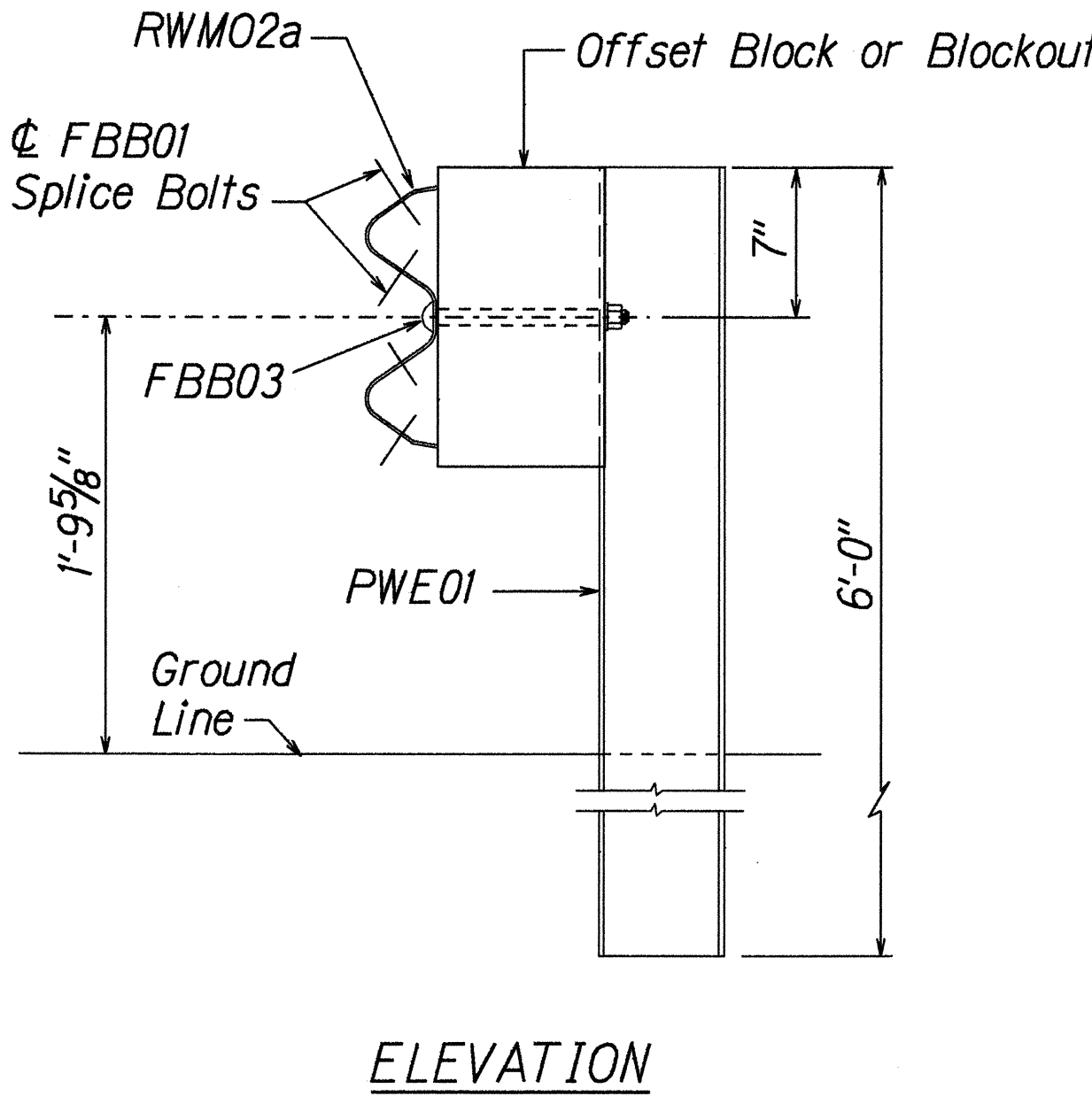
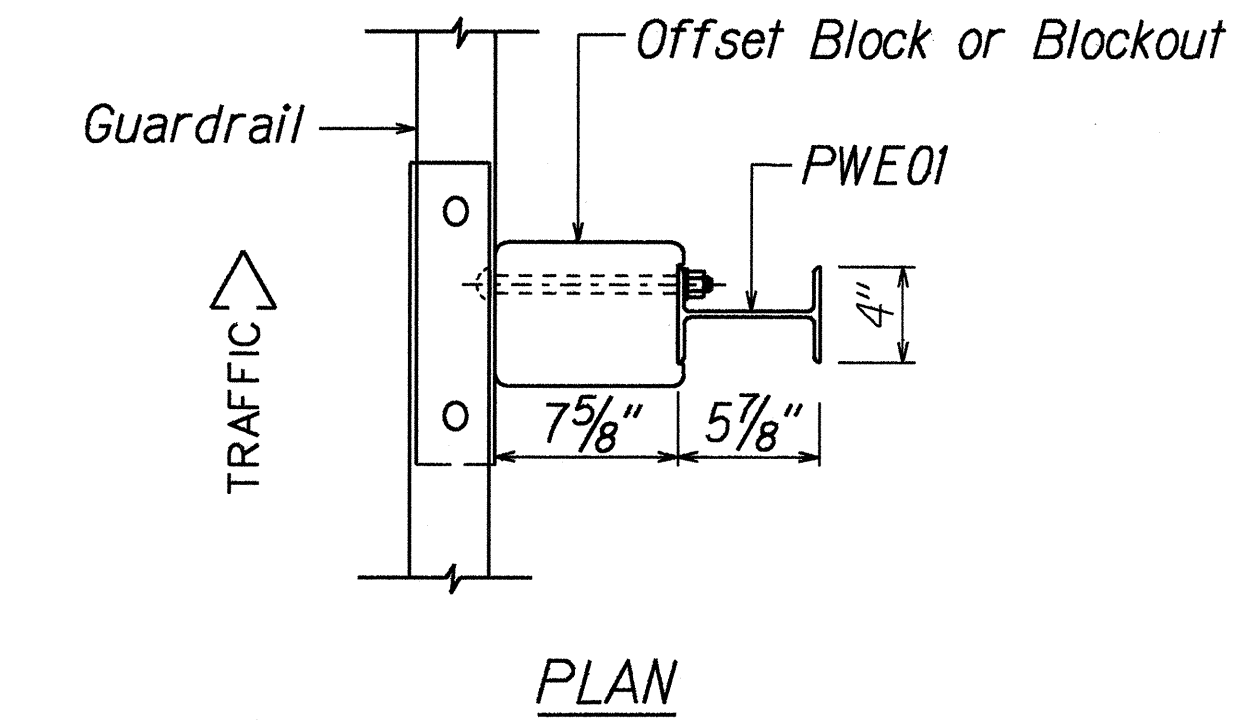
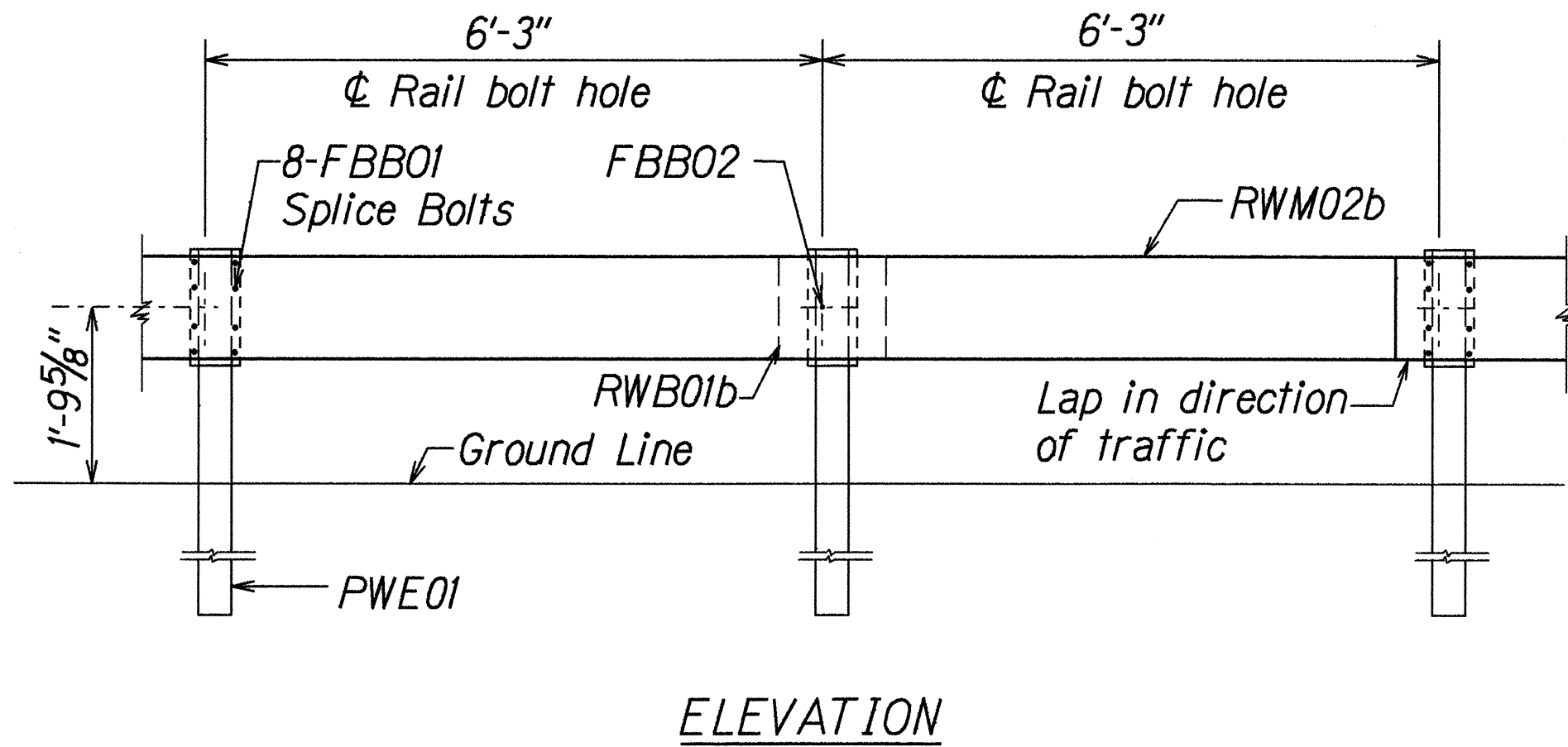


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-072-1(45)	1999	ADD.19	33

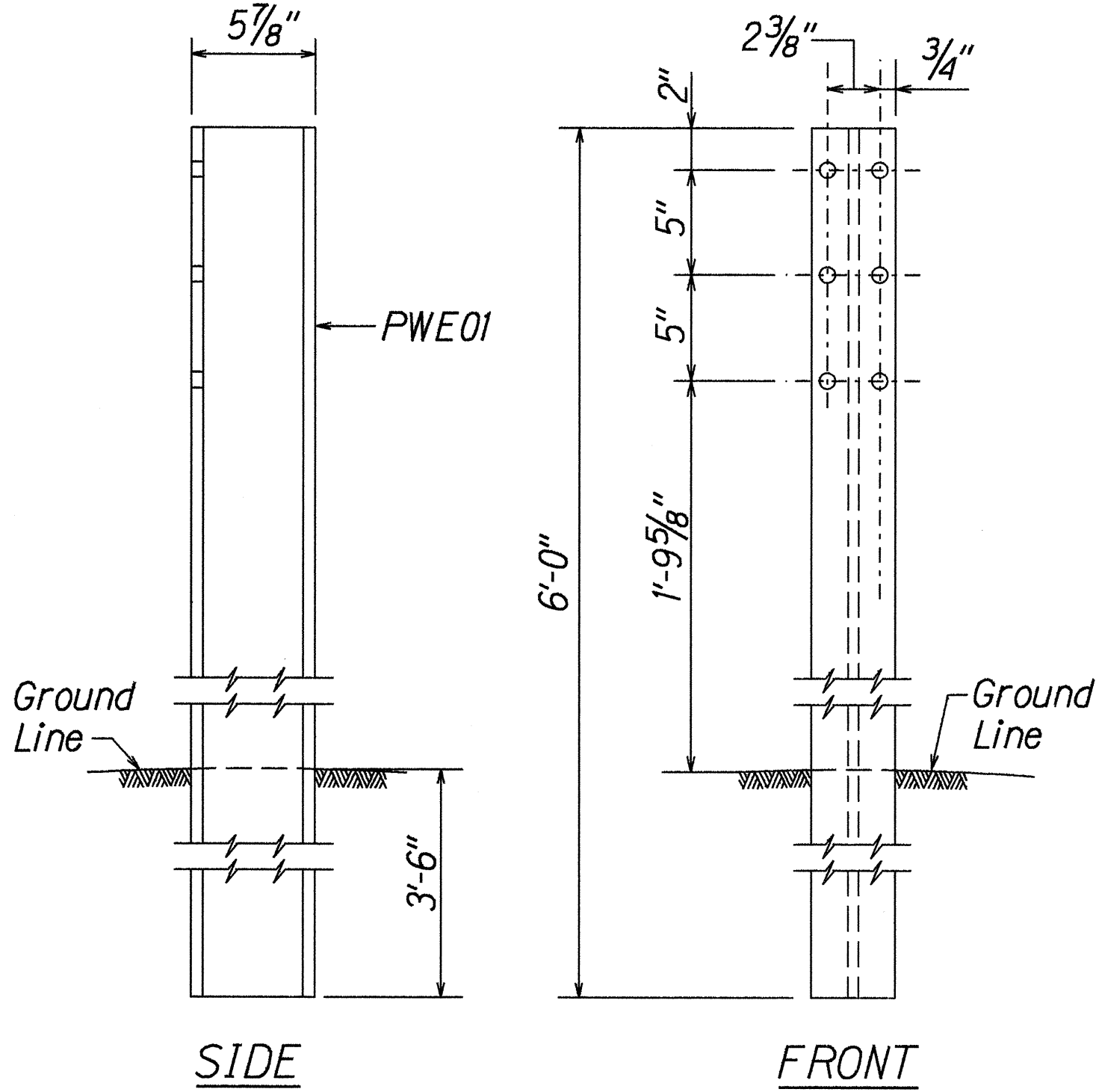


STRONG POST W-BEAM GUARDRAIL
(SGR04a)

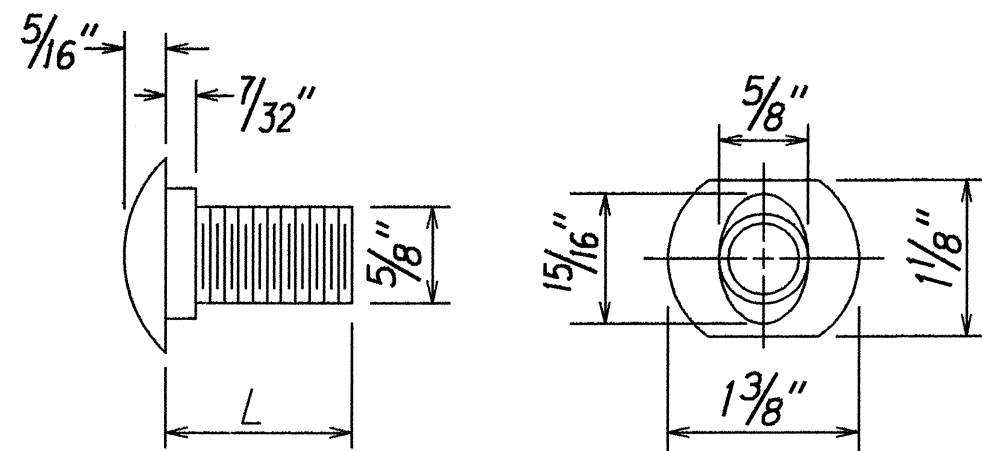
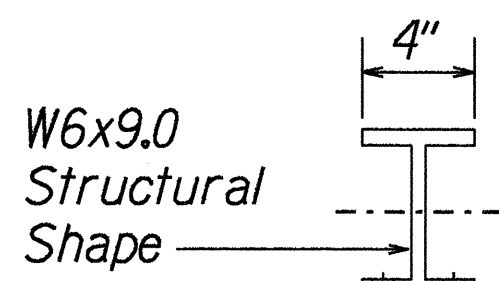


STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

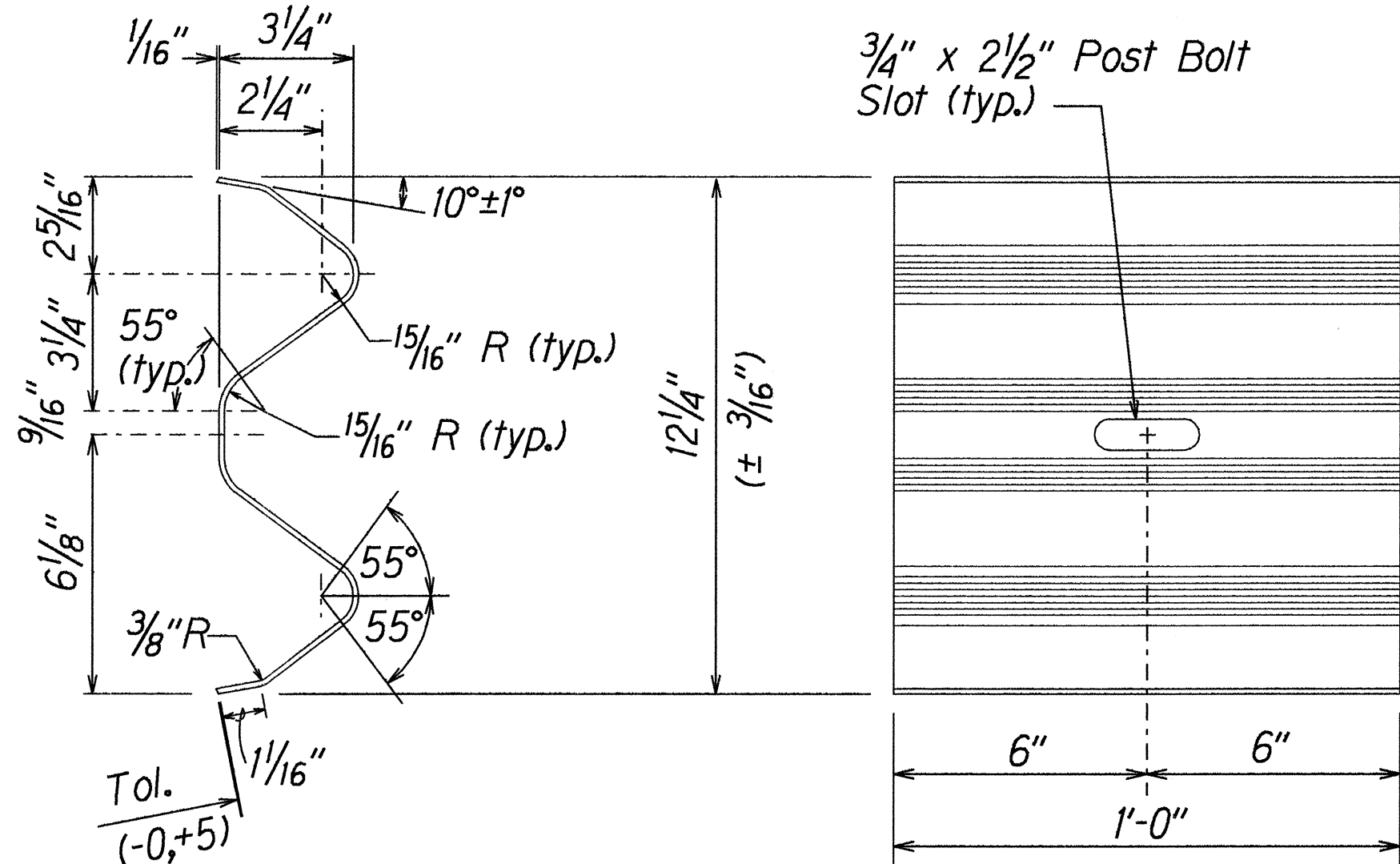
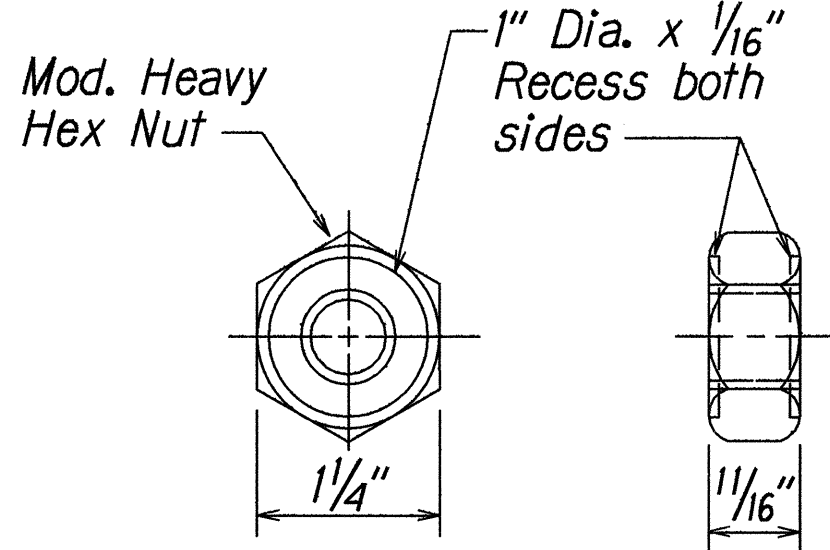
NOTE:
All Holes are
3/4" Dia.



W-BEAM STRONG POST (PWE01)

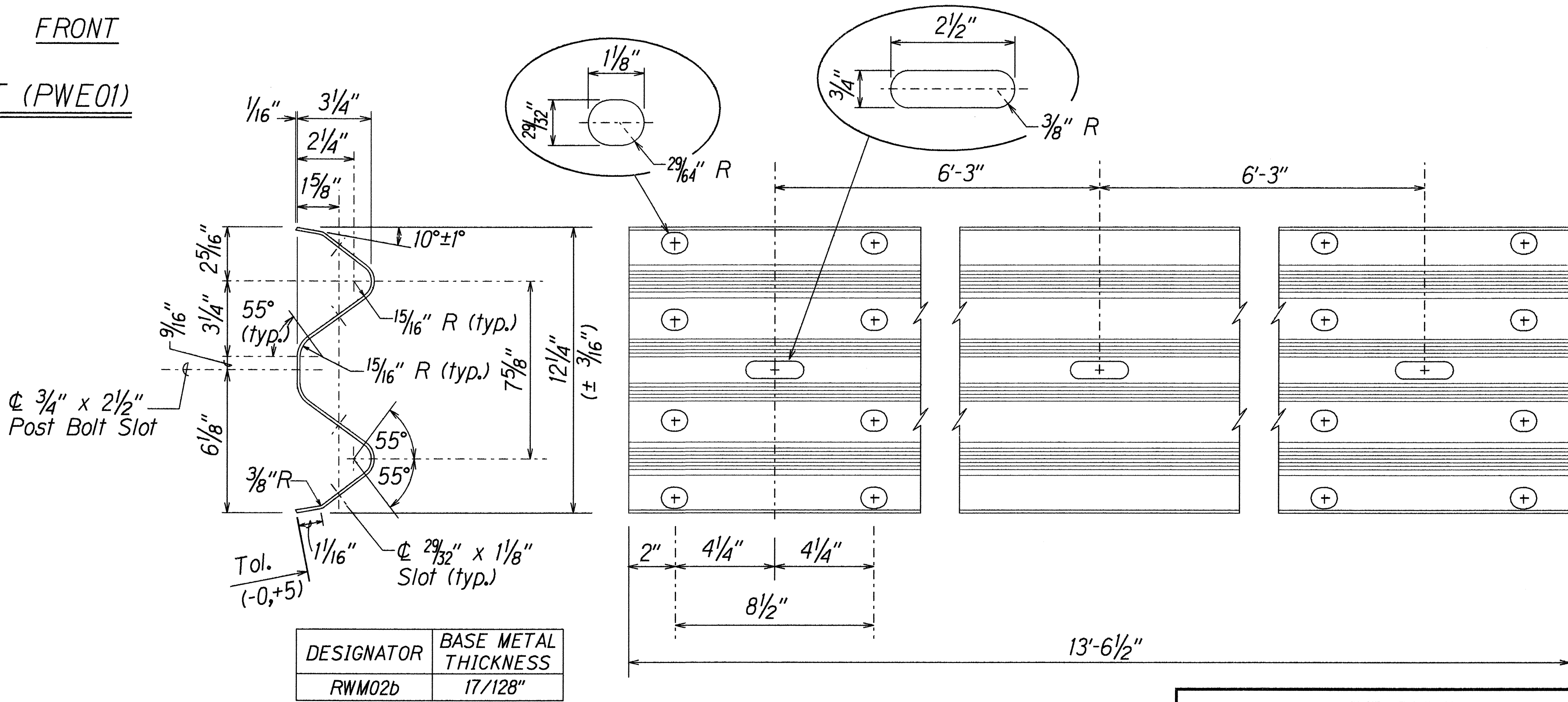


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"

2 SPACE W-BEAM GUARDRAIL (RWM02b)

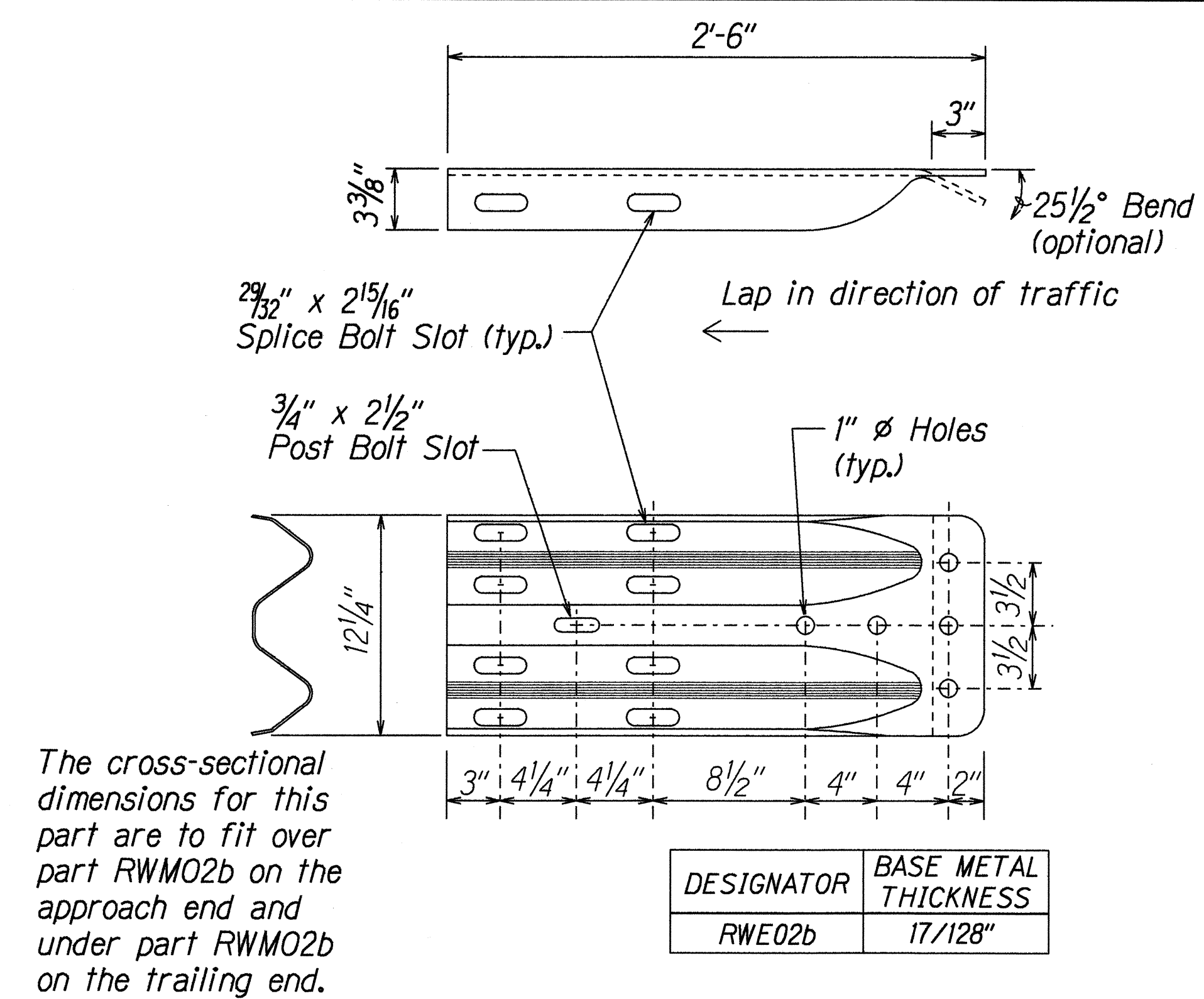
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL
KALANIANA'OLE HIGHWAY SHOULDER IMPROVEMENTS
Makapuu Lookout to Kealahou Street
Fed. Aid Project No. STP-072-1(45)
Scale: NTS Date: March, 1999
SHEET No. 1 OF 1 SHEETS

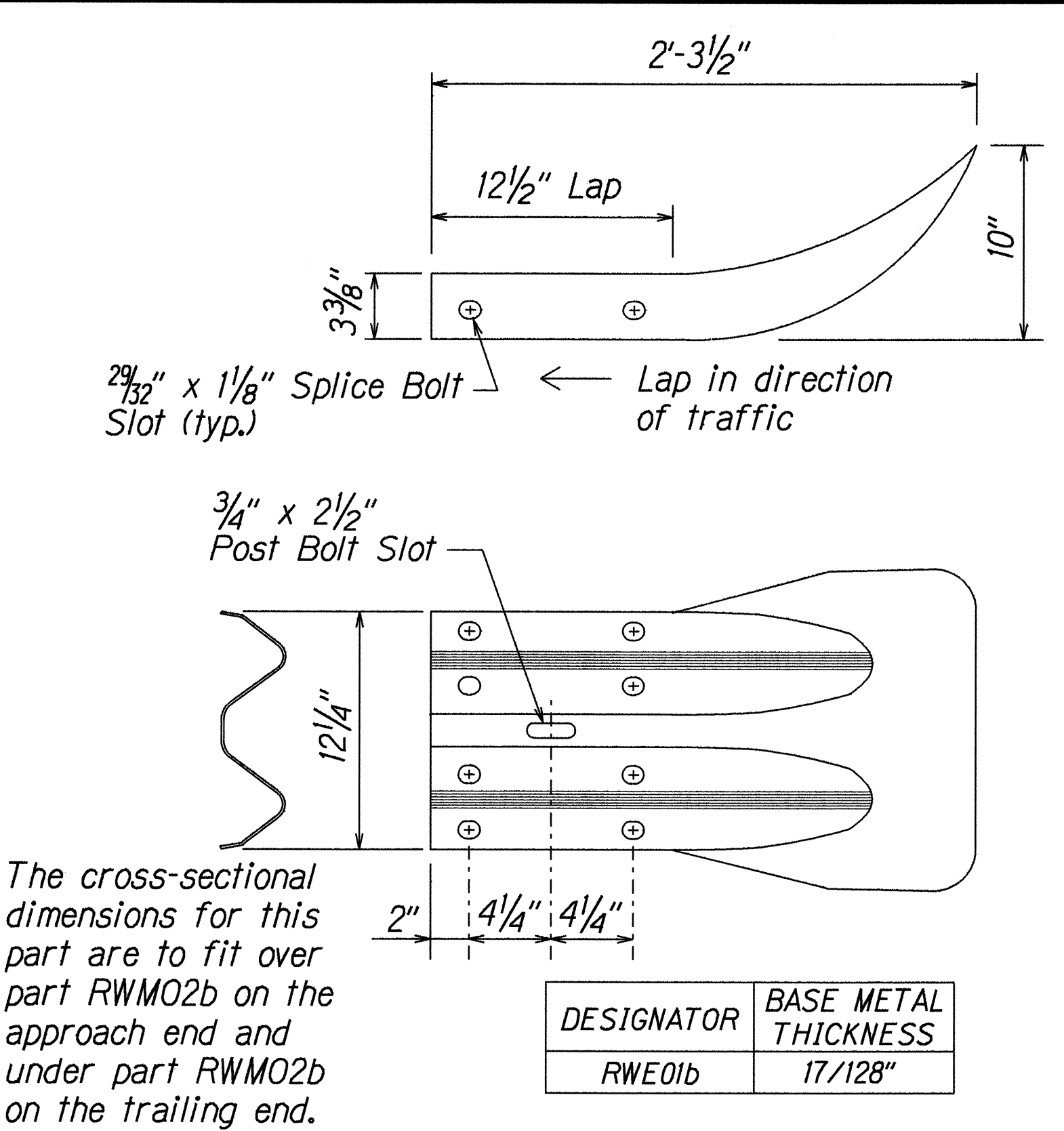
DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
REVISIONS	

13/01/99 tdr/ruby/guardrail/wbeamsdgp (standard plan TE-50 03/06/87) HWY-TO B-2

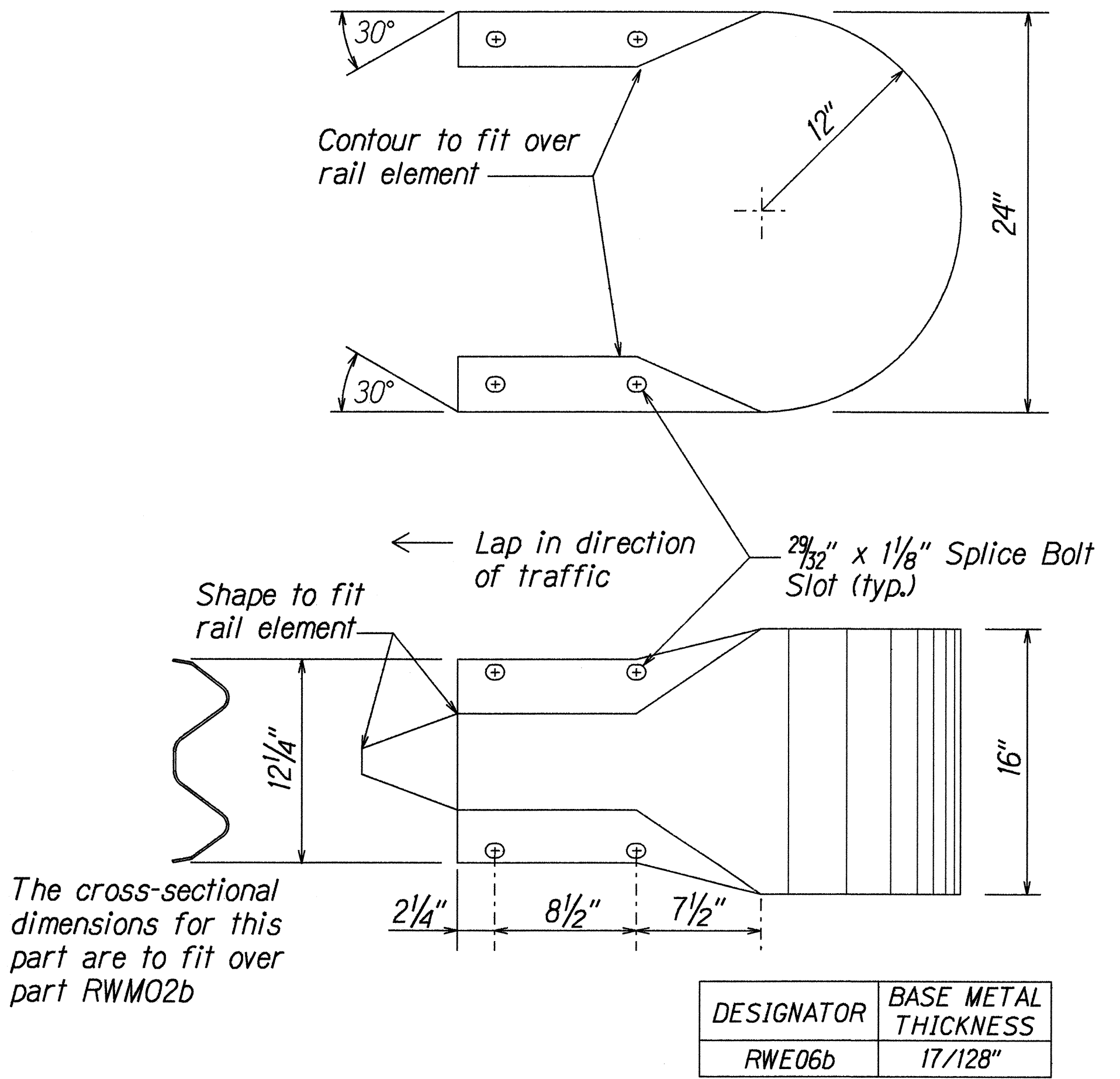
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HAWAII	HAW.	STP-072-1(45)	1999	ADD.20	33



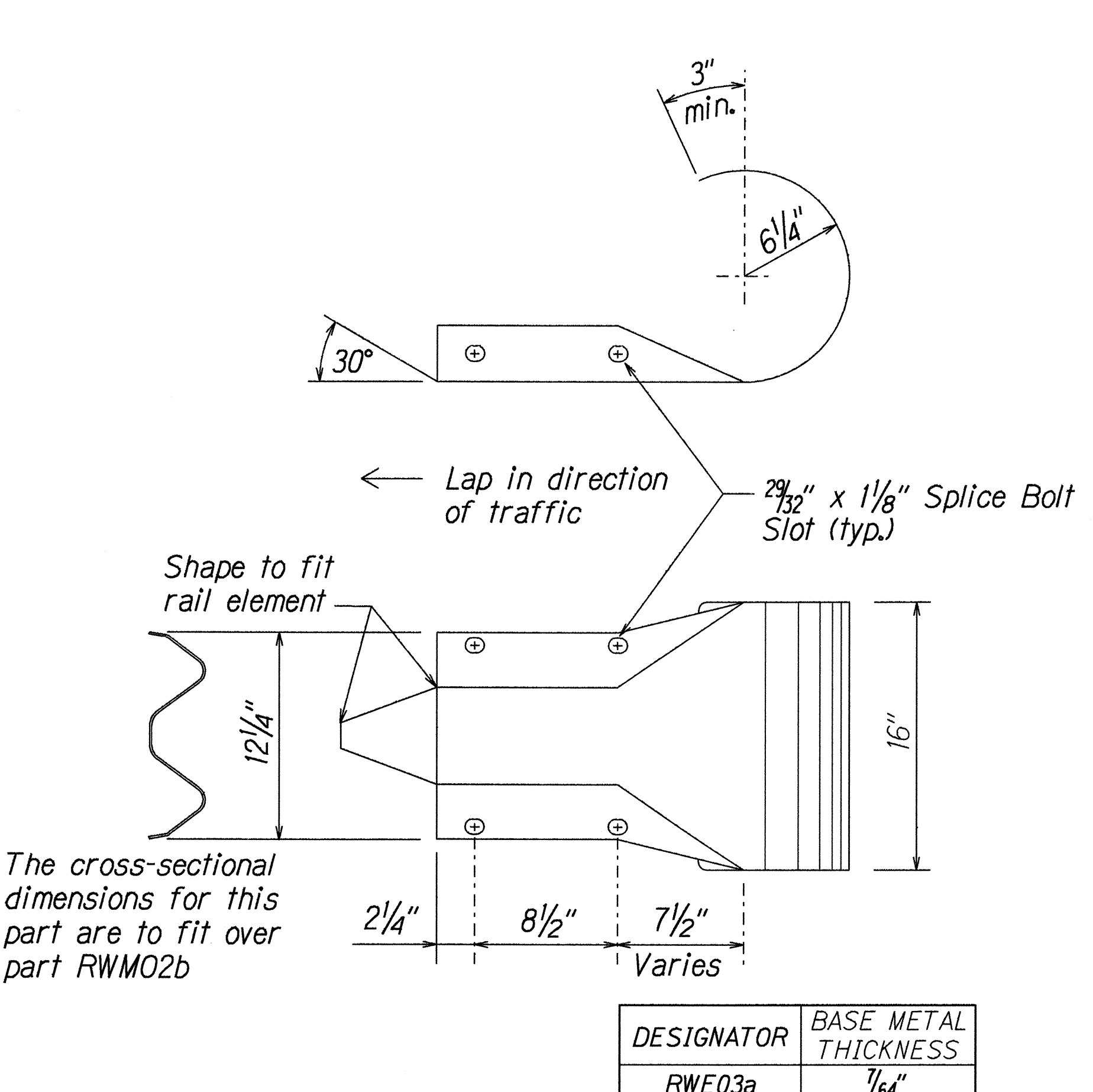
W-BEAM TERMINAL CONNECTOR (RWE02b)



W-BEAM END SECTION (FLARED RWE01b)



W-BEAM END SECTION (BUFFER RWE06b)



W-BEAM END SECTION (ROUNDED RWE03a)

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

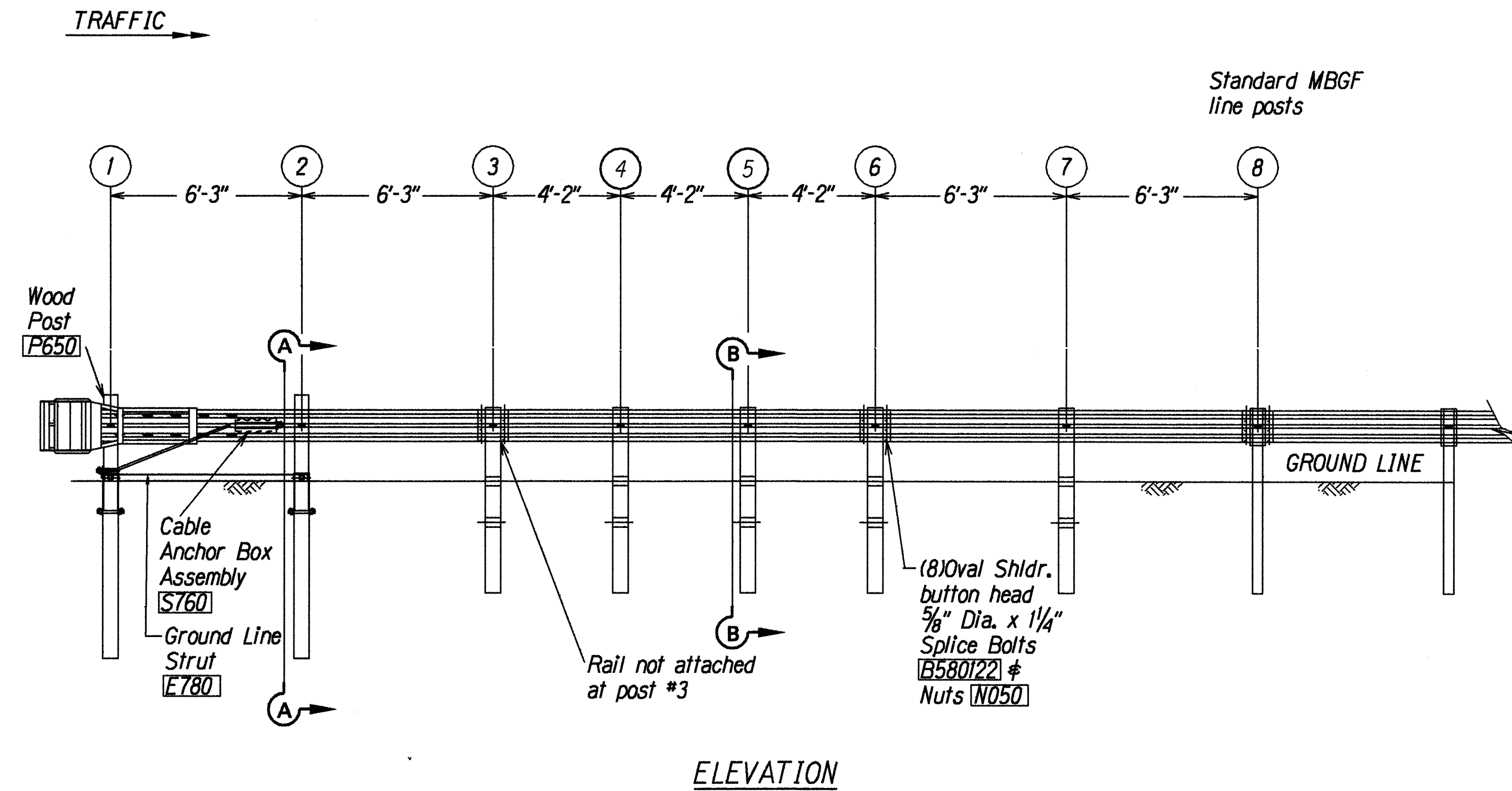
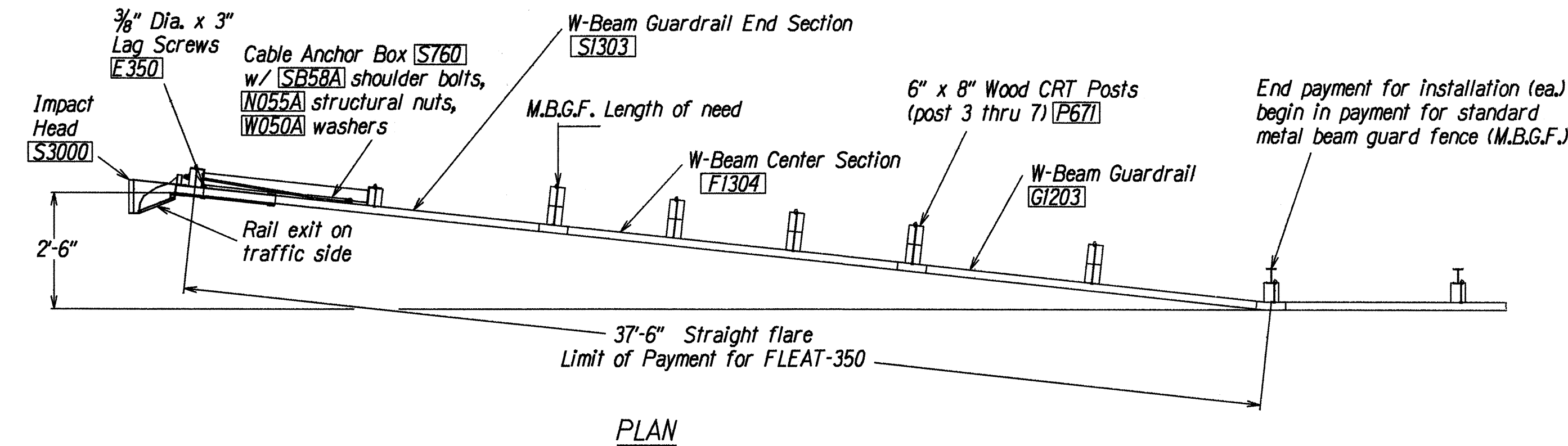
13.01.99 rd/rub/guardrail/revision Standard Plan TE-51 r09/01/87 HW-TD B-3

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**STRONG POST W-BEAM
GUARDRAIL END SECTION**
KALANIANA'OLE HIGHWAY SHOULDER IMPROVEMENTS
Makapuu Lookout to Kealahou Street
Fed. Aid Project No. STP-072-1(45)
Scale: NTS Date: March, 1999

SHEET No. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-072-1(45)	1999	ADD20S-1	33



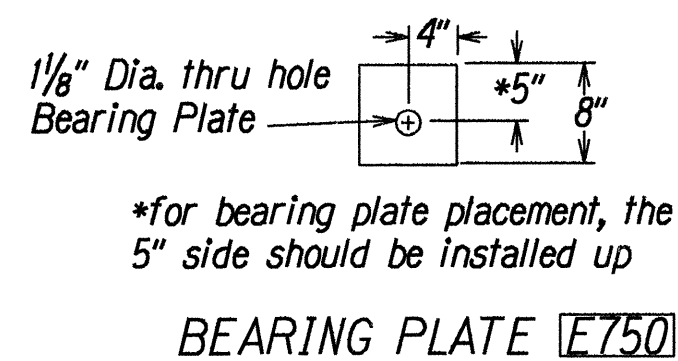
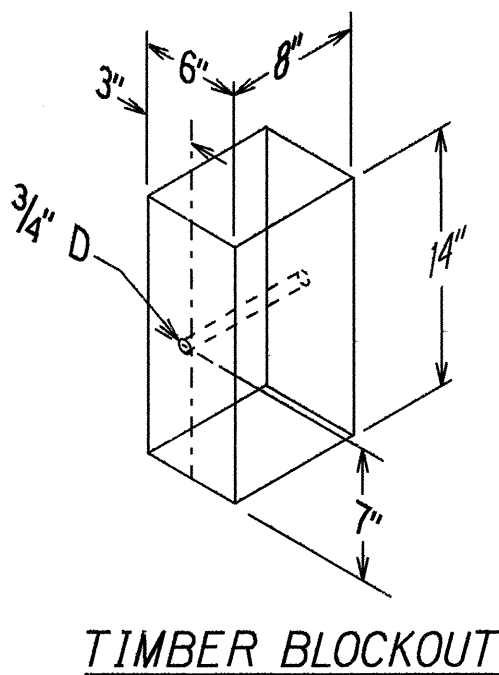
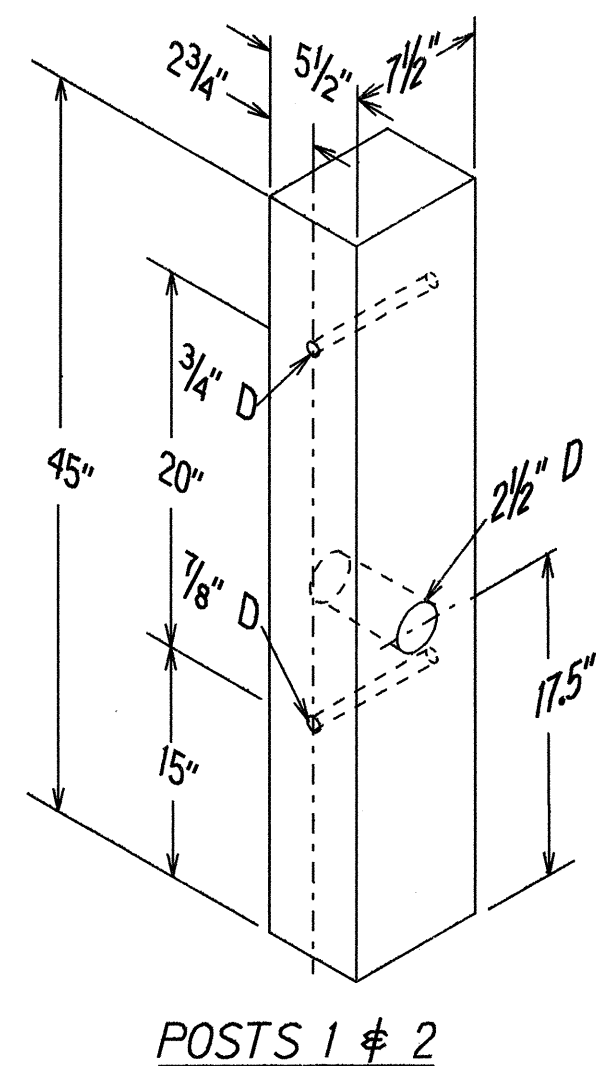
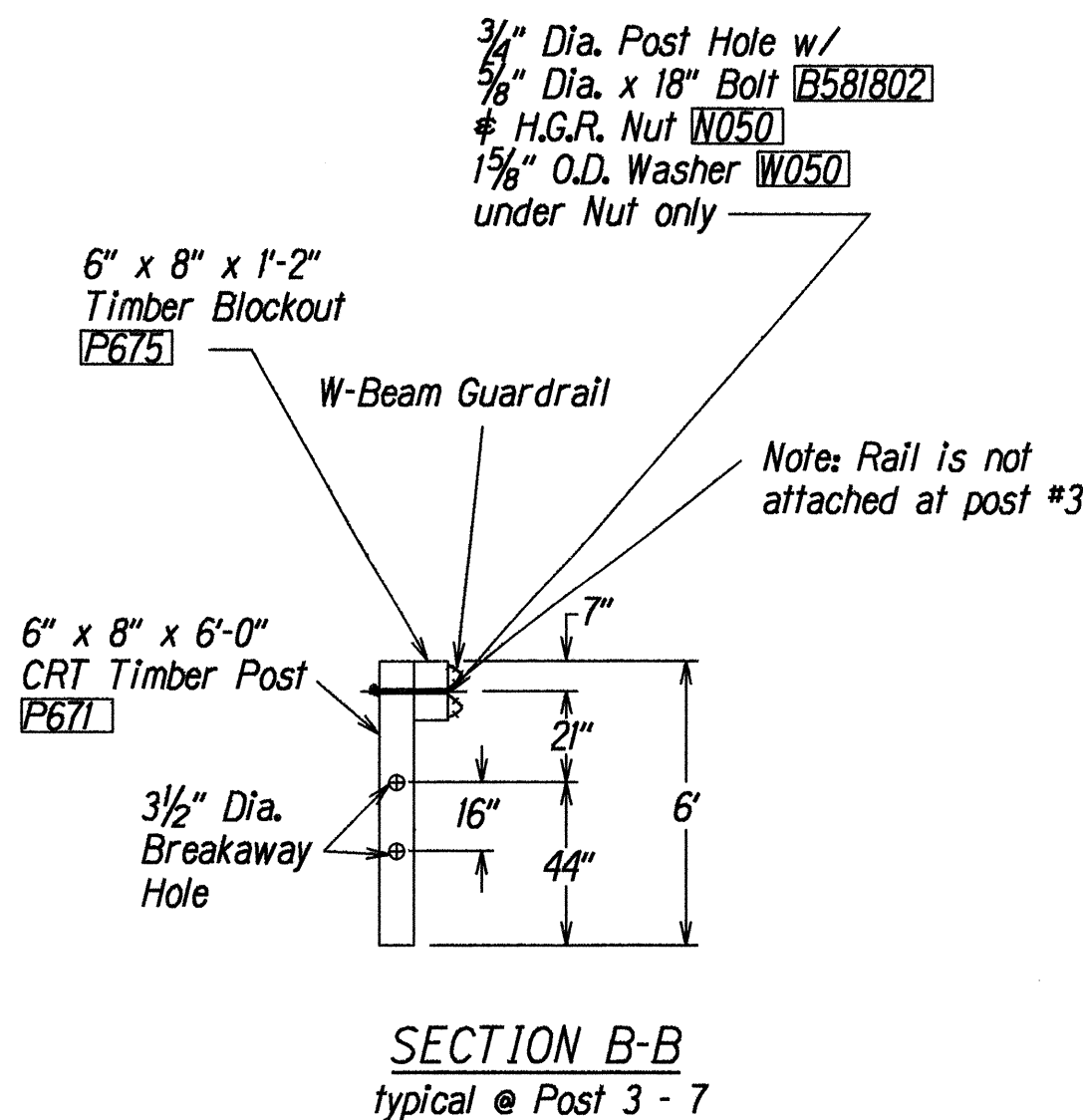
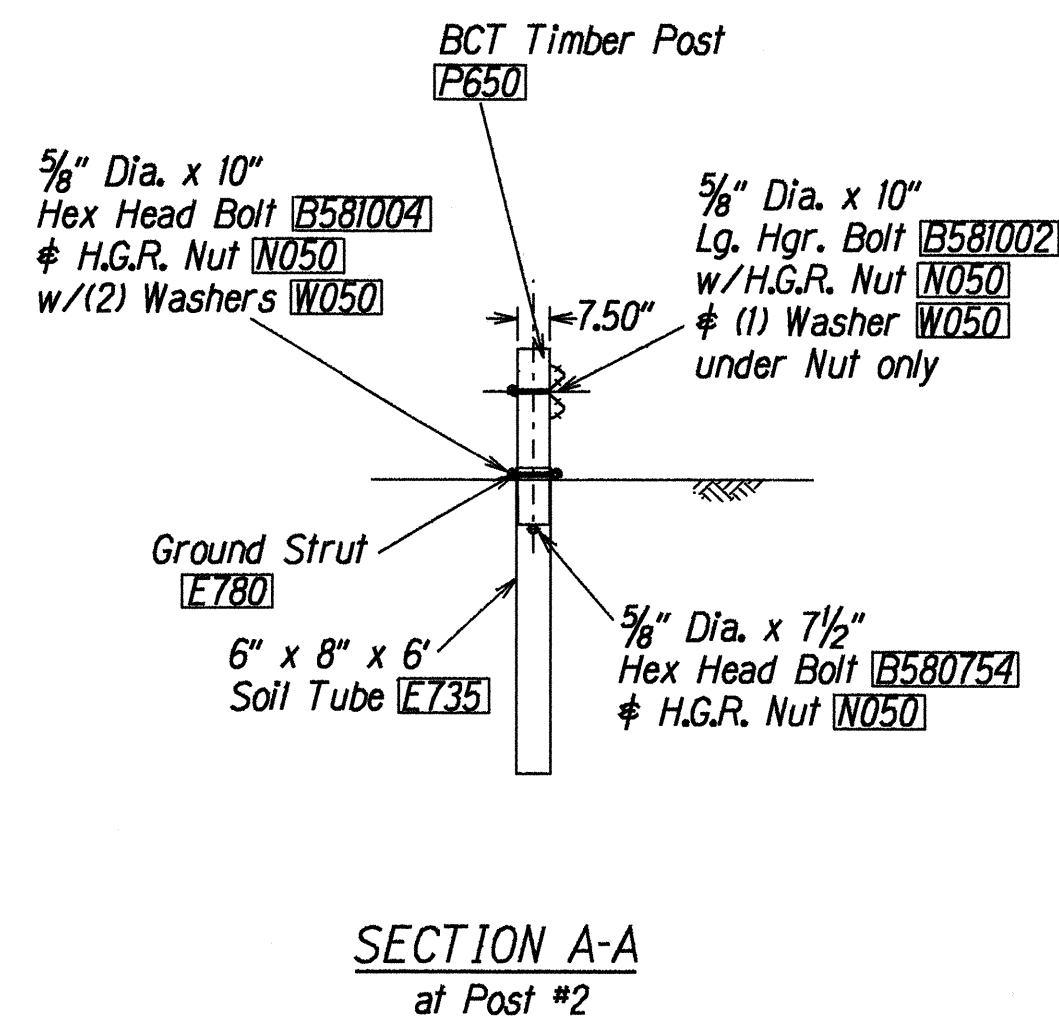
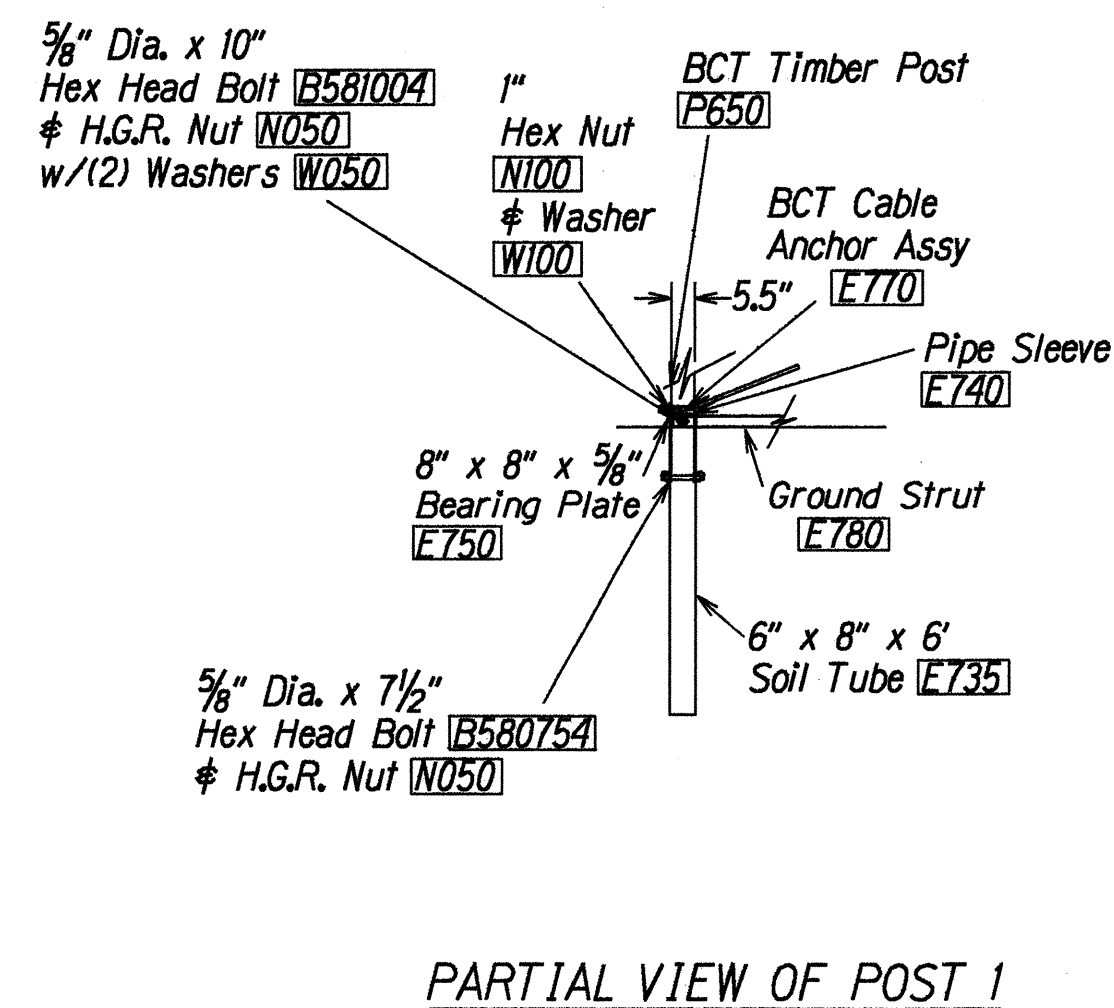
GENERAL NOTES

- Wood posts are required with the fleat.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The soil tube 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. They shall not be driven with the wood post in the tube. If the soil 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.
- The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
- For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will require field drilling new holes to accommodate the rail to the post connecting bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the engineer.

ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SEC., 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'
E740	1	PIPE SLEEVE
E750	1	BEARING PLATE, 8" x 8" x 5/8"
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
P650	2	5.5" x 7.5" x 45" WOOD POSTS
P671	5	6" x 8" x 6' WOOD CRT POST
P675	5	6" x 8" x 14" TIMBER BLOCKOUT
HARDWARE		
B580122	24	5/8" Dia. x 1 1/4" SPLICE BOLT
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B581004	2	5/8" Dia. x 10" HEX BOLT
B581002	1	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	5	5/8" Dia. x 18" H.G.R. BOLT (POST 3-7)
N050	34	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, STRUT 2, POST 2, 1/4 POST 3 THRU 7, 5)
W050	10	5/8" Dia. H.G.R. WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
E350	2	3/8" x 3" LAG SCREW
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
W050A	16	1 1/16" OD x 9/16" ID A325 STR. WASHER

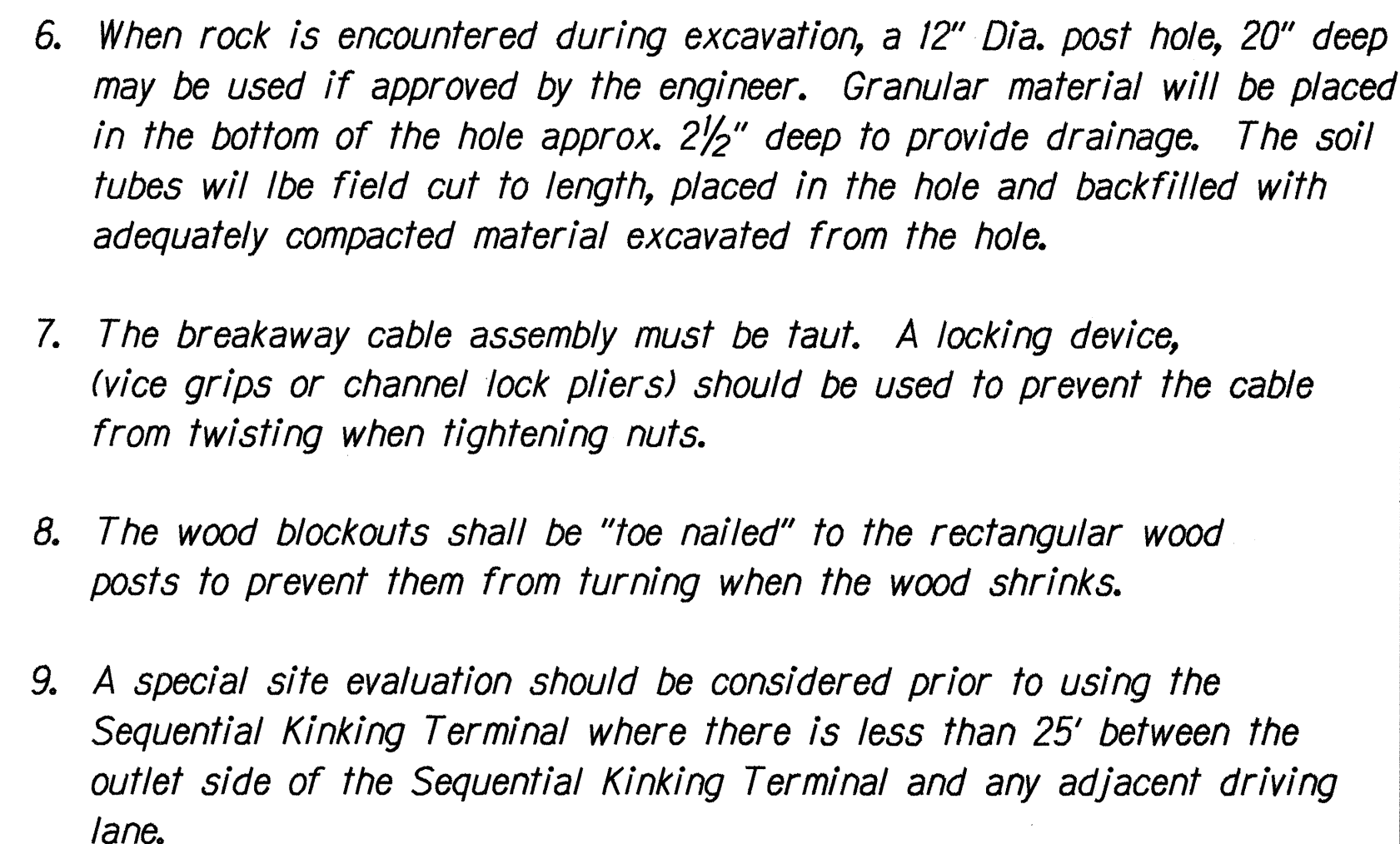
Foundation Tube Options For Posts 1 & 2

- *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



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
FLEAT-350
FLARED ENERGY ABSORBING TERMINAL
KALANIANA'OLE HIGHWAY SHOULDER IMPROVEMENTS
Makapuu Lookout to Kealahou Street
Fed. Aid Project No. STP-072-1(45)
Not to Scale Date: March, 1999
SHEET No. 1 OF 1 SHEETS

ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
SI303/SI305	1	W-BEAM GUARDRAIL END SECTION ^{12 GA.} _{12.5' or 25'}
GI203/GI205	3/1	W-BEAM GUARDRAIL, 12 GA., 12.5' or 25'
E735	8	FOUNDATION SOIL TUBE, 6" x 8" x 4'-6"
SP600	8	SOIL PLATE, 24" x 18" x 1/4"
E740	1	PIPE SLEEVE
E750	1	BEARING PLATE, 8" x 8" x 5/8"
S760	1	CABLE ANCHOR BOX
E770	1	BCT ANCHOR CABLE
E780	1	GROUND STRUT
P650	8	5.5" x 7.5" x 45" WOOD POSTS
P675	6	6" x 8" x 14" TIMBER BLOCKOUT
E3151	1	**IMPACT HEAD OBJECT MARKER (Not Shown)
		HARDWARE
B580122	16 / 32	5/8" Dia. x 1 1/4" SPLICE BOLT
B580754	16	5/8" Dia. x 7 1/2" HEX BOLT
B581004	8	5/8" Dia. x 10" HEX BOLT
B581002	1	5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)
B581802	6	5/8" Dia. x 18" H.G.R. BOLT (POST 3-8)
N050	47/63	5/8" Dia. H.G.R. NUT ^{(SPLICE 16 / 32, SOIL TUBES 22, STRUT 2} _{POST 2-8, 7)}
W050	23	5/8" Dia. H.G.R. WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
E350	2	3/8" x 3" LAG SCREW
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLTS
N055A	8	1/2" A325 STRUCTURAL NUTS
W050A	16	1 1/16" OD X 9/16" ID A325 STR. WASHER



3/01/99 td\ruby\quardrail\skt350.dan (Stand Plan TE-61 r11/03/89 \$ TE-62 r09/01/87) HWY-TD B-11

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SKT-350

SEQUENTIAL KINKING TERMINAL

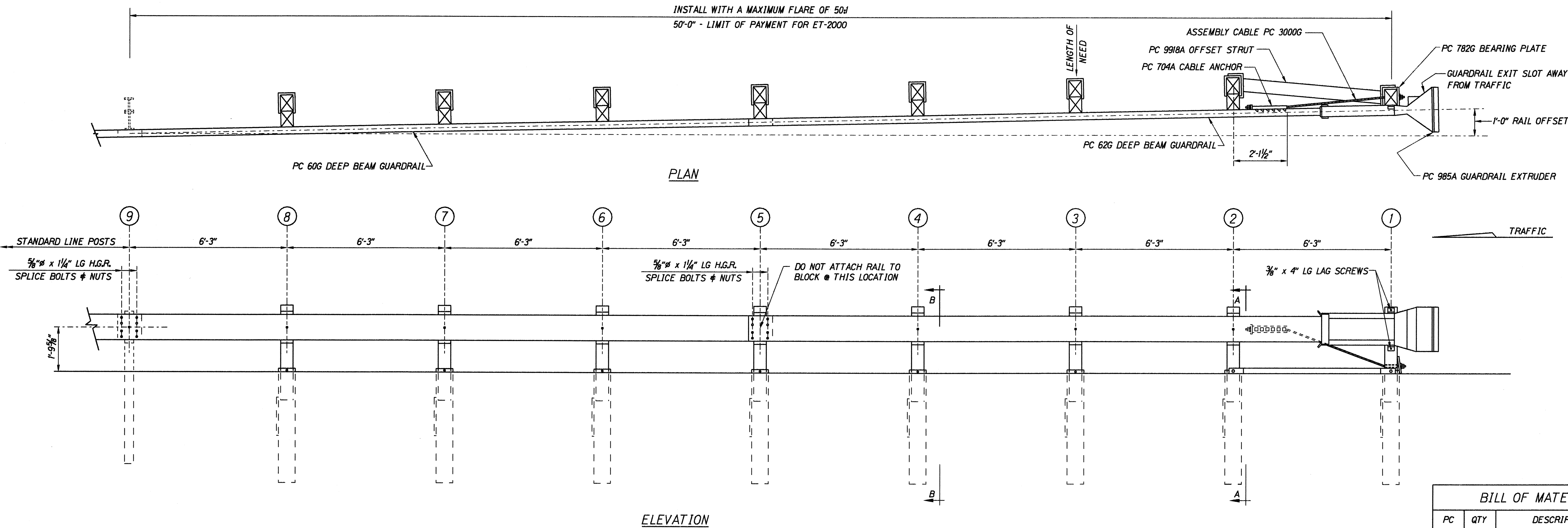
KALANIANAOLE HIGHWAY SHOULDER IMPROVEMENTS
Makapuu Lookout to Kealahou Street
Fed. Aid Project No. STP-072-1(45)

Not to Scale *Date: March, 1999*

SHEET No. 1 OF 1 SHEETS

ADD.20S-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-072-1(45)	1999	ADD.20S-3	33



BILL OF MATERIAL		
PC	QTY	DESCRIPTION
60G	1	12/25/6'3"/S (GUARDRAIL)
62G	1	12/25/6'3"/S ANC (GUARDRAIL)
704A	1	CABLE ANCHOR BRACKET
705G	1	2" x 5 1/2" PIPE
740G	8	46 TUBE SLEEVE
766G	8	1/4" x 18" x 24" SOIL PLATE
782G	1	3/8" x 8" x 8" BEARING PLATE
985A	1	ET-2000 EXTRUDER
3000G	1	CABLE 3/4" x 6'
3300G	11	3/8" WASHER
3340G	47	3/8" HEX NUT
3360G	16	5/8" x 1 1/4" SPLICE BOLT
3478G	16	5/8" x 7 1/2" HEX HD BOLT
3497G	8	3/8" x 9 1/2" HEX HD BOLT
3580G	7	5/8" x 18" POST BOLT
3900G	2	1" WASHER
3910G	2	1" HEX NUT
4075B	7	WD BLOCK 1'2" 6" x 8" DR
4147B	8	WD 3'9" POST 5 1/2" x 7 1/2"
4228G	2	3/8" x 4" LAG SCREW
9918A	1	6'3" STRUT

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

NOTE: SECTION "B-B" IS SIMILAR @ POST #5 EXCEPT RAIL IS NOT ATTACHED.

ORIGINAL PLAN	DATE	3/16/99
DESIGNED BY		
NOTE BOOK		
QUANTITIES BY		
CHECKED BY		

13/01/99 14/ruby/guardrail/et2000a.dgn (Standard plan TE-61 r11/03/89 & TE-62 r09/01/87) HWY-TD B-12

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

ET-2000 - OPTION "A"

KALANIANA'OLE HIGHWAY SHOULDER IMPROVEMENTS

Makapuu Lookout to Kealahou Street

Fed. Aid Project No. STP-072-1(45)

Not to Scale

Date: March, 1999

SHEET No. 1 OF 1 SHEETS

ADD.20S-3