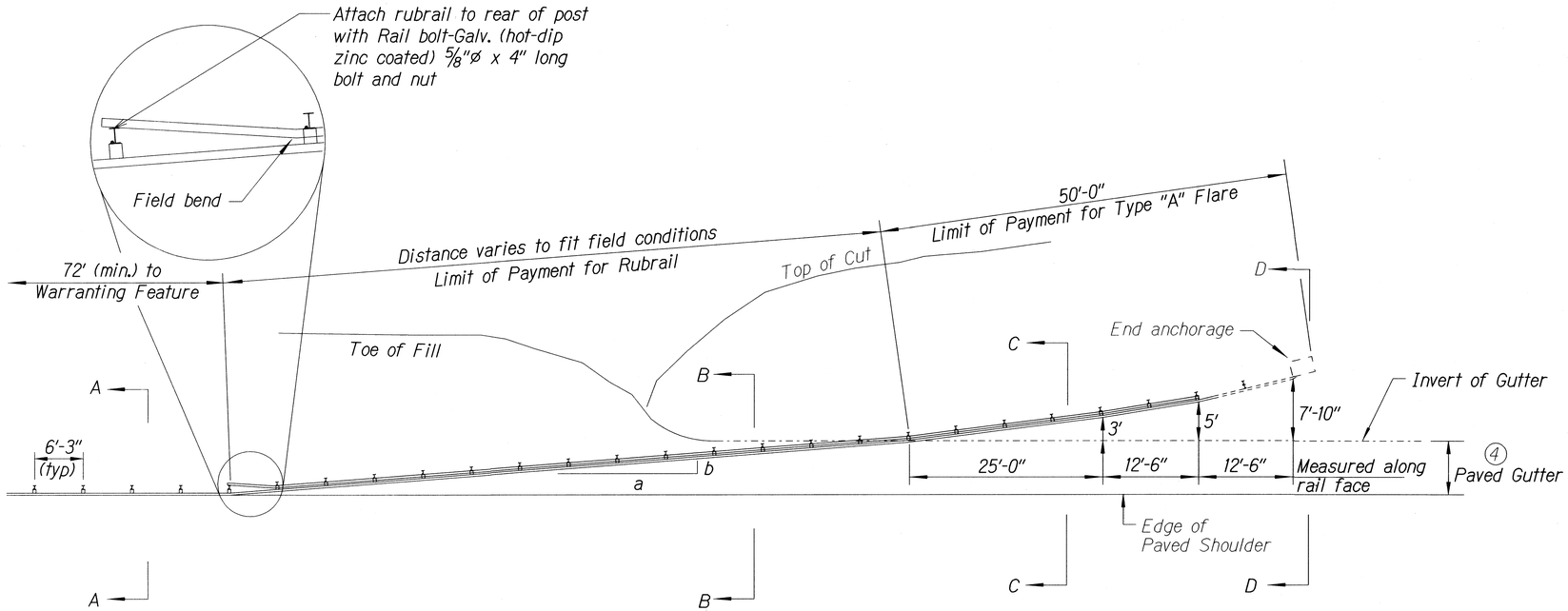
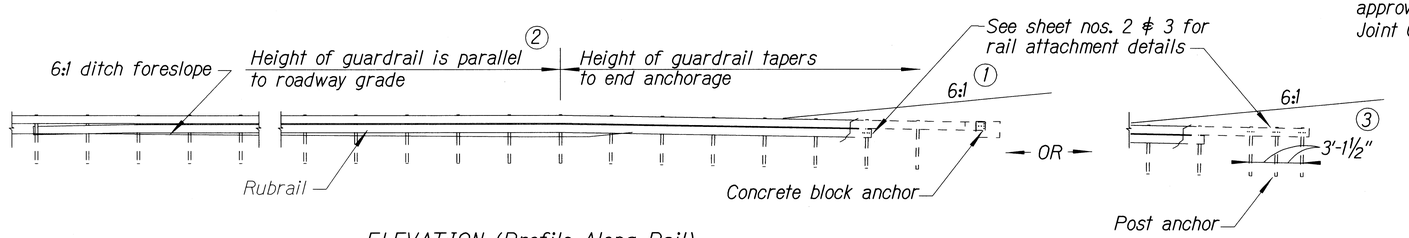
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	460A-01-11MR	2011	8	29

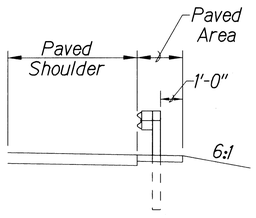


PLAN

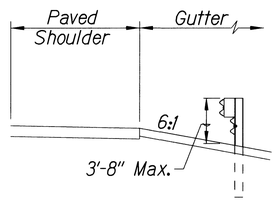
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



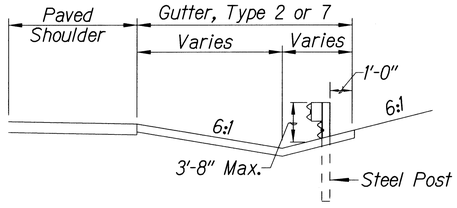
ELEVATION (Profile Along Rail)



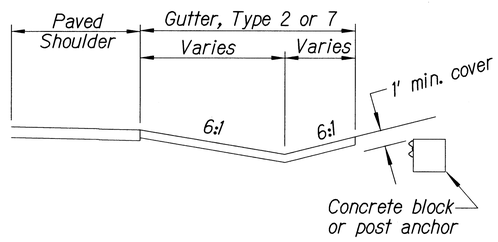
Section A-A



Section B-B
(With Rubrail)



Section C-C
(With Rubrail)



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

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 and approved by the AASHTO-AGCARTBA Joint Cooperative Committee.

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY X	
NOTE BOOK dd.1 Vol. 2400	TRACED BY X	
	DESIGNED BY X	
	QUANTITIES BY	
	CHECKED BY	

tdl:ruby/guardrail/pdgrveedition.dgn (standard plan TE-58 07/01/96, TE-59 rlt/03/89 & TE-60 07/01/86)

8/21/01

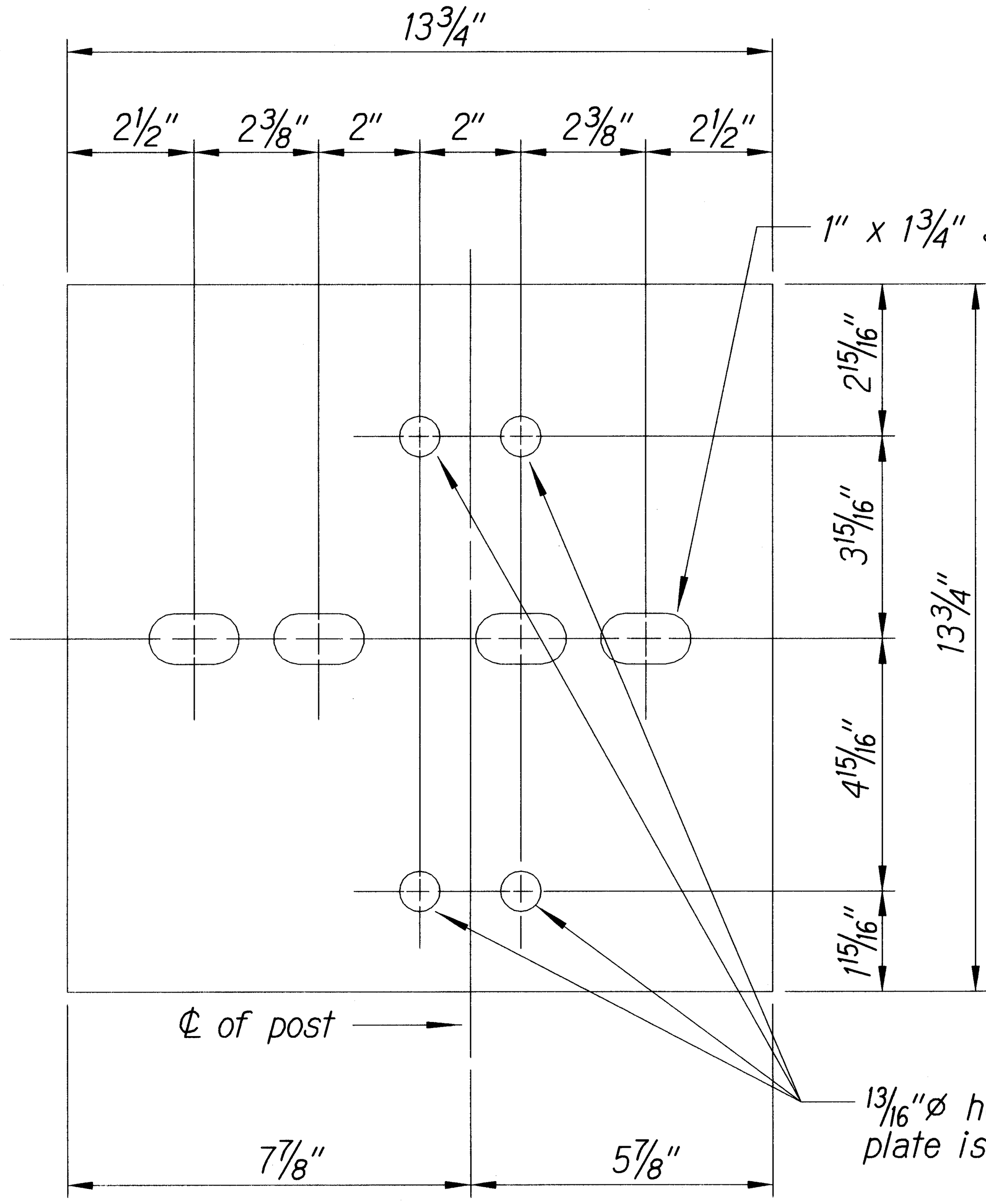
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

MAUNALOA HIGHWAY RESURFACING
Vicinity of Keonelele Avenue to Mahana
Project No. 460A-01-11MR

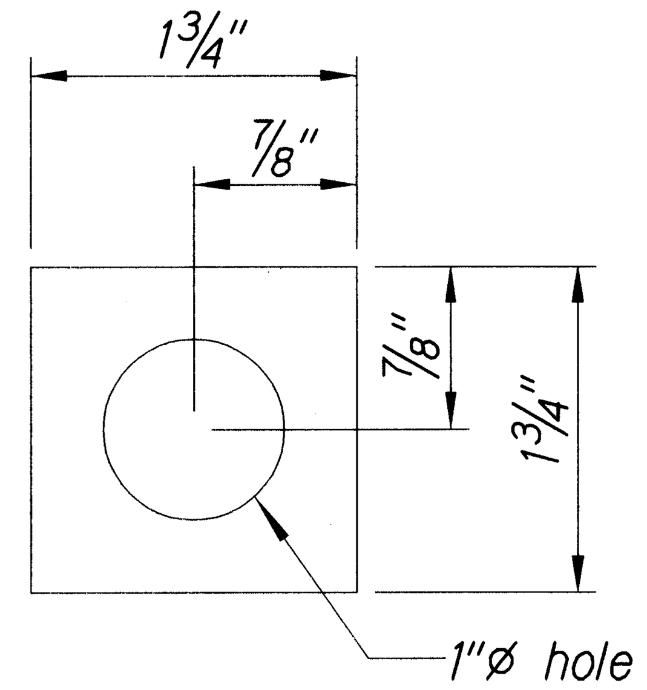
Scale: NTS Date: August, 2010

SHEET No. 1 OF 5 SHEETS



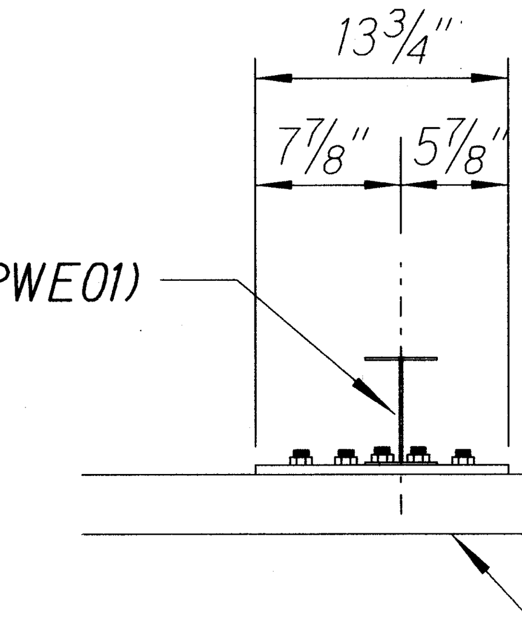
Steel Plate - ½"

(Hot-dip Zinc Coated Galvanized Welded or Bolted to Post)

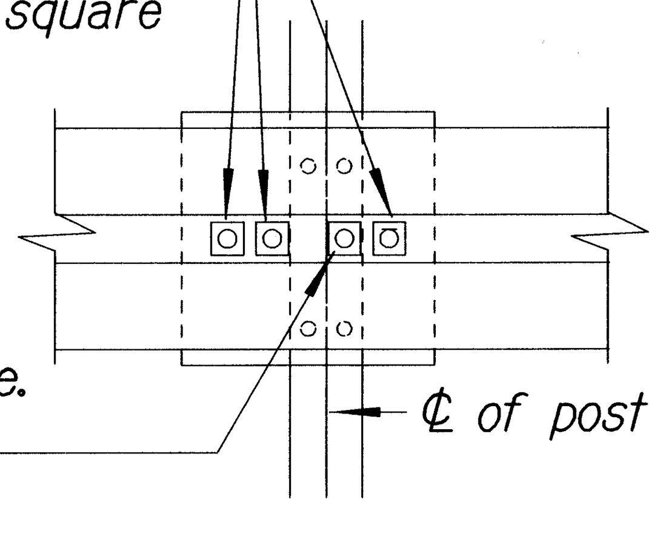


Square Washer

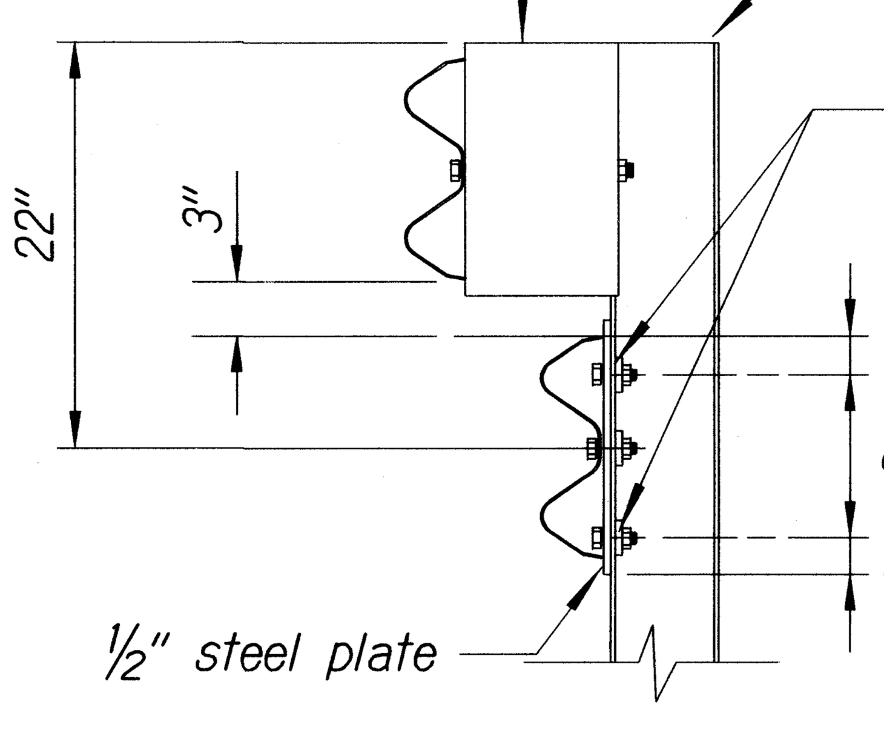
(3/16" Thick - Hot-dip Zinc Coated Galvanized)



Plan

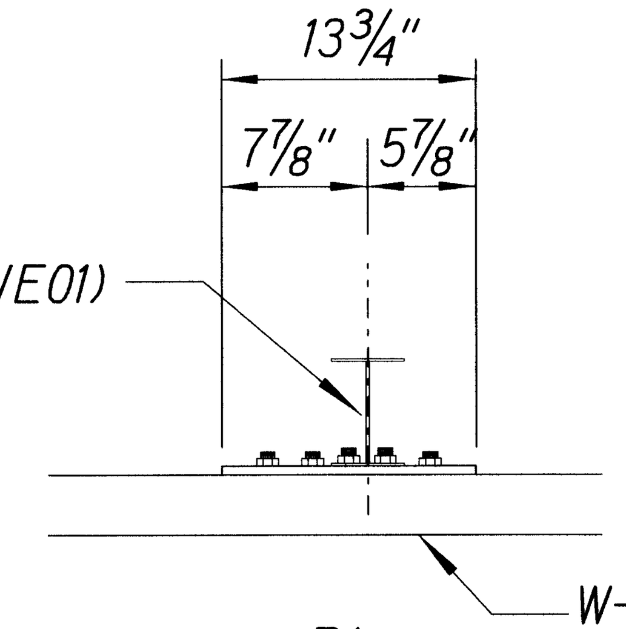


Front View

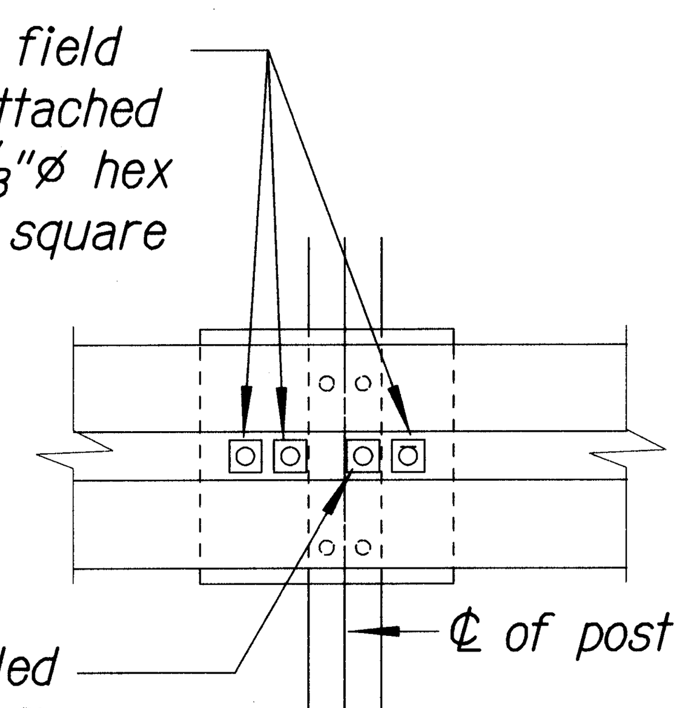


Elevation

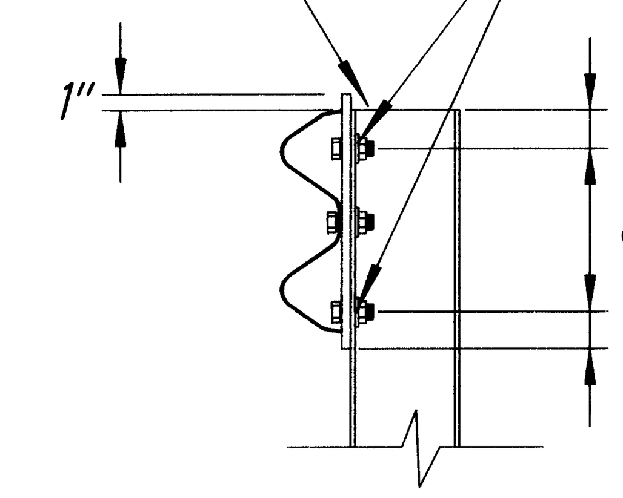
RUBRAIL ANCHOR DETAILS



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.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

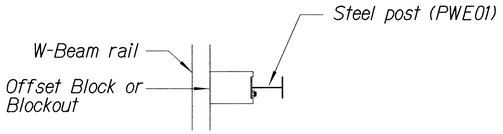
MAUNALOA HIGHWAY RESURFACING
Vicinity of Keonelele Avenue to Mahana
Project No. 460A-01-11MR

Scale: NTS Date: August, 2010

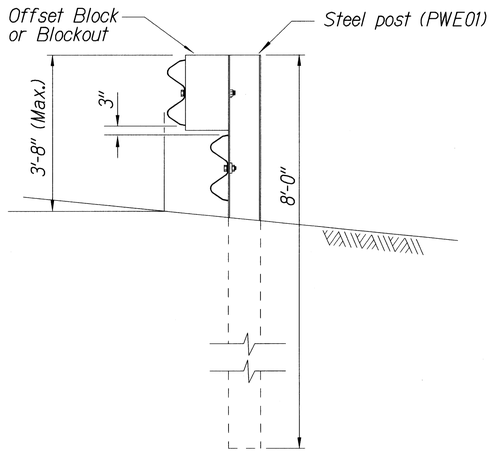
SHEET No. 2 OF 5 SHEETS

r3/01/99 tdtruby/guardrail/g4det2.dgn (standard plan TE-58 07/01/86, TE-59 r11/03/89 & TE-60 07/01/86)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	460A-01-11MR	2011	10	29

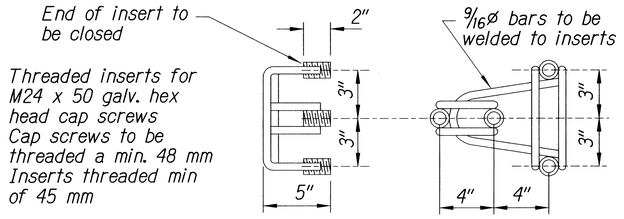


Plan

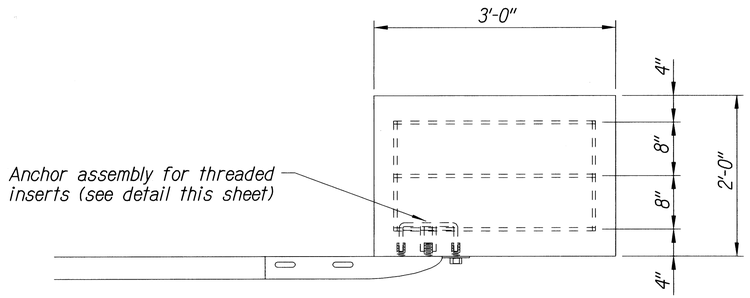


Elevation

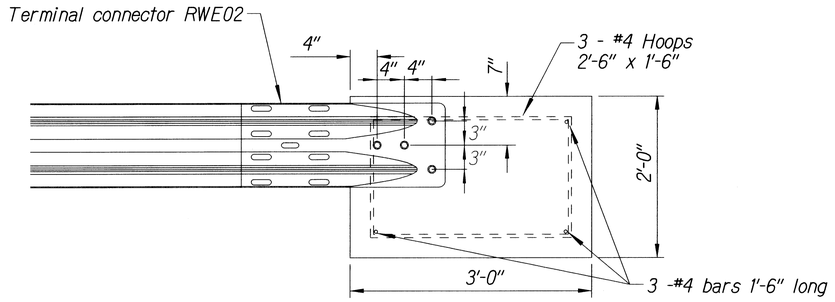
STEEL POST GUARDRAIL
WITH RUBRAIL



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	SURVEY PLOTTED BY	DATE
	DRAWN BY X	
	TRACED BY	
NOTE BOOK	DESIGNED BY X	
dd.x	QUANTITIES BY	
N. date	CHECKED BY	

c3/01/99 rd1:ubi/guardrail/gfdefl.dgn (standard plan TE-58 07/01/86, TE-59 rd1/03/89 & TE-60 07/01/86)

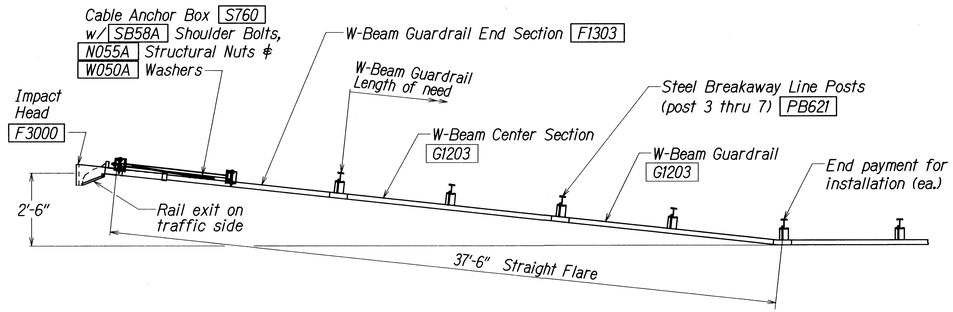
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

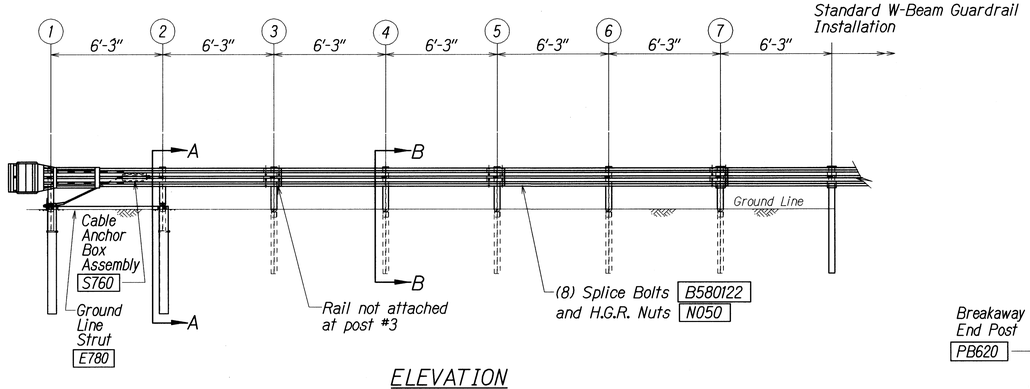
MAUNALOA HIGHWAY RESURFACING
Vicinity of Keonelele Avenue to Mahana
Project No. 460A-01-11MR

Scale: NTS Date: August, 2010

SHEET No. 3 OF 5 SHEETS



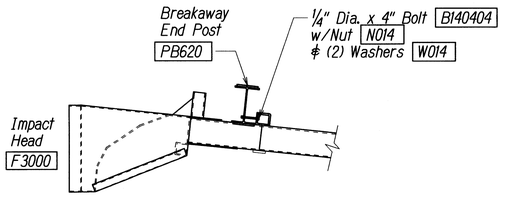
PLAN



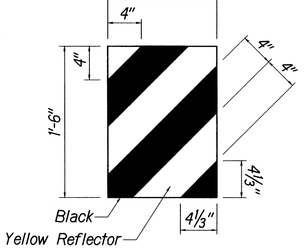
ELEVATION

GENERAL NOTES

1. Breakaway steel posts are required with the FLEAT Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tubes 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. Soil tubes shall not be driven with the post in the tube. If the 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 ½" 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. (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
8. The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.



IMPACT HEAD CONNECTING DETAIL

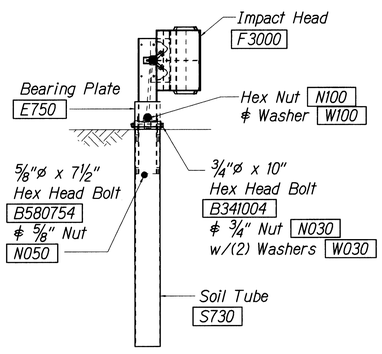


IHRM(R)
IMPACT HEAD REFLECTOR MARKER INSERT DETAIL

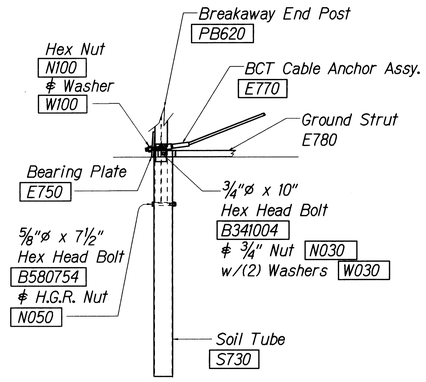
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	460A-01-11MR	2011	11	29

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
G1203	2	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POST
PB621	5	STEEL BREAKAWAY LINE POST
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		HARDWARE
B580122	25	⅝" Dia. x 1¼" SPLICE BOLT, POST #2
B580754	2	⅝" Dia. x 7½" HEX BOLT
B341004	2	¾" Dia. x 10" HEX BOLT
B581002	5	⅝" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)
N050	32	⅝" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6)
N030	2	¾" Dia. HEX NUT
W050	6	H.G.R. WASHER
W030	4	¾" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	¼" x 4" HEX BOLT
N014	2	¼" HEX NUT
W014	4	¼" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½" A325 STRUCTURAL NUT
W050A	16	1⅛" OD x 3/16" ID A325 STR. WASHER

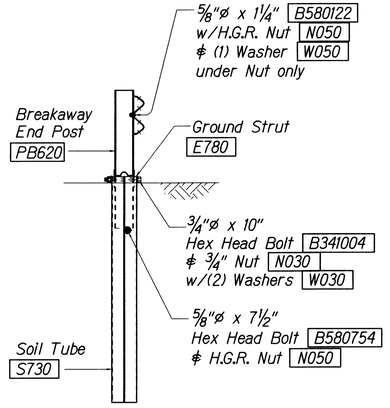
Foundation Tube Options For Posts 1 & 2
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil Plates SP600
*4'-6" Foundation Tubes E735 W/Soil Plates SP600



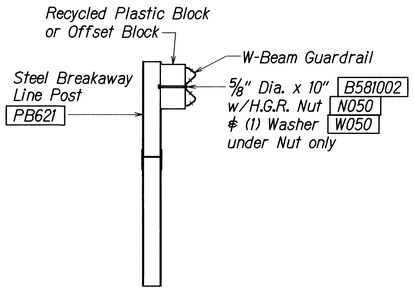
FRONT VIEW OF POST 1



PARTIAL VIEW OF POST 1



SECTION A-A
at Post #2



SECTION B-B
(Typical @ Post 3 - 7)
NOTE: RAIL NOT BOLTED @ POST #3

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350

FLARED ENERGY ABSORBING TERMINAL

MAUNALOA HIGHWAY RESURFACING
Vicinity of Keonelele Avenue to Mahana
Project No. 460A-01-11MR

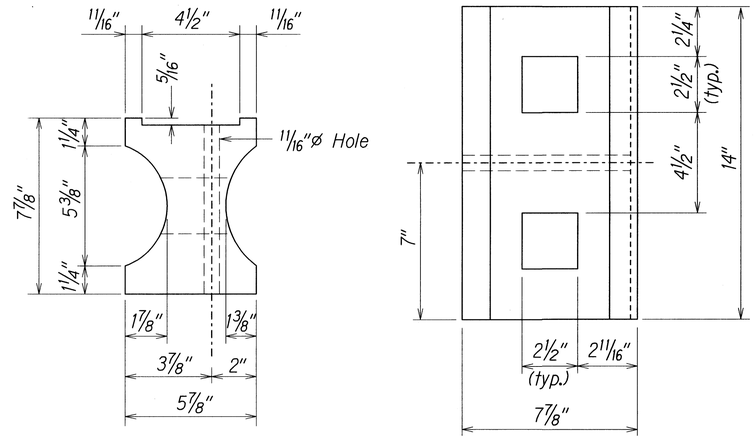
Not to Scale Date: August, 2010

SHEET No. 4 OF 5 SHEETS

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

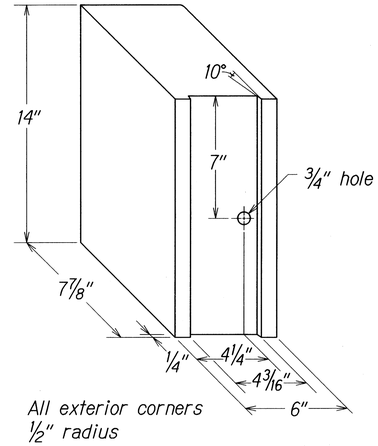
r8/12/02 tdl:ruby/guardrail/fleat350.dgn (standard plan TE-61 rll/03/99 & TE-62 r09/01/87)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	460A-01-11MR	2011	12	29



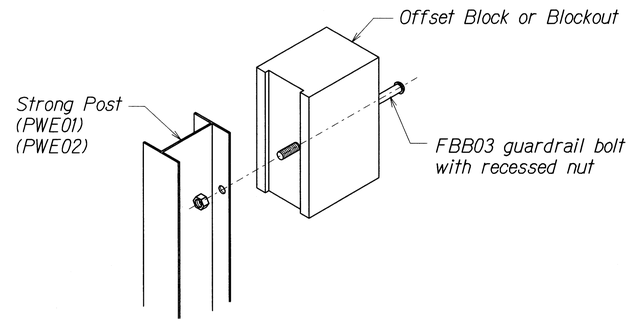
TOP SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)



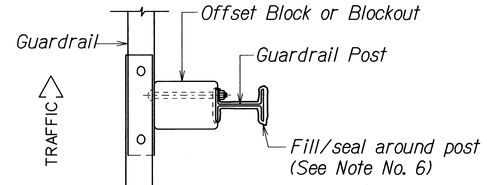
All exterior corners
1/2" radius

RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

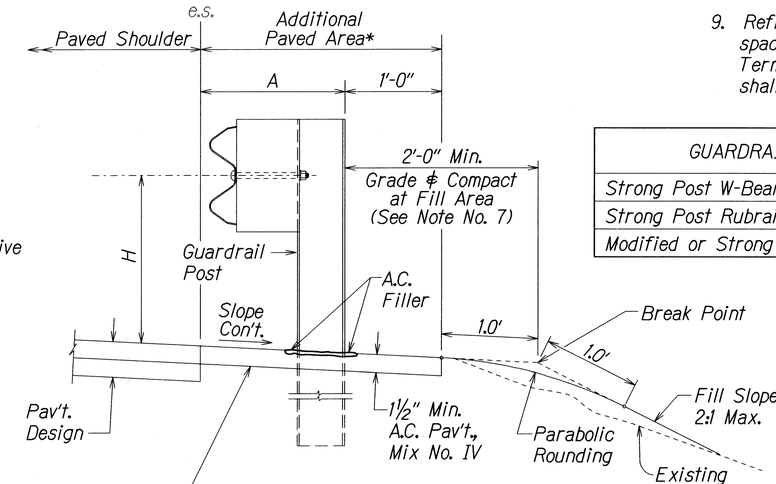


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL

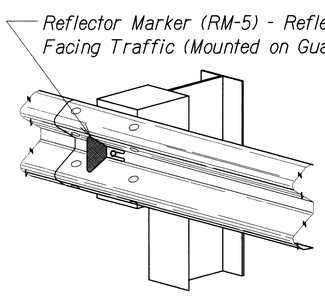


PLAN

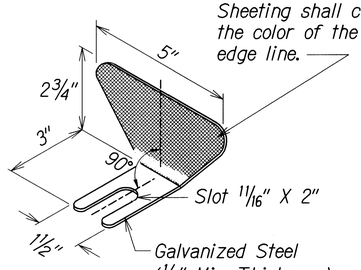


ELEVATION

TYPICAL GUARDRAIL INSTALLATION



Reflector Marker (RM-5) - Reflector Facing Traffic (Mounted on Guardrail Bolt)



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL 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.
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. 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. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
9. 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 adjacent guardrail system.

GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"

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

(standard plan TE-50 r09/01/00)
td1:ruby/guardrail/te50rev.dgn
r12/31/03

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

MAUNALOA HIGHWAY RESURFACING
Vicinity of Keonelele Avenue to Mahana
Project No. 460A-01-11MR

Scale: NTS Date: November, 2010

SHEET No. 5 OF 5 SHEETS