FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	10	77

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DATE	REVISION
02-15-07	As Built - Added Note

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Roadway	Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

INDEX TO DRAWINGS

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown   Date: January 2001

SHEET No. S0.1 OF 50 SHEETS

ORIGINAL PLAN
NOTE BOOK
No. KB-S01.dgn
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AS-BUILT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	11	77

ESTIMATED QUANTITIES

ITEM NO.	ITEM		QUANTITY	UNIT
206.6000	Structure Excavation for Abutments and Wingwalls		2100	CY
206.6001	Structure Excavation for Pier Footings		1250	CY
206.6002	Structure Excavation for CRM Walls	1	300	CY
206.7200	Structure Backfill for Abutments and Wingwalls	1	700	CY
206.7201	Structure Backfill for Abutments and Wingwalls (Class D concrete)	1	300	CY
206.7202	Structure Backfill for Pier Footings (Class D concrete)		800	CY
206.7203	Structure Backfill for CRM Walls		300	CY
206.8200	Filter Material		4	CY
313.1000	Controlled Low Strength Material at Abutments and Wingswalls	1	750	CY
503.1090	Concrete for Abutments and Wingwalls		(400 CY)	L.S.
503.1091	Concrete for Abutment and Wingwall Footings		(600 CY)	L.S.
503.1092	Concrete for Bridge Deck		(370 CY)	L.S.
503.1093	Concrete for Pier Walls		(440 CY)	L.S.
503.1094	Concrete for Pier Wall Footings		(450 CY)	L.S.
503.1910	Concrete for Approach Slab		(75 CY)	L.S.
504.6100	Prestressed Precast Plank		(2160 L.F.)	L.S.
507.7000	Concrete End Posts		(4 EA.)	L.S.
507.7001	Bridge Railing including Metal Rails		468	L.F.

ESTIMATED QUANTITIES

ITEM NO.	ITEM		QUANTITY	UNIT
508.0100	Cement Rubble Masonry Wall	1	(480 CY)	L.S.
602.0090	Reinforcing Steel for Abutments and Wingwalls		(145,000 LBS.)	L.S.
602.0091	Reinforcing Steel for Abutments and Wingwall Footings		(240,000 LBS.)	L.S.
602.0092	Reinforcing Steel for Bridge Deck		(180,000 LBS.)	L.S.
602.0093	Reinforcing Steel for Pier Walls		(230,000 LBS.)	L.S.
602.0094	Reinforcing Steel for Pier Wall Footings		(75,000 LBS.)	L.S.
602.1910	Reinforcing Steel for Approoch Slabs	1	(30,000 LBS.)	L.S.

ORIGINAL PLAN
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DATE	DESCRIPTION
01-29-01	1 Revised Quantities

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ESTIMATED QUANTITIES

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S0.2 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	12	77

BRIDGE GENERAL NOTES

1. General Specifications: Hawaii Department of Transportation, Standard Specifications for Road and Bridge Construction, 1994, together with Special Provisions prepared for this contract.
2. Design Specifications: AASHTO 1998 LRFD Bridge Design Specifications (Second Edition) and its subsequent interim specifications with interim supplements and modifications by the Highways Division, Department of Transportation, State of Hawaii.
3. Loads:
   (A) Dead Load: An allowance of 25 PSF for future wearing surface of asphalt concrete has been provided in the design.
   (B) Live Load: AASHTO HL-93 Truck Loading
   (C) Seismic Loads: Acceleration coefficient - 0.8
   Seismic Performance Zone - 4
   Importance Category - Essential
4. Materials:
   (A) All concrete strengths shall be as noted below:

Item No.	Structural Parts	Classes of Concrete	Specified Compressive Strength, f'c (28 Days)	
(1)	Pre-stressed planks	-	7000 PSI	
(2)	Abutment footings, Pier, Pier Footings	-	5000 PSI	
(3)	Abutment walls Retaining walls including foundations	-	5000 PSI	
(4)	Rails	-	4000 PSI	
(5)	Bridge deck	-	5000 PSI	w/ Tetragard
(6)	Approach Slab	-	4000 PSI	
(7)	Except as noted otherwise all others	A	3000 PSI	

   All concrete with the exception of Class A and Class D concrete shall have a maximum W/C Ratio of 0.45. The W/C Ratio for Class A and Class D concrete shall follow the standard specificaitons.
   (B) All reinforcing steel shall be ASTM A 615 Grade 60 unless otherwise noted.
   (C) Reinforcing steel shall be ASTM A 706 where welded connections are required.
   (D) All structural steel shall be ASTM A 36 hot dip galvanized after fabrication, unless otherwise noted.
   (E) All anchor bolts, washers and nuts shall be ASTM A 307 hot dip galvanized after fabrication, unless otherwise specified.
   (F) For materials of prestressed concrete planks see applicable prestressed concrete notes.
   (G) Concrete for bridge deck shall have a maximum size aggregate of 3/8 of an inch and shall use a hi-range water reducer.
5. Reinforcement:
   (A) The minimum covering measured from the surface of the concrete to the face of any reinforcing bars shall be as follows, except as otherwise shown:
   (1) Deck slabs
   A. Top bars = 2"
   B. Bottom bars = 1 1/2" except as otherwise noted.
   (2) For prestressed concrete planks see prestressed concrete plank details.
   (3) Abutments and retaining walls = 2"
   (4) Piers = 3" to ties
   (5) Approach slab bottom bars = 3"
   All others unless otherwise noted = 2" Clear
   (6) Concrete cast against and permanently exposed to earth = 3"
   (7) All others unless otherwise noted = 2".
   (B) Reinforcing bars shall be detailed in accordance with the latest edition of the A.C.I. Detailing Manual unless otherwise noted.
   (C) Minimum clear spacing between parallel bars shall be 1 1/2 times the diameter of bars (for non bundled bars). In no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate.
   (D) All dimensions relating to reinforcing bars are to centers of bars unless otherwise noted.
   (E) Reinforcing bars shall be securely tied at all intersections and lap splices except where the spacing of intersections is less than one foot in each direction, in which case alternate intersections shall be tied.
   (F) Vertical wall bars shall be arranged in such a manner as to avoid interference with plank and topping bars above as directed by the Engineer.
6. Plank Bearings:
   (A) Plank concrete seats receiving elastomeric pads shall be poured monolithically with supporting structure. Top of concrete seat receiving elastomeric bearing pads shall be finished with a steel trowel to a smooth level surface to the elevation shown on the plans. Grind down high spots as needed to provide an even bearing surface to 1/16"± tolerance.
   (B) Elastomeric pads: To prevent displacement, the bottom of bridge bearing pads shall be secured to the concrete seats with adhesives approved by the Engineer.
7. Construction Notes:
   (A) See Standard Specifications and Special Provisions.
   (B) In general, top of concrete deck slab shall be constructed to follow the roadway vertical and horizontal curves and superelevations.
   (C) Except as otherwise noted, all vertical dimensions are measured plumb.
   (D) The Contractor shall verify all site conditions and not rely upon these plans for stream location, etc. Conditions may differ from those shown.
   (E) 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.
   (F) For concrete finish see Standard Specifications and Special Provisions.
   (G) Construction joints may be relocated or additional ones added subject to the approval of the Engineer.
   (H) Unless otherwise noted, all exposed concrete edges shall be chamfered 3/4" x 3/4".
8. General:
   (A) All items noted incidental will not be paid for separately.
   (B) Standard detail drawings refer to all structures in general, except for modifications as may be required for special conditions. For such modifications refer to the corresponding detailed drawings.
9. Foundation:
   (A) For boring logs and other geotechnical information, see foundation report by Geolabs, Inc. and Sheets G1 through G6.
   (B) General:
   (1) Many footings are located in or near the Stream. Construction at these locations may be complicated by the presence of water and cobbles or boulders. Additionally, the stream is subject to flash flooding. Shoring of the excavation may be required for the construction of these footings.
   (2) Concrete footings from the previous bridge that was demolished may complicate excavation. If required excavation of the concrete footings which includes removal of the reforcing steel shall be considered incidental to Section 206 - Excavation and Backfill for Conduits and Structures of the Specifications.
   (3) The pay limits for excavation for the Bridge , shown on sheets no. S4.8 and S5.7 should not be considered as indicative of actual excavation requirements.
   (4) Prior to structure excavation at Abutment No. 1, provide soldier piling and lagging at the existing power pole shown on sheet S4.4.
   (C) Design Soil / Rock Parameters:
   (1) Bearing pressure on basalt rock
   A. Extreme event limit state = 60 ksf
   B. Strength limit state = 36 ksf
   C. Service limit state = 20 ksf
   (2) Passive resistance of intact rock
   A. Extreme event limit state = 35 ksf (rectangular distribution)
   B. Strength limit state = 17.5 ksf (rectangular distribution)
   (3) Coefficient of friction of basalt rock
   A. Extreme event limit state = 0.75
   B. Strength limit state = 0.64
   (4) Side shear between concrete and intact basalt rock
   A. Extreme event limit state = 2 ksf
   (5) Static lateral earth pressure
   A. Active condition, level backfill = 35 pcf
   B. Active condition, 2H : 1V backfill = 50 pcf
   C. At-rest condition, level backfill = 50 pcf
   D. At-rest condition, 2H : 1V backfill = 65 pcf
   (6) Dynamic lateral earth pressure
   A. Level backfill = 74H psf (rectangular distribution) (for abutment walls)
   B. Level backfill = 36H psf (rectangular distribution) (for wingwalls and site retaining walls)
   (D) Blasting will not be allowed on this project.
10. Reference Drawings:
   (A) For construction sequence, see Sheet S-11.1.

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY KSF | TRACED BY | DESIGNED BY KSF | QUANTITIES BY | CHECKED BY | DATE 10/2000
NOTE BOOK | NB-502.htm

GEOLABS, INC.
2006 KALIHI STREET
HONOLULU, HAWAII 96819

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Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Added Note

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BRIDGE GENERAL NOTES

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S0.3 OF 50 SHEETS

AS-BUILT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	13	77

SYMBOLS AND ABBREVIATIONS

@	At
≥	Greater than
Abut.	Abutment
Alt.	Alternate
Approx.	Approximate
Az.	Azimuth
Bal.	Balance
Beg.	Begin
Bet.	Between
Bm.	Beam
Bot.	Bottom
Brg.	Bearing
℄	Center line
CIP	Cast in place
Cl., clr.	Clear
CLSM	Controlled Low Strength Material
Conc.	Concrete
Col.	Column
Cont.	Continue
Corresp.	Corresponding
CRM	Concrete Rubble Masonry
CY	Cubic yards
Det.	Detail
Dim.	Dimension
Ea.	Each
EF	Each face
El., elev.	Elevation
Eq.	Equal, equally
EW	Each way
Exc.	Excavation
Exist.	Existing
Exp.	Expansion
f'c	Specified compressive strength (28 days)
FA	Force account
FF	Front face
Fin.	Finish
Ft.	Foot, feet
Ftg.	Footing
Galv.	Galvanize
Gr., grd.	Ground, grade
H, h	Height
Horiz.	Horizontal
HS	High strength
Hwy.	Highway
Int.	Interior
Inv.	Invert
Jt.	Joint
L	Length
Lbs.	Pounds
LF	Linear foot
Longit.	Longitudinal
LS	Lump sum
Max.	Maximum
Min.	Minimum
No., #	Number
OC, oc	On center
P(e)	Effective Prestress Force
Psf.	Pounds per square foot
Psi.	Pounds per square inch
R	Radius
Rdwy.	Roadway
Ref.	Reference
Reinf.	Reinforcement
Req., Req'd.	Required
Ret.	Retaining
Sect.	Section
SF	Square foot
Sht.	Sheet
Spcg.	Spacing
Spcs.	Spaces
Sta.	Station
Std.	Standard
Stirr.	Stirrup
Str.	Stream
Struct.	Structure
Symm.	Symmetrical
Transv.	Transverse
Typ.	Typical
Vert.	Vertical
W/C	Water/Cement Ratio
WW	Wingwall

ORIGINAL PLAN
NOTE BOOK
No. ____
SURVEY PLOTTED BY
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QUANTITIES BY
CHECKED BY
DATE NOV/2000

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STATE OF HAWAII
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HIGHWAYS DIVISION

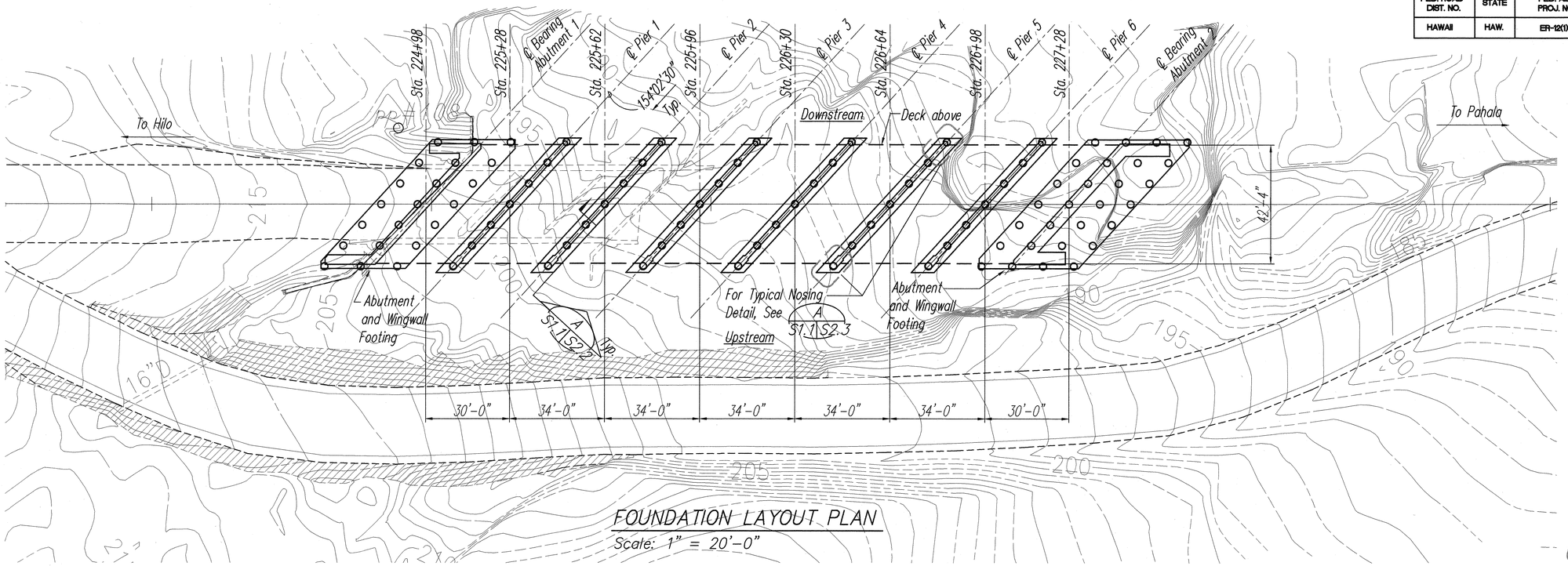
SYMBOLS AND ABBREVIATIONS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S0.4 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	14	77



FOUNDATION LAYOUT PLAN
Scale: 1" = 20'-0"

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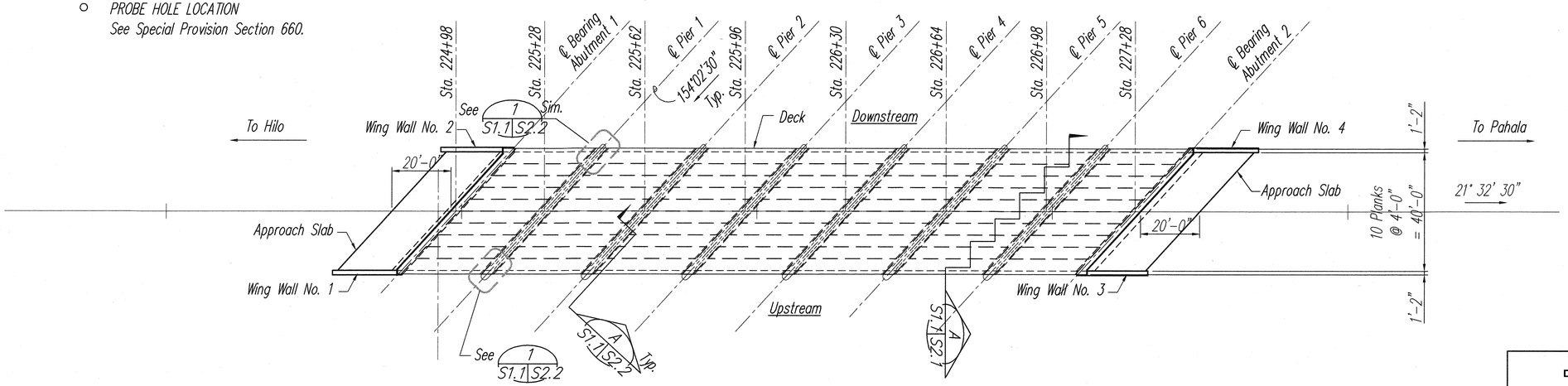
LEGEND:

○ PROBE HOLE LOCATION
See Special Provision Section 660.



DECK LAYOUT PLAN
Scale: 1" = 20'-0"

GRAPHIC SCALE:
20' 10' 0 20' 40'
SCALE: 1" = 20'

ORIGINAL PLAN
NOTE BOOK
No.
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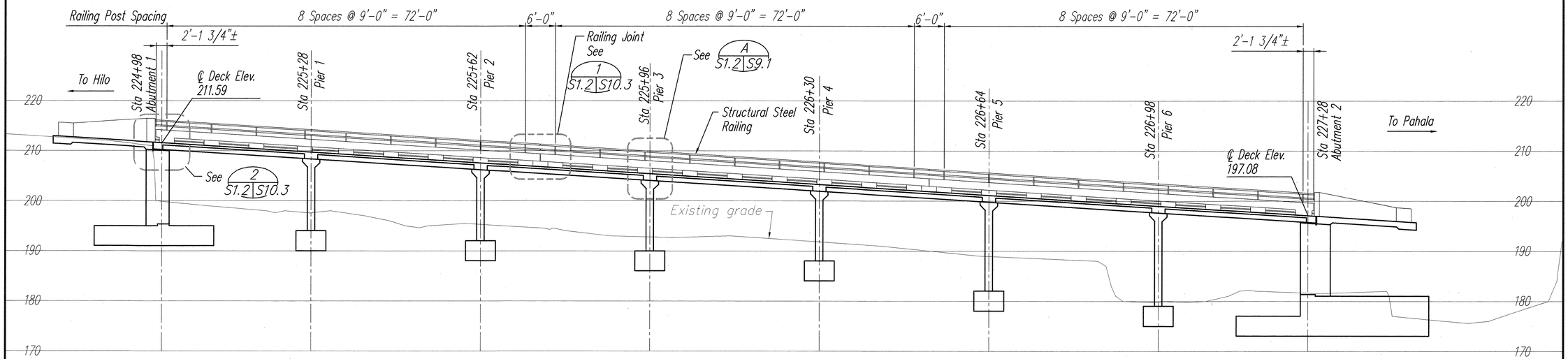
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FOUNDATION LAYOUT PLAN
AND DECK LAYOUT PLAN
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S1.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	15	77



LONGITUDINAL SECTION ALONG CENTERLINE ROAD

Scale: 1" = 10'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE NOV2000
	DRAWN BY JSY	" "
	TRACED BY	" "
NOTE BOOK	DESIGNED BY KSF	" "
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No.	CHECKED BY	" "

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10' 5' 0 10' 20'

SCALE: 1" = 10'

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

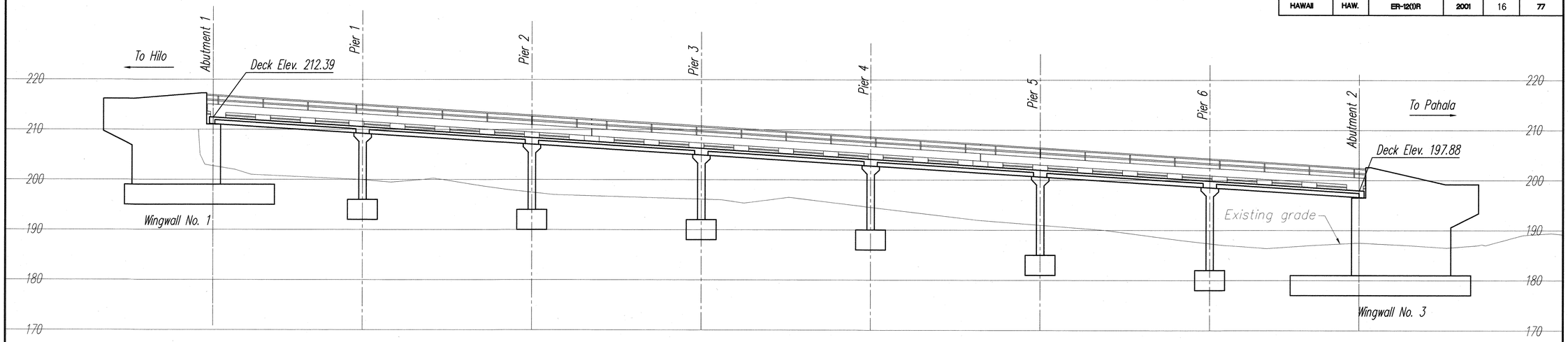
LONGITUDINAL SECTION

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

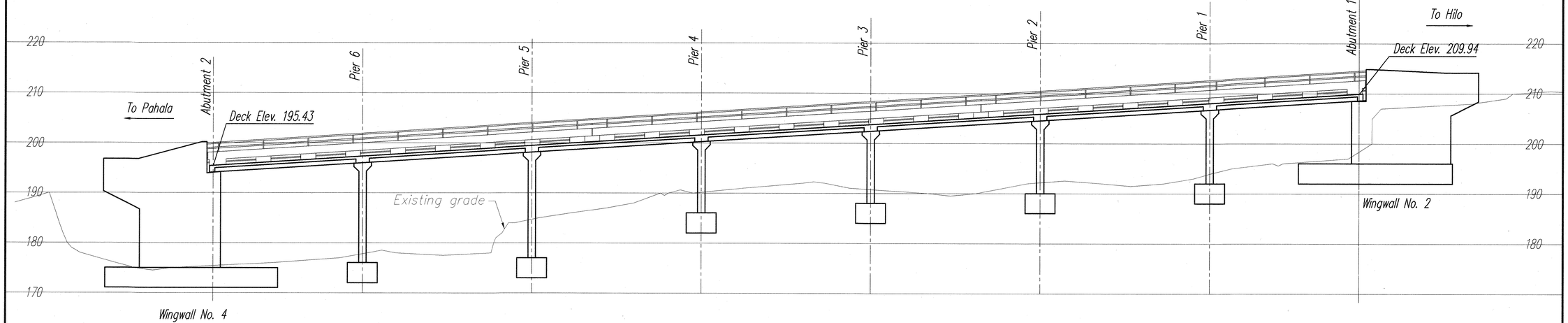
SHEET No. S1.2 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(0)R	2001	16	77



UPSTREAM ELEVATION

Scale: 1" = 10'-0"



DOWNSTREAM ELEVATION

Scale: 1" = 10'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE DEC2000
	DRAWN BY VSY	
NOTE BOOK	TRACED BY	
	DESIGNED BY KSF	
No.	QUANTITIES BY	
	CHECKED BY	

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GRAPHIC SCALE:
10' 5' 0 10' 20'
SCALE: 1" = 10'

STATE OF HAWAII
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HIGHWAYS DIVISION

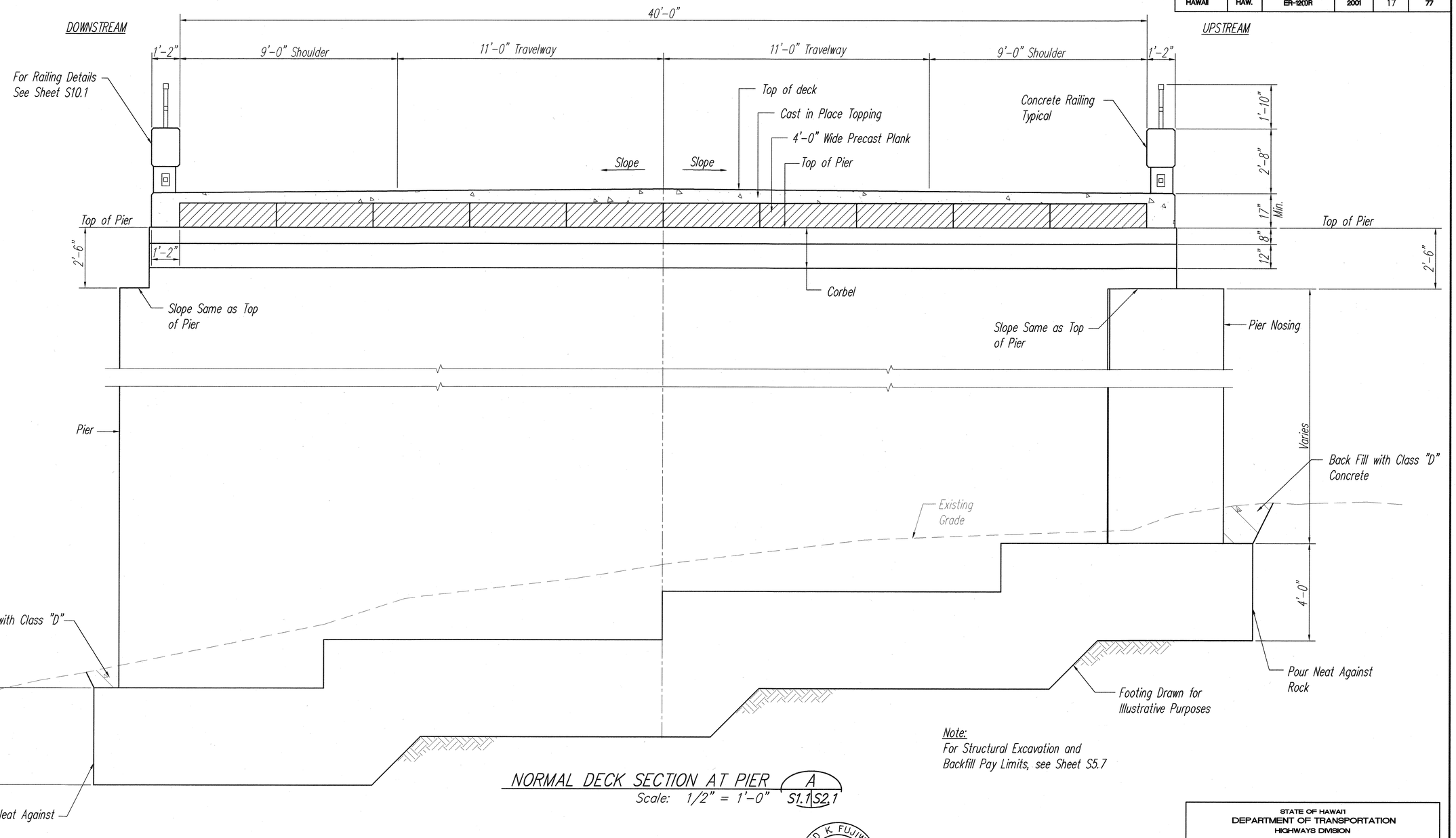
BRIDGE ELEVATIONS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S1.3 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	17	77



Note:
For Structural Excavation and Backfill Pay Limits, see Sheet S5.7

NORMAL DECK SECTION AT PIER (A)
Scale: 1/2" = 1'-0"
S1.1 S2.1

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE NOV2000
	DRAWN BY VSY	" " " "
	TRACED BY	" " " "
NOTE BOOK	DESIGNED BY KSF	
	QUANTITIES BY	
No.	CHECKED BY	

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

David K. Fujiwara

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GRAPHIC SCALE:
1' 0 1' 2' 3' 4' 5' 6'
SCALE: 1/2" = 1'-0"

STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

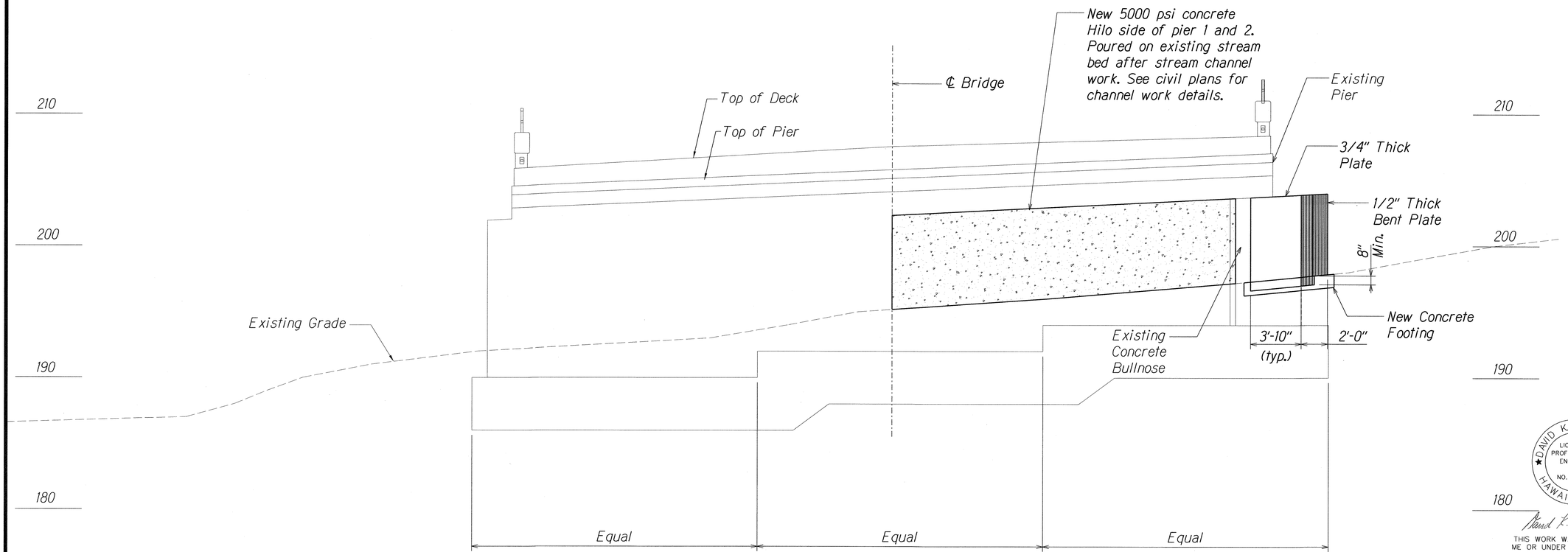
NORMAL DECK SECTION AT PIER

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S2.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	17 S-1	77



SECTION - PIER 1 AND 2 (1 / S2.1A | S2.1A)

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

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 4/2002
	DRAWN BY JCF	
NOTE BOOK	TRACED BY JCF	
	DESIGNED BY JCF	
NBS-S2.1A.dgn	QUANTITIES BY	
	CHECKED BY	

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David K. Fujiwara

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DATE	REVISION
02-15-07	C.O. - New Sheet

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SECTION - PIER 1 AND 2

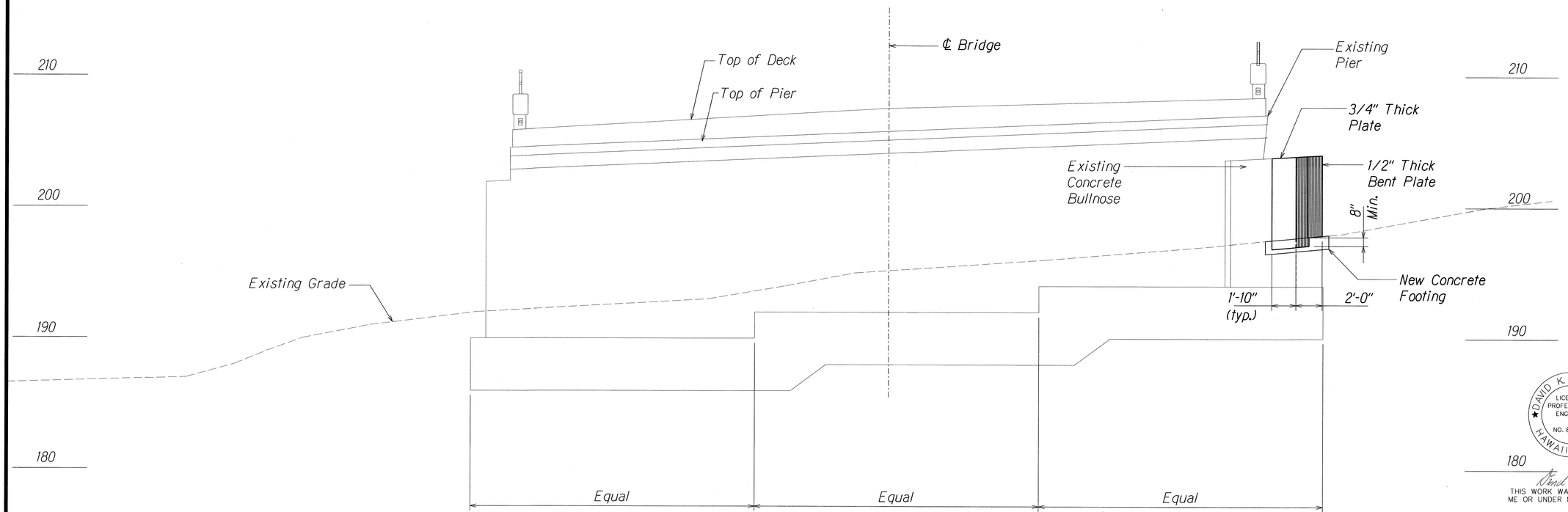
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown — Date: January 2001

SHEET No. S2.1A OF 50 SHEETS

17 S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	17 S-2	77



SECTION - PIER 3 THRU 6 (S2JB | S2JB)

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

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE: APR2002
	DRAWN BY	. . . .
NOTE BOOK	TRACED BY	KSF
NB-S2JB.dgn	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

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

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DATE	REVISION
02-15-07	C.O. - New Sheet

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SECTION - PIER 3 THRU 6

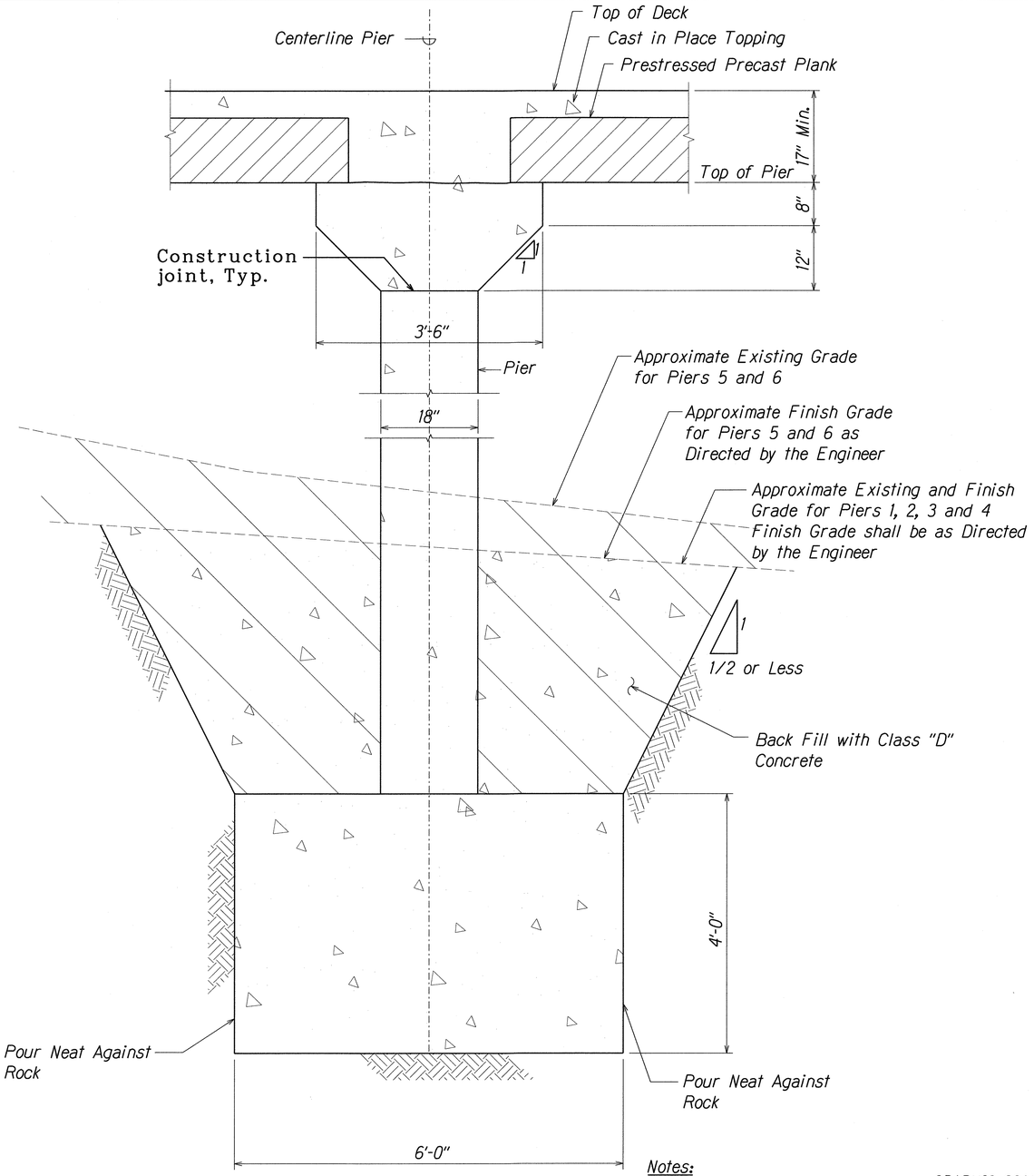
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown — Date: January 2001

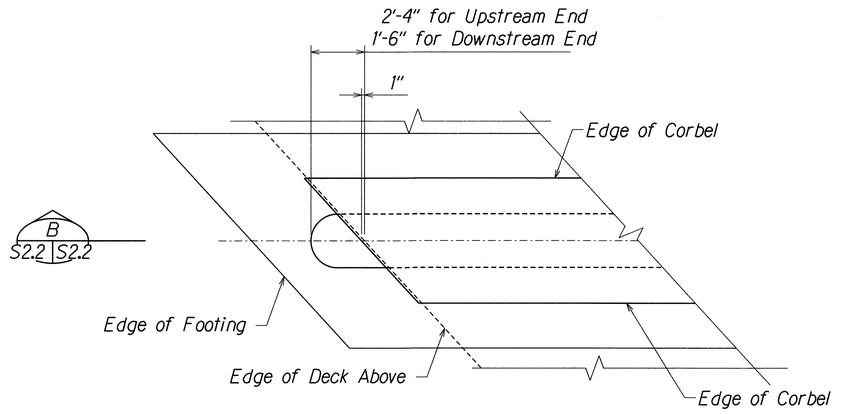
SHEET No. S2JB OF 50 SHEETS

17 S-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	18	77



SECTION A
Scale: 1" = 1'-0"
S1.1 | S2.2



CORBEL DETAIL 1
Scale: 1/2" = 1'-0"
S1.1 | S2.2

SECTION B
S2.2 | S2.2

Notes:
1. For Structural Excavation and Backfill Pay Limits, see Sheet S5.7
2. Finish Grade for All Piers shall be As Directed by the Engineer.

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

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

David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL SECTIONS

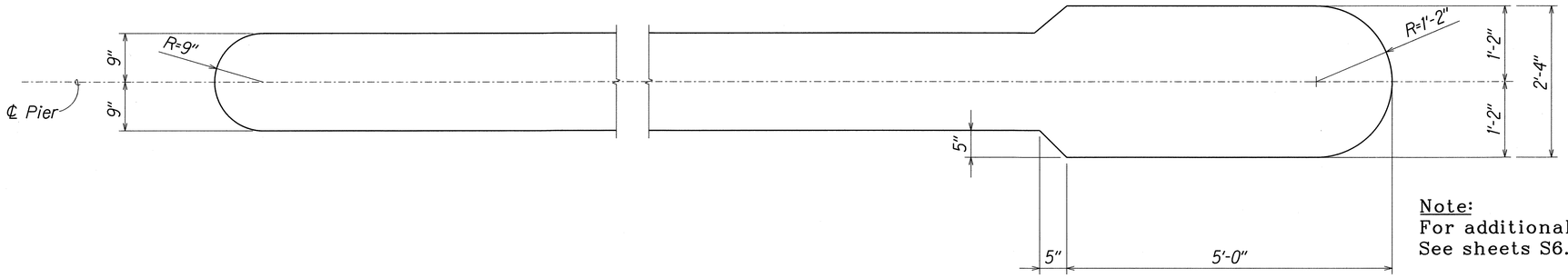
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S2.2 OF 50 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY KSF	10/2000
NO. 48-S22.dgn	TRACED BY KSF	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	19	77



Note:
For additional nosing details,
See sheets S6.4A & S6.4B.

DOWNSTREAM NOSING DETAIL

UPSTREAM BUMPER NOSING DETAIL

TYPICAL NOSING PLAN (A)
Scale: 1" = 1'-0"
S1.1 | S2.3

ORIGINAL PLAN
NOTE BOOK N.B. S24 pgs
SURVEY PLOTTED BY
DRAWN BY KSF DATE 10/2000
TRACED BY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

LEGEND FOR AS-BUILT POSTINGS

∿∿∿∿	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL PIER NOSING DETAIL

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S2.3 OF 50 SHEETS

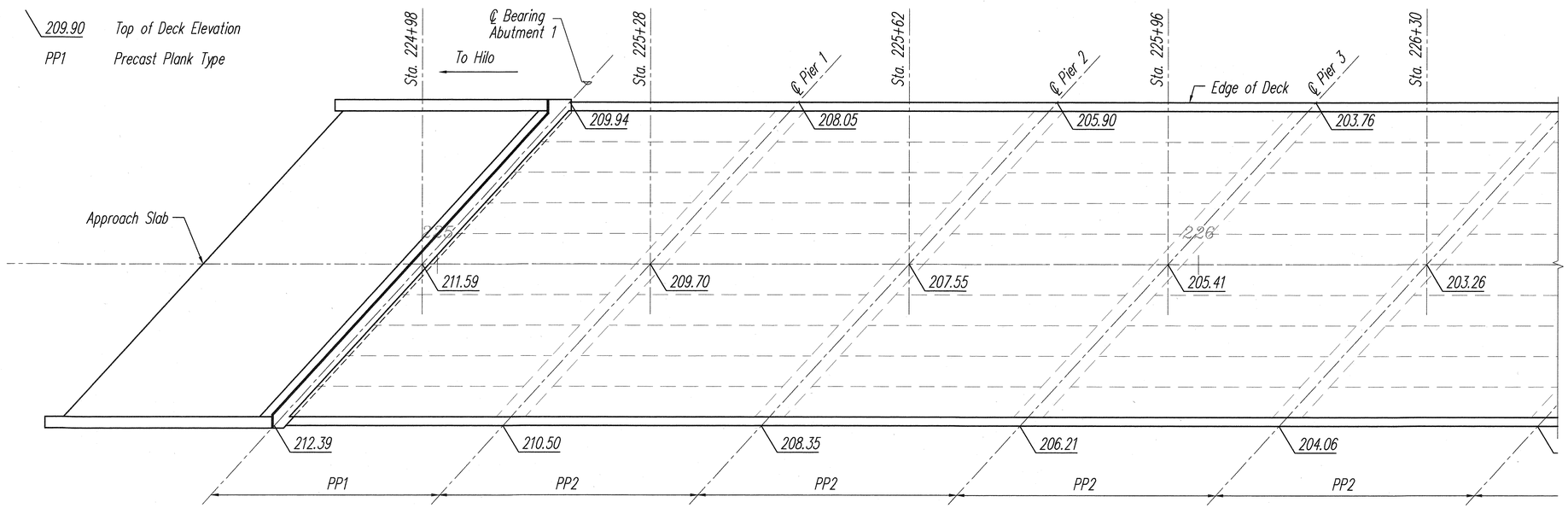
AS-BUILT

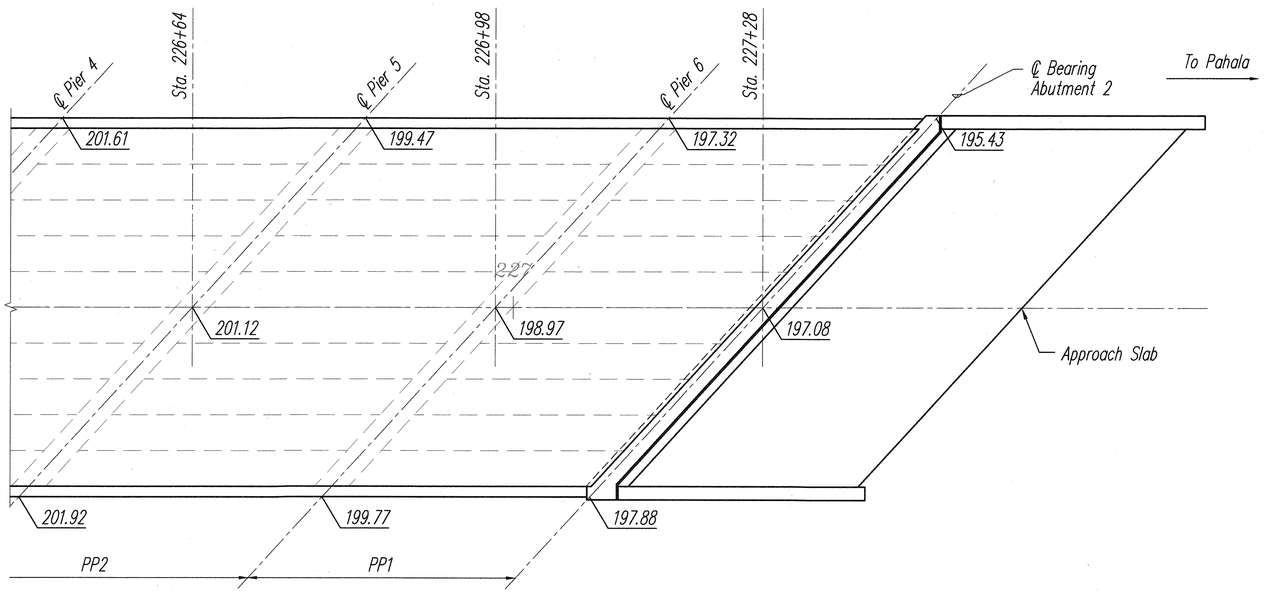
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	20	77

LEGEND:

209.90 Top of Deck Elevation

PP1 Precast Plank Type





TOP OF DECK ELEVATION PLAN

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

GRAPHIC SCALE:

8' 4' 0 8' 16'

SCALE: 1/8" = 1'-0"

ORIGINAL PLAN

SURVEY PLOTTED BY
DRAWN BY VSY DATE NOV/2000
TRACED BY VSY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY

NOTE BOOK
No.

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

David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

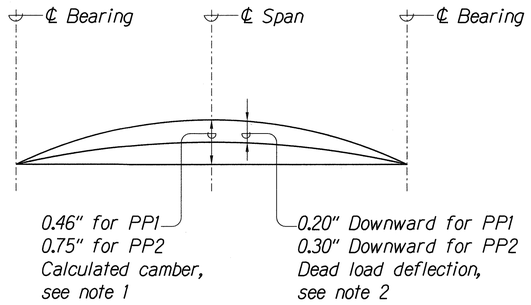
TOP OF DECK ELEVATION

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S3.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	21	77



LOCATION	ELEVATION "A"	ELEVATION "B"
ABUT. NO.		
1	208.38	210.83
2	193.87	196.32
PIER NO.		
1	206.55	209.00
2	204.40	206.85
3	202.26	204.71
4	200.11	202.56
5	197.97	200.42
6	195.82	198.27

CAMBER AND DEFLECTION NOTES:

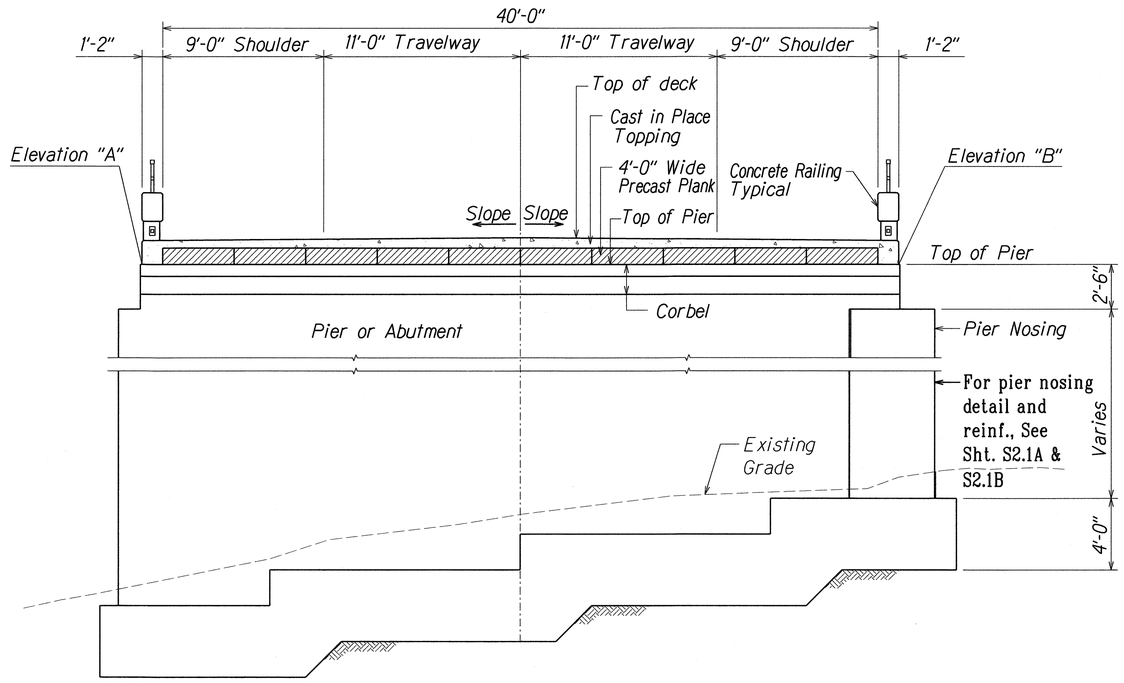
1. The calculated camber includes the effect of the prestress force and the weight of the girder after removal from the bed. Positive values shown for calculated camber indicate a net upward deflection. The calculated camber value has been multiplied by creep factors to approximate the effect of camber growth and concrete creep. The actual camber shall not exceed the calculated camber by more than 1/2".
2. The dead load deflection for the weight of the topping.
3. All cambers and deflections are in inches.

GIRDER CAMBER DIAGRAM (1) S3.2 | S3.2

Not to Scale

DOWNSTREAM

UPSTREAM



NOTES:

1. Top of pier and abutment slopes shall be constant from Elevation "A" to Elevation "B".
2. Top of pier and abutments also slope parallel with the bridge and shall have a constant slope of 6.31% in that direction. The higher elevation is on the Hilo side.
3. Elevations "A" and "B" accounts for camber
4. Elevations are at centerline pier and centerline bearing at abutments.
5. Abutment elevations account for the bearing pad thickness.

NORMAL DECK SECTION AT PIER (A) S3.2 | S3.2

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

GRAPHIC SCALE:

1' 0 1' 2' 3' 4' 5' 6'

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

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

David K. Fujiwara

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

DATE	REVISION
02-15-07	As Built - Revised Detail

ORIGINAL PLAN — NOTE BOOK — SURVEY PLOTTED BY — DRAWN BY JSF 11/07/2000 — TRACED BY — DESIGNED BY JSF — QUANTITIES BY — CHECKED BY — K:\B-S32.dgn

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

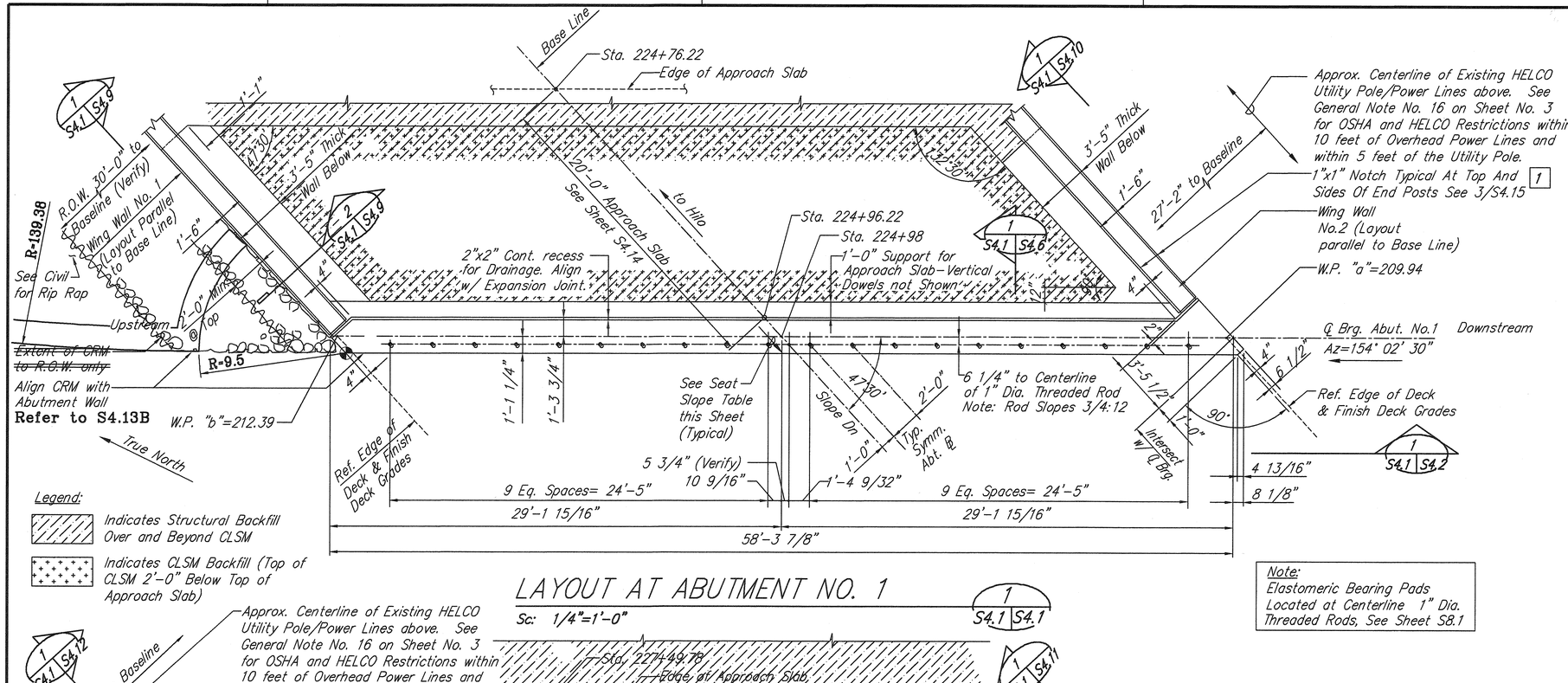
TOP OF PIER ELEVATIONS AND CAMBER DIAGRAM

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown — Date: January 2001

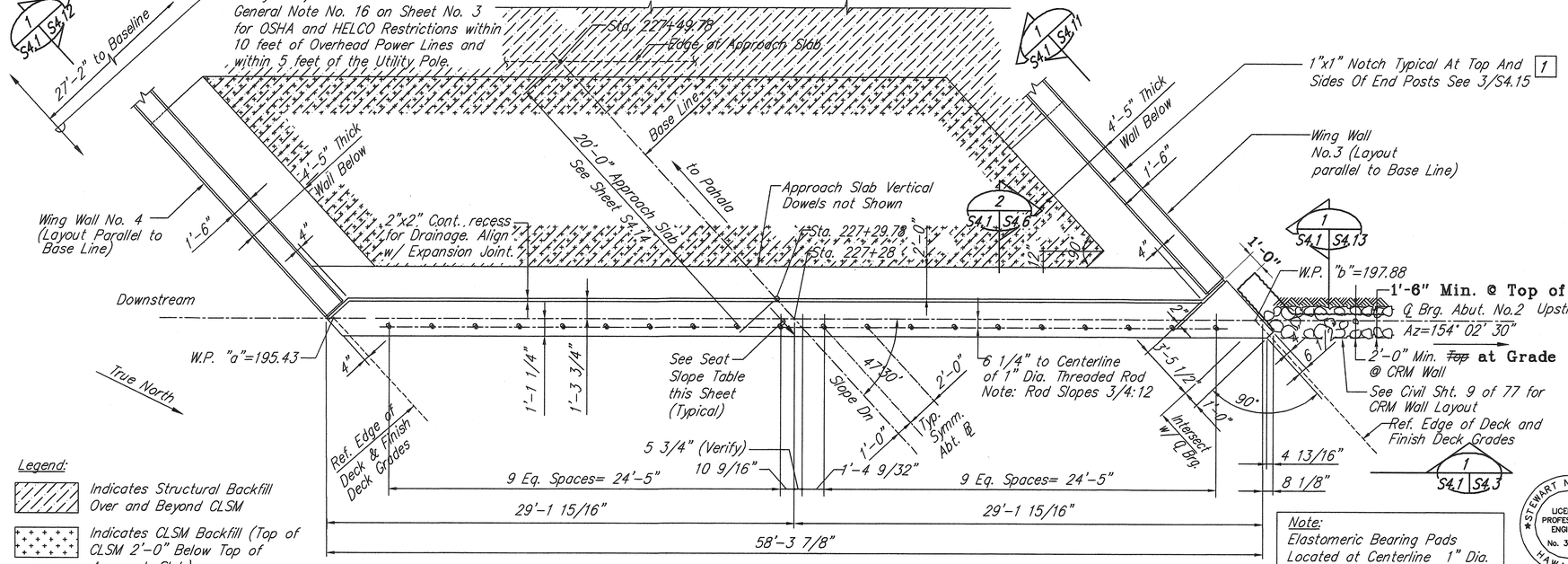
SHEET No. S3.2 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	22	77



LAYOUT AT ABUTMENT NO. 1

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



LAYOUT AT ABUTMENT NO. 2

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

1/4"= 1'-0"

4 3 2 1 0 4 8

Legend:

- Indicates Structural Backfill Over and Beyond CLSM
- Indicates CLSM Backfill (Top of CLSM 2'-0" Below Top of Approach Slab)

Note: Elastomeric Bearing Pads Located at Centerline 1" Dia. Threaded Rods, See Sheet S8.1

NOTES:

1. For Wing Wall Elevations, See Shts. S4.9 thru S4.13.
2. For Wing Wall and Abutment Footing Dimensions and Reinforcing, See Shts. S4.4 and S4.5.
3. For Bridge Rail, End Post and Metal Guard Rail Connection Details, See Sheet S4.16 and S8.1.
4. "℄ Brg. Abut. No. 1" and "℄ Brg. Abut. No. 2" are given as References for Grading and Layout. Centerlines of 1" Dia. Threaded Rods and Elastomeric Bearing Pads are Off-set from these and are shown on Details 1 and 2 on this Sheet. See also Sheet S8.1.

SEAT SLOPE TABLE:

ABUTMENT NO. 1	12 / -3/4
SLOPE= -3/4:12	
ABUTMENT NO. 2	+3/4 / 12
SLOPE= +3/4:12	

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	[1] Added 1"x1" Notches @ End Posts

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ABUTMENT NO.1 and NO.2 SEAT PLAN
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

STEWART N. WILLIAMS — LICENSED PROFESSIONAL ENGINEER — No. 3908-S — HAWAII, U.S.A.

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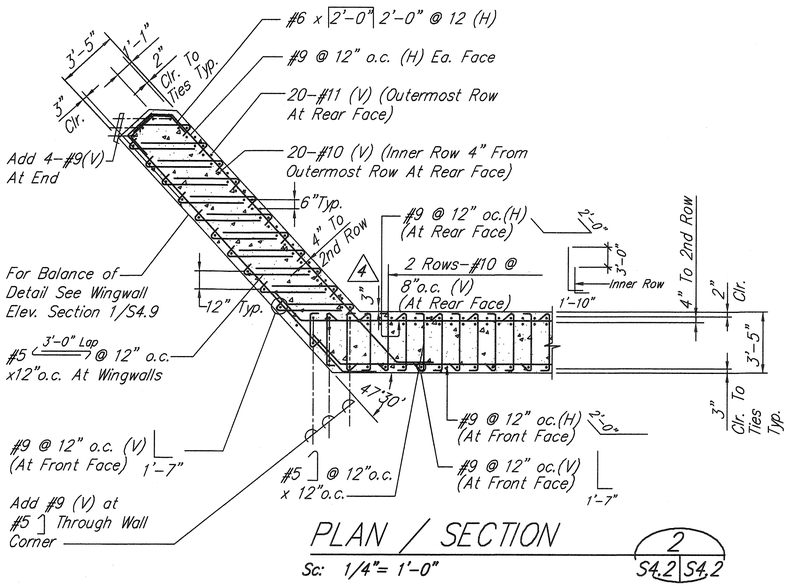
Mitsunaga & Associates, Inc.

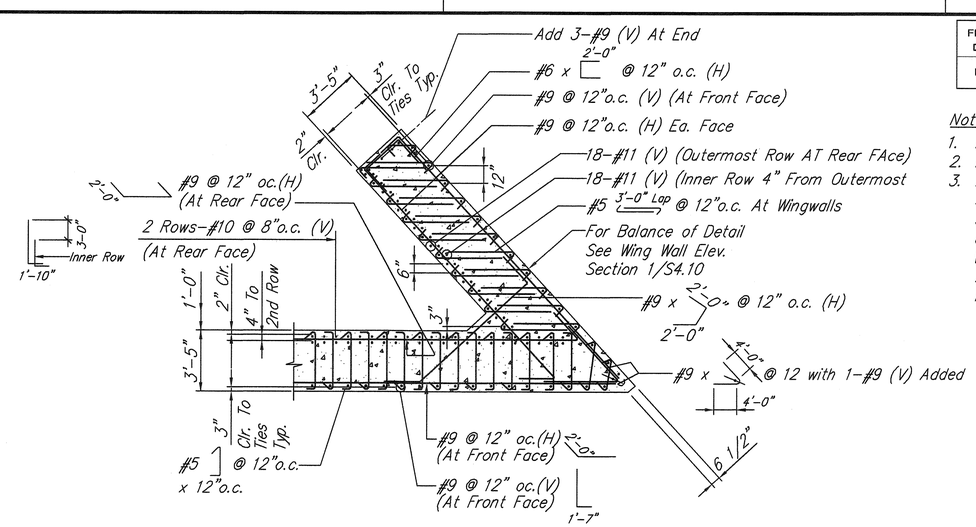
SHEET No. S4.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	23	77



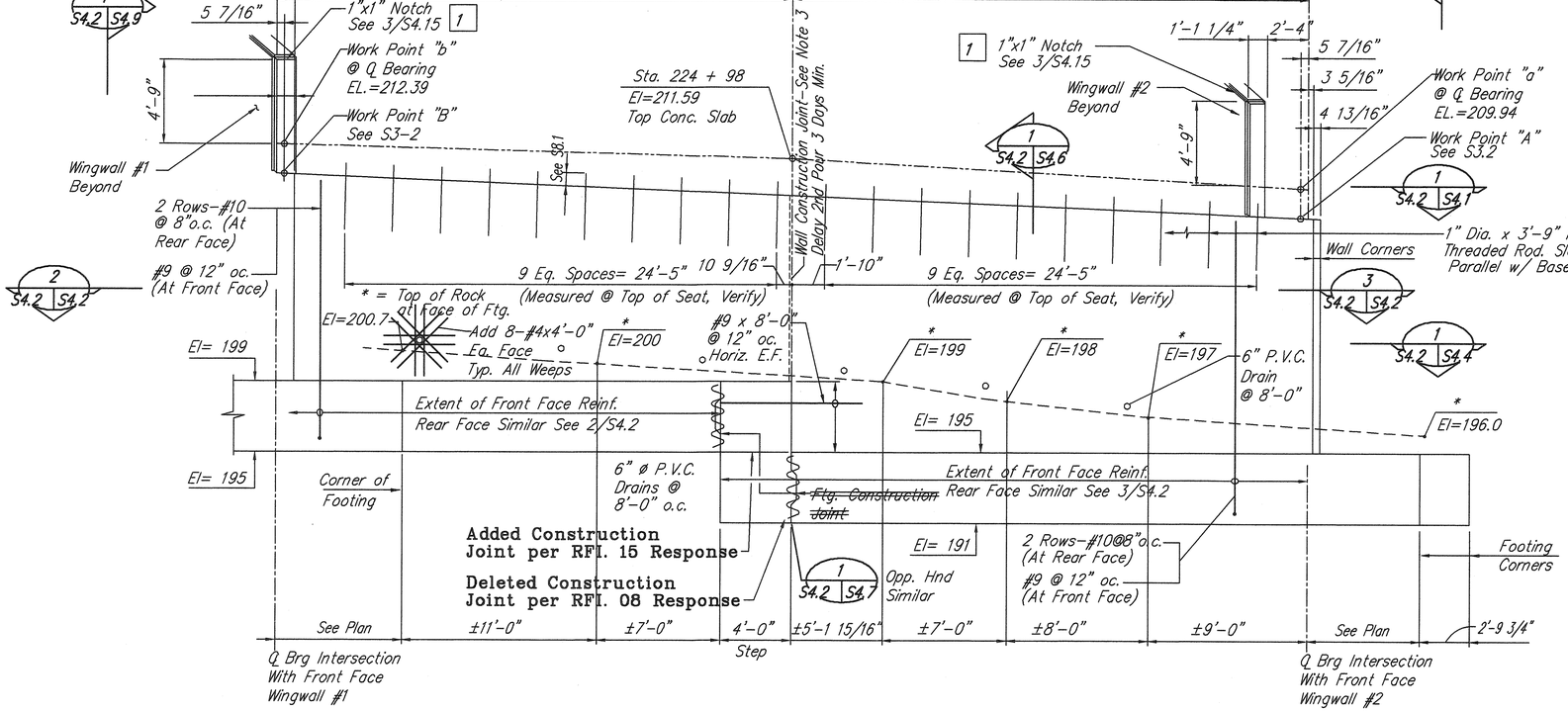
PLAN / SECTION 2 S4.2 | S4.2

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



PLAN / SECTION 3 S4.2 | S4.2

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



ELEVATION / ABUTMENT NO. 1 (EXPANSION END) 1 S4.1, S4.6 | S4.2

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

1/4"= 1'-0" 4 3 2 1 0 4 8

Notes:

1. Refer to S1.1 for Probe Hole Locations.
2. Refer to S4.8 for Excavation and Backfill Limits.
3. Abutment Walls Shall Be 2 Pours Minimum – Separated 3 Days Minimum. Horizontal Reinforcing Shall be Continuous Through The Joint. Provide a 2" X 1'-4" Wide Vertical Key Centered On The Wall Width. Apply Approved Bonding Agent In Accordance with Manufacturers Recommendations Prior To Adjacent Pours.

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	1 Added 1"x1" Notch Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ABUTMENT NO.1 ELEVATION, PLAN SECTIONS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.2 OF 50 SHEETS

STEWART N. WILLIAMS LICENSED PROFESSIONAL ENGINEER No. 3908-S HAWAII, U.S.A.

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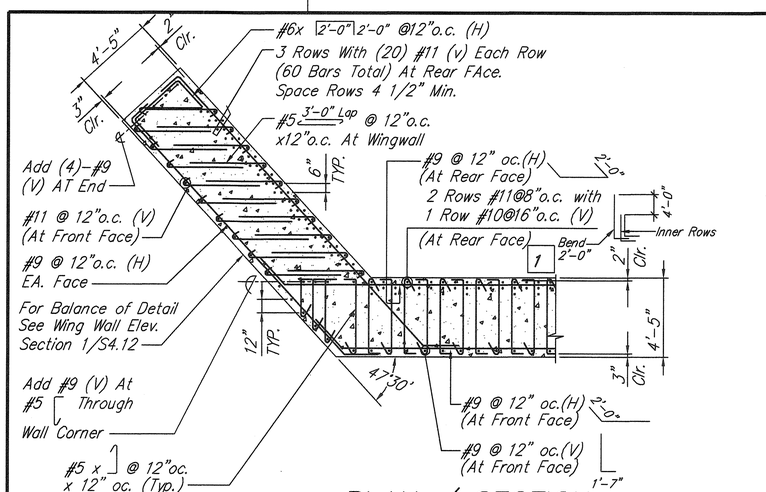
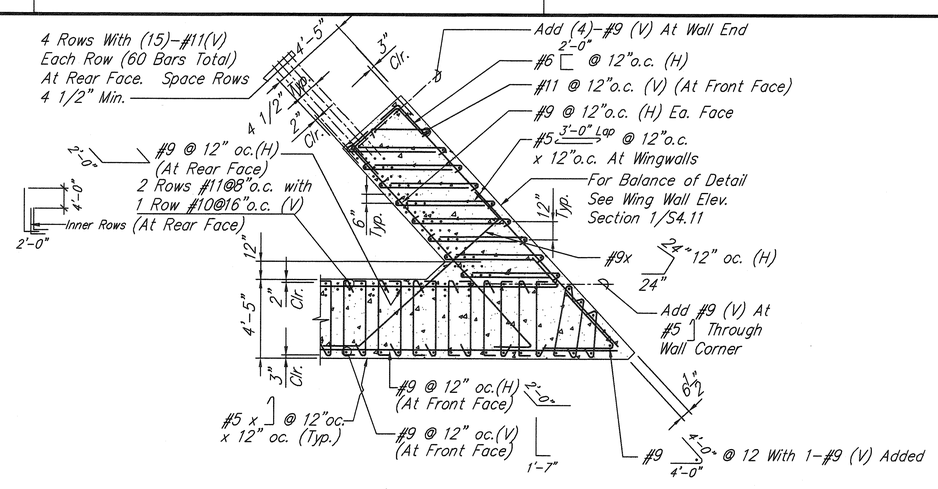
ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

AS-BUILT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	24	77

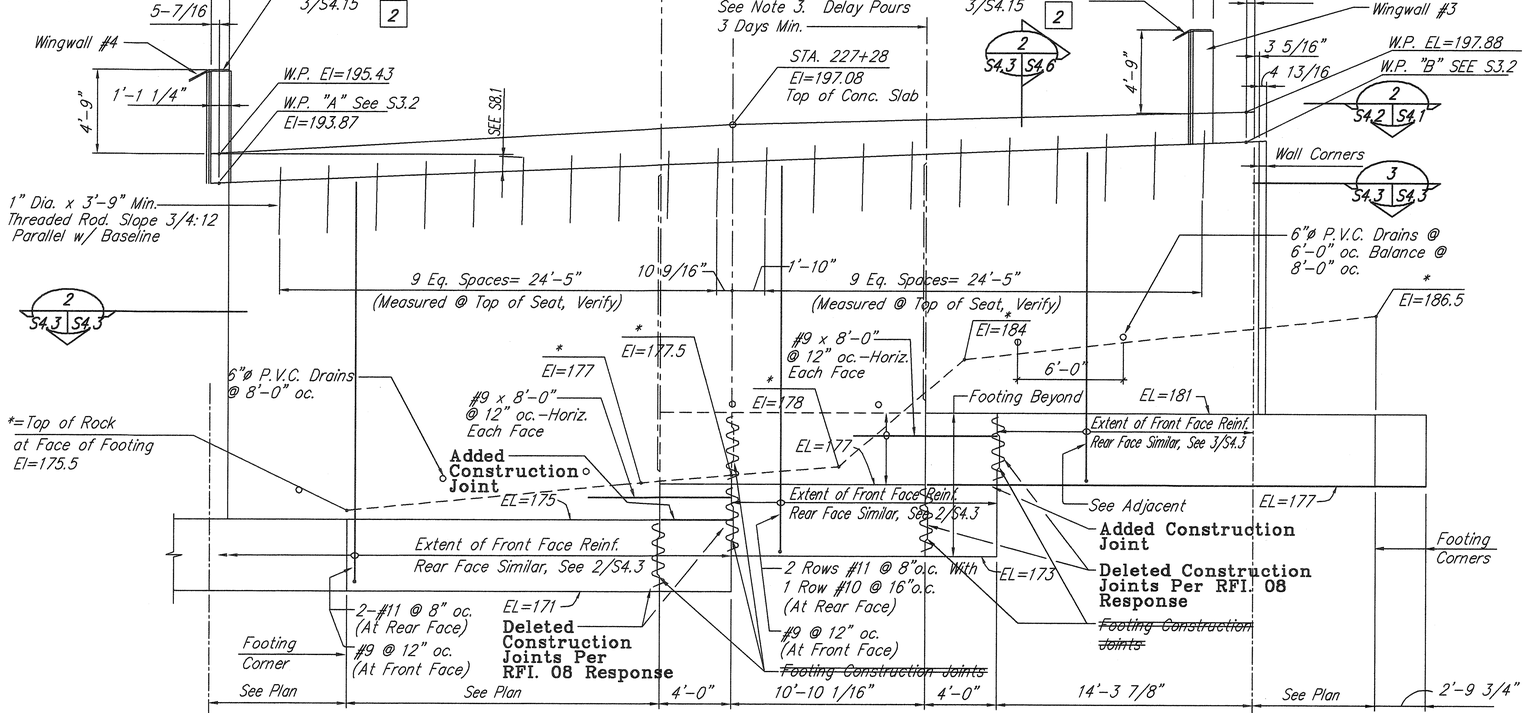


PLAN / SECTION 2 (S4.3 | S4.3)
Sc: 1/4"= 1'-0"



PLAN / SECTION 3 (S4.3 | S4.3)
Sc: 1/4"= 1'-0"

NOTES:
1. Refer to S1.1 for probe hole locations.
2. Refer to S4.8 for excavation and backfill limits.
3. Abutment Walls Shall Be 2 Pours Minimum-Separated 3 Days Minimum. Horizontal Reinforcing Shall Be Continuous Through The Joints(s). Provide A 2"x1'-4" Wide Vertical Key Centered On The Wall Width. Apply An Approved Bonding Agent In Accordance with Manufacturers Recommendations Prior to Adjacent Pours.



ELEVATION / ABUTMENT NO. 2 (EXPANSION END)
Sc: 1/4"= 1'-0"

1 (S4.1, S4.6 | S4.3) 1/4"= 1'-0"

4 3 2 1 0 4 8

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	2 Added 1"x1" Notch References
01-30-01	1 Clarified Rebar Bend Notation

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ABUTMENT NO.2 ELEVATION, PLAN SECTIONS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.3 OF 50 SHEETS

STEWART N. WILLIAMS* LICENSED PROFESSIONAL ENGINEER No. 3908-S HAWAII, U.S.A.

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Mitsunaga & Associates, Inc.

AS-BUILT

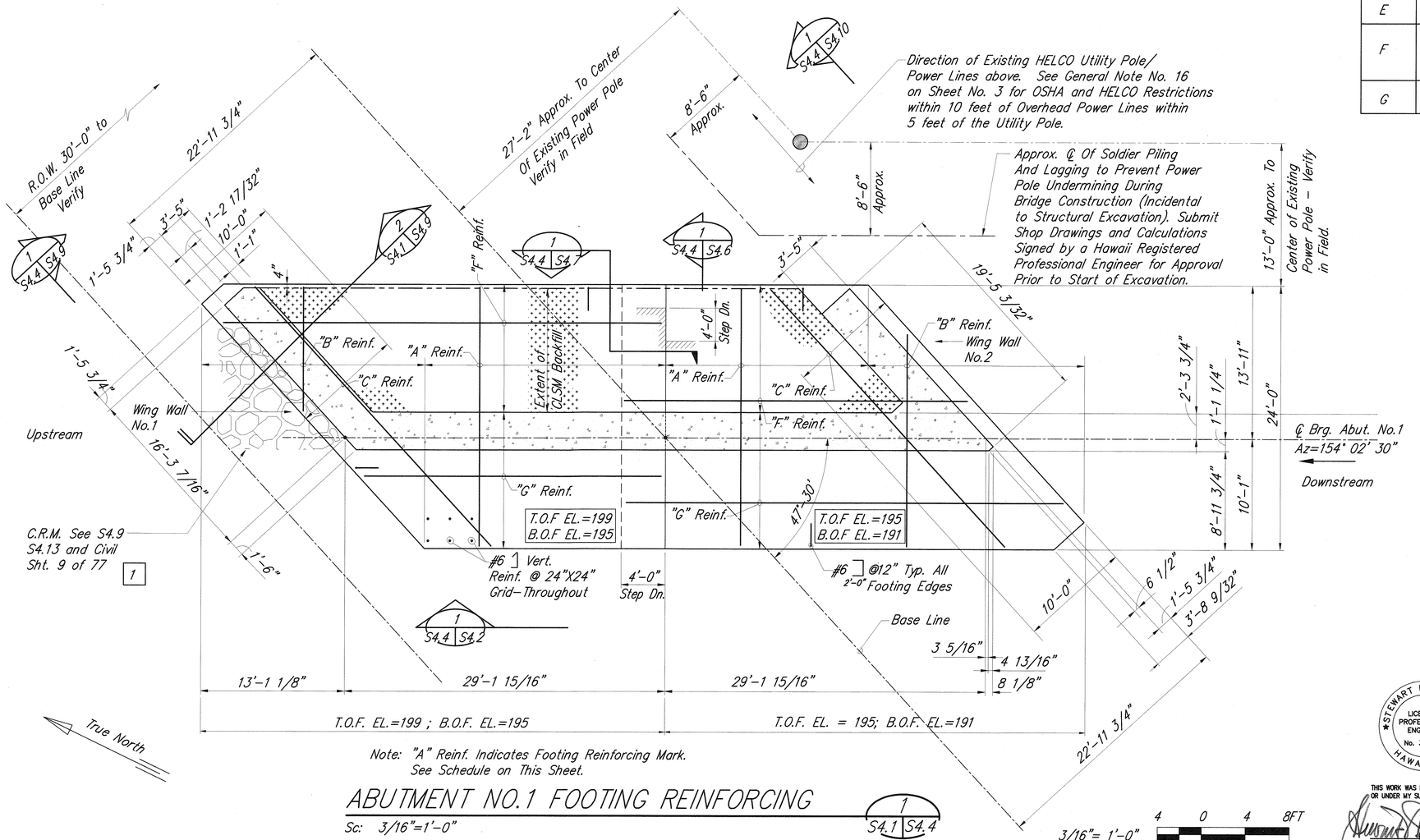
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1) R	2001	25	77

NOTES:

1. For Wing Wall Elevations, See Shts. S4.9 thru S4.12.
2. For Bridge Rail, End Post and Metal Guard Rail Connection Details, See Sheet S4.16 and S8.1.
3. See S1.1 For Probe Hole Locations
4. See S4.8 For Excavation And Backfill Limits.
5. See S4.2 For Wall Reinf. Sizes & Layouts
6. Indicates CLSM Backfill
7. T.O.F. = Top of Footing
   B.O.F. = Bottom of Footing

ABUTMENT NO.1 FOOTING REINFORCING

MARK	TOP REINF.	BOTTOM REINF.
A	#10 @ 8" o.c. ⌐ 1'-10"	#10 @ 8" o.c. ⌙ 1'-10"
B	#9 @ 12" o.c. ⌐ 1'-7"	#10 @ 8" o.c. ⌙ 1'-10"
C	#9 @ 12" o.c. ⌐ 1'-7"	#10 @ 8" o.c. ⌙ 1'-10"
D	Not Used	Not Used
E	Not Used	Not Used
F	#11 @ 6" ⌐ 2'-0" 4 1/2 min. 5 1/2 max. #10 @ 6" o.c.	#10 @ 12" o.c. 4 1/2 min. 5 1/2 max. #10 @ 6" ⌙ 1'-10"
G	#9 @ 12" o.c. ⌐ 1'-7"	#9 @ 8" o.c. ⌙ 1'-7"



Note: "A" Reinf. Indicates Footing Reinforcing Mark. See Schedule on This Sheet.

ABUTMENT NO.1 FOOTING REINFORCING

Sc: 3/16"=1'-0"

3/16"= 1'-0" 4 0 4 8FT

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

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STEWART N. WILLIAMS LICENSED PROFESSIONAL ENGINEER No. 3908-S HAWAII, U.S.A.

Mitsunaga & Associates, Inc.

DATE	DESCRIPTION
01-30-01	1 Revised Sheet Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ABUTMENT FOOTING REINFORCING DETAILS MAMALAHOA HIGHWAY REPLACEMENT OF KEAIWA STREAM BRIDGE Federal Aid Project No. ER-12(1)R

Scale: As Noted January 2001

SHEET No. S4.4 OF 50 SHEETS

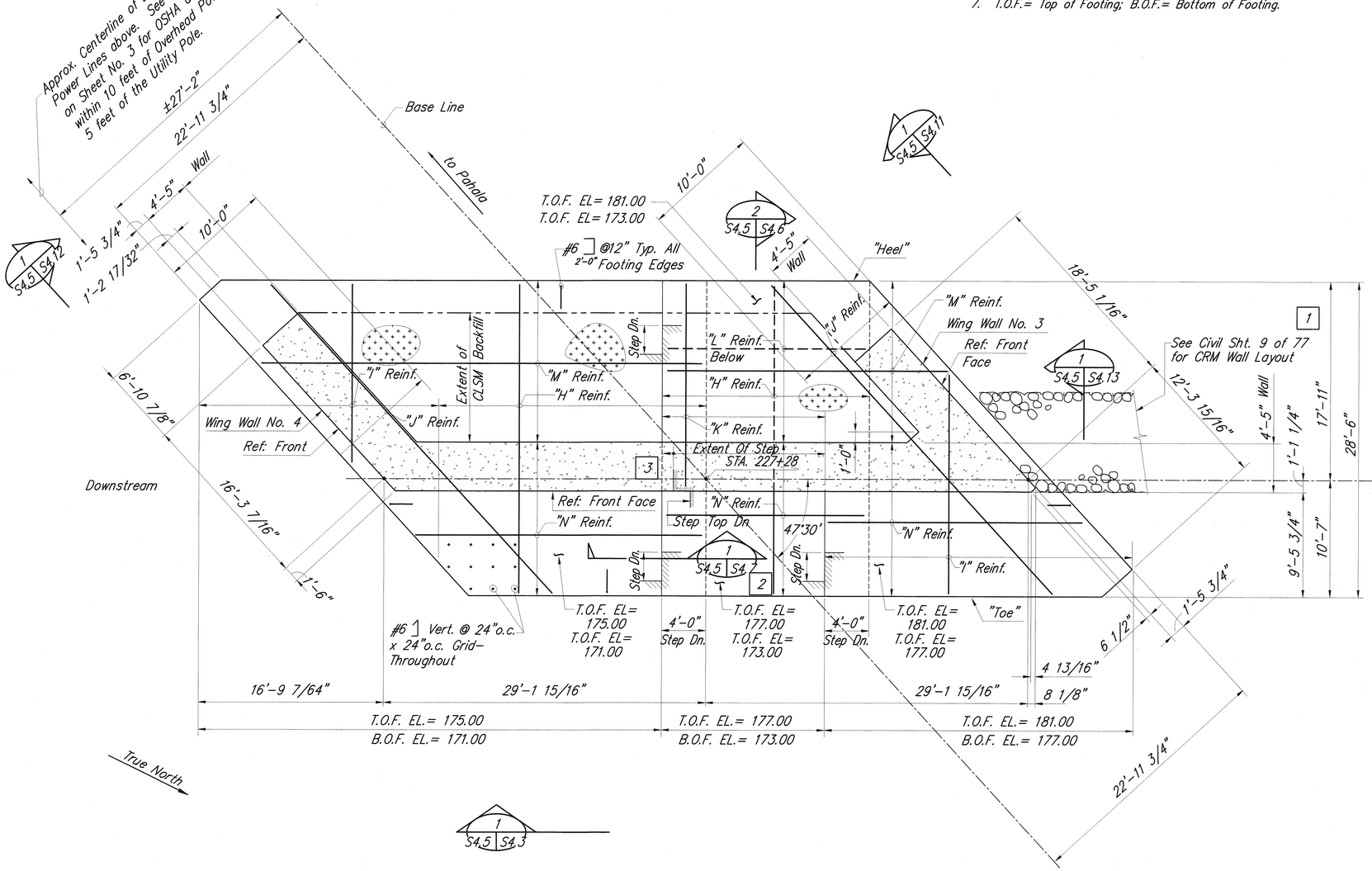
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1) R	2001	26	77

NOTES:

1. For Wing Wall Elevations, See Shts. S4.9 thru S4.12.
2. For Bridge Rail, End Post and Metal Guard Rail Connection Details, See Sheet S4.16 and S10.1.
3. See S1.1 For Probe Hole Locations
4. See S4.8 For Excavation And Backfill Limits.
5. See Sheet S4.3 for Wall Reinf., Sizes, & Layouts.
6. Indicates CLSM Backfill
7. T.O.F.= Top of Footing; B.O.F.= Bottom of Footing.

ABUTMENT NO.2 FOOTING REINFORCING

MARK	TOP REINF.	BOTTOM REINF.
A thru G	Not Used	Not Used
H	#10 @ 8"o.c. 4 1/2" 22" #10 @ 8"o.c.	#10 @ 16" o.c. 22" #10 @ 8" o.c. 4 1/2"
I	#10 @ 12" o.c. 22"	#10 @ 16" o.c. 22" #10 @ 8" o.c. 4 1/2"
J	#10 @ 12" o.c. 22"	#11 @ 8" o.c. 24"
K	#10 @ 8"o.c. 4 1/2" 22" #10 @ 8"o.c. At T.O.F. El.=181. Length is from Front Face Abutment Wall to Heel	Not Used
L	#11 @ 6"o.c. T.O.F. EL.=177 24"	#11 @ 12" o.c. 24" #11 @ 6" o.c. 4 1/2"
M	#11 @ 6"o.c. 4 1/2" 24" #11 @ 6"o.c. 4 1/2" #11 @ 6"o.c.	#11 @ 12" o.c. 24" #11 @ 6" o.c. 4 1/2"
N	#10 @ 12" o.c. 22"	#10 @ 8" o.c. 22"



Note: "H" Reinf. Indicates Footing Reinforcing Mark. See Schedule on This Sheet.

ABUTMENT NO.2 FOOTING REINFORCING

Sc: 3/16"=1'-0"

3/16"= 1'-0" 4 0 4 8FT

DATE	DESCRIPTION
01-30-01	3 Clarified Top Of Footing Step
01-30-01	2 Added Section Mark 1/S4.7
01-30-01	1 Revised Sheet Reference

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ABUTMENT FOOTING REINFORCING DETAILS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted January 2001

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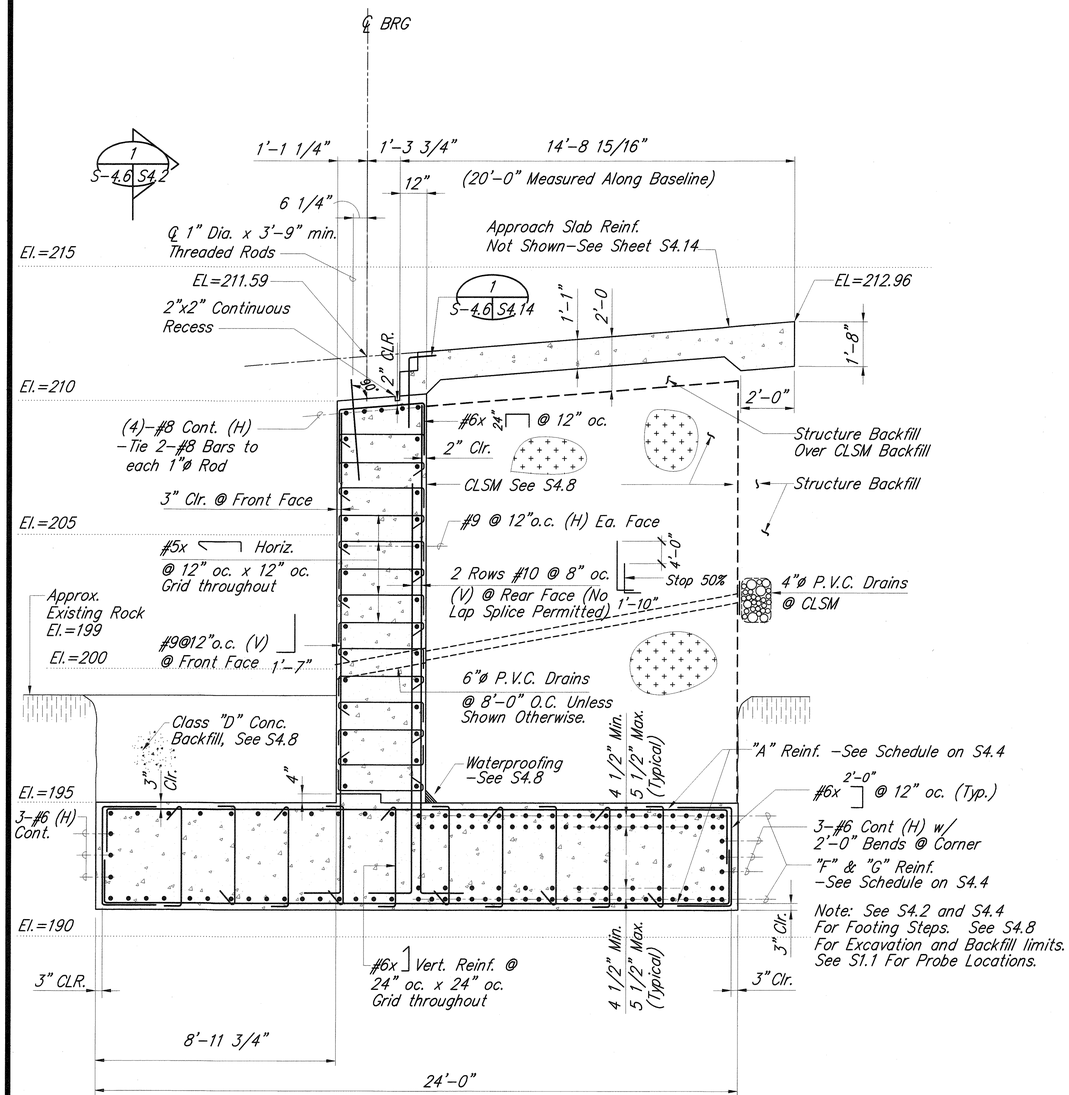
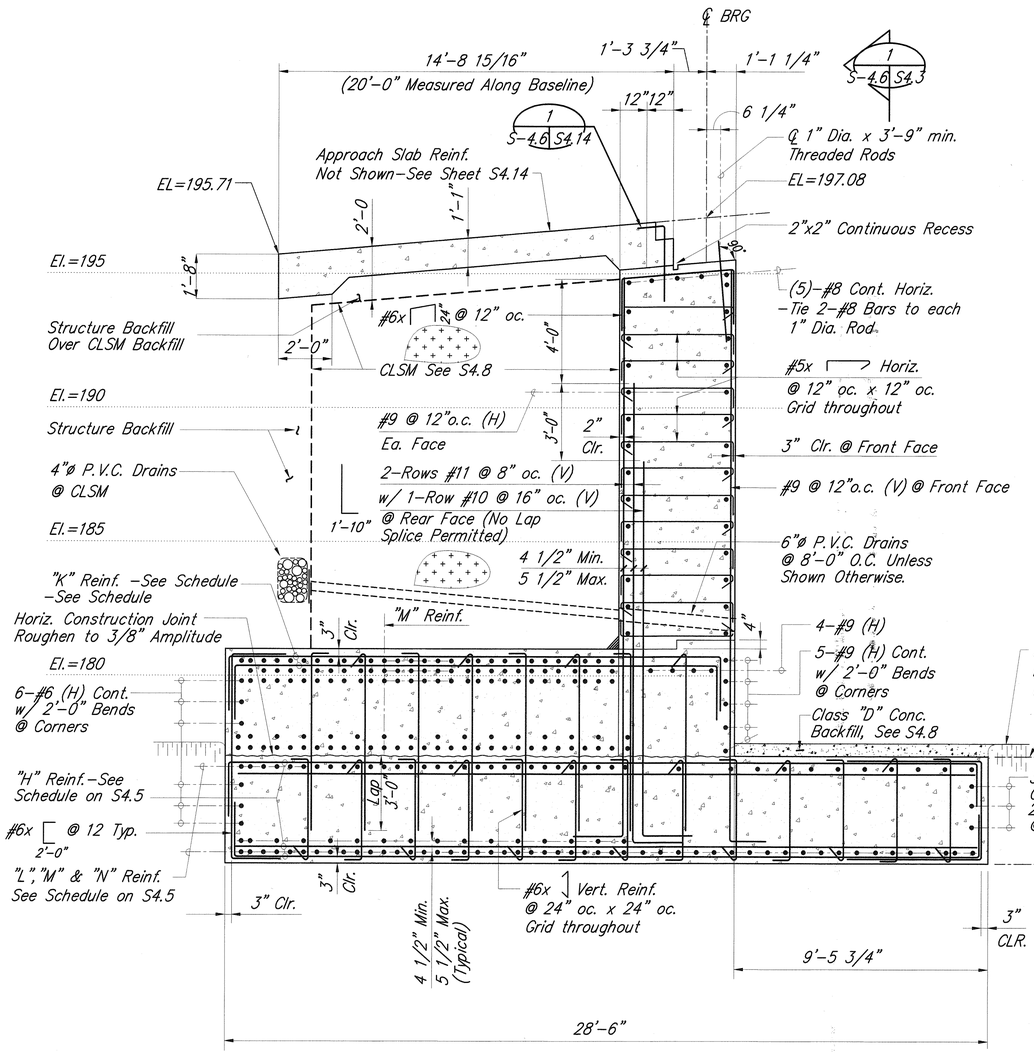
SHEET No. S4.5 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	27	77



SECTION AT ABUTMENT NO. 1 PERPENDICULAR TO ℄ BRG — 1 S4.1, S4.3, S4.4, S4.6 | S4.6

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



SECTION AT ABUTMENT NO. 2 PERPENDICULAR TO ℄ BRG — 2 S4.1, S4.3, S4.5, S4.6 | S4.6

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

Note: See S4.3 and S4.5 For Footing Steps. See S4.8 For Excavation and Backfill limits. See S1.1 for Probe Locations

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

2 0 2 4FT

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

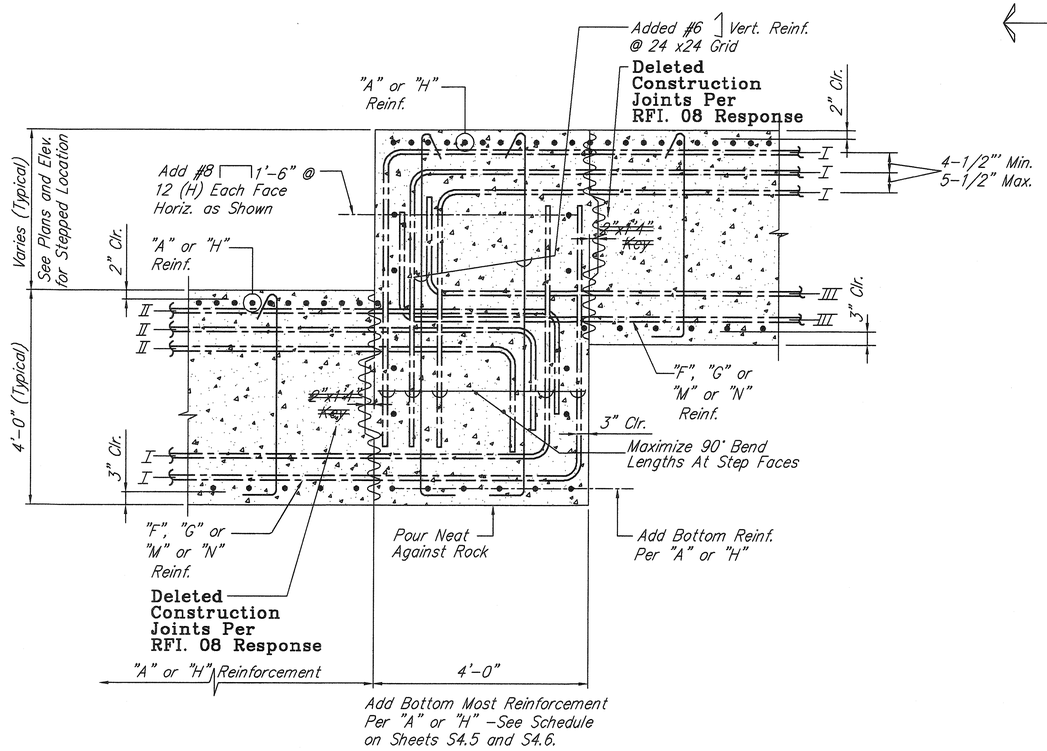
ABUTMENT SECTIONS and DETAILS MAMALAHOA HIGHWAY REPLACEMENT OF KEAIWA STREAM BRIDGE

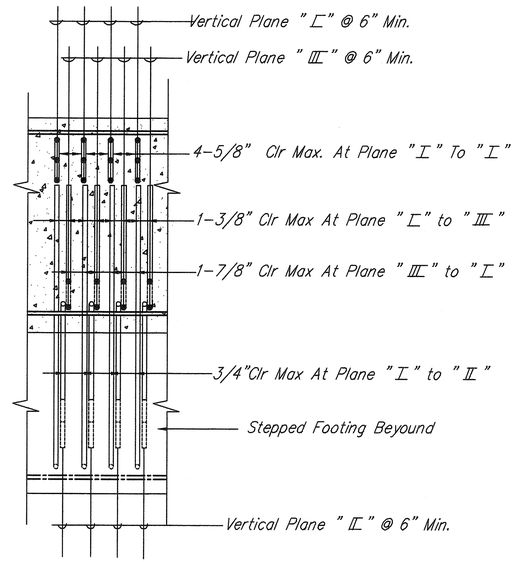
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.6 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	28	77





SECTION

TYPICAL ABUTMENT STEPPED FOOTING DETAIL

1 / S4.7 | S4.7

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

LEGEND FOR AS-BUILT POSTINGS	
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~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

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

3/4"= 1'-0" 1' 0 1' 2' 3'

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DATE	DESCRIPTION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

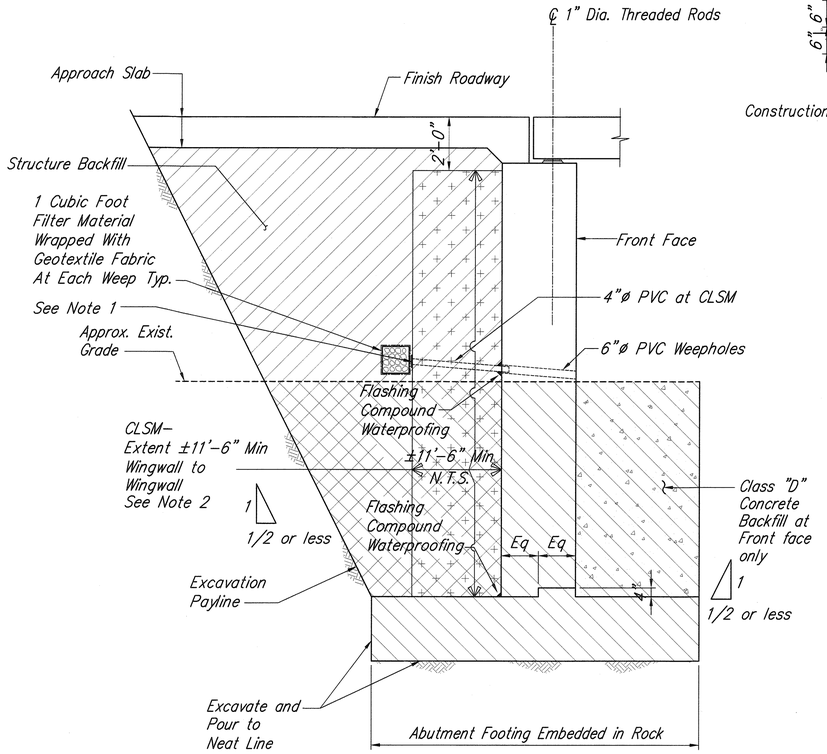
ABUTMENT SECTIONS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.7 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	29	77



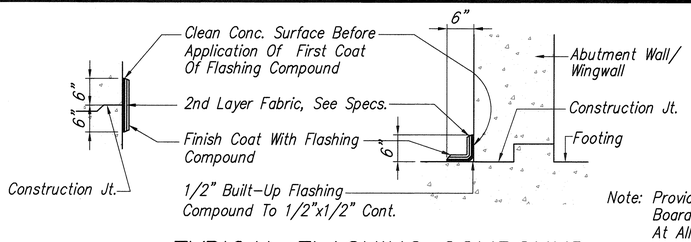
Note:

1. Provide 6" square aluminum or galvanized steel wire, 1/4" mesh hardware cloth (minimum wire diameter 0.025"). Anchor firmly to backface.
2. CLSM Shall Be Formed and Placed At 4'-0" Maximum Lifts. CLSM Lifts Shall Be Placed No Less Than 24 Hours After The Completion of the Previous CLSM Lift. Roughen CLSM Surfaces to 1/4" Minimum Roughness.

ABUTMENT EXCAVATION and BACKFILL PAYLIMITS

A S4.8 | S4.8

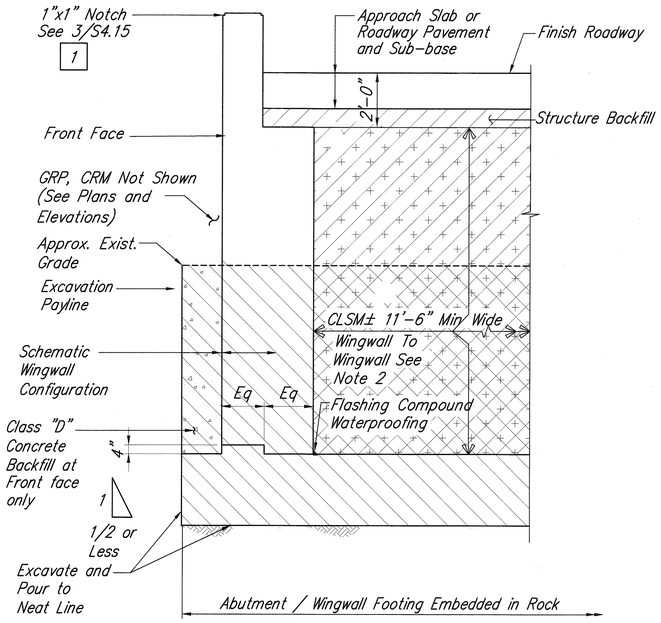
Scale: 3/8"= 1'-0"



Note: Provide 1/4" Protection Board - Shaped As Required At All Joints.

TYPICAL FLASHING COMPOUND WATERPROOFING DETAIL

N.T.S.



Note:

1. Provide 6" square aluminum or galvanized steel wire, 1/4" mesh hardware cloth (minimum wire diameter 0.025"). Anchor firmly to backface.
2. CLSM Shall Be Formed and Placed At 4'-0" Maximum Lifts. CLSM Lifts Shall Be Placed No Less Than 24 Hours After The Completion of the Previous CLSM Lift. Roughen CLSM Surfaces to 1/4" Minimum Roughness .

WINGWALL EXCAVATION and BACKFILL PAYLIMITS

B S4.8 | S4.8

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

Legend:

- Structure Excavation
- Structure Backfill
- Class "D" Concrete Backfill
- CLSM Backfill

Note:

1. Excavations for footings in Basalt Rock formation (including fractured rock and clinker materials) shall be kept to near-vertical (0.5H:1V) or steeper. Inadvertent over-excavations by the Contractor shall be cleaned of loose and fractured rock to expose intact rock. Concrete for the final footing shall be poured in contact with the sides of the excavation for the full for the full designed footing thickness. The resulting void space above the top of the footing shall be backfilled with Class D concrete where indicated . Backfilling the inadvertent over-excavations with footing concrete or Class D concrete will not be measured and paid for separately.
2. All footing excavations shall be cleaned of loose materials and highly fractured rock to the satisfaction of the Engineer.
3. The Engineer may direct the Contractor to over-excavate below the bottom of footing elevation and to the sides of the edges of the footing excavations. The additional over-excavation of the footing excavations, as directed by the Engineer, will be measured and paid for as structure excavation as indicated in the specifications.
4. The additional over-excavation as directed by the Engineer, below the bottom of footing elevation shall be backfilled with Class D concrete. This item will be measured and paid for as Structure Backfill for Abutments and Wingwalls (Class D concrete).
5. Geotextile and 4" PVC shall be incidental to Structural backfill.

DATE	DESCRIPTION
01-30-01	1 Added 1"x1" Notch Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXCAVATION and BACKFILL LIMITS MAMALAHOA HIGHWAY REPLACEMENT OF KEAIWA STREAM BRIDGE Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.8 OF 50 SHEETS

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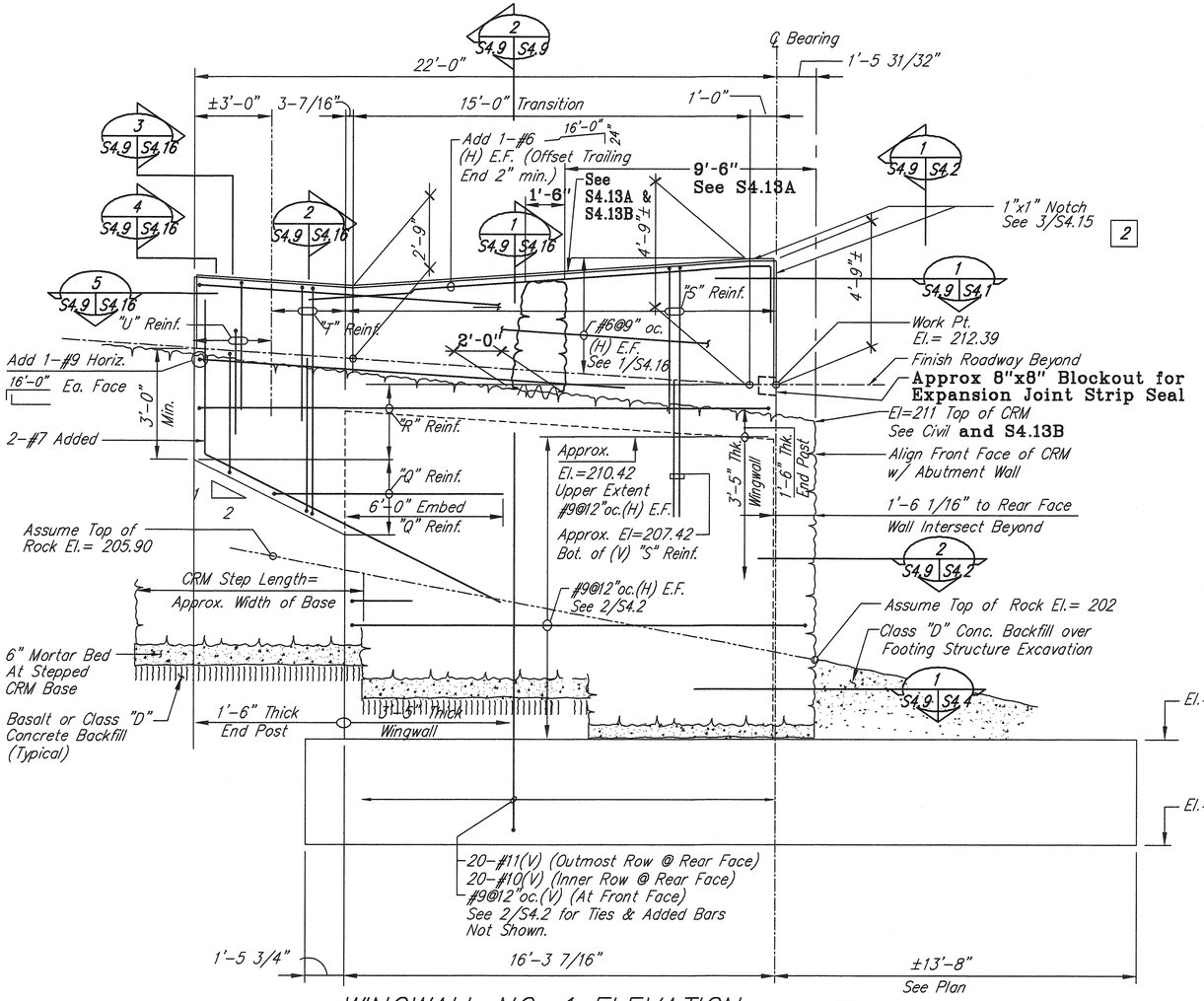
3/8"= 1'-0" 2 0 2 4FT

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

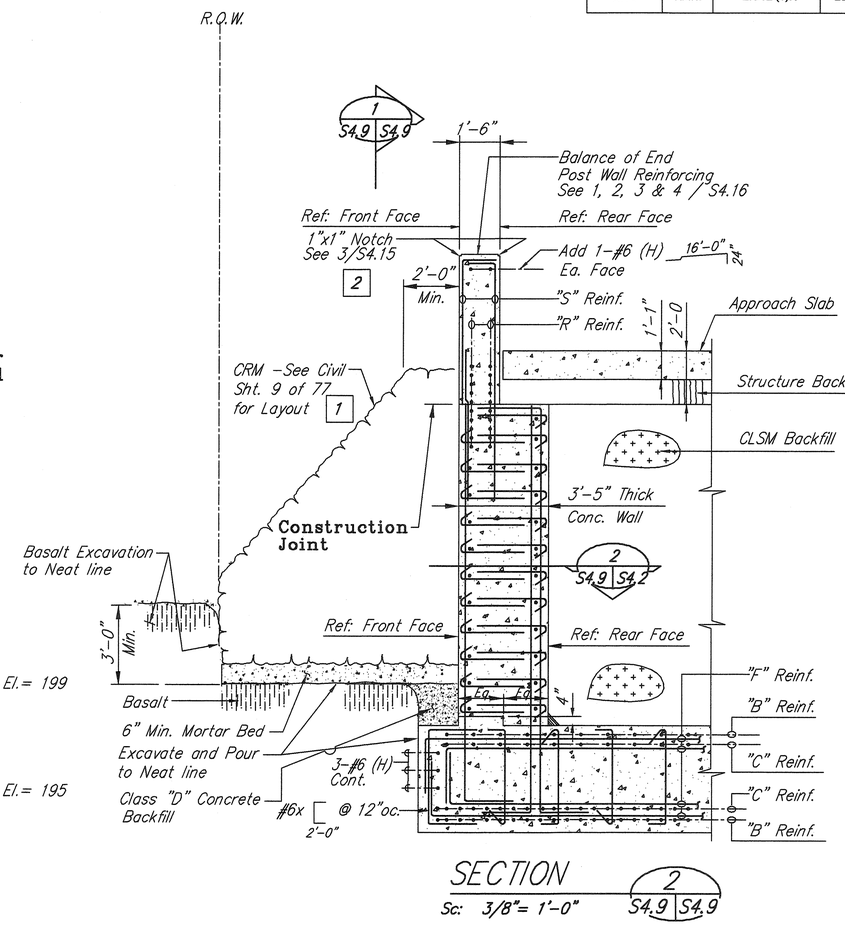
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	30	77



WINGWALL NO. 1 ELEVATION

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

(1 / S4.9 | S4.9)



SECTION

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

(2 / S4.9 | S4.9)

WINGWALL NO. 1 / END POST REINFORCING

MARK	FRONT FACE REINFORCING	REAR FACE REINFORCING
A thru P	Not Used	Not Used
Q	#9 @ 6" o.c. (H)	#9 @ 6" o.c. (H)
R	#9 @ 4" o.c. (H)	#9 @ 4" o.c. (H)
S	#4 @ 12" o.c. (V); #6 @ 6" o.c. (V); T.O.W.; Fin. Gr.; 24"; Elev. 207.42	#6 @ 6" o.c. (V); T.O.W.; Elev. 207.42
T	#4 @ 6" o.c. (V); #5 @ 6" o.c. (V); T.O.W.; Fin. Gr.; 24"; Bot. Varies	#6 @ 6" o.c. (V); T.O.W.; Bot. Varies
U	Same as "T"	#6 @ 6" o.c. (V) with #6 @ 6" o.c. (V) with #6 @ 6" o.c. (V); T.O.W.; Fin. Gr.; 36"; Bot. Varies
V thru Z	Not Used	Not Used

LEGEND FOR AS-BUILT POSTINGS

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~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

3/8"= 1'-0"

2 0 2 4FT

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DATE	DESCRIPTION
01-30-01	2 Added 1"x1" Notch References
01-30-01	1 Revised Sheet Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

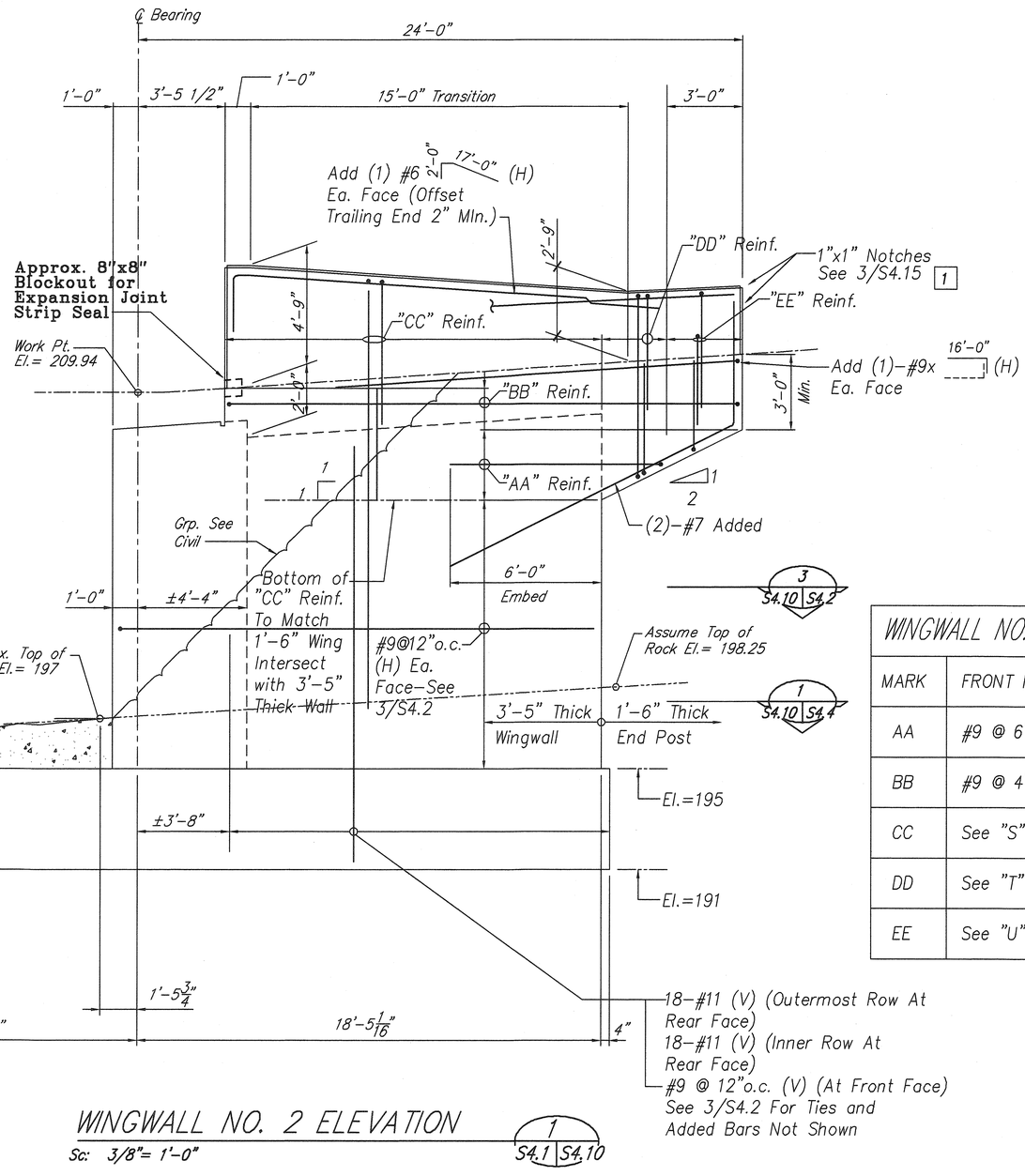
WINGWALL NO.1
ELEVATION and DETAILS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.9 OF 50 SHEETS

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	31	77



WINGWALL NO. 2 ELEVATION

1 S4.1 | S4.10

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

WINGWALL NO. 2 /END POST REINFORCING

MARK	FRONT FACE REINF.	REAR FACE REINF.
AA	#9 @ 6"o.c. (H)	#10 @ 4"o.c. (H)
BB	#9 @ 4"o.c. (H)	#10 @ 4"o.c. (H)
CC	See "S" At S4.9	See "S" At S4.9
DD	See "T" At S4.9	See "T" At S4.9
EE	See "U" At S4.9	See "U" At S4.9

3/8"= 1'-0" 2 0 2 4FT

LEGEND FOR AS-BUILT POSTINGS

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~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	1 Added 1"x1" Notch Reference

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WINGWALL NO.2 ELEVATION and DETAILS
MAMALAHOA HIGHWAY
REPLACEMENT OF KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

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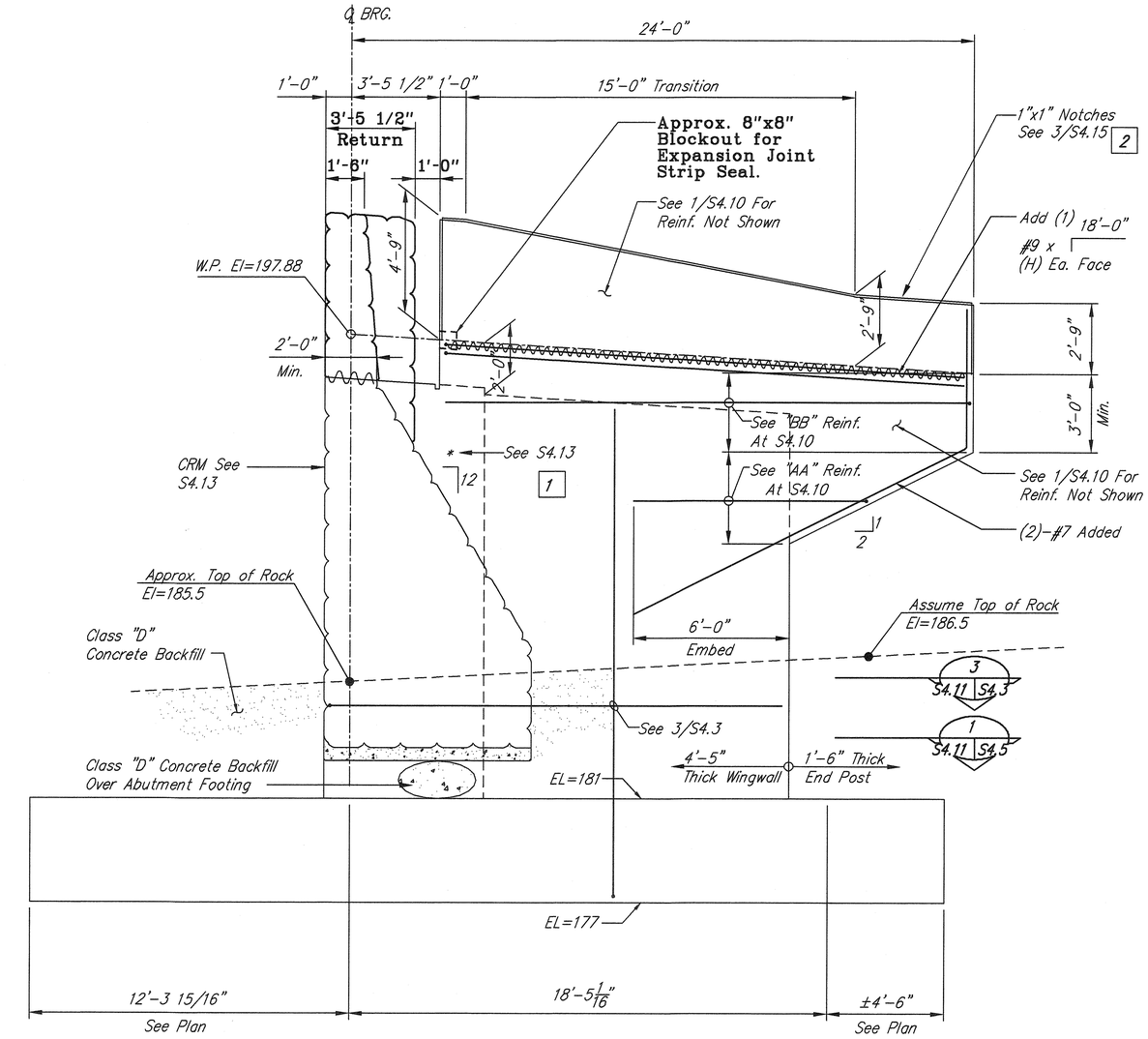
SHEET No. S4.10 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	32	77



WINGWALL NO.3 ELEVATION (1 / S4.1 | S4.11)

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

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

LEGEND FOR AS-BUILT POSTINGS

∿∿∿	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE		DESCRIPTION
01-30-01	2	Added 1"x1" Notch Reference
01-30-01	1	Coordinate CRM Slope Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WINGWALL NO.3

ELEVATION and DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.11 OF 50 SHEETS

2 0 2 4FT
SCALE: 3/8"= 1'-0"

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LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

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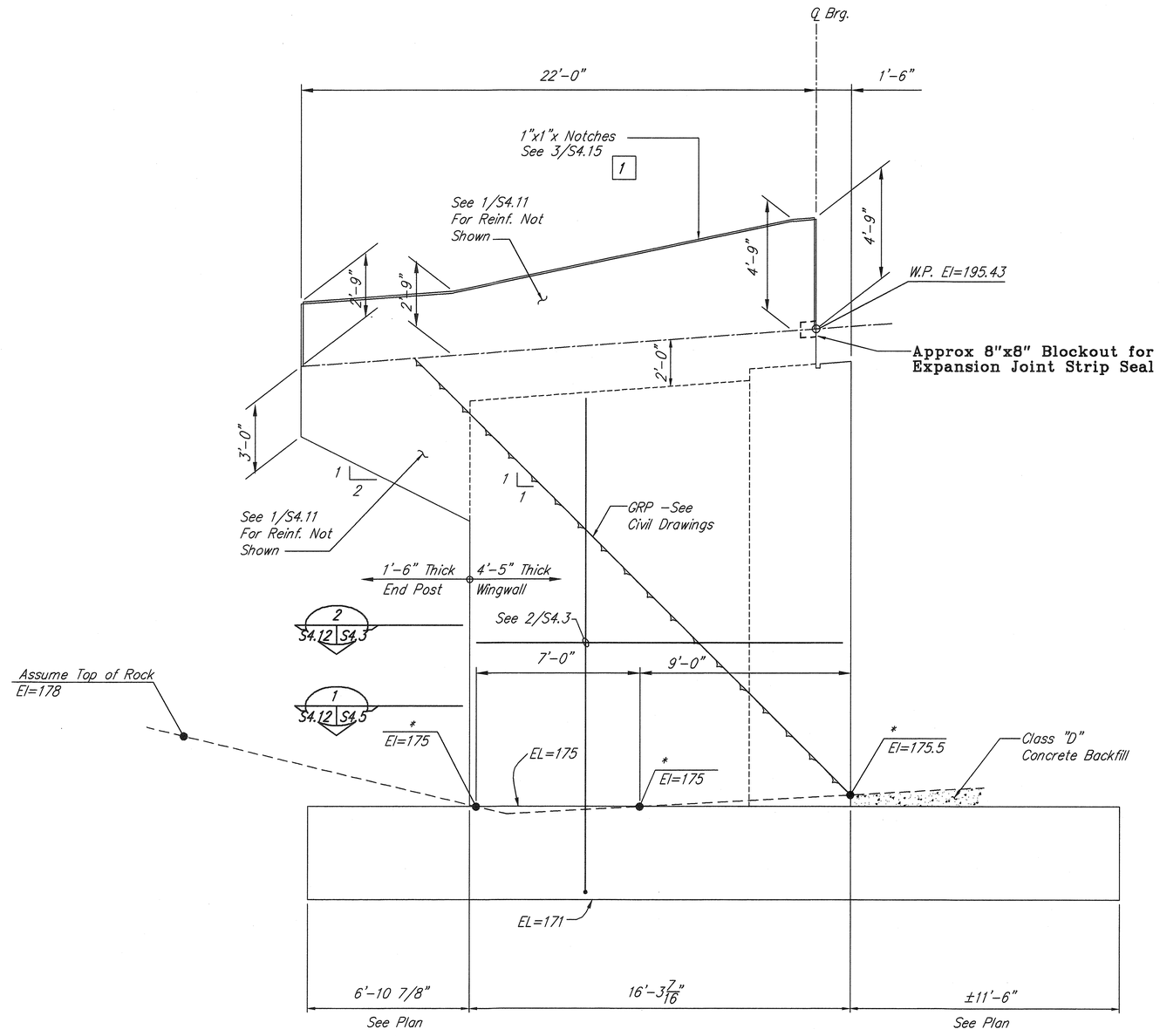
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	33	77



WINGWALL NO.4 ELEVATION

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

1
S4.1 S4.12

3/8"= 1'-0"

2 0 2 4FT

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	1 Added 1"x1"x Notch Reference

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WINGWALLS NO.4 ELEVATION
and DETAILS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.12 OF 50 SHEETS

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HAWAII, U.S.A.

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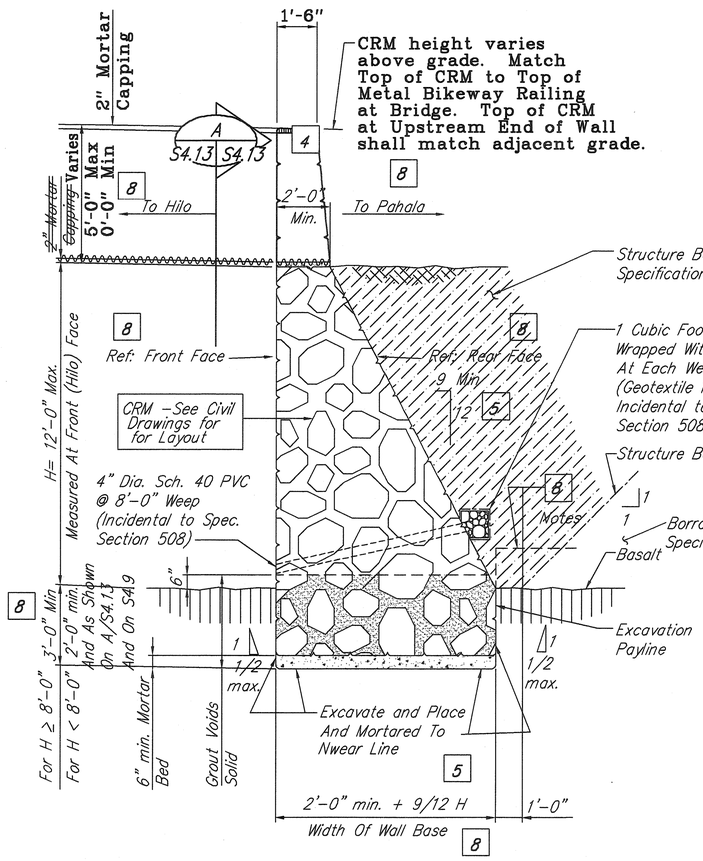
ORIGINAL PLAN | NOTE BOOK | No. ____
SURVEY PLOTTED BY ____ DATE ____
DRAWN BY ____
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____

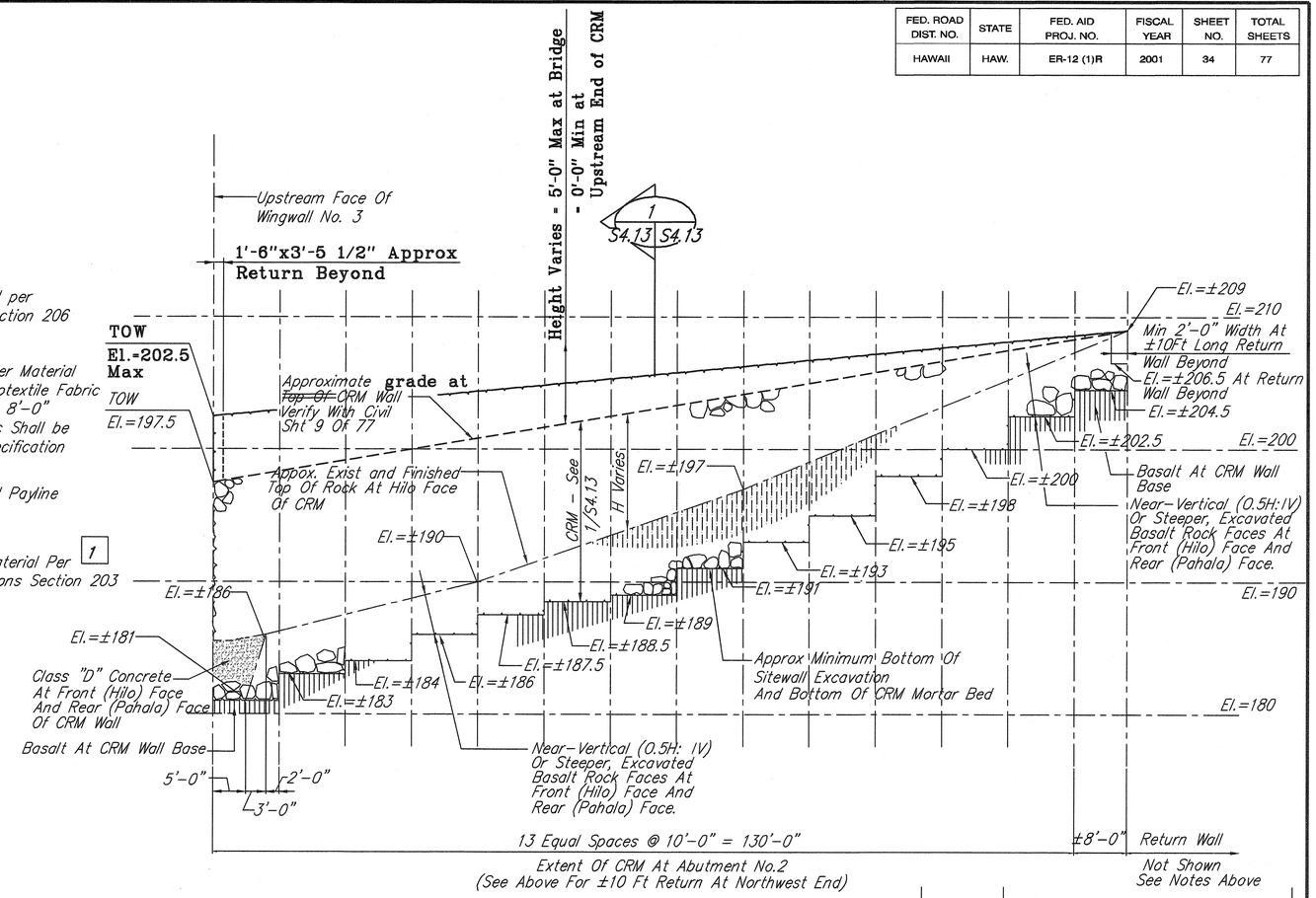
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	34	77



SITEWALL SECTION

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

1 S4.13 S4.13



Note:
1. Sitewall Shall Be Embedded In Basalt.
2. Assumed Basalt (Top Of Rock) Configuration Is Based Upon The Owner's Topographic Survey Made Prior To Detour Road Construction.
3. Weeps Not Shown - See 1/S4.13
4. Construction Sequence - See Specificationss, Special Provisions, Civil Sheet 9 To 77, Stage 9 Notes At S11.1 And Embankment BMP Sheet 77 Of 77.

SITEWALL ELEVATON AT ABUTMENT NO.2

Scale: Horizontal 3/32" = 1'-0"
Vertical 3/16" = 1'-0"

A S4.13 S4.13

6

Notes:

1. 3 Indicates Zone of CRM With All Beds, Joints and Voids Filled Solid With Portland Cement Mortar To The Basalt Excavation Faces 7
2. See Civil Sht. 9 of 77 For CRM Wall Layout.
3. See S4.9 For CRM Sitewall Configuration At Wingwall No.1.
4. The CRM Wall Base Shall Be Level And Embedded In Basalt 2'-0" min. (For H<8'-0") And 3'-0" min. (For H≥ 8'-0"). The Wall Base Shall Be Stepped At Intervals Approximately Equal to The Width Of The Wall Base And As Indicated At S4.9 And A/S4.13. Steps Shall Be Adjusted To Step 4'-0" Maximum. 2
5. 8 At CRM Sitewall At Abutment NO.2 (See A/S4.13), The Rear (Pahala) Face Top Of Basalt Elevation Is Expected To Be Greater Than That At The Front (Hilo) Face.

DATE	DESCRIPTION
01-30-01	8 Added reference Notes @ 1/S4.13
01-30-01	7 Revised Sheet Reference
01-30-01	6 Added Detail A/S4.13
01-30-01	5 Revised CRM Slope At 1/S4.13
01-30-01	4 Added Detail Mark A/S4.13 At Detail 1/S4.13
01-30-01	3 Clarified Note 1 At Detail 1/S4.13
01-30-01	2 Revised Maximum Step @ Note 4 At Detail 1/S4.13
01-30-01	1 Added Note Re: Borrow At 1/S4.13

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

SCALE: 3/32"= 1'-0" 8 4 0 8 16FT
SCALE: 3/16"= 1'-0" 4 0 4 8FT
SCALE: 3/8"= 1'-0" 2 0 2 4FT

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WINGWALL and SITEWALL DETAILS

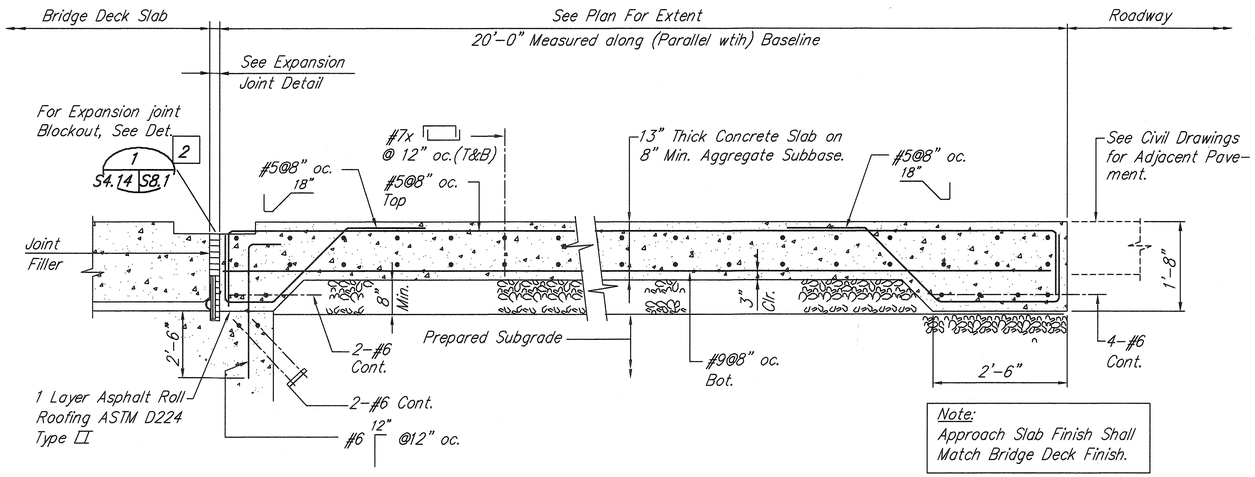
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.13 OF 50 SHEETS

AS-BUILT

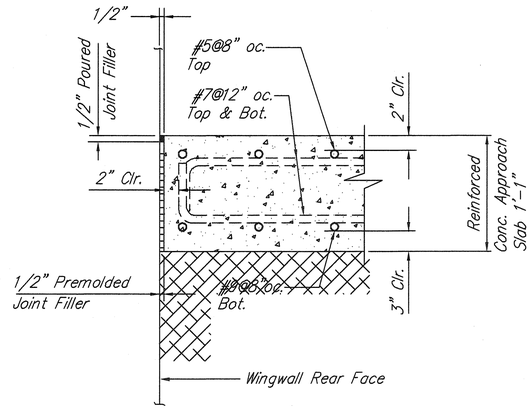
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	35	77



TYPICAL APPROACH SLAB DETAIL

1 S4.14 | S4.14

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

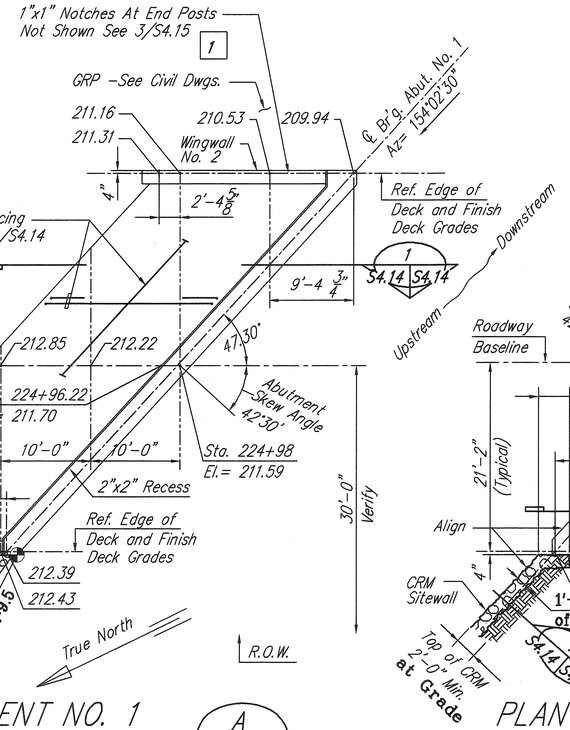


Note: See 1 S4.14 | S4.14 for Reinforcing

TYPICAL JOINT DETAIL AT CONCRETE RAIL

2 S4.14 | S4.14

Not to Scale

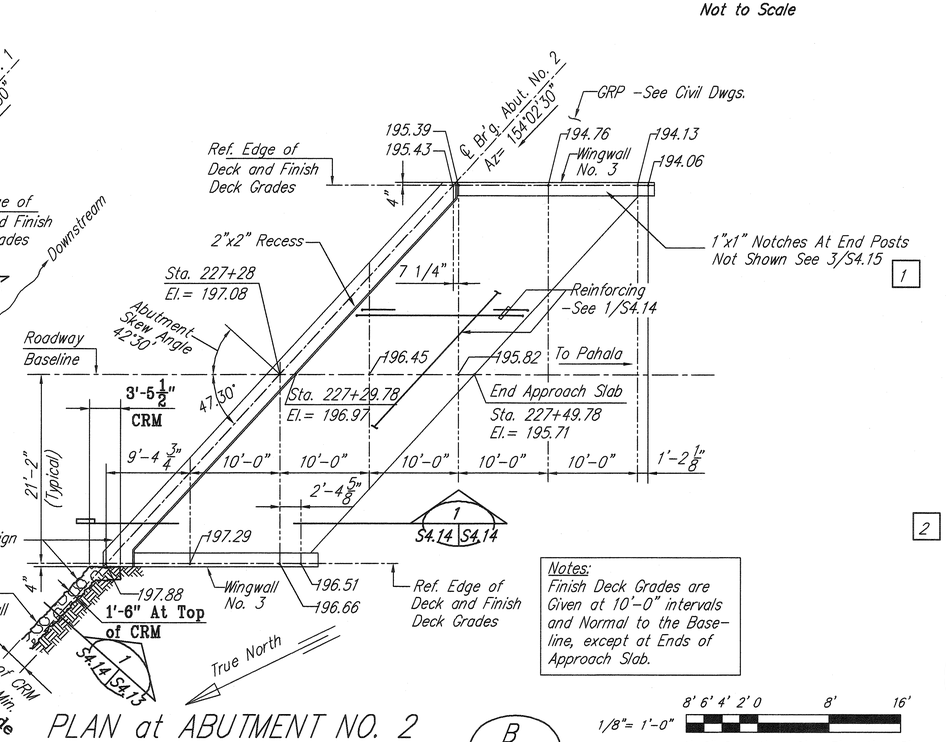


Notes:
Finish Deck Grades are Given at 10'-0" intervals and Normal to the Base-line, except at Ends of Approach Slab.

PLAN at ABUTMENT NO. 1 APPROACH SLAB

A S4.14 | S4.14

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



Notes:
Finish Deck Grades are Given at 10'-0" intervals and Normal to the Base-line, except at Ends of Approach Slab.

PLAN at ABUTMENT NO. 2 APPROACH SLAB

B S4.14 | S4.14

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	DESCRIPTION
01-30-01	2 Clarified Expansion Joint Reference At 1/S4.14
01-30-01	1 Added 1"x1" Notch Reference

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

1/8"= 1'-0" 8' 6' 4' 2' 0 8' 16'
1/2"= 1'-0" 1' 6" 0 1' 2' 3' 4' 5'
3/4"= 1'-0" 1' 6" 0 1' 2' 3'

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

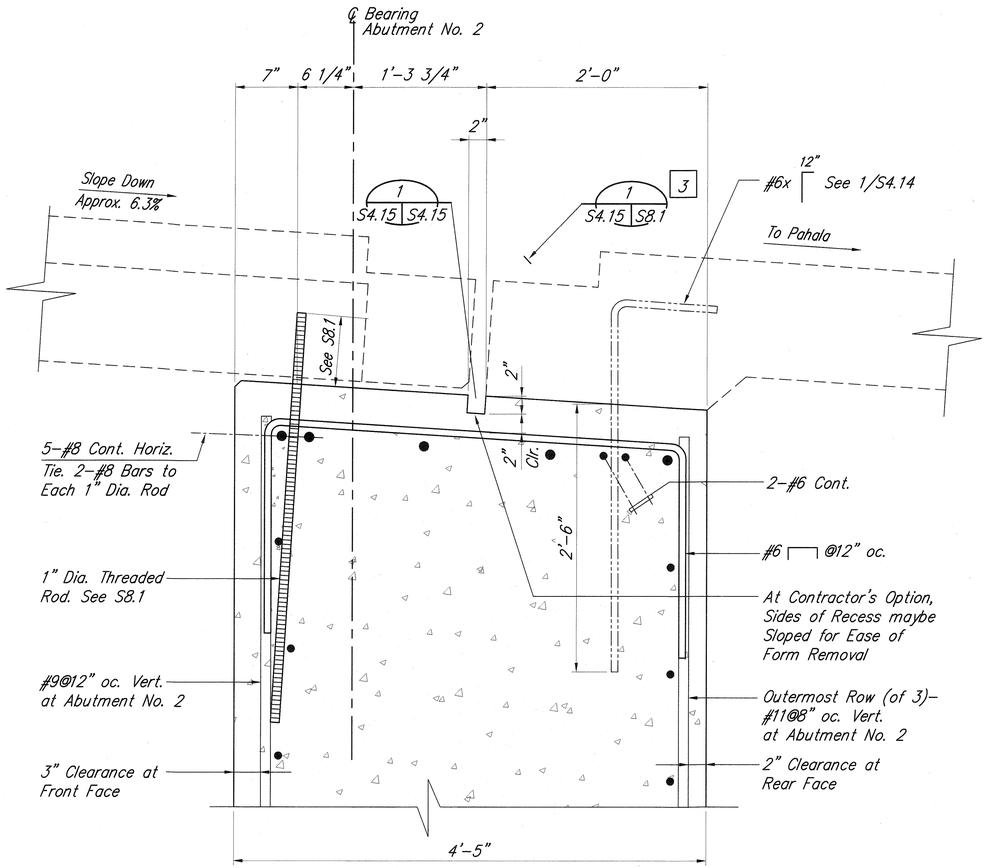
APPROACH SLAB DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.14 OF 50 SHEETS

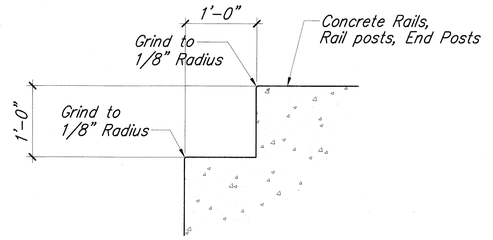
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	36	77



ABUTMENT NO. 2 SECTION AT 2"x2" CONT. RECESS

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

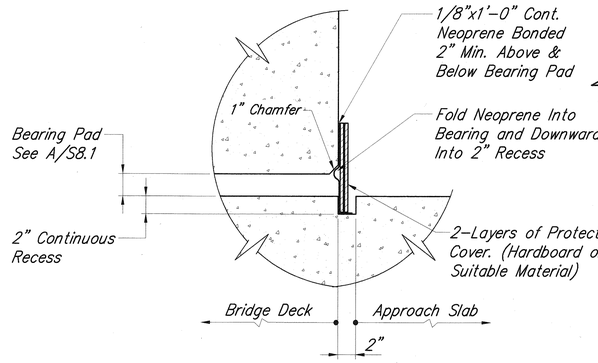
A
S4.15 S4.15
S4.14



3
S4.15 S4.15
2

1"x1" NOTCH DETAIL

Full Size

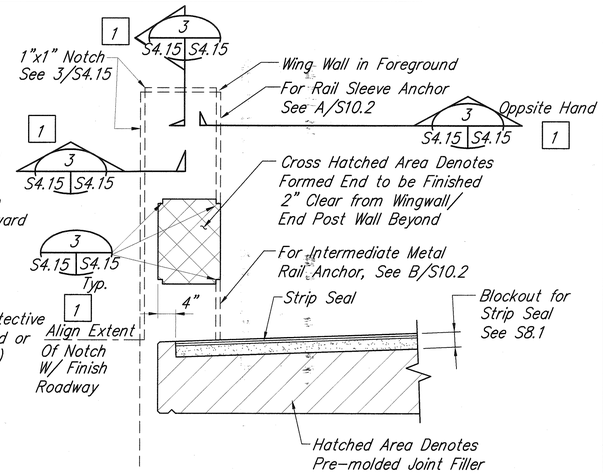


Note: At Engineers Option, Only Neoprene and Hard board May Be Omitted At Abutment No. 2 only.

TYP. WATERPROOFING STRIP DETAIL

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

1
S4.15 S4.15



TYP. EXPANSION JOINT DETAIL AT RAILS

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

2
S4.15 S4.15

DATE	DESCRIPTION
01-30-01	3 Coordinated Reference Detail At Detail A/S4.15
01-30-01	2 Added 1"x1" Notch Detail 3/S4.15
01-30-01	1 Added 1"x1" Notch At Rail End Post At Detail 2/S4.15

Notch Notes:

1. 1"x1" Corner Notches Shall Be Provided At All Corners Of Concrete Bridge Rails, Bridge Rail Posts And Including Top And Vertical Faces Of Concrete End Posts (Except At Vertical Face Of End Post Where Metal Thrie Beam Connection Occurs).
2. All Outer Corners Of Notches Shall Be eased By Grinding to A Uniform, Continuous 1/8" Radius
3. Color And Texture Of Concrete Shall Match Adjacent Surface Color And Texture.
4. Damaged And Non-Uniform Surfaces Shall Be Patched So As To Comply With Note 3 Above. - Or As Directed By The Engineer.

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

3/4"= 1'-0" 1' 0 1' 2' 3'

1 1/2"= 1'-0" 0 6" 1' 2'

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LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

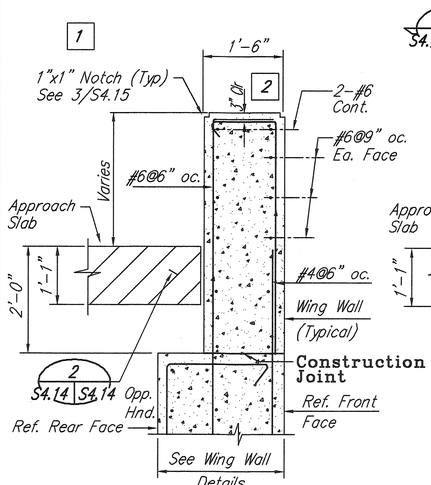
DECK JOINT DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

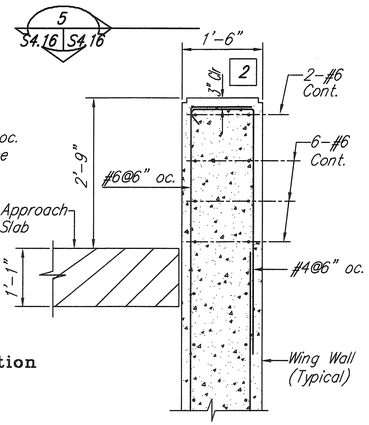
Scale: As Noted Date: January 2001

SHEET No. S4.15 OF 50 SHEETS

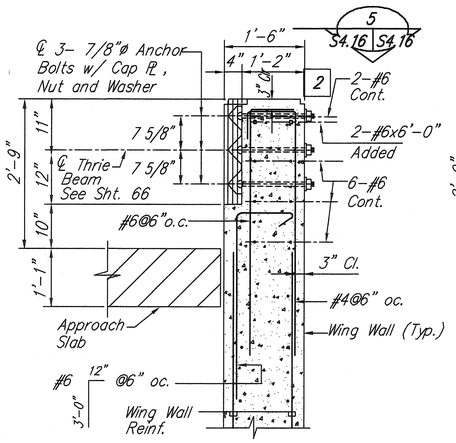
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12 (1)R	2001	37	77



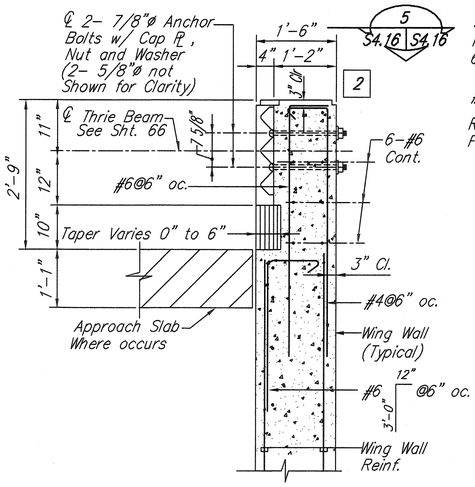
SECTION 1 S4.16 S4.16
Sc: 3/4"= 1'-0"



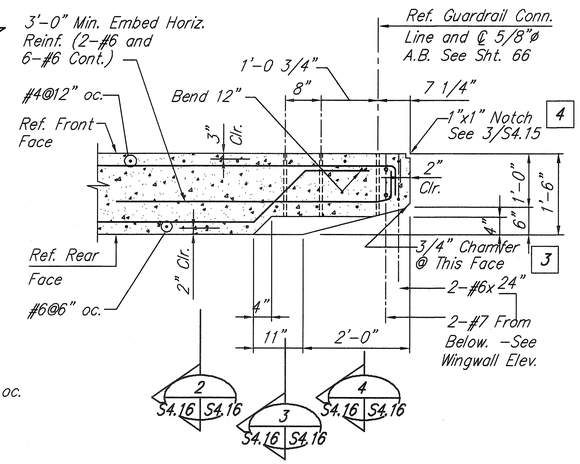
SECTION 2 S4.16 S4.16
Sc: 3/4"= 1'-0"



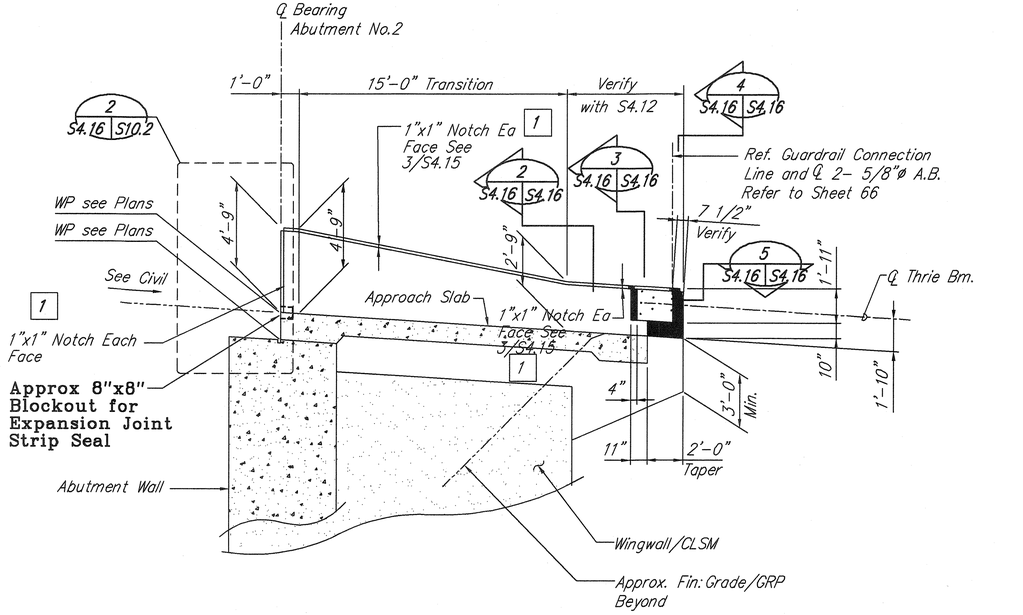
SECTION 3 S4.16 S4.16
Sc: 3/4"= 1'-0"



SECTION 4 S4.16 S4.16
Sc: 3/4"= 1'-0"



PLAN / DETAIL 5 S4.16 S4.16
Sc: 3/4"= 1'-0"



PARTIAL ELEVATION WINGWALL NO. 4 / END POST
A S4.16 S4.16
Sc: 1/4"= 1'-0"

Depressed "V" Letters 3/8" Deep
1/2"
3"
NAME DATE

Use Correct Name of Bridge — Date of Year built

NOTES:
1. Unless otherwise Directed by The Engineer, The Bridge Name and Date built shall be placed at the "Trailing" End Post on each side of the roadway.
2. Exact details and spacing of letter and figures and location shall be as directed by the Engineer. Gothic letters and figures approximating dimensions shown will be acceptable if approved by the Engineer.

TYPICAL DETAIL OF LETTERS AND FIGURES AT CONCRETE END POST

BRIDGE IDENTIFICATION DETAIL

Not to Scale

SC: 1/4"= 1'-0" 2 1 0 1 2 3 4FT

SC: 3/4"= 1'-0" 1 0 1 2FT

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE		DESCRIPTION
01-30-01	4	Added 1"x1" Notch Note At 5/S4.16
01-30-01	3	Added 3/4" Chamfer Note At Thrie Beam Face At 5/S4.16
01-30-01	2	Increased Reinforcing Cover At 1"x1" Notched Faces
01-30-01	1	Added 1"x1" Notch At End Post Detail A/S4.16

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

END POST DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Noted Date: January 2001

SHEET No. S4.16 OF 50 SHEETS

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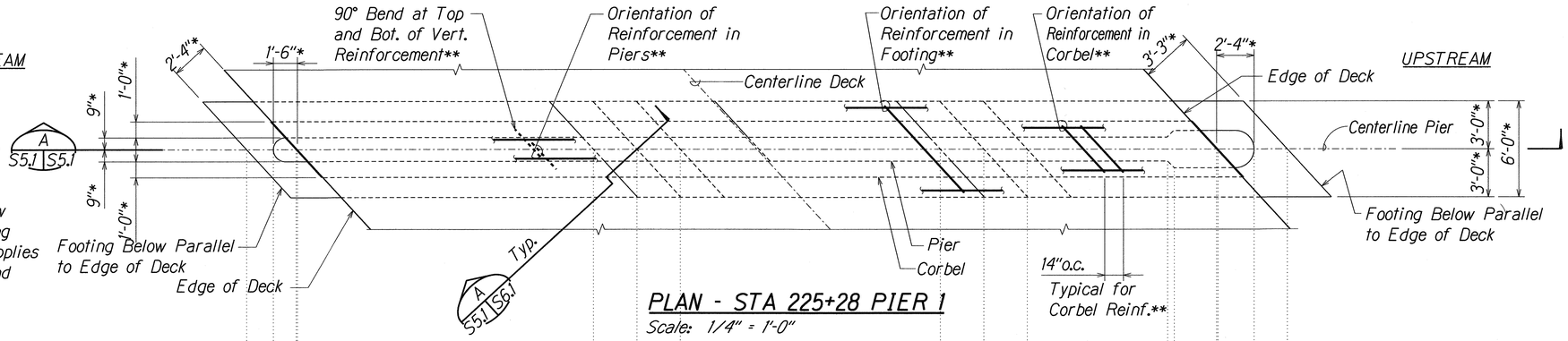
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE
NOTE BOOK | No.

AS-BUILT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	38	77

DOWNSTREAM



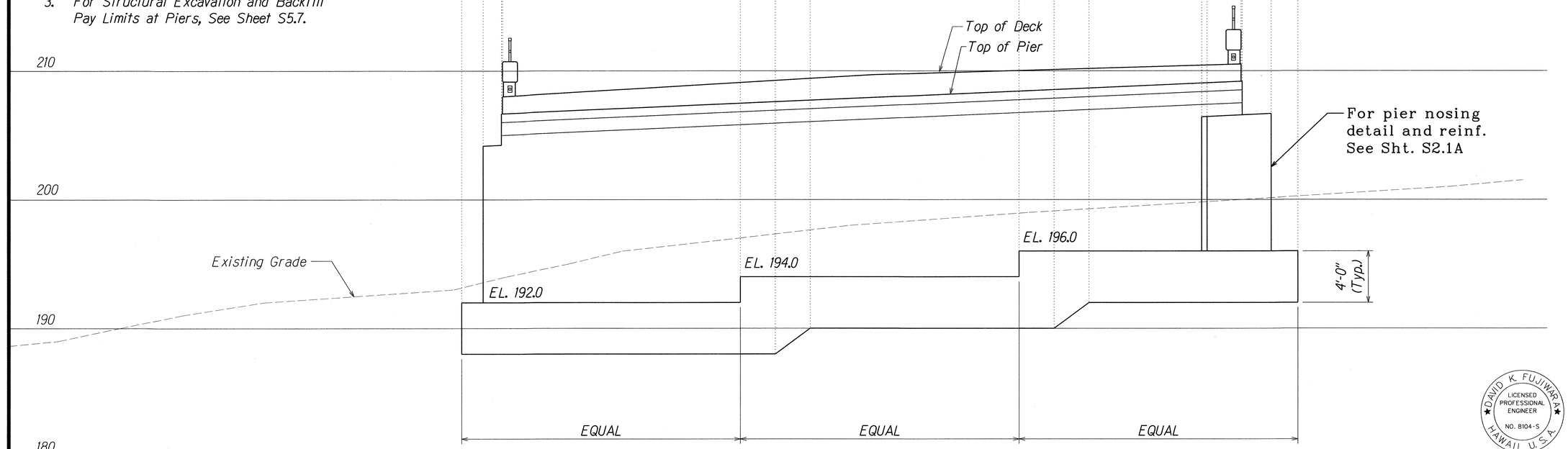
UPSTREAM

PLAN - STA 225+28 PIER 1

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

Notes:

1. All Dimensions (*) Typical to All Piers Unless Otherwise Noted.
2. Notes Designated by (**) Show Spacing for Corbel Reinforcing and Rebar Orientation, and Applies to all Piers. For Sections and Details Showing Reinforcing, See S6.* Series.
3. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.



SECTION - STA. 225+28 PIER 1

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

A S5.1 S5.1

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

∿∿∿∿	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

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David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND SECTION - PIER 1

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S5.1 OF 50 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 10/2000
	DRAWN BY KSF	
NOTE BOOK	TRACED BY KSF	
NO. KB-55 dgn	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

AS-BUILT

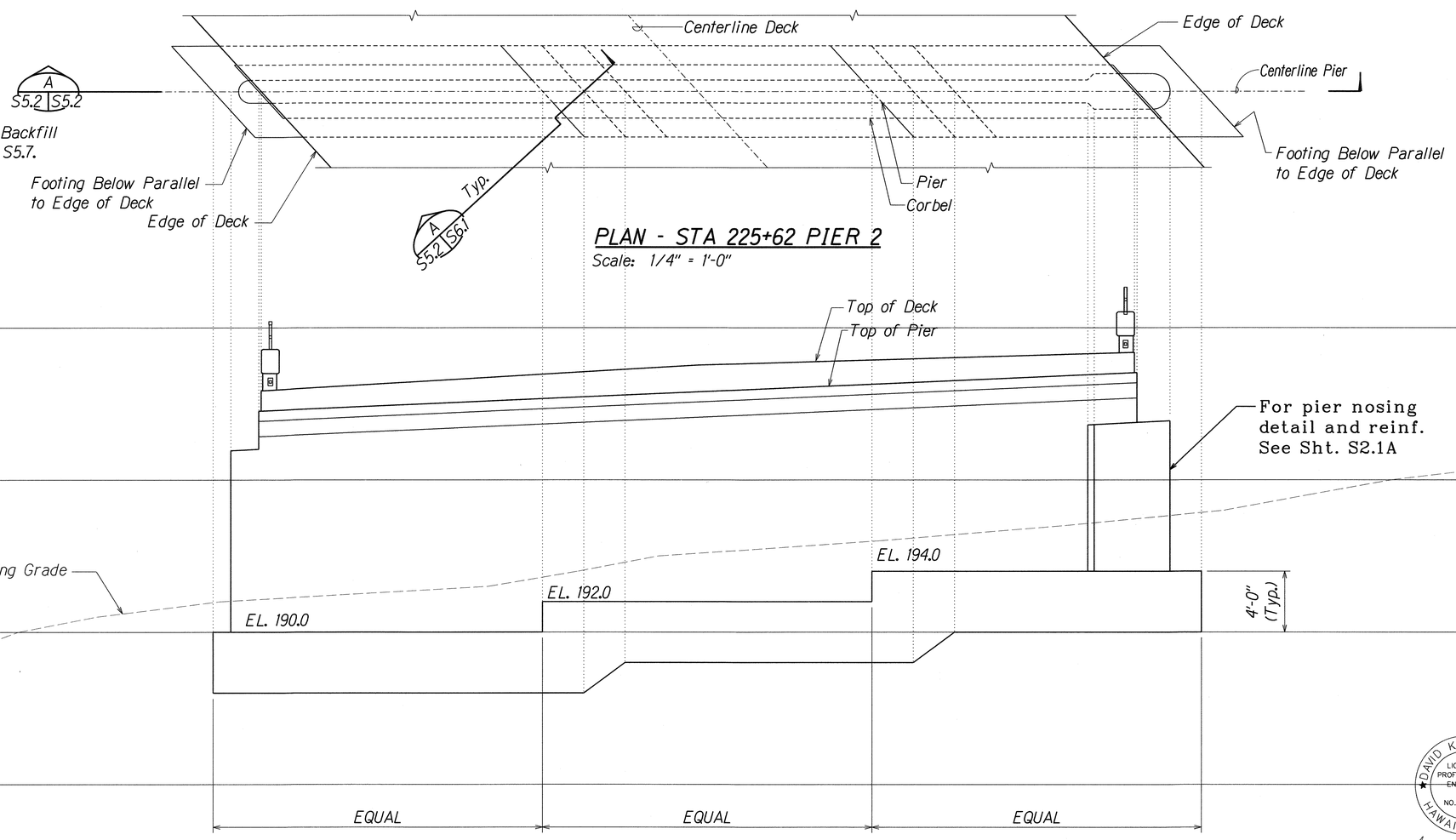
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	39	77

DOWNSTREAM

UPSTREAM

Notes:

1. For Dimensions and Notes, See Sheet S5.1.
2. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.



PLAN - STA 225+62 PIER 2

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

SECTION - STA 225+62 PIER 2 (A S5.2 | S5.2)

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

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

ORIGINAL PLAN — NOTE BOOK N/A SS2dgn

SURVEY PLOTTED BY — DATE 10/2000
DRAWN BY KSF
TRACED BY KSF
DESIGNED BY
QUANTITIES BY
CHECKED BY

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

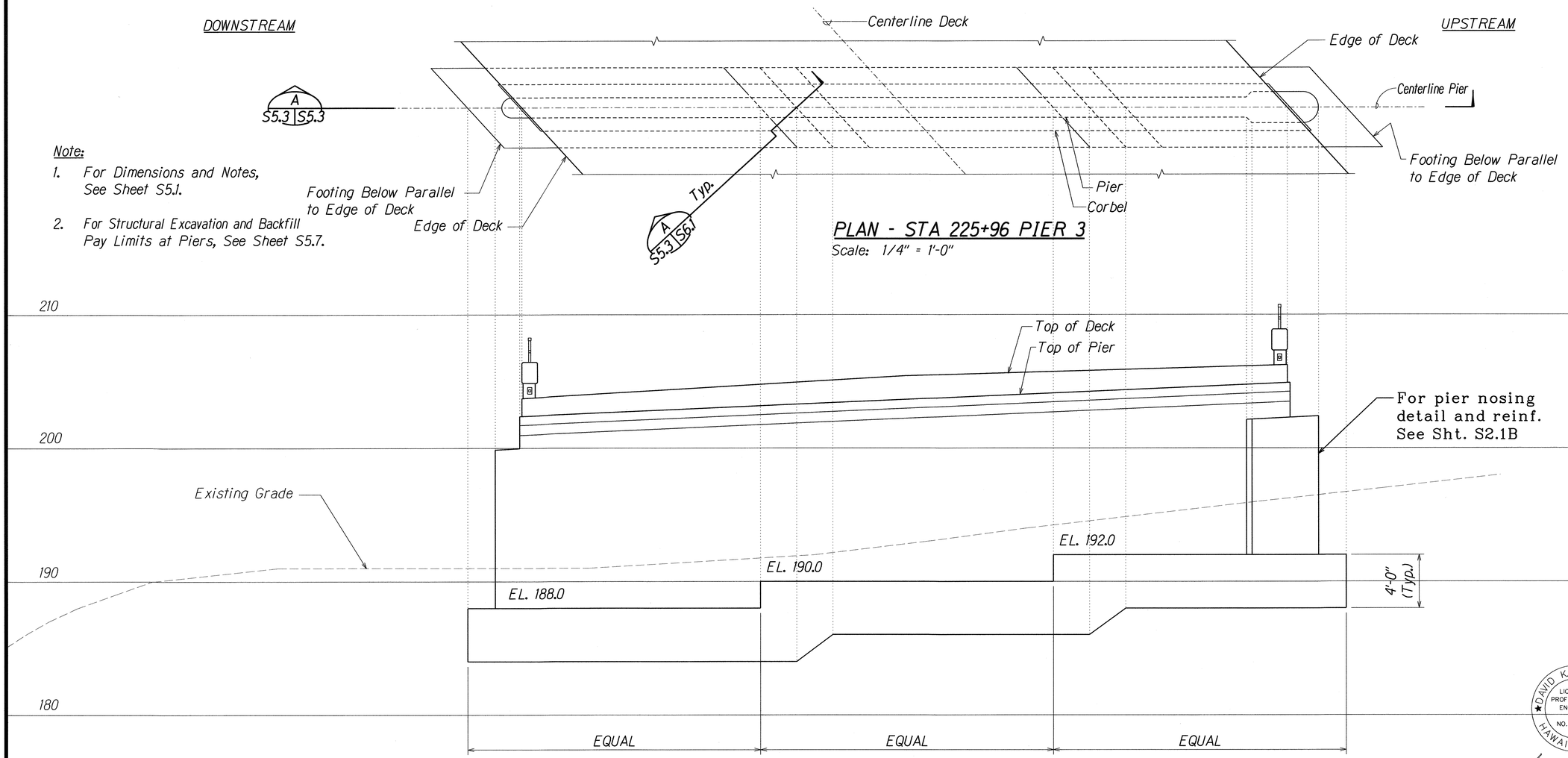
PLAN AND SECTION - PIER 2

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown — Date: January 2001

SHEET No. S5.2 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	40	77



PLAN - STA 225+96 PIER 3

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

Note:

1. For Dimensions and Notes, See Sheet S5.1.
2. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.

SECTION - STA 225+96 PIER 3

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

A S5.3 S5.3

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

~~^^^^~~	Squiggly line for as-built deletion
~~100.00~~	~~Double line for as-built deletion~~
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

ORIGINAL PLAN
NOTE BOOK KB-553.sgm
SURVEY PLOTTED BY
DRAWN BY ASF
TRACED BY
DESIGNED BY ASF
QUANTITIES BY
CHECKED BY
DATE 10/2000

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

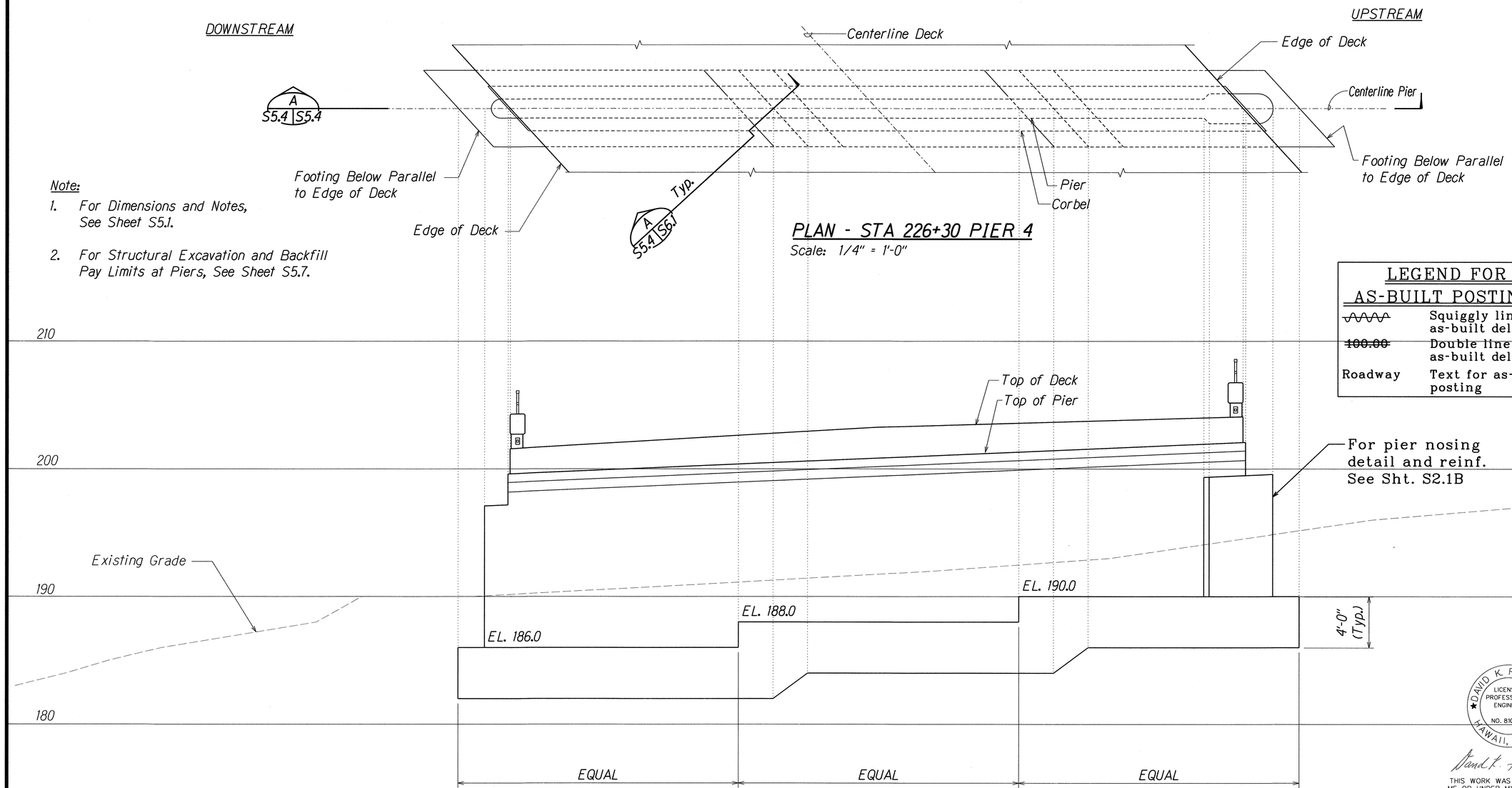
PLAN AND SECTION - PIER 3

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S5.3 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	41	77



Note:

1. For Dimensions and Notes, See Sheet S5.1.
2. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.

PLAN - STA 226+30 PIER 4

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

SECTION - STA 226+30 PIER 4 (A S5.4 | S5.4)

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

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 10/1/2000
NOTE BOOK KFB-S54(60)	DRAWN BY JST	
	TRACED BY	
	DESIGNED BY KSF	
	QUANTITIES BY	
	CHECKED BY	

DATE	REVISION
02-15-07	As Built - Revised Detail

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David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND SECTION - PIER 4

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S5.4 OF 50 SHEETS

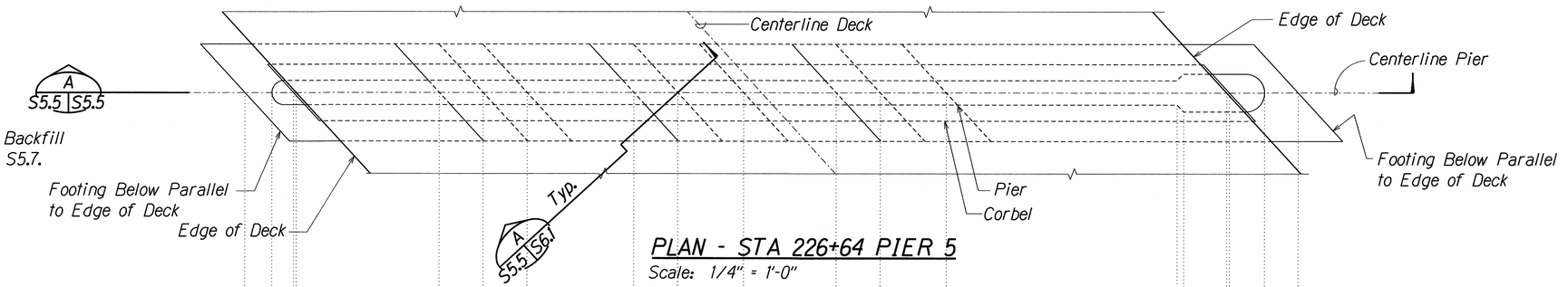
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	42	77

DOWNSTREAM

UPSTREAM

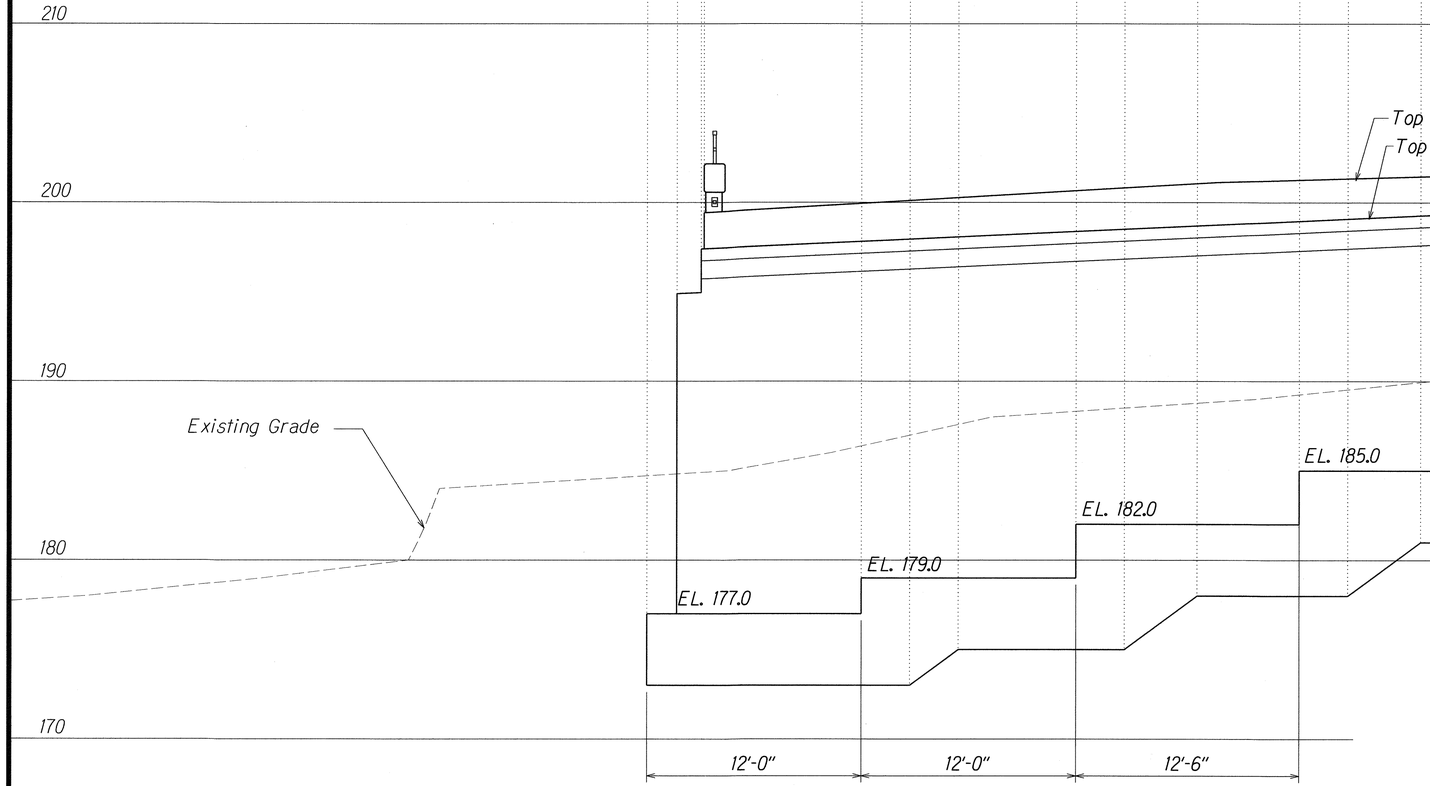
Notes:

1. For Dimensions and Notes, See Sheet S5.1.
2. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.



PLAN - STA 226+64 PIER 5

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



SECTION - STA 226+64 PIER 5 (A S5.5 | S5.5)

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

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail
12-20-00	1 Modified Note.
12-20-00	2 Added Notes.
12-20-00	3 Modified Drawn Dimensions of Steps. Added Section Mark.
12-20-00	4 Modified Footing Elevations and Drawn Dimensions of Steps.

ORIGINAL PLAN

SURVEY PLOTTED BY — DATE 10/1/2000
DRAWN BY KSF
TRACED BY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY

NOTE BOOK
KB-S55.dgn

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

David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND SECTION - PIER 5

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown — Date: January 2001

SHEET No. S5.5 OF 50 SHEETS

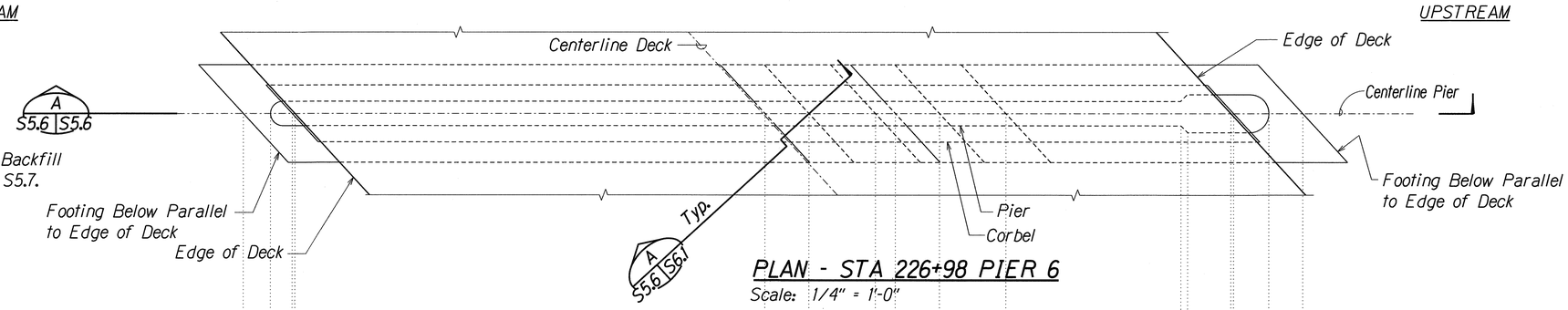
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	43	77

DOWNSTREAM

UPSTREAM

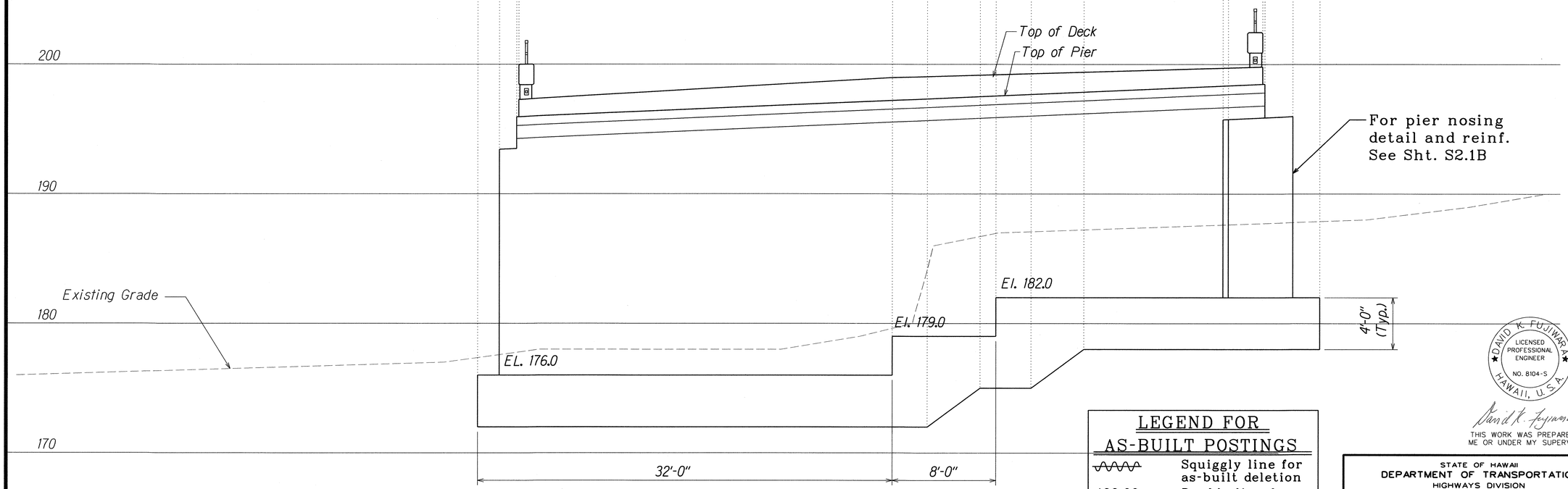
Notes:

1. For Dimensions and Notes, See Sheet S5.1.
2. For Structural Excavation and Backfill Pay Limits at Piers, See Sheet S5.7.



PLAN - STA 226+98 PIER 6

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



SECTION - STA 226+98 PIER 6

A S5.6 | S5.6

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

GRAPHIC SCALE:

4' 2' 0 4' 8'

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND SECTION - PIER 6

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

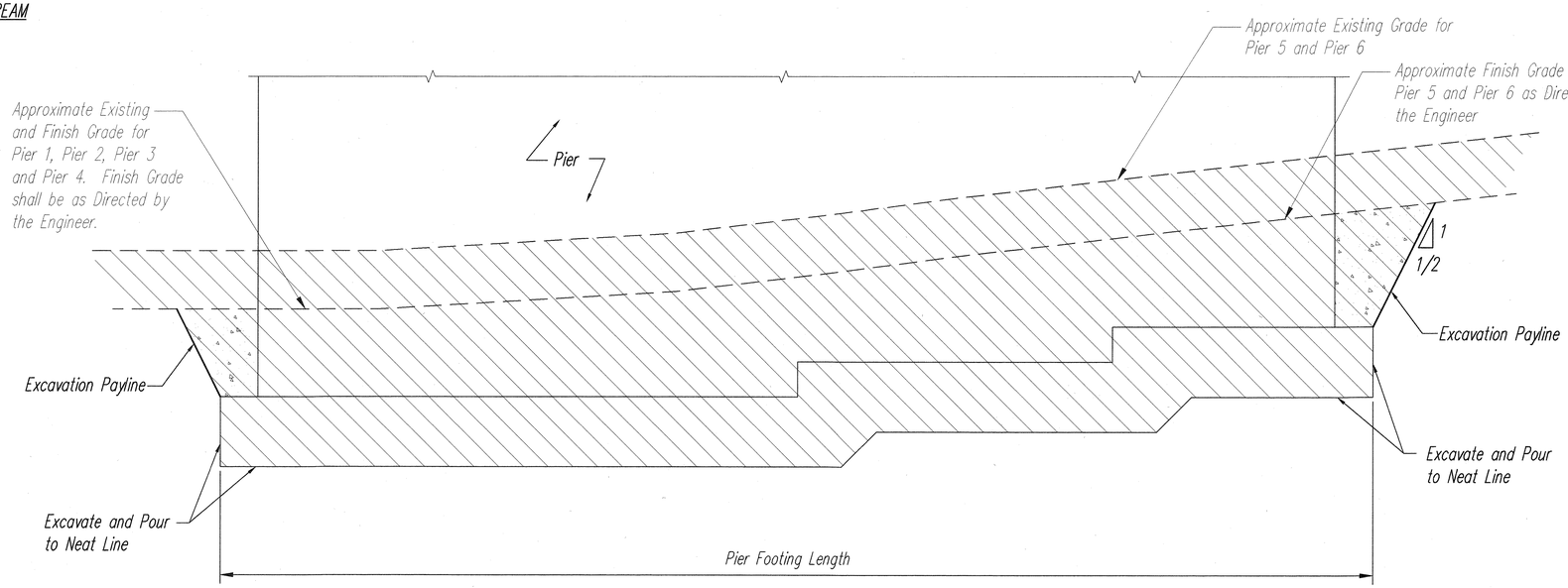
SHEET No. S5.6 OF 50 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 10/1/2000
	DRAWN BY JSF	
NOTE BOOK	TRACED BY	
KB-556 pp	DESIGNED BY JSF	
	QUANTITIES BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	44	77

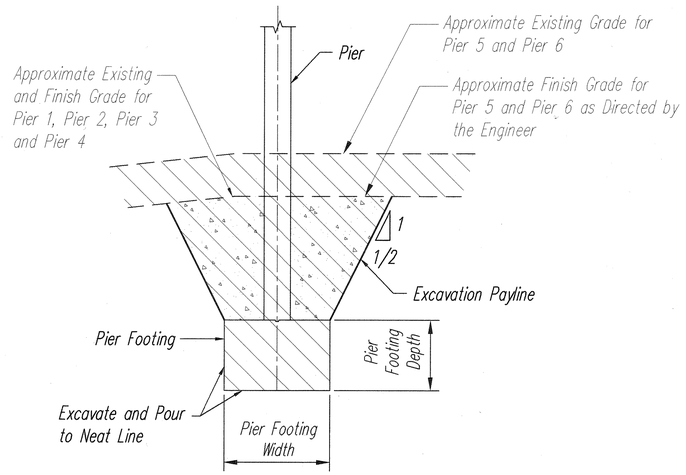
DOWNSTREAM

UPSTREAM



LEGEND:

- Structural Excavation
- Class "D" Concrete Backfill



SECTION – EXCAVATION PAYLIMITS (B) S5.7 | S5.7
Scale: 1/4" = 1'-0"

EXCAVATION PAYLIMITS (A) S5.7 | S5.7
Scale: 1/4" = 1'-0"

NOTES:

1. Excavations for footings in basalt rock formation (including fractured rock and clinker materials) shall be kept to near-vertical (0.5H:1V or steeper). Inadvertent over-excavations by the Contractor shall be cleaned of loose and fractured rock to expose intact rock. Concrete for the final footing shall be poured in contact with the sides of the excavation for the full designed footing thickness. The resulting void space above the top of footing shall be backfilled with Class D concrete. Backfilling the inadvertent over-excavations with footing concrete or Class D concrete will not be measured and paid for separately.
2. All footing excavations shall be cleaned of loose materials and highly fractured rock to the satisfaction of the Engineer.
3. The Engineer may direct the Contractor to over-excavate below the bottom of footing elevation and to the sides of the edges of the footing excavation. The addtional over-excavation of the footing excavations, as directed by the Engineer, will be measured and paid for as structure excavation as indicated in the specifications.
4. The additional over-excavation as directed by the Engineer below the bottom of footing elevation shall be back-filled with Class D concrete. This item will be measured and paid for as Structure Backfill for Pier Footing (Class D concrete). Concrete for the final footing may be poured at least 3 days after the Class D concrete backfill pour. [1]
5. Excavation and backfill shall follow the Construction Sequence and requirements including BMPs on sheet S11.1. [2]

GRAPHIC SCALE:
4' 2' 0 4' 8'
SCALE: 1/4" = 1'-0"

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

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DATE	DESCRIPTION
01-29-01	1 Change in the Notes
01-29-01	2 Added Note

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

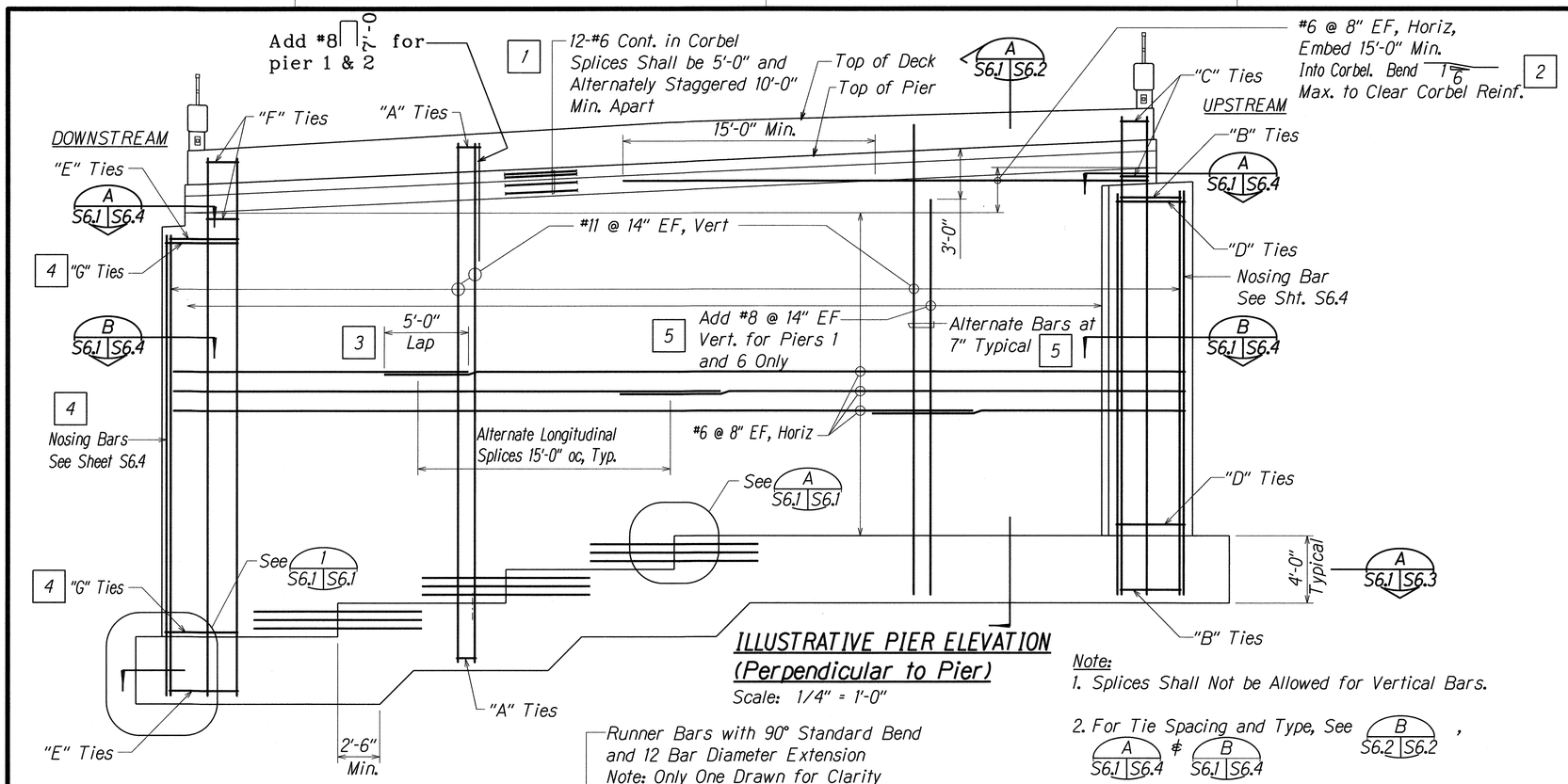
STRUCTURAL EXCAVATION AND BACKFILL PAY LIMITS AT PIERS
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S5.7 OF 50 SHEETS

ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY VSY DATE NOV2000
TRACED BY
DESIGNED BY KSF
NOTE BOOK
QUANTITIES BY
No. CHECKED BY

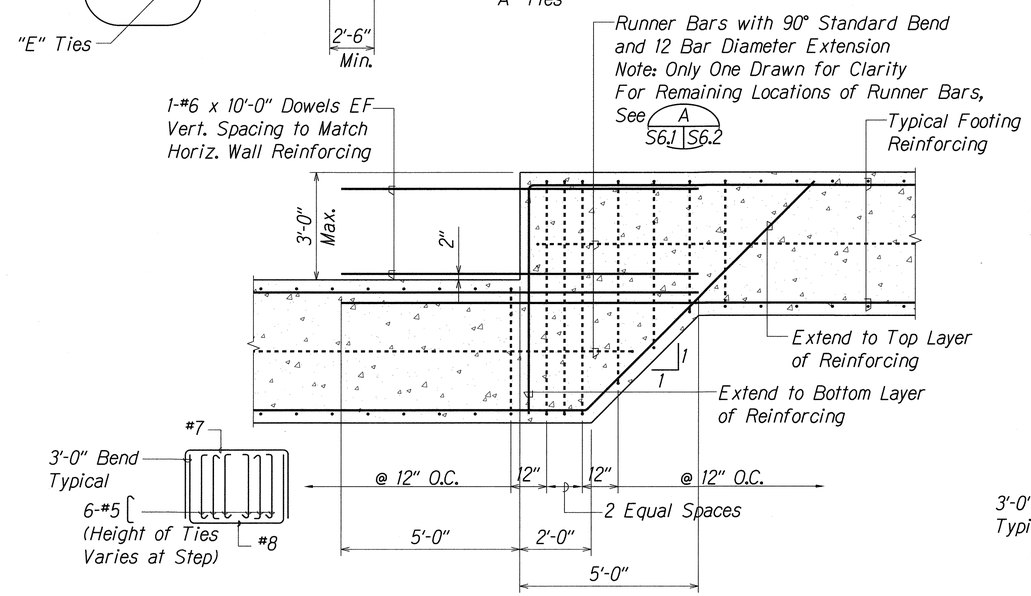
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	45	77



ILLUSTRATIVE PIER ELEVATION (Perpendicular to Pier)

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

Note:
1. Splices Shall Not be Allowed for Vertical Bars.
2. For Tie Spacing and Type, See A S6.1 | S6.4 & B S6.1 | S6.4 , B S6.2 | S6.2

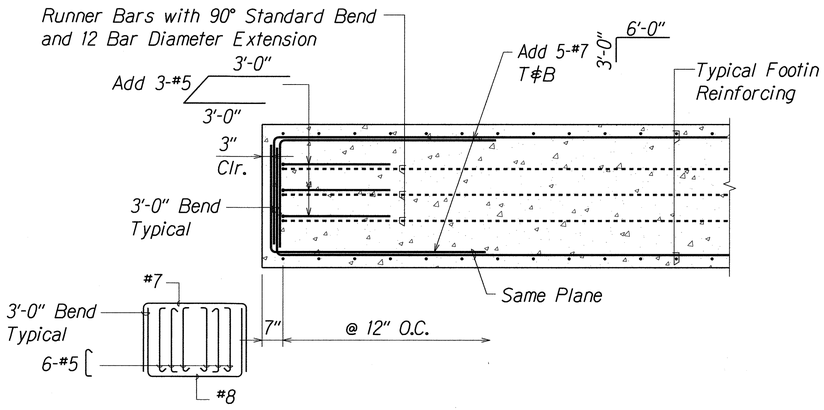


SECTION - TYPICAL STEP DETAIL

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

A S6.1 | S6.1

S5.1, S5.2, S5.3, S5.4, S5.5, S5.6



TYPICAL END CONDITION

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

1 S6.1 | S6.1

LEGEND FOR AS-BUILT POSTINGS	
∿∿∿	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

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

David K. Fujiwara

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DATE	REVISION
02-15-07	As Built - Revised Detail
01-29-01	1 Modified Cont. Reinf. in Corbel
01-29-01	2 Clarified Horiz. Reinf.
01-29-01	3 Changed Lap Length
01-29-01	4 Added "G" Ties and Nosing Bars at Downstream End
01-29-01	5 Added Vert. Reinf. for Piers 1 and 6 Only

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 10/2000
	DRAWN BY JST	
NOTE BOOK	TRACED BY	
	DESIGNED BY KSF	
N/B-56.dgn	QUANTITIES BY	
	CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

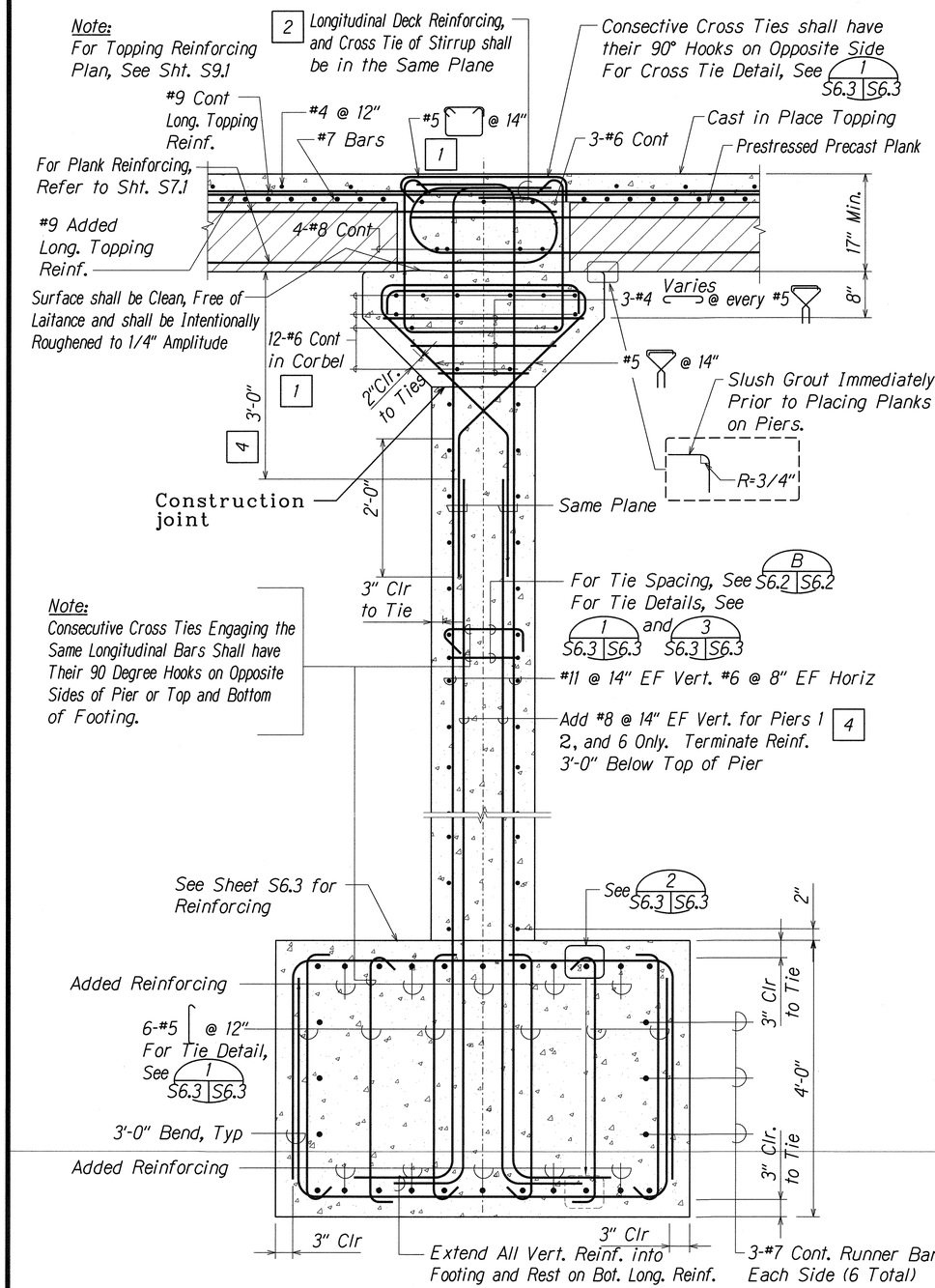
TYPICAL PIER ELEVATION AND DETAILS

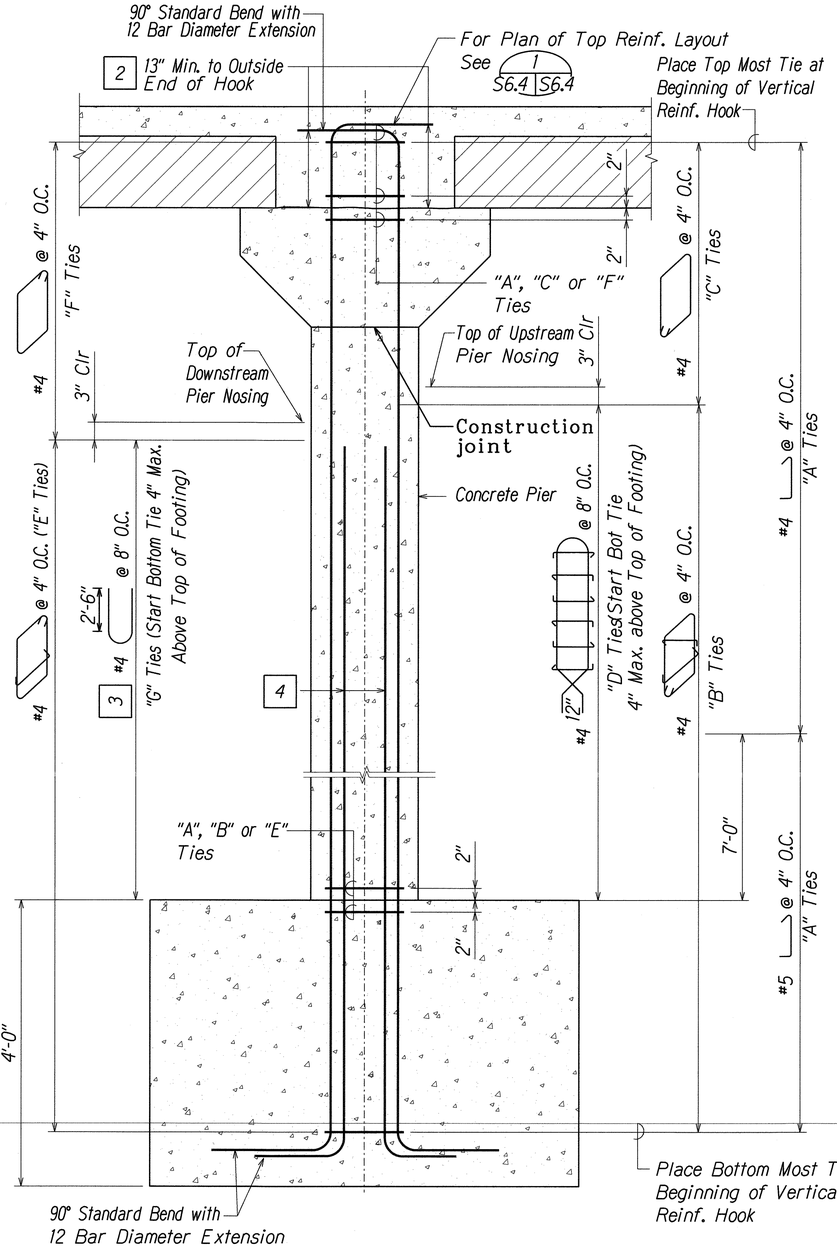
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S6.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	46	77





Notes:

1. For Types "A", "B", "C", "D", "E" and "F" Ties, See Sht. S6.4
2. For Tie Details, See 1 S6.3 | S6.3 and 3 S6.3 | S6.3

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

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David K. Fujiwara

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GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

DATE	REVISION
02-15-07	As Built - Revised Detail
01-29-01	1 Modified Corbel Reinf.
01-29-01	2 Clarified dimension of Vert. Pier Reinf. from Top of Pier to Outside End of Hook
01-29-01	3 Added "G" Ties
01-29-01	4 Added Vert. Reinf. for Piers 1 and 6 Only

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PIER SECTION

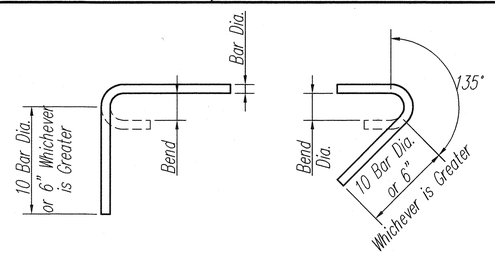
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

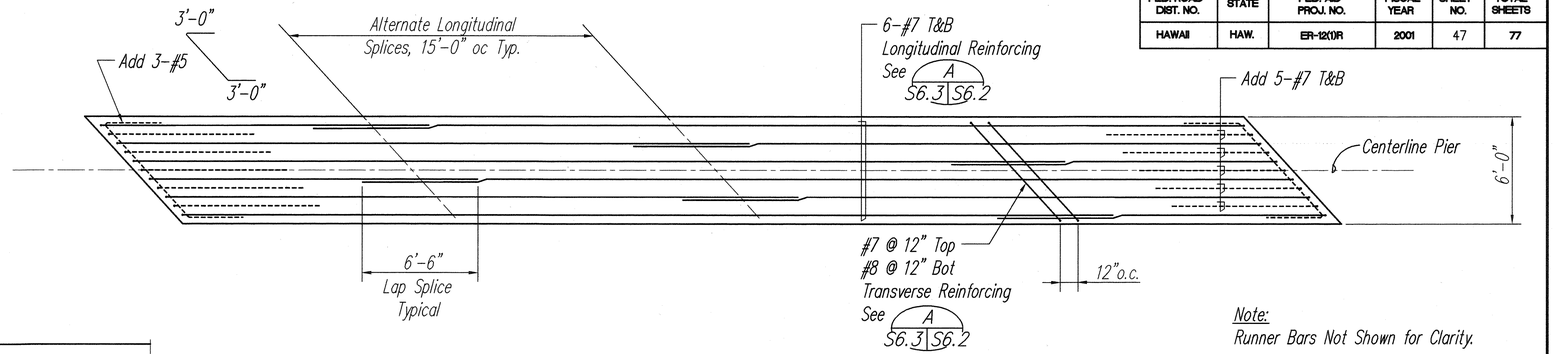
SHEET No. S6.2 OF 50 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY JSF	
NOTE BOOK	TRACED BY	
	DESIGNED BY JSF	
KB-562.dgn	QUANTITIES BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	47	77

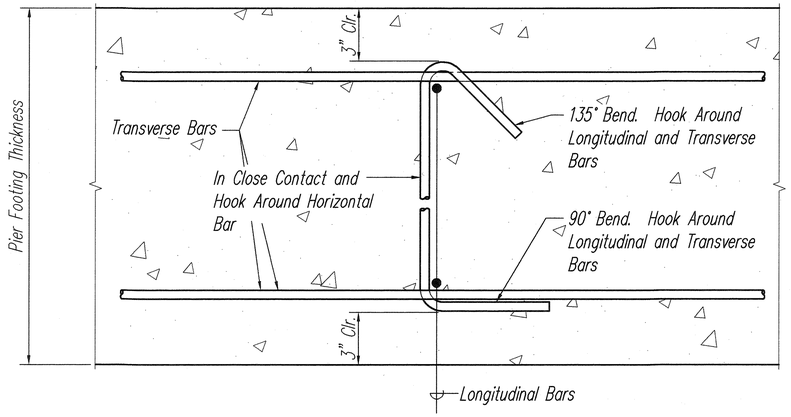


TIE REINFORCEMENT DETAIL (1) S6.3|S6.3
Not To Scale

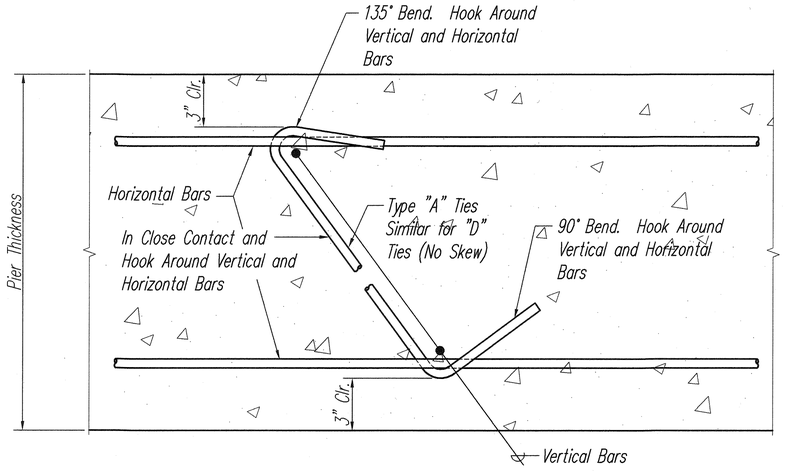


Note:
Runner Bars Not Shown for Clarity.

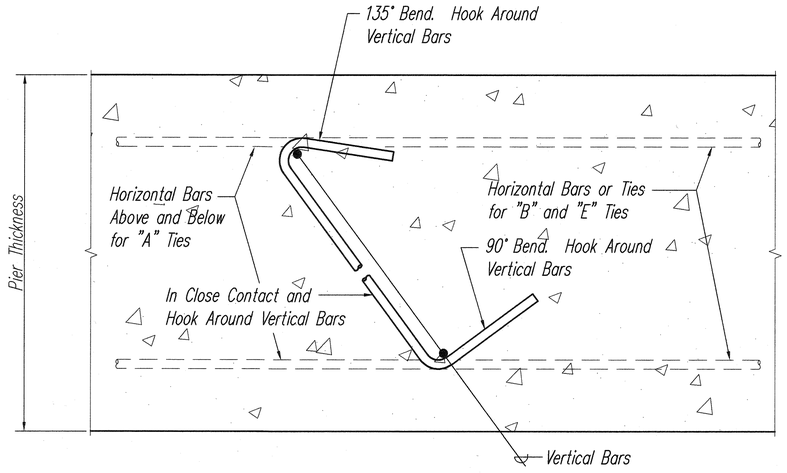
TYPICAL FOOTING REINFORCING PLAN (A) S6.1|S6.3
Scale: 1/4" = 1'-0"



FOOTING TIE DETAIL (2) S6.3|S6.3
Not To Scale



INTERSECTION OF VERTICAL AND HORIZONTAL REINFORCING FOR TYPE "A' AND "D" TIES



FOR TYPE "B" AND "E" TIES AND BETWEEN HORIZONTAL REINFORCING FOR TYPE "A" TIES

PIER TIE DETAIL (3) S6.3|S6.3
Not To Scale

GRAPHIC SCALE:
4' 2' 0 4' 8'
SCALE: 1/4" = 1'-0"

ORIGINAL PLAN
NOTE BOOK
SURVEY PLOTTED BY
DRAWN BY VSY
TRACED BY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY
DATE NOV2000
No.

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

David K. Fujiwara

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

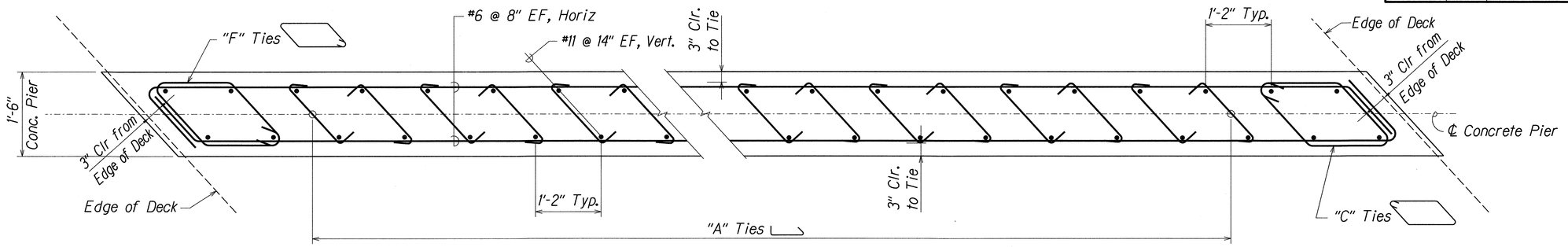
TYPICAL FOOTING REINFORCING PLAN

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S6.3 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	48	77

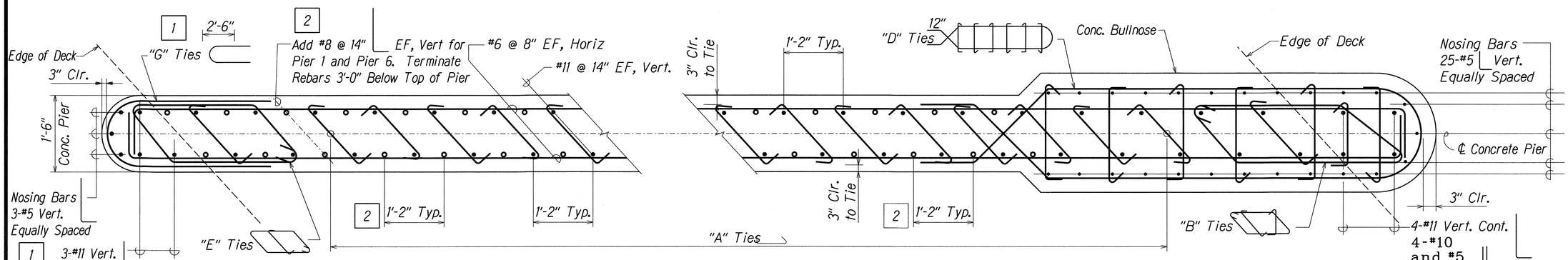


DOWNSTREAM

TYPICAL SECTION A
Scale: 1" = 1'-0" S6.1 | S6.4

UPSTREAM

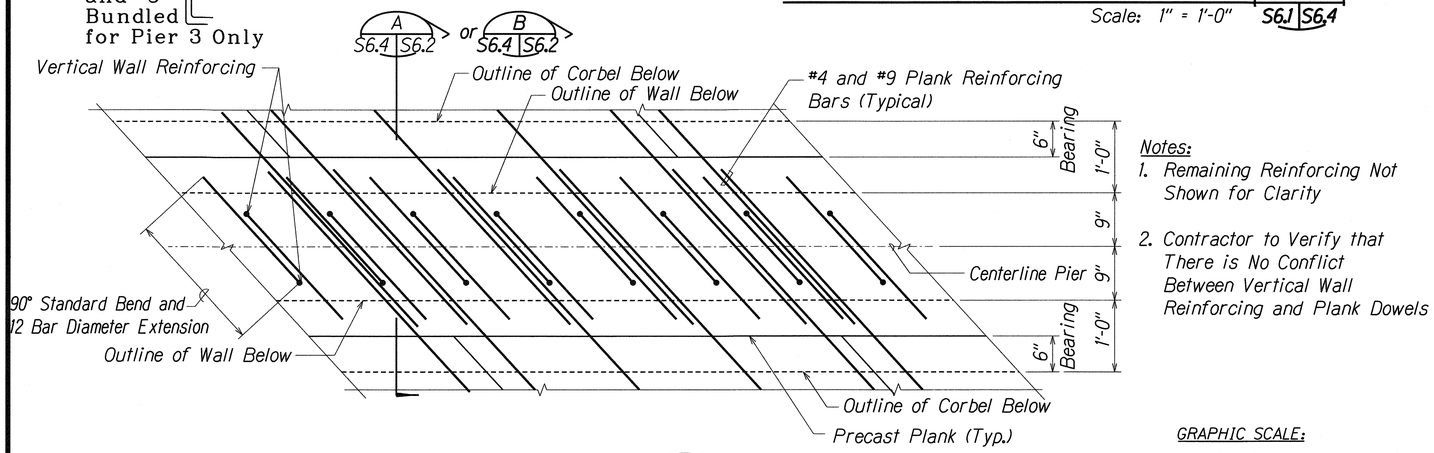
Note:
Splices Shall Not be Allowed for Vertical Rebars.



DOWNSTREAM NOSING DETAIL

TYPICAL NOSING DETAIL AT PIERS B
Scale: 1" = 1'-0" S6.1 | S6.4

UPSTREAM BUMPER NOSING DETAIL



Notes:
1. Remaining Reinforcing Not Shown for Clarity
2. Contractor to Verify that There is No Conflict Between Vertical Wall Reinforcing and Plank Dowels

DETAIL - PLAN AT TOP OF PIER 1
Scale: 1" = 1'-0" S6.4 | S6.4

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

Notes:
1. Splices Shall Not be Allowed for Vertical Rebars.
2 2. ○ Designates Added Vert. Reinf. for Piers 1 and 6 Only.

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

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LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Revised Detail
01-29-01	1 Added "G" Ties and Nosing Bars at Downstream End
	2 Added Vert. Reinf. for Piers 1 and 6 Only

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL PIER DETAILS AND SECTION AT PIERS 1, 2, 5 AND 6

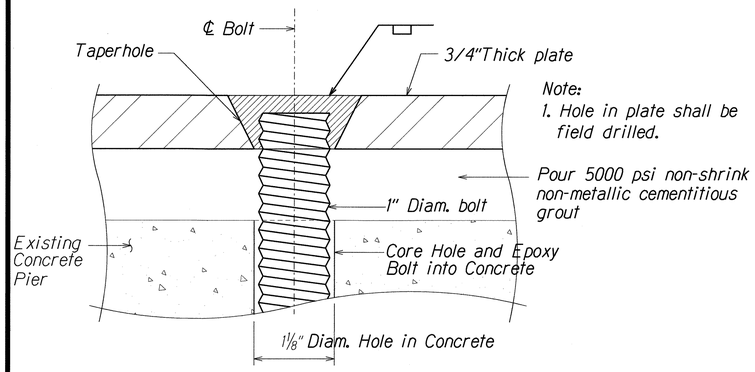
MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S6.4 OF 50 SHEETS

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY MS | TRACED BY | NOTE BOOK | DESIGNED BY KSF | QUANTITIES BY | CHECKED BY | DATE 10/2000

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	-	77

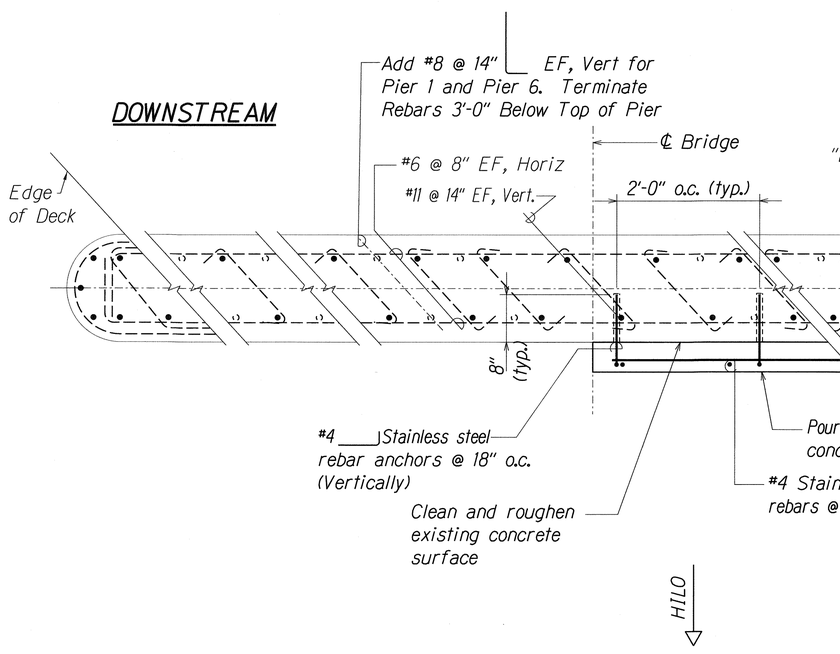


DETAIL 2
SCALE: 1" = 1" S6.4A | S6.4A

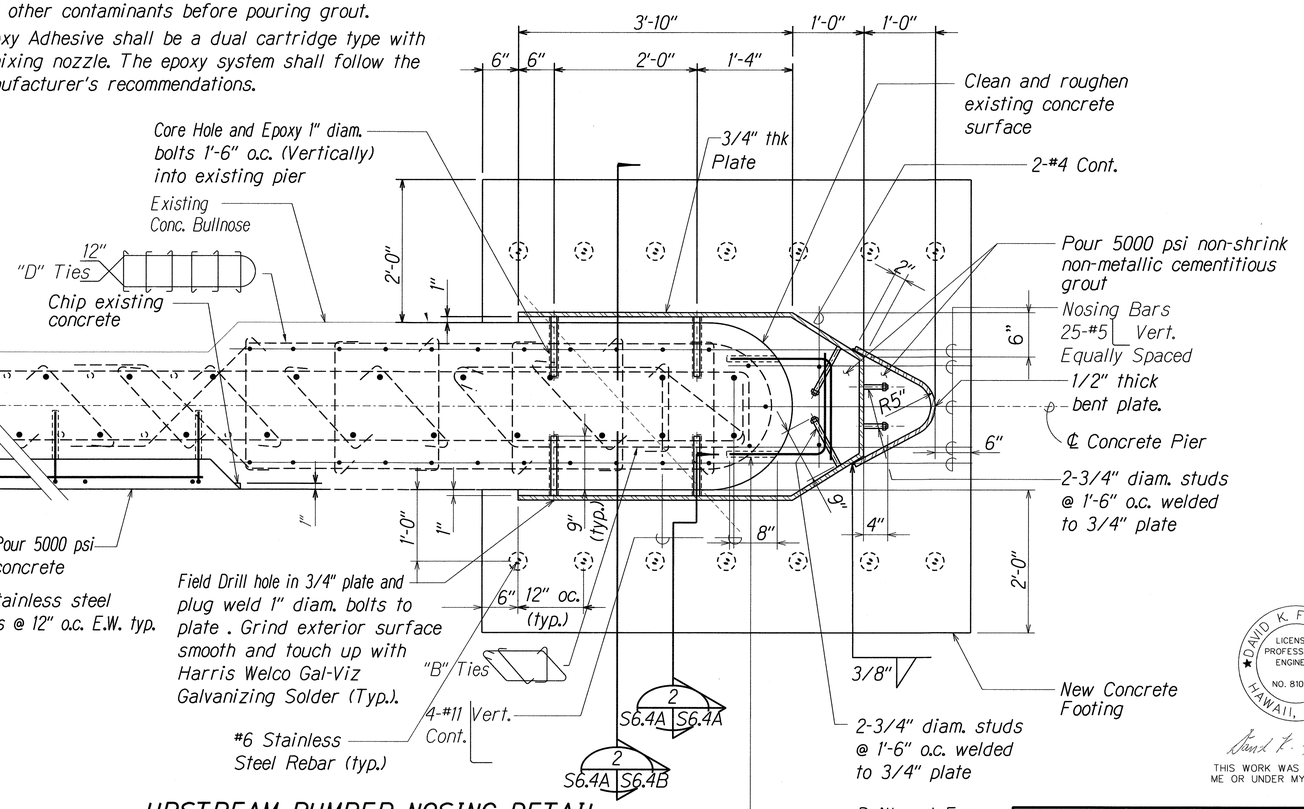
Notes:

1. 3/4" Plates shall be welded together with full penetration butt welds.
2. Studs and epoxied anchor bolts shall be A307 bolts.
3. Plates shall be ASTM36 Steel and Hot-Dipped galvanized after fabrication. Repair of damaged Zinc coated areas shall be done with Harris Welco Gal-Viz Galvanizing Solder in accordance with the manufacturer's recommendations.
4. Stainless steel reinforcing shall be Type 316.
5. Add 1 pound of Grace Micro Fiber per cubic yard of concrete to the concrete wall on Hilo side of Pier 1 and Pier 2 and the concrete footing for all the Piers.
6. For Pier 1, clean all exposed reinforcing of rust and other contaminants before pouring grout.
7. Epoxy Adhesive shall be a dual cartridge type with a mixing nozzle. The epoxy system shall follow the manufacturer's recommendations.

DOWNSTREAM



UPSTREAM



DOWNSTREAM NOSING DETAIL

UPSTREAM BUMPER NOSING DETAIL

TYPICAL NOSING DETAIL AT PIER 1 AND 2 1
SCALE: 1" = 1'-0" S6.4A | S6.4A

SURVEY PLOTTED BY — DATE APR '02
ORIGINAL MAPS BY —
TRACED BY —
NOTE BOOK — DESIGNED BY LM
MB-S64.dgn — QUANTITIES BY —
CHECKED BY —

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

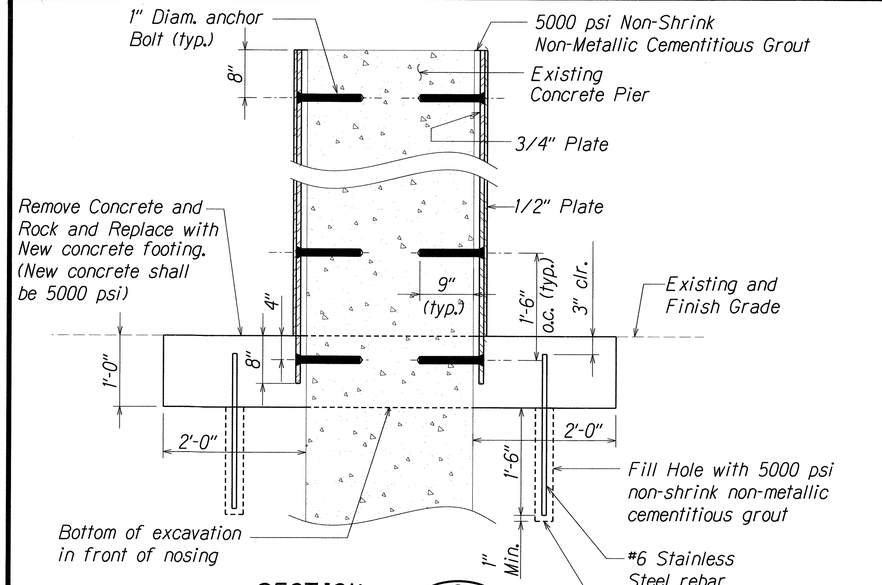
TYPICAL PIER DETAIL AT PIER 1 AND 2

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

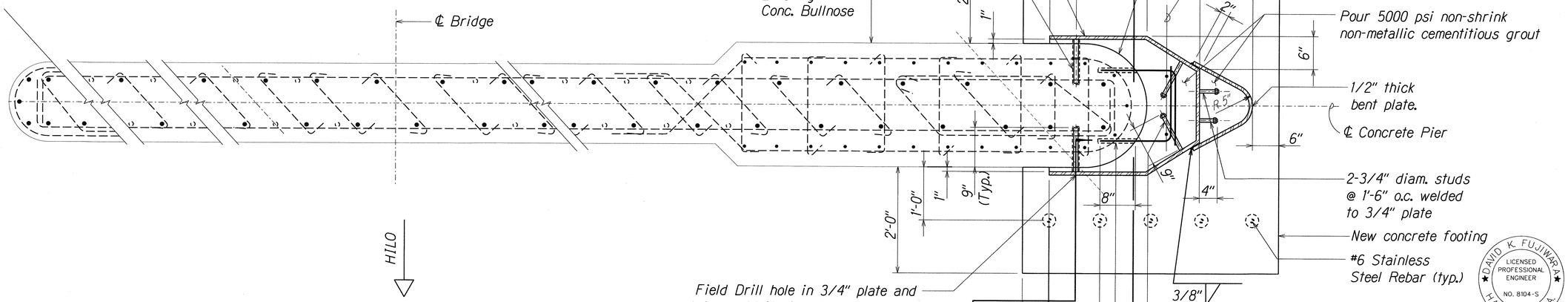
SHEET No. S6.4A OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	-	77



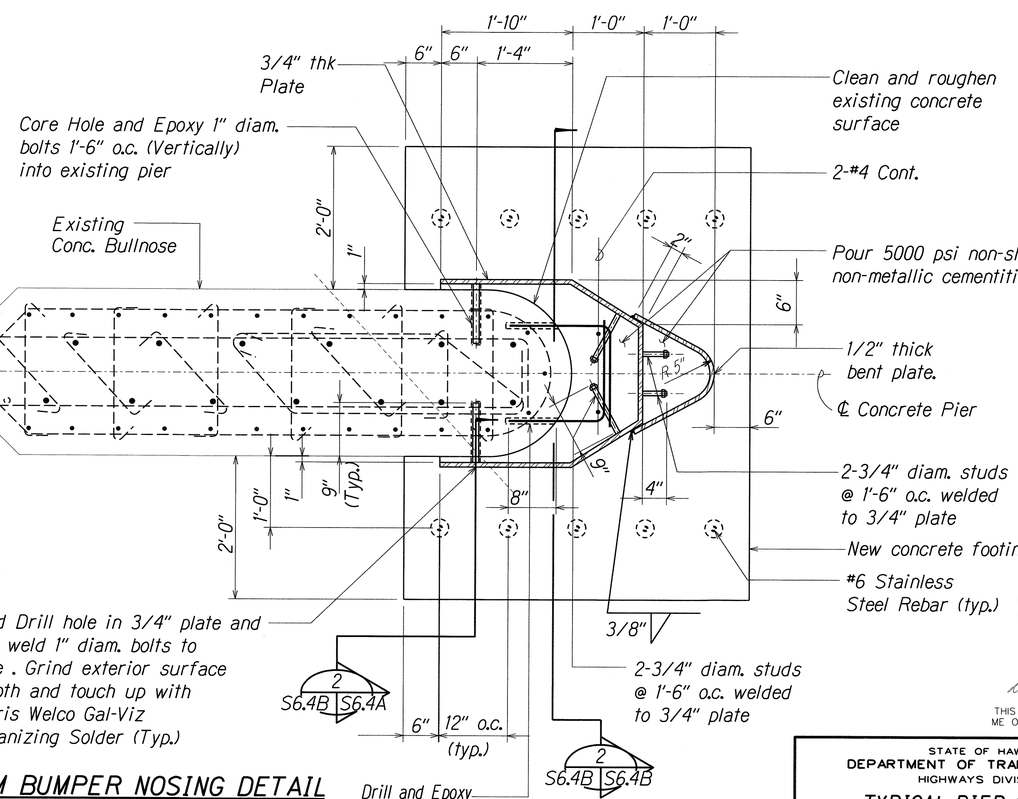
SECTION 2
SCALE: 1" = 1'-0" S6.4B | S6.4B

DOWNSTREAM



DOWNSTREAM NOSING DETAIL

UPSTREAM



UPSTREAM BUMPER NOSING DETAIL

TYPICAL NOSING DETAIL AT PIER 3 THRU 6
SCALE: 1" = 1'-0"

1 S6.4B | S6.4B

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE APR 00
	DRAWN BY ZC	
	TRACED BY	
NOTE BOOK	DESIGNED BY CW	
KB-S64Bdgn	QUANTITIES BY	
	CHECKED BY	

DAVID K. FUJIWARA
LICENSED PROFESSIONAL ENGINEER
NO. 8104-S
HAWAII, U.S.A.
David K. Fujiwara
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

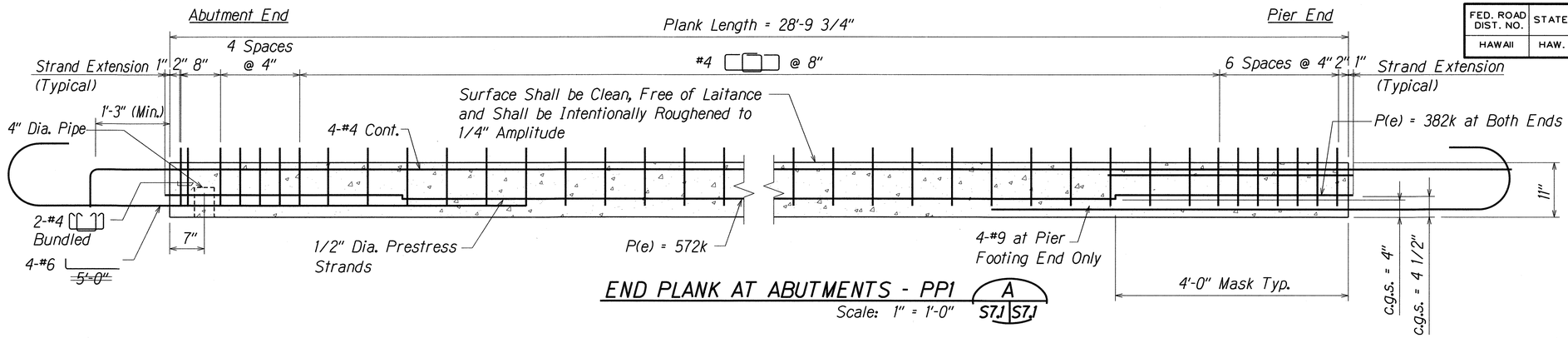
TYPICAL PIER SECTION AT PIER 3 THRU 6

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

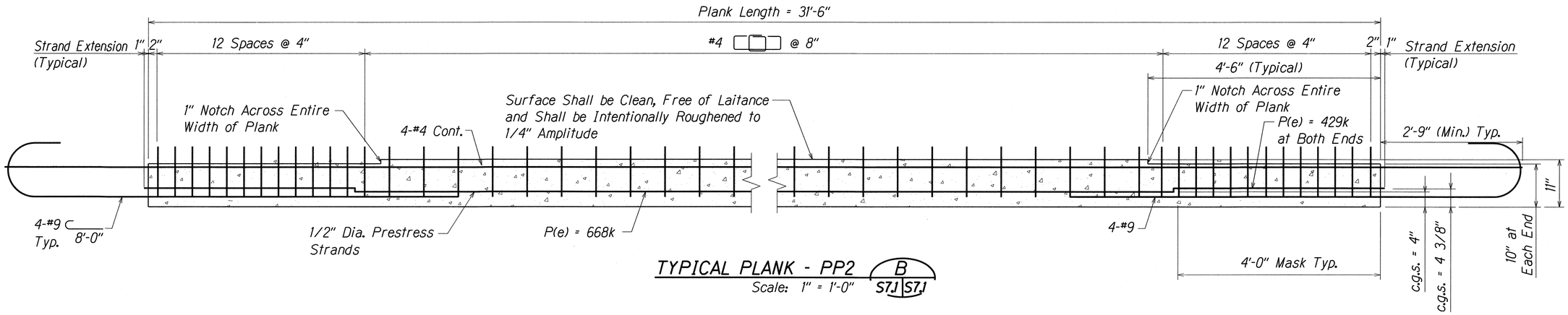
SHEET No. S6.4B OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	49	77



END PLANK AT ABUTMENTS - PP1 (A)

Scale: 1" = 1'-0" S7.1 | S7.1



TYPICAL PLANK - PP2 (B)

Scale: 1" = 1'-0" S7.1 | S7.1

PRESTRESSED PLANK NOTES

1. Prestressed concrete 28 day strength f'c = 7,000 PSI.
   Prestressed concrete strength at time of release fci = 4,500 PSI.
2. Pretensioned strands shall be 7 wire ½"ø low relaxation steel strands (Area = 0.153 in) with an ultimate tensile strength of 270 KSI. For properties, see "State Standard Specifications."
3. Non-prestressed reinforcing steel shall be grade 60. For properties, see "State Standard Specifications."
4. Strand pattern shall be symmetrical about the longitudinal ℄ of the plank.
5. Strand release sequence shall not induce any lateral deflection of the plank.
6. Contractor shall submit shop drawings indicating proposed strand pattern, releasing sequence, reinforcing details & hold down device details to the Engineer prior to fabrication.
7. During curing, care shall be taken to avoid any lateral deflection of the plank due to improper orientation. Steam curing may be used to accelerate strength gain.
8. Lifting devices shall be placed as close as possible to the centerline of bearings of the plank. Details and locations of lifting devices shall be submitted to the Engineer for approval. Such approval does not relieve the Contractor of his responsibilities if beam is damaged due to failure of the lifting device.
9. See Sheet S3.1 for location of plank mark numbers.

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE DEC 2000
	DRAWN BY JSF	
NOTE BOOK	TRACED BY	
N/B-57 Hdgs.	DESIGNED BY JSF	
	QUANTITIES BY	
	CHECKED BY	

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

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

David K. Fujiwara

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DATE	REVISION
02-15-07	As Built - Added Note

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

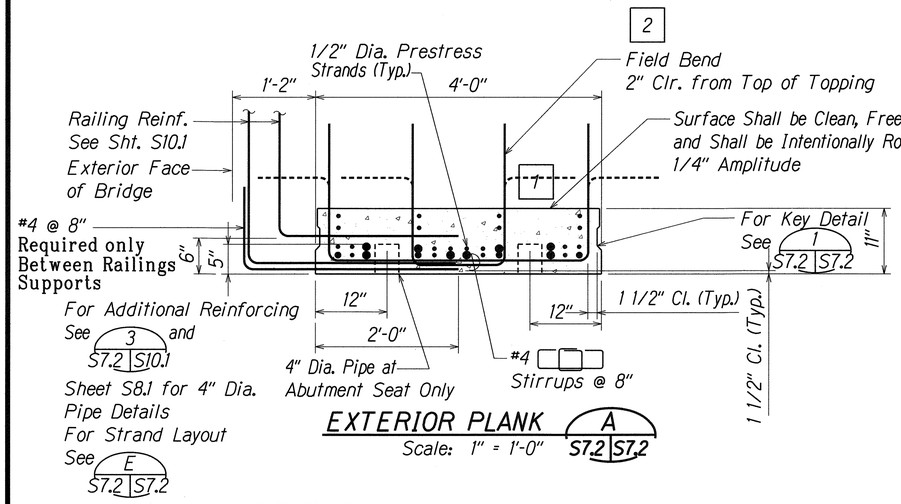
PRECAST PLANK SECTION AND DETAILS

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

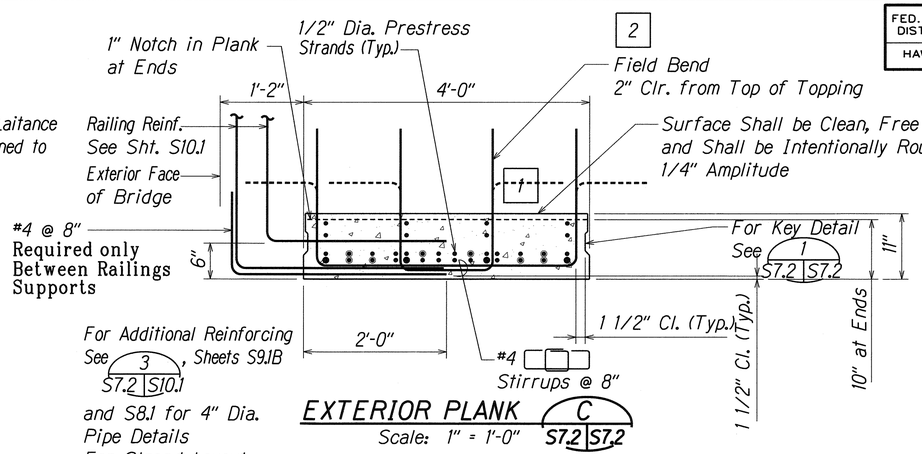
SHEET No. S7.1 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	50	77



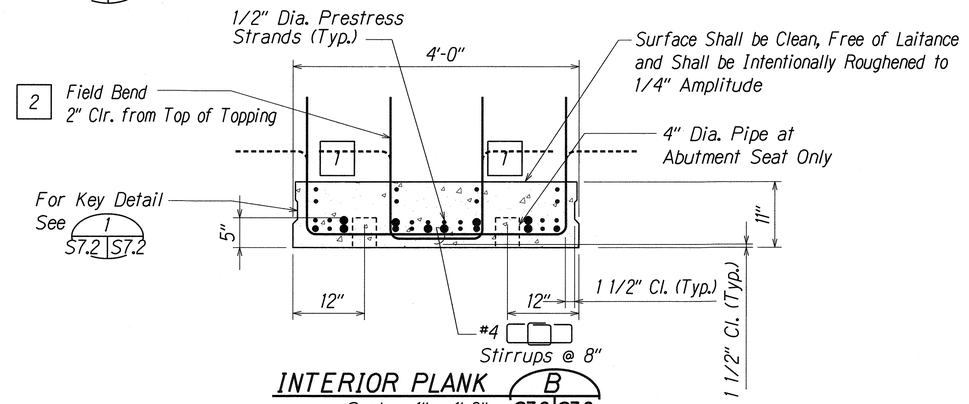
EXTERIOR PLANK A S7.2 | S7.2

Scale: 1" = 1'-0"



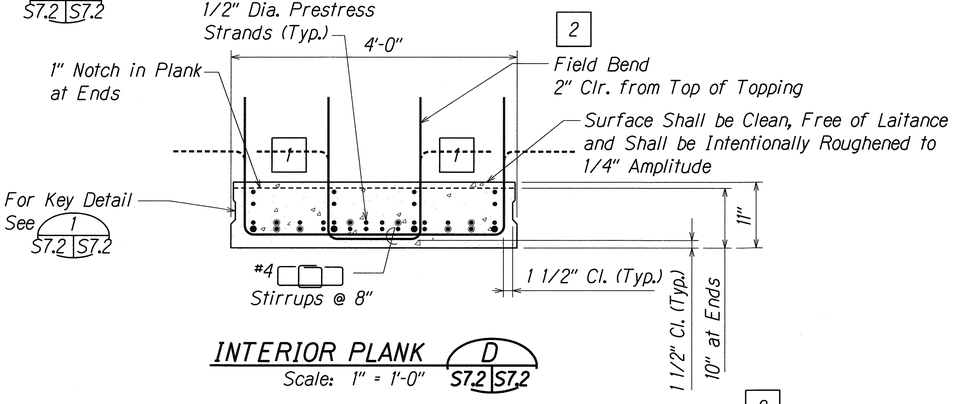
EXTERIOR PLANK C S7.2 | S7.2

Scale: 1" = 1'-0"



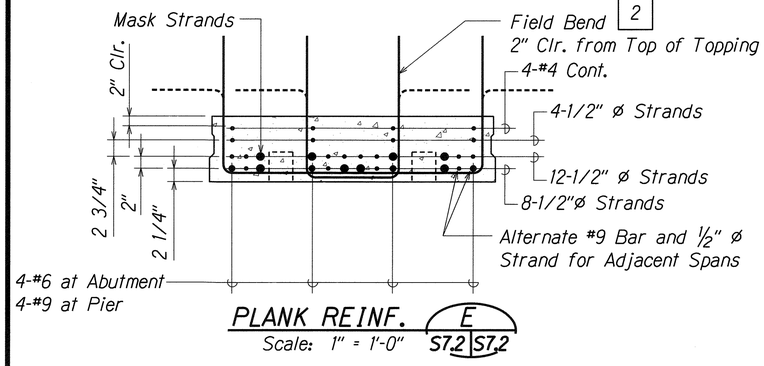
INTERIOR PLANK B S7.2 | S7.2

Scale: 1" = 1'-0"



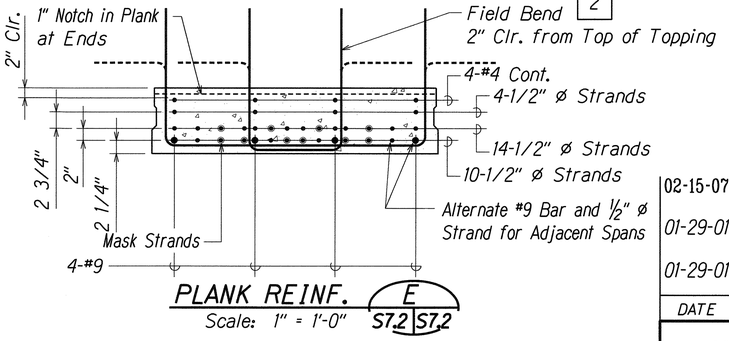
INTERIOR PLANK D S7.2 | S7.2

Scale: 1" = 1'-0"



PLANK REINF. E S7.2 | S7.2

Scale: 1" = 1'-0"



PLANK REINF. E S7.2 | S7.2

Scale: 1" = 1'-0"

PRECAST PLANK PP1

PRECAST PLANK PP2

GRAPHIC SCALES:

1' 6" 0 1' 2'

SCALE: 1" = 1'-0"

1' 6" 0 1' 2'

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

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
02-15-07	As Built - Added Note
01-29-01	1 Remove Cross Ties
01-29-01	2 Added Note

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PRECAST PLANK SECTION AND DETAILS

MAMALAHOA HIGHWAY
REPLACMENT OF
KEAIWA STREAM BRIDGE
Federal-Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S7.2 OF 50 SHEETS

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

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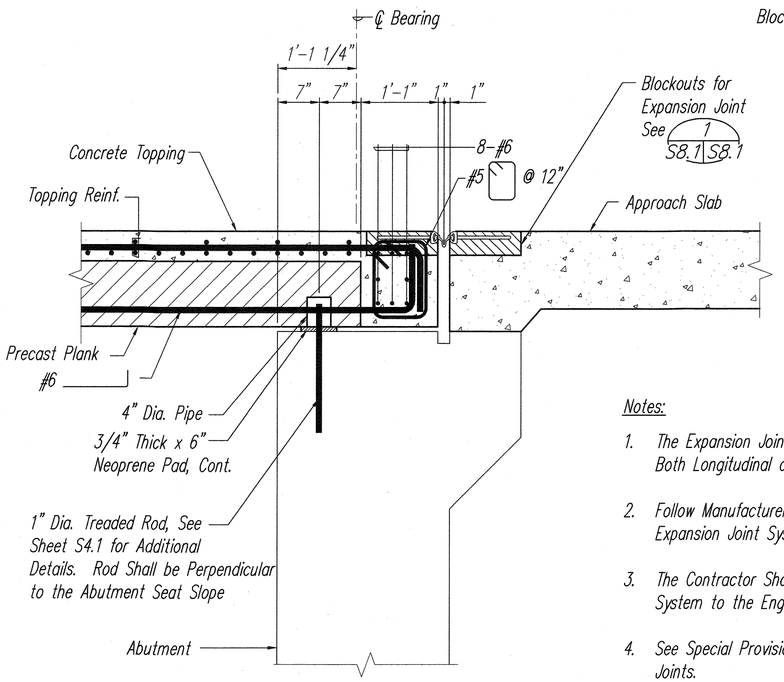
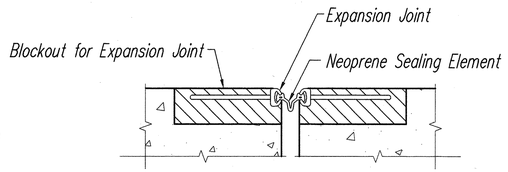
ORIGINAL PLAN
NOTE BOOK
SURVEY PLOTTED BY
DRAWN BY JST
TRACED BY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY
DATE DEC 2000

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(10)R	2001	51	77



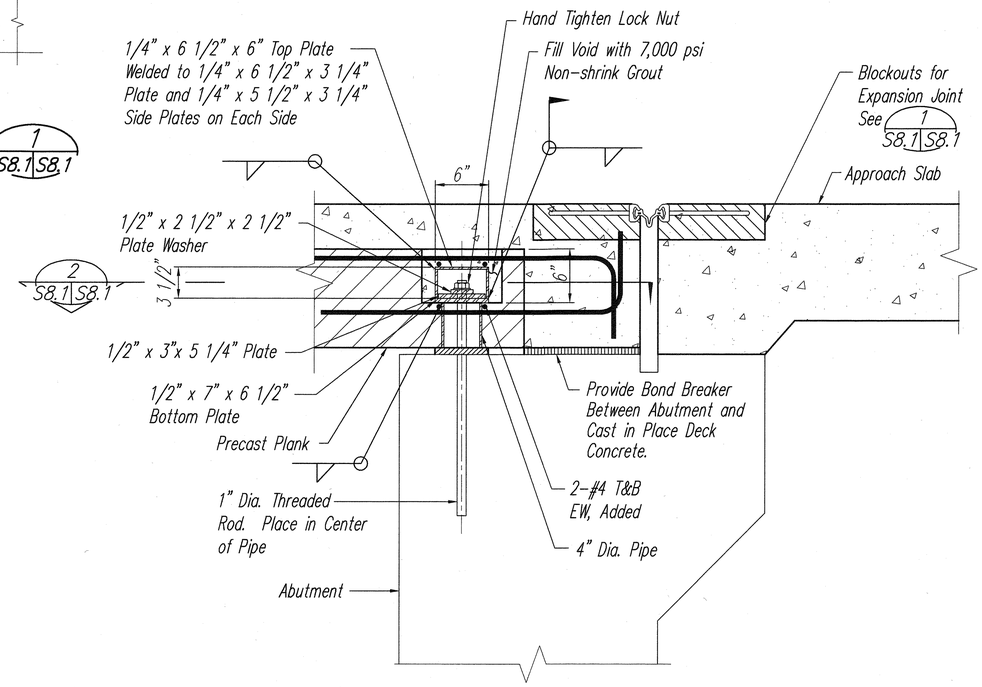
SECTION A
Scale: 1" = 1'-0" S8.1 S8.1



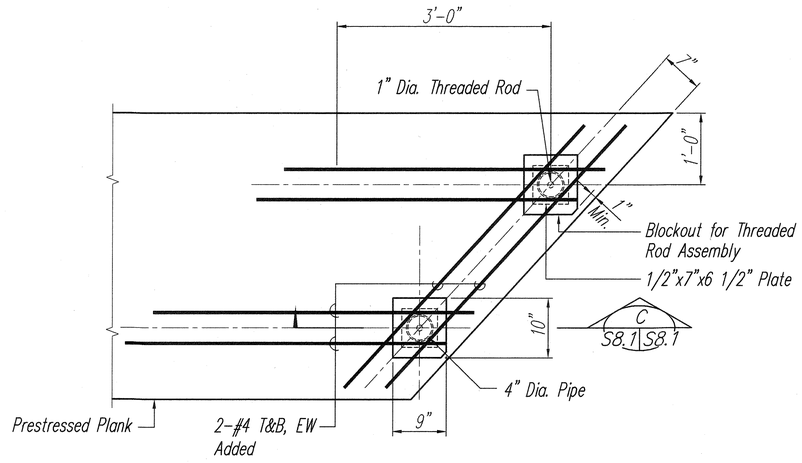
EXPANSION JOINT SYSTEM ANCHOR METHOD 1 S8.1 S8.1
Scale: 1 1/2" = 1'-0"

Notes:

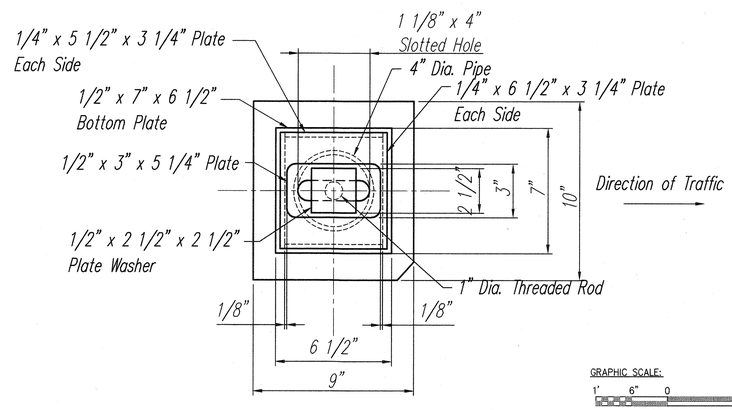
1. The Expansion Joint Shall Allow ±2" Movement in Both Longitudinal and Transverse Directions.
2. Follow Manufacturer's Recommendations for Expansion Joint System.
3. The Contractor Shall Submit the Expansion Joint System to the Engineer for Approval.
4. See Special Provision Section 585 Expansion Joints.



SECTION C
Scale: 1 1/2" = 1'-0" S8.1 S8.1

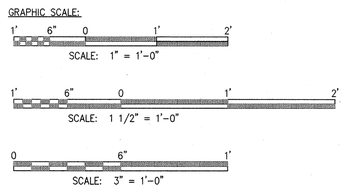


SECTION PLAN B
Scale: 1" = 1'-0" S8.1 S8.1



DETAIL 2
Scale: 3" = 1'-0" S8.1 S8.1

GRAPHIC SCALE:



ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY JSY
TRACED BY
DESIGNED BY KSF
QUANTITIES BY
CHECKED BY
DATE DEC2000
NOTE BOOK
No.

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

David K. Fujiwara

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

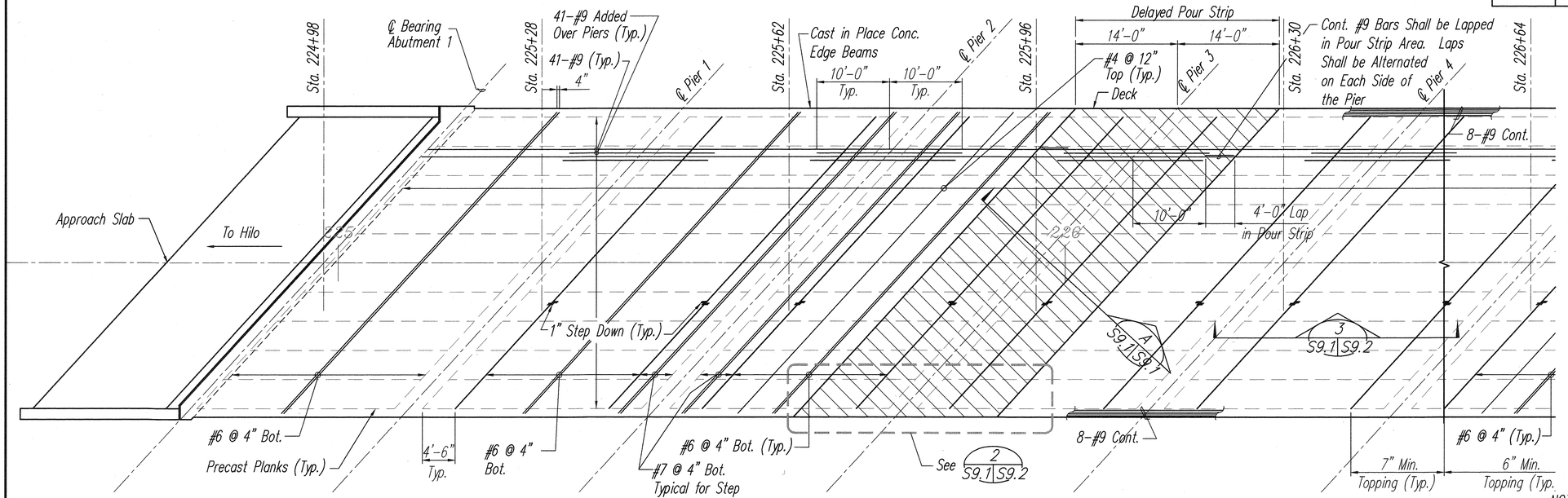
SECTIONS AND DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S8.1 OF 50 SHEETS

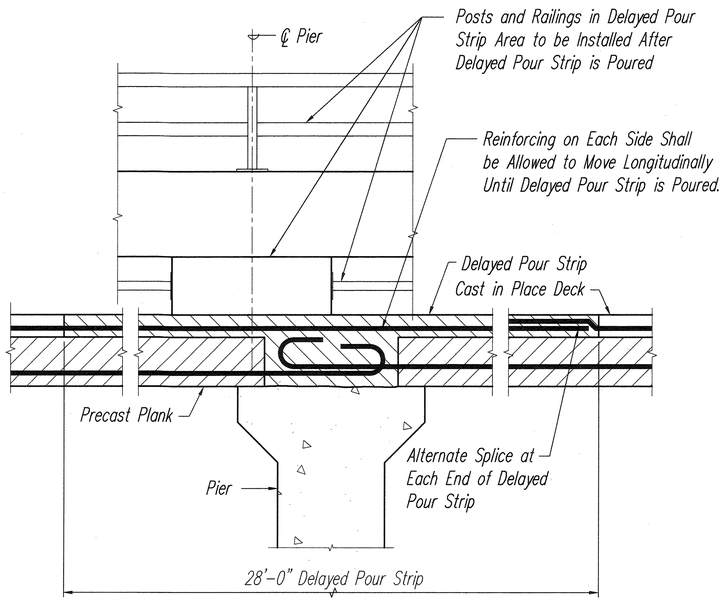
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	52	77



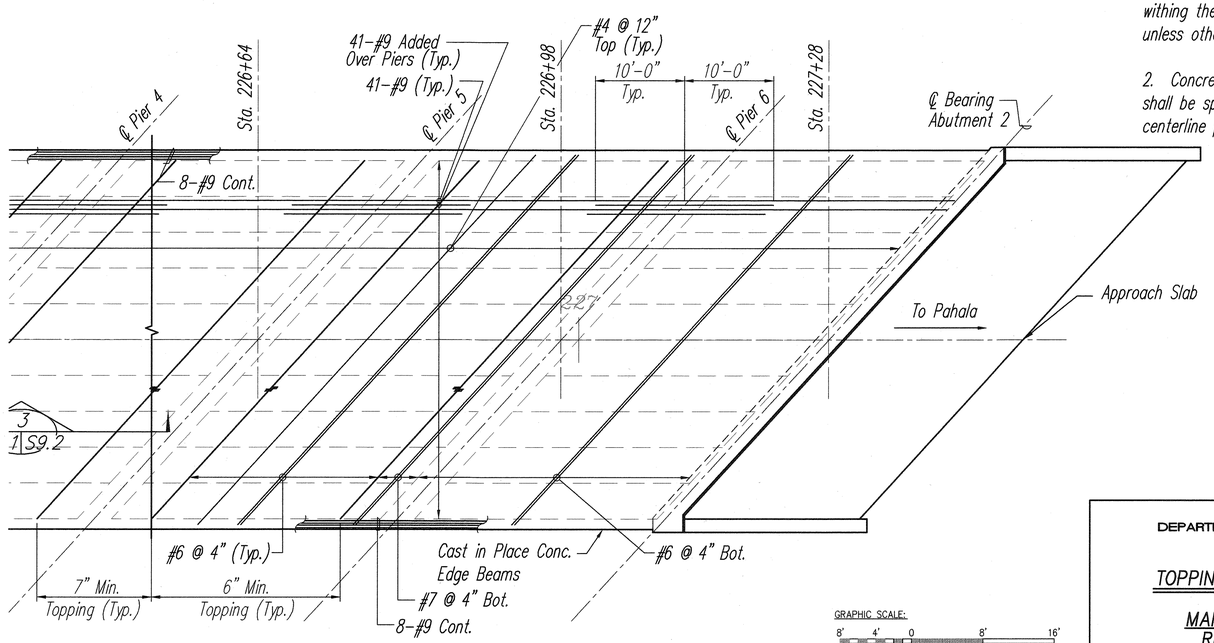
NOTES:

1. Top deck reinforcing and concrete edge beam top reinforcing shall be spliced withing the middle 1/2 of the span unless otherwise noted.

2. Concrete edge beam bottom reinforcing shall be spliced 6 to 10 feet from centerline pier unless otherwise noted.



SECTION A
Scale: 3/4" = 1'-0"
S9.1 S9.1
S1.2



TOPPING REINFORCING PLAN
Scale: 1/8" = 1'-0"

GRAPHIC SCALE:
8' 4' 0 8' 16'
SCALE: 1/8" = 1'-0"
1' 0 1' 2' 3'
SCALE: 3/4" = 1'-0"

ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY VST
TRACED BY
DESIGNED BY KSF
NOTE BOOK
QUANTITIES BY
No. ____
CHECKED BY
DATE NOV2000

DAVID K. FUJIWARA
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

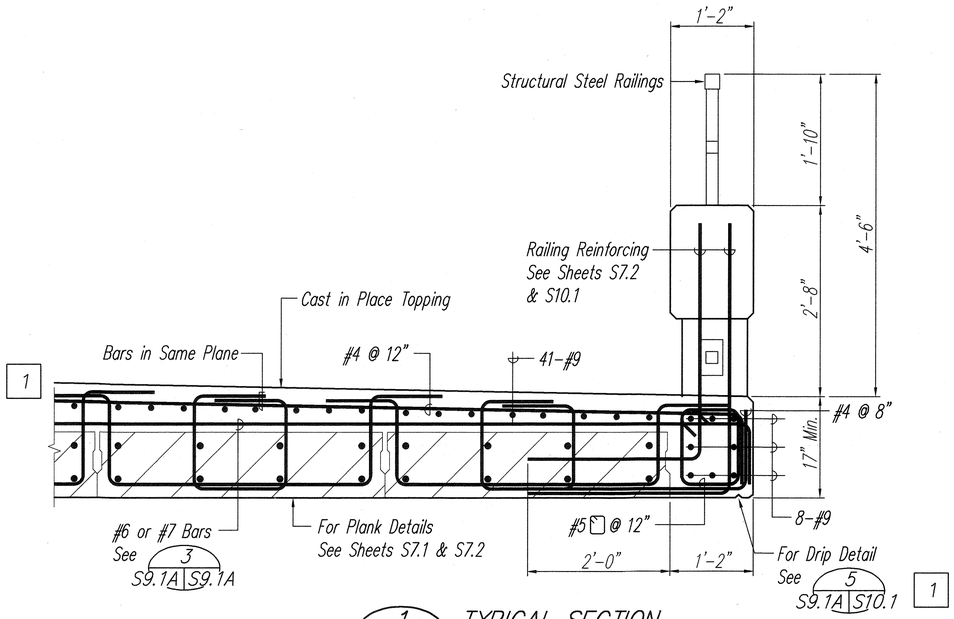
TOPPING REINFORCING PLAN

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S9.1 OF 50 SHEETS

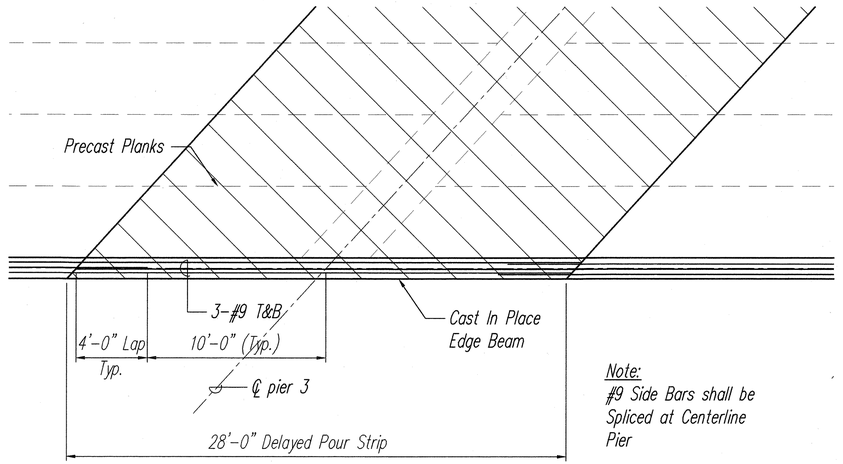
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(0)R	2001	53	77



1 TYPICAL SECTION
S9.1C|S9.1A SCALE: 1" = 1'-0"
S9.1B

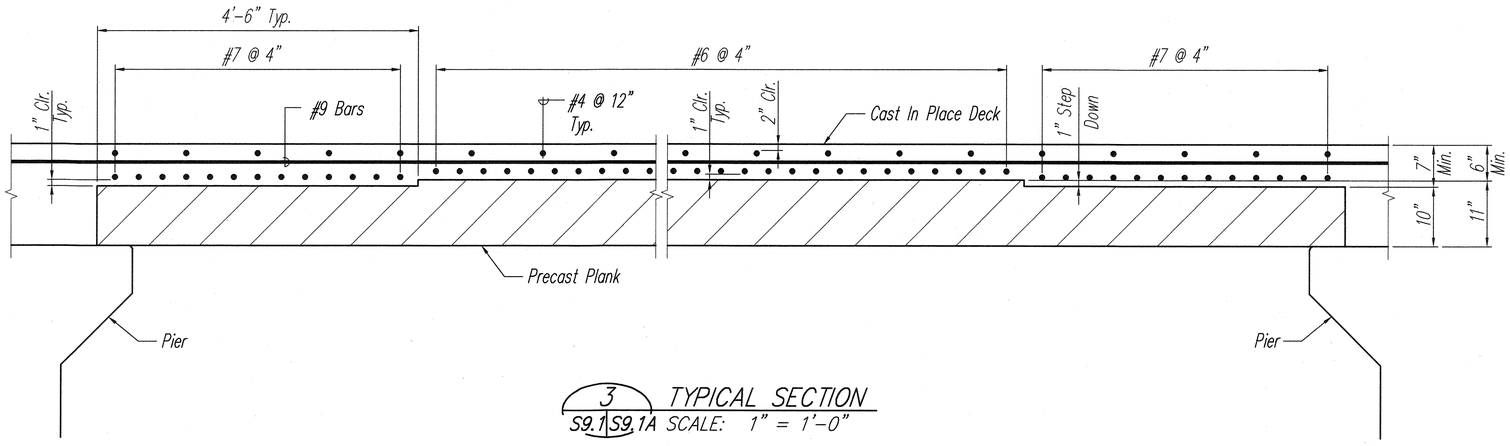
Note:
#4 @ 12" and 41-#9 Bars Shall be in the Top Mat of the Topping Reinforcing and Shall Follow the Slope of the Topping.

2



Note:
#9 Side Bars shall be Spliced at Centerline Pier

2 POUR STRIP DETAIL
S9.1|S9.1A SCALE: 1/4" = 1'-0"



3 TYPICAL SECTION
S9.1|S9.1A SCALE: 1" = 1'-0"

DAVID K. FUJIWARA
LICENSED PROFESSIONAL ENGINEER
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DATE	DESCRIPTION
01-29-01	1 Added Deck Slope
01-29-01	2 Added Note
01-29-01	3 Revised Detail Number

ORIGINAL PLAN
NOTE BOOK No. ____
SURVEY PLOTTED BY
DRAWN BY VSY DATE NOV2000
TRACED BY " " "
DESIGNED BY KSF " " "
QUANTITIES BY " " "
CHECKED BY " " "

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

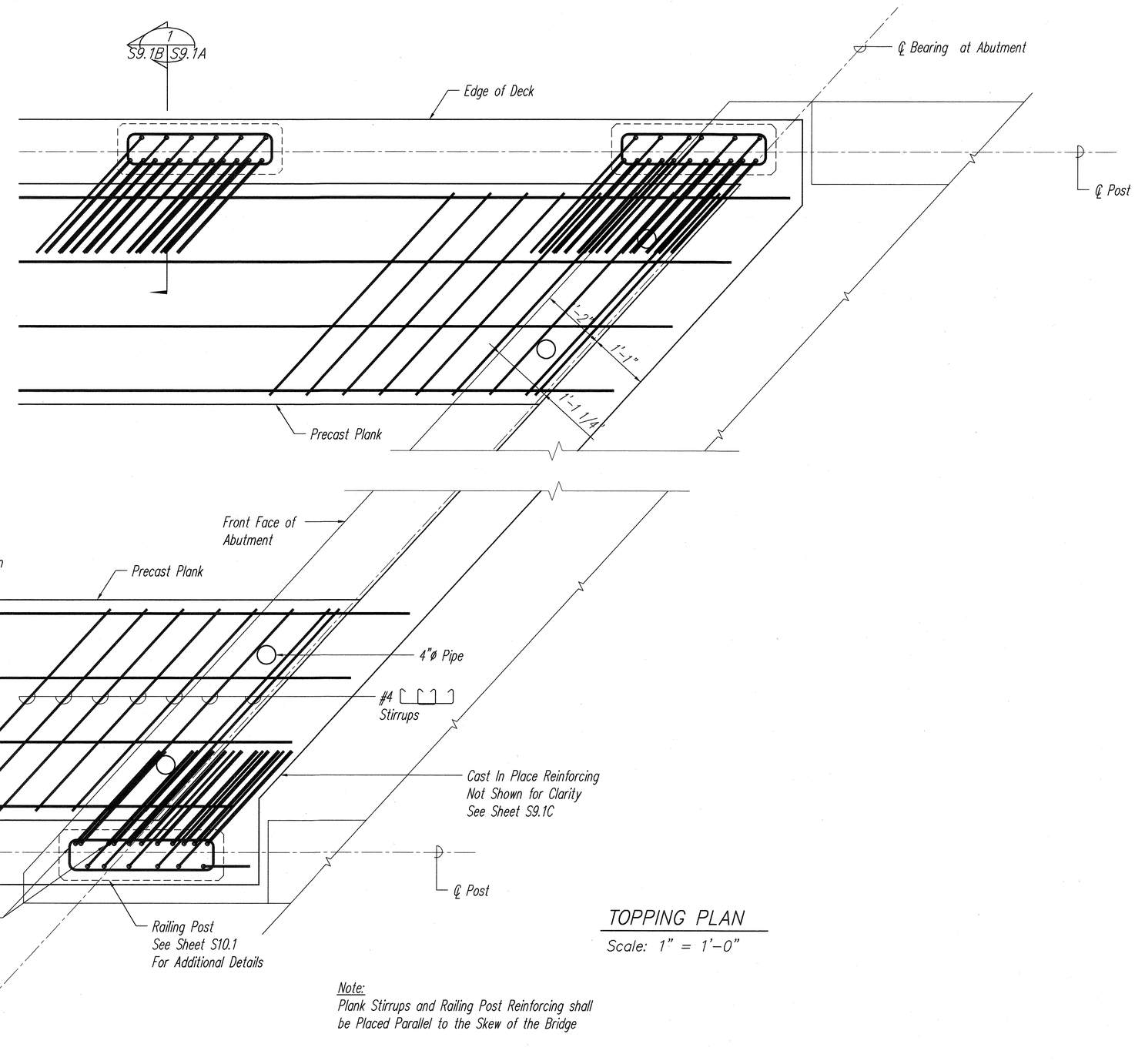
SECTIONS AND DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S9.1A OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	54	77



TOPPING PLAN

Scale: 1" = 1'-0"

Note:
Plank Stirrups and Railing Post Reinforcing shall be Placed Parallel to the Skew of the Bridge

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY VSY	NOV2000
	TRACED BY	
NOTE BOOK	DESIGNED BY GSF	
	QUANTITIES BY	
No.	CHECKED BY	

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

David K. Fujiwara

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STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

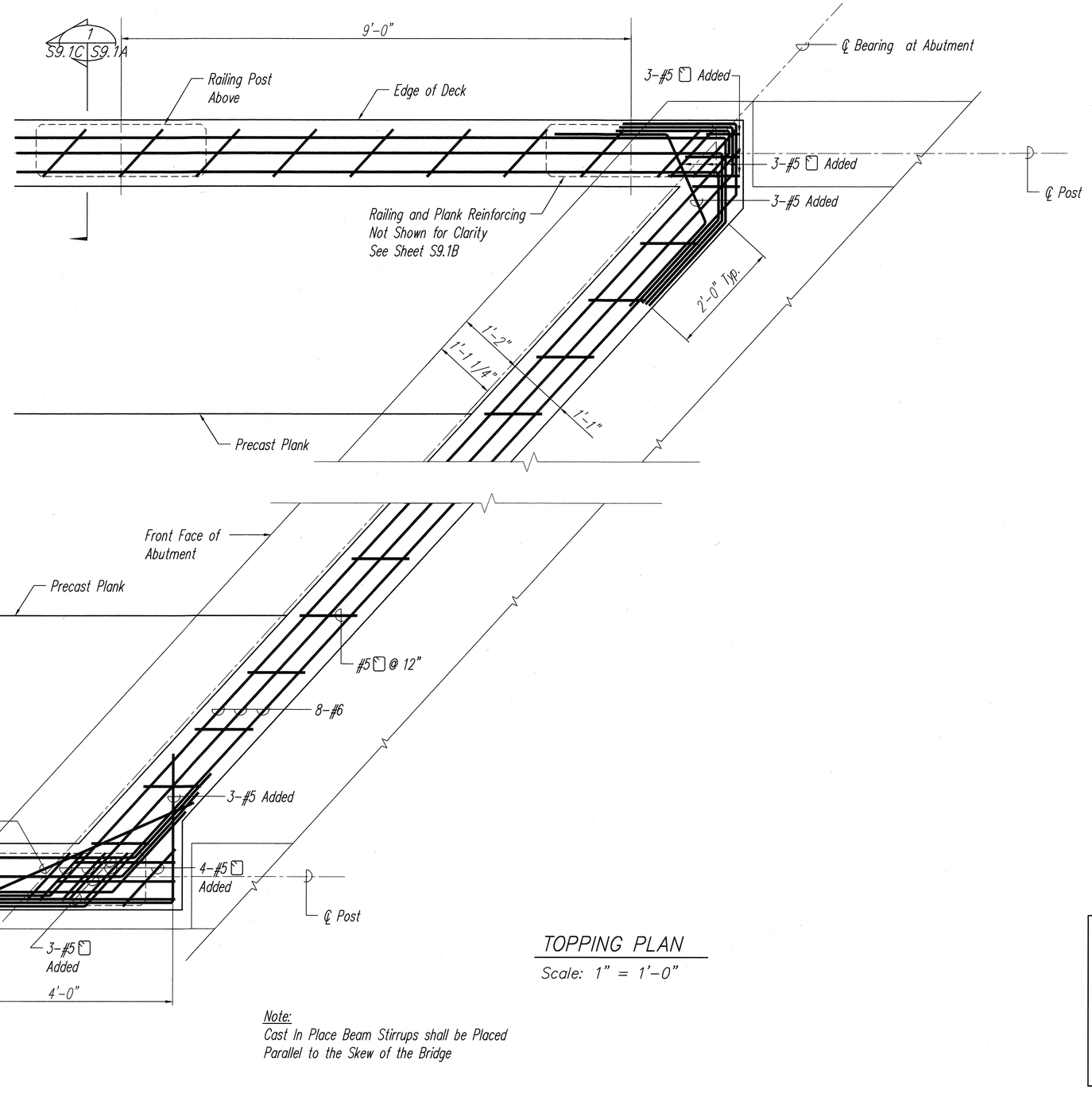
TOPPING PLAN

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S9.1B OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	55	77



TOPPING PLAN

Scale: 1" = 1'-0"

Note:
Cast In Place Beam Stirrups shall be Placed Parallel to the Skew of the Bridge

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY VSY	NOV2000
	TRACED BY	
NOTE BOOK	DESIGNED BY KSF	
	QUANTITIES BY	
No.	CHECKED BY	

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

David K. Fujiwara

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STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

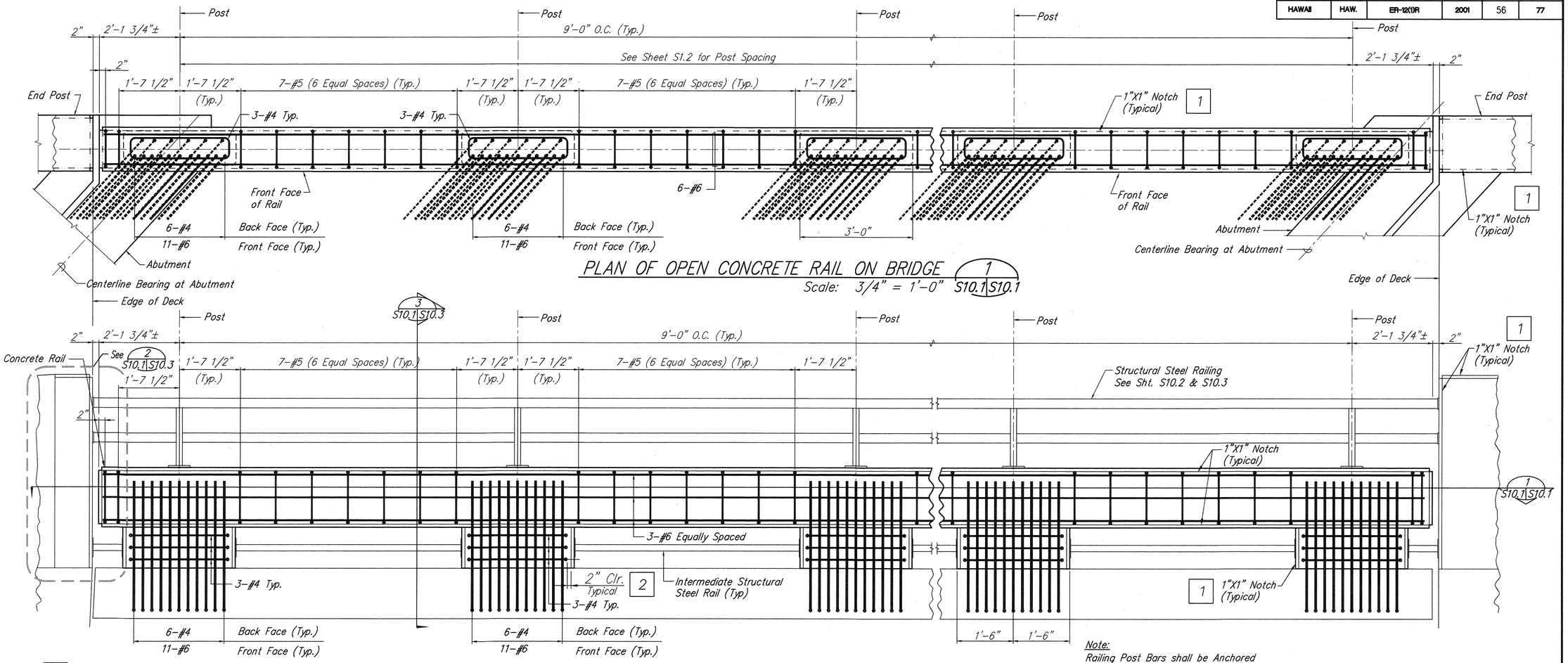
TOPPING PLAN

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S9.1C OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(10)R	2001	56	77



PLAN OF OPEN CONCRETE RAIL ON BRIDGE (1 S10.1|S10.1)

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

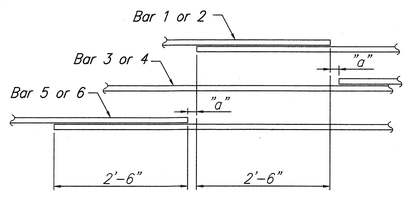
ELEVATION OF OPEN CONCRETE RAIL ON BRIDGE (2 S10.1|S10.1)

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

Note:
Railing Post Bars shall be Anchored into Bottom of Planks or Cast in Place Beam over Piers

NOTES:

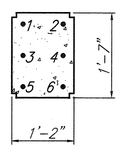
1. *Grind All Outer Corners of Notches to a Uniform 1/8" Radius.*
2. *Color and Texture of Concrete Shall Match Adjacent Surfaces and Damaged and Non-Uniform Surfaces Shall be Patched.*



Laps for Bars 1 and 5 shall be staggered.
Laps for Bars 2 and 6 shall be staggered.
Bar 3 to be continuous through laps for Bars 1 and 5
Bar 4 to be continuous through laps for Bars 2 and 6
"a" ≥ Zero

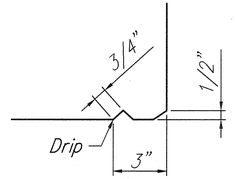
LAP DETAIL (3 S10.1|S10.1) 3

Not to Scale



RAIL SECTION (4 S10.1|S10.1) 3

Not to Scale



DRIP DETAIL (5 S10.1|S10.1) 3

Not to Scale

DATE		DESCRIPTION
01-29-01	1	Added Notch in Railing
01-29-01	2	Added Note
01-29-01	3	Changed Detail Number
01-29-01	4	Move Detail

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

David K. Fujiwara

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RAILING SECTION AND DETAILS

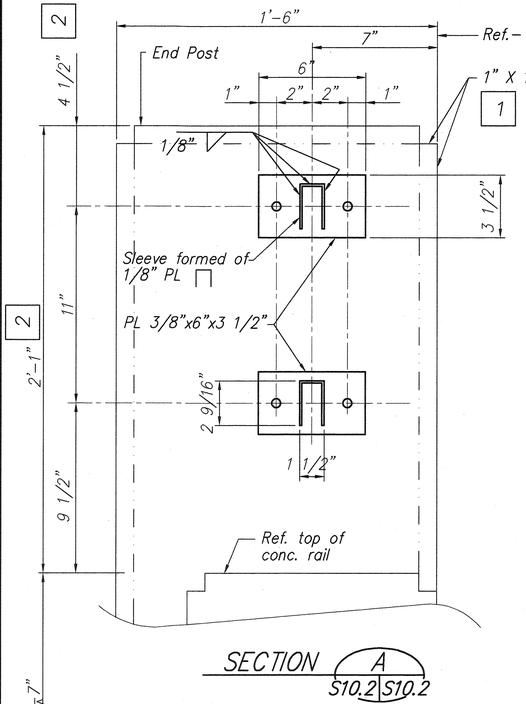
MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

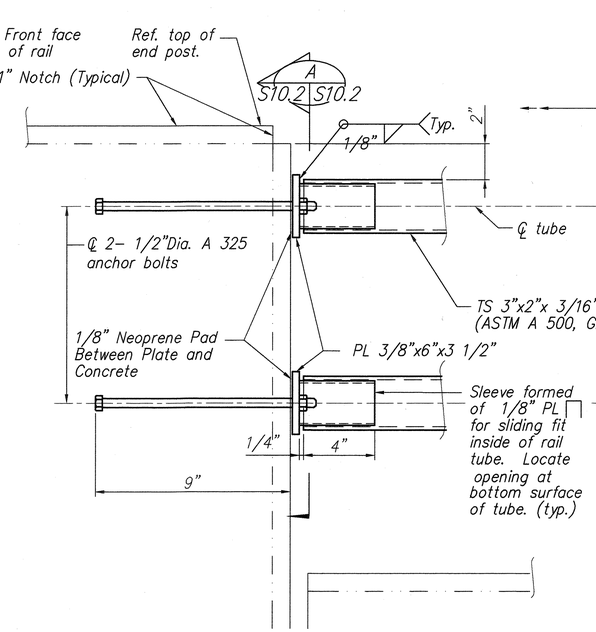
SHEET No. S10.1 OF 50 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE NOV/2000
	DRAWN BY VSY	
	TRACED BY	
NOTE BOOK	DESIGNED BY LKF	
	QUANTITIES BY	
No.	CHECKED BY	

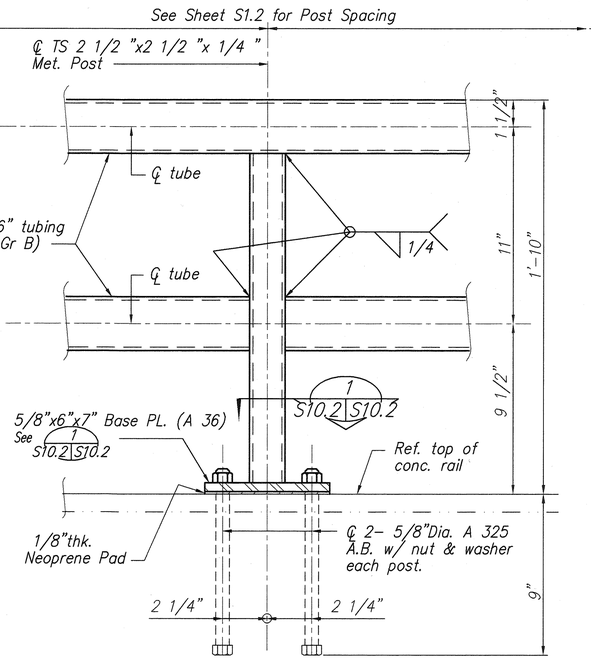
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	57	77



SECTION A S10.2 | S10.2



ELEVATION

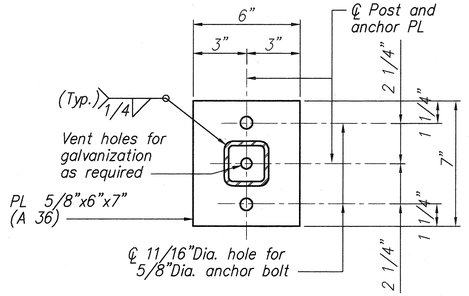


ELEVATION

Scale: 3" = 1'-0"

RAIL SLEEVE ANCHOR AT END POST CONNECTION DETAIL

Scale: 3" = 1'-0"

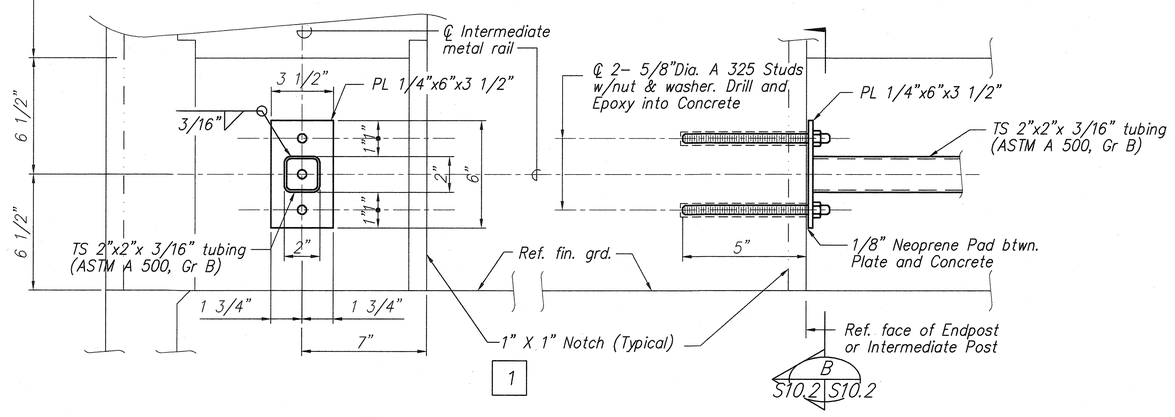


ANCHOR PLATE DETAIL 1 S10.2 | S10.2

Scale: 3" = 1'-0"

NOTE:

All structural steel members, plates and bolts shall be hot dipped galvanized after fabrication.



SECTION B S10.2 | S10.2

ELEVATION

INTERMEDIATE METAL RAIL DETAIL

(INCIDENTAL TO METAL BIKE RAILING)

Scale: 3" = 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE NOV/2000
	DRAWN BY VSY	
	TRACED BY	
NOTE BOOK	DESIGNED BY KSF	
	QUANTITIES BY	
No.	CHECKED BY	

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

David K. Fujiwara

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

GRAPHIC SCALE:

1' 6" 0 1'

SCALE: 3" = 1'-0"

DATE	DESCRIPTION
01-29-01	1 Added Notch in Railing and End Post
01-29-01	2 Modified Dimension

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

METAL BIKEWAY AND INTERMEDIATE RAILING ON CONCRETE RAILING DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

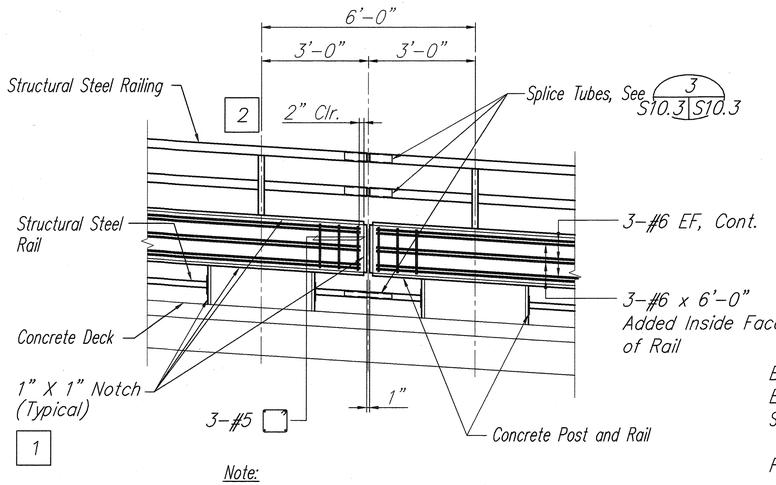
Scale: As Shown Date: January 2001

SHEET No. S10.2 OF 50 SHEETS

57

METAL BIKEWAY and INTERMEDIATE RAILING ON CONCRETE RAIL DETAILS

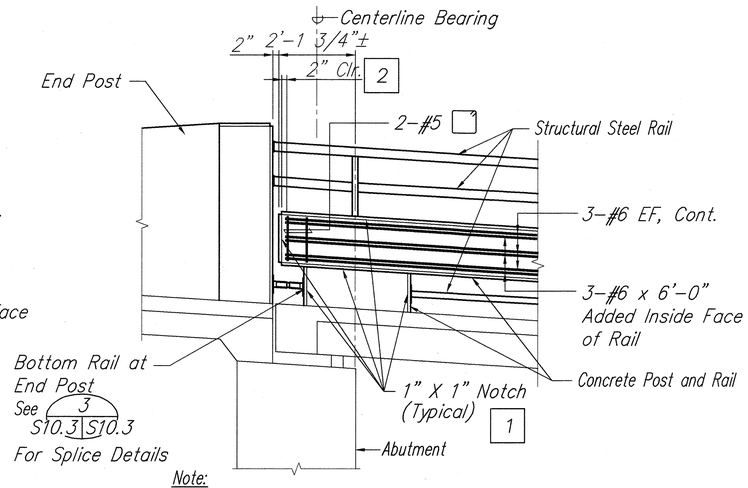
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	58	77



Note:
See Sheets S10.1 and S10.2 for Additional Details

TYPICAL RAILING EXPANSION JOINT 1 S1.2 S10.3

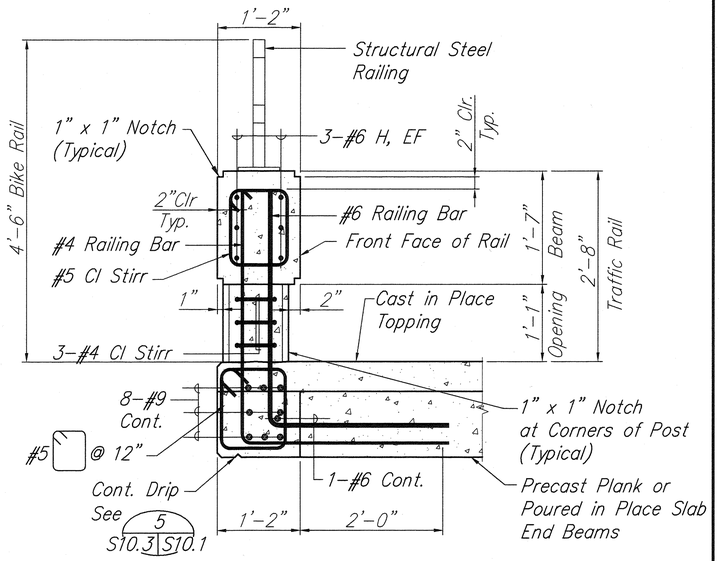
Scale: 1/2" = 1'-0"



Note:
See Sheet S10.1 and S10.2 for Additional Details

TYPICAL RAILING DETAIL AT END Post 2 S10.1 S10.3 S1.2

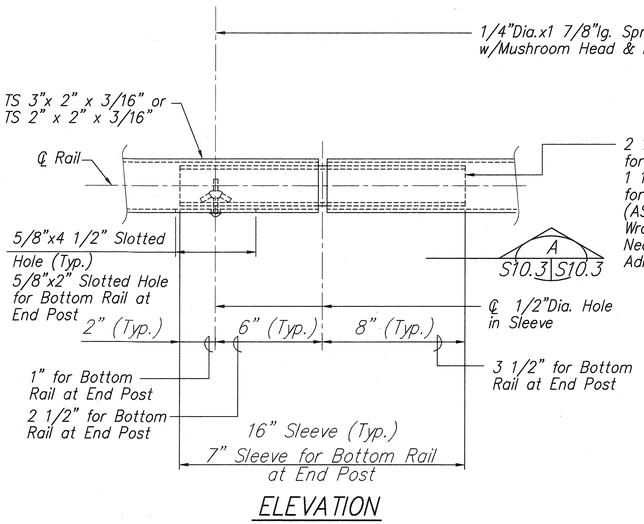
Scale: 1/2" = 1'-0"



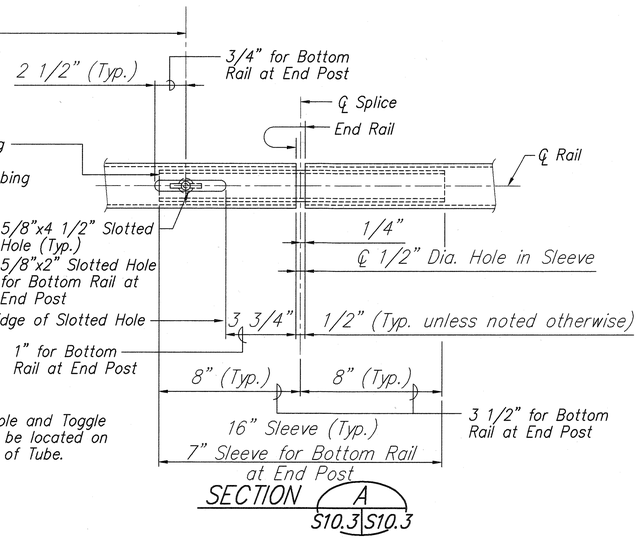
SECTION 3 S10.1 S10.3

SCALE: 1" = 1'-0"

3



ELEVATION



Note:
Slotted Hole and Toggle Bolt shall be located on underside of Tube.

SECTION A S10.3 S10.3

TYPICAL TUBE SPLICE DETAIL 3 S10.3 S10.3

Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE NOV/2000
	DRAWN BY JSY	
	TRACED BY JSY	
NOTE BOOK	DESIGNED BY KSF	
No.	QUANTITIES BY	
	CHECKED BY	

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

David K. Fujiwara

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

GRAPHIC SCALE:
1' 6" 0 1' 2'
SCALE: 1" = 1'-0"

DATE		DESCRIPTION
01-29-01	1	Added Notch
01-29-01	2	Added Note
01-29-01	3	Added Detail

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RAILING SECTION AND DETAILS

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S10.3 OF 50 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(1)R	2001	59	77

CONSTRUCTION SEQUENCE

STAGE 1: Construct the following in accordance with the Bridge and Roadway Best Management Practices (BMPs): [1]

(1) Abutments No. 1 and No. 2
(2) Wingwalls No. 1, No. 2, No. 3 and No. 4
(3) All Piers

Notes: (i) Probing and grouting is included in this stage. [1]

(ii) Do not place concrete backfill above footings at all piers until Stage 7.

[1] (For Stages 2 through 6, see note below.)

STAGE 2: Erect precast planks at least seven (7) days after pier and abutment pour or until pier and abutment concrete has attained a compressive strength of 3500 psi, whichever occurs later. Concrete compressive strength for precast planks shall have a compressive strength of 7000 psi.

STAGE 3: Pour deck topping except at "Delayed Pour Strip" at Pier 3.

STAGE 4: Construct Railings except at "Delayed Pour Strip" at Pier 3.

For Live Loading requirements, refer to Section 503.03(E) of the Hawaii Standard Specifications for Road, Bridge and Public Works Construction except between Pier 2 and Pier 4 where the Live Load shal be limited to 50 psf or one (1) vehicle with a gross weight not exceeding 5 kips on each side of the "Delayed Pour Strip".

STAGE 5: Pour concrete in "Delayed Pour Strip" thirty (30) days after entire deck pour in Stage 3.

STAGE 6: Construct remaining portion of railing at "Delayed Pour Strip" location.

STAGE 7: [1] Pour concrete backfill above footings at all Piers. Prior to pour, setup one layer of sandbag containment around the footings.

STAGE 8: Bridge may be opened for traffic after the concrete in the pour strip and railing have attained a compressive strength of 5000 psi and 4000 psi, respectively, or at least 7 days after the newest pour, whichever occurs later.

STAGE 9: [1] Remove existing detour road and construct embankments, CRM walls, GRP and rip rap in accordance with the Detour Road and Embankments BMPs.

[1] NOTE: Stages 2 through 6 will not require containment of work unless stream is flowing. Spilled concrete on the channel shall be removed.

ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DRAWN BY VSY DATE NOV2000
TRACED BY " " "
DESIGNED BY KSF " "
QUANTITIES BY " "
CHECKED BY " "

STEWART N. WILLIAMS ★ LICENSED PROFESSIONAL ENGINEER NO. 3908-S ★ HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

DATE	DESCRIPTION
01-29-01	[1] Modified Note

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE

MAMALAHOA HIGHWAY
REPLACEMENT OF
KEAIWA STREAM BRIDGE
Federal Aid Project No. ER-12(1)R

Scale: As Shown Date: January 2001

SHEET No. S11.1 OF 50 SHEETS