FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	39	59

INDEX TO STRUCTURAL DRAWINGS

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

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S001.DWG PLOT TIME: 03-23-18, 3:00 PM)

DAVID K. FUJIWARA
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KSF, INC. — APRIL 30, 2020 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

INDEX TO STRUCTURAL DRAWINGS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: None Date: March 2018

SHEET No. S0.1 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	40	59

STRUCTURAL GENERAL NOTES

1. General Specifications: Hawaii Department of Transportation (HDOT), Hawaii Standard Specifications for Road and Bridge Construction, 2005.

2. Design Specifications:

   (A) AASHTO 2010 LRFD Bridge Design Specifications, Fifth Edition and its subsequent interim specifications with interim supplements and modifications by HDOT.

   (B) HDOT Memorandum "Design Criteria for Bridges and Structures" Dated October 20, 2010.

3. Loads:

   (A) Live Load: AASHTO HL-93 Truck Loading

   (B) Seismic Loads: Acceleration coefficient 0.28
   Site Class ..... E

4. Materials:

   (A) Concrete:

   (1) Concrete for outlet structure shall have a minimum compressive strength at 28 days of 5000 psi and have a maximum 0.45 water to cement ratio and contain 24 oz. per cubic yard of migrating amine carboxylate corrosion inhibiting water-based admixture, Cortec MCI 2005 NS or approved equivalent. A shrinkage reducing admixture, such as Eclipse or Master Life SRA 20 or approved equivalent shall be added at a dosage of 128 oz. per cubic yard.

   (2) Temperature of concrete shall not exceed 90° F at the point of placement.

   (3) Concrete shall be cured using Sinak Lithium Cure or approved equivalent at a coverage rate of 200 sq. ft. per gallon.

   (B) Shotcrete:

   (1) Shotcrete for walls shall have a minimum compressive strength at 28 days of 5000 psi and have a maximum 0.45 water to cement ratio and contain 24 oz. per cubic yard of migrating amine carboxylate corrosion inhibiting water-based admixture, Cortec MCI 2005NS or approved equivalent. A shrinkage reducing admixture, such as Eclipse or Master Life SRA 20 or approved equivalent shall be added at a dosage of 128 oz. per cubic yard.
   Shotcrete shall contain either 7.5 lbs of Strux 85/50 Synthetic Structural Fiber per cubic yard or 13 lbs of Cemfil AntiCrak 67/36 Alkali resistant glass fiber per cubic yard.

   (2) Temperature of shotcrete shall not exceed 90° F at the point of placement.

   (3) Shotcrete shall be cured using Sinak Lithium Cure or approved equivalent at a coverage rate of 100 sq. ft. per gallon.

   (C) Soil nail grout shall consist of the following constituents and properties:

   (1) Portland Cement Type I/II - 1 Sack (94 lbs)

   (2) Potable Water - 4 Gallons

   (3) MasterRoc FLC 100 or Approved Equivalent - 3 lbs

   (4) Cortec MCI 2005 NS or Approved Equivalent - 1 oz.
   Note:
   Corrosion inhibitor and flowcable shall be added to the mixing water before adding cement.

   (5) Minimum compressive strength at 28 days of 4000 psi

   (6) Glenium 3030 or approved equivalent may be used as a high range water reducer for workability as needed.

4. Materials (Cont.):

   (C) Soil nail grout shall consist of the following constituents and properties (Cont.):

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

   (8) Temperature of grout shall not exceed 85° F at the end of the grouting hose coupling to fill tube.

   (D) All reinforcing steel shall be ASTM A 615 Grade 60, deformed bars, unless otherwise noted.

   (E) Reinforcing steel shall be ASTM A 706 deformed bars where welded connections are required.

   (F) All welded wire reinforcing shall conform to ASTM A185 or A497.

   (G) All epoxy coating on the reinforcing steel shall comply with ASTM A-775. Damaged epoxy coating shall be patched using a two-part epoxy repair material, approved by the manufacturer.

   (H) Glass Fiber Reinforced Polymer (GFRP) Rebar

   (1) GFRP rebar shall have a guaranteed minimum tensile strength in accordance with the following:

Size	f*fu (ksi)
4	140
5	160
6	150
7	150
8	140

   (2) The modulus of elasticity of the GFRP bar shall be a minimum of 8,800,000 psi.

   (3) GFRP bar shall be sand coated.

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

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

   (6) All GFRP bars shall be securely tied in place using either plastic coated tie wire or nylon zip ties.

   (7) GFRP bars may be cut in the field with a masonry or diamond blade, grinder or fine blade saw.

   (8) All work including materials and bends shall follow manufacturer's recommendations.

   (I) Soil nails shall be Triple Corrosion Protected. Each threaded steel bar shall be ASTM A615-Grade 60 and shall be epoxy coated in in accordance with ASTM A-934 and pregrouted in a corrugated PVC or HDPE sheathing.
   Pregrout, provided by manufacturer, shall contain an amine carboxylate corrosion inhibiting water-based admixture, Cortec MCI 2005 NS or approved equivalent Corrosion inhibitor and shall be added at a dose of 24 oz. per cubic yard. Soil nails that are damaged shall either not be used or shall be repaired in accordance with manufacturer's recommendations.

   (J) Bearing plates, nuts, and welded shear connectors

   (1) Bearing plates: AASHTO M183/ASTM A36

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

   (3) Shear connectors: AASHTO LFRD Bridge Construction Specifications 3rd Edition Section 11.3.3.1

4. Materials (Cont.):

   (K) All hardware for soil nails, such as plates, nuts, washers, and shear connectors shall be hot-dip galvanized after fabrication.

   (L) Geocomposite Drain Strips shall be Miradrain 6000, Amerdrain 500 or approved equal.
   Drainstrips shall be taped at edges to prevent shotcrete from entering drain during placement.

   (M) PVC Drain Pipe shall be ASTM 1785 Schedule 40, solid and perforated wall, cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric gasket joints.

   (N) WWR shall be hot-dip galvanized unless otherwise noted.

5. Reinforcing Steel:

   (A) The minimum covering measured from the surface of the shotcrete/concrete to the face of reinforcing bars shall be as follows, except as otherwise shown.

   (1) Shotcrete/Concrete cast against and permanently exposed to earth = 3".

   (2) All others unless otherwise noted = 2".

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

   (C) Minimum clear spacing between parallel bars shall be 1 1/2 times the diameter of bars (for non bundled bars). In no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate or 1 1/2".

   (D) All dimensions relating to reinforcing bars are to centers of bars unless otherwise noted.

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KSF, INC. — LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURAL GENERAL NOTES

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: None — Date: March 2018

SHEET No. S0.2 OF 6 SHEETS

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE
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DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S002.DWG PLOT TIME: 03-23-18, 3:01 PM)

SYMBOLS AND ABBREVIATIONS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	41	59

℄	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
f* fu	Min. Guaranteed Tensile Strength of GFRP
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 or Wall Thickness
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. — LIC. EXP. DATE

STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

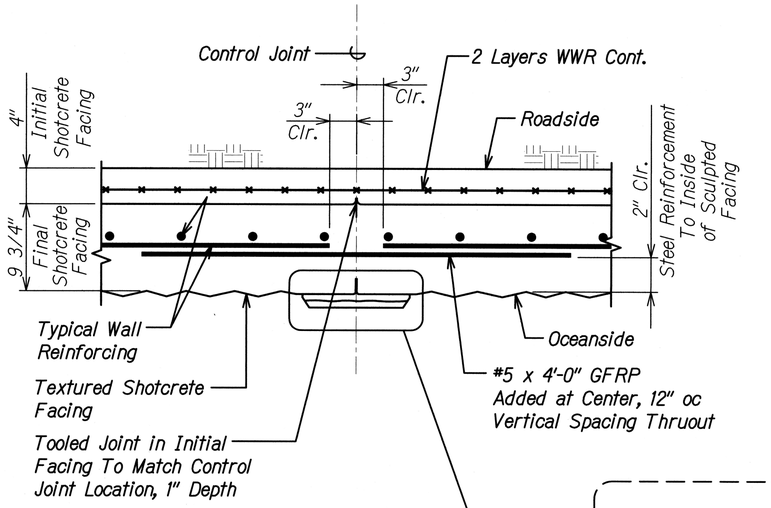
SYMBOLS AND ABBREVIATIONS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: None — Date: March 2018

SHEET No. S0.3 OF 6 SHEETS

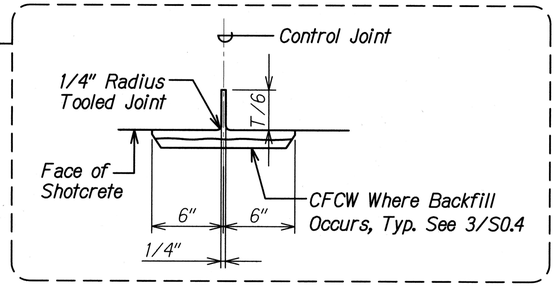
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	42	59

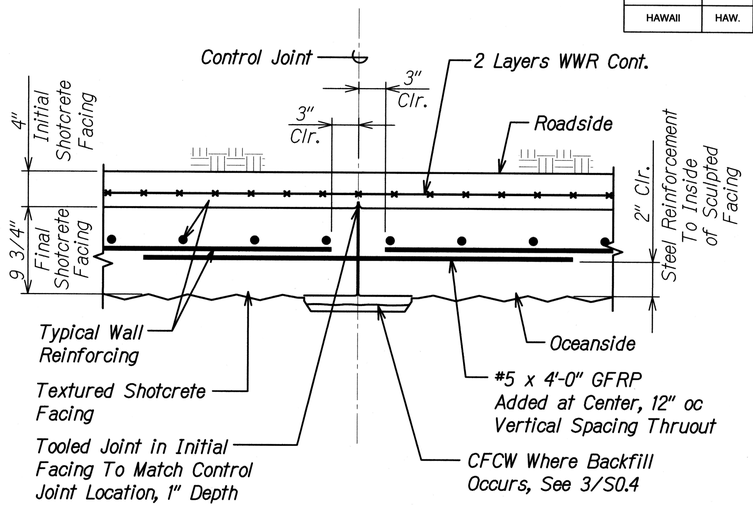


CONTROL JOINT AT SOIL NAIL WALL

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

1 S0.4 | S0.4





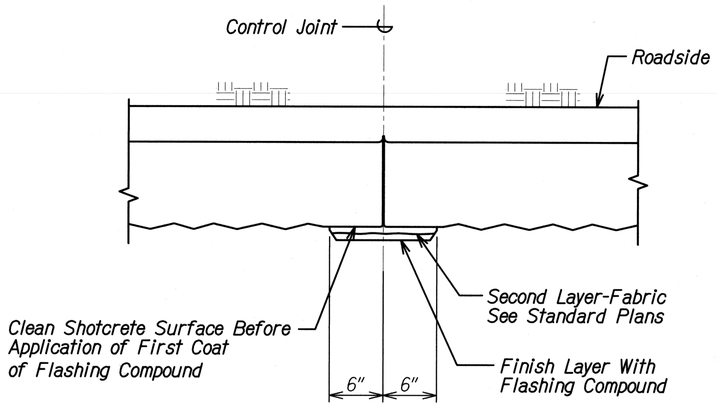
CONSTRUCTION JOINT AT CONTROL JOINT LOCATION IN SOIL NAIL WALL

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

2 S0.4 | S0.4

Legend

T Wall Thickness



CONTINUOUS FLASHING COMPOUND WATERPROOFING (CFCW) DETAIL

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

3 S0.4 | S0.4

DRAWING NAME: Z:\DOT ONGOING\12-027.2 HANA HWY IMPR PH2C MP81.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S004.DWG PLOT TIME: 03-23-18, 3:04 PM

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STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

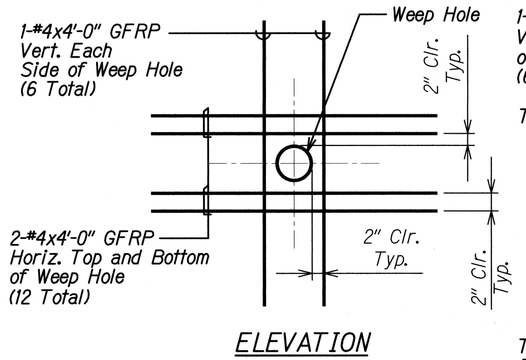
TYPICAL JOINT DETAILS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S0.4 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	43	59



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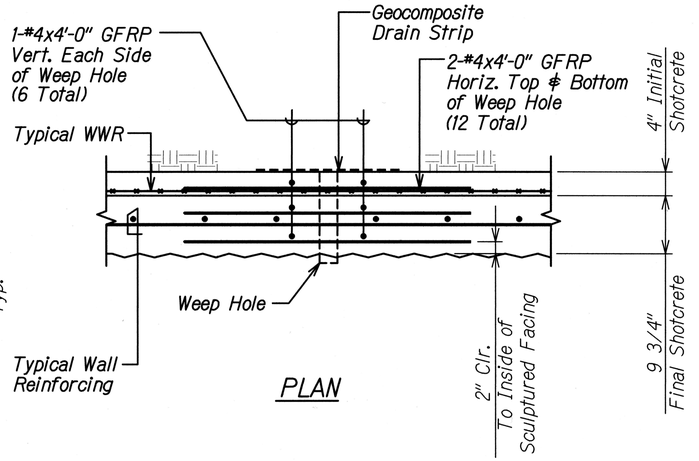

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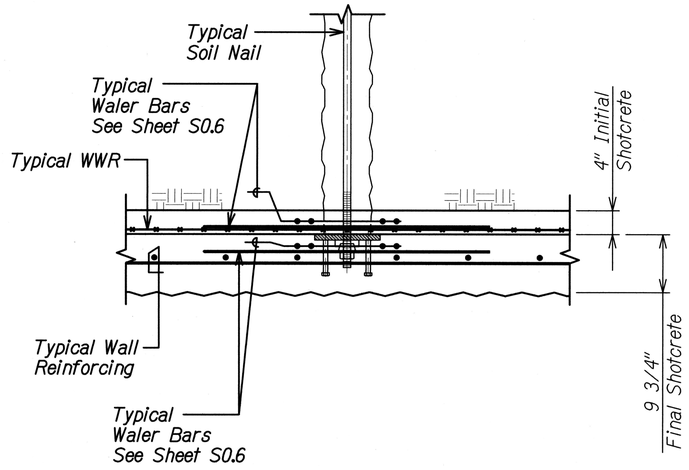

ADDED REINFORCING AT WEEP HOLES

Scale: 1" = 1'-0"

1 / S0.5 | S0.5

ADDED REINFORCING AT SOIL NAIL

Scale: 1" = 1'-0"

2 / S0.5 | S0.5

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-28-18 NEW PROJ NO & BBR VELLUM\HHI-S004.DWG PLOT TIME: 03-23-18, 3:04 PM)

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

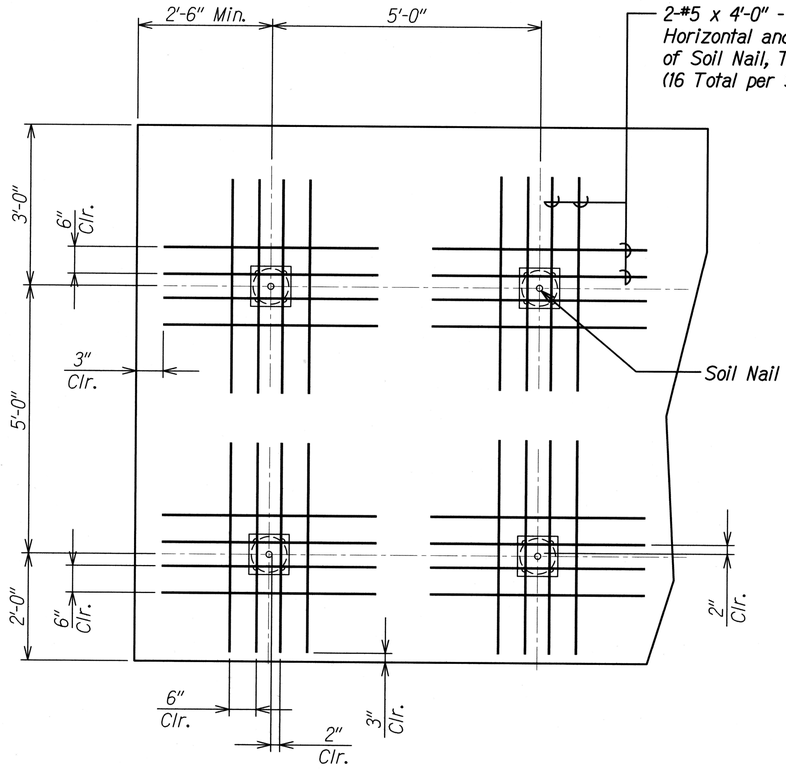
ADDED REINFORCING DETAILS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S0.5 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	44	59



TYPICAL WALER BAR DETAIL

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

1 S0.6 | S0.6

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S006.DWG PLOT TIME: 03-23-18, 3:05 PM

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DEPARTMENT OF TRANSPORTATION
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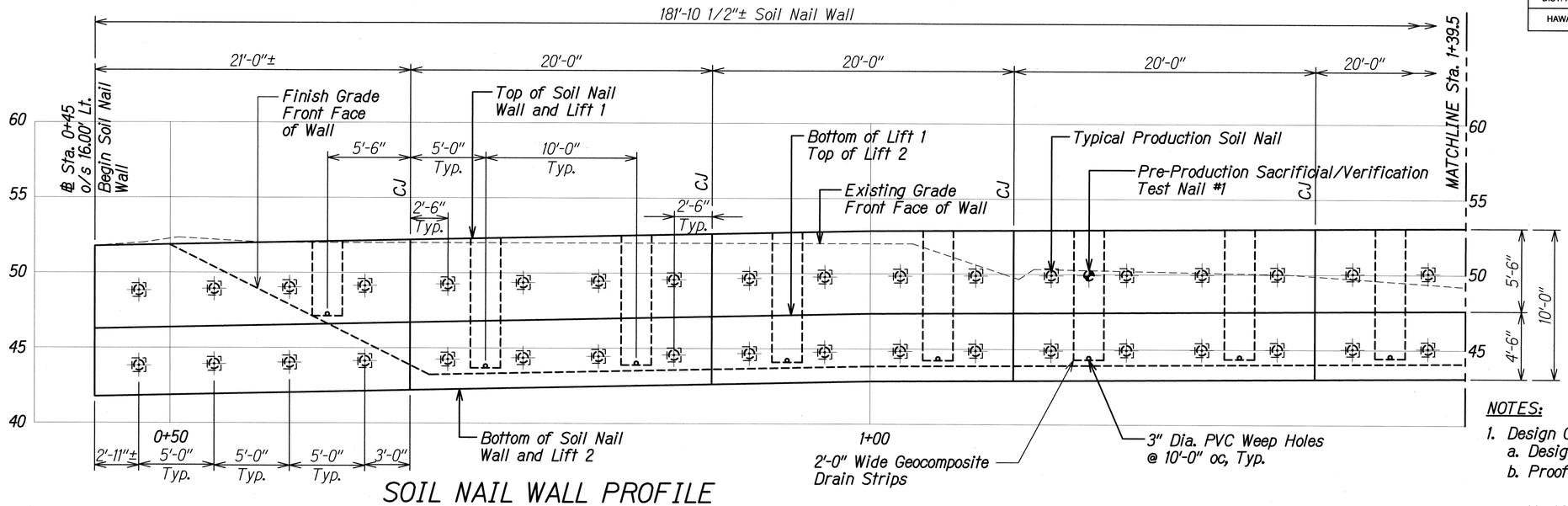
WALER BAR REINFORCING DETAILS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S0.6 OF 6 SHEETS

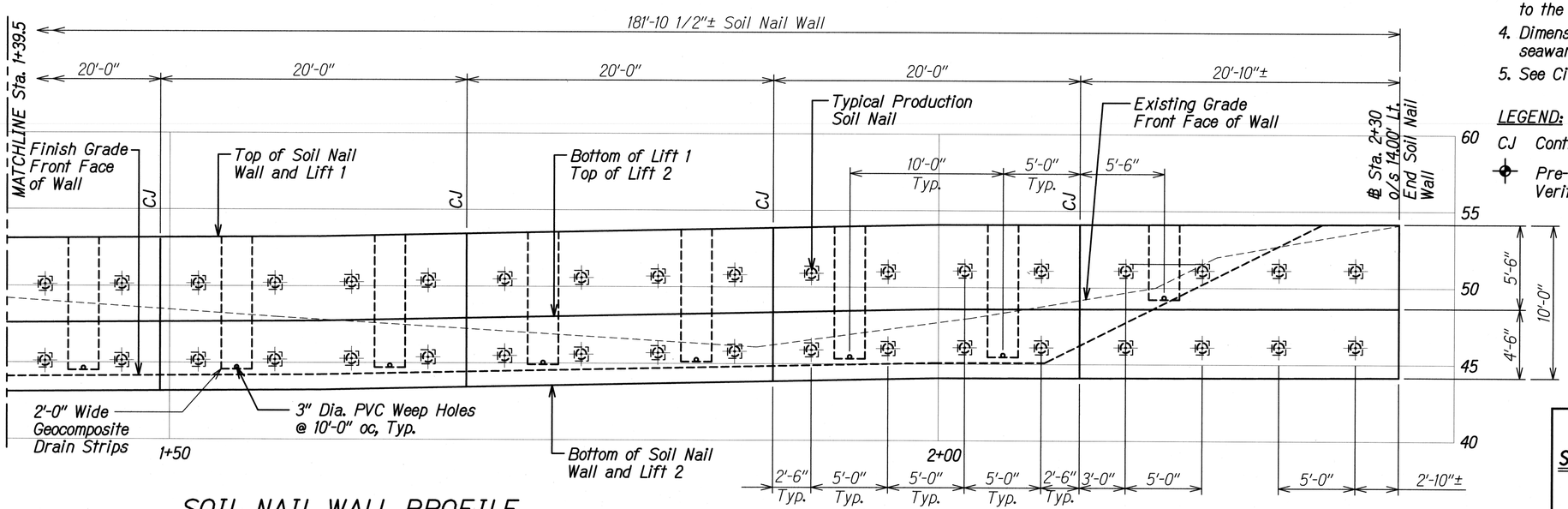
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	45	59



SOIL NAIL WALL PROFILE
MILE POST 8.1 - STA. 0+45 TO 1+39.5

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

A S1.1 | S1.1



SOIL NAIL WALL PROFILE
MILE POST 8.1 - STA. 1+39.5 TO 2+30

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

B S1.1 | S1.1

NOTES:

1. Design Criteria / Definitions:
   a. Design Load = 32 kips
   b. Proof Test Load = 150% x Design Load = 48 kips
   c. Verification Test Load = 200% x Design Load = 64 kips
2. Pre-Production and Production Nails: #10 Threaded Bar
3. Nails shall be drilled at a 20° angle to the horizontal.
4. Dimensions are measured along valley/ seaward side of wall.
5. See Civil Drawings for top of wall elevations

LEGEND:

CJ Control Joint

⌖ Pre-Production Sacrificial/ Verification Test Nail

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SOIL NAIL WALL PROFILE MILE POST 8.1
STA. 0+45 TO 2+30
HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S1.1 OF 3 SHEETS

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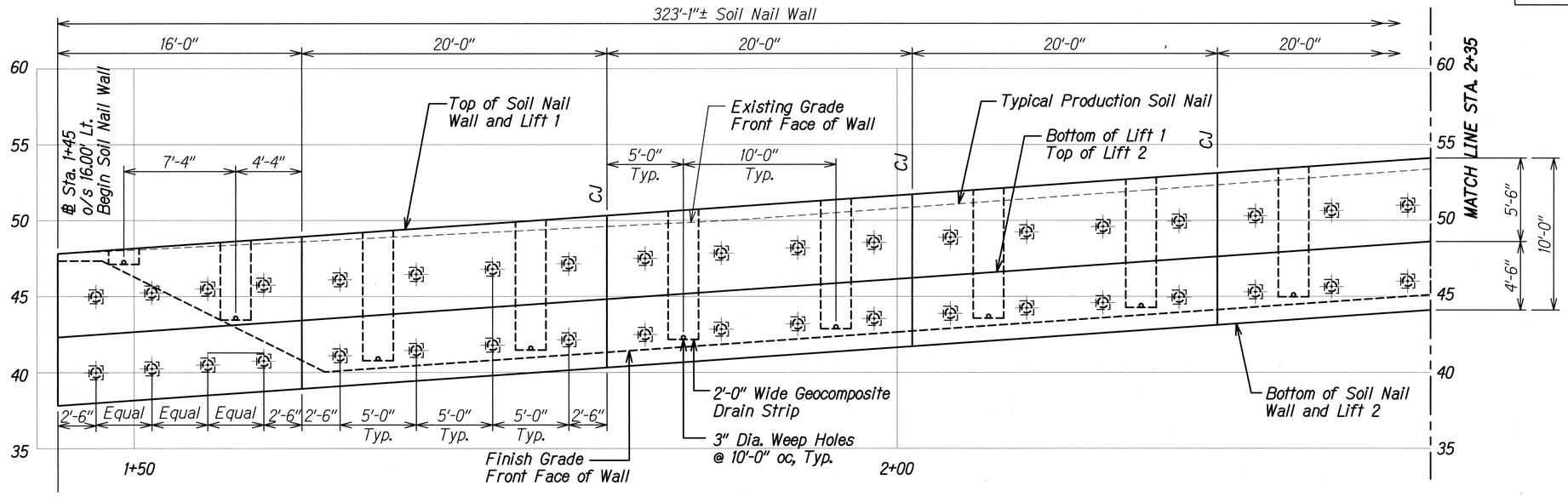
	QUANTITIES BY	
No.	CHECKED BY	

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-28-18 NEW PROJ NO & BDR VELLUM\HH-S101.DWG PLOT TIME: 03-23-18, 3:06 PM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	46	59



SOIL NAIL WALL PROFILE
MILE POST 19.0 - STA. 1+45 TO 2+35

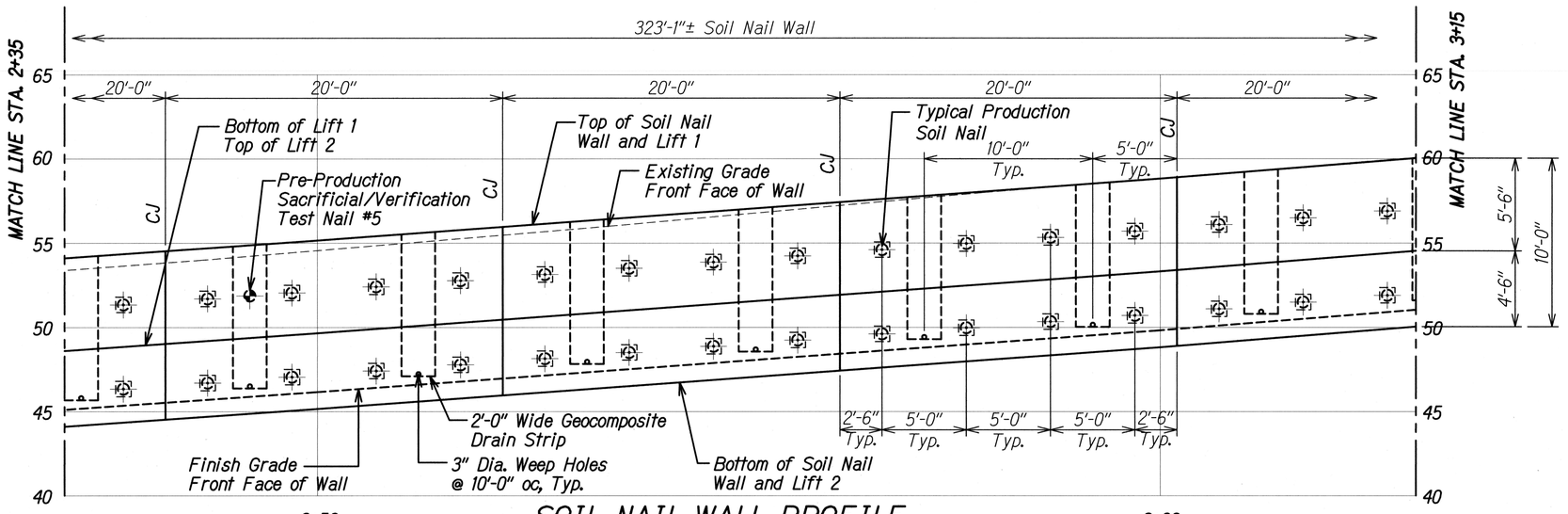
Scale: 1/4" = 1'-0"

A S1.2 | S1.2

LEGEND:

CJ Control Joint

Pre-Production Sacrificial/
Verification Test Nail



SOIL NAIL WALL PROFILE
MILE POST 19.0 - STA. 2+35 TO 3+15

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

B S1.2 | S1.2

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David K. Fujimara — KSF, INC. — APRIL 30, 2020 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SOIL NAIL WALL PROFILE MILE POST 19.0
STA. 1+45 TO 3+15

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

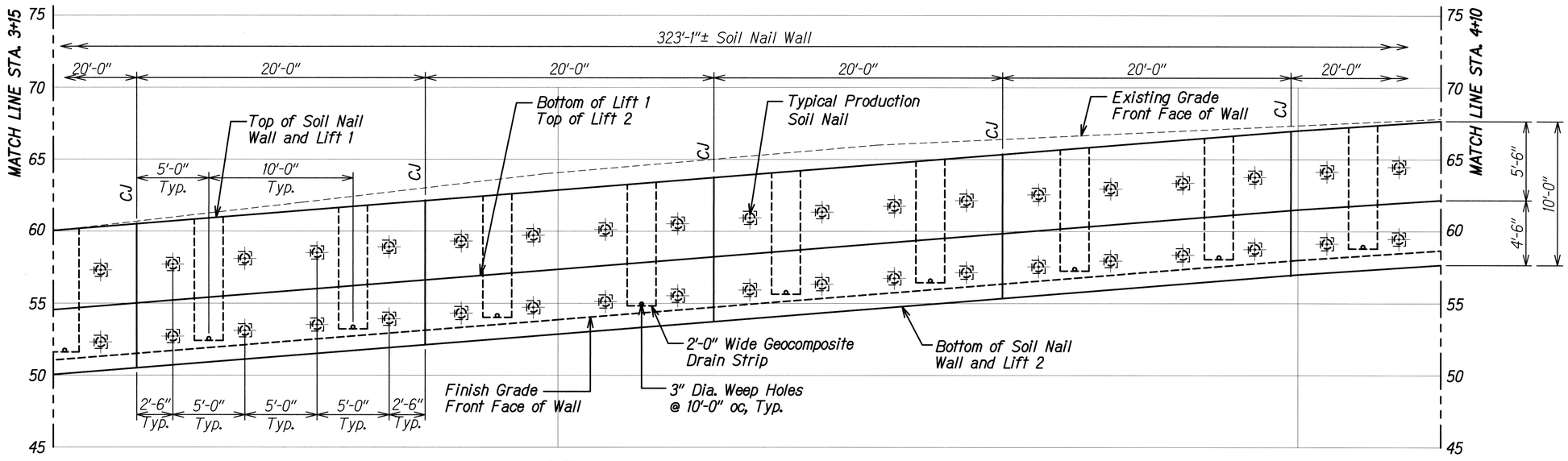
Scale: As Noted Date: March 2018

SHEET No. S1.2 OF 3 SHEETS

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

DRAWING NAME: Z:\00_ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BOR VELLUM\HHI-S102 - S103.DWG PLOT TIME: 03-23-18, 3:07 PM)

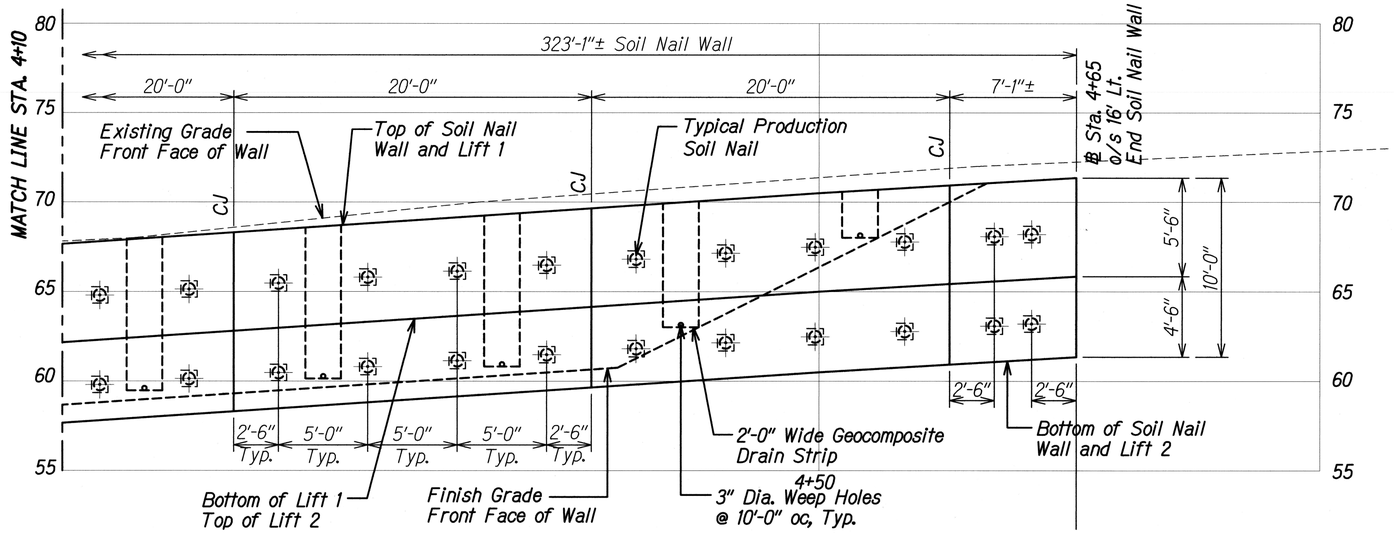
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	47	59



SOIL NAIL WALL PROFILE
MILE POST 19.0 - STA. 3+15 TO 4+10

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

A S1.3 | S1.3



SOIL NAIL WALL PROFILE
MILE POST 19.0 - STA. 4+10 TO 4+65

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

B S1.3 | S1.3

LEGEND:

CJ Control Joint

Pre-Production Sacrificial/ Verification Test Nail

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SOIL NAIL WALL PROFILE MILE POST 19.0
STA. 3+15 TO 4+65

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S1.3 OF 3 SHEETS

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

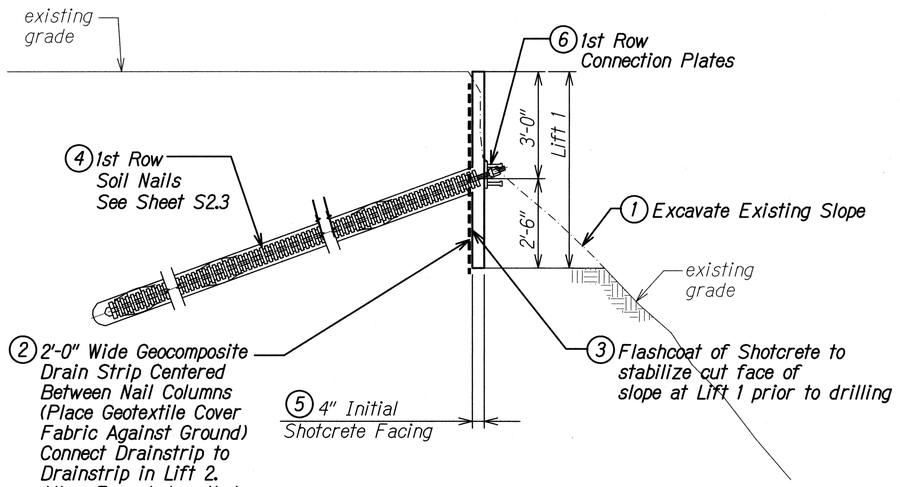
DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WQC\01 CAD\03-26-18 NEW PROJ NO & BDR YELLUM\HHI-S102 - S103.DWG PLOT TIME: 03-23-18, 3:34 PM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	48	59

TYPICAL INITIAL SHOTCRETE SECTION (LIFT 1):

Notes:

1. See B/S2.1 and C/S2.1 for additional details.
2. Contractor may need to apply extra shotcrete as fill in case the face of the cut slope is not vertical.



SECTION - LIFT 1 (A)

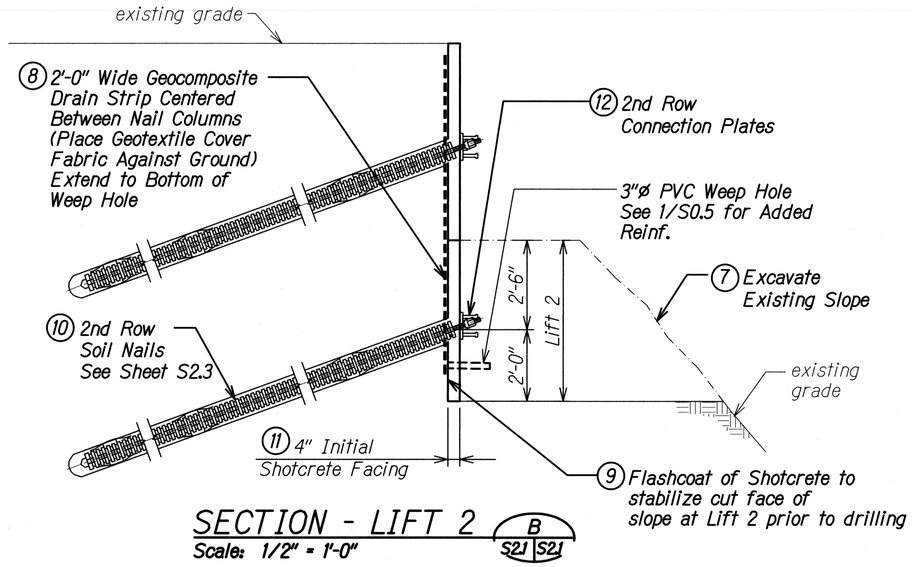
Scale: 1/2" = 1'-0"

S2.1 | S2.1

TYPICAL INITIAL SHOTCRETE SECTION (LIFT 2):

Notes:

1. See A/S2.1 and C/S2.1 for additional details.
2. Contractor may need to apply extra shotcrete as fill in case the face of the cut slope is not vertical.



SECTION - LIFT 2 (B)

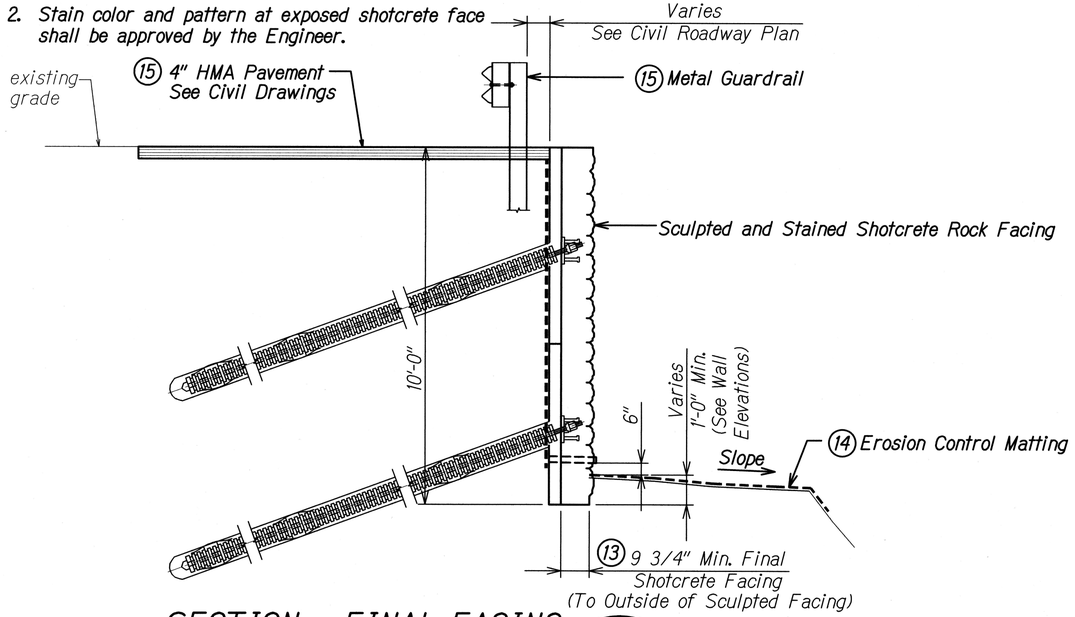
Scale: 1/2" = 1'-0"

S2.1 | S2.1

TYPICAL FINAL SHOTCRETE SECTION:

Notes:

1. See A/S2.1 and B/S2.1 for additional details.
2. Stain color and pattern at exposed shotcrete face shall be approved by the Engineer.



SECTION - FINAL FACING (C)

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

S2.1 | S2.1

CONSTRUCTION SEQUENCE:

1. Excavate to Required 1st Lift
2. Install Geocomposite Drain Strips
3. Apply Flashcoat of Shotcrete
4. Drill, Install, and Grout 1st Row of Soil Nails; Run any necessary Performance/Proof Tests.
5. Place Reinforcing and Apply Lift 1 Initial Shotcrete Facing.
6. Install Studded Connection Plates on 1st Row.
7. Excavate to Required 2nd Lift
8. Extend Geocomposite Drain Strips to Bottom of Wall and install PVC Weep Holes.
9. Apply Flashcoat of Shotcrete
10. Drill, Install, and Grout 2nd Row of Soil Nails; Run any necessary Performance/Proof Tests.
11. Place Reinforcing and Apply Lift 2 Initial Shotcrete Facing.
12. Install Studded Connection Plates on 2nd Row.
13. Place Reinforcing and Apply Final Shotcrete Wall Facing.
14. Regrade Soil at Makai Face of Wall and Lay Erosion Control Matting.
15. Lay HMA Pavement and Then Install Metal Guardrail.

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KSF, INC. — APRIL 30, 2020 LIC. EXP. DATE

STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL SOIL NAIL WALL SECTION
CONSTRUCTION SEQUENCE

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

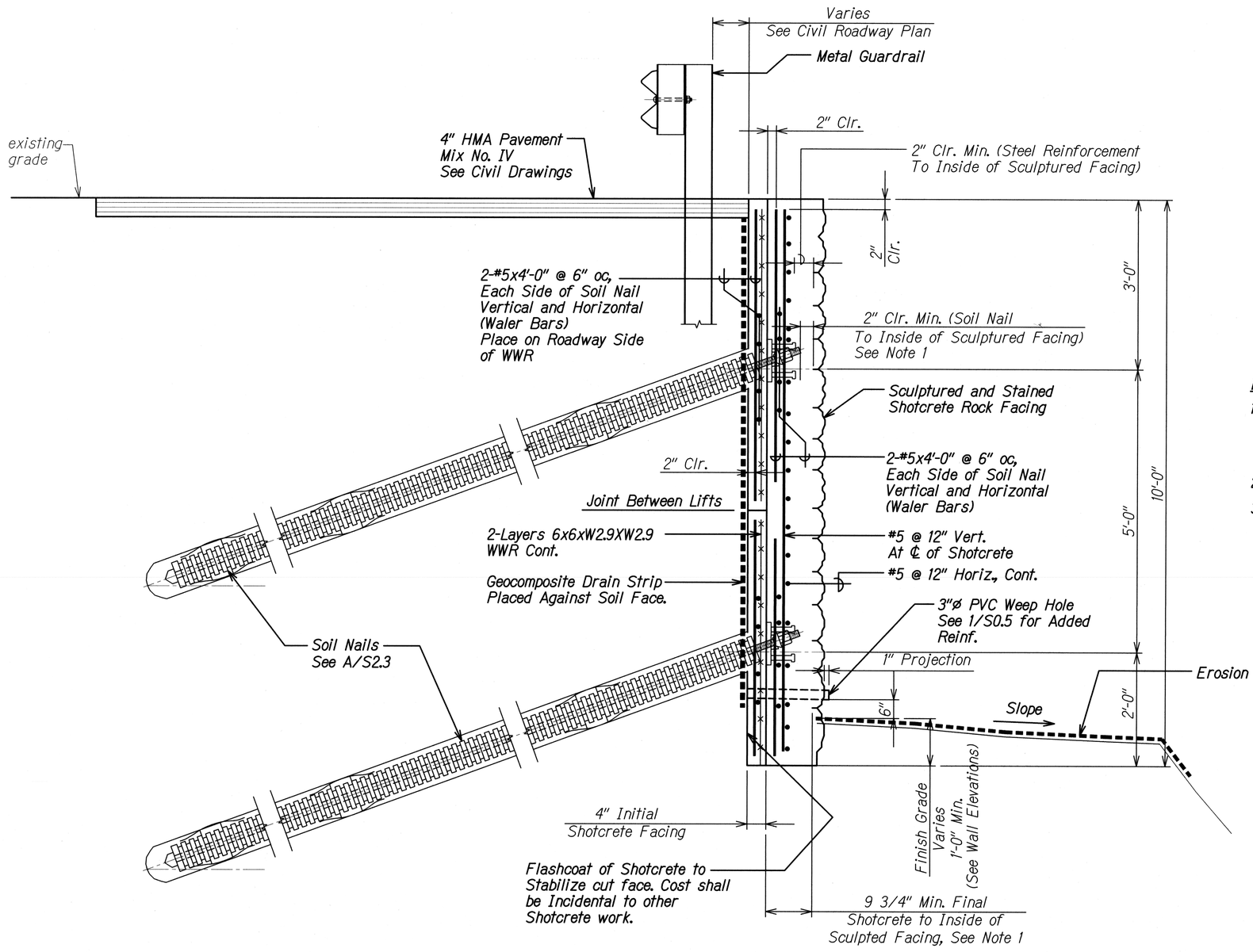
Scale: As Noted — Date: March 2018

SHEET No. S2.1 OF 3 SHEETS

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

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WQC\01 CAD\03-26-18 NEW PROJ NO & BBR VELLUM\HH-S201.DWG PLOT TIME: 03-23-18, 3:05 PM)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	49	59



SOIL NAIL WALL SECTION - REINFORCING DETAIL

A S2.2 | S2.2

Scale: 1" = 1'-0"

Notes:

1. Inside of Sculptured Facing is interpreted as being the point of the greatest groove depth in the relief carving. Wall thickness may be greater in some areas to provide an uneven natural rock look.
2. WWR shall be hot-dip galvanized.
3. Flashcoat of Shotcrete shall be applied after placement of Geocomposite drain strips.

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

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S201.DWG PLOT TIME: 03-23-18, 3:05 PM)

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

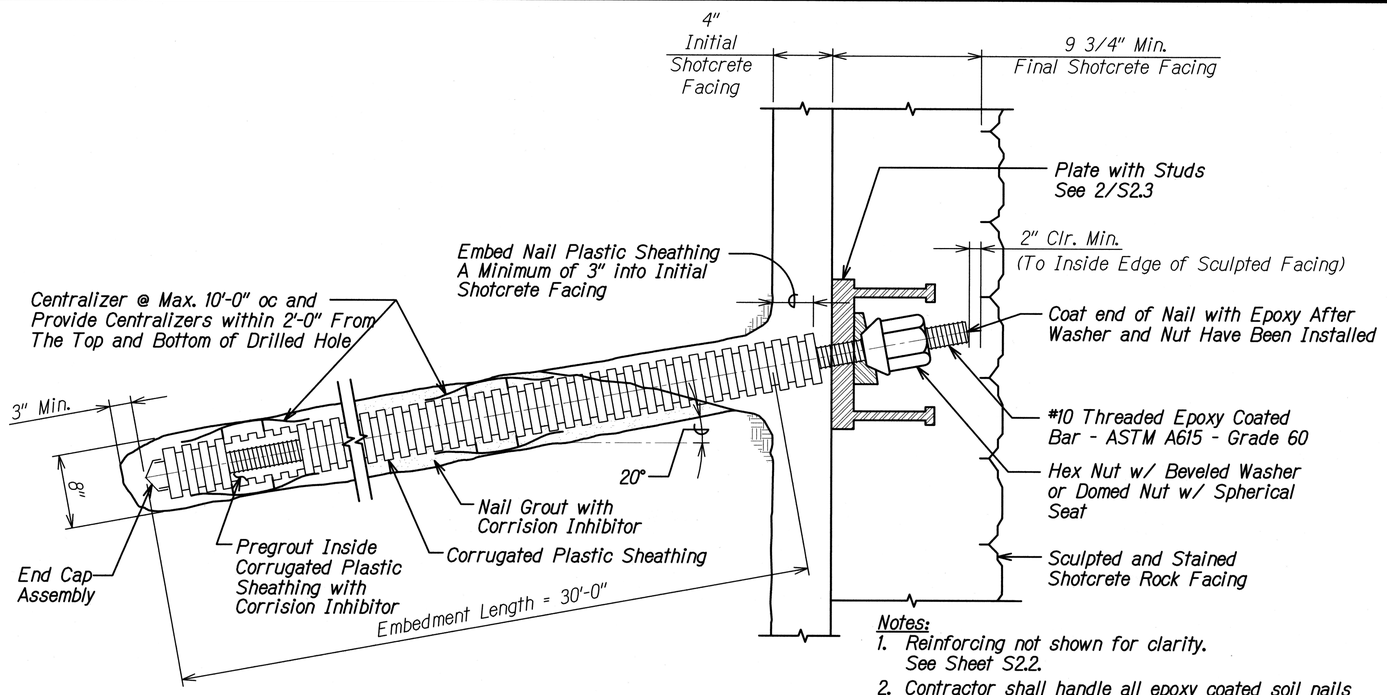
TYPICAL SOIL NAIL WALL SECTION REINFORCING DETAIL

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S2.2 OF 3 SHEETS

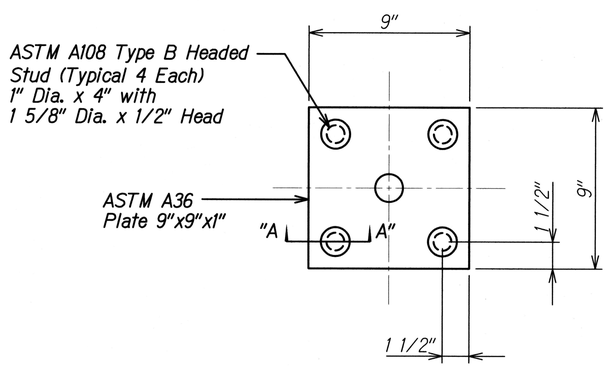
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	50	59



Notes:
1. Reinforcing not shown for clarity. See Sheet S2.2.
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.

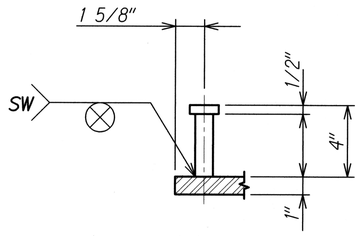
ENCAPSULATED PRODUCTION SOIL NAIL DETAIL (1 S2.3 | S2.3)

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



CONNECTION PLATE WITH STUD DETAIL (2 S2.3 | S2.3)

Scale: 3" = 1'-0"



SECTION "A - A"

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

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STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SOIL NAIL AND CONNECTION PLATE DETAIL

HANA HIGHWAY IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

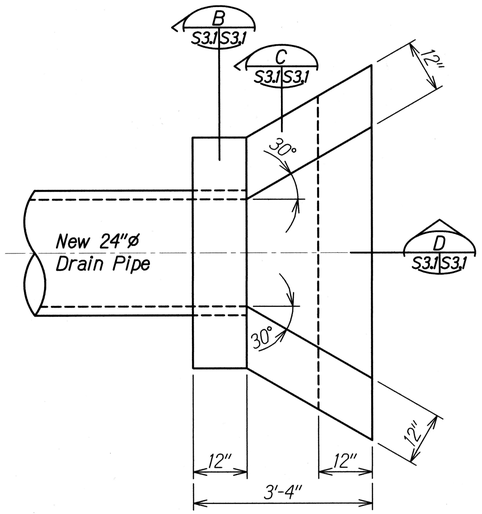
Scale: As Noted — Date: March 2018

SHEET No. S2.3 OF 3 SHEETS

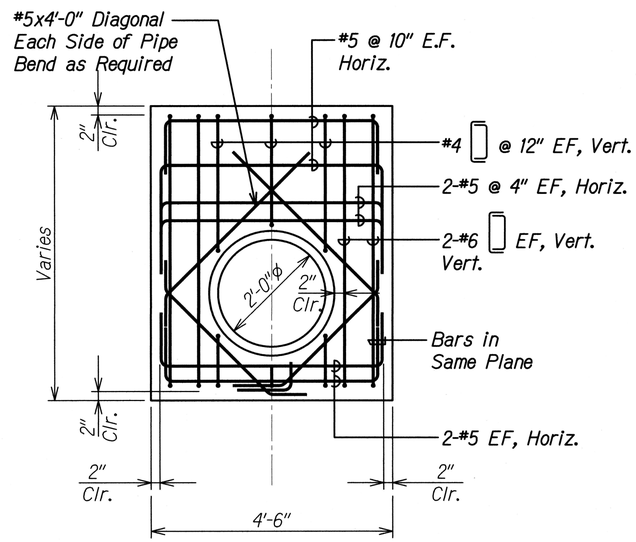
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

DRAWING NAME: Z:\00 ONGOING\12-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WOC\01 CAD\03-26-18 NEW PROJ NO & BDR KELLUM\HHI-S203.DWG PLOT TIME: 03-23-18, 3:05 PM)

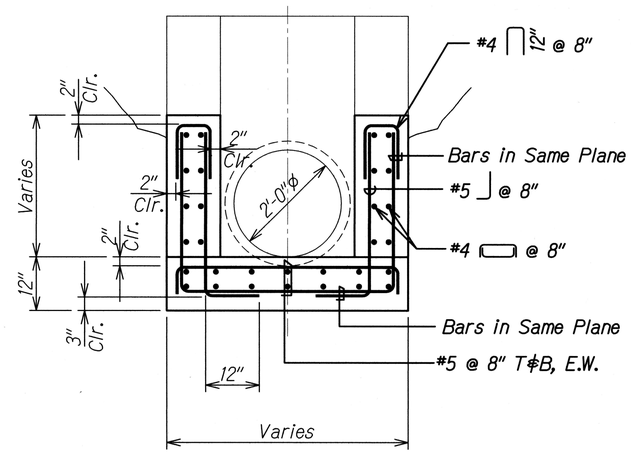
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360AB-01-18	2018	51	59



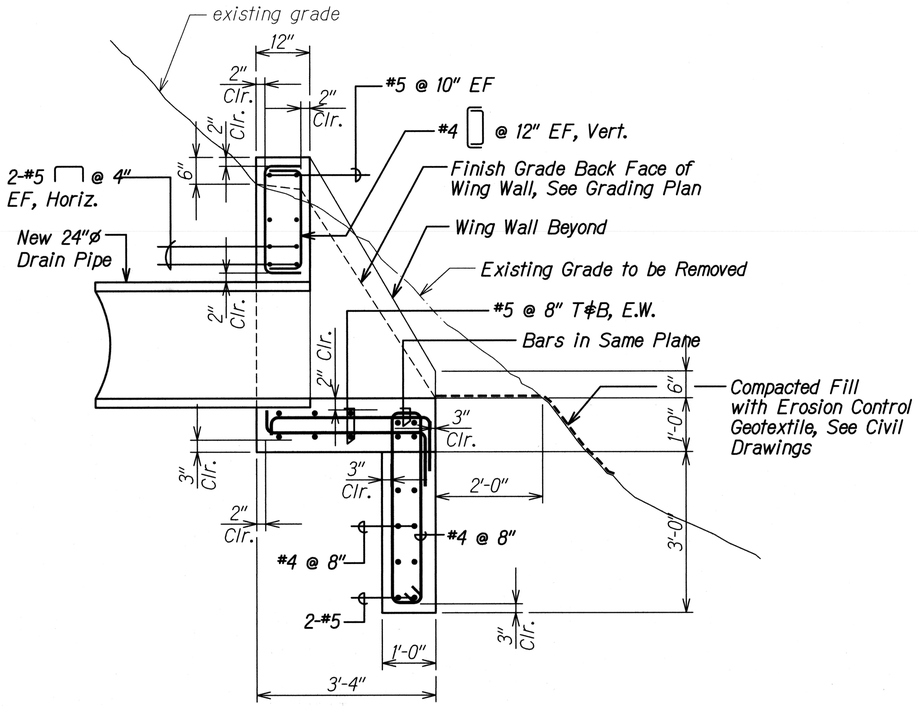
OUTLET PLAN (A S31 S31)
Scale: 3/4" = 1'-0"



OUTLET SECTION (B S31 S31)
Scale: 3/4" = 1'-0"



HEADWALL SECTION (C S31 S31)
Scale: 3/4" = 1'-0"



OUTLET SECTION (D S31 S31)
Scale: 3/4" = 1'-0"

Note:
Outlet structure located at M.P. 8.1 at Approx. Sta. 2+86.50.

DRAWING NAME: Z:\DO ONGOING\2-027.2 HANA HWY IMPR PH2C MP8.1 MP19 PD-WCC\01 CAD\03-26-18 NEW PROJ NO & BDR VELLUM\HHI-S301.DWG PLOT TIME: 03-23-18, 3:06 PM)

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

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

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KSF, INC. APRIL 30, 2020 LIC. EXP. DATE

STATE OF HAWAI'I
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HIGHWAYS DIVISION

OUTLET PLAN AND SECTIONS

HANA HIGHWAY
IMPROVEMENTS, PHASE 2C
Huelo to Hana
Project No. 360AB-01-18

Scale: As Noted Date: March 2018

SHEET No. S31 OF 1 SHEETS