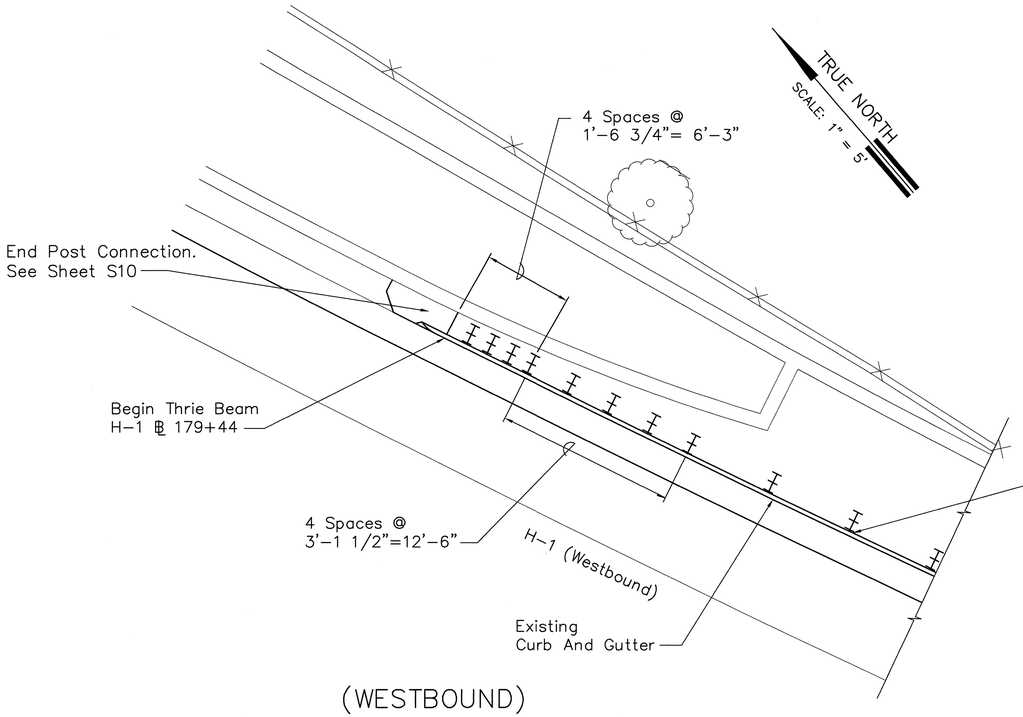
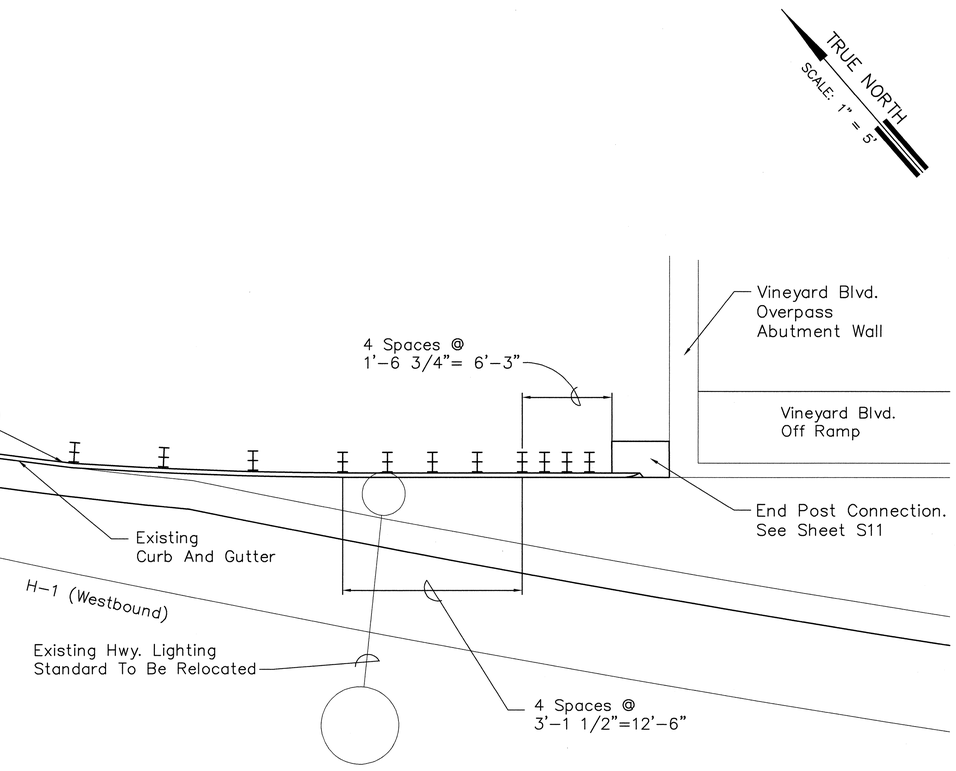
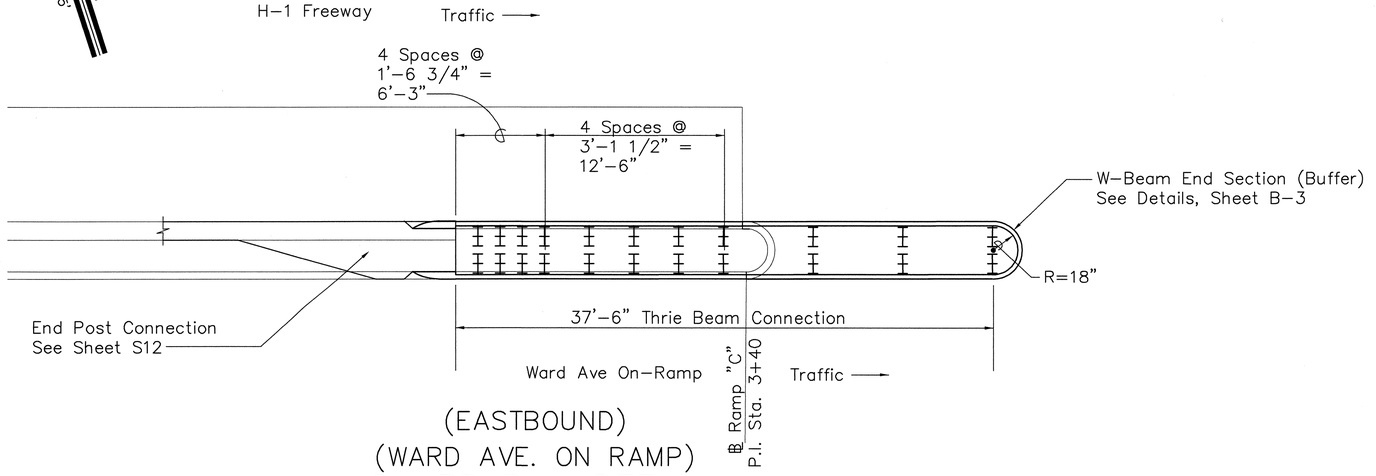
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	53	557



(WESTBOUND)
(BEGIN H-1 STA. 179+44±)
GUARD RAIL DETAIL
SCALE 1'=5'



(WESTBOUND)
(VINEYARD BLVD. OFF RAMP)
GUARD RAIL DETAIL
SCALE 1'=5'



(EASTBOUND)
(WARD AVE. ON RAMP)
GUARD RAIL DETAIL
SCALE 1'=5'

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98
SCALE: 1 = 5
FILE: 9815-185
PM: BST
OPER: SHA,*FAI
REVISED: 05/12/99

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

BENJAMIN S. TANAKA
LICENSED PROFESSIONAL ENGINEER
No. 2055-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Benjamin S. Tanaka

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARD RAIL DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: 1"=5' Date: June 1, 1999

SHEET NO. **R25** OF **34** SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55	557

SCHEDULE–GUARD RAIL (H–1 ℄ 170+00 to H–1 ℄ 55+40)*

DESCRIPTION	FROM	TO	DISTANCE	THRIE BEAM GUARD RAIL	SINGLE BEAM GUARD RAIL
Magellan Ave.	℄ 170+00	℄ 172+46	246'	40'	206'
Magellan Ave./ Capt. Cooke	℄ 172+73	℄ 183+66	1065'	150'	915'
Magellan Ave.	℄ 183+97	℄ 189+45	500'	145'	355'
H–1 EB Shoulder	℄ 180+04	℄ 182+04	215'	25'	190'
H–1 WB Shoulder	℄ 179+44	℄ 183+30	309'	309'	–
H–1 EB Shoulder	℄ 190+07	℄ 190+91	84'	25'	59'
H–1 WB Shoulder	℄ 186+60	℄ 187+70	110'	25'	85'
Vineyard Off Ramp(Lt.)	℄ 168+00	℄ 166+90	110'	25'	85'
Vineyard On Ramp(Rt.)	℄ 162+49	℄ 166+60	420'	25'	395'
Ward Avenue On Ramp	℄ 192+06	℄ 194+08	220'	25'	195'
Lunalilo Street	℄ 196+25	℄ 196+83	58'	58'	–
Ward Avenue On Ramp	℄ 194+87	℄ 195+07	75'	75'	–
H–1 EB Shoulder	℄ 196+79	℄ 199+77	298'	25'	273'
H–1 EB Shoulder	℄ 199+83	℄ 202+94	311'	50'	261'
Lunalilo On Ramp	℄ 202+00	℄ 202+70	70'	25'	45'
Lunalilo Street	℄ 202+00	℄ 202+70	70'	25'	45'
Piikoi On Ramp	℄ 17+94	℄ 20+90	296'	–	296'
Lunalilo Off Ramp	℄ 224+36	℄ 224+73	37'	37'	–
Lunalilo Street	℄ 224+48	℄ 224+73	25'	25'	–
Lunalilo Street	℄ 227+74	℄ 228+89	120'	–	120'
H–1 EB Shoulder	℄ 4+93	℄ 10+89	596'	54'	542'
H–1 WB Shoulder	℄ 11+44	℄ 13+42	198'	25'	173'
Ramp "U–1" Shoulder (Rt.)	℄ 2+60	℄ 7+61	501'	456'	45'
Ramp "U–1" Shoulder (Lt.)	℄ (–)0+46	℄ 6+75	721'	279'	442'
H–1 WB Shoulder	℄ 14+65	℄ 15+53	90'	25'	65'
H–1 EB Shoulder	℄ 15+32	℄ 18+19	279'	25'	254'
H–1 EB Shoulder	℄ 19+14	℄ 24+60	550'	25'	525'
H–1 WB Shoulder	℄ 19+88	℄ 24+60	473'	25'	448'
H–1 EB Shoulder	℄ 25+14	℄ 30+12	512'	50'	462'
H–1 WB Shoulder	℄ 25+14	℄ 30+50	523'	25'	498'
H–1 EB Shoulder	℄ 33+56	℄ 34+36	82'	25'	57'
H–1 EB Shoulder	℄ 34+88	℄ 37+43	256'	25'	231'
H–1 WB Shoulder	℄ 36+00	℄ 37+93	192'	25'	167'
H–1 EB Shoulder	℄ 41+00	℄ 44+45	345'	50'	295'
H–1 WB Shoulder	℄ 41+96	℄ 46+39	442'	175'	267'
		TOTAL	10,399'	2,403'	7,996'

SCHEDULE–GUARD RAIL

DESCRIPTION	FROM	TO	DISTANCE	THRIE BEAM GUARD RAIL	SINGLE BEAM GUARD RAIL
H–1 EB Shoulder	℄ 44+50	℄ 55+25	1050'	1050'	–
H–1 WB Shoulder	℄ 46+39	℄ 49+58	323'	323'	–
Ramp "U–3" Shoulder (Rt.)	℄ 0+00	℄ 3+93	393'	–	393'
Ramp "U–3" Shoulder (Lt.)	℄ 1+20	℄ 3+81	305'	25'	280'
Ramp "U–5" Shoulder (Rt.)	℄ 1+02	℄ 6+75	580'	–	580'
Ramp "U–6" Shoulder (Rt.)	℄ –0+40	℄ 8+17	829'	–	829'
Ramp "U–8" Shoulder (Lt.)	℄ 1+44	℄ 2+67	138'	–	138'
Ramp "WL–0" Shoulder (Lt.)	℄ 4+74	℄ 7+44	272'	–	272'
Ramp "WL–0" Shoulder (Rt.)	℄ 6+43	℄ 7+88	145'	25'	120'
Ramp "WL–1" Shoulder (Rt.)	℄ 5+87	℄ 9+00	313'	25'	288'
Ramp "WL–1" Shoulder (Lt.)	℄ 7+75	℄ 9+90	215'	50'	165'
Old Waialae Rd. Shoulder (Lt.)	℄ 3+84	℄ 4+08	25'	25'	–
Old Waialae Rd. Shoulder (Lt.)	℄ 4+65	℄ 4+95	30'	30'	–
Old Waialae Rd. Shoulder (Rt.)	℄ 5+06	℄ 5+27	22'	22'	–
Old Waialae Rd. Shoulder (Lt.)	℄ 6+56	℄ 7+15	60'	25'	35'
Ramp "T" (Lt.) Old Waialae Road	℄ 3+10	℄ 8+76	565'	–	565'
Ramp "T" (Rt.) Old Waialae Road	℄ 3+80	℄ 8+27	453'	–	453'
Ramp "T" (Lt.) Old Waialae Road	℄ 8+73	B 9+96	115'	–	115'
Ramp "T–1" (Lt.)	℄ 9+19	℄ 9+73	54'	25'	29'
Vineyard Blvd. Median WB	℄ 158+00	℄ 159+40	140'	25'	115'
Vineyard Blvd. Shoulder (Rt.)	℄ 157+71	℄ 158+87	116'	25'	91'
Vineyard Blvd. Median EB	℄ 158+66	℄ 159+36	75'	25'	50'
Vineyard Blvd. Shoulder EB	℄ 154+50	℄ 160+20	575'	25'	550'
Kinau St. Off Ramp (Rt.)	℄ 2+50	℄ 7+68	540'	50'	490'
Kinau St. Off Ramp (Lt.)	℄ 5+65	℄ 7+23	159'	–	159'
Kinau St. Off Ramp (Rt.)	℄ 10+03	℄ 13+50	353'	25'	328'
Kapiolani On Ramp (Rt)	℄ 11+40	℄ 12+00	60'	60'	–
Kapiolani Off Ramp (Lt)	℄ 103+84 =℄ 3+84	℄ 31+60	2797'	2797'	–
Kapiolani Off Ramp (Rt)	℄ 102+33 =℄ 2+33	℄ 9+65	732'	732'	–
Kapiolani On Ramp (Rt)	℄ 12+60	℄ 25+38	1278'	1278'	–
		TOTAL	12,712'	6,667'	6,045'

* Equation Sta. : H–1 ℄ 281+75= H–1 ℄ 1+75

PM: BST
OPER: SHA,*FAI
REVISED: 05/18/99

DATE: 03/19/99
SCALE: 1 = 1
FILE: 9815–184

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

BENJAMIN S. TANAKA ★ LICENSED PROFESSIONAL ENGINEER No. 2055-C ★ HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Benjamin S. Tanaka

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

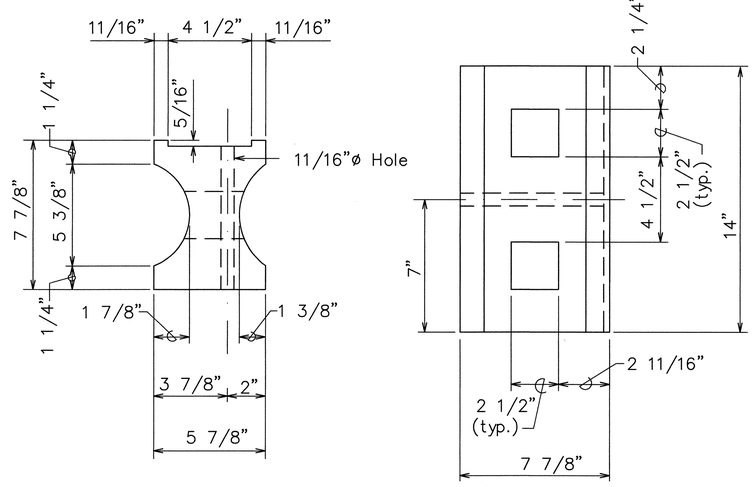
GUARD RAIL SUMMARY

INTERSTATE ROUTE H–1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani 1C
F.A.I. Project No. IM–H1–1(234)

Scale: As Shown Date: June 1, 1999

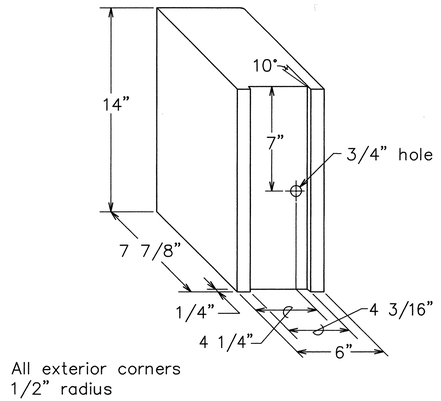
SHEET NO. R27 OF 34 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-1	557



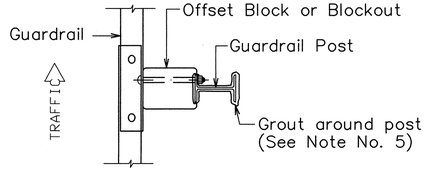
TOP SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)

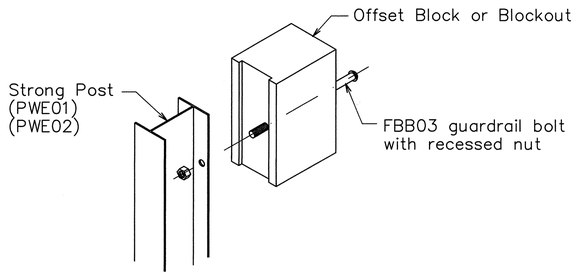


All exterior corners
1/2" radius

RECYCLED POLYETHELENE OFFSET BLOCK (TYPE II)

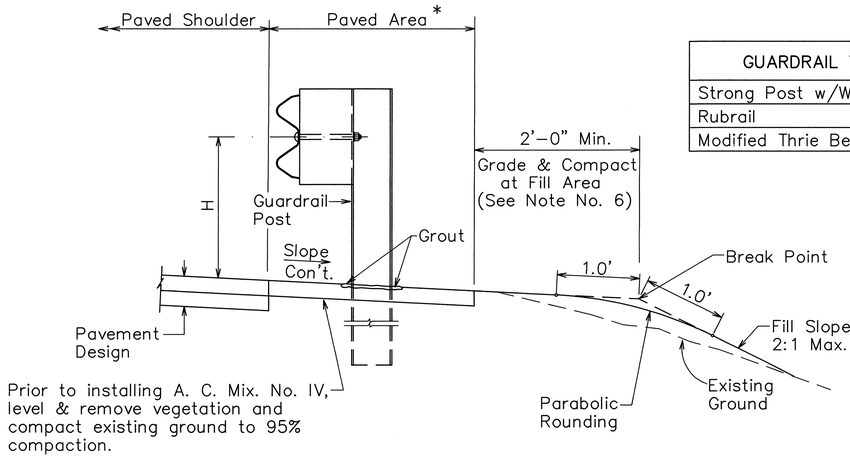


PLAN



Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



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

ELEVATION

* – For paved area at guardrail, refer to typical sections.

TYPICAL GUARDRAIL 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 fasteners, 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.
7. Strong Post with W Beam Guardrail is referred to on the plans, specifications and proposal schedule as Type 3 – Single Metal Beam Guardrail.
8. All guardrail flare rates shall be in accordance with AASHTHO Roadway Design Guide, January 1996.

PM: BST
OPER: SHA,*BTY
REVISED: 07/19/99

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-233

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

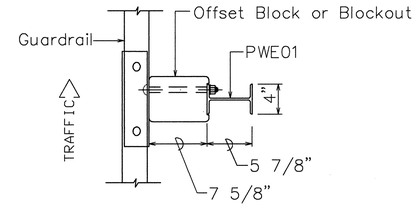
INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

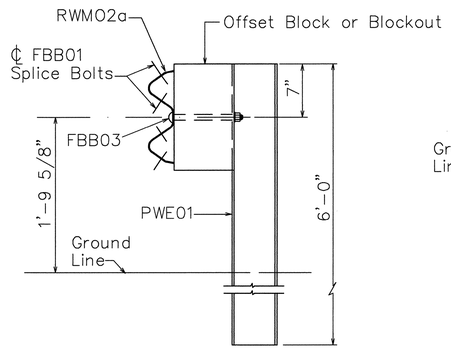
SHEET NO. B-1 OF 14 SHEETS

55S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-2	557



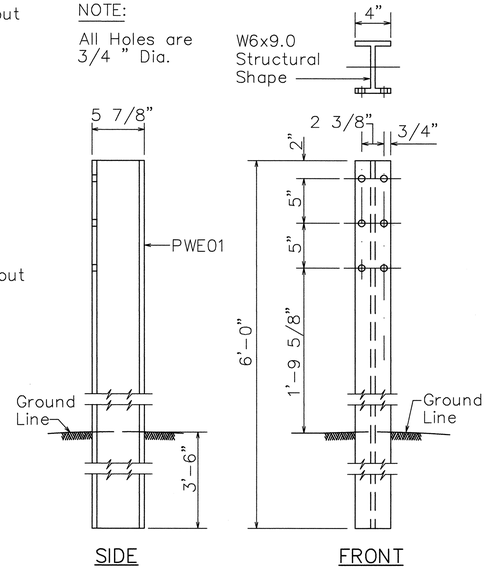
PLAN



ELEVATION

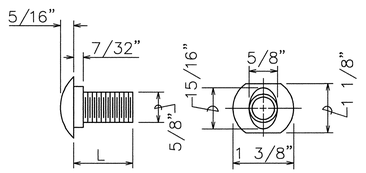
STRONG POST W-BEAM GUARDRAIL (SGR04a)

NOTE:
All Holes are 3/4 " Dia.

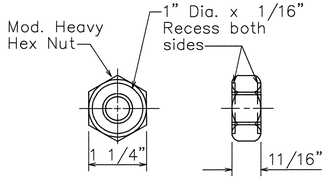


SIDE FRONT

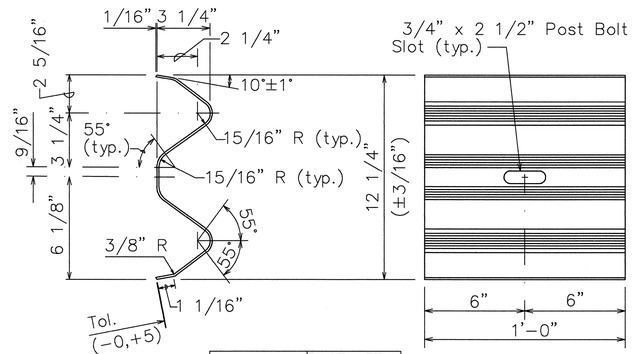
W-BEAM STRONG POST (PWE01)



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

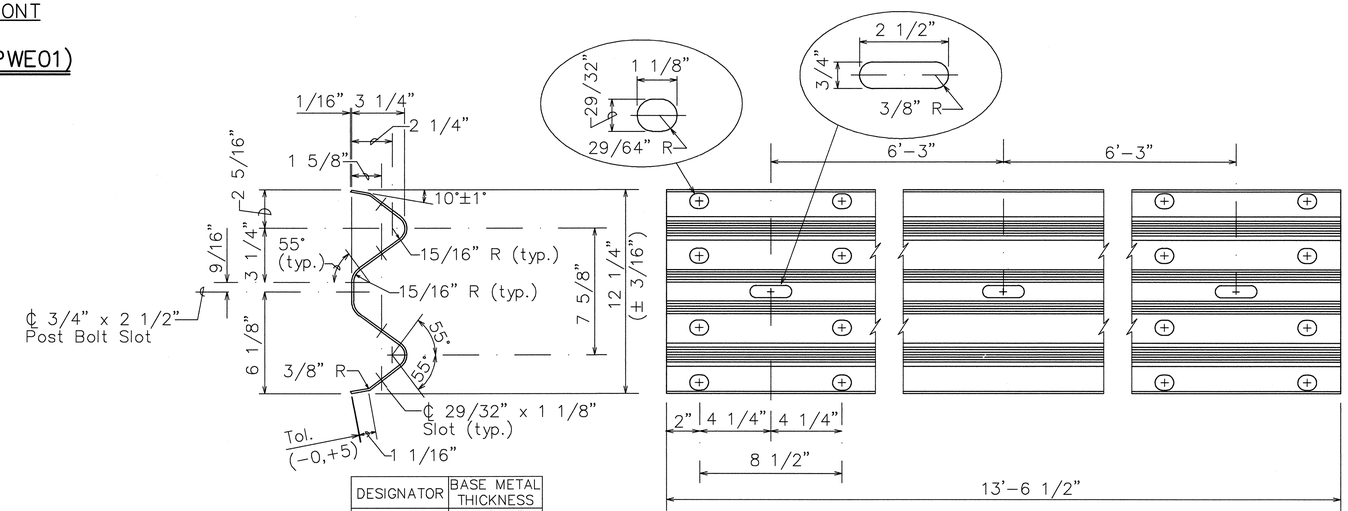


GUARDRAIL BOLTS AND RECESSED NUT



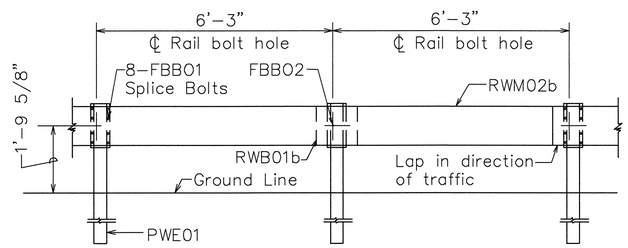
DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"

2 SPACE W-BEAM GUARDRAIL (RRWM02b)



ELEVATION

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

PM: BST
OPER: SHA
REVISED: -

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-234

ORIGINAL PLANS	NOTEBOOK No.	SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

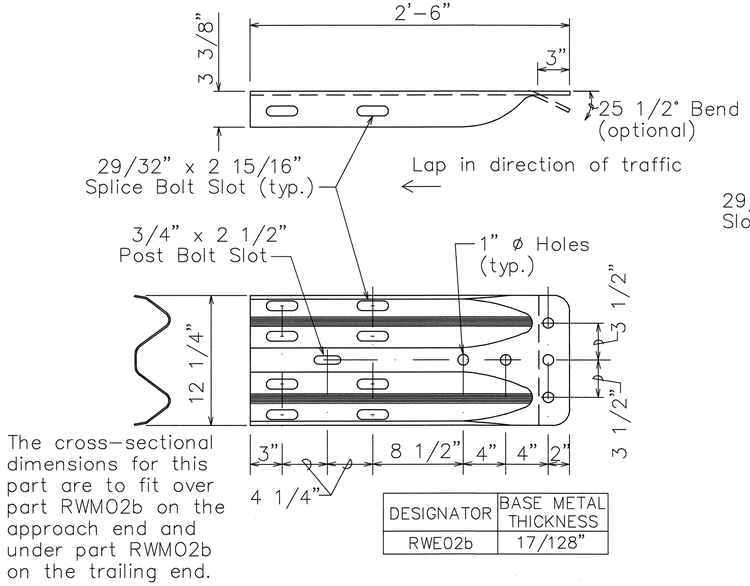
STRONG POST W-BEAM GUARDRAIL

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

SHEET NO. B-2 OF 14 SHEETS

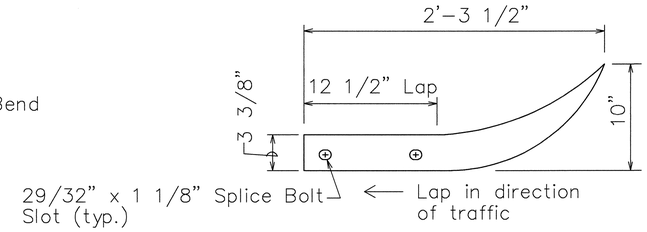
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-3	557

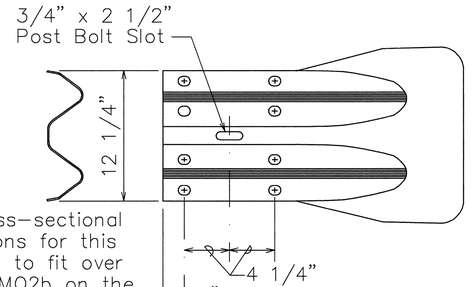


The cross-sectional dimensions for this part are to fit over part RWM02b on the approach end and under part RWM02b on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE02b	17/128"

W-BEAM TERMINAL CONNECTOR (RWE02b)

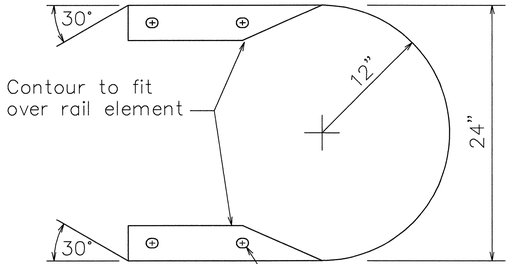


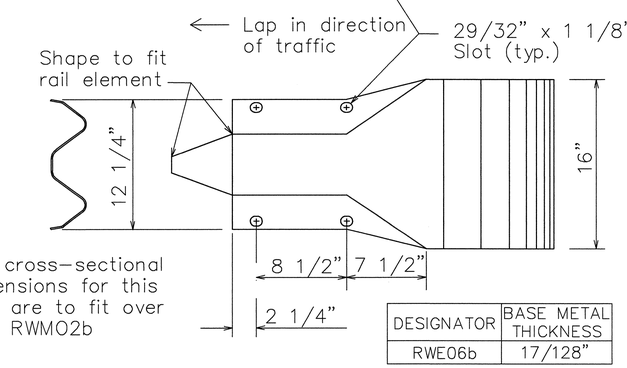


The cross-sectional dimensions for this part are to fit over part RWM02b on the approach end and under part RWM02b on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE01b	17/128"

W-BEAM END SECTION (FLARED RWE01b)

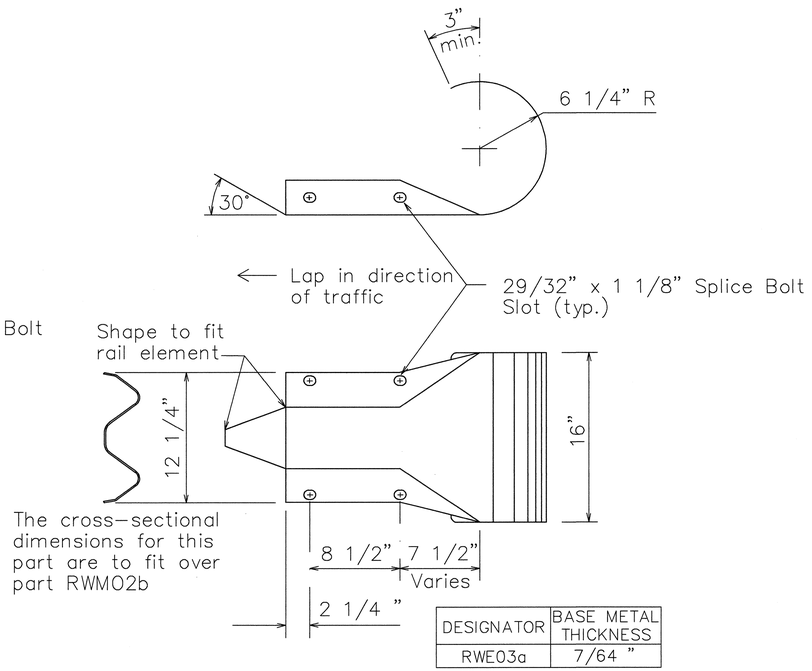




The cross-sectional dimensions for this part are to fit over part RWM02b

DESIGNATOR	BASE METAL THICKNESS
RWE06b	17/128"

W-BEAM END SECTION (BUFFER RWE06b)



The cross-sectional dimensions for this part are to fit over part RWM02b

DESIGNATOR	BASE METAL THICKNESS
RWE03a	7/64 "

W-BEAM END SECTION (ROUNDED RWE03a)

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-235

PM: BST
OPER: SHA
REVISED: -

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

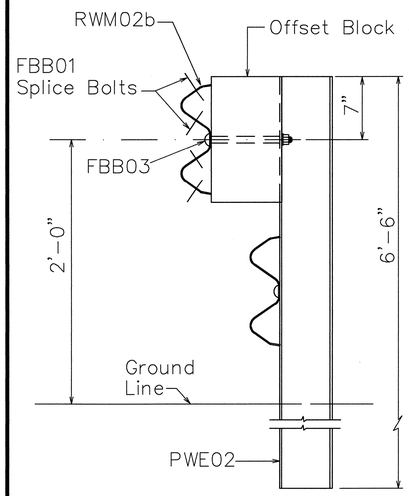
FREEWAY TYPICAL SECTIONS & DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

SHEET NO. B-3 OF 14 SHEETS

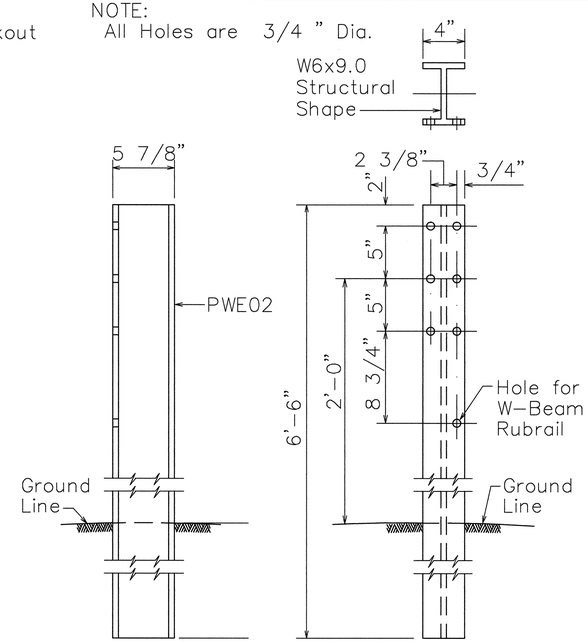
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-4	557



ELEVATION

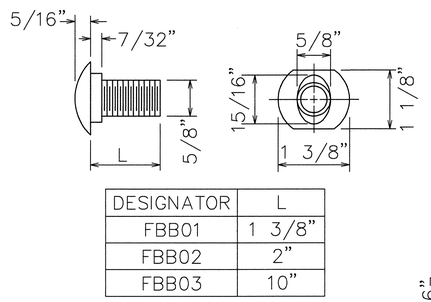
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

NOTE:
All Holes are 3/4 " Dia.

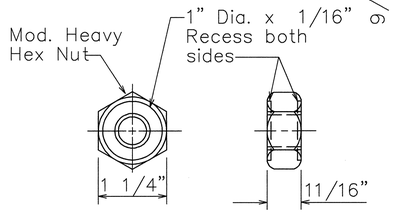


SIDE FRONT

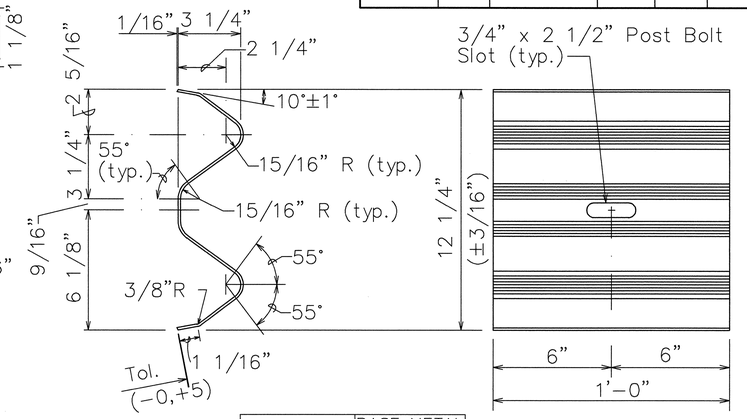
W-BEAM STRONG POST (PWE02)



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

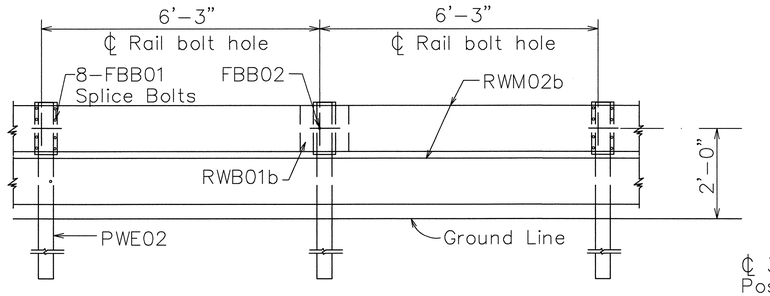


GUARDRAIL BOLTS AND RECESSED NUT



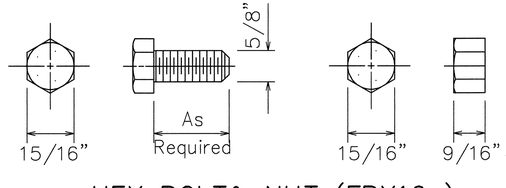
DESIGNATOR	BASE METAL THICKNESS
RWB01b	17/128"

W-BEAM BACK-UP-PLATE (RWB01b)

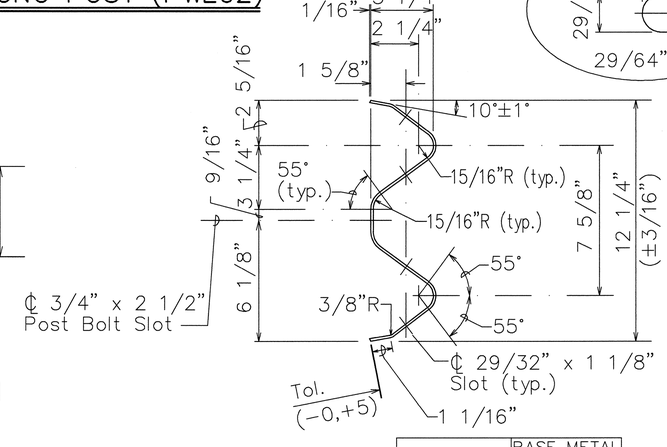


ELEVATION

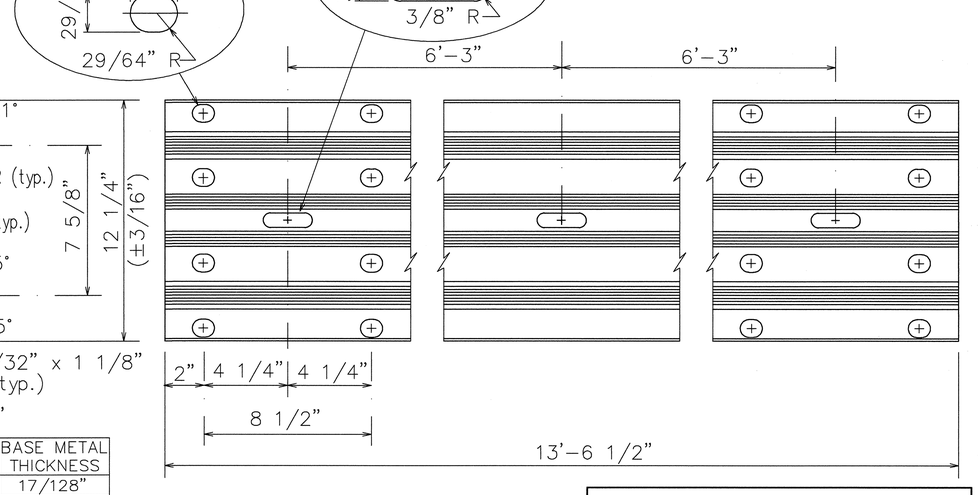
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



HEX BOLT& NUT (FBX16a)



DESIGNATOR	BASE METAL THICKNESS
RWM02b	17/128"



2 SPACE W-BEAM GUARDRAIL (RWM02b)

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL

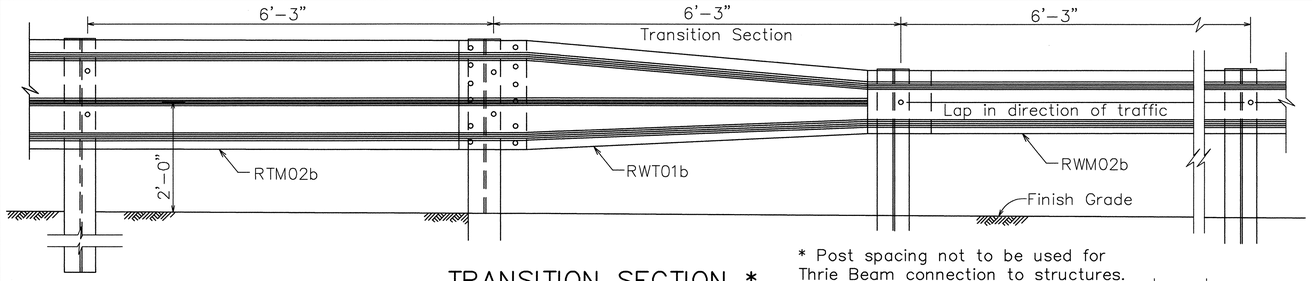
INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)
Scale: As Shown Date: June 1, 1999

SHEET NO. B-4 OF 14 SHEETS

PM: BST
OPER: SHA
REVISED: -
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-236

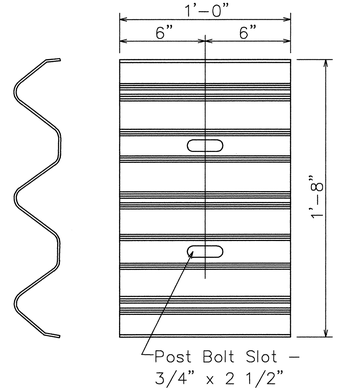
ORIGINAL PLANS | NOTEBOOK No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-5	557

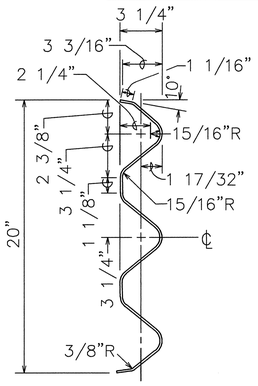


TRANSITION SECTION *

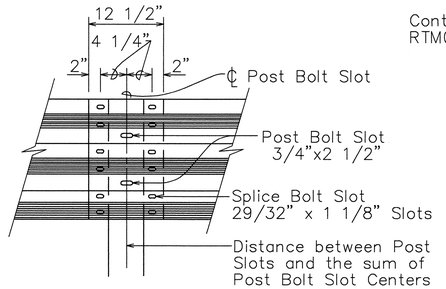
* Post spacing not to be used for Thrie Beam connection to structures.



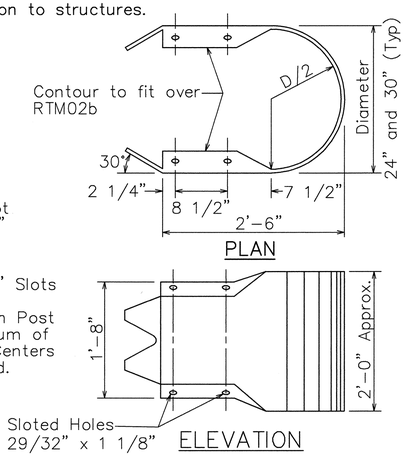
BACKUP PLATE
(RTB01b)
(Use at Posts where Splices do not occur)



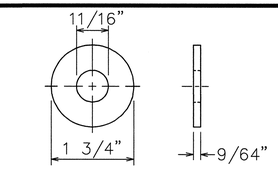
SECTION THRU
RAIL ELEMENT
(RTM02b)



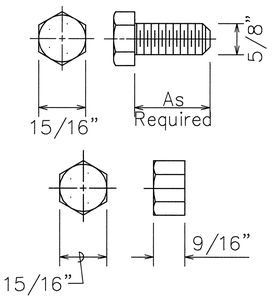
RAIL SPLICE



END SECTION (BUFFER RTE03b or RTE04b)



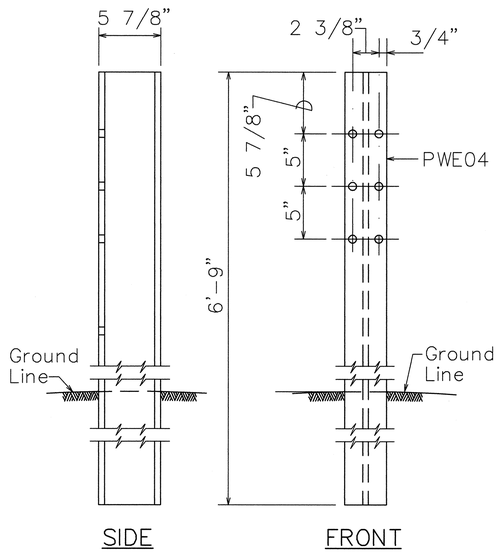
STEEL WASHER
FOR 5/8 " BOLT



HEX BOLT& NUT
(FBX16a)

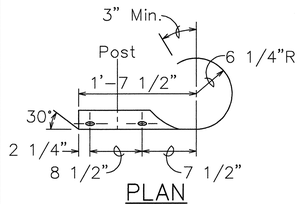
NOTE:
All Holes are
3/4 " Dia.

W6x9.0
Structural
Shape

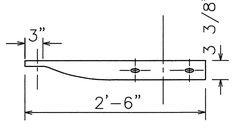


SIDE FRONT

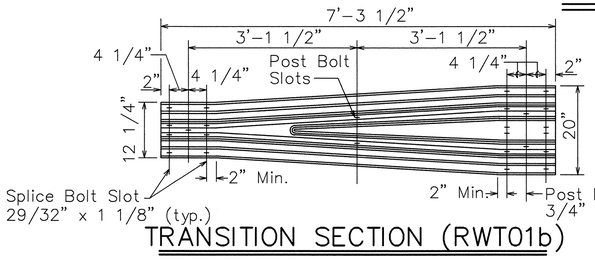
W-BEAM STRONG POST (PWE04)



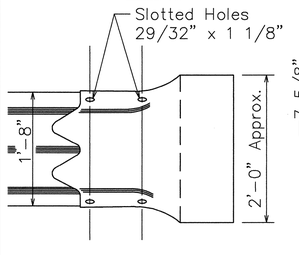
PLAN



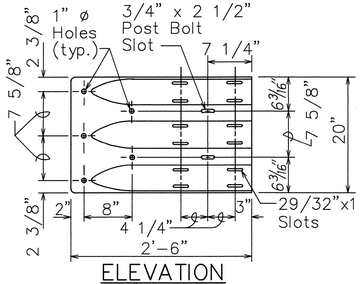
PLAN



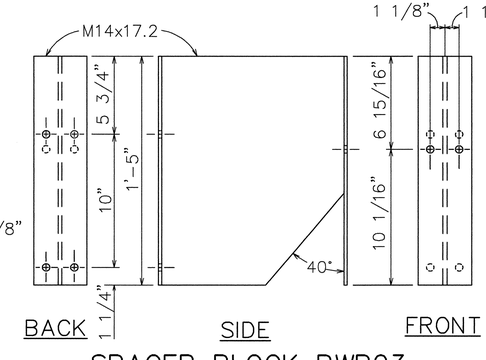
TRANSITION SECTION (RWT01b)



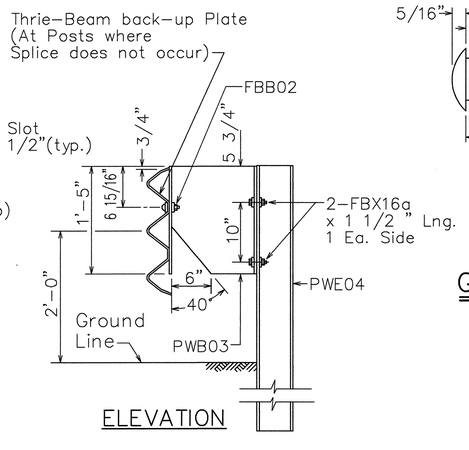
ELEVATION
SECTION (ROUNDED)
(RTE02b)



ELEVATION
TERMINAL CONNECTOR
(RTE01b)

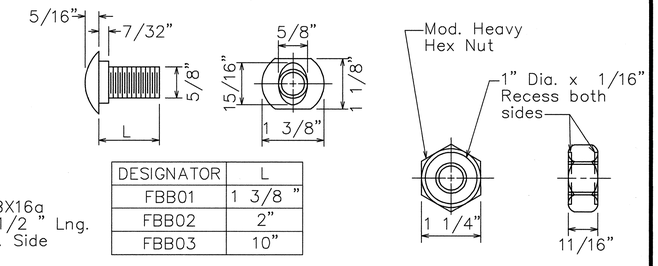


SPACER BLOCK PWB03



ELEVATION

STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL
(SGR09b)



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

GUARDRAIL BOLTS AND RECESSED NUT

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

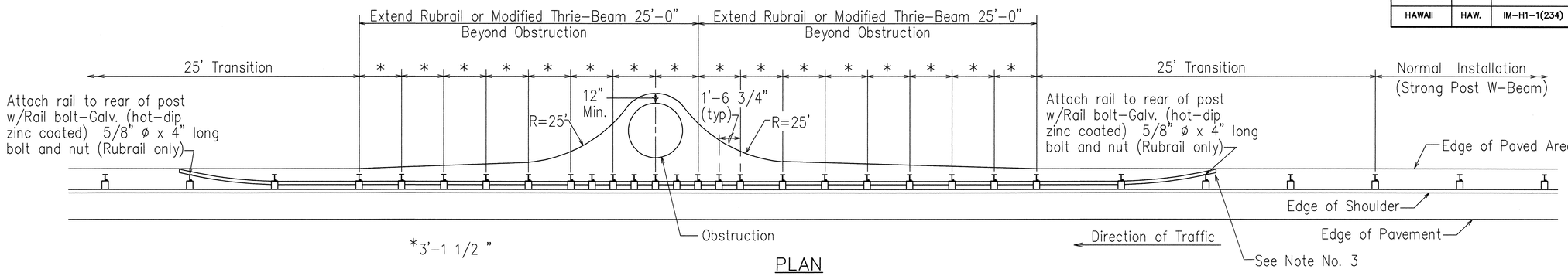
SHEET NO. **B-5** OF **14** SHEETS

PM: BST
OPER: SHA
REVISED: –

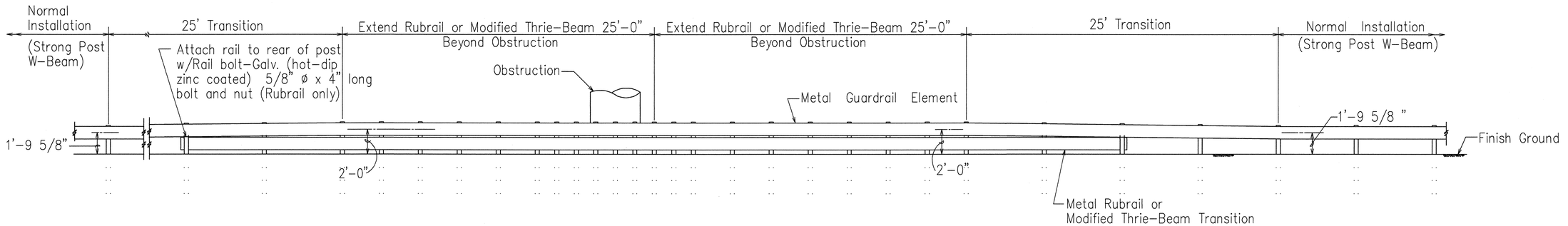
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-237

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

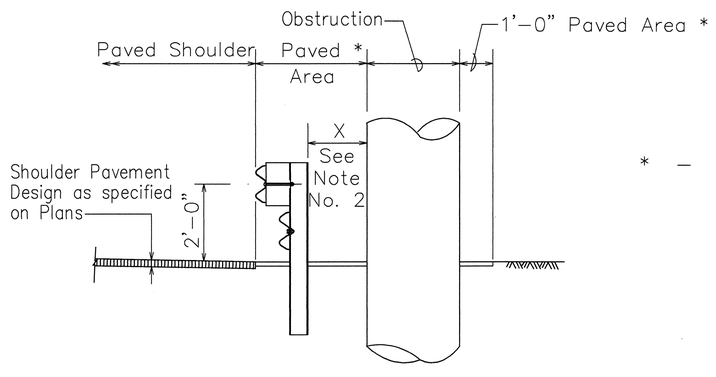
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-6	557



PLAN



ELEVATION



TYPICAL SECTION AT OBSTRUCTION

* – Provide only where indicated on the Typical Sections and/or Roadway Plans

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.

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION

PM: BST
OPER: SHA,*BTY
REVISED: 07/07/99
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-238

ORIGINAL PLAN | NOTEBOOK: No.

DATE	SURVEY PLOTTED BY	DRAWN BY	TRACED BY	DESIGNED BY	QUANTITIES BY	CHECKED BY

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

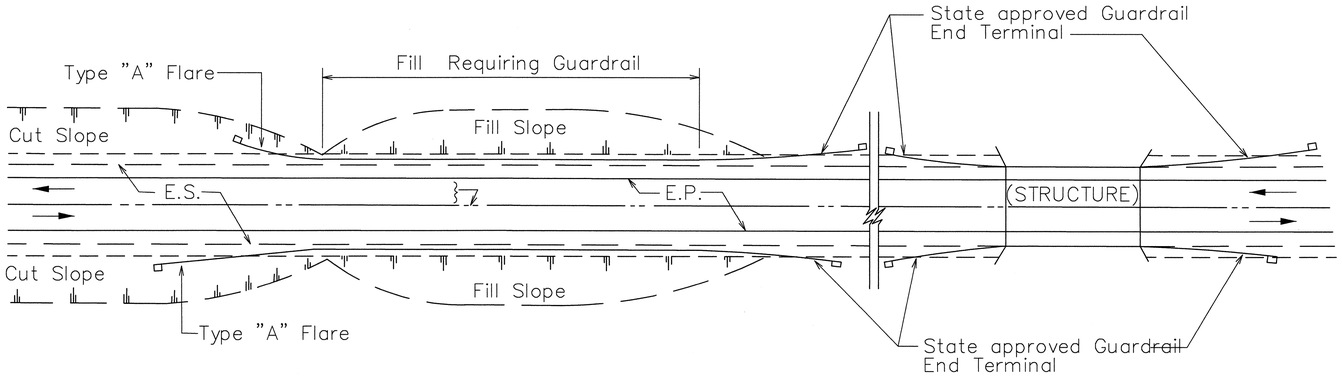
GUARDRAIL DETAILS
(AT OBSTRUCTION)

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

SHEET NO. B-6 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-7	557

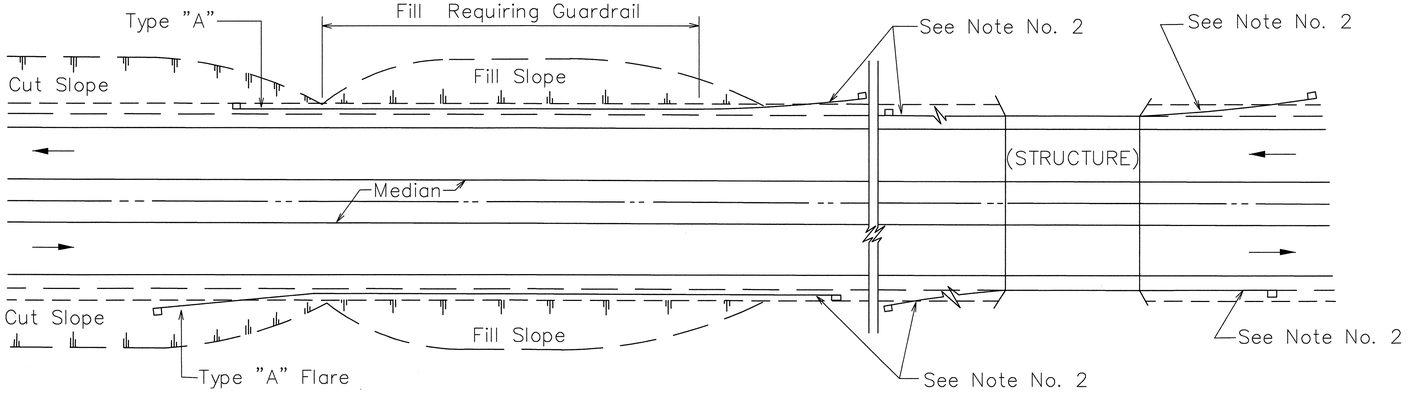


PLAN

TWO WAY ROADWAY

NOTES:

1. Metal Guardrail connection to concrete structures requires End Post Connection. See Structure Plans.
2. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
3. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.



PLAN

ONE WAY ROADWAY (DIVIDED HIGHWAY)

PM: BST
OPER: SHA
REVISED: -

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-239

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

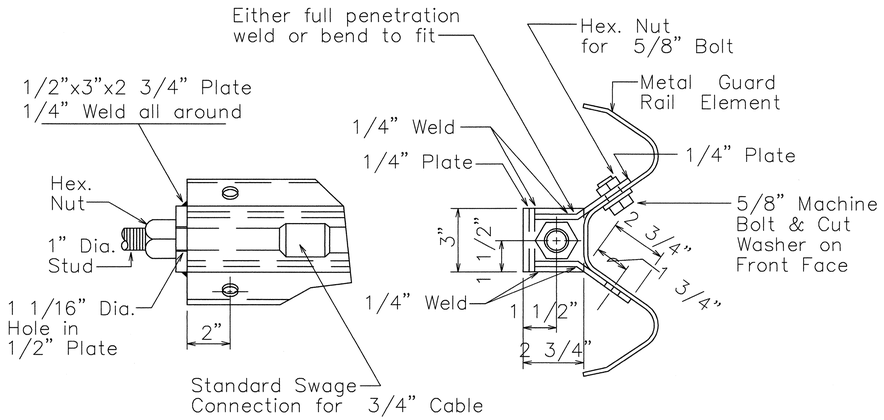
GUARDRAIL DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

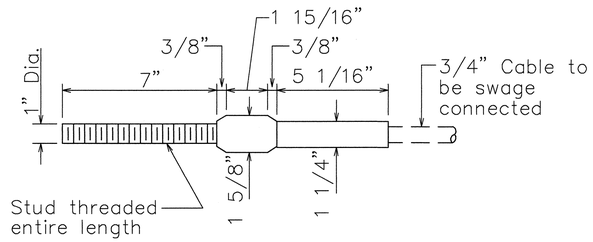
Scale: As Shown Date: June 1, 1999

SHEET NO. B-7 OF 14 SHEETS

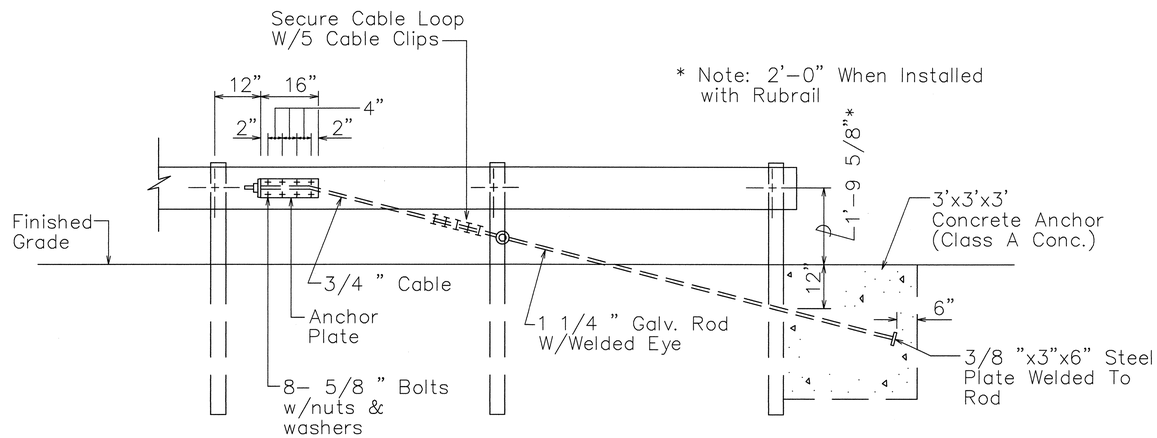
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-8	557



ANCHOR PLATE DETAILS

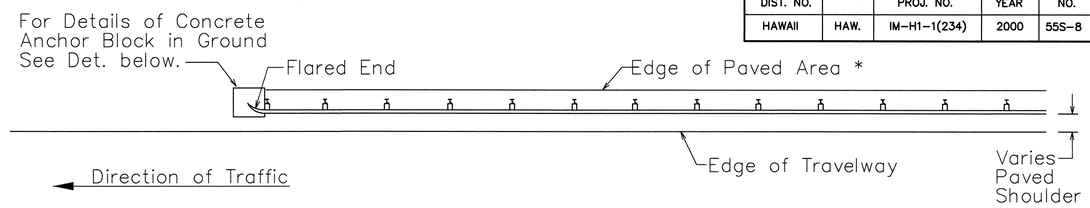


STANDARD SWAGED FITTING AND STUD

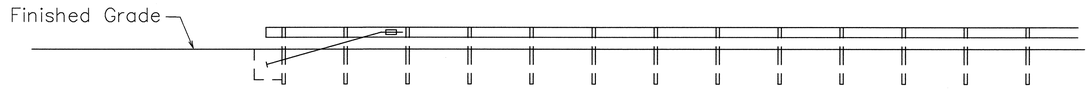


ANCHOR BLOCK DETAIL

1. Concrete, G.R.P., excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.



PLAN



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.

* – Provide only where indicated on the Typical Sections and/or Roadway Plans

PM: BST
OPER: SHA, *BTY
REVISED: 07/07/99

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-240

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

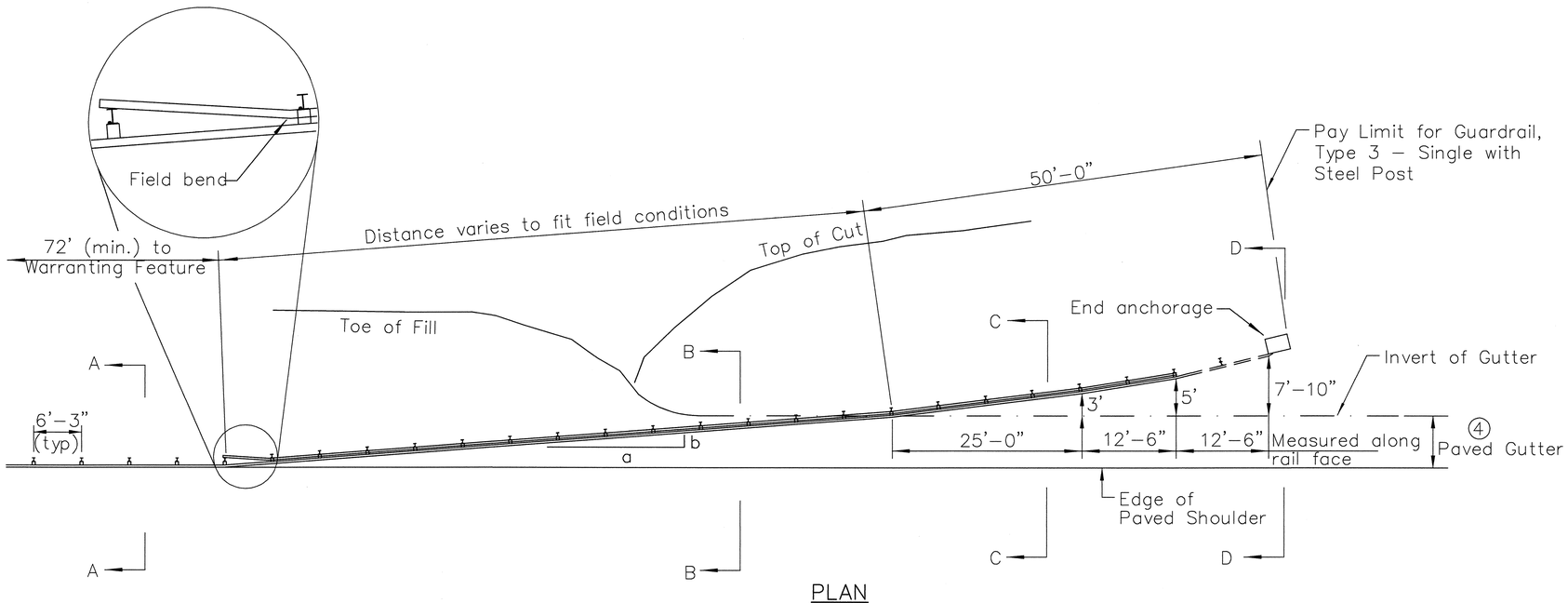
GUARDRAIL DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

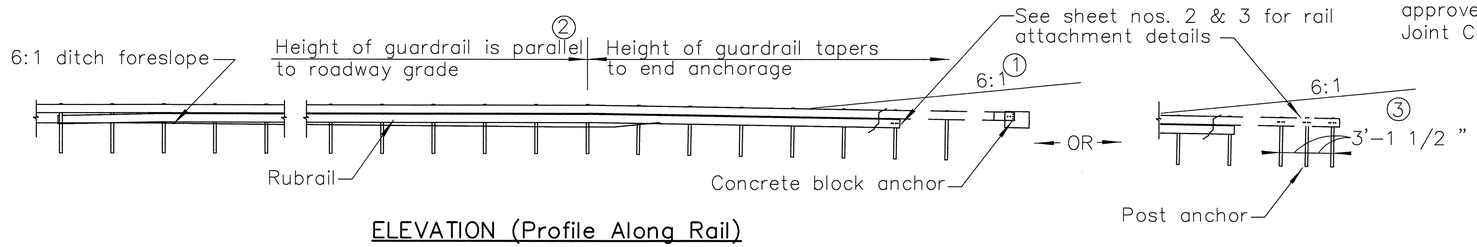
SHEET NO. B-8 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-9	557

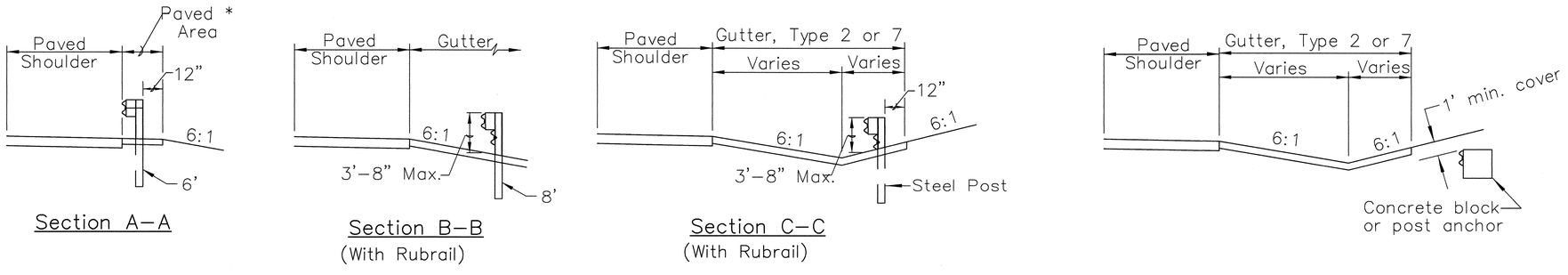


PLAN

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)



* – Provide only where indicated on the Typical Sections and/or Roadway Plans

General Notes

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

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-241
PM: BST
OPER: SHA,*BTY
REVISED: 07/07/99

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

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

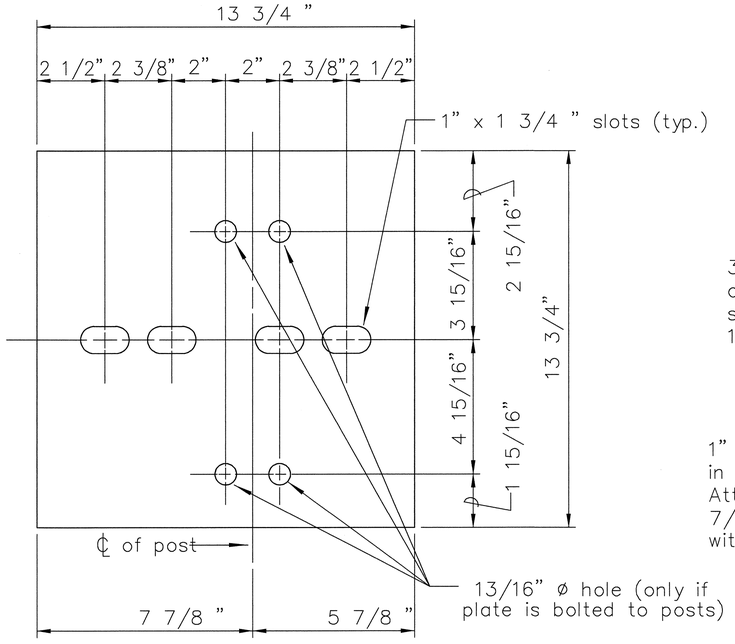
TYPE "A" FLARE

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

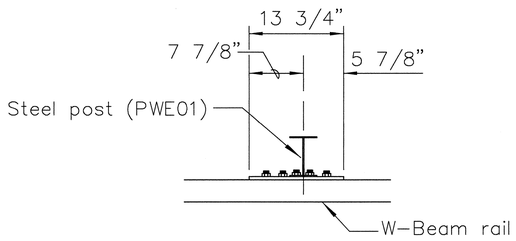
SHEET NO. B-9A OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-10	557

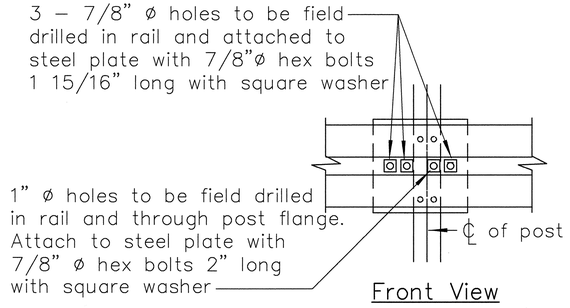


Steel Plate – 1/2"

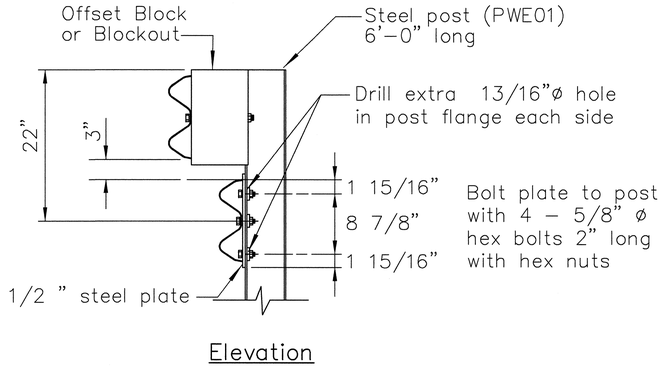
(Hot-dip Zinc Coated Galvanized Welded or Bolted to Post)



Plan

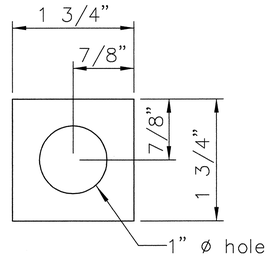


Front View



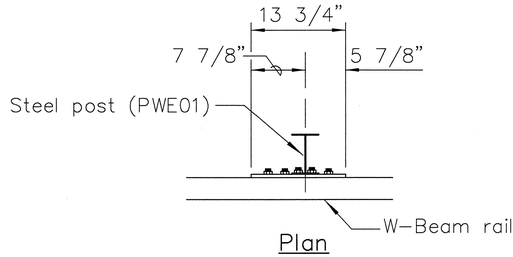
Elevation

RUBRAIL ANCHOR DETAILS



Square Washer

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



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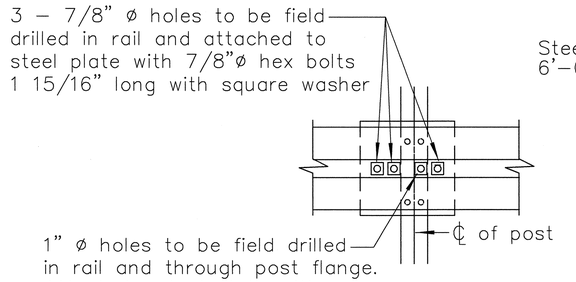
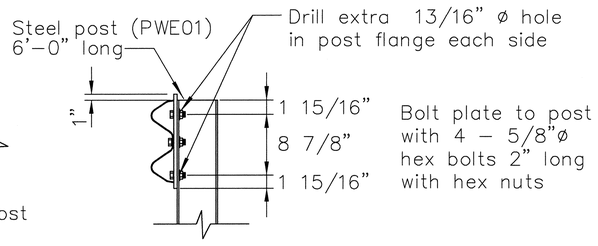


Front View



Elevation

POST ANCHOR DETAILS

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.

BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS
TYPE "A" FLARE)

PM: BST
OPER: SHA
REVISED: –
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-242

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

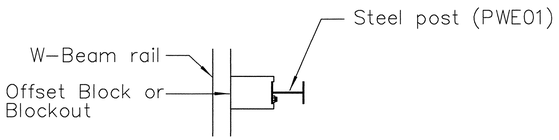
TYPE "A" FLARE

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

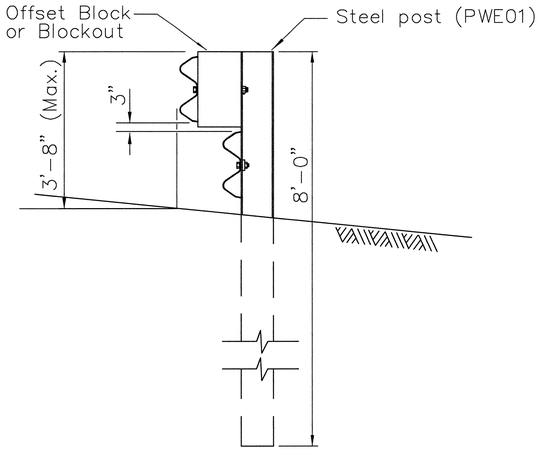
Scale: As Shown Date: June 1, 1999

SHEET NO. B-9 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-11	557

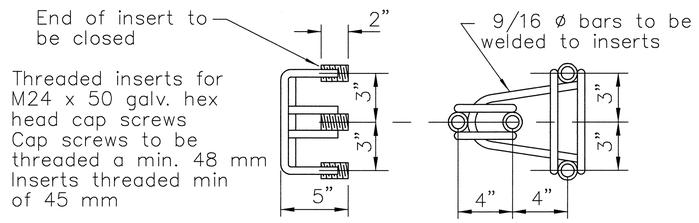


Plan

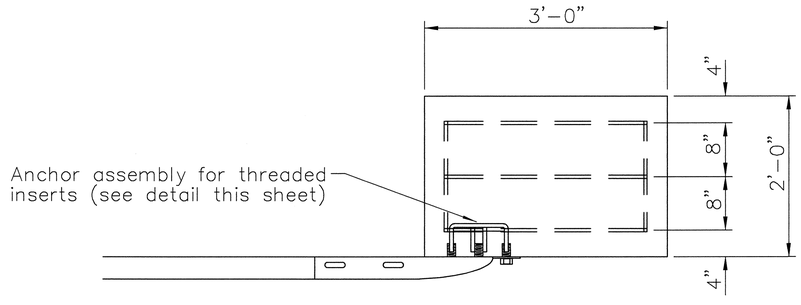


Elevation

STEEL POST GUARDRAIL WITH RUBRAIL



ANCHOR ASSEMBLY CONCRETE BLOCK ANCHOR



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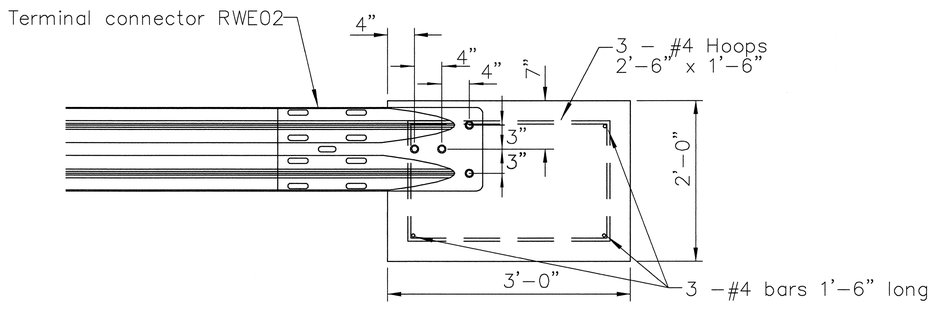


Elevation

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.

PM: BST
OPER: SHA
REVISED: -

DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-243

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

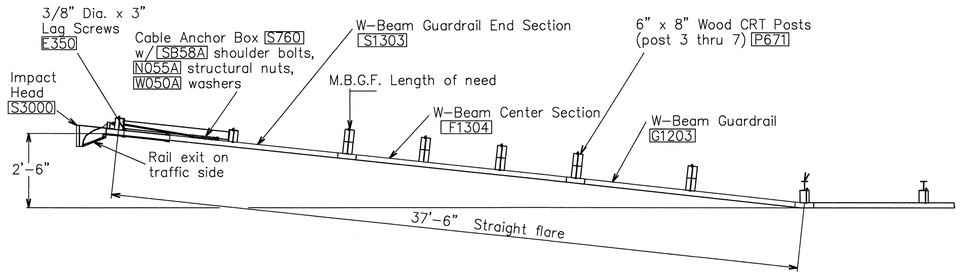
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

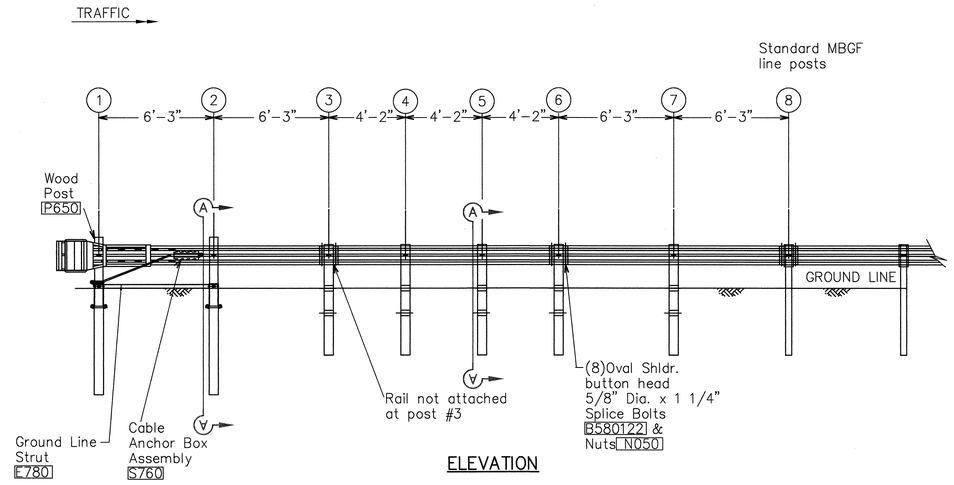
INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

SHEET NO. B-9 OF 14 SHEETS



PLAN



ELEVATION

GENERAL NOTES

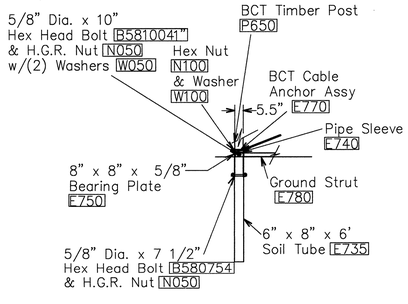
1. Wood posts are required with the fleat.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tube shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may 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.
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. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
8. 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.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-12	557

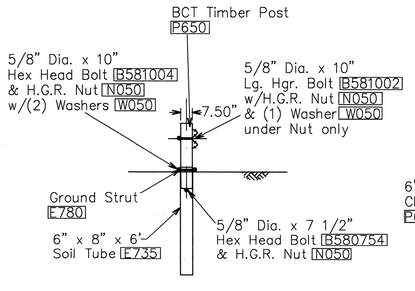
ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SEC., 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'
E740	1	PIPE SLEEVE
E750	1	BEARING PLATE, 8" x 8" x 5/8"
S760	1	CABLE ANCHOR BOX
E770	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; 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

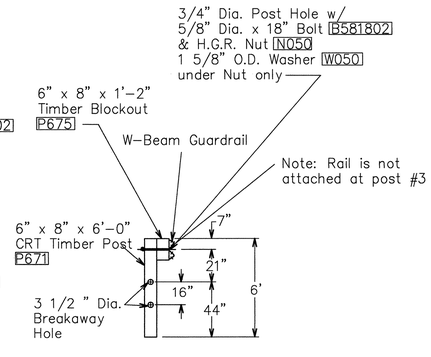
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil Plates SP600
*4'-6" Foundation Tubes E735 W/Soil Plates SP600



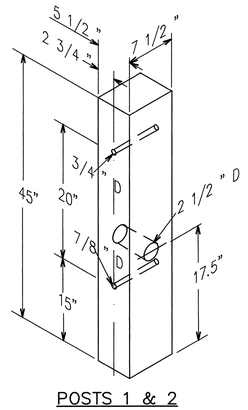
PARTIAL VIEW OF POST 1



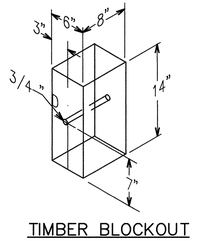
SECTION A-A
at Post #2



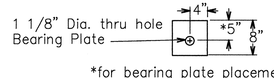
SECTION B-B
typical @ Post 3 - 7



POSTS 1 & 2



TIMBER BLOCKOUT



*for bearing plate placement, the 5" side should be installed up

BEARING PLATE E750

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350

FLARED ENERGY ABSORBING TERMINAL

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

SHEET NO. B-10 OF 14 SHEETS

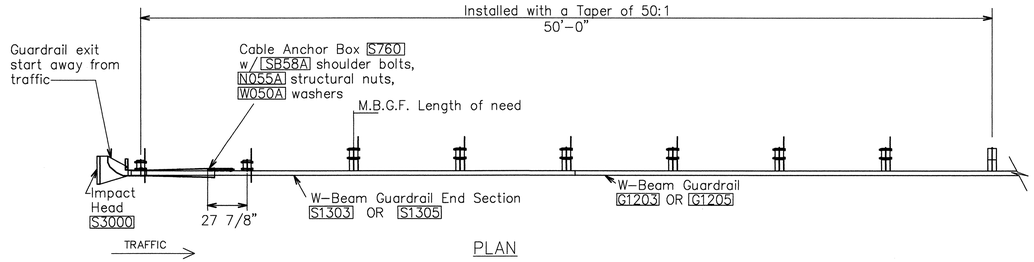
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-244

PM: BST
OPER: SHA,*FAI
REVISED: 05/18/99

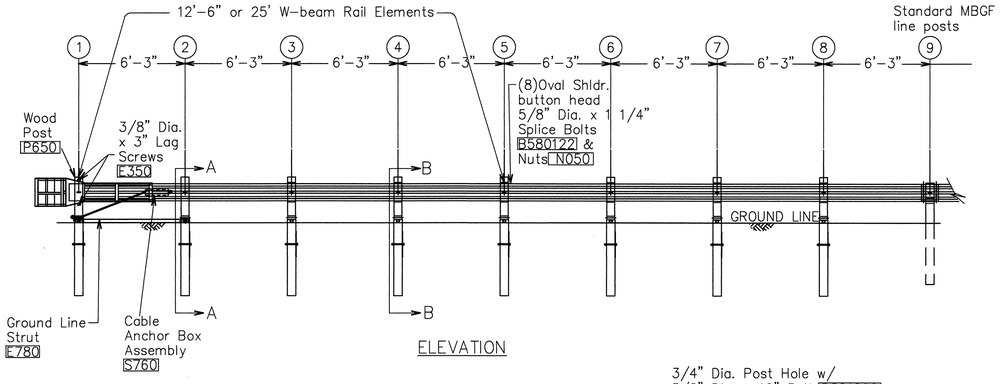
ORIGINAL PLAN
NOTEBOOK
No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

55S-12

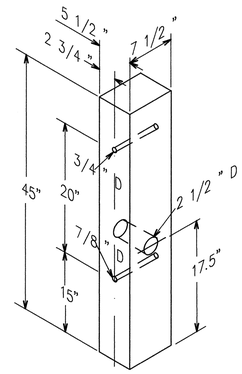
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-13	577



PLAN

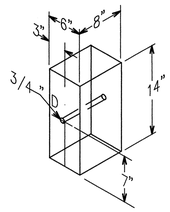


ELEVATION



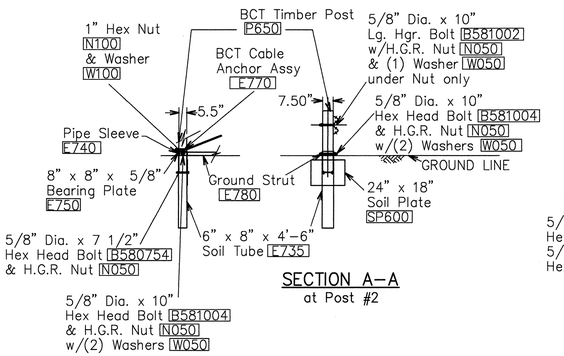
POSTS 1 thru 8 P650

All measurements should be taken from bottom of post

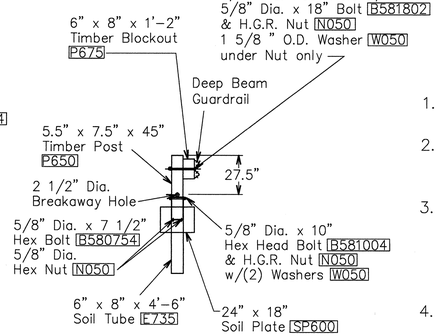


TIMBER BLOCKOUT P675

**not supplied by Road Systems.



SECTION A-A
at Post #2

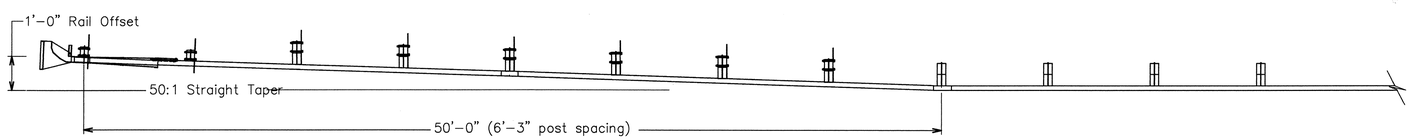


SECTION B-B
typical @ Post 3 - 8

PARTIAL VIEW OF POST 1

*for bearing plate placement, the 5" side should be installed up

BEARING PLATE E750



TYPICAL FLARE CONFIGURATION

ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
S1303/S1305	1	W-BEAM GUARDRAIL END SECTION 12 GA. 12.5' or 25'
G1203/G1205	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

GENERAL NOTES:

1. Wood posts are required with the Sequential Kinking Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. When the Sequential Kinking Terminal is selected as the end treatment for MBGF installation, the MBGF shall be flared at a rate of 50:1 to prevent the impact head from encroaching on the shoulder.
4. 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. Soil tubes shall be installed for all wood posts.
5. 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.

GENERAL NOTES: (continued)

6. 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 wil lbe field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
7. 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.
8. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
9. A special site evaluation should be considered prior to using the Sequential Kinking Terminal where there is less than 25' between the outlet side of the Sequential Kinking Terminal and any adjacent driving lane.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SKT-350

SEQUENTIAL KINKING TERMINAL

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)
Scale: As Shown Date: June 1, 1999

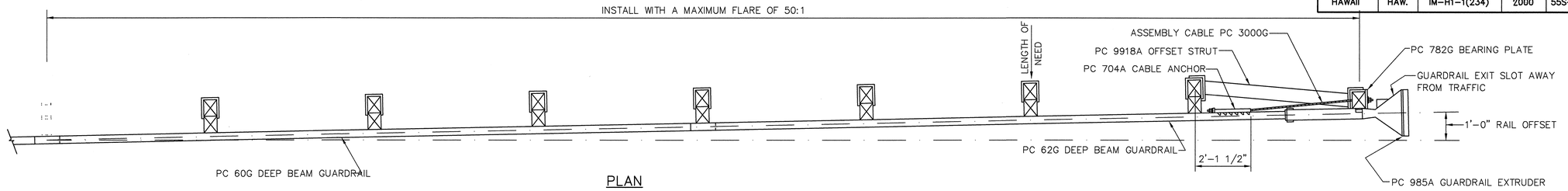
SHEET NO. B-11 OF 14 SHEETS

PM: BST
OPER: SHA,+BTY
REVISED: 07/07/99
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-245

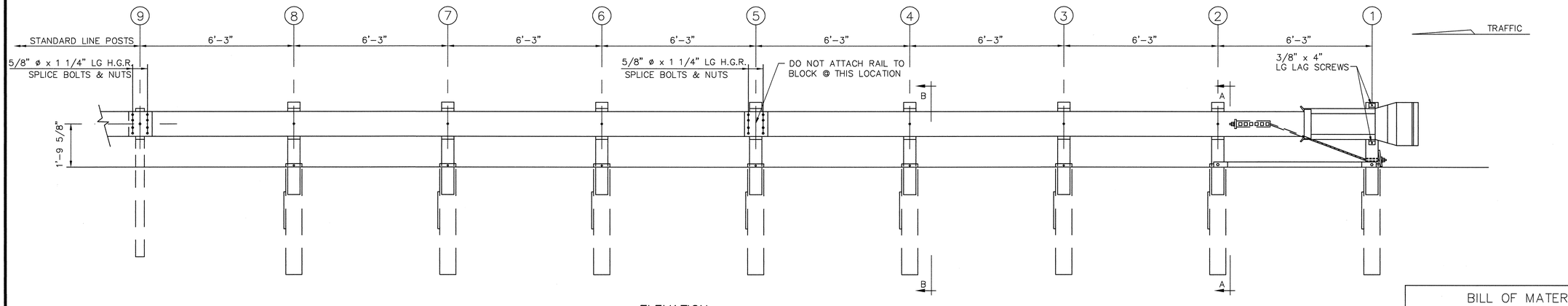
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE
ORIGINAL PLAN
NOTEBOOK
No.

55S-13

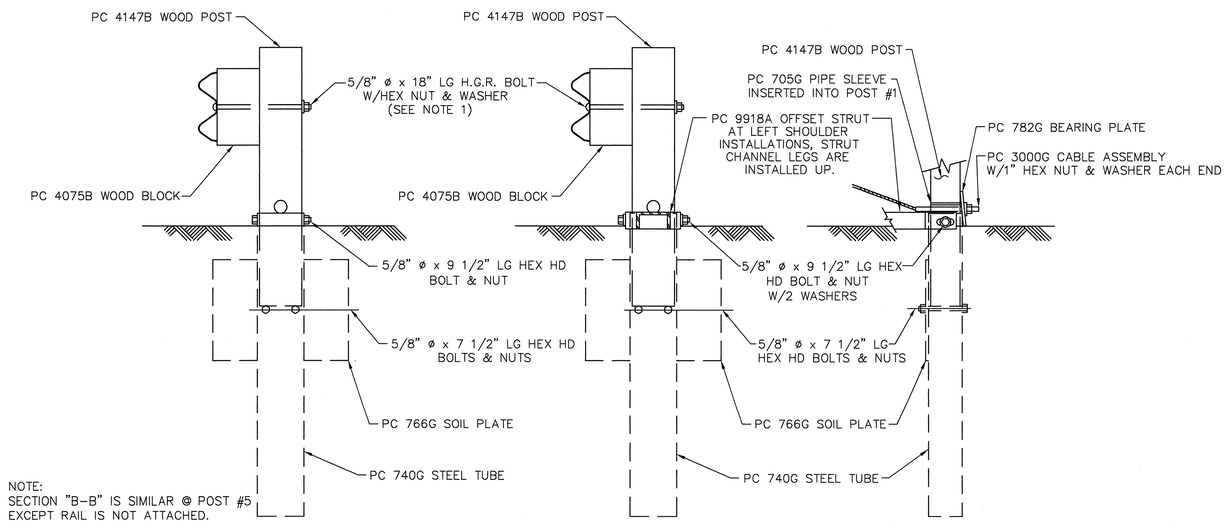
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	55S-14	557



PLAN



ELEVATION



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

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

SECTION "B-B"
(TYP @ POSTS #3, 4, 6, 7 & 8)

SECTION "A-A"
(@ POST #2)

PARTIAL VIEW @ POST #1

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	4'6 TUBE SLEEVE
766G	8	1/4" x 18" x 24" SOIL PLATE
782G	1	5/8" x 8" x 8" BEARING PLATE
985A	1	ET-2000 EXTRUDER
3000G	1	CABLE 3/4 x 6'6
3300G	11	5/8" WASHER
3340G	47	5/8" HEX NUT
3360G	16	5/8" ø x 1 1/4" SPLICE BOLT
3478G	16	5/8" ø x 7 1/2" HEX HD BOLT
3497G	8	5/8" ø x 9 1/2" HEX HD BOLT
3580G	7	5/8" ø 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" ø x 4" LAG SCREW
9918A	1	6'3 STRUT

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ET-2000 - OPTION "A"

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: As Shown Date: June 1, 1999

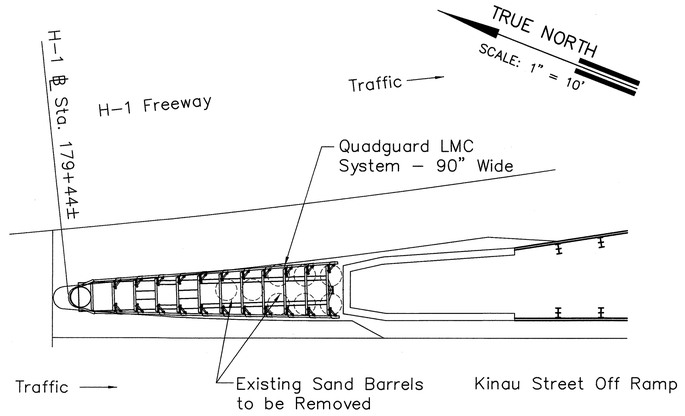
SHEET NO. B-12 OF 14 SHEETS

PW: BST
OPER: SHA,*FAI
REVISED: 05/09/99

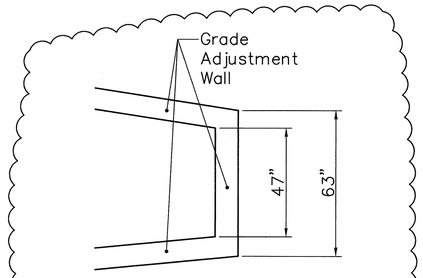
DATE: 05/03/99
SCALE: 1 = 1
FILE: 9815-246

ORIGINAL PLANS	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTEBOOK	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

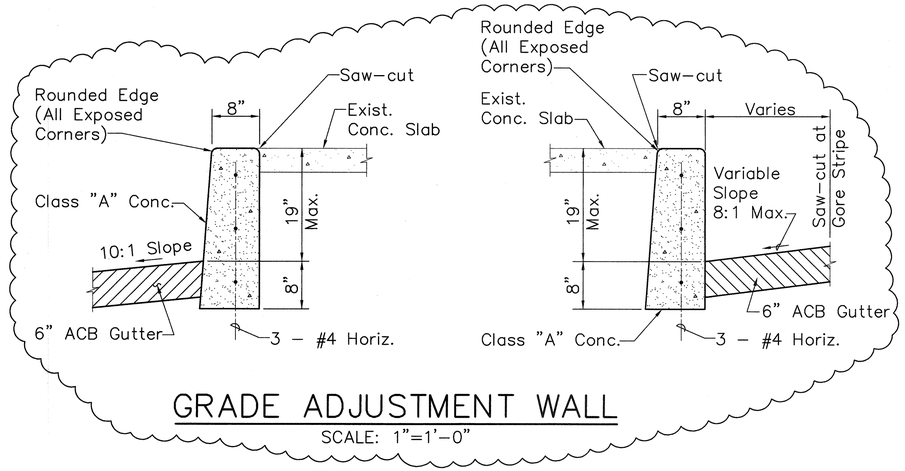
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	56	557



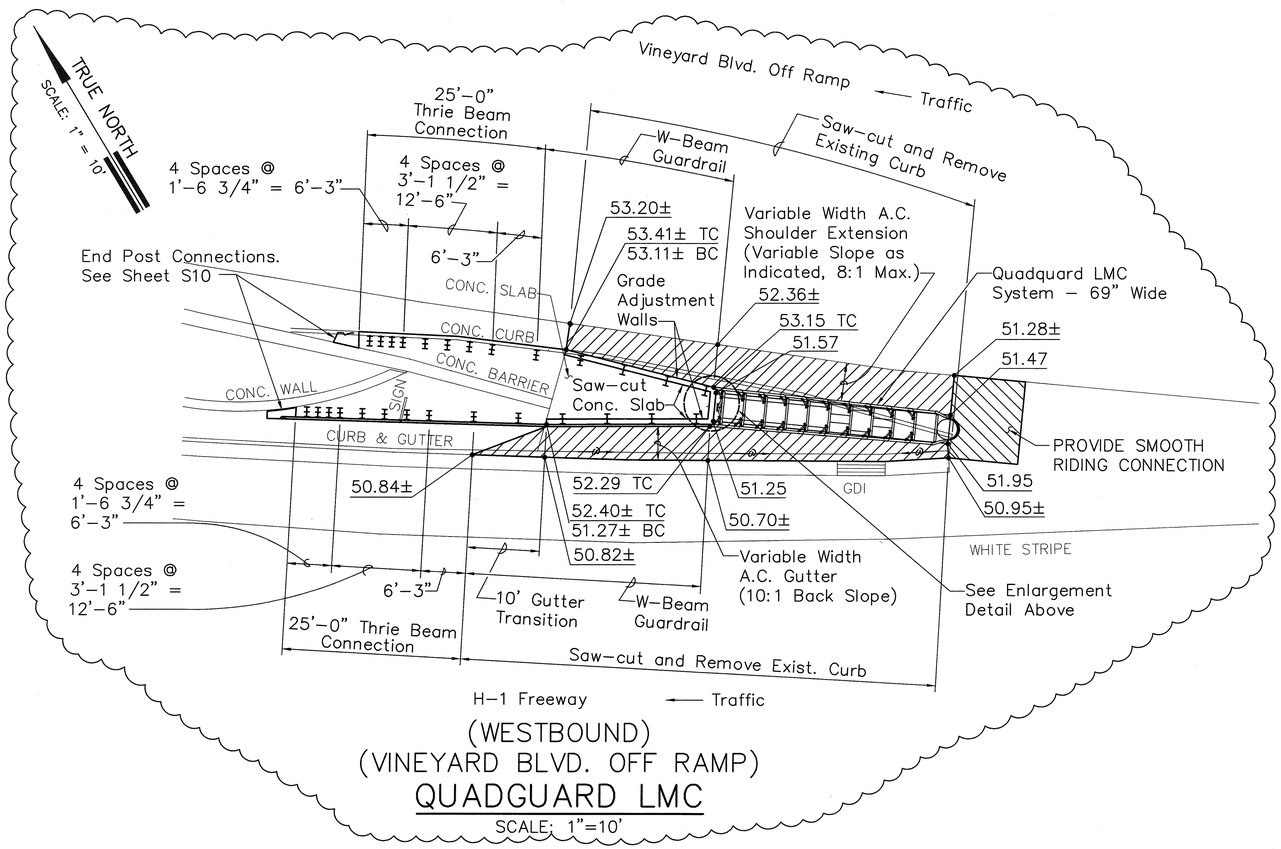
(EASTBOUND)
(KINAU STREET OFF RAMP)
QUADGUARD LMC
SCALE: 1"=10'



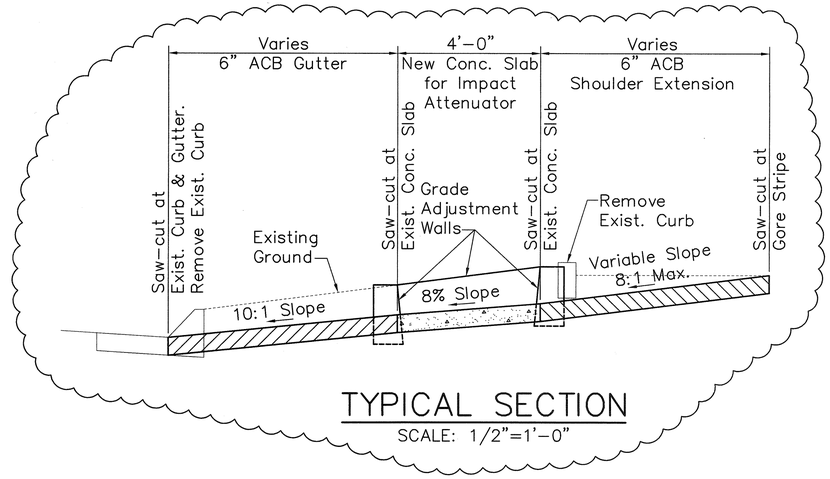
ENLARGEMENT DETAIL
NOT TO SCALE



GRADE ADJUSTMENT WALL
SCALE: 1"=1'-0"



(WESTBOUND)
(VINEYARD BLVD. OFF RAMP)
QUADGUARD LMC
SCALE: 1"=10'



TYPICAL SECTION
SCALE: 1/2"=1'-0"

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98
SCALE: 1 = 10
FILE: 9815-195a
PW:
OPER: BST
REVISED: SHA, *F AI
REVISED: 10/03/00

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

IMPACT ATTENUATOR DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

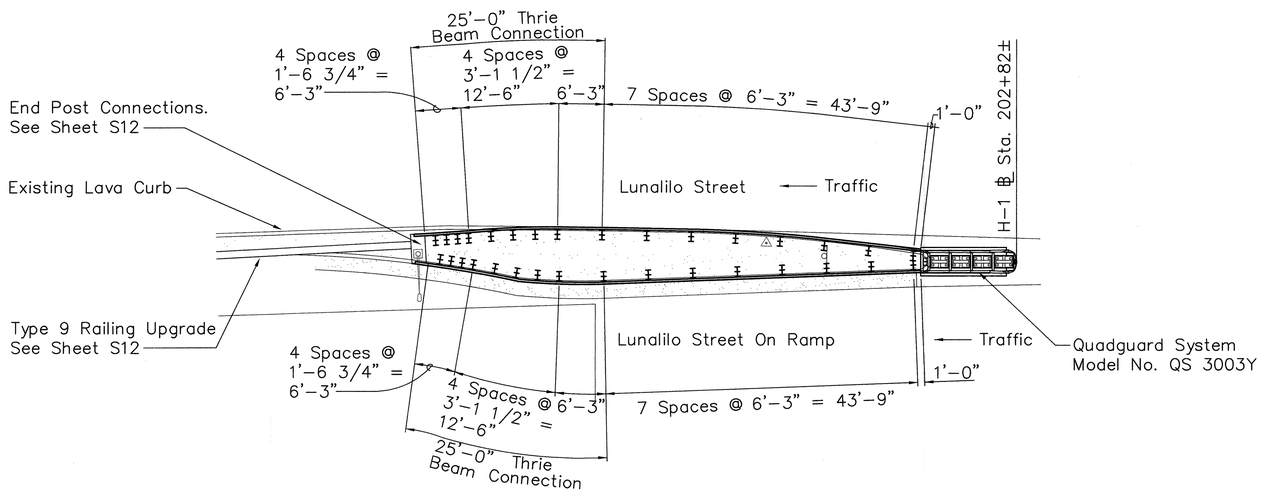
Scale: 1"=10' Date: June 1, 1999

SHEET NO. R28 OF 34 SHEETS

CO 56

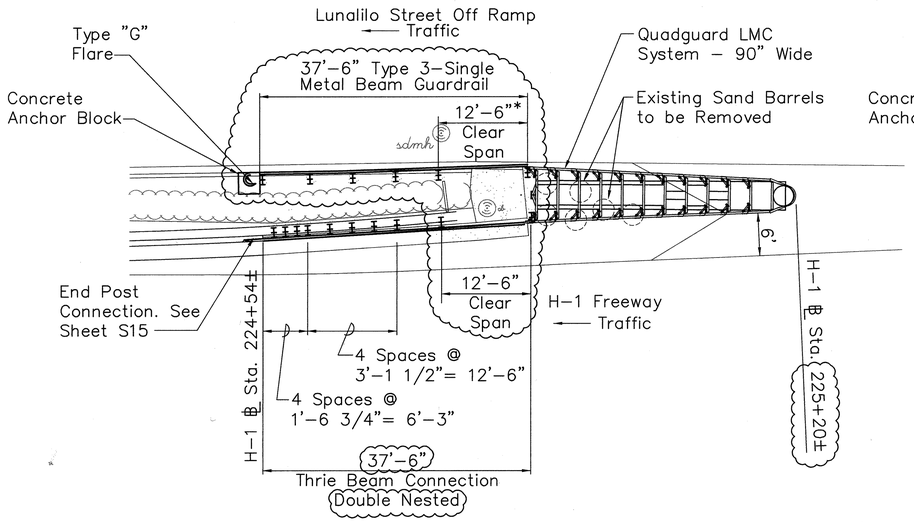
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	57	557

TRUE NORTH
SCALE: 1" = 10'

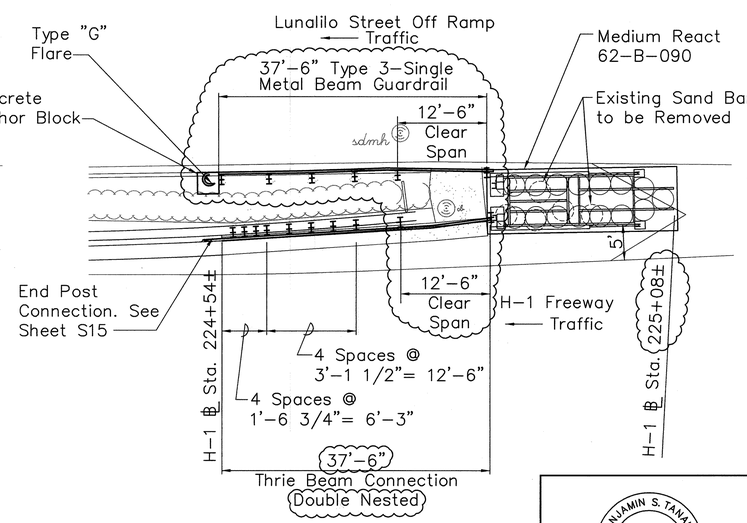


(WESTBOUND)
(LUNALILO STREET ON RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'

TRUE NORTH
SCALE: 1" = 10'



QUARDGUARD LMC SYSTEM PLAN



MEDIUM REACT PLAN

TRUE NORTH
SCALE: 1" = 10'

*Double Nest W-Beam Guardrail

(WESTBOUND)
(LUNALILO STREET OFF RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98
SCALE: 1 = 10
FILE: 9815-196
PW: BST
OPER: SHA,*FAI
REVISED: 10/03/00

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

IMPACT ATTENUATOR DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

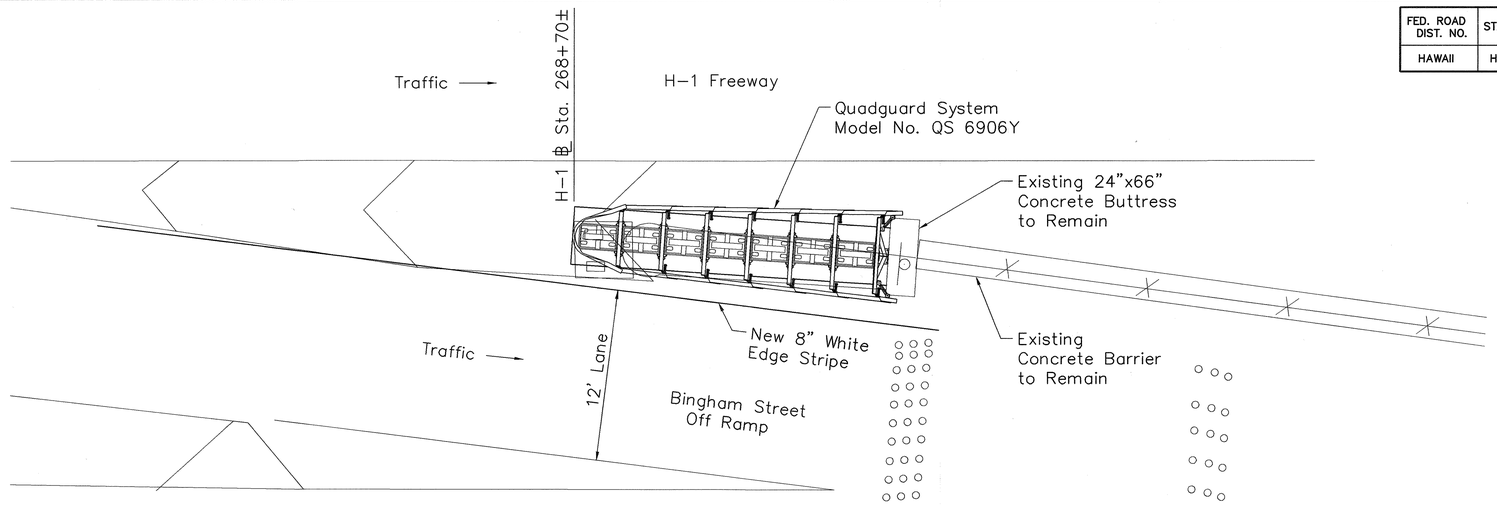
Scale: 1"=10' Date: June 1, 1999

SHEET NO. R29 OF 34 SHEETS

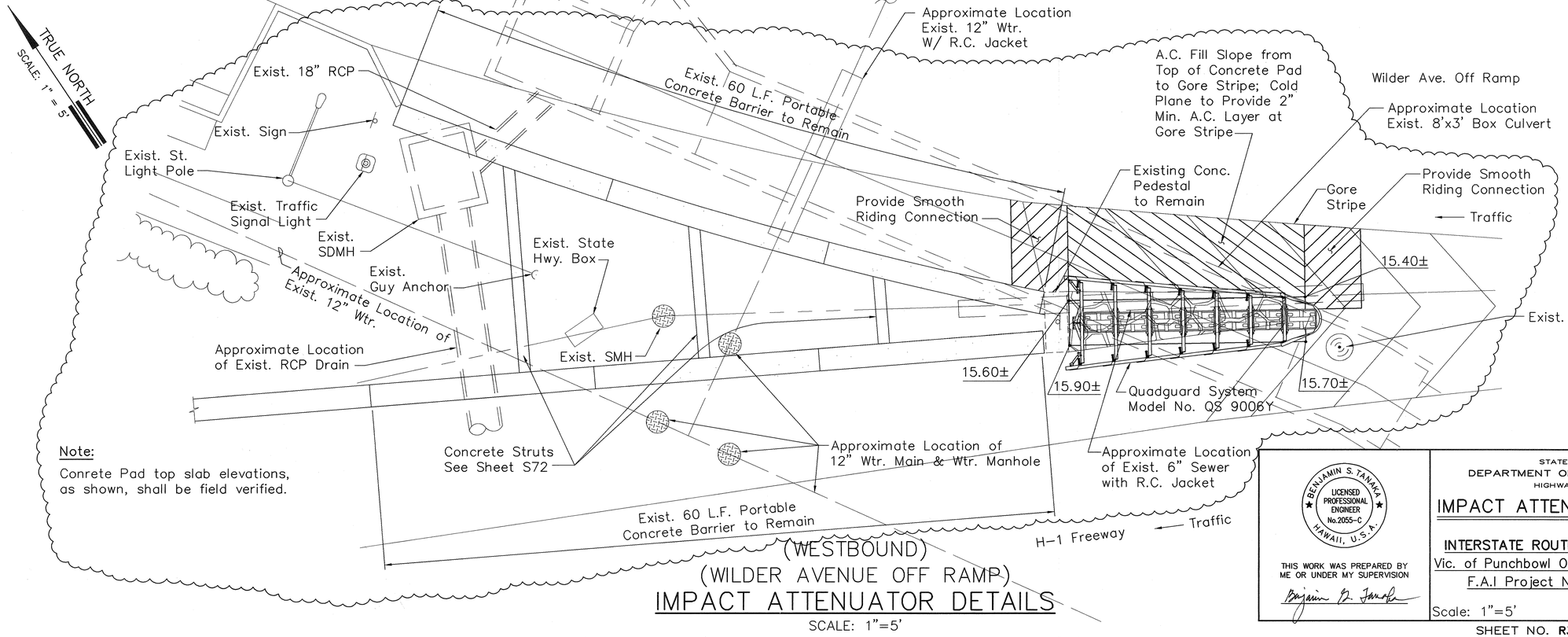
CO 57

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	58	557

TRUE NORTH
SCALE: 1" = 5'



(EASTBOUND)
(BINGHAM STREET OFF RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=5'



Note:
Conrete Pad top slab elevations, as shown, shall be field verified.

(WESTBOUND)
(WILDER AVENUE OFF RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=5'

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98
SCALE: 1" = 5
FILE: 9815-197
PM: BST
OPER: SHA,*FAI
REVISED: 09/01/00

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

IMPACT ATTENUATOR DETAILS

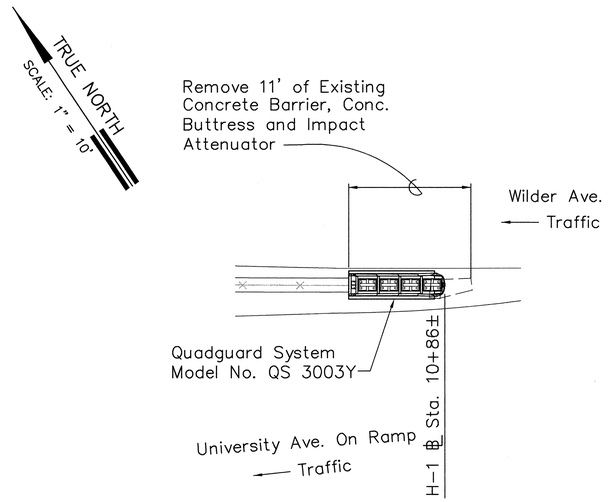
INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: 1"=5' Date: June 1, 1999

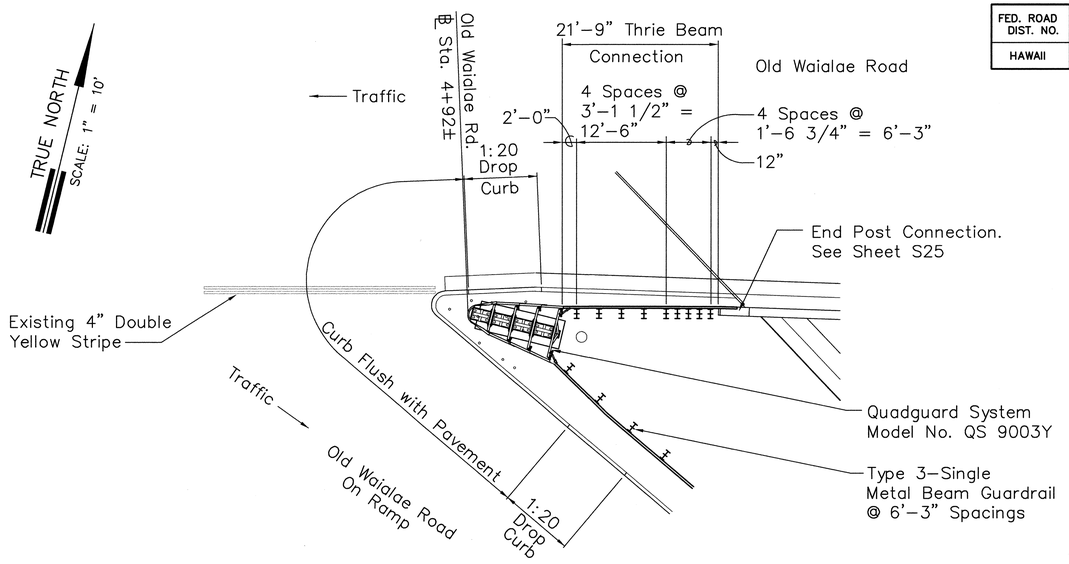
SHEET NO. R30 OF 34 SHEETS

CO 58

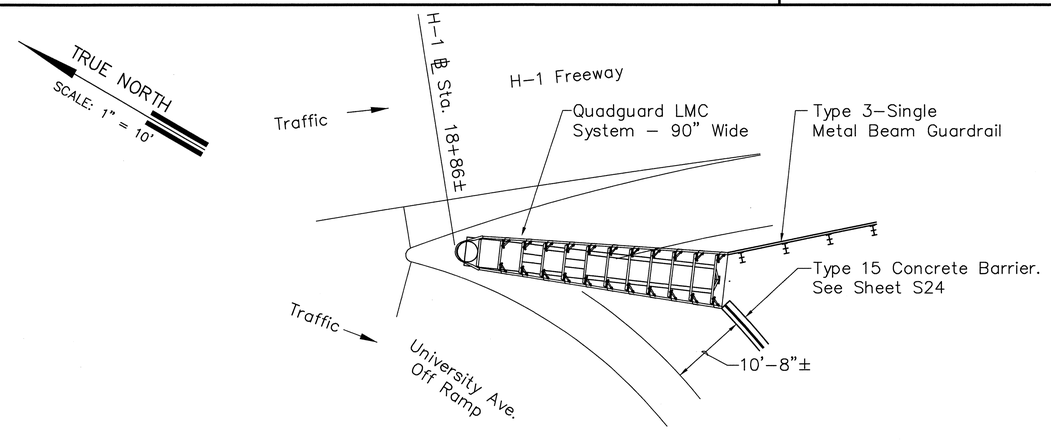
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	59	557



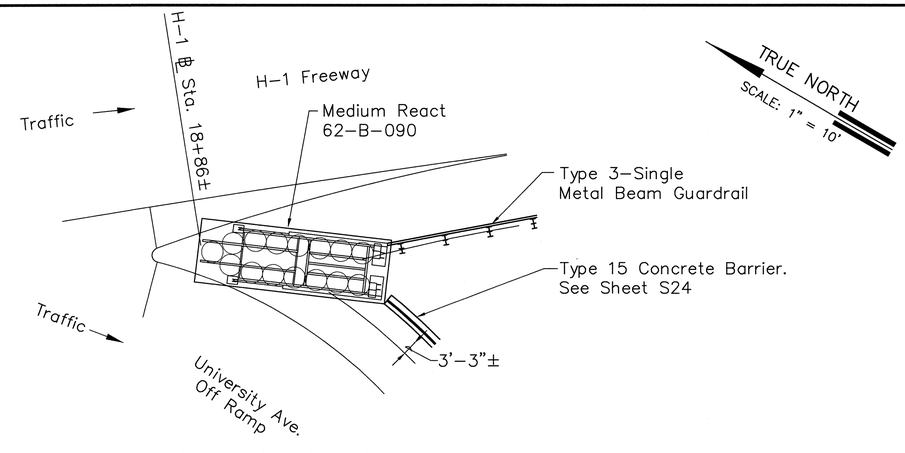
(WESTBOUND)
(UNIVERSITY AVENUE ON RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'



(EASTBOUND)
(OLD WAIALAE ROAD ON RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'



QUARDGUARD LMC SYSTEM PLAN



MEDIUM REACT PLAN

(EASTBOUND)
(UNIVERSITY AVENUE OFF RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98
SCALE: 1 = 10
FILE: 9815-198
PM: BST
OPER: SHA.*FAI
REVISED: 05/04/99

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

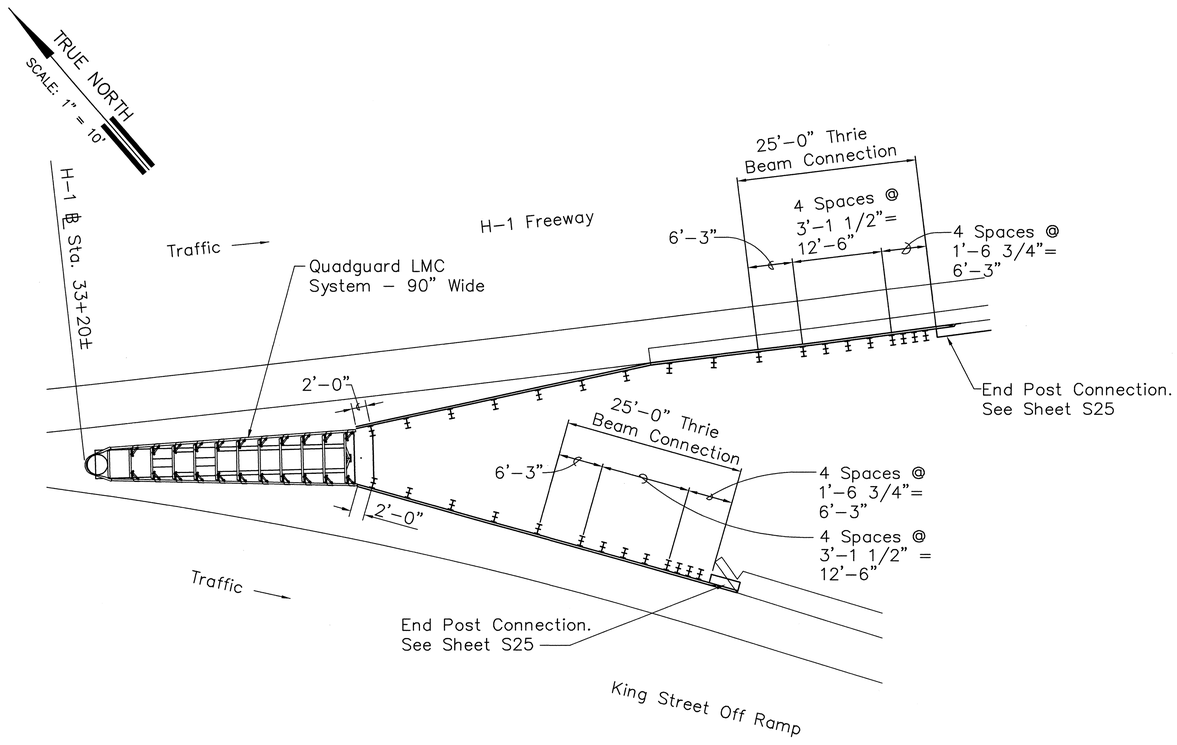
IMPACT ATTENUATOR DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

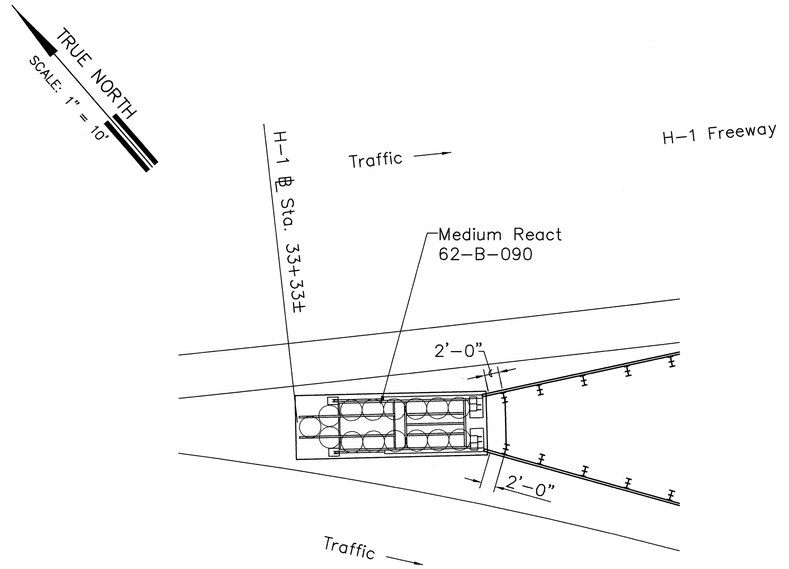
Scale: 1"=10' Date: June 1, 1999

SHEET NO. R31 OF 34 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	60	557



QUARDGUARD SYSTEM PLAN



MEDIUM REACT PLAN

(EAST BOUND)
(KING STREET OFF RAMP)

IMPACT ATTENUATOR DETAILS

SCALE: 1"=10'

ROTATED: 73° 11' 04.08"
AT 0,0

DATE: 6/17/98
SCALE: 1" = 10'
FILE: 9815-199

PM: BST
OPER: SHA,*FAI
REVISED: 05/04/99

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

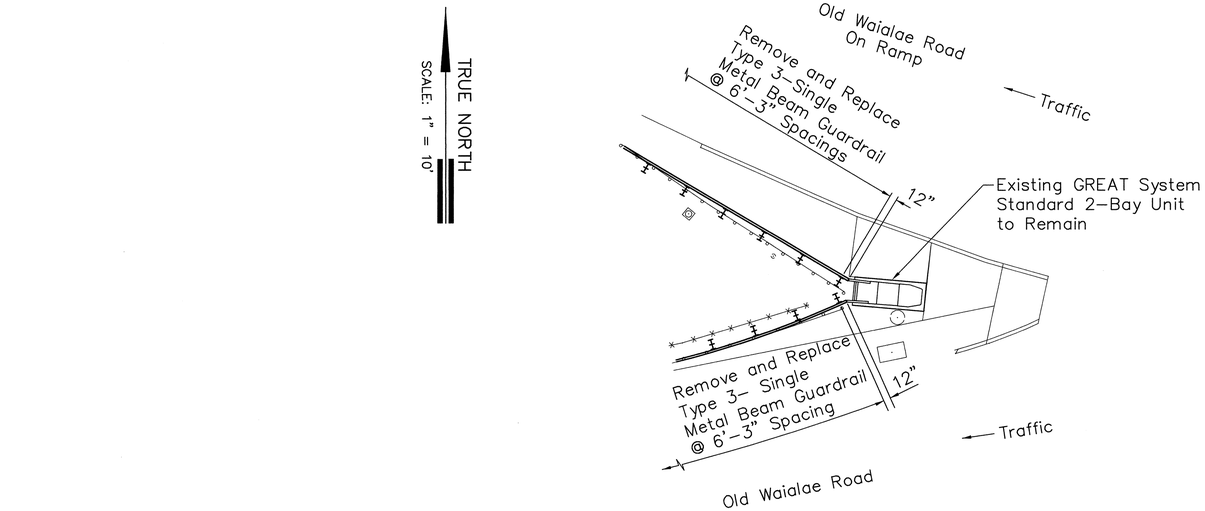
IMPACT ATTENUATOR DETAILS

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)

Scale: 1"=10' Date: June 1, 1999

SHEET NO. **R32** OF **34** SHEETS

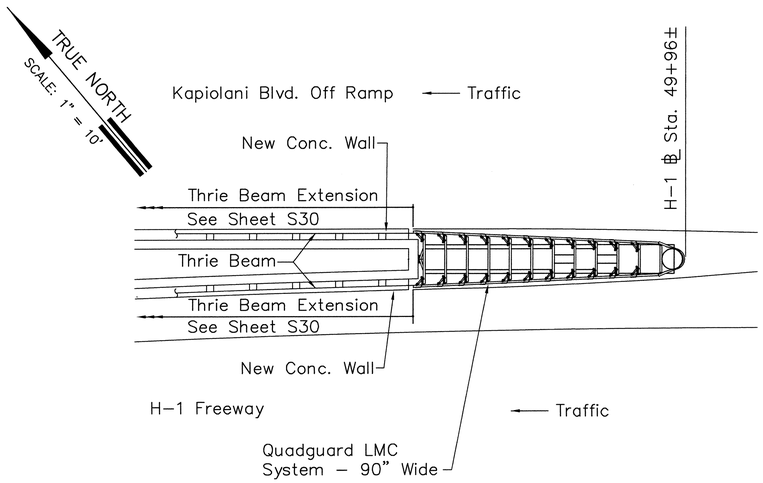
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H1-1(234)	2000	61	557



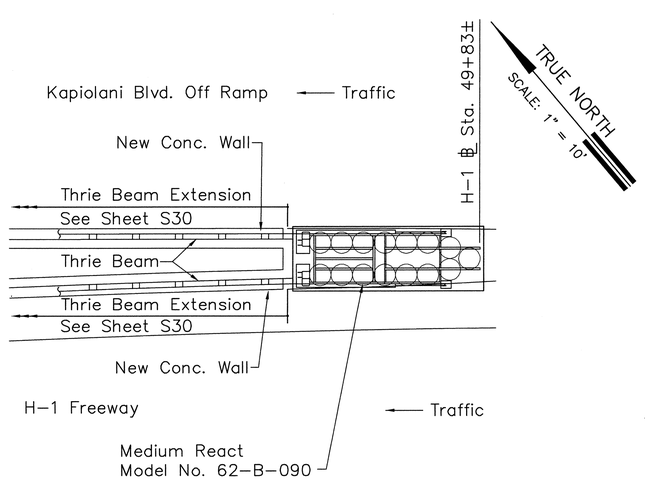
(WEST BOUND)
(OLD WAIALAE ROAD ON RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'

IMPACT ATTENUATOR SCHEDULE

LOCATION	QS 3003Y	QS 9003Y	QS 6906Y	QS 9006Y	QUADGUARD LMC - 69" WIDE OR MEDIUM REACT 55-B-72	QUADGUARD LMC - 90" WIDE OR MEDIUM REACT 62-B-090
Kinau St. Off Ramp (EB)						1
Vineyard Blvd. Off Ramp (WB)					1	
Lunalilo St. On Ramp (WB)	1					
Lunalilo St. Off Ramp (WB)						1
Bingham St. Off Ramp (EB)			1			
Wilder Avenue. Off Ramp (WB)				1		
University Ave. On Ramp (WB)	1					
University Ave. Off Ramp (EB)						1
Old Waialae Rd. On Ramp (EB)		1				
King St. Off Ramp (EB)						1
Kapiolani Blvd. Off Ramp (WB)						1
TOTAL	2	1	1	1	1	5



QUARDGUARD LMC SYSTEM PLAN



MEDIUM REACT PLAN

(WEST BOUND)
(KAPIOLANI BLVD. OFF RAMP)
IMPACT ATTENUATOR DETAILS
SCALE: 1"=10'

NOTES:

1. Existing Sand Barrels to be Removed.
2. See Sheet S30 for Connection Details to Existing Bridge Deck.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

IMPACT ATTENUATOR DETAILS AND SCHEDULE

INTERSTATE ROUTE H-1 RESURFACING
Vic. of Punchbowl Off Ramp to Kapiolani IC
F.A.I Project No. IM-H1-1(234)
Scale: 1"=10' Date: June 1, 1999

SHEET NO. R33 OF 34 SHEETS

ROTATED: 73° 11' 04.08" AT 0,0
DATE: 6/17/98 SCALE: 1 = 10 FILE: 9815-200
PM: BST OPER: SHA*FAI REWISED: 05/04/99

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