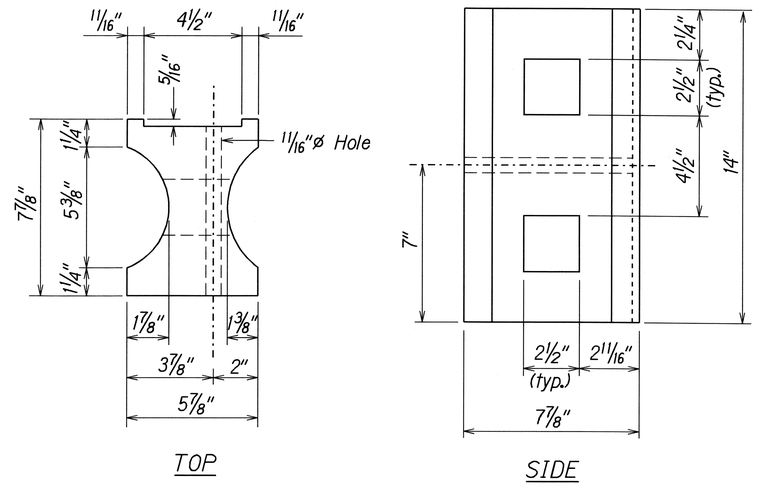
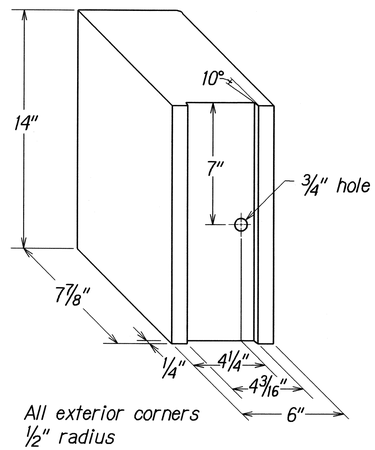
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	7	64



TOP SIDE

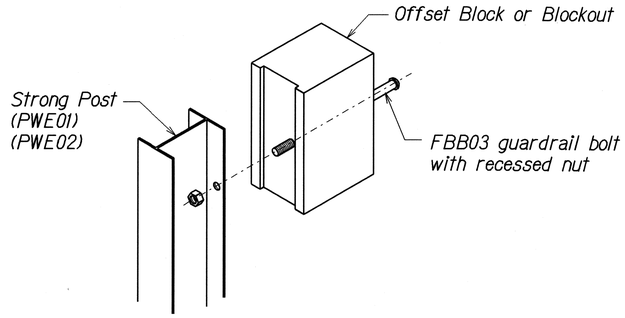
RECYCLED PLASTIC BLOCKOUT (TYPE I)



All exterior corners 1/2" radius

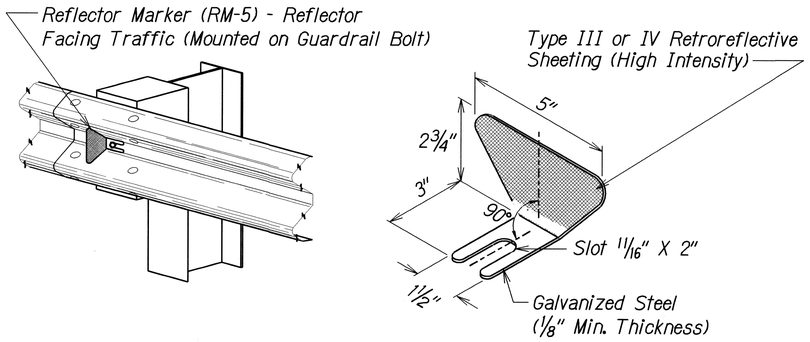
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

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.

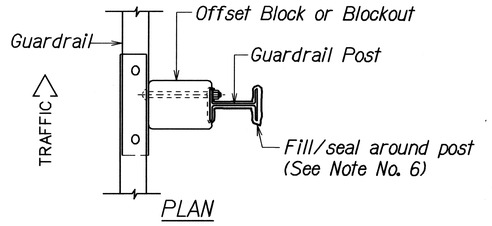


Exploded View
(Rail and washer not shown)

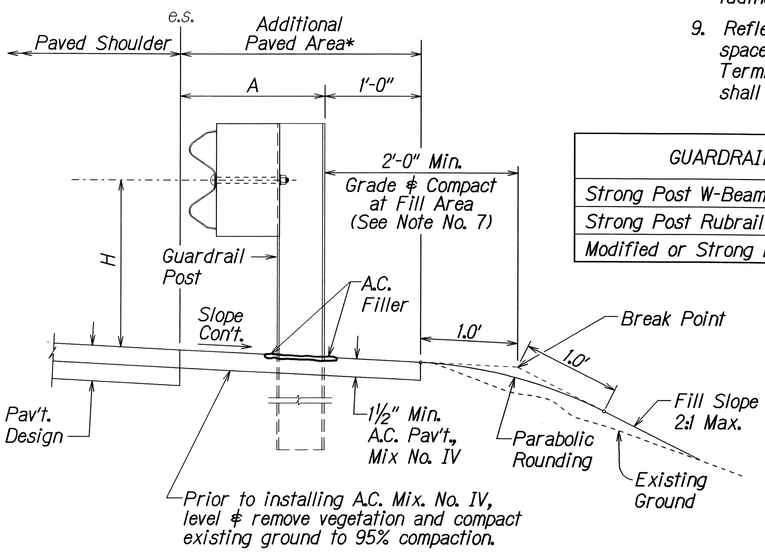
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



PLAN



ELEVATION

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"

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

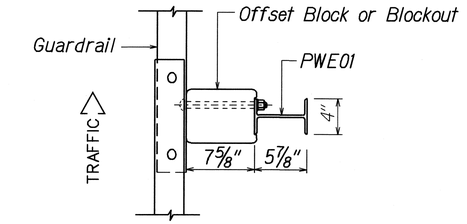
GUARDRAIL DETAILS & NOTES

MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

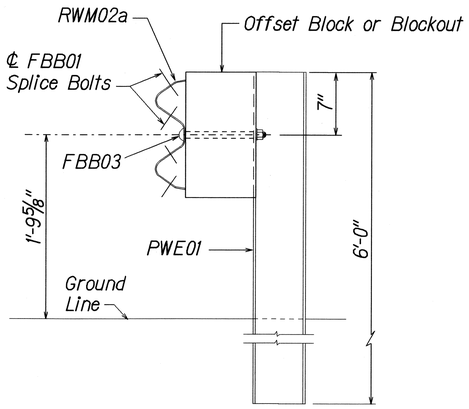
Scale: NTS Date: April, 2008

SHEET No. 1 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	8	64



PLAN

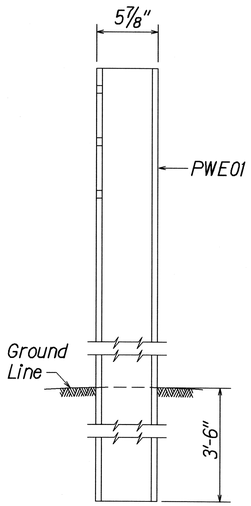


ELEVATION

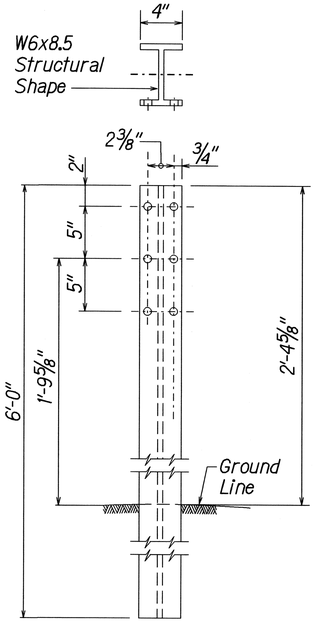
STRONG POST W-BEAM GUARDRAIL

(SGR04a)

NOTE:
All Holes are ¾" Dia.

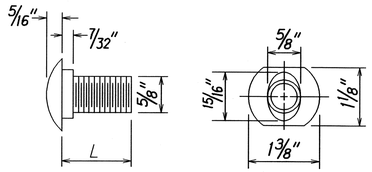


SIDE

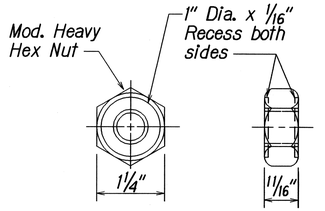


FRONT

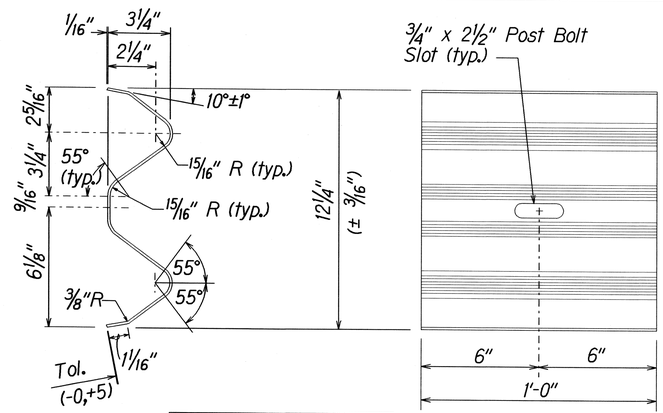
W-BEAM STRONG POST (PWE01)



DESIGNATOR	L
FBB01	1⅜"
FBB02	2"
FBB03	10"

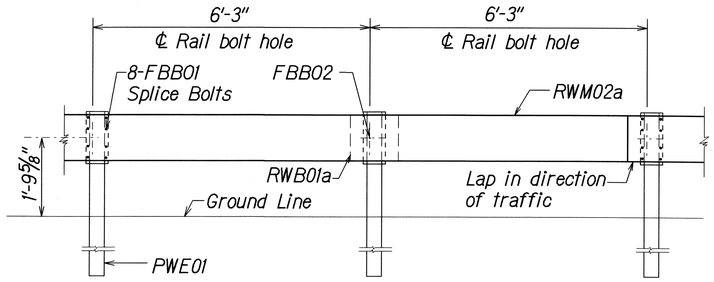


GUARDRAIL BOLTS AND RECESSED NUT



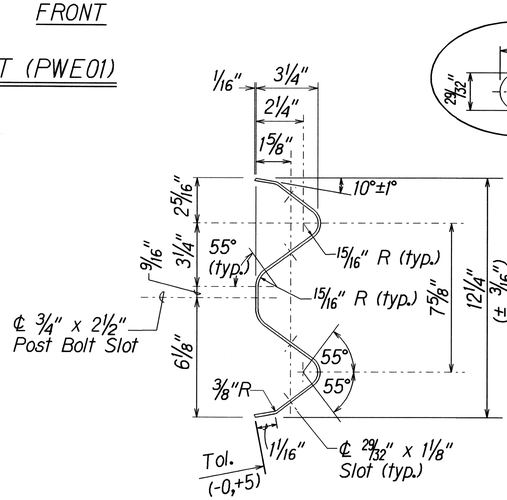
DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)

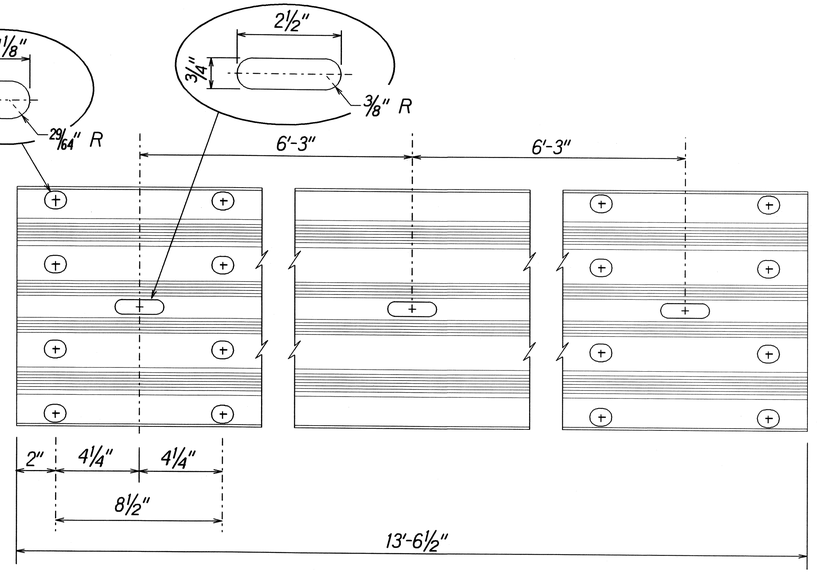


ELEVATION

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



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge



2 SPACE W-BEAM GUARDRAIL (RWM02a)

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

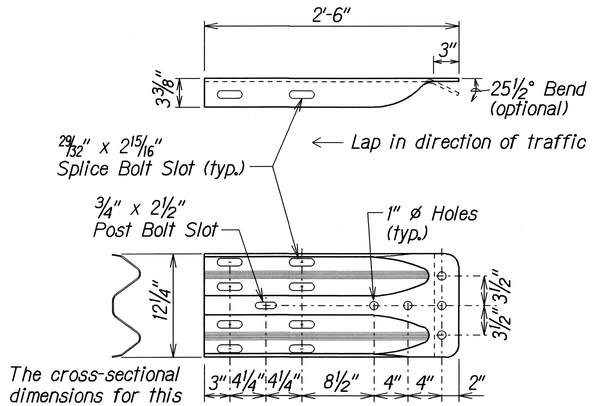
STRONG POST W-BEAM GUARDRAIL

MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

Scale: NTS Date: January, 2008

SHEET No. 2 OF 8 SHEETS

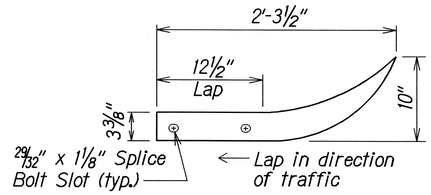
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	9	64

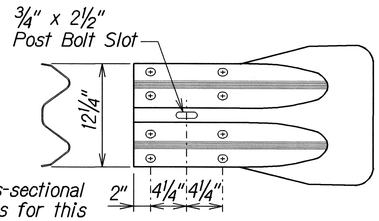


The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

W-BEAM TERMINAL CONNECTOR (RWE02b)

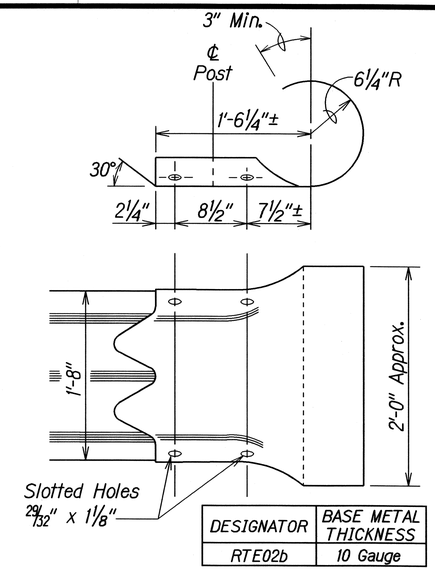




The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

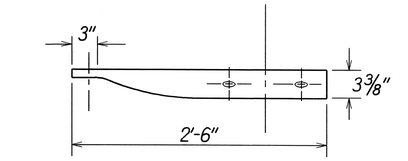
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

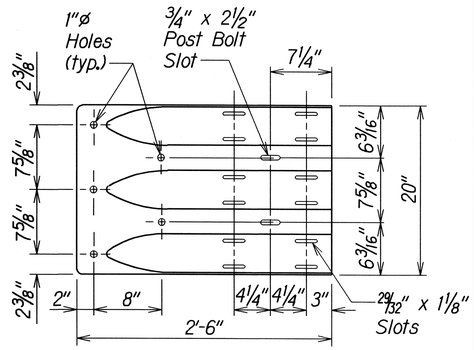
W-BEAM END SECTION (FLARED RWE01a)



DESIGNATOR	BASE METAL THICKNESS
RTE02b	10 Gauge

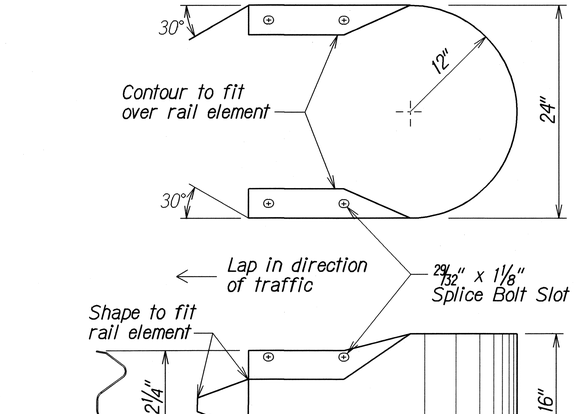
THRIE-BEAM SECTION (ROUNDED) (RTE02b)





DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

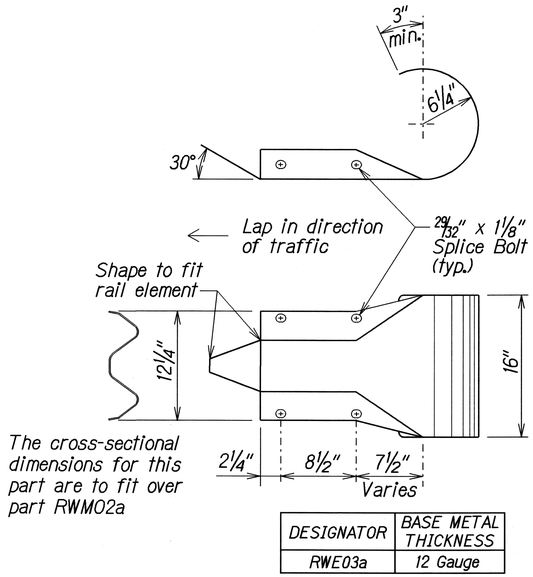
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

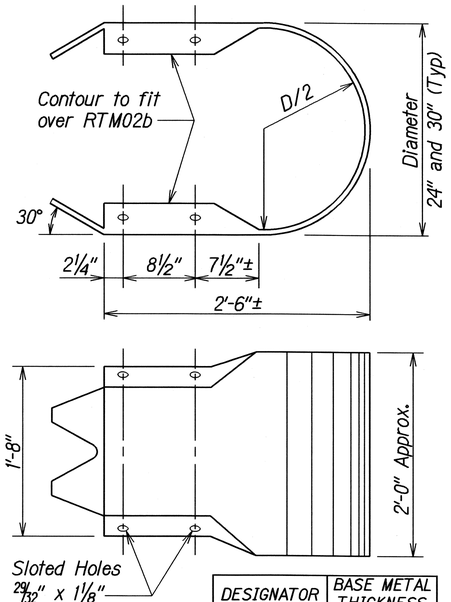
W-BEAM END SECTION (BUFFER RWE06a)



The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

THRIE-BEAM TERMINAL CONNECTOR (RTE01b)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

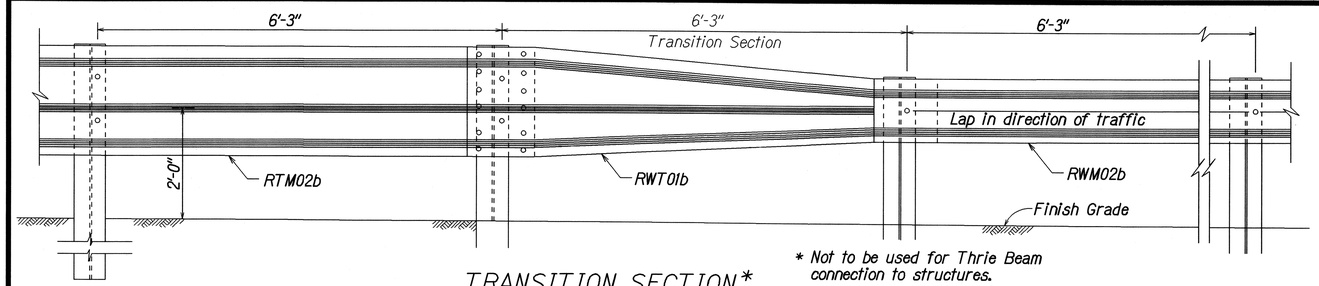
MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

Scale: NTS Date: January, 2008

SHEET No. 3 OF 8 SHEETS

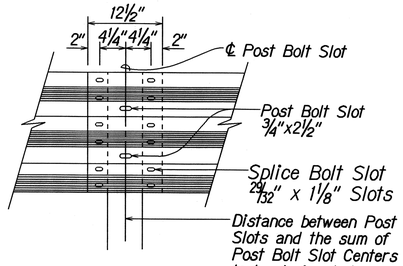
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
gmoadgr03.dgn	QUANTITIES BY	
No.	CHECKED BY	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	10	64



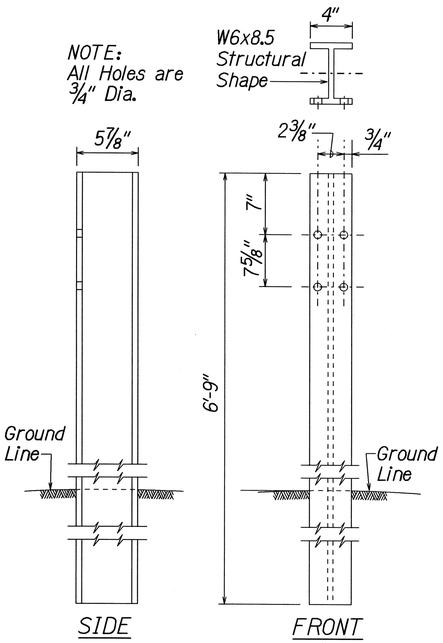
* Not to be used for Thrie Beam connection to structures.

TRANSITION SECTION*



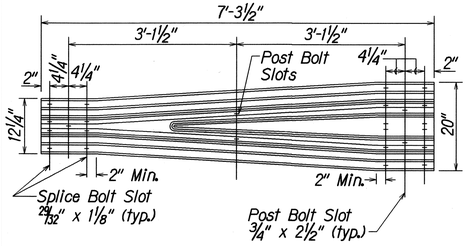
RAIL SPLICE

NOTE: All Holes are ¾" Dia.

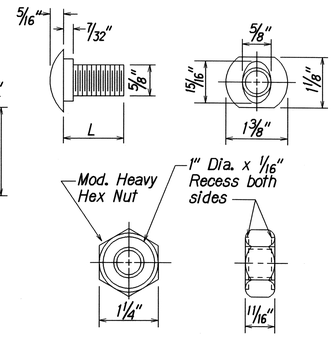


SIDE FRONT

THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS

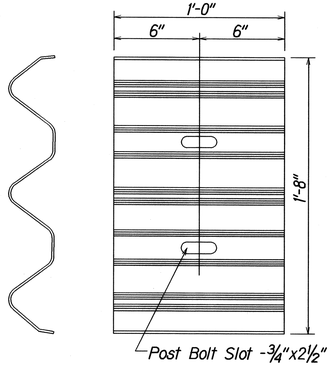


TRANSITION SECTION (RWT01b)



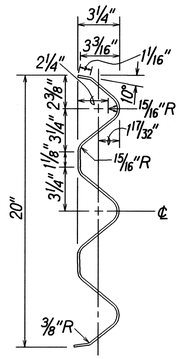
DESIGNATOR	L
FBB01	1⅜"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND RECESSED NUT

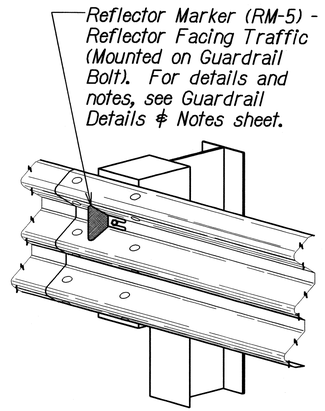


BACKUP PLATE (RTB01b)

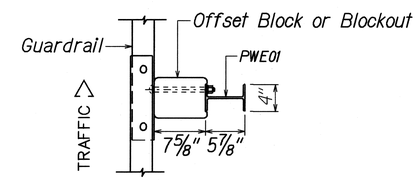
(Use at Posts where Splices do not occur)



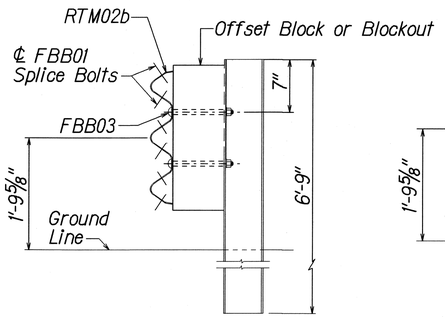
SECTION THRU RAIL ELEMENT (RTM02b)



TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)

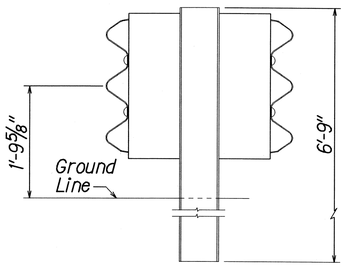


PLAN



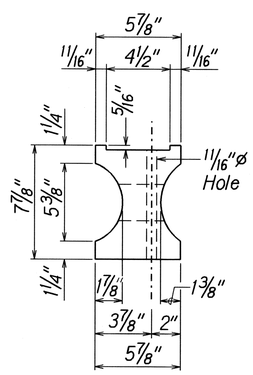
ELEVATION

STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)

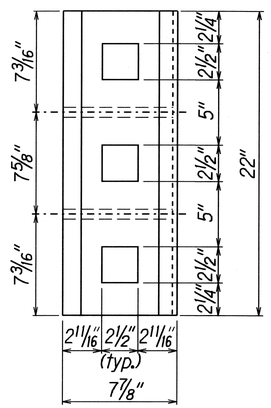


ELEVATION

STRONG POST THRIE-BEAM MEDIAN GUARDRAIL (SGM09a)

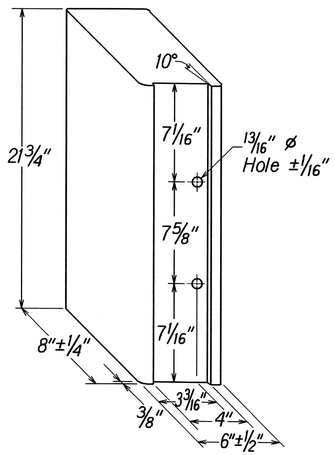


TOP



SIDE

MODIFIED 6X8X22 PLASTIC BLOCKOUT (TYPE I-THRIE)



RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST THRIE-BEAM GUARDRAIL

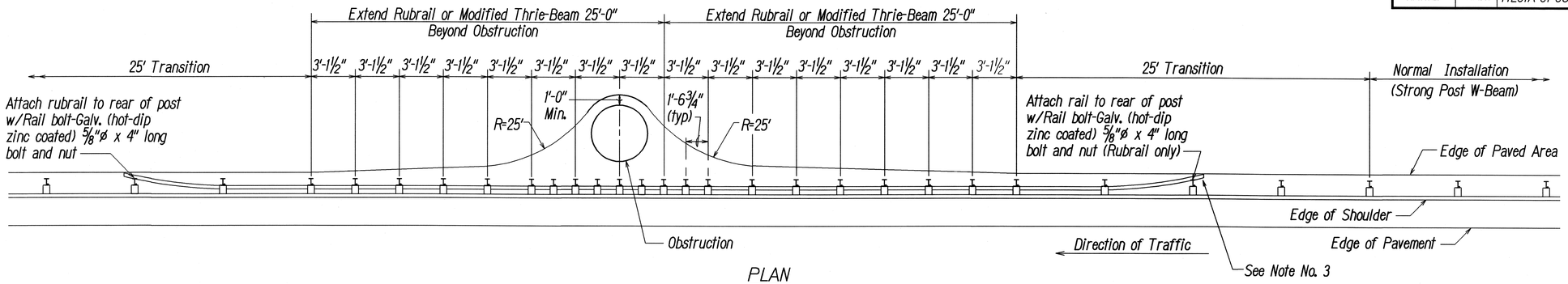
MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

Scale: NTS Date: May, 2008

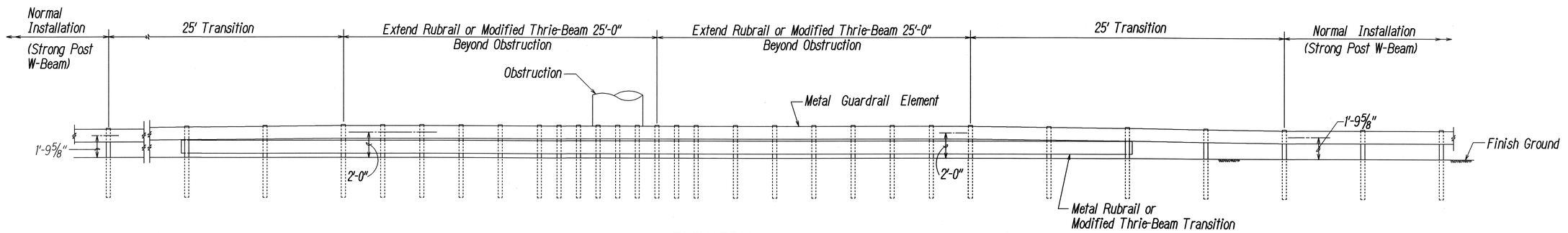
SHEET No. 4 OF 8 SHEETS

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

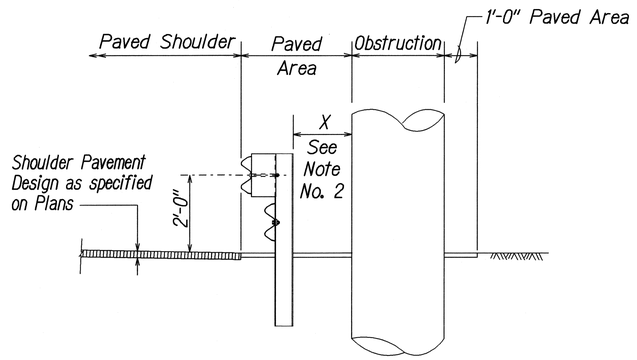
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	11	64



PLAN



ELEVATION



TYPICAL SECTION AT OBSTRUCTION

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION

NOTES:

1. All Guardrail and Concrete Barrier Designs at Obstructions shall be approved by the Engineer.

2. If X < 2'-0", Concrete Barrier or special guardrail design;
   2'-0" ≤ X < 3'-0", Strong Post Rubrail or Strong Post Thrie-Beam with reduced post spacing;
   3'-0" ≤ X, Strong Post W-Beam with 6'-3" post spacing (Normal Installation).

3. If a pedestrian walkway or bicycle route is located behind the guardrail, the Engineer should install the Modified Thrie-Beam System. The Rubrail termini may become a hazard to pedestrians & bicyclists.

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

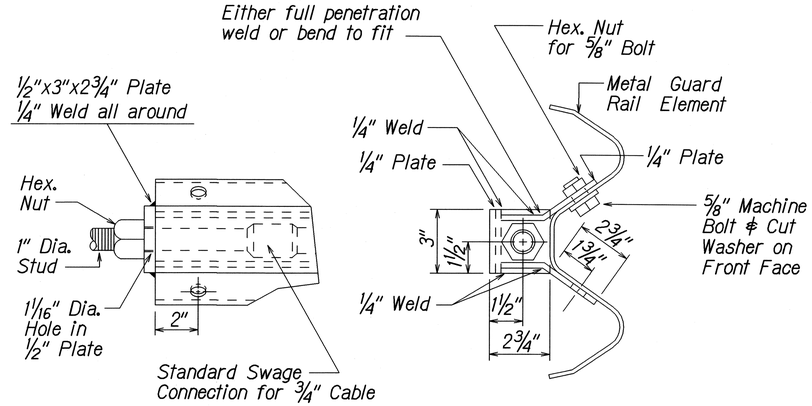
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS
(AT OBSTRUCTION)
MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

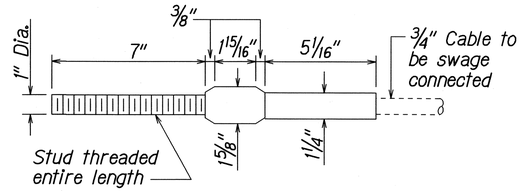
Scale: NTS Date: May, 2008

SHEET No. 5 OF 8 SHEETS

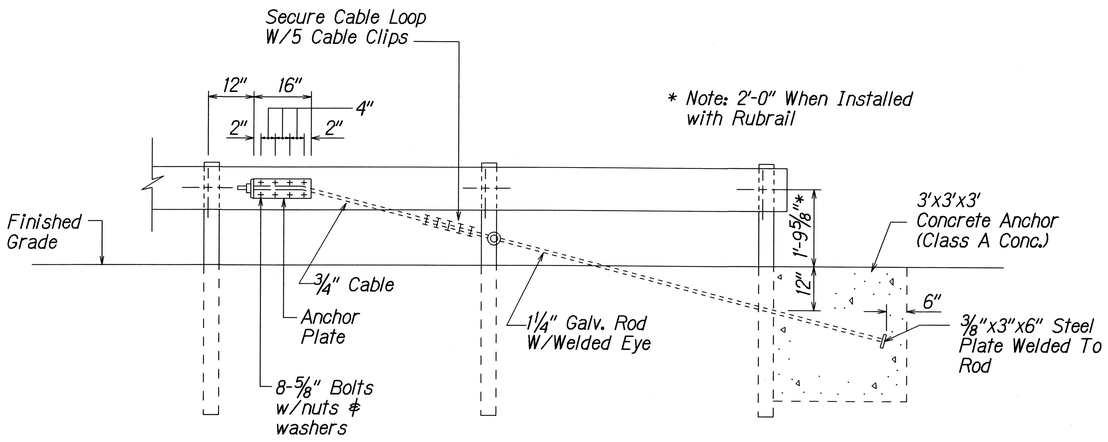
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	12	64



ANCHOR PLATE DETAILS

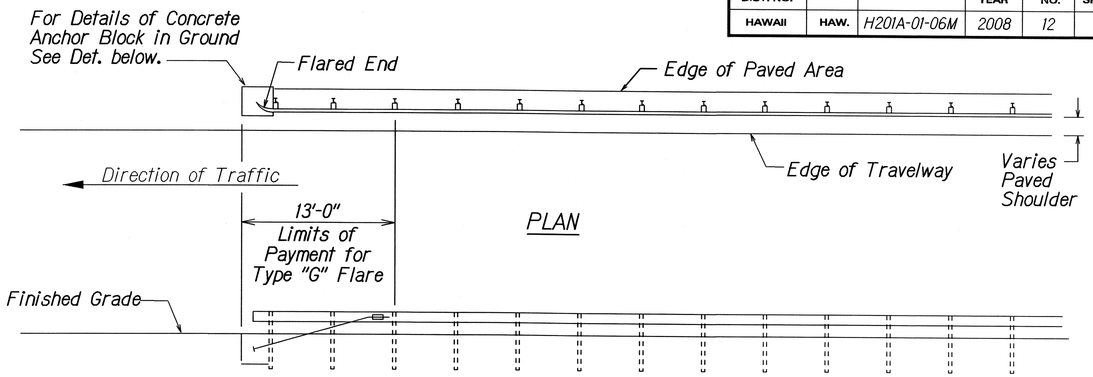


STANDARD SWAGED FITTING AND STUD



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.



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
SURVEY PLOTTED BY ..... DATE
DRAWN BY .....
TRACED BY .....
DESIGNED BY .....
QUANTITIES BY .....
CHECKED BY .....
NOTE BOOK groady/06dgn
No. .....

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

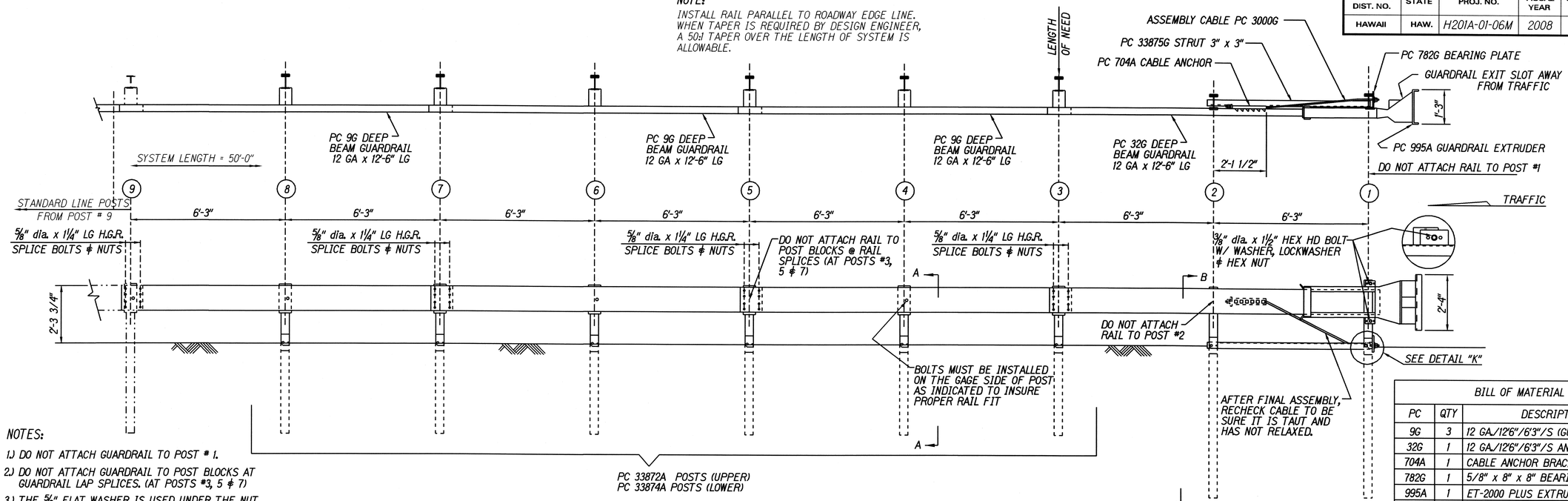
MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M

Scale: NTS Date: May, 2008

SHEET No. 6 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	13	64

NOTE:
INSTALL RAIL PARALLEL TO ROADWAY EDGE LINE. WHEN TAPER IS REQUIRED BY DESIGN ENGINEER, A 50:1 TAPER OVER THE LENGTH OF SYSTEM IS ALLOWABLE.



NOTES:

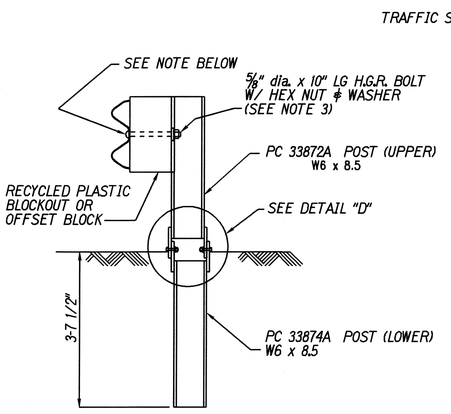
1.) DO NOT ATTACH GUARDRAIL TO POST # 1.

2.) DO NOT ATTACH GUARDRAIL TO POST BLOCKS AT GUARDRAIL LAP SPLICES. (AT POSTS #3, 5 & 7)

3.) THE 5/8" FLAT WASHER IS USED UNDER THE NUT, BEHIND THE POST ONLY. NO WASHER IS USED AT THE RAIL.

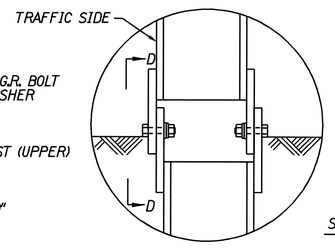
4.) MANUFACTURER SUGGESTS CUSTOMER TO PROVIDE REFLECTORIZATION OF TERMINAL.

BILL OF MATERIAL		
PC	QTY	DESCRIPTION
9G	3	12 GA./12'6"/6'3"/S (GUARDRAIL)
32G	1	12 GA./12'6"/6'3"/S ANC (GUARDRAIL)
704A	1	CABLE ANCHOR BRACKET
782G	1	5/8" x 8" x 8" BEARING PLATE
995A	1	ET-2000 PLUS EXTRUDER
3000G	1	CABLE 3/4" x 6'6"
3300G	6	5/8" WASHER
3340G	38	5/8" HEX NUT
3360G	32	5/8" dia. x 1 1/4" SPLICE BOLT
3500G	6	5/8" dia. x 10" POST BOLT
3701G	19	3/4" WASHER
3704G	16	3/4" HEX NUT
3717G	15	3/4" dia. x 2 1/2" HEX HD BOLT
3718G	1	3/4" dia. x 3" HEX HD BOLT
3900G	2	1" WASHER
3910G	2	1" HEX NUT
5326B	6	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
4254G	18	3/8" WASHER
4255G	2	3/8" FENDER WASHERS
4258G	16	3/8" LOCKWASHER
4261G	2	3/8" dia. x 1 1/2" HEX HD BOLT
4699G	16	3/4" LOCKWASHER
6321G	16	3/8" dia. x 2" HEX HD BOLT
6405G	18	3/8" HEX NUT
33871A	1	ET2000 HBA POST #1 TOP
33872A	7	ET2000 HBA POST #2-#8 TOP
33873A	2	ET2000 HBA POST #1-#2 BOTTOM
33874A	6	ET2000 HBA POST #3-#8 BOTTOM
33875G	1	6'-6" ANGLE STRUT ET HBA

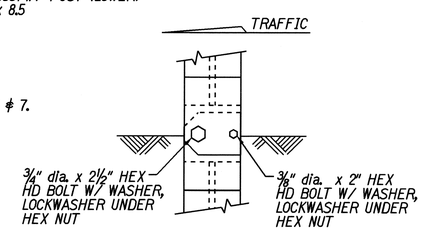


NOTE:
SECTION "A-A" IS SIMILAR @ POST #3, 5 & 7. EXCEPT RAIL IS NOT ATTACHED.

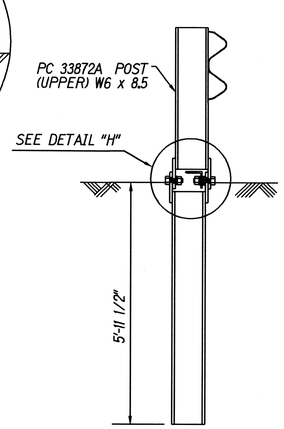
SECTION "A-A"
(TYP @ POSTS #4, 6 & 8)



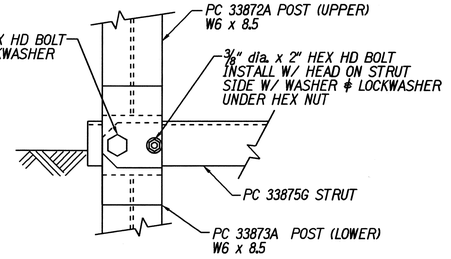
DETAIL "D"



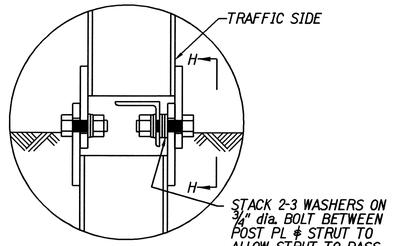
VIEW "D-D"



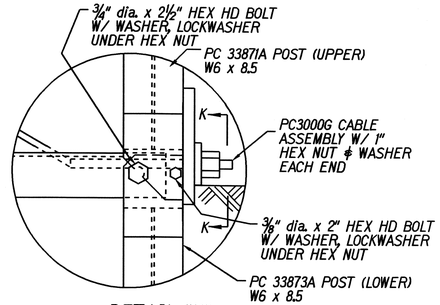
SECTION "B-B"
(POST #2)



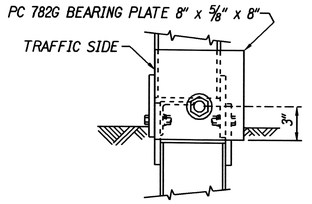
VIEW "H-H"



DETAIL "H"
(POST #2)



DETAIL "K"
(POST #1)



VIEW "K-K"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ET-2000 PLUS

MOANALUA FREEWAY

NORTH FRONTAGE ROAD RESURFACING

Vicinity of Ala Aolani to Vicinity of Ala Kapuna

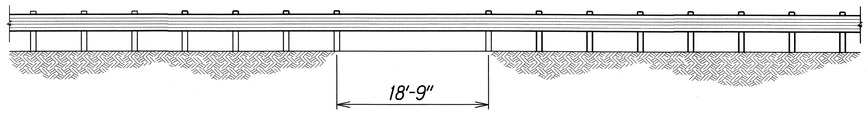
Project No. H201A-01-06M

Scale: NTS Date: January, 2008

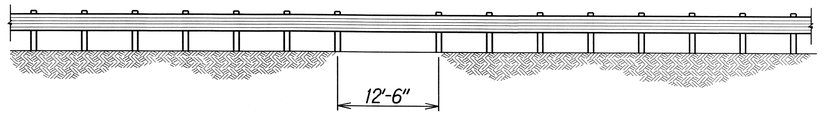
SHEET No. 7 OF 8 SHEETS

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

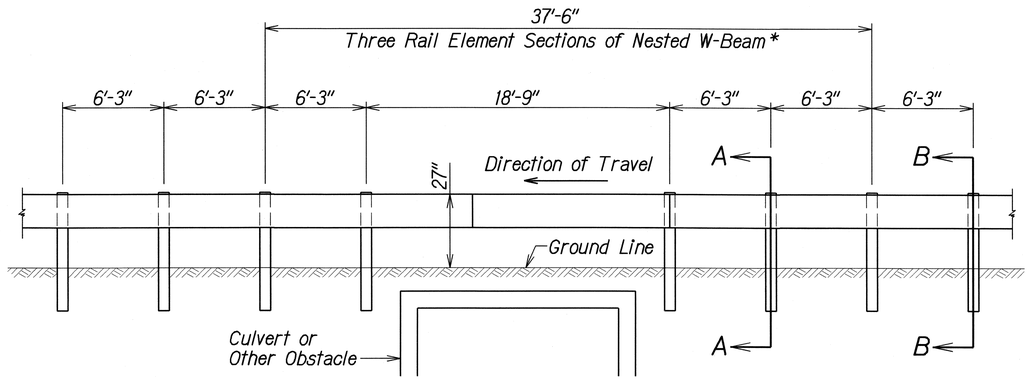
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H201A-01-06M	2008	14	64



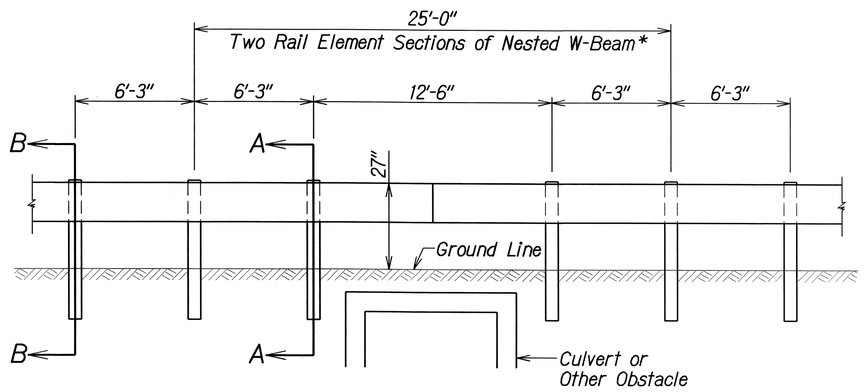
LONG SPAN OVER CULVERT



LONG SPAN OVER CULVERT

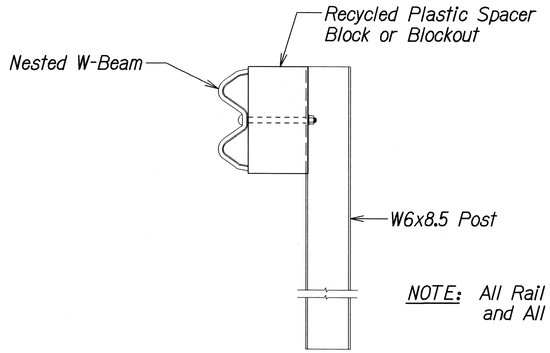


NESTED LONG SPAN STRONG POST
W-BEAM GUARDRAIL OVER 18'-9" CULVERT
(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)

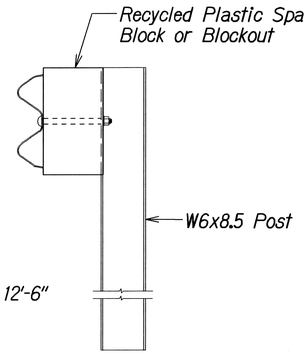


(SPLICE IN CENTER OF 12'-6" SPACING)

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.

ORIGINAL PLAN
NOTE BOOK
SURVEY PLOTTED BY ____ DATE
DRAWN BY .....
TRACED BY .....
DESIGNED BY .....
QUANTITIES BY .....
CHECKED BY .....
9/roadgr08.dgn

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
NESTED LONG SPAN STRONG POST
W-BEAM GUARDRAIL OVER CULVERT
MOANALUA FREEWAY
NORTH FRONTAGE ROAD RESURFACING
Vicinity of Ala Aolani to Vicinity of Ala Kapuna
Project No. H201A-01-06M
Scale: NTS Date: January, 2008

SHEET No. 8 OF 8 SHEETS