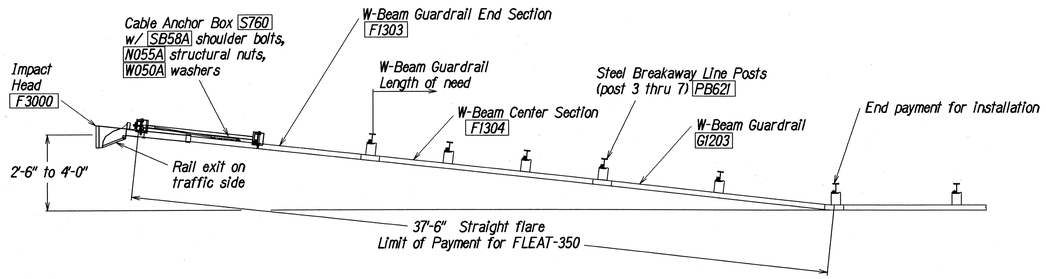
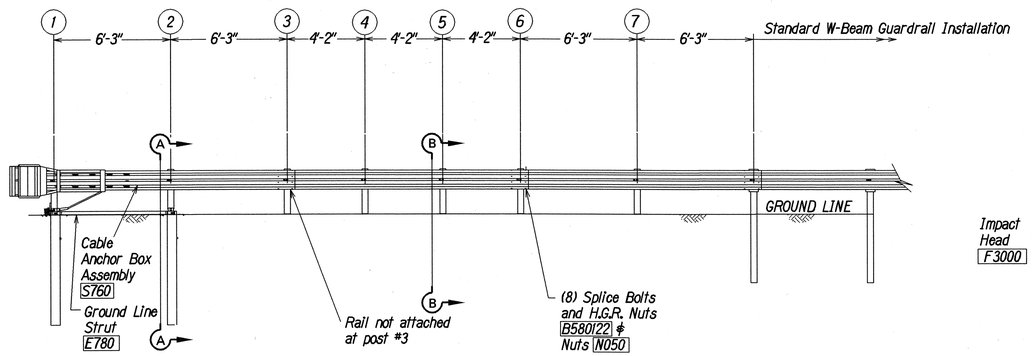
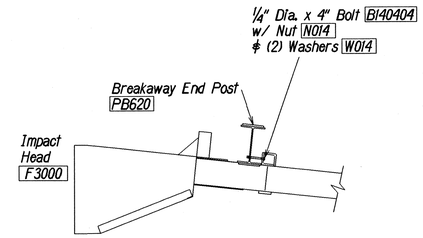
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	44	72



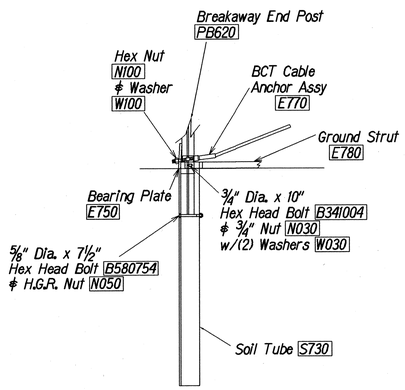
PLAN



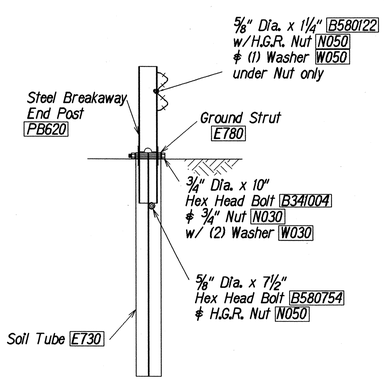
ELEVATION



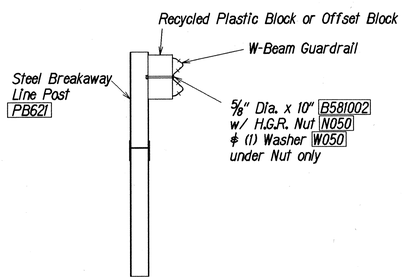
IMPACT HEAD CONNECTING DETAIL



PARTIAL VIEW OF POST 1



SECTION A-A
(@ Post #2)



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

GENERAL NOTES

1. Breakaway 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 should 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.

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.
GI203	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
		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

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY X	FEB-01
	TRACED BY	
NOTE BOOK	DESIGNED BY X	
	QUANTITIES BY	
No.	CHECKED BY	

r1/31/2000tfd:/uby/guardrail/flfleat350.dgn (standard plan TE-61 rl1/03/89 & TE-62 r09/01/87)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350

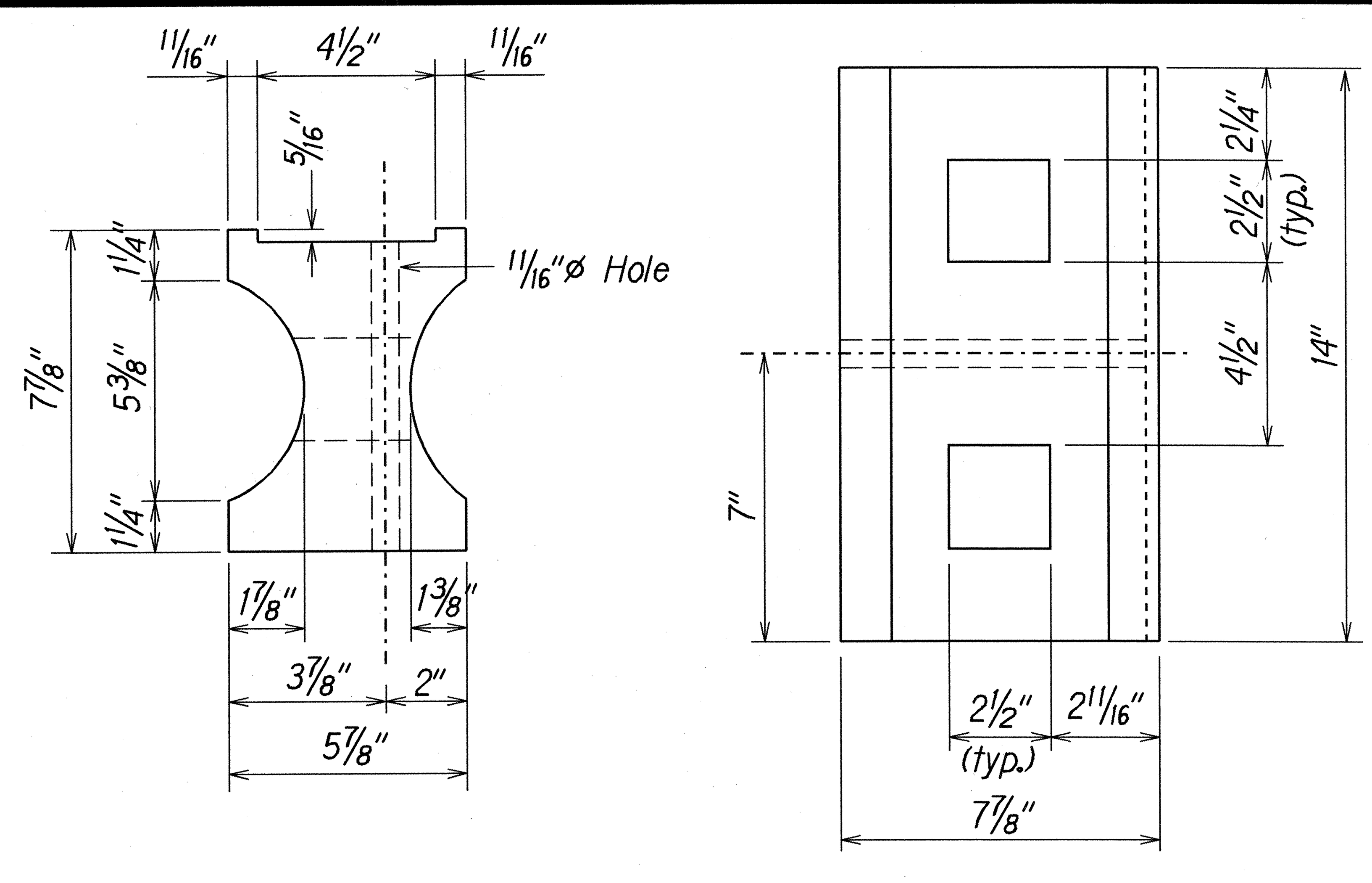
FLARED ENERGY ABSORBING TERMINAL

HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal Aid Project No. NH-030-1(28)

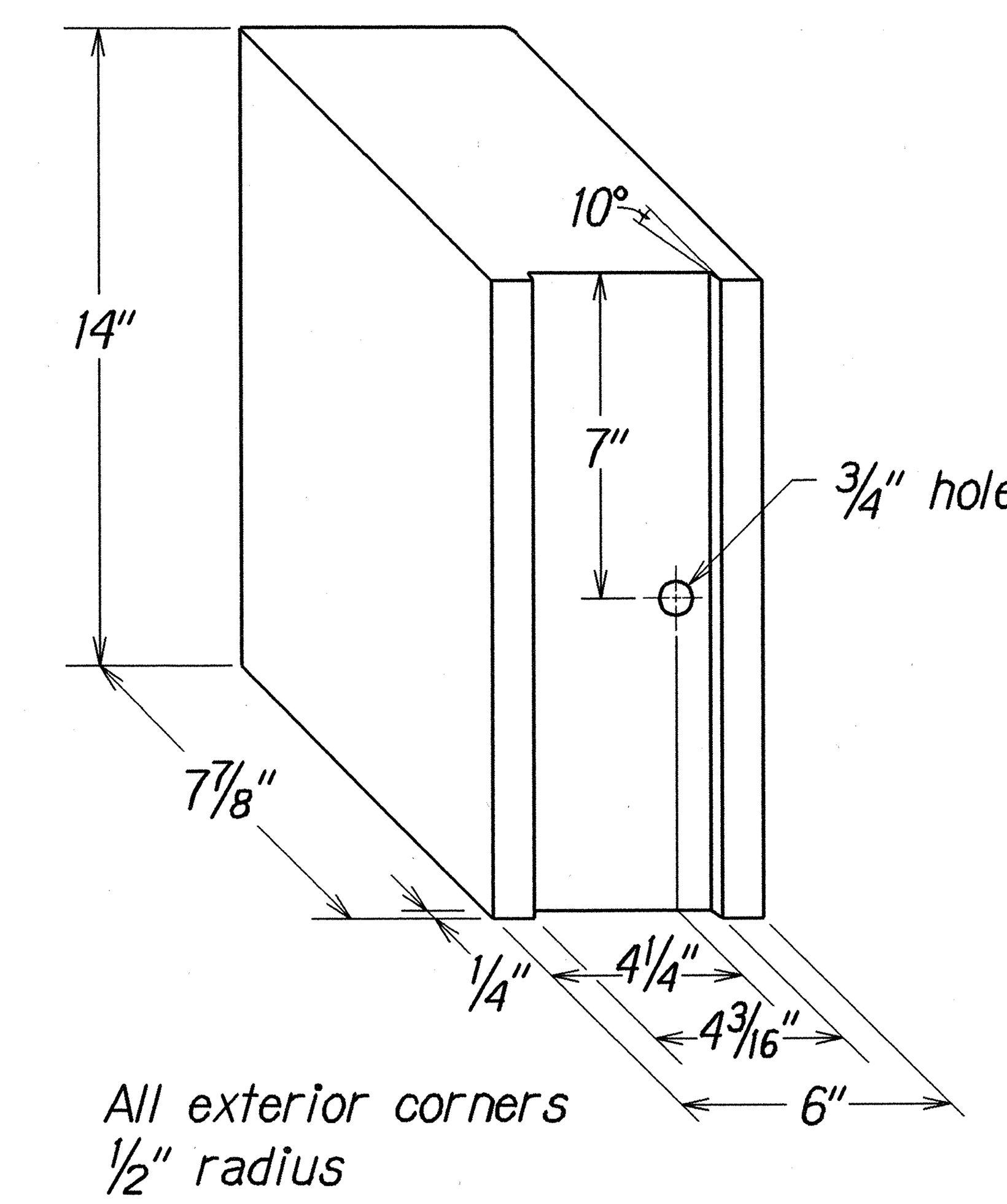
Not to Scale Date: Feb. 2001

SHEET No. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	45	72



RECYCLED PLASTIC BLOCKOUT (TYPE I)



RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

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.

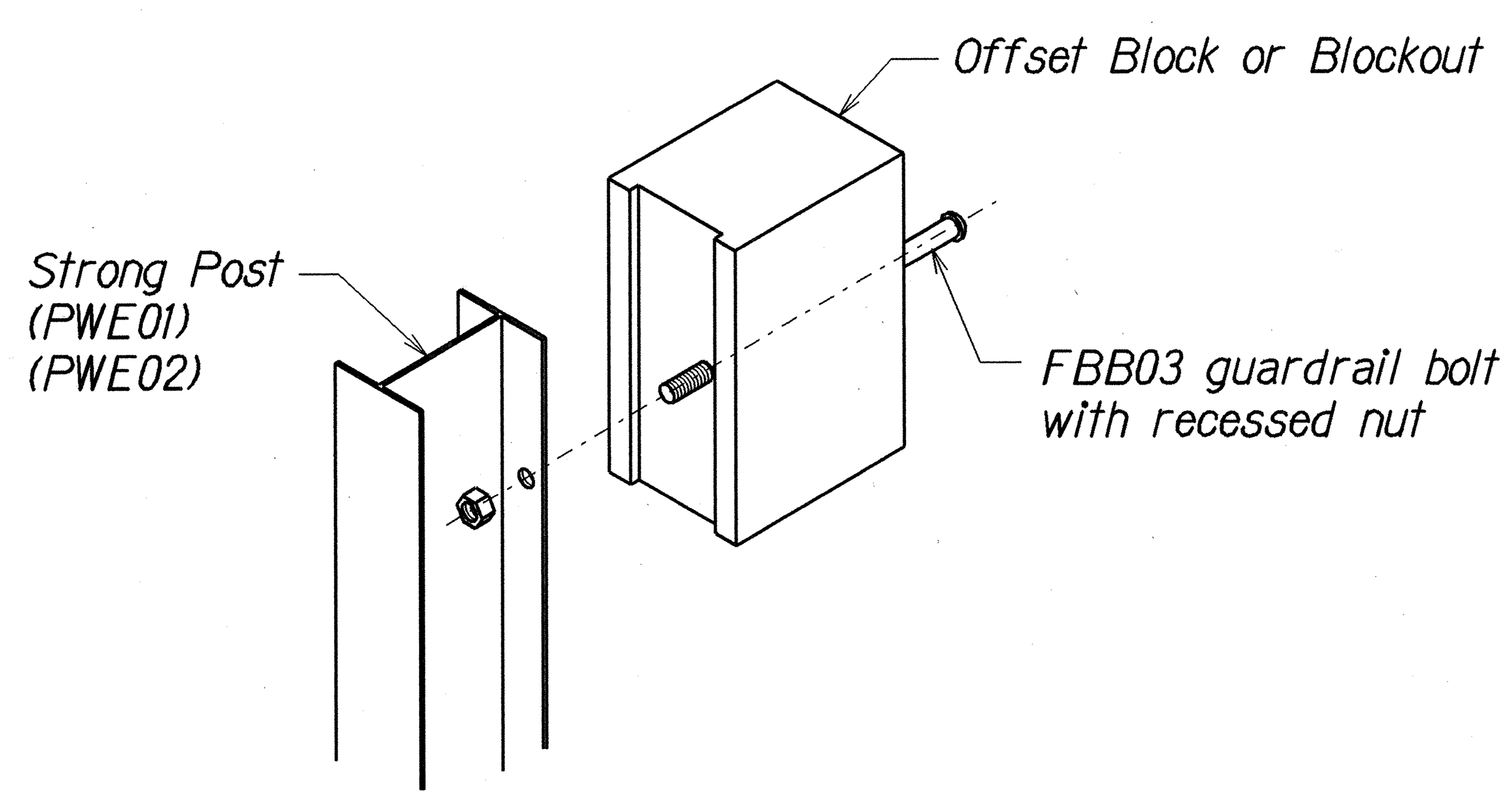
2. Where conditions require, special post lengths in increments of 6 inches may be specified.

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.

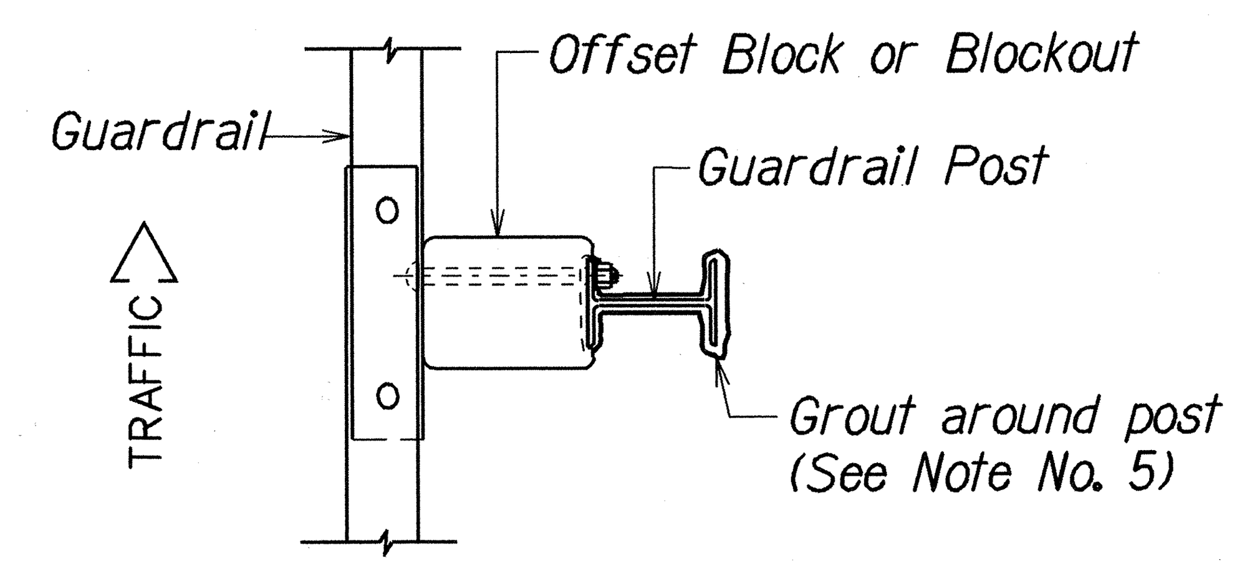
5. After the guardrail posts are installed in the paved area, the Contractor shall grout around the guardrail post and seal all cracks in the paved area that was caused during the guardrail post installation. If required by the inspector/ engineer, the Contractor shall tamper the paved area around the guardrail post prior to grouting. The cost for this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.

6. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.

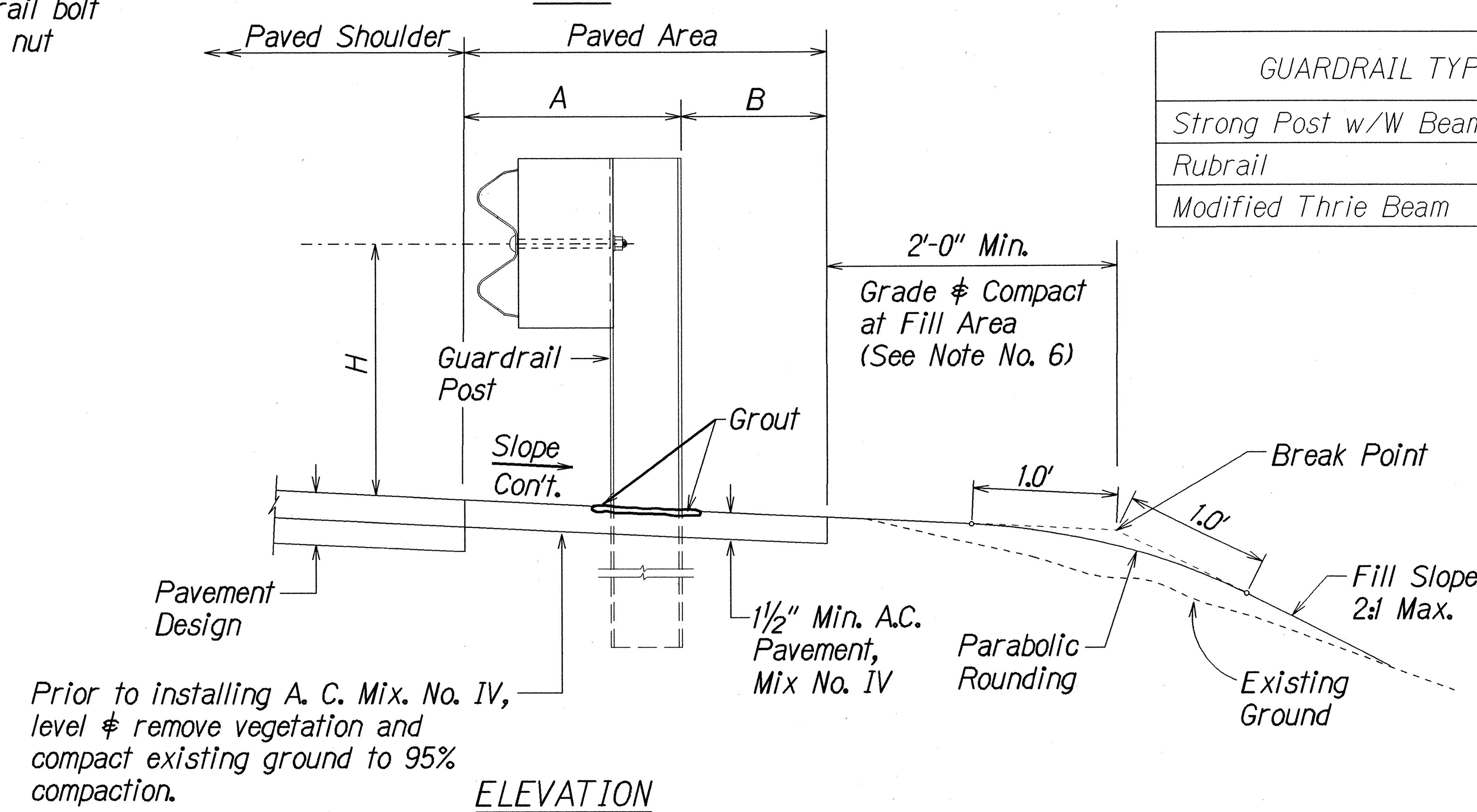


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal Aid Project No. NH-030-1(28)

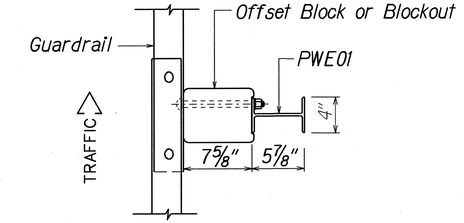
Scale: NTS — Date: May, 2001

SHEET No. 1 OF 1 SHEETS

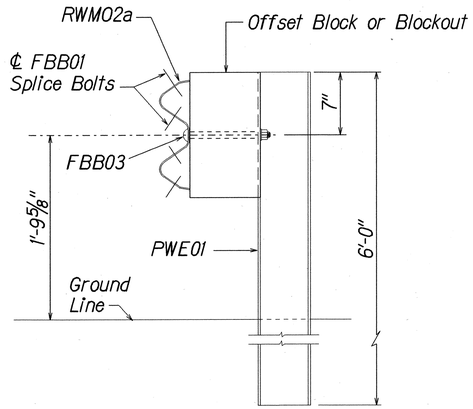
ORIGINAL PLAN / NOTE BOOK No. / SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY / DATE

r3/01/99 tdt.ruby/guardrail/te50rev.dgn (standard plan TE-50 r03/06/87)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	46	72



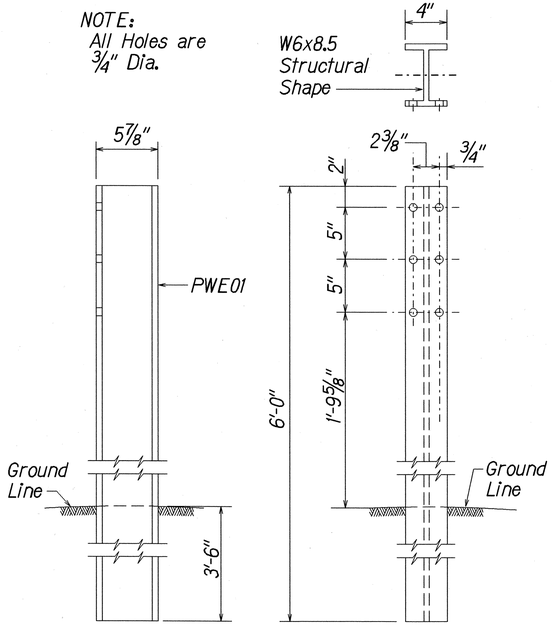
PLAN



ELEVATION

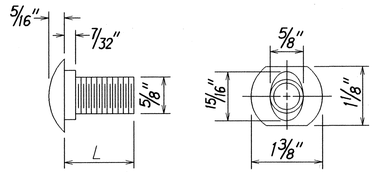
STRONG POST W-BEAM GUARDRAIL

(SGR04a)

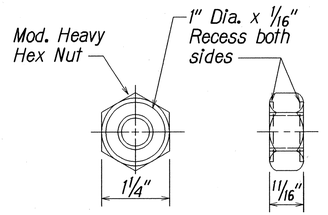


SIDE FRONT

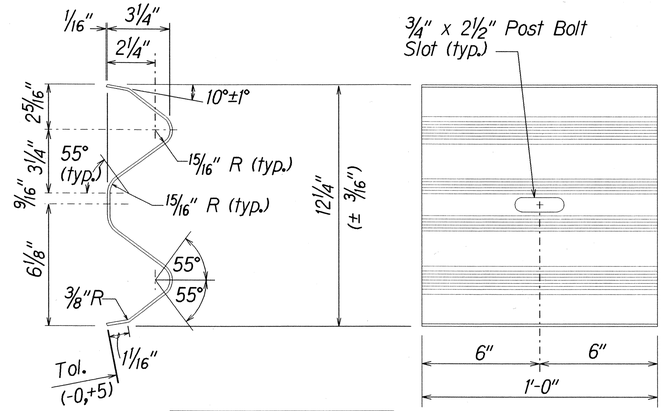
W-BEAM STRONG POST (PWE01)



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

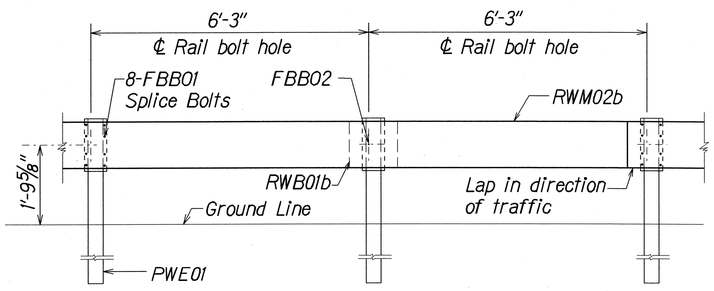


GUARDRAIL BOLTS AND RECESSED NUT



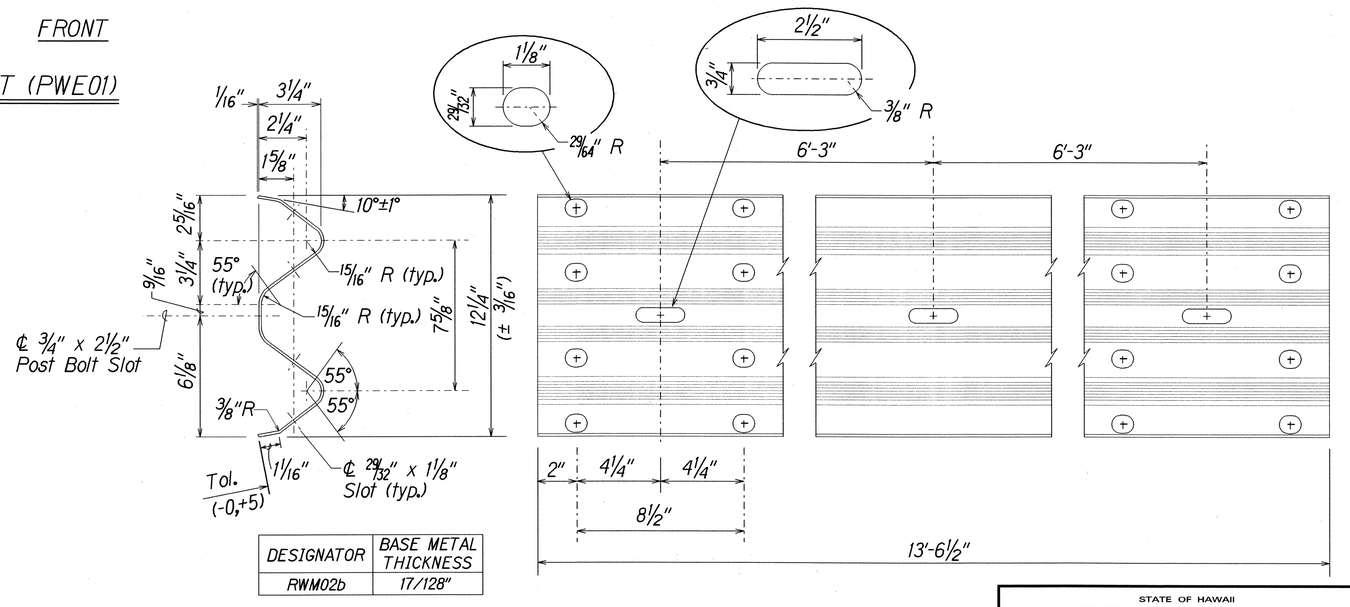
DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)



ELEVATION

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



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"

2 SPACE W-BEAM GUARDRAIL (RWM02b)

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 11/05/01
	DRAWN BY JY	
	TRACED BY	
	DESIGNED BY JY	
NOTE BOOK	QUANTITIES BY	
No.	CHECKED BY	

r3/01/99 td:\rdy\guardrail\wbeamsp.dgn (standard plan TE-50 03/06/87)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

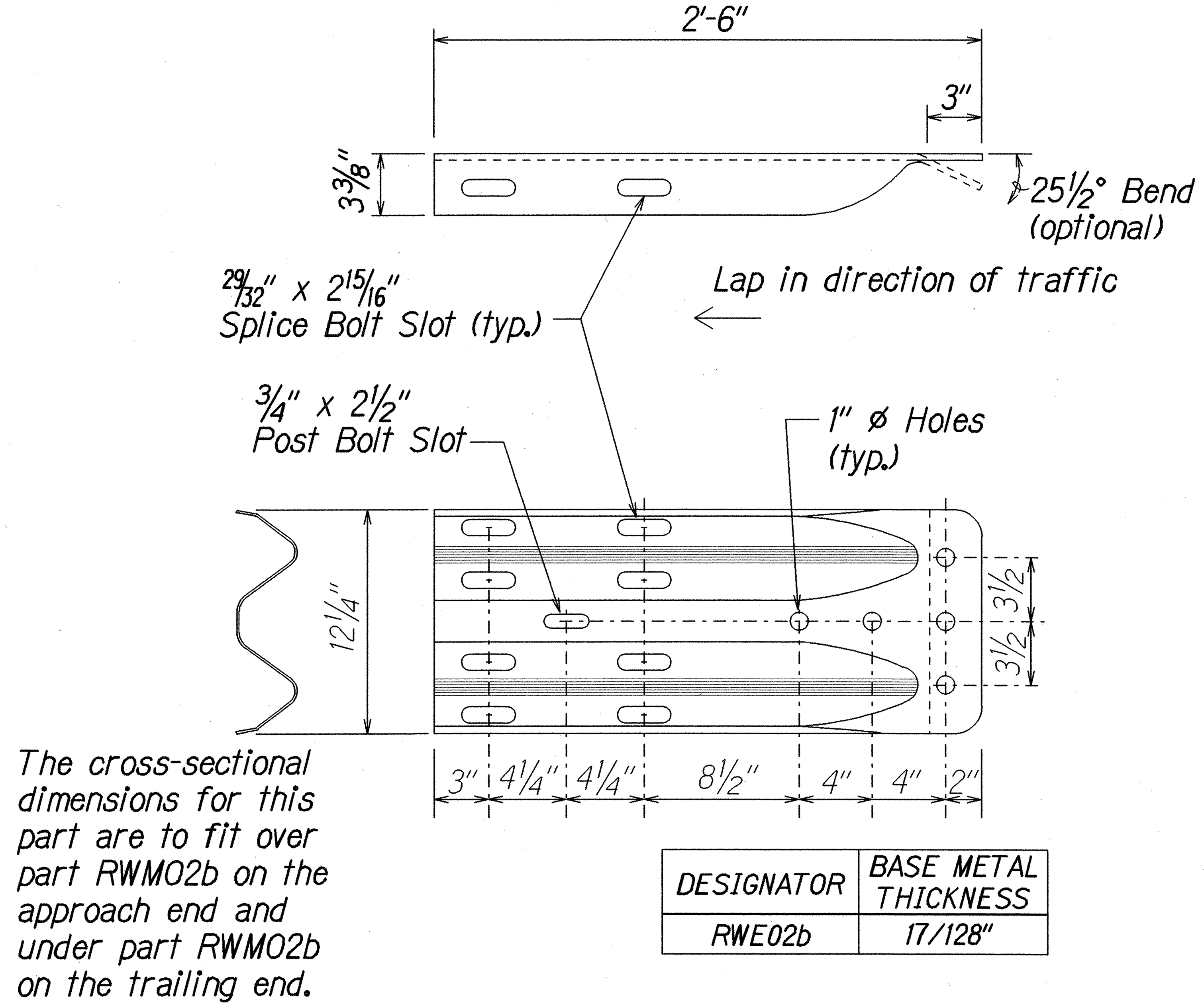
STRONG POST W-BEAM GUARDRAIL

HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal Aid Project No. NH-030-1(28)

Scale: NTS Date: May, 2001

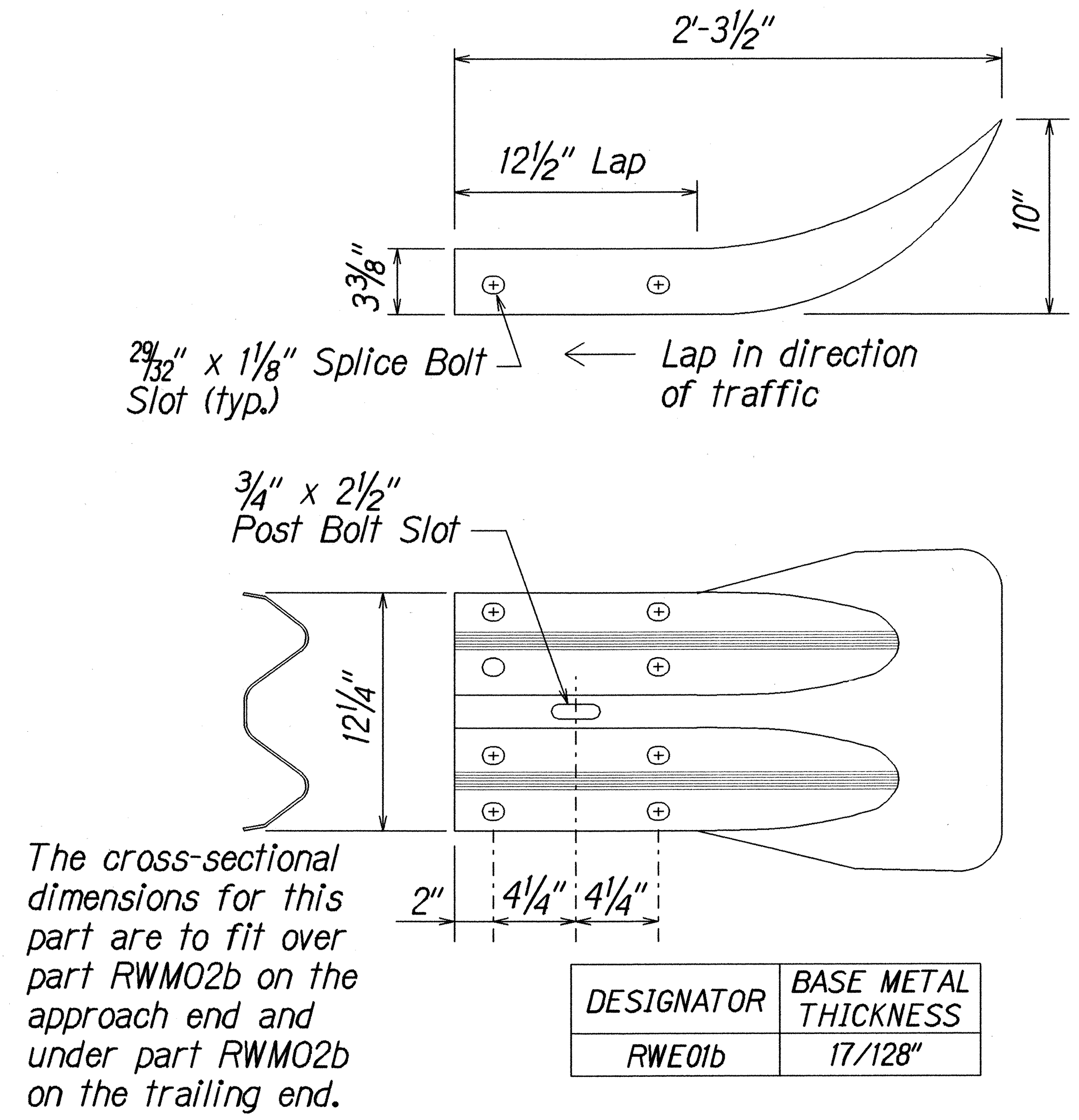
SHEET No. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	47	72



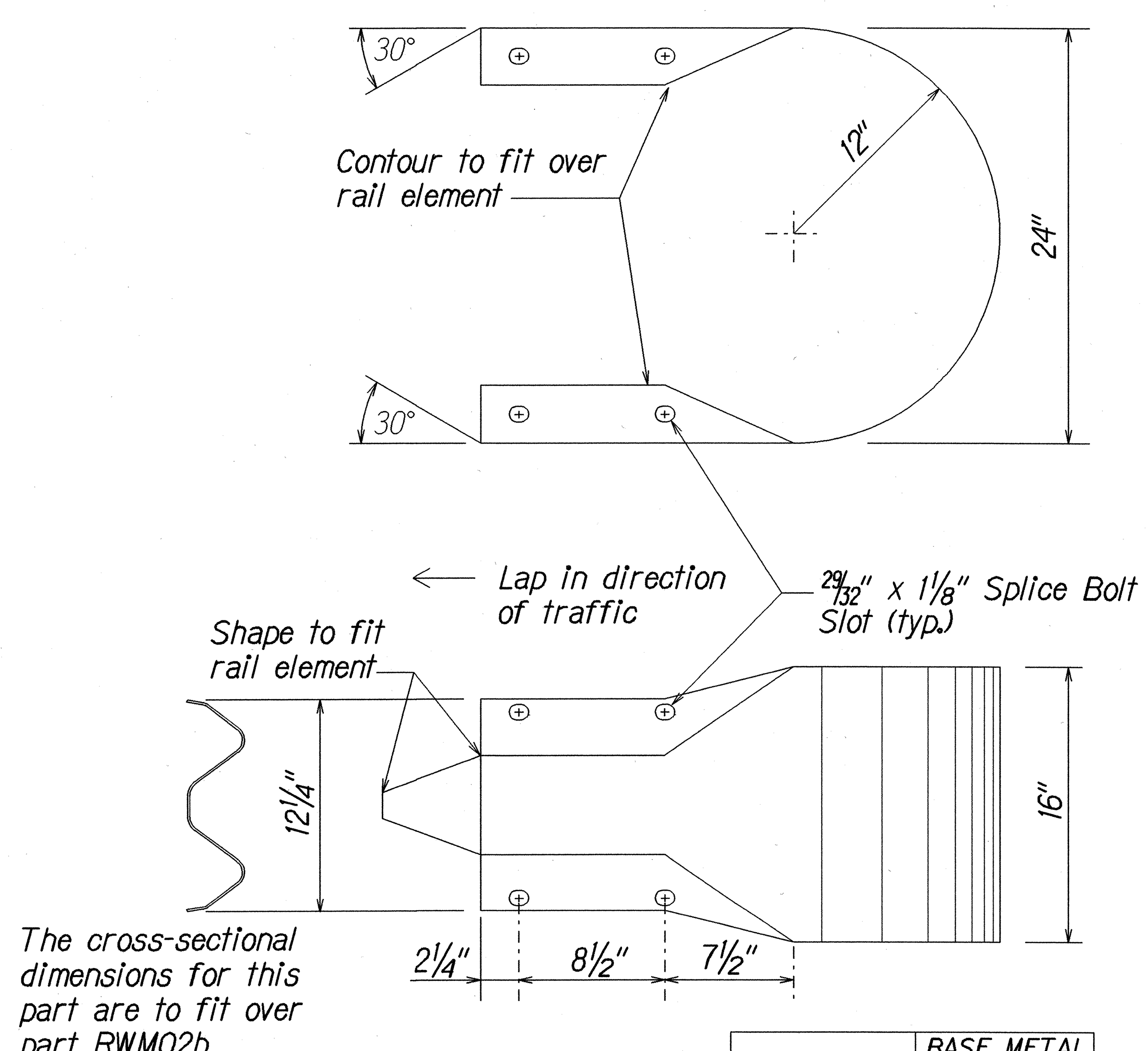
DESIGNATOR	BASE METAL THICKNESS
RWE02b	17/128"

W-BEAM TERMINAL CONNECTOR (RWE02b)



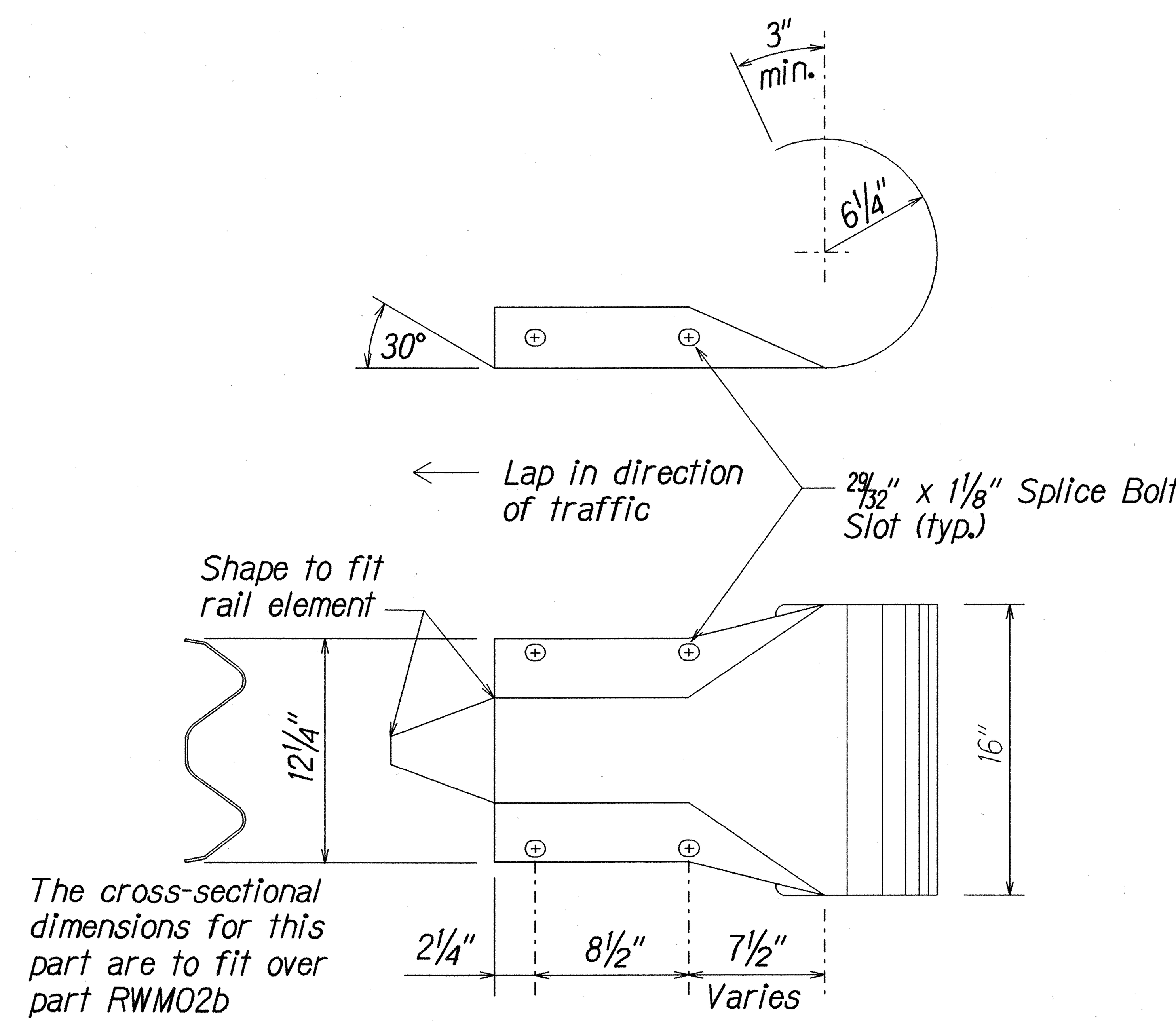
DESIGNATOR	BASE METAL THICKNESS
RWE01b	17/128"

W-BEAM END SECTION (FLARED RWE01b)



DESIGNATOR	BASE METAL THICKNESS
RWE06b	17/128"

W-BEAM END SECTION (BUFFER RWE06b)



DESIGNATOR	BASE METAL THICKNESS
RWE03a	7/64"

W-BEAM END SECTION (ROUNDED RWE03a)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal Aid Project No. NH-030-1(28)

Scale: NTS Date: May, 2001

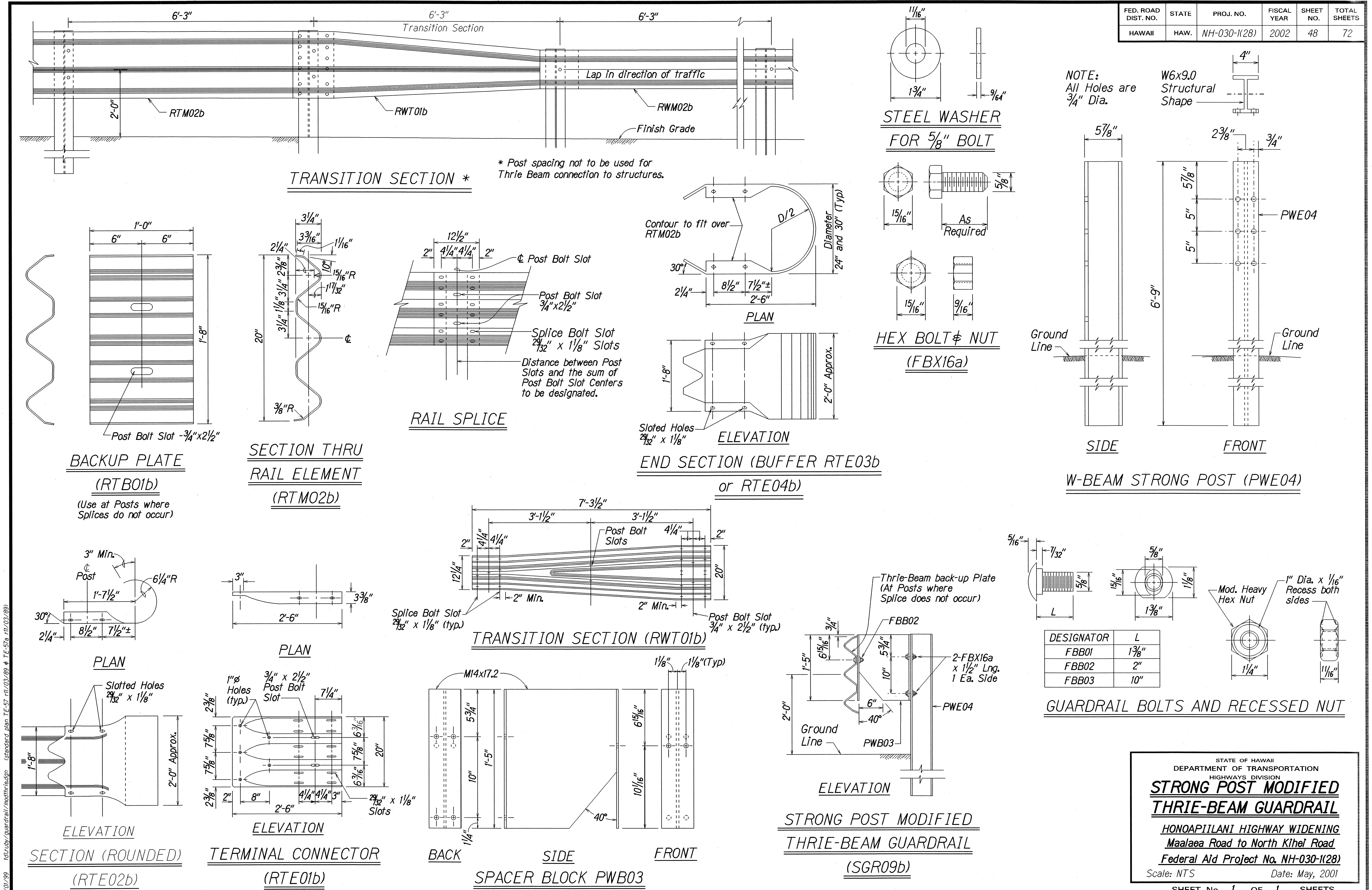
SHEET No. 1 OF 1 SHEETS

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

r3/01/99 tdt.ruby/guardrail/te51rev.dgn (standard plan TE-51 r09/01/87)

DDB-Highway Design Section

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	48	72



6'-3"
Transition Section
Lap in direction of traffic
RTM02b
RWT01b
RWM02b
Finish Grade
2'-0"
TRANSITION SECTION *
* Post spacing not to be used for Thrie Beam connection to structures.
STEEL WASHER FOR 5/8" BOLT
HEX BOLT & NUT (FBX16a)
As Required
NOTE: All Holes are 3/4" Dia.
W6x9.0 Structural Shape
PWE04
Ground Line
SIDE
FRONT
W-BEAM STRONG POST (PWE04)
Post Bolt Slot -3/4"x2 1/2"
BACKUP PLATE (RTB01b)
(Use at Posts where Splices do not occur)
SECTION THRU RAIL ELEMENT (RTM02b)
℄ Post Bolt Slot
Post Bolt Slot 3/4"x2 1/2"
Splice Bolt Slot 29/32" x 1 1/8" Slots
Distance between Post Slots and the sum of Post Bolt Slot Centers to be designated.
RAIL SPLICE
Contour to fit over RTM02b
D/2
Diameter 24" and 30" (Typ)
PLAN
Sloted Holes 29/32" x 1 1/8"
ELEVATION
END SECTION (BUFFER RTE03b or RTE04b)
7'-3 1/2"
3'-1 1/2"
Post Bolt Slots
2" Min.
Splice Bolt Slot 29/32" x 1 1/8" (typ.)
Post Bolt Slot 3/4" x 2 1/2" (typ.)
TRANSITION SECTION (RWT01b)
3" Min.
℄ Post
6 1/4"R
Slotted Holes 29/32" x 1 1/8"
ELEVATION
SECTION (ROUNDED) (RTE02b)
1"ø Holes (typ.)
3/4" x 2 1/2" Post Bolt Slot
29/32" x 1 1/8" Slots
TERMINAL CONNECTOR (RTE01b)
M14x17.2
BACK
SIDE
FRONT
SPACER BLOCK PWB03
Thrie-Beam back-up Plate (At Posts where Splice does not occur)
FBB02
2-FBX16a x 1 1/2" Lng. 1 Ea. Side
PWE04
PWB03
Ground Line
STRONG POST MODIFIED THRIE-BEAM GUARDRAIL (SGR09b)
Mod. Heavy Hex Nut
1" Dia. x 1/16" Recess both sides
GUARDRAIL BOLTS AND RECESSED NUT
r3/01/99 td/ruby/guardrail/modthrie.dgn (standard plan TE-57 r11/03/89 & TE-57a r11/03/89)

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

GUARDRAIL BOLTS AND RECESSED NUT

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

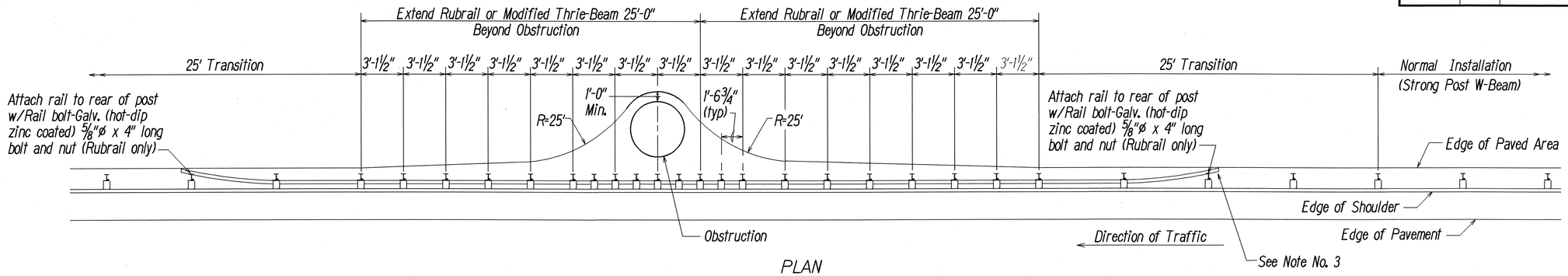
STRONG POST MODIFIED THRIE-BEAM GUARDRAIL

HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal Aid Project No. NH-030-1(28)

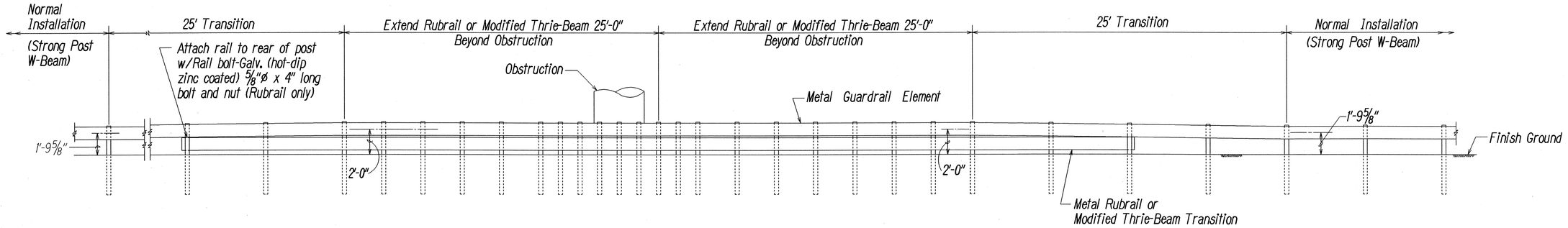
Scale: NTS Date: May, 2001

SHEET No. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-030-1(28)	2002	49	72



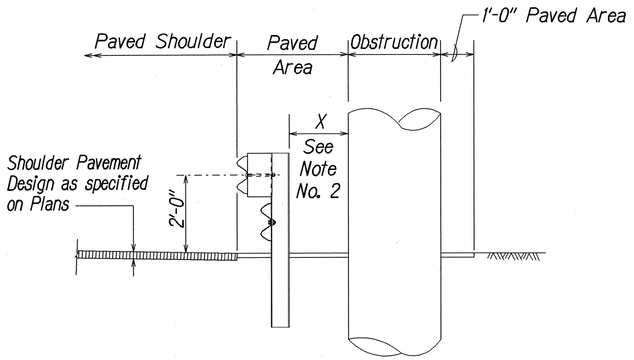
PLAN



ELEVATION

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 Modified Thrie-Beam with reduced post spacing.
   3'-0" ≤ X, Strong Post W-Beam or Modified Thrie-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.



TYPICAL SECTION AT OBSTRUCTION

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION

ORIGINAL PLAN
NOTE BOOK
No.
SURVEY PLOTTED BY
DRAWN BY X
TRACED BY
DESIGNED BY X
QUANTITIES BY
CHECKED BY
DATE 11/15/01

r3/01/99 td:/dby/guardrail/te54revdgn (standard plan TE-53 r09/01/87 & TE-54 r11/03/89)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS
(AT OBSTRUCTION)
HONOAPIILANI HIGHWAY WIDENING
Maalaea Road to North Kihei Road
Federal-Aid Project No. NH-030-1(28)

Scale: NTS Date: May, 2001

SHEET No. 1 OF 1 SHEETS