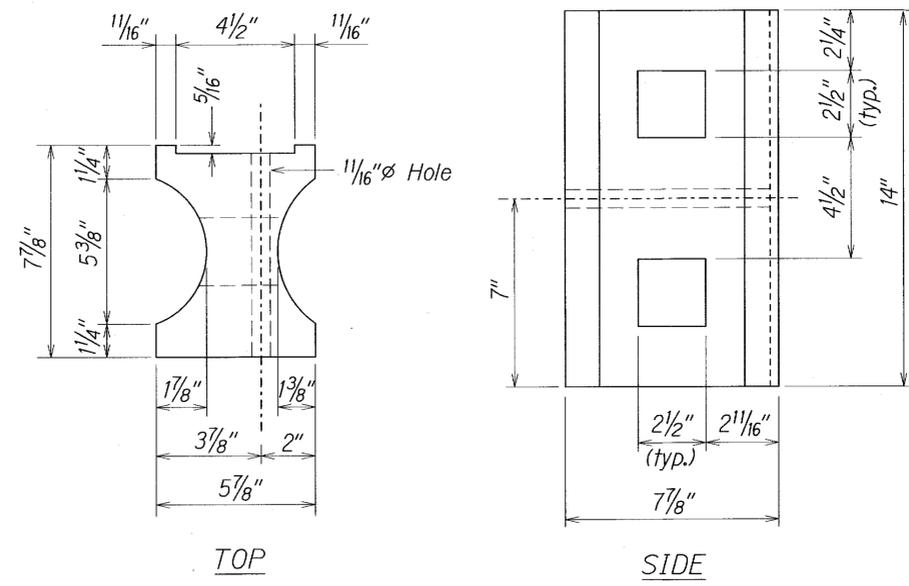
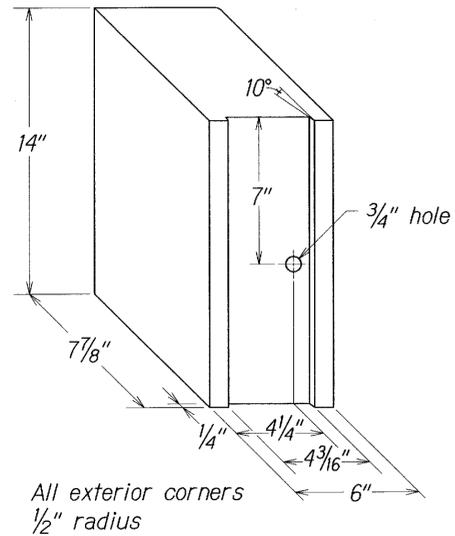


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2013	29	40



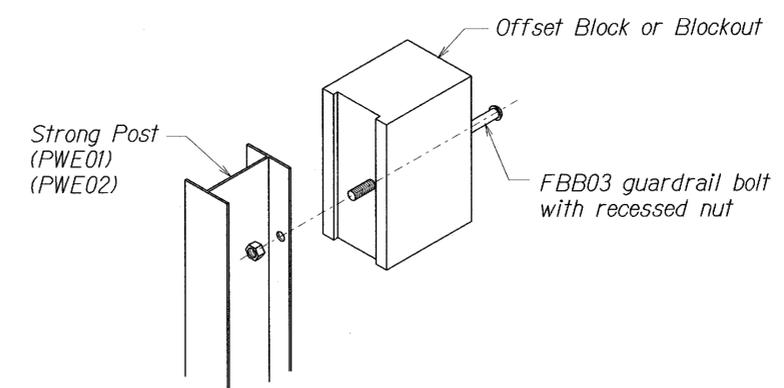
RECYCLED PLASTIC BLOCKOUT (TYPE I)



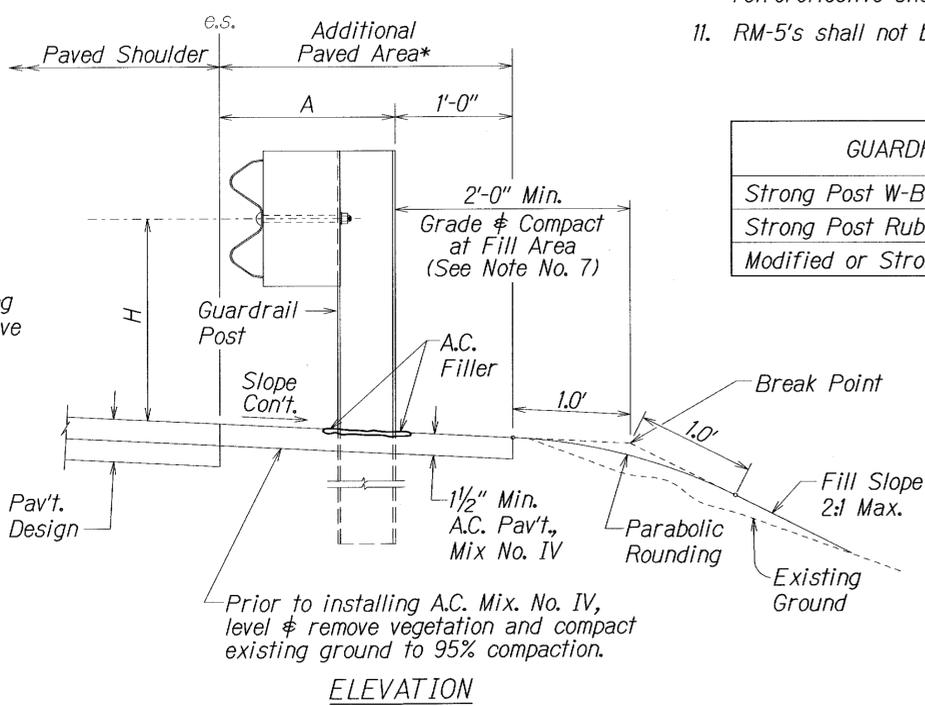
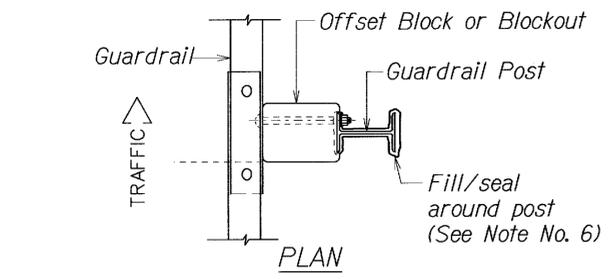
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

GENERAL NOTES

- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- 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 fasteners, posts and rail elements have been converted from metric units into their present form.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
- After the guardrail posts are installed/ removed or adjusted 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 work. 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.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- 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.
- Reflector Markers (RM-5) shall be bi-directional with white and red retroreflective sheeting.
- RM-5's shall not be installed on the End Terminals.

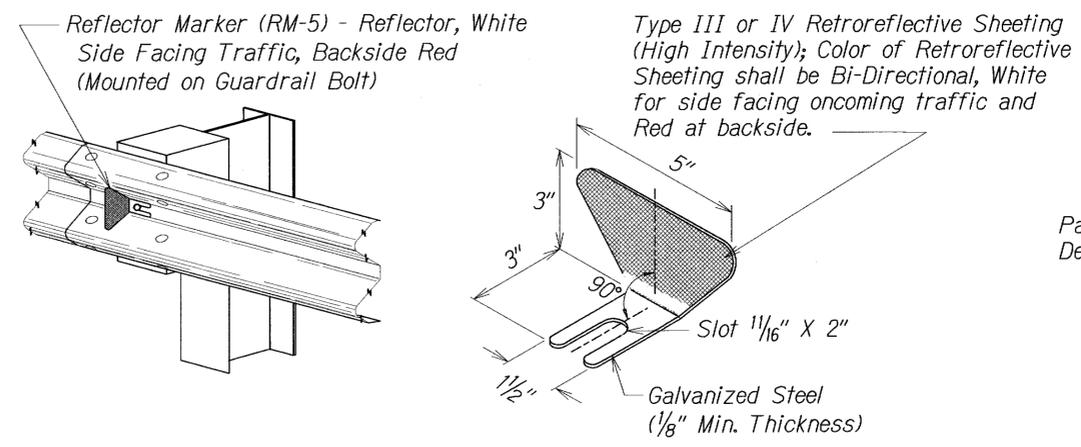


STEEL POST AND BLOCK DETAIL



TYPICAL GUARDRAIL INSTALLATION

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"



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

4/30/14	Reflector Marker (RM-5) change detail to white one side and red the other side, also general notes 10 & 11 added.
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DATE	REVISION
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STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

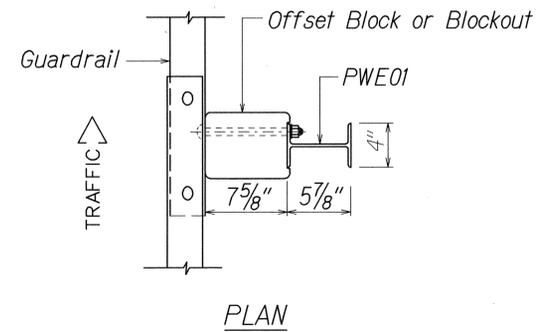
**GUARDRAIL DETAILS & NOTES**

HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)

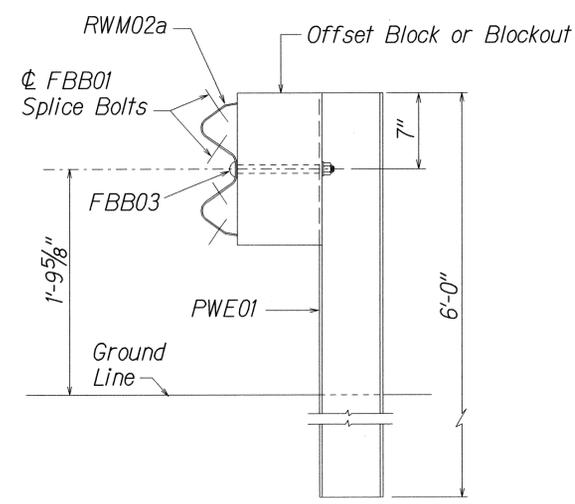
Scale: NTS Date: April, 2013

SHEET No. 1 OF 10 SHEETS

ORIGINAL SURVEY PLOTTED BY DATE X  
 DESIGNED BY  
 CHECKED BY  
 02/23/03 kdcubby/guardrail/ks0rev.dgn (standard plan TE-50, 08/01/00)

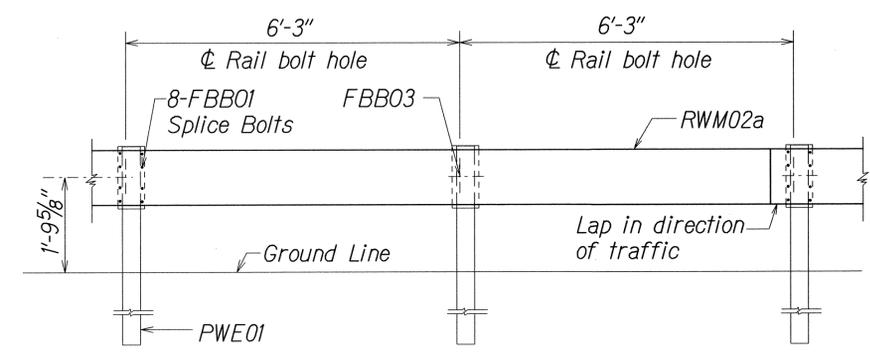


PLAN



ELEVATION

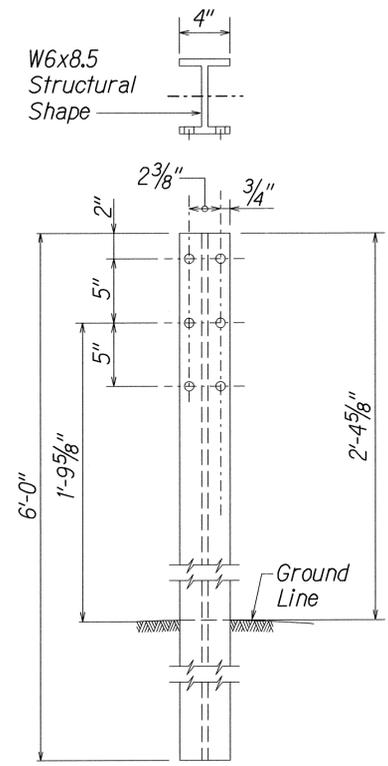
STRONG POST W-BEAM GUARDRAIL (SGR04a)



ELEVATION

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

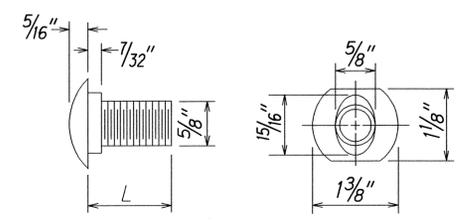
NOTE:  
All Holes are 3/4" Dia.



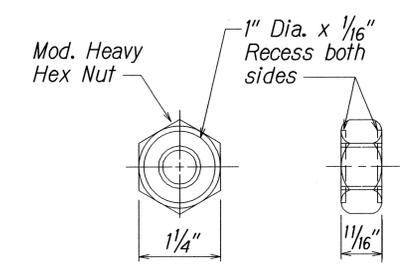
SIDE

FRONT

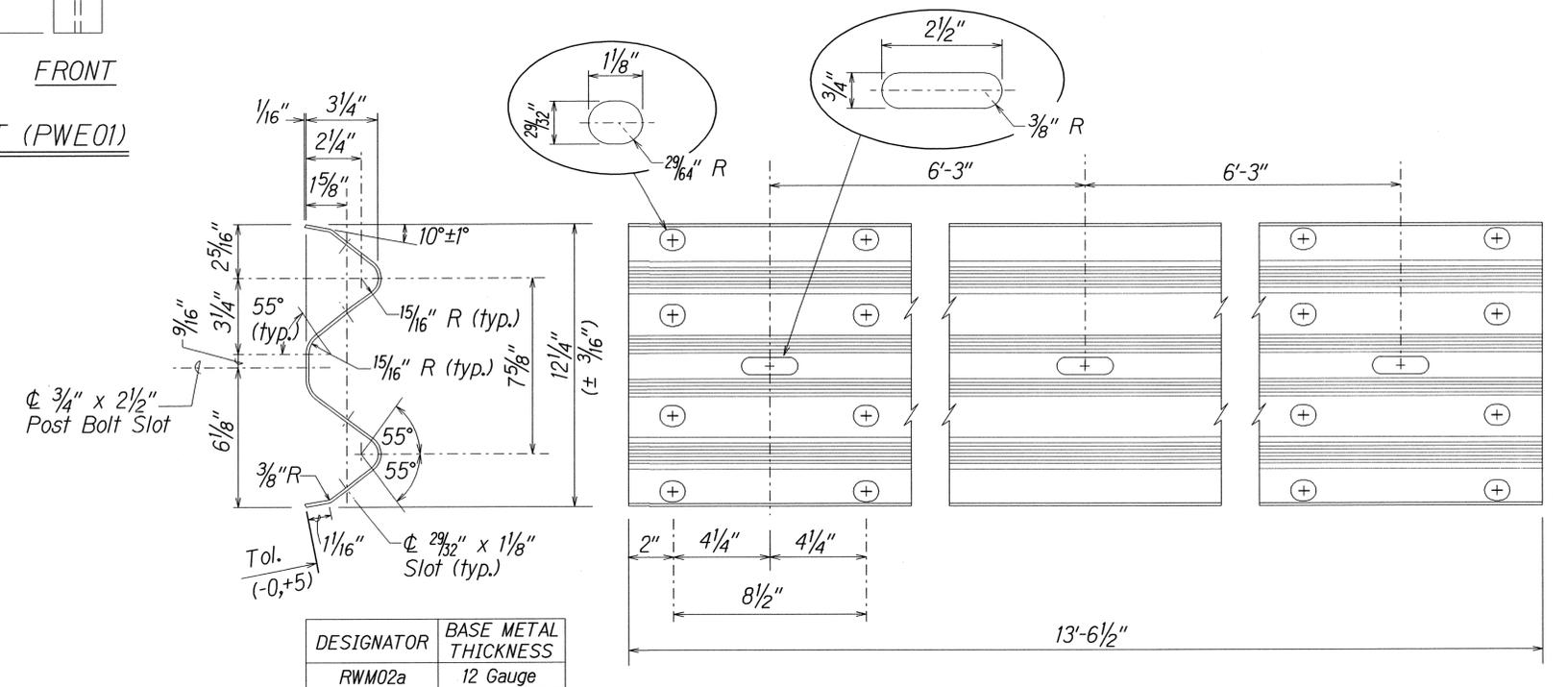
W-BEAM STRONG POST (PWE01)



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



GUARDRAIL BOLTS AND RECESSED NUT



2 SPACE W-BEAM GUARDRAIL (RWM02a)

ORIGINAL PLAN  
DATE  
SURVEY PLOTTED BY  
DRAWN BY  
TRACED BY  
NOTE BOOK  
hel/heave  
QUANTITIES BY  
CHECKED BY  
r11/01/05  
tdr/ubj/guardrail/wbeams04a  
cstandard plan TE-50 r03/06/07

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

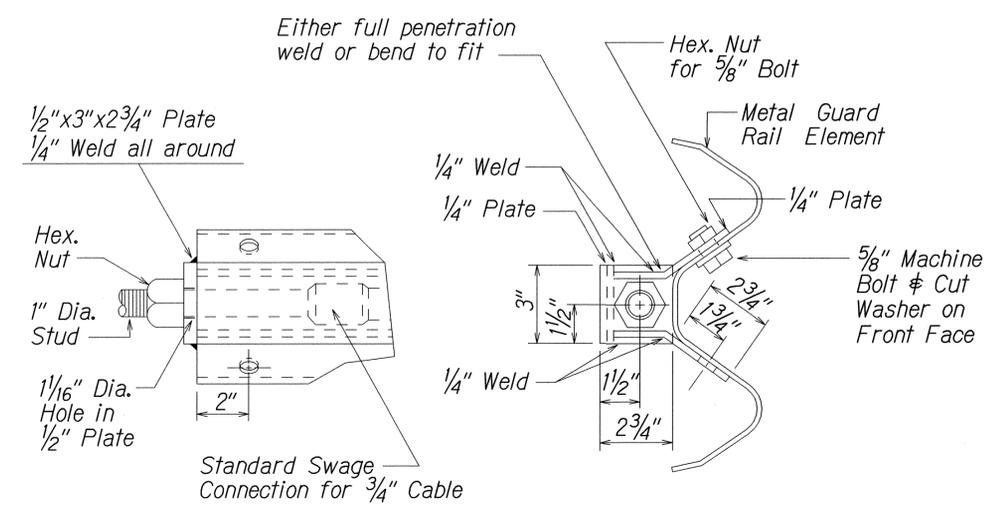
**STRONG POST W-BEAM GUARDRAIL**

HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)

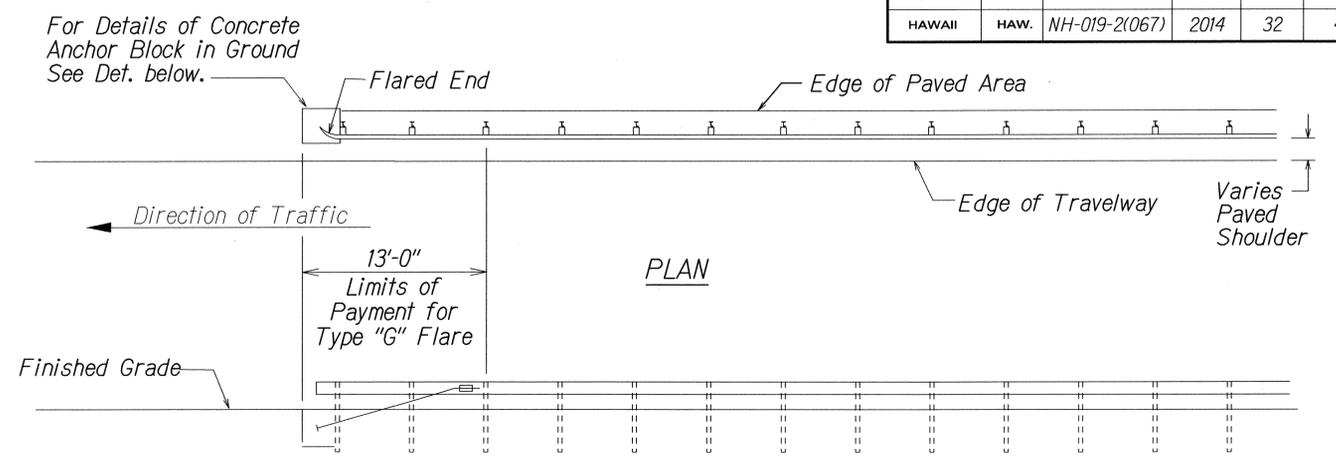
Scale: NTS Date: March, 2014

SHEET No. 2 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	32	41

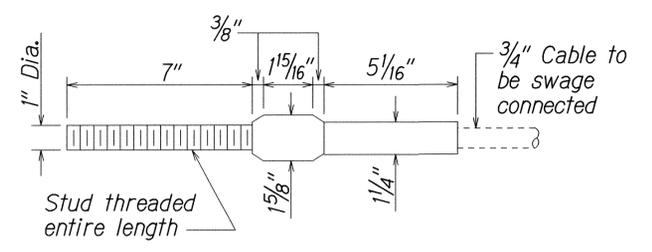


ANCHOR PLATE DETAILS



ELEVATION

TYPE "G" FLARE END TERMINAL



STANDARD SWAGED FITTING AND STUD

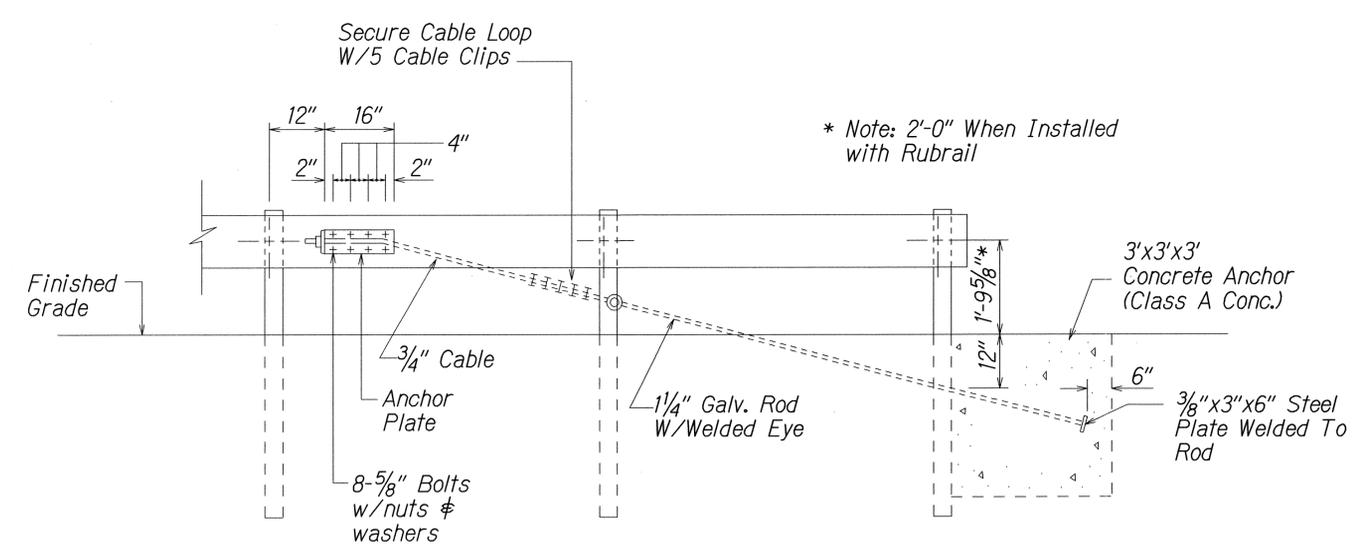
NOTE:

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.



ANCHOR BLOCK DETAIL

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

DATE	
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
FILE/leave	
8/19/13/02	

8/19/13/02 rdtracy/guardrail/ra99rev.dgn (standard) plan TE-89 rtr/03/09

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

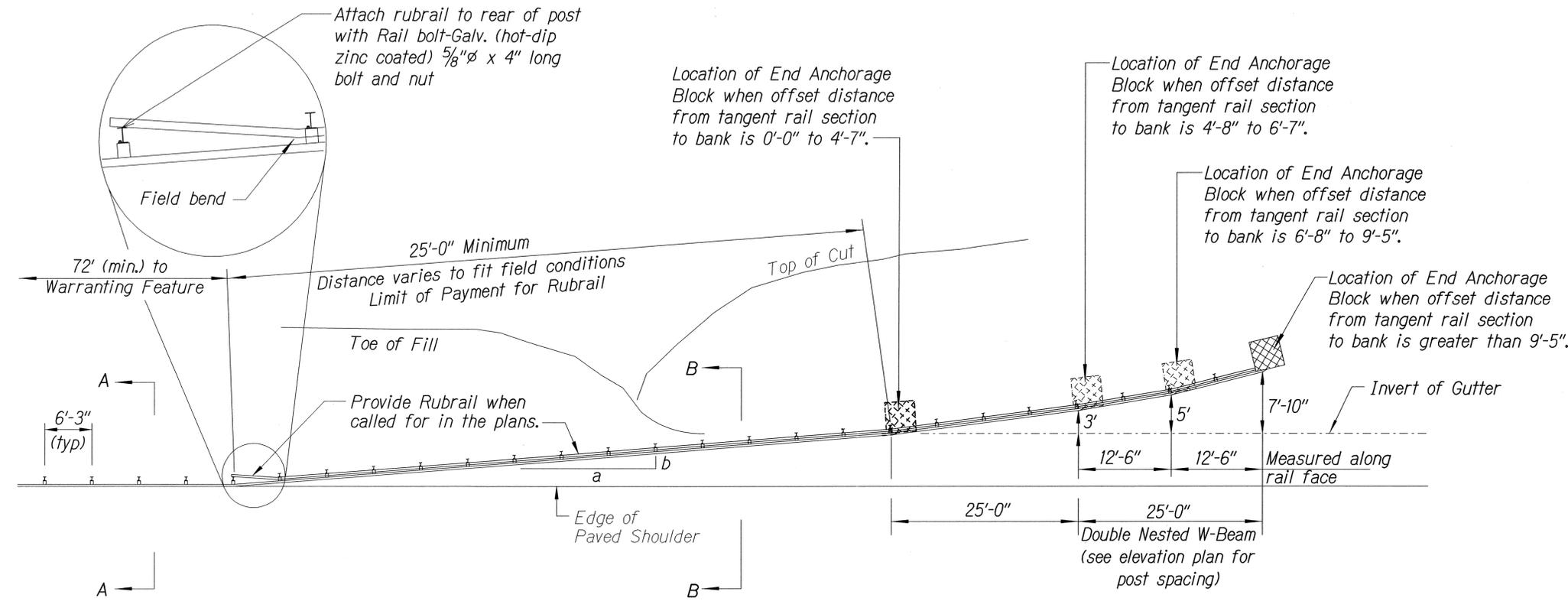
**GUARDRAIL DETAILS**

HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)

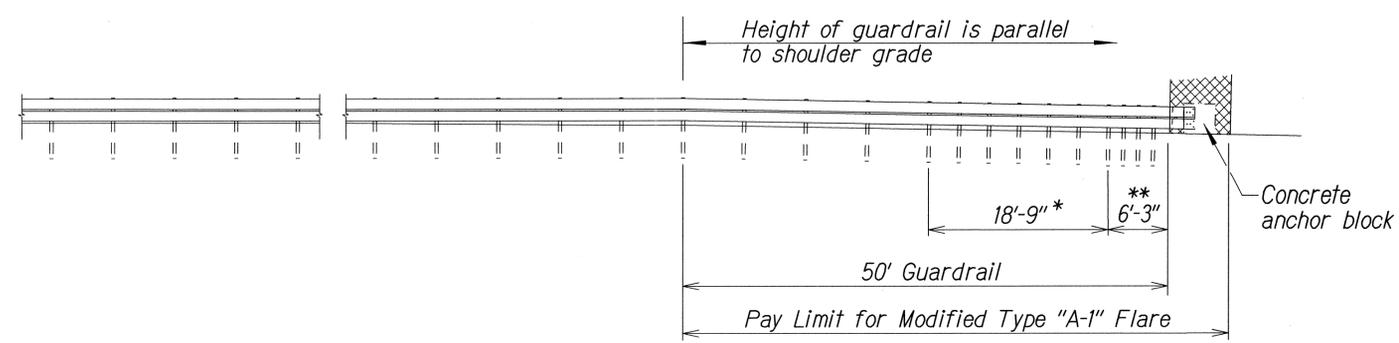
Scale: NTS Date: March, 2014

SHEET No. 3 OF 10 SHEETS

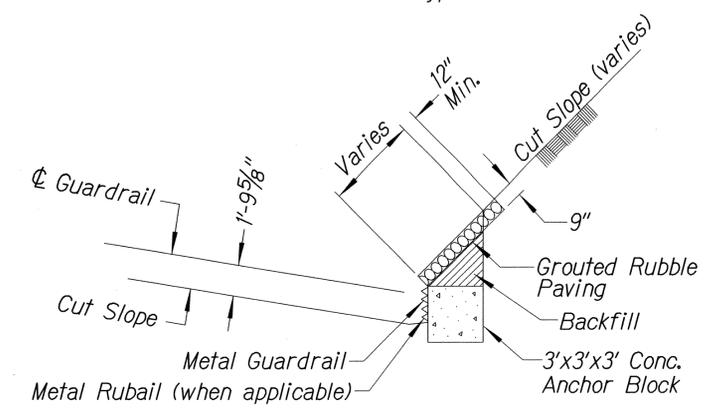
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	33	41



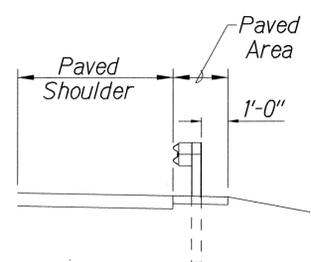
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



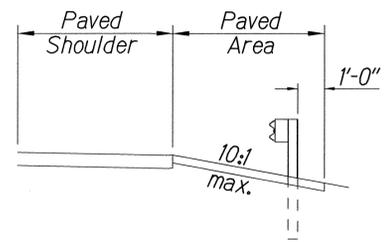
ELEVATION (Profile Along Rail)



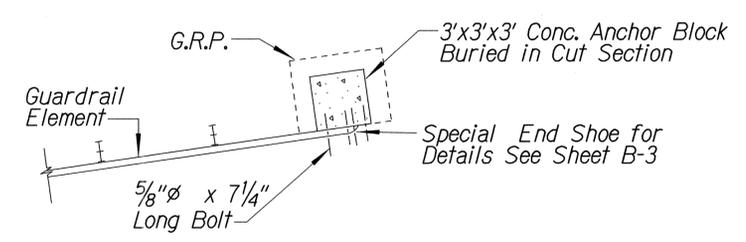
ANCHOR BLOCK IN CUT SECTION



Section A-A



Section B-B



PLAN - ANCHOR BLOCK IN CUT SECTION

General Notes

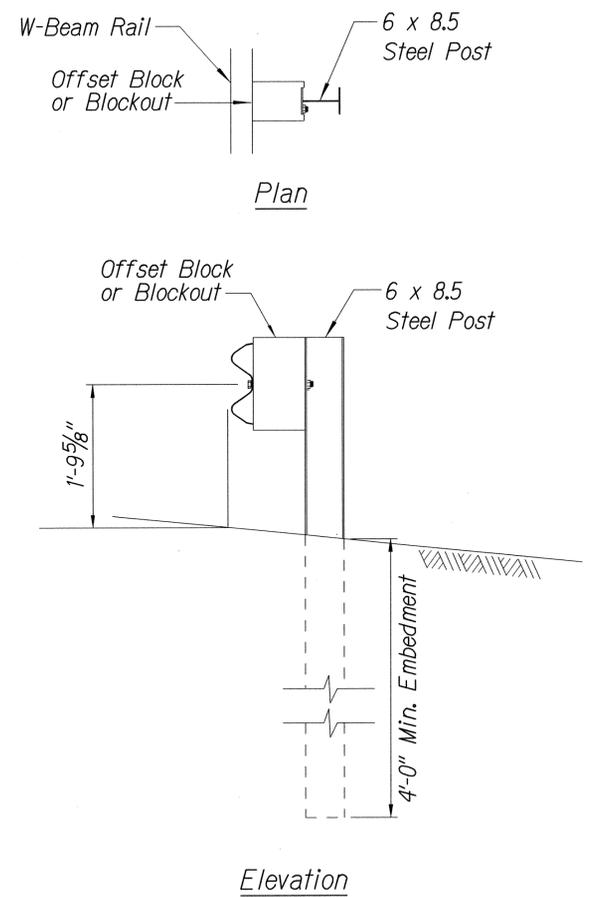
- All posts are 6'-0" in length within the 50'-0" pay limit for the Modified Type "A-1" Flare without rubrail.
- Whenever swales or a change in grade is encountered within the 50'-0" pay limit for the Modified Type "A-1" Flare, a rubrail shall be installed and all posts shall have a minimum embedment of 4'-0". Post lengths shall be adjusted to provide the minimum embedment.
- 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 and HDOT's Statewide Guideline for Permanent Highway Safety Hardware.
- Limit of payment for Modified Type "A-1" Flare shall be 50'-0" from End Shoe including Rubrail (when applicable), Anchor Block and GRP work.
- Excavation, Anchor Block, Backfill and GRP work shall be considered incidental to the Modified Type "A-1" Flare.

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
NOTE BOOK	
FILE/KEY	
PROJECT	

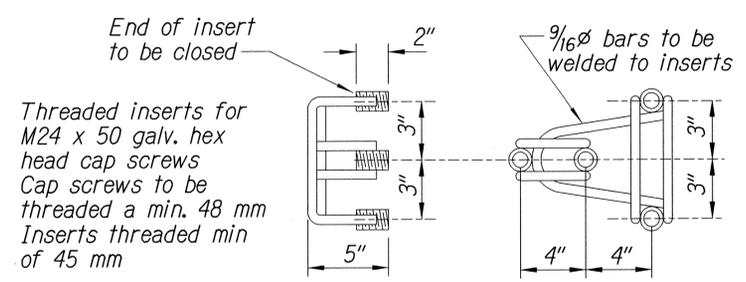
18-21-01 Standard Plan TE-58 07/01/05 TE-59 01/03/09 # TE-50 07/01/06  
 18-21-01 Standard Plan TE-58 07/01/05 TE-59 01/03/09 # TE-50 07/01/06

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**MODIFIED TYPE "A-1" FLARE**  
 HAWAII BELT ROAD RESURFACING  
 Pepeekeo to Hakalau  
 Federal Aid Project No. NH-019-2(067)  
 Scale: NTS Date: March, 2014  
 SHEET No. 4 OF 10 SHEETS

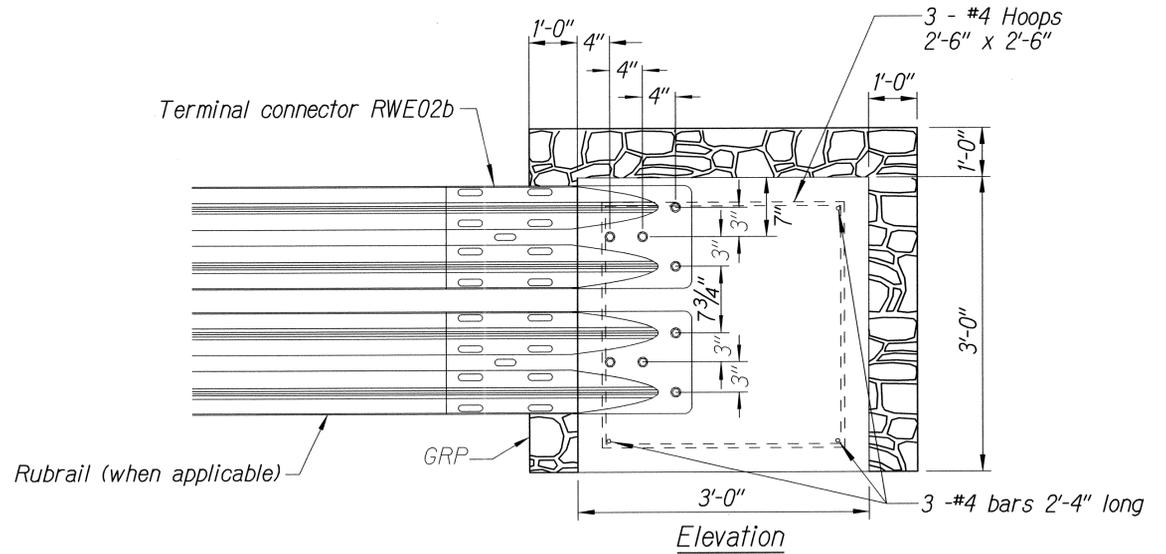
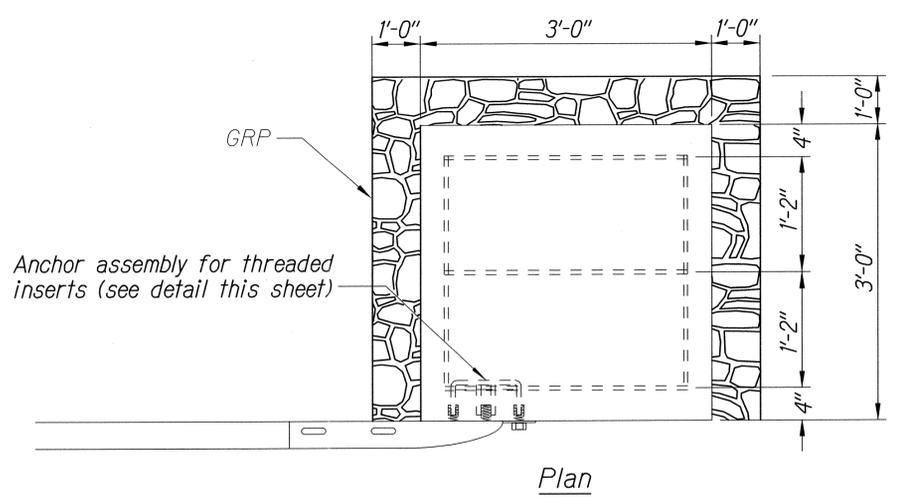
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	34	41



**STRONG POST W-BEAM GUARDRAIL**



**ANCHOR ASSEMBLY  
CONCRETE BLOCK ANCHOR**



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

**BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS  
MODIFIED TYPE "A-1" FLARE**

**Note:**

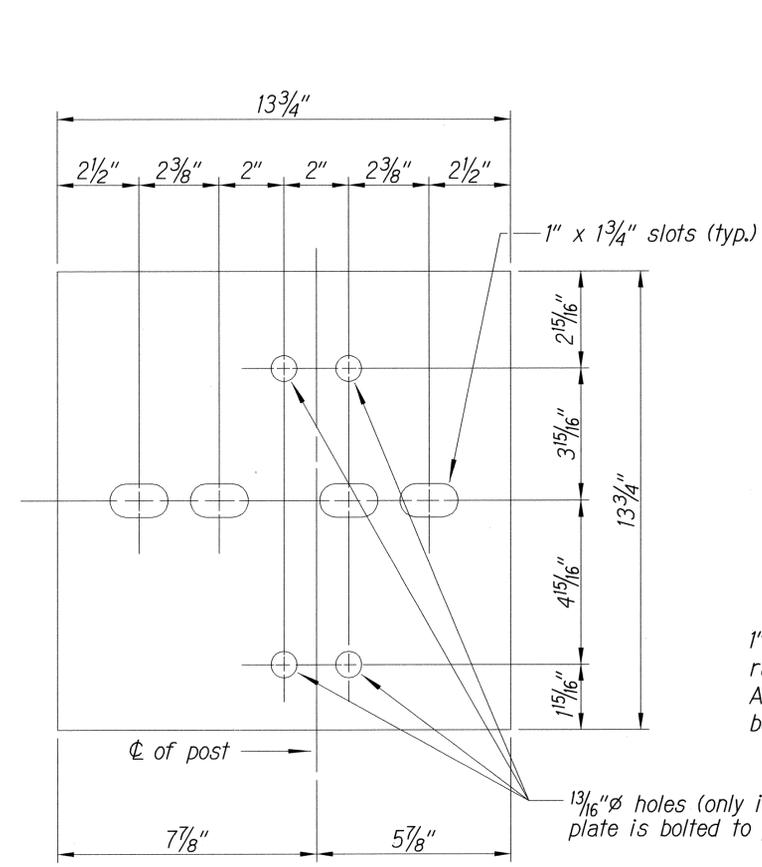
All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee and HDOT's Statewide Guideline for Permanent Highway Safety Hardware.

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

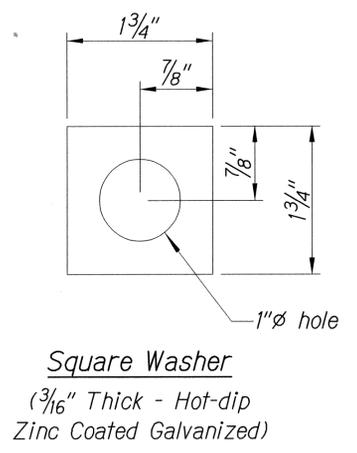
(standard plan TE-58 07/01/85, TE-59 11/03/89 & TE-60 07/01/86)  
 rdcrub/guardrail/flare\_a1\_2.dgn  
 05/12/01

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**MODIFIED TYPE "A-1" FLARE**  
 HAWAII BELT ROAD RESURFACING  
 Pepeekeo to Hakalau  
 Federal Aid Project No. NH-019-2(067)  
 Scale: NTS Date: March, 2014  
 SHEET No. 5 OF 10 SHEETS

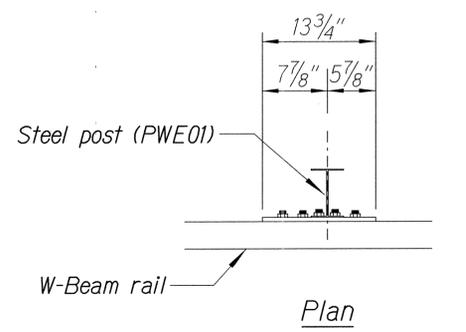
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	35	41



**Steel Plate - 1/2"**  
(Hot-dip Zinc Coated Galvanized-  
Welded or Bolted to Post)

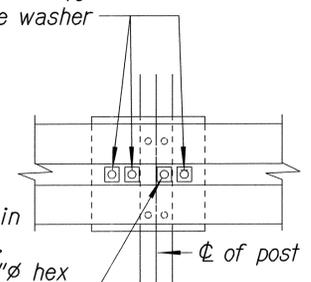


**Square Washer**  
(3/16" Thick - Hot-dip  
Zinc Coated Galvanized)

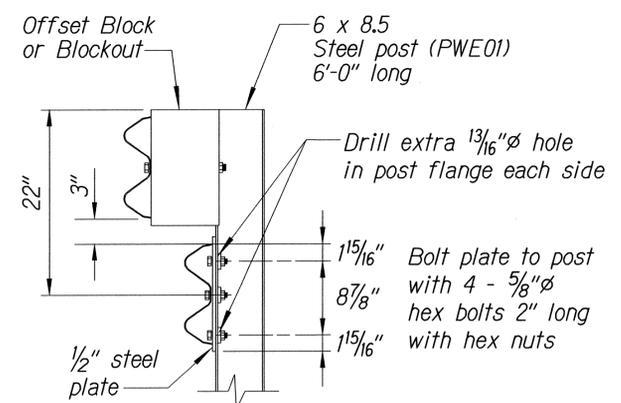


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

1"  $\phi$  holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8"  $\phi$  hex bolts 2" long with square washer



Front View

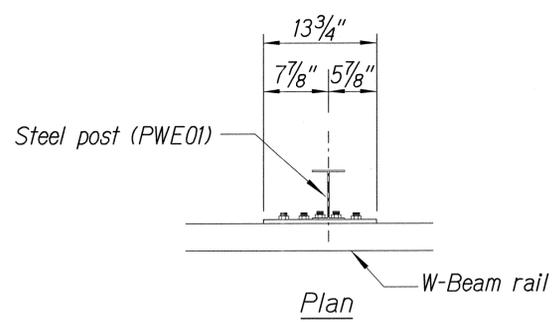


Drill extra 1 3/16"  $\phi$  hole in post flange each side

Bolt plate to post with 4 - 5/8"  $\phi$  hex bolts 2" long with hex nuts

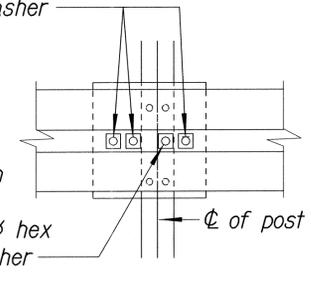
Elevation

**RUBRAIL ANCHOR DETAILS**

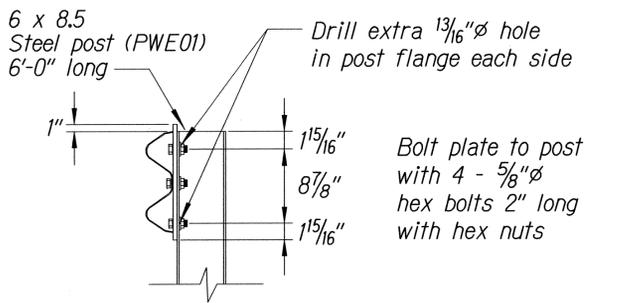


3 - 7/8"  $\phi$  holes to be field drilled in rail and attached to steel plate with 7/8"  $\phi$  hex bolts 1 5/16" long with square washer

1"  $\phi$  holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8"  $\phi$  hex bolts 2" long with square washer



Front View



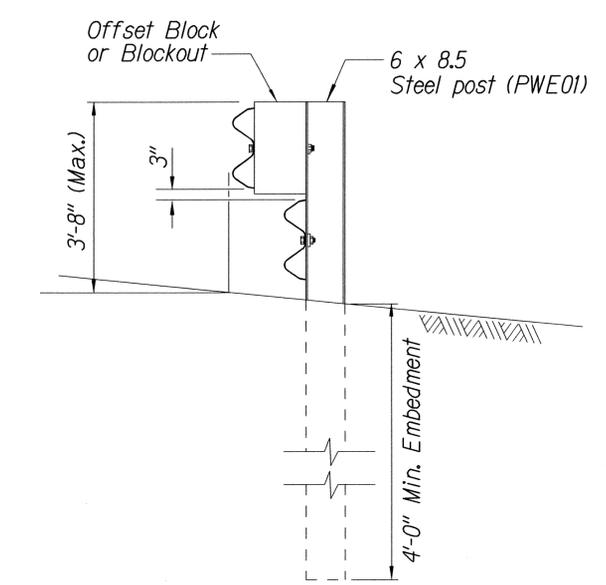
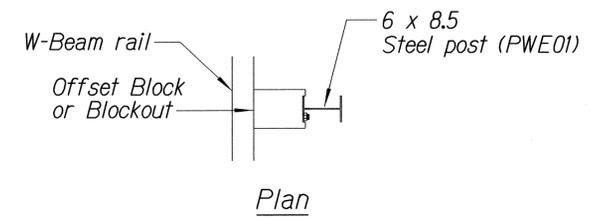
Bolt plate to post with 4 - 5/8"  $\phi$  hex bolts 2" long with hex nuts

Elevation

**POST ANCHOR DETAILS**

**RUBRAIL DETAIL FOR MODIFIED TYPE "A-1" FLARE  
(WHEN CALLED FOR IN PLANS)**

**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.



Elevation

**STEEL POST GUARDRAIL WITH RUBRAIL**

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

15-21-01 rubrail guardrail/flare.dwg

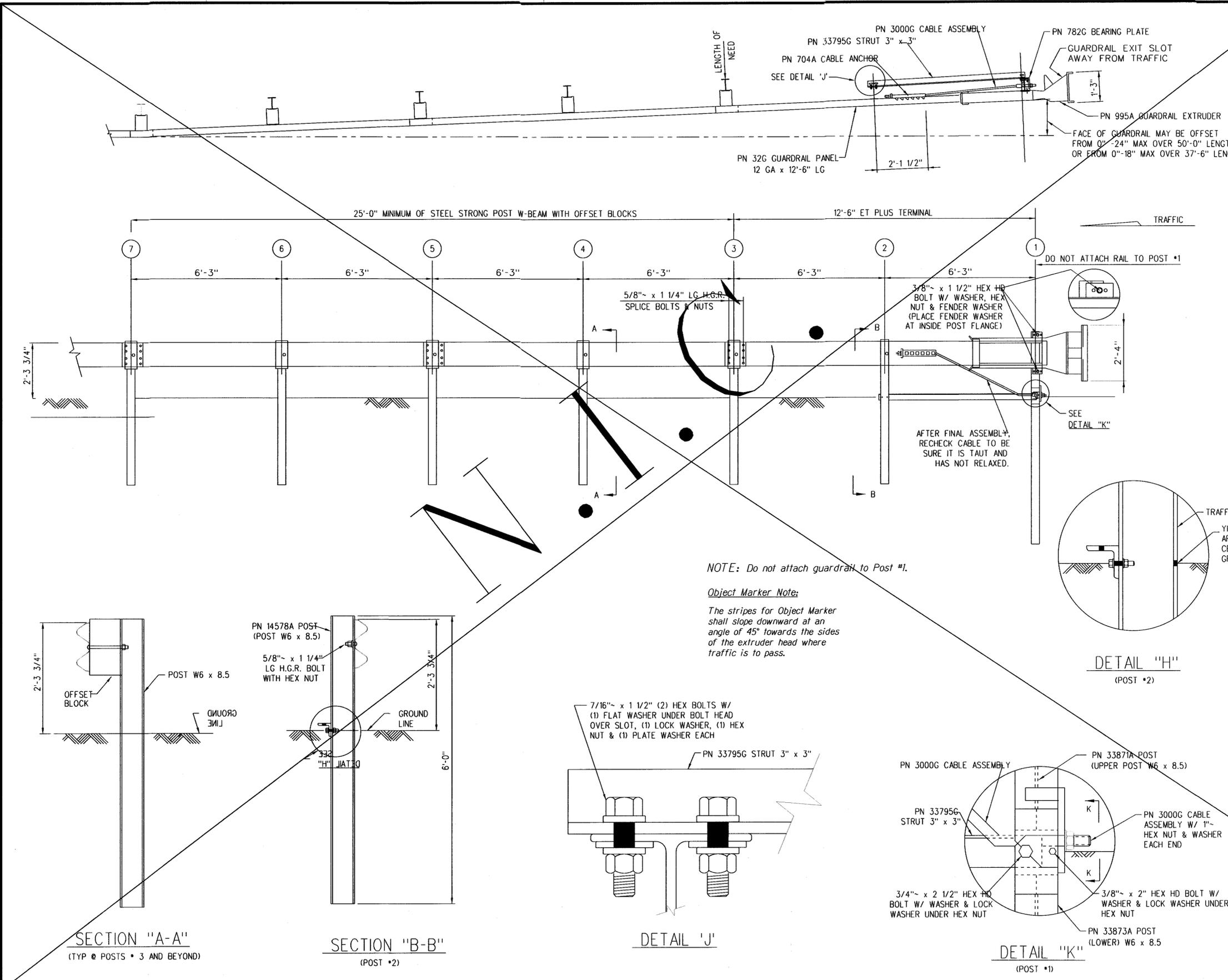
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MODIFIED TYPE "A-1" FLARE  
RUBRAIL DETAILS**

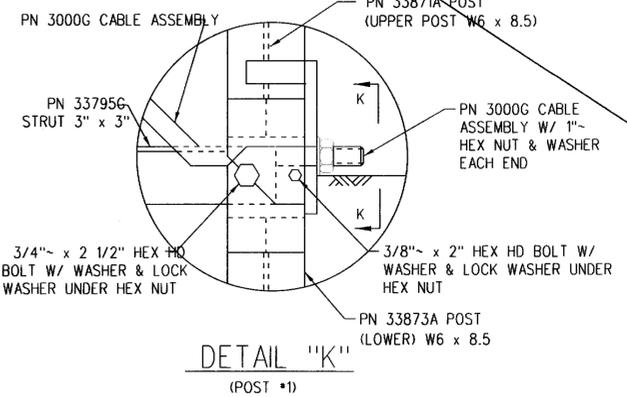
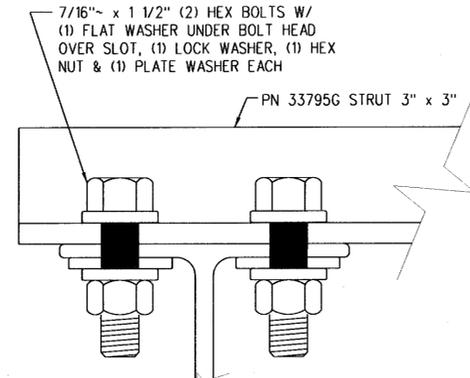
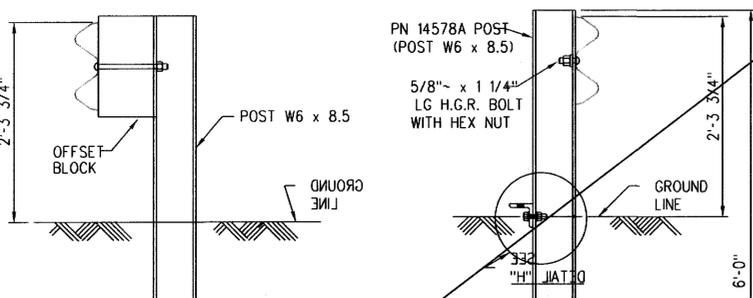
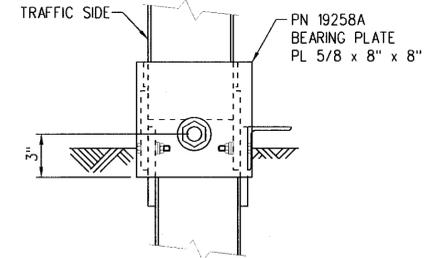
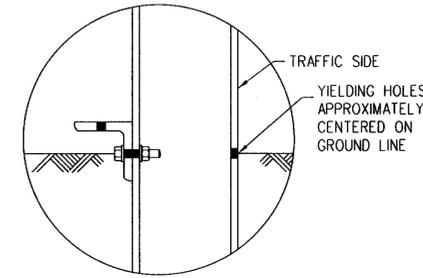
HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)  
Scale: As Noted Date: March, 2014  
SHEET No. 6 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	36	41

BILL OF MATERIAL		
PN	QTY	DESCRIPTION
32G	1	12/12'-6/6'3/5" ANC (GUARDRAIL)
704A	1	CABLE ANCHOR BRACKET
995A	1	ET-PLUS EXTRUDER
3000G	1	CABLE 3/4 x 6'6"
3340G	9	5/8" HEX NUT
3360G	9	5/8" x 1 1/4" SPLICE BOLT
3701G	2	3/4" FLAT WASHER
3704G	2	3/4" HEX NUT
3717G	2	3/4" x 2 1/2" HEX HD BOLT
3900G	2	1" FLAT WASHER
3910G	2	1" HEX NUT
4254G	4	3/8" FLAT WASHER
4255G	2	3/8" FENDER WASHER (1 1/2 OD)
4258G	2	3/8" LOCKWASHER
4261G	2	3/8" x 1 1/2" HEX HD BOLT
4389G	2	7/16" FLAT WASHER
4390G	2	7/16" x 1 1/2" HEX HD BOLT
4393G	2	7/16" LOCK WASHER
4396G	2	7/16" HEX NUT
4699G	2	3/4" LOCK WASHER
6321G	2	3/8" x 2" HEX HD BOLT
6405G	4	3/8" HEX NUT
6668B	1	OBJECT MARKER
14578G	1	POST SYT *2
19258A	1	5/8" x 8" x 8" BEARING PLATE
33795G	1	ANGLE STRUT (ET/SYTP/HBA)
33871A	1	POST ET PLUS HBA *1 TOP
33873A	1	POST ET PLUS HBA *1 BOTTOM



LEGEND FOR AS-BUILT POSTINGS	
	Squiggly line for as-built deletion
	Double line for as-built deletion
	Text for as-built posting



NOTE: Do not attach guardrail to Post #1.

Object Marker Note:  
The stripes for Object Marker shall slope downward at an angle of 45° towards the sides of the extruder head where traffic is to pass.

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

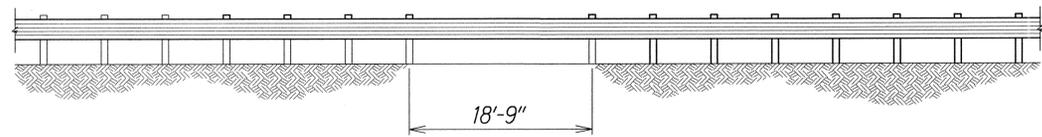
**ET-PLUS (TL-3)**

**HAWAII BELT ROAD RESURFACING**  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)

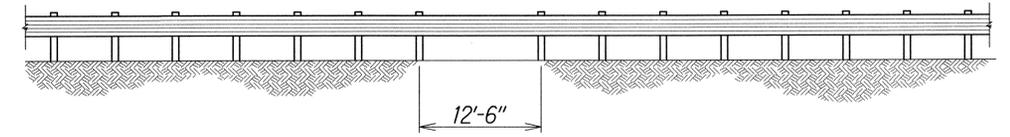
Scale: NTS Date: March, 2014

"AS-BUILT"

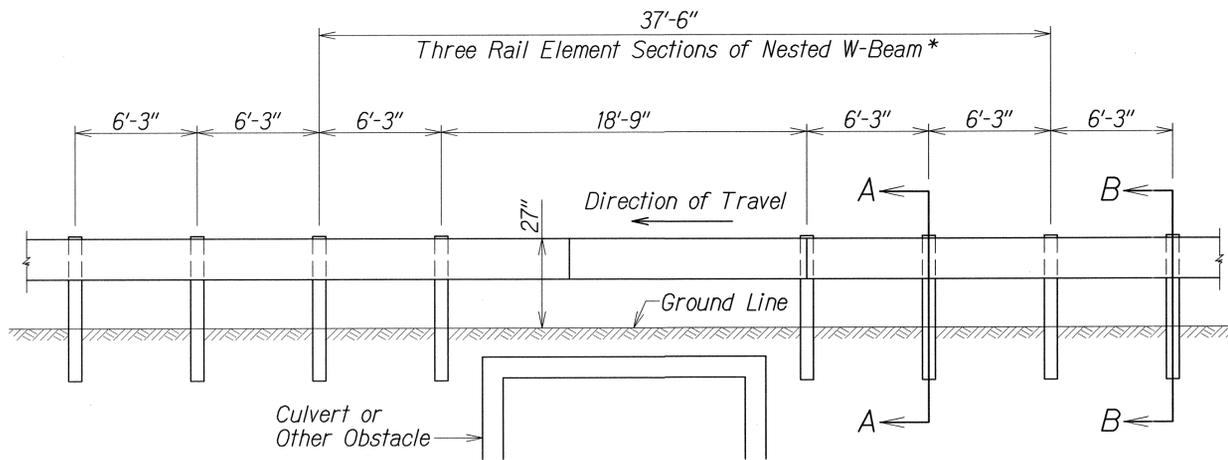
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	37	41



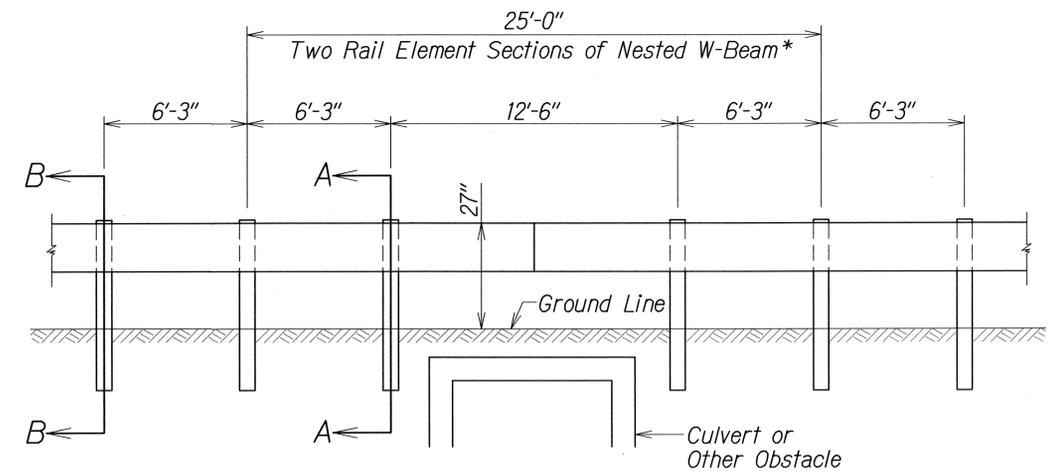
LONG SPAN OVER CULVERT



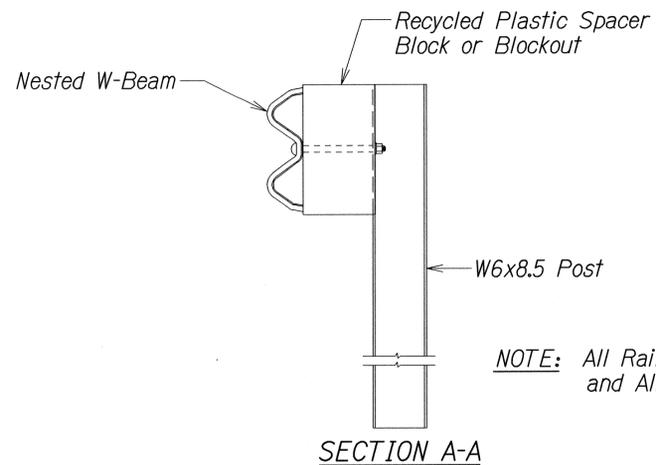
LONG SPAN OVER CULVERT



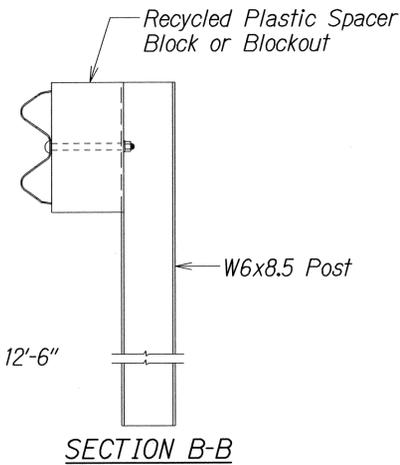
NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 18'-9" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)



(SPLICE IN CENTER OF 12'-6" SPACING)  
NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 12'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.1 FT.)



SECTION A-A



SECTION B-B

NOTE: All Rail Elements Sections are 12'-6" and All Posts are 6' Long

\* Note: All nested W-Beam splices points shall be staggered. Additional rails may be required to meet minimum nested sections.

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

4-22-04 141raby:guardrail/wsbwbeamsdesign

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

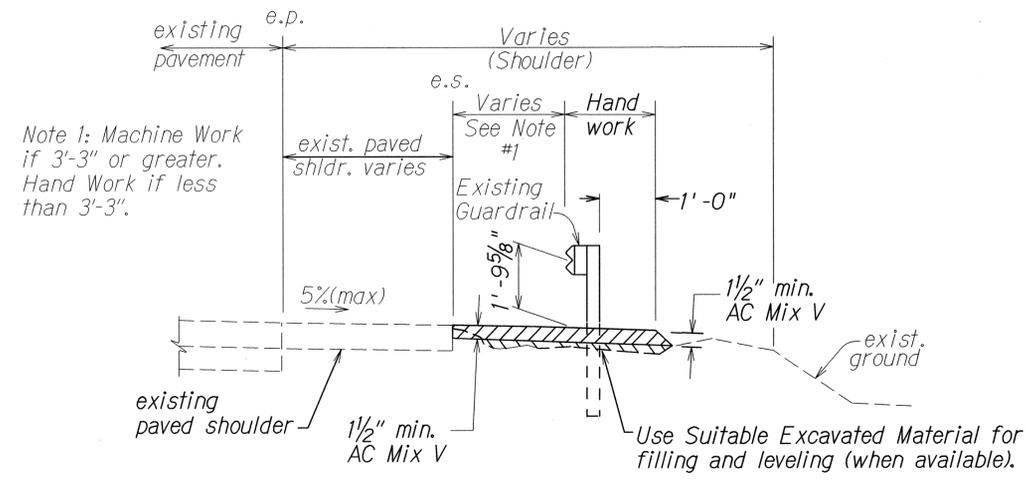
**NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER CULVERT**

HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)  
Scale: As Noted Date: March, 2014  
SHEET No. 8 OF 10 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-019-2(067)	2014	38	41

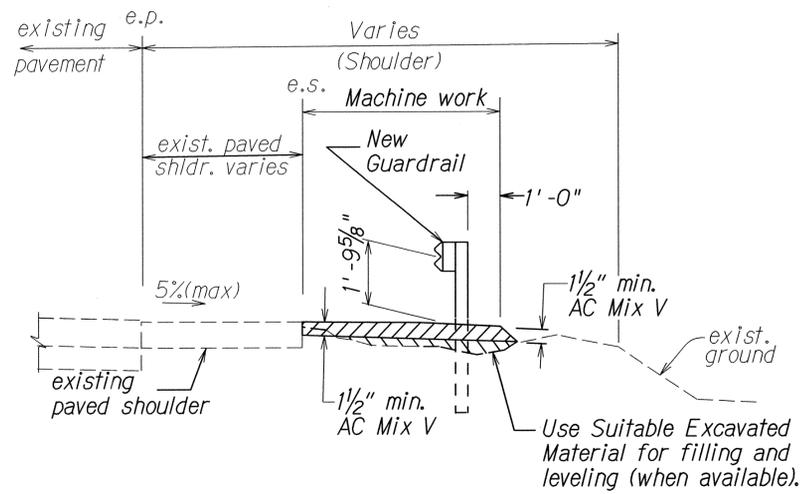
**NOTES:**

1. Pay limits for A.C. Mix V, Handwork, and A.C. Mix V, Machine work, are as shown.
2. AC Mix V, Handwork shall be paid for under Item No. 401.0501 - Asphalt Concrete Pavement, Mix No. V, Hand Paving under Guardrails. AC Mix V, Machine Work shall be paid for under Item No. 401.0502 - Asphalt Concrete Pavement, Mix No. V, Machine Paving Under Guardrails.
3. Excavating, placing, leveling, and compacting of suitable excavated material shall not be paid for separately, but shall be considered incidental to various contract items in Section 401 - Asphalt Concrete Pavement.
4. Compaction requirements of Cold Planed material shall be in accordance with Section 203 - Excavation and Embankment.
5. Maintain longitudinal drainage as shown on the plans or as directed by the Engineer.
6. Contractor's attention is called to the increase in the asphalt content and compaction requirements in Section 401 - Asphalt Concrete Pavement, Paragraph 401.05-(E)-(3) of the Special Provisions.



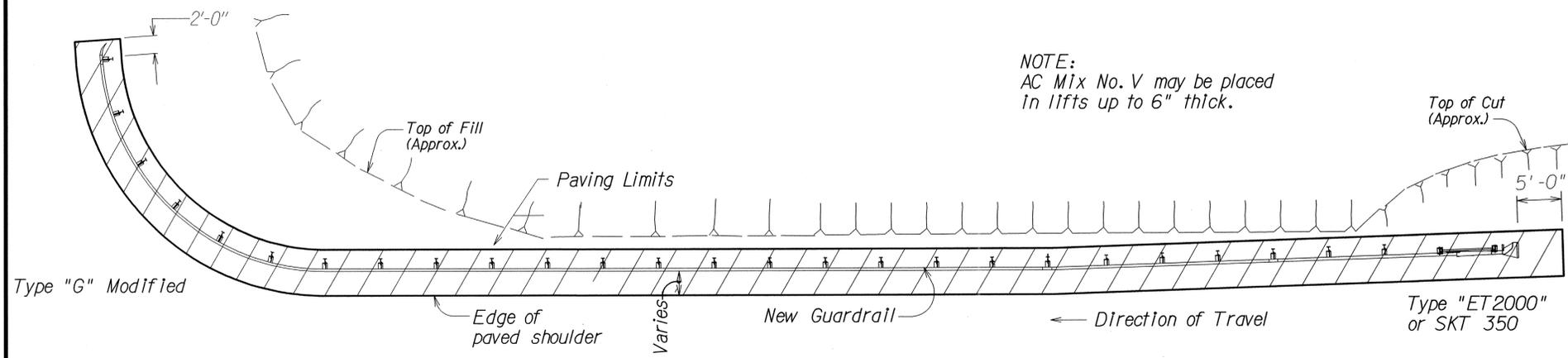
**TYPICAL PAVING UNDER EXISTING GUARDRAIL**

Not To Scale



**TYPICAL PAVING UNDER NEW GUARDRAIL**

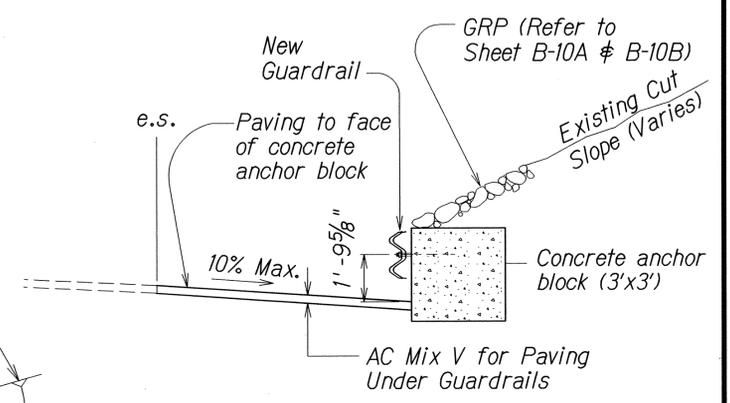
Not To Scale



**PLAN - PAVING UNDER GUARDRAIL**

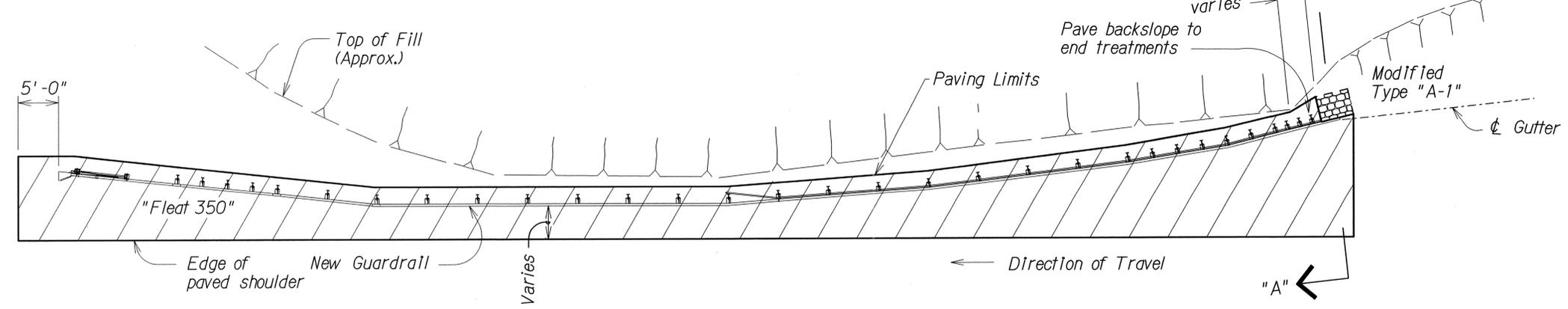
Not To Scale

NOTE:  
AC Mix No. V may be placed  
in lifts up to 6" thick.



**SECTION "A-A"**

Not To Scale



**PLAN - PAVING UNDER GUARDRAIL**

Not To Scale

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

3/25/02 - 3/25/02 Hawaii District Project Plans/Guardrail Details/peepkeo

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPICAL GUARDRAIL PAVING DETAILS**  
**FULL PAVING UNDER GUARDRAIL**  
HAWAII BELT ROAD RESURFACING  
Pepeekeo to Hakalau  
Federal Aid Project No. NH-019-2(067)  
Scale: As Noted Date: March, 2014  
SHEET No. 9 OF 10 SHEETS

