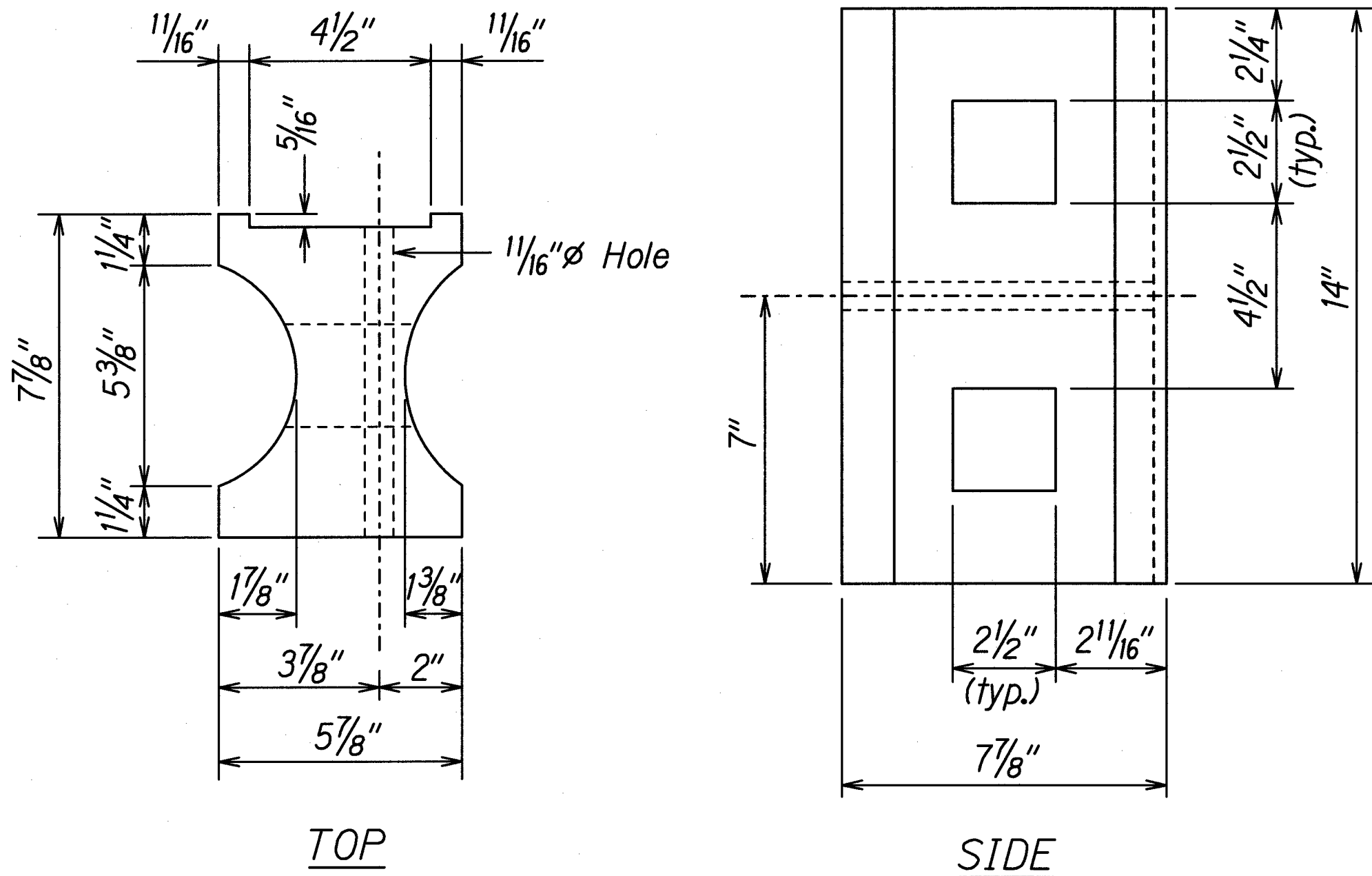


FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-K270	2018	40	241

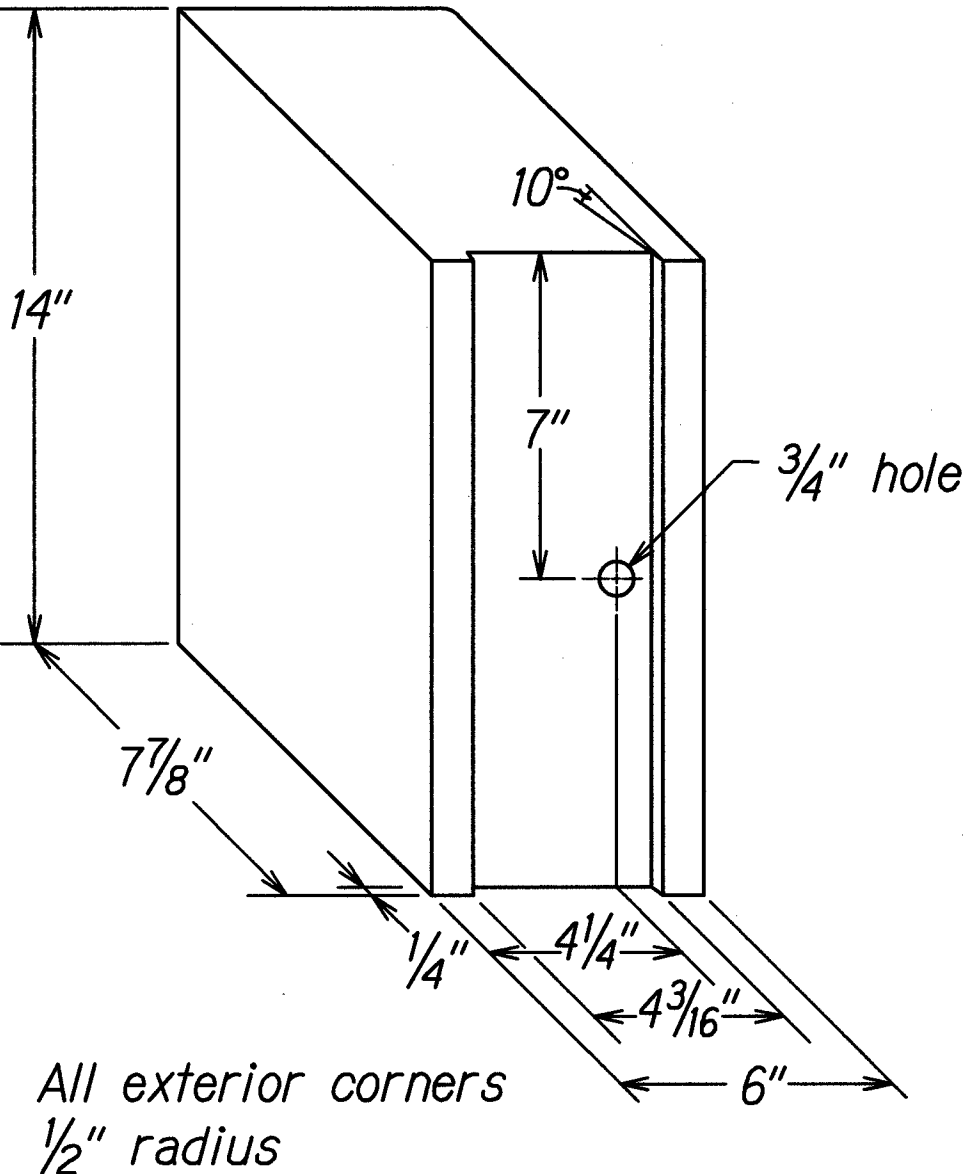
GENERAL NOTES

- 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.

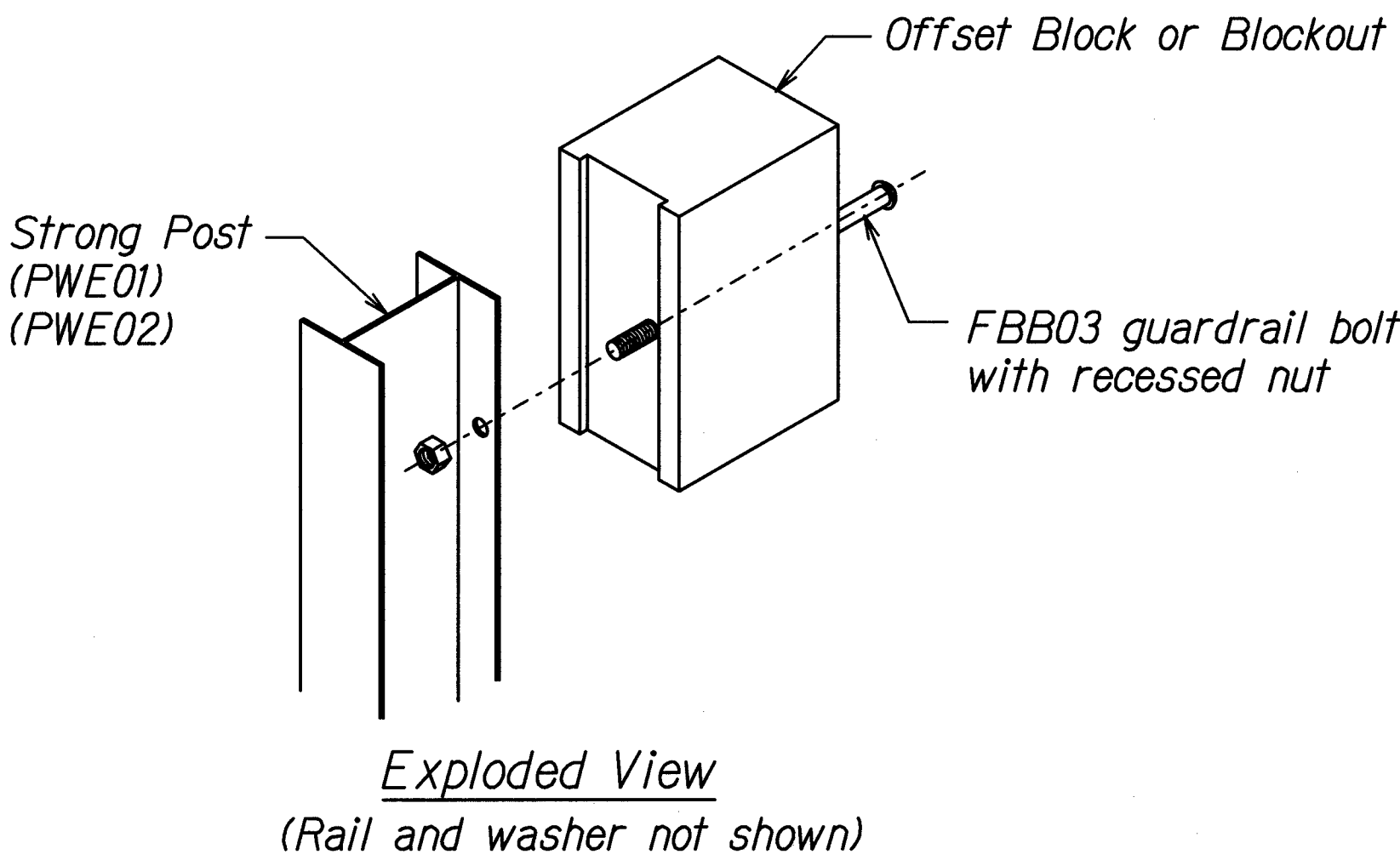
GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 ⁵ / ₈ "	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Strong Post Thrie-Beam	1'-9 ⁵ / ₈ "	1'-6"
Strong Post Modified Thrie-Beam	2'-0"	2'-0"



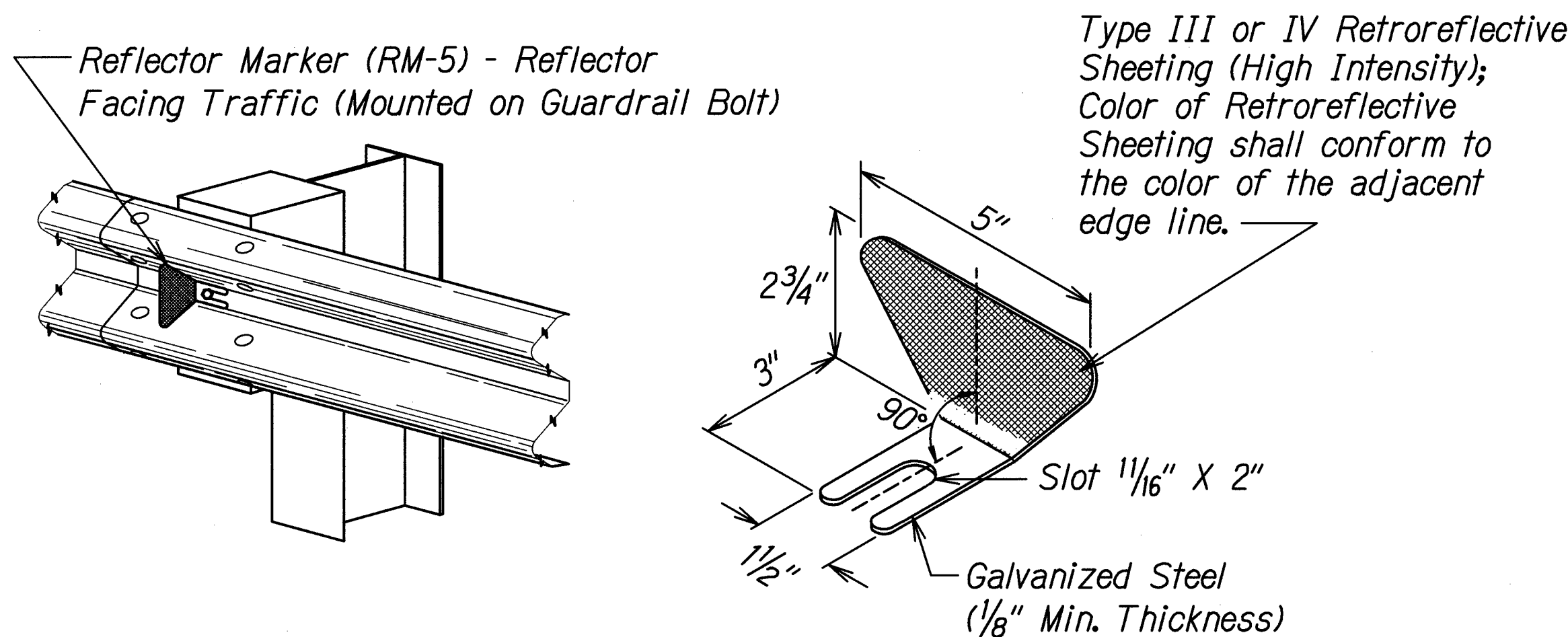
TOP
SIDE
RECYCLED PLASTIC BLOCKOUT (TYPE I)



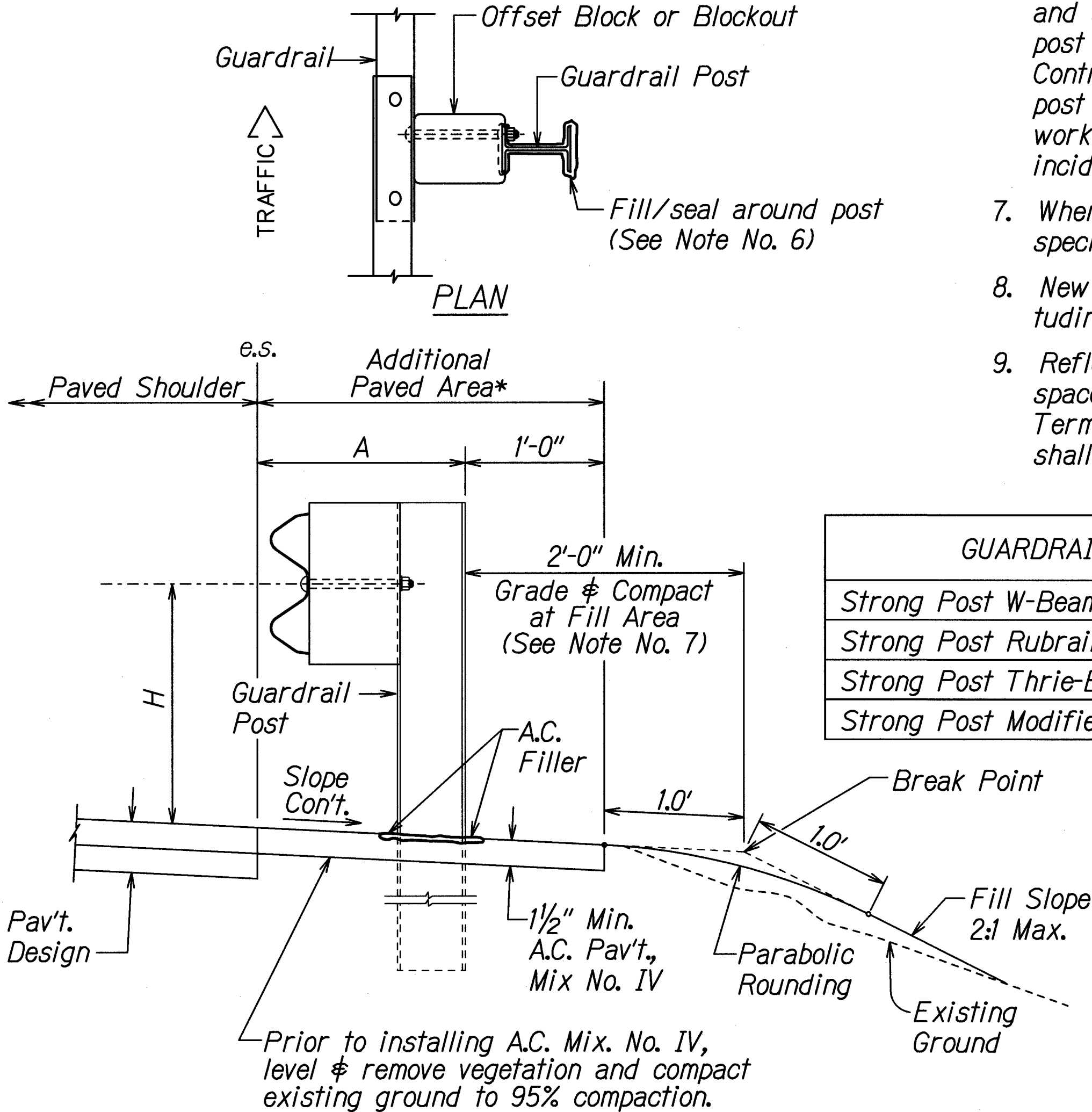
RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)



STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



ELEVATION
TYPICAL GUARDRAIL INSTALLATION

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Signature: *Gerald D. Andrade* Date: 04/30/20

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALALAI INTERCHANGE TO WAIAWA OVERPASS
FAP NO. HSIP-HI-K270

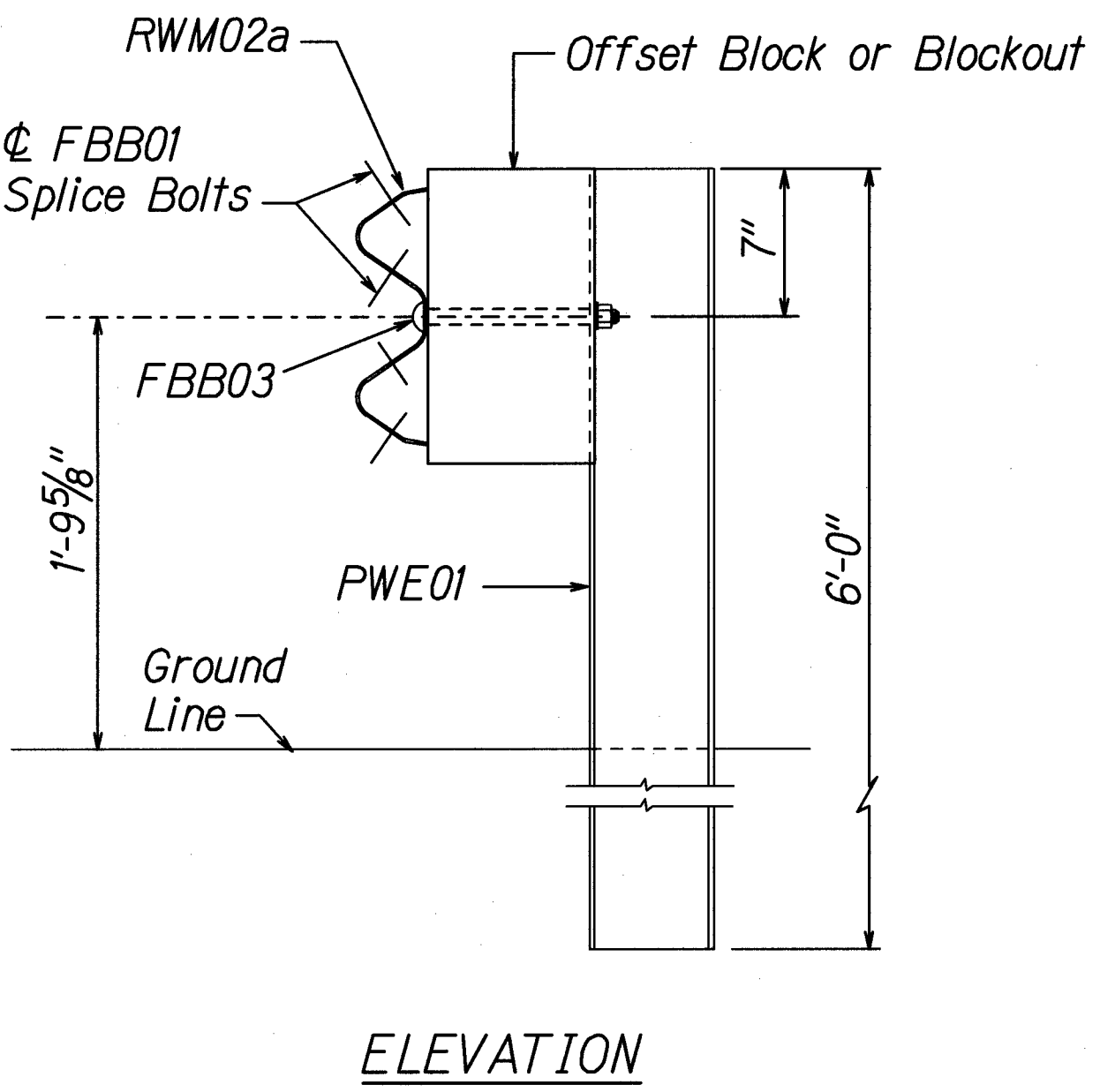
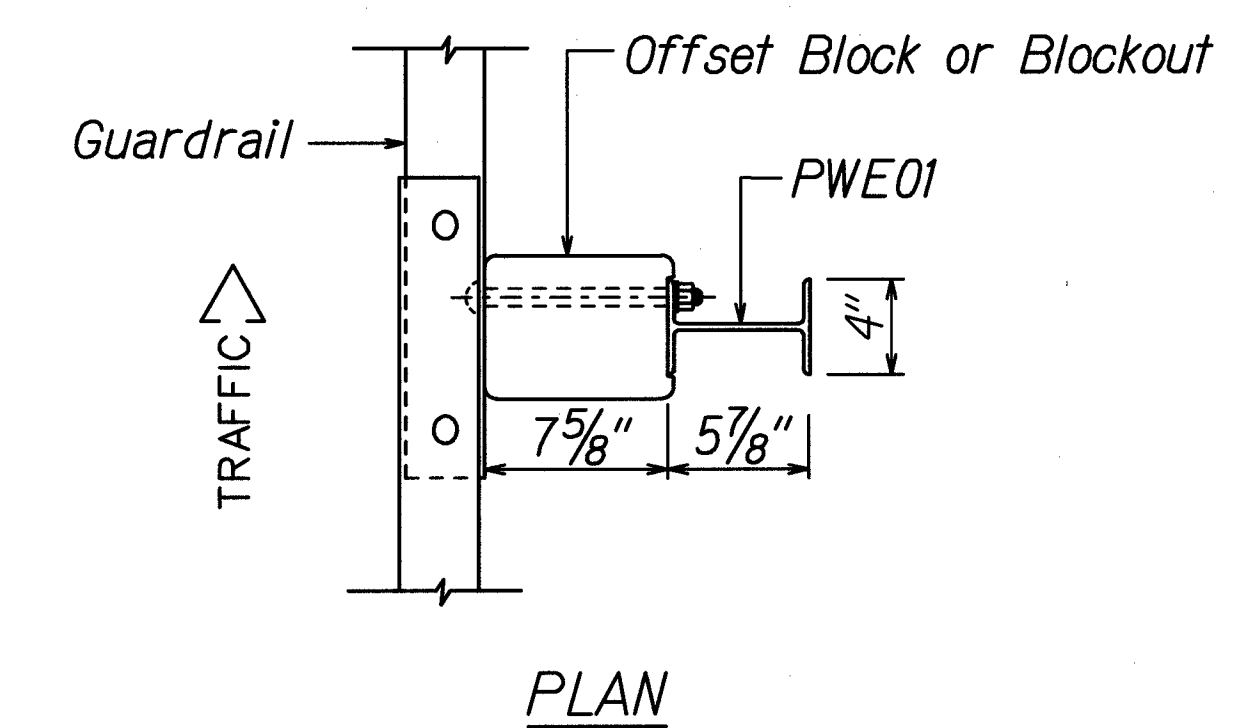
Scale: NTS Date: July 26, 2018

SHEET No. RD-1 OF 10 SHEETS

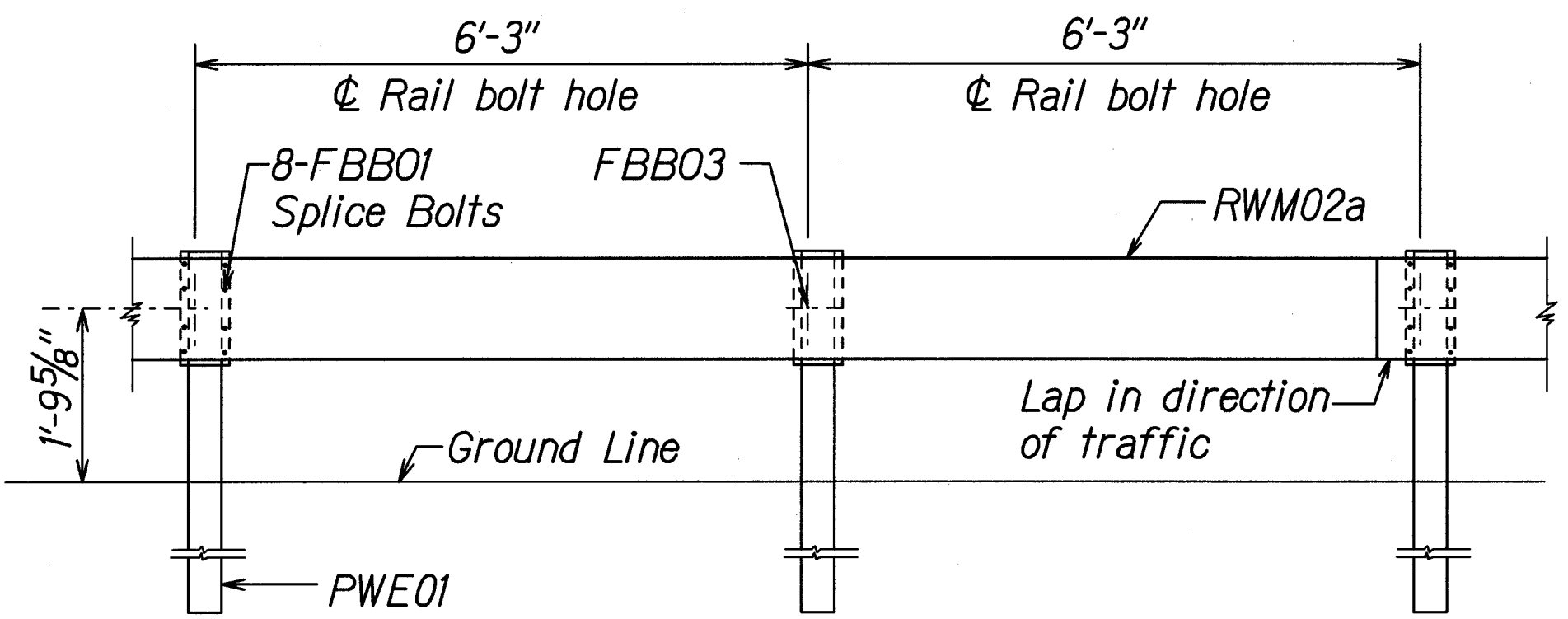
DESIGNED BY	DATE
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

10/08/13 hdm/guardrail/rev09.dwg (standard plan TE-50 r09/01/00)

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-1(270)	2018	41	241



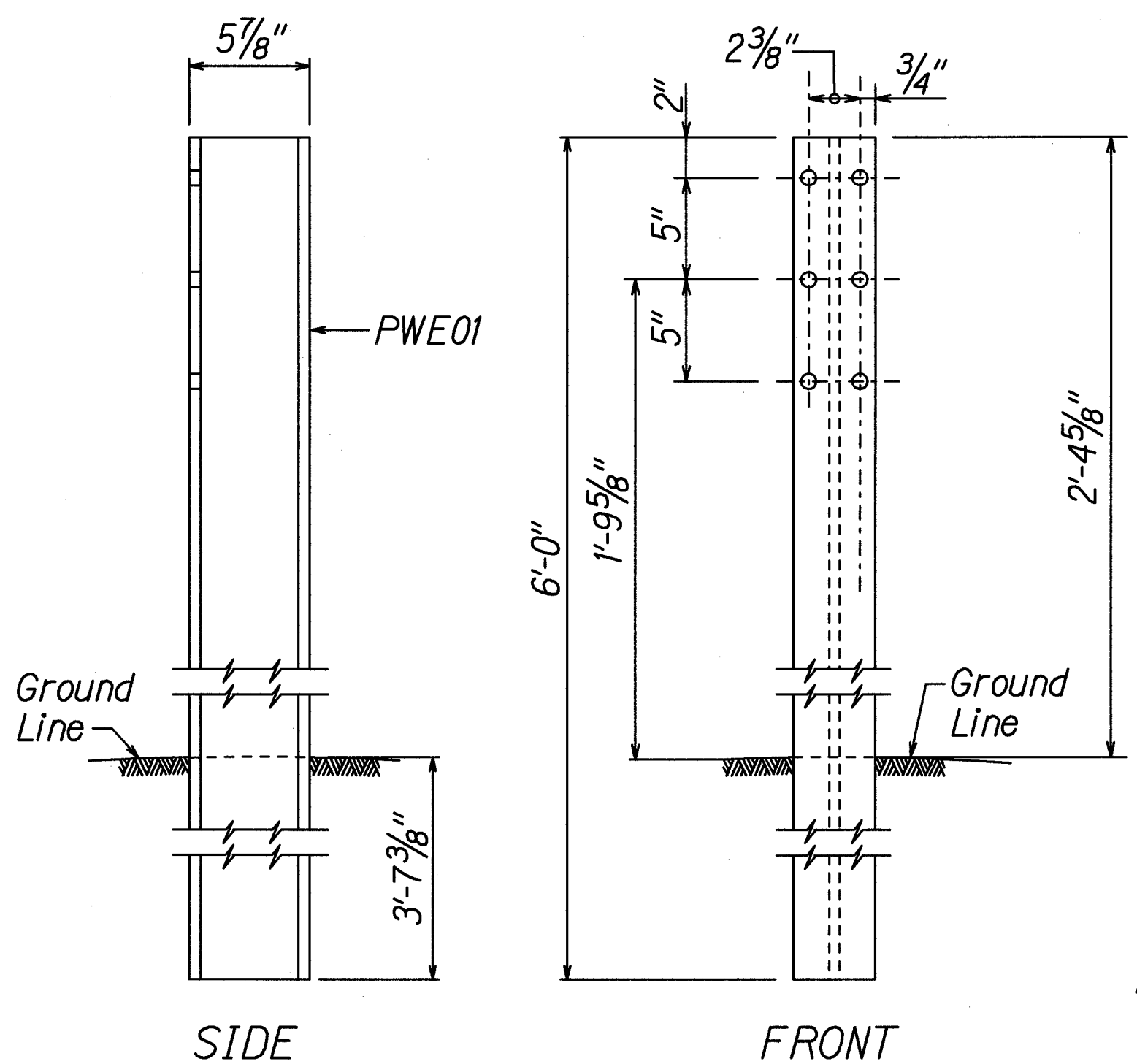
STRONG POST W-BEAM GUARDRAIL
(SGR04a)



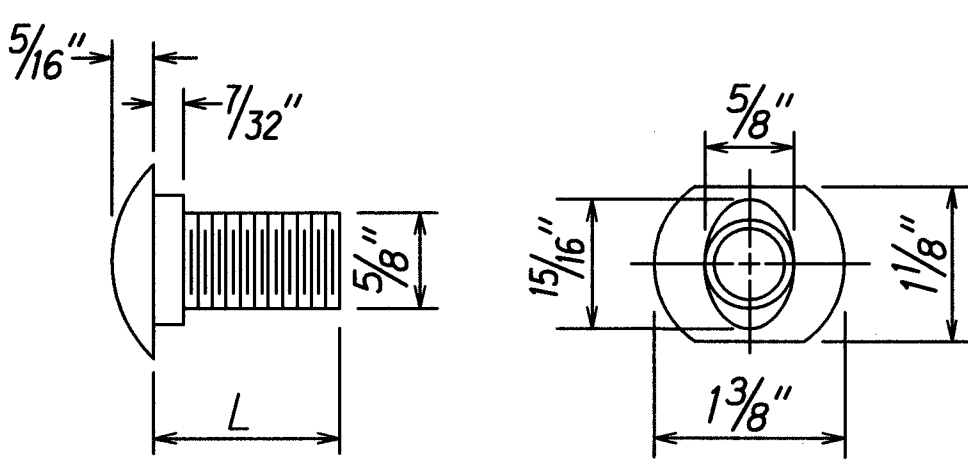
STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

NOTE:
All Holes are
3/4" Dia.

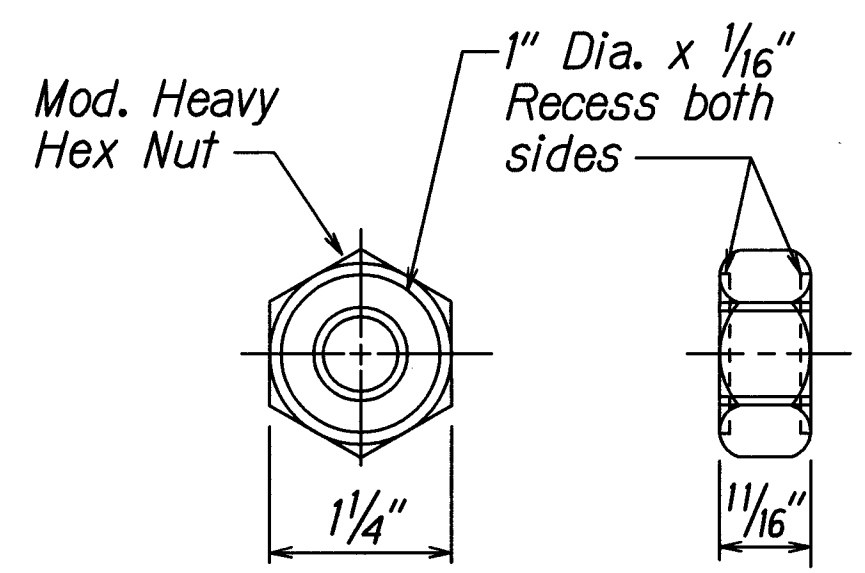
W6x8.5
Structural
Shape



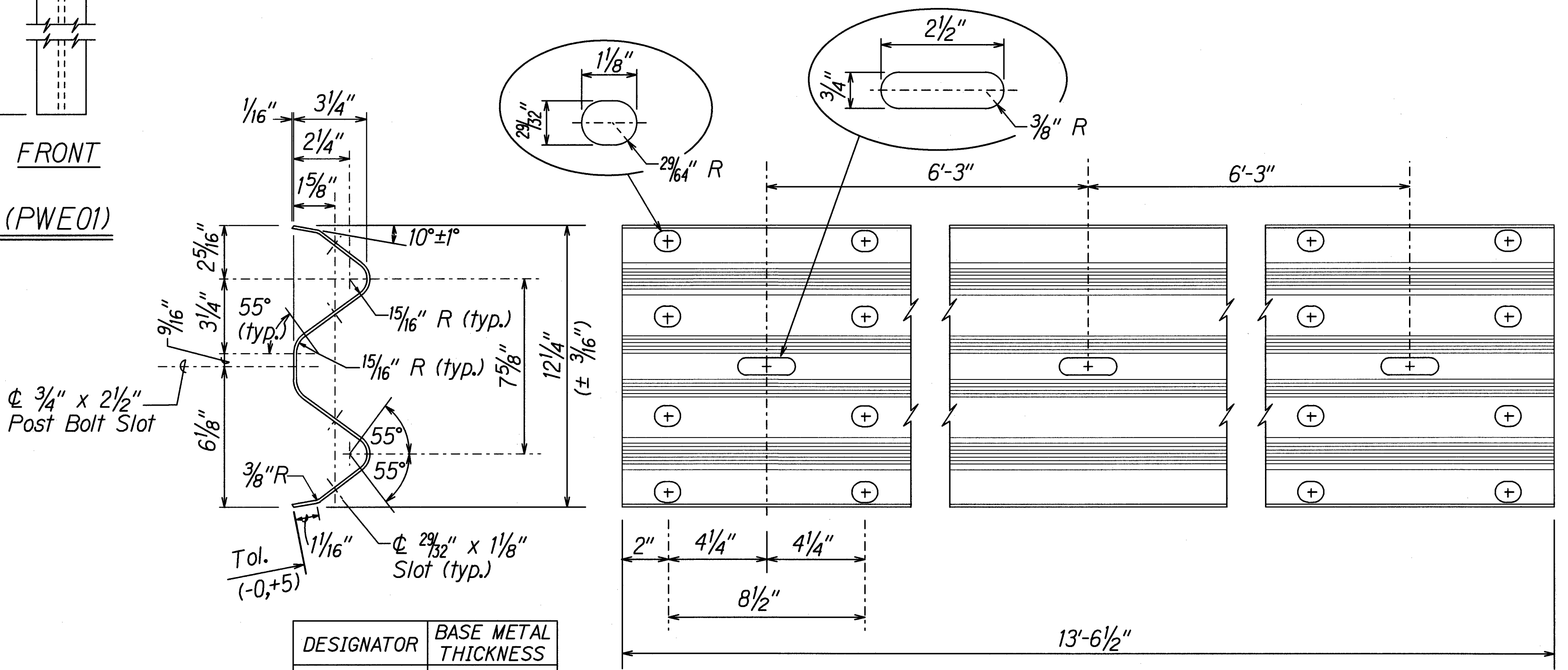
W-BEAM STRONG POST (PWE01)



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)

ORIGINAL PLAN	DATE	SURVEY PLOTTED BY
NOTE BOOK	DESIGNED BY	DATE
CHECKED BY	QUANTITIES BY	DATE
N.		

Standard plan TE-50 103/06/87

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Signature: *Gerald D. Andrade* Date: 04/30/20

EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

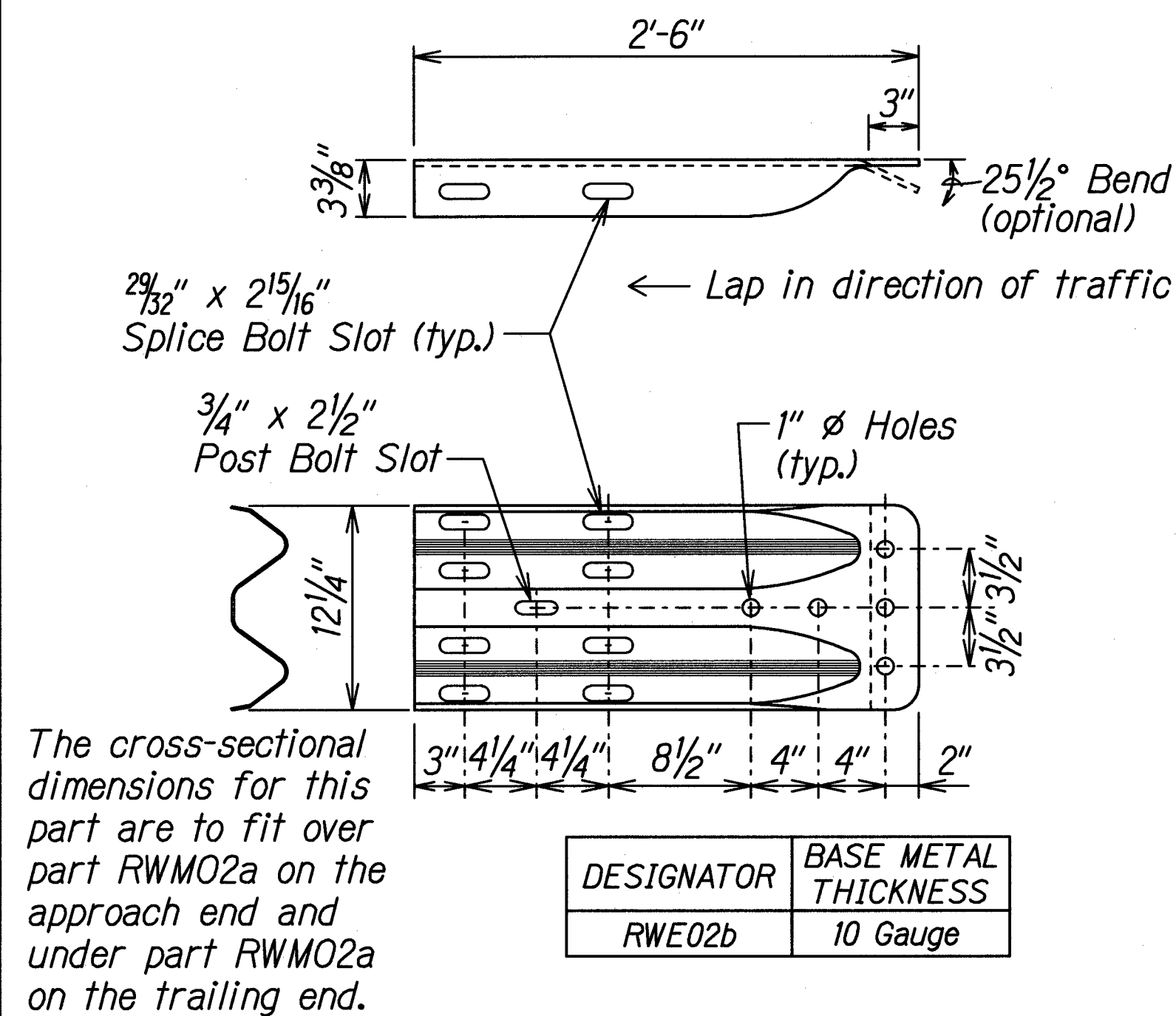
STRONG POST W-BEAM GUARDRAIL

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALAILAI INTERCHANGE TO WAI'AWA OVERPASS
FAP NO. HSIP-HI-1(270)

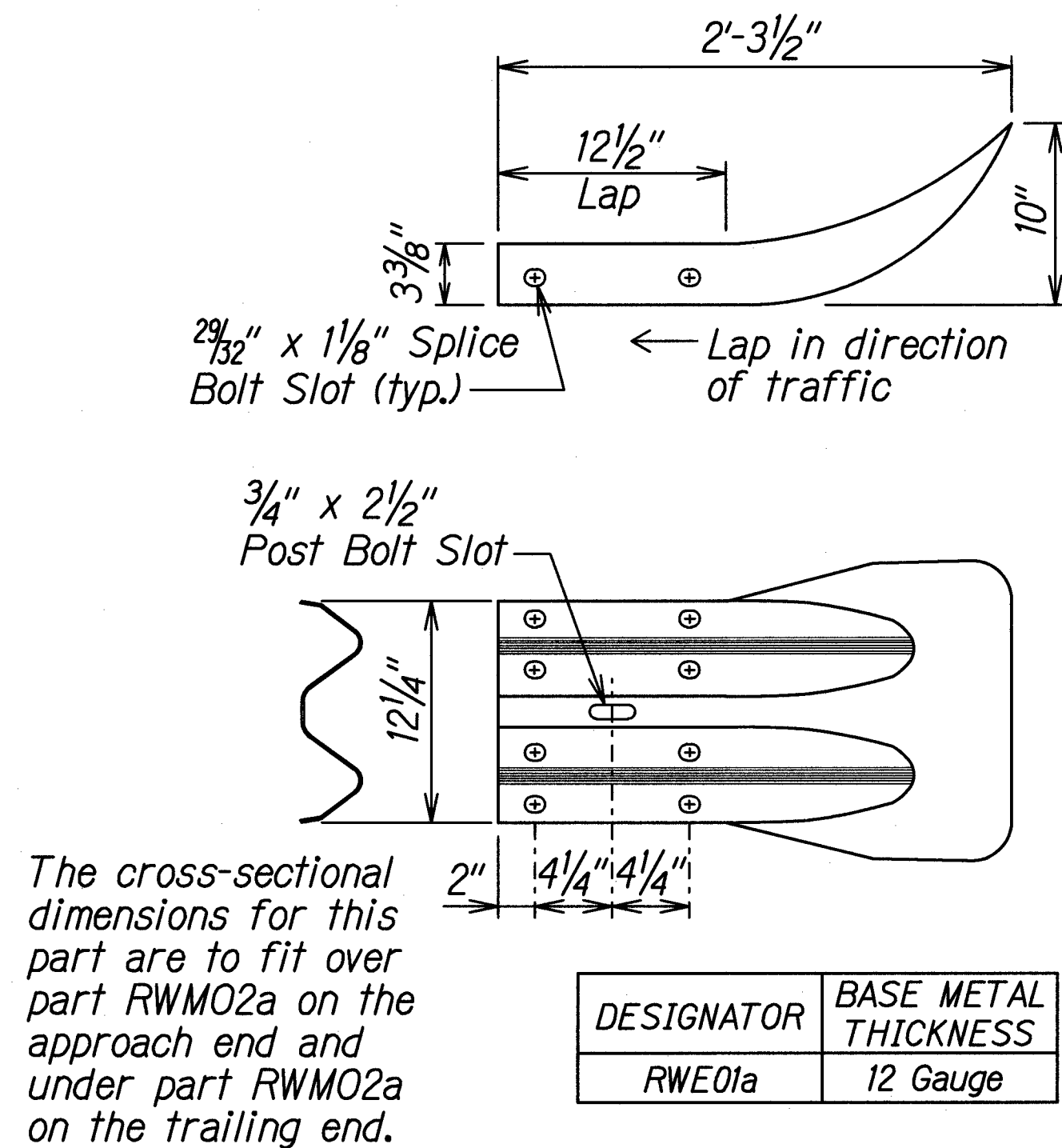
Scale: NTS Date: July 26, 2018

SHEET No. RD-2 OF 10 SHEETS

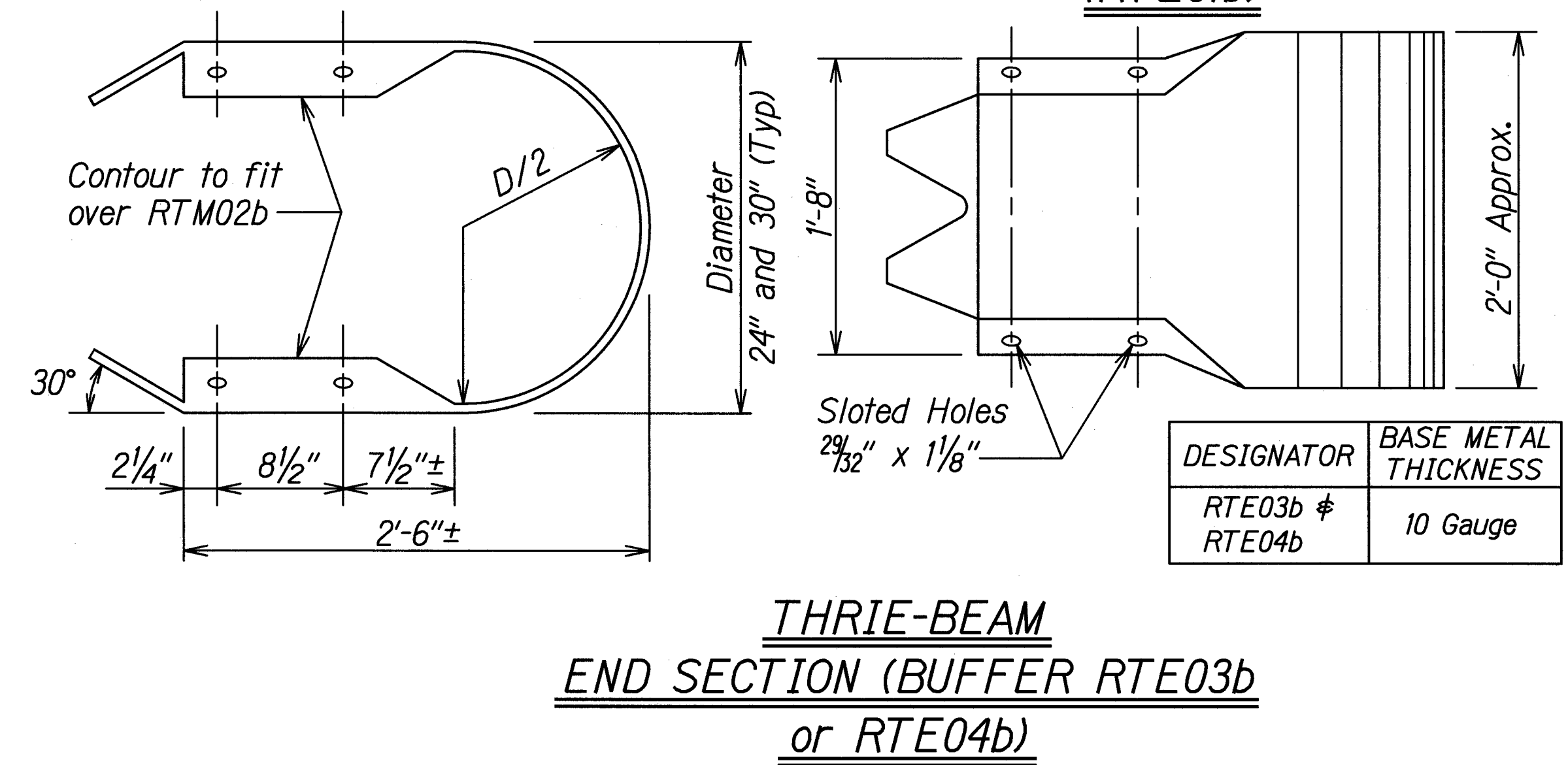
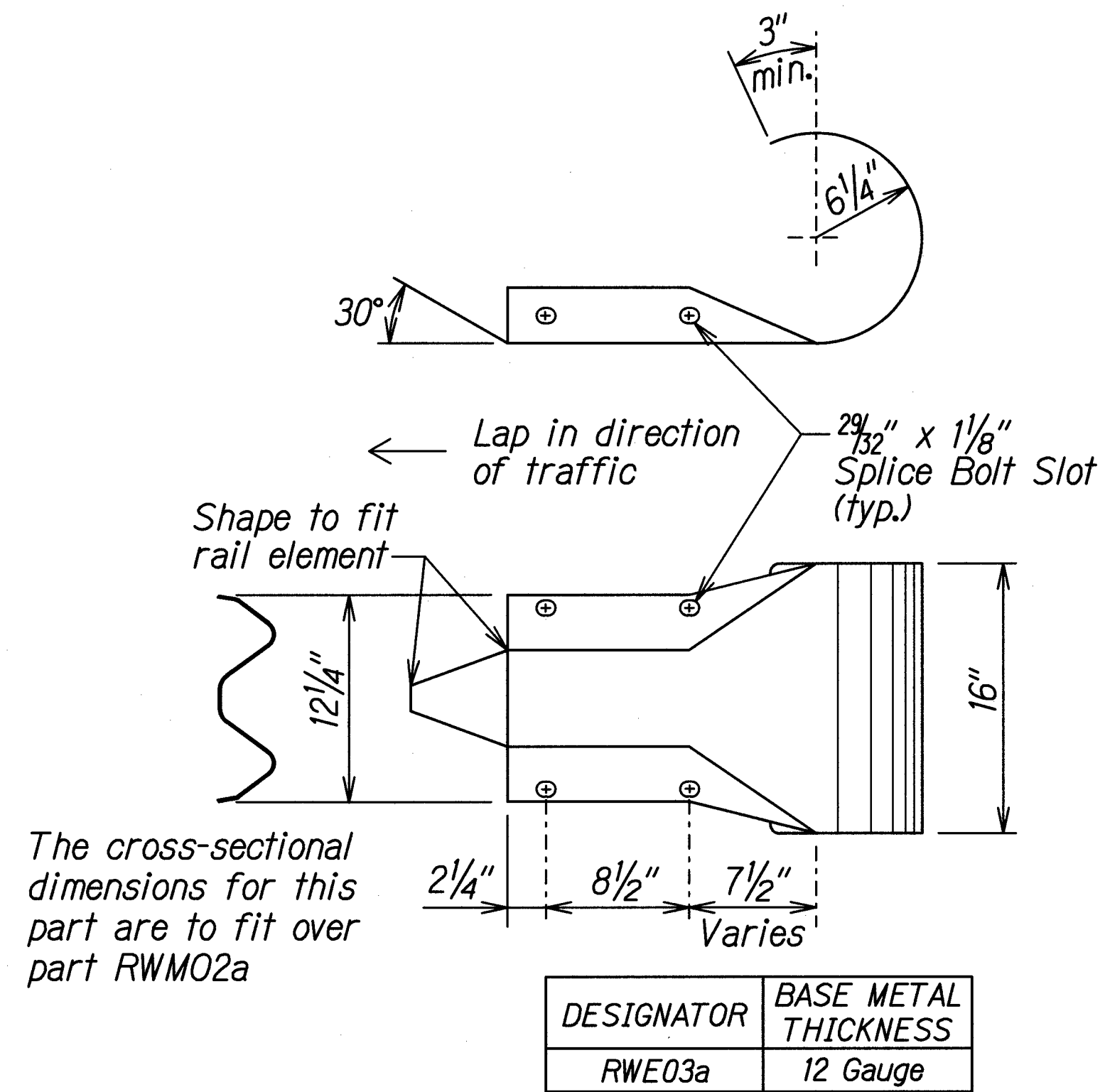
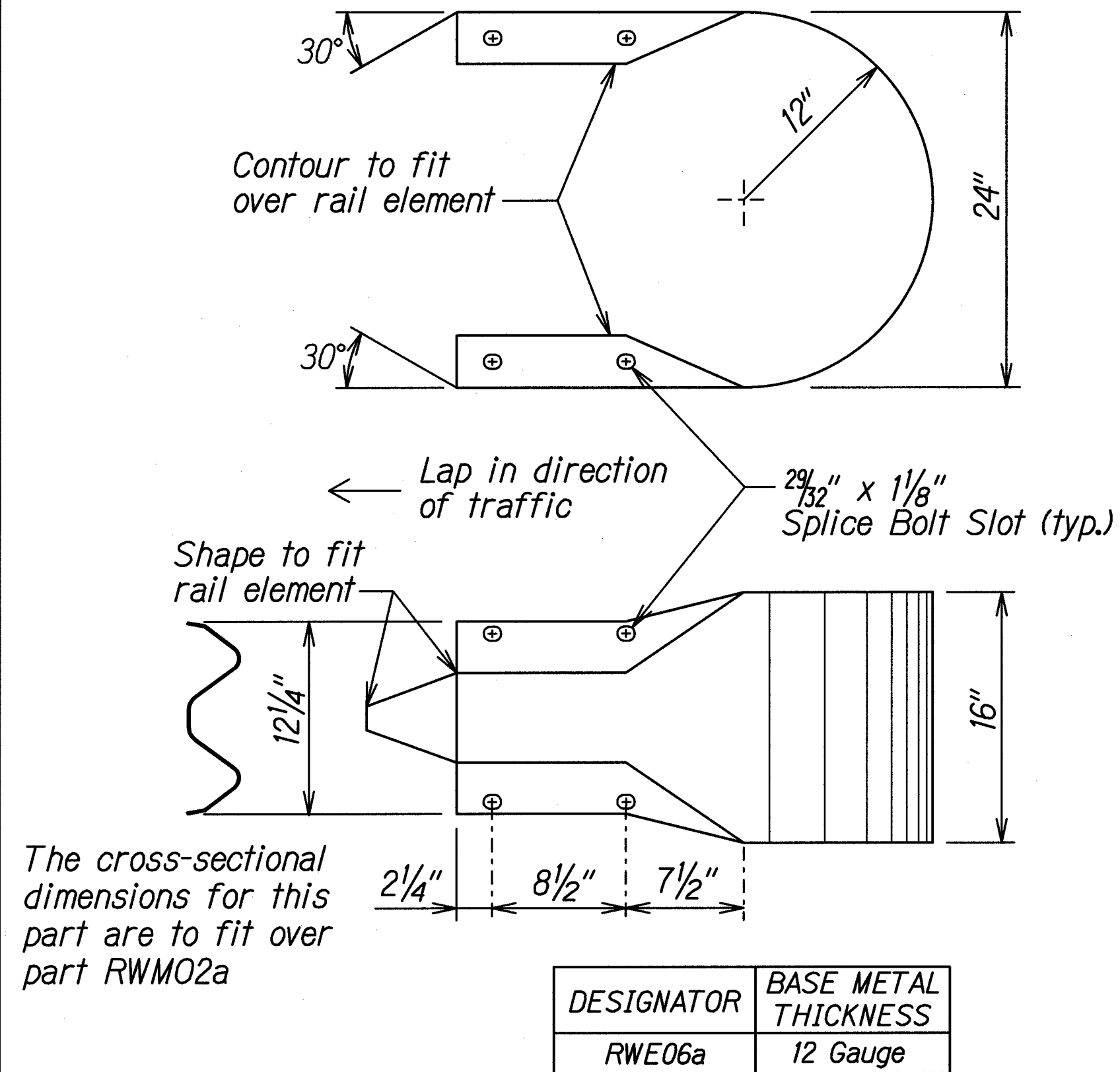
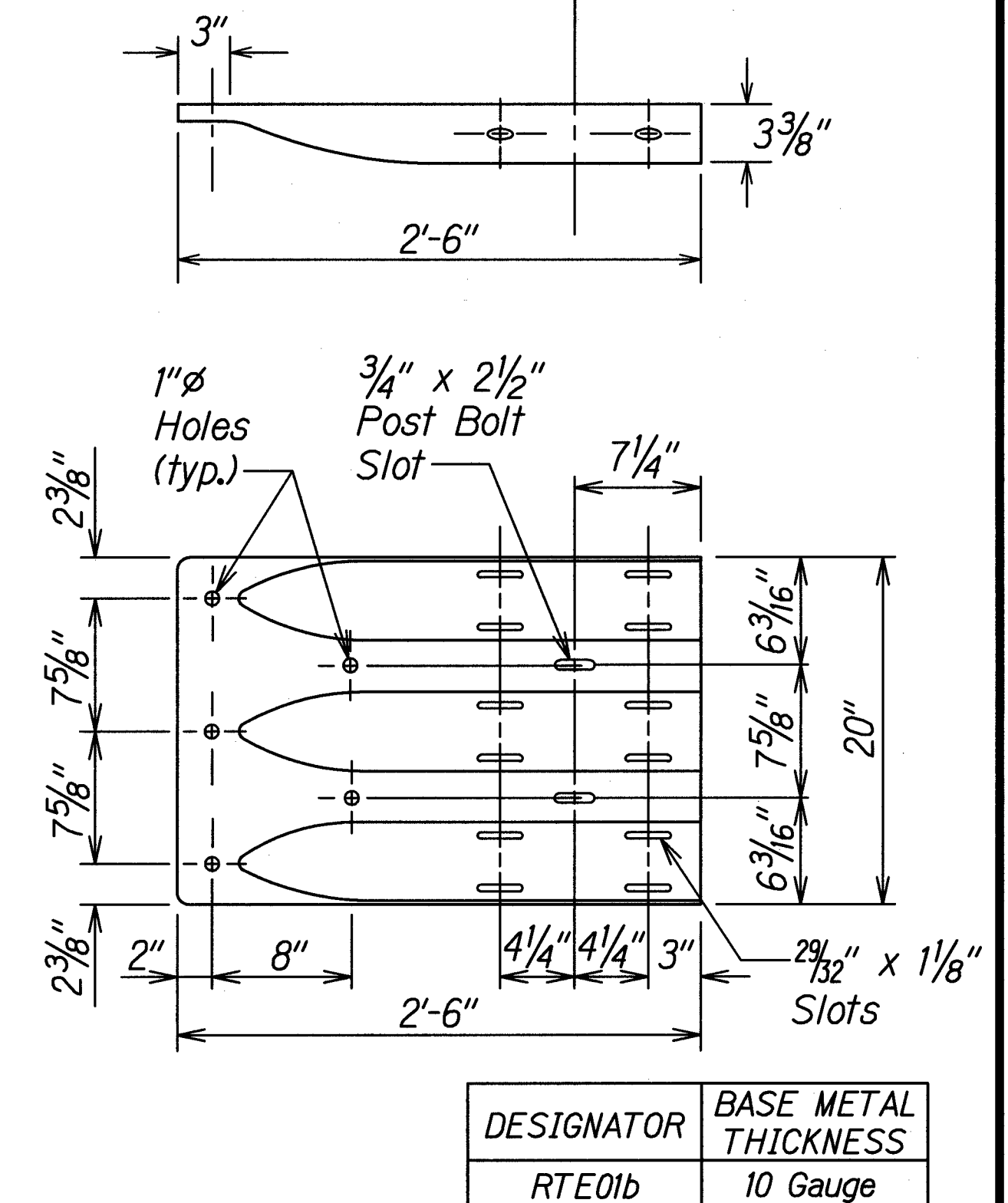
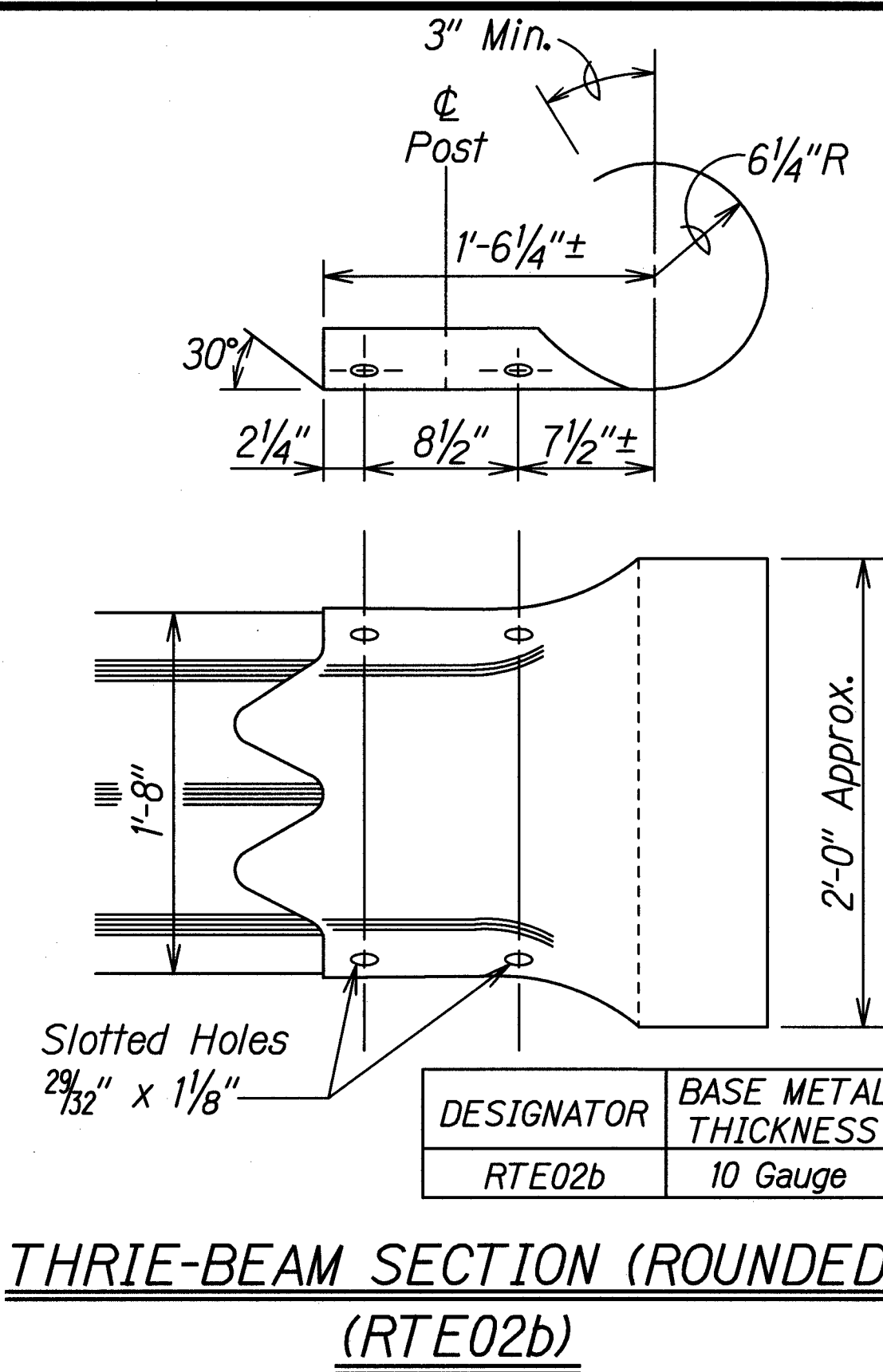
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-1(K270)	2018	42	241



W-BEAM TERMINAL CONNECTOR (RWE02b)



W-BEAM END SECTION (FLARED RWE01a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
N.	

Standard plan TE-51 (09/01/87)
 rd by guardrail/retrofit
 16/2/01

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Signature: *Gerald D. Andrade* 04/30/20
 SIGNATURE EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

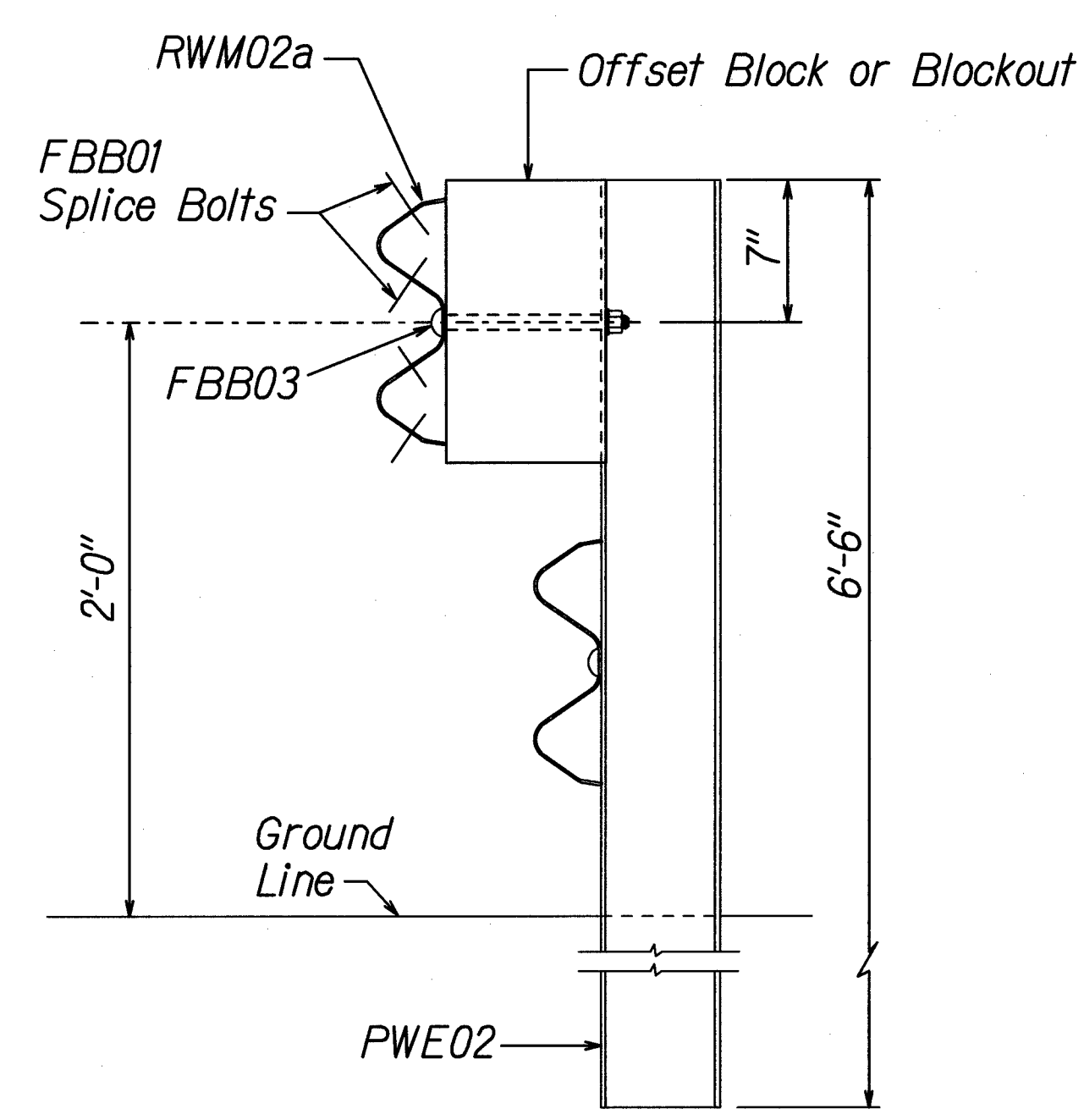
GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
 PALAILAI INTERCHANGE TO WAIKAWA OVERPASS
 FAP NO. HSIP-HI-1(K270)

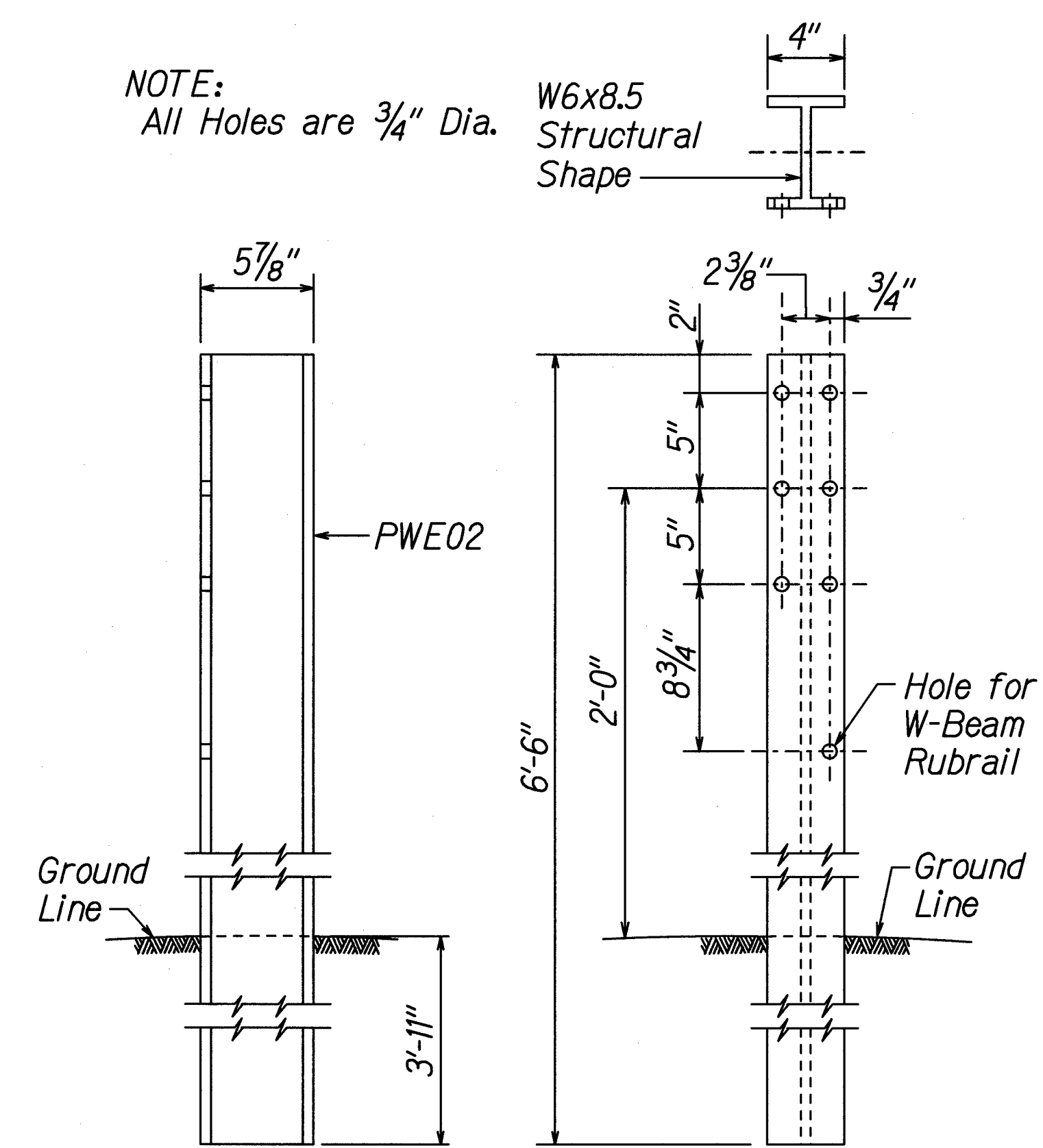
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SHEET No. RD-3 OF 10 SHEETS

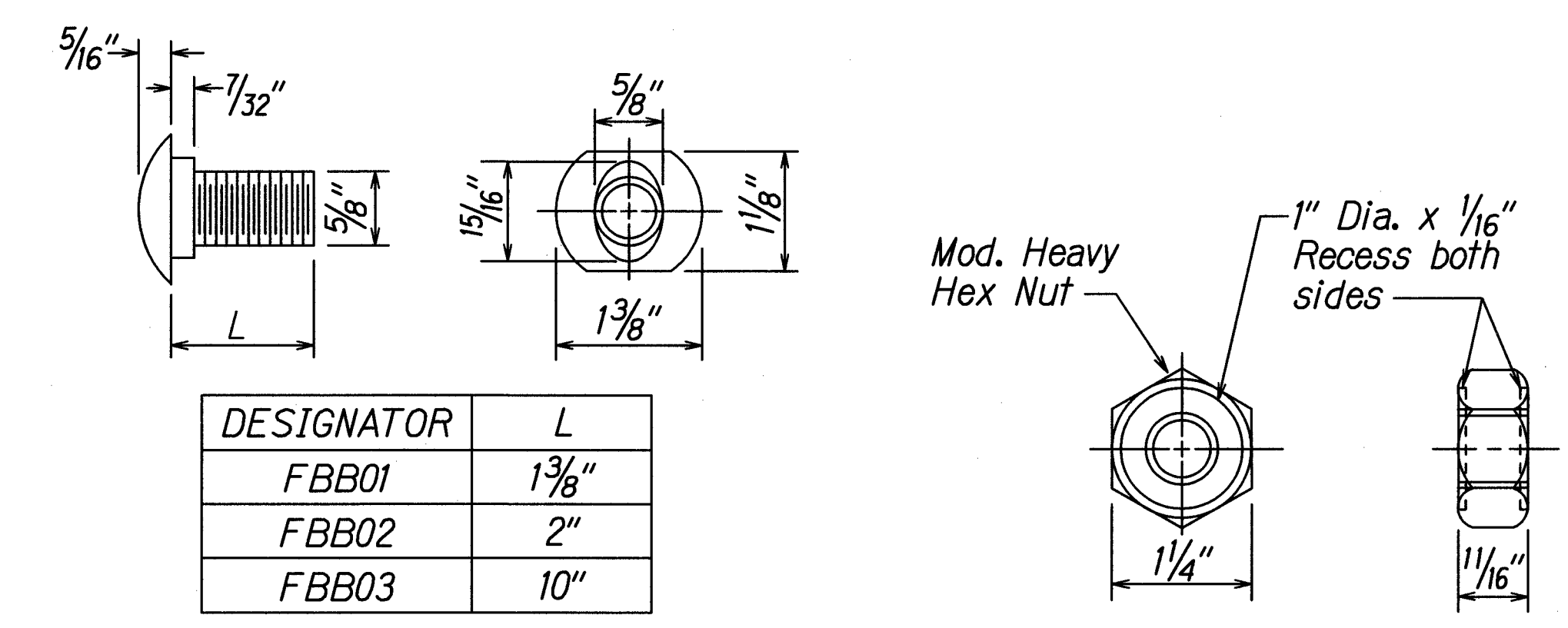
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-1(270)	2018	43	241



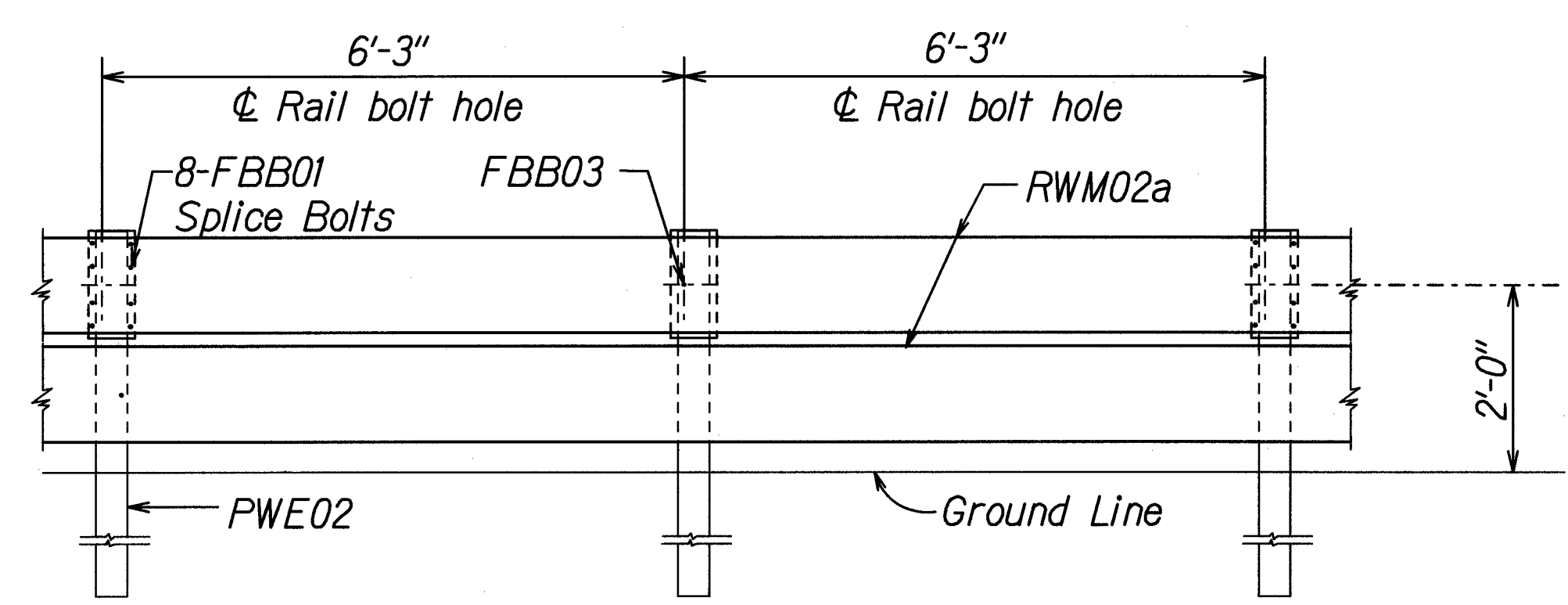
ELEVATION
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL



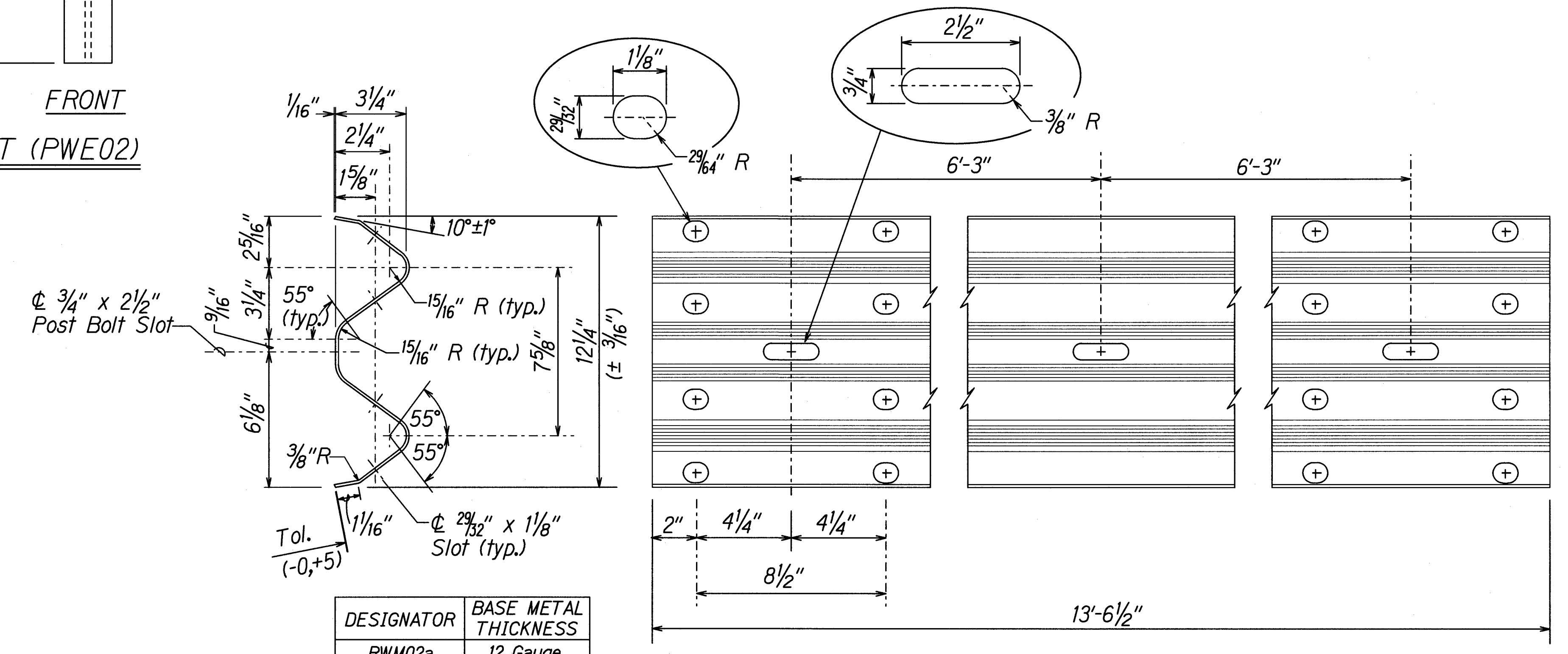
SIDE
FRONT
W-BEAM STRONG POST (PWE02)



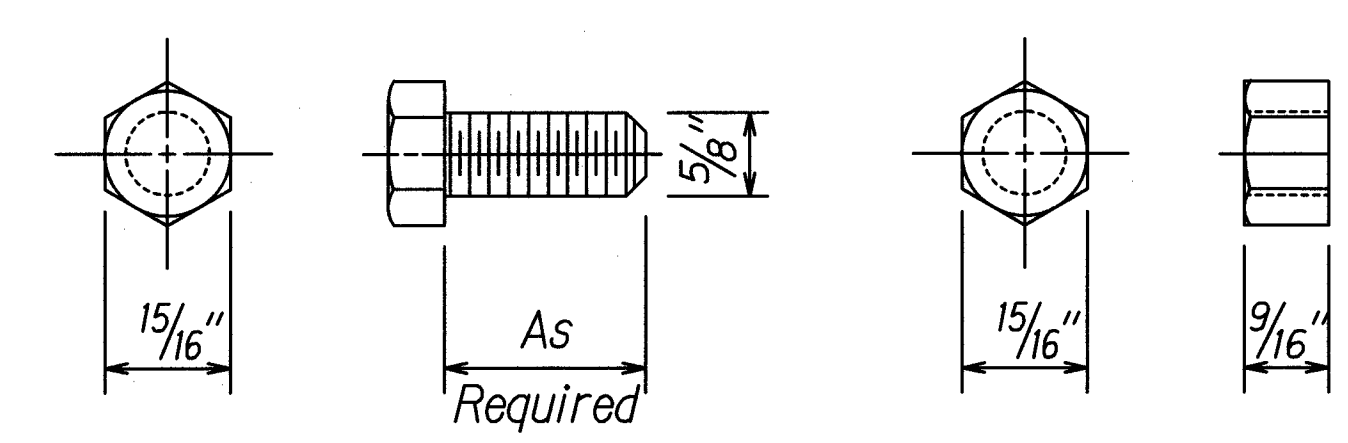
GUARDRAIL BOLTS AND RECESSED NUT



ELEVATION
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



2 SPACE W-BEAM GUARDRAIL (RWM02a)



HEX BOLT & NUT (FBX16a)

ORIGINAL PLAN	DATE	BY
NOTE BOOK	DESIGNED BY	QUANTITIES BY
CHECKED BY		

Standard plan TE-52 (11/03/89)

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Signature: *Gerald D. Andrade* Date: 04/30/20

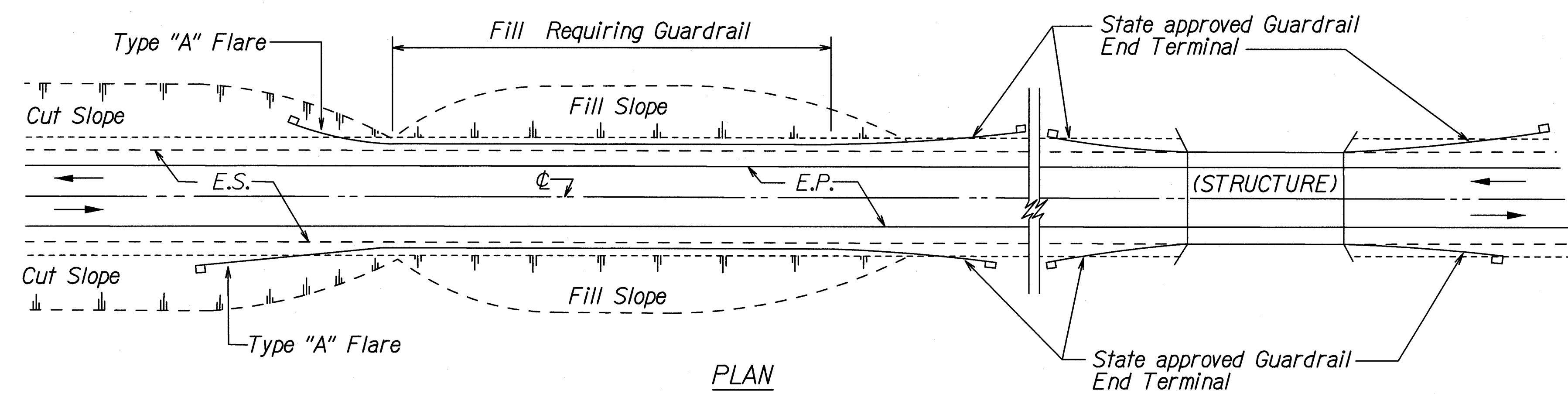
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

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

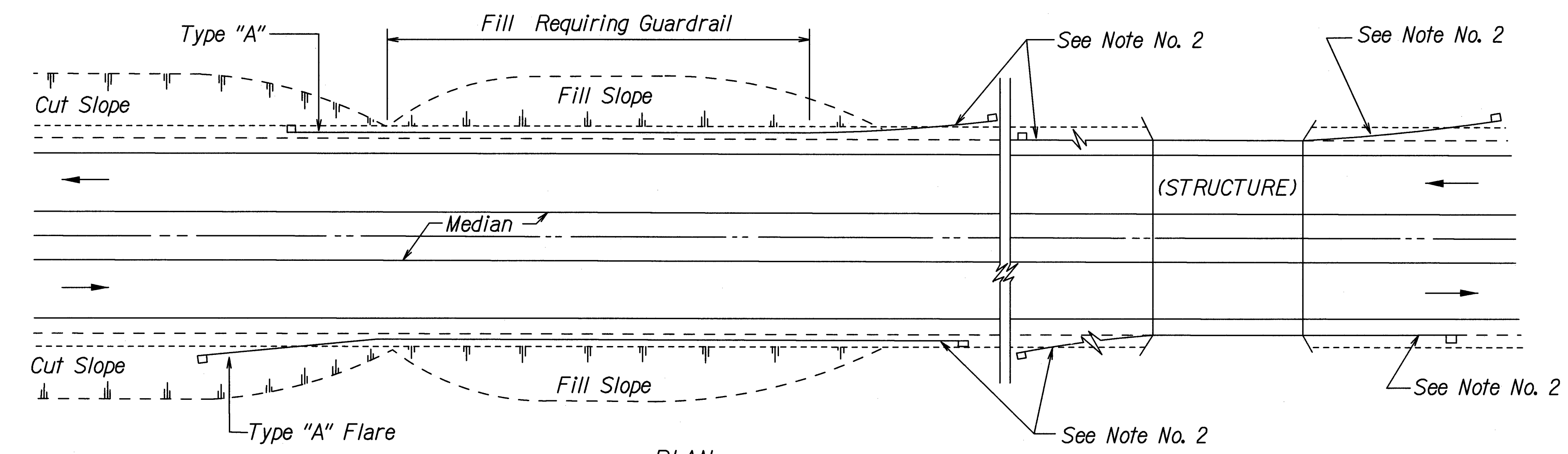
INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALAILAI INTERCHANGE TO WAIKAWA OVERPASS
FAP NO. HSIP-HI-1(270)

Scale: NTS Date: July 26, 2018

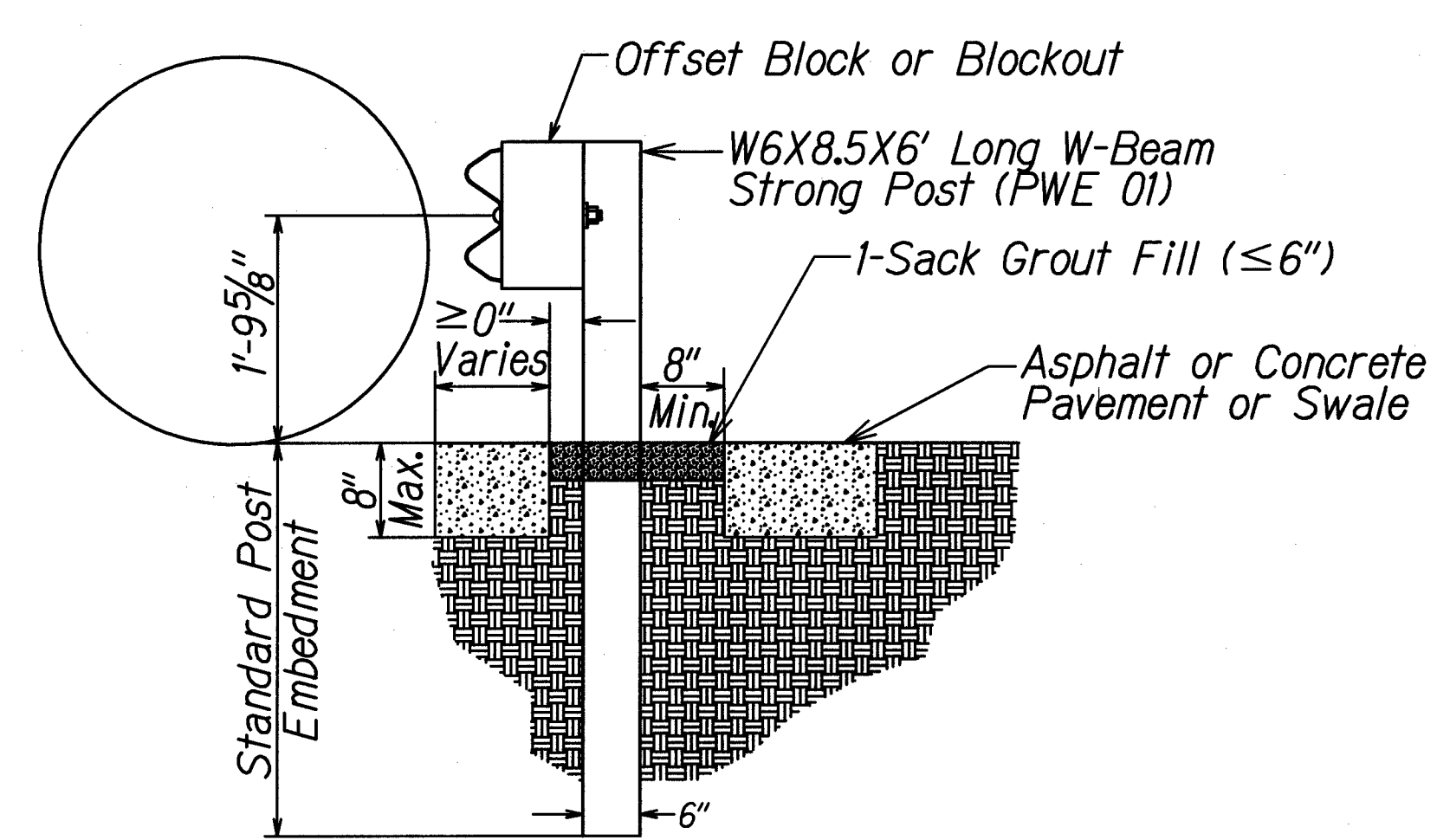
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-1(270)	2018	45	241



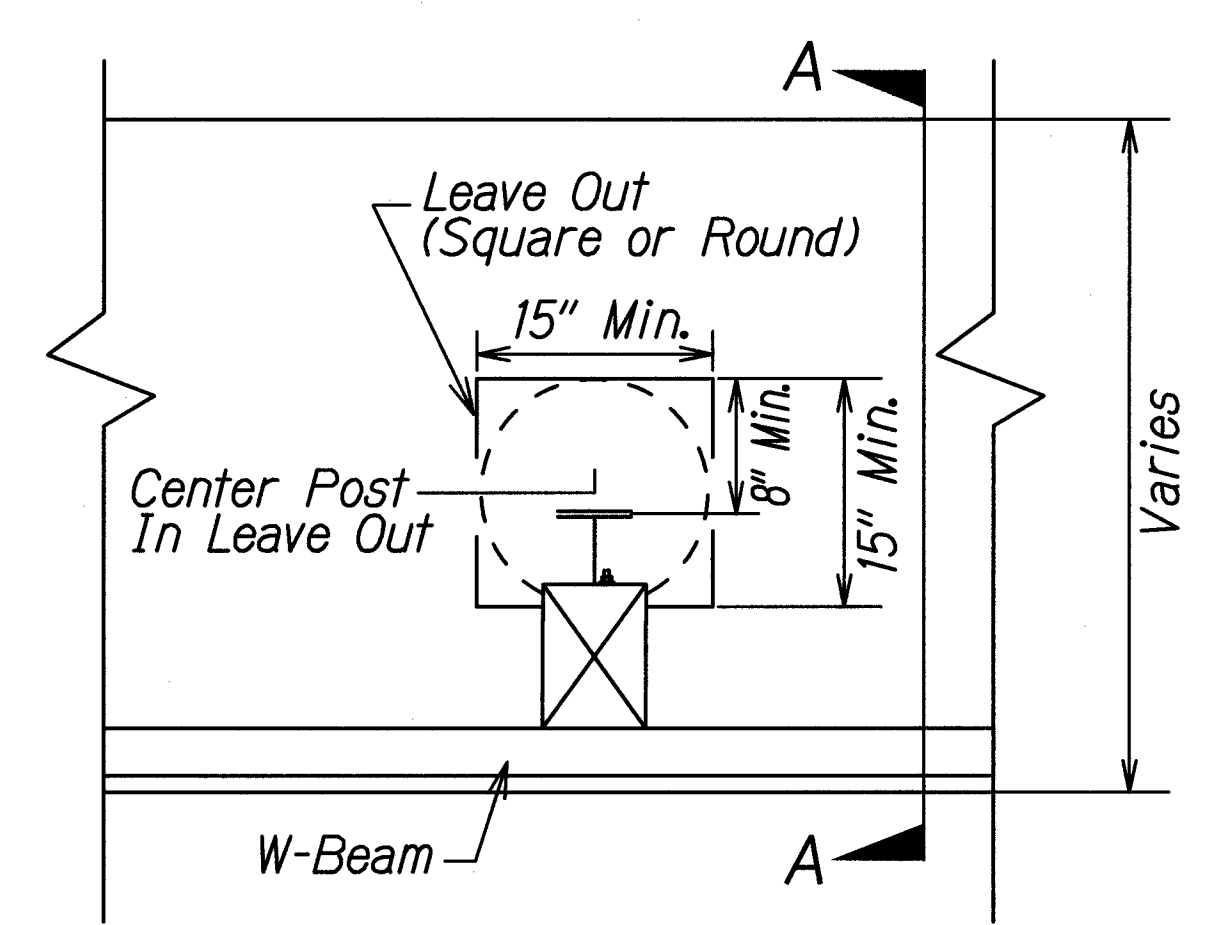
PLAN
TWO WAY ROADWAY



PLAN
ONE WAY ROADWAY (DIVIDED HIGHWAY)



SECTION A-A



STEEL POST DETAIL

STRONG POST W-BEAM GUARDRAIL
POST IN PAVEMENT OR DRAINAGE SWALE

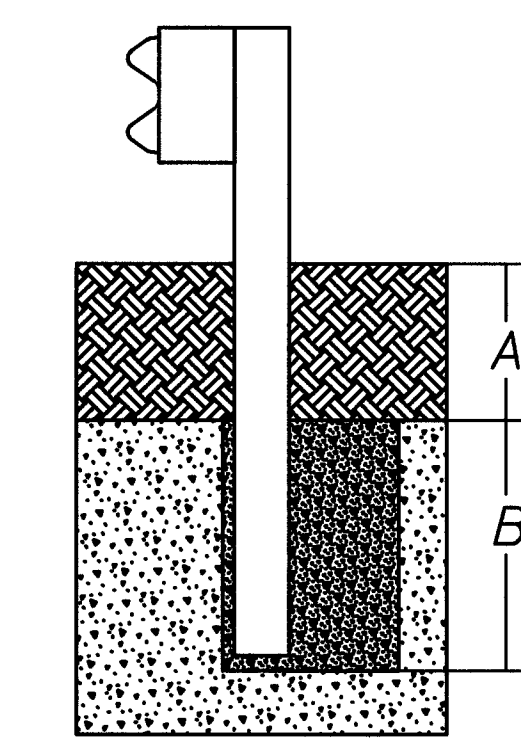
NOTES:

1. Metal Guardrail connection to concrete structures requires End Post Connection. See Structure Plans.
2. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
3. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.

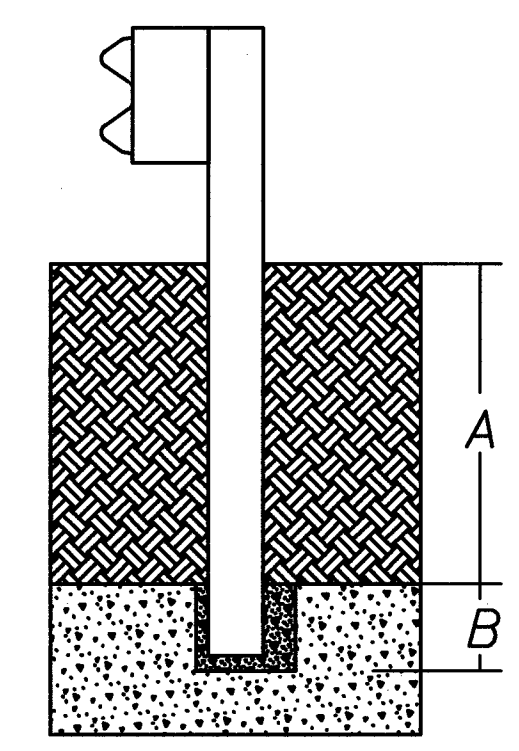
NOTES (STRONG POST W-BEAM IN ROCK):

1. Backfill of drilled holes shall be with compressible material, ASTM C33 Coarse Aggregate, Size No. 57.
2. Elongated 21-inch long hole can be accomplished by drilling three 8-inch diameter holes at 6 1/2-inches on center.

Case 1



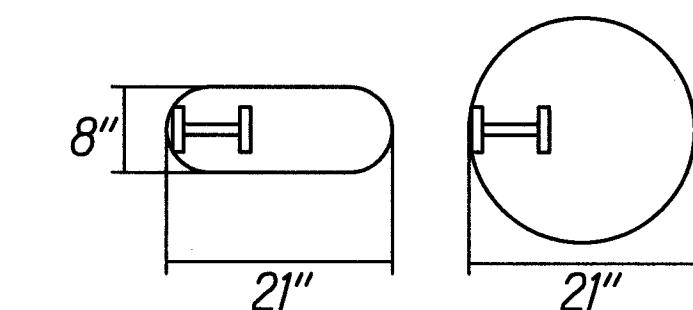
Case 2



Soil

Rock

ASTM C33 Coarse Aggregate, Size No. 57



Plan View Steel Posts
Either hole configuration acceptable

(A) ranging from 0 to 18-inches, the depth of required drilling (B) is equal to 24-inches.

(A) ranging from 18-inches to the embedment depth of the post, depth of required drilling (B) is equal to either 12-inches or the desired embedment depth minus the depth of soil whichever is less.

Overlying Soil Depths of
0 to 18-inches

Overlying Soil Depths of
18 to 42-inches

STRONG POST W-BEAM GUARDRAIL IN ROCK

DESIGNED BY	DATE
CHECKED BY	
NOTES BOOK	
N.	

GERALD D. ANDRADE
LICENSED PROFESSIONAL ENGINEER
No. 10377-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Signature: *Gerald D. Andrade* Date: 04/30/20
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALAILAI INTERCHANGE TO WAIKAWA OVERPASS
FAP NO. HSIP-HI-1(270)

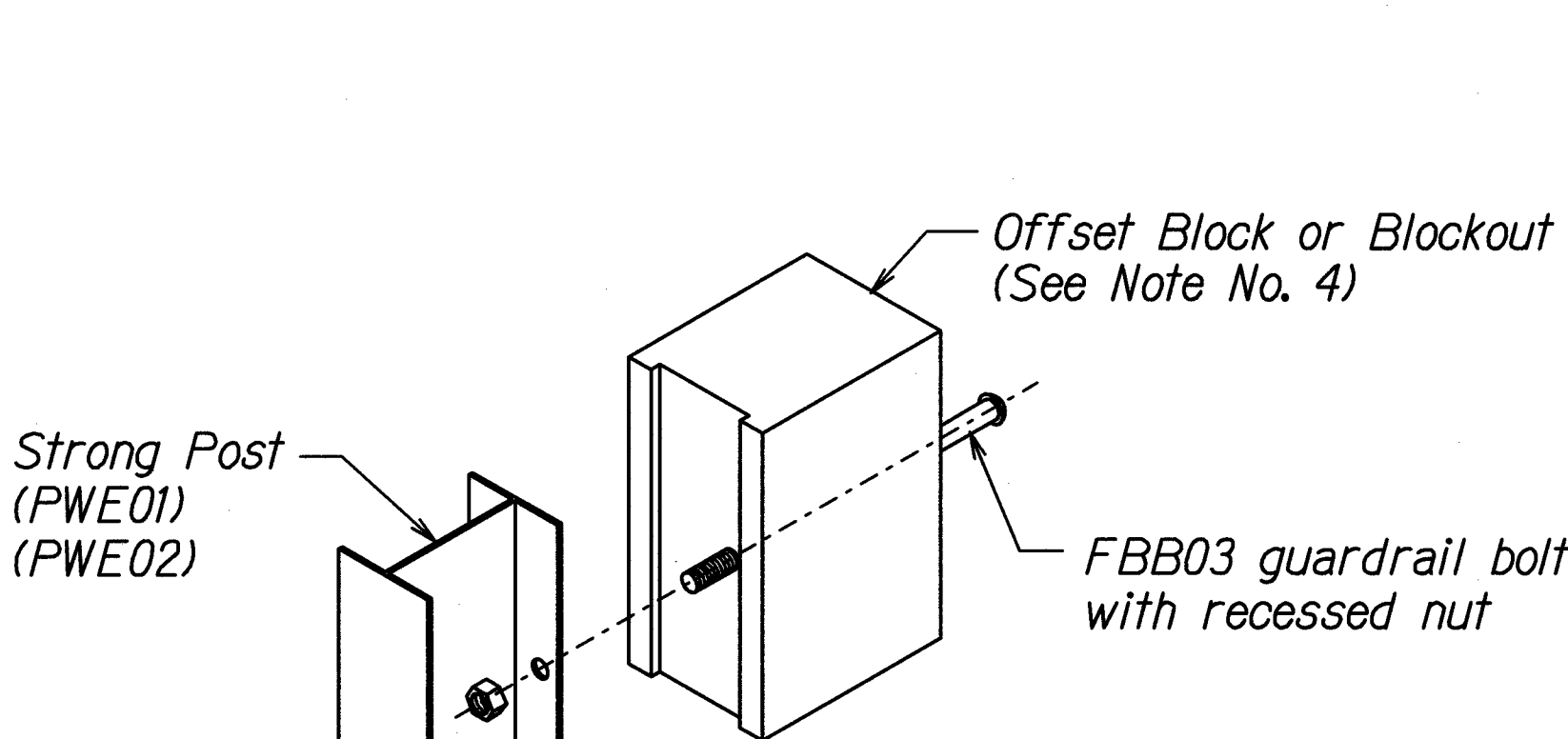
Scale: NTS Date: July 26, 2018

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-K270	2018	46	241

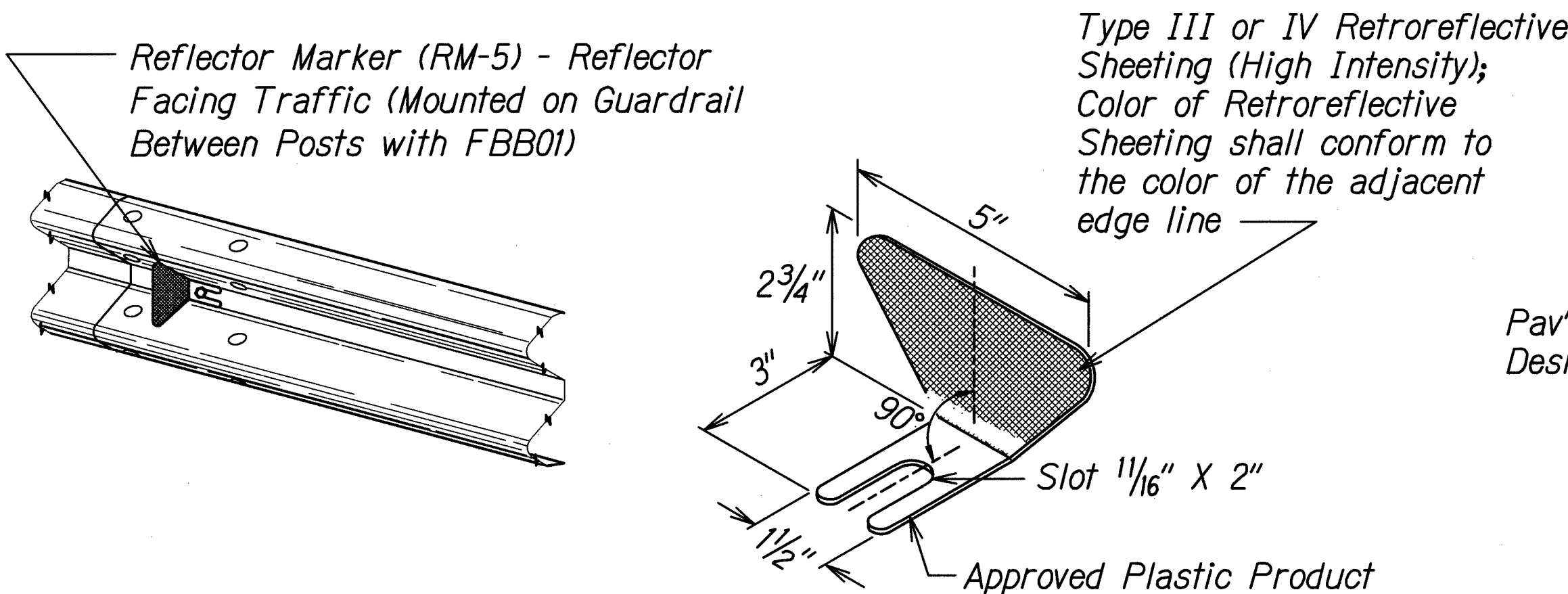
GENERAL NOTES

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 by the Engineer.
3. All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM04b, 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 Blockout 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. Minimum working width (clear distance) between back of MGS post to any fixed object is 4'-1" (49").
9. New Hot Mix Asphalt (HMA) pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
10. 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 guardrail system.

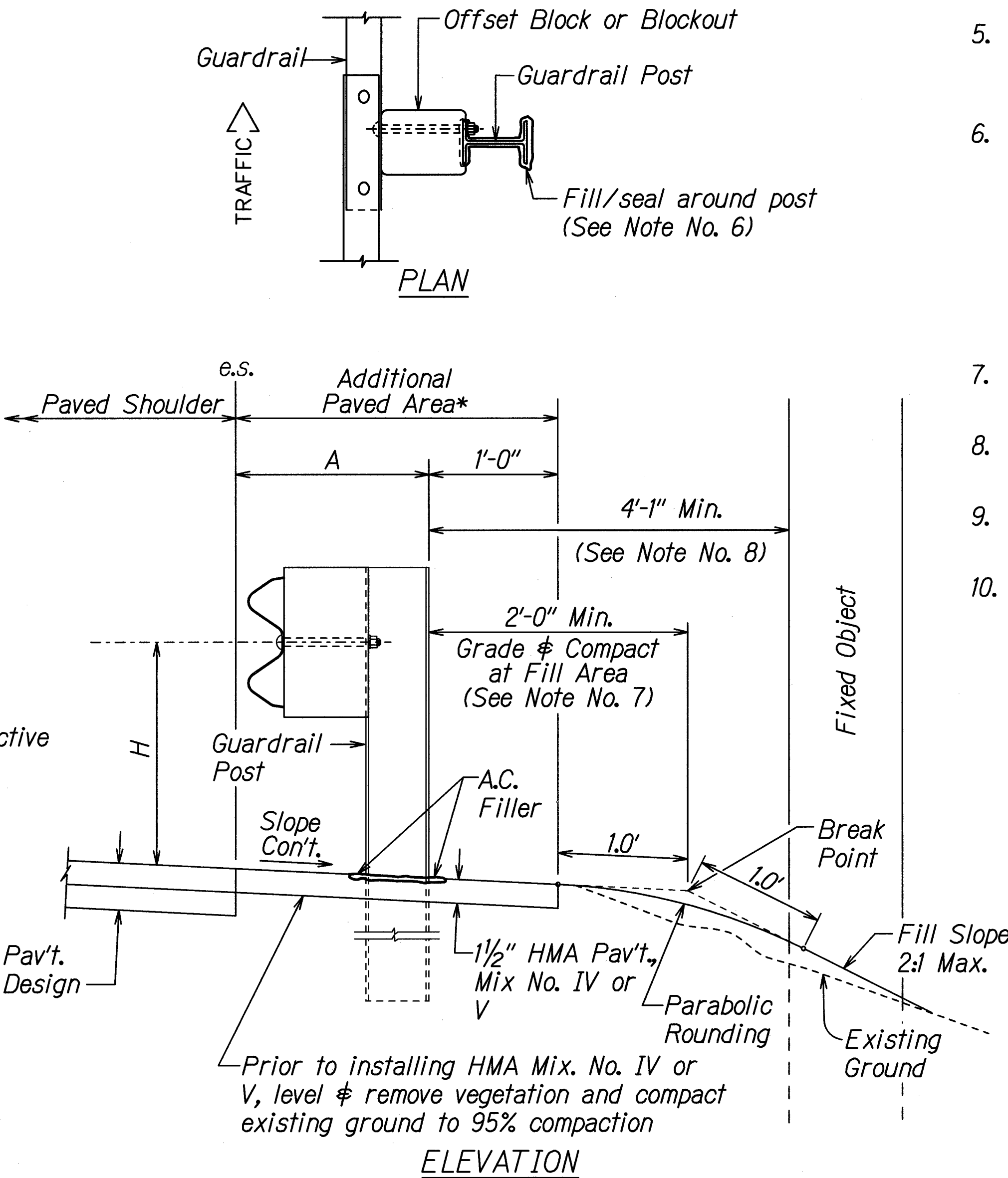
GUARDRAIL TYPE	DIMENSION	
	H	A
MGS w/ Standard 8" Offset Block	2'-1"	1'-6"
MGS w/ No Blockout	2'-7/8"	9/4"



Exploded View
(Rail and washer not shown)
STEEL POST AND BLOCK DETAIL

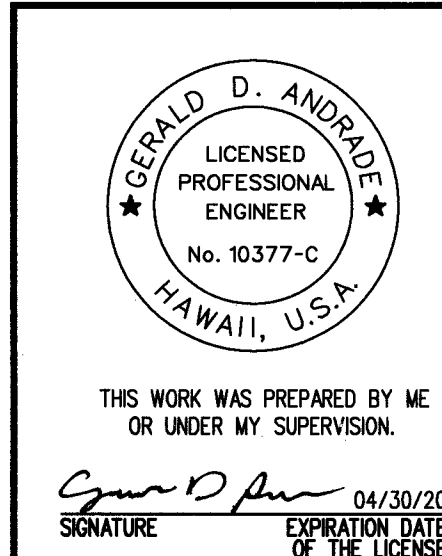


REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



ELEVATION

TYPICAL GUARDRAIL INSTALLATION



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

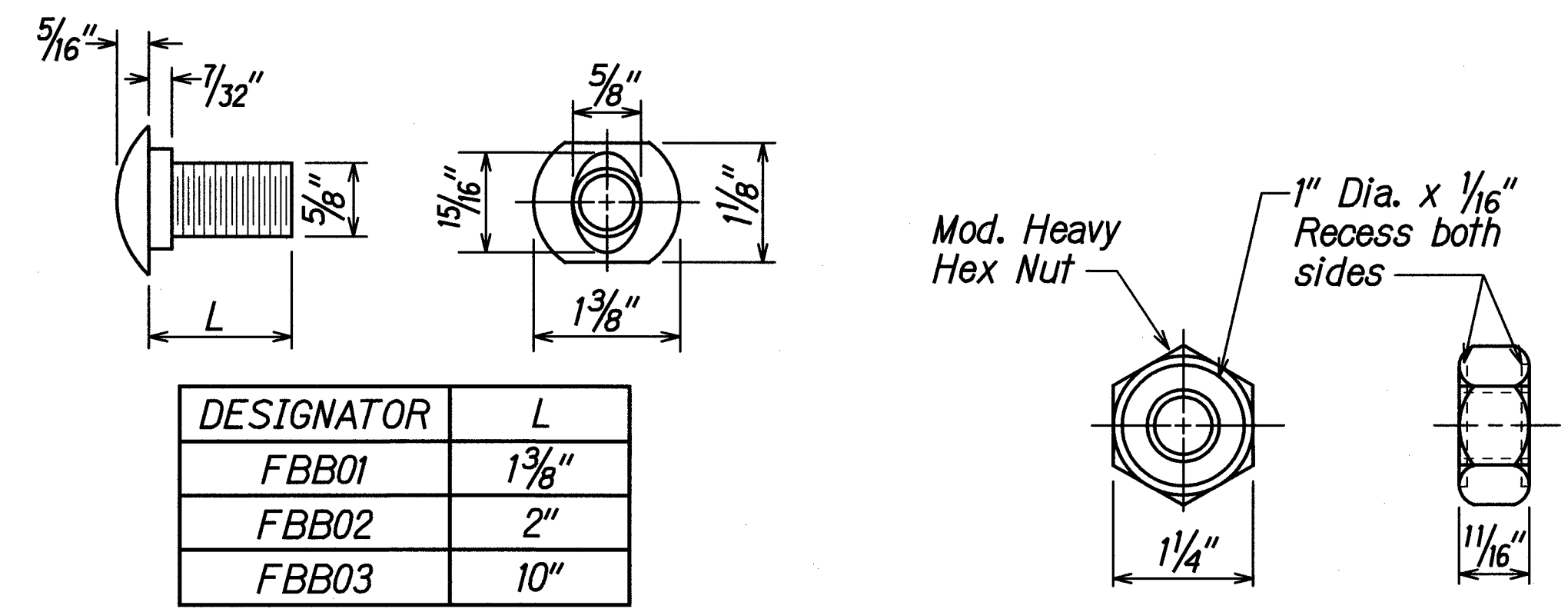
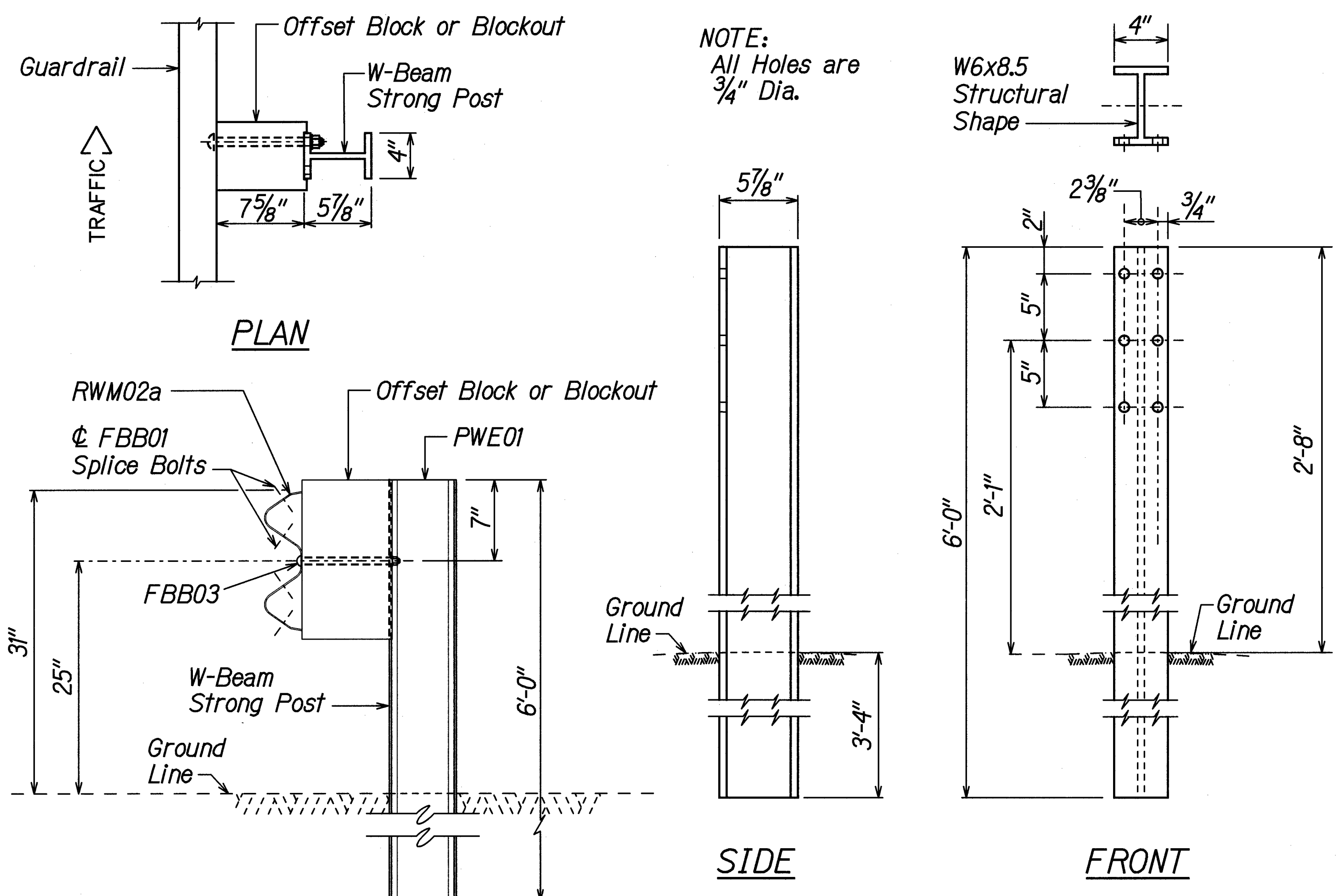
**MASH GUARDRAIL
DETAILS & NOTES**

**INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALAILAI INTERCHANGE TO WAIKAWA OVERPASS**

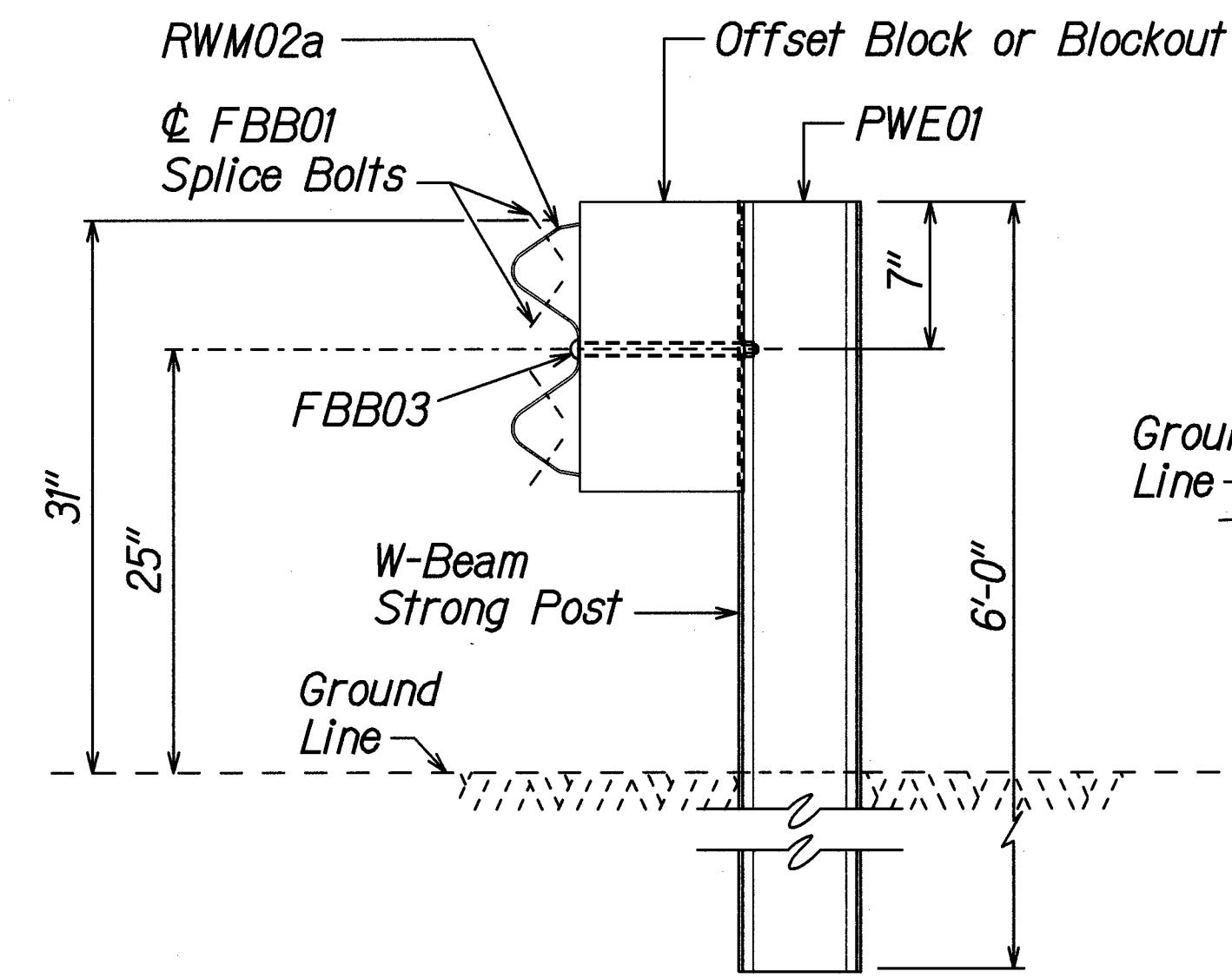
FAP NO. HSIP-HI-K270

Scale: NTS Date: July 26, 2018

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-K270	2018	47	241



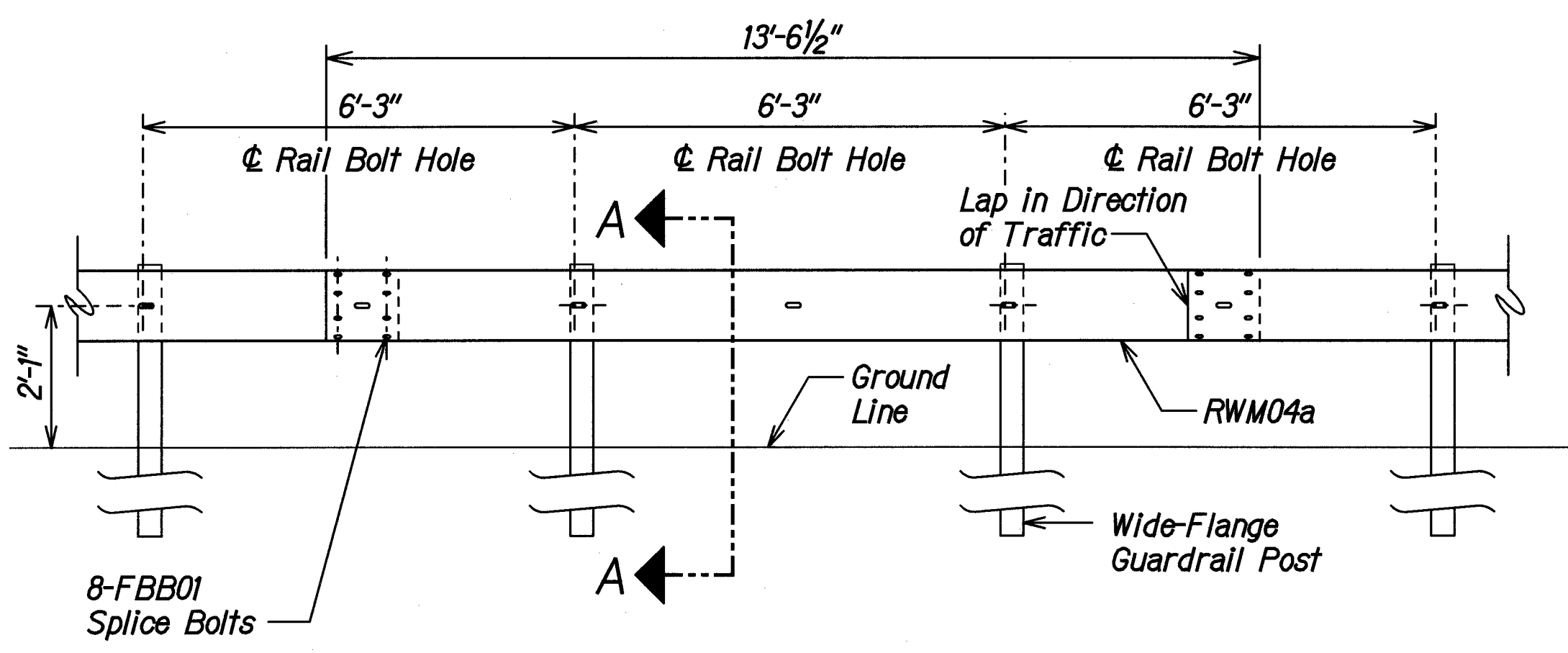
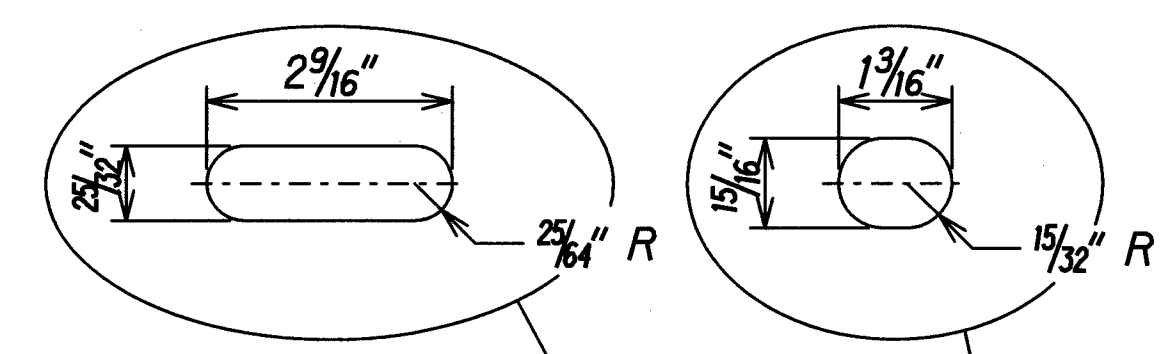
GUARDRAIL BOLTS AND RECESSED NUT



SECTION A-A

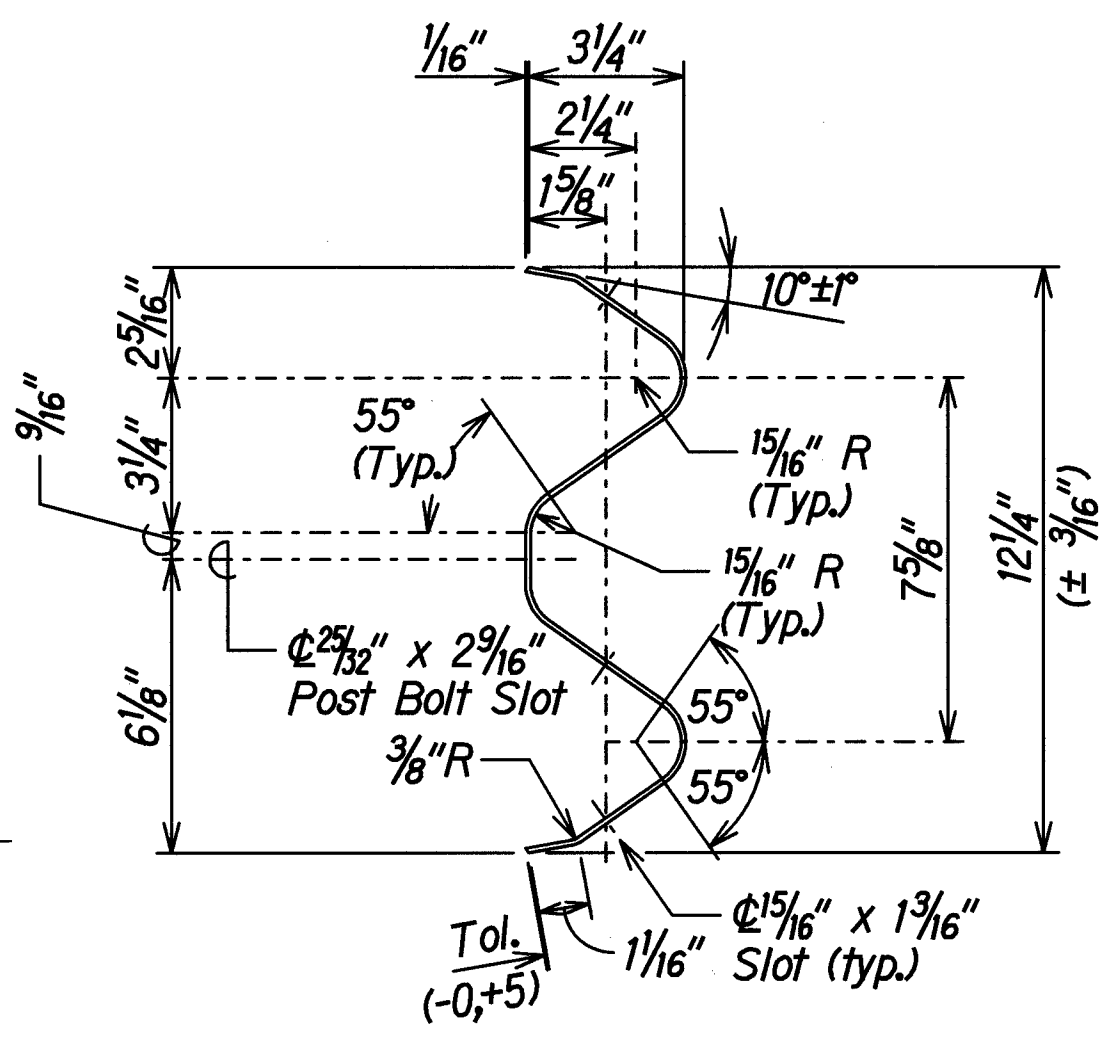
W-BEAM STRONG POST (PWE01)

DESIGNATOR	BASE METAL THICKNESS
RWM04a	12 Gauge

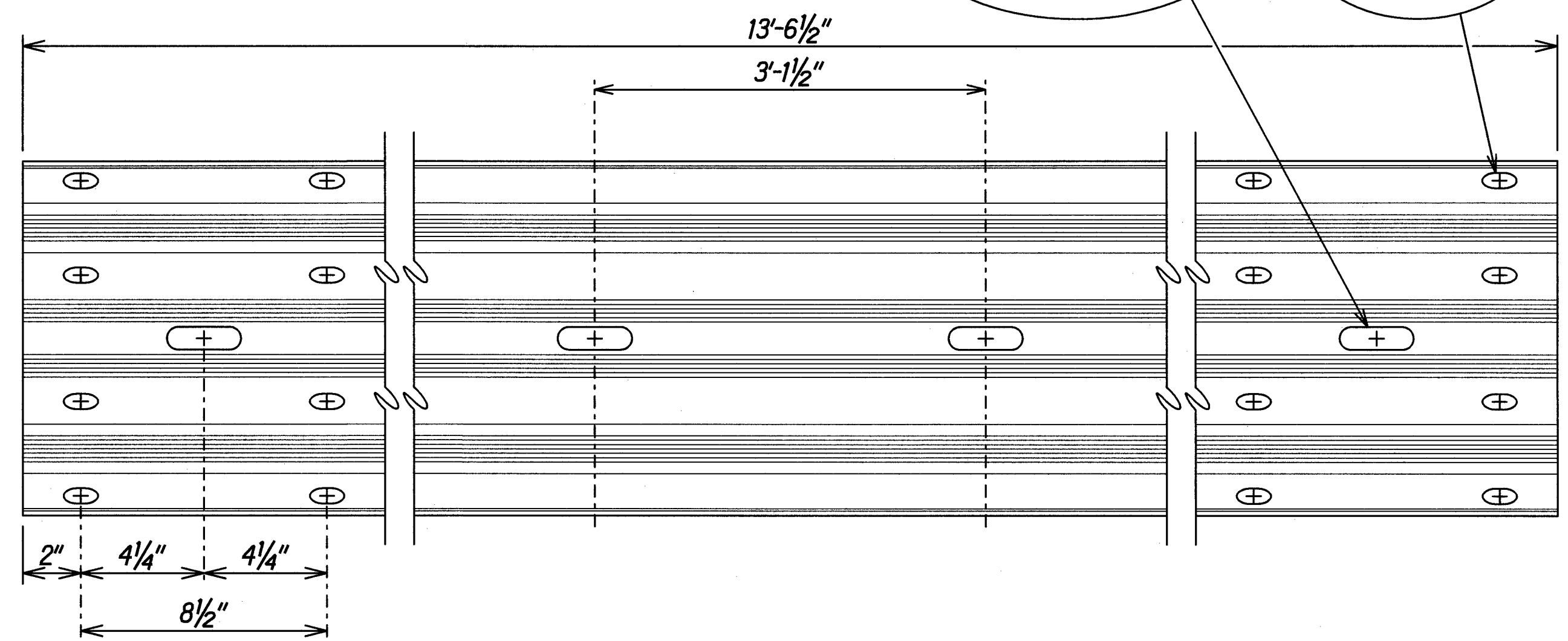


ELEVATION

MIDWEST GUARDRAIL SYSTEM WITH STANDARD 8" OFFSET BLOCK (SGR47)



4 SPACE W-BEAM GUARDRAIL (RWM04a)



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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Signature: *Gerald D. Andrade* 04/30/20
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

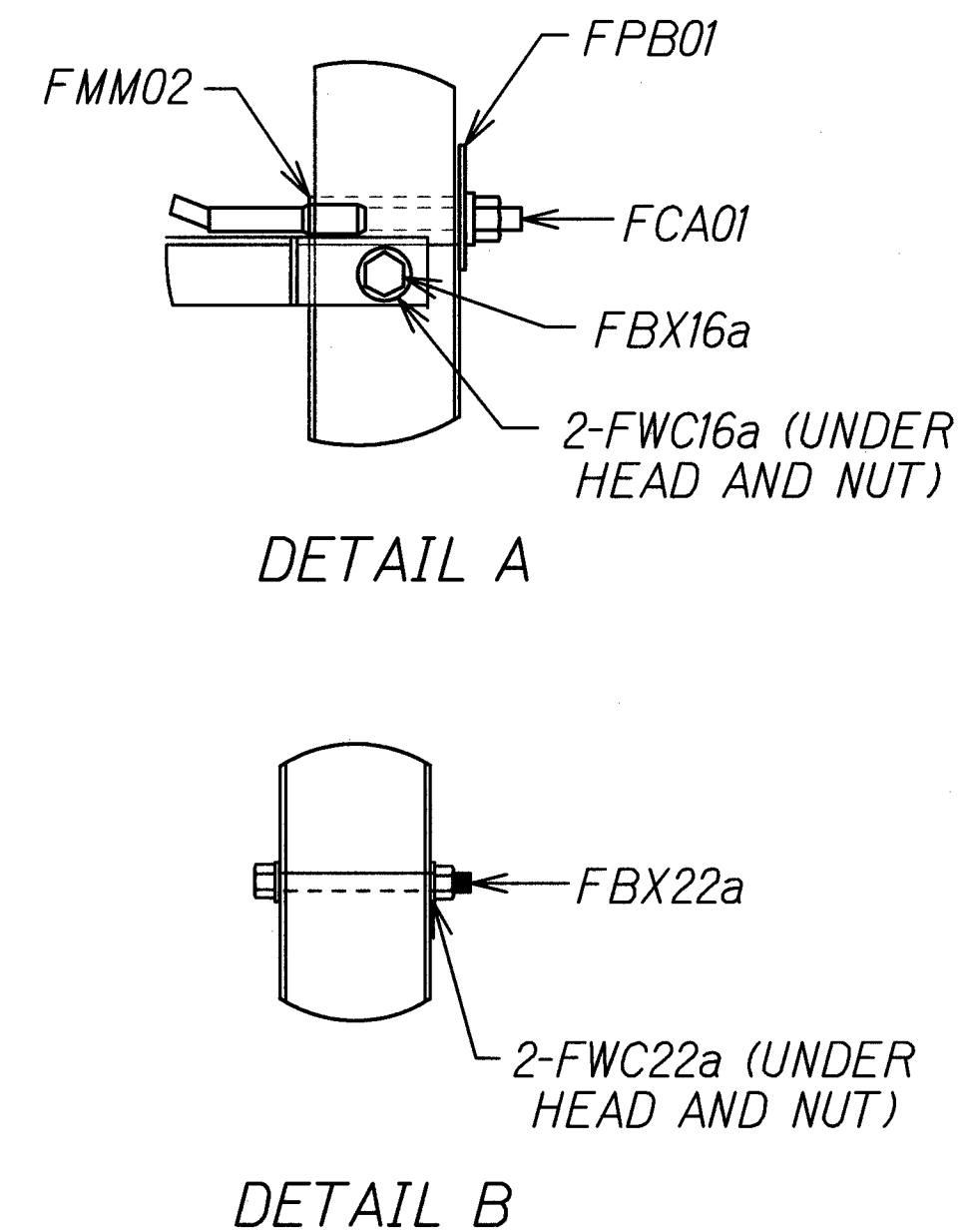
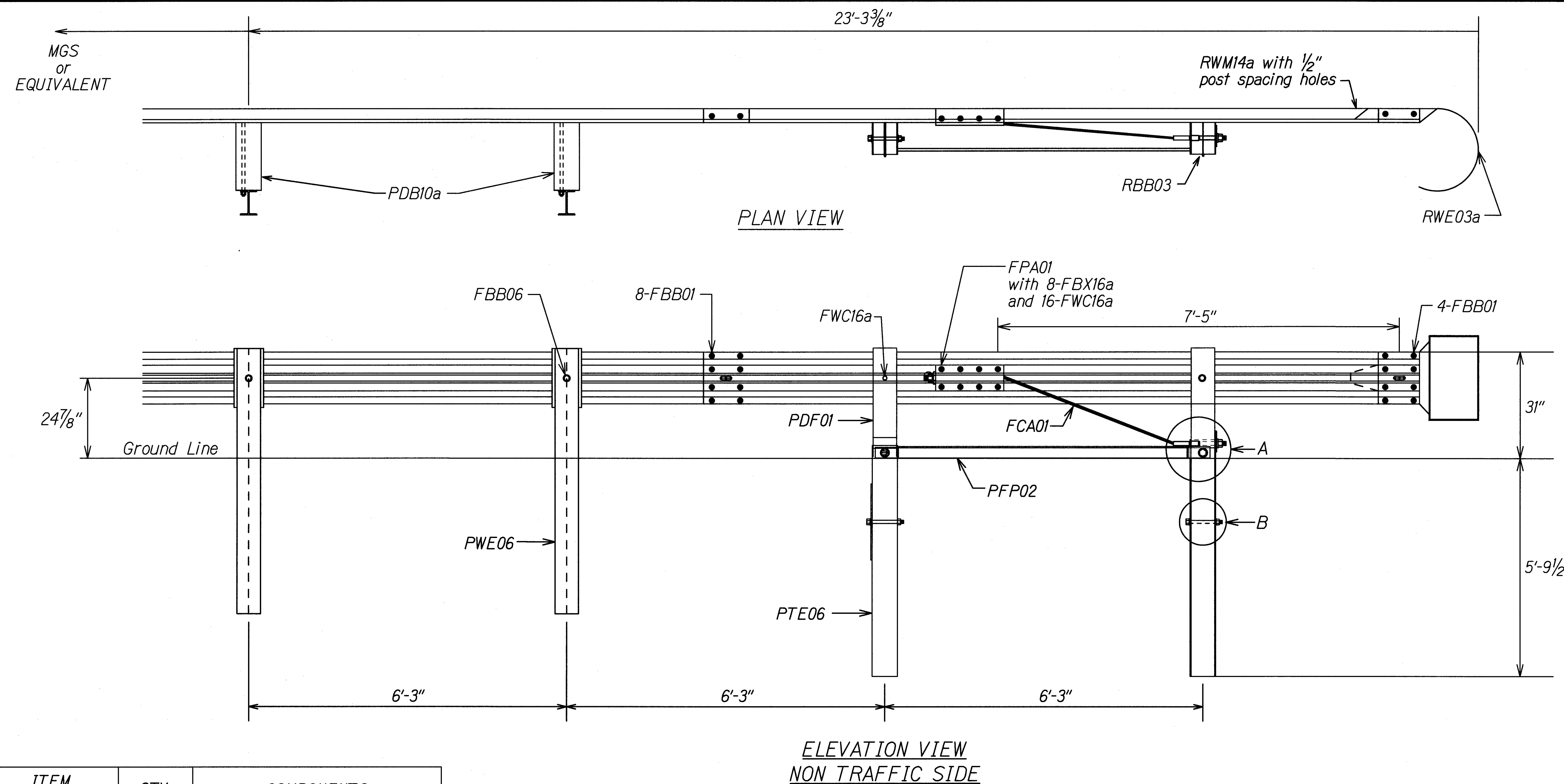
31" W-BEAM GUARDRAIL WITH STANDARD 8" OFFSET BLOCK

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALALAI INTERCHANGE TO WAIKAWA OVERPASS
FAP NO. HSIP-HI-K270

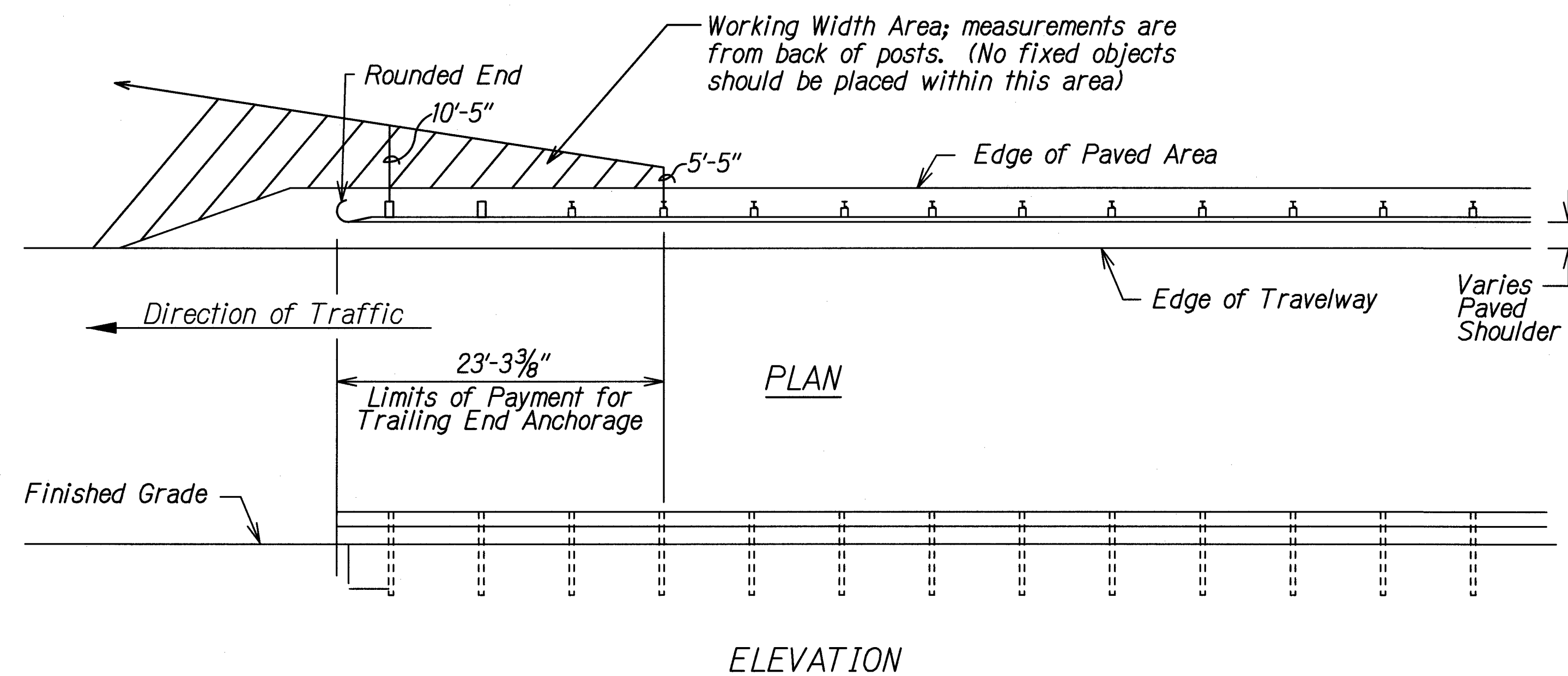
Scale: NTS Date: July 26, 2018

SHEET No. RD-8 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-HI-K270	2018	49	241



ITEM NO.	QTY	COMPONENTS
FBB01	12	Guardrail Bolt and Nut
FBB03	2	Guardrail Bolt and Nut
FBB06	1	Guardrail Bolt and Nut
FBX16a	2	Hex Head Bolt (10") and Nut
FBX16a	8	Hex Head Bolt (1 1/2") and Nut
FBX22a	2	Hex Head Bolt (7 1/2") and Nut
FCA01	1	BCT Anchor Cable Assembly
PDB10a	2	MGS Timber Blockout
PFP02	1	Strut and Yoke Assembly
PWE06	1	Wide-Flange Guardrail Post
FMM02	1	BCT Post Sleeve
FPA01	1	Anchor Bracket Assembly
FPB01	1	BCT Bearing Plate
FWC16a	22	Circular Washer
FWC22a	4	Circular Washer
PDF01	2	BCT Timber Post
PTE06	2	Foundation Tube
RWE03a	1	W-Beam Rounded End Section
RWM14a	1	W-Beam MGS End Section



DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAILING-END ANCHORAGE SYSTEM

INTERSTATE ROUTE H-1 SAFETY IMPROVEMENTS
PALAILAI INTERCHANGE TO WAI'AWA OVERPASS
FAP NO. HSIP-HI-K270

Scale: _____ Date: July 26, 2018

GERALD D. ANDRADE
LICENSED PROFESSIONAL ENGINEER
No. 10377-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Signature: _____ Date: 04/30/20
Expiration Date of License: _____

SHEET No. RD-10 OF 10 SHEETS