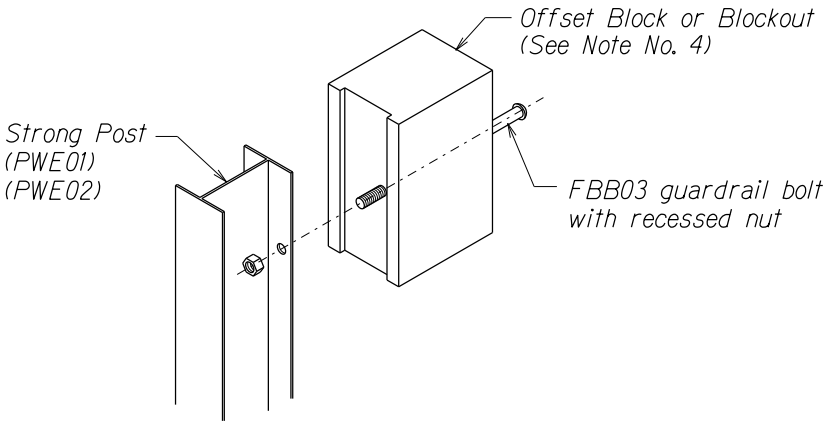


GENERAL NOTES

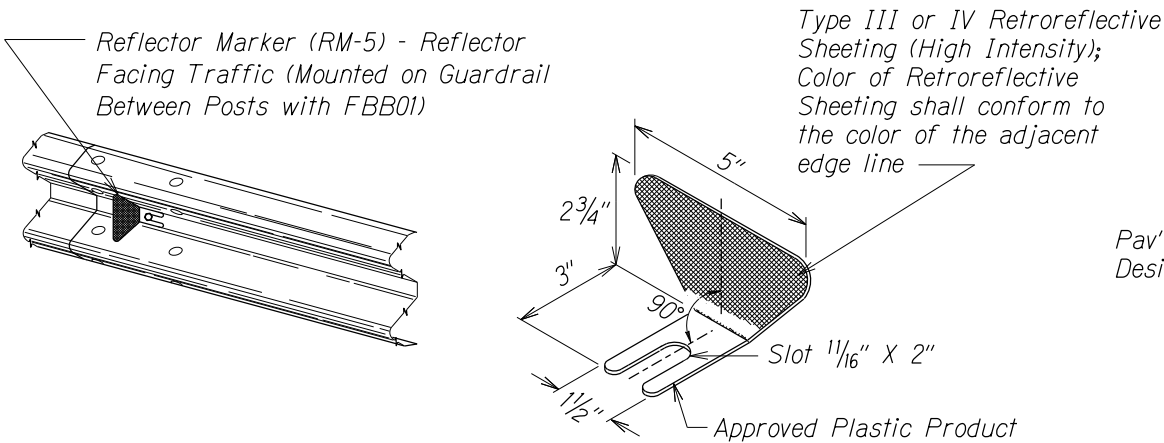
- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified by the Engineer.
- All fasteners, posts, and 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.
- The Blockout 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.
- Minimum working width (clear distance) between back of MGS post to any fixed object is 4'-1" (49").
- New Hot Mix Asphalt (HMA) 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 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"

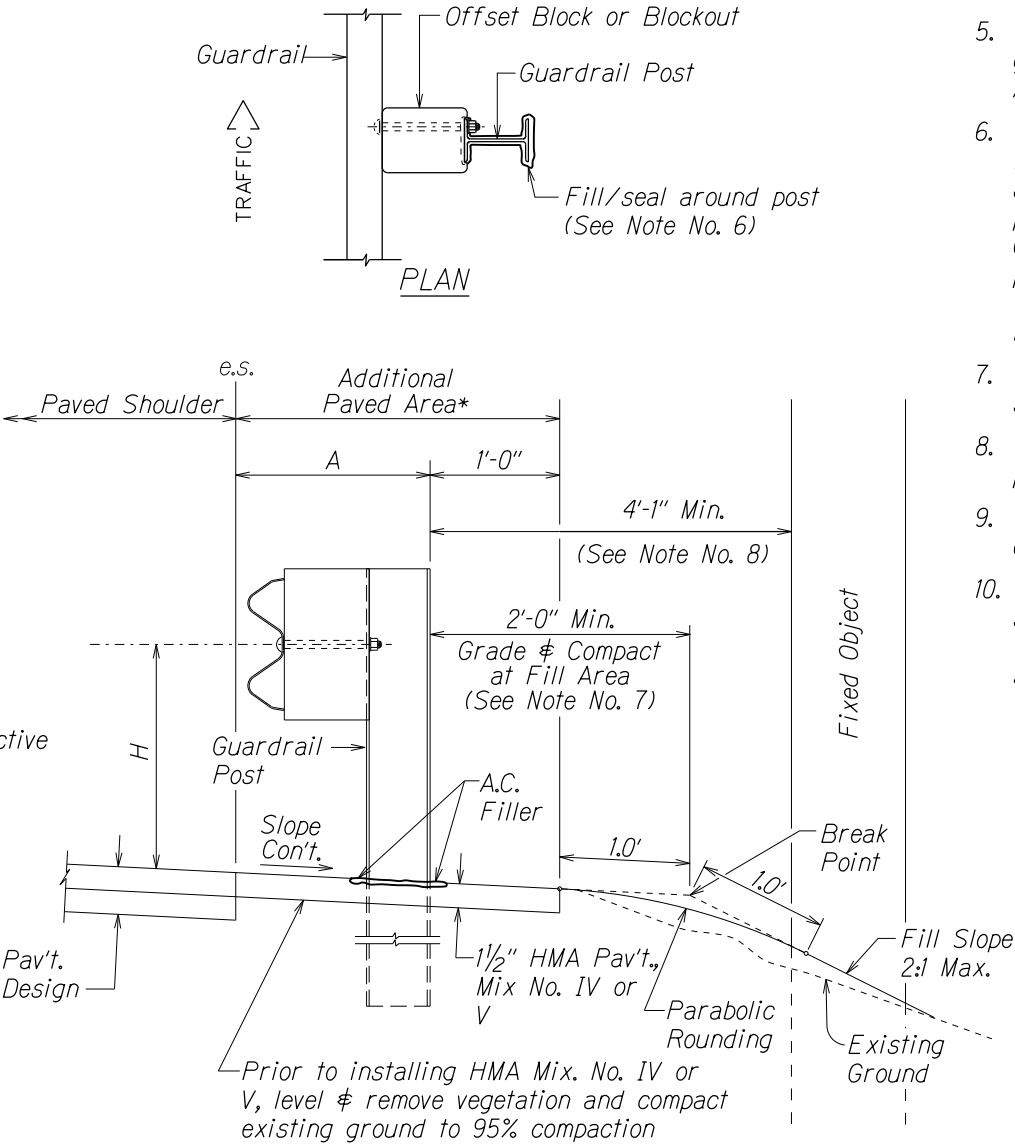


Exploded View  
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



ELEVATION

TYPICAL GUARDRAIL INSTALLATION



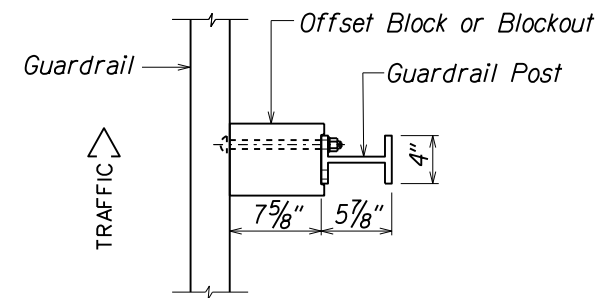
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS & NOTES**  
HONOAPIILANI HIGHWAY  
GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(058)

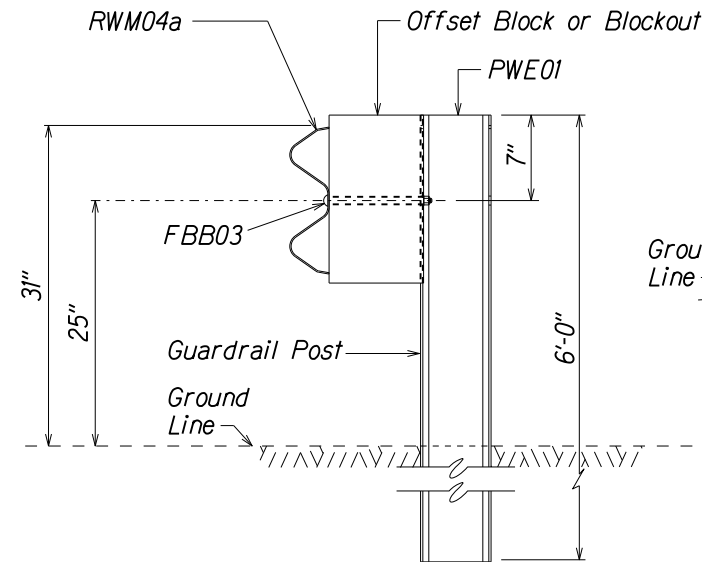
Scale: NTS  
Date: July, 2022

SHEET No. 1 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	9	38

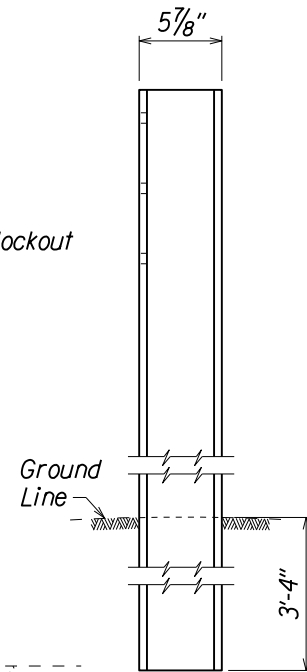


PLAN

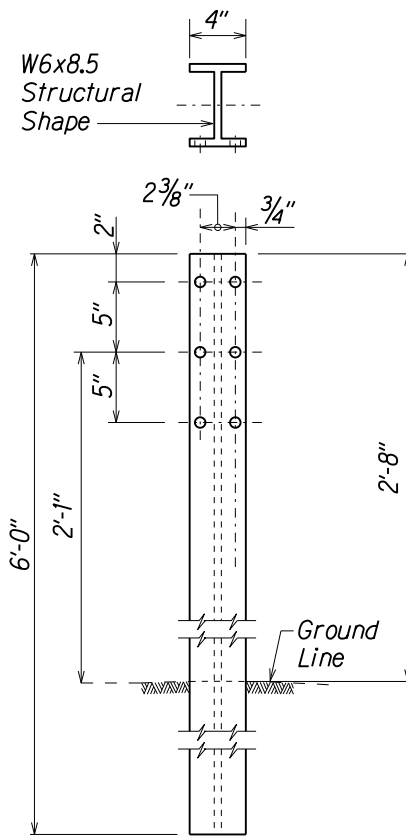


SECTION A-A

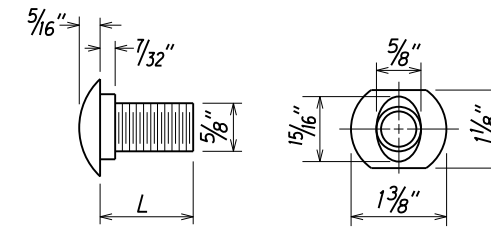
NOTE:  
All Holes are  
3/4" Dia.



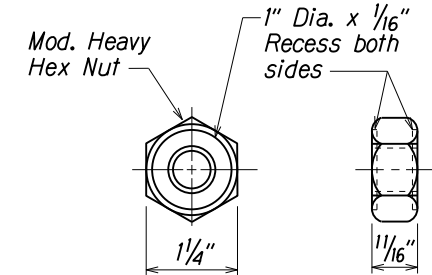
SIDE



FRONT

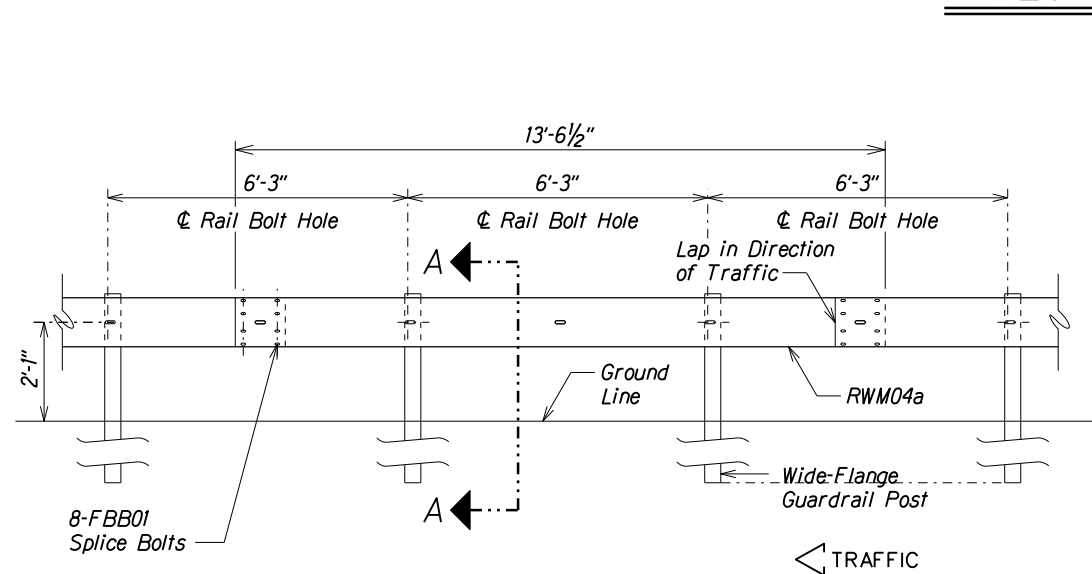
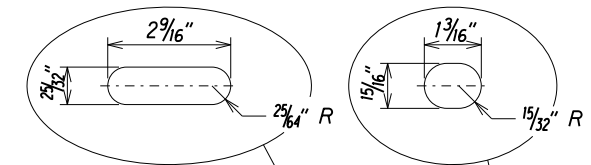


DESIGNATOR	L
FBB01	1 $\frac{3}{8}$ "
FBB02	2"
FBB03	10"



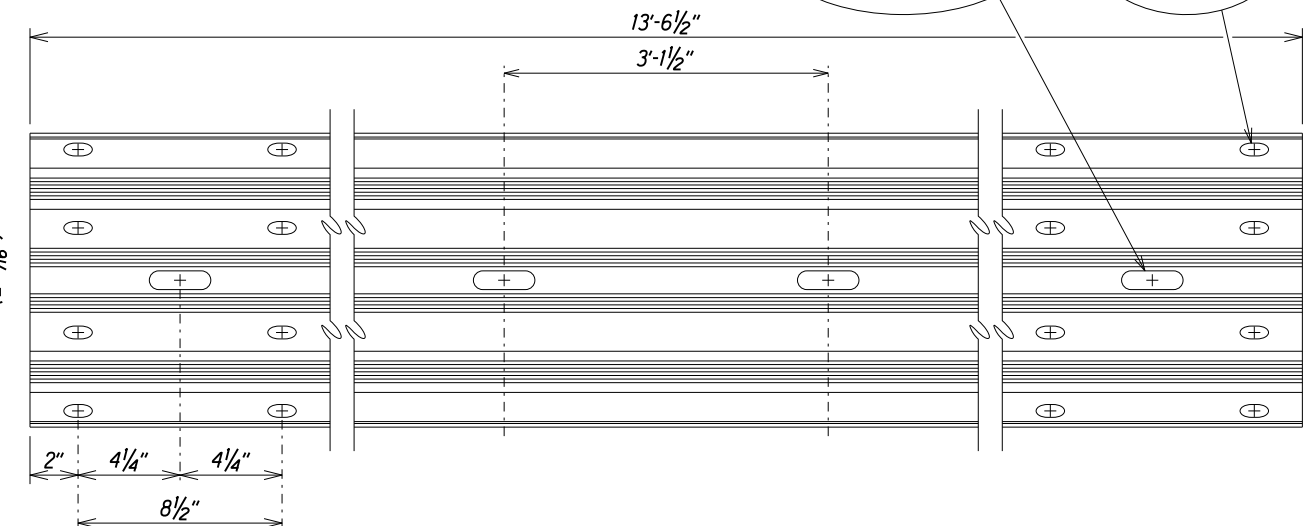
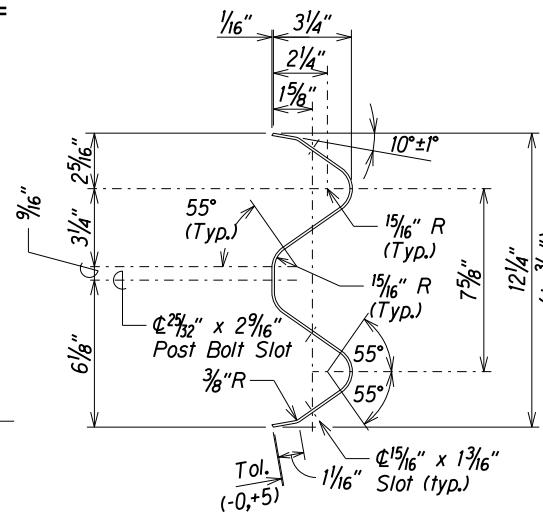
### GUARDRAIL BOLTS AND RECESSED NUT

DESIGNATOR	BASE METAL THICKNESS
RWM04a	12 Gauge



ELEVATION

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

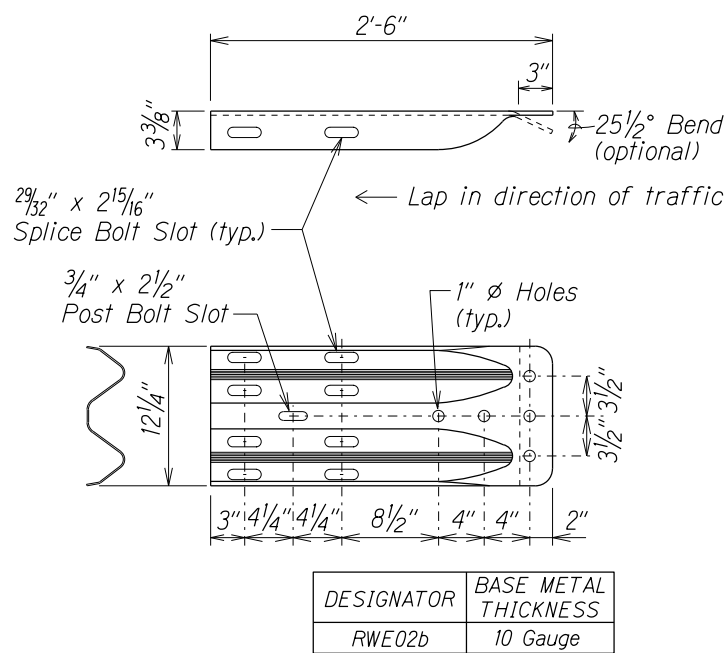


#### 4 SPACE W-BEAM GUARDRAIL (RWM04a)

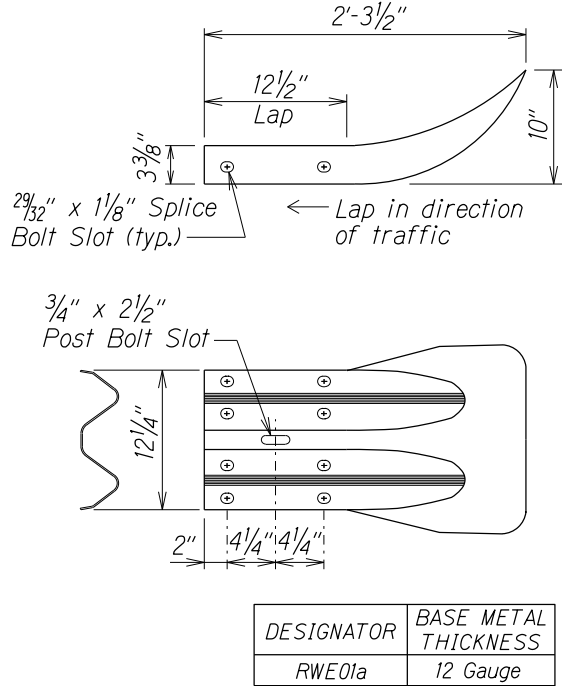


STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
3" W-BEAM GUARDRAIL WITH  
STANDARD 8" OFFSET BLOCK  
HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(K058)  
Scale: NTS Date: July, 2022  
SHEET No. 2 OF 12 SHEETS

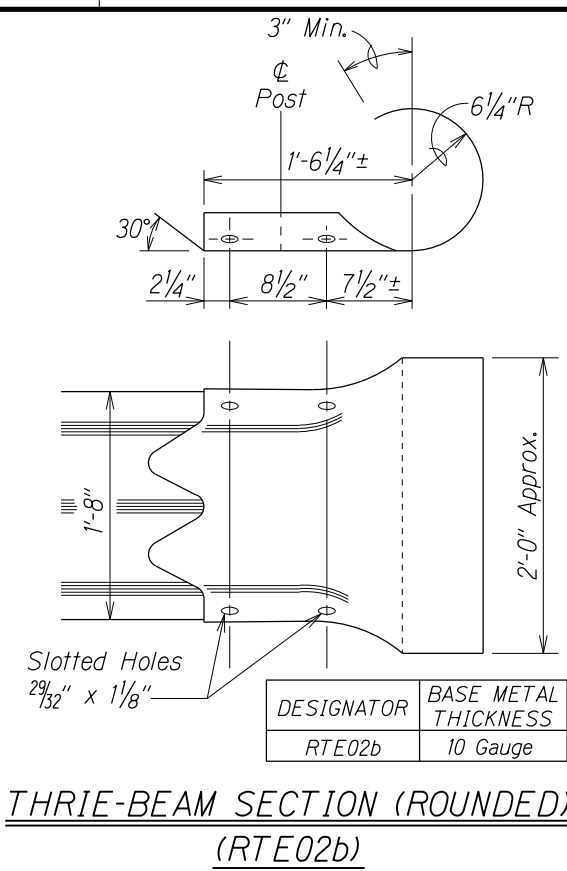
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	10	38



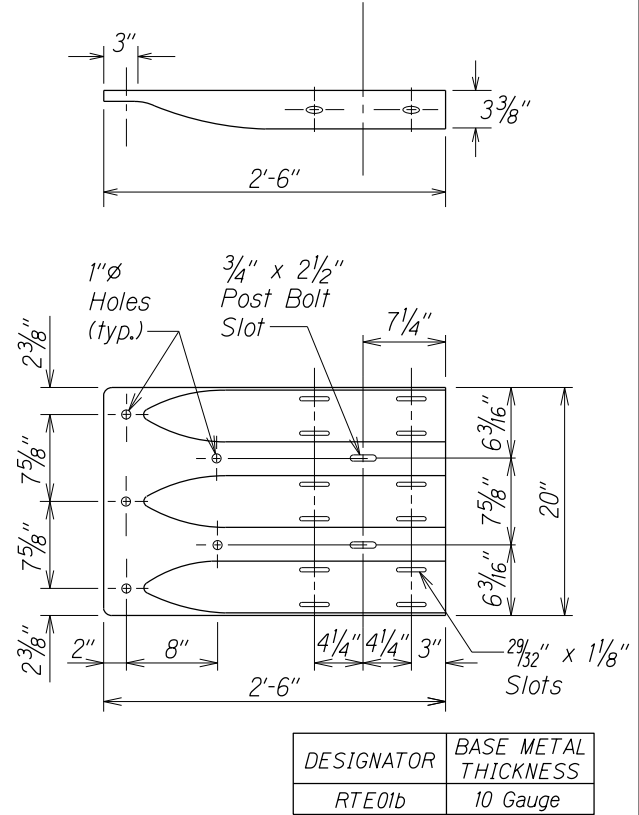
W-BEAM TERMINAL CONNECTOR (RWE02b)



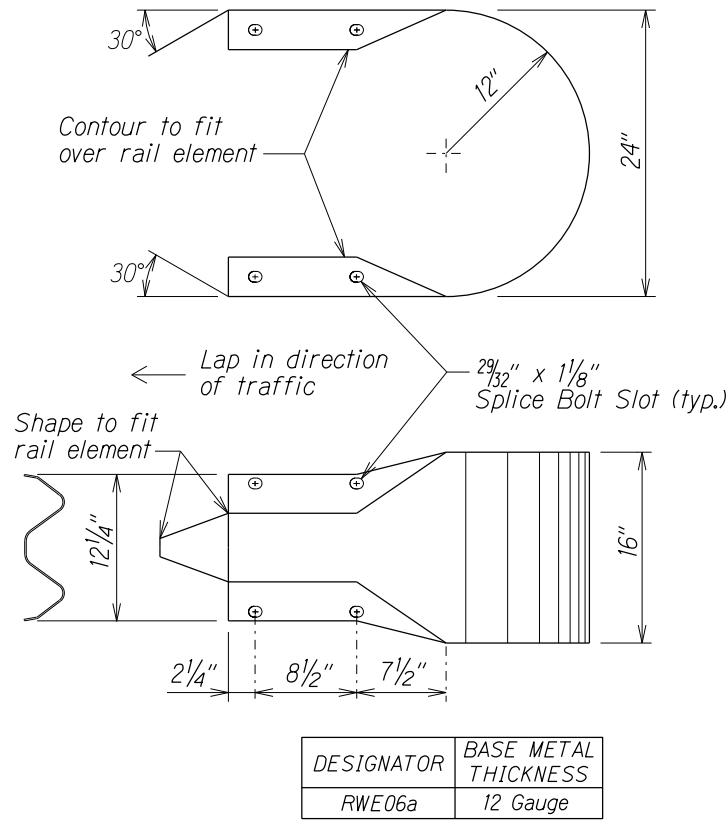
W-BEAM END SECTION (FLARED RWE01a)



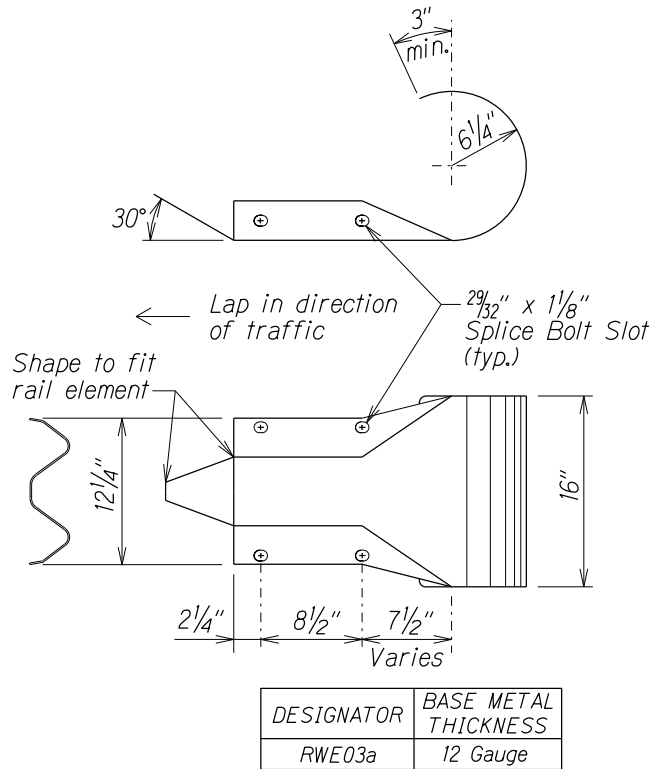
THRIE-BEAM SECTION (ROUNDED) (RTE02b)



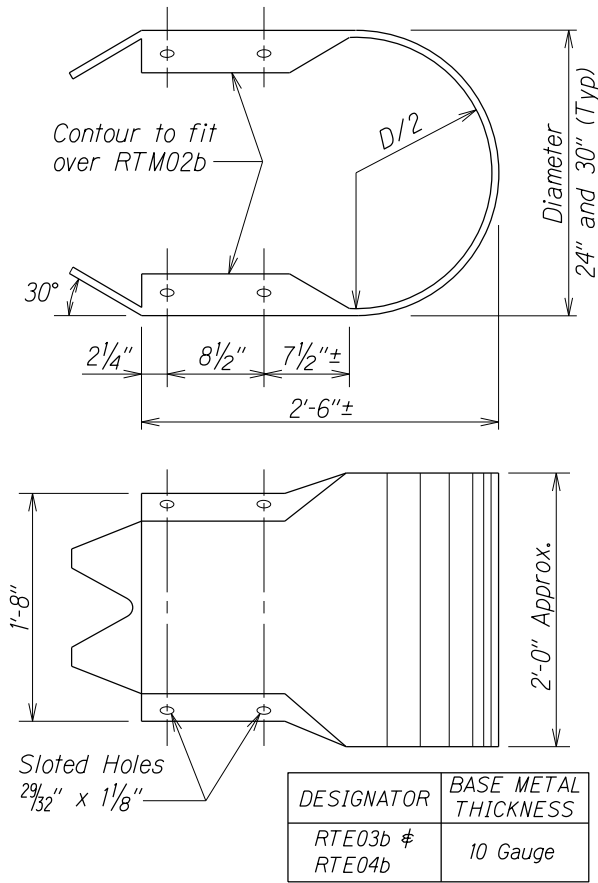
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)



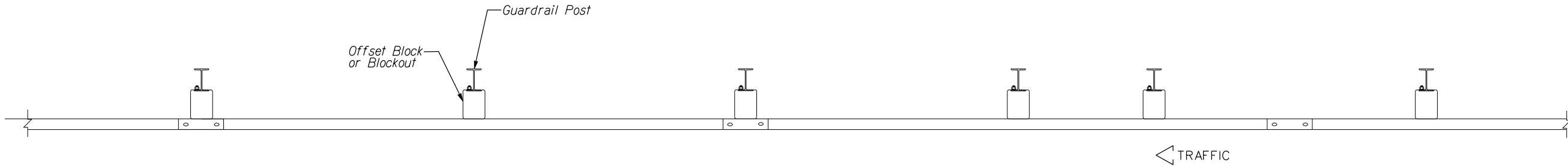
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL TERMINAL CONNECTORS  
AND END SECTIONS**

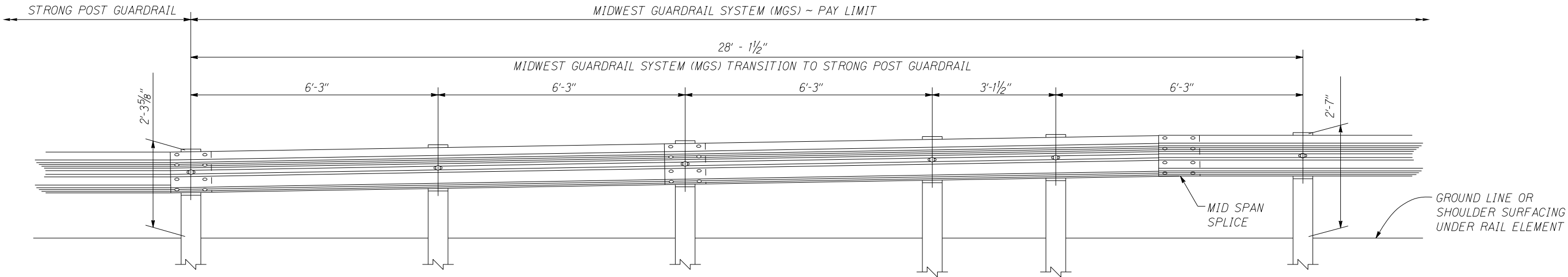
HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(058)  
Scale: NTS Date: July, 2022

SHEET No. 3 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	11	38



PLAN



ELEVATION

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	7/22
ddx	DESIGNED BY	
N	QUANTITIES BY	
X	CHECKED BY	

r09/06/16 D:\st2\Ernest\standards\Traffic Guardrail Standards\ml7\_midwest.dgn

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MGS TRANSITION TO  
STRONG POST GUARDRAIL**

HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS

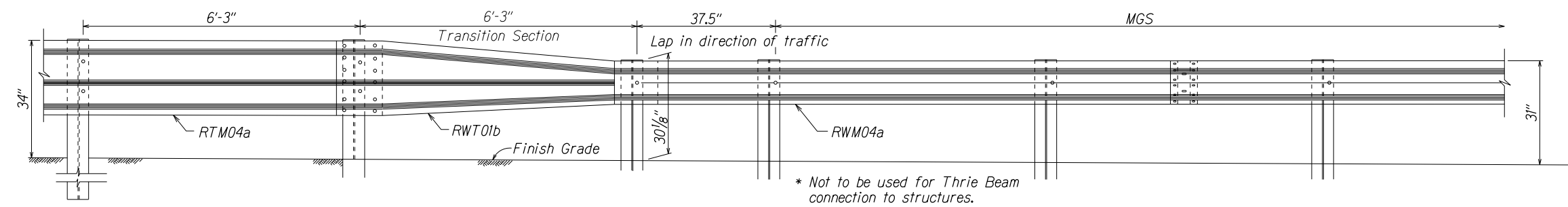
Vicinity of North Kihei Road to Hononana

Federal-Aid Project No. STP-030-1(058)

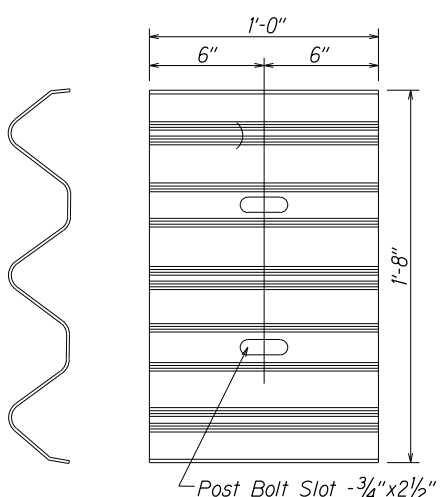
Scale: NTS Date: July, 2022

SHEET No. 4 OF 12 SHEETS

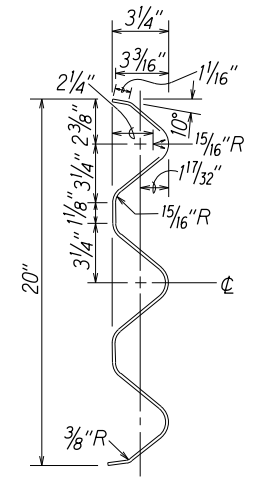
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	12	38



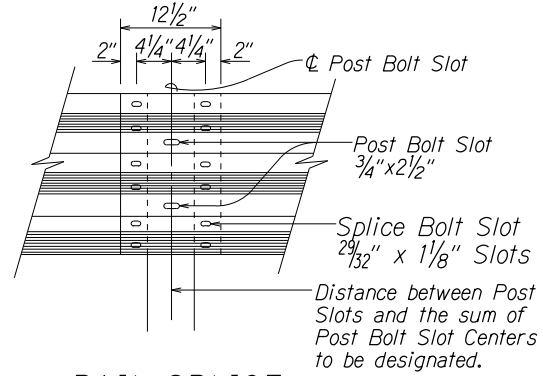
TRANSITION SECTION \*



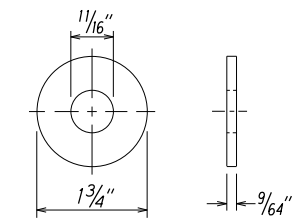
BACKUP PLATE  
(RTB01b)  
(Use at Posts where  
Splices do not occur)



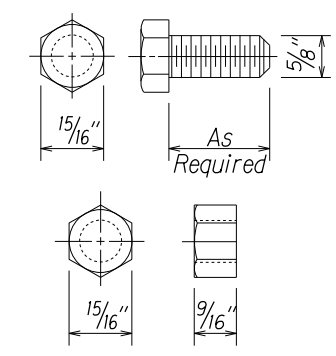
SECTION THRU  
RAIL ELEMENT  
(RTM04a)



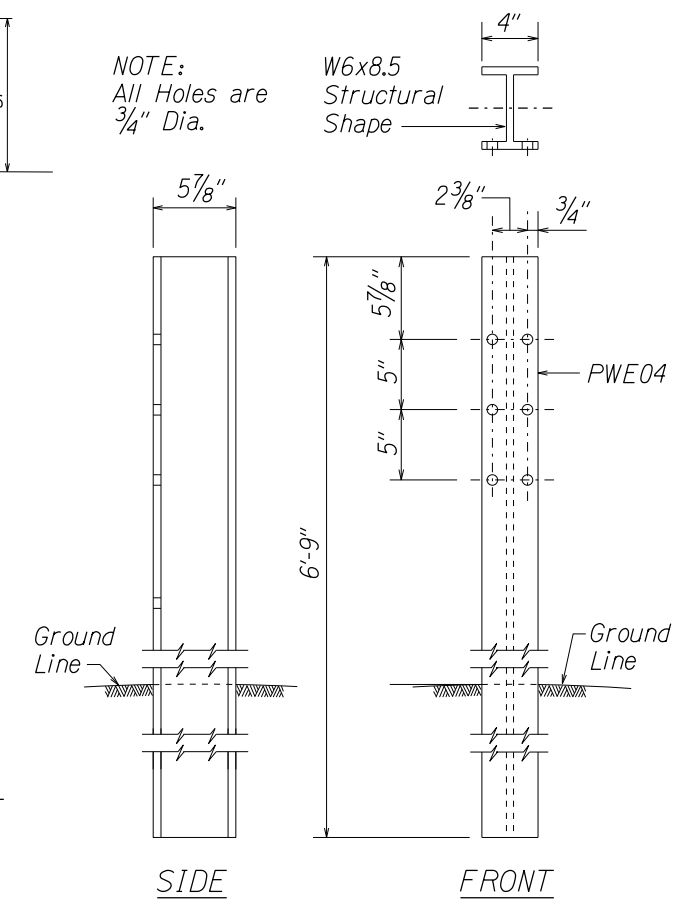
RAIL SPLICE



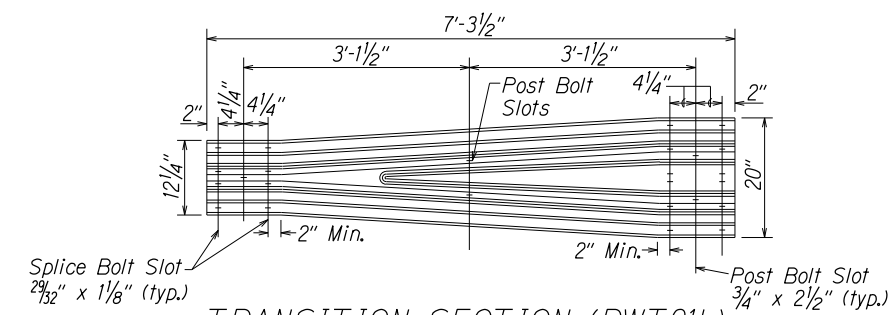
STEEL WASHER  
FOR 5/8" BOLT  
(FWC16a)



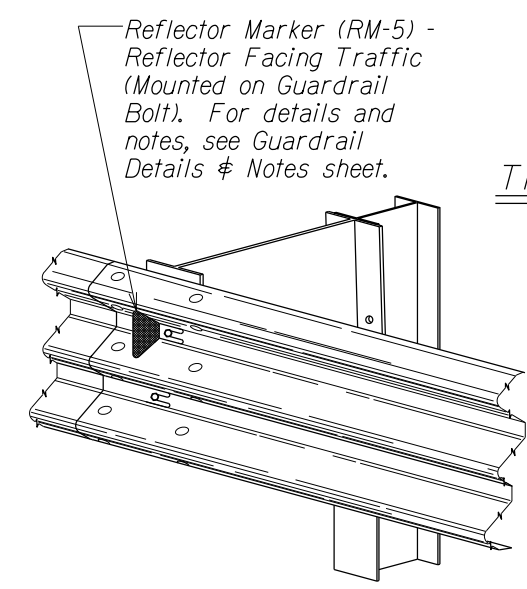
HEX BOLT & NUT  
(FBX16a)



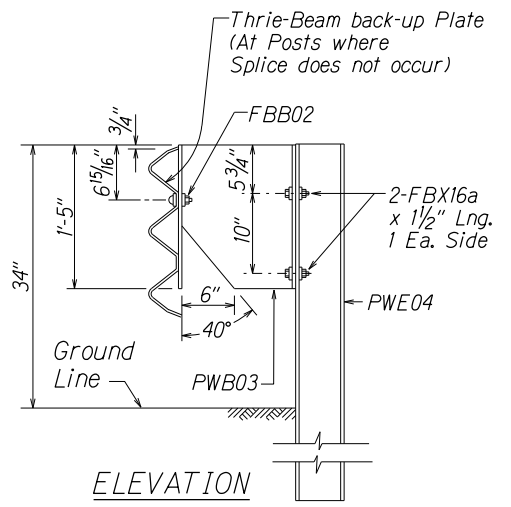
THRIE-BEAM STRONG POST (PWE04)



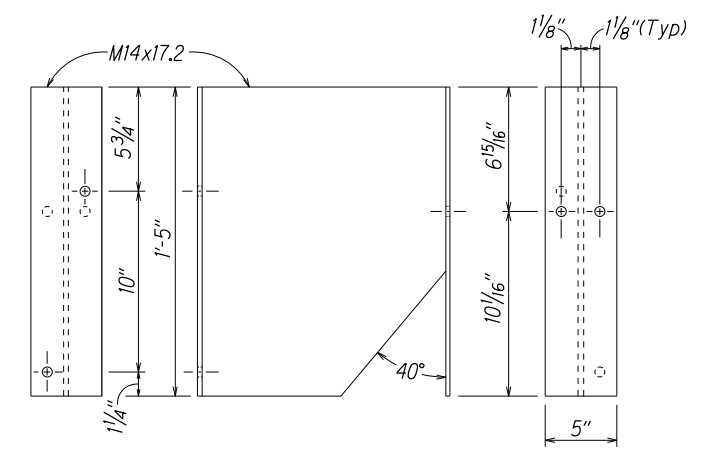
TRANSITION SECTION (RWT01b)



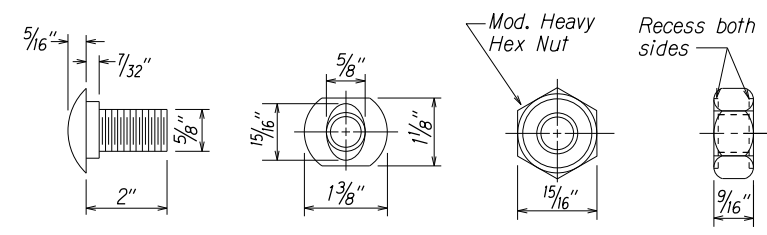
TYPICAL INSTALLATION OF  
REFLECTOR MARKER (RM-5)



STRONG POST MODIFIED  
THRIE-BEAM GUARDRAIL  
(SGR09b)



BACK SIDE FRONT  
SPACER BLOCK (PWB03)

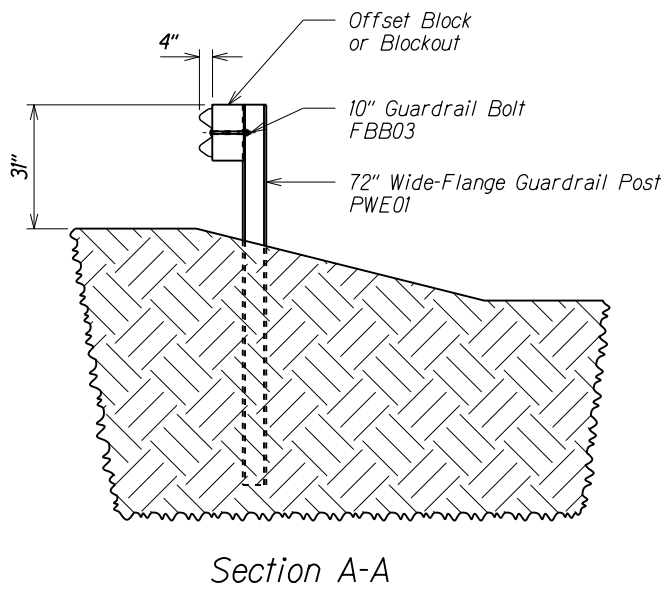
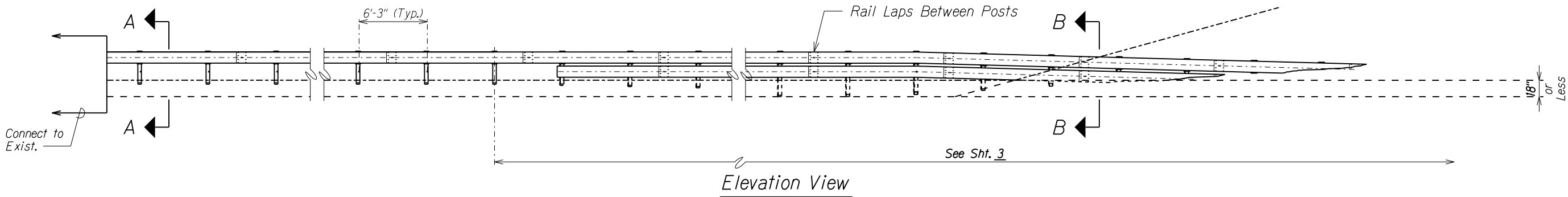
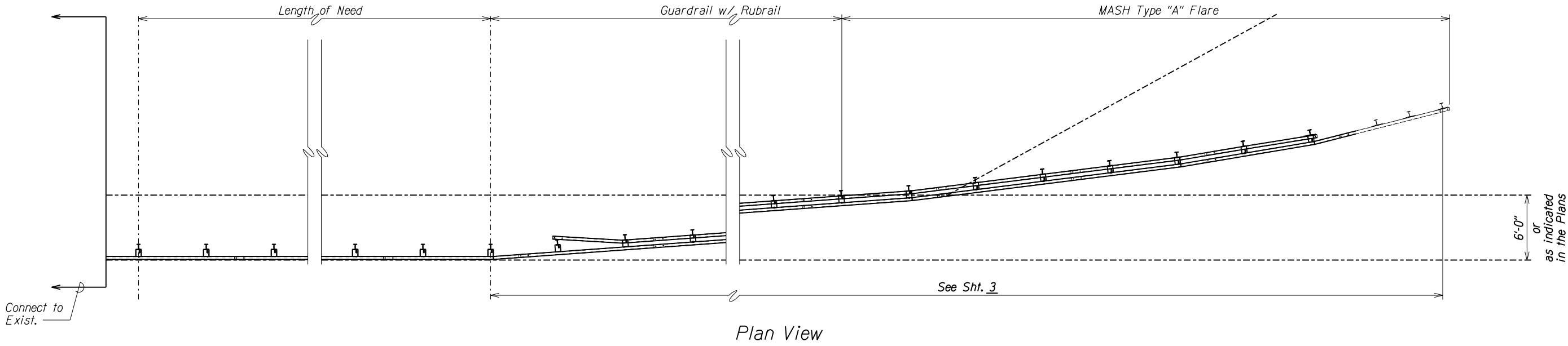


GUARDRAIL BOLTS AND RECESSED NUT

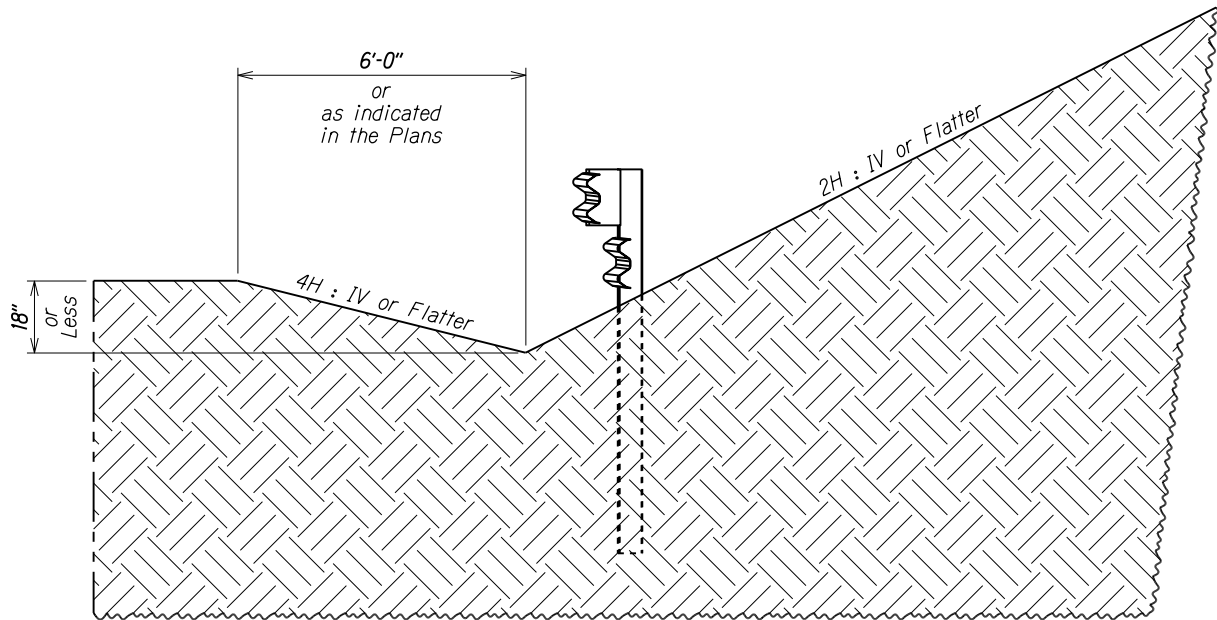


STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**STRONG POST MODIFIED  
THRIE-BEAM GUARDRAIL (MASH)**  
HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(058)  
Scale: NTS Date: July, 2022  
SHEET No. 5 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	13	38



Section A-A



Section B-B

Notes:

- Backfill Post holes with AASHTO M147-65(2004), Grade B crushed limestone road base, compacted to MASH standard.
- 75" Post spacing typical for LoN and Terminal unless otherwise indicated.

TERMINAL PLAN & ELEVATION VIEW AND SECTIONS  
(BURIED IN BACKSLOPE)

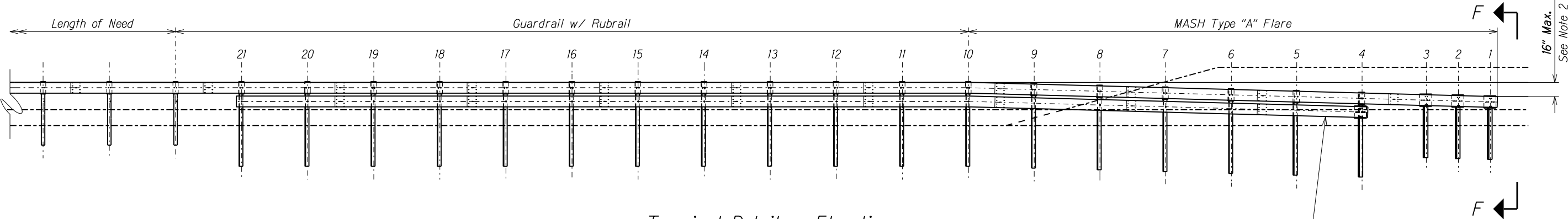
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MASH TYPE "A" FLARE**  
**HONOAPIILANI HIGHWAY**  
**GUARDRAIL & SHOULDER IMPROVEMENTS**  
**Vicinity of North Kihei Road to Hononana**  
**Federal-Aid Project No. STP-030-1(058)**

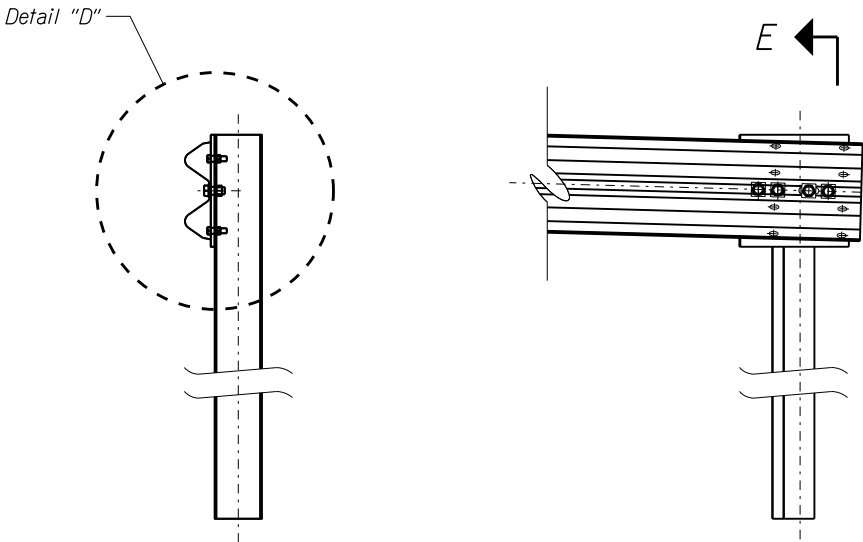
Scale: NTS Date: July, 2022

SHEET No. 6 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	14	38

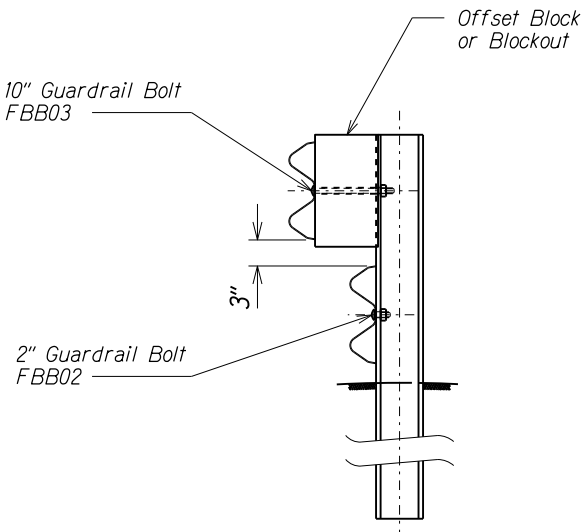


Terminal Details - Elevation

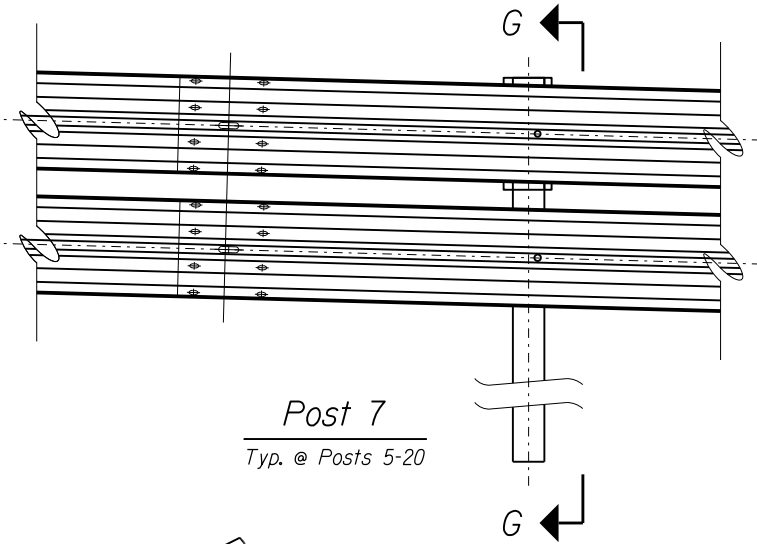


Section E-E

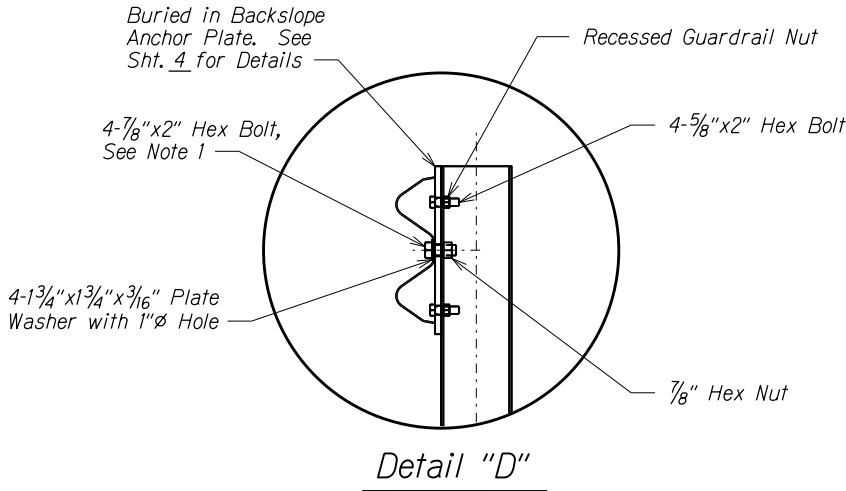
Post 1



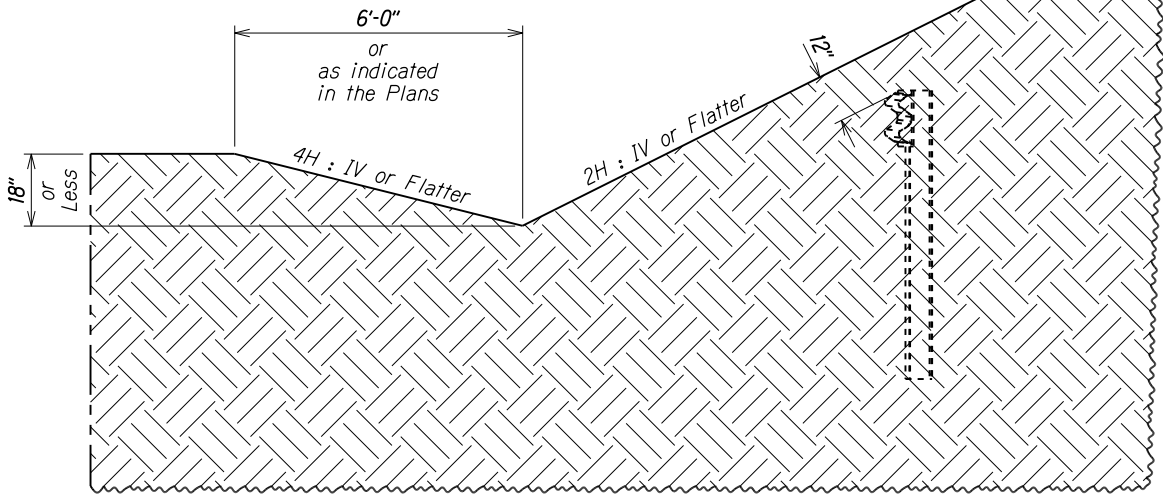
Section G-G



Post 7  
Typ. @ Posts 5-20



Detail "D"



Section F-F

Notes:

1. Recessed Guardrail Nuts typical on all 5/8" Bolts. Anchor Plate and hardware are typical on top rail at Posts 1-3, and rub rail at Post 4. Field drill 1"Ø holes in Guardrail as needed for 1/8" Bolts at Posts 1-4. Hex head bolts are ASTM A307.
2. Rail height changes 16" Maximum from Post 10 to 1 to achieve 12" of soil coverage at Post 1.

TERMINAL ELEVATION & DETAILS  
(BURIED IN BACKSLOPE)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

MASH TYPE "A" FLARE

HONOAPIILANI HIGHWAY

GUARDRAIL & SHOULDER IMPROVEMENTS

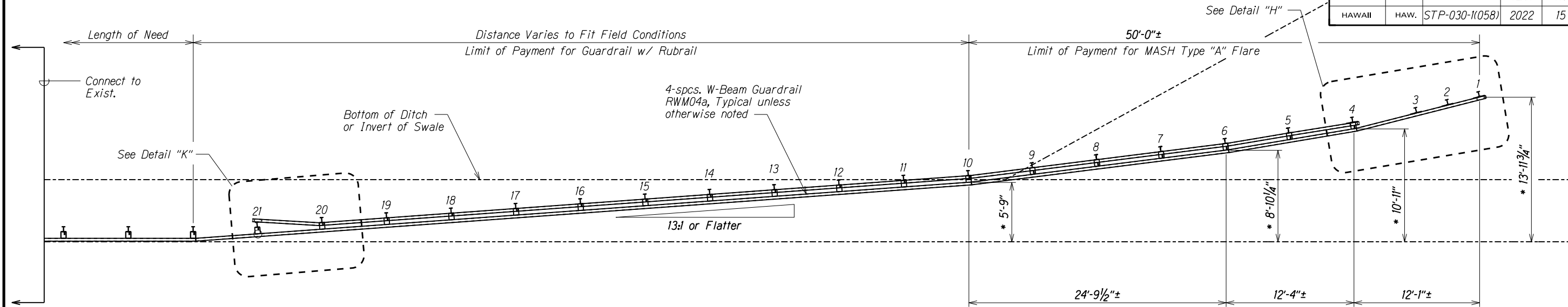
Vicinity of North Kihei Road to Hononana

Federal-Aid Project No. STP-030-1(058)

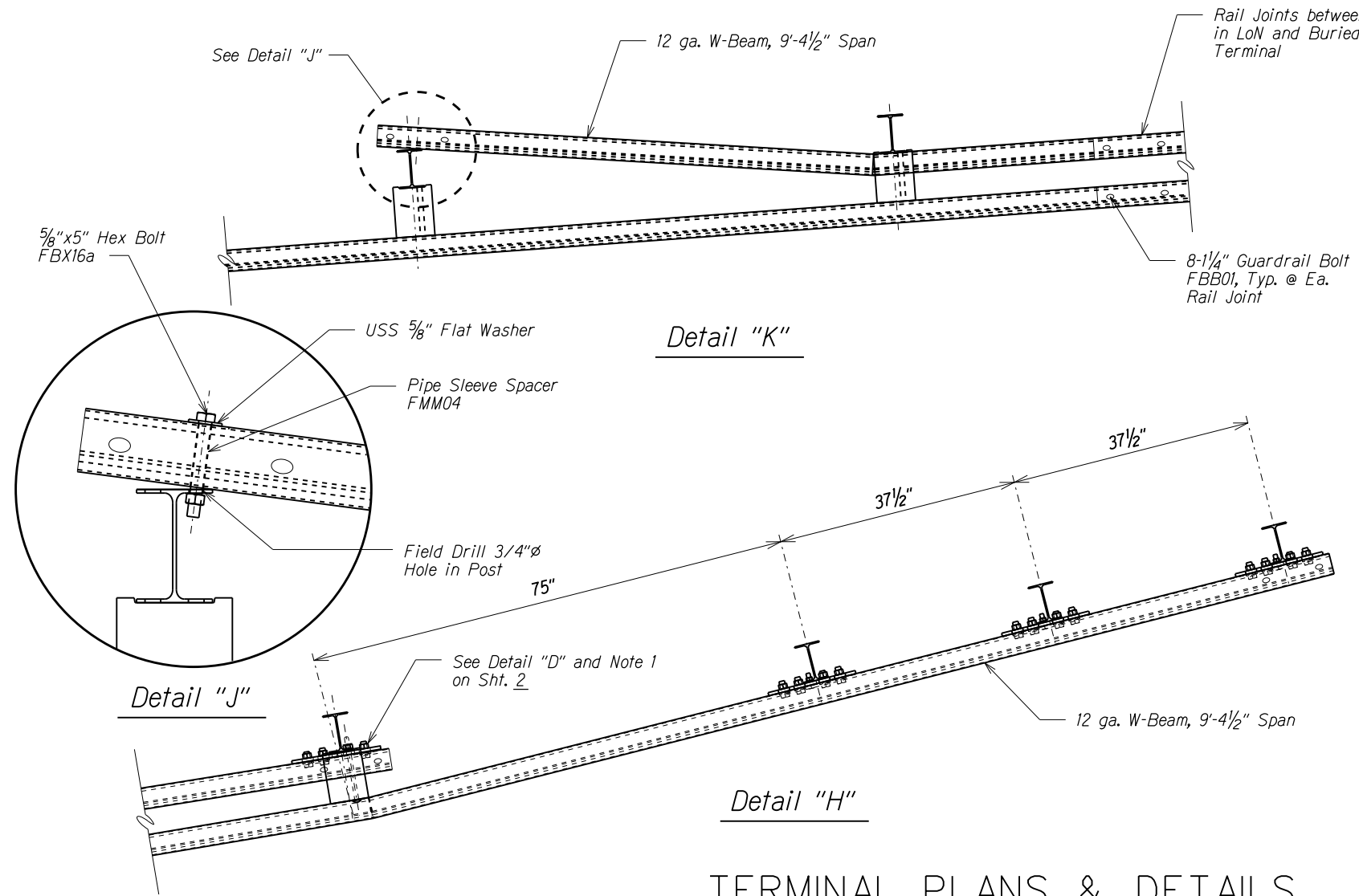
Scale: NTS Date: July, 2022

SHEET No. 7 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	15	38



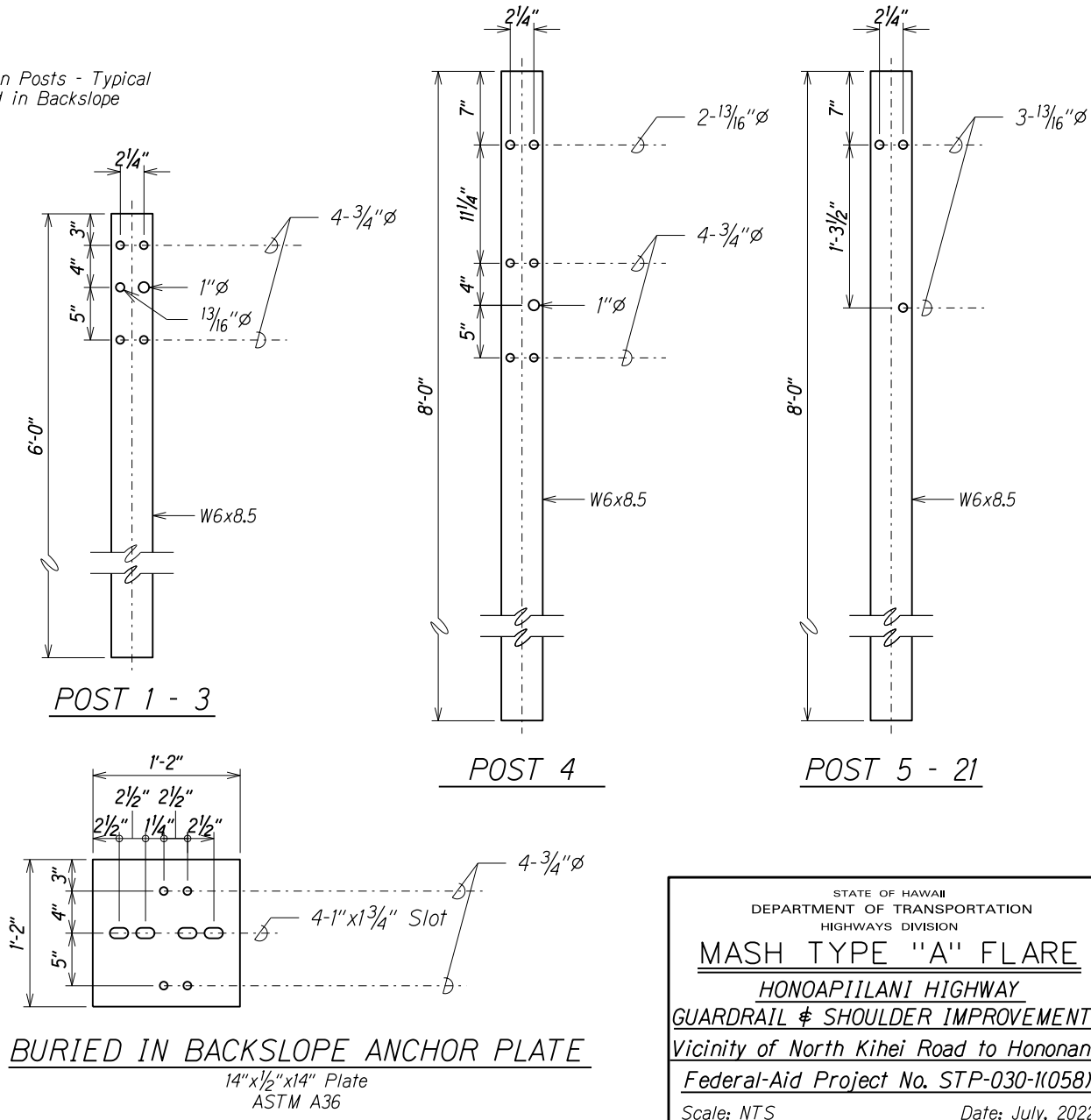
Terminal Details - Plan



Detail "K"

Detail "H"

TERMINAL PLANS & DETAILS  
(BURIED IN BACKSLOPE)



POST 1 - 3

POST 4

POST 5 - 21

BURIED IN BACKSLOPE ANCHOR PLATE

14" x 1/2" x 14" Plate  
ASTM A36

Note:  
1. \* These dimensions indicate the offset to the back of the Rail at Posts 1, 4, 6 and 10, based on a 6'-0" Wide Ditch or Swale foreslope.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

MASH TYPE "A" FLARE

HONOAPIILANI HIGHWAY

GUARDRAIL & SHOULDER IMPROVEMENTS

Vicinity of North Kihei Road to Hononaha

Federal-Aid Project No. STP-030-1(058)

Scale: NTS Date: July, 2022

SHEET No. 8 OF 12 SHEETS

SURVEY PLOTTED BY	DATE
DESIGNED BY	
NOTED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
ddx.x	
X.dgn	

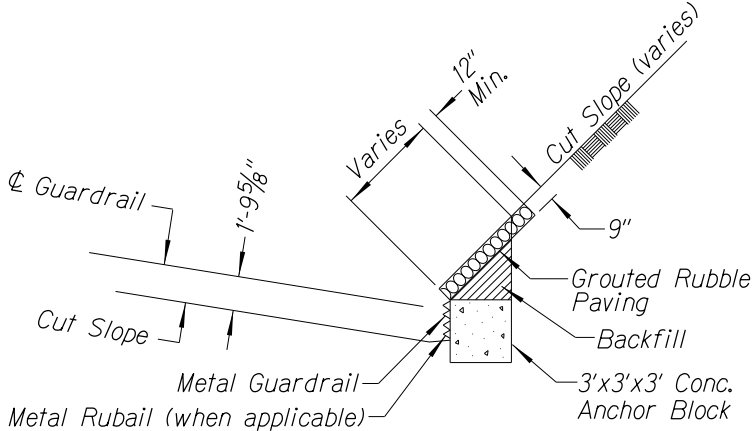
6/09/22 1dErnest/guardrail/M9/MASH-A\_Flare-M9C.dgn



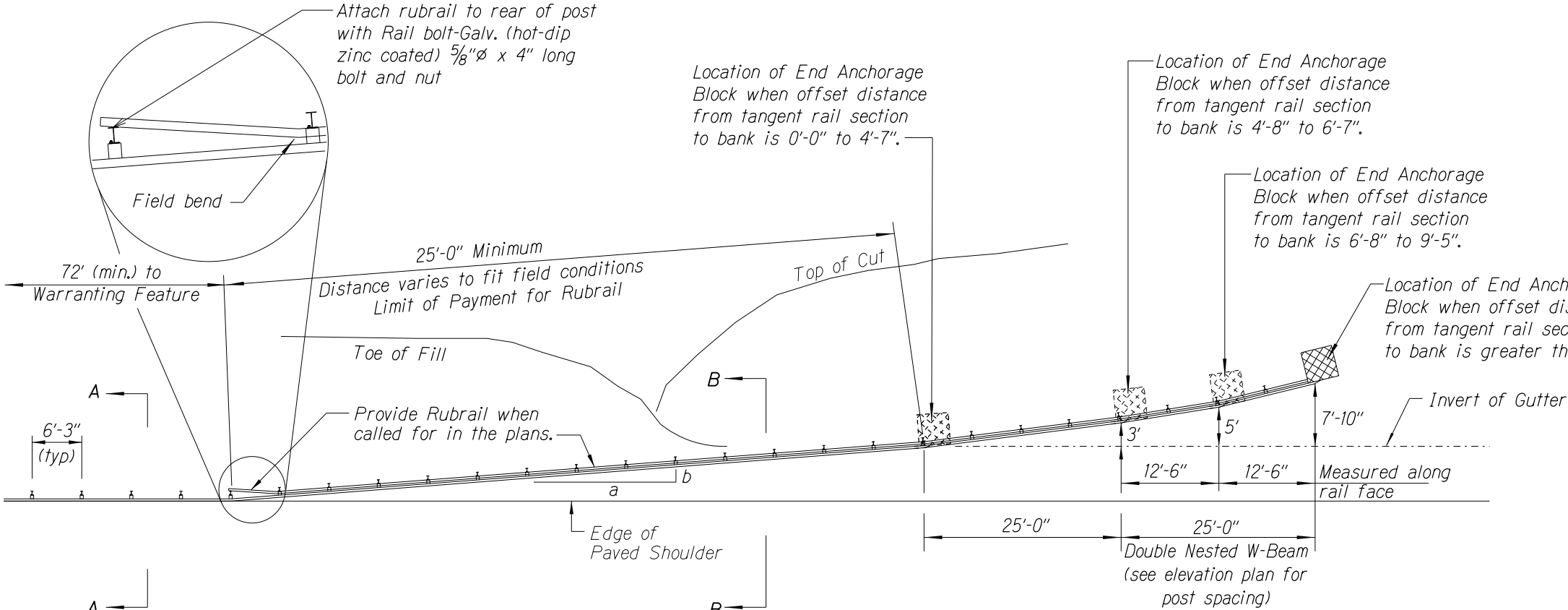
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	16	38

General Notes

- All posts are 6'-0" in length within the 50'-0" pay limit for the Modified Type "A-1" Flare without rubrail.
- Whenever swales or a change in grade is encountered within the 50'-0" pay limit for the Modified Type "A-1" Flare, a rubrail shall be installed and all posts shall have a minimum embedment of 4'-0". Post lengths shall be adjusted to provide the minimum embedment.
- 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 and HDOT's Statewide Guideline for Permanent Highway Safety Hardware.
- Limit of payment for Modified Type "A-1" Flare shall be 50'-0" from End Shoe including Rubrail (when applicable), Anchor Block and GRP work.
- Excavation, Anchor Block, Backfill and GRP work shall be considered incidental to the Modified Type "A-1" Flare.

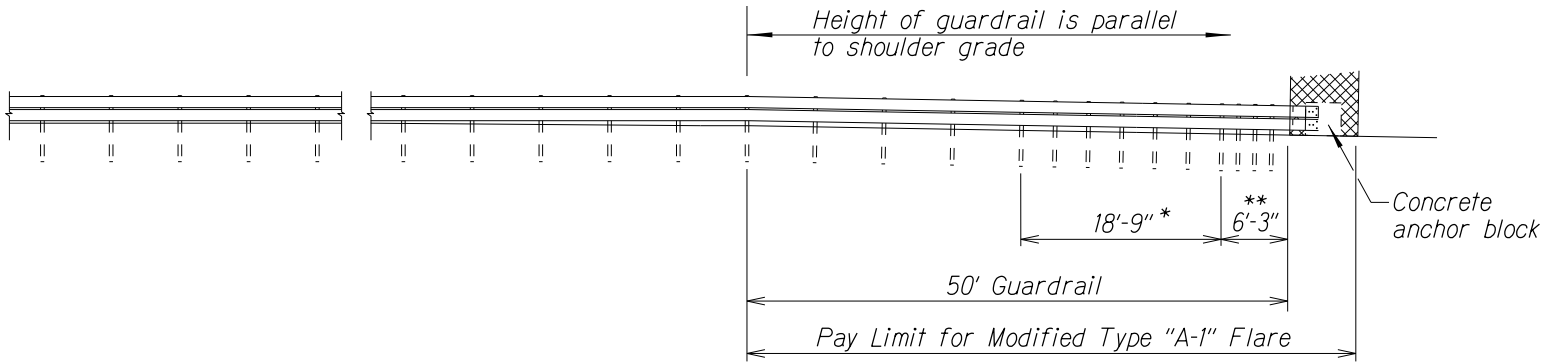


ANCHOR BLOCK IN CUT SECTION



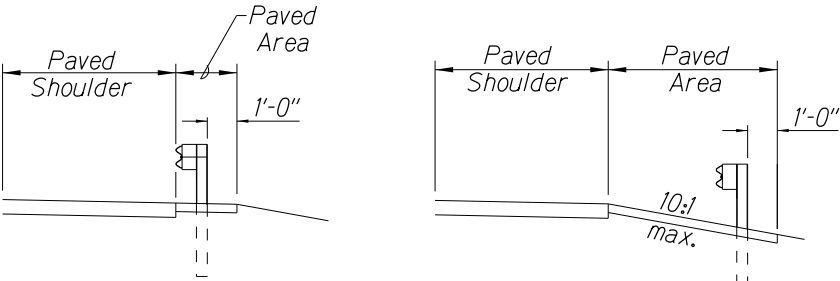
PLAN

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



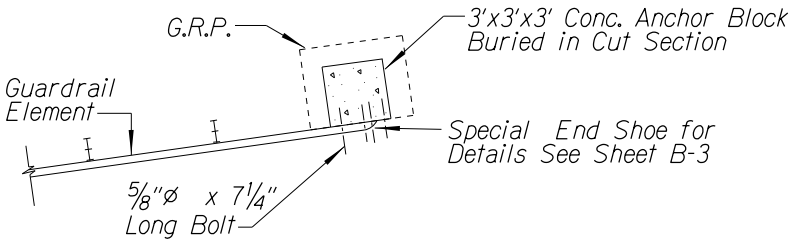
ELEVATION (Profile Along Rail)

- \* Posts at 3'-1 1/2" o.c.
- \*\* Posts at 1'-6 3/4" o.c.



Section A-A

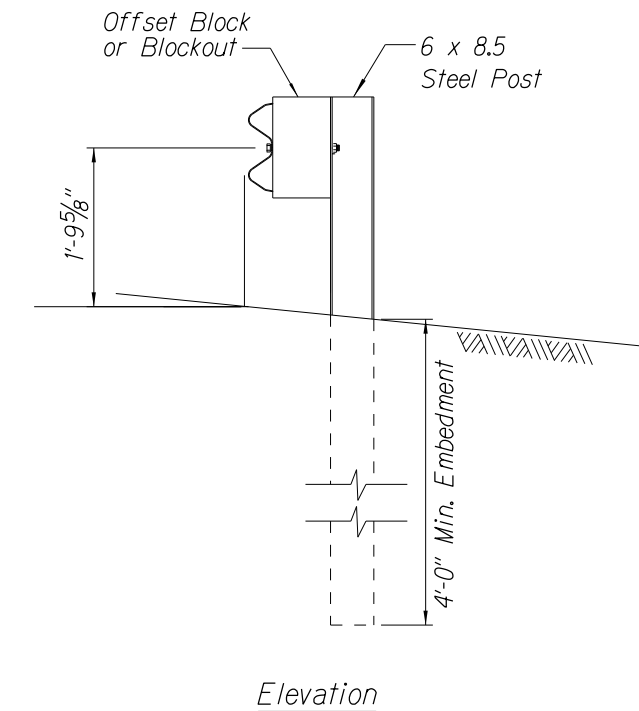
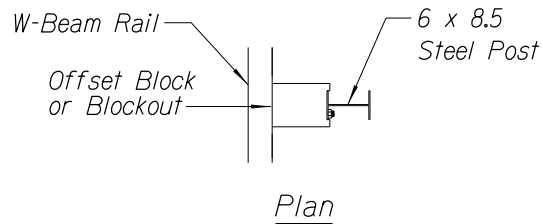
Section B-B



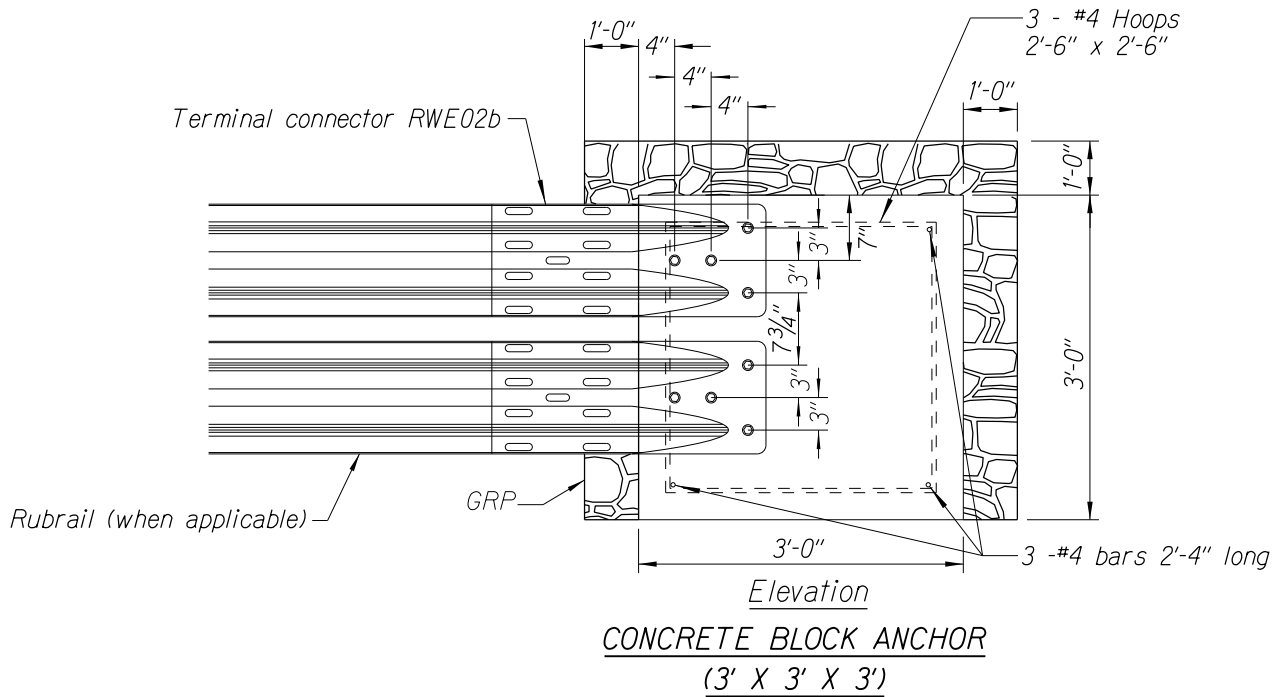
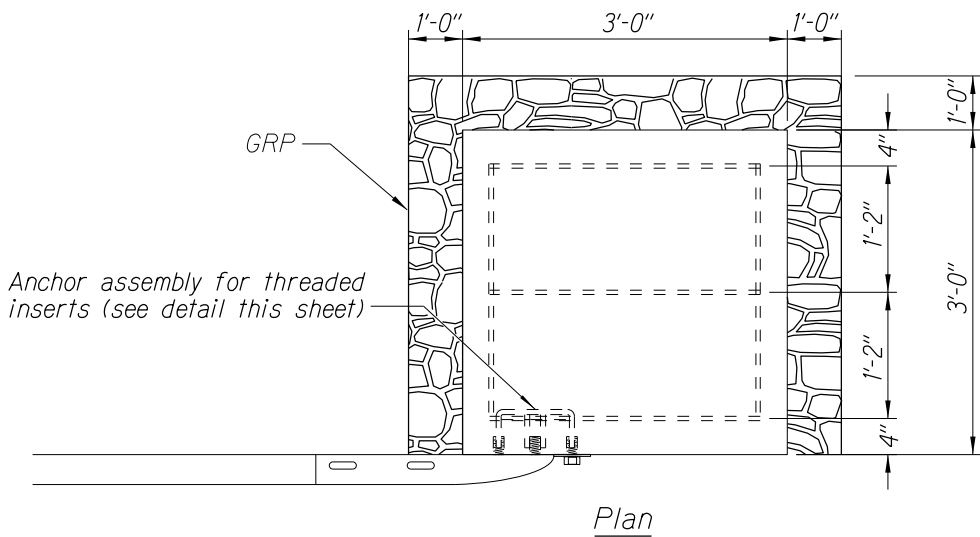
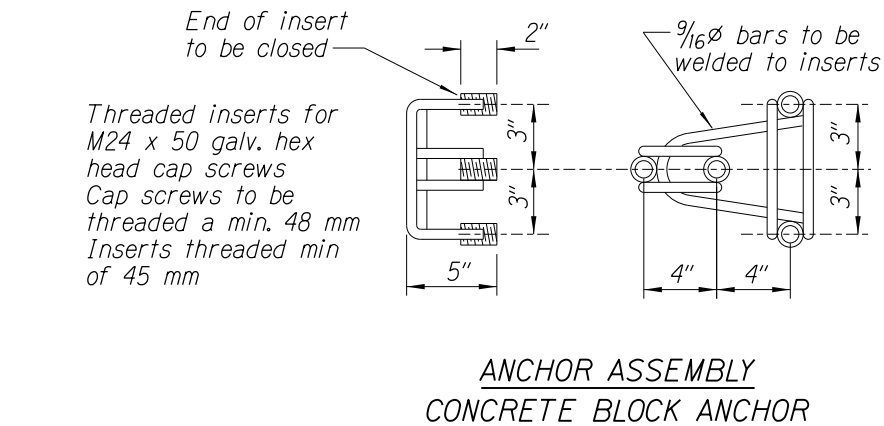
PLAN - ANCHOR BLOCK IN CUT SECTION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**MODIFIED TYPE "A-1" FLARE**  
HONOAPIILANI HIGHWAY  
GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(058)  
Scale: NTS Date: July, 2022  
SHEET No. 9 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	17	38



**STRONG POST W-BEAM GUARDRAIL**



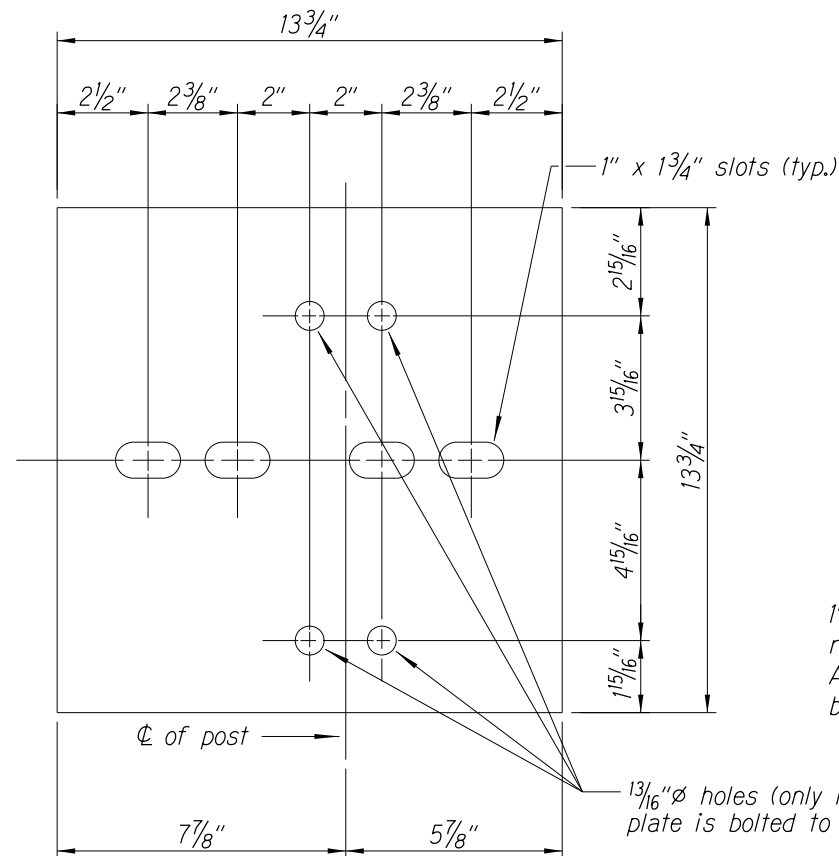
**BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS**  
**MODIFIED TYPE "A-1" FLARE**

Note:

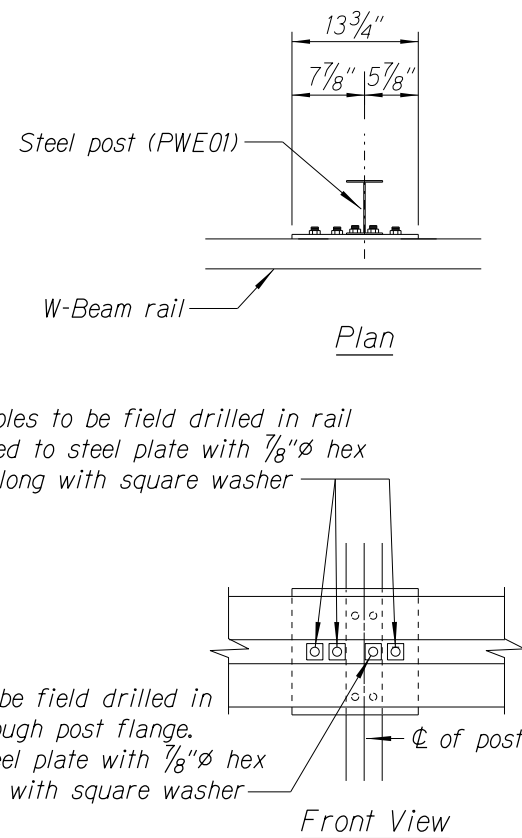
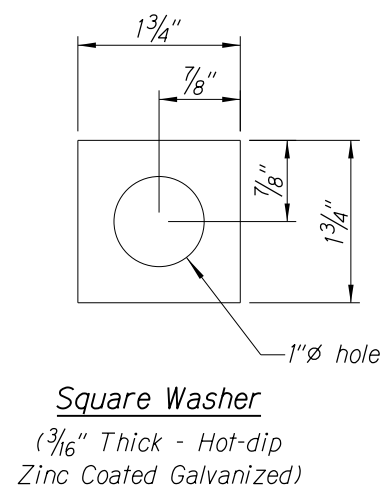
All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee and HDOT's Statewide Guideline for Permanent Highway Safety Hardware.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**MODIFIED TYPE "A-1" FLARE**  
HONOAPIILANI HIGHWAY  
GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-1(058)  
Scale: NTS  
Date: July, 2022  
SHEET No. 10 OF 12 SHEETS

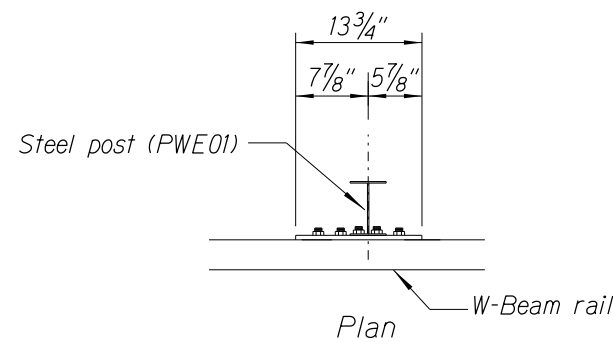
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	18	38



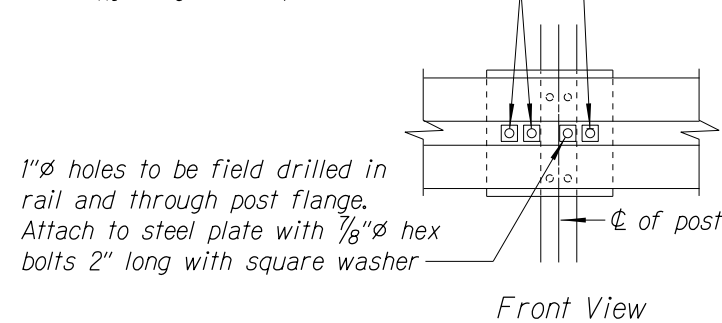
Steel Plate - 1/2"  
(Hot-dip Zinc Coated Galvanized-  
Welded or Bolted to Post)



RUBRAIL ANCHOR DETAILS

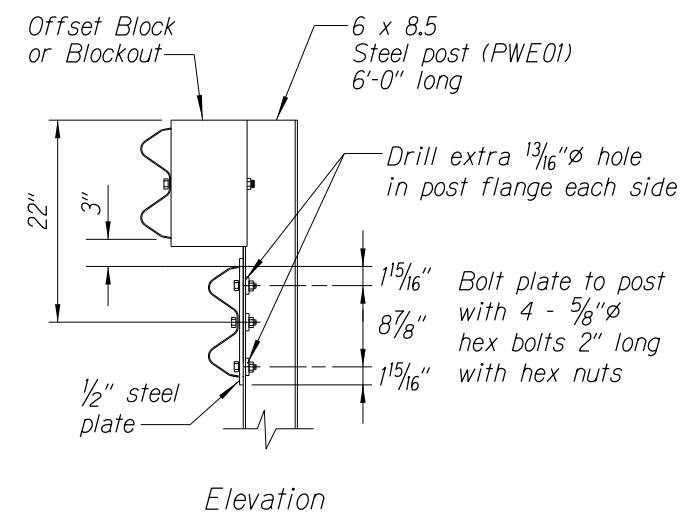


3 -  $\frac{7}{8}$ " $\varnothing$  holes to be field drilled in rail  
and attached to steel plate with  $\frac{7}{8}$ " $\varnothing$  hex  
bolts  $1\frac{15}{16}$ " long with square washer —



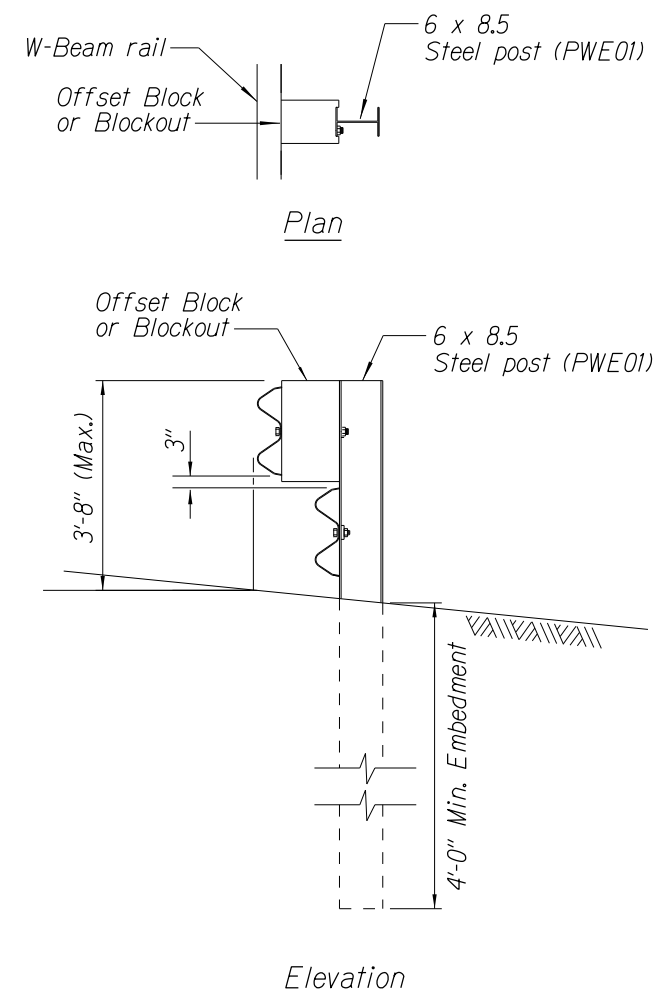
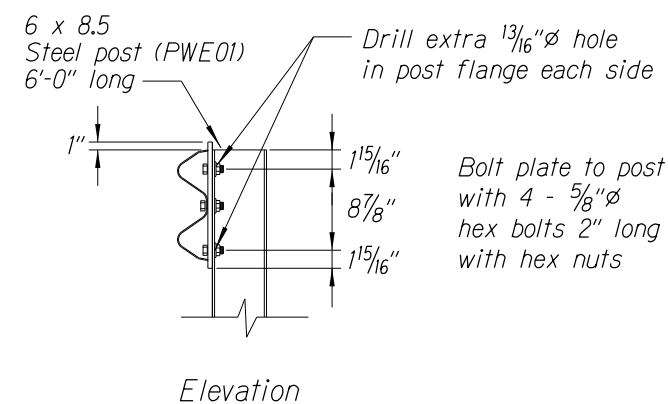
### POST ANCHOR DETAILS

RUBRAIL DETAIL FOR MODIFIED TYPE "A-1" FLARE  
(WHEN CALLED FOR IN PLANS)



*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.*



STEEL POST GUARDRAIL  
WITH RUBRAIL

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MODIFIED TYPE "A-1" FLARE**  
**RUBRAIL DETAILS**

HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS  
Vicinity of North Kihei Road to Hononana  
Federal-Aid Project No. STP-030-(K058)

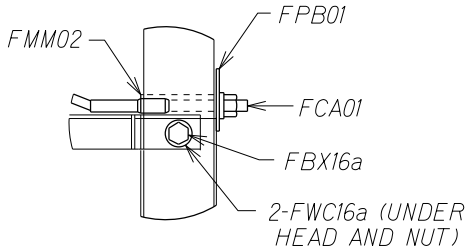
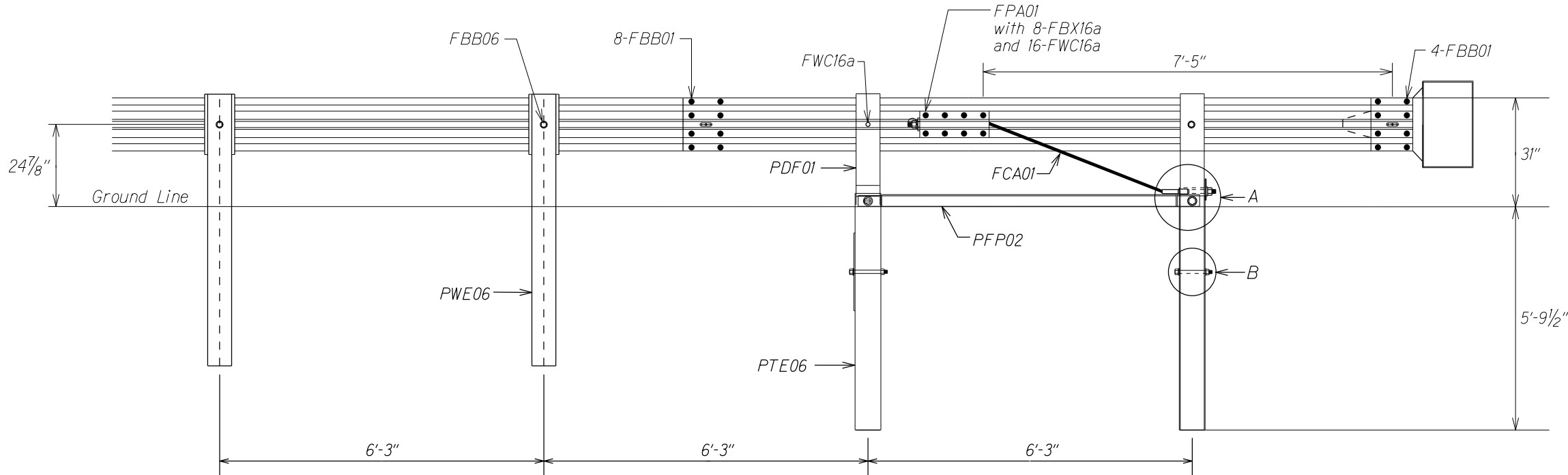
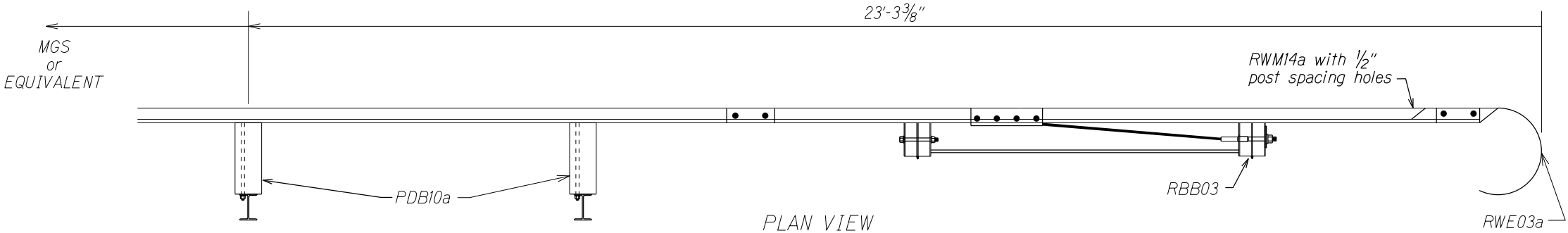
Scale: As Noted Date: July, 2022

SHEET No. 11 OF 12 SHEETS

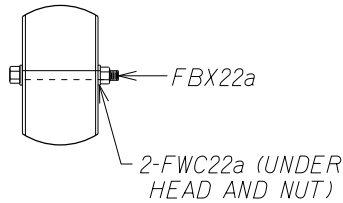
ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE <u>7/22</u>
NOTE BOOK	DRAWN BY <u>X</u>	_____
	TRACED BY _____	_____
	DESIGNED BY <u>LH</u>	_____
	QUANTITIES BY _____	_____
No. <u>X</u>	CHECKED BY _____	_____

-5/2/01 tdl:ruby/guardrail/flare\_al\_3.dqn

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(058)	2022	19	38

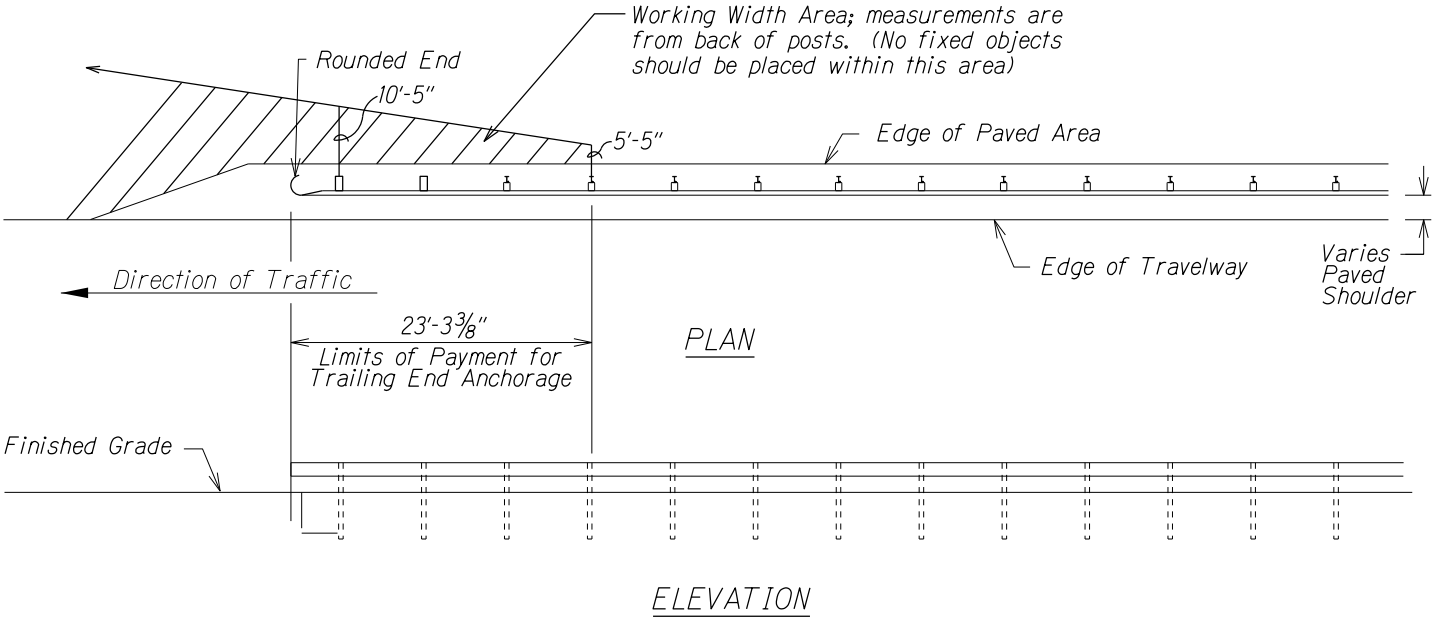


DETAIL A



DETAIL B

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



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TRAILING-END ANCHORAGE  
SYSTEM**

HONOAPIILANI HIGHWAY GUARDRAIL & SHOULDER IMPROVEMENTS

Vicinity of North Kihei Road to Hononana

Federal-Aid Project No. STP-030-1(058)

Scale: NTS      Date: July, 2022

SHEET No. 12 OF 12 SHEETS