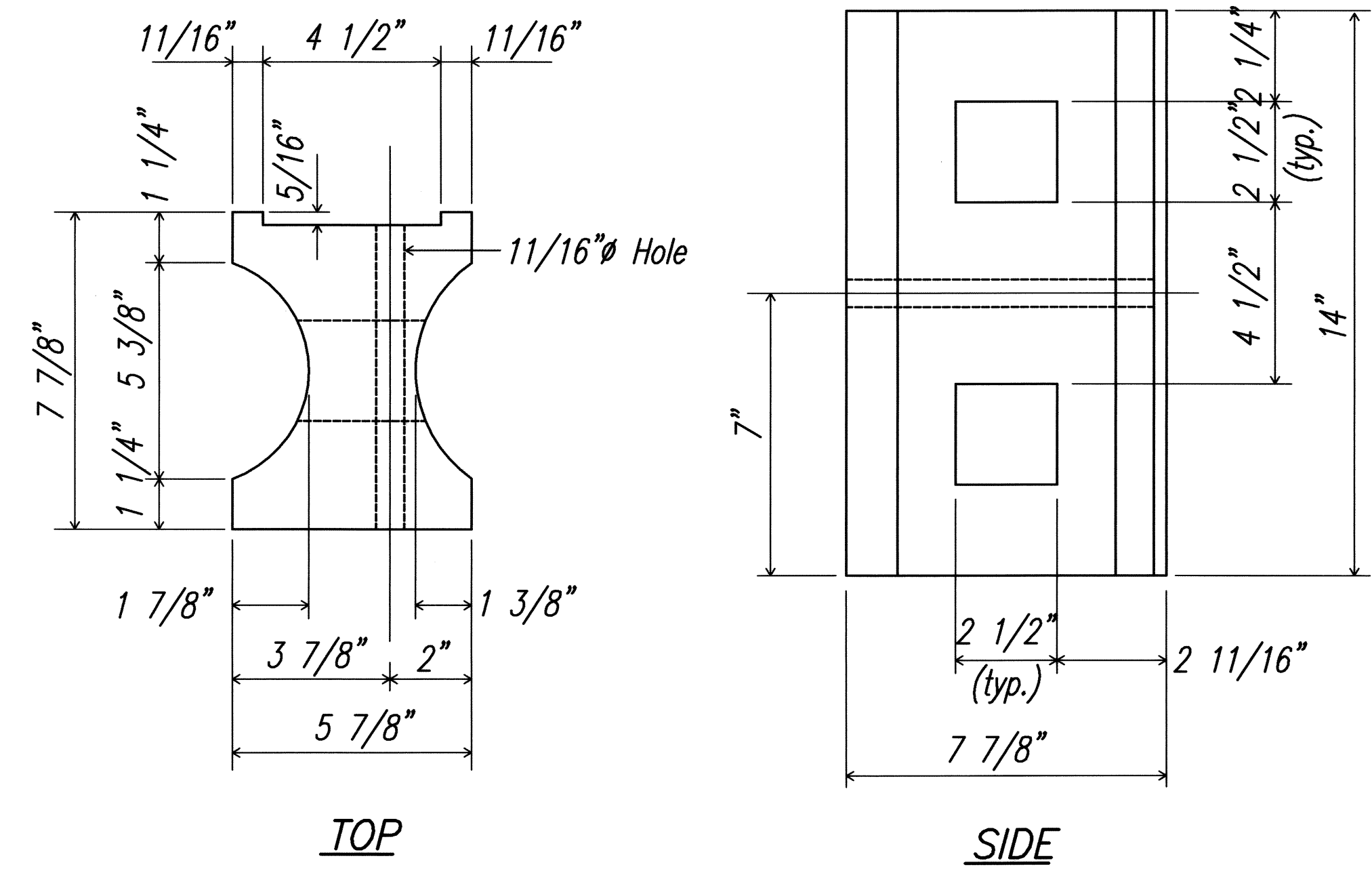


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37CDE-01-07M	2009	7	57

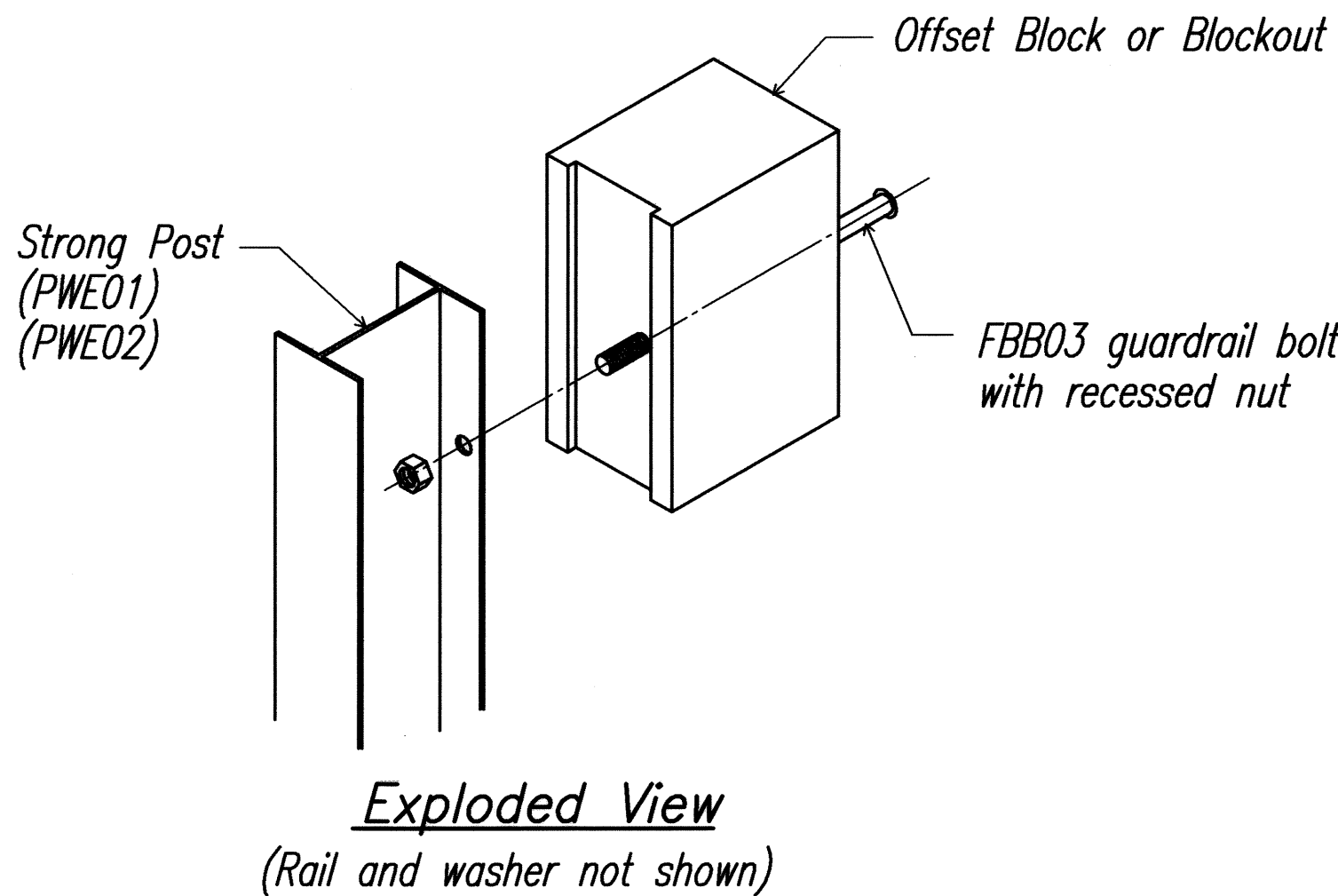
GENERAL NOTES

- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02b, etc.) shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware", a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fastners, posts and rail elements have been converted from metric units into their present form.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
- After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. RM-5's shall not be installed on Terminal Sections. Furnishing and installing of each RM-5 shall be considered incidental to the adjacent guardrail system.

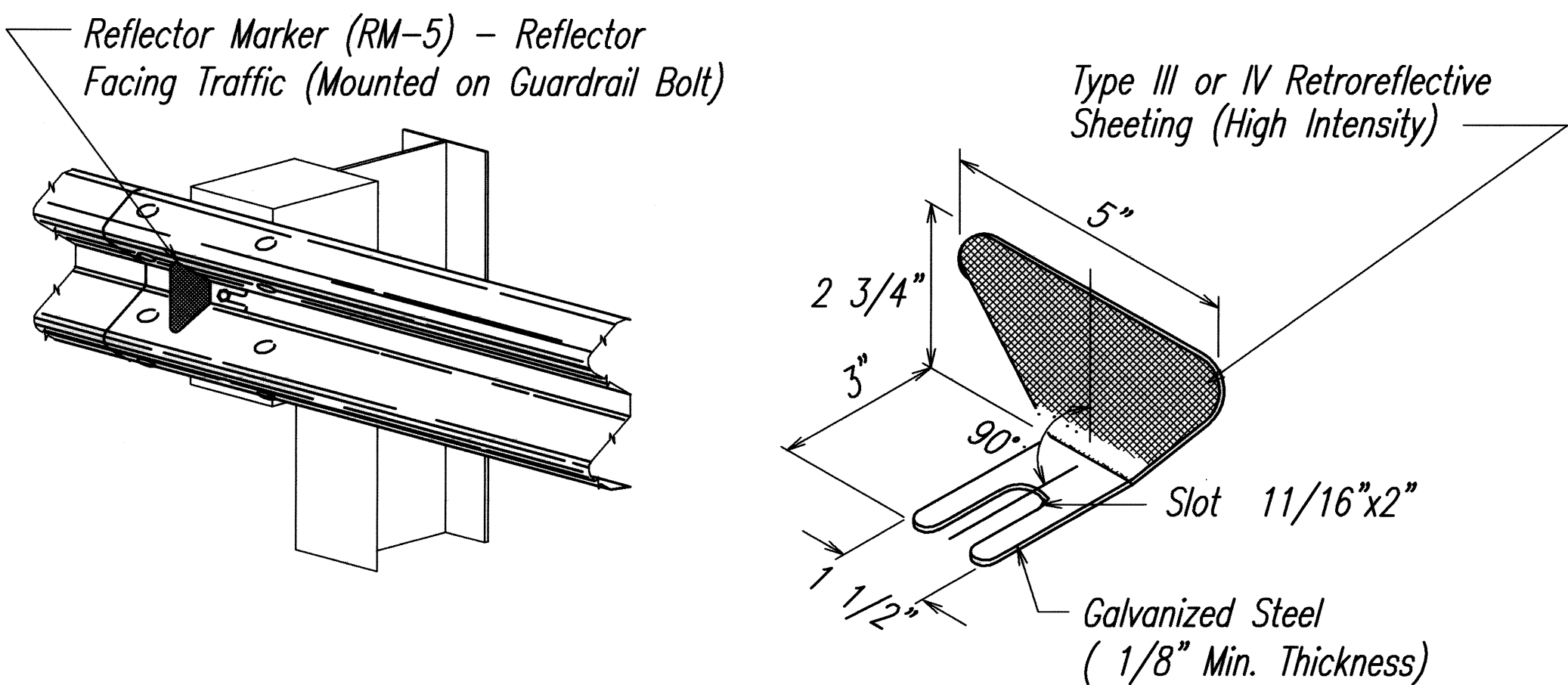
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



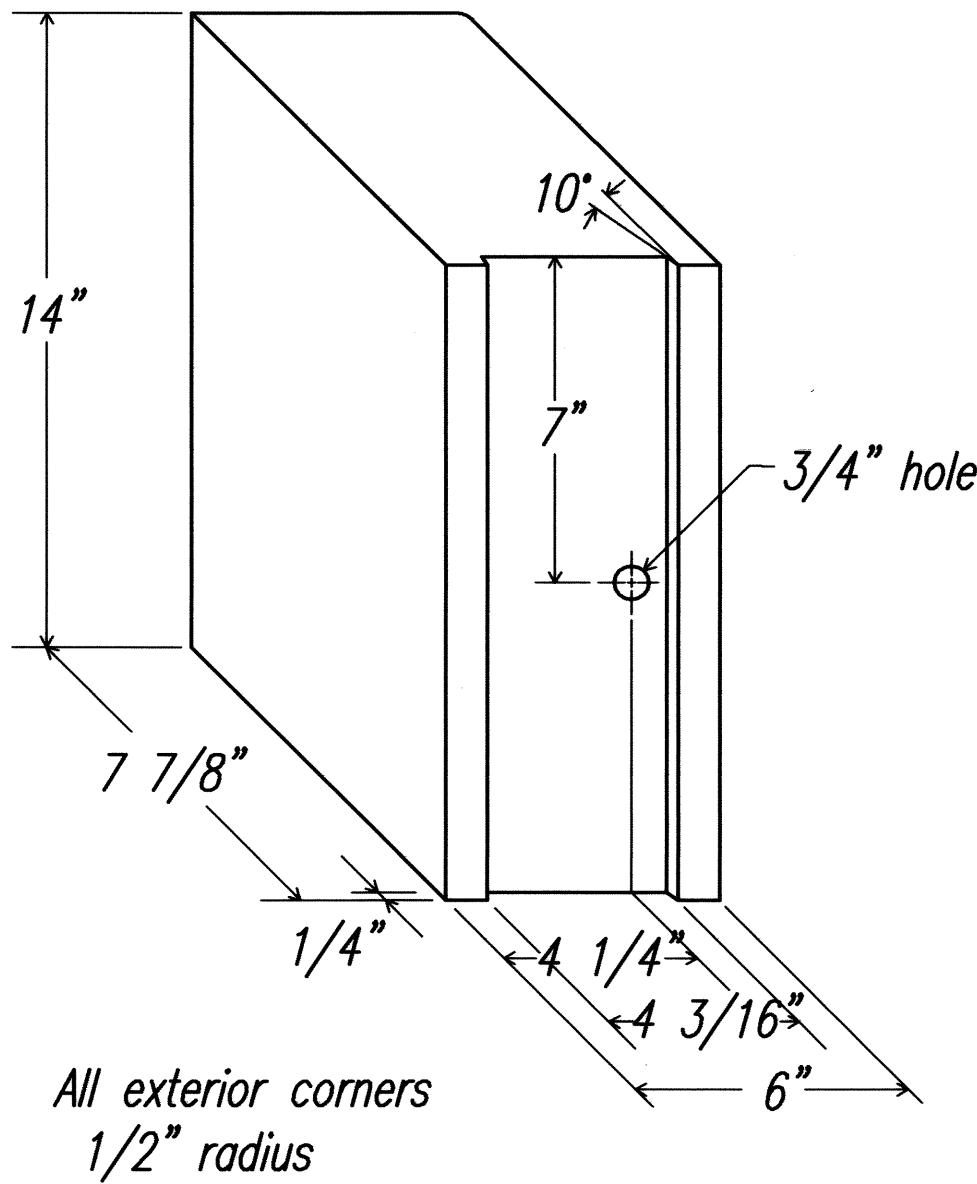
TOP
SIDE
RECYCLED PLASTIC BLOCKOUT (TYPE I)



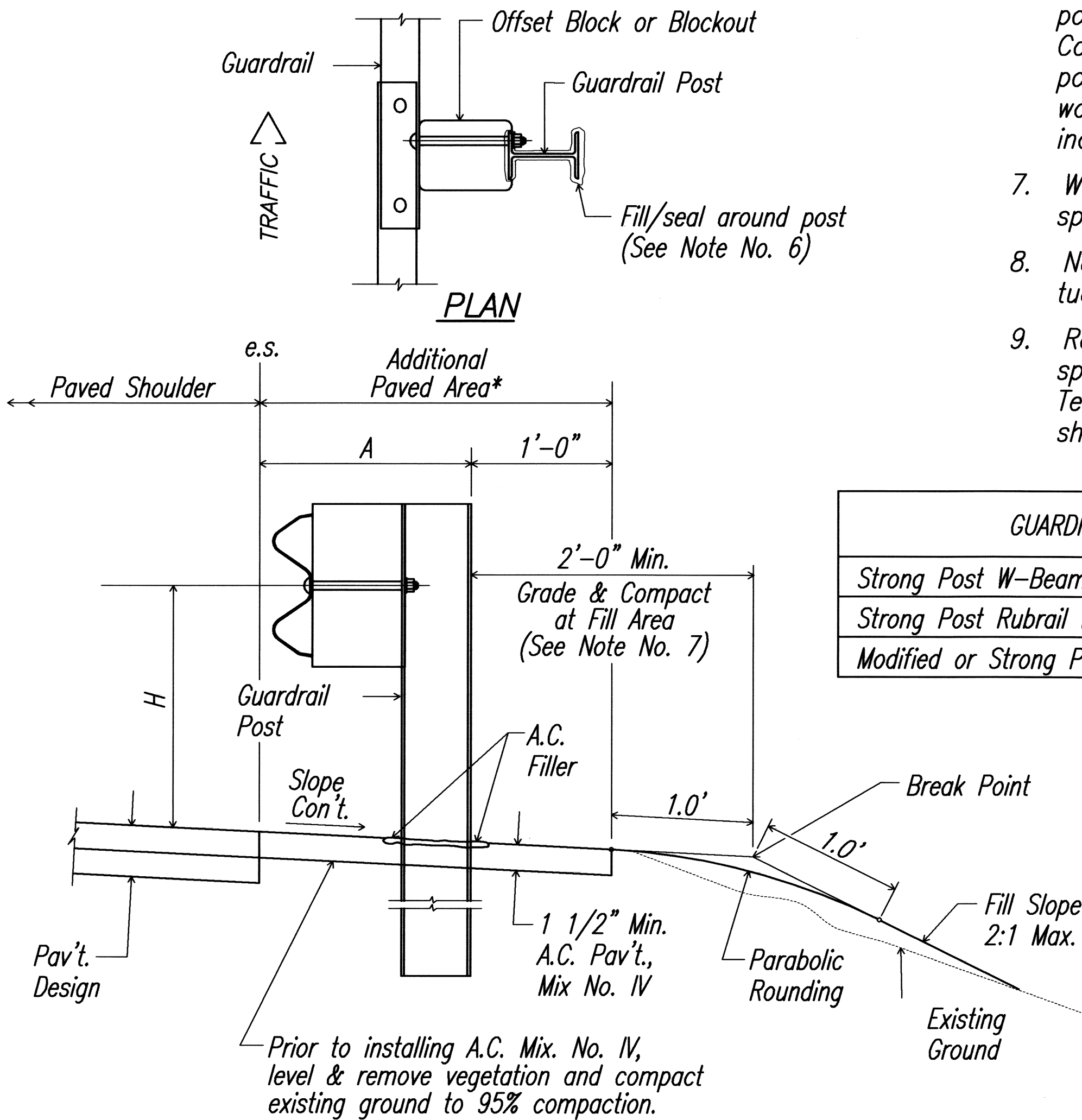
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)



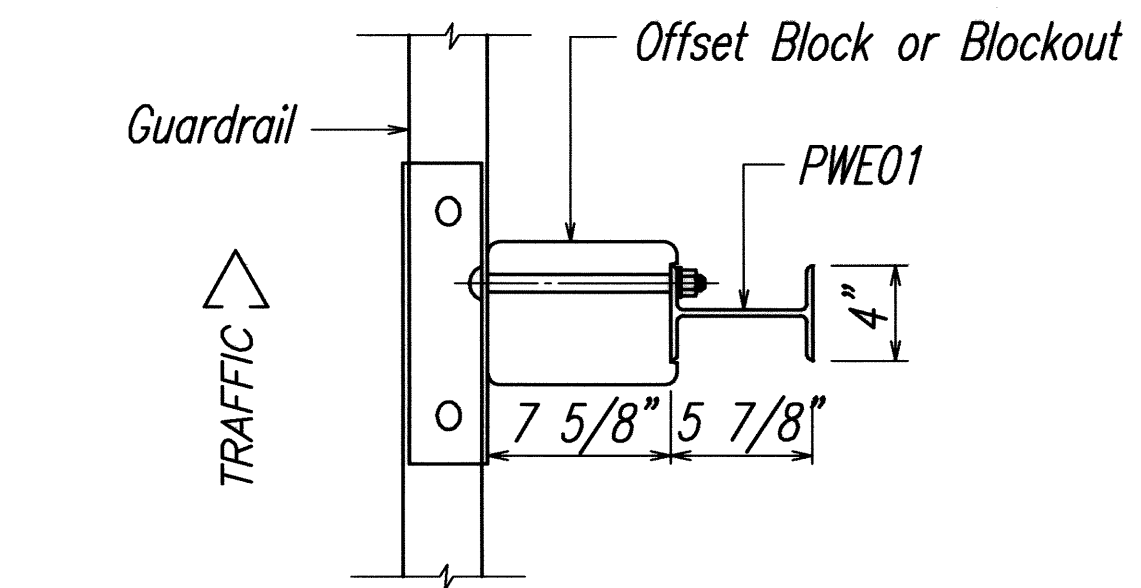
ELEVATION

TYPICAL GUARDRAIL INSTALLATION

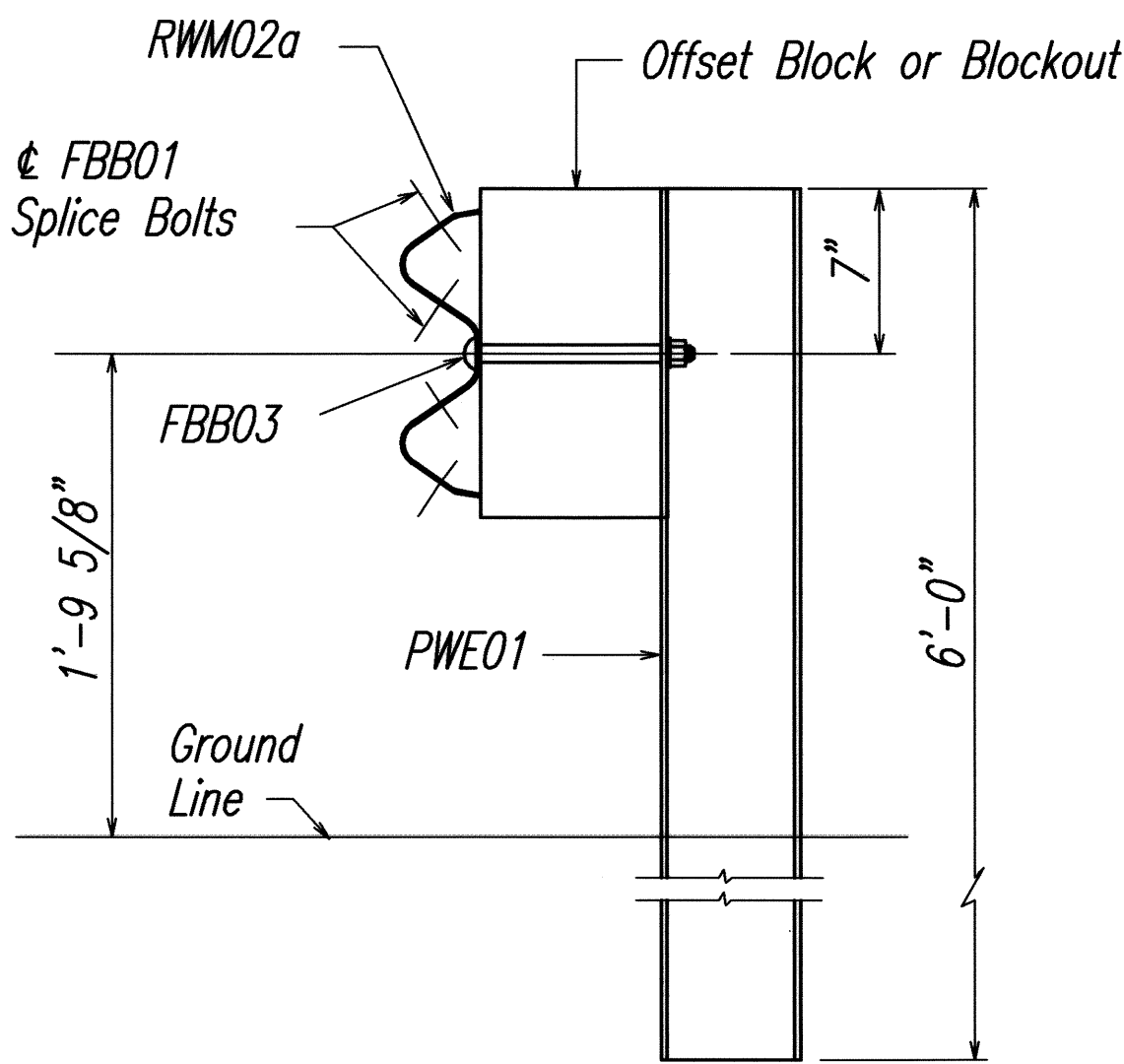
ORIGINAL PLAN	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
QUANTITIES BY	DATE
CHECKED BY	DATE
No.	

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <u>GUARDRAIL DETAILS AND NOTES</u> KULA HIGHWAY RESURFACING KEKAULIKE AVENUE TO ULUPALAKUA PROJECT NO. 37CDE - 01 - 07M	
LICENSE EXPIRES 4/30/2010 This work was prepared by me or under my supervision and construction of this project will be under my observation.	Scale: AS NOTED Date: May 2009 SHEET No. 1 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37CDE-01-07M	2009	8	57

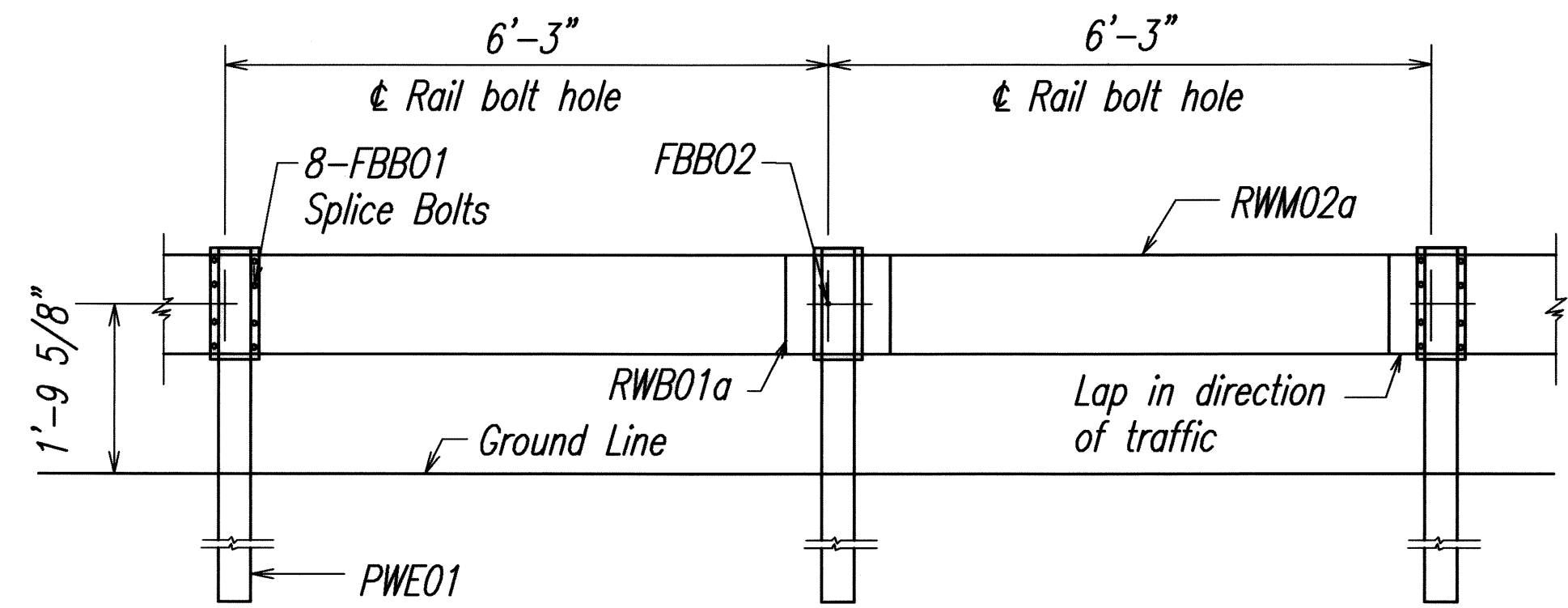


PLAN



ELEVATION

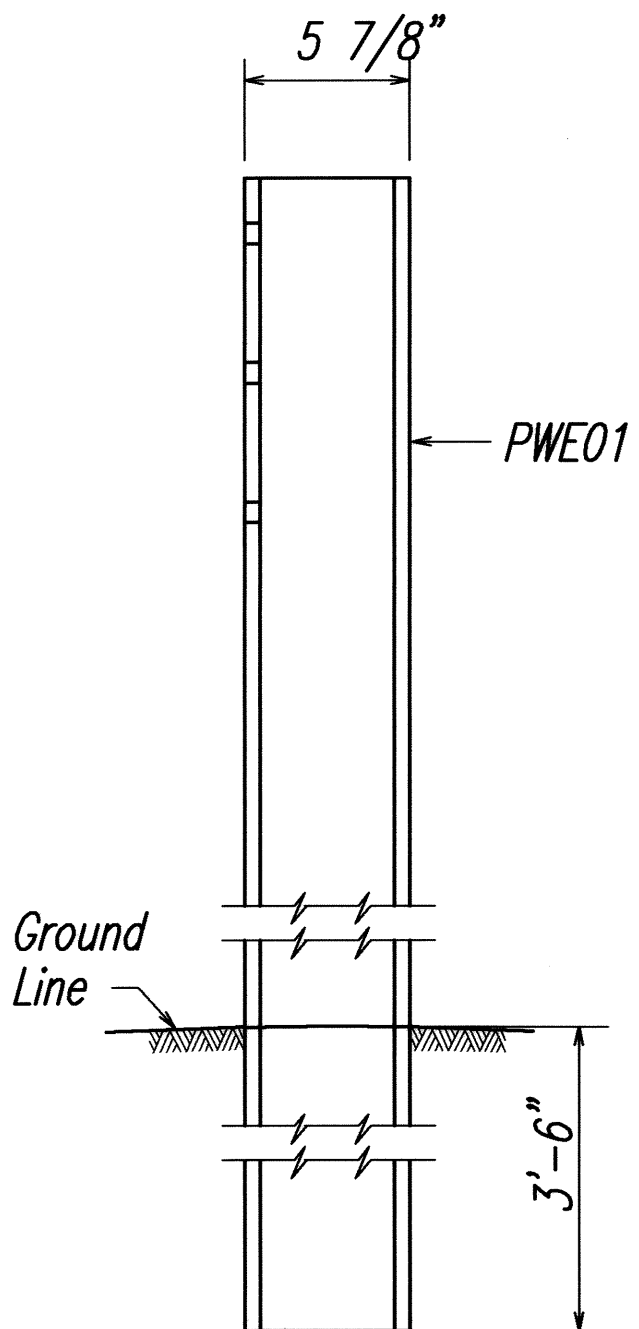
STRONG POST W-BEAM GUARDRAIL
(SGR04a)



ELEVATION

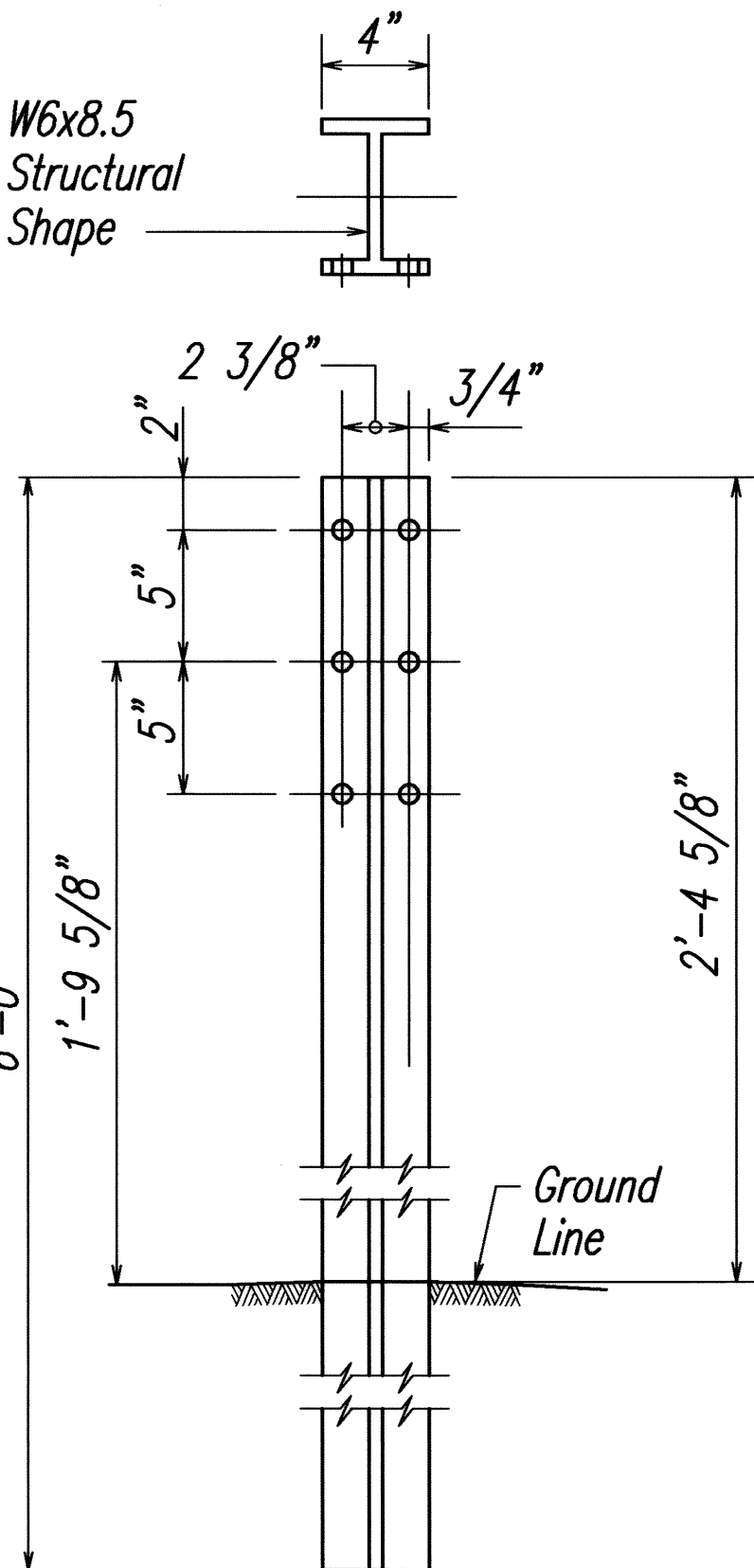
STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

NOTE:
All Holes are
3/4" Dia.

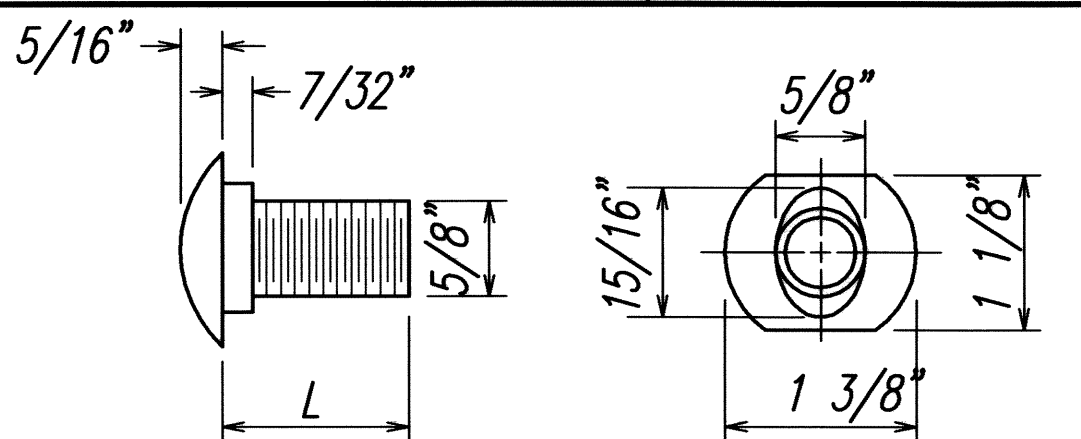


SIDE

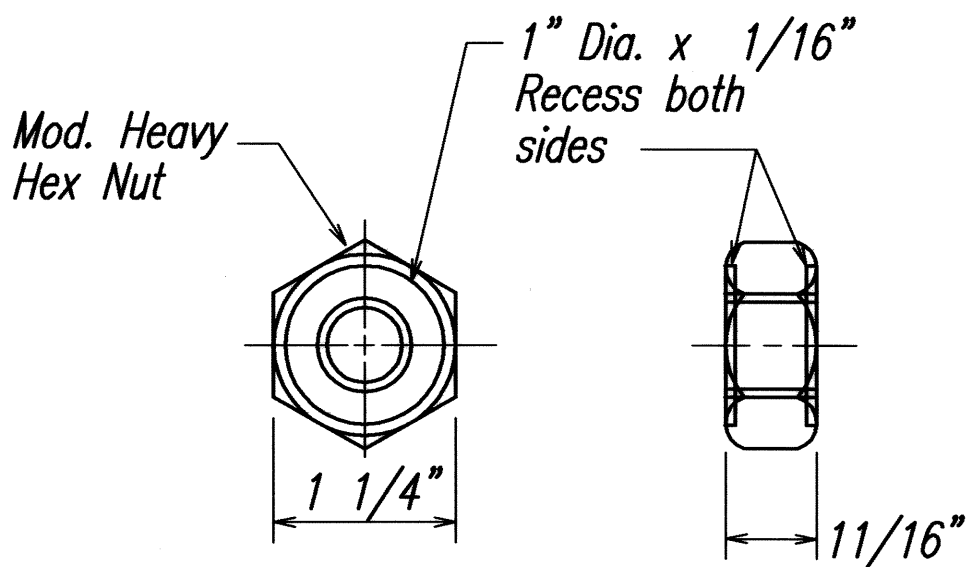
W-BEAM STRONG POST (PWE01)



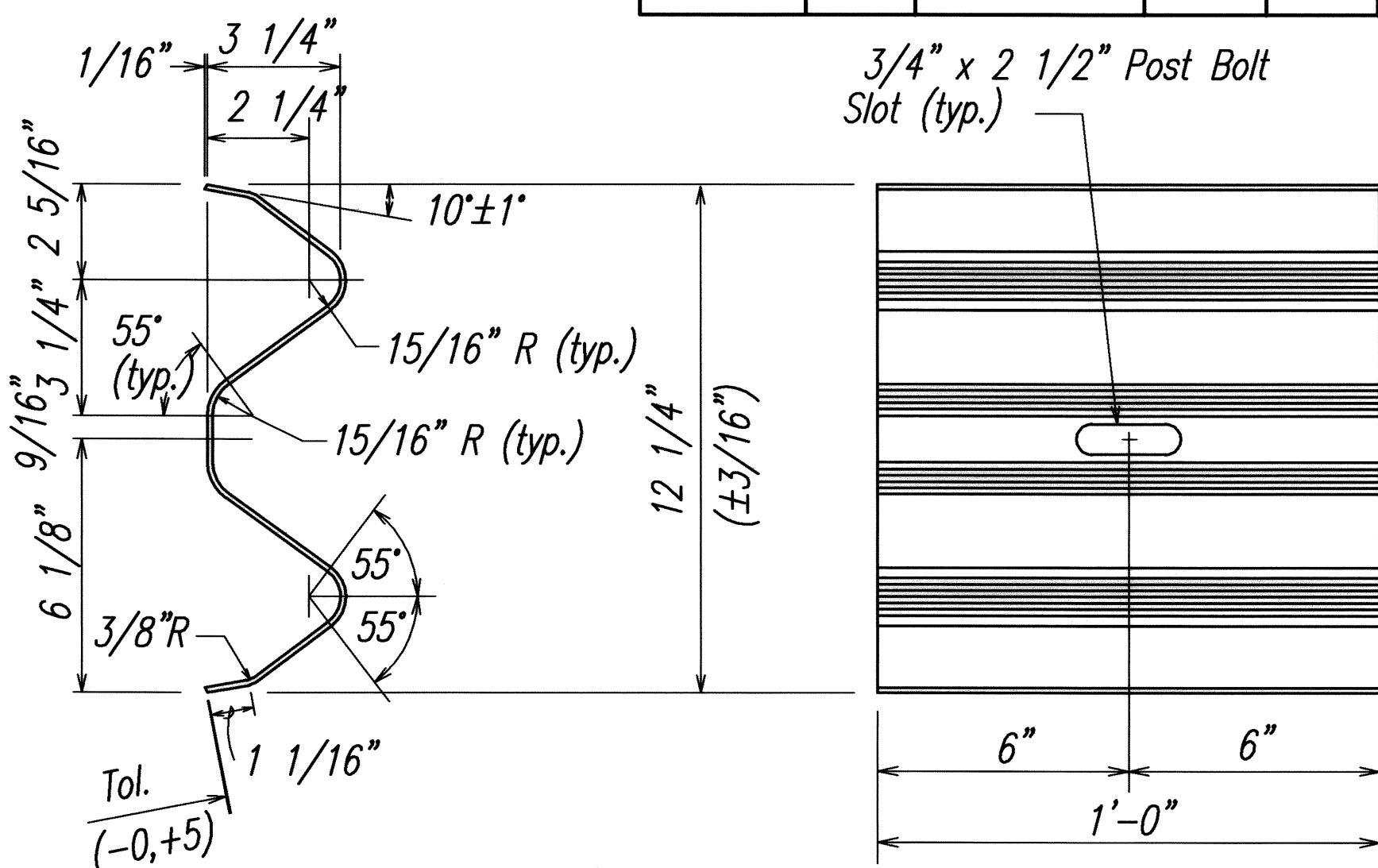
FRONT



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

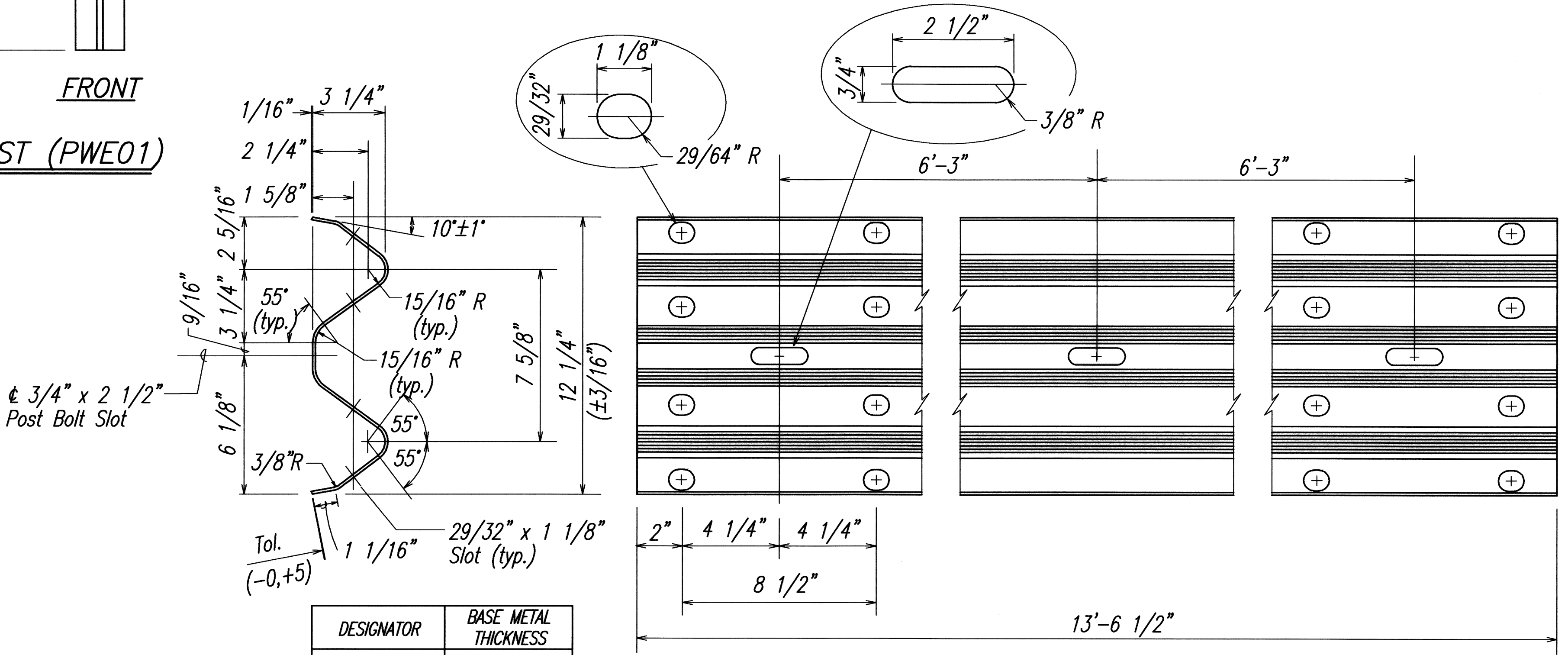


GUARDRAIL BOLTS AND
RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)

ORIGINAL PLAN	DATE
DESIGNED BY	DATE
NOTED BY	DATE
CHECKED BY	DATE
NO.	

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

KULA HIGHWAY RESURFACING

KEKAULIKE AVENUE TO ULUPALAKUA

PROJECT NO. 37CDE - 01 - 07M

LICENSE EXPIRES 4/30/2010

This work was prepared by me or under my supervision and construction of this project will be under my observation.

Scale: AS NOTED

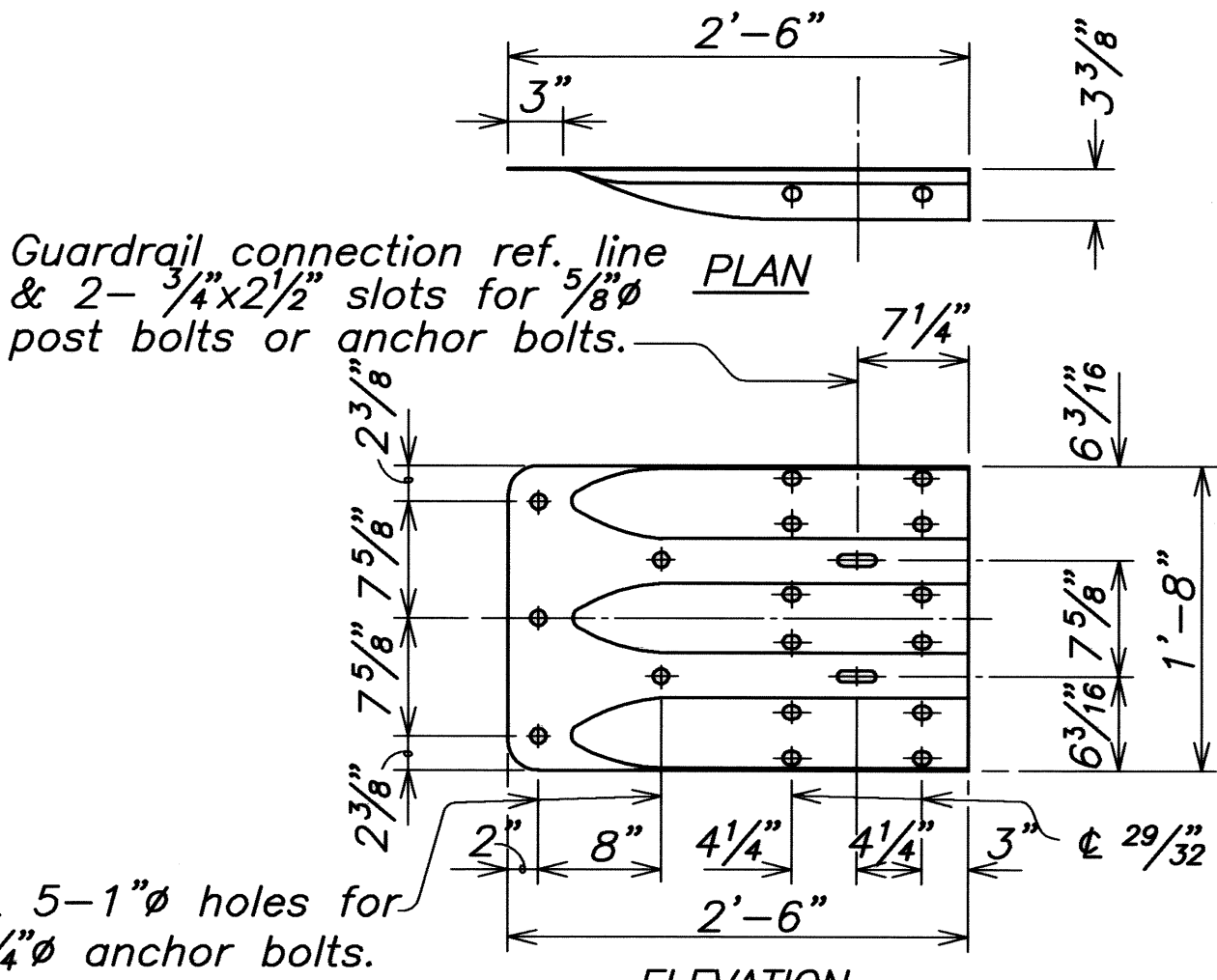
Date: May 2009

SHEET No. 2 OF 6 SHEETS

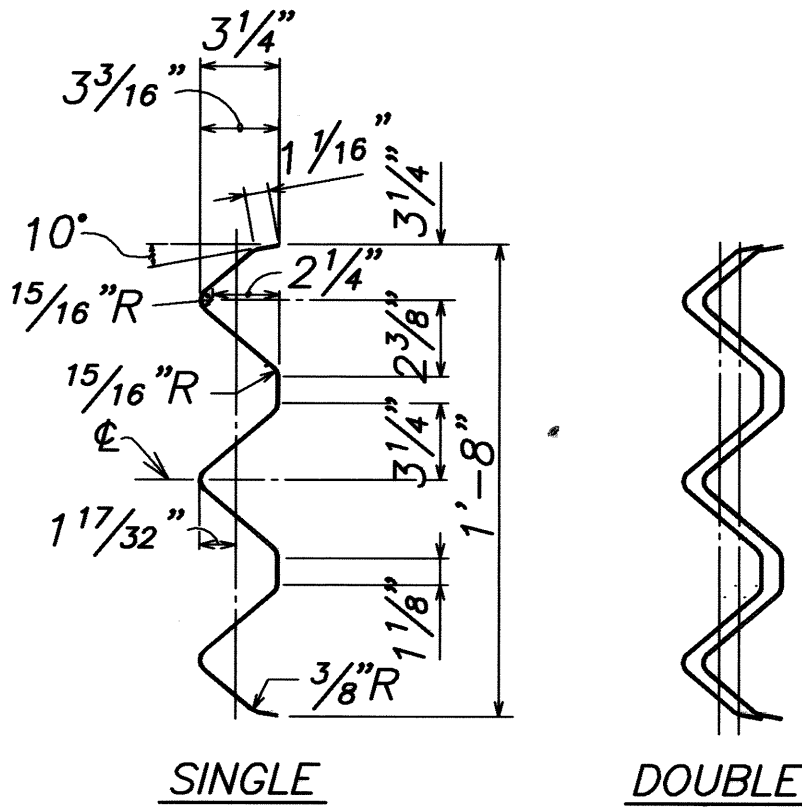
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37CDE-01-07M	2009	9	57

NOTES:

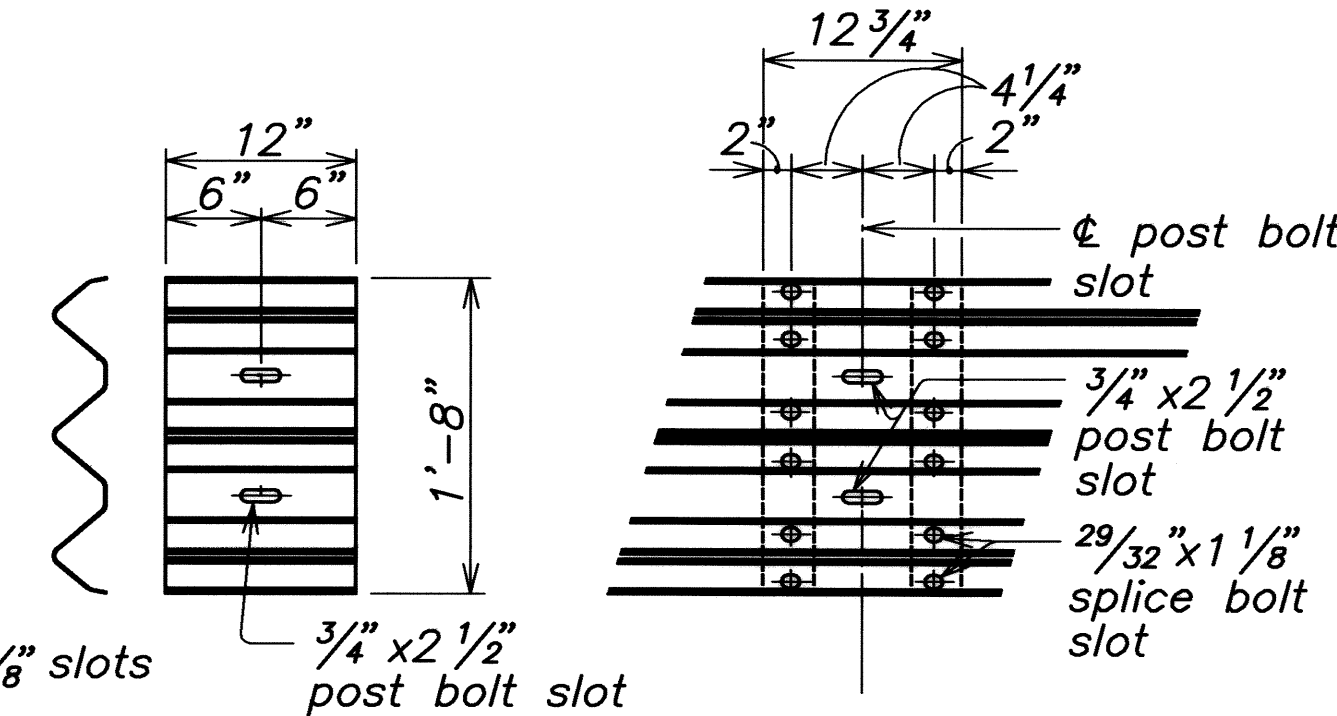
- A. The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Guardrail Type 3 Thrie Beam of Steel Post and will not be paid for separately.
- B. Lap terminal connector and rail element in direction of traffic to prevent snagging.
- C. All anchor bolts shall be high strength bolts conforming to the requirements of ASTM 325 and Standard Specification, Section 713.04.
- D. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
- E. "Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180, Type II, from Class B.
- F. "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
- G. Cap PL shall be fabricated from ASTM A 36.
- H. 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.
- I. Double (nest 1st panel) thrie beam elements at all end post connections, expect on on trailing end only.
- J. Where double (nested) beam occur, 12" "Back-up Plate" not required.
- K. Heads of through anchor bolts shall be placed on the traffic side of the rail.
- L. All steel shapes, rails and plates shall conform to ASTM A 36 specifications.



TERMINAL CONNECTOR
Scale: 1"=1'-0"

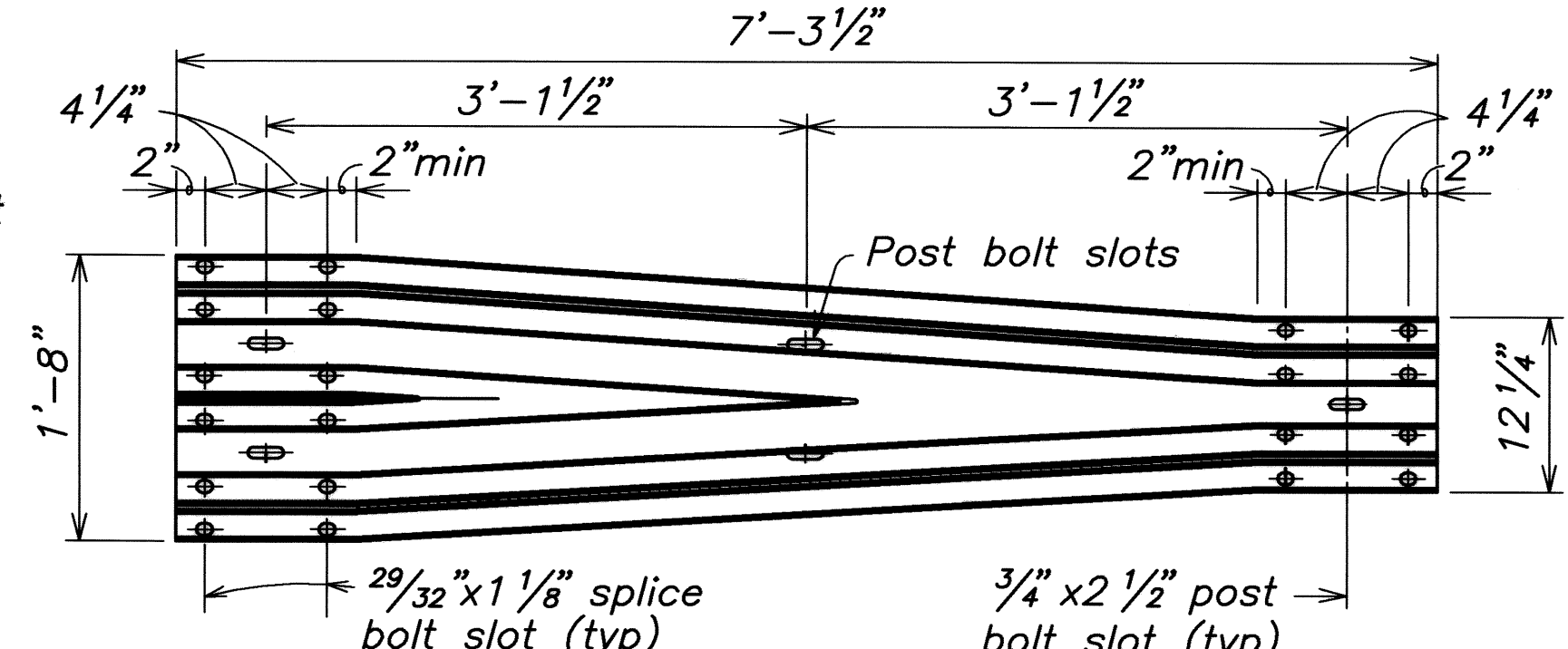


SECTION THRU
RAIL ELEMENT
Scale: 1 1/2"=1'-0"

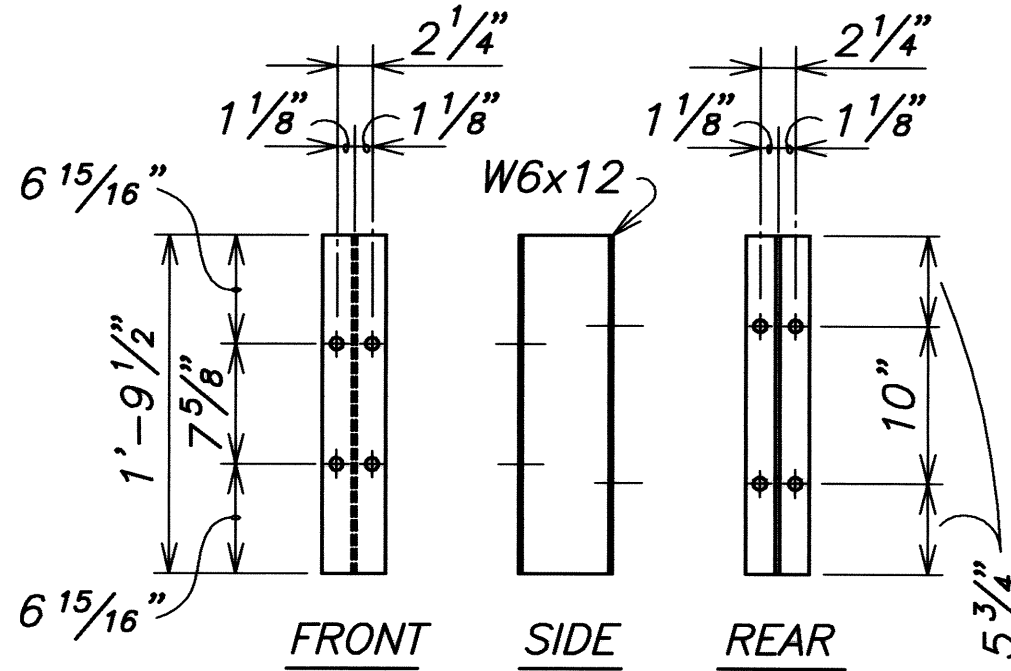


BACKUP PLATE
Scale: 1"=1'-0"

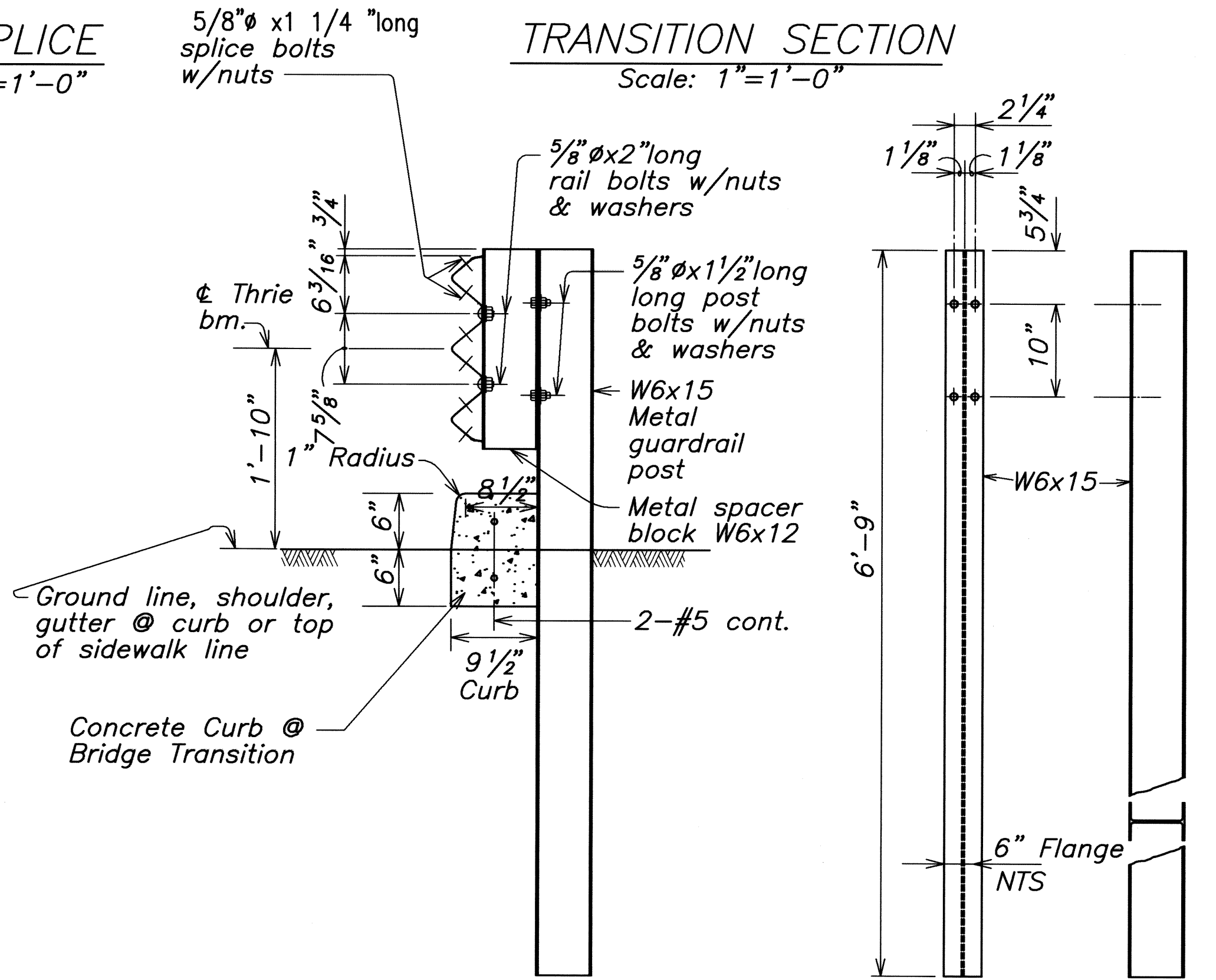
RAIL SPLICE
Scale: 1"=1'-0"



TRANSITION SECTION
Scale: 1"=1'-0"



SPACER BLOCK DETAILS
Scale: 1"=1'-0"



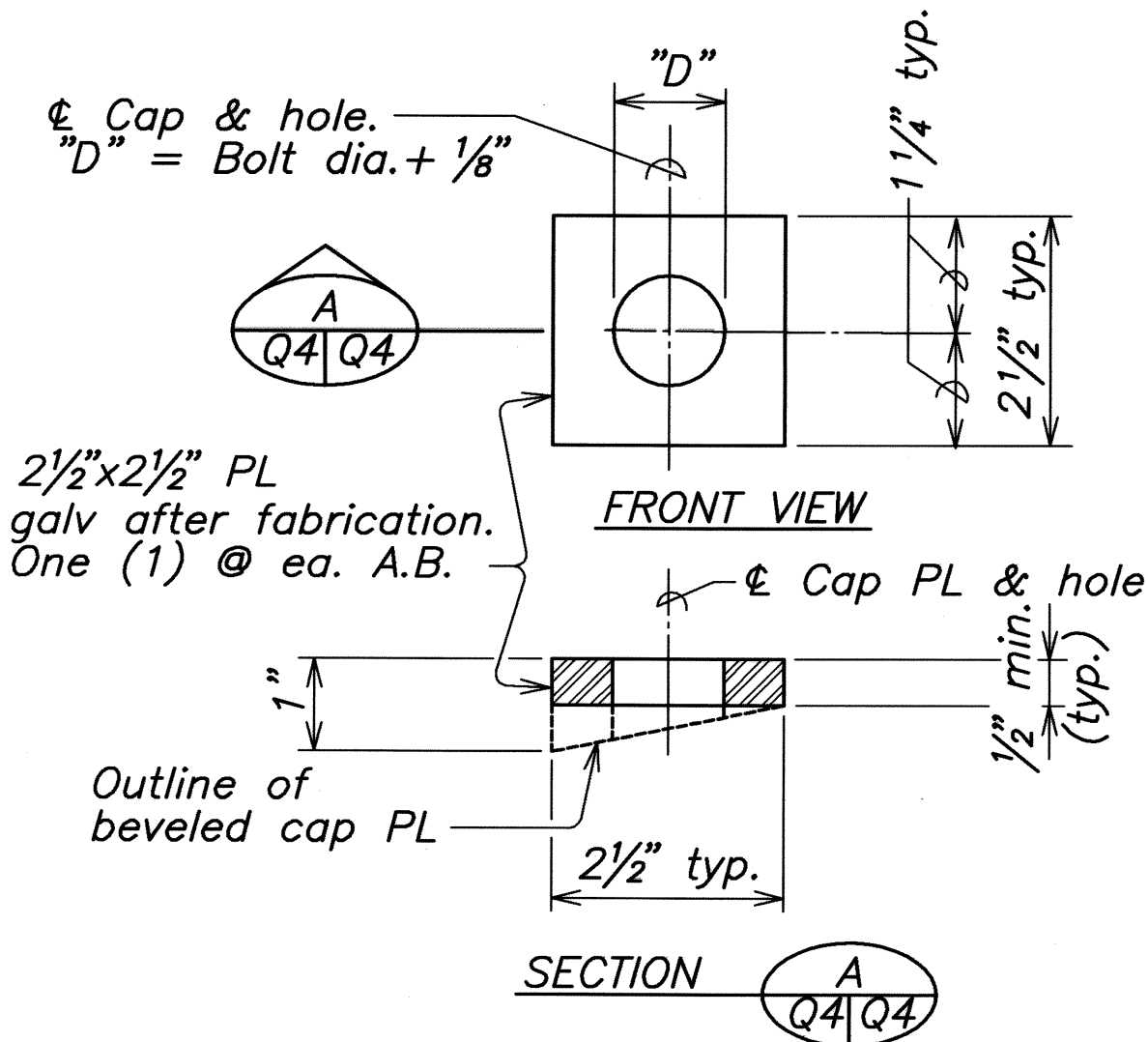
TYPICAL SECTION

METAL GUARDRAIL ON METAL POST
WITH METAL SPACER BLOCK
Scale: 1"=1'-0"

FRONT

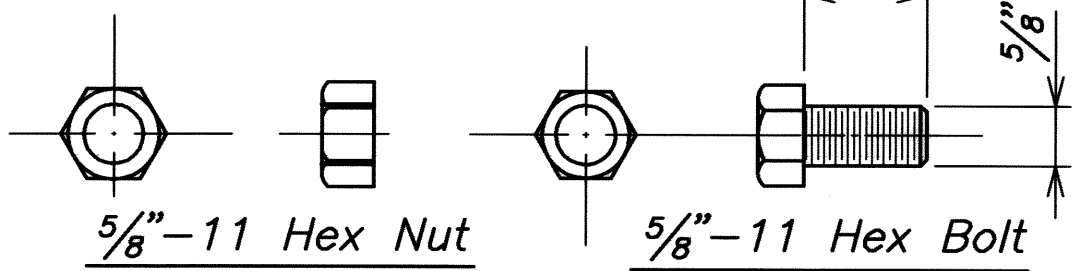
POST DETAILS
Scale: 1"=1'-0"

SIDE

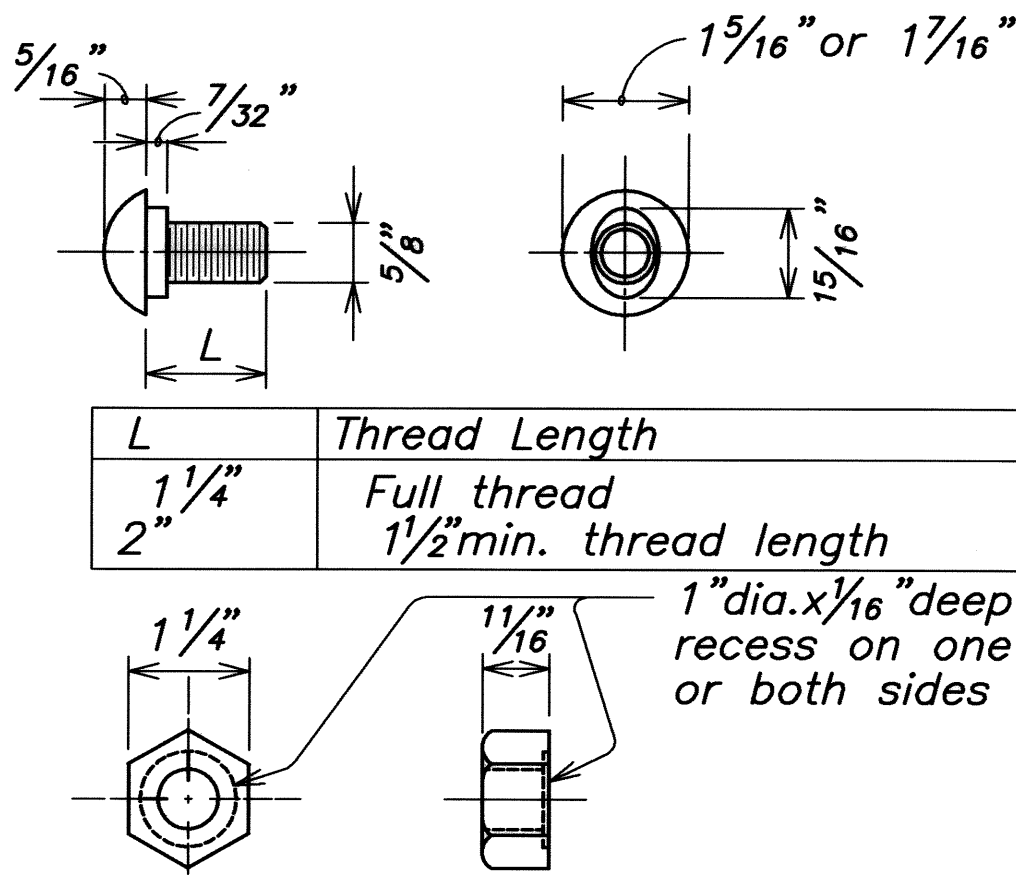


CAP (BEARING) PLATE DETAIL
Scale: 6"=1'-0"

STEEL WASHER FOR 5/8" BOLT
Scale: 6"=1'-0"



5/8" HEX BOLT & NUT
Scale: 6"=1'-0"



5/8" BUTTON HEAD BOLT
& RECESS NUT
Scale: 6"=1'-0"

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
QUANTITIES BY	DATE
CHECKED BY	DATE
No.	

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

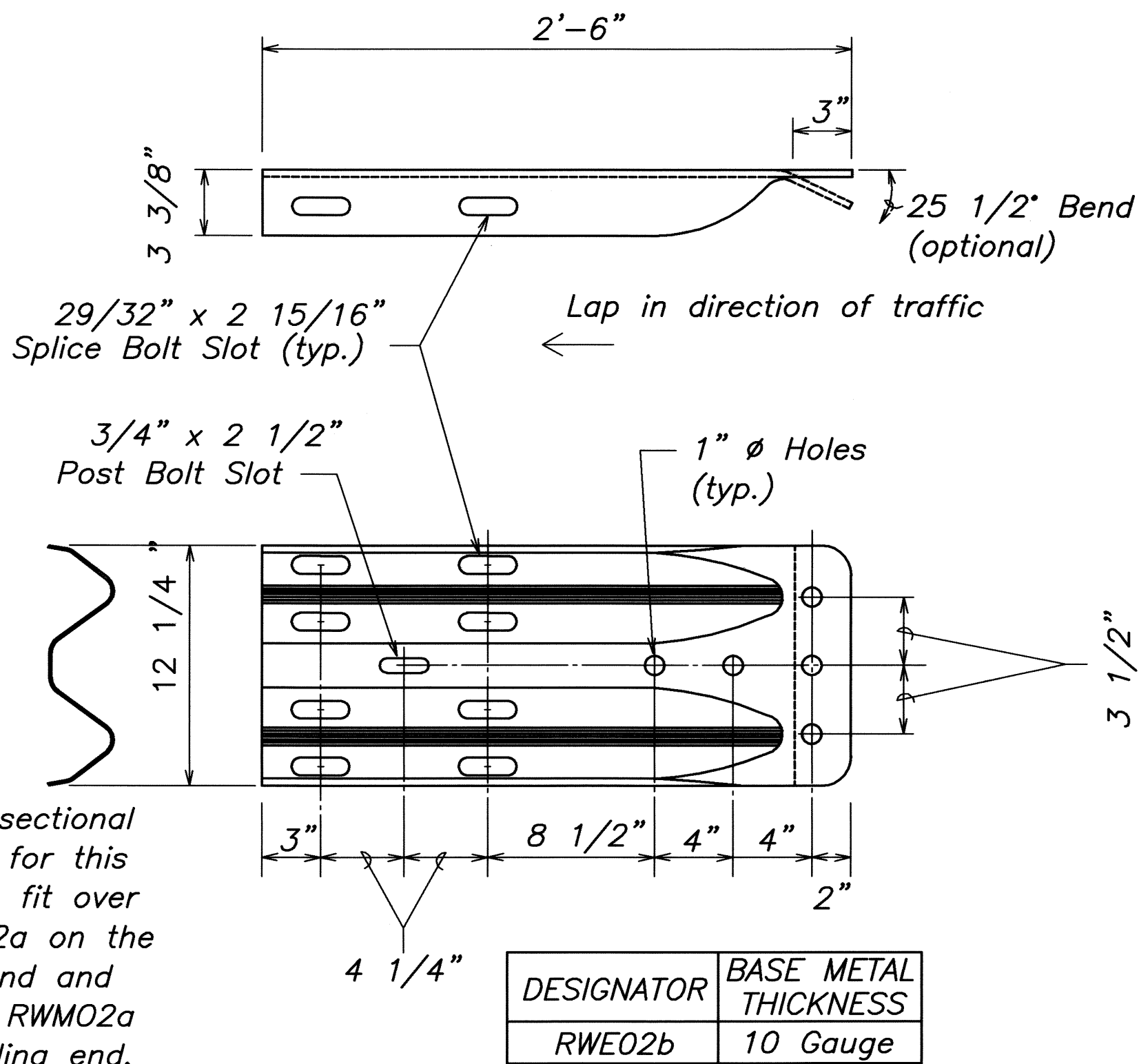
METAL GUARDRAIL TYPE 3 THRIE BEAM
TRANSITION AND APPURTENANCES DETAILS

KULA HIGHWAY RESURFACING
KEKAULIKE AVENUE TO ULUPALAKUA
PROJECT NO. 37CDE - 01 - 07M

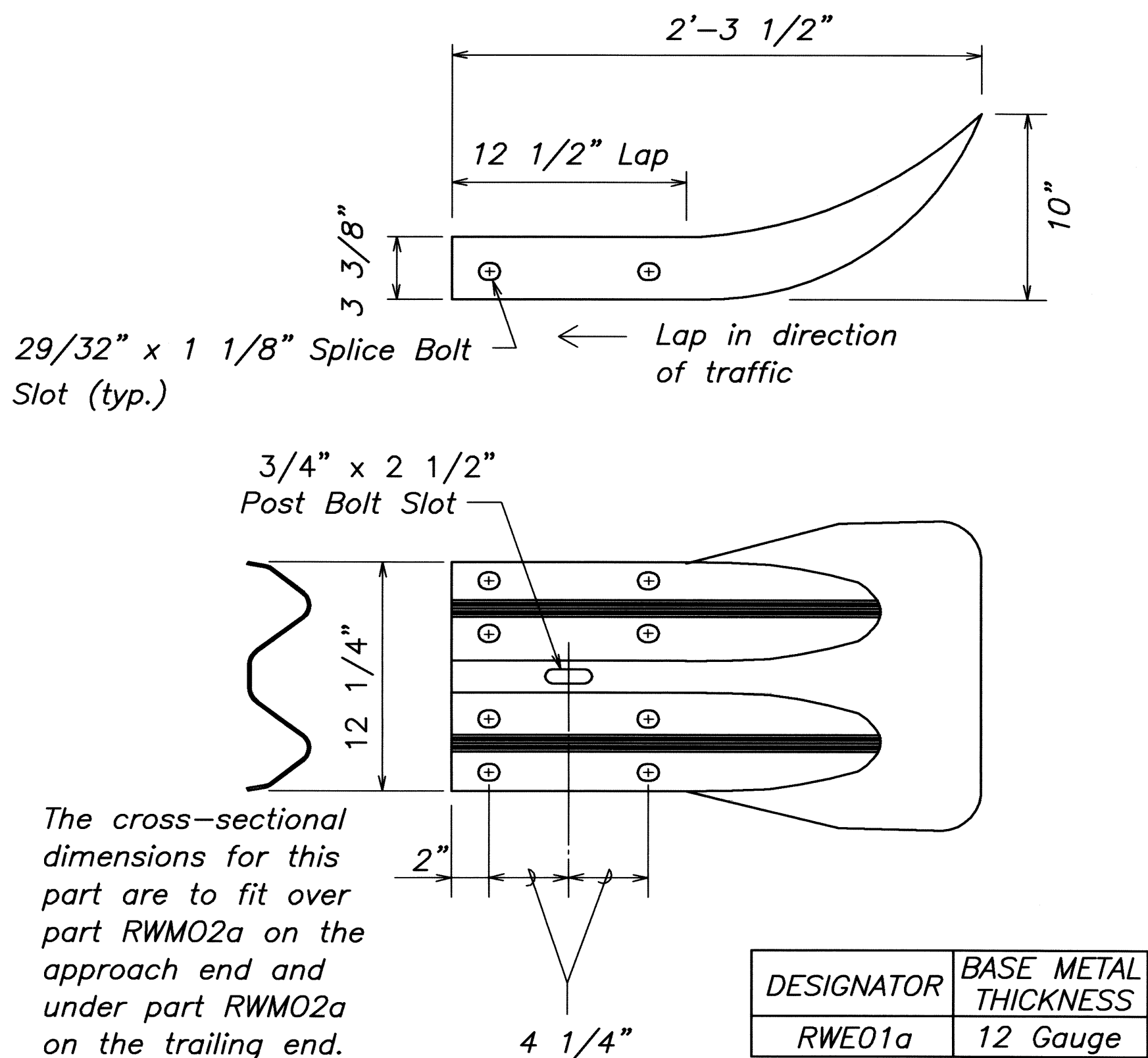
Scale: AS NOTED Date: May 2009

SHEET No. 3 OF 6 SHEETS

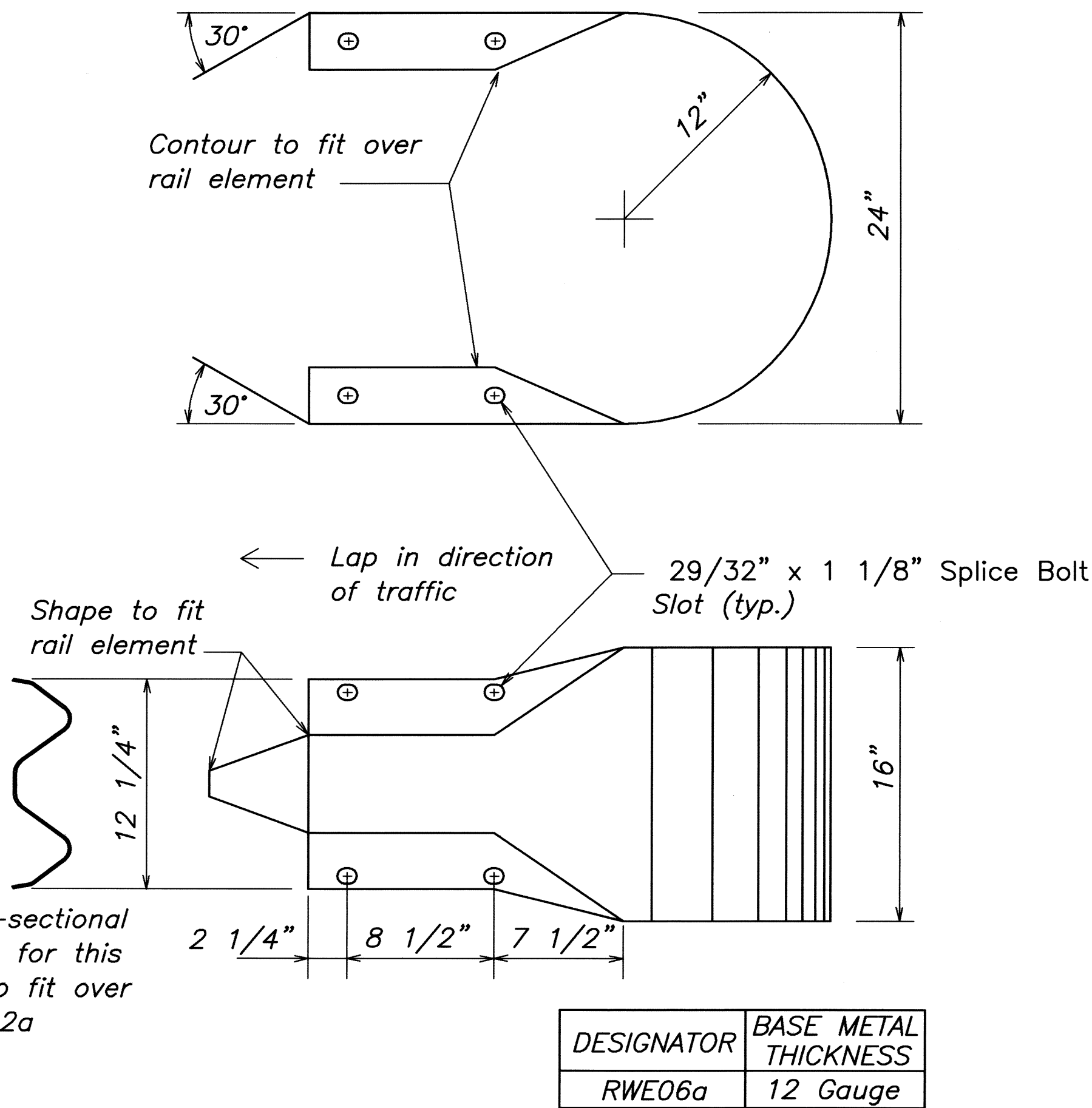
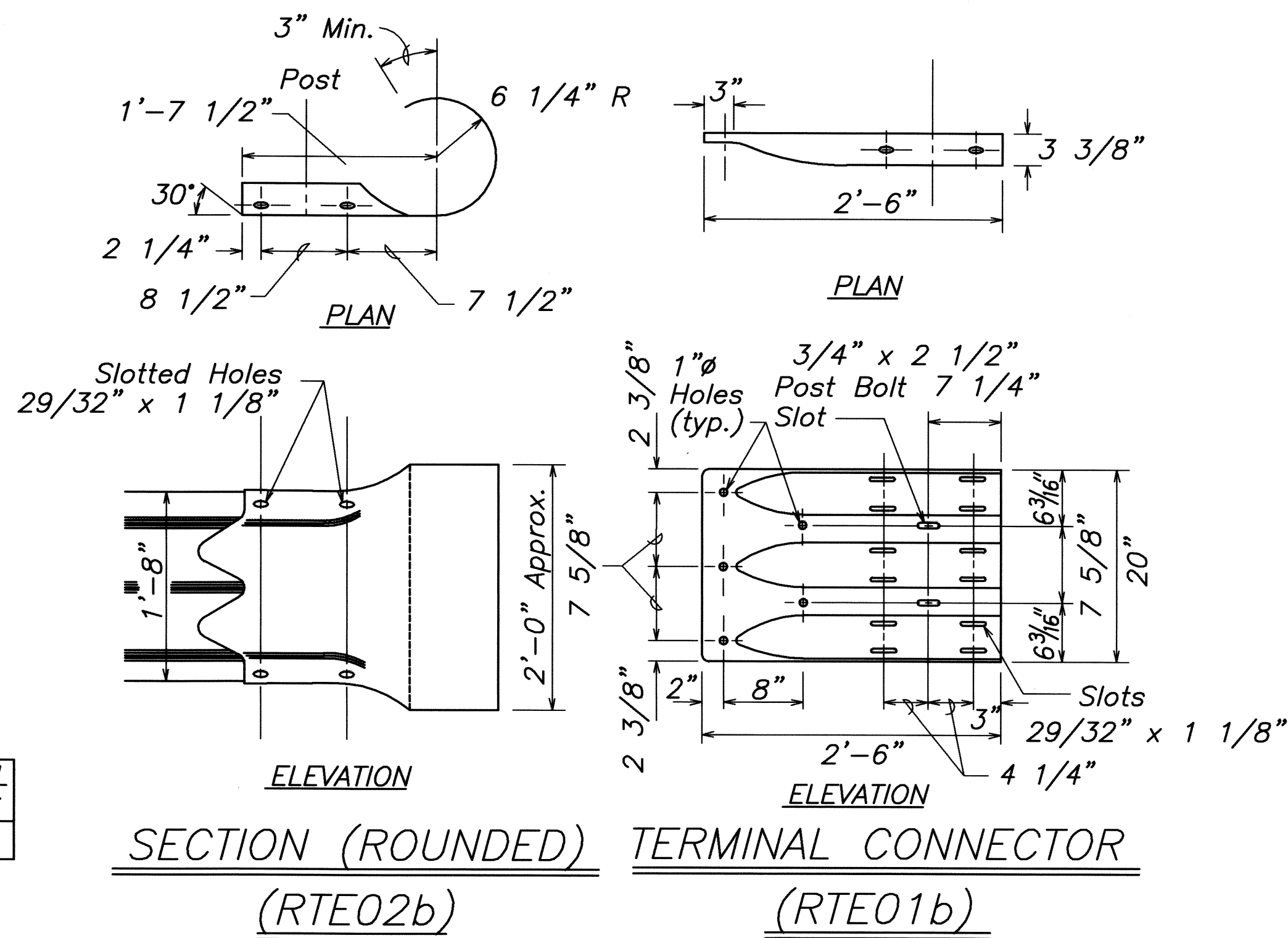
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37CDE-01-07M	2009	10	57



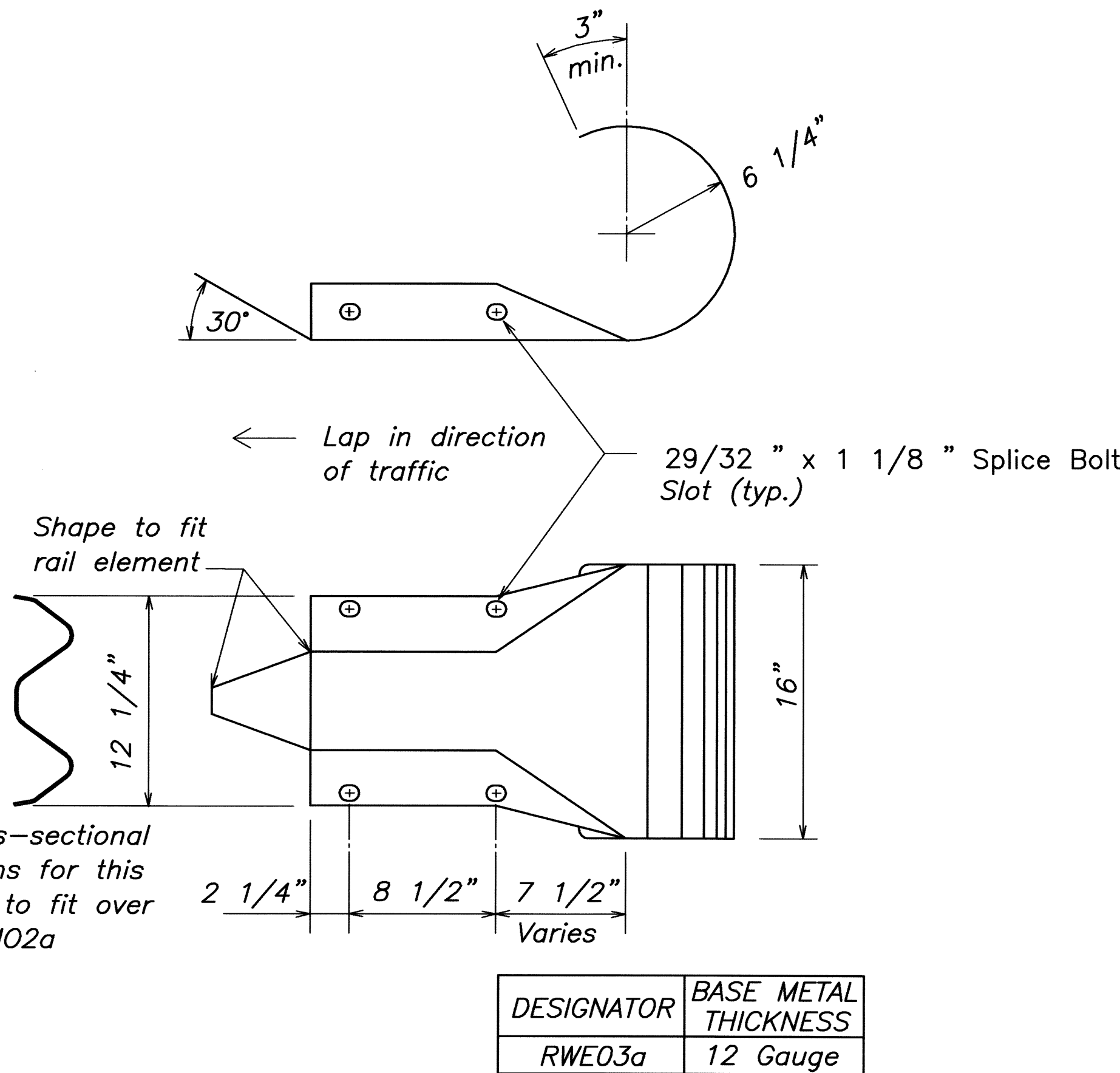
W-BEAM TERMINAL CONNECTOR (RWE02b)



W-BEAM END SECTION (FLARED RWE01a)



W-BEAM END SECTION (BUFFER RWE06a)

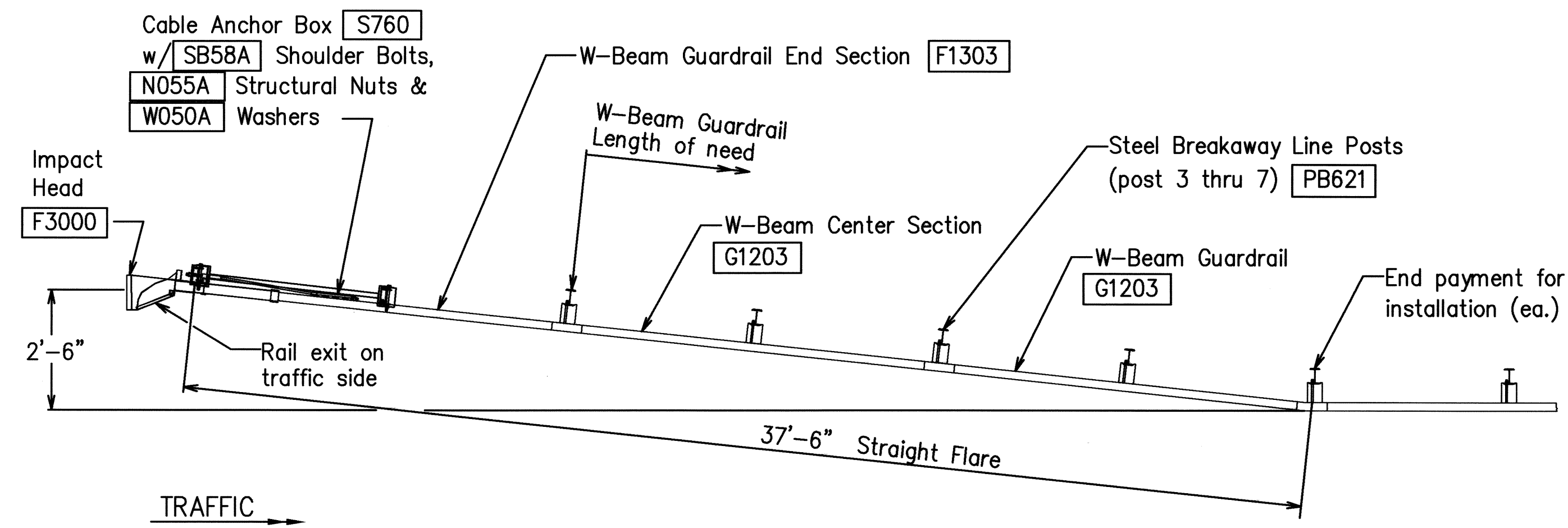


W-BEAM END SECTION (ROUNDED RWE03a)

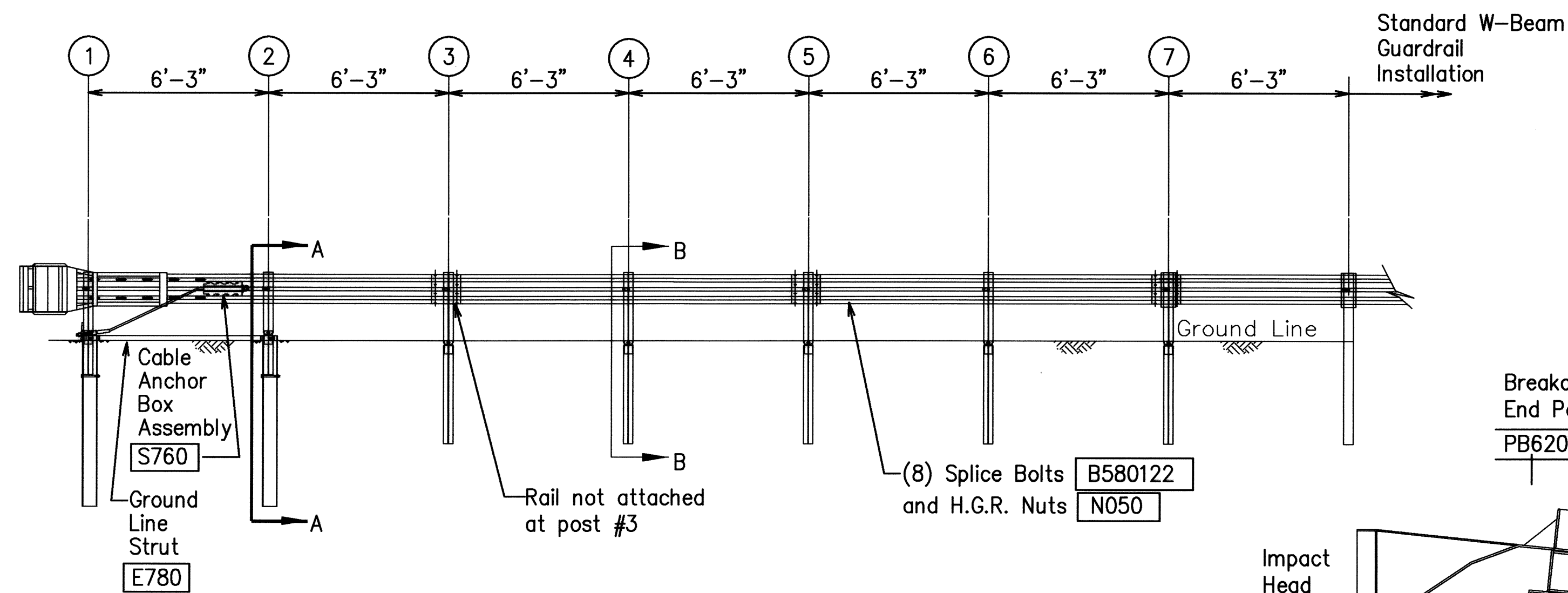
ORIGINAL PLAN	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
QUANTITIES BY	DATE
CHECKED BY	DATE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS KULA HIGHWAY RESURFACING KEKAULIKE AVENUE TO ULUPALAKUA PROJECT NO. 37CDE - 01 - 07M	
LICENSE EXPIRES 4/30/2010 This work was prepared by me or under my supervision and construction of this project will be under my observation.	Scale: AS NOTED Date: May 2009 SHEET No. 4 OF 6 SHEETS

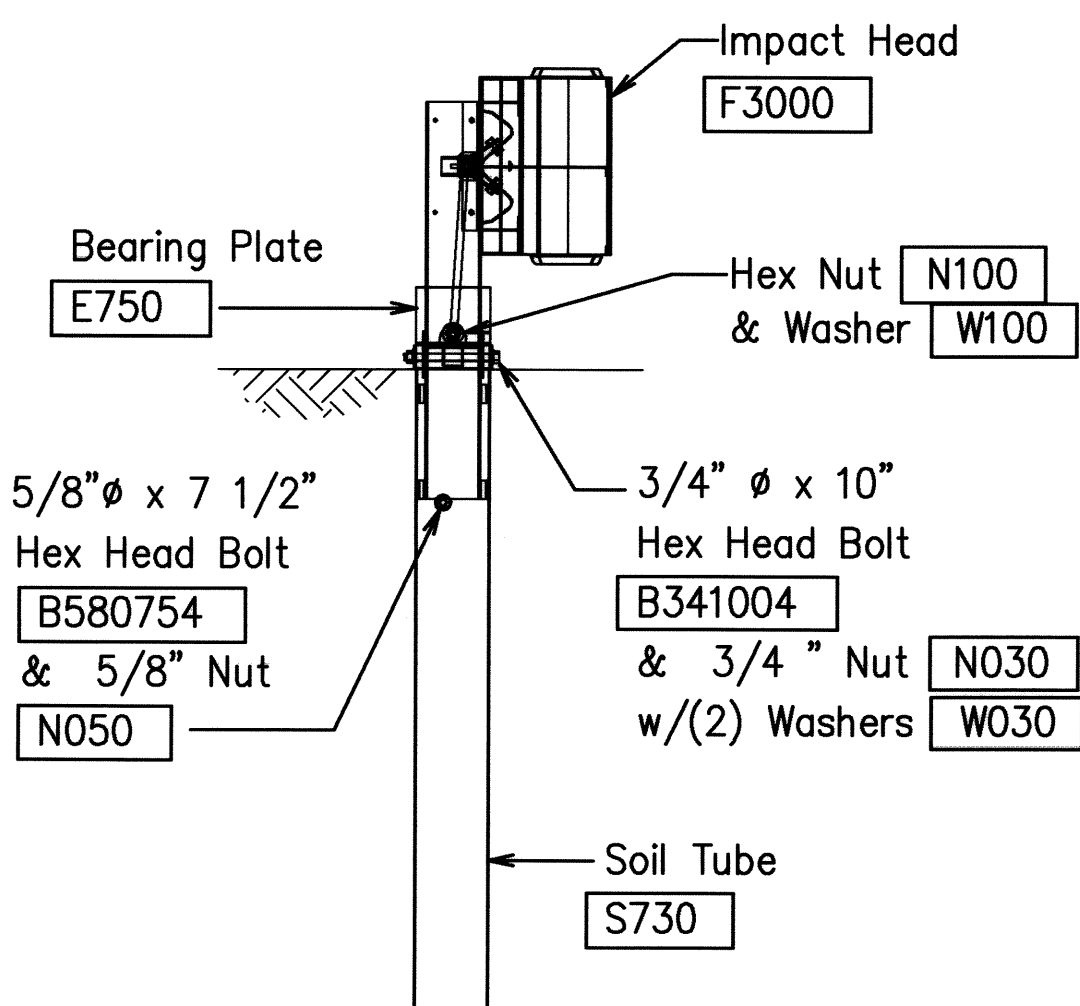
DATE	_____
DESIGNED BY	_____
CHECKED BY	_____
NOTED BY	_____
ORIGINAL	_____



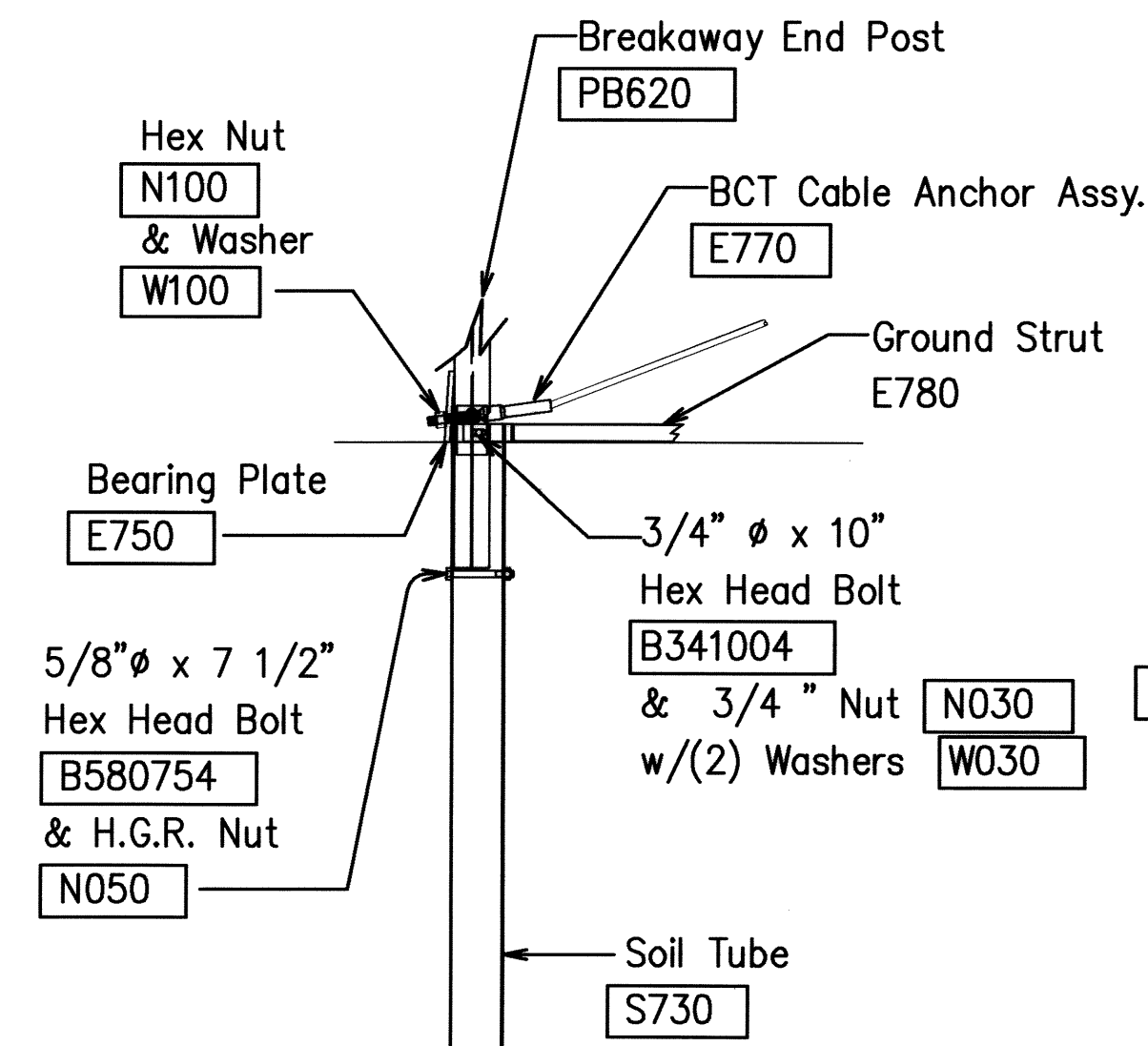
PLAN



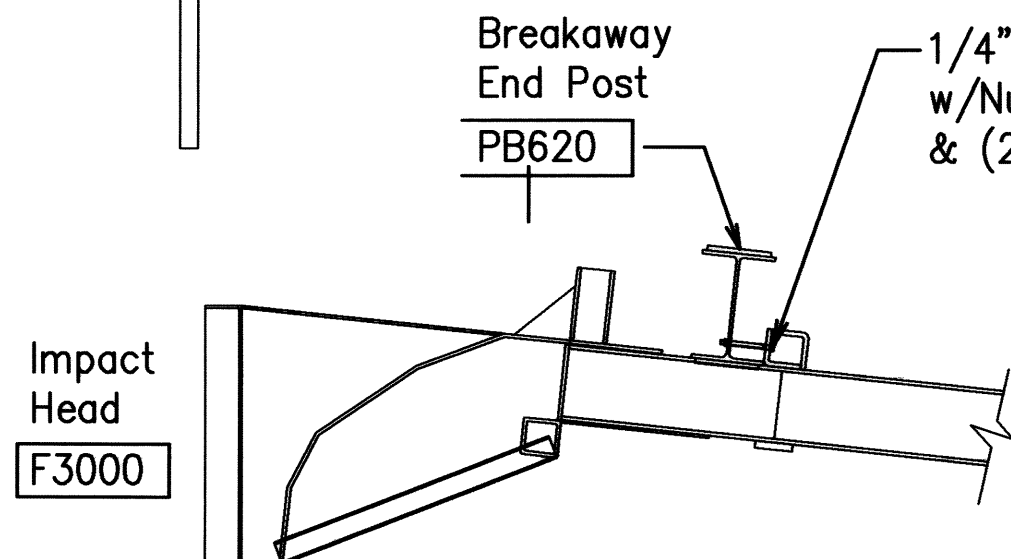
ELEVATION



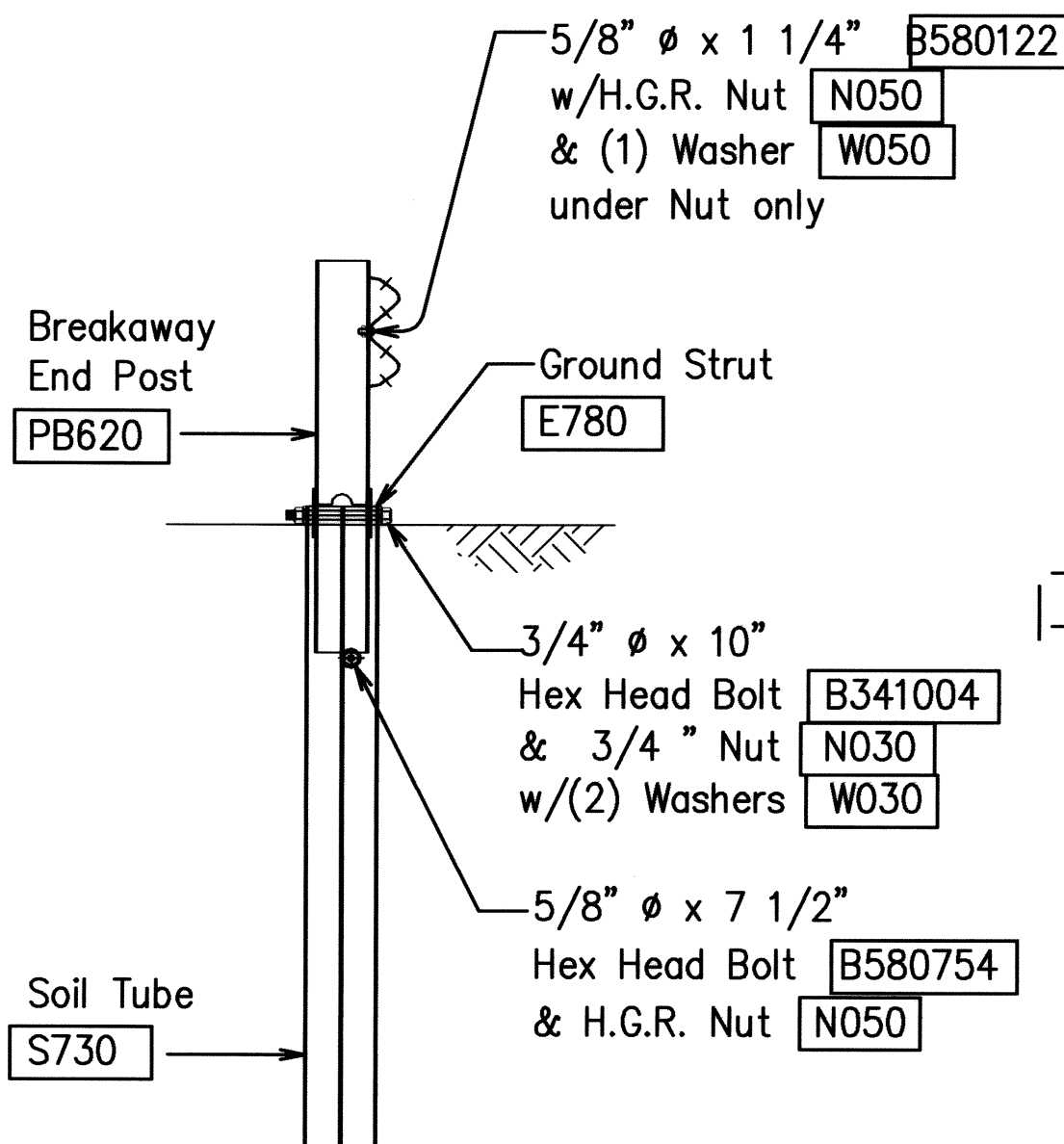
FRONT VIEW OF POST 1



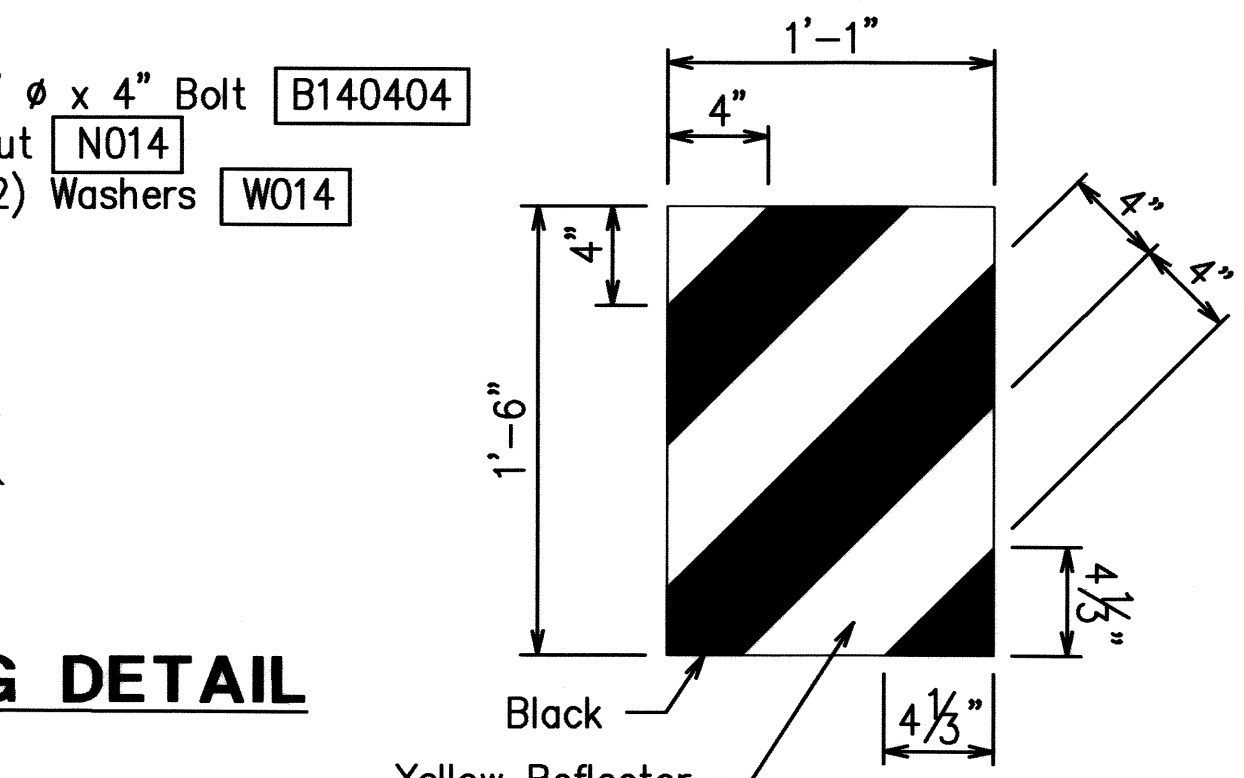
PARTIAL VIEW OF POST 1



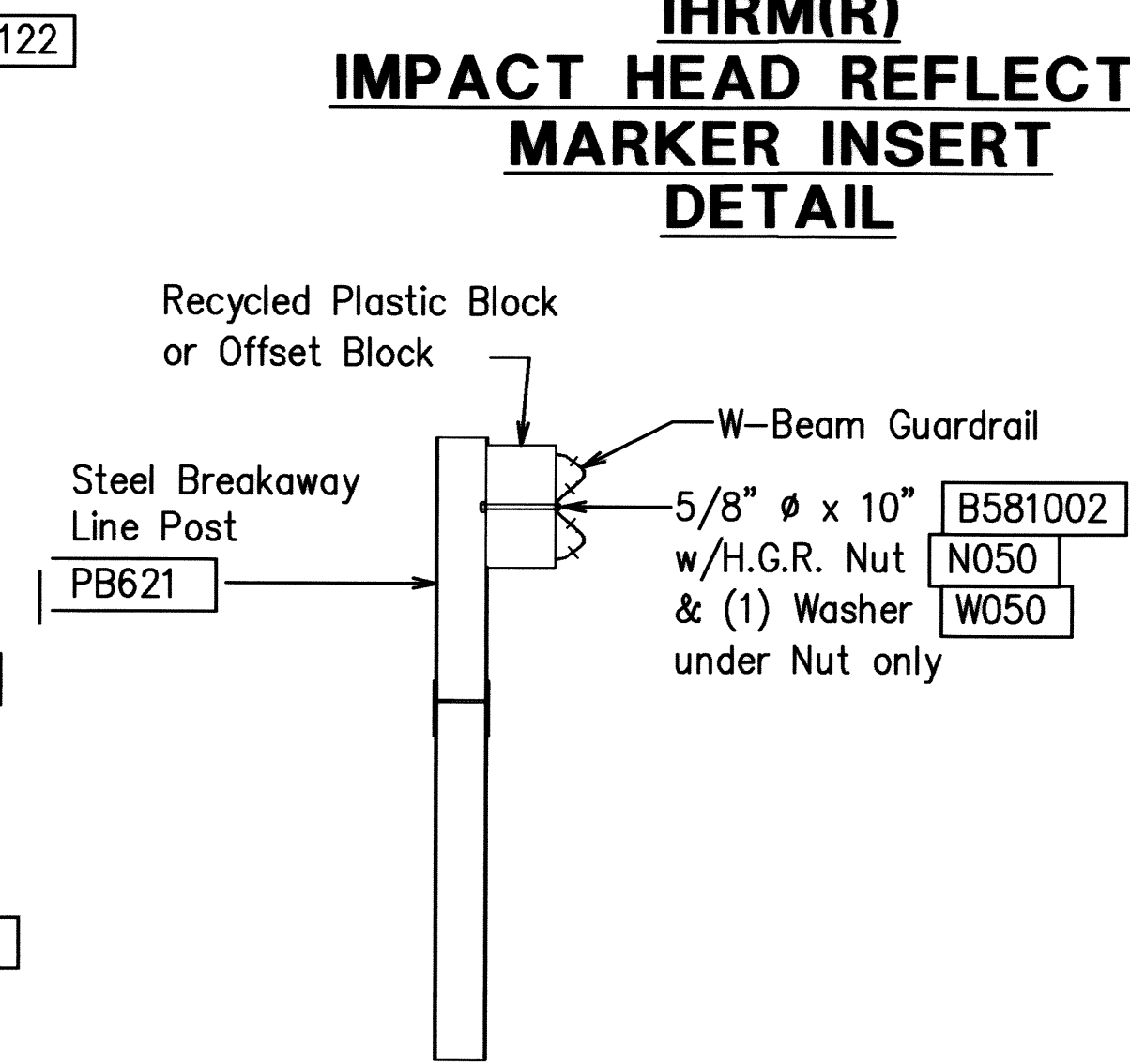
IMPACT HEAD CONNECTING DETAIL



SECTION A-A
at Post #2



IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL



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

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.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	37CDE-01-07M	2009	11	57

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

LICENSE EXPIRES 4/30/2010 This work was prepared by me or under my supervision and construction of this project will be under my observation.	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION FLEAT-350 FLARED ENERGY ABSORBING TERMINAL KULA HIGHWAY RESURFACING KEKAULIKE AVENUE TO ULUPALAKUA PROJECT NO. 37CDE - 01 - 07M Scale: AS NOTED Date: May 2009 SHEET No. 5 OF 6 SHEETS
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May 27, 2009 - 10:24am
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ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DESIGNED BY	
	CHECKED BY	

