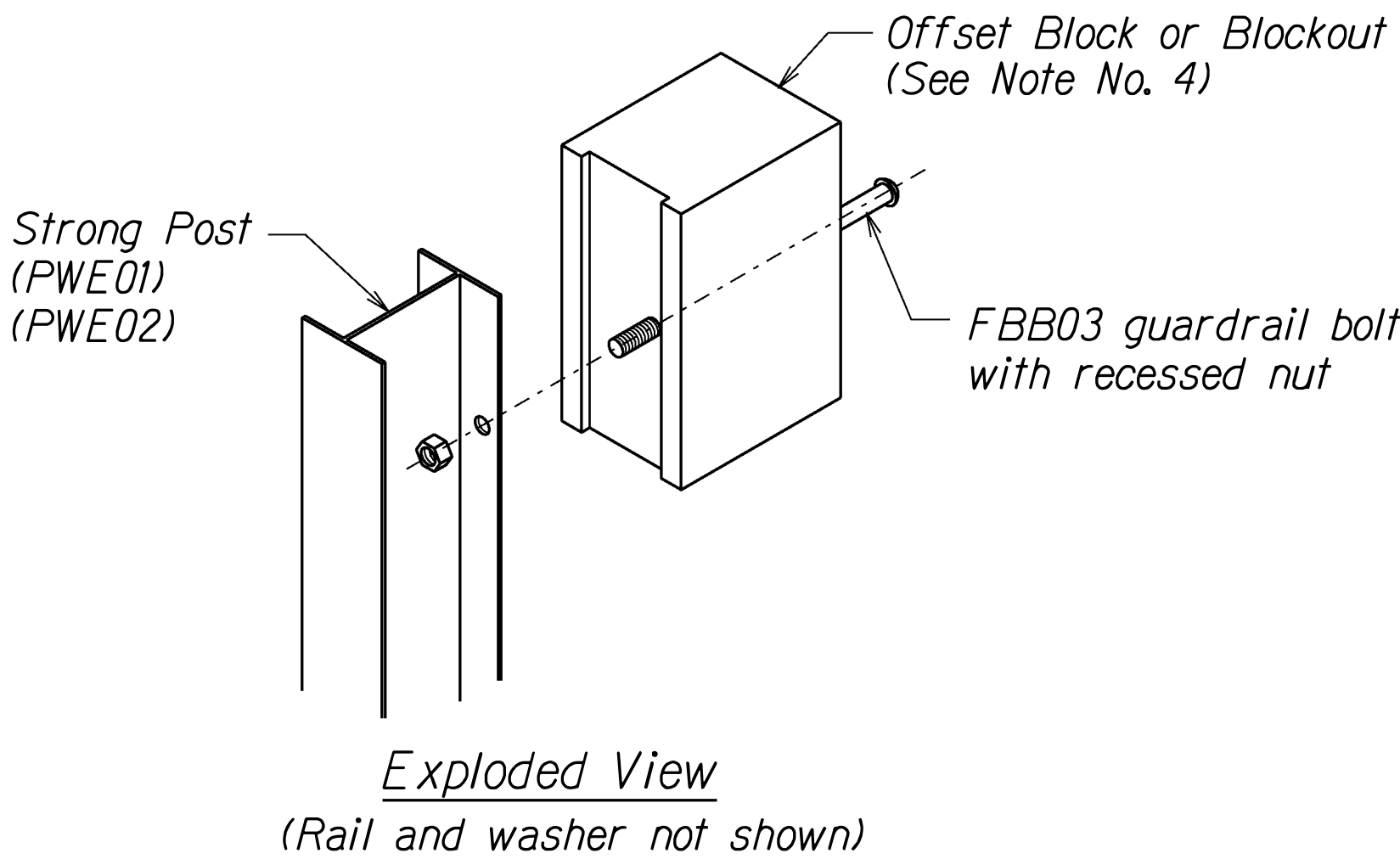


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	12	87

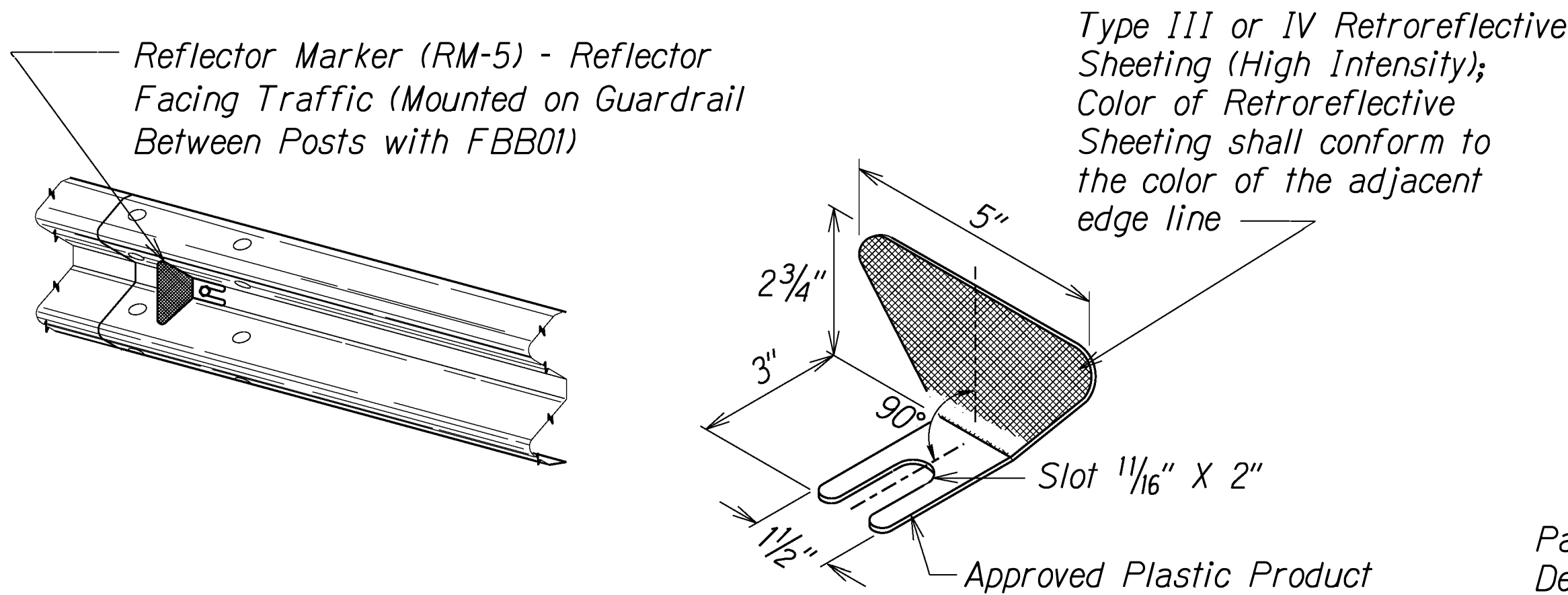
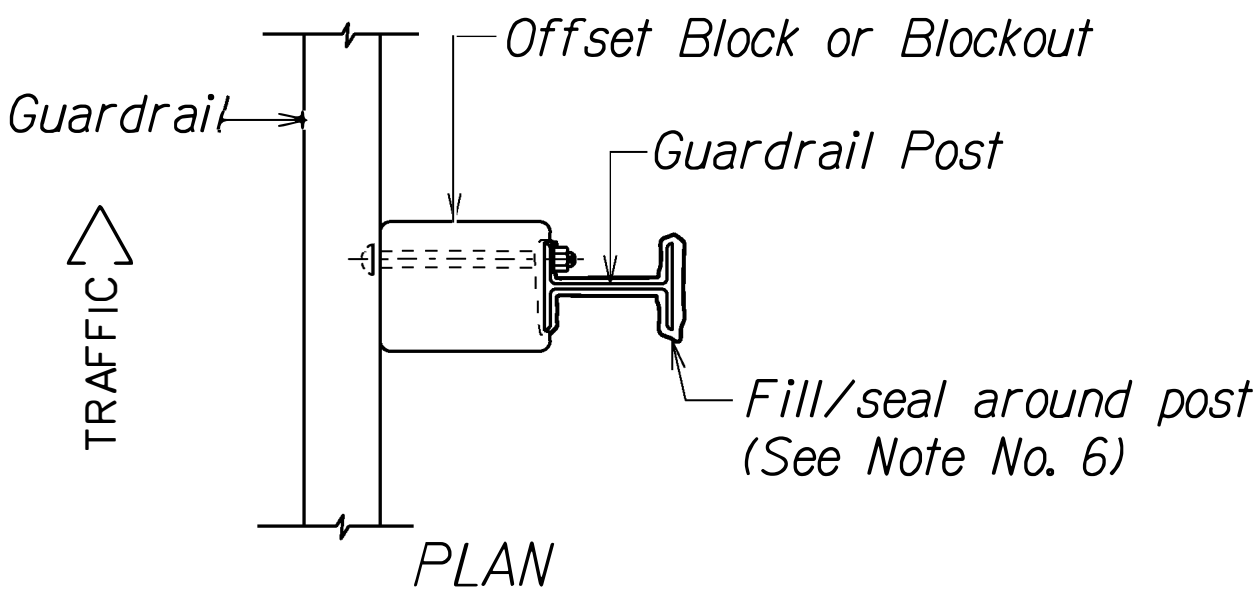
GENERAL NOTES

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.

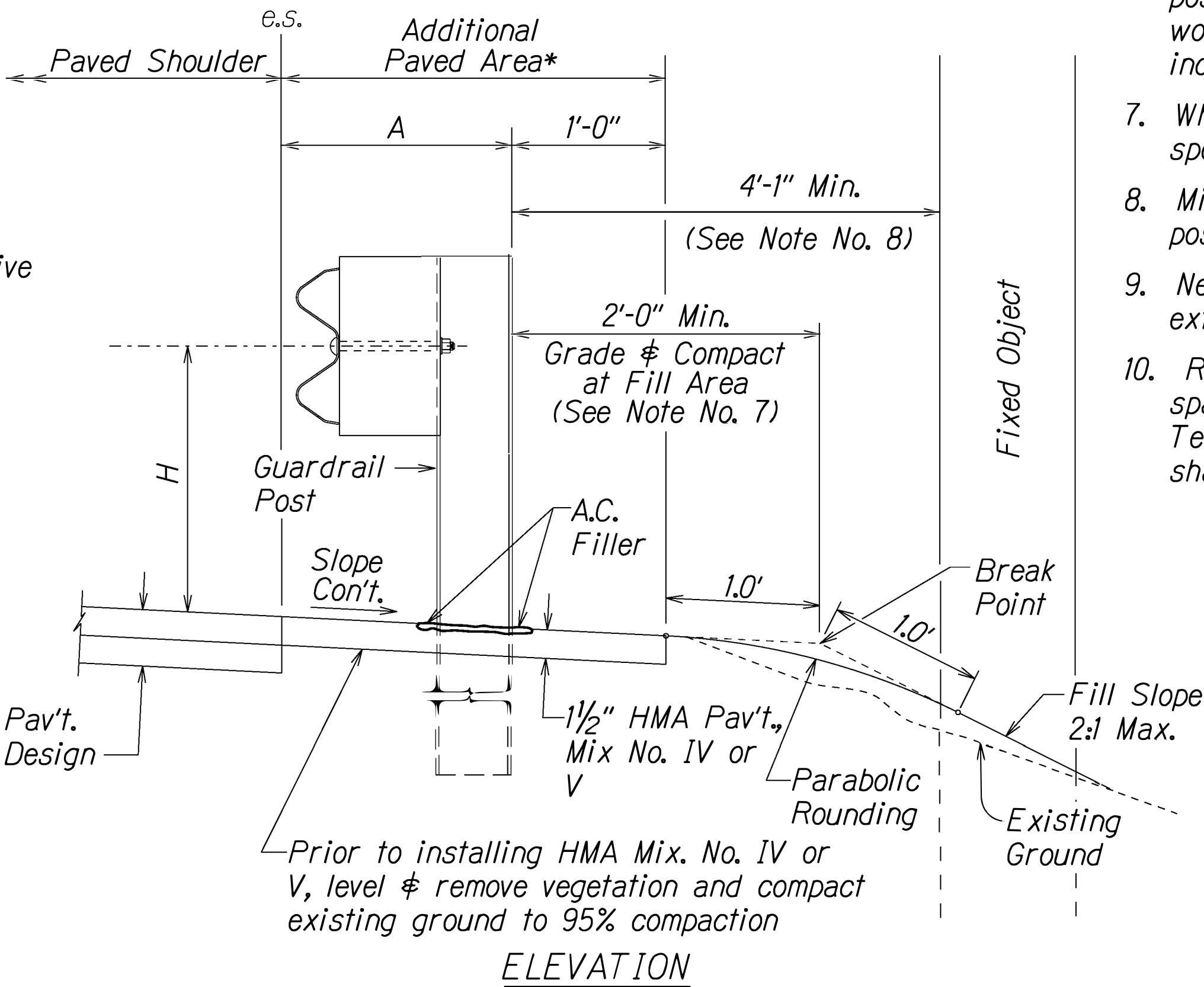
GUARDRAIL TYPE	DIMENSION	
	H	A
MGS w/ Standard 8" Offset Block	2'-1"	1'-6"
MGS w/ No Blockout	2'-7/8"	9 1/4"



STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



TYPICAL GUARDRAIL INSTALLATION

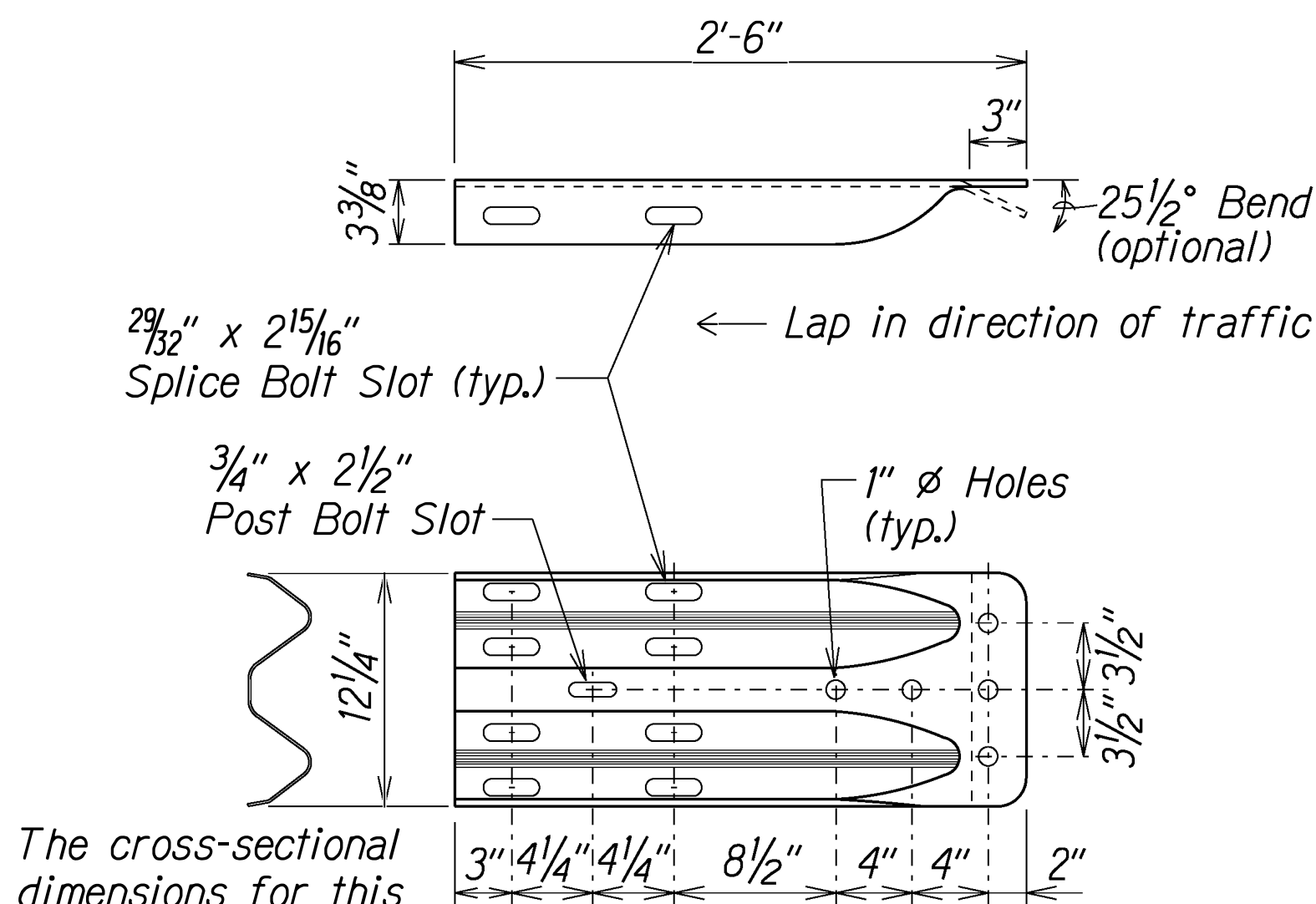
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: NTS
Date: June, 2020

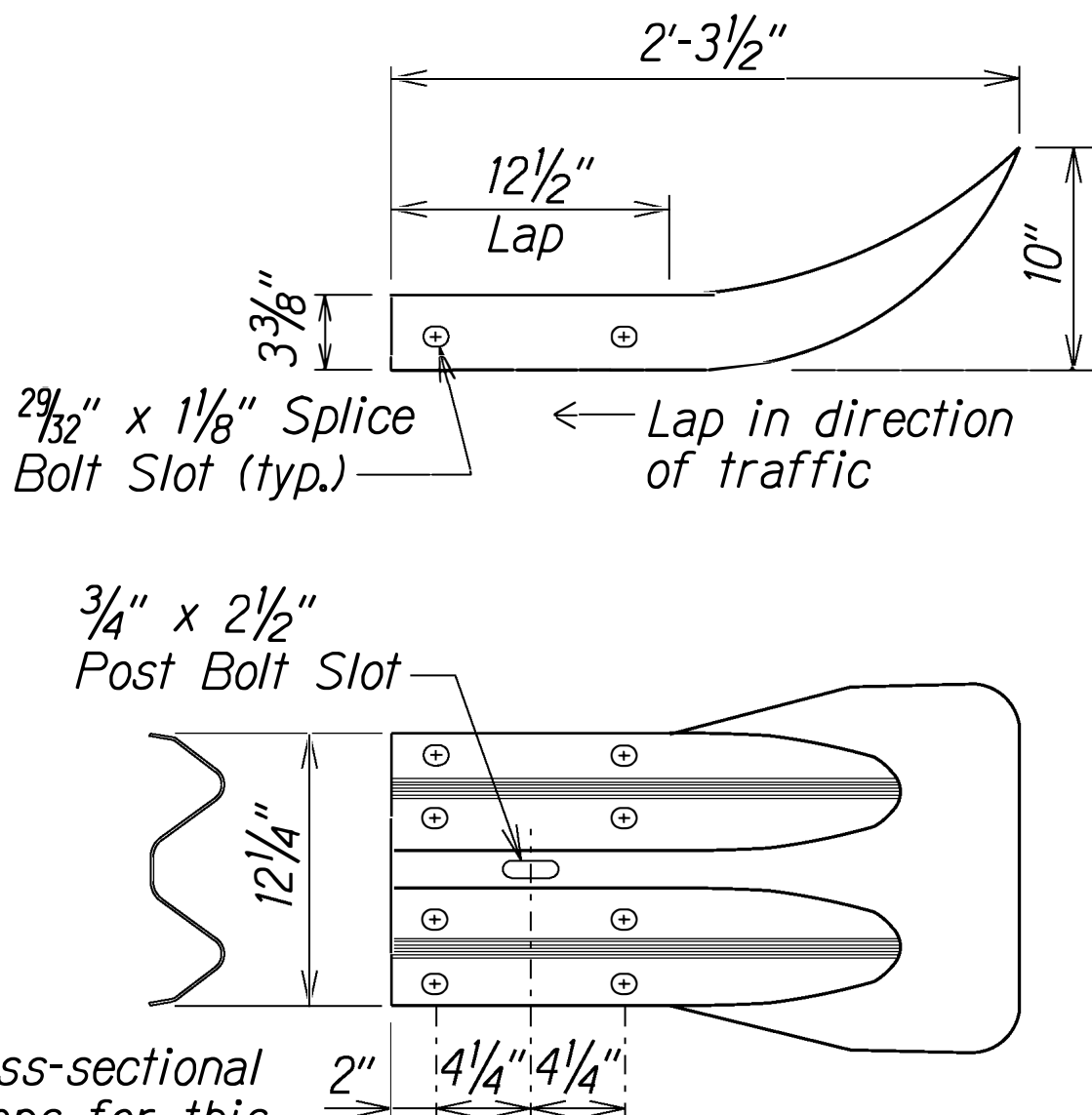
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	14	87



The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

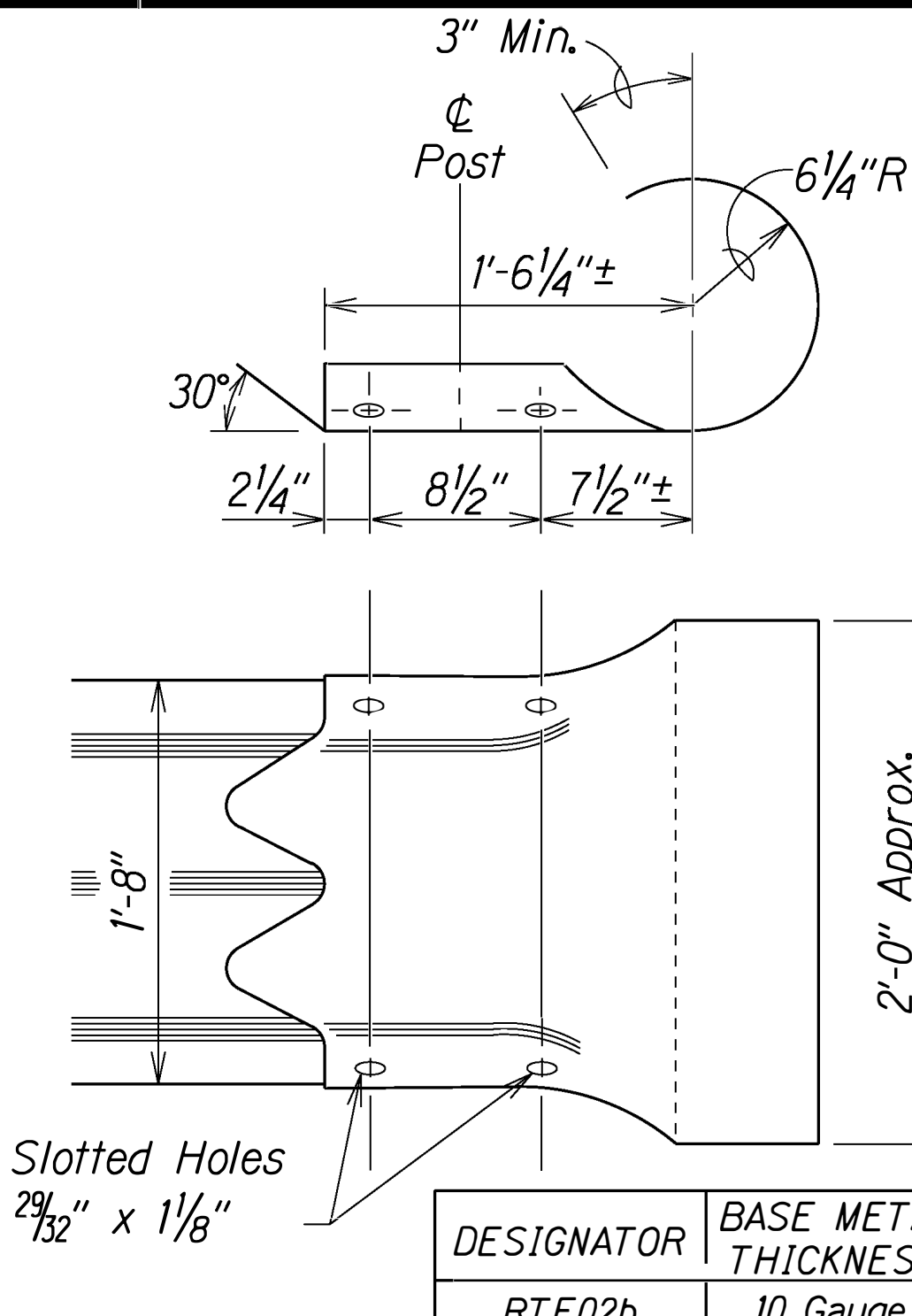
W-BEAM TERMINAL CONNECTOR (RWE02b)



The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

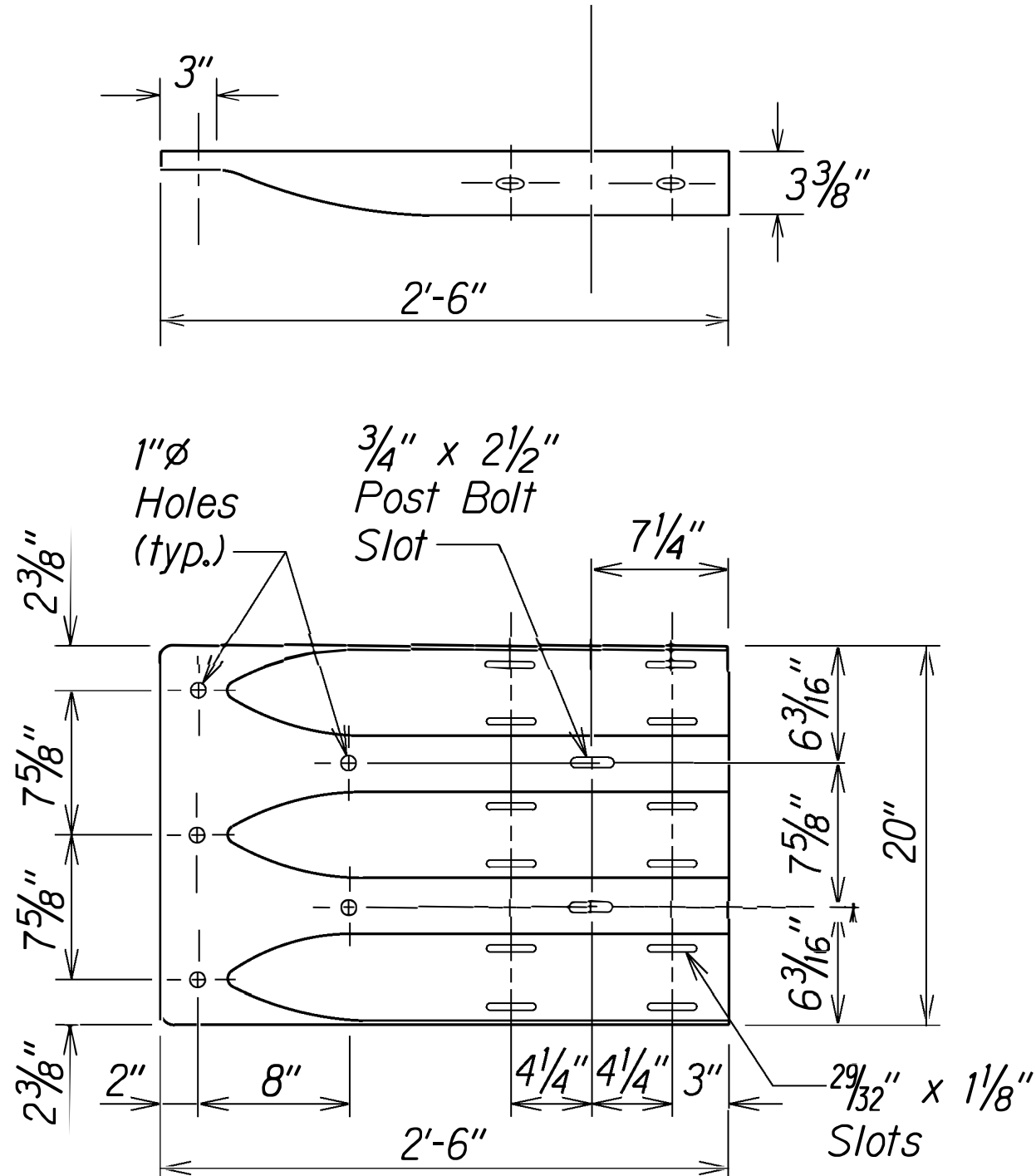
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)



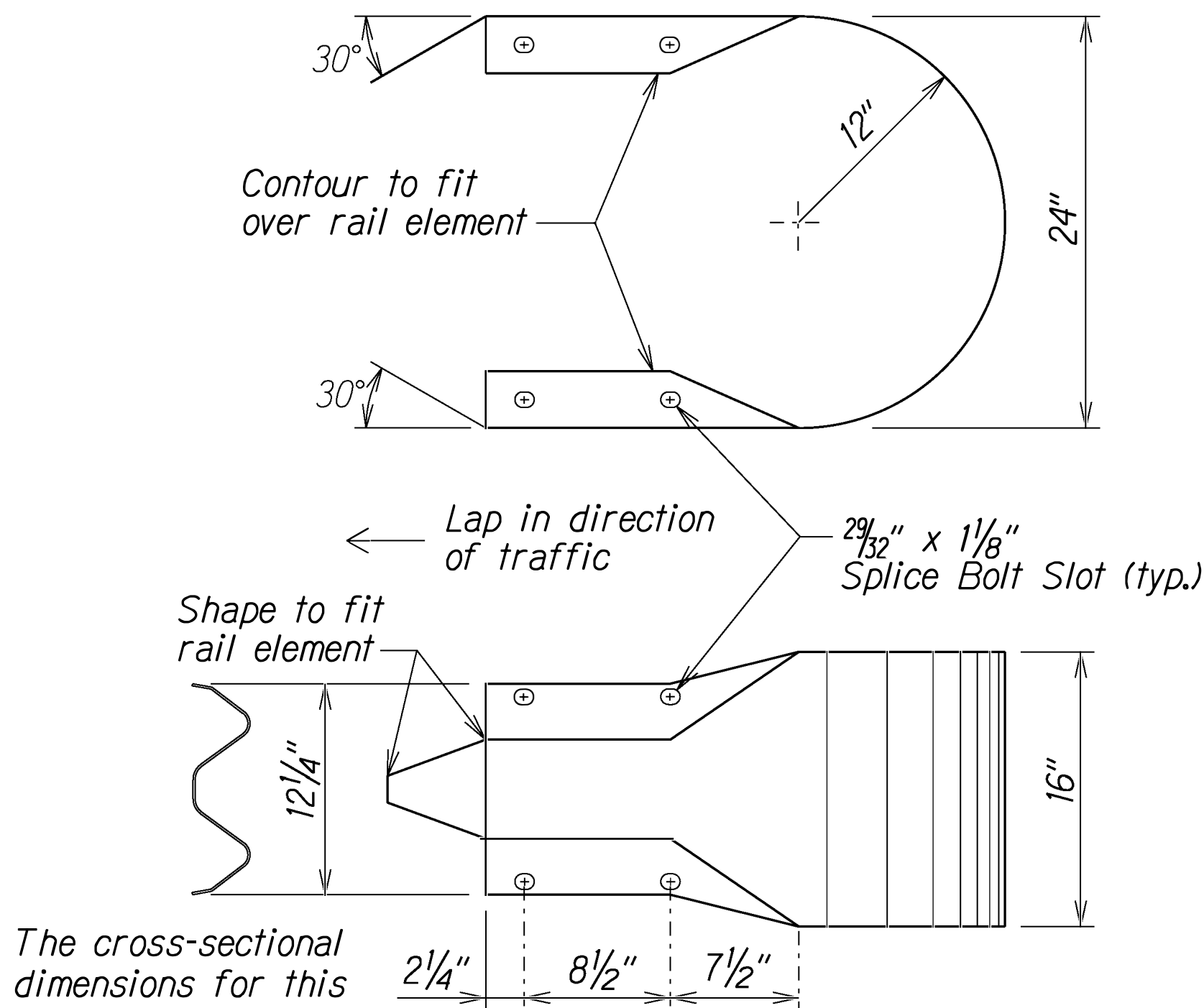
DESIGNATOR	BASE METAL THICKNESS
RTE02b	10 Gauge

THRIE-BEAM SECTION (ROUNDED) (RTE02b)



DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

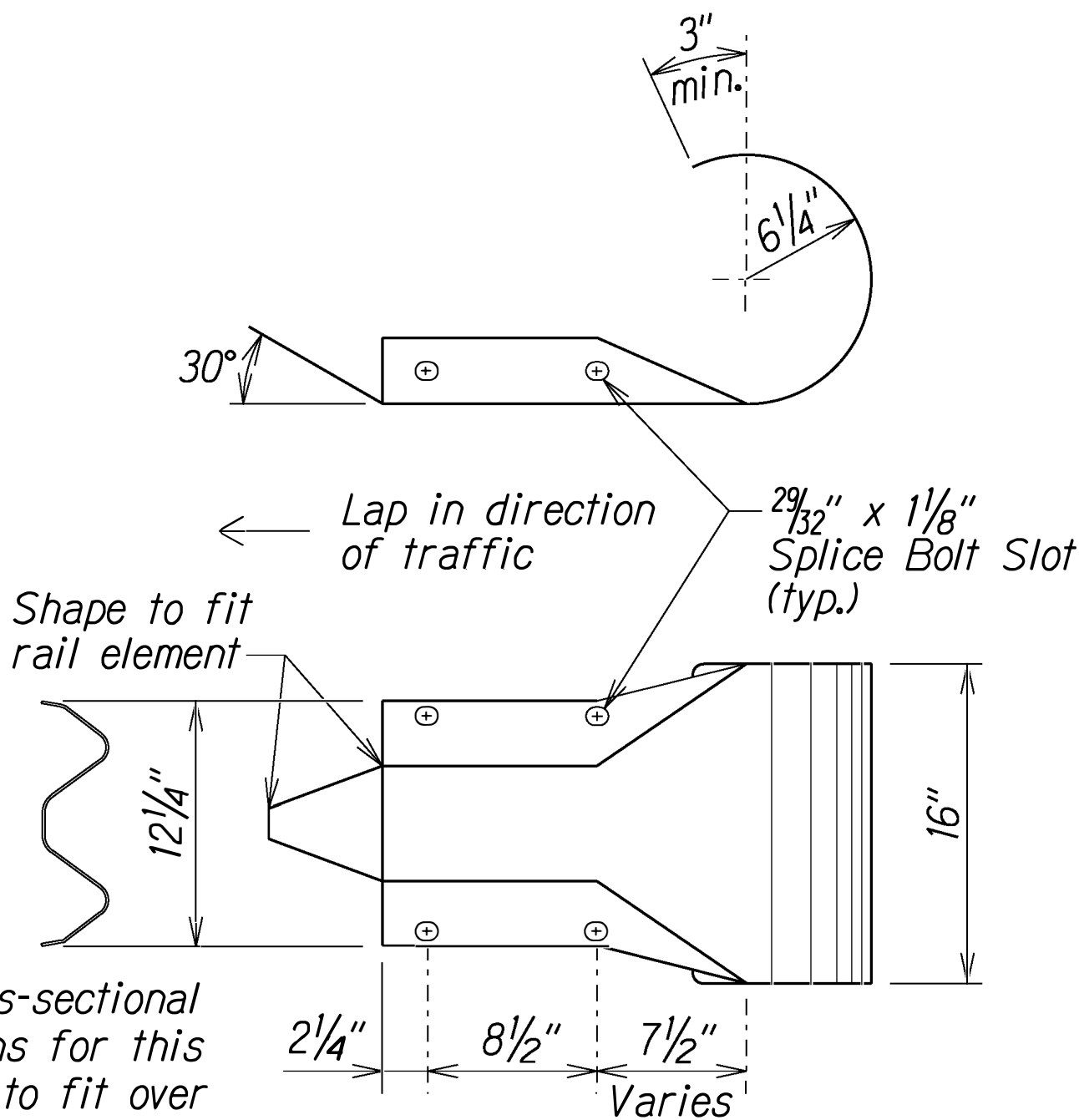
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

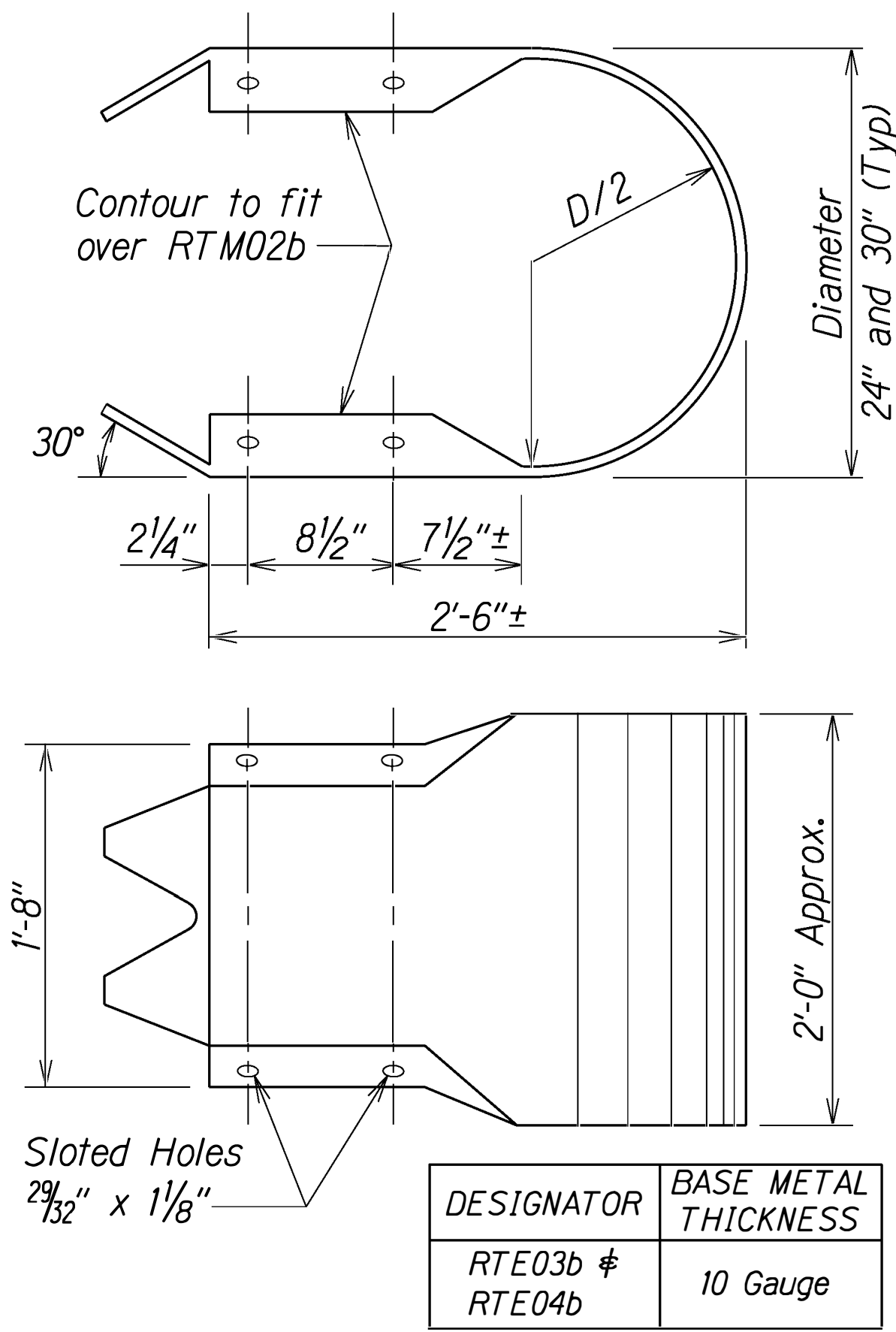
W-BEAM END SECTION (BUFFER RWE06a)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)



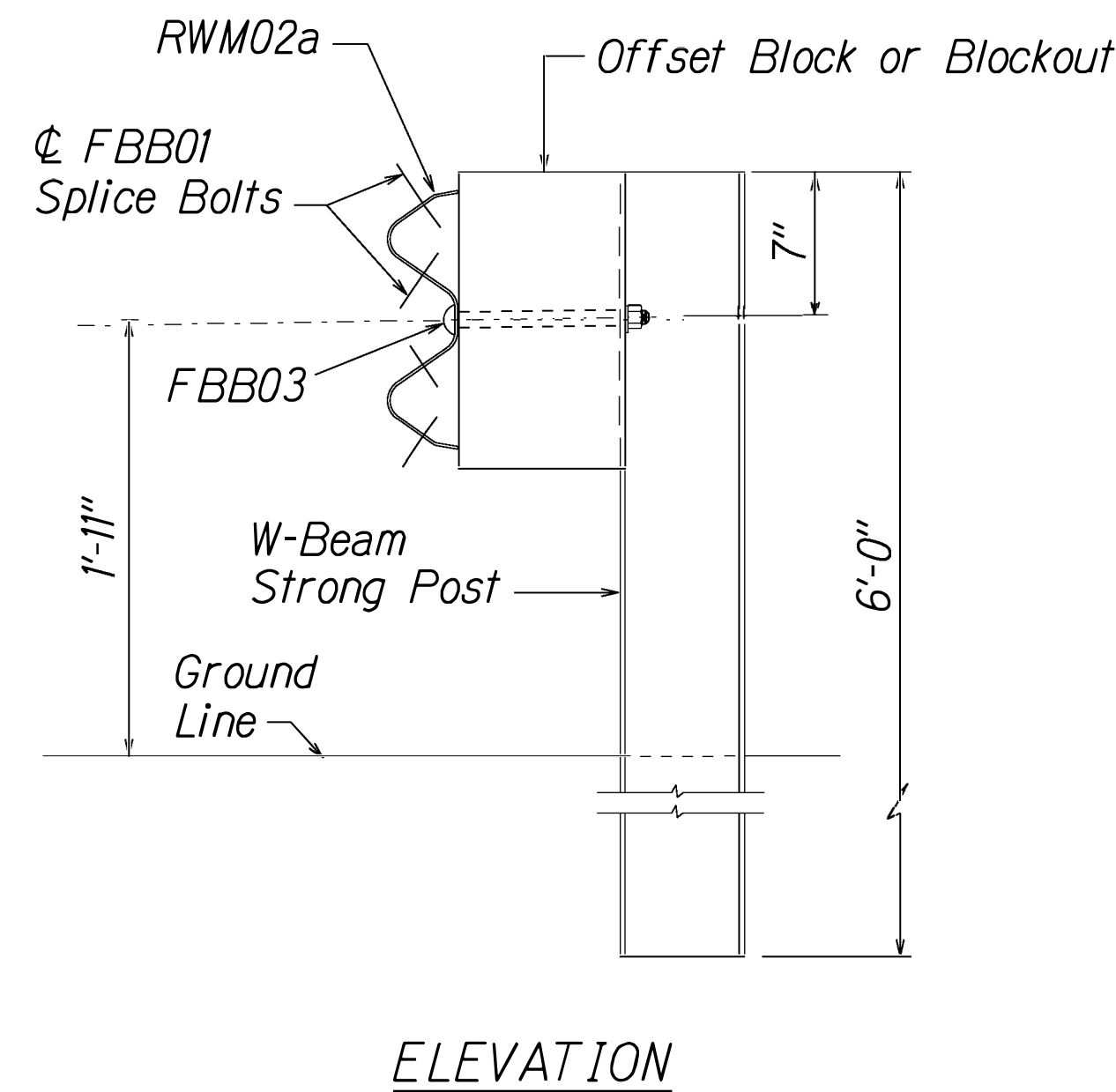
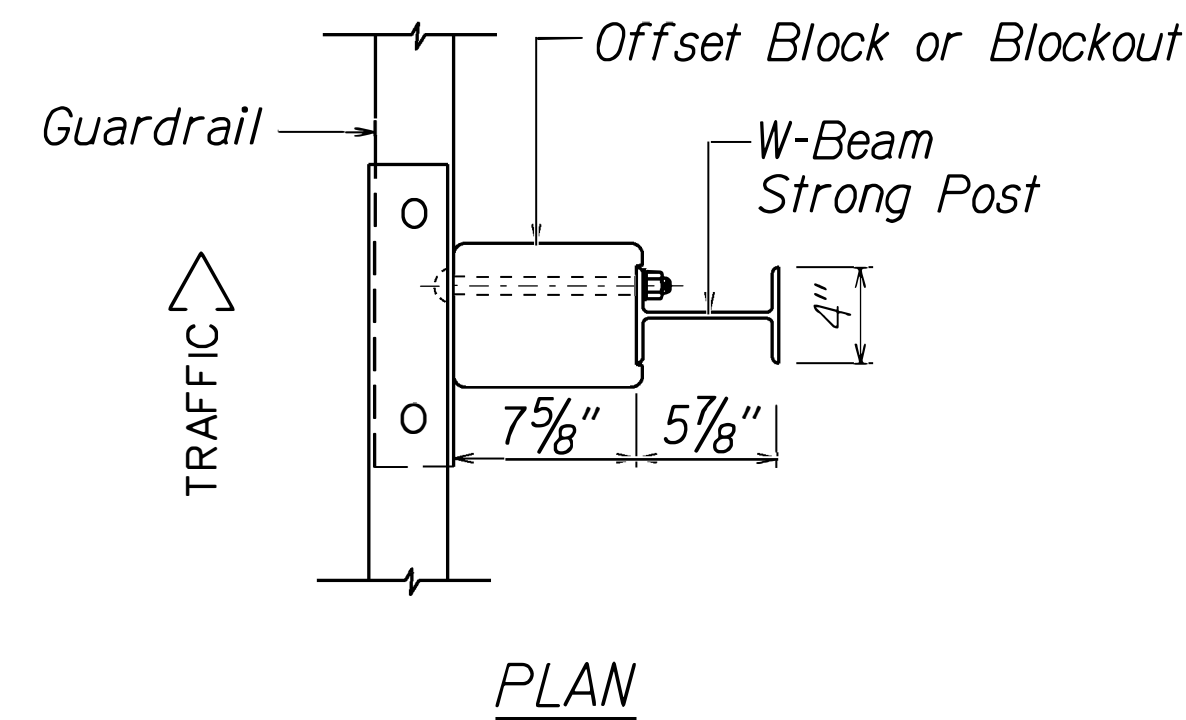
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**GUARDRAIL TERMINAL CONNECTORS
AND END SECTIONS**

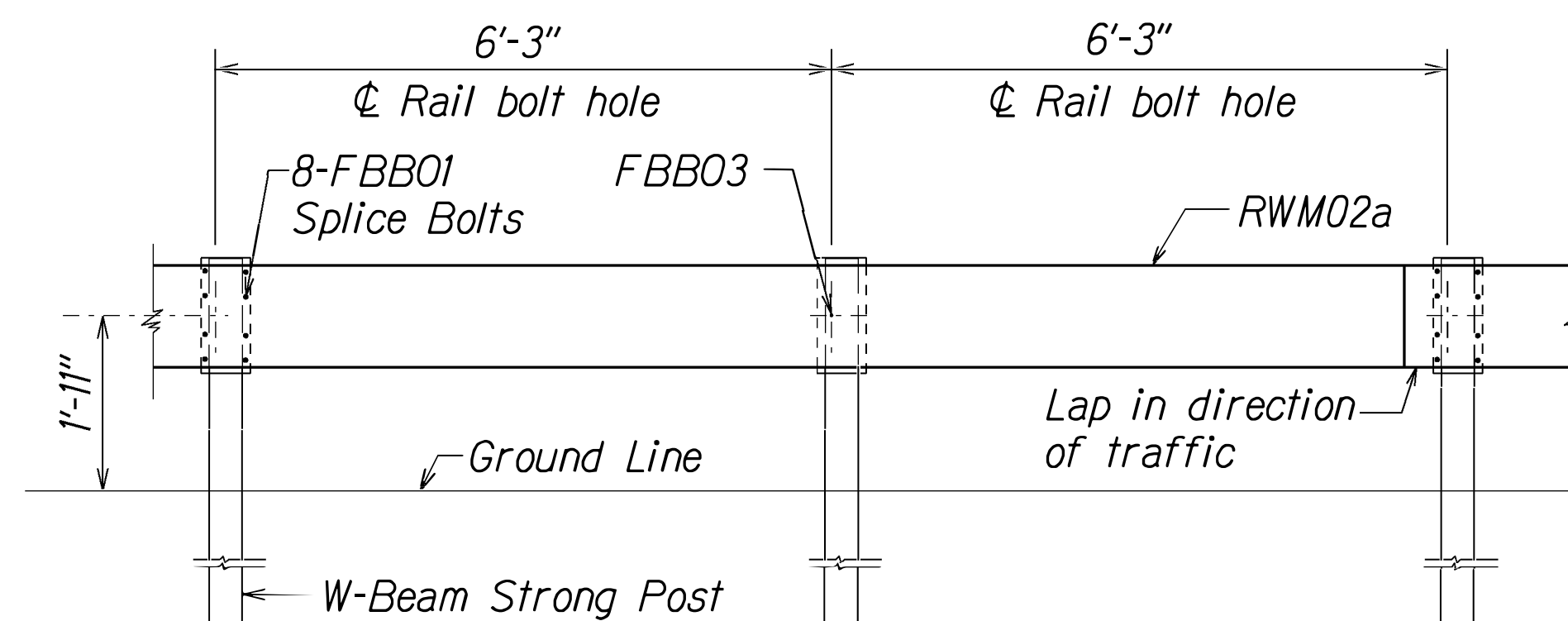
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: NTS Date: June, 2020

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	15	87

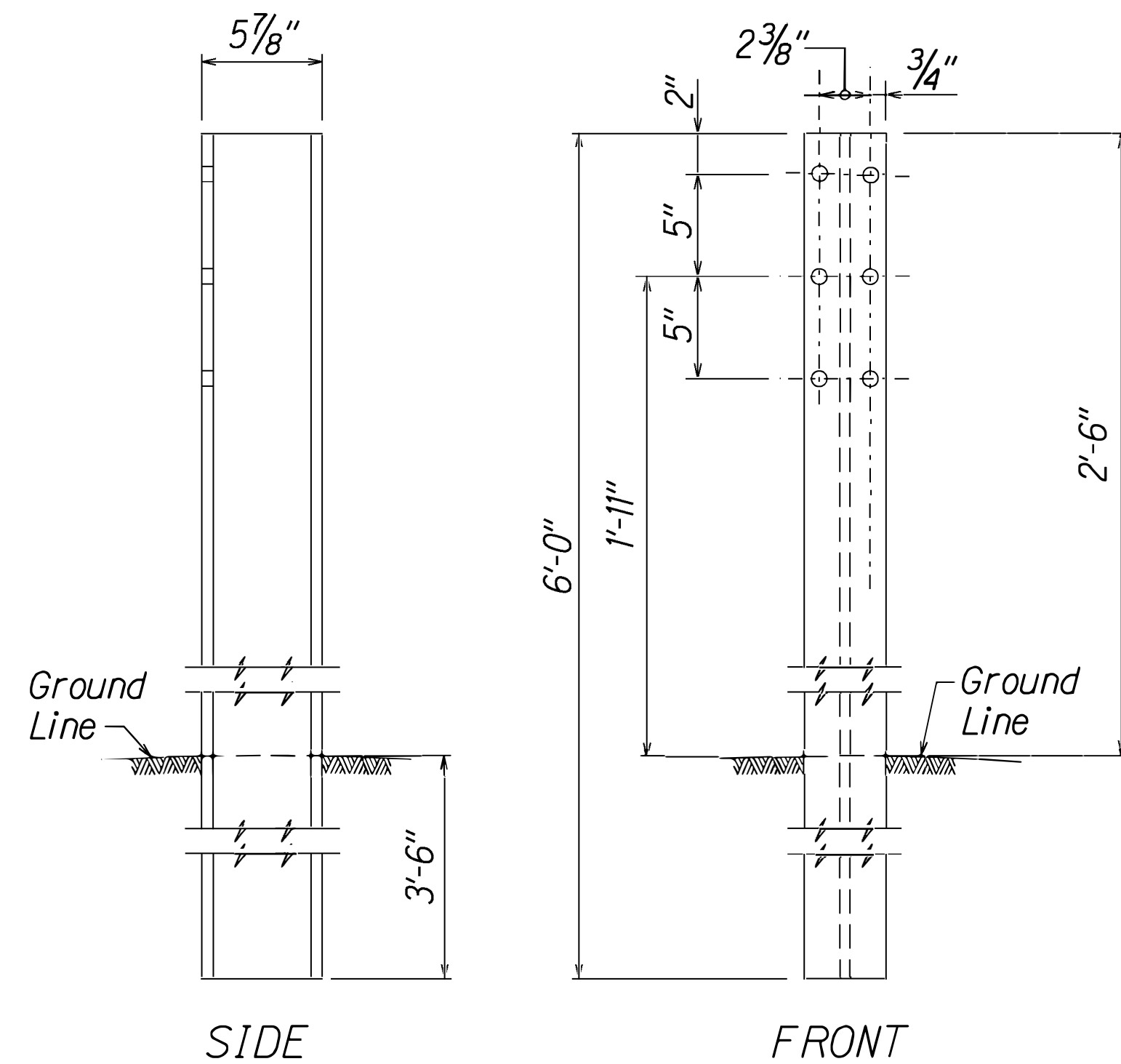


STRONG POST W-BEAM GUARDRAIL

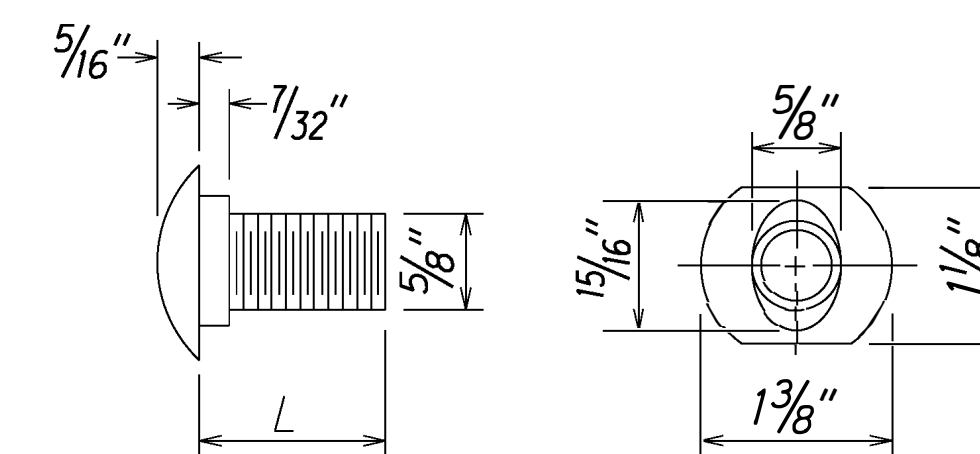
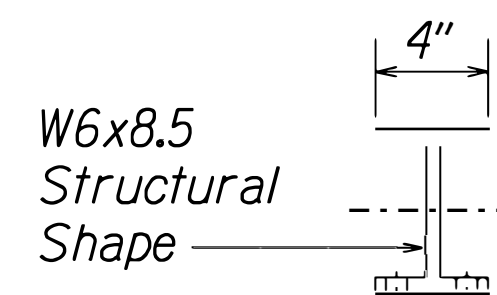


STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

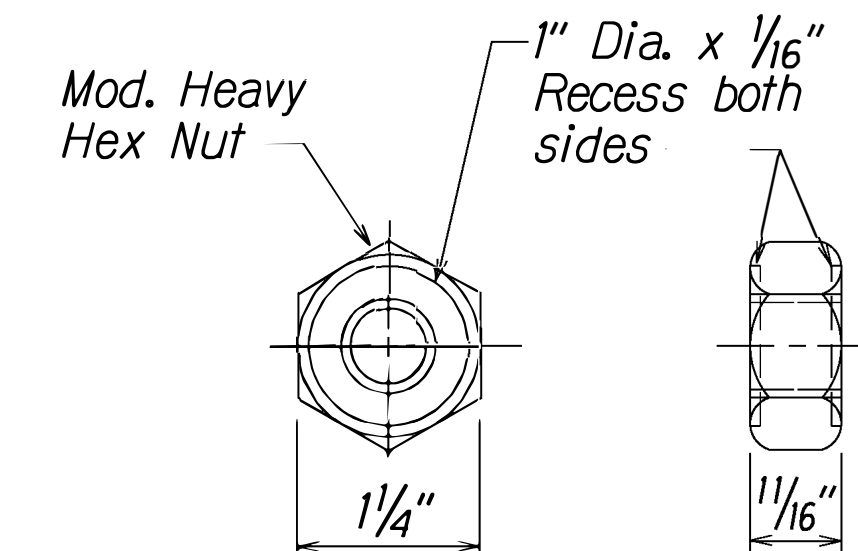
NOTE:
All Holes are
3/4" Dia.



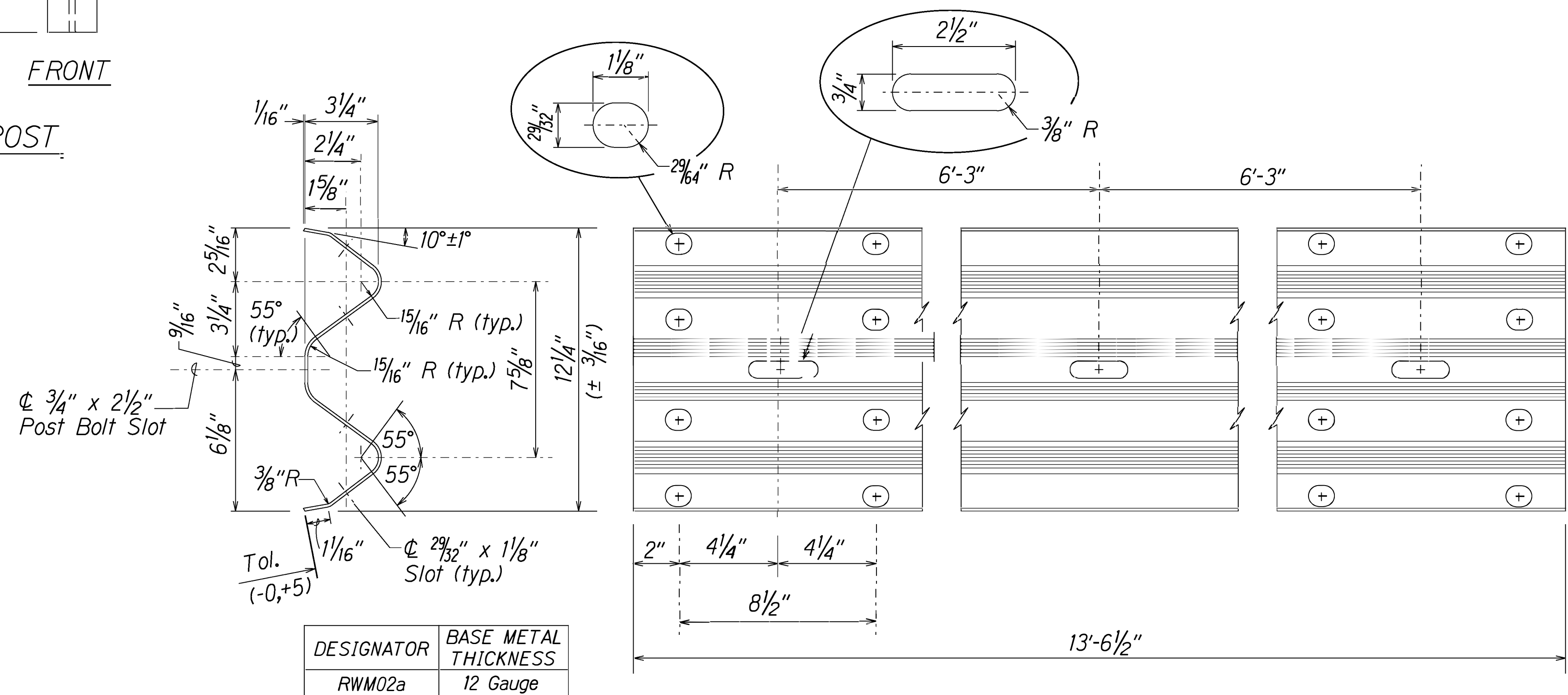
W-BEAM STRONG POST



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)

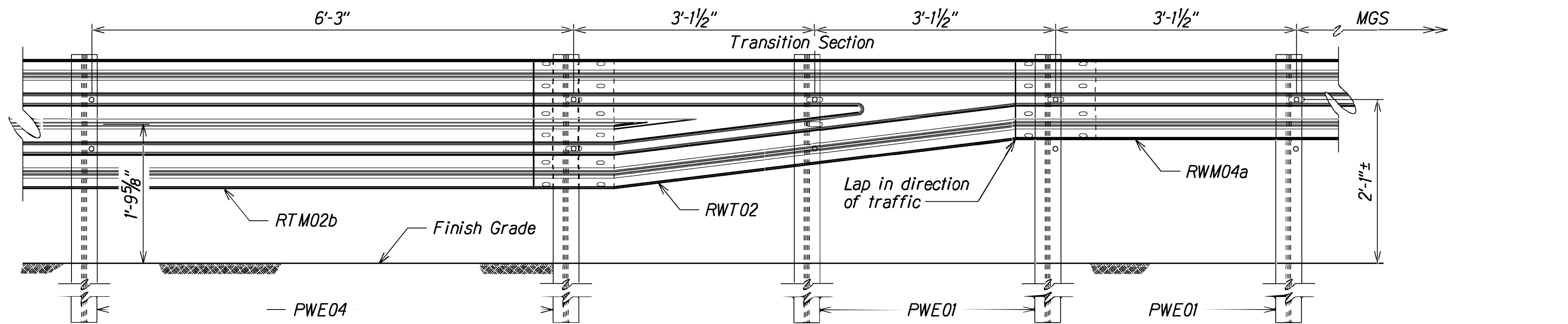
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

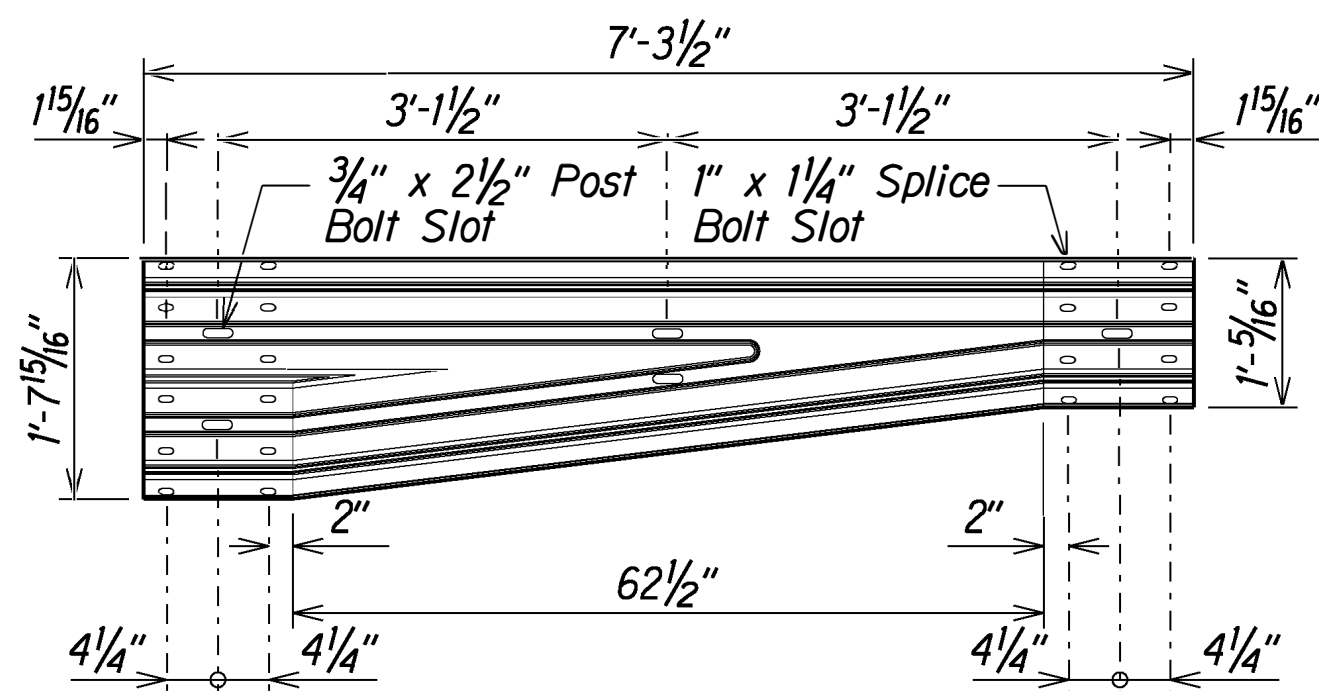
Scale: NTS Date: June, 2020

SHEET No. 4 OF 11 SHEETS

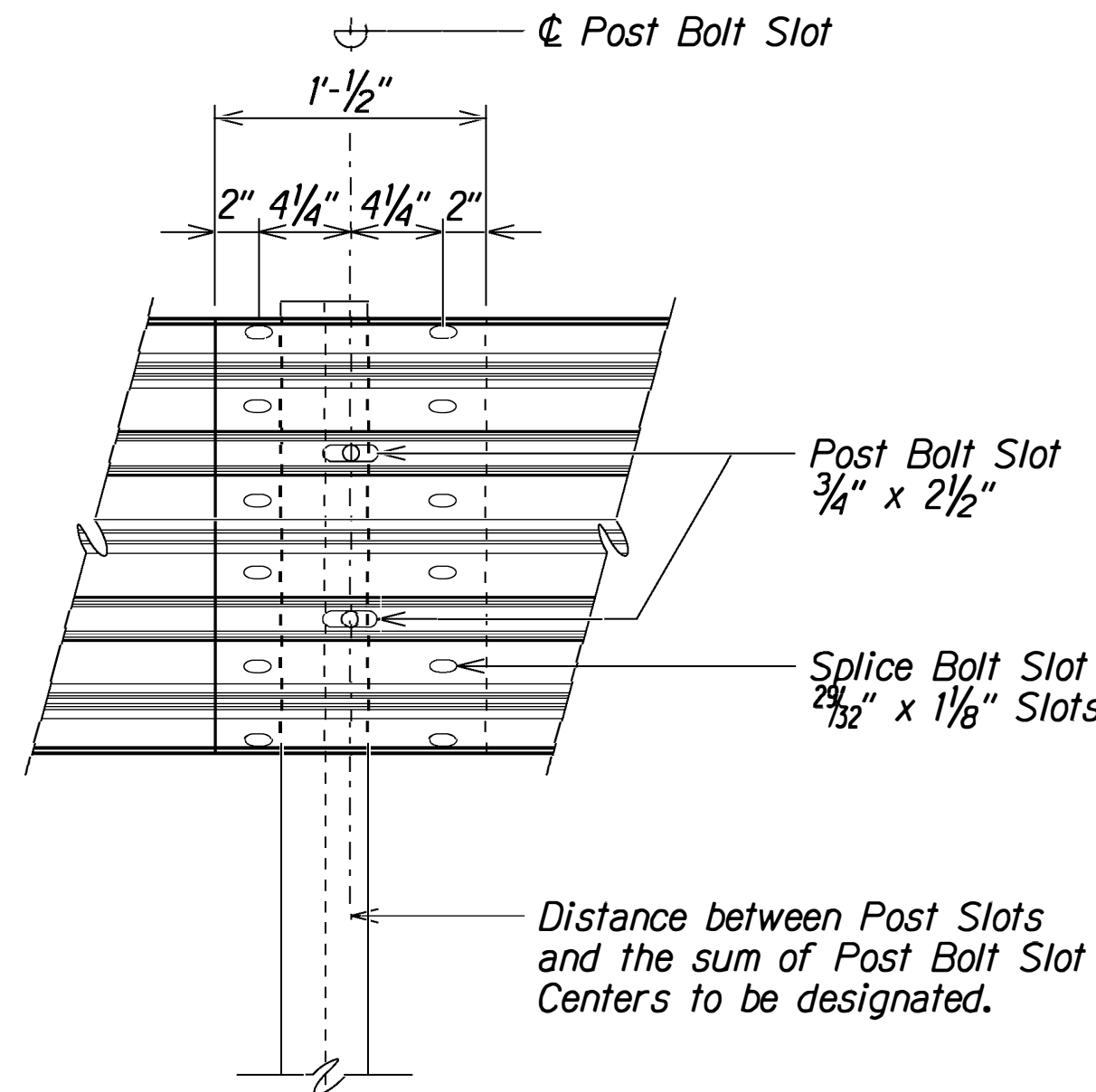
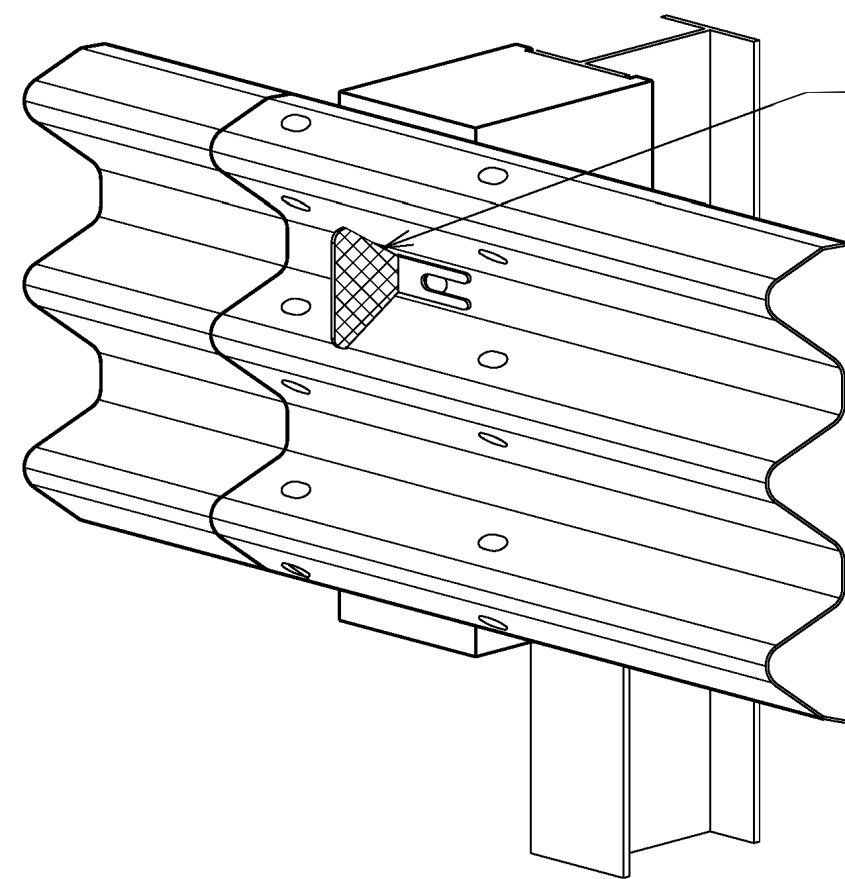
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	16	87



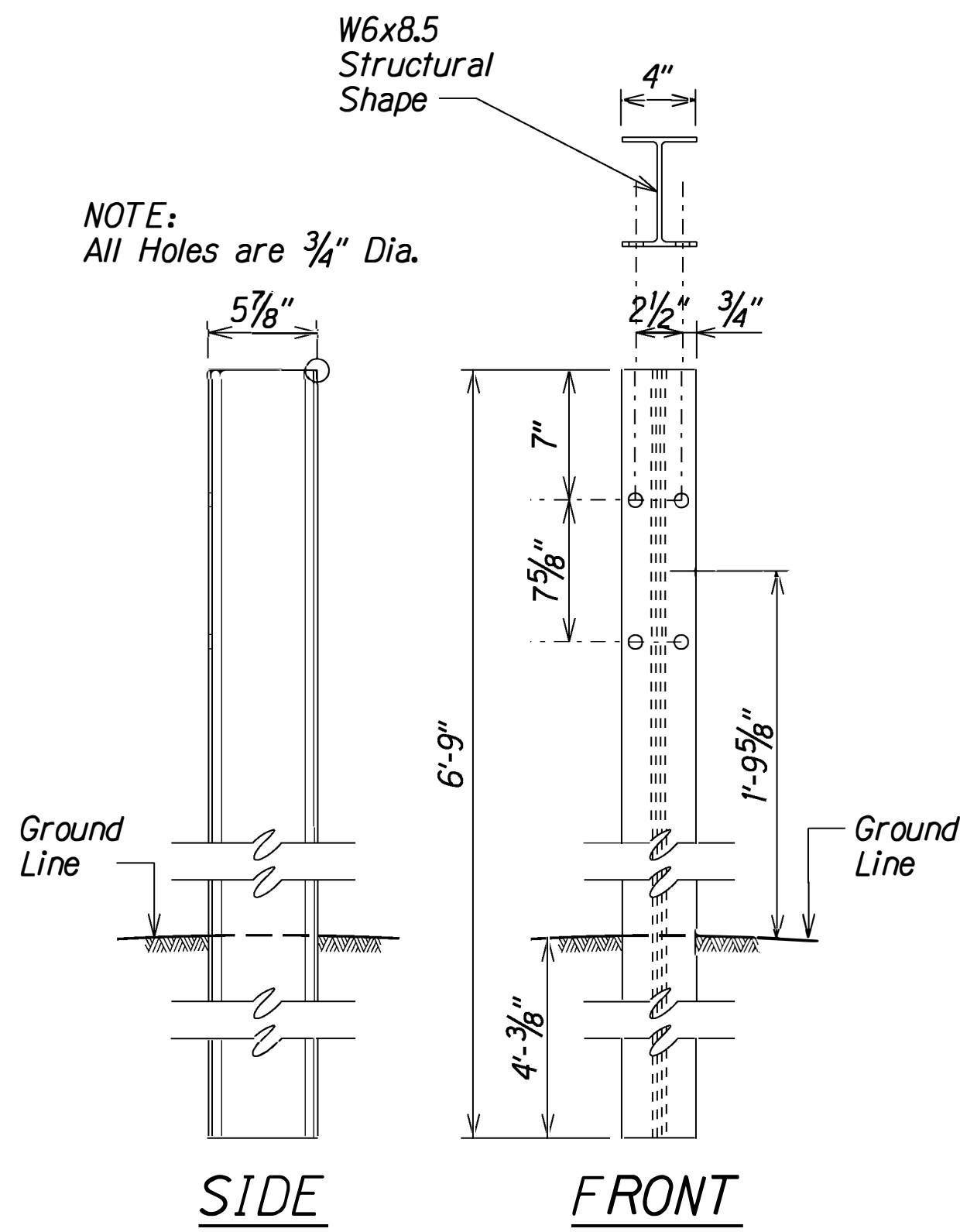
TRANSITION SECTION*



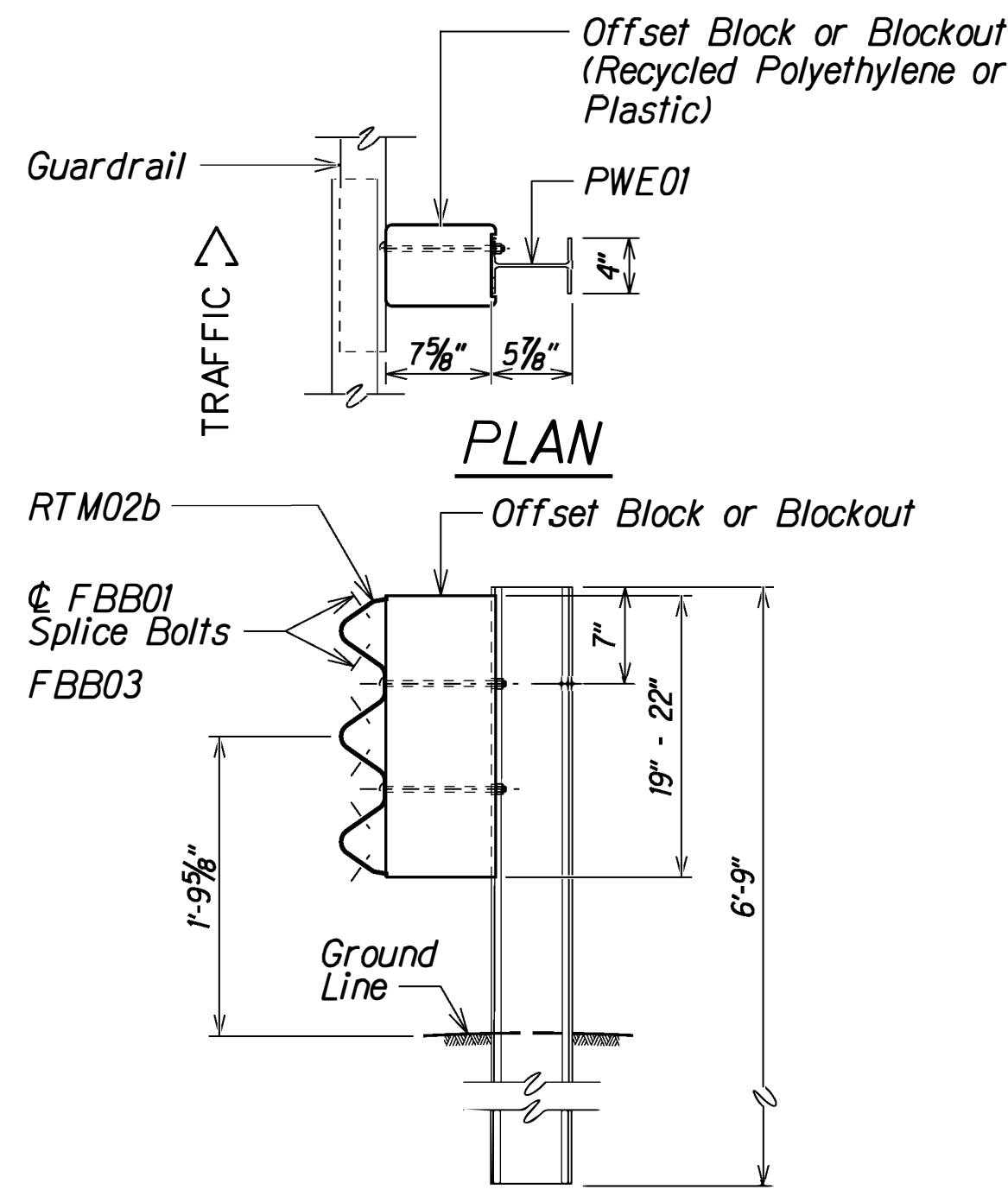
TRANSITION SECTION (RWT02)



RAIL SPLICE

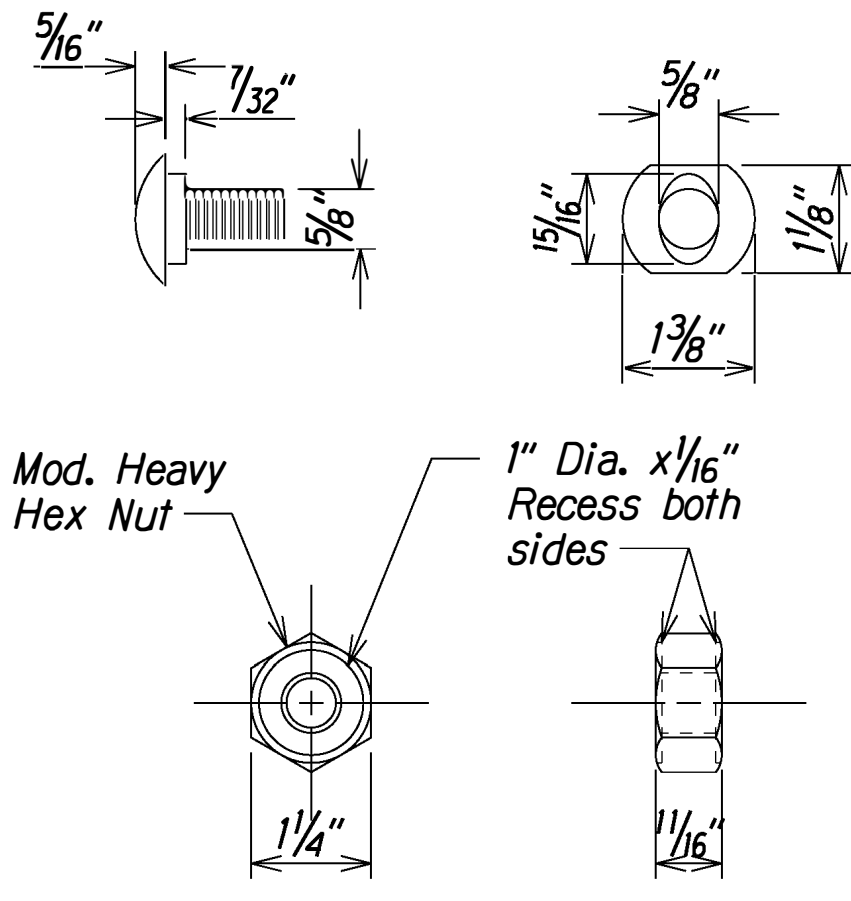


THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS PWE04



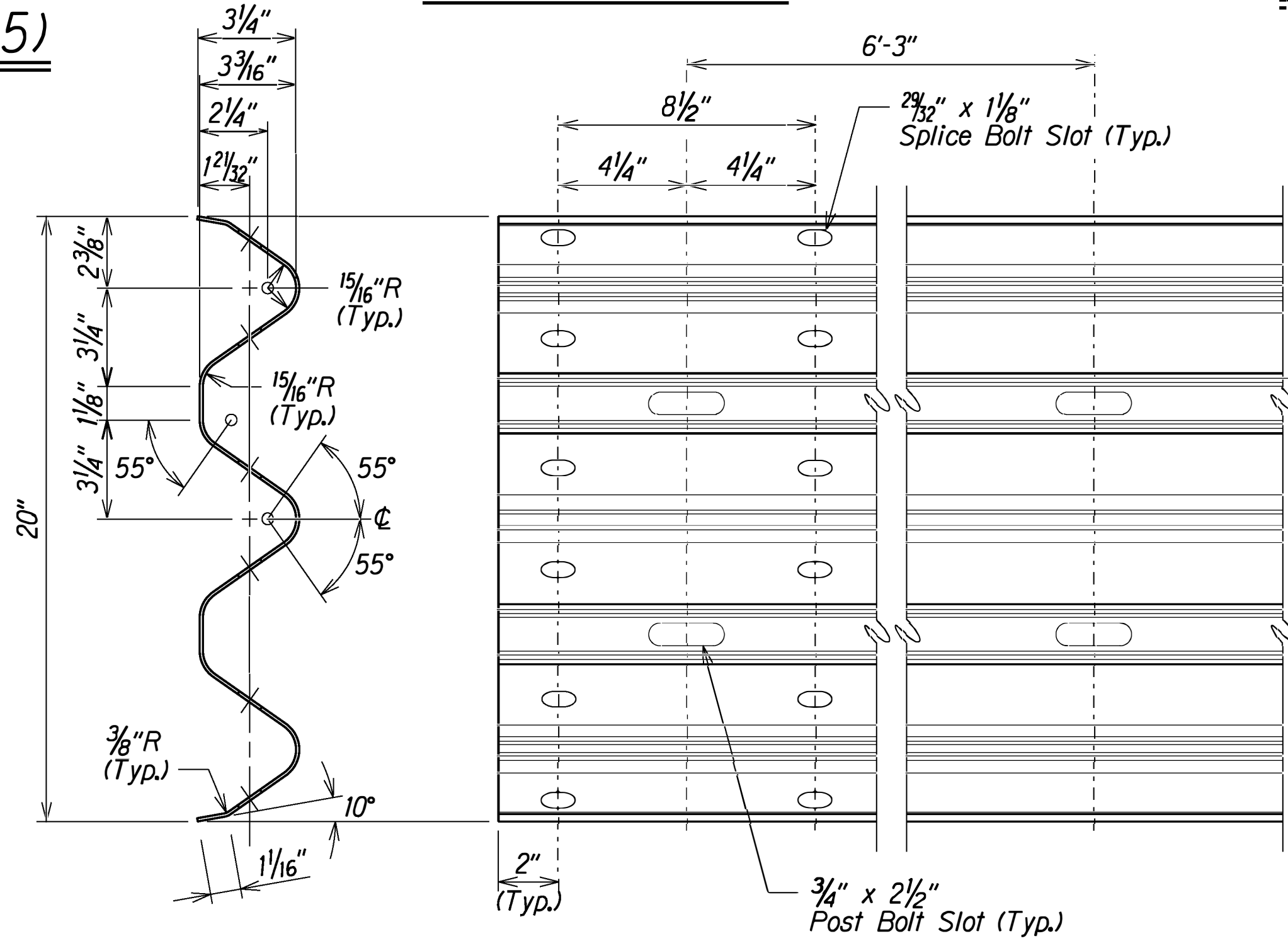
ELEVATION STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)

TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)



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

GUARDRAIL BOLTS AND RECESSED NUT

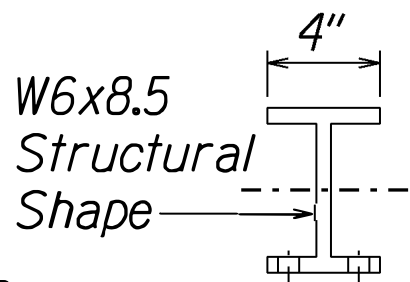
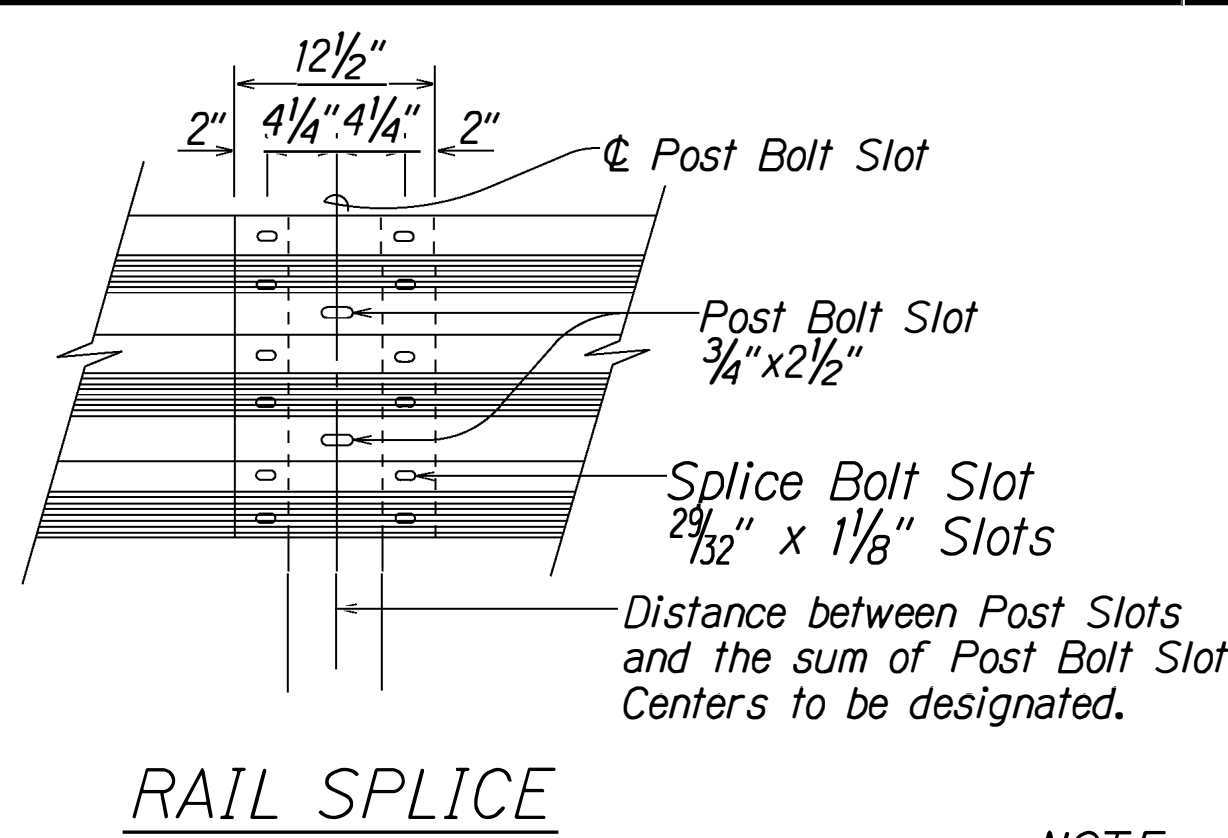
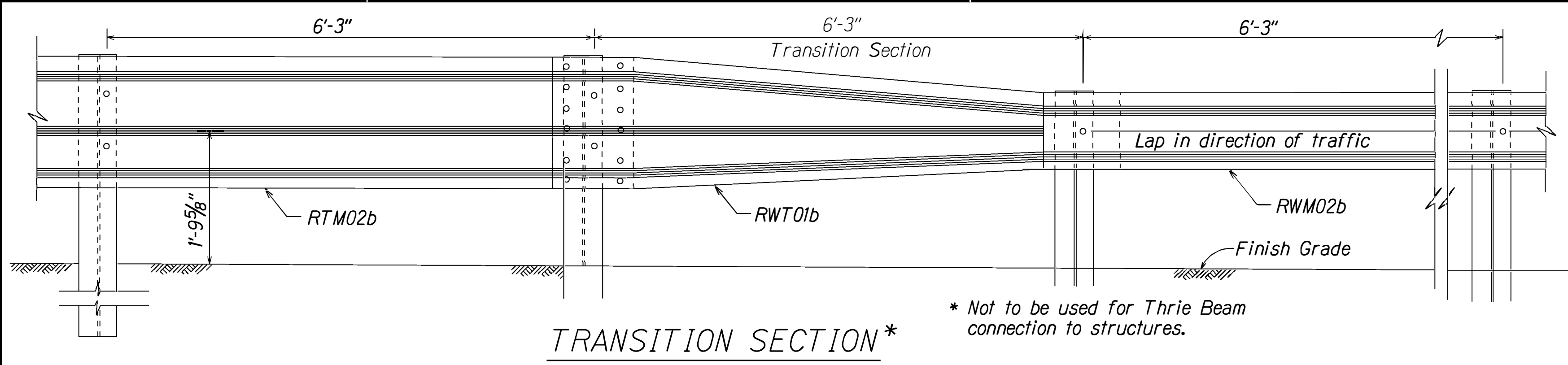


1 & 2 SPACE THRIE-BEAM GUARDRAIL (RTM02b)

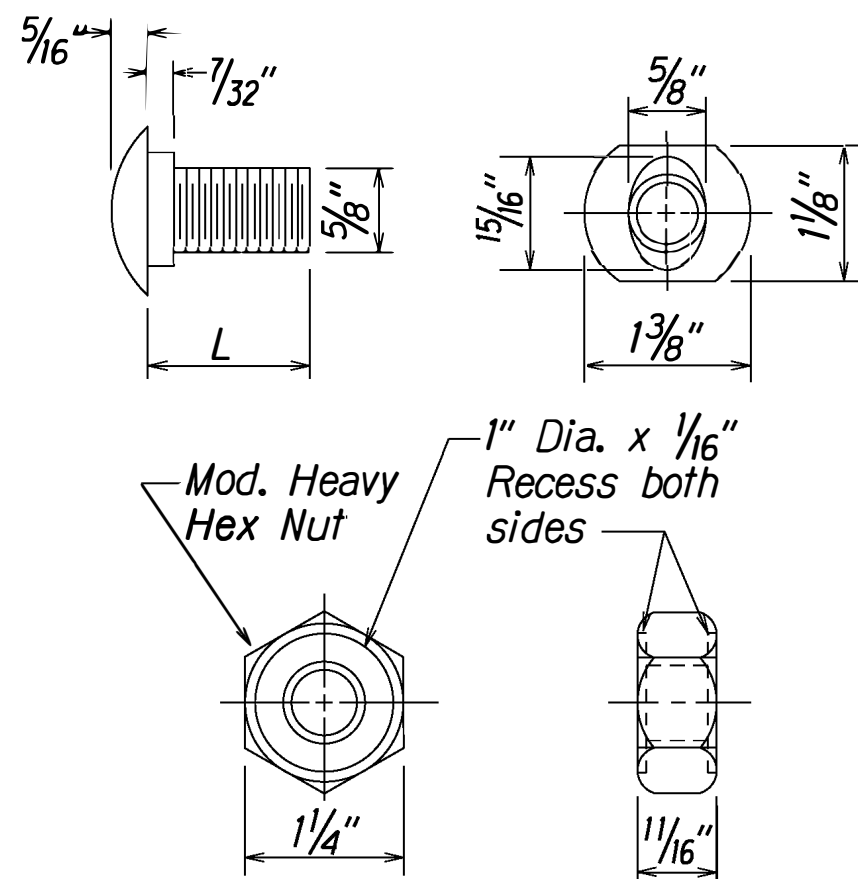
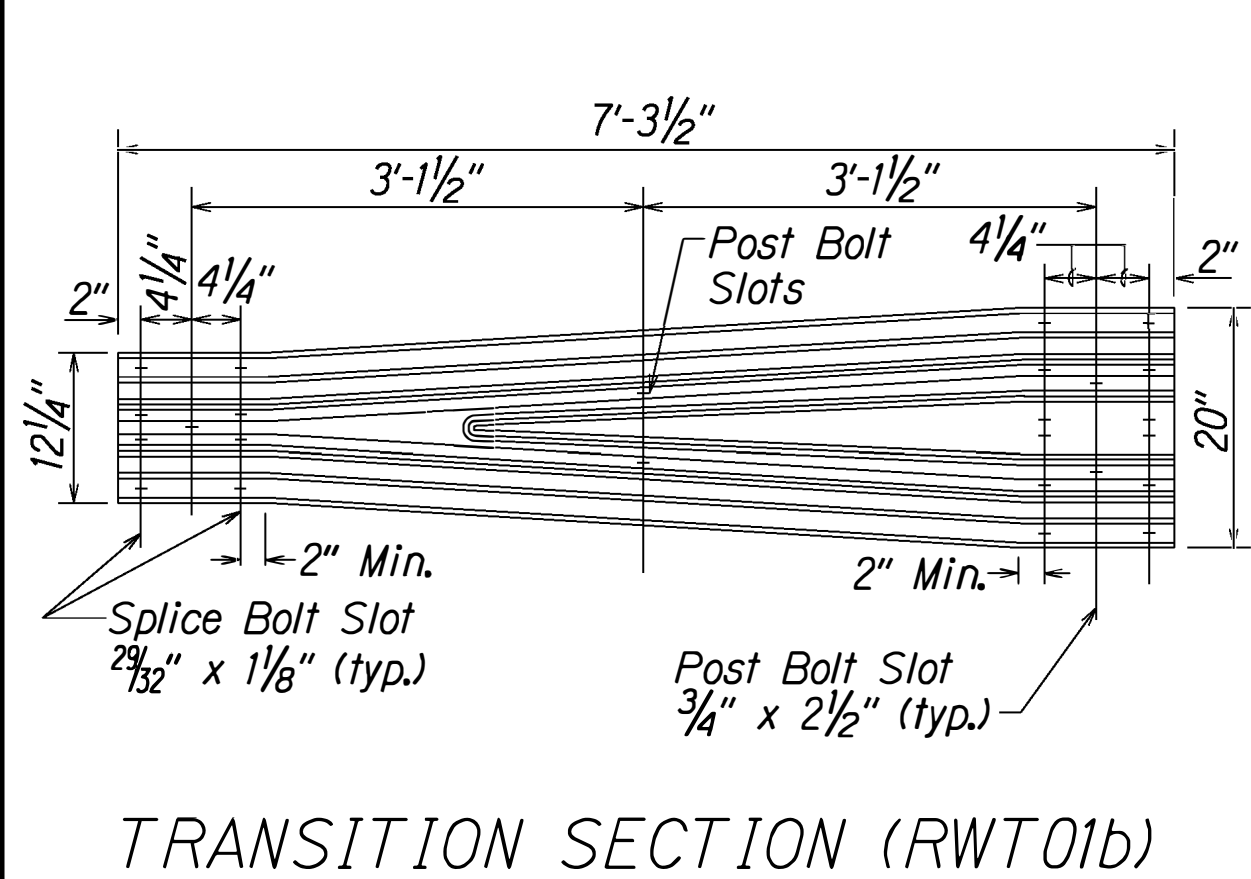
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST THRIE-BEAM
GUARDRAIL W/ RWT02
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)
Scale: NTS Date: June, 2020

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	17	87

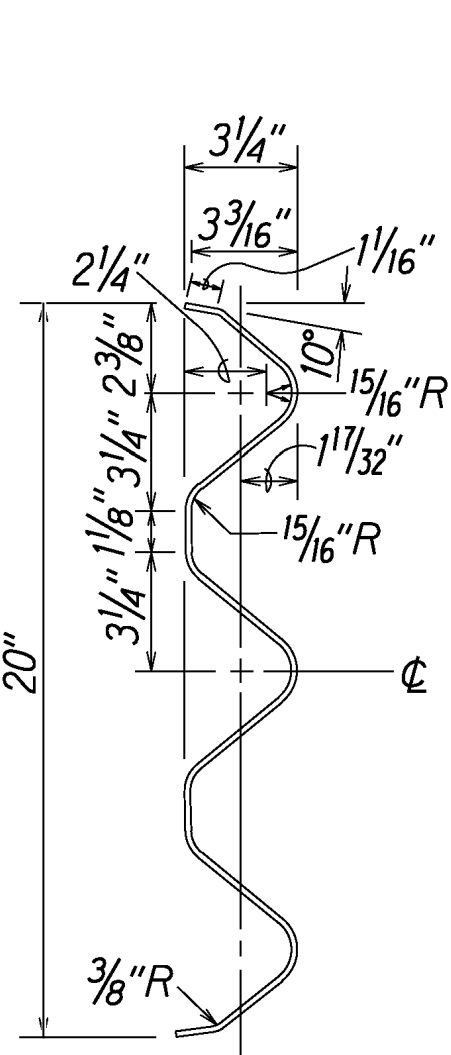


NOTE:
All Holes are 3/4" Dia.

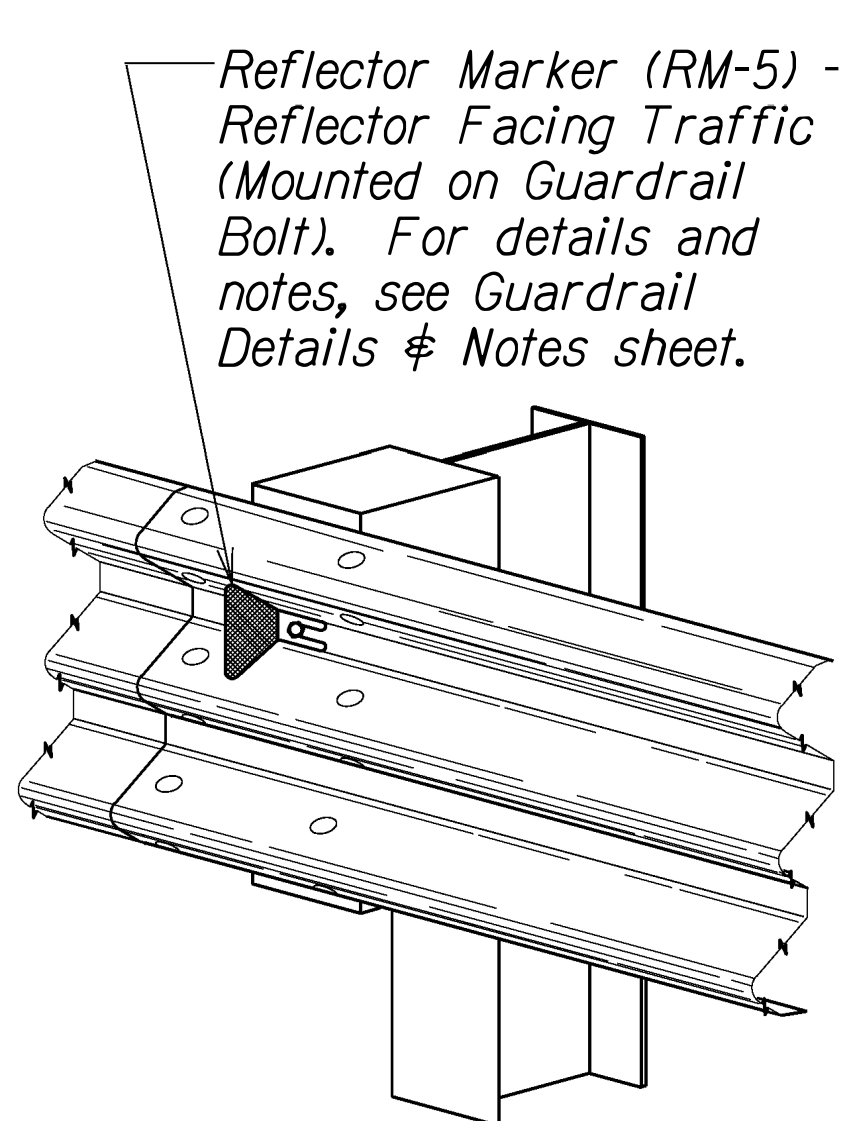


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

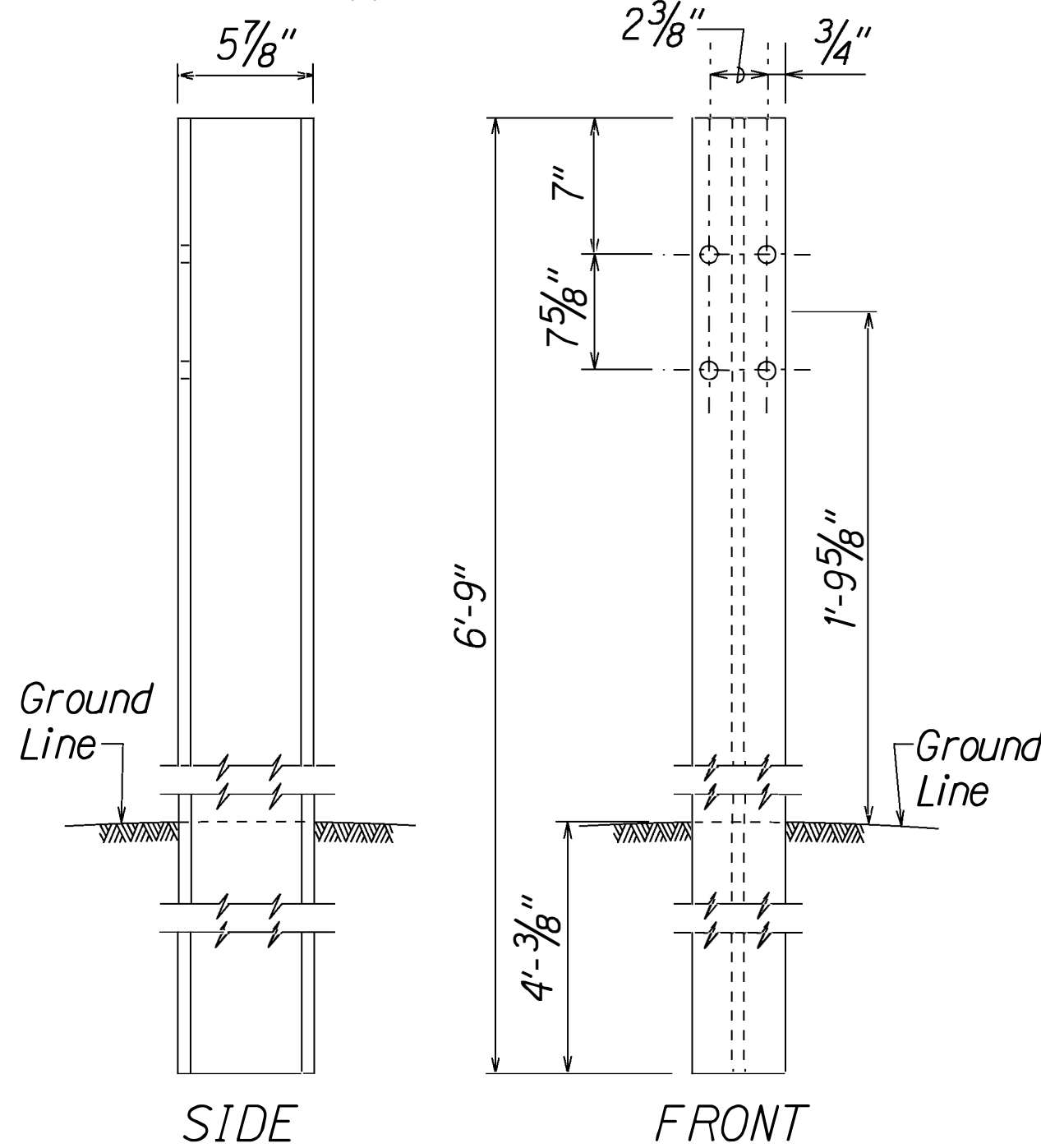
GUARDRAIL BOLTS
AND RECESSED NUT



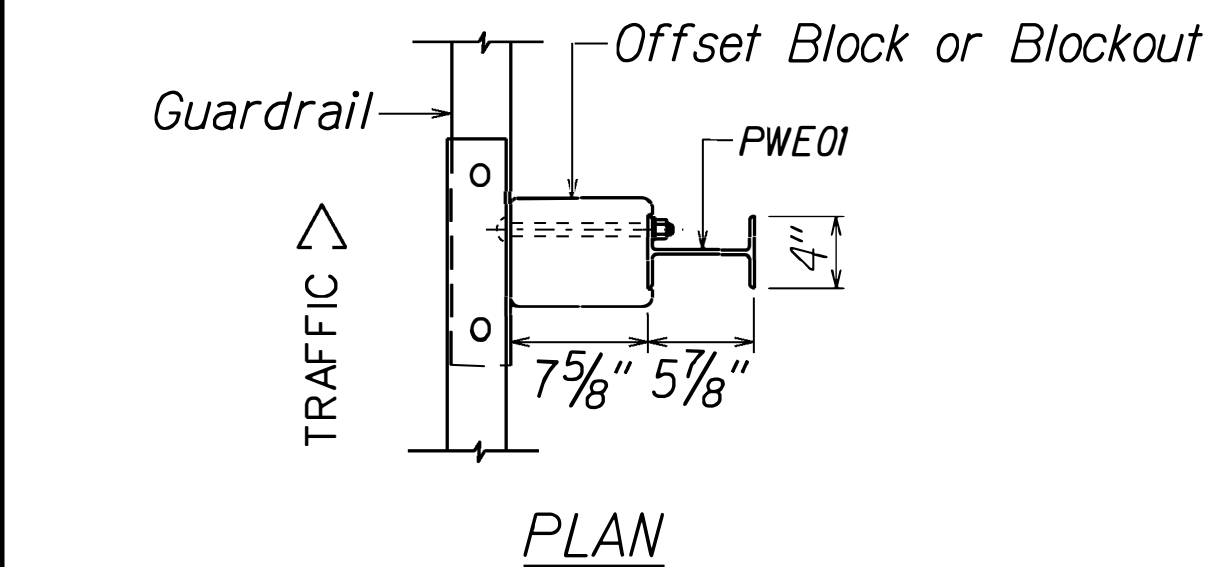
SECTION THRU
RAIL ELEMENT
(RTM02b)



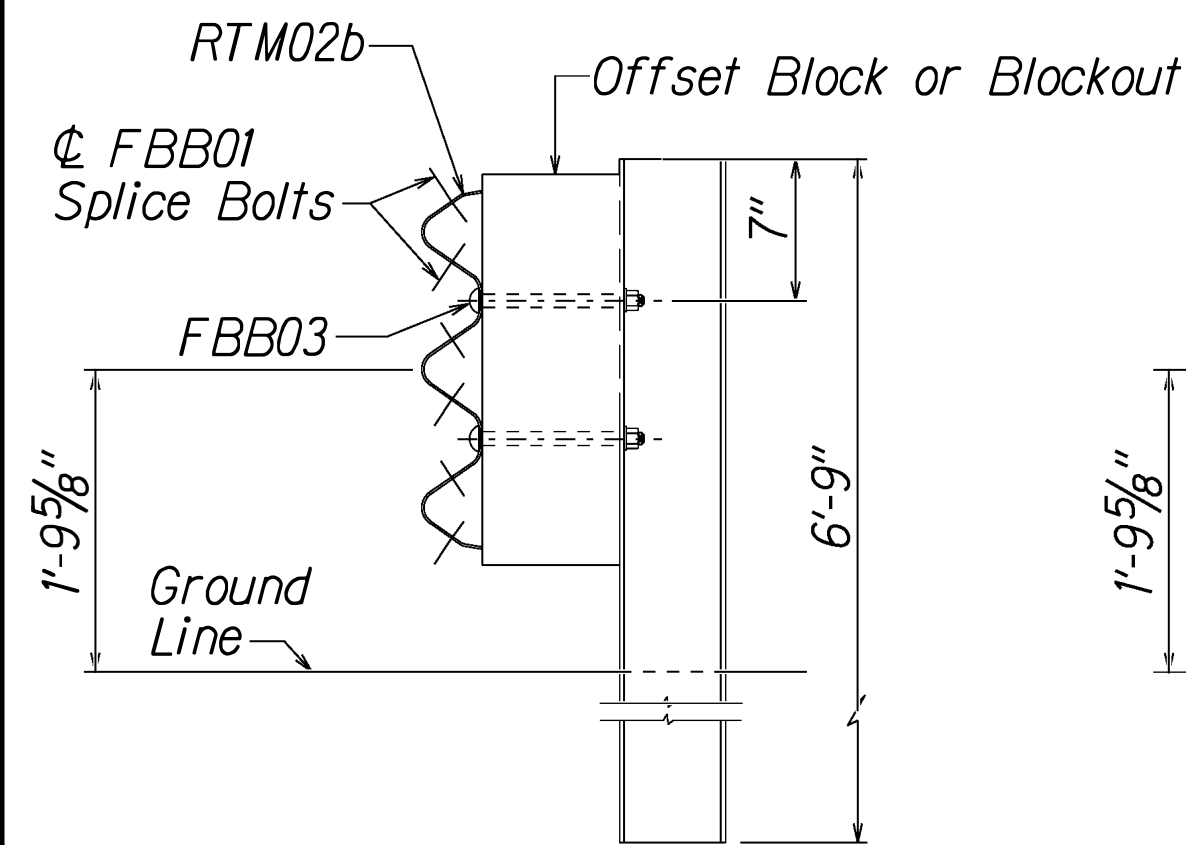
TYPICAL INSTALLATION OF
REFLECTOR MARKER (RM-5)



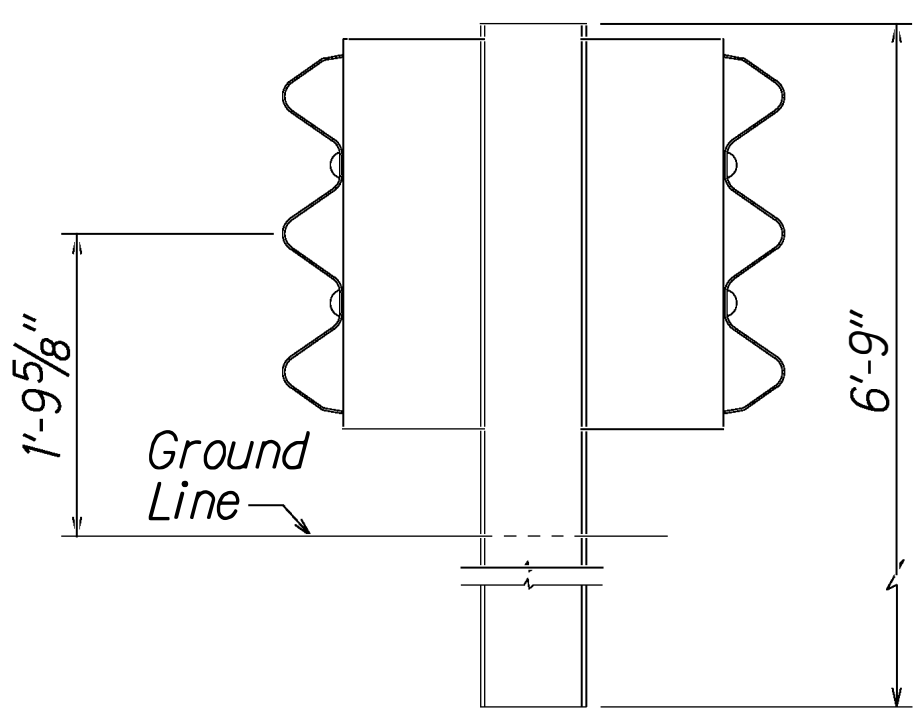
THRIE-BEAM STRONG POST
FOR PLASTIC SPACER BLOCKS



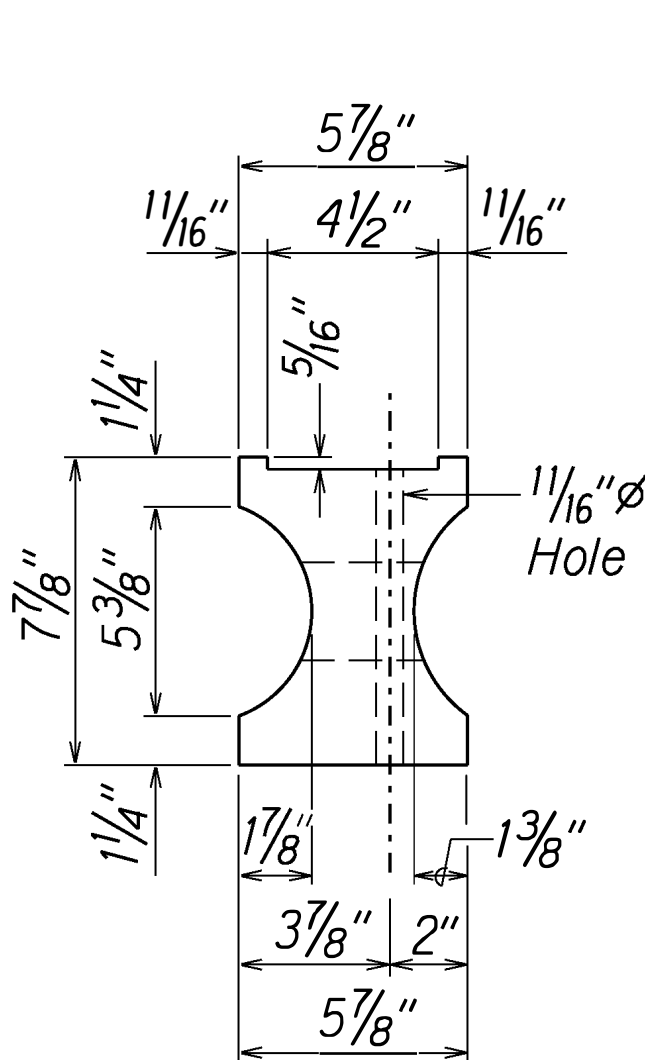
PLAN



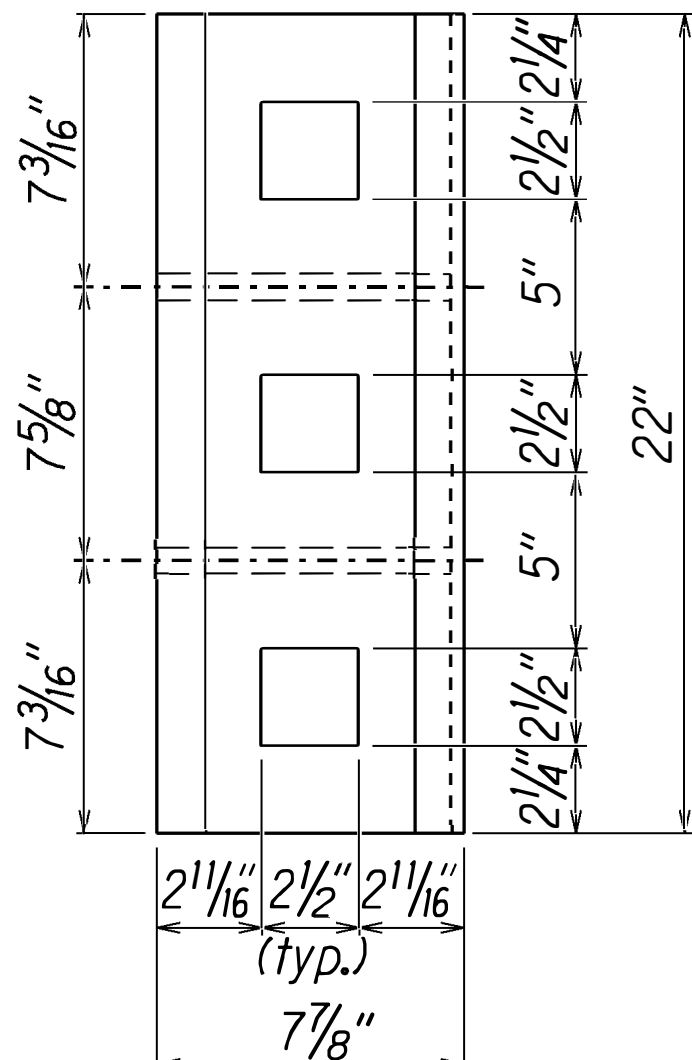
STRONG POST
THRIE-BEAM GUARDRAIL
(SGR09a)



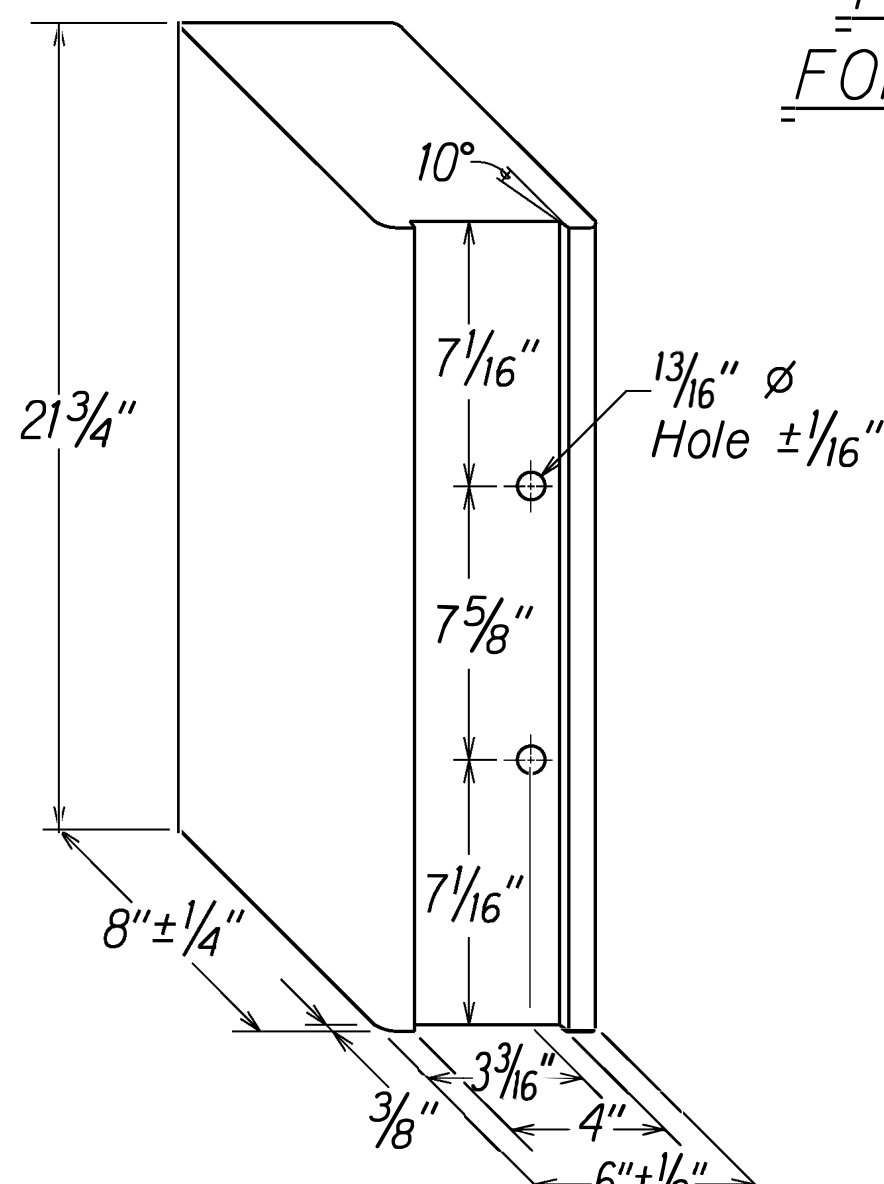
STRONG POST THRIE-BEAM
MEDIAN GUARDRAIL
(SGM09a)



MODIFIED 6X8X22 PLASTIC BLOCKOUT
(TYPE I-THRIE)



SIDE



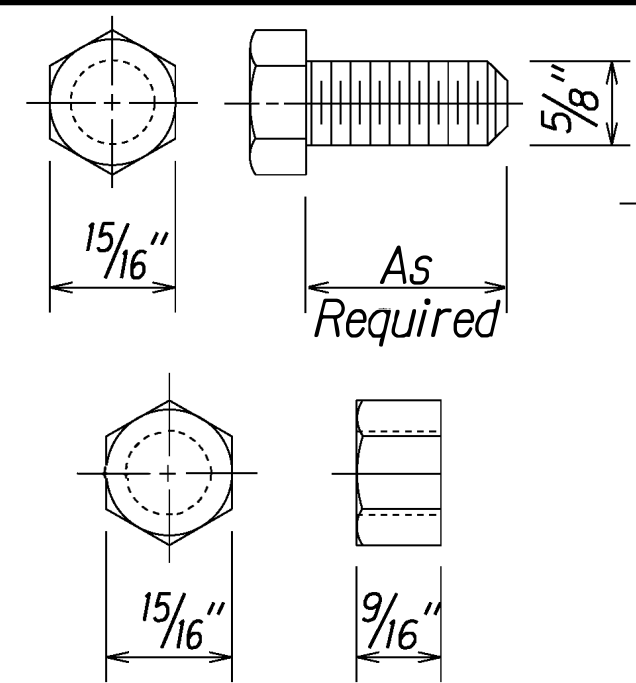
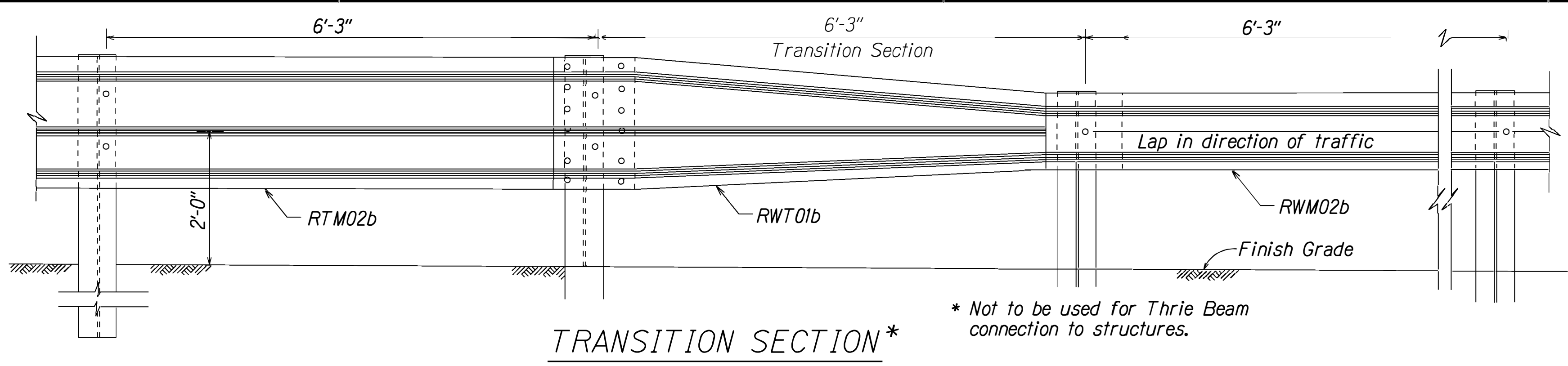
RECYCLED POLYETHYLENE
THRIE-BEAM OFFSET BLOCK
(TYPE II - THRIE)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

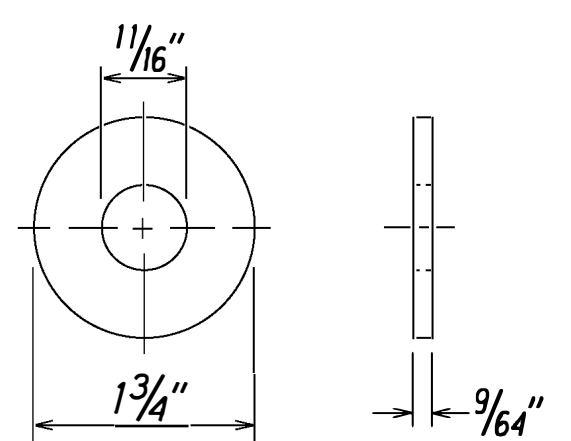
STRONG POST THRIE-BEAM
GUARDRAIL W/ RWT01b
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)
Scale: NTS
Date: June, 2020

SHEET No. 6 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	18	87



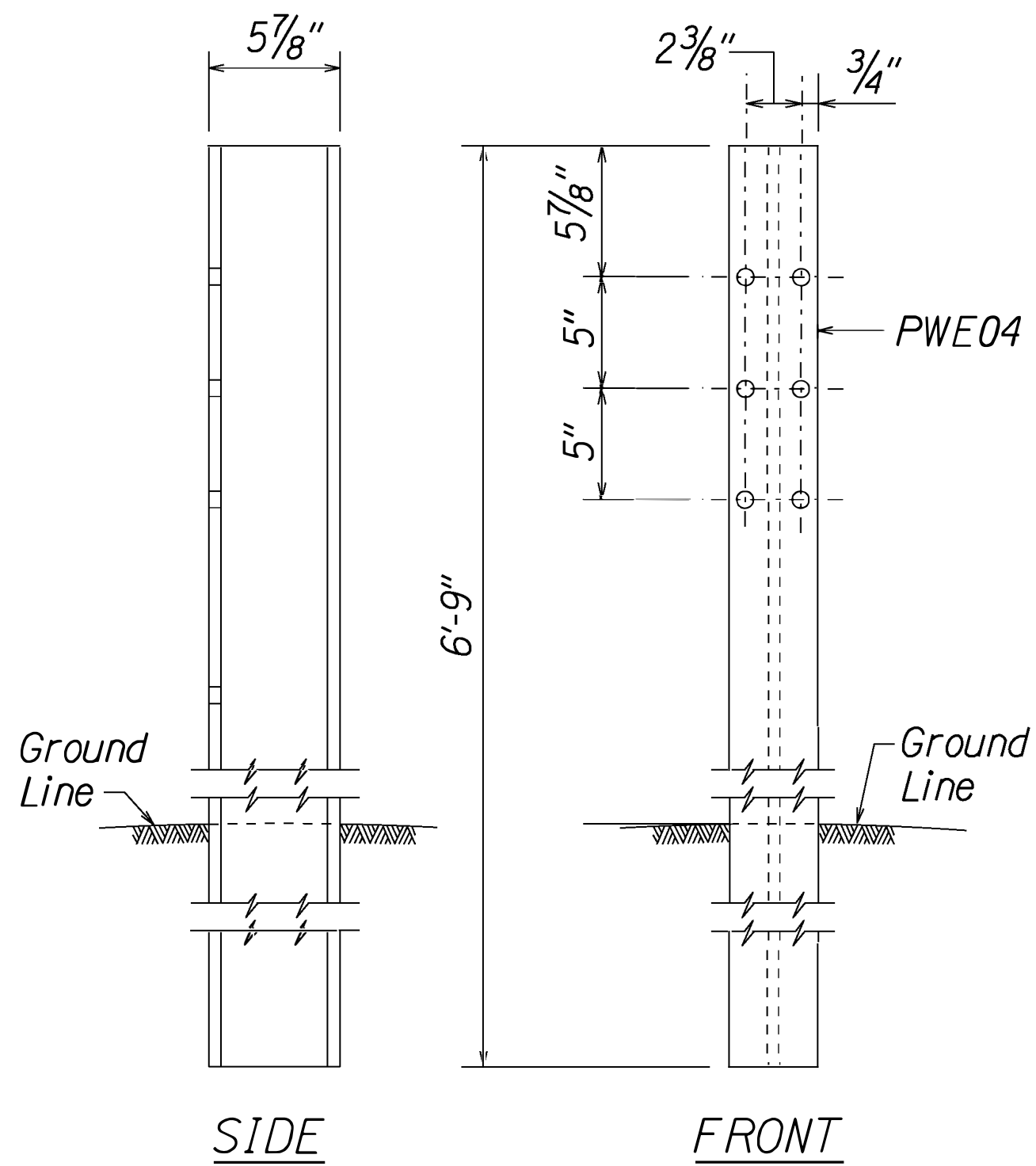
HEX BOLT & NUT
(FBX16a)



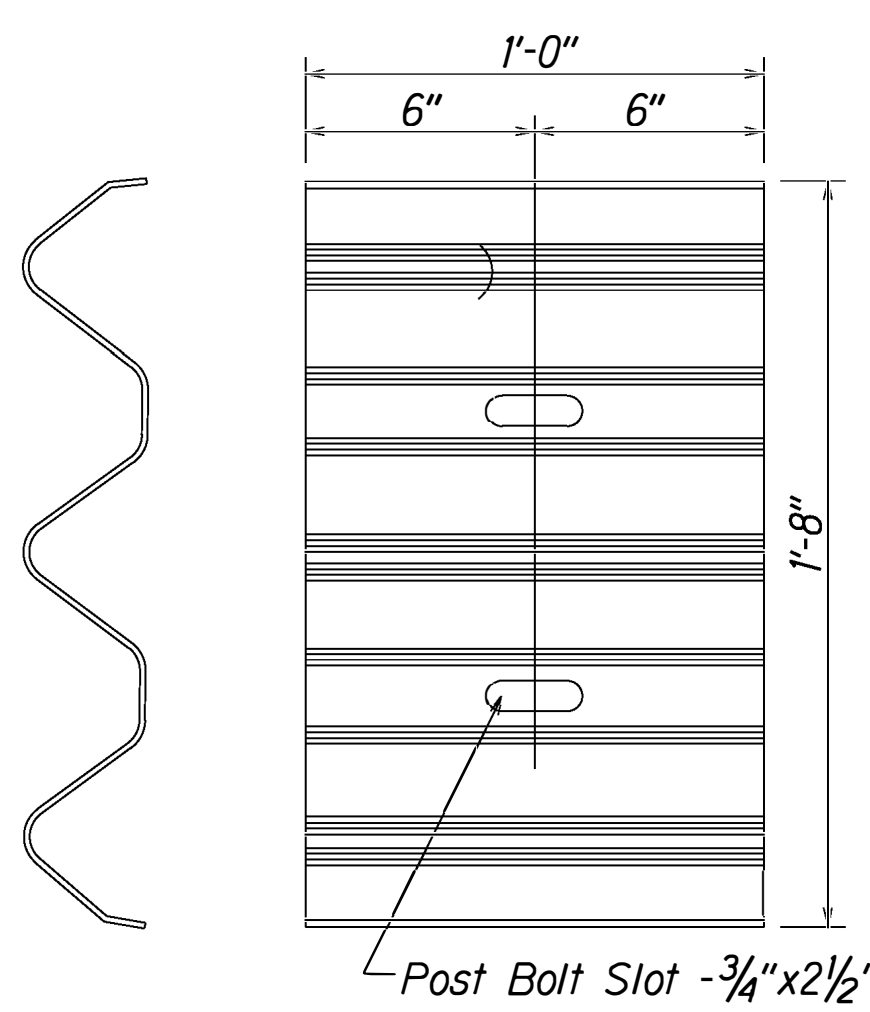
STEEL WASHER
FOR 5/8" BOLT

NOTE: All Holes are 3/4" Dia.

W6x8.5 Structural Shape

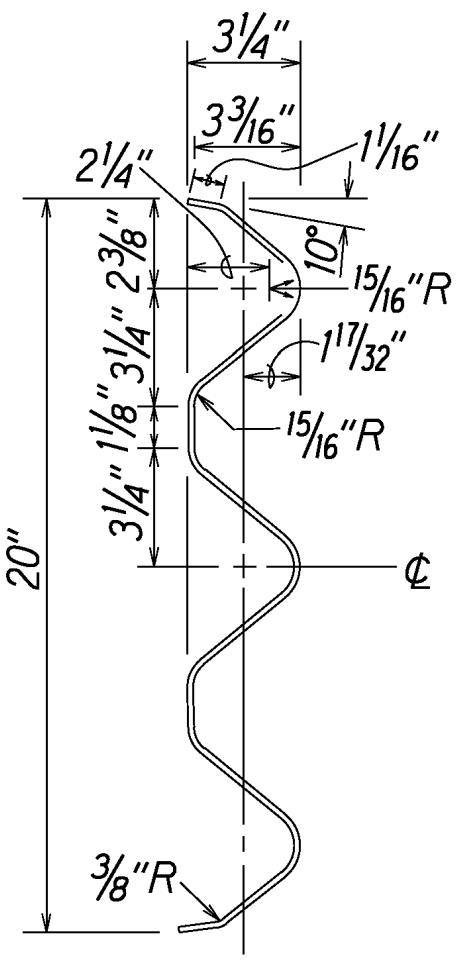


W-BEAM STRONG POST (PWE04)

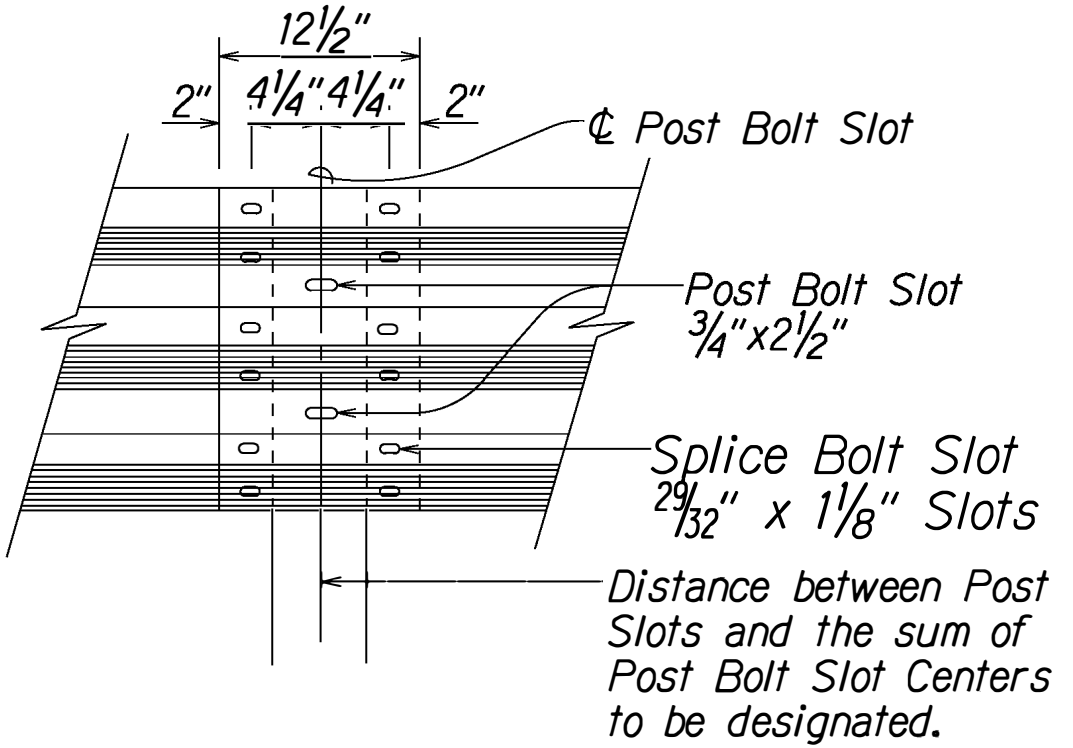


BACKUP PLATE
(RTB01b)

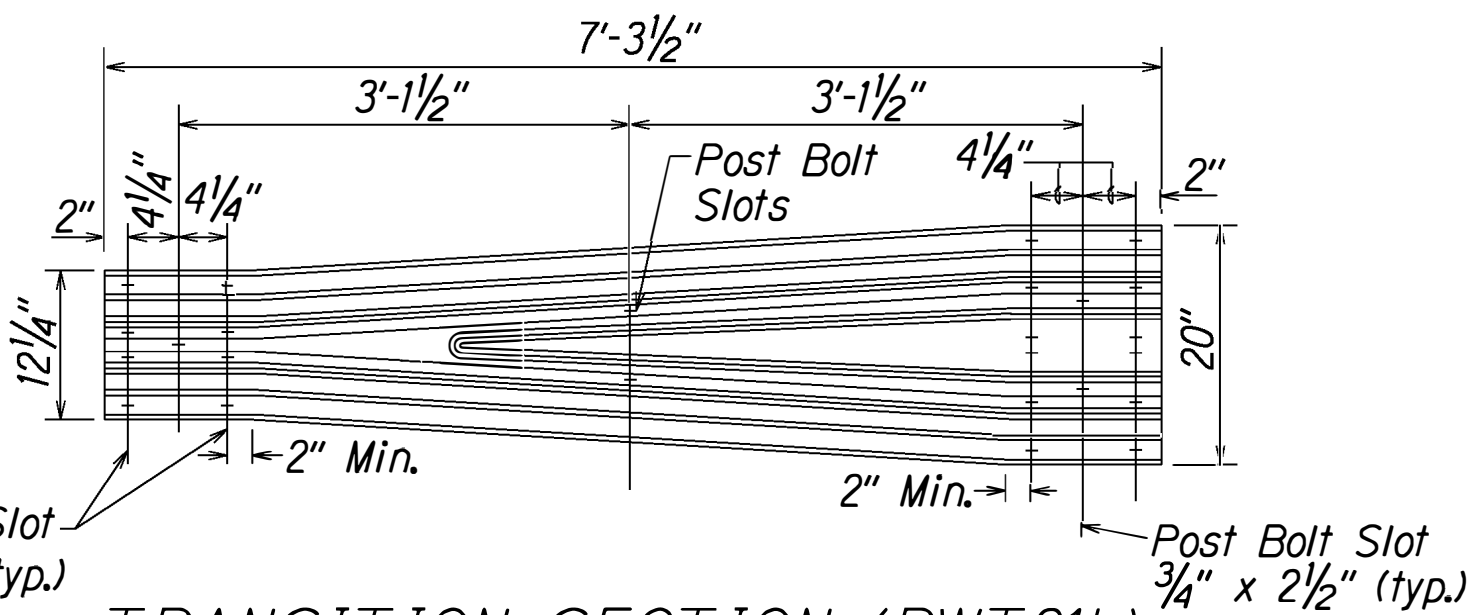
(Use at Posts where Splices do not occur)



SECTION THRU
RAIL ELEMENT
(RTM02b)

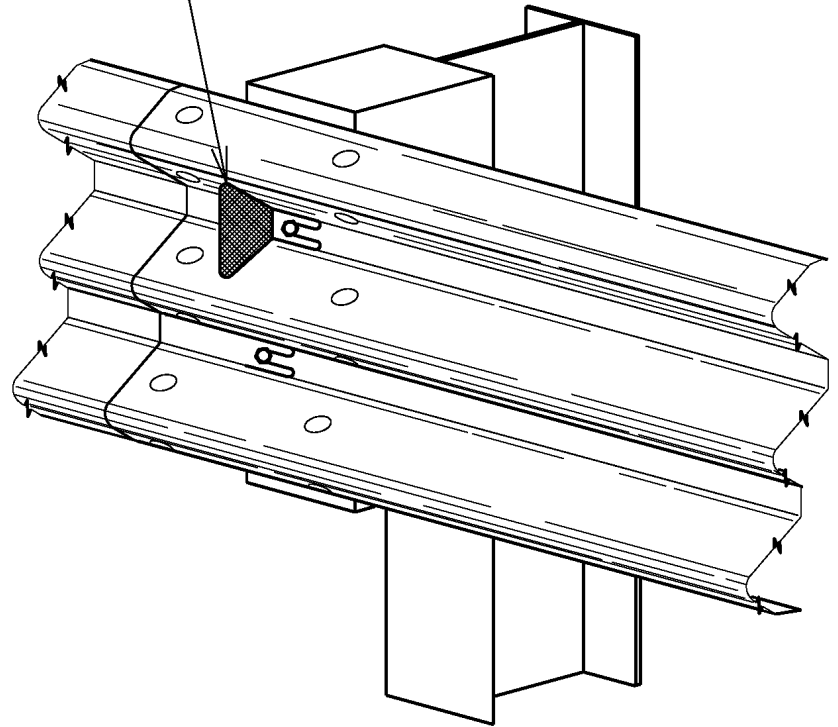


RAIL SPLICE

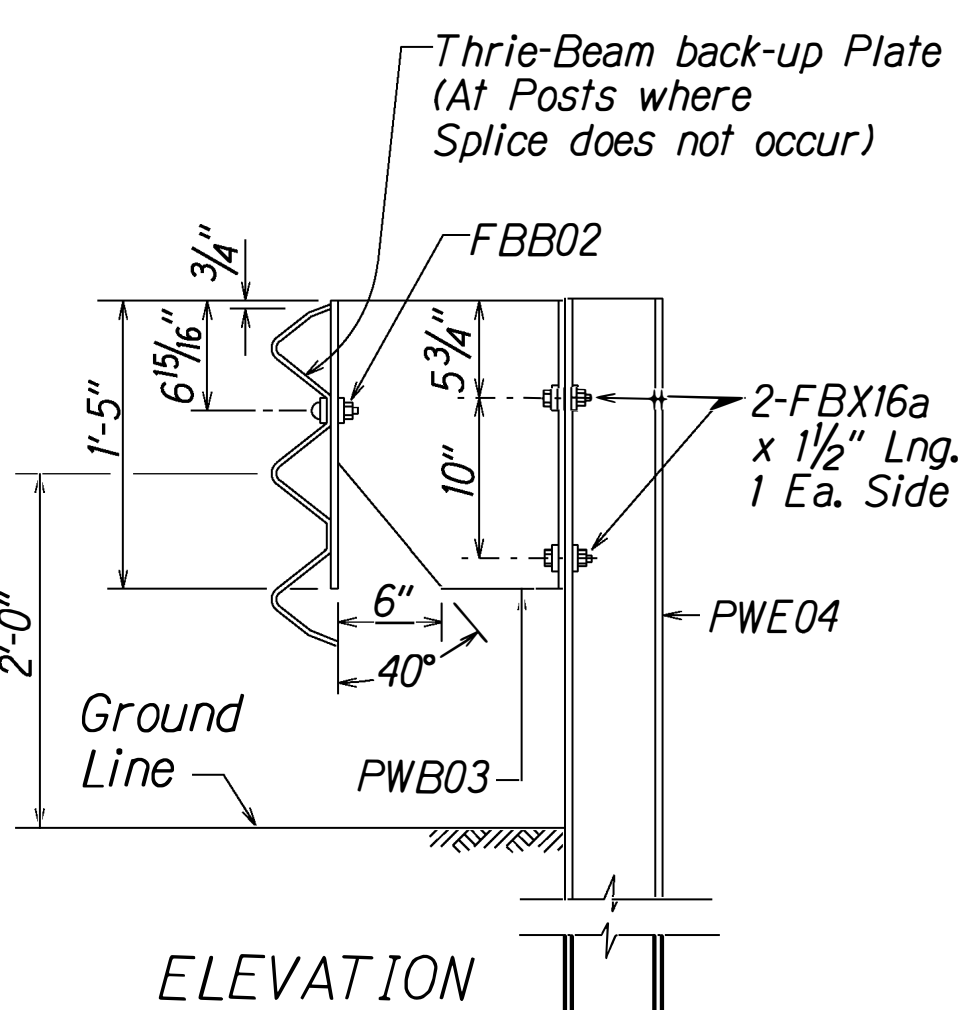


TRANSITION SECTION (RWT01b)

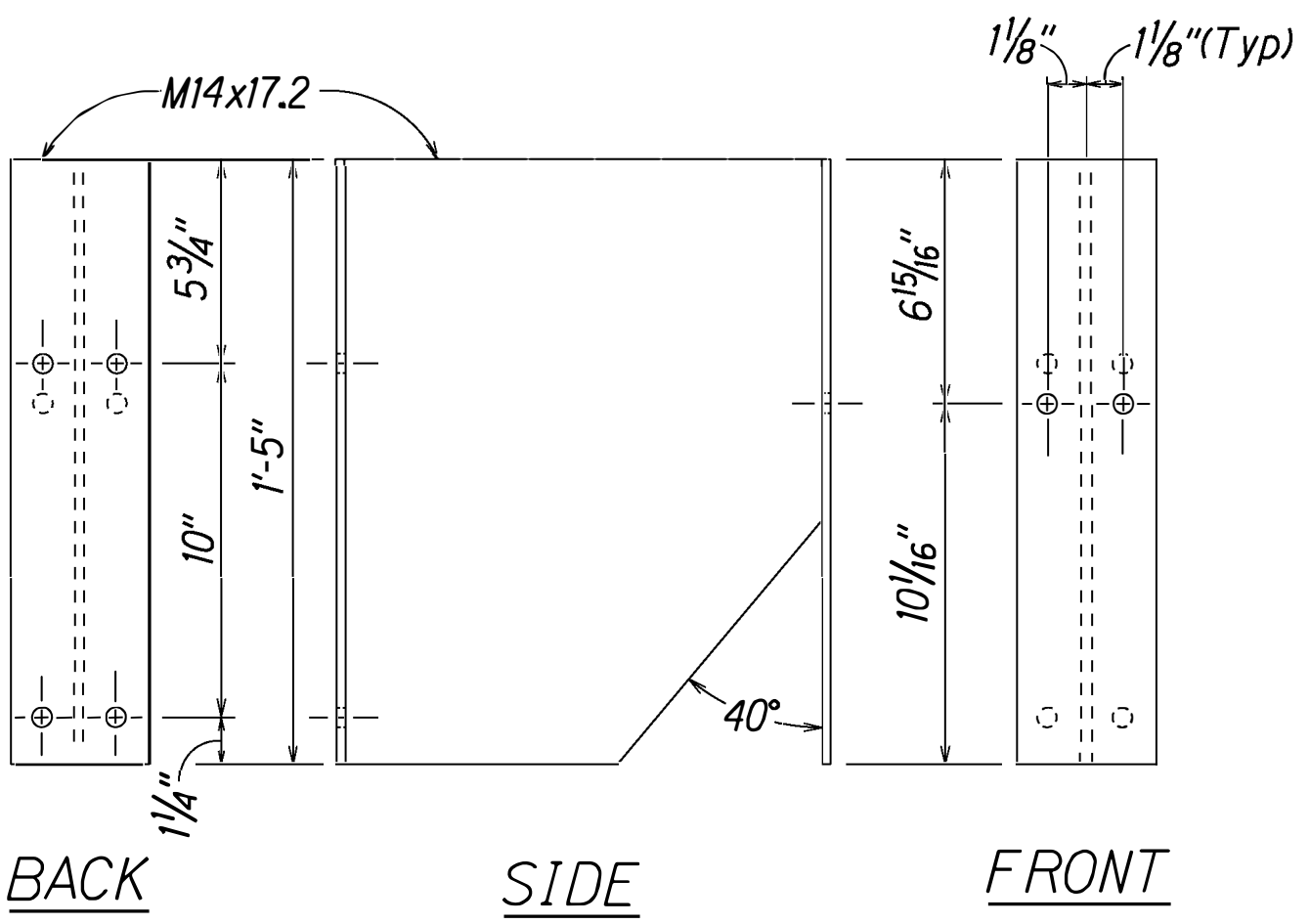
Reflector Marker (RM-5) - Reflector Facing Traffic (Mounted on Guardrail Bolt). For details and notes, see Guardrail Details & Notes sheet.



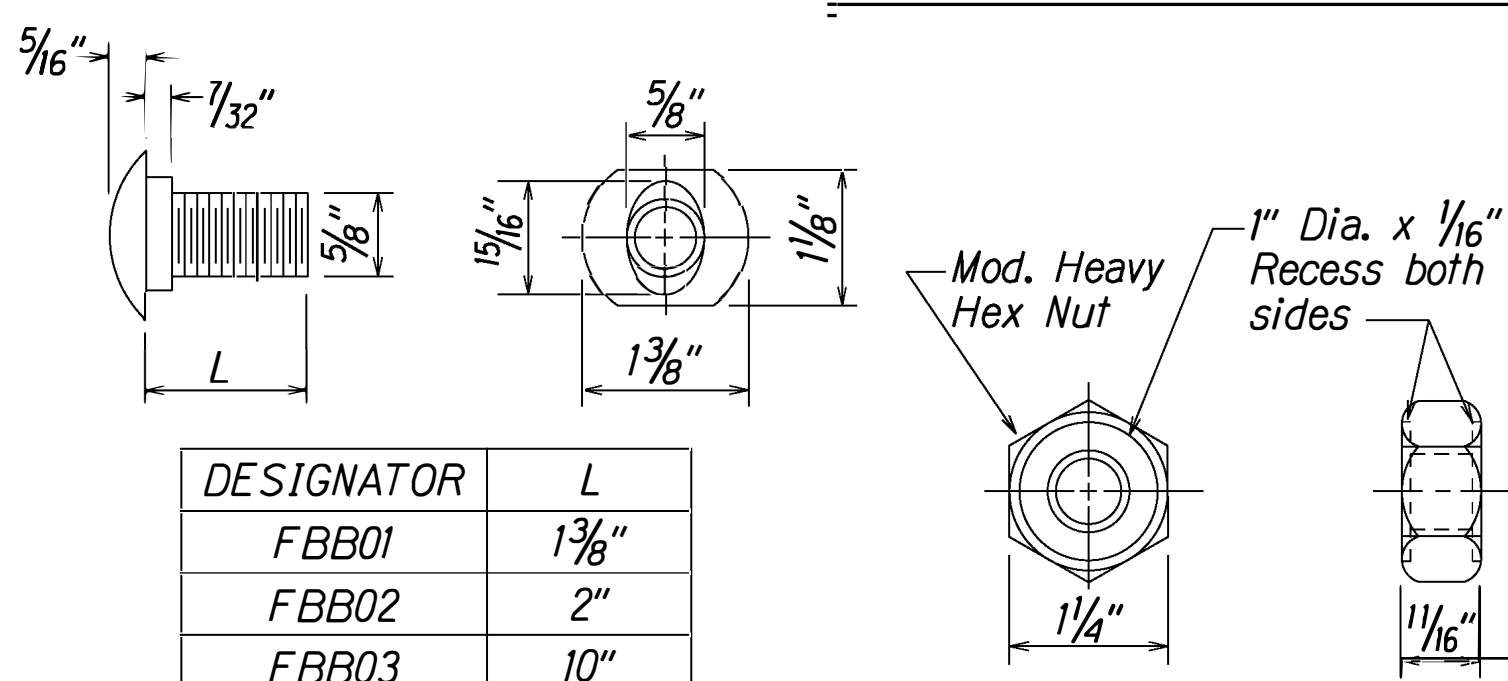
TYPICAL INSTALLATION OF
REFLECTOR MARKER (RM-5)



STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL
(SGR09b)



SPACER BLOCK PWB03



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

GUARDRAIL BOLTS AND RECESSED NUT

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

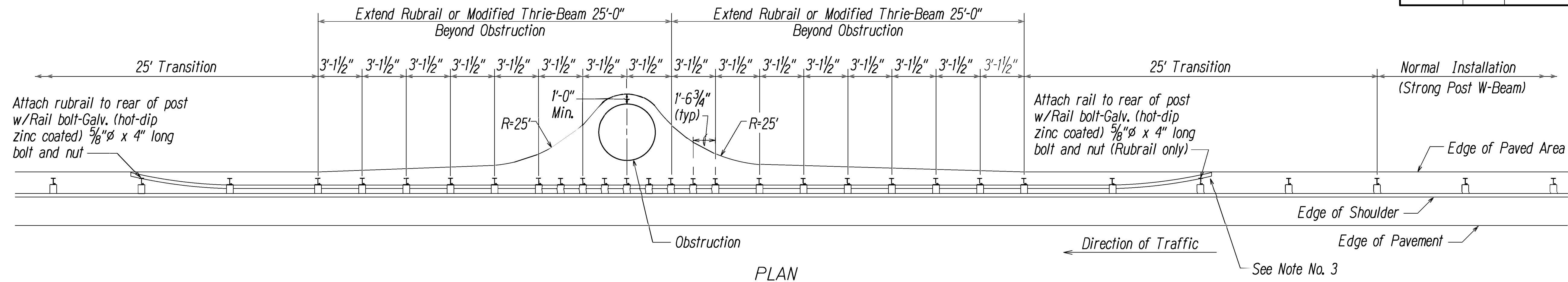
STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)
Scale: NTS
Date: June, 2020

SHEET No. 7 OF 11 SHEETS

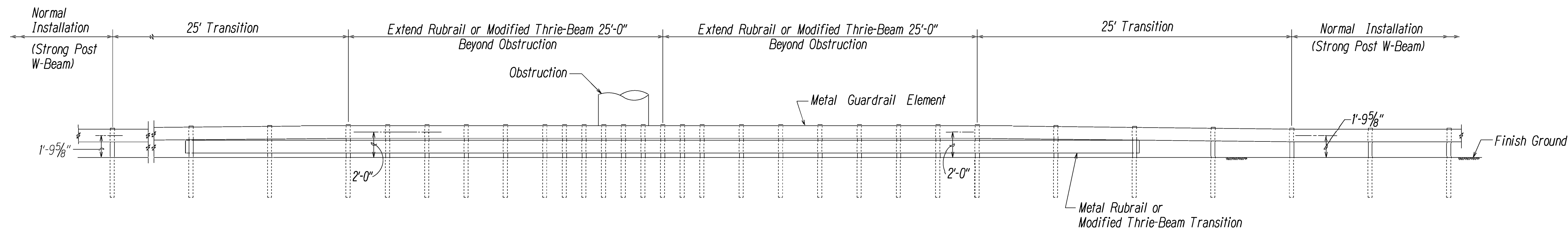
ORIGINAL PLAN	DATE	
DRAWN BY		
CHECKED BY		
NOTED BY		
DESIGNED BY		
APPROVED BY		
DATE		

16/13/01 rdlrubby/guardrail/modthrieadgn (standard plan TE-57 rll/03/89 & TE-57a rll/03/89)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	19	87



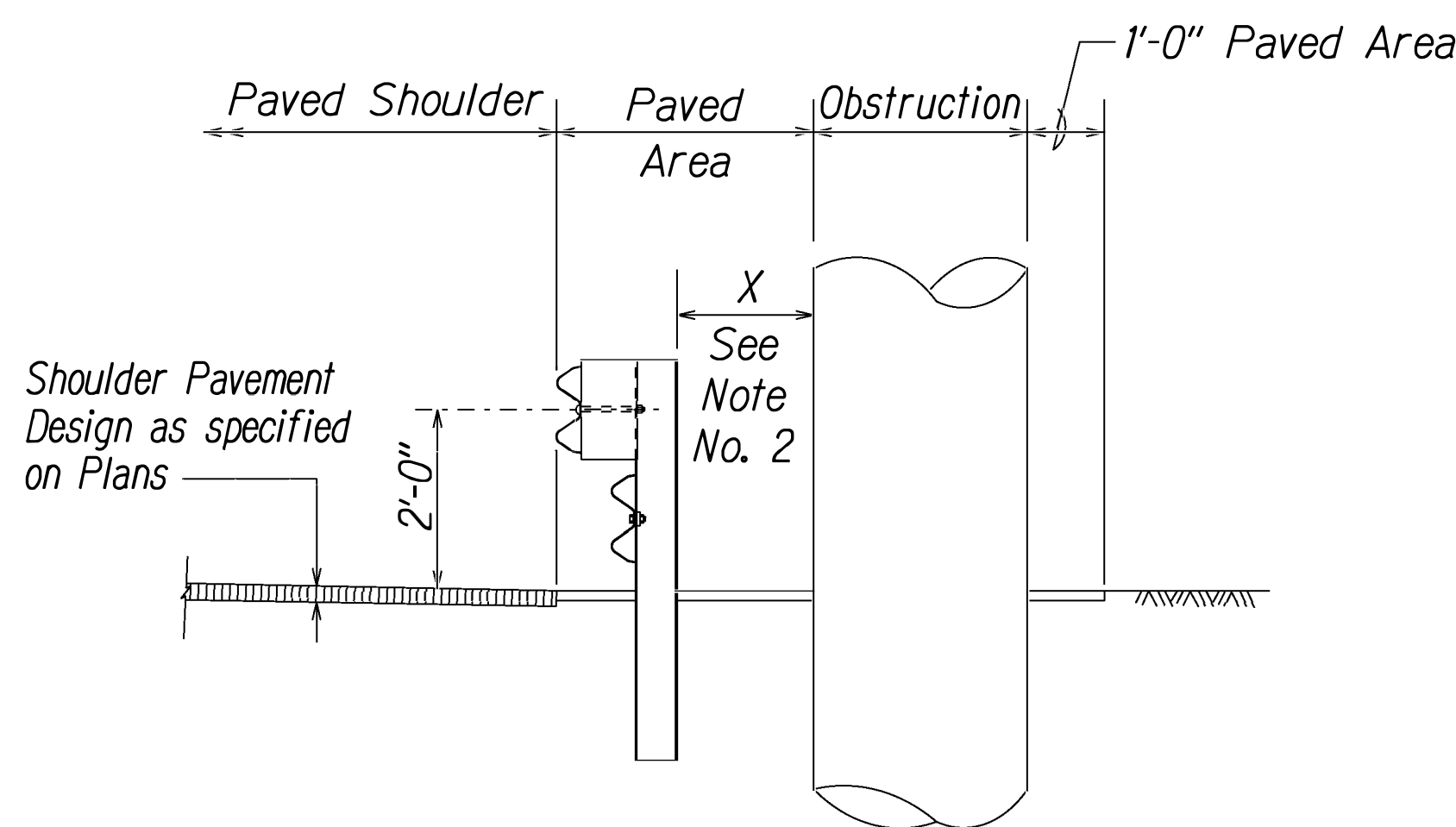
PLAN



ELEVATION

NOTES:

- All Guardrail and Concrete Barrier Designs at Obstructions shall be approved by the Engineer.
- If $X < 2'-0"$, Concrete Barrier or special guardrail design;
 $2'-0" \leq X < 3'-0"$, Strong Post Rubrail or Strong Post Thrie-Beam with reduced post spacing;
 $3'-0" \leq X$, Strong Post W-Beam with 6'-3" post spacing (Normal Installation).
- If a pedestrian walkway or bicycle route is located behind the guardrail, the Engineer should install the Modified Thrie-Beam System. The Rubrail termini may become a hazard to pedestrians & bicyclists.

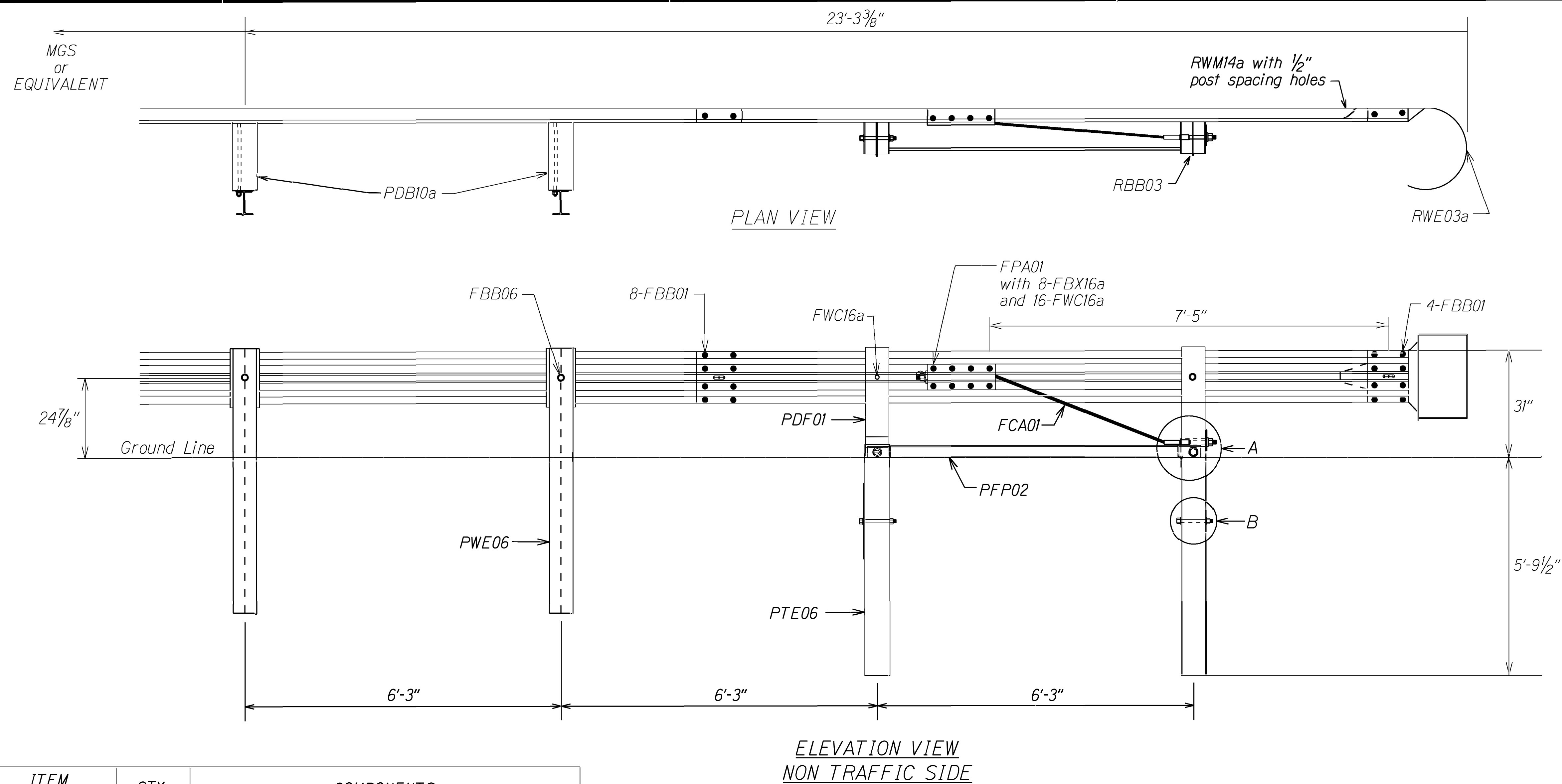


TYPICAL SECTION AT OBSTRUCTION

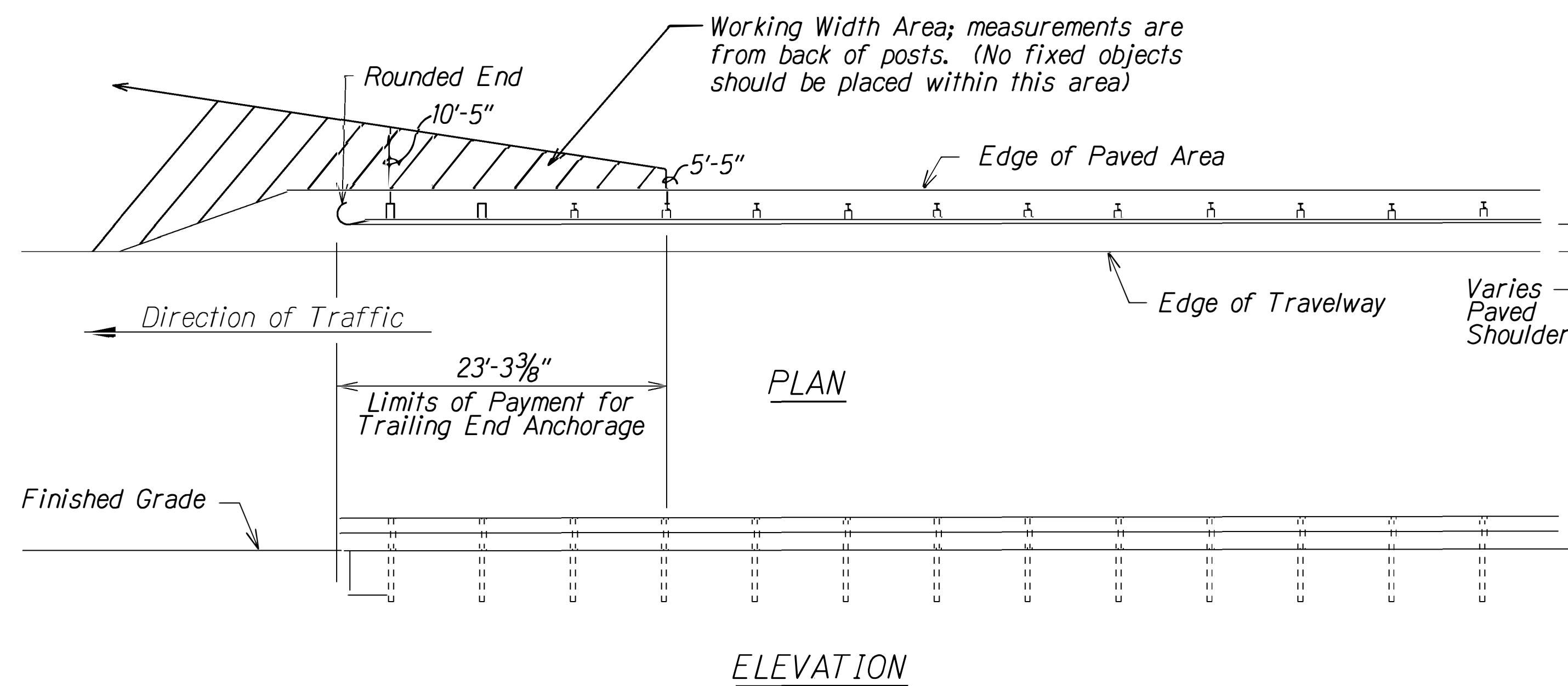
DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL DETAILS
(AT OBSTRUCTION)
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)
Scale: NTS Date: June, 2020
SHEET No. 8 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	20	87



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



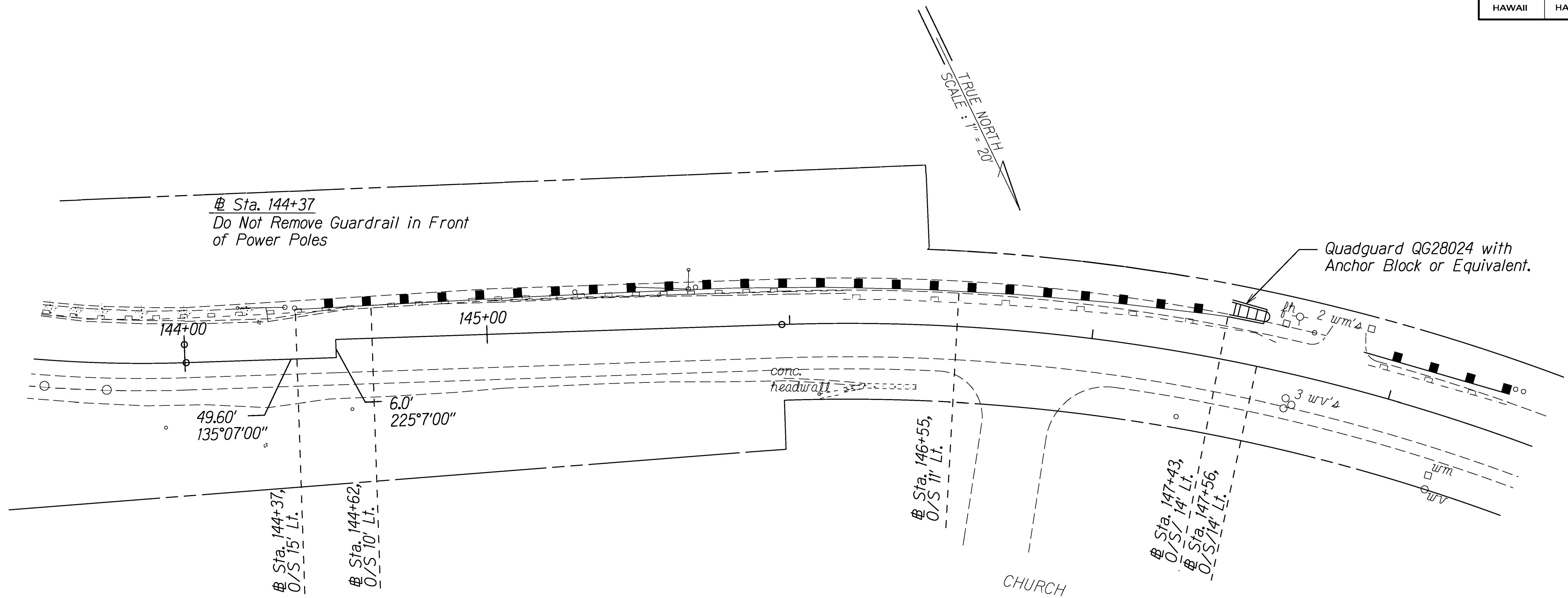
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TRAILING-END ANCHORAGE
SYSTEM**

KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)
Scale: NTS Date: June, 2020

SHEET No. 9 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	21	87



GUARDRAIL DETAIL AT
STA. 144+37 TO # STA. 147+56 LT.
Scale: 1"=20.0'

Notes:

1. Remove 307.00 L.F. of Existing Guardrail and End Treatment.
2. Do Not Remove Guardrail Before HECO Utility Poles Located at # Sta. 144+37 to # Sta. 147+56.
3. Install:
 - a. # Sta. 144+37 to # Sta. 144+62 - 25.00 L.F. Transition Existing W-Beam to Strong Post Thrie Beam Guardrail.
 - b. # Sta. 144+62 to # Sta. 146+55± - 193.75 L.F. Strong Post Guardrail.
 - c. # Sta. 146+55± to # Sta. 147+56± - 87.50 L.F. Strong Post Thrie Beam Guardrail (8' Posts). Connect to Quadguard QG28024 or Equivalent at Approach End (1 Ea.).
 - d. Use Obstruction Installation for Power Poles.
 - e. Support Pole as necessary during Guardrail installation.

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
CHECKED BY	
NOTED BY	
DATE	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAIL

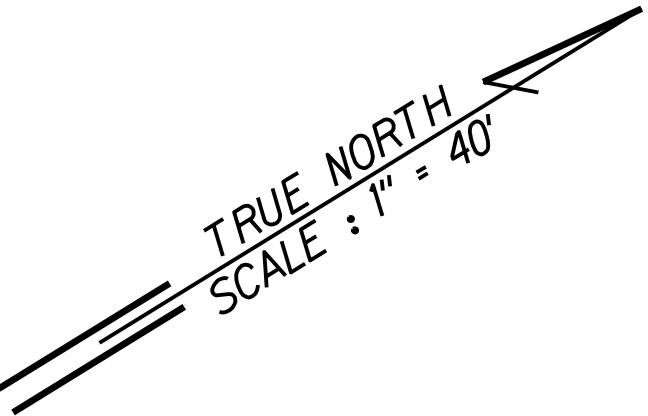
KAMEHAMEHA HIGHWAY REHABILITATION
Vicinity of Kapuhi Street to Dairy Road
Federal Aid Project No. NH-083-1(77)

Scale: 1" = 20' Date: June, 2020

SHEET No. 10 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-083-1(77)	2021	22	87

Sta. 202+31.22± to # Sta. 203+81.65± Lt.
Do Not Remove Guardrail before HECO Utility Poles
Located at # Sta. 203.07 to # Sta. 204+65.
Use Obstruction Installation for Power Poles.

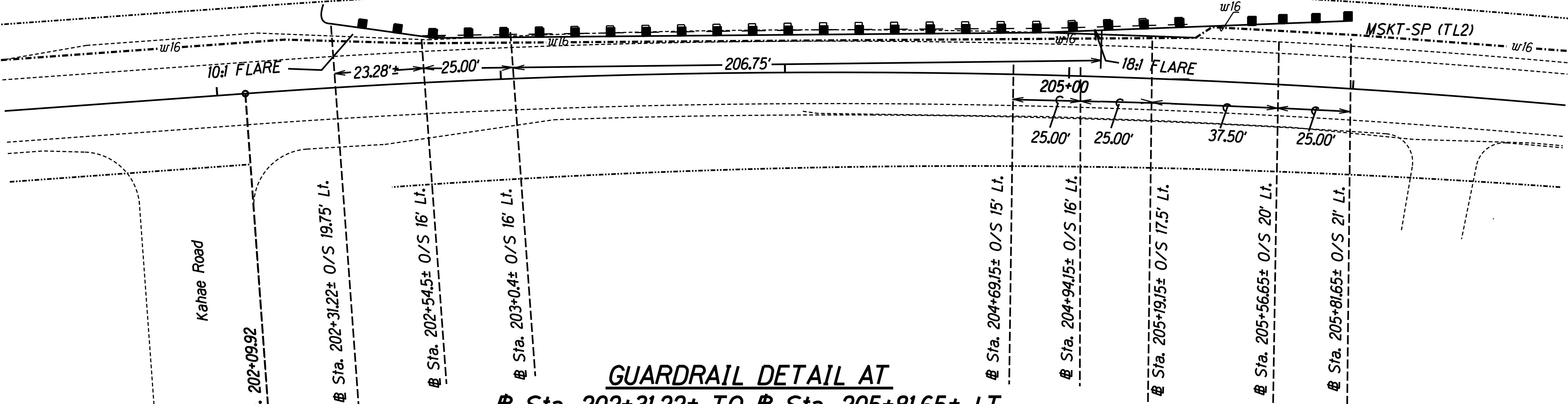


Sta. 202+31.22± to # Sta. 203+81.65± Lt.
Transition Existing W-Beam to Strong
Post Thrie Beam Guardrail. Install MSKT-SP TL-2
or Equivalent (1 Ea.) at Trailing End.

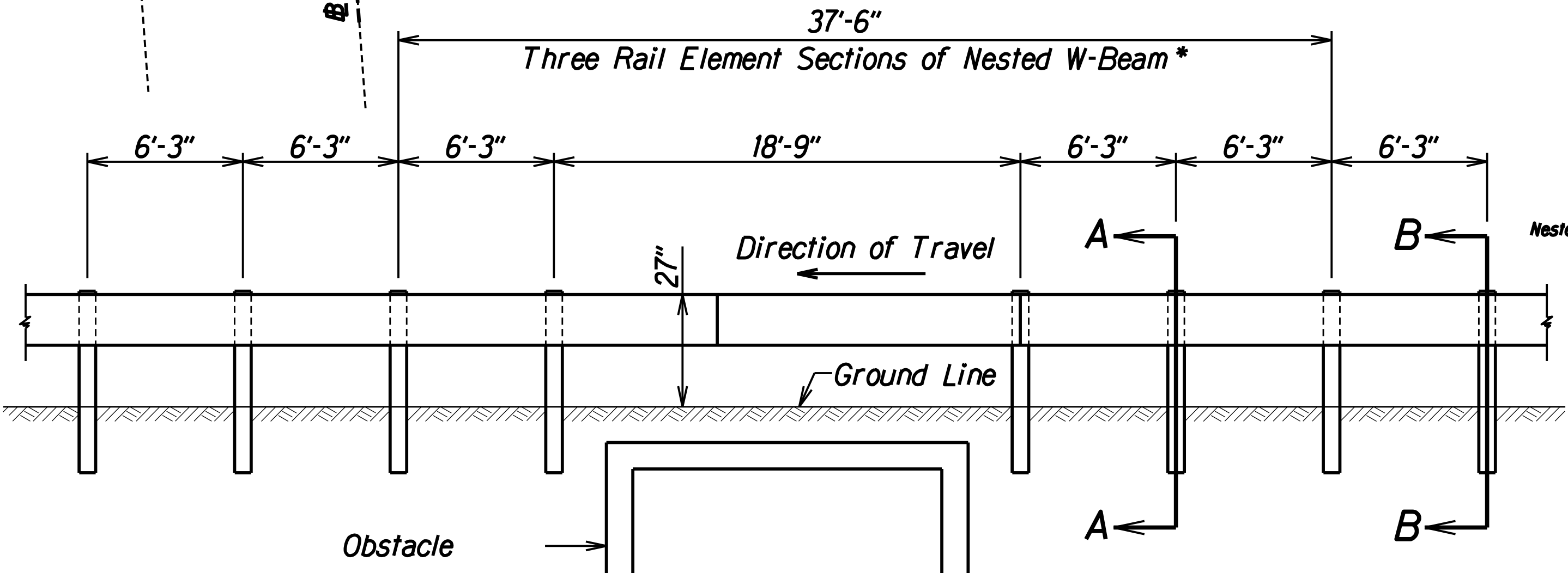
Sta. 203+6.65± to # Sta. 204+56.65± Lt.
Transition Existing W-Beam to Strong Post
Thrie Beam. Install 100.00 L.F. Strong Post
Thrie Beam Guardrail (8' Posts) and
Transition from Strong Post Thrie Beam
to Existing W-Beam

Sta. 204+69.15± to # Sta. 205+81.65± Lt.
Transition Existing W-Beam to Strong Post
W-Beam Guardrail. Install 25 L.F. Strong
Post W-Beam Guardrail. Install 37.5 L.F.
Nested Long Span Strong Post
W-Beam Guardrail over 18'-9" Obstacle.
Install 25 L.F. Strong Post W-Beam Guardrail.
Install MSKT-SP TL-2 or Equivalent
(1 Ea.) at Approach End.

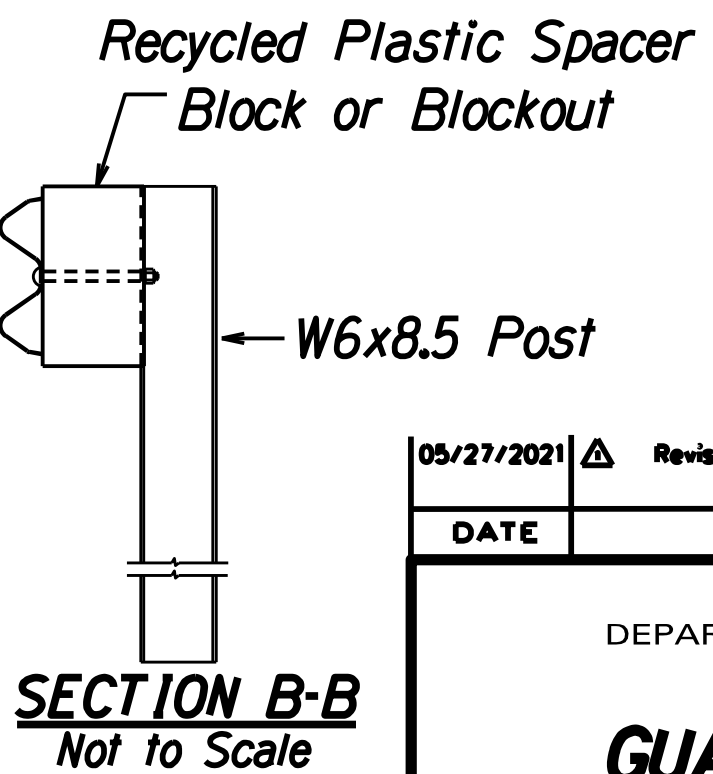
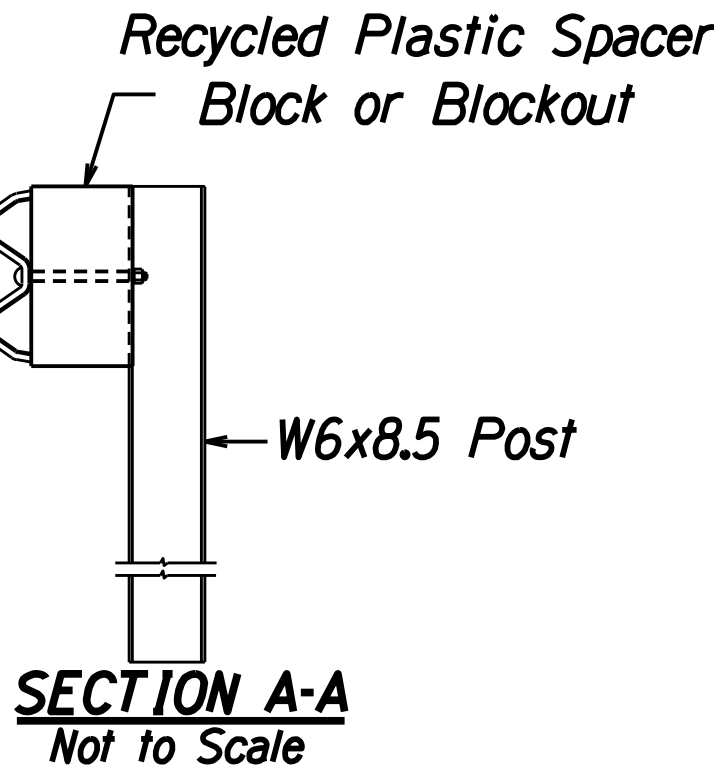
Sta. 202+67± to # Sta. 205+42± Lt.
Remove Existing Guardrail with Rubrail except
where noted on plans.



GUARDRAIL DETAIL AT
Sta. 202+31.22± TO # Sta. 205+81.65± LT.
Scale: Not to Scale



NESTED LONG SPAN STRONG POST
W-BEAM GUARDRAIL OVER 18'-9" OBSTACLE
Scale: N.T.S.



NOTE: All Rail Elements Sections are 12'-6"
and All Posts are 6' Long
All nested W-Beam splice points shall be staggered.

DATE	9/2/09
DESIGNED BY	
TRACED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	

05/27/2021	Revised Sheet
DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	GUARDRAIL DETAIL
	KAMEHAMEHA HIGHWAY REHABILITATION
	Vicinity of Kapuhi Street to Dairy Road
	Federal Aid Project No. NH-083-1(77)
	Scale: 1" = 20' Date: June, 2020
	SHEET No. 11 OF 11 SHEETS