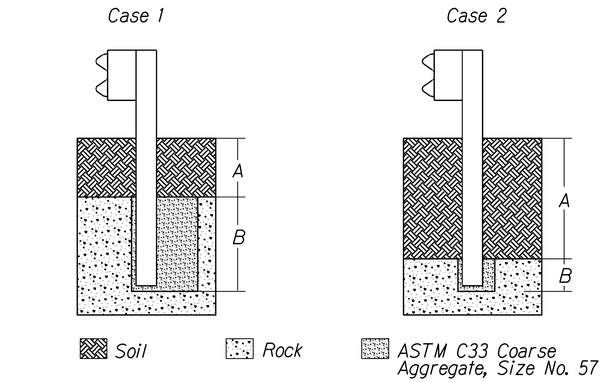
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0190(017)	2021	8	27

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.



Plan View Steel Posts
Either hole configuration acceptable

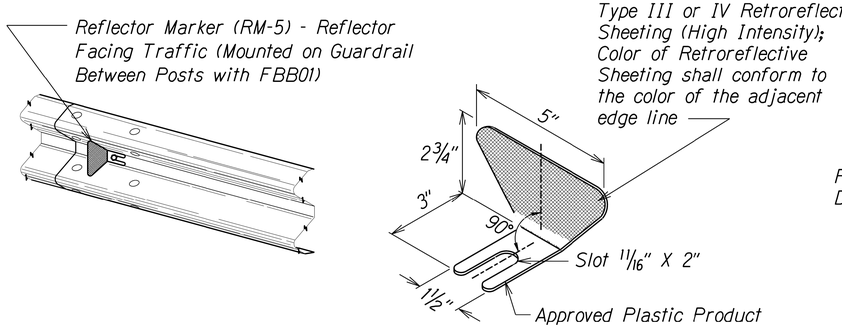
(A) ranging from 0 to 18-inches, the depth of required drilling (B) is equal to 24-inches.

Overlying Soil Depths of 0 to 18-inches

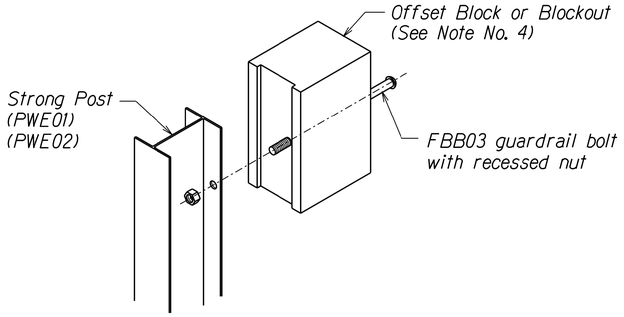
(A) ranging from 18-inches to the embedment depth of the post, depth of required drilling (B) is equal to either 12-inches or the desired embedment depth minus the depth of soil whichever is less.

Overlying Soil Depths of 18 to 42-inches

31-INCH W-BEAM GUARDRAIL IN ROCK

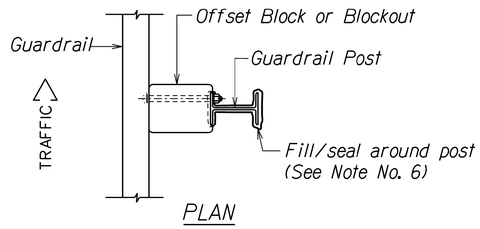


REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

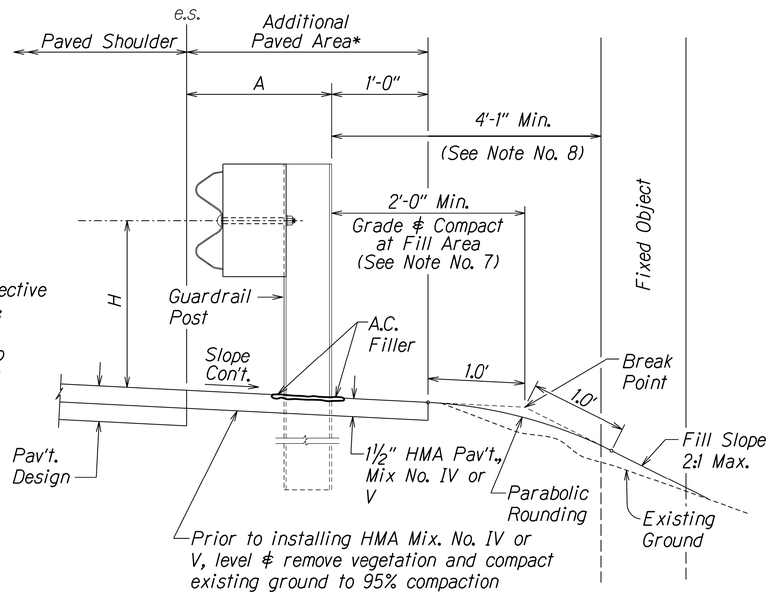


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION

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"	9¼"

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES OF ORIGINAL PLAN

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

LENNIE OKANO-KENDRICK
Licensed Professional Engineer
No.11108-C
HAWAII, U.S.A.

This work was prepared by me or under my supervision.

Lennie Okano-Kendrick
Expiration Date of License 4/22

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

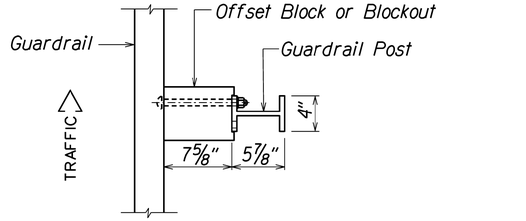
GUARDRAIL DETAILS & NOTES

MAMALAHOA HIGHWAY
SAFETY IMPROVEMENTS
Mile Post 3.90 to Mile Post 6.90
Federal Aid Project No. HSIP-0190(017)

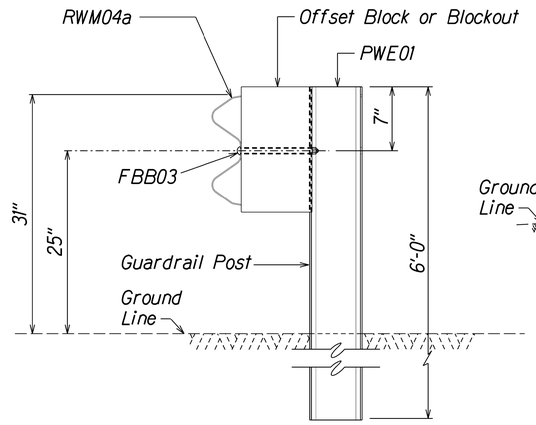
Scale: Not to Scale Date: June 2020

SHEET No. 1 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0190(017)	2021	9	27

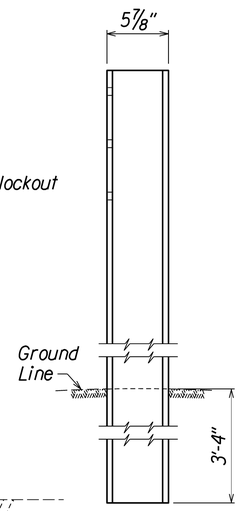


PLAN

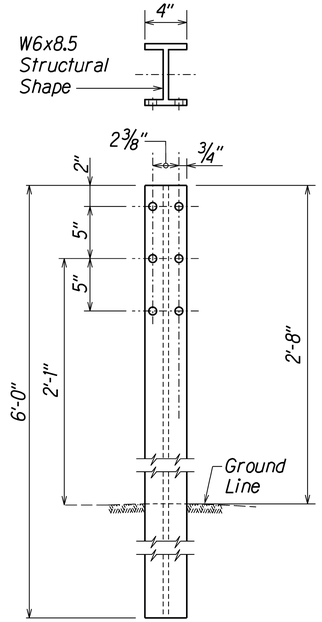


SECTION A-A

NOTE:
All Holes are 3/4" Dia.

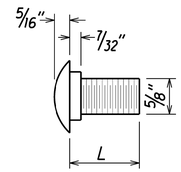


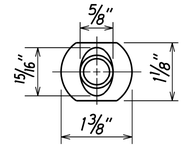
SIDE



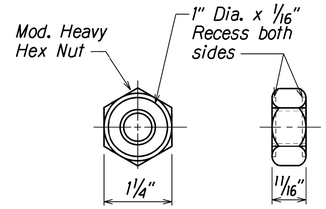
FRONT

WIDE-FLANGED GUARDRAIL POST (PWE01)

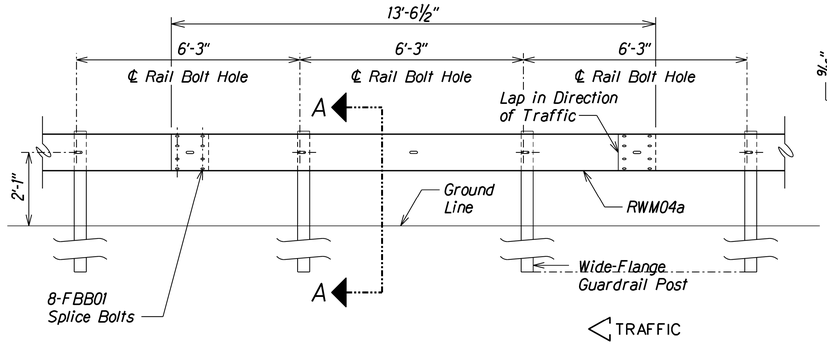




DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



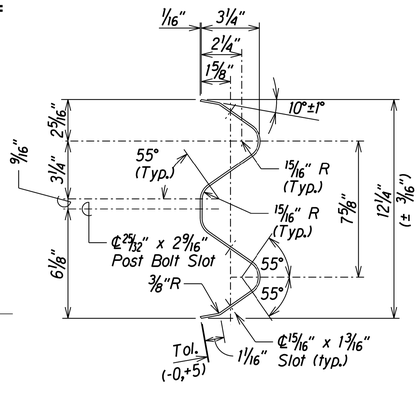
GUARDRAIL BOLTS AND RECESSED NUT

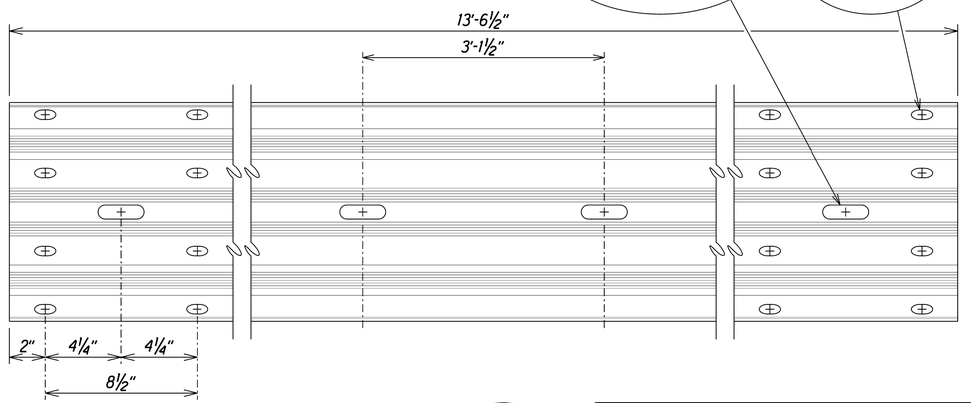


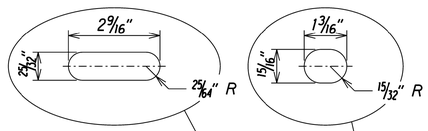
ELEVATION

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

DESIGNATOR	BASE METAL THICKNESS
RWM04a	12 Gauge







4 SPACE W-BEAM GUARDRAIL (RWM04a)

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES OF ORIGINAL PLAN

LENNIE OKANO-KENDRICK
Licensed Professional Engineer
No. 11108-C
HAWAII, U.S.A.

This work was prepared by me or under my supervision.

Jennie Okano-Kendrick

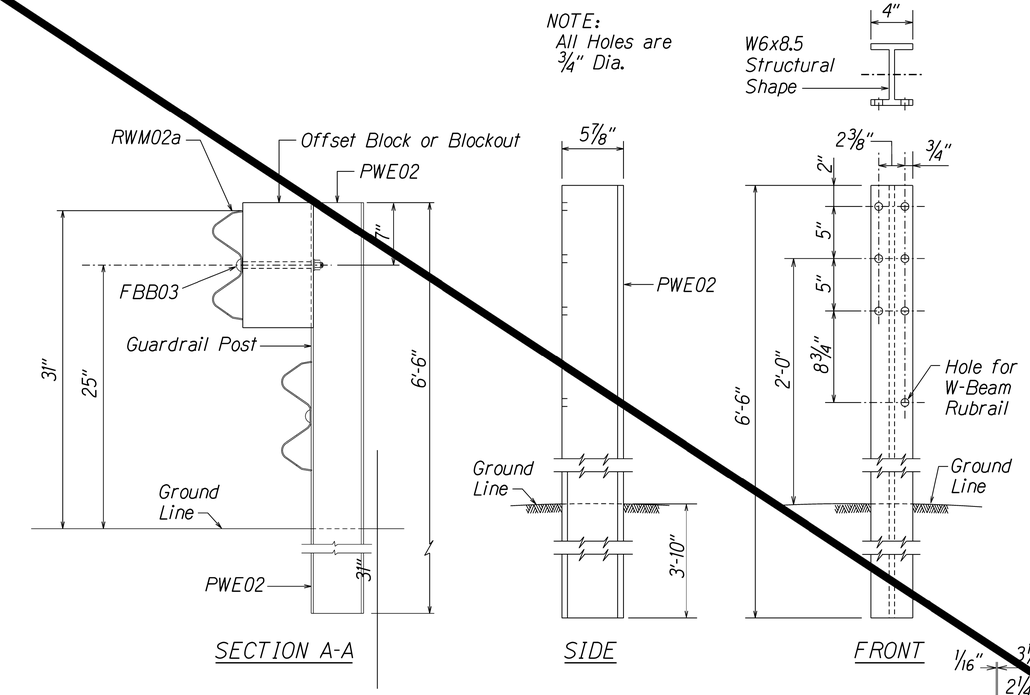
Expiration Date of License 4/22

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
31" W-BEAM GUARDRAIL WITH STANDARD 8" OFFSET BLOCK
MAMALAHOA HIGHWAY
SAFETY IMPROVEMENTS
Mile Post 3.90 to Mile Post 6.90
Federal Aid Project No. HSIP-0190(017)
Scale: Not to Scale Date: June 2020

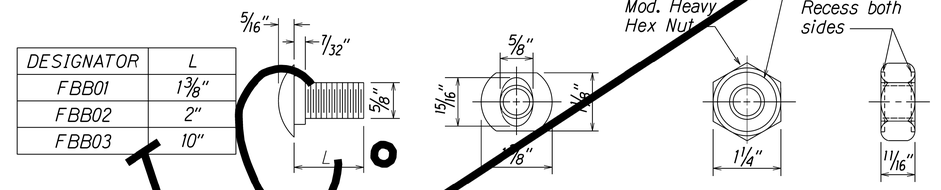
SHEET No. 2 OF 4 SHEETS

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0190(017)	2021	10	27

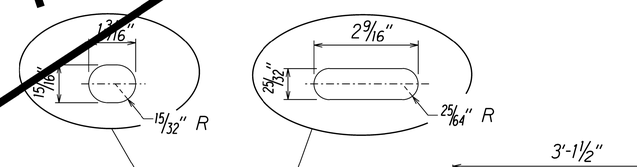


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

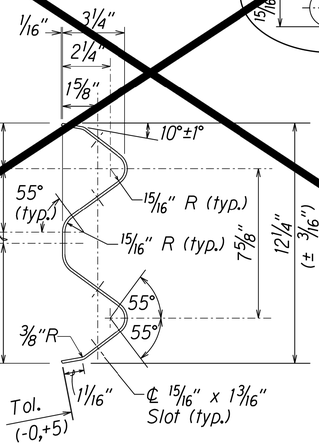


GUARDRAIL BOLTS AND RECESSED NUT

N.I.C.O.

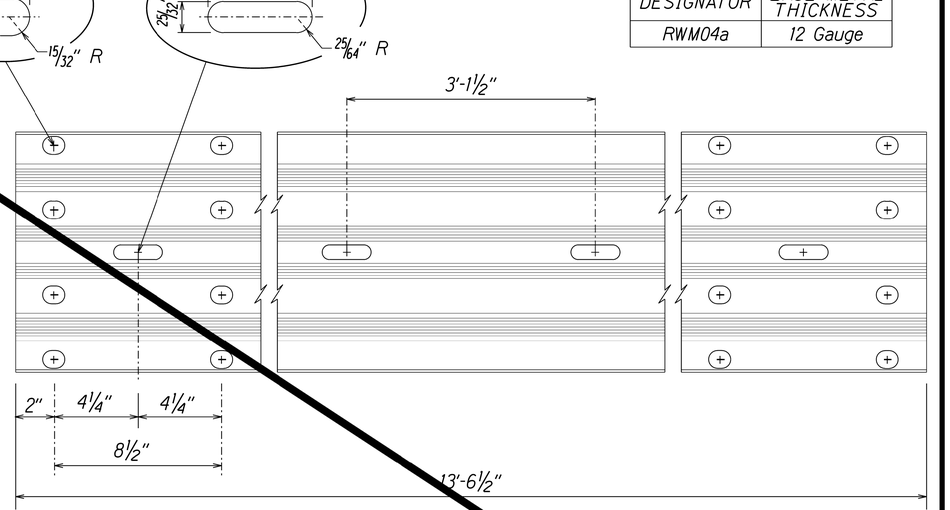


DESIGNATOR	BASE METAL THICKNESS
RWM04a	12 Gauge

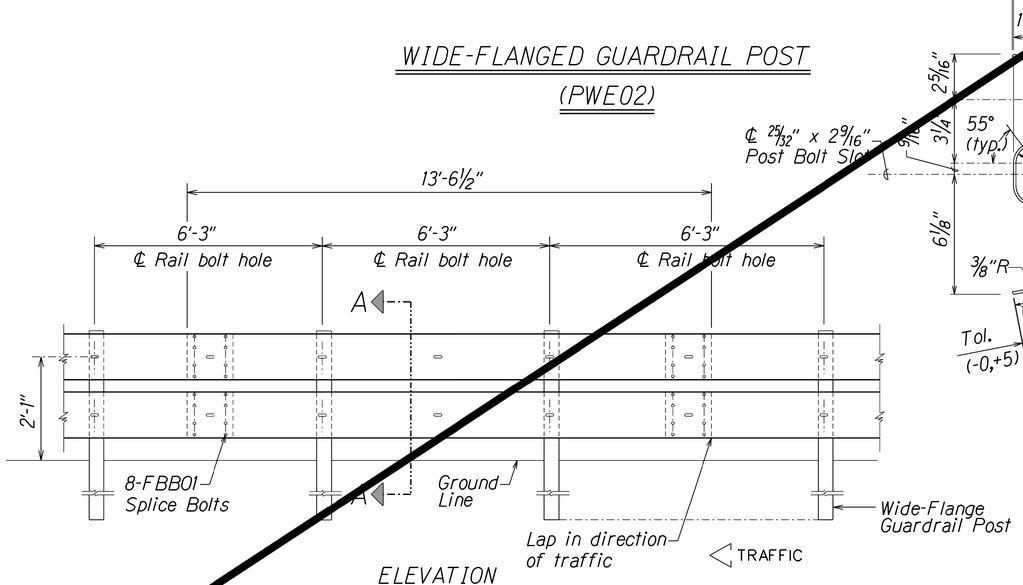


WIDE-FLANGED GUARDRAIL POST

(PWE02)



4 SPACE W-BEAM GUARDRAIL (RWM04a)



ELEVATION

MIDWEST GUARDRAIL SYSTEM WITH

STANDARD 8" OFFSET BLOCK (SGR41)

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES OF ORIGINAL PLAN

LENNIE OKANO-KENDRICK
Licensed Professional Engineer
No. 11108-C
HAWAII, U.S.A.

This work was prepared by me or under my supervision.

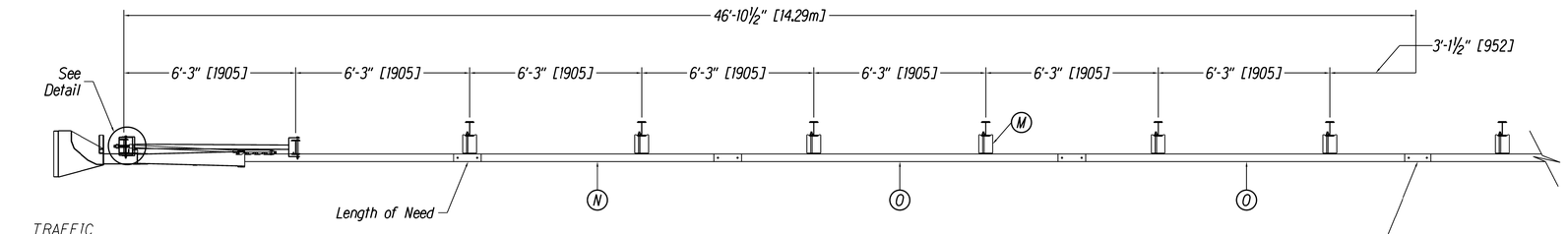
Expiration Date of License 4/22

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MIDWEST GUARDRAIL SYSTEM WITH
STANDARD 8" OFFSET BLOCK & RUBRAIL
MAMALAHOA HIGHWAY
SAFETY IMPROVEMENTS
Mile Post 3.90 to Mile Post 6.90
Federal Aid Project No. HSIP-0190(017)
Scale: Not to Scale Date: June 2020

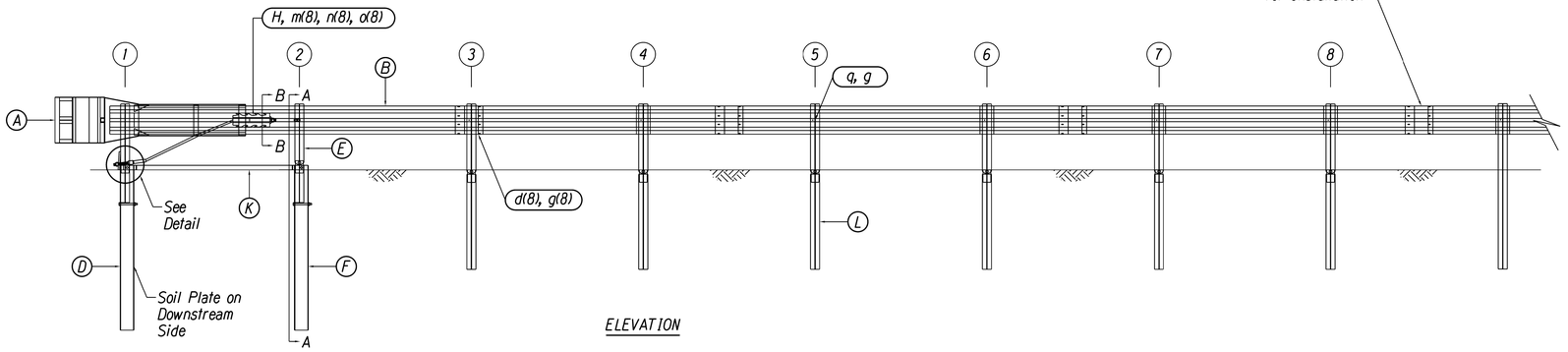
SHEET No. 3 OF 4 SHEETS

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

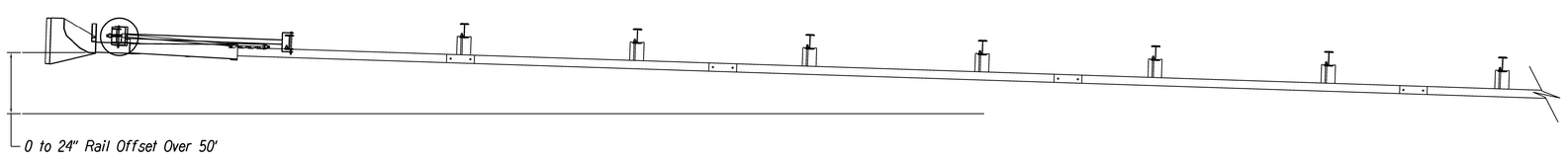
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0190(017)	2021	11	27



PLAN



ELEVATION

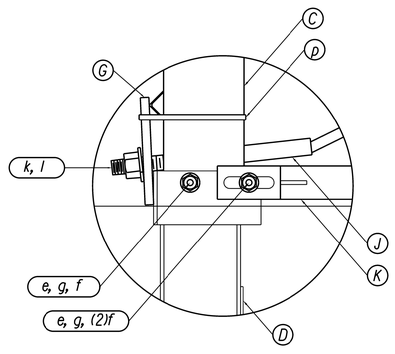


OPTIONAL FLARED INSTALLATION
25:1 Maximum flare rate

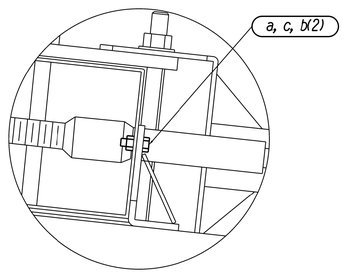
ITEM	ITEM NO.	QTY.	BILL OF MATERIALS
A	MS3000	1	IMPACT HEAD
B	SF1303	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.
C	MTPHPIA	1	FIRST POST TOP (6X6X⅛" Tube)
D	MTPHPIB	1	FIRST POST BOTTOM (6' W6X15)
E	UHP2A	1	SECOND POST ASSEMBLY TOP
F	HP2B	1	SECOND POST ASSEMBLY BOTTOM
G	E750	1	BEARING PLATE
H	S760	1	CABLE ANCHOR BOX
J	E770	1	BCT CABLE ANCHOR ASSEMBLY
K	MS785	1	STRUT
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	B5160104A	2	5/16 X 1 HEX BOLT GRD 5
b	W0516	4	5/16 WASHER
c	N0516	2	5/16 HEX NUT
d	B580122	25	5/8 Dia. x 1¼ SPLICE BOLT (POST #2)
e	B580904A	2	5/8 Dia. x 9 HEX BOLT A449
f	W050	3	5/8 WASHER
g	N050	33	5/8 Dia. H.G.R NUT
h	B340854A	1	¾ Dia. X 8½ HEX BOLT GRD A449
j	N030	1	¾ Dia. HEX NUT
k	N100	2	1 ANCHOR CABLE HEX NUT
l	W100	2	1 ANCHOR CABLE WASHER
m	SB12A	8	½ RS1 SHOULDER BOLT W/ WASHER
n	N012A	8	½ STRUCTURAL NUT
o	W012A	8	½ STRUCTURAL WASHER
p	CT-100ST	1	BEARING PLATE RETAINER TIE
q	B581002	6	5/8" x 10" H.G.R. BOLT

GENERAL NOTES:

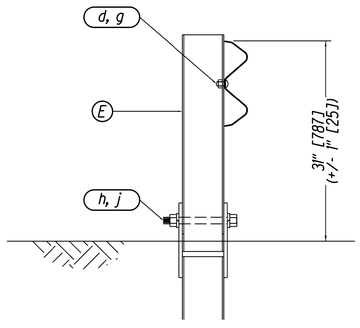
1. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
2. The lower sections of the Posts 1&2 shall not protrude more than 4 in [100] above the ground (measured along a 5' [1.5m] cord longitudinal to the system). Site grading may be necessary to meet this requirement.
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] dia. 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.



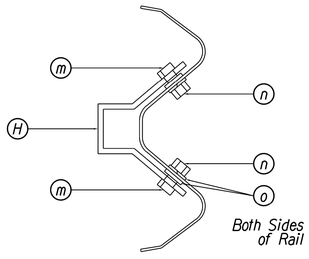
POST #1 CONNECTION DETAIL



IMPACT HEAD CONNECTION DETAIL



SECTION A-A
at Post #2



SECTION B-B
Anchor Bracket

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES OF ORIGINAL PLAN

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

LENNIE OKANO-KENDRICK
Licensed Professional Engineer
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HAWAII, U.S.A.

This work was prepared by me or under my supervision.

Jennie Okano-Kendri

Expiration Date of License 4/22

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MSKT-SP-MGS TERMINAL (8" BLOCKS) TEST LEVEL 3

MAMALAHOA HIGHWAY
SAFETY IMPROVEMENTS
Mile Post 3.90 to Mile Post 6.90
Federal Aid Project No. HSIP-0190(017)

Scale: Not to Scale Date: June 2020

SHEET No. 4 OF 4 SHEETS