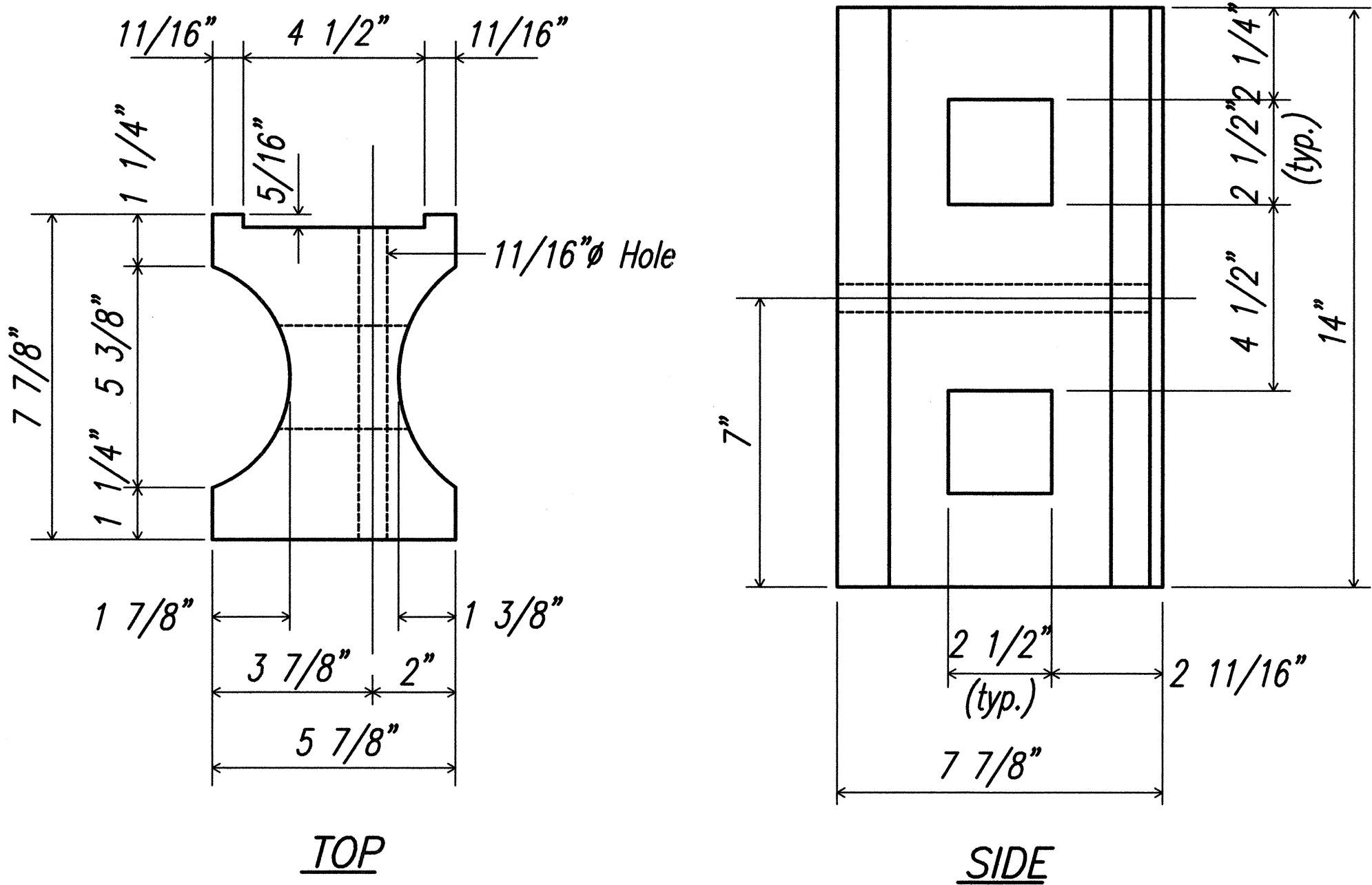


FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-A311(4)	2006	10	180

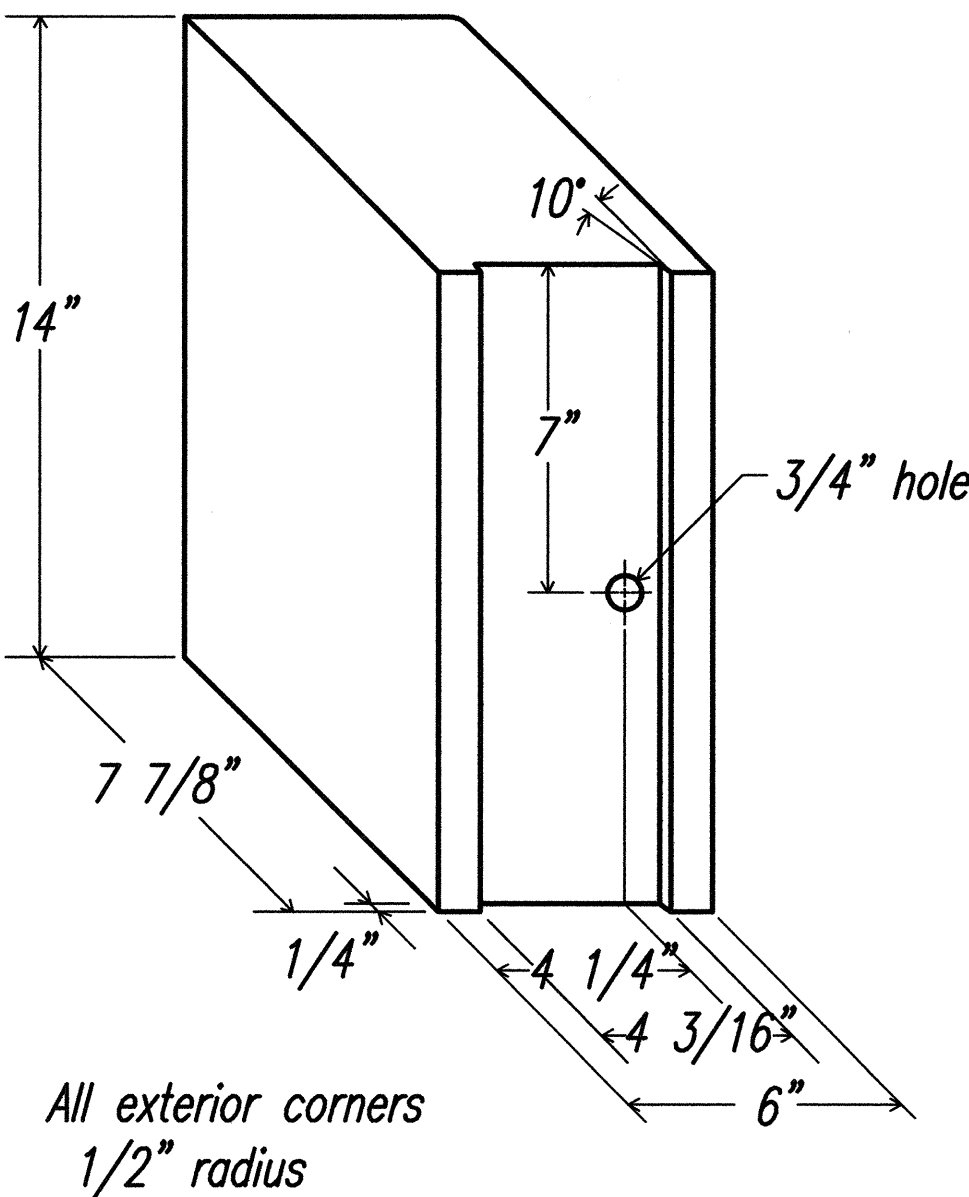
GENERAL NOTES

- 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 100 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.

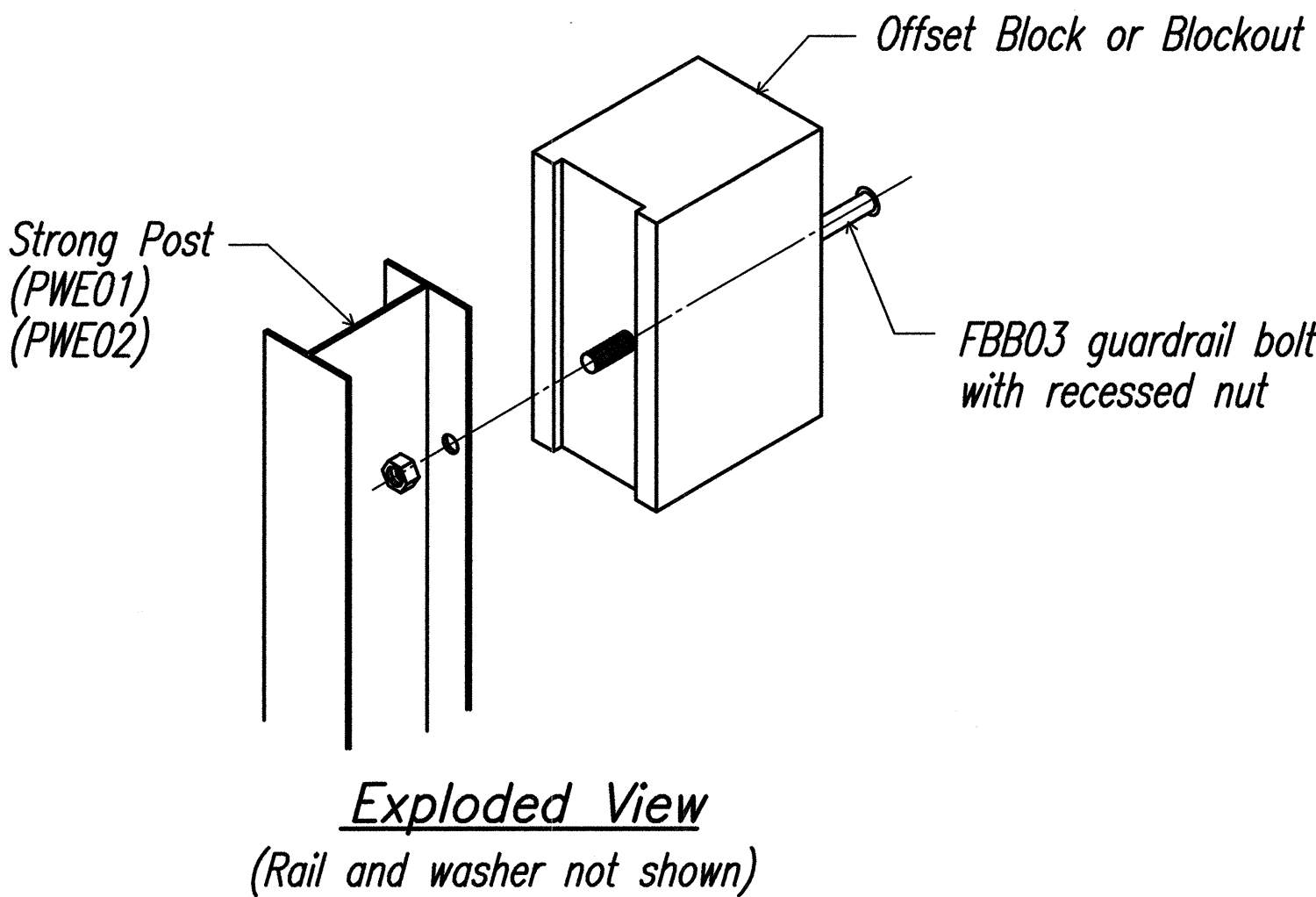
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



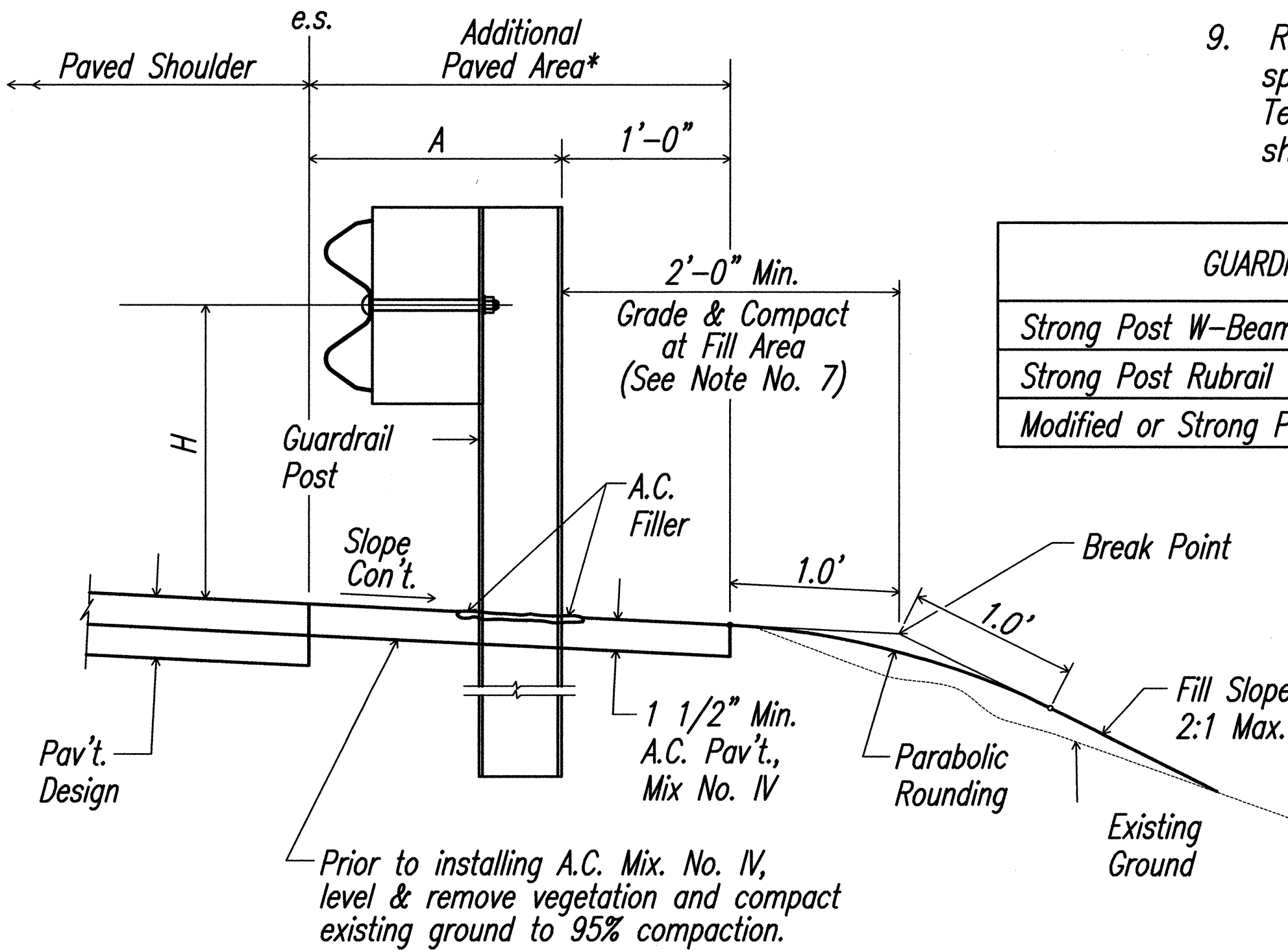
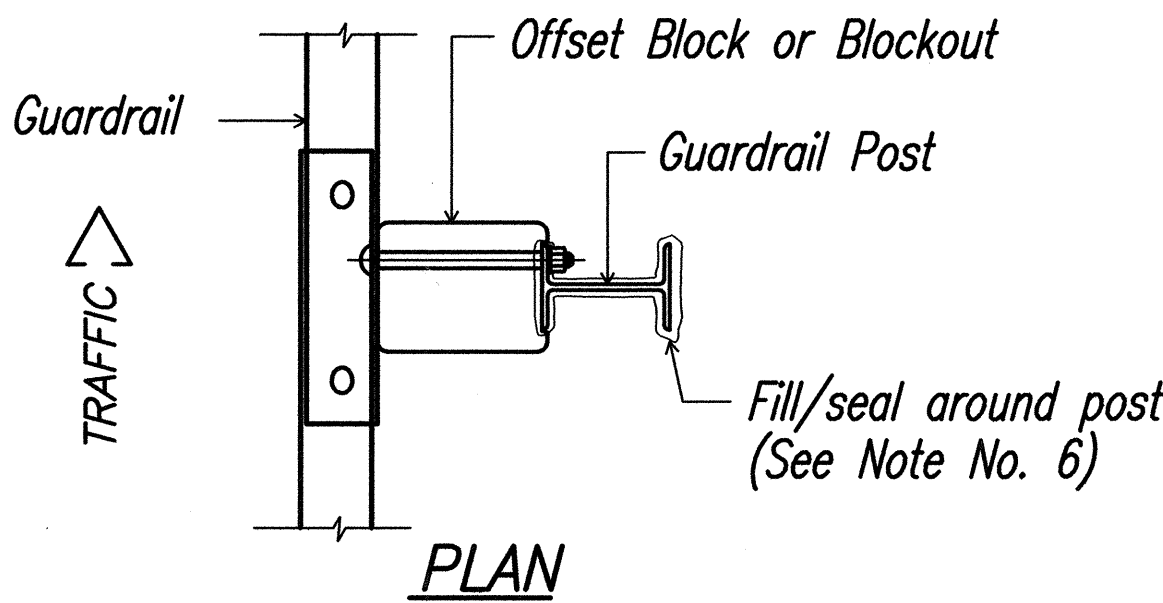
RECYCLED PLASTIC BLOCKOUT (TYPE I)



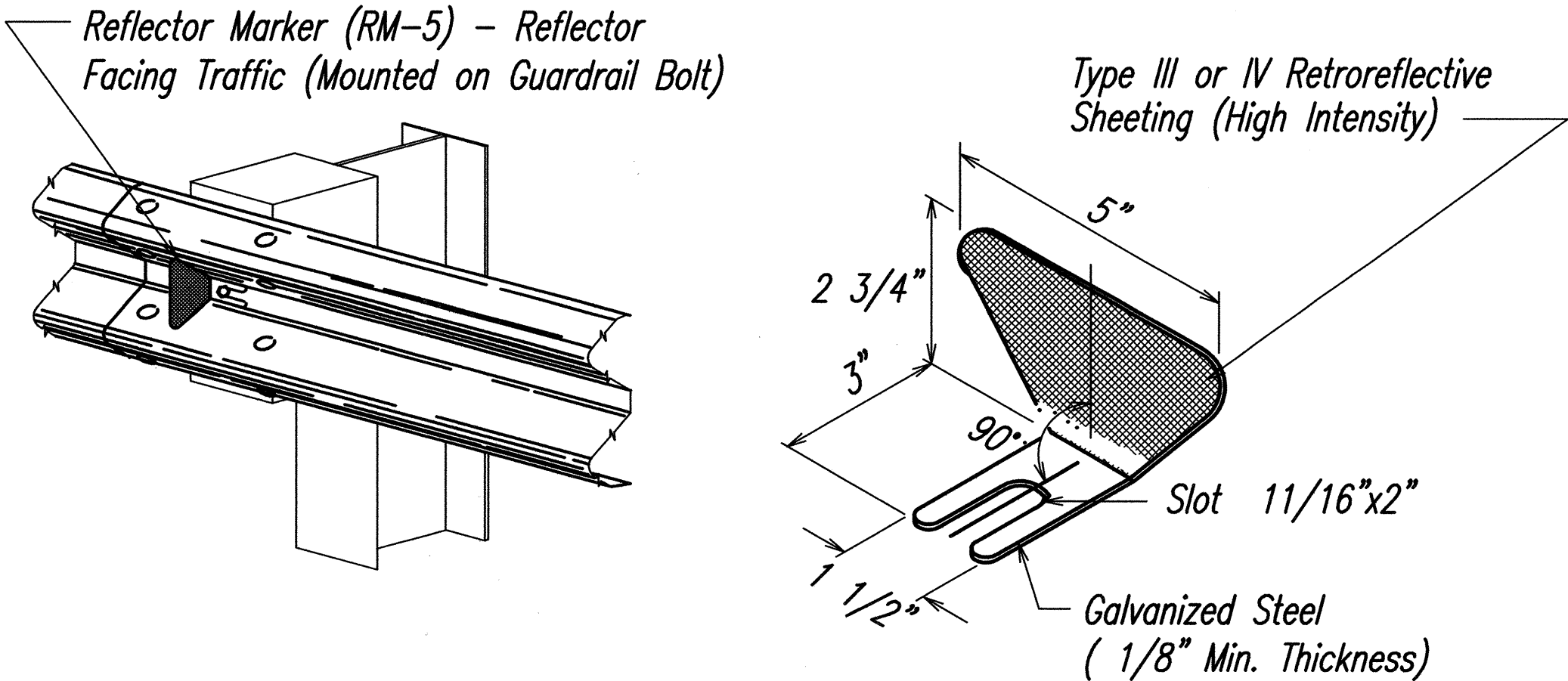
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)



STEEL POST AND BLOCK DETAIL



TYPICAL GUARDRAIL INSTALLATION



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

GUARDRAIL DETAILS AND NOTES

MOKULELE HIGHWAY WIDENING

Vicinity of Kealia Pond Driveway

To

Piilani Highway

Federal - Aid Project No. NH-A311(4)

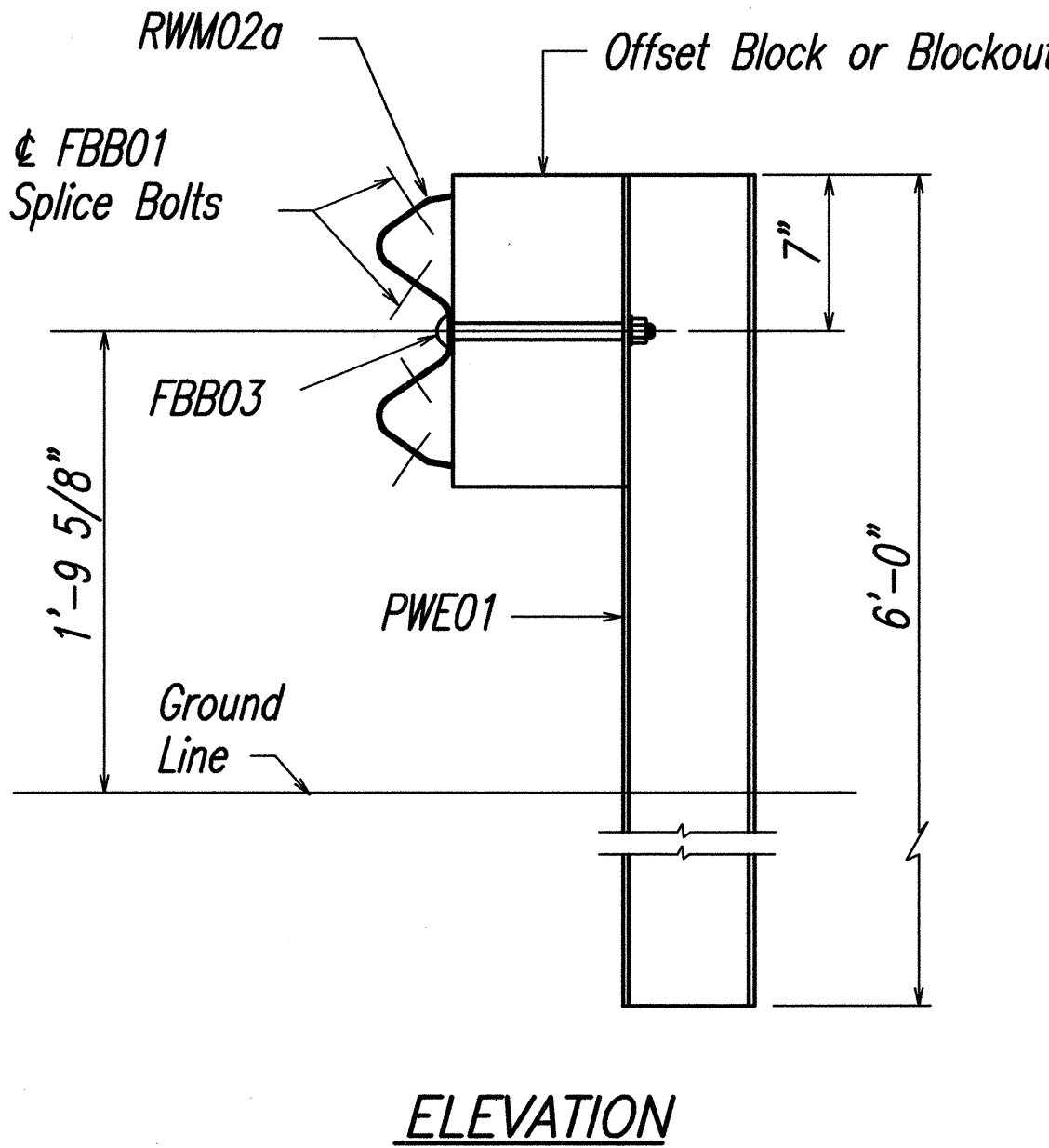
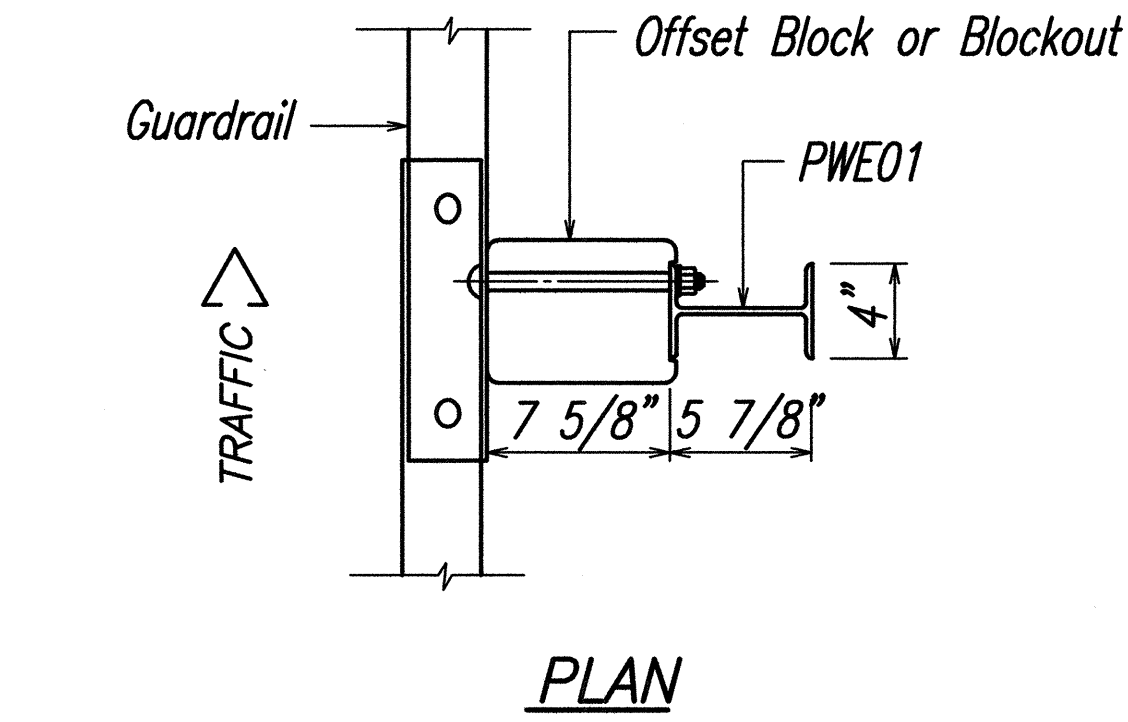
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Date: July 2005

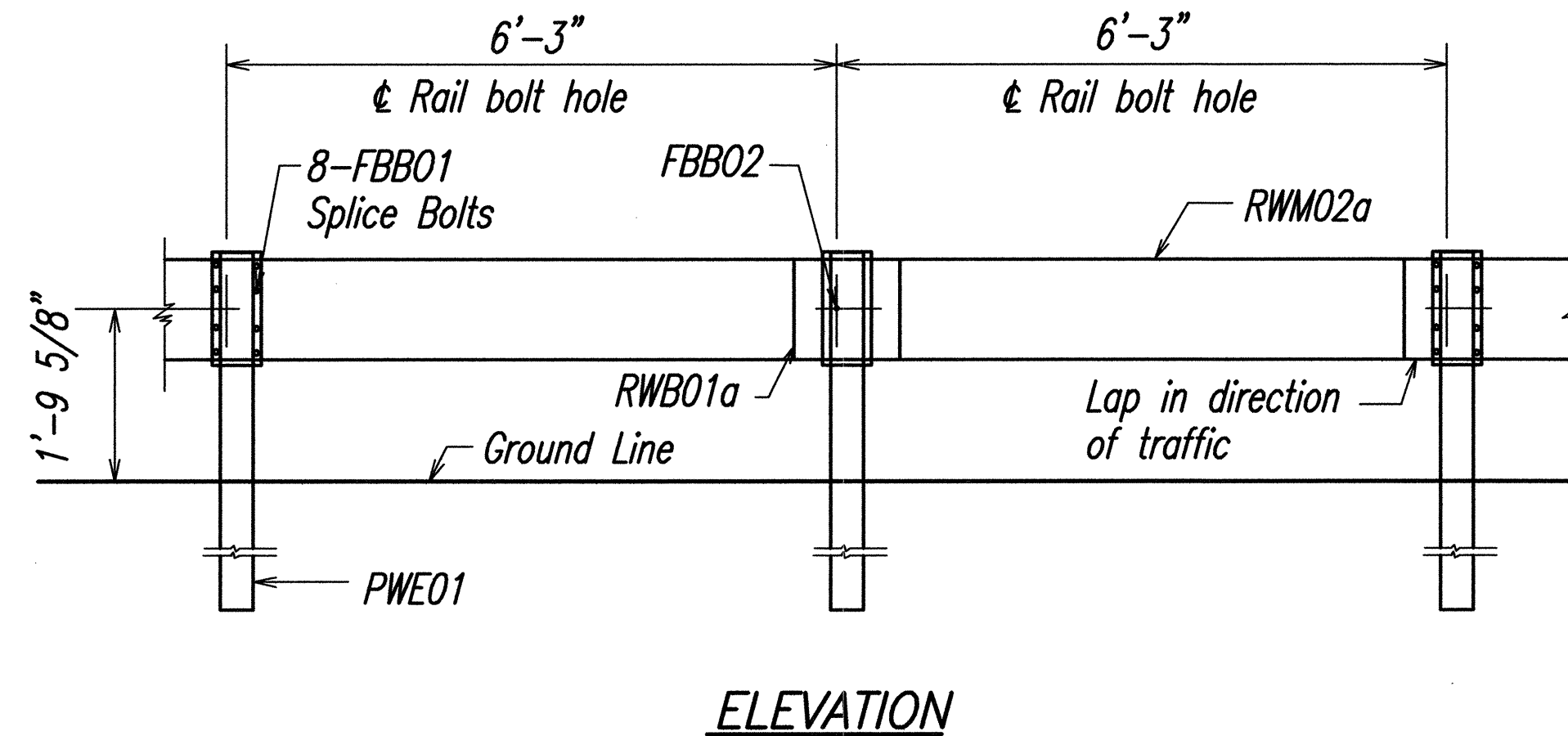
SHEET No. 1 OF 5 SHEETS

DATE	12/15/03
SURVEY PLOTTED BY	
ORIGINAL PLAN	
DESIGNED BY	
NOTED BY	
CHECKED BY	
NO.	

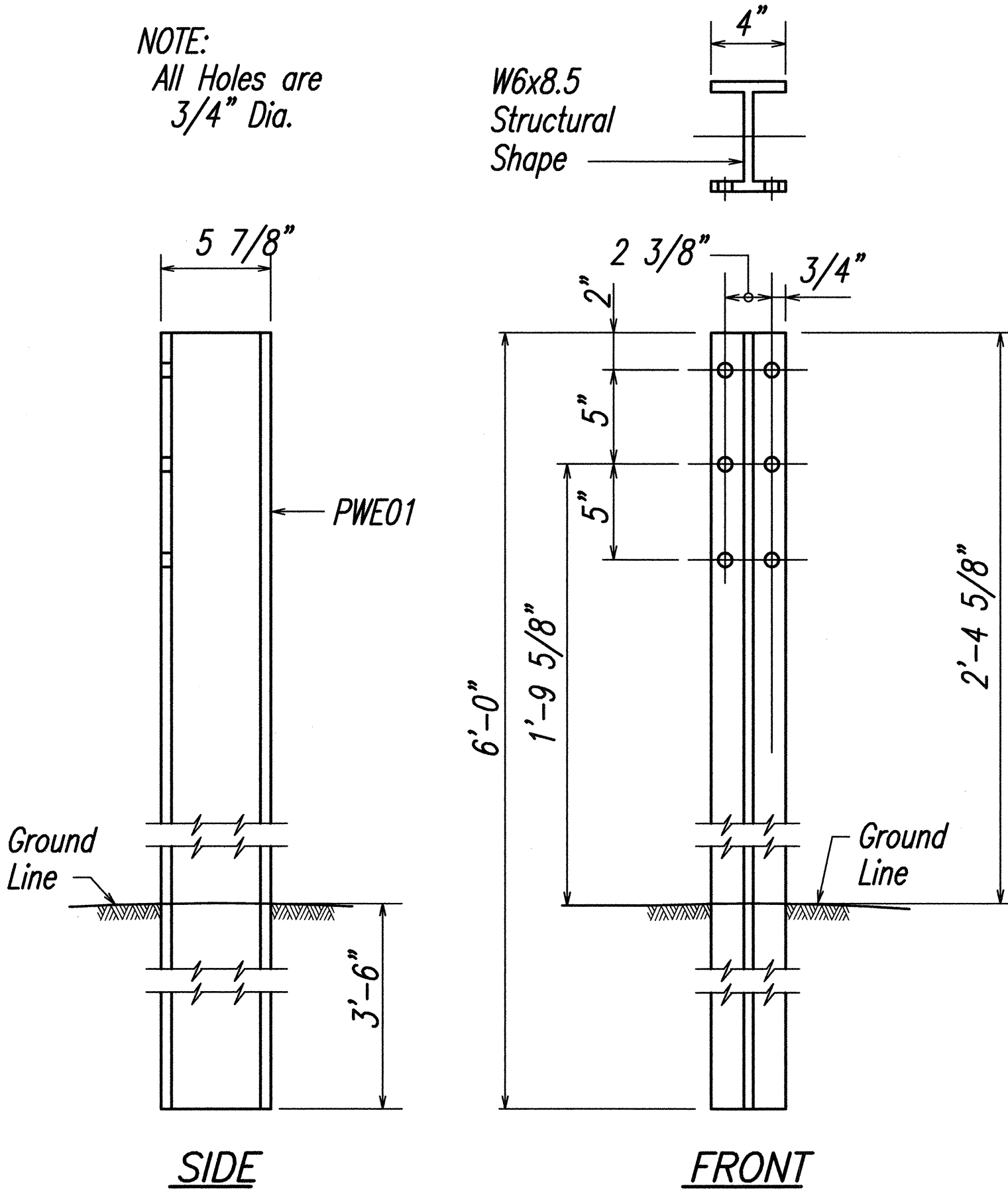
FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-A311(4)	2006	11	180



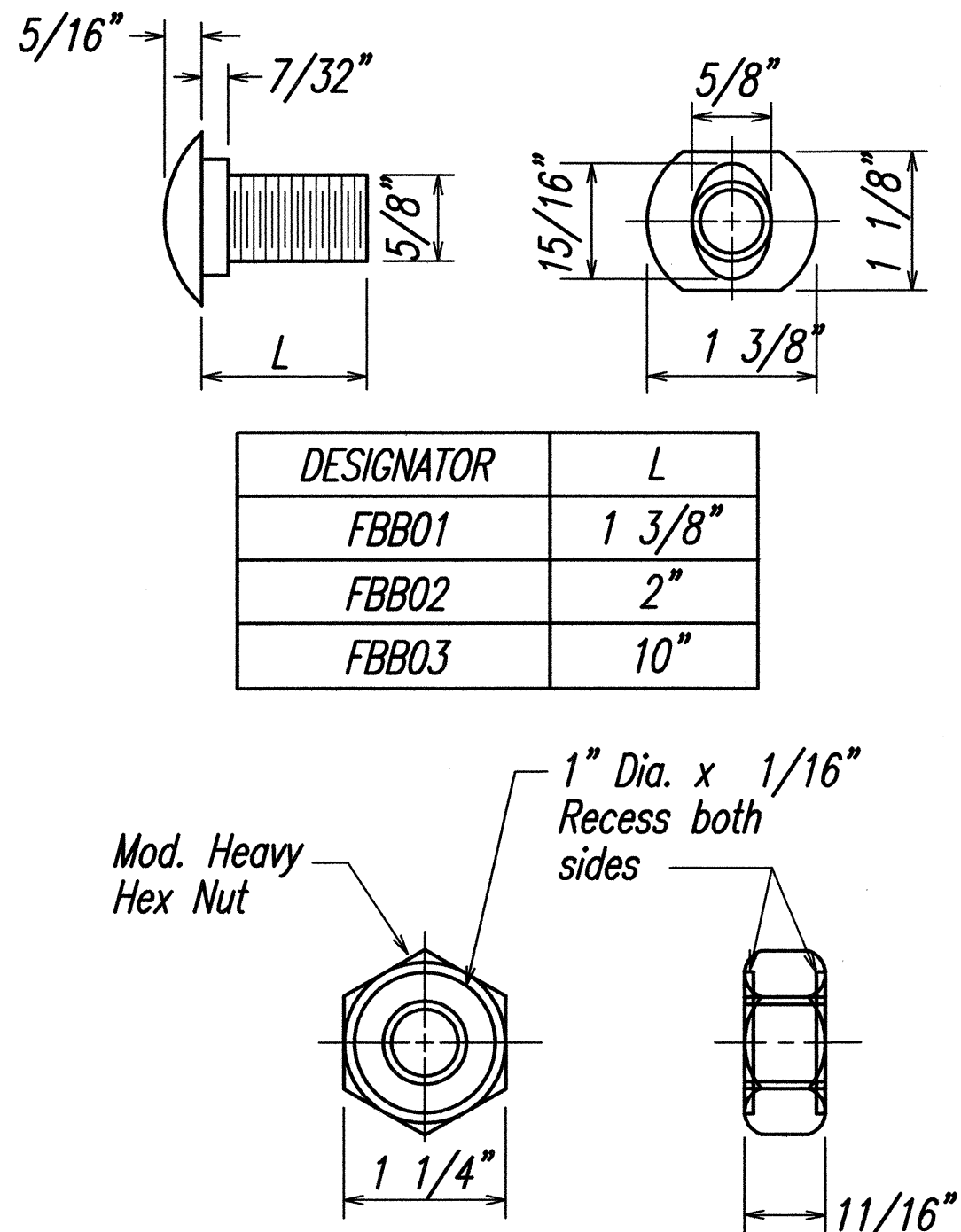
STRONG POST W-BEAM GUARDRAIL (SGR04a)



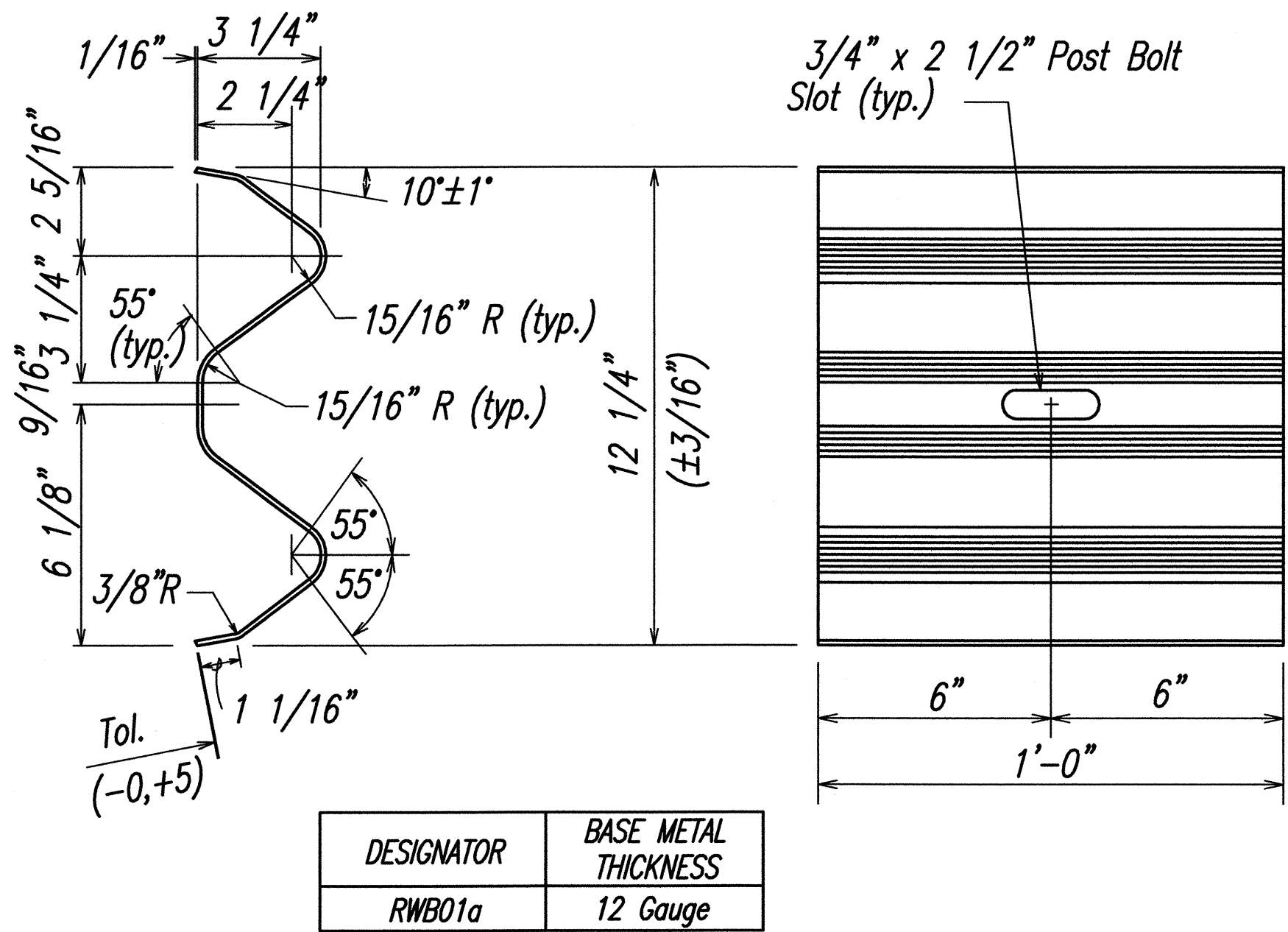
STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



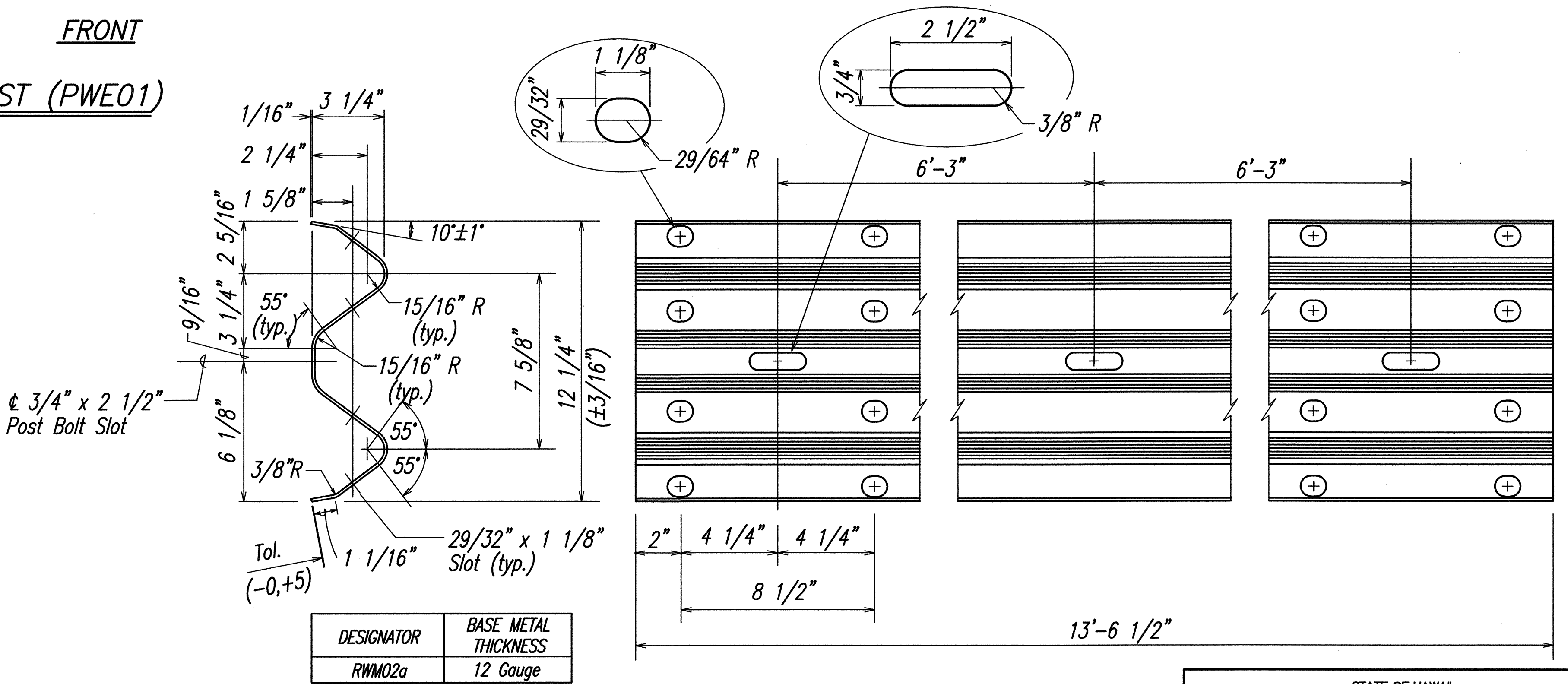
W-BEAM STRONG POST (PWE01)



GUARDRAIL BOLTS AND RECESSED NUT



W-BEAM BACK-UP-PLATE (RWB01a)



2 SPACE W-BEAM GUARDRAIL (RWM02a)

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

MOKULELE HIGHWAY WIDENING

Vicinity of Kealia Pond Driveway

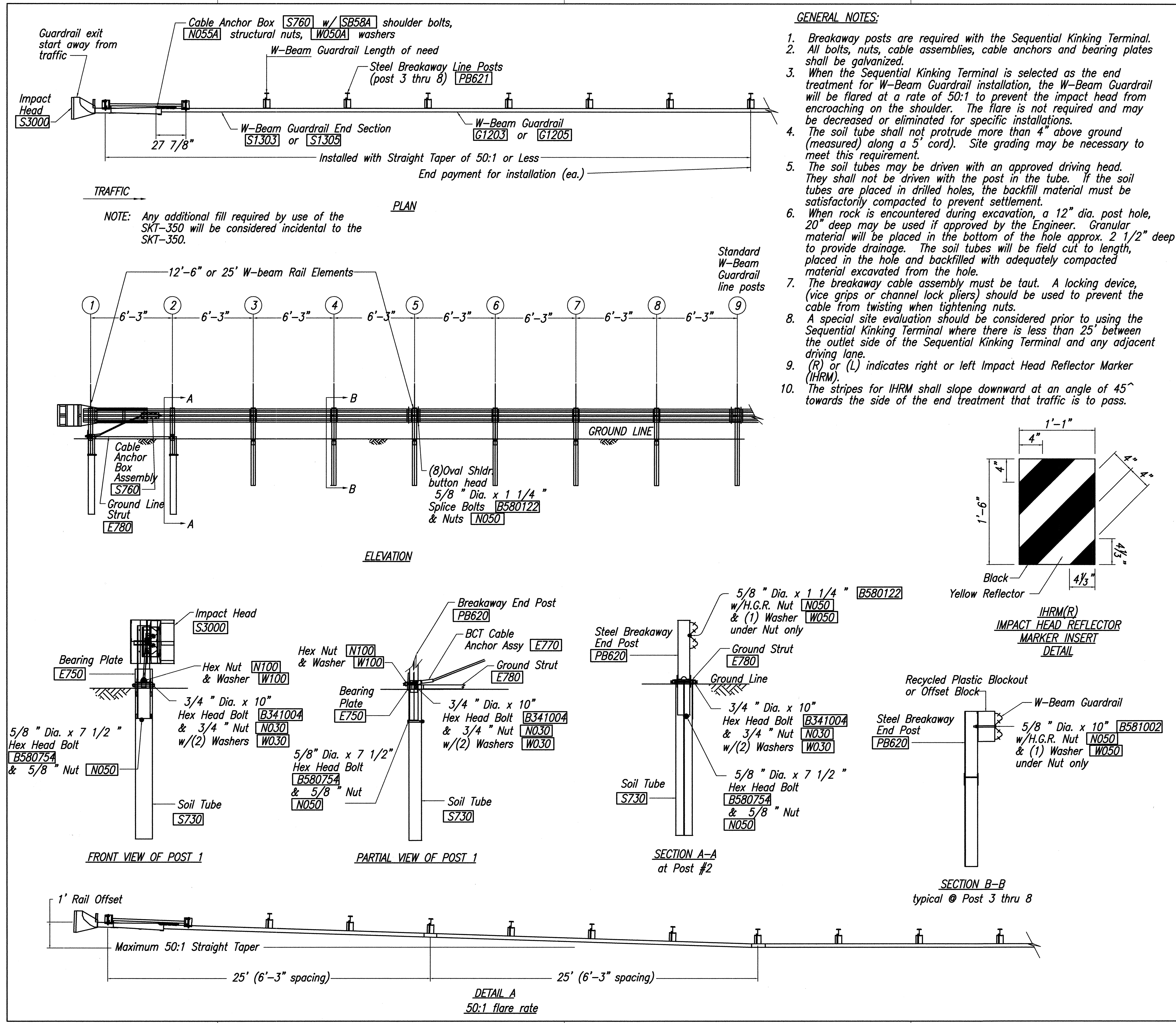
To

Piilani Highway

Federal - Aid Project No. NH-A311(4)

Scale: AS NOTED

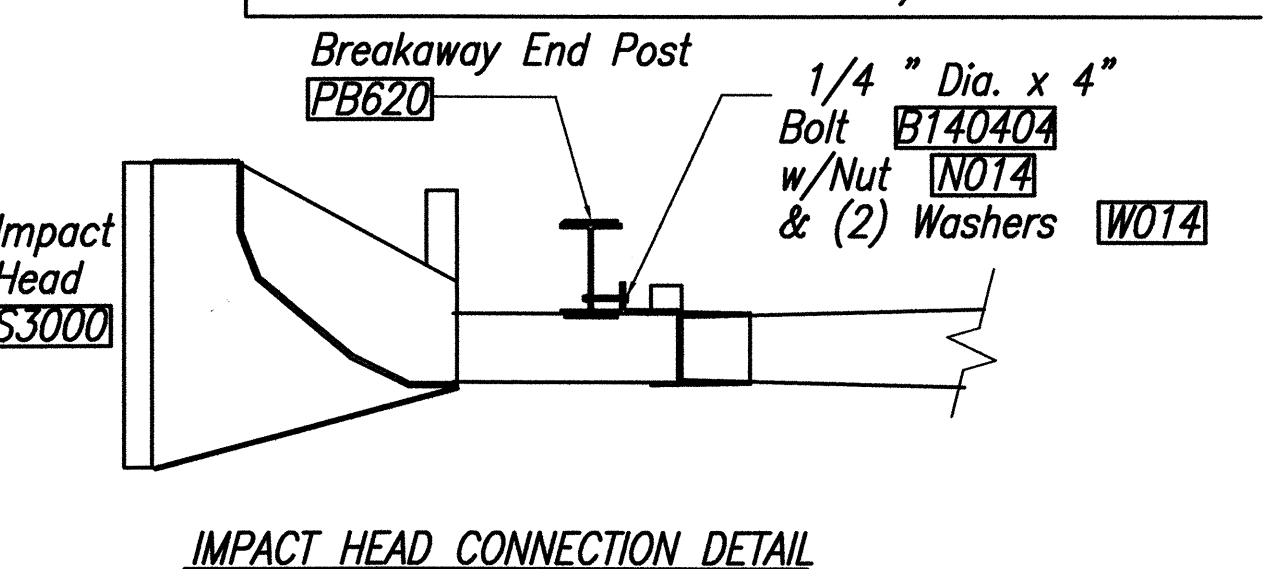
Date: July 2005



FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-A311(4)	2006	12	180

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
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		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	3/4" 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



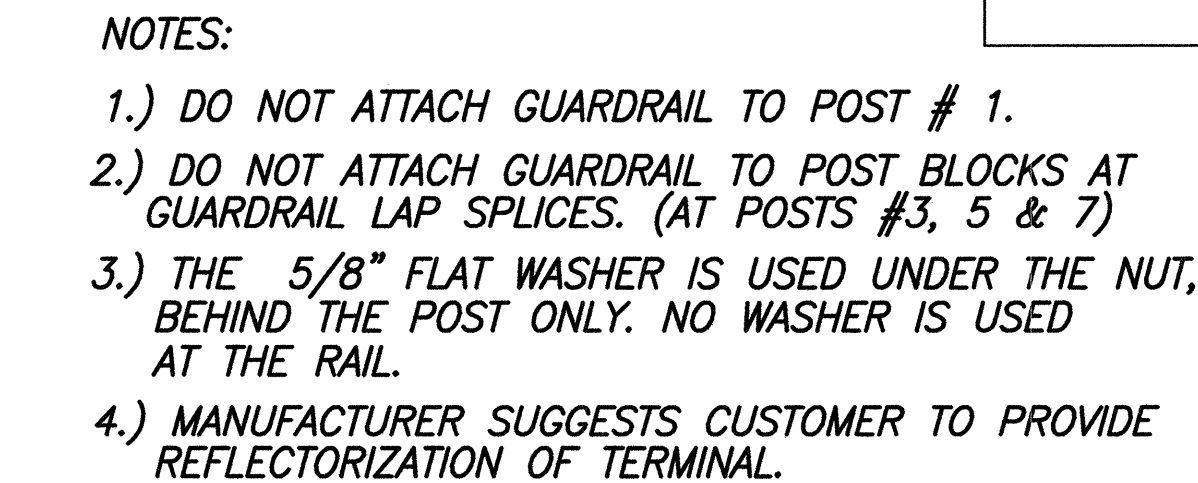
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
SKT-350
SEQUENTIAL KINKING TERMINAL
MOKULELE HIGHWAY WIDENING
 Vicinity of Kealia Pond Driveway
 To
 Piilani Highway
 Federal - Aid Project No. NH-A311(4)
 Scale: AS NOTED Date: July 2005
 SHEET No. 3 OF 5 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ET-2000 PLUS

MOKULELE HIGHWAY WIDENING
Vicinity of Kealia Pond Driveway
To
Piilani Highway
Federal - Aid Project No. NH-A311(4)

Scale: AS NOTED Date: July 2005



5/8" dia. x 10" LG H.G.R. BOLT
W/ HEX NUT & WASHER
(SEE NOTE 3)

TRAFFIC SIDE

SEE NOTE BELOW

PC 33872A POST (UPPER)
W6 x 8.5

SEE DETAIL "D"

RECYCLED PLASTIC
BLOCKOUT OR
OFFSET BLOCK

3-7 1/2"

PC 33874A POST (LOWER)
W6 x 8.5

NOTE:
SECTION "A-A" IS SIMILAR @ POST #3, 5 & 7.
EXCEPT RAIL IS NOT ATTACHED.

SECTION "A-A"
(TYP @ POSTS #4, 6 & 8)

3/4" dia. x 2 1/2" HEX
HD BOLT W/ WASHER,
LOCKWASHER UNDER
HEX NUT

3/8" dia. x 2" HEX
HD BOLT W/ WASHER,
LOCKWASHER UNDER
HEX NUT

VIEW "D-D"

TRAFFIC

PC 33872A POST
(UPPER) W6 x 8.5

SEE DETAIL "H"

5'-11 1/2"

SECTION "B-B"
(POST #2)

3/4" dia. x 3" HEX HD BOLT
W/ WASHER, LOCKWASHER
UNDER HEX NUT

PC 33875G STRUT

PC 33873A POST (LOWER)
W6 x 8.5

VIEW "H-H"

3/8" dia. x 2" HEX HD BOLT
INSTALL W/ HEAD ON STRUT
SIDE W/ WASHER & LOCKWASHER
UNDER HEX NUT

DETAIL "H"
(POST #2)

STACK 2-3 WASHERS ON
3/4" dia. BOLT BETWEEN
POST PL & STRUT TO
ALLOW STRUT TO PASS
OVER 3/8" dia. BOLT HEAD.

TRAFFIC SIDE

PC 33873A POST (LOWER)
W6 x 8.5

DETAIL "K"
(POST #1)

3/8" dia. x 2" HEX HD BOLT
W/ WASHER, LOCKWASHER
UNDER HEX NUT

PC 33871A POST (UPPER)
W6 x 8.5

PC3000G CABLE
ASSEMBLY W/ 1"
HEX NUT & WASHER
EACH END

PC 782G BEARING PLATE 8" x 5/8" x 8"

TRAFFIC SIDE

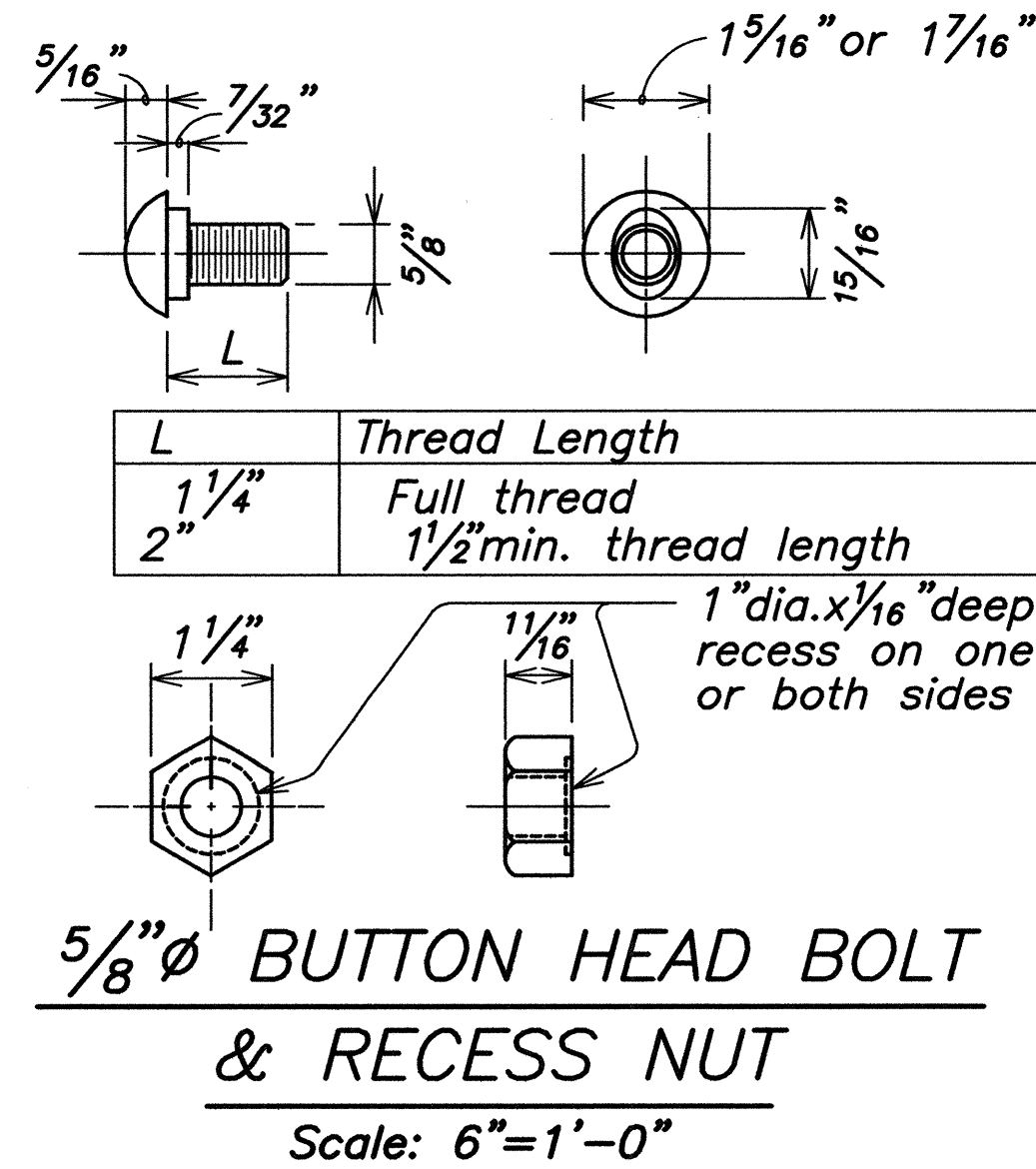
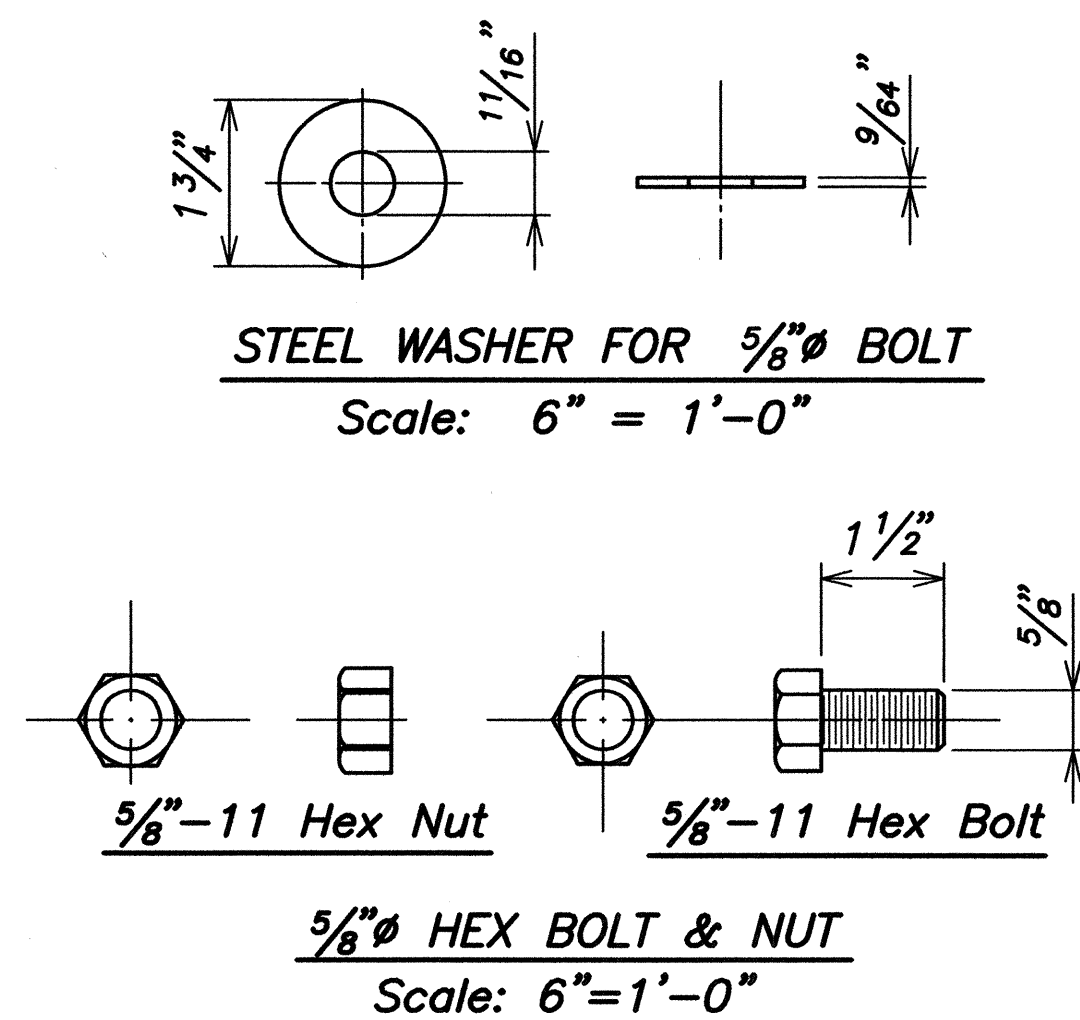
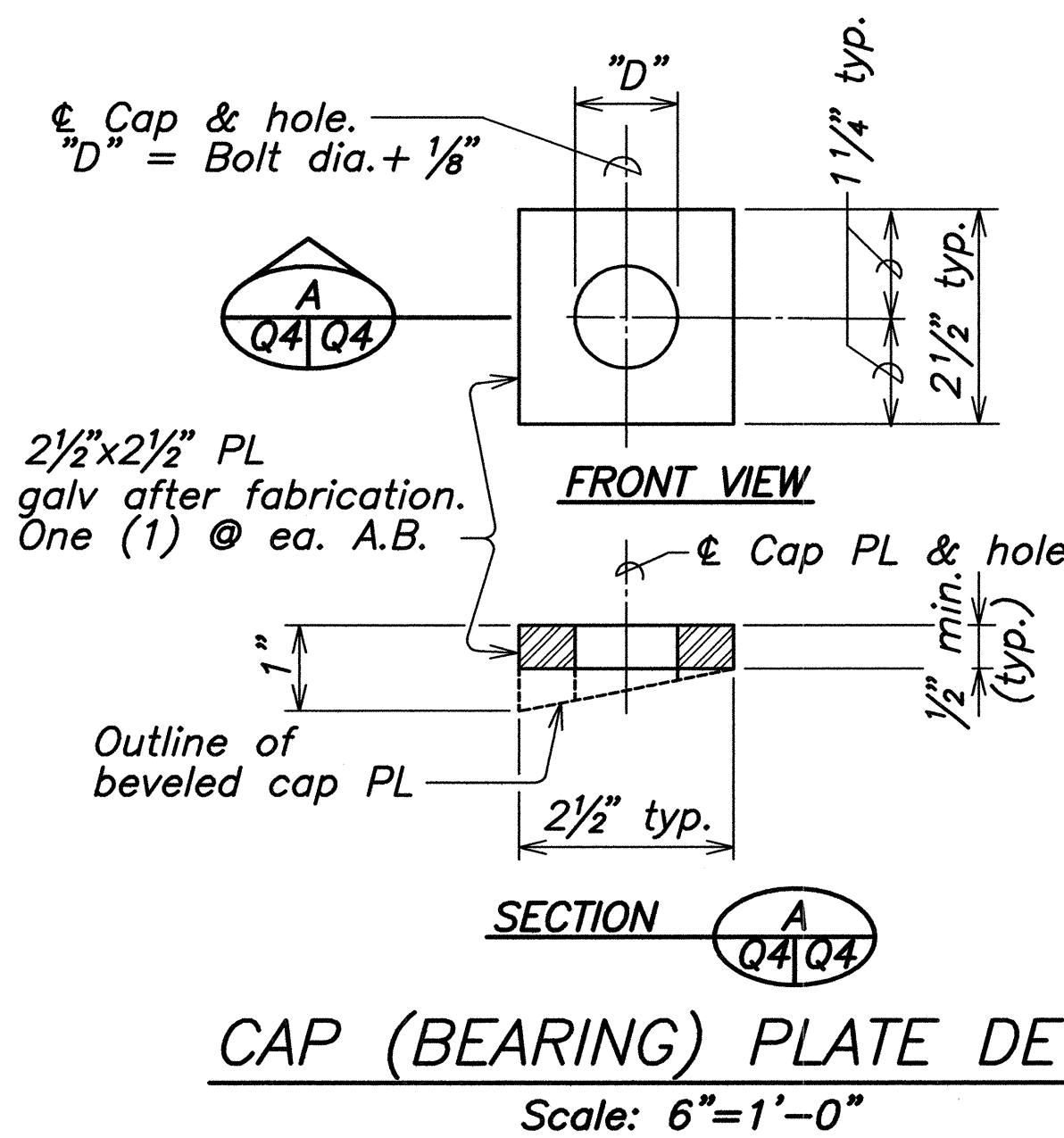
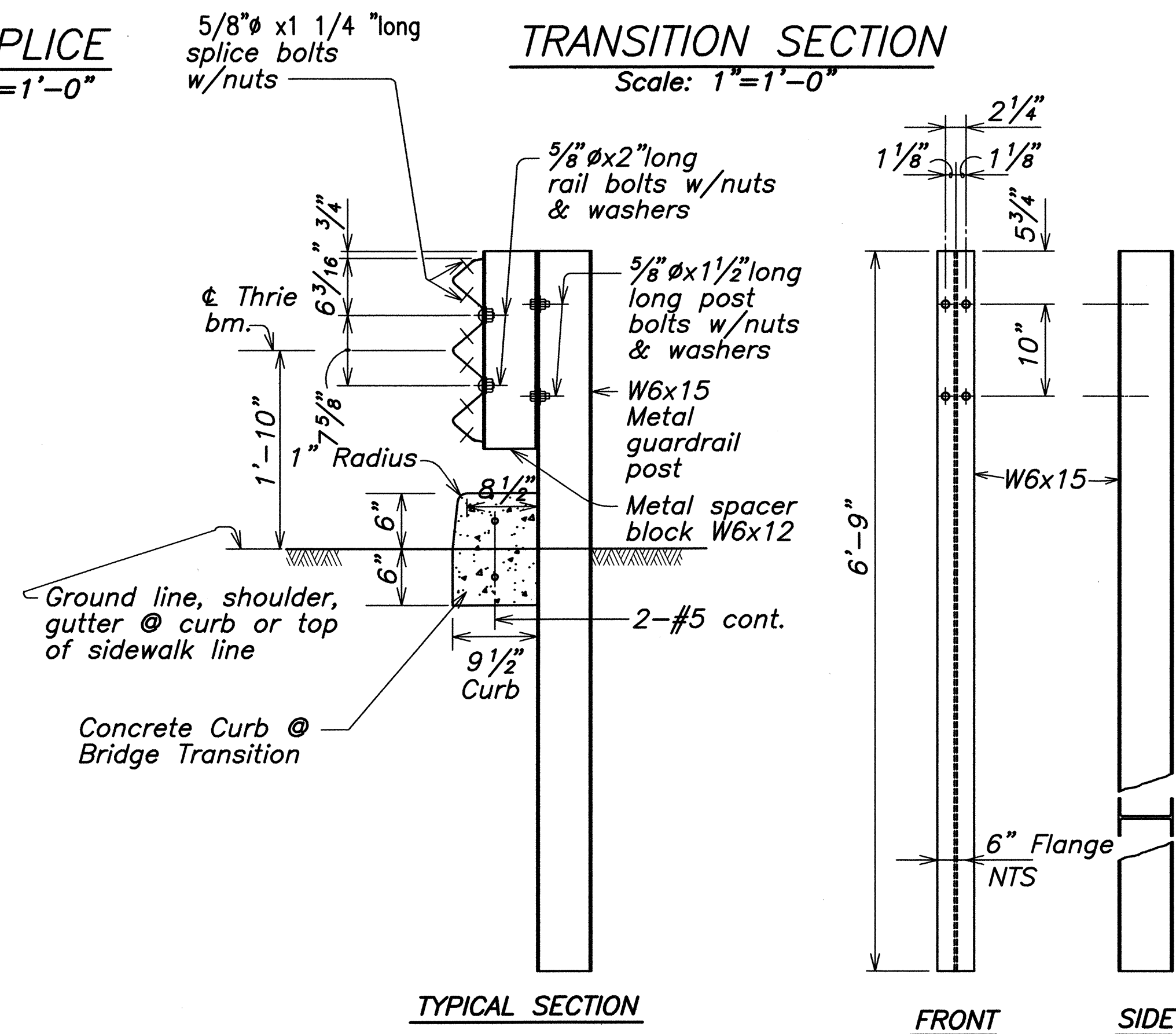
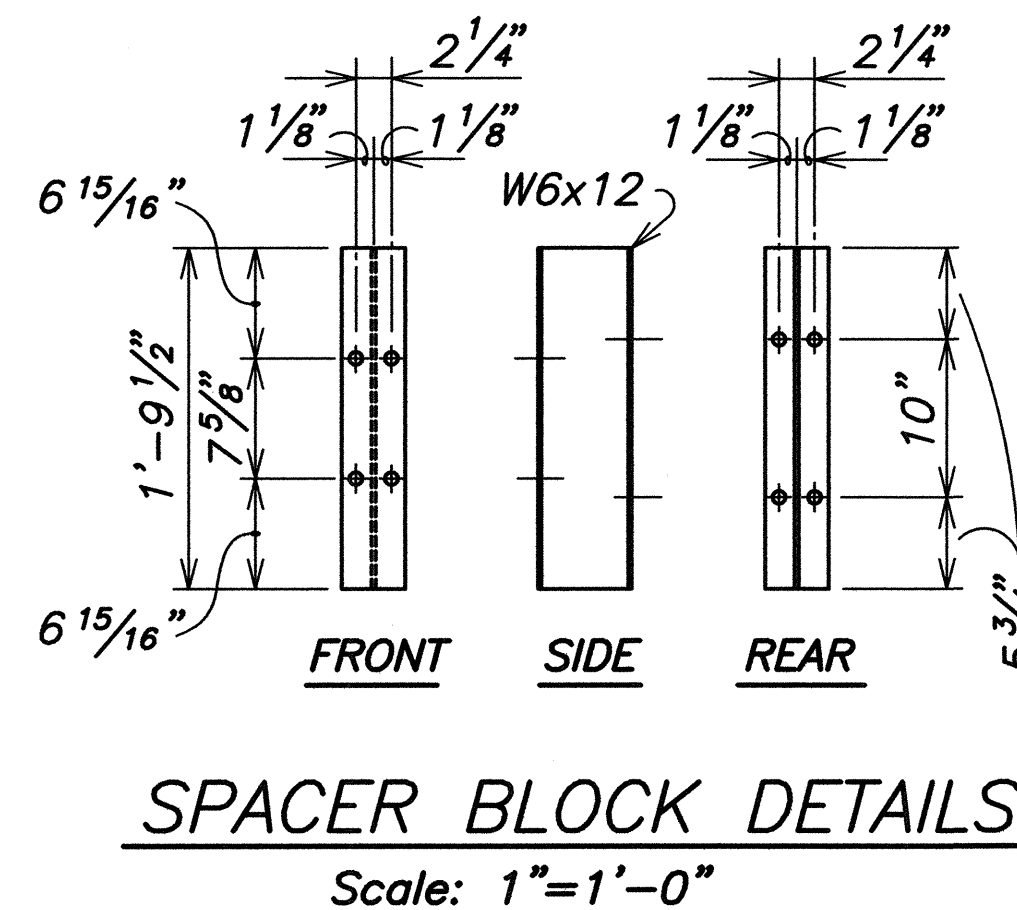
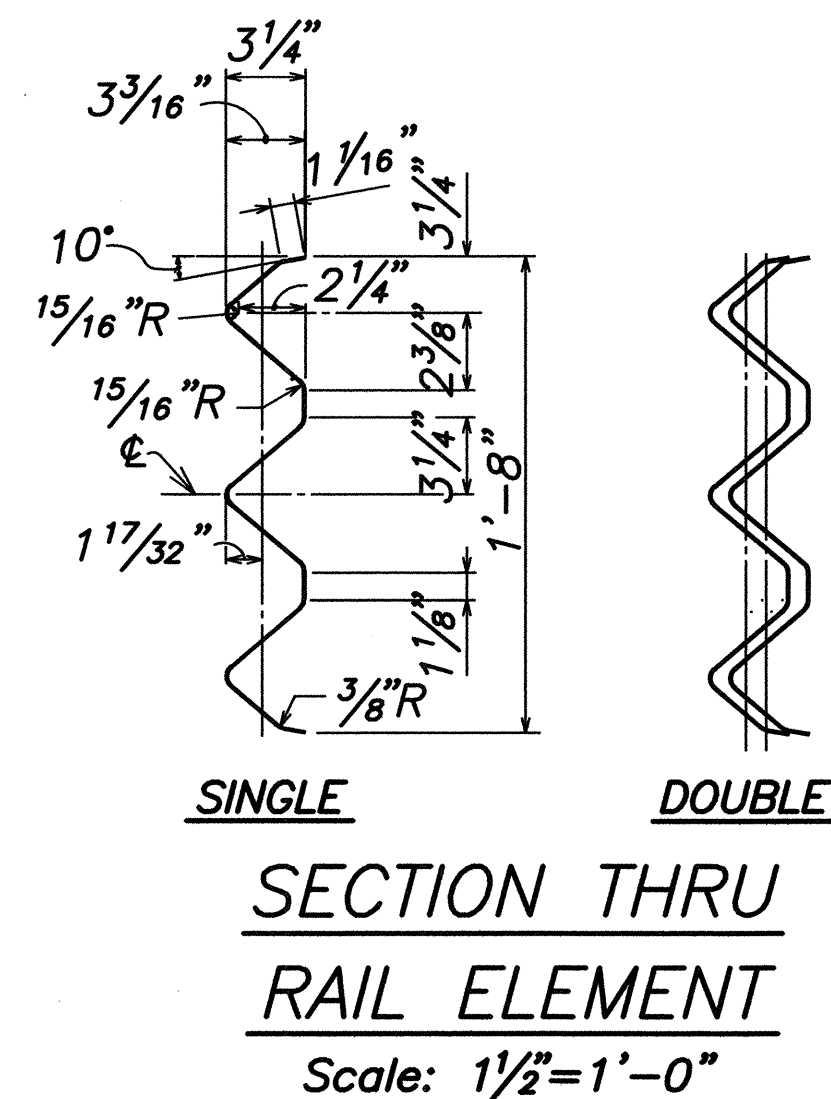
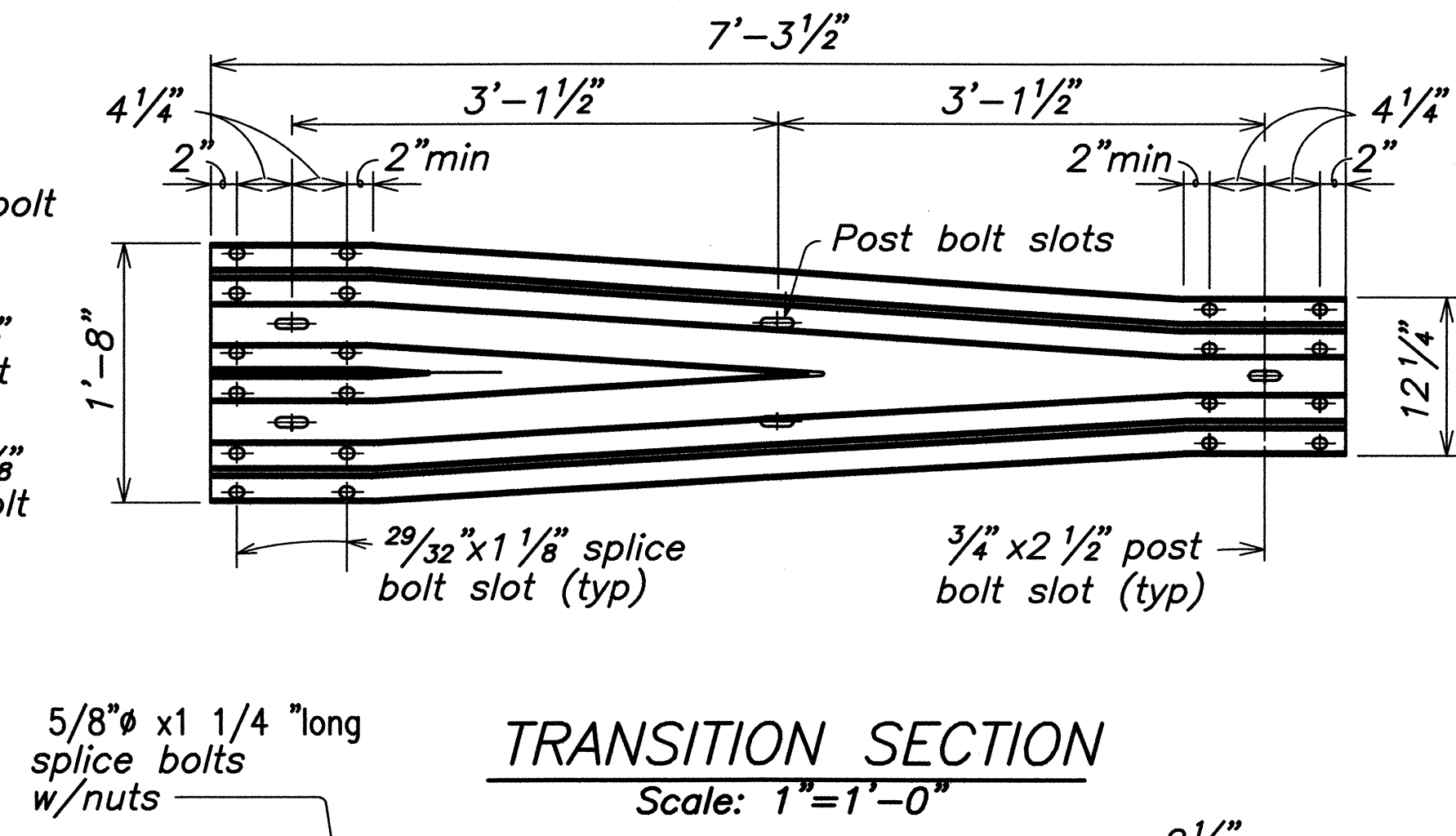
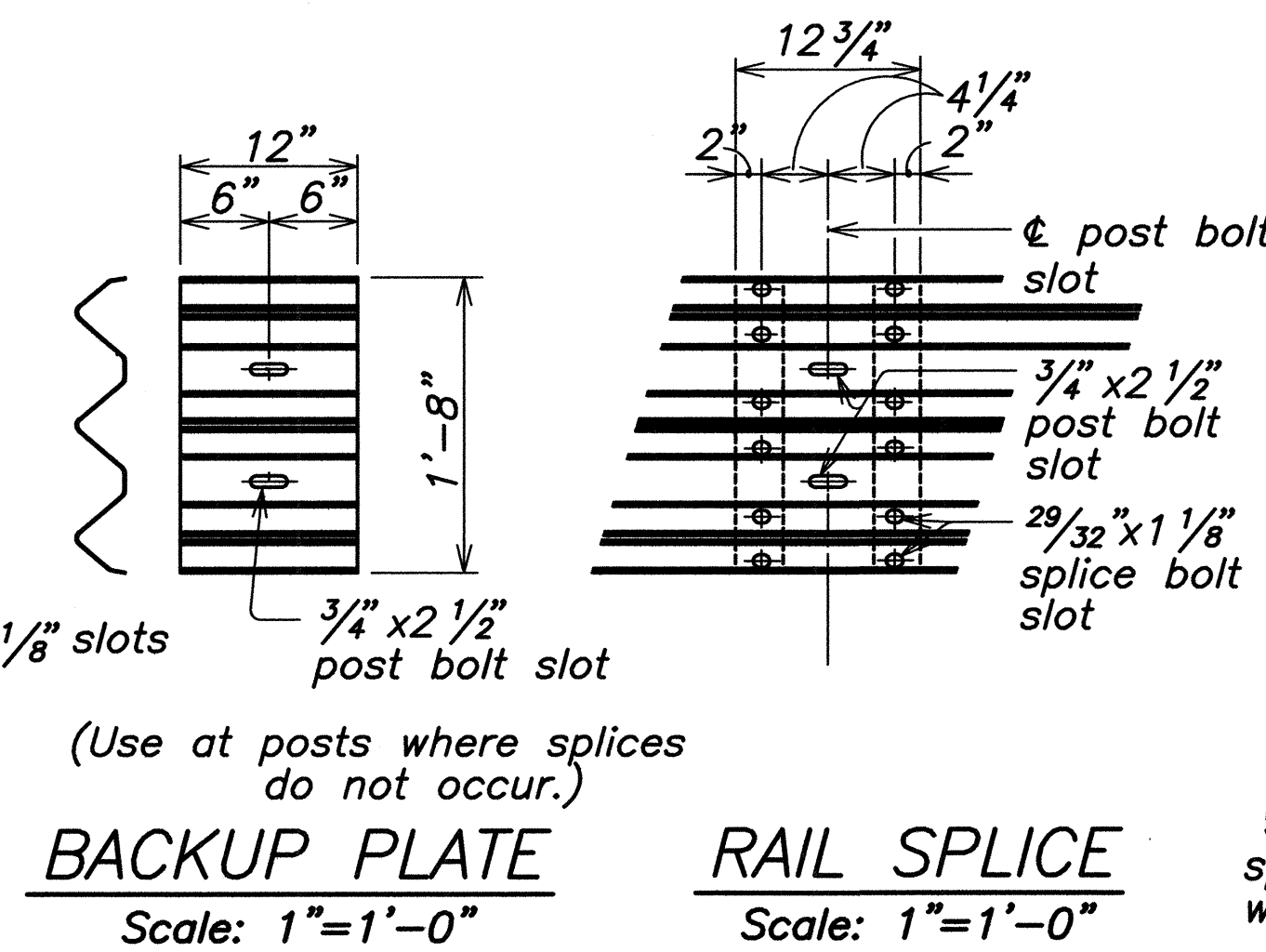
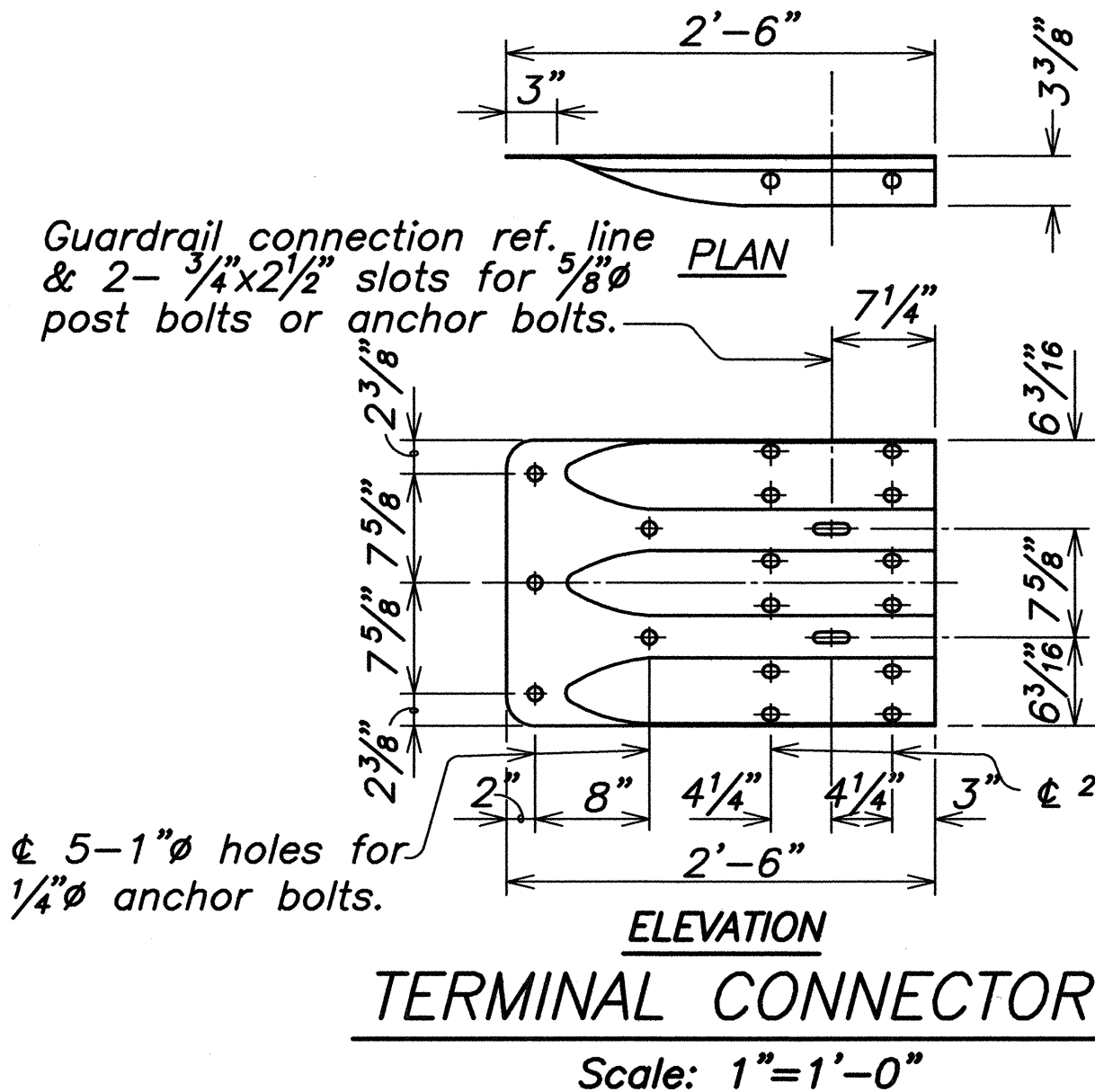
VIEW "K-K"

Scale

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-A311(4)	2006	14	180

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 highways with one-way traffic pattern, use single thrie beam elements at end post 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.



METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK

Scale: 1"=1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**METAL GUARDRAIL TYPE 3 THRIE BEAM
TRANSITION AND APPURTENANCES DETAILS**
MOKULELE HIGHWAY WIDENING
Vicinity of Kealia Pond Driveway
To
Piilani Highway
Federal - Aid Project No. NH-A311(4)
Scale: AS NOTED Date: July 2005
SHEET No. 5 OF 5 SHEETS

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

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