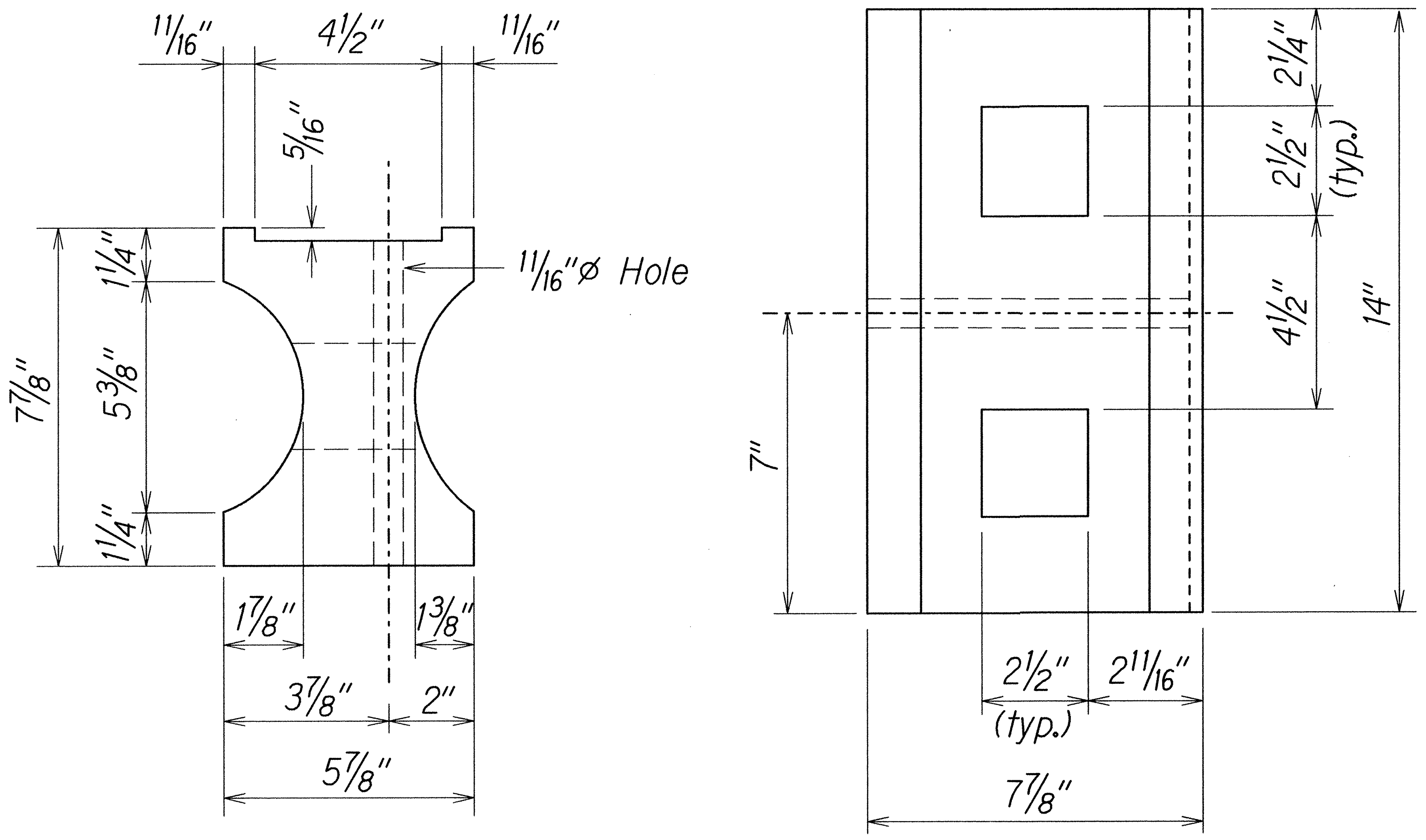
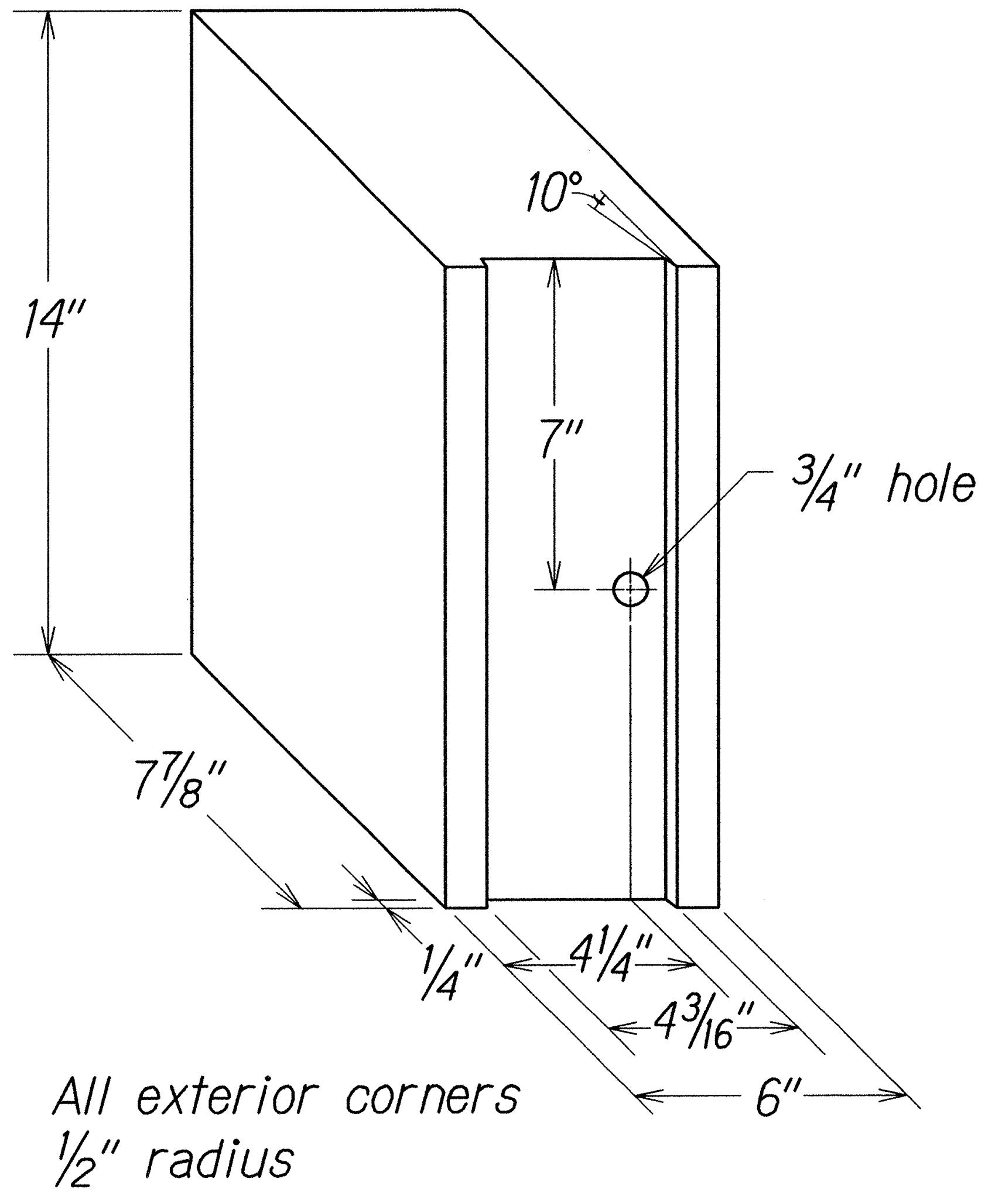
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	7	50



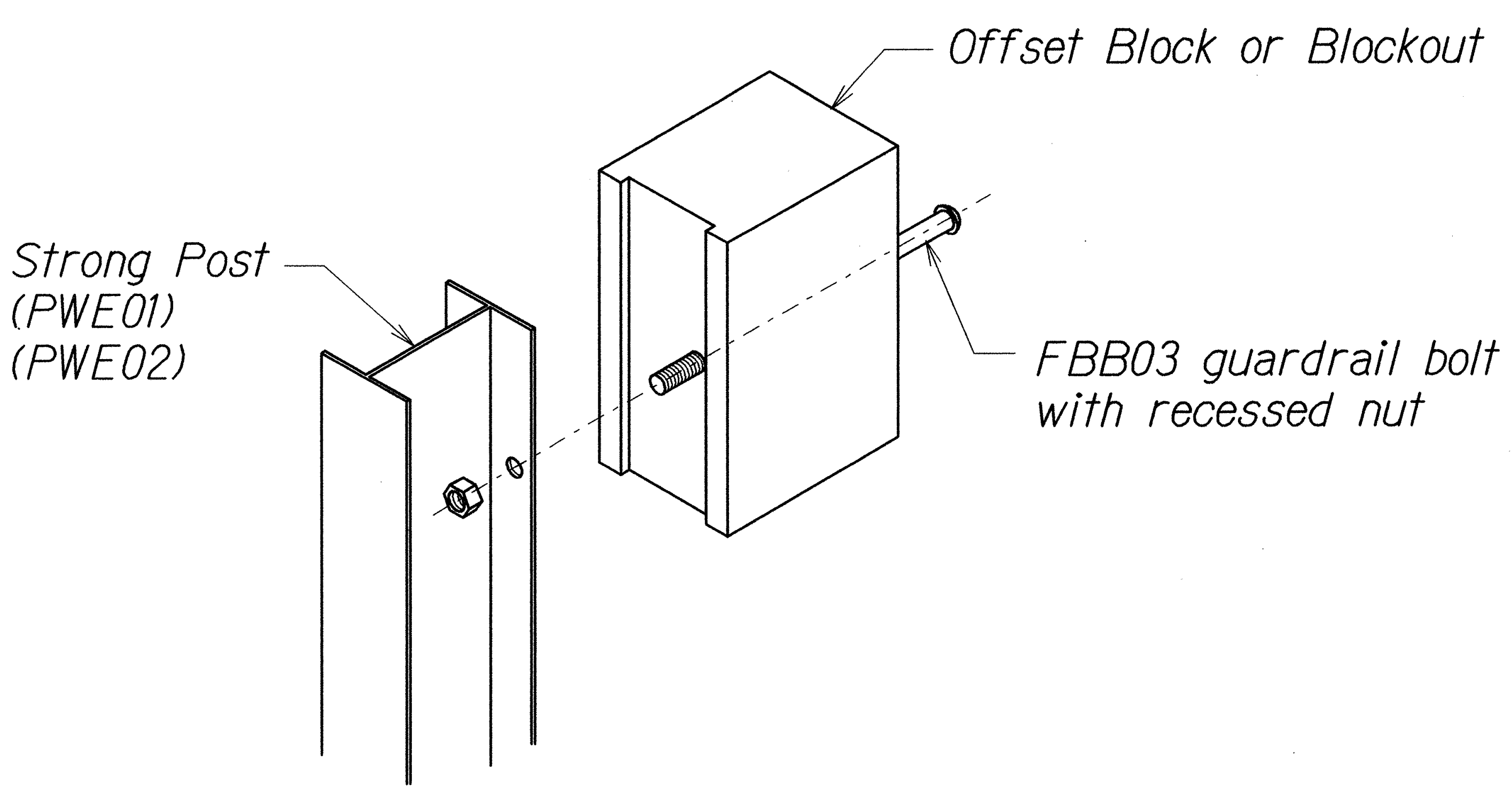
TOP

SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)



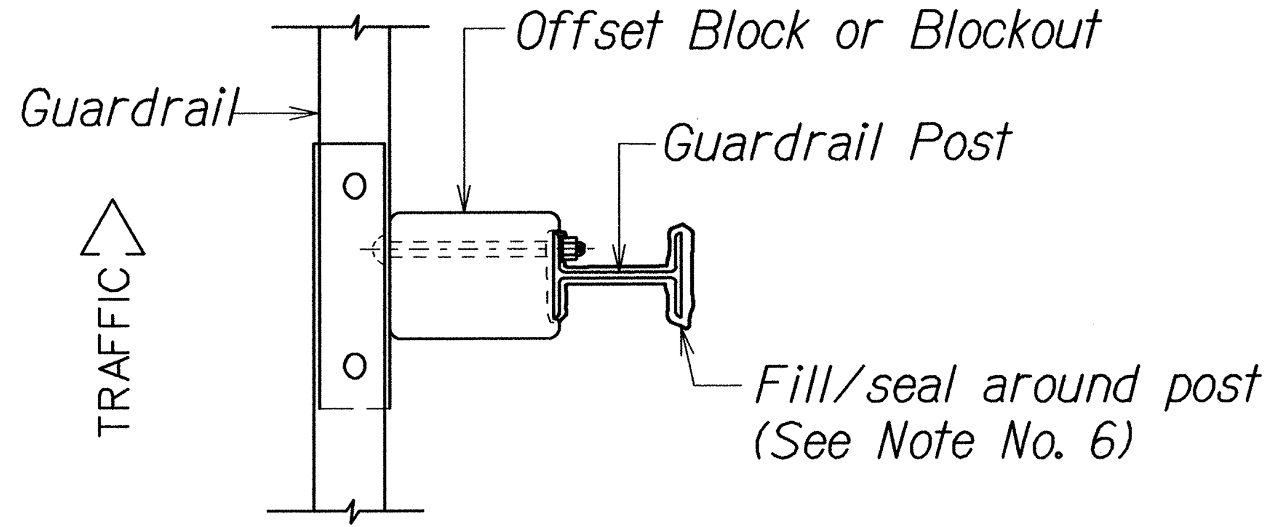
RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)



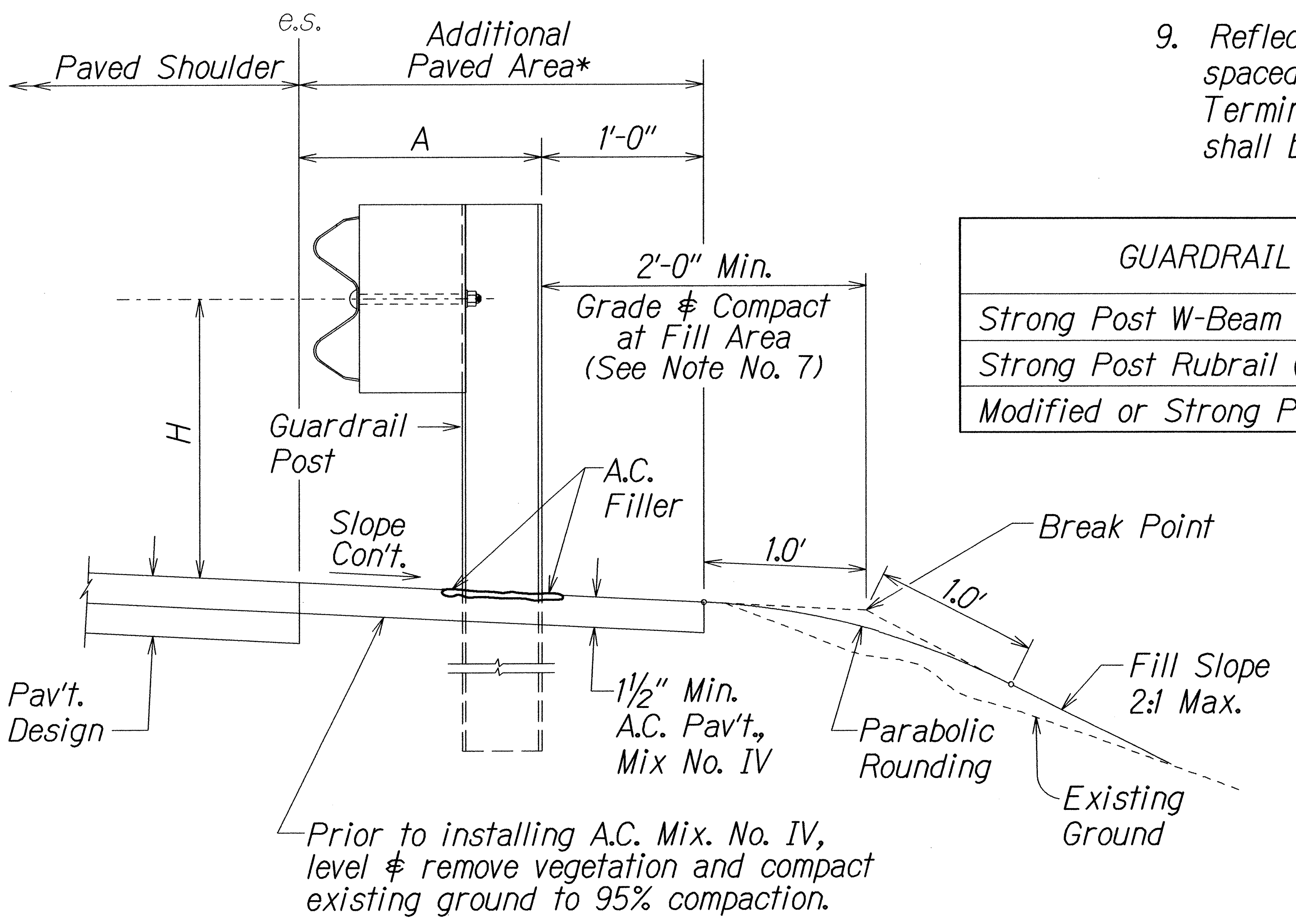
Exploded View

(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL

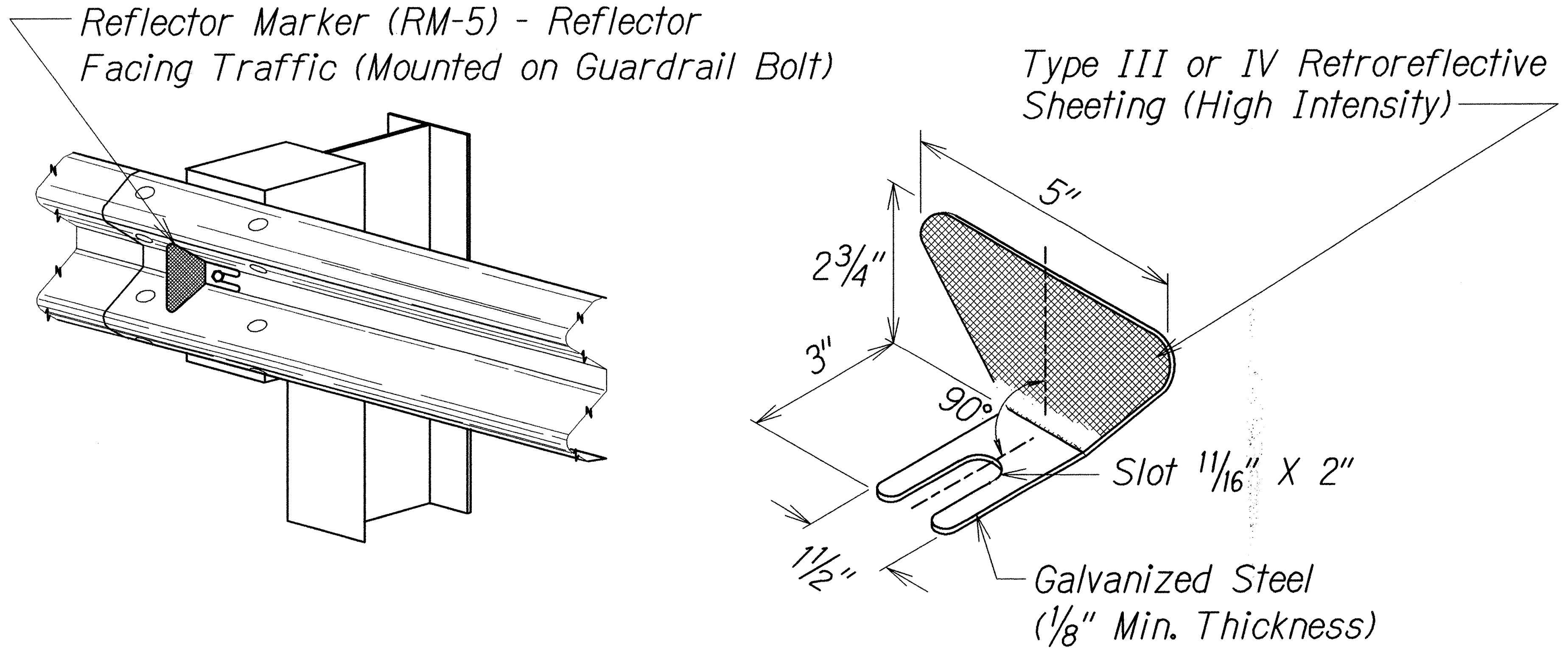


PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION



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
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

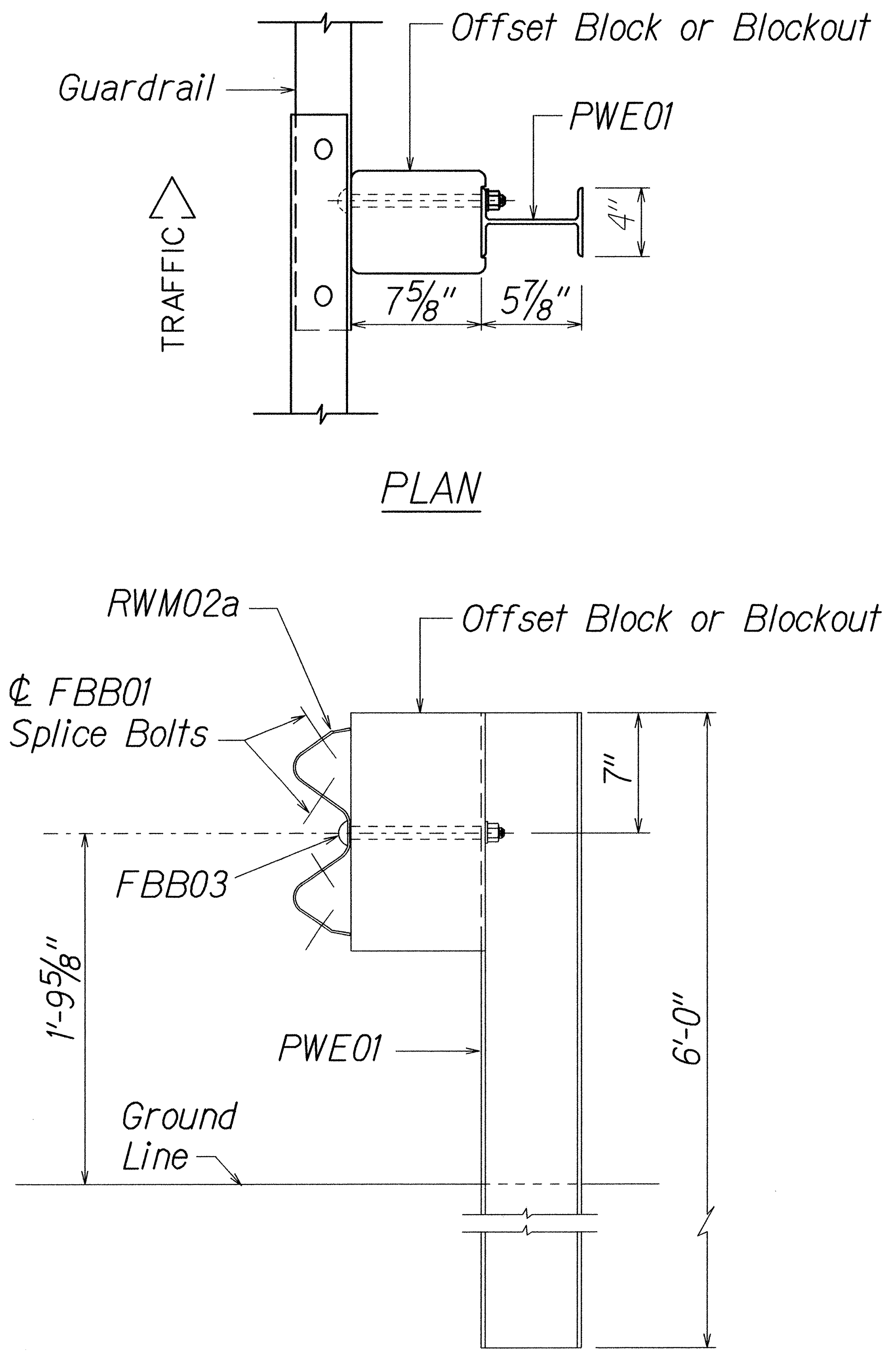
GUARDRAIL DETAILS & NOTES

KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)

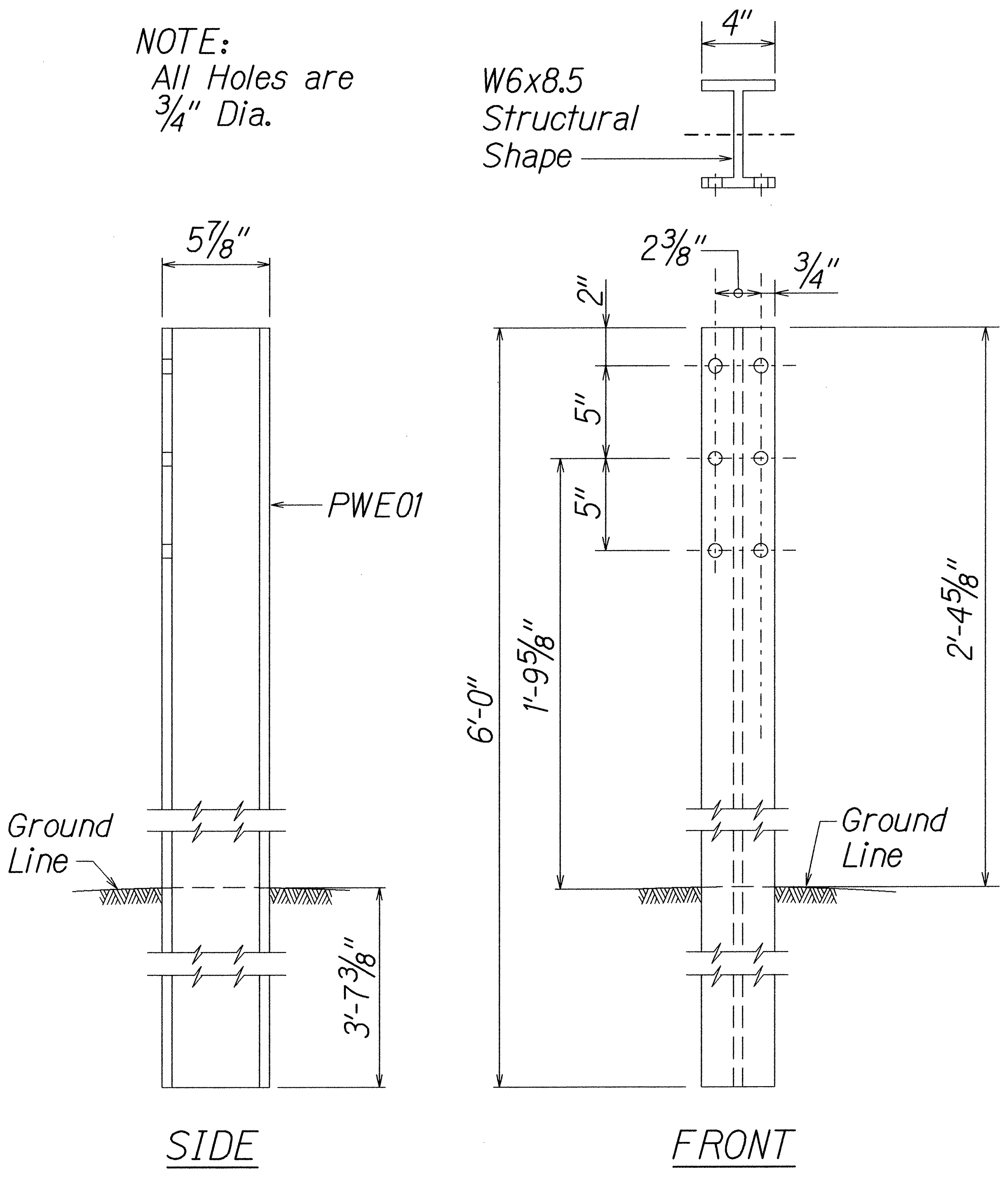
Scale: N.T.S. Date: August, 2014

SHEET No. 1 OF 6 SHEETS

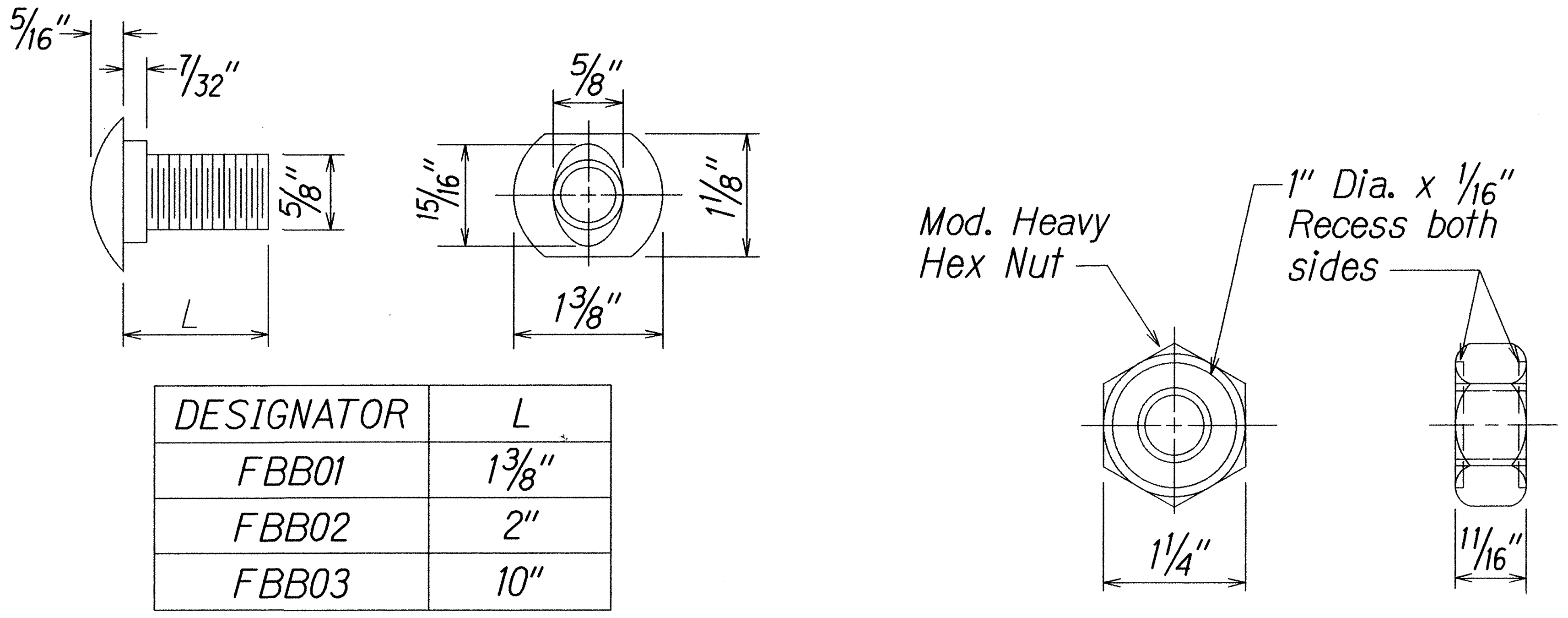
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	8	50



STRONG POST W-BEAM GUARDRAIL (SGR04a)

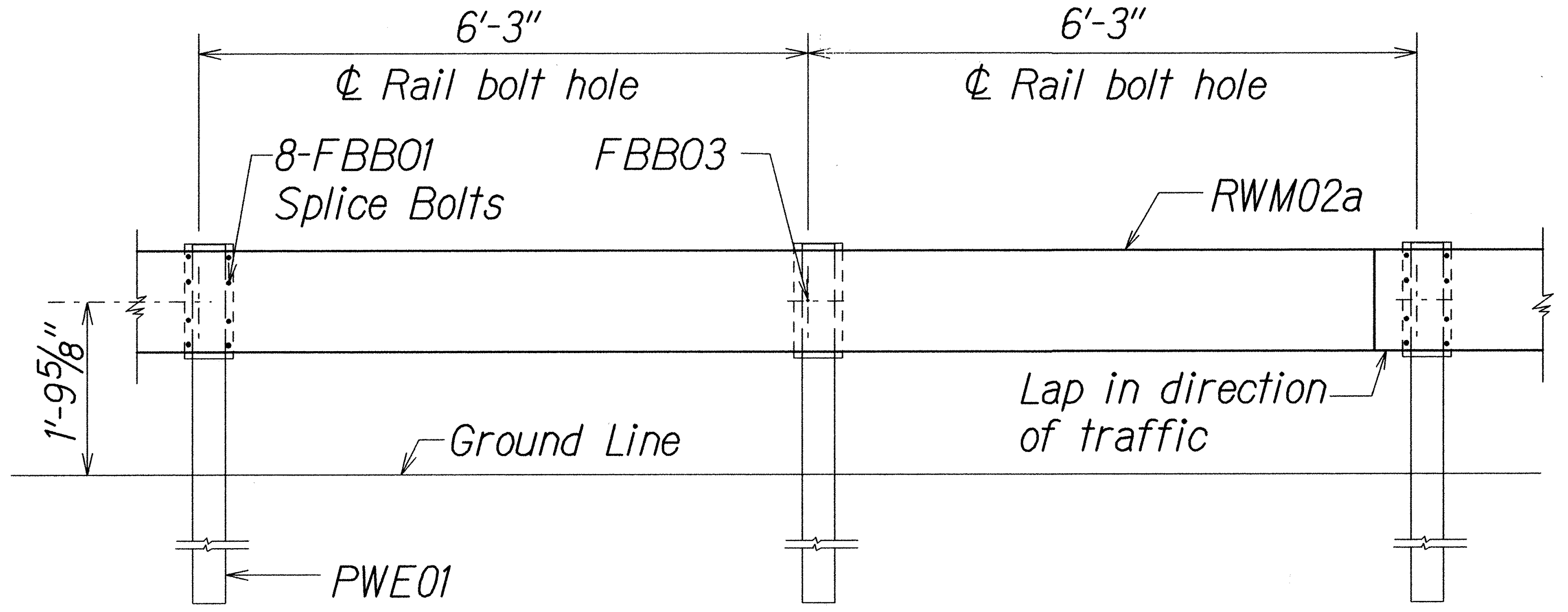


W-BEAM STRONG POST (PWE01)



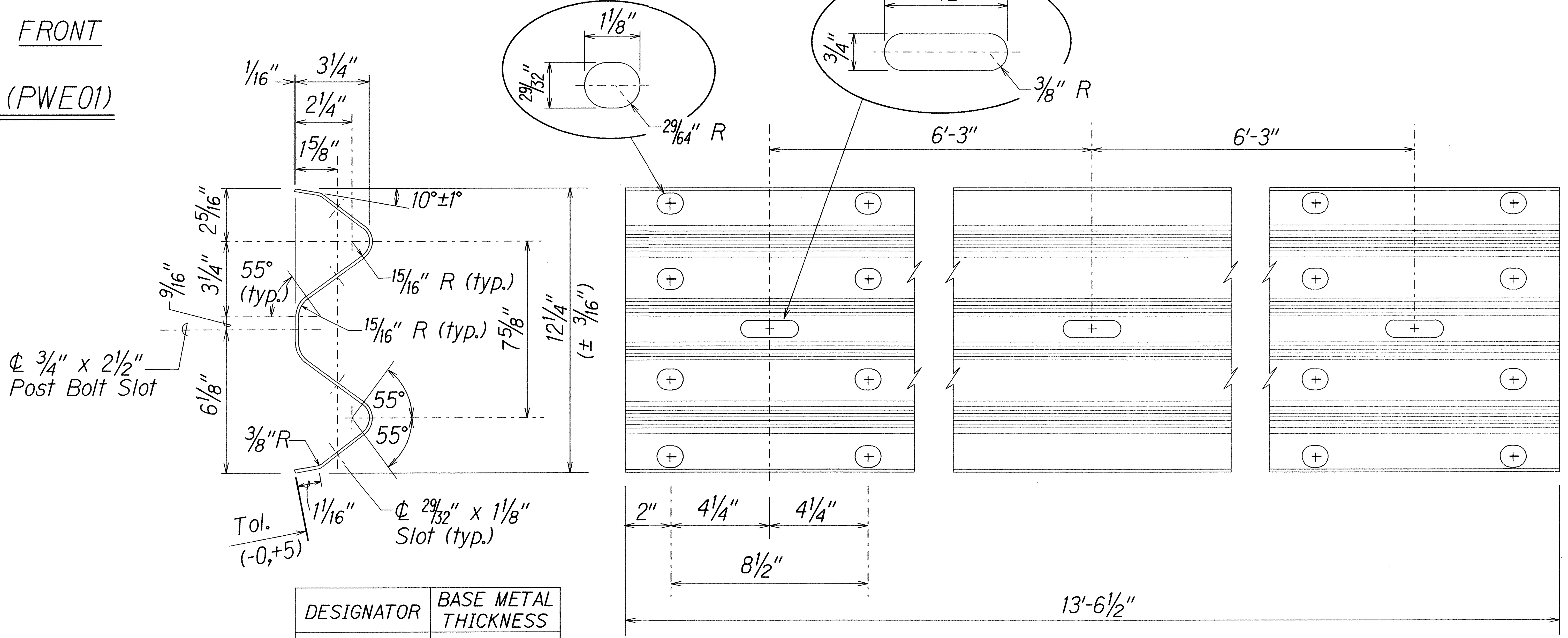
DESIGNATOR	L
FBB01	1⅜"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND RECESSED NUT



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)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)

Scale: N.T.S. Date: August, 2014

SHEET No. 2 OF 6 SHEETS

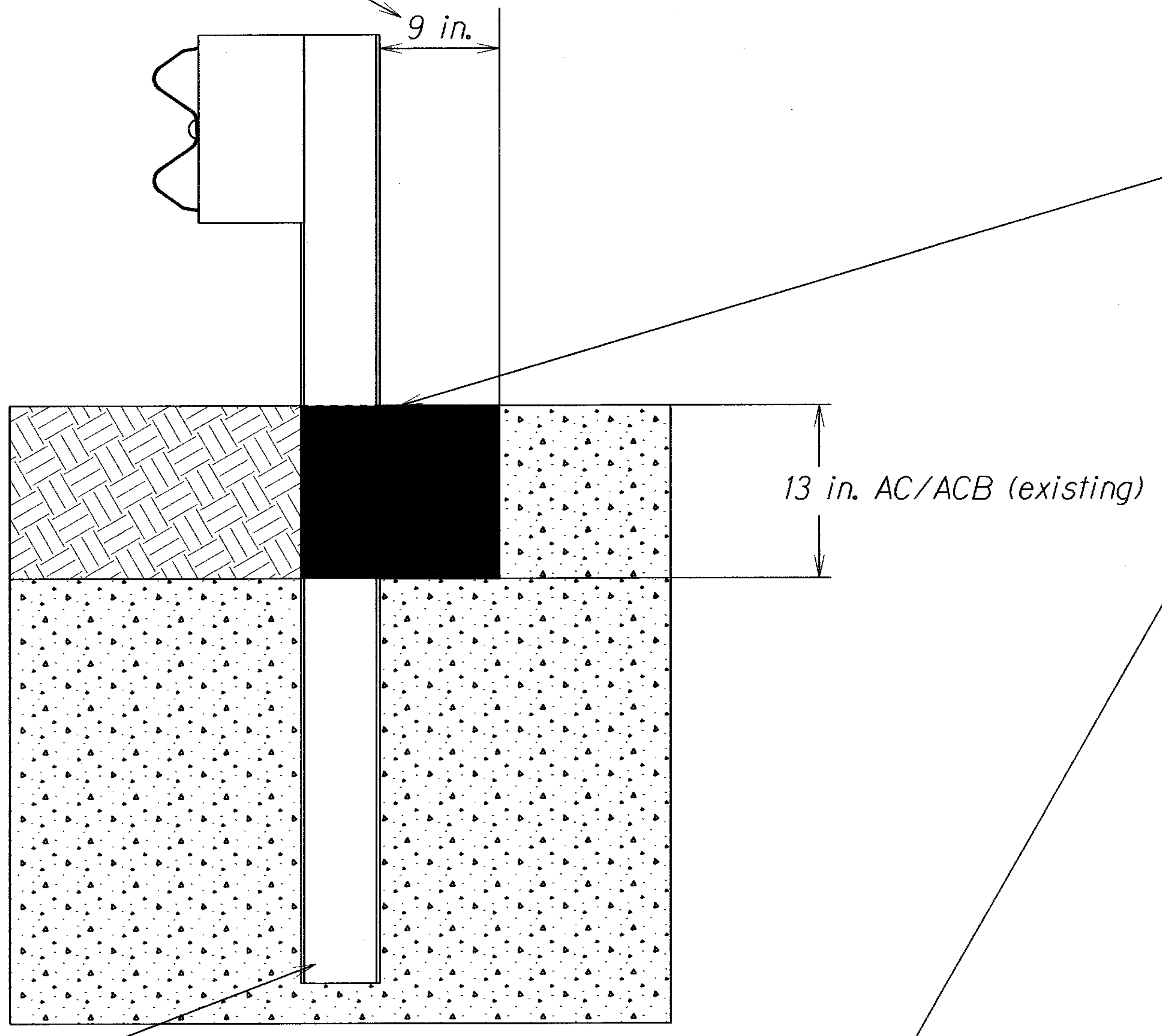
ORIGINAL PLAN	SURVEY PLOTTED BY DRAWN BY TRACED BY DESIGNED BY QUANTITIES BY CHECKED BY	DATE
NOTE BOOK		
No.		

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	8 S-1	50

Where the existing 13" deep AC/ACB extends more than 9" behind a new guardrail post installation, a hole shall be drilled for the new post to the dimensions described and filled with the material described.

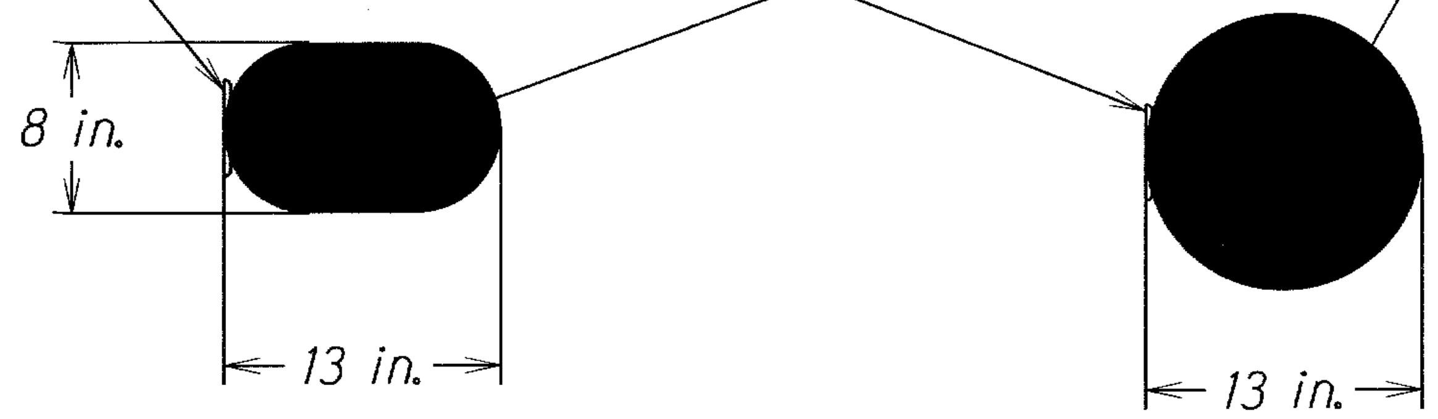
Remove existing AC replace with compressible material (3B Fine, sand, etc.)

New Post



NEW POST INSTALLATION DETAIL

Scale: N.T.S.



Either hole configuration acceptable

PLAN VIEW STEEL POSTS

Scale: N.T.S.

Note: This tracing prepared during "As-Built" posting.

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

NEW POST INSTALLATION DETAIL

KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)

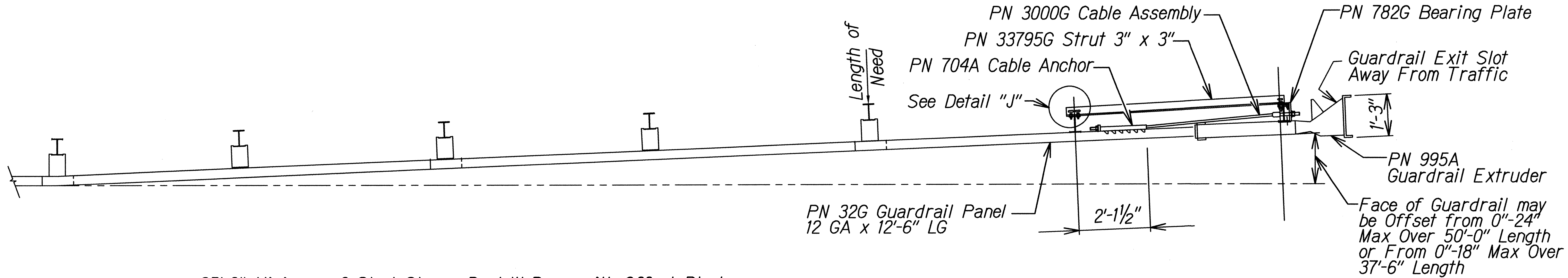
Scale: N.T.S. Date: August, 2015

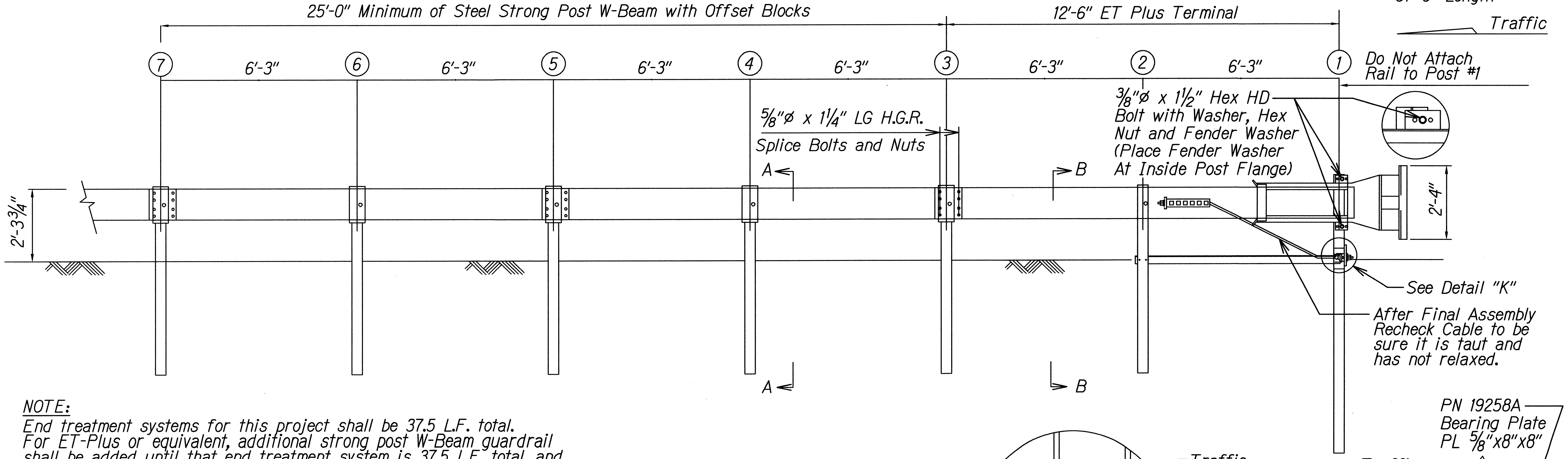
SHEET No. 2a OF 6 SHEETS

"AS-BUILT"

8 S–1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	9	50



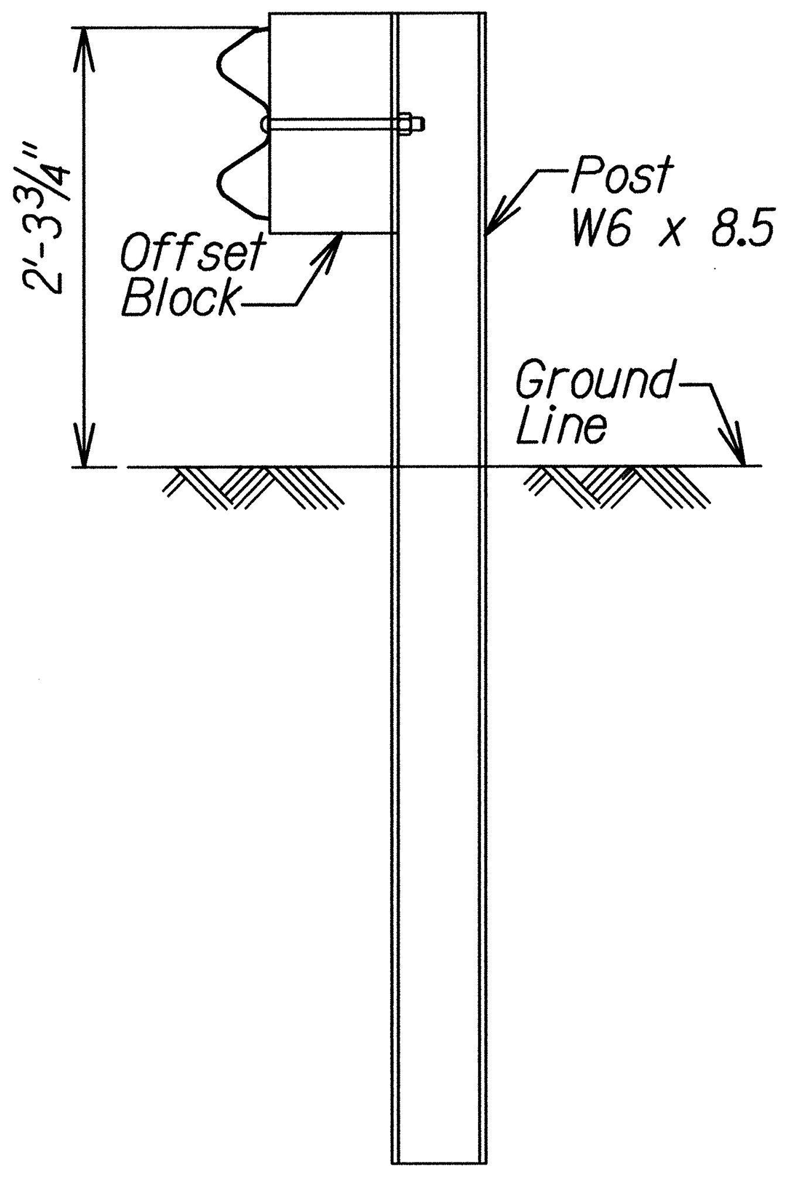


NOTE:
End treatment systems for this project shall be 37.5 L.F. total. For ET-Plus or equivalent, additional strong post W-Beam guardrail shall be added until that end treatment system is 37.5 L.F. total, and shall be made incidental to the end treatment item.

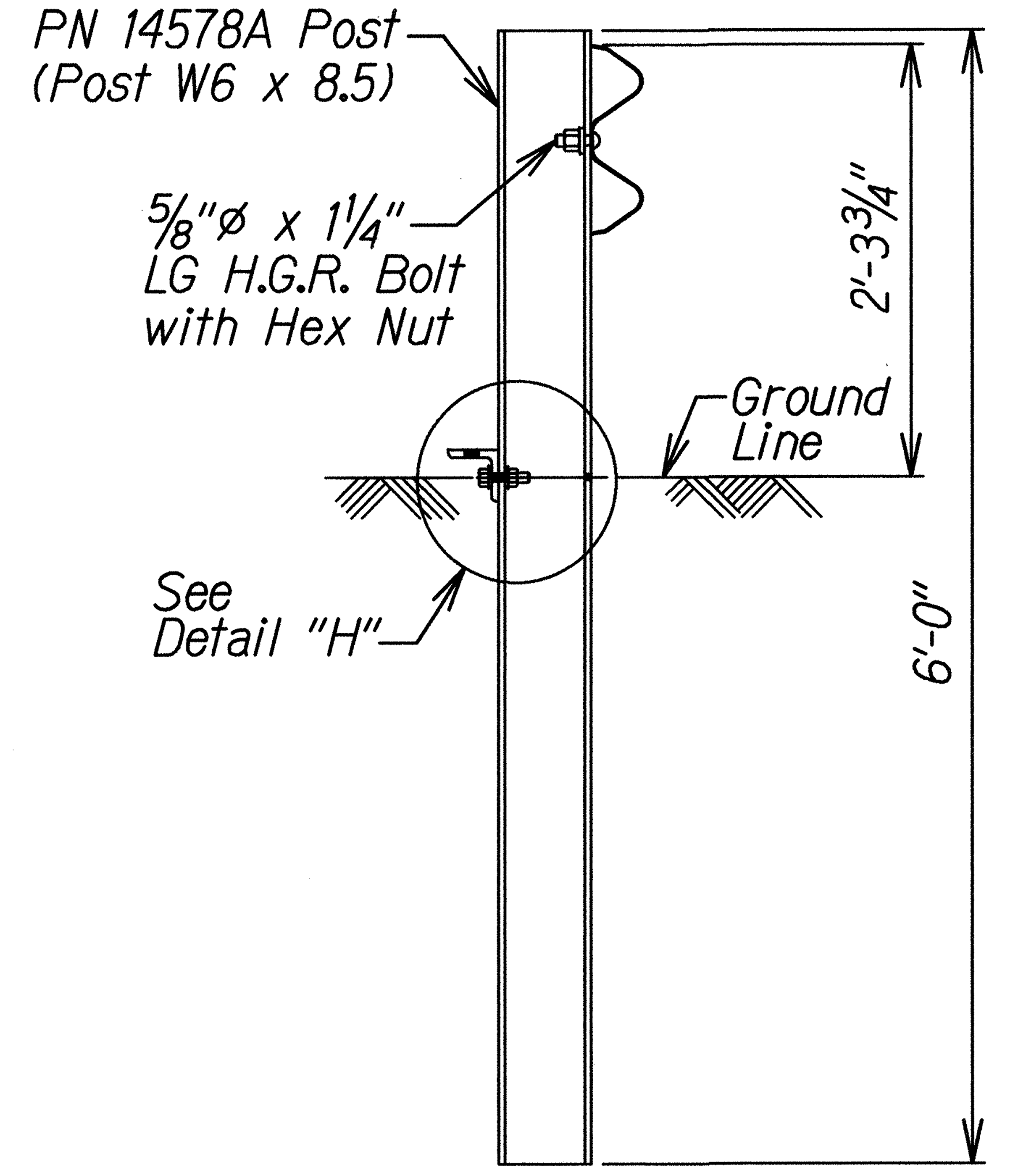
NOTE: Do attach guardrail to Post #1.

Object Marker Note:

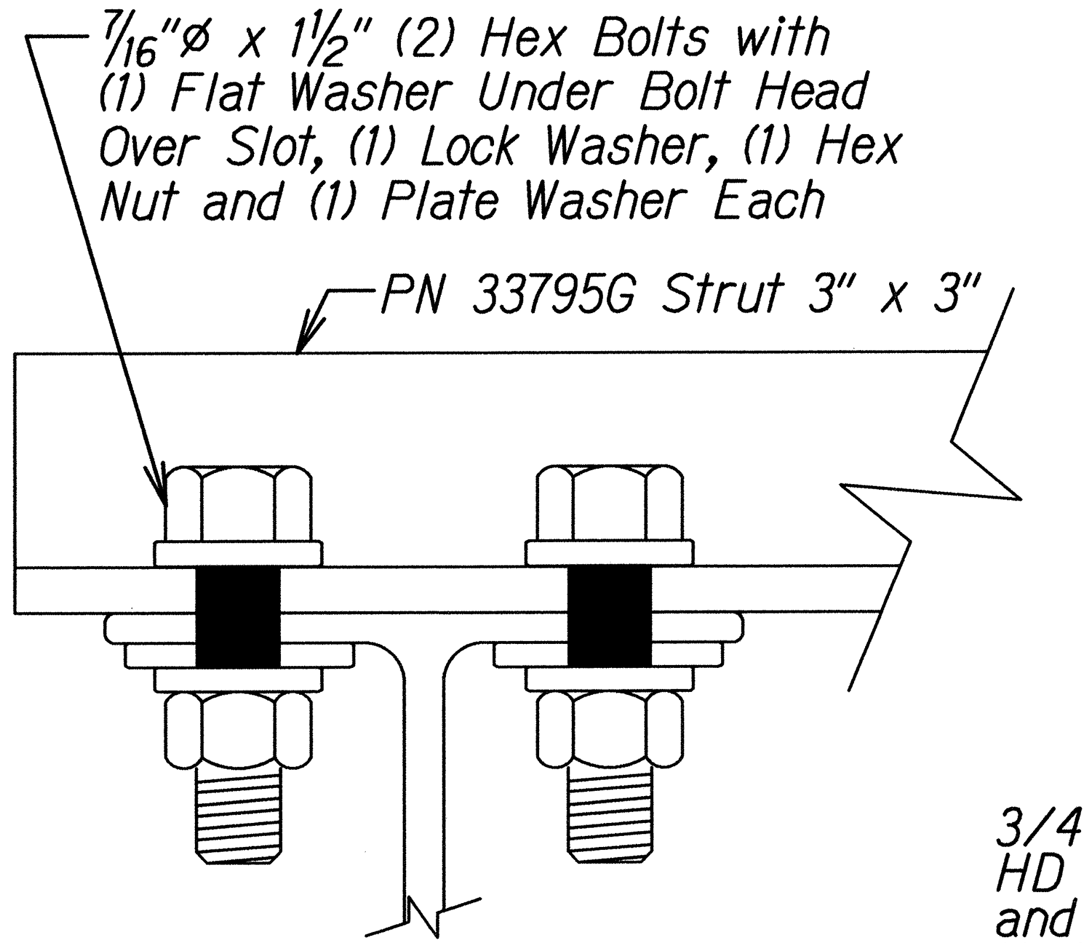
The stripes for Object Marker shall slope downward at an angle of 45° towards the sides of the extruder head where traffic is to pass.



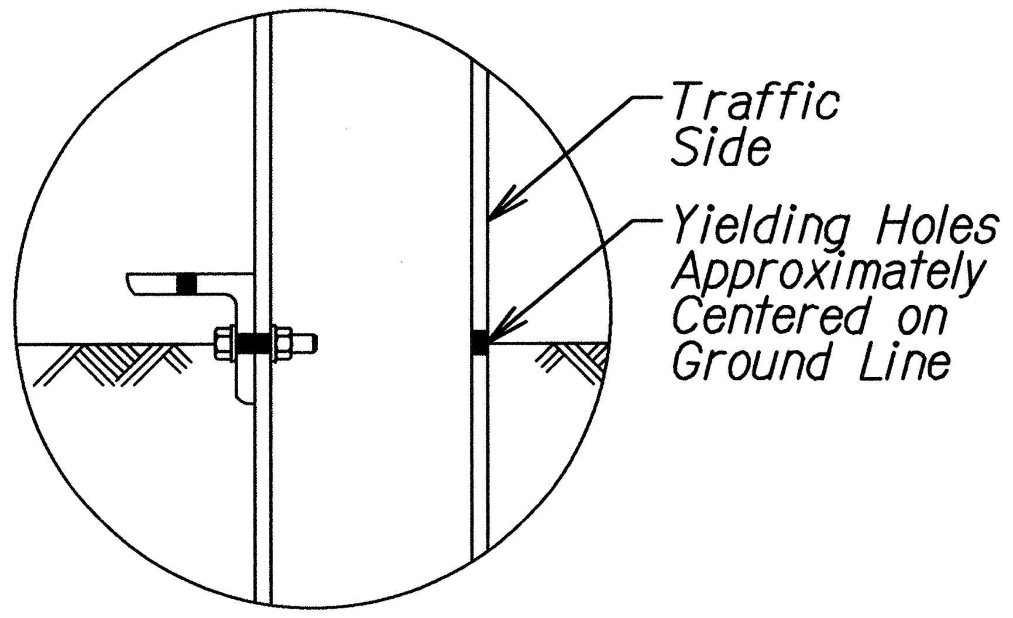
SECTION "A-A"
(TYP @ Posts #3 and Beyond)



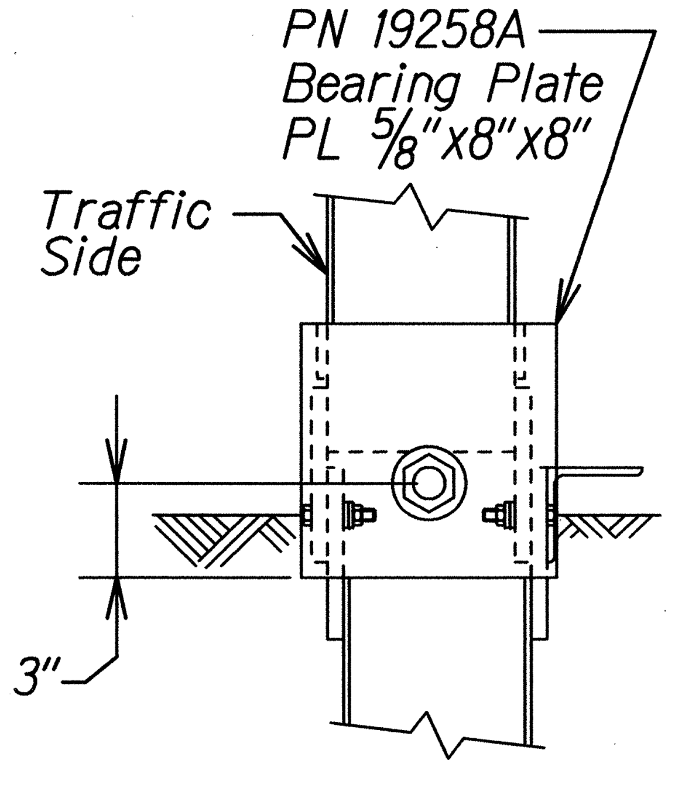
SECTION "B-B"
(Post #2)



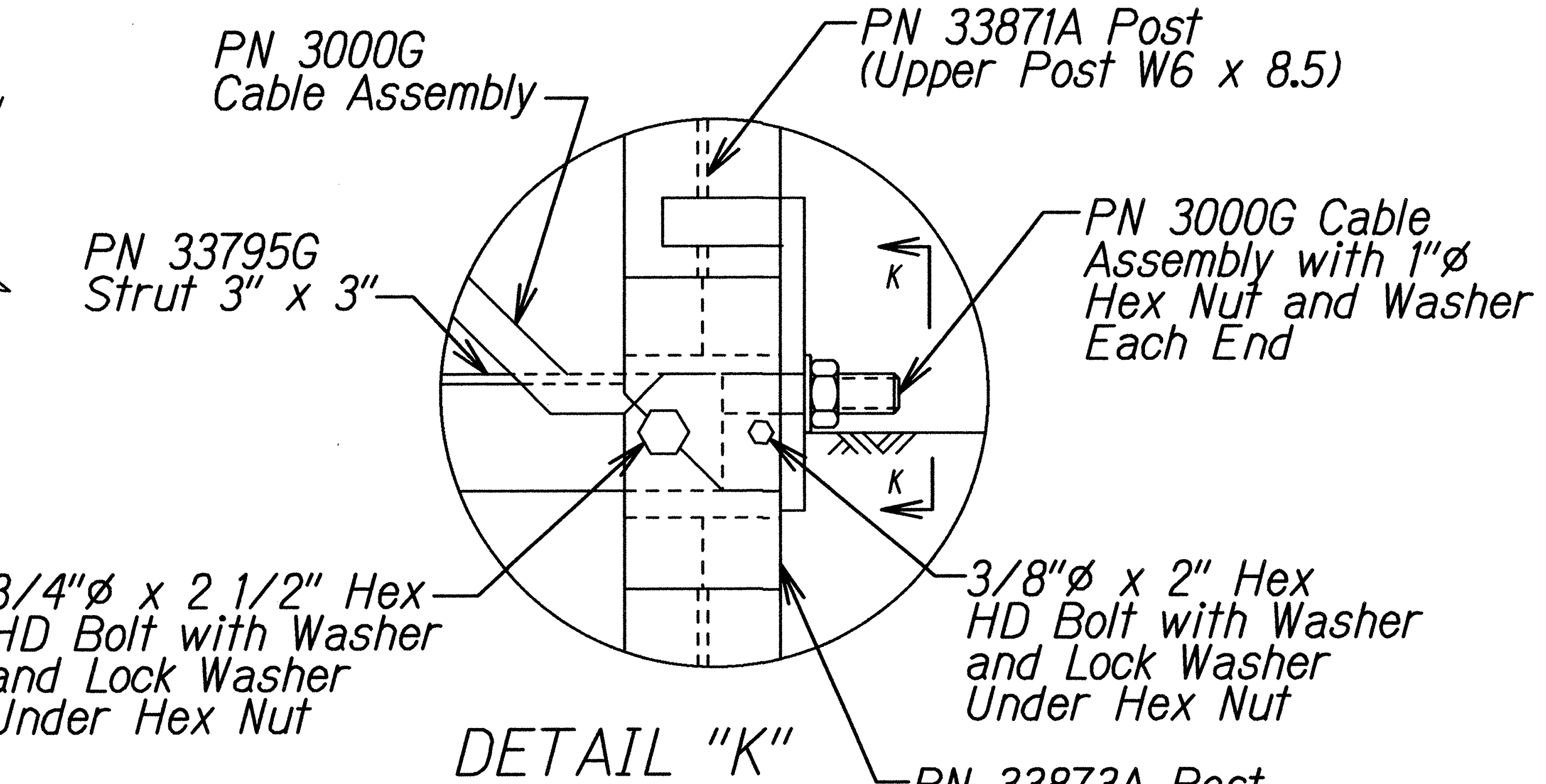
DETAIL "J"



DETAIL "H"
(Post #2)



VIEW "K-K"



DETAIL "K"
(Post #1)

BILL OF MATERIAL		
32G	1	12/12'-6/6'3/S ANC (Guardrail)
704A	1	Cable Anchor Bracket
995A	1	ET-Plus Extruder
3000G	1	Cable ¾ x 6'6"
3340G	9	5/8" Hex Nut
3360G	9	5/8"ø x 1¼" Splice Bolt
3701G	2	¾" Flat Washer
3704G	2	¾" Hex Nut
3717G	2	¾"ø x 2½" 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 (1½" OD)
4258G	2	3/8" Lock Washer
4261G	2	3/8"ø x 1½" Hex HD Bolt
4389G	2	7/16" Flat Washer
4390G	2	7/16"ø x 1½" Hex HD Bolt
4393G	2	7/16" Lock Washer
4396G	2	7/16" Hex Nut
4699G	2	¾" Lock Washer
6321G	2	3/8"ø 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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ET-PLUS (TL-3)

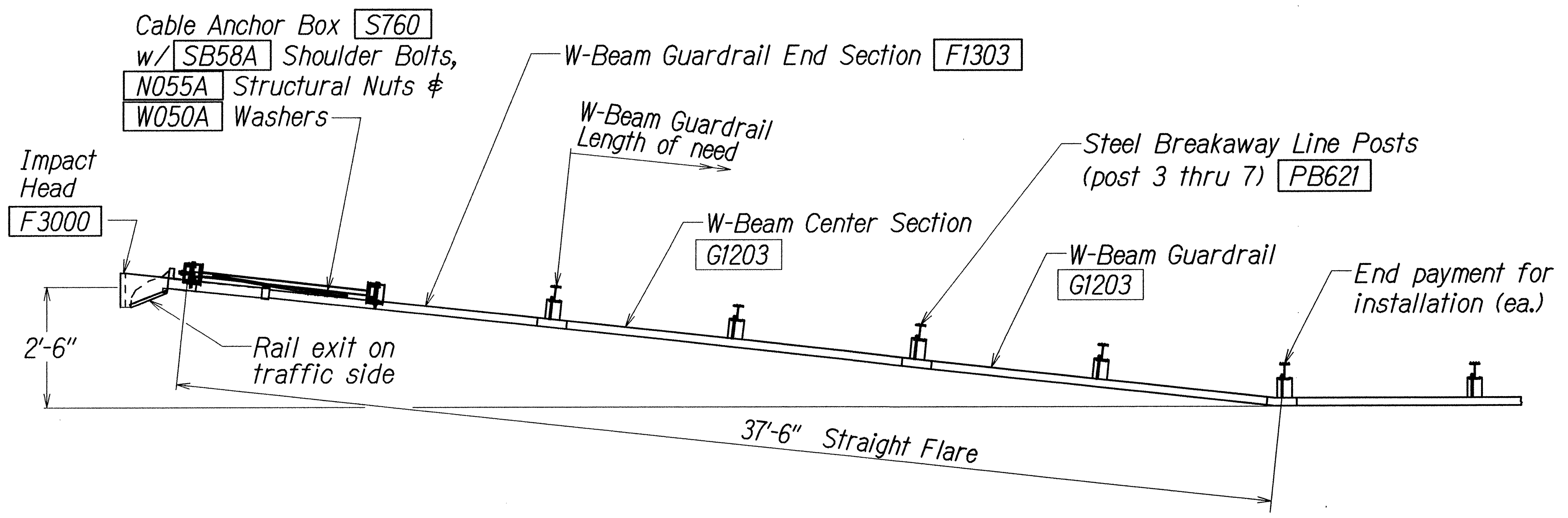
KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)

Scale: N.T.S. Date: August, 2014

SHEET No. 3 OF 6 SHEETS

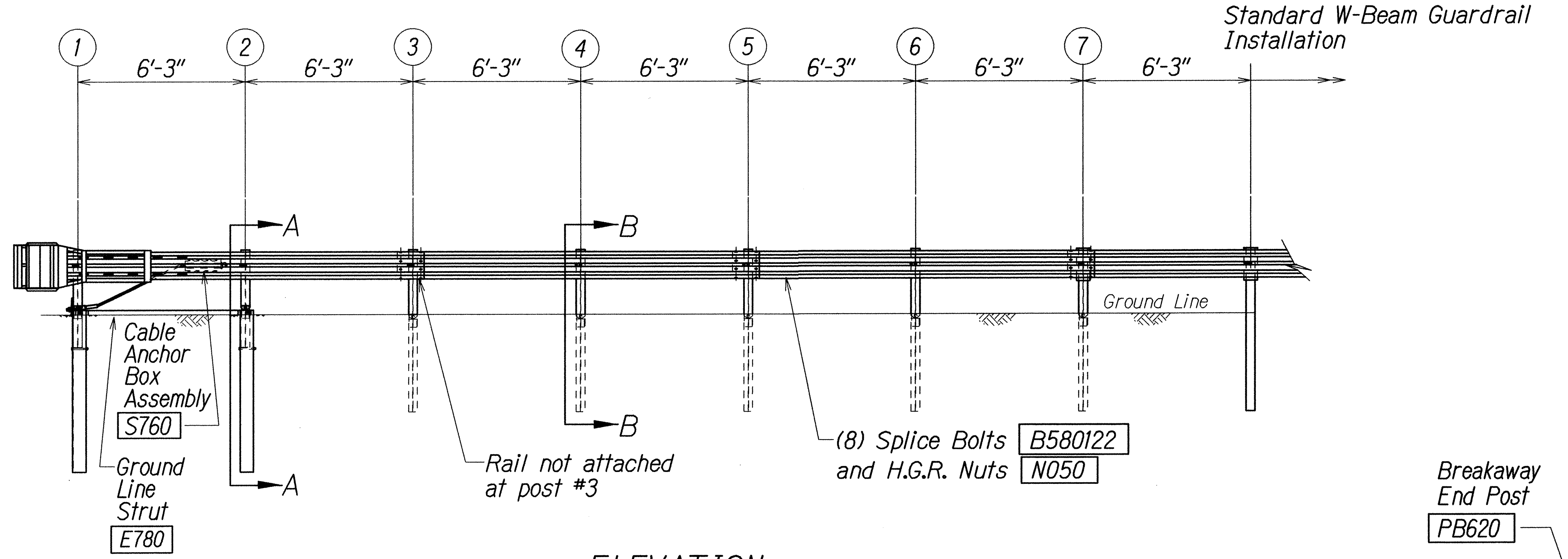
ORIGINAL PLAN
NOTE BOOK
No.
SURVEY PLOTTED BY DATE X
DRAWN BY X "
TRACED BY "
DESIGNED BY X "
QUANTITIES BY "
CHECKED BY "

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	10	50



PLAN

TRAFFIC



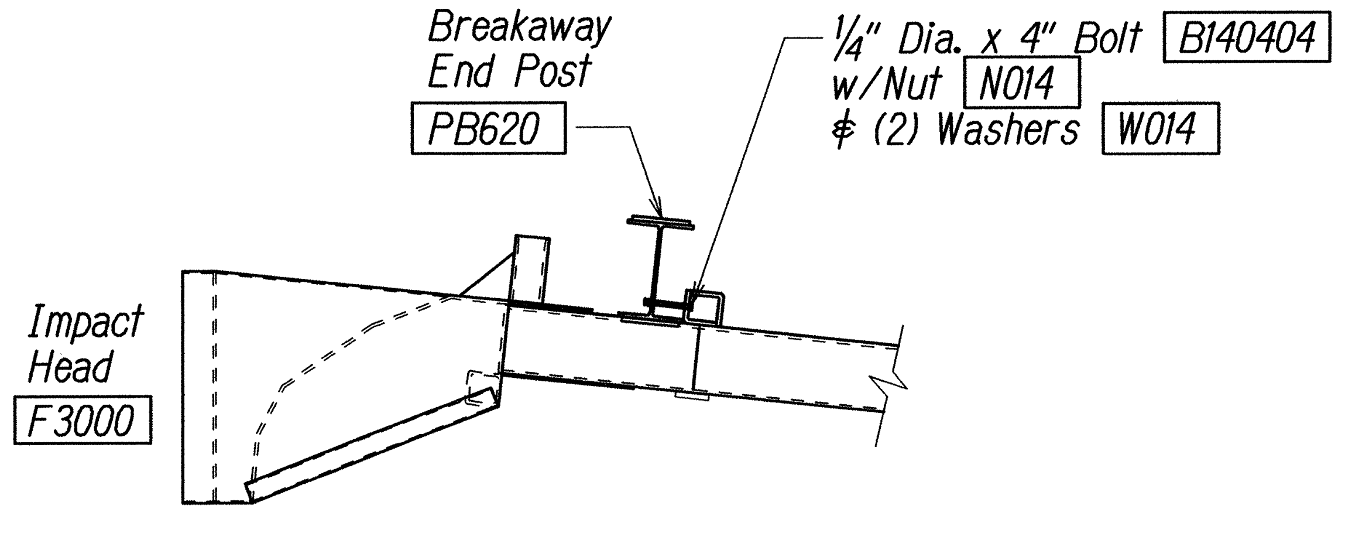
ELEVATION

GENERAL NOTES

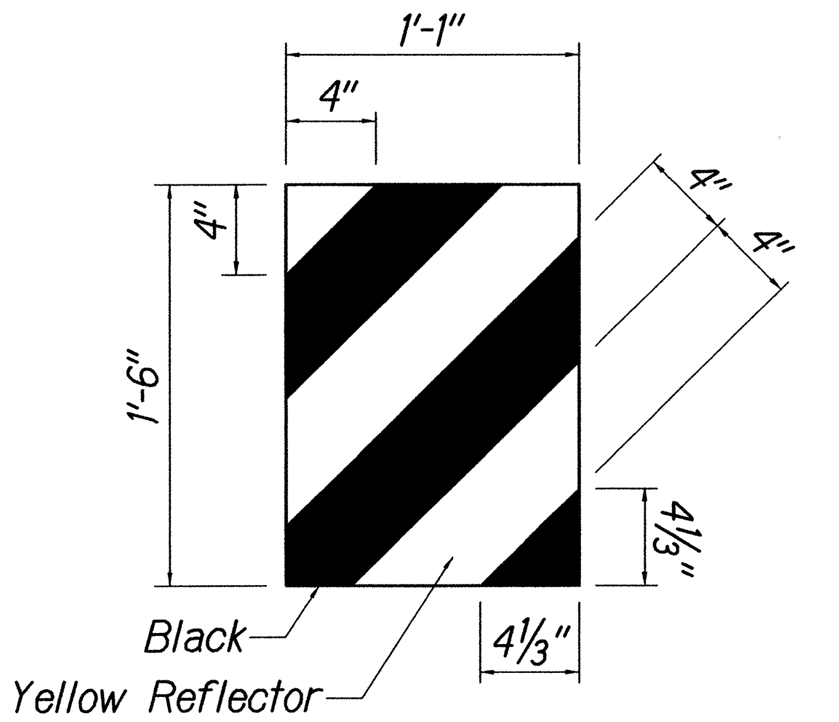
1. Breakaway steel posts are required with the FLEAT Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
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 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. (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.

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	5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B341004	2	3/4" Dia. x 10" HEX BOLT
B581002	5	5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)
N050	32	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6)
N030	2	3/4" Dia. HEX NUT
W050	6	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 9/16" ID A325 STR. WASHER

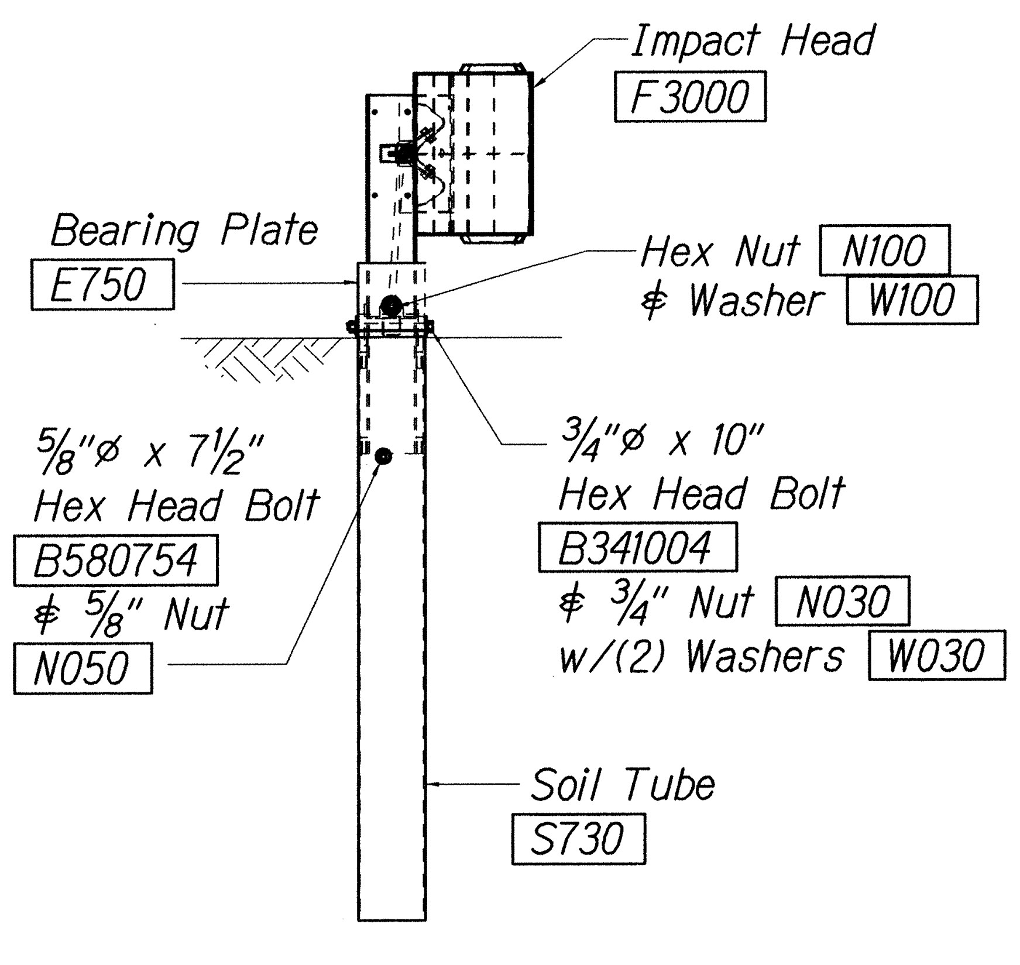
Foundation Tube Options For Posts 1 ¢ 2
- *6'-0" Split Foundation Tubes S730
- *6'-0" Solid Foundation Tubes E731
- *5'-0" Foundation Tubes S735 W/Soil Plates SP600
- *4'-6" Foundation Tubes E735 W/Soil Plates SP600



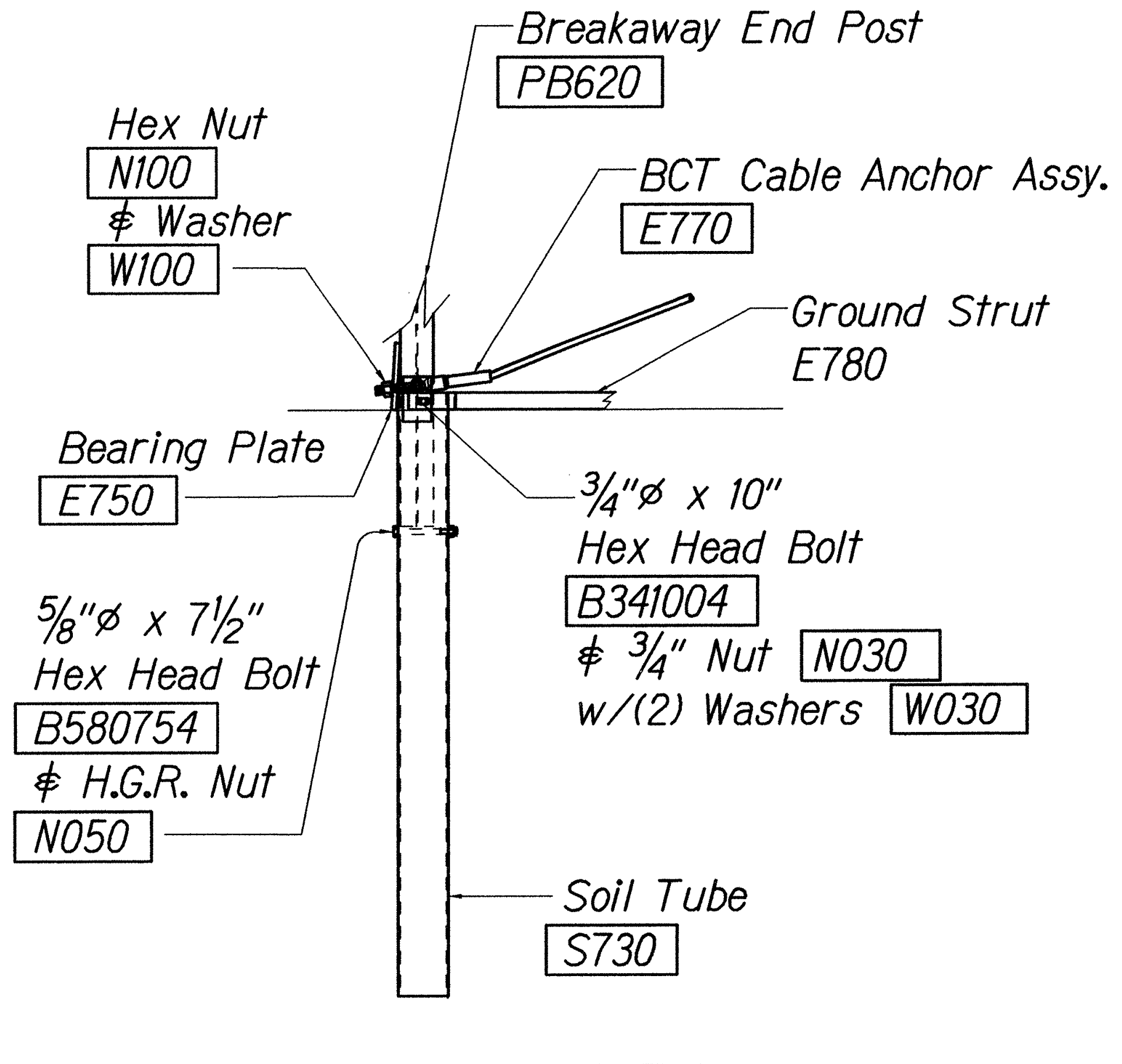
IMPACT HEAD CONNECTING DETAIL



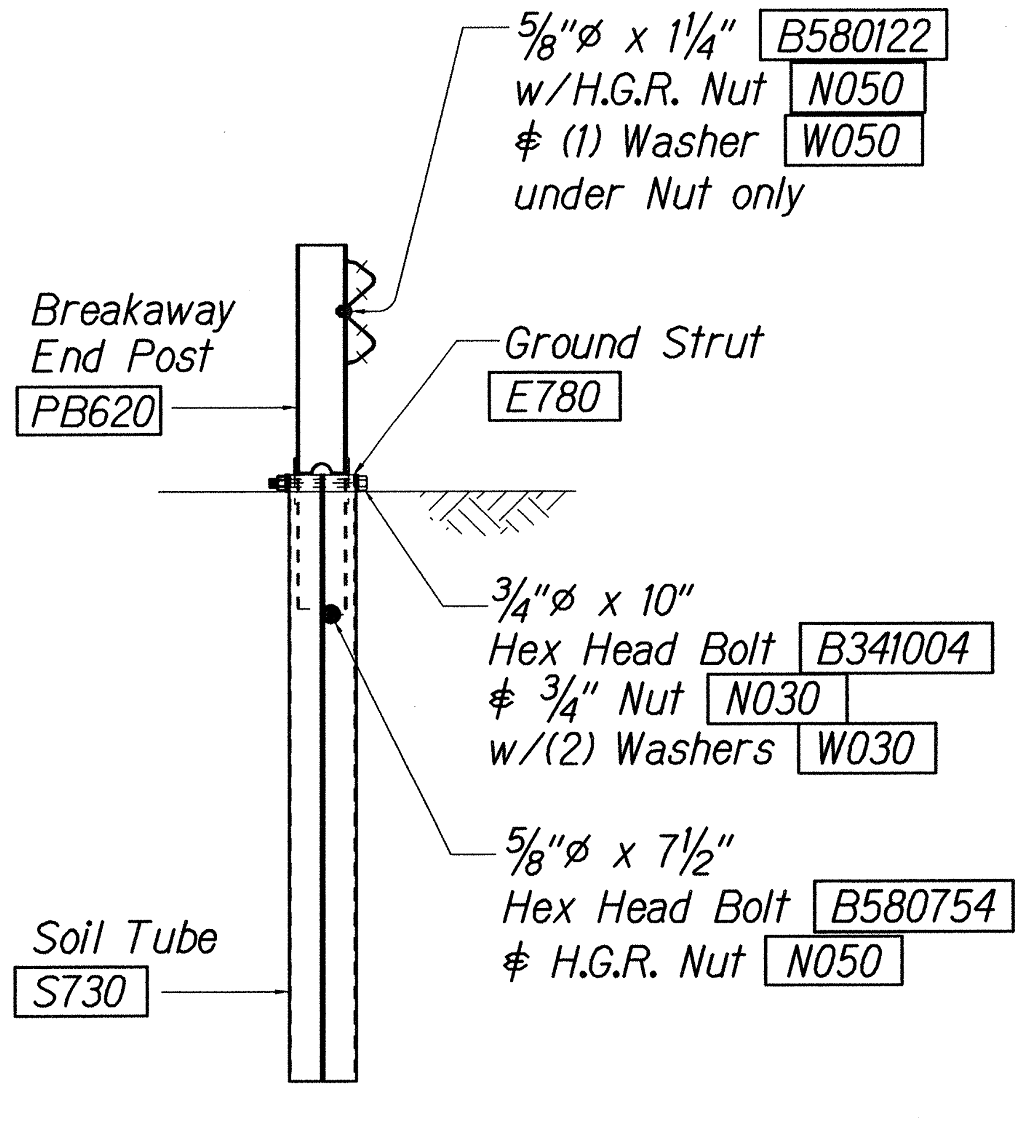
IHRM(R)
IMPACT HEAD REFLECTOR MARKER INSERT DETAIL



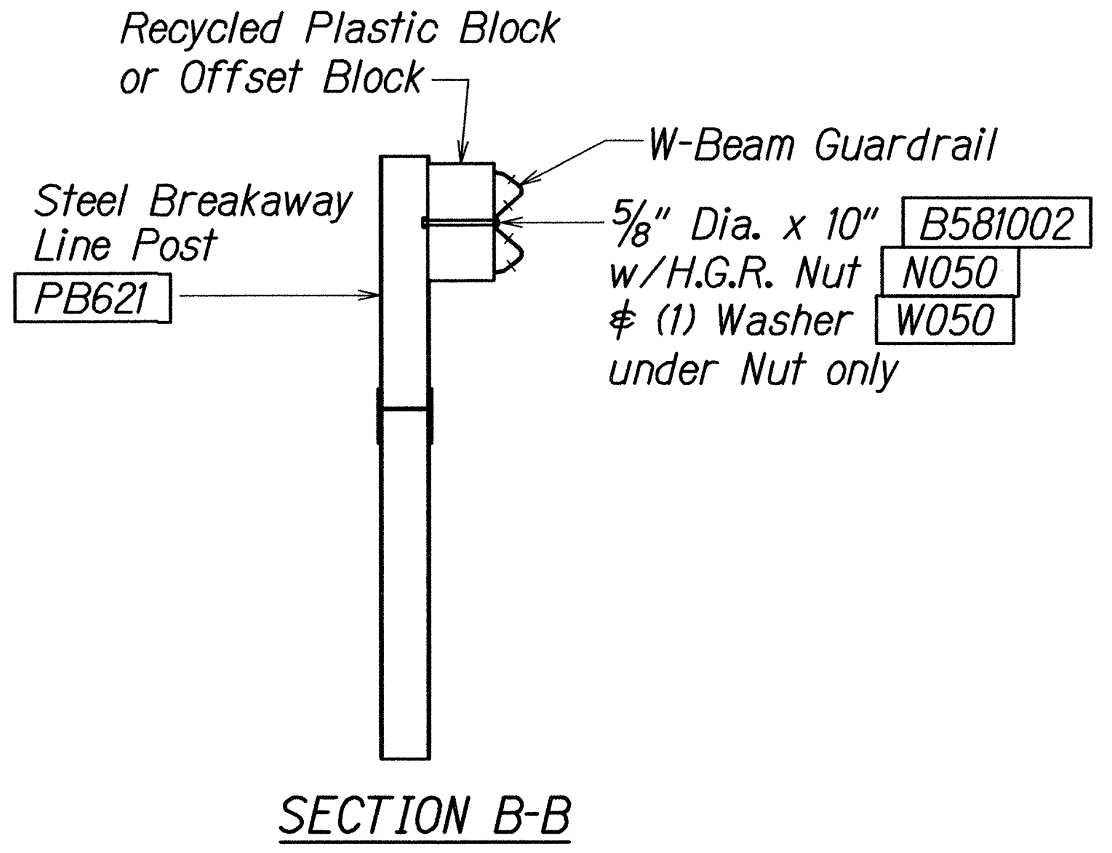
FRONT VIEW OF POST 1



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

KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)

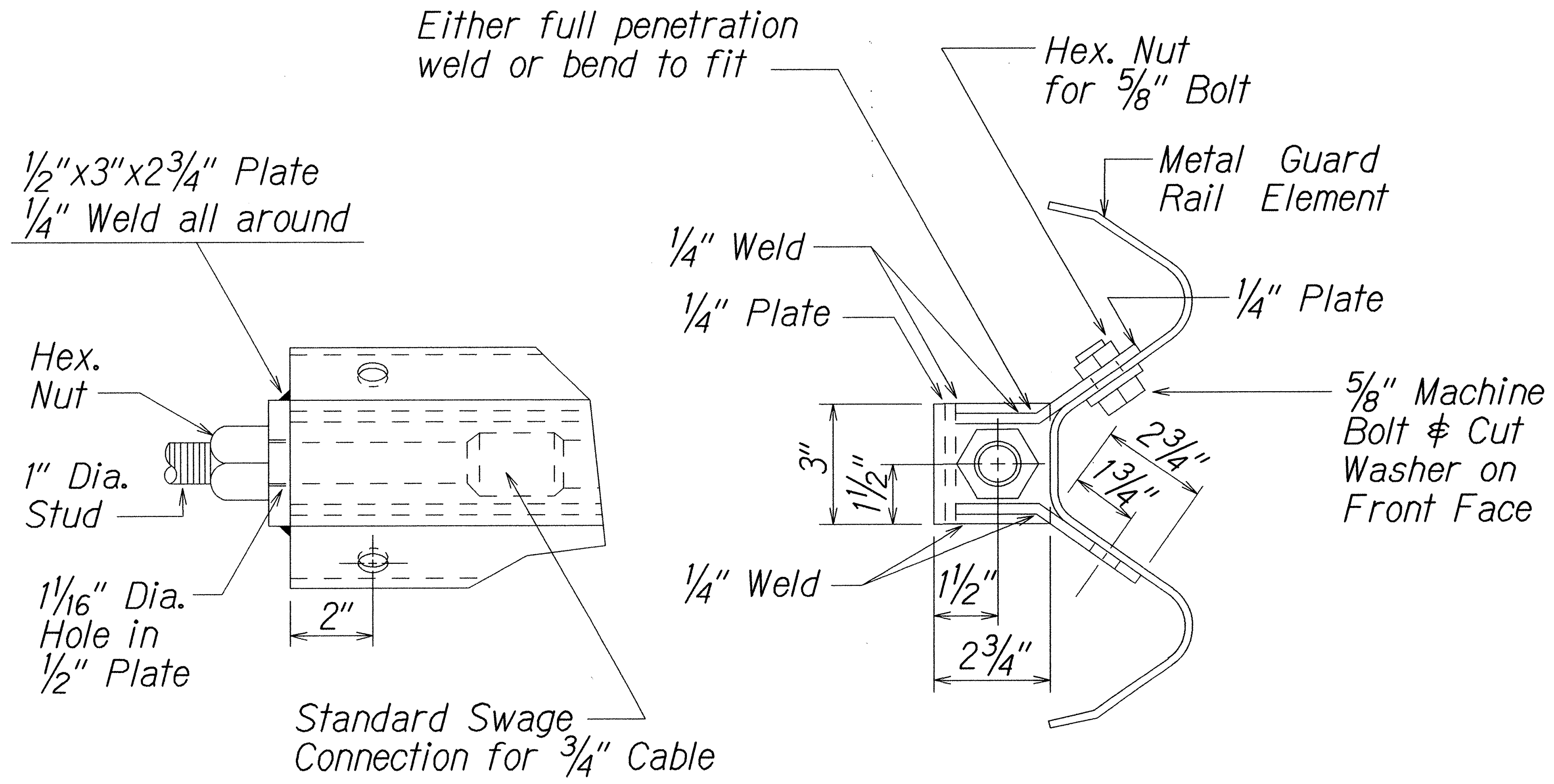
Scale: N.T.S. Date: August, 2014

SHEET No. 4 OF 6 SHEETS

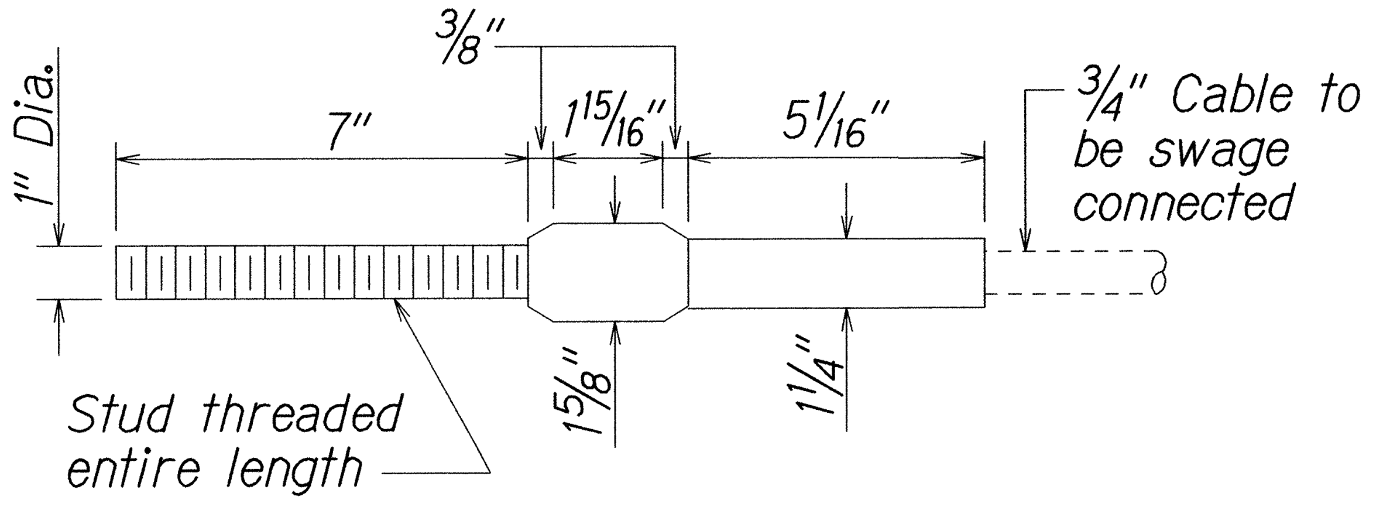
(standard plan TE-61 r11/03/89 ¢ TE-62 r09/01/87)

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

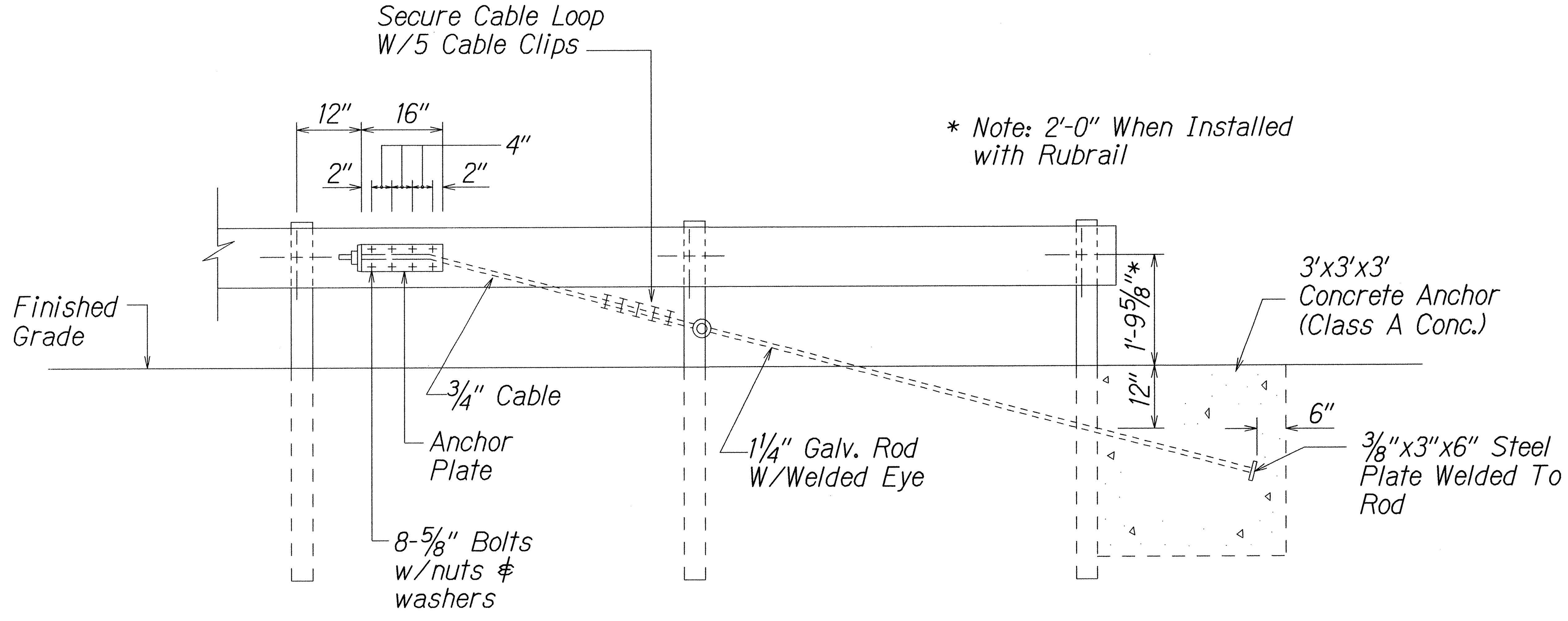
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	11	50



ANCHOR PLATE DETAILS

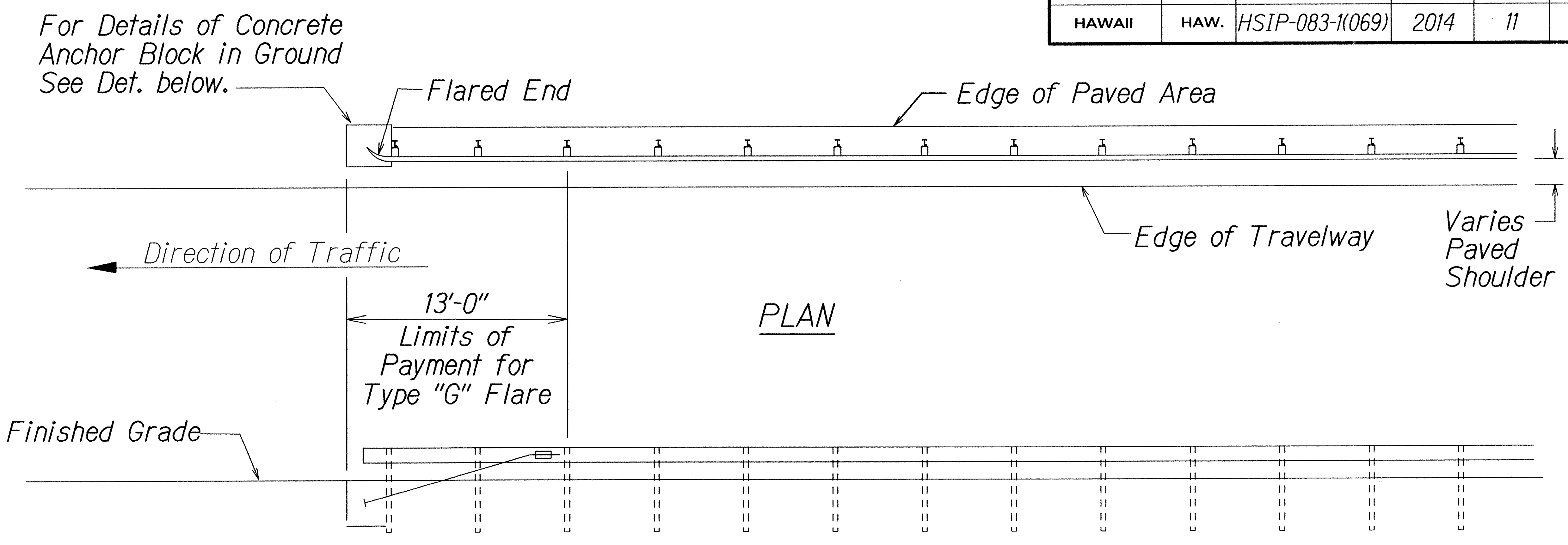


STANDARD SWAGED FITTING AND STUD



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.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

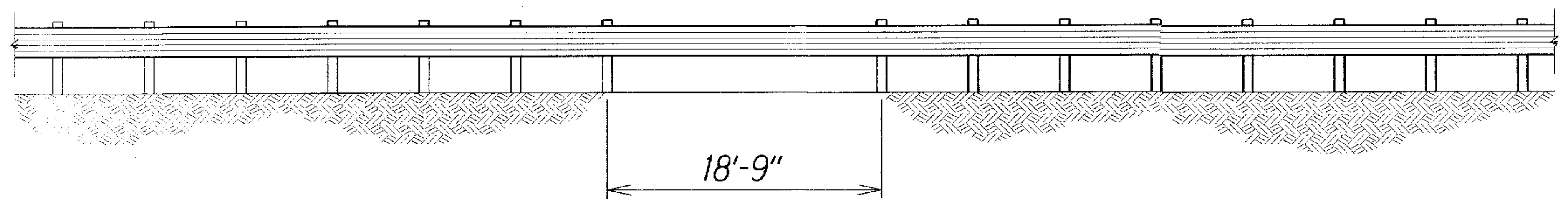
KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)
Scale: N.T.S. Date: August, 2014

SHEET No. 5 OF 6 SHEETS

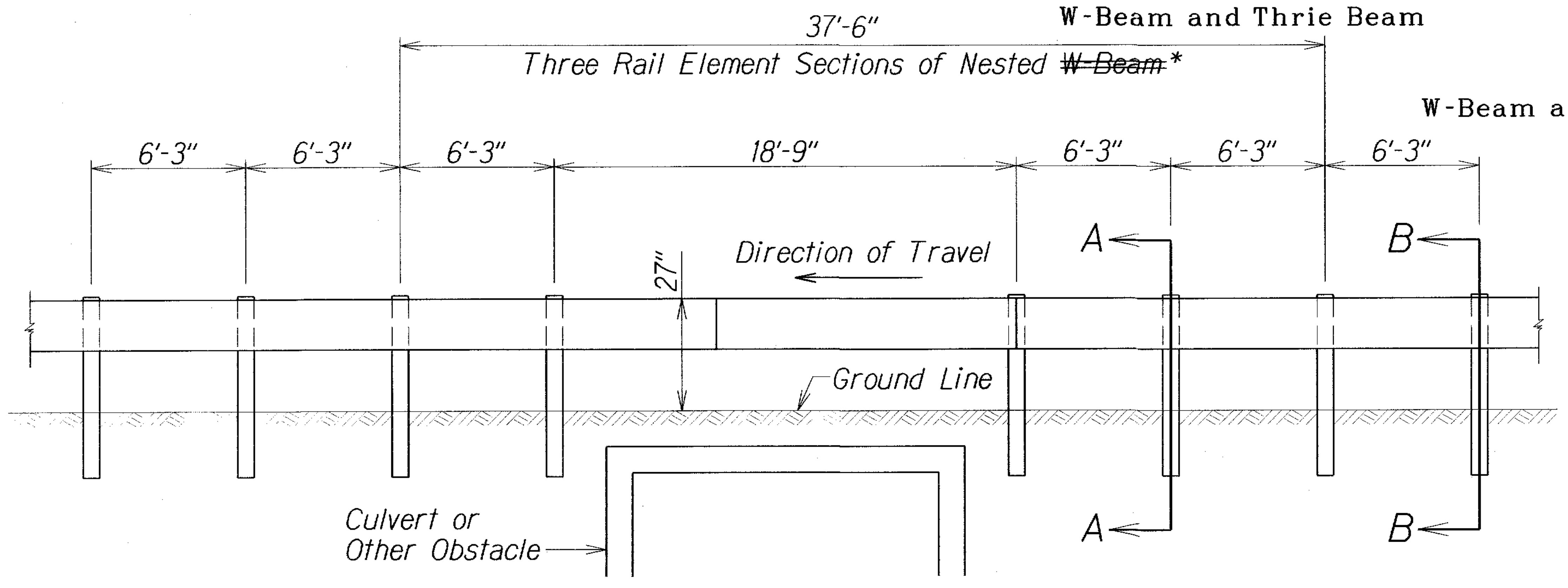
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY X	X
No.	TRACED BY X	
	DESIGNED BY X	
	QUANTITIES BY	
	CHECKED BY	

r3/13/02 tdl.ruby/guardrail/te59rev.dgn (standard plan TE-59 r11/03/89)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-083-1(069)	2014	ADD. 12	50



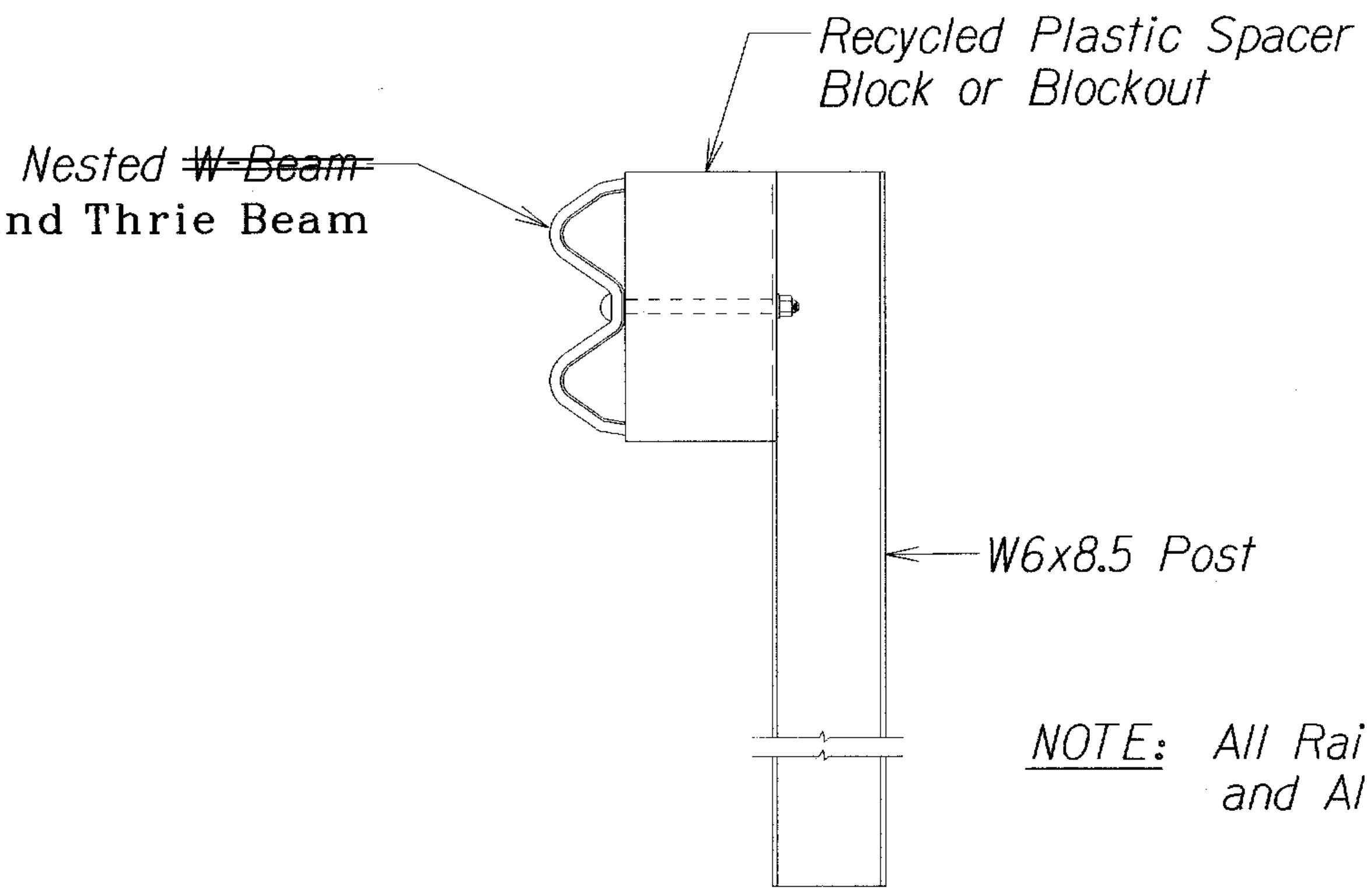
LONG SPAN OVER CULVERT



NESTED LONG SPAN STRONG POST

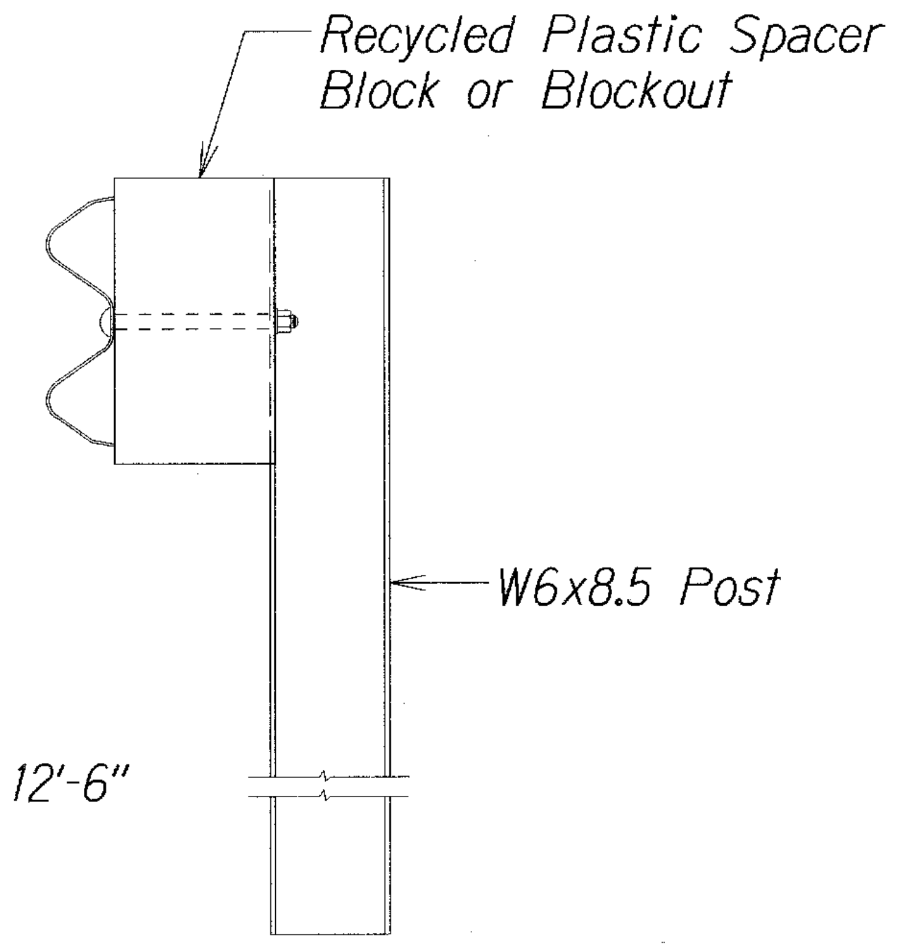
W-Beam and Thrie Beam ~~W-BEAM~~ GUARDRAIL OVER 18'-9" CULVERT

(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)



SECTION A-A

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



SECTION B-B

*Note: All nested W-Beam splices points shall be staggered.

	DATE	REVISION
2	10/20/14	Deleted Nested Long Span Strong W-Beam Guardrail Over 12'-16" Culvert

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NESTED LONG SPAN STRONG POST
W-Beam and Thrie Beam ~~W-BEAM~~ GUARDRAIL OVER CULVERT

KAMEHAMEHA HIGHWAY SAFETY IMPROVEMENTS
Waikane Valley Road to Kaaawa Bridge
Federal Aid Project No. HSIP-083-1(069)
Scale: N.T.S. Date: August, 2014
SHEET No. 6 OF 6 SHEETS

LEGEND FOR AS-BUILT POSTINGS	
∿∿∿	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

"AS-BUILT"

ADD. 12

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

tdt.ruby/guardrail/nstdwbeamsp.dgn
4/22/04