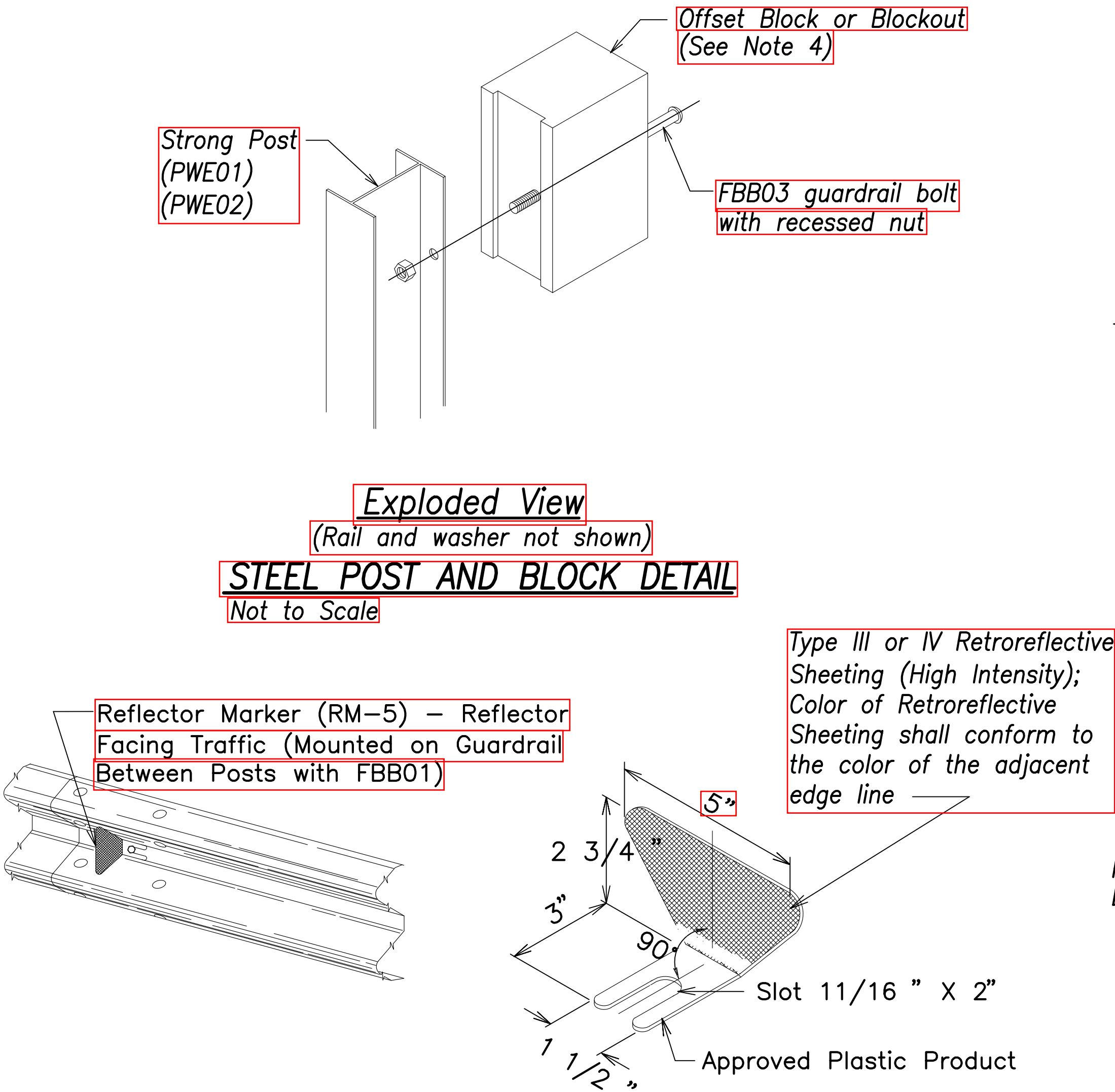


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(20)	2020	63	168

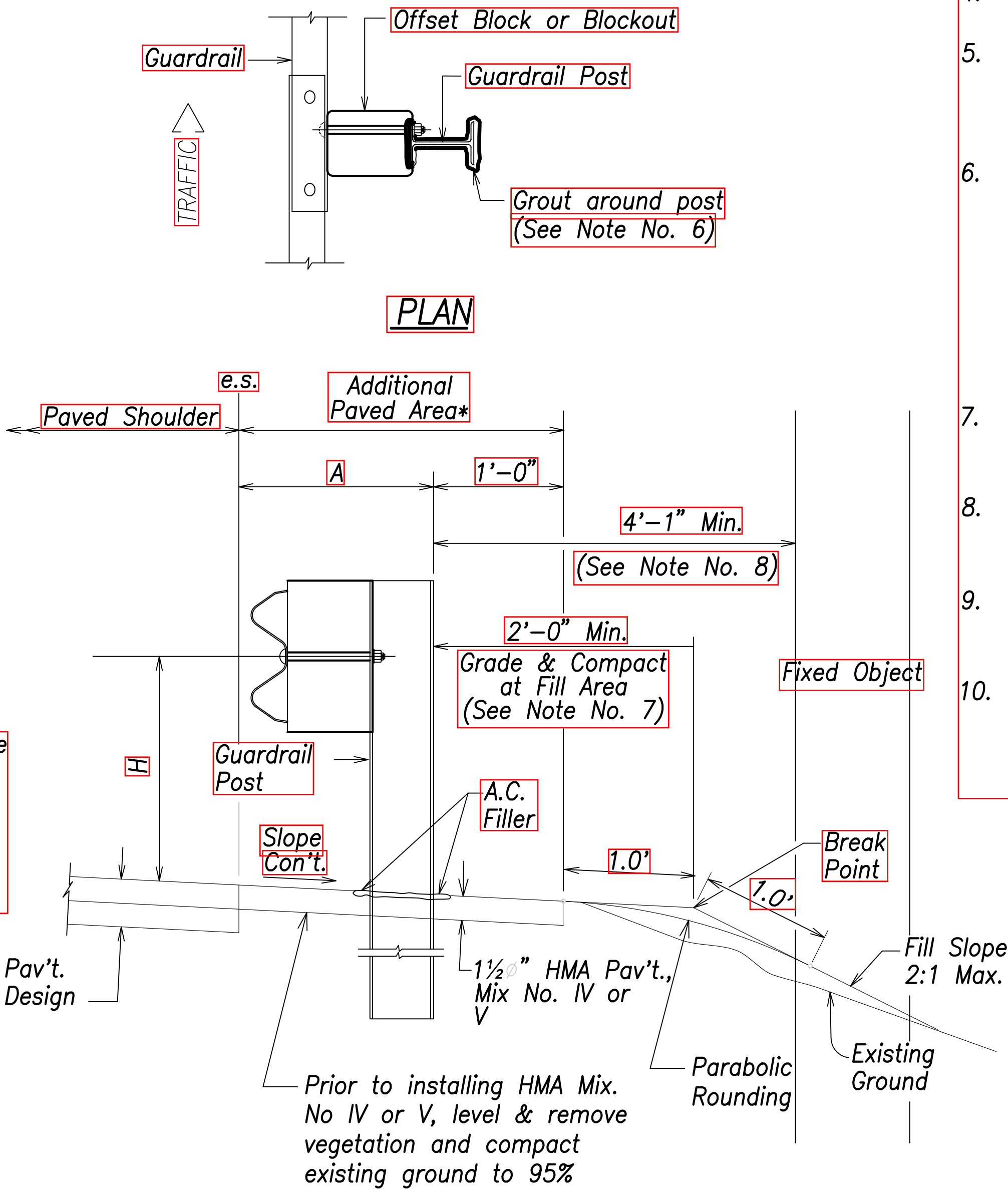
General Notes:

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"



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION
Not to Scale



ELEVATION
TYPICAL GUARDRAIL INSTALLATION
Not to Scale



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

Signature: Michael H. Okamoto
Expiration Date: April 30, 2022
Of the License

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS AND NOTES

FARRINGTON HIGHWAY
Replacement of Makaha Bridge
No. 3 and Makaha Bridge 3A
F. A. Project No. BR-093-1(20)

Scale: As Shown Date: July 2020

SHEET No. C8.6 OF 168 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(20)	2020	64	168

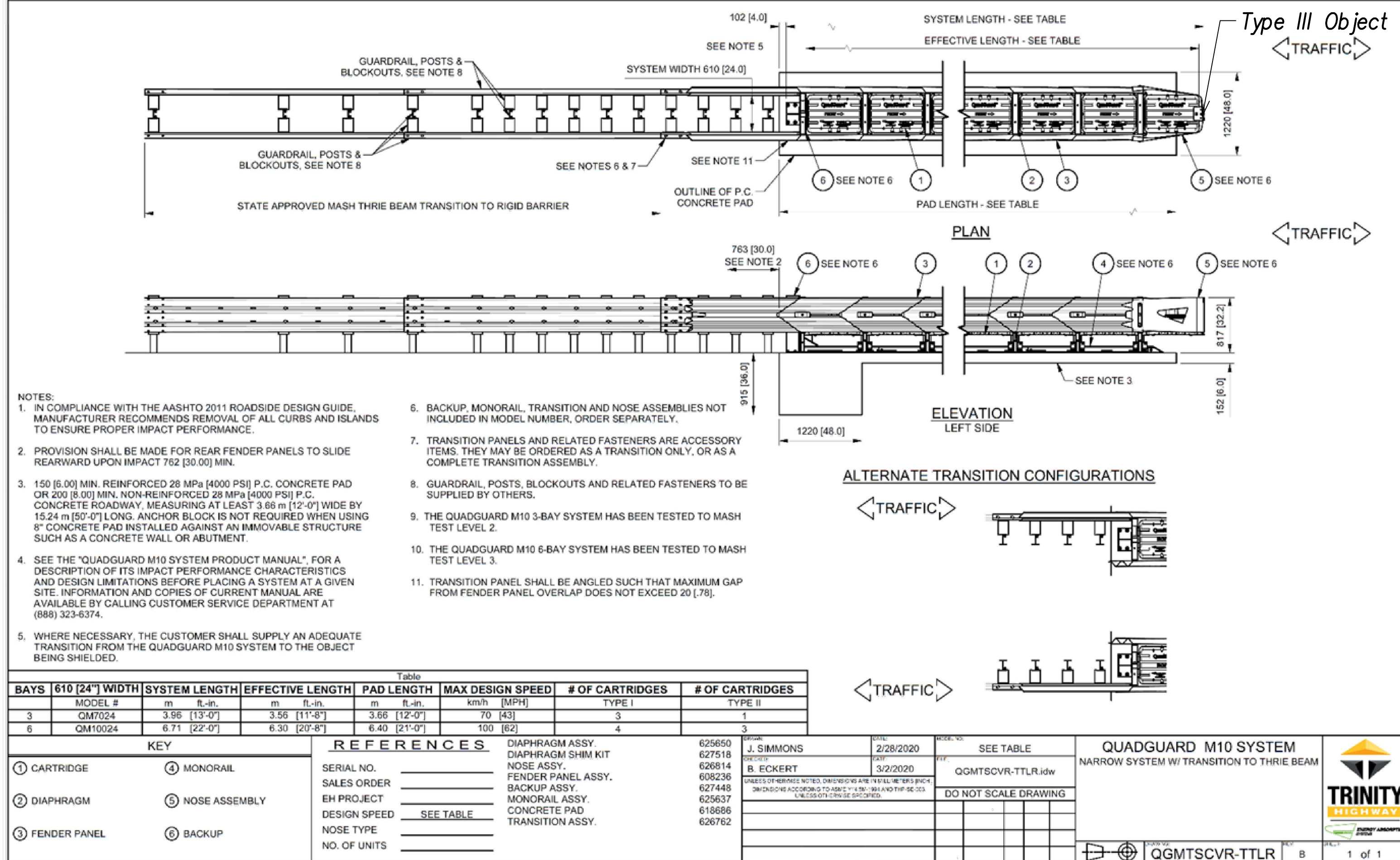
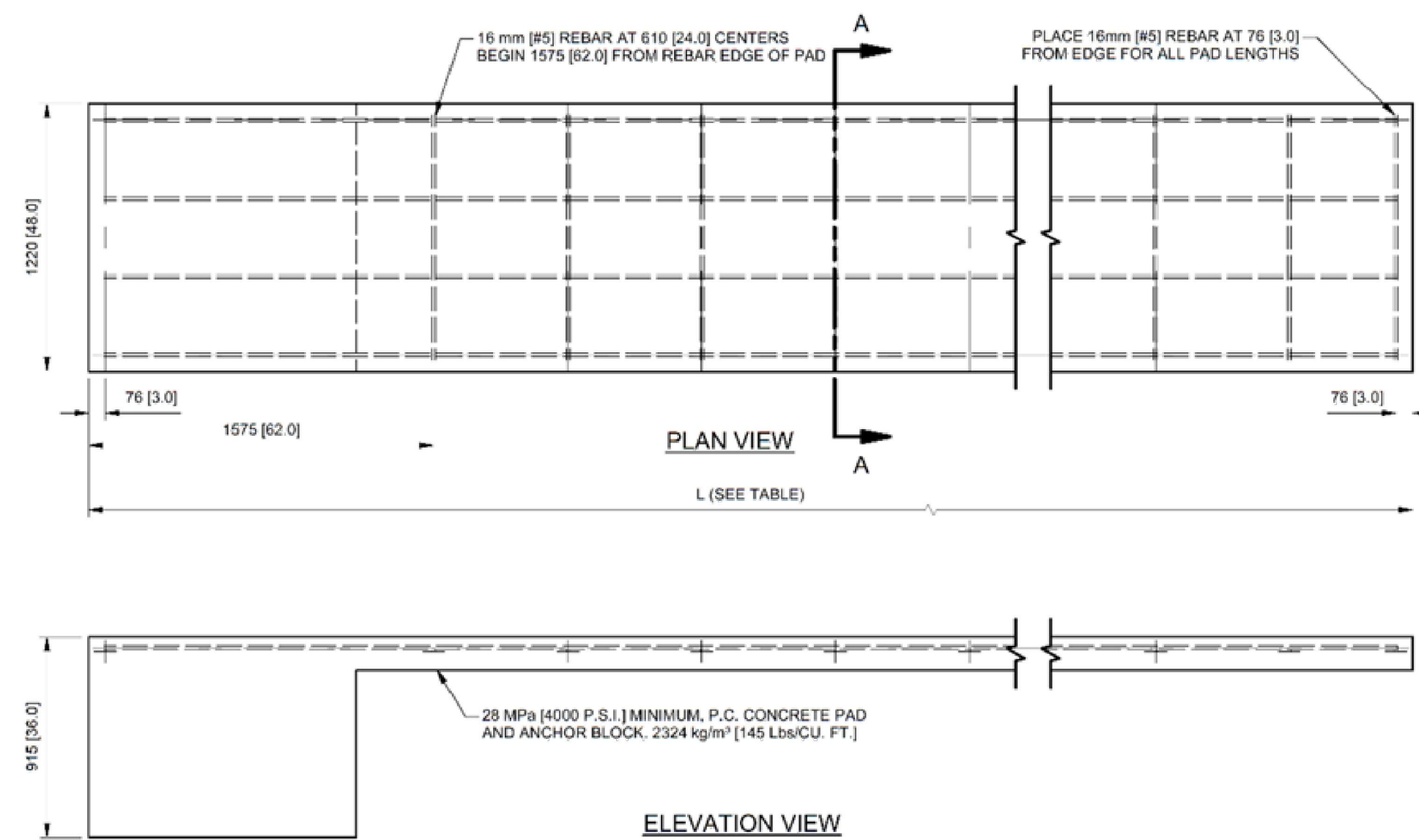
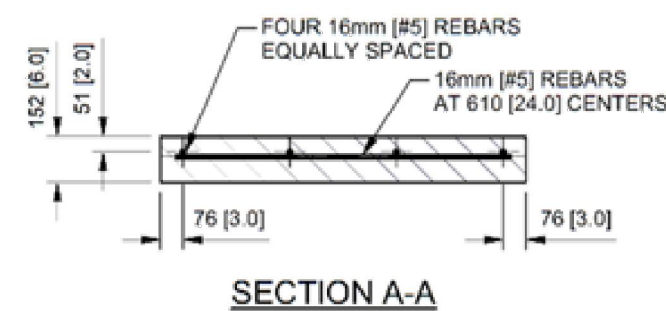


TABLE			
NO. OF BAYS	"L" (PAD LENGTH)	REBAR REQUIRED	YARDS OF CONCRETE IN PAD
	m [ft-in]	m [ft-in]	m ² [YARDS]
1	2.74 [9'-0"]	14.83 [48'-8"]	1.59 [2.1]
2	2.74 [9'-0"]	14.83 [48'-8"]	1.59 [2.1]
3	3.66 [12'-0"]	20.73 [68'-0"]	1.82 [2.4]
4	4.57 [15'-0"]	25.50 [83'-8"]	1.97 [2.6]
5	5.49 [18'-0"]	31.39 [103'-0"]	2.12 [2.8]
6	6.40 [21'-0"]	36.17 [118'-8"]	2.35 [3.1]
7	7.32 [24'-0"]	42.06 [138'-0"]	2.51 [3.3]
8	8.23 [27'-0"]	46.84 [153'-6"]	2.66 [3.5]
9	9.14 [30'-0"]	52.73 [173'-0"]	2.81 [3.7]
10	10.06 [33'-0"]	57.51 [188'-5"]	3.04 [4.0]
11	10.97 [36'-0"]	63.40 [208'-0"]	3.19 [4.2]
12	11.88 [39'-0"]	68.17 [223'-5"]	3.35 [4.4]



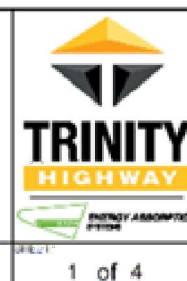
NOTES:

1. CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. ANCHOR BLOCK LOCATION IS RECOMMENDED AT BACK OF CONCRETE PAD. EXISTING CONCRETE PADS WITH BELOW GROUND OBSTRUCTIONS ARE ACCEPTABLE WITH ANCHOR BLOCKS AT THE FRONT OF THE PAD.

[illegible]

QUADGUARD® SYSTEM

CONCRETE PAD FOR
TENSION STRUT BACKUP



THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION AND
CONSTRUCTION OF THIS PROJECT
WILL BE UNDER MY OBSERVATION.

Michael H. Oram April 30, 2022
SIGNATURE EXPIRATION DATE
OF THE LICENSE

**STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION**

QUADGUARD DETAILS

FARRINGTON HIGHWAY

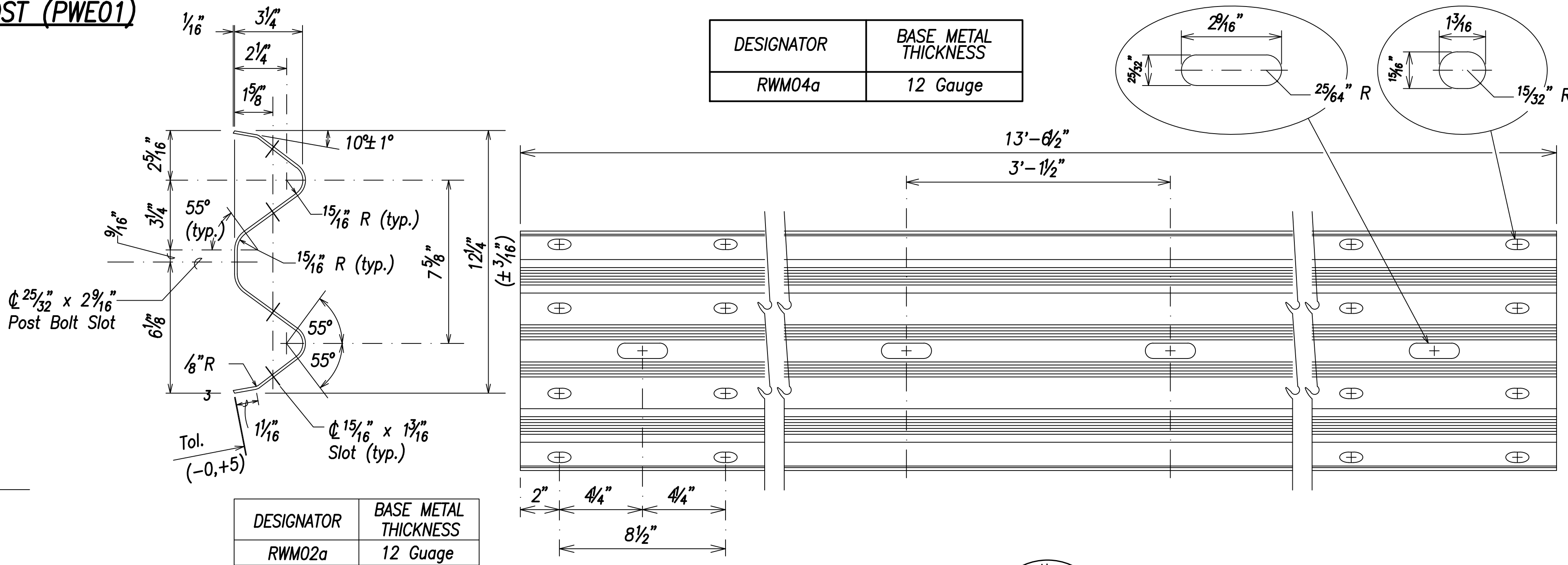
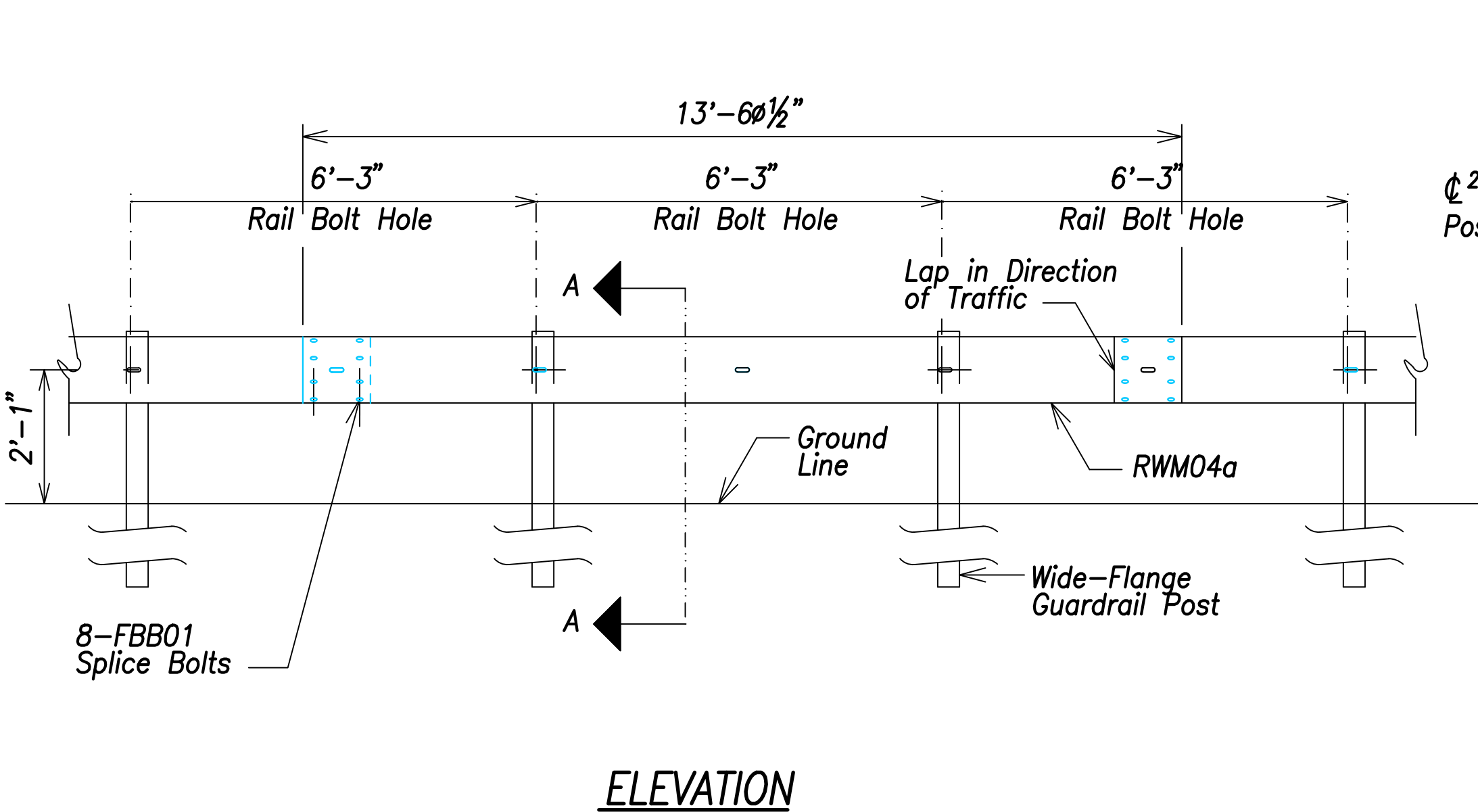
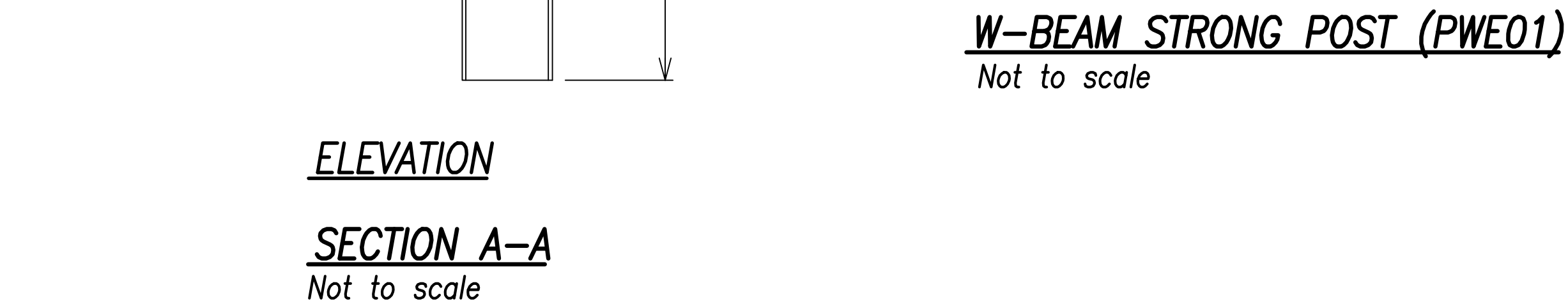
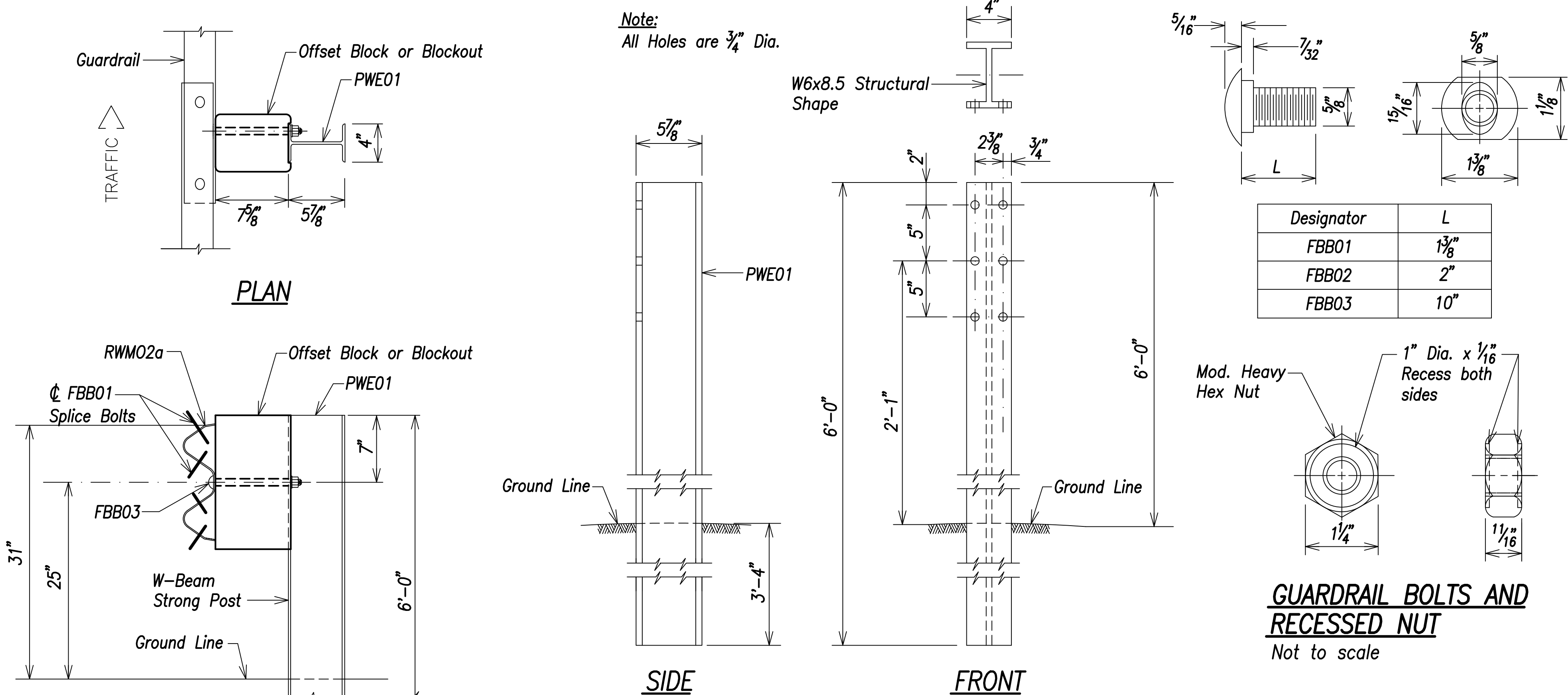
Replacement of Makaha Bridge

No. 3 and Makaha Bridge 3A
F. A. Project No. BR-093-1(20)

Scale: As Shown Date: July 2020

SHEET No. C8.7 OF 168 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(20)	2020	65	168



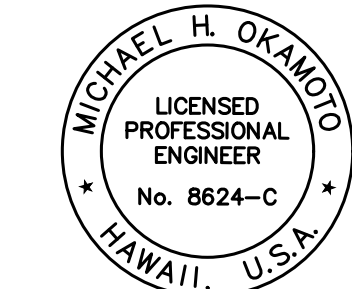
SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
CHECKED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	

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

Not to scale

2 SPACE W-BEAM GUARDRAIL (RWM02a)

Not to scale



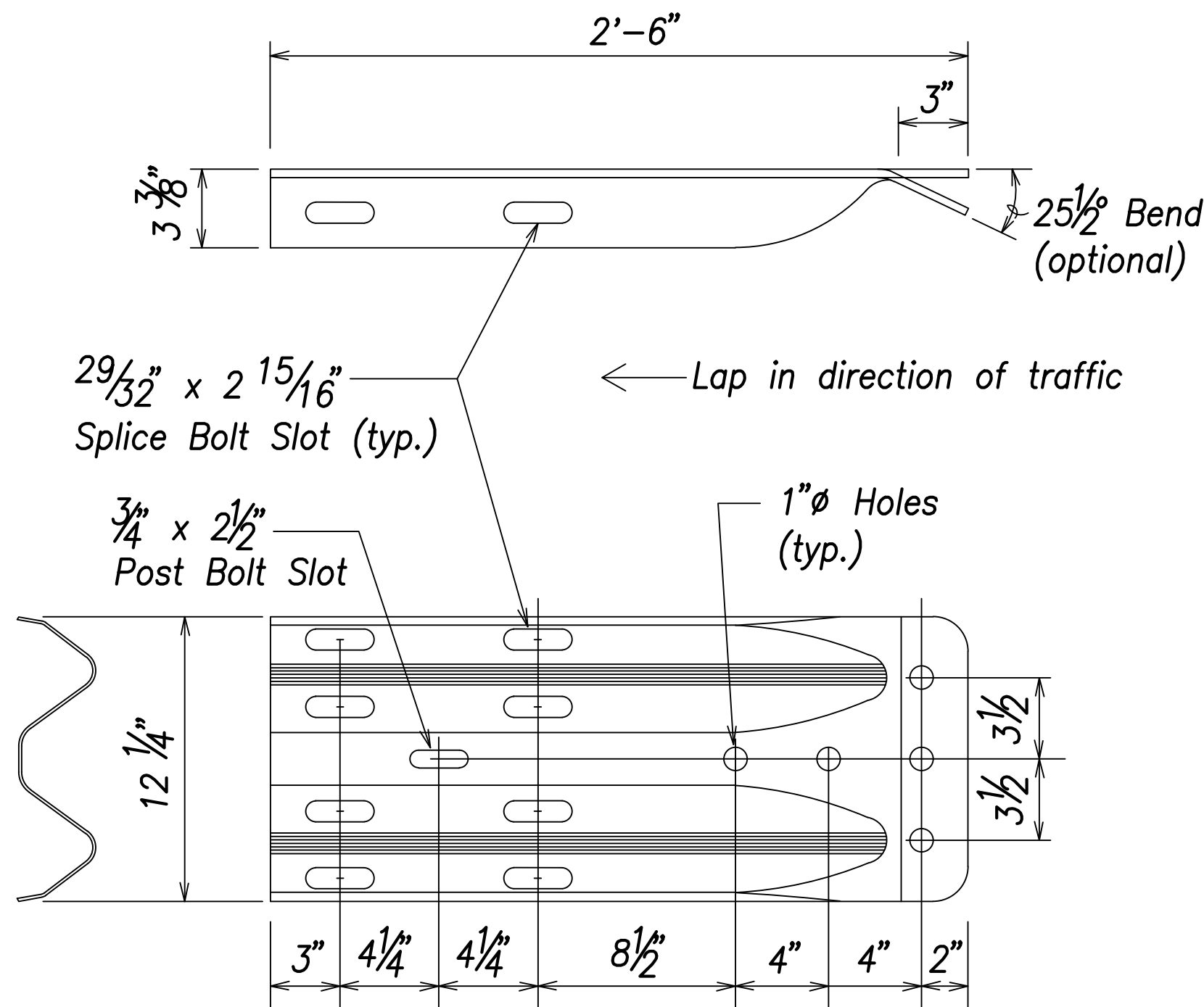
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

Michael H. Okamoto April 30, 2022
SIGNATURE EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MIDWEST GUARDRAIL SYSTEM DETAILS - 1
FARRINGTON HIGHWAY
Replacement of Makaha Bridge No. 3 and Makaha Bridge 3A
F. A. Project No. BR-093-1(20)
Scale: As Shown Date: July 2020
SHEET No. C8.8 OF 168 SHEETS

65

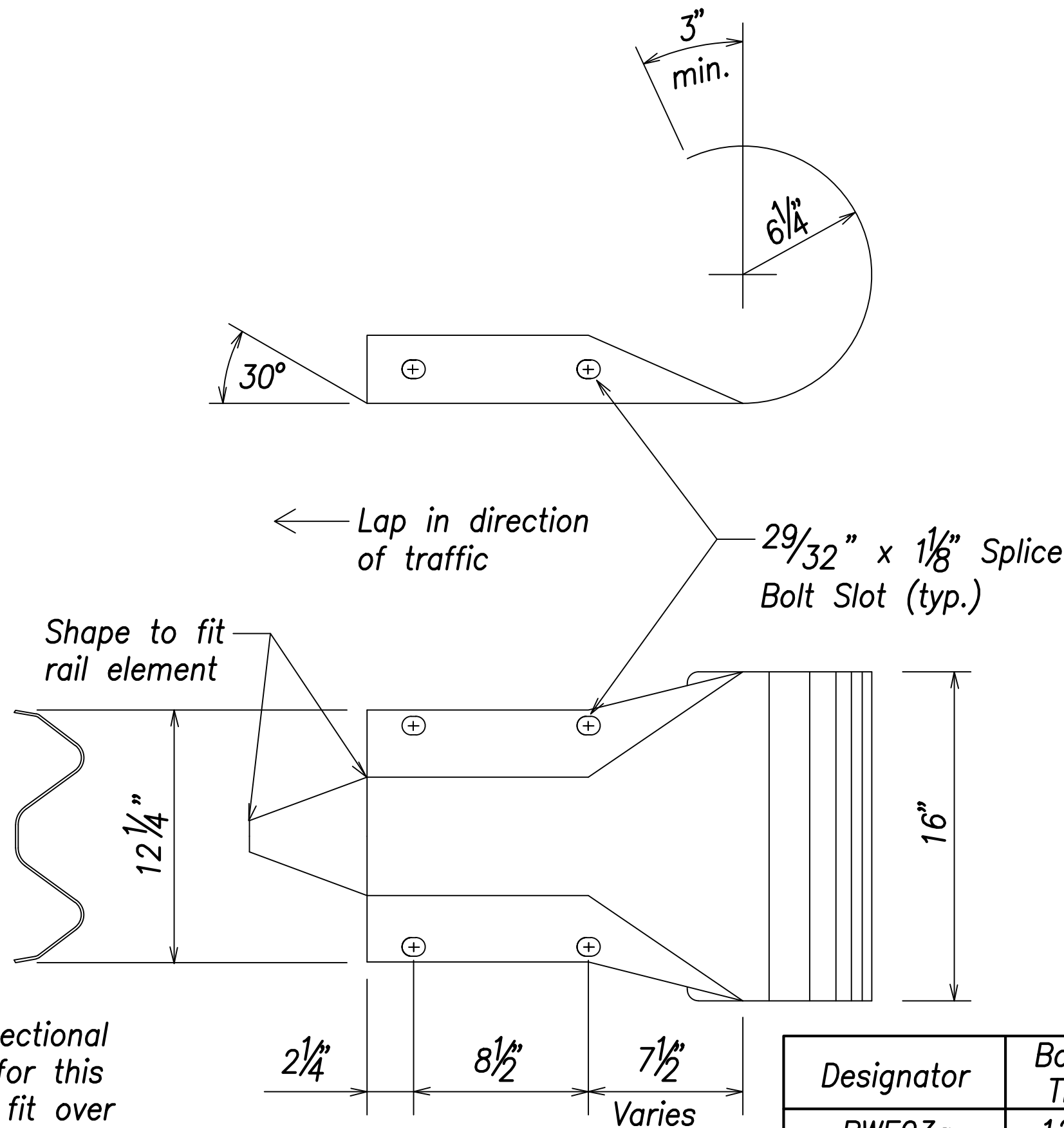
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HAWAII	HAW.	BR-093-1(20)	2020	66	168



Note:
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)
Not to Scale



Note:
The cross-sectional dimensions for this part are to fit over part RWM02b

Designator	Base Metal Thickness
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)
Not to Scale

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



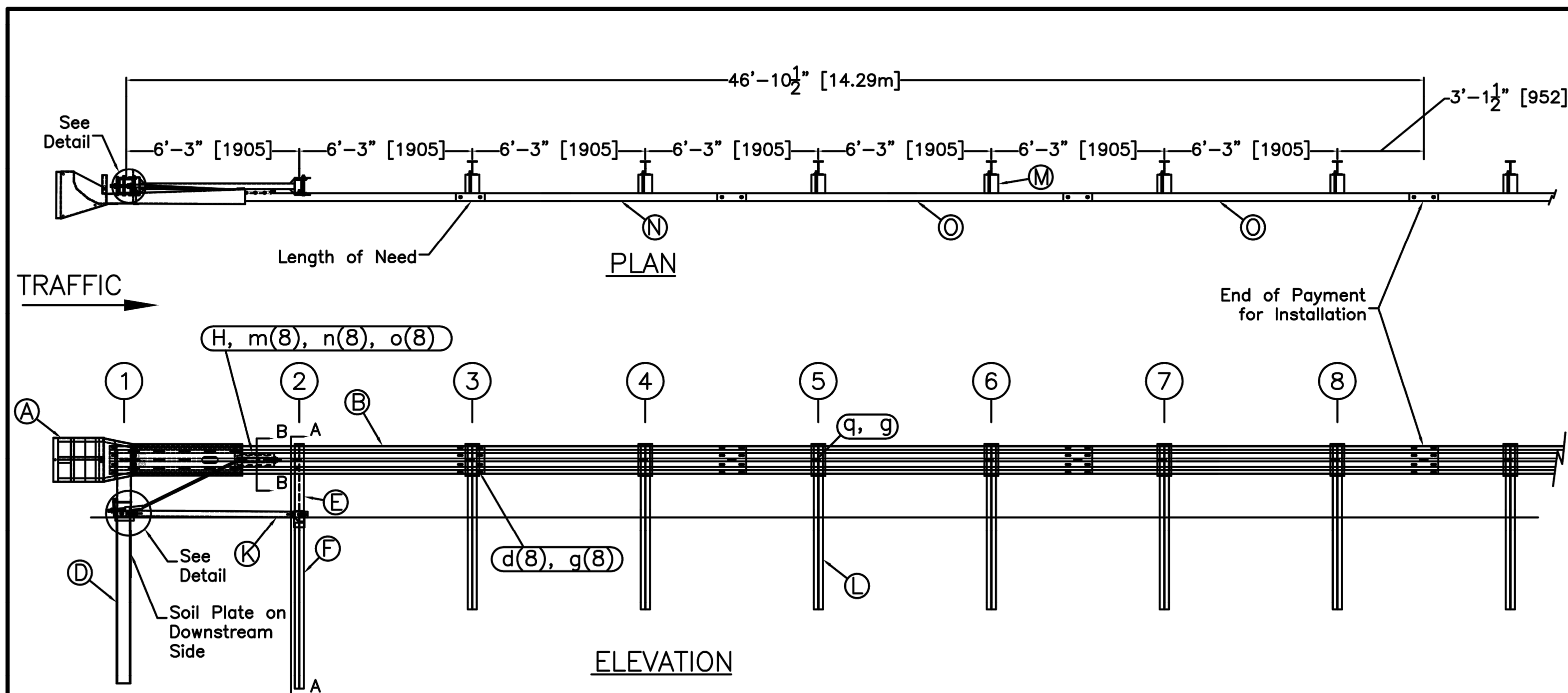
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

Signature: *Michael H. Okamoto* April 30, 2022
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**MIDWEST GUARDRAIL
SYSTEM DETAILS – 2**
FARRINGTON HIGHWAY
Replacement of Makaha Bridge 3A
No. 3 and Makaha Bridge 3A
F. A. Project No. BR-093-1(20)
Scale: As Shown Date: July 2020
SHEET No. C8.9 OF 168 SHEETS

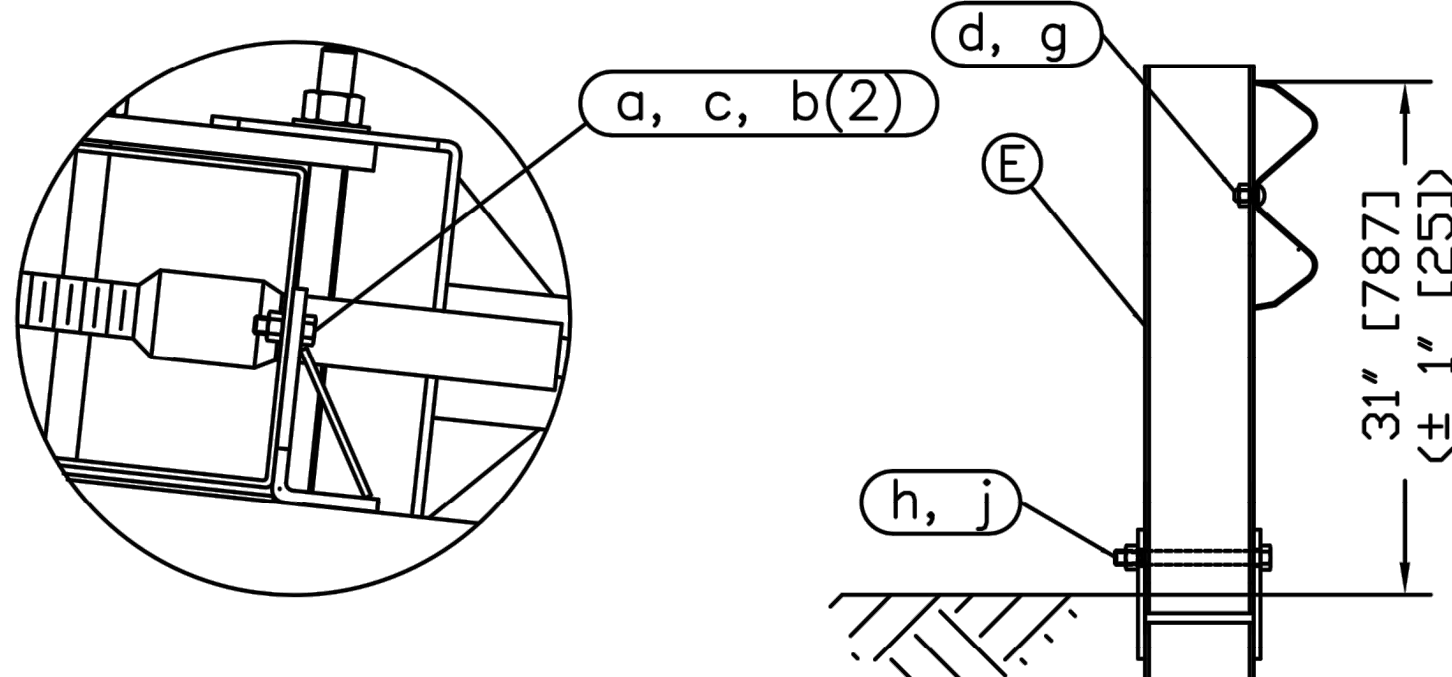
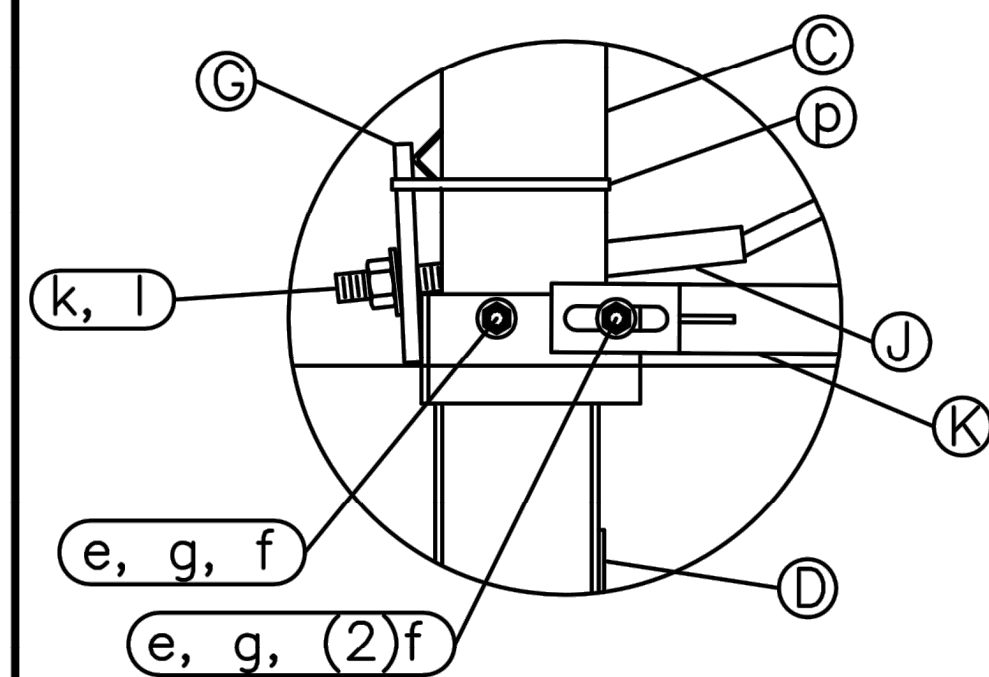
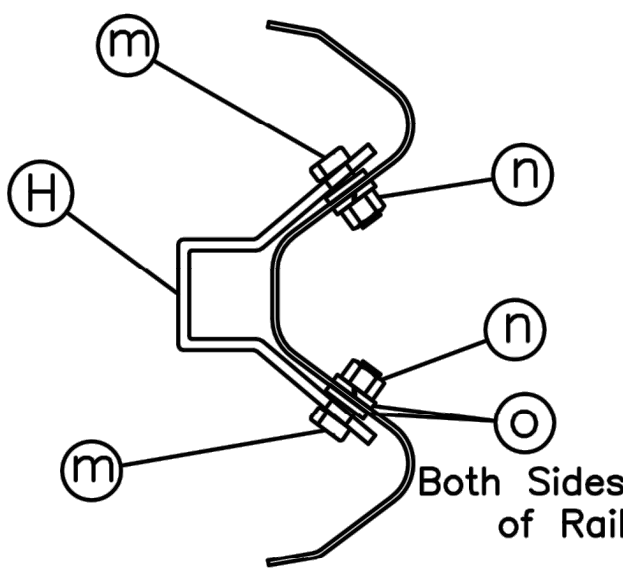
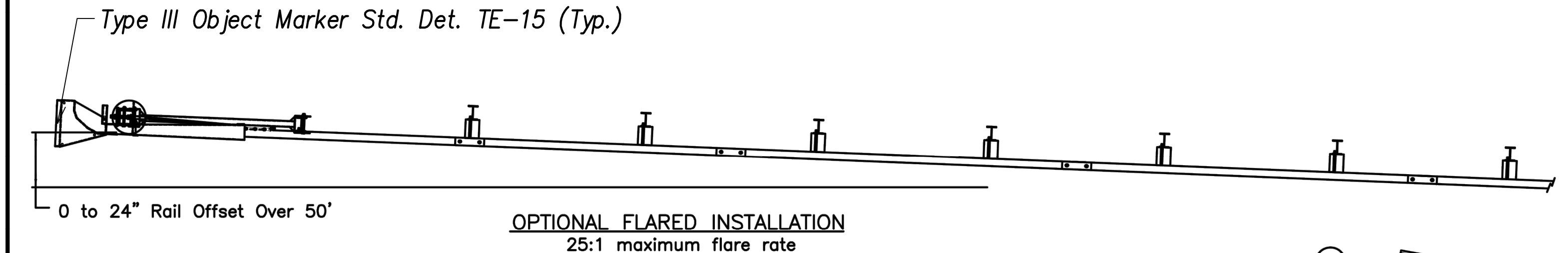
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-093-1(20)	2020	67	168



ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	FIRST POST TOP (6X6X1/8 Tube)	MTPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	MTPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	STRUT	MS785
L	6	6x9 (6x8.5) STEEL POST	P621
M	6	RECYCLED PLASTIC BLOCK OR EQUIV.	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	25	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	2	5/8 Dia. x 9 HEX BOLT A449	B580904A
f	3	5/8 WASHER	W050
g	33	5/8 Dia. H.G.R. NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2 RSI SHOULDER BOLT W/WASHER	SB12A
n	8	1/2 STRUCTURAL NUT	N012A
o	8	1/2 STRUCTURAL WASHER	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002

- GENERAL NOTES:
1. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
 2. The lower sections of the Posts 1&2 shall not protrude more than 4 in [100] above the ground (measured along a 5' [1.5m] cord longitudinal to the system). Site grading may be necessary to meet this requirement.
 3. The lower section of the hinged post should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
 4. When competent rock is encountered, a 12" [300] Ø post hole, 20 in. [500] deep cored into the rock surface may be used if approved by the engineer for Posts 1 and/or 2. Granular material will be placed in the bottom of the hole, approximately 2.5" [60] deep to provide drainage. The first and/or second post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
 5. 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.



Post #1 Connection Detail

Impact Head Connection Detail

SECTION A-A
Post #2



MSKT-SP-MGS Terminal (8" Blocks) Test Level 3	Drawing Name: MSKT-SP-MGS8	Scale: None	Sheet: 1 Date: 05/20/17 By: JRR Rev: 0
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Michael H. Okamoto April 30, 2022
SIGNATURE EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

END TREATMENT DETAILS

FARRINGTON HIGHWAY
Replacement of Makaha Bridge
No. 3 and Makaha Bridge 3A
F. A. Project No. BR-093-1(20)

Scale: As Shown Date: July 2020

SHEET No. C8.10 OF 168 SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	