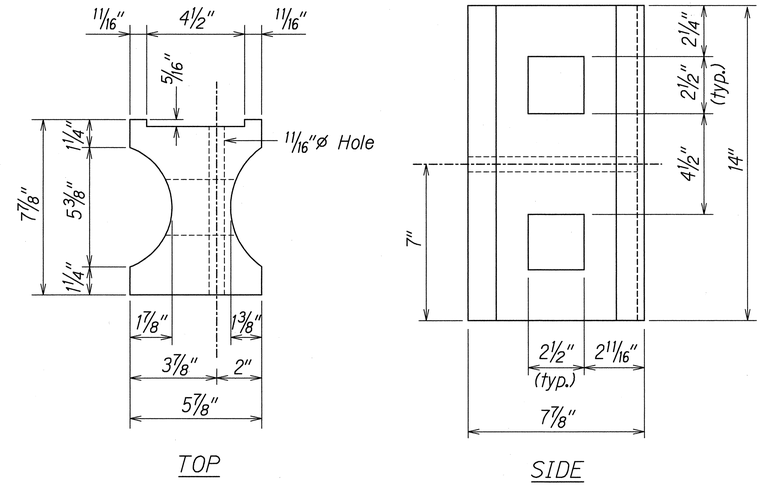
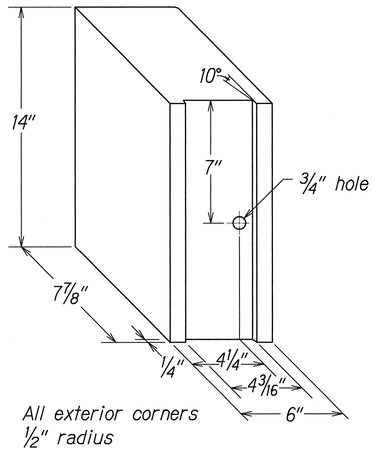
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	96	187

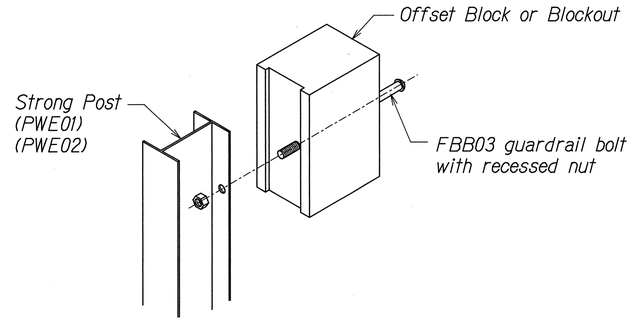


TOP SIDE

RECYCLED PLASTIC BLOCKOUT (TYPE I)

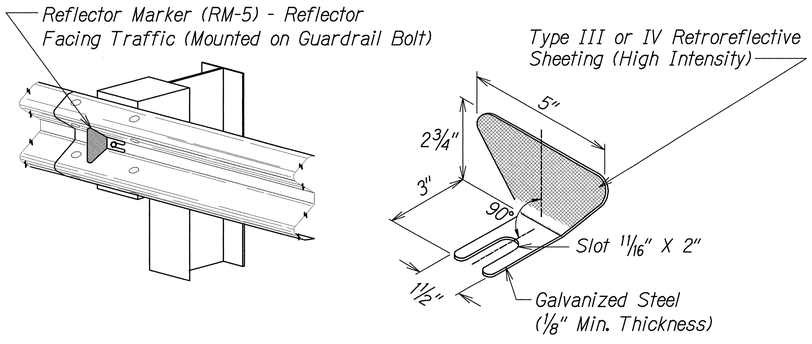


RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

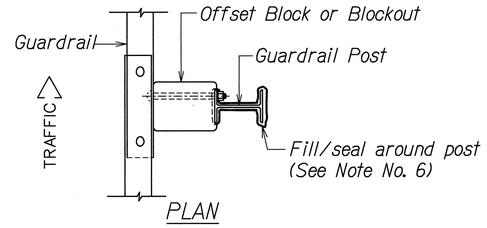


Exploded View
(Rail and washer not shown)

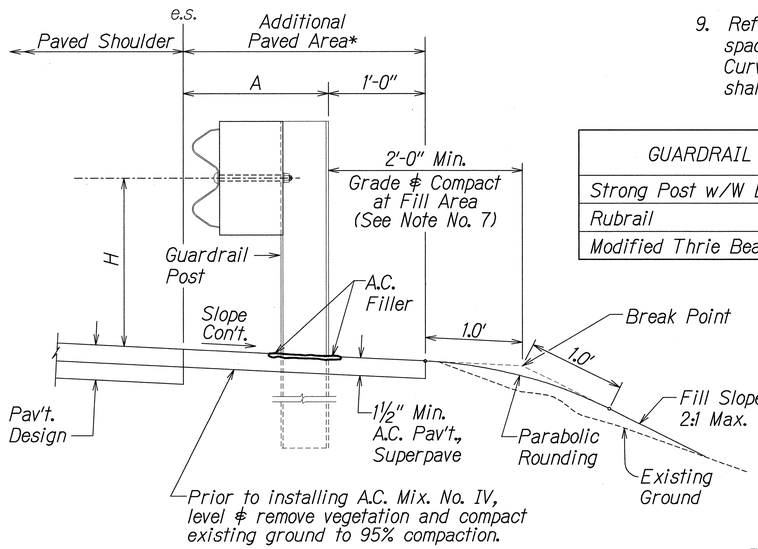
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION

GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post w/W Beam	1'-9 5/8"	1'-6"
Rubrail	2'-0"	1'-6"
Modified 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 200 feet. Spacing of RM-5's on Horizontal Curves shall comply with Table III-1 of the MUTCD. RM-5's shall not be installed on Terminal Sections.

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY JL	
NOTE BOOK	TRACED BY	
N-	DESIGNED BY JL	
	QUANTITIES BY	
	CHECKED BY	

6/13/01 testrevsgn - 4LK-BUSN (standard plan TE-59 09/01/00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

Alan Y. Tomita

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

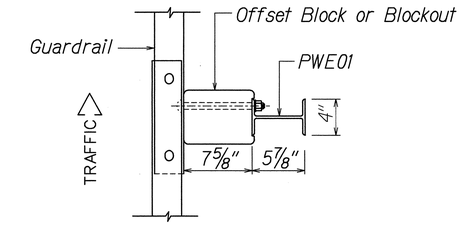
GUARDRAIL DETAILS & NOTES

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

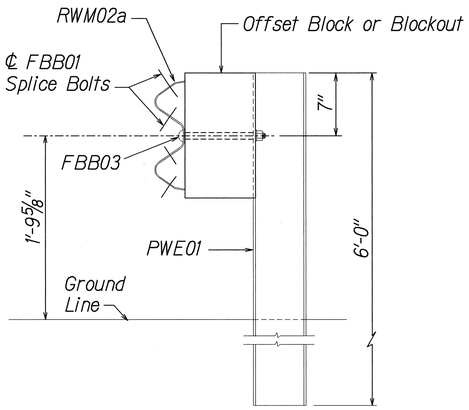
Scale: NTS Date: December, 2001

SHEET No. 1 OF 19 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	97	187



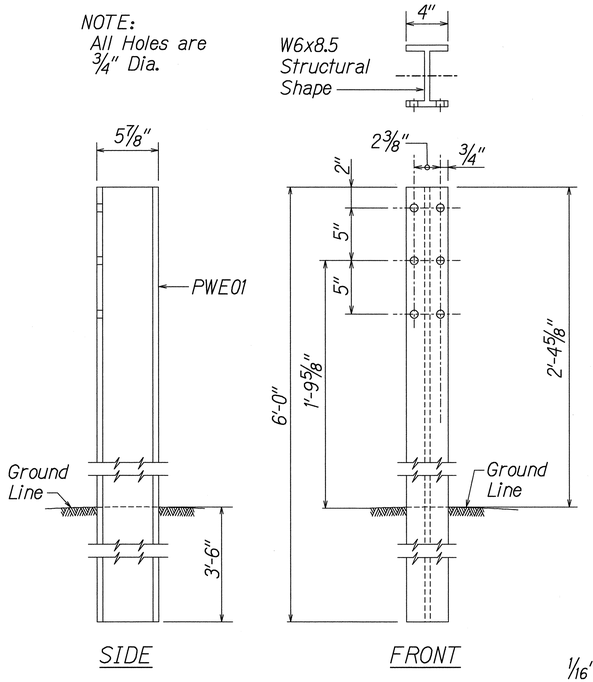
PLAN



ELEVATION

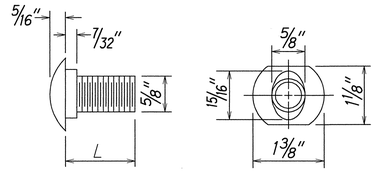
STRONG POST W-BEAM GUARDRAIL (SGR04a)

NOTE:
All Holes are 3/4" Dia.

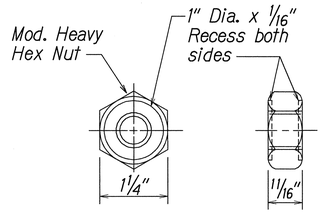


SIDE FRONT

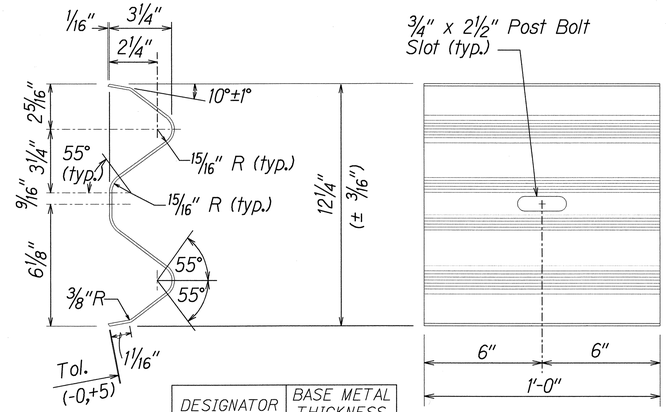
W-BEAM STRONG POST (PWE01)



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

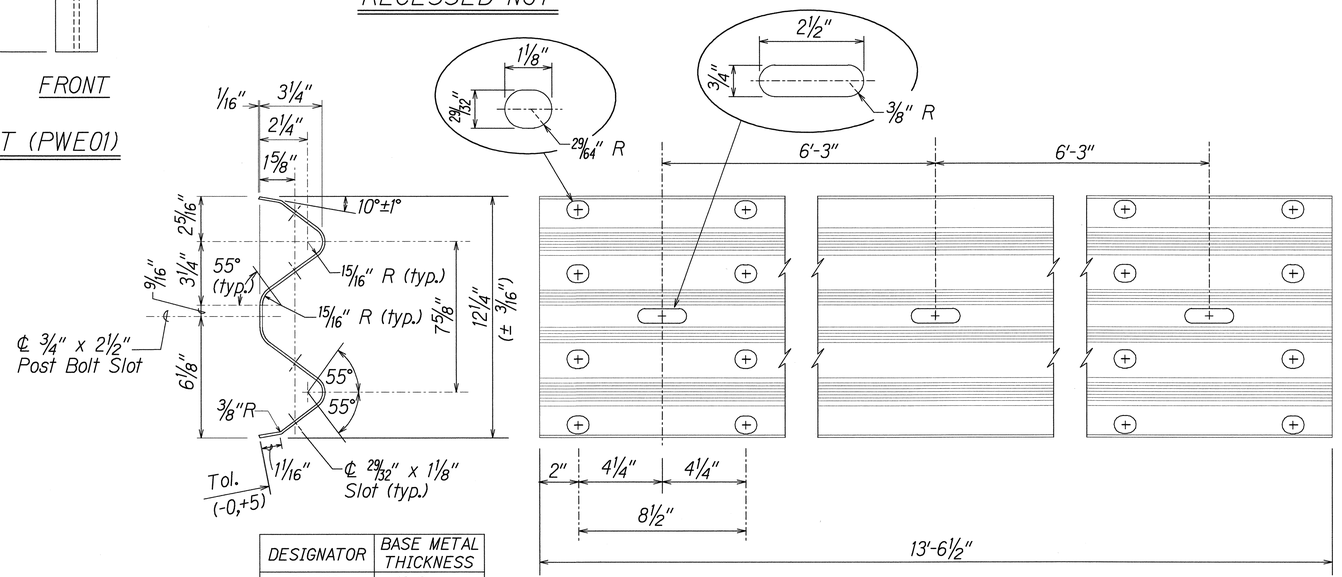


GUARDRAIL BOLTS AND RECESSED NUT



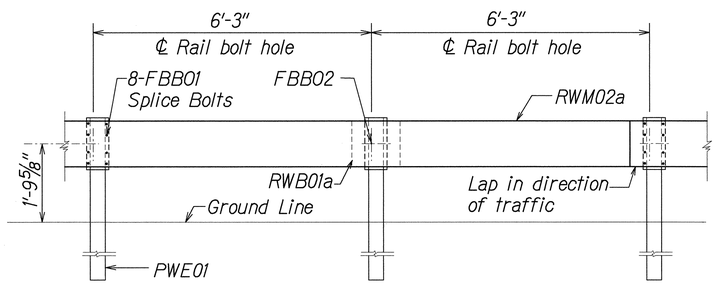
DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)



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

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

12/5/00 w3beamsdgn - 4LIK-12JC61 (standard plan TE-59 03/06/01)

ALAN Y. TOMITA
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NO. 4129-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Alan Y. Tomita

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

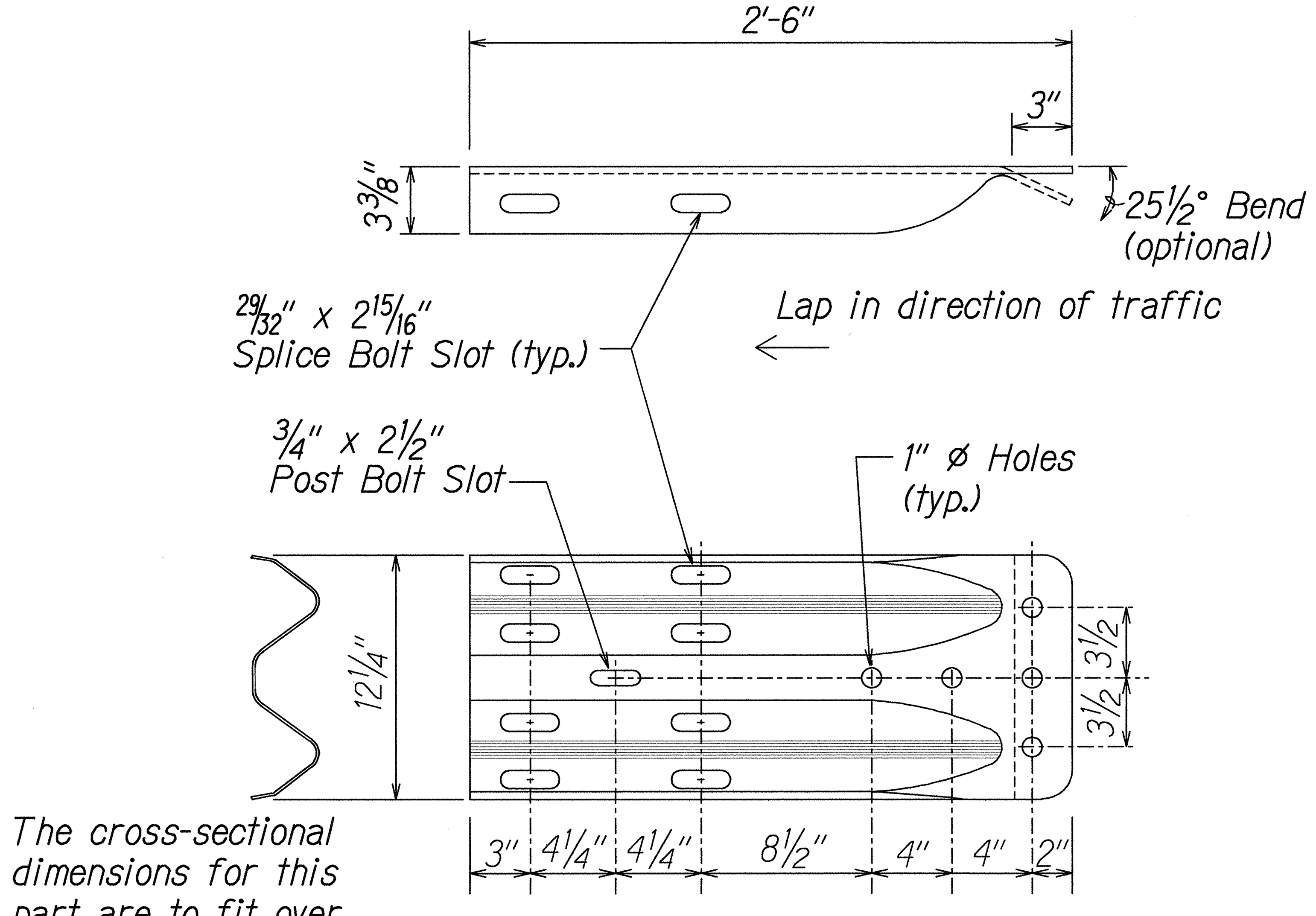
STRONG POST W-BEAM GUARDRAIL

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

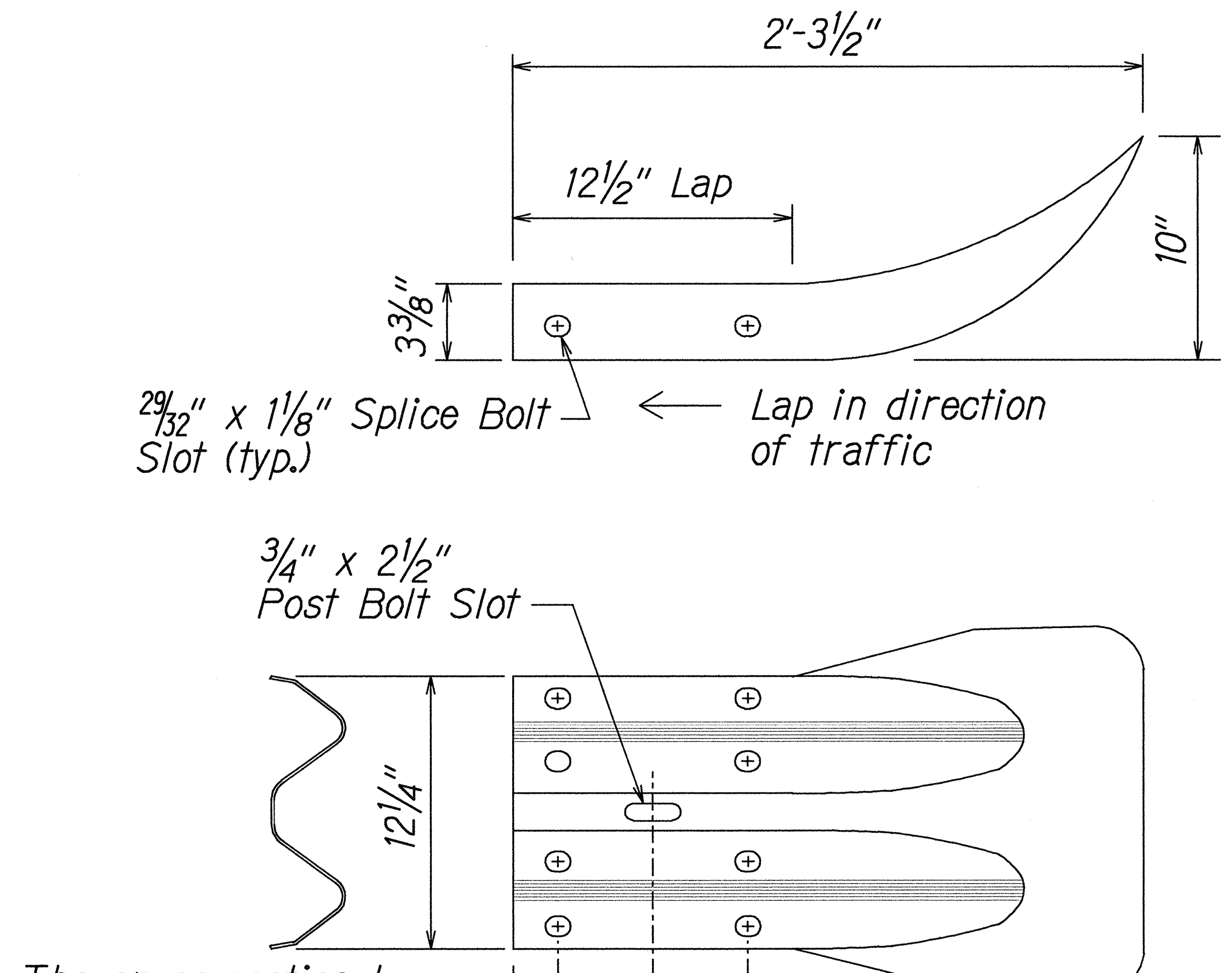
SHEET No. 2 OF 19 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	98	187



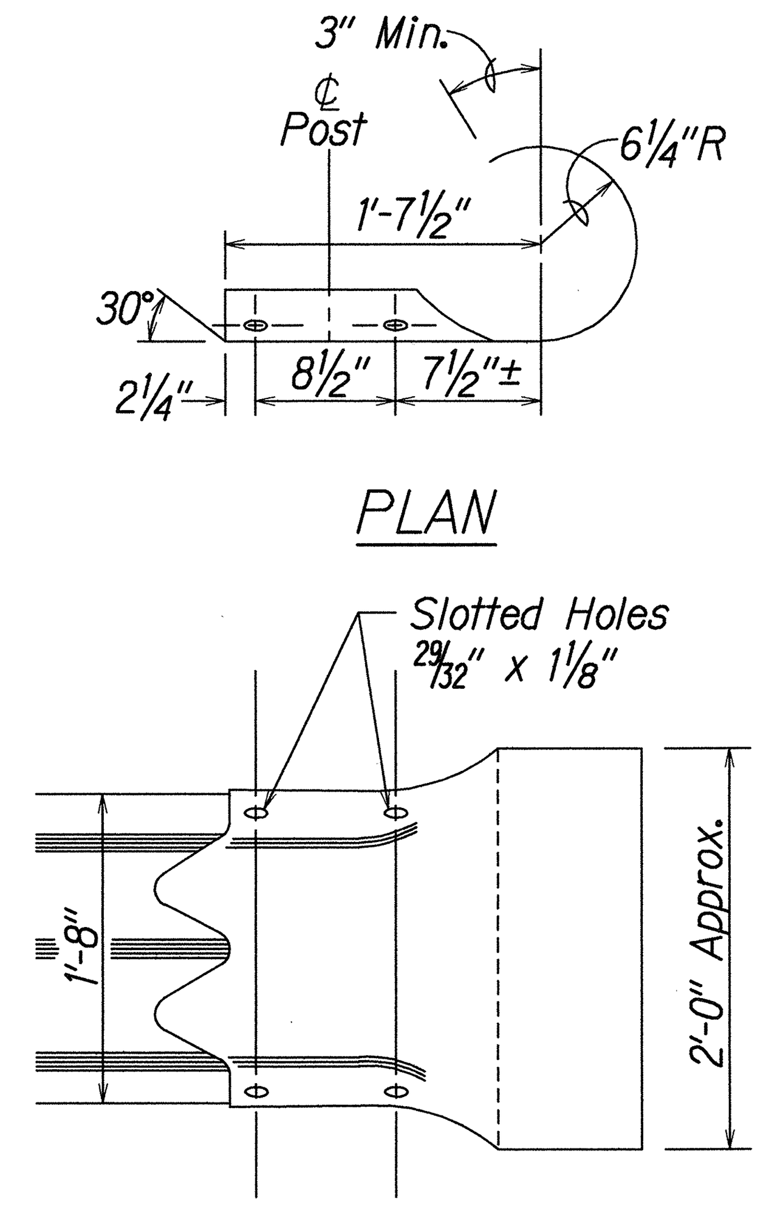
DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

W-BEAM TERMINAL CONNECTOR (RWE02b)



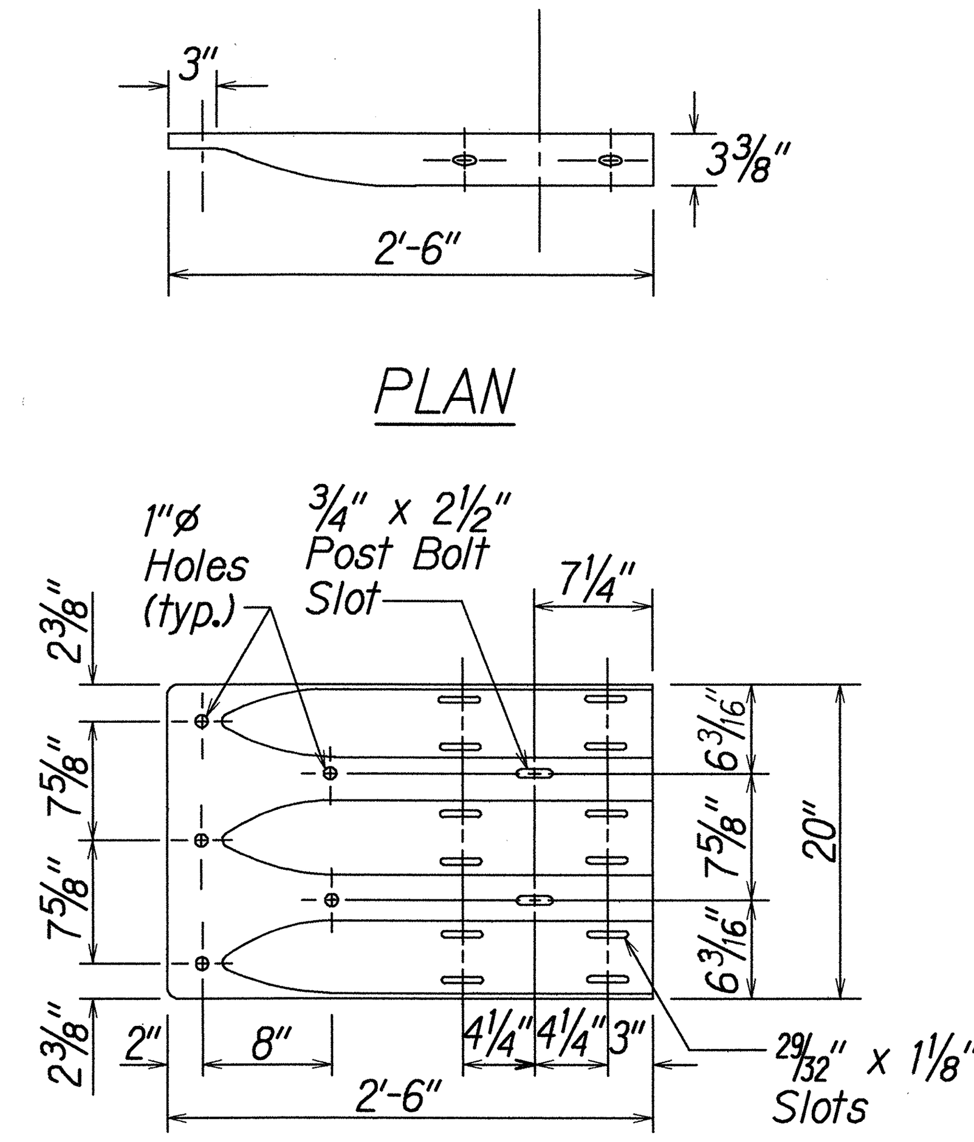
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)



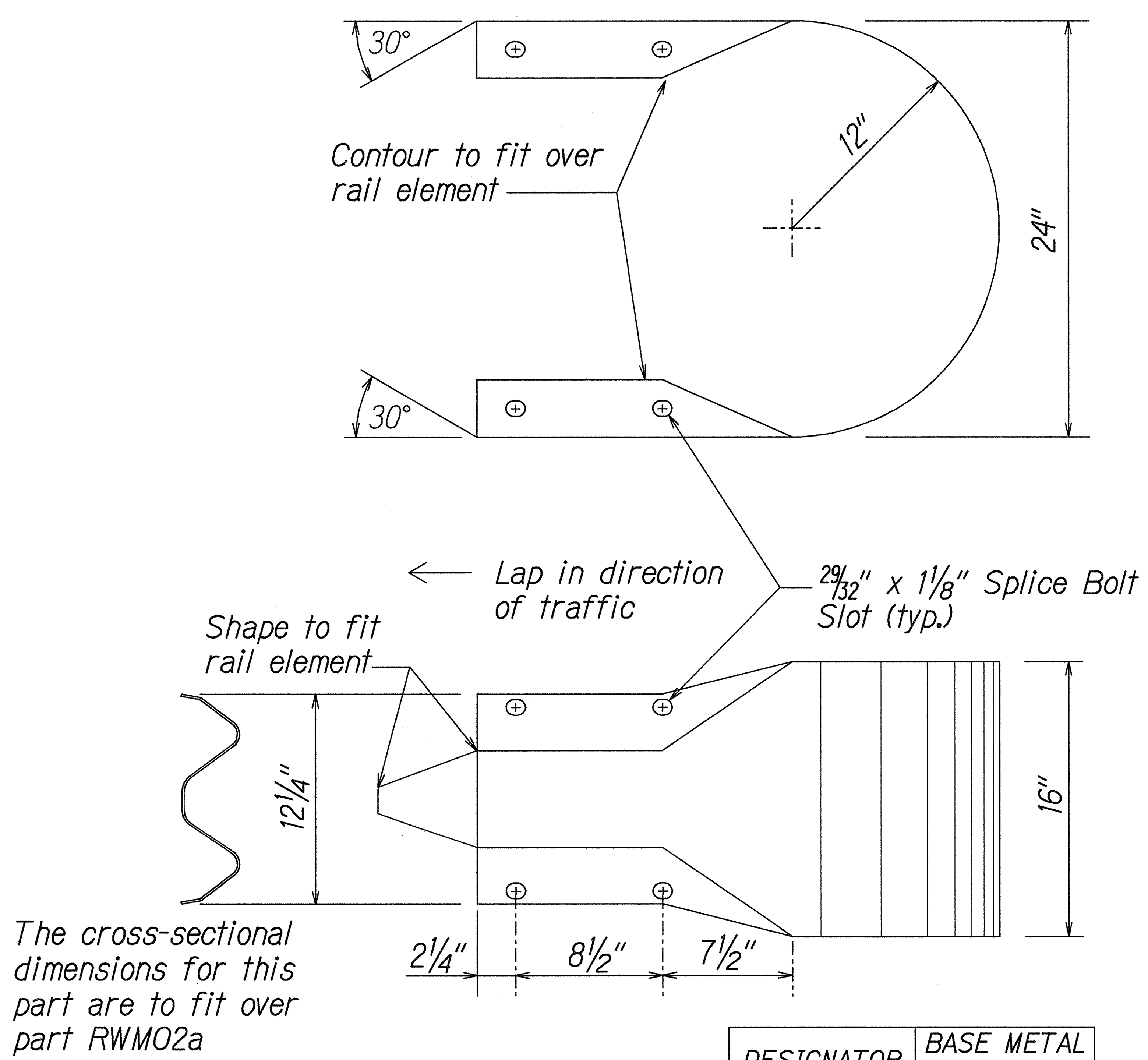
SECTION (ROUNDED)

(RTE02b)



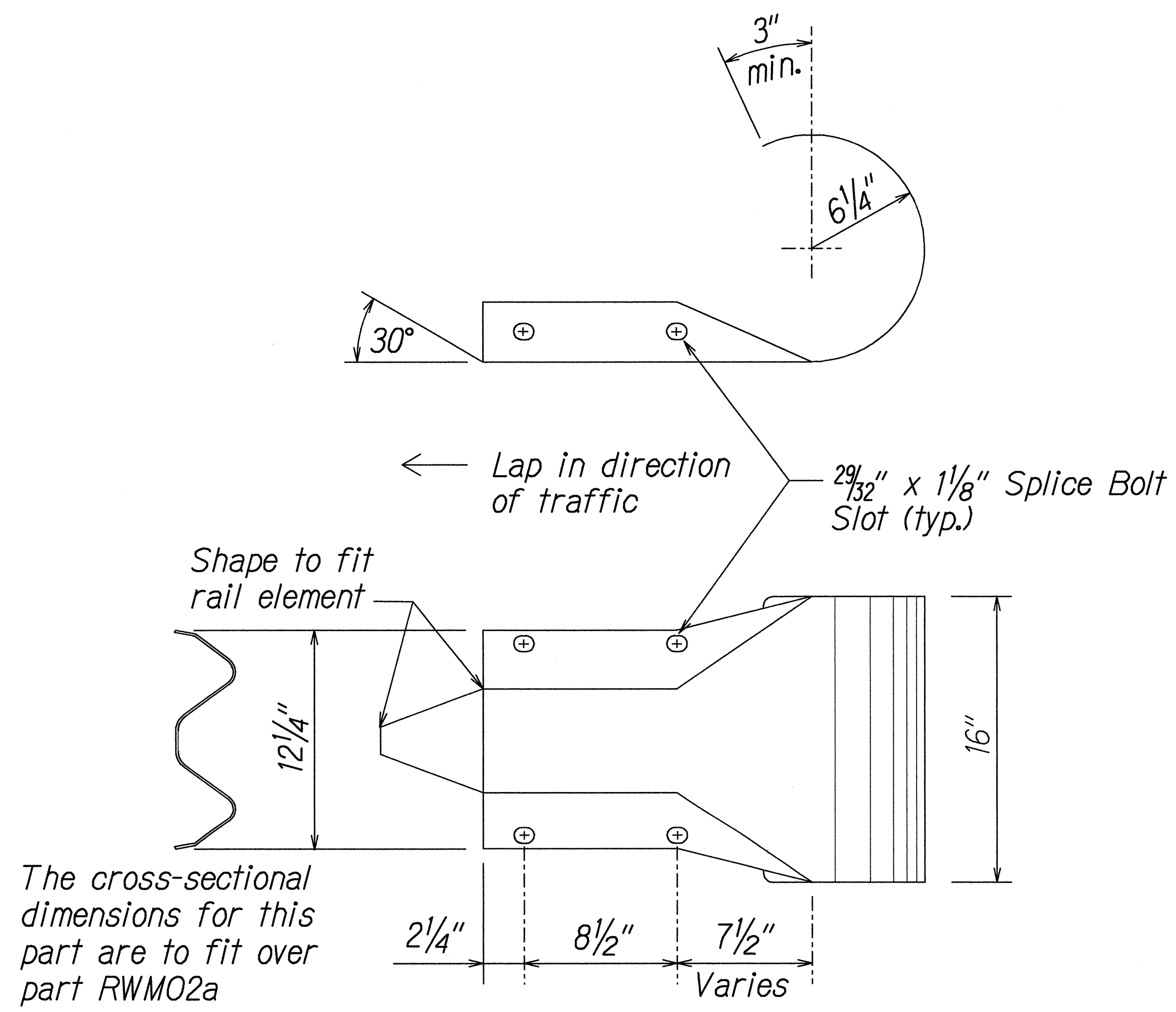
TERMINAL CONNECTOR

(RTE01b)



DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

W-BEAM END SECTION (BUFFER RWE06a)



DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

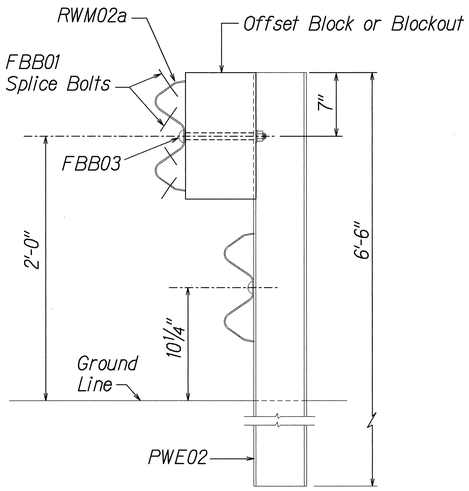
Scale: NTS Date: December, 2001

SHEET No. 3 OF 19 SHEETS

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

r12/5/000 te51rwe.dgn - 4LIK-B3.DGN (standard plan TE-51 r09/01/87)

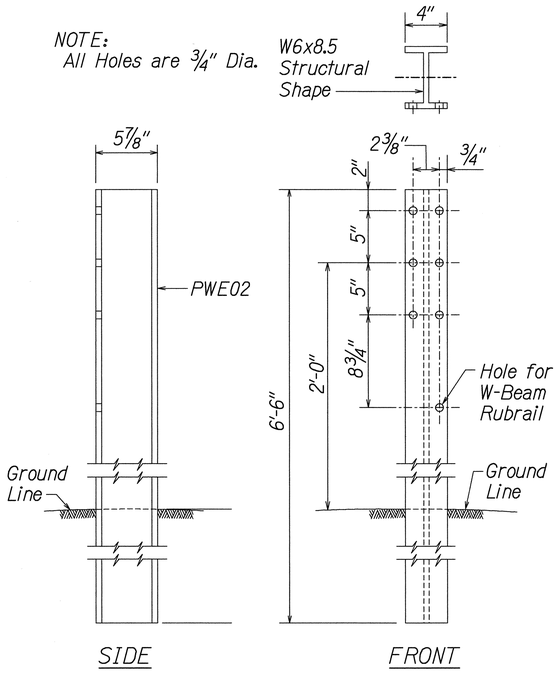
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	99	187



ELEVATION

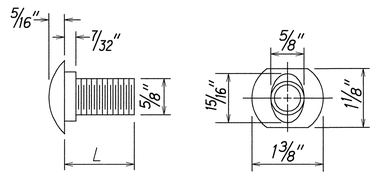
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

NOTE:
All Holes are ¾" Dia.

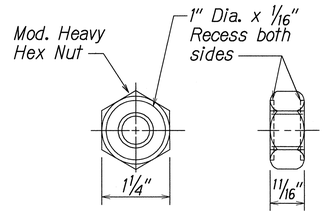


SIDE FRONT

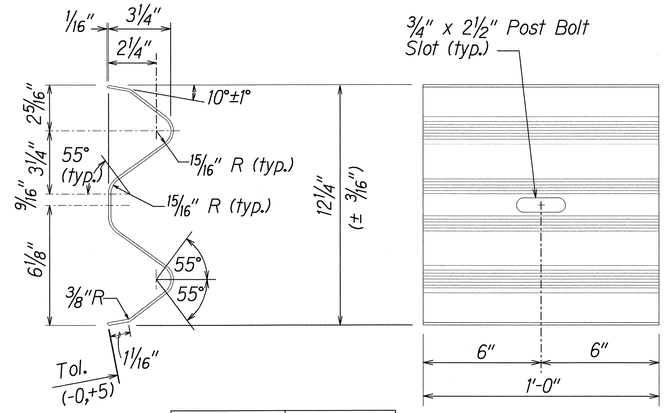
W-BEAM STRONG POST (PWE02)



DESIGNATOR	L
FBB01	1⅜"
FBB02	2"
FBB03	10"



GUARDRAIL BOLTS AND RECESSED NUT

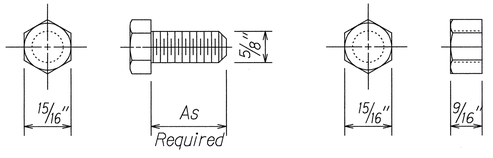


DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

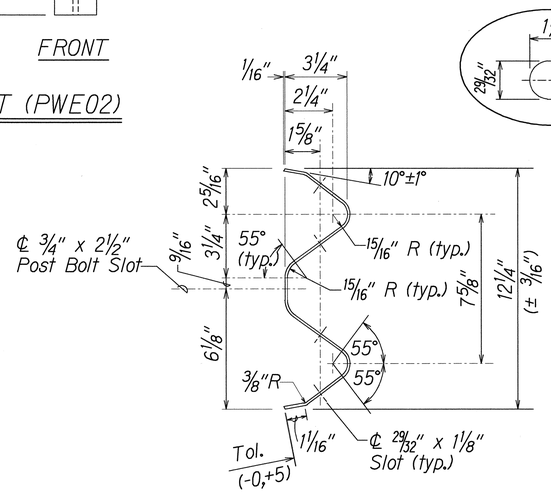
W-BEAM BACK-UP-PLATE (RWB01a)

ELEVATION

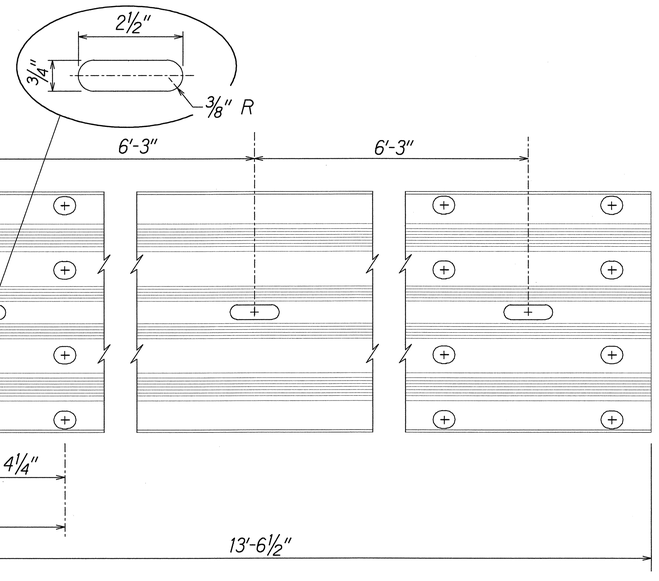
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



HEX BOLT & NUT (FBX16a)



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge



2 SPACE W-BEAM GUARDRAIL (RWM02a)

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

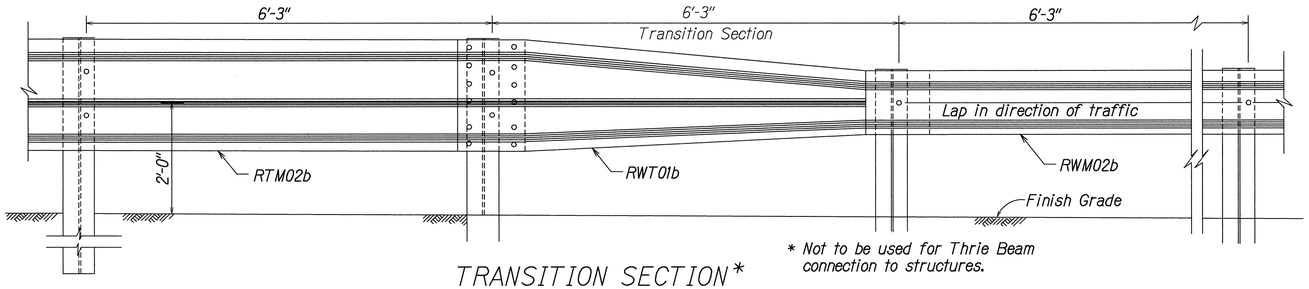
Scale: NTS Date: December, 2001

SHEET No. 4 OF 19 SHEETS

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

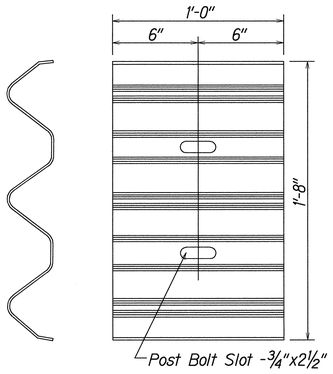
1/31/2000 rubrailgm - 4LK-BADGN (standard plan TE-32 11/03/89)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	100	187



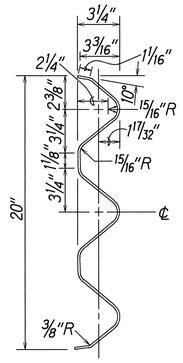
* Not to be used for Thrie Beam connection to structures.

TRANSITION SECTION*

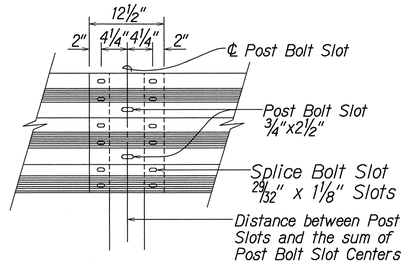


BACKUP PLATE (RTB01b)

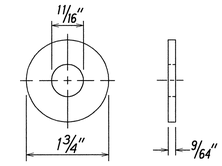
(Use at Posts where Splices do not occur)



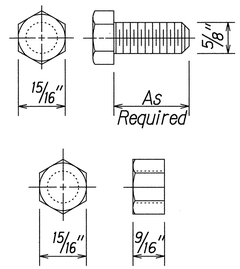
SECTION THRU RAIL ELEMENT (RTM02b)



RAIL SPLICE



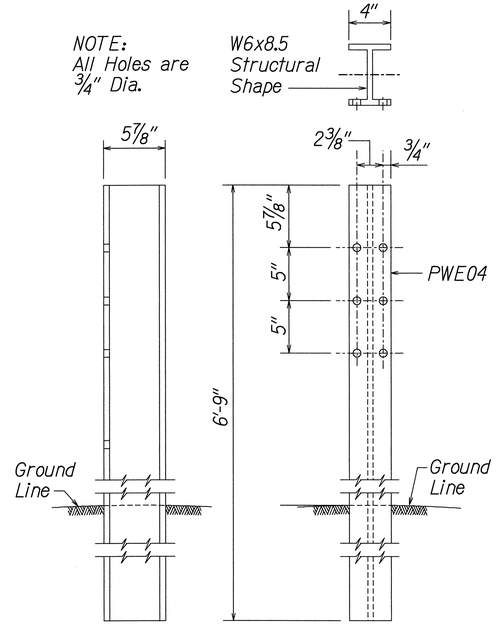
STEEL WASHER FOR ⅝" BOLT



HEX BOLT & NUT (FBX16a)

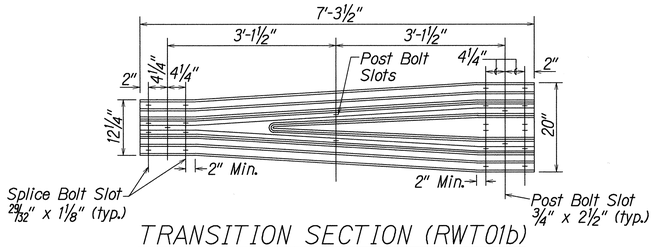
NOTE:
All Holes are ¾" Dia.

W6x8.5 Structural Shape

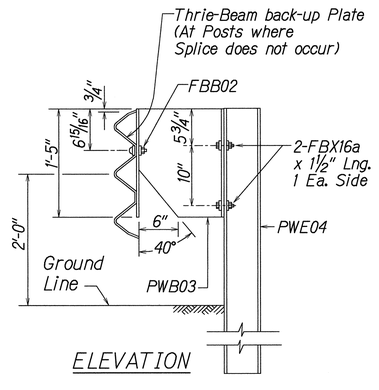


SIDE FRONT

W-BEAM STRONG POST (PWE04)

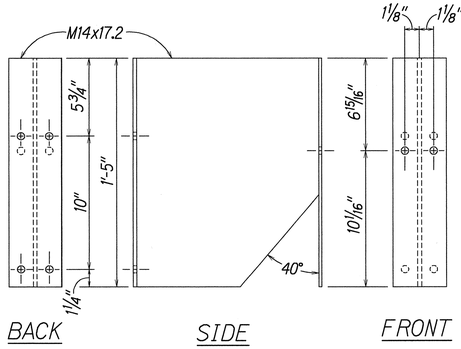


TRANSITION SECTION (RWT01b)



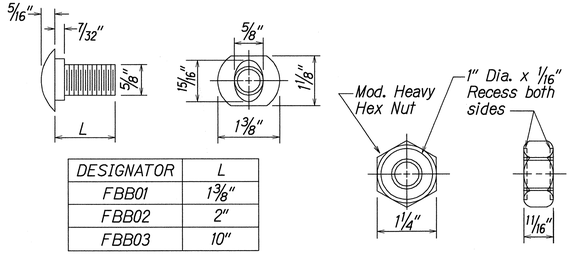
ELEVATION

STRONG POST MODIFIED THRIE-BEAM GUARDRAIL (SGR09b)



BACK SIDE FRONT

SPACER BLOCK PWB03



DESIGNATOR	L
FBB01	1⅜"
FBB02	2"
FBB03	10"

GUARDRAIL BOLTS AND RECESSED NUT

Note:
See Sheet 103 for Thrie Beam Metal Guardrail upgrade.

ALAN Y. TOMITA
LICENSED PROFESSIONAL ENGINEER
NO. 4129-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST MODIFIED THRIE-BEAM GUARDRAIL

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

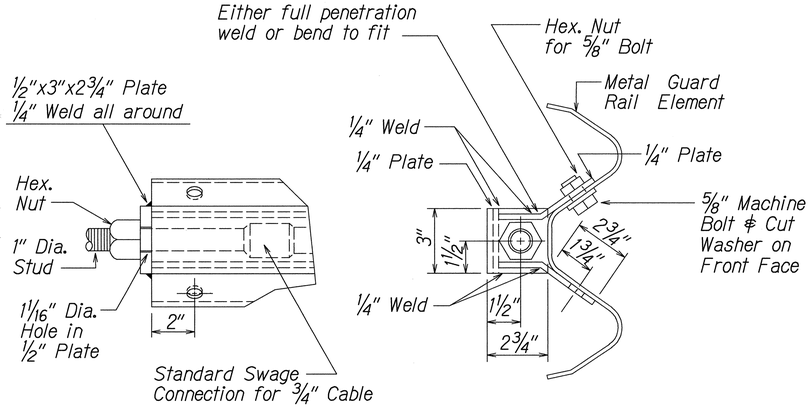
SHEET No. 5 OF 19 SHEETS

100

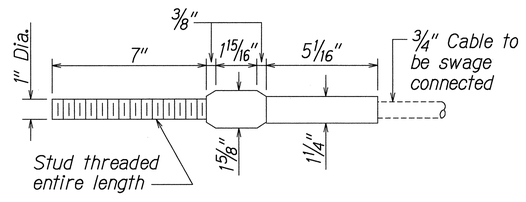
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY X | TRACED BY X | DESIGNED BY X | NOTE BOOK | QUANTITIES BY | CHECKED BY | DATE | No.

6/13/01 modthrudgn - 4LIN-BSJGN (standard plan TE-57 11/03/89 & TE-57a 11/03/89)

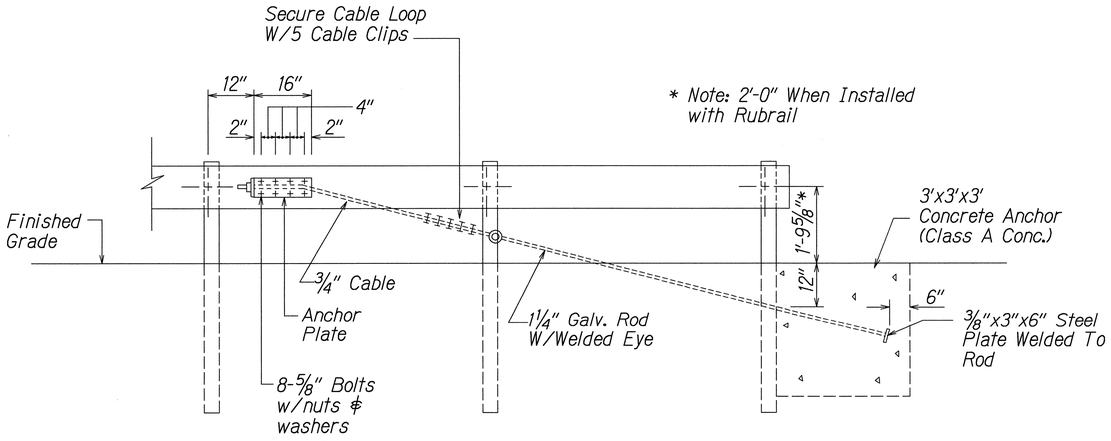
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	101	187



ANCHOR PLATE DETAILS

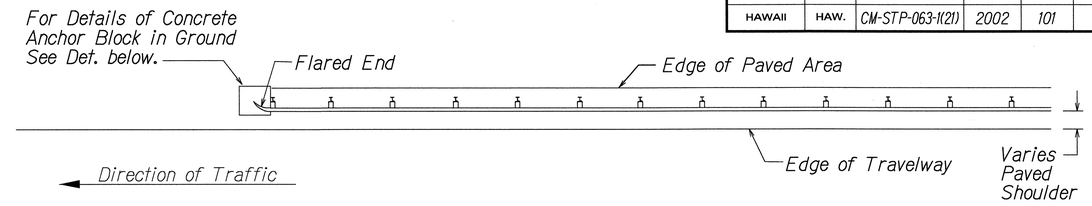


STANDARD SWAGED FITTING AND STUD

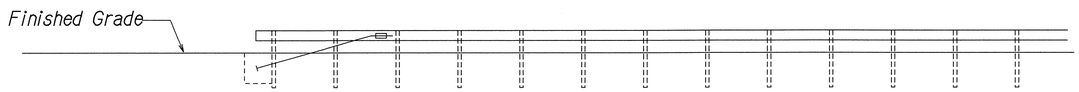


ANCHOR BLOCK DETAIL

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

Not to Scale

NOTE:

Type "G" 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" 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" End Terminal.

During construction, the Contractor shall layout the proposed Type "G" End Terminal and receive approval from the Construction Engineer prior to installation.

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

3/01/99 fe39revdgn - ALIX-BALDON (standard plan TE-59 11/03/89)

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

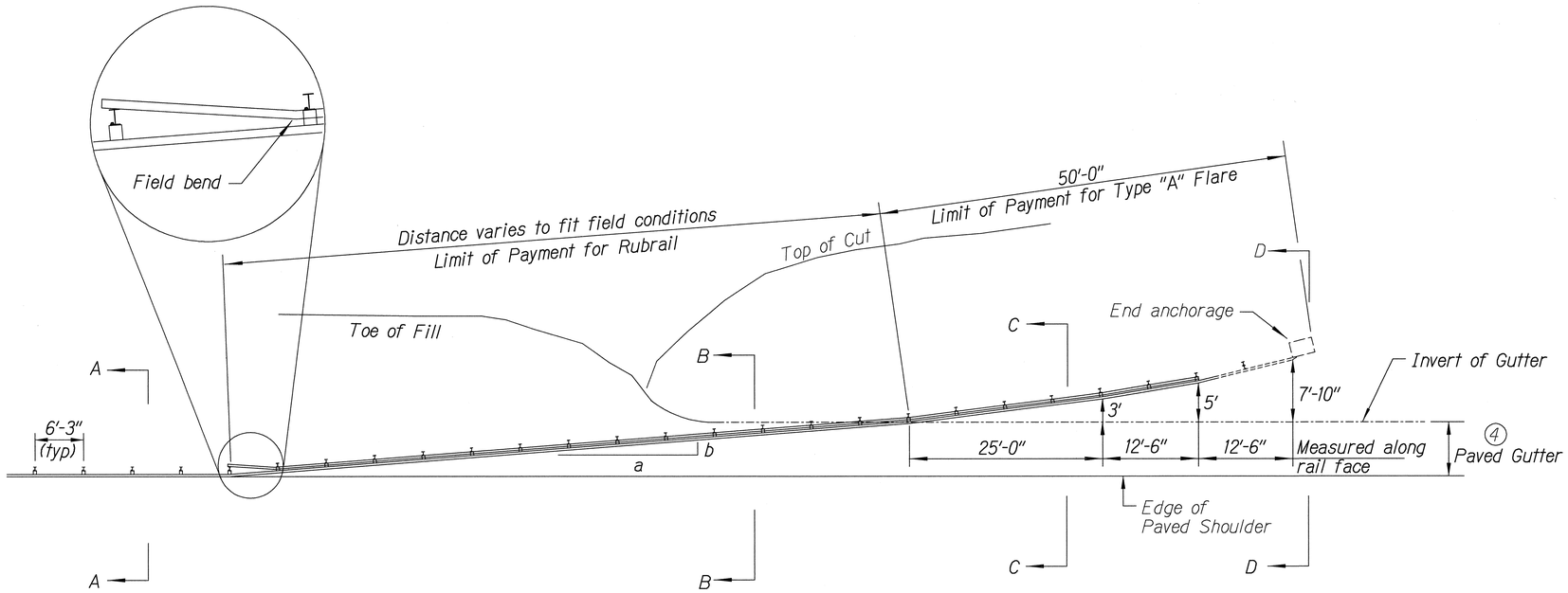
GUARDRAIL DETAILS

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

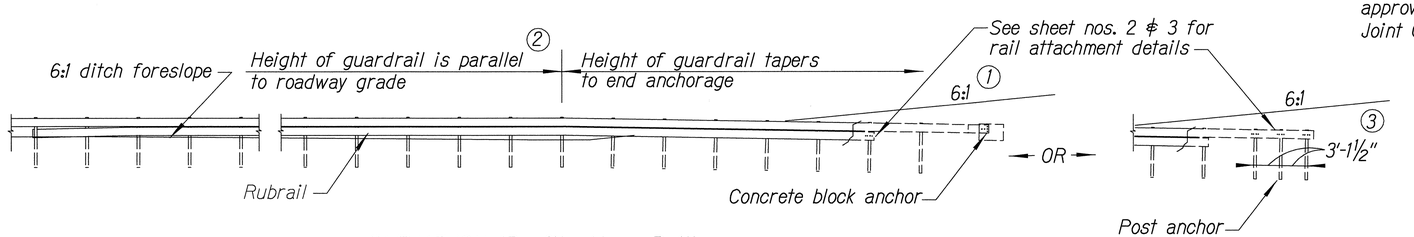
SHEET No. 6 OF 19 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	102	187

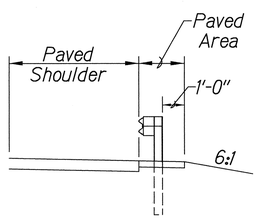


PLAN

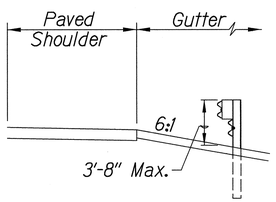
Design speed mph	a:b
68	15:1
62	13:1
56	12:1
50	11:1
43	10:1
37	9:1
31	7:1



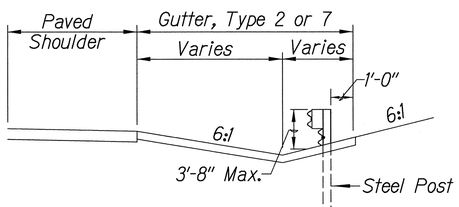
ELEVATION (Profile Along Rail)



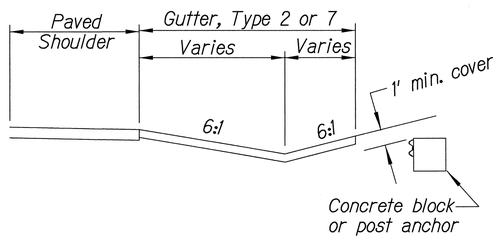
Section A-A



Section B-B
(With Rubrail)



Section C-C
(With Rubrail)



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

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.

ORIGINAL PLAN
NOTE BOOK dd.x kdgn
No. kdgn

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

3/01/99 g4gtreedtlch.dgn - 4LIK-89ALOGN (standard plan TE-58 07/01/86, TE-59 01/03/89 & TE-60 07/01/86)

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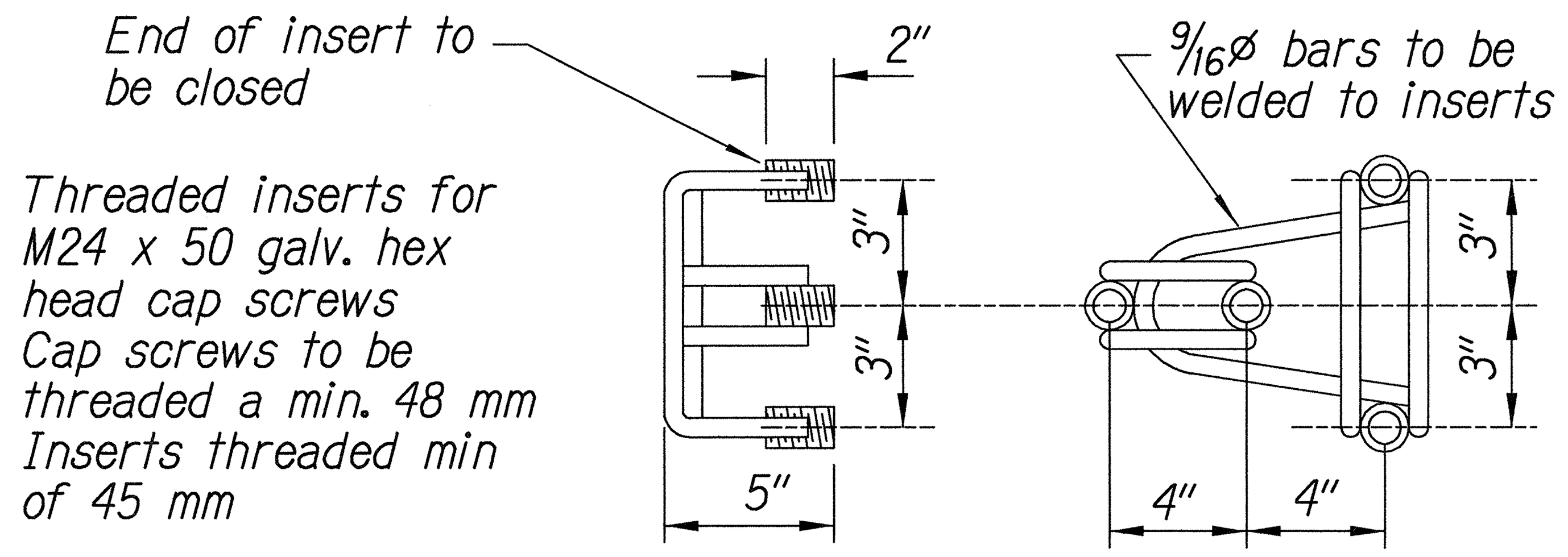
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

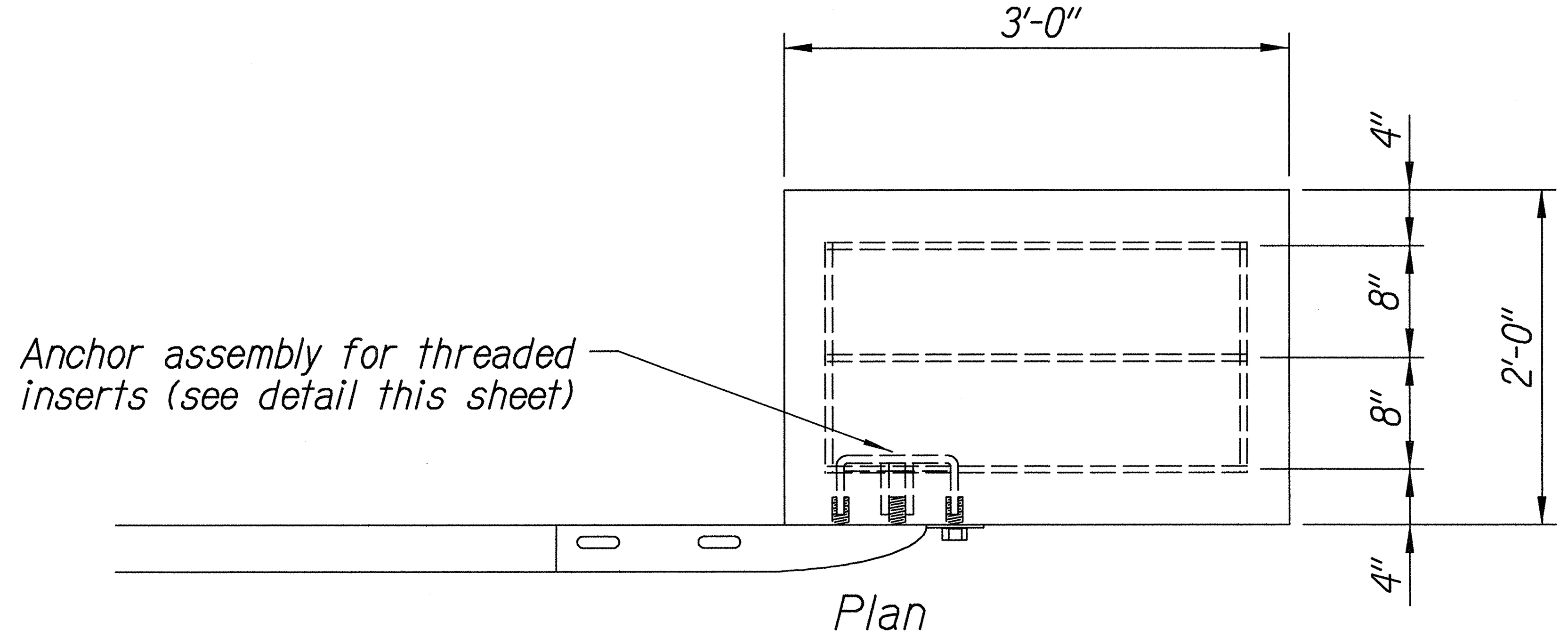
SHEET No. 7 OF 19 SHEETS

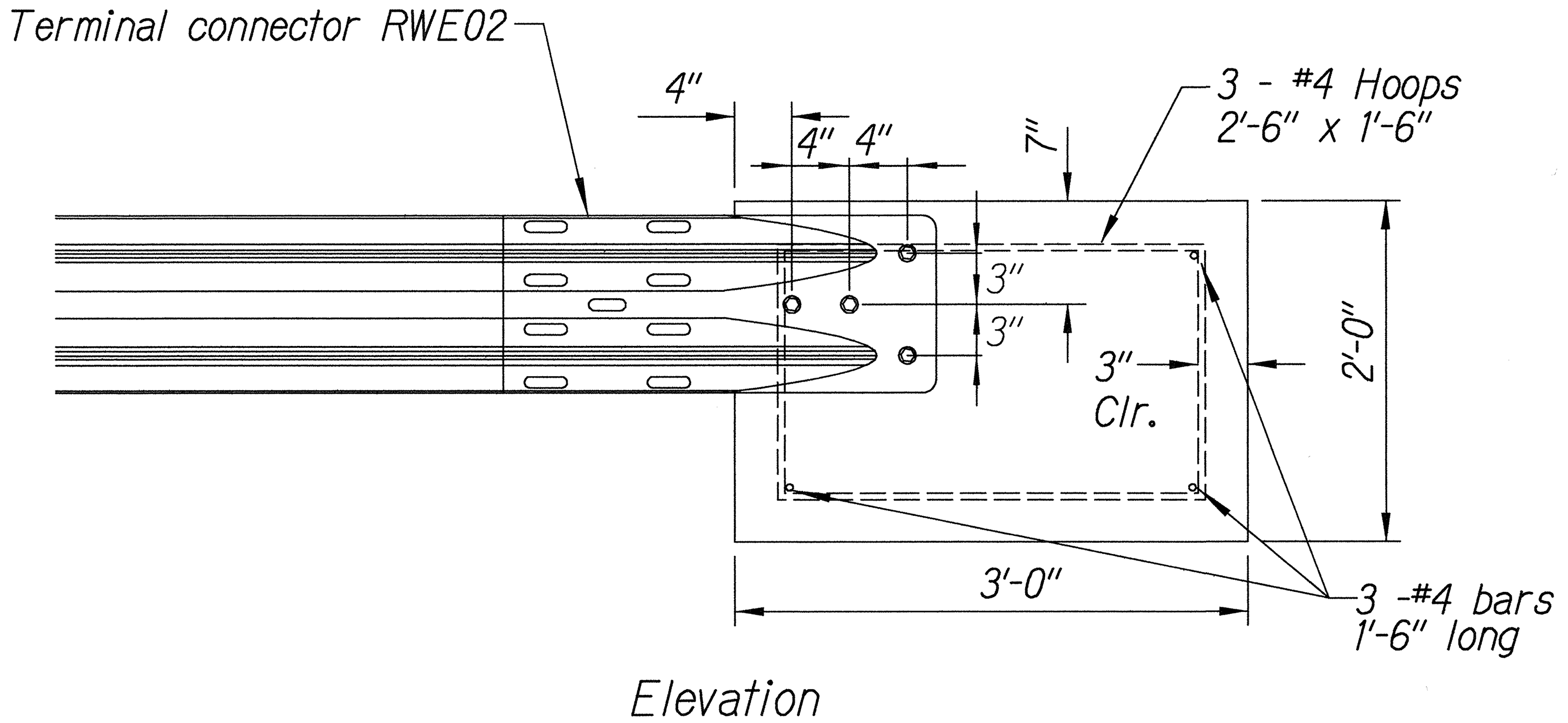


ANCHOR ASSEMBLY
CONCRETE BLOCK ANCHOR

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.



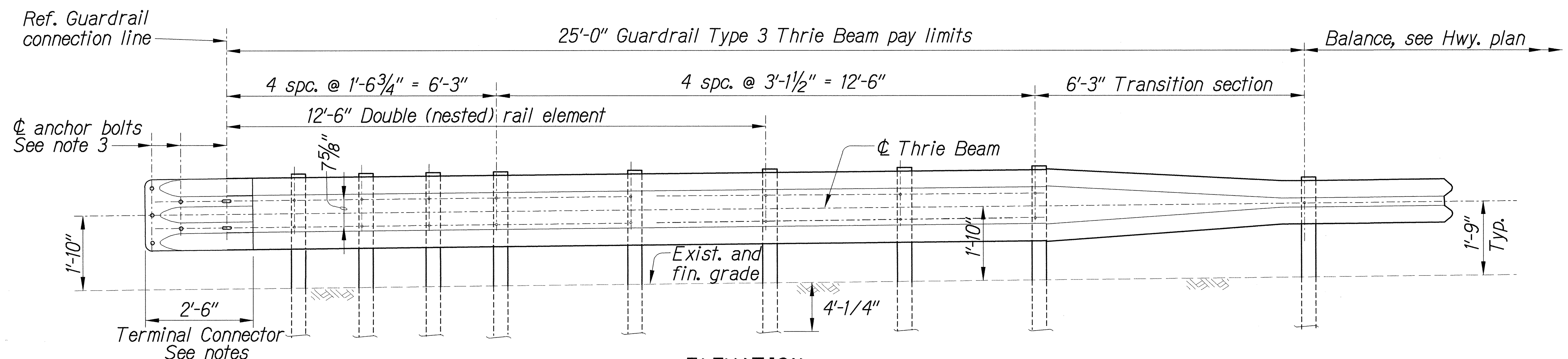


CONCRETE BLOCK ANCHOR
(2' X 2' X 3')

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

NOTES:

1. The work necessary to connect guardrail to concrete end post or metal spacer block shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.5300, End Post Connection and will not be paid for separately.
2. Terminal connector, guardrail post, spacer block, transition section and all other associated hardware will not be paid for separately and shall be considered incidental to Item No. 606.5300 - End Post Connection.
3. See DOT latest standard for additional jersey barrier, guardrail and drilling information.
4. All anchor bolts shall be high strength bolts conforming to the requirements of AASHTO M 164. See Special Provisions.
5. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
6. Terminal connector, Thrie Beam Metal Guardrail and Transition Section shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180 and shall be hot-dip galvanized after fabrication. See Special Provisions.
7. Guardrail posts, spacer blocks, "terminal connectors" and all anchor bolts, cap PL, bolts, nuts, and washers shall be hot-dip galvanized after fabrication.
8. Cap PL shall be fabricated from ASTM A 36.
9. First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
10. Double (nest 1st panel) thrie beam elements at all end post connections.
11. Where double (nested) beam occur, 12" "Back-up Plate" not required.
12. Heads of through anchor bolts shall be placed on the traffic side of the rail.
13. Drilling of through holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.



ELEVATION

TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL UPGRADE

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

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

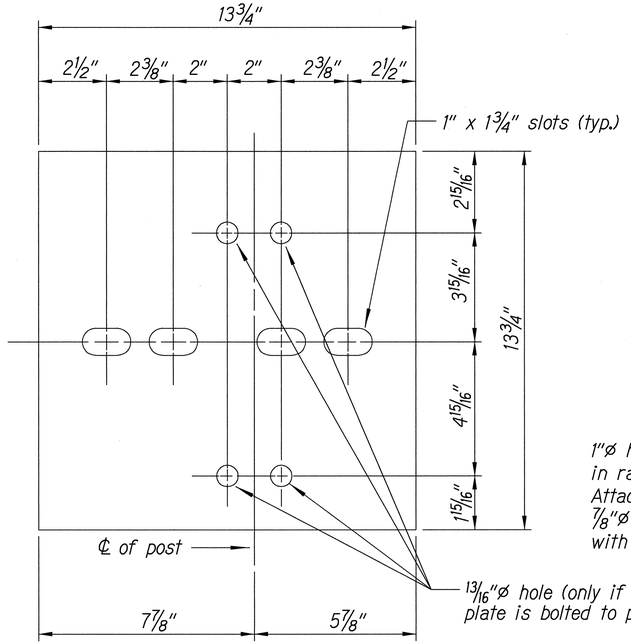
SHEET No. 8 OF 19 SHEETS

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

(standard plan TE-58 07/01/86, TE-59 r11/03/89 & TE-60 07/01/86)

r3/01/99

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	104	187

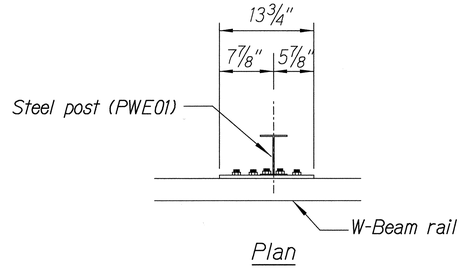


Steel Plate - ½"

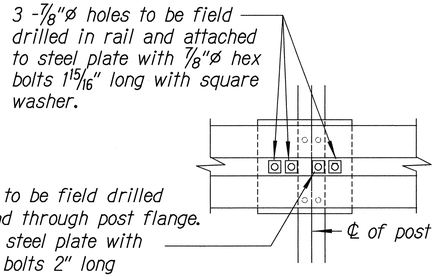
(Hot-dip Zinc Coated Galvanized Welded or Bolted to Post)

Square Washer

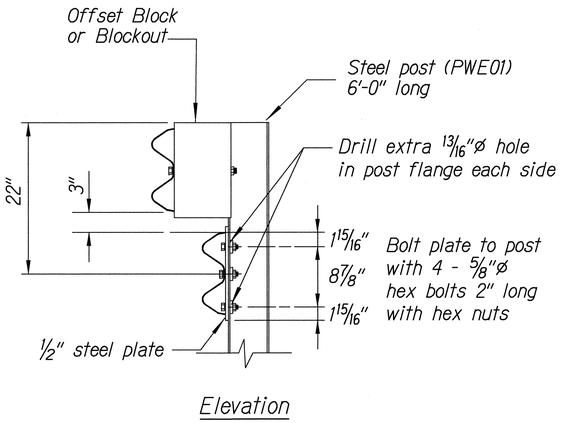
(3⁄16" Thick - Hot-dip Zinc Coated Galvanized)



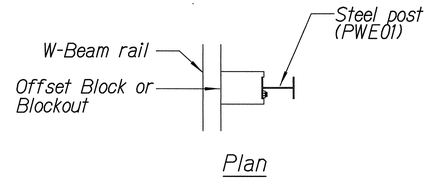
Plan



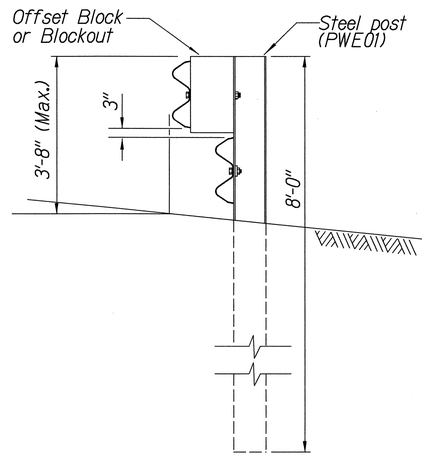
Front View



Elevation



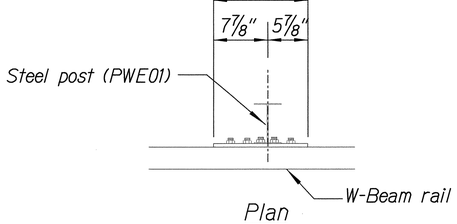
Plan



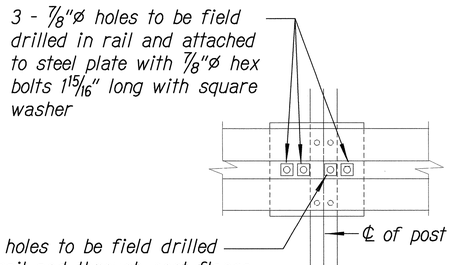
Elevation

STEEL POST GUARDRAIL WITH RUBRAIL

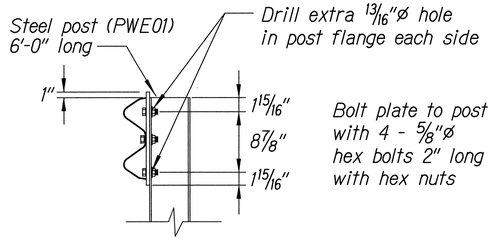
RUBRAIL ANCHOR DETAILS



Plan



Front View



Elevation

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.

POST ANCHOR DETAILS

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A" FLARE

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

SHEET No. 9 OF 19 SHEETS

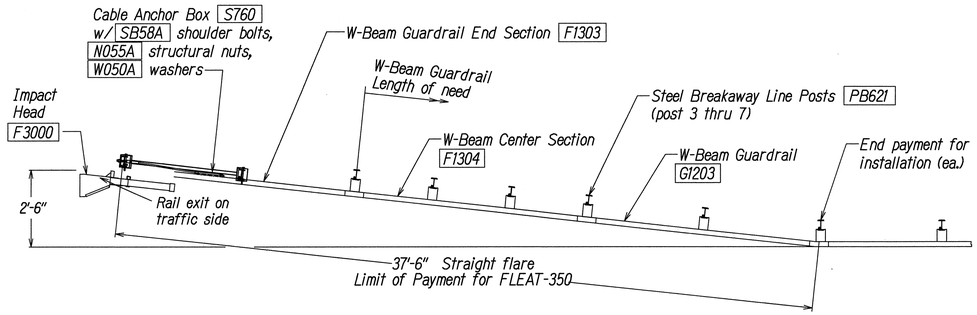
104

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

(standard plan TE-58 07/01/86, TE-59 rll/03/89 & TE-60 07/01/86)

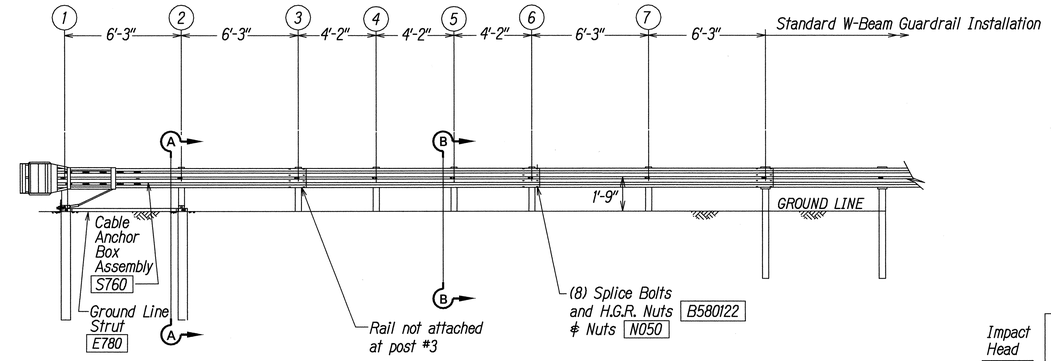
13/01/99 g46et2dgn - 4LIK-B9BJGH

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	105	187

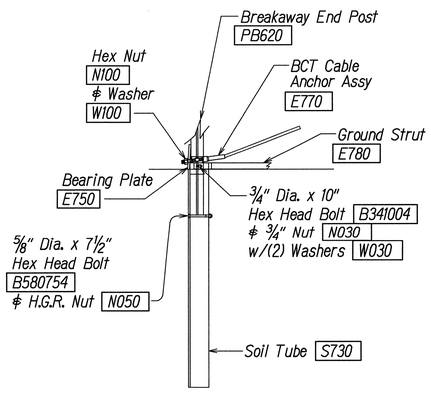


PLAN

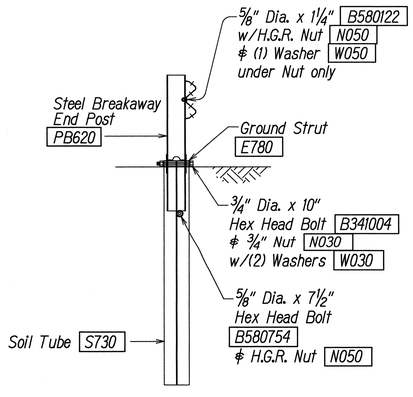
TRAFFIC



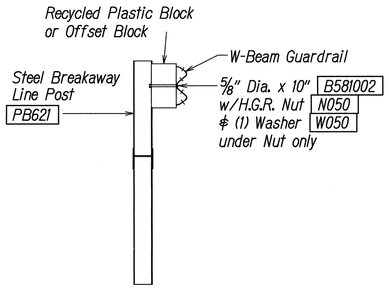
ELEVATION



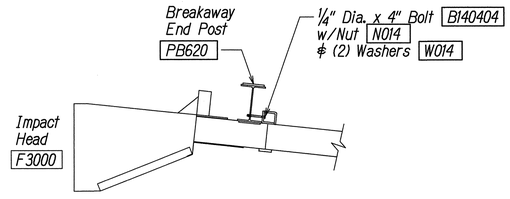
PARTIAL VIEW OF POST 1



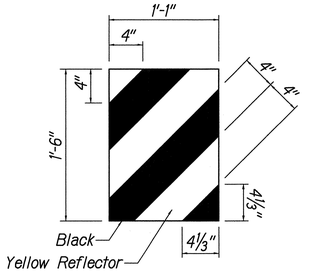
SECTION A-A
(@ Post #2)



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



IMPACT HEAD CONNECTING DETAIL



IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL

GENERAL NOTES

1. Breakaway steel posts are required with the FLEAT Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may be driven with an approved driving head. Soil tubes shall not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
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 ½" 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.

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POST
PB621	5	STEEL BREAKAWAY LINE POST
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		HARDWARE
B580122	25	5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B341004	2	3/4" Dia. x 10" HEX BOLT
B581002	5	5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)
N050	32	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6)
N030	2	3/4" Dia. HEX NUT
W050	6	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 3/16" ID A325 STR. WASHER

Foundation Tube Options For Posts 1 & 2
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil Plates SP600
*4'-6" Foundation Tubes E735 W/Soil Plates SP600

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350

FLARED ENERGY ABSORBING TERMINAL

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

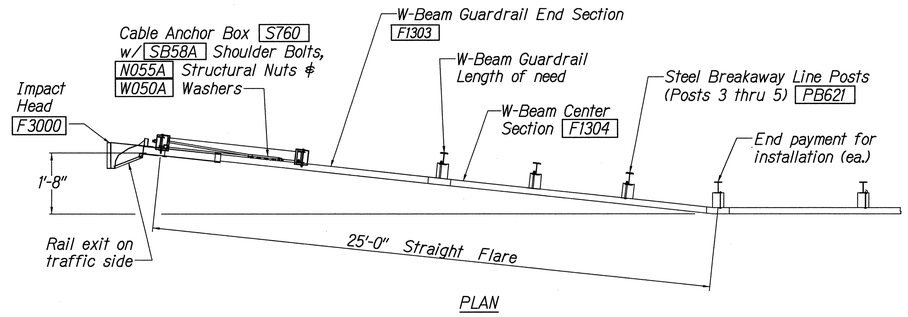
Scale: NTS Date: December, 2001

SHEET No. 10 OF 19 SHEETS

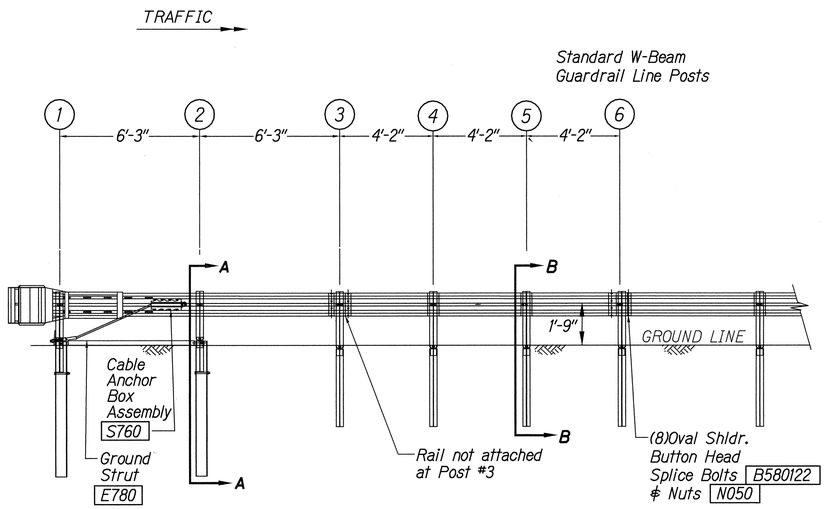
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY X	
NOTE BOOK	TRACED BY X	
	DESIGNED BY	
	QUANTITIES BY	
N.	CHECKED BY	

r3/28/01 file1350.dgn - 4LIK-BIODGN (standard plan TE-61 r11/03/89 & TE-62 r09/01/87)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	106	187



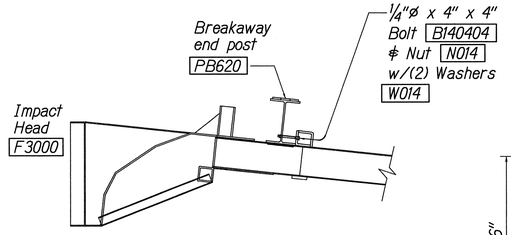
PLAN



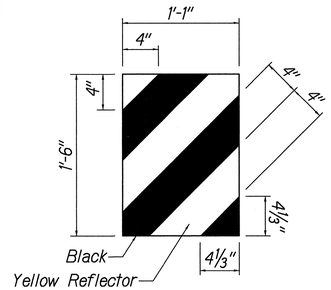
ELEVATION

GENERAL NOTES:

1. Breakaway steel posts are required with the FLEAT Terminal.
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 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. 2½" 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.



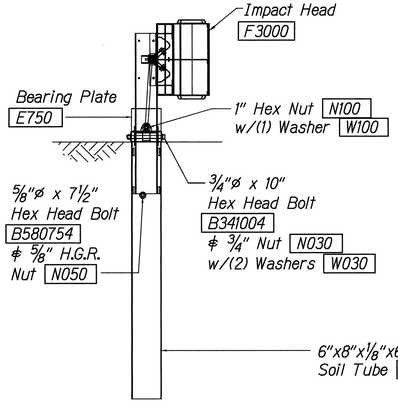
IMPACT HEAD CONNECTING DETAIL



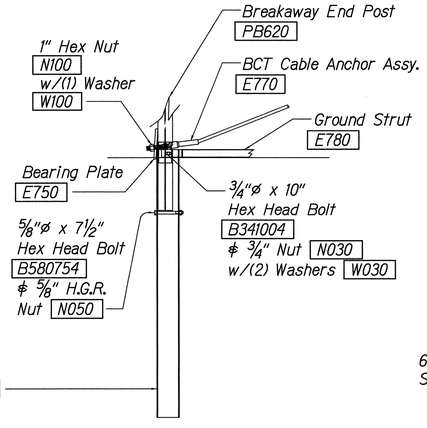
IHRM(R)
IMPACT HEAD REFLECTOR
MARKER INSERT
DETAIL

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 6'-0"
E750	1	BEARING PLATE, 8" x 8" x ⅝"
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
	3	RECYCLED PLASTIC BLOCKOUT OR OFFSSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		HARDWARE
B580122	17	⅝" Dia. x 1 ¼" SPLICE BOLT, POST 2
B580754	2	⅝" Dia. x 7 ½" HEX BOLT
B341004	2	¾" Dia. x 10" HEX BOLT
B581002	3	⅝" Dia. x 10" H.G.R. BOLT (POSTS 3 THRU 5)
N030	2	¾" Dia. HEX NUT
N050	22	⅝" Dia. H.G.R. NUT (SPLICE 16, SOIL TUBES 2, POSTS 2, 1; POSTS 3 THRU 5, 3)
W030	4	¾" I.D. WASHER
W050	4	H.G.R. WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	¼" x 4" HEX BOLT
N014	2	¼" HEX NUT
W014	4	¼" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD X 9/16" ID A325 STR. WASHER

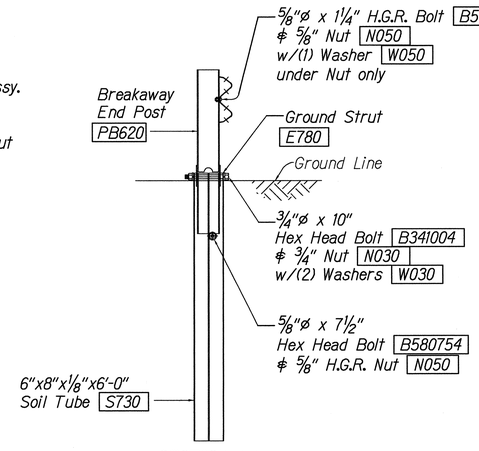
Foundation Tube Options For Posts 1 & 2
*6'-0" Split Foundation Tube S730
*6'-0" Solid Foundation Tube E731
*5'-0" Foundation Tube S735 W/Soil Plate SP600
*4'-6" Foundation Tube E735 W/Soil Plate SP600



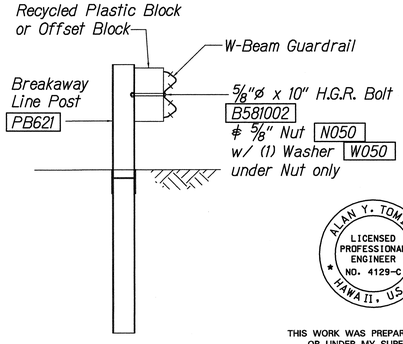
FRONT VIEW OF POST 1



PARTIAL VIEW OF POST 1



SECTION A-A
at Post #2



SECTION B-B
typical @ Post 3 thru 5
Note: Rail not Bolted @ Post 3

ALAN Y. TOMITA
LICENSED PROFESSIONAL ENGINEER
NO. 4129-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT TL-2
FLARED ENERGY ABSORBING TERMINAL

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

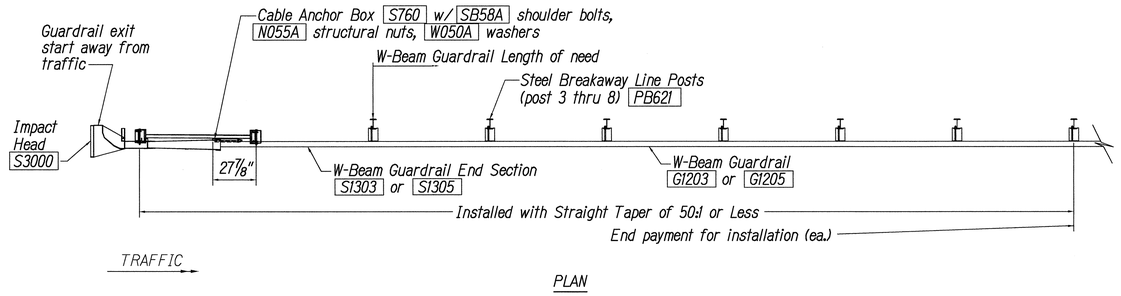
Scale: NTS Date: December, 2001

SHEET No. 11 OF 19 SHEETS

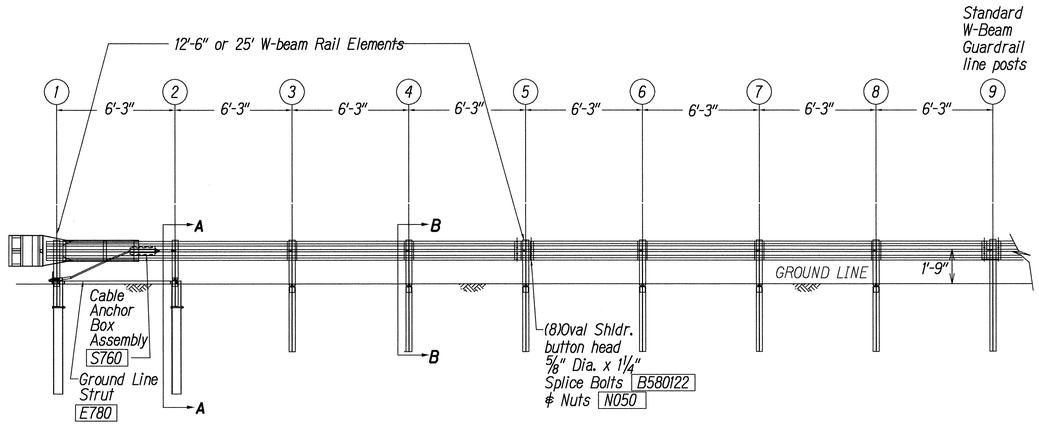
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE
NOTE BOOK | No.

3/28/01 fleat12usdgn

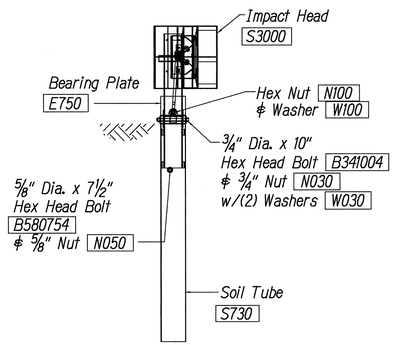
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	107	187



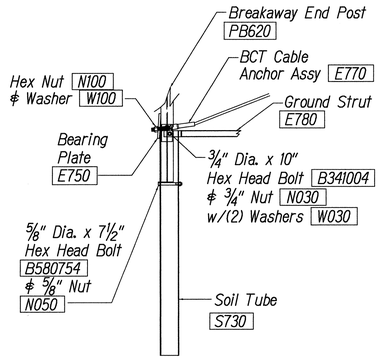
PLAN



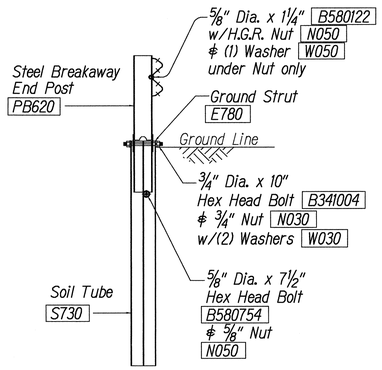
ELEVATION



FRONT VIEW OF POST 1

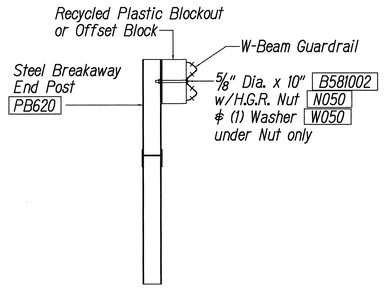


PARTIAL VIEW OF POST 1

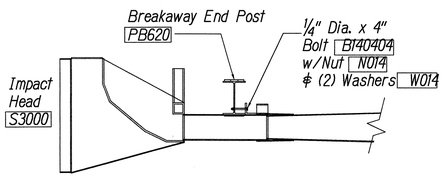


SECTION A-A
at Post #2

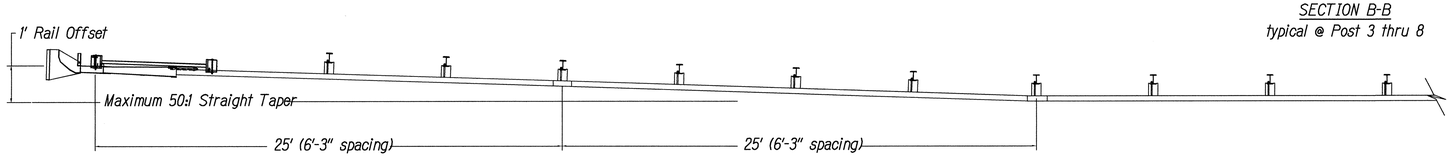
IHRM(R)
IMPACT HEAD REFLECTOR MARKER INSERT DETAIL



SECTION B-B
typical @ Post 3 thru 8



IMPACT HEAD CONNECTION DETAIL



DETAIL A
50:1 flare rate

GENERAL NOTES:

1. Breakaway steel 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 W-Beam Guardrail installation, the W-Beam Guardrail will be flared at a rate of 50:1 to prevent the impact head from encroaching on the shoulder. The flare is not required and may be decreased or eliminated for specific installations.
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.
5. 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.
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. 2½" 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.
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. 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.
9. (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
10. The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.

BILL OF MATERIALS

ITEM NO.	QTY.	
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'
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POSTS
PB621	6	STEEL BREAKAWAY LINE POSTS
	6	RECYCLED PLASTIC BLOCKOUTS OR OFFSET BLOCK
	1	IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)
		HARDWARE
B580122	17/33	5/8" Dia. x 1 1/4" SPLICE BOLTS, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLTS
B341004	2	3/4" Dia. x 10" HEX BOLTS
B341002	6	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 THRU 8)
N050	26/42	5/8" Dia. H.G.R. NUT (SPLICE 17/33, SOIL TUBES 2, POST 2 THRU 8)
N030	2	3/4" Dia. HEX NUTS
W050	7	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER 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

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

sht350.dgn - ALIK-BIL26N (Stand Plan TE-61 11/03/99 & TE-62 10/01/87)

3/28/01

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SKT-350

SEQUENTIAL KINKING TERMINAL

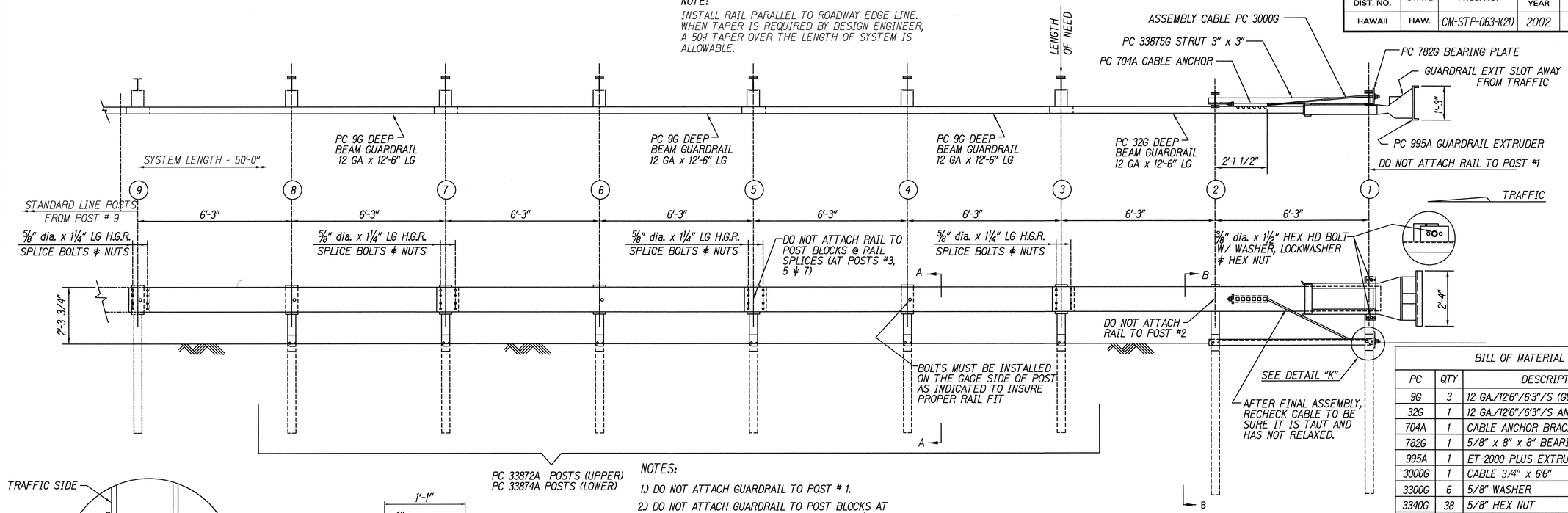
LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

SHEET No. 12 OF 19 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	108	187

NOTE:
INSTALL RAIL PARALLEL TO ROADWAY EDGE LINE. WHEN TAPER IS REQUIRED BY DESIGN ENGINEER, A 50:1 TAPER OVER THE LENGTH OF SYSTEM IS ALLOWABLE.



PC 33872A POSTS (UPPER)
PC 33874A POSTS (LOWER)

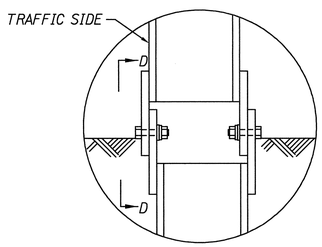
NOTES:

1.) DO NOT ATTACH GUARDRAIL TO POST # 1.

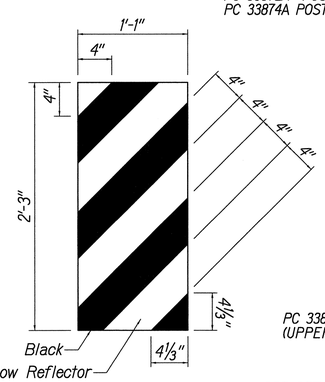
2.) DO NOT ATTACH GUARDRAIL TO POST BLOCKS AT GUARDRAIL LAP SPLICES. (AT POSTS #3, 5 & 7)

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

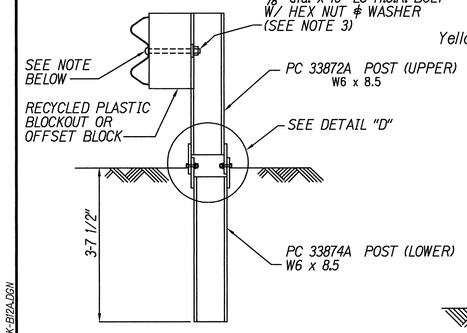
4.) MANUFACTURER SUGGESTS CUSTOMER TO PROVIDE RELECTORIZATION OF TERMINAL.



DETAIL "D"

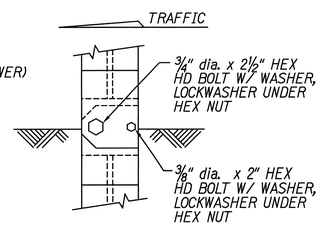


IHRM(R) IMPACT HEAD REFLECTOR MARKER INSERT DETAIL

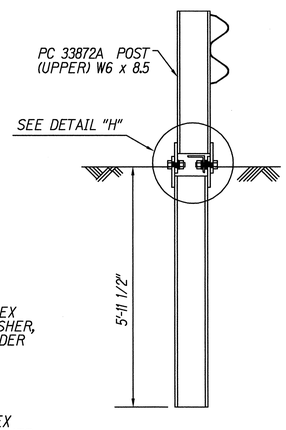


NOTE:
SECTION "A-A" IS SIMILAR @ POST #3, 5 & 7. EXCEPT RAIL IS NOT ATTACHED.

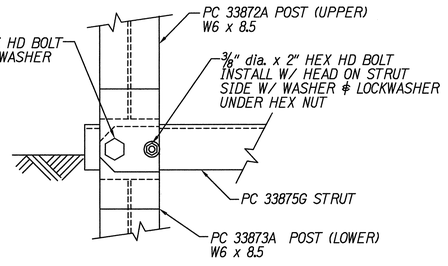
SECTION "A-A"
(TYP @ POSTS #4, 6 & 8)



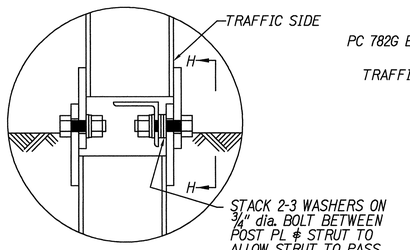
VIEW "D-D"



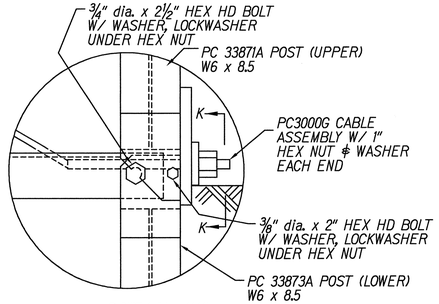
SECTION "B-B"
(POST #2)



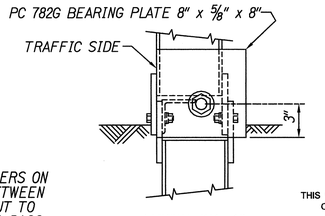
VIEW "H-H"



DETAIL "H"
(POST #2)



DETAIL "K"
(POST #1)



VIEW "K-K"

BILL OF MATERIAL

PC	QTY	DESCRIPTION
9G	3	12 GA./12'6"/6'3"/S (GUARDRAIL)
32G	1	12 GA./12'6"/6'3"/S ANC (GUARDRAIL)
704A	1	CABLE ANCHOR BRACKET
782G	1	5/8" x 8" x 8" BEARING PLATE
995A	1	ET-2000 PLUS EXTRUDER
3000G	1	CABLE 3/4" x 6'6"
3300G	6	5/8" WASHER
3340G	38	5/8" HEX NUT
3360G	32	5/8" dia. x 1 1/4" SPLICE BOLT
3500G	6	5/8" dia. x 10" POST BOLT
3701G	19	3/4" WASHER
3704G	16	3/4" HEX NUT
3717G	15	3/4" dia. x 2 1/2" HEX HD BOLT
3718G	1	3/4" dia. x 3" HEX HD BOLT
3900G	2	1" WASHER
3910G	2	1" HEX NUT
5326B	6	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
4254G	18	3/8" WASHER
4255G	2	3/8" FENDER WASHERS
4258G	16	3/8" LOCKWASHER
4261G	2	3/8" dia. x 1 1/2" HEX HD BOLT
4699G	16	3/4" LOCKWASHER
6321G	16	3/8" dia. x 2" HEX HD BOLT
6405G	18	3/8" HEX NUT
33871A	1	ET2000 HBA POST #1 TOP
33872A	7	ET2000 HBA POST #2-#8 TOP
33873A	2	ET2000 HBA POST #1-#2 BOTTOM
33874A	6	ET2000 HBA POST #3-#8 BOTTOM
33875G	1	6'-6" ANGLE STRUT ET HBA

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY X	
NOTE BOOK dd.x	TRACED BY X	
No. X.dgn	DESIGNED BY X	
	QUANTITIES BY	
	CHECKED BY	

8/1/00 e2000sdgn - 4LIK-B2ALDGN

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Alan Y. Tomita

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

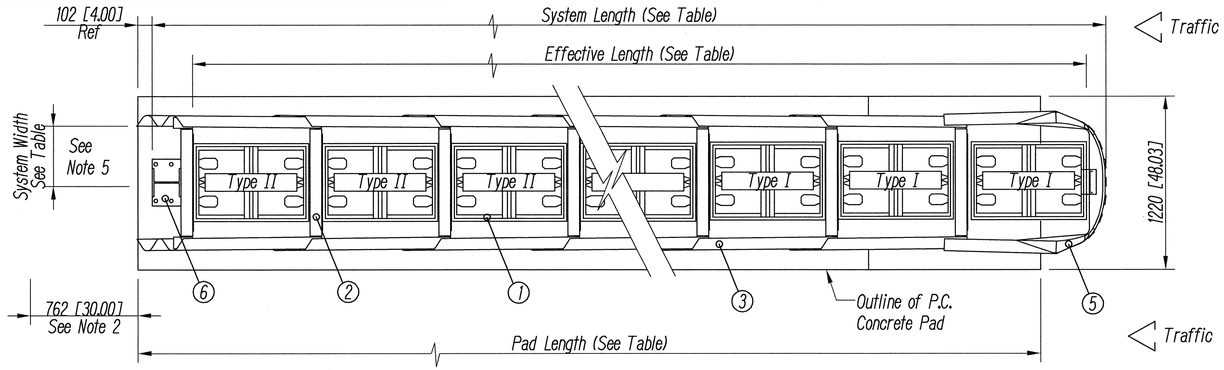
ET-2000 PLUS

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: None Date: December, 2001

SHEET No. 13 OF 19 SHEETS

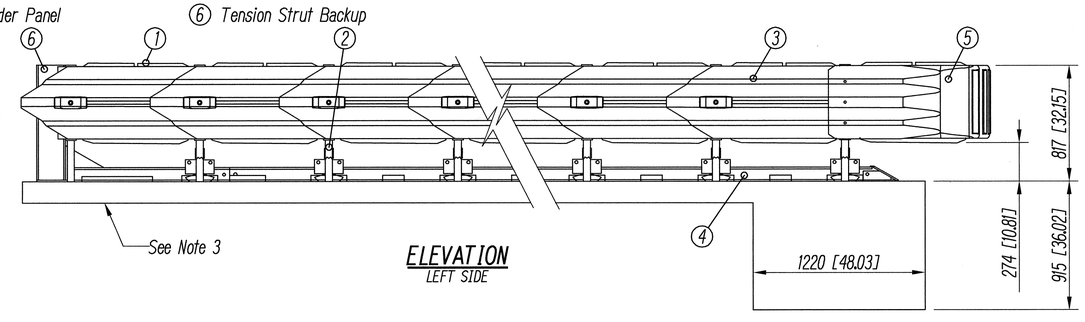
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	109	187



PLAN

key

1. Quadguard Cartridge
2. Diaphragm
3. Fender Panel
4. Monorail
5. Nose Assembly
6. Tension Strut Backup



ELEVATION
LEFT SIDE

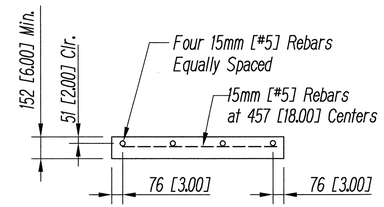
Notes:

1. In compliance with the AASHTO 1996 Roadside Design Guide, manufacturer recommends removal of all curbs and islands to ensure proper impact performance.

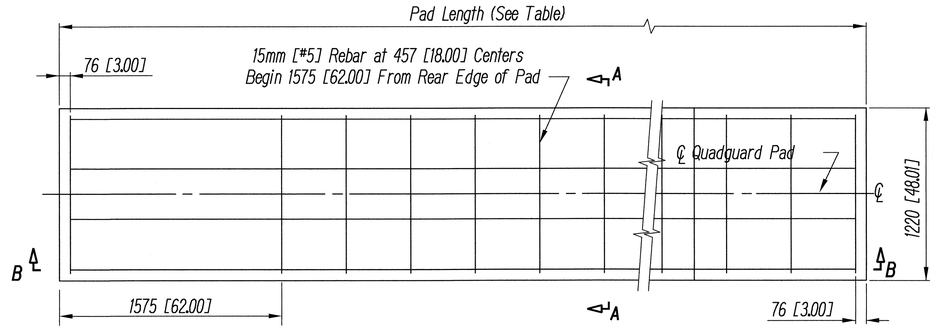
2. Provison shall be made for rear fender panels to slide rearward upon impact 762 [30.00] minimum.

3. 152 [6.00] minimum reinforced 27.6 MPA [4000 PSI] P.C. concrete pad or 203 [8.00] minimum non-reinforced 27.6 MOA [4000 PSI] P.C. concrete roadway.

4. See the "Quadguard System Design Manual" coded ENE 820-796 for a description of its impact performance characteristics and design limitations before placing a sytem at a given site. Information and copies of above manual are available by calling Customer Service Department at (312) 467-6750.

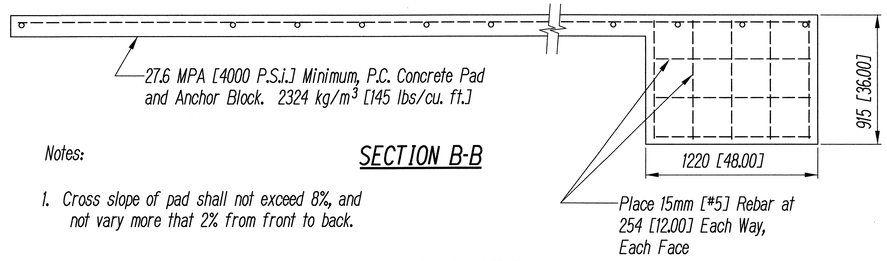


SECTION A-A



PLAN VIEW

Place 15mm [#5] Rebar at 76 [3.00] From Edge for All Pad Length



Notes:

1. Cross slope of pad shall not exceed 8%, and not vary more that 2% from front to back.

SECTION B-B

QUADGUARD SYSTEM W/ TENSION STRUT BACKUP

Bays	System Length m	System Length ft-in	Effective Length m	Effective Length ft-in	Pad Length m	Pad Length ft-in	Rebar Required m	Rebar Required ft-in	Yds. of Conc. in Pad m^3	Yds. of Conc. in Pad $yards^3$
1	2.16	[7'-1"]	1.74	[5'-8"]	2.74	[9'-0"]	14.83	[48'-8"]	1.59	[2.1]
2	3.08	[10'-1"]	2.66	[8'-8"]	2.74	[9'-0"]	14.83	[48'-8"]	1.59	[2.1]
3	4.00	[13'-1"]	3.57	[11'-8"]	3.66	[12'-0"]	20.73	[68'-0"]	1.82	[2.4]
4	4.91	[16'-1"]	4.49	[14'-8"]	4.57	[15'-0"]	25.50	[83'-8"]	1.97	[2.6]
5	5.83	[19'-1"]	5.40	[17'-8"]	5.49	[18'-0"]	31.39	[103'-0"]	2.12	[2.8]
6	6.74	[22'-1"]	6.32	[20'-8"]	6.40	[21'-0"]	36.17	[118'-8"]	2.35	[3.1]
7	7.65	[25'-1"]	7.23	[23'-8"]	7.32	[24'-0"]	42.06	[138'-0"]	2.51	[3.3]
8	8.57	[28'-1"]	8.15	[26'-8"]	8.23	[27'-0"]	46.84	[153'-8"]	2.66	[3.5]
9	9.49	[31'-1"]	9.06	[29'-8"]	9.14	[30'-0"]	52.73	[173'-0"]	2.81	[3.7]
10	10.40	[34'-1"]	9.98	[32'-8"]	10.06	[33'-0"]	57.51	[188'-08]	3.04	[4.0]
11	11.32	[37'-1"]	10.89	[35'-8"]	10.97	[36'-0"]	63.40	[208'-0"]	3.19	[4.2]
12	12.23	[40'-1"]	11.81	[38'-8"]	11.89	[39'-0"]	68.17	[223'-8"]	3.35	[4.4]

QUADGUARD SYSTEM
CONCRETE PAD, TENSION STRUT, QG

Units of measurement are millimeters [inches] unless otherwise noted

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

ORIGINAL PLAN
NOTE BOOK
No.

4LIK-QUAD.DGN

ALAN Y. TOMITA
LICENSED PROFESSIONAL ENGINEER
NO. 4129-C
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

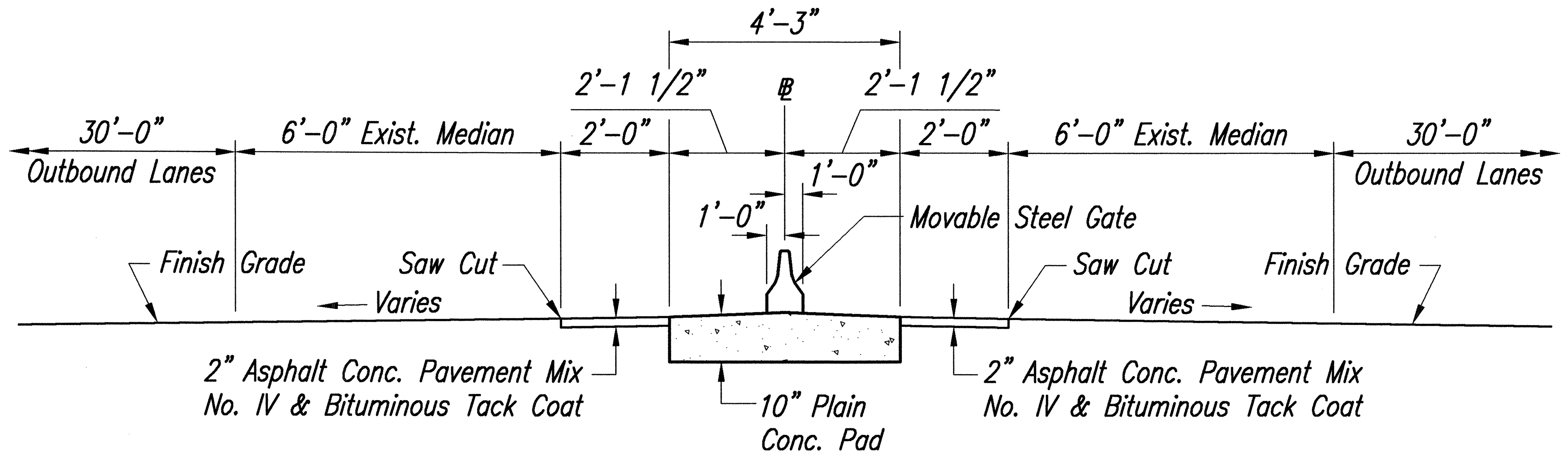
QUADGUARD SYSTEM

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

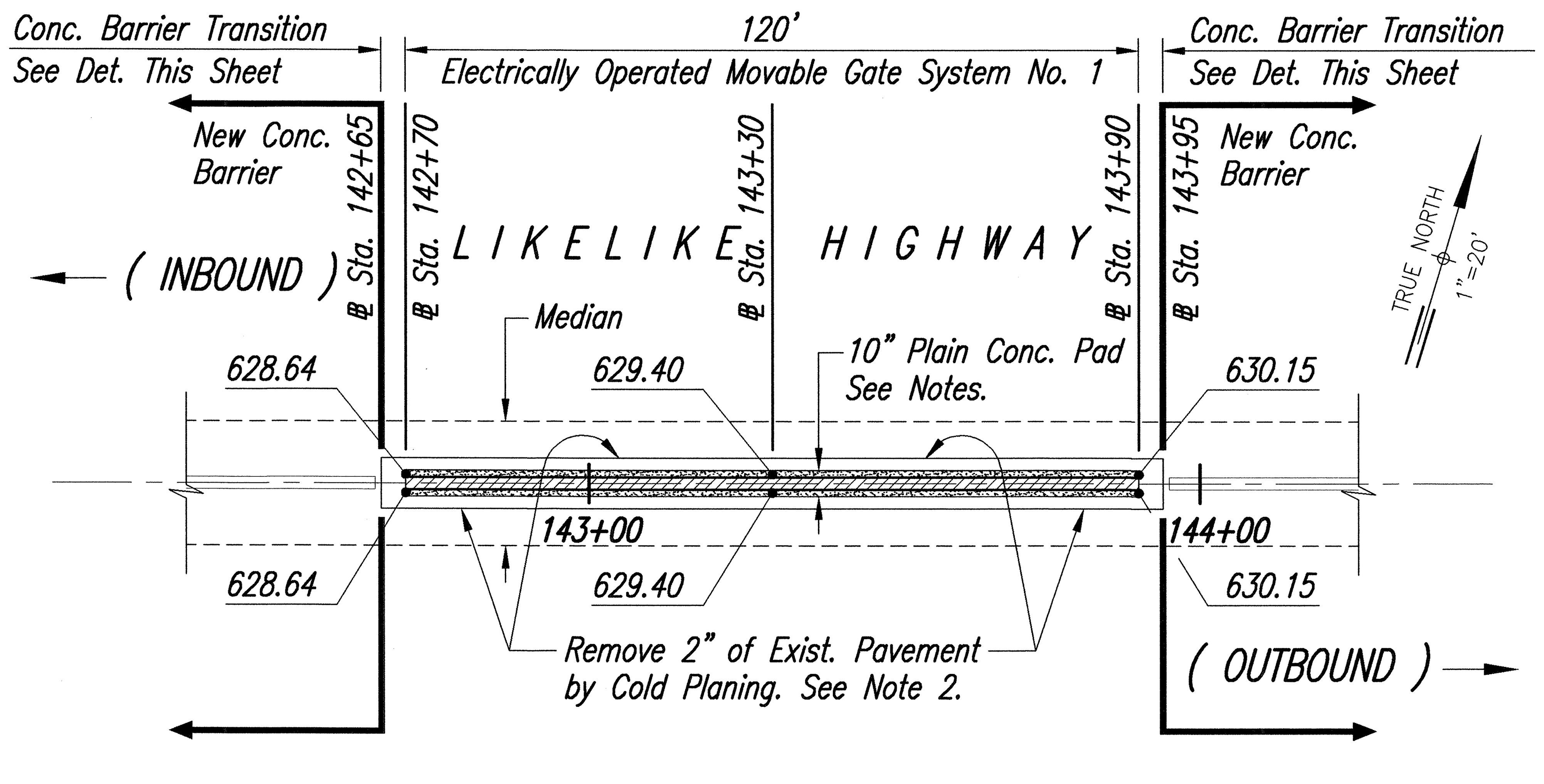
SHEET No. 14 OF 19 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	110	187



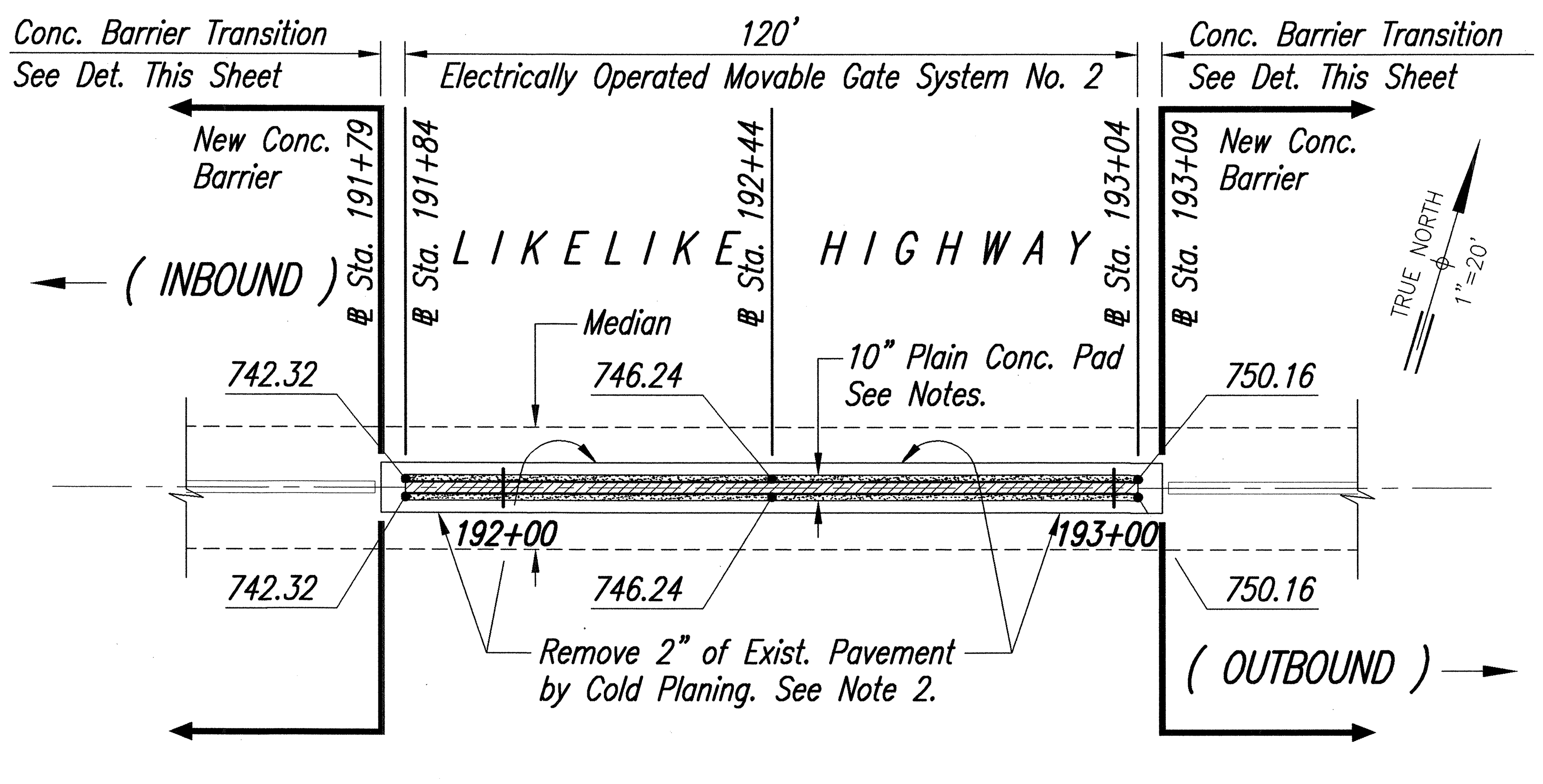
TYPICAL SECTION - INBOUND AND OUTBOUND LANES

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



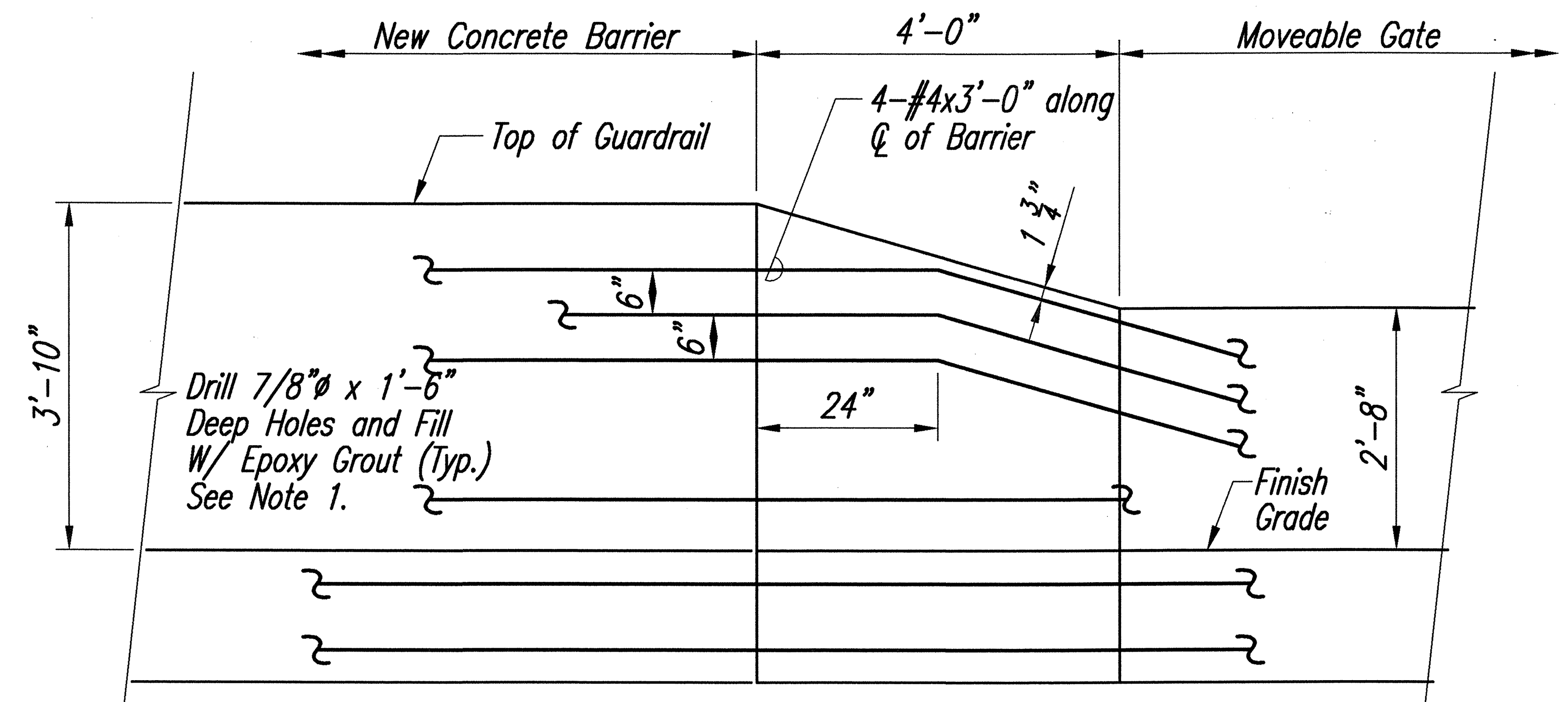
PLAN - MOVABLE STEEL GATE NO. 1 (STA. 142+70 TO STA. 143+90)

Scale: 1"=20'-0"



PLAN - MOVABLE STEEL GATE NO. 2 (STA. 191+84 TO STA. 193+04)

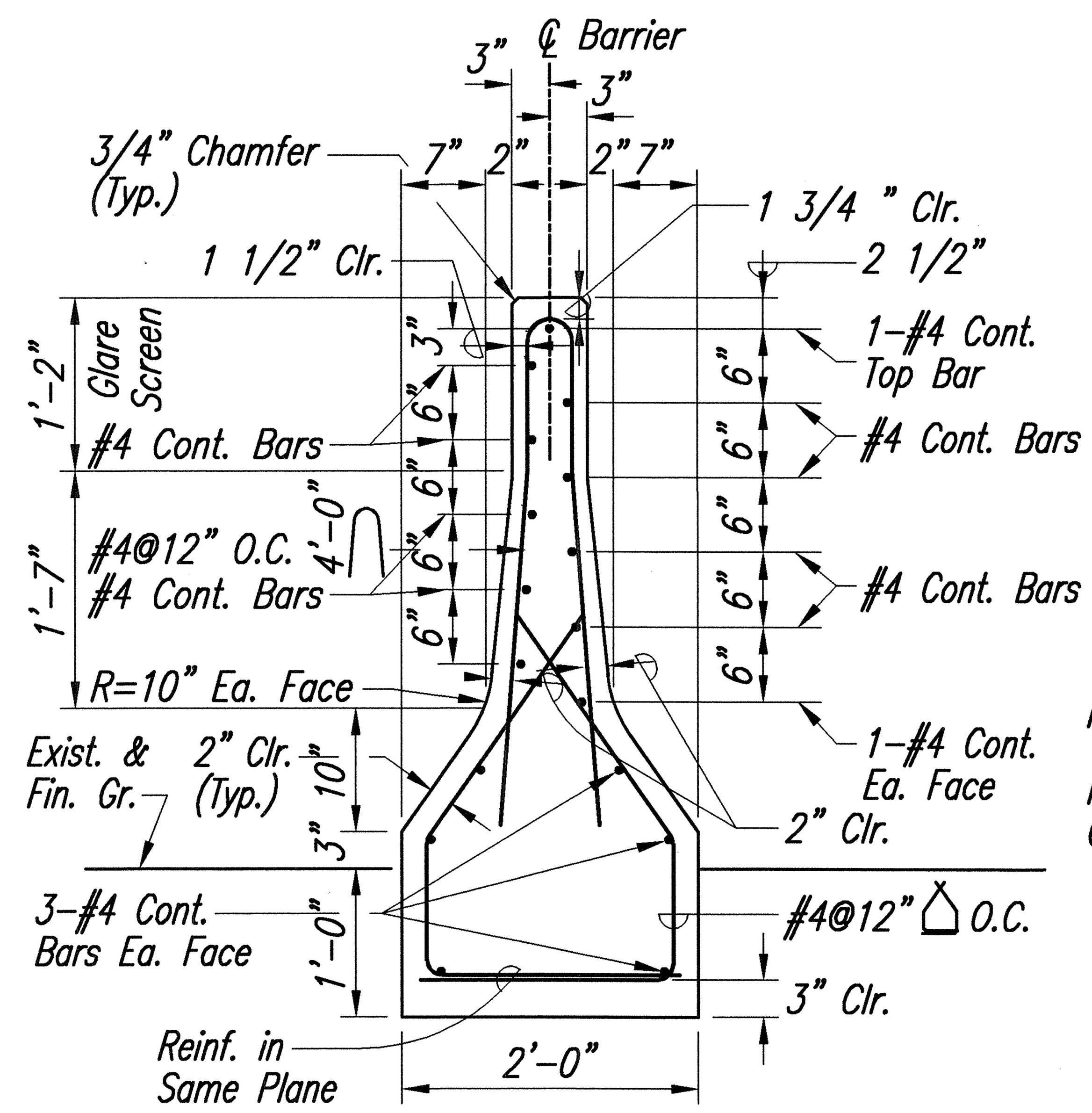
Scale: 1"=20'-0"



ELEVATION

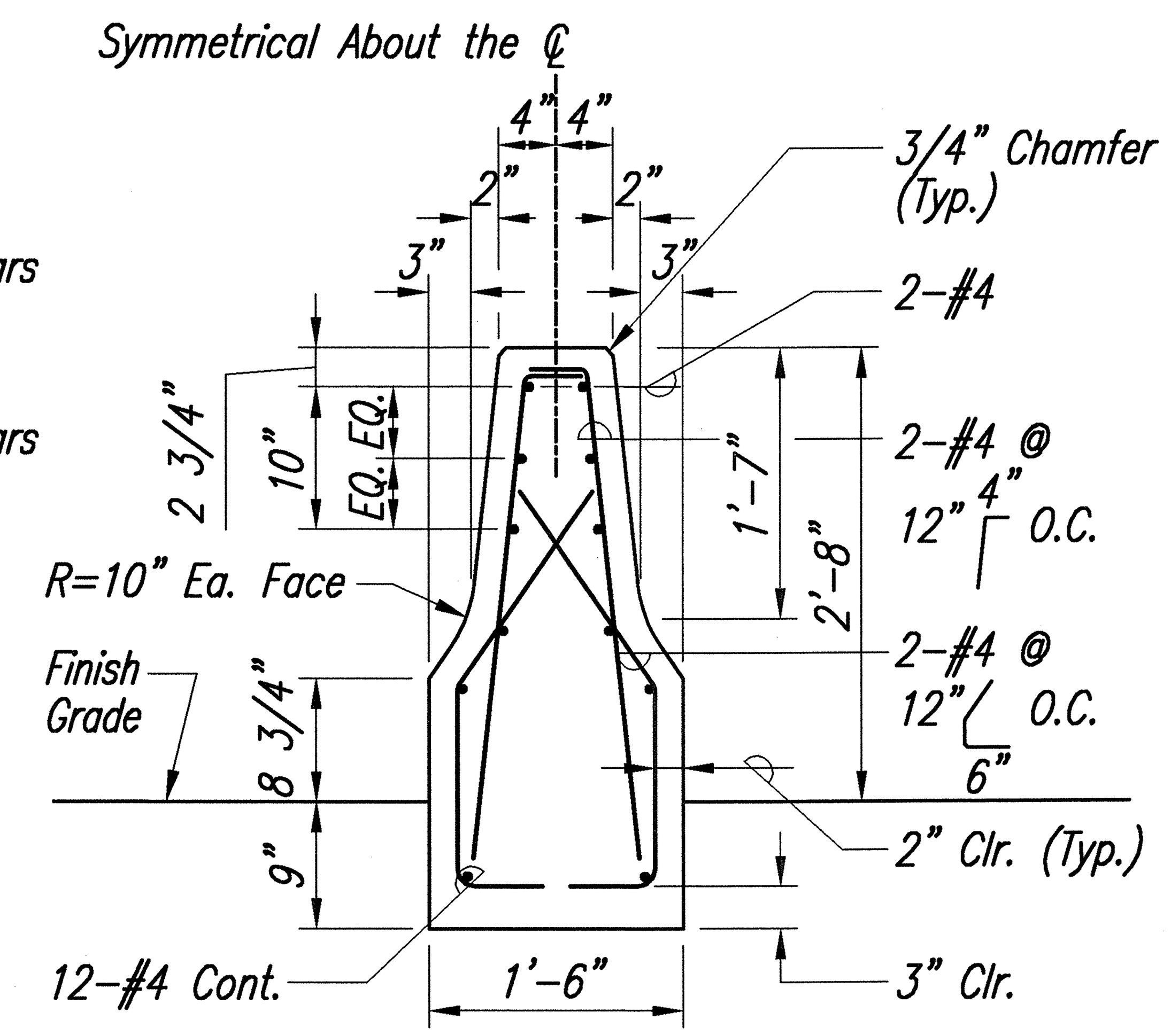
CONTROL JOINT DETAIL

Scale: NTS



TYPICAL SECTION TYPE 4E AT STA. 142+65, 143+95, 191+79 AND 193+09

Scale: 1"=1'-0"



SECTION AT STA. 142+70, 143+90, 191+84 AND 193+04

Scale: 1"=1'-0"

LEGEND

- 10" Plain Concrete Pad
- 2" Asphalt Concrete Pavement Mix No. IV & Bituminous Tack Coat
- Median
- Movable Steel Gate
- Concrete Barrier
- 750.16 — Top of Concrete Pad Elevation
- 100+00 — Baseline & Station

ABBREVIATIONS

A.C.	Asphalt Concrete
℄	Baseline
Conc.	Concrete

NOTES:

1. Saw Cut Pavement Before Removal. Payment for Saw Cutting and Cold Planing Shall be Considered Incidental to Various Contract Items.
2. Concrete for the 10" Plain Concrete Pad Shall be 4000 PSI Minimum Strength (28 Days) Portland Cement Concrete with Graded Aggregate and 3" Maximum Slump.
3. Sawed Contraction Joints for the 10" Plain Concrete Pad Shall be Spaced 8' Apart and Extend into the Slab to a Depth of 2 1/2".
4. The Engineer Will Not Pay for the 10" Plain Concrete Pad Nor Sawed Contraction Joints Separately and Will Consider Payment Incidental to the Movable Steel Gate System at Likelike Highway Under Pay Item 606.4200 - Electrically Operated Moveable Barrier.

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MOVABLE STEEL GATE SYSTEMS

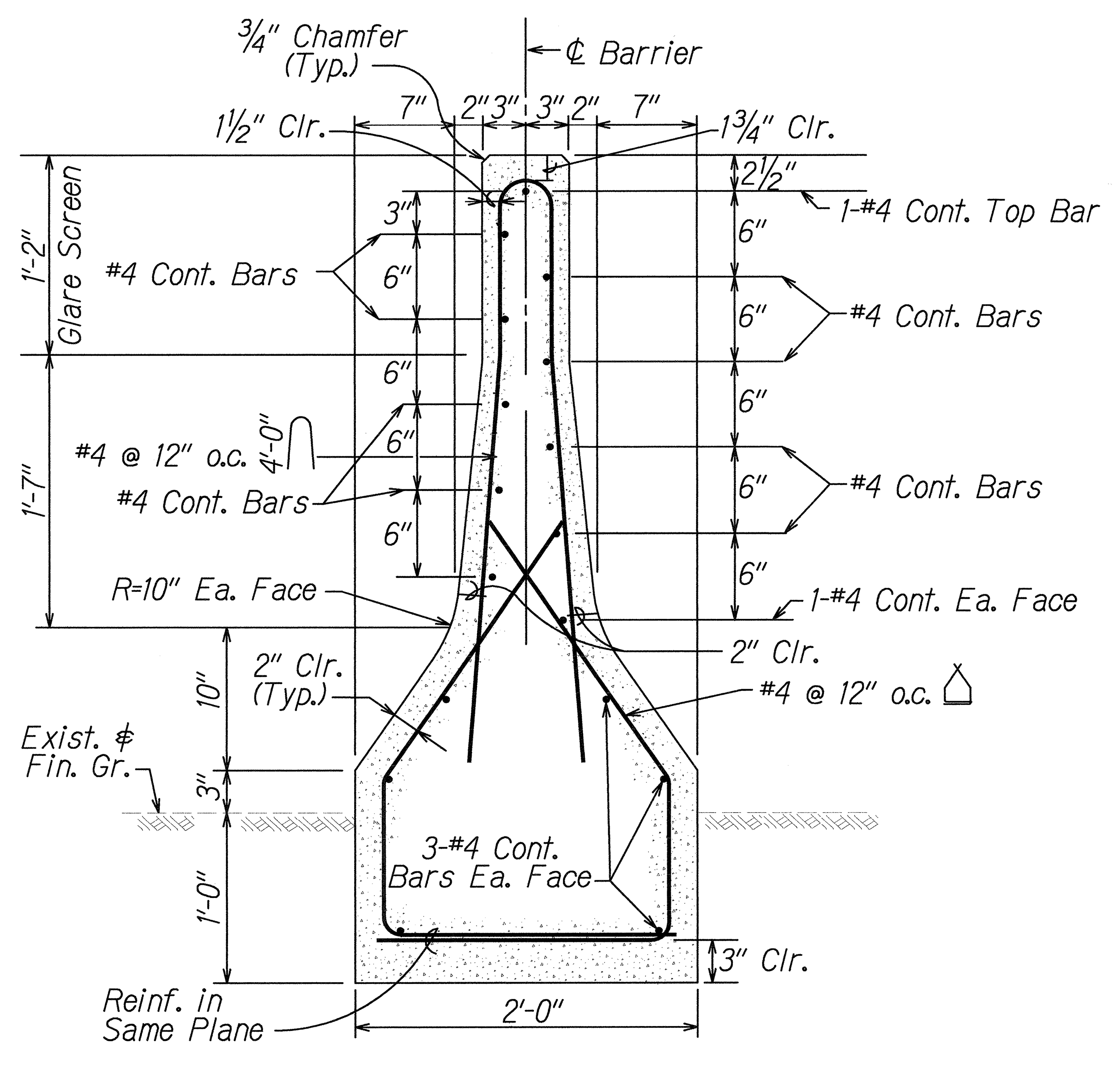
LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: As Shown — Date: December, 2001

SHEET No. 15 OF 19 SHEETS

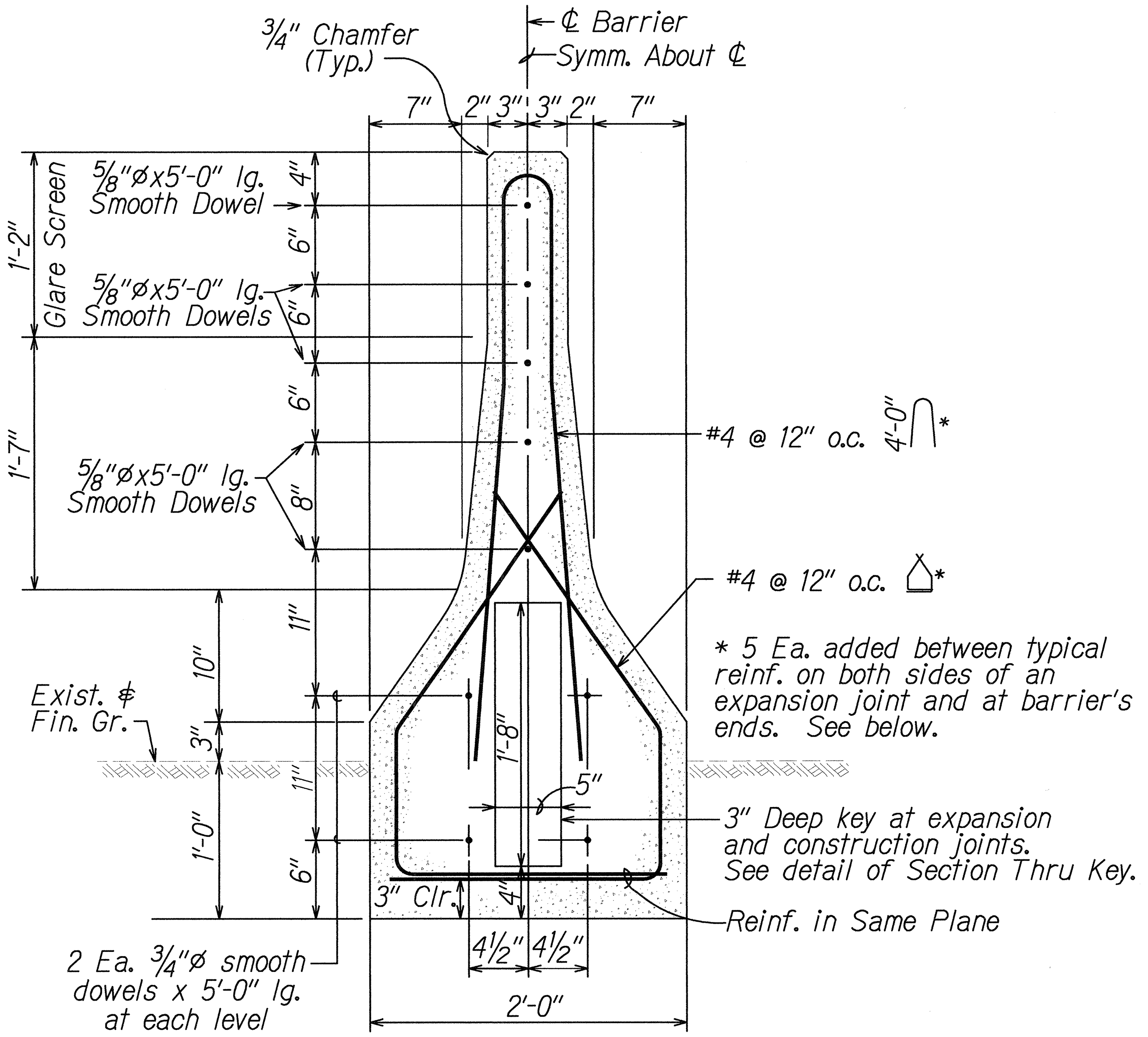
ORIGINAL PLAN — SURVEY PLOTTED BY — DRAWN BY — TRACED BY — DESIGNED BY — QUANTITIES BY — CHECKED BY — DATE
NOTE BOOK No.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	ADD111	187



TYPICAL SECTION TYPE 4E

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

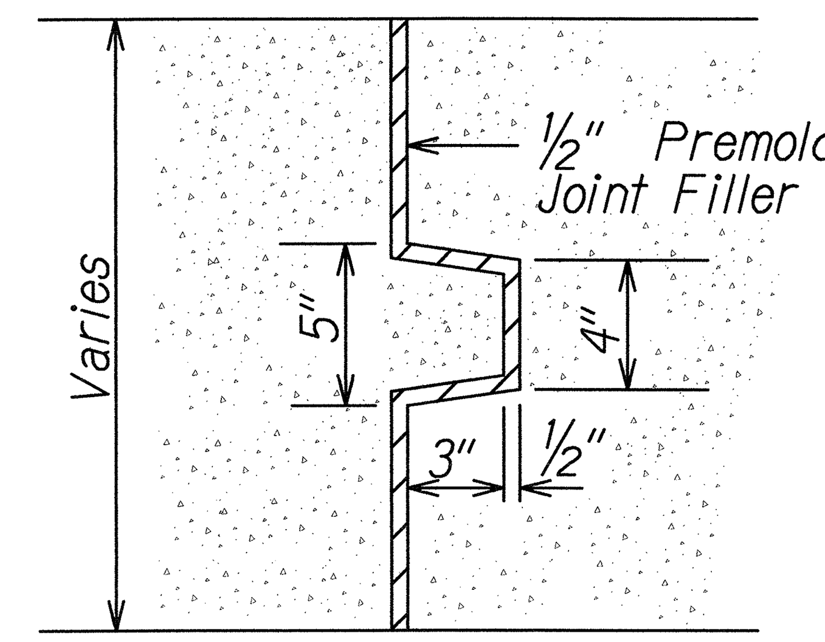


SECTION A 104|104

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

Barrier Notes:

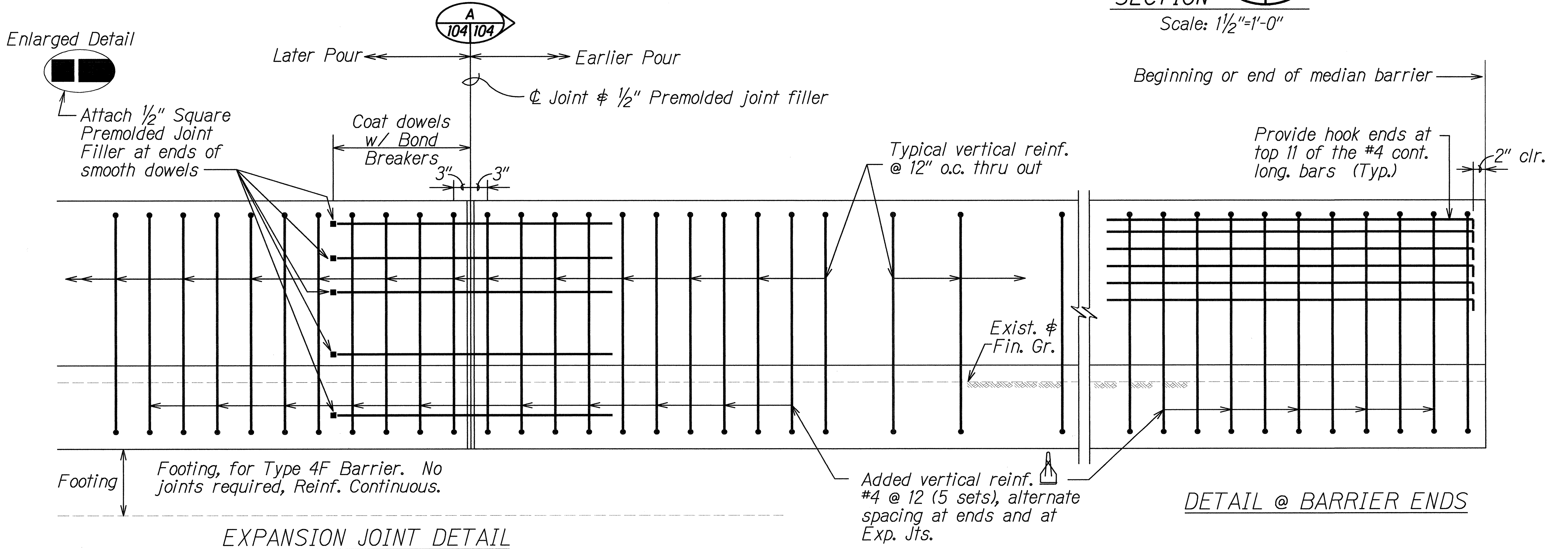
1. Reinf. = Gr. 60
2. Conc. = Type BD
3. Long. Reinf. Splice = Lap 18"
4. Dowels shall be plain Gr. 60 Bars
5. Exp. joint at 96' max. intervals.
6. Control joints shall be placed at 32' max. intervals between exp. joint.
7. 1/2" premolded joint filler shall be incidental to Type 4 Rigid Barrier Guardrail.
8. The exterior surface and vertical alignment of the Type 4 Rigid Barrier Guardrails shall not have variations of more than 1/4" in 20' and 1/2" in 40'.
9. For conduits, ducts and junction boxes, see Electrical plans for details.



NOTE: 1/2" Premolded joint filler is not used at construction joints.

SECTION THRU KEY AT EXPANSION AND CONSTRUCTION JOINT

Not to Scale



PART ELEVATION - MEDIAN BARRIER

Not to Scale

DATE	REVISION
1/2/02	Replace Sheet 111

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MEDIAN BARRIER 4E
TYPICAL SECTION & PART ELEVATION

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

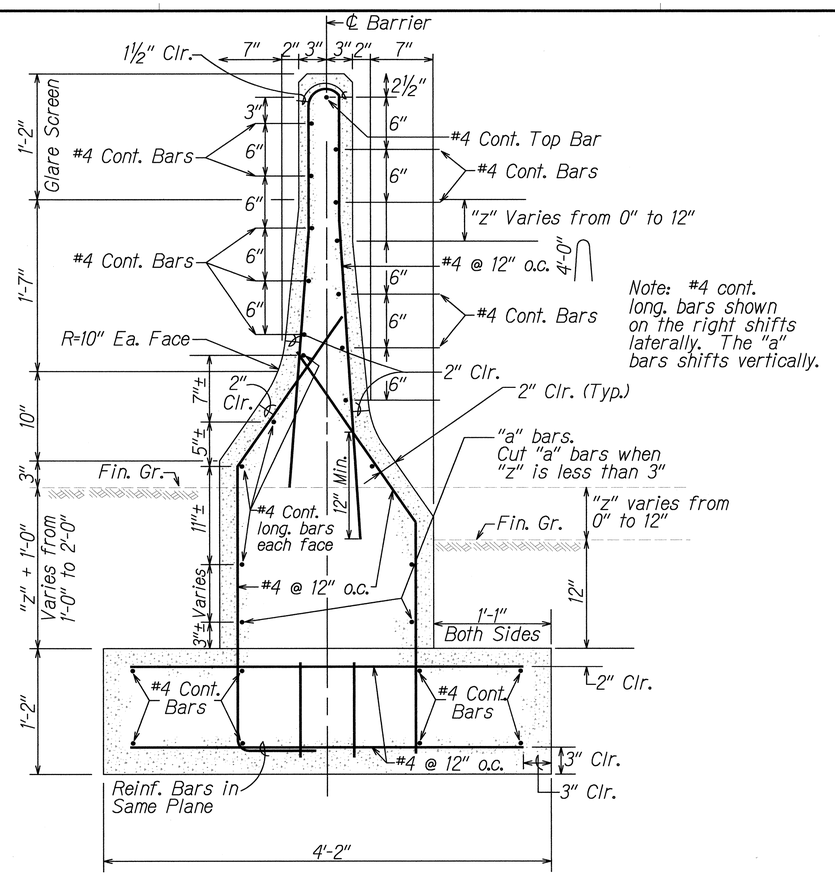
Scale: None Date: December, 2001

SHEET No. 16 OF 19 SHEETS

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

MB4EDET-REV.DGN

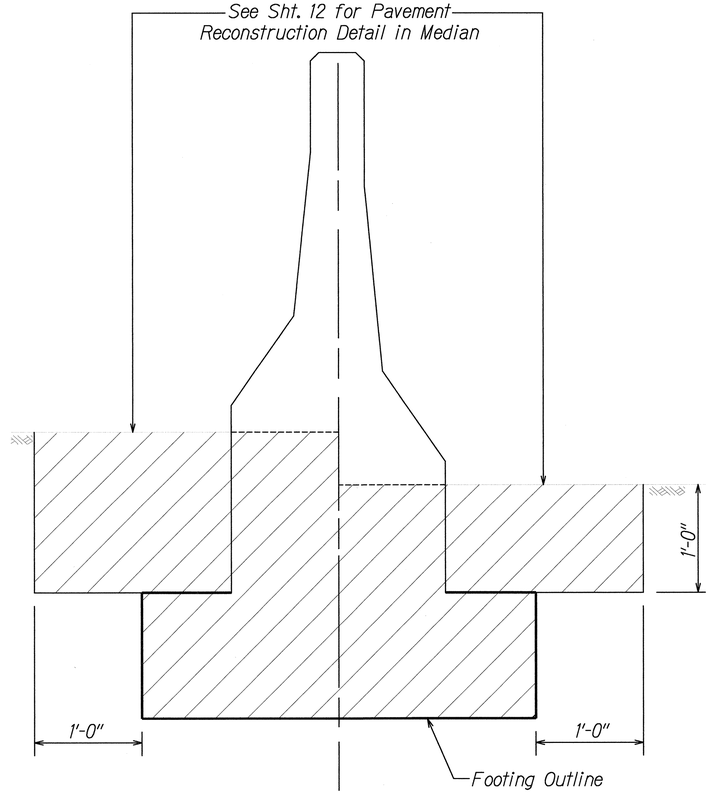
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	ADD112	187



Note: #4 cont. long. bars shown on the right shifts laterally. The "a" bars shifts vertically.

TYPICAL SECTION TYPE 4F

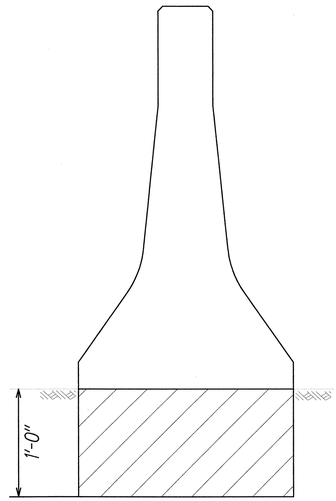
Scale: 1½"=1'-0"



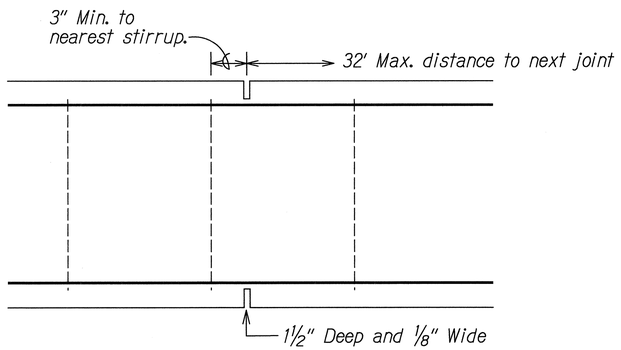
TYPE 4F

Scale: 1½"=1'-0"

Pay limits for Structural Excavation



TYPE 4E



CONTROL JOINT DETAIL

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

MBHFDET-REVISION

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DATE	REVISION
1/2/02	Replace Sheet 112

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MEDIAN BARRIER 4F

TYPICAL SECTION & DETAILS

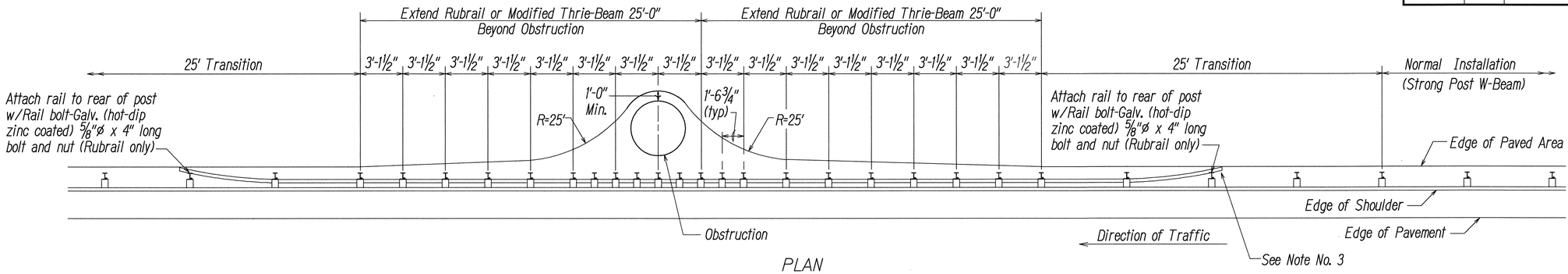
LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: None Date: December, 2001

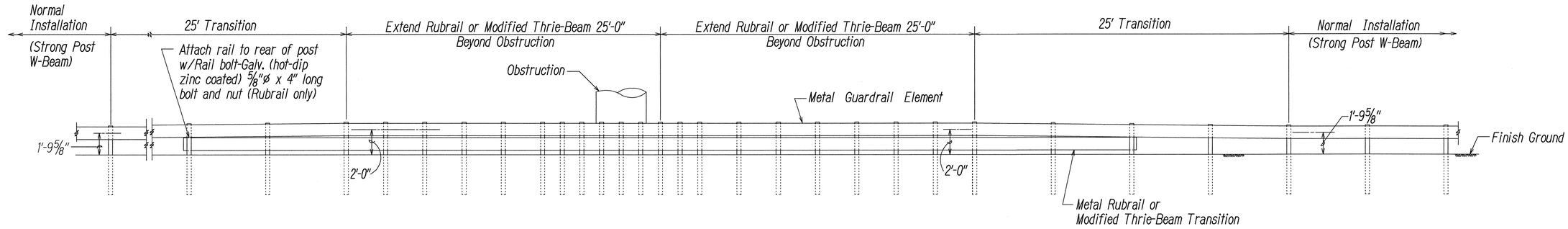
SHEET No. 17 OF 19 SHEETS

ADD 112

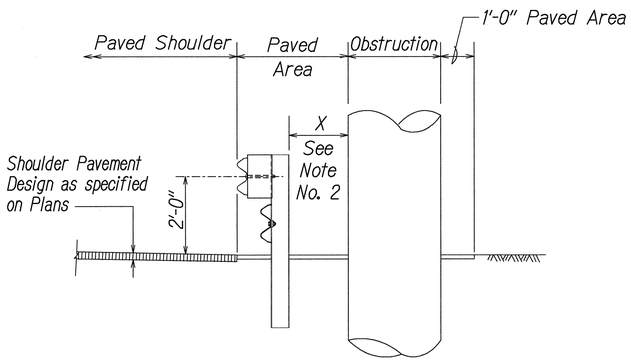
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	113	187



PLAN



ELEVATION



TYPICAL SECTION AT OBSTRUCTION

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. (As shown, this sheet)
   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

ALAN Y. TOMITA LICENSED PROFESSIONAL ENGINEER NO. 4129-C HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

(AT OBSTRUCTION)

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

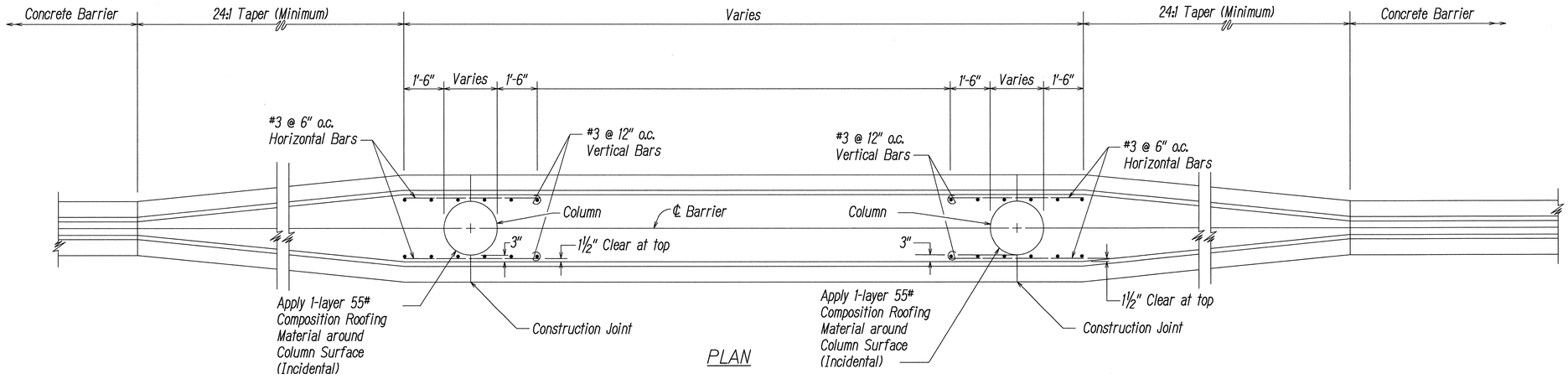
Scale: NTS Date: December, 2001

SHEET No. 18 OF 19 SHEETS

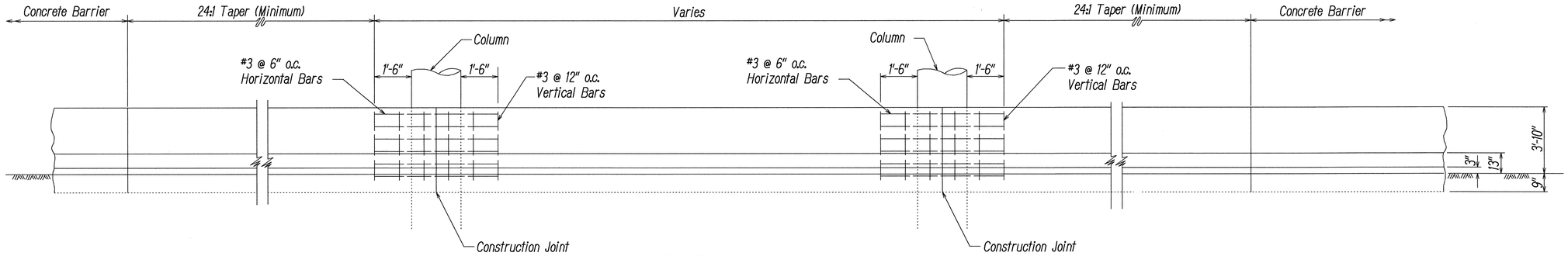
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE
NOTE BOOK | No.

3/01/99 te54rewdgn - 4LIK-BLDGN (standard plan TE-53 rd9/01/81 & TE-54 rl1/03/88)

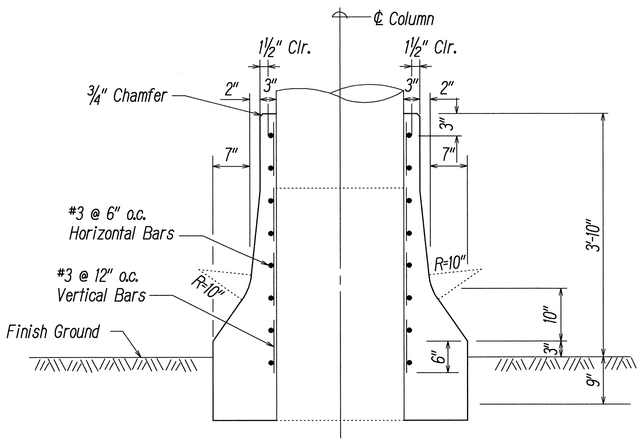
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	CM-STP-063-1(21)	2002	114	187



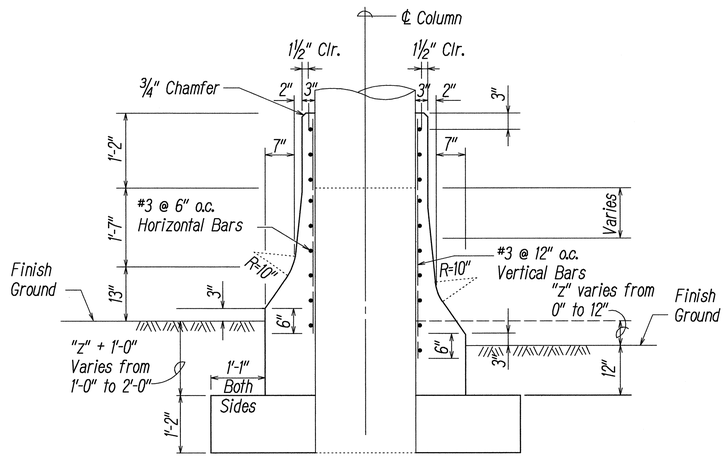
PLAN



ELEVATION



TYPICAL SECTION AT TANGENT



TYPICAL SECTION AT SUPER

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

ALAN Y. TOMITA
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HAWAII, U.S.A.

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Alan Y. Tomita

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MEDIAN BARRIER MODIFICATION AT BURMEISTER OVERPASS COLUMN

LIKELIKE HIGHWAY RESURFACING
Emmeline Place to the Wilson Tunnel
F. A. Project No. CM-STP-063-1(21)

Scale: NTS Date: December, 2001

SHEET No. 19 OF 19 SHEETS