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HI	HI STP SR 30(1)	S1

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RG3103-E	S5	STRUCTURAL GENERAL NOTES
RG3103-F	S6	STRUCTURAL GENERAL NOTES
RG3103-G	S7	FOUNDATION PLAN
RG3103-H	S8	BORING LOG LEGENDS AND NOTES
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4-30-18

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

INDEX TO STRUCTURAL DRAWINGS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	NO SCALE	D. FUJIWARA	1 of 103	JUNE 1, 2017	RG3103-A

DRAWING NO.: FINAL DESIGN

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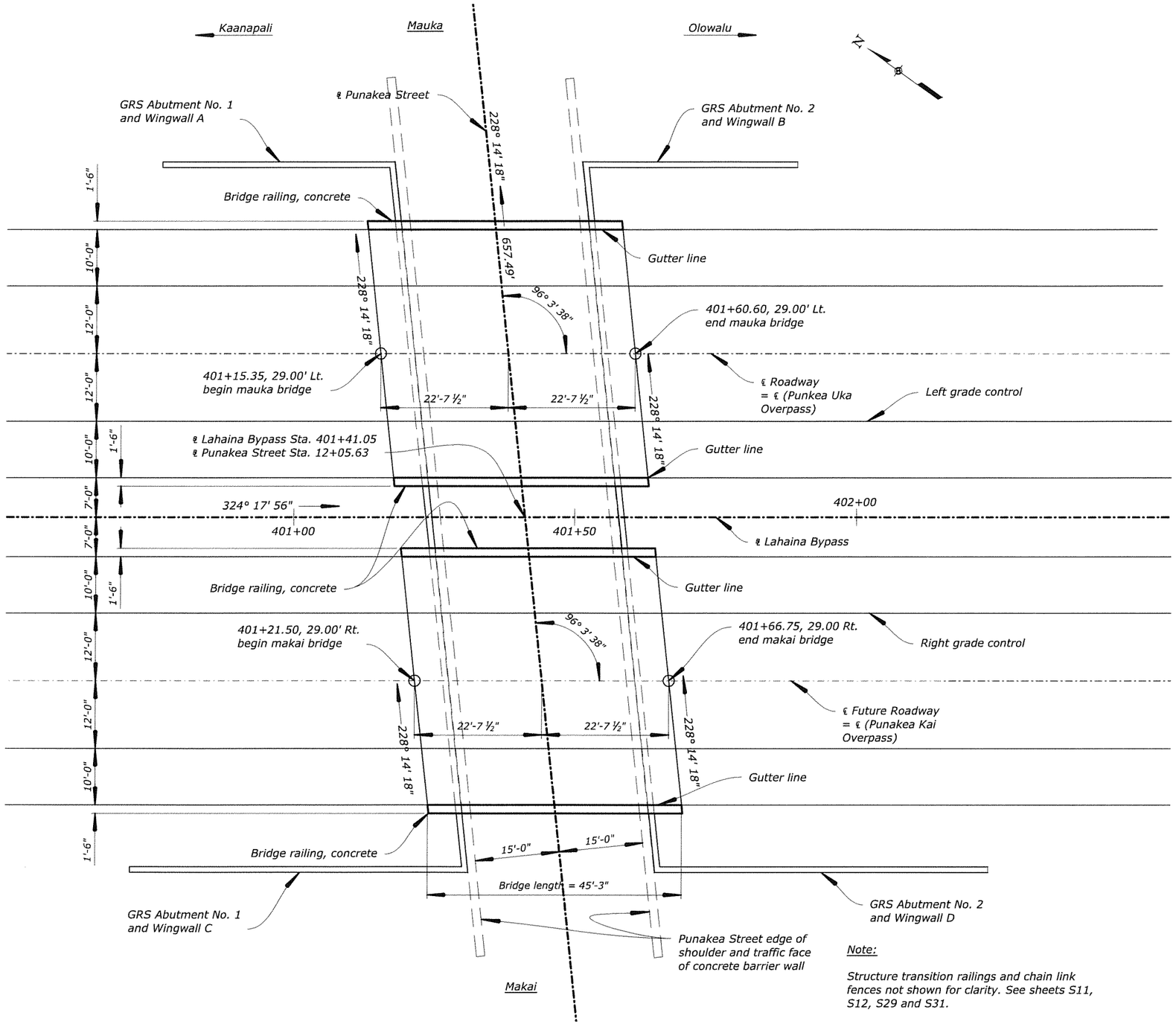
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S2



Note:

Structure transition railings and chain link fences not shown for clarity. See sheets S11, S12, S29 and S31.

BRIDGE PLAN

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Eric Y. Matsumoto — 4-30-18

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BRIDGE PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=20'-0"	D. FUJIWARA	2 of 103	JUNE 1, 2017	RG3103-B

DRAWING NO.: FINAL DESIGN

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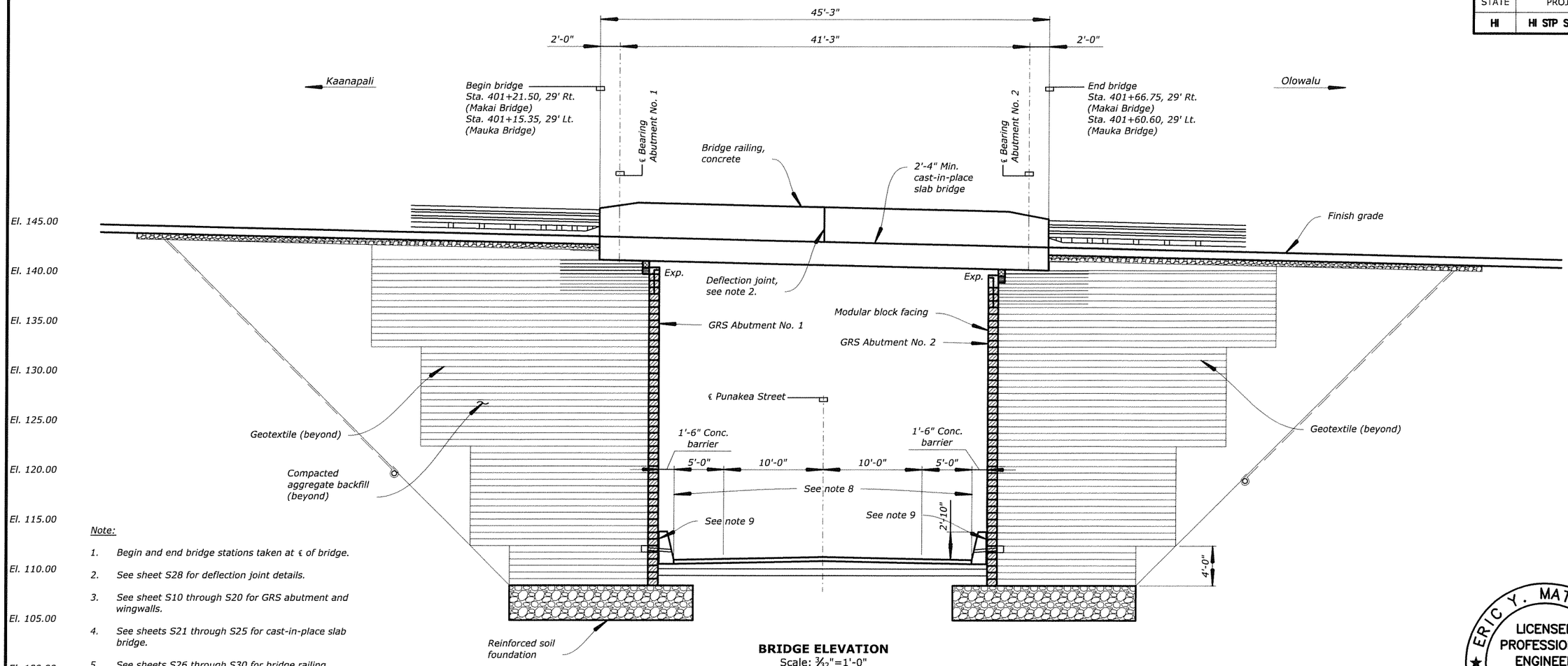
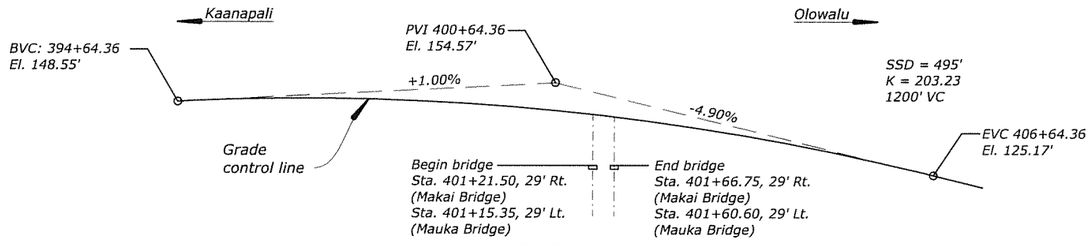
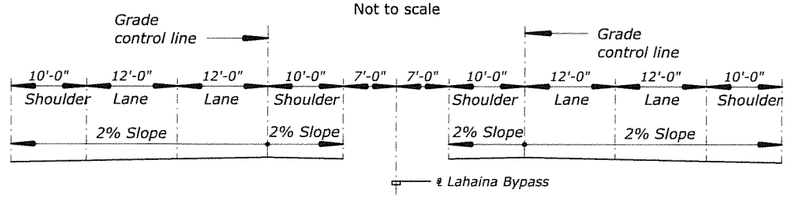
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S3



BRIDGE ELEVATION
Scale: $\frac{3}{32}$"=1'-0"



PROFILE GRADE DIAGRAM
Not to scale



TYPICAL ROADWAY SECTION
Not to scale

Note:

1. Begin and end bridge stations taken at ℄ of bridge.
2. See sheet S28 for deflection joint details.
3. See sheet S10 through S20 for GRS abutment and wingwalls.
4. See sheets S21 through S25 for cast-in-place slab bridge.
5. See sheets S26 through S30 for bridge railing, concrete.
6. Wingwalls are not shown for clarity.
7. See sheet S7 for reinforced soil foundation plan.
8. Lane, shoulder and concrete barrier dimensions are measured perpendicular to centerline Punakea street.
9. 1" Premolded joint filler between concrete barrier and GRS abutment facing. See sheet S33.
10. See sheets S31 through S34 for Punakea Street concrete barrier and end post.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BRIDGE ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	3 of 103	JUNE 1, 2017	RG3103-C

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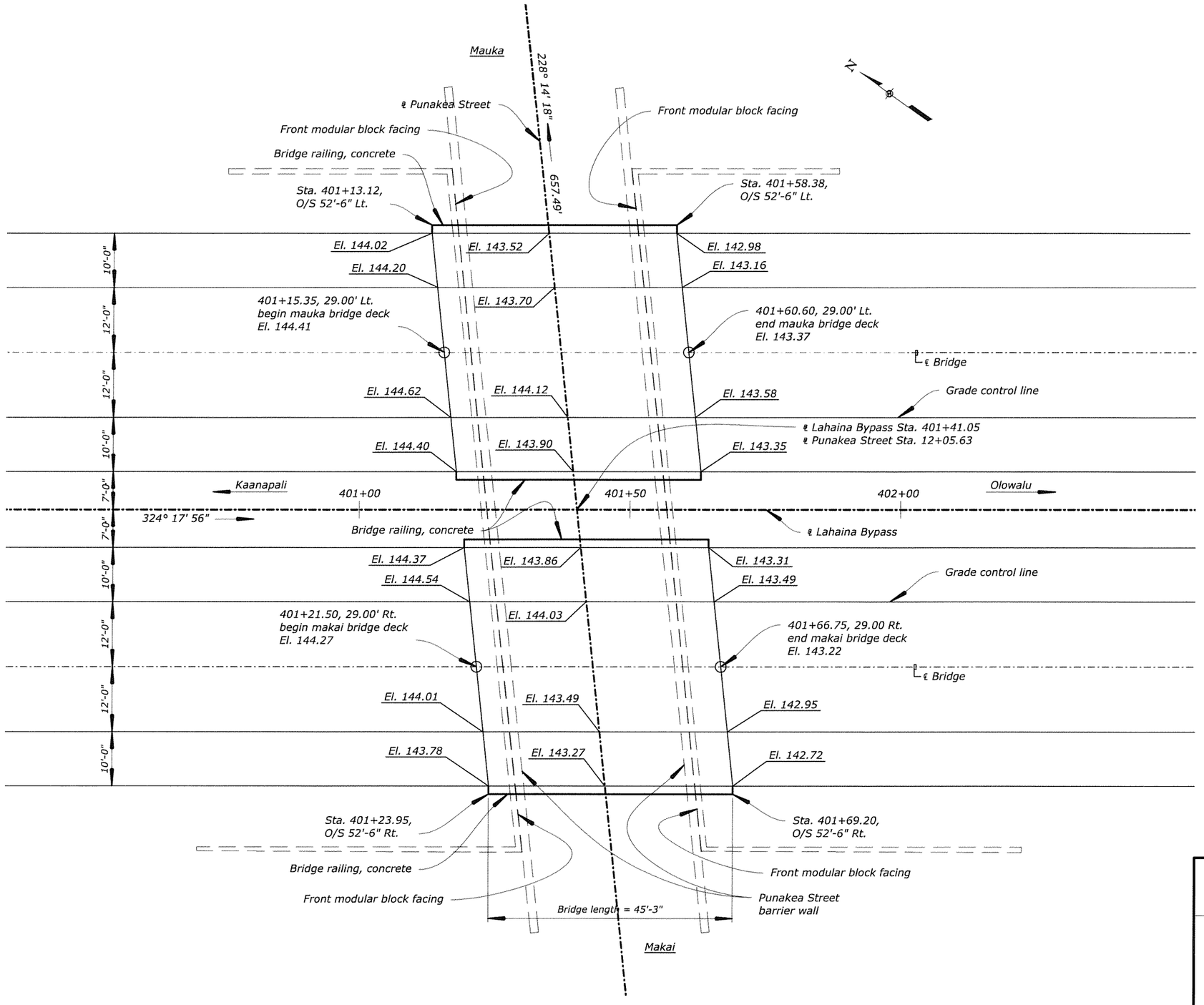
DRAWING NO.: FINAL DESIGN

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S4



FINISH DECK GRADING PLAN

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

FINISH DECK GRADING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=20'-0"	D. FUJIWARA	4 of 103	JUNE 1, 2017	RG3103-D

DRAWING NO.: FINAL DESIGN

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STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S5

STRUCTURAL GENERAL NOTES

1. GENERAL SPECIFICATIONS:

A. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-14, and the Special Contract Requirements (SCR) prepared for this contract.

2. DESIGN SPECIFICATIONS:

A. American Association of State Highway and Transportation Officials (AASHTO) 2014 LRFD Bridge Design Specifications, 7th Edition, including the 2015 and 2016 interim revisions and the Hawaii Department of Transportation (HDOT) document dated August 8, 2014 with subject title "Design Criteria for Bridges and Structures".

3. GENERAL:

A. Structural general notes apply to the structural plans unless otherwise noted.

4. LOADS:

A. Dead Loads: Concrete self weight assumed to be 160 pcf.

B. Live Load: AASHTO HL-93 Loading.

C. Seismic Loads:
In accordance with AASHTO LFRD Bridge Design Specifications, 7th edition 2014. Peak Ground Acceleration (PGA = 0.2332g), modified by the Site Coefficient (F_{PGA} = 1.17) to give a spectrum acceleration, A_S = 0.274g. Short period acceleration at 0.2 seconds (S_S = 0.5326g) modified by the site coefficient (F_a = 1.19) to give the short period spectrum acceleration, S_{DS} = 0.6321g. Long period acceleration at 1.0 seconds (S_1 = 0.1534g) modified by the Site Coefficient (Fv = 1.65) to give the long period spectrum acceleration, S_{D1} = 0.2526g. Site Class = C. Seismic Zone = 1.

D. Future Utility Load: An allowance of 150 plf on each side of bridge for utility loads has been provided for in the design.

E. Railing Test Level: TL-4

F. Wind: Base Design Wind Velocity = 105 MPH

G. Future wearing surface: 25 psf curb to curb

5. MATERIALS:

A. All concrete strengths shall be as noted below:

Item No.	Structural Parts	Classes of Concrete	Compressive Strength f'c (28 Days)	Maximum Water Cement (W/C)	Maximum Cement Content (lbs/cyd)
(1)	Concrete deck	E	6000 psi	0.40	670
(2)	Bridge railings, concrete barriers, end posts, box culvert, cutoff wall and wingwall	D	5000 psi	0.40	670
(3)	All others, except as otherwise noted	A	4500 psi	0.45	625

B. A shrinkage reducing admixture (SRA), (See SCR 711.03(b)) shall be added to the concrete mix for item numbers (1) and (2) under note 5.(A). The minimum dosage requirement shall be one gallon per cubic yard of concrete.

C. A migrating corrosion inhibitor amine carboxylate water-based admixture (See SCR 711.03(a)) shall be added to all concrete mix for item numbers under note 5.(A). The minimum dosage requirement shall be 1 ½ pints per cubic yard of concrete.

D. Concrete for item (1) under note 5.A. shall contain 13 lbs./cyd of alkali resistant glass macrofiber. The fiber shall be 1-1/2" long minimum and shall have an aspect ratio of 67.

E. The use of any calcium chloride in any concrete is prohibited.

F. Reinforcing steel shall be American Society of Testing and Materials (ASTM) A615, Grade 60, deformed bars unless otherwise noted. Where welded connections are required, reinforcing steel shall be ASTM A706 grade 60 deformed bars.

G. Bonding agent shall be a three-component, preproportioned, anti-corrosion, water-based, epoxy-modified portland cement bonding agent. Bond strength shall exceed 2,400 psi in accordance with ASTM C882.

5. **MATERIALS:** (Continued)

H. Structural steel:

(1) All structural steel shapes and plates shall conform to ASTM A 36 hot-dip galvanized, unless otherwise noted.

(2) All anchor bolts, threaded rods, and other hardware, including nuts and washers, which connect steel to concrete shall be high-strength bolts conforming to ASTM F1554, Grade 105, unless otherwise noted.

(3) All structural steel shapes and plates shall be ASTM A123 Hot-Dipped galvanized after fabrication. Bolts, anchor bolts, nuts, and washers shall be ASTM A153 Hot-Dip galvanized.

(4) All welds shall be in conformity with the structural welding code AWS D1.1 or AWS D1.5. Electrodes shall be E70.

I. Expanded polystyrene shall be Type XI EPS per ASTM C578 with density of 0.70 lb/cu ft. and a maximum compressive resistance of 5 psi at 10% deformation.

J. Premolded joint filler shall be ASTM D1751 with a minimum compressive strength of 100 psi at 50% deformation.

6. REINFORCEMENT:

A. The covering measured from the surface of the concrete to the face of any reinforcing bars shall be as follows, except as otherwise shown:

(1) Top of deck slab = 2 ¾"
Bottom of deck = 1 ½"

(2) Bridge railings, concrete barriers and end posts = 2"

(3) Box culvert
(a) Top slab top reinforcing = 2"
(b) Top slab bottom reinforcing = 2"
(c) Walls = 2"
(d) Bottom slab top reinforcing = 2"
(e) Bottom slab bottom reinforcing = 3"

(4) Concrete cast against and permanently exposed to earth = 3"

(5) All others unless otherwise noted = 2"

B. Reinforcing bars shall be detailed in accordance with the latest edition of the American Concrete Institute (ACI) Detailing Manual unless otherwise noted.

C. Unless otherwise noted, reinforcing splices shall be staggered. Minimum distance between staggered lap splice shall be equal to the length required for the lap splice. Number of bars spliced at sections normal to axis of member shall not exceed 33 percent of the total main reinforcing steel in the member.

D. Minimum lap splice length for steel reinforcing shall be 40 bar diameters or 2'-0", whichever is greater, unless otherwise noted. Increase lap length by multiplying the minimum lap splice length by 1.3 for bars having more than 12" concrete below bars.

E. Minimum clear spacing between parallel bars in a horizontal or vertical layer shall be 1 1/2 times the maximum size of the coarse aggregate or 1 1/2", whichever is greater. Bundled bars shall be in close contact for the length of the bundles.

F. All dimensions relating to reinforcing bars are to centers of bars unless otherwise noted.

G. 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.

H. Dissimilar metals shall be separated at contact points using teflon tape.

I. Strands for prestressing shall be Grade 270, seven wire, low relaxation type conforming to ASTM A416.

J. Glass Fiber Reinforced Polymer (GFRP) reinforcing bars shall have a minimum elastic modulus of 8,800,000 psi and shall have a guaranteed minimum tensile strength of 141 ksi for #4 bar, 163 ksi for #5 bar, and 150 ksi for #6 bar.

K. Tie wire used for GFRP reinforcing shall be alloy 302 or 304 stainless steel or non-metallic.

L. All work for GFRP bars including materials and bends shall follow manufacturer's recommendations.

M. GFRP bars may be cut in the field with a masonry or diamond blade.

N. Smooth GFRP dowels shall be Hughes Brothers Aslan 600 GFRP dowels or approved equal.

O. Minimum lap length for GFRP reinforcing shall be 42 bar diameter or 2'-6", whichever is greater, unless otherwise noted.

7. CONSTRUCTION NOTES:

A. See FP-14 and Special Contract Requirements.

B. The contractor shall verify all dimensions and site conditions and shall report any discrepancies in writing to the Contracting Officer (CO) before commencing work or ordering materials.

C. The contractor shall be solely responsible for the protection of adjacent properties, utilities and existing and new structures from damage due to construction.

D. The contractor shall verify the location of all utility lines and notify the respective owners before commencing with excavation, and any temporary piling or sheeting.

E. All vertical dimensions are measured plumb, unless otherwise noted.

F. Construction joints may be relocated or additional ones added subject to the approval of the CO.

G. All exposed concrete edges shall be chamfered 3/4" x 3/4", unless otherwise noted.

H. Class 2 rubbed surface finish shall be applied to the surfaces of all new concrete railings, concrete barriers and walls to at least 12 inches below finished ground.

I. Location of drilled holes shown in plans are approximate. Prior to placing holes in concrete, the contractor shall locate all reinforcing steel and adjust the location of the holes to clear all reinforcing bars. Final hole locations are subject to the approval of the CO.

J. Construction joints between separate pours shall not be feather edged. All joints shall be made square and vertical for the entire thickness of the new pour prior to pouring, except as directed by the CO.

K. Construction joints shall be roughened to ¼" amplitude.

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Eric Y. Matsumoto 4-30-18
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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STRUCTURAL GENERAL NOTES

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	NO SCALE	D. FUJIWARA	5 of 103	JUNE 1, 2017	RG3103-E

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DRAWING NO.: FINAL DESIGN

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S6

STRUCTURAL GENERAL NOTES (CONTINUED)

8. FOUNDATION NOTES: For Punakea Uka Overpass and Punakea Kai Overpass

A. Foundation design entitled "Geotechnical Engineering Exploration is based on the report prepared by Geolabs, Inc., Lahaina Bypass, Phase 1B-2, Lahaina, Maui, Hawaii" dated May 23, 2017.

B. Unless otherwise indicated, refer to FP-14 and SCRs for foundation preparation, compaction requirements, and other requirements.

C. Soil Design Parameters

(1) Soil bearing pressures
Extreme Event Limit State = 24,000 psf
Strength Limit State = 10,000 psf
Service Limit State = 8,000 psf

(2) Coefficient of Friction
Extreme Event Limit State = 0.45
Strength Limit State = 0.36

(3) Passive earth pressure
(a) Extreme event limit state = 300 pcf
(b) Strength limit state = 150 pcf

(4) Static lateral earth pressure
Backfill condition: Level backfill above water
(a) Active = 30 pcf
(b) At-rest = 48 pcf

(5) Dynamic lateral earth pressure
(a) Lateral movement of 1 in. $5.1\ H^2$ lbs/ft

(6) Geosynthetic reinforced soil
(a) Reinforced fill friction angle 38 degrees
(b) Reinforced fill unit weight 135 lb/ft

9. FOUNDATION NOTES: For Culverts

A. Foundation design entitled "Geotechnical Engineering Exploration is based on the report prepared by Geolabs, Inc., Lahaina Bypass, Phase 1B-2, Lahaina, Maui, Hawaii" dated May 23, 2017.

B. Unless otherwise indicated, refer to FP-14 and SCRs for foundation preparation, compaction requirements, and other requirements.

C. Soil Design Parameters

(1) Box Culvert

(a) Lateral earth pressures
Active:
Level backfill above water = 30 pcf
Level backfill below water = 77 pcf
At rest:
Level backfill above water = 48 pcf
Level backfill below water = 87 pcf

(b) Soil bearing pressures
Extreme event limit state = 12,000 psf
Strength limit state = 5,000 psf
Service limit state = 4,000 psf

(2) New end post and wingwall foundations

(a) Soil bearing pressures
Extreme limit state = 12,000 psf
Strength limit state = 5,000 psf
Service limit state = 4,000 psf

(b) Coefficient of friction
Extreme limit state = 0.45
Strength limit state = 0.36

(c) Passive Earth pressure = On site clayey silt
Extreme limit state = 300 pcf
Strength limit state = 150 pcf

(d) Active pressure
Level backfill above water = 30 pcf
Level backfill below water = 77 pcf

Note: Lateral earth pressure does not account for the reduction due to the Geosynthetic reinforcement.

(e) Dynamic lateral Earth forces - Level backfill, unrestrained
1" Lateral movement $5.1H^2$ lbs/ft

10. GEOSYNTHETIC REINFORCED SOIL: For Punakea Uka Overpass and Punakea Kai Overpass

1. Geosynthetic Reinforcement Placement:
Pull the geosynthetic taut to remove any wrinkles and lay flat prior to placing and compacting the backfill material. Splices shall be staggered with minimum 24 inch overlap and splices are not allowed in the bearing reinforcement zone. No equipment is allowed directly on the geosynthetic. Place a minimum 6-inch layer of granular fill prior to operating only rubber tired equipment over the geosynthetic at speeds less than 5 miles per hour with no sudden braking or sharp turning. The geosynthetic reinforcement shall extend between layers of modular block to provide a frictional connection.

2. Reinforced Soil Foundation (RSF) Construction:
The RSF shall be encapsulated in geotextile reinforcement on all sides with minimum overlaps of 5.0 feet. Wrapped corners shall be tight without exposed soil. Compact backfill material in lifts less than 6-inches in compacted height. Grade and level the top of the RSF prior to final encapsulation, as this layer will serve as the leveling pad for the modular blocks of the GRS abutment.

3. GRS Wall Face Alignment:
Check for level alignment of the modular block row at least every other layer of the GRS abutment. Correct any alignment deviations greater than 0.25 inches. Check vertical GRS wall for plumbness at least every other layer and correct any deviations greater than 0.25 inches.

4. Integrated Approach Placement:
Following the placement of the superstructure, geotextile reinforcement layers are placed along the back of the superstructure, built-in maximum lift heights of 6-inches (maximum vertical reinforcement spacing 12-inches). The top of the final wrap shall be approximately 2-inches below the top of the superstructure to allow at least 2-inches of aggregate base cover over the geosynthetic to protect it from hot mix asphalt.

MODULAR BLOCK FACING ELEMENT
Compressive strength = 4,000 psi minimum
Water absorption limit = 5%
Block dimensions = See sheet S8.1
Note: modular blocks shall be hollow core, split face and solid corner block conforming to ASTM C90 with the modification that the blocks have a minimum compressive strength of 4,000 psi and a maximum water absorption limit of 5%.

REINFORCED BACKFILL GRADATION

Reinforced Backfill Gradation = Use backfill materials in accordance with SCR 704.03 (c).

GEOSYNTHETIC REINFORCEMENT PROPERTIES

Required ultimate tensile strength = 4,800 lb/ft in accordance with ASTM D 4595 for bioaxial geotextile.
Minimum tensile strength of geotextile at 2% strain = 960 lb/ft.

11. LOAD RATING:

A. New governing load rating results as follows:

For Punakea Uka Overpass and Punakea Kai Overpass		Rating Factor	Distribution Factor	Load Effect	Controlling Member
Design	HL-93 Inventory	1.93	0.081	Pos. M	Slab
	HL-93 Operating	2.50	0.081	Pos. M	Slab

For Sta. 422+02		Rating Factor	Distribution Factor	Load Effect	Controlling Member
Design	HL-93 Inventory	1.41	0.08	Neg. M	Slab
	HL-93 Operating	1.83	0.08	Neg. M	Slab

For Sta. 434+30		Rating Factor	Distribution Factor	Load Effect	Controlling Member
Design	HL-93 Inventory	1.41	0.08	Neg. M	Slab
	HL-93 Operating	1.82	0.08	Neg. M	Slab

For Sta. 482+12		Rating Factor	Distribution Factor	Load Effect	Controlling Member
Design	HL-93 Inventory	1.32	0.07	Neg. M	Slab
	HL-93 Operating	1.72	0.07	Neg. M	Slab

PUNAKEA UKA OVERPASS AND PUNAKEA KAI OVERPASS ESTIMATE

Bid Item Number	Item Description	Quantities	Unit	Notes
20435-2000	Granular backfill material	8,800	CY	-
20801-0000	Structure excavation	3,516	CY	-
20803-0000	Structure backfill	50	CY	-
55204-1000	Structural concrete, class state DOT (class D)	19	CY	-
55204-2000	Structural concrete, class state DOT (class E)	390	CY	-
55303-0000	Prestressing system	LPSM	LPSM	-
55401-1000	Reinforcing steel	93,556	LB	-
55601-0500	Bridge railing, concrete	182	LNFT	(1) (4)
57401-0000	GRS-IBS Geosynthetic reinforcement	44,778	SQYD	-
57403-0000	GRS-IBS Concrete masonry unit	1142	SQYD	-
58401-1000	Glass fiber reinforced polymer reinforcing	980	LBS	-
61707-0000	Structure transition railing	100	LNFT	(3)
61801-0000	Concrete barrier	314	LNFT	(1) (2) (4) (6)

CULVERT ESTIMATE

Bid Item Number	Item Description	Quantities	Unit	Notes
20720-0400	Reinforcement, Geosynthetic, Type 4	4330	SQYD	-
20801-0000	Structure excavation	3540	CUYD	-
20803-0001	Structure backfill	3130	CUYD	-
55204-1000	Structural concrete, class state DOT (class D)	1593	CUYD	(2) (5) (6)
55401-1000	Reinforcing steel	380,000	LB	-
55401-2000	Reinforcing steel, epoxy coated	1736	LB	-
55601-0500	Bridge railing, concrete	20	LNFT	(1) (4)
58401-0000	Glass fiber reinforced polymer reinforcing	4180	LB	-
61707-0000	Structure transition railing	50	LNFT	(3)

ESTIMATE NOTES:

(1) Includes costs of structural concrete and rebar.

(2) Includes costs of furnishing and installing weepholes.

(3) Includes costs of furnishing and installing posts, blocks, thrie and W-beam rail elements, anchor plates, and installation hardware.

(4) End post barrier, including curbs, shall be paid for in item no. 55601-0500.

(5) Includes costs of box culverts, wingwalls, cutoff walls, headwalls, and retaining walls.

(6) Includes cost of smooth GFRP dowels.

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE 4-30-18 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STRUCTURAL GENERAL NOTES

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	NO SCALE	D. FUJIWARA	6 of 103	JUNE 1, 2017	RG3103-F

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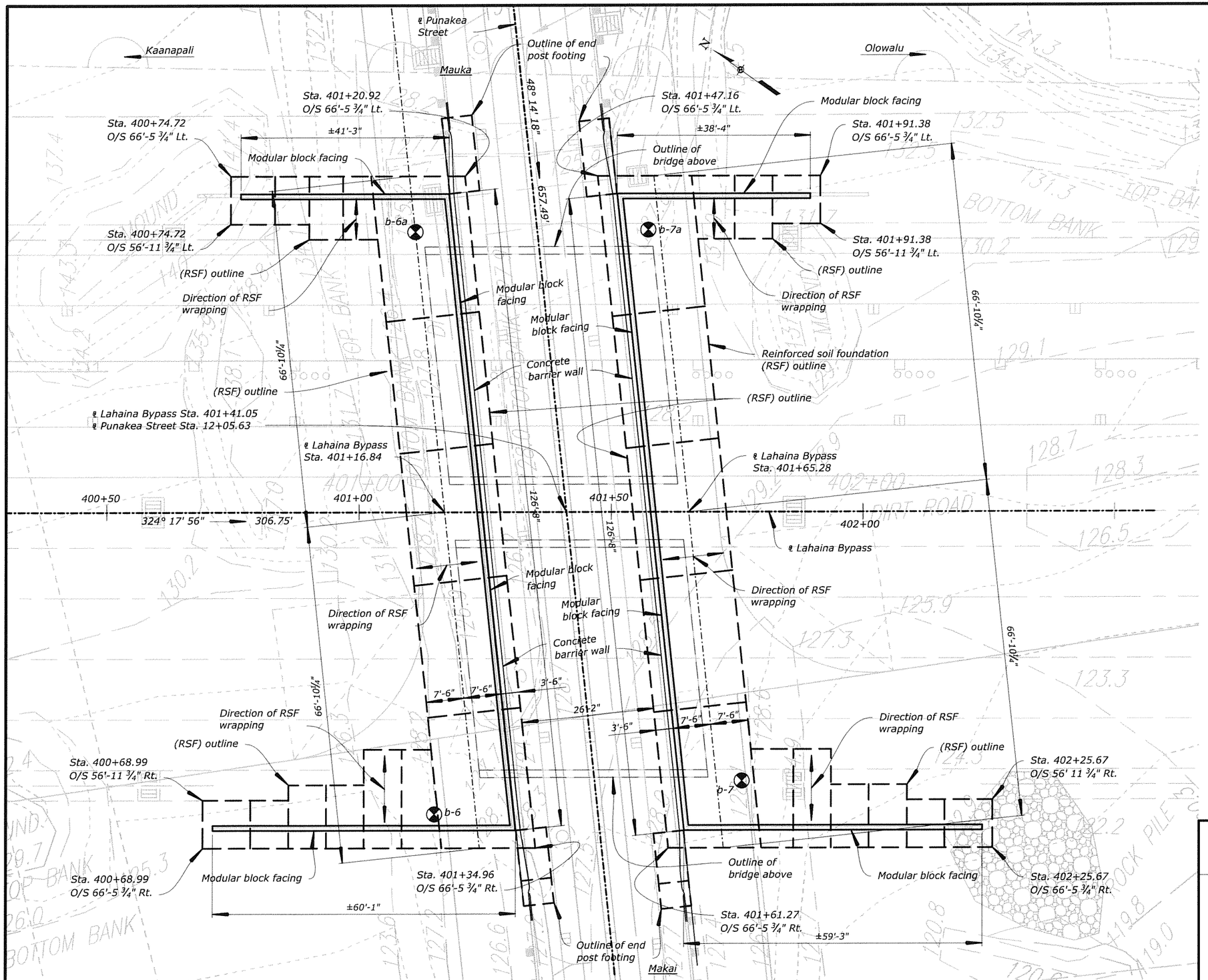
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S7



RSF FOUNDATION PLAN

Note:

1. *Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft). See SCR section 714 for geotextile requirements.*
2. *Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO 180. See SCR section 204 for backfill gradation requirements.*

Legend:

⊗ *Denotes boring log locations.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE — 4-30-18 EXPIRATION DATE OF THE LICENSE

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

FOUNDATION PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=20'-0"	D. FUJIWARA	7 of 103	JUNE 1, 2017	RG3103-G

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STATE	PROJECT	SHEET NO.
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GEOLABS, INC.
Geotechnical Engineering

Soil Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	LESS THAN 5% FINES	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		MORE THAN 12% FINES	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	LESS THAN 5% FINES	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
		MORE THAN 12% FINES	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE				
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

	(2-INCH) O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT (NP=NON-PLASTIC)
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX (NP=NON-PLASTIC)
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	GRAB SAMPLE	UC	UNCONFINED COMPRESSION OR UNIAXIAL COMPRESSIVE STRENGTH
	CORE SAMPLE	TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)
	WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING		
	WATER LEVEL OBSERVED IN BORING AFTER DRILLING		
	WATER LEVEL OBSERVED IN BORING OVERNIGHT		

Plate A-0.1

LOG LEGEND FOR SOIL 7378-00.GPJ GEOLABS.GDT 10/11/16

GEOLABS, INC.
Geotechnical Engineering

Soil Classification Log Key
(with deviations from ASTM D2488)

GEOLABS, INC. CLASSIFICATION*

GRANULAR SOIL (- #200 <50%)	COHESIVE SOIL (- #200 ≥50%)
• PRIMARY constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., GRAVEL, SAND)	• PRIMARY constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., CLAY, SILT)
• SECONDARY constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (SILTY or CLAYEY); otherwise, a granular constituent is used (GRAVELLY or SANDY) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., SANDY GRAVEL, CLAYEY SAND) and precede the primary constituent.	• SECONDARY constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., SANDY CLAY, SILTY CLAY, CLAYEY SILT) and precede the primary constituent.
• accessory descriptions compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY GRAVEL with a little sand)	• accessory descriptions compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY CLAY with some sand)
EXAMPLE: Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: SILTY GRAVEL with some sand	

RELATIVE DENSITY / CONSISTENCY

Granular Soils			Cohesive Soils			
N-Value (Blows/Foot)		Relative Density	N-Value (Blows/Foot)		PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS		
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4		Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	< 0.5	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	0.5 - 1.0	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	1.0 - 2.0	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	2.0 - 4.0	Very Stiff
			> 30	> 55	> 4.0	Hard

MOISTURE CONTENT DEFINITIONS

Dry: Absence of moisture, dry to the touch

Moist: Damp but no visible water

Wet: Visible free water, usually soil is below water table

GRAIN SIZE DEFINITION

Description	Sieve Number and / or Size
Boulders	> 12 Inches (305-mm)
Cobbles	3 to 12 Inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-Inch to 3/4-Inch (75-mm to 19-mm)
Fine Gravel	3/4-Inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

ABBREVIATIONS

WOH: Weight of Hammer

WOR: Weight of Drill Rods

SPT: Standard Penetration Test Split-Spoon Sampler

MCS: Modified California Sampler

PP: Pocket Penetrometer

**Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).*

Plate A-0.2

SOIL CLASS. LOG KEY 7378-00.GPJ GEOLABS.GDT 10/11/16

GEOLABS, INC.
Geotechnical Engineering

Rock Log Legend

ROCK DESCRIPTIONS

	BASALT		FINGER CORAL
	BOULDERS		LIMESTONE
	BRECCIA		SANDSTONE
	CLINKER		SILTSTONE
	COBBLES		TUFF
	CORAL		VOID/CAVITY

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

Massive:	Greater than 24 inches apart
Slightly Fractured:	12 to 24 inches apart
Moderately Fractured:	6 to 12 inches apart
Closely Fractured:	3 to 6 inches apart
Severely Fractured:	Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

Unweathered:	Rock shows no sign of discoloration or loss of strength.
Slightly Weathered:	Slight discoloration inwards from open fractures.
Moderately Weathered:	Discoloration throughout and noticeably weakened though not able to break by hand.
Highly Weathered:	Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.
Extremely Weathered:	Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard:	Specimen breaks with difficulty after several "pinging" hammer blows. Example: Dense, fine grain volcanic rock
Hard:	Specimen breaks with some difficulty after several hammer blows. Example: Vesicular, vugular, coarse-grained rock
Medium Hard:	Specimen can be broked by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce. Example: Porous rock such as clinker, cinder, and coral reef
Soft:	Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot. Example: Weathered rock, chalk-like coral reef
Very Soft:	Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure. Example: Saprolite

Plate A-0.3

LOG LEGEND FOR ROCK 7378-00.GPJ GEOLABS.GDT 10/11/16

GEOTECHNICAL NOTES:

1. *A geotechnical engineering technical memorandum entitled "Lahaina Bypass Phase 1B - 2, Geotechnical Recommendations - GRS-IBS at Punakea Loop" dated May 23, 2017 has been prepared by Geolabs, Inc.*
2. *For boring locations, see Sheets X thru X.*
3. *The information presented in the logs of borings depict the subsurface conditions encountered at that specified location and at the time of the field exploration only. Variations of subsoil conditions from those depicted in the logs of borings may occur between and beyond the borings.*
4. *The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.*

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BORING LOG LEGENDS AND NOTES

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								J. SEIDMAN	J. SEIDMAN	H. CHUN	NO SCALE	G. SEKI	8 of 103	JUNE 1, 2017	RG3103-H

DRAWING NO.: FINAL DESIGN

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STATE	PROJECT	SHEET NO.
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GEOLABS, INC.
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LAHAINA BYPASS PHASE 1B - 2
LAHAINA, MAUI, HAWAII

Log of Boring 6

Approximate Ground Surface Elevation (feet MSL): 127.24 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
Direct Shear	14	69			10/6"			SM	Brown SILTY SAND with some gravel, very stiff to hard, dry (alluvium)
Sieve - #200 = 29.9%	8		100		+50/2" 38 50/1"		5	SW-SM	Brownish gray GRAVELLY SAND with a little silt, very dense, dry (alluvium) grades with cobbles and boulders
UC= 5820 psi			37				10		
Sieve - #200 = 9.7%	9				70		15		
			38						
	5	93	70		50/4"		20		
			75				25		
			97				30		Boring terminated at 31.7 feet
					50/2"		35		Latitude: 20.855145° N Longitude: 156.657514° W

Date Started:	August 31, 2016	Water Level: ▽	Not Encountered
Date Completed:	August 31, 2016		
Logged By:	D. Gremminger	Drill Rig:	CME-75DG1 (Energy Transfer Ratio = 80.3%)
Total Depth:	31.7 feet	Drilling Method:	4" Solid Stem Auger & PQ Coring
Work Order:	7378-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

LAHAINA BYPASS PHASE 1B - 2
LAHAINA, MAUI, HAWAII

Log of Boring 7

Approximate Ground Surface Elevation (feet MSL): 127.71 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
Direct Shear	14	69			48	4.5		SM	Brown SILTY SAND with a little gravel and cobbles, medium dense to very dense, dry (alluvium)
Sieve - #200 = 45.6%	13				24/6" +50/4"		5		
	5	98	18		65/6"		10		
UC= 5970 psi	4		95		50/3"		15		Brownish gray GRAVELLY COBBLES with some boulders and sandy silt seams, very dense, dry (alluvium)
			14		50/2"				
			41		50/2"		20		
			52				25		
					50/1"		30		Boring terminated at 31.1 feet
							35		Latitude: 20.855019° N Longitude: 156.657394° W

Date Started:	August 31, 2016	Water Level: ▽	Not Encountered
Date Completed:	September 1, 2016		
Logged By:	D. Gremminger	Drill Rig:	CME-75DG1 (Energy Transfer Ratio = 80.3%)
Total Depth:	31.1 feet	Drilling Method:	4" Solid Stem Auger & PQ Coring
Work Order:	7378-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

LAHAINA BYPASS PHASE 1B - 2
LAHAINA, MAUI, HAWAII

Log of Boring 6A

Approximate Ground Surface Elevation (feet MSL): 129.57 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
Direct Shear	20	87			18	3.0		SM	Reddish brown SILTY SAND with some gravel, medium dense, moist (fill)
UC= 13480 psi			97		15/0" Ref.		5	ML	Brown SANDY SILT with some cobbles and boulders (basaltic), hard, moist (alluvium)
	21		15		15/0" Ref.		10		
			51		26/6" +35/1"		15		
UC= 4720 psi Consol.	31		49		50/5"		20		
			47		15/0" Ref.		25		
	9				52/6" +30/1"		30		Boring terminated at 31.1 feet
							35		Latitude: 20.8553387543424° N Longitude: 156.657246702818° W

Date Started:	September 28, 2016	Water Level: ▽	Not Encountered
Date Completed:	September 28, 2016		
Logged By:	B. Aiu	Drill Rig:	CME-75DG1 (Energy Transfer Ratio = 80.3%)
Total Depth:	31.1 feet	Drilling Method:	4" Solid Stem Auger & HQ Coring
Work Order:	7378-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

LAHAINA BYPASS PHASE 1B - 2
LAHAINA, MAUI, HAWAII

Log of Boring 7A

Approximate Ground Surface Elevation (feet MSL): 127.7 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	15	117			66	>4.5		ML	Reddish brown SANDY SILT with some gravel, medium stiff, moist (fill)
LL=49 PI=8	26		37		55/5"		5	ML	Brown SANDY SILT with some cobbles and boulders (basaltic), hard, moist (alluvium)
	38		7		72		10		
UC= 460 psi			25		15/0" Ref.		15		
			53		15/0" Ref.		20		
			67		15/0" Ref.		25		
					15/0" Ref.		30		Boring terminated at 30 feet
							35		Latitude: 20.8552360837836° N Longitude: 156.657166888107° W

Date Started:	September 28, 2016	Water Level: ▽	Not Encountered
Date Completed:	September 28, 2016		
Logged By:	B. Aiu	Drill Rig:	CME-75DG1 (Energy Transfer Ratio = 80.3%)
Total Depth:	30 feet	Drilling Method:	4" Casing & HQ Coring
Work Order:	7378-00	Driving Energy:	140 lb. wt., 30 in. drop

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BORING LOG-1

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								J. SEIDMAN	J. SEIDMAN	H. CHUN	NO SCALE	G. SEKI	9 of 103	JUNE 1, 2017	RG3103-I

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STATE	PROJECT	SHEET NO.
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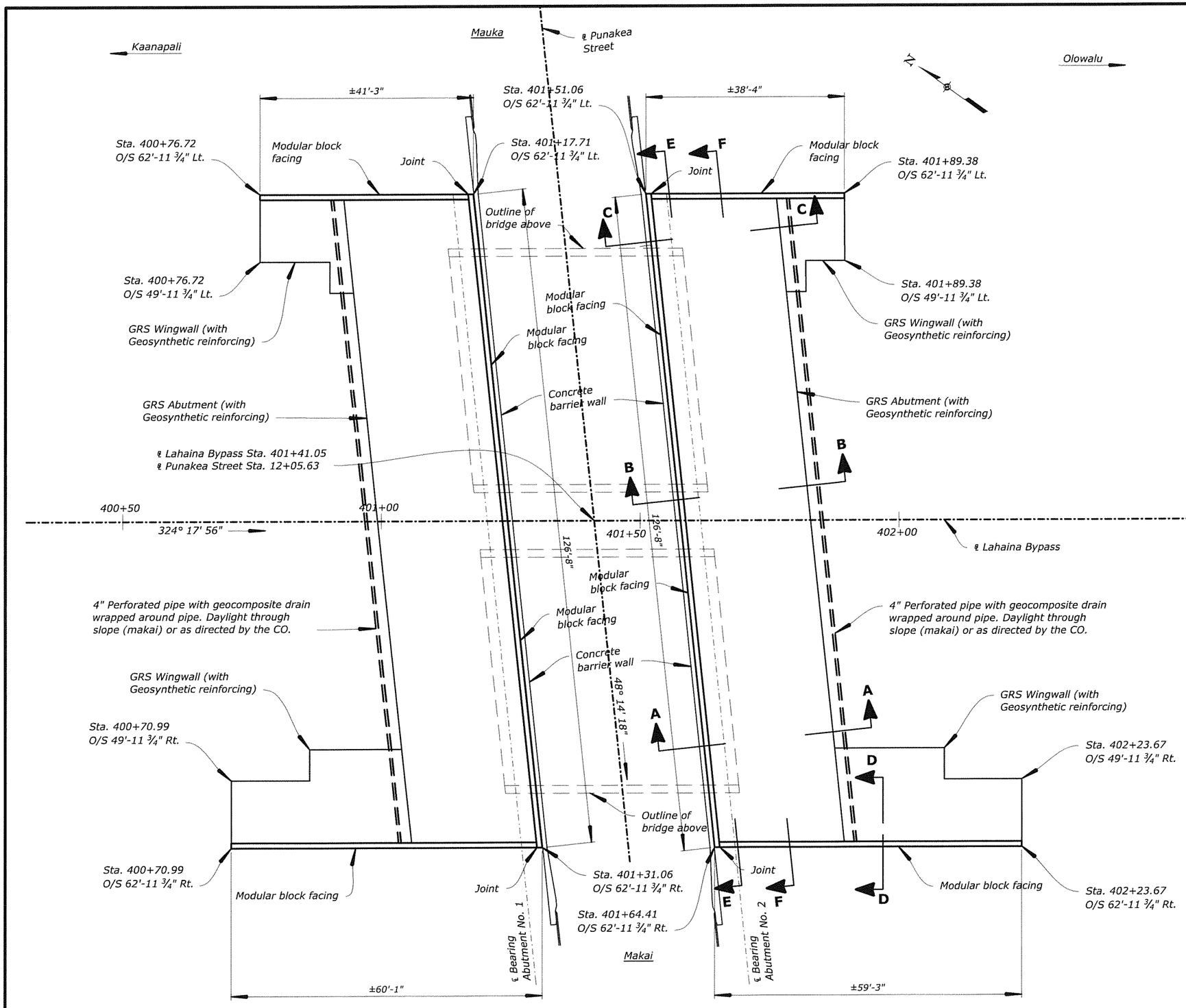

ABUTMENT PLAN

Note:

1. *Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft). See SCR section 714 for geotextile requirements.*
2. *Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO 180. See SCR section 204 for backfill gradation requirements.*
3. *See sheet S15 for section 'A-A'.*
4. *See sheet S16 for section 'B-B'.*
5. *See sheet S17 for section 'C-C'.*
6. *See sheet S18 for section 'D-D'.*
7. *See sheet S19 for section 'E-E'.*
8. *See sheet S20 for section 'F-F'.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
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Eric Y. Matsumoto — 4-30-18

SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

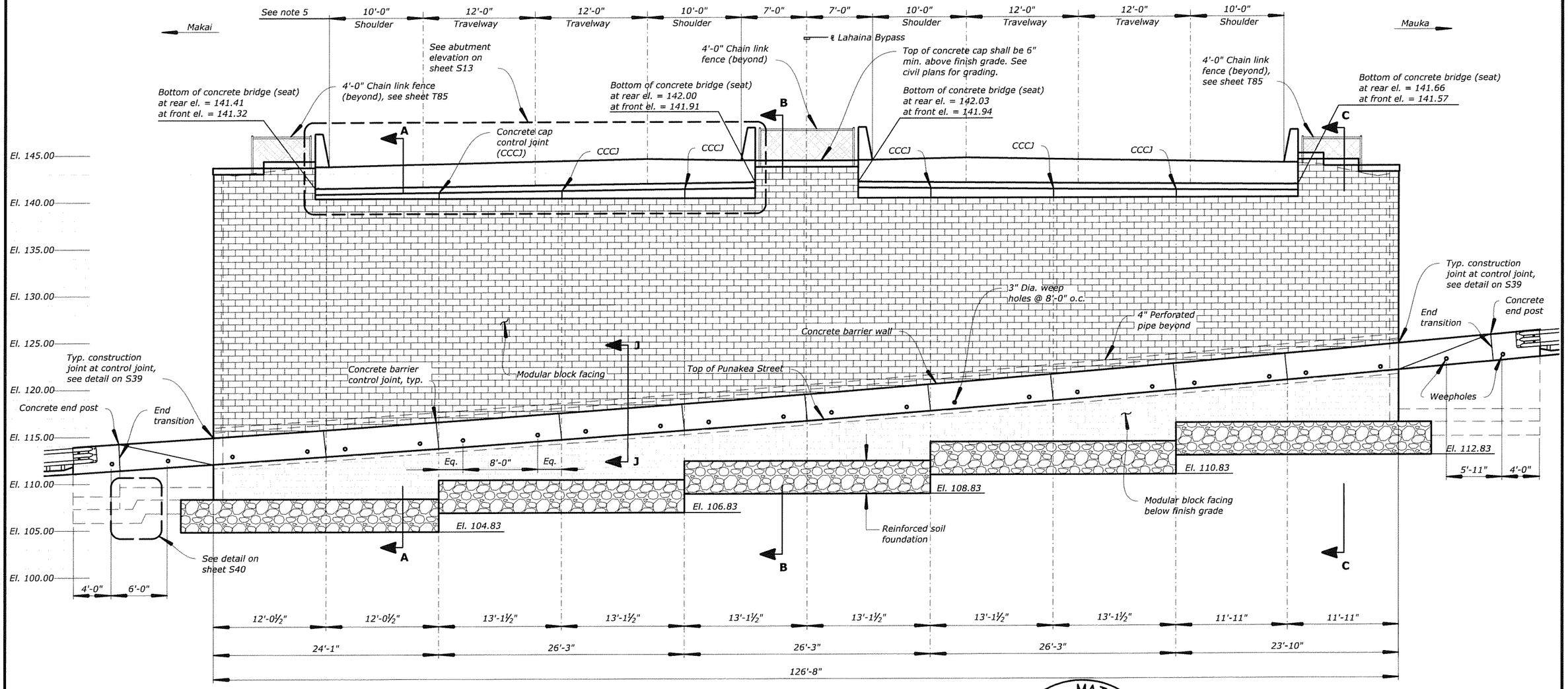
ABUTMENT PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=20'-0"	D. FUJIWARA	10 of 103	JUNE 1, 2017	RG3103-J

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S11



ABUTMENT NO. 1 GRS WALL ELEVATION

Notes:

1. *See sheet S15 for sections 'A-A'.*
2. *See sheet S16 for section 'B-B'.*
3. *See sheet S17 for section 'C-C'.*
4. *See sheet S33 for section 'J-J'.*
5. *Travelway, shoulder and median dimensions are measured perpendicular to ℄ Lahaina Bypass.*

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

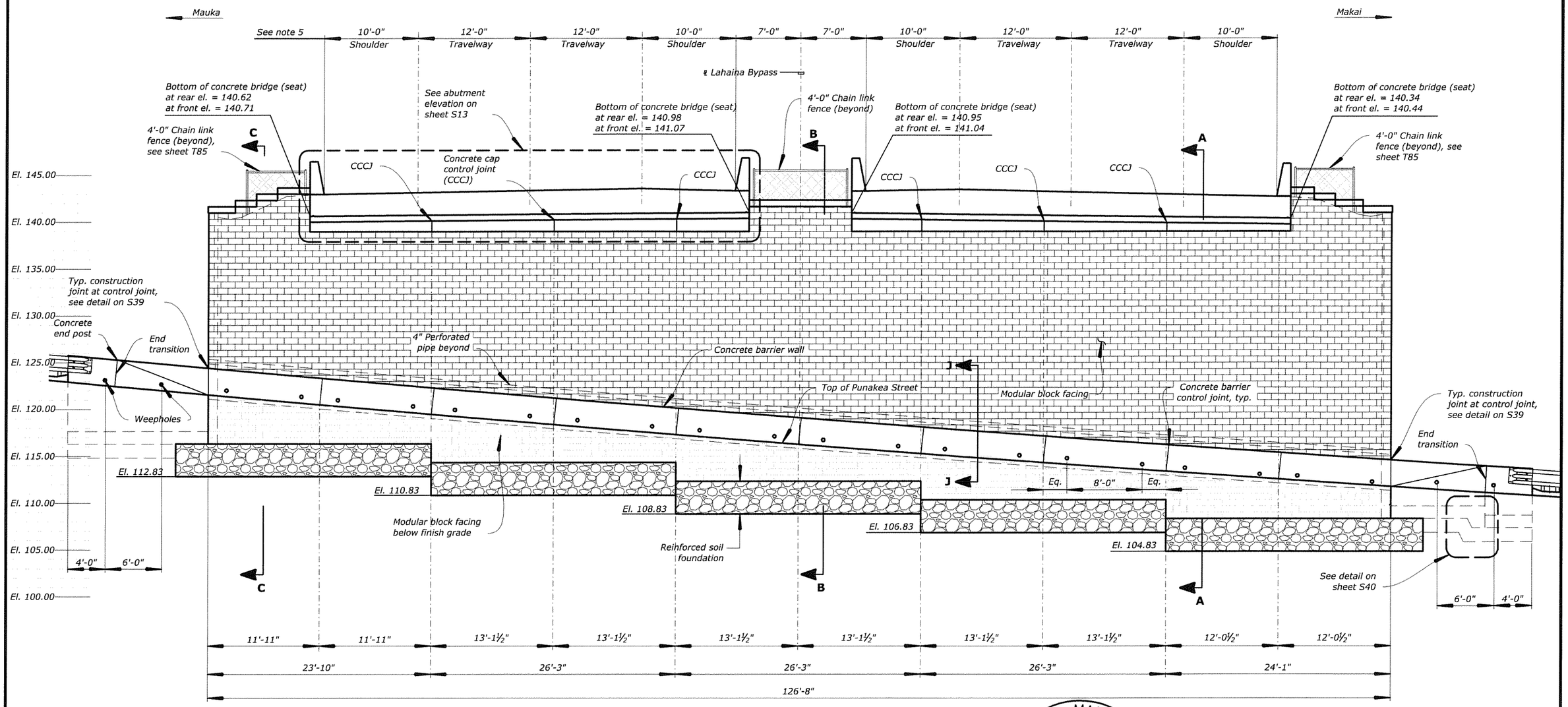
ABUTMENT NO. 1 WALL ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	11 of 103	JUNE 1, 2017	RG3103-K

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S12



Notes:

1. See sheet S15 for sections 'A-A'.
2. See sheet S16 for section 'B-B'.
3. See sheet S17 for section 'C-C'.
4. See sheet S33 for section 'J-J'.
5. Travelway, shoulder and median dimensions are measured perpendicular to ℄ Lahaina Bypass.

ABUTMENT NO. 2 GRS WALL ELEVATION

ERIC Y. MATSUMOTO
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

ABUTMENT NO. 2 WALL ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	12 of 103	JUNE 1, 2017	RG3103-L

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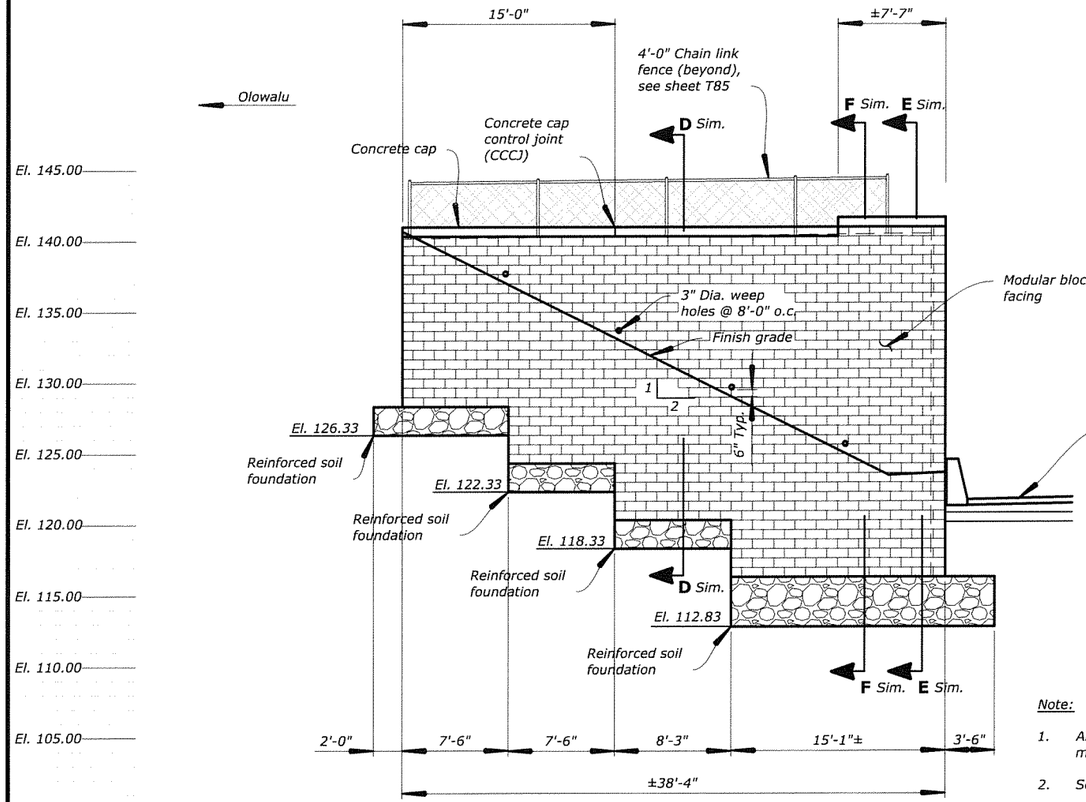
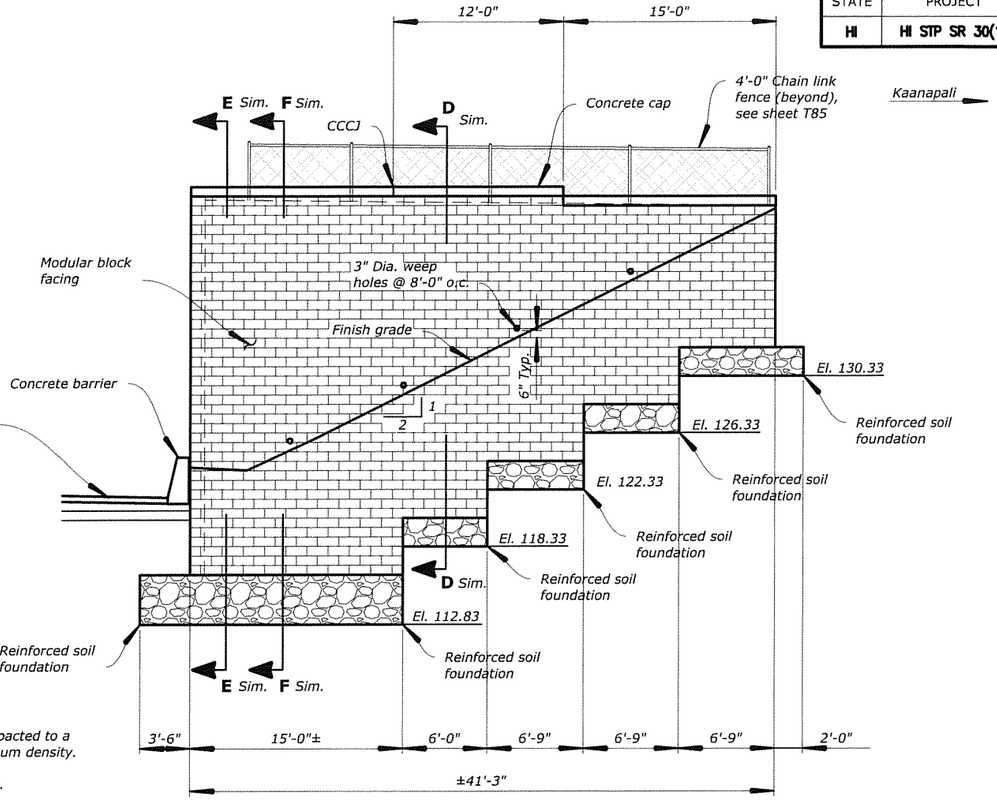
DRAWING NO.: FINAL DESIGN

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S13



WINGWALL B

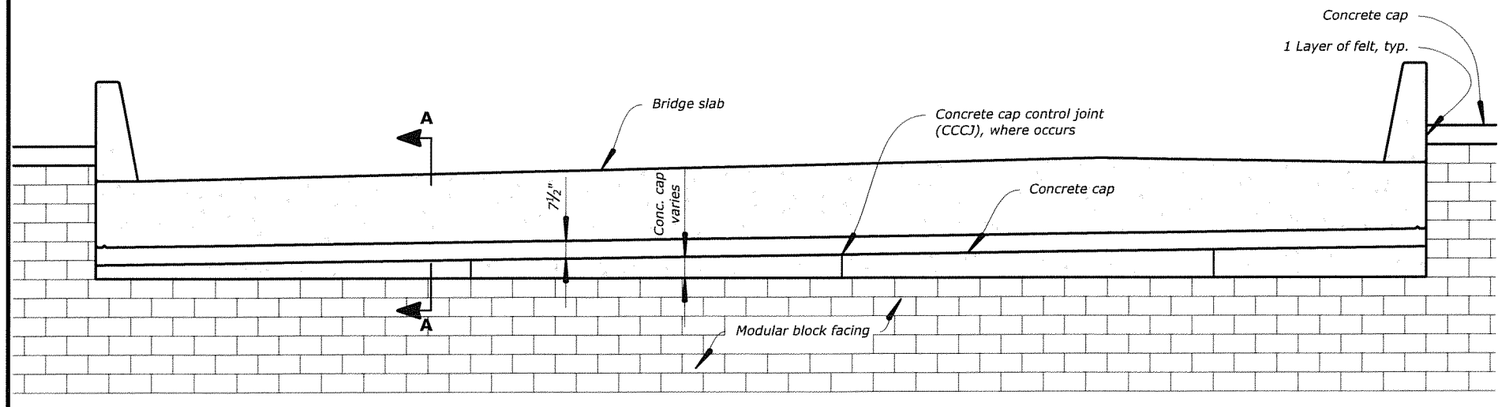


WINGWALL A

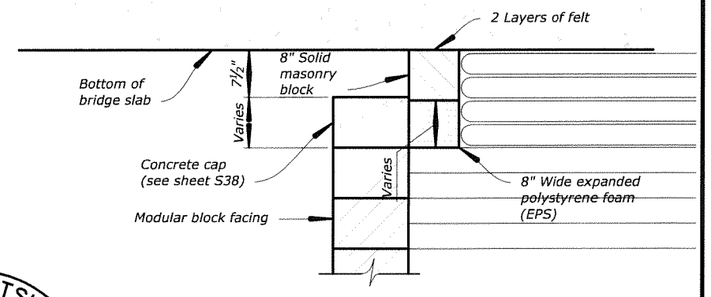
<u>Note:</u>

1. All soil under RSF shall be compacted to a minimum of 95% of the maximum density.
2. See sheet S18 for section 'D-D'.
3. See sheet S19 for section 'E-E'.
4. See sheet S20 for section 'F-F'.

WINGWALL (MAUKA) ELEVATION
Scale: 3/32"=1'-0"



ABUTMENT ELEVATION
Scale: 3/16"=1'-0"



SECTION 'A-A'
Scale: ½"=1'-0"

ERIC Y. MATSUMOTO
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HAWAII, U.S.A.

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

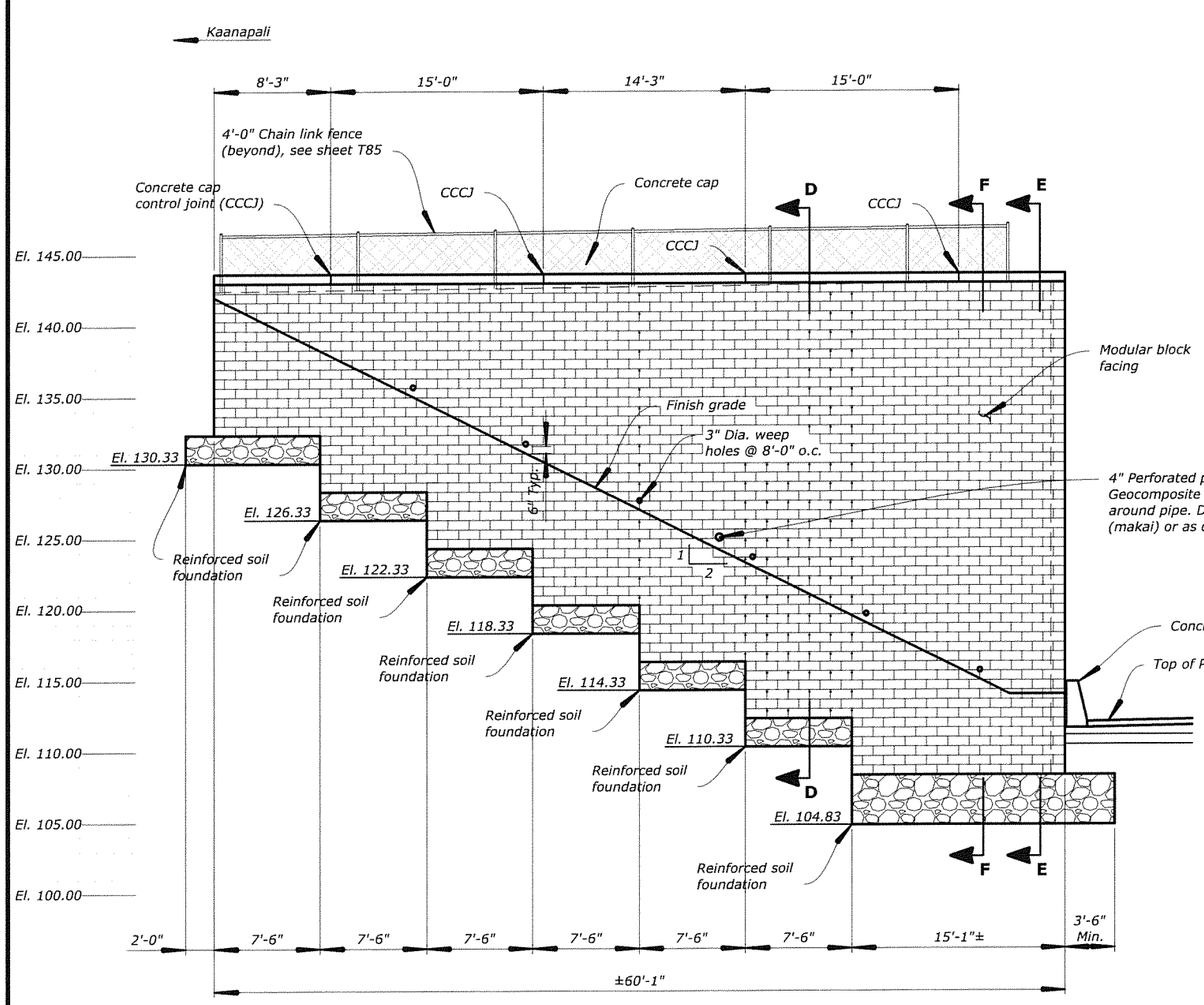
WINGWALL (MAUKA) ELEVATIONS AND ABUTMENT DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	13 of 103	JUNE 1, 2017	RG3103-M

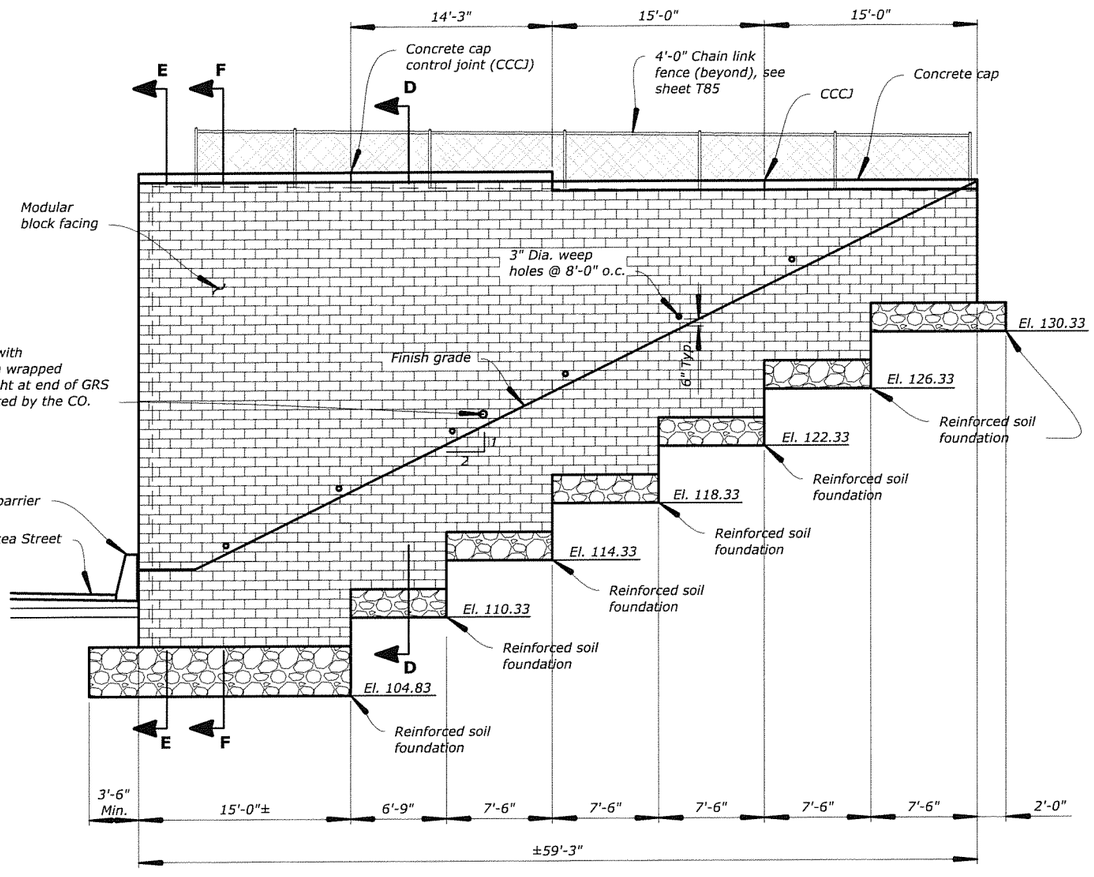
3:12:13 PM

DRAWING NO.: FINAL DESIGN

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S14



WINGWALL C



WINGWALL D

Note:

1. *All soil under RSF shall be compacted to a minimum of 95% of the maximum density.*
2. *See sheet S18 for section 'D-D'.*
3. *See sheet S19 for section 'E-E'.*
4. *See sheet S20 for section 'F-F'.*

WINGWALL (MAKAI) ELEVATION

ERIC Y. MATSUMOTO
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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL (MAKAI) ELEVATIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	14 of 103	JUNE 1, 2017	RG3103-N

DRAWING NO.: FINAL DESIGN

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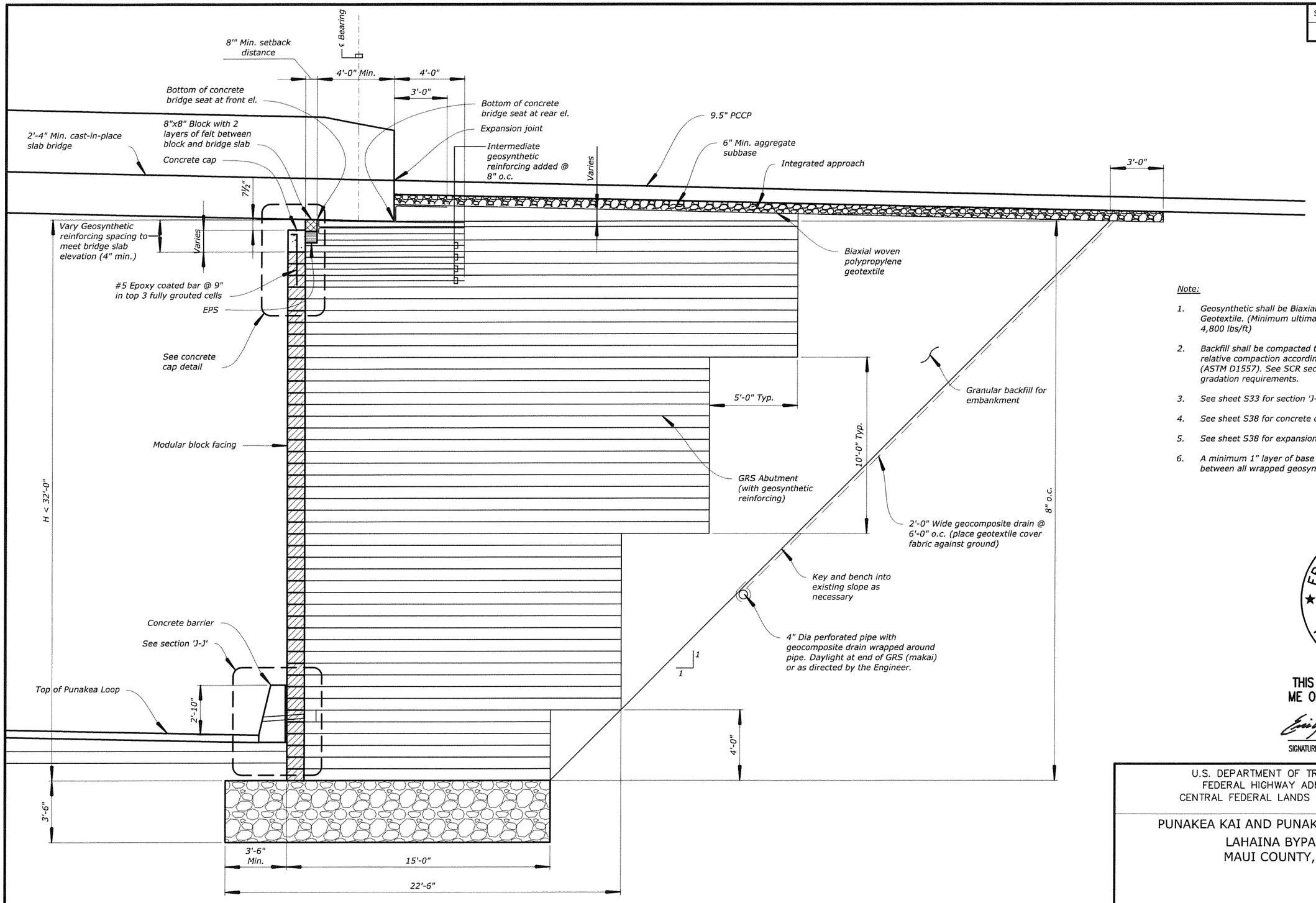
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S15



SECTION 'A-A'

Note:

1. Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft)
2. Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO T-180 (ASTM D1557). See SCR section 204 for backfill gradation requirements.
3. See sheet S33 for section 'J-J'.
4. See sheet S38 for concrete cap detail.
5. See sheet S38 for expansion joint detail.
6. A minimum 1" layer of base course D shall be placed between all wrapped geosynthetic layers.

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

ABUTMENT WALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/16"=1'-0"	D. FUJIWARA	15 of 103	JUNE 1, 2017	RG3103-O

DRAWING NO.:
FINAL DESIGN

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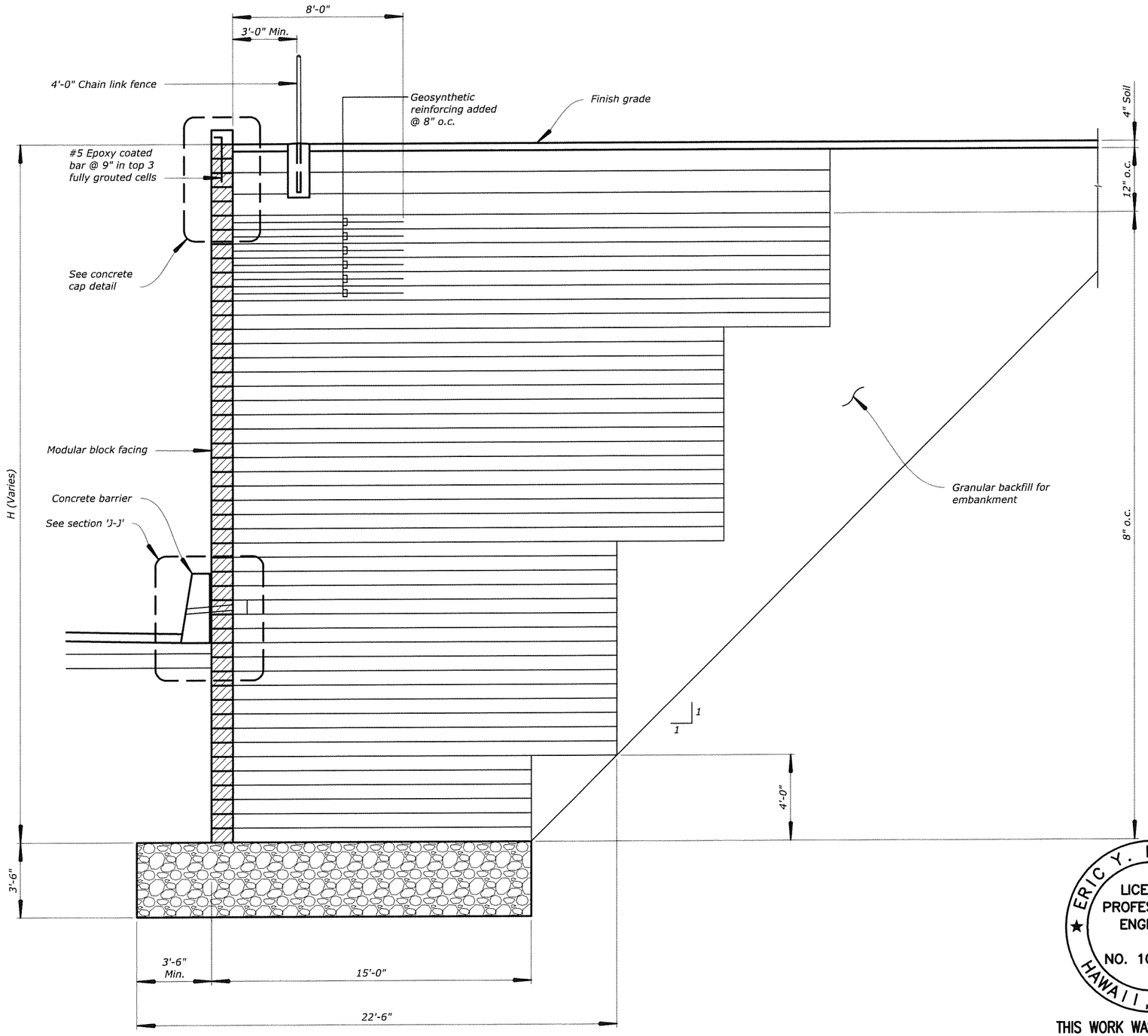
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S16



SECTION 'B-B'

Note:

1. Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft)
2. Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO T-180 (ASTM D1557). See SCR section 204 for backfill gradation requirements.
3. See sheet S38 for concrete cap detail.
4. See sheet S33 for section 'J-J'.

ERIC Y. MATSUMOTO
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NO. 10156-S
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Eric Y. Matsumoto — 4-30-18
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

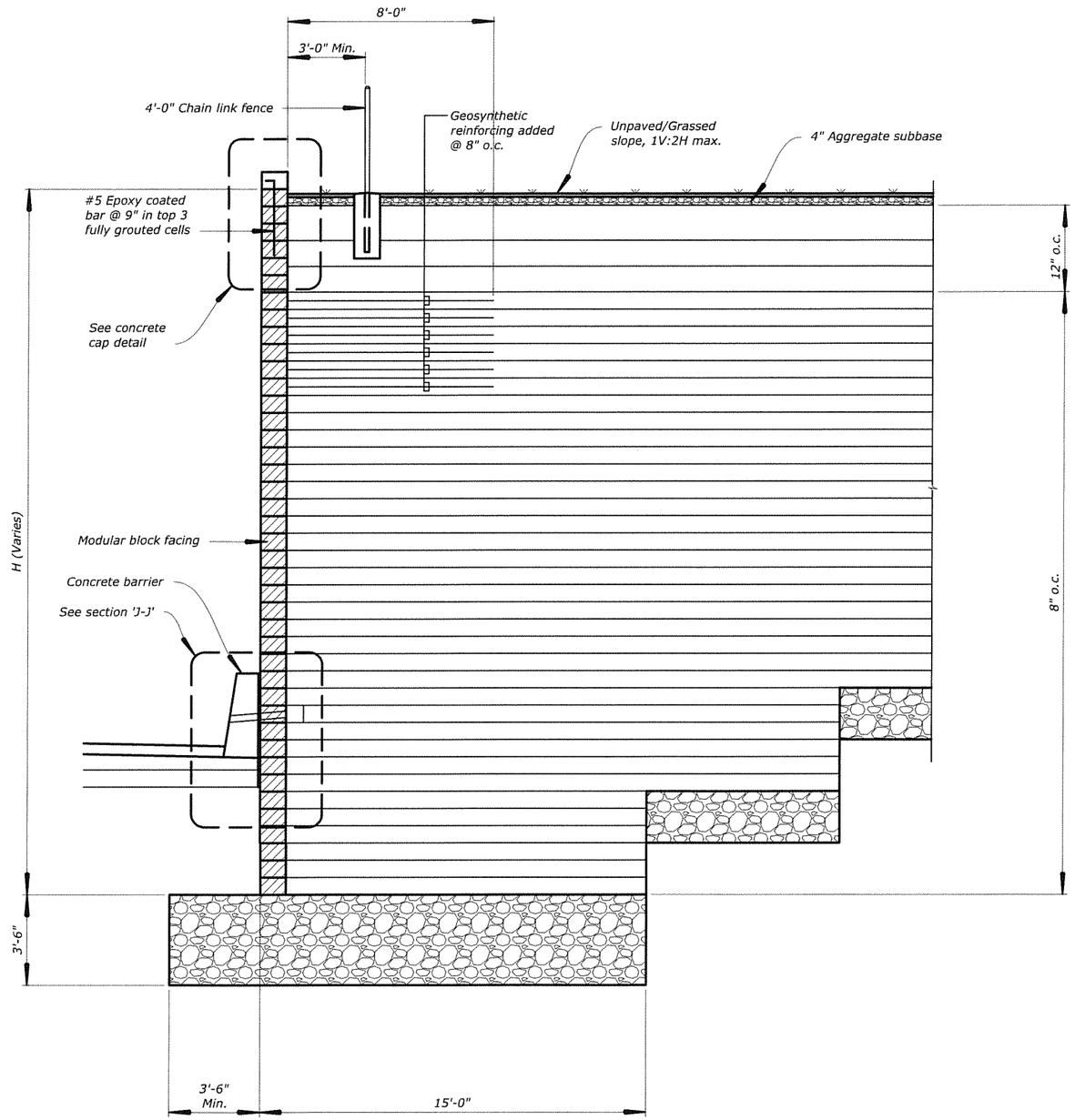
ABUTMENT WALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/16"=1'-0"	D. FUJIWARA	16 of 103	JUNE 1, 2017	RG3103-P

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S17



SECTION 'C-C'

Note:

1. *Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft)*
2. *Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO T-180 (ASTM D1557). See SCR section 204 for backfill gradation requirements.*
3. *See sheet S38 for concrete cap detail.*
4. *See sheet S33 for section 'J-J'.*

ERIC Y. MATSUMOTO
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NO. 10156-S
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Eric Y. Matsumoto 4-30-18
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

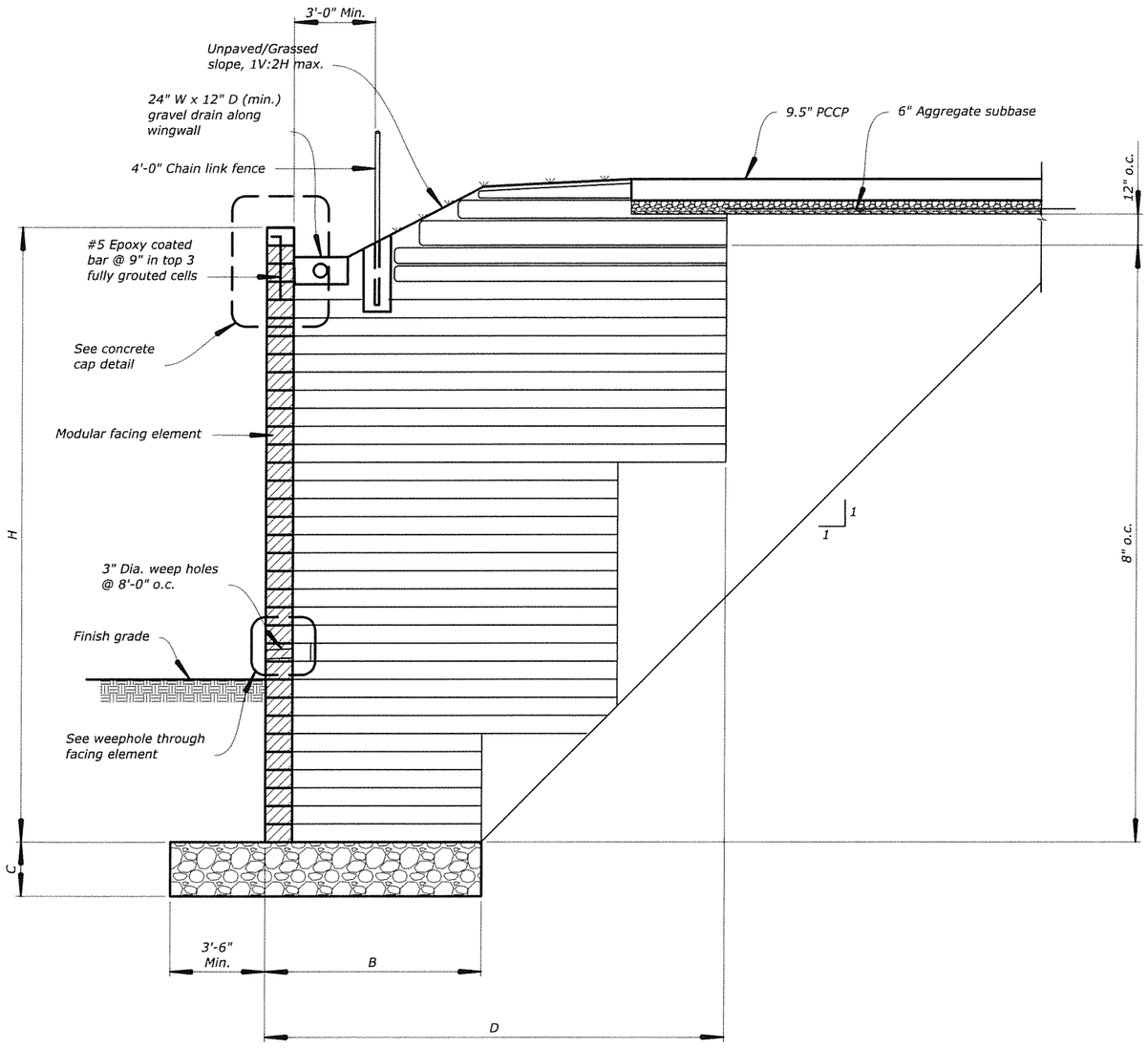
ABUTMENT WALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/16"=1'-0"	D. FUJIWARA	17 of 103	JUNE 1, 2017	RG3103-Q

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S18



SECTION 'D-D'

H	B	C	D
≤ 36'-0"	15'-0"	3'-6"	22'-6"
≤ 24'-0"	8'-0"	2'-0"	17'-0"
≤ 16'-0"	5'-0"	2'-0"	12'-0"

Note:

1. Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,800 lbs/ft)
2. Backfill shall be compacted to at least 95 percent relative compaction according to AASHTO T-180 (ASTM D1557). See SCR section 204 for backfill gradation requirements.
3. See sheet S38 for concrete cap detail.
4. See sheet S40 for weephole through facing element.

ERIC Y. MATSUMOTO
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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/16"=1'-0"	D. FUJIWARA	18 of 103	JUNE 1, 2017	RG3013-R

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FINAL DESIGN

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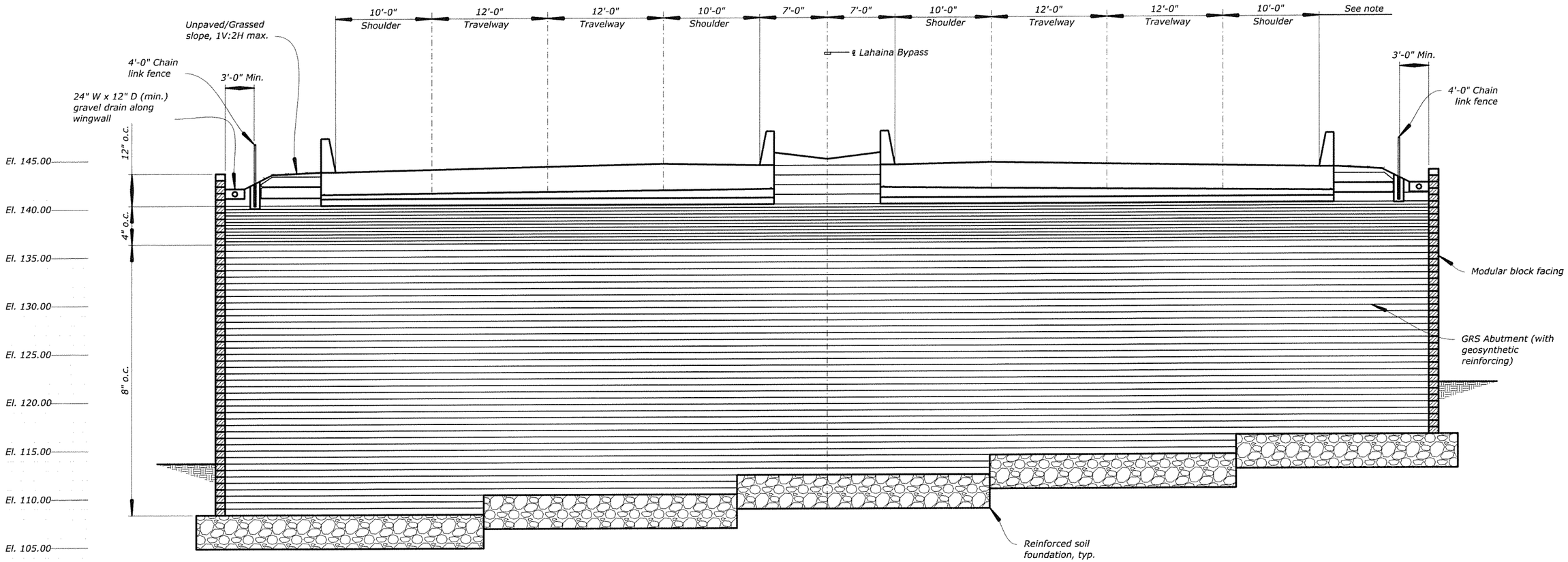
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S19



Note:

Travelway, shoulder and median dimensions are measured perpendicular to ℄ Lahaina Bypass.

SECTION 'E-E'

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	19 of 103	JUNE 1, 2017	RG3103-S

DRAWING NO.: FINAL DESIGN

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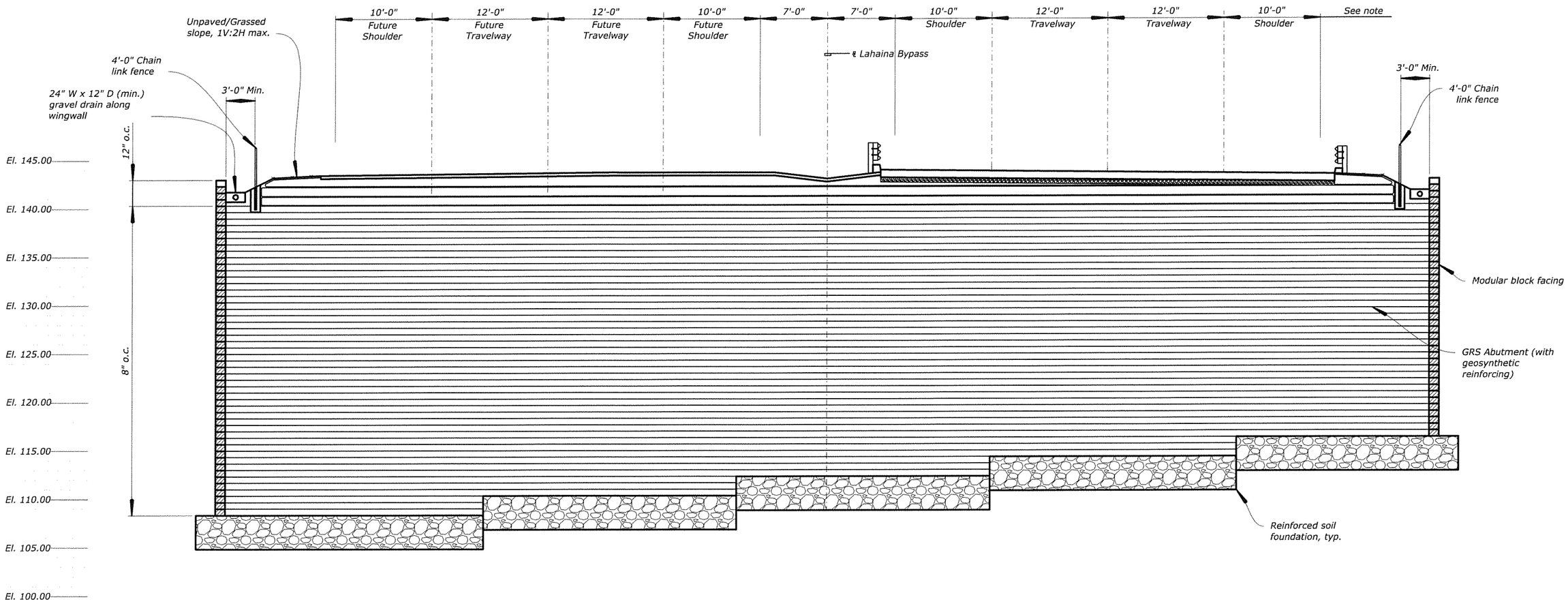
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S20



Note:

Travelway, shoulder and median dimensions are measured perpendicular to ℄ Lahaina Bypass.

SECTION 'F-F'

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	20 of 103	JUNE 1, 2017	RG3103-T

DRAWING NO.: FINAL DESIGN

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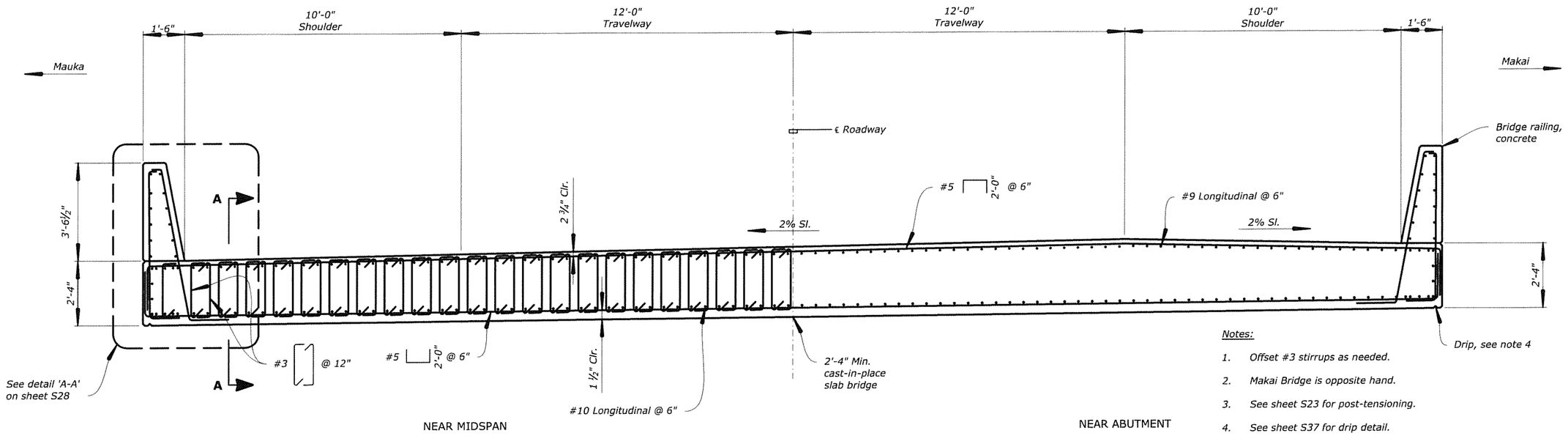
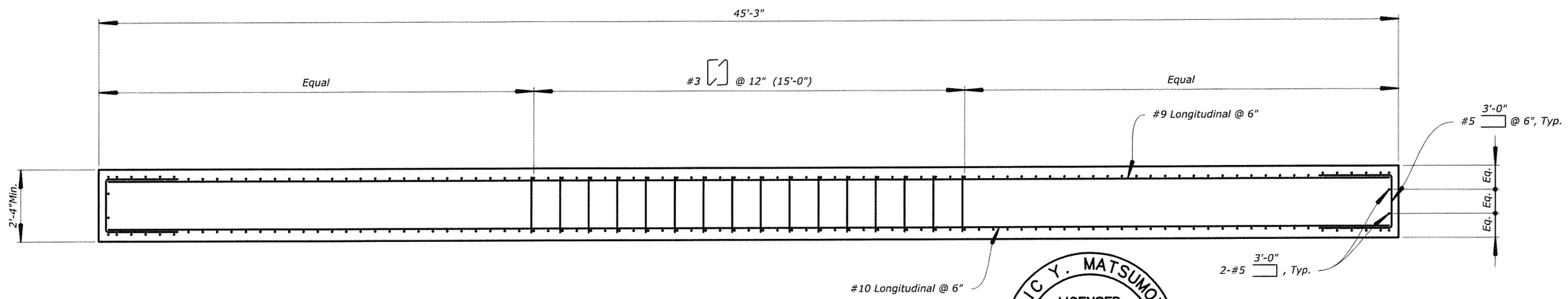
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S21



TYPICAL MAUKA BRIDGE NORMAL SECTION

Notes:

1. Offset #3 stirrups as needed.
2. Makai Bridge is opposite hand.
3. See sheet S23 for post-tensioning.
4. See sheet S37 for drip detail.



SECTION 'A-A'

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18
SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

TYPICAL BRIDGE SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/4"=1'-0"	D. FUJIWARA	21 of 103	JUNE 1, 2017	RG3103-U

DRAWING NO.: FINAL DESIGN

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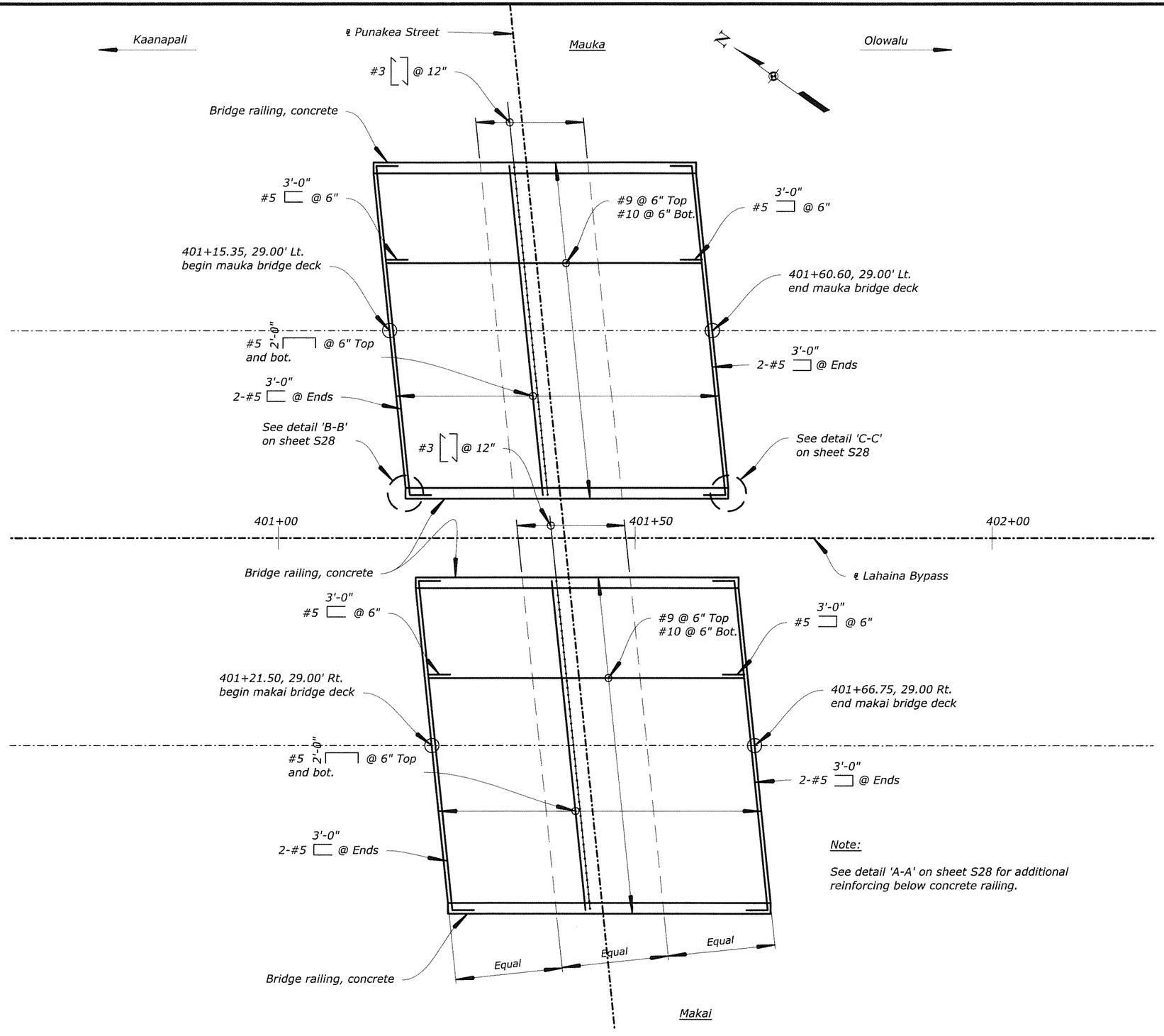
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S22



DECK REINFORCING PLAN

Note:

See detail 'A-A' on sheet S28 for additional reinforcing below concrete railing.

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE 4-30-18 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

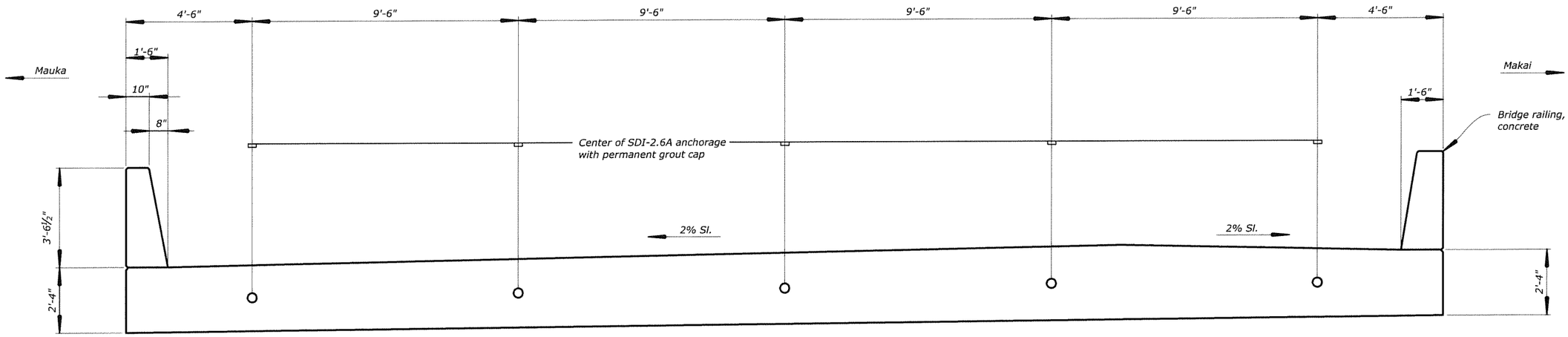
DECK REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/16"=1'-0"	D. FUJIWARA	22 of 103	JUNE 1, 2017	RG3103-V

DRAWING NO.: FINAL DESIGN

3:12:13 PM

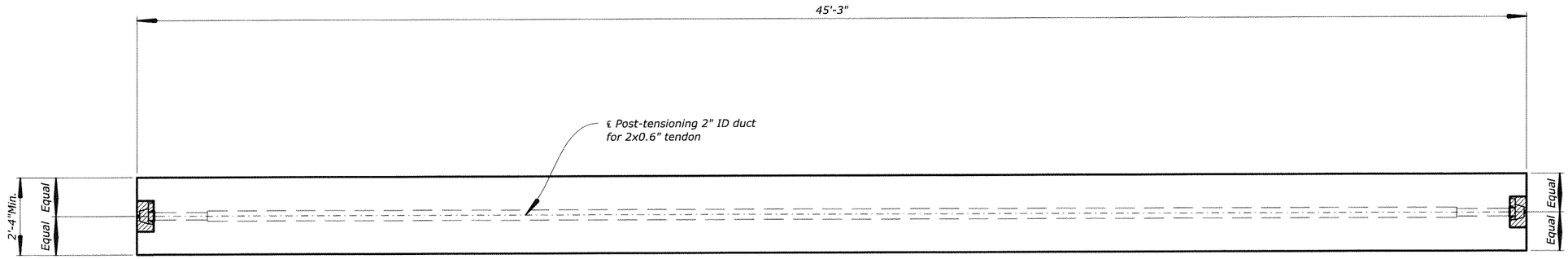
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S23



Note:

Makai Bridge is opposite hand.

TYPICAL MAUKA POST TENSIONING SECTION (NORMAL TO ℄)



Note:

See sheet S25 for anchorage details.

POST TENSIONING PROFILE

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

POST-TENSIONING SECTION AND PROFILE

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/4"=1'-0"	D. FUJIWARA	23 of 103	JUNE 1, 2017	RG3103-W

DRAWING NO.: FINAL DESIGN

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STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S24

POST-TENSIONING NOTES

1. *Post-tensioning strands shall be ASTM A416 Grade 270 0.6" diameter uncoated 7 wire low relaxation steel strands.*

2. *Post-tensioning ducts shall be Spiro-Type Semi-Rigid Galvanized.*

3. *After Post-tensioning, tendons shall be pressure grouted with Masterflow 1205 cable grout, Sika Grout 300 PT, or approved equal. Ducts shall have grouting vents at anchorage and at each high point along the tendon profile.*

4. *Ducts shall be secured to prevent misalignment or leakage during concrete pour.*

5. *Prevent ducts, at all times, from getting plugged or damaged. Ducts shall be checked to show that ducts are clear and contain no obstructions prior to installing prestressing steel and stressing the member.*

6. *The post-tensioning design assumptions are as follows:*

Curve Friction Coefficient	*0.18*
Wobble Friction Coefficient	*0.0002/ft.*
Anchor Set	*3/8"*

7. *Stress one strand in each tendon to 30 kips at 24 hours from Kaanapali end. A minimum Compressive Strength of 2,000 psi shall be attained in the slab before the application of post-tensioning.*

8. *Stress all strands to 44 kips a minimum of 3 days after casting the concrete slab and after the concrete slab has attained a minimum compressive strength of 3,000 psi from Kaanapali end.*

9. *Post-tensioning shall comply with section 10 of AASHTO LRFD Bridge Construction Specifications including the latest interim revisions unless otherwise noted.*

10. *Prior to grouting and within two days after installing strands, a corrosion inhibitor amine carboxylate powder (Cortec MCI-309) shall be blown into the ducts.*

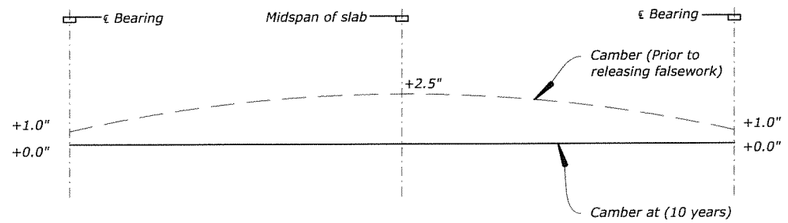
11. *Purpose of post-tensioning is to relieve bond stresses and avoid tensile shrinkage stresses.*

12. *The force in Prestressing Steel shall not be less than shown in note 8 above.*

    The force in the Prestressing Steel shall be considered as the smaller of the two values as determined by the measured elongation and the gage pressure. If the difference in stress as obtained by the measured elongation and the measured gage pressure exceeds 5 percent of the required prestressing force, the stressing process shall be terminated and shall not resume until the Contractor submits data indicating the cause of such difference and makes corrections, approved by the CO, to rectify such difference.

13. *See Specifications Section 553 for additional requirements.*

14. *See sheet S41 for construction sequence.*



CAMBER DIAGRAM

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

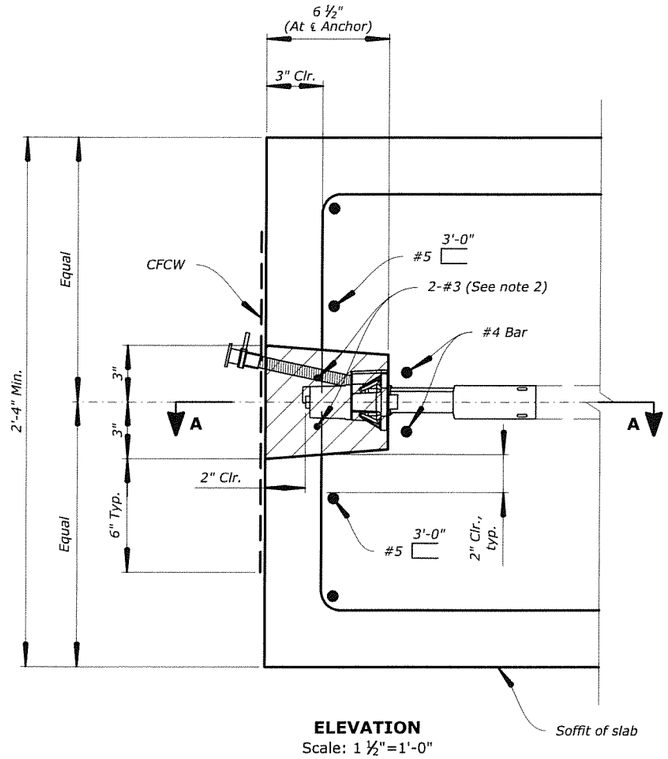
POST-TENSIONING NOTES AND CAMBER DIAGRAM

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	NO SCALE	D. FUJIWARA	24 of 103	JUNE 1, 2017	RG3103-X

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S25



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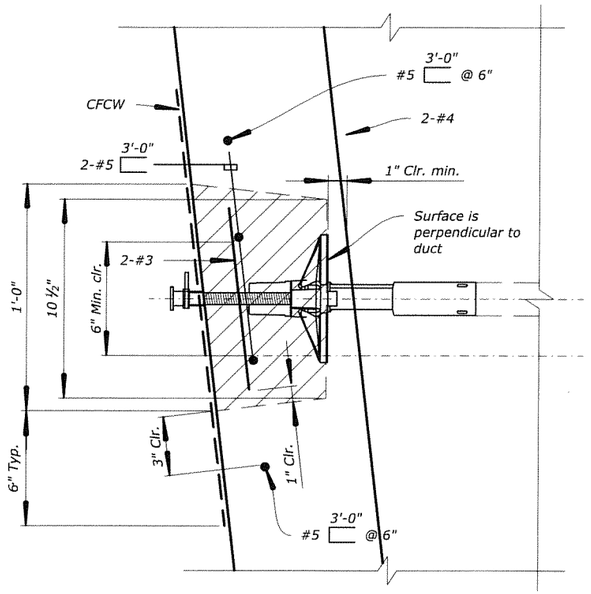

SECTION 'A-A'
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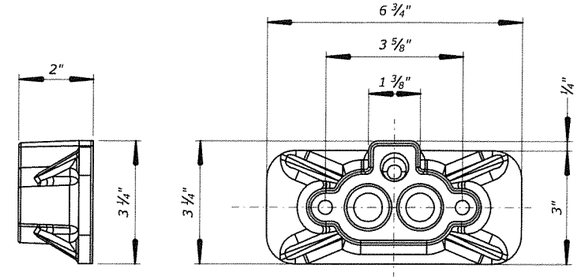

2.6A ANCHORAGE
Scale: 3"=1'-0"

Legend

Indicates pour back with Duratop gel or equivalent

Notes:

1. *Remove grout tube prior to pour back.*
2. *Place 2-#3*
3. *Coat pocket and anchorage with Duralprep ac or equivalent.*
4. *Pour back pocket with Duraptop gel or equivalent.*
5. *Apply CFCW.*

ERIC Y. MATSUMOTO
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HAWAII, U.S.A.

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PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

ANCHORAGE SYSTEM SECTIONS AND DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	25 of 103	JUNE 1, 2017	RG3103-Y

DRAWING NO.:
FINAL DESIGN

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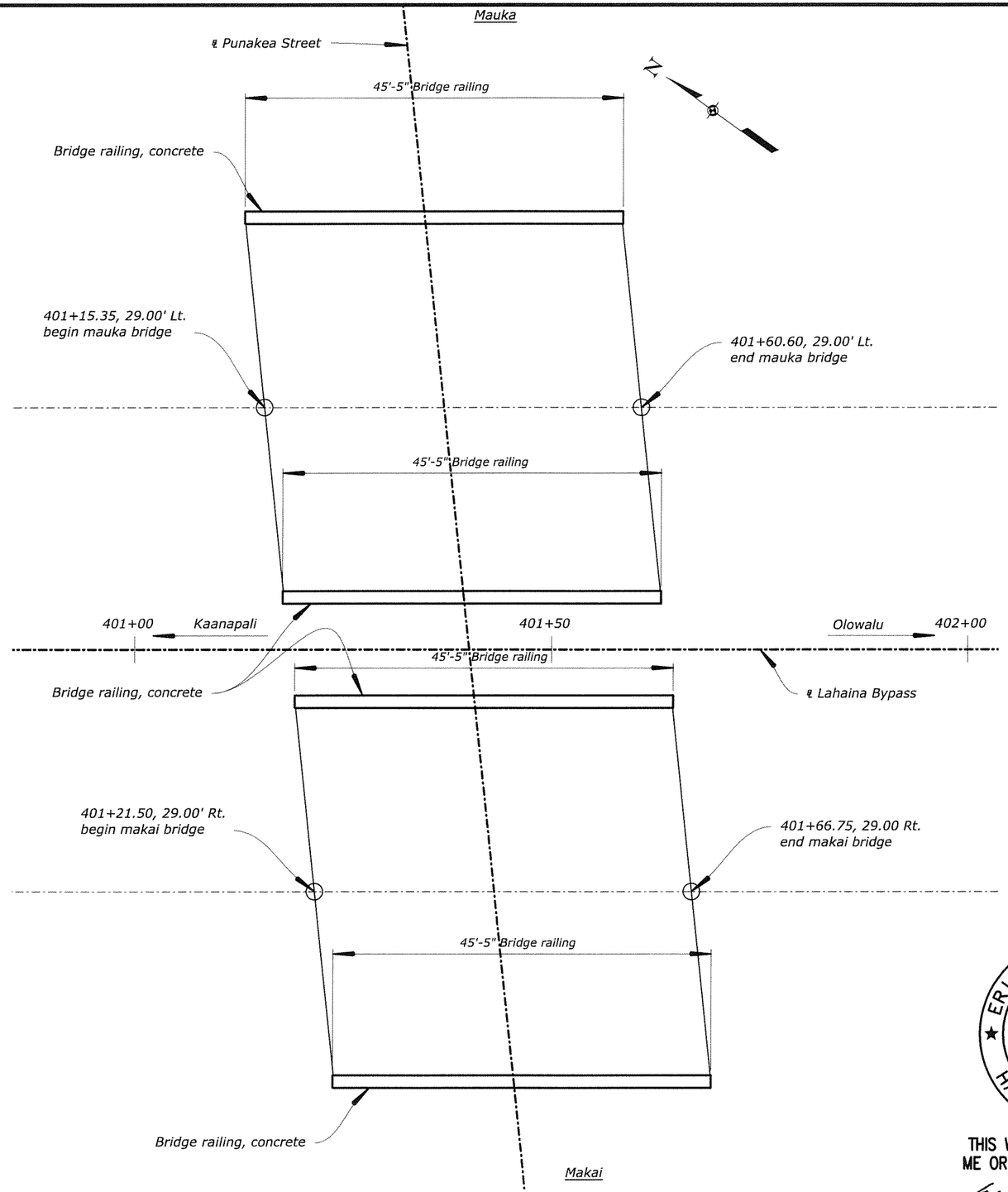
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S26



BRIDGE RAILING PLAN

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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Eric Y. Matsumoto 4-30-18

SIGNATURE EXPIRATION DATE OF THE LICENSE

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BRIDGE RAILING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/16"=1'-0"	D. FUJIWARA	26 of 103	JUNE 1, 2017	RG3103-Z

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FINAL DESIGN

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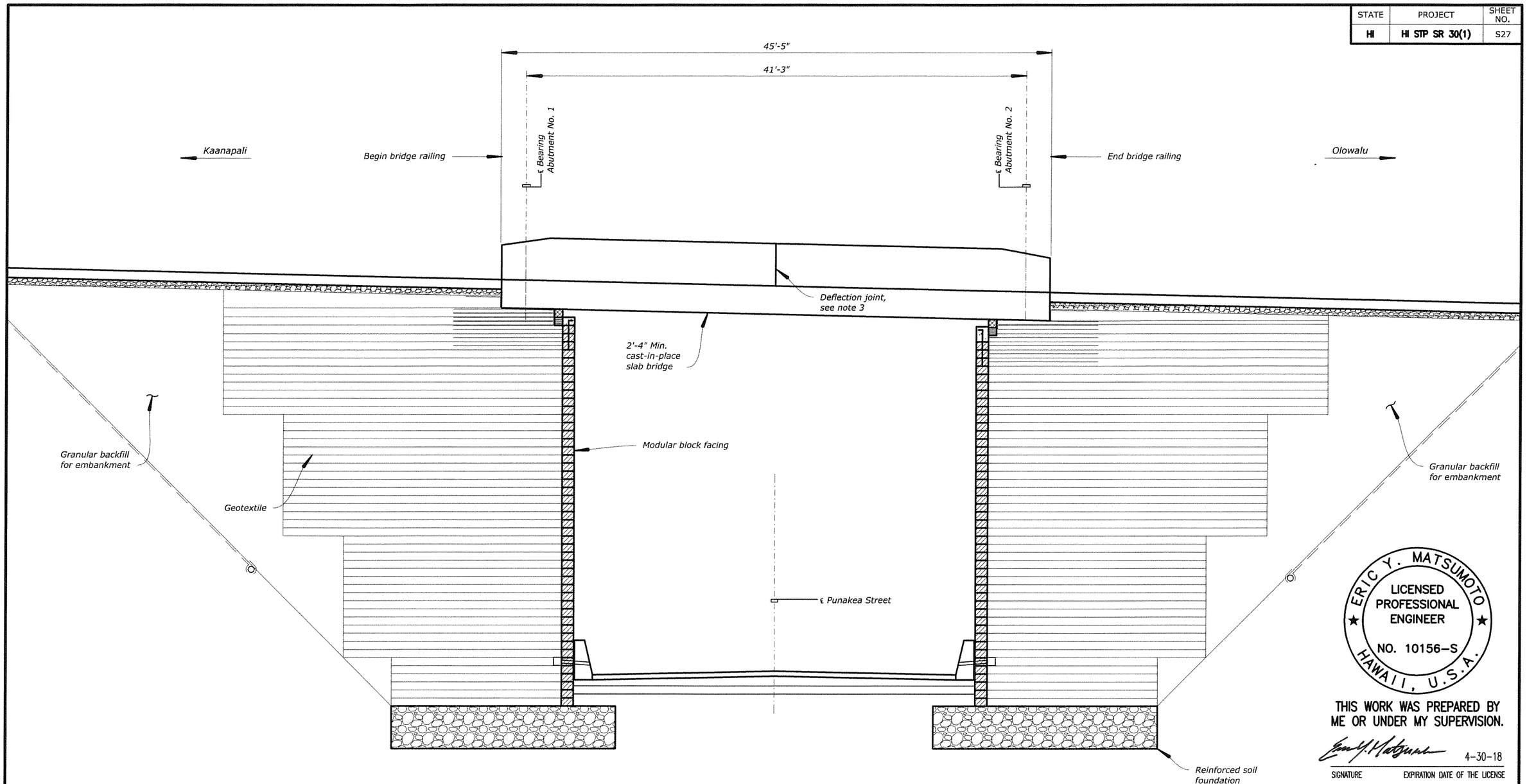
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S27



BRIDGE RAILING ELEVATION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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Note:

1. *Elevation view is on the Makai side facing Mauka.*
2. *Upstream railing is opposite hand.*
3. *See sheet S28 for deflection joint details.*

U.S. DEPARTMENT OF TRANSPORTATION
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BRIDGE RAILING ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	27 of 103	JUNE 1, 2017	RG3103-AA

DRAWING NO.:
FINAL DESIGN

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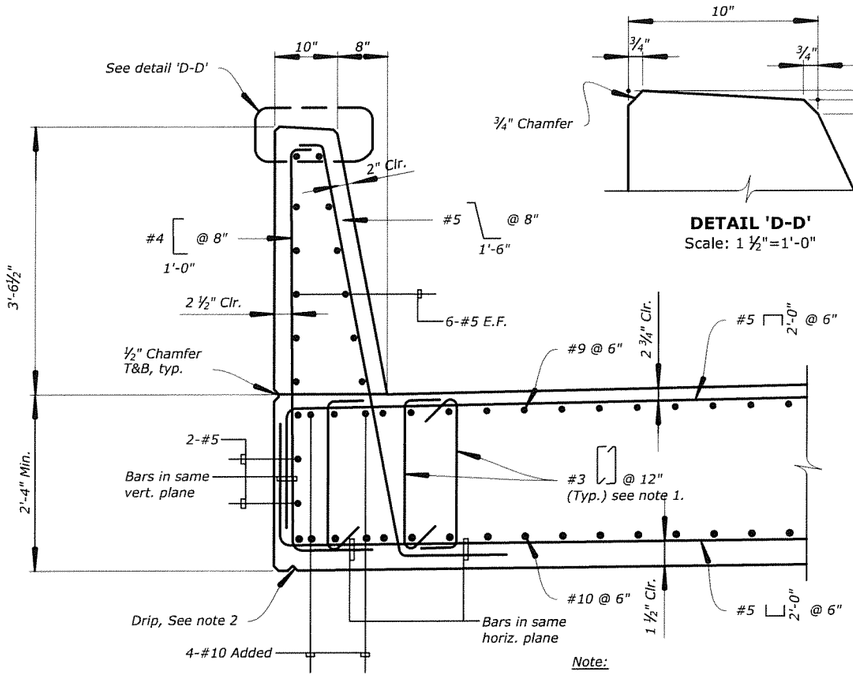
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S28



DETAIL 'A-A'
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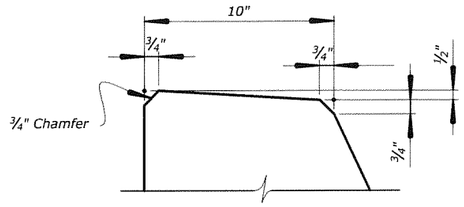

DETAIL 'D-D'
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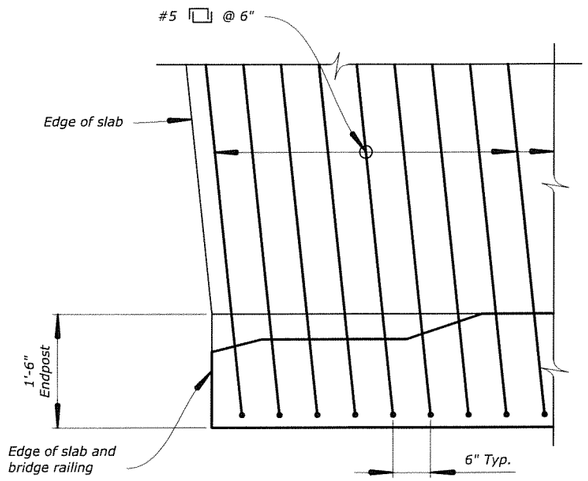

DETAIL 'B-B'
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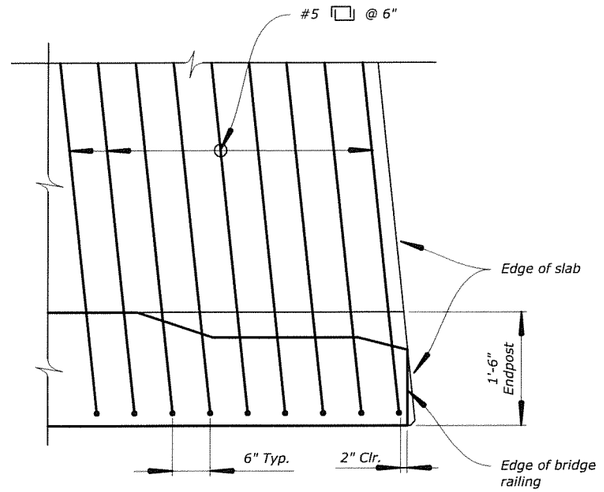
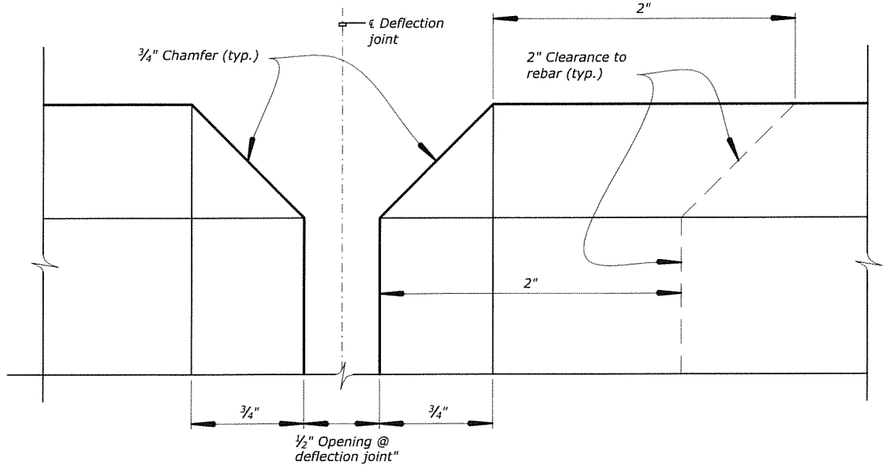


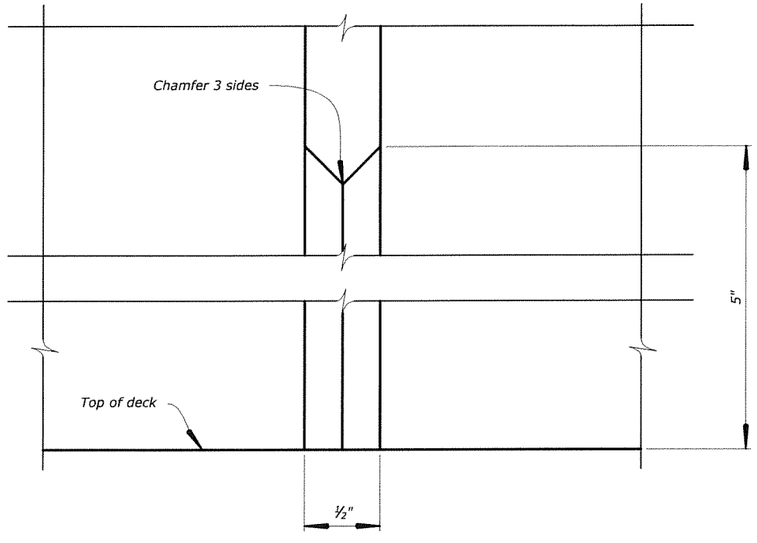
DETAIL 'C-C'
Scale: ½"=1'-0"

Note:

1. *Alternate 135° and 90° stirrups.*
2. *See sheet S37 for drip detail.*



TOP OF DEFLECTION JOINT DETAIL
Full Scale



BOTTOM OF DEFLECTION JOINT DETAIL
Full Scale

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156–S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BRIDGE RAILING DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	28 of 103	JUNE 1, 2017	RG3103-BB

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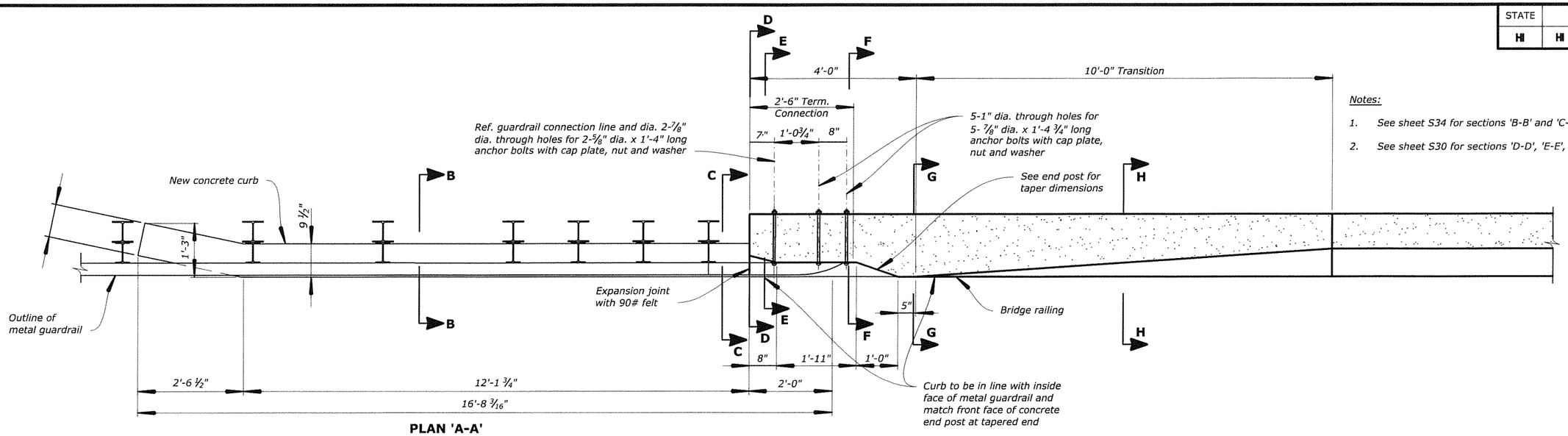
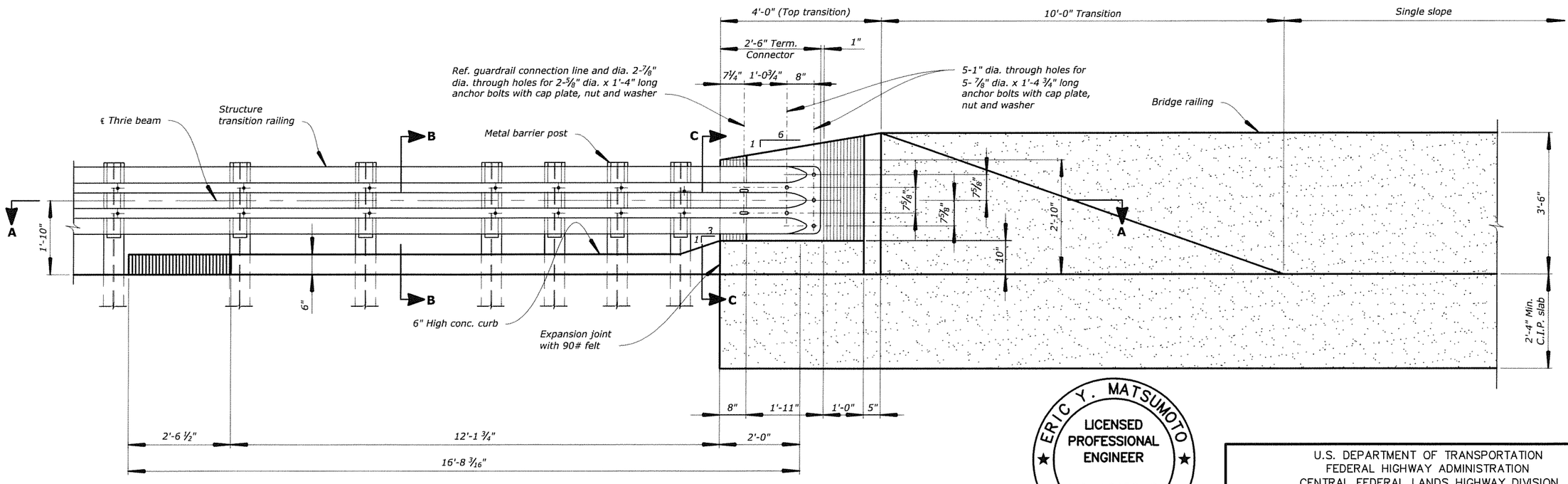
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S29



PLAN 'A-A'

Notes:

1. *See sheet S34 for sections 'B-B' and 'C-C'.*
2. *See sheet S30 for sections 'D-D', 'E-E', 'F-F', 'G-G', and 'H-H'.*



ELEVATION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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Eric Y. Matsumoto — 4-30-18
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

LAHAINA BYPASS ROAD BRIDGE RAILING AND STRUCTURE TRANSITION RAILING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	29 of 103	JUNE 1, 2017	RG3103-CC

DRAWING NO.: FINAL DESIGN

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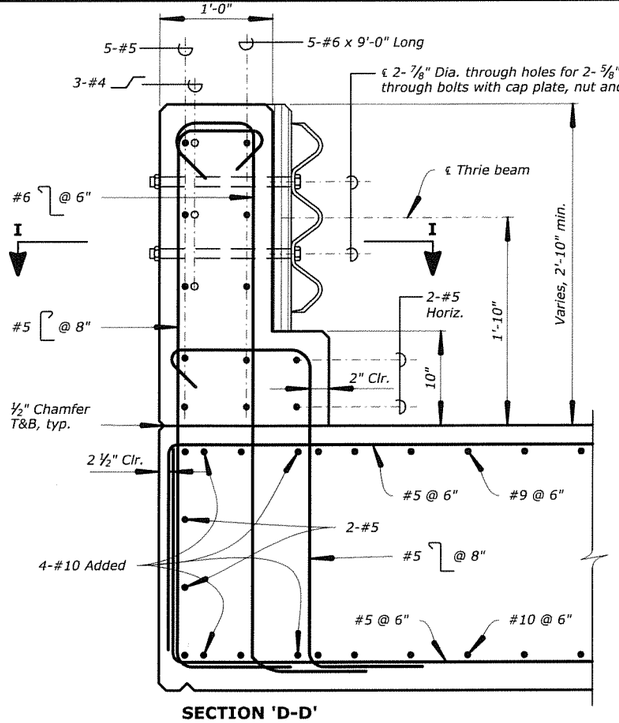
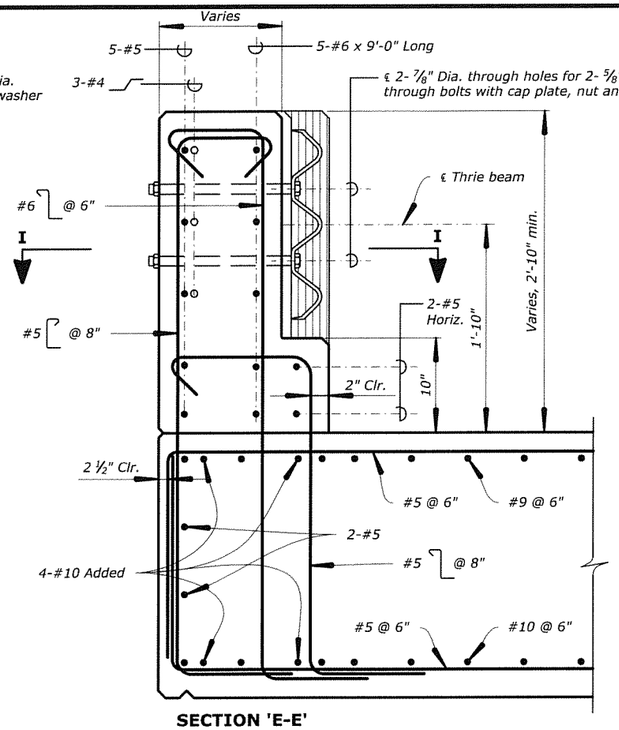
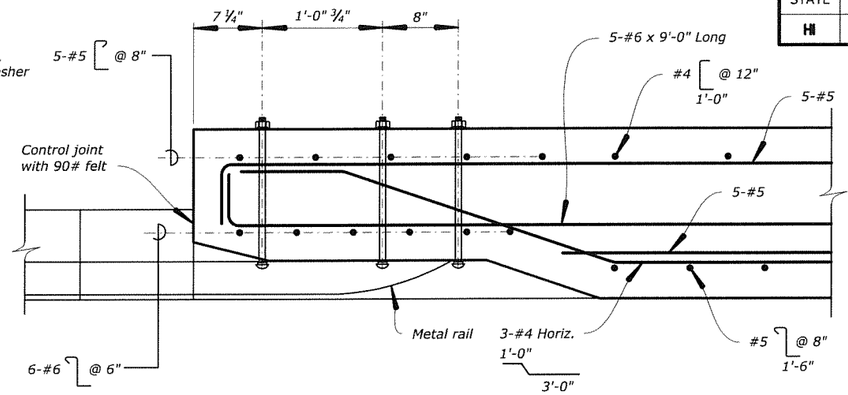
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S30



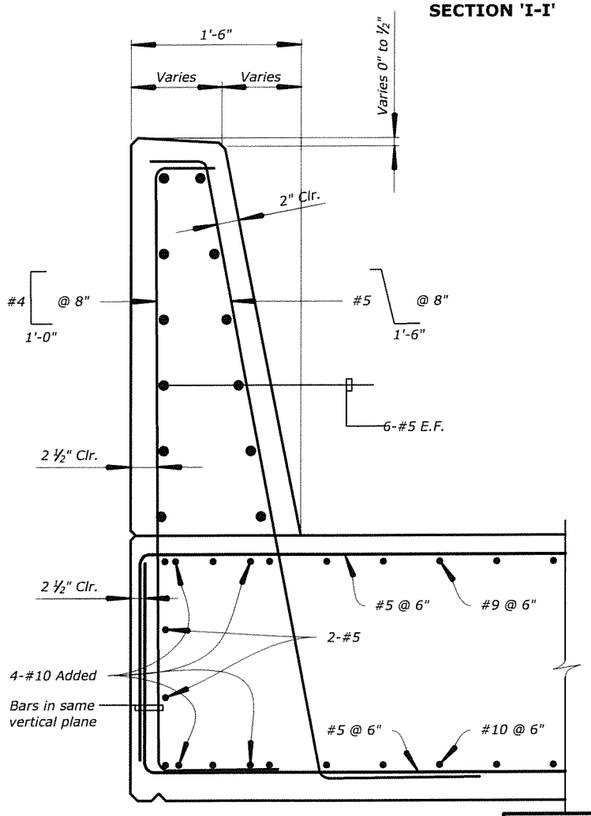
SECTION 'D-D'



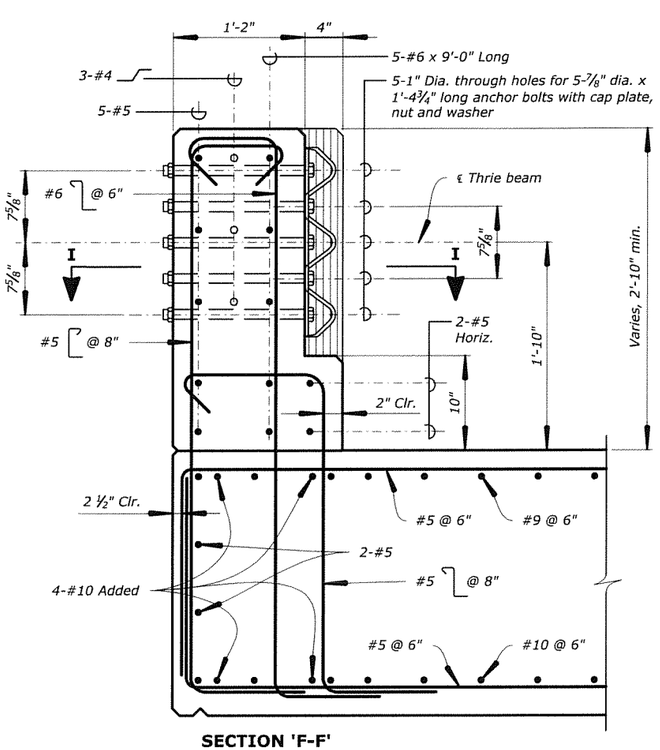
SECTION 'E-E'



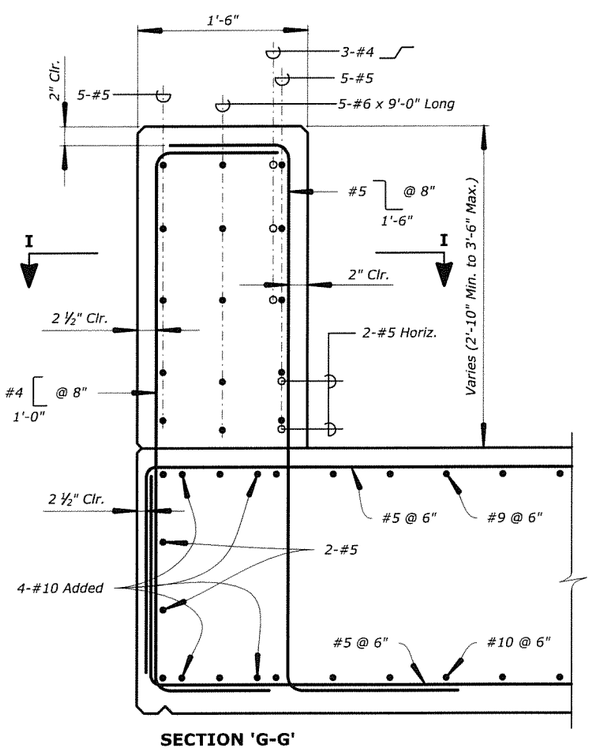
SECTION 'I-I'



SECTION 'H-H'



SECTION 'F-F'



SECTION 'G-G'

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

LAHAINA BYPASS ROAD BRIDGE RAILING SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	30 of 103	JUNE 1, 2017	RG3103-DD

DRAWING NO.:
FINAL DESIGN

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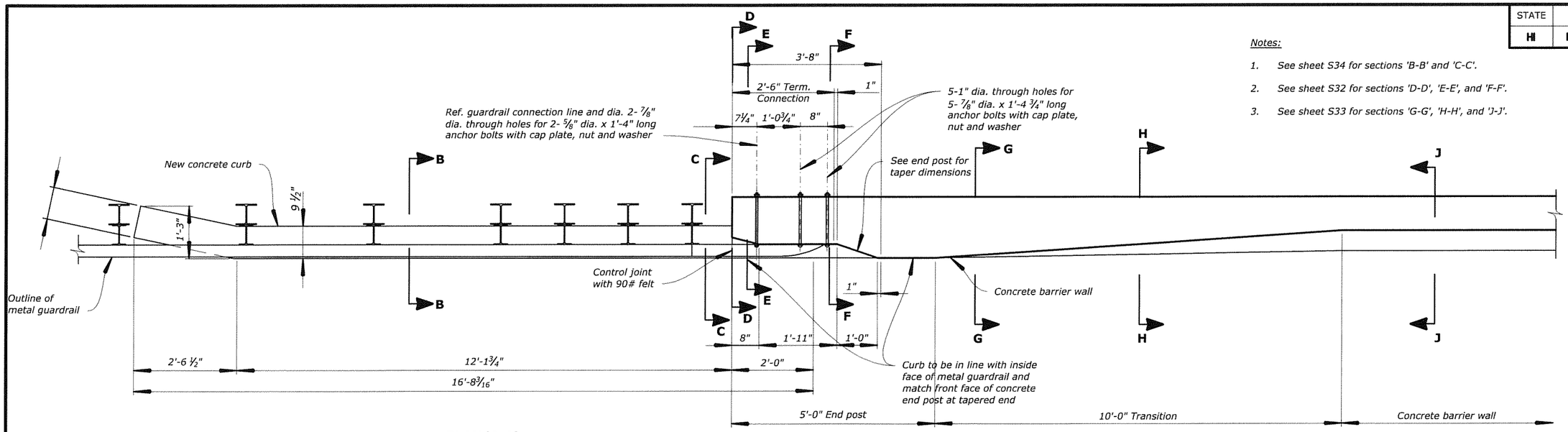
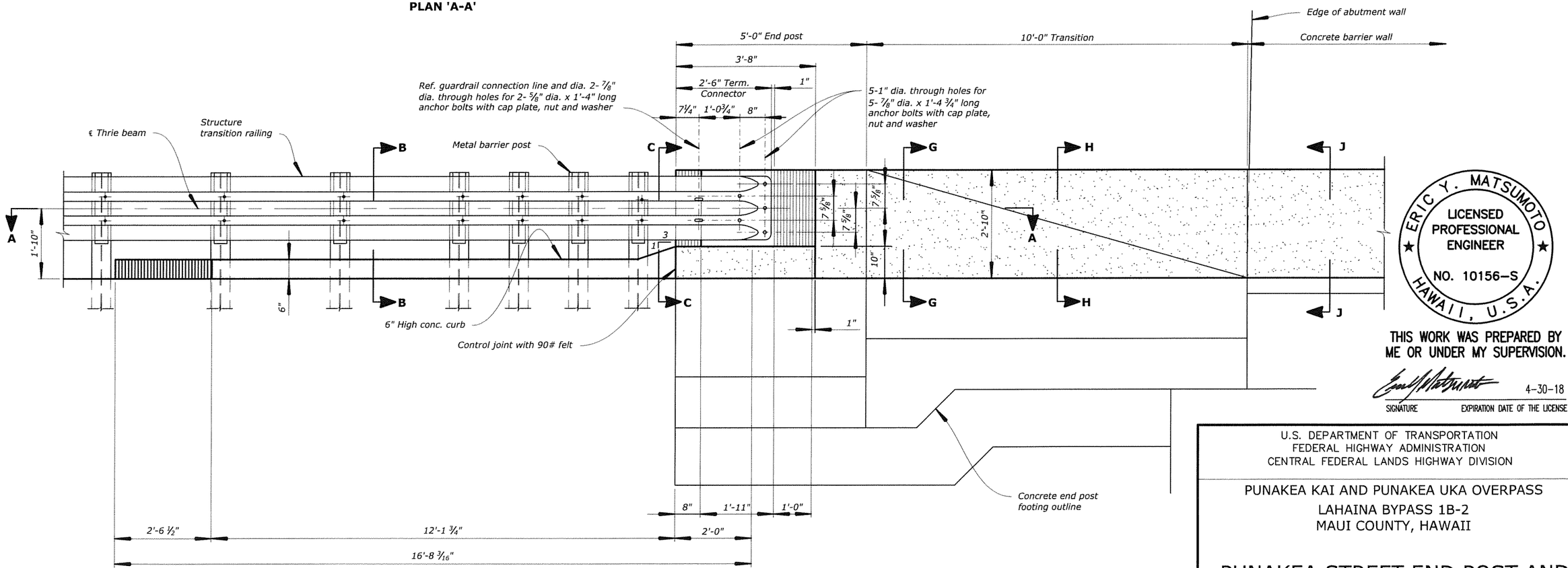
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S31

Notes:

1. *See sheet S34 for sections 'B-B' and 'C-C'.*
2. *See sheet S32 for sections 'D-D', 'E-E', and 'F-F'.*
3. *See sheet S33 for sections 'G-G', 'H-H', and 'J-J'.*



PLAN 'A-A'



ELEVATION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

PUNAKEA STREET END POST AND STRUCTURE TRANSITION RAILING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	31 of 103	JUNE 1, 2017	RG3103-EE

DRAWING NO.: FINAL DESIGN

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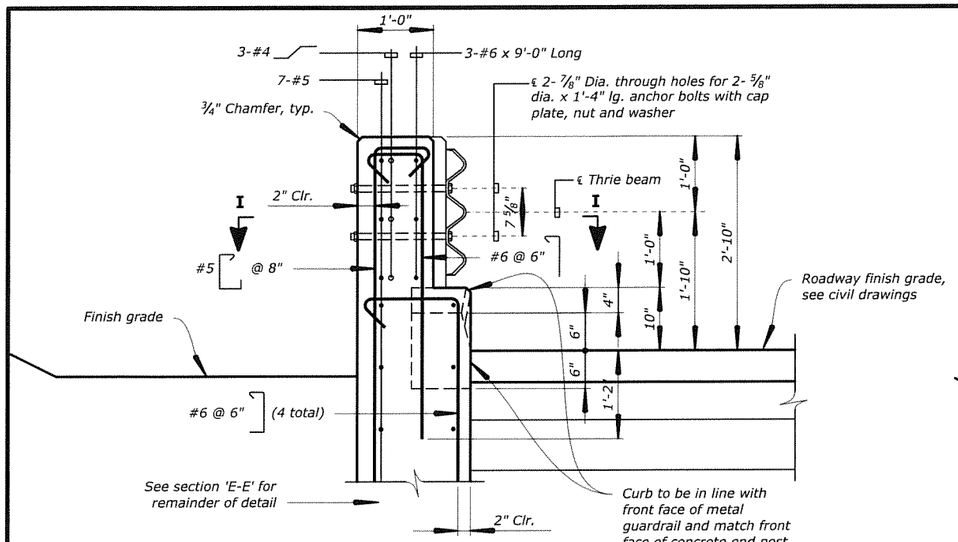
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S32



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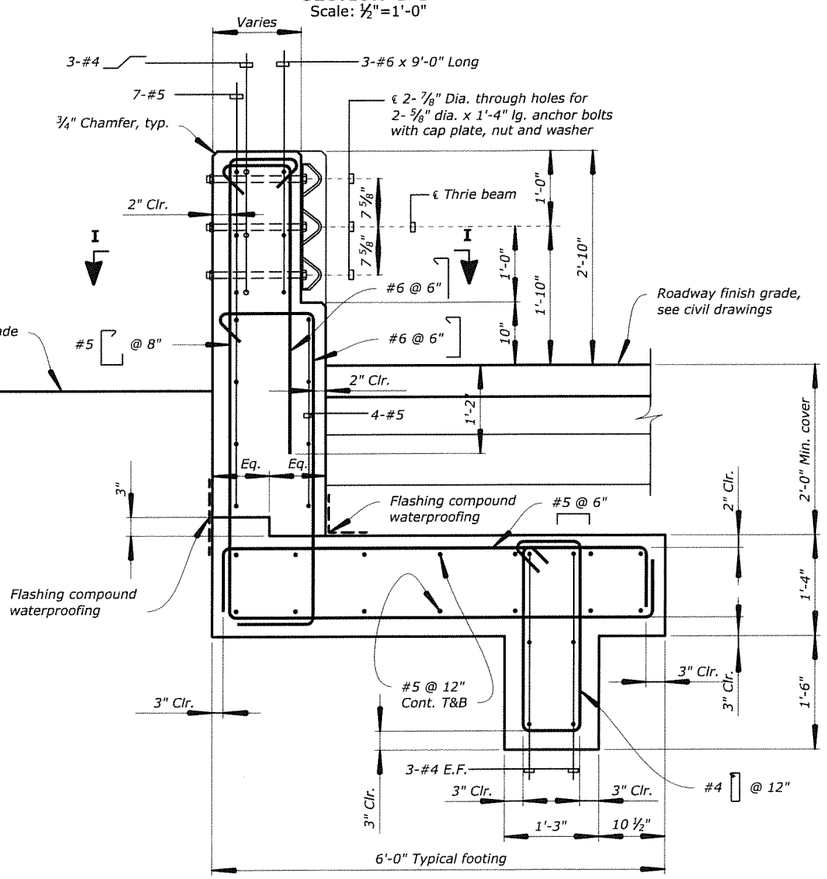

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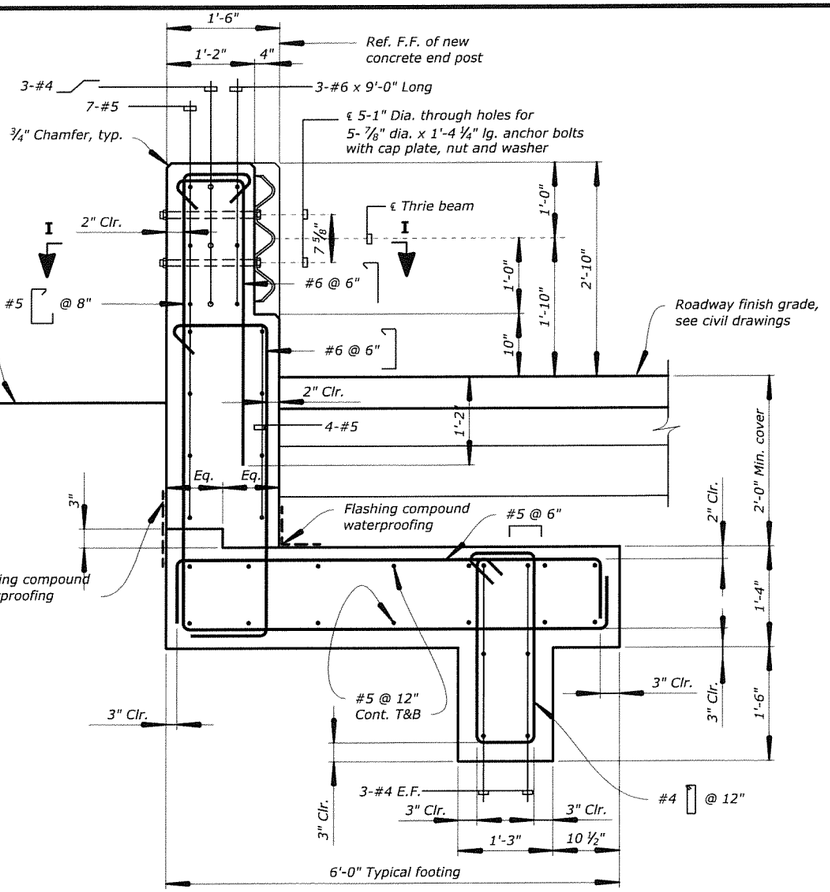

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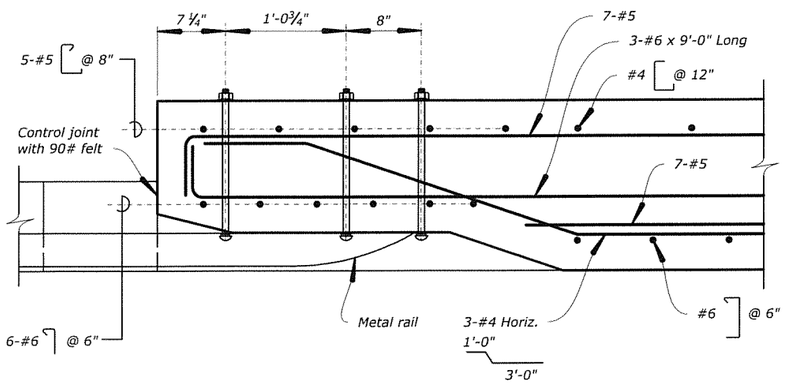

SECTION 'I-I'
Scale: ¾"=1'-0"

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE — EXPIRATION DATE OF THE LICENSE: 4-30-18

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

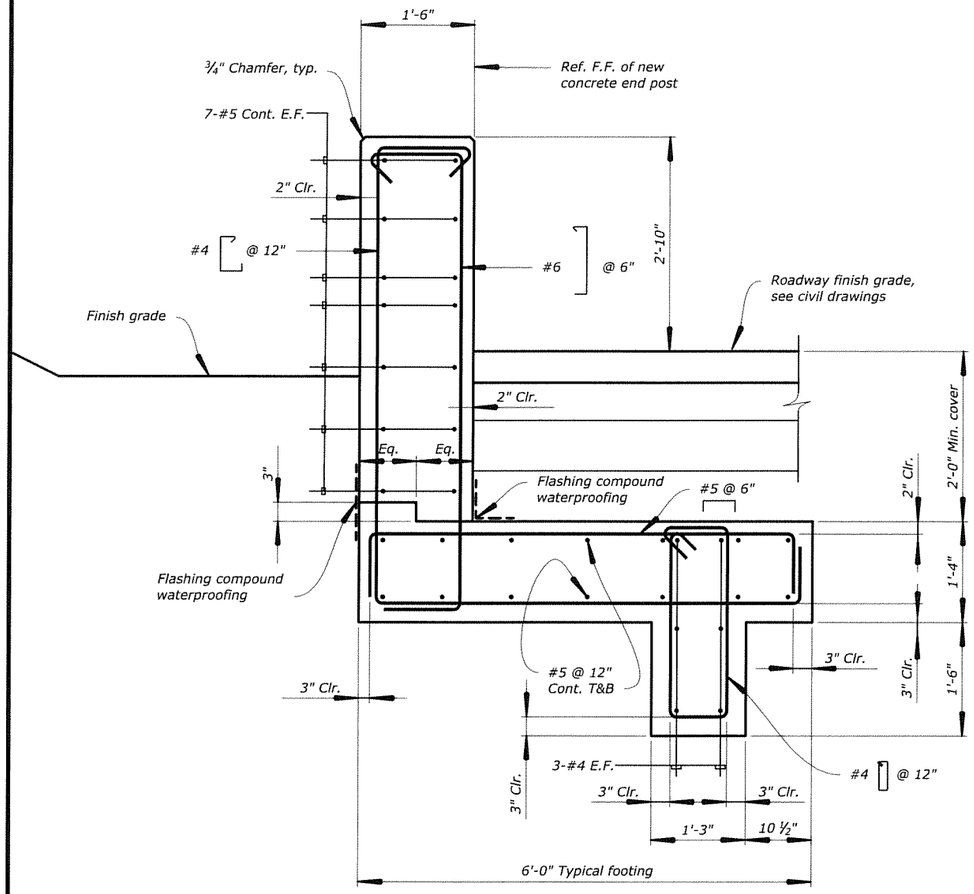
PUNAKEA STREET END POST SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	32 of 103	JUNE 1, 2017	RG3103-FF

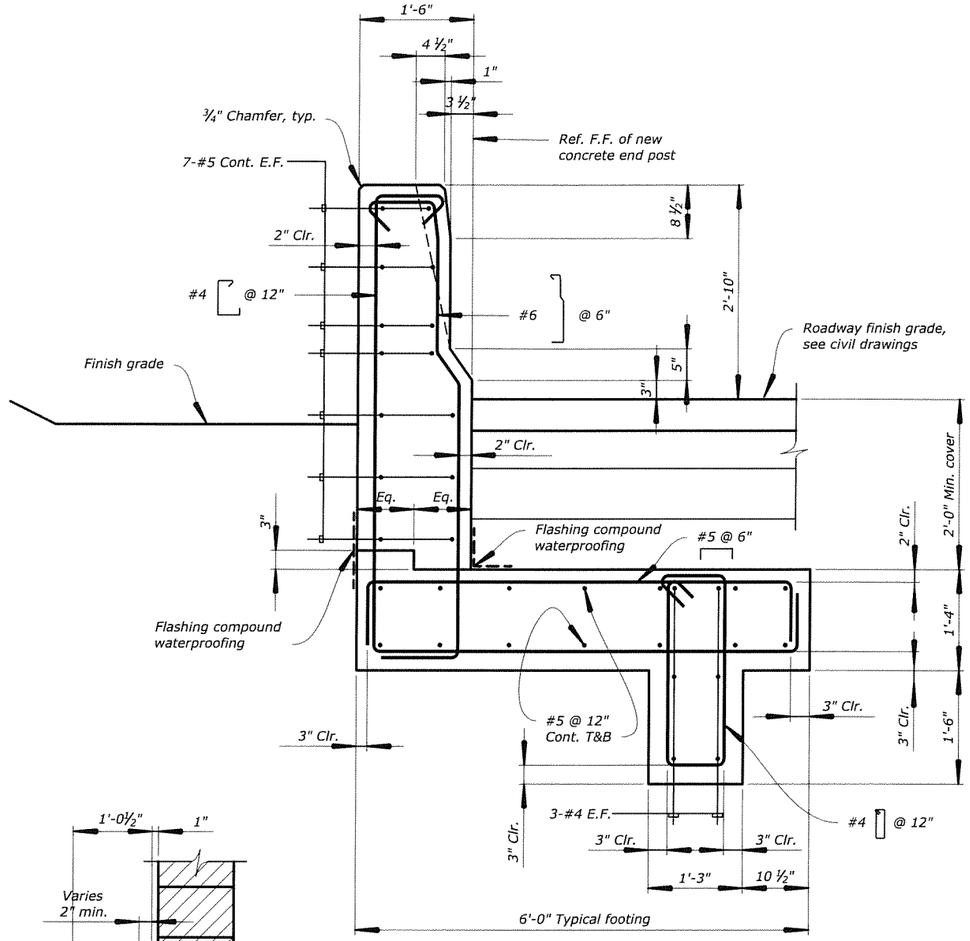
DRAWING NO.: FINAL DESIGN

3:12:13 PM

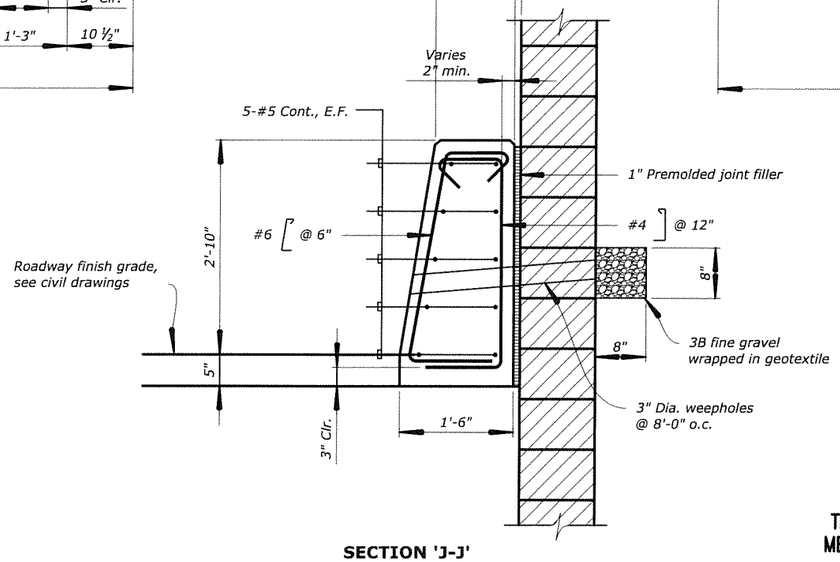
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S33



SECTION 'G-G'



SECTION 'H-H'



SECTION 'J-J'

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18
SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

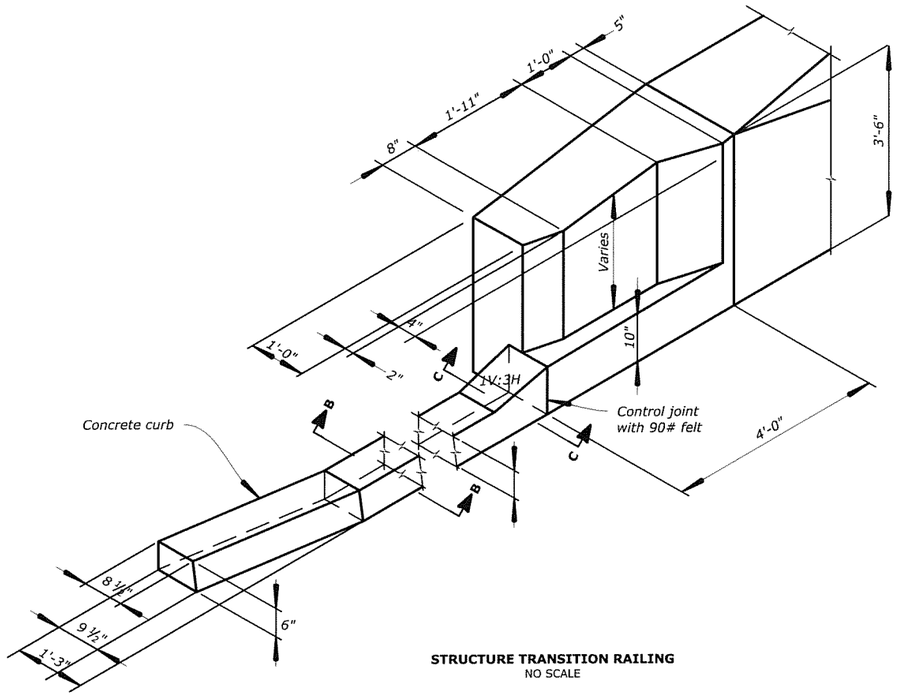
PUNAKEA STREET CONCRETE BARRIER & END POST SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	33 of 103	JUNE 1, 2017	RG3103-GG

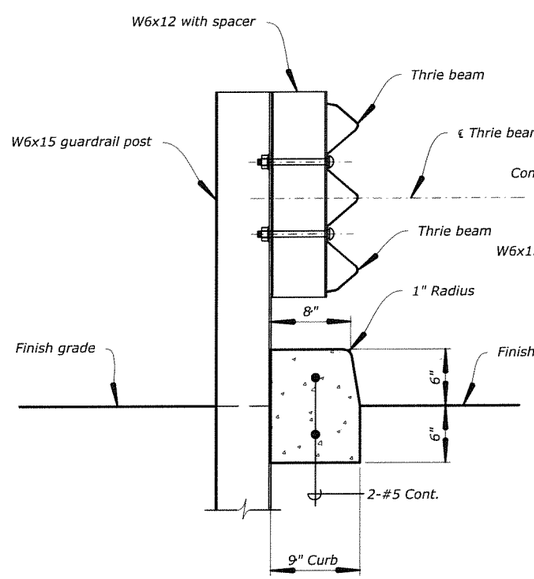
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

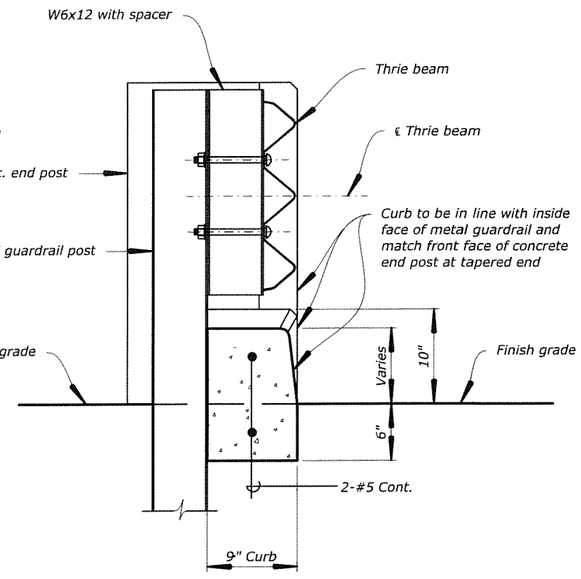
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S34



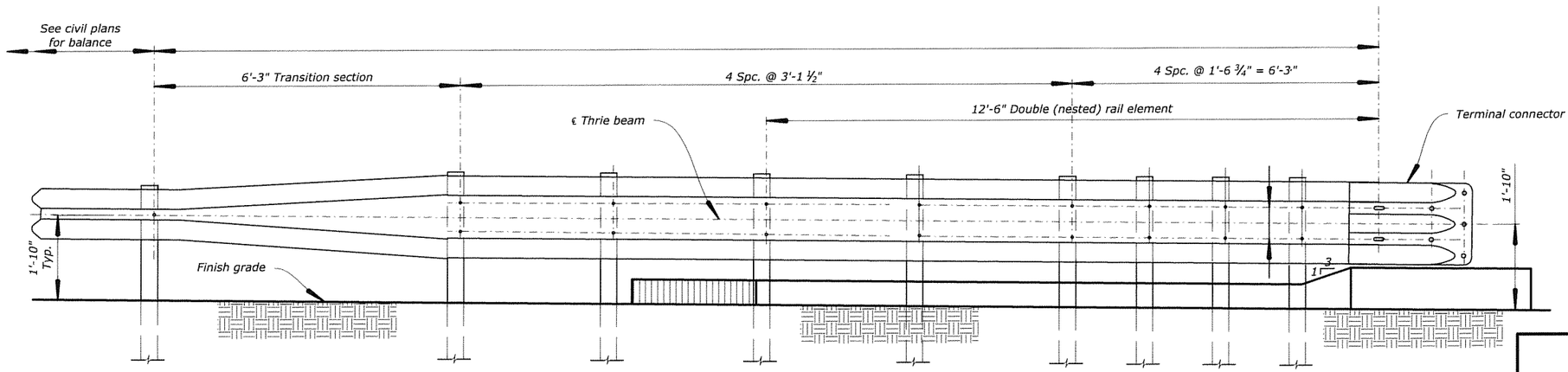
STRUCTURE TRANSITION RAILING
NO SCALE



SECTION 'B-B'
Scale: ¾"=1-0"



SECTION 'C-C'
Scale: ¾"=1-0"



TYPICAL STRUCTURE TRANSITION RAILING ELEVATION
Scale: ⅜"=1-0"

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

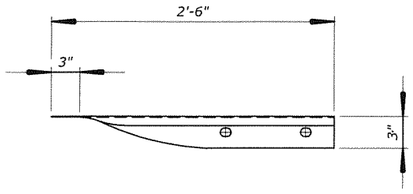
END POST AND STRUCTURE TRANSITION RAILING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	34 of 103	JUNE 1, 2017	RG3103-HH

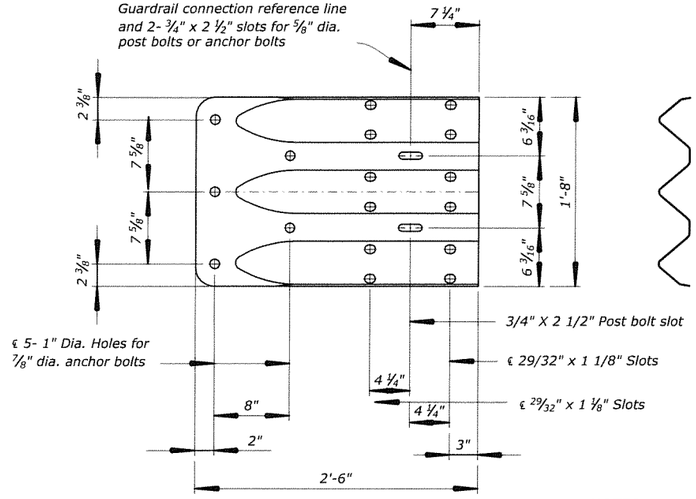
DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S35

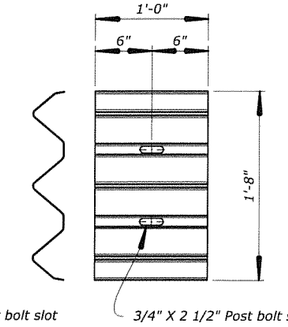


PLAN

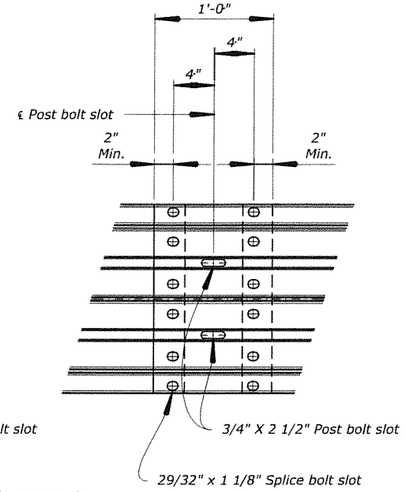


ELEVATION

TERMINAL CONNECTOR

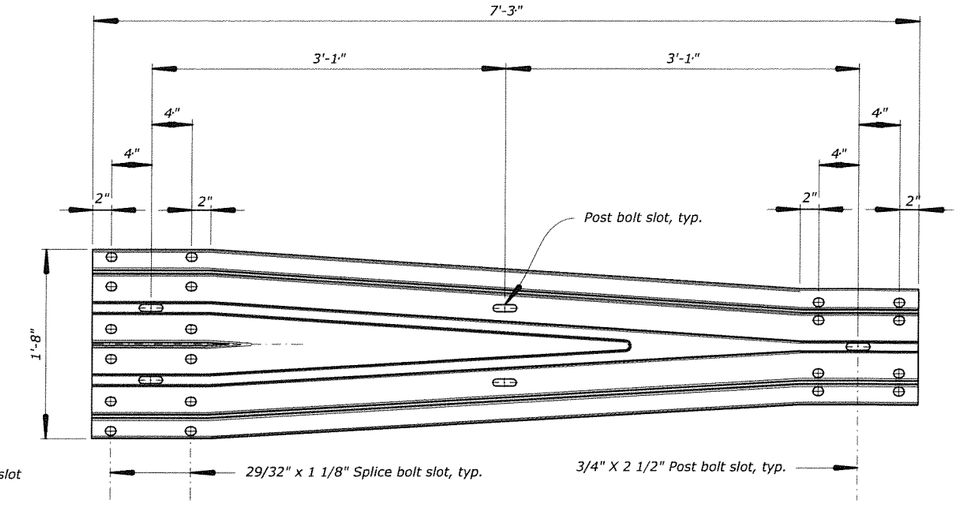


BACKUP PLATE



(Use at posts where splices do not occur)

RAIL SPLICE



TRANSITION SECTION

NOTES:

1. *The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and will not be paid for separately.*
2. *Lap terminal connector and rail element in direction of traffic to prevent snagging.*
3. *Splice bolt (FBB01), rail bolt (FBB02), and recessed nut shall conform to AASHTO M180 and be hot-dip galvanized in accordance with AASHTO M232, Class C.*
4. *Post hex bolt and nut shall conform to Section 617.*
5. *"Terminal Connector" and standard spacer, including all anchor bolts, nuts and washers, shall be hot-dip galvanized after fabrication.*
6. *"Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M180, Type II, Class B. All other rail shall conform to the requirements of AASHTO M180, Type II, Class A.*
7. *First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.*
8. *Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.*
9. *Where double (nested) beam occur, 12" "Back-Up Plate" not required.*
10. *Heads of through anchor bolts shall be placed on the traffic side of the rail.*
11. *W-beam structural steel shall conform to ASTM A992. Structural steel plates and bars shall conform to ASTM A36.*
12. *No bolts are to be cut after manufacturing and galvanizing.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18

SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

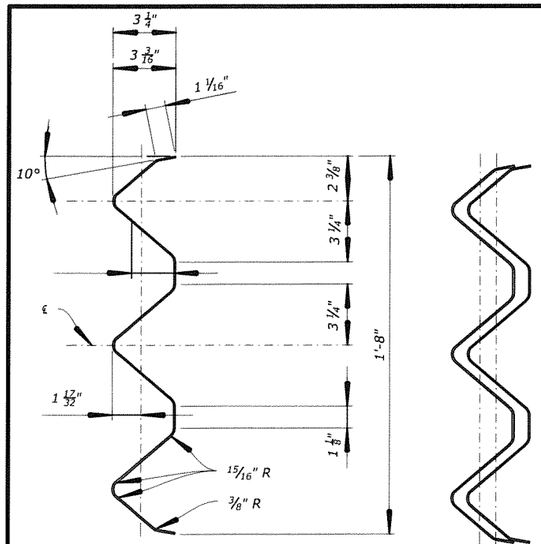
STRUCTURE TRANSITION RAILING NOTES AND DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	35 of 103	JUNE 1, 2017	RG3103-II

DRAWING NO.: FINAL DESIGN

3:12:13 PM

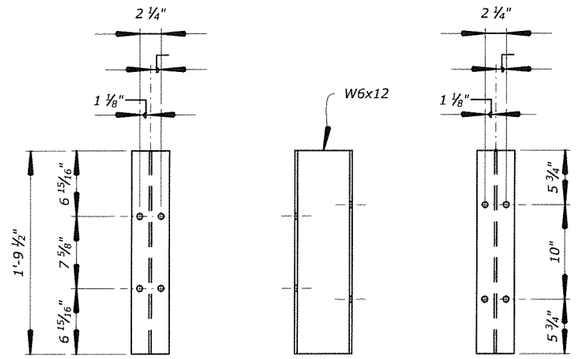
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S36



SINGLE

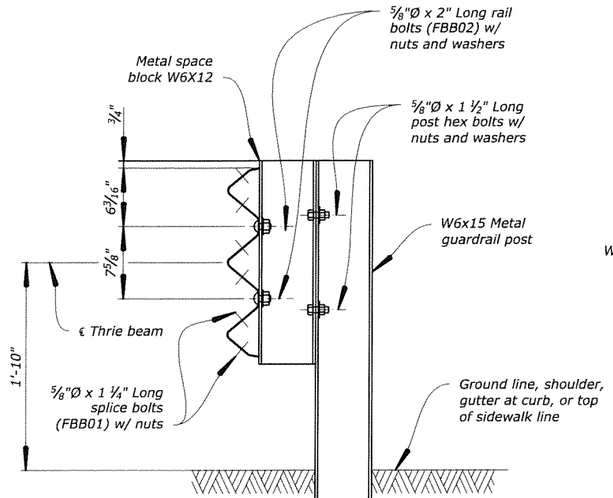
DOUBLE

SECTION THRU RAIL ELEMENT
Scale: 1 ½"=1'-0"

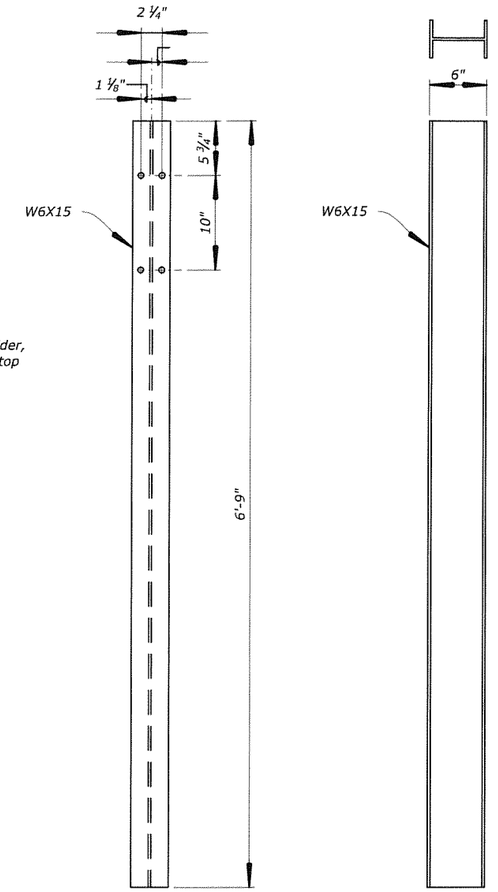


FRONT SIDE REAR

SPACER BLOCK DETAILS
Scale: ¾"=1-0"

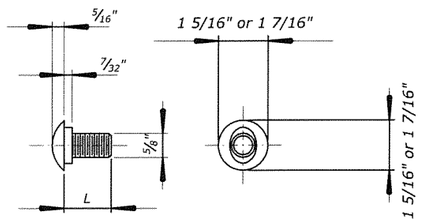


TYPICAL SECTION METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK
Scale: ¾"=1-0"

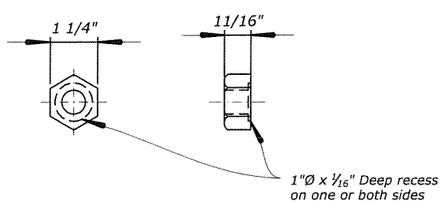


FRONT SIDE

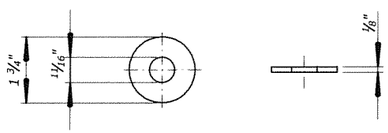
POST DETAILS
Scale: ¾"=1-0"



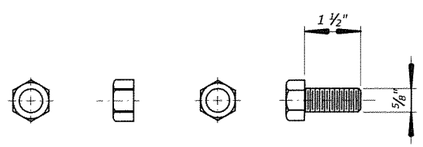
L	Thread Length
L	Full thread
L	1 ½" Min. thread length



5/8"Ø SPLICE (FBB01) & RAIL (FBB02) BOLT AND RECESS NUT
Scale: 3"=1'-0"



STEEL WASHER FOR 5/8"Ø BOLT
Scale: 3"=1'-0"



5/8"-11 HEX NUT 5/8"-11 HEX BOLT

5/8"Ø POST HEX BOLT AND NUT
Scale: 3"=1'-0"

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ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

4-30-18
SIGNATURE EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STRUCTURE TRANSITION RAILING DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	36 of 103	JUNE 1, 2017	RG3103-JJ

DRAWING NO.: FINAL DESIGN

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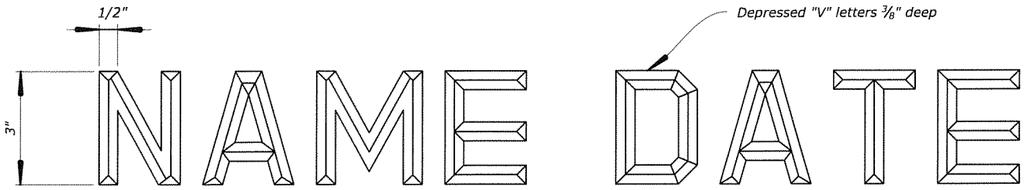
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S37



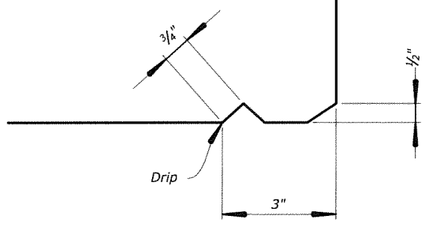
NAME OF BRIDGE

DATE OF YEAR BUILT

Notes:

1. *Exact details and spacing of letter and location shall be as directed by the CO. Gothic letters and figures approximating the dimensions shown will be acceptable if approved by the CO.*
2. *Name and date shall be placed on the trailing (exit) end post on each side of bridge.*
3. *Unless otherwise directed by the CO, the names of the bridges shall be "Punakea Uka Overpass" for mauka bridge and "Punakea Kai Overpass" for makai bridge. The year shall be the year at completion.*

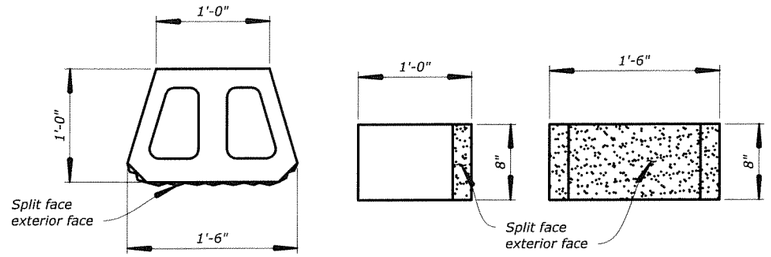
BRIDGE IDENTIFICATION DETAIL
Scale: 3"=1'-0"



Note:

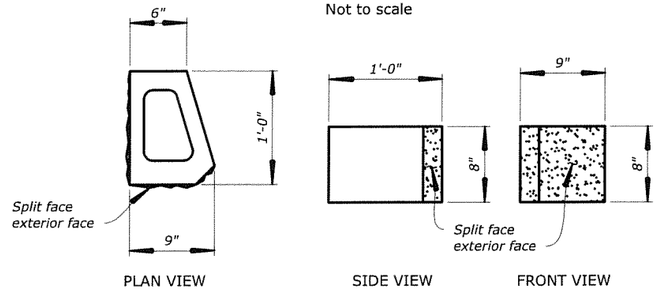
End continuous drip under concrete deck 6" from front face of abutment.

DRIP DETAIL
Scale: 3"=1'-0"



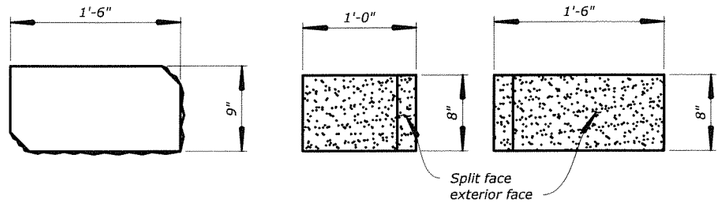
PLAN VIEW SIDE VIEW FRONT VIEW

TYPICAL GRS FULL MODULAR BLOCK FACING ELEMENT
Not to scale



PLAN VIEW SIDE VIEW FRONT VIEW

TYPICAL GRS HALF MODULAR BLOCK FACING ELEMENT
Not to scale



PLAN VIEW SIDE VIEW FRONT VIEW

TYPICAL GRS CORNER MODULAR BLOCK FACING ELEMENT
Not to scale

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

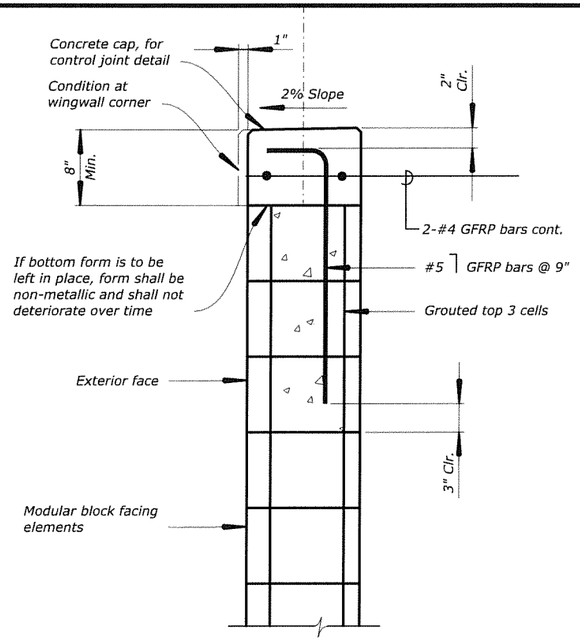
TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	37 of 103	JUNE 1, 2017	RG3103-KK

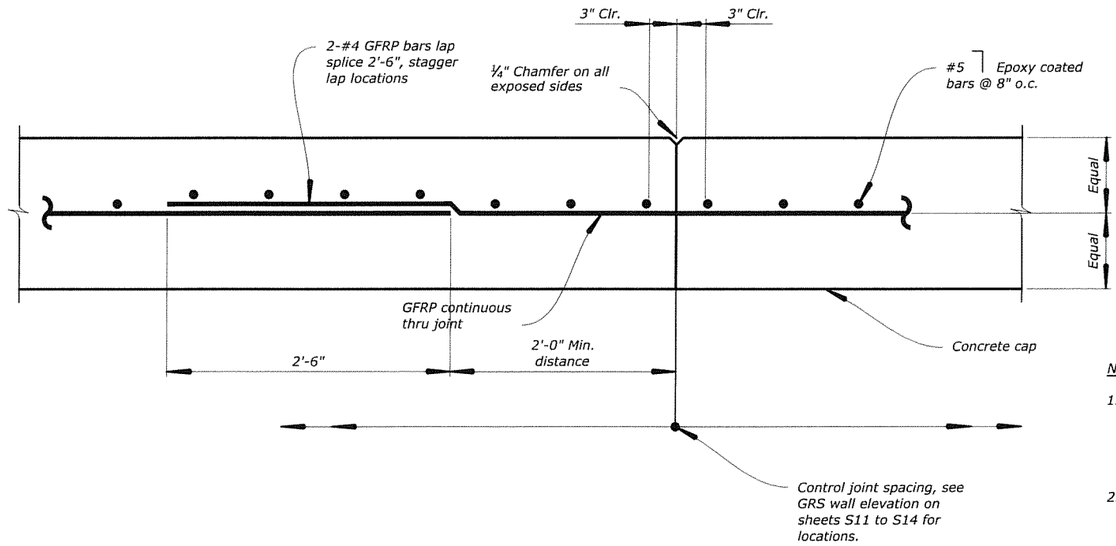
DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S38



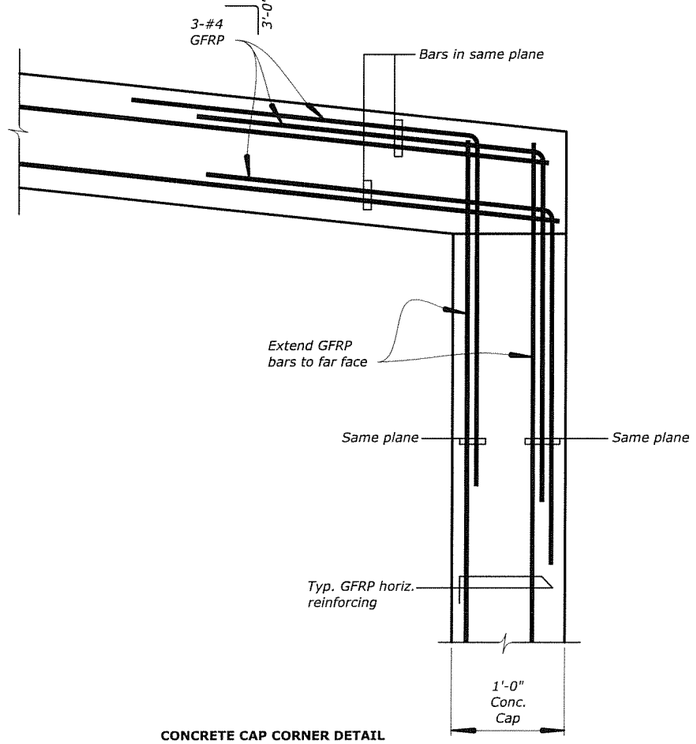
CONCRETE CAP DETAIL
Scale: ¾"=1'-0"



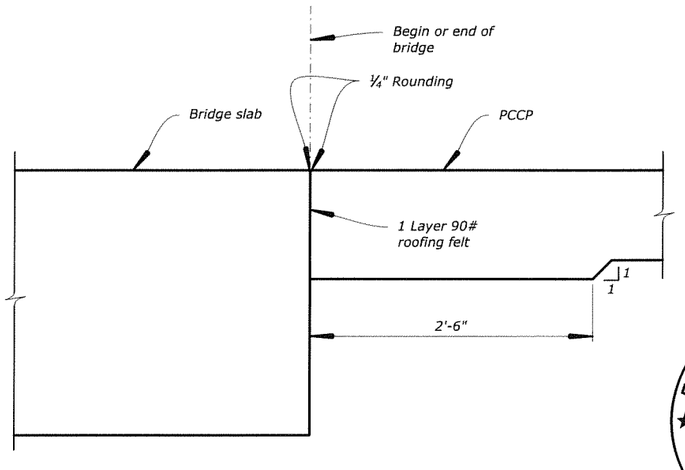
TYPICAL CONCRETE CAP CONTROL JOINT DETAIL
Not to scale

Notes:

1. Control joint shall be constructed before uncontrolled shrinkage cracking occurs, but only after concrete has hardened sufficiently to prevent excessive tearing or ravelling, or both during sawing operations.
2. GRS abutment wall not shown for clarity.



CONCRETE CAP CORNER DETAIL
Scale: ¾"=1'-0"



EXPANSION JOIN DETAIL
Scale: ¾"=1'-0"

Note:

Cover seams or defects in the exposed geocomposite plastic or geotextile fabric with a geotextile fabric.

DRAIN DETAIL
Not to scale

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
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HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

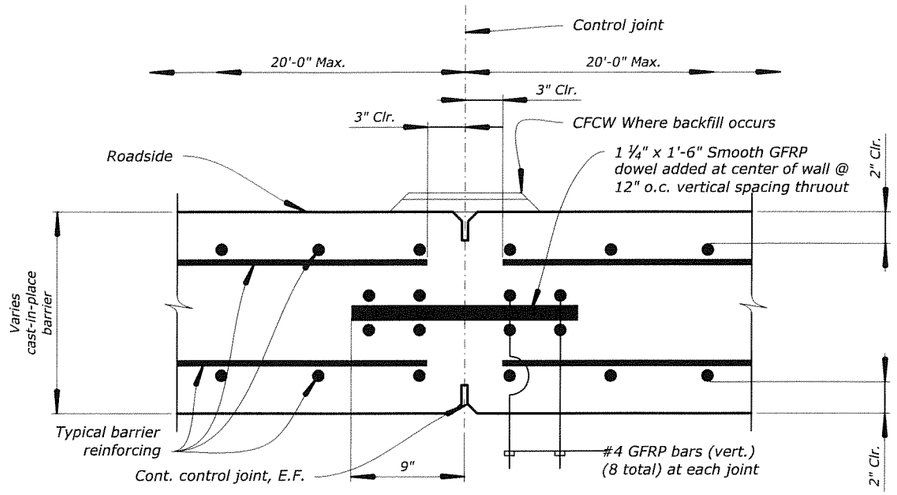
TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	38 of 103	JUNE 1, 2017	RG3103-LL

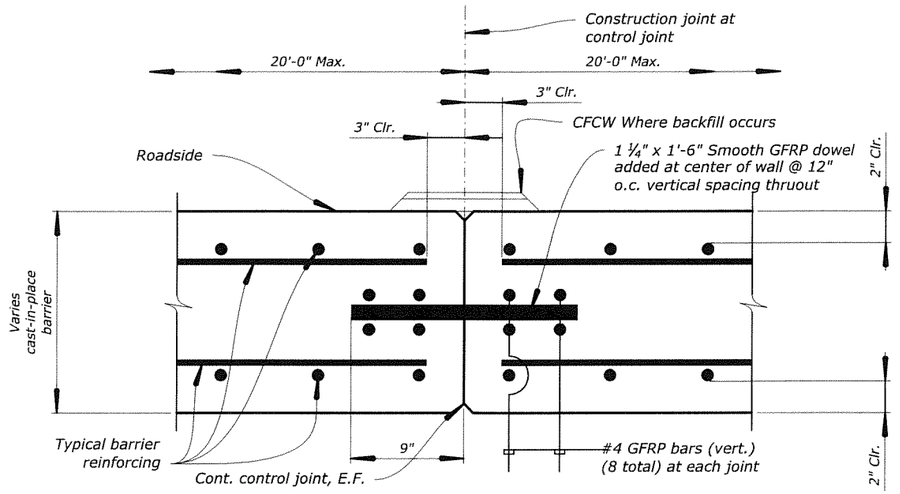
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

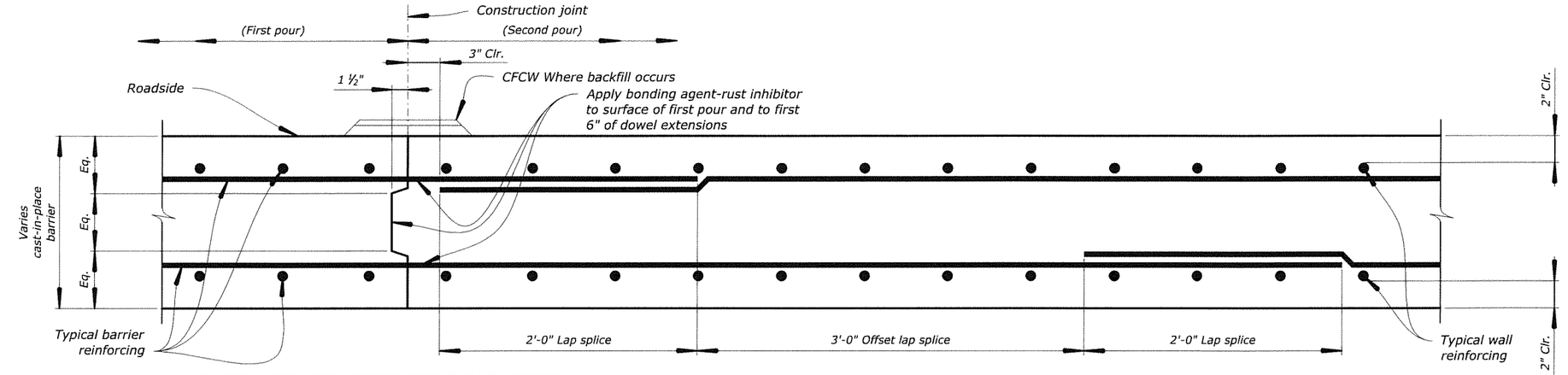
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S39



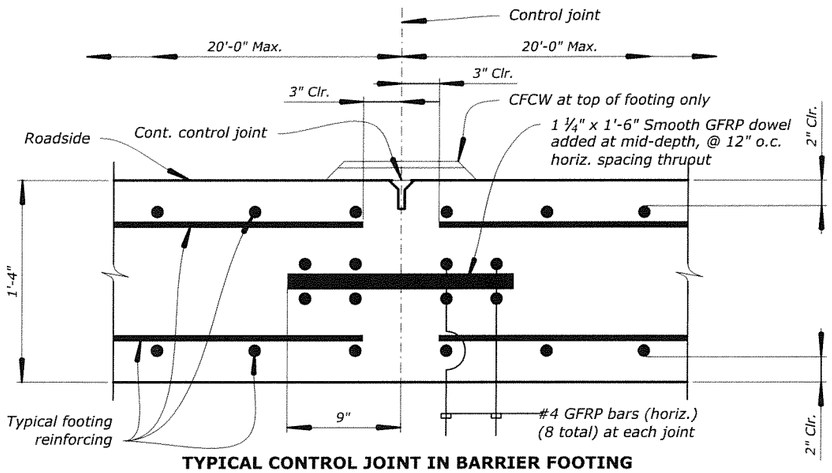
TYPICAL CONTROL JOINT IN BARRIER WALL



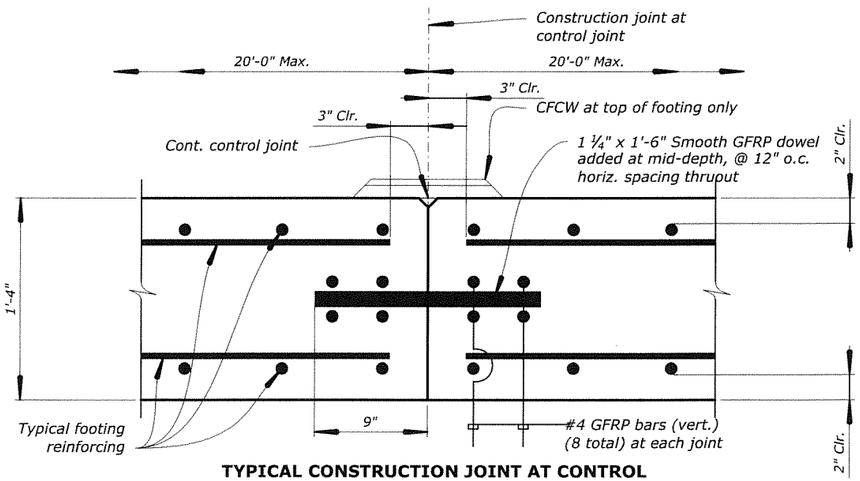
TYPICAL CONSTRUCTION JOINT AT CONTROL JOINT LOCATION IN BARRIER WALL



TYPICAL CONSTRUCTION JOINT IN BARRIER WALL



TYPICAL CONTROL JOINT IN BARRIER FOOTING



TYPICAL CONSTRUCTION JOINT AT CONTROL JOINT LOCATION IN BARRIER FOOTING

Note:

1. *See sheets S11 and S12 for joint locations.*

ERIC Y. MATSUMOTO
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NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE — EXPIRATION DATE OF THE LICENSE: 4-30-18

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

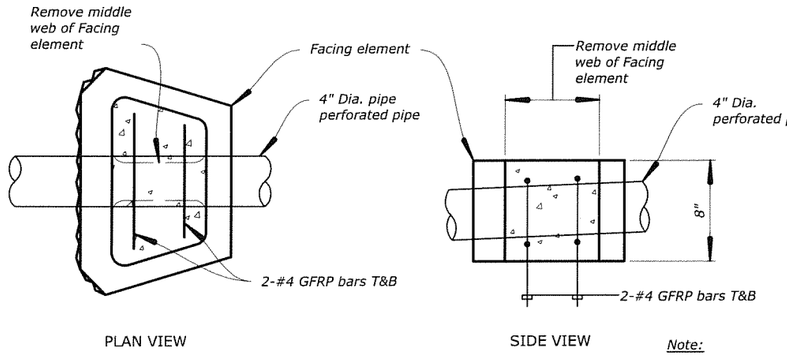
TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=1'-0"	D. FUJIWARA	39 of 103	JUNE 1, 2017	RG3103-MM

DRAWING NO.: FINAL DESIGN

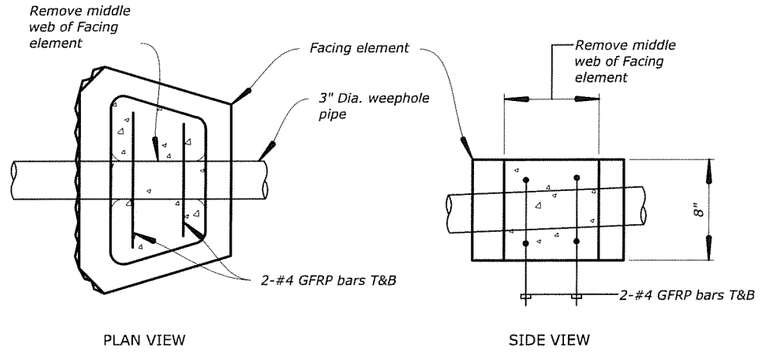
3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S40



PLAN VIEW SIDE VIEW

PERFORATED PIPE THROUGH MODULAR BLOCK FACING ELEMENT
Scale: 1"=1'-0"

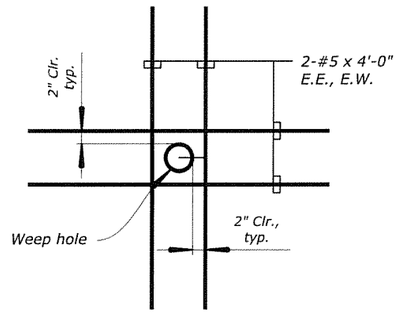


PLAN VIEW SIDE VIEW

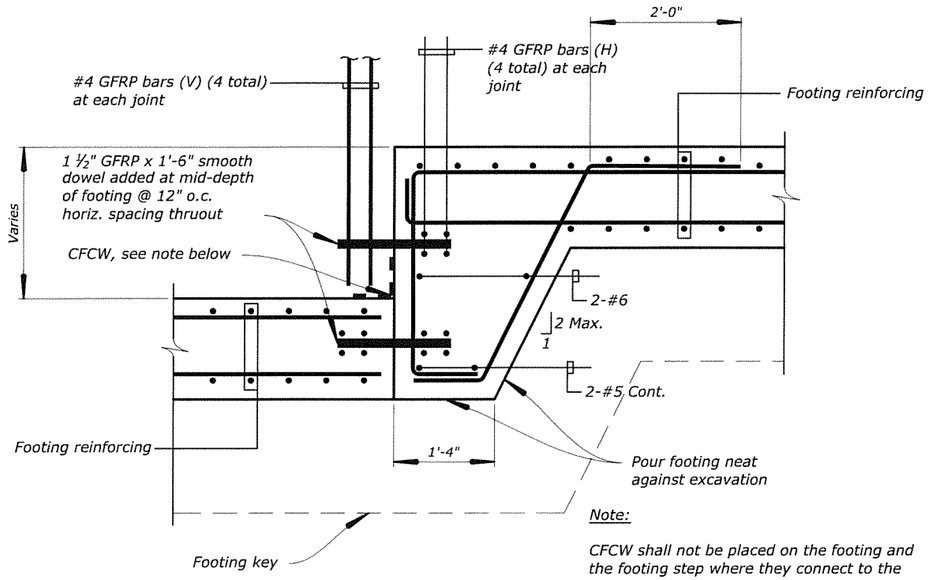
PERFORATED PIPE THROUGH FACING ELEMENT
Scale: 1"=1'-0"

Note:

1. *All GFRP bars shall have a minimum concrete cover of ¾".*
2. *Fill facing element with perforated pipe with grout.*



ADDED REINFORCING AT WEEP HOLES
No Scale



Note:

CFCW shall not be placed on the footing and the footing step where they connect to the vertical stem of retaining wall.

TYPICAL STEP FOOTING
No Scale

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

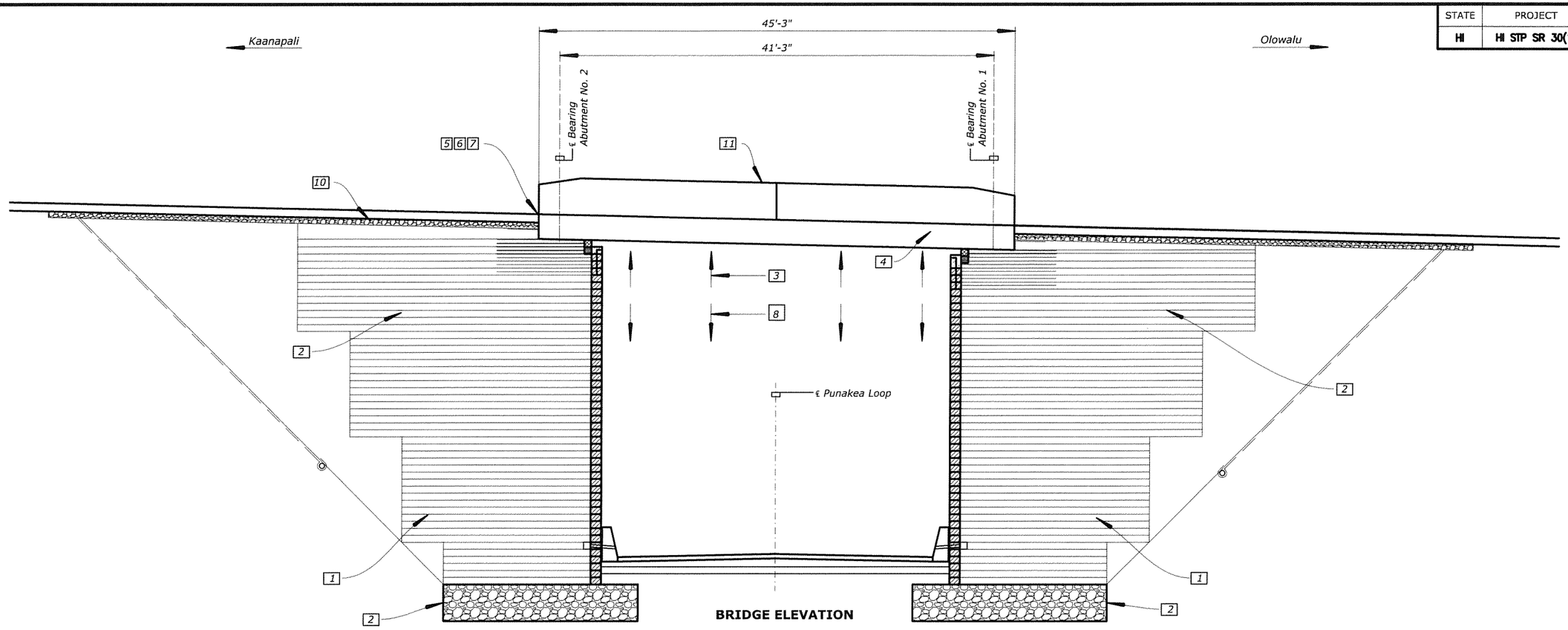
TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	40 of 103	JUNE 1, 2017	RG3103-NN

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S41



BRIDGE ELEVATION

CONSTRUCTION SEQUENCE:

1 *Excavate for RSF (Reinforced Soil Foundation).*

2 *Construct RSF and GRS system.*

3 *Erect falsework and forms.*

4 *Cast slab.*

5 *Post-tension one strand to 30k in each tendon at f'c=2,000 psi and 24 hours after casting slab in stage 4.*

6 *Post-tension remainder of slab tendons to 44k after 3 days and f'c = 3,000 psi.*

7 *Grout tendons and fill pockets.*

8 *Release falsework and forms after 14 days from stage 5.*

9 *Waterproof joints.*

10 *Backfill.*

11 *Construct bridge railing.*

12 *Grind and groove deck slab.*

13 *Bridge may be opened for traffic after the concrete slab and bridge railing have attained a compressive strength of 6,000 psi and 5,000 psi, respectively and at least 10 days after the newest pour.*

CONSTRUCTION SEQUENCE NOTES:

1. *Order of construction sequence shall not be changed.*
2. *Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The CO will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.*
3. *Contractor shall submit overweight vehicular details for approval prior to their use.*

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

PUNAKEA KAI AND PUNAKEA UKA OVERPASS
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

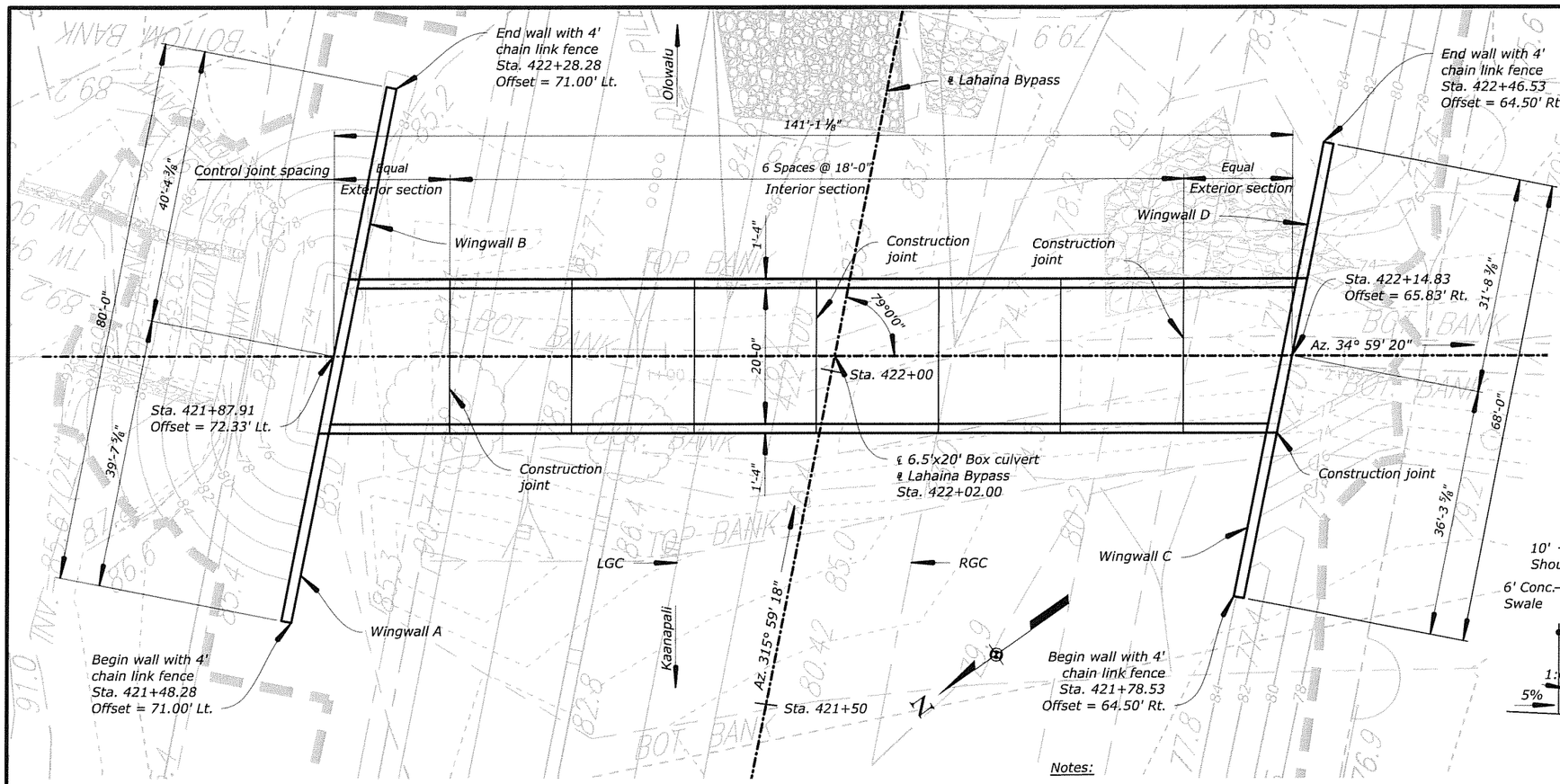
BRIDGE CONSTRUCTION SEQUENCE

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/32"=1'-0"	D. FUJIWARA	41 of 103	JUNE 1, 2017	RG3103-00

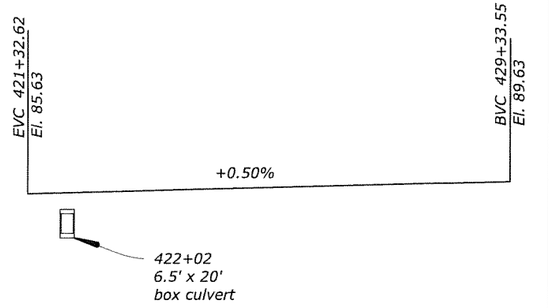
DRAWING NO.: FINAL DESIGN

3:12:13 PM

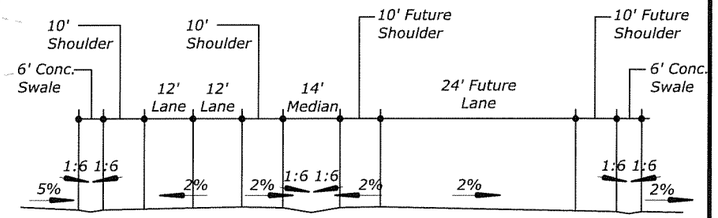
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S42



STA. 422+02
6.5'x20' BOX CULVERT PLAN
Scale: 1"=20'



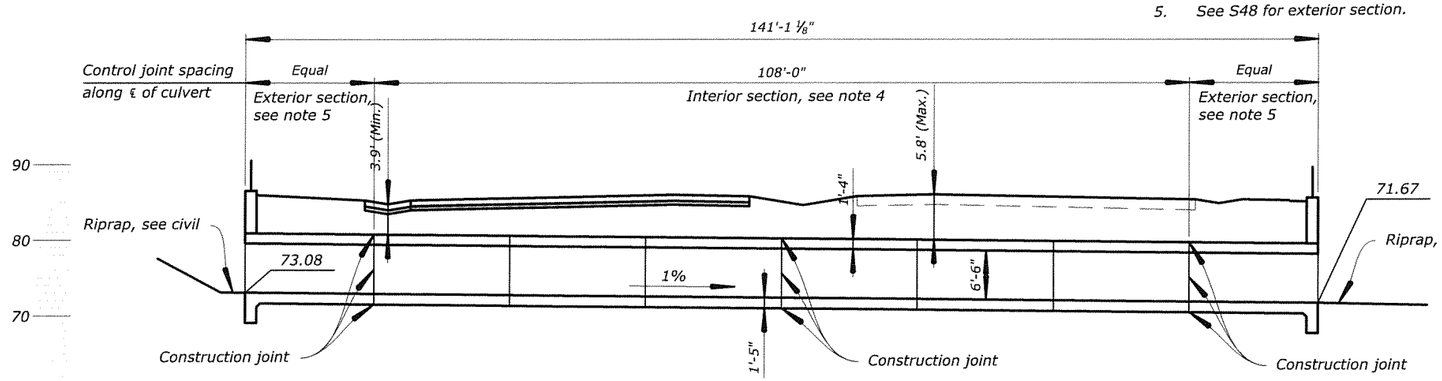
PROFILE GRADE DIAGRAM
No scale



TYPICAL ROADWAY SECTION
No scale

Notes:

1. *Control joints shall be used as construction joints as shown.*
2. *Stations and offsets for begin wall and end wall are at the centerline of the wall.*
3. *Stations and offsets shown on centerline box culvert are taken at the face of wall.*
4. *See S47 for interior section.*
5. *See S48 for exterior section.*



STA. 422+02
6.5'x20' BOX CULVERT LONGITUDINAL SECTION
Scale: 1"=20'

HYDRAULIC DATA			
Return Years	*Q (cfs)*	*WSEL (ft)*	*Velocity (ft/s)*
2-year	*67*	*73.78*	*7.09*
5-year	*206*	*74.57*	*10.17*
50-year	*841*	*76.88*	*15.35*
100-year	*1117*	*77.67*	*16.53*

ERIC Y. MATSUMOTO
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HAWAII, U.S.A.

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4-30-18
SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

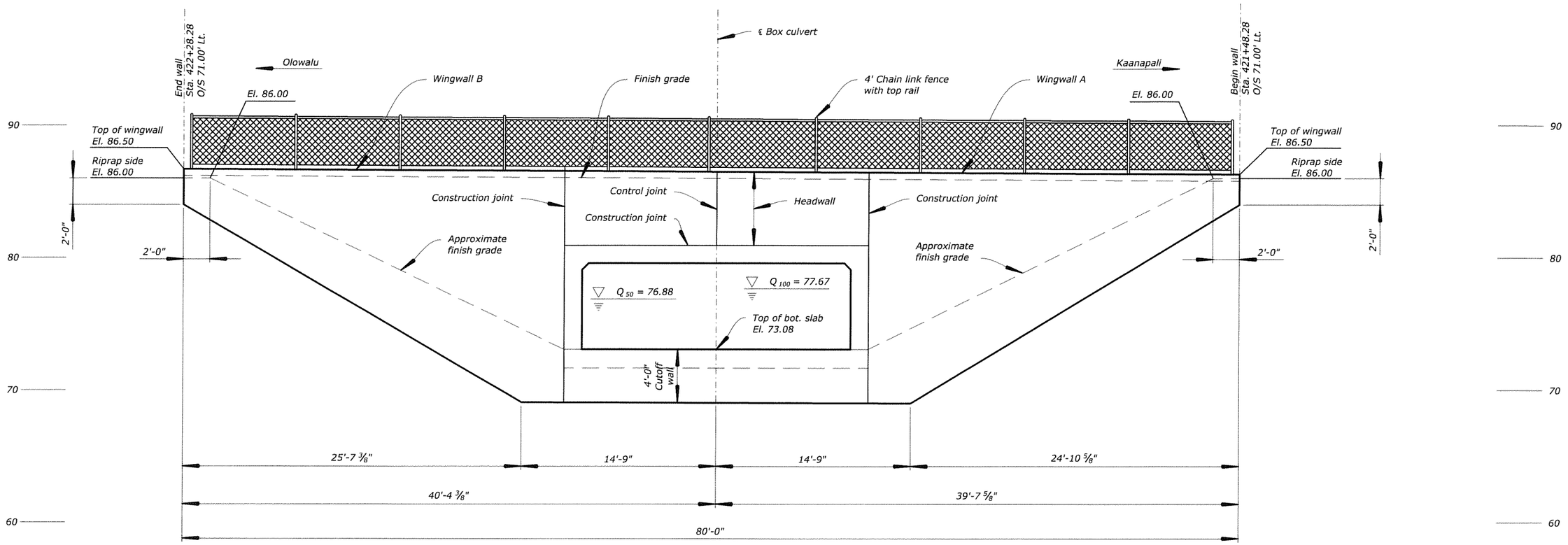
LUAKOI STREAM BOX CULVERT
STA. 422+02 HONOAPIILANI HWY.
MAUI COUNTY, HAWAII

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	42 of 103	JUNE 1, 2017	RG3104-A

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S43



STA. 422+02
BOX CULVERT - INLET ELEVATION

Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*

ERIC Y. MATSUMOTO
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NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

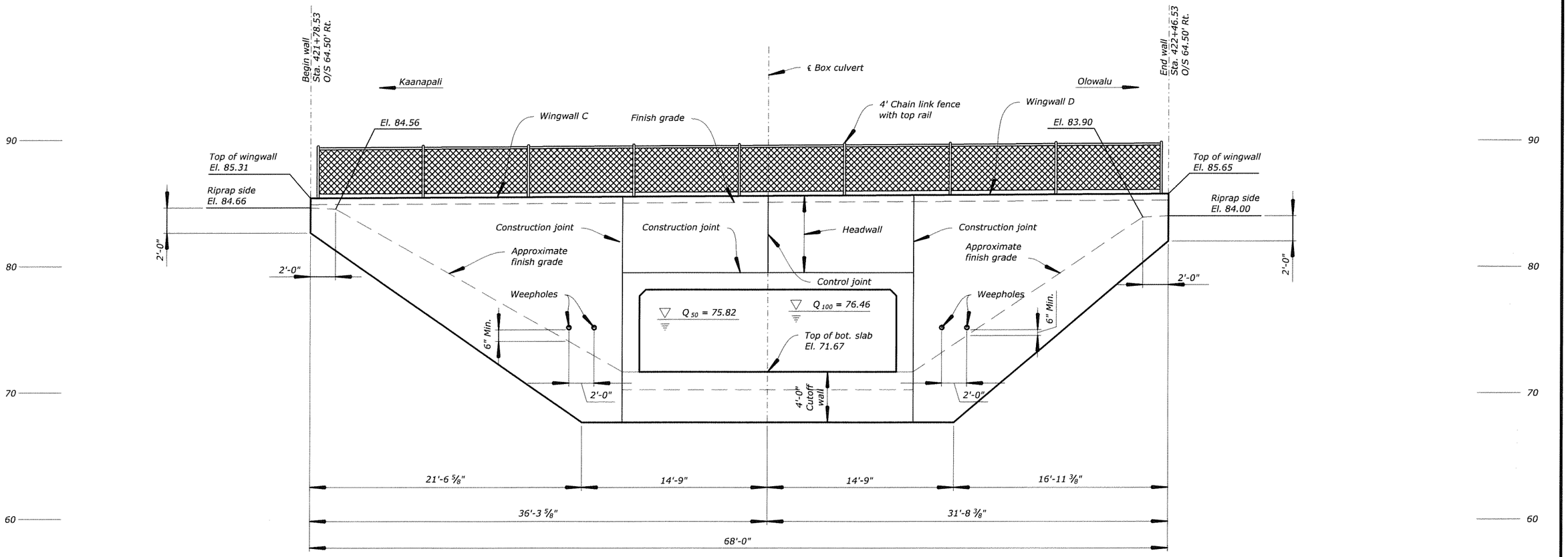
STA. 422+02
BOX CULVERT INLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	43 of 103	JUNE 1, 2017	RG3104-B

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S44



STA. 422+02
BOX CULVERT - OUTLET ELEVATION

Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

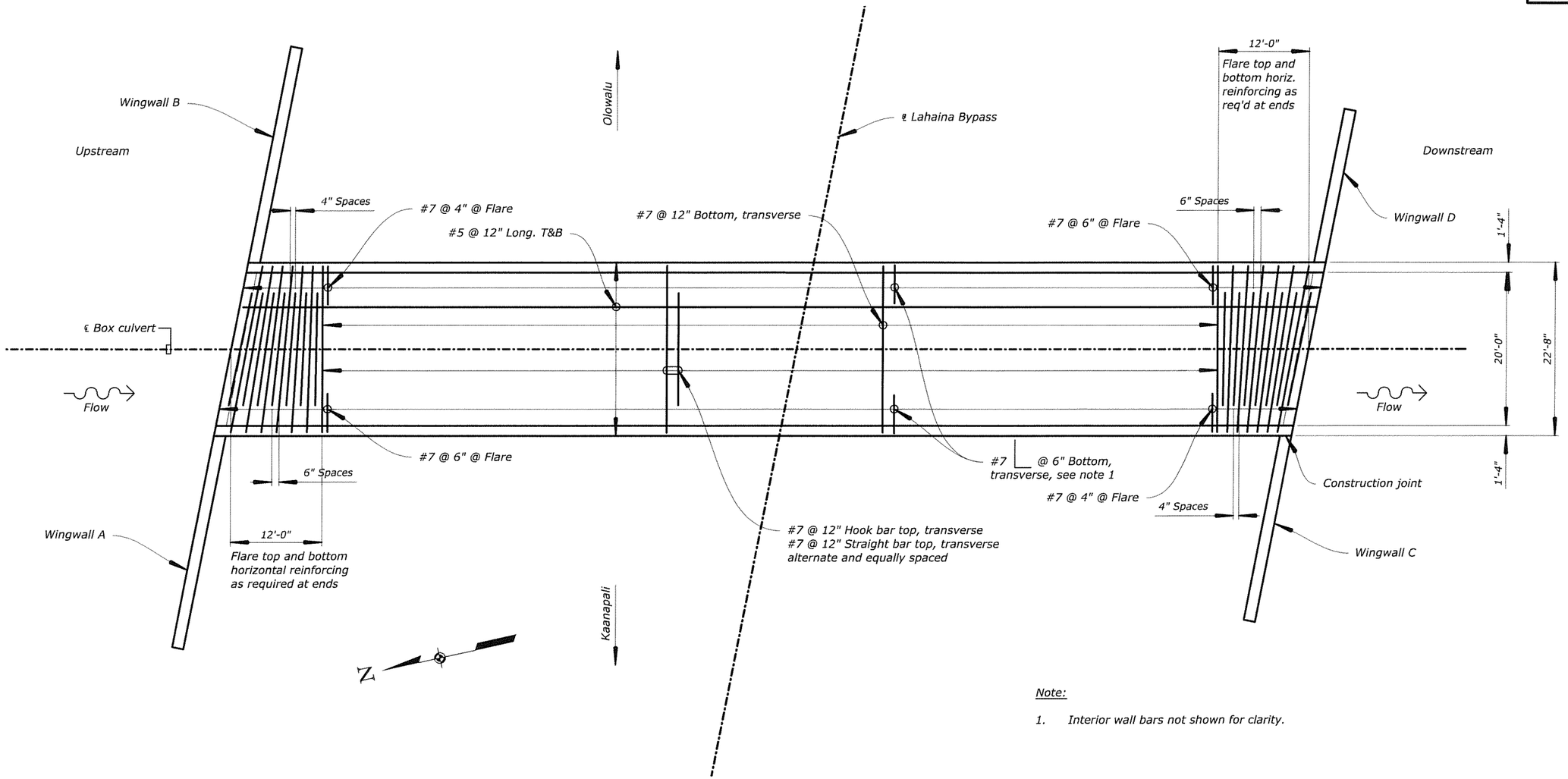
STA. 422+02
BOX CULVERT OUTLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	44 of 103	JUNE 1, 2017	RG3104-C

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S45



Note:

1. Interior wall bars not shown for clarity.

STA. 422+02
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

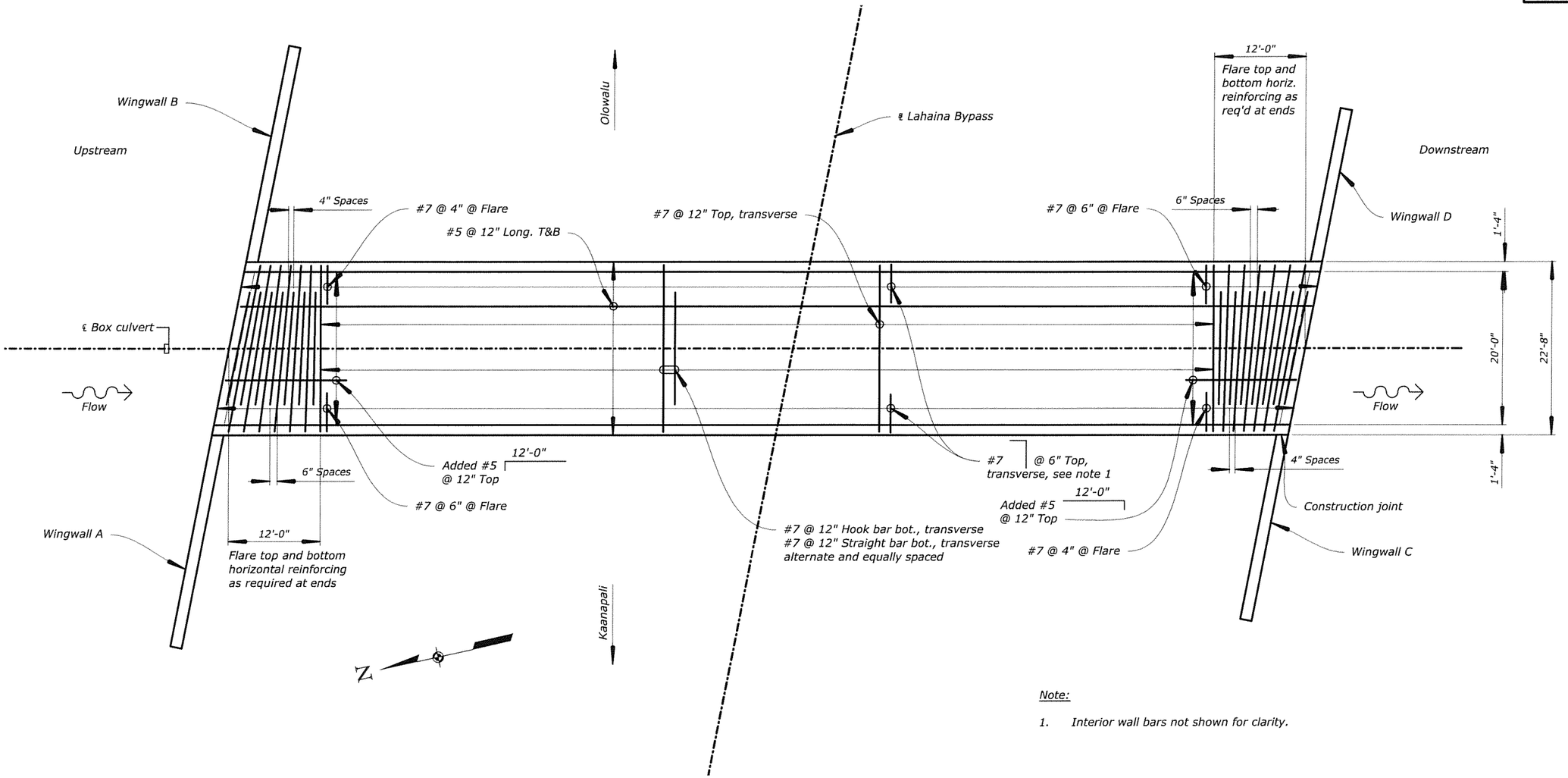
STA. 422+02
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	45 of 103	JUNE 1, 2017	RG3104-D

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S46



Note:

1. Interior wall bars not shown for clarity.

STA. 422+02
BOX CULVERT TOP SLAB REINFORCING PLAN

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE — EXPIRATION DATE OF THE LICENSE: 4-30-18

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

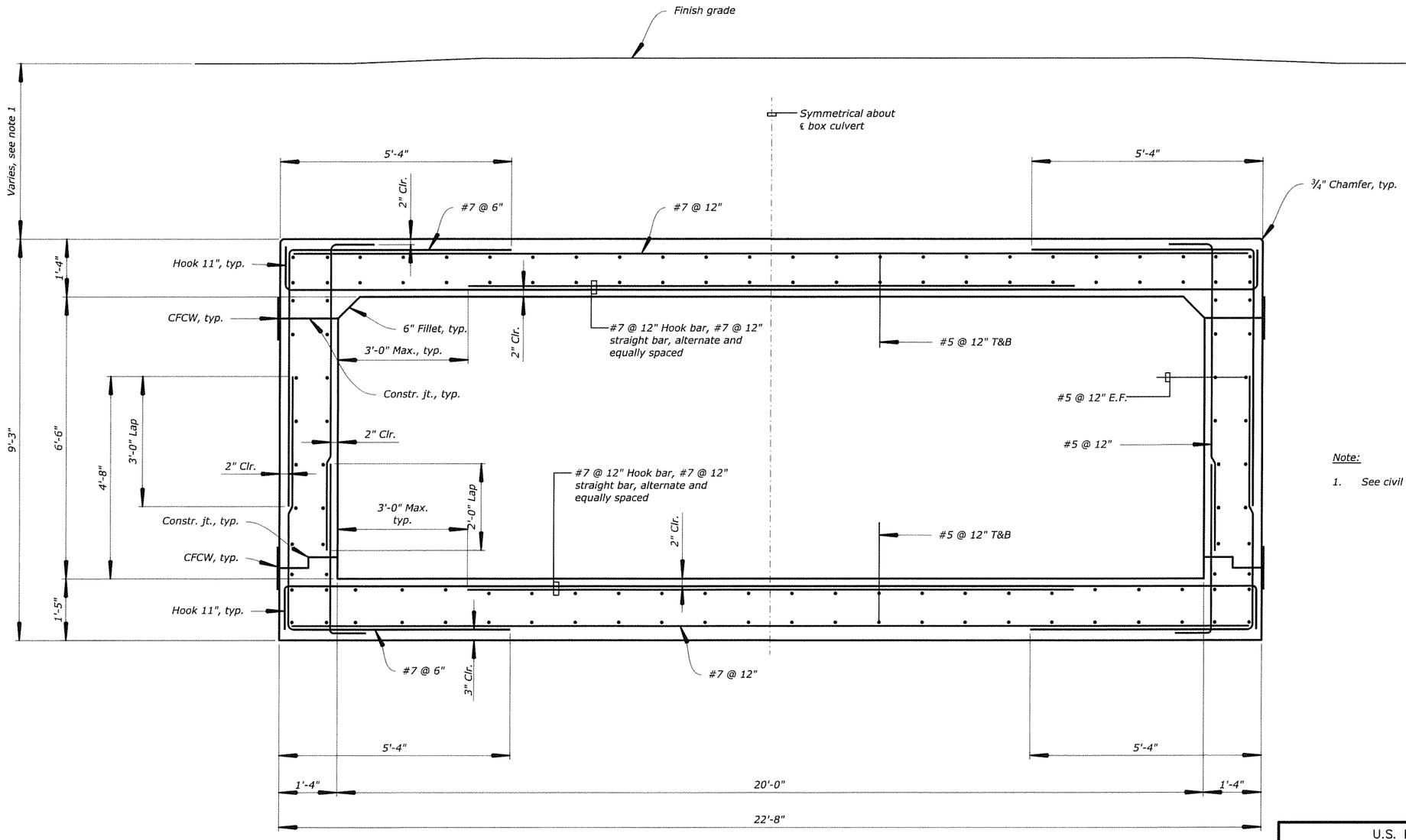
STA. 422+02
BOX CULVERT TOP SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	46 of 103	JUNE 1, 2017	RG3104-E

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S47



TYPICAL INTERIOR SECTION

Note:

1. See civil sheets for depth of fill above box culvert.

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

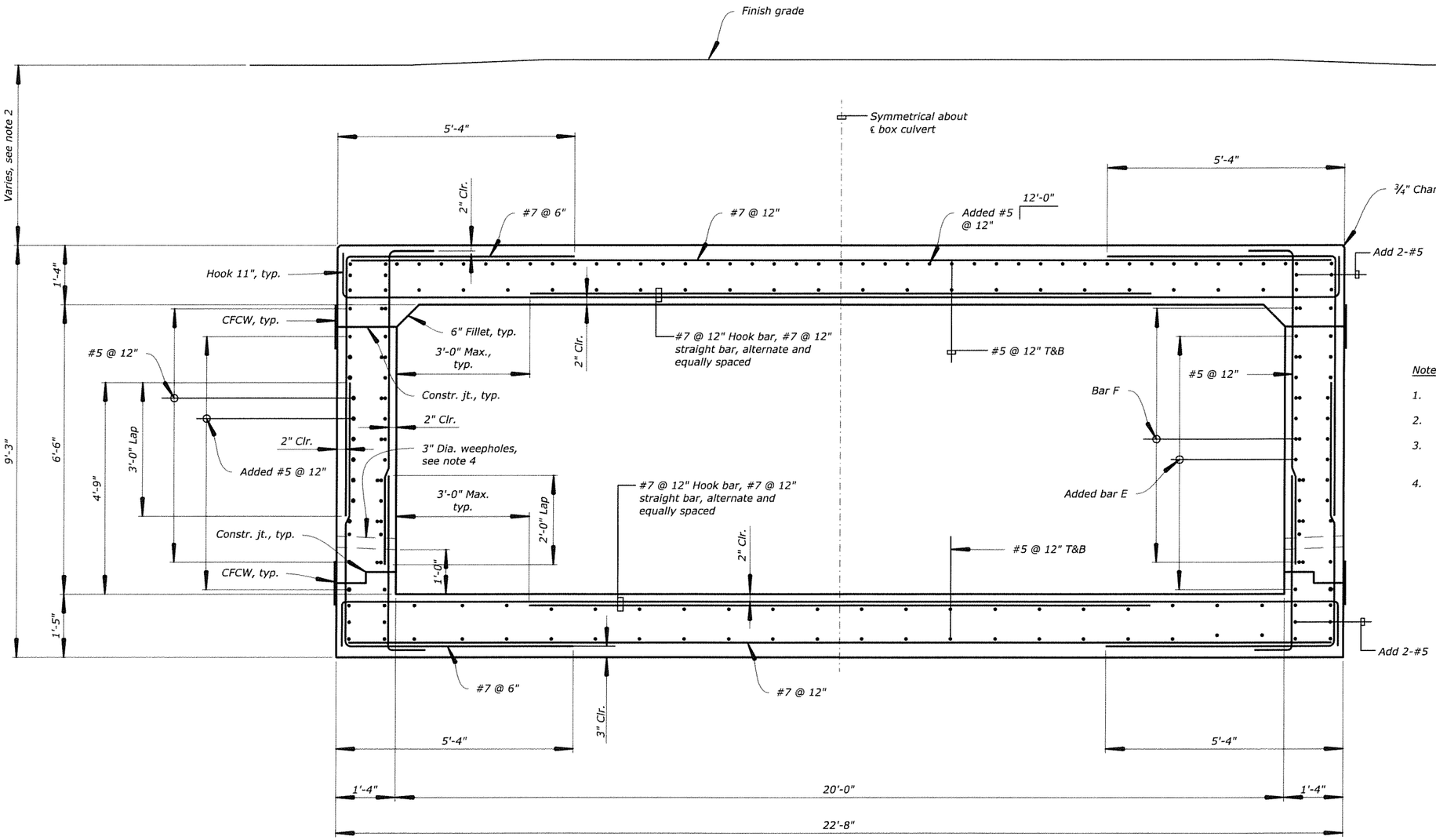
STA. 422+02
BOX CULVERT INTERIOR SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	47 of 103	JUNE 1, 2017	RG3104-F

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S48



EXTERIOR SECTION

Note:

1. See sheet S46 for added reinforcing in top slab.
2. See civil sheets for depth of fill above box culvert.
3. See sheets S66 to S68 for details of added bar E, bar F, and additional reinforcing.
4. See sheet S78 for location of weepholes at inlet end only.

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

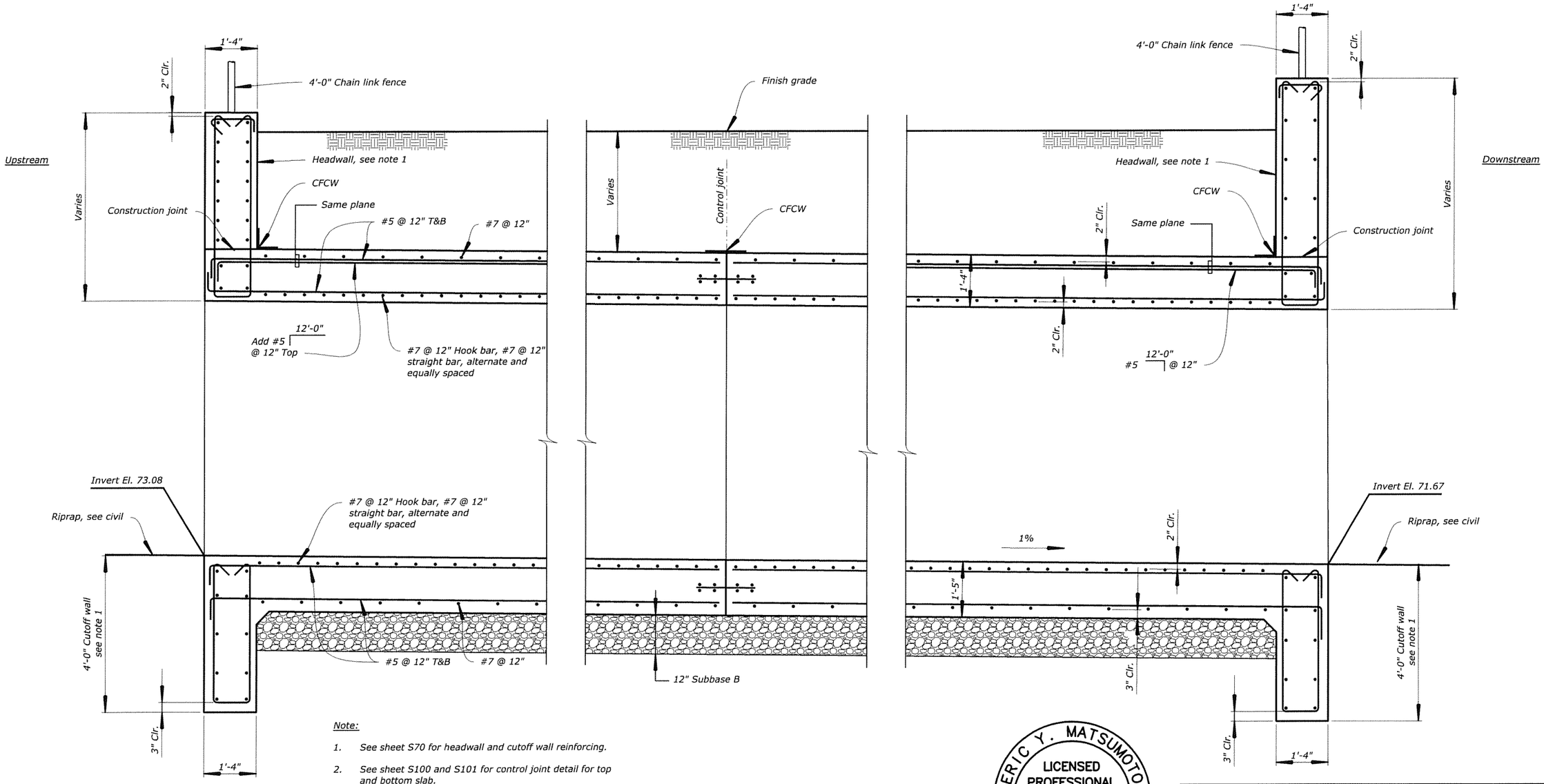
STA. 422+02
BOX CULVERT EXTERIOR SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	48 of 103	JUNE 1, 2017	RG3104-G

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S49



Note:

1. See sheet S70 for headwall and cutoff wall reinforcing.
2. See sheet S100 and S101 for control joint detail for top and bottom slab.

LONGITUDINAL SECTION AT ℄ CULVERT

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE 4-30-18 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 422+02
BOX CULVERT LONGITUDINAL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	49 of 103	JUNE 1, 2017	RG3014-H

DRAWING NO.: FINAL DESIGN

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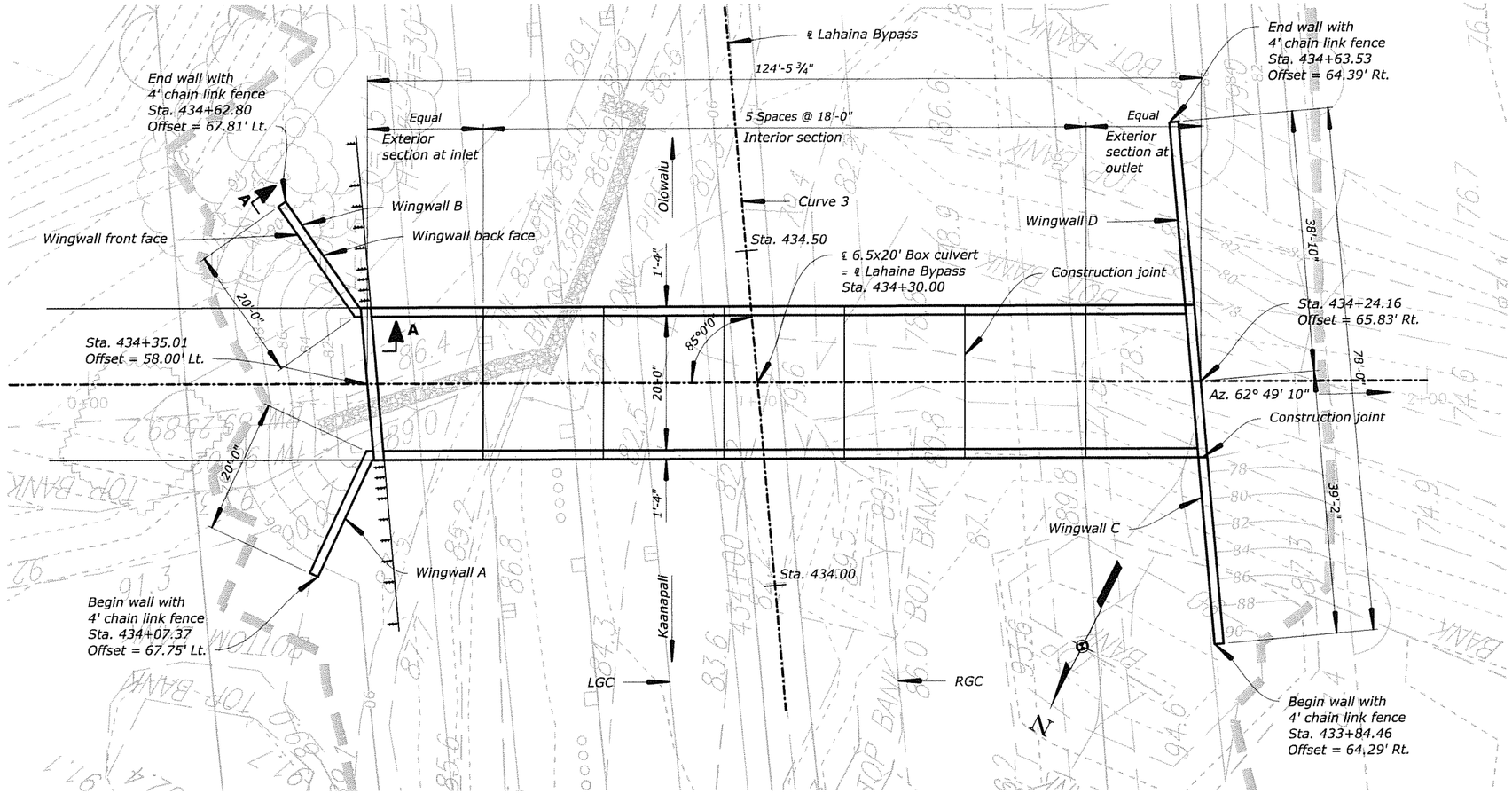
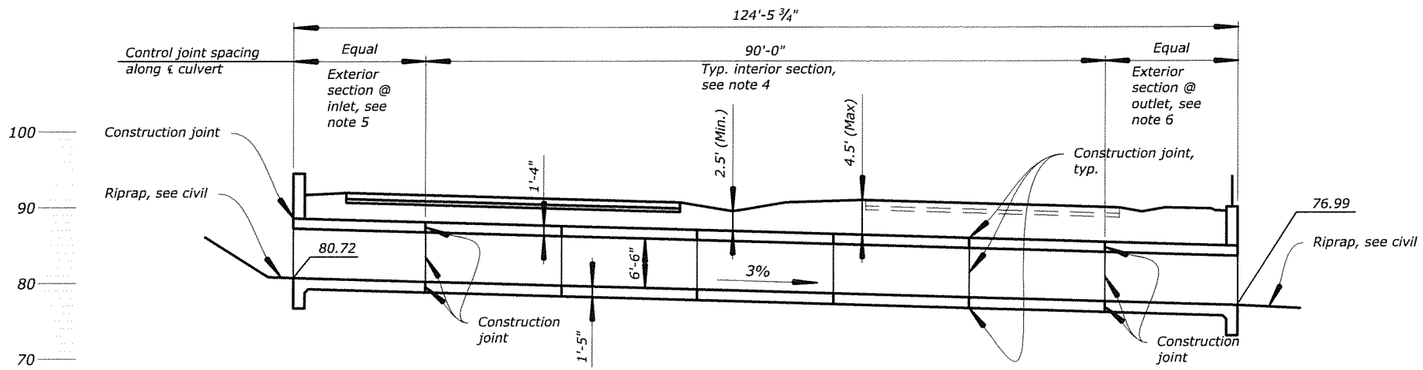


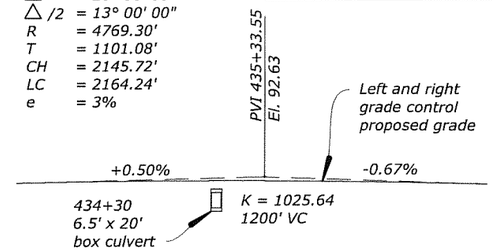
STA. 434+30
6.5'x20' BOX CULVERT PLAN
Scale: 1"=20'



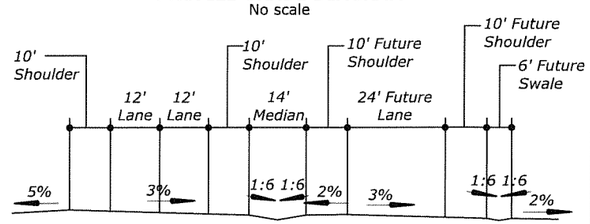
STA. 434+30
6.5'x20' BOX CULVERT LONGITUDINAL SECTION
Scale: 1"=20'

Curve 3

△	= 26° 00' 00"
△ /2	= 13° 00' 00"
R	= 4769.30'
T	= 1101.08'
CH	= 2145.72'
LC	= 2164.24'
e	= 3%



PROFILE GRADE DIAGRAM
No scale



TYPICAL ROADWAY SECTION
No scale

HYDRAULIC DATA			
Return Years	*Q (cfs)*	*WSEL (ft)*	*Velocity (ft/s)*
2-year	*64*	*81.40*	*9.7*
5-year	*193*	*82.15*	*13.67*
50-year	*781*	*84.34*	*19.57*
100-year	*1036*	*85.09*	*20.77*

Notes:

1. *Control joints shall be used as construction joints as shown.*
2. *Stations and offsets for begin wall and end wall are at the centerline of the wall.*
3. *Stations and offsets shown on centerline box culvert are taken at the face of the wall.*
4. *See sheet S55 for interior section.*
5. *See sheet S56 for exterior section at inlet.*
6. *See sheet S48 for exterior section at outlet.*
7. *See sheets S96 to S99 for transition railing details.*
8. *See sheet S71 for section 'A-A' front face wingwall A and B elevation.*
9. *See sheet S72 for section 'A-A' back face wingwall A and B elevations.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

LAUNIU POKO STREAM BOX CULVT.
STA. 434+30 HONOAPIILANI HWY.
MAUI COUNTY, HAWAII

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S50

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	50 of 103	JUNE 1, 2017	RG3104-I

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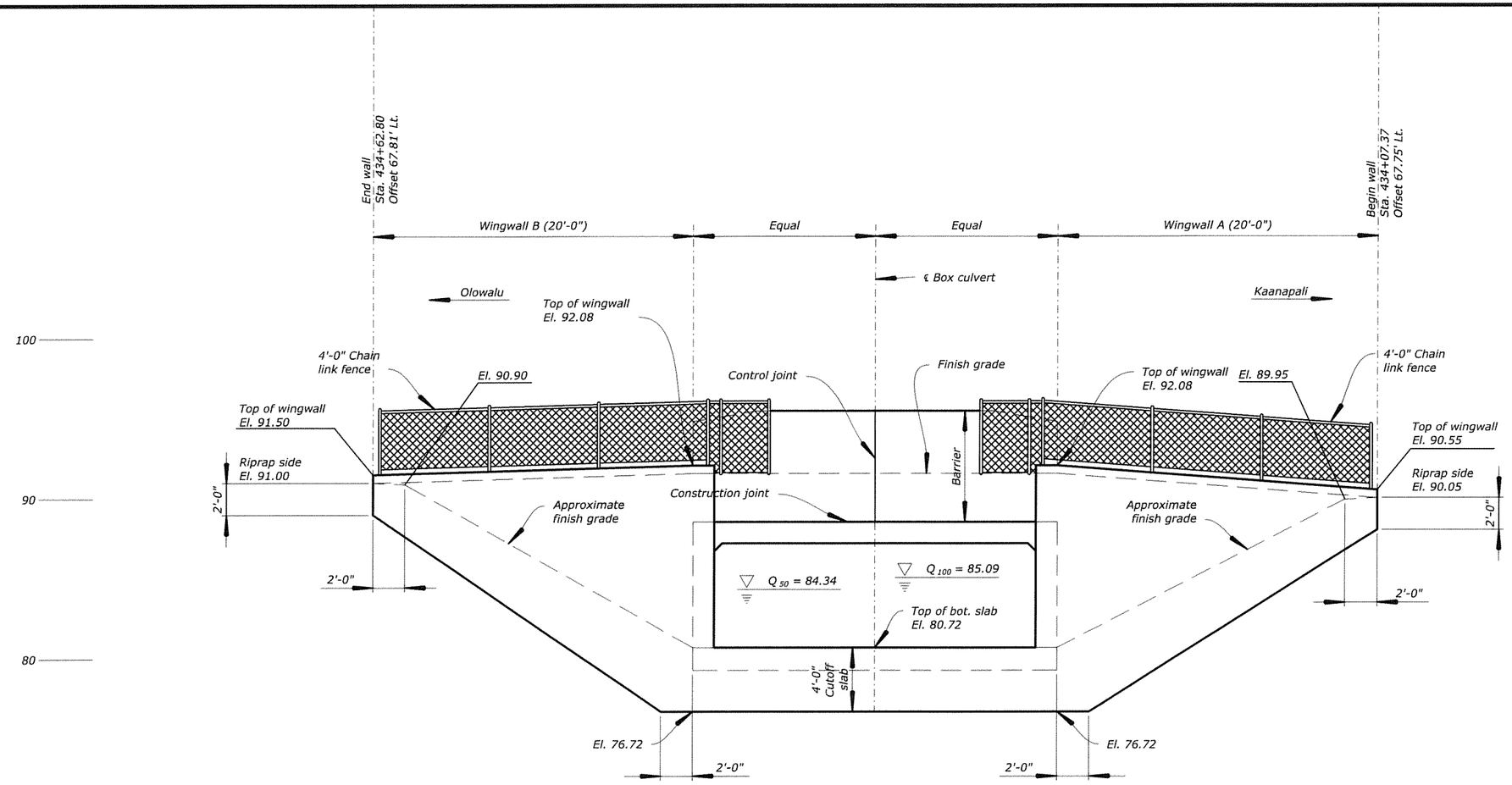
3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S51



STA. 434+30
BOX CULVERT - INLET ELEVATION

Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT INLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	51 of 103	JUNE 1, 2017	RG3104-J

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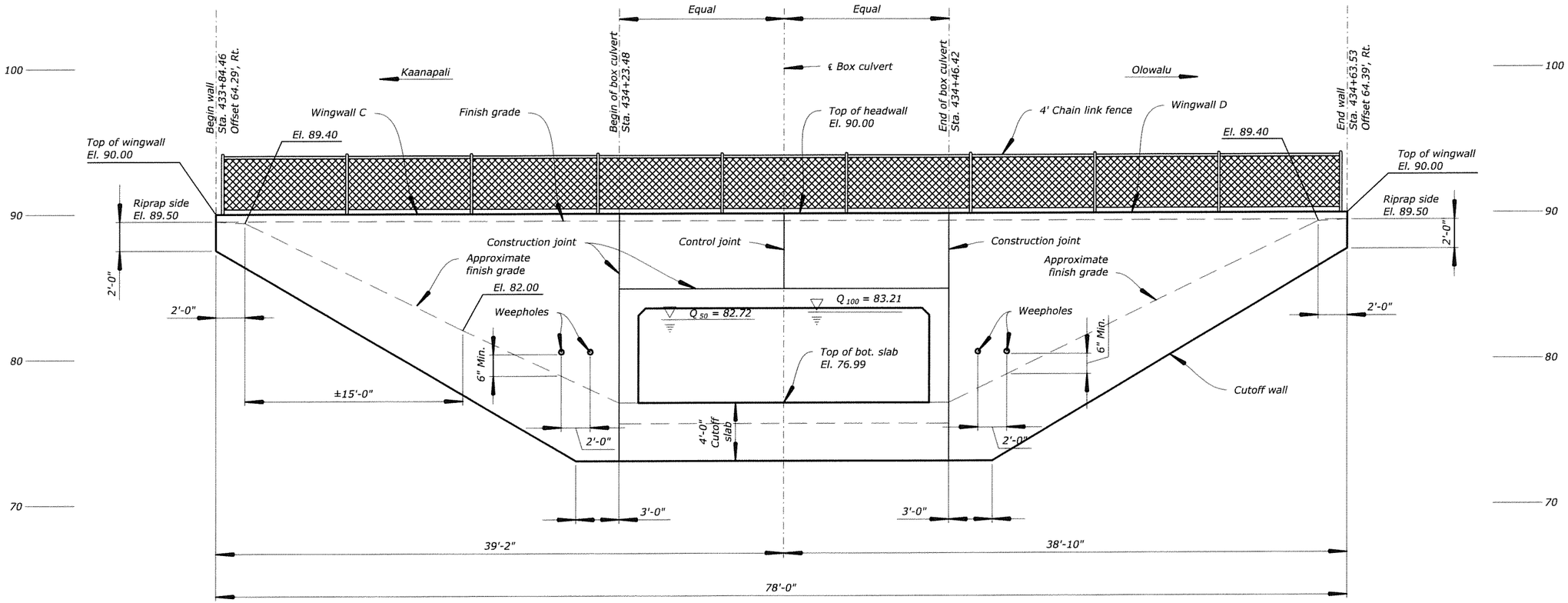
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S52



Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*

STA. 434+30
BOX CULVERT - OUTLET ELEVATION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT OUTLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	52 of 103	JUNE 1, 2017	RG3104-K

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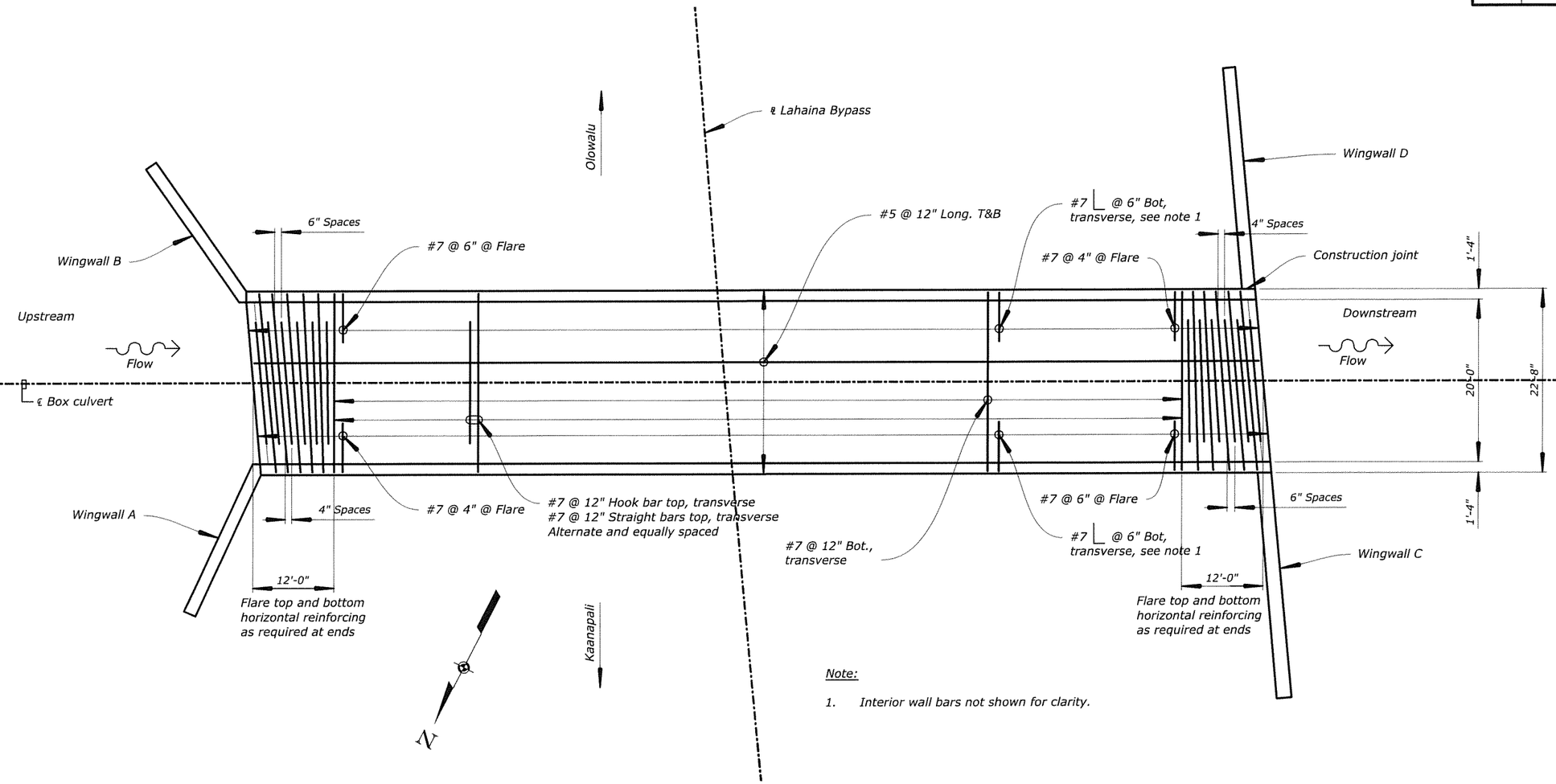
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S53



Note:

1. *Interior wall bars not shown for clarity.*

STA. 434+30
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	53 of 103	JUNE 1, 2017	RG3104-L

DRAWING NO.: FINAL DESIGN

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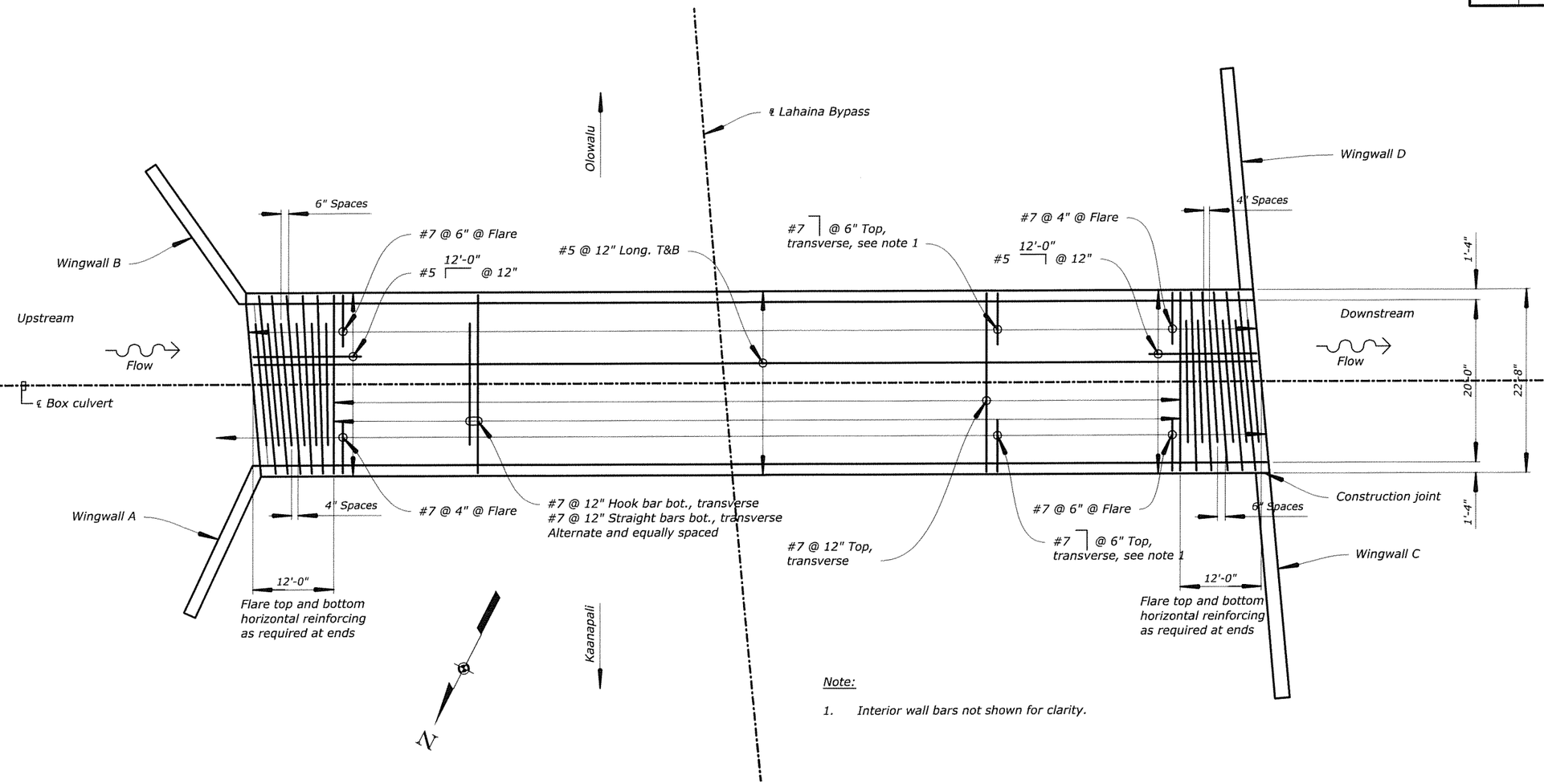
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S54



Note:

1. Interior wall bars not shown for clarity.

STA. 434+30
BOX CULVERT TOP SLAB REINFORCING PLAN

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

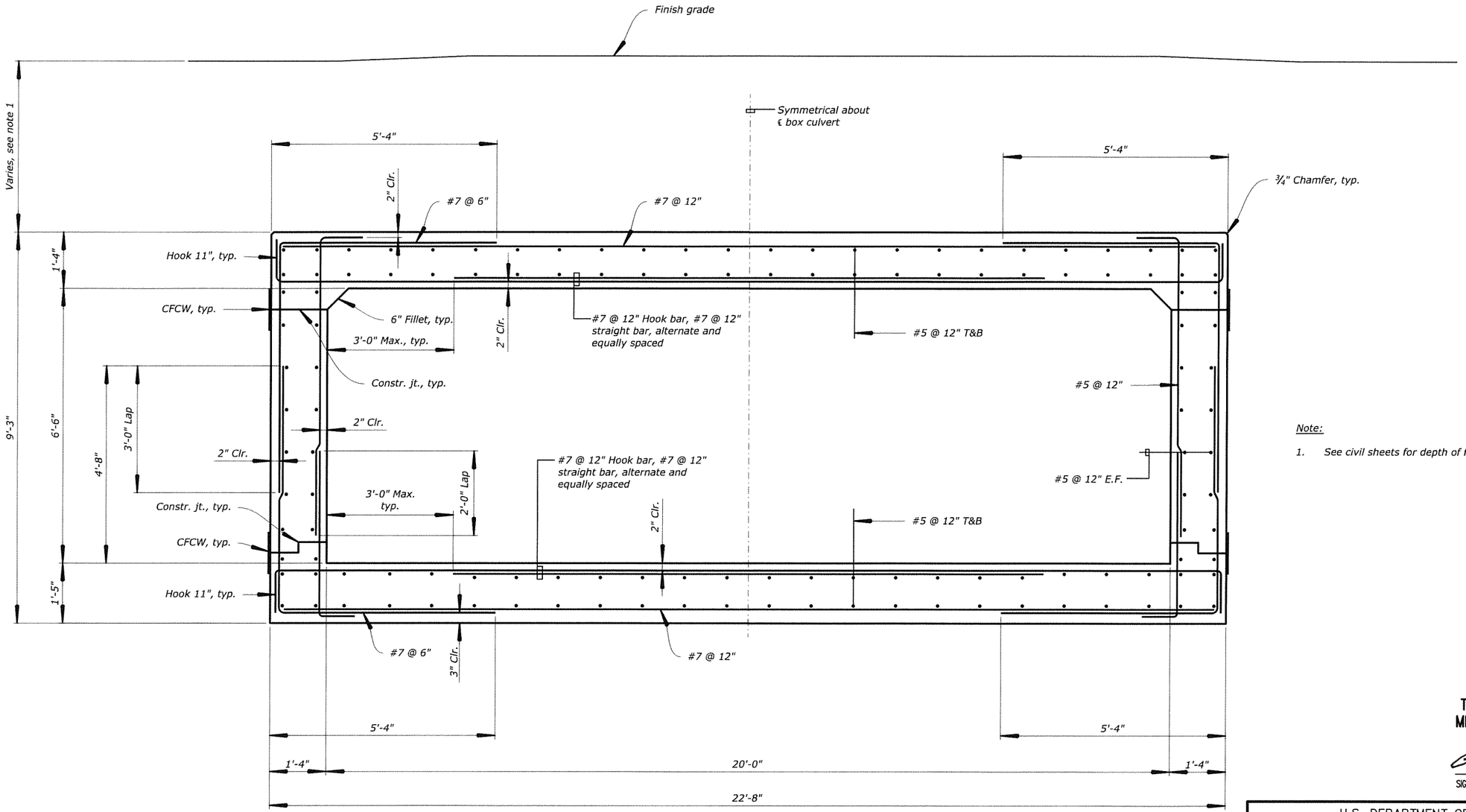
STA. 434+30
BOX CULVERT TOP SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	54 of 103	JUNE 1, 2017	RG3104-M

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S55



TYPICAL INTERIOR SECTION

Note:

1. *See civil sheets for depth of fill above box culvert.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT INTERIOR SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	55 of 103	JUNE 1, 2017	RG3104-N

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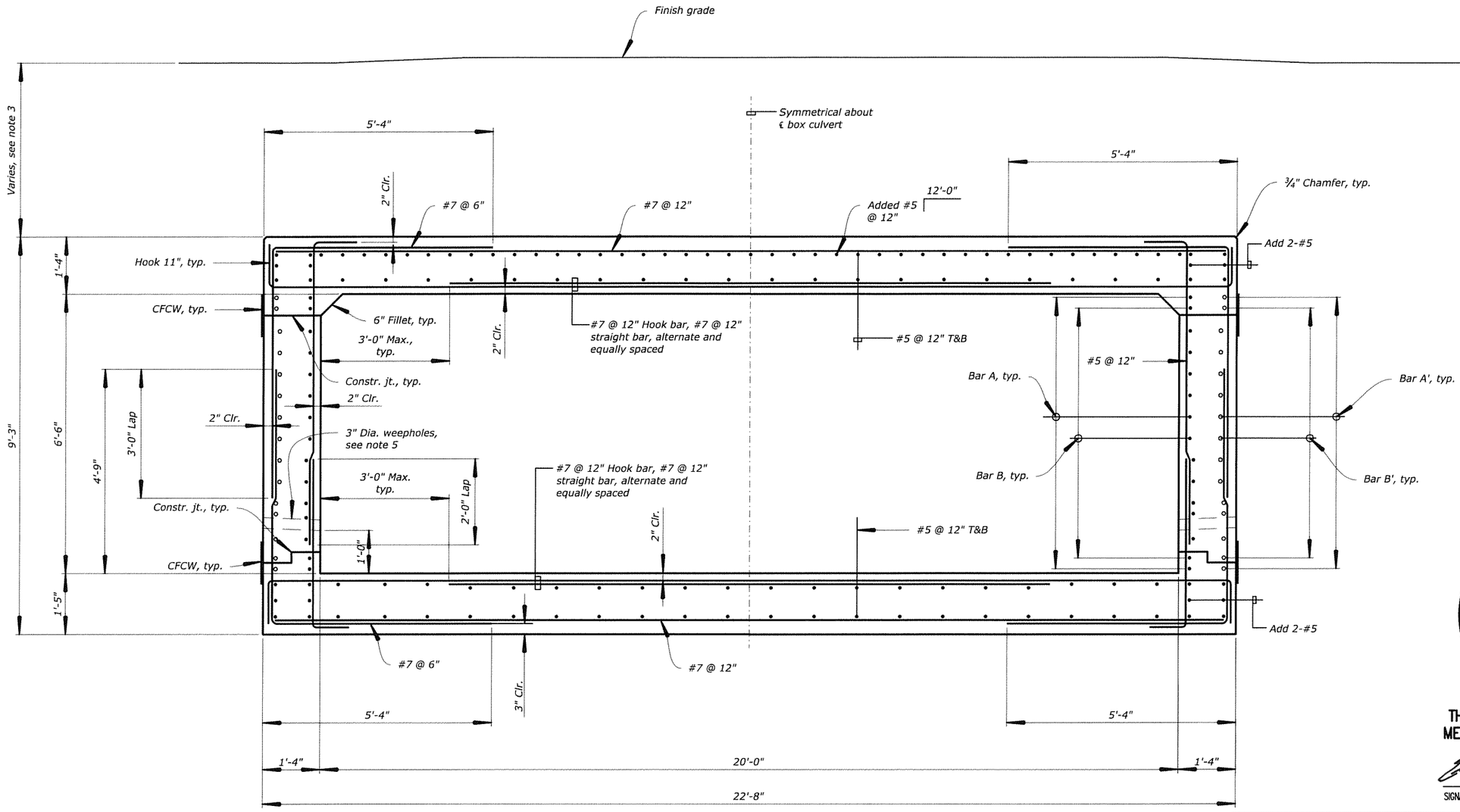
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S56



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NO. 10156-S
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EXTERIOR SECTION AT INLET

Note:

1. See sheet S54 for added reinforcing in top slab.
2. See sheet S74 for A, A', B and B' rebar.
3. See civil sheets for depth of fill above box culvert.
4. See sheet S79 for location of weepholes at inlet end only.
5. See sheet S48 for end section at outlet reinforcing.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT EXTERIOR SECTION AT INLET

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	56 of 103	JUNE 1, 2017	RG3104-O

DRAWING NO.: FINAL DESIGN

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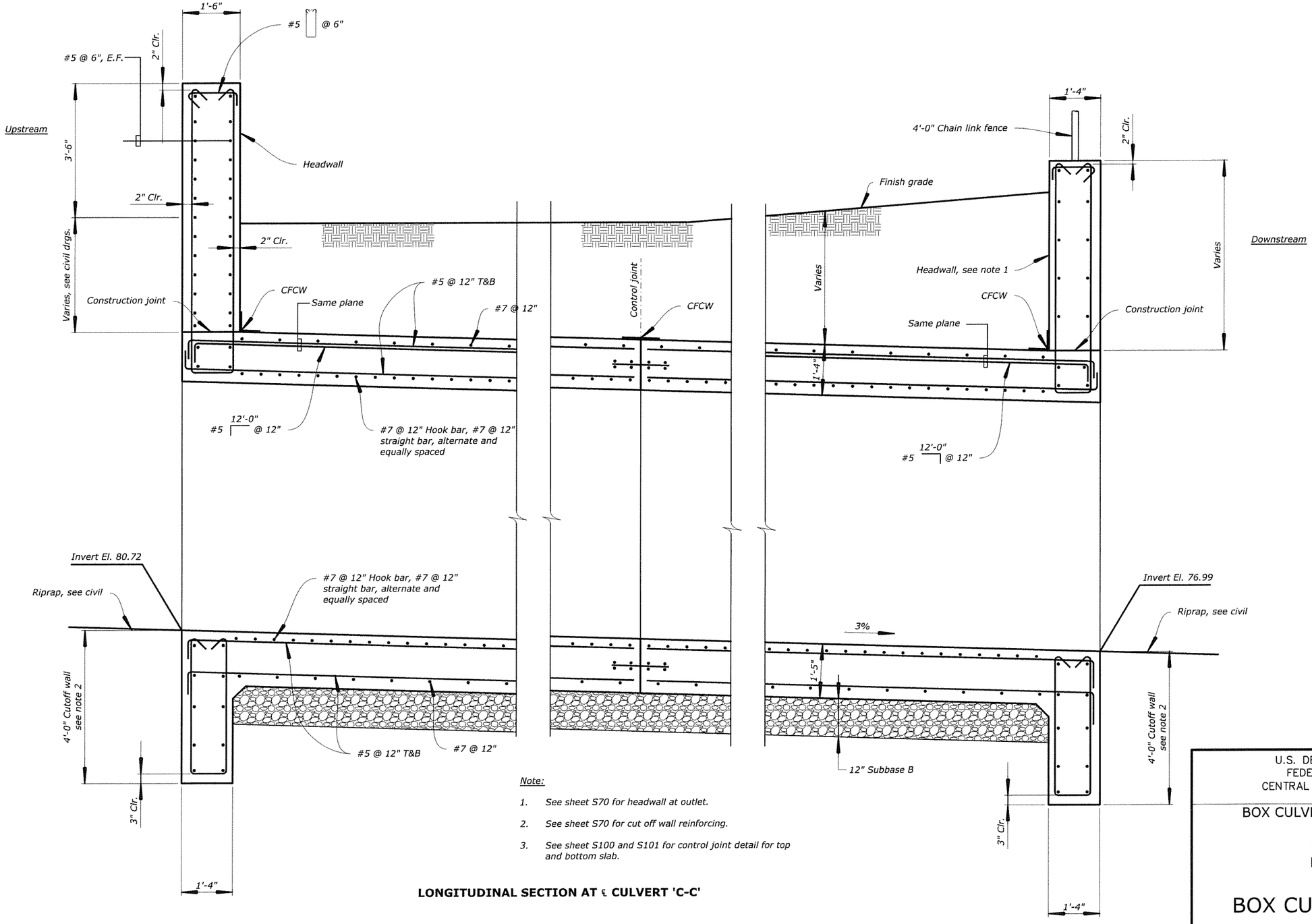
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S57



Note:

1. *See sheet S70 for headwall at outlet.*
2. *See sheet S70 for cut off wall reinforcing.*
3. *See sheet S100 and S101 for control joint detail for top and bottom slab.*

LONGITUDINAL SECTION AT ℄ CULVERT 'C-C'

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT LONGITUDINAL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	57 of 103	JUNE 1, 2017	RG3104-P

DRAWING NO.: FINAL DESIGN

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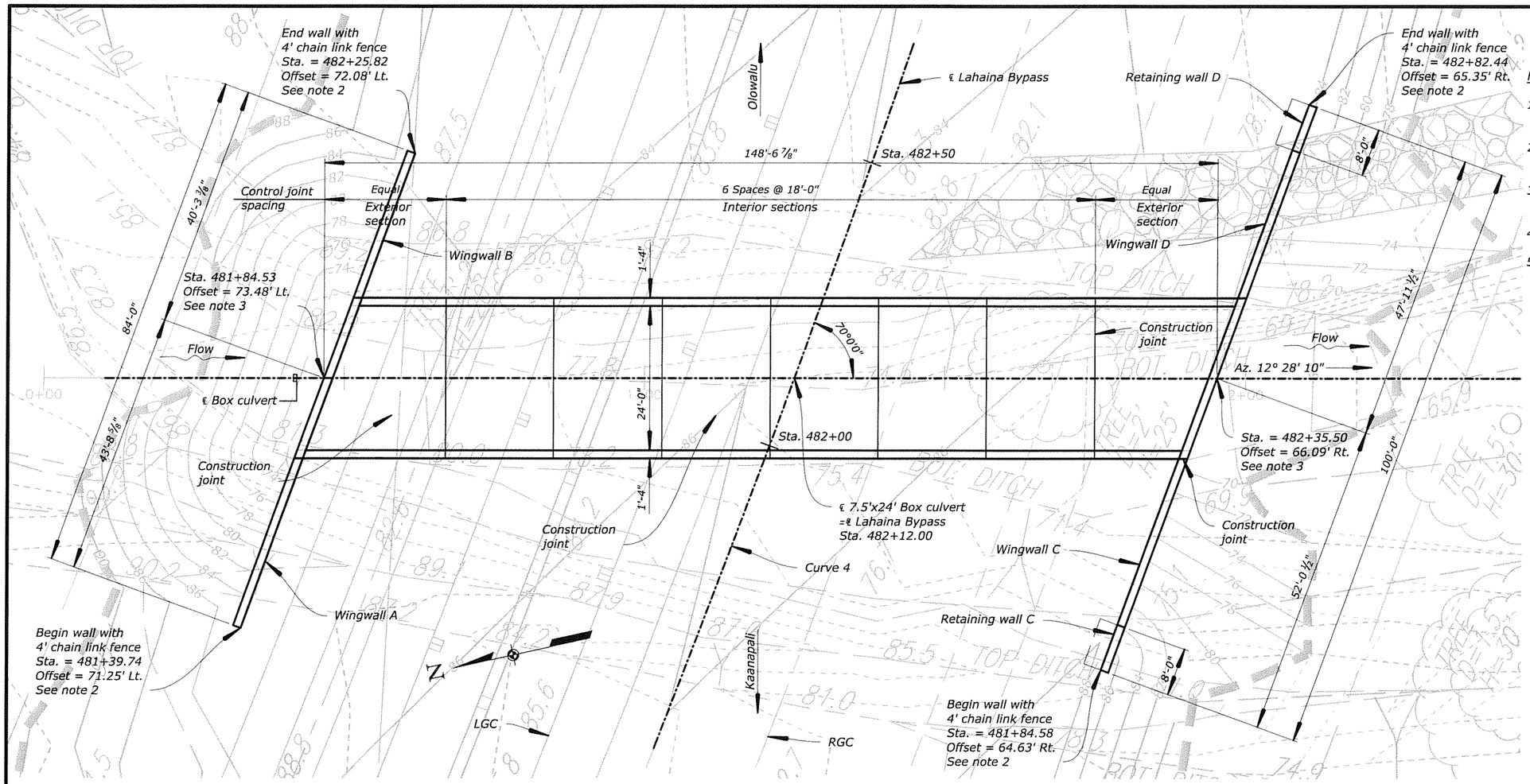
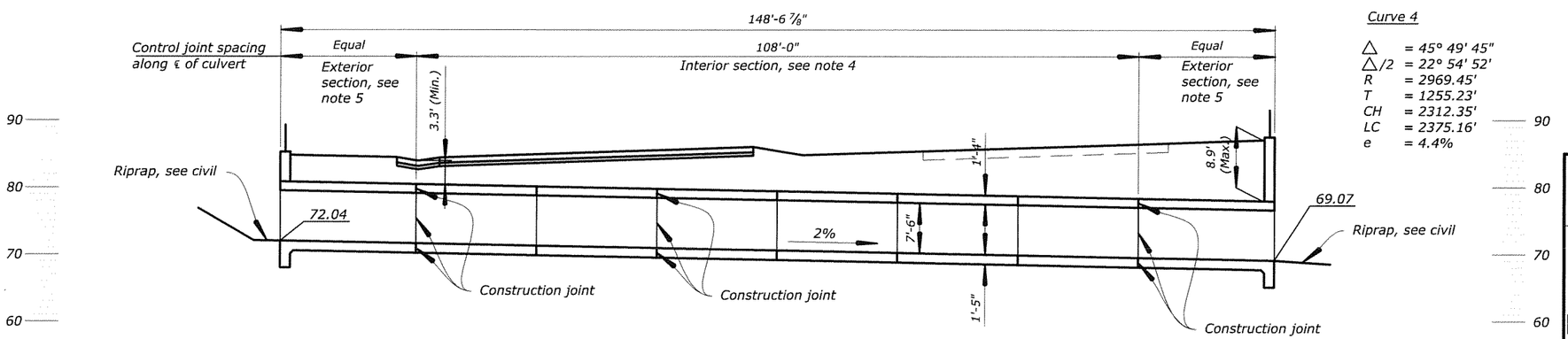
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S58



STA. 482+12
7.5'x24' BOX CULVERT PLAN
Scale: 1"=20'



Curve 4

△	= 45° 49' 45"
△/2	= 22° 54' 52'
R	= 2969.45'
T	= 1255.23'
CH	= 2312.35'
LC	= 2375.16'
e	= 4.4%

STA. 482+12
7.5'x24' BOX CULVERT LONGITUDINAL SECTION

Notes:

1. Control joints shall be used as construction joints as shown.
2. Stations and offsets for begin wall and end wall are at the centerline of the wall.
3. Stations and offsets shown on centerline box culvert are taken at the face of the wall.
4. See sheet S63 for interior section.
5. See sheet S64 for exterior section.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

LAUNIUPOKO STREAM BOX CULVERT
STA. 482+12 HONOAPIILANI HWY
MAUI COUNTY, HAWAII

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=20'-0"	D. FUJIWARA	58 of 103	JUNE 1, 2017	RG3104-Q

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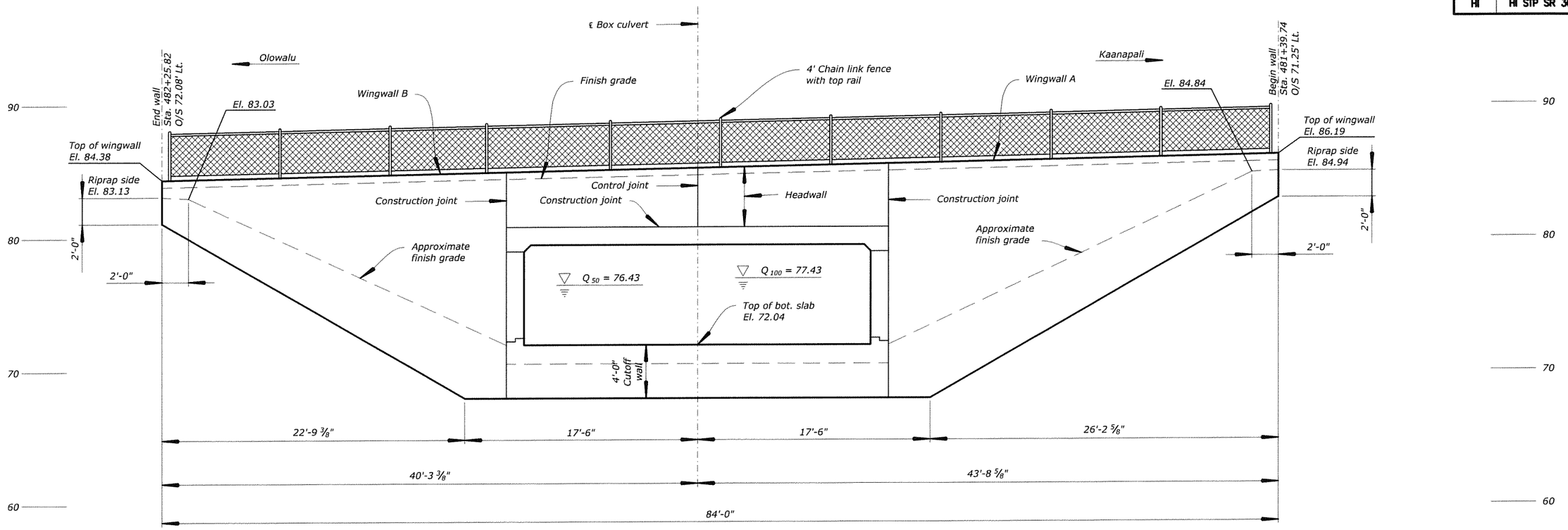
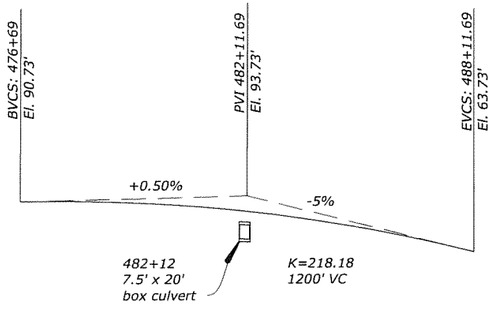
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S59



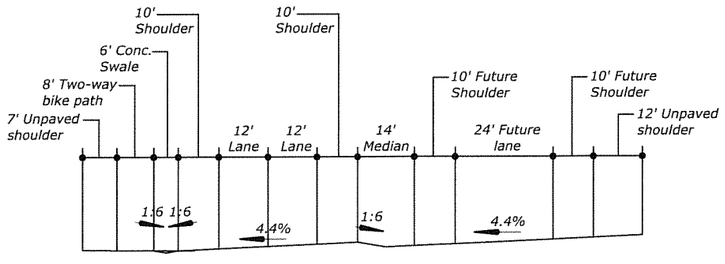
STA. 482+12
BOX CULVERT - INLET ELEVATION
Scale: 1/8"=1'-0"

Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*



PROFILE GRADE DIAGRAM
No scale



TYPICAL ROADWAY SECTION
No scale

HYDRAULIC DATA

Return Years	Q (cfs)	WSEL (ft)	Velocity (ft/s)
2-year	88	72.79	8.82
5-year	293	73.71	13.34
50-year	1274	76.43	19.45
100-year	1706	77.43	20.77

ERIC Y. MATSUMOTO
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NO. 10156-S
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U.S. DEPARTMENT OF TRANSPORTATION
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 482+12
BOX CULVERT INLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	59 of 103	JUNE 1, 2017	RG3104-R

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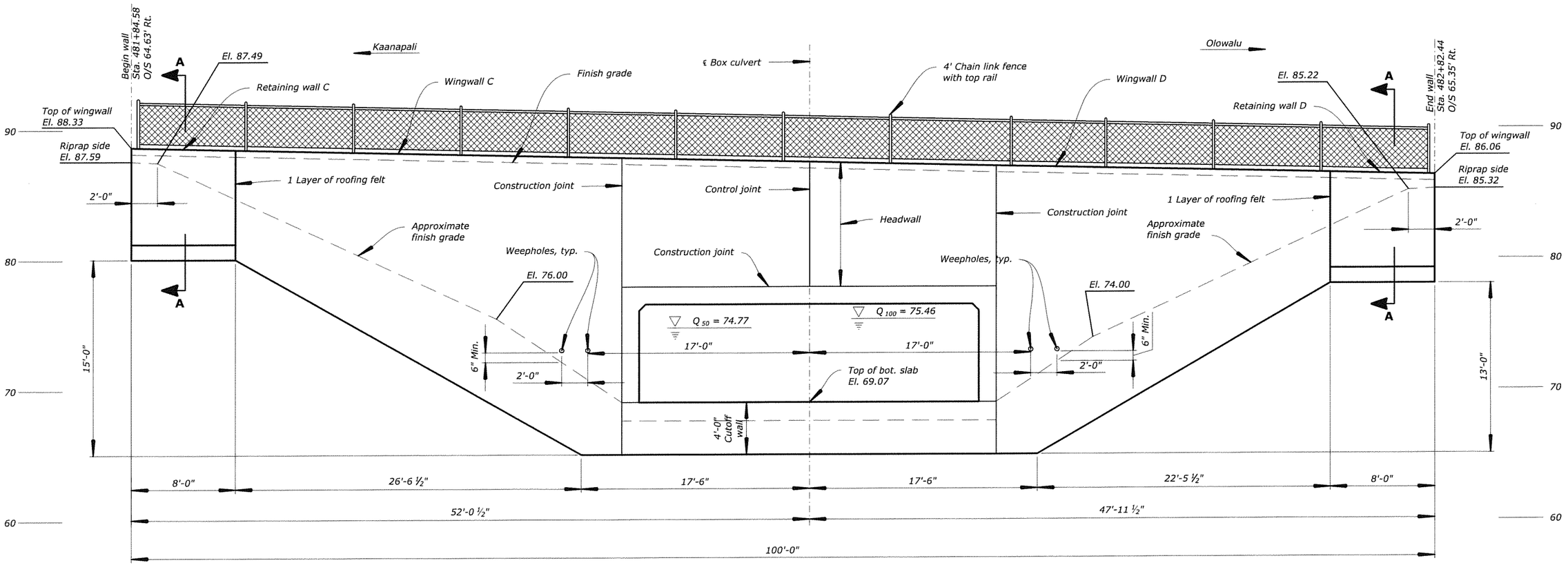
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S60



Notes:

1. *Horizontal dimensions are taken in front (traffic side face) of the wall parallel along the axis of the wall.*
2. *Stations, elevations, and offsets are taken in front (traffic side face) of the wall unless noted otherwise.*
3. *See sheet S76 for section 'A-A'.*

STA. 482+12
BOX CULVERT - OUTLET ELEVATION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 482+12
BOX CULVERT OUTLET ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	60 of 103	JUNE 1, 2017	RG3104-S

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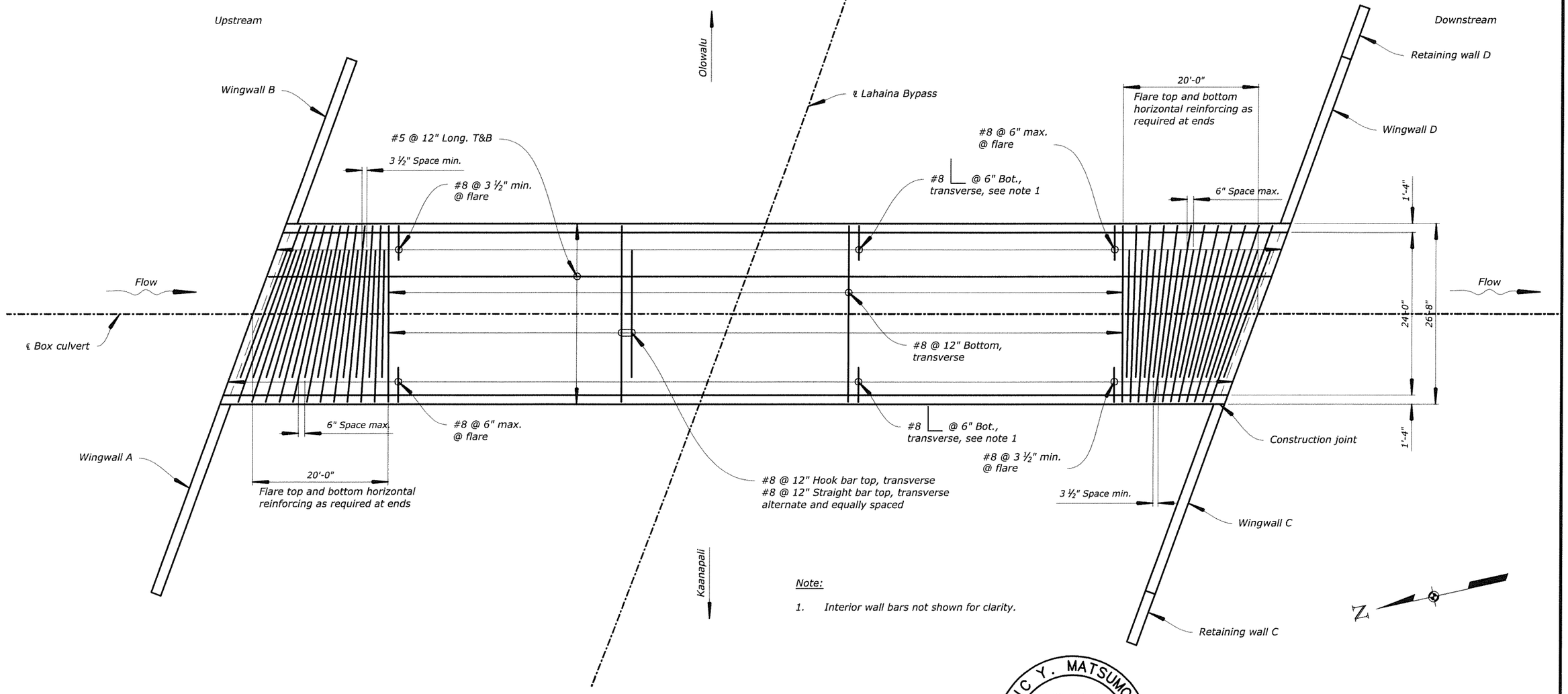
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S61



Note:

1. Interior wall bars not shown for clarity.

STA. 482+12
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
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Eric Y. Matsumoto — 4-30-18
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 482+12
BOX CULVERT BOTTOM SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	61 of 103	JUNE 1, 2017	RG3104-T

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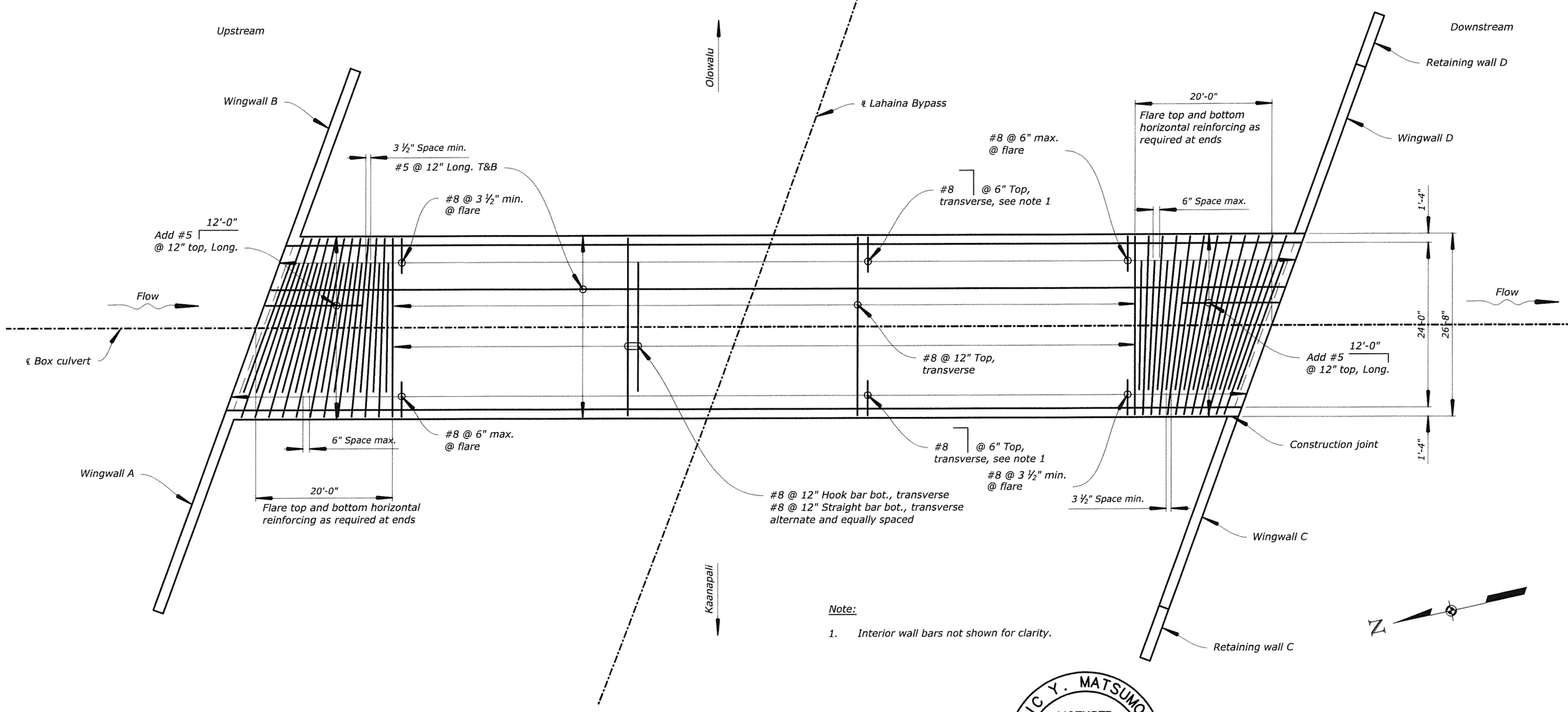
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S62



STA. 482+12
BOX CULVERT TOP SLAB REINFORCING PLAN

Note:

1. Interior wall bars not shown for clarity.

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 482+12
BOX CULVERT TOP SLAB REINFORCING PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	62 of 103	JUNE 1, 2017	RG3104-U

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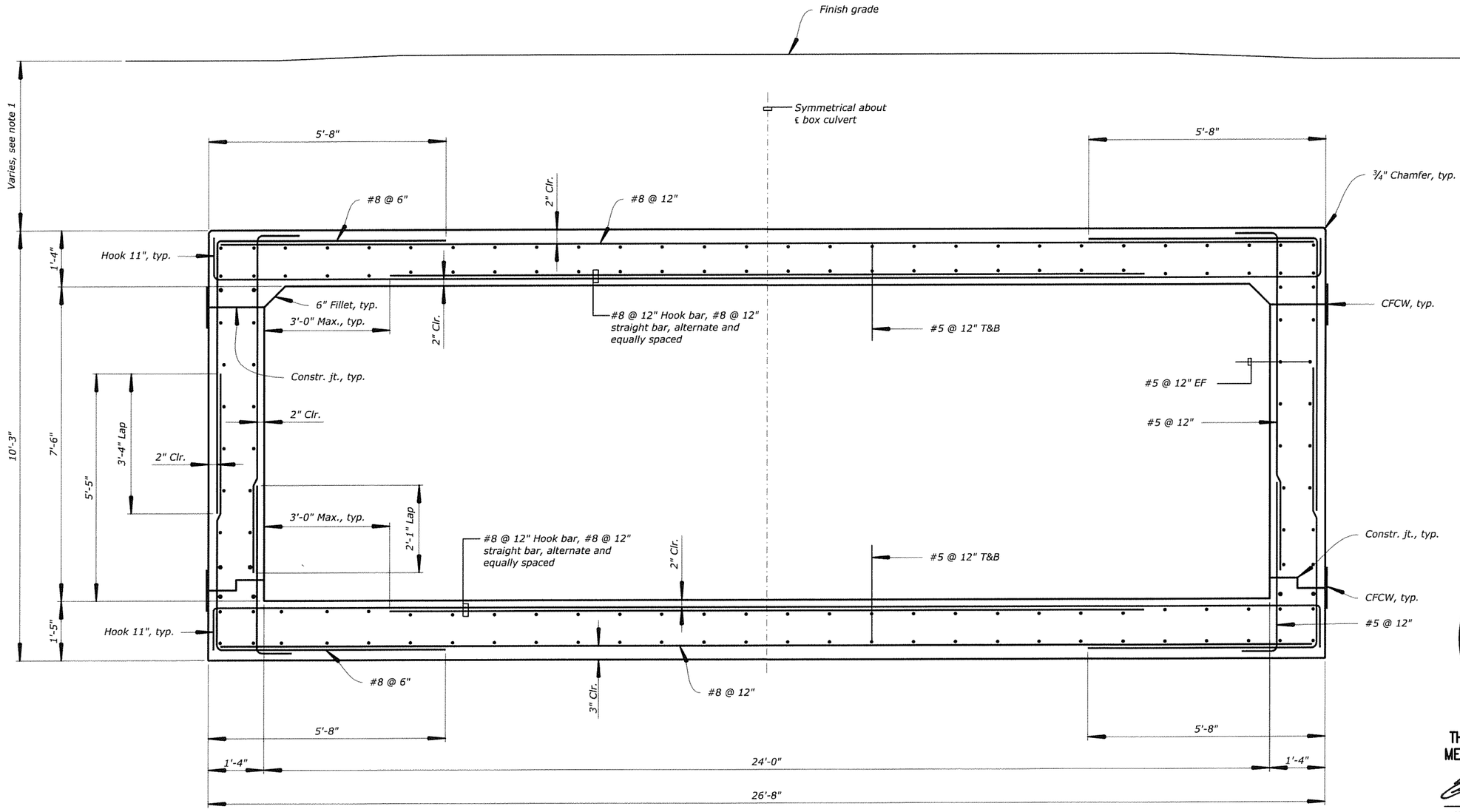
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S63



Note:

1. See civil sheets for depth of fill above box culvert.

TYPICAL BOX CULVERT SECTION AT INTERIOR SECTION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

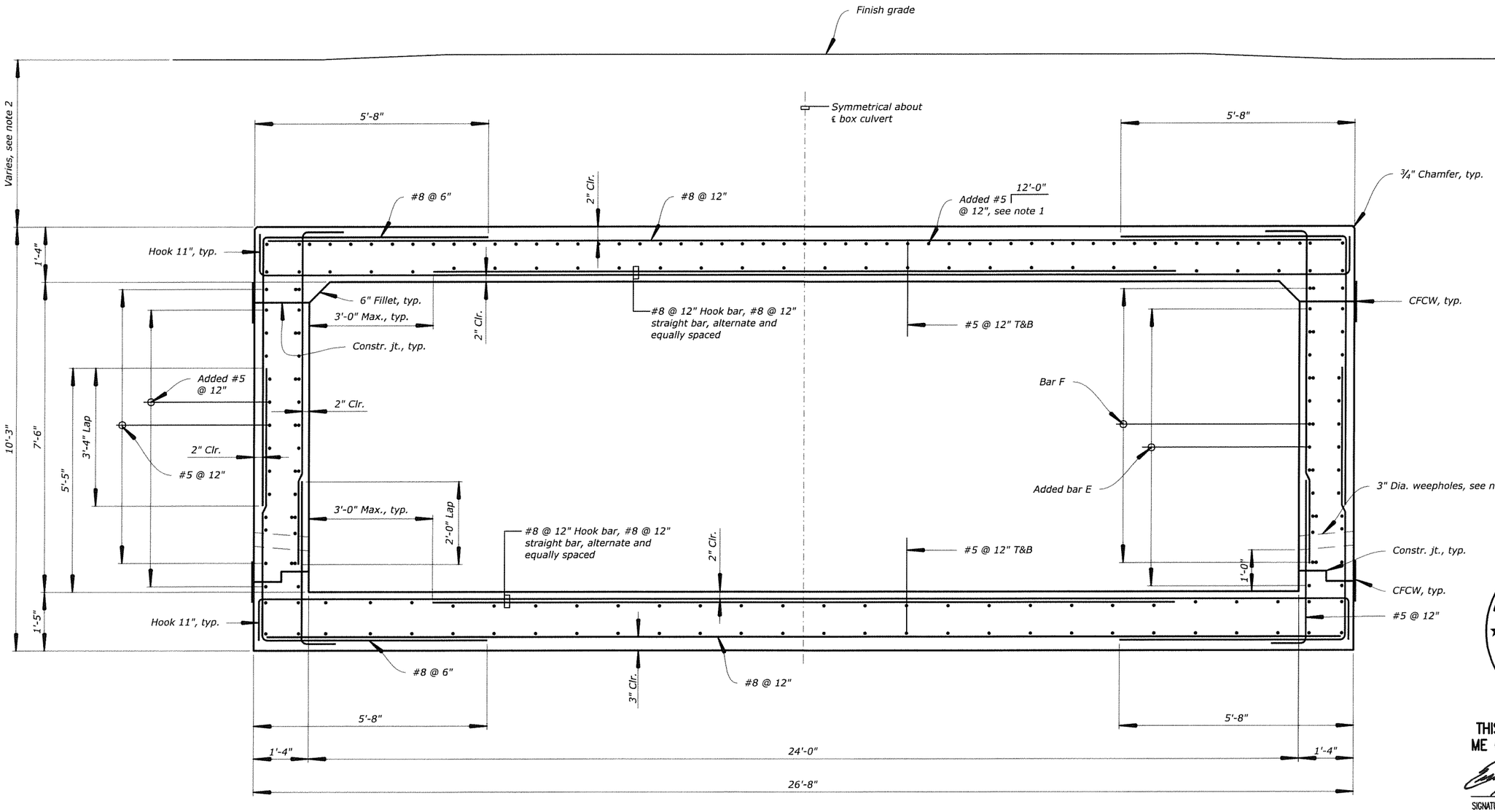
STA. 482+12
BOX CULVERT INTERIOR SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	63 of 103	JUNE 1, 2017	RG3104-V

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S64



Note:

1. See sheet S62 for added reinforcing in top slab.
2. See civil sheets for depth of fill above box culvert.
3. See sheets S66 to S68 for details of added bar E', bar F, and additional reinforcing.
4. See sheet S80 for location of weepholes at inlet end only.

EXTERIOR SECTION

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

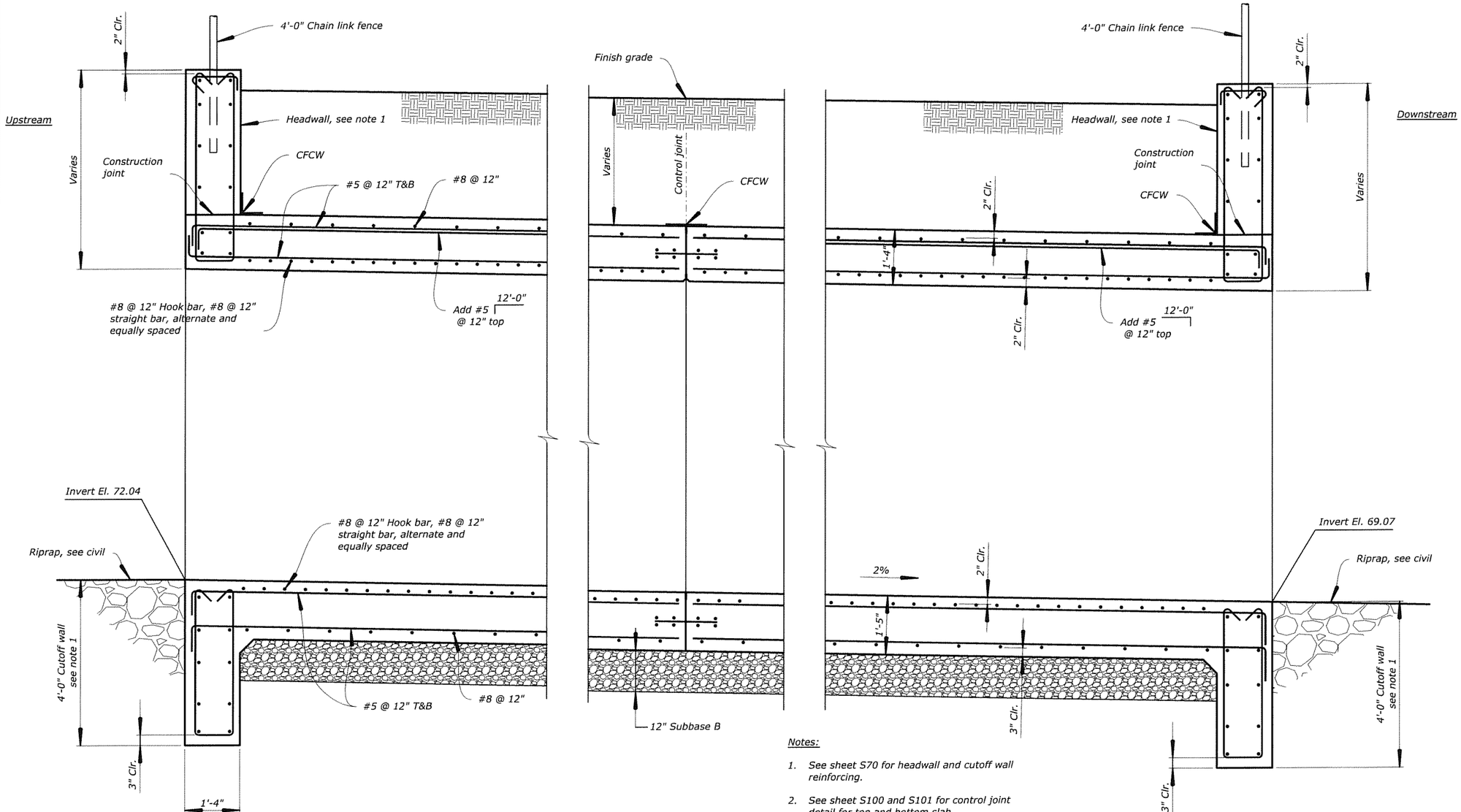
STA. 482+12
BOX CULVERT EXTERIOR SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	64 of 103	JUNE 1, 2017	RG3104-W

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S65



Notes:

1. See sheet S70 for headwall and cutoff wall reinforcing.
2. See sheet S100 and S101 for control joint detail for top and bottom slab.

LONGITUDINAL SECTION AT ℄ CULVERT

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LICENSED PROFESSIONAL ENGINEER
NO. 10156–S
HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA.482+12

BOX CULVERT LONGITUDINAL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	65 of 103	JUNE 1, 2017	RG3104-X

DRAWING NO.: FINAL DESIGN

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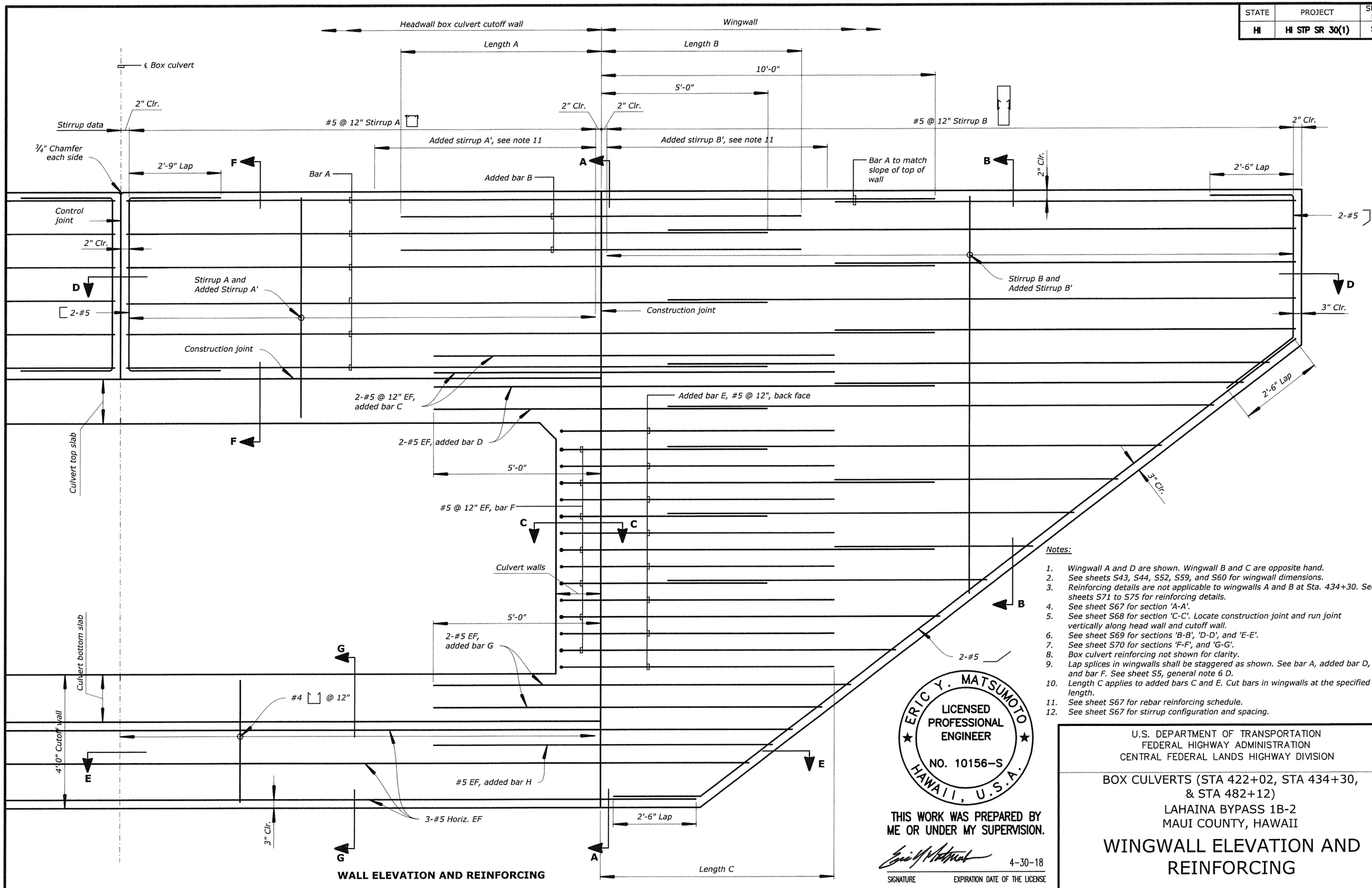
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S66



WALL ELEVATION AND REINFORCING

Notes:

1. *Wingwall A and D are shown. Wingwall B and C are opposite hand.*
2. *See sheets S43, S44, S52, S59, and S60 for wingwall dimensions.*
3. *Reinforcing details are not applicable to wingwalls A and B at Sta. 434+30. See sheets S71 to S75 for reinforcing details.*
4. *See sheet S67 for section 'A-A'.*
5. *See sheet S68 for section 'C-C'. Locate construction joint and run joint vertically along head wall and cutoff wall.*
6. *See sheet S69 for sections 'B-B', 'D-D', and 'E-E'.*
7. *See sheet S70 for sections 'F-F', and 'G-G'.*
8. *Box culvert reinforcing not shown for clarity.*
9. *Lap splices in wingwalls shall be staggered as shown. See bar A, added bar D, and bar F. See sheet S5, general note 6 D.*
10. *Length C applies to added bars C and E. Cut bars in wingwalls at the specified length.*
11. *See sheet S67 for rebar reinforcing schedule.*
12. *See sheet S67 for stirrup configuration and spacing.*

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL ELEVATION AND REINFORCING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	66 of 103	JUNE 1, 2017	RG3104-Y

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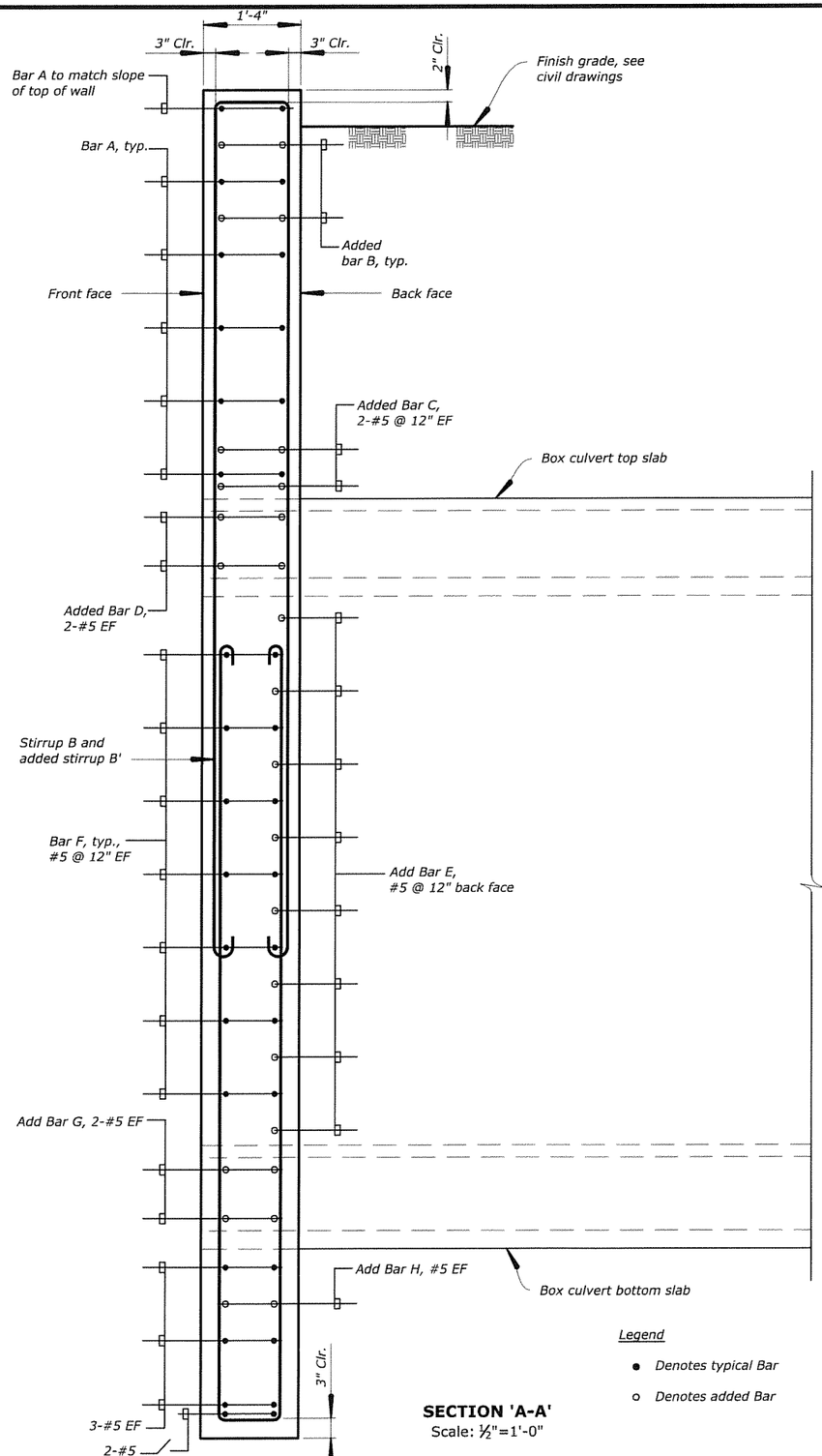
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S67



SECTION 'A-A'
Scale: ½"=1'-0"

Legend

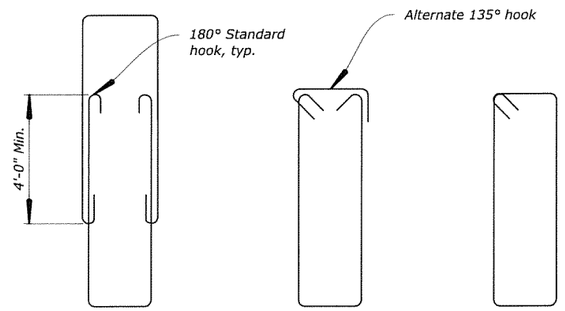
- ● *Denotes typical Bar*
- ○ *Denotes added Bar*

HORIZONTAL WALL REINFORCING SCHEDULE

Station	Wingwall	Bar A	Bar B	Length A	Length B	Length C
422+02	A	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-0"	5'-0"	6'-0"
	B	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-0"	5'-0"	6'-0"
	C	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-6"	5'-0"	6'-0"
	D	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-6"	5'-0"	6'-0"
434+30	C	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-0"	5'-0"	6'-0"
	D	6-#5 @ 12" EF	2-#5 @ 12" EF	6'-0"	5'-0"	6'-0"
482+12	A	5-#5 @ 12" EF	2-#5 @ 12" EF	5'-0"	5'-0"	6'-0"
	B	5-#5 @ 12" EF	2-#5 @ 12" EF	5'-0"	5'-0"	6'-0"
	C	10-#5 @ 12" EF	2-#6 @ 12" EF	11'-0"	6'-0"	8'-0"
	D	10-#5 @ 12" EF	2-#6 @ 12" EF	11'-0"	6'-0"	8'-0"

WALL STIRRUP REINFORCING SCHEDULE

Station	Wingwall	Stirrup A'	Stirrup B'
422+02	A	8-#5 @ 12"	4-#5 @ 12"
	B	8-#5 @ 12"	4-#5 @ 12"
	C	8-#5 @ 12"	4-#5 @ 12"
	D	8-#5 @ 12"	4-#5 @ 12"
434+30	C	9-#5 @ 12"	5-#5 @ 12"
	D	9-#5 @ 12"	5-#5 @ 12"
482+12	A	6-#5 @ 12"	3-#5 @ 12"
	B	6-#5 @ 12"	3-#5 @ 12"
	C	12-#5 @ 12"	6-#5 @ 12"
	D	12-#5 @ 12"	6-#5 @ 12"



Note:

1. *The following stirrups are permitted for use with stirrup A, A', B, B', and in Sta. 434+30 box culvert wingwalls A and B.*

WINGWALL AND HEADWALL STIRRUP DETAIL
No Scale

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTION AND SCHEDULE

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	67 of 103	JUNE 1, 2017	RG3104-Z

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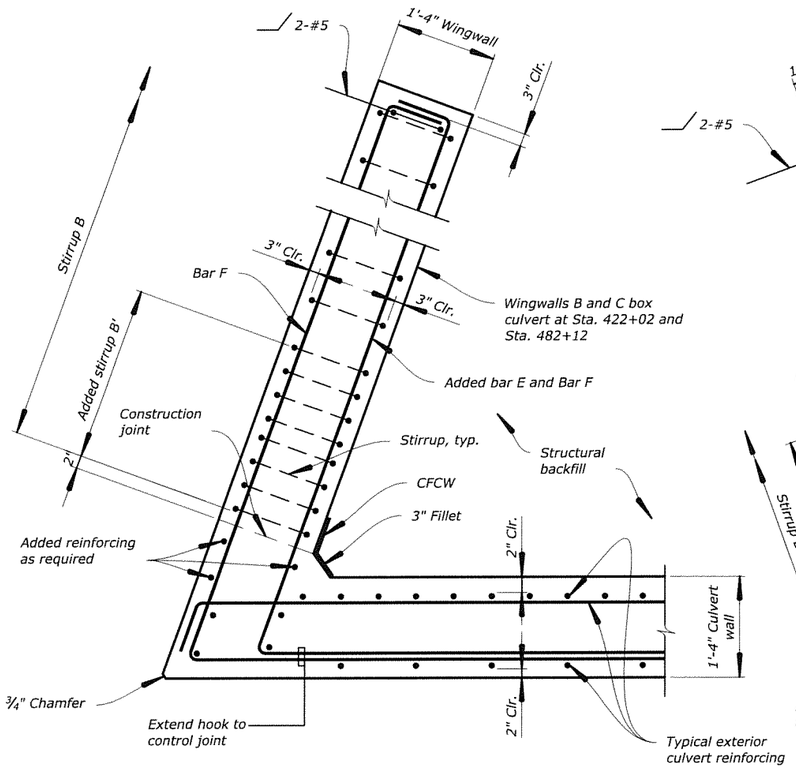
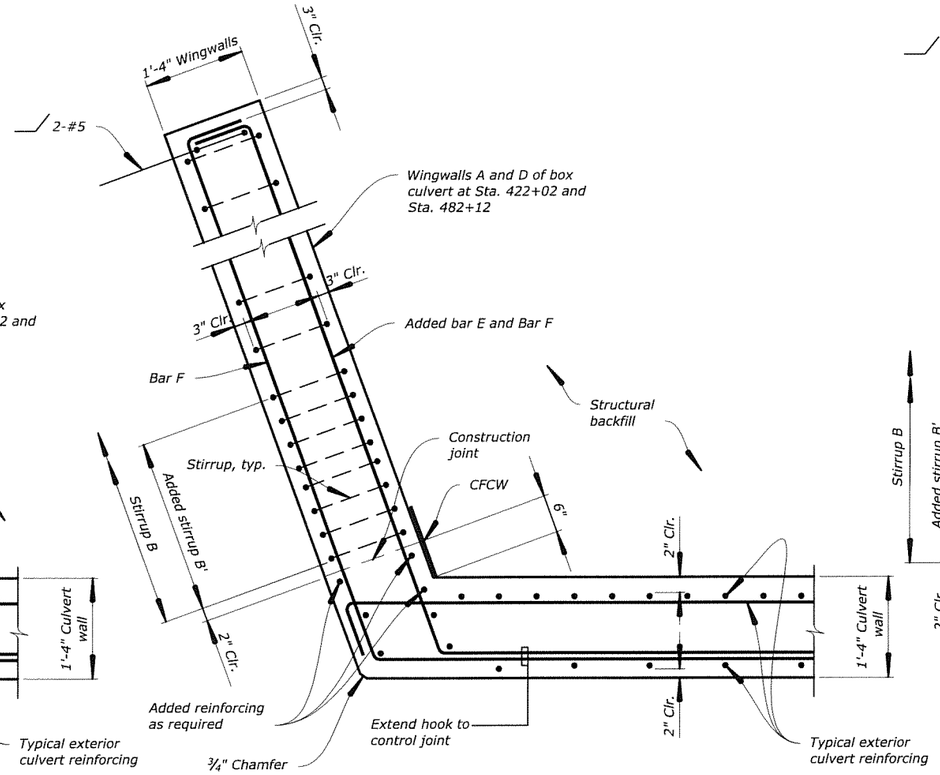
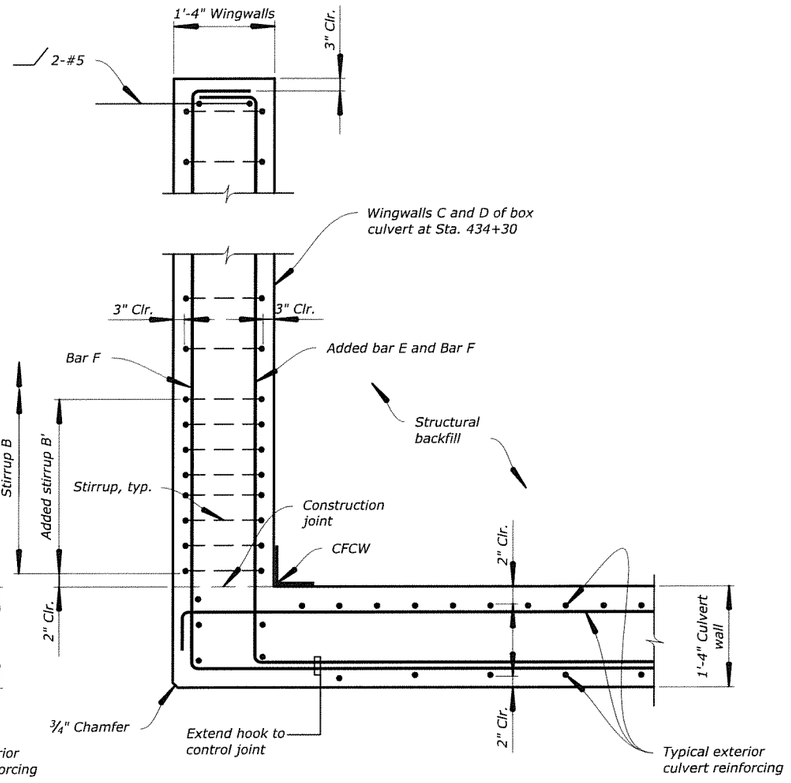
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S68



AT ACUTE ANGLES



AT OBTUSE ANGLES



AT ANGLE CLOSE TO 90°

SECTION 'C-C' AT CULVERT WALLS

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	68 of 103	JUNE 1, 2017	RG3104-AA

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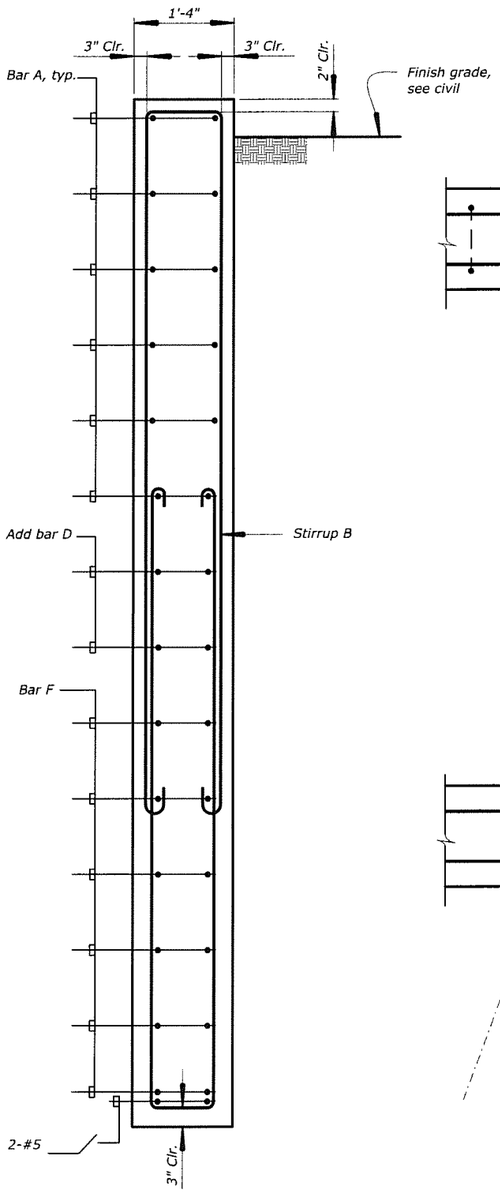
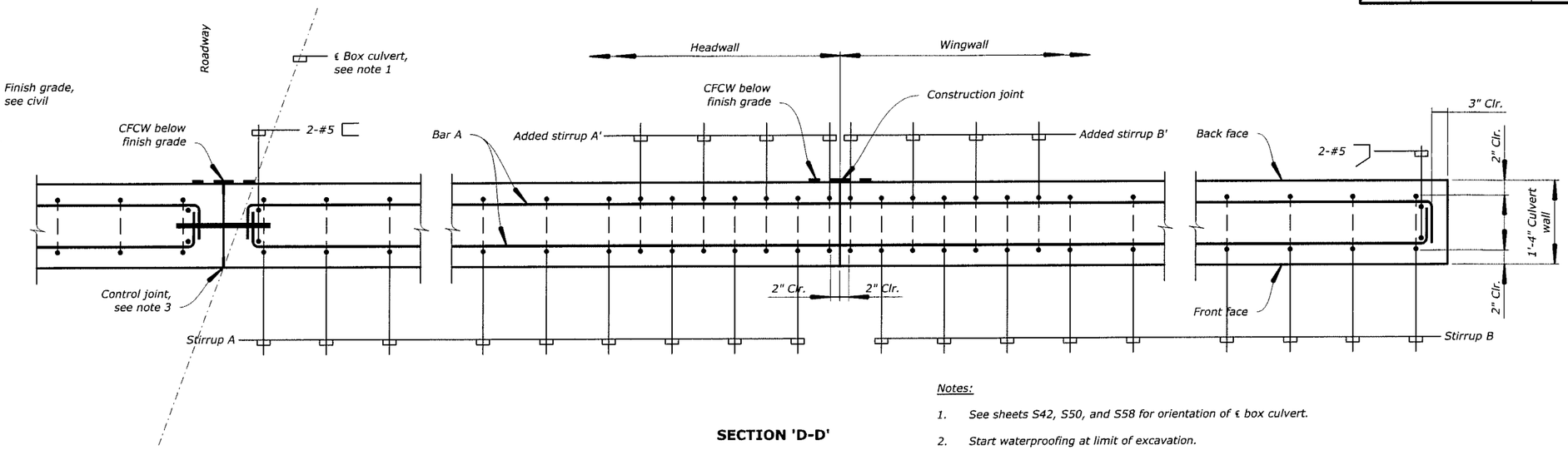
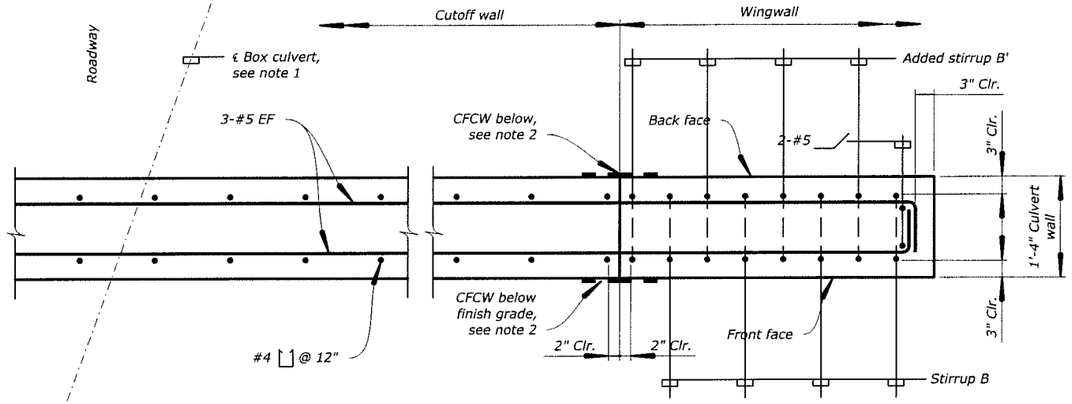
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S69



SECTION 'B-B'



SECTION 'D-D'



SECTION 'E-E'

Notes:

1. *See sheets S42, S50, and S58 for orientation of ℄ box culvert.*
2. *Start waterproofing at limit of excavation.*
3. *See sheet S100 for control joint detail in headwall.*

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	69 of 103	JUNE 1, 2017	RG3104-BB

DRAWING NO.: FINAL DESIGN

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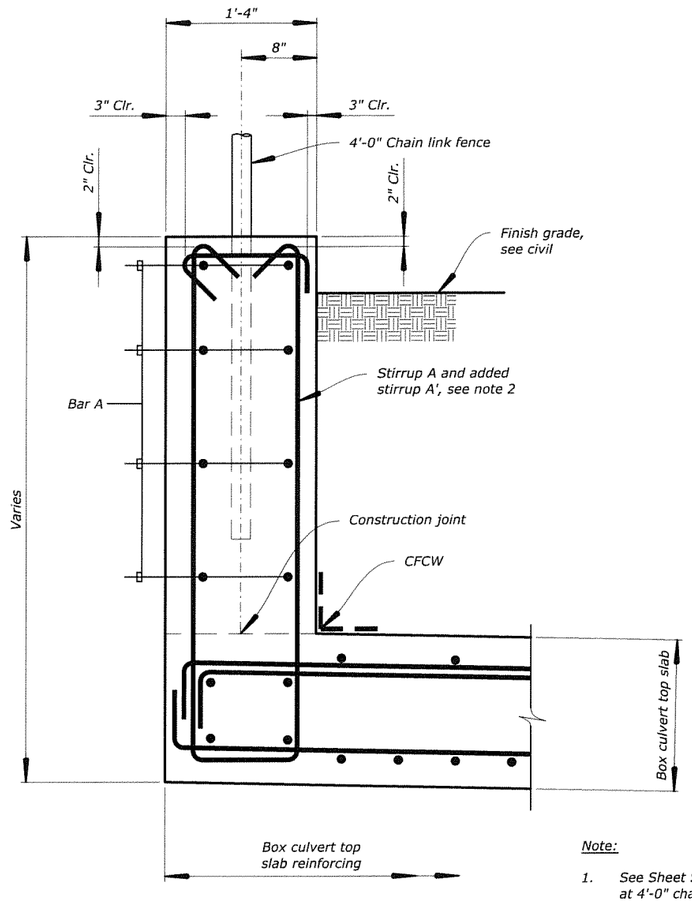
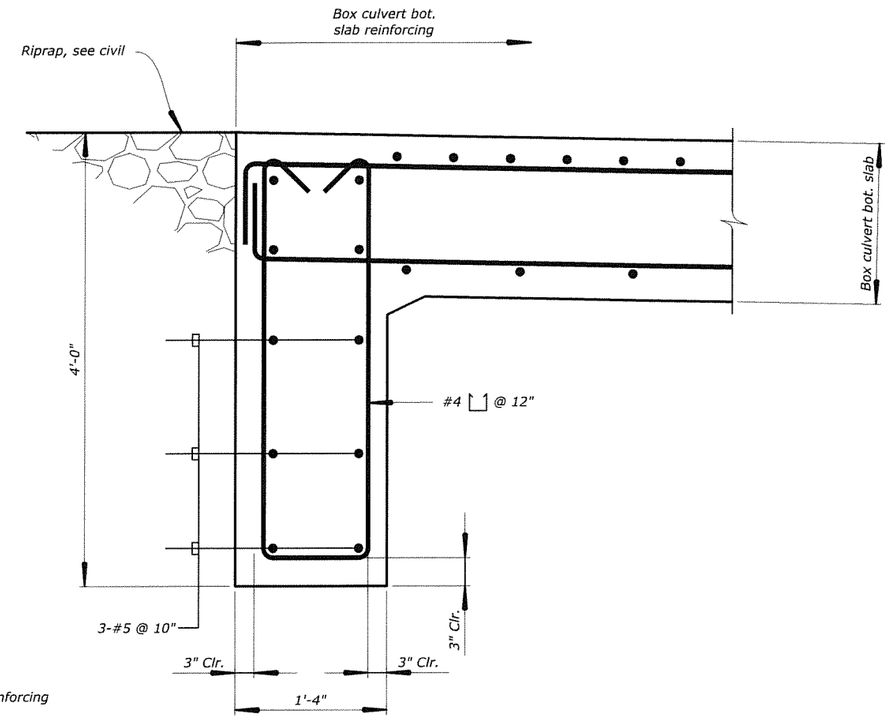
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S70



TYPICAL HEADWALL SECTION 'F-F'

Note:

1. *See Sheet S102 for added reinforcing at 4'-0" chain link fence post.*
2. *See sheet S66 and S67 for stirrup spacing and schedule.*



TYPICAL CUTOFF WALL SECTION 'G-G'

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

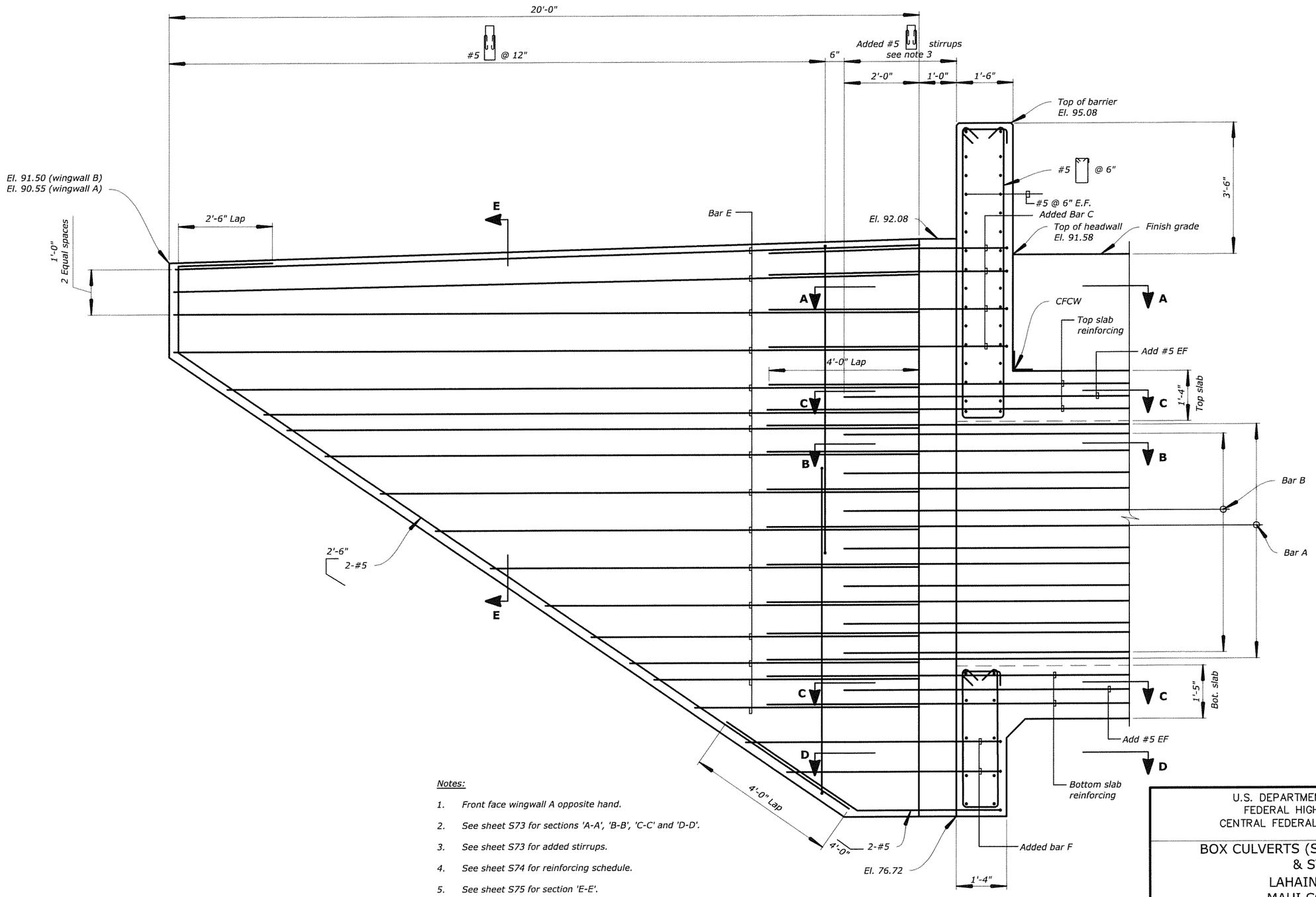
CULVERT SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	70 of 103	JUNE 1, 2017	RG3104-CC

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S71



Notes:

1. *Front face wingwall A opposite hand.*
2. *See sheet S73 for sections 'A-A', 'B-B', 'C-C' and 'D-D'.*
3. *See sheet S73 for added stirrups.*
4. *See sheet S74 for reinforcing schedule.*
5. *See sheet S75 for section 'E-E'.*

STA. 434+30
FRONT FACE WINGWALL A AND B ELEVATION 'A-A'

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT WINGWALL A&B ELEVATION AND REINFORCING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	71 of 103	JUNE 1, 2017	RG3104-DD

DRAWING NO.: FINAL DESIGN

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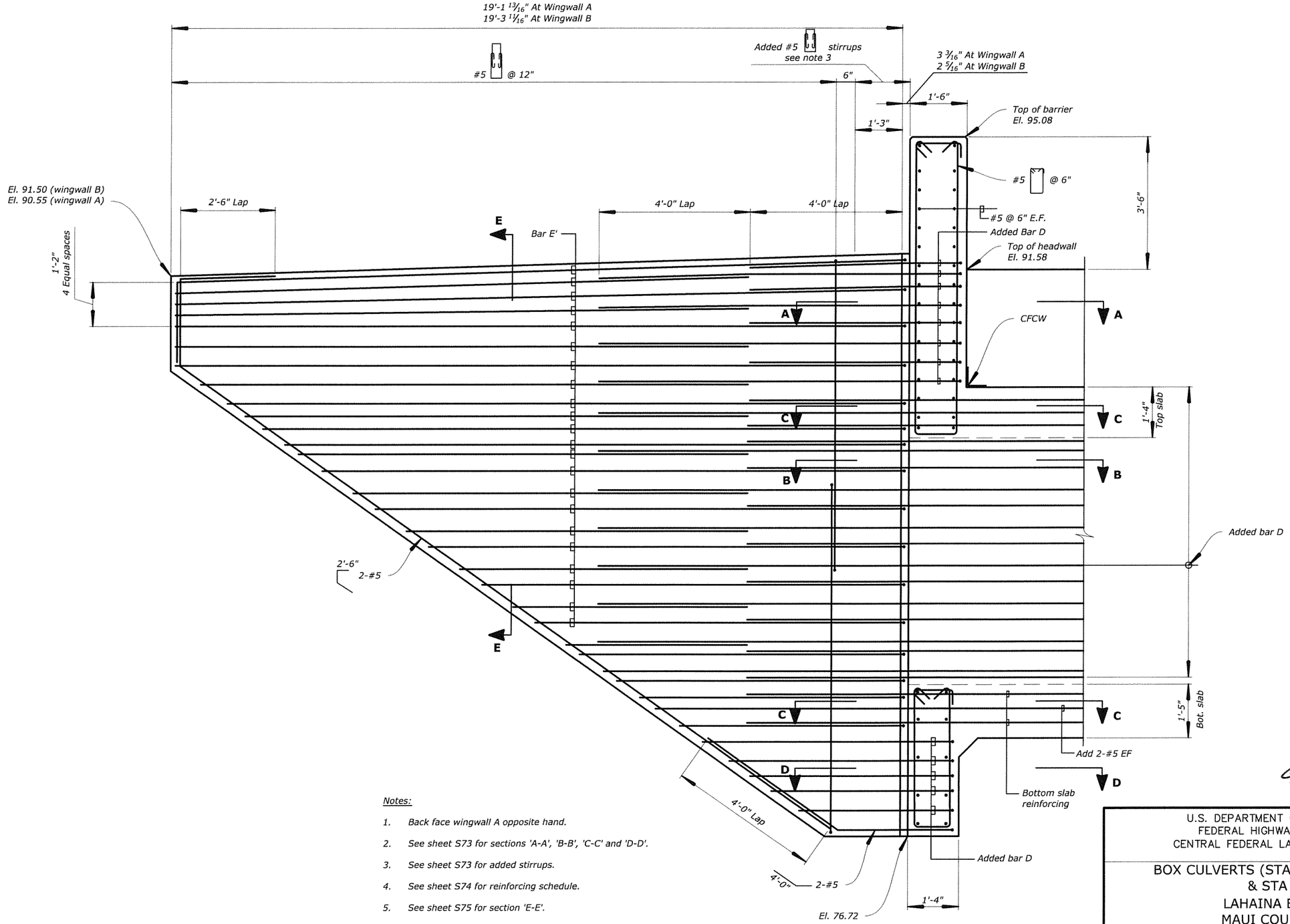
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S72



Notes:

1. *Back face wingwall A opposite hand.*
2. *See sheet S73 for sections 'A-A', 'B-B', 'C-C' and 'D-D'.*
3. *See sheet S73 for added stirrups.*
4. *See sheet S74 for reinforcing schedule.*
5. *See sheet S75 for section 'E-E'.*
6. *Lap splices shall be staggered as shown.*

STA. 434+30
BACK FACE WINGWALL A AND B ELEVATION 'A-A'

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT WINGWALL A&B ELEVATION REINFORCING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	72 of 103	JUNE 1, 2017	RG3104-EE

DRAWING NO.: FINAL DESIGN

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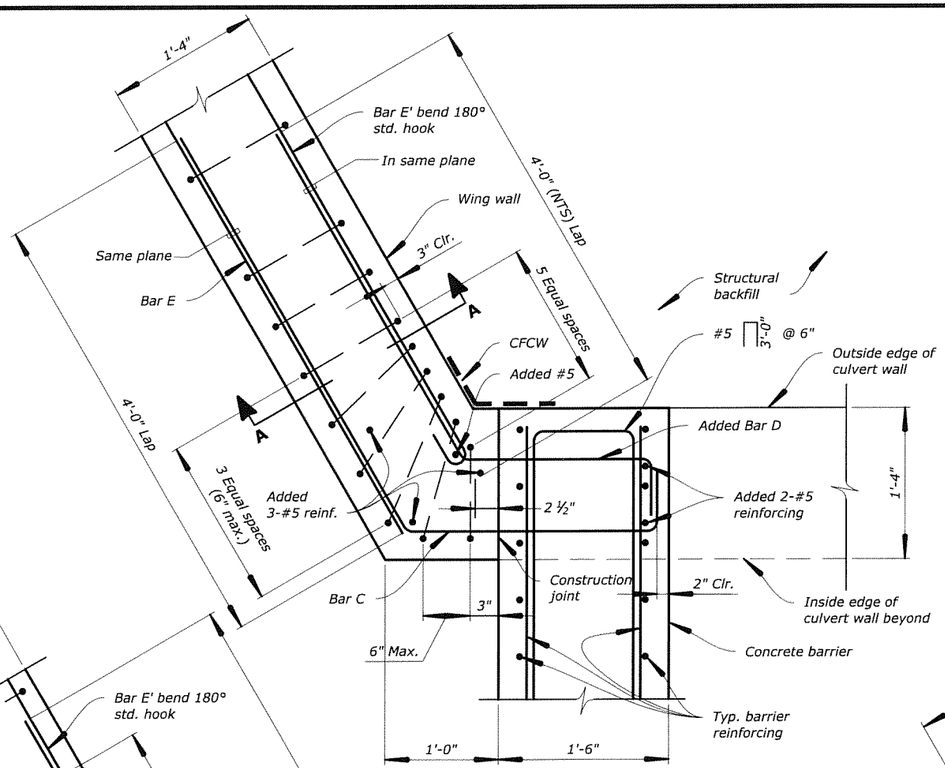
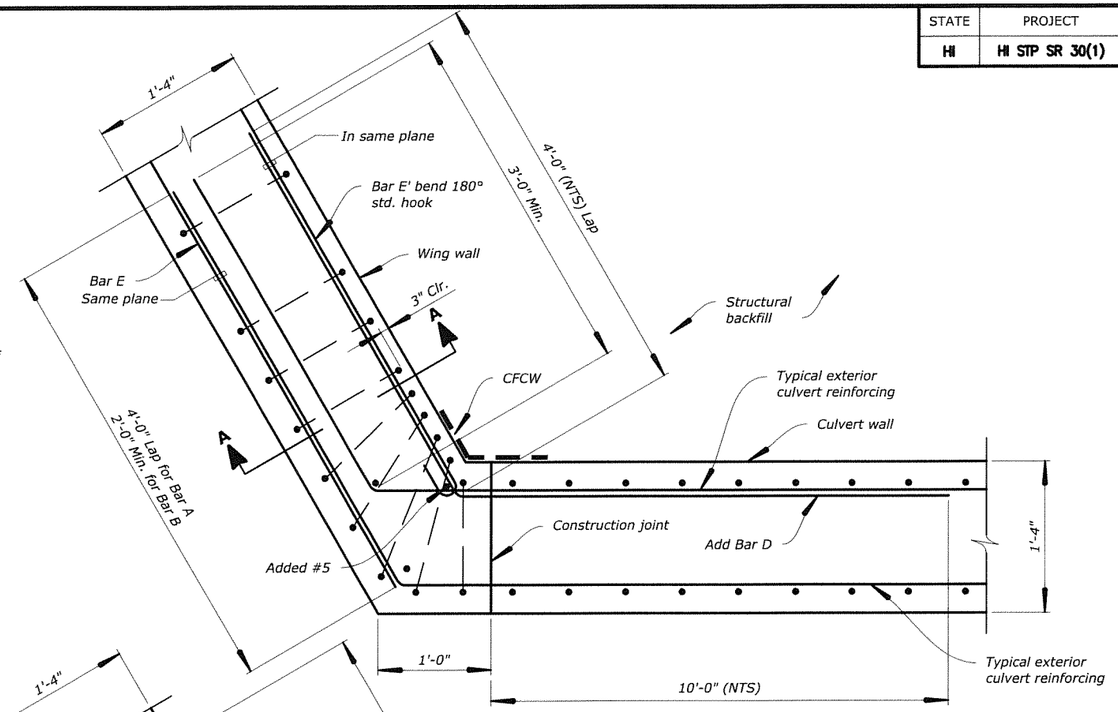
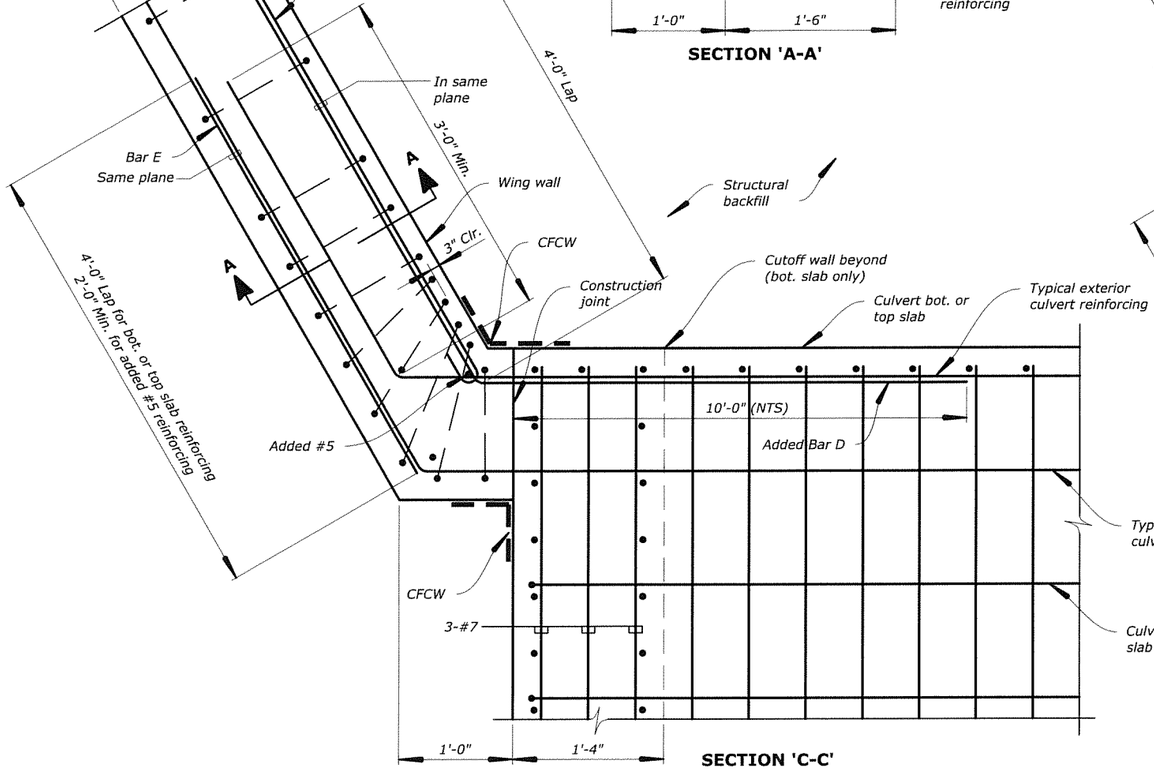
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S73



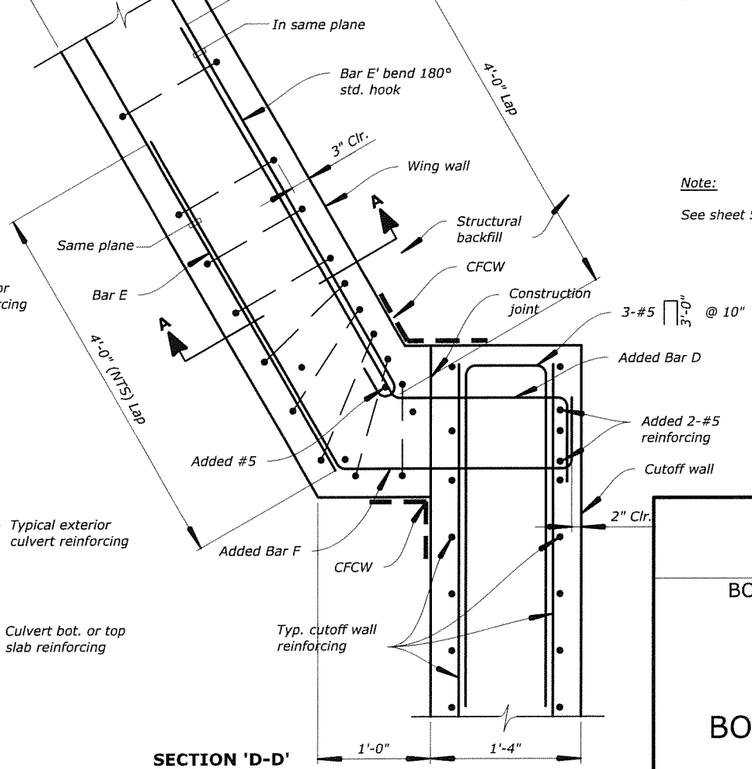
SECTION 'A-A'



SECTION 'B-B'



SECTION 'C-C'



SECTION 'D-D'

Note:

See sheet S74 for section 'A-A'.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT WINGWALL A&B SECTIONS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	73 of 103	JUNE 1, 2017	RG3014-FF

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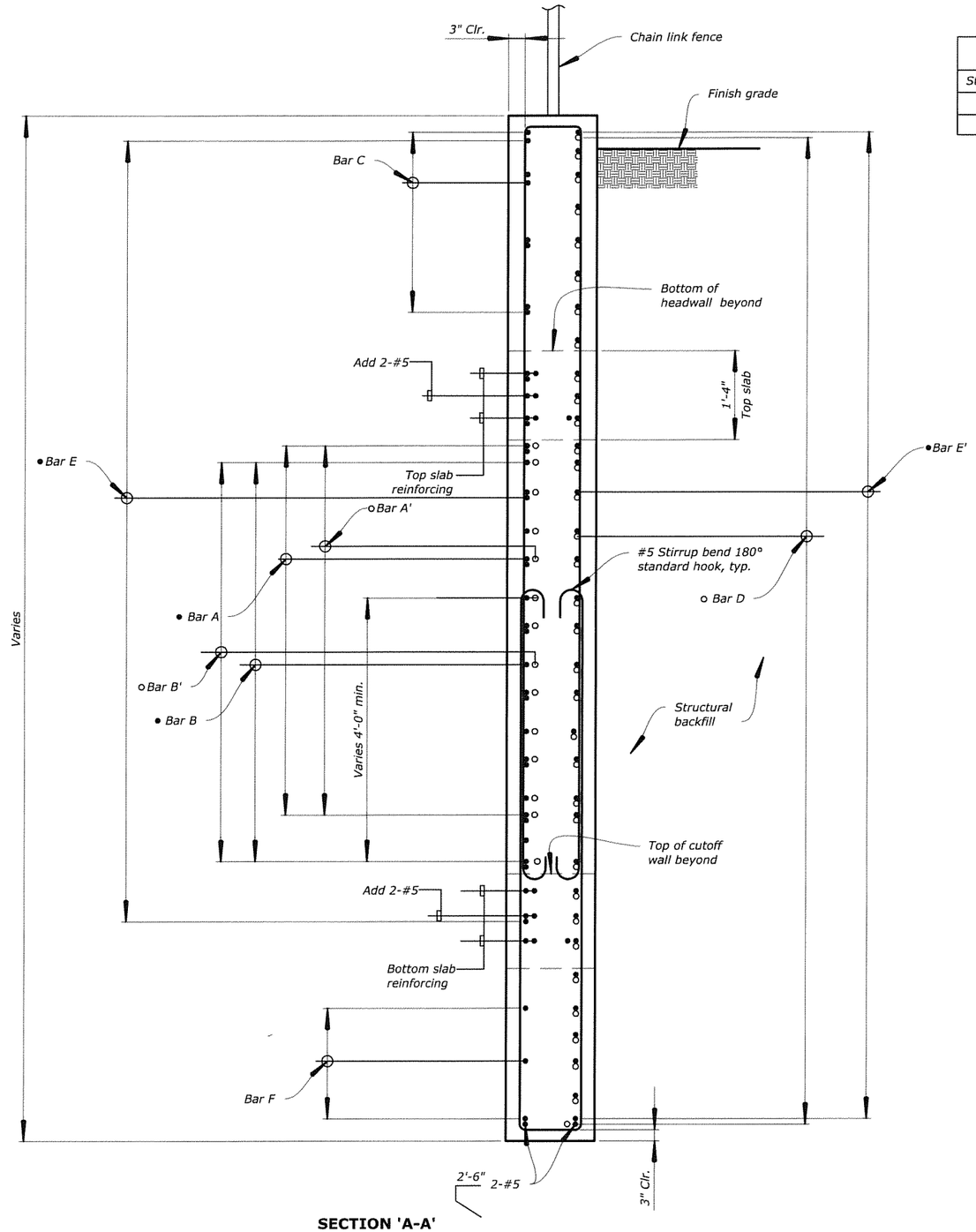
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S74



SECTION 'A-A'

REINFORCING SCHEDULE

Sta. 434+30	Wingwall	Bar A	Bar A'	Bar B	Bar B'	Bar C	Bar D	Bar E	Bar E'	Bar F
	A & B	#5 @ 12"	#5 @ 12"	#5 @ 12"	#5 @ 12"	#5 @ 12"	#5 @ 6"	#5 @ 12"	#5 @ 6"	#5 @ 12"

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

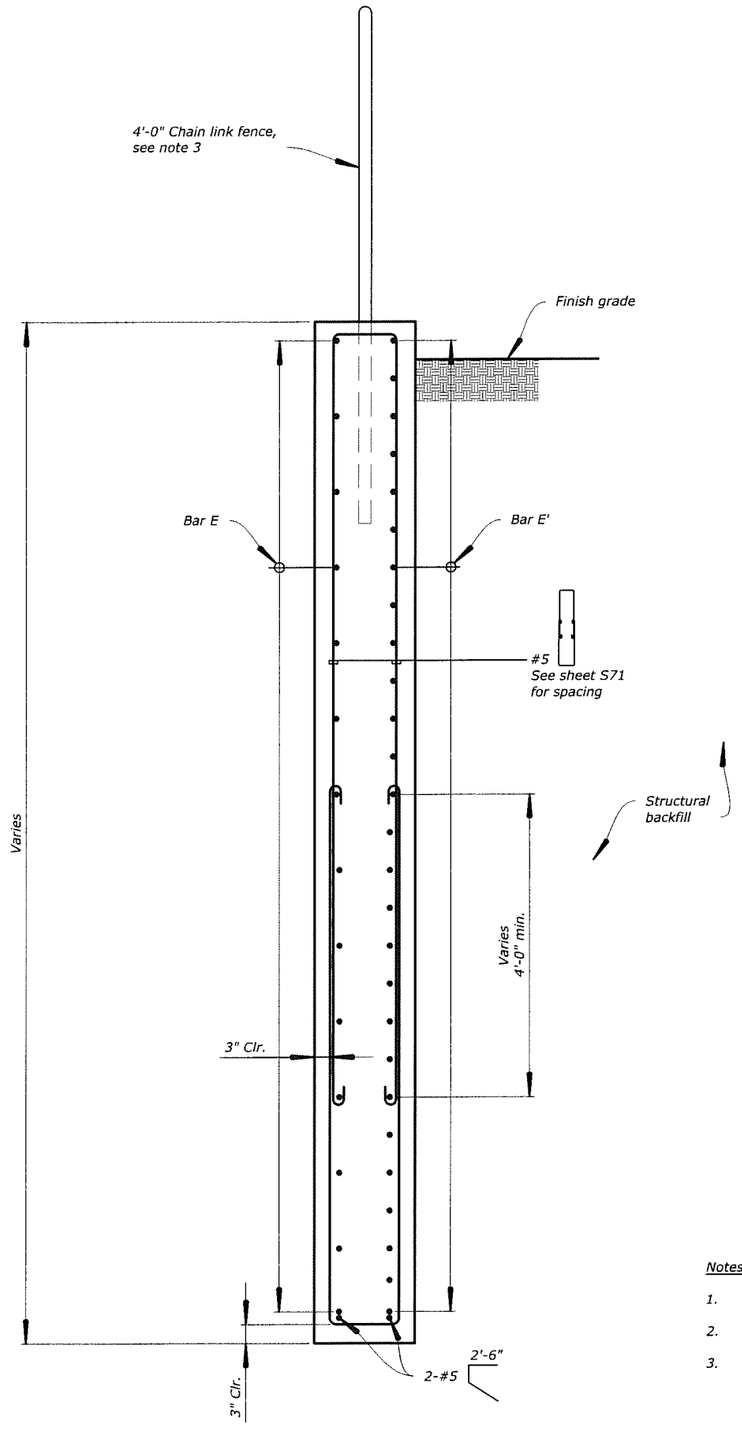
STA. 434+30
BOX CULVERT WINGWALL A&B SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	74 of 103	JUNE 1, 2017	RG3104-GG

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S75



SECTION 'E-E'

Notes:

1. ☐ *Stirrups may be used when wall height permits it.*
2. *See sheet S74 for wingwall rebar schedule.*
3. *See sheet S102 for chain link fence details.*

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HAWAII, U.S.A.

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT WINGWALL A&B SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	75 of 103	JUNE 1, 2017	RG3104-HH

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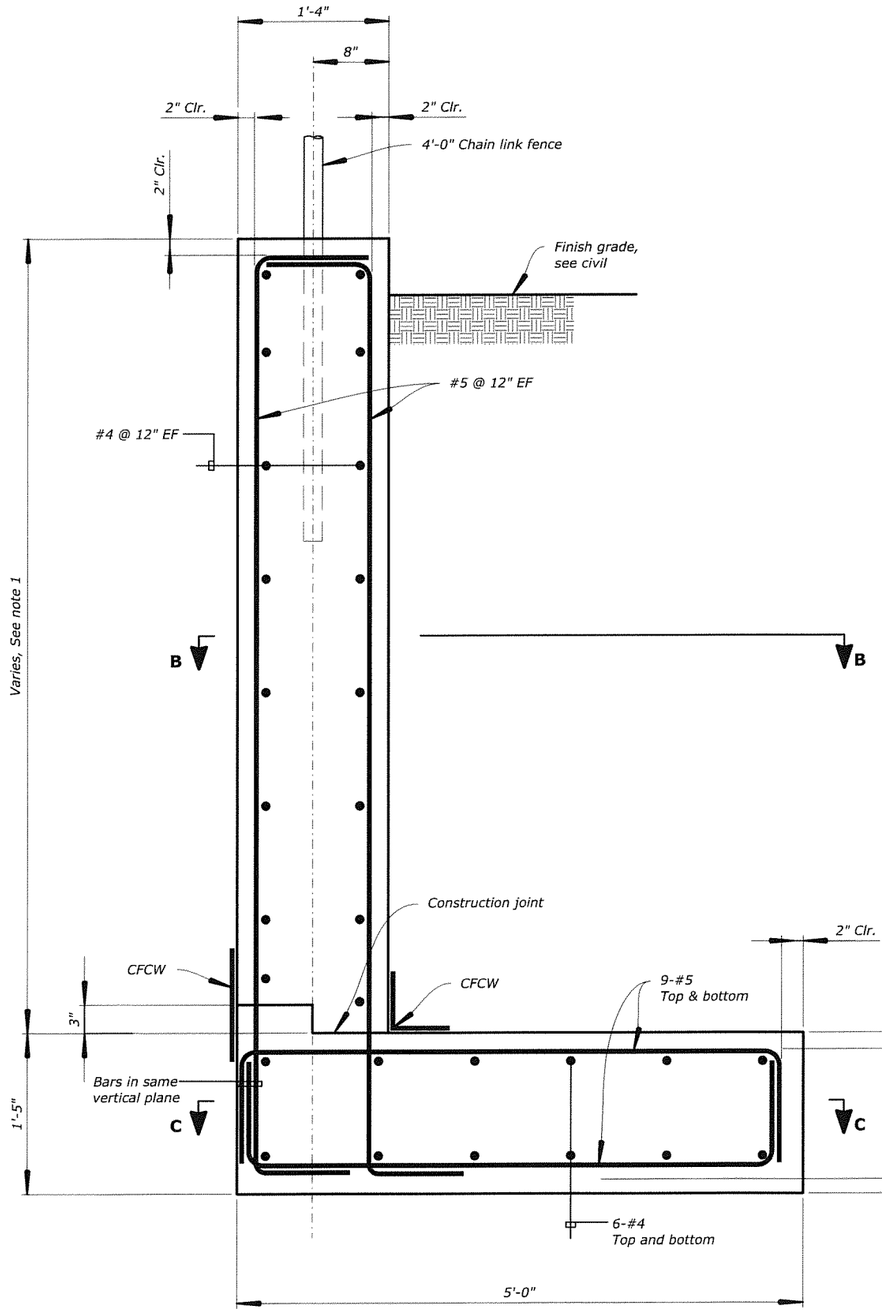
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S76



SECTION 'A-A'

Notes:

1. *See Sheet S60 for elevations of retaining walls C and D.*
2. *See sheet S92 for retaining wall backfill section.*
3. *See sheet S77 for section 'B-B' and 'C-C'.*
4. *See sheet S102 for chain link fence details.*

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

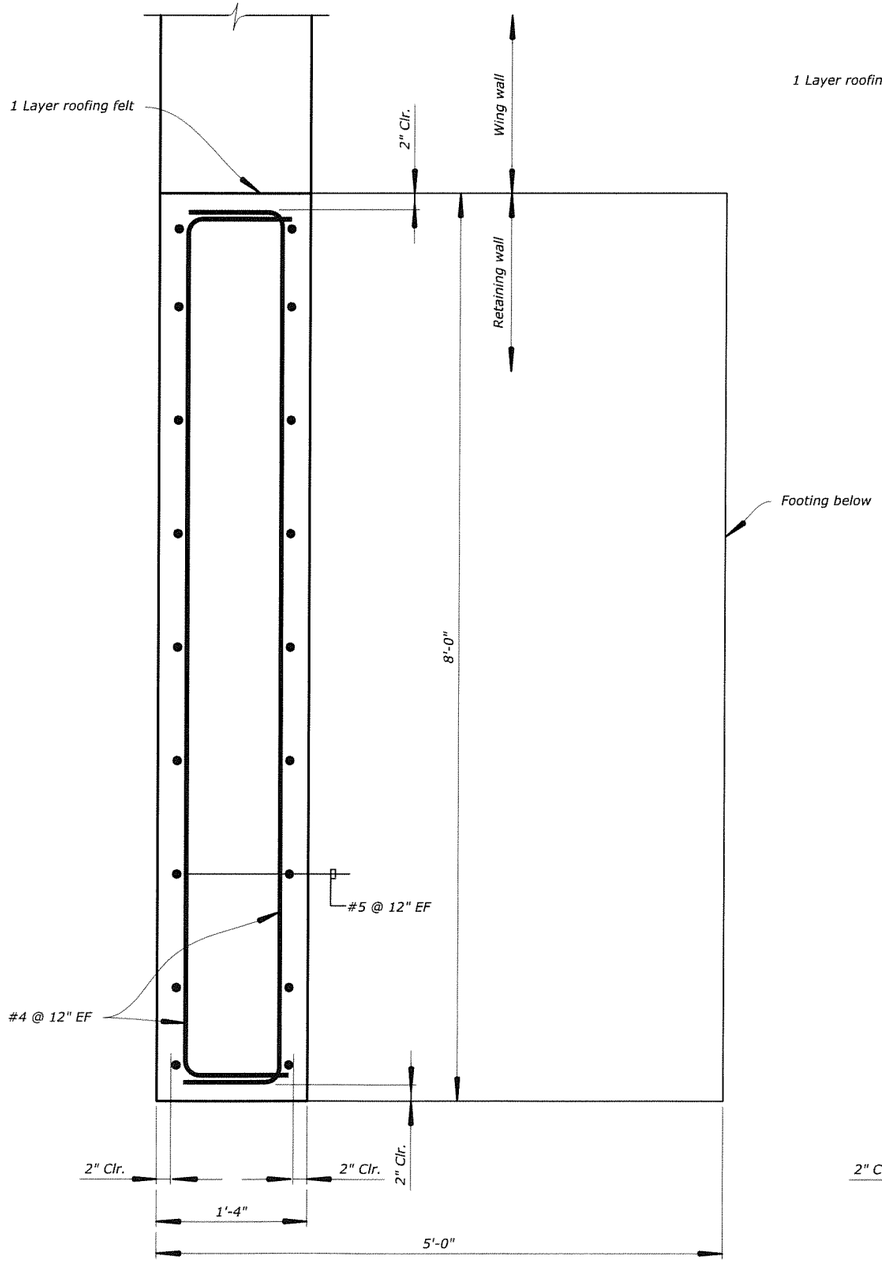
RETAINING WALL SECTION AT STA. 482+12

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	76 of 103	JUNE 1, 2017	RG3104-II

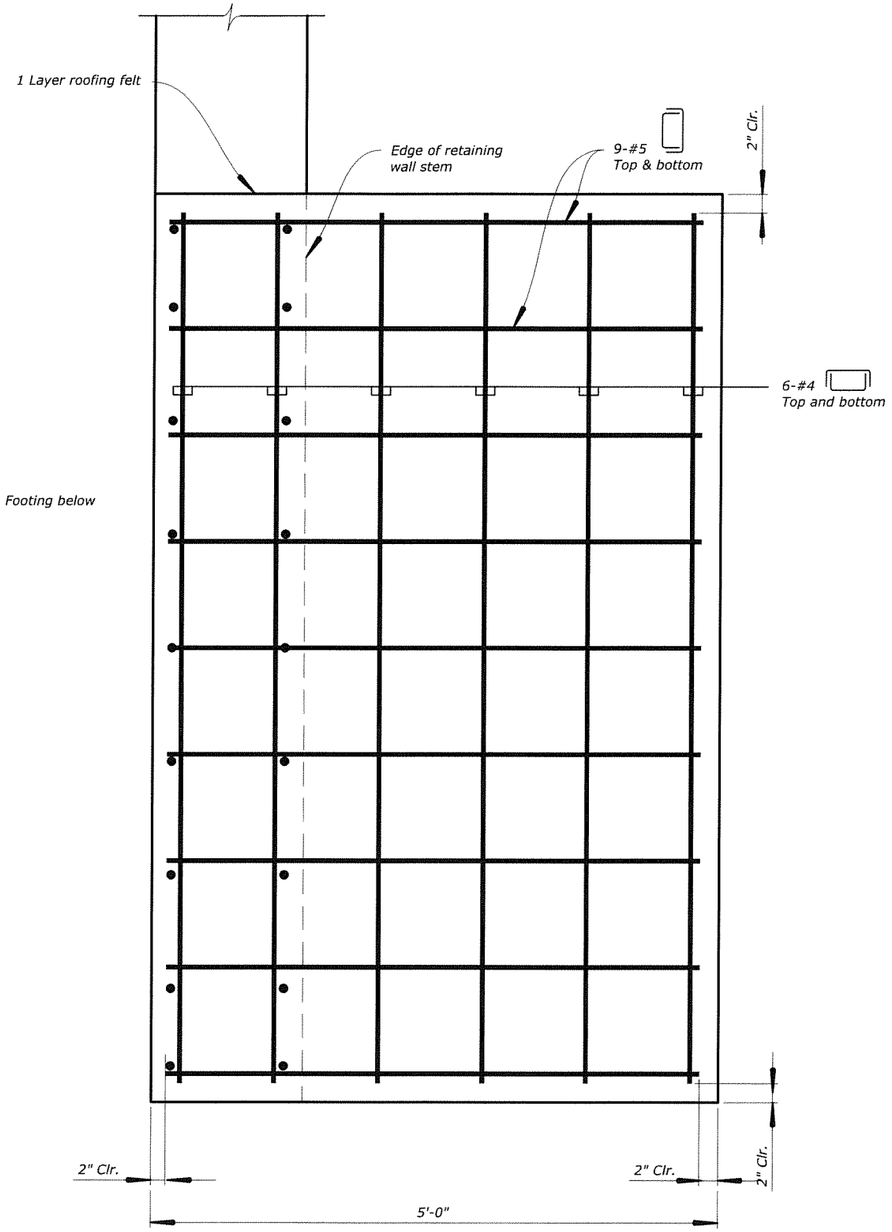
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S77



SECTION 'B-B'



SECTION 'C-C'

Note:

Retaining wall D is shown. Retaining wall C is opposite hand.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

RETAINING WALL SECTION AT STA. 482+12

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	77 of 103	JUNE 1, 2017	RG3104-JJ

DRAWING NO.: FINAL DESIGN

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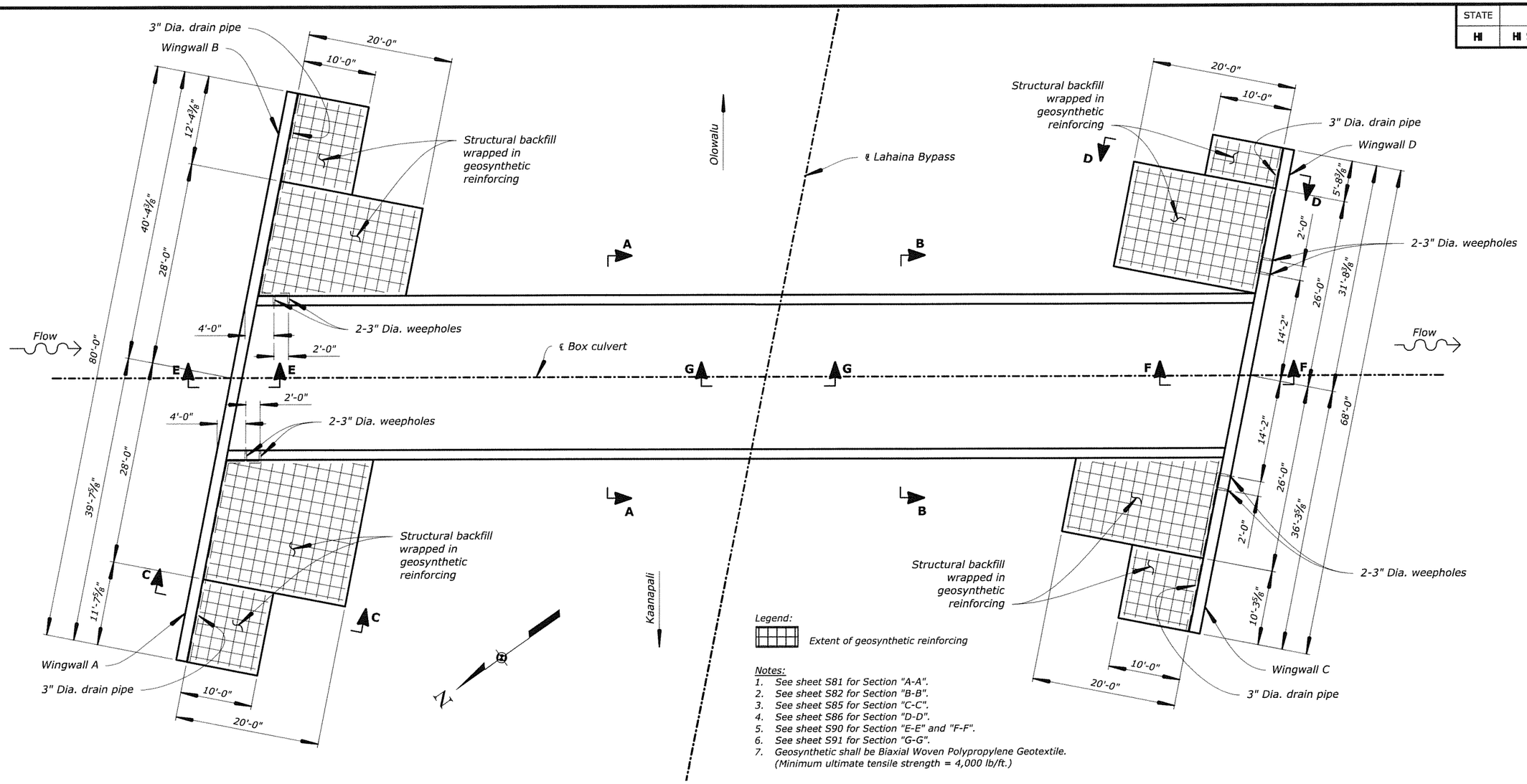
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S78



STA. 422+02
BOX CULVERT BACKFILL PLAN

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 422+02
BOX CULVERT BACKFILL PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	78 of 103	JUNE 1, 2017	RG3104-KK

DRAWING NO.: FINAL DESIGN

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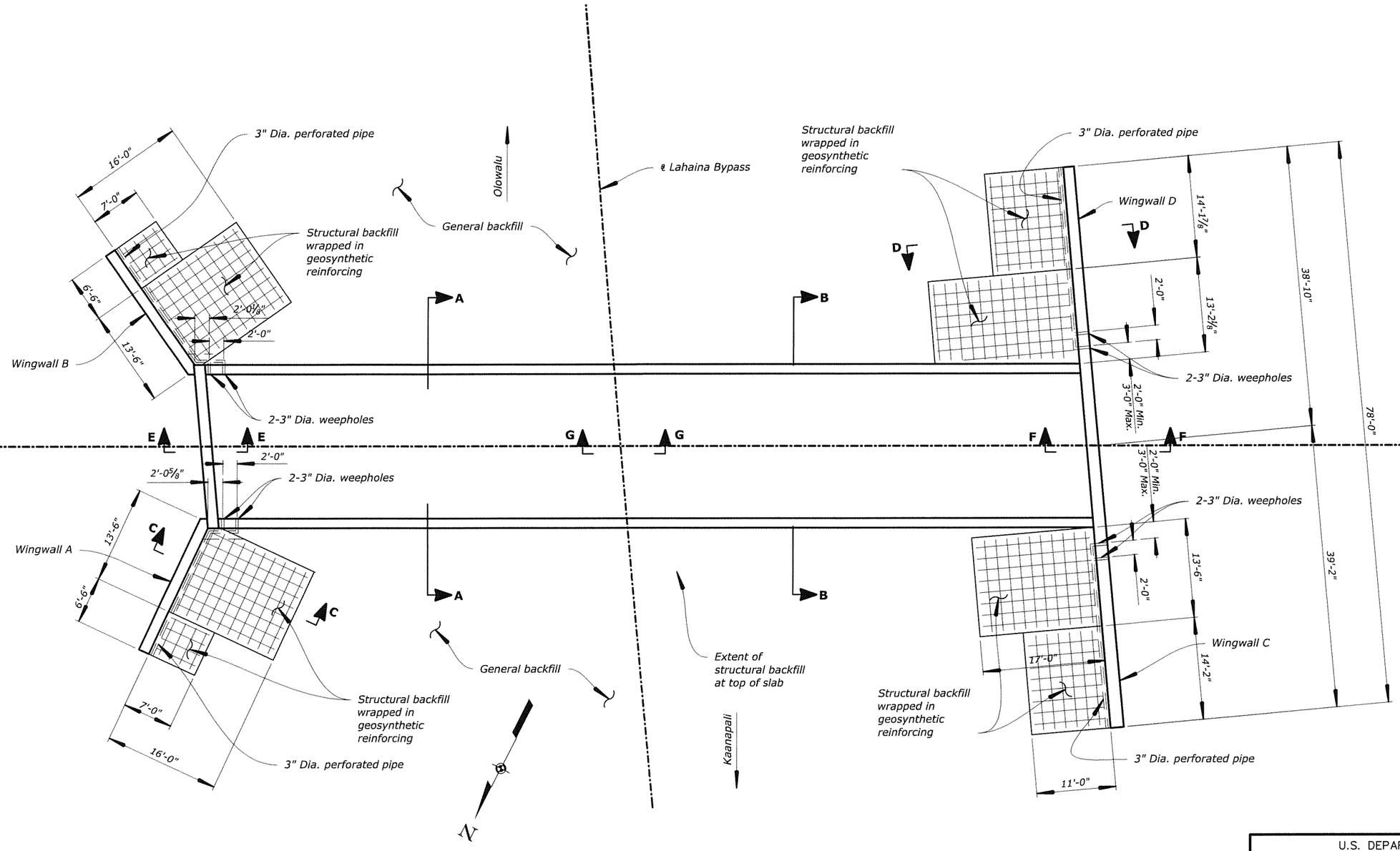
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S79



STA. 434+30
BOX CULVERT BACKFILL PLAN

Legend:

Extent of geosynthetic reinforcing

Notes:

1. *See sheet S81 for Section "A-A".*
2. *See sheet S82 for Section "B-B".*
3. *See sheet S88 for Section "C-C".*
4. *See sheet S86 for Section "D-D".*
5. *See sheet S90 for section "E-E" and "F-F".*
6. *See sheet S91 for section "G-G".*
7. *Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,000 lb/ft.)*

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 434+30
BOX CULVERT BACKFILL PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	79 of 103	JUNE 1, 2017	RG3104-LL

DRAWING NO.: FINAL DESIGN

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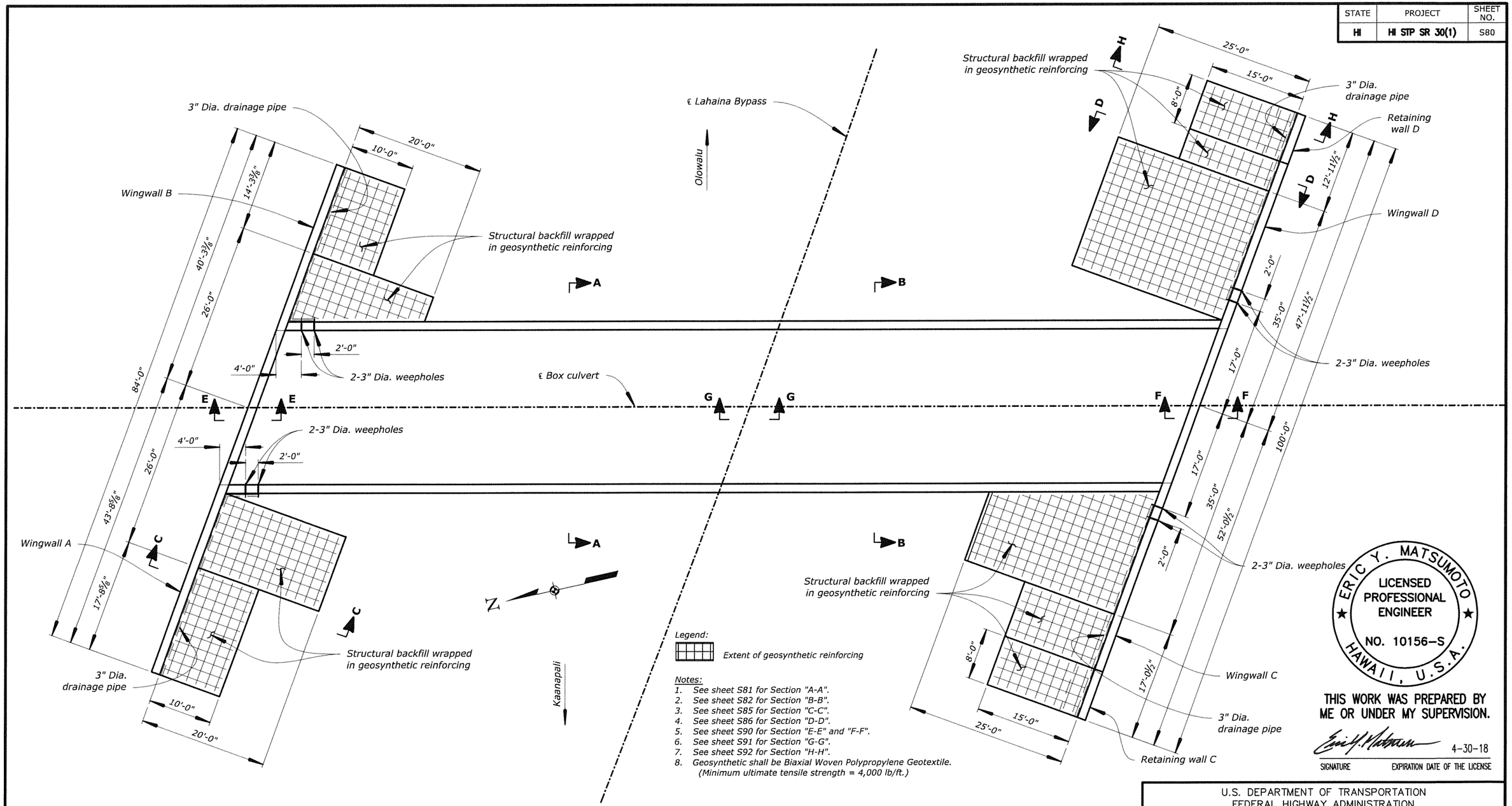
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S80



Legend:

Extent of geosynthetic reinforcing

Notes:

1. See sheet S81 for Section "A-A".
2. See sheet S82 for Section "B-B".
3. See sheet S85 for Section "C-C".
4. See sheet S86 for Section "D-D".
5. See sheet S90 for Section "E-E" and "F-F".
6. See sheet S91 for Section "G-G".
7. See sheet S92 for Section "H-H".
8. Geosynthetic shall be Biaxial Woven Polypropylene Geotextile. (Minimum ultimate tensile strength = 4,000 lb/ft.)

STA. 482+12
BOX CULVERT BACKFILL PLAN
Scale: 1"=15'

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Eric Y. Matsumoto 4-30-18
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

STA. 482+12
BOX CULVERT BACKFILL PLAN

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=15'-0"	D. FUJIWARA	80 of 103	JUNE 1, 2017	RG3104-MM

DRAWING NO.: FINAL DESIGN

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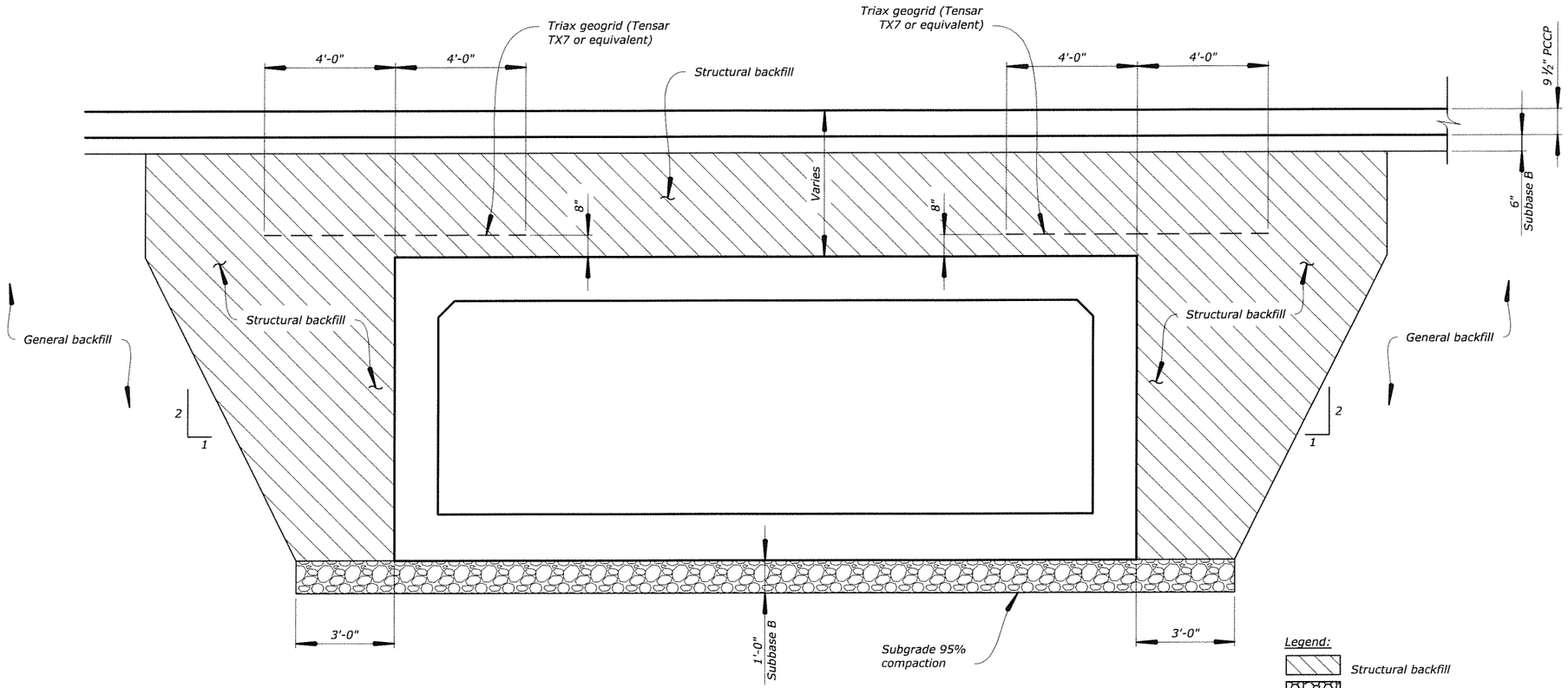
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S81



SECTION 'A-A'

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

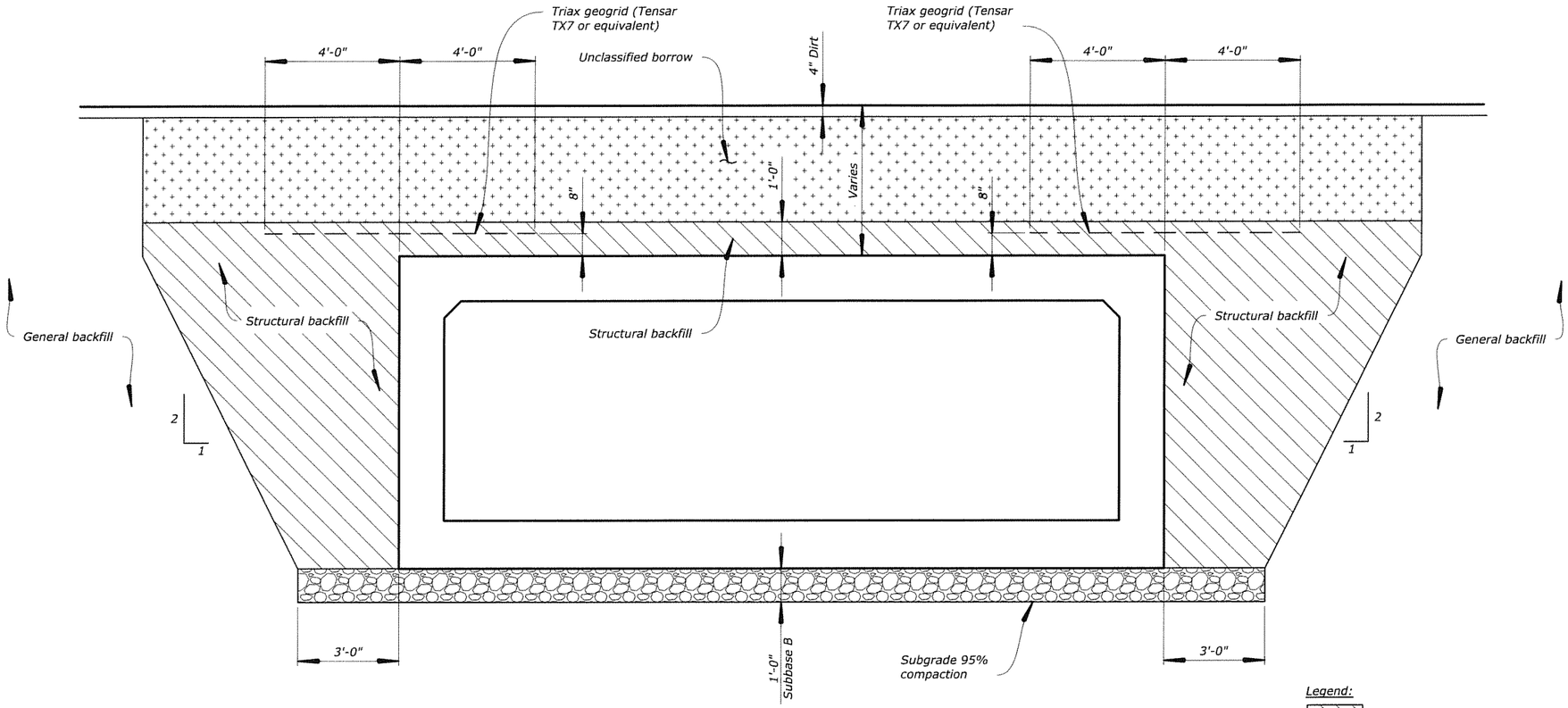
BOX CULVERT BACKFILL SECTION 'A-A'

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/4"=1'-0"	D. FUJIWARA	81 of 103	JUNE 1, 2017	RG3104-NN

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S82



Legend:

- Structural backfill
- Subbase B
- Unclassified borrow

SECTION 'B-B'

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BOX CULVERT BACKFILL SECTION 'B-B'

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/4"=1'-0"	D. FUJIWARA	82 of 103	JUNE 1, 2017	RG3104-00

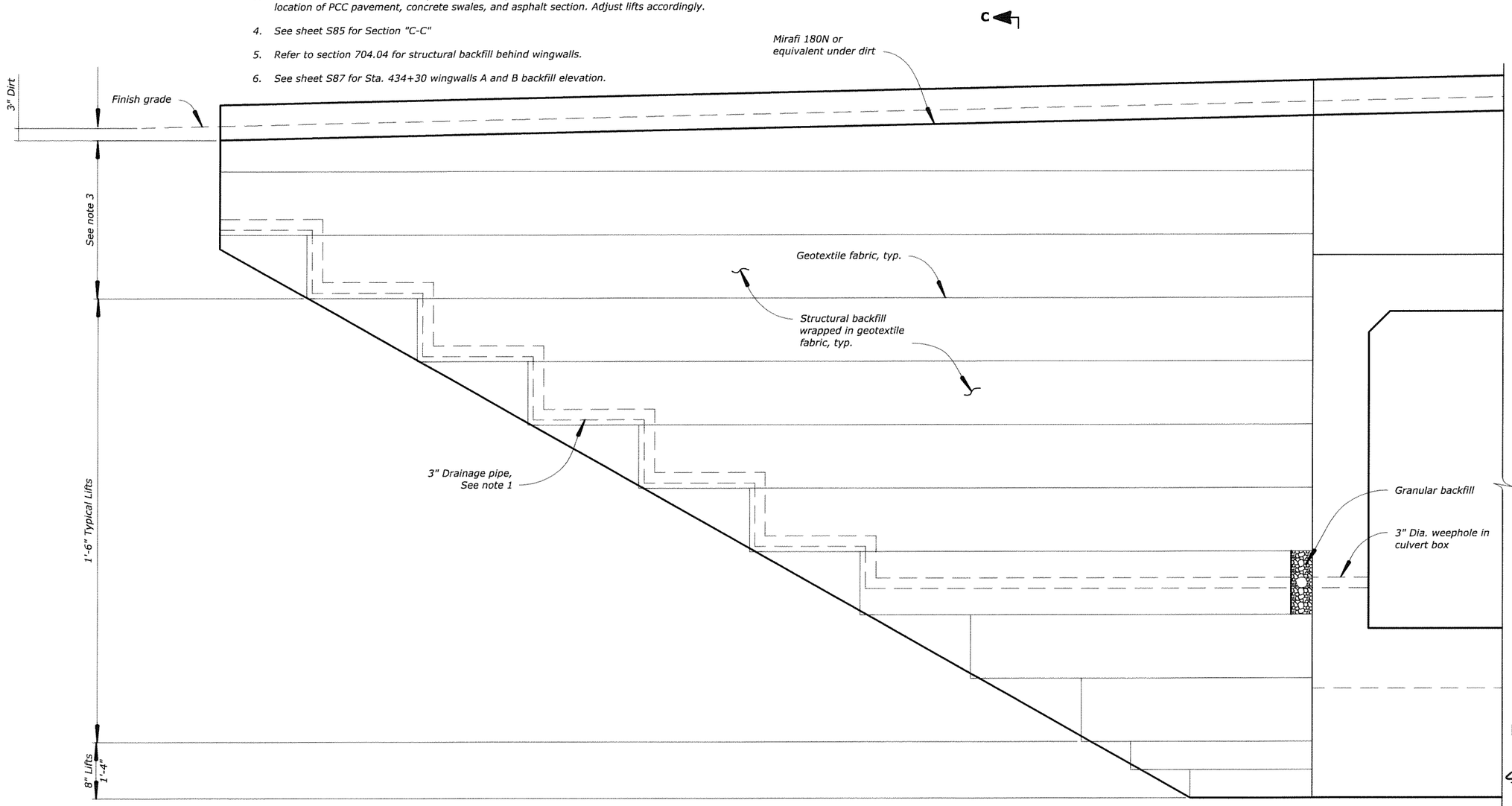
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S83

Notes:

1. Drain pipe shall be perforated when placed horizontal along the length of the wing wall. See drain detail on S101. Do not perforate remainder of pipe.
2. See sheets S43, S51, and S59 for dimensions of wing walls.
3. See sheets S78 and S80 for required length of geotextile fabric. See civil sheets for size and location of PCC pavement, concrete swales, and asphalt section. Adjust lifts accordingly.
4. See sheet S85 for Section "C-C"
5. Refer to section 704.04 for structural backfill behind wingwalls.
6. See sheet S87 for Sta. 434+30 wingwalls A and B backfill elevation.



BACKFILL ELEVATION AT WINGWALLS A AND B

ERIC Y. MATSUMOTO
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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BACKFILL ELEVATION AT WINGWALLS A AND B

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	83 of 103	JUNE 1, 2017	RG3104-PP

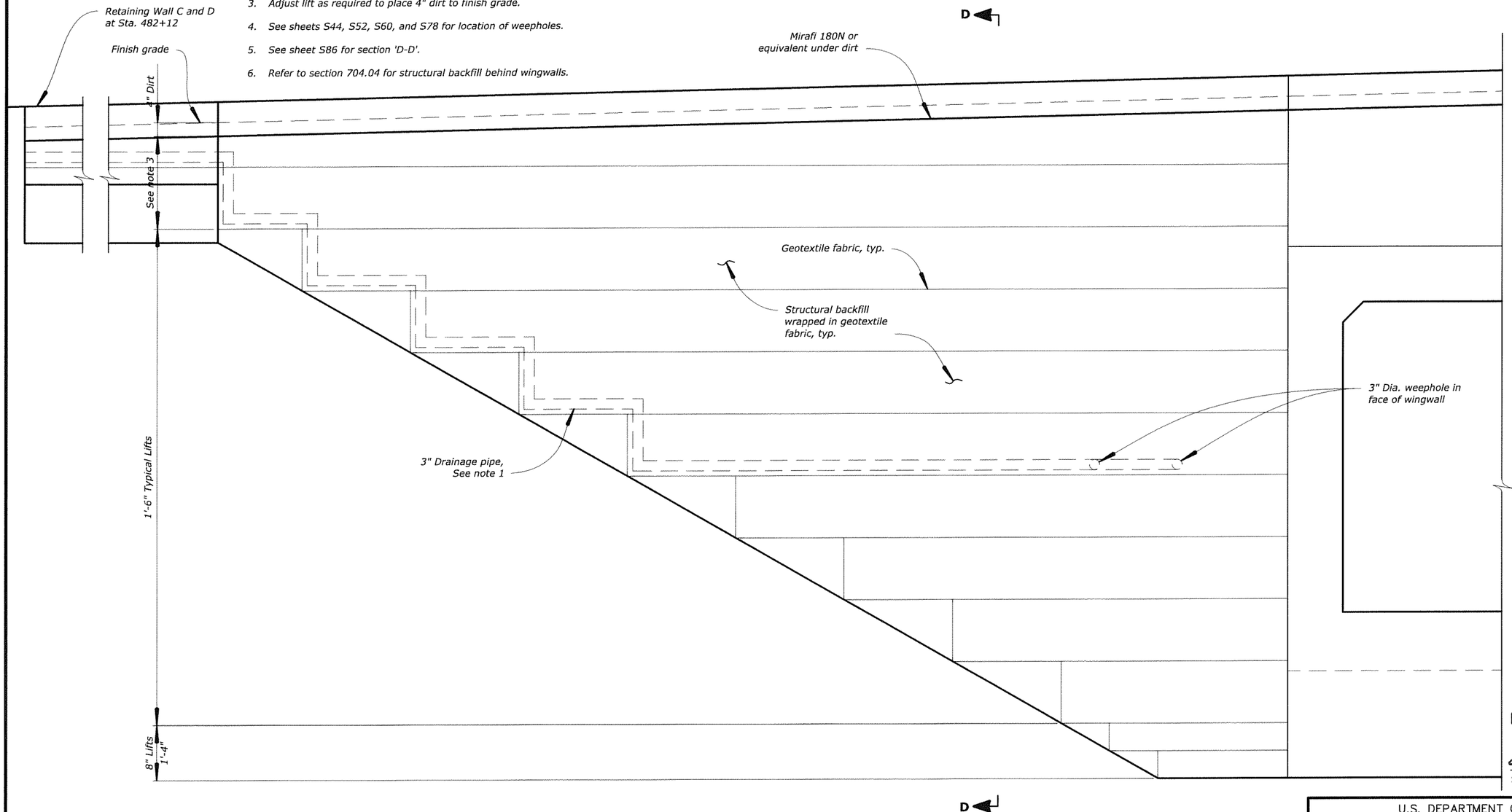
DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S84

Notes:

1. Drain pipe shall be perforated when placed horizontal along the length of the wing wall. See drain detail on S101. Do not perforate remainder of pipe.
2. See sheets S44, S52, and S60 for dimensions of wing walls.
3. Adjust lift as required to place 4" dirt to finish grade.
4. See sheets S44, S52, S60, and S78 for location of weepholes.
5. See sheet S86 for section 'D-D'.
6. Refer to section 704.04 for structural backfill behind wingwalls.



BACKFILL ELEVATION AT WINGWALLS C AND D

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

BACKFILL ELEVATION AT WINGWALLS C AND D

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	84 of 103	JUNE 1, 2017	RG3104-QQ

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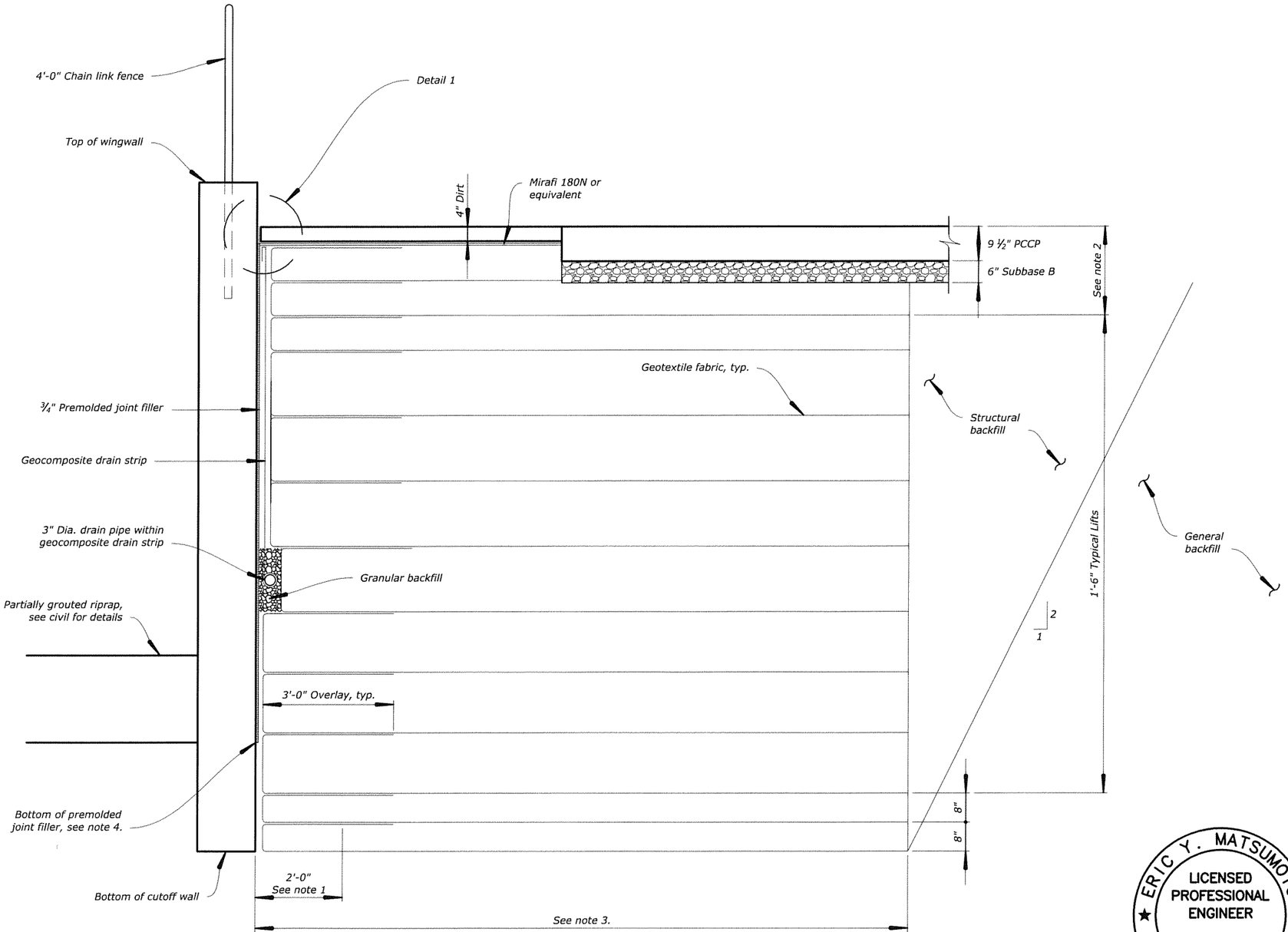
3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S85



WINGWALL A SECTION 'C-C'
WINGWALL B OPPOSITE HAND

Notes:

1. *Compaction of structural backfill wrapped in geotextile fabric is not required for the 2'-0" portion closest to the wall.*
2. *See civil sheets for details on PCC pavement, concrete swales, and asphalt section. Adjust lift thickness accordingly.*
3. *See sheet S78 and S80 for length of fabric.*
4. *Bottom of premolded joint filler shall match the bottom of the paritally grouted riprap. Where there is no riprap, bottom of premolded joint filler shall match finish grade.*
5. *See sheet S89 for detail 1.*
6. *See sheet S88 for Sta. 434+30 Wingwall A and B backfill section.*

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL A AND B SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	85 of 103	JUNE 1, 2017	RG3104-RR

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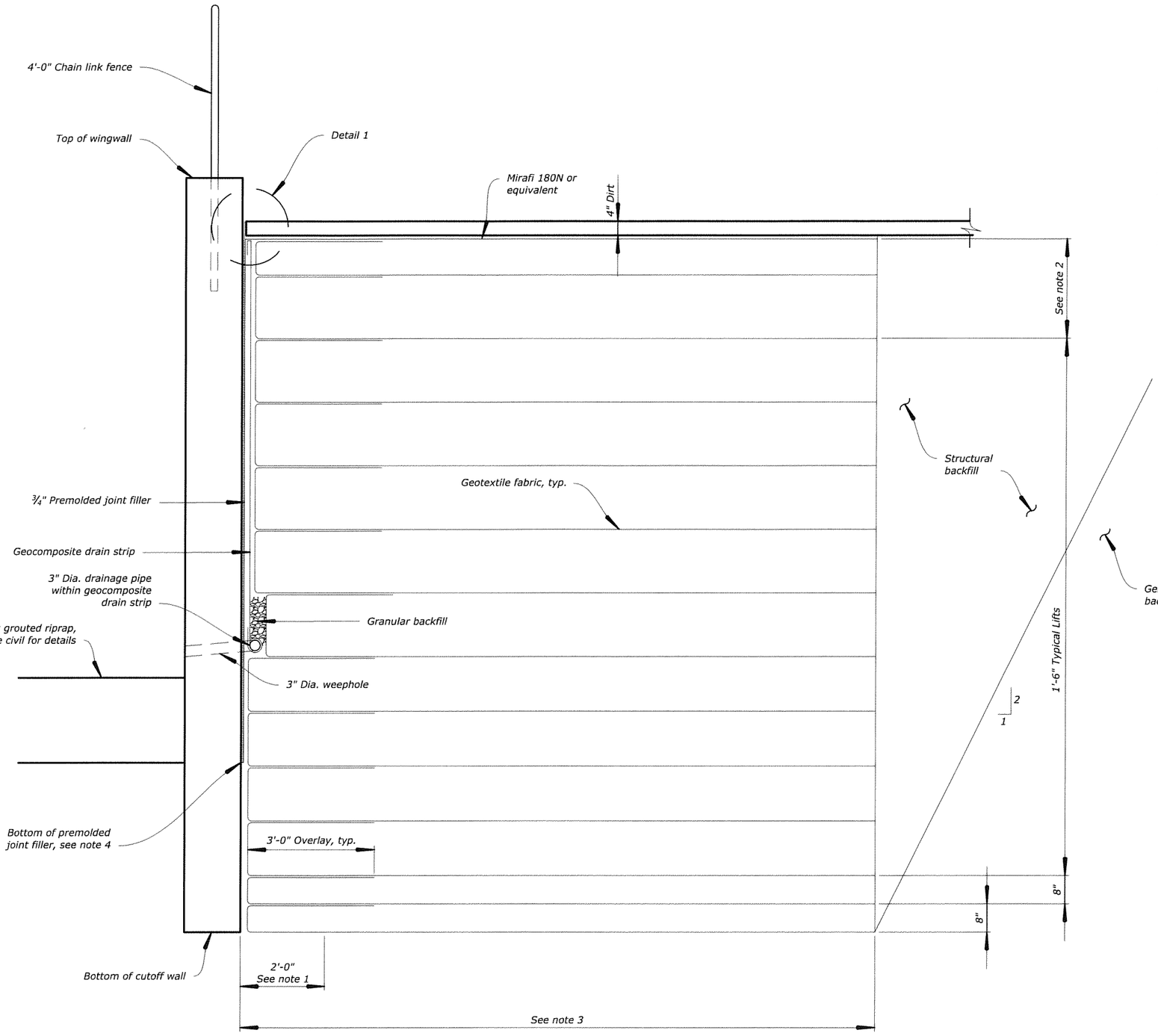
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S86



WINGWALL D SECTION 'D-D'
WINGWALL C OPPOSITE HAND

Notes:

1. *Compaction of structural backfill wrapped in geotextile fabric is not required for the 2'-0" portion closest to the wall.*
2. *Adjust lift thickness to place 4" dirt to finish grade.*
3. *See sheet S78, S79, and S80 for length of fabric.*
4. *Bottom of premolded joint filler shall match the bottom of the paritally grouted riprap. Where there is no riprap, bottom of premolded joint filler shall match finish grade.*
5. *See sheet S89 for detail 1.*

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NO. 10156-S
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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

WINGWALL C AND D SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	86 of 103	JUNE 1, 2017	RG3104-SS

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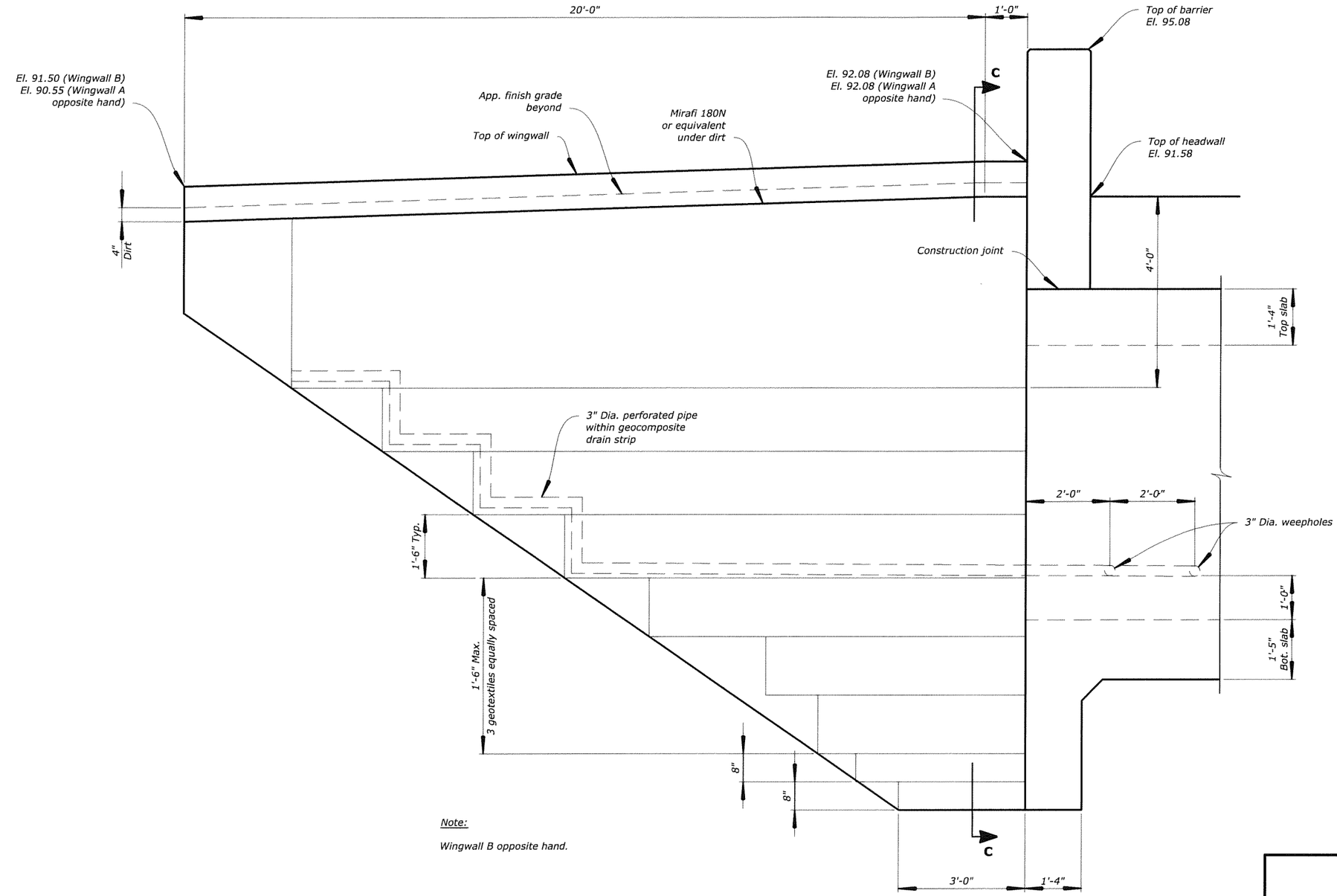
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S87



Note:

Wingwall B opposite hand.

STA. 434+30
WINGWALL A AND B BACKFILL ELEVATION

ERIC Y. MATSUMOTO
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

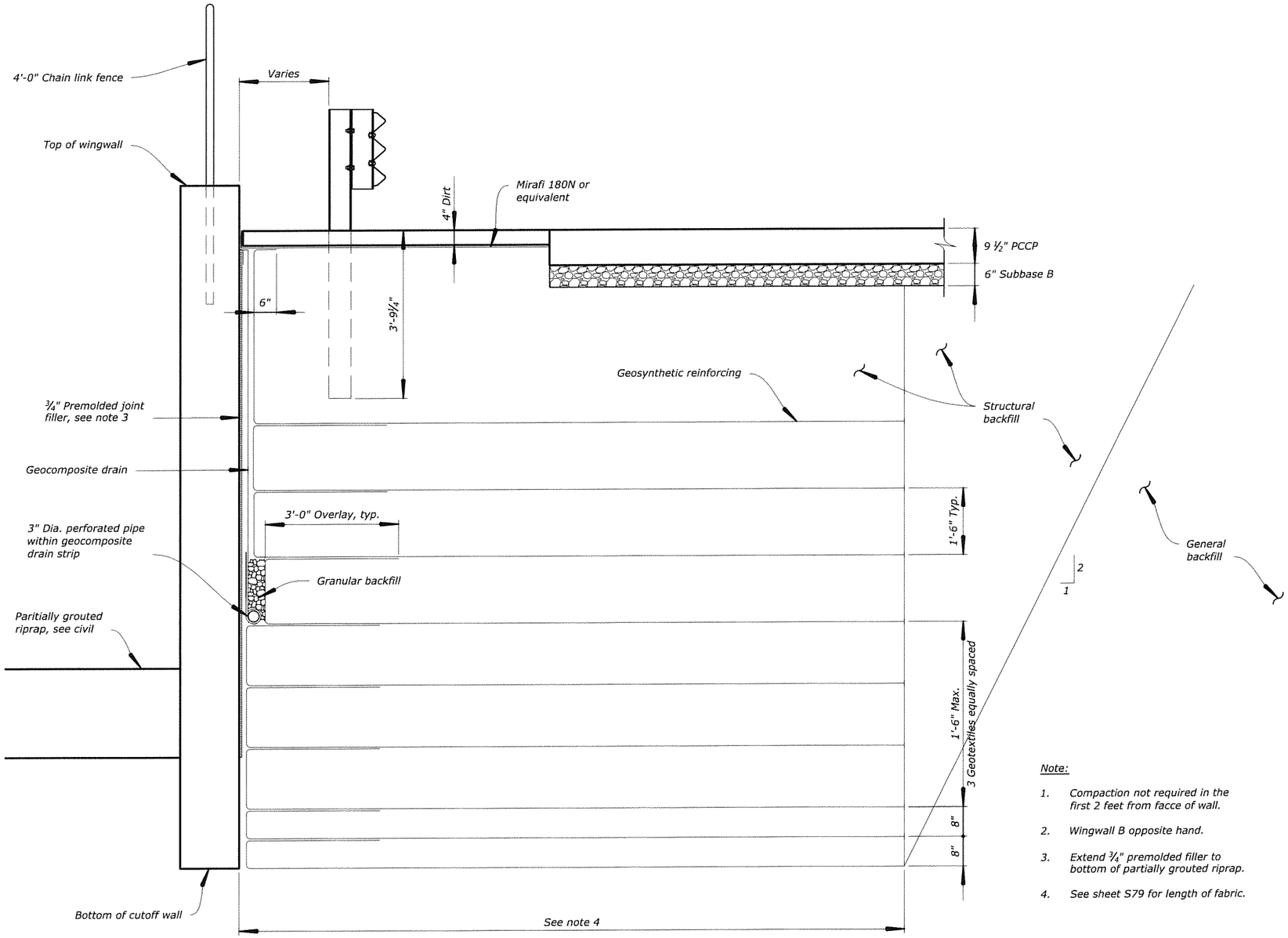
STA. 434+30
WINGWALL A AND B BACKFILL ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	87 of 103	JUNE 1, 2017	RG3104-TT

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S88



SECTION 'C-C'

Note:

1. Compaction not required in the first 2 feet from facce of wall.
2. Wingwall B opposite hand.
3. Extend ¾" premolded filler to bottom of partially grouted riprap.
4. See sheet S79 for length of fabric.

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

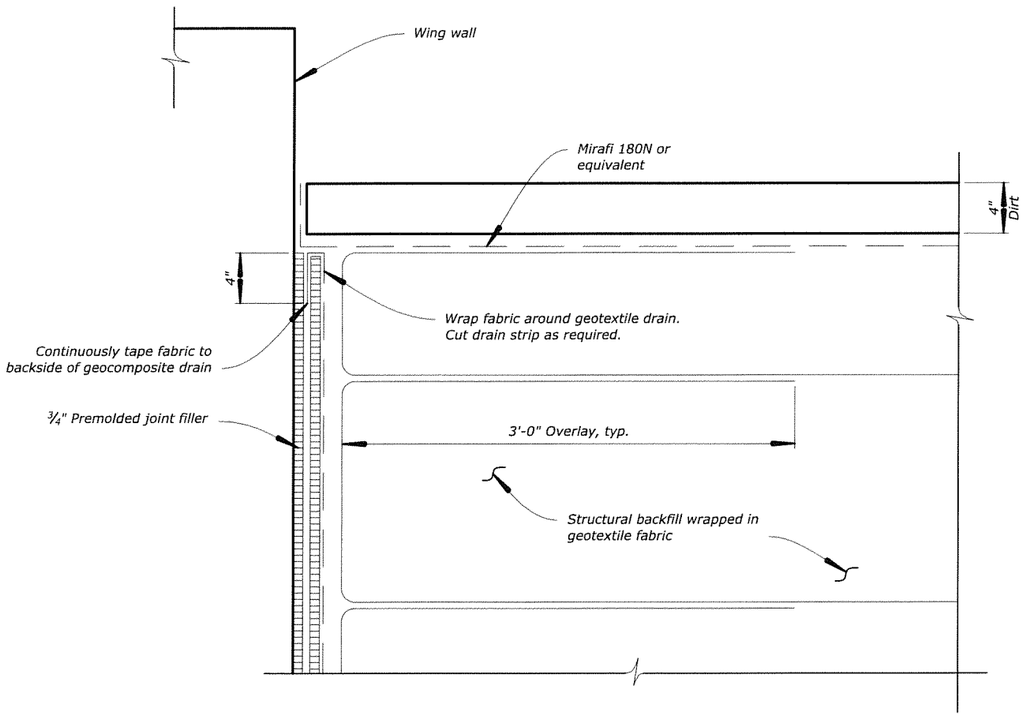
STA. 434+30
WINGWALL A AND B BACKFILL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	88 of 103	JUNE 1, 2017	RG3104-UU

3:12:13 PM

DRAWING NO.: FINAL DESIGN

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S89



DETAIL 1

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

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MAUI COUNTY, HAWAII

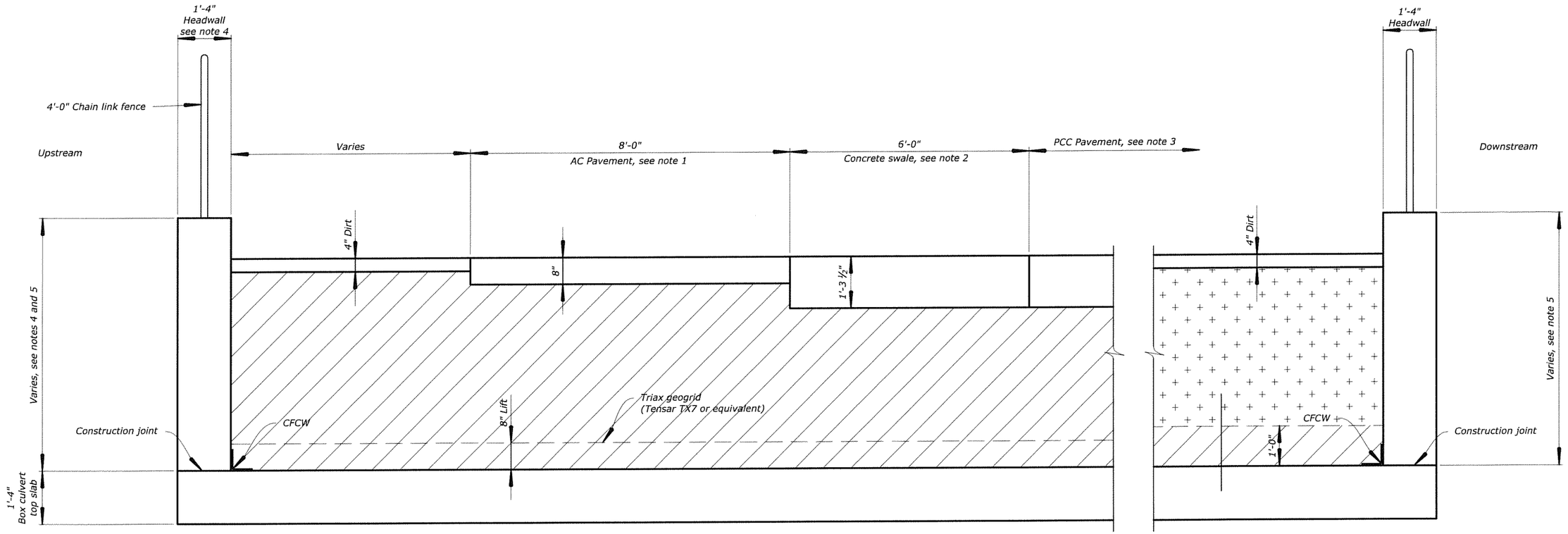
BACKFILL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=1'-0"	D. FUJIWARA	89 of 103	JUNE 1, 2017	RG3104-VV

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S90



SECTION 'E-E'

SECTION 'F-F'
Scale: ⅜"=1'-0"

Note:

1. *See civil for AC pavement at Sta. 482+12 box culvert only.*
2. *See civil for concrete swale detail at Sta. 422+02 box culvert and Sta. 482+12 box culvert only.*
3. *See civil for extent of PCC pavement.*
4. *See sheet S57 for concrete barrier rail detail at Sta. 434+30 box culvert.*
5. *See sheets S43, S44, S51, S52, S59, and S60 for headwall elevations.*
6. *See sheet S91 for backfill transition section.*
7. *Box culvert and headwall reinforcing not shown.*

Legend

Structural fill

Unclassified borrow

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

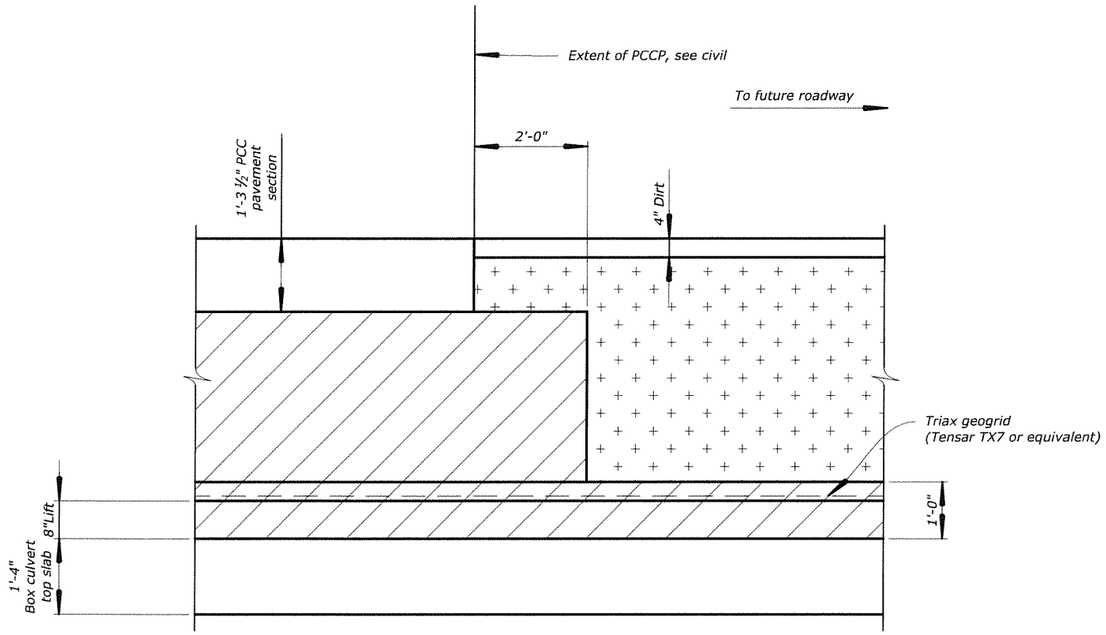
HEADWALL SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	90 of 103	JUNE 1, 2017	RG3104-WW

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S91



SECTION 'G-G'

SECTION 'E-E'
Scale: ⅜"=1'-0"

Note:

1. *Geogrids shall extend to the full length of the box culvert. See sheet S81 to S82 for details.*

Legend

Structural fill

Unclassified borrow

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

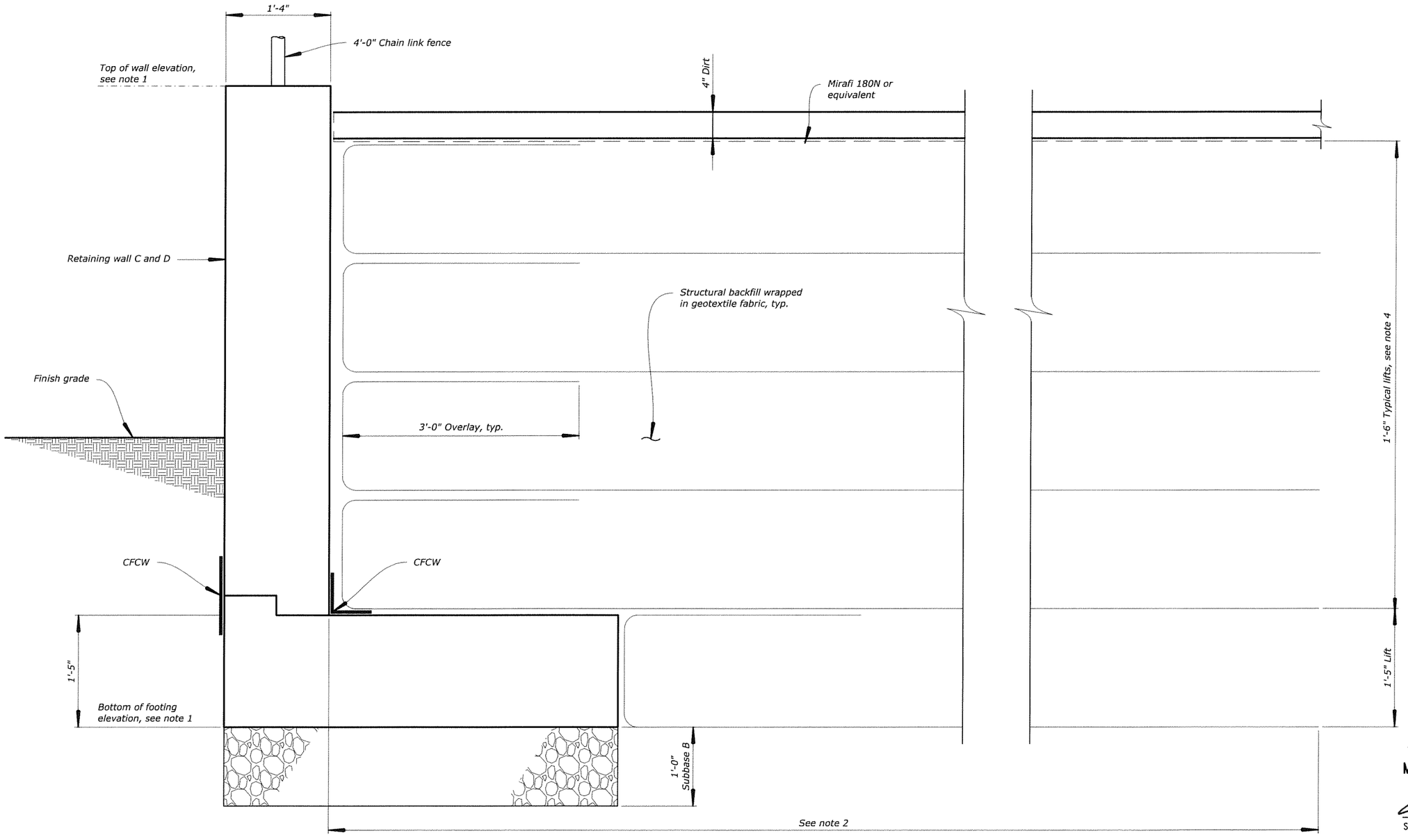
BACKFILL TRANSITION SECTION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	91 of 103	JUNE 1, 2017	RG3104-XX

DRAWING NO.:
FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S92



SECTION 'H-H'

Notes:

1. *See sheet S60 for elevations.*
2. *See sheet S80 for extent of geotextile fabric.*
3. *See sheets S76 and S77 for retaining wall reinforcing.*
4. *See civil for finish grade elevations. Reduce lift thickness to run geotextile fabric up to 4" dirt.*

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
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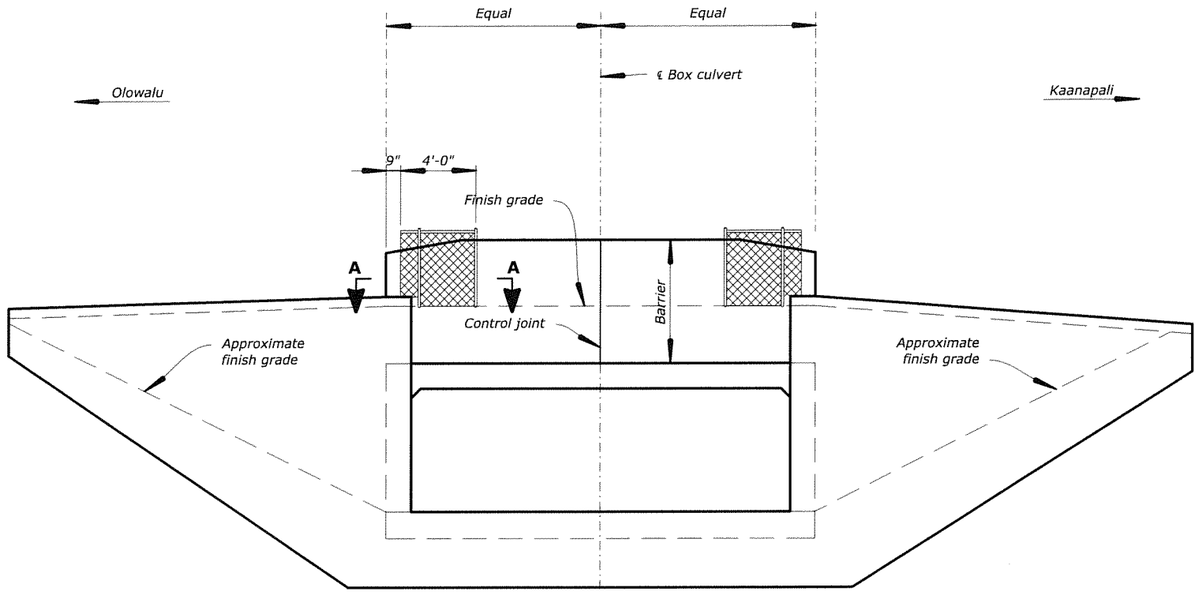
RETAINING WALL BACKFILL SECTION AT STA. 482+12

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	92 of 103	JUNE 1, 2017	RG3104-YY

DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S93



Note:

See sheet S94 for section 'A-A'.

STA. 434+30
CONCRETE BARRIER ELEVATION

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

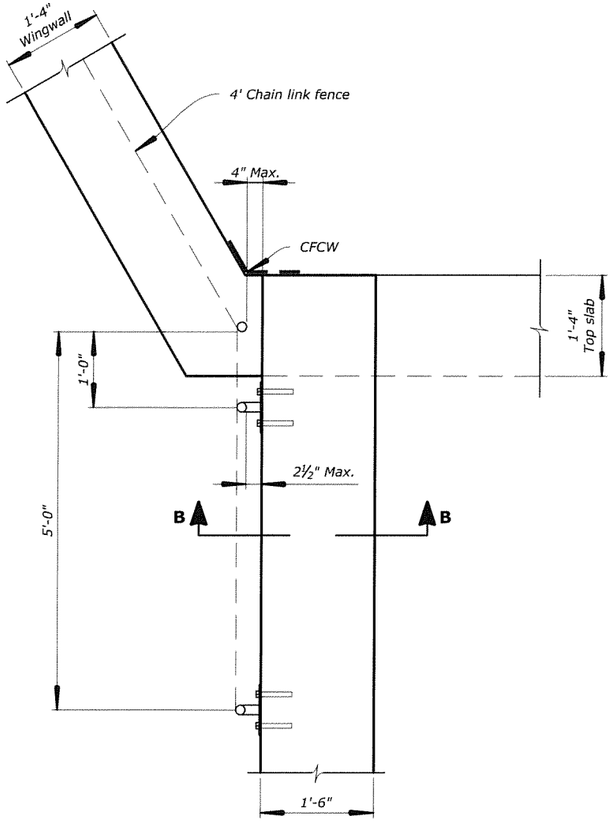
CONCRETE BARRIER ELEVATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/8"=1'-0"	D. FUJIWARA	93 of 103	JUNE 1, 2017	RG3104-ZZ

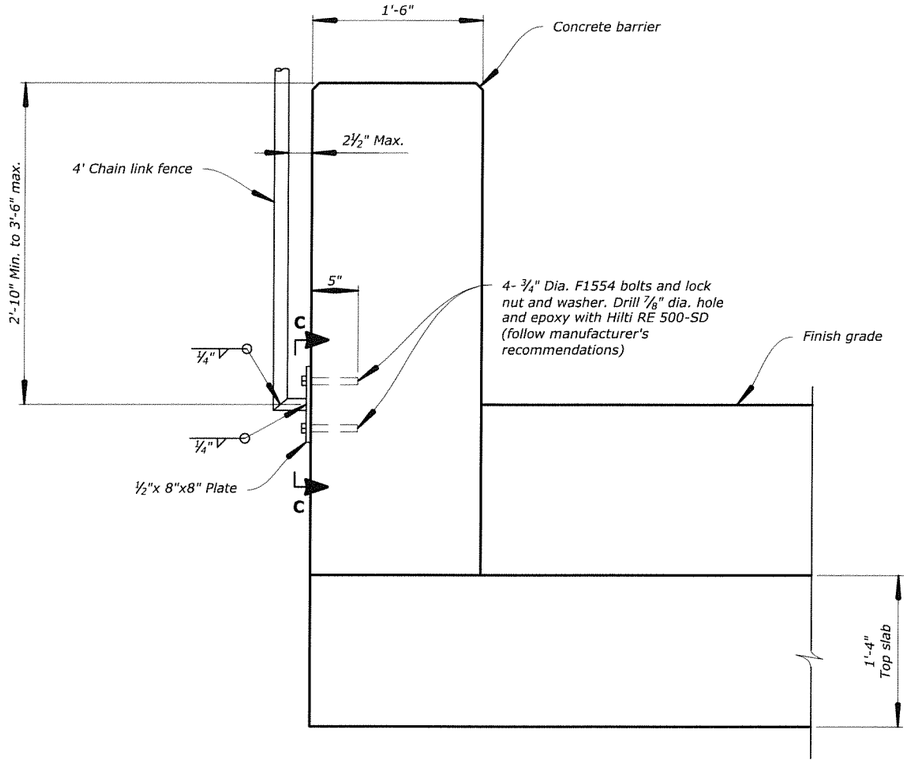
DRAWING NO.: FINAL DESIGN

3:12:13 PM

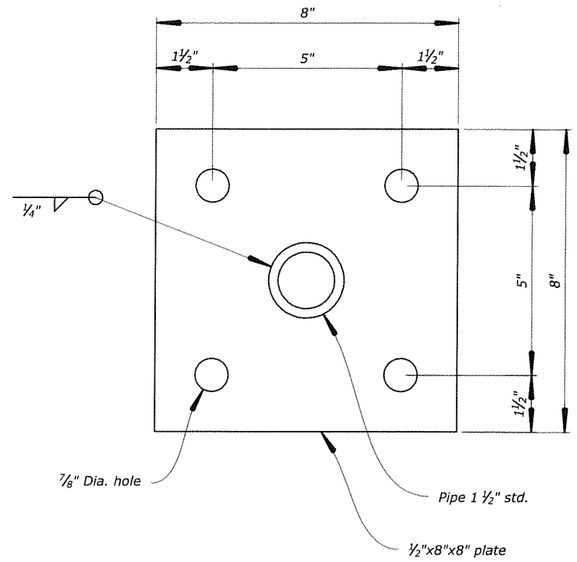
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S94



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



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



SECTION 'C-C'
Scale: 3"=1'-0"

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

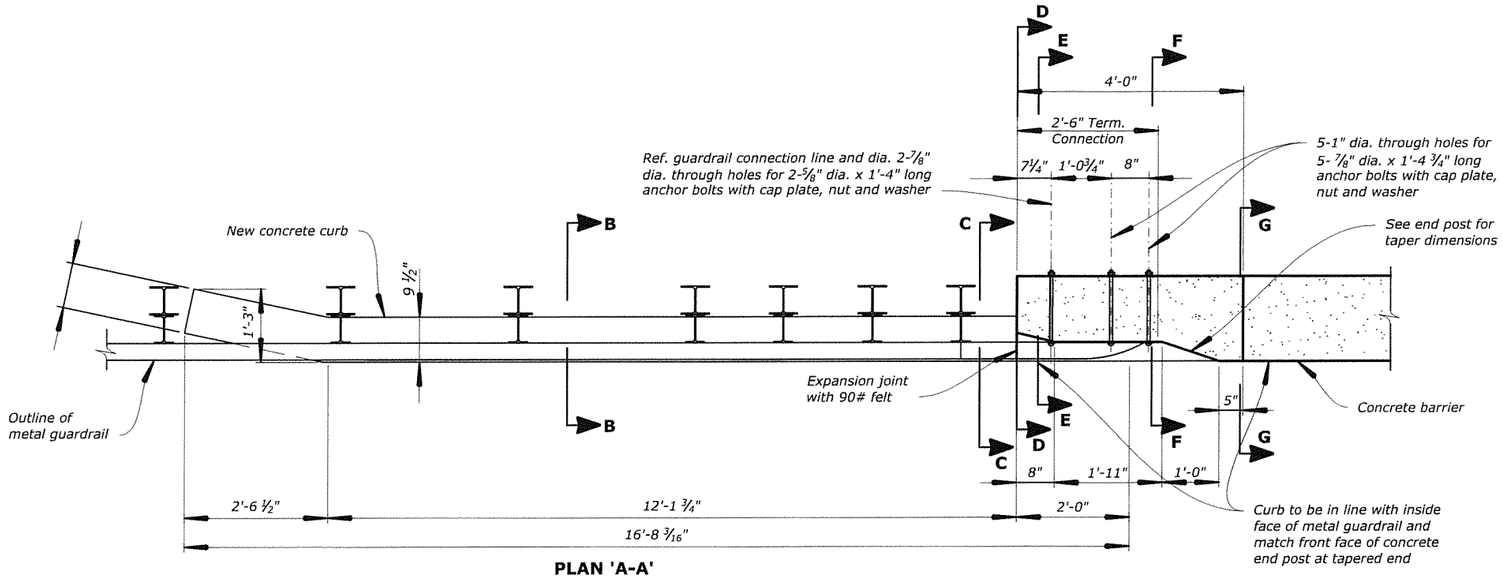
CHAIN LINK FENCE DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	94 of 103	JUNE 1, 2017	RG3104-AAA

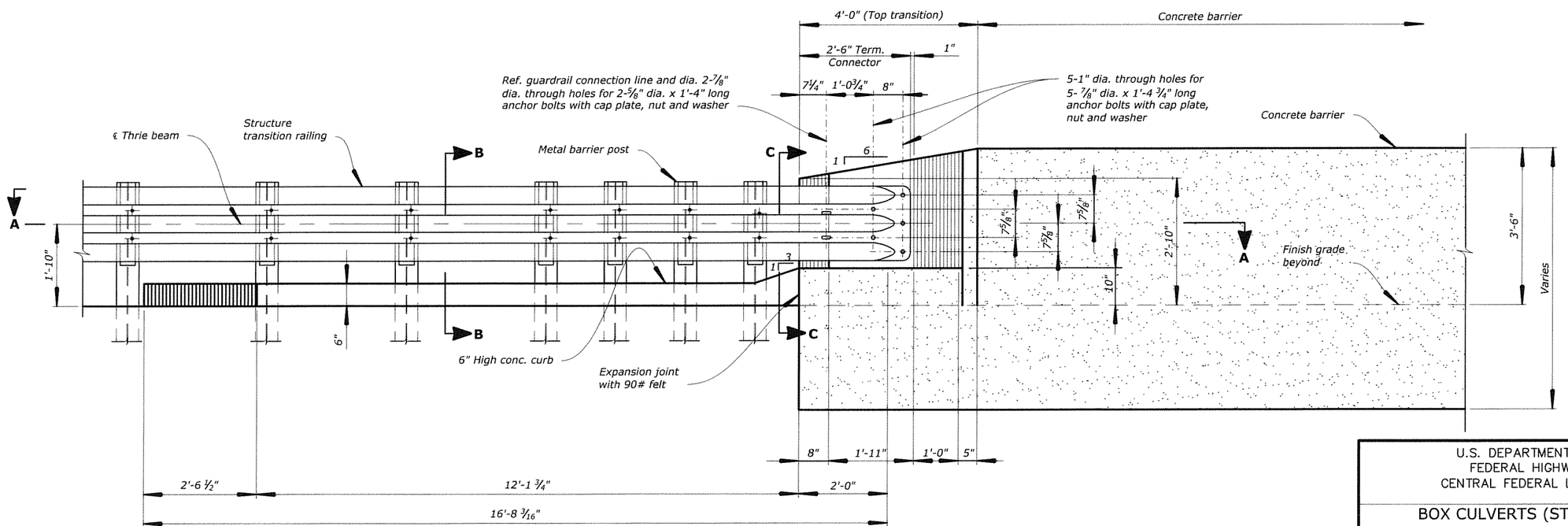
DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S95



PLAN 'A-A'



ELEVATION

Notes:

1. See sheet S96 for sections 'B-B' and 'C-C'.
2. See sheet S97 for sections 'D-D', 'E-E', 'F-F', and 'G-G'.

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NO. 10156-S
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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

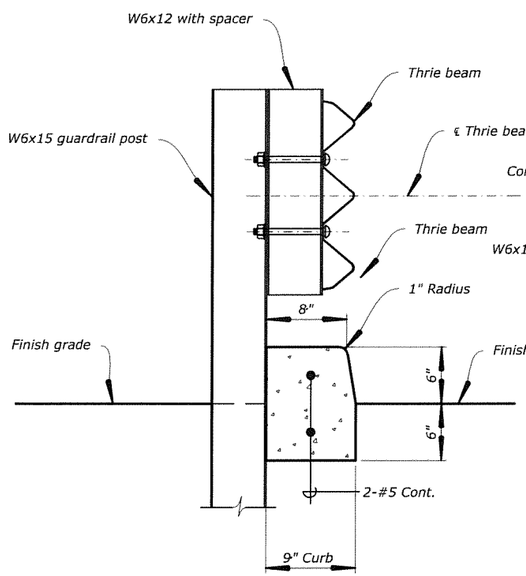
CONCRETE BARRIER AND STRUCTURE TRANSITION RAILING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/8"=1'-0"	D. FUJIWARA	95 of 103	JUNE 1, 2017	RG3104-BBB

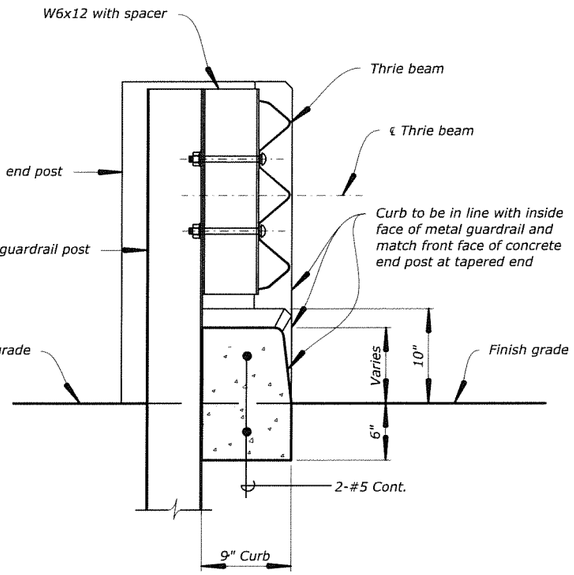
DRAWING NO.: FINAL DESIGN

3:12:13 PM

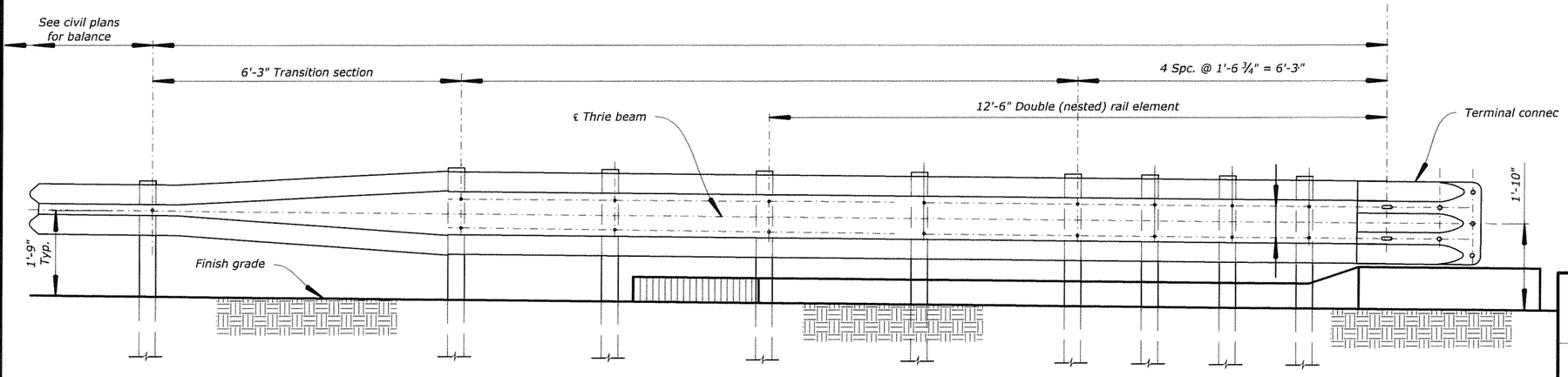
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S96



SECTION 'B-B'
Scale: ¾"=1-0"



SECTION 'C-C'
Scale: ¾"=1-0"



TYPICAL STRUCTURE TRANSITION RAILING ELEVATION
Scale: ⅜"=1-0"

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BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

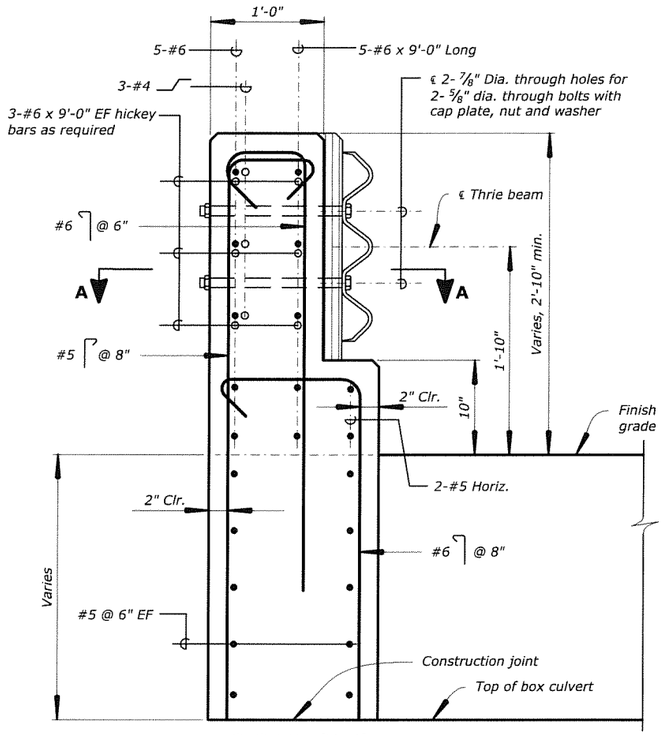
CONCRETE BARRIER TRANSITION RAILING

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	96 of 103	JUNE 1, 2017	RG3104-CCC

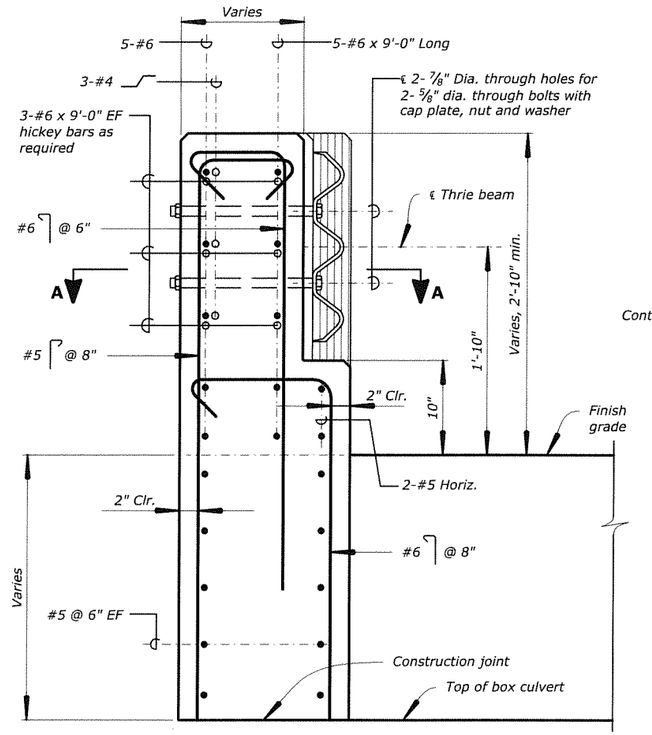
DRAWING NO.: FINAL DESIGN

3:12:13 PM

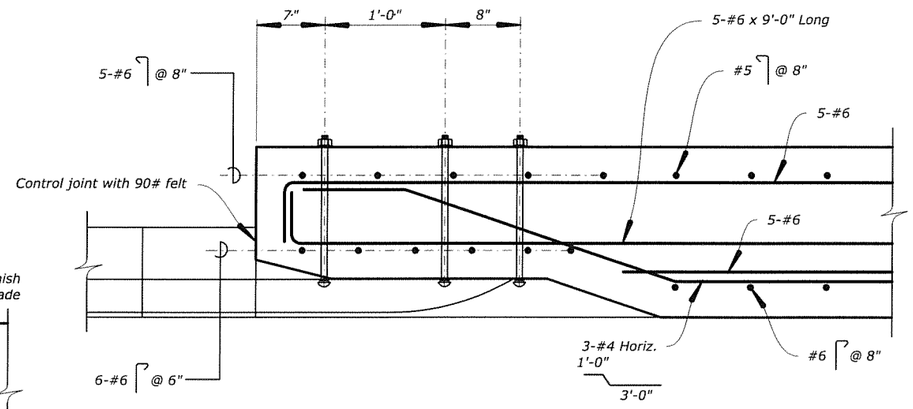
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S97



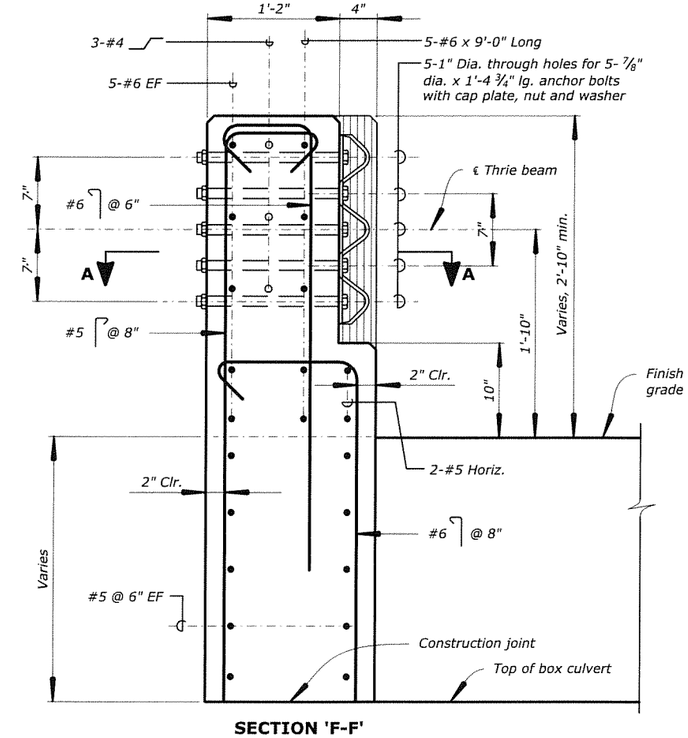
SECTION 'D-D'



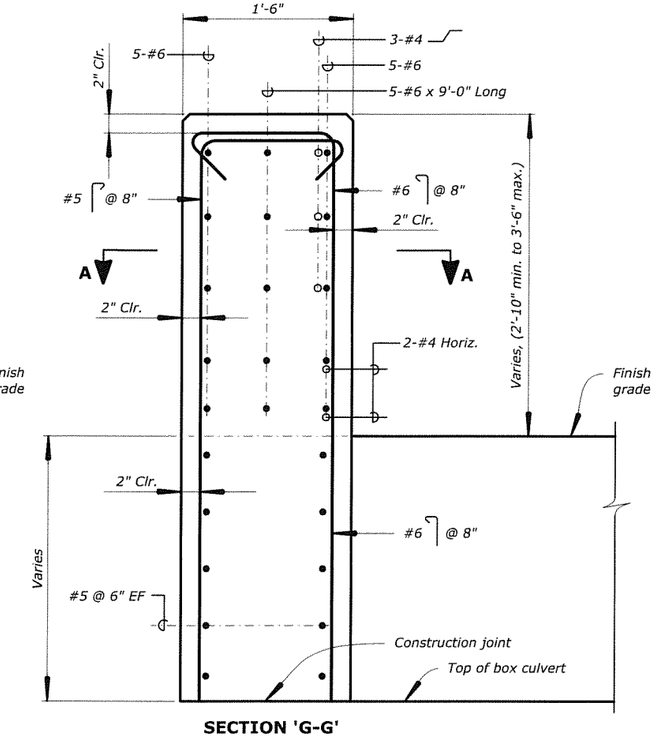
SECTION 'E-E'



SECTION 'A-A'



SECTION 'F-F'



SECTION 'G-G'

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LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18

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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

TRANSITION SECTIONS

NO.	DATE	BY	REVISIONS

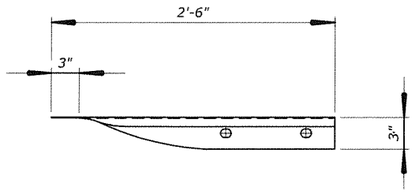
NO.	DATE	BY	REVISIONS

DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	97 of 103	JUNE 1, 2017	RG3104-DDD

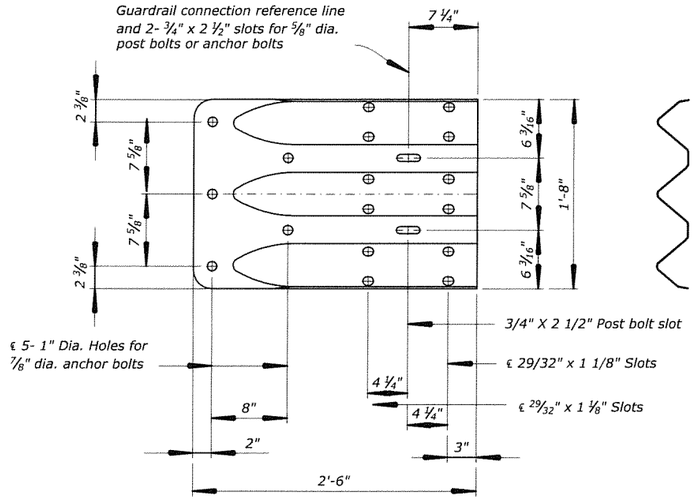
DRAWING NO.: FINAL DESIGN

3:12:13 PM

STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S98

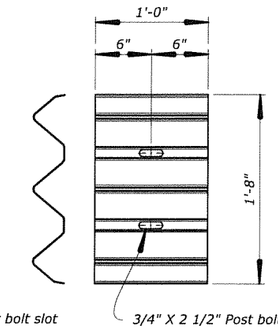


PLAN



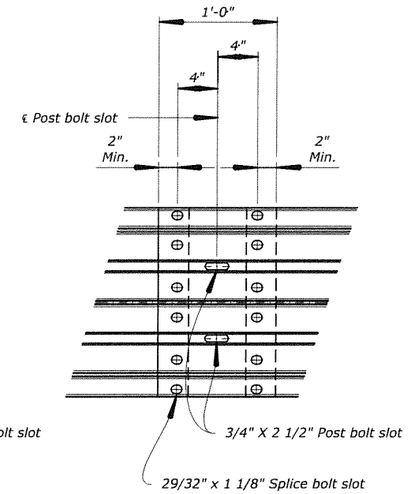
ELEVATION

TERMINAL CONNECTOR

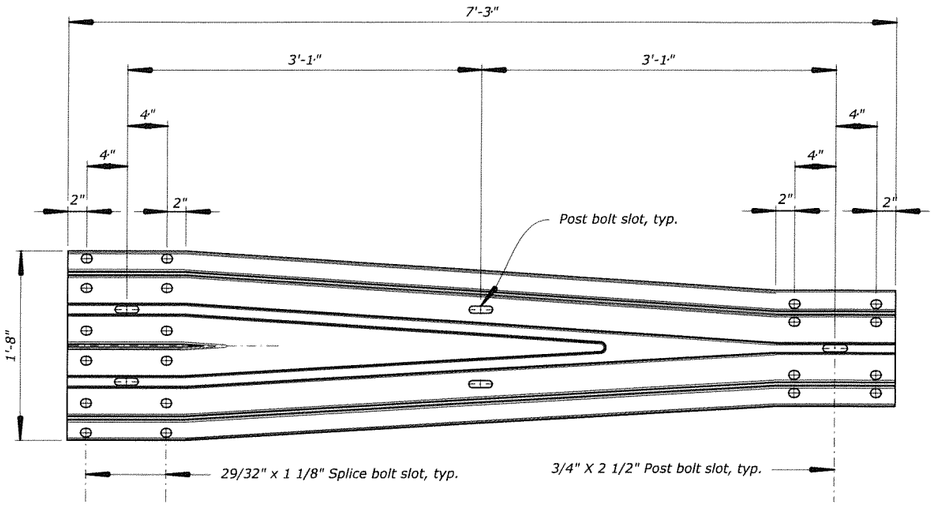


(Use at posts where splices do not occur)

BACKUP PLATE



RAIL SPLICE



TRANSITION SECTION

NOTES:

A. *The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and will not be paid for separately.*

B. *Lap terminal connector and rail element in direction of traffic to prevent snagging.*

C. *Splice bolt (FBB01), rail bolt (FBB02), and recessed nut shall conform to AASHTO M180 and be hot-dip galvanized in accordance with AASHTO M232, Class C.*

D. *Post hex bolt and nut shall conform to Section 617.*

E. *"Terminal Connector" and standard spacer, including all anchor bolts, nuts and washers, shall be hot-dip galvanized after fabrication.*

F. *"Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M180, Type II, Class B. All other rail shall conform to the requirements of AASHTO M180, Type II, Class A.*

G. *First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.*

H. *Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.*

I. *Where double (nested) beam occur, 12" "Back-Up Plate" not required.*

J. *Heads of through anchor bolts shall be placed on the traffic side of the rail.*

K. *W-beam structural steel shall conform to ASTM A992. Structural steel plates and bars shall conform to ASTM A36.*

L. *No bolts are to be cut after manufacturing and galvanizing.*

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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

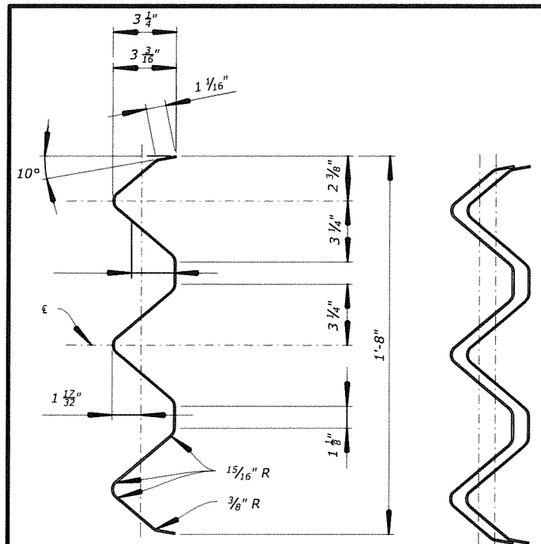
CONCRETE BARRIER TRANSITION RAILING NOTES AND DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	3/4"=1'-0"	D. FUJIWARA	98 of 103	JUNE 1, 2017	RG3104-EEE

DRAWING NO.: FINAL DESIGN

3:12:13 PM

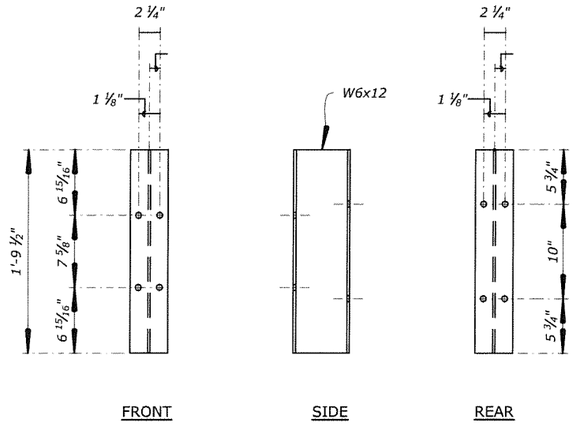
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S99



SINGLE

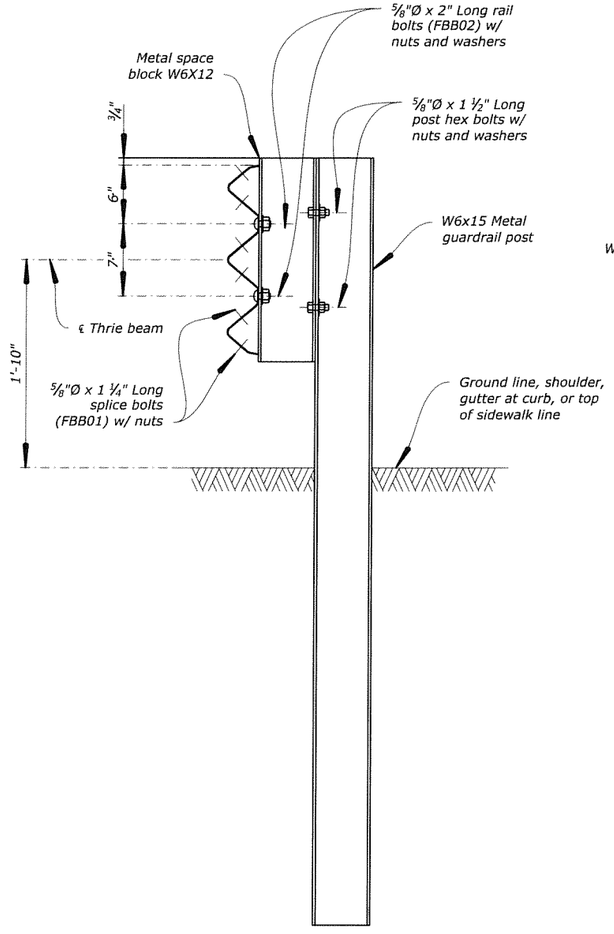
DOUBLE

SECTION THRU RAIL ELEMENT
Scale: 1 ½"=1'-0"

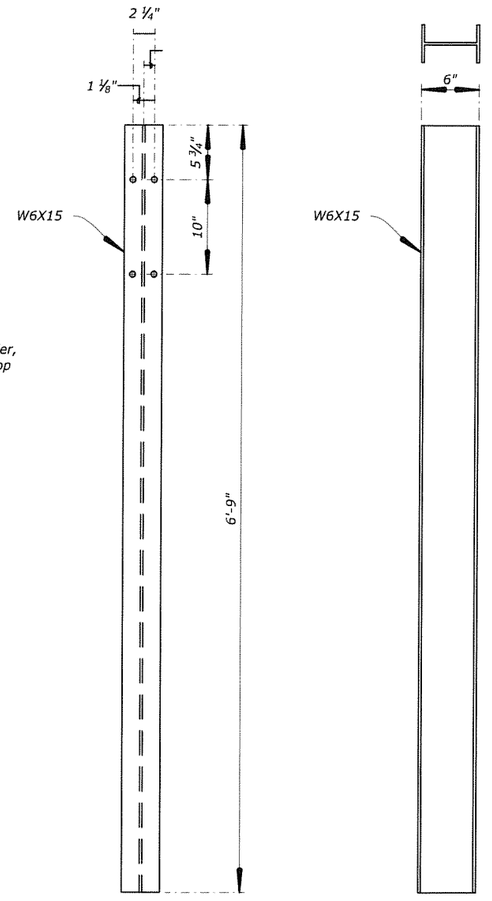


FRONT SIDE REAR

SPACER BLOCK DETAILS
Scale: ¾"=1-0"

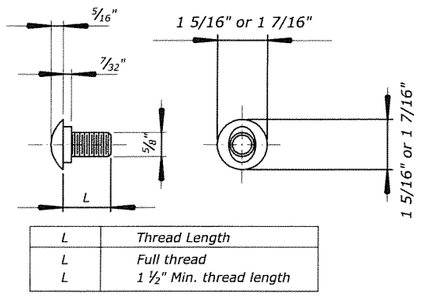


TYPICAL SECTION METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK
Scale: ¾"=1-0"

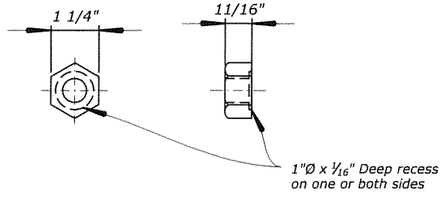


FRONT SIDE

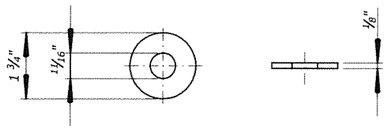
POST DETAILS
Scale: ¾"=1-0"



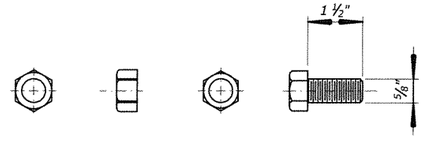
L	Thread Length
L	Full thread
L	1 ½" Min. thread length



5/8"Ø SPLICE (FBB01) & RAIL (FBB02) BOLT AND RECESS NUT
Scale: 3"=1'-0"



STEEL WASHER FOR 5/8"Ø BOLT
Scale: 3"=1'-0"



5/8"-11 HEX NUT 5/8"-11 HEX BOLT

5/8"Ø POST HEX BOLT AND NUT
Scale: 3"=1'-0"

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

4-30-18
SIGNATURE EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

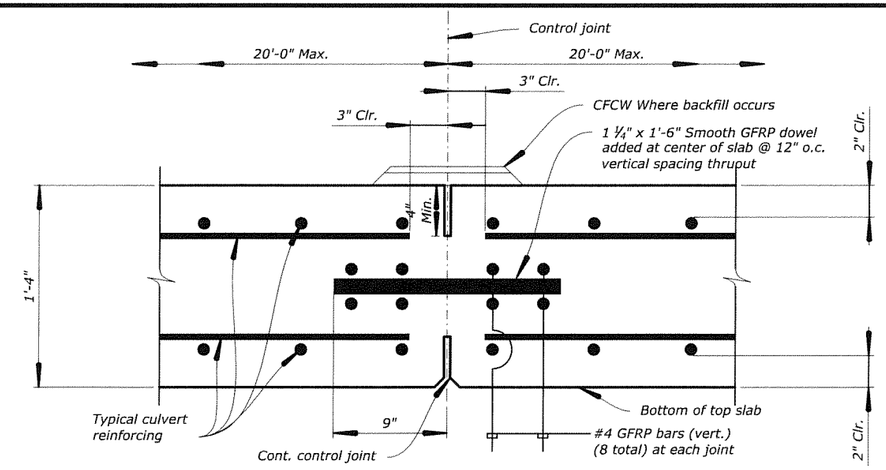
CONCRETE BARRIER TRANSITION RAILING DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	99 of 103	JUNE 1, 2017	RG3104-FFF

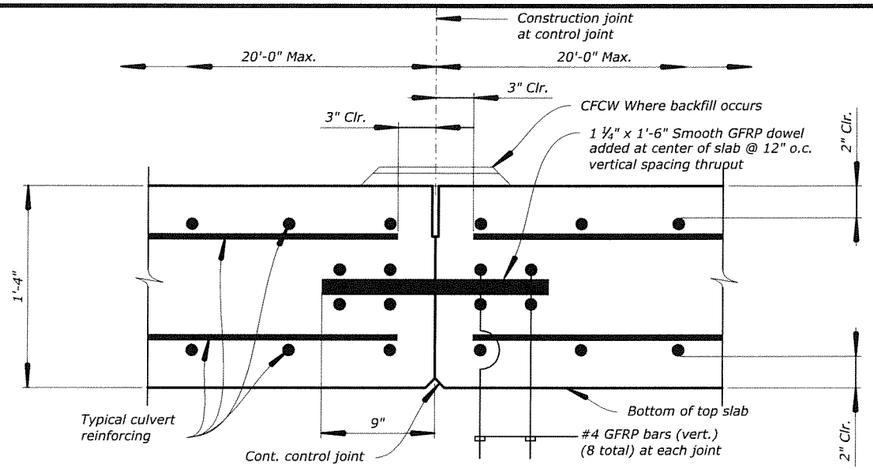
DRAWING NO.: FINAL DESIGN

3:12:13 PM

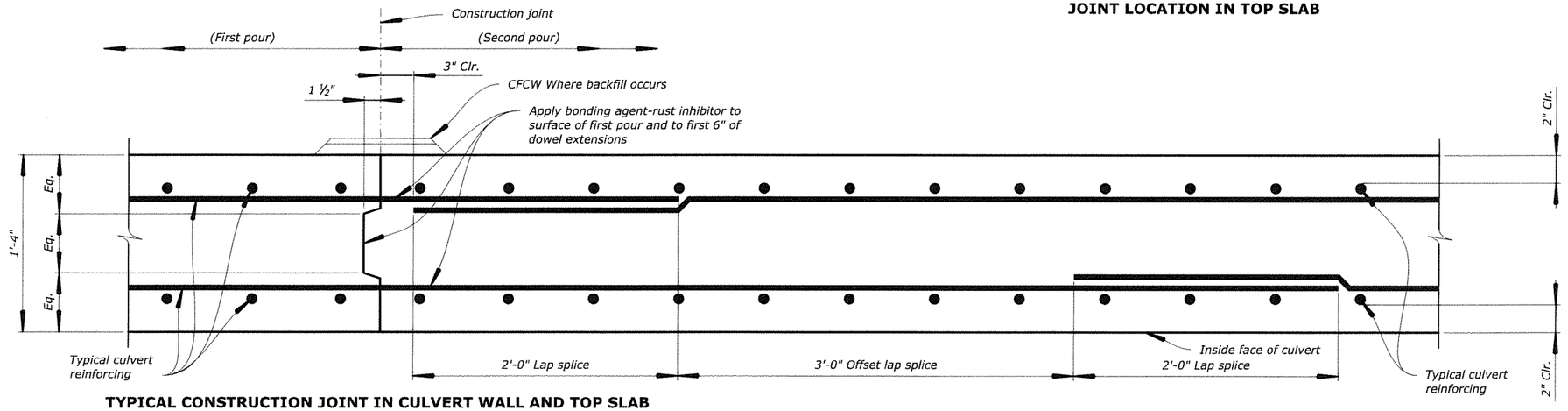
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S100



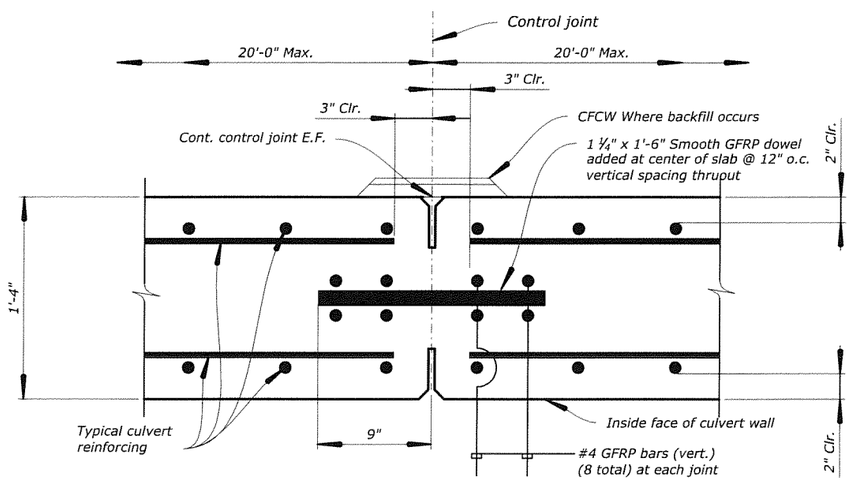
TYPICAL CONTROL JOINT IN TOP SLAB



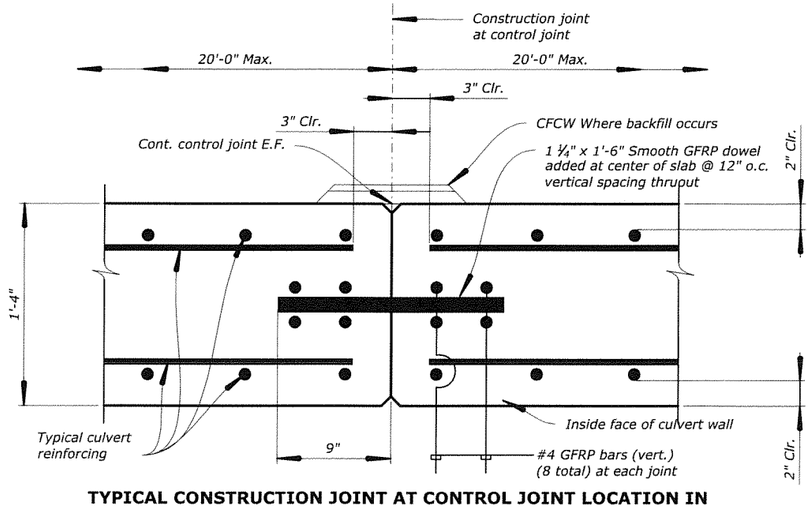
TYPICAL CONSTRUCTION JOINT AT CONTROL JOINT LOCATION IN TOP SLAB



TYPICAL CONSTRUCTION JOINT IN CULVERT WALL AND TOP SLAB



TYPICAL CONTROL JOINT IN CULVERT WALL AND HEADWALL/BARRIER



TYPICAL CONSTRUCTION JOINT AT CONTROL JOINT LOCATION IN CULVERT WALL AND HEADWALL/BARRIER

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE — 4-30-18 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

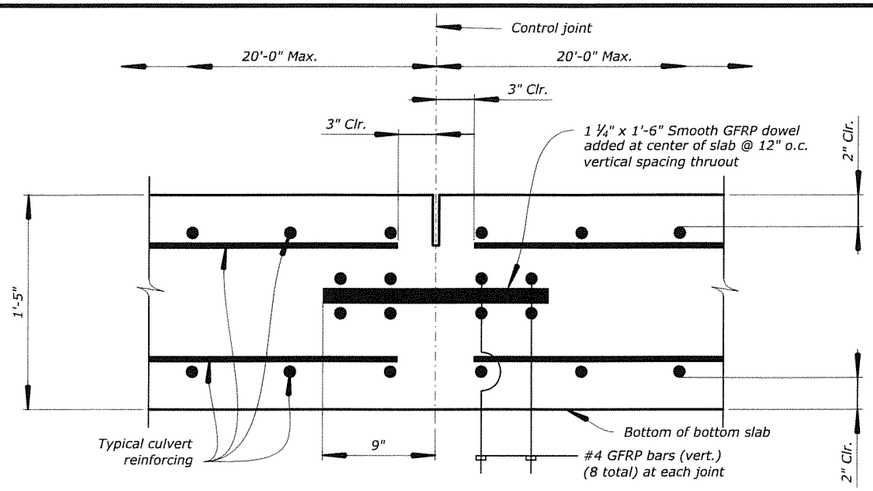
BOX CULVERT TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1"=1'-0"	D. FUJIWARA	100 of 103	JUNE 1, 2017	RG3104-GGG

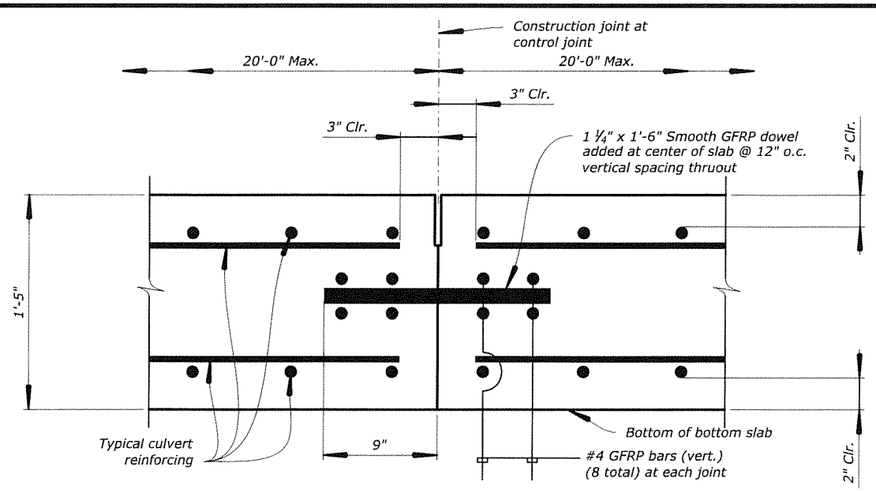
DRAWING NO.: FINAL DESIGN

3:12:13 PM

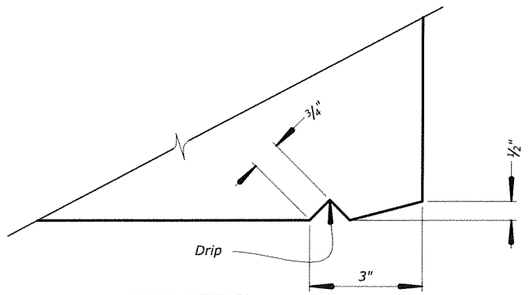
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S101



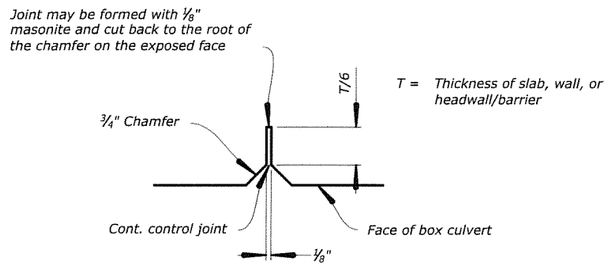
TYPICAL CONTROL JOINT IN BOTTOM SLAB
Scale: 1"=1'-0"



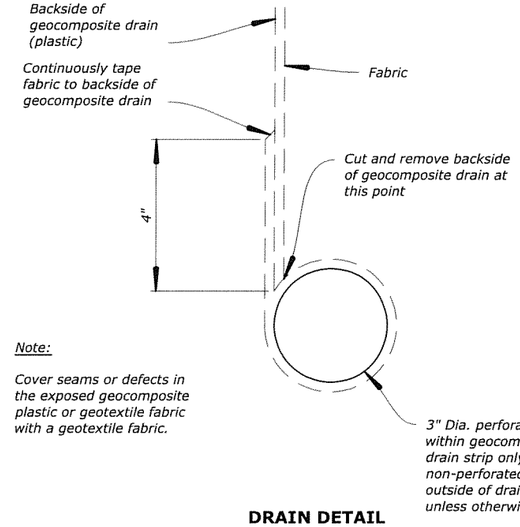
TYPICAL CONSTRUCTION JOINT AT CONTROL JOINT IN BOTTOM SLAB
Scale: 1"=1'-0"



DRIP DETAIL
Scale: 3"=1'-0"



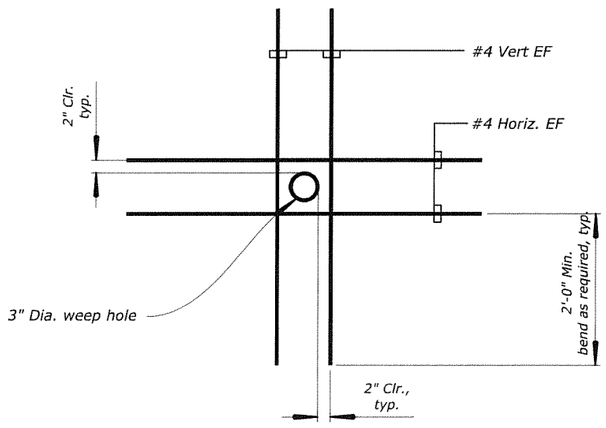
CONTROL JOINT DETAIL
Scale: 3"=1'-0"



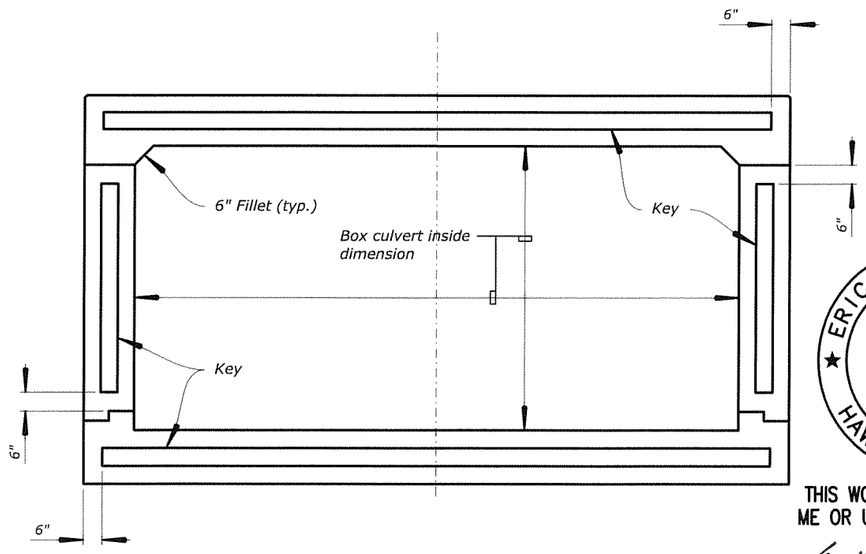
Note:

Cover seams or defects in the exposed geocomposite plastic or geotextile fabric with a geotextile fabric.

DRAIN DETAIL
Scale: 3"=1'-0"



ADDED REINFORCING AT WEEP HOLES
No Scale



CONSTRUCTION JOINT KEY SCHEMATIC
Not to scale

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

4-30-18
SIGNATURE EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

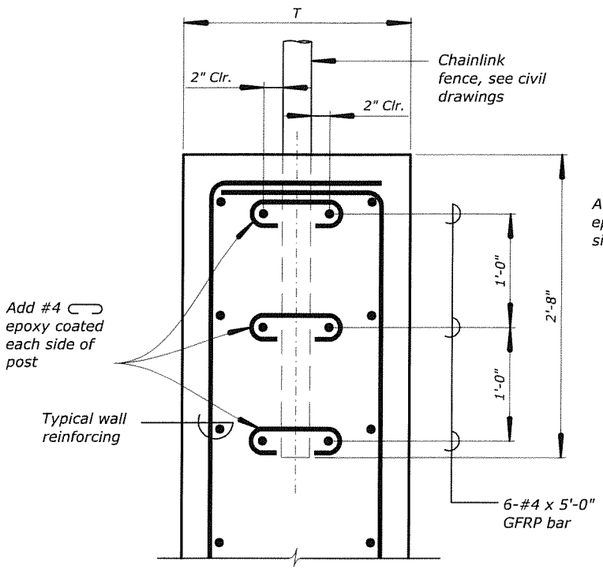
BOX CULVERT TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	101 of 103	JUNE 1, 2017	RG3104-HHH

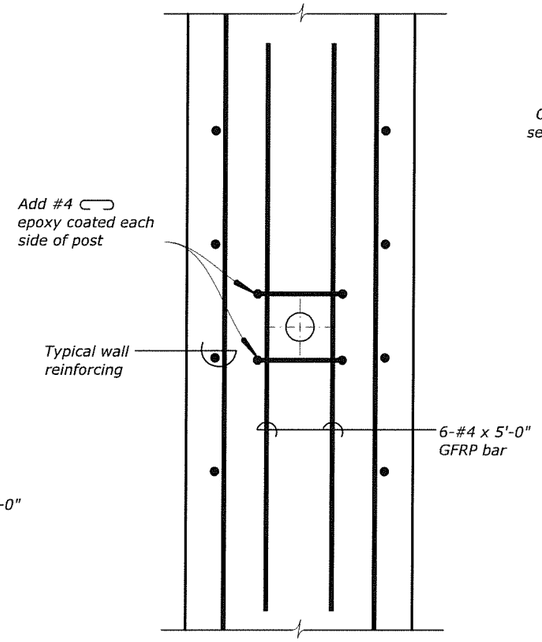
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

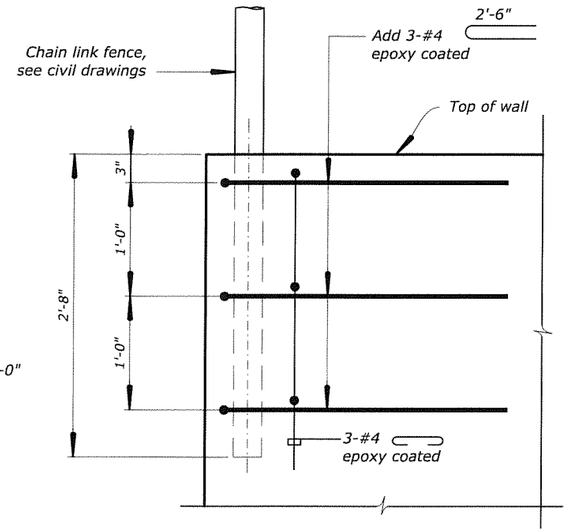
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S102



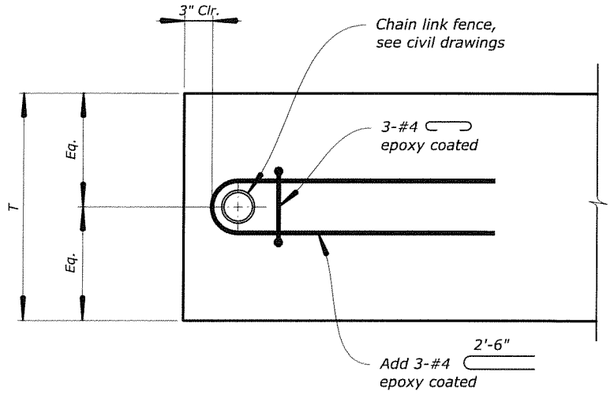
POST ELEVATION SECTION
Scale: ¾"=1'-0"



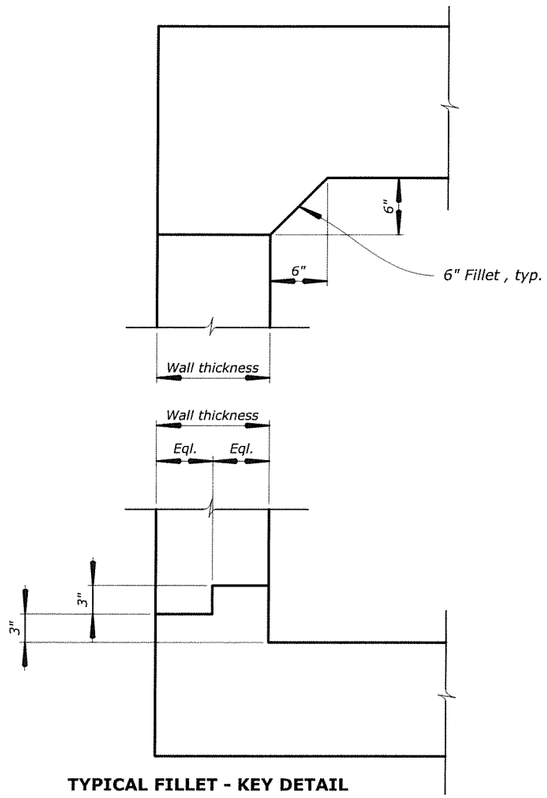
POST PLAN SECTION
Scale: ¾"=1'-0"



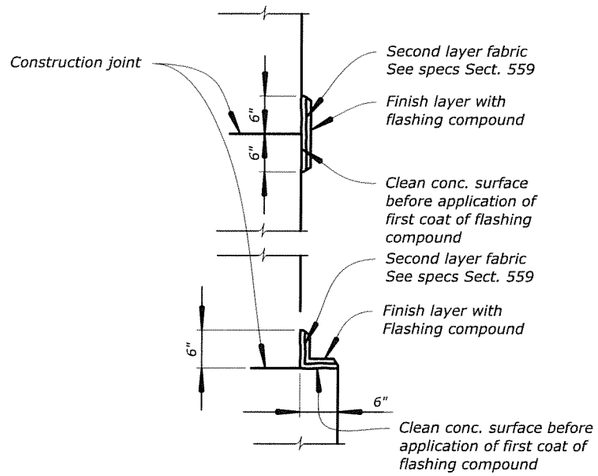
TYPICAL CHAIN LINK POST AT END OF WALL - ELEVATION
Scale: ¾"=1'-0"



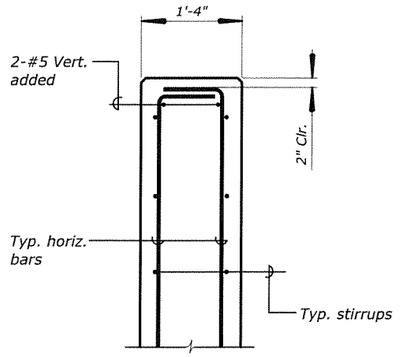
TYPICAL CHAIN LINK POST AT END OF WALL OR JOINT - PLAN
Scale: ¾"=1'-0"



TYPICAL FILLET - KEY DETAIL
Scale: ¾"=1'-0"



TYPICAL CONTINUOUS FLASHING COMPOUND WATERPROOFING (CFCW) DETAILS
Scale: 1/2" = 1'-0"



DOUBLE CURTAIN

WINGWALL ENDS - PLAN VIEW
Scale: 1/2" = 1'-0"

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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4-30-18
SIGNATURE — EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

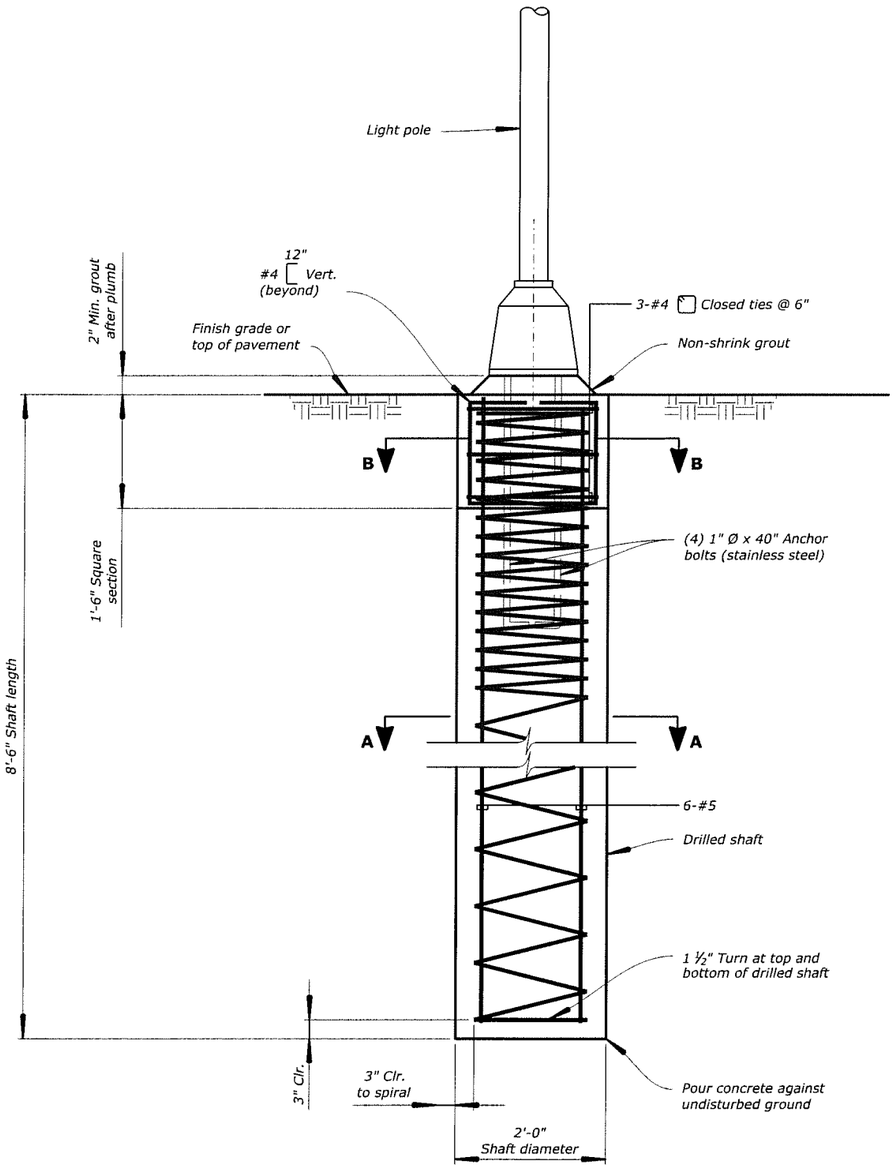
BOX CULVERT TYPICAL DETAILS

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	AS NOTED	D. FUJIWARA	102 of 103	JUNE 1, 2017	RG3104-III

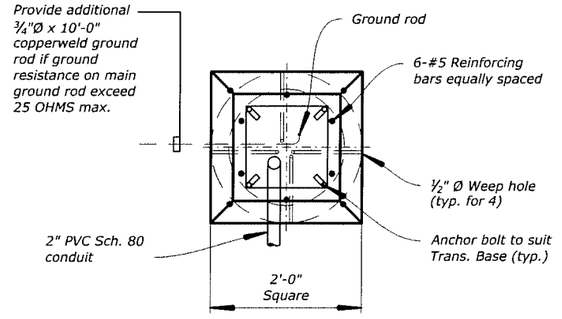
DRAWING NO.:
FINAL DESIGN

3:12:13 PM

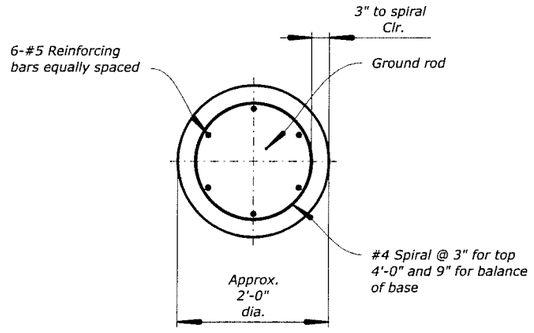
STATE	PROJECT	SHEET NO.
HI	HI STP SR 30(1)	S103



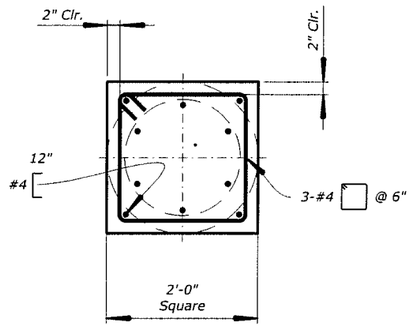
TYPICAL POLE FOUNDATION



PLAN



SECTION 'A-A'



SECTION 'B-B'

Notes:

1. *See civil and electrical drawings for additional details*
2. *Contractor shall design pole, base, anchor bolts, and all appurtenances for the light pole.*
3. *Light pole manufacturer's recommendations shall be followed.*
2. *Separate dissimilar metals with teflon tape at contact points only.*

ERIC Y. MATSUMOTO
LICENSED PROFESSIONAL ENGINEER
NO. 10156-S
HAWAII, U.S.A.

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SIGNATURE 4-30-18 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

BOX CULVERTS (STA 422+02, STA 434+30, & STA 482+12)
LAHAINA BYPASS 1B-2
MAUI COUNTY, HAWAII

HIGHWAY LIGHT STANDARD FOUNDATION

NO.	DATE	BY	REVISIONS	NO.	DATE	BY	REVISIONS	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	PROJECT TEAM LEADER	BRIDGE DRAWING	DATE	DRAWING NO.
								E. MATSUMOTO	C. TANABE	D. FUJIWARA	1/2"=1'-0"	D. FUJIWARA	103 of 103	JUNE 1, 2017	RG3104-JJJ

DRAWING NO.: FINAL DESIGN

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