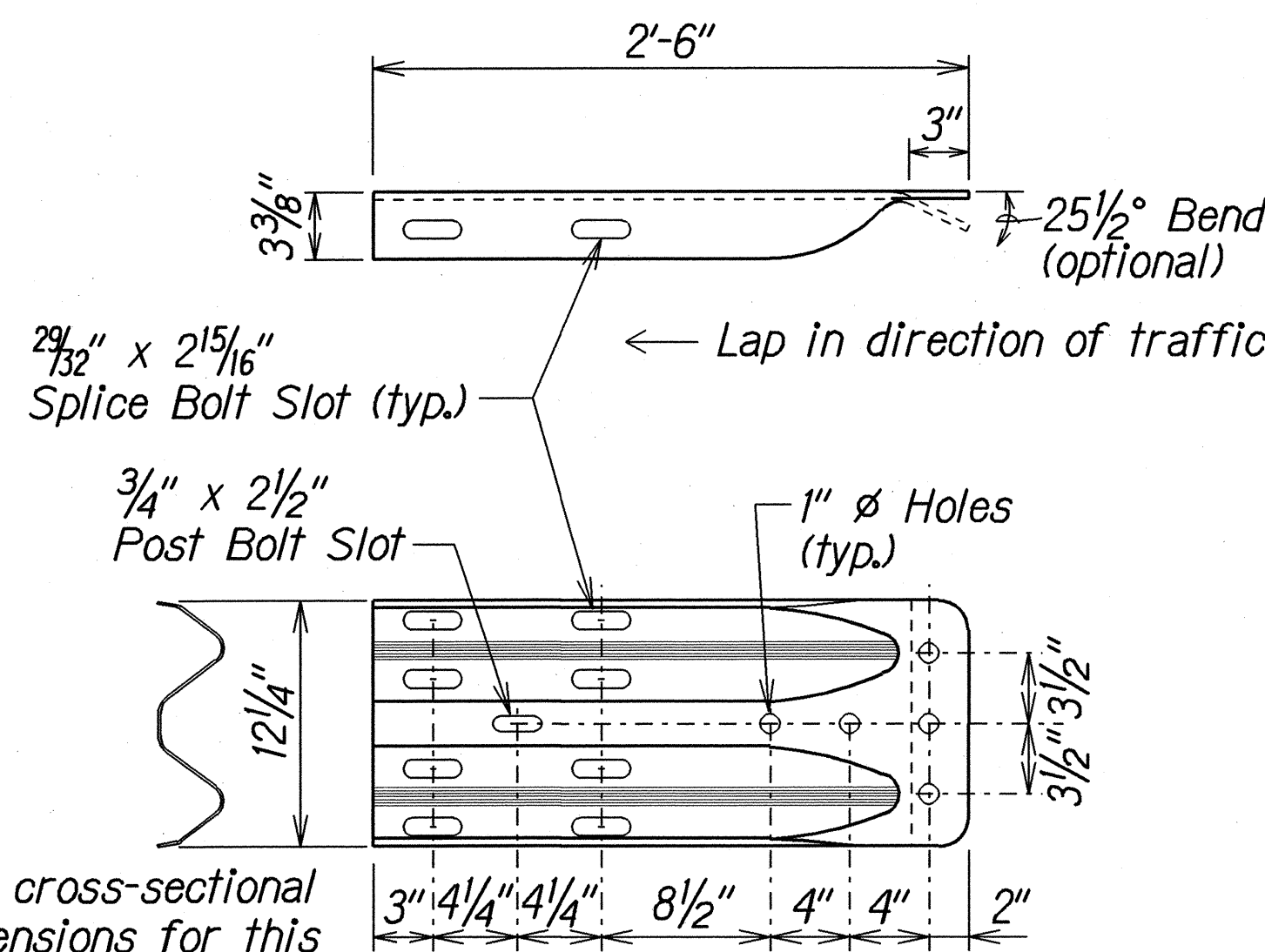


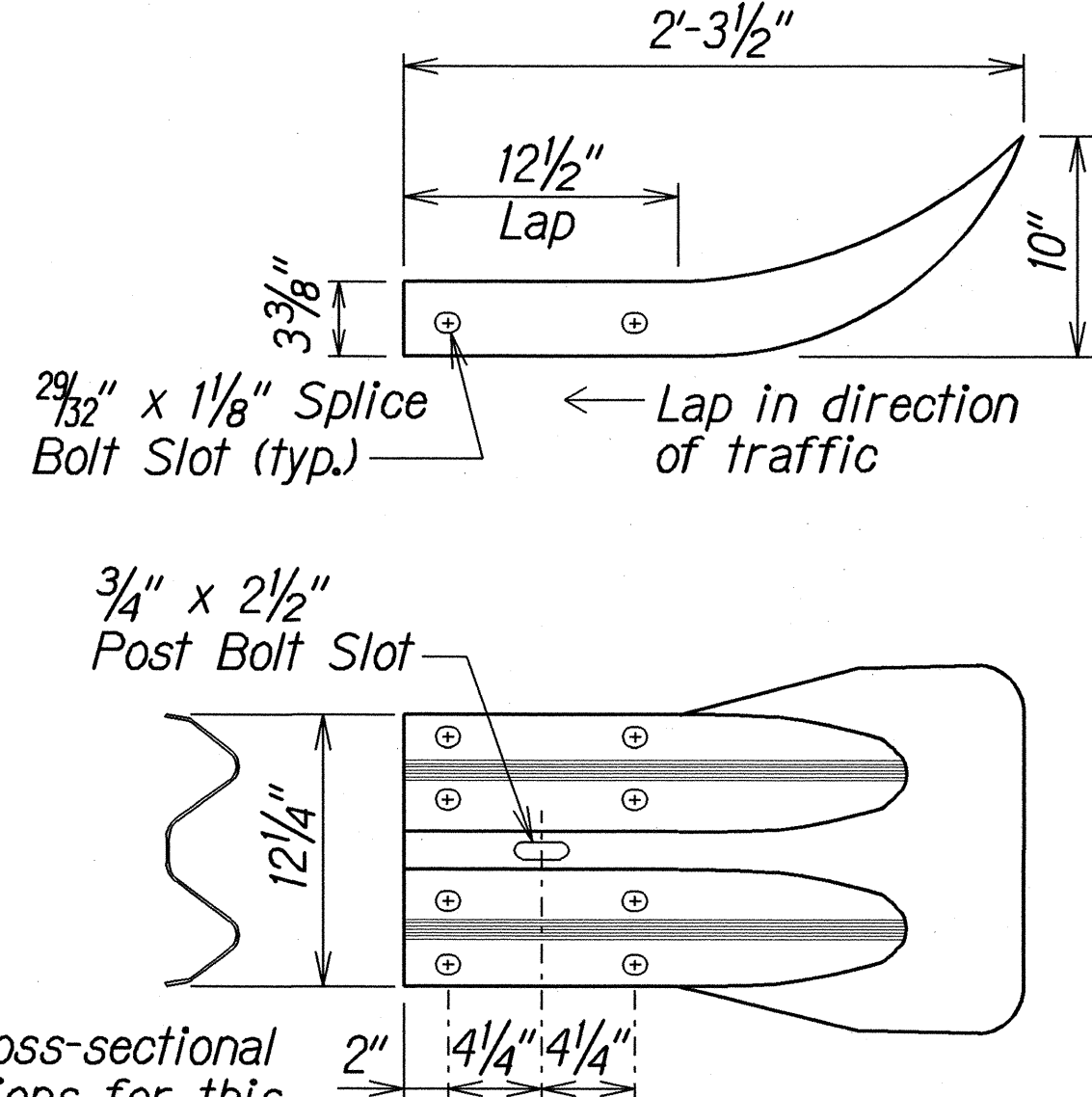
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	9	46



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

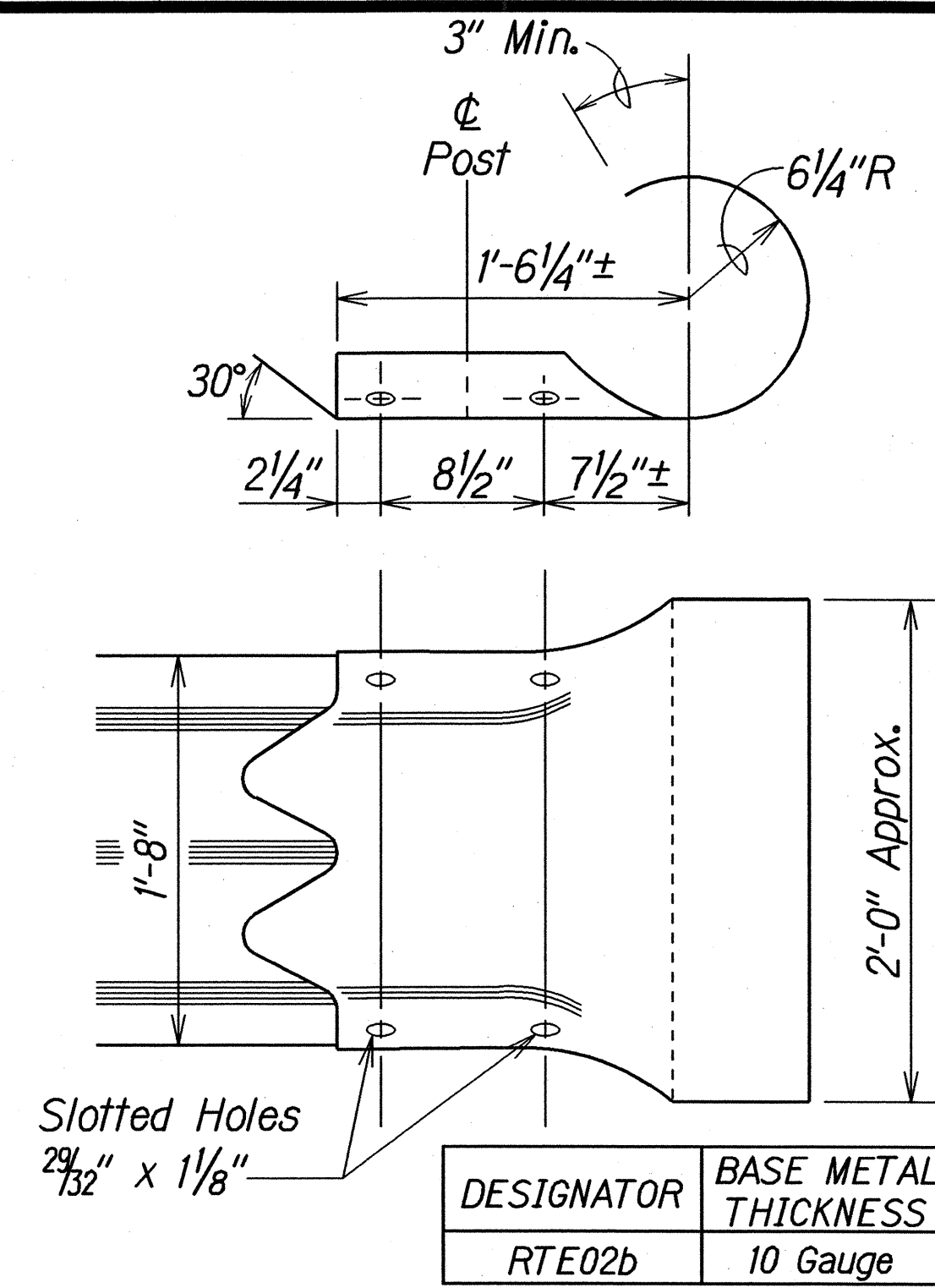
W-BEAM TERMINAL CONNECTOR (RWE02b)



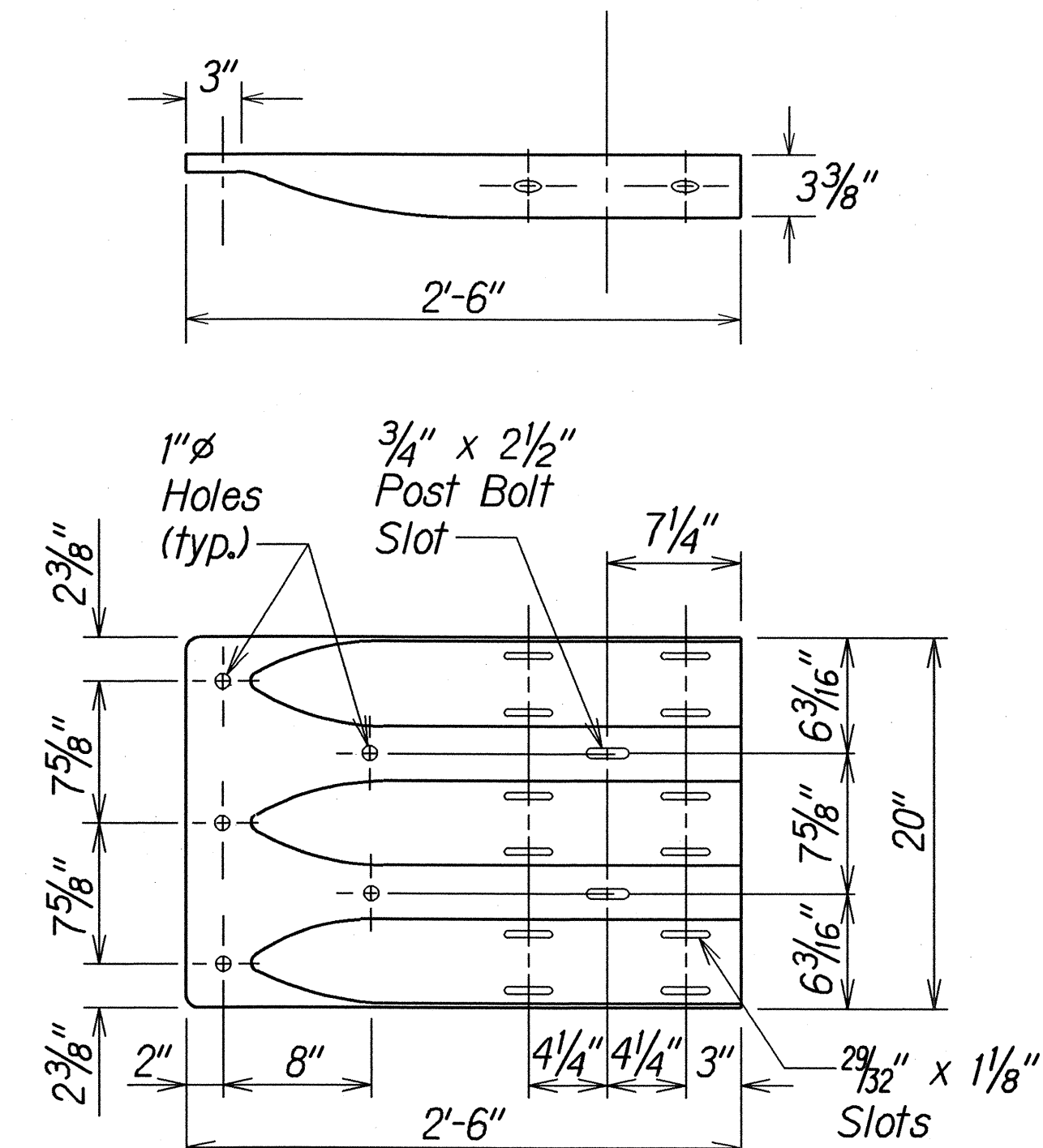
The cross-sectional dimensions for this part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)

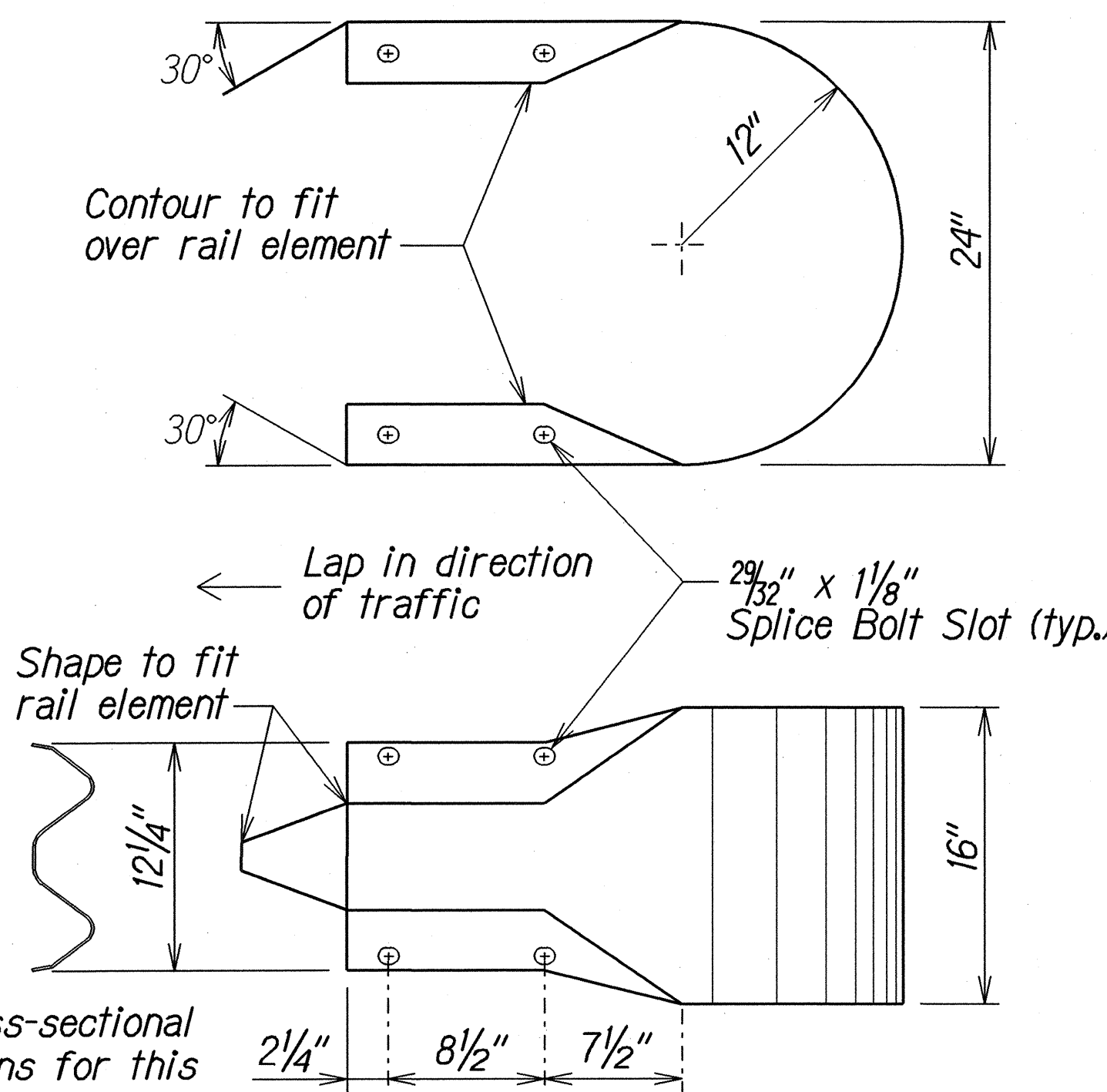


THRIE-BEAM SECTION (ROUNDED) (RTE02b)



DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

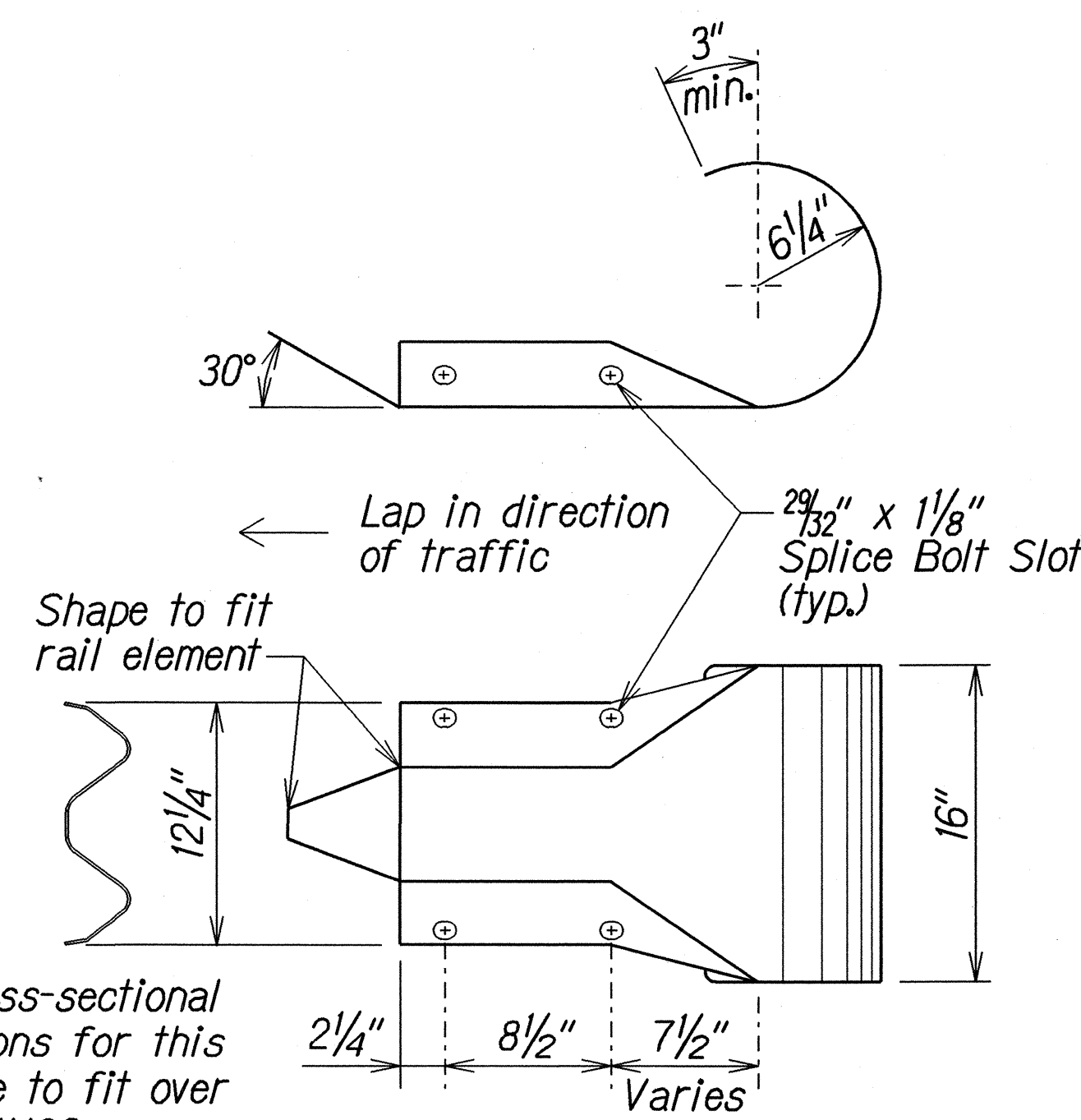
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



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

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

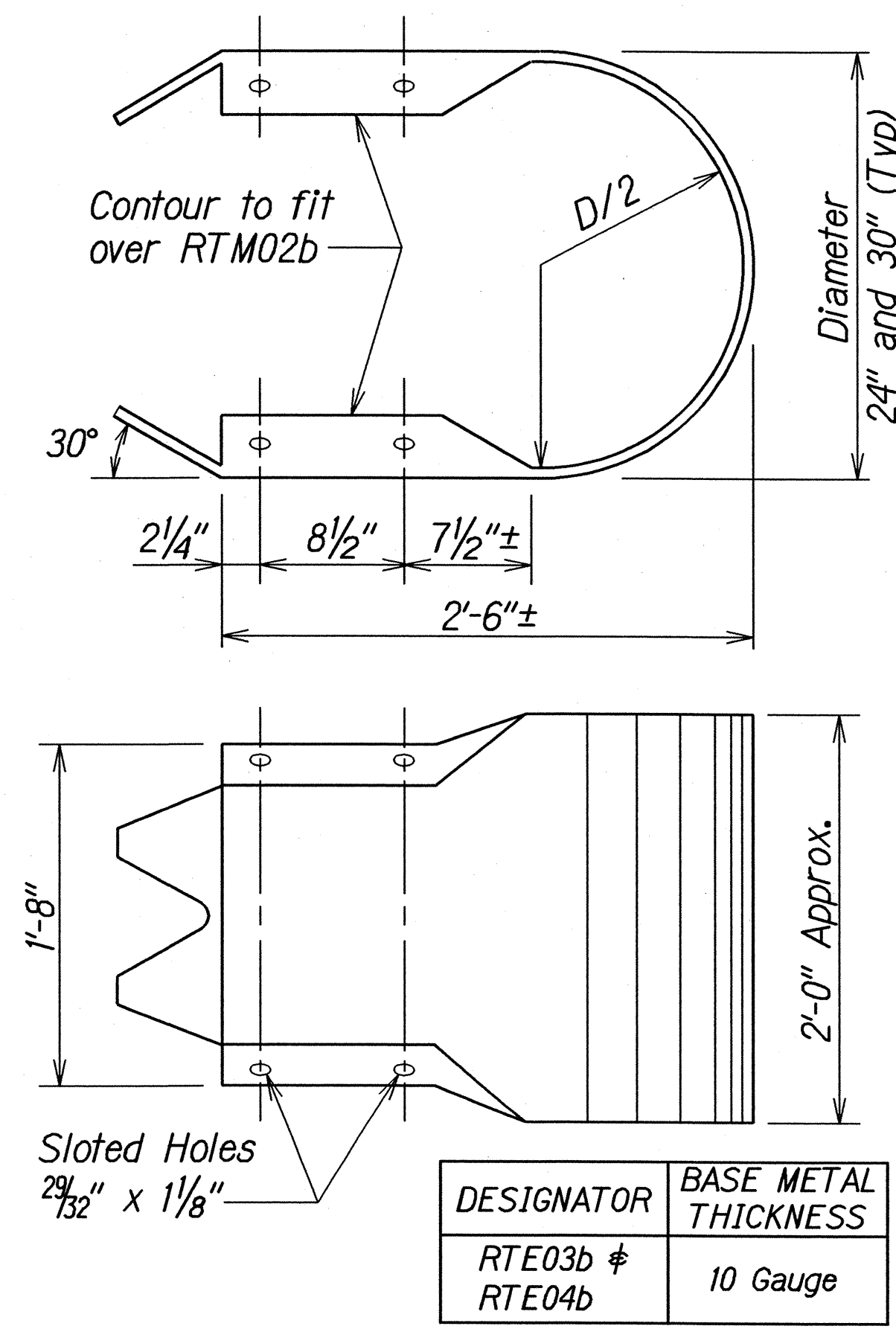
W-BEAM END SECTION (BUFFER RWE06a)



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)



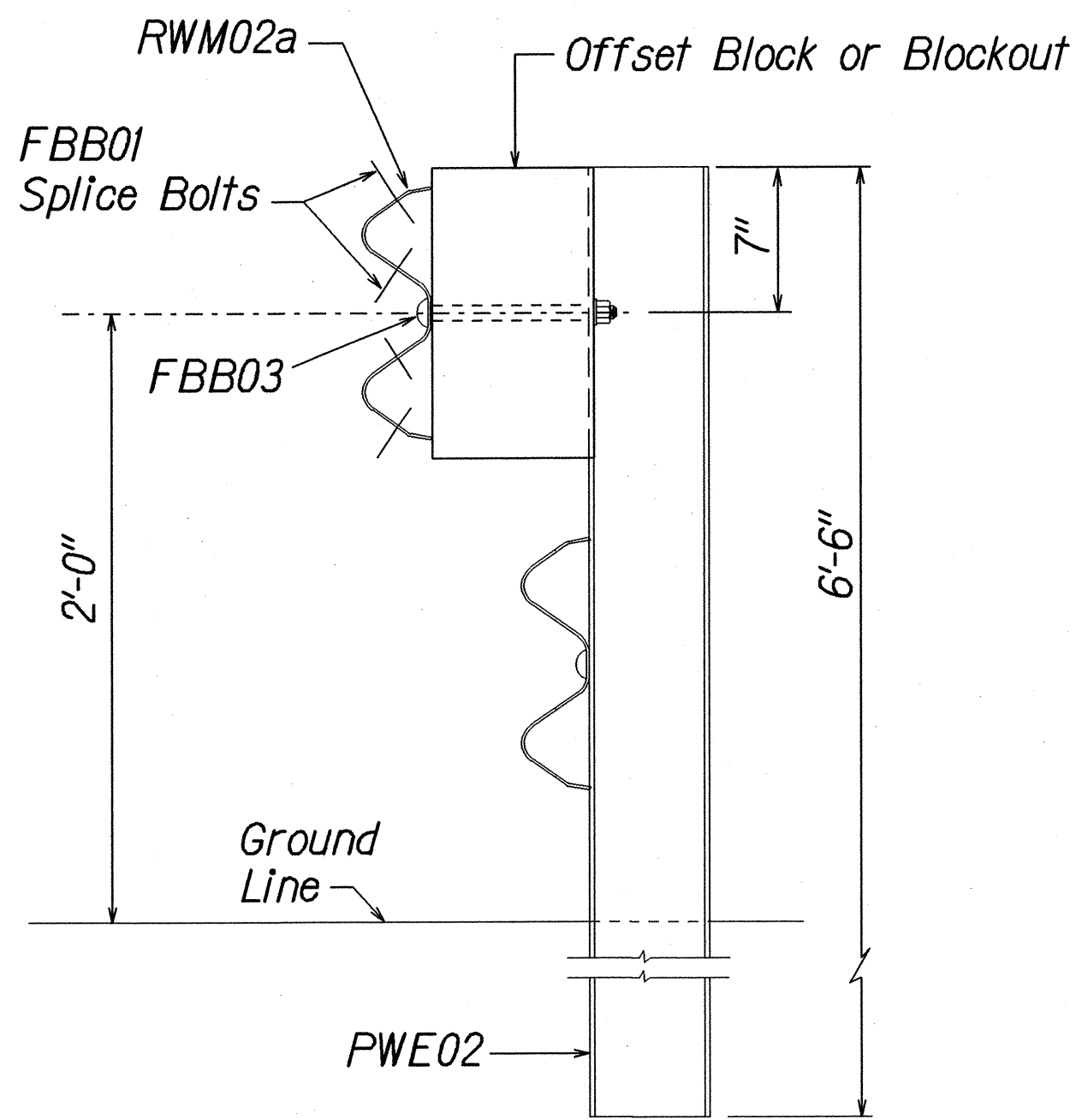
THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS
HONOAPILANI HIGHWAY GUARDRAIL AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-1(34)
Scale: NTS Date: December, 2002
SHEET No. 3 OF 11 SHEETS

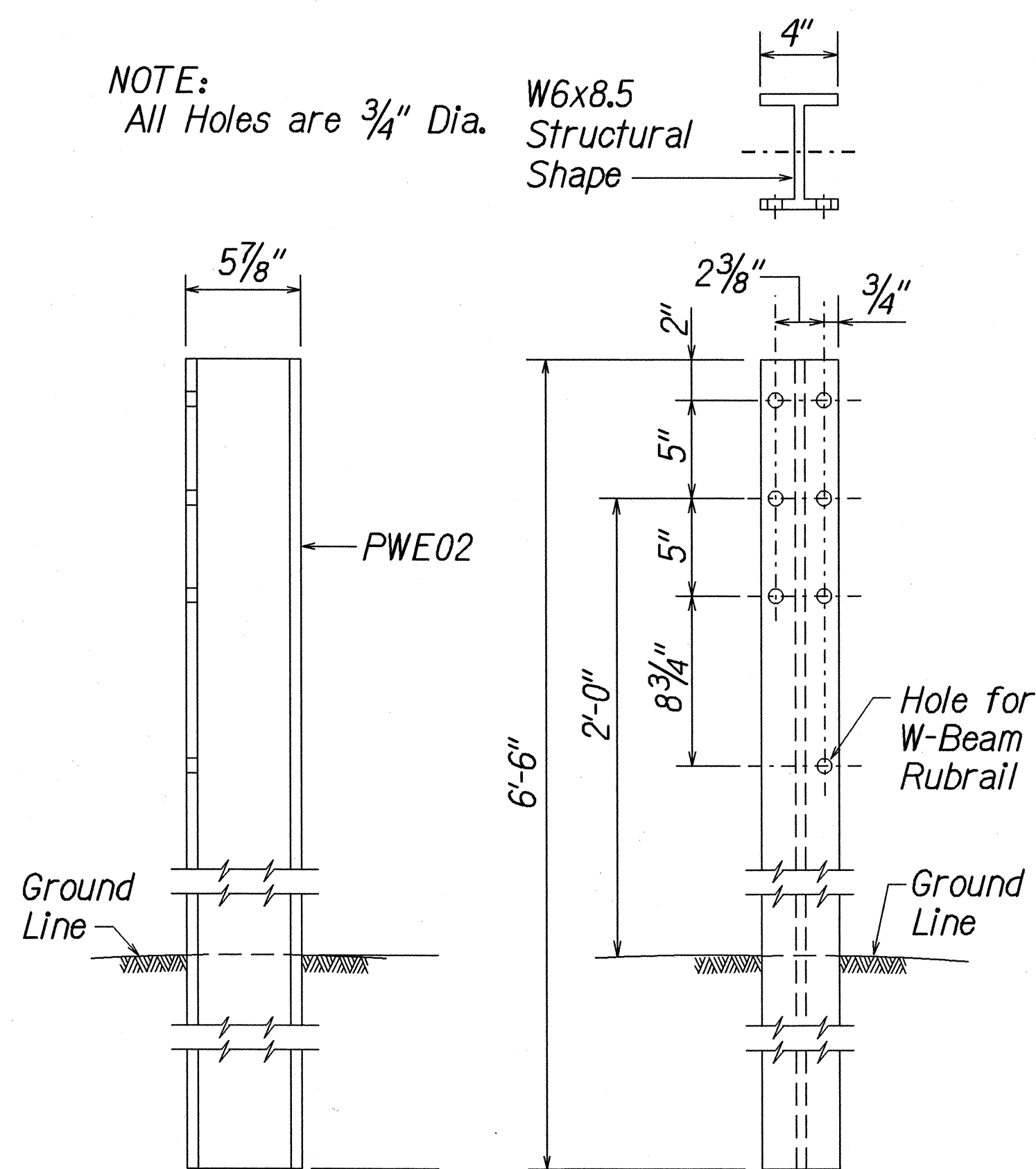
ORIGINAL PLAN	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
DATE	

16/2/01 1d1rby/guardrail/rev5/rev5 (Standard plan TE-51 09/01/87)

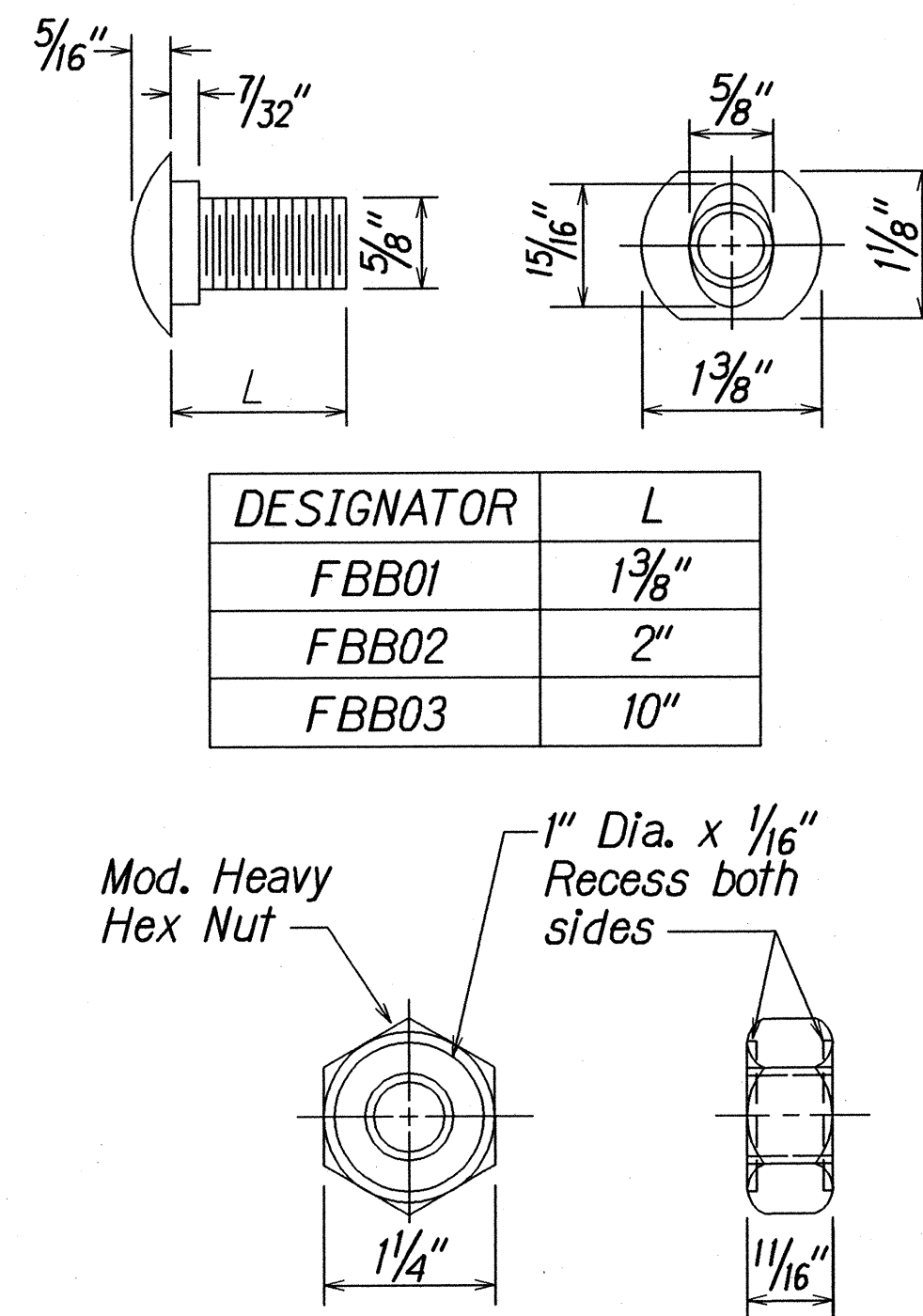
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-I(34)	2004	10	46



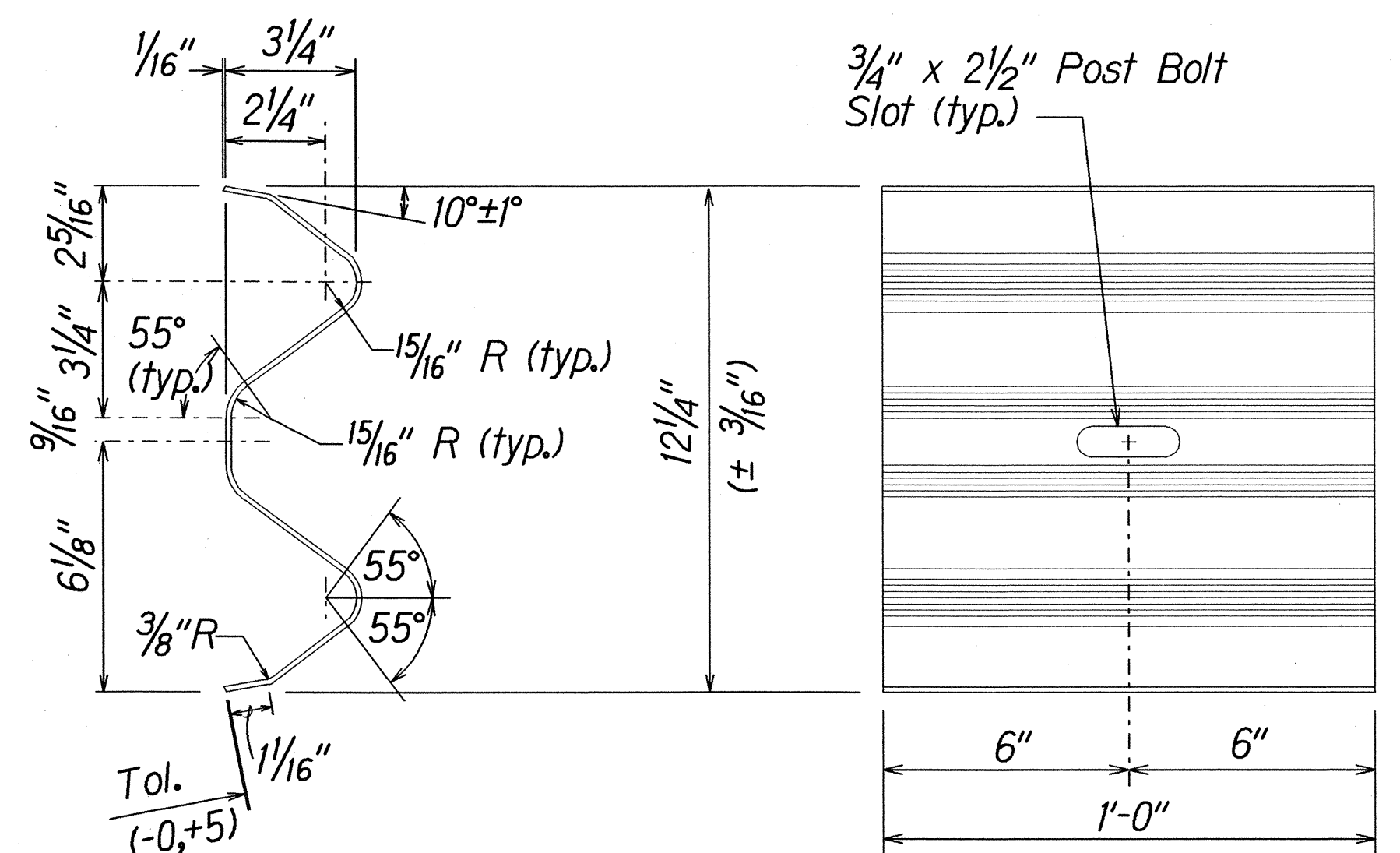
ELEVATION
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL



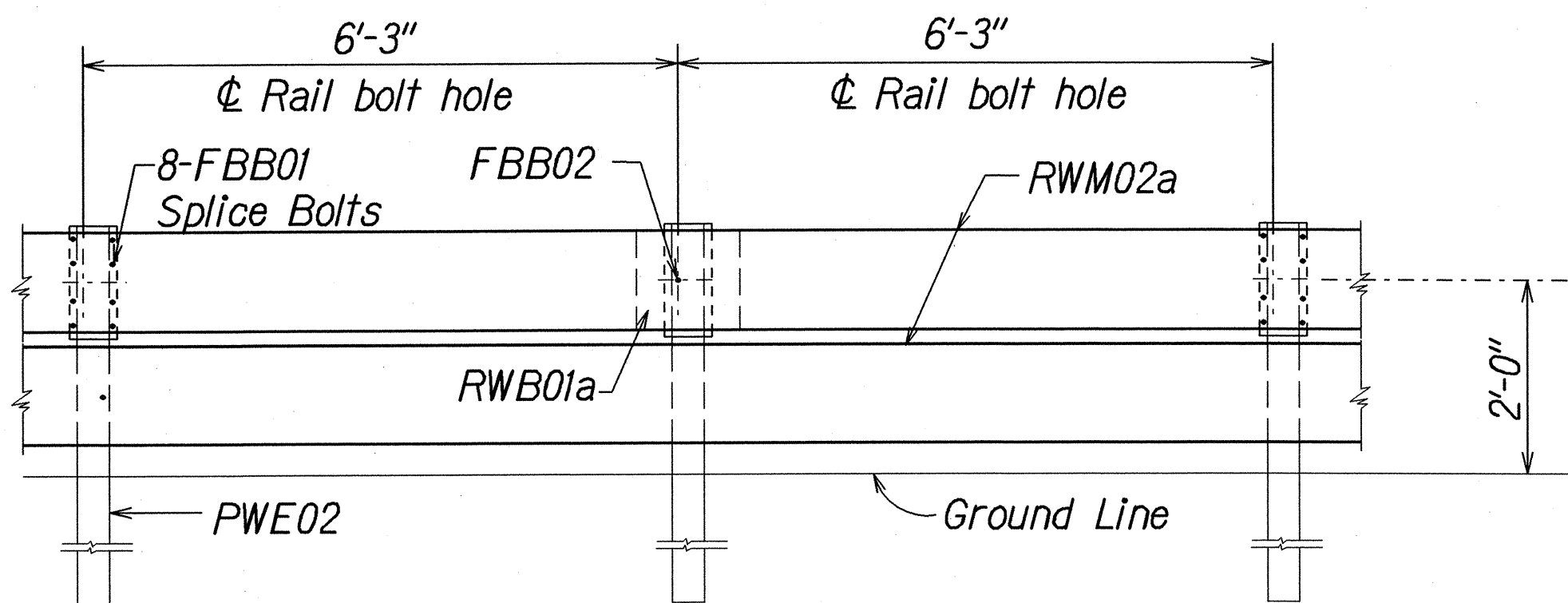
SIDE
FRONT
W-BEAM STRONG POST (PWE02)



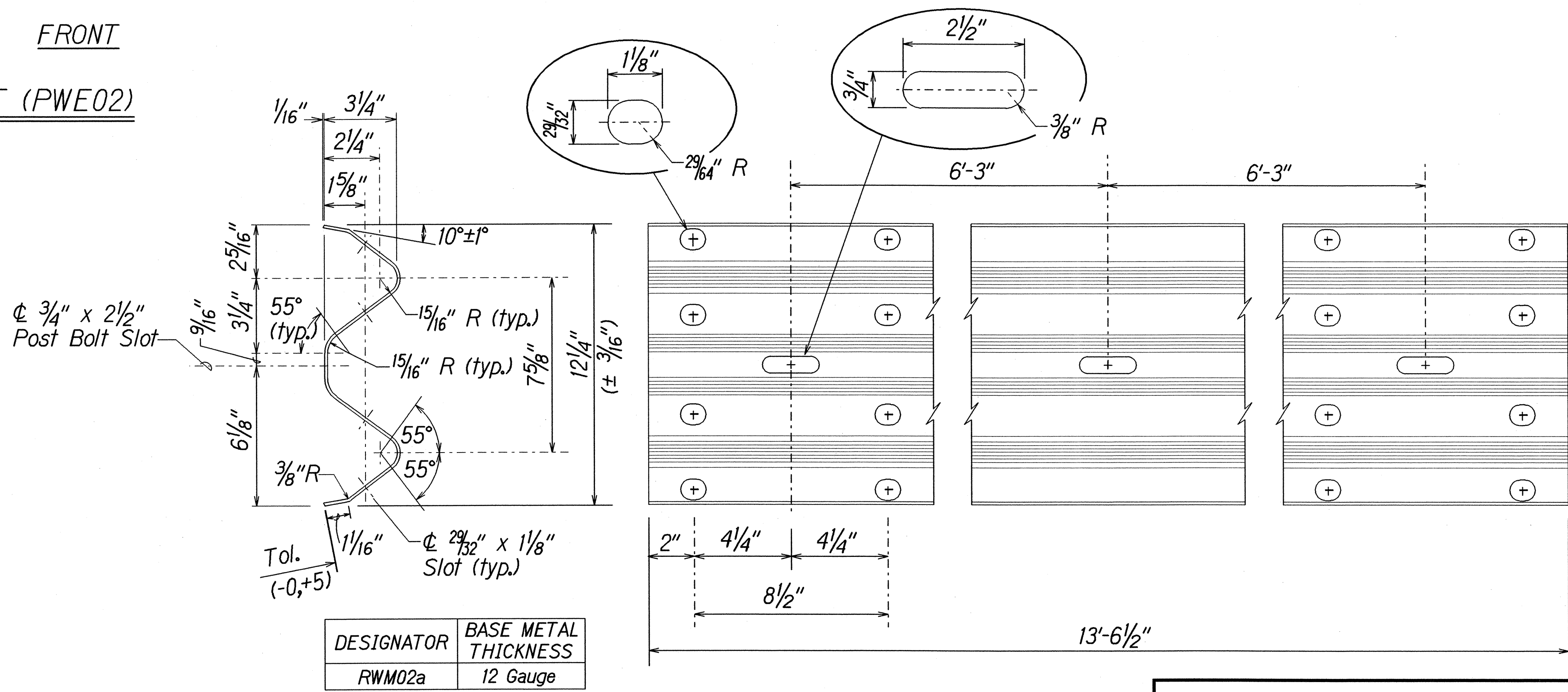
GUARDRAIL BOLTS AND
RECESSED NUT



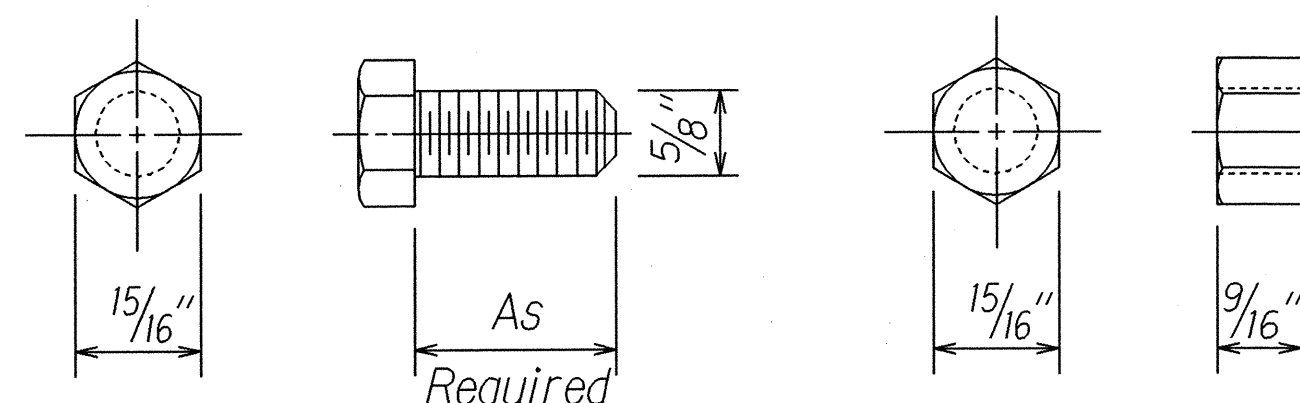
W-BEAM BACK-UP-PLATE (RWB01a)



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



2 SPACE W-BEAM GUARDRAIL (RWM02a)



HEX BOLT & NUT (FBX16a)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL
HONOAPIILANI HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-I(34)
Scale: NTS
Date: December, 2002

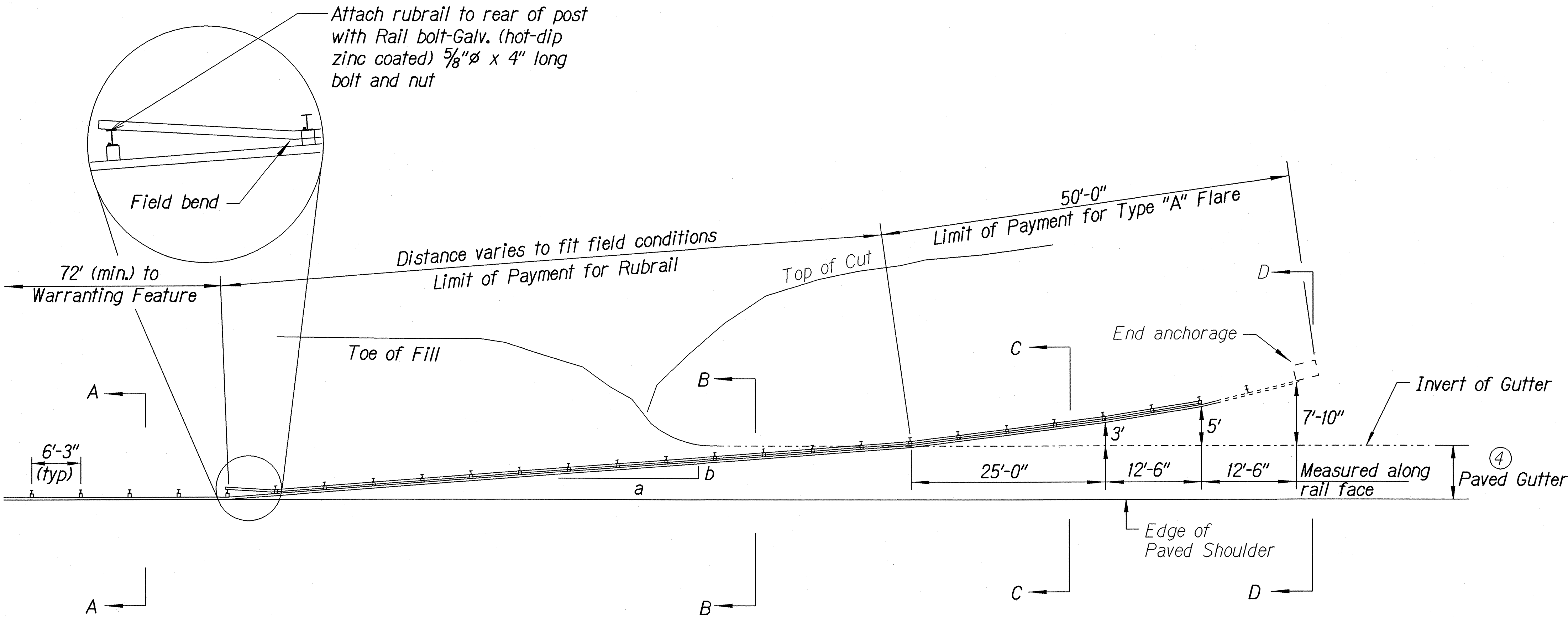
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTE BOOK	
FILE NO.	

16/13/01 101rubi/guardrail/rubrail.dgn 1 standard plan TE-52 rll/03/89

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	13	46

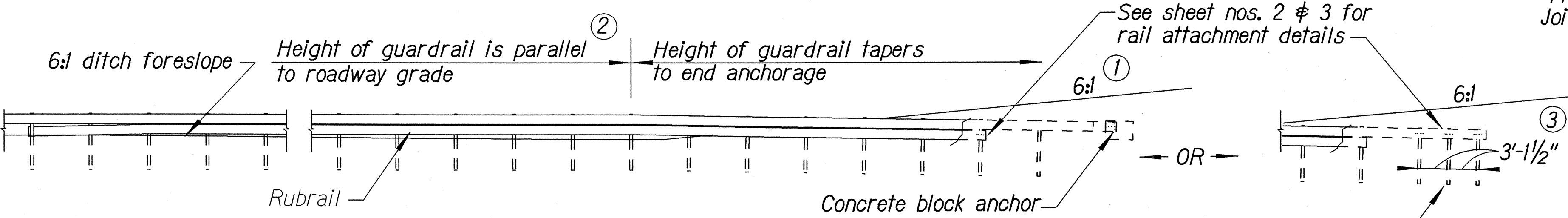
General Notes

1. A 6:1 or flatter slope is desirable. 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.

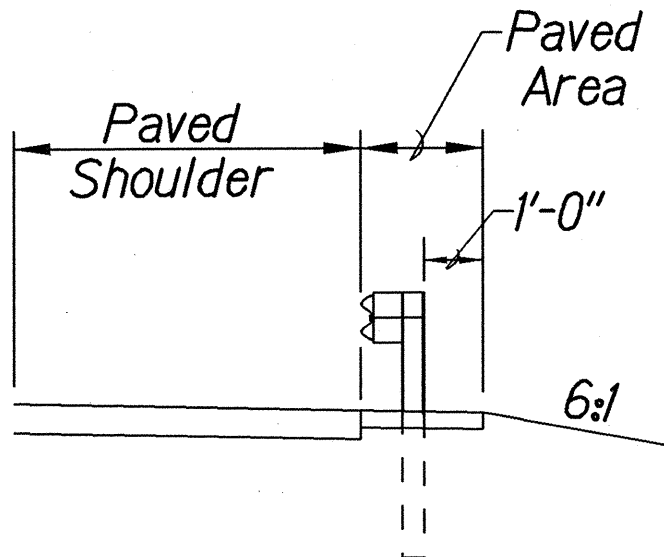


PLAN

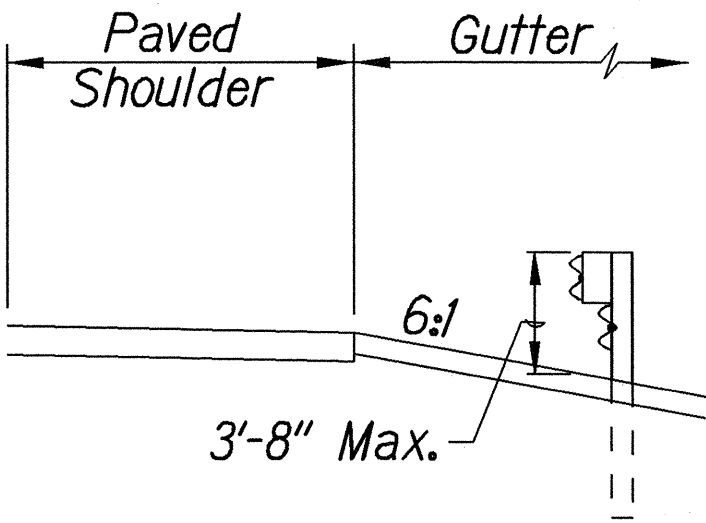
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



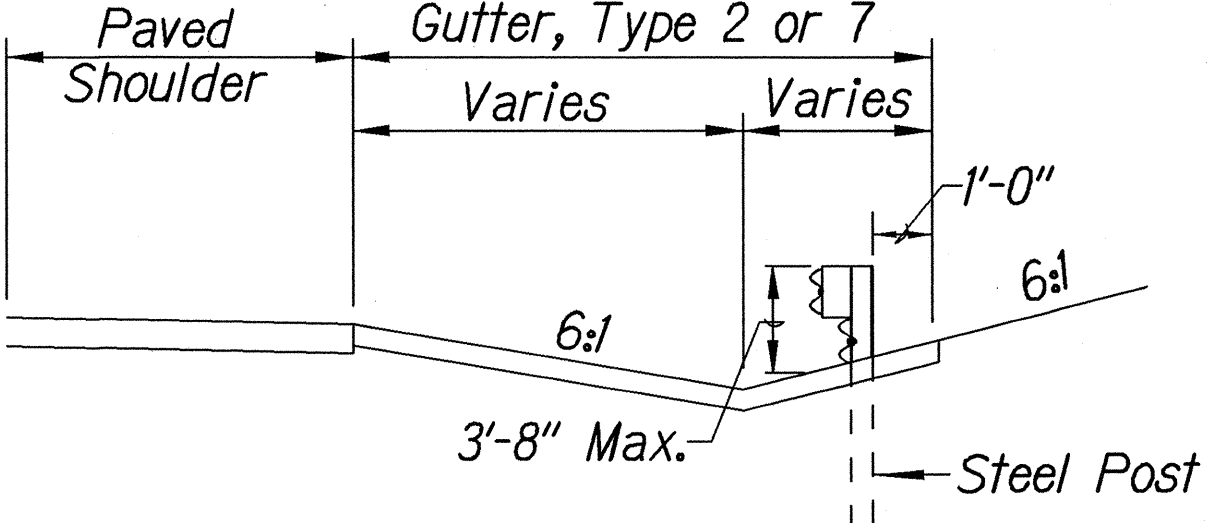
ELEVATION (Profile Along Rail)



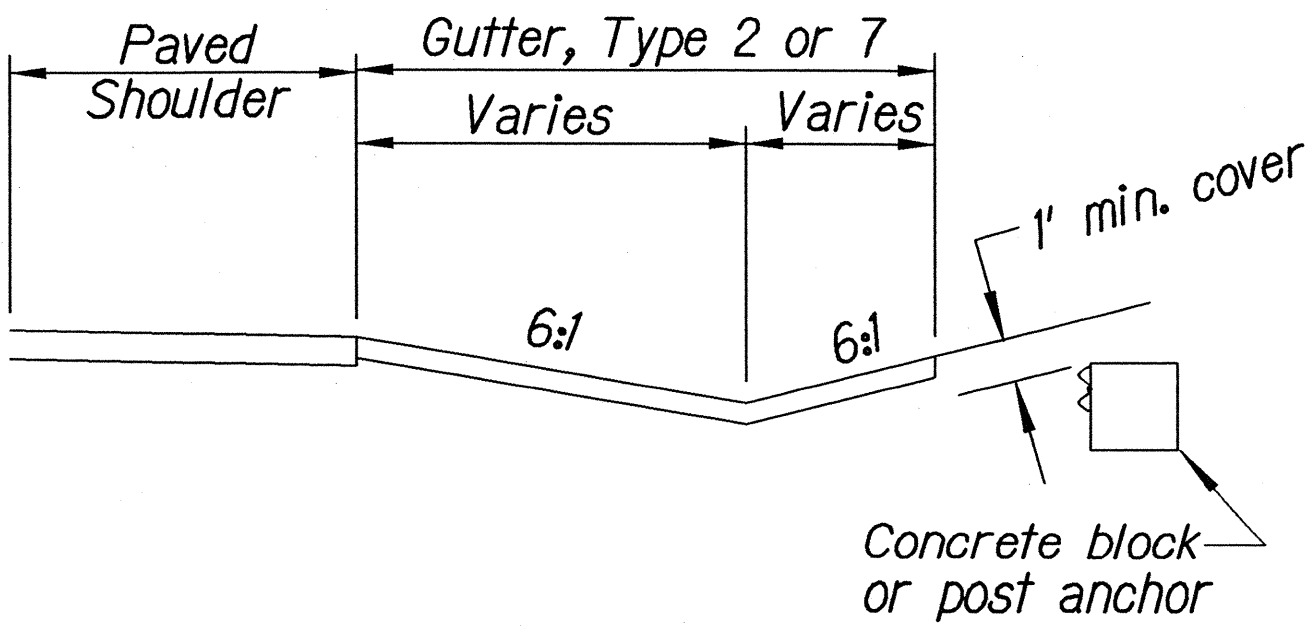
Section A-A



Section B-B
(With Rubrail)



Section C-C
(With Rubrail)



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

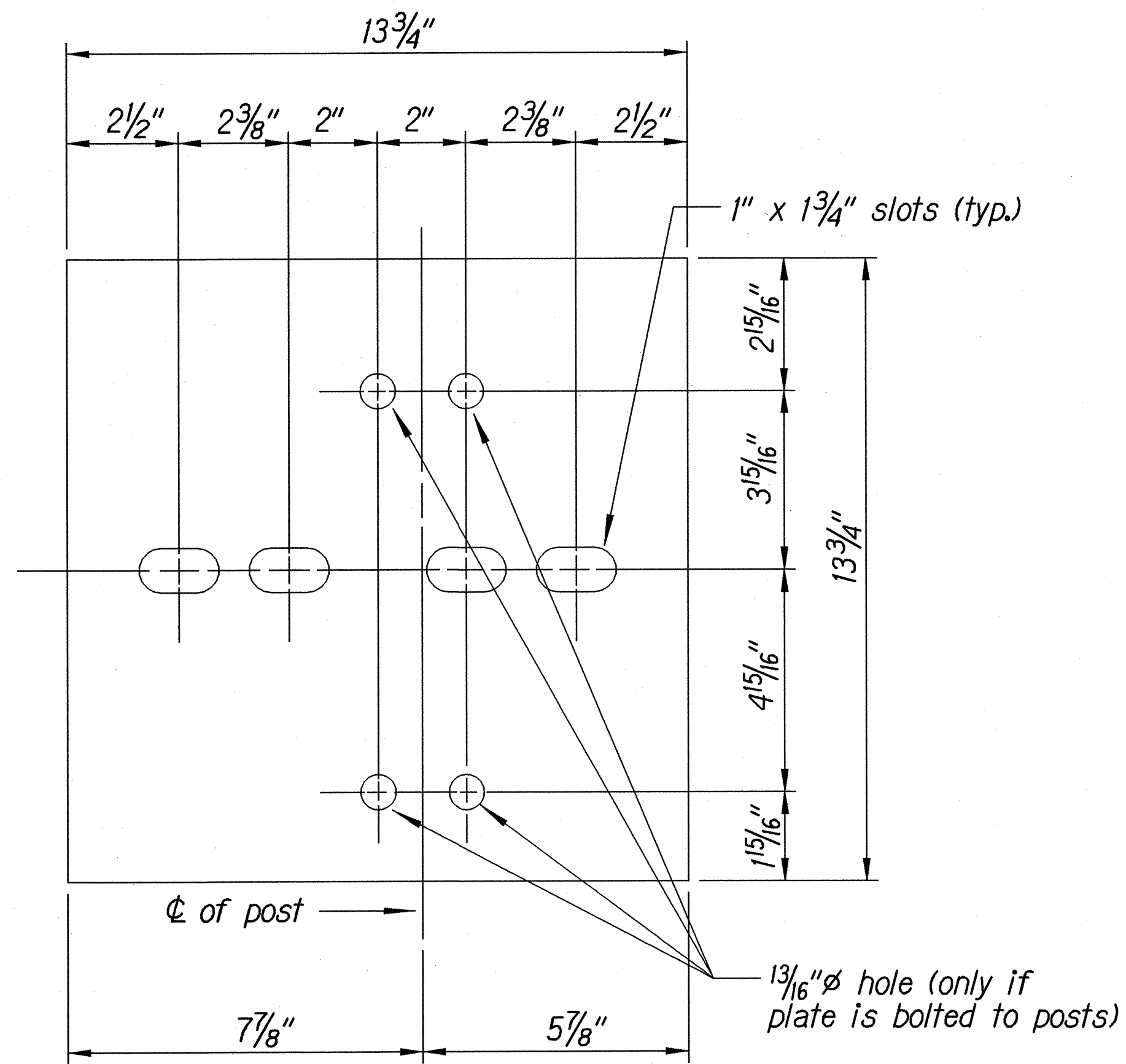
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE
HONOAPIILANI HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-1(34)
Scale: NTS
Date: July, 2003

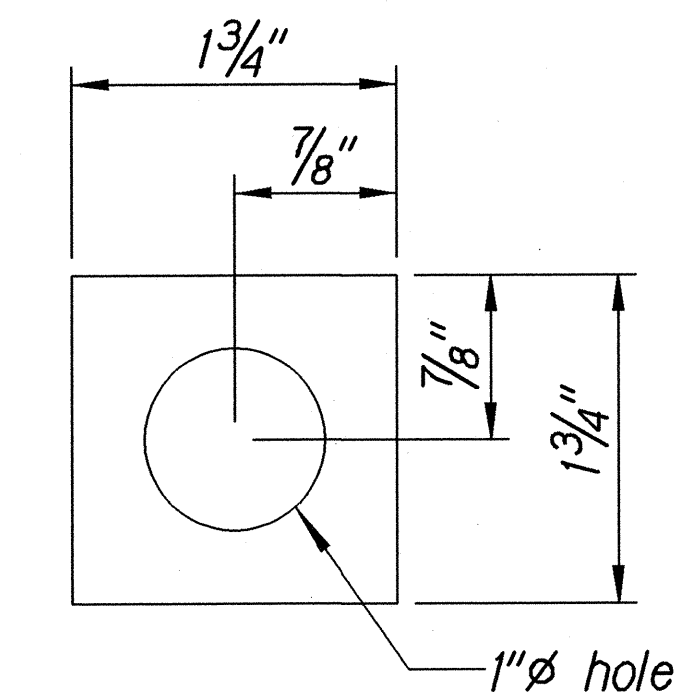
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	

18/21/01 1d1rubr/guardrail/04grveshch.com (standard plan TE-59 r11/03/89 # TE-60 07/01/86)

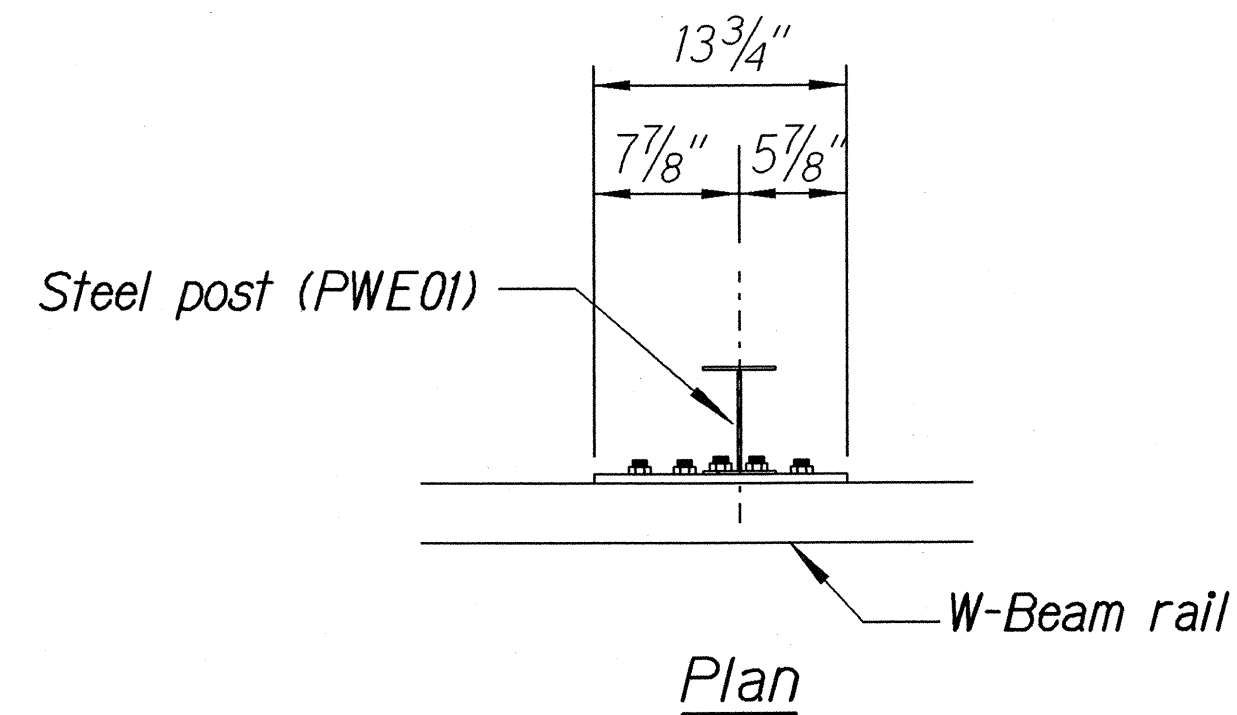
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	14	46



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



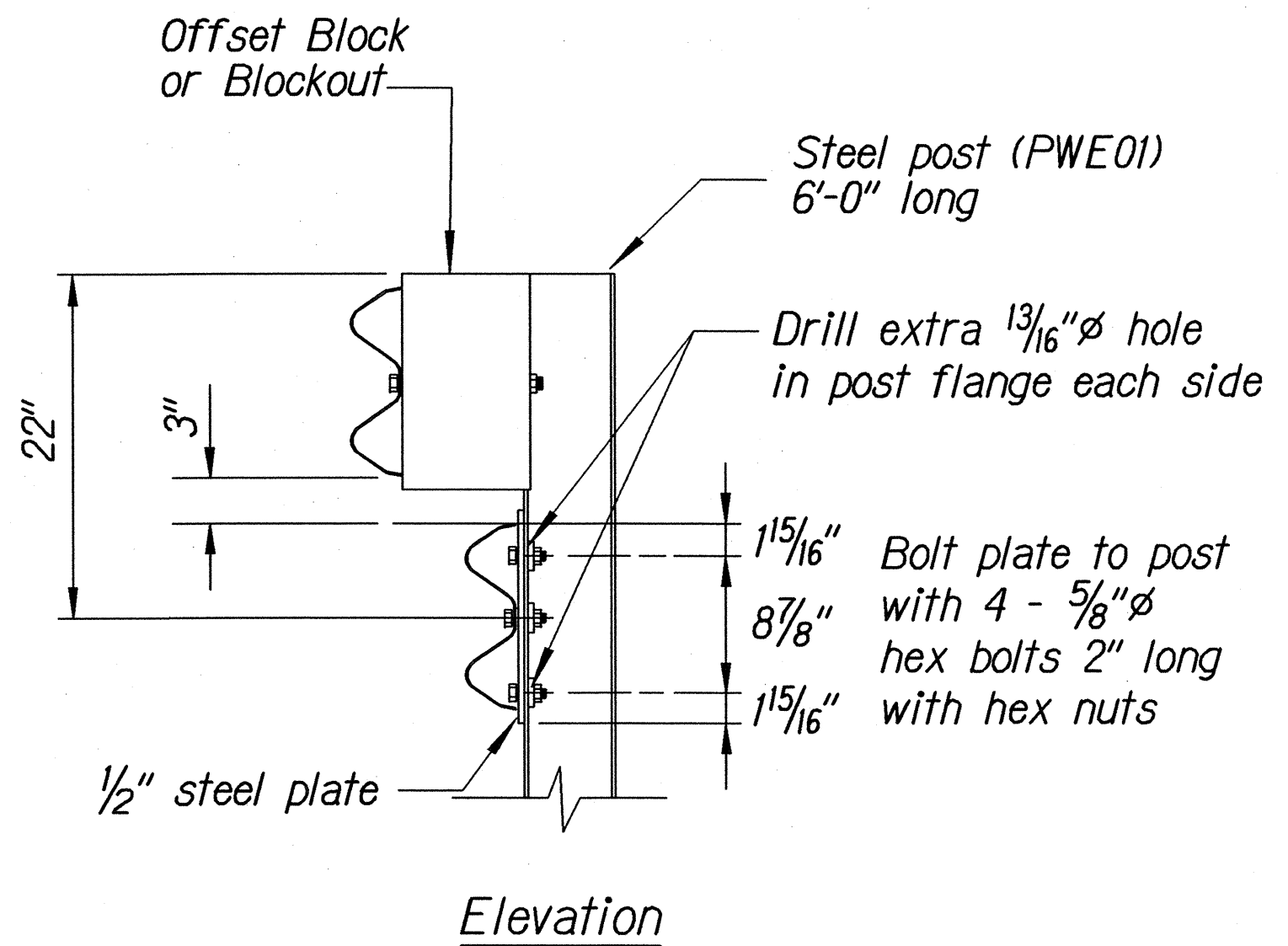
Square Washer
(3/16" Thick - Hot-dip
Zinc Coated Galvanized)



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

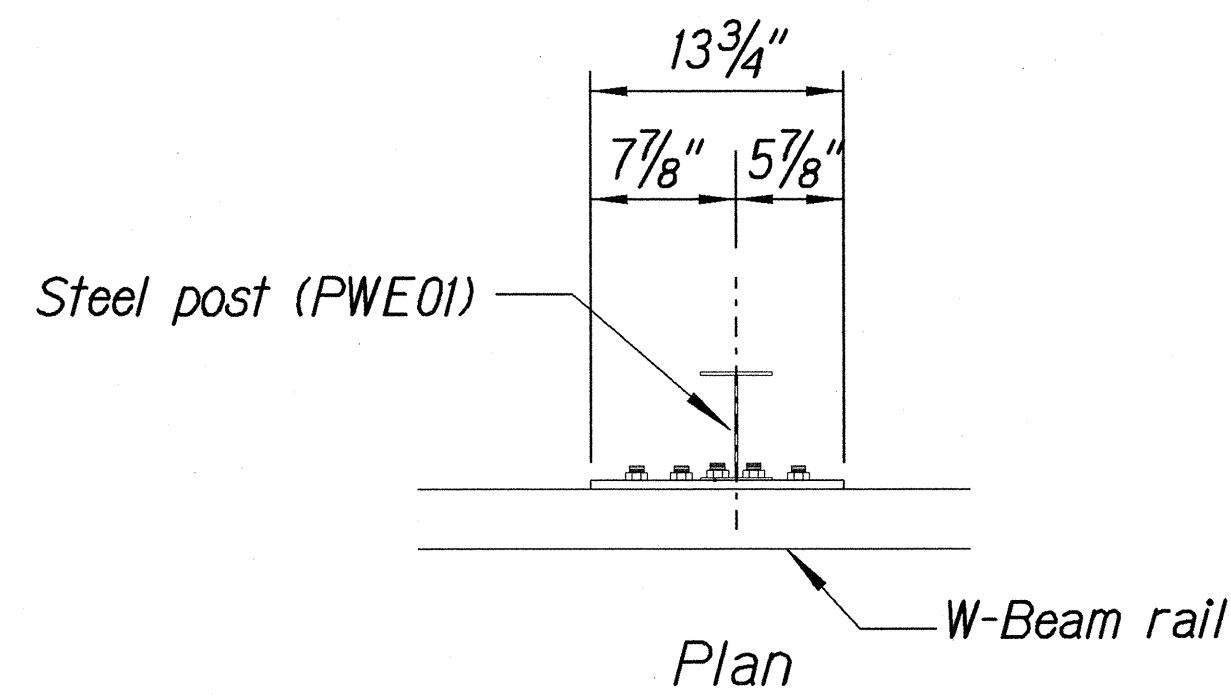
1" ϕ holes to be field drilled in rail and through post flange. Attach to steel plate with 7/8" ϕ hex bolts 2" long with square washer

Front View



Elevation

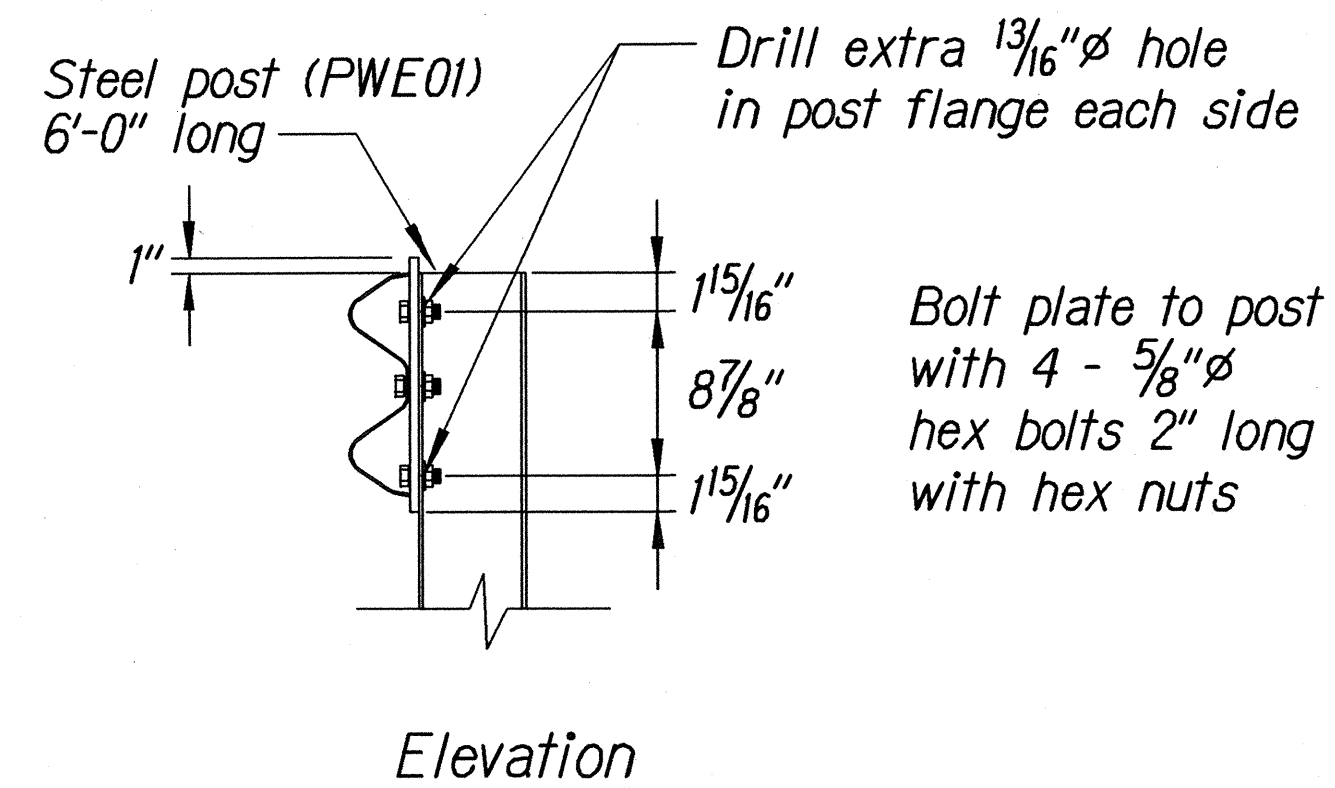
RUBRAIL ANCHOR DETAILS



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

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

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

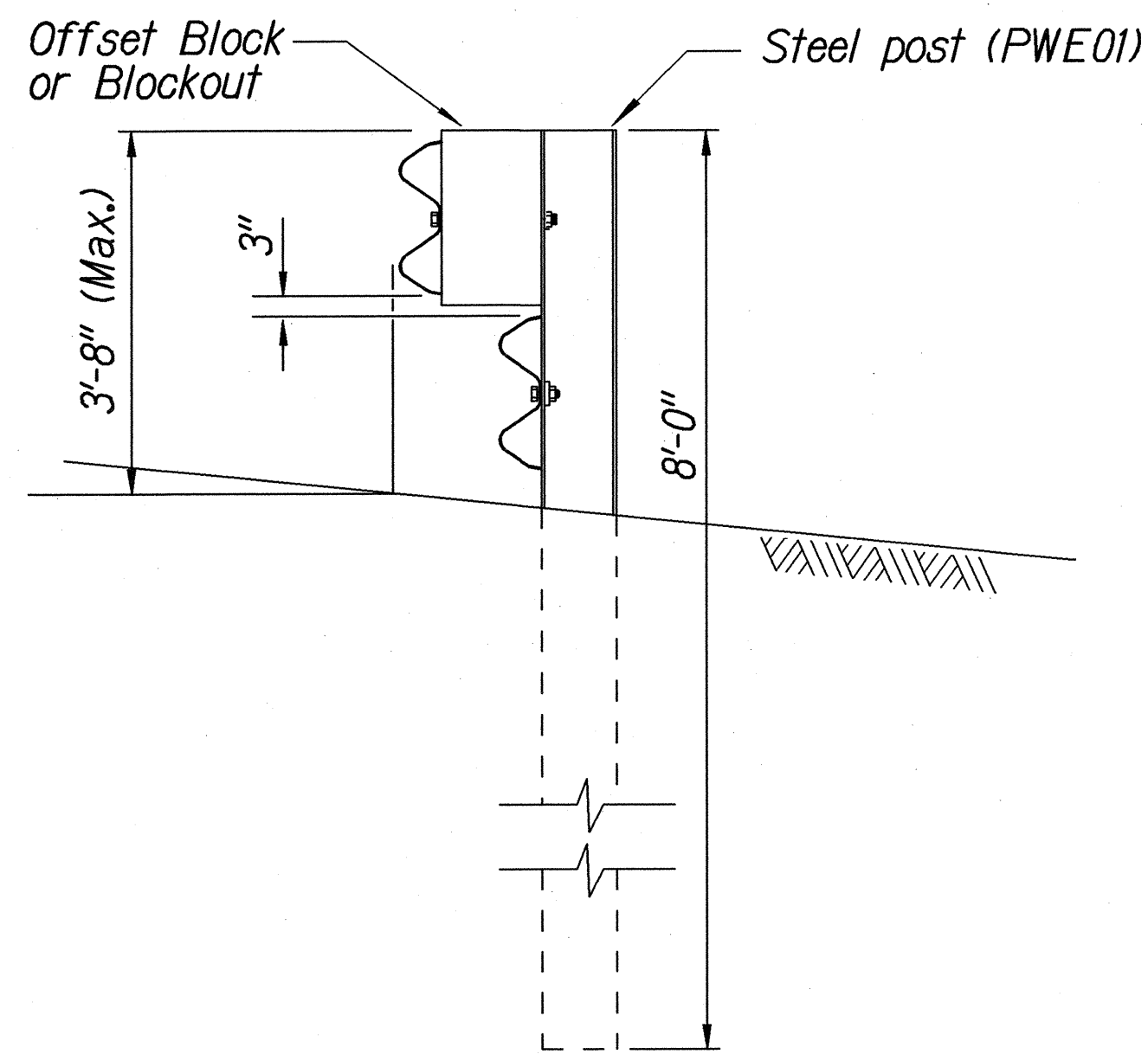
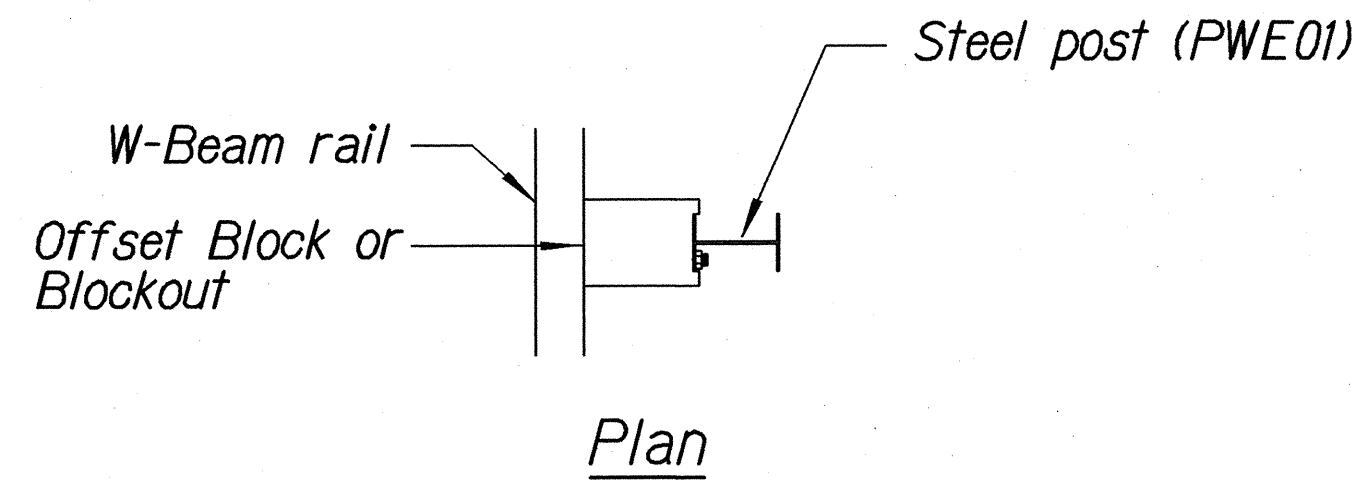
TYPE "A" FLARE

**HONOAPIILANI HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I**
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-1(34)

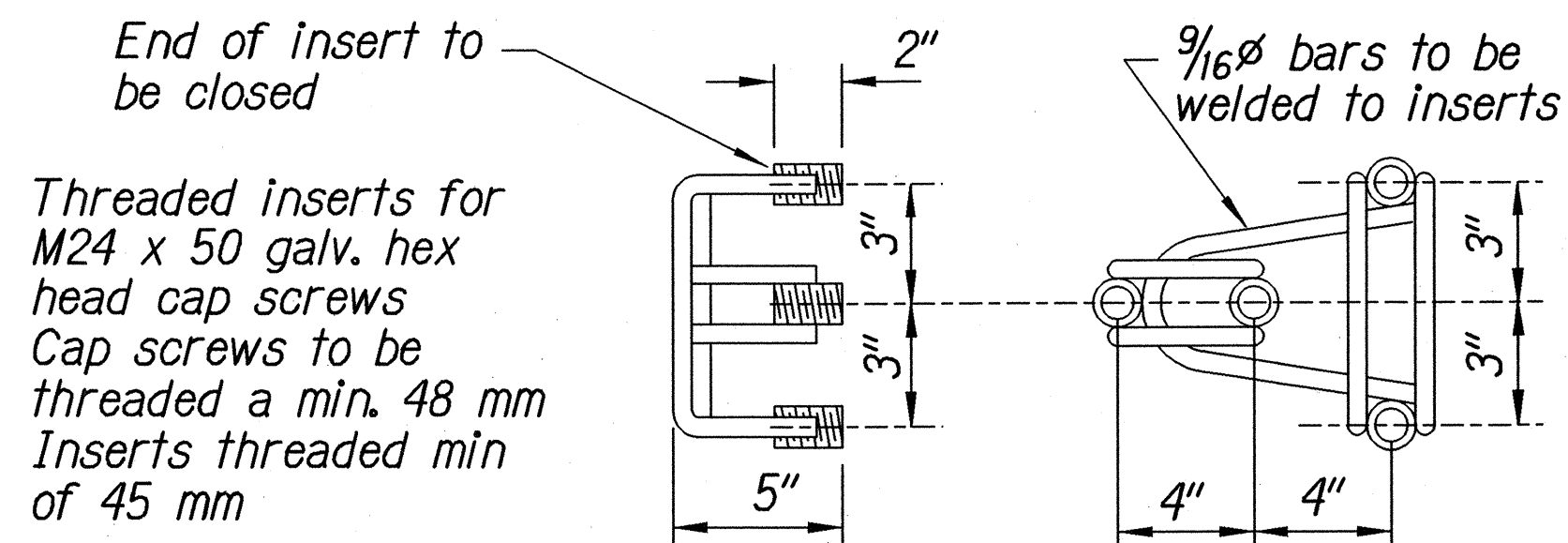
Scale: NTS Date: July, 2003

SHEET No. 8 OF 11 SHEETS

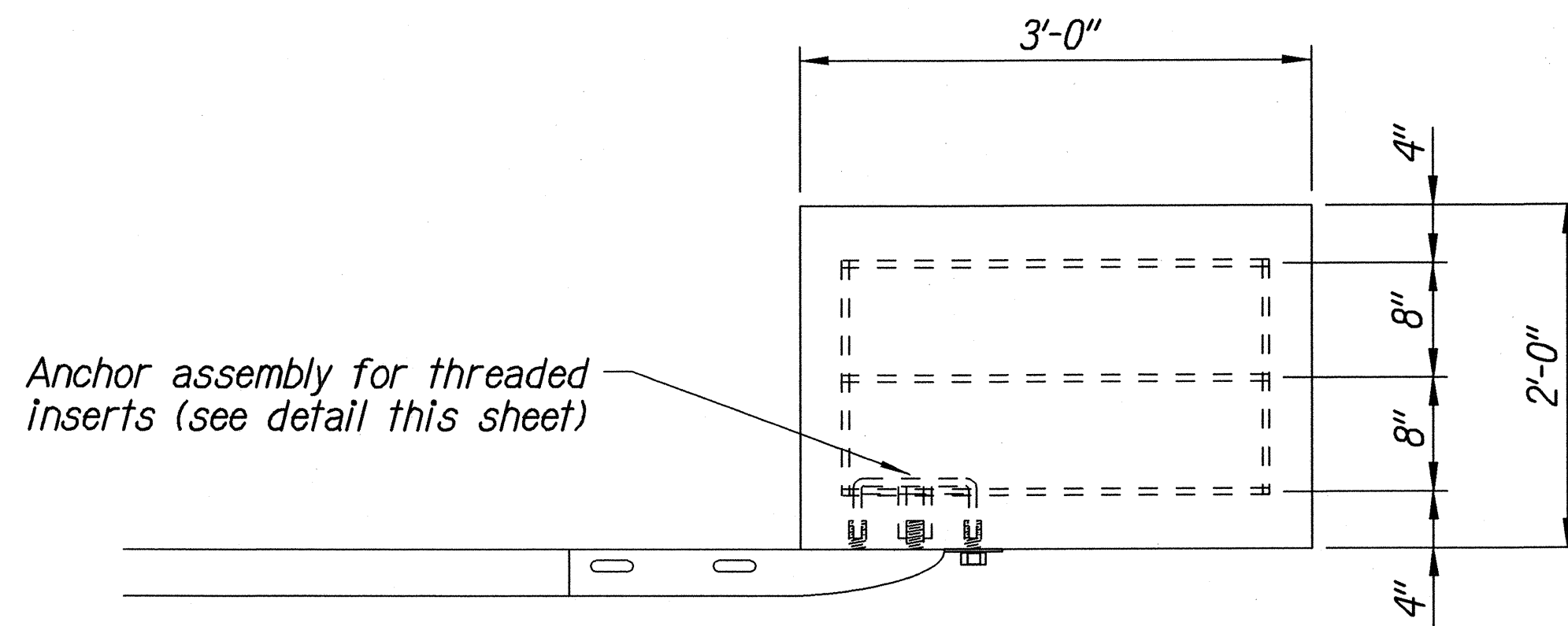
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	15	46



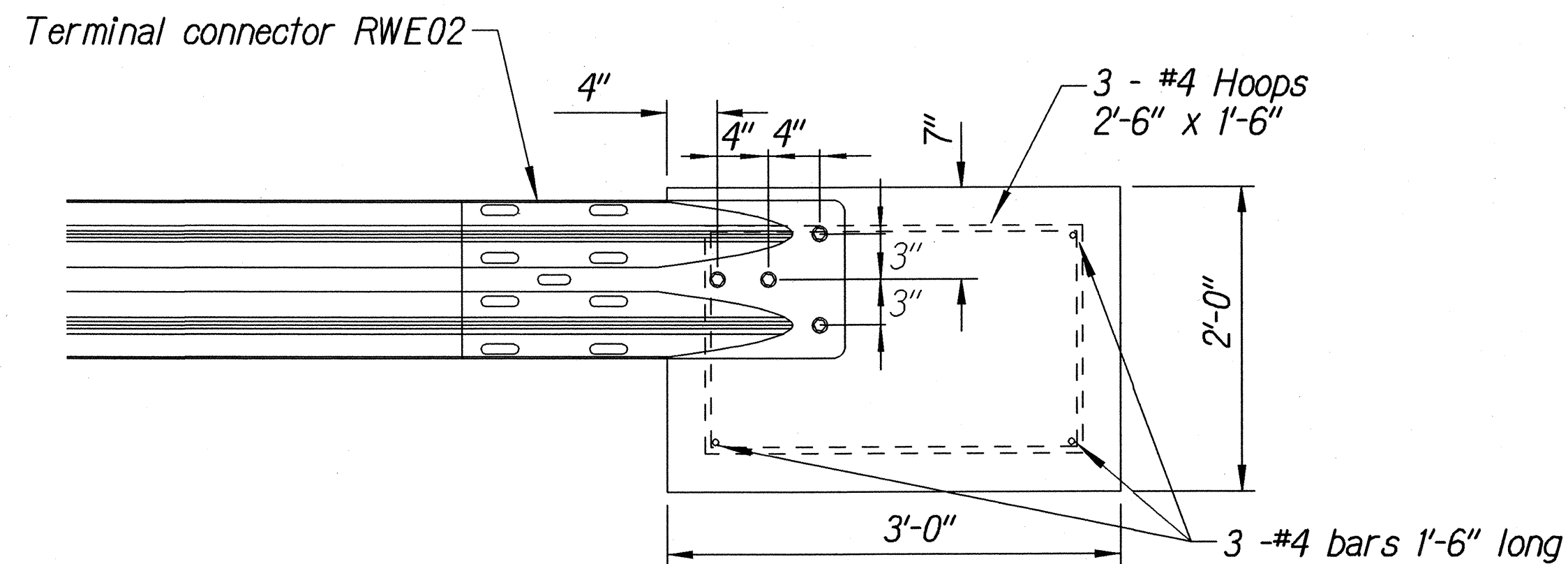
STEEL POST GUARDRAIL WITH RUBRAIL



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:

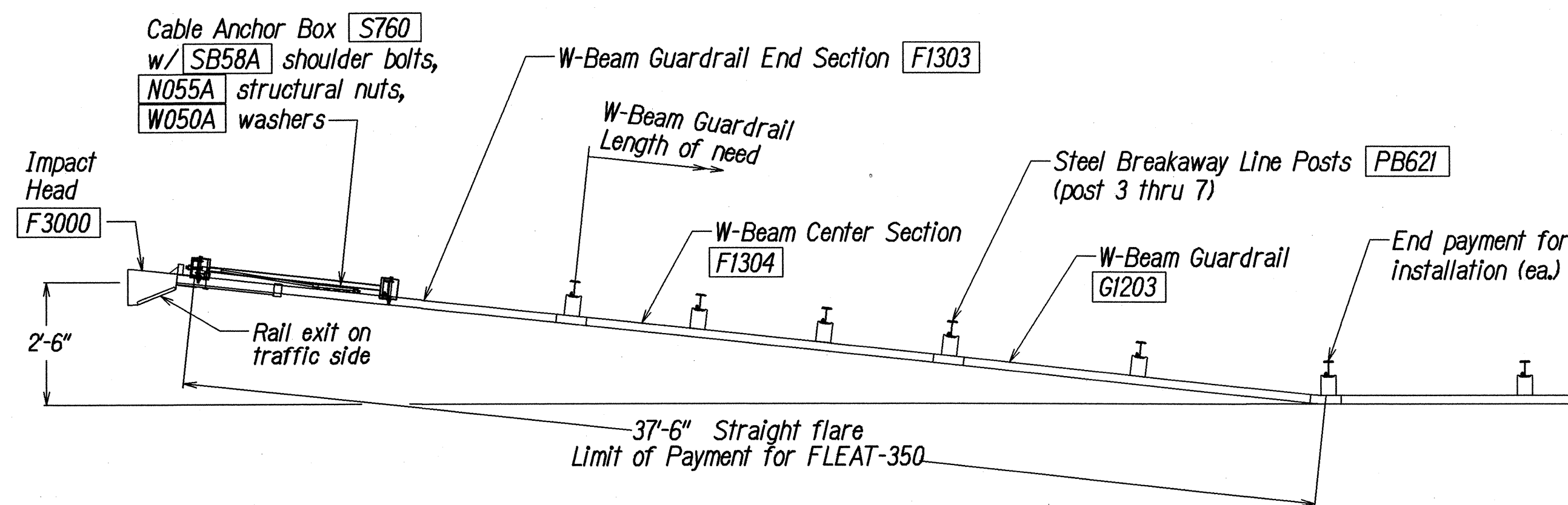
All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGCARTBA Joint Cooperative Committee.

ORIGINAL	SURVEY PLOTTED BY	DATE
PLAN	DRAWN BY	X
NOTE BOOK	TRACED BY	X
OK	DESIGNED BY	X
OK	REVIEWED BY	X
OK	CHECKED BY	X

r3/01/99 vdruby/guardrail/gd4del.dgn standard plan TE-59 07/01/86, TE-59 r1/03/89 # TE-60 07/01/86)

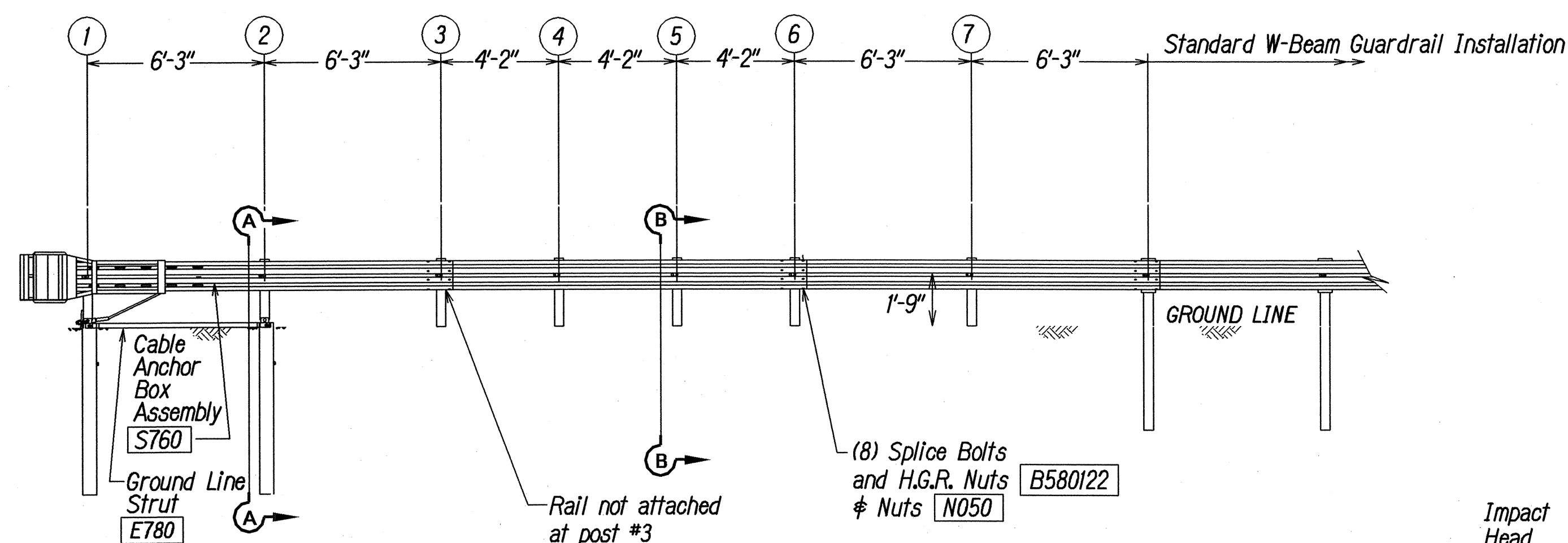
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
TYPE "A" FLARE
HONOAPIILANI HIGHWAY GUARDRAIL AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-1(34)
Scale: NTS Date: July, 2003
SHEET No. 9 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	16	46



TRAFFIC →

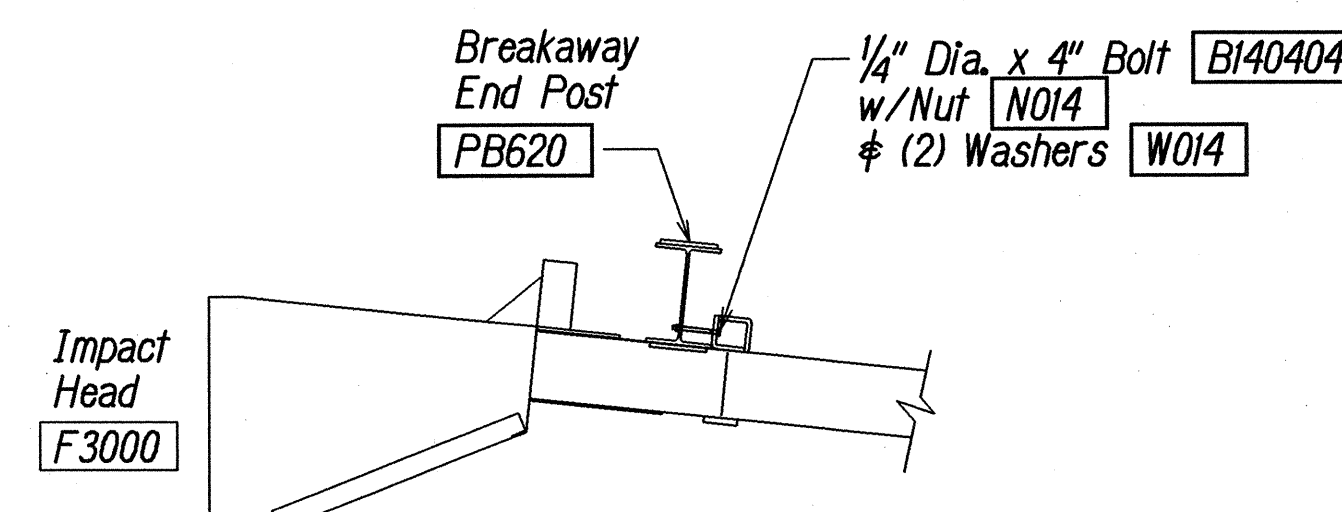
PLAN



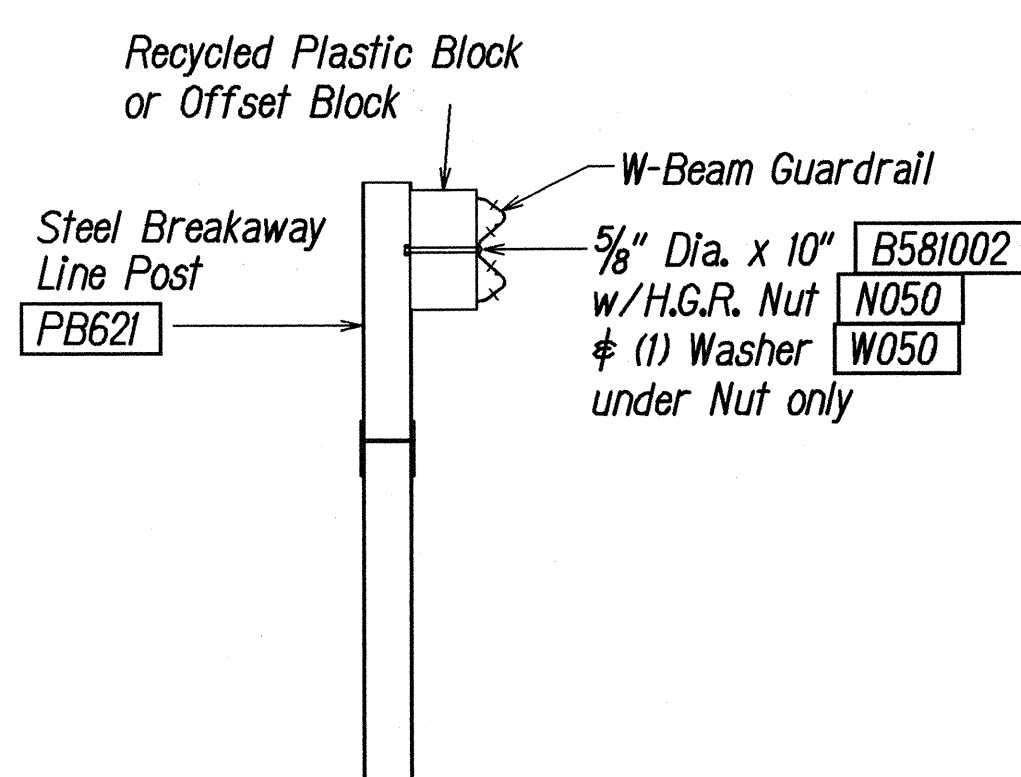
ELEVATION

GENERAL NOTES

- Breakaway steel posts are required with the FLEAT Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- 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.
- 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.
- 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.
- 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.
- (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
- The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.

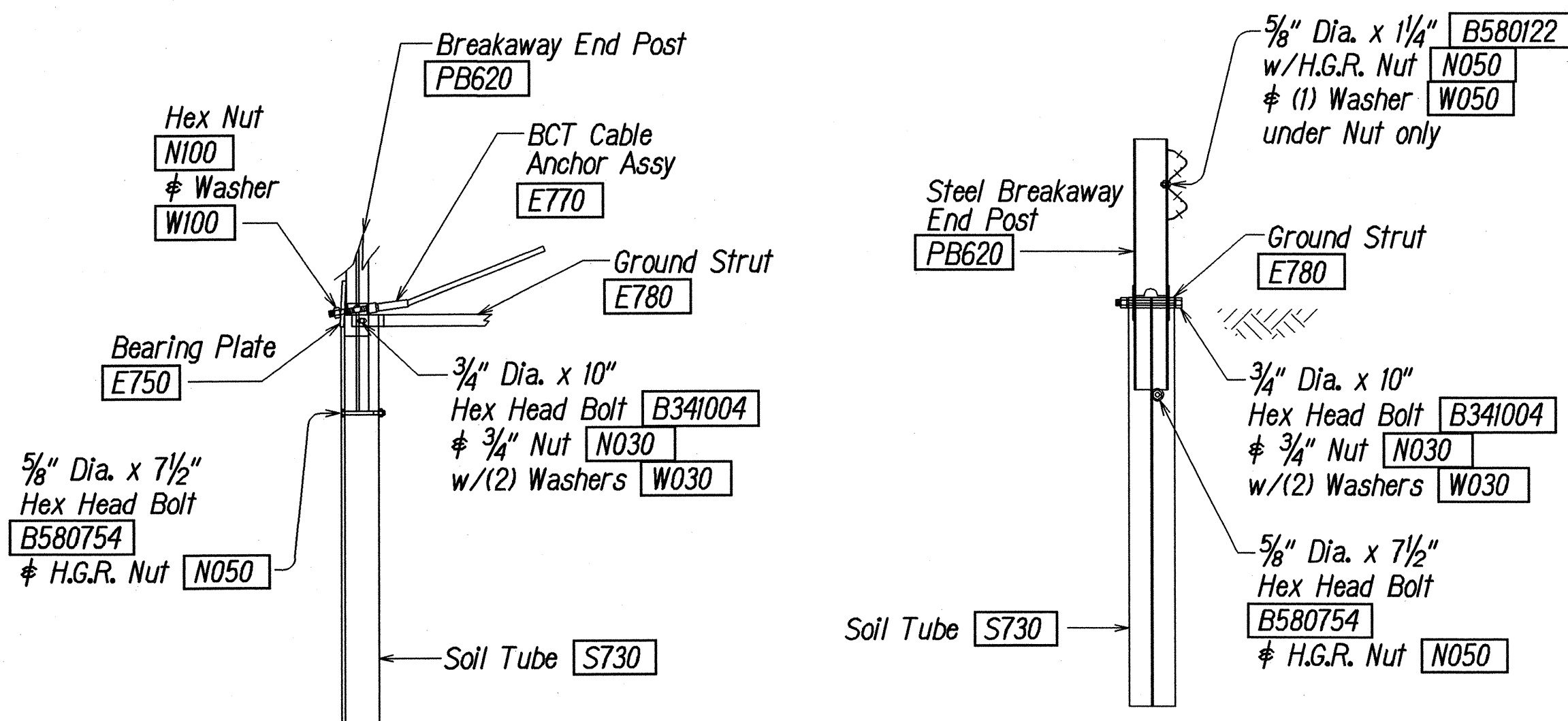


IMPACT HEAD CONNECTING DETAIL



SECTION B-B

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

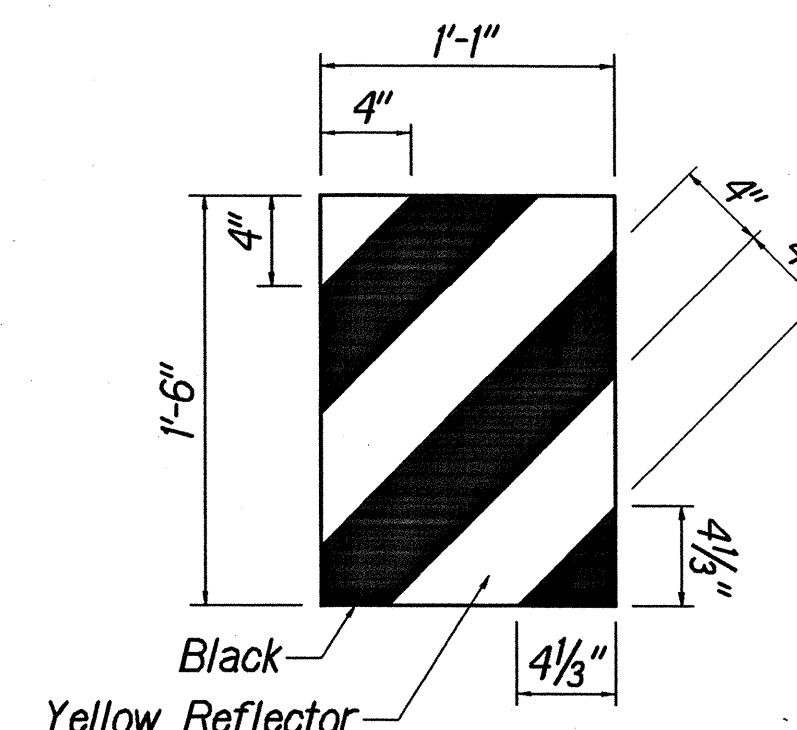


PARTIAL VIEW OF POST 1

SECTION A-A
(@ Post #2)

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
G1203	1	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, 8)
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 1/8" 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

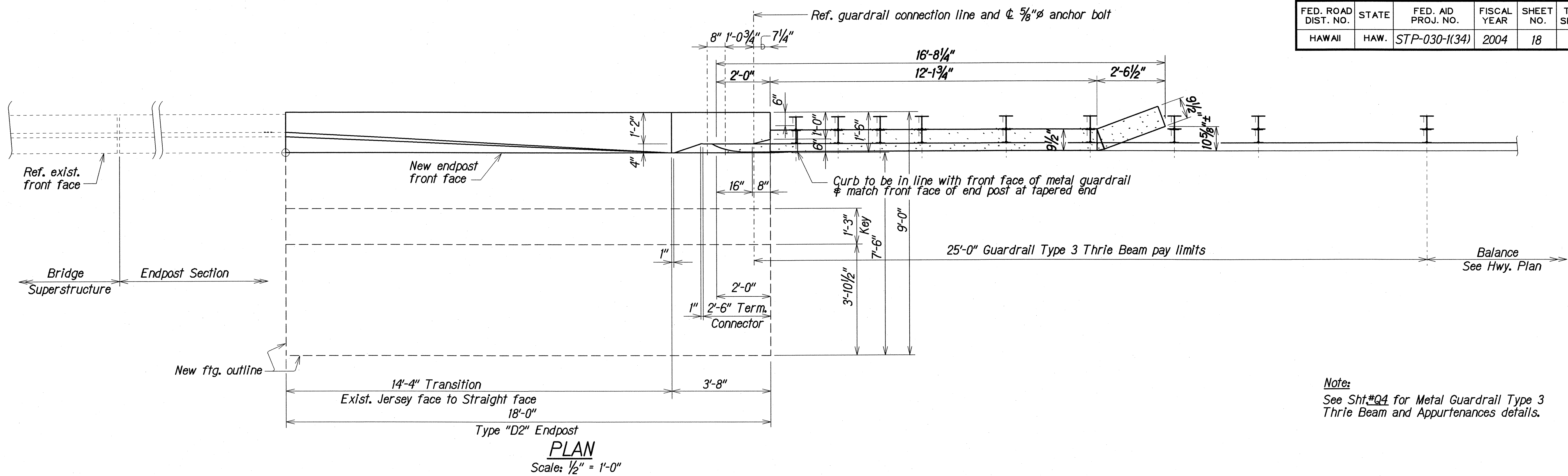


IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL

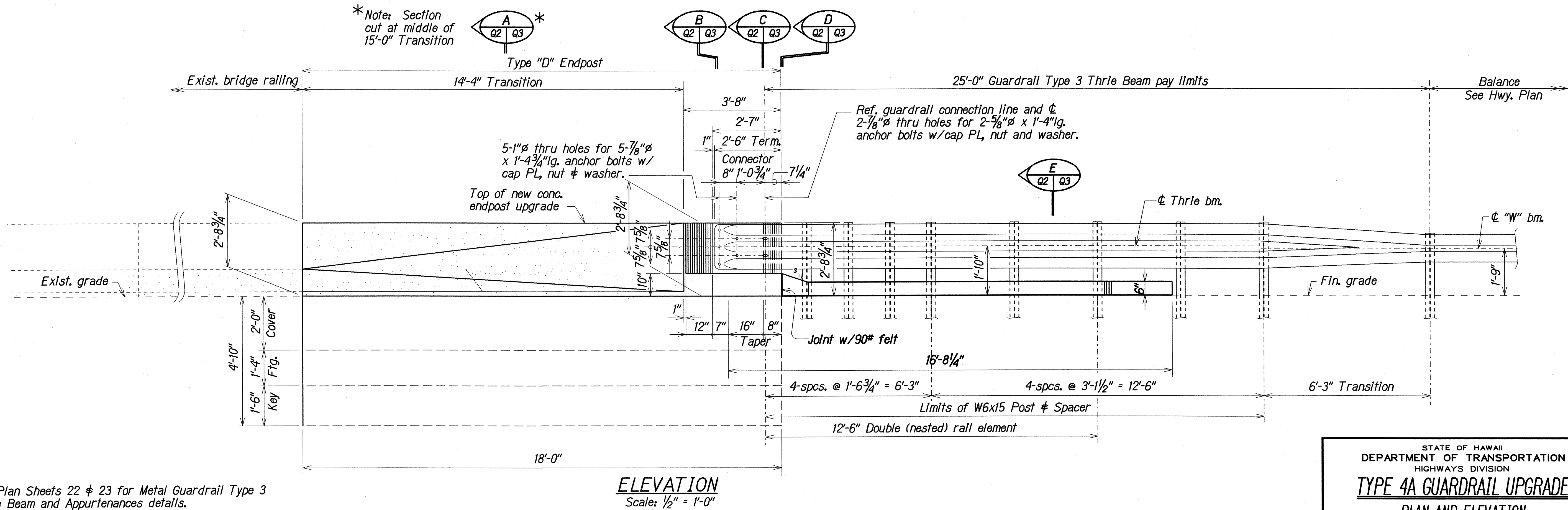
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
FLEAT-350
FLARED ENERGY ABSORBING TERMINAL
HONOAPILANI HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I
Kahama Stream Bridge to Honokahua Stream Bridge
Federal-Aid Project No. STP-030-1(34)
Scale: NTS Date: December, 2002

SHEET No. 10 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	18	46



Note:
See Sht.#Q4 for Metal Guardrail Type 3 Thrie Beam and Appurtenances details.



- NOTE:
- See Plan Sheets 22 & 23 for Metal Guardrail Type 3 Thrie Beam and Appurtenances details.
 - For Type 4A upgrade locations where gabion baskets are present, remove gabion baskets & build the upgrade as shown on plans as approved by the Engineer.

TYPE 4A GUARDRAIL UPGRADE PLAN AND ELEVATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

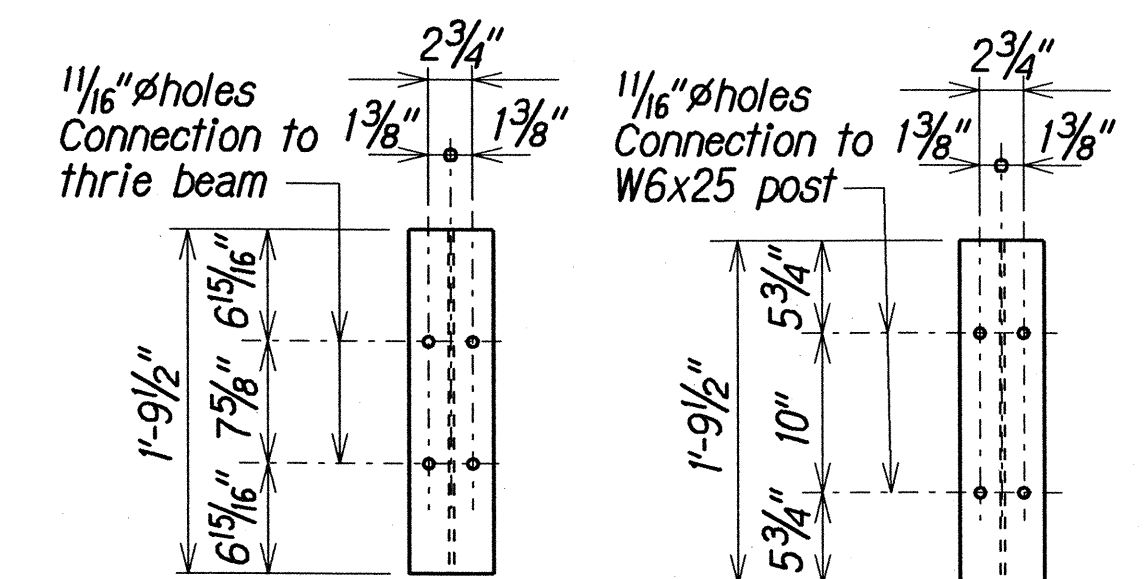
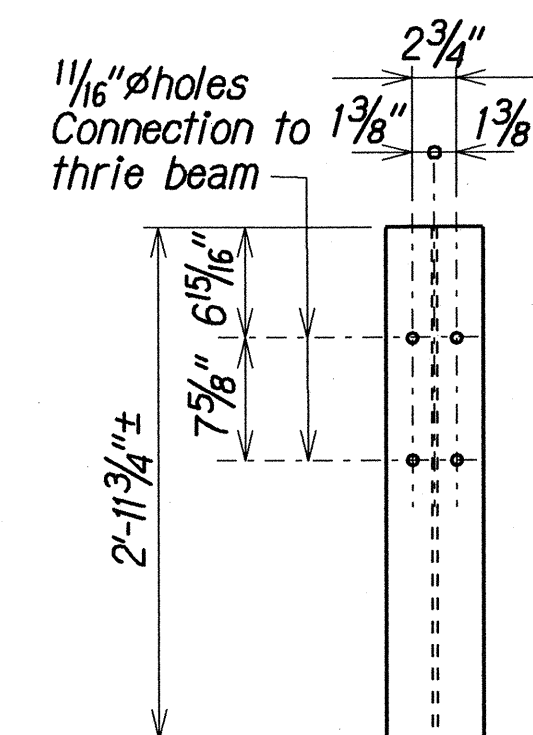
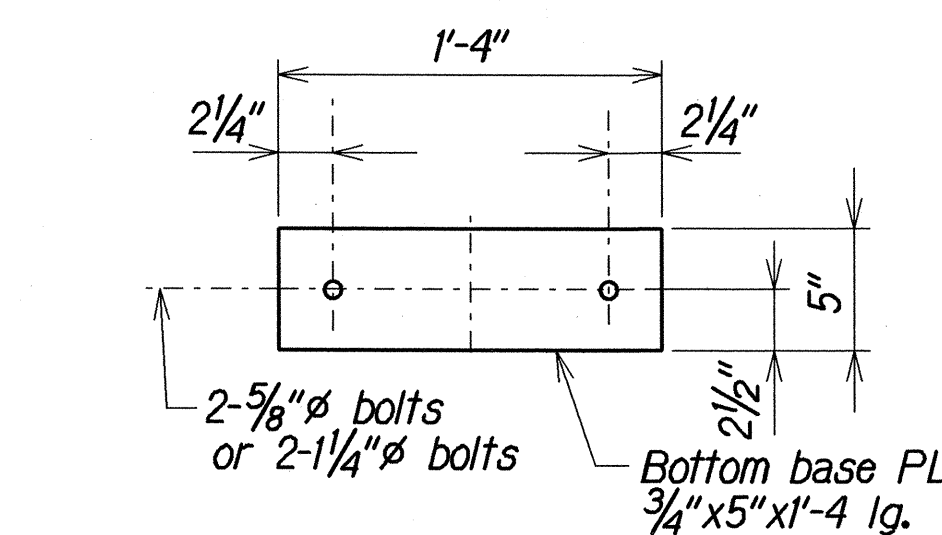
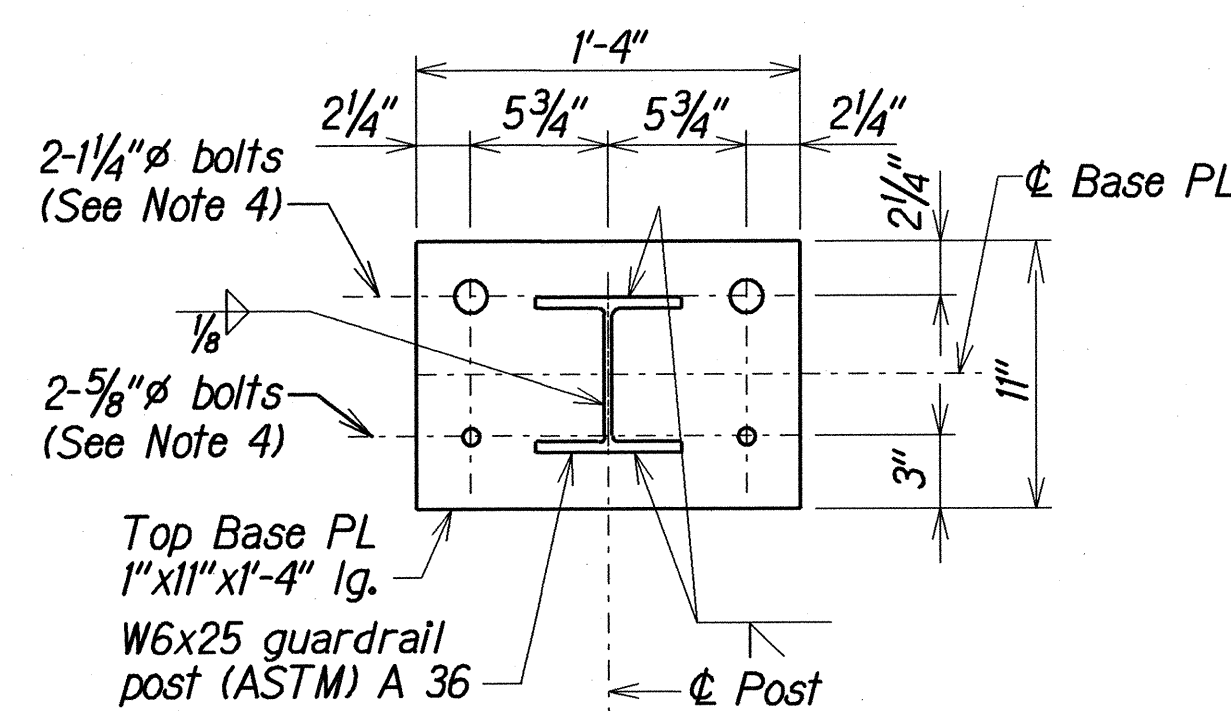
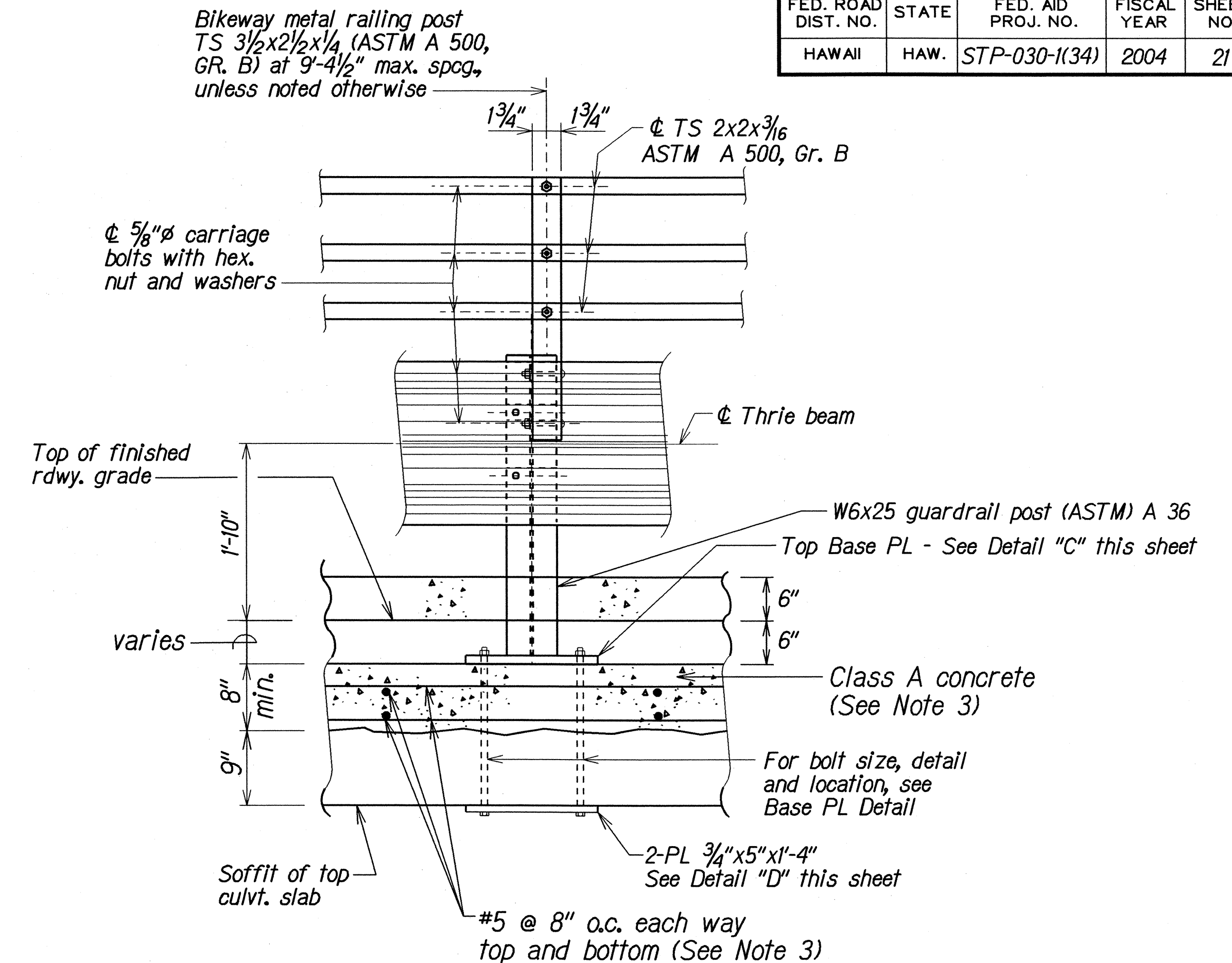
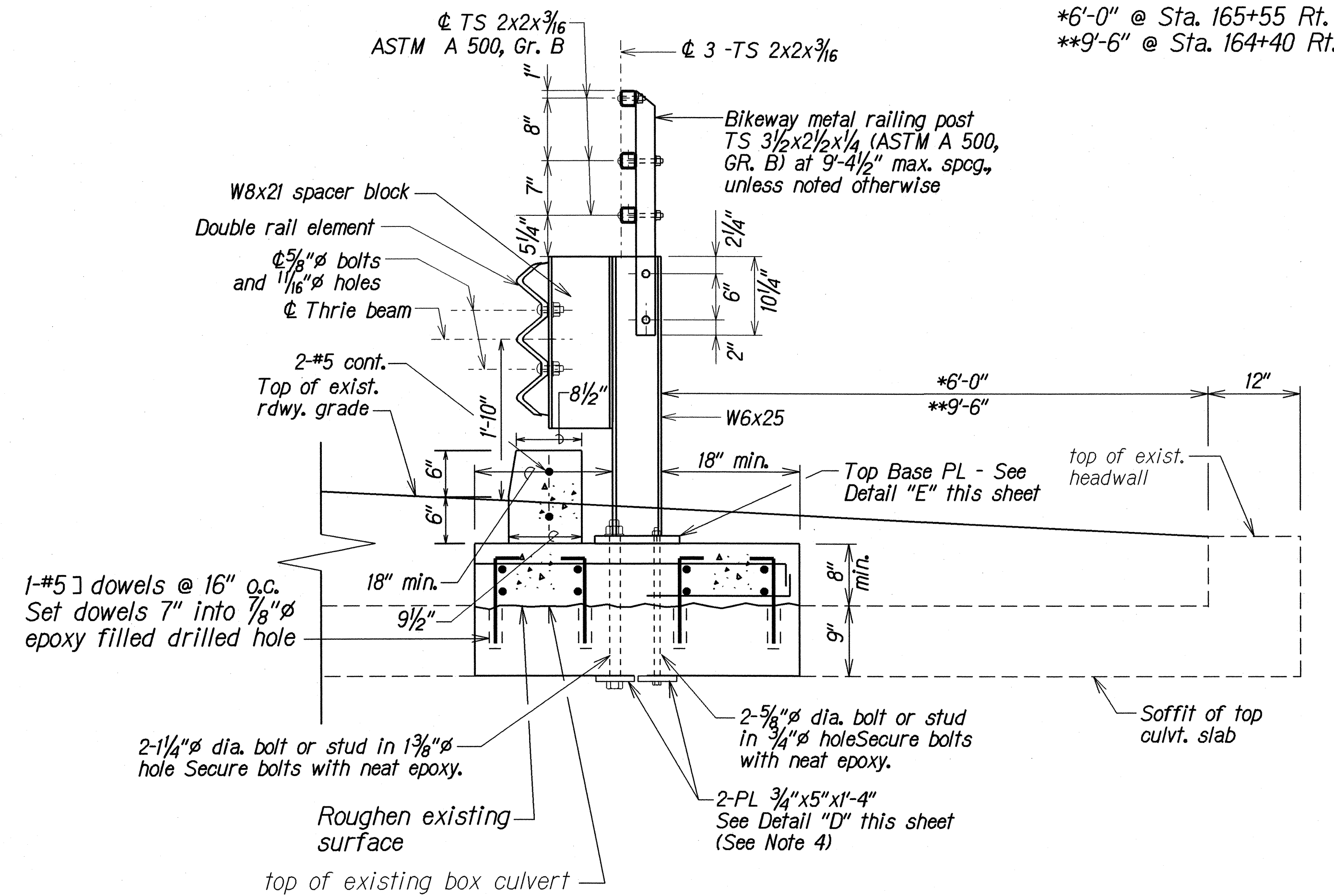
TYPE 4A GUARDRAIL UPGRADE
PLAN AND ELEVATION
HONOLULU HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE 1
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal Aid Project No. STP-030-1(34)

Scale: As Noted
Date: July, 2003

SHEET No. 1 OF 2 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	MAY 1992
4402/Honolulu	DESIGNED BY	MAY 1992
	CHECKED BY	MAY 1992

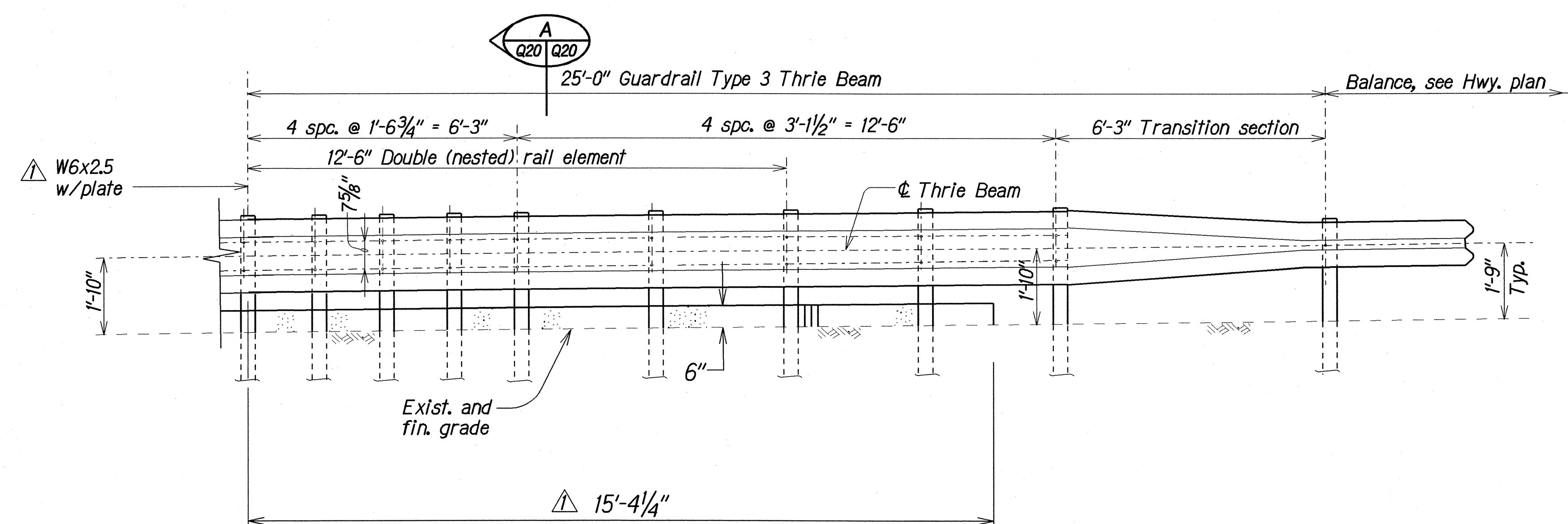
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	21	46



SURVEY PLOTTED BY	DATE
DRAWN BY	MAR 1999
CHECKED BY	MAR 1999
NOTED BY	MAR 1999
DESIGNED BY	MAR 1999
APPROVED BY	MAR 1999

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CULVERT HEADWALL UPGRADE
TYPE 1 AND TYPE 2 CULVERT UPGRADE
SECTIONS, POST & BASE PLATES DETAILS
HONOLULU HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
Federal Aid Project No. STP-030-1(34)
Scale: As Noted Date: July, 2003
SHEET No. 2 OF 2 SHEETS

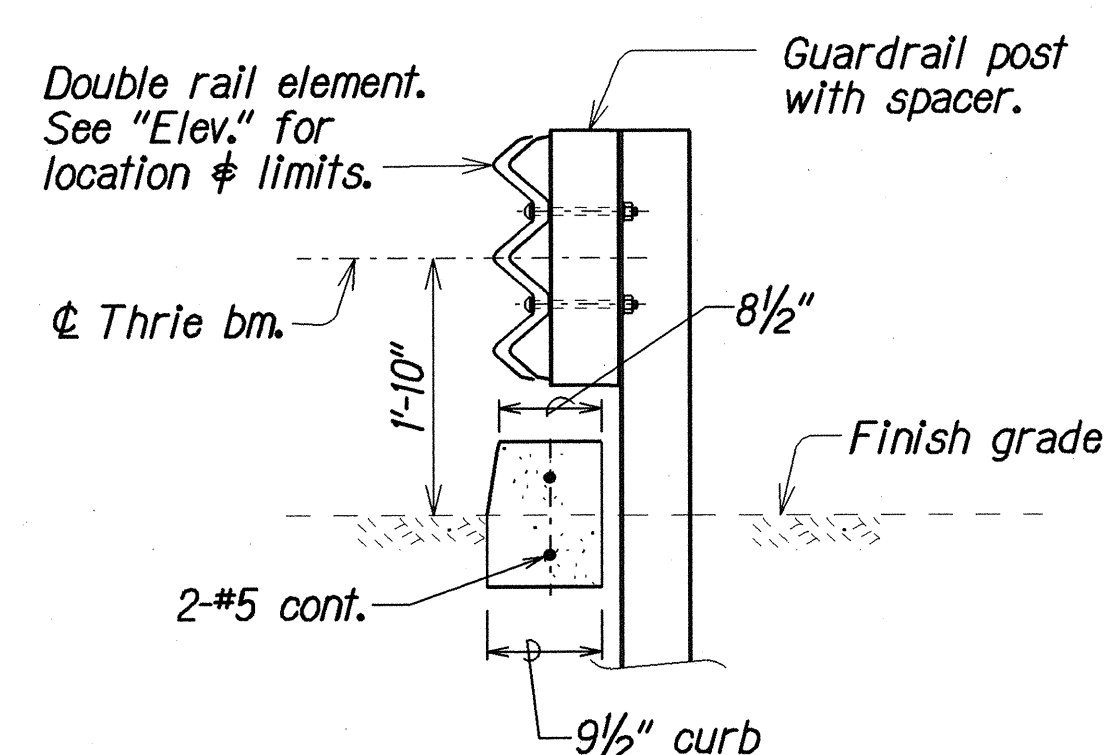
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HAWAII	HAW.	STP-030-1(34)	2004	ADD.22	46



ELEVATION

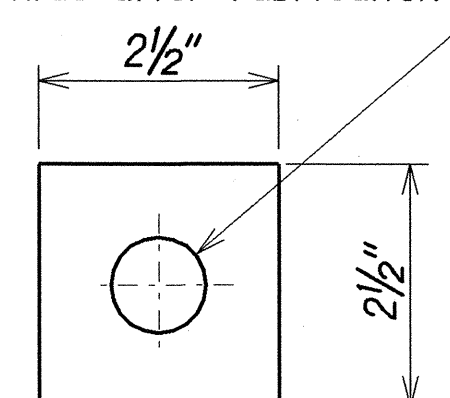
△ TYPICAL HALF SECTION - TYPE 3 THRIE BEAM
METAL GUARDRAIL AT HEADWALL UPGRADE

Scale: 1/2" = 1'-0"



SECTION A
Scale: 3/4" = 1'-0"

Hole centered in 1/2" thick steel PL (bolt size + 1/8")
Galvanize after fabrication



CAP PLATE DETAIL

Scale: 6" = 1'-0"

ORIGINAL PLAN	DATE
DESIGNED BY	MAY 1993
TRACED BY	MAY 1993
NOTED BY	MAY 1993
QUANTITIES BY	MAY 1993
CHECKED BY	MAY 1993

△ 5-28-04 Edited drawing and dimension.

DATE REVISION

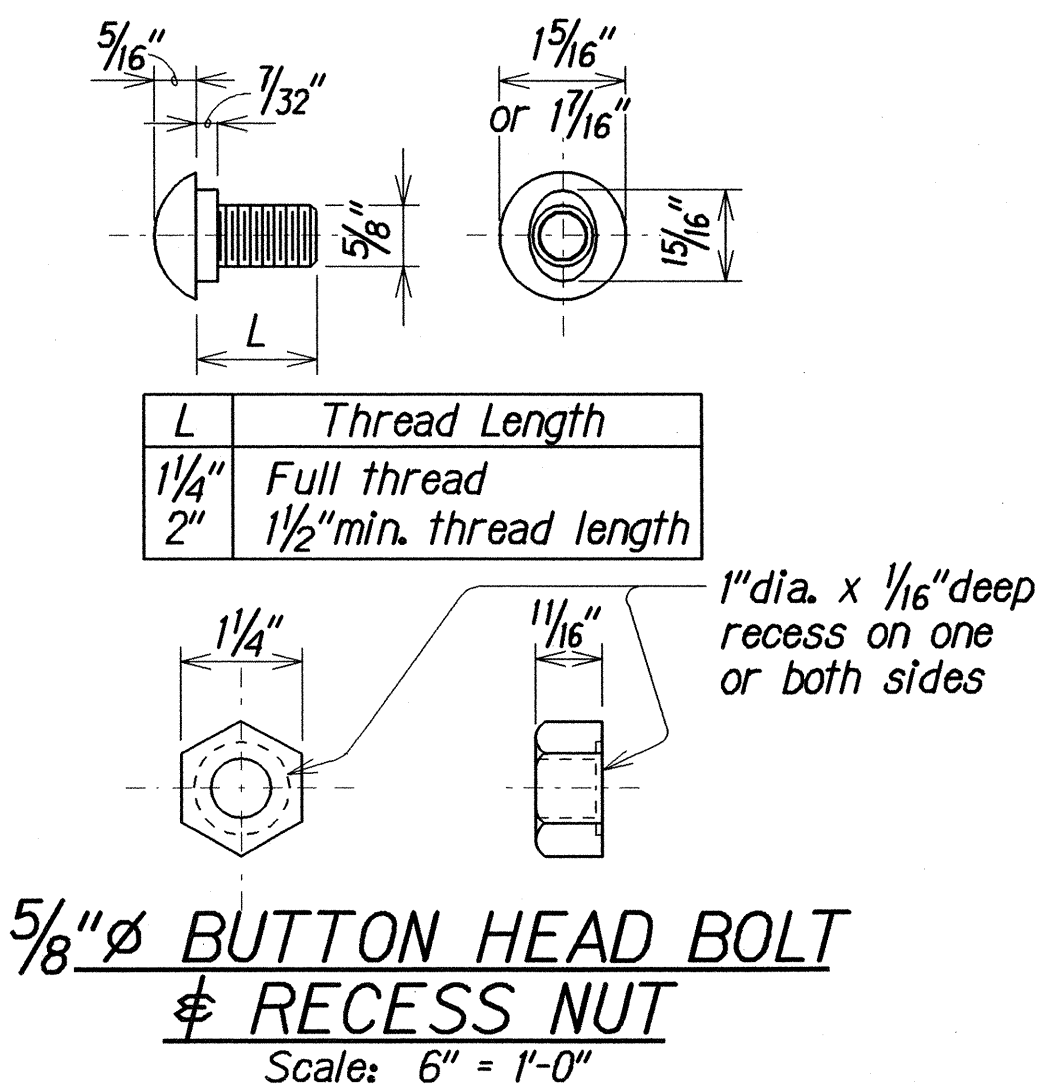
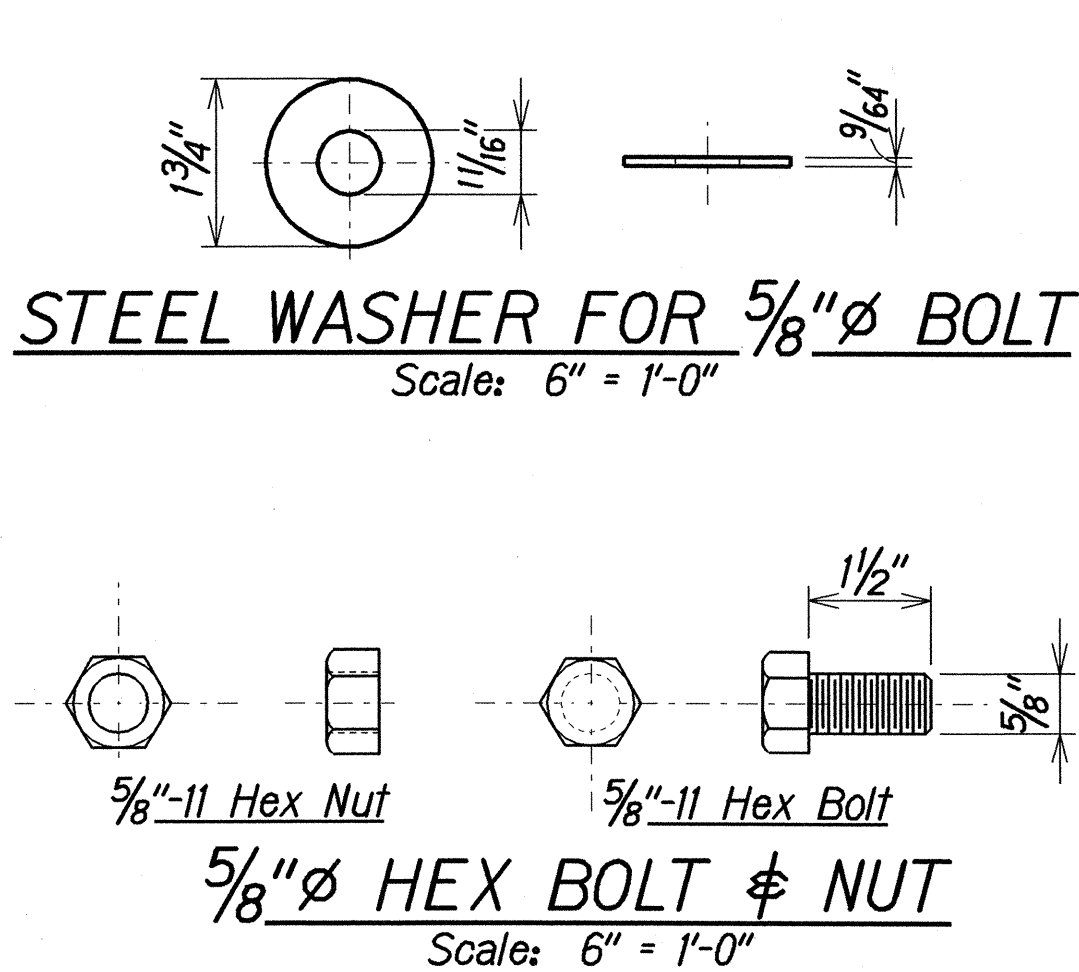
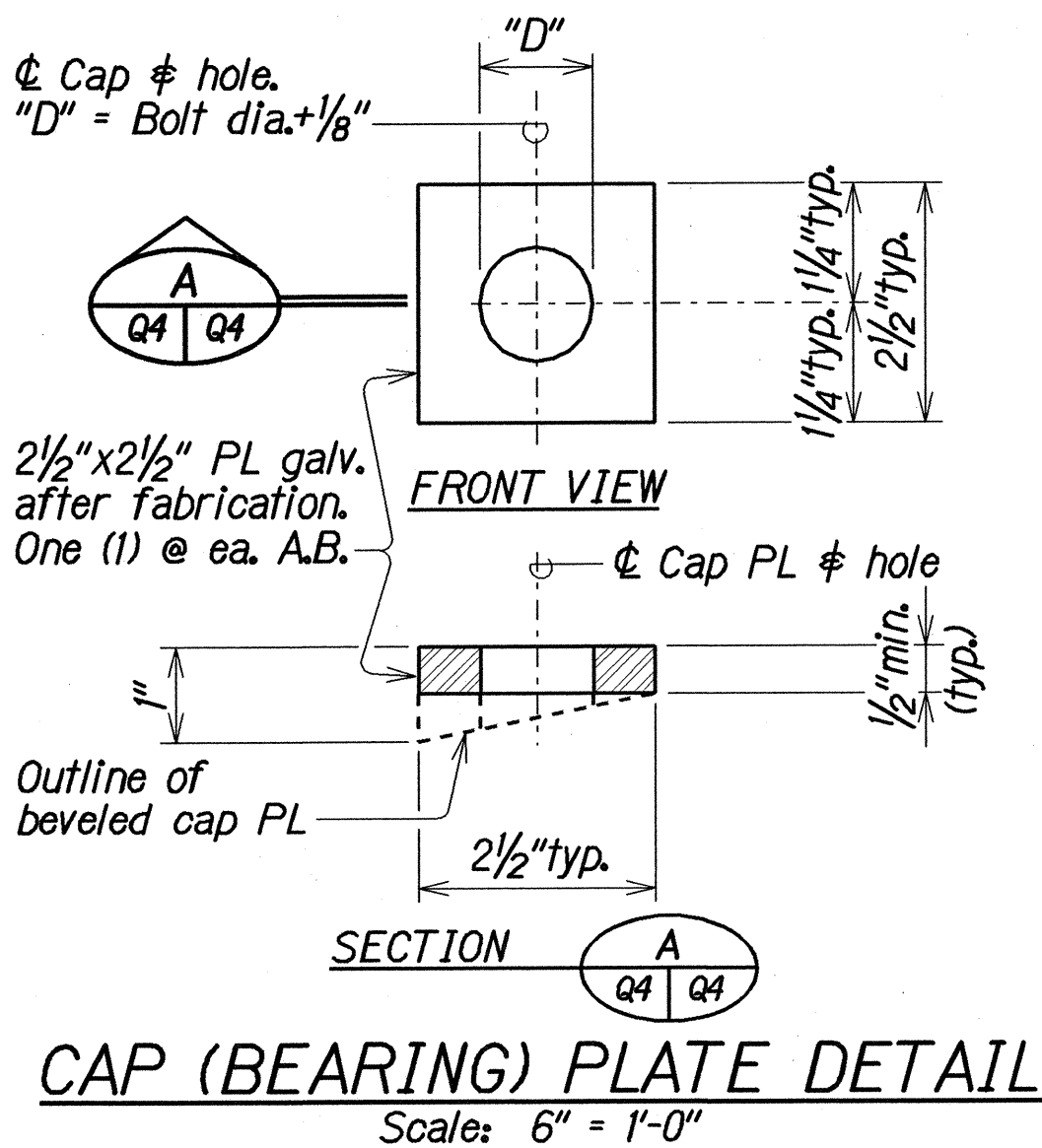
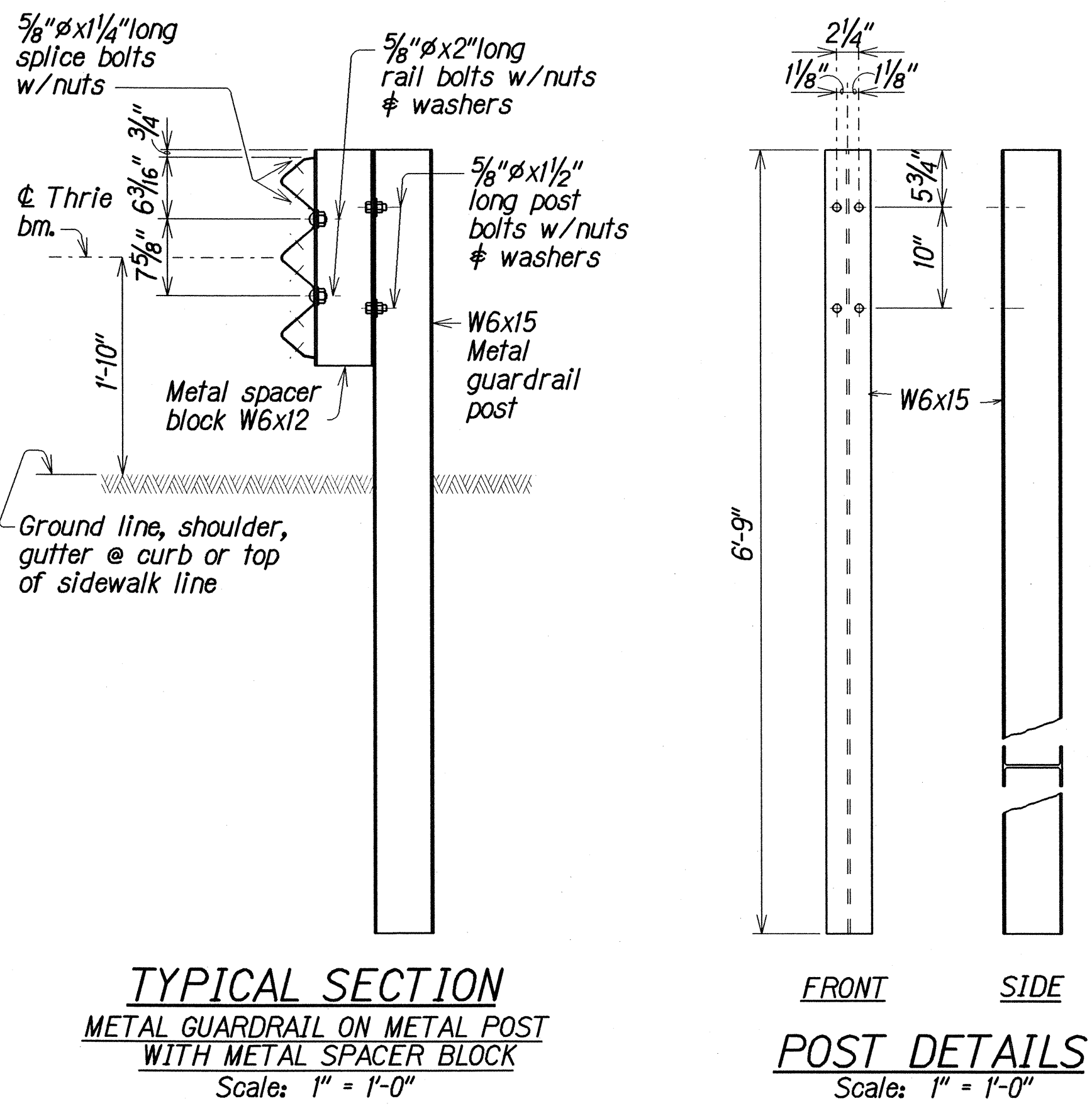
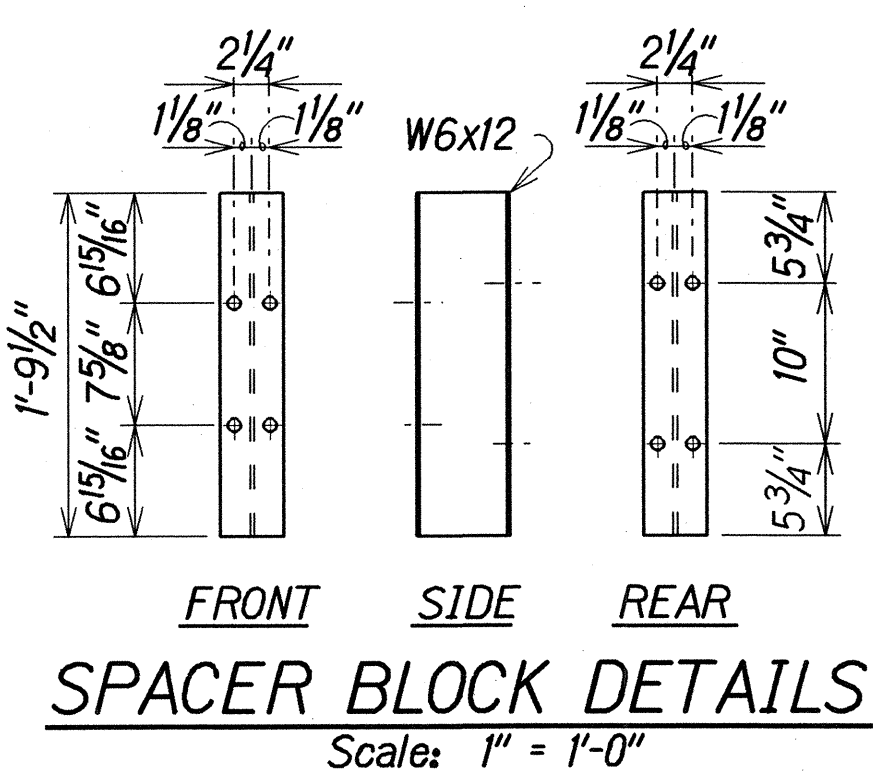
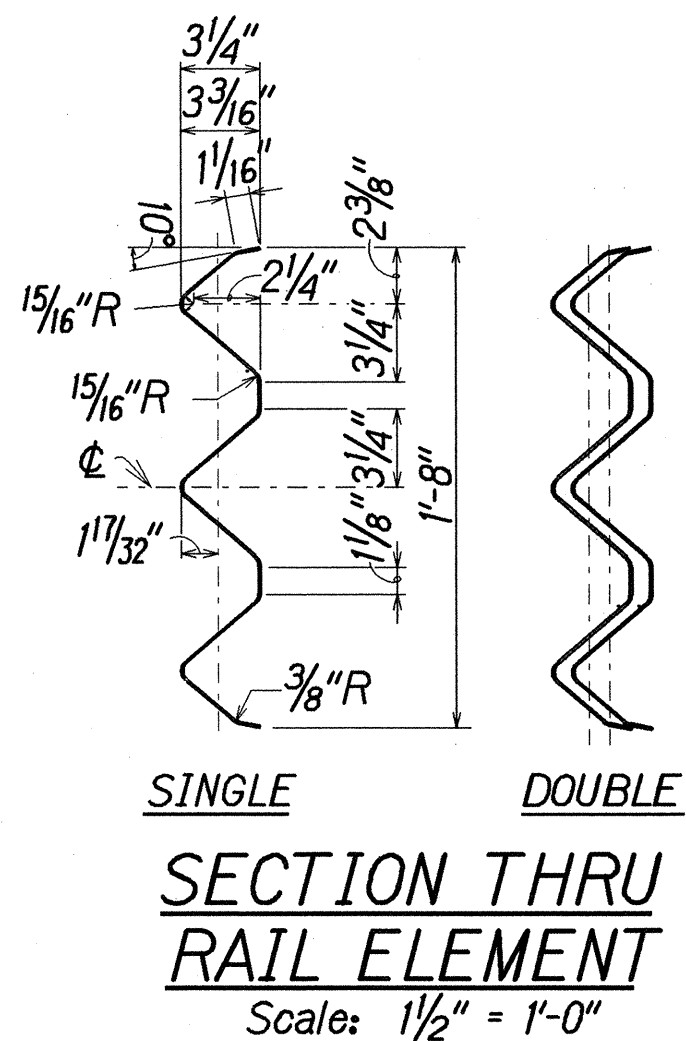
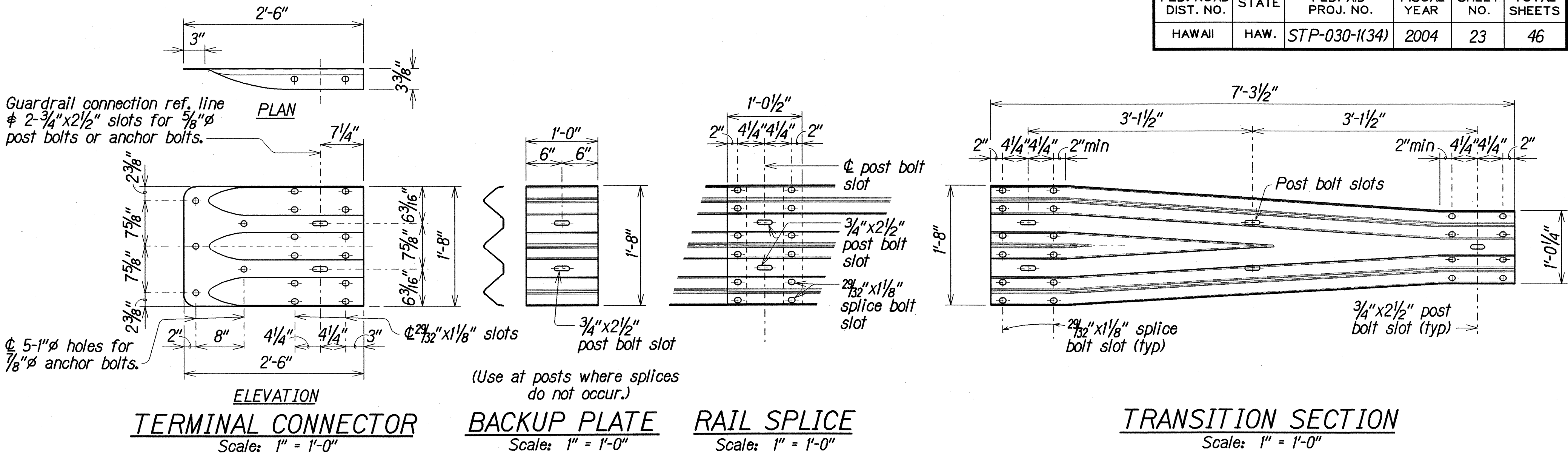
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
TYPICAL TYPE 3 METAL GUARDRAIL
METAL GUARDRAIL TYPE 3 THRIE BEAM DETAILS
HONOAPIILANI HIGHWAY GUARDRAIL AND SHOULDER IMPROVEMENTS, PHASE 1 Kahoma Stream Bridge to Honokahua Stream Bridge Federal Aid Project No. STP-030-1(34)
Scale: As Noted Date: July, 2003
SHEET No. 1 OF 2 SHEETS

ADD.22

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-030-1(34)	2004	23	46

NOTES:

- The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and will not be paid for separately.
- Lap terminal connector and rail element in direction of traffic to prevent snagging.
- All anchor bolts shall be high strength bolts conforming to the requirements of ASTM 325 and Standard Specification, Section 713.04.
- Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
- "Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10gauge steel conforming to the requirements of AASHTO M 180, Type II, Class B.
- "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
- Cap PL shall be fabricated from ASTM A 36.
- First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
- Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.
- Where double (nested) beam occur, 12" "Back-up Plate" not required.
- Heads of through anchor bolts shall be placed on the traffic side of the rail.
- All steel shapes, rails and plates shall conform to ASTM A 36 specifications.



METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL TYPE 3 METAL GUARDRAIL
METAL GUARDRAIL TYPE 3 THRIE BEAM
AND APPURTENANCES DETAILS
HONOAPILANI HIGHWAY GUARDRAIL
AND SHOULDER IMPROVEMENTS, PHASE I
Kahoma Stream Bridge to Honokahua Stream Bridge
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