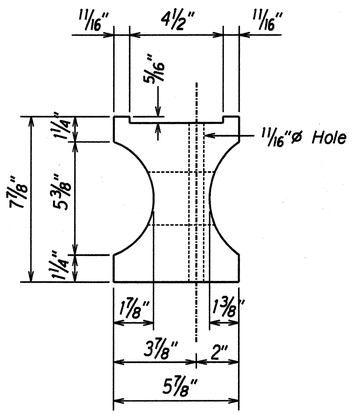
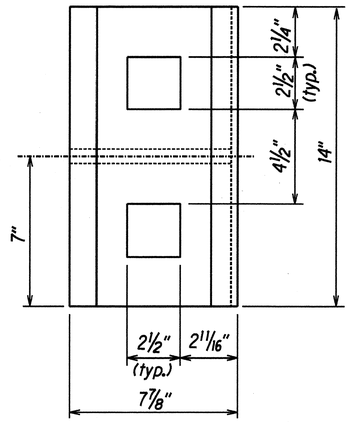
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	31	72

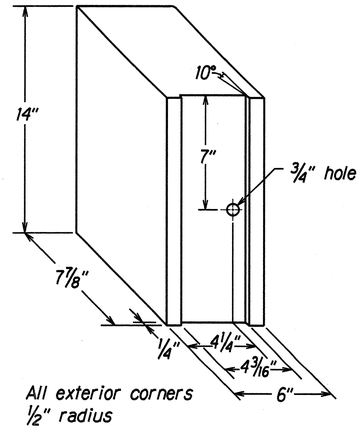


TOP

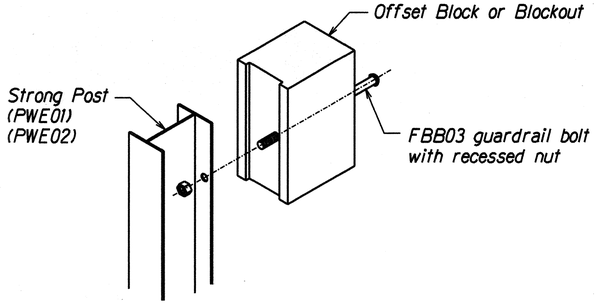


SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)

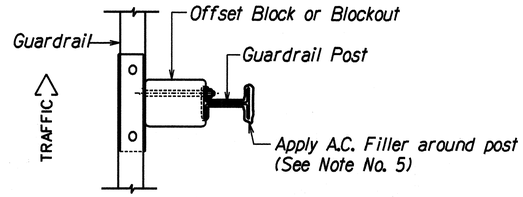


RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

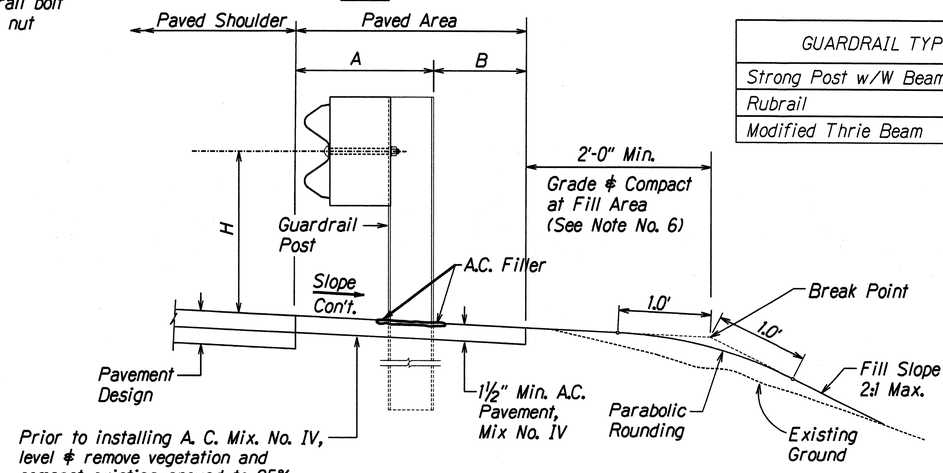


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION

GUARDRAIL TYPE	DIMENSION		
	H	A	B
Strong Post w/W Beam	1'-9⅝"	1'-6"	1'-0"
Rubrail	2'-0"	1'-6"	2'-0"
Modified Thrie Beam	2'-0"	2'-0"	1'-0"

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.
3. 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.
4. The Recycled Plastic Block or Offset Block shall be approved by the State.
5. After the guardrail posts are installed in the paved area, the Contractor shall apply A.C. Filler around the guardrail post and seal all cracks in the paved area that was 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 applying A.C. filler. The cost for this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
6. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

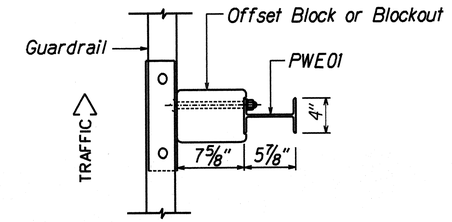
GUARDRAIL DETAILS & NOTES

KAUMUALII HIGHWAY INTERSECTION
IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

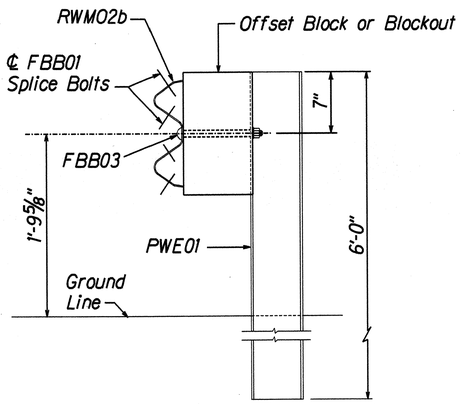
Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-29 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	32	72

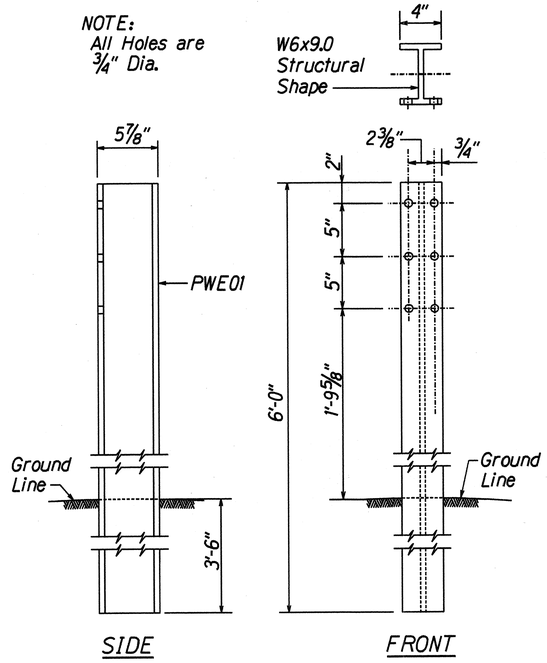


PLAN



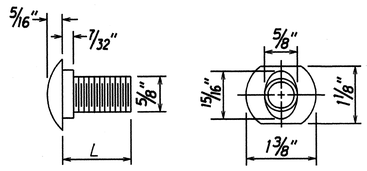
ELEVATION

STRONG POST W-BEAM GUARDRAIL (SGR04a)

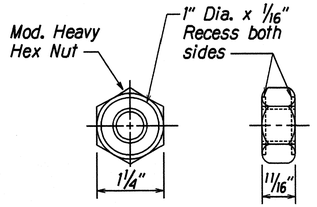


SIDE FRONT

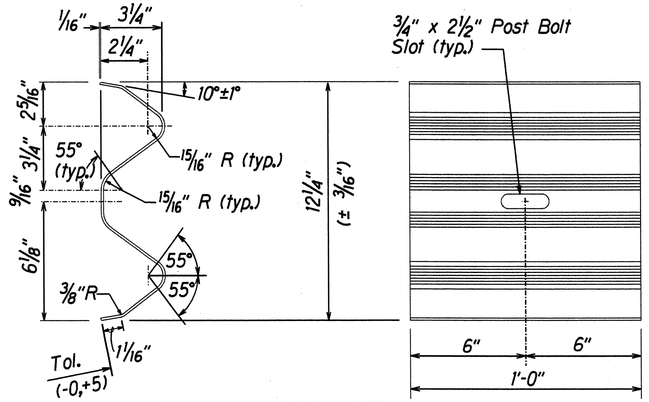
W-BEAM STRONG POST (PWE01)



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

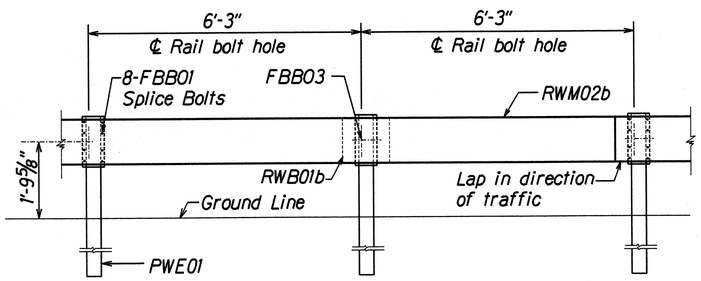


GUARDRAIL BOLTS AND RECESSED NUT



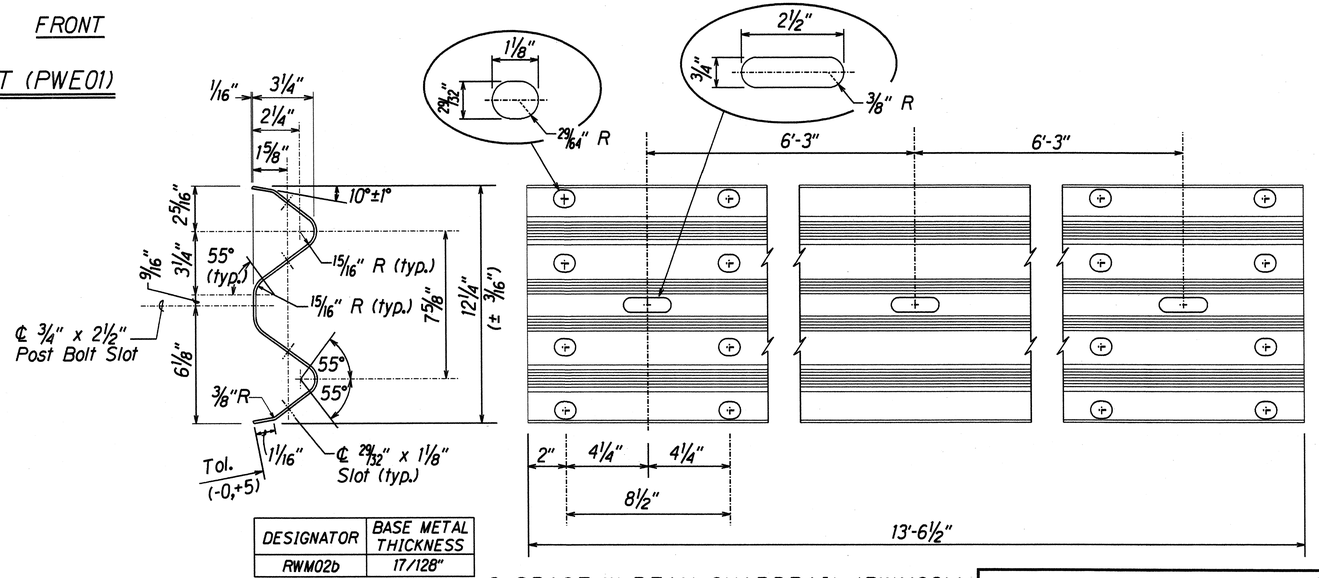
DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)



ELEVATION

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



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"

2 SPACE W-BEAM GUARDRAIL (RWM02b)

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

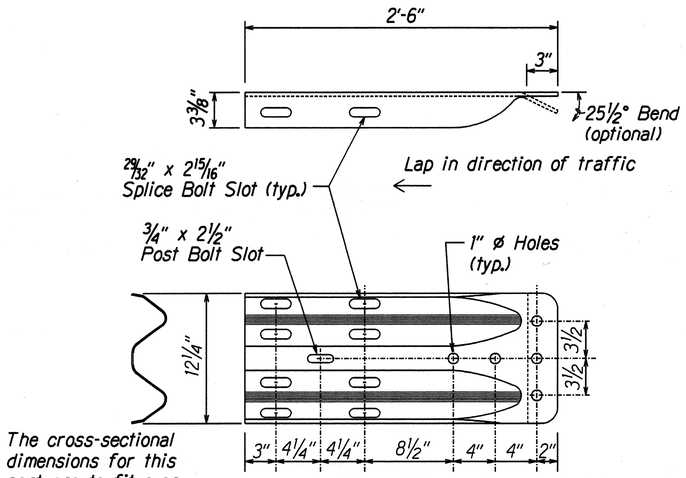
STRONG POST W-BEAM GUARDRAIL

KAUMUALII HIGHWAY INTERSECTION IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-30 OF 38 SHEETS

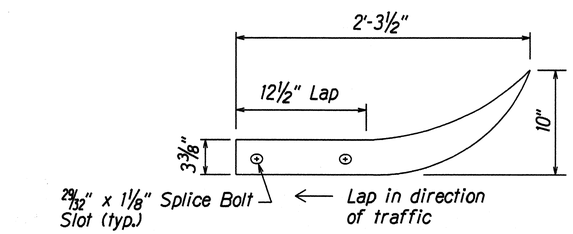
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	33	72

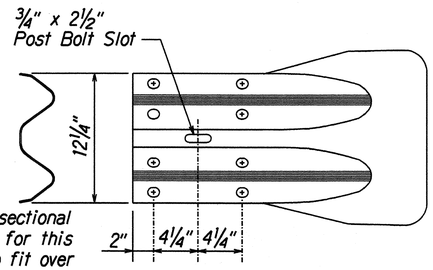


The cross-sectional dimensions for this part are to fit over part RWM02b on the approach end and under part RWM02b on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	17/128"

W-BEAM TERMINAL CONNECTOR (RWE02b)

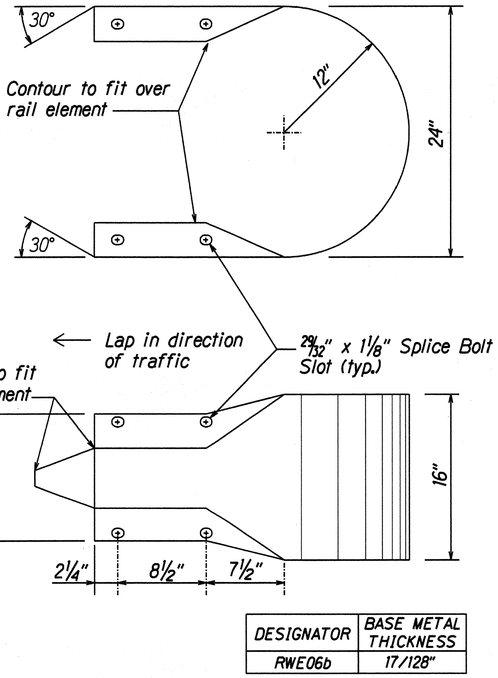




The cross-sectional dimensions for this part are to fit over part RWM02b on the approach end and under part RWM02b on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE01b	17/128"

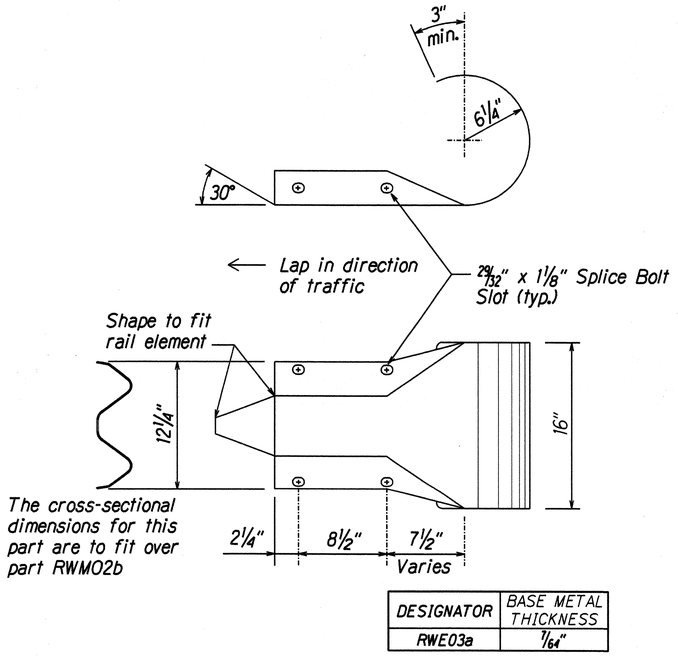
W-BEAM END SECTION (FLARED RWE01b)



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

DESIGNATOR	BASE METAL THICKNESS
RWE06b	17/128"

W-BEAM END SECTION (BUFFER RWE06b)



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

DESIGNATOR	BASE METAL THICKNESS
RWE03a	1/64"

W-BEAM END SECTION (ROUNDED RWE03a)

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

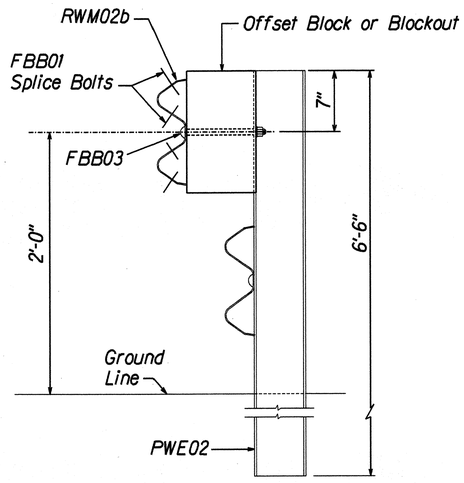
STRONG POST W-BEAM GUARDRAIL

KAUMUALII HIGHWAY INTERSECTION
IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

Scale: N.T.S. Date: Oct. 8, 1999

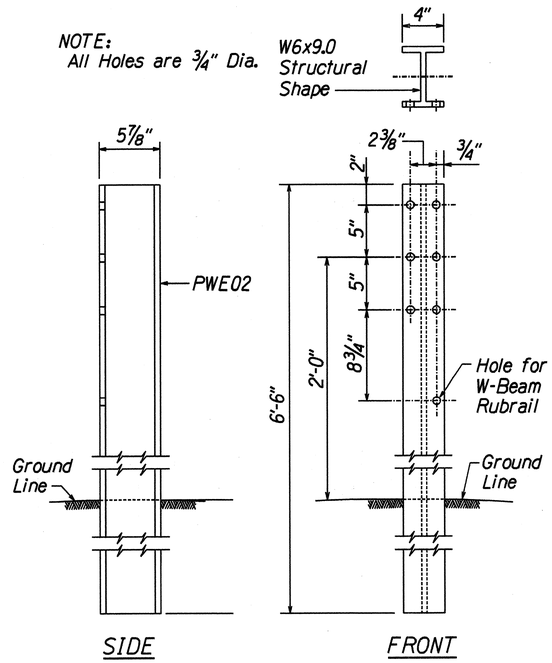
SHEET No. C-31 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	34	72



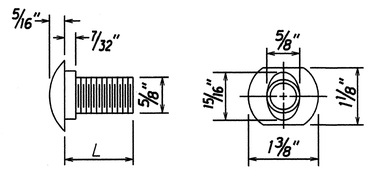
ELEVATION

STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

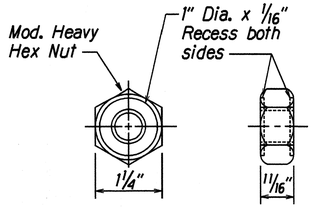


SIDE FRONT

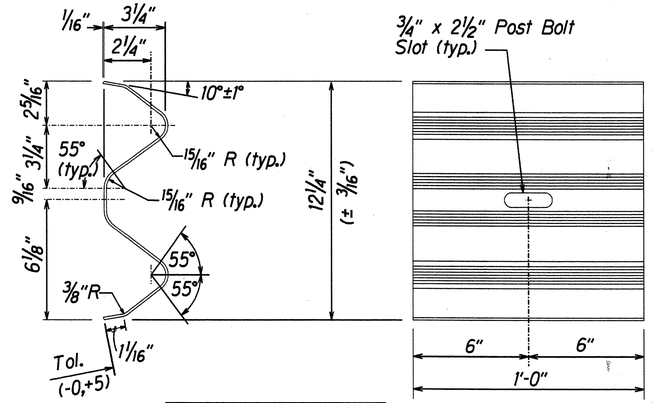
W-BEAM STRONG POST (PWE02)



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

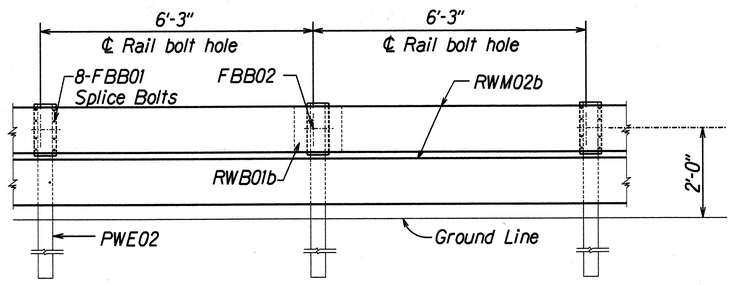


GUARDRAIL BOLTS AND RECESSED NUT



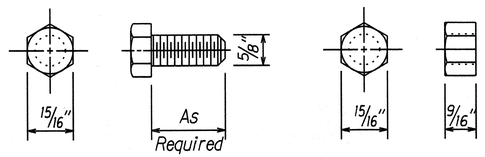
DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)

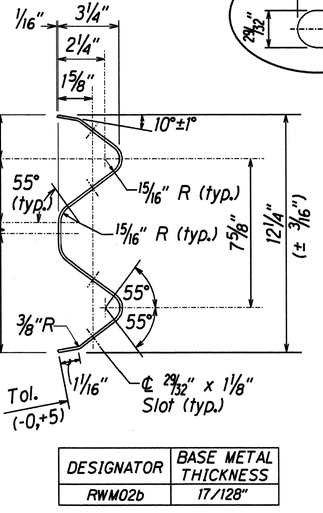


ELEVATION

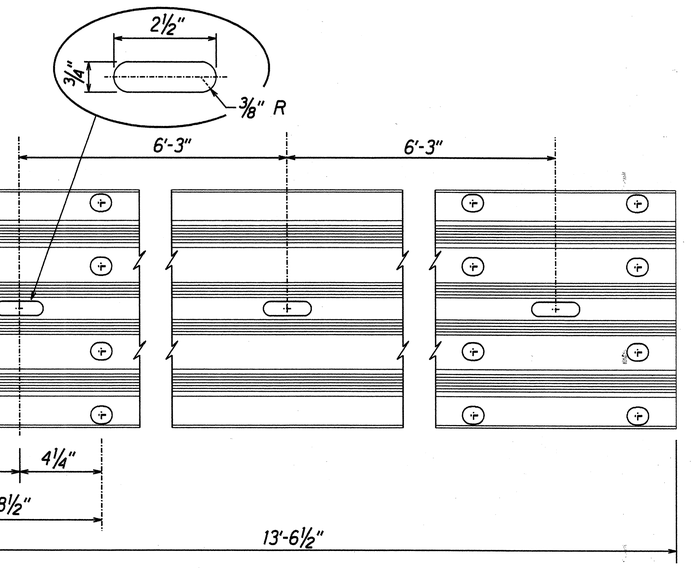
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



HEX BOLT & NUT (FBX16a)



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"



2 SPACE W-BEAM GUARDRAIL (RWM02b)

SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK
No.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

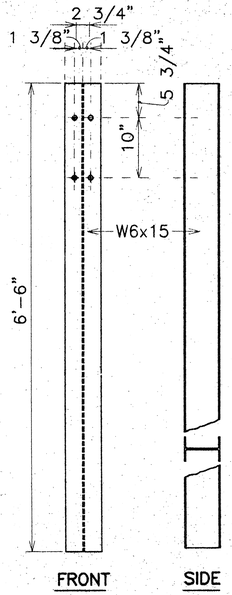
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL

KAUMUALII HIGHWAY INTERSECTION
IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

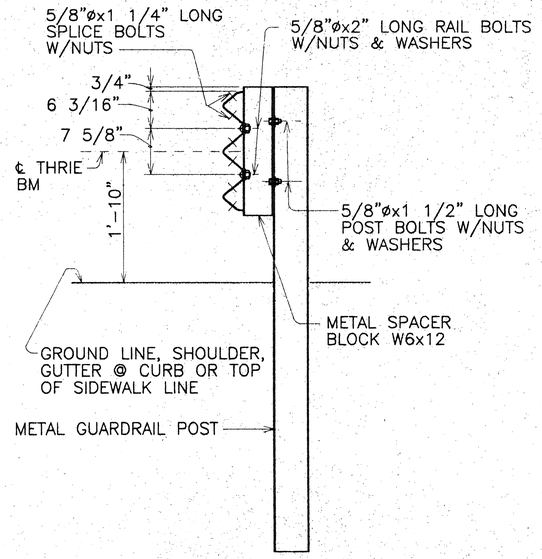
Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-32 OF 38 SHEETS

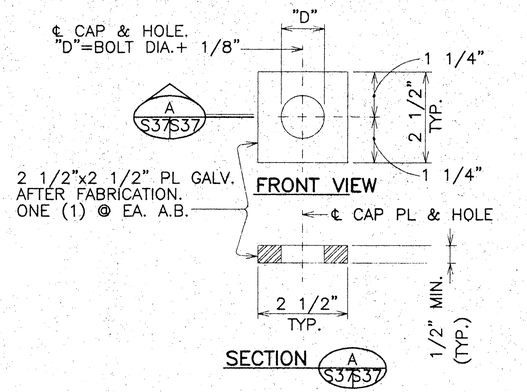
FED. ROAD DIST NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	35	72



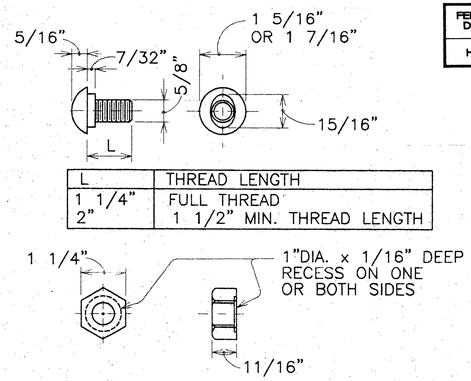
POST DETAILS
SCALE: 1" = 1'-0"



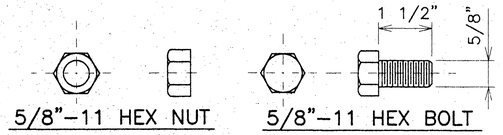
TYPICAL SECTION
METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK
SCALE: 1" = 1'-0"



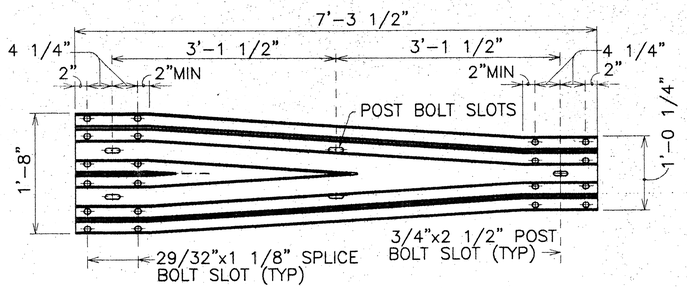
CAP (BEARING) PLATE DETAIL
SCALE: 6" = 1'-0"



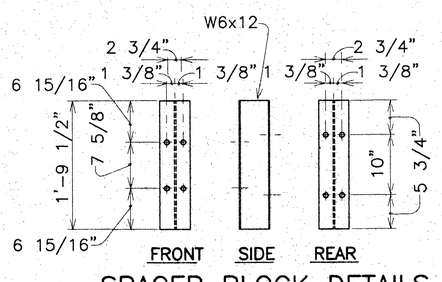
5/8"ø BUTTON HEAD BOLT & RECESS NUT
SCALE: 6" = 1'-0"



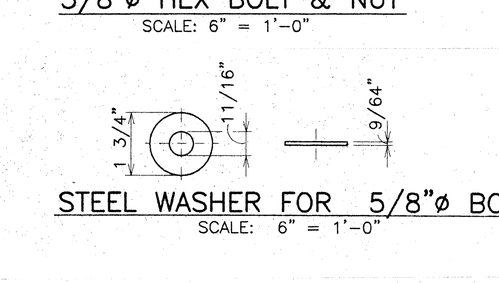
5/8"ø HEX BOLT & NUT
SCALE: 6" = 1'-0"



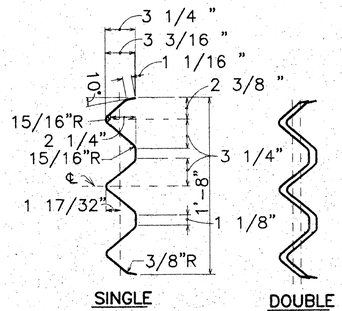
TRANSITION SECTION
SCALE: 1" = 1'-0"



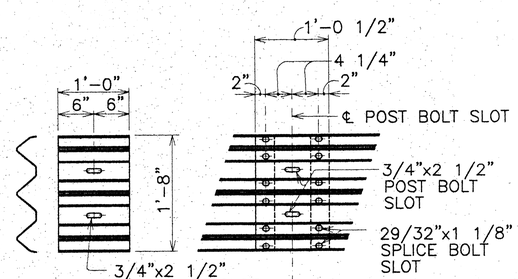
SPACER BLOCK DETAILS
SCALE: 1" = 1'-0"



STEEL WASHER FOR 5/8"ø BOLT
SCALE: 6" = 1'-0"



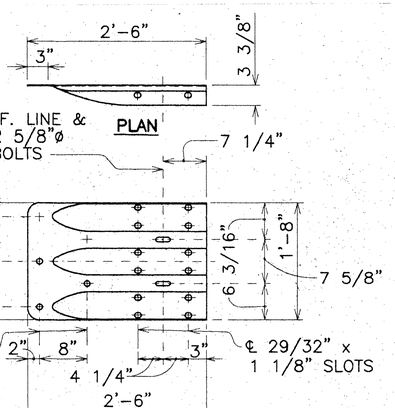
SECTION THRU RAIL ELEMENT
SCALE: 1 1/2" = 1'-0"



(USE AT POSTS WHERE SPLICES DO NOT OCCUR.)

BACKUP PLATE
SCALE: 1" = 1'-0"

RAIL SPLICE
SCALE: 1" = 1'-0"



ELEVATION

TERMINAL CONNECTOR
SCALE: 1" = 1'-0"

KENNETH C. W. KWOCK
LICENSED PROFESSIONAL ENGINEER
No. 1895-C
HAWAII USA

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

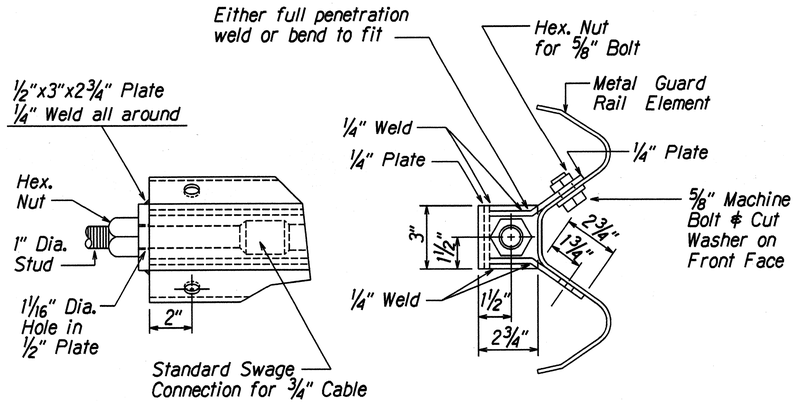
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE 3 THRIE BEAM GUARDRAIL DETAILS

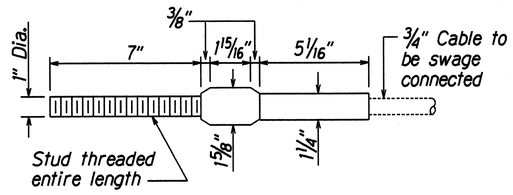
KAUMUALII HIGHWAY INTERSECTION
IMPROVEMENTS AT KOLOA ROAD
FED. AID PROJ. No. STP-050-1(17)
DATE:

SHEET No. C-33 OF 38 SHEETS

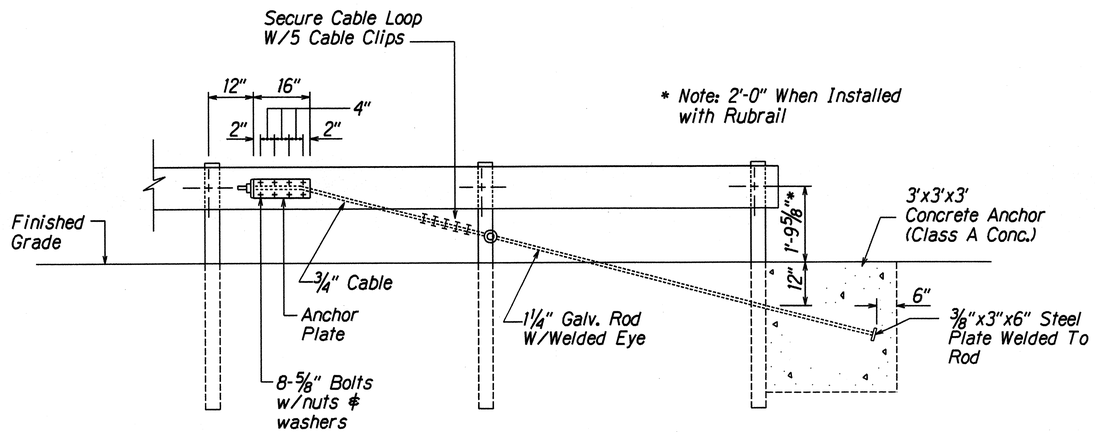
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	36	72



ANCHOR PLATE DETAILS

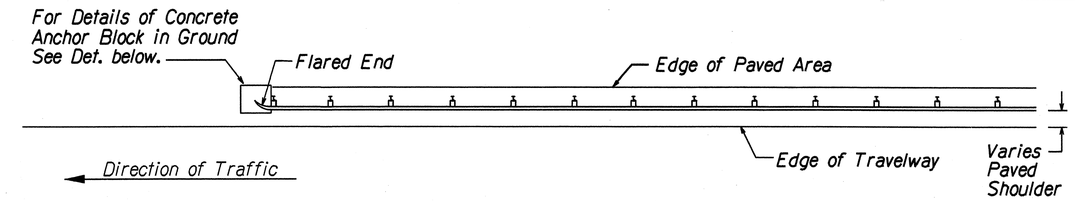


STANDARD SWAGED FITTING AND STUD

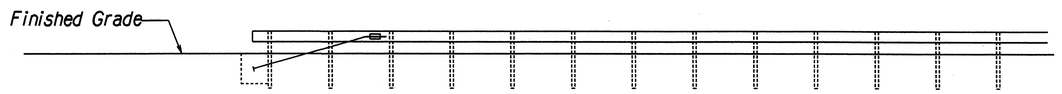


ANCHOR BLOCK DETAIL

1. Concrete, G.R.P., excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.



PLAN



ELEVATION

TYPE "G" FLARE END TERMINAL

NOTE:

Type "G" Modified End Terminal is a site specific end terminal with a taper and radial termini. A site specific detailed drawing is required for all Type "G" Modified End Terminal and must receive Engineer's approval.

The taper (flare rate) of the guardrail shall follow the latest edition of AASHTO'S Roadside Design Guide (currently, Table 5.6 - Suggested Flare Rate for Barrier Design, page 5-21, Jan. 1996 edition).

The radius of the radial termini is an Engineer's judgement based on the site evaluation. The Engineer shall consider safety (minimize the spearing ⊄ blunt end situation); degree and potential seriousness of the hazard; bicycle and pedestrian accessibility; maintenance equipment accessibility; Right-of-Way availability; the smallest radii the metal w-beam/thrie-beam railing can be constructed (check with supplier/contractor); posted speed limit; angle of vehicle impact; and aesthetics when designing the Type "G" Modified End Terminal.

During construction, the Contractor shall layout the proposed Type "G" Modified End Terminal and receive approval from the Construction Engineer prior to installation.

ORIGINAL PLAN
NOTE BOOK
No.

SURVEY PLOTTED BY
DRAWN BY
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DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

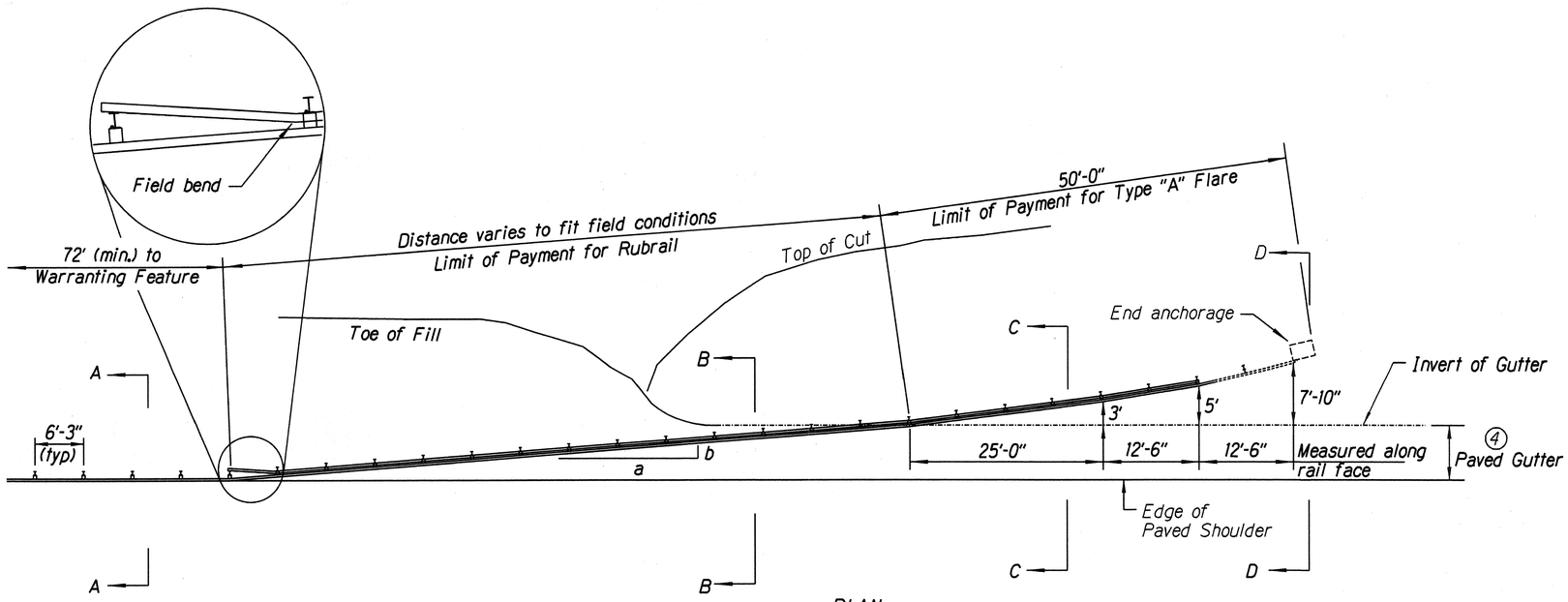
GUARDRAIL DETAILS

KAUMUALII HIGHWAY INTERSECTION
IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

Scale: N.T.S. Date: Oct. 8, 1999

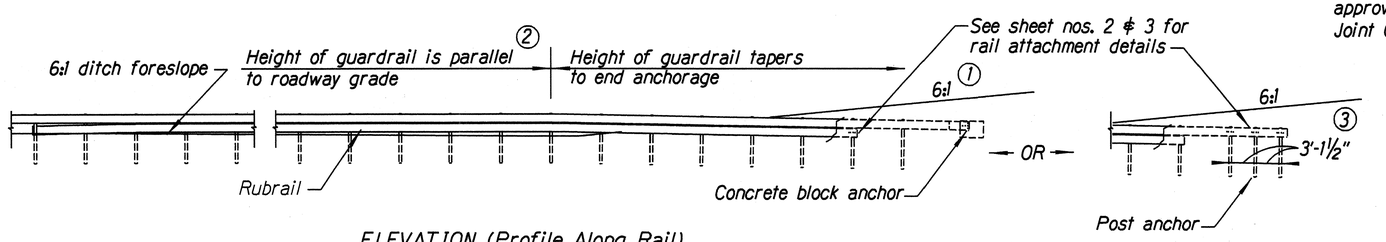
SHEET No. C-34 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	37	72

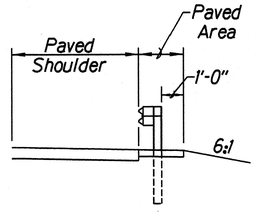


PLAN

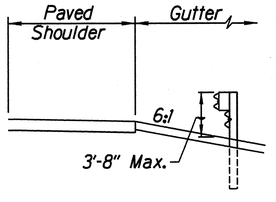
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



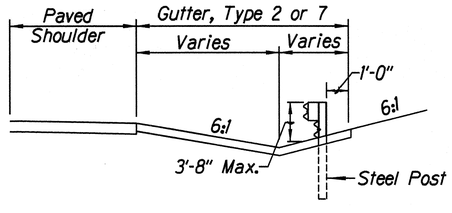
ELEVATION (Profile Along Rail)



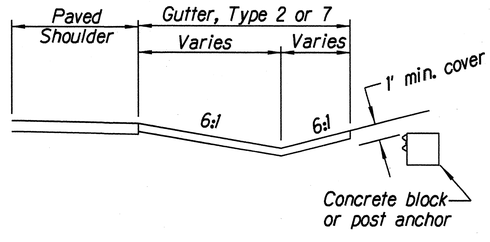
Section A-A



Section B-B
(With Rubrail)



Section C-C
(With Rubrail)



General Notes

1. A 6:1 or flatter slope is desireable. However, a steeper or flatter existing slope may be used.
2. Height of guardrail may be tapered down in elevation to maintain 3'-8" maximum height.
3. All posts are 8'-0" in length from where the guardrail flares away from the shoulder back to the post anchor. Posts for the post anchor are 6'-0" long.
4. Variable Paved Gutter offsets may be used to fit field conditions.
5. The Guardrail Posts shall be located away from the gutter/swale invert.
6. 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 an1 approved by the AASHTO-AGCAR Joint Cooperative Committee.

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

BACKSLOPE ANCHOR TERMINAL (WITH 6:1 PAVED GUTTER AND TYPE "A" FLARE)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

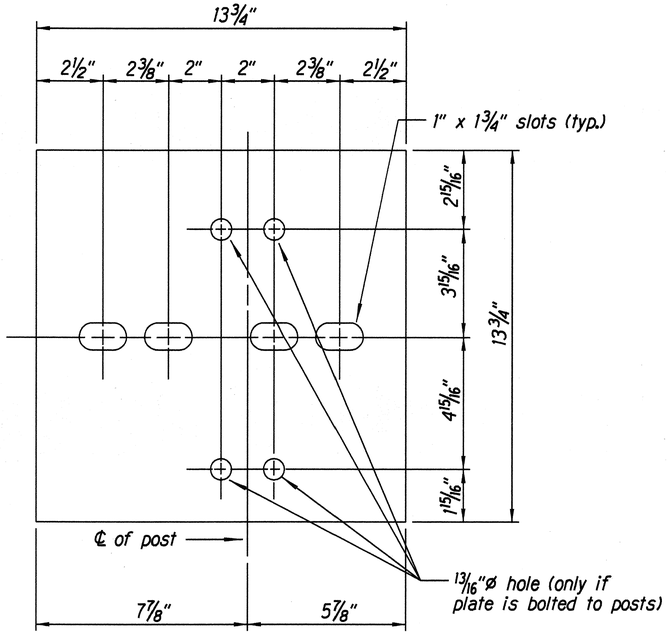
TYPE "A" FLARE

KAUMUALII HIGHWAY INTERSECTION IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

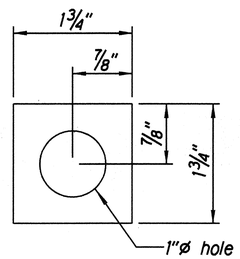
Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-35 OF 38 SHEETS

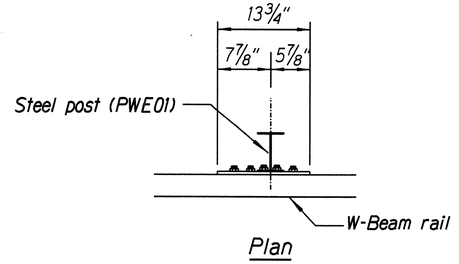
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	38	72



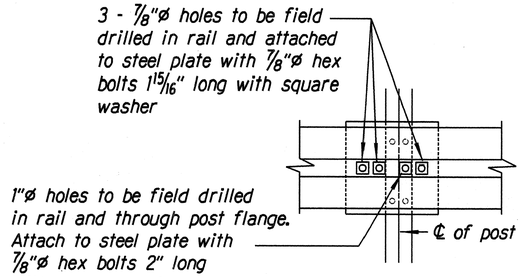
Steel Plate - ½"
(Hot-dip Zinc Coated Galvanized Welded or Bolted to Post)



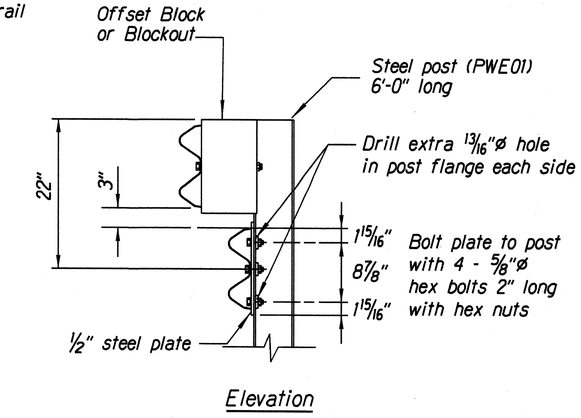
Square Washer
(3⁄16" Thick - Hot-dip Zinc Coated Galvanized)



Plan

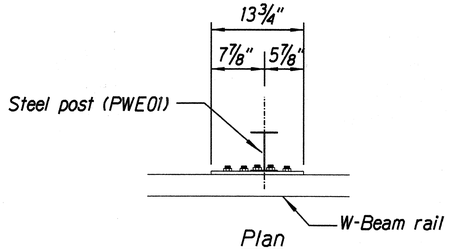


Front View

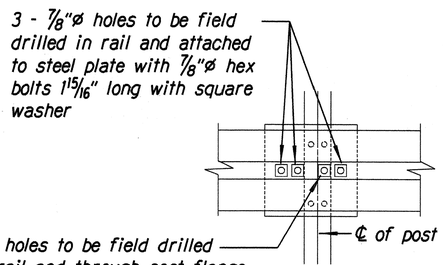


Elevation

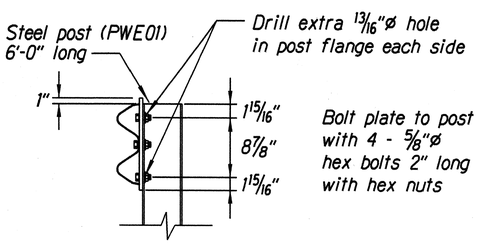
RUBRAIL ANCHOR DETAILS



Plan



Front View



Elevation

POST ANCHOR DETAILS

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS
TYPE "A" 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.

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

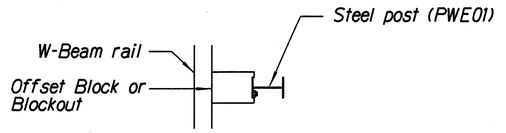
TYPE "A" FLARE

KAUMUALII HIGHWAY INTERSECTION IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

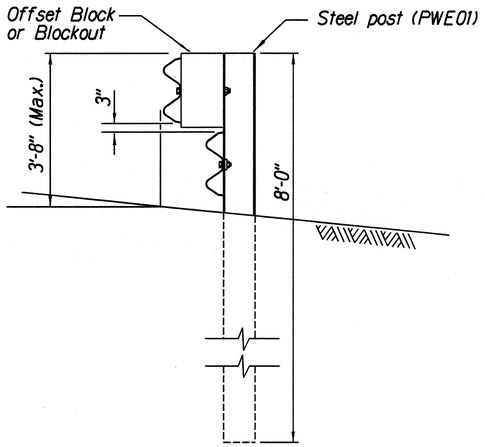
Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-36 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	39	72

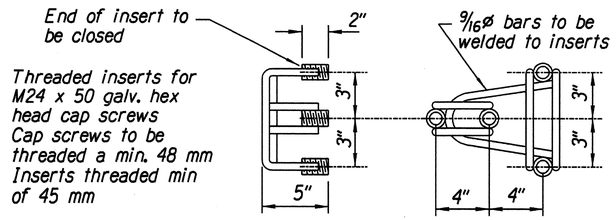


Plan

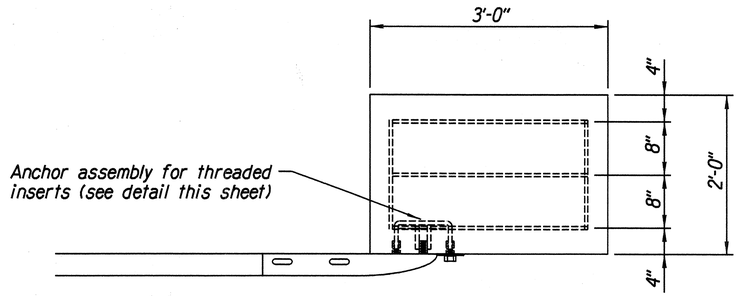


Elevation

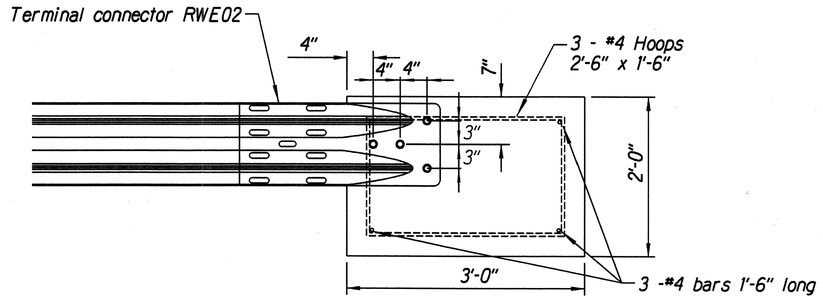
STEEL POST GUARDRAIL WITH RUBRAIL



ANCHOR ASSEMBLY
CONCRETE BLOCK ANCHOR



Plan



Elevation

CONCRETE BLOCK ANCHOR
(2' X 2' X 3')

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS TYPE "A" 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.

ORIGINAL PLAN
NOTE BOOK
No.

SURVEY PLOTTED BY ____ DATE
DRAWN BY " " "
TRACED BY " " "
DESIGNED BY " " "
QUANTITIES BY " " "
CHECKED BY " " "

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

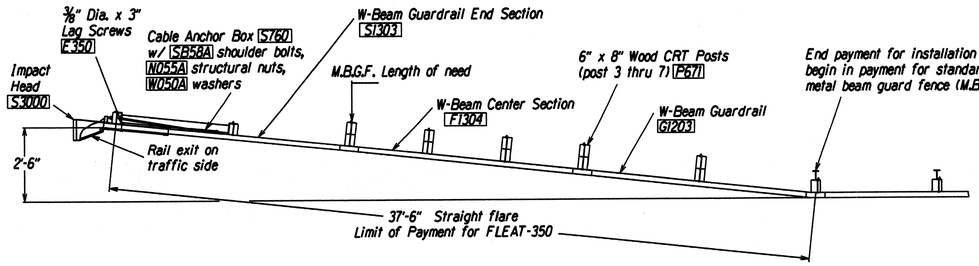
TYPE "A" FLARE

KAUMUALII HIGHWAY INTERSECTION IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

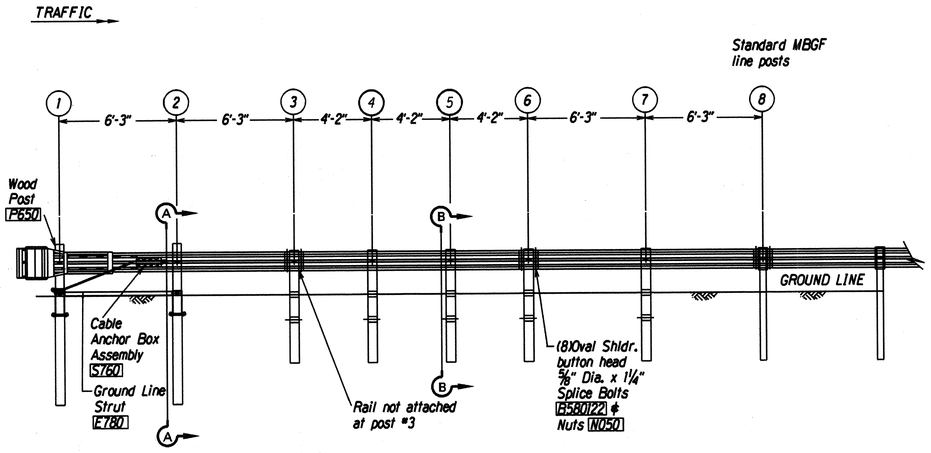
Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-37 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-050-1(17)	2000	40	72



PLAN



ELEVATION

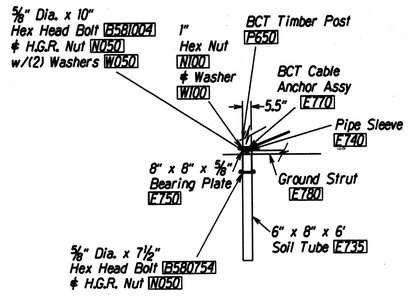
GENERAL NOTES

1. Wood posts are required with the fleat.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tube shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the soil tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
6. 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.
7. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
8. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will require field drilling new holes to accommodate the rail to the post connecting bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the engineer.

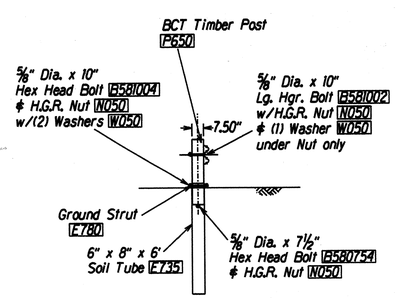
ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SEC., 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'
E740	1	PIPE SLEEVE
E750	1	BEARING PLATE, 8" x 8" x 5/8"
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
P650	2	5.5" x 7.5" x 45" WOOD POSTS
P671	5	6" x 8" x 6' WOOD CRT POST
P675	5	6" x 8" x 14" TIMBER BLOCKOUT
		HARDWARE
B580122	24	5/8" Dia. x 1 1/4" SPLICE BOLT
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B581004	2	5/8" Dia. x 10" HEX BOLT
B581002	1	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	5	5/8" Dia. x 18" H.G.R. BOLT (POST 3-7)
N050	34	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, STRUT 2, POST 2, & POST 3 THRU 7, 5)
W050	10	5/8" Dia. H.G.R. WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
E350	2	3/8" x 3" LAG SCREW
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
W050A	16	1 1/16" OD X 5/16" ID A325 STR. WASHER

Foundation Tube Options For Posts 1 & 2

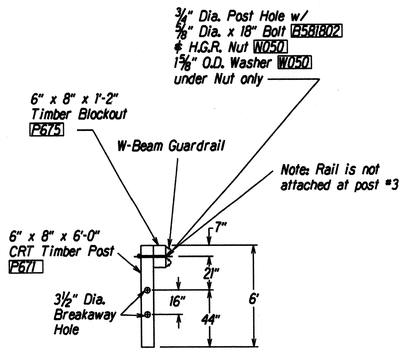
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil Plates SP600
*4'-6" Foundation Tubes E735 W/Soil Plates SP600



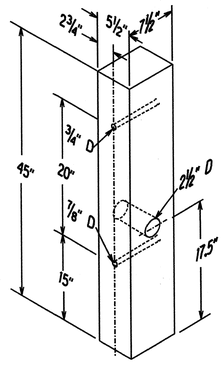
PARTIAL VIEW OF POST 1



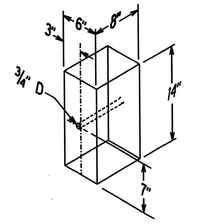
SECTION A-A
at Post #2



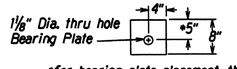
SECTION B-B
typical @ Post 3 - 7



POSTS 1 & 2



TIMBER BLOCKOUT



*for bearing plate placement, the 5" side should be installed up

BEARING PLATE E750

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350
FLARED ENERGY ABSORBING TERMINAL

KAUMUALII HIGHWAY INTERSECTION IMPROVEMENTS AT KOLOA ROAD
Project No. STP-050-1(17)

Scale: N.T.S. Date: Oct. 8, 1999

SHEET No. C-38 OF 38 SHEETS

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