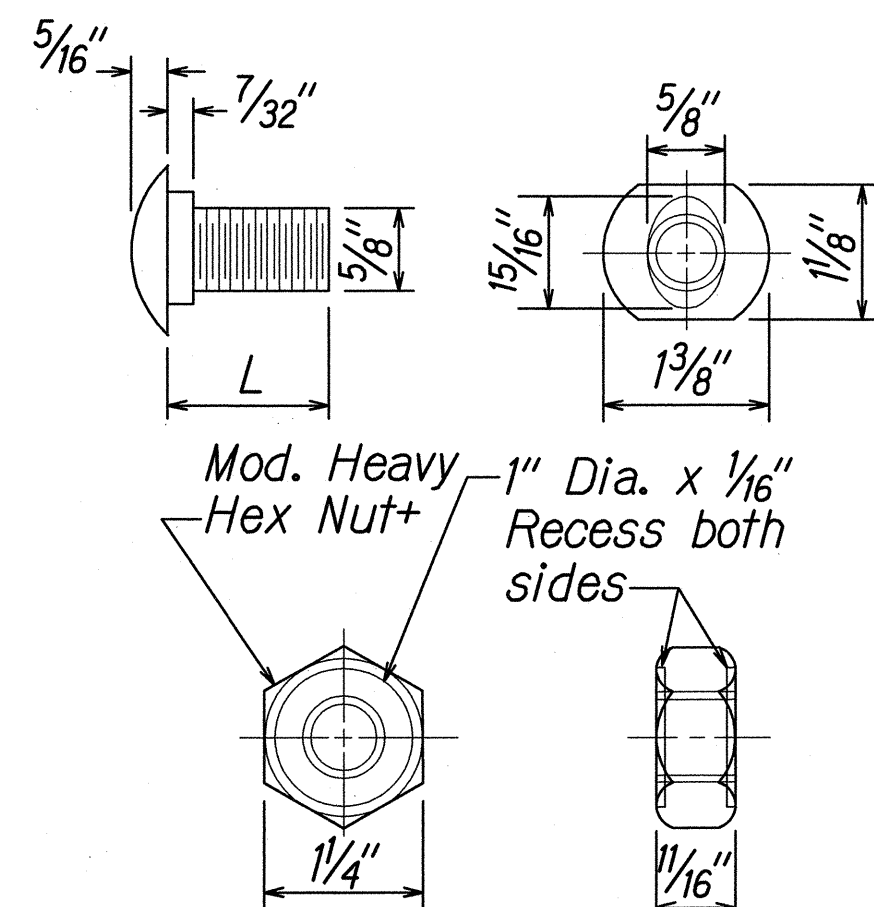
Scale: N.T.S. Date: JUNE 2015

SHEET No. 3 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	23	99



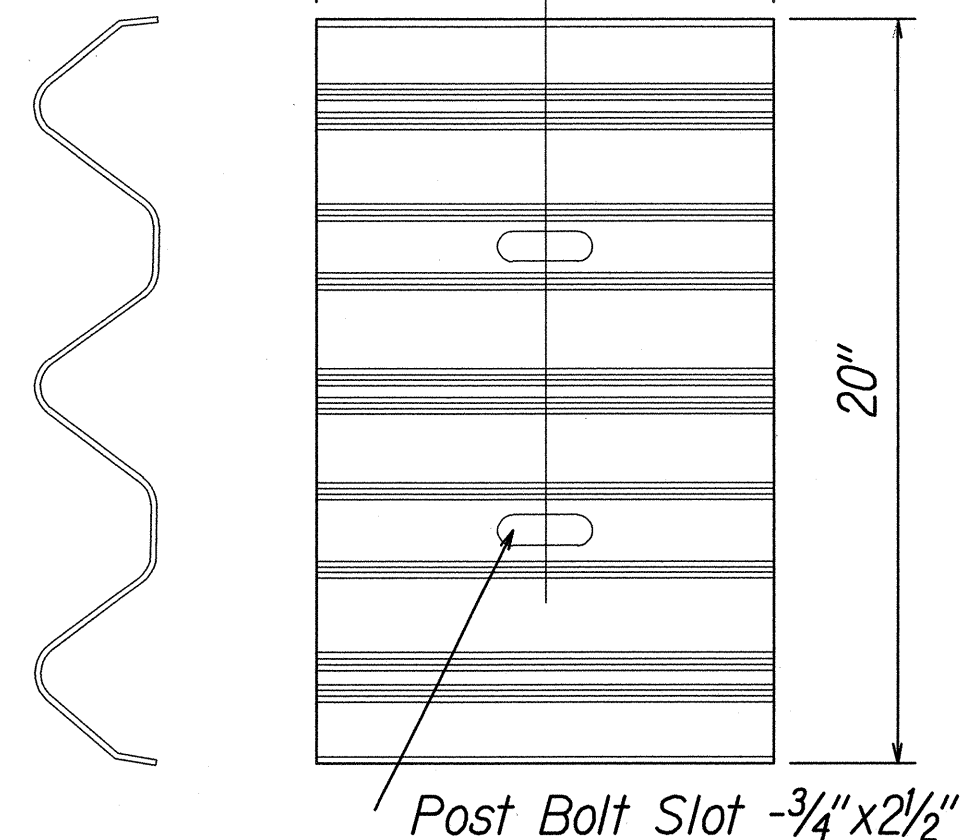
TRANSITION SECTION RWT01b



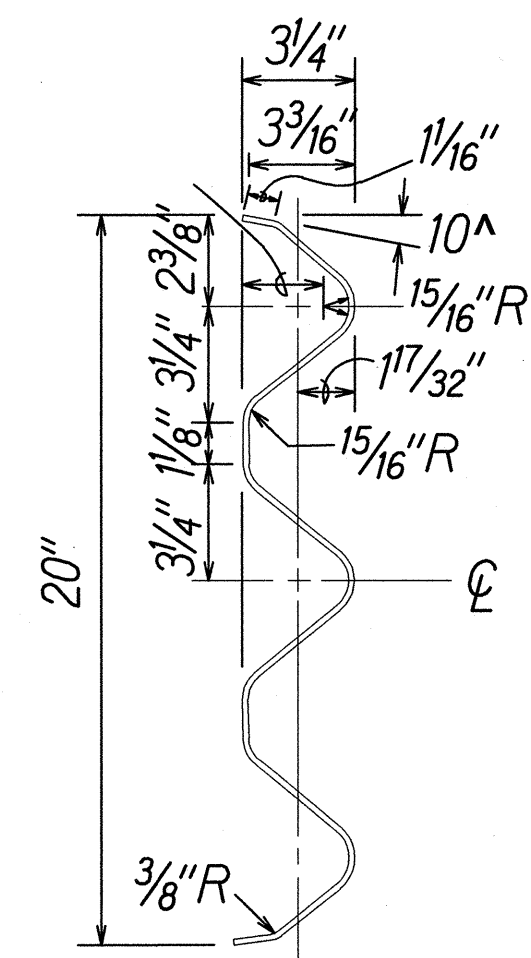
Designator	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND RECESSED NUT

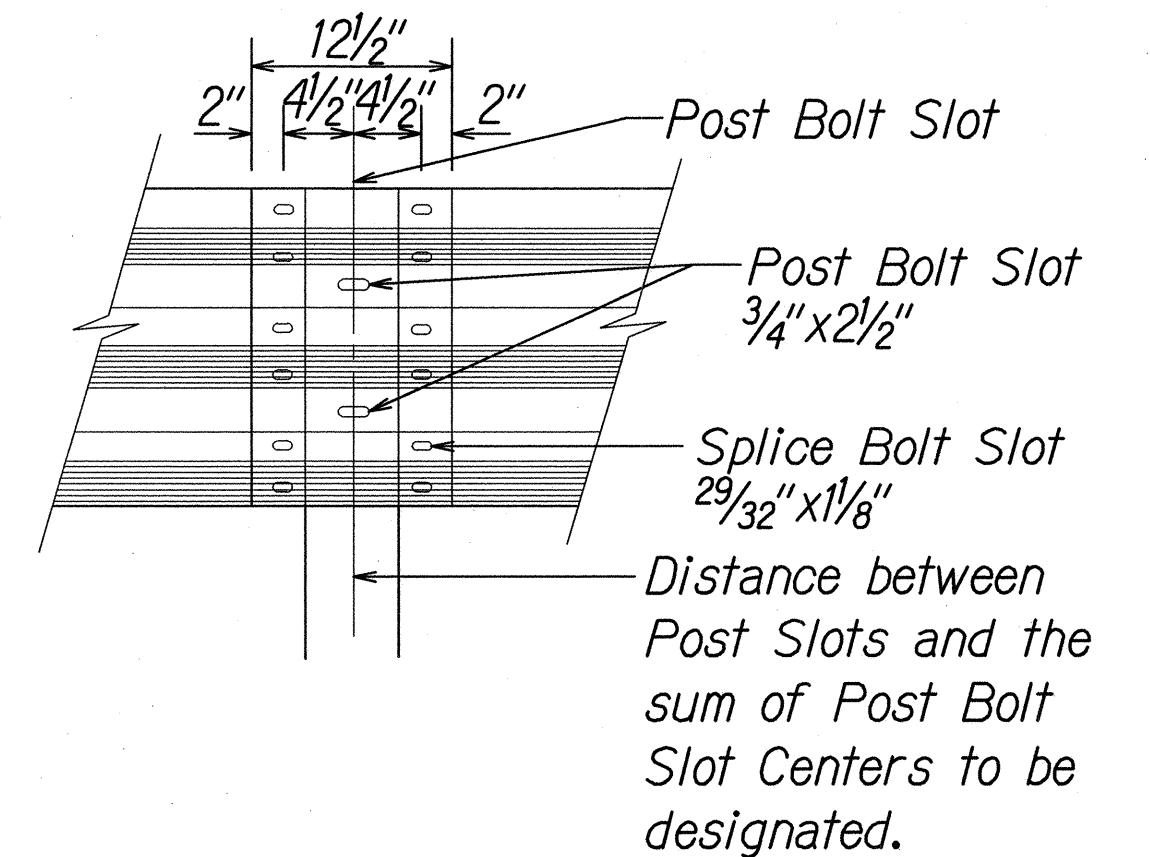
NOTE:  
Not to be used for Thrie Beam connection to structures.



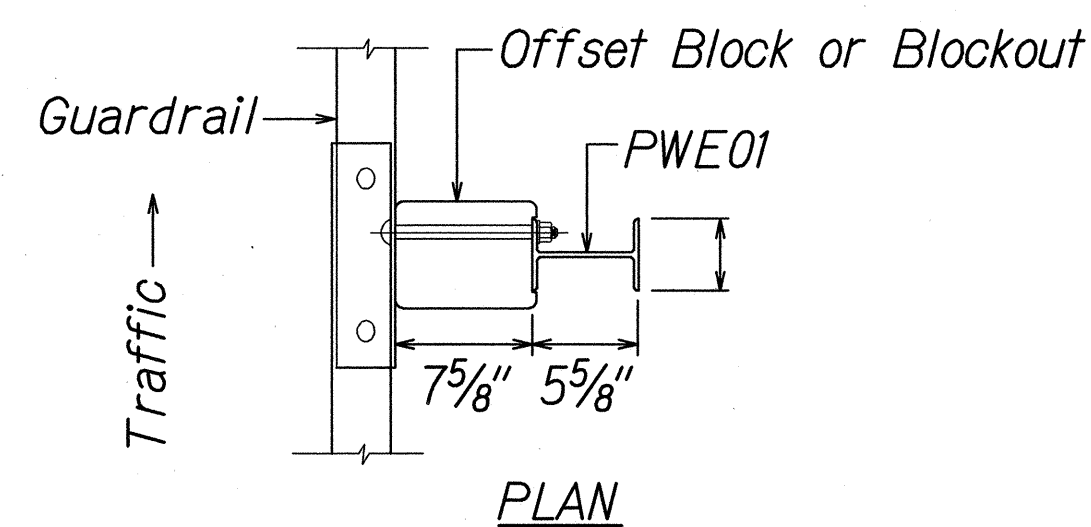
BACKUP PLATE RTB01b



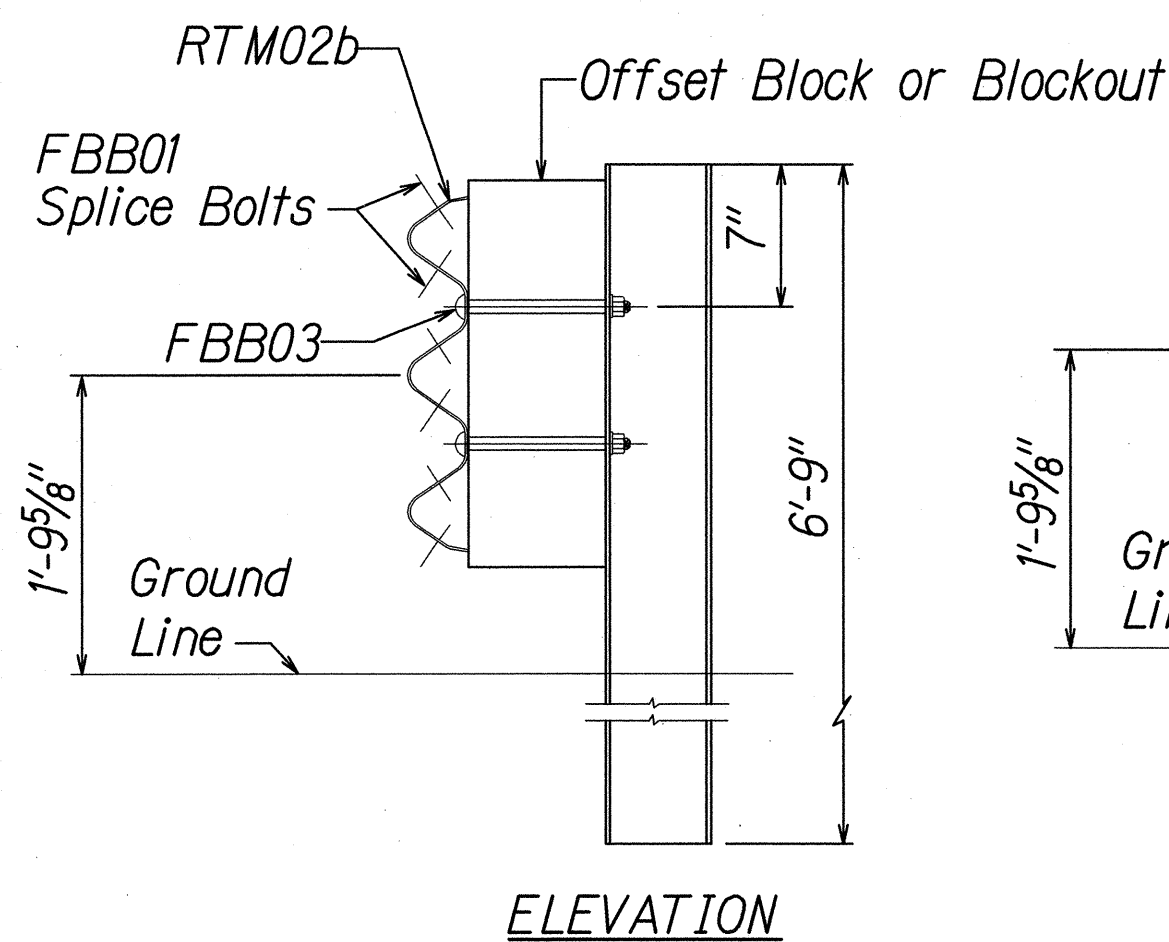
SECTION THRU RAIL ELEMENT (RTM02b)



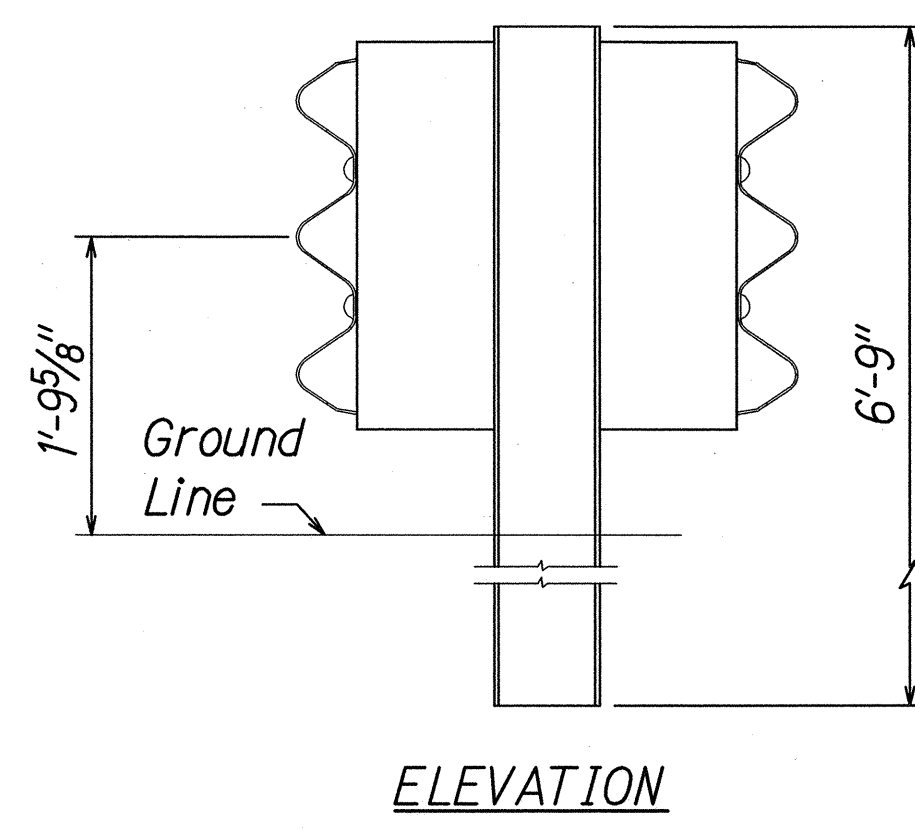
RAIL SPLICE



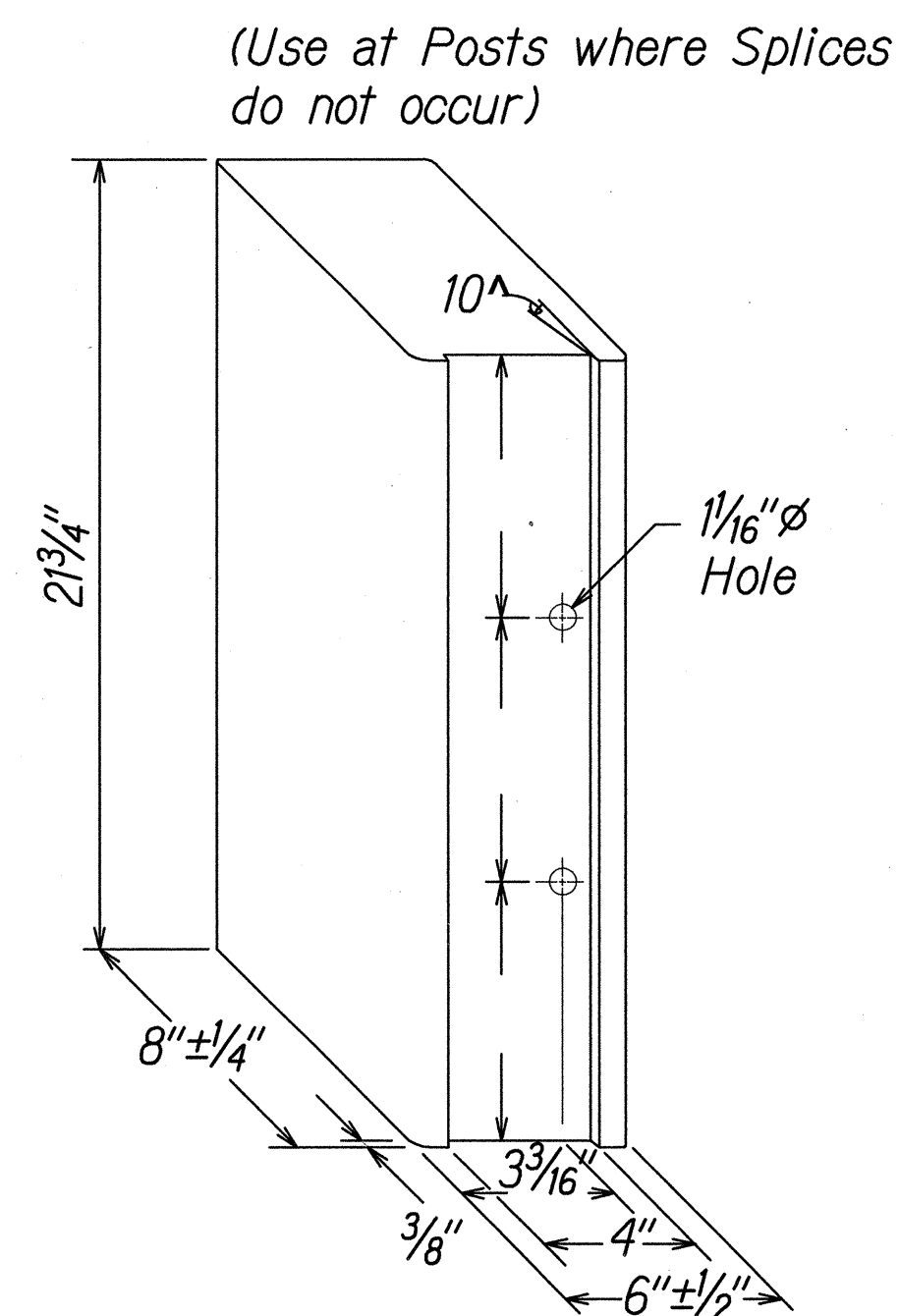
PLAN



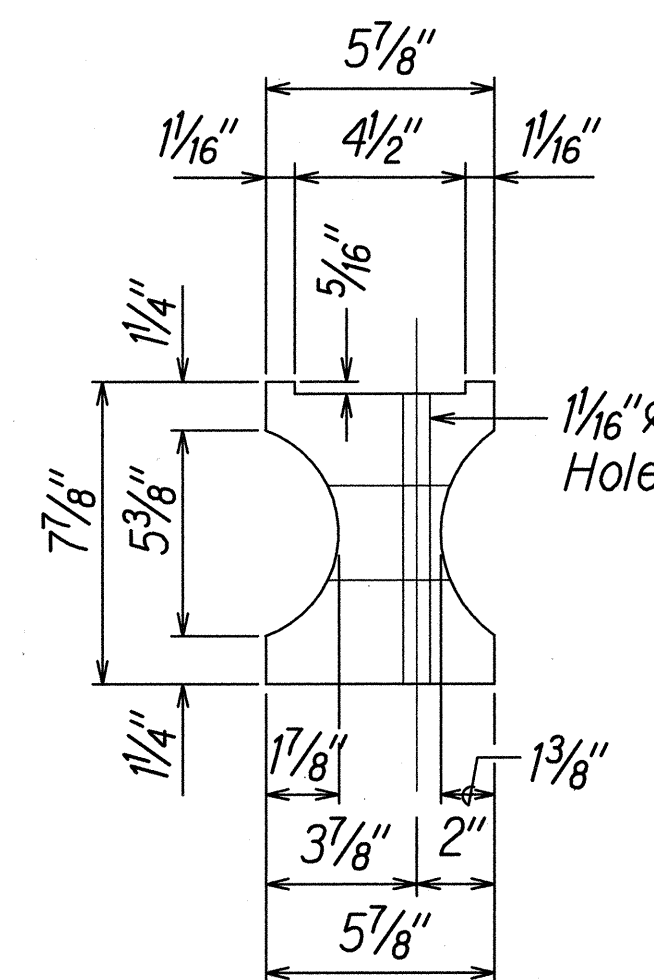
ELEVATION



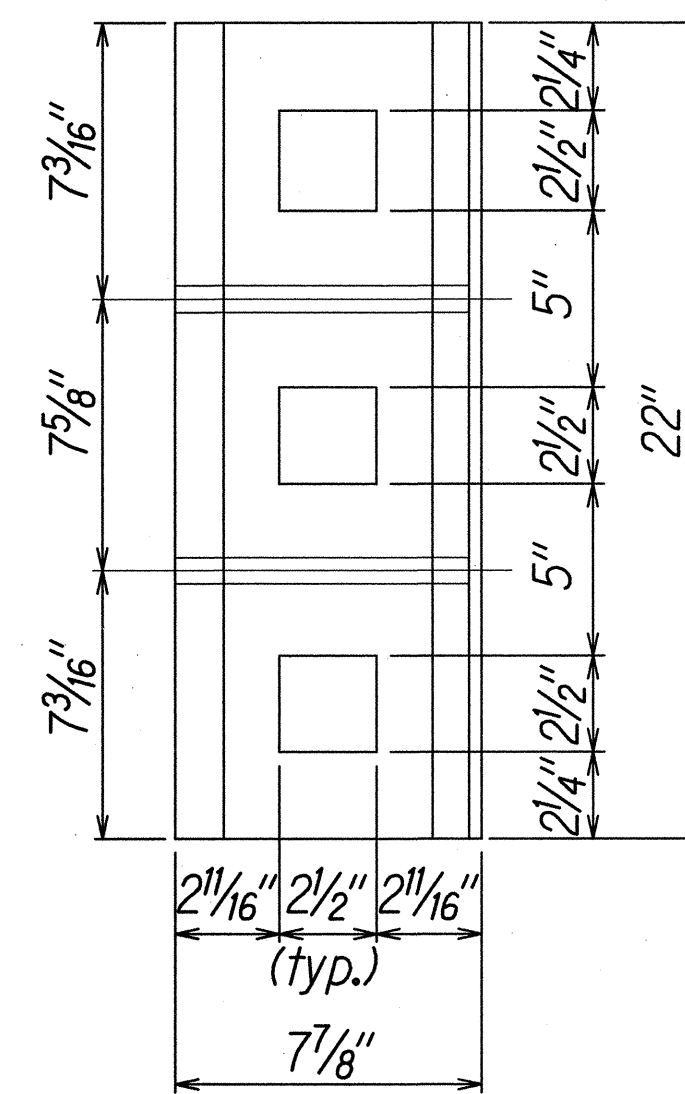
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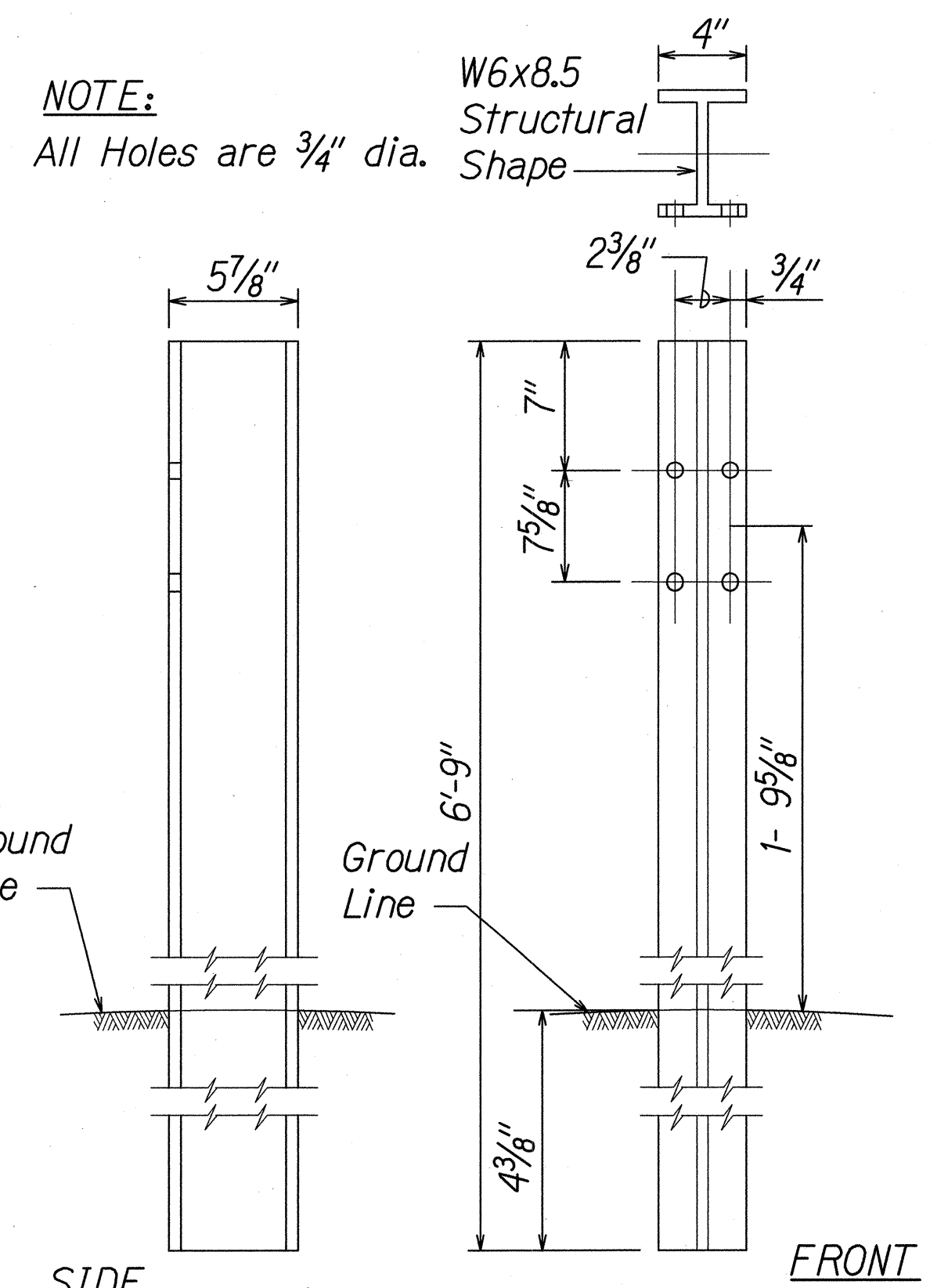
RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)



TOP



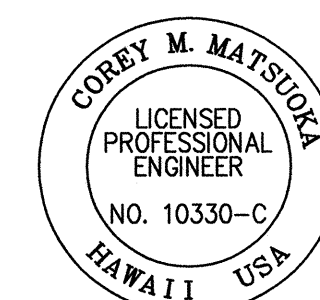
SIDE



SIDE

FRONT

THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS



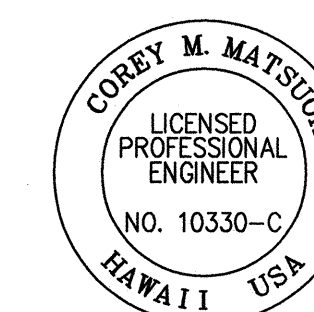
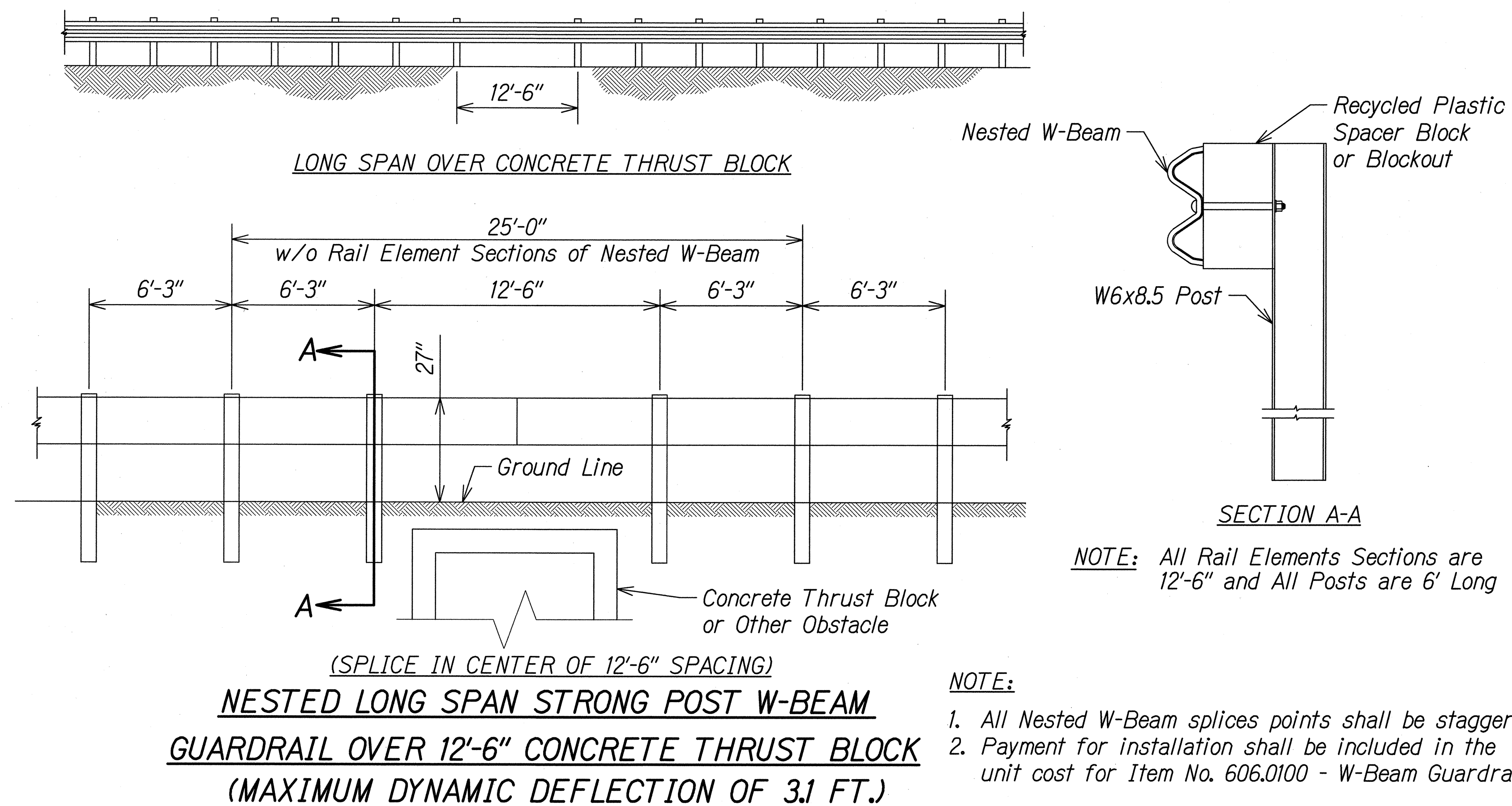
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EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GUARDRAIL DETAILS AND NOTES	
FARRINGTON HIGHWAY Replacement of Maipalaoa Bridge Federal Aid Project No. BR-093-1(21)	
Scale: N.T.S.	Date: JUNE 2015
SHEET No. 4 OF 7 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	24	99



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DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

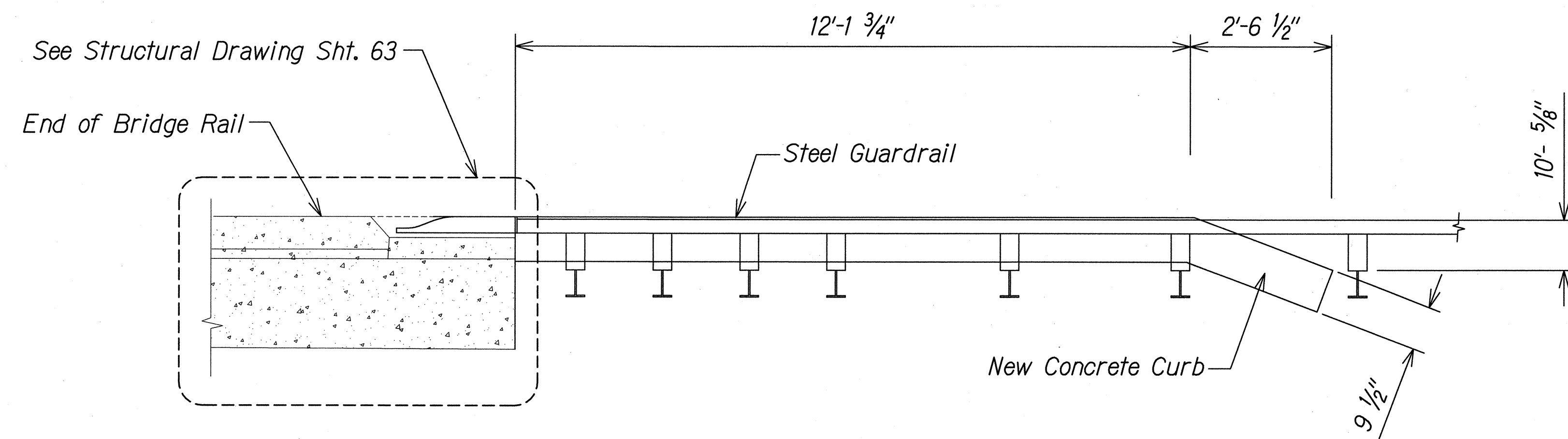
GUARDRAIL DETAILS AND NOTES

FARRINGTON HIGHWAY  
Replacement of Maipalaoa Bridge  
Federal Aid Project No. BR-093-1(21)

Scale: N.T.S. Date: JUNE 2015  
SHEET No. 5 OF 8 SHEETS



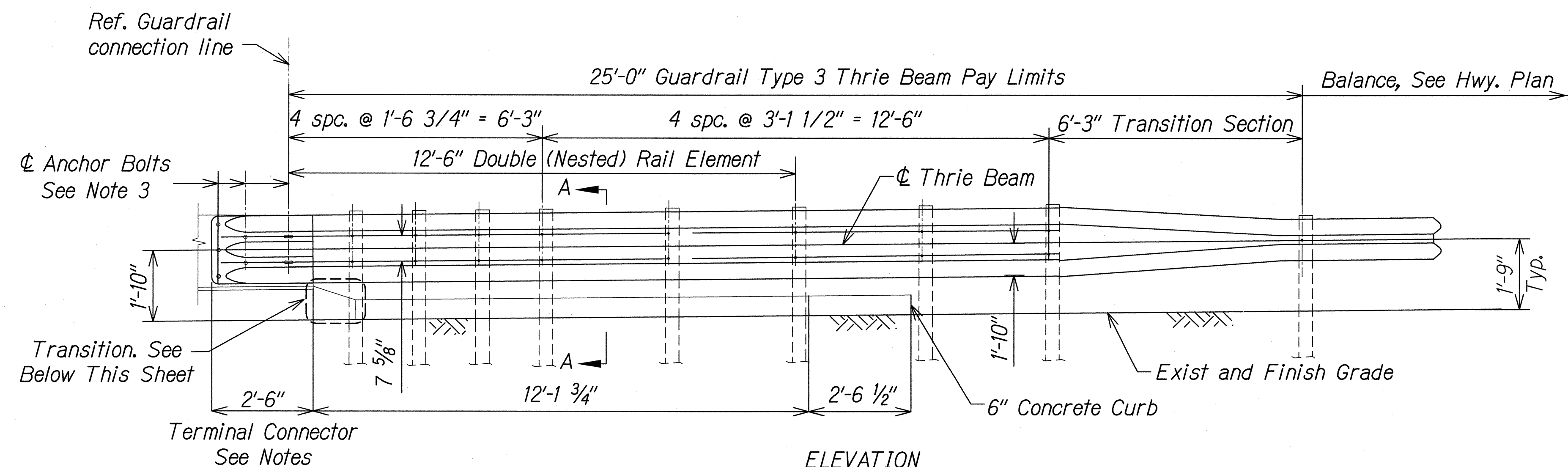
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	25	99



PLAN

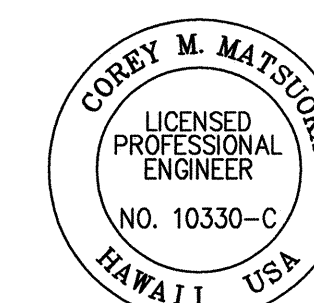
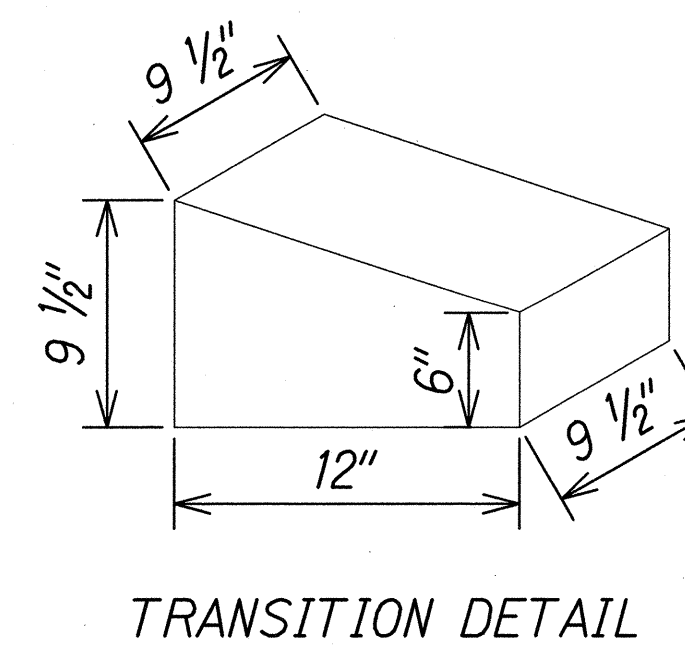
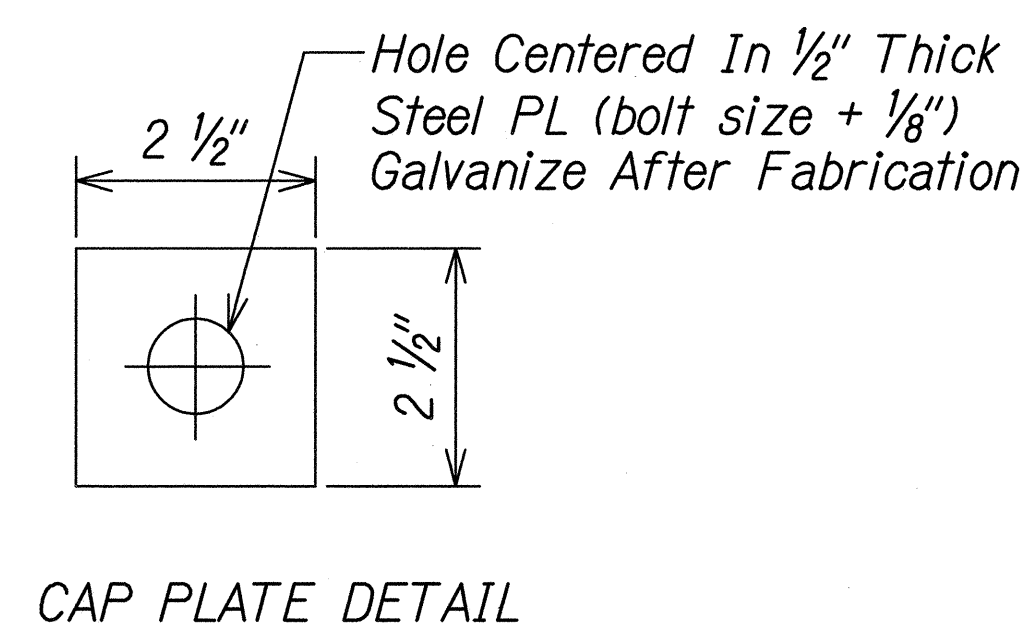
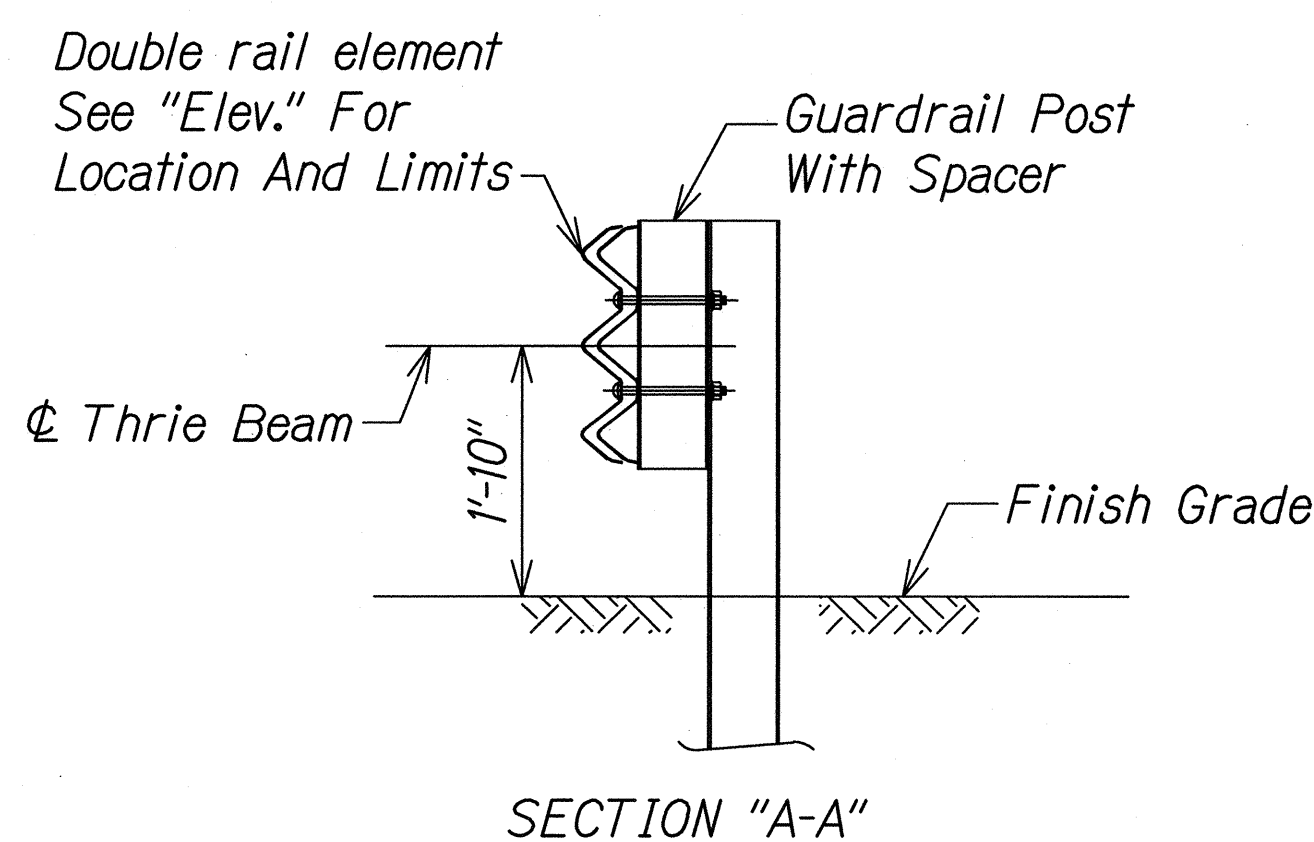
## NOTES

1. The work necessary to connect guardrail to concrete end post or metal spacer block shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.3112, Guardrail Type 3 Thrie Beam Transition to End Post or Jersey Barrier and will not be paid for separately.
2. Terminal connector, guardrail post, spacer block, transition section and all other associated hardware will not be paid for separately and shall be considered incidental to Item No. 606.3112 - Guardrail Type 3 Thrie Beam Transition to End Post or Median Barrier.
3. See "General Notes" on Sht. Q1 for additional jersey barrier, guardrail and drilling information.
4. All anchor bolts shall be high strength bolts conforming to the requirements of AASHTO M 164. See Special Provisions.
5. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
6. Terminal connector, Thrie Beam Metal Guardrail and Transition Section shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180 and shall be hot-dip galvanized after fabrication. See Special Provisions.
7. Guardrail posts, spacer blocks, "terminal connectors" and all anchor bolts, cap PL, bolts, nuts, and washers shall be hot-dip galvanized after fabrication.
8. Cap PL shall be fabricated from ASTM A 36.
9. First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
10. Double (nest 1st panel) thrie beam elements at all end post connections.
11. Where double (nested) beam occur, 12" "Back-up Plate" not required.
12. Heads of through anchor bolts shall be placed on the traffic side of the rail.
13. Drilling of through holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.



ELEVATION

## TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL UPGRADE



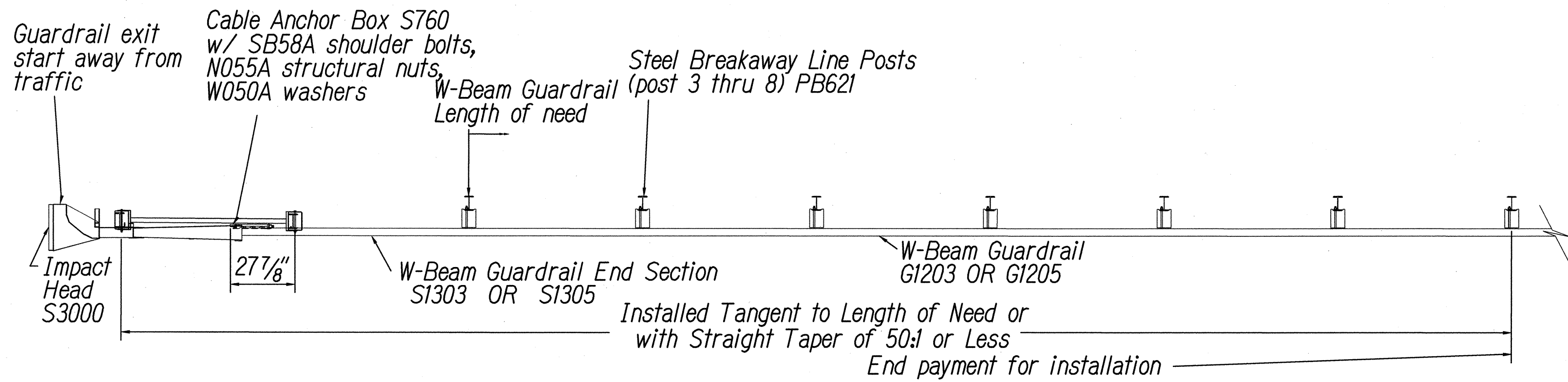
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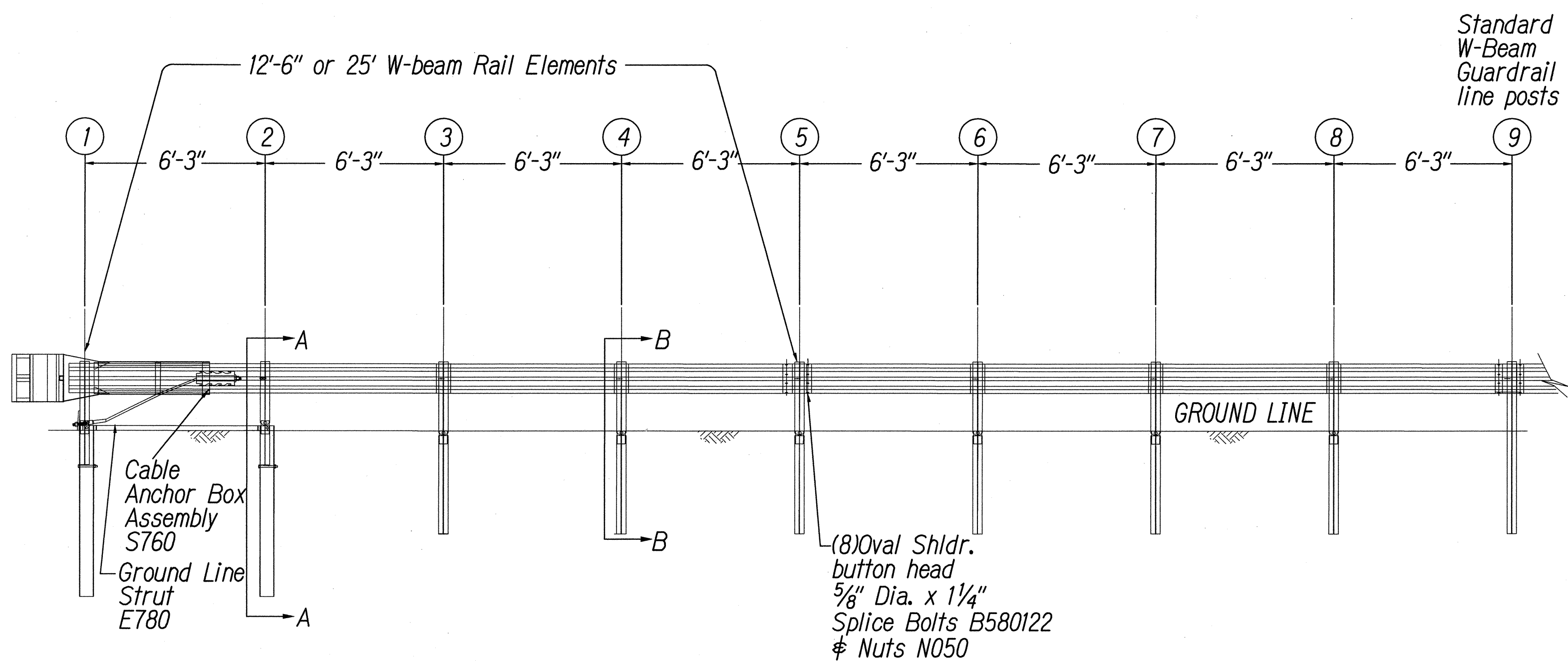
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>GUARDRAIL DETAILS AND NOTES</b>	
FARRINGTON HIGHWAY	
Replacement of Maipalaoa Bridge	
Federal Aid Project No. BR-093-1(21)	
Scale: N.T.S.	Date: JUNE 2015
SHEET No. 6 OF 8 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	26	99



TRAFFIC →

PLAN

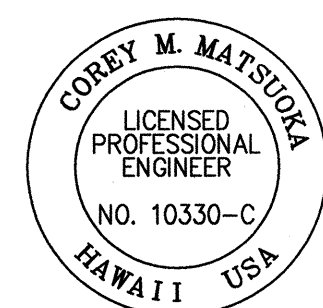


#### GENERAL NOTES:

- Breakaway posts are required with the Sequential Kinking Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- When the Sequential Kinking Terminal is selected as the end treatment for W-Beam Guardrail installation, the W-Beam Guardrail can be flared at a rate of 50:1 to prevent the impact head from encroaching on the shoulder. The flare is not required and may be decreased or eliminated for specific installations.
- The soil tube shall not protrude more than 4" above ground (measured) along a 5' cord). Site grading may be necessary to meet this requirement.
- The soil tubes may be driven with an approved driving head. They shall not be driven with the post in the tube. If the soil tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
- When rock is encountered during excavation, a 12" dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
- The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
- A special site evaluation should be considered prior to using the Sequential Kinking Terminal where there is less than 25' between the outlet side of the Sequential Kinking Terminal and any adjacent driving lane.

SKT-350

ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
S1303/S1305	1	W-BEAM GUARDRAIL END SECTION 12 GA, 12.5' or 25'
G1203/G1205	3/1	W-BEAM GUARDRAIL, 12 GA., 12.5' or 25'
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 POSTS
PB621	6	STEEL BREAKAWAY LINE POSTS
	6	RECYCLED PLASTIC BLOCKOUTS OR OFFSET BLOCK
HARDWARE		
B580122	17/33	5/8" Dia. x 1 1/4" SPLICE BOLTS, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLTS
B341004	2	5/8" Dia. x 10" HEX BOLTS
B341002	6	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	6	5/8" Dia. x 18" H.G.R. BOLT (POST 3 THRU 8)
N050	26/42	5/8" Dia. H.G.R. NUT (SPLICE 17/33, SOIL TUBES 2, POST 2 THRU 8)
N030	2	3/4" Dia. HEX NUTS
W050	7	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 BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
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		



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SIGNATURE

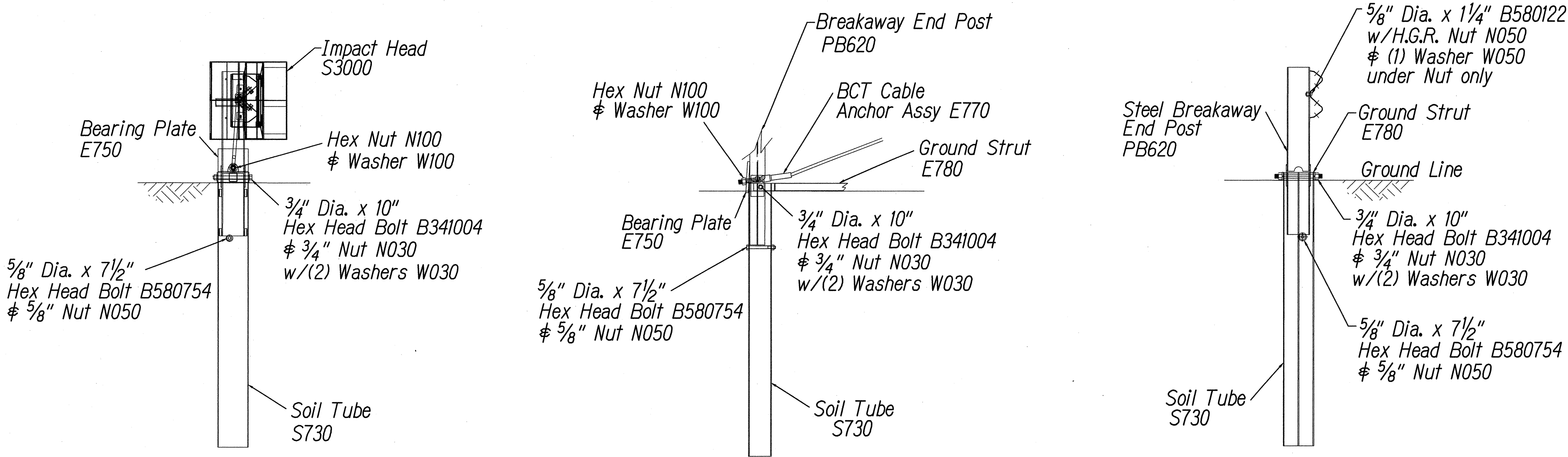
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DATE OF THE  
LICENSE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GUARDRAIL DETAILS AND NOTES	
FARRINGTON HIGHWAY	
Replacement of Maipalaoa Bridge	
Federal Aid Project No. BR-093-1(21)	
Scale: N.T.S.	Date: JUNE 2015
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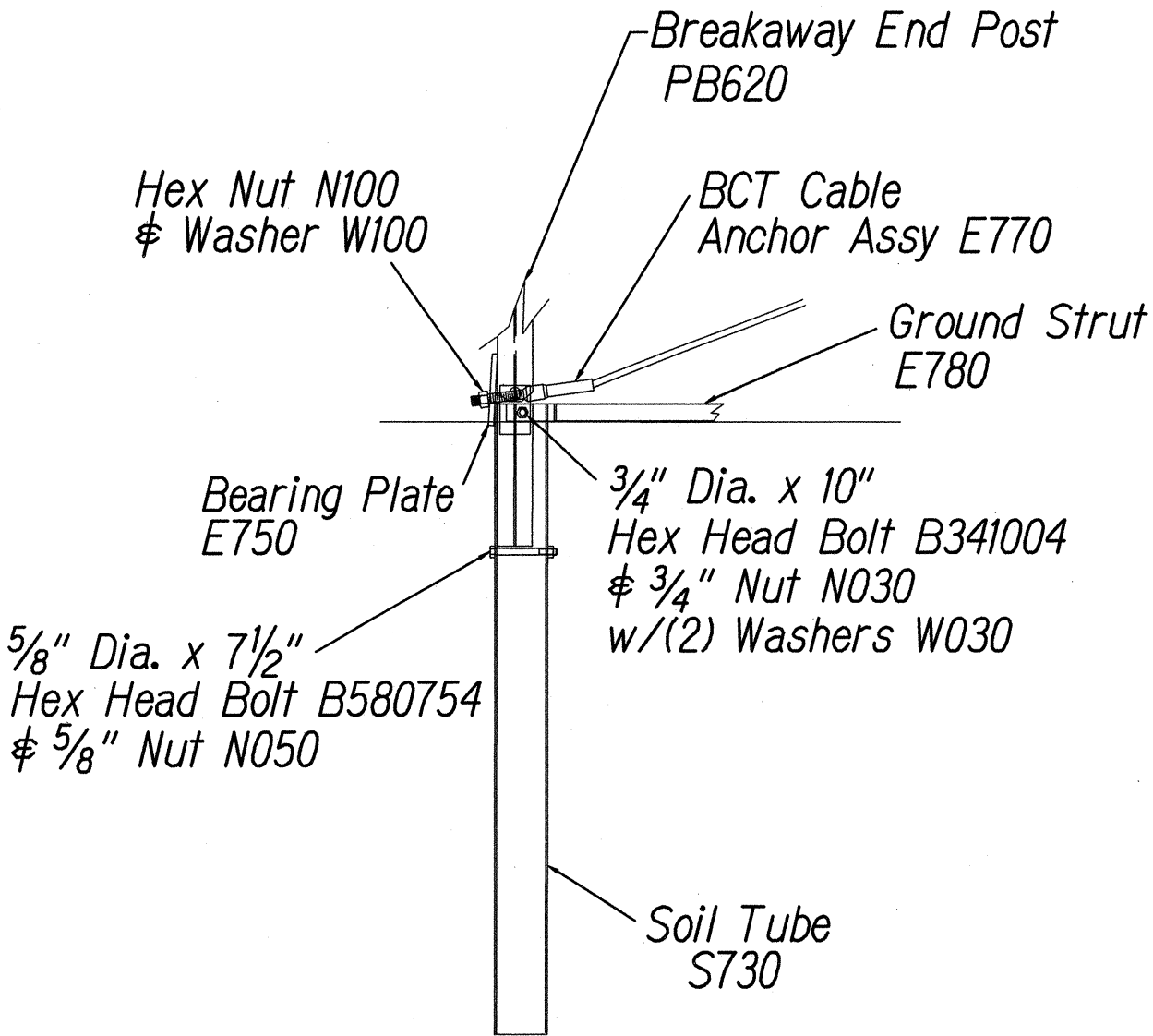


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(21)	2015	27	99

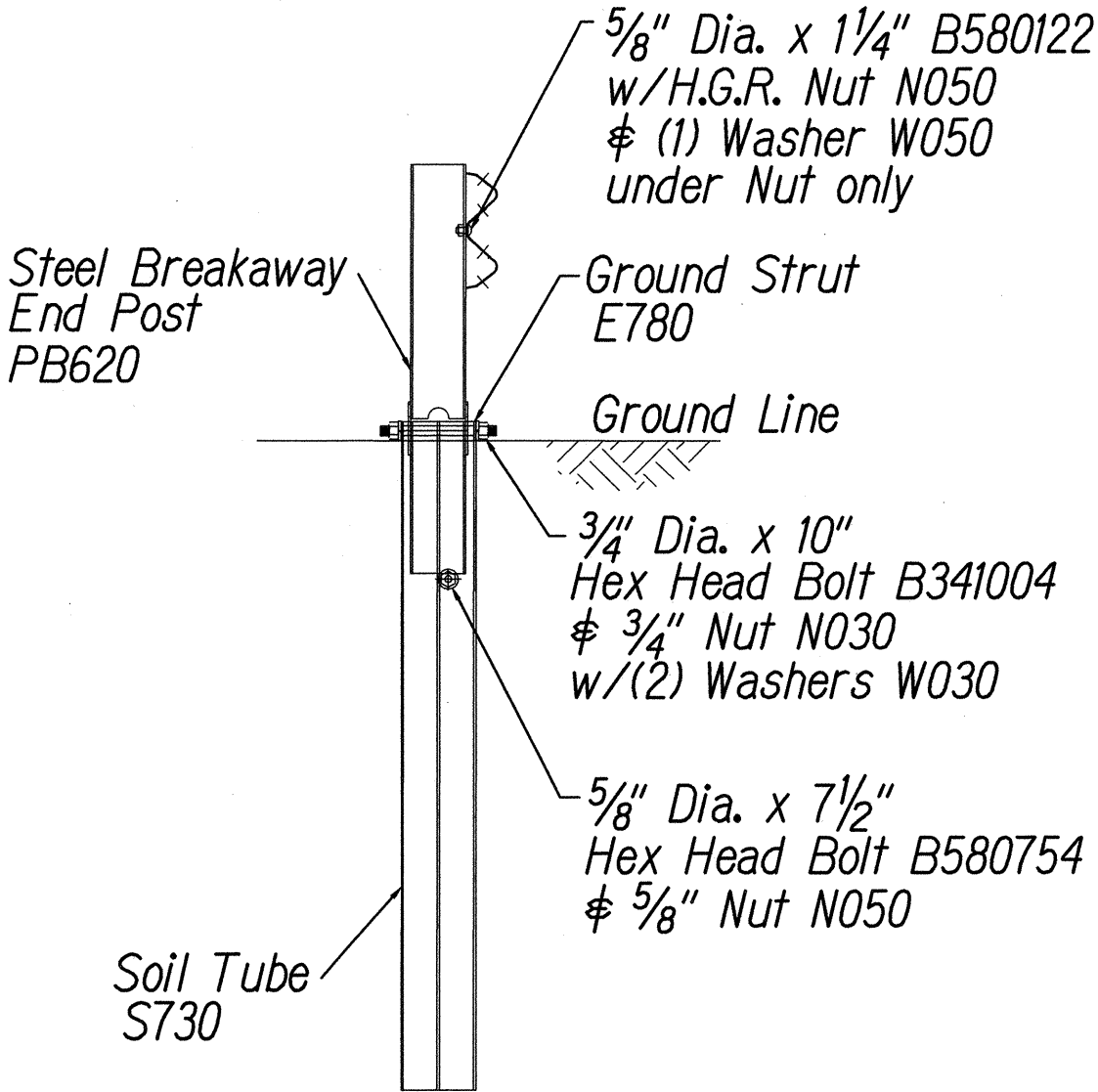
ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
SI303/SI305	1	W-BEAM GUARDRAIL END SECTION <sup>12 GA.</sup> <sub>12.5' or 25'</sub>
G1203/G1205	3/1	W-BEAM GUARDRAIL, 12 GA., 12.5' or 25'
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POSTS
PB621	6	STEEL BREAKAWAY LINE POSTS
	6	RECYCLED PLASTIC BLOCKOUTS OR OFFSET BLOCK
		HARDWARE
B580122	17/33	5/8" Dia. x 1 1/4" SPLICE BOLTS, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLTS
B341004	2	5/8" Dia. x 10" HEX BOLTS
B341002	6	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	6	5/8" Dia. x 18" H.G.R. BOLT (POST 3 THRU 8)
N050	26/42	5/8" Dia. H.G.R. NUT <sup>(SPLICE 17/33, SOIL TUBES 2, POST 2 THRU 8)</sup>
N030	2	3/4" Dia. HEX NUTS
W050	7	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 BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
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



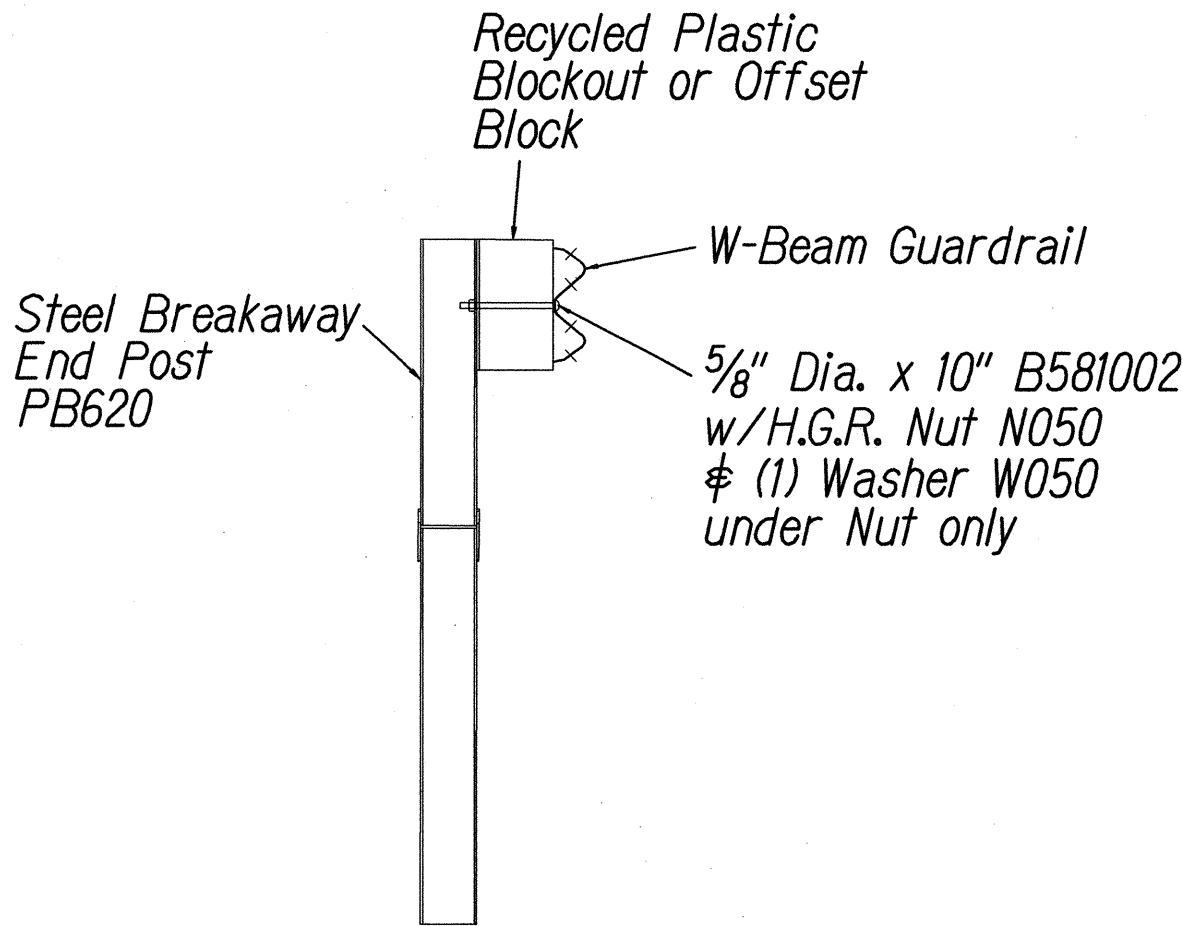
FRONT VIEW OF POST 1



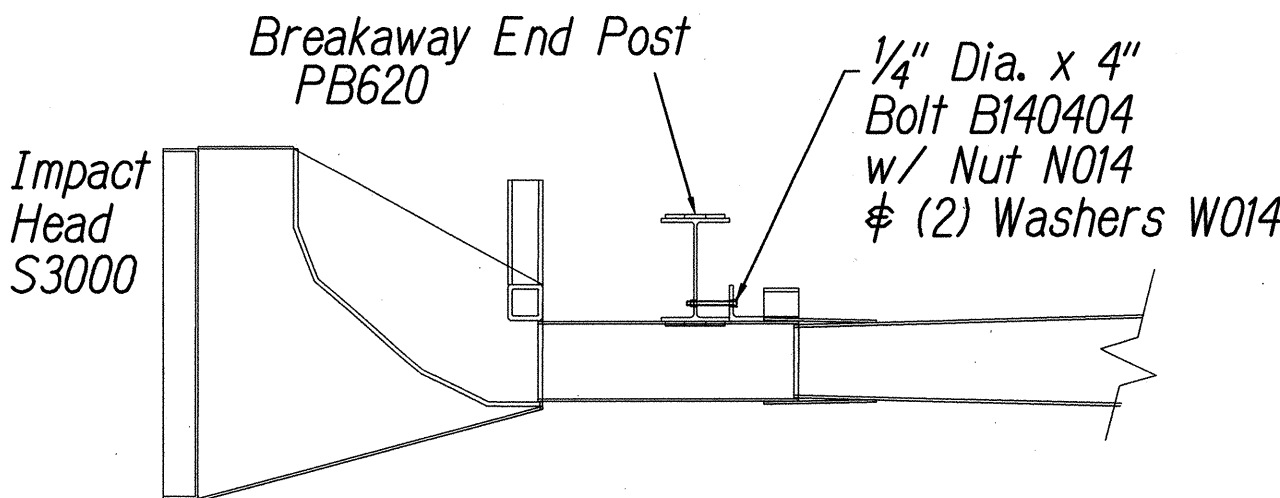
PARTIAL VIEW OF POST 1



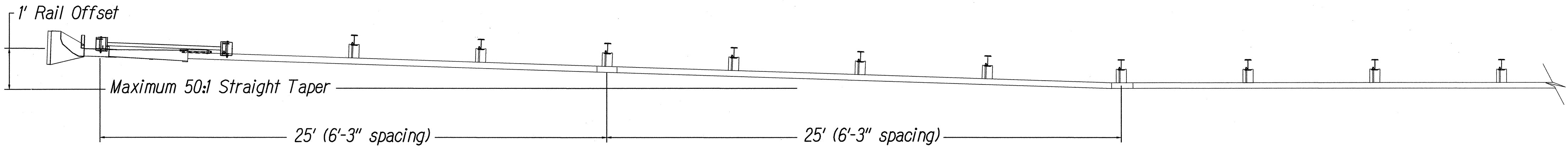
SECTION A-A  
at Post #2



SECTION B-B  
typical @ Post 3 thru 8

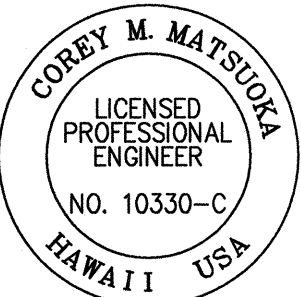


IMPACT HEAD CONNECTION DETAIL



DETAIL A  
optional flared installation, 50:1 maximum flare rate

SKT-350



THIS WORK WAS PREPARED BY ME  
OR UNDER MY SUPERVISION

*Corey Matsuka*  
SIGNATURE

4/30/16  
EXPIRATION  
DATE OF THE  
LICENSE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

### GUARDRAIL DETAILS AND NOTES

FARRINGTON HIGHWAY

Replacement of Maipalaoa Bridge

Federal Aid Project No. BR-093-1(21)

Scale: N.T.S.      Date: JUNE 2015

SHEET No. 8 OF 8 SHEETS