STRUCTURAL NOTES

1. GENERAL SPECIFICATIONS: HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION, 1994, TOGETHER WITH SPECIAL PROVISIONS FOR THIS CONTRACT.
2. DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS," SECOND EDITION, 1998 AND ITS SUBSEQUENT INTERIM REVISIONS.
3. LOADS:
   - A. LIVE LOAD: HL-93
   - B. RAILING TEST LEVEL = TL-2
4. MATERIALS:
   - A. MINIMUM CONCRETE COMPRESSIVE STRENGTH (AT 28 DAYS) SHALL BE 4,000 PSI.
   - B. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, UNLESS OTHERWISE NOTED.
   - C. ALL MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A36 AND BE HOT-DIP GALVANIZED AFTER FABRICATION, UNLESS OTHERWISE NOTED.
   - D. ALL ANCHOR BOLTS SHALL BE STAINLESS STEEL AND CONFORM TO ASTM F593, TYPE 316, WITH MINIMUM TENSILE STRENGTH OF 90,000 PSI. ALL NUTS FOR ANCHOR BOLTS SHALL BE STAINLESS STEEL AND CONFORM TO ASTM F594, TYPE 316, WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI. ALL WASHERS FOR ANCHOR BOLTS SHALL BE TYPE 316 STAINLESS STEEL AND CONFORM TO ANSI B18.22.1.
5. REINFORCEMENT:
   - A. UNLESS OTHERWISE NOTED, THE COVERING MEASURED FROM THE SURFACE OF THE CONCRETE TO THE FACE OF ANY REINFORCING BARS SHALL BE AS FOLLOWS:
     - 1) SLABS:
       - A) TOP BARS = 2"
       - B) BOTTOM BARS = 2"
     - 2) RAILINGS, PARAPETS, AND PEDESTALS = 2"
     - 3) CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH = 3"
   - B. REINFORCING BARS SHALL BE DETAILED IN ACCORDANCE WITH ACI DETAILING MANUAL FOR REINFORCED CONCRETE HIGHWAY STRUCTURES, UNLESS OTHERWISE NOTED.
   - C. MINIMUM CLEAR SPACING BETWEEN PARALLEL BARS SHALL BE 1-1/2 TIMES THE DIAMETER OF BARS, BUT IN NO CASE SHALL THE CLEAR DISTANCE BETWEEN THE PARALLEL BARS BE LESS THAN 1-1/2 TIMES THE MAXIMUM SIZE OF THE COARSE AGGREGATE OR 1-1/2 INCHES.
   - D. ALL DIMENSIONS RELATING TO REINFORCING BARS (E.G. SPACING OF BARS, ETC.) ARE TO CENTERS OF BARS, UNLESS OTHERWISE NOTED.
   - E. REINFORCING BARS SHALL BE SECURELY TIED AT ALL INTERSECTIONS AND LAP SPLICES EXCEPT WHERE THE SPACING OF INTERSECTIONS IS LESS THAN ONE FOOT IN EACH DIRECTION, IN WHICH CASE ALTERNATE INTERSECTIONS SHALL BE TIED.
   - F. ALL BARS SHOWN WITH BENDS SHALL CONFORM TO STANDARD ACI HOOKS, UNLESS OTHERWISE NOTED.
6. CONSTRUCTION NOTES:
   - A. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS.
   - B. UNLESS OTHERWISE NOTED, ALL VERTICAL DIMENSIONS ARE MEASURED PLUMB.
   - C. THE CONTRACTOR SHALL VERIFY ALL SITE CONDITIONS BEFORE COMMENCING WITH WORK.
   - D. FOR CONCRETE FINISH, SEE STANDARD SPECIFICATIONS.
   - E. CONSTRUCTION JOINTS MAY BE RELOCATED OR ADDITIONAL ONES ADDED, SUBJECT TO THE APPROVAL OF THE ENGINEER.
   - F. UNLESS OTHERWISE NOTED, ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4" X 3/4".
7. FOUNDATION:

   THESE FOUNDATION NOTES WERE BASED ON RECOMMENDATIONS CONTAINED IN A FOUNDATION INVESTIGATION REPORT BY GEOLABS, INC. (PHONE: 808-841-5064) DATED APRIL 11, 2001. THE REPORT SHALL BE CONSIDERED AS PART OF THE CONSTRUCTION DOCUMENTS AND ITS RECOMMENDATIONS SHALL BE IMPLEMENTED, UNLESS OTHERWISE DIRECTED BY THE SOILS ENGINEER.
   - A. DRILLED SHAFTS:
     - 1) THE DRILLED SHAFT ESTIMATED LENGTHS SHOWN ON THE PLANS ARE BASED ON THE BORING DATA. THE ACTUAL DRILLED SHAFT LENGTH COULD CHANGE DUE TO VARYING SUBSURFACE CONDITIONS. SOILS ENGINEER OF RECORD SHALL BE PRESENT DURING THE DRILLING OPERATION TO DETERMINE THAT THE ACTUAL SUBSURFACE CONDITIONS ARE CONSISTENT WITH THE CONDITIONS ASSUMED FOR DESIGN. THE CONTRACTOR SHALL MAKE PROVISIONS TO ACCOUNT FOR VARIATIONS IN THE FINAL DRILLED SHAFT LENGTHS.
     - 2) THE CONTRACTOR SHALL EXERCISE CARE IN DRILLING THE SHAFT HOLES AND IN PLACING CONCRETE INTO THE HOLES. ROCK DRILLING/CORING EQUIPMENT MAY BE REQUIRED FOR DRILLED SHAFTS EXTENDING THROUGH HARD BASALT LAYERS. TEMPORARY CASING MAY BE NEEDED TO REDUCE THE POTENTIAL FOR CAVING IN OF THE HOLES. THE USE OF PERMANENT CASING WILL NOT BE ALLOWED.
     - 3) DRILLING SHALL NOT BE CONDUCTED BY METHODS UTILIZING DRILLING FLUIDS.
     - 4) CONCRETE FOR DRILLED SHAFTS SHALL BE PLACED WITHIN 48 HOURS AFTER DRILLING TO REDUCE THE POTENTIAL FOR CAVING IN.
     - 5) SINCE GROUNDWATER MAY BE ENCOUNTERED IN THE DRILLED HOLES, PLACEMENT OF CONCRETE SHALL BE BY TREMIE METHODS. A MINIMUM OF 5 FEET OF CONCRETE HEAD SHALL BE MAINTAINED ABOVE THE BOTTOM OF THE TREMIE PIPE DURING PLACEMENT OF CONCRETE.
8. THE CONTRACTOR SHALL BE AWARE THAT THE BRIDGES ON ROUTE 360, HANA HIGHWAY HAVE A POSTED WEIGHT LIMIT OF 10 TONS MAXIMUM.

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

SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	CONTRACT ITEM	QUANTITY	UNIT
206.0100	STRUCTURE EXCAVATION FOR CONCRETE SUPPORT AT MP 11.4	125	C.Y.
206.0101	STRUCTURE EXCAVATION FOR CONCRETE SUPPORT AT MP 12.8 A	125	C.Y.
206.0102	STRUCTURE EXCAVATION FOR CONCRETE SUPPORT AT MP 12.8 B	110	C.Y.
206.0103	STRUCTURE EXCAVATION FOR CONCRETE SUPPORT AT MP 14.3	140	C.Y.
206.0104	STRUCTURE EXCAVATION FOR CONCRETE SUPPORT AT MP 19.8	90	C.Y.
206.0700	STRUCTURE BACKFILL FOR CONCRETE SUPPORT AT MP 11.4	25	C.Y.
206.0701	STRUCTURE BACKFILL FOR CONCRETE SUPPORT AT MP 12.8 A	25	C.Y.
206.0702	STRUCTURE BACKFILL FOR CONCRETE SUPPORT AT MP 12.8 B	20	C.Y.
206.0703	STRUCTURE BACKFILL FOR CONCRETE SUPPORT AT MP 14.3	25	C.Y.
206.0704	STRUCTURE BACKFILL FOR CONCRETE SUPPORT AT MP 19.8	20	C.Y.
503.1000	CONCRETE FOR CONCRETE SUPPORT AT MP 11.4	(100)	(C.Y.) L.S.
503.1001	CONCRETE FOR CONCRETE SUPPORT AT MP 12.8 A	(100)	(C.Y.) L.S.
503.1002	CONCRETE FOR CONCRETE SUPPORT AT MP 12.8 B	(90)	(C.Y.) L.S.
503.1003	CONCRETE FOR CONCRETE SUPPORT AT MP 14.3	(110)	(C.Y.) L.S.
503.1004	CONCRETE FOR CONCRETE SUPPORT AT MP 19.8	(70)	(C.Y.) L.S.
511.0200	DRILLED SHAFT - 36-INCH DIAMETER	1345	L.F.
511.0300	UNCLASSIFIED SHAFT EXCAVATION	1345	L.F.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	11	42

ABBREVIATIONS

#	NUMBER OR POUND
A.B.	ANCHOR BOLT
A.C.	ASPHALT CONCRETE
AZ.	AZIMUTH
BOT., BOTT., B	BOTTOM
C.J.	CONSTRUCTION JOINT
℄	CENTERLINE
C.G.	CENTER OF GRAVITY
CLR., CL.	CLEAR
CONC.	CONCRETE
CONT.	CONTINUOUS
C.Y.	CUBIC YARD
DBL.	DOUBLE
DET.	DETAIL
D.I.	DUCTILE IRON
DIA.	DIAMETER
DN.	DOWN
DWG.	DRAWING
E.F.	EACH FACE
ELEV., EL.	ELEVATION
E.W.	EACH WAY
EXP.	EXPANSION
F.B.	FLAT BAR
G	GIRDER
GALV.	GALVANIZED
HORIZ., H	HORIZONTAL
IN.	INCH
JT.	JOINT
K	KIPS
KSI	KIPS PER SQUARE INCH
LB., LBS.	POUND, POUNDS
L.F.	LINEAR FEET
L.S.	LUMP SUM
MAX.	MAXIMUM
MIN.	MINIMUM
NO., #	NUMBER
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
PCF	POUNDS PER CUBIC FEET
PL., ℙ	PLATE
PSF	POUNDS PER SQUARE FEET
PSI	POUNDS PER SQUARE INCH
PVC.	POLYVINYL CHLORIDE
R, RAD.	RADIUS
REBAR	REINFORCING BAR
REF.	REFERENCE
REINF.	REINFORCED, REINFORCING, REINFORCEMENT
REQ'D.	REQUIRED
R.O.W.	RIGHT-OF-WAY
SHT.	SHEET
SL.	SLOPE
STA.	STATION
STD.	STANDARD
STIRR.	STIRRUP
SYM., SYMM.	SYMMETRICAL
THK., TH.	THICK
TYP.	TYPICAL
VERT., V	VERTICAL
W/	WITH
W.S.	WHITE STRIPE

LEONARD F. OKI
LICENSED PROFESSIONAL ENGINEER
No. 2431-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Date	Revision

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

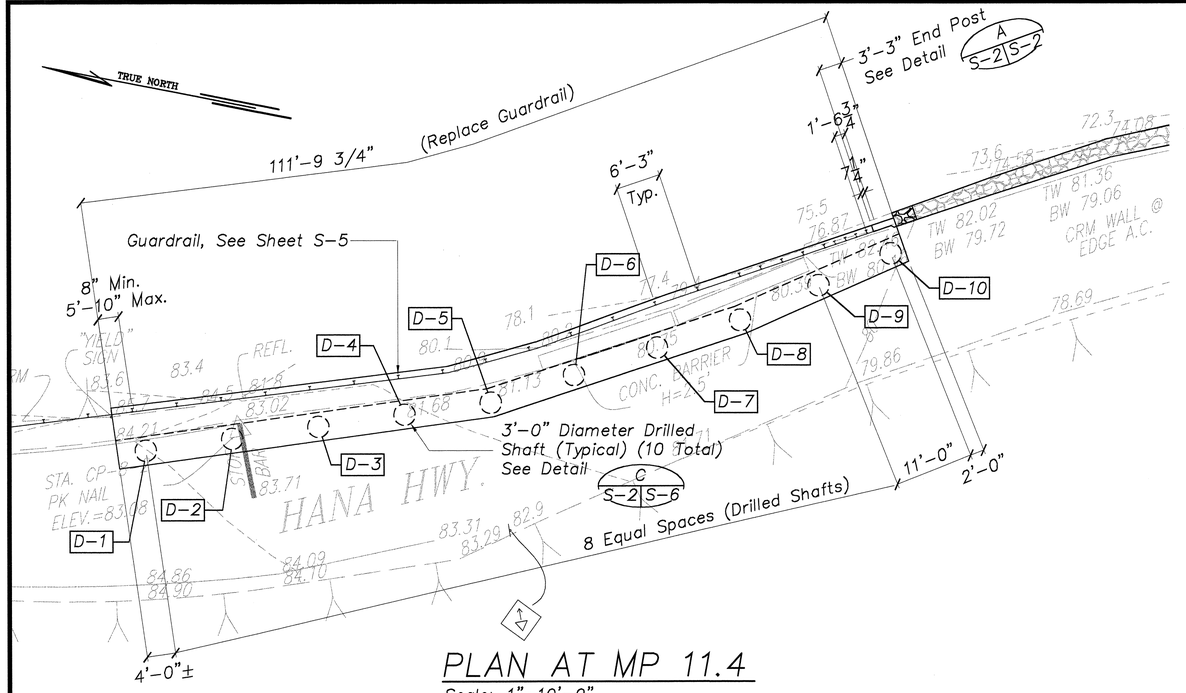
STRUCTURAL NOTES, SUMMARY OF ESTIMATED QUANTITIES

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

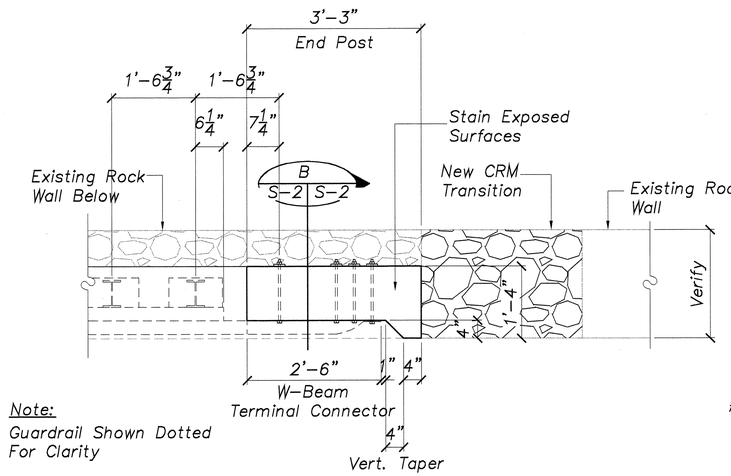
SHEET No. S-1 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 12	42

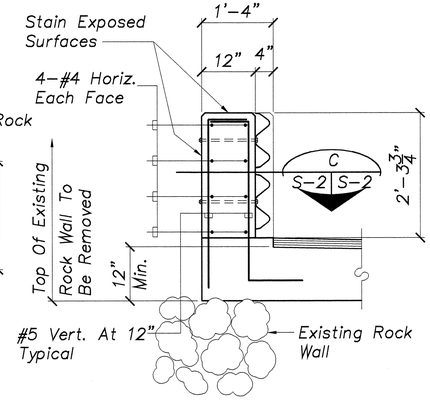


PLAN AT MP 11.4

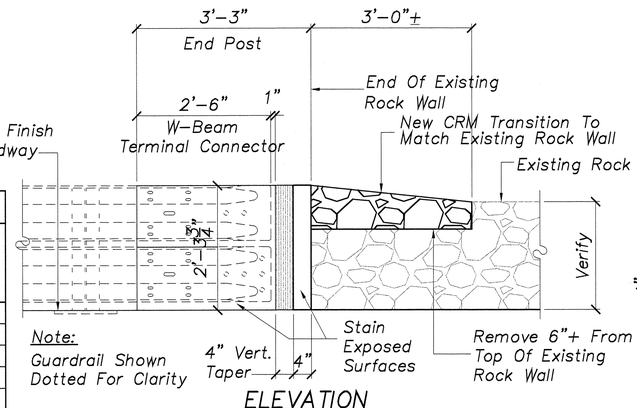
Scale: 1"=10'-0"



Note:
Guardrail Shown Dotted For Clarity



PLAN

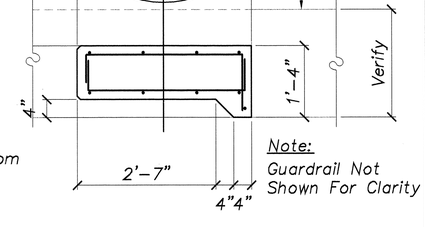


Note:
Guardrail Shown Dotted For Clarity

ELEVATION

SECTION

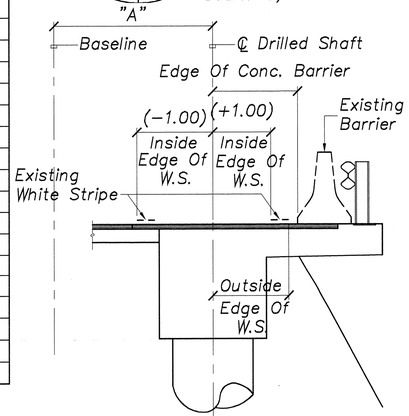
B S-2 S-2 Scale: 3/4"=1'-0"



Note:
Guardrail Not Shown For Clarity

END POST DETAIL

A S-2, S-5 S-2 "A" Scale: 3/4"=1'-0"



SECTION

C S-2 S-2 Scale: 3/4"=1'-0"

1. Contractor Shall Use The Offset Distance "A" As Shown On The Drill Shaft Location Table To Locate The Drill Shafts.
2. Contractor Shall Use The Verification Offset Distance To Verify The Location Of The Drill Shaft.
3. Contractor Shall Notify The Engineer Of Any Discrepancies Between The Offset Dimension.
4. Contractor Shall Not Move Any Existing Features Until The Verification Offset Distances Have Been Checked. At His Option, The Contractor May Mark The Locations Of Any Existing Feature That He Intends To Move Prior To Verifying Any Offset Distances.

DRILL SHAFT LOCATION TABLE

Milepost	Drill Shaft	Offset Distance "A" ℄ Of Drill Shaft To ℄	Baseline Station	Verification Offset Distance ℄ Of Drill Shaft To Edge Of Exist'g Feature
11.4	D-1	7.5' Lt.	452+39.5	+1.5' From Outside Edge Of 8" W.S.
11.4	D-2	8.4' Lt.	452+52.3	+1.83' From Outside Edge Of 8" W.S.
11.4	D-3	8.2' Lt.	452+65.1	2.33' From Edge Of Pavement
11.4	D-4	6.9' Lt.	452+77.7	2.5' From Edge Of Pavement
11.4	D-5	5.2' Lt.	452+90.2	2.67' From Edge Of Pavement
11.4	D-6	4.6' Lt.	453+02.7	2.2' From Conc. Barrier
11.4	D-7	3.6' Lt.	453+14.9	2.1' From Conc. Barrier
11.4	D-8	1.9' Lt.	453+27.2	2.67' From Conc. Barrier
11.4	D-9	0.2' Lt.	453+39.3	2.58' From Conc. Barrier
11.4	D-10	1.7' Rt.	453+50.4	3.3' From CRM Wall
12.8A	D-11	0.1' Rt.	524+11.6	+3.3' From Inside Edge Of 4" W.S.
12.8A	D-12	0.6' Lt.	524+23.8	+3.0' From Inside Edge Of 4" W.S.
12.8A	D-13	1.3' Lt.	524+35.9	+2.58' From Inside Edge Of 4" W.S.
12.8A	D-14	3.2' Lt.	524+47.8	1.25' From Conc. Barrier
12.8A	D-15	3.9' Lt.	524+59.8	1.42' From Conc. Barrier
12.8A	D-16	4.8' Lt.	524+71.7	1.08' From Conc. Barrier
12.8A	D-17	5.5' Lt.	524+83.6	1.08' From Conc. Barrier
12.8A	D-18	6.2' Lt.	524+95.5	1.17' From Conc. Barrier
12.8A	D-19	7.6' Lt.	525+07.3	0.08' From Conc. Barrier
12.8A	D-20	7.6' Lt.	525+19.4	0.67' From Conc. Barrier
12.8B	D-21	6.3' Lt.	526+99.6	+2.0' From Inside Edge Of 4" W.S.
12.8B	D-22	3.6' Lt.	527+11.0	1.33' From Conc. Barrier
12.8B	D-23	2.0' Lt.	527+22.6	1.7' From Conc. Barrier
12.8B	D-24	0.9' Lt.	527+34.6	1.42' From Conc. Barrier
12.8B	D-25	0.0'	527+46.6	0.83' From Conc. Barrier
12.8B	D-26	0.7' Rt.	527+58.6	1.7' From Conc. Barrier
12.8B	D-27	1.0' Rt.	527+70.6	+2.0' From Inside Edge Of 4" W.S.
12.8B	D-28	1.9' Rt.	527+82.6	+2.0' From Inside Edge Of 4" W.S.
12.8B	D-29	1.5' Rt.	527+94.6	+2.0' From Inside Edge Of 4" W.S.
11.4	D-30	8.2' Lt.	11+28.6	+1.58' From Inside Edge Of 4" W.S.
11.4	D-31	8.4' Lt.	11+40.1	+1.33' From Inside Edge Of 4" W.S.
11.4	D-32	9.0' Lt.	11+51.7	+0.92' From Inside Edge Of 4" W.S.
11.4	D-33	8.8' Lt.	11+63.7	+0.3' From Inside Edge Of 4" W.S.
11.4	D-34	9.1' Lt.	11+75.7	-0.67' From Inside Edge Of 4" W.S.
11.4	D-35	8.2' Lt.	11+87.7	-0.42' From Inside Edge Of 4" W.S.
11.4	D-36	7.6' Lt.	11+99.7	-0.33' From Inside Edge Of 4" W.S.
11.4	D-37	7.2' Lt.	12+11.7	-0.33' From Inside Edge Of 4" W.S.
11.4	D-38	7.5' Lt.	12+23.3	-0.58' From Inside Edge Of 4" W.S.
11.4	D-39	8.2' Lt.	12+34.7	+0.17' From Inside Edge Of 4" W.S.
11.4	D-40	8.1' Lt.	12+46.1	+0.0' From Inside Edge Of 4" W.S.
19.8	D-41	9.7' Lt.	890+49.9	0.67' From Conc. Barrier
19.8	D-42	7.3' Lt.	890+61.2	1.17' From Conc. Barrier
19.8	D-43	6.6' Lt.	890+72.7	1.67' From Conc. Barrier
19.8	D-44	4.2' Lt.	890+84.0	2.33' From Conc. Barrier
19.8	D-45	4.9' Lt.	890+95.6	2.0' From Conc. Barrier
19.8	D-46	5.9' Lt.	891+07.1	0.0' From Inside Edge Of 4" W.S.
19.8	D-47	6.5' Lt.	891+18.6	0.4' From Inside Edge Of 4" W.S.

Date	Revision
11/13/01	Revise Guardrail to T6, Stain Exposed Concrete Surfaces

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PARTIAL PLANS, END POST DETAILS

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

SHEET No. S-2 OF 8 SHEETS

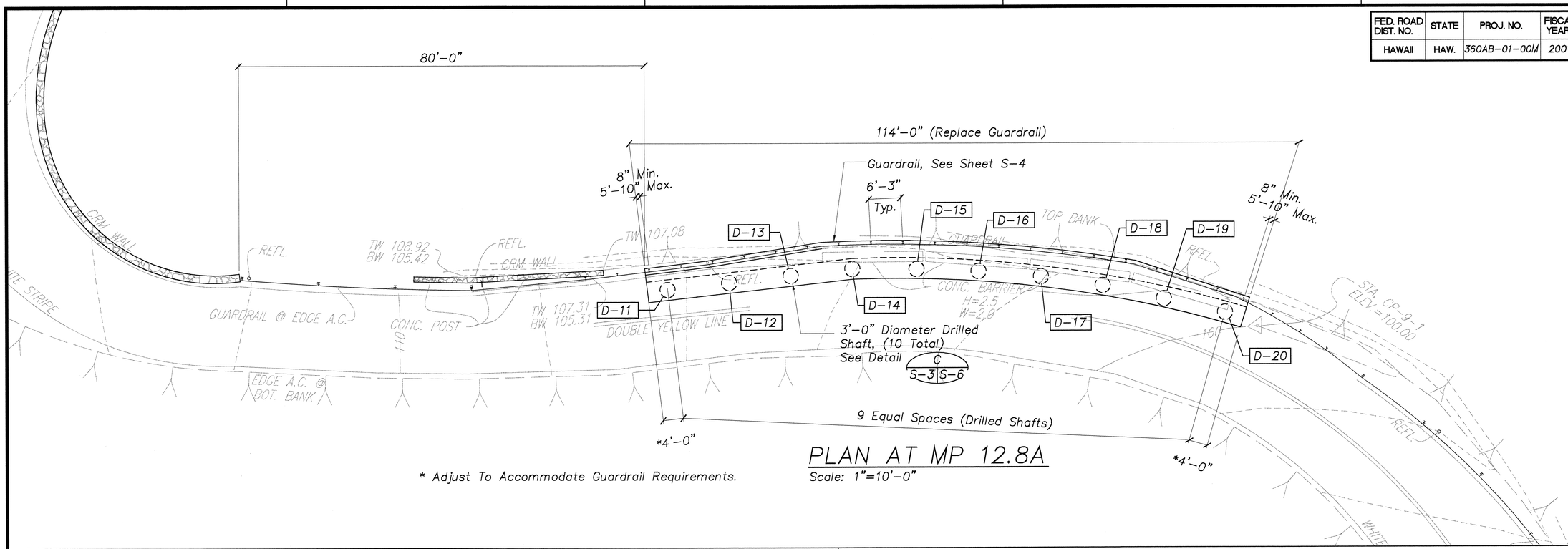
LEONARD F. OKI LICENSED PROFESSIONAL ENGINEER No. 2431-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

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

C.O. 12

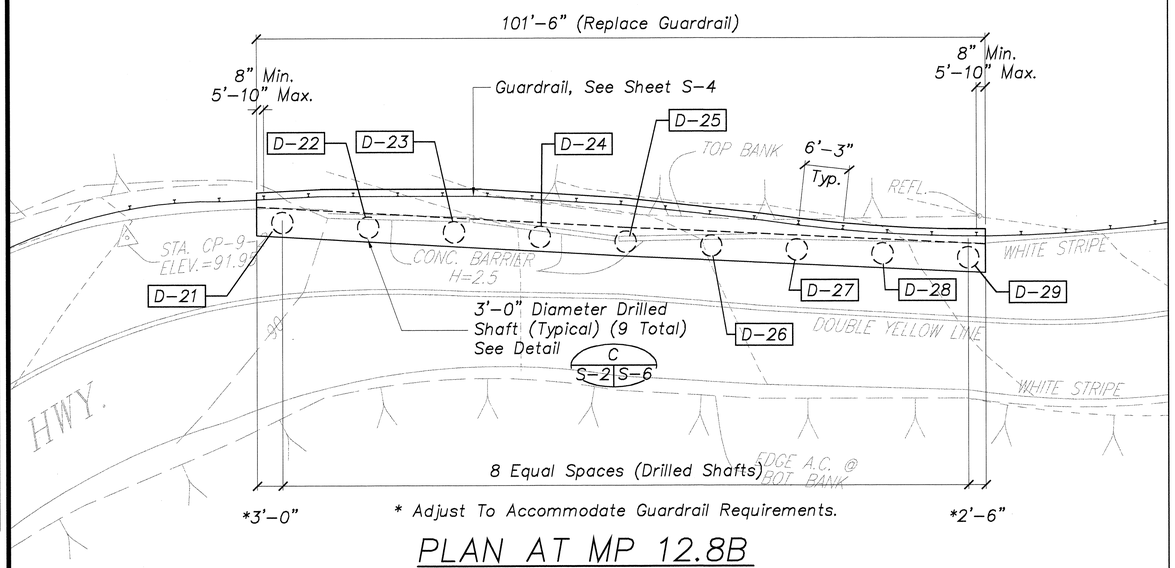
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 13	42



* Adjust To Accommodate Guardrail Requirements.

PLAN AT MP 12.8A

Scale: 1"=10'-0"



* Adjust To Accommodate Guardrail Requirements.

PLAN AT MP 12.8B

Scale: 1"=10'-0"

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

ORIGINAL PLAN
NOTE BOOK
No.

LEONARD F. OKI
LICENSED PROFESSIONAL ENGINEER
No. 2431-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Date	Revision
11/13/01	Revise Guardrail To T6

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PARTIAL PLANS

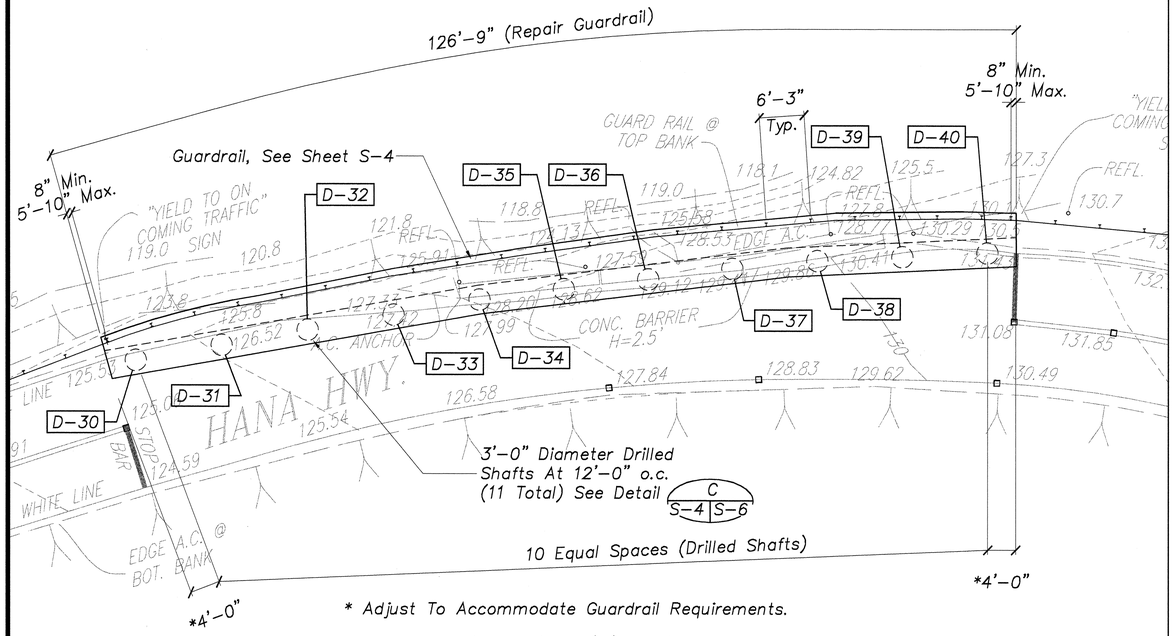
HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

SHEET No. S-3 OF 8 SHEETS

C.O. 13

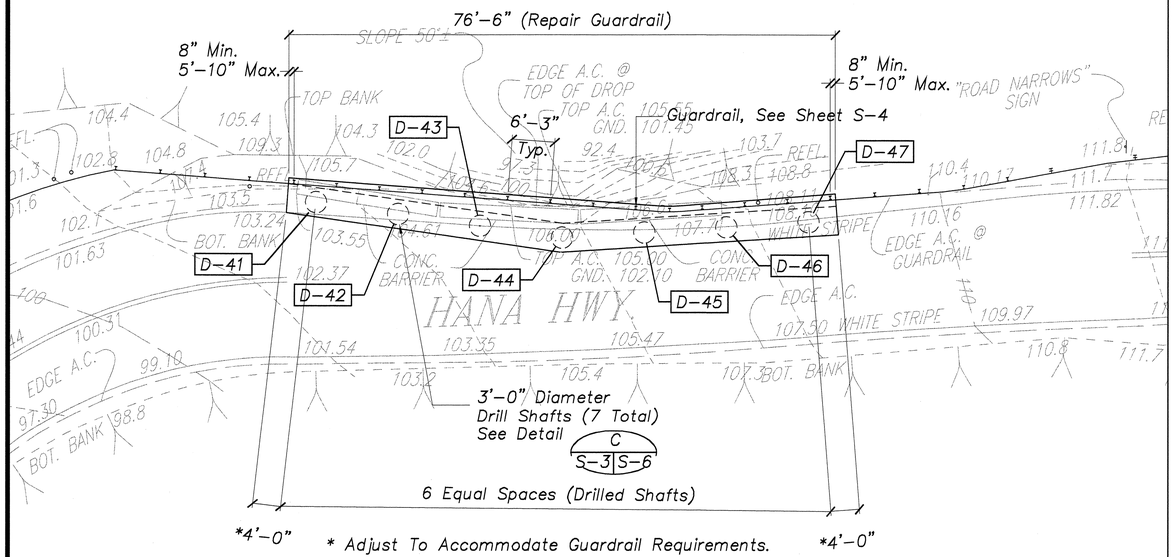
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 14	42



* Adjust To Accommodate Guardrail Requirements.

PLAN AT MP 14.3

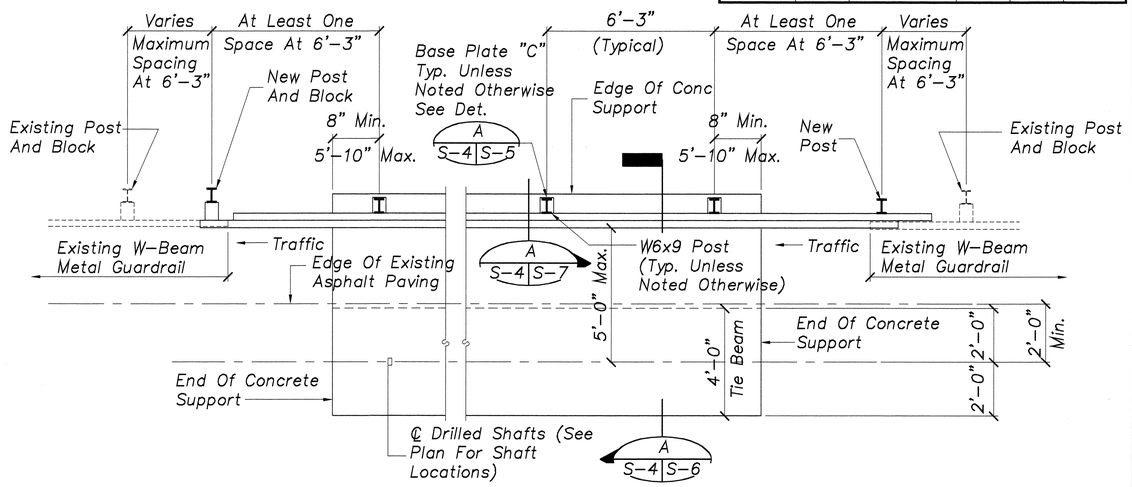
Scale: 1"=10'-0"



* Adjust To Accommodate Guardrail Requirements.

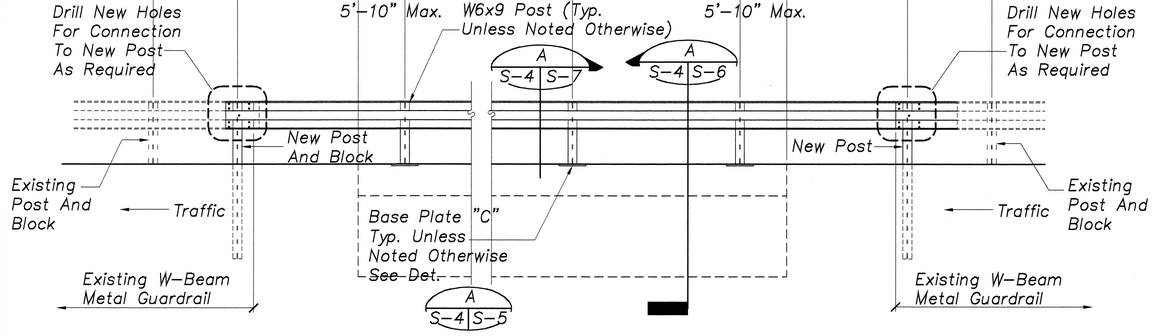
PLAN AT MP 19.8

Scale: 1"=10'-0"



TYPICAL GUARDRAIL PLAN

Scale: 3/8"=1'-0"



TYPICAL GUARDRAIL ELEVATION

Scale: 3/8"=1'-0"

Date	Revision
11/13/01	Revise Guardrail to T6, Added Typical Guardrail Plan And Elevation

LEONARD F. OKI
LICENSED PROFESSIONAL ENGINEER
No. 2431-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PARTIAL PLAN, GUARDRAIL PLAN, GUARDRAIL ELEVATION

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

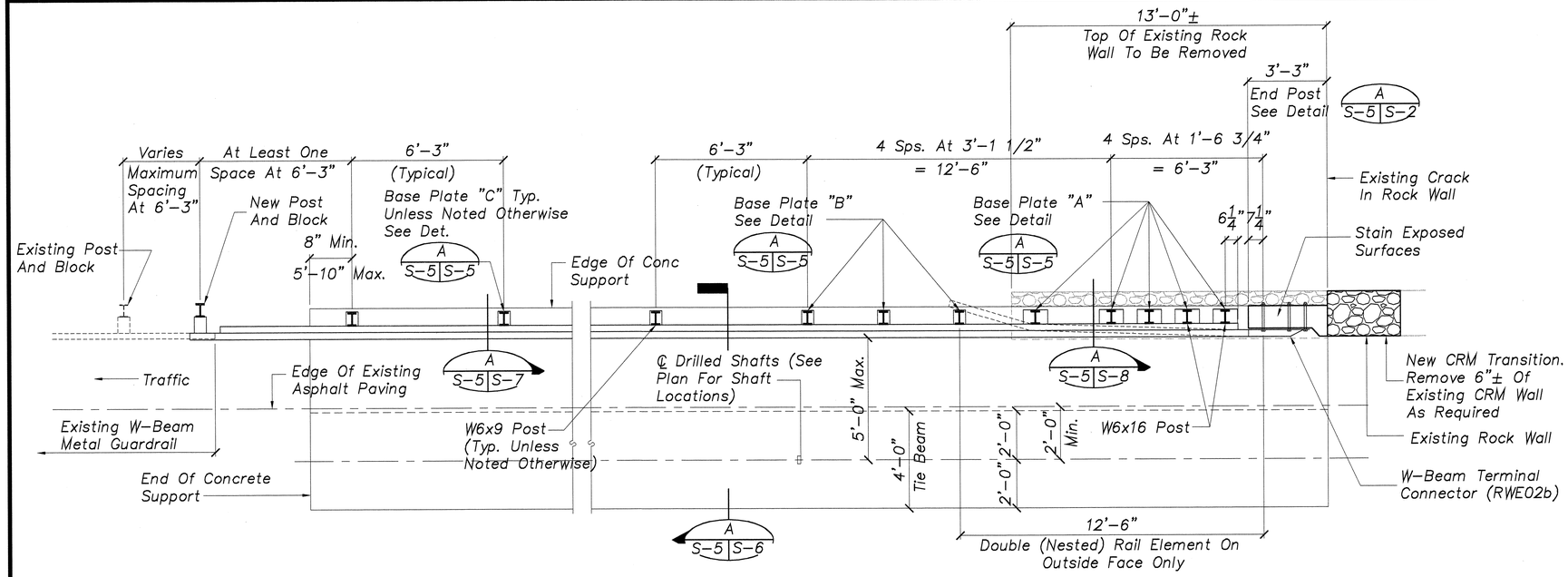
Scale: As Noted Date: March, 2001

SHEET No. S-4 OF 8 SHEETS

C.O. 14

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

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 15	42



GUARDRAIL PLAN AT MP 11.4

Scale: 3/8"=1'-0"

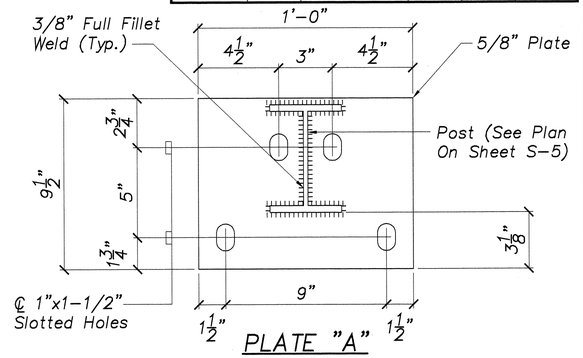
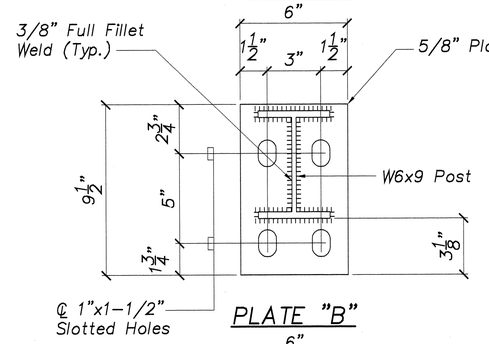


PLATE "A"



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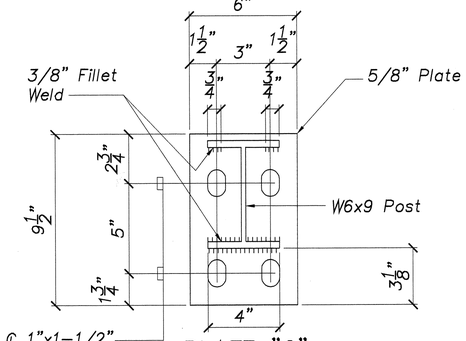
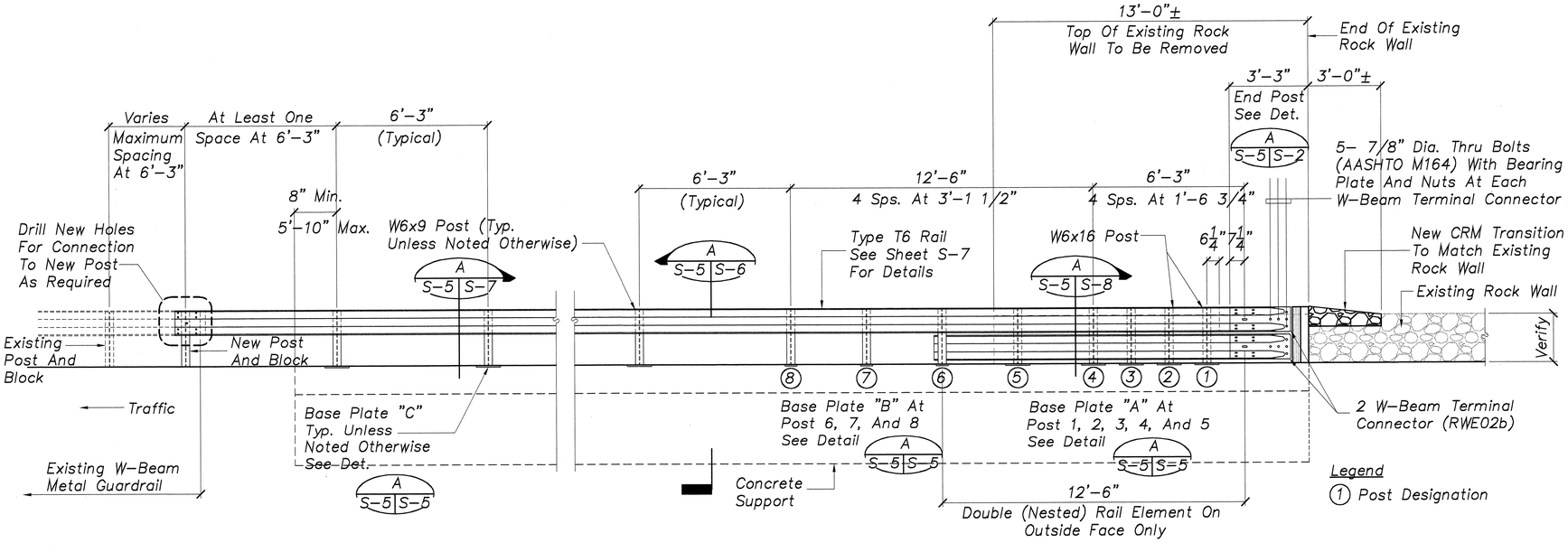


PLATE "C"

BASE PLATE DETAILS

Scale: 3"=1'-0"



GUARDRAIL ELEVATION AT MP 11.4

Scale: 3/8"=1'-0"

Date	Revision
11/13/01	Revise Guardrail To T6, New Base Plate Details

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

SHEET No. S-5 OF 8 SHEETS

C.O. 15

LEONARD F. OKI
LICENSED PROFESSIONAL ENGINEER
No. 2431-S
HAWAII, U.S.A.

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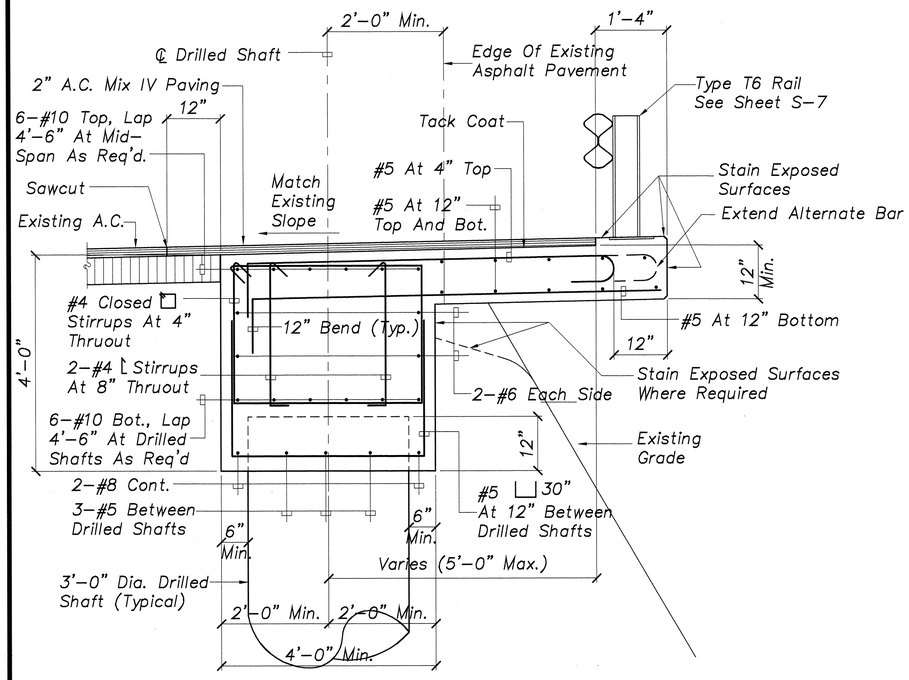
ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

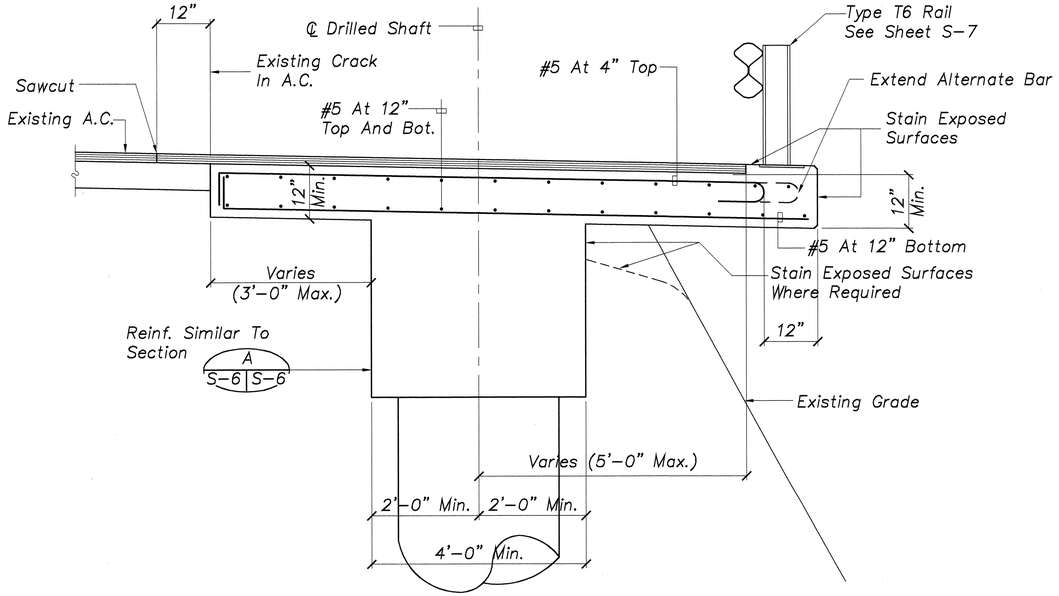
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 16	42



SECTION AT CONCRETE SUPPORT

A
S-4, S-5 | S-6

Scale: 3/4"=1'-0"

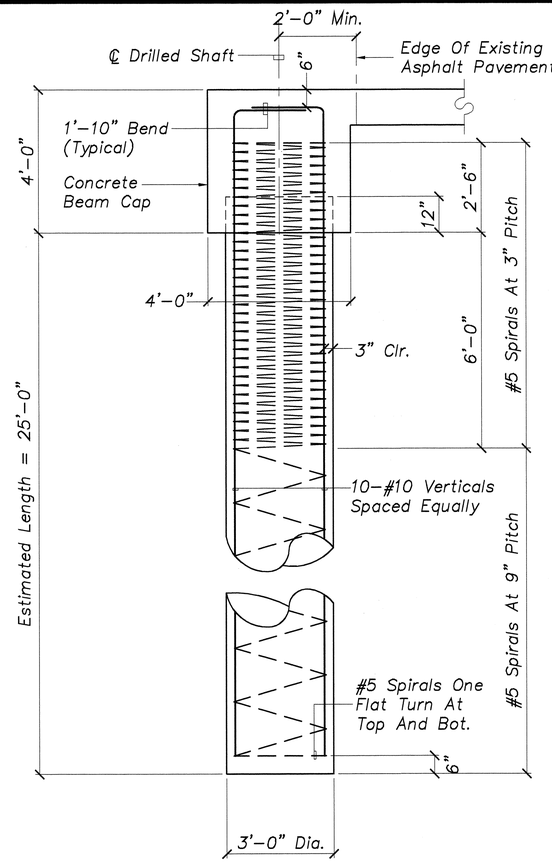


CONDITION AT MP 11.4, DRILL SHAFTS D-3, D-4 D-5, D-6, AND D-7

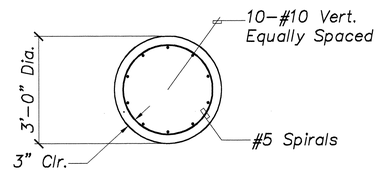
SECTION AT CONCRETE SUPPORT

E
S-5 | S-6

Scale: 3/4"=1'-0"



ELEVATION



SECTION

Notes:

1. Drilled Shaft Concrete Shall Be 4000 PSI Strength At 28 Days.
2. Concrete Spacers Shall Be Used To Maintain The Reinforcement Cage In Position Within The Shaft.
3. Spirals May Be Discontinuous At Concrete Support Bottom Reinforcement To Allow For Placing Of Reinforcement. The Discontinuous Spirals Shall Be Terminated With A 135° Hook Around Vertical Reinforcement.
4. Vertical Bars With Hooked Ends Shall Be Provided At All Drilled Shafts. If Temporary Casing For The Drilled Shafts Are Required, Mechanical Connectors Shall Be Used For The Hooked Ends Of The Vertical Bars.

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S-2, S-3, C S-4 | S-6

DRILLED SHAFT DETAILS

Not To Scale

Date	Revision
11/13/01	Revise Guardrail To T6, Stain Exposed Concrete Surfaces

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISCELLANEOUS DETAILS

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

SHEET No. S-6 OF 8 SHEETS

C.O. 16

ORIGINAL PLAN
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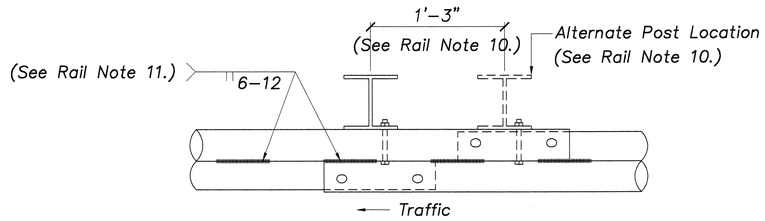
DATE

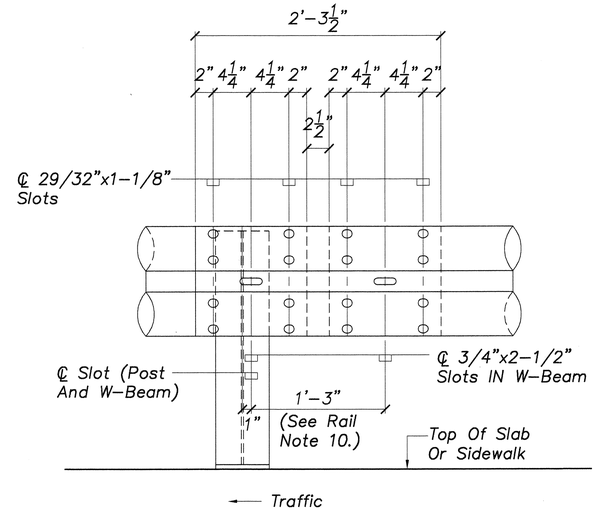
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 17	42

RAIL NOTES:

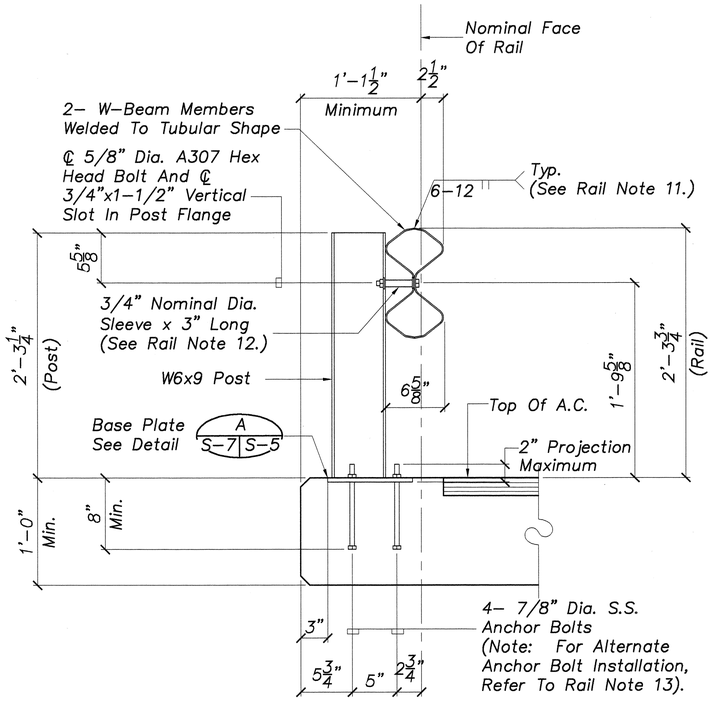
1. THIS RAIL HAS BEEN SUCCESSFULLY EVALUATED BY FULL SCALE IMPACT TESTS CONDUCTED IN ACCORDANCE WITH NCHRP REPORT 230. TEST DOCUMENTATION MAY BE FOUND IN RESEARCH REPORT 230-1, "TUBULAR W-BEAM BRIDGE RAIL", OF RESEARCH STUDY 2-5-78-230 "BRIDGE RAIL TO CONTAIN HEAVY TRUCKS AND BUSES", TEXAS TRANSPORTATION INSTITUTE, OCTOBER 1978.
2. TUBULAR RAIL MEMBER SHALL BE EXTENDED AND CONNECTED TO AT LEAST THE FIRST SOIL EMBEDDED POST AT EACH END OF THE STRUCTURE. MORE SUCH POSTS SHALL BE USED TO UTILIZE 25' STANDARD SECTIONS. APPROACH GUARD FENCE POSTS SHALL BE SPACED AT 6'-3" ADJACENT TO THE TUBULAR RAIL SINCE ITS FLEXIBILITY IS SIMILAR TO STANDARD METAL BEAM GUARD FENCE.
3. FACE OF RAIL AND POSTS SHALL BE VERTICAL TRANSVERSELY UNLESS OTHERWISE APPROVED BY THE ENGINEER. POSTS SHALL BE PERPENDICULAR TO ADJACENT ROADWAY GRADE. GROUT MAY BE USED UNDER BASE PLATES IF NECESSARY.
4. ALL POSTS, W-BEAM, PIPE, SHEET METAL, BOLTS, NUTS, WASHERS, AND BOTTOM PLATES ARE CONSIDERED AS PARTS OF THE RAIL FOR PAYMENT.
5. ALL STEEL COMPONENTS EXCEPT REINFORCING SHALL BE GALVANIZED UNLESS OTHERWISE SHOWN IN PLANS. RAILS SHALL BE EXTENDED ACROSS ALL JOINTS IN THE CONCRETE SUPPORT WITH NO CHANGE IN POST SPACING OR CONTINUITY.
6. ALL ANCHOR BOLTS SHALL BE STAINLESS STEEL AND CONFORM TO ASTM F593, TYPE 316, WITH MINIMUM TENSILE STRENGTH OF 90,000 PSI. ALL NUTS FOR ANCHOR BOLTS SHALL BE STAINLESS STEEL AND CONFORM TO ASTM F594, TYPE 316, WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI. ALL WASHERS FOR ANCHOR BOLTS SHALL BE TYPE 316 STAINLESS STEEL AND CONFORM TO ANSI B18.22.1.
7. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
8. AVERAGE WEIGHT OF RAILING (6'-3" POST SPACING) = 23 PLF.
9. 8- 5/8" SPLICE NUTS SHALL BE TACKED TO BENT SHEET METAL POSITIONERS AS SHOWN. OTHER SUITABLE POSITIONING METHODS OR DEVICES MAY BE SUBSTITUTED. THE COMPLETE SPLICE SHALL HAVE 16 BOLTS. EACH BOLT WILL INCLUDE A 1 3/4" x 3" x 3/16" PLATE WASHER OR A 1 3/4" O.D. WASHER.
10. MAINTAIN 6'-3" POST SPACING WHEREVER POSSIBLE FOR USE WITH NOMINAL 25'-0" W-BEAM SECTIONS (26'-0 1/2" OVERALL).
11. TUBULAR W-BEAM RAIL MEMBER IS TO BE FABRICATED FROM NOMINAL 25'-0" W-BEAM SECTIONS (26'-0 1/2" OVERALL). ADDITIONAL POST MOUNTING SLOTS ARE TO BE MADE IN EACH MEMBER 15" FROM THE STANDARD SLOTS AT 6'-3" CENTERS. TOP AND BOTTOM SEAMS MAY BE CONTINUOUSLY WELDED WITH 80% PENETRATION IN LIEU OF INTERMITTENT WELDING SHOWN. WELDS SHALL BE CHIPPED AND CLEANED AND THE COMPLETE 27'-3 1/2" TUBULAR MEMBER GALVANIZED AFTER FABRICATION.
12. SEE SECTION THRU SPLICE FOR WASHERS.
13. AS AN ALTERNATE, 7/8" DIAMETER STAINLESS STEEL THREADED RODS DRILLED AND EPOXIED MAY BE USED. THE THREADED RODS SHALL BE STAINLESS STEEL AND CONFORM TO ASTM F593, TYPE 316. THE MINIMUM ULTIMATE TENSILE STRENGTH MUST BE 27,700 LBS. PER FRONT ANCHOR AND 15,000 LBS. PER REAR ANCHOR. DEPTH OF HOLES AND INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS SUCH THAT THE FULL REQUIRED MINIMUM TENSILE STRENGTH CAN BE OBTAINED. DRILLED HOLES FOR RESIN OR OTHER TWO-COMPONENT ANCHORAGE SYSTEMS MUST BE POWER WIRE BRUSHED. COMPRESSED AIR, IF USED TO HELP CLEAN HOLES, SHALL HAVE NO OIL IN SUSPENSIONS. FIELD TESTS IN ACCORDANCE WITH ASTM E488 MAY BE USED IF PERMITTED AND/OR REQUIRED BY THE ENGINEER TO DEMONSTRATE MINIMUM TENSILE STRENGTH.



PLAN AT SPLCE



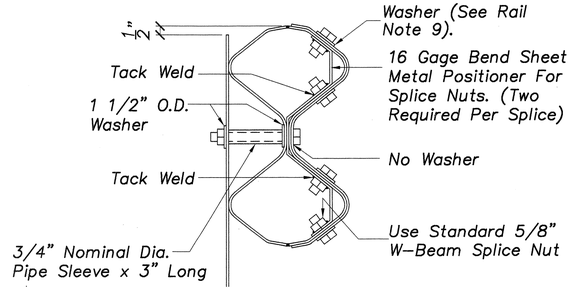
TUBULAR W-BEAM SPLICE DETAIL



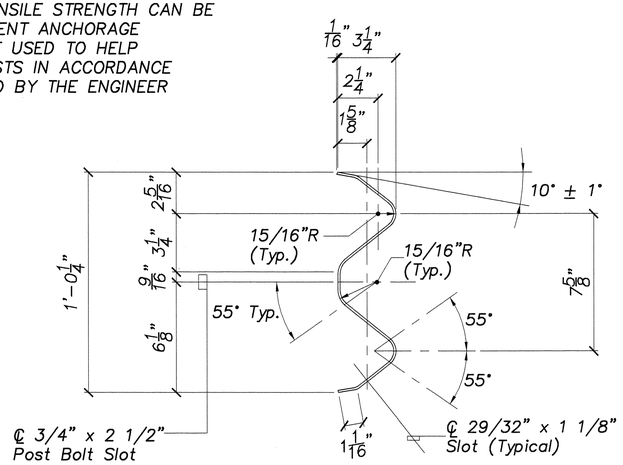
A S-4, S-5 | S-7

SECTION THRU RAIL

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



SECTION THRU SPLICE



W-BEAM SECTION

RAIL DESIGN CRITERIA

1. THIS RAIL IS INTENDED TO BE USED ONLY FOR CURBLESS STRUCTURES.
2. FULLY ANCHORED GUARD FENCE MUST BE ATTACHED TO BOTH ENDS OF RAIL.
3. TESTS HAVE SHOWN THAT ALTHOUGH THIS RAIL DEFLECTS HORIZONTALLY TWO OR THREE FEET, ADEQUATE VEHICLE CONTAINMENT AND RE-DIRECTION IS ACHIEVED. THE RESULTING MORE GRADUAL DECELERATION THUS PRODUCES A SAFER CONDITION THAN AFFORDED BY OTHER BRIDGE RAILINGS.

TYPICAL TYPE T6 RAIL DETAILS

Scale As Noted

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

ORIGINAL PLAN
NOTE BOOK
No.

LEONARD F. OKI
LICENSED PROFESSIONAL ENGINEER
No. 2431-S
HAWAII, U.S.A.

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11/13/01	New T6 Guardrail Details
Date	Revision

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL TYPE T6 RAIL DETAILS

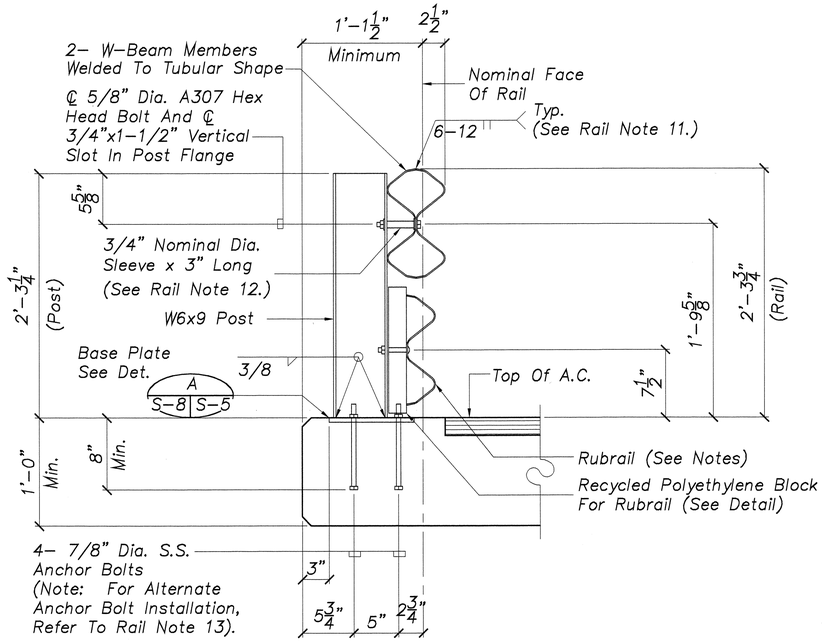
HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-00M	2001	C.O. 18	42

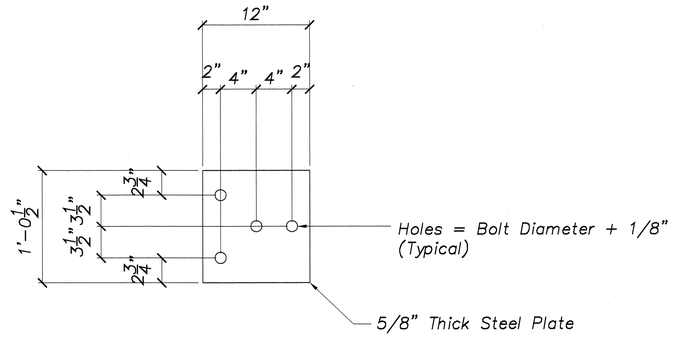
NOTES

1. ALL GUARDRAIL BEAMS, POSTS, BACKUP PLATES, BLOCKS, ETC. SHALL BE HOT-DIP GALVANIZED. NO PUNCHING, DRILLING OR CUTTING WILL BE PERMITTED AFTER GALVANIZING.
2. 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-AGC-ARTBA JOINT COOPERATIVE COMMITEE, UNLESS OTHERWISE NOTED.
3. DO NOT BOLT RUBRAIL W-BEAM TO POSTS AND BLOCKS ON POSTS (1), (2), (3), AND (5). BOLT BLOCKS DIRECTLY TO POSTS.
4. DRILL RECYCLED POLYETHYLENE BLOCKS FOR RUBRAIL TO SIT SQUARELY ON THE POST FLANGE FOR POSTS (1) THROUGH (4). SECURE POSTS (1) THROUGH (3) WITH 5/8" DIAMETER CARRIAGE BOLTS AND NUT.
5. THE RUBRAIL MAY BE SHOP BENT IN THE LAST 3'-0" TO FACILITATE INSTALLATION.
6. POSTS (1), (2), (3), (4), AND (6) REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKS AND/OR RUBRAIL.
7. POST (1) AND (2) ARE W6x16. ALL OTHER POSTS ARE W6x9.



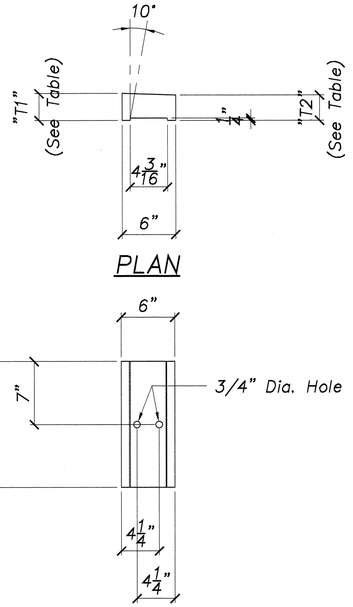
A S-5 | S-8 SECTION AT RAIL

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



BEARING PLATE

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



PLAN

BLOCK TABLE		
Post	"T1"	"T2"
(1)	3"	2 13/16"
(2)	2 7/16"	2 1/4"
(3)	1 7/8"	1 5/8"
(4)	1 1/4"	1 1/6"
(5)	No Block	No Block

ELEVATION

RECYCLED POLYETHYLENE BLOCK FOR RUBRAIL

B S-8 | S-8

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

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

LEONARD F. OKI LICENSED PROFESSIONAL ENGINEER No. 2431-S HAWAII, U.S.A.

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11/13/01	New Rubrail Details
Date	Revision

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RUBRAIL DETAILS

HANA HIGHWAY
REPAIR AND MAINTENANCE
PROJECT NO. 360AB-01-00M

Scale: As Noted Date: March, 2001

SHEET No. S-8 OF 8 SHEETS

C.O. 18