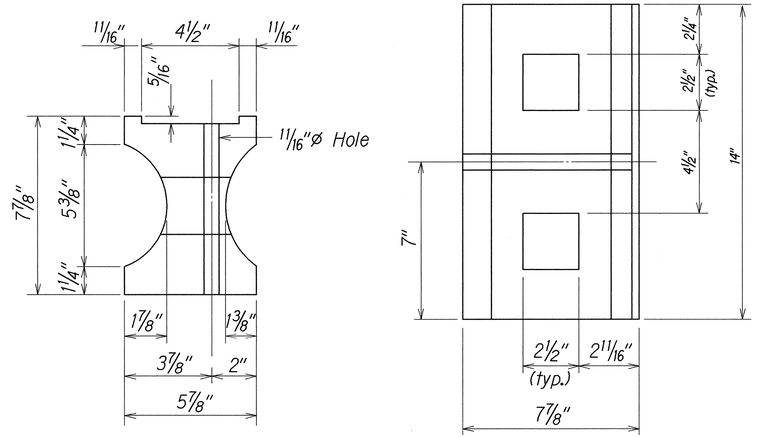
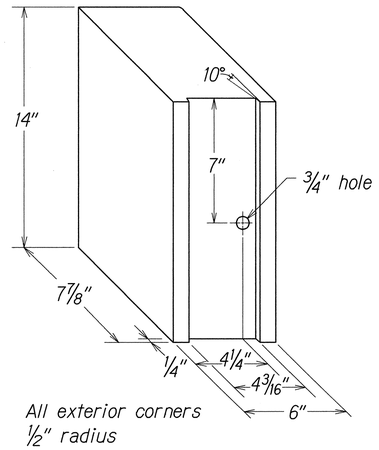
FED. RDAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-99	2004	19	22

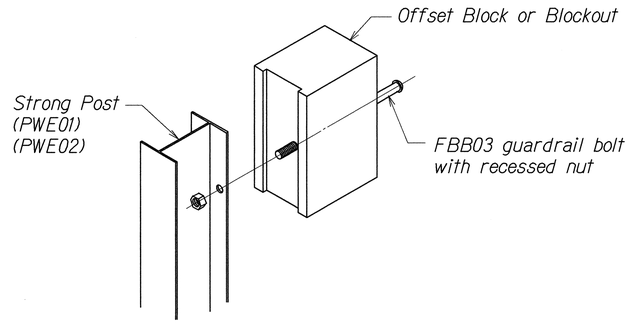


TOP SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)

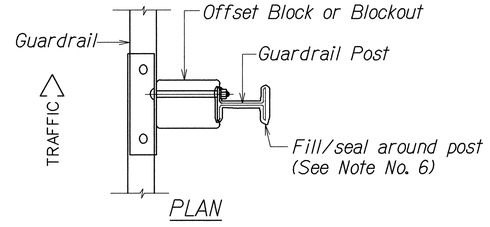


RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

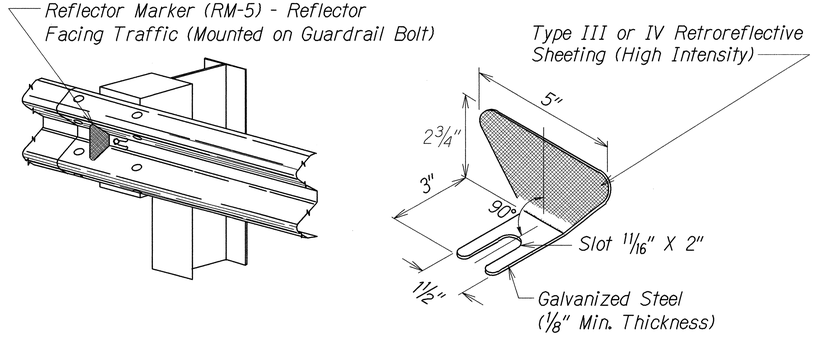


Exploded View
(Rail and washer not shown)

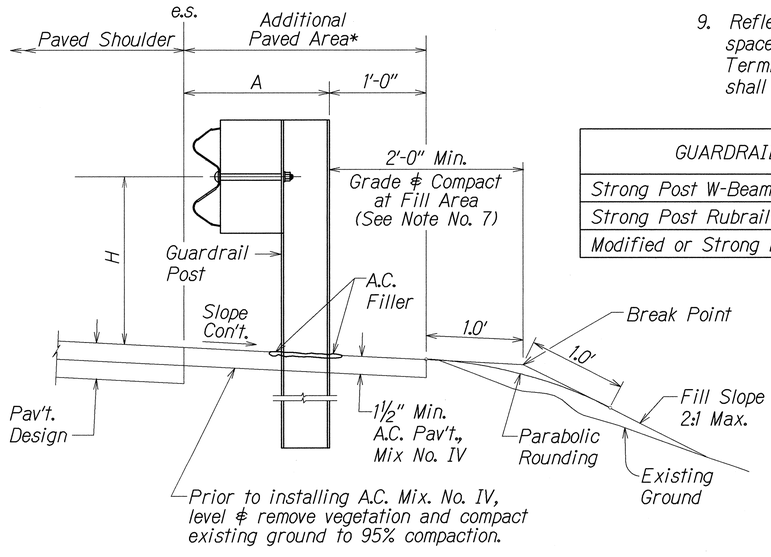
STEEL POST AND BLOCK DETAIL



PLAN



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



ELEVATION

TYPICAL GUARDRAIL INSTALLATION

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

GENERAL NOTES

1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified.
3. All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02b, etc.) shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware", a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fastners, posts and rail elements have been converted from metric units into their present form.
4. The Recycled Plastic Block or Offset Block shall be approved by the State.
5. All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
6. After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
7. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
8. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
9. Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. RM-5's shall not be installed on Terminal Sections. Furnishing and installing of each RM-5 shall be considered incidental to the adjacent guardrail system.

REDUCED PLAN
(HALF SIZE)
0 1 2 3
3 INCHES OF ORIGINAL PLAN

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

KAY MURANAKA LICENSED PROFESSIONAL ENGINEER No. 2330-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

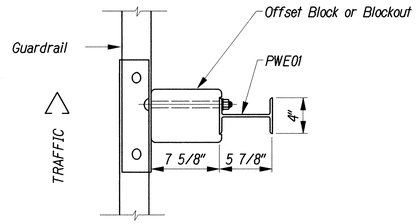
GUARDRAIL DETAILS & NOTES

KALANIANAOLE HIGHWAY REALIGNMENT
MP 7.20 to MP 7.72
Project No. 72B-01-99

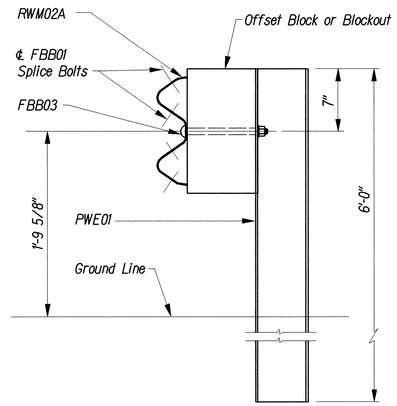
Scale: As Shown Date: May 2004

SHEET NO. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-99	2004	ADD.MS-1	22



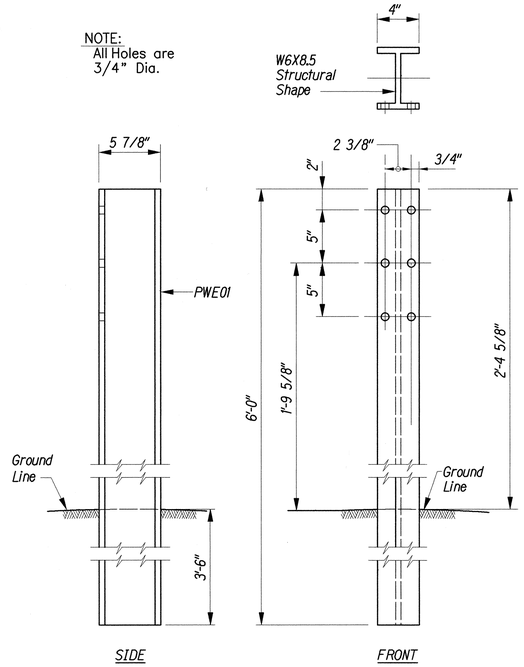
PLAN



ELEVATION

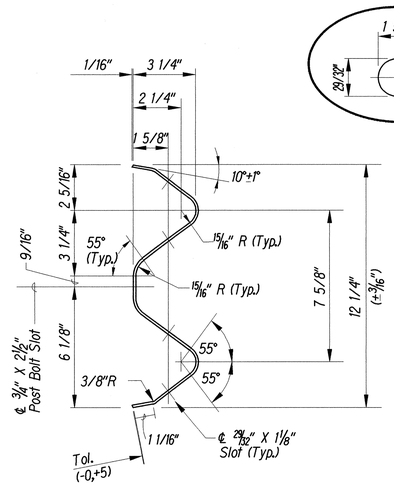
STRONG POST W-BEAM GUARDRAIL (SGR04A)

NOTE:
All Holes are 3/4" Dia.

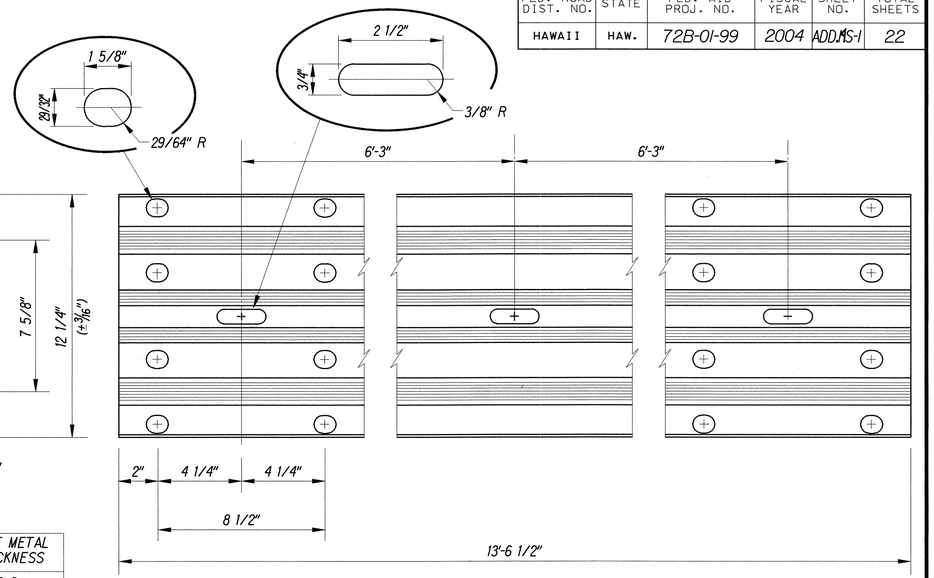


SIDE FRONT

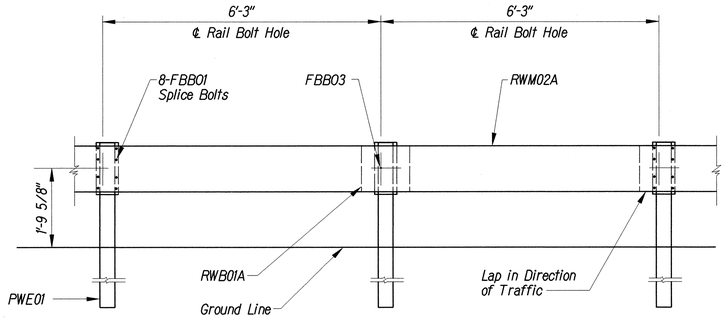
W-BEAM STRONG POST (PWE01)



DESIGNATOR	BASE METAL THICKNESS
RWM02A	12 Gauge

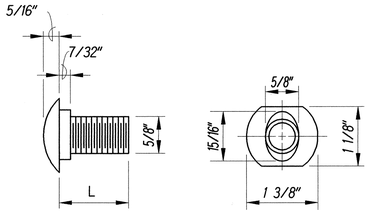


2 SPACE W-BEAM GUARDRAIL (RWM02A)

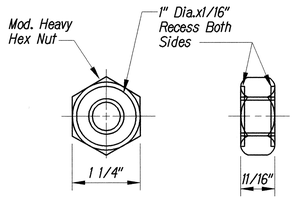


ELEVATION

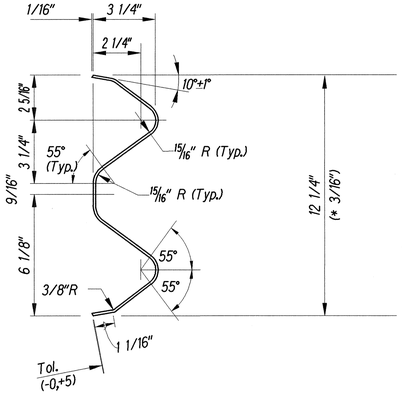
STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



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



GUARDRAIL BOLTS AND RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01A	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01A)

DATE	REVISION
6/10/04	1 Added Sheet

KAY MURANAKA
LICENSED PROFESSIONAL ENGINEER
No. 2330-C
HAWAII, U.S.A.

LICENSE EXP. DATE 04-30-06

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR TITLE 16, CHAPTER 115, RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND SURVEYORS, STATE OF HAWAII.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST BEAM GUARDRAIL

KALANIANAOLE HIGHWAY REALIGNMENT
MP 7.20 to MP 7.72
Project No. 72B-01-99

Scale: As Shown Date: May 2004

SHEET No. 2 OF 2 SHEETS

ADD. 19 S-1

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

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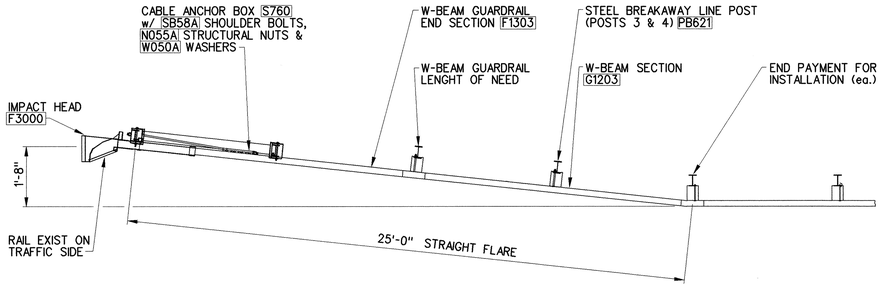


PLAN

TRAFFIC

STANDARD W-BEAM
GUARDRAIL LINE POSTS

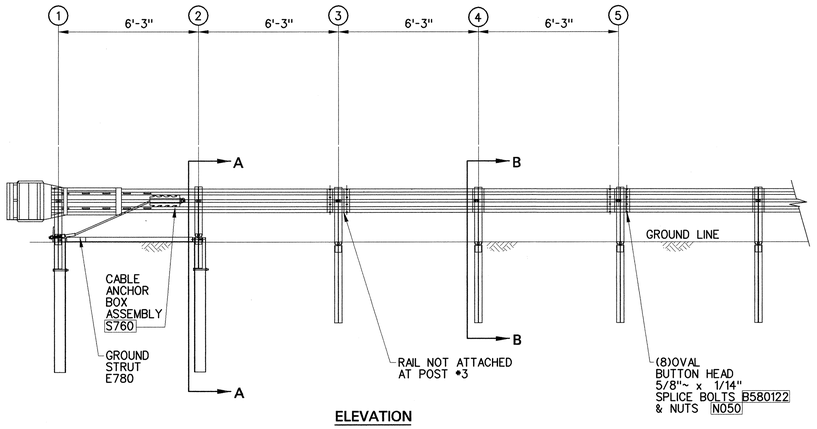
GENERAL NOTES:

1. BREAKAWAY STEEL POSTS ARE REQUIRED WITH THE FLEAT TERMINAL.
2. ALL BOLTS, NUTS, CABLE ASEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
3. THE SOIL TUBE SHALL NOT PORTRUDE MORE THAN 4" ABOVE GROUND (MEASURED ALONG A 5' CARD). 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 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. (R) OR (L) INDICATES RIGHT OR LEFT IMPACT HEAD REFLECTOR MARKER (IHRM). PROVIDING AND INSTALLING OF IHRM SHALL BE CONSIDERED INCIDENTAL TO END TREATMENT.
8. THE STRIPES FOR IHRM SHALL SLOPE DOWNWARD AT AN ANGLE OF 45° TOWARDS THE SIDE OF THE END TREATMENT THAT TRAFFIC IS TO PASS.

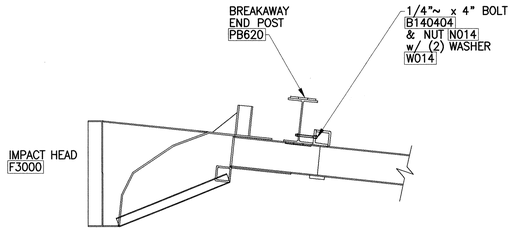
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-99	2004	20	22

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
G1203	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'-0"
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
PB620	2	BREAKAWAY END POST
PB621	3	BREAKAWAY LINE POST
	2	RECYCLED PLASTIC BLOCKOUT OR OFFSSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		HARDWARE
B580122	17	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	3	5/8" DIA. x 10" H.G.R. BOLT (POSTS 3 & 4)
N030	2	3/4" DIA. HEX NUT
N050	21	5/8" DIA. H.G.R. NUT (SPLICE 16, SOIL TUBES 2, POSTS 2, 1; POSTS 3 & 4, 3)
W030	4	3/4" I.D. WASHER
W050	3	H.G.R. 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 5/16" ID A325 STR. WASHER

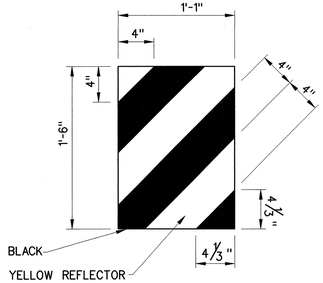
FOUNDATION TUBE OPTIONS FOR POSTS 1 & 2
- *6'-0" SPLIT FOUNDATION TUBE S730
- *6'-0" SOLID FOUNDATION TUBE E731
- *5'-0" FOUNDATION TUBE S735 w/ SOIL PLATE SP600
- *4'-6" FOUNDATION TUBE E735 w/ SOIL PLATE SP600



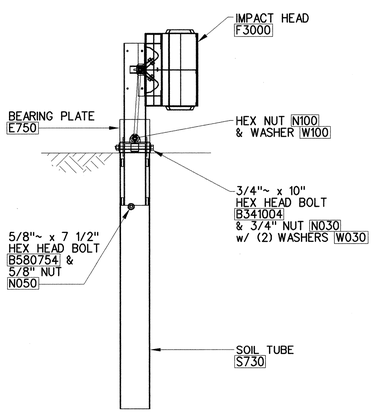
ELEVATION



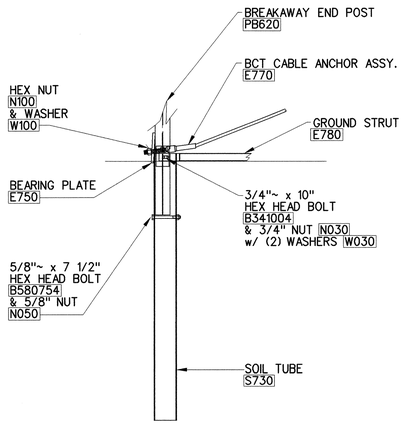
IMPACT HEAD CONNECTION DETAIL
NO SCALE



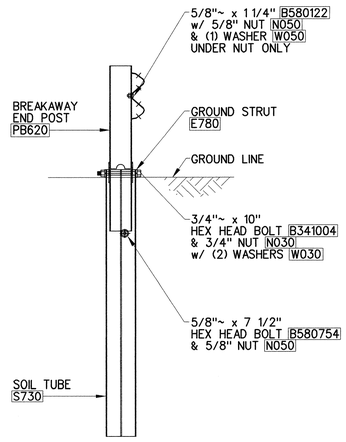
IHRM(R)
IMPACT HEAD REFLECTOR MARKER INSERT DETAIL



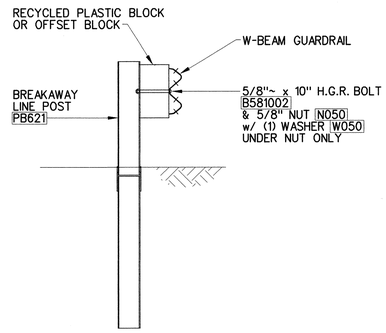
FRONT VIEW OF POST 1



PARTIAL VIEW OF POST 1



SECTION A–A
AT POST *2



SECTION B–B
TYPICAL @ POST 3 & 4
NOTE: RAIL NOT BOLTED @ POST 3

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

KAY MURANAKA
LICENSED PROFESSIONAL ENGINEER
No. 2330-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350 FLARED ENERGY ABSORBING TERMNINAL

KALANIANAOLE HIGHWAY REALIGNMENT
MP 7.20 to MP 7.72
Project No. 72B-01-99

Scale: As Shown Date: May 2004

SHEET No. / OF / SHEETS

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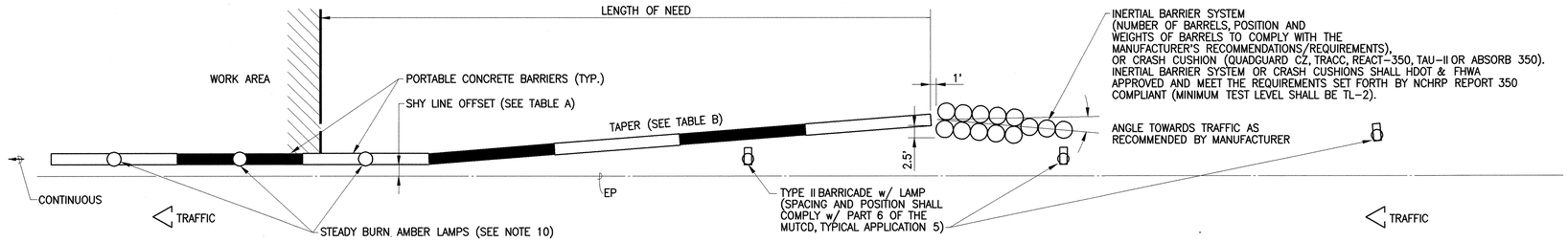
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-99	2004	21	22

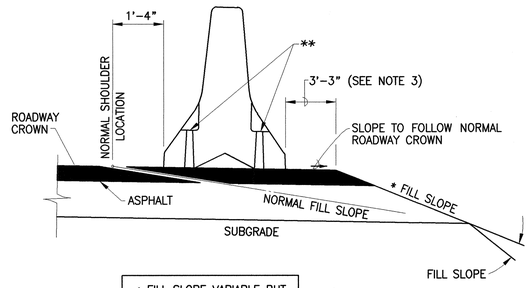


TYPICAL DETAIL – PORTABLE CONCRETE BARRIER END TREATMENT

SCALE: 1" = 10'-0"

METAL REINFORCEMENT TABLE

MARK	LOCATION	BAR SIZE	(NO. BARS)	SKETCH
H-1	HORIZONTAL IN BARRIER TIED INSIDE V-1 BARS	#5	(6)	19'-3"
H-2	CENTERED ABOVE SCUPPERS LONG, & TRANSVERSELY	#5	(6)	6'-6"
H-3	TIED ABOVE H-1 BARS TO SUPPORT H-2, TIED TO V-1	#4	(2)	1'-6"
S-1	HORIZONTAL IN TOP OF WING WALL & IN FLOOR BACK WALL	#4	(2)	R=3⅜" 2'-5" 90° LIFTING HOLE
S-2	HORIZONTAL AROUND SLOTS BETWEEN V-1's @ SCUPPERS	#4	(2)	R=1½" SLOTS 7" 1'-6" 1" MIN. CLEAR TO BAR; 5'-1" BAR w/(4) 1 1/2 "R BENDS & MIN. 1'-0" OVERLAP
V-1	VERTICAL BARRIER (3) EACH END & (2) AT EACH SCUPPER	#5	(16)	TOTAL LENGTH 4'-9" R=2⅜" 12° 9½" 4⅜" 2'-1⅜"



* FILL SLOPE VARIABLE BUT NOT STEEPER THAN 2:1
** NO STABILIZATION PINS (SEE NOTE NOS. 3 & 4)

STANDARD INSTALLATION

(SEE NOTE NO. 1)

TABLE A

SHY LINE OFFSETS *

DESIGN SPEED (mph)	SHY LINE OFFSETS
70	10.0'
65	9.0'
60	8.5'
55	7.0'
50	6.5'
45	6.0'
40	5.0'
35	4.5'
30	3.5'
≤ 25	2.0'

TABLE B

MAXIMUM TAPERS FOR CONCRETE BARRIER

DESIGN SPEED (mph)	TAPER	
	INSIDE SHY LINE	BEYOND SHY LINE
70	30:1	20:1
65	28:1	19:1
60	26:1	18:1
55	24:1	16:1
50	21:1	14:1
45	18:1	12:1
40	17:1	11:1
35	15:1	9:1
≤ 30	13:1	8:1

* NOTE: MINIMUM SHY LINE OFFSET FOR TANGENT SECTIONS SHALL BE 2'-0".

NOTES:

1. FOR END TREATMENT, LAYOUT, CRASH CUSHIONS AND WHERE NEEDED SEE PROJECT PLANS OR SPECIAL PROVISIONS.
2. BARRIER MUST BE PINNED TOGETHER AND CANNOT EXCEED THE TABLE OF MAXIMUM TAPERS.
3. THE CONCRETE BARRIER "STANDARD INSTALLATION" DESIGN ALLOWS FOR 3'-3" OF OUTWARD LATERAL MOVEMENT SHOULD BARRIER IS STRUCT. BARRIER INSTALLATION THAT REQUIRE LESS THAN THE 3'-3" OF OUTWARD LATERAL MOVEMENT SHOULD HAVE STABILIZATION PINS.
4. ASTM A-36 STEEL SHALL BE USED FOR THE CONNECTION PIN, CONNECTION LOOPS AND STABILIZATION PINS. A ONE PIECE PIN WITH A 3" ROUNDED TOP MAY BE USED IN PLACE OF THE DETAILED CONNECTION PIN IF THE ONE PIECE PIN MEETS ASTM A-36 REQUIREMENTS.
5. A 4" WHITE PVC SLEEVE MAY BE USED TO FORM THE LIFTING HOLE AND IF USED THE SLEEVE IS TO BE LEFT IN PLACE.
6. CONCRETE SHALL BE CLASS A AND REINFORCING SHALL BE GRADE 60.
7. IDENTIFICATION AND DATE OF DESIGN WILL BE AS FOLLOWS:

   PROPERTY
   OF HDOT
   OCT 2001

   TEXT LETTERS AND NUMBERS SHALL BE SHOWN AS ON STANDARD PLAN SHT. B-01. "PROPERTY OF HDOT" MAY BE CHANGED DEPENDING UPON OWNERSHIP. ALL PORTABLE CONCRETE BARRIER MADE FOR HDOT WILL BE SUBJECT TO REJECTION, IF "PROPERTY OF HDOT" IS NOT IMPRINTED. THE CONTRACTOR SHALL BEAR THE COST OF THE REJECTED PORTABLE CONCRETE BARRIERS.
8. MINIMUM TANGENT LENGTH FOR PORTABLE CONCRETE BARRIER SYSTEM SHALL BE 100' (5 UNITS). THIS MINIMUM DOES NOT INCLUDE THE REQUIRED SYSTEM LENGTH OF THE INERTIAL BARRIER SYSTEM.
9. INSTALL STEADY BURN AMBER LAMPS ON PORTABLE CONCRETE BARRIERS @ 20.0' O.C. INSTALLATION, MAINTAINING AND REMOVING EACH STEADY BURN AMBER LAMP INCLUDING CHANGING OF BATTERIES AND BULBS SHALL BE CONSIDERED INCIDENTAL TO APPLICABLE PORTABLE CONCRETE BARRIER ITEMS.

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

KAY MURANAKA
LICENSED PROFESSIONAL ENGINEER
No. 2330-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PORTABLE CONCRETE BARRIER

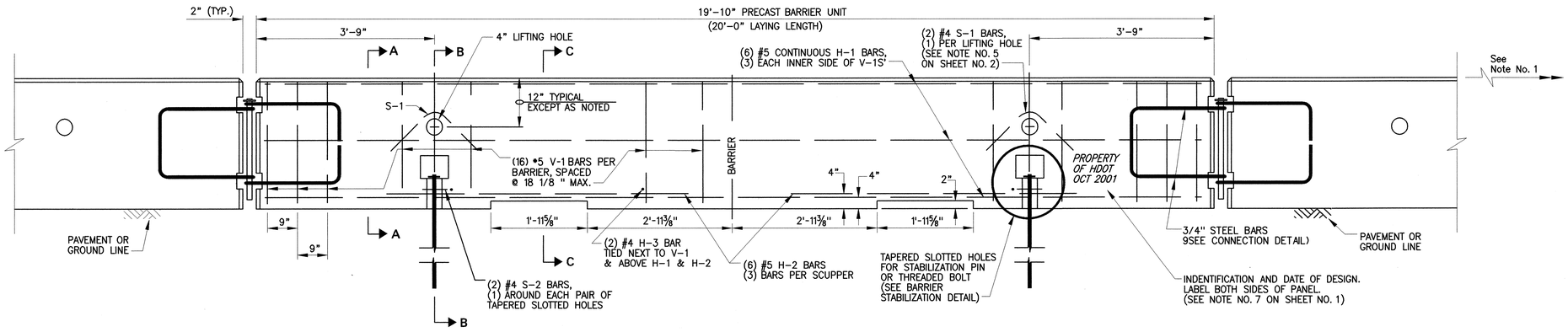
KALANIANAOLE HIGHWAY REALIGNMENT
MP 7.20 to MP 7.72
Project No. 72B-01-99

Scale: As Shown Date: May 2004

SHEET No. 1 OF 2 SHEETS

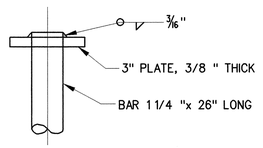
I:\CAD\Stuart\Kal_Hwy\Dgn\detbarr2.dgn

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72B-01-99	2004	22	22



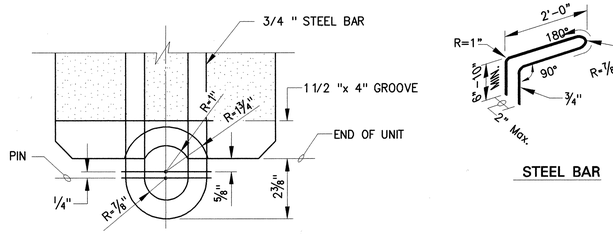
ELEVATION – TYPICAL BARRIER

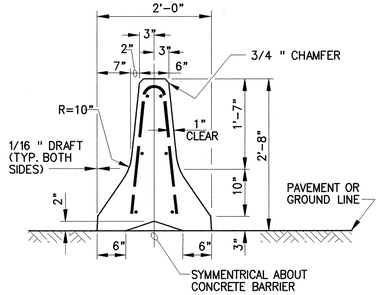
MASS: 3.9 TONS PER PANEL

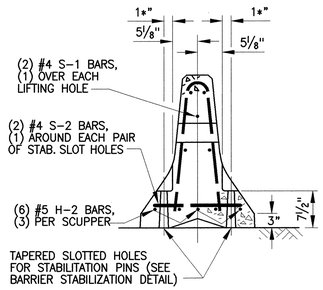


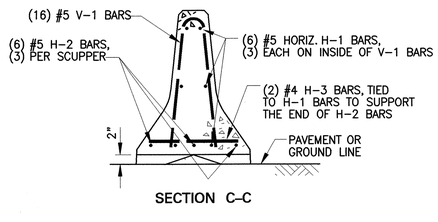
CONNECTING PIN

NO SCALE



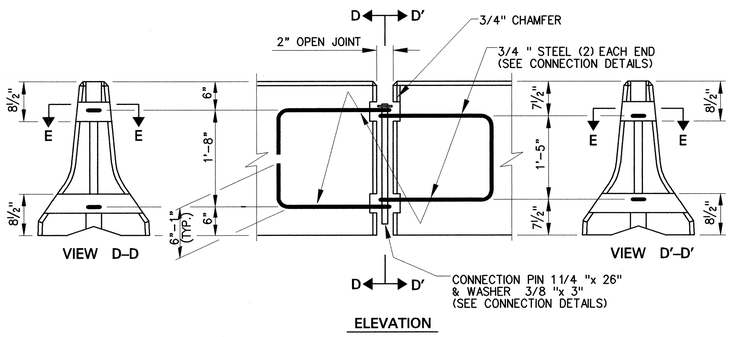


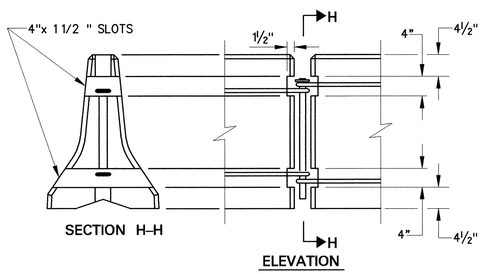




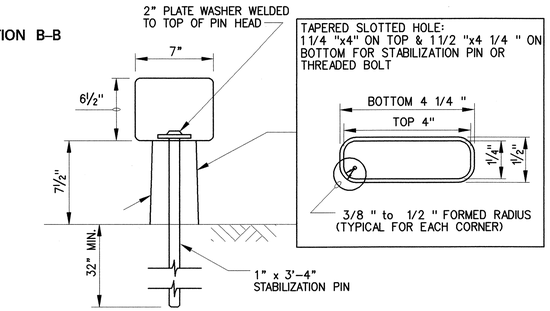
CONNECTION DETAILS

NO SCALE





BARRIER REMOVAL SLOT DETAILS



BARRIER STABILIZATION DETAIL

(SEE NOTE NOS. 3 & 4 ON SHEET NO. 2)

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

KAY MURANAKA
LICENSED PROFESSIONAL ENGINEER
No. 2330-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION

Kay Muranaka

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PORTABLE CONCRETE BARRIER

KALANIANAOLE HIGHWAY REALIGNMENT
MP 7.20 to MP 7.72
Project No. 72B-01-99

Scale: As Shown Date: May 2004

SHEET No. 2 OF 2 SHEETS