FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	32	54

INDEX TO STRUCTURAL DRAWINGS

ORIGINAL PLAN
NOTE BOOK
No.

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

DRAWING NAME: Z:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\32-S000.DWG PLOT TIME: 01-02-14, 9:23 AM)

DAVID K. FUJIWARA
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THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

INDEX TO STRUCTURAL DRAWINGS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: None Date: Oct. 25, 2013

SHEET No. S0.0 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	33	54

STRUCTURAL GENERAL NOTES:

1. General Specifications:
Hawaii Department of Transportation (HDOT),
Standard Specifications for Road and Bridge, Construction, 2005,
together with Special Provisions prepared for this project.

2. Design Specifications:

   A. AASHTO 2012 LRFD Bridge Design Specifications, Sixth Edition, including subsequent interim specifications with interim supplements and modifications by the HDOT Highways Division.

   B. HDOT "Design Criteria for Bridges and Structures" dated March 1, 2013.

3. Barrier/Wall Design Parameters:

   A. Railing Test Level = TL-2

   B. Soil Nail Wall Design Parameters
      (1) Live load surcharge = 2 ft soil height equivalent
      Horizontal Pressure = 53% of vertical pressure

4. Materials:

   A. All concrete shall have a minimum 28-day compressive strength f'c of 4,000 psi and have a maximum 0.45 water-to-cement ratio. In addition, the concrete shall contain the following:

      (1) Amine carboxylate corrosion inhibiting water-based admixture such as Cortec MCI 2005 NS or approved equal shall be added at a dosage of 24 ounces per cubic yard.

      (2) Shrinkage reducing admixture such as Eclipse or Masterlife SRA 20 or approved equal shall be added at a dosage of 128 ounces per cubic yard or as recommended by the manufacturer.

      (3) 1" Long Alkali-Resistant Glass Fiber such as Cem-Fil 61/1 Chopped Roving or approved equal shall be added at a dosage of 2 pounds per cubic yard.

      (4) All concrete exposed within 7 days of placement shall be cured using Sinak Lithium Cure or approved equal at a coverage rate of no less than 400 sq. ft. per gallon.

   B. All shotcrete shall have a minimum 28-day compressive strength f'c of 4,000 psi and have a maximum 0.45 water-to-cement ratio. In addition, the shotcrete shall contain the following:

      (1) Amine carboxylate corrosion inhibiting water-based admixture such as Cortec MCI 2005 NS or approved equal shall be added at a dosage of 24 ounces per cubic yard.

      (2) 1" Long Alkali-Resistant Glass Fiber such as Cem-Fil 61/1 Chopped Roving or approved equal shall be added at a dosage of 2 pounds per cubic yard.

      (3) 2% minimum air entrainment measured at the truck or mixer.

      (4) Shotcrete shall be cured using Sinak Lithium Cure or approved equal at a coverage rate of no less than 200 sq. ft. per gallon.

4. Materials (Cont.):

   C. All soil nail grout shall have a minimum 28-day compressive strength f'c of 4,000 psi and have a maximum 0.36 water-to-cement ratio. In addition, the grout shall contain the following:

      (1) 94 lbs. of Type I/II cement, 4 gallons of water, 3-6 lbs. of Flowcable Admixture or approved equal, and 1 oz. of an amine carboxylate corrosion inhibiting water-based admixture such as Cortec MCI 2005 NS or approved equal.

      (2) Glenium 3030 or approved equal may be used as a high range water reducer for workability.

      (3) Grout shall be stable (bleed less than 2%) per ASTM C940.

   D. Reinforcing steel shall conform to ASTM A615, Grade 60 deformed bars unless otherwise noted.

   E. Geocomposite drains shall be as specified in Section 646 of the Specifications.

   F. Glass Fiber Reinforced Polymer Rebar:

      (1) Glass Fiber Reinforced Polymer (GFRP) rebar shall have a guaranteed minimum tensile strength of 110 ksi for #4 rebar and 105 ksi for #5 rebar.

      (2) The modulus of elasticity of the GFRP rebar shall be a minimum of 6,700,000 psi.

      (3) Minimum concrete cover for the GFRP rebar shall be 3/4" unless otherwise noted.

      (4) Minimum lap splice lengths for the GFRP rebar shall be 42 bar diameters unless otherwise noted.

      (5) All GFRP rebar shall be securely tied in place. Tie wire shall be either Alloy 302 or 304 stainless steel or non-metallic.

      (6) The GFRP rebar may be cut in the field with a masonry or diamond blade.

      (7) All work including materials and bends shall follow Manufacturer's recommendations.

   G. Soil nails shall be Triple Corrosion Protected. Each threaded steel bar shall be epoxy coated in accordance with ASTM A-934 and pregrouted in a corrugated PVC or HDPE sheathing. Pregrout shall contain an amine carboxylate corrosion inhibiting water-based admixture, Cortec MCI 2005 NS or approved equal. Corrosion inhibitor shall be added at a dose as recommended by the manufacturer.

   H. Bearing plates, nuts, and welded stud shear connectors shall conform to the following:

      (1) Bearing Plates: AASHTO M1831 ASTM A36

      (2) Nuts: AASHTO M291, Grade B, hexagonal, fitted with 2 beveled washers or a spherical seat to provide uniform bearing.

      (3) Welded Stud Shear Connectors: AASHTO Construction Specifications, Section 11.3.3.1.

   I. All hardware for soil nails, such as bearing plates, beveled washers, and nuts shall be hot-dip galvanized after fabrication in accordance with ASTM A-153.

5. Reinforcement:
   A. Unless otherwise noted, the clear covering measured from the surface of the concrete to the face of any reinforcing steel bars shall be 3".

   B. Reinforcing bars shall be detailed in accordance with the latest edition of the design specifications in Note 2 unless otherwise noted.

   C. Minimum clear spacing between parallel bars shall be 1 1/2 times the maximum size of the coarse aggregate or 1 1/2 inches, whichever is greater.

   D. Reinforcing bars shall be securely tied at all intersections and lap splices except where the spacing of the intersections is less than 12 inches in each direction, in which case alternate intersections shall be tied.

6. General Construction Notes:
   A. See 2005 Standard Specifications and Special Provisions.

   B. The Contractor shall comply with all applicable permits for this project. In addition, the Contractor shall comply with all applicable laws of the Federal, State, and County governments.

   C. Unless otherwise noted, all vertical dimensions are measured plumb.

   D. The Contractor shall verify all site conditions before commencing the work of excavation.

   E. For concrete finish, see Standard Specifications and Special Provisions.

   F. Unless otherwise noted, all exposed concrete surfaces shall be chamfered 3/4" x 3/4".

7. Concrete railing shall be textured and stained as specified in Sections 507 and 660 of the Special Provisions.

8. The Contractor is notified of the existence of weight-posted one-lane bridges along Kuhio Highway (Route 560). Current weight limits are 15 tons at Hanalei Bridge and 8 tons for 3 bridges between Hanalei and the project site. Prior to crossing these bridges, the contractor shall apply for an oversize/overweight/vehicle/load permit for each affected vehicle, equipment, and/or load at the State Highways Division Office (Ph. 241-3000). The State reserves the right to disallow crossing of these bridges by loads exceeding the posted weight limits.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURAL GENERAL NOTES

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: None — Date: Oct. 25, 2013

SHEET No. S0.1 OF 7 SHEETS

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

DRAWING NAME: Z:\OD_ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN 33-5001.DWG PLOT TIME: 01-02-14, 9:29 AM

SYMBOLS AND ABBREVIATIONS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	34	54

∉	And
@	At
℄	Baseline
℄	Centerline
ø	Diameter
≥	Greater Than or Equal to
≤	Less Than or Equal to
#	Number
±	Plus or Minus
AB	Anchor Bolt
Abut.	Abutment
AC	Asphaltic Concrete
Add.	Additional, Added
Alt.	Alternate
Approx.	Approximate
Az.	Azimuth
B, Bot., Bott.	Bottom
Bal.	Balance
Bet.	Between
BF	Both Faces, Back Face
BFE	Bottom of Footing Elevation
Bk.	Back
Blt.	Bolt
Bm.	Beam
BOF	Bottom of Footing
Br.	Bridge
Brg., Brgs.	Bearing, Bearings
BVC	Beginning of Vertical Curve
BW	Both Ways
Cant.	Cantilever
CBW	Concrete Barrier Wall
cc	Center to Center
CF	Cubic Feet
CFCW	Continuous Flashing Compound Waterproofing
CG	Center of Gravity
cgs	Center to Gravity of Strands
CIP	Cast-in-Place
CJ	Control Joint
Cl.	Class
Clr.	Clearance
CLSM	Controlled Low Strength Material
CO	Clean Out
Col.	Column
Conc.	Concrete
Conn.	Connection
Const.	Construction
Const. Jt.	Construction Joint
Cont.	Continuous
CSL	Cross Hole Sonic Loggin
CY, Cu. Yd.	Cubic Yard
Dbl.	Double
Det.	Detail
DI	Drain Inlet, Ductile Iron
Dia.	Diameter
Diaph.	Diaphragm
Dim.	Dimension
Dist.	Distance
Dn.	Down
DO	Ditto
DS	Drilled Shaft
Dwg., Dwgs.	Drawing, Drawings
Dwls.	Dowels
E	East
(E), Exp.	Expansion
EA, Ea., ea.	Each
EF	Each Face
EFH	Each Face Horizontal
EFV	Each Face Vertical
EJ	Expansion Joint
El., Elev.	Elevation
Elec.	Electrical
EMH	Electrical Manhole
Emb.	Embankment
Embed.	Embedded, Embedment
EP	Edge of Pavement
EPS	Expanded Polystyrene
Eq.	Equal
Est.	Estimated
EVC	End of Vertical Curve
EW	Each Way
Ex., Exist.	Existing
Exc.	Excavation
Excl.	Excluding
Ext.	Exterior
(F)	Fixed
FA	Force Account
FB	Flat Bar
F'c	Specified Strength of Concrete
F'ci	Strength of Concrete at Time of Initial Prestress
FF	Far Face. Front Face
Fig.	Figure
Fin. Gr.	Finish Grade
FRP	Fiber Reinforced Plastic
Ft.	Feet, Foot
Ftg.	Footing
Ga.	Gage, Gauge
Galv.	Galvanized
GFRP	Glass Fiber Reinforced Polymer
Gr.	Grade
Grd.	Ground
GRP	Grouted Rubble Pavement
(H)	Hinge
HECO	Hawaiian Electric Company
Horiz., H	Horizontal
HS	High strength
Ht.	Height
IB	Inbound
ID	Inside Diameter
I.F.	Inside Face
In.	Inch
Int.	Interior
Inv.	Invert
Jt.	Joint
K	Kips
KF	Kip Foot
KLF	Kips Per Linear Foot
KSF	Kips Per Square Foot
KSI	Kips Per Square Inch
L	Length
lb., lbs., LBS.	Pound, Pounds
LF, Lin. Ft.	Linear Feet/Foot
Longit.	Longitudinal
LS	Lump Sum
Ltg. Std.	Lighting Standard
M	Modified
Max.	Maximum
Mech.	Mechanical
MH	Manhole
Min.	Minimum
Misc.	Miscellaneous
MPH	Miles Per Hour
N	North
NF	Near Face
NIC	Not in Contract
No.	Number
NTS	Not to Scale
OB	Outbound
oc	On Center
OD	Outside Diameter
O.F.	Outside Face
OG	Outside Girder, Outbound Girder
Opn'g	Opening
O/S	Offset
PB	Pull Box
P(e)	Effective Prestressing Force
PC	Point of Curvature
PCC	Portland Cement Concrete
PCF	Pounds per Cubic Foot
Perf.	Perforated
PI	Point of Intersection of Tangents
PIVC	Point of Intersection of Vertical Curve
PL	Plate
PLF	Pounds per Linear Foot
PP	Precast Plank
PRC	Point of Reverse Curvature
Prestr.	Prestressed
P/S	Prestressed Strands
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
Pt., Pts.	Point, Points
PT	Point of Tangency, Post Tensioned
PVC	Polyvinyl Chloride
Q	Flow Rate
R, Rad.	Radius
Rdwy.	Roadway
Rebar	Reinforcing Bar
Ref.	Reference
Reinf.	Reinforced, Reinforcing, Reinforcement
Req'd.	Required
Ret.	Retaining
RF	Rear Face
R/W, ROW	Right of Way
S	South
SDMH	Sewer Drain Manhole
SE	Super Elevation
Sect.	Section
SF	Square Feet
Sht.	Sheet
Sim.	Similar
Sl.	Slope
Spc., Spg.	Spaces, Spacing
Spec.	Specification
Sprd.	Spread
SS	Stainless Steel
Sta.	Station
Stagg.	Staggered
Std.	Standard
Stiff.	Stiffener
Stirr.	Stirrup
Stl.	Steel
Str.	Straight
Struct.	Structure
SY	Square Yard
Symm.	Symmetrical
T	Top
Tan.	Tangent
T∉B	Top and Bottom
Temp.	Temporary
Thk.	Thick
TFE	Top of Footing Elevation
TOD	Top of Deck
TOF	Top of Footing
Tot.	Total
TOW	Top of Wall Elevation
Transv.	Transverse
TS	Structural Tubing
Typ.	Typical
Undergrd.	Underground
UNO	Unless Noted Otherwise
V, Vert.	Vertical
Var.	Varies
VC	Vertical Curve
W	West
w/	With
W/C	Water/Cement Ratio
WP	Work Point, Working Point
WS	Water Surface
WW	Wing Wall
WWR	Welded Wire Reinforcement
Yr.	Year

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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SYMBOLS AND ABBREVIATIONS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S0.2 OF 7 SHEETS

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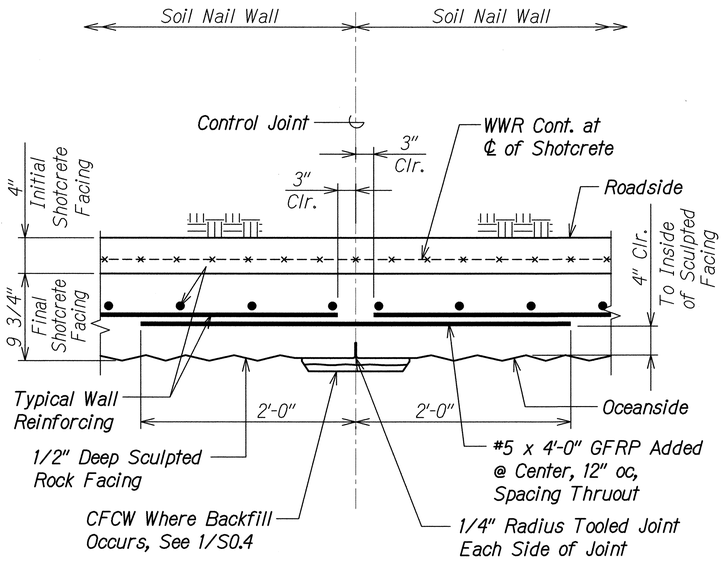
NOTE BOOK | No.

DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABLIZTN KUHIO HWY MP5.1-5.3 PHA\CAD\01-02-14 SF MES SIGN\34-S002.DWG PLOT TIME: 01-02-14, 9:30 AM)

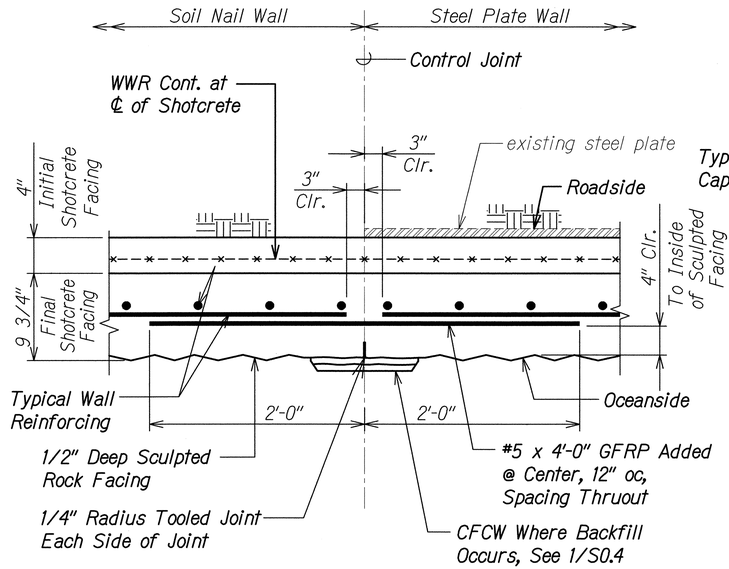
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	35	54



TYPICAL CONTROL JOINT AT SOIL NAIL WALL

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

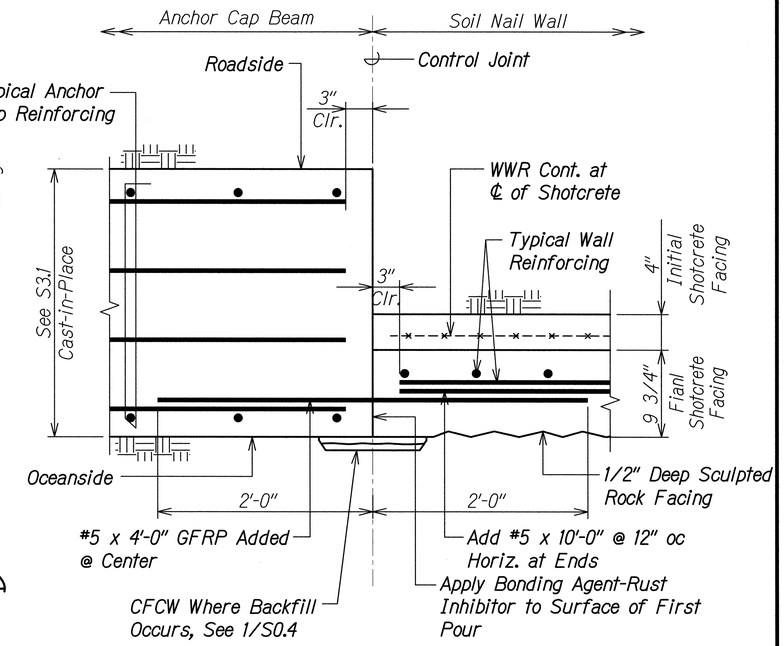
1 S1.1 S0.3



TYPICAL CONTROL JOINT AT SOIL NAIL WALL / STEEL PLATE WALL INTERFACE

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

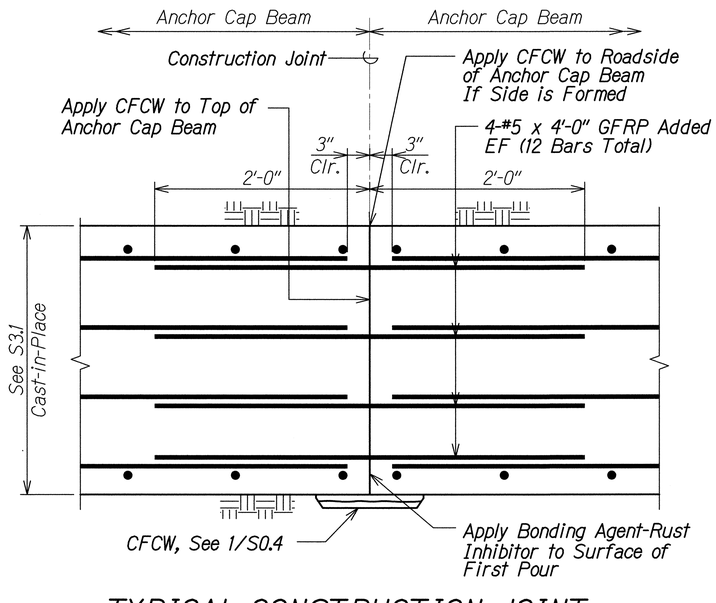
2 S1.1 S0.3



TYPICAL CONTROL JOINT AT SOIL NAIL WALL / ANCHOR CAP BEAM INTERFACE

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

3 S1.3 S0.3

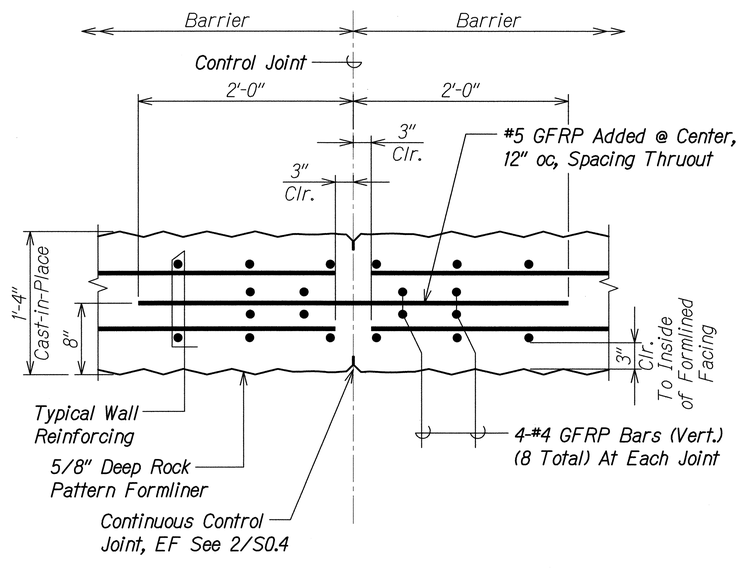


TYPICAL CONSTRUCTION JOINT AT ANCHOR CAP BEAM

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

4 S1.3 S0.3

S3.1



TYPICAL CONTROL JOINT AT BARRIER

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

5 S1.3 S0.3

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APRIL 30, 2014
LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL JOINT DETAILS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S0.3 OF 7 SHEETS

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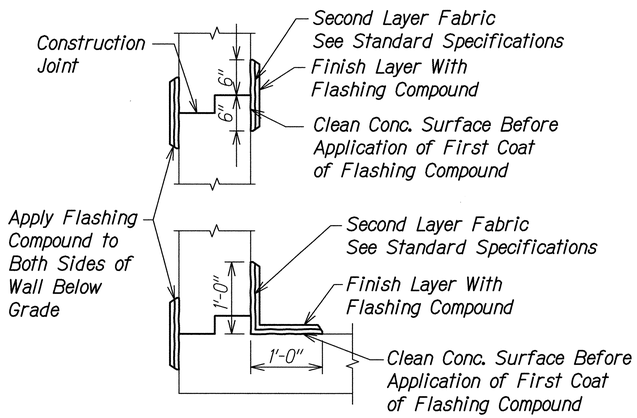
DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER. SLOPE STABILIZTN. KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 SF WET SIGN\35-S003.DWG PLOT TIME: 01-02-14, 8:31 AM

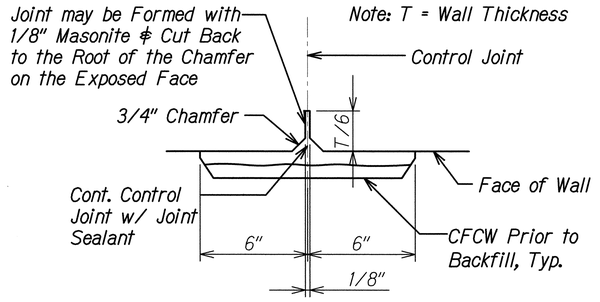
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	36	54



TYP. CONTINUOUS FLASHING COMPOUND WATERPROOFING (CFCW) DETAILS

Not to Scale

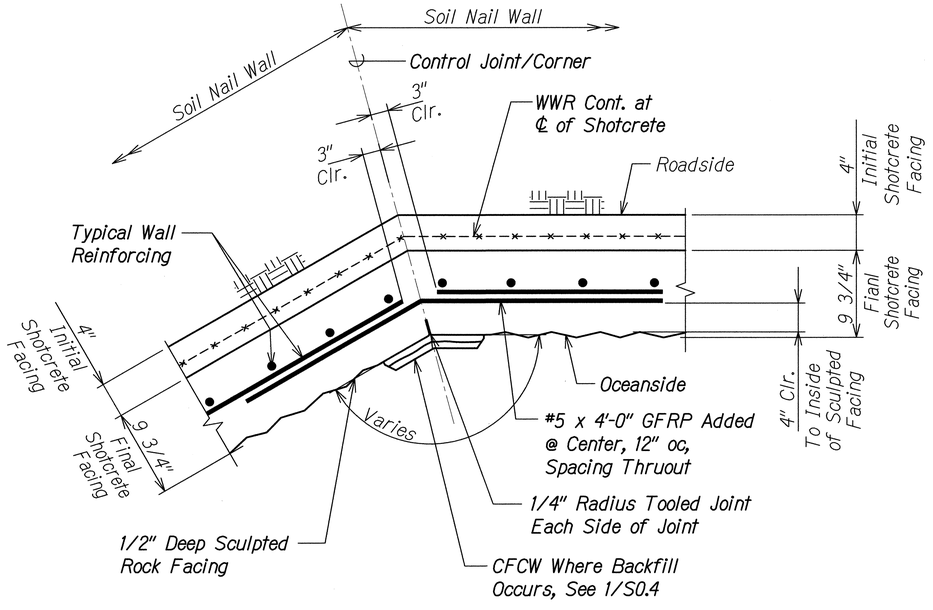
1 / S0.3 | S0.4



CONTINUOUS CONTROL JOINT DETAIL

Scale: 3" = 1'-0"

2 / S0.3 | S0.4



TYPICAL CONTROL JOINT AT SOIL NAIL WALL CORNER

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

3 / S1.1 | S0.4

DRAWING NAME: Z:\00 DWGS\WG\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 OF WET SIGN\36-S004.DWG PLOT TIME: 01-02-14, 9:31 AM)

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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STATE OF HAWAII
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TYPICAL JOINT DETAILS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

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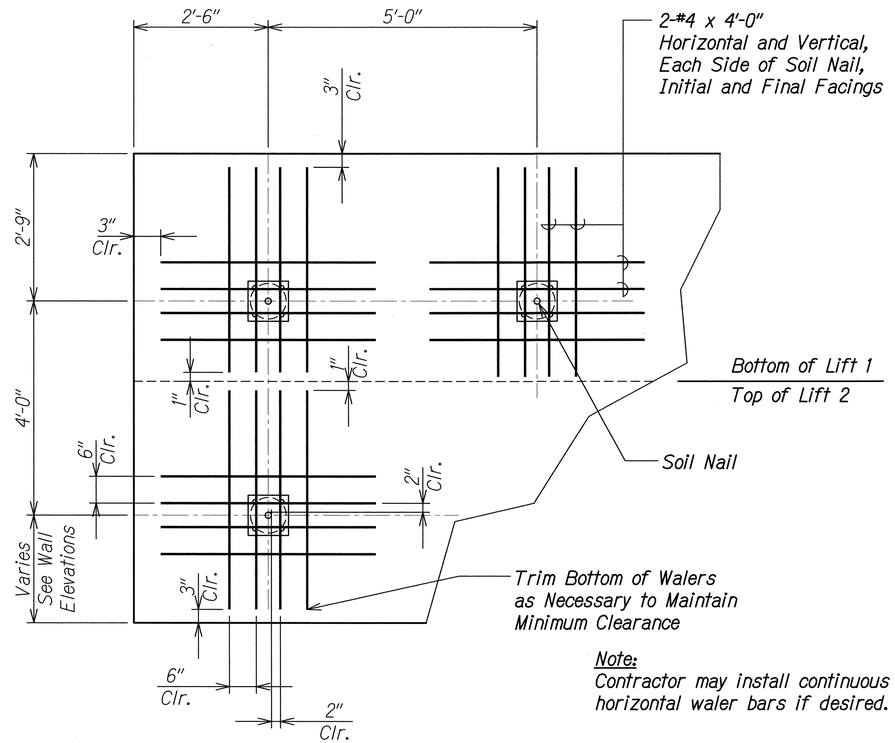
SHEET No. S0.4 OF 7 SHEETS

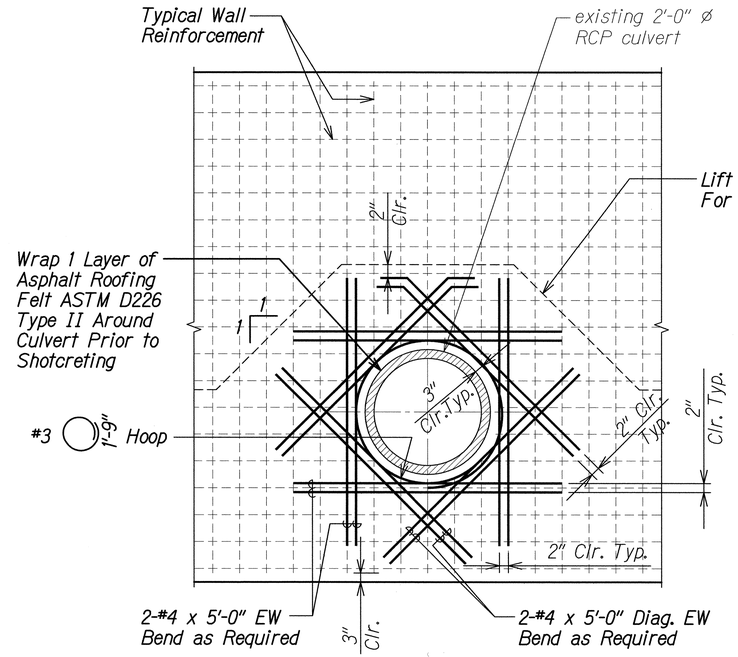
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	37	54



Note:
Contractor may install continuous horizontal waler bars if desired.

TYPICAL WALER BAR DETAIL (1 / S0.5 | S0.5)

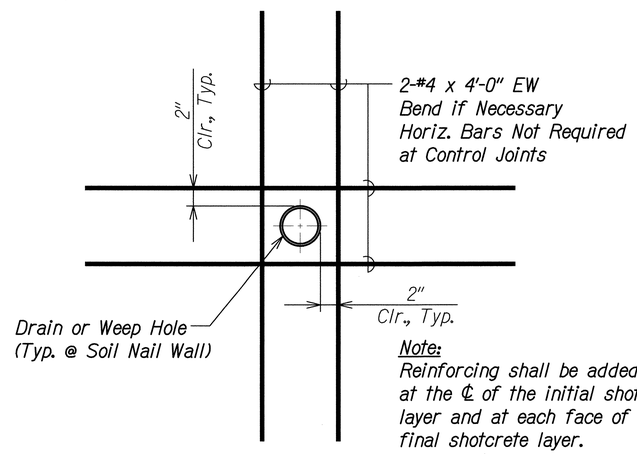
Scale: 3/4" = 1'-0"



Note:
Reinforcing shall be added at the ℄ of the initial shotcrete layer and at each face of the final shotcrete layer.

ADDED REINFORCING AT EXISTING RCP CULVERT (2 / S1.1 | S0.5)

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



Note:
Reinforcing shall be added at the ℄ of the initial shotcrete layer and at each face of the final shotcrete layer.

ADDED REINFORCING AT WEEP HOLES (3 / S1.1 | S0.5)

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

S2.3, S2.6, S2.7

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

DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\37-S005.DWG PLOT TIME: 01-02-14, 8:58 AM)

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KSF, INC. APRIL 30, 2014
LIC. EXP. DATE

STATE OF HAWAII
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HIGHWAYS DIVISION

TYPICAL ADDED REINFORCING DETAILS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
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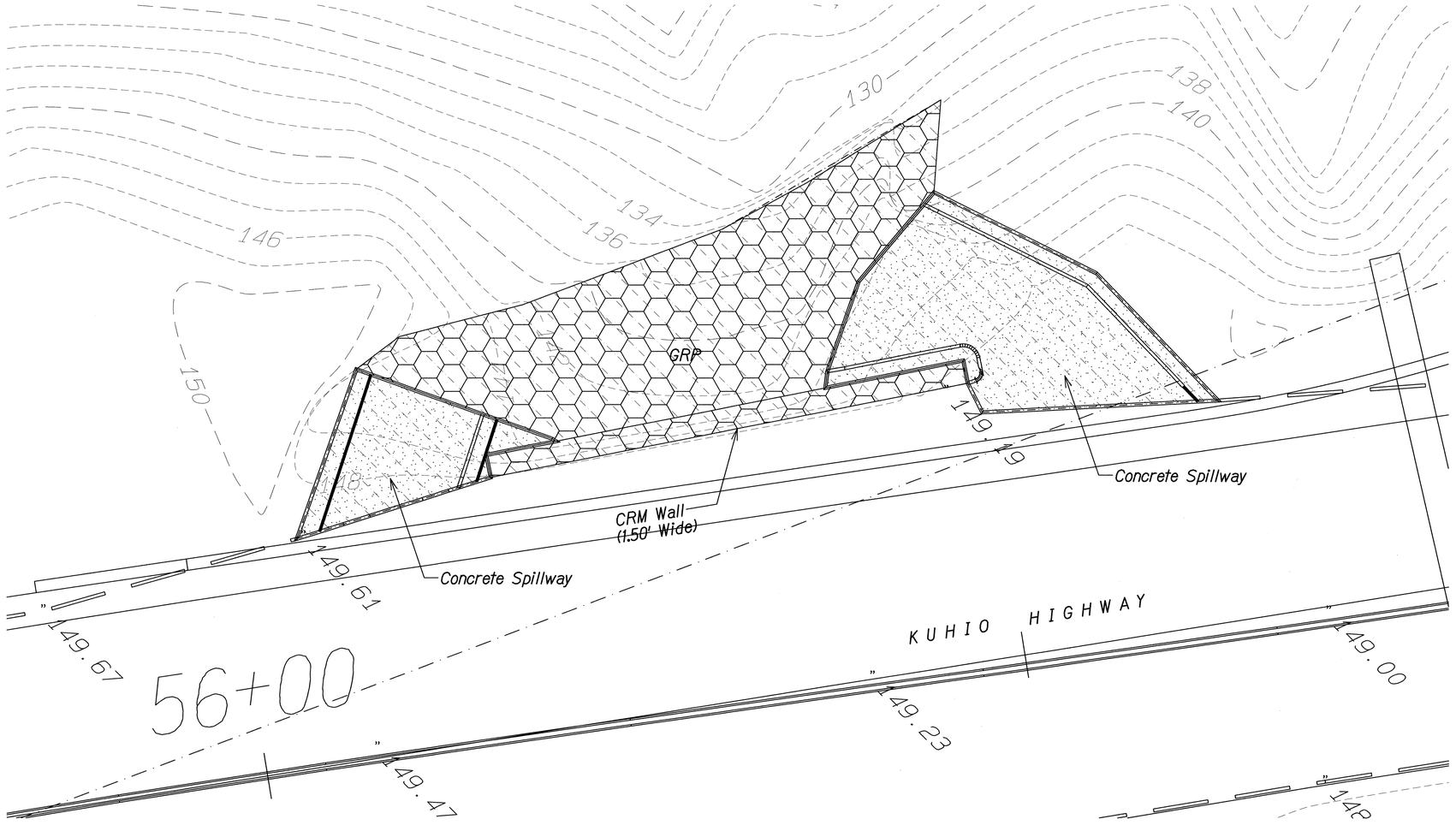
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S0.5 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	38	54



Note:
Contractor shall demolish spillway, CRM Wall, and GRP from the top down in incremental lifts, while subsequently constructing the soil nail wall. Contractor shall demolish no more than 5 feet vertical per lift.

Legend:

Demolition Plan

DEMOLITION PLAN

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

DAVID K. FUJIWARA
LICENSED PROFESSIONAL ENGINEER
NO. 8104-S
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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEMOLITION PLAN FOR EXISTING SPILLWAY
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

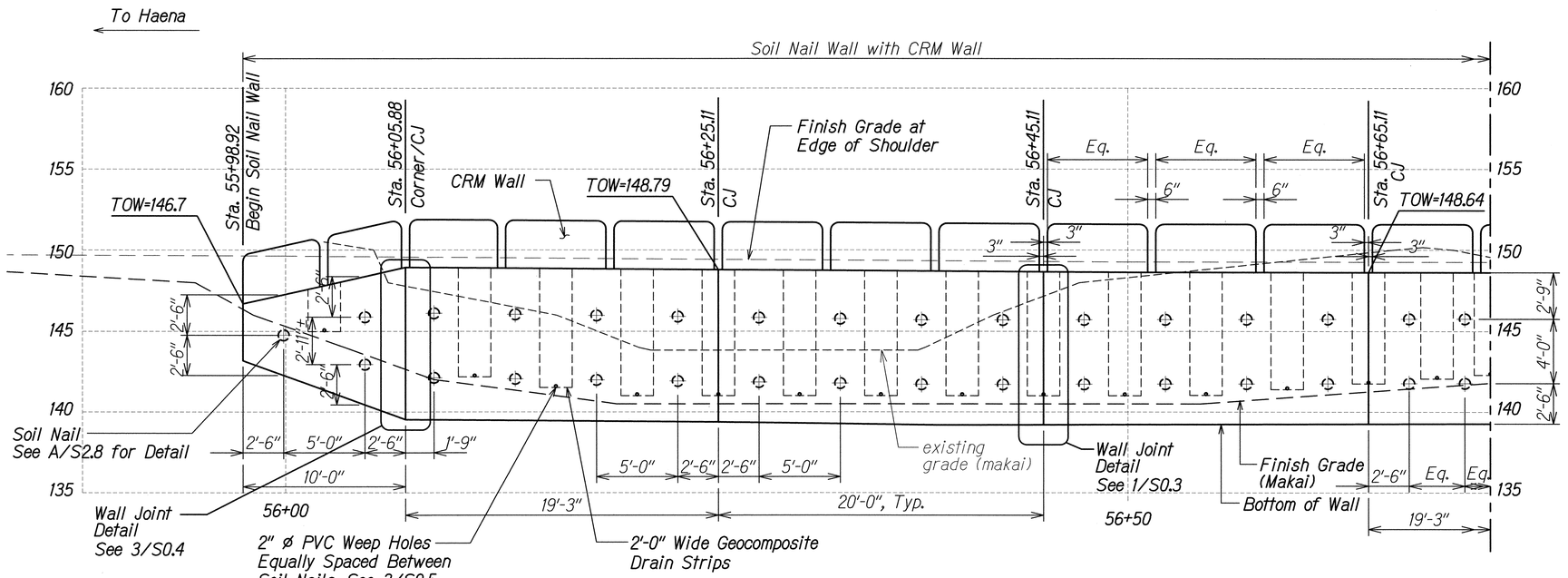
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S0.6 OF 7 SHEETS

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

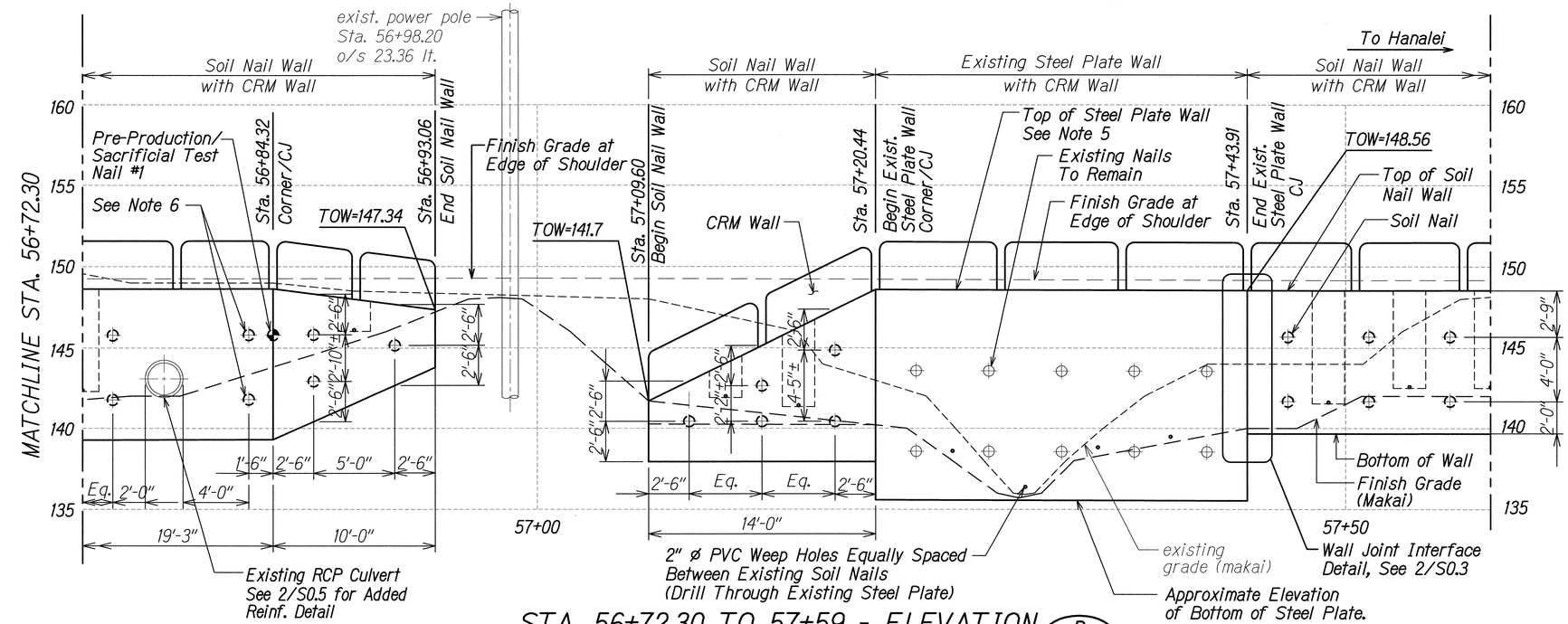
DRAWING NAME: Z:\OD ONGOING\12-207-LUMAHAI EMER SLOPE STABLZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\38-S006.DWG PLOT TIME: 01-02-14, 9:32 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	39	54



STA. 55+98.92 TO 56+72.30 - ELEVATION (A)

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



STA. 56+72.30 TO 57+59 - ELEVATION (B)

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

MATCHLINE STA. 56+72.30

MATCHLINE STA. 57+59

LEGEND:

CJ Control Joint in Wall

TOW Top of Soil Nail Wall Elevation

◆ Pre-Production / Sacrificial Test Nail

NOTES:

1. Design/Test Criteria
   a. Design Test Load (DTL) = 28 kips
   b. Maximum Proof Test Load = 150% x DTL = 42 kips
   c. Maximum Verification Test Load = 200% x DTL = 56 kips
2. Production Nails - #9 Threaded Bar
3. Pre-Production / Sacrificial Nails - #11 Threaded Bar
4. View of wall elevation is at back face (Roadway Side) of 9 3/4" Permanent Shotcrete Facing Looking Mauka.
5. Contractor shall cut top of existing steel plate to match elevation of soil nail wall on either end.
6. Referenced soil nails shall be angled 5° horizontally away from the existing RCP culvert.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEVELOPED LONGITUDINAL SECTION
STA. 55+98.92 TO 57+59
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

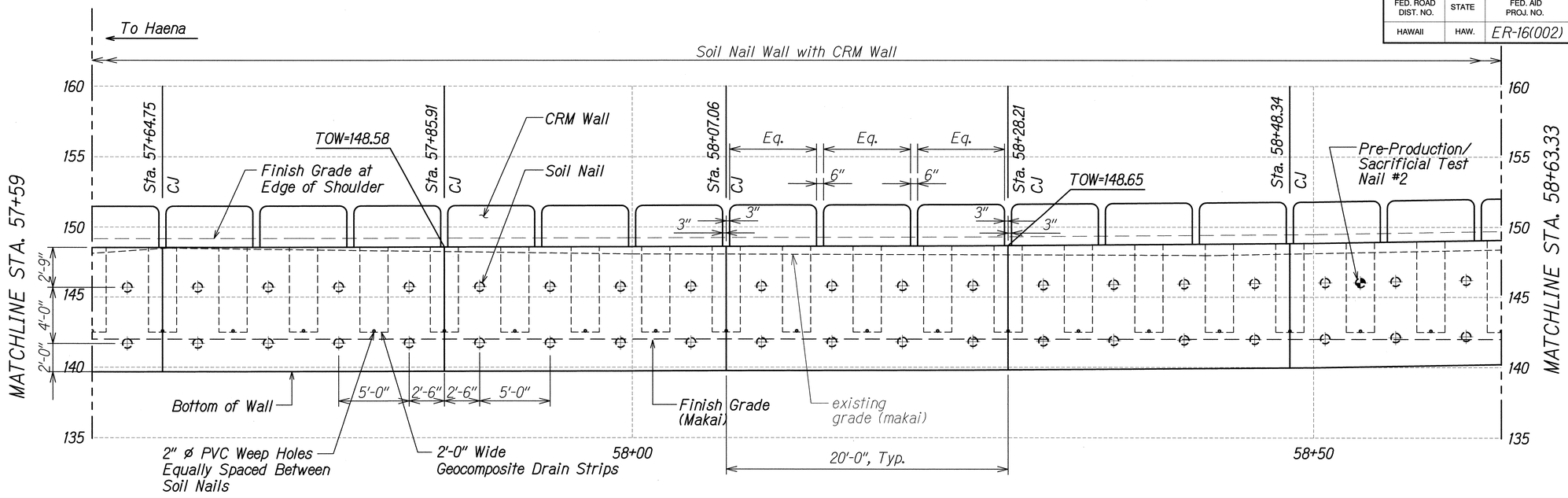
SHEET No. S1.1 OF 3 SHEETS

ORIGINAL PLAN | NOTE BOOK | No. ____

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

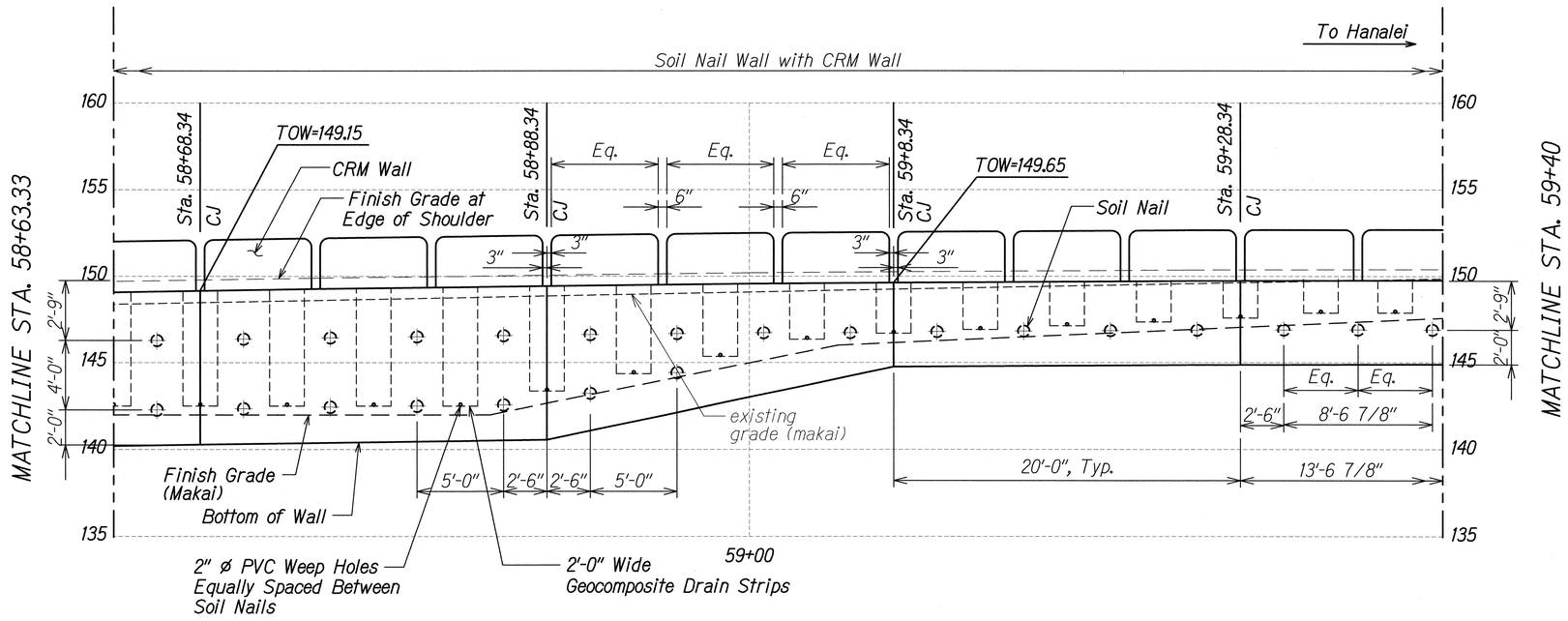
DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER. SLOPE STABILIZTN. KUHIO HWY MP5.1-5.3 PHA\CAD\01-02-14 BF MET SIGN\39-S101.DWG PLOT TIME: 01-02-14, 9:33 AM

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	40	54



STA. 57+59 TO 58+63.33 - ELEVATION (A S1.2|S1.2)

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



STA. 58+63.33 TO 59+40 - ELEVATION (B S1.2|S1.2)

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

LEGEND:

CJ Control Joint in Wall

TOW Top of Soil Nail Wall Elevation

◆ Pre-Production / Sacrificial Test Nail

NOTE:

View of wall elevation is at back face (Roadway Side) of 9 3/4" Permanent Shotcrete Facing Looking Mauka.

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KSF, INC. APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEVELOPED LONGITUDINAL SECTION
STA. 57+59 TO 59+40
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

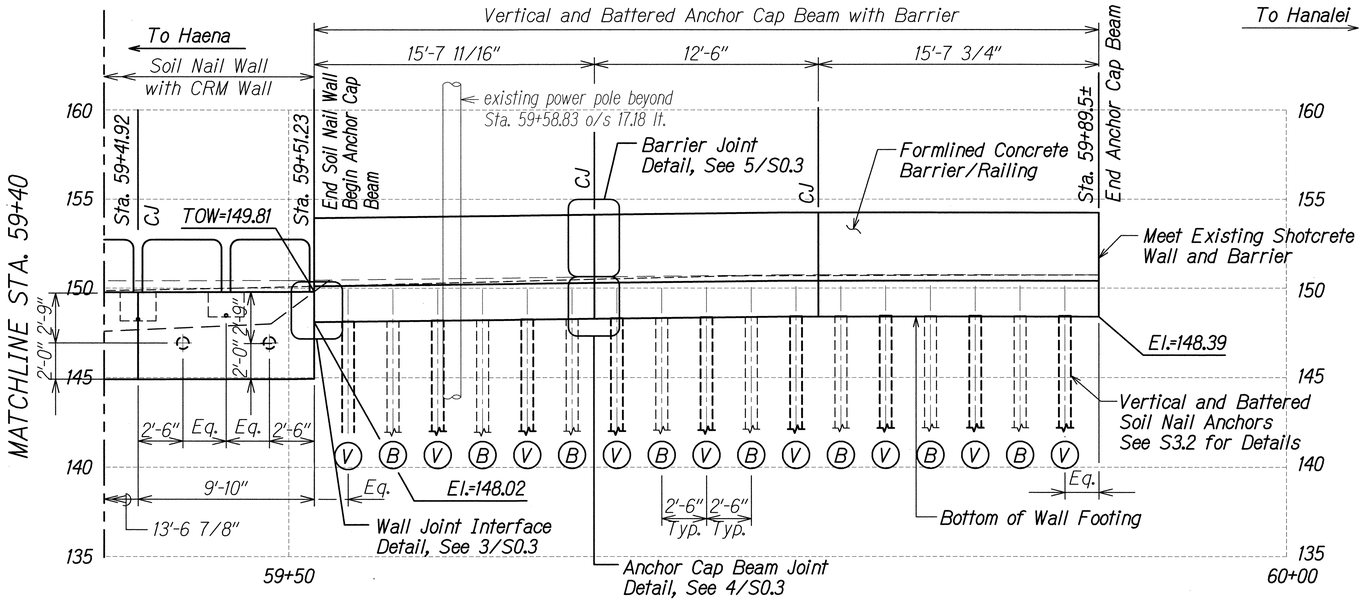
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S1.2 OF 3 SHEETS

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

DRAWING NAME: Z:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\39-S101.DWG PLOT TIME: 01-02-14, 9:33 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	41	54



STA. 59+40 TO 59+89.6± - ELEVATION

A S1.3 | S1.3

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

LEGEND:

- CJ Control Joint in Wall and Barrier
- TOW Top of Soil Nail Wall Elevation
- ⌖ Pre-Production / Sacrificial Test Nail
- (V) Vertical Anchor
- (B) Battered Anchor (20° From Horizontal)

NOTE:

View of wall elevation is at back face (Roadway Side) of 9 3/4" Permanent Shotcrete Facing Looking Mauka.

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEVELOPED LONGITUDINAL SECTION
STA. 59+40 TO 59+89.5±
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S1.3 OF 3 SHEETS

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

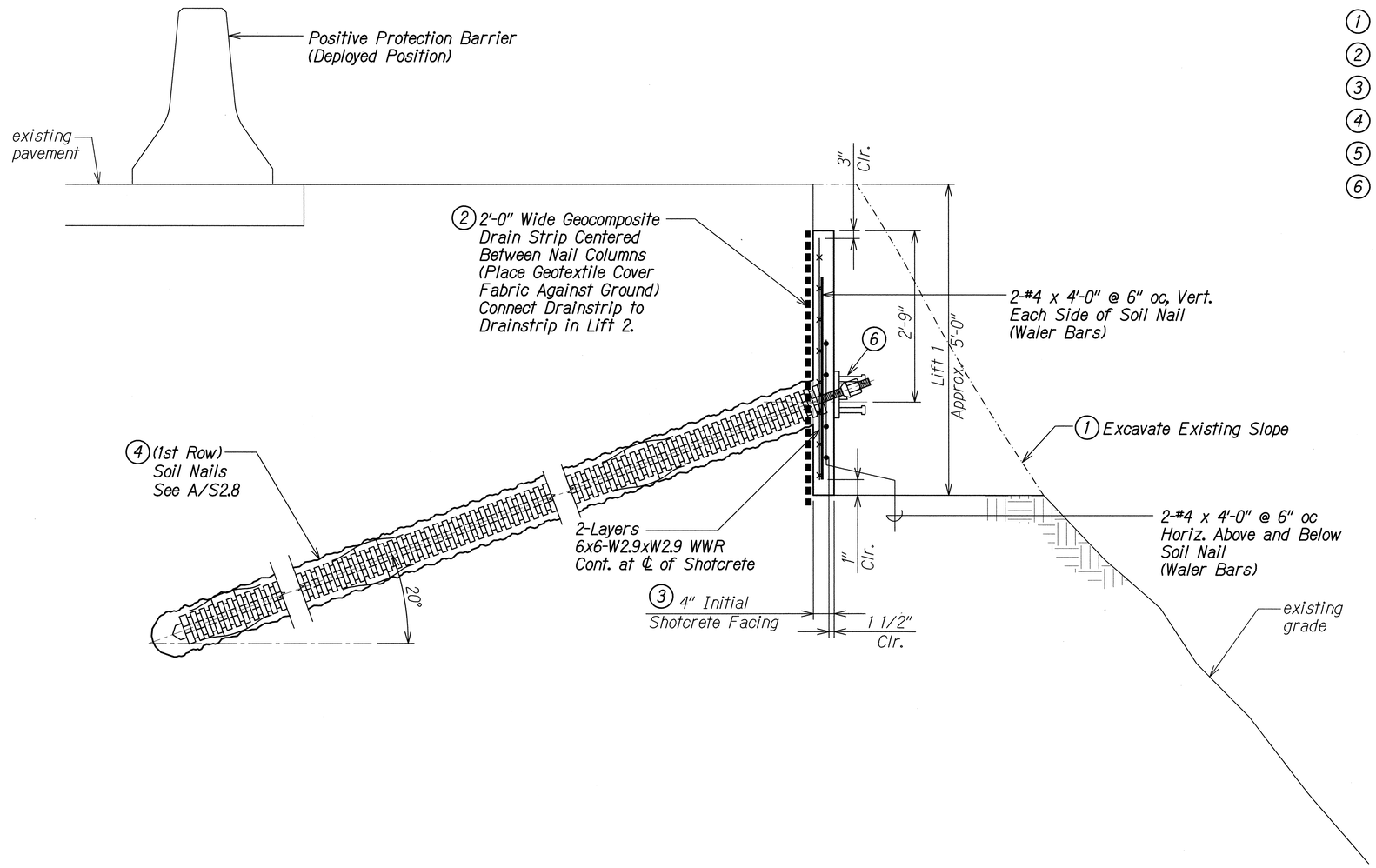
DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY (MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\39-S101.DWG PLOT TIME: 01-02-14, 9:33 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	42	54

TYPICAL INITIAL SHOTCRETE (LIFT 1):

Notes:

1. *See A/S2.2 and A/S2.3 for additional details.*
2. *Existing slope and soil conditions may vary. A thicker layer of initial shotcrete in some areas may be required.*



TYPICAL SOIL NAIL WALL SECTION - LIFT 1

Scale: 1" = 1'-0"

A S2.2 S2.1 S2.3

CONSTRUCTION SEQUENCE:

1. *Excavate to Required 1st Lift*
2. *Drill, Install, and Grout 1st Row of Soil Nails*
3. *Test 1st Row of Soil Nails as Necessary*
4. *Install Geocomposite Drain Strip*
5. *Place Reinforcing and Apply Lift 1 Initial Shotcrete Facing*
6. *Install Studded Connection Plates on 1st Row.*

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL SOIL NAIL WALL SECTION - LIFT 1

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S2.1 OF 8 SHEETS

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

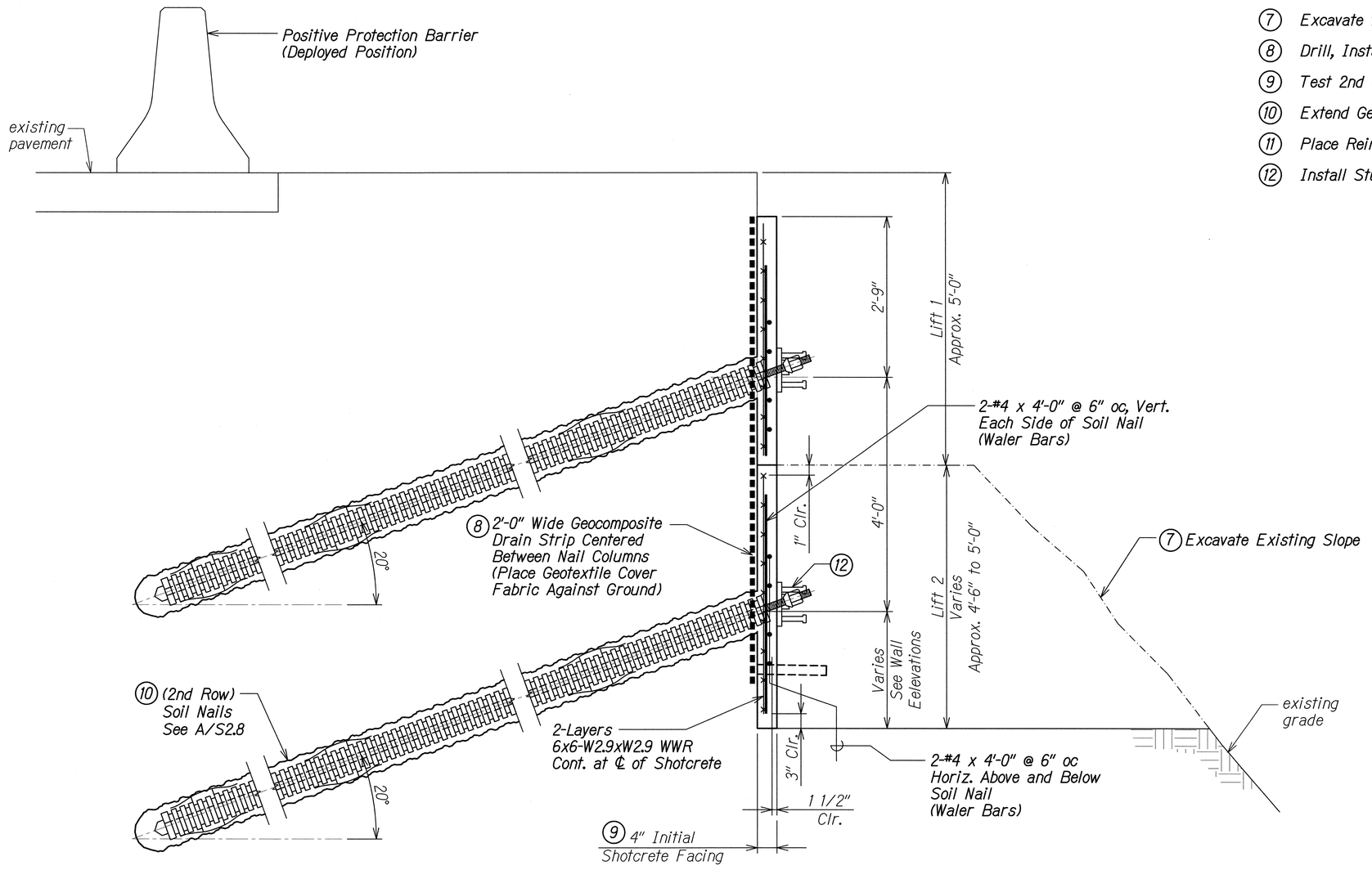
DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 OF WET SIGN\12-5201.DWG PLOT TIME: 01-02-14, 9:33 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	43	54

TYPICAL INITIAL SHOTCRETE (LIFT 2):

Note:

1. See A/S2.1 and A/S2.3 for additional details.



TYPICAL SOIL NAIL WALL SECTION - LIFT 2

Scale: 1" = 1'-0"

A
S2.1 | S2.2
S2.3

CONSTRUCTION SEQUENCE:

7. *Excavate to Required 2nd Lift*
8. *Drill, Install, and Grout 2nd Row of Soil Nails*
9. *Test 2nd Row of Soil Nails as Necessary*
10. *Extend Geocomposite Drain Strip to Bottom of Weepholes*
11. *Place Reinforcing and Apply Lift 2 Initial Shotcrete Facing*
12. *Install Studded Connection Plates on 2nd Row*

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STATE OF HAWAII
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HIGHWAYS DIVISION

TYPICAL SOIL NAIL WALL SECTION - LIFT 2

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S2.2 OF 8 SHEETS

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

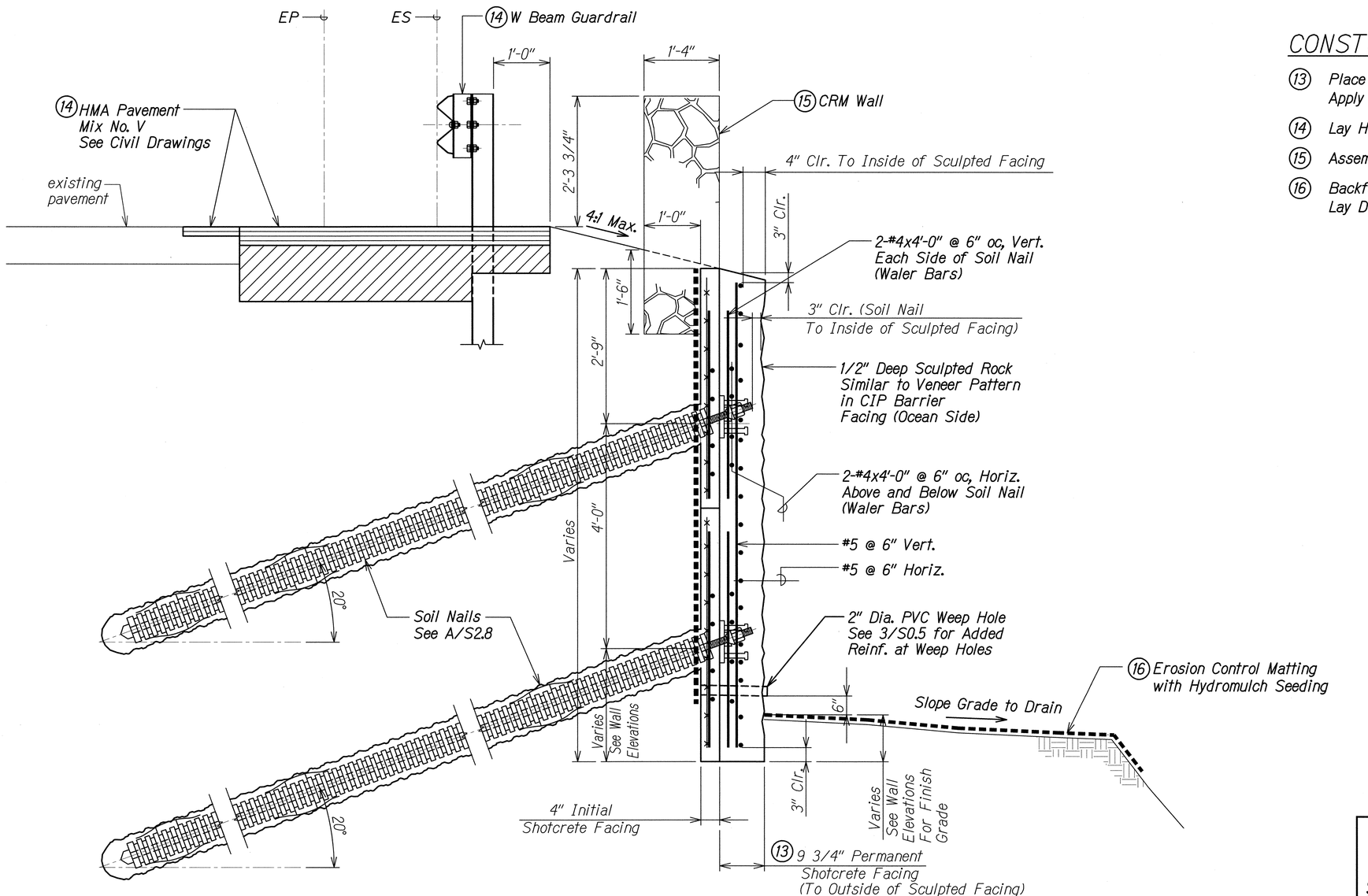
DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY WP\S1-5.3 PH3\CAD\01-02-14 DF WET SIGN\A3-S202.DWG PLOT TIME 01-02-14, 8:34 AM

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	44	54

TYPICAL PERMANENT SHOTCRETE:

Note:

1. *See A/S2.1 and A/S2.2 for additional details.*
2. *Contractor shall maintain 27 3/4" from finish road to top of rock wall.*



TYPICAL SOIL NAIL WALL SECTION - PERMANENT FACING AND CRM WALL

Scale: 1" = 1'-0"

A S2.1 S2.3 S2.2

CONSTRUCTION SEQUENCE:

(13) *Place Reinforcing and Apply Permanent Shotcrete Wall Facing*

(14) *Lay HMA Pavement and Install Guardrail*

(15) *Assemble CRM Wall*

(16) *Backfill as necessary and Lay Down Erosion Control Matting*

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL SOIL NAIL WALL SECTION - PERMANENT FACING AND CRM WALL

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S2.3 OF 8 SHEETS

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

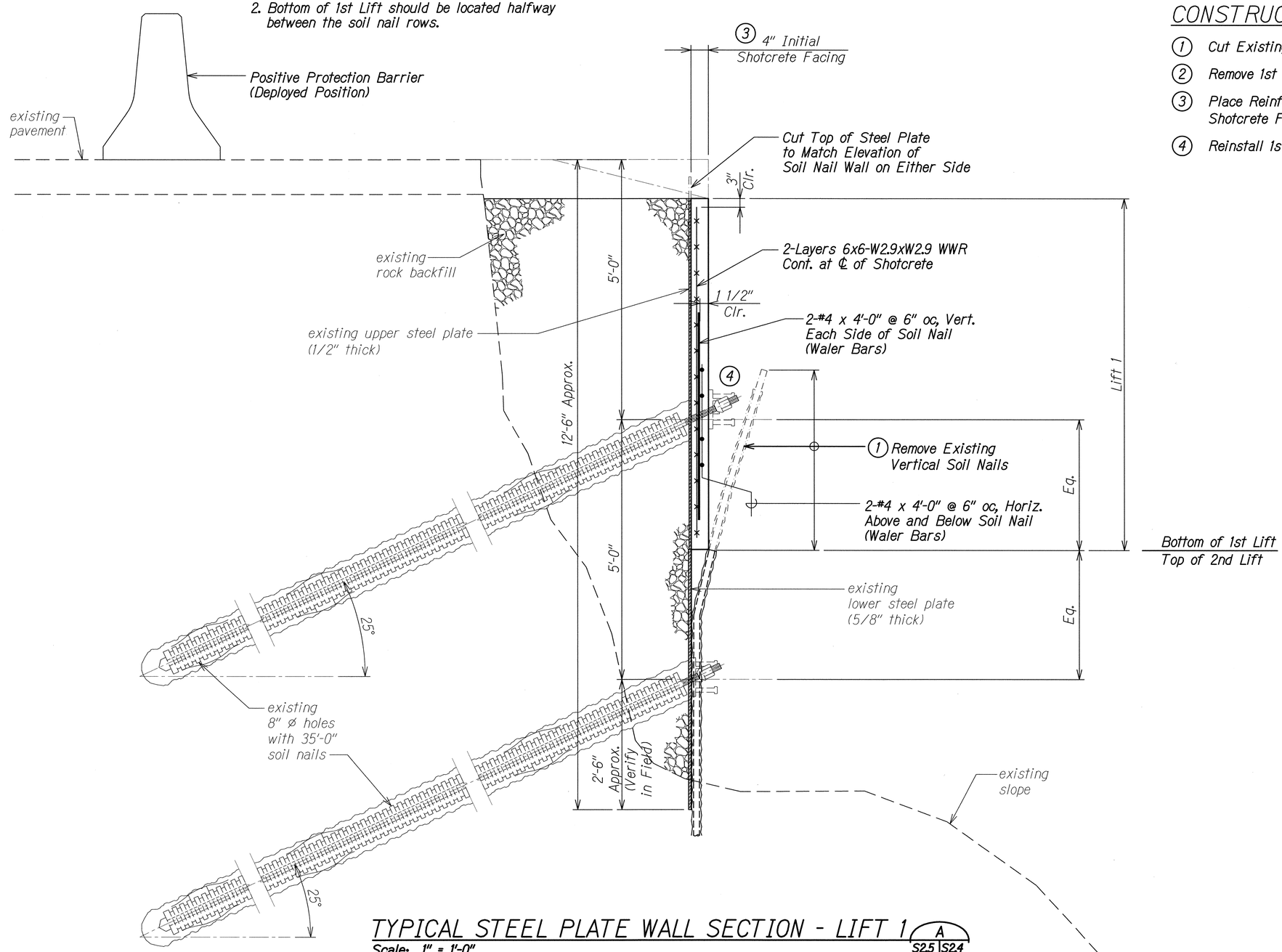
DRAWING NAME: Z:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PHX\CAD\01-02-14 OF WET SIGN\44-S203.DWG PLOT TIME: 01-02-14, 8:34 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	45	54

TYPICAL INITIAL SHOTCRETE AT STEEL PLATE (LIFT 1):

Notes:

1. *See A/S2.5 and A/S2.6 for additional details.*
2. *Bottom of 1st Lift should be located halfway between the soil nail rows.*



TYPICAL STEEL PLATE WALL SECTION - LIFT 1

Scale: 1" = 1'-0"

A
S2.5 S2.4
S2.6

CONSTRUCTION SEQUENCE:

1. *Cut Existing Vertical Nails to Bottom of 1st Lift*
2. *Remove 1st Row of Existing Studded Connection Plates*
3. *Place Reinforcing and Apply Lift 1 Initial Shotcrete Facing*
4. *Reinstall 1st Row of Studded Connection Plates*

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL STEEL PLATE WALL SECTION - LIFT 1

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted *Date: Oct. 25, 2013*

SHEET No. S2.4 OF 8 SHEETS

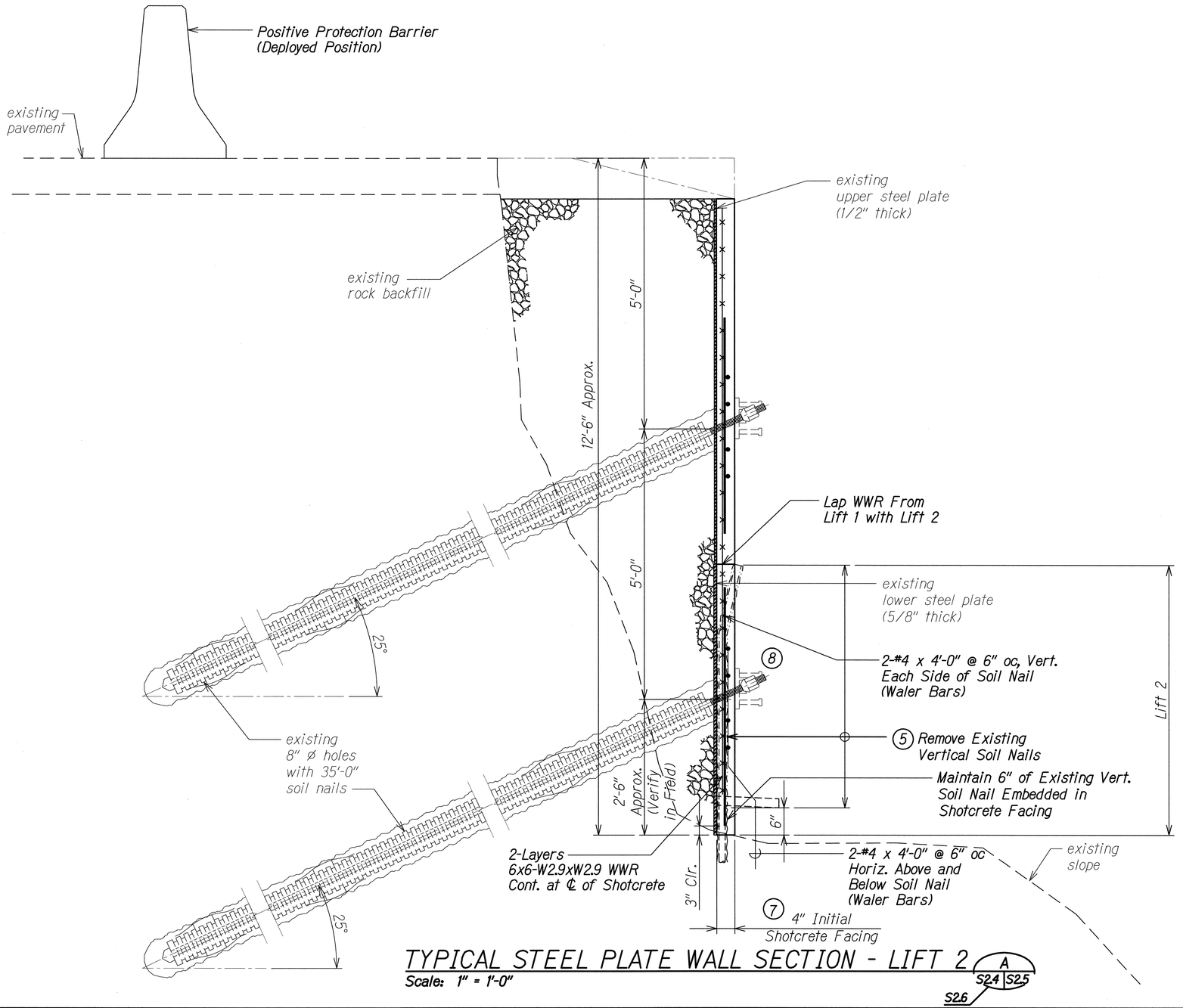
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	TRACED BY	
No.	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

DRAWING NAME: Z:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABILTN KUHIO HWY MP5\1-5.3 PH3\CAD\01-02-14 OF WET SIGN\45-S204.DWG PLOT TIME: 01-02-14, 9:35 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	46	54

TYPICAL INITIAL SHOTCRETE AT STEEL PLATE (LIFT 2):

Notes:
See A/S2.4 and A/S2.6 for additional details.



TYPICAL STEEL PLATE WALL SECTION - LIFT 2

Scale: 1" = 1'-0"

A
S2.4 | S2.5
S2.6

CONSTRUCTION SEQUENCE:

5. Cut Existing Vertical Nails to 6" Above Bottom of 2nd Lift
6. Remove 2nd Row of Studded Connection Plates
7. Place Reinforcing and Apply Lift 2 Initial Shotcrete Facing
8. Reinstall 2nd Row of Studded Connection Plates

DAVID K. FUJIWARA
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HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL STEEL PLATE WALL SECTION - LIFT 2
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S2.5 OF 8 SHEETS

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

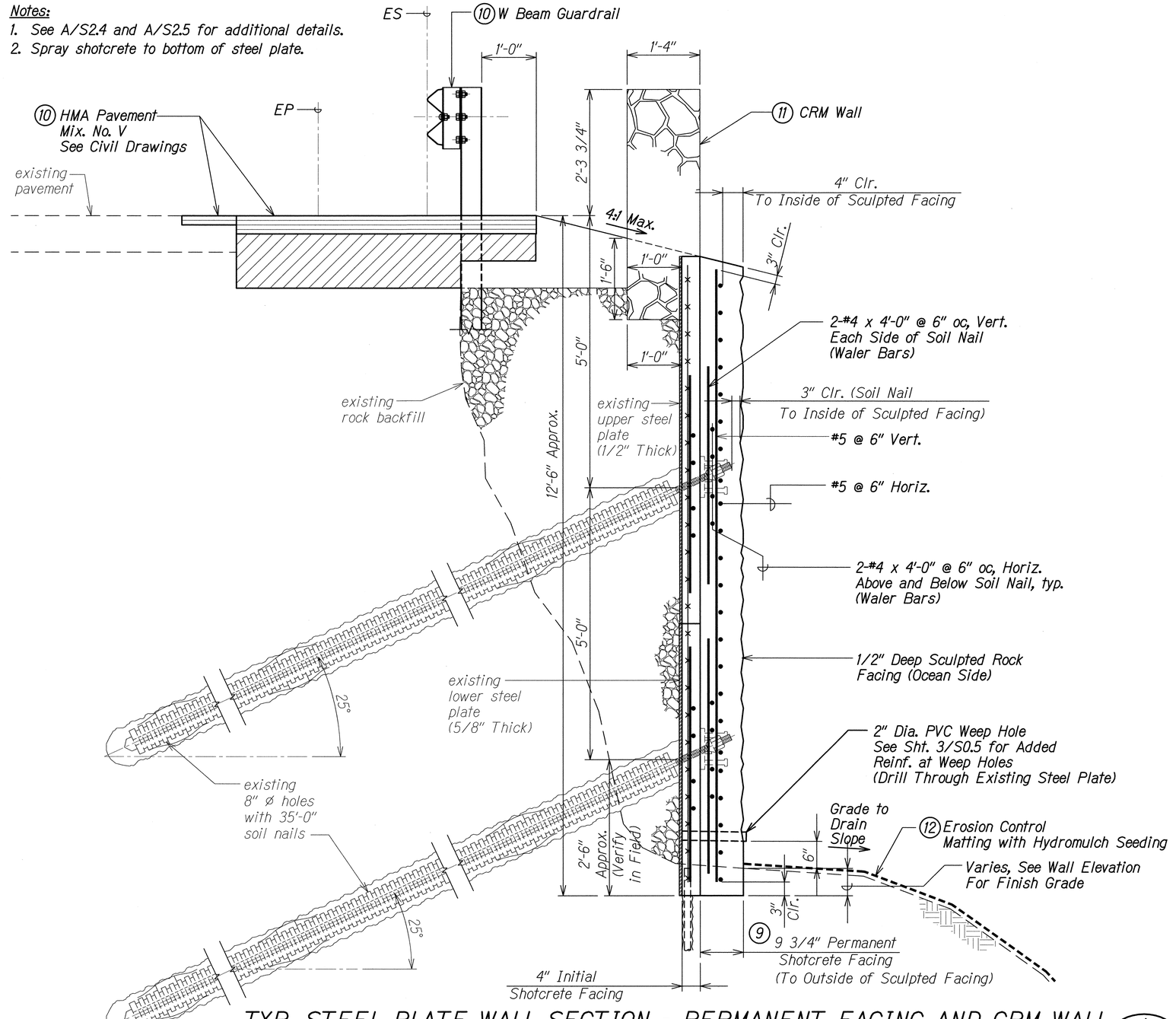
DRAWING NAME: Z:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\46-S205.DWG PLOT TIME: 01-02-14, 9:37 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	47	54

TYPICAL PERMANENT SHOTCRETE AT STEEL PLATE:

Notes:

1. See A/S2.4 and A/S2.5 for additional details.
2. Spray shotcrete to bottom of steel plate.



TYP. STEEL PLATE WALL SECTION - PERMANENT FACING AND CRM WALL

Scale: 1" = 1'-0"

A
S2.4 | S2.6
S2.5

CONSTRUCTION SEQUENCE:

(9) Place Reinforcing and Apply Permanent Shotcrete Wall Facing

(10) Lay HMA Pavement and Install Guardrail

(11) Assemble CRM Wall

(12) Backfill as Shown on Plan View and Lay Down Erosion Control Matting

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL STEEL PLATE WALL
SECTION - PERMANENT FACING AND CRM WALL
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

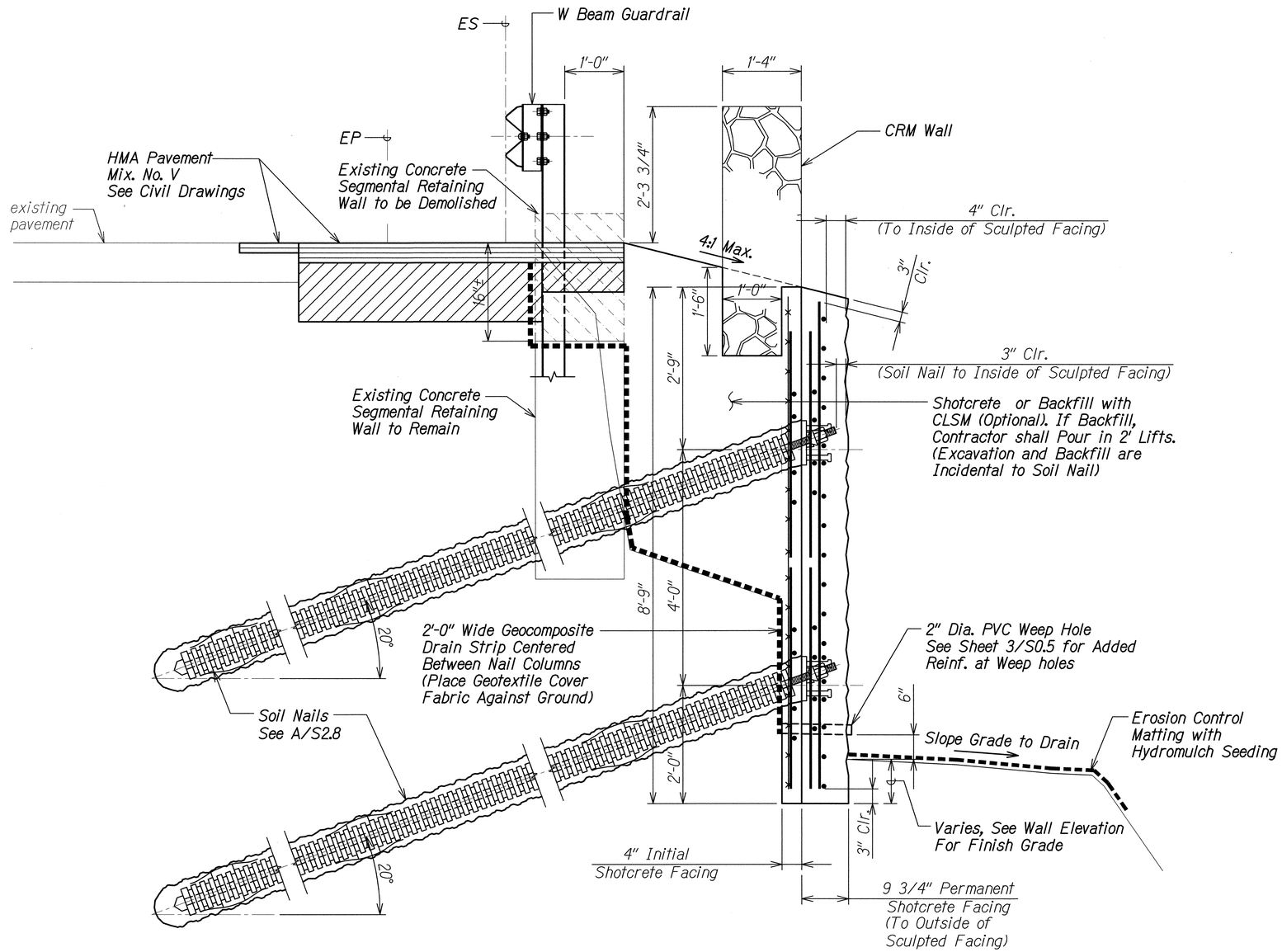
SHEET No. S2.6 OF 8 SHEETS

ORIGINAL PLAN | NOTE BOOK No. ____

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

DRAWING NAME: Z:\OD_ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\47-S206.DWG PLOT TIME: 01-02-14, 9:37 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	48	54



SOIL NAIL WALL SECTION AT EXISTING SEGMENTAL RETAINING WALL

Scale: 1" = 1'-0"

A
S2.1 | S2.7
S2.2

Legend:

Portion of Existing Concrete Segmental Retaining Wall To be Demolished

Notes:

1. Existing Segmental Retaining Wall to remain. Contractor shall demolish the top of wall down to 16" below future roadway.
2. Soil Nails will require drilling through the existing concrete keystone blocks and high-strength polyester geogrids. The existing concrete keystone block and geogrid shall be anticipated and not be considered as unanticipated obstruction by the Contractor.
3. The guardrail strong posts will require driving through the existing concrete keystone blocks. The existing concrete keystone blocks shall be anticipated and not be considered as unanticipated obstruction by the Contractor.
4. See sheets S2.1, S2.2, and S2.3 for reinf. detail.
5. If Existing Segmental wall is not present to retain soil or contractor removes more than specified 16" of wall, Construction Sequences Specified on Sheets S2.1 thru S2.3 shall be followed, otherwise wall section may be constructed in a single lift.

DAVID K. FUJIWARA
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NO. 8104-S
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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SOIL NAIL WALL SECTION AT EXISTING SEGMENTAL RETAINING WALL
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

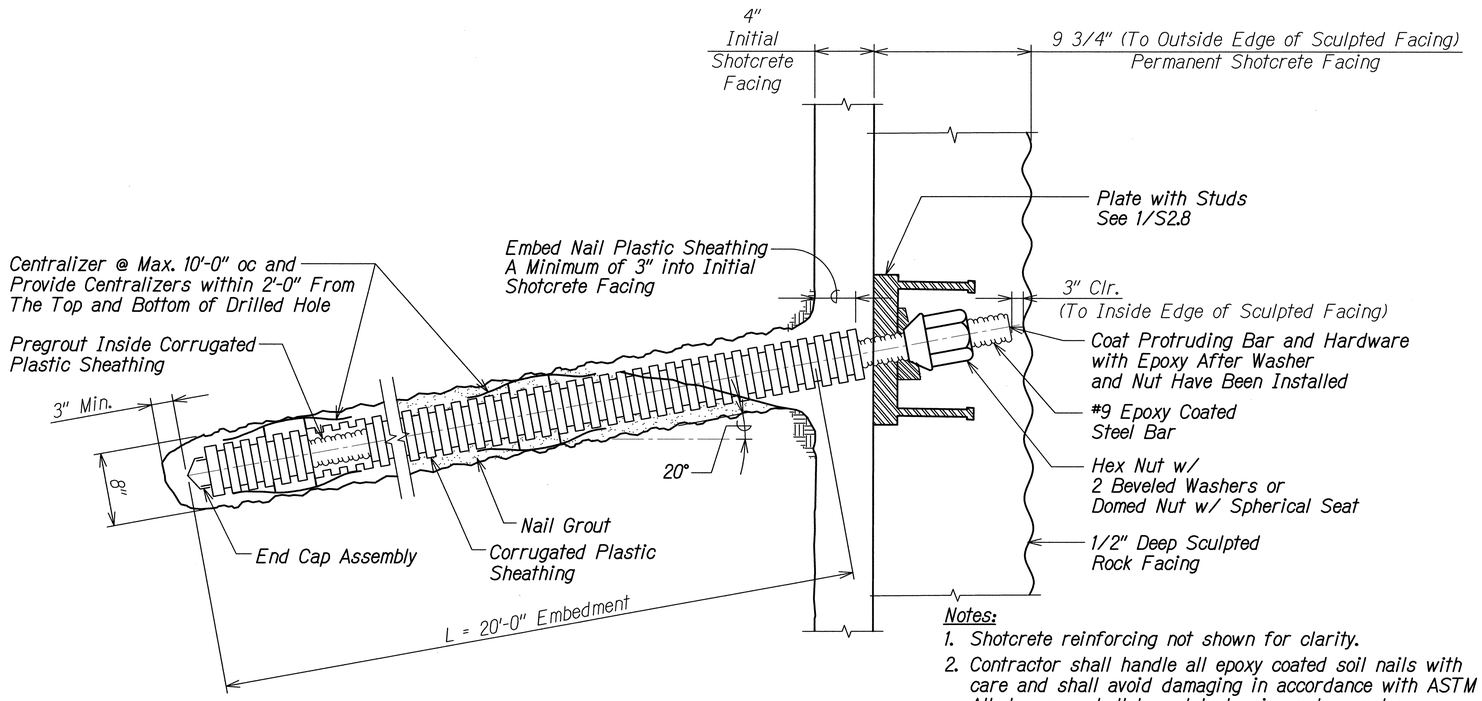
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S2.7 OF 8 SHEETS

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

DRAWING NAME: Z:\100 ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PW3\CAD\01-02-14 DF WET SIGN\48-S207.DWG PLOT TIME: 01-02-14, 9:38 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	49	54



Notes:

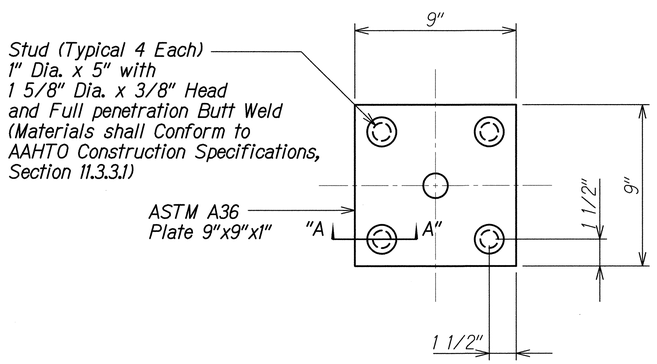
1. Shotcrete reinforcing not shown for clarity.
2. Contractor shall handle all epoxy coated soil nails with care and shall avoid damaging in accordance with ASTM D3963. All damages shall be patched using a two-part epoxy repair material, approved by the coating manufacturer.

ENCAPSULATED PRODUCTION SOIL NAIL SECTION

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

A — S1.1 | S2.8

S2.1, S2.2, S2.3, S2.7

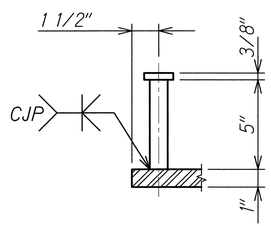


CONNECTION PLATE WITH STUD DETAIL

Scale: 3" = 1'-0"

1 — S2.8 | S2.8

S3.2



SECTION "A - A"

NOTE:
All nuts, washers, plates and studs shall be hot dip galvanized after fabrication.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SOIL NAIL / HARDWARE DETAILS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

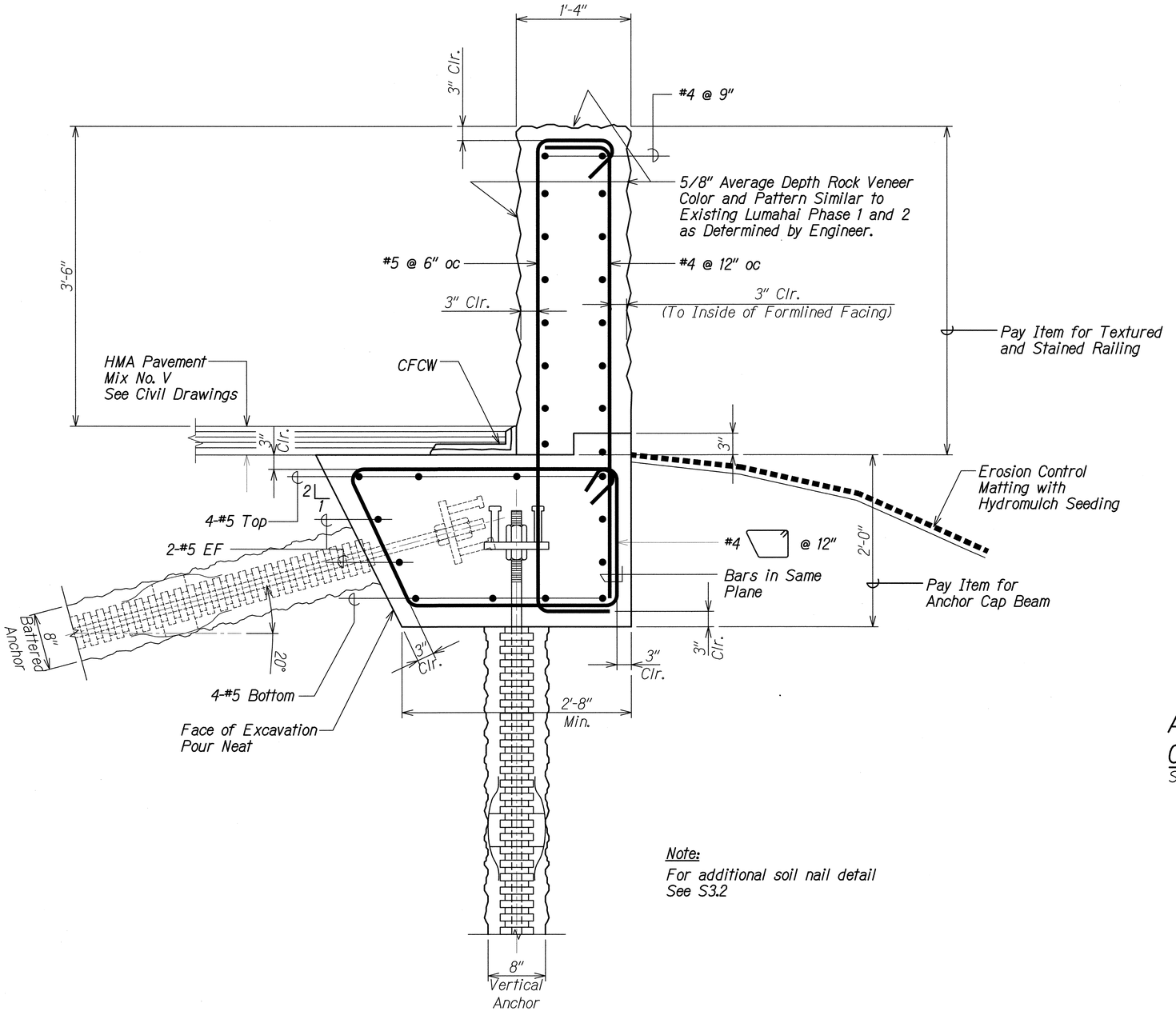
Scale: As Noted — Date: Oct. 25, 2013

SHEET No. S2.8 OF 8 SHEETS

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

DRAWING NAME: 2:\00 ONGOING\12-007-LUMAHAI EMER SLOPE STABLZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\49-S208.DWG PLOT TIME: 01-02-14, 9:38 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	50	54

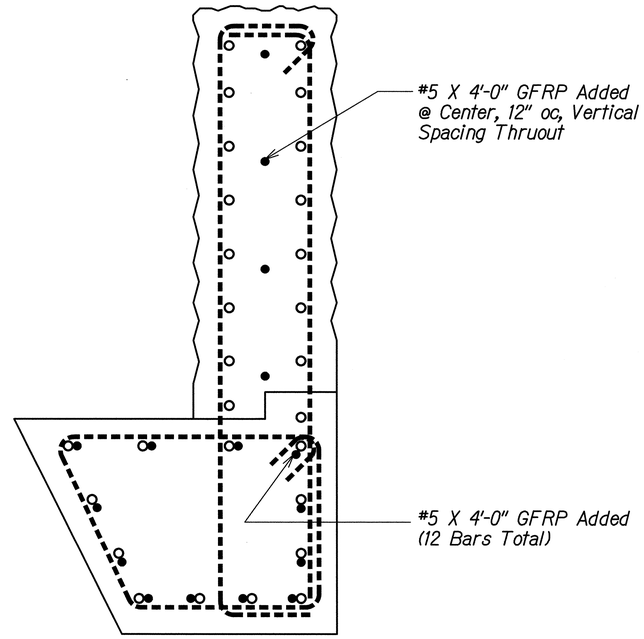


Note:
For additional soil nail detail
See S3.2

SOIL NAIL VERTICAL AND BATTERED ANCHOR CAP BEAM AND BARRIER SECTION

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

A S3.2 | S3.1



Note:
See 4/S0.3 for plan view of control joint detail.

ADDED REINFORCING AT CONSTRUCTION JOINT

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

B S3.1 | S3.1

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL VERTICAL/BATTERED SOIL NAIL BEAM AND BARRIER SECTION

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

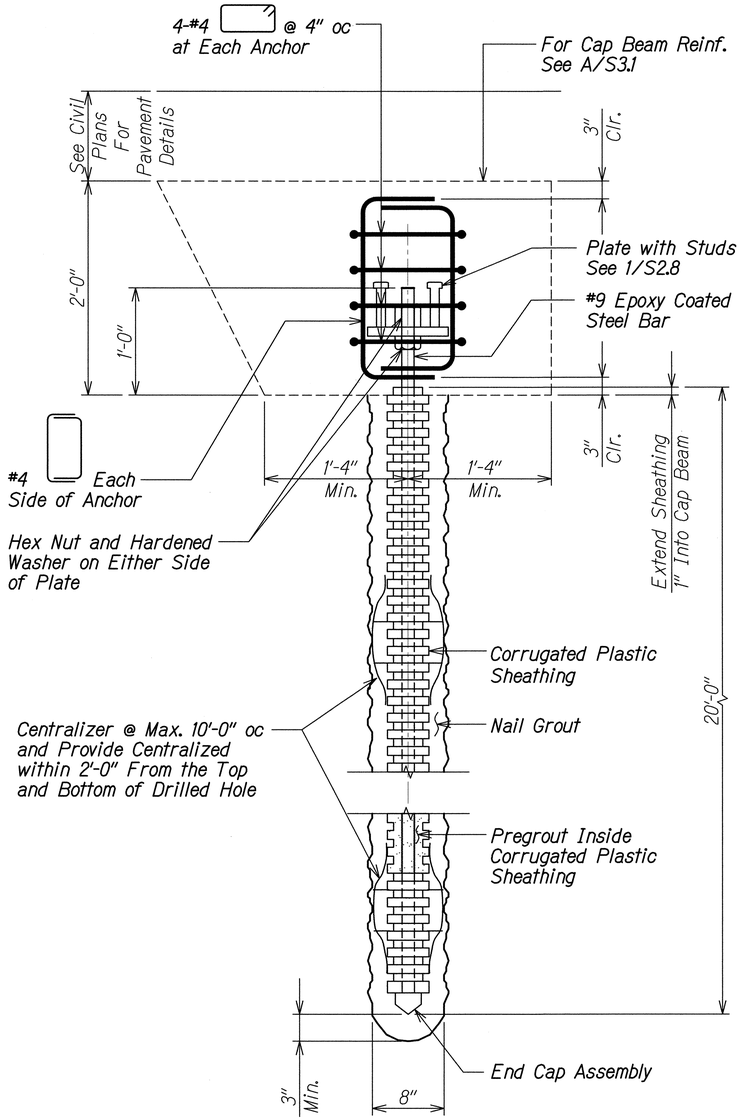
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S3.1 OF 2 SHEETS

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

DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY WPS\1-5.3 PH3\CAD\01-02-14 DF WET SIGN\S0-S3D1.DWG PLOT TIME: 01-02-14, 9:39 AM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	51	54

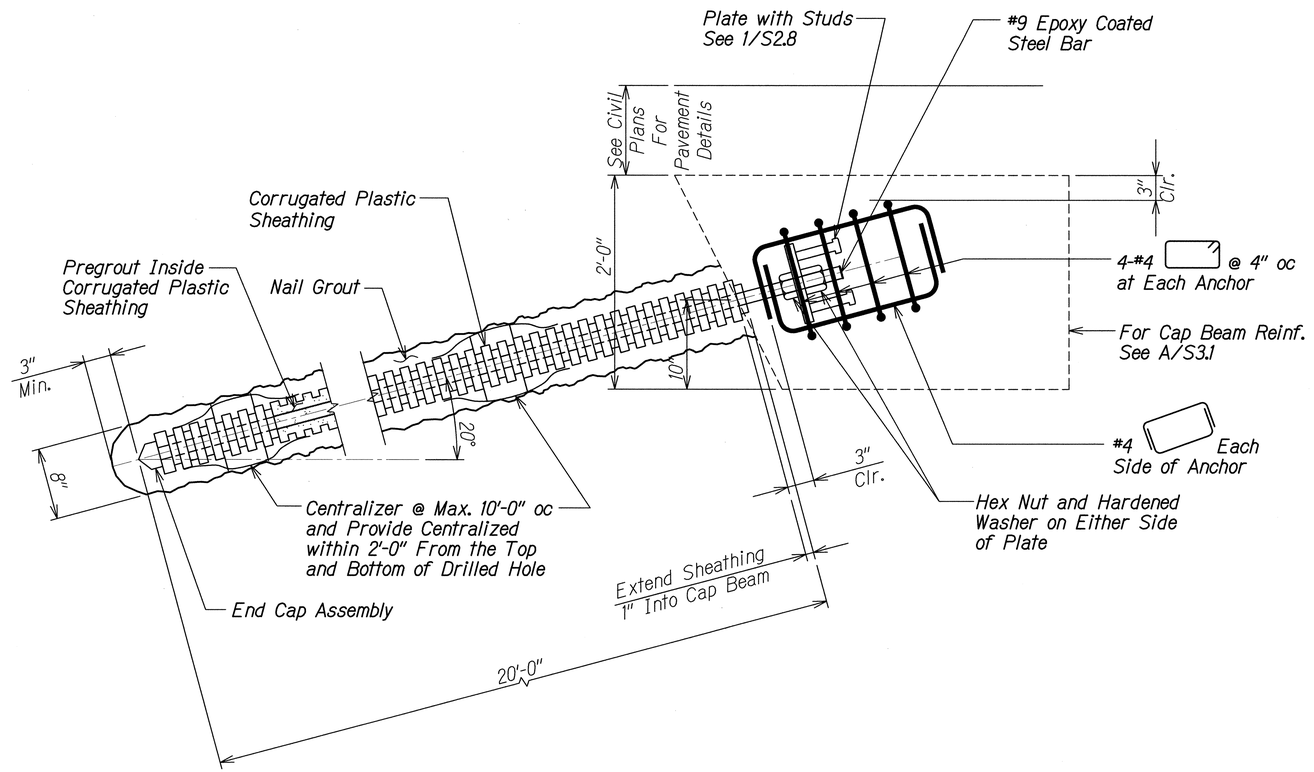


Note:
Battered anchor not shown for clarity.

ENCAPSULATED VERTICAL SOIL NAIL DETAIL

A S1.3 S3.2

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



Note:
Vertical anchor not shown for clarity.

ENCAPSULATED BATTERED SOIL NAIL DETAIL

B S1.3 S3.2

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ENCAPSULATED SOIL NAIL DETAIL

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

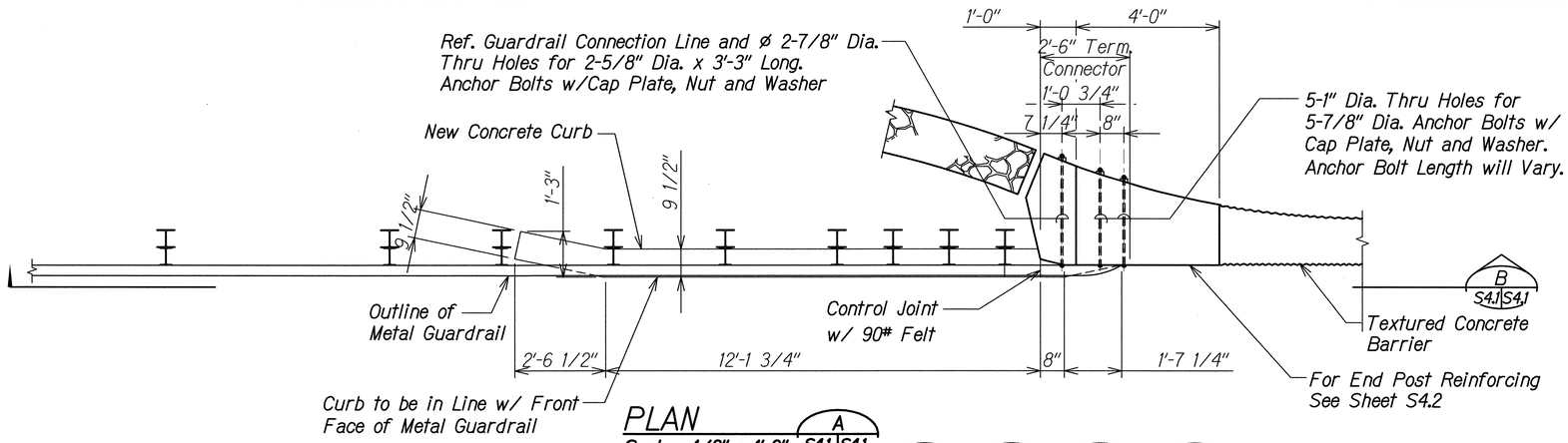
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S3.2 OF 2 SHEETS

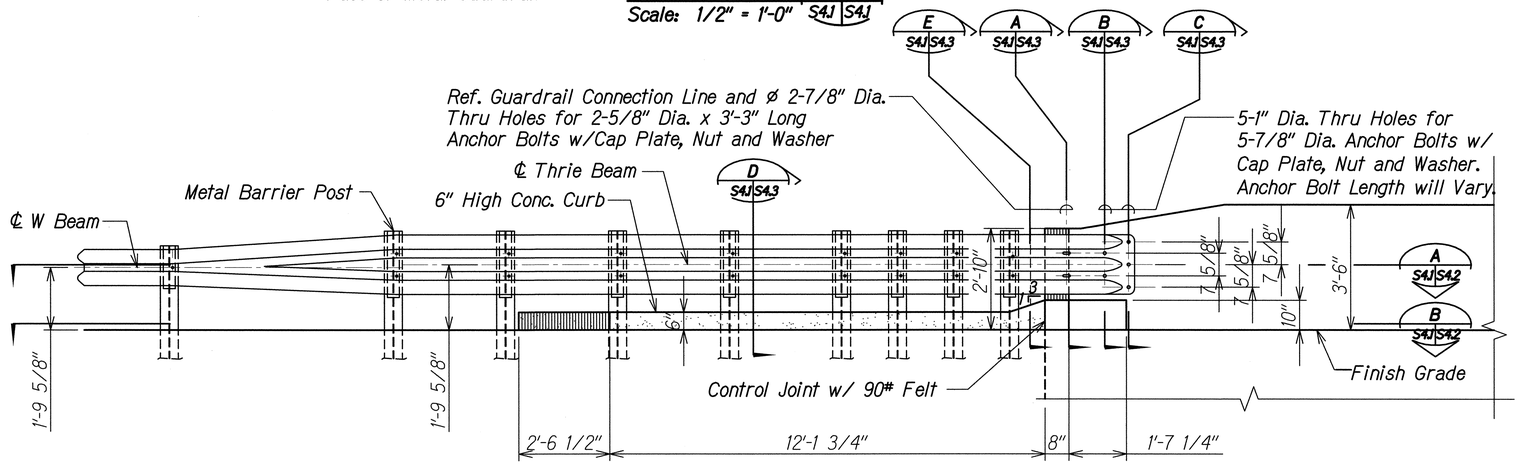
ORIGINAL PLAN
NOTE BOOK
No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

DRAWING NAME: Z:\OD ONGOING\12-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PH3\CAD\01-02-14 DF WET SIGN\S1-S302.DWG PLOT TIME: 01-02-14, 9:39 AM)

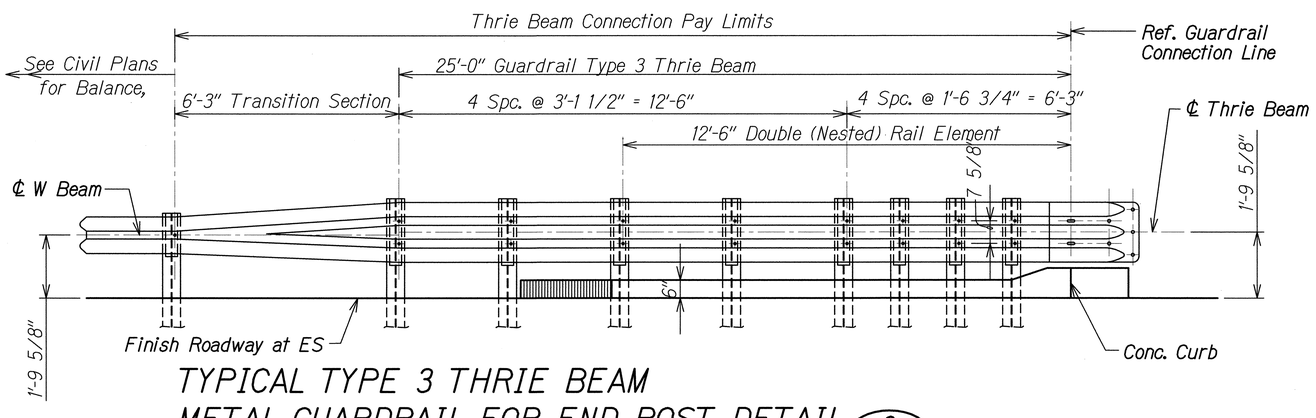
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	52	54



PLAN Scale: 1/2" = 1'-0" A S4.1|S4.1



ELEVATION B Scale: 1/2" = 1'-0" S4.1|S4.1



TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL FOR END POST DETAIL C Scale: 1/2" = 1'-0" S4.1|S4.1

ORIGINAL PLAN | NOTE BOOK | No.

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

DRAWING NAME: Z:\OO_ONGOING\12-007-LUMAHAI EMER SLOPE STABILIZTN KUHIO HWY MP5.1-5.3_PH3\CAD\01-02-14 DF WET SIGN\S2-S401.DWG PLOT TIME: 01-02-14, 9:40 AM

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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David K. Fujiwara — KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

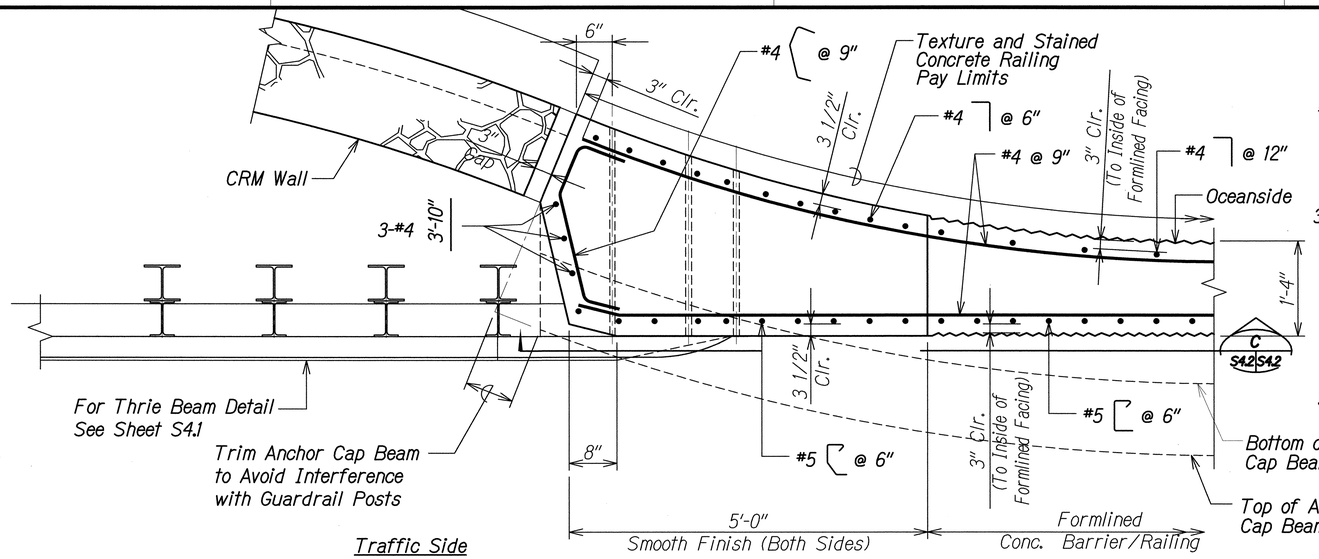
THRIE BEAM AND END POST - PLAN, ELEVATION, AND DETAIL

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted Date: Oct. 25, 2013

SHEET No. S4.1 OF 3 SHEETS

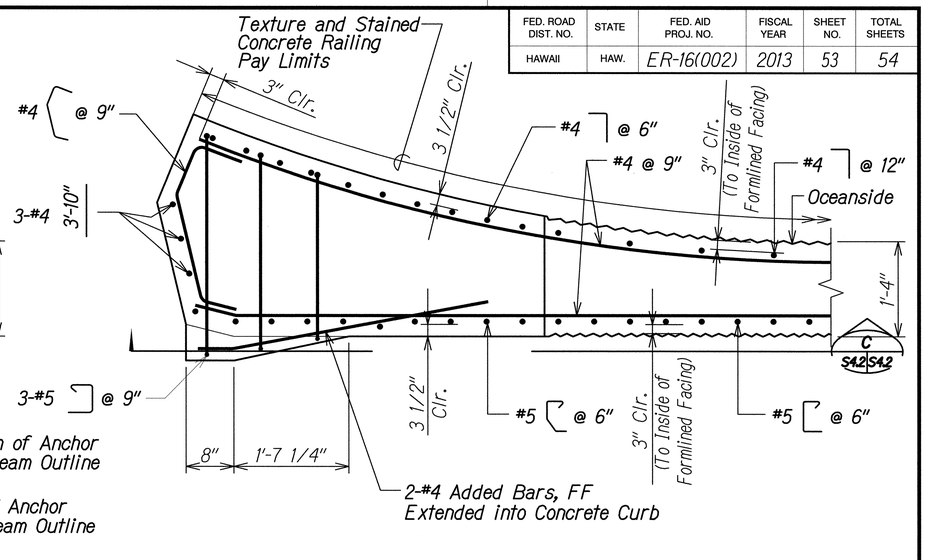
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	53	54



Traffic Side

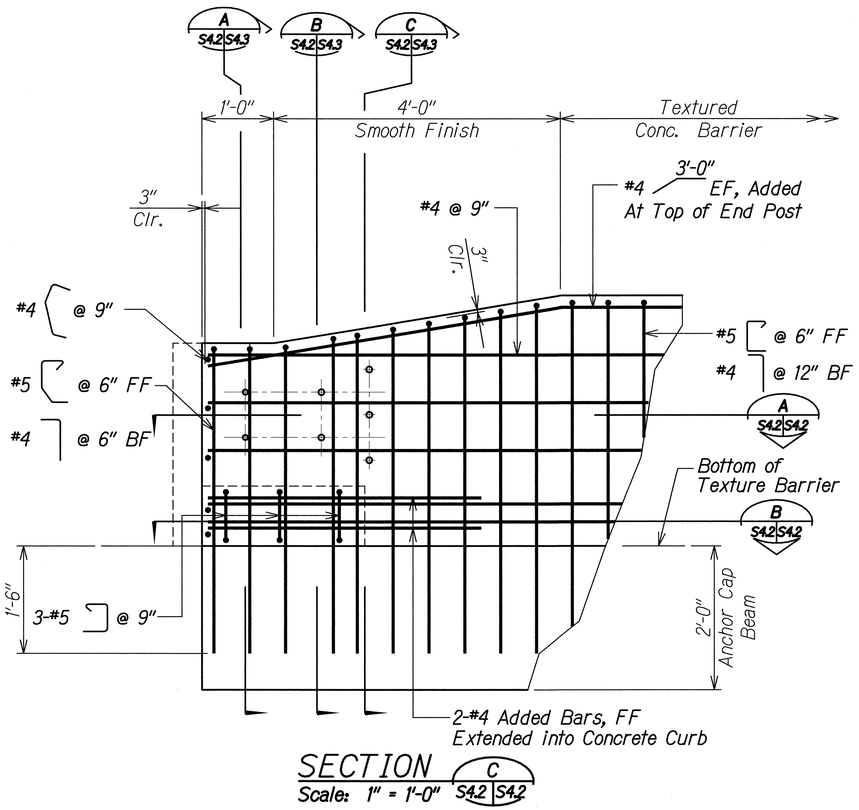
SECTION - PLAN VIEW A S4.2 S4.2

Scale: 1" = 1'-0"



SECTION - PLAN VIEW B S4.2 S4.2

Scale: 1" = 1'-0"



SECTION C S4.2 S4.2

Scale: 1" = 1'-0"

SPECIAL COATING SCHEDULE FOR ZINC COATED METAL BEAMS AND POSTS				
	Option #1	Option #2	Option #3	Option #4
Preparation:	Carboline Thinner #2 or Surface Cleaner #3 per SSPC-SP1, Apply Rustbound Penetrating Sealer	Solvent Clean per SSPC-SP1, Apply Valspar VyGuard Sealer 513-V-110	Solvent Clean per SSPC-SP1 and as Recommended by the Manufacturer	Solvent Clean per SSPC-SP1. Apply Galvaprep Zinc Treatment
1st Coat:	Carboline 890 Epoxy DFT 5 mil (min.) WFT 7 mil (min.)	Valspar VyGuard V75 Epoxy DFT 5 mil (min.) WFT 7 mil (min.)	Sherwin Williams Tile Clad High Solids B62 Series DFT 4 mil (min.) WFT 7 mil (min.)	Ameron Amercoat 385 Epoxy DFT 5 mil (min.) WFT 8 mil (min.)
Re-Coating Time:	8 Hrs. (min.) 2 Days (max.)	36 Hrs. (min.) 14 Days (max.)	8 Hrs. (min.) 10 Days (max.)	8 Hrs. (min.) 2 Days (max.)
Top Coat:	Carboline 133HB Alyphatic Polyurethane DFT 5 mil (min.) WFT 7 mil (min.)	Valspar VyGuard V41 Series DFT 4 mil (min.) WFT 7 mil (min.)	Sherwin Williams Corothane II B65 W200 Series / B60V2 DFT 4 mil (min.) WFT 7 mil (min.)	Ameron Amercoat 450 SA Polyurethane DFT 4 mil WFT 7 mil

DAVID K. FUJIWARA LICENSED PROFESSIONAL ENGINEER NO. 8104-S HAWAII, U.S.A.

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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

END POST SECTIONS

KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

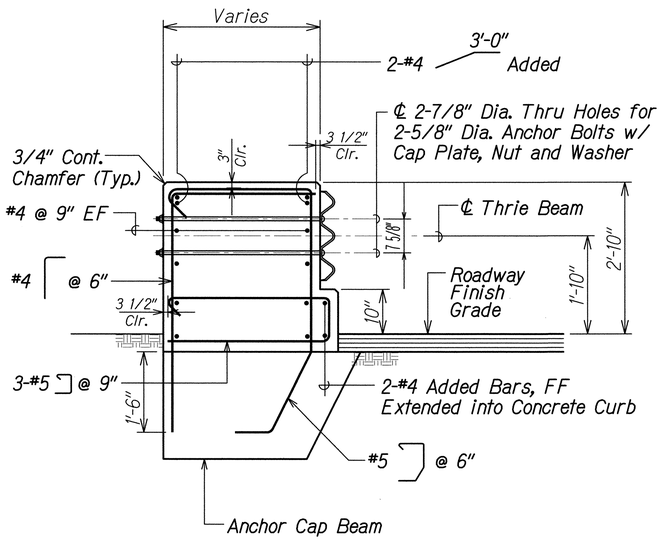
Scale: As Noted Date: Oct. 25, 2013

SHEET No. S4.2 OF 3 SHEETS

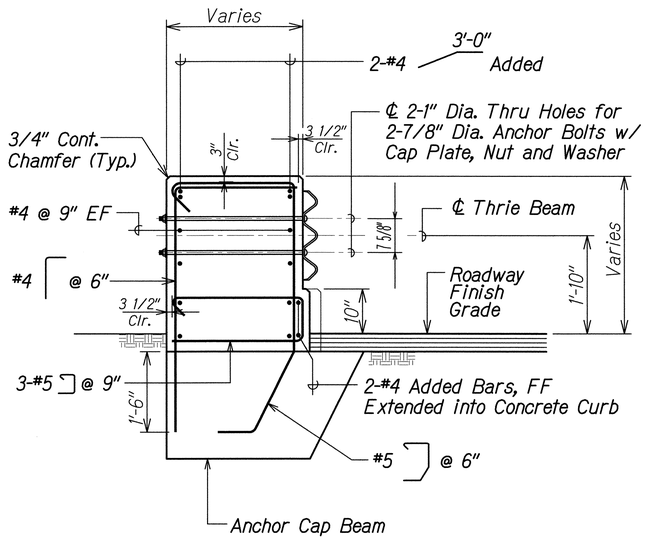
ORIGINAL PLAN | NOTE BOOK | No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

DRAWING NAME: Z:\OD_ONGONG\12-007-LUMAHAI EMER. SLOPE STABILZTN. KUHIO HWY MP5.1-5.3 PHS\CAD\01-02-14 DF WET SIGN\S3-5402.DWG PLOT TIME: 01-02-14, 9:40 AM

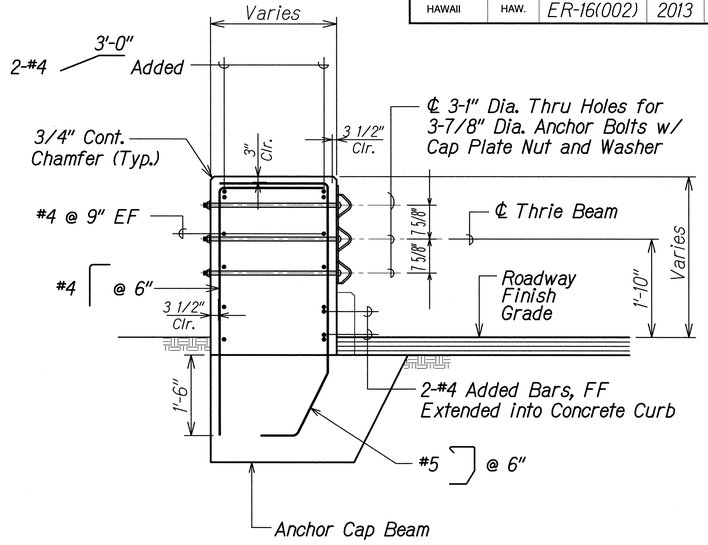
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-16(002)	2013	54	54



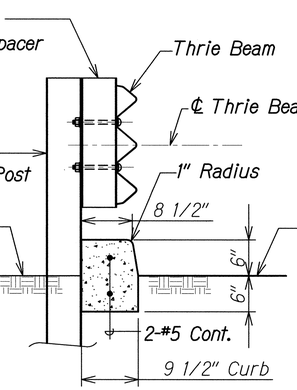
SECTION A
Scale: 3/4" = 1'-0"
S4.1 | S4.3 | S4.2



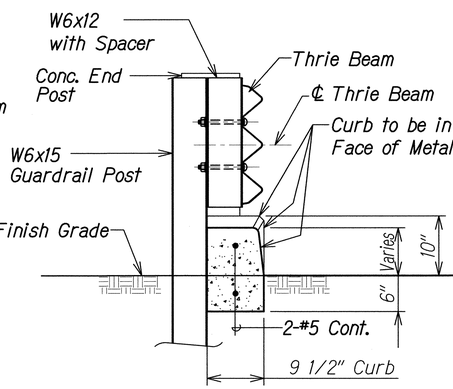
SECTION B
Scale: 3/4" = 1'-0"
S4.1 | S4.3 | S4.2



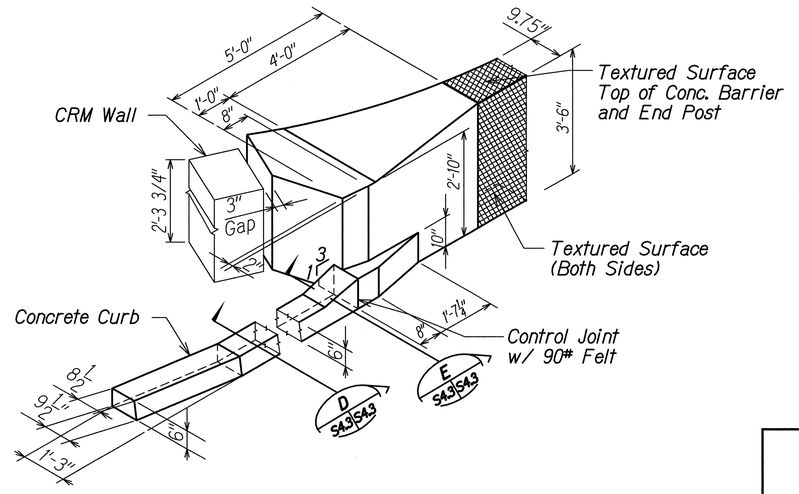
SECTION C
Scale: 3/4" = 1'-0"
S4.1 | S4.3 | S4.2



SECTION D
Scale: 1" = 1'-0"
S4.1 | S4.3 | S4.3



SECTION E
Scale: 1" = 1'-0"
S4.1 | S4.3 | S4.3



END POST DETAIL 1
Scale: Not to scale
S4.3 | S4.3

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NO. 8104-S
HAWAII, U.S.A.

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KSF, INC. — APRIL 30, 2014 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

END POST / GUARDRAIL SECTIONS AND DETAIL
KUHIO HIGHWAY (ROUTE 560)
EMERGENCY SLOPE STABILIZATION IN LUMAHAI
IN THE VICINITY OF M.P. 5.1 TO 5.3
Fed. Aid Proj. No. ER-16(002)

Scale: As Noted — Date: Oct. 25, 2013

SHEET No. S4.3 OF 3 SHEETS

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

DRAWING NAME: Z:\OD_ONGOING\V2-007-LUMAHAI EMER SLOPE STABILZTN KUHIO HWY MP5.1-5.3 PHS\CAD\01-02-14 DIF MET SIGN\S4-S403.DWG PLOT TIME: 01-02-14, 9:41 AM)