

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	35	137

GENERAL

- All materials shall conform to the drawings, Hawaii Standard Specifications for Road and Bridge Construction (2005 Edition) and Special Provisions.
- The Contractor shall verify the location of all existing utility lines and notify the respective owners before commencing the work of excavation or the drilling of the micropile and/or drilled shaft foundation, including any temporary piling or sheeting.
- Standard detail drawings refer to all structures in general except for modifications as may be required for special conditions. For such modifications refer to corresponding detailed drawings.
- The Contractor shall provide all measures necessary to protect the structure during construction. Such measures shall include, but not be limited to, bracing, shoring for loads due to construction equipment, winds, seismic, etc.
- The Contractor shall be solely responsible for all excavation and dewatering procedures including lagging, shoring and protection of streets, highways and utilities, including treatment and discharge of pumped water. For other dewatering notes, refer to site specific BMP notes on civil sheet C-13.
- The Contractor shall be solely responsible for coordinating the work of all trades and shall check all dimensions for existing and new construction. All discrepancies shall be called to the attention of the Engineer and be resolved before proceeding with the work.
- Shop drawings required by the standard specifications and special provisions shall be submitted to the Engineer for review prior to fabrication or ordering of materials.

SPECIAL NOTE

Should there be any conflict between Plans (drawings), Special Provisions and Standard Specifications, the most stringent requirement shall govern.

CONCRETE

- Schedule of structural concrete 28-day strength and types:
Bridge Railings and Endposts 4,000 PSI
Bridge Deck Slabs 5,000 PSI w/ 0.40 max w/c ratio

Approach Slabs 5,000 PSI
Abutment Walls and Wingwalls 4,000 PSI, Unless Otherwise Noted
Abutment Foundations (Pile Caps) 5,000 PSI
Pier Foundations 6,000 PSI w/ 0.40 max w/c ratio
(Footings, Pile Caps, and Grade Beams)
Pier Columns and Caps 6,000 PSI w/ 0.40 max w/c ratio

Other Elements 4,000 PSI
Micropiles - See sheet S3.1
Drilled Shafts - See sheet S3.3

Notes:

- Maximum cement content shall be 800 Lbs. per cubic yard.
- Color of concrete for pier columns and pier caps shall be standard concrete gray.

- Corrosion inhibitors shall be provided at manufacturer's recommended dosage. See special provisions.
- Shrinkage reducing admixture shall be provided in concrete for bridge deck slabs, railings and endposts. See special provisions for type and dosage.
- Maximum size of coarse aggregate shall be 3/4 inch for Pier #3 column, cap and grade beams.

- Concrete mixes shall be submitted to the Engineer for review.
- Clear coverage of concrete over outer reinforcing bars shall be as follows, unless otherwise noted.

Bridge Railings and Endposts	2"
Bridge Deck Slabs	2" to top steel 2" to bottom steel
Approach Slabs	2-1/2" to top steel 3" to bottom steel
Abutment Walls and Wingwalls	2"
Pier Caps	2-1/2"
Pier Columns (above ordinary high-water)	2-1/2"
Pier Columns (below ordinary high-water)	3"
Pier Column Base	3"
Spread Footings	3"
Pile Caps and Grade Beams	3"
Cast-In-Place Micropiles	See Sheet S3.1
Cast-In-Place Drilled Shafts	3-1/2"
Cast directly against earth	3"

Note:

For bridge deck slabs, placement tolerance on concrete cover shall be as follows:

Top Bars:	+0" and -3/8"
Bot Bars:	+0" and -1/4"

For other elements, see standard specifications.

- Concrete admixtures containing chloride salts shall not be used.
- All intentionally roughened surfaces in concrete shall be made with a minimum amplitude of 1/4" and shall be clean before pouring adjacent concrete.
- Nonshrinking grout shall have a minimum compressive strength of 5,000 PSI at 28 days, and shall be nonmetallic and nonstaining.
- Unless otherwise noted on drawings, all exterior corners and re-entrant angles 90 degrees or less in concrete work shall be chamfered 3/4"x3/4".

REINFORCING STEEL

- Reinforcing steel bars shall be ASTM A615 Grade 60, unless otherwise noted. Where noted on drawings, reinforcing steel bars shall be ASTM A706, Grade 60.
- Reinforcing steel bars shall be uncoated, unless otherwise noted. Where noted on drawings, reinforcing steel shall be stainless steel conforming to ASTM A955.

- Reinforcing steel splices shall be located only where indicated on the drawings.
- Lap splice length for reinforcing steel shall be as indicated on drawings. Where not indicated, minimum splice length shall be 52 bar diameters or 2'-4", whichever is longer.
- All reinforcing steel bars, anchor bolts, dowels and other embedded items shall be securely tied in place before concrete pour.
- All reinforcing steel bar bends shall be made cold.
- Reinforcing steel shall be detailed in accordance with the AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Fifth Edition, 2010, including Interim revisions, unless otherwise noted.
- Welding of reinforcing steel shall not be permitted unless otherwise shown on the drawings. Welding of reinforcing steel shall conform to AWS D1.4-05 "AWS Structural Welding Code - Reinforcing Steel" of the American Welding Society.

STRUCTURAL STEEL

- All structural steel shall conform to AASHTO M270 (ASTM A709), Grade 50, unless otherwise noted.
- Unless otherwise noted, all structural steel shall be hot dip zinc coated after fabrication. Steel plate girders shall be sand-blasted to SSPC SP-10 and shop primed with an organic epoxy zinc rich primer, intermediate coated with epoxy paint, and top coated with polyurethane paint. All holes shall be prepunched before shop priming and coating steel. Touch-up paint steel in field. All structural steel shall be painted. Color shall be black.
- All anchor bolts, threaded rods and other hardware, including nuts and washers, which connect steel to concrete shall be high-strength bolts conforming to ASTM F 1554, Grade 105, unless otherwise noted. All hardware shall be hot dip zinc coated.
- All bolts which connect steel to steel shall be high-strength bolts conforming to ASTM A325, Type 1, unless otherwise noted. Provide direct tension indicator washers for all high-strength bolts. All bolts, nuts and washers shall be hot dip zinc coated.
- All welds shall be in conformity with the structural welding code AWS D1.1-08 of the American Welding Society. Electrodes shall be E70.
- Field welding to existing steel shall not be permitted unless specifically shown or noted on drawings. See standard specifications and special provisions for pre-heat and other requirements.

ORIGINAL PLAN	NOTED BY	DESIGNED BY	QUANTITIES BY	CHECKED BY	DATE

 LICENSE EXPIRES: 4/30/14 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION <i>Norman K. Nagamine</i>	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION GENERAL STRUCTURAL NOTES <u>HAWAII BELT ROAD</u> <u>Rehabilitation of Umauma Stream Bridge</u> <u>Federal Aid Project No. BR-019-2(61)</u> Scale: None Date: July 25, 2012

SHEET No. 50.1 OF 4 SHEETS

DESIGN CRITERIA

AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Fifth Edition, 2010, including Interim revisions.

DESIGN LOADS

1. Dead Loads:
- A. An allowance of 25 PSF (from curb-to-curb) for A.C. wearing surface has been provided for in the design.
- B. An allowance of 150 PLF (at each side of the bridge) for future utilities has been provided for in the design.
2. Live Load: HL-93 Design Truck or Design Tandem, and Design Lane Load
3. Wind: Base Design Wind Velocity = 105 MPH
4. Earthquake:
- A. Horizontal Peak Ground Acceleration, PGA = 45%
- B. Horizontal Spectral Acceleration Coefficients
S_S = 95%
S₁ = 40%
- C. Seismic Zone = 4
- D. Soil Site Class = C
- E. Operational Classification = Essential Bridge

5. Traffic Railing Test Level = TL-4

CONSTRUCTION NOTES

1. See Standard Specifications and Special Provisions.
2. All items noted as incidental will not be paid for separately.
3. In general, top of concrete deck slab shall be constructed to follow the slopes shown on the drawings.
4. Except as otherwise noted, all vertical dimensions are measured plumb.
5. Contractor shall field verify all dimensions.
6. For concrete finish, see Standard Specifications, and for architectural treatment of columns, see details.
7. Construction joints shown on the drawings may be relocated or additional ones added, subject to the approval of the Engineer.
8. Where new concrete is poured against existing concrete, existing interface surface shall be cleaned and intentionally roughened to a minimum amplitude of 1/4".
9. New bridge rail shall be installed after new widened bridge deck structure is cast and cured 14 days minimum, and all shoring is removed.
10. Contractor shall follow "Construction Phasing Sheet" as shown on sheet S15.1.
11. Contractor shall submit detailed 3-week work schedules to the Engineer. See Standard Specifications.
12. For falsework or temporary shoring, Contractor shall refer to the current version of the AASHTO "Guide Specification for Temporary Works" and the "Construction Handbook for Bridge Temporary Works", including interim revisions.

FOUNDATION NOTES

1. Foundation design is based on a geotechnical investigation by Hirata and Associates, Inc., "Foundation Investigation Umauma Stream Bridge Rehabilitation Route 19, M.P. 16.02, North Hilo, Hawaii." dated April 28, 2011.
2. Unless otherwise indicated, refer to special provisions and Standard Specifications for foundation preparation, compaction requirements, and other requirements.
3. Unless otherwise noted, spread footings shall be excavated and poured neat against undisturbed ground. In case of over excavation, space between footing and ground shall be filled with concrete at the Contractor's expense and as directed by the Engineer. The minimum quality of the fill concrete shall be Class D. For spread footings bearing on rock (hard basalt), see sheet S5.1.
4. Soil Design Parameters
- a. New Pier #1 and Pier #2
Soil Bearing Pressures:
Service Limit State = 10,000 PSF
Strength Limit State = 13,000 PSF
Extreme Event Limit State = 30,000 PSF

Coefficient of Friction:
Strength Limit State = 0.60
Extreme Event Limit State = 0.70

Passive Earth Pressure:
Strength Limit State = 400 PCF
Extreme Event Limit State = 800 PCF
- b. New Pier #3
Micropiles, see sheet S3.1
Ground Anchors, see sheet S5.12
- c. Abutments (Existing and New Widened Sections)
Soil Bearing Pressures:
Service Limit State = 4,000 PSF
Strength Limit State = 6,000 PSF
Extreme Event Limit State = 13,000 PSF

Coefficient of Friction:
Strength Limit State = 0.45
Extreme Event Limit State = 0.53

Passive Earth Pressure:
Strength Limit State = 220 PCF
Extreme Event Limit State = 440 PCF

Active Earth Pressure:
Free-Standing, Level Backfill = 40 PCF
Restrained, Level Backfill = 55 PCF

Dynamic Lateral Earth Force = 22 x H squared

Drilled Shafts: see sheet S3.3
- d. Approach Slabs
Soil Bearing Pressures:
Service Limit State = 4,000 PSF
Strength Limit State = 6,000 PSF

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GENERAL NOTES FOR EPOXY GROUTED DOWELS & BOLTS

1. See Special Provisions and Standard Specifications Section 656 for reinforcing steel dowels.
2. Contractor shall locate existing reinforcing prior to drilling holes for new epoxy grouted reinforcing steel dowels and steel anchor bolts. Do not damage existing reinforcing.
3. Epoxy grout for reinforcing steel dowels and steel anchor bolts shall conform to Standards Specifications Section 712.04(B).
4. Clean holes of all dust and residue before filling holes with epoxy grout.
5. Where noted on drawings, installation of epoxy grout and reinforcing dowels and steel anchor bolts shall be inspected by the Engineer.
6. After epoxy grout has cured, dowels shall be pull-tested as directed by the Engineer.
7. Epoxy grouted reinforcing steel dowels shall be incidental to Section 602 reinforcing steel and will not be paid for separately.
8. Epoxy grouted steel anchor bolts shall be incidental to Section 501 Steel Structures and will not be paid for separately.
9. All drilled holes shall be cleaned, filled with epoxy, and reinforcing dowels and anchor bolts installed prior to end of work day.

INSPECTION REQUIREMENTS

1. Contractor shall refer to Standard Specifications Section 105.11 - "Inspection of the Work and Materials."
2. The work items that will require inspection by the Engineer shall be, but not be limited to, the following items:
- a. Reinforcing steel
- b. Concrete
- c. Epoxy grouted reinforcing dowels and steel anchor bolts
- d. Anchor bolts cast-in concrete
- e. High-strength bolting
- f. Field welding

Contractor shall notify the Engineer at least 7 working days prior to the above inspections.

	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	GENERAL STRUCTURAL NOTES
	(CONTINUATION)
	HAWAII BELT ROAD Rehabilitation of Umauma Stream Bridge Federal Aid Project No. BR-019-2(61)
Scale: None Date: July 25, 2012	

SHEET No. S0.2 OF 4 SHEETS

PAINTING OF EXISTING STEEL TRETTLES

EXISTING STEEL ENCASED IN NEW STRUCTURES

ABBREVIATIONS:

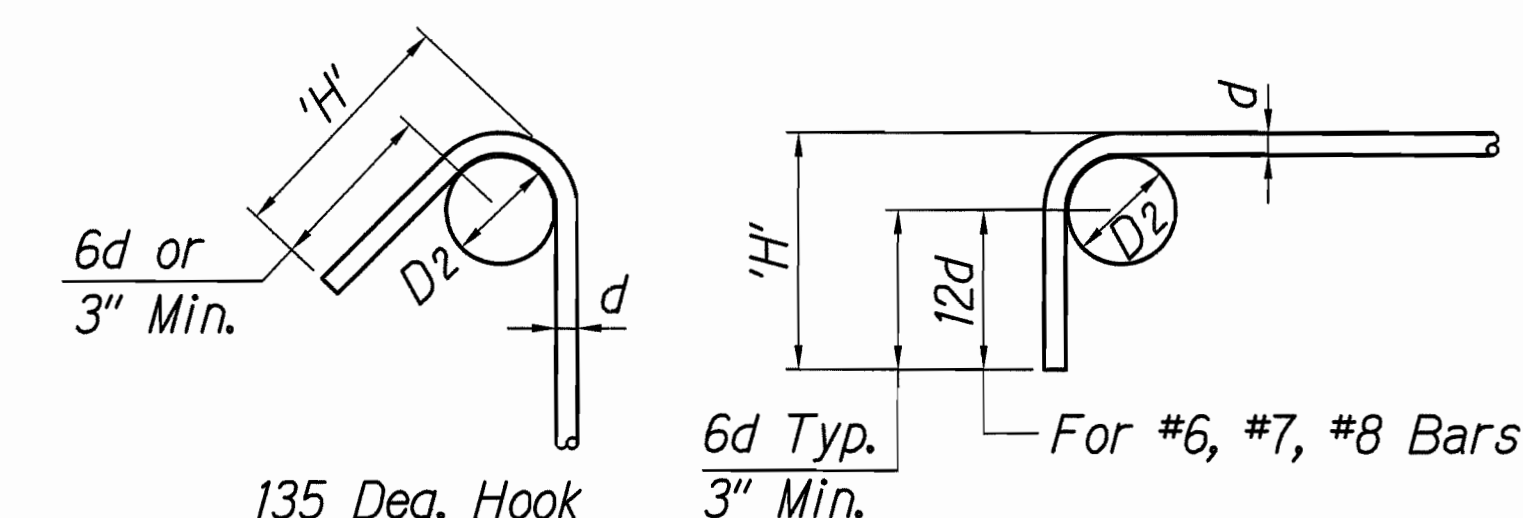
ABBREVIATIONS (CONTINUE):

ABBREVIATIONS (CONTINUE):

90 Deg. Hook

180 Deg. Hook

PRINCIPAL REINFORCING



TIE OR STIRRUP

Notes:

1. *All bends shall be made cold.*
2. *#14 & #18 bars shall be bend-tested and approved prior to bending.*
3. *Bar bend dimension (hook length) where shown on drawings shall govern if dimension is greater than shown in table.*

REINFORCING STEEL BAR BENDS & HOOKS

NOT TO SCALE

 LICENSE EXPIRES: 4/30/14 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION <i>Norman K. Nagamine</i>	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <u>GENERAL STRUCTURAL NOTES</u> <u>(CONT.) LEGEND & ABBREVIATIONS</u> <u>HAWAII BELT ROAD</u> <u>Rehabilitation of Umauma Stream Bridge</u> <u>Federal Aid Project No. BR-019-2(61)</u> Scale: _____ Date: July 25, 2012
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ESTIMATED QUANTITIES (STRUCTURAL)			
ITEM NO.	ITEM	QUANTITY	UNIT
202.1000	Removal of existing bridge railings, endposts and sidewalks, portion of existing deck slabs and deck drains, portion of existing abutments, wingwalls, fins, parapets and brackets, existing wood stairs and concrete stair on grade	L.S.	L.S.
202.2000	Relocate existing DOT trailer and field house	L.S.	L.S.
205.1000	Structure excavation for abutments and wingwalls	L.S.	L.S.
205.2000	Structure excavation for Piers #1, #2, and #3	L.S.	L.S.
205.3000	Shoring, bracing and/or underpinning of existing bridge foundations	L.S.	L.S.
205.4000	Structure backfill for abutments and wingwalls	L.S.	L.S.
205.5000	Structure backfill for Piers #1, #2, and #3	L.S.	L.S.
212.1000	Probing at Pier #1 and Pier #2	460	L.F.
212.2000	Grouting of Probe Holes at Pier #1 and Pier #2	4	C.Y.
212.3000	Backfilling of Grouting of Voids or Cavities at Pier #1 and Pier #2	F.A.	F.A.
501.1000	Structural steel - welded plate girders (primed and painted)	L.S.	L.S.
501.2000	Structural steel - bracing and other members (zinc hot dip galvanized and painted)	L.S.	L.S.
501.3000	Structural steel - longitudinal strut, bumper and strut/bumper (zinc hot-dip galvanized and painted)	L.S.	L.S.
503.1000	Concrete in bridge deck slab widening	L.S.	L.S.
503.2000	Concrete in pier columns and caps - Piers #1, #2, and #3	L.S.	L.S.
503.3000	Concrete in abutments and wingwalls	L.S.	L.S.
503.4000	Concrete in abutment foundations (pile caps)	L.S.	L.S.
503.5000	Concrete in pier foundations (footings and pile caps)	L.S.	L.S.
503.6000	Concrete in approach slabs behind abutments	L.S.	L.S.
503.7000	Concrete in bridge deck new and existing - joint seals	L.S.	L.S.
506.1000	Bearing and expansion plates under new and existing steel plate girders (including new anchor bolts)	L.S.	L.S.
507.1000	Concrete traffic railing and endposts	L.S.	L.S.
511.1000	Furnishing drilled shaft drilling equipment	L.S.	L.S.
511.2000	Furnishing instrumentation and collecting data	L.S.	L.S.
511.3000	Drilled shafts	330	L.F.
511.4000	Standard excavation	330	L.F.
512.1000	Furnishing micropile drilling and grouting equipment	L.S.	L.S.
512.2000	Preproduction micropile load tests	L.S.	L.S.
512.3000	Production micropiles - uncased length of micropile	720	L.F.
512.4000	Production micropiles - cased length of micropile	800	L.F.
602.1000	Reinforcing steel for bridge (except foundations)	L.S.	L.S.
602.2000	Reinforcing steel for foundations	L.S.	L.S.
604.1000	Steel frame and hatch cover in concrete pier column	L.S.	L.S.
628.1000	Shotcrete for Pier #3 ground anchors	L.S.	L.S.
648.1000	Field Posted Drawings	L.S.	L.S.
654.1000	Longitudinal cable restrainer	L.S.	L.S.
670.1000	Draped wire mesh	180	S.Y.
681.1000	Furnishing specialty equipment for ground anchors	L.S.	L.S.
681.2000	Ground anchors for Pier #3	10	Ea.
681.3000	Reinstallation of ground anchors due to grout loss and additional performance tests or proof tests	F.A.	F.A.
694.1001	Repair to structural steel members - type 1	20	Ea.
694.1002	Repair to structural steel members - type 2	500	Ea.
694.1003	Repair to structural steel members - type 3	100	Ea.

ORIGINAL PLAN	SURVEY PLOTTED BY _____ DATE _____
NOTEBOOK	DRAWN BY _____
	TRACED BY _____
	DESIGNED BY _____
	QUANTITIES BY _____
No. _____	CHECKED BY _____

NORMAN K. NAGAMINE

LICENSED
PROFESSIONAL
ENGINEER

NO. 5479-S

HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14

THIS WORK WAS PREPARED BY ME
UNDER MY SUPERVISION

Norman K. Nagamine

EXISTING & DEMOLITION GENERAL NOTES

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	ADD. 39	137

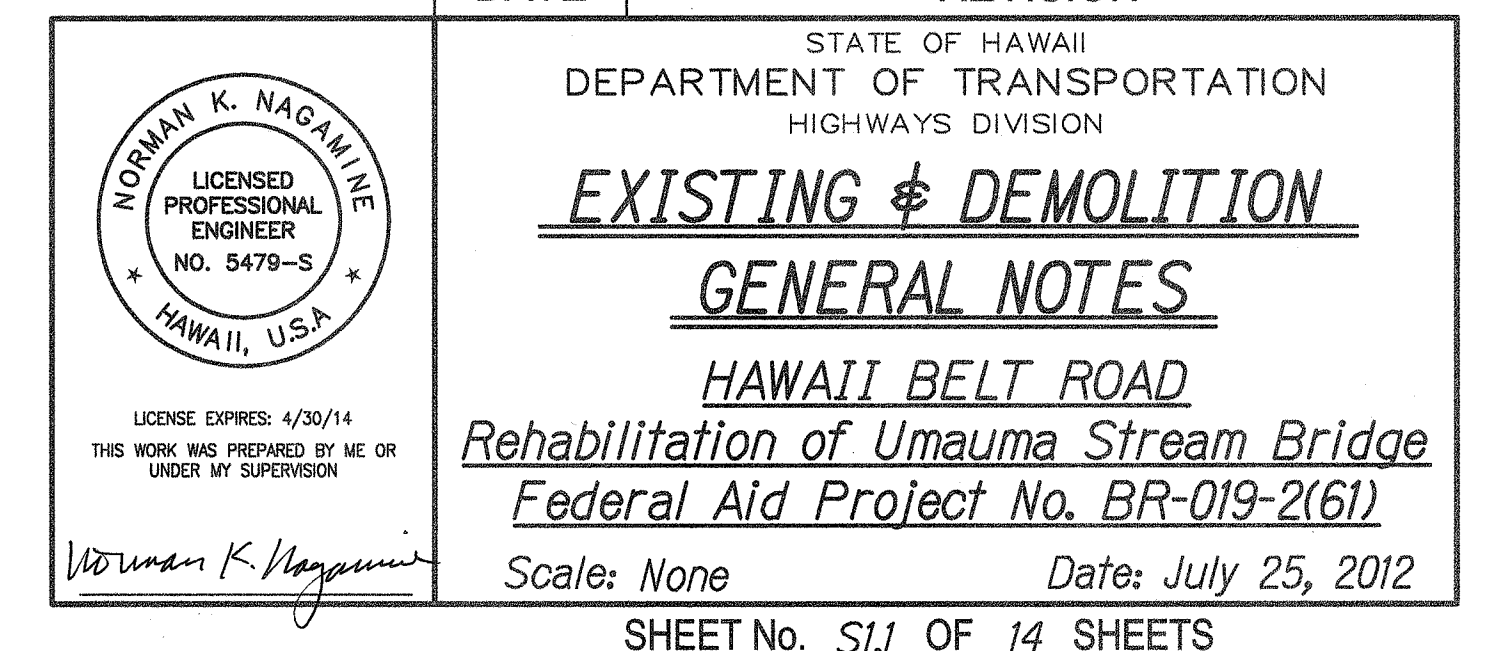
1. *See general structural notes on sheet S0.1, S0.2 and S0.3 for additional information.*
2. *Existing bridge occurs over a deep valley with steep sloped terrain on both sides. There are no existing access roads below the bridge. Refer to topographic map on sheet T7 and elevation view of bridge on sheet S1.4.*
3. *Existing bridge must remain open to traffic during the construction period.*
4. *Demolition work shall be coordinated with construction of new work. See construction phasing on sheet S15.1. Contractor shall submit proposed schedule and sequence of demolition work for Engineer's review prior to commencing with demolition work.*
5. *Existing conditions are shown on the drawings to the best of our knowledge. Dimensions and member sizes where shown on the drawings are based on available as-built bridge plans. Existing dimensions shown may not be exact and are provided for information only. Contractor shall field verify all existing dimensions prior to construction. All discrepancies shall be promptly called to the attention of the Engineer and shall be resolved prior to proceeding with the demolition work.*
6. *As-built plans of the existing bridge are available for review from the State of Hawaii Department of Transportation, Highways Division, Design Branch, Kakuhihewa Building Room 609, 601 Kamokila Boulevard, Kapolei, Hawaii 96707, Phone no. 808-692-7586.*
7. *Protect from damage existing structures to remain. Protect from damage and clean existing reinforcing steel to be incorporated in new concrete work. See Standard Specifications Section 202 "Removal of Structures and Obstructions".*
8. *Where existing reinforcing steel is not required to be incorporated in new concrete work, cut ends of reinforcing steel shall be recessed 1-1/2" minimum below existing concrete surface. Resulting pockets in existing concrete shall be filled with non-shrink grout. This work shall be incidental to Section 202 "Removal of Structures and Obstructions".*

HAZARDOUS MATERIALS NOTES

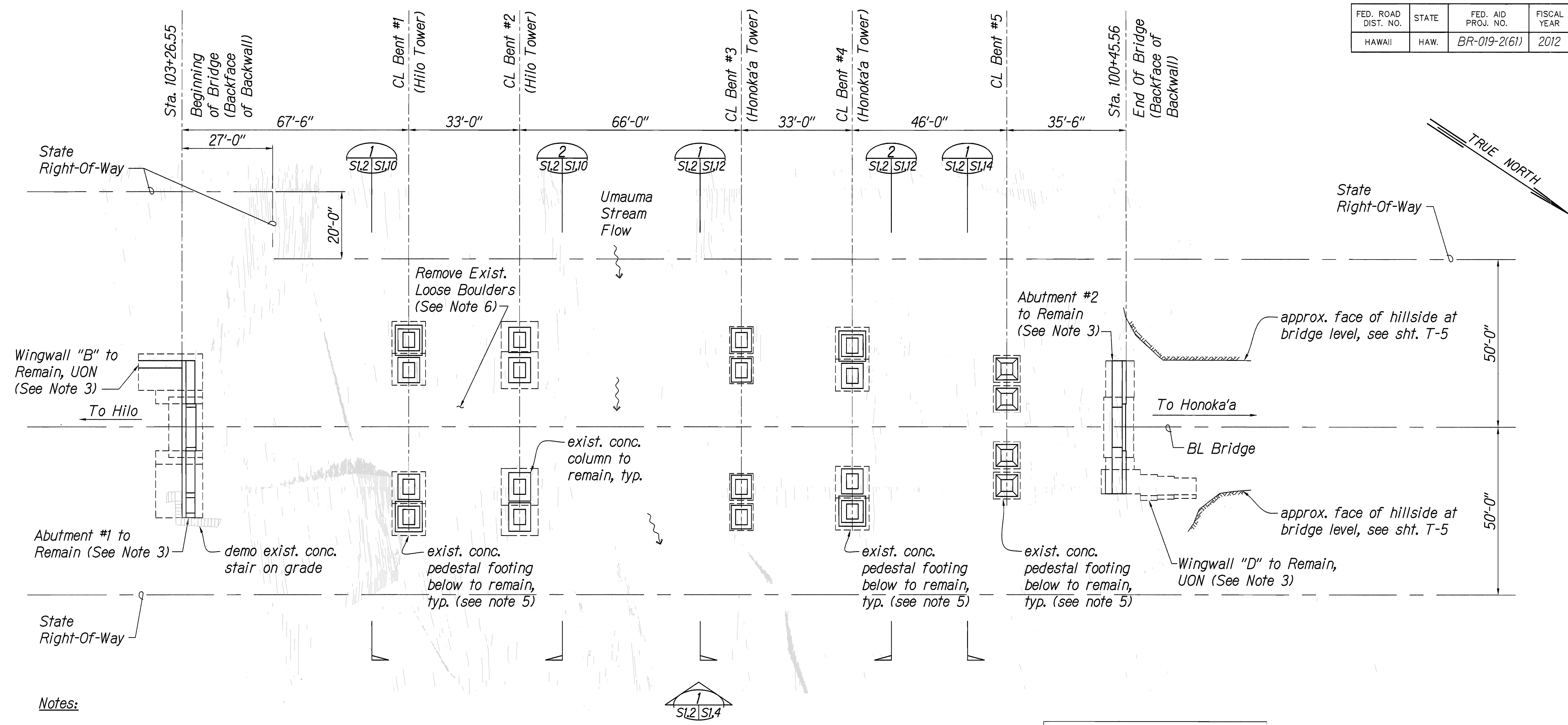
1. *Portions of existing bridge structure are known to contain lead-based paint. Portions of existing grade around existing pedestal footings are known to contain lead impacted soil. Contractor shall refer to the report prepared by Bureau Veritas North America, Inc. and entitled "Hazardous Materials Assessment with Soil and Sediment Sampling and Analysis, Rehabilitation of Umauma Stream Bridge, Hawaii Belt Road, Route 19, District of North Hilo, Island of Hawaii", dated April 16, 2010.*
2. *Refer to Special Provisions Section 695 "Lead in Construction" for removal and disposal of lead in construction.*
3. *Removal and disposal of lead-based paint on existing concrete structures shall be paid for under Section 695 "Lead in Construction".*
4. *Remediation of lead-impacted soil shall be paid for under Section 695 "Lead in Construction".*

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
	DRAWN BY _____	" _____
	TRACED BY _____	" _____
	DESIGNED BY _____	" _____
	QUANTITIES BY _____	" _____
NOTEBOOK		

 10/22/12	<i>Revised Hazardous Materials Notes</i>
DATE	REVISION

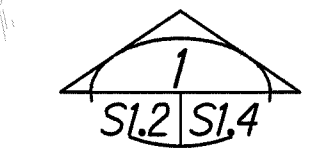


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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Notes:

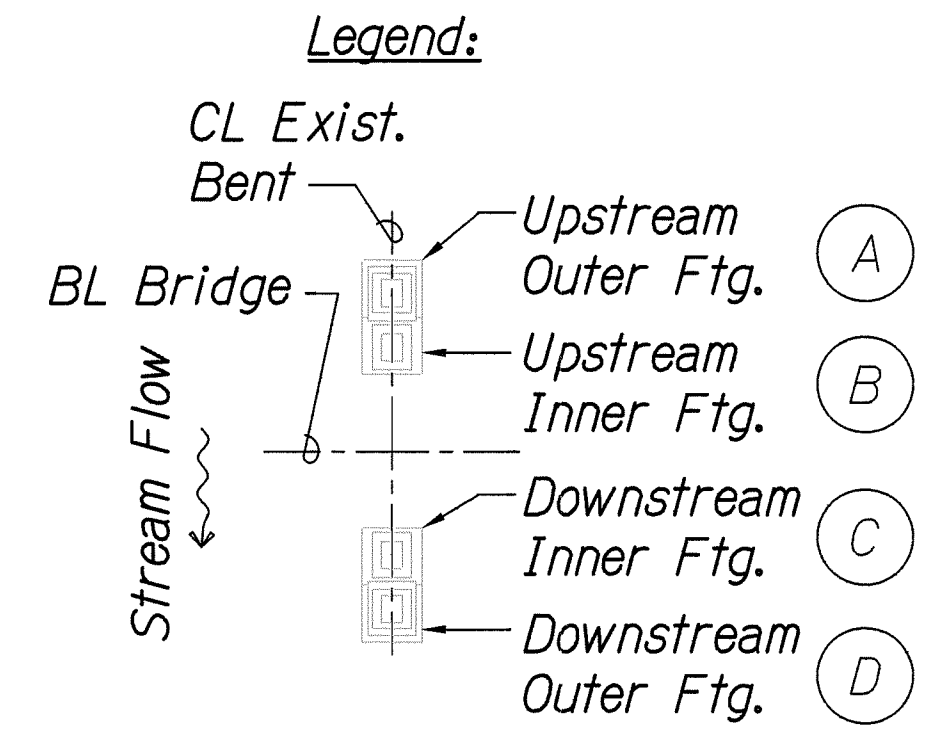
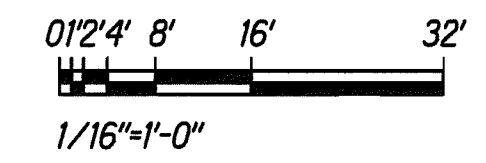
- Contractor shall field verify existing dimensions and conditions.
- All work shall be contained within State Right-Of-Way.
- For existing and demolition plans and details of abutment #1 and wingwall "B", see sheets S1.6 and S1.7. For existing and demolition plans and details of abutment #2 and wingwall "D", see sheets S1.8 and S1.9.
- For existing elevations of towers and bents, see sheets S1.10 to S1.14.
- Abate and dispose of lead impacted soil around existing pedestal footings. See Hazardous Materials notes on sheet S1.1.
- Use extreme caution when removing loose boulders. Do not damage existing footings, pedestals, columns and steel structures. Do not undermine existing footings.
- For construction phasing, see sheet S15.1.
- Work within ordinary high-water mark shall be conducted during "dry season" or during minimal stream flow. See civil sheet C-13.
- Refer to Site Specific BMP Notes on sheet C-13.



EXISTING FOUNDATION PLAN
SCALE: 1/16" = 1'-0"

Note:
For dimensions not shown, see elevations and enlarged plans.

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**EXISTING & DEMOLITION PLAN -
FOUNDATION LEVEL**

**HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)**

Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S1.2 OF 14 SHEETS

LEGEND

CL Exist. Bent

BL Bridge

Stream Flow

Upstream Outer Ftg. (A)

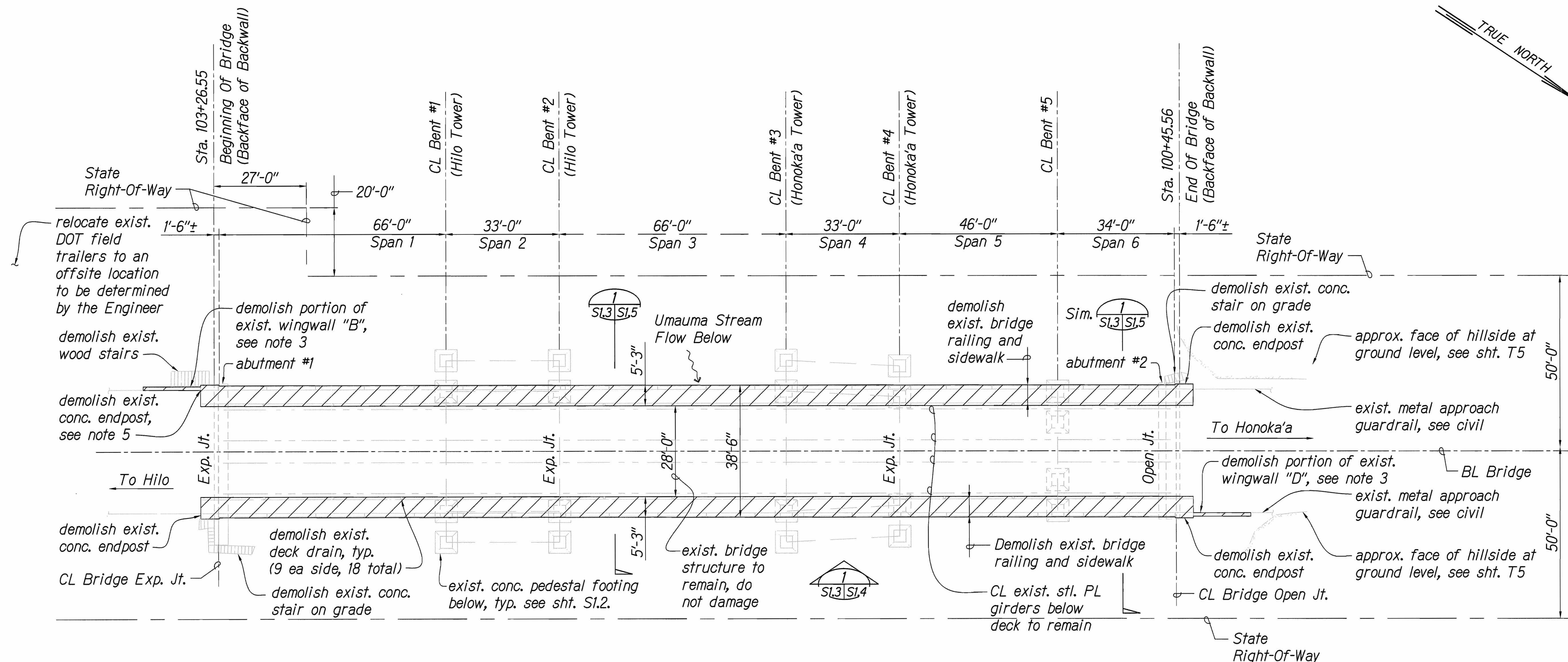
Upstream Inner Ftg. (B)

Downstream Inner Ftg. (C)

Downstream Outer Ftg. (D)

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
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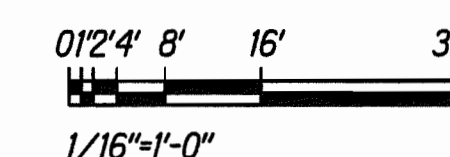


EXISTING & DEMOLITION PLAN - BRIDGE DECK LEVEL
 SCALE: 1/16" = 1'-0"

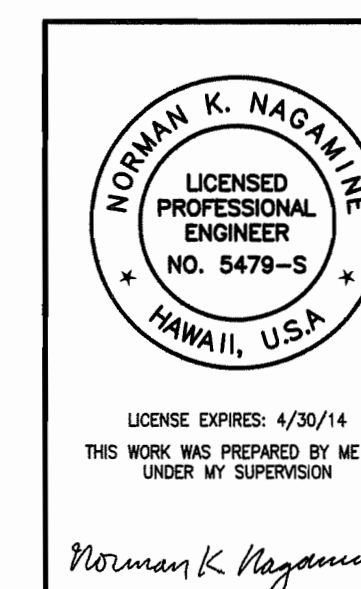
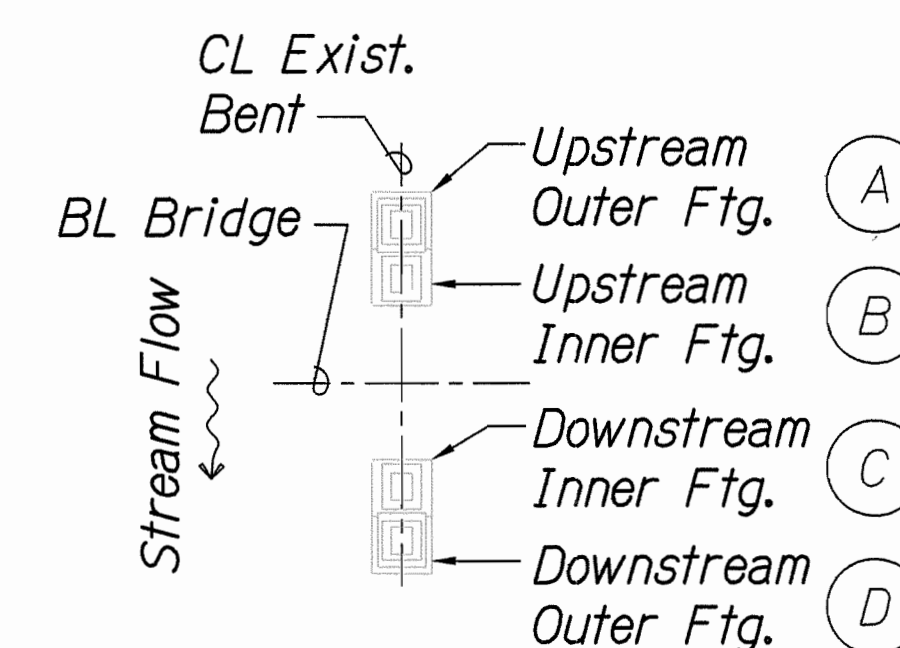
Notes:

- Contractor shall field verify existing dimensions and conditions.
- All work shall be contained within State Right-Of-Way.
- For existing and demolition plans and details of abutment #1 and wingwall "B", see sheets S1.6 and S1.7. For existing and demolition plans and details of abutment #2 and wingwall "D", see sheets S1.8 and S1.9.
- For existing elevations of towers and bents, see sheets S1.10 to S1.14.
- Abate and dispose of lead-based paint on existing concrete endpost prior to demolition. See Hazardous Materials notes on sheet S1.1.
- For construction phasing, see sheet S1.5.1.

GRAPHIC SCALES:



Legend:



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

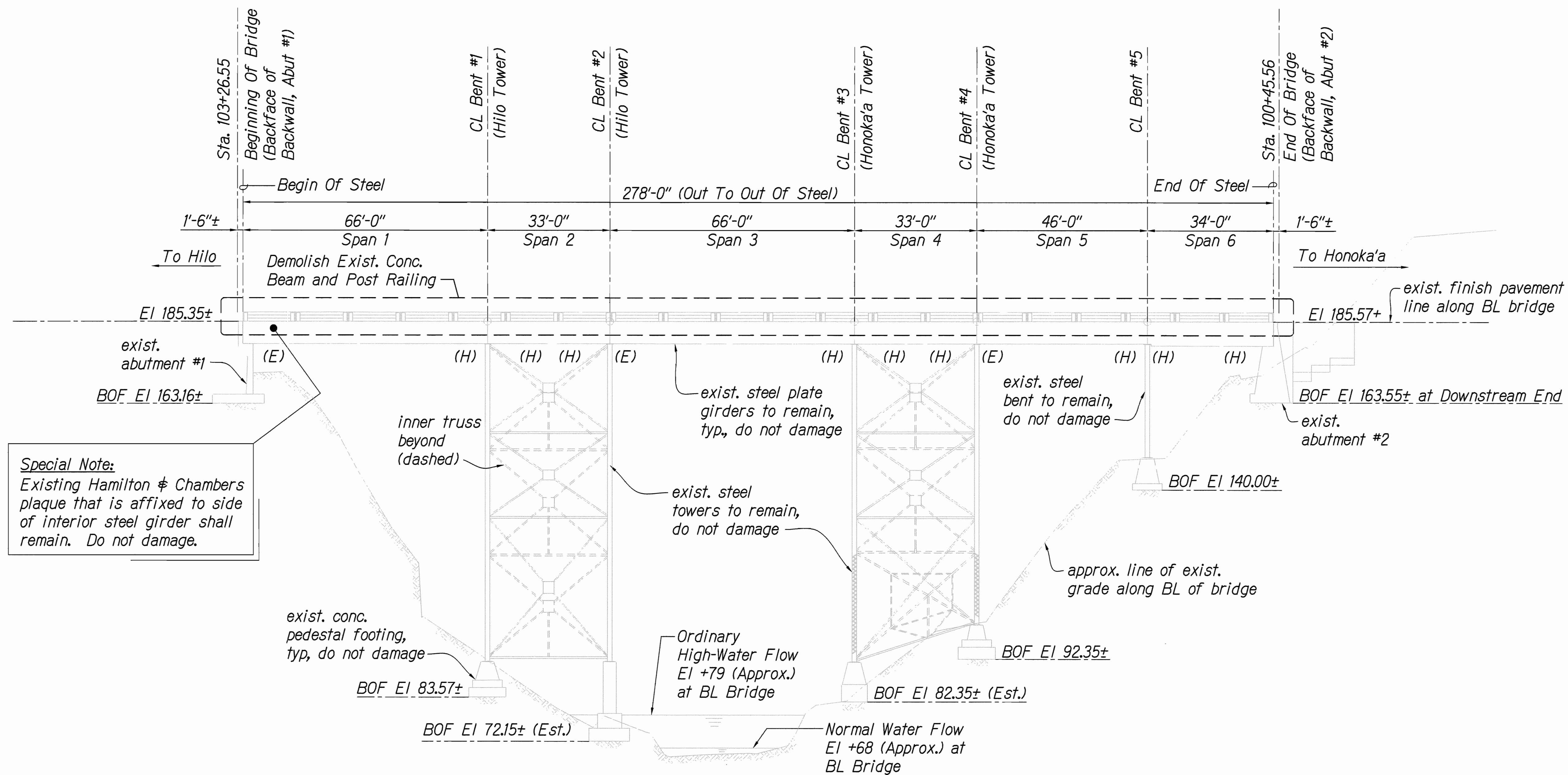
**EXISTING & DEMOLITION
 PLAN - BRIDGE DECK LEVEL**

**HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)**

Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S1.3 OF 14 SHEETS

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Special Note:
Existing Hamilton & Chambers plaque that is affixed to side of interior steel girder shall remain. Do not damage.

EXISTING & DEMOLITION - EAST/DOWNSTREAM ELEVATION (WEST/UPSTREAM SIMILAR)

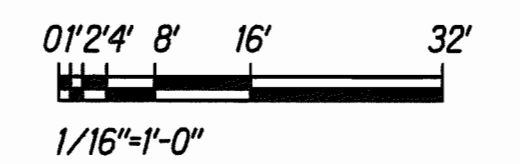
Notes:

1. All elevations denoted as "±" were estimated from as-built bridge drawings. Contractor shall field verify these elevations where applicable.
2. For construction phasing, see sheet S15.1.
3. Work within ordinary high-water mark shall be conducted during "dry season" or during minimal stream flow. See civil sheet C-13.

Legend:

(E) = Expansion Bearing
(H) = Hinge Bearing

GRAPHIC SCALES:



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

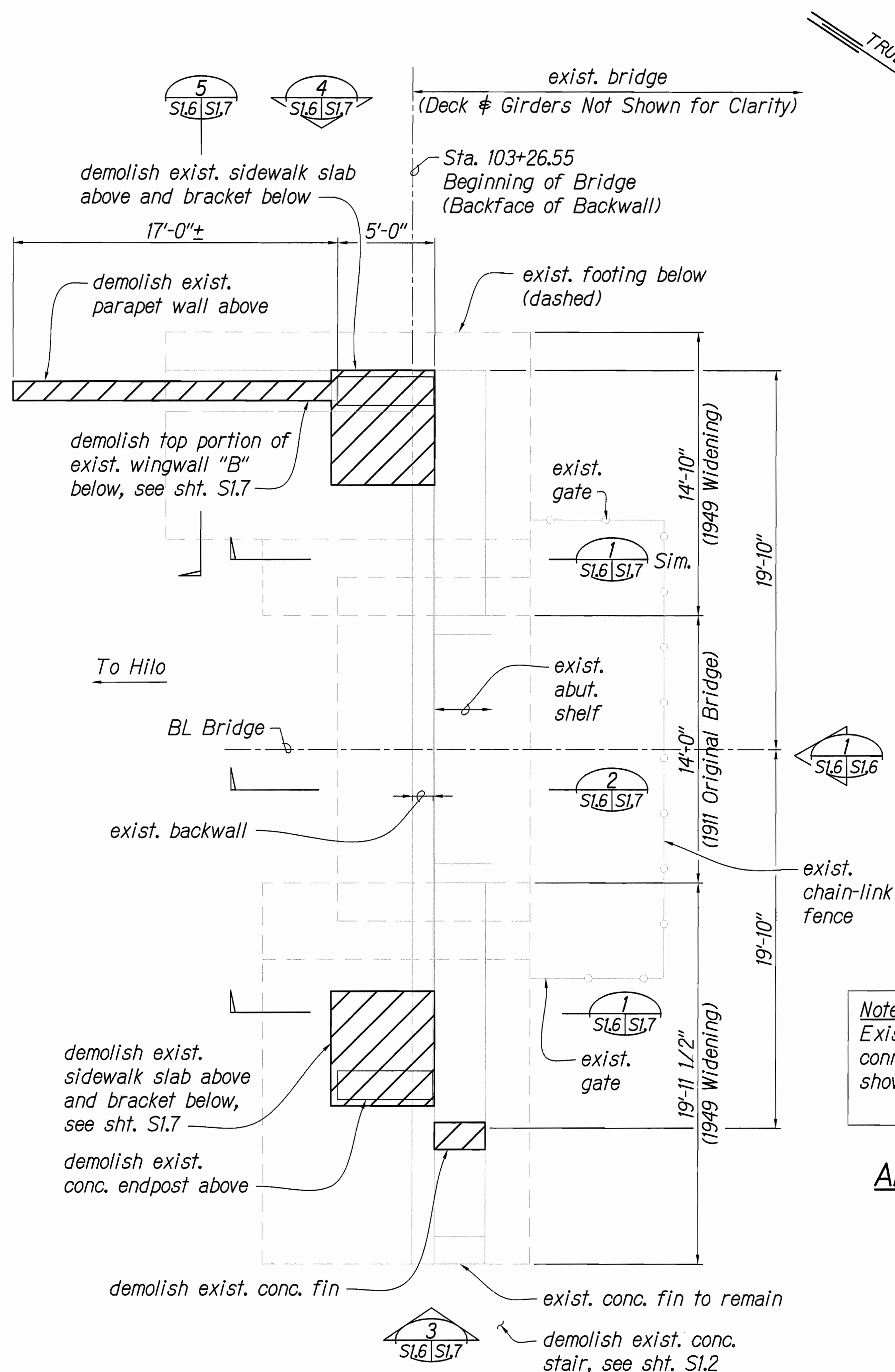
**EXISTING & DEMOLITION -
EAST (OR DOWNSTREAM) ELEVATION**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

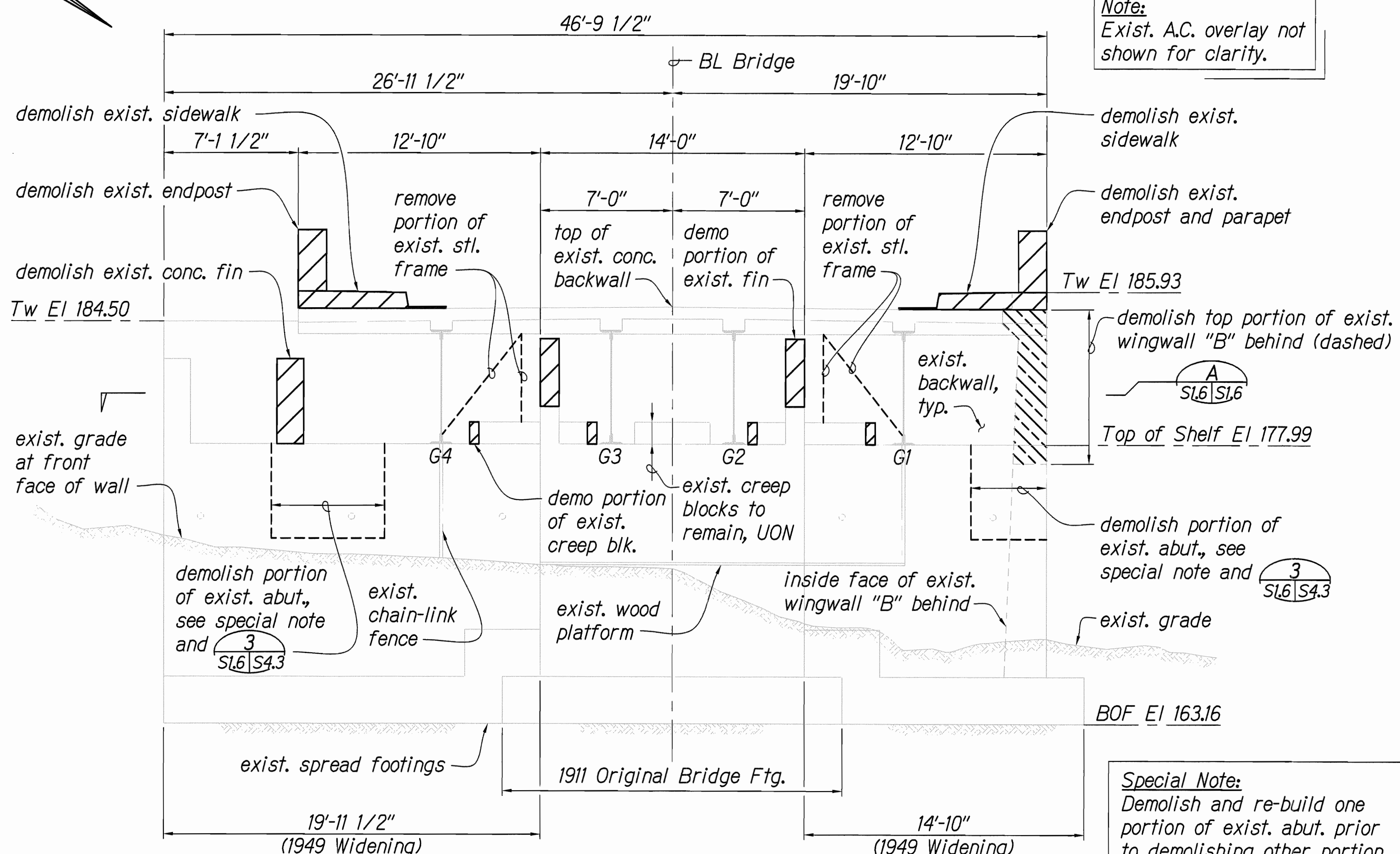
Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S1.4 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	44	137



ABUTMENT #1 - BRIDGE LEVEL & FOUNDATION PLAN
 S1.2 & S1.6 S1.6 SCALE: 1/4" = 1'-0"



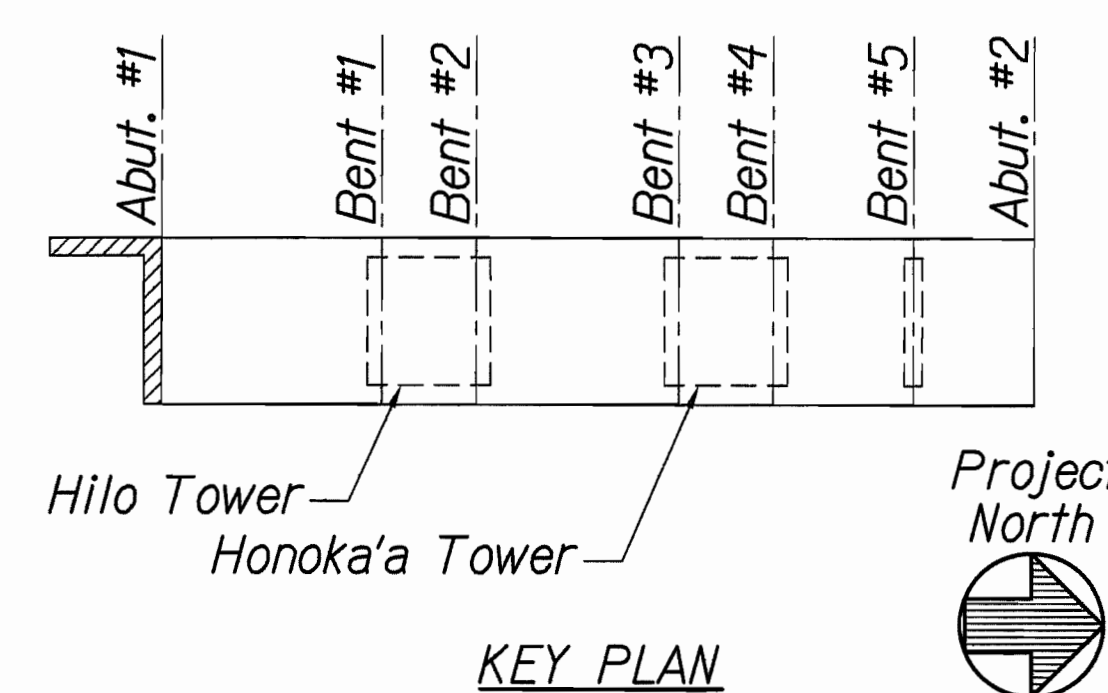
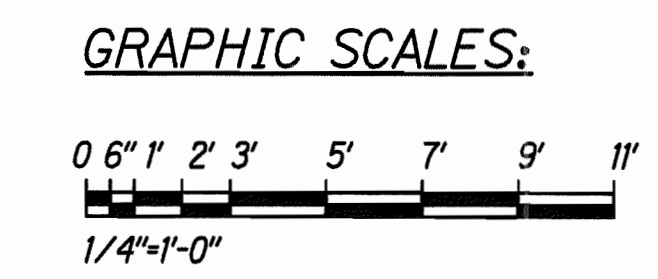
ABUTMENT #1 - FRONT ELEVATION
 S1.6 S1.6 SCALE: 1/4" = 1'-0"

ABUTMENT #1 - EXISTING AND DEMOLITION

Note:
 Exist. A.C. overlay not shown for clarity.

Note:
 Existing steel end frame and connection to remain not shown, UON. See S1.6 S9.5

Special Note:
 Demolish and re-build one portion of exist. abut. prior to demolishing other portion. Coordinate work sequence with construction phasing on sht. S15.1



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

EXISTING & DEMOLITION
ABUTMENT #1 - PLAN & ELEVATION

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

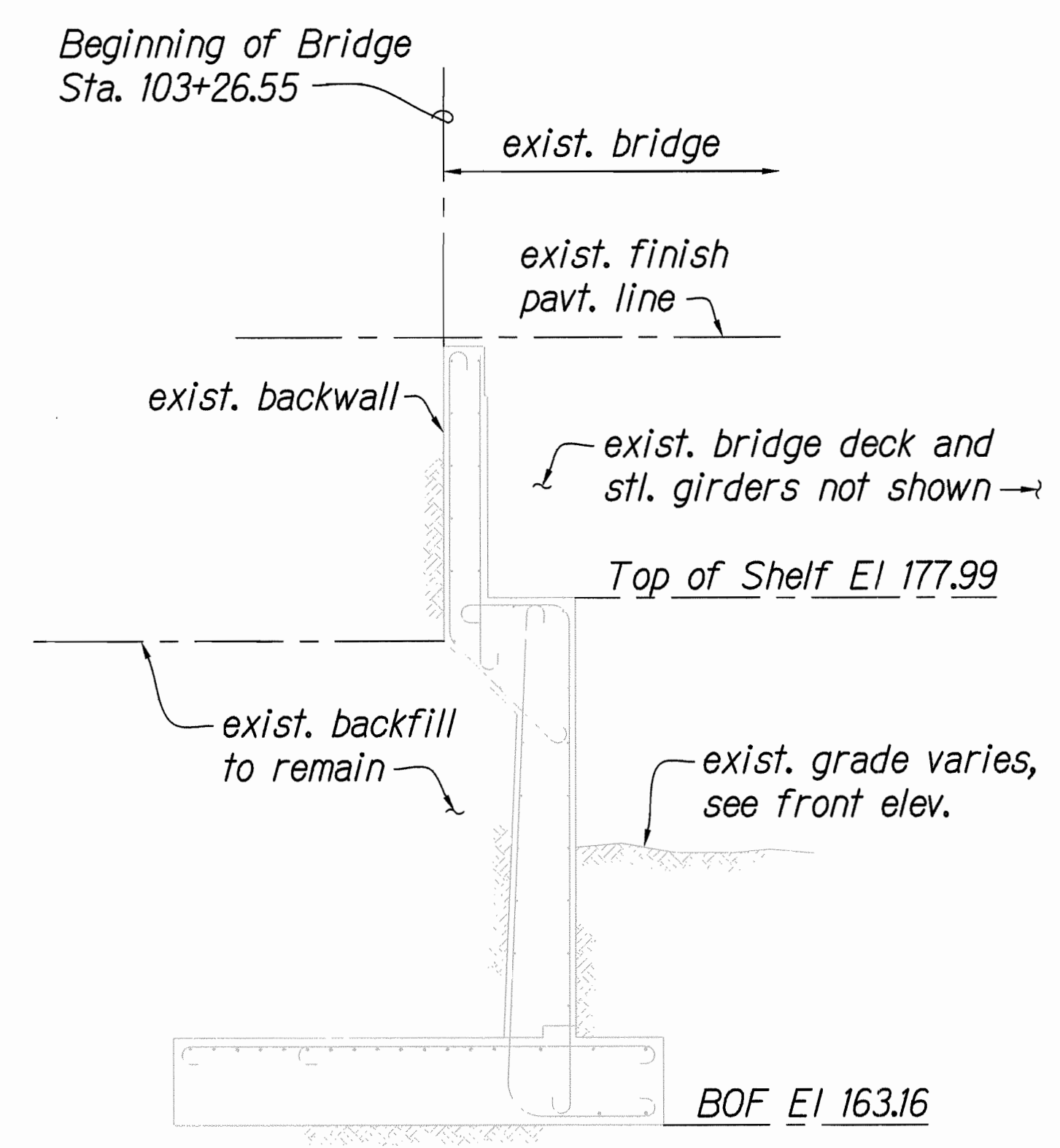
SHEET No. S1.6 OF 14 SHEETS

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 LICENSED PROFESSIONAL ENGINEER
 NO. 5479-S
 HAWAII, U.S.A.

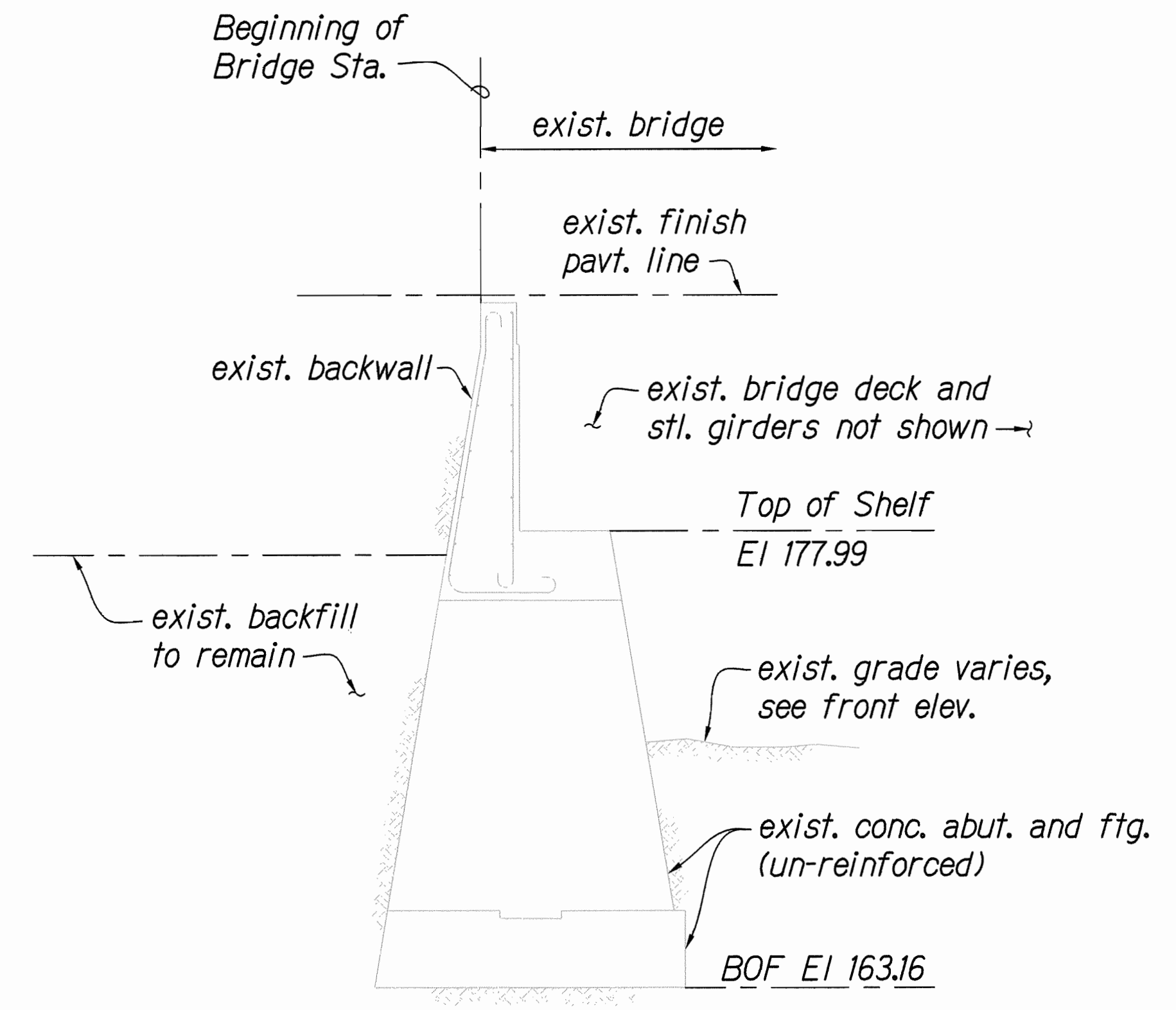
License Expires: 4/30/14
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SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED BY	
NO.	

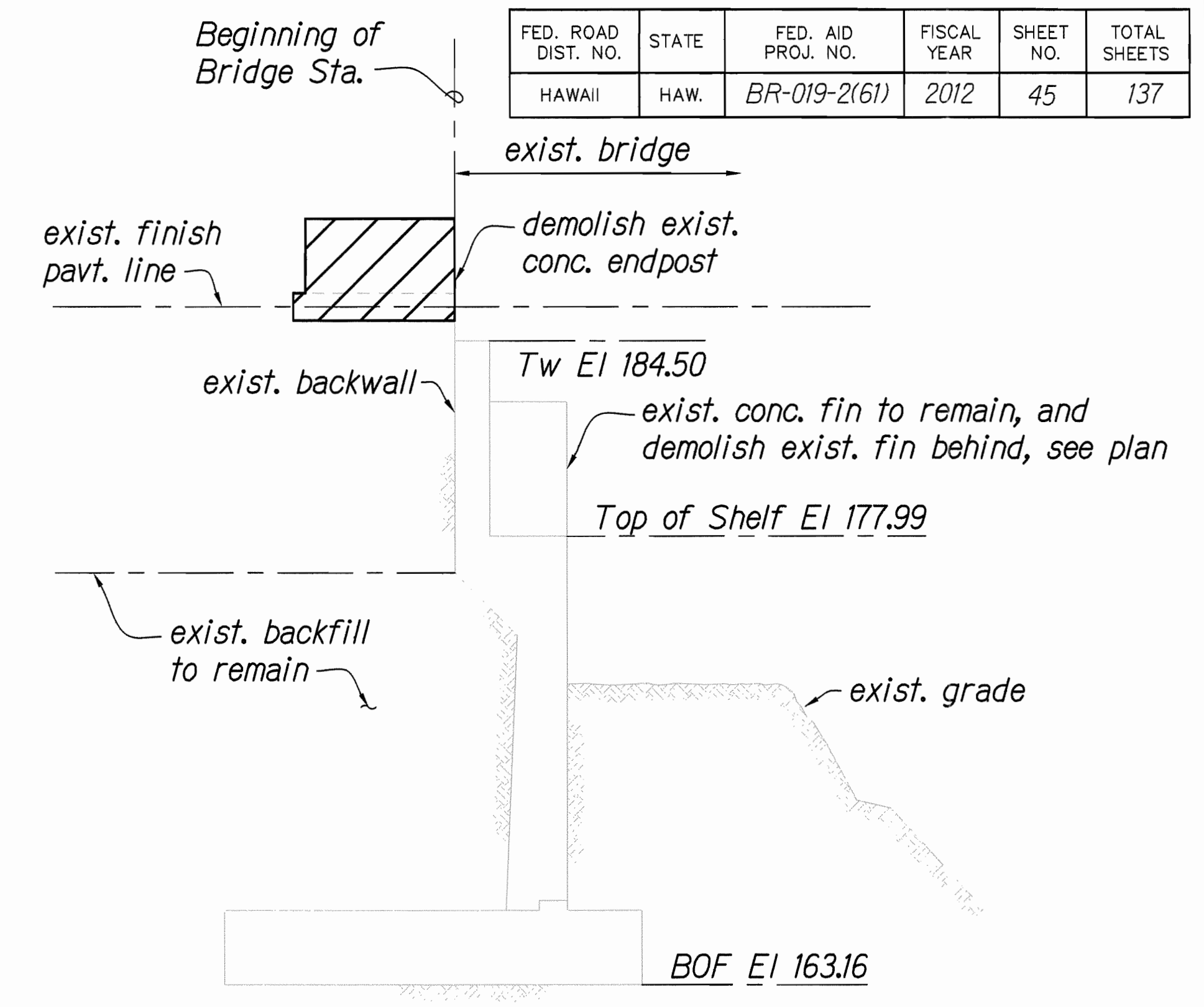
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	45	137



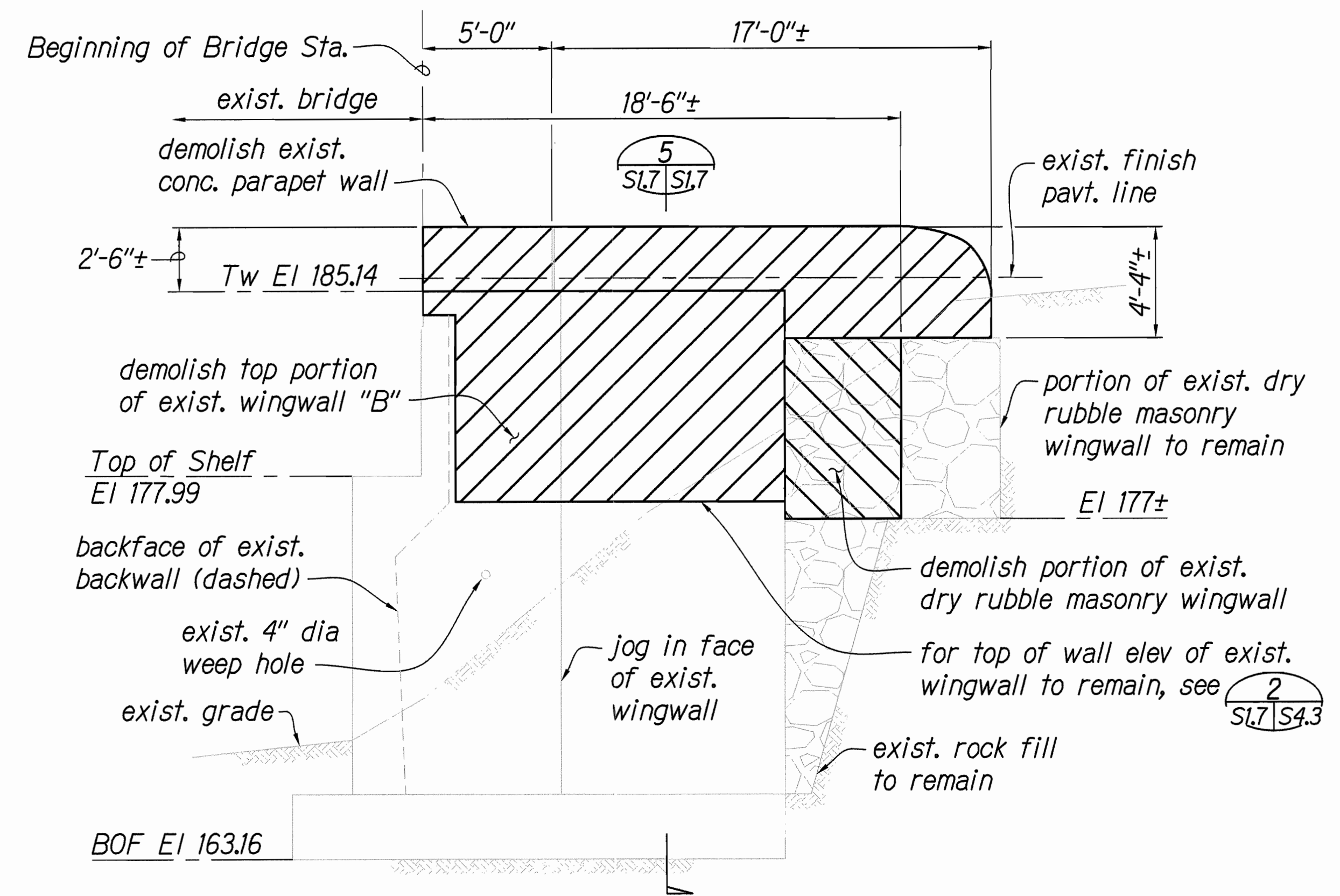
1 SECTION THRU 1949 WIDENING
 SCALE: 1/4" = 1'-0"



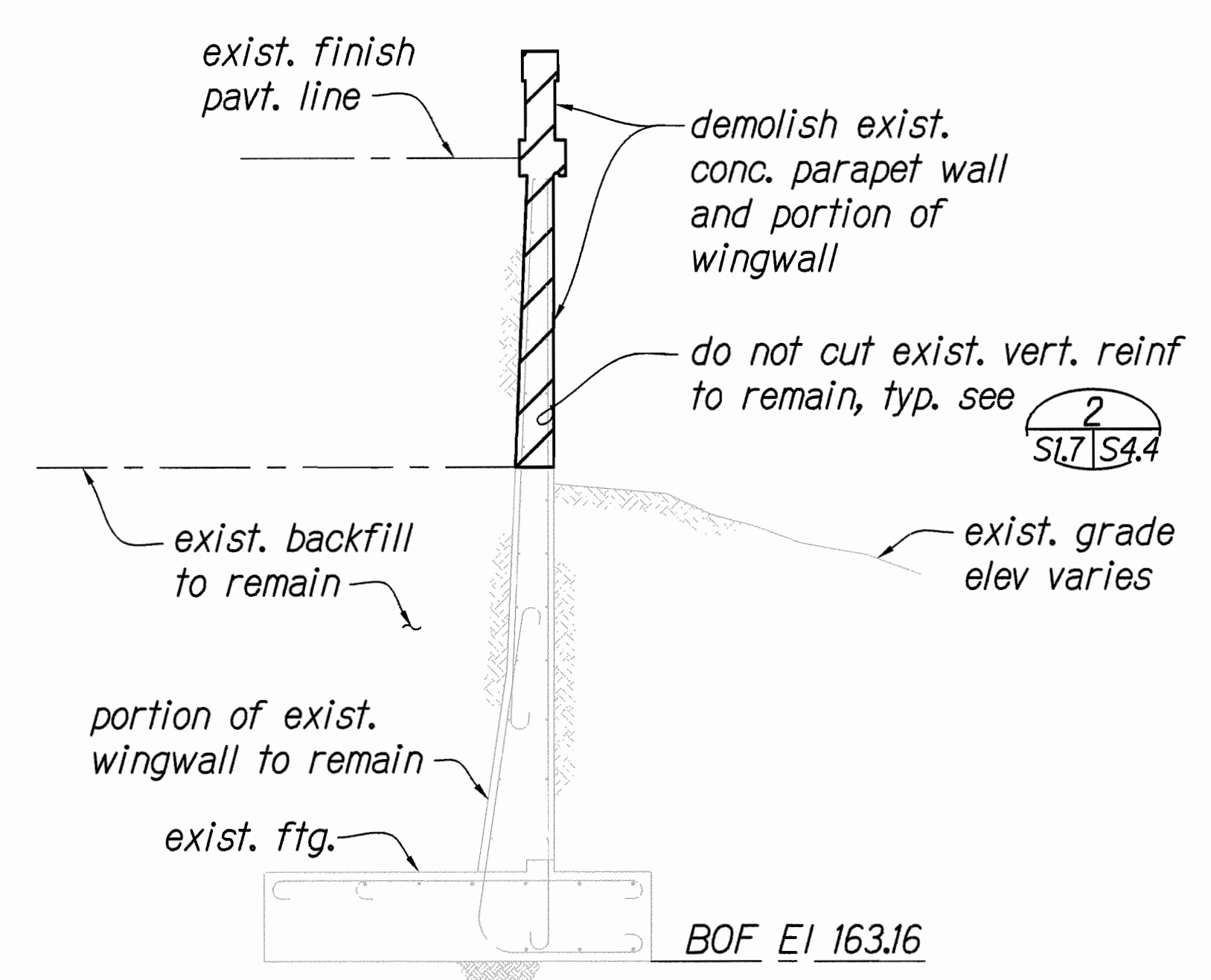
2 SECTION THRU 1911 ORIGINAL ABUTMENT
 SCALE: 1/4" = 1'-0"



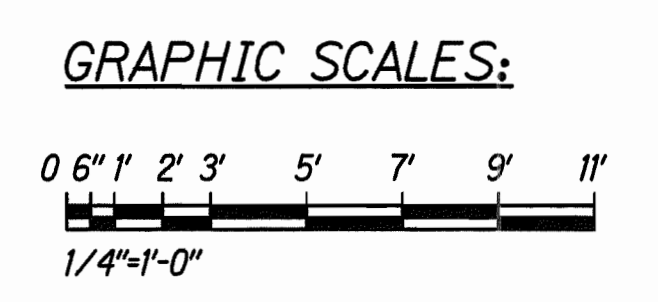
3 EXISTING ELEVATION "A"
 SCALE: 1/4" = 1'-0"



4 EXIST WINGWALL "B" - ELEVATION
 SCALE: 1/4" = 1'-0"



5 SECTION AT EXIST WINGWALL "B"
 SCALE: 1/4" = 1'-0"



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

EXISTING & DEMOLITION
ABUTMENT #1 DETAILS

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

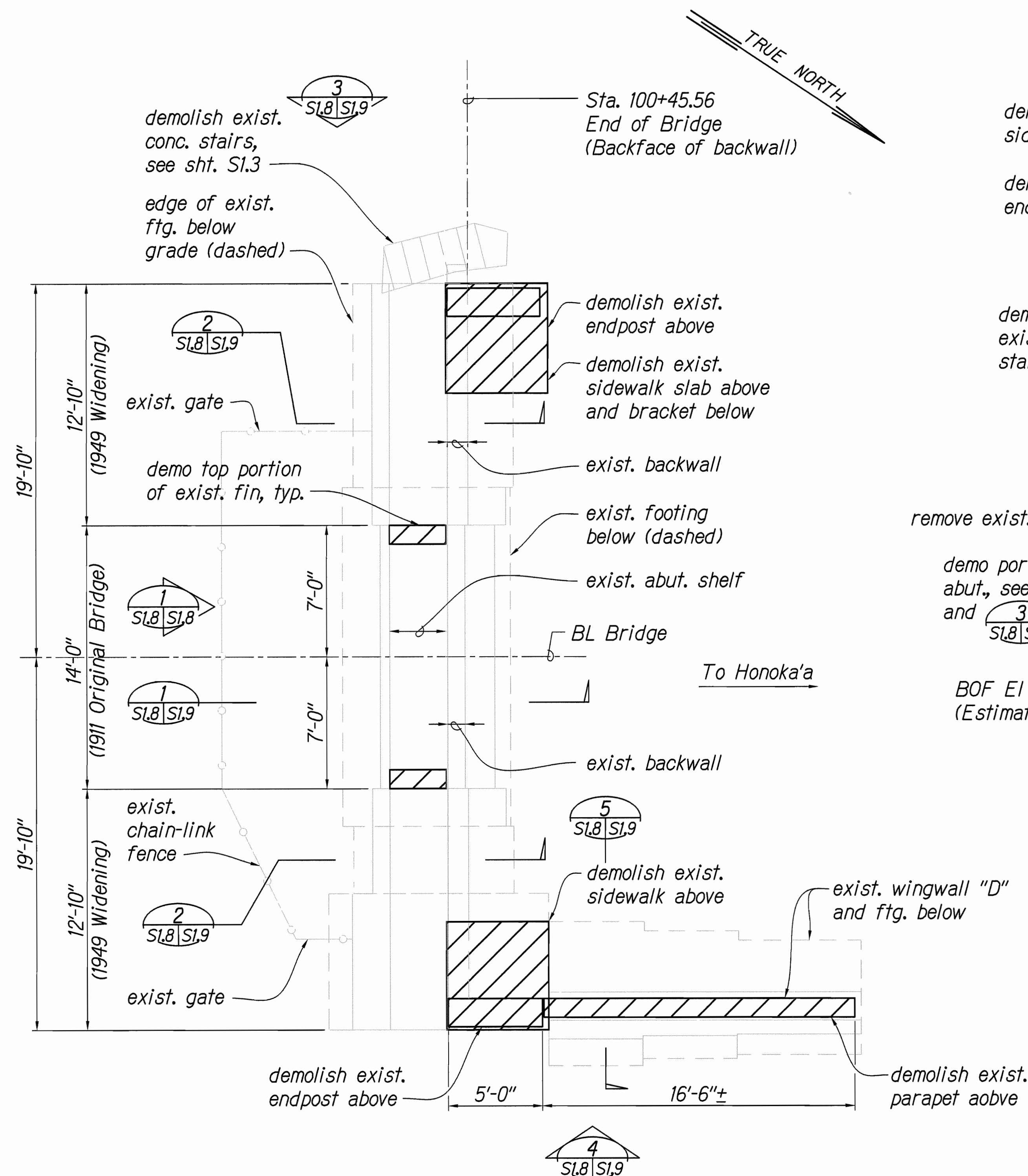
SHEET No. SL7 OF 14 SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED	
NO.	

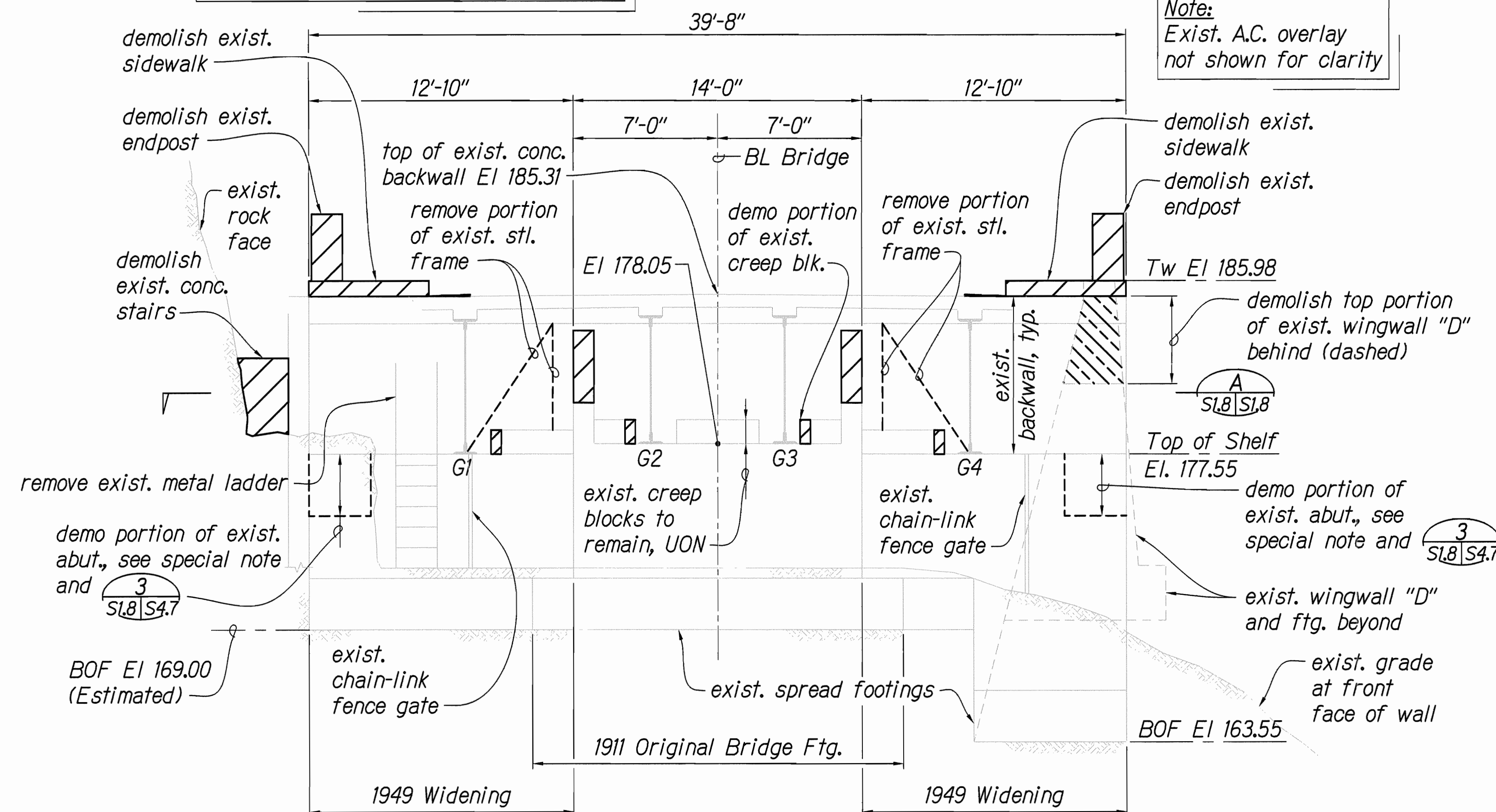
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	46	137

Special Note:
Demolish and re-build one portion of exist. abut. prior to demolishing other portion. Coordinate work sequence with construction phasing on sht. S15.1

Note:
Exist. A.C. overlay not shown for clarity



ABUTMENT #2 - BRIDGE LEVEL & FOUNDATION PLAN
SCALE: 1/4" = 1'-0"

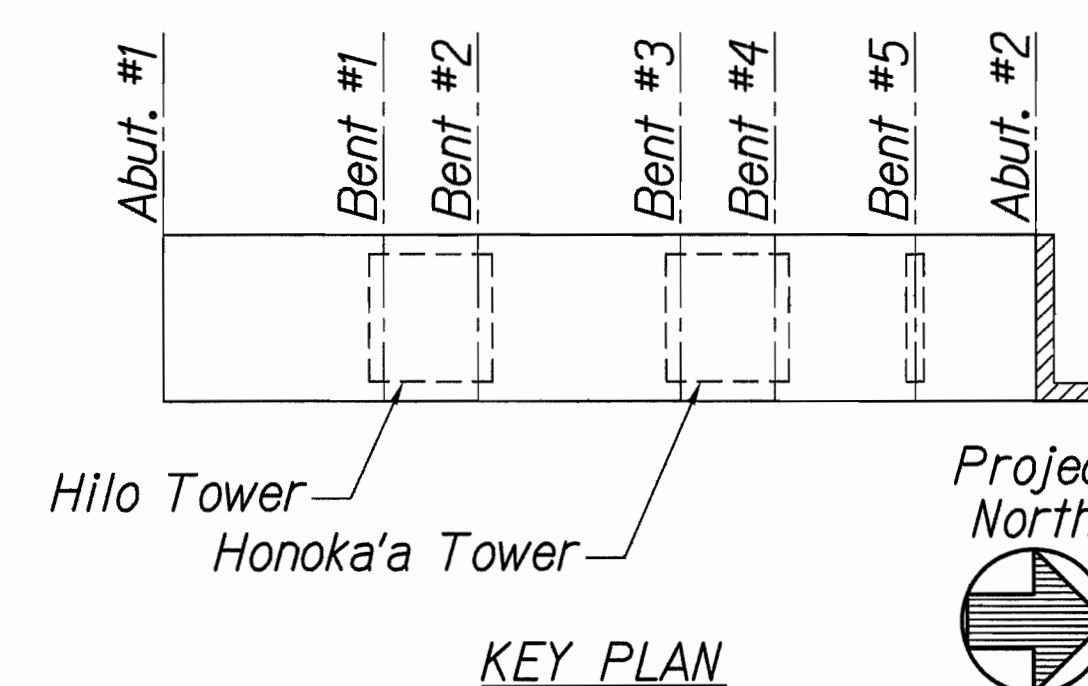
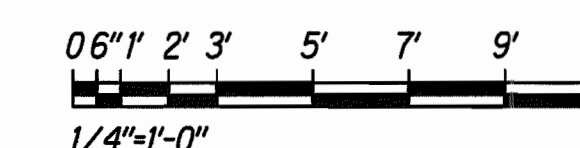


ABUTMENT #2 - FRONT ELEVATION
SCALE: 1/4" = 1'-0"

Note:
Existing steel end frames and connection to remain not shown, UON. See S1.8/S9.5

ABUTMENT #2 - EXISTING AND DEMOLITION

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXISTING & DEMOLITION
ABUTMENT #2 - PLAN & ELEVATION

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

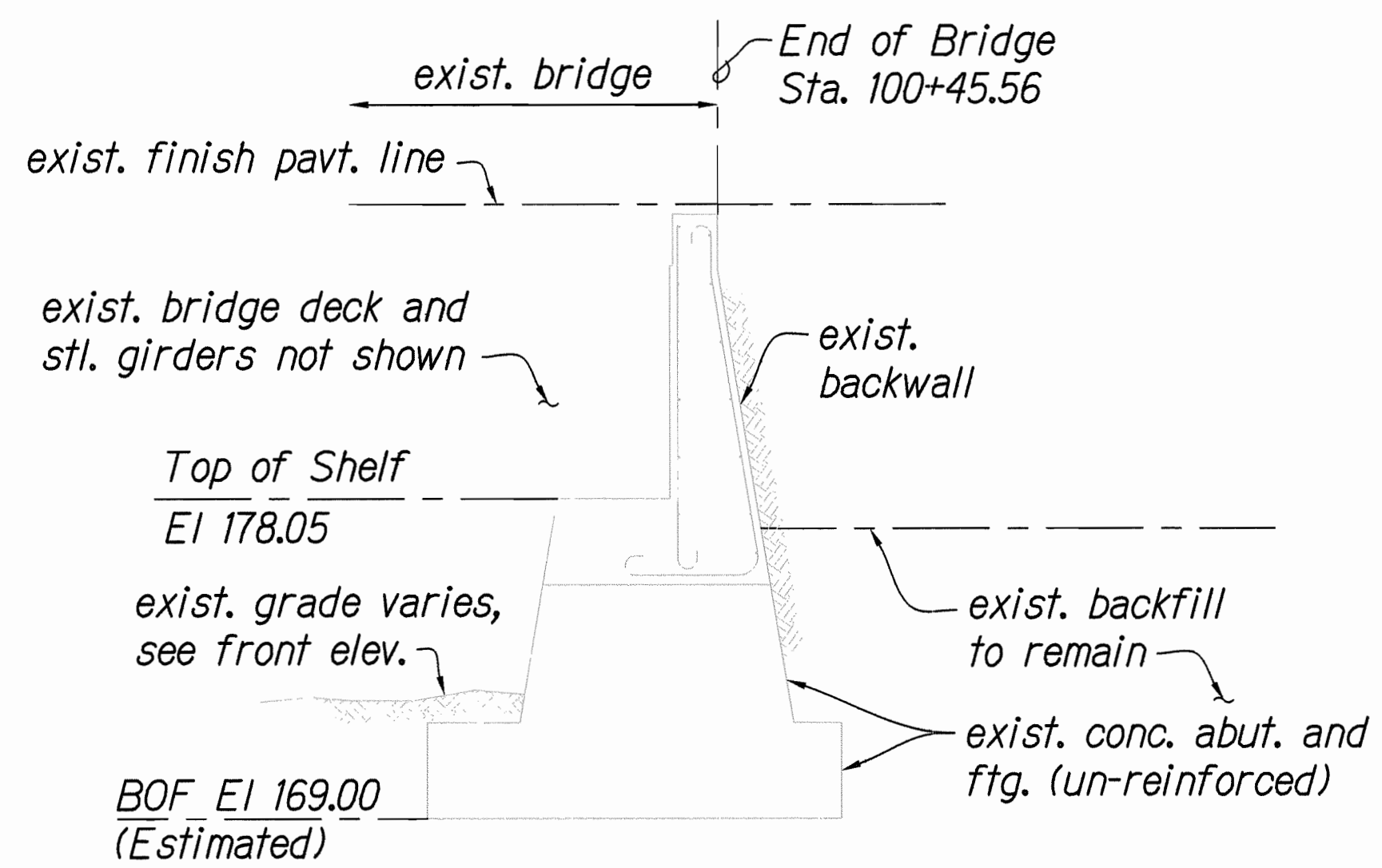
Scale: 1/4" = 1'-0" Date: July 25, 2012

SHEET No. S1.8 OF 14 SHEETS

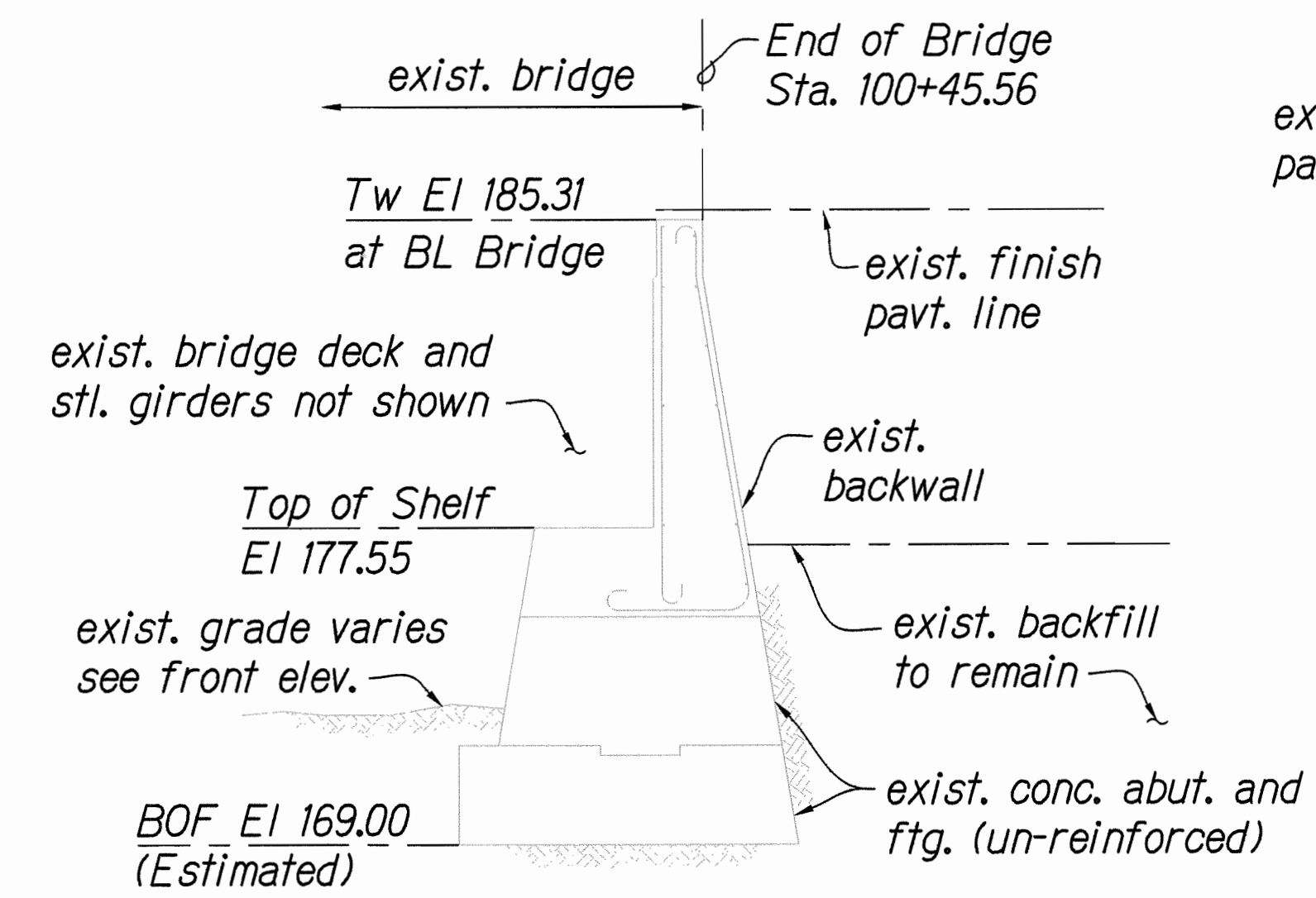
46

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

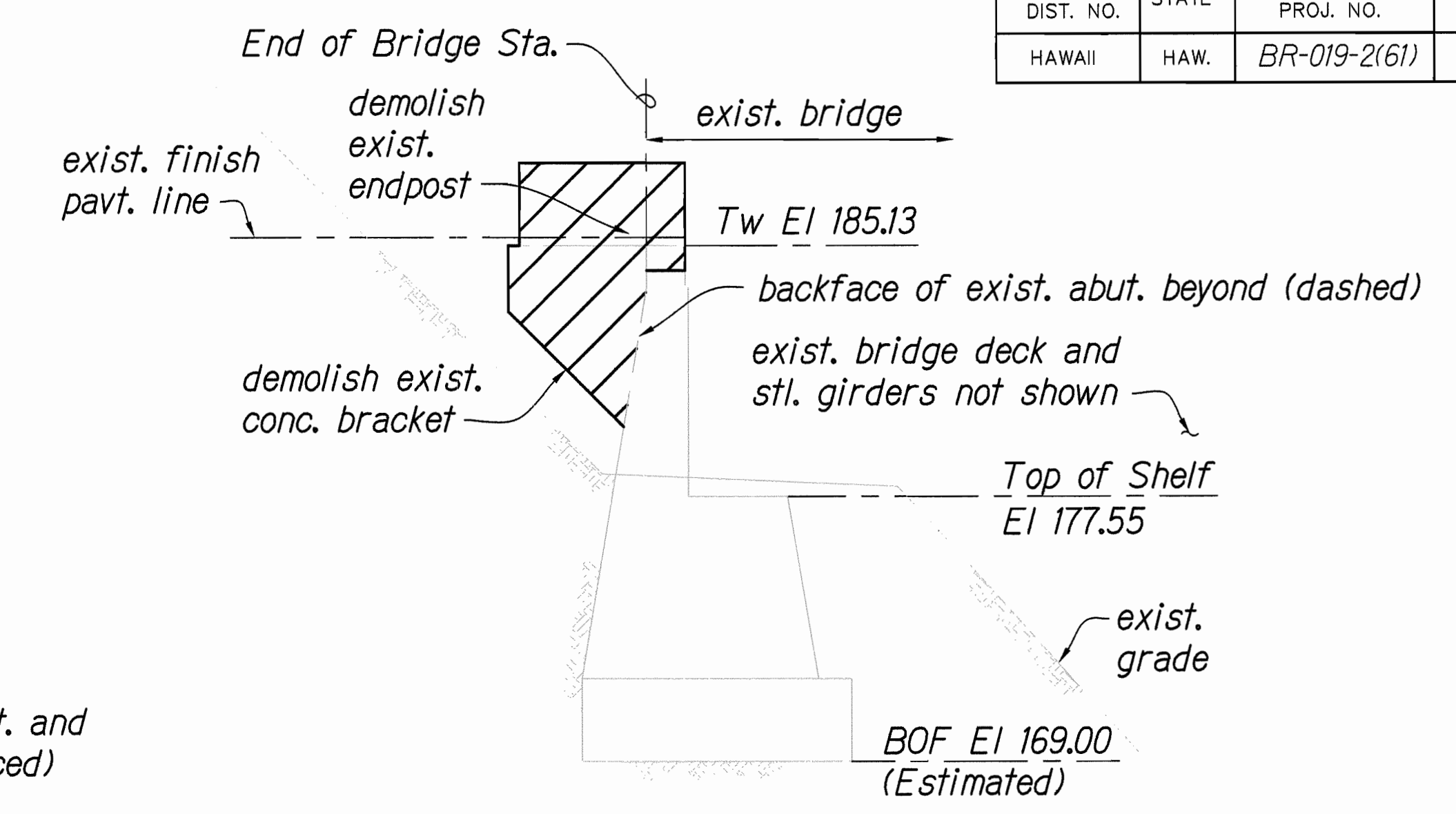
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	47	137



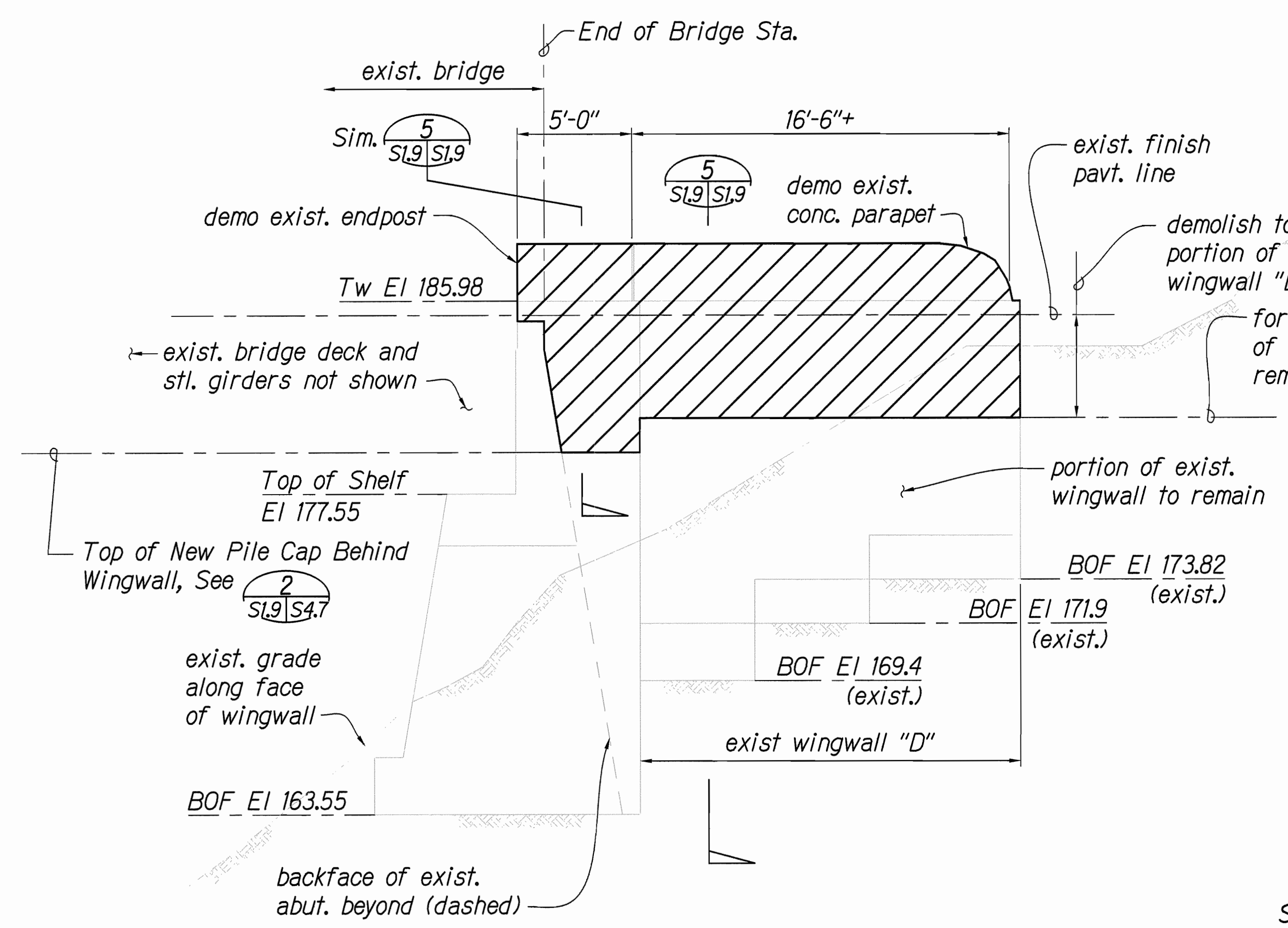
1 SECTION THRU 1911 ORIGINAL ABUTMENT
 S1.8 S1.9 SCALE: 1/4" = 1'-0"



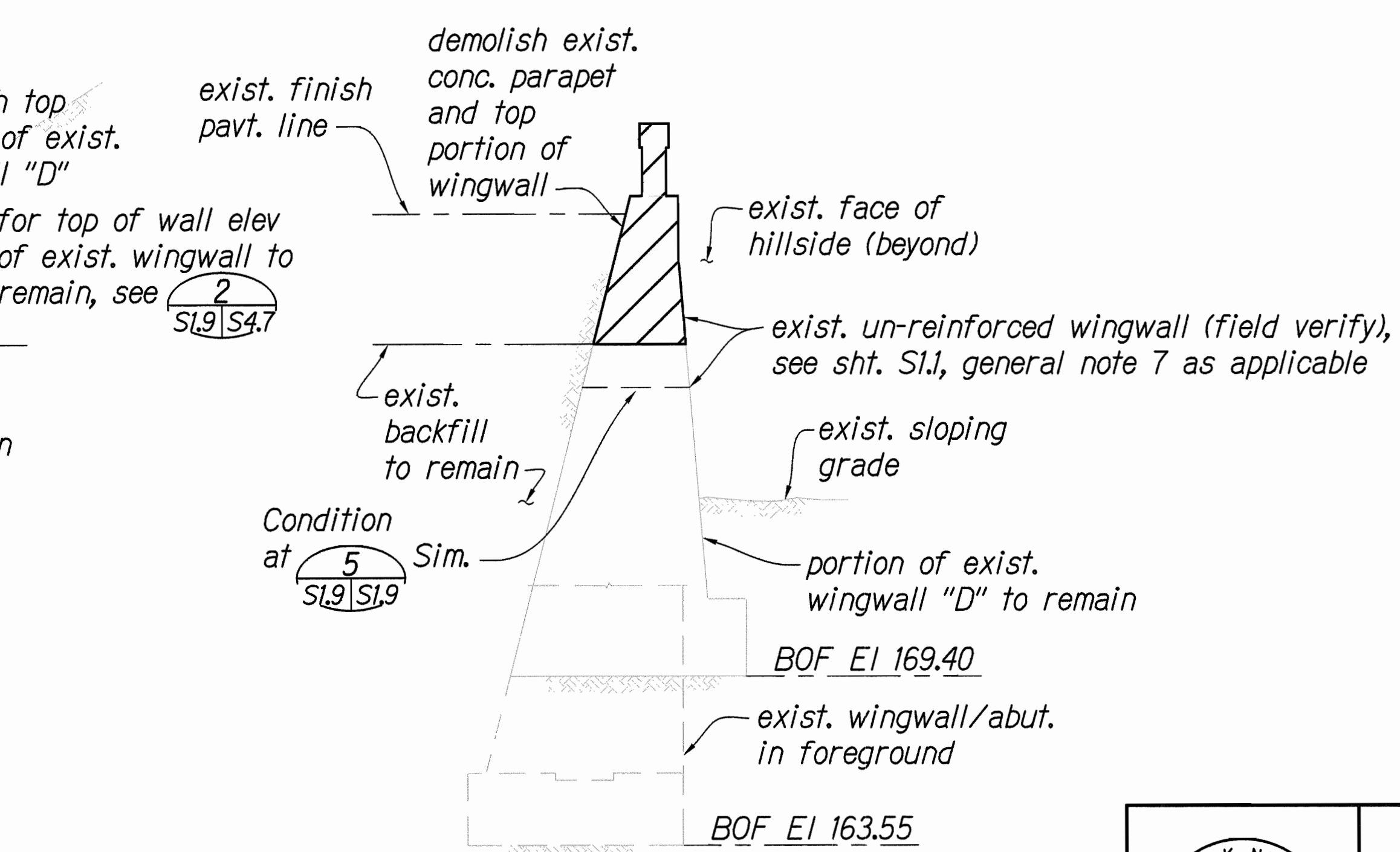
2 SECTION THRU 1949 WIDENING
 S1.8 S1.9 SCALE: 1/4" = 1'-0"



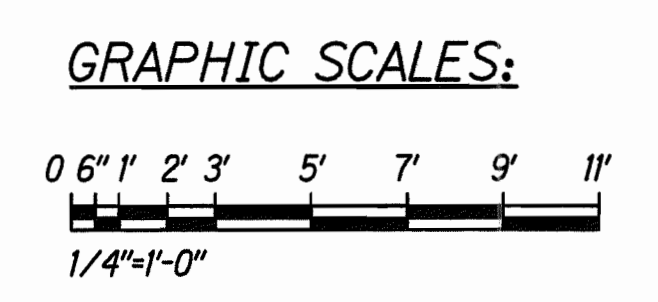
3 EXISTING ELEVATION "C"
 S1.8 S1.9 SCALE: 1/4" = 1'-0"



4 EXIST WINGWALL "D" - ELEVATION
 S1.8 S1.9 SCALE: 1/4" = 1'-0"



5 SECTION AT EXISTING WINGWALL "D"
 S1.8 S1.9 S1.9 SCALE: 1/4" = 1'-0"



NORMAN K. NAGANIE
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**EXISTING & DEMOLITION
 ABUTMENT #2 DETAILS**

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

SHEET No. S1.9 OF 14 SHEETS

SURVEY PLOTTED BY	DATE
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DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	48	137

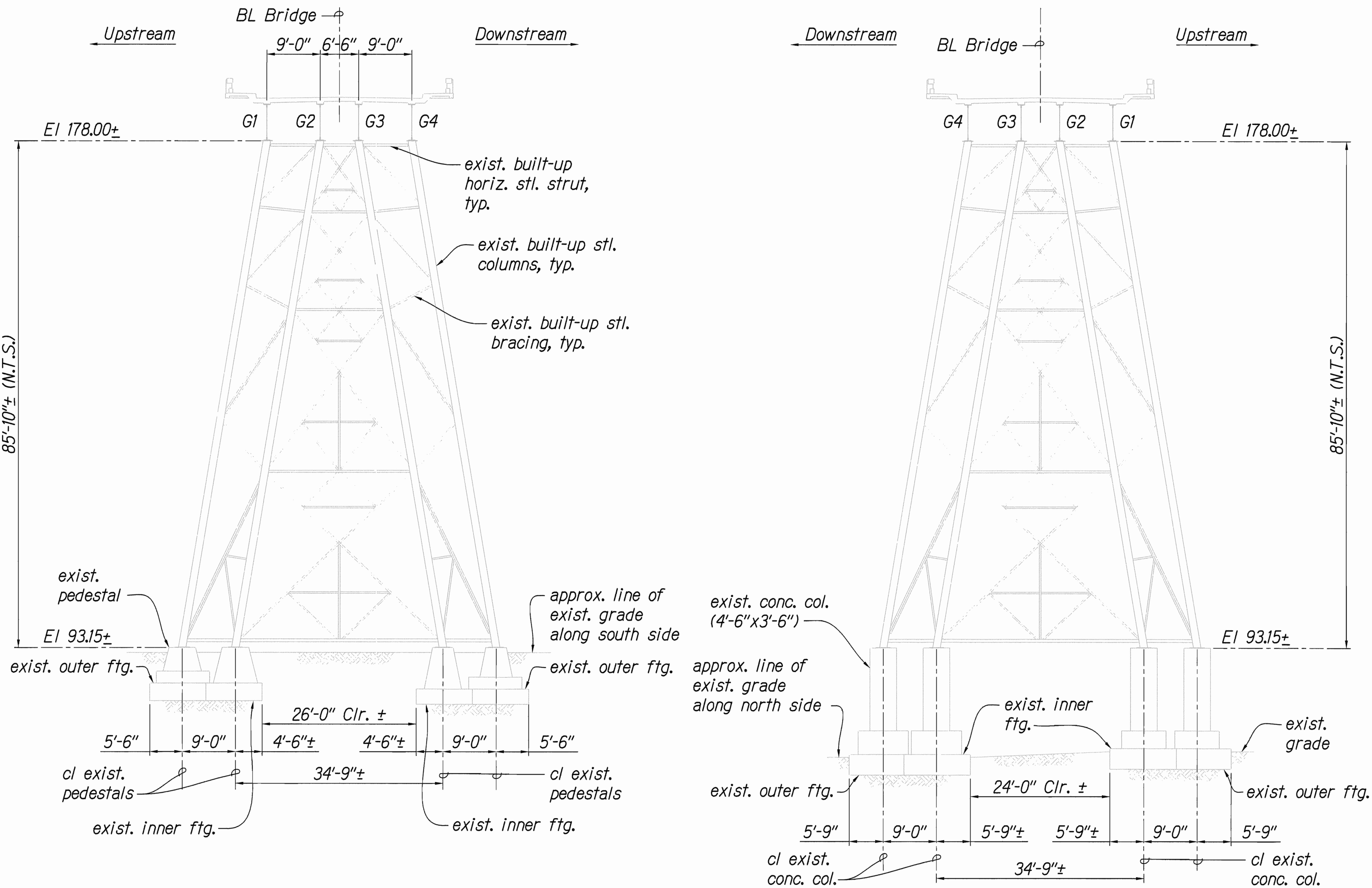
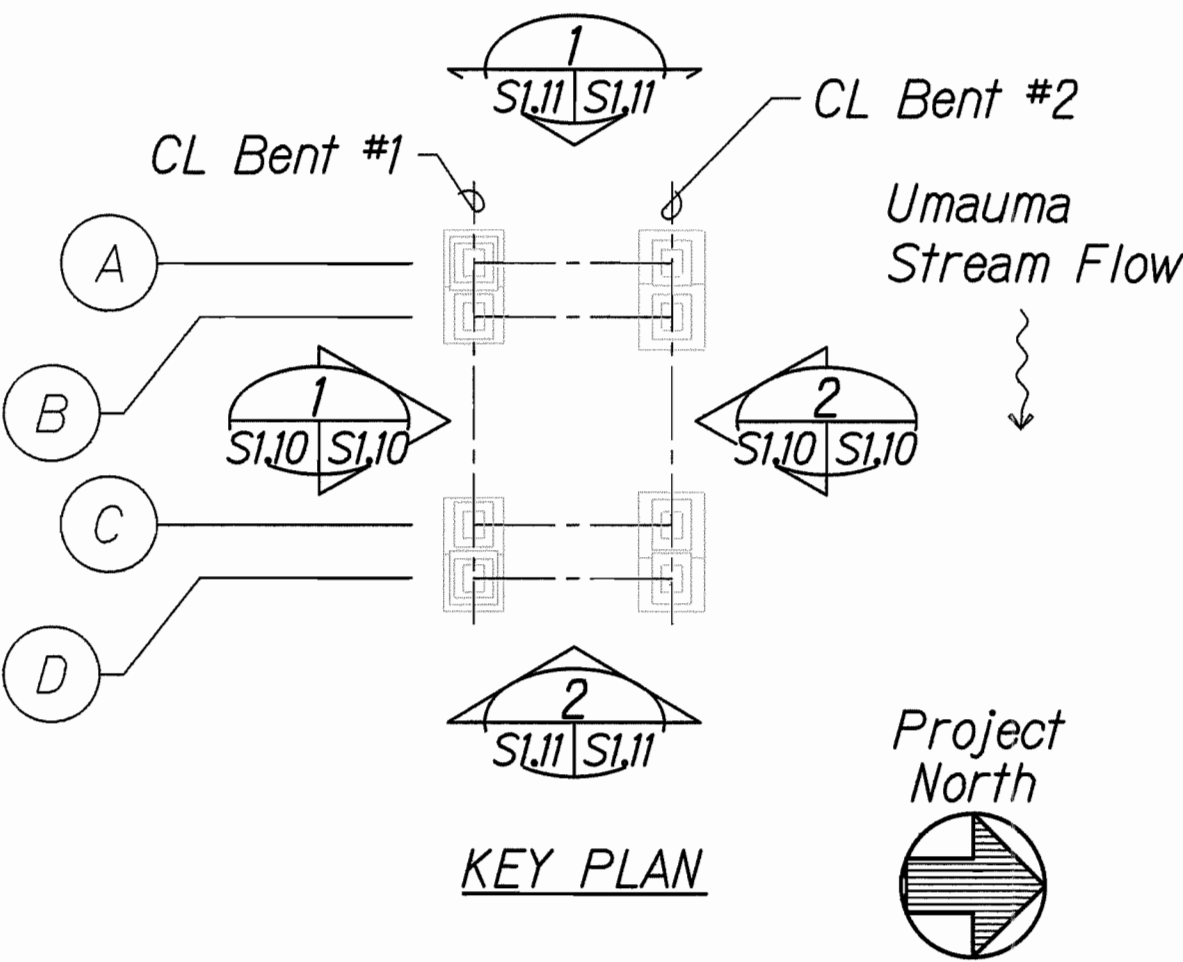
Notes:

- See existing and demolition general notes on sheet S1.1.
- Existing tower and foundation structures shall remain. Contractor shall protect existing structure from damage at all times during construction period.

ESTIMATED FOUNDATION GRAVITY LOADS (KIPS)				
	BENT #1		BENT #2	
	DEAD	LIVE	DEAD	LIVE
OUTER FOOTINGS:	200	80	300	80
INNER FOOTINGS:	180	80	250	80

Estimated foundation gravity loads are shown for bidder's information only. Contractor shall retain a Hawaii licensed structural engineer to verify the foundation loads. Loads shall be per AASHTO LRFD Bridge Design Specifications and the "Design Criteria for Bridges and Structures", October 20, 2010, State of Hawaii, Department of Transportation, Highways Division, including subsequent revisions.

- Refer to new pier foundation special notes on sheet S5.1.
- Existing steel pipe structures attached to side of steel columns not shown. Contractor shall field verify as-built condition as necessary.

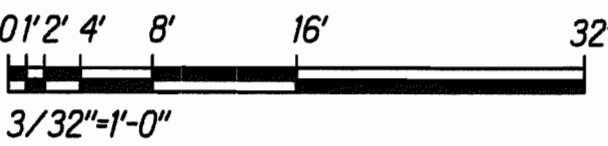


1 BENT #1 - SOUTH ELEVATION
 S1.2 ∇ S1.10 S1.10 SCALE: 3/32" = 1'-0"

2 BENT #2 - NORTH ELEVATION
 S1.2 ∇ S1.10 S1.10 SCALE: 3/32" = 1'-0"

EXISTING HILO TOWER BENT ELEVATIONS

GRAPHIC SCALES:



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 Norman K. Nagamine

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

**EXISTING ELEVATION AT HILO
 TOWER - BENT #1 & BENT #2**

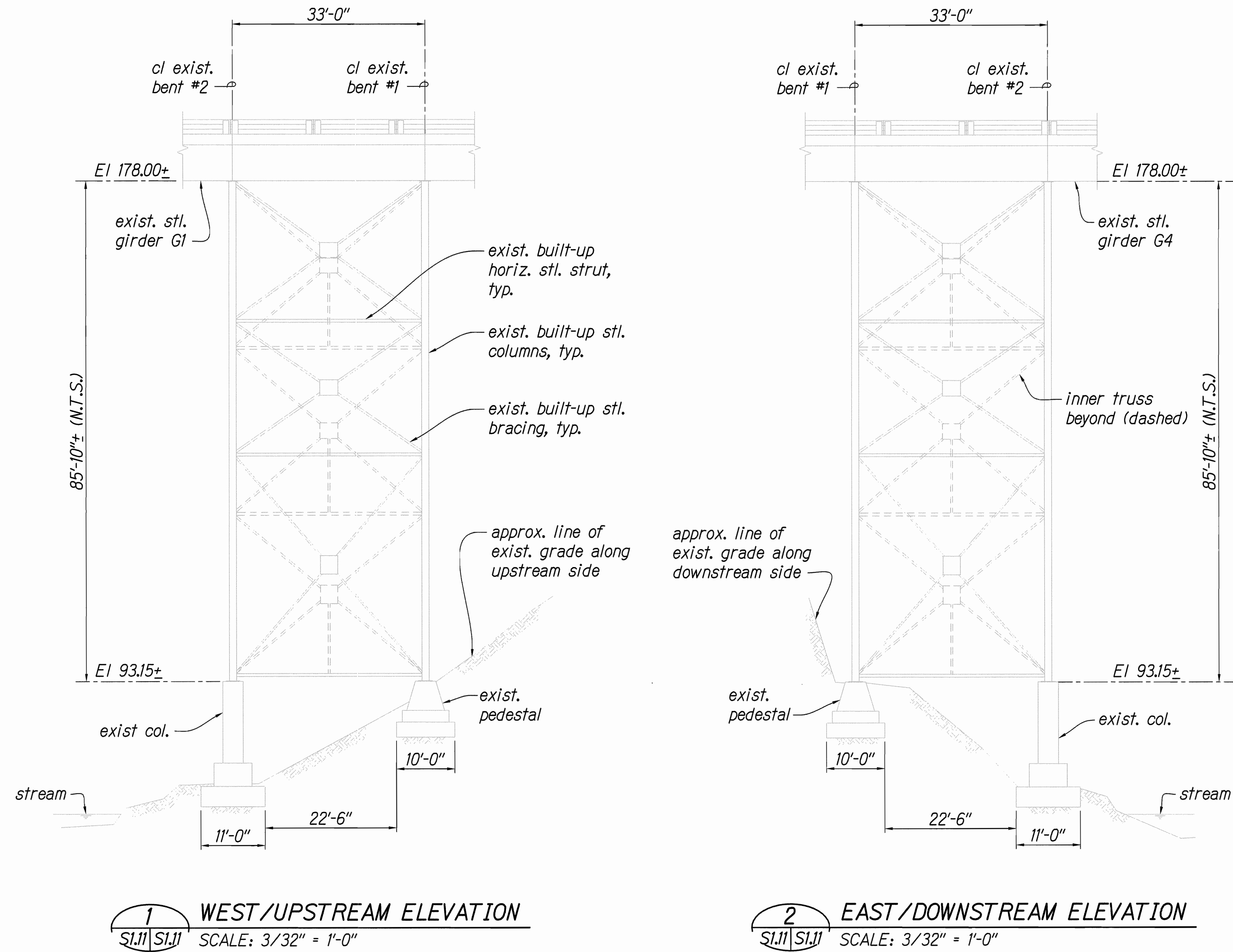
HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

SHEET No. S1.10 OF 14 SHEETS

SURVEY PLOTTED BY	DATE
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CHECKED BY	
ORIGINAL PLAN	
NOTED	
No.	

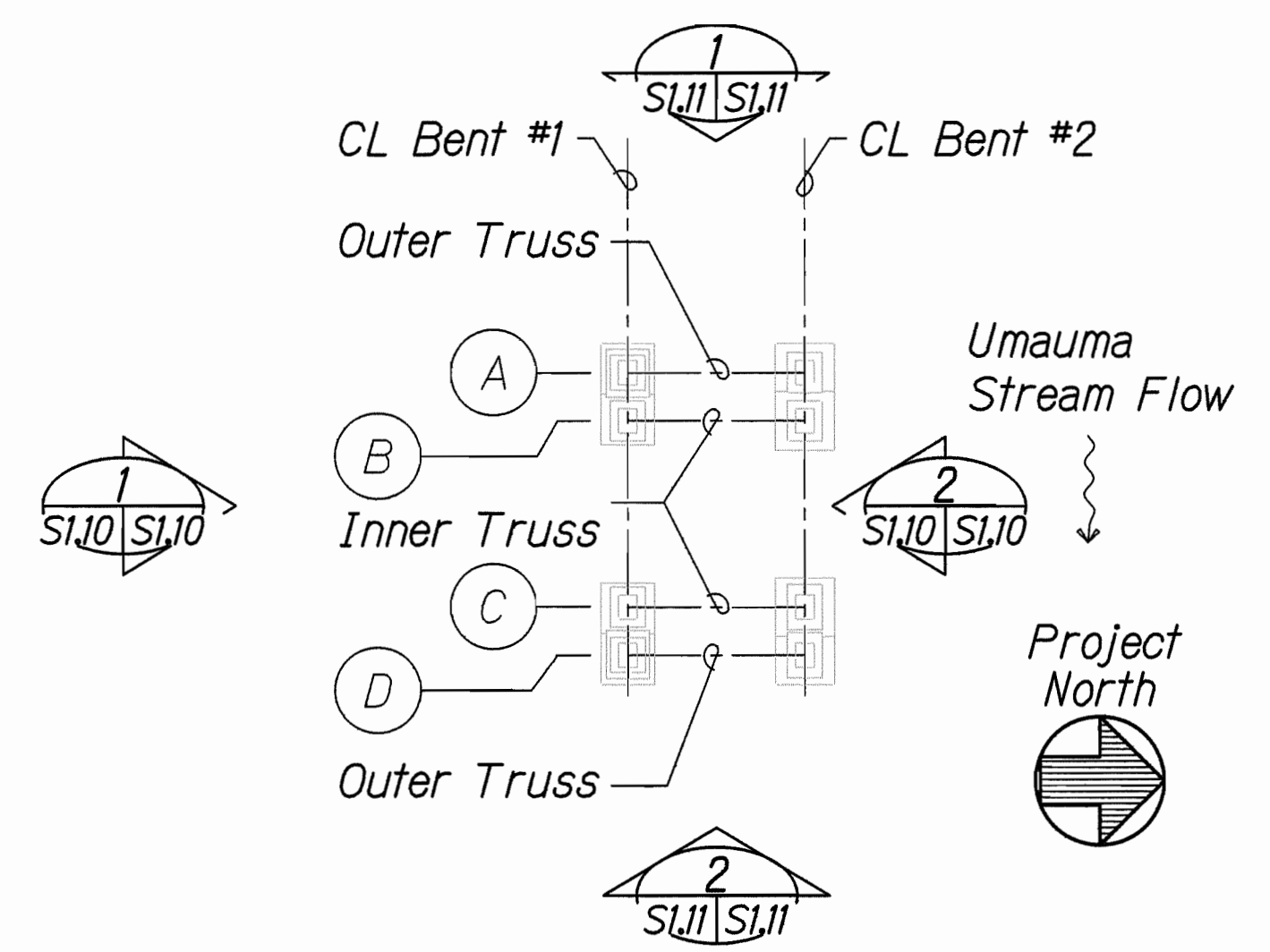
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	49	137



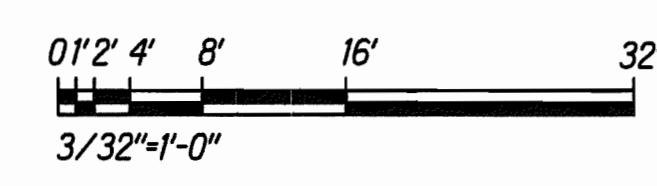
EXISTING HILO TOWER TRUSS ELEVATIONS

Notes:

- See existing and demolition general notes on sheet S1.1.
- Existing tower and foundation structures shall remain. Contractor shall protect from damage at all times during construction period.
- For estimated foundation gravity loads, see sheet S1.10.
- Refer to new pier foundation special notes on sheet S5.1.
- Existing steel pipe structures attached to steel columns not shown. Contractor shall field verify as-built condition as necessary.



GRAPHIC SCALES:



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**EXISTING ELEVATION AT HILO
TOWER - TRUSSES BETWEEN BENTS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

SHEET No. S1.11 OF 14 SHEETS

SURVEY PLOTTED BY	DATE
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DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	50	137

Notes:

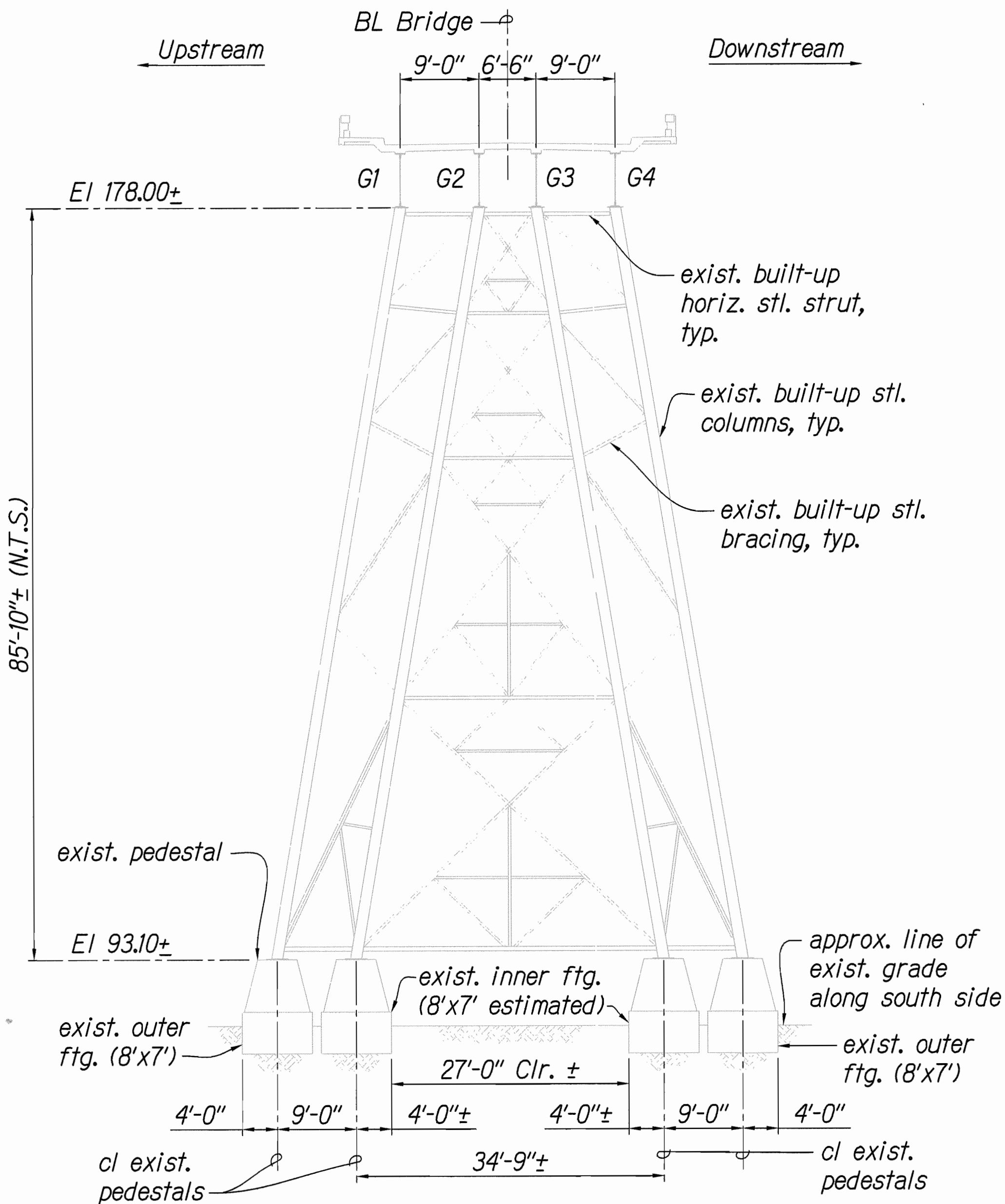
- See existing and demolition general notes on sheet S1.1.
- Existing tower and foundation structures shall remain. Contractor shall protect existing structure from damage at all times during construction period.

3.

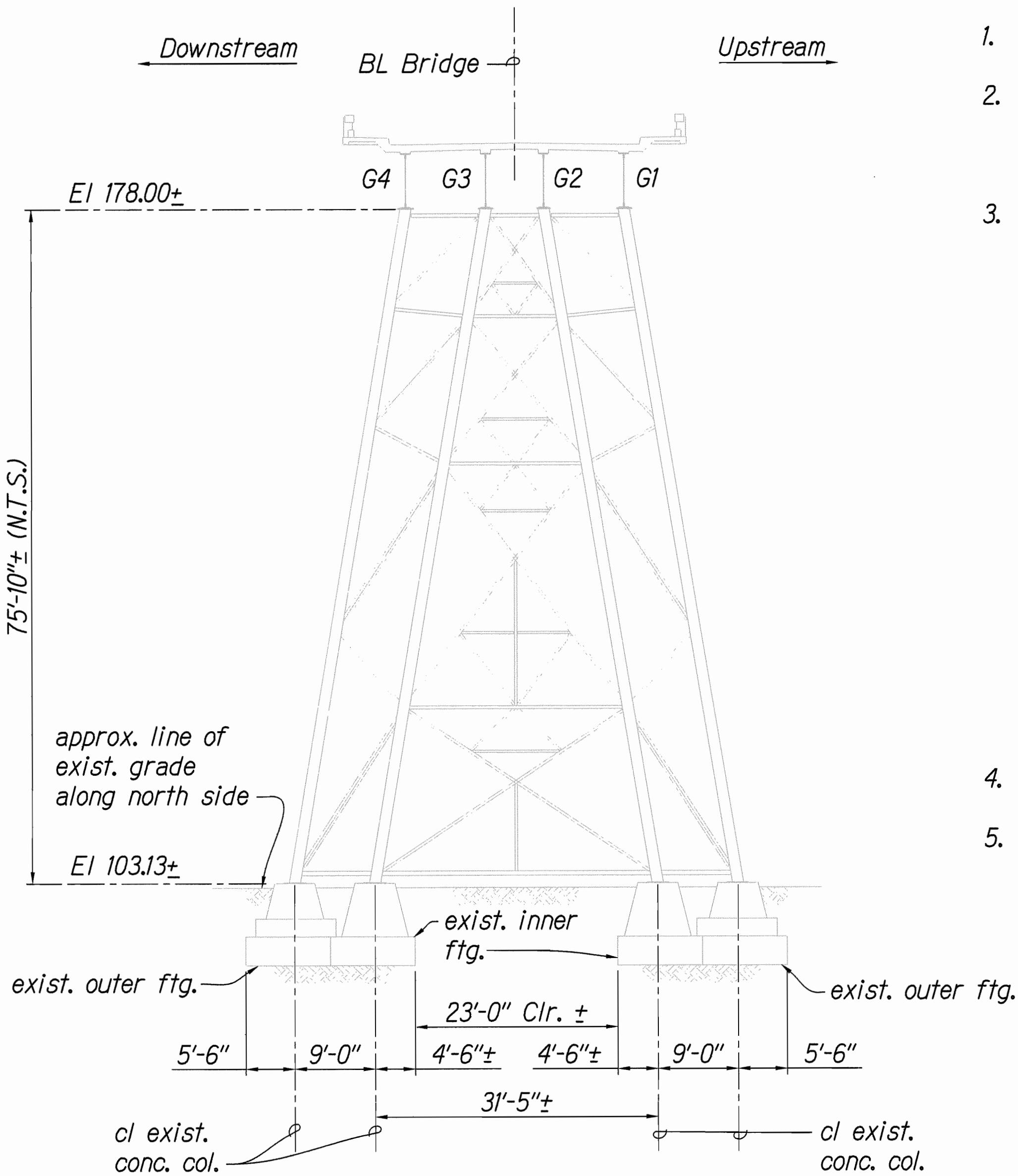
ESTIMATED FOUNDATION GRAVITY LOADS (KIPS)				
	BENT #3		BENT #4	
	DEAD	LIVE	DEAD	LIVE
OUTER FOOTINGS:	200	80	180	70
INNER FOOTINGS:	180	80	160	70

Estimated foundation gravity loads are shown for bidder's information only. Contractor shall retain a Hawaii licensed structural engineer to verify the foundation loads. Loads shall be per AASHTO LRFD Bridge Design Specifications and the "Design Criteria for Bridges and Structures", October 20, 2010, State of Hawaii, Department of Transportation, Highways Division, including subsequent revisions.

- Refer to new pier foundation special notes on sheet S5.1.
- Existing steel pipe structures attached to side of steel columns not shown. Contractor shall field verify as-built condition as necessary.

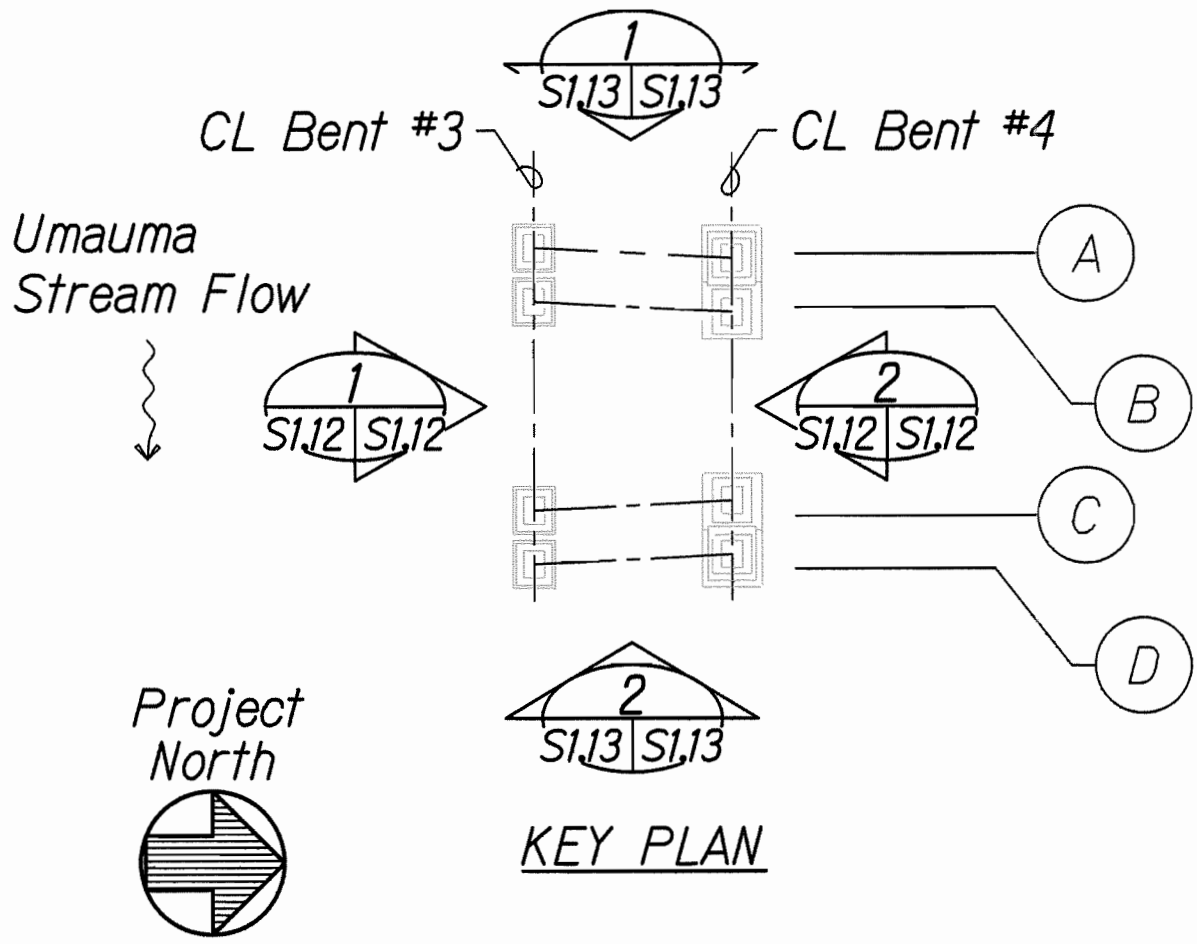


1 BENT #3 - SOUTH ELEVATION
S1.2 & S1.12 SCALE: 3/32" = 1'-0"

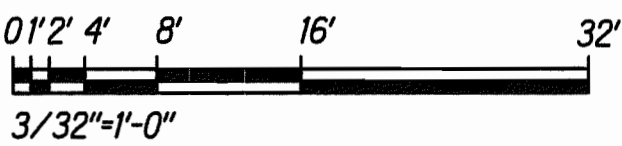


2 BENT #4 - NORTH ELEVATION
S1.2 & S1.12 SCALE: 3/32" = 1'-0"

EXISTING HONOKA'A TOWER BENT ELEVATIONS



GRAPHIC SCALES:



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**EXISTING ELEVATION AT HONOKA'A
TOWER - BENT #3 & BENT #4**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

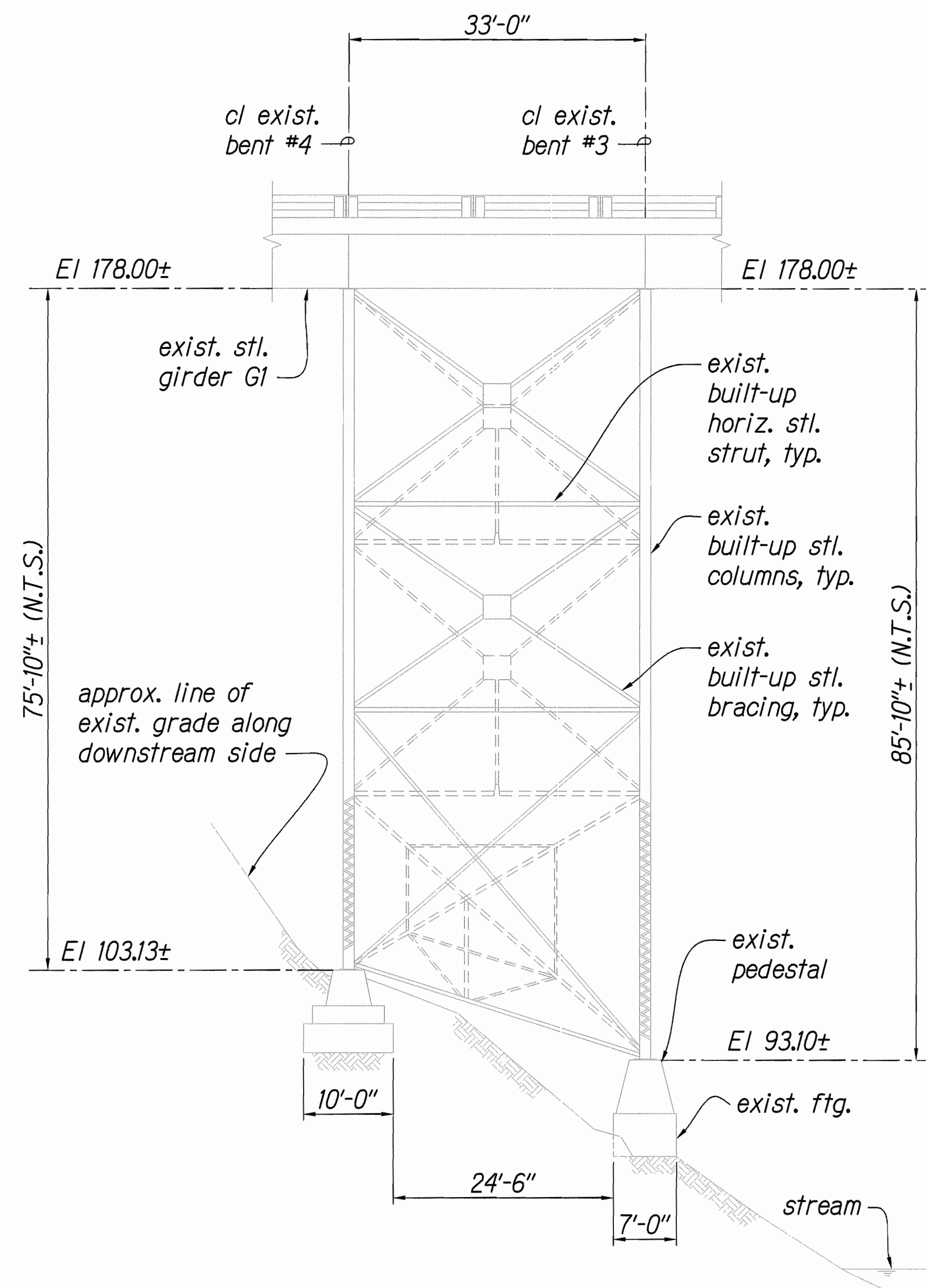
SHEET No. S1.12 OF 14 SHEETS

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED BY	
NO.	

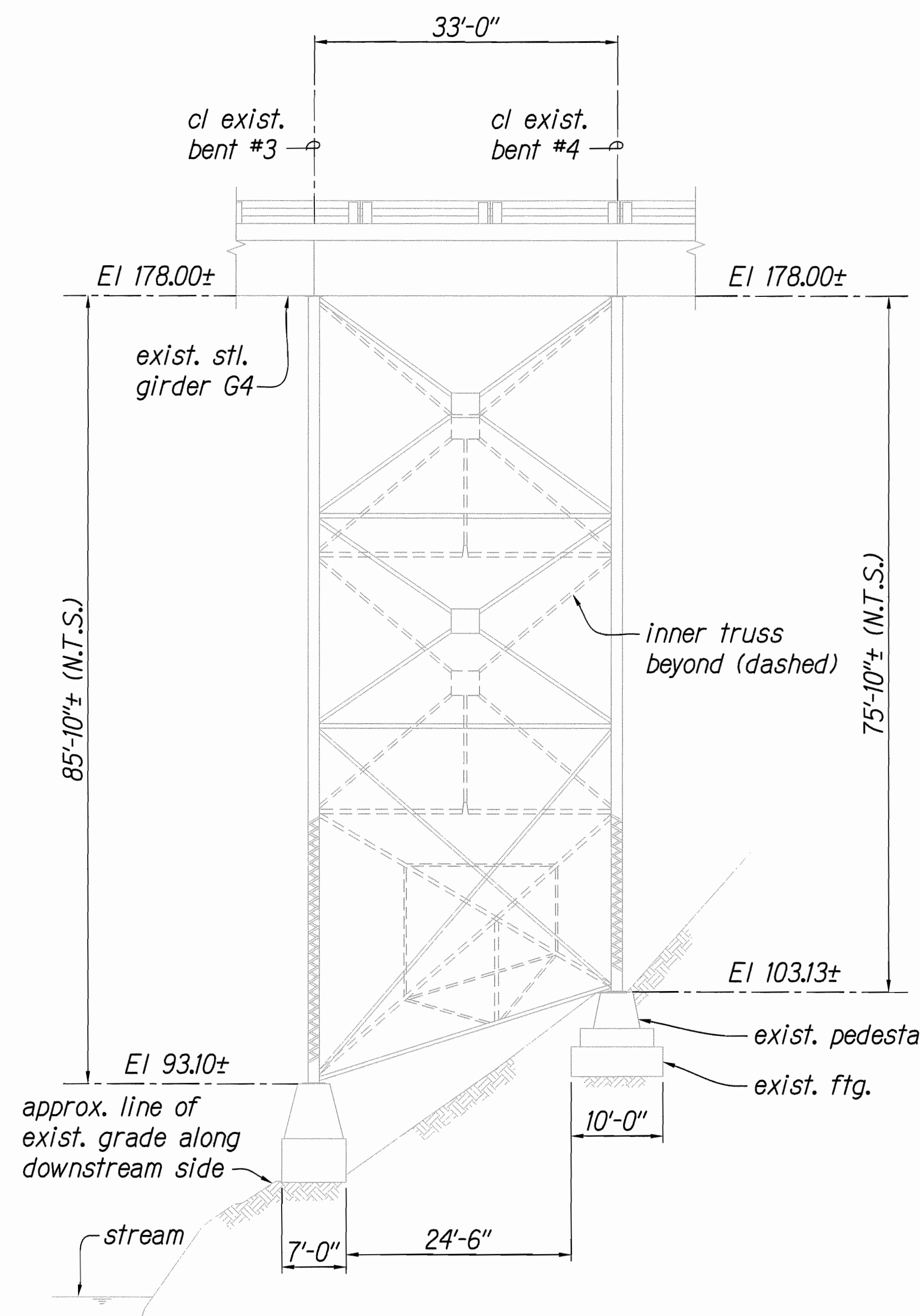
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	51	137

Notes:

1. See existing and demolition general notes on sheet S1.1.
2. Existing tower and foundation structures shall remain. Contractor shall protect from damage at all times during construction period.
3. For estimated foundation gravity loads, see sheet S1.12.
4. Refer to new pier foundation special notes on sheet S5.1.
5. Existing steel pipe structures attached to side of steel columns not shown. Contractor shall field verify as-built condition as necessary.

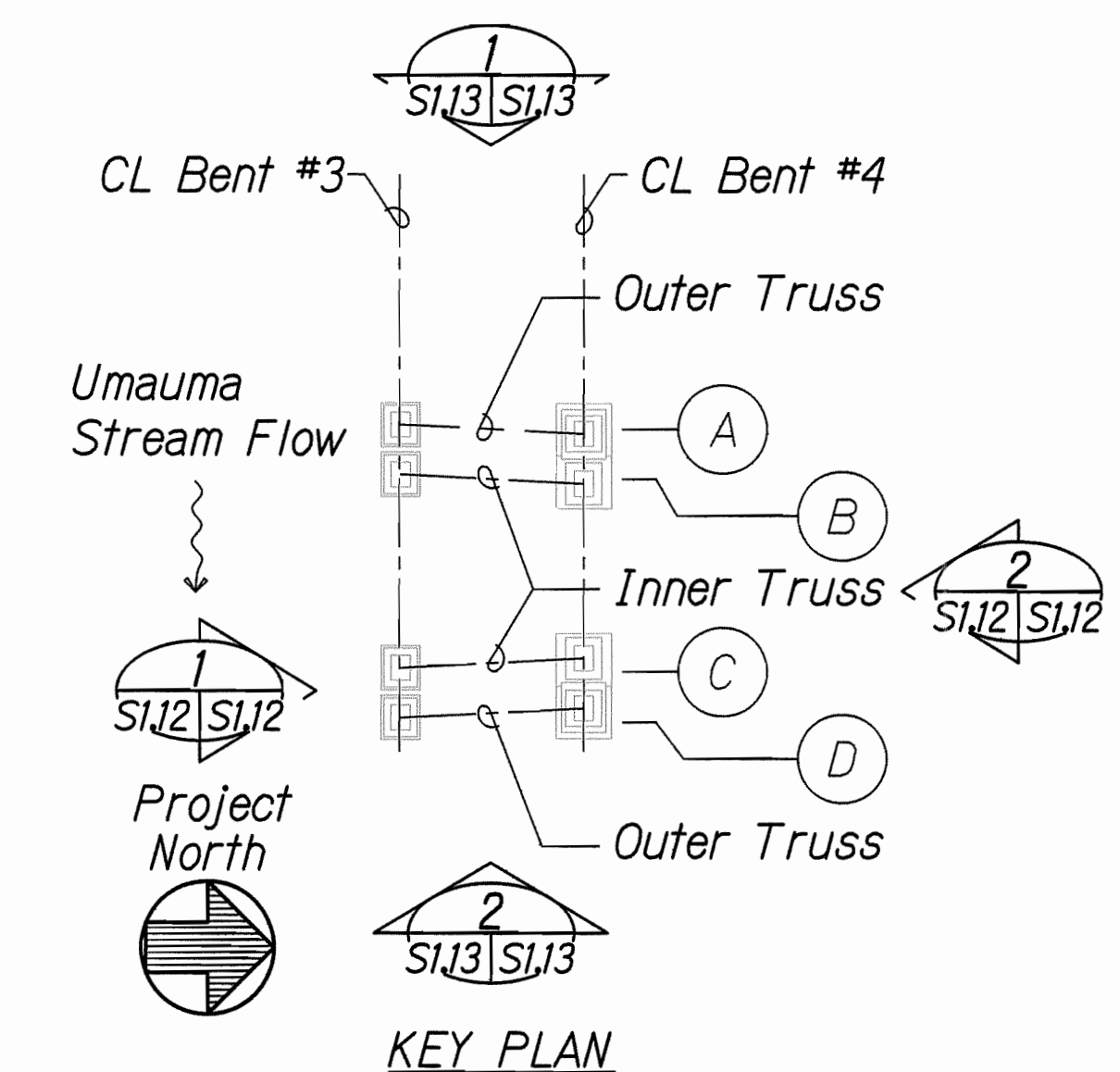


1 WEST/UPSTREAM ELEVATION
S1.13 S1.13 SCALE: 3/32" = 1'-0"

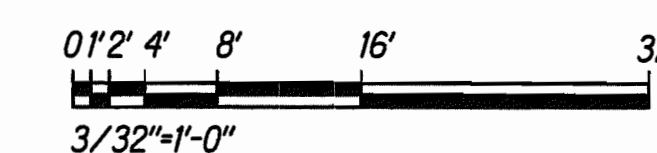


2 EAST/DOWNSTREAM ELEVATION
S1.13 S1.13 SCALE: 3/32" = 1'-0"

EXISTING HONOKA'A TOWER TRUSS ELEVATIONS



GRAPHIC SCALES:



NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

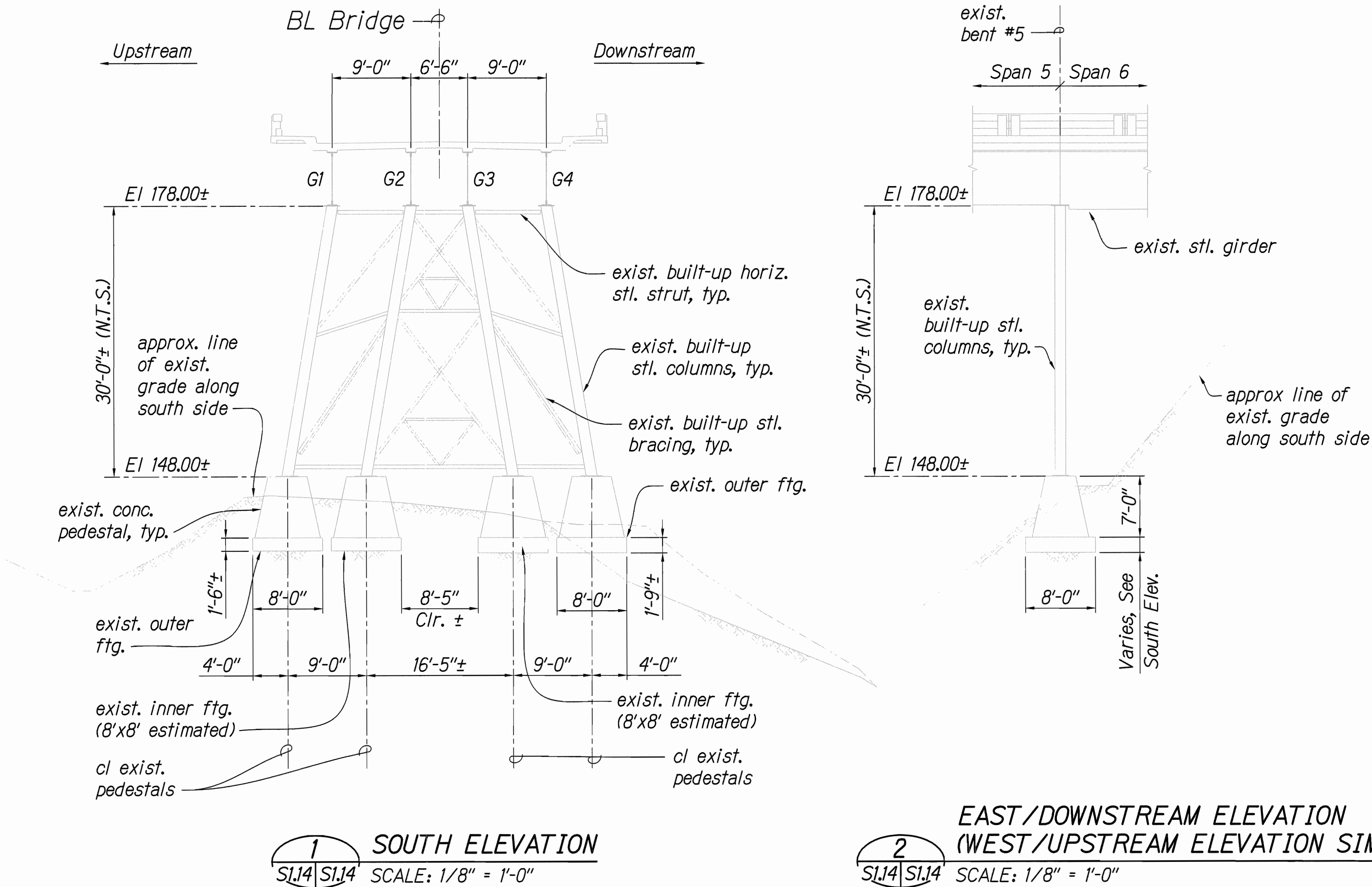
**EXISTING ELEVATION AT HONOKA'A
TOWER - TRUSSES BETWEEN BENTS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

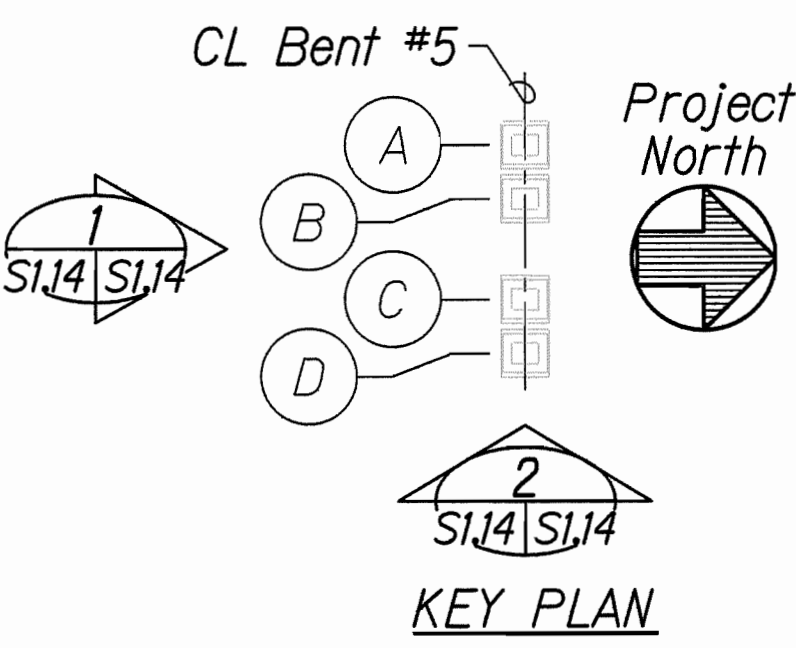
SHEET No. S1.13 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	52	137

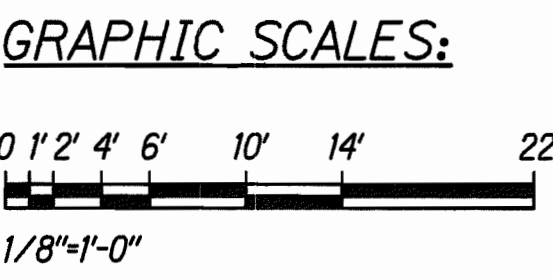


- Notes:**
- See existing and demolition general notes on sheet S1.1.
 - Existing bent and foundation structures shall remain. Contractor shall protect existing structure from damage at all times during construction period.
 - | ESTIMATED FOUNDATION GRAVITY LOADS (KIPS) | | |
|---|---------|------|
| | BENT #5 | |
| | DEAD | LIVE |
| OUTER FOOTINGS: | 140 | 70 |
| INNER FOOTINGS: | 120 | 70 |

Estimated foundation gravity loads are shown for bidder's information only. Contractor shall retain a Hawaii licensed structural engineer to verify the foundation loads. Loads shall be per AASHTO LRFD Bridge Design Specifications and the "Design Criteria for Bridges and Structures", October 20, 2010, State of Hawaii, Department of Transportation, Highways Division, including subsequent revisions.
 - Refer to new pier foundation special notes on sheet S5.1.



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



NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, USA

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

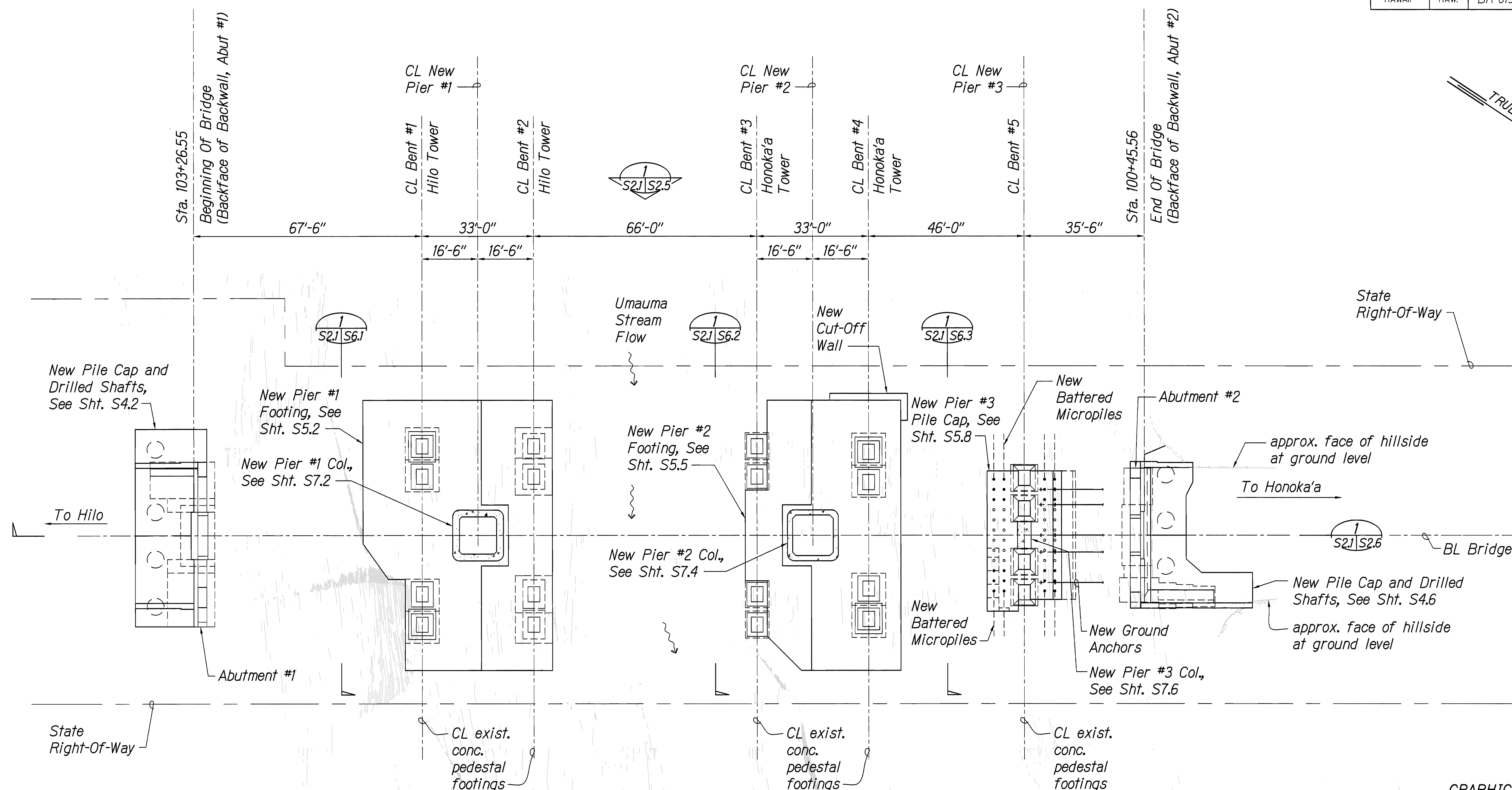
EXISTING ELEVATIONS - BENT #5

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

SHEET No. S1.14 OF 14 SHEETS

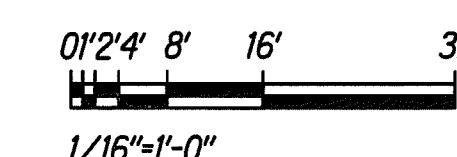
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	53	137



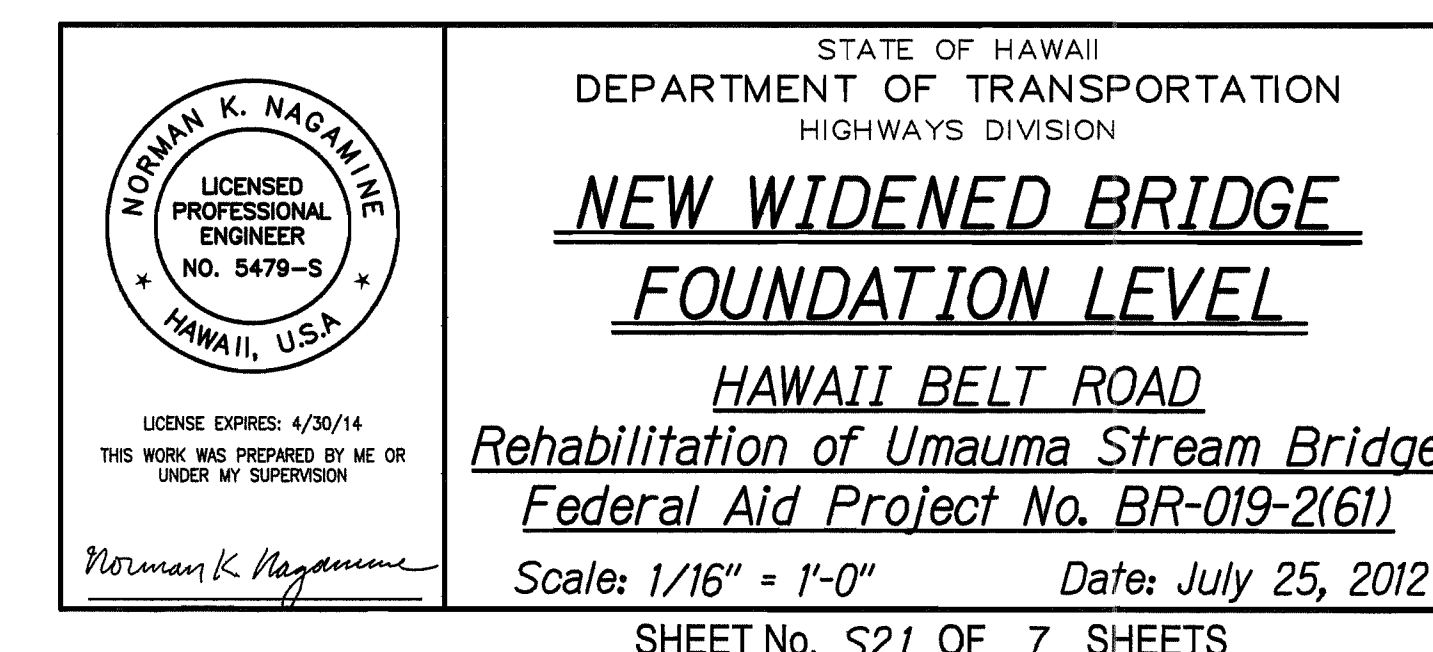
Notes:

1. *Existing dimensions shown may not be exact and are provided for information only. Contractor shall field verify all existing and new dimensions prior to construction.*
2. *For construction phasing, see sheet S15.1.*
3. *Work within ordinary high-water mark shall be conducted during "dry season" or during minimal stream flow. See Civil sheet C-13.*
4. *Refer to Site Specific BMP Notes on sheet C-13.*

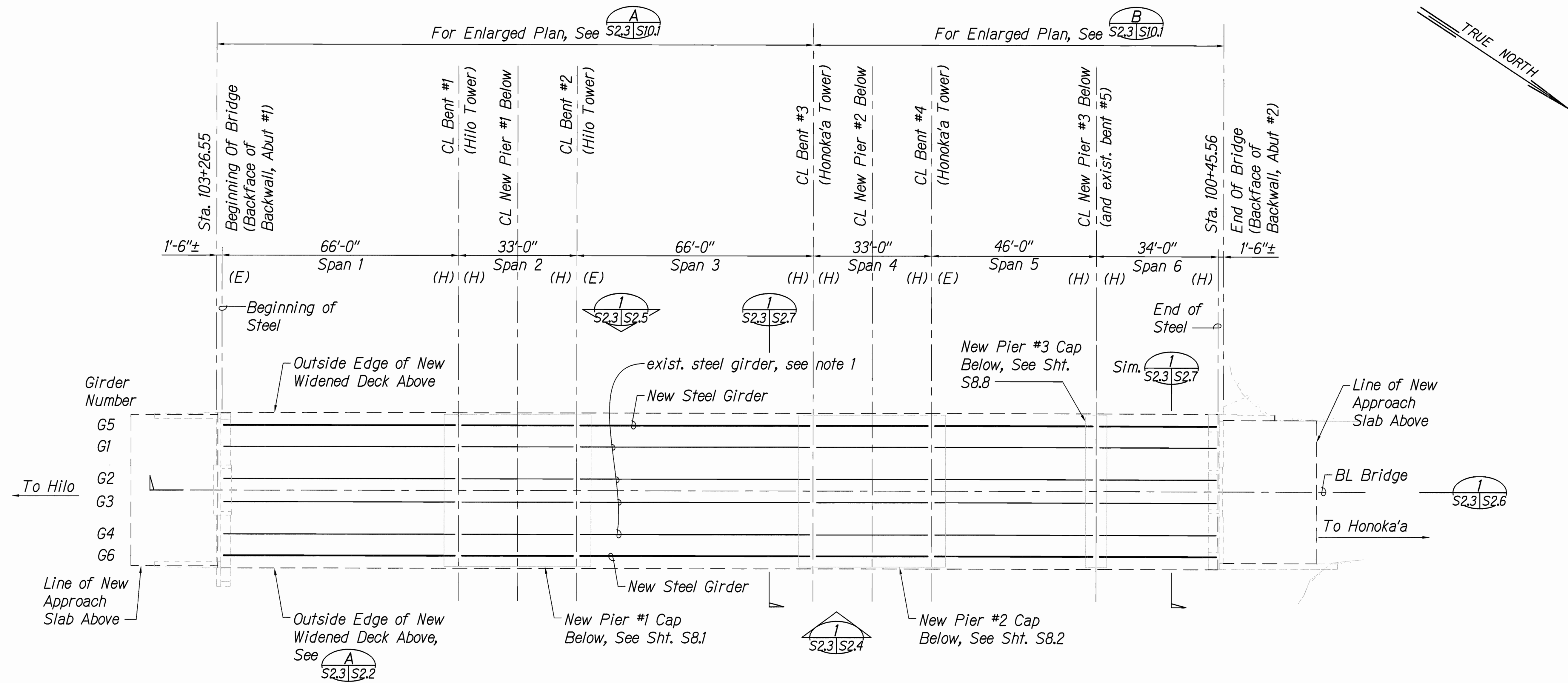
GRAPHIC SCALES:



A NEW WIDENED BRIDGE FOUNDATION PLAN
S2.1 S2.1 SCALE: 1/16" = 1'-0"



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	55	137



A
S2.3/S2.3 **NEW WIDENED BRIDGE - GIRDER FRAMING PLAN (OVERALL)**
SCALE: 1/16" = 1'-0"

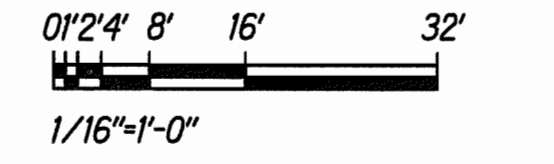
Notes:

- Clean and repaint existing steel superstructure (girders, bracings and connections), see Special Provisions Section 501 "Steel Structures" and Section 694 "Clean and Paint Structural Bridge Steel", for General Notes, see sheet S17.1. For surface preparation and application, see Special Provisions.
- New steel girders shall be shop primed and painted. See Structural Steel notes on sheet S0.1 and Special Provision Section 501.

Legend:

(E) = Expansion Bearing
(H) = Hinge Bearing

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW WIDENED BRIDGE -
GIRDER FRAMING PLAN (OVERALL)**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S2.3 OF 7 SHEETS

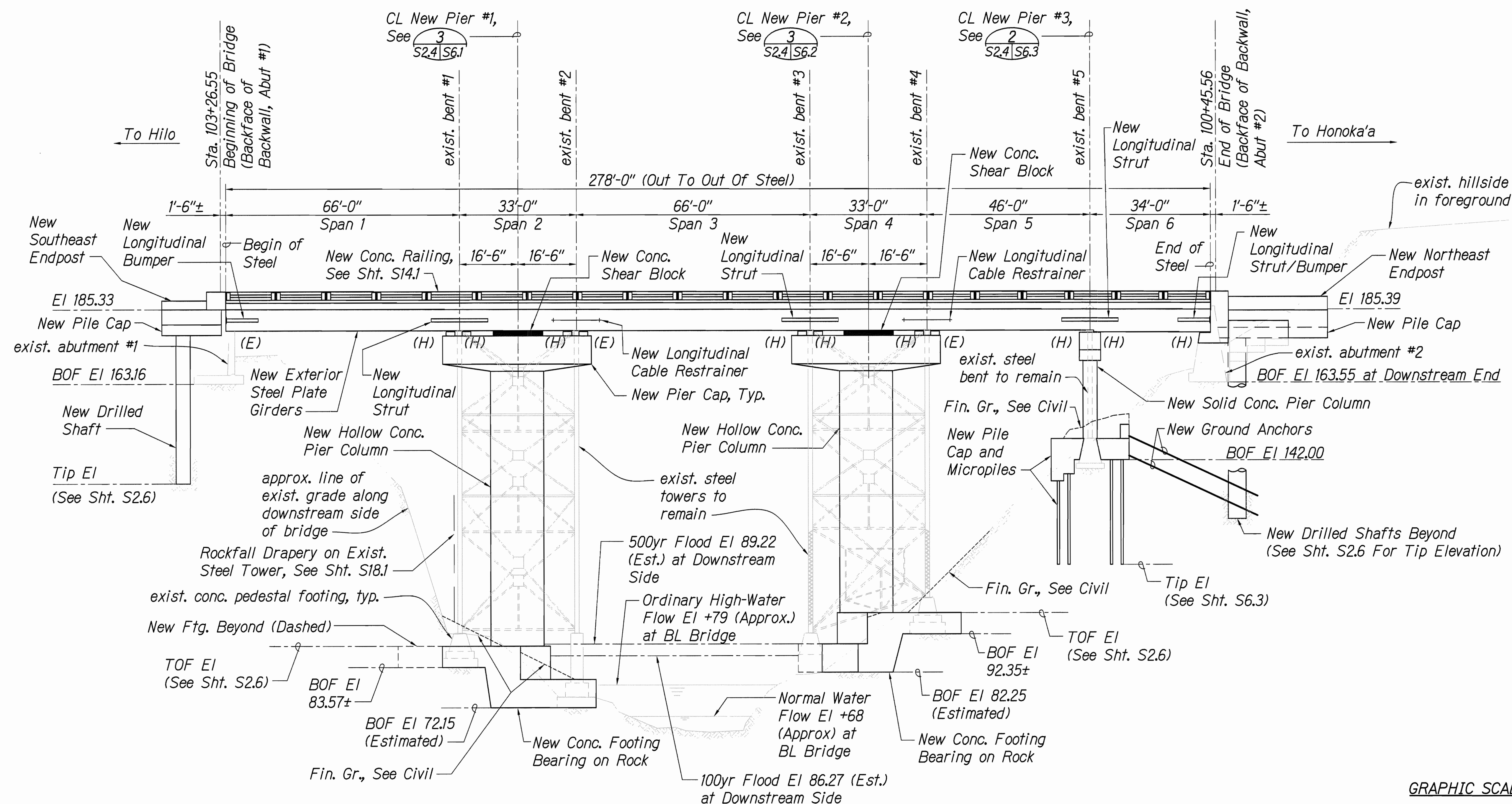
NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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HAWAII	HAW.	BR-019-2(61)	2012	56	137

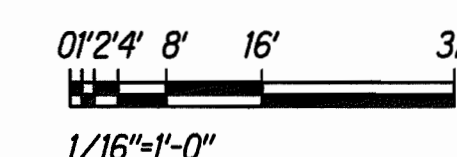


1
S2.1, S2.2 & S2.3 S2.4 NEW WIDENED BRIDGE ELEVATION - EAST/DOWNSTREAM
SCALE: 1/16" = 1'-0"

Legend:

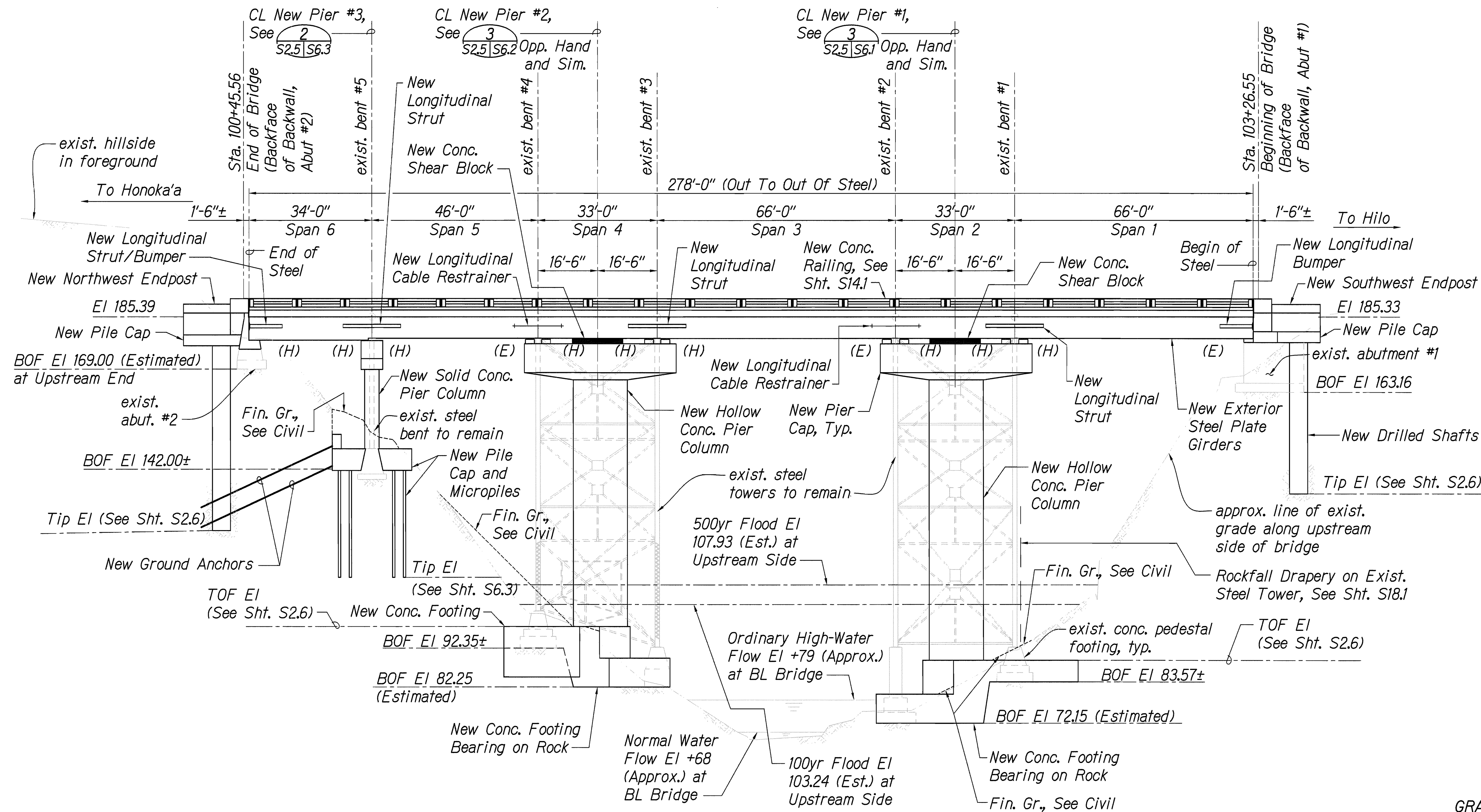
(E) = Expansion Bearing
(H) = Hinge Bearing

GRAPHIC SCALES:



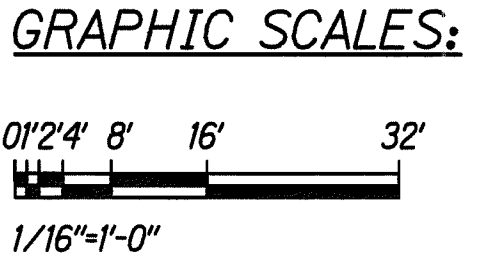
	STATE OF HAWAII	
	DEPARTMENT OF TRANSPORTATION	
	HIGHWAYS DIVISION	
	NEW WIDENED BRIDGE ELEVATION	
	- EAST/DOWNSTREAM	
HAWAII BELT ROAD		
Rehabilitation of Umauma Stream Bridge		
Federal Aid Project No. BR-019-2(61)		
Scale: 1/16" = 1'-0" Date: July 25, 2012		
SHEET No. S2.4 OF 7 SHEETS		

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	57	137



1
S2.1, S2.2 & S2.3 S2.5
NEW WIDENED BRIDGE ELEVATION - WEST/UPSTREAM
SCALE: 1/16" = 1'-0"

Legend:
(E) = Expansion Bearing
(H) = Hinge Bearing



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NEW WIDENED BRIDGE ELEVATION
- WEST/UPSTREAM

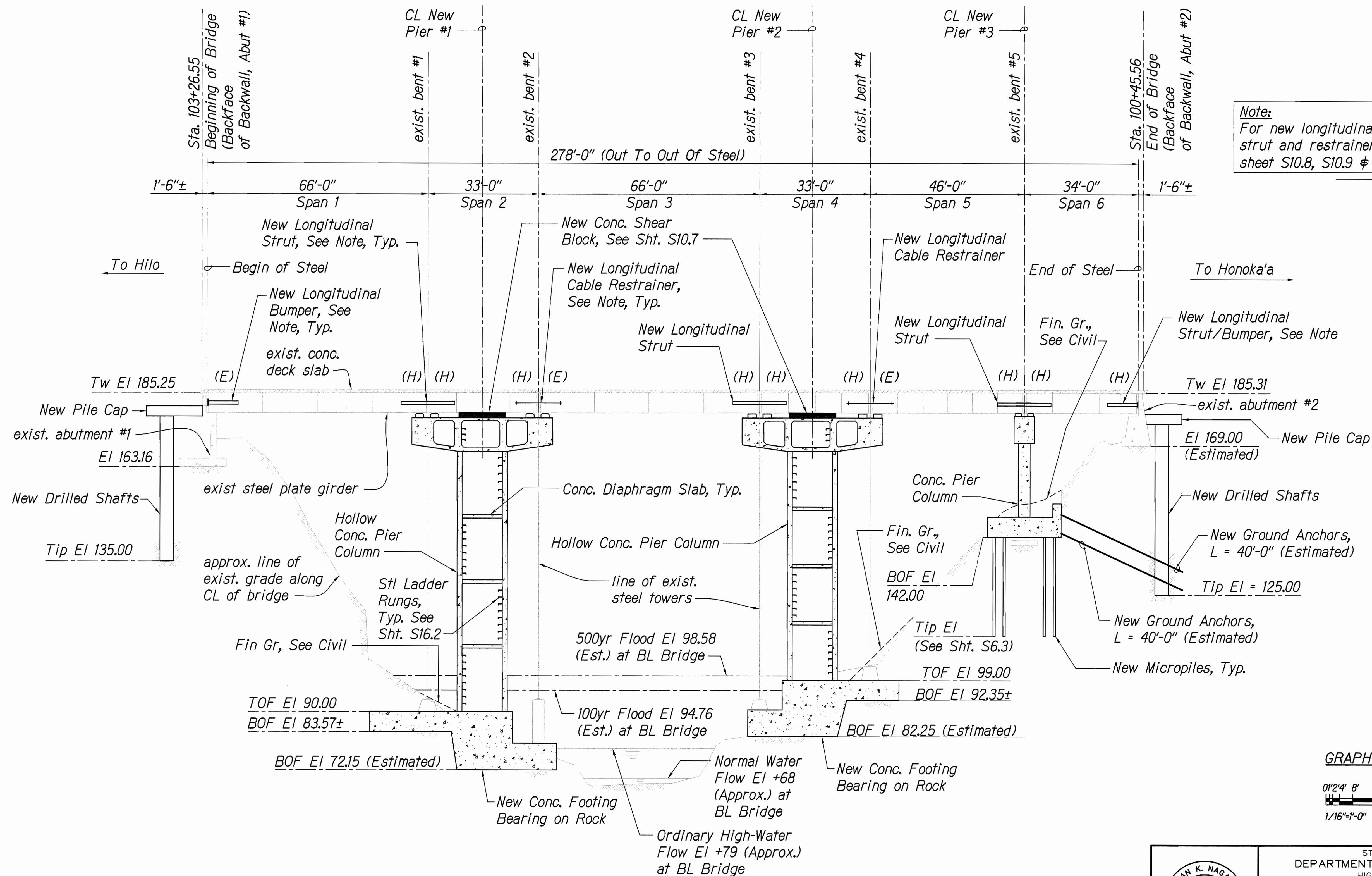
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S2.5 OF 7 SHEETS

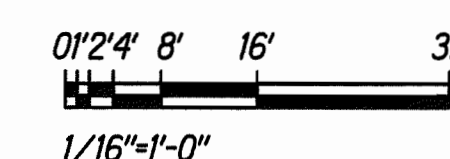
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ORIGINAL PLAN	
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HAWAII	HAW.	BR-019-2(61)	2012	58	137



Note:
For new longitudinal bumper, strut and restrainers, see sheet S10.8, S10.9 & S10.10

GRAPHIC SCALES:



Legend:

(E) = Expansion Bearing
(H) = Hinge Bearing

LONGITUDINAL SECTION THRU BRIDGE
S2.1, S2.2 & S2.3 S2.6 (ALONG BASELINE) SCALE: 1/16" = 1'-0"

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**LONGITUDINAL SECTION
THRU BRIDGE**

HAWAII BELT ROAD

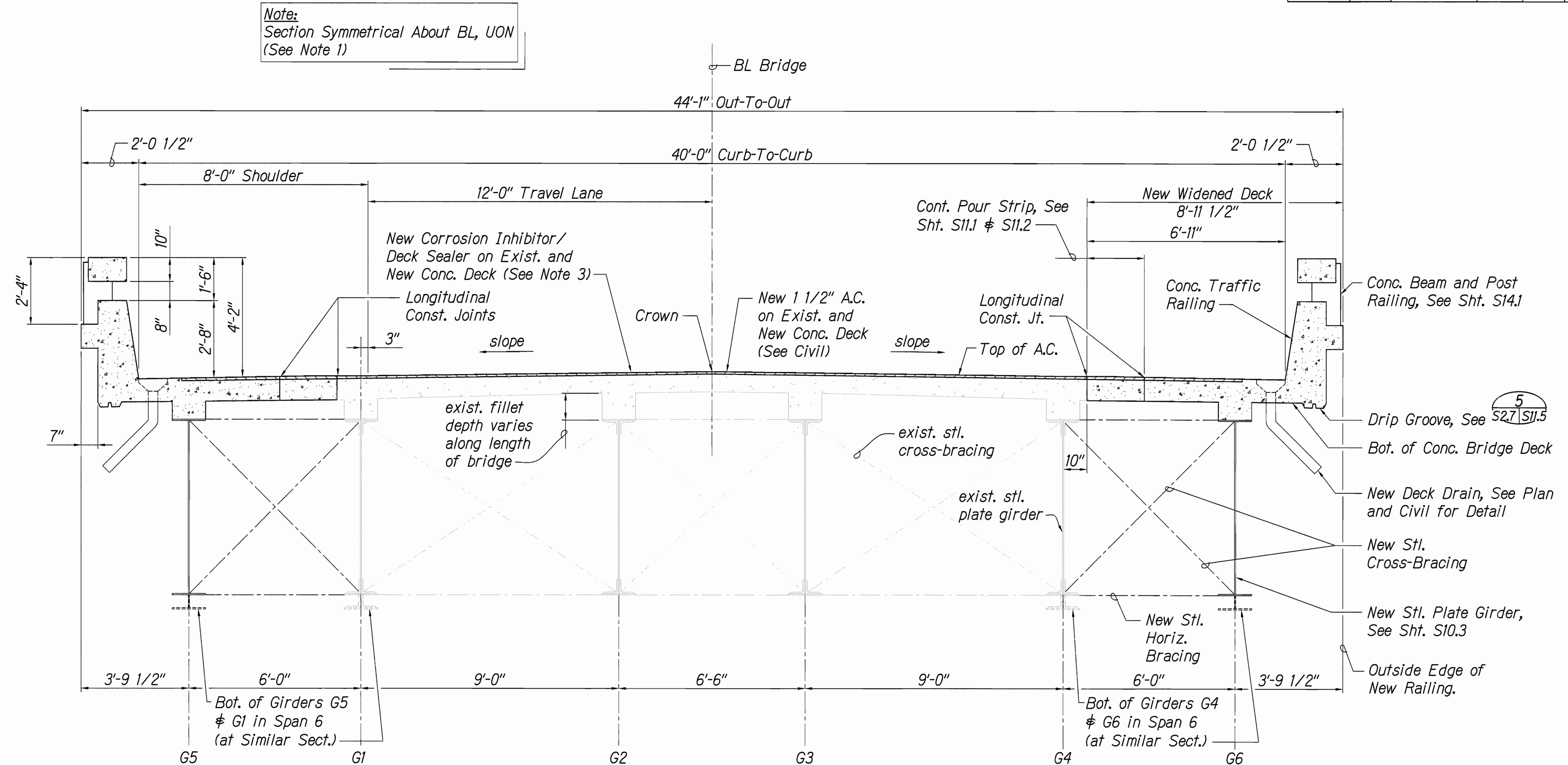
Rehabilitation of Umauma Stream Bridge

Federal Aid Project No. BR-019-2(61)

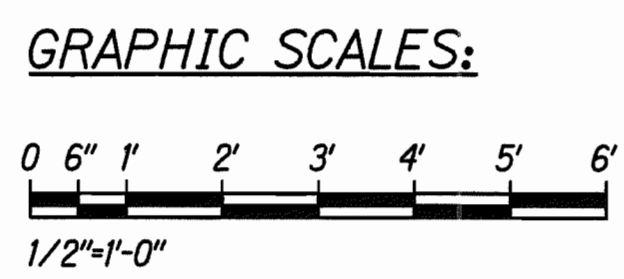
Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S2.6 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	59	137



1
S2.2 & S2.3 S2.7 **NEW WIDENED BRIDGE - TRANSVERSE SECTION (LOOKING NORTH)**
SCALE: 1/2" = 1'-0"



- Notes:**
- Existing dimensions shown may not be exact and are provided for information only. Contractor shall field verify all existing and new dimensions prior to construction. Existing as-builts conditions may not be symmetrical.
 - For construction phasing, see sheet S15.1.
 - New corrosion inhibitor/deck sealer shall be installed on new and existing concrete deck surfaces between curb-to-curb prior to installing new A.C. overlay. See Special Provisions Section 503 - Concrete Structures. This item shall be incidental to and paid for under Section 401 Hot Mix Asphalt Pavement. Contractor shall coordinate this work with A.C. pavement sub-contractor.

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HAWAII, U.S.A.

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NEW WIDENED BRIDGE - TRANSVERSE SECTION

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

SHEET No. S2.7 OF 7 SHEETS

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HAWAII	HAW.	BR-019-2(61)	2012	60	137

Micropile General Notes:

1. Micropile and foundation design is based on Geotechnical recommendations report by Hirata and Associates, dated April 28, 2011.
2. 7" diameter micropile shall be embedded into hard basalt as shown on drawings.
13. Production micropiles shall be proof tested. 10 percent of all vertical micropiles shall be tested as directed by the Engineer. Half shall be tested in compression and half shall be tested in tension, see Special Provisions.

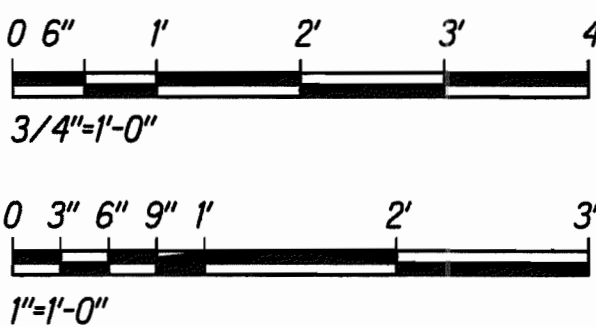
Design Loads Per Micropile (Vertical and Battered):

Strength Limit State:	150 kips Compression 75 kips Uplift
Extreme Event Limit State:	220 kips Compression 150 kips Uplift

14. Contractor shall notify the Engineer prior to commencing with any load test.
15. Estimated tip elevation of micropile shall be field verified and shall be adjusted as necessary to provide minimum cased and uncased lengths, and minimum embedment into hard basalt layer. See typical elevation on this sheet.

3. Contractor shall refer to Special Provisions Section 512 "Micropiles".
4. Excavations shall be clean of all dirt and debris prior to placement of reinforcing steel and cement grout.
5. Permanent steel casing shall have outside diameter and wall thickness as shown on drawings, machined flush jointed threads, and conform to ASTM A 252, Grade 3.
6. Permanent steel casing shall be hot dip zinc coated conforming to ASTM A 123.
7. Central reinforcing steel shall be 1-3/8 inch diameter high-strength threadbar conforming to ASTM A 722 (AASHTO M 275), Type II, grade 150, and shall be fusion bonded epoxy coated conforming to ASTM A 934.
8. Provide centering devices (centralizers) fabricated from plastic or material not harmful to reinforcing steel. Provide centralizers at top and bottom and 10'-0" O.C. within micropile length. Centralizer shall allow grout to flow freely.
9. Cement grout shall be $f'_c = 5,500$ psi at 28 days with water-cement ratio of 0.40 or less.
10. Where necessary, central reinforcing steel shall be spliced only below end of permanent steel casing with coupler capable of developing 125% of bar ultimate strength in tension or compression. Submit coupler product data for Engineer's review.
11. Micropiles shall have at least 15'-0" uncased length into hard basalt. See elevation.
12. For Pier #3 foundation, at least two pre-production vertical micropiles shall be load tested, one in compression and one in tension. See Special Provisions and sheet S5.8.

GRAPHIC SCALES:



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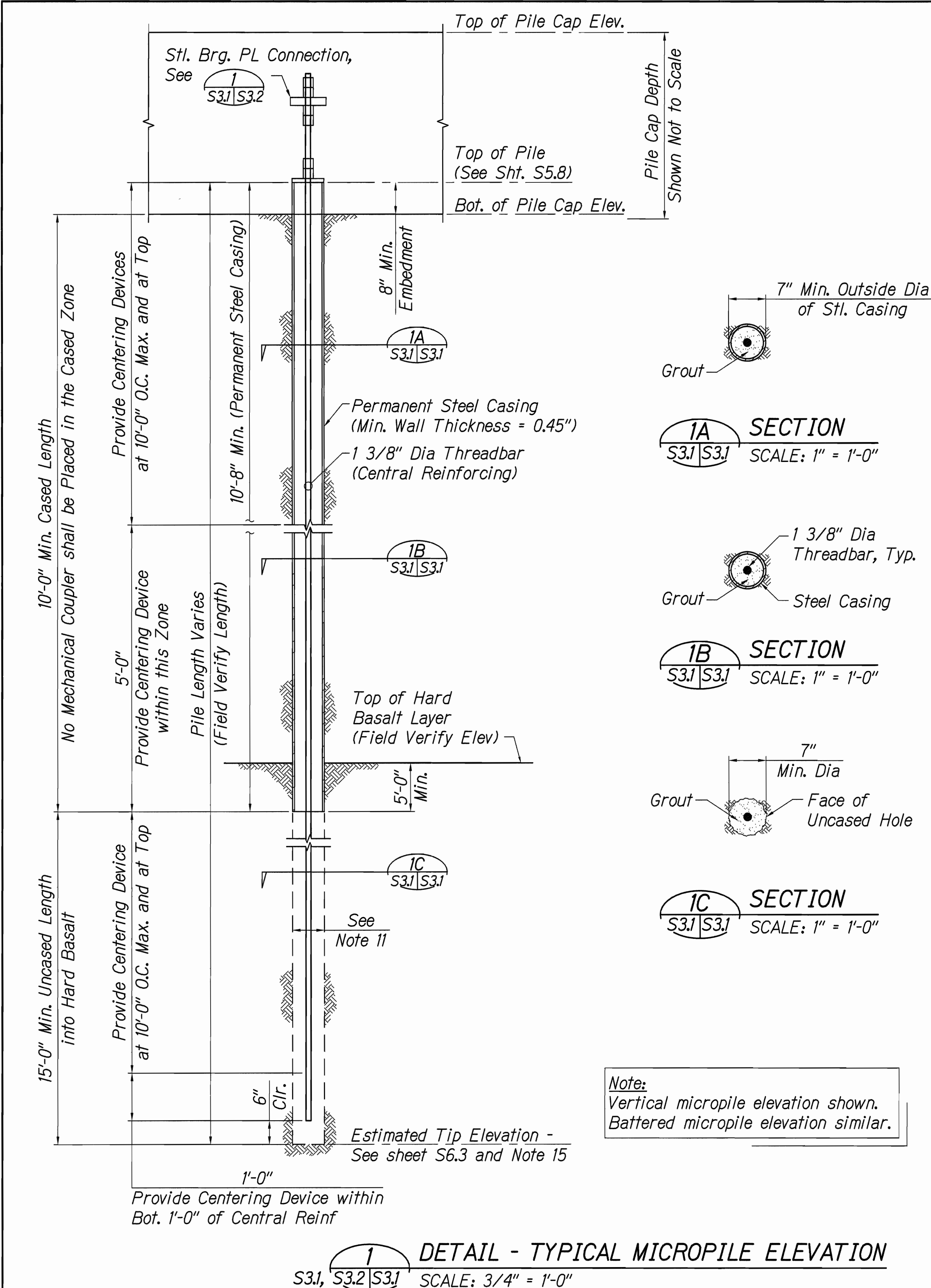
STATE OF HAWAII
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HIGHWAYS DIVISION

MICROPILES - GENERAL
NOTES & TYPICAL DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

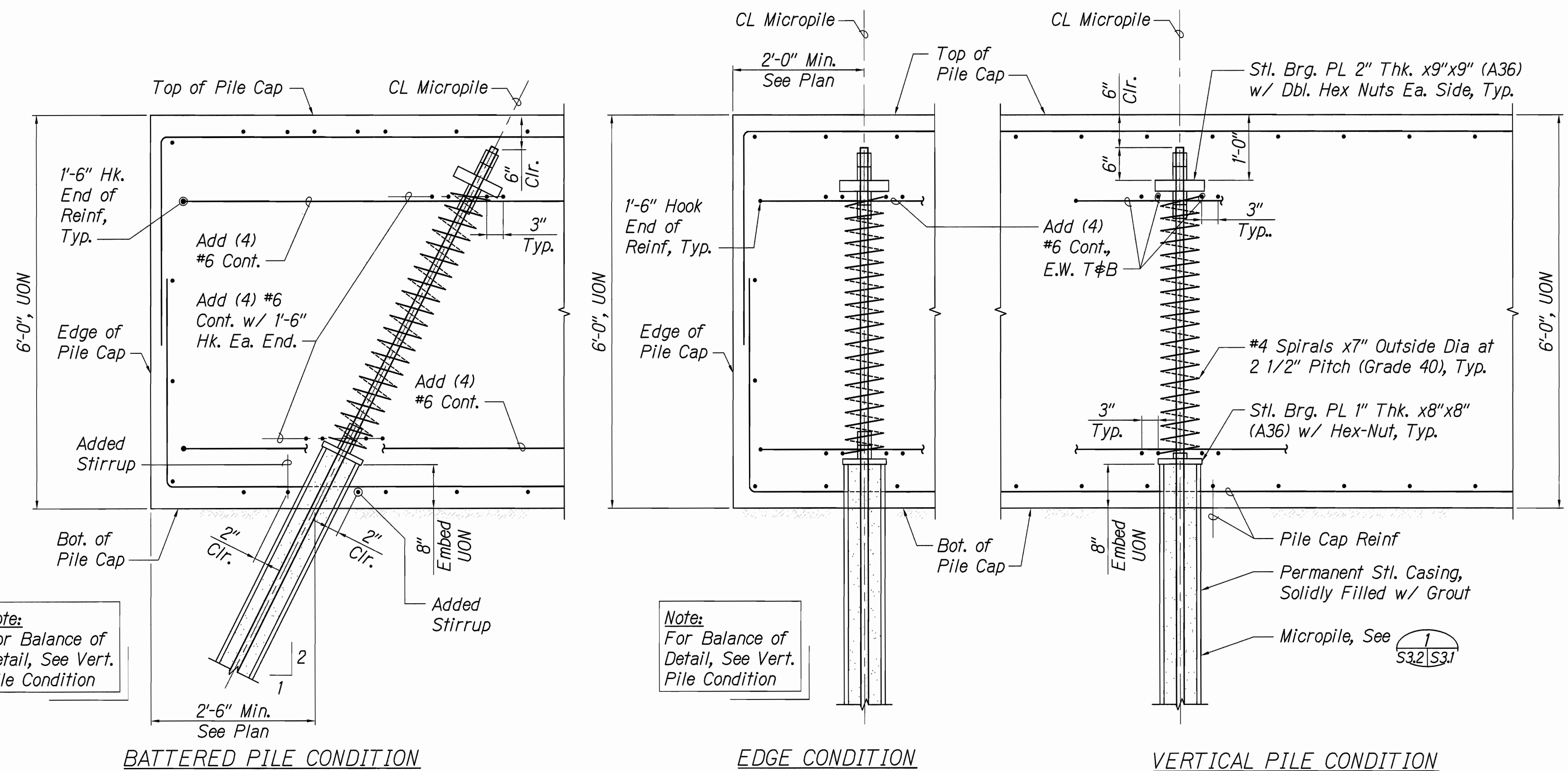
Scale: As Shown Date: July 25, 2012

SHEET No. S3.1 OF 4 SHEETS



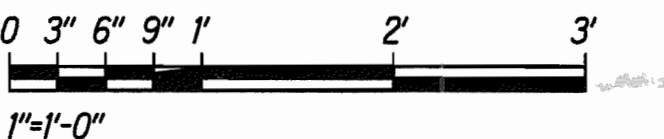
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	61	137



SECTION - MICROPILE PILE CAP CONNECTION
 SCALE: 1" = 1'-0"

GRAPHIC SCALES:



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

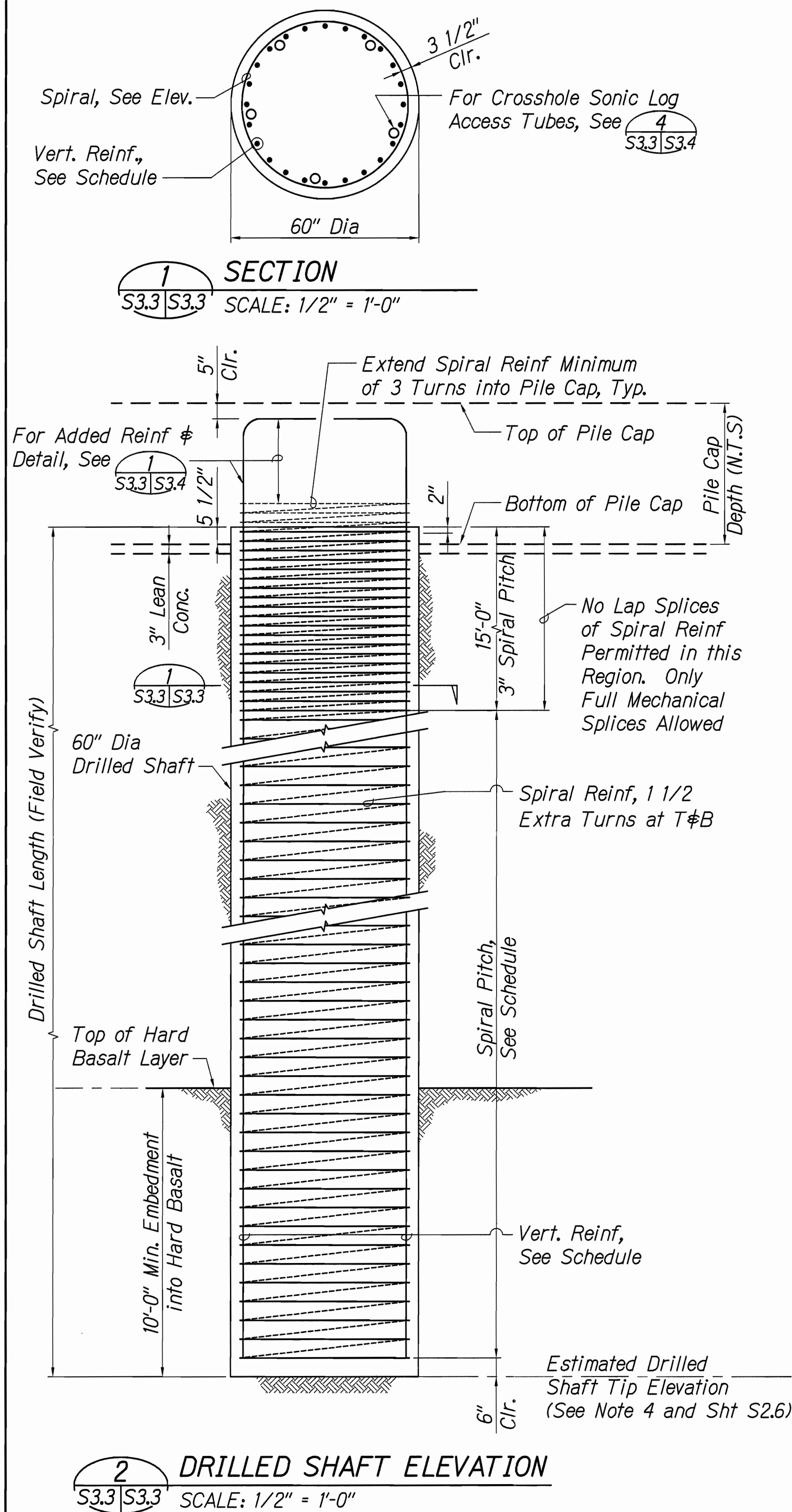
MICROPILES - TYPICAL DETAILS

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1" = 1'-0" Date: July 25, 2012

SHEET No. S3.2 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	62	137



Drilled Shaft Notes:

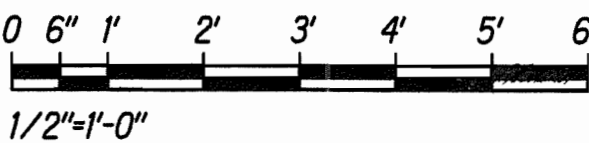
- Foundation design based on Geotechnical Report by Hirata & Associates, dated April 28, 2011. Lateral load resistance of drilled shafts are as shown in table this sheet.
- The contractor shall refer to the Special Provisions Section 511 "DRILLED SHAFTS" and Standard Specs Section 511.
- All excavation and drilling operations for foundations shall be monitored by the Engineer.
- Drilled shafts shall extend at least 10 feet into hard basalt. Drilled shaft tip elevations shown in the drawings are estimated elevations. The actual drilled shaft tip elevations shall be determined by the Engineer during construction.
- Shafts within three diameters of an adjacent shaft shall not be drilled within 24 hours of completion of concreting of the adjacent shaft.
- Contractor shall provide for de-watering of excavations from either surface water, ground water or seepage. Otherwise, concrete shall be placed by tremie as necessary.
- Provide temporary non-corrugated steel casing as necessary to reduce caving of the side walls. Permanent casing shall not be permitted.
- Drilled shafts shall be embedded to tip elevations and a minimum of 10 feet into hard basalt, whichever is deeper. Temporary casing shall be removed.
- Excavations for drilled shafts shall be approved by the Engineer prior to placing the concrete and reinforcing. Contractor shall notify the Engineer when excavation is ready for inspection.
- Excavations shall be cleaned of all dirt and debris prior to placement of reinforcing steel and concrete.
- Longitudinal (or vertical) reinforcing bars shall conform to ASTM A706, Grade 60. Spiral and hoop reinforcing shall be uncoated deformed bars conforming to ASTM A615, Grade 60.

- Longitudinal (or vertical) bars shall not be lap spliced. Splices, if required, shall be mechanical butt splices capable of developing in tension and compression at least 125 percent of the specified yield strength of the smaller bar connected. Welded splices shall not be permitted.
- Minimum lap length for spiral and hoop lateral reinforcement shall be as shown on typical detail (see sheet S3.4). Welded lap splices shall not be permitted.
- Spacer blocks shall be used to maintain proper position and clearance of the reinforcement cage within the shaft.
- Drilled shafts concrete shall be f'c = 6,000 PSI at 28 days with water-cement ratio of 0.40 or less. Maximum size of coarse aggregate shall be 3/8 inch.
- Concrete shall not be placed without approval of the Engineer.

- All excavations shall be properly backfilled. Do not place backfill behind retaining walls before concrete has attained full design strength and a minimum of 7 days curing time.
- For Crosshole Sonic Log access tubes and testing, see Standard Specs Section 511 and Special Provisions. CSL testing and analysis will be performed by the Engineer or the Engineer's authorized representative.
- Special Note For Abutment #2:** Contractor shall refer to sheet S5.9 for new ground anchors below abutment, and shall field verify and coordinate actual drilled shaft locations to avoid conflicts.
- Contractor shall provide survey ties to all drilled shaft as-built locations. See Special Provisions.

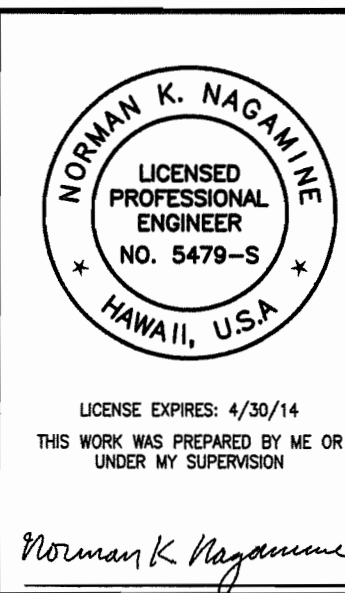
LATERAL LOAD RESISTANCE OF DRILLED SHAFT (60" DIA)				
Location	Limit State	Loading Direction	Maximum Shear (kips)	Lateral Deflection (inches)
Abut. #1	Extreme Event	Longitudinal (Into Slope)	135	1.5
		Longitudinal (Away From Slope)	115	1.5
		Transverse	485	1.5
Abut. #2	Extreme Event	Longitudinal (Into Slope)	135	1.5
		Longitudinal (Away From Slope)	85	1.5
		Transverse	295	1.5

GRAPHIC SCALES:



REINFORCING SCHEDULE

Location	Vert. Reinf	Spiral Reinf
Abut. #1	(24) #14	#6 at 3" Pitch
Abut. #2	(24) #11	#5 at 3" Pitch



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**DRILLED SHAFTS - GENERAL
NOTES & TYPICAL DETAILS**

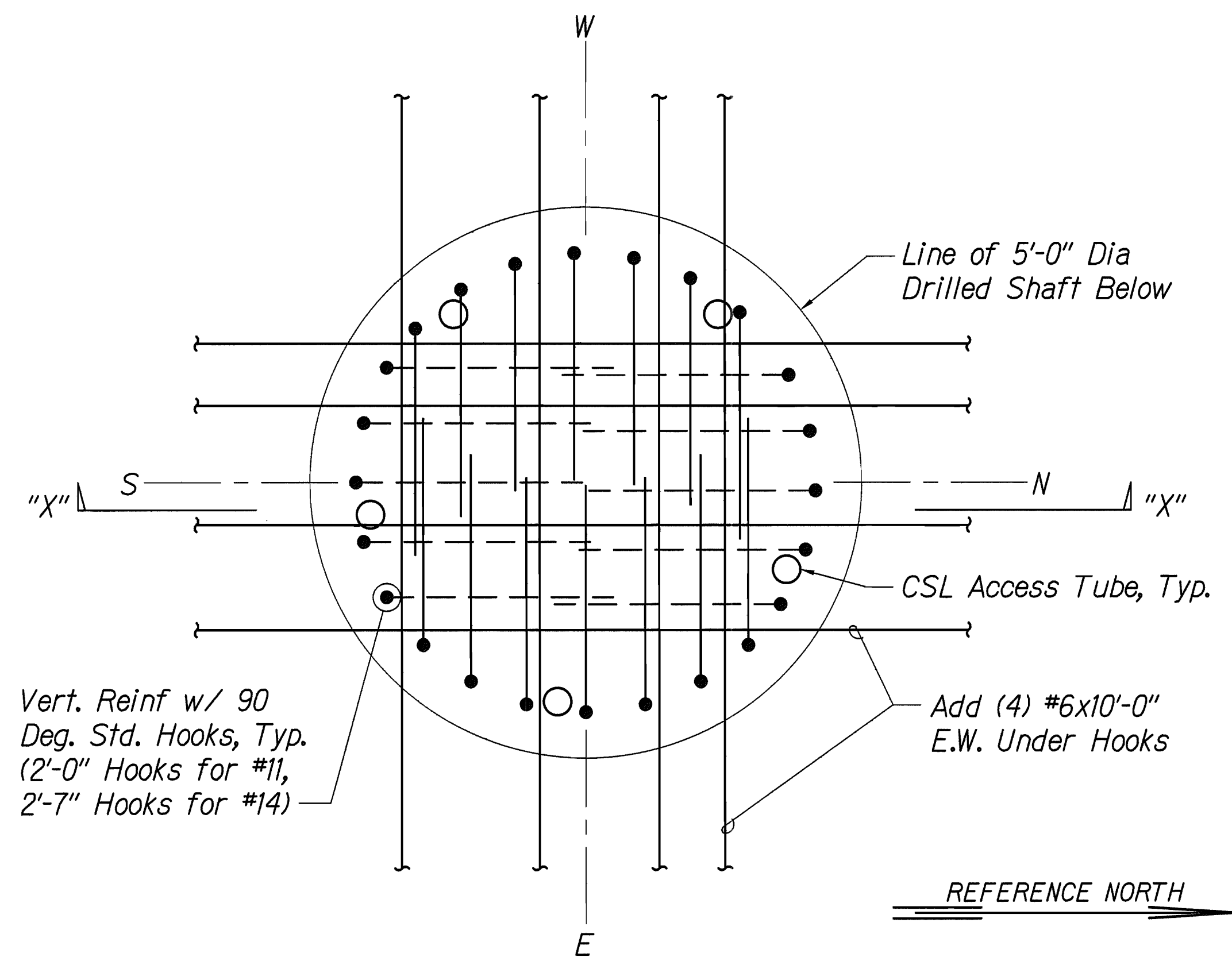
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

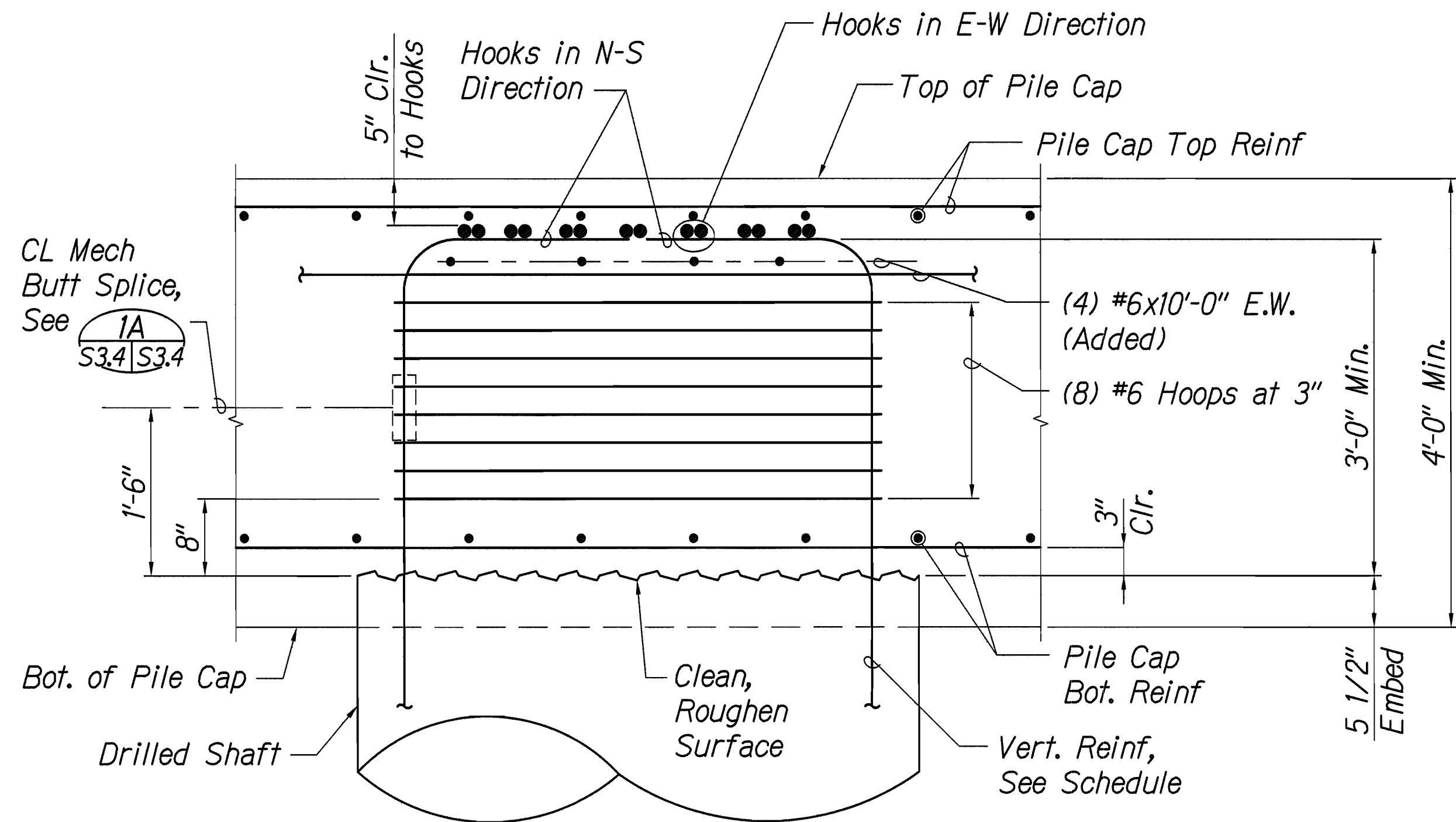
SHEET No. S3.3 OF 4 SHEETS

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HAWAII	HAW.	BR-019-2(61)	2012	63	137



PLAN

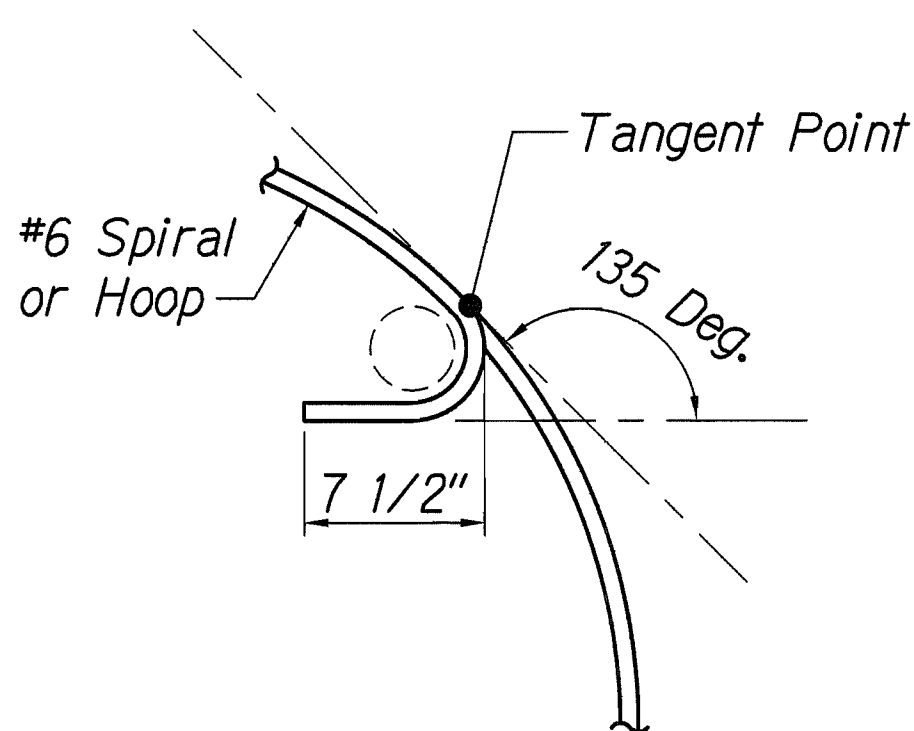
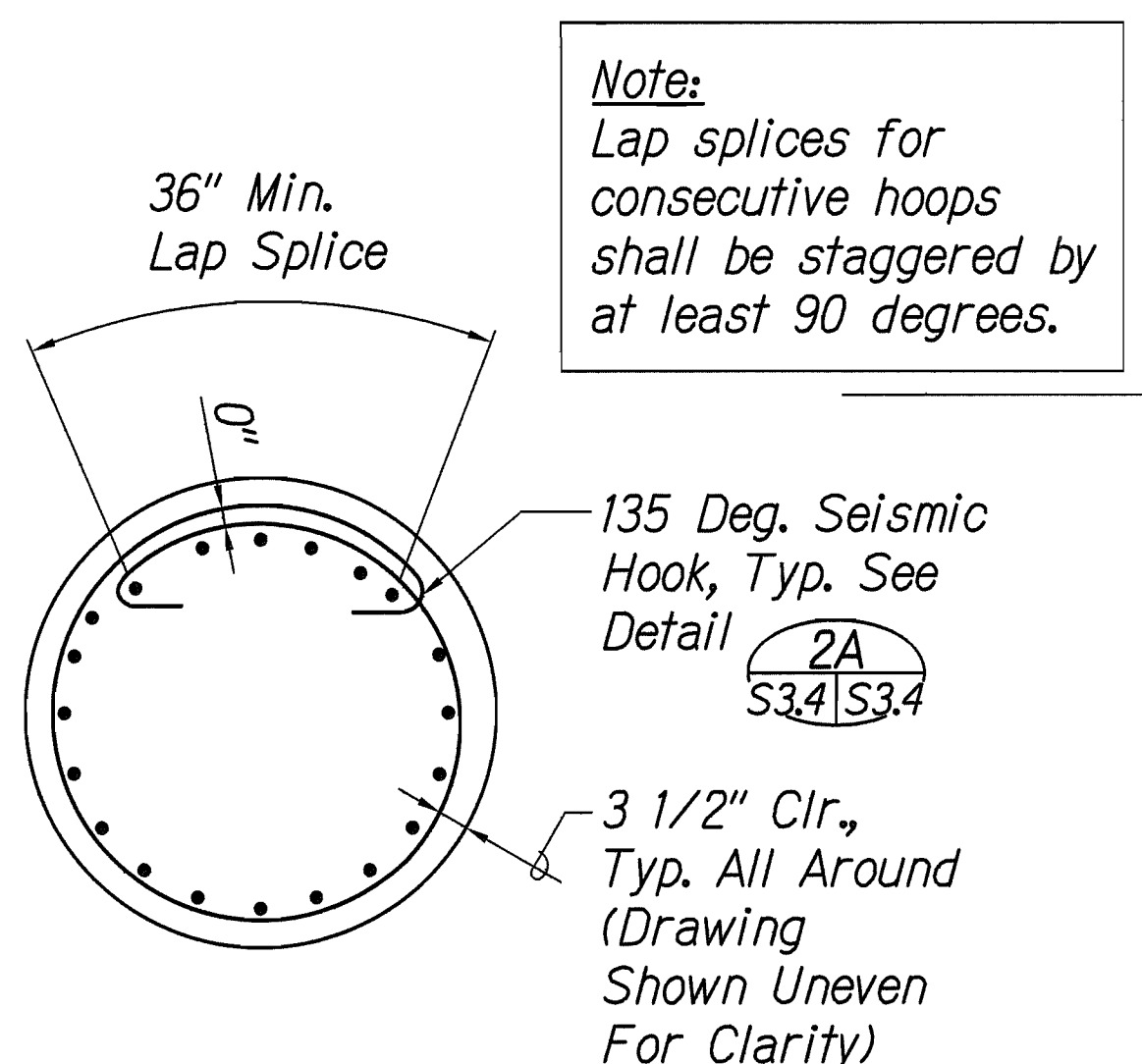


SECTION "X-X"

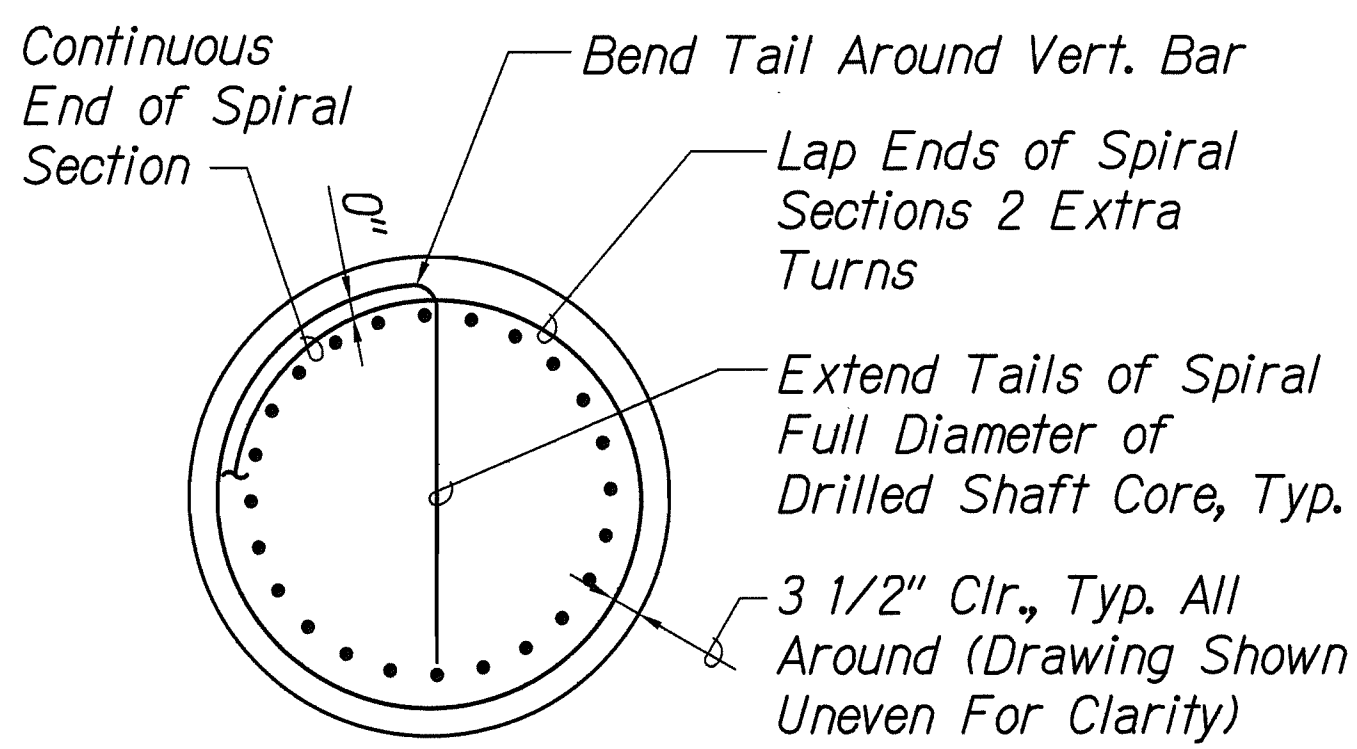
1. Top hooked section of vertical reinforcing (no more than every other bar) shall be installed after pouring and curing (7 days minimum) of drilled shaft concrete.
2. Top section of vertical reinforcing (no more than every other bar) shall be mechanical butt spliced as shown. Mechanical butt splice shall be "sleeve-filler metal" type only. See Standard Specs Section 602 Reinforcing Steel, subsection 602.03 (E) (3) (b) 2.
3. Contractor shall submit locations of proposed bar to be spliced, for Engineer's approval.

1A MECHANICAL BUTT SPLICE NOTES
S3.4 S3.4

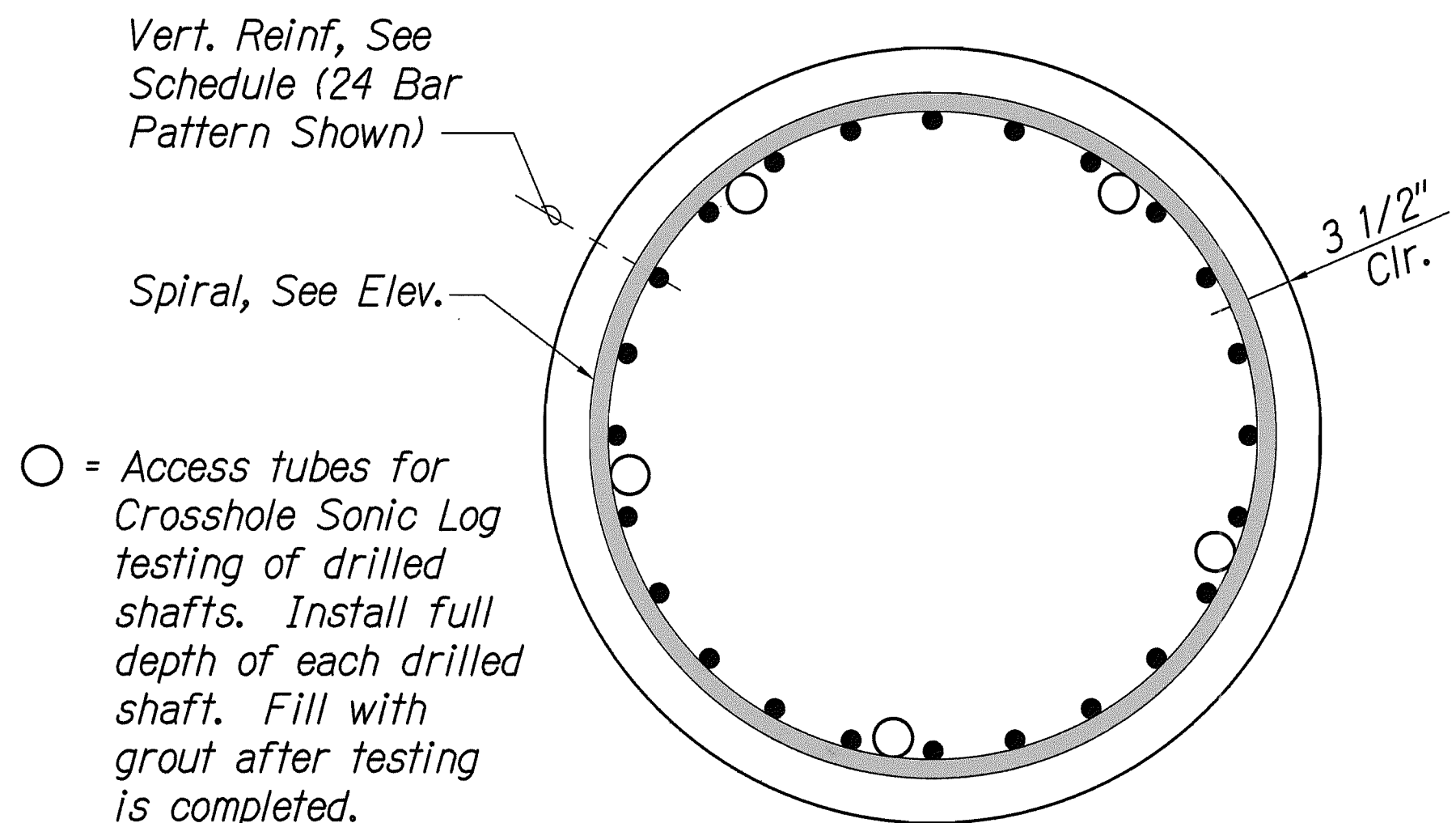
1 DETAIL AT TOP OF PILE CAP (24 BAR PATTERN SHOWN)
S3.3 S3.4 SCALE: 1" = 1'-0"



2A SEISMIC HOOK DETAIL
S3.4 S7.1 S3.4 SCALE: 1-1/2" = 1'-0"



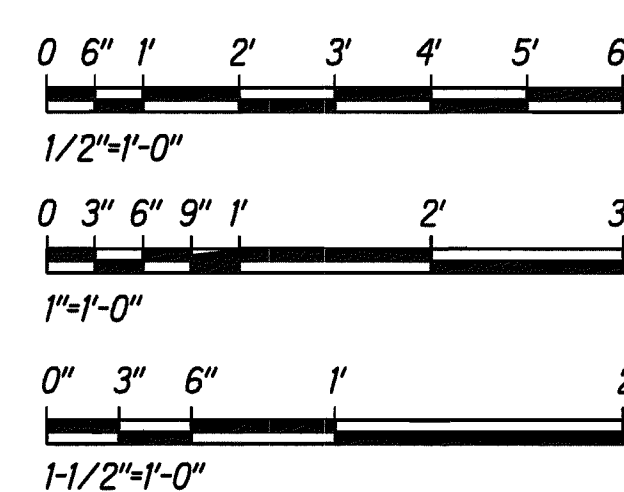
3 SPIRAL REINFORCING LAP SPLICE DETAIL (TYPICAL)
S3.4 S3.4 SCALE: 1/2" = 1'-0"



4 CSL ACCESS TUBES
S3.3 S3.4 SCALE: 1" = 1'-0"

2 HOOP REINFORCING LAP SPLICE DETAIL (TYPICAL)
S3.4 S3.4 SCALE: 1/2" = 1'-0"

GRAPHIC SCALES:



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DRILLED SHAFTS - TYPICAL DETAILS

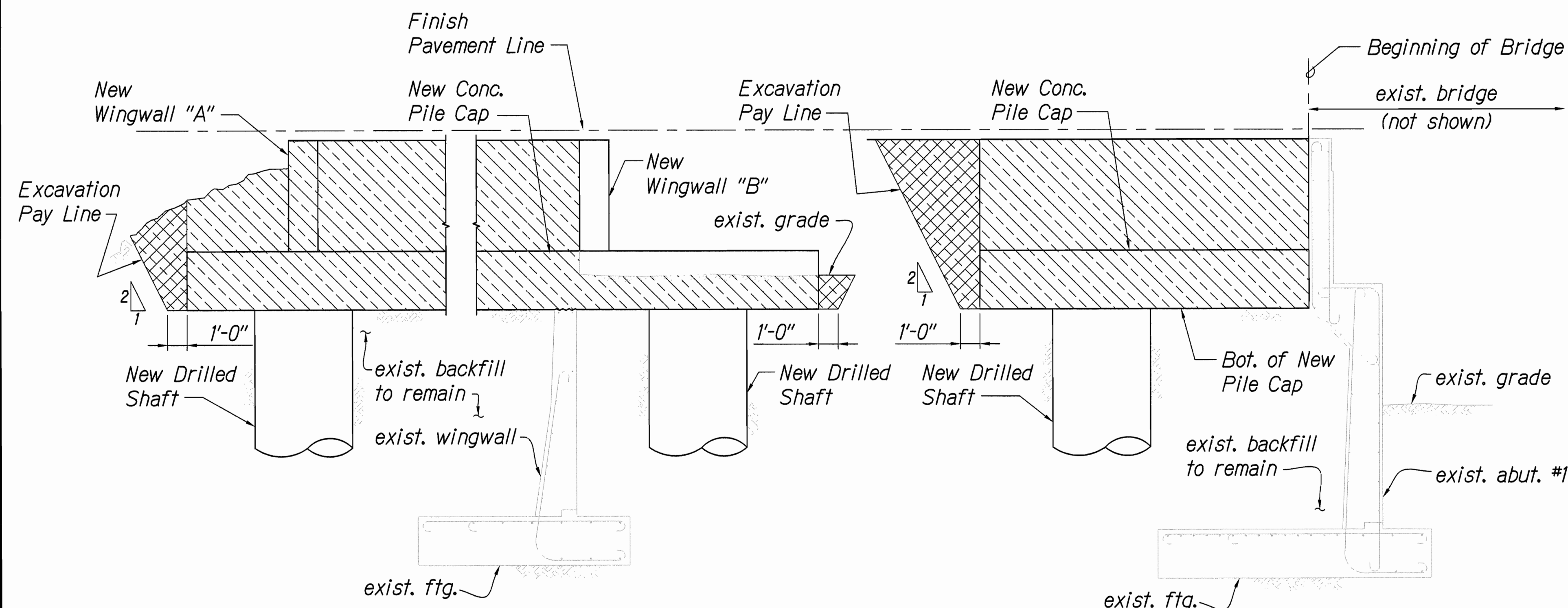
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

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SHEET No. S3.4 OF 4 SHEETS

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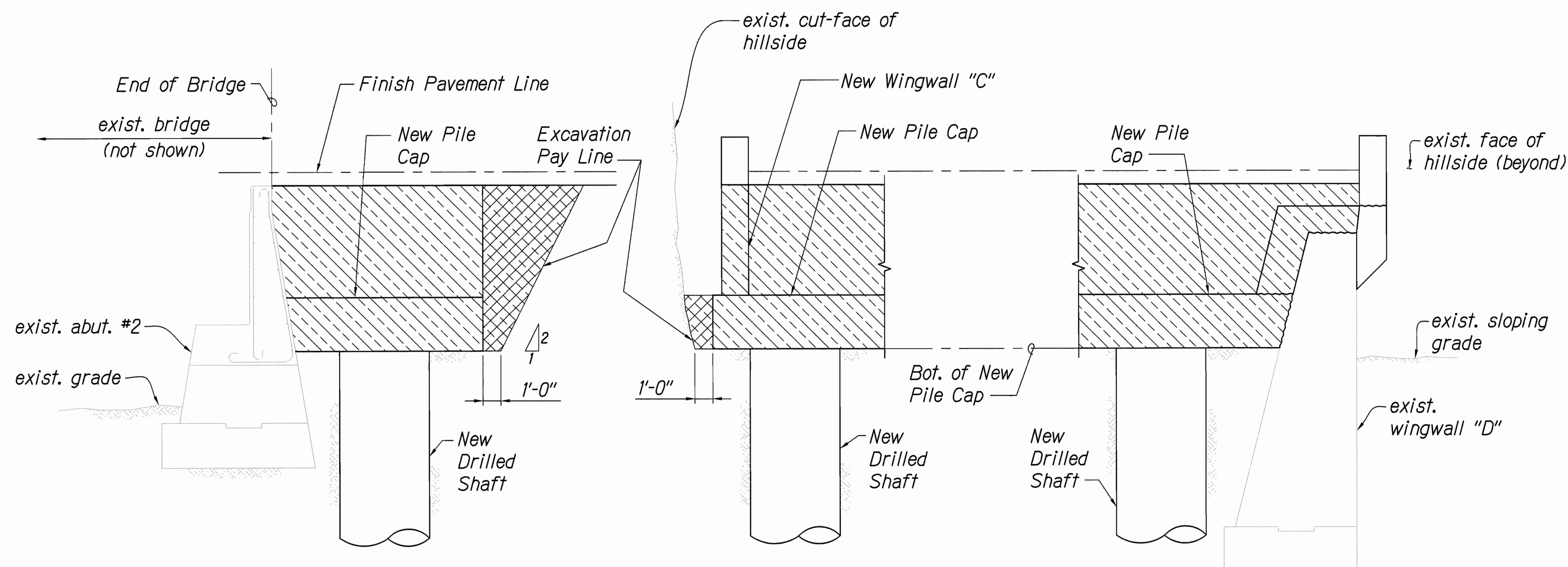
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	64	137



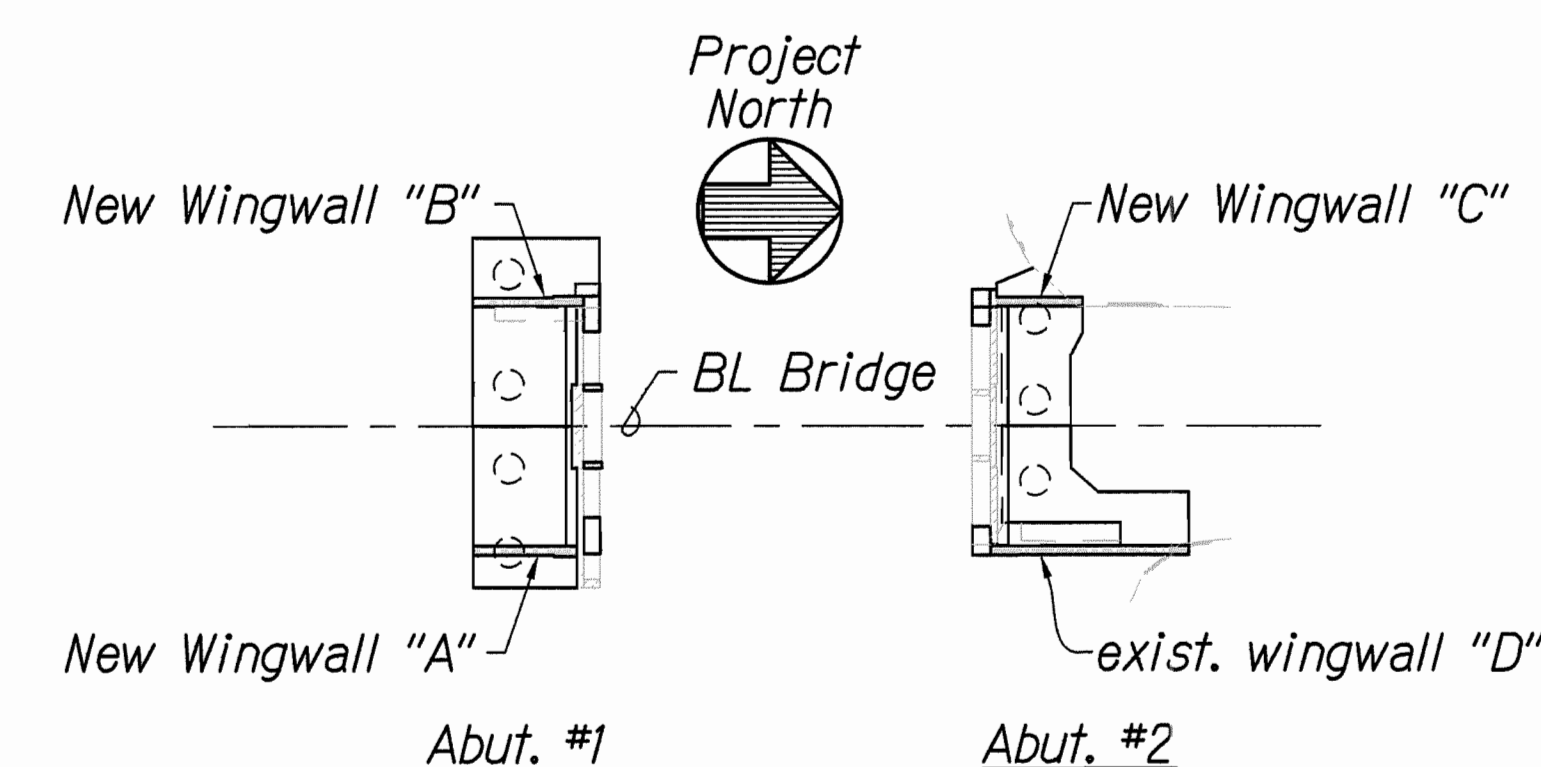
1 ABUTMENT #1 - STRUCTURE EXCAVATION/ BACKFILL PAY LIMITS
 S4.1 S4.1 SCALE: 1/4" = 1'-0"

Notes:

1. Refer to General Structural Notes on sheets S0.1 and S0.2.
2. Existing abutment and wingwall footings, and existing pavements shall be protected at all times from undermining.
3. Excavation for drilled shafts will be paid for under Section 511-Drilled Shafts.

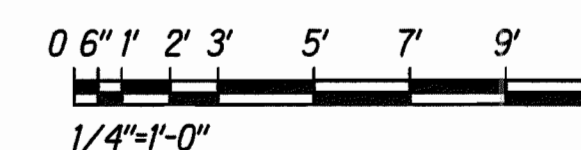


2 ABUTMENT #2 - STRUCTURE EXCAVATION/ BACKFILL PAY LIMITS
 S4.1 S4.1 SCALE: 1/4" = 1'-0"



KEY PLAN

GRAPHIC SCALES:



Legend:

- = Structure Excavation
- = Structure Backfill

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ABUTMENT - TYPICAL PAY LIMITS FOR EXCAVATION

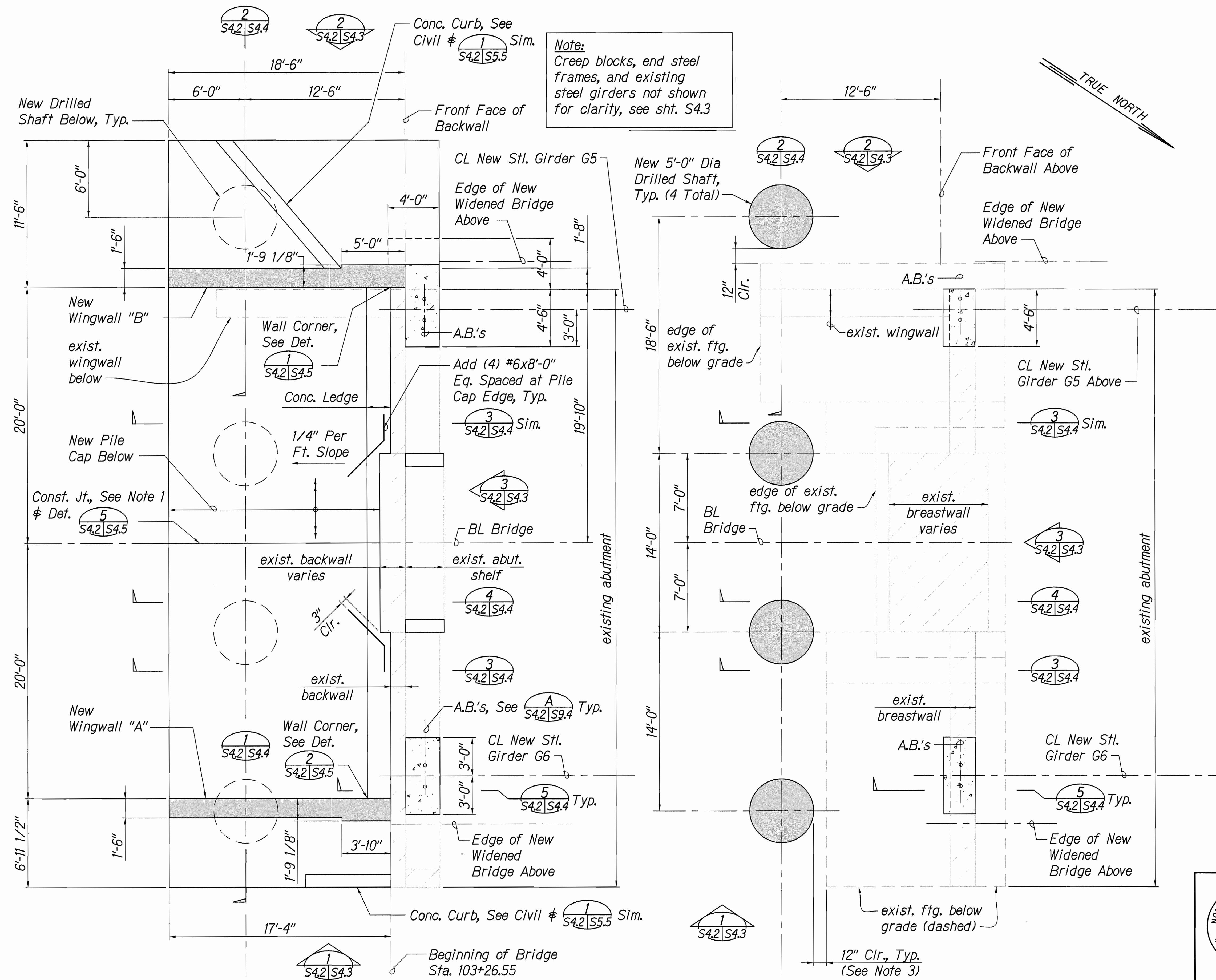
HAWAII BELT ROAD
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Scale: 1/4" = 1'-0" Date: July 25, 2012

SHEET No. S4.1 OF 9 SHEETS

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DESIGNED BY	
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CHECKED BY	
ORIGINAL PLAN	
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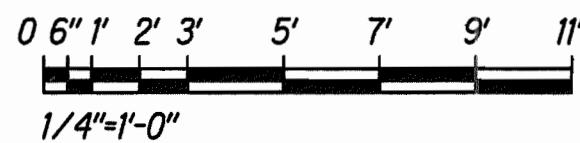
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	65	137



Notes:

- Construction phasing, see sheet S15.1.
- Drilled shaft typical details and reinforcing, and added reinforcing steel in pile cap, see sheets S3.3 and S3.4.
- Locate edge of existing footings prior to drilling shaft excavation. If existing footing encroaches into drilled shaft, immediately notify Engineer for direction.
- Excavations for new drilled shafts and new pile cap shall be kept dry during construction. See Standard Specs Section 205.
- Where new concrete is poured against existing concrete, existing interface surface shall be cleaned and intentionally roughened to 1/4" amplitude, typical.
- Portion of existing Abutment #1 breastwall to be re-poured shall have $f'c = 6,000$ psi.
- New concrete creep blocks shall have $f'c = 6,000$ psi and shall be incidental to abutment concrete.

GRAPHIC SCALES:



A ABUTMENT #1 - BRIDGE LEVEL PLAN
S2.1 # S4.3 | S4.2 SCALE: 1/4" = 1'-0"

B ABUTMENT #1 - FOUNDATION PLAN
S2.1 # S4.3 | S4.2 SCALE: 1/4" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW WIDENED BRIDGE.
ABUTMENT #1 - PLANS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

SHEET No. S4.2 OF 9 SHEETS

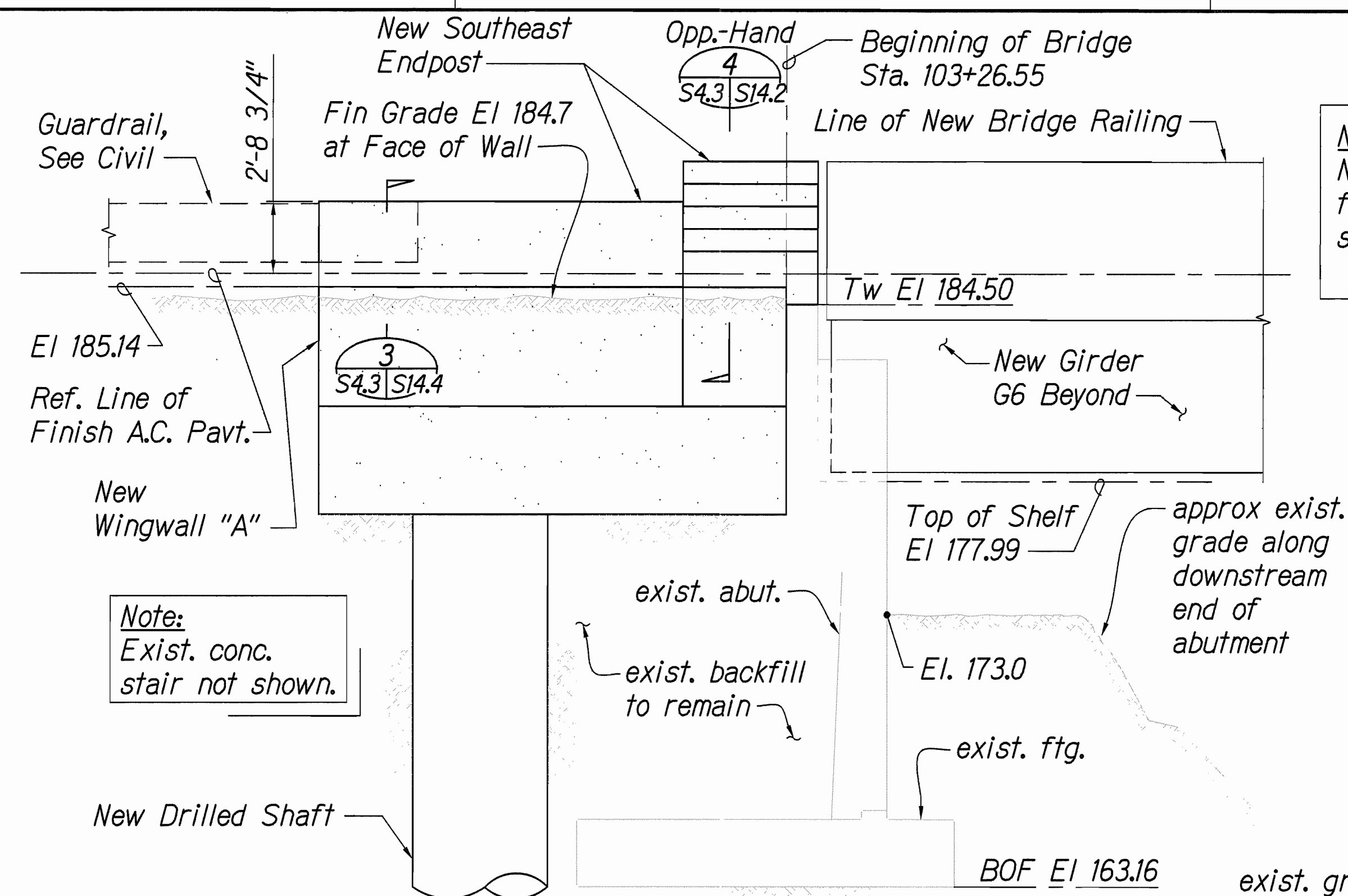
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NO. 5479-S
HAWAII, U.S.A.

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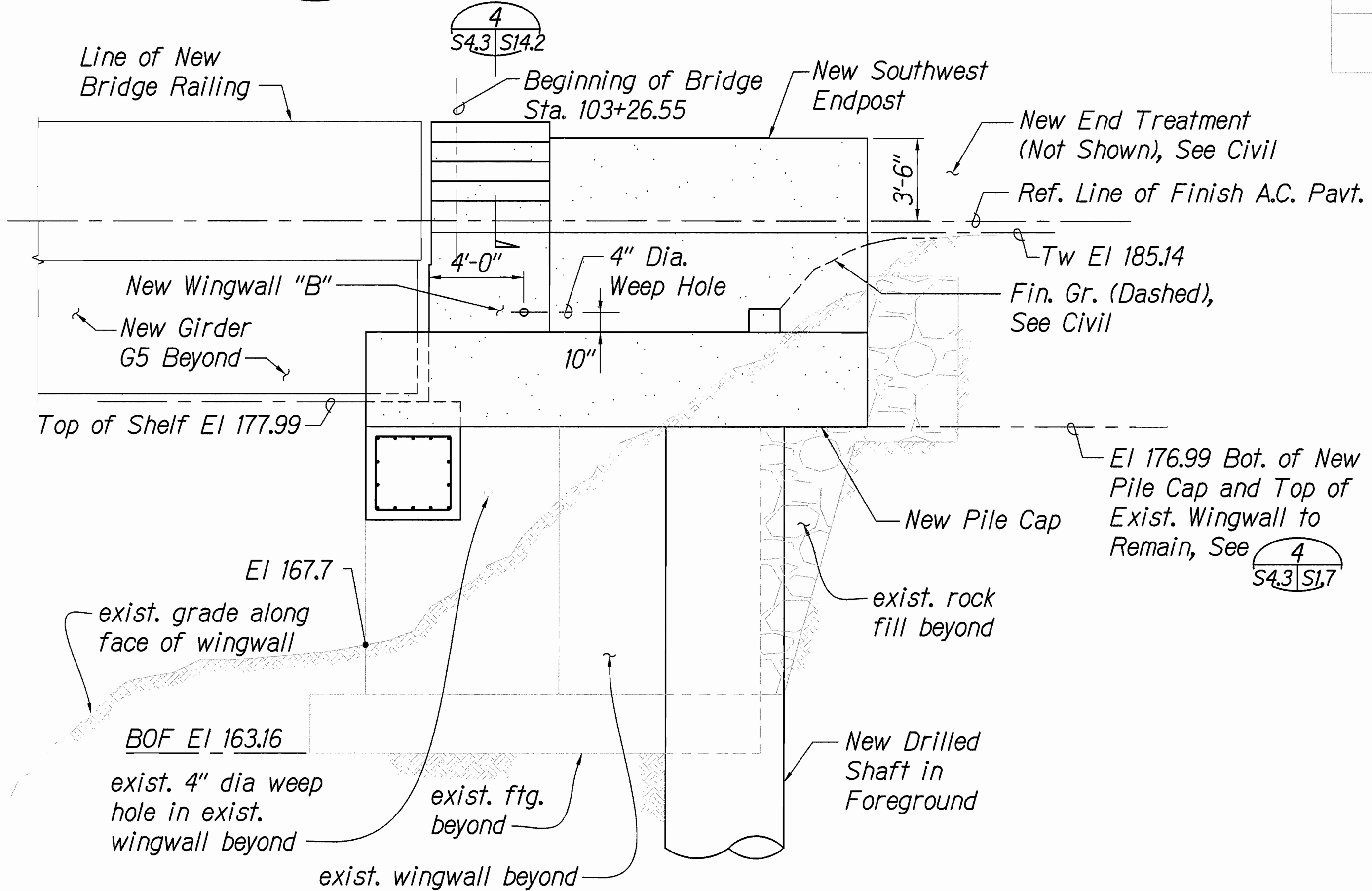
Norman K. Nagamine

SURVEY PLOTTED BY	DATE
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CHECKED BY	
ORIGINAL PLAN	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	66	137

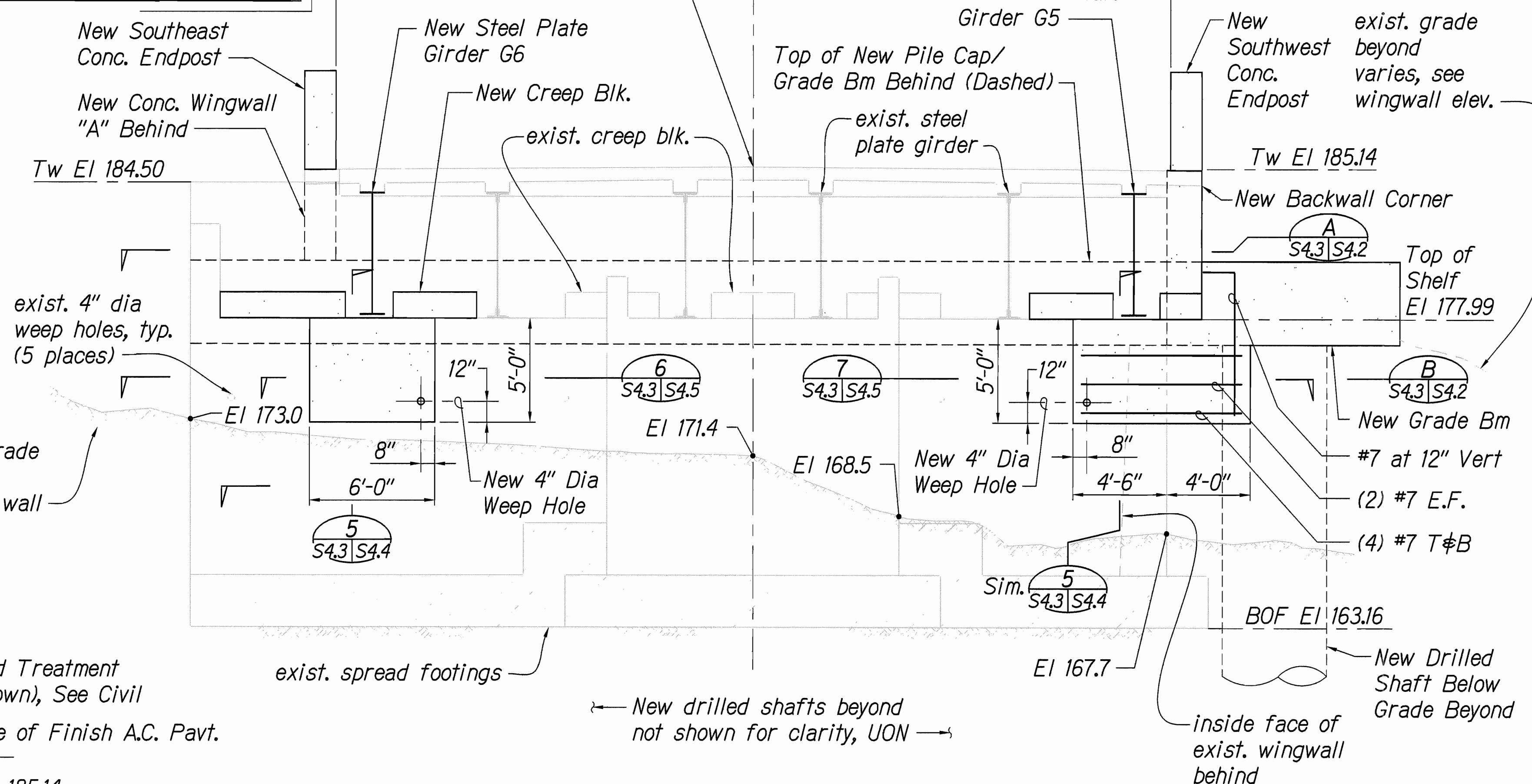


1 WINGWALL "A" - ELEVATION
 SCALE: 1/4" = 1'-0"

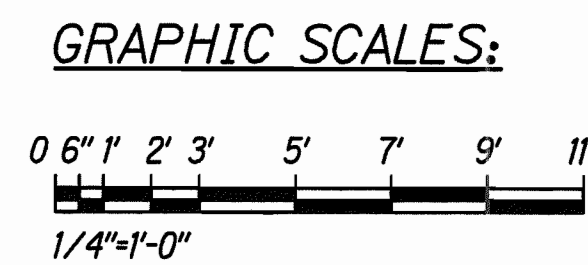


2 WINGWALL "B" - ELEVATION
 SCALE: 1/4" = 1'-0"

Note:
 New and existing steel frames not shown for clarity, see S4.3 S9.5



3 ABUTMENT #1 - FRONT ELEVATION
 SCALE: 1/4" = 1'-0"



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**NEW WIDENED BRIDGE,
 ABUTMENT #1 - ELEVATIONS**

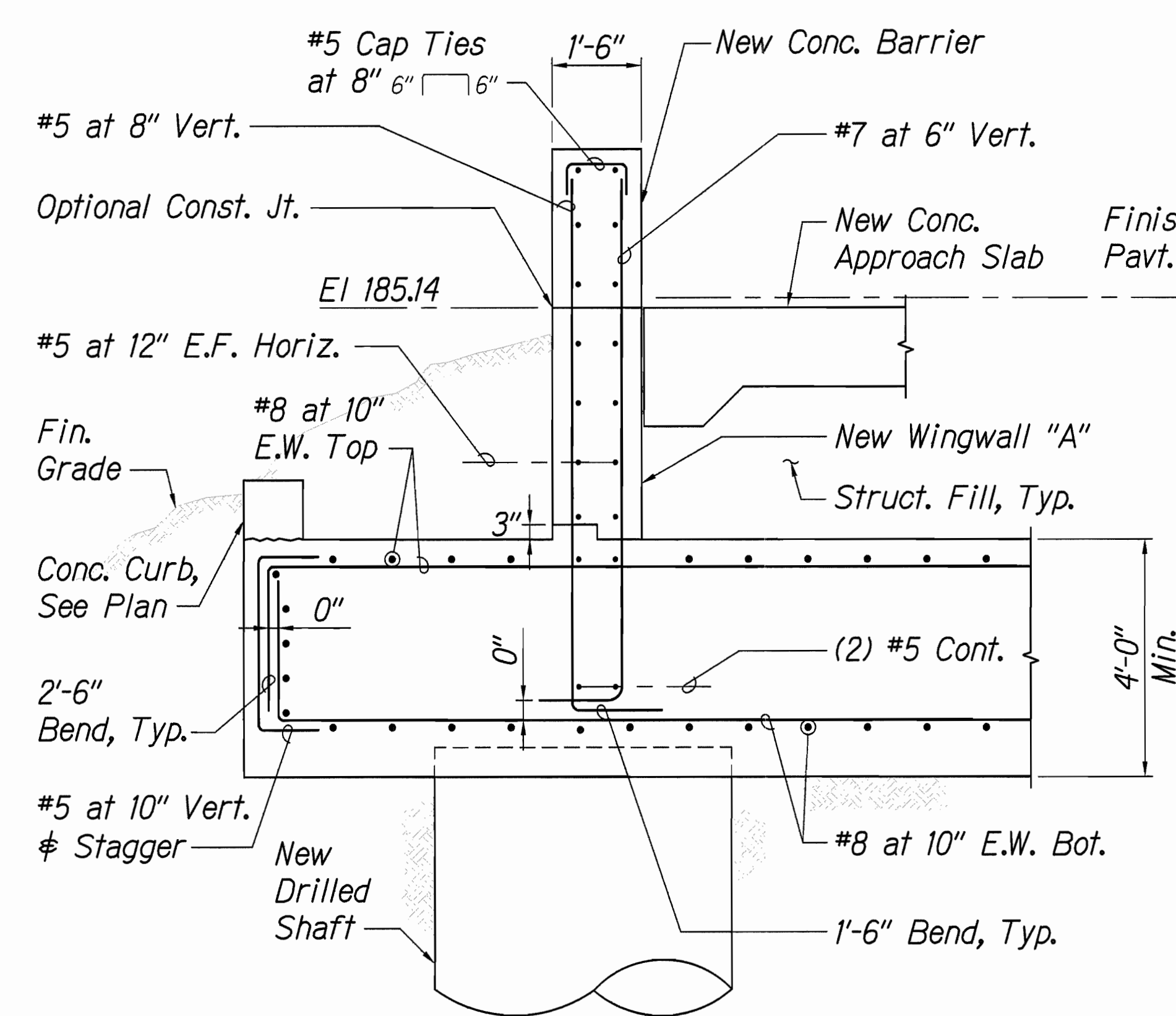
HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

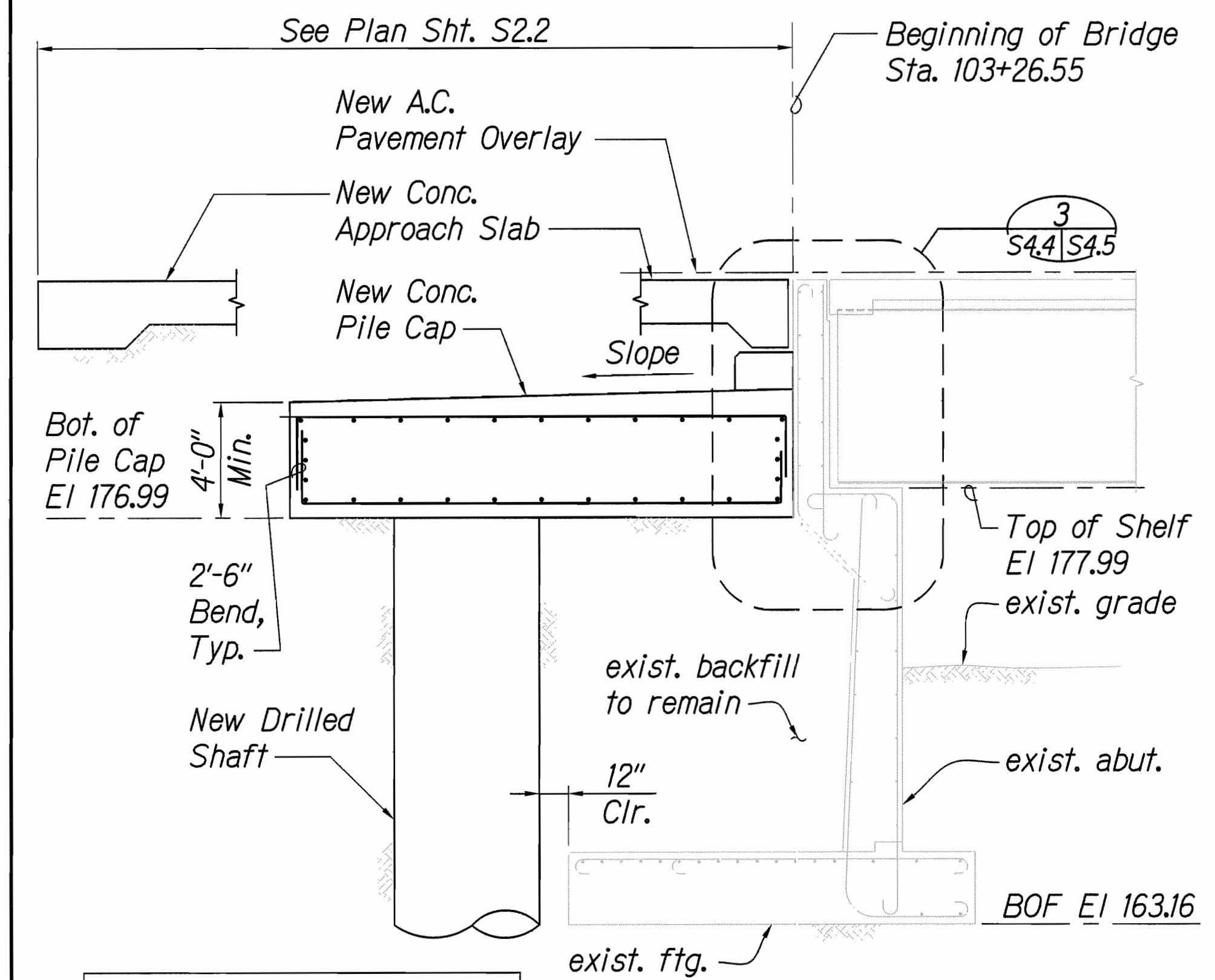
SHEET No. S4.3 OF 9 SHEETS

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	67	137

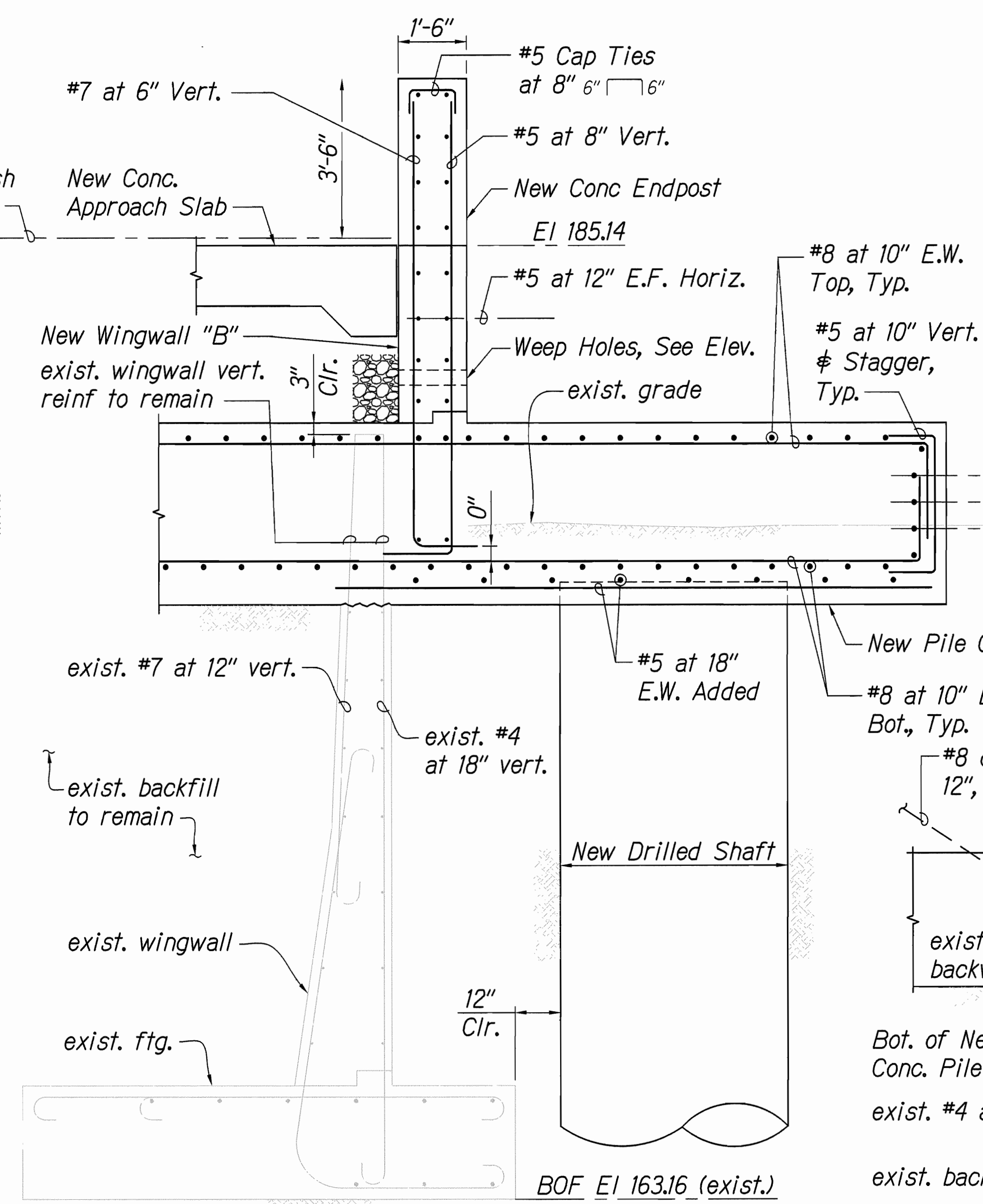


1 SECTION AT NEW WINGWALL "A"
S4.2, S14.4, S4.4 SCALE: 1/2" = 1'-0"

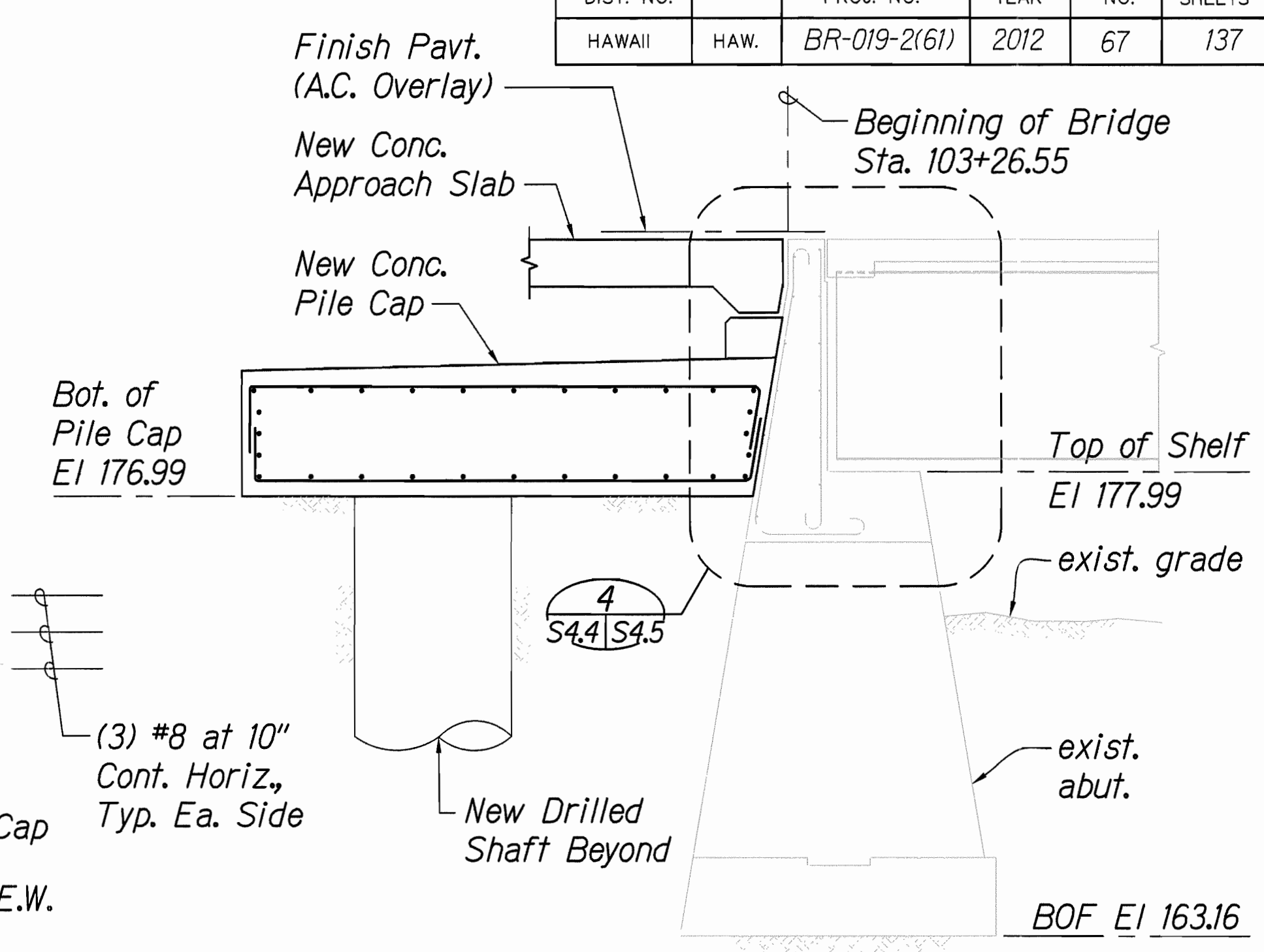


Note:
Drilled shaft reinf not shown, see sht. S3.3 & S3.4.

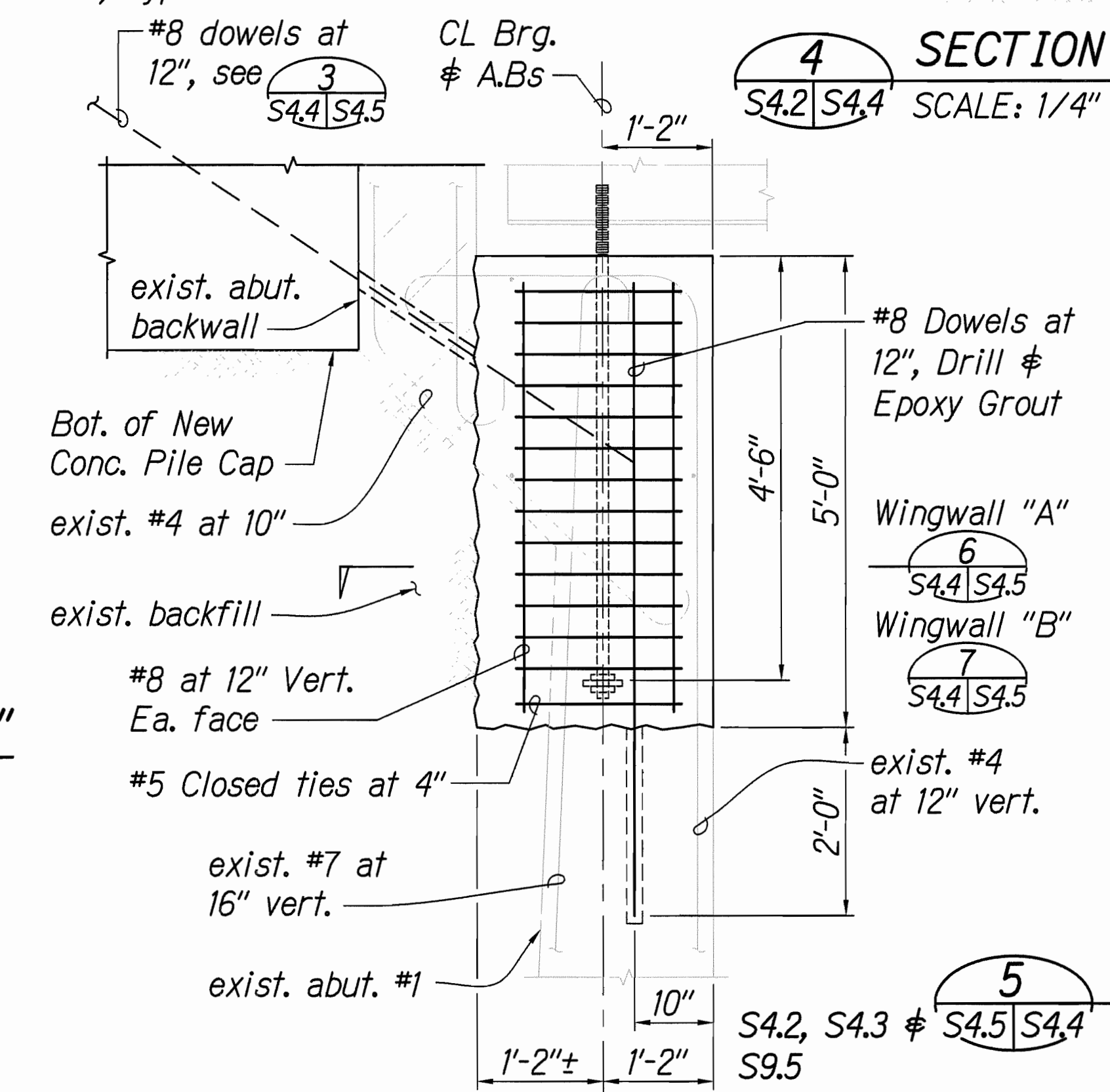
3 SECTION
S4.2, S4.4 SCALE: 1/4" = 1'-0"



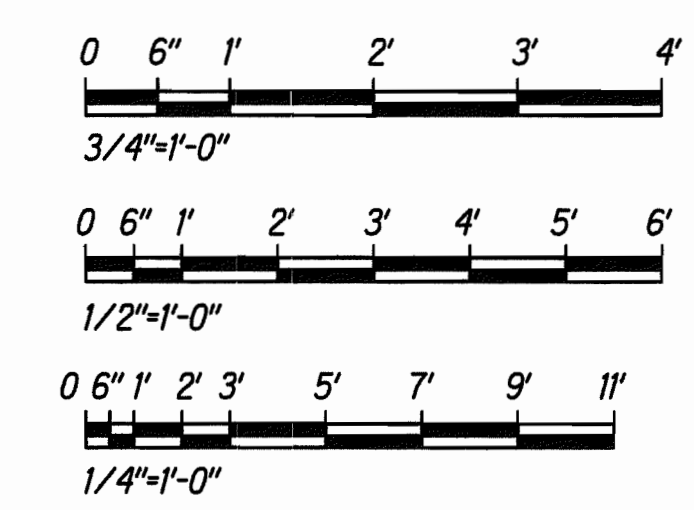
2 SECTION AT NEW WINGWALL "B"
S1.7, S4.2, S4.4 SCALE: 1/2" = 1'-0"



Note:
All exist. abut. reinf shall remain and be cast-in new concrete.



GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

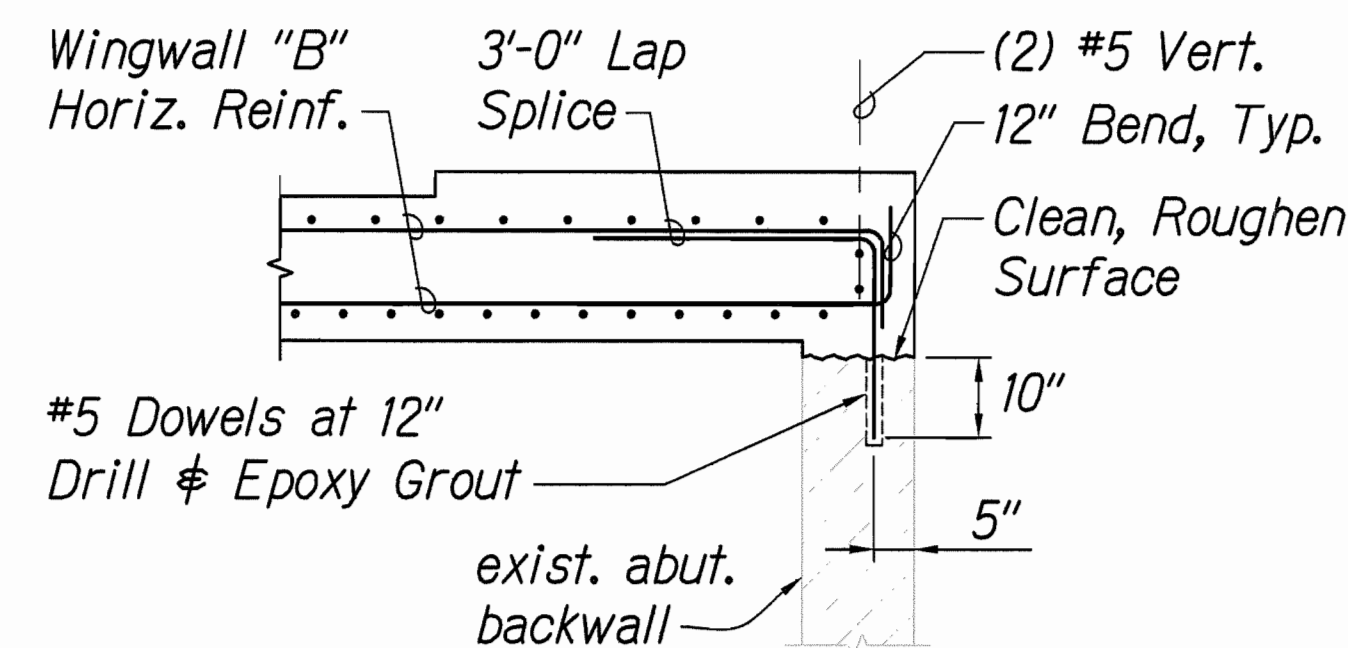
NEW WIDENED BRIDGE, ABUTMENT #1
- SECTION & DETAILS
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)
Scale: As Shown Date: July 25, 2012
SHEET No. S4.4 OF 9 SHEETS

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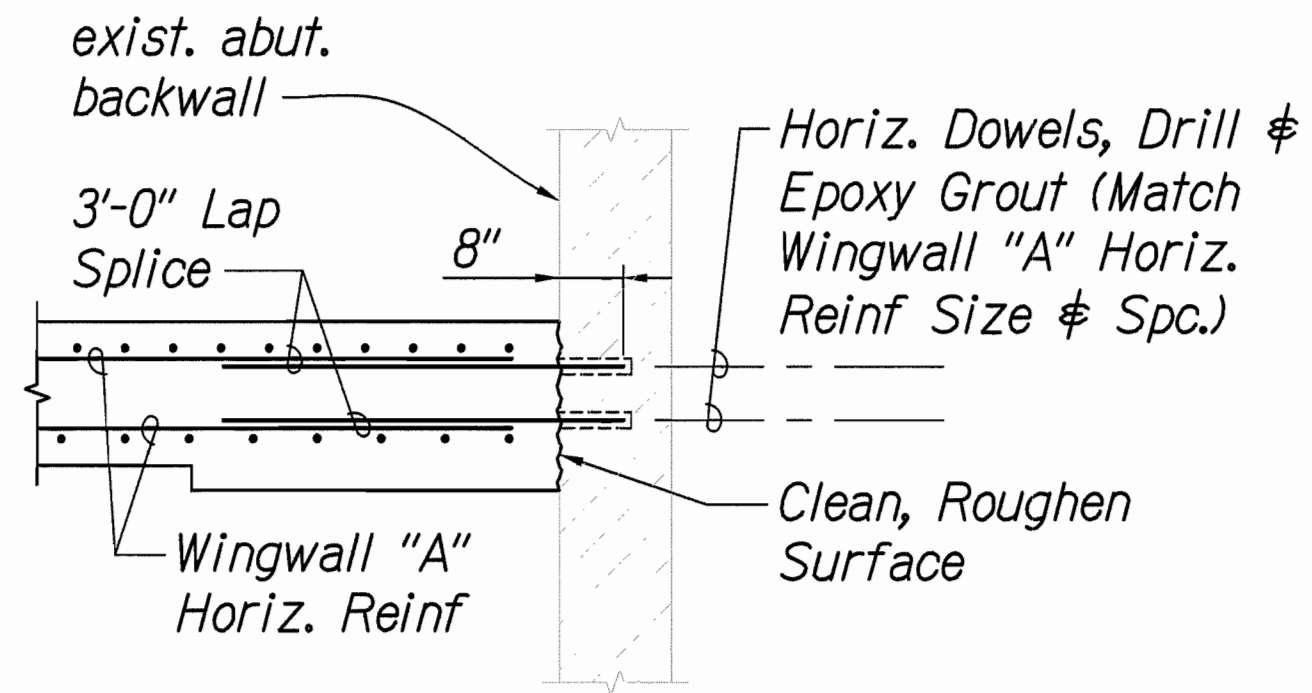
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DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTES	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	68	137



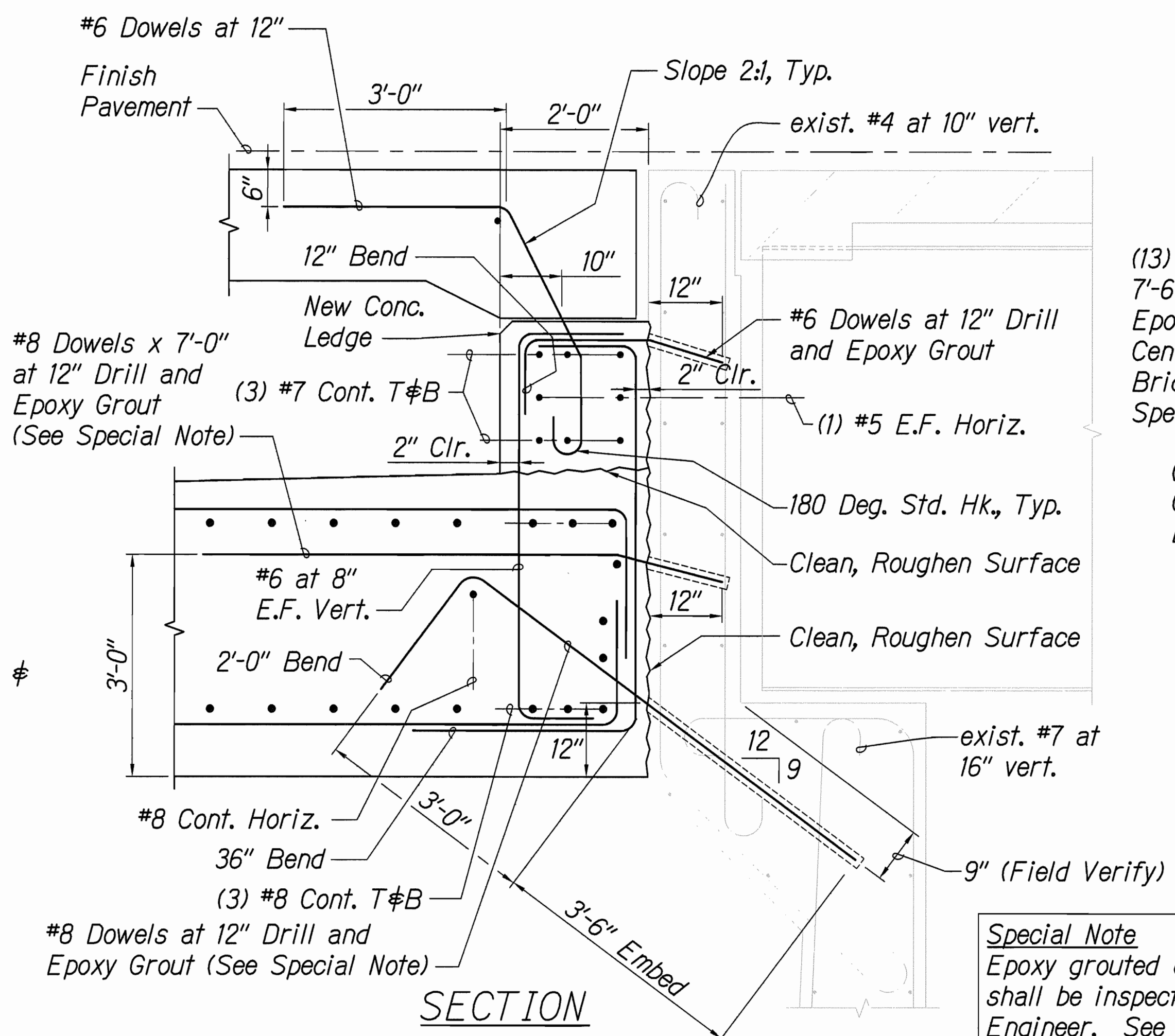
PLAN/SECTION

1 DETAIL
S4.2 & S4.7 | S4.5 SCALE: 1/2" = 1'-0"



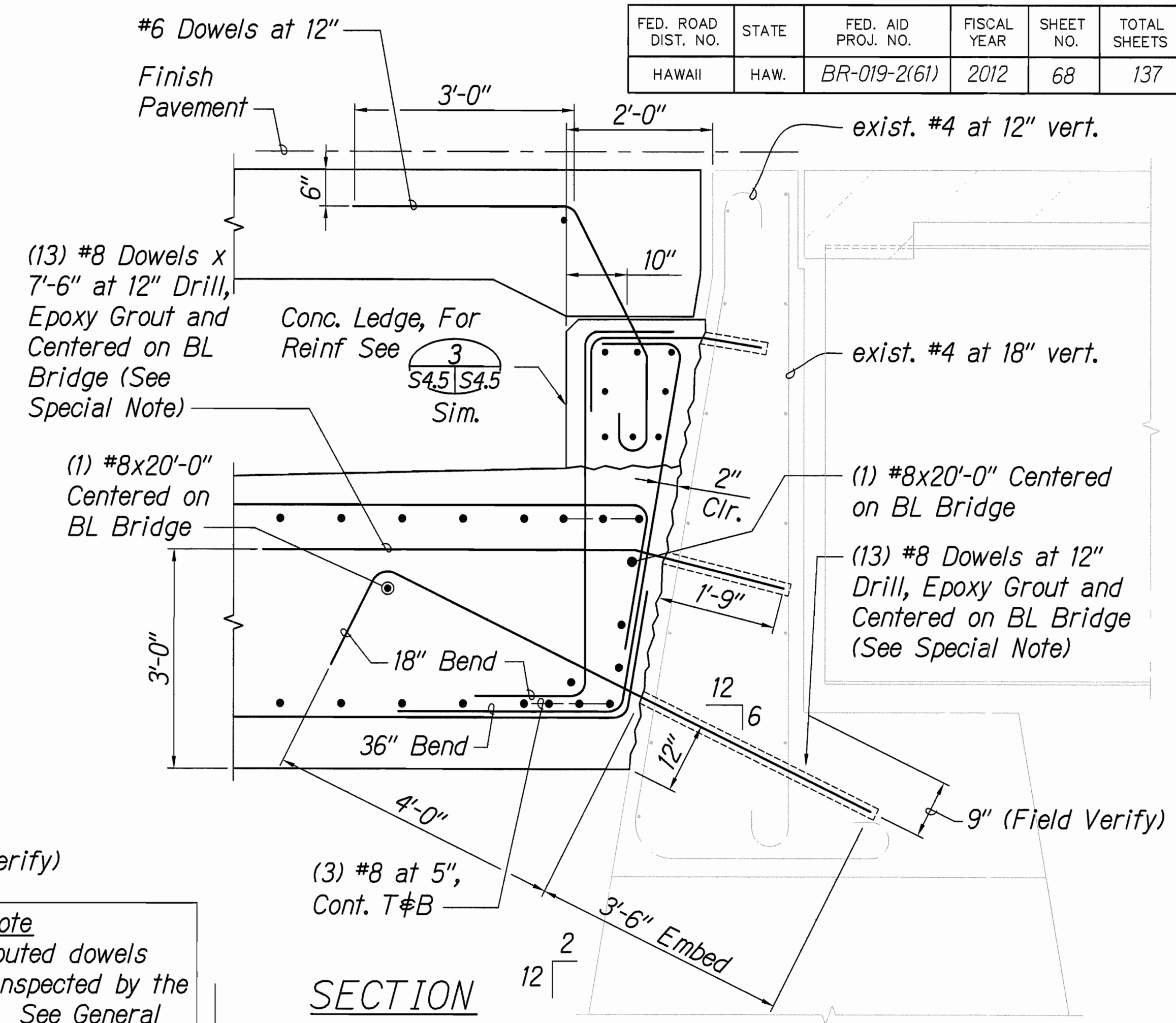
PLAN/SECTION

2 DETAIL
S4.2 | S4.5 SCALE: 1/2" = 1'-0"



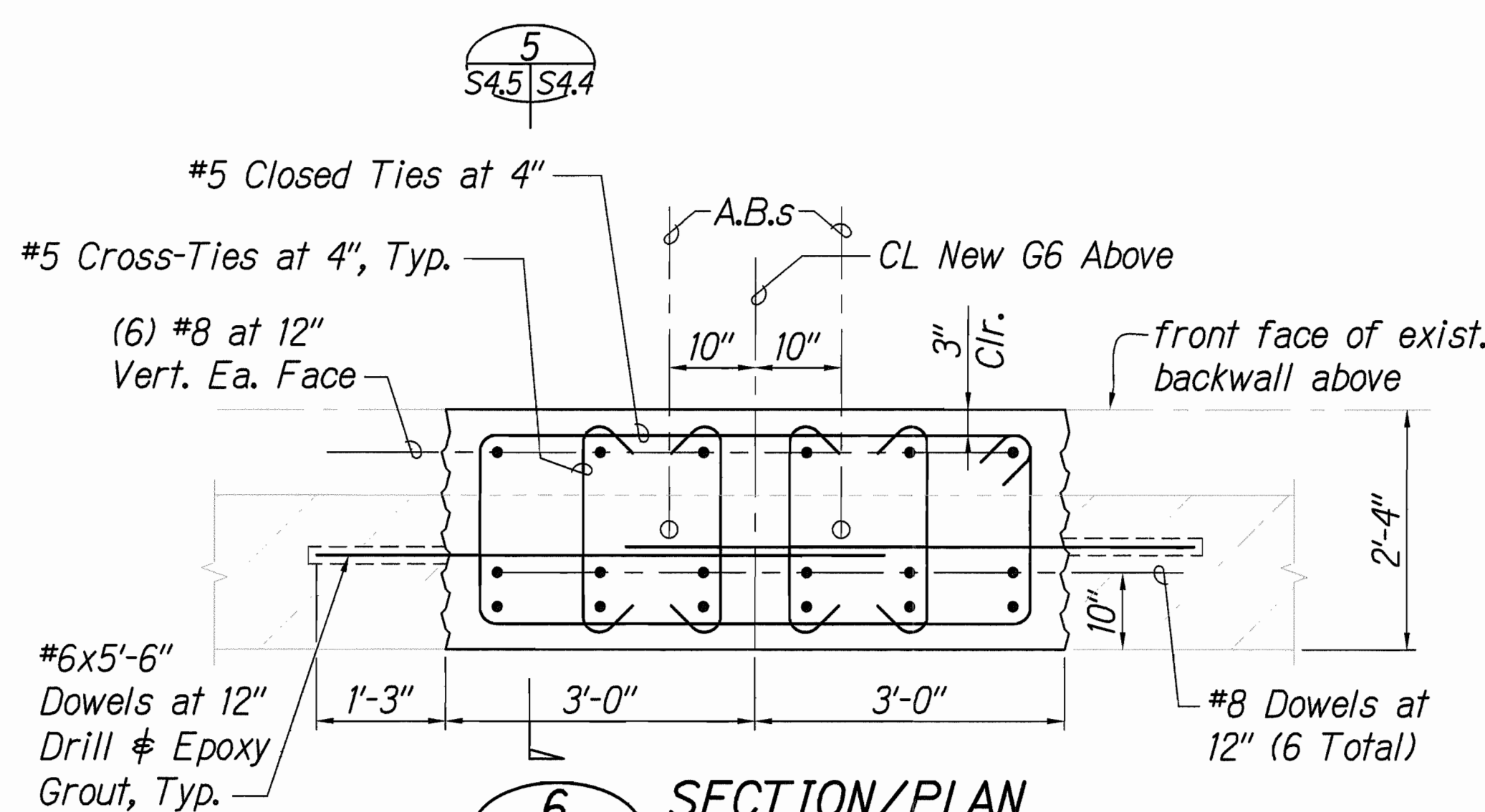
SECTION

3 DETAIL
S4.4, S4.5 & S13.1 | S4.5 SCALE: 3/4" = 1'-0"

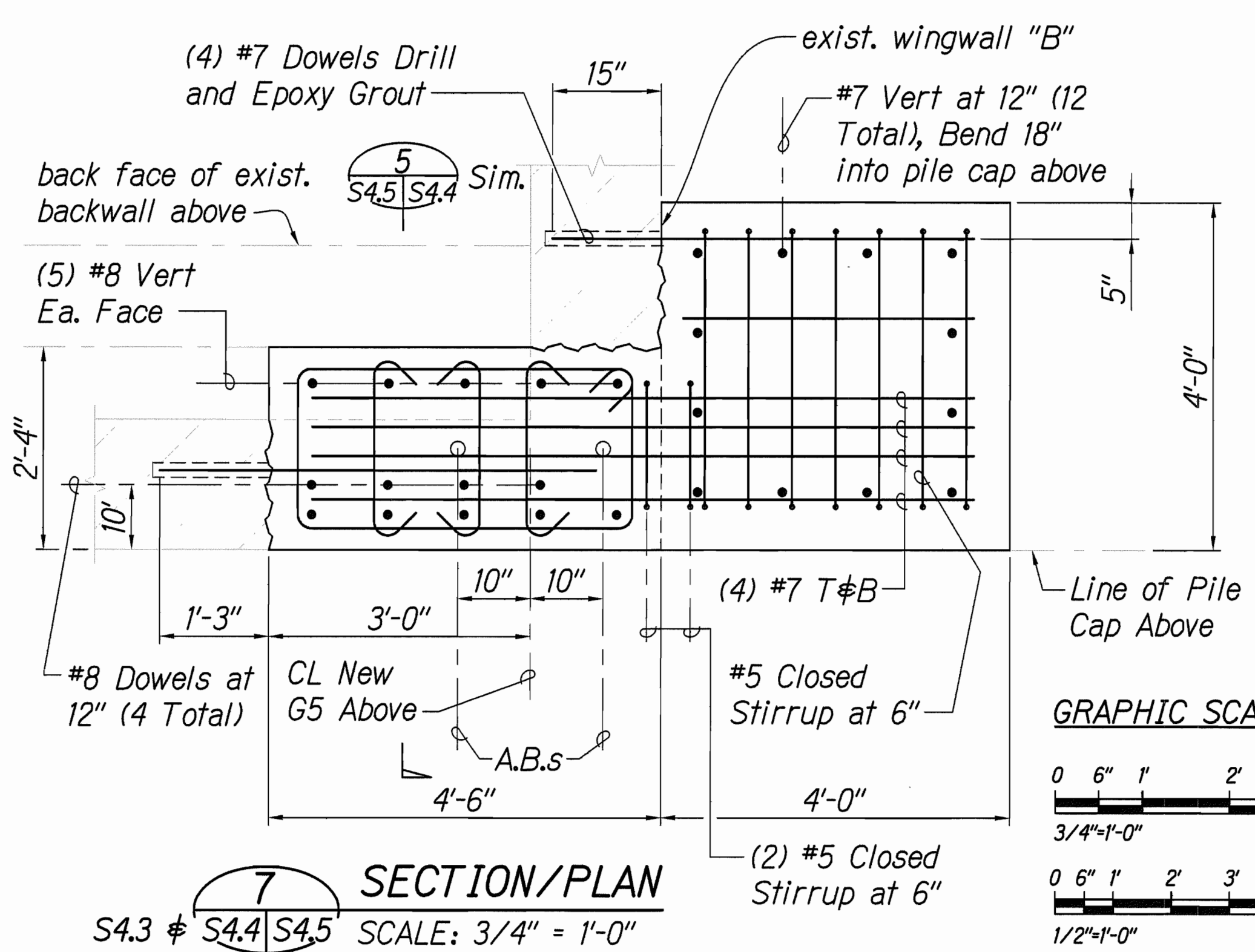


SECTION

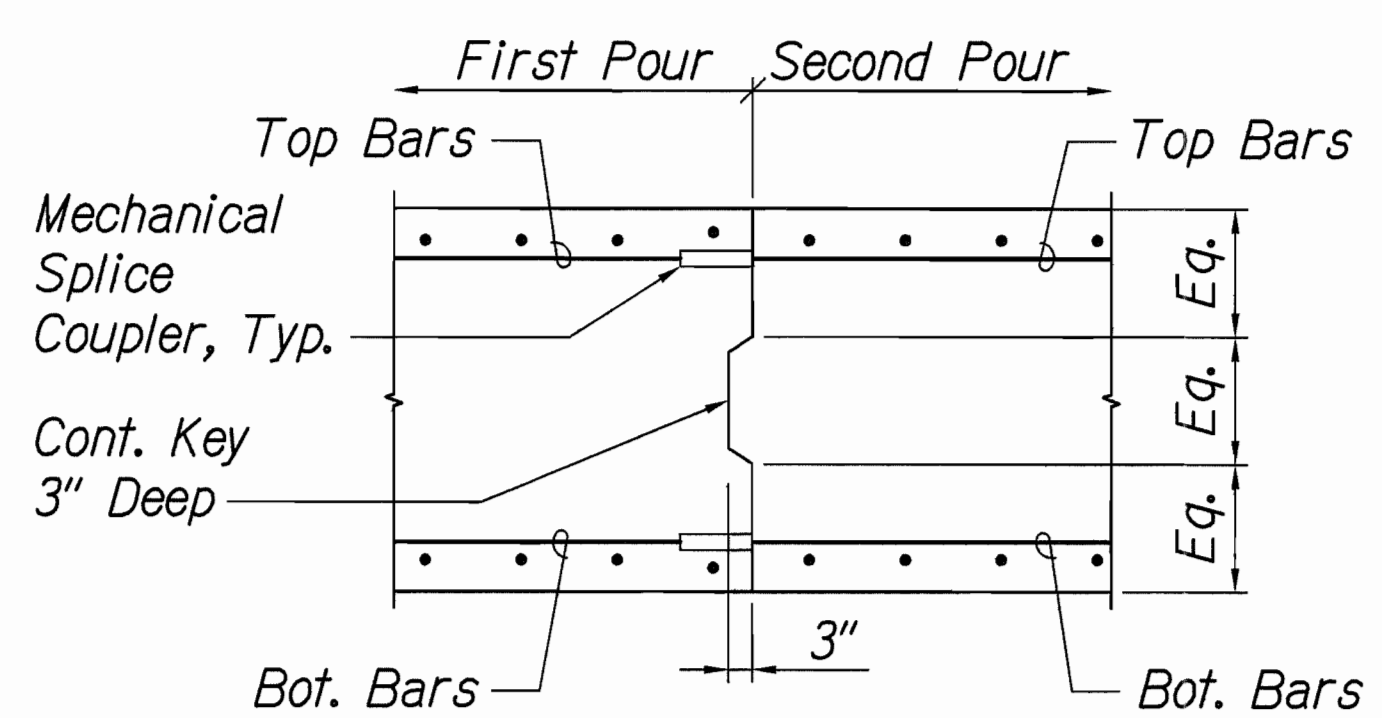
4 DETAIL
S4.4, S4.9 & S13.1 | S4.5 SCALE: 3/4" = 1'-0"



5 SECTION/PLAN
S4.3 & S4.4 | S4.5 SCALE: 3/4" = 1'-0"



6 SECTION/PLAN
S4.3 & S4.4 | S4.5 SCALE: 3/4" = 1'-0"



5 CONSTRUCTION JOINT DETAIL
S4.2 | S4.5 SCALE: 1/2" = 1'-0"

GRAPHIC SCALES:

0 6" 1' 2' 3' 4'

3/4" = 1'-0"

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

1/2" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW WIDENED BRIDGE, ABUTMENT #1
- SECTION & DETAILS
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S4.5 OF 9 SHEETS

5

S4.2 | S4.5 SCALE: 1/2" = 1'-0"

CONSTRUCTION JOINT DETAIL

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

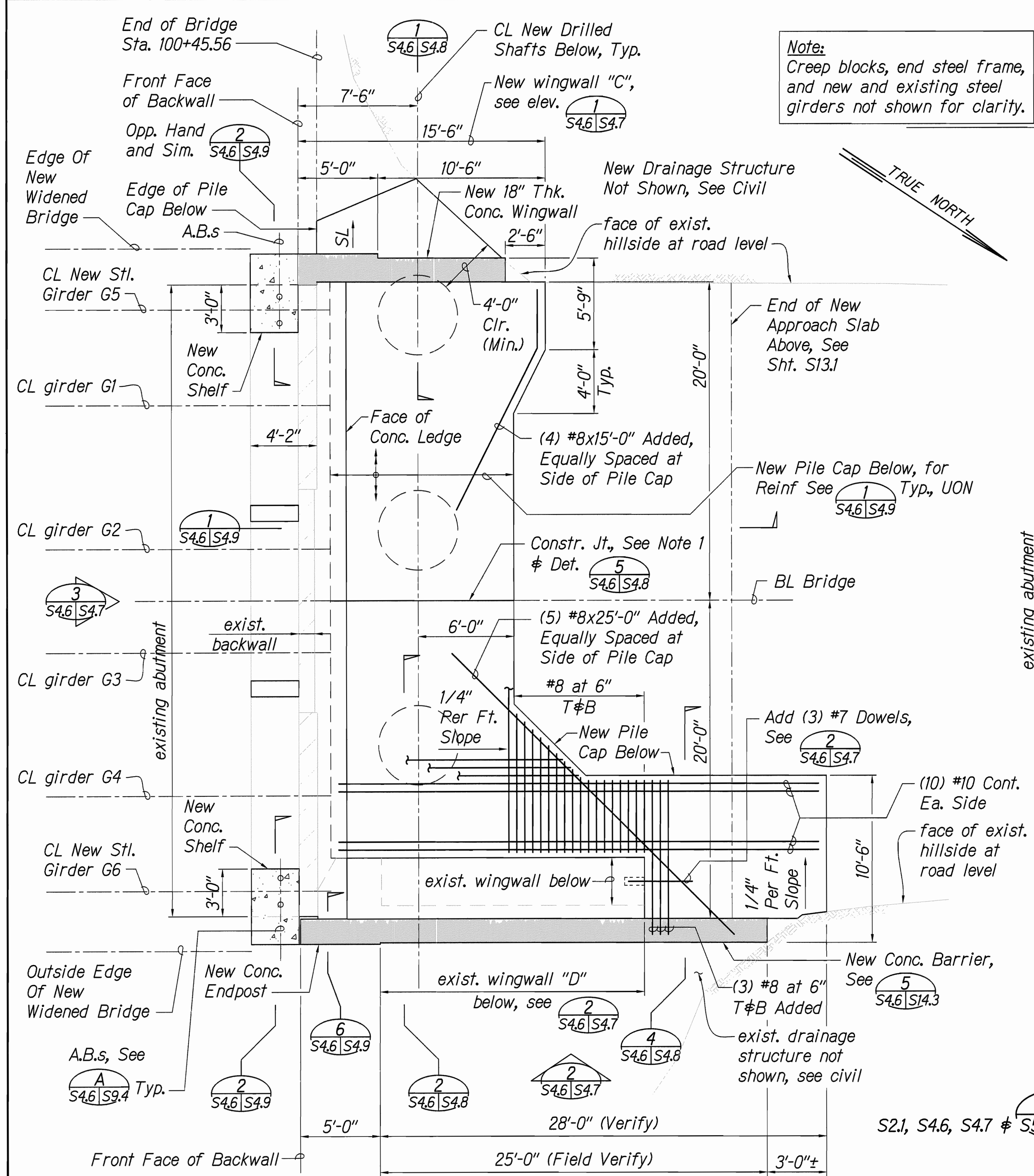
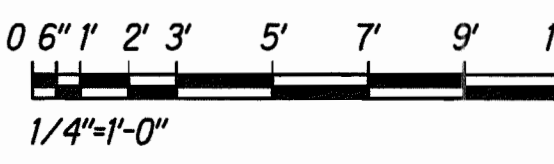
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	69	137

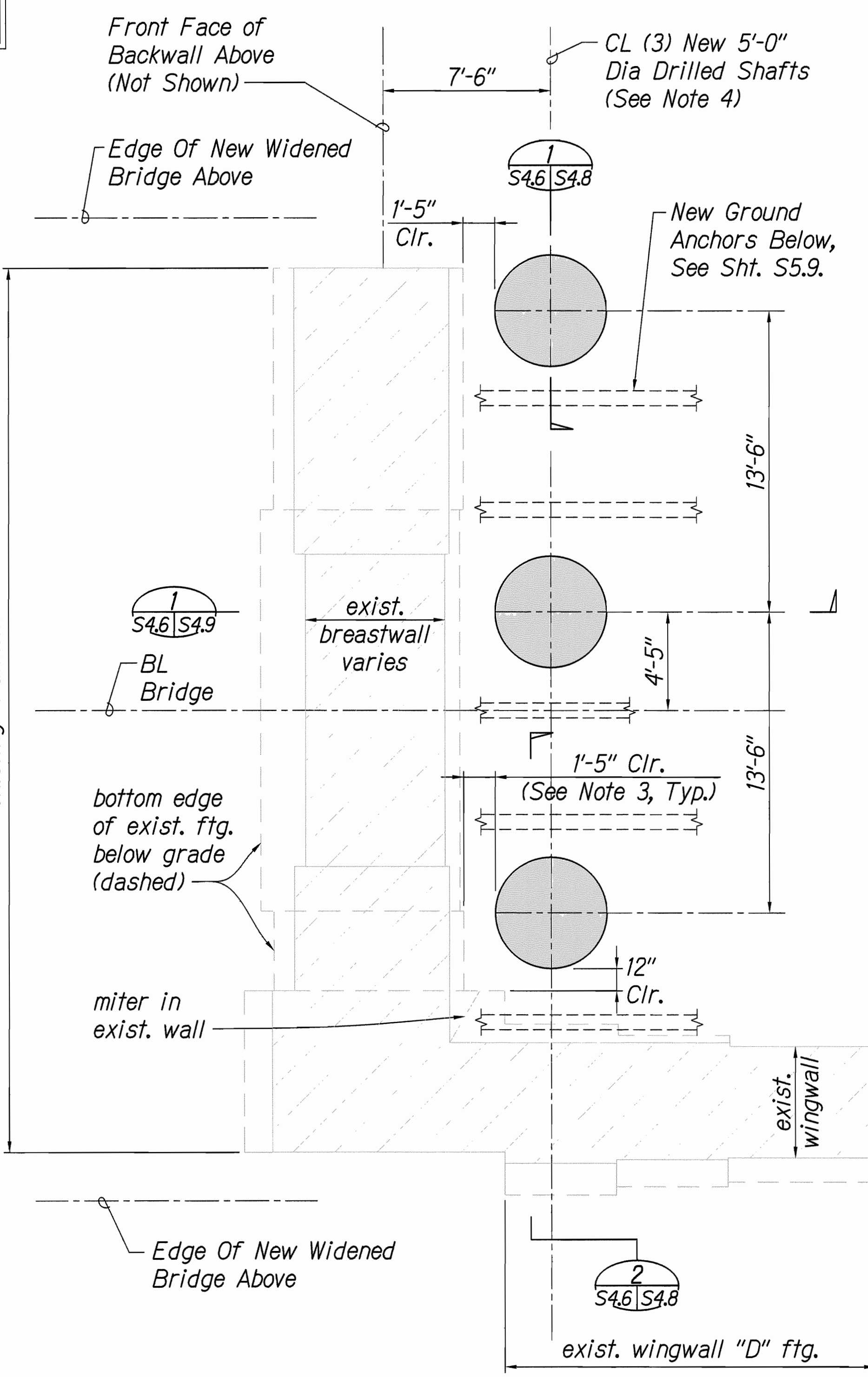
Notes:

1. Construction phasing, see sheet S15.1.
2. Drilled shaft typical details and reinforcing, and added reinforcing steel in pile caps, see sheets S3.3 and S3.4.
3. Locate edge of existing footings prior to drilling shaft excavation. If existing footing encroaches into drilled shaft, immediately notify Engineer for direction.
4. Coordinate plan location of drilled shafts with new Pier #3 foundation ground anchors below to avoid conflicts. See sheet S5.9.
5. Excavations for new drilled shafts and new pile cap shall be kept dry during construction. See Standard Specs Section 205.
6. Where new concrete is poured against existing concrete, existing interface surface shall be cleaned and intentionally roughened to 1/4" amplitude, typical.
7. Portion of existing Abutment #2 breastwall to be re-poured shall have f'c = 6,000 psi.
8. New concrete creep blocks shall have f'c = 6,000 psi and shall be incidental to abutment concrete.

GRAPHIC SCALES:



A ABUTMENT #2 - BRIDGE LEVEL PLAN
S2.1, S4.7 & S14.3 | S4.6 SCALE: 1/4" = 1'-0"



B ABUTMENT #2 - FOUNDATION PLAN
S2.1, S4.6, S4.7 & S5.9 | S4.6 SCALE: 1/4" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW WIDENED BRIDGE.
ABUTMENT #2 - PLANS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

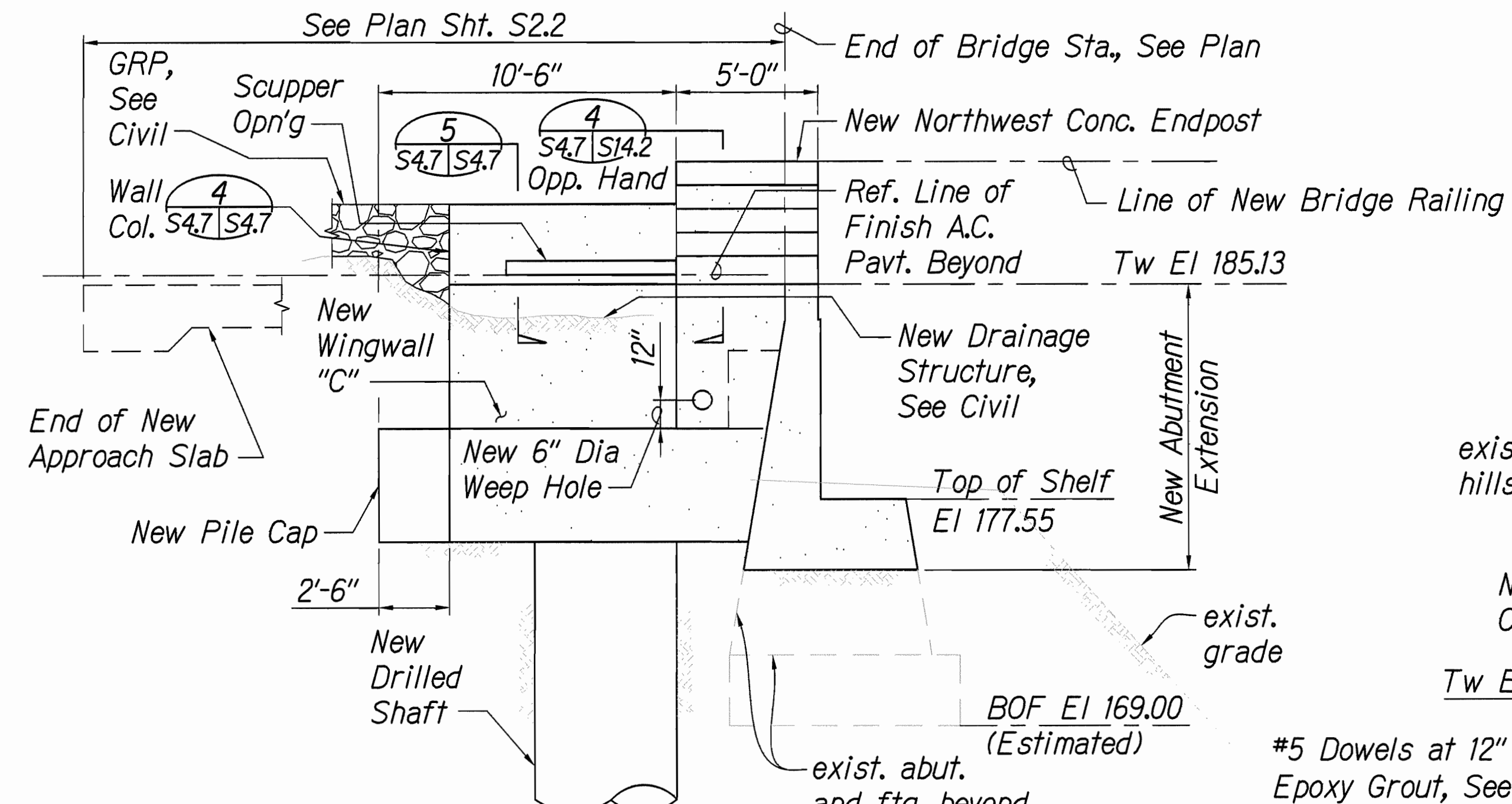
SHEET No. S4.6 OF 9 SHEETS

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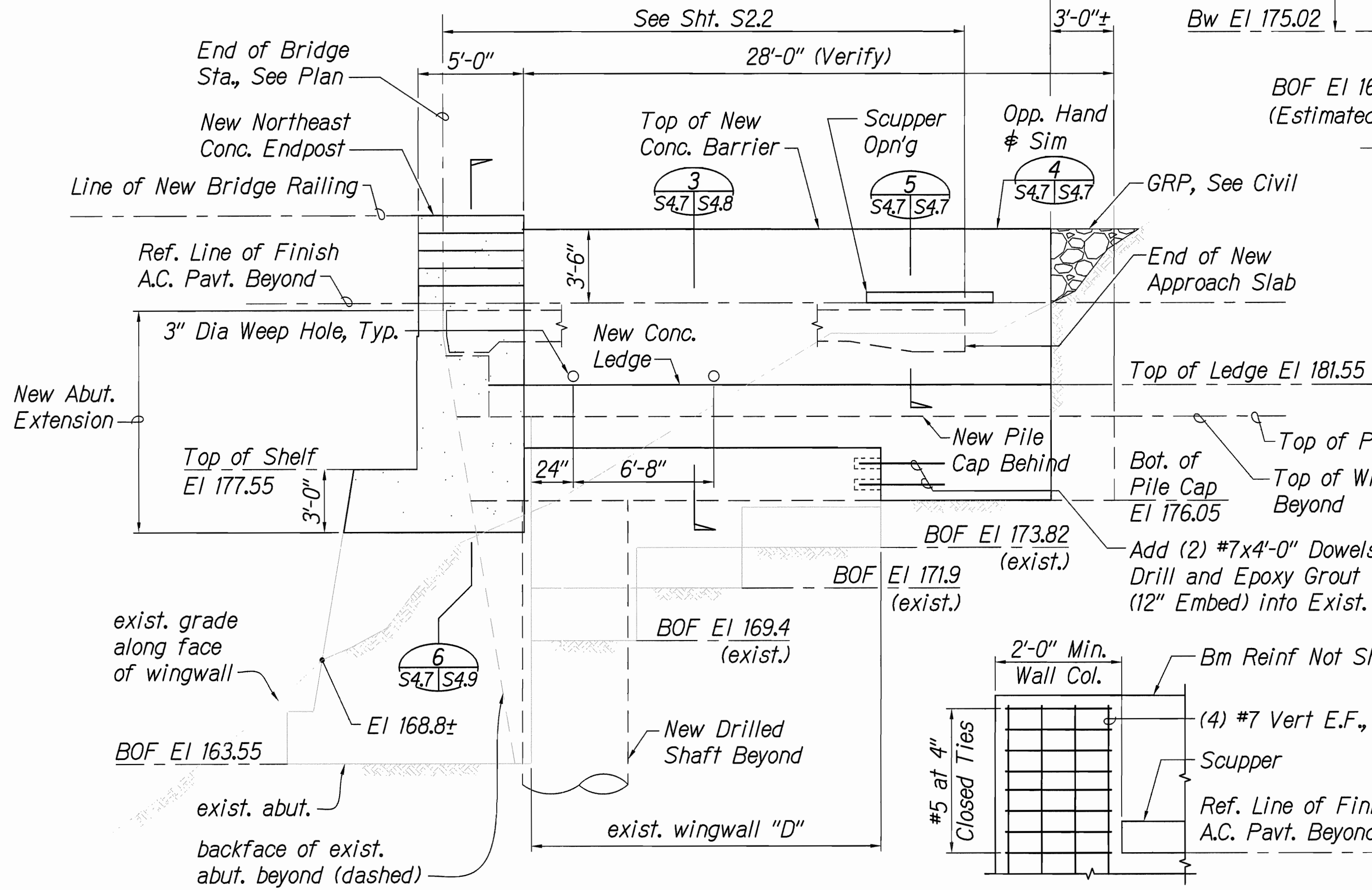
NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

SURVEY PLOTTED BY	DATE
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED BY	
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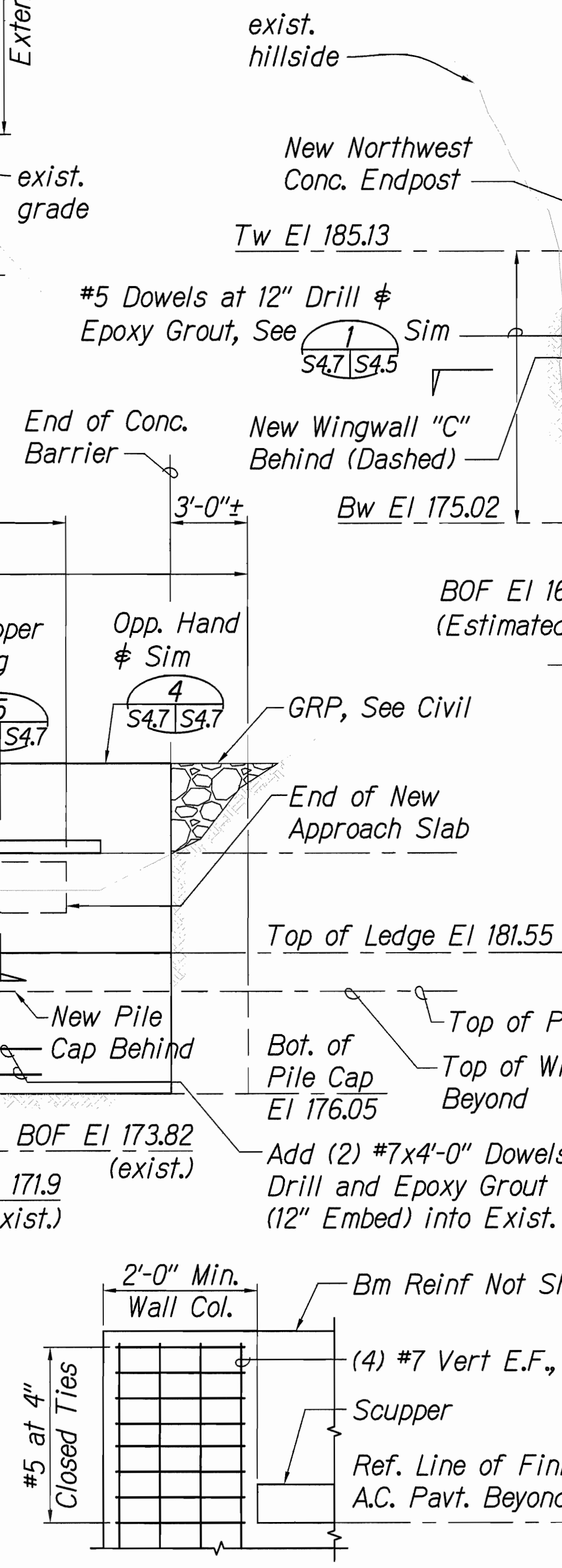
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	70	137



1 WINGWALL "C" - ELEVATION
SCALE: 1/4" = 1'-0"

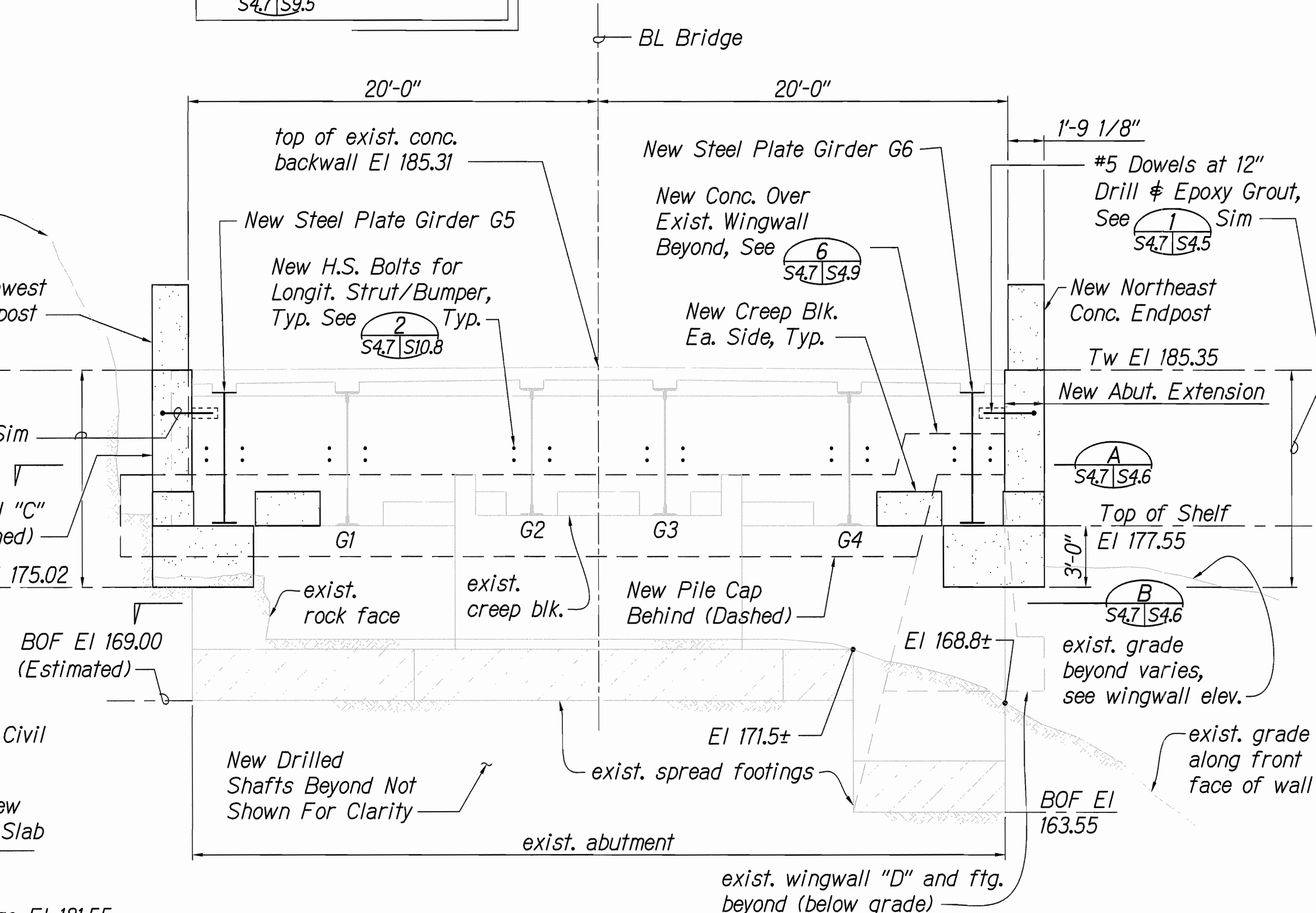


2 WINGWALL "D" - ELEVATION
SCALE: 1/4" = 1'-0"

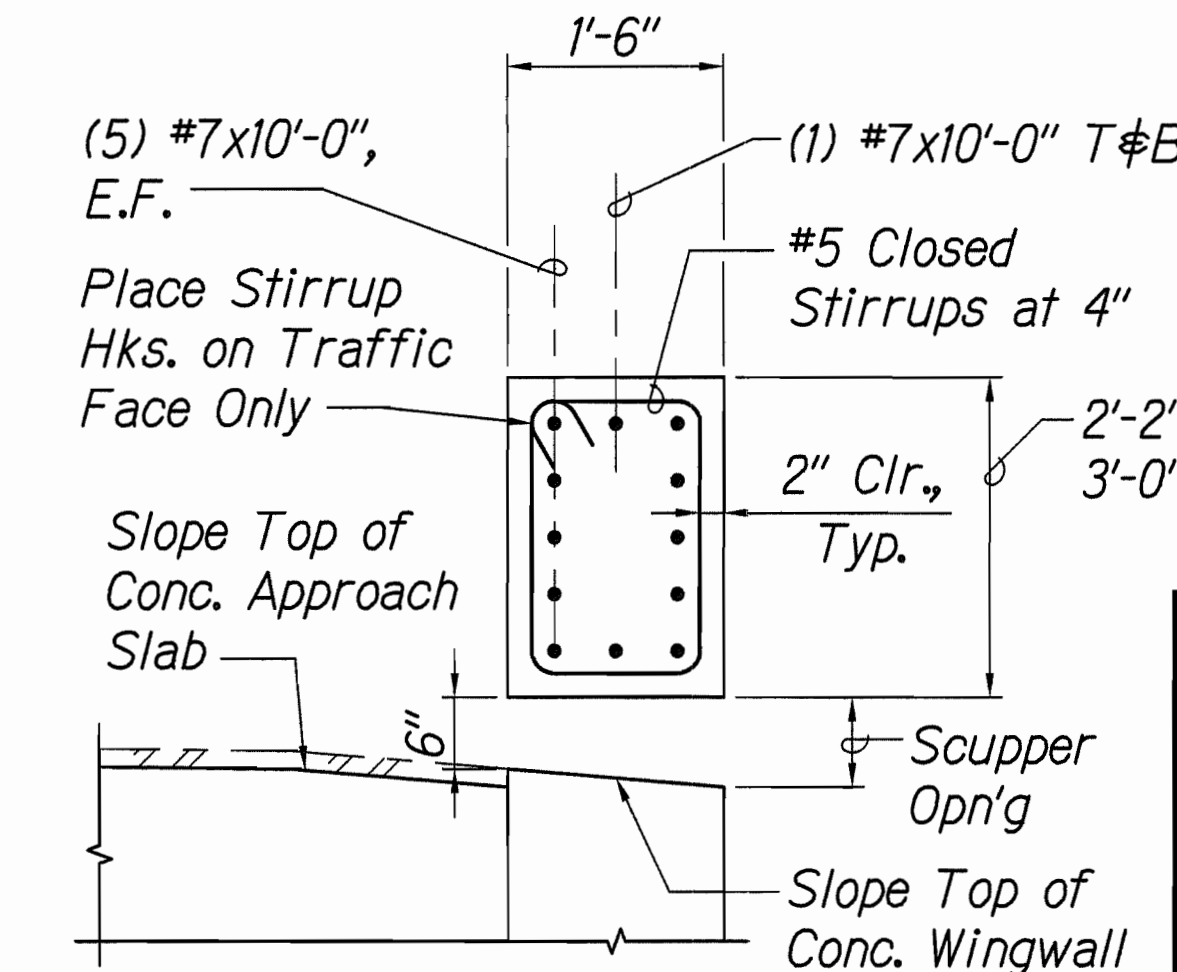


4 DETAIL/ELEVATION
SCALE: 3/4" = 1'-0"

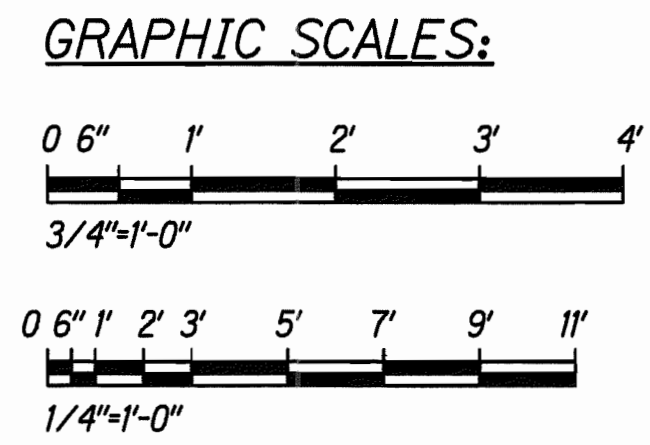
Note:
New and existing steel frames not shown for clarity, see S4.7/S9.5



3 ABUTMENT #2 - FRONT ELEVATION
SCALE: 1/4" = 1'-0"



5 SECTION
SCALE: 3/4" = 1'-0"



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STATE OF HAWAII
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HIGHWAYS DIVISION

NEW WIDENED BRIDGE.
ABUTMENT #2 - ELEVATIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S4.7 OF 9 SHEETS

SURVEY PLOTTED BY	DATE
DESIGNED BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
ORIGINAL PLAN	
NO.	

SECTION AT NEW WINGWALL "C"
S4.6 S4.8 SCALE: 1/2" = 1'-0"

SECTION AT EXISTING WINGWALL "D"
S4.6 S4.8 SCALE: 1/2" = 1'-0"

CONSTRUCTION JOINT DETAIL
S4.6 S4.8 SCALE: 1/2" = 1'-0"

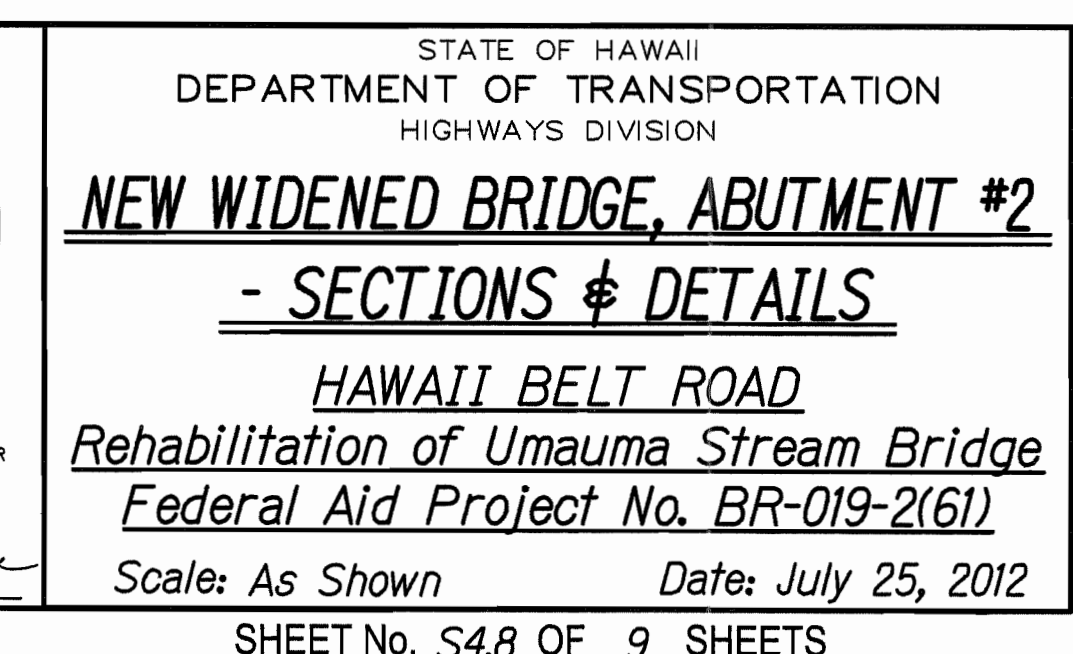
SECTION
S4.6, S4.8 & S4.9 S4.8 SCALE: 1/2" = 1'-0"

0 6" 1' 2' 3'

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

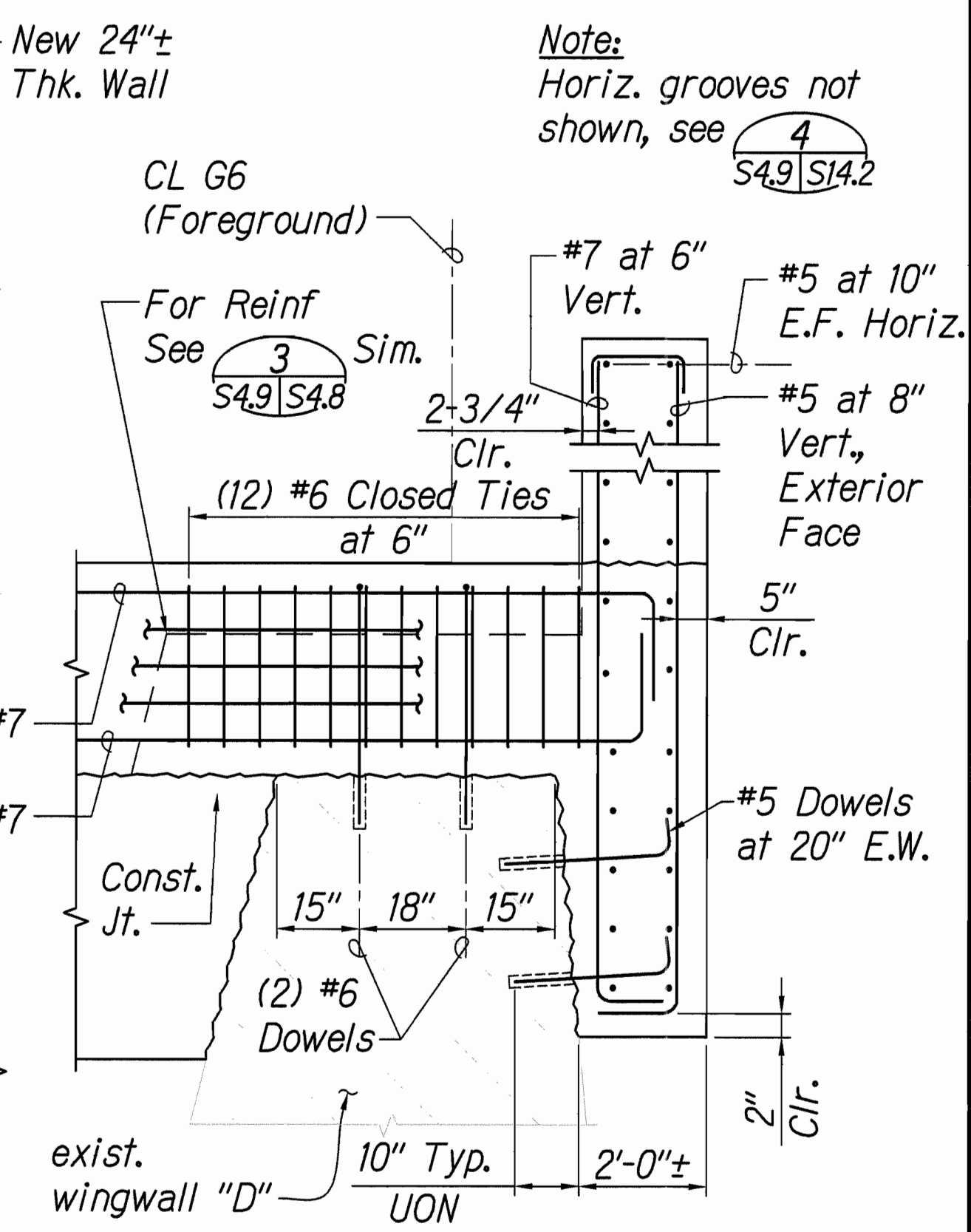
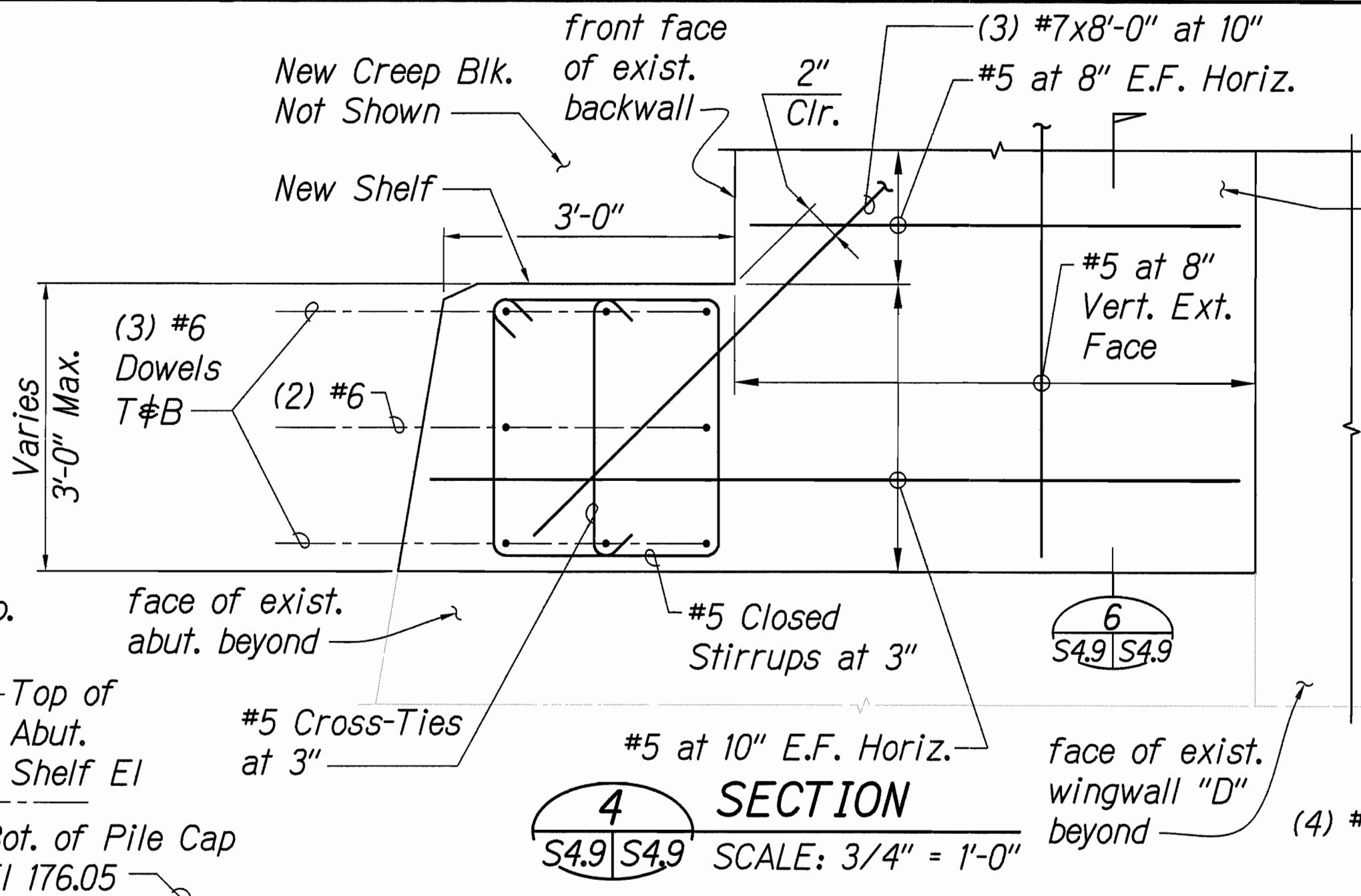
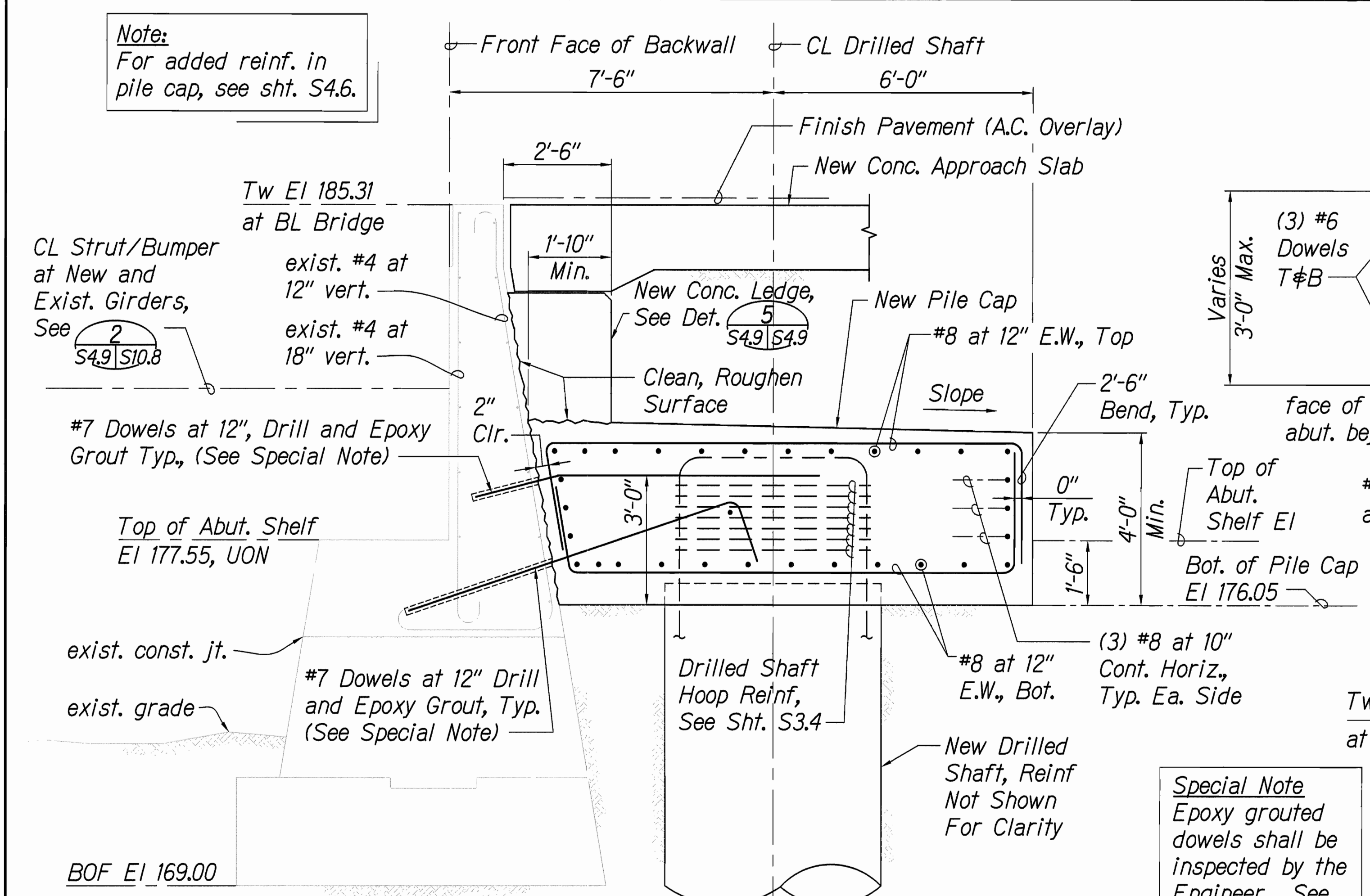
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$1/2" = 1' - 0"$

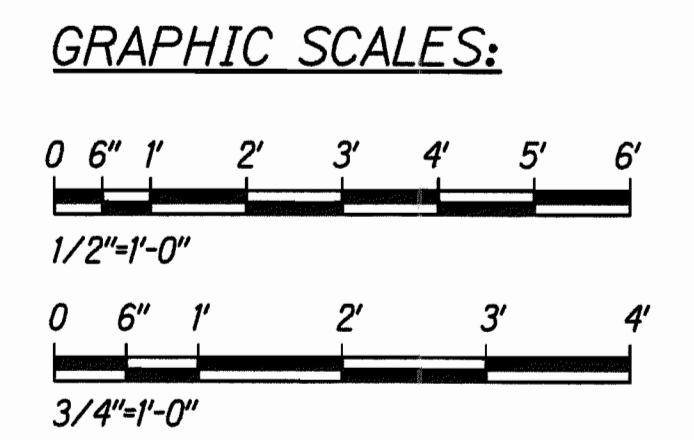
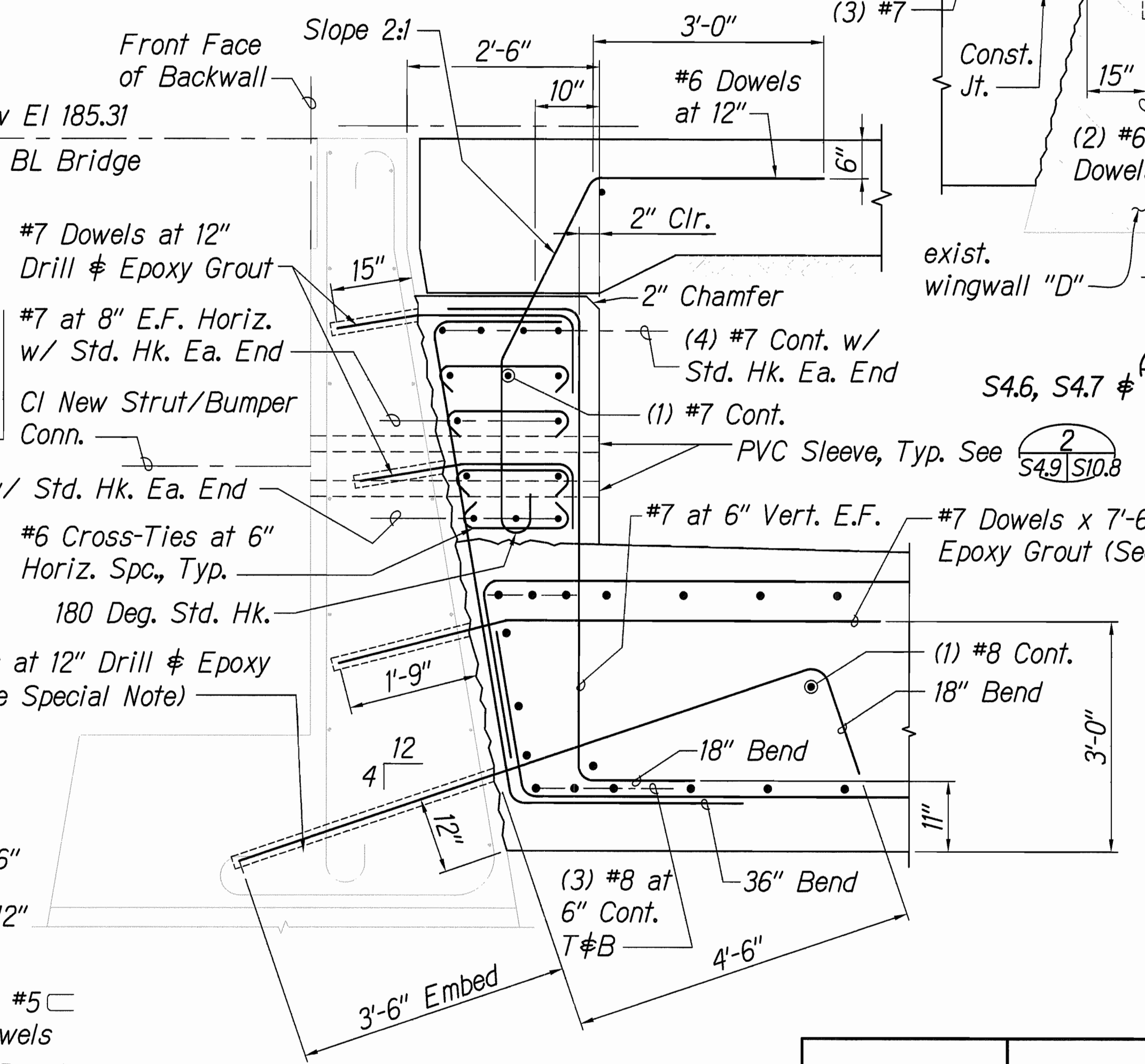
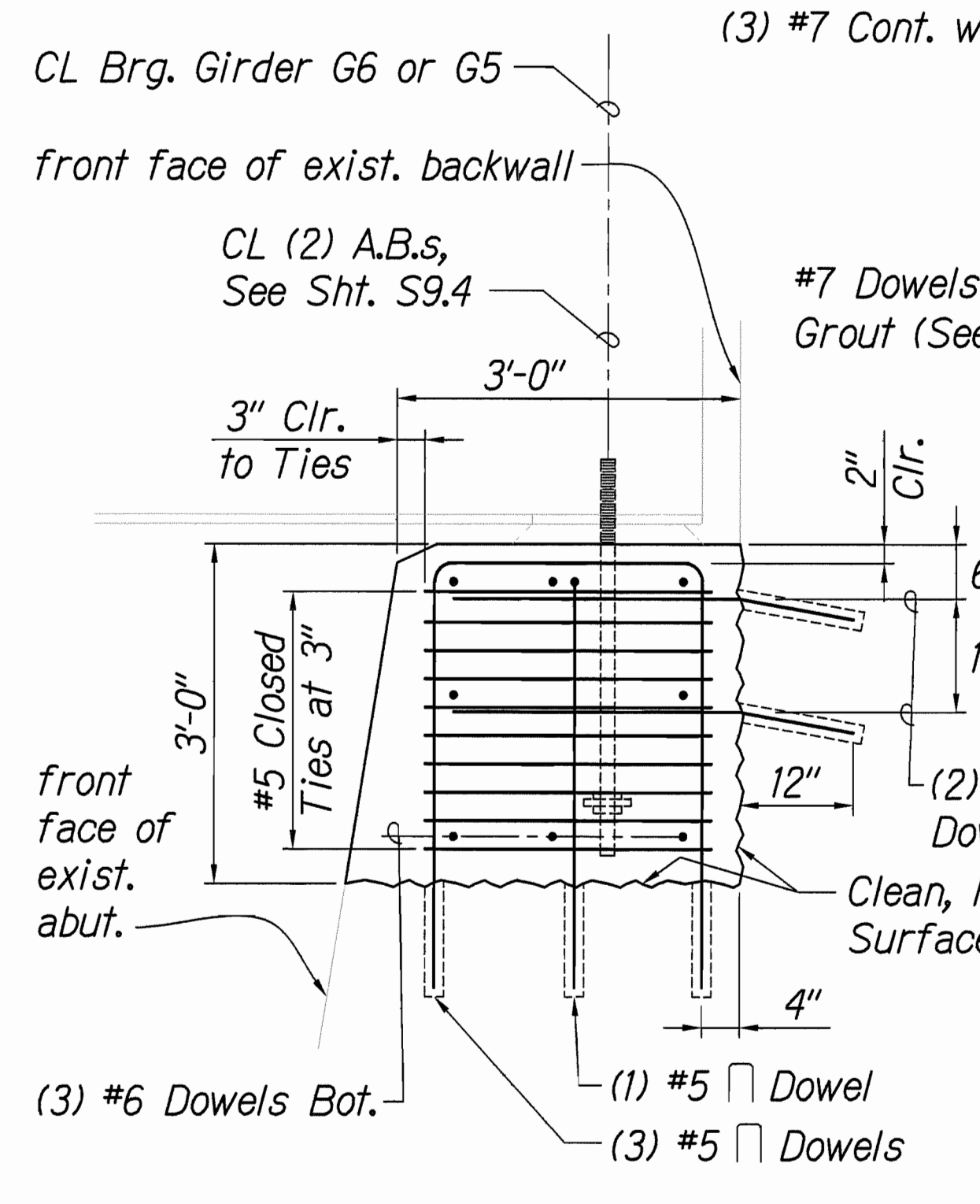
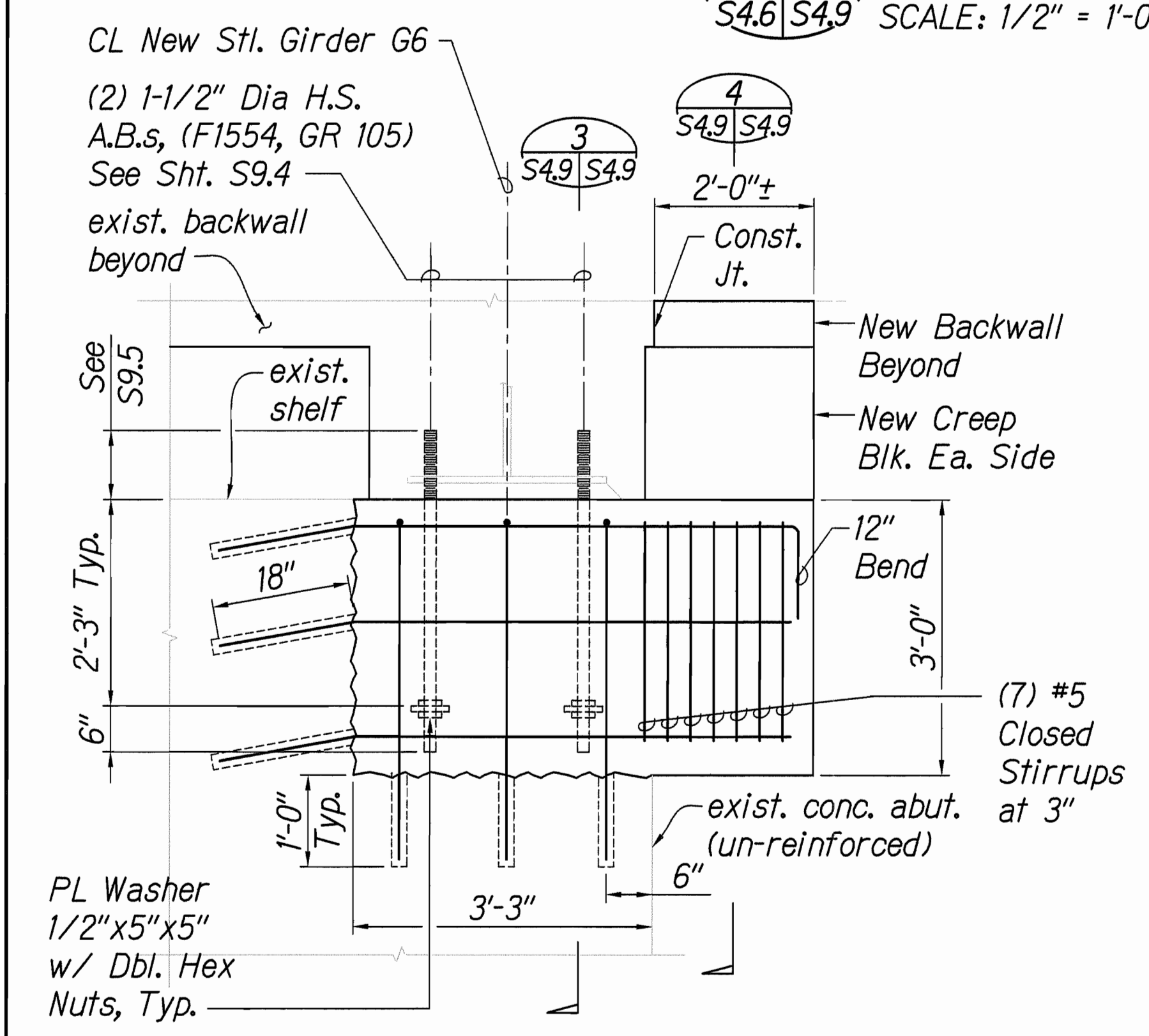


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	72	137

Note:
For added reinf. in pile cap, see sht. S4.6.



Special Note
Epoxy grouted dowels shall be inspected by the Engineer. See General Notes on sheet S0.2.



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HIGHWAYS DIVISION

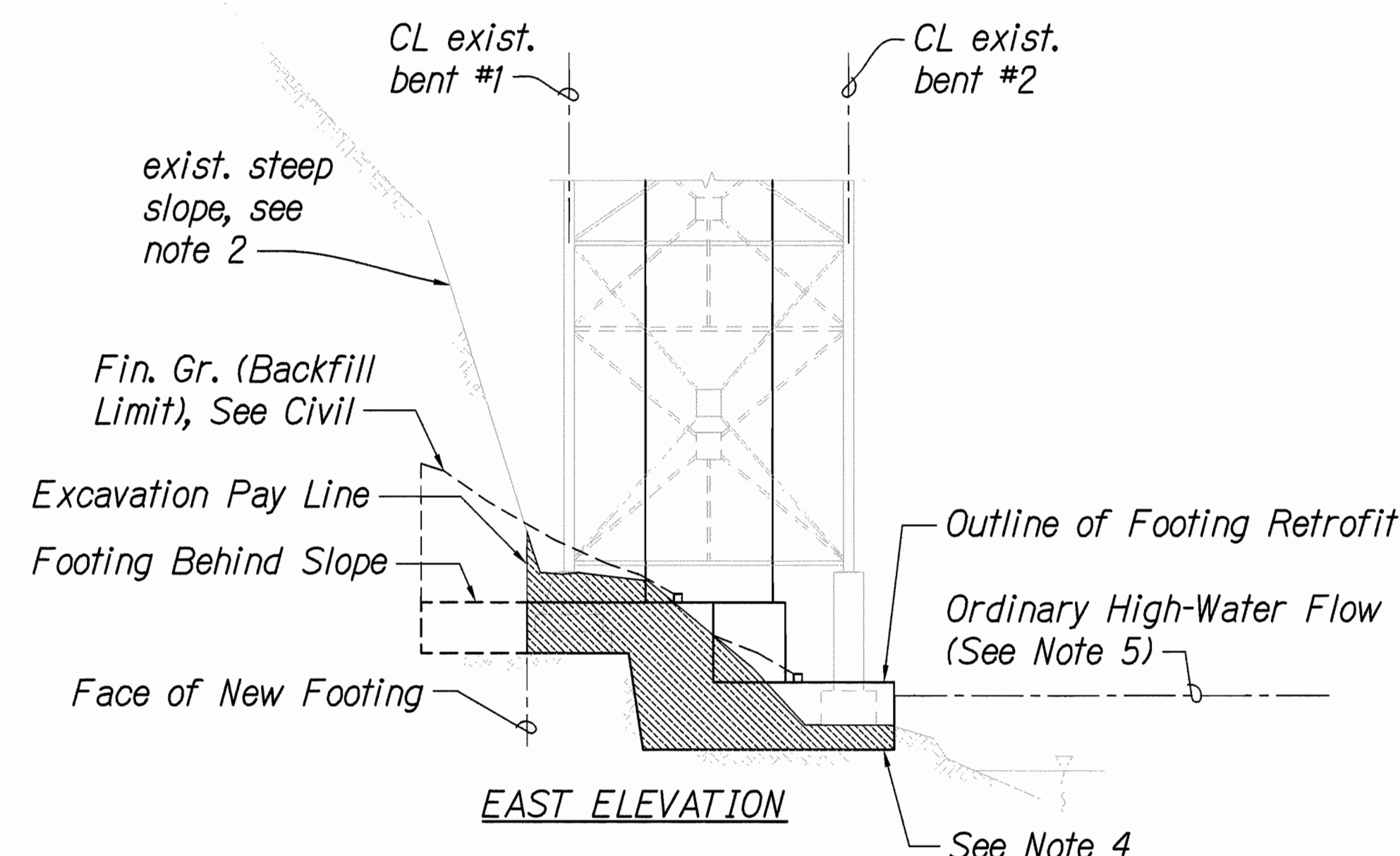
NEW WIDENED BRIDGE, ABUTMENT #2
- SECTIONS & DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S4.9 OF 9 SHEETS

New Pier Foundation Special Notes:



exist. Honoka'a tower structure
(bent #3 & bent #4)

New Pier #2
Conc. Col.

exist. grade in foreground, see
east elev.

2'-0"

2
1

Bot. of New Ftg. Beyond

NORTH ELEVATION

2'-0"

2
1

CL exist. bent #3

CL exist. bent #4

Fin. Gr. (Backfill Limit), See Civil

exist. steep slope, see note 2

Excavation Pay Line

Ordinary High-Water Flow (See Note 5)

estimated top of exist. hard basalt layer

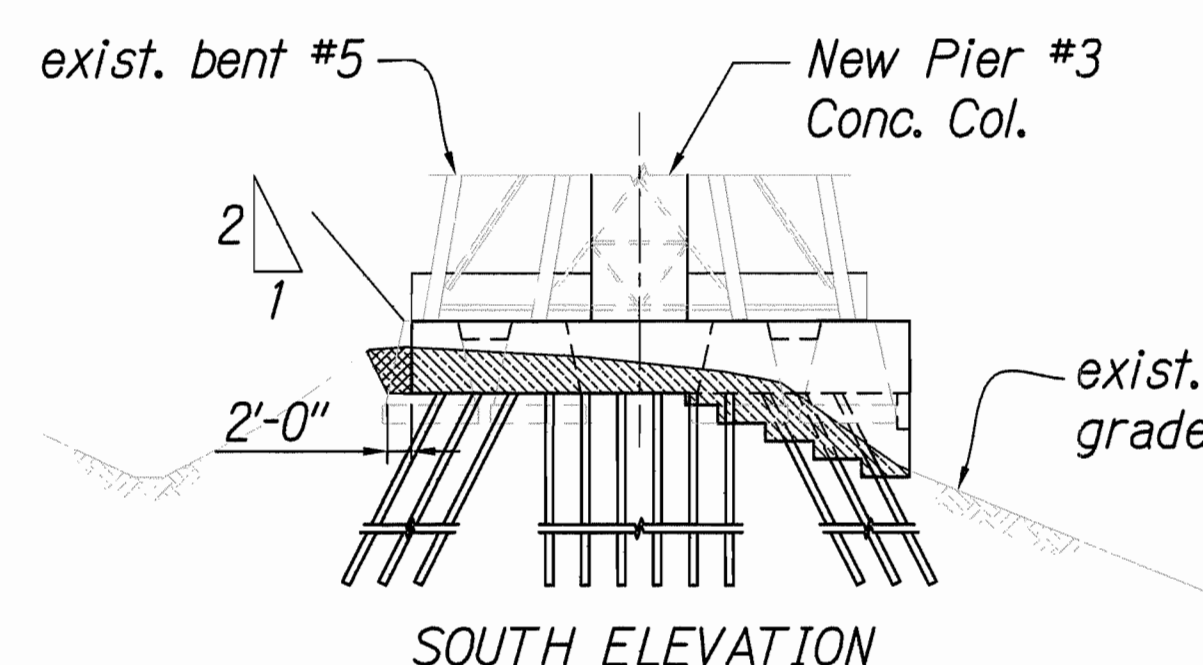
1'-0"

6'-0"±

exist. grade (see note 6)

Outline of Footing Retrofit (See Note 4)

EAST ELEVATION



Fin. Gr. (Backfill Limit), See Civil

Outline of Footing Retrofit

exist. steep slope, see note 2

Excavation Pay Line (See Sht. S5.12)

New Ground Anchors

2'-0"

New Micropile Foundation (See Note 7)

EAST ELEVATION

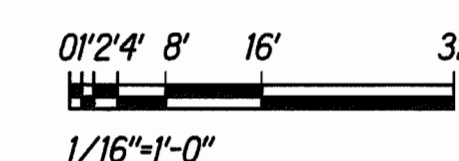
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Legend:

 = Structure Excavation

 = *Structure Backfill*

GRAPHIC SCALES:



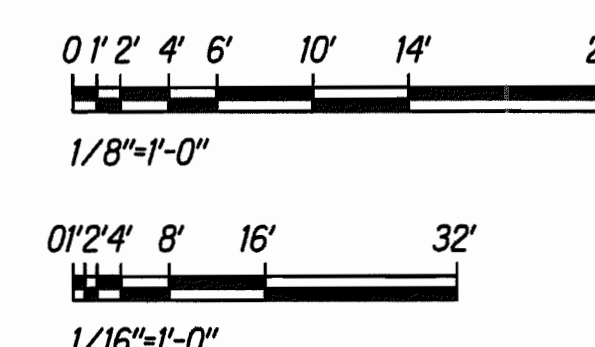
 Norman K. Nagamine LICENSED PROFESSIONAL ENGINEER No. 5479-S HAWAII, USA LICENSE EXPIRES: 4/30/14 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION <i>Norman K. Nagamine</i>	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <u>NEW PIER FOUNDATION - SPECIAL</u> <u>NOTES & TYPICAL PAY LIMITS</u> <u>HAWAII BELT ROAD</u> <u>Rehabilitation of Umauma Stream Bridge</u> <u>Federal Aid Project No. BR-019-2(61)</u> Scale: 1/16" = 1'-0" Date: July 25, 2012 SHEET No. 551 OF 12 SHEETS
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	74	137

Probing and Grouting Notes (Typical):

1. Prior to placing reinforcing steel, footing excavations shall be probed for possible cavities or voids in underlying basalt strata. Refer to Special Provisions Section 212 "Probing and Grouting Work at Structure Pier Footing".
2. Probe holes shall be minimum 2 inches in diameter and extend a minimum 10 feet below bottom of footings. See plan for location of probe holes.
3. Provide plastic pipes in probe holes as necessary to prevent holes from caving in.
4. Probe holes which encounter large pockets or voids, or which consume large quantities of grout shall require additional probe holes as directed by the Engineer.
5. Voids encountered at bottom of footing excavations shall be exposed and filled with Class D lean concrete ($f'c = 1,500$ psi).
6. Sand-cement grout for filling probe holes shall be high-slump (pump mix) with minimum $f'c = 500$ psi at 28 days.
7. All probing and grouting work shall be performed in the presence of the Engineer.

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #1 - FOUNDATION PLAN

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.2 OF 12 SHEETS

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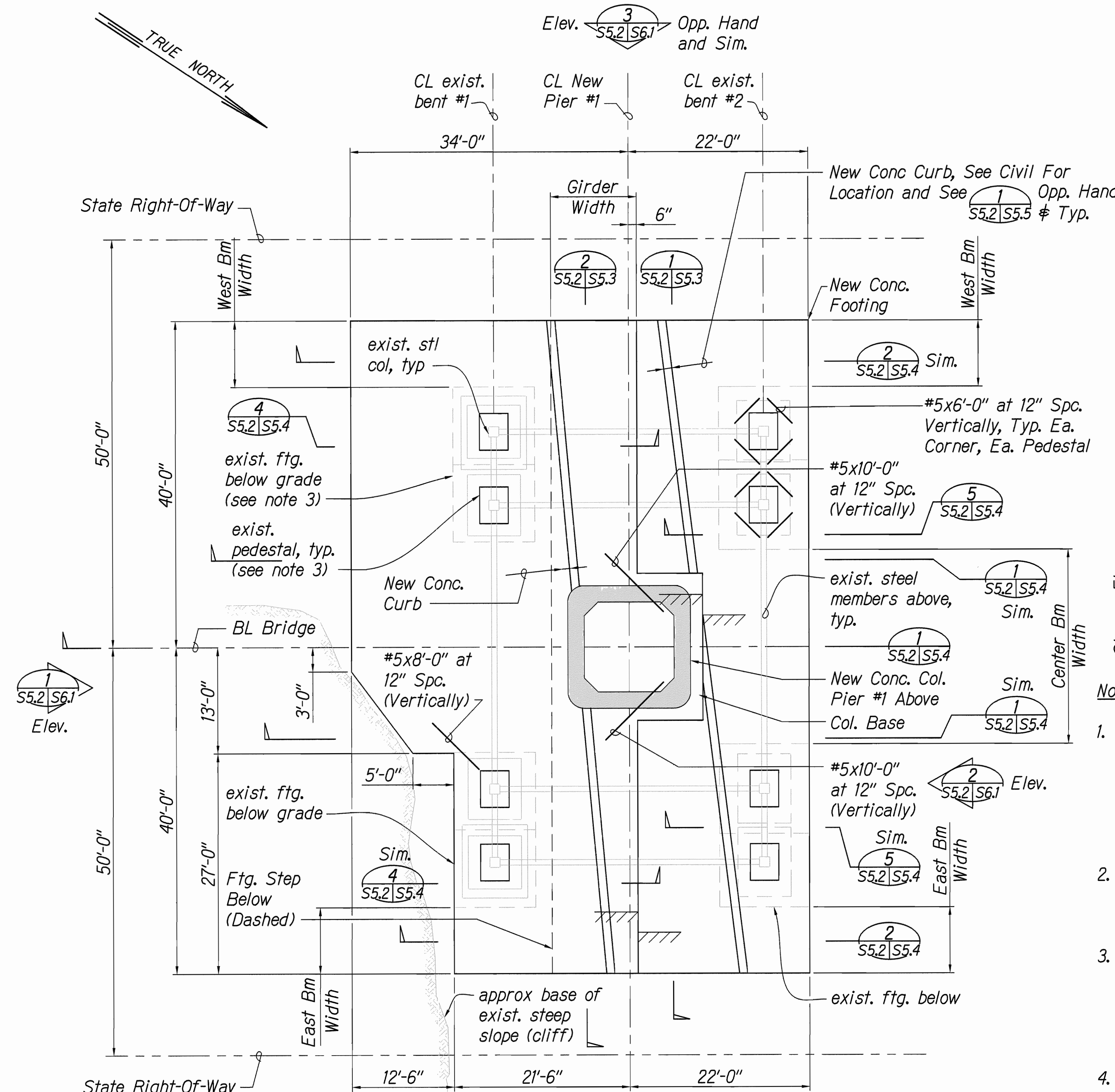
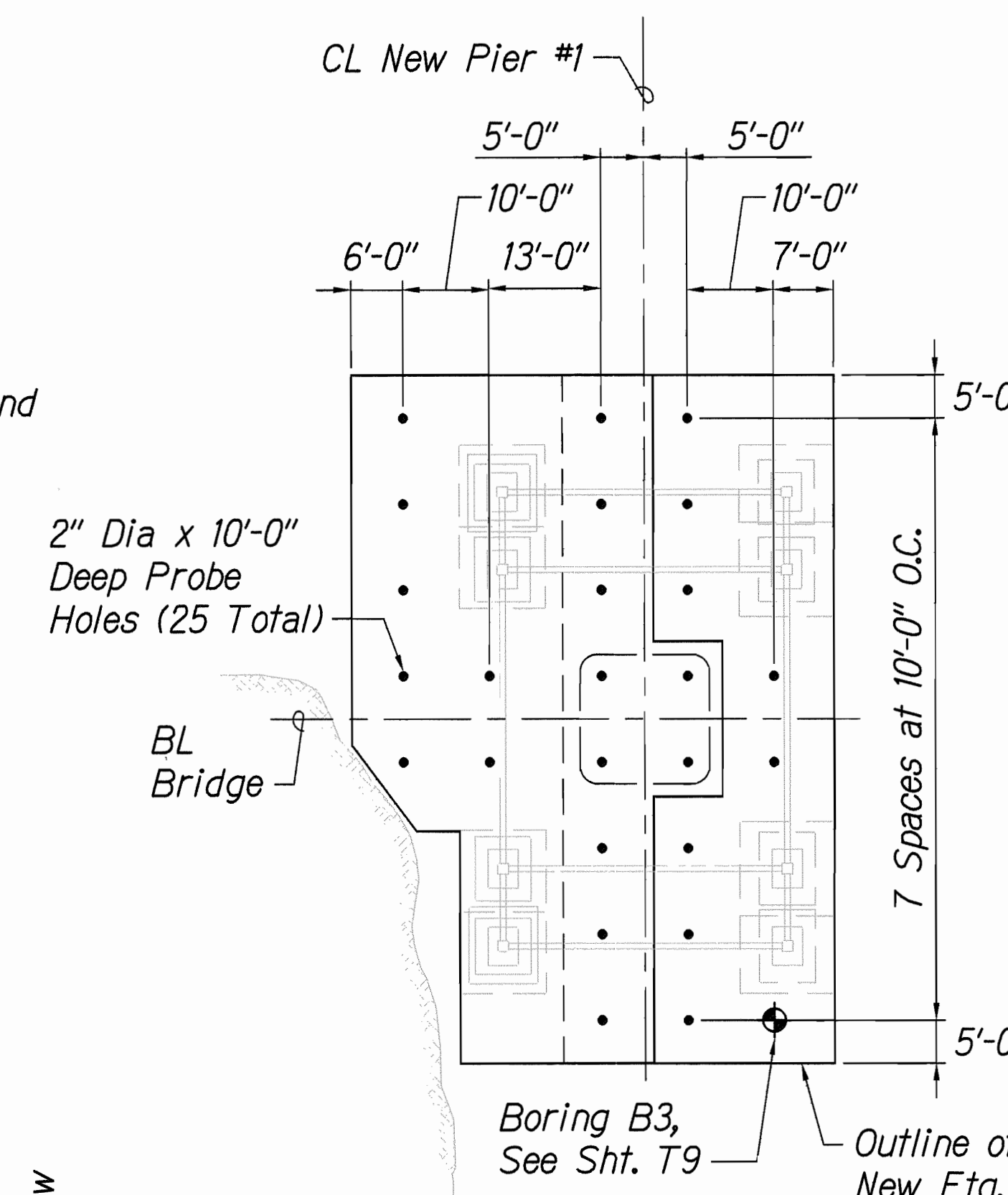
Norman K. Nagamine

Notes:

1. Existing pedestal footings shall be strengthened, shored and/or under-pinned prior to excavating existing grade for new pier footing. Contractor shall submit proposed design for Engineer's review. Design shall be stamped by a licensed Hawaii Structural Engineer. See sheet S5.1.
2. For special notes and excavation pay limits, see sheet S5.1. For concrete pour restriction, see Special Note 5.
3. All bottom of footing elevations of existing and new footings shown on drawings shall be field verified by contractor. All discrepancies shall be reported to the Engineer and shall be resolved before proceeding with the work.
4. New concrete curb shall be incidental to concrete footings and will not be paid for separately.
5. Foundation shall be poured in layers with horizontal construction joints located as shown on drawings. Adjacent pours shall be staggered by at least 14 calendar days.
6. Vertical construction joints shall not be permitted unless approved by the Engineer.

Stream Flow

PROBING AND GROUTING PLAN SCALE: 1/16" = 1'-0"



Note:
Top surfaces of footing shall be sloped to each side to avoid ponding water.

NEW PIER #1 - FOUNDATION PLAN SCALE: 1/8" = 1'-0"

SURVEY PLOTTED BY	DATE
DESIGNED BY	
NOTED BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	75	137

Notes:

- Top of new concrete base elevation of 90.00 shall be maintained.

GRAPHIC SCALES:

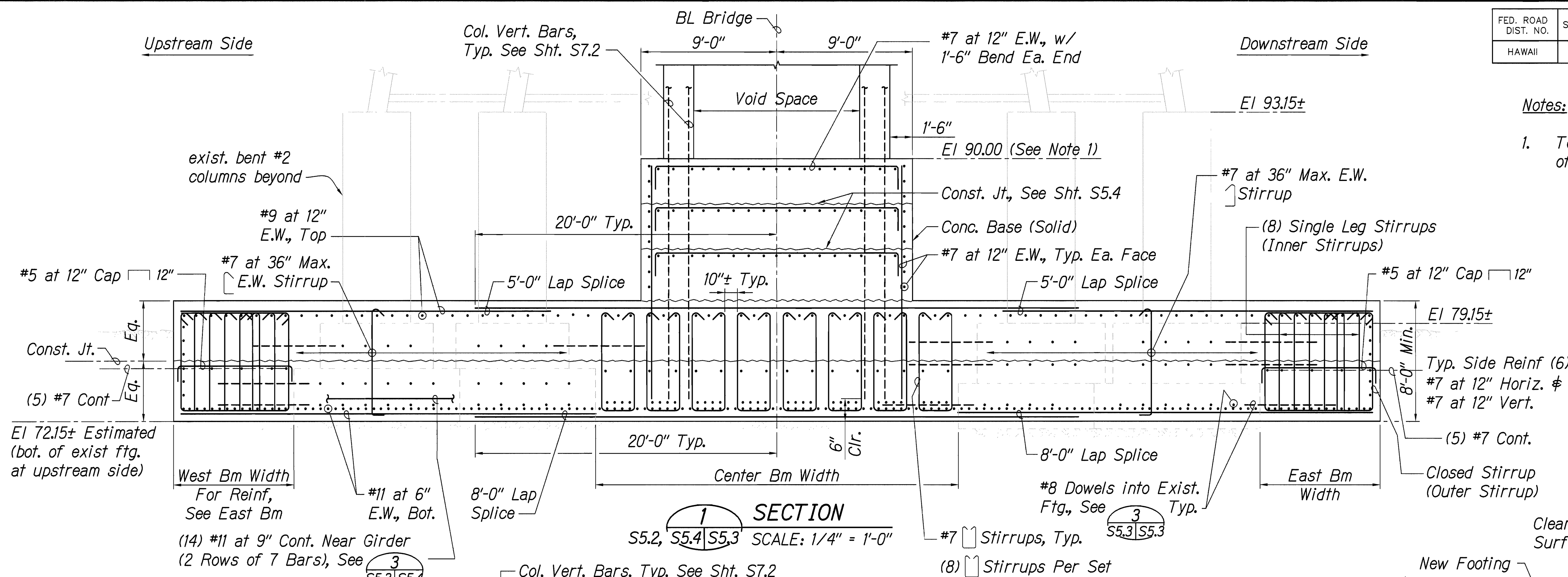
0 6" 1' 2' 3' 5' 7' 9' 11'

1/4"=1'-0"

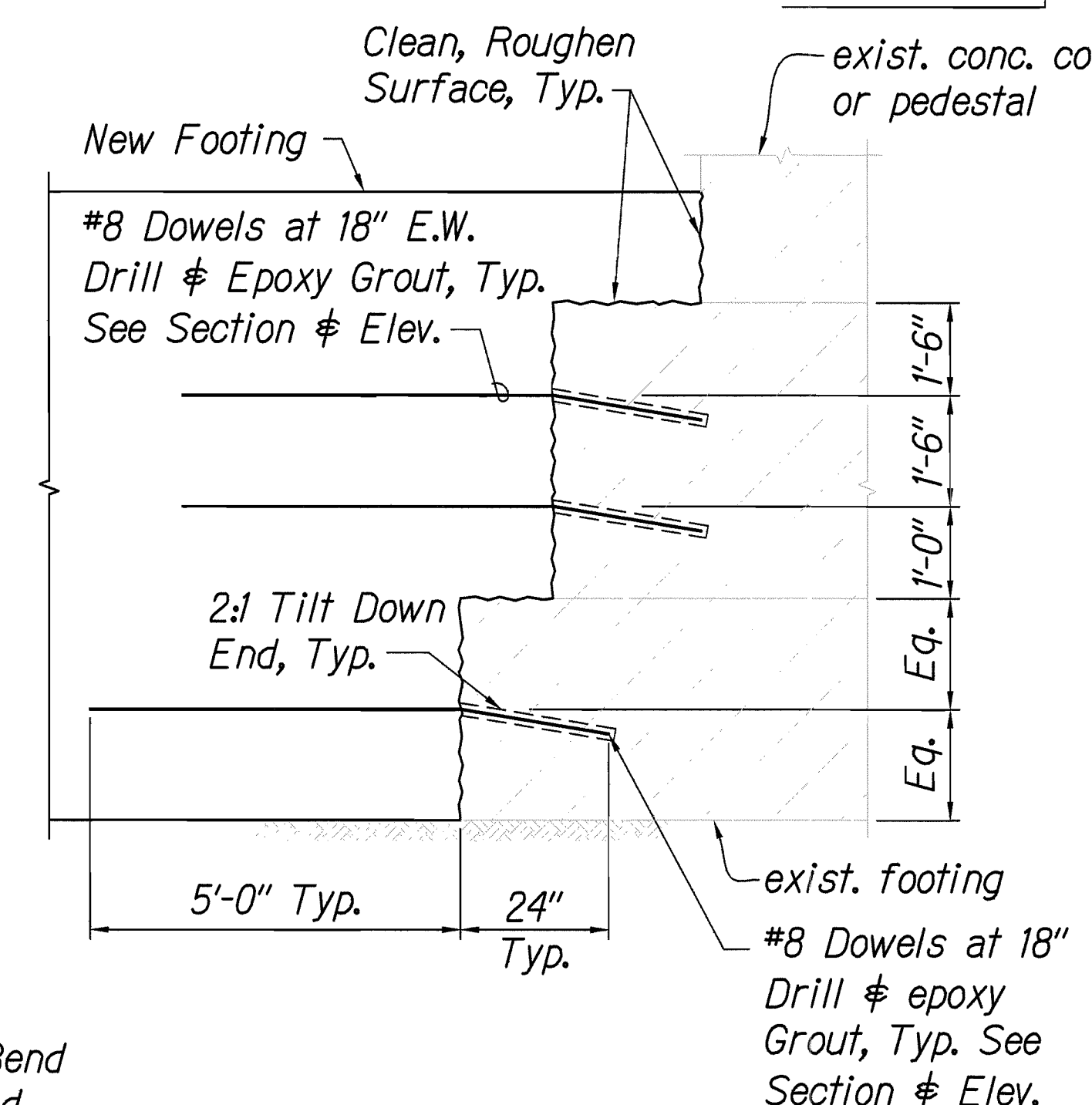
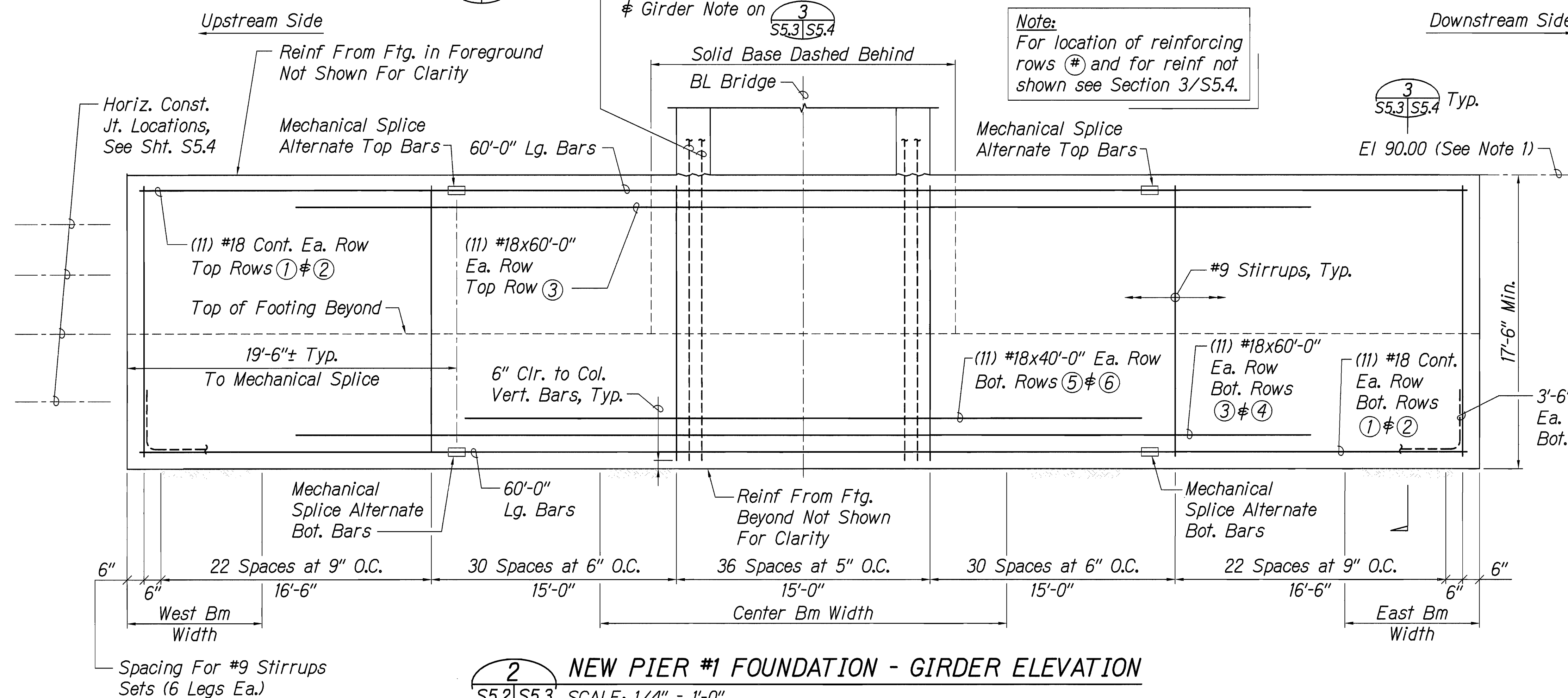
0 6" 1' 2' 3' 4' 5' 6'

1/2"=1'-0"

Special Note:
Epoxy grouted dowels shall be inspected by the Engineer. See General Notes on sheet S0.2.



Note:
For location of reinforcing rows ① and for reinf not shown see Section 3/S5.4.



S5.3, S5.4, S5.5 & S5.6 SCALE: 1/2" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #1 - FOUNDATION SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.3 OF 12 SHEETS

NEW PIER #1 - FOUNDATION SECTIONS

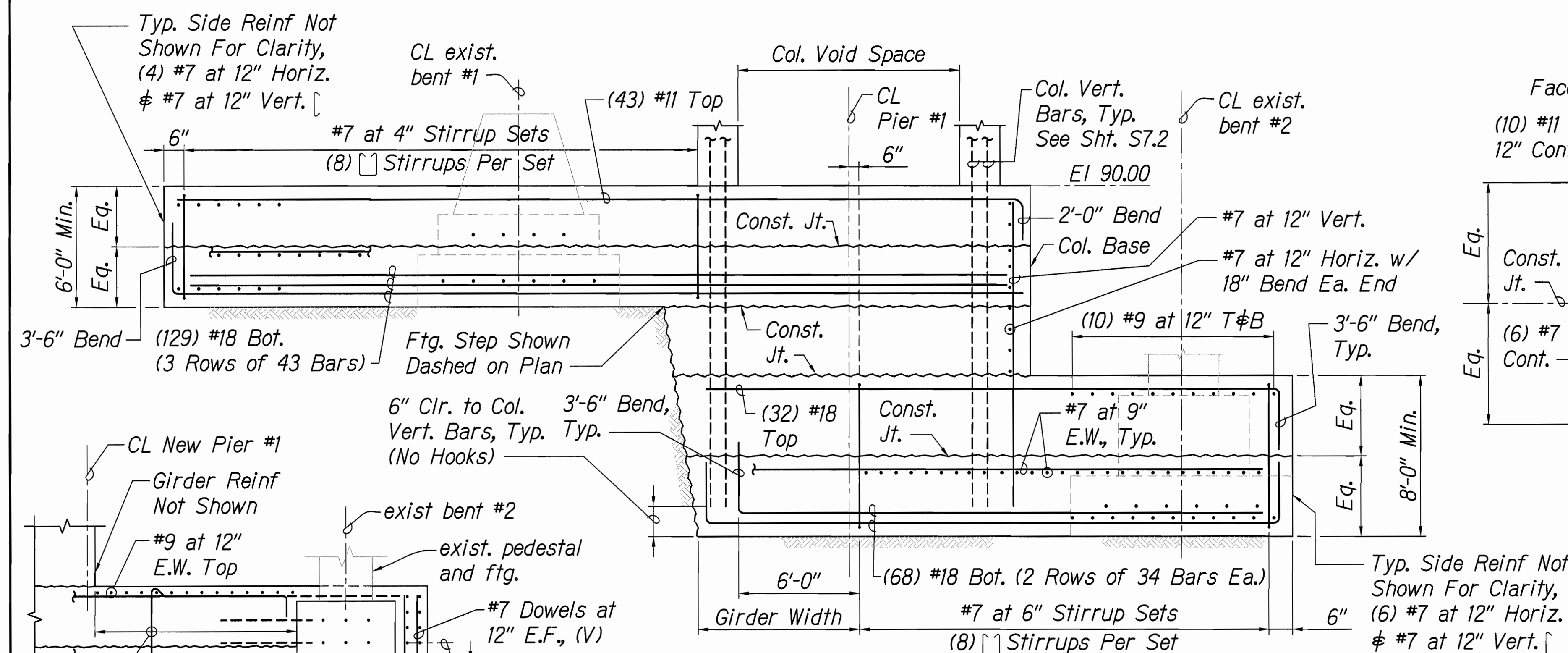
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.3 OF 12 SHEETS

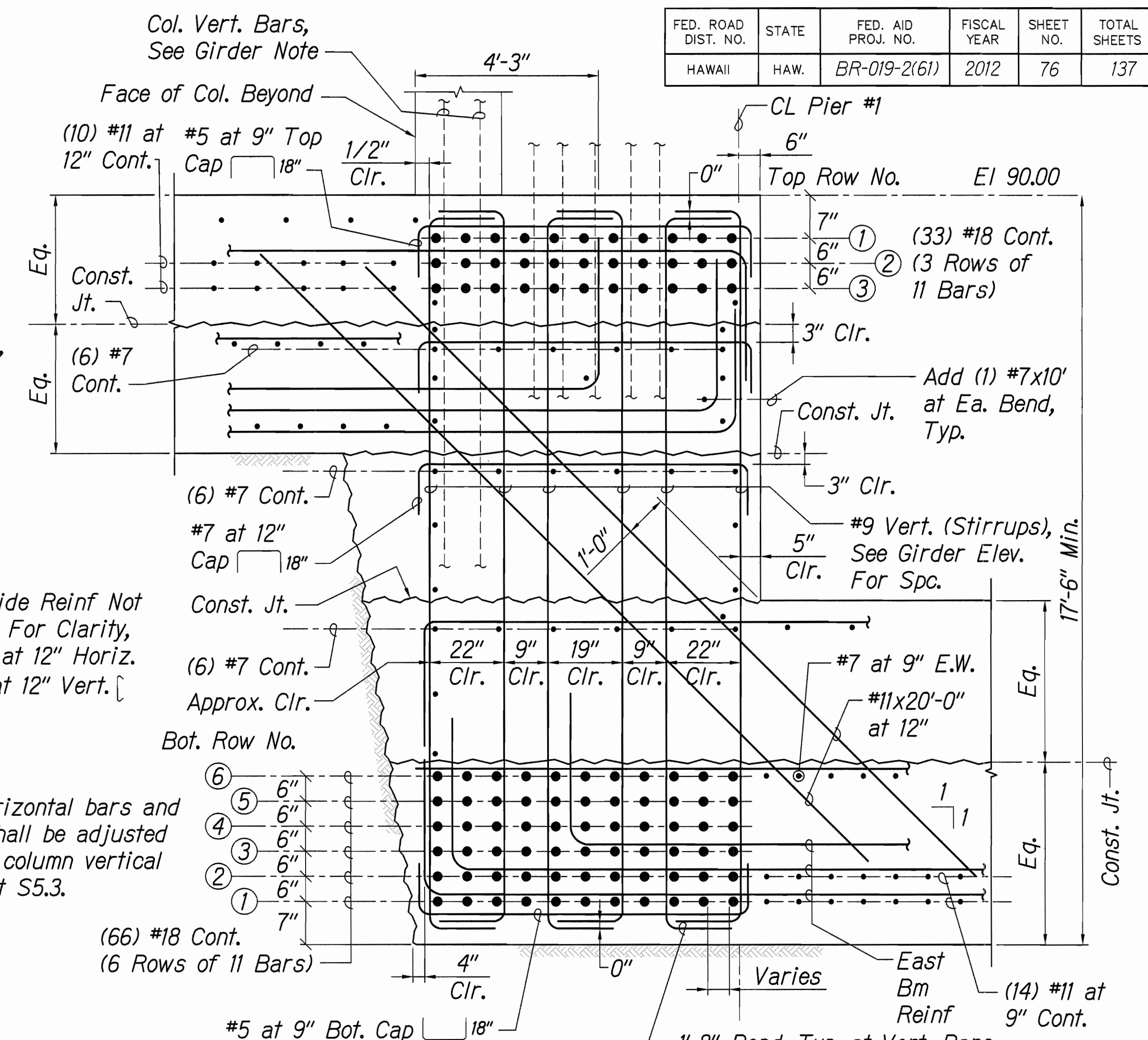
75

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	76	137

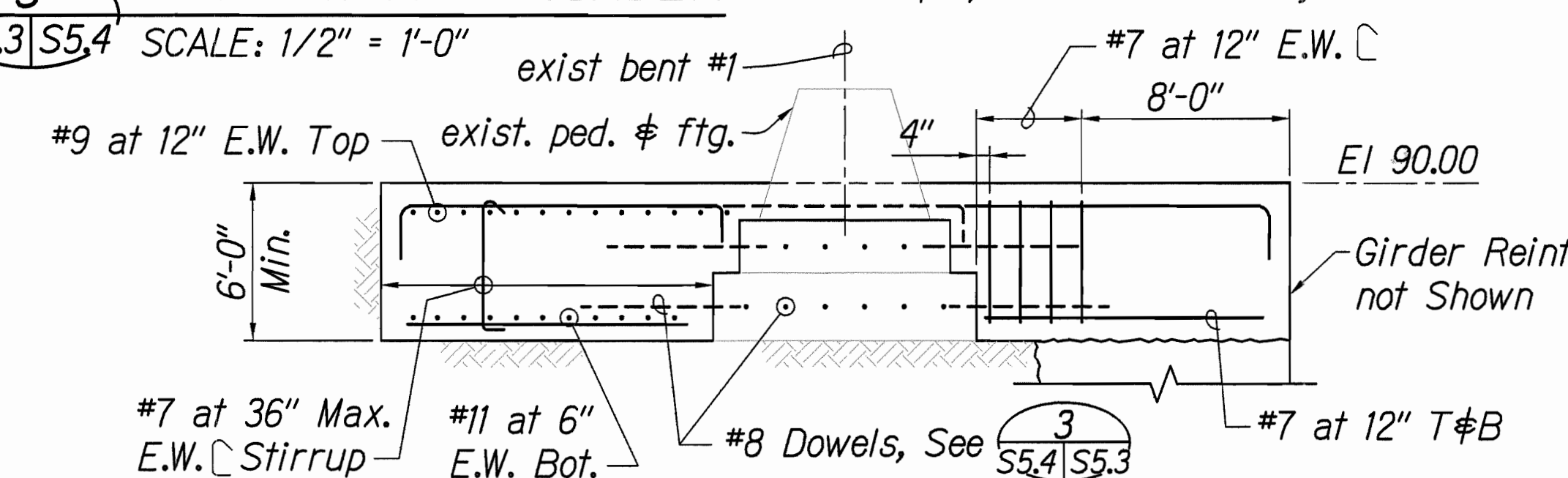


1 LONGITUDINAL SECTION THRU CENTER BEAM
S5.2 S5.4 SCALE: 1/4" = 1'-0"

Girder Note:
Spacing of horizontal bars and stirrup legs shall be adjusted to fit between column vertical bars, see sheet S5.3.

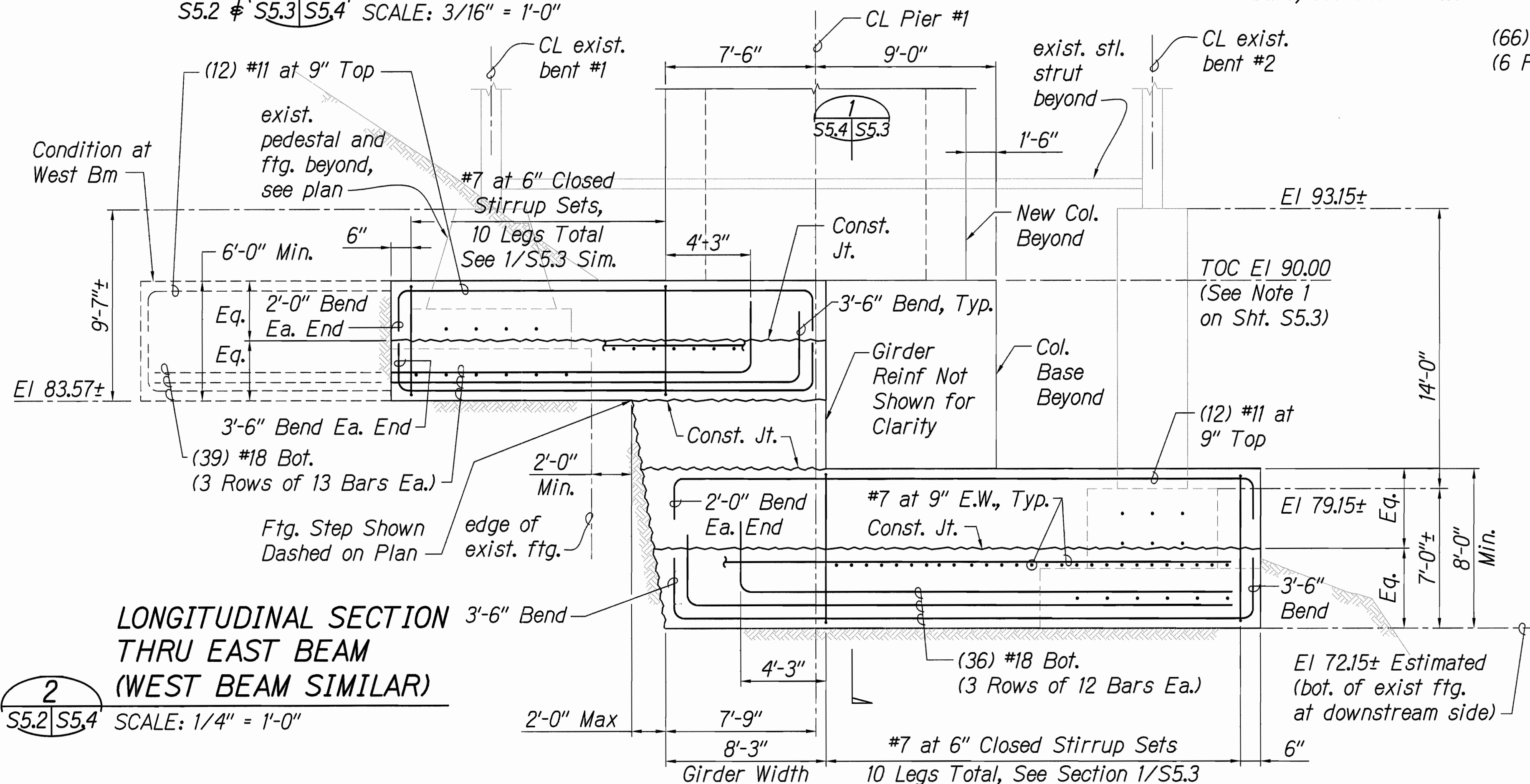


3 SECTION THRU GIRDER
S5.3 S5.4 SCALE: 1/2" = 1'-0"



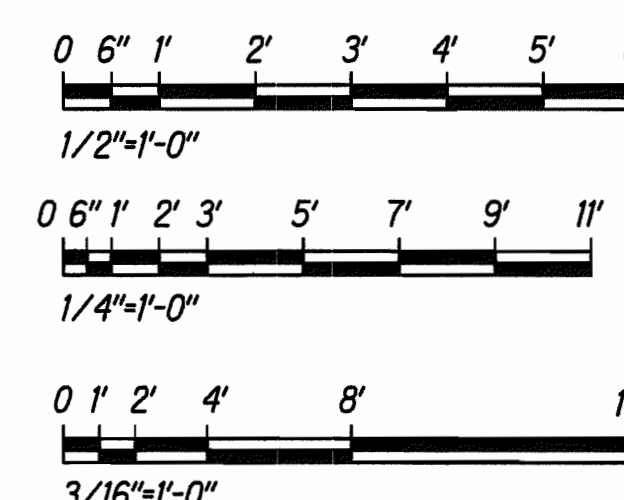
4 SECTION
S5.2 ϕ S5.3 S5.4 SCALE: 3/16" = 1'-0"

5 SECTION
S5.2 ϕ S5.3 S5.4 SCALE: 3/16" = 1'-0"



2 LONGITUDINAL SECTION THRU EAST BEAM (WEST BEAM SIMILAR)
S5.2 S5.4 SCALE: 1/4" = 1'-0"

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #1 - FOUNDATION SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.4 OF 12 SHEETS

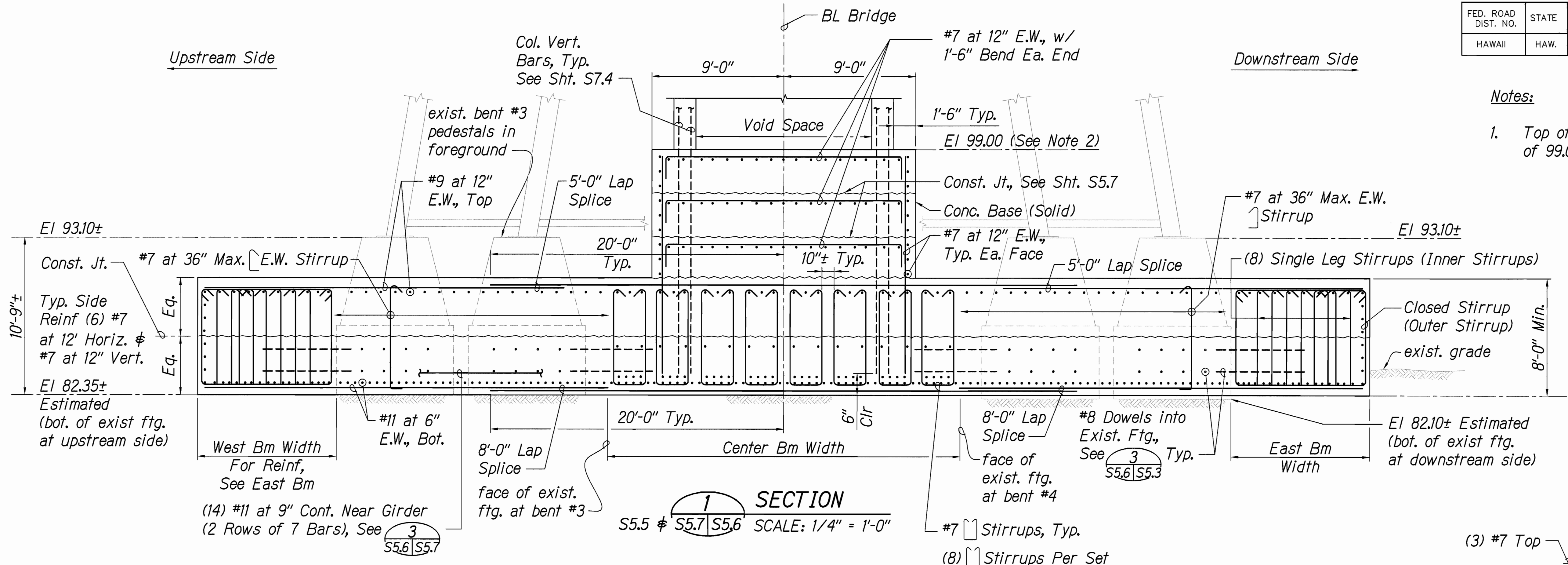
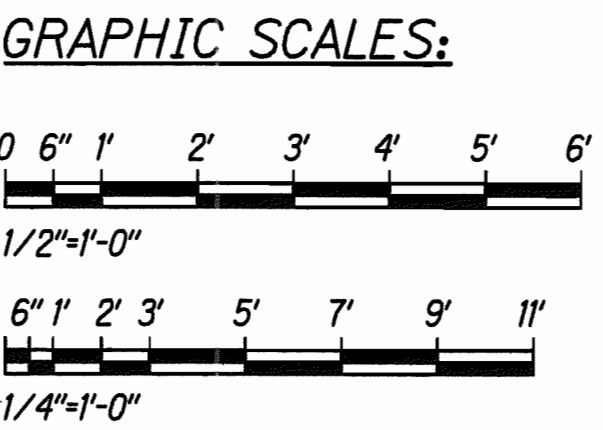
NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

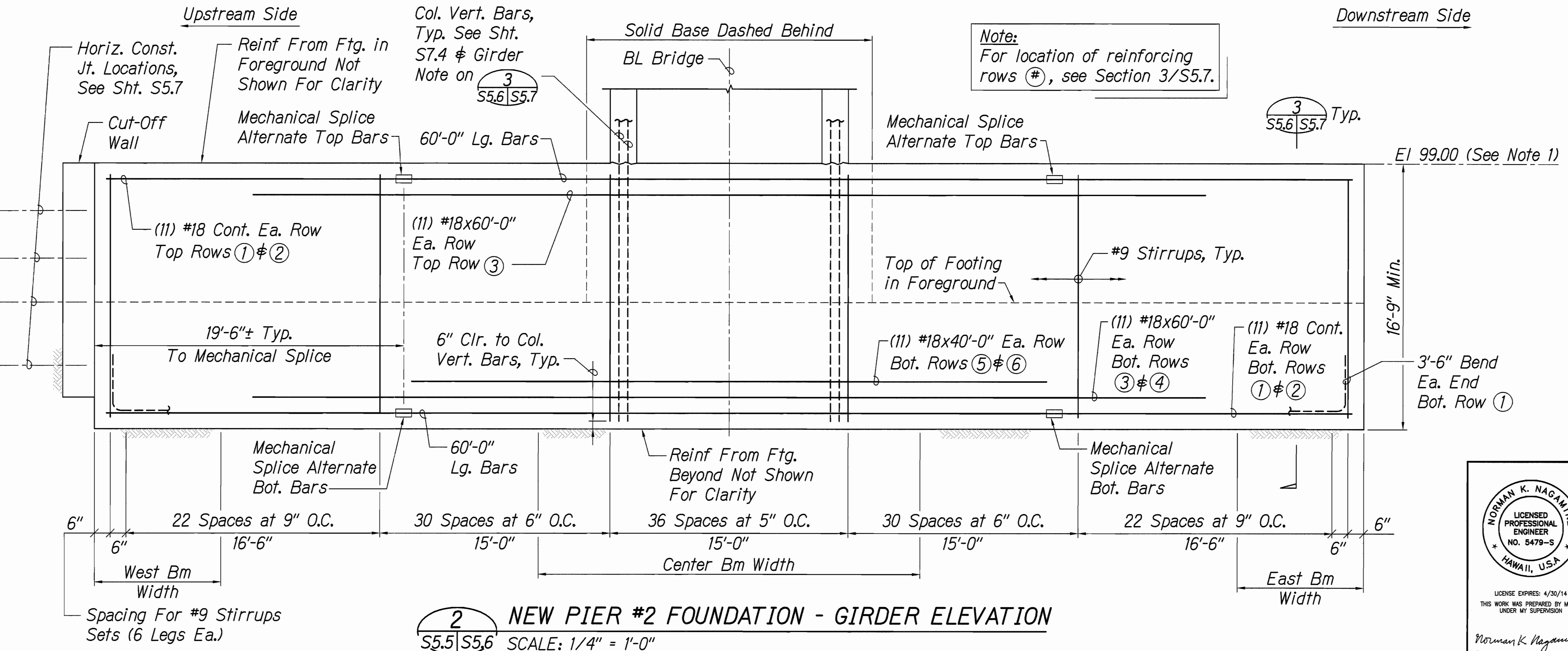
Norman K. Nagamine

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	78	137

- Notes:
- Top of new concrete base elevation of 99.00 shall be maintained.

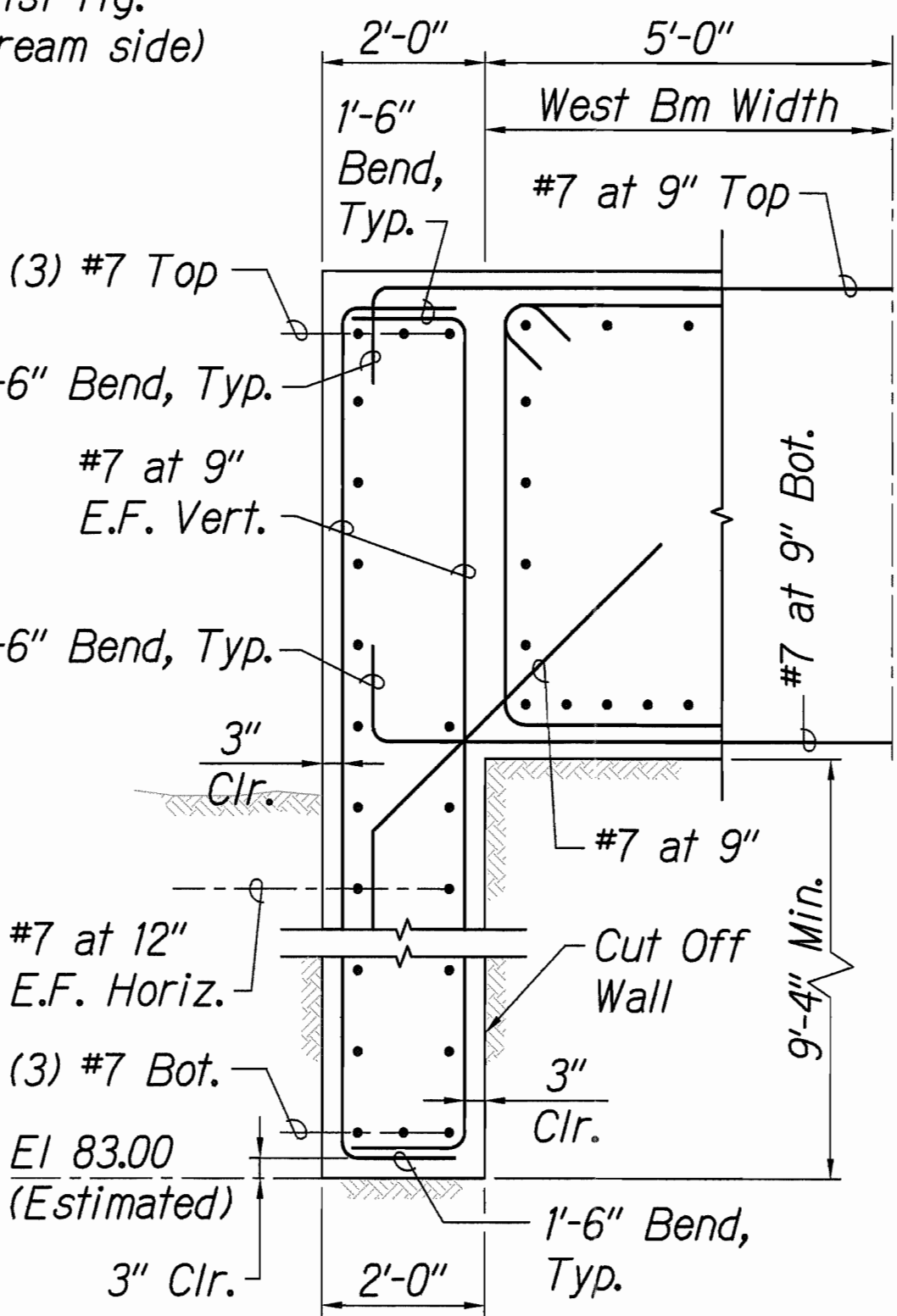


Note:
For location of reinforcing rows (#), see Section 3/S5.7.



SECTION 3

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



SURVEY PLOTTED BY	DATE
DESIGNED BY	
DESIGNED BY	
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ORIGINAL PLAN	
NOTED	
NO.	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #2 - FOUNDATION SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.6 OF 12 SHEETS

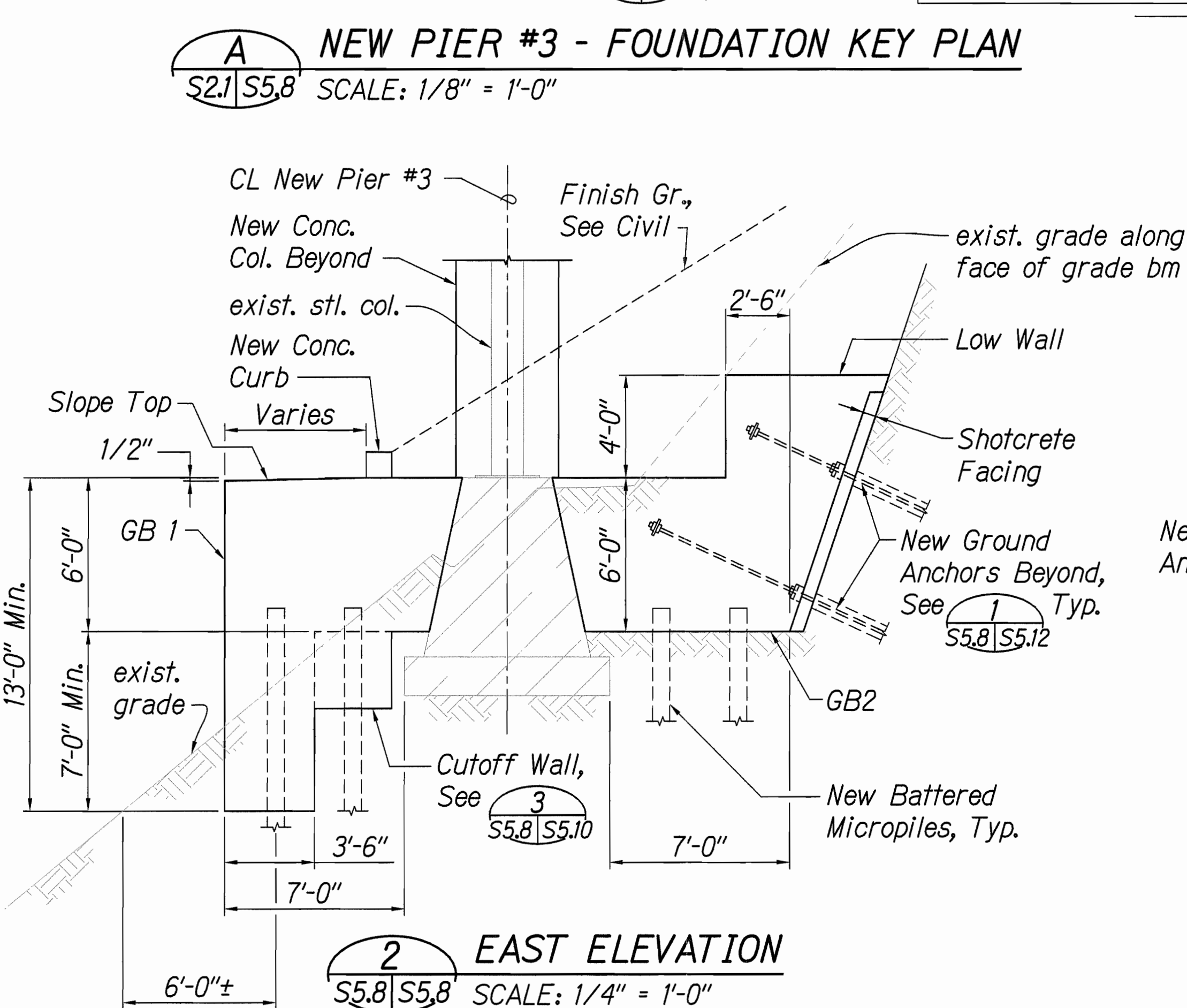
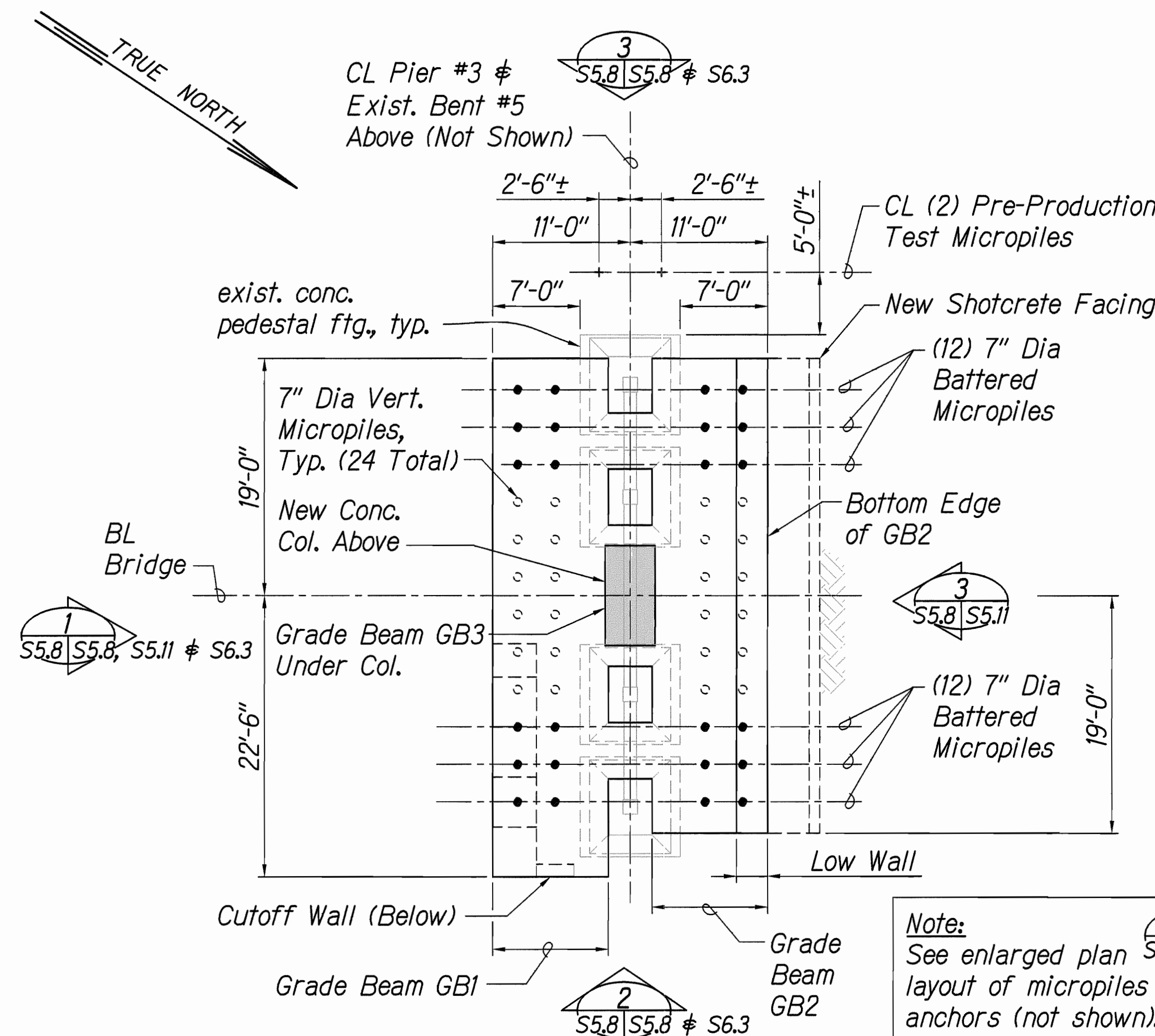
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	79	137

Col. Vert. Bars, See Girder Note
#5 at 9" Top Cap
CL Pier #2
Top Row No.
(33) #18 Cont.
(3 Rows of 11 Bars)
(6) #7 Cont.
Add (1) #7x10' at Ea. Bend, Typ.
#9 Vert. (Stirrups)
See Elev. For Spc.
5" Clr.
Const. Jt.
#7 at 9" E.W.
#11x20'-0" at 12"
(14) #11 at 9" Conf.
Varies
EI 103.13±
EI 99.00
EI 82.25 (Est.)
Bottom Row No.
(66) #18 Cont. (6 Rows of 11 Bars)
1'-8" Bend, Typ. at Vert. Bars (Stirrups), Cant as Necessary to Fit

2 LONGITUDINAL SECTION THRU EAST BEAM
S5.5 S5.7 SCALE: 1/4" = 1'-0" (WEST BEAM SIMILAR)

79

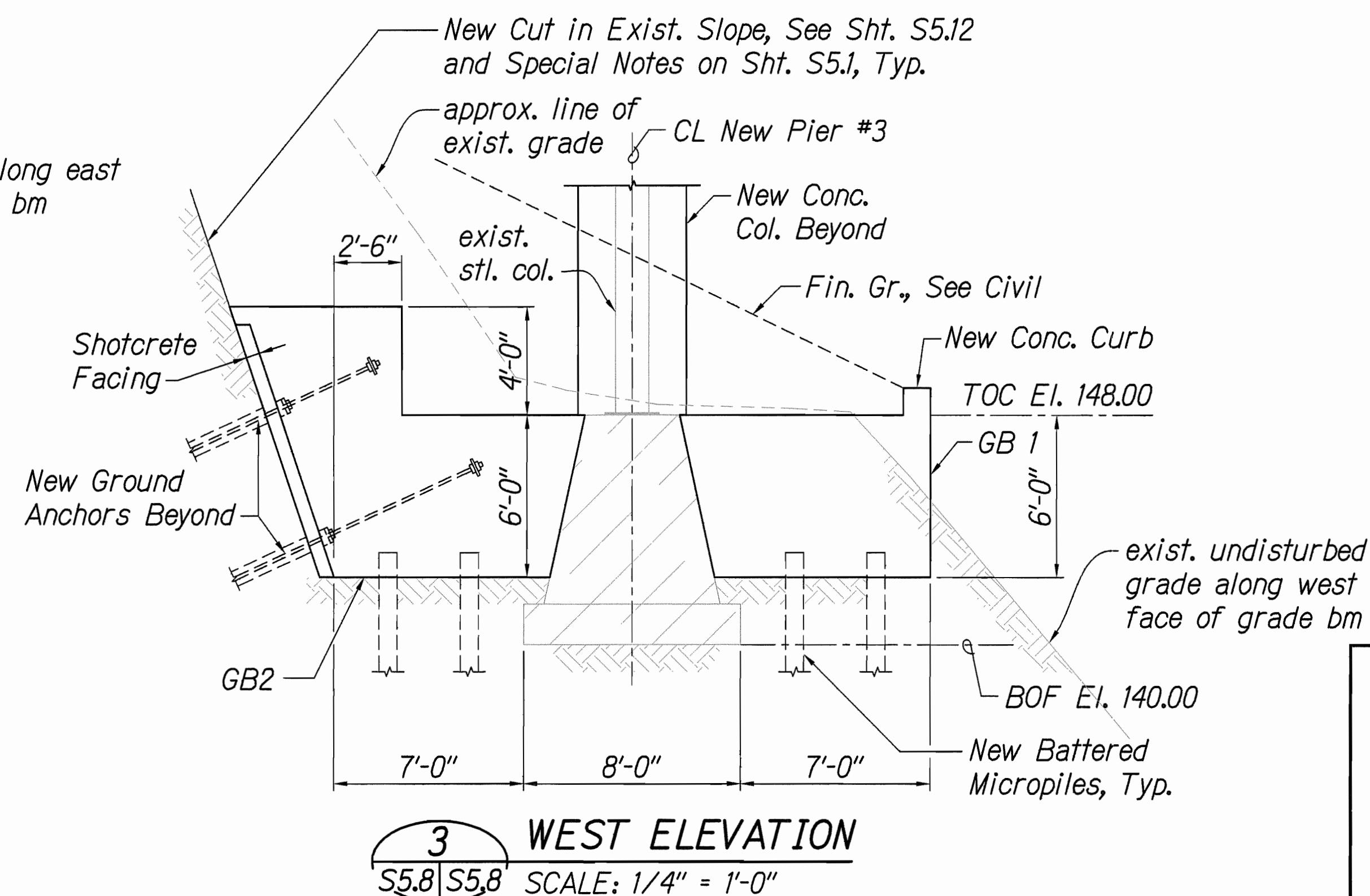
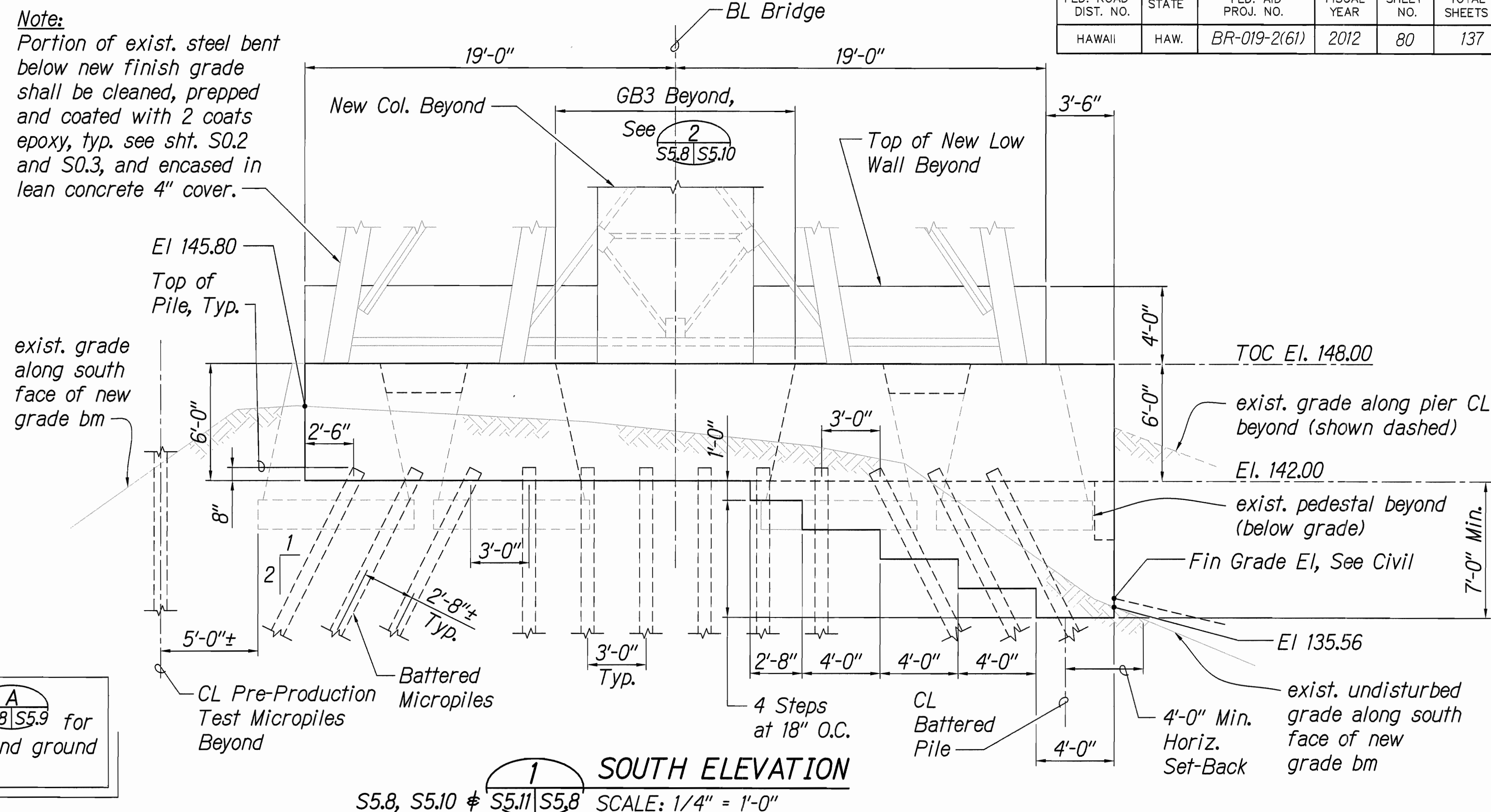
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	80	137



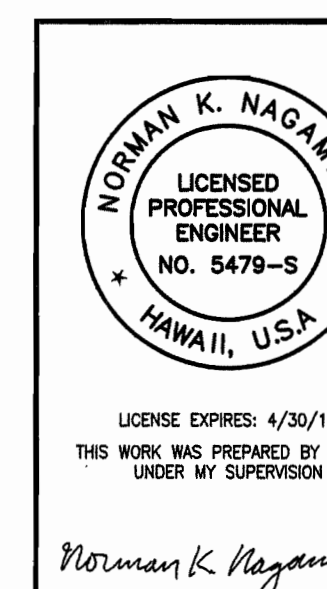
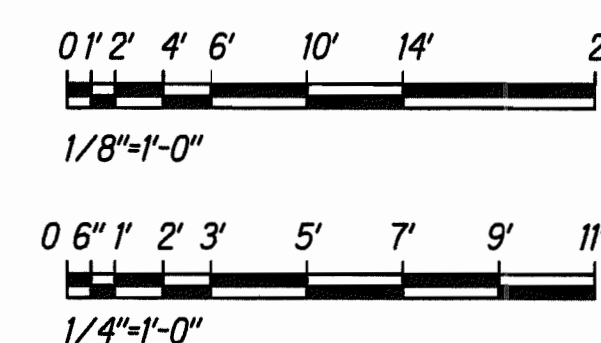
Note:
 Portion of exist. steel bent below new finish grade shall be cleaned, prepped and coated with 2 coats epoxy, typ. see sht. S0.2 and S0.3, and encased in lean concrete 4" cover.

exist. grade along south face of new grade bm

Note:
 See enlarged plan S5.8/S5.9 for layout of micropiles and ground anchors (not shown).



GRAPHIC SCALES:



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
NEW PIER #3 FOUNDATION - KEY PLAN & ELEVATIONS
 HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)
 Scale: As Shown Date: July 25, 2012
 SHEET No. S5.8 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	81	137

Legend:

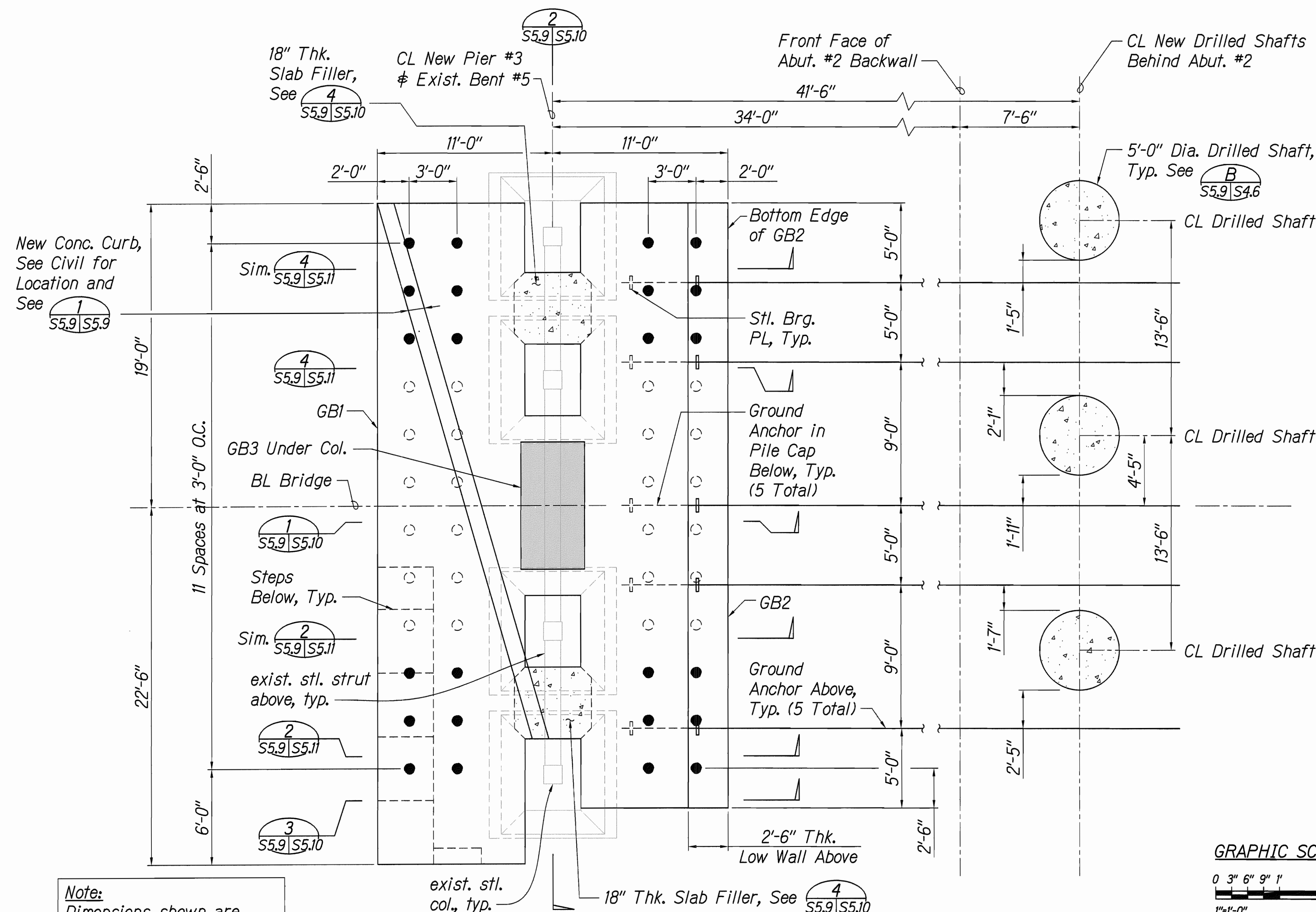
- = 7" Dia Vertical Micropile
- = 7" Dia Battered Micropile

Notes:

- Existing pedestal footings shall be strengthened, shored and/or under-pinned prior to excavating existing grade for new pier footing. See sheet S5.1
- For special notes and excavation pay limits, see sheet S5.1.
- For new micropile suggested installation sequence, see notes on this sheet. For other requirements, see Special Provisions Section 512.
- For micropile General Notes and Typical Details, and added reinforcing in grade beams, see sheets S3.1 and S3.2.
- For ground anchor General Notes and Typical Details, see sheet S5.12.
- Contractor shall field verify and coordinate actual plan locations of ground anchors and drilled shafts to avoid conflicts.
- Epoxy grouted dowels shall be inspected by the Engineer. See General Notes on sheet S0.2.
- For pre-production load test micropiles, see key plan on sheet S5.8, and General Notes on sheet S3.1.
- For grade beam concrete, maximum size of coarse aggregate shall be 3/4 inch.

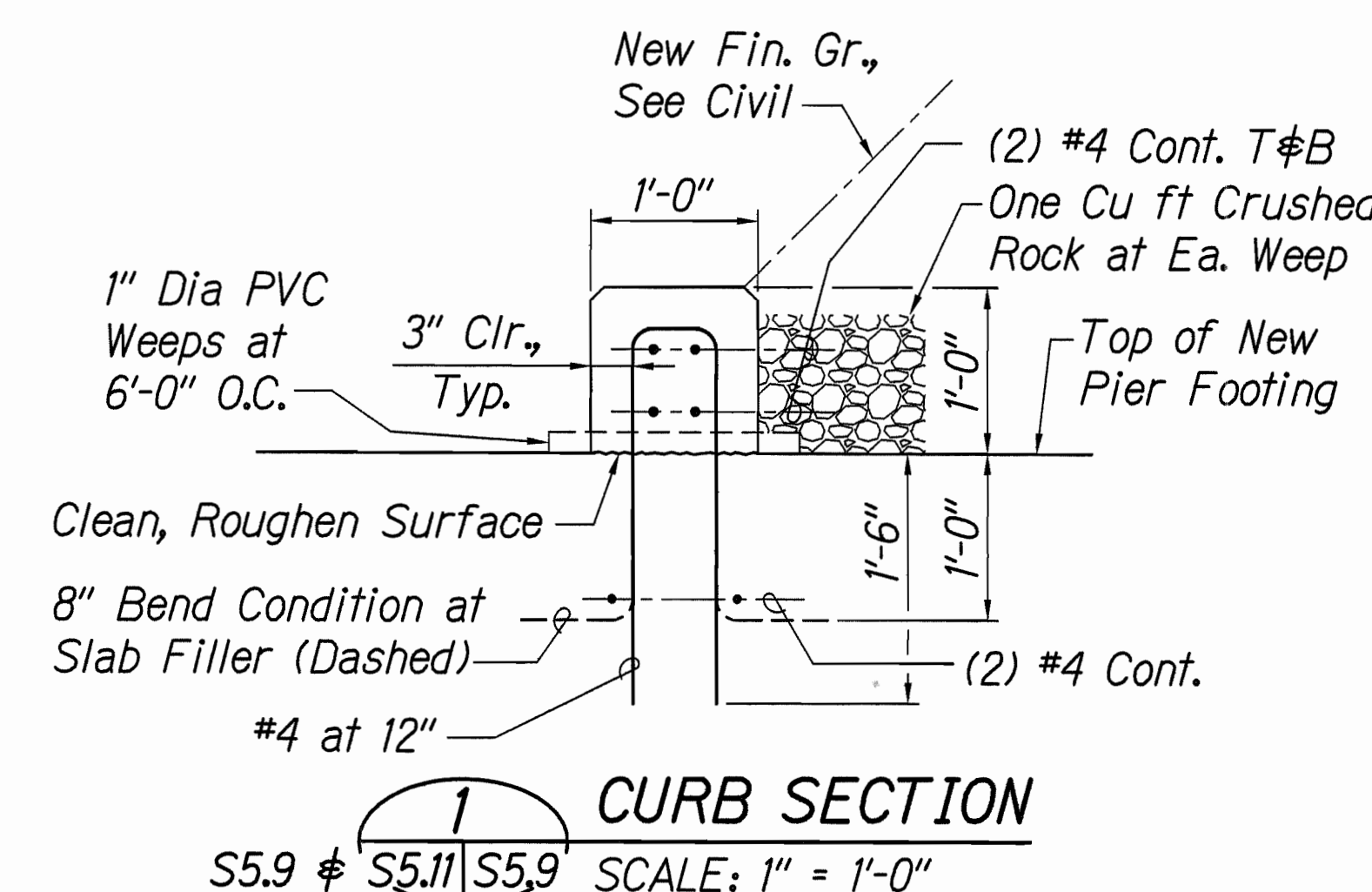
Suggested Micropile Installation Sequence

- Excavate along north side of existing bent #5 and install new micropiles (2 rows).
- Construct new grade beam GB2.
- Excavate along south side of existing bent #5 and install new micropiles (2 rows).
- Construct new grade beams GB1 and GB3.

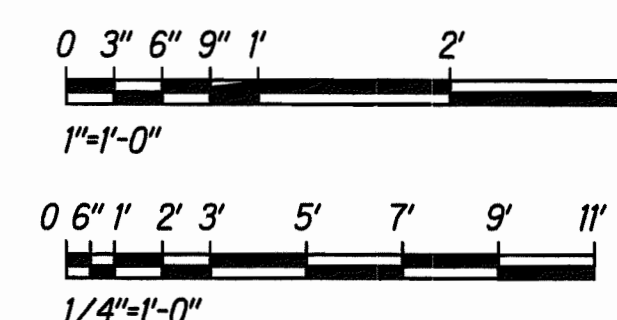


Note:
Dimensions shown are measured at bottom of pile cap (grade beam) EI 142.0

ENLARGED PLAN - NEW PIER #3 FOUNDATION
SCALE: 1/4" = 1'-0"



GRAPHIC SCALES:

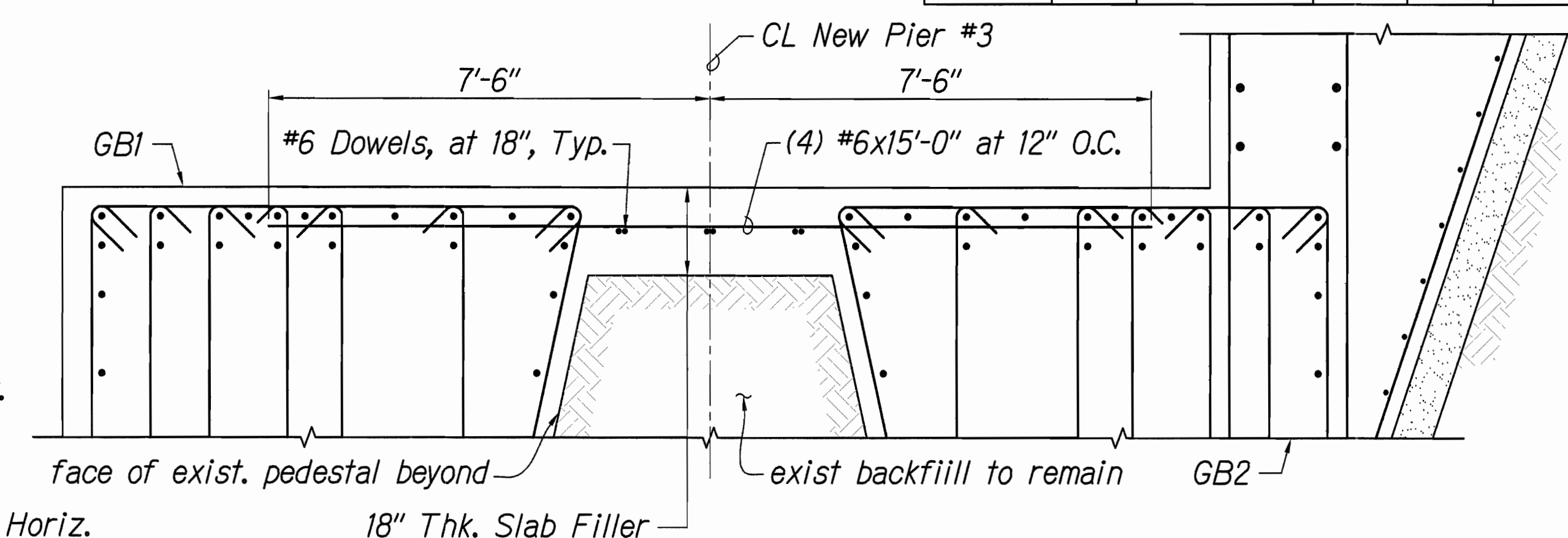
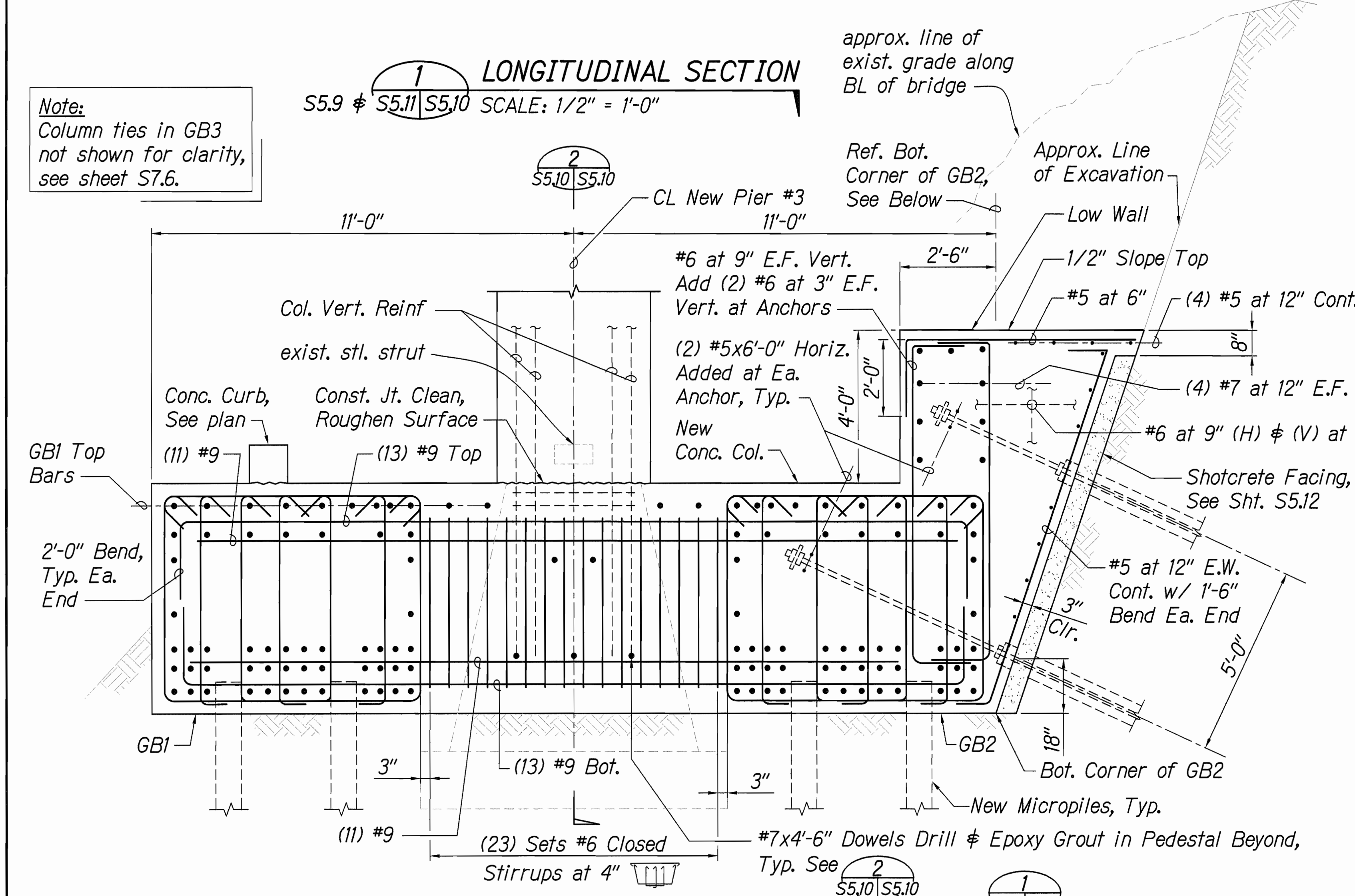


	STATE OF HAWAII	
	DEPARTMENT OF TRANSPORTATION	
	HIGHWAYS DIVISION	
	NEW PIER #3 FOUNDATION - ENLARGED PLAN & NOTES	
	HAWAII BELT ROAD	
Rehabilitation of Umauma Stream Bridge		
Federal Aid Project No. BR-019-2(61)		
Scale: As Shown		Date: July 25, 2012
SHEET No. S5.9 OF 12 SHEETS		

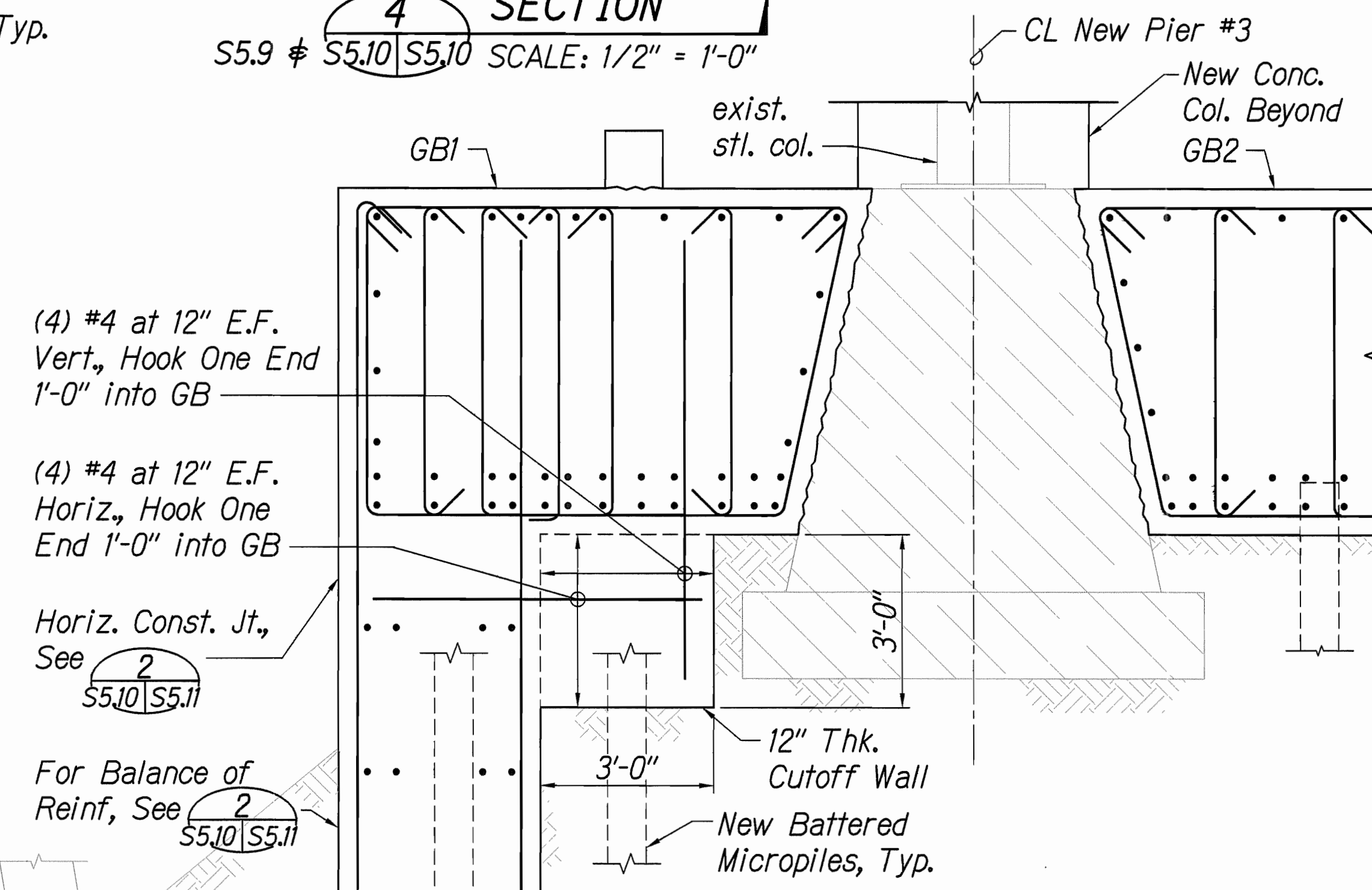
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	82	137

Note:
Column ties in GB3 not shown for clarity, see sheet S7.6.

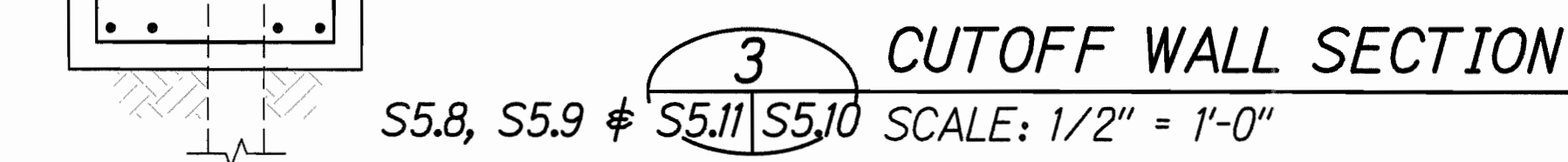
1 LONGITUDINAL SECTION S5.9 & S5.11 | S5.10 SCALE: 1/2" = 1'-0"



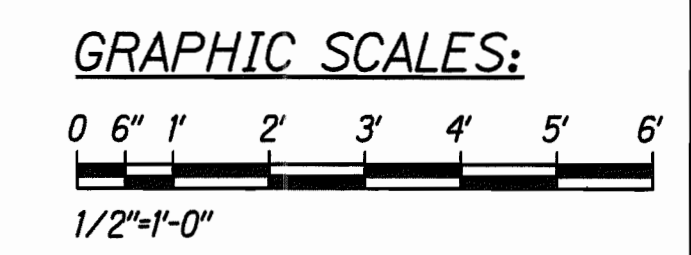
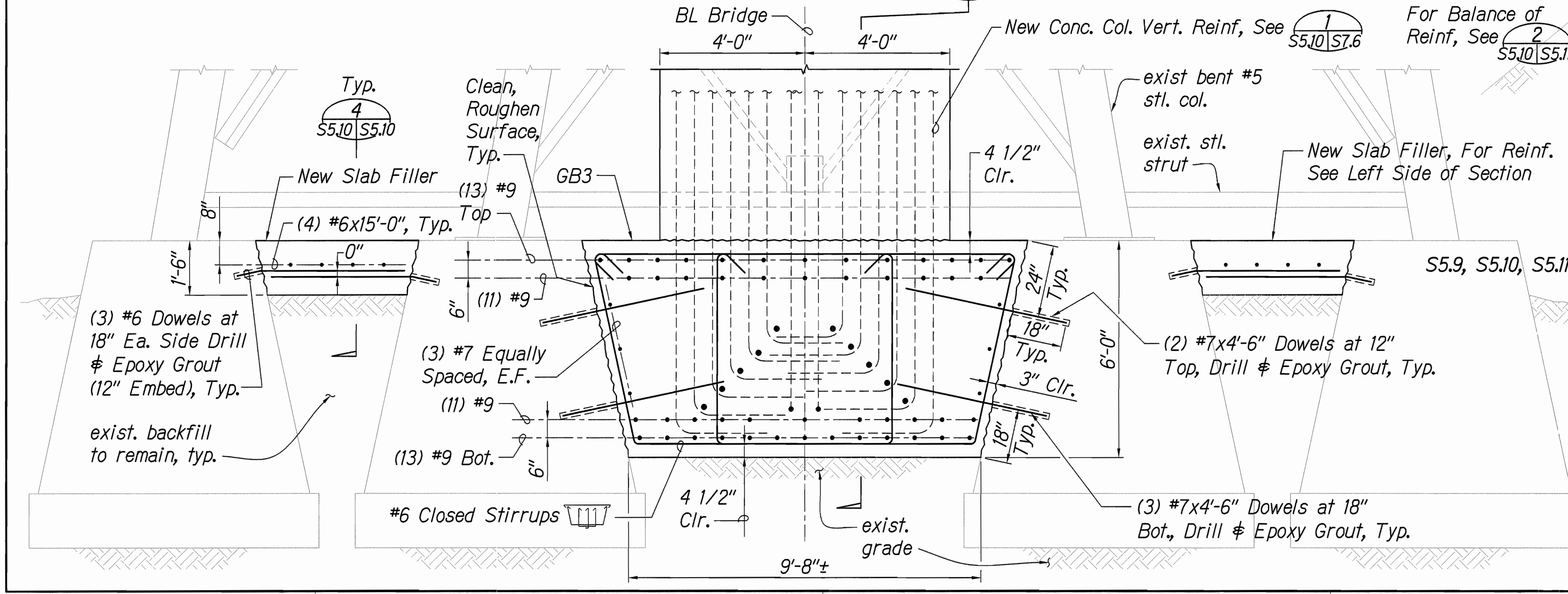
4 SECTION S5.9 & S5.10 | S5.10 SCALE: 1/2" = 1'-0"



3 CUTOFF WALL SECTION S5.8, S5.9 & S5.11 | S5.10 SCALE: 1/2" = 1'-0"



2 TRANSVERSE SECTION S5.9, S5.10, S5.11 & S7.6 | S5.10 SCALE: 1/2" = 1'-0"



NORMAN K. NAGAMINE
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LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW PIER #3 FOUNDATION -
GRADE BEAM REINFORCING**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

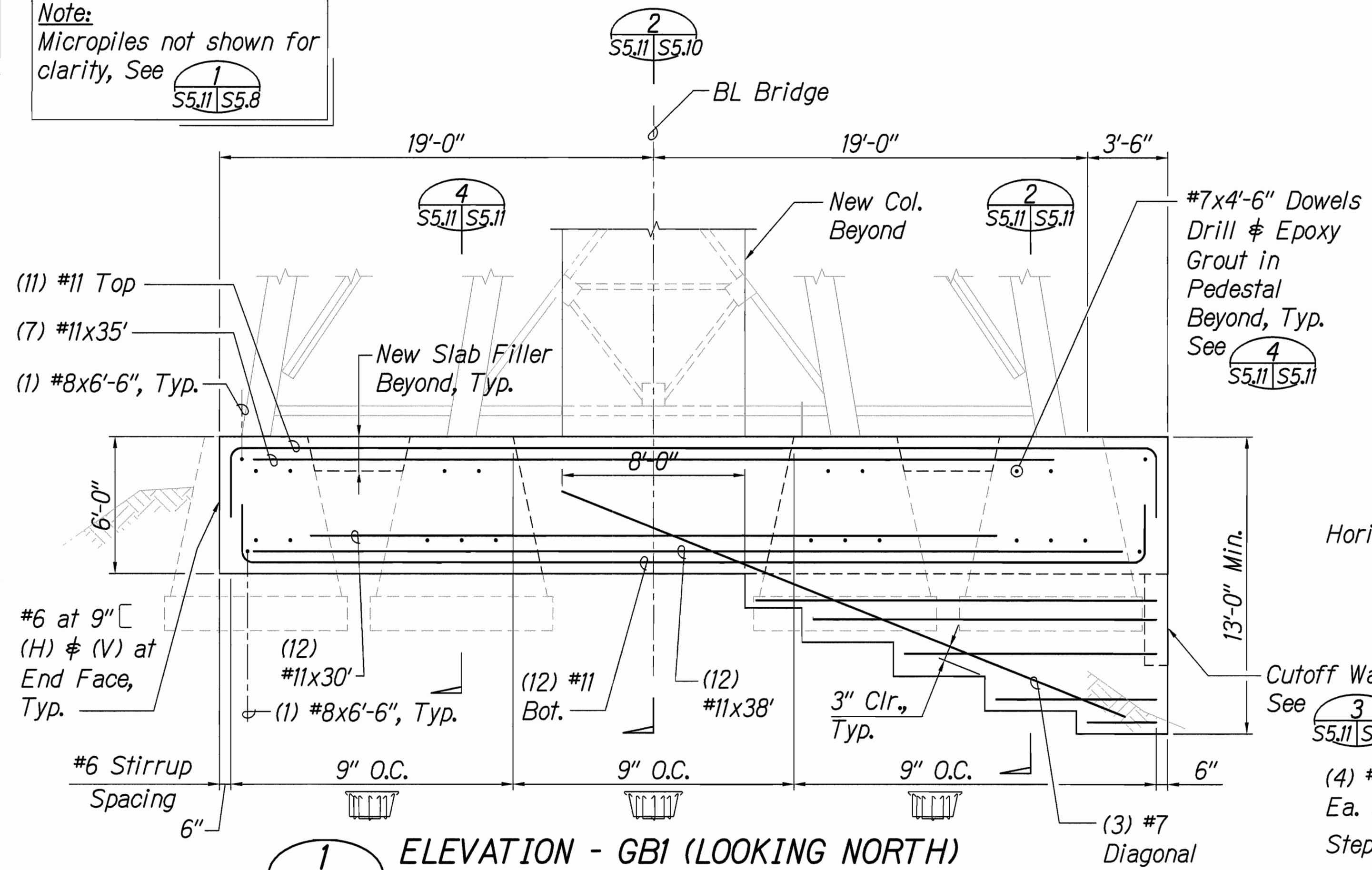
Scale: 1/2" = 1'-0" Date: July 25, 2012

SHEET No. S5.10 OF 12 SHEETS

DATE	_____
DESIGNED BY	_____
CHECKED BY	_____
NOTED BY	_____
QUANTITIES BY	_____
TRACED BY	_____
DRAWN BY	_____
ORIGINAL PLAN	_____
NO.	_____

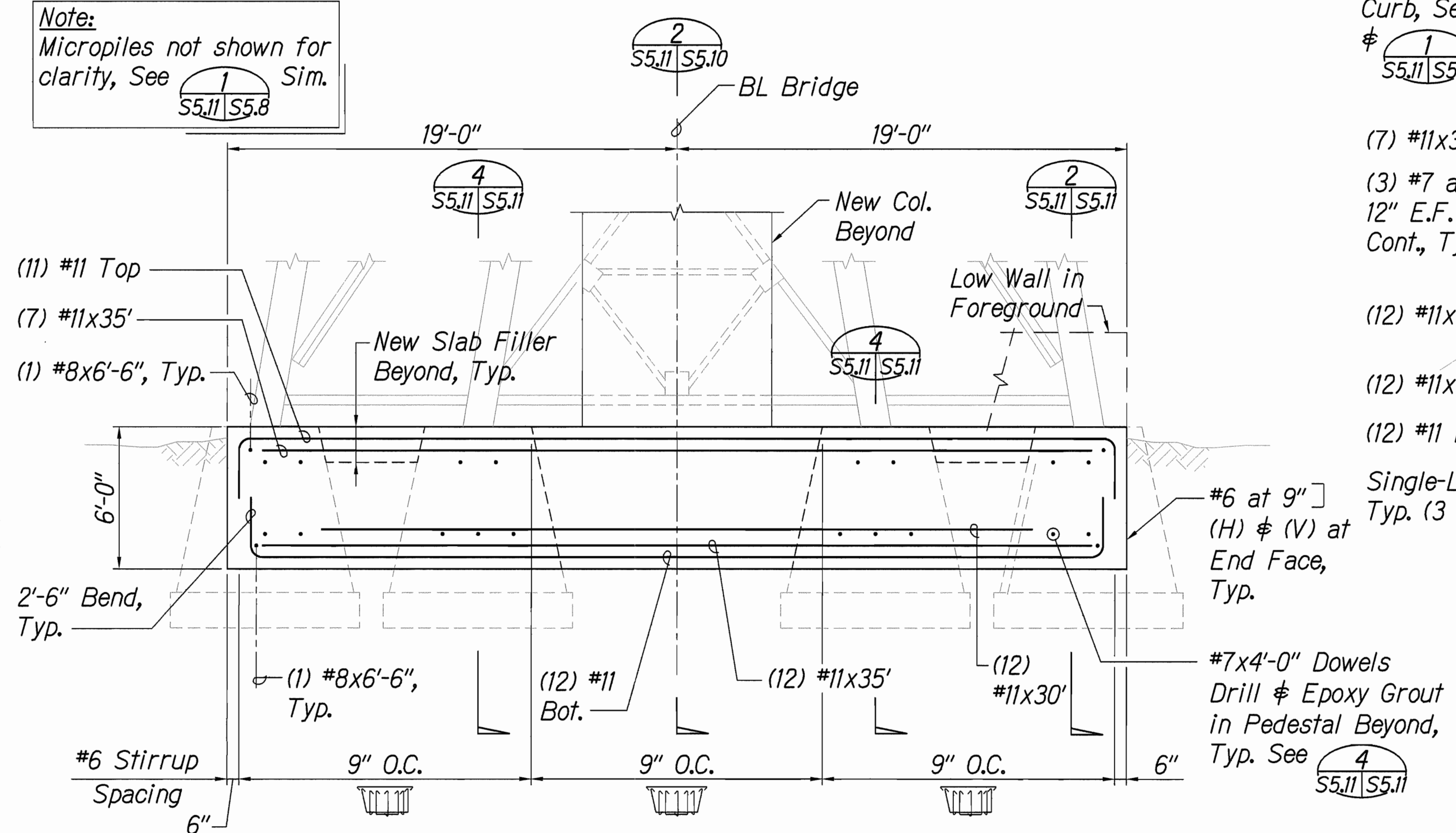
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	83	137

Note:
Micropiles not shown for clarity, See 1 S5.11 S5.8



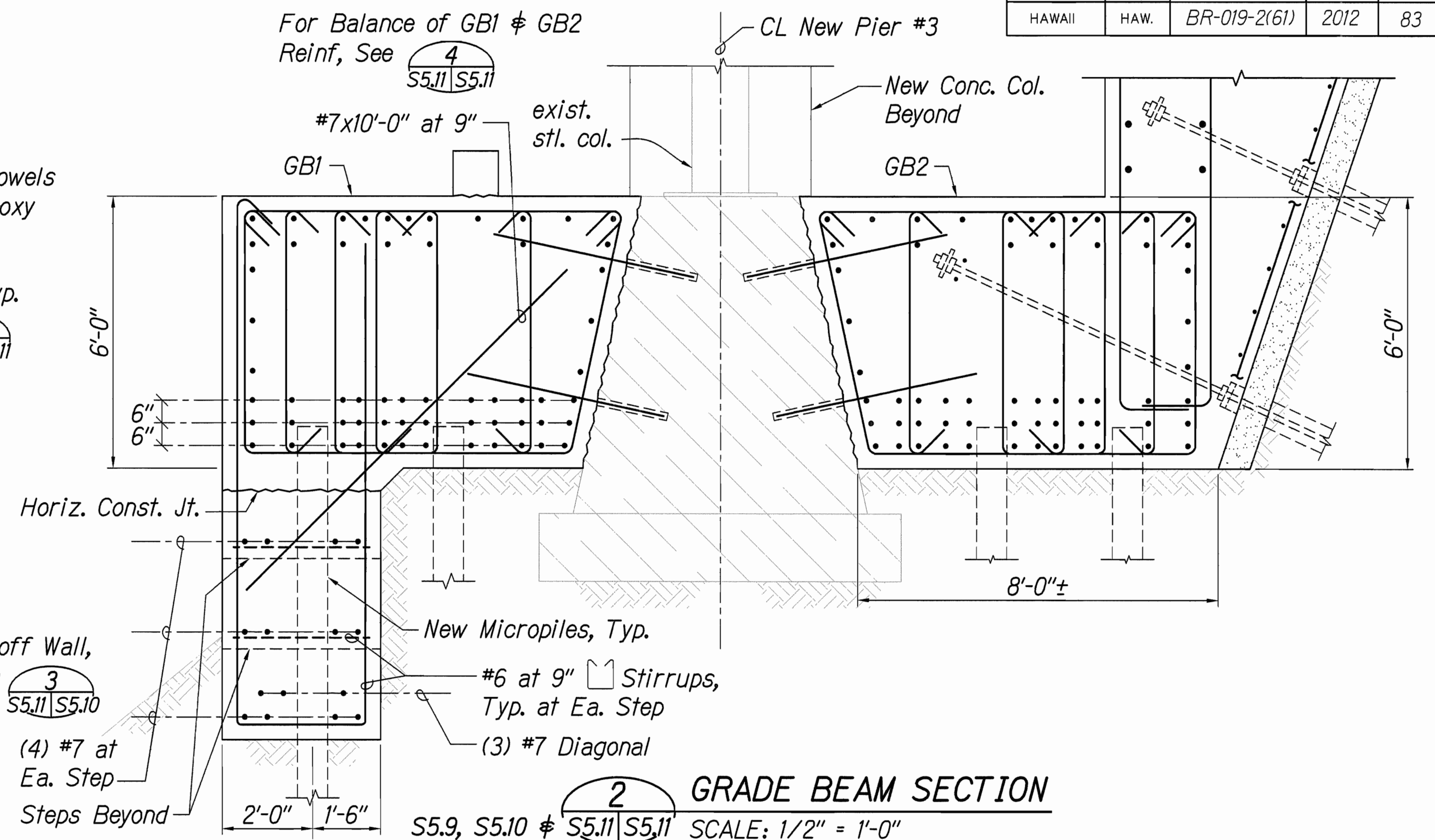
1 ELEVATION - GB1 (LOOKING NORTH)
S5.8 S5.11 SCALE: 1/4" = 1'-0"

Note:
Micropiles not shown for clarity, See 1 S5.11 S5.8 Sim.

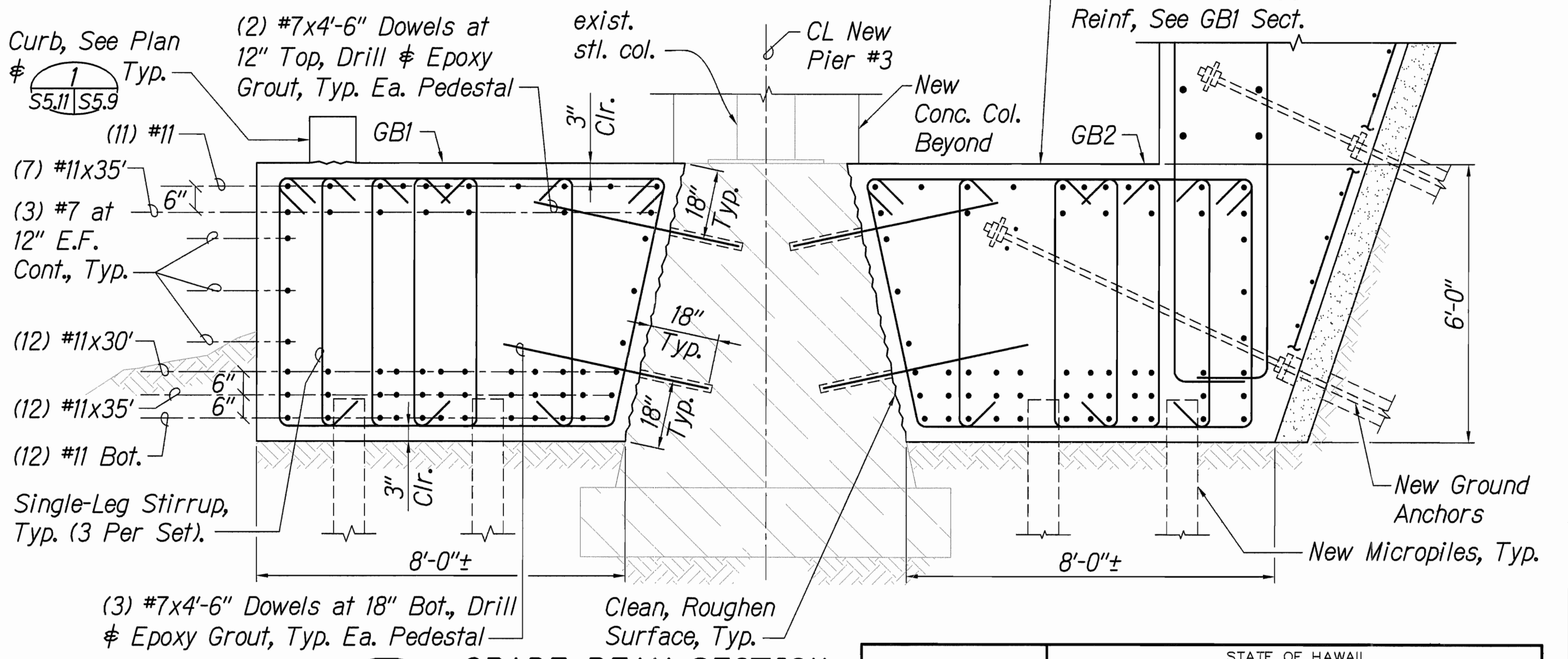


3 ELEVATION - GB 2 (LOOKING SOUTH)
S5.8 S5.11 SCALE: 1/4" = 1'-0"

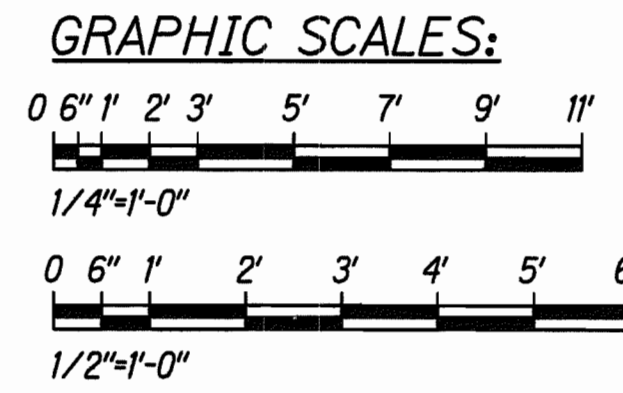
For Balance of GB1 & GB2 Reinf, See 4 S5.11 S5.11



2 GRADE BEAM SECTION
S5.9, S5.10 & S5.11 S5.11 SCALE: 1/2" = 1'-0"



4 GRADE BEAM SECTION
S5.9 & S5.11 S5.11 SCALE: 1/2" = 1'-0"



NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW PIER #3 FOUNDATION -
GRADE BEAM REINFORCING**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S5.11 OF 12 SHEETS

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

Pier #3 Foundation - Ground Anchor Notes

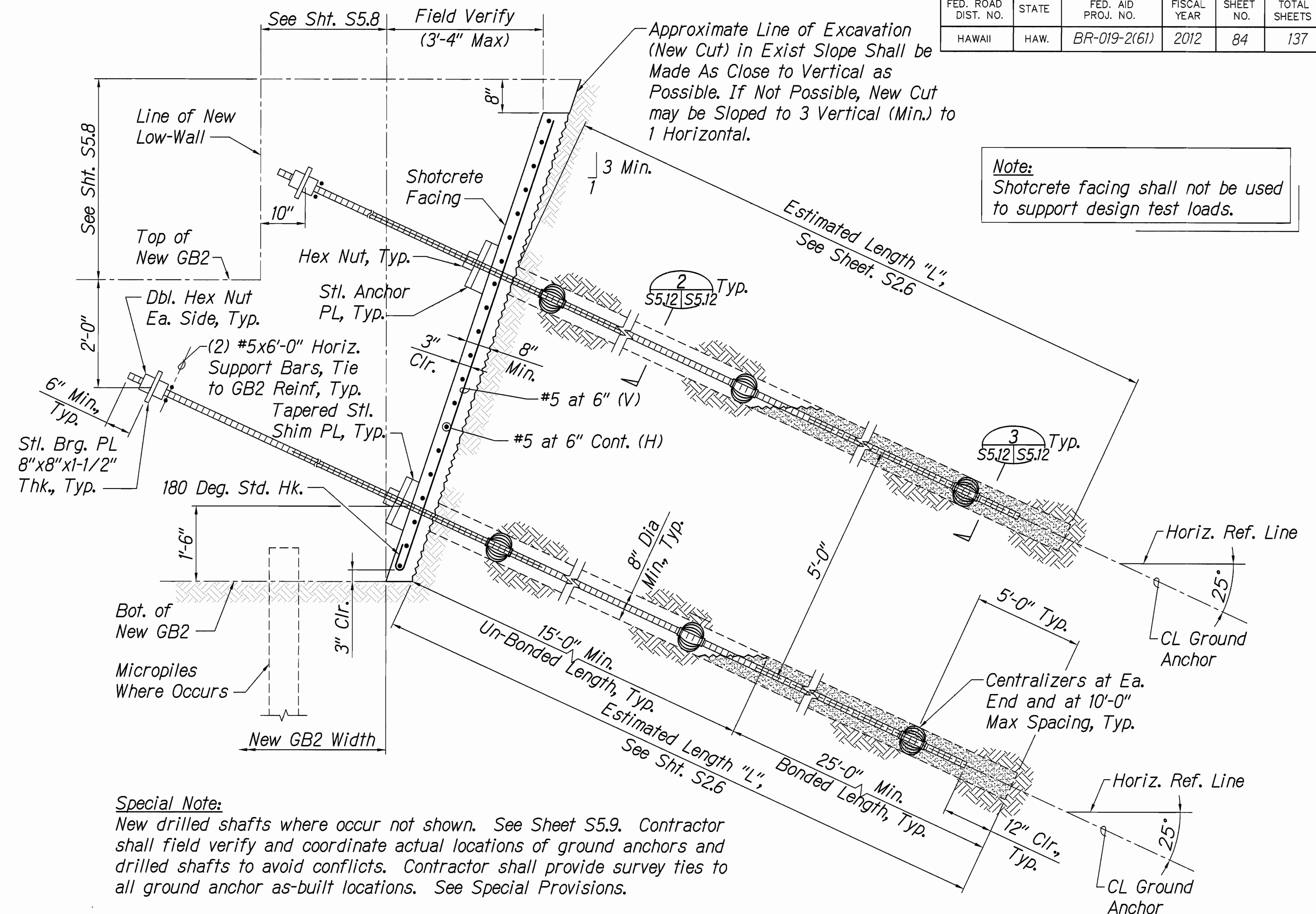
General Notes

- Foundation Design is based on a Geotechnical Investigation by Hirata and Associates, Inc., "Foundation Investigation, Umauma Stream Bridge Rehabilitation, Route 19, M.P. 16.02 North Hilo, Hawaii" dated April 28, 2011.
- Soil Design Data
 - Average soil-grout bond strength = 1,500 psf
 - Resistance Factor for Extreme Event Limit State = 0.7
 - Minimum soil-grout bonded length = 25 feet
 - Declination angle from horizontal = 25 degrees
- Ground anchors shall be uncoated high-strength steel deformed bars conforming to ASTM A-722 (AASHTO M 275), Type II, Grade 150, with minimum bar diameter as shown on drawings.
- Where possible, ground anchors shall be installed in one section (no splicing). Where not possible, ground anchors shall be mechanically spliced with couplers and lock nut capable of developing 125% of bar yield strength in tension. Submit coupler and lock nut product data for Engineer's review and approval.
- Structural steel plates shall be ASTM A36, and hot-dip zinc coated.
- Cement grout shall have $f'c = 3,000$ psi at 28 days with water-cement ratio of 0.40 or less.
- Shotcrete facing shall have $f'c = 4,000$ psi minimum at 28 days. Provide broom finish. For other requirements, refer to Standard Specs section 628 "Shotcrete".

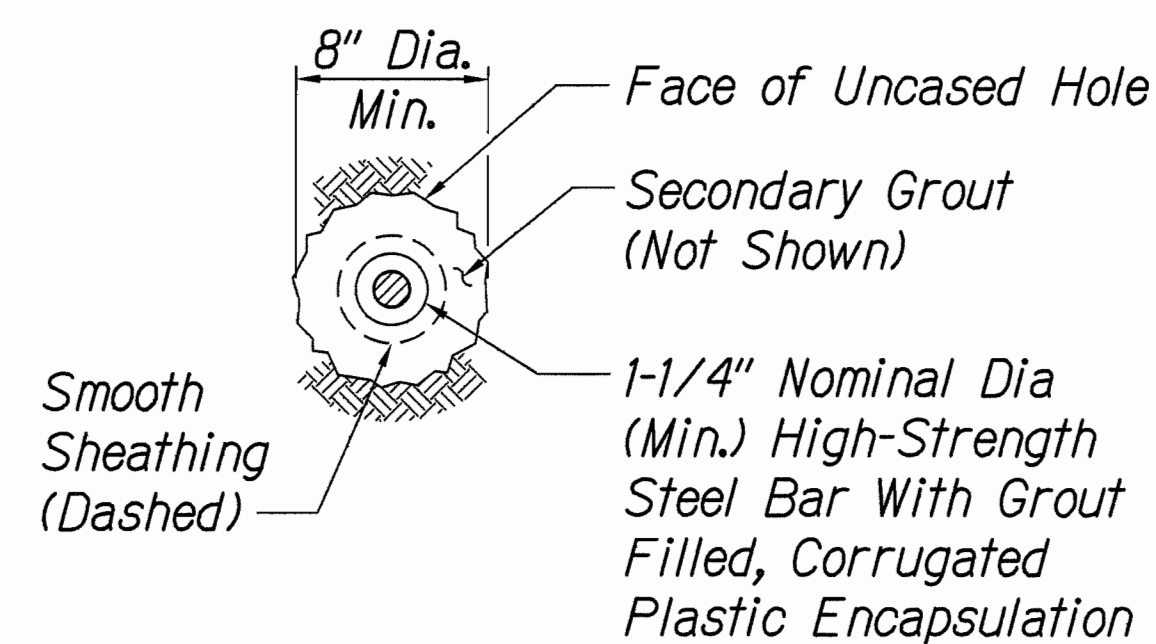
Construction Notes

- Contractor shall refer to Special Provisions Section 681 "Ground Anchors".
- One production ground anchor shall be performance tested. See Special Provisions.
- All other production ground anchors shall be proof tested. See Special Provisions.
- All testing shall be performed by a Hawaii Licensed Professional Engineer retained by Contractor. Contractor shall notify the State's Engineer at least 7 calendar days prior to commencing with any testing. Cost for all testing shall be incidental to cost of ground anchors.
- Design Test Load: For Bonded Length = 25 feet and 8" Diameter Hole

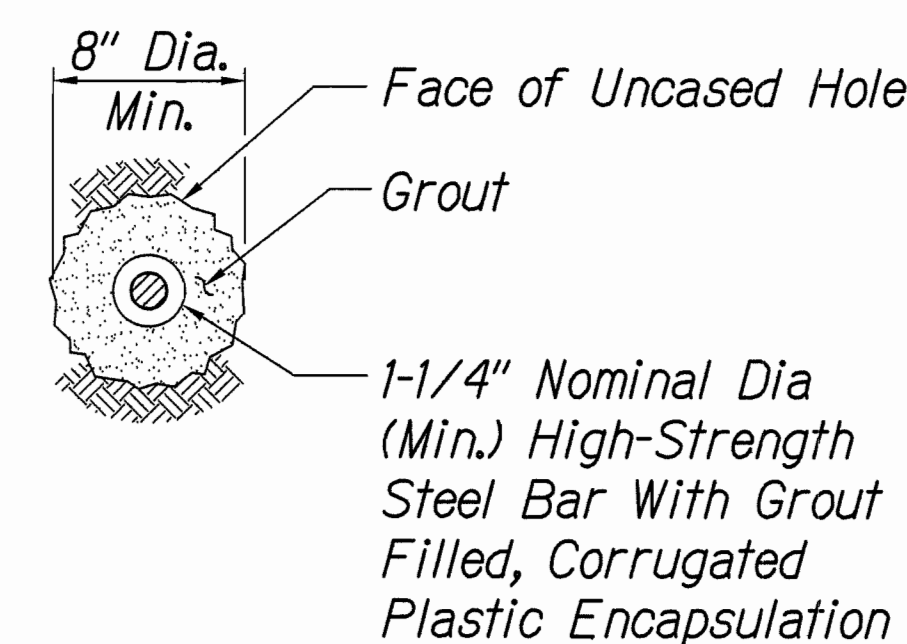
Performance test,	P = 55.0 kips Per Anchor
Proof test,	P = 55.0 kips Per Anchor
Lockoff Load	= 3.0 kips Per Anchor



DETAIL - TYPICAL GROUND ANCHOR ELEVATION
S5.8 # S5.12 S5.12 SCALE: 3/4" = 1'-0"

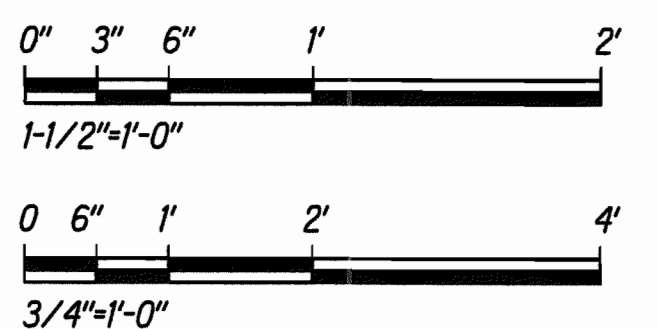


SECTION 2
S5.12 S5.12 SCALE: 1 1/2" = 1'-0"



SECTION 3
S5.12 S5.12 SCALE: 1 1/2" = 1'-0"

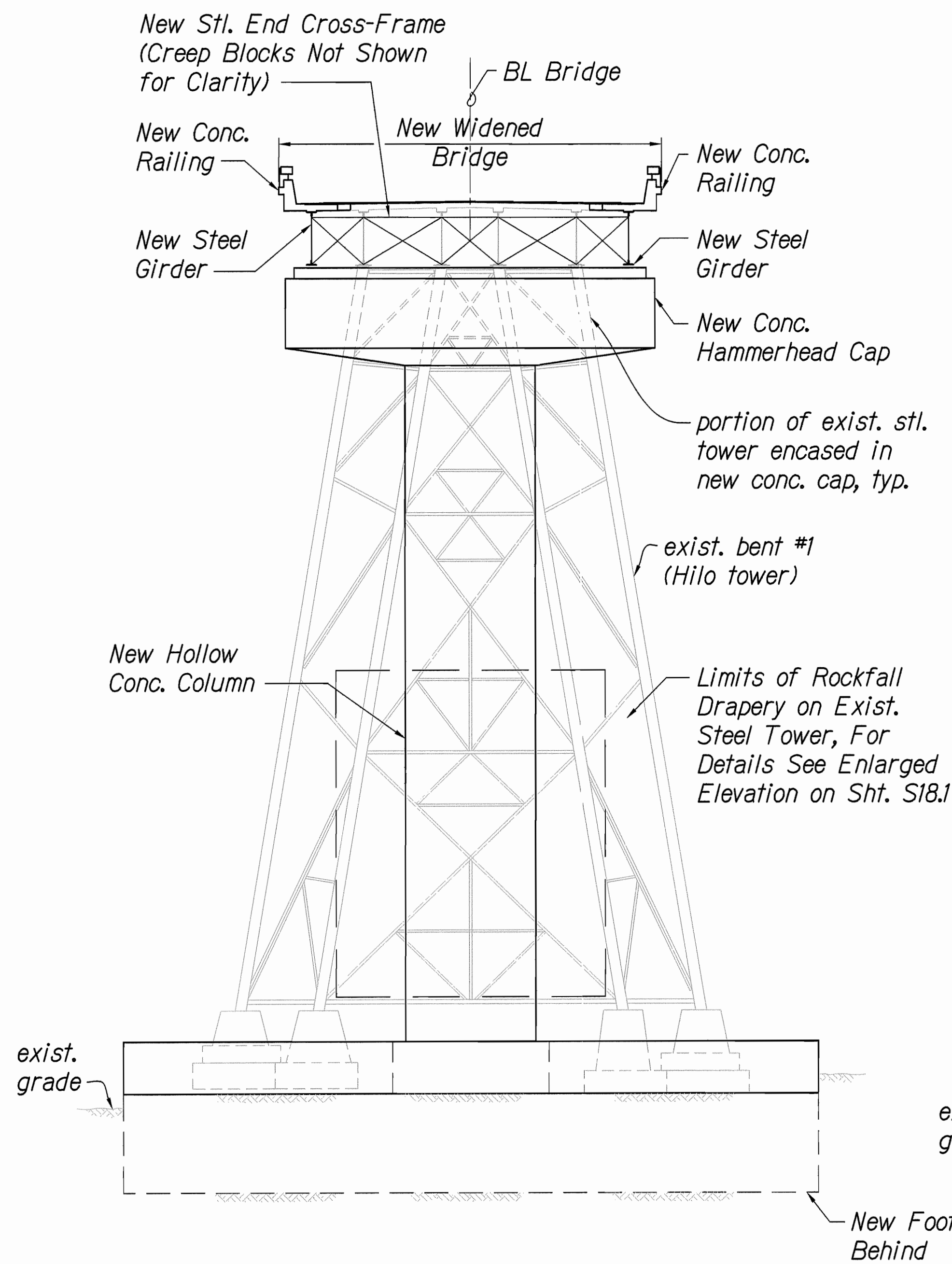
GRAPHIC SCALES:



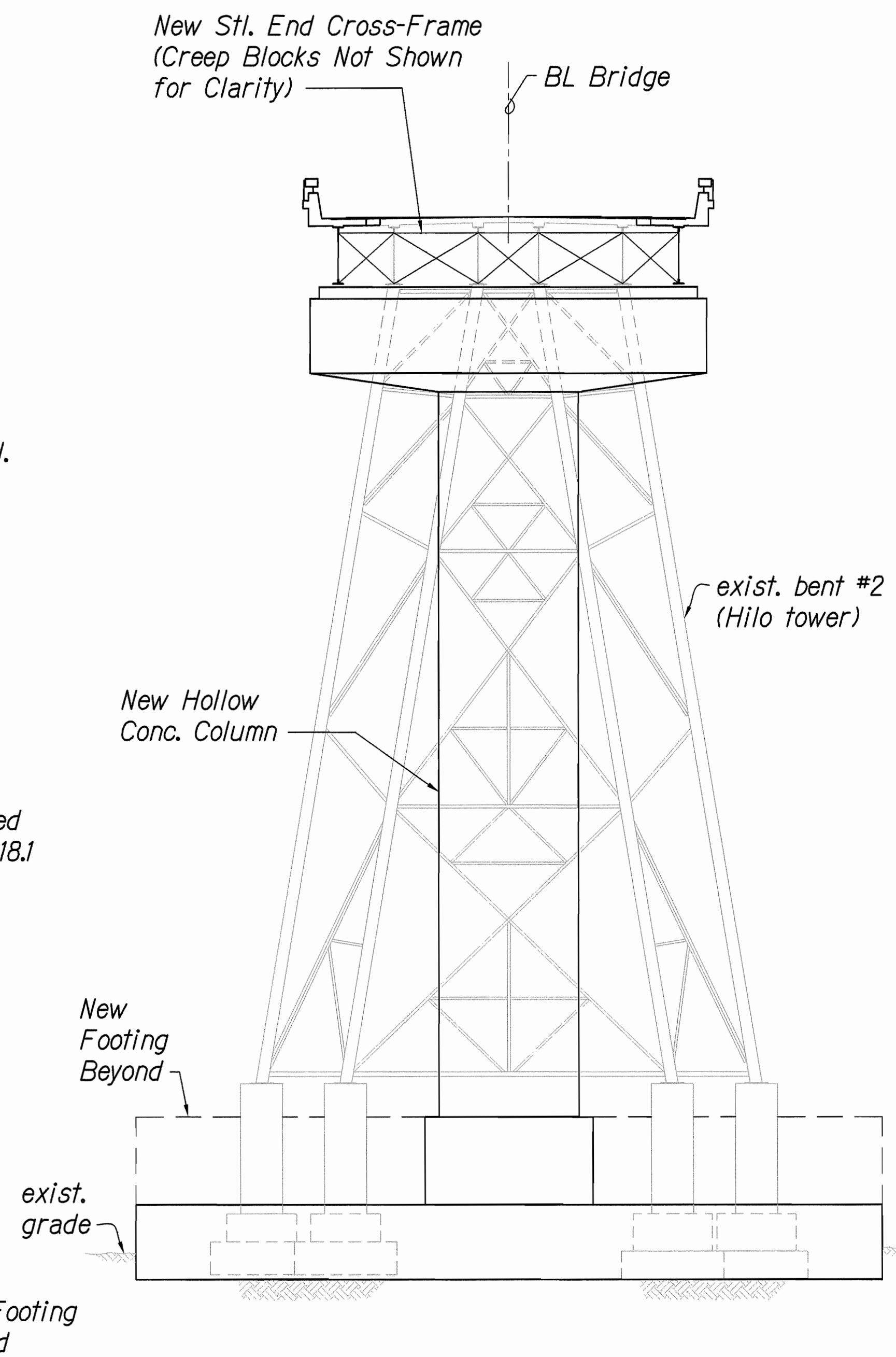
	STATE OF HAWAII	
	DEPARTMENT OF TRANSPORTATION	
	HIGHWAYS DIVISION	
	NEW PIER #3 FOUNDATION -	
	GROUND ANCHOR DETAILS	
HAWAII BELT ROAD		
Rehabilitation of Umauma Stream Bridge		
Federal Aid Project No. BR-019-2(61)		
Scale: As Shown Date: July 25, 2012		
SHEET No. S5.12 OF 12 SHEETS		

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED	
NO.	

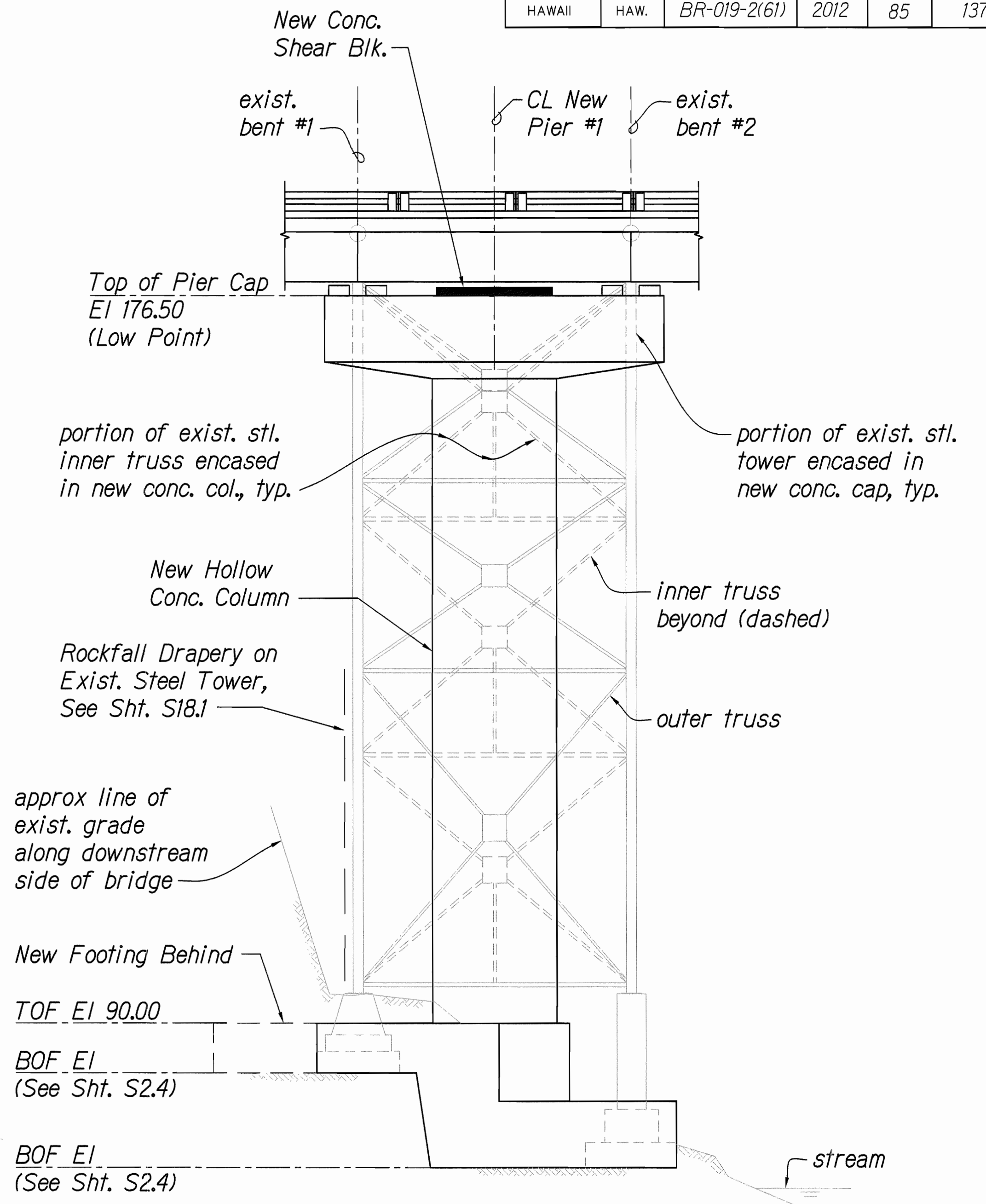
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	85	137



1 SOUTH ELEVATION
S2.1, S2.2, S5.2 # S6.1/S6.1 SCALE: 3/32" = 1'-0"



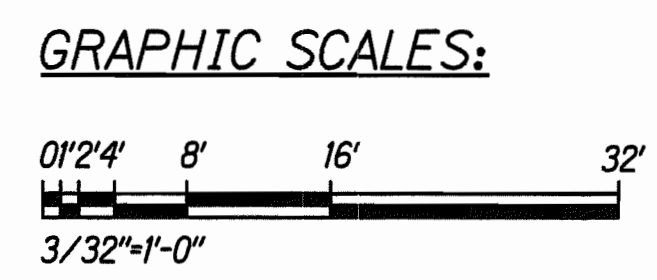
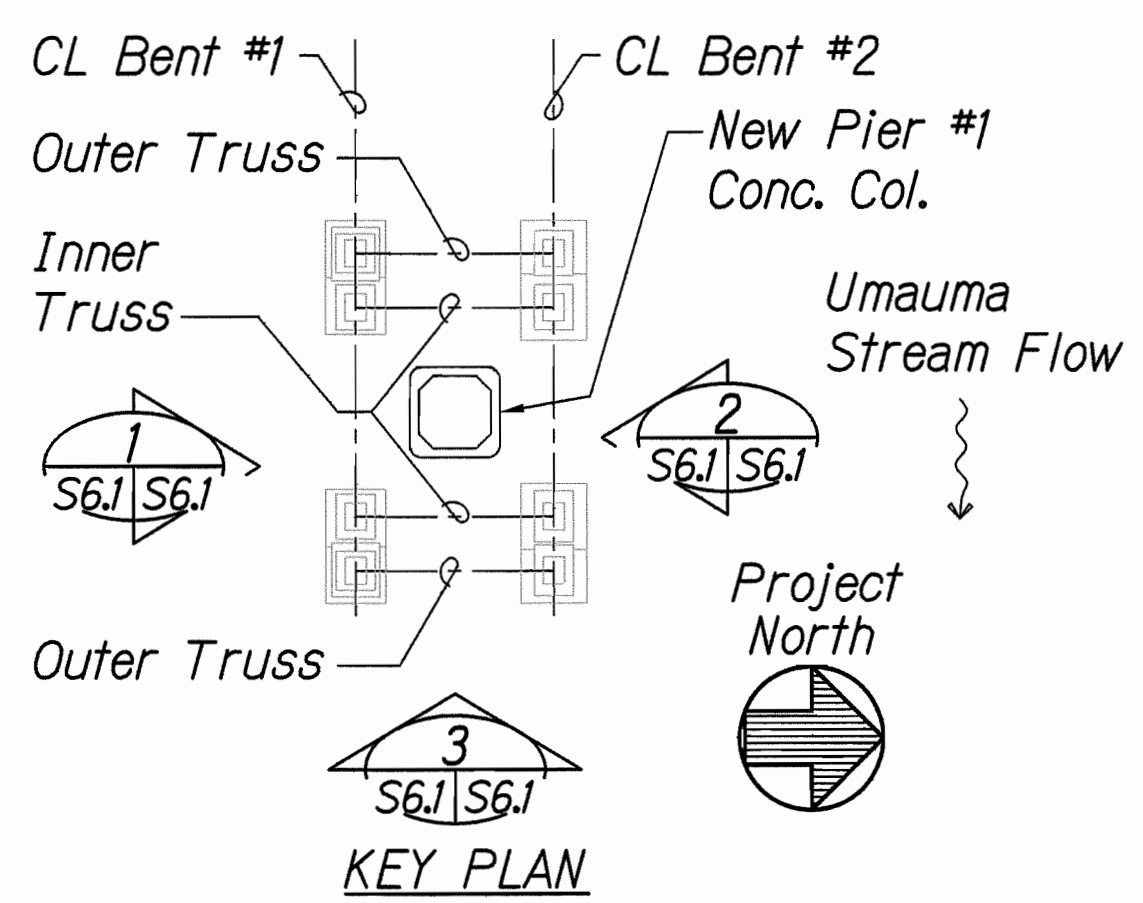
2 NORTH ELEVATION
S5.2 # S6.1/S6.1 SCALE: 3/32" = 1'-0"



3 EAST/DOWNSTREAM ELEVATION (UPSTREAM SIMILAR)
S2.4, S2.5, S5.2 # S6.1/S6.1 SCALE: 3/32" = 1'-0"

NEW PIER #1 ELEVATIONS

Note:
Portions of existing steel bent not embedded in new concrete structures shall be repaired and repainted. See sheet S17.1.



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #1 ELEVATIONS
(AT EXISTING BENT #1 & #2)

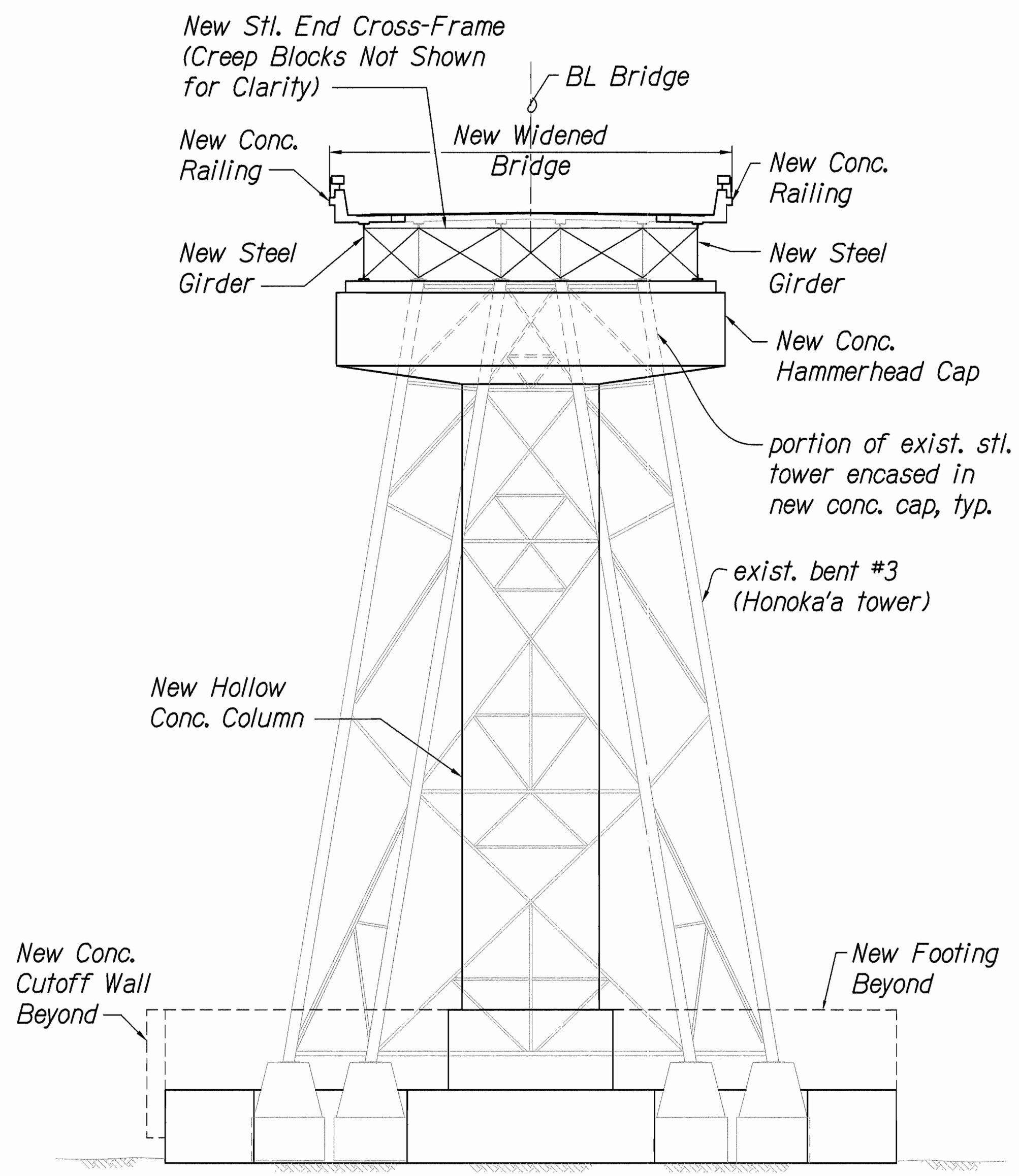
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

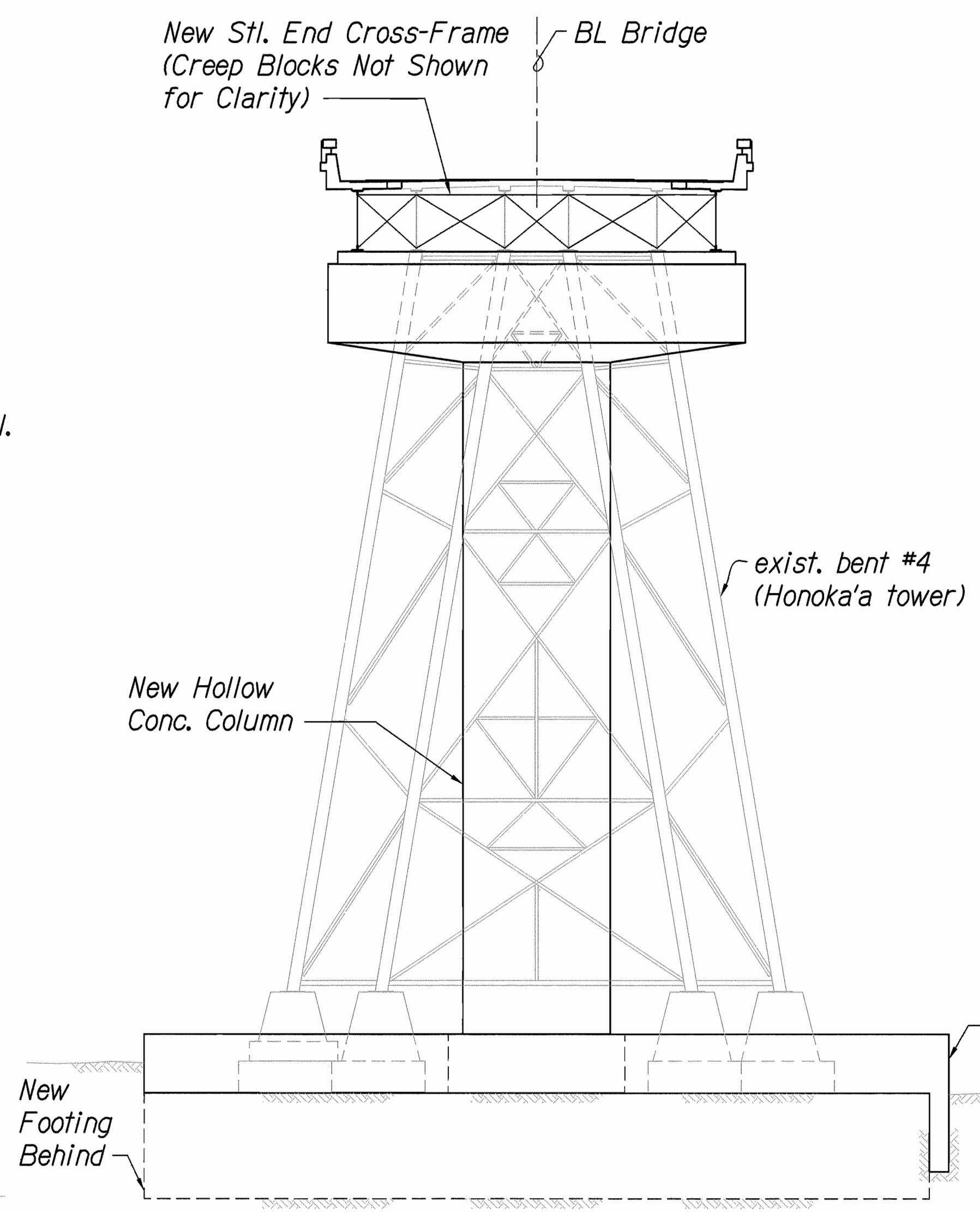
SHEET No. S6.1 OF 3 SHEETS

SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
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NO.	

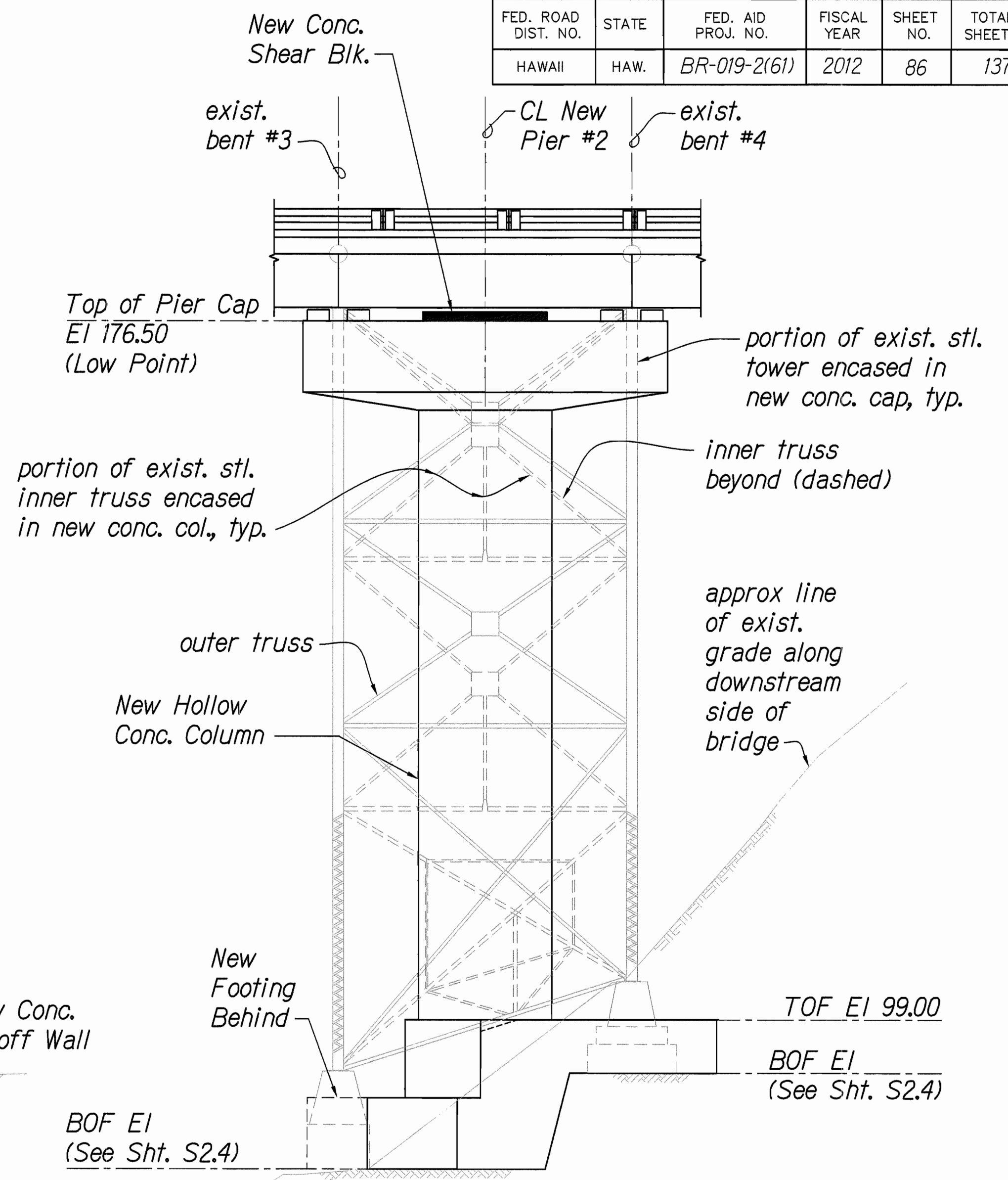
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	86	137



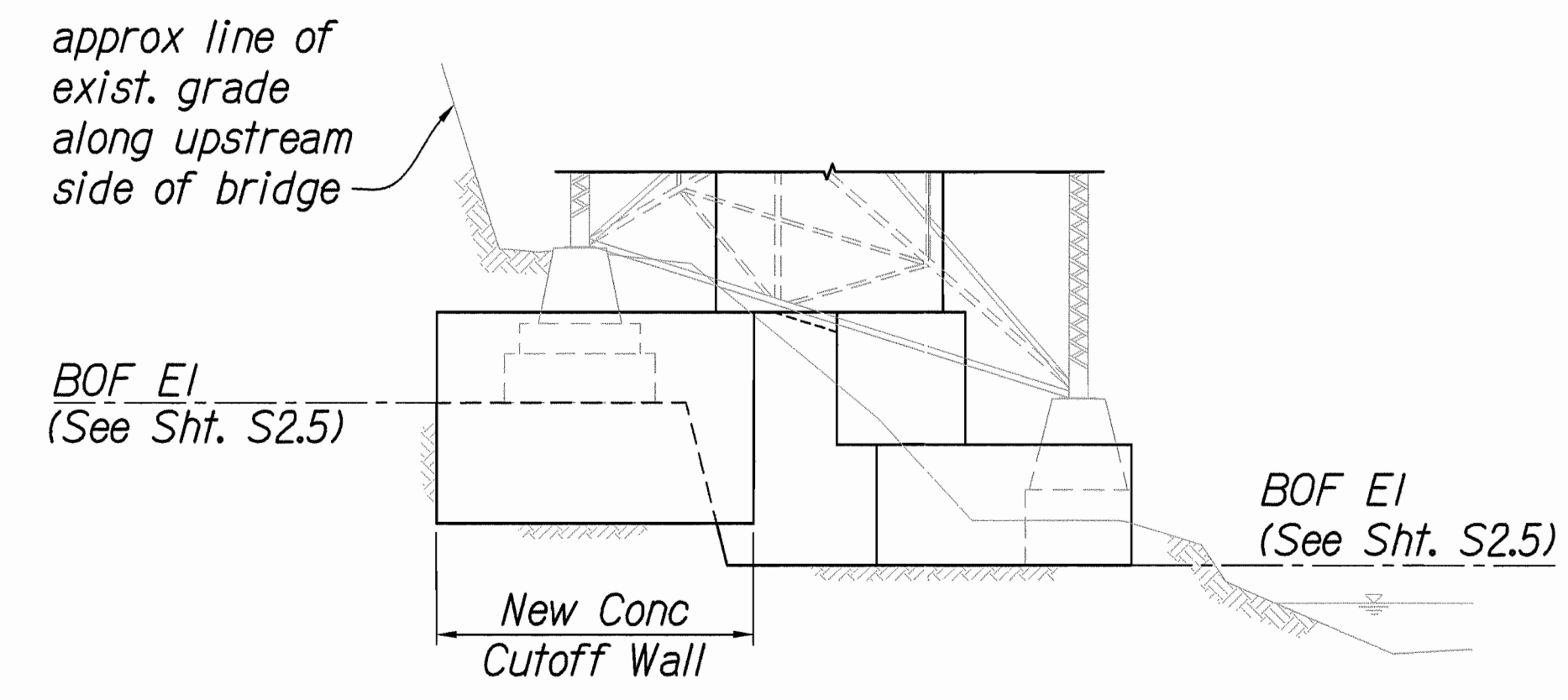
1 SOUTH ELEVATION
S2.1, S2.2, S5.5 & S6.2 | S6.2 SCALE: 3/32" = 1'-0"



2 NORTH ELEVATION
S5.5 & S6.2 | S6.2 SCALE: 3/32" = 1'-0"

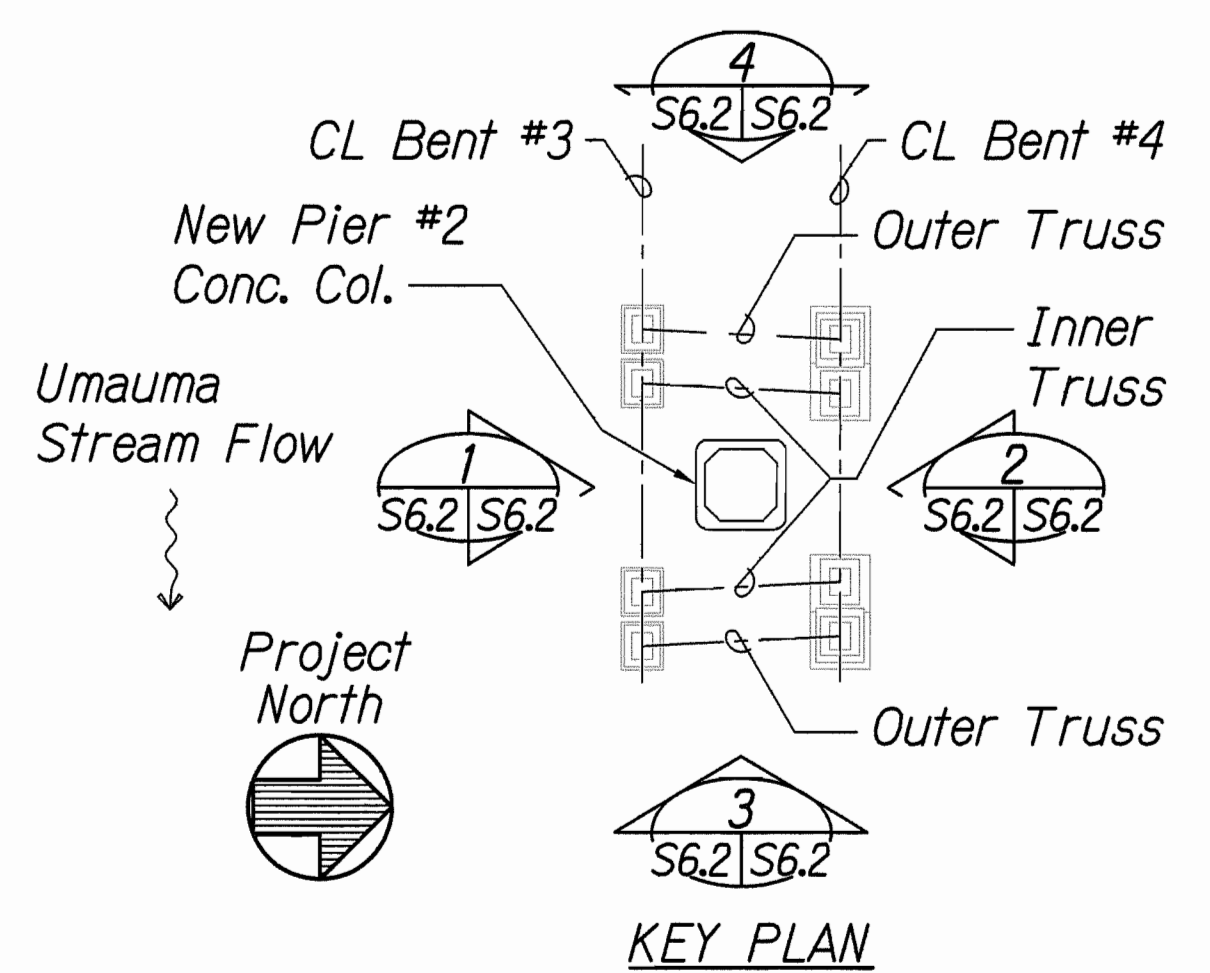


3 EAST/DOWNSTREAM ELEVATION
S2.4, S2.5, S5.5 & S6.2 | S6.2 SCALE: 3/32" = 1'-0"



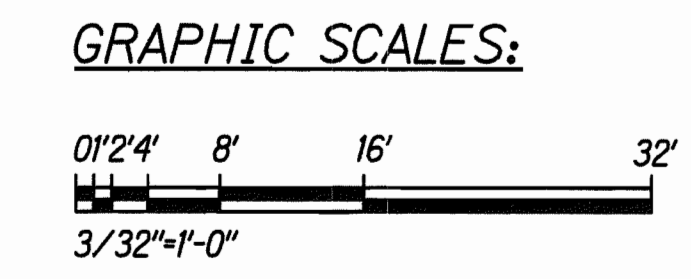
4 PARTIAL WEST/UPSTREAM ELEVATION
S5.5 & S6.2 | S6.2 SCALE: 3/32" = 1'-0"

NEW PIER #2 ELEVATIONS



KEY PLAN

Note:
Portions of existing steel bent not embedded in new concrete structures shall be repaired and repainted. See sheet S17.1.



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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #2 ELEVATIONS
(AT EXISTING BENT #3 & #4)

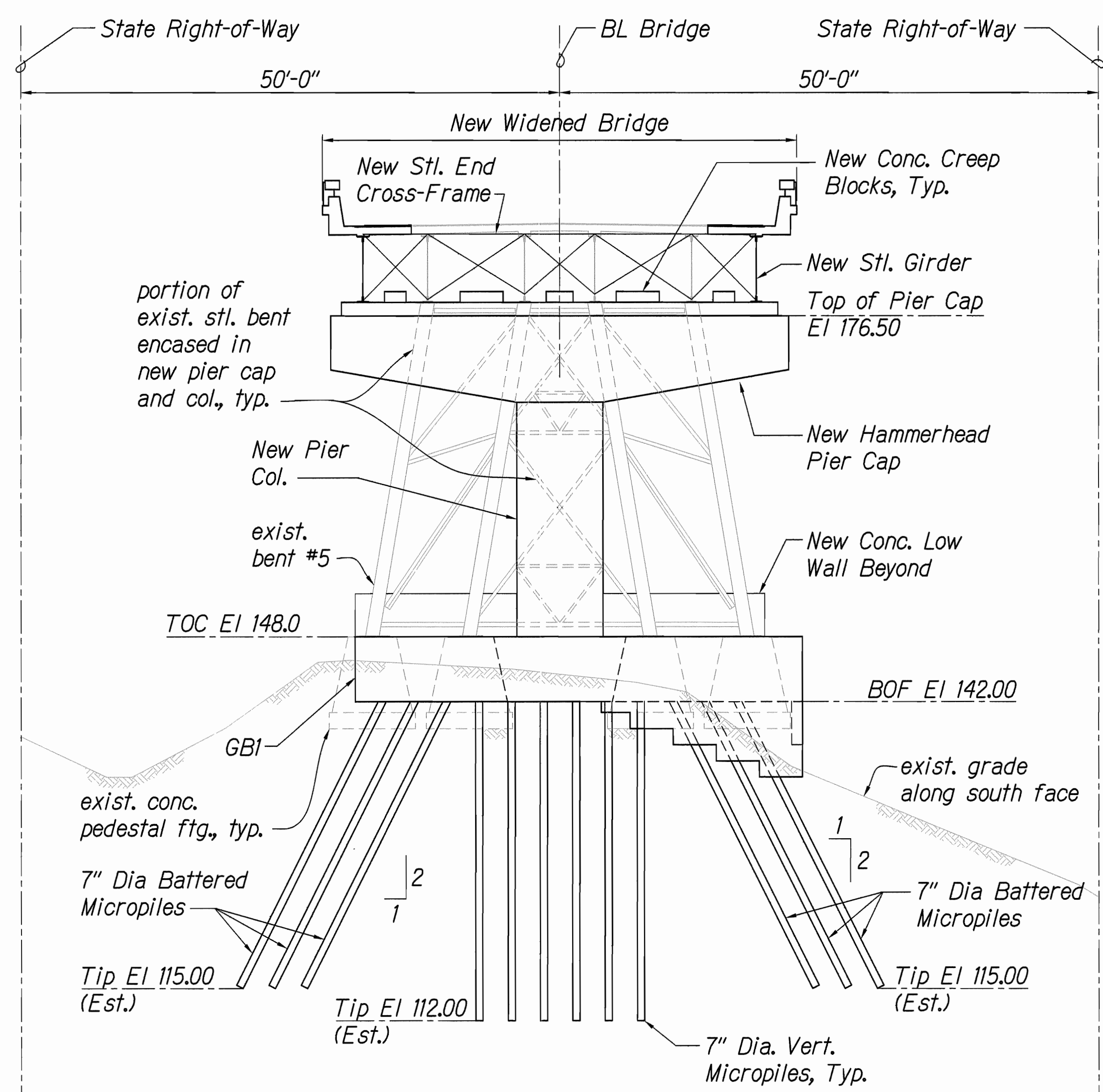
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/32" = 1'-0" Date: July 25, 2012

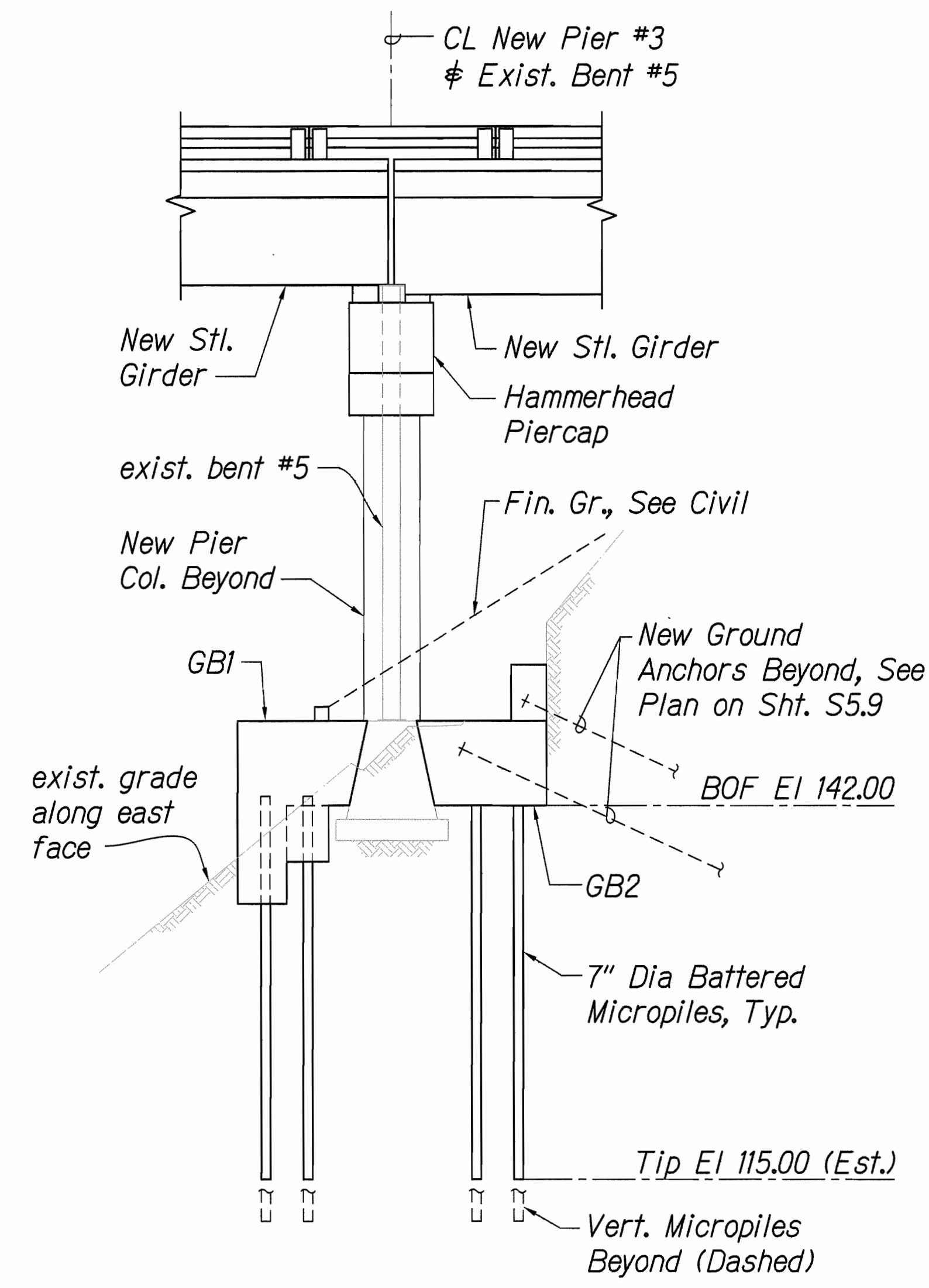
SHEET No. S6.2 OF 3 SHEETS

SURVEY PLOTTED BY	DATE
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TRACED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	

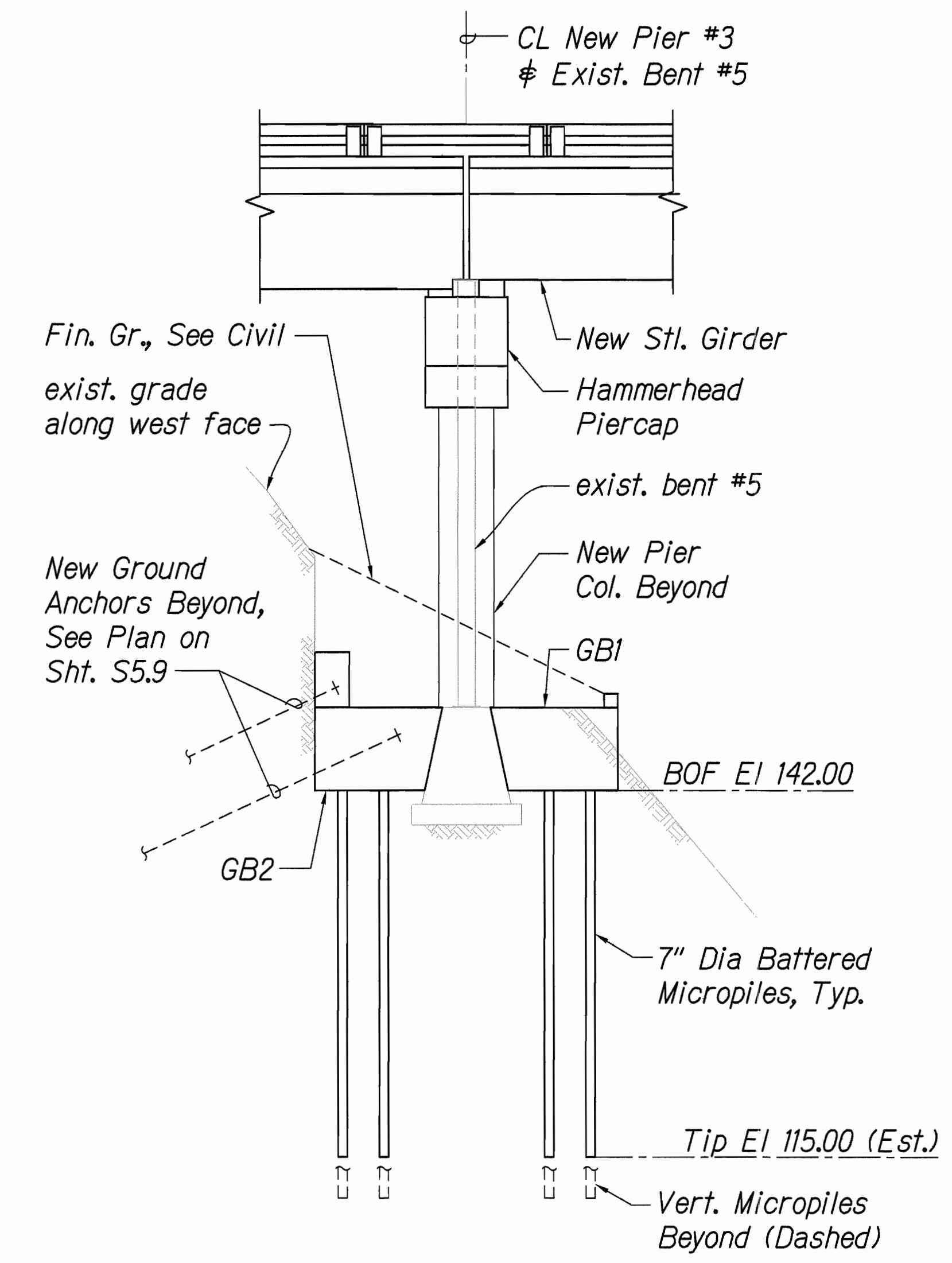
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	87	137



1 SOUTH ELEVATION
S2.1, S2.2, S5.7 & S6.3 | S6.3 SCALE: 1/8" = 1'-0"

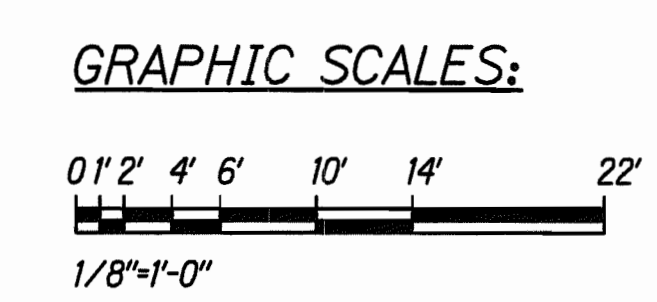
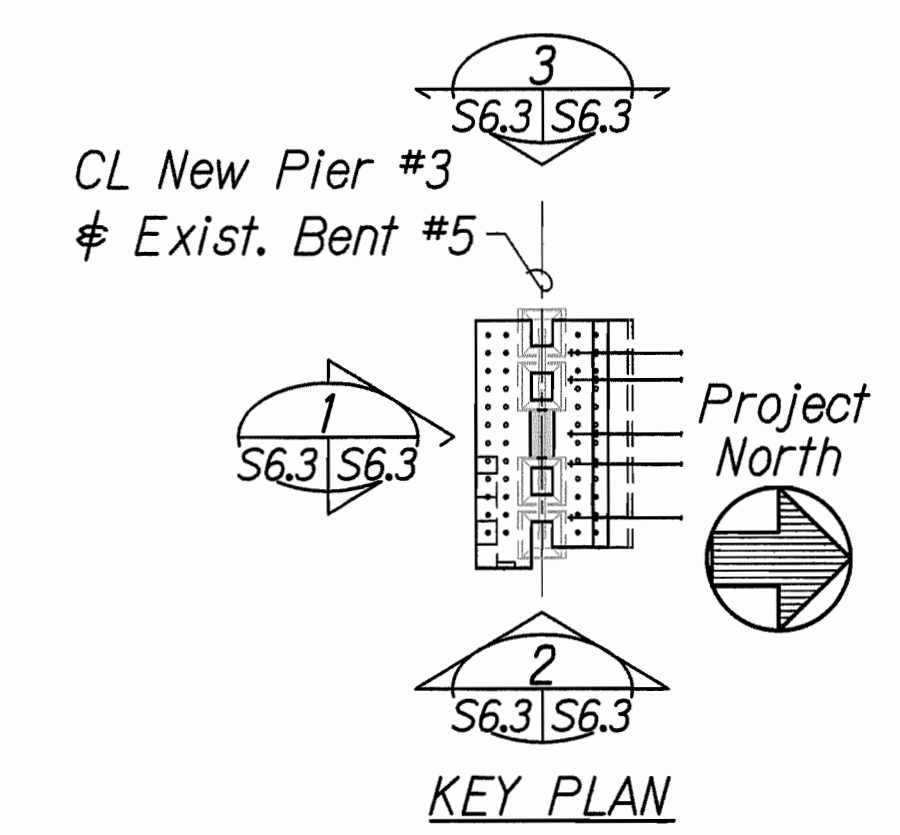


2 EAST ELEVATION
S2.4, S5.7 & S6.3 | S6.3 SCALE: 1/8" = 1'-0"



3 WEST ELEVATION
S2.5, S5.7 & S6.3 | S6.3 SCALE: 1/8" = 1'-0"

NEW PIER #3 ELEVATIONS



Note:
Portions of existing steel bent not embedded in new concrete structures shall be repaired and repainted. See sheet S17.1.

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NEW PIER #3 ELEVATIONS
(AT EXISTING BENT #5)

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

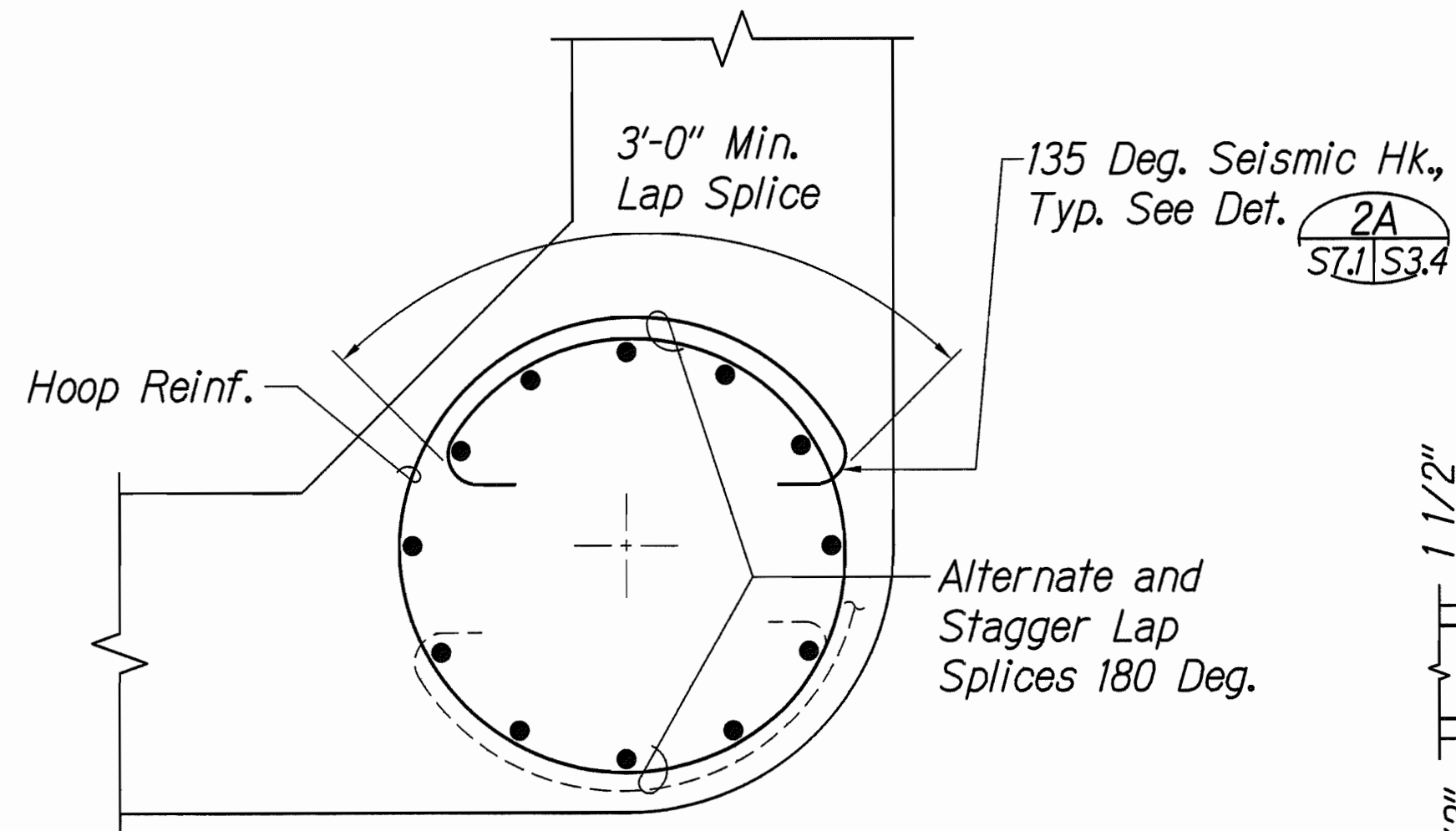
SHEET No. S6.3 OF 3 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	88	137

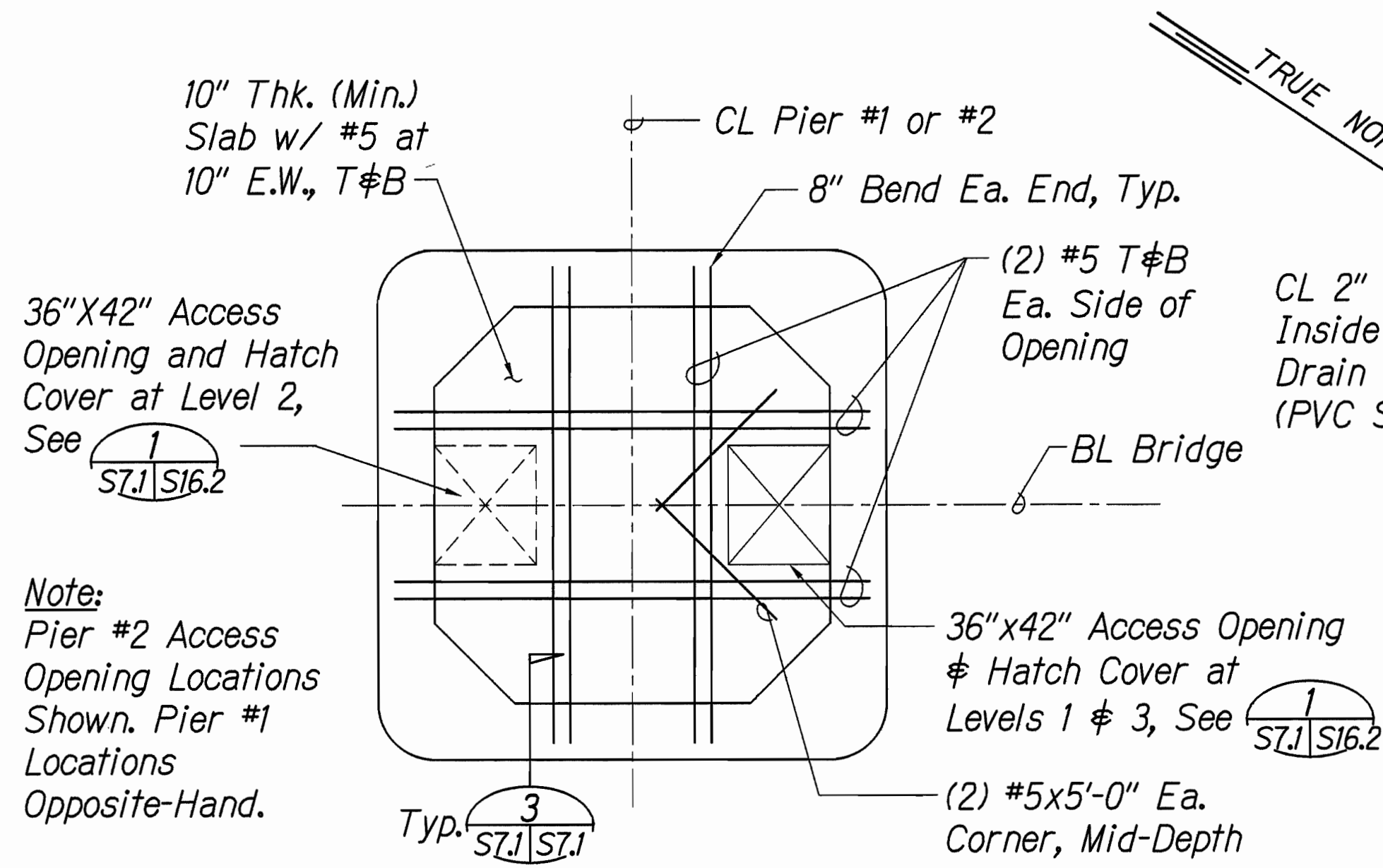
- Notes:**
- Concrete Diaphragm Slabs Shall be 6,000 PSI.
 - Concrete Diaphragm Slabs Shall be Incidental to Concrete Pier Columns and will not be Paid for Separately.

New Pier Column Notes (Typical):

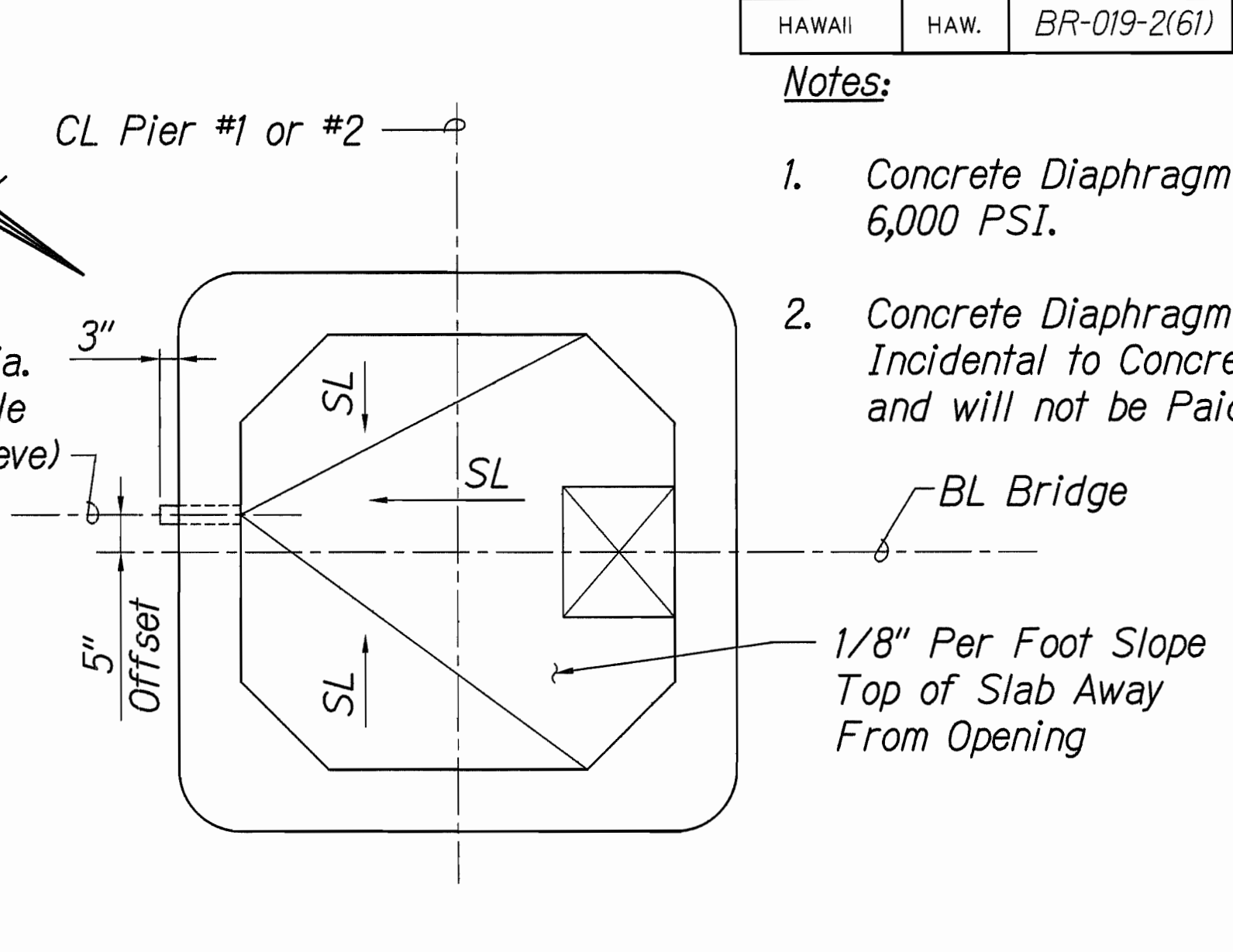
- All vertical reinforcing (#8, #9 , #10 & #11 bars) shall be ASTM A706, Grade 60.
- Lap splices shall not be permitted in vertical reinforcing. Provide welded butt splice or mechanical butt splice connections only where shown. Mechanical butt splice (coupler) shall develop minimum 125% of specified yield strength of unspliced bars.
- Welded or mechanical butt splice connection shall be staggered 24" minimum (alternate splice location of every other vertical bar).
- Lap splices shall not be permitted in horizontal reinforcing.
- Intermittent pour "holes" shall be provided in formwork to facilitate placement of concrete and to avoid segregation of concrete or displacement of rebars. See Special Provisions Section 503 - "Concrete Structures".
- Existing structural steel to be embedded in new concrete shall be blast cleaned and coated with 2 coats epoxy. See Sheet S0.3.
- Unless otherwise noted or shown, for reinforcing bar bends and hook lengths, see Sheet S0.3.



CORNER COLUMN HOOP REINFORCING DETAIL
2
 S7.3 & S7.5/S7.1 SCALE: 1" = 1'-0" (TYPICAL)

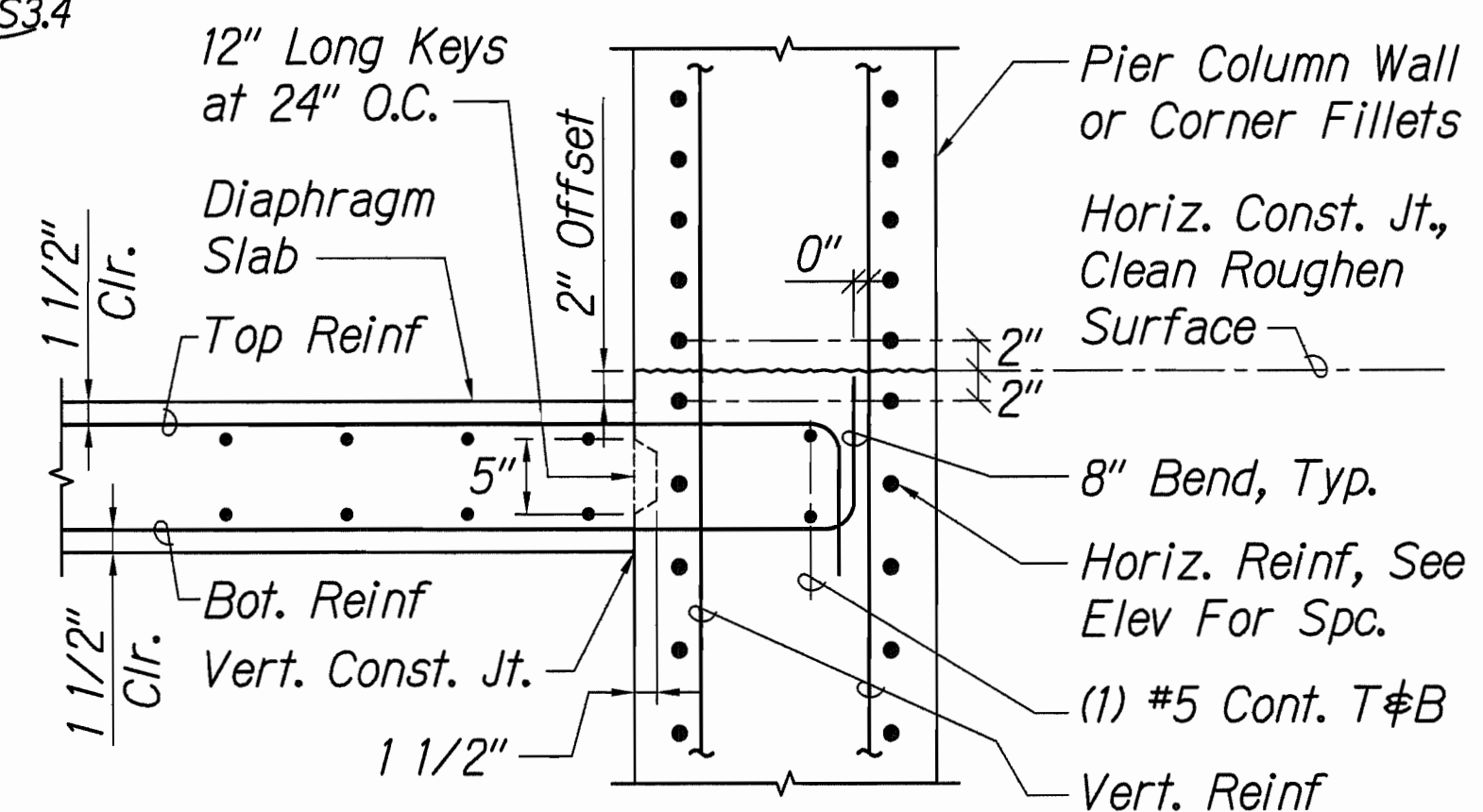


DIAPHRAGM SLAB REINFORCING

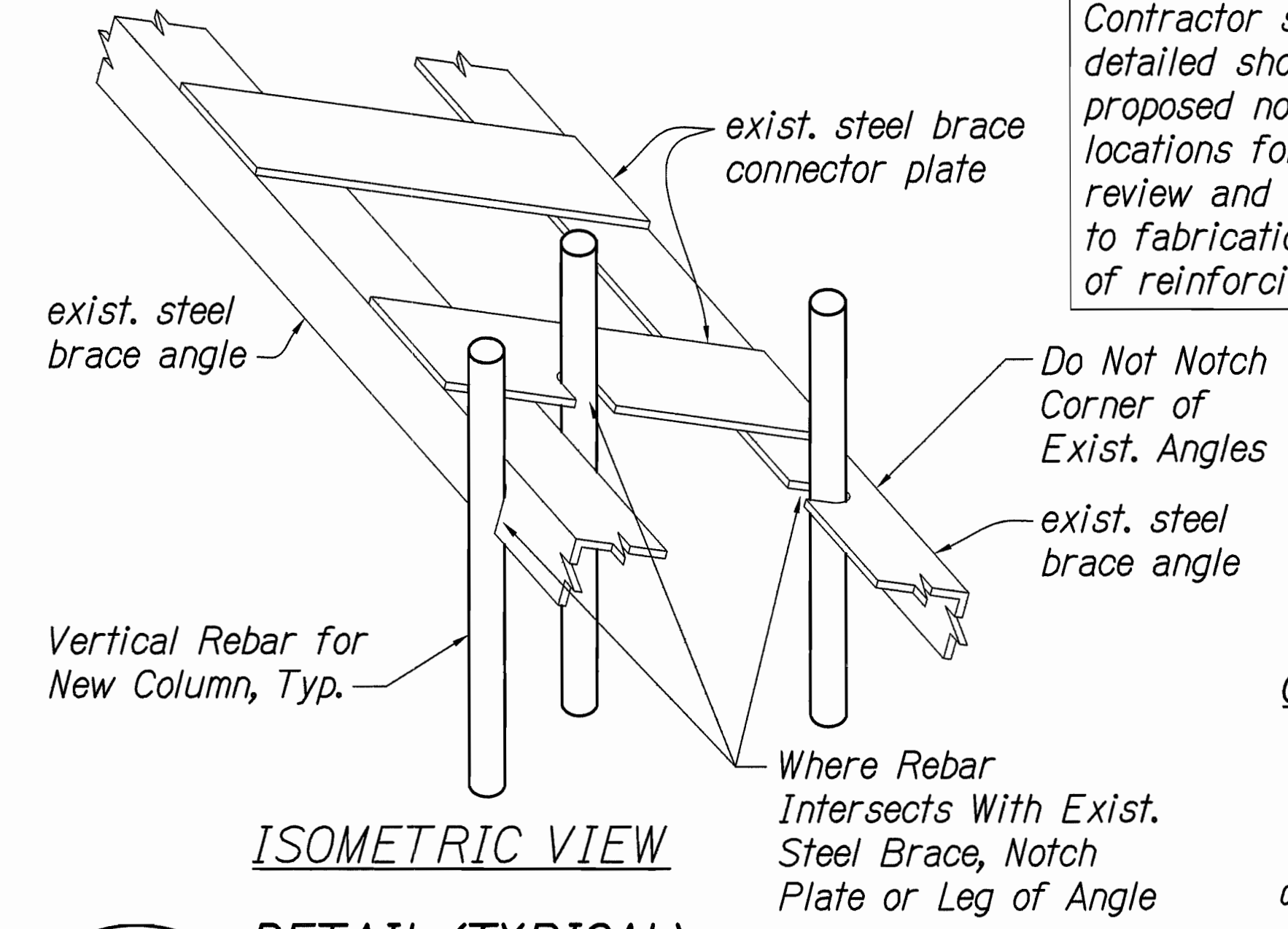


DIAPHRAGM SLAB SLOPES

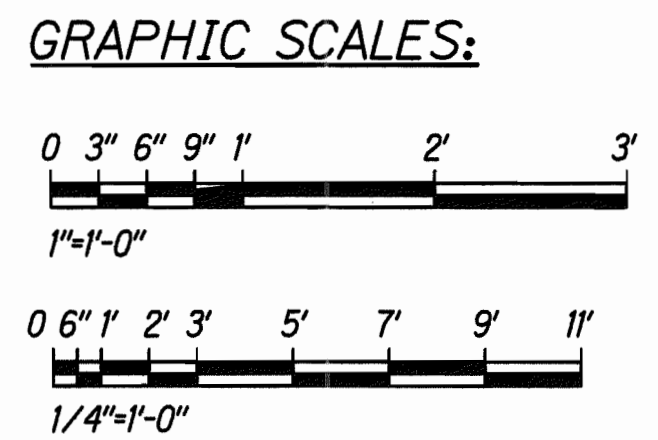
DIAPHRAGM SLAB PLANS (TYPICAL)
1
 S7.2, S7.4 & S16.2/S7.1 SCALE: 1/4"=1'-0"



SECTION
3
 S7.2 & S7.4/S7.1 SCALE: 1" = 1'-0" (TYPICAL)



ISOMETRIC VIEW
4
 S7.2 & S7.4/S7.1 NOT TO SCALE



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NEW PIER COLUMN - TYPICAL DETAILS & NOTES

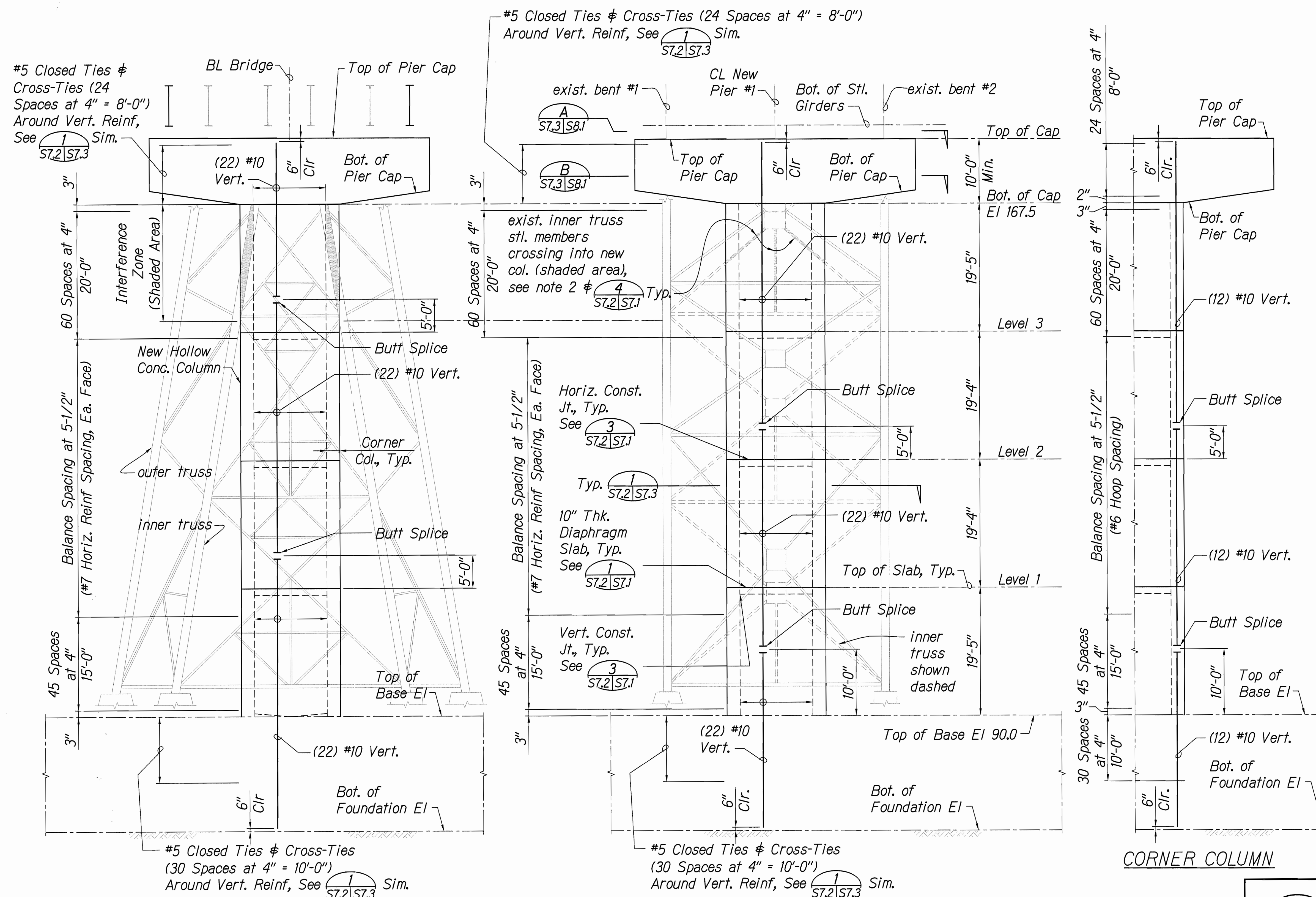
HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

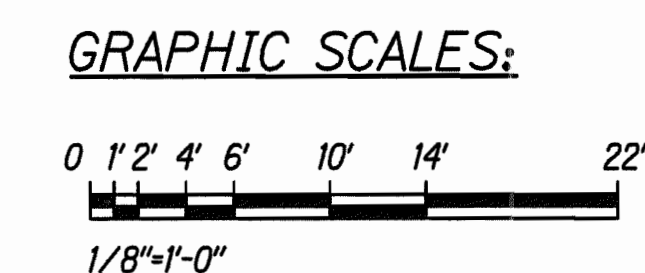
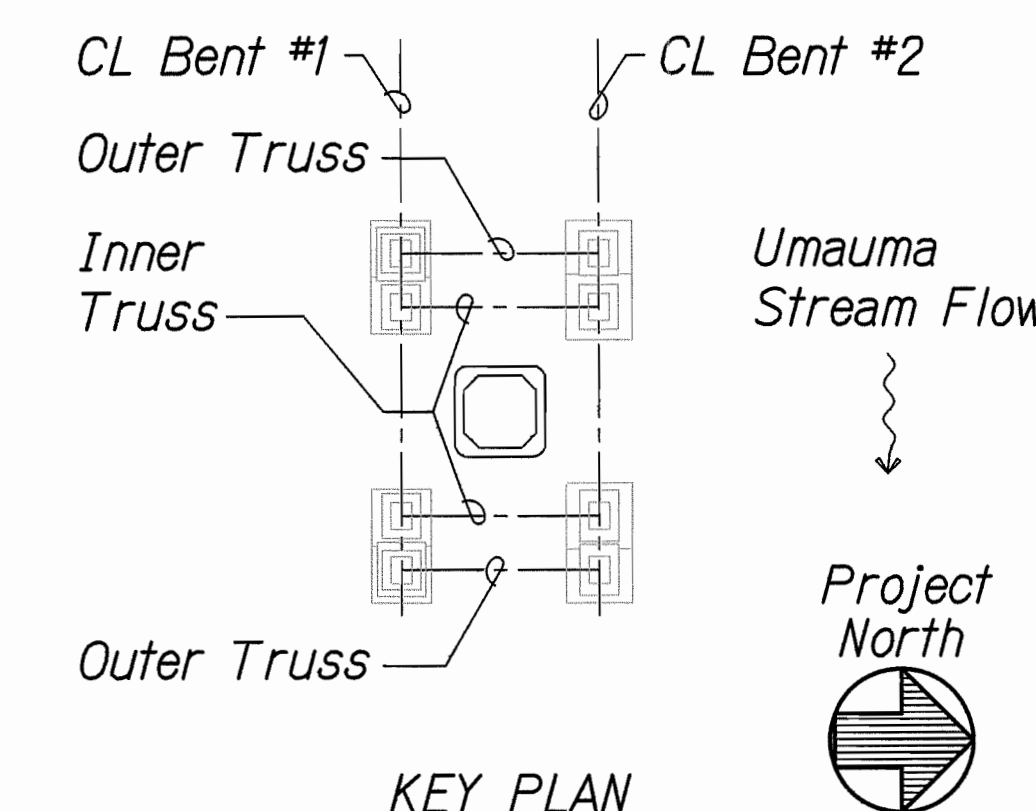
SHEET No. S7.1 OF 6 SHEETS

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	89	137



- Notes:**
1. Typical pier column notes, see sheet S7.1.
 2. Portions of existing steel members crossing into new columns shall be blast cleaned and coated with 2 coats epoxy. See sheet S0.3.



STATE OF HAWAII
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**NEW PIER #1 - COLUMN
ELEVATIONS & REINFORCING**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

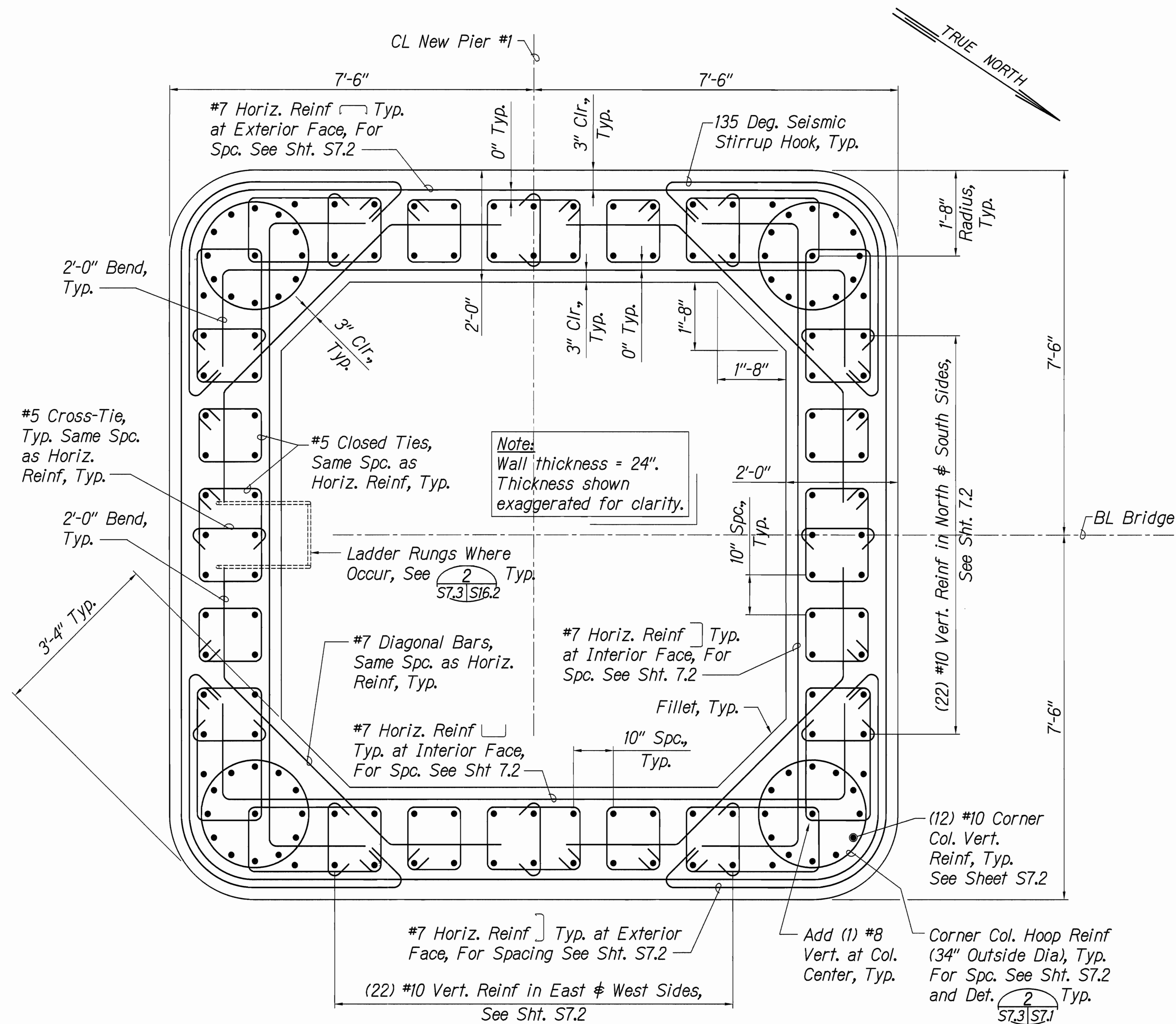
SHEET No. S7.2 OF 6 SHEETS

1
S7.2 | S7.3

ELEVATION NEW PIER #1 COLUMN REINFORCING

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	90	137



SECTION/PLAN - NEW PIER #1 COLUMN
 NOT TO SCALE

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NEW PIER #1 COLUMN - SECTION

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: None Date: July 25, 2012

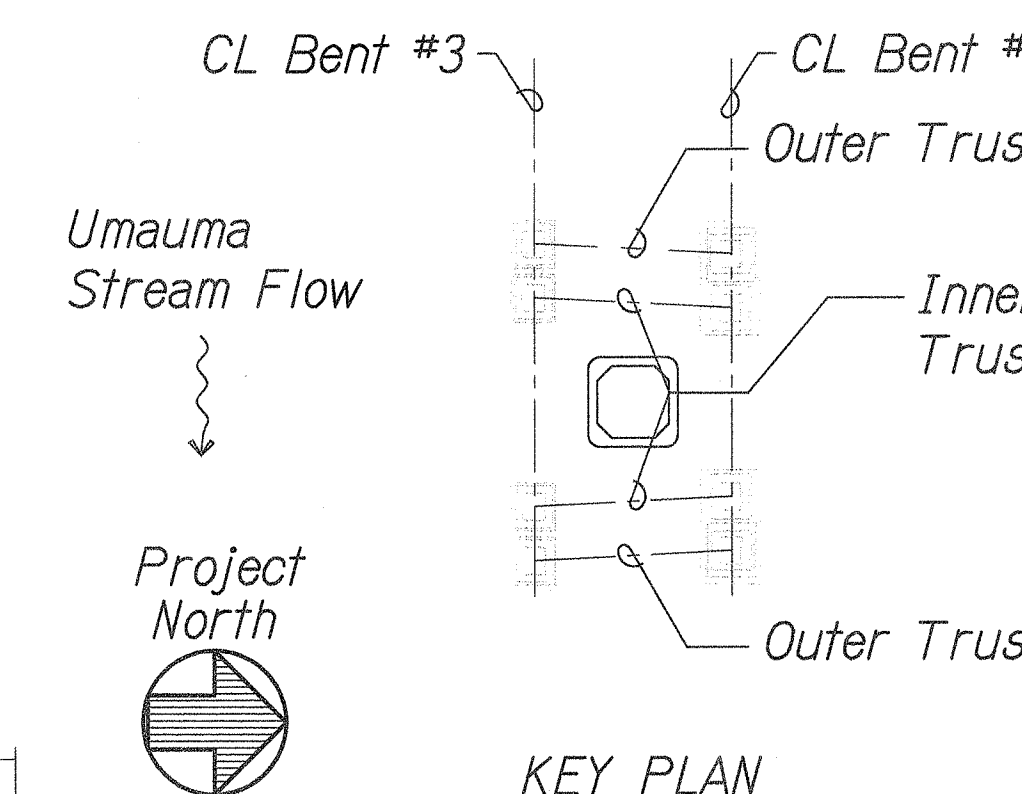
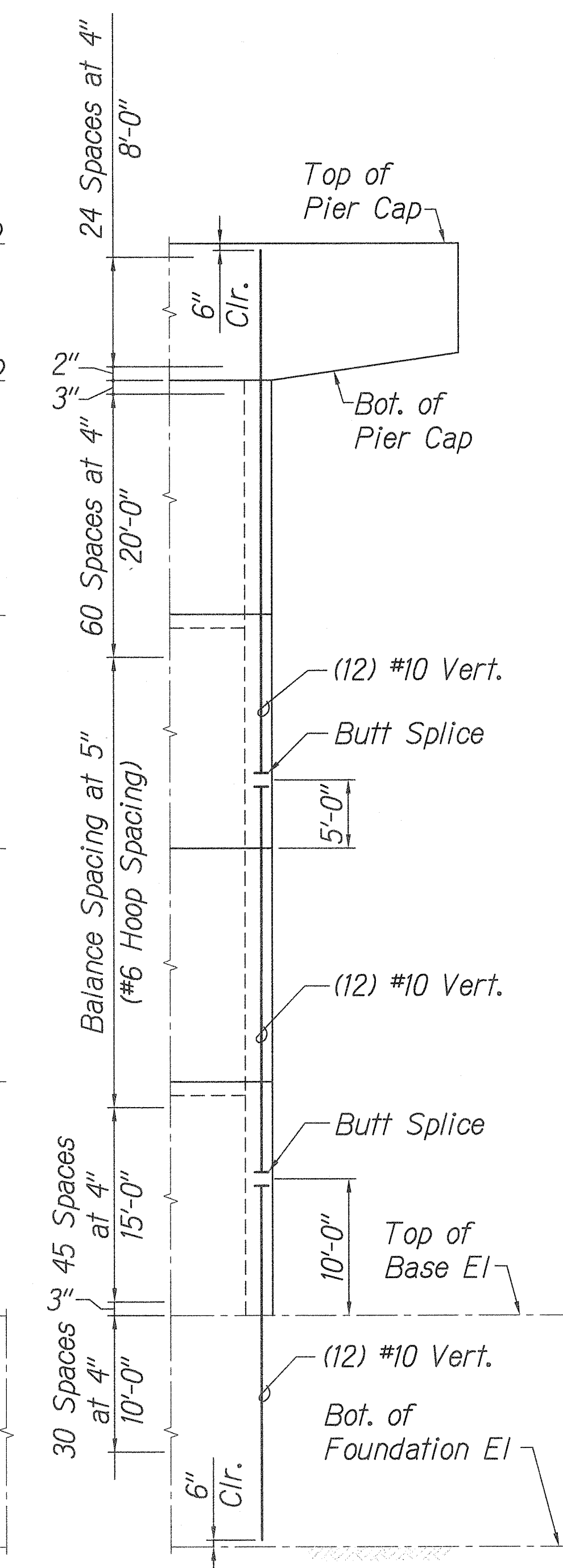
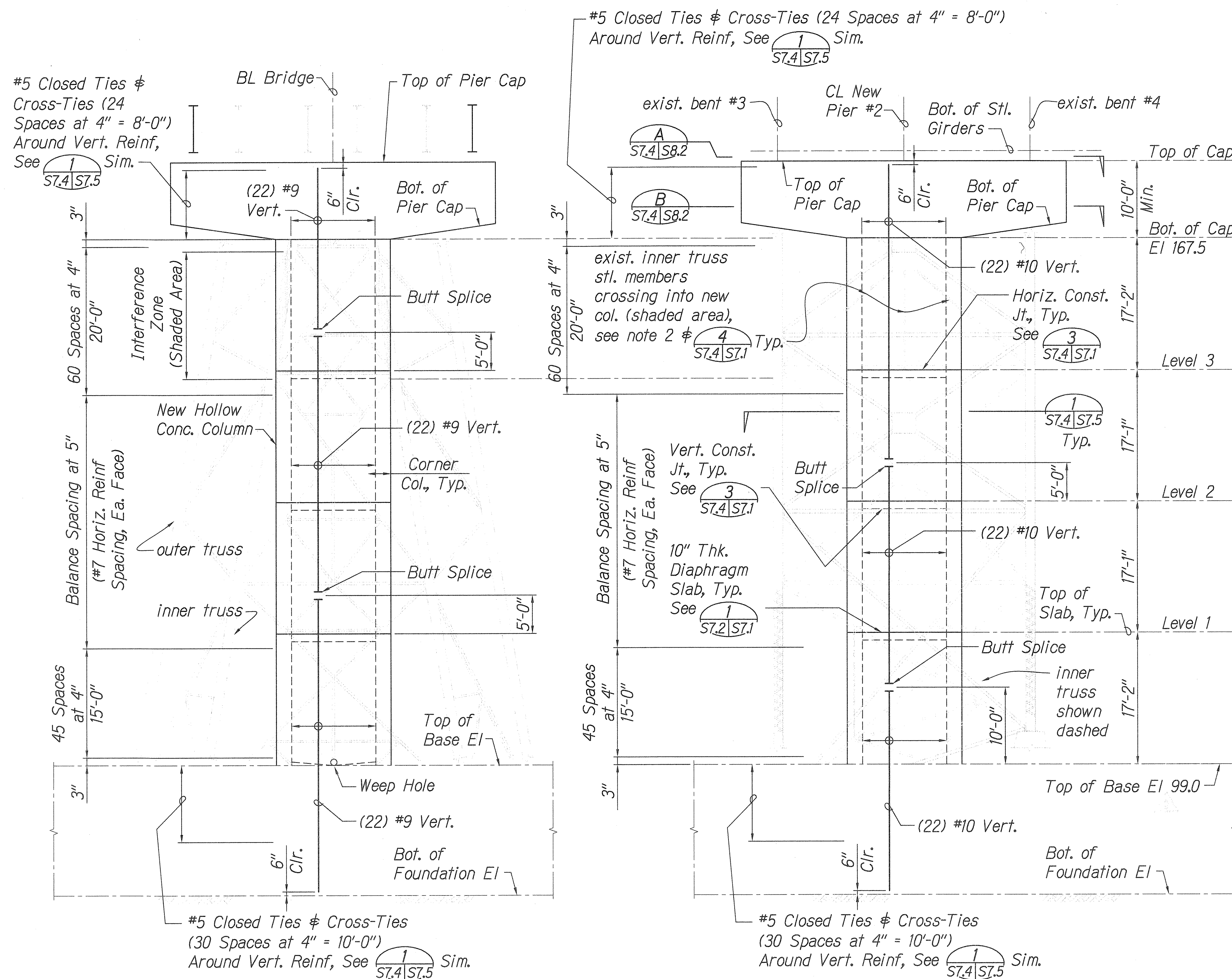
SHEET No. S7.3 OF 6 SHEETS

SURVEY PLOTTED BY	DATE
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CHECKED BY	
ORIGINAL PLAN	
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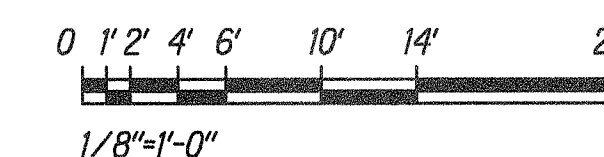
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	ADD. 91	137

Notes:

1. Typical pier column notes, see sheet S7.1.
2. Portions of existing steel members crossing into new columns shall be blast cleaned and coated with 2 coats epoxy. See sheet S0.3.



GRAPHIC SCALES:



NORTH AND SOUTH ELEVATION

EAST AND WEST ELEVATION

1 ELEVATION NEW PIER #2 COLUMN REINFORCING
SCALE: 1/8" = 1'-0"

CORNER COLUMN

DATE	REVISION
10/22/12	EAST AND WEST ELEVATION: "Top of Base El 99.0"

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**NEW PIER #2 - COLUMN
ELEVATIONS & REINFORCING**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

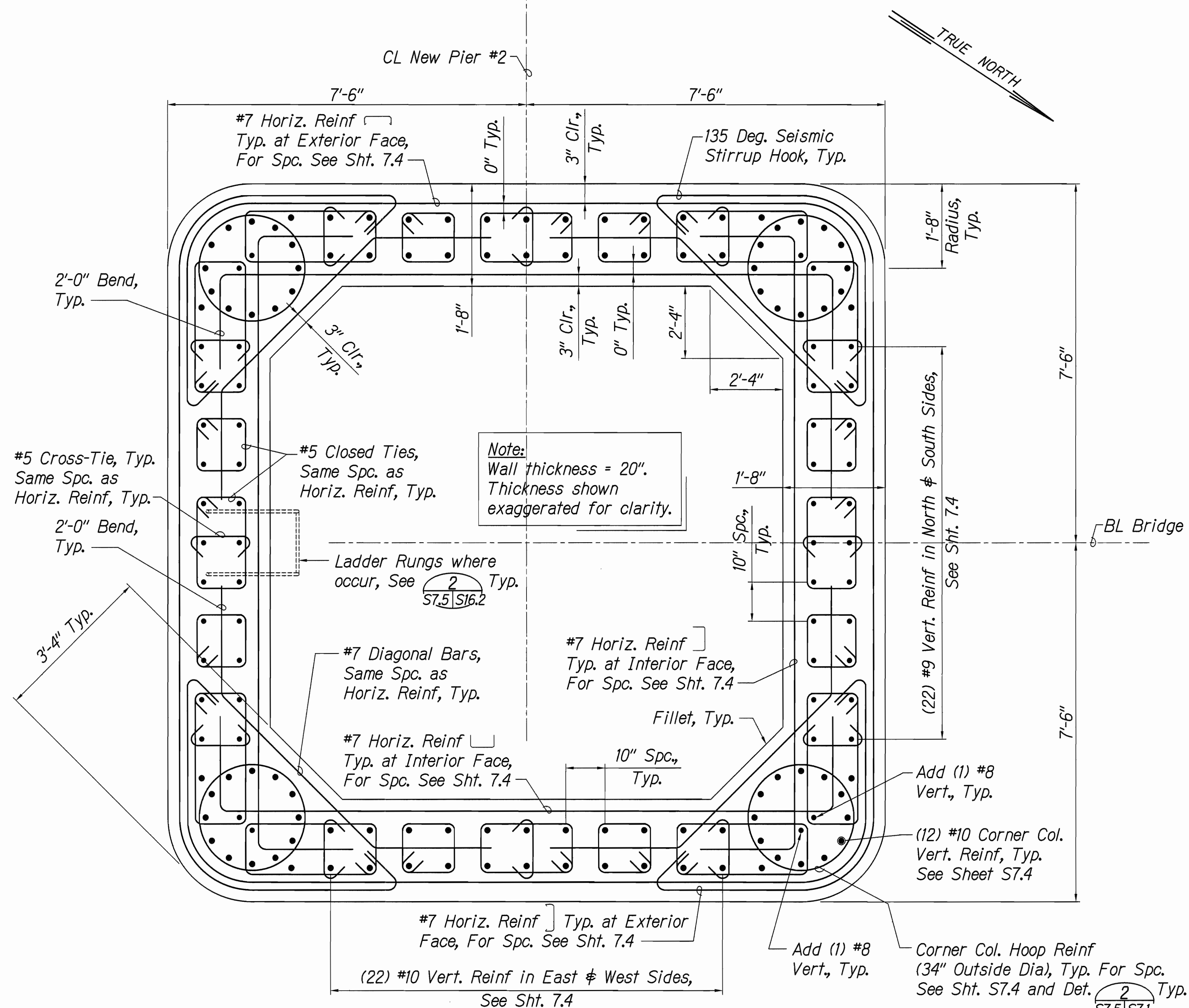
Scale: 1/8" = 1'-0" Date: July 25, 2012

SHEET No. S7.4 OF 6 SHEETS

ADD. 91

SURVEY PLOTTED BY	DATE
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NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	92	137



1 SECTION/PLAN - NEW PIER #2 COLUMN
 NOT TO SCALE

SURVEY PLOTTED BY	DATE
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TRACED BY	
NOTED BY	
CHECKED BY	
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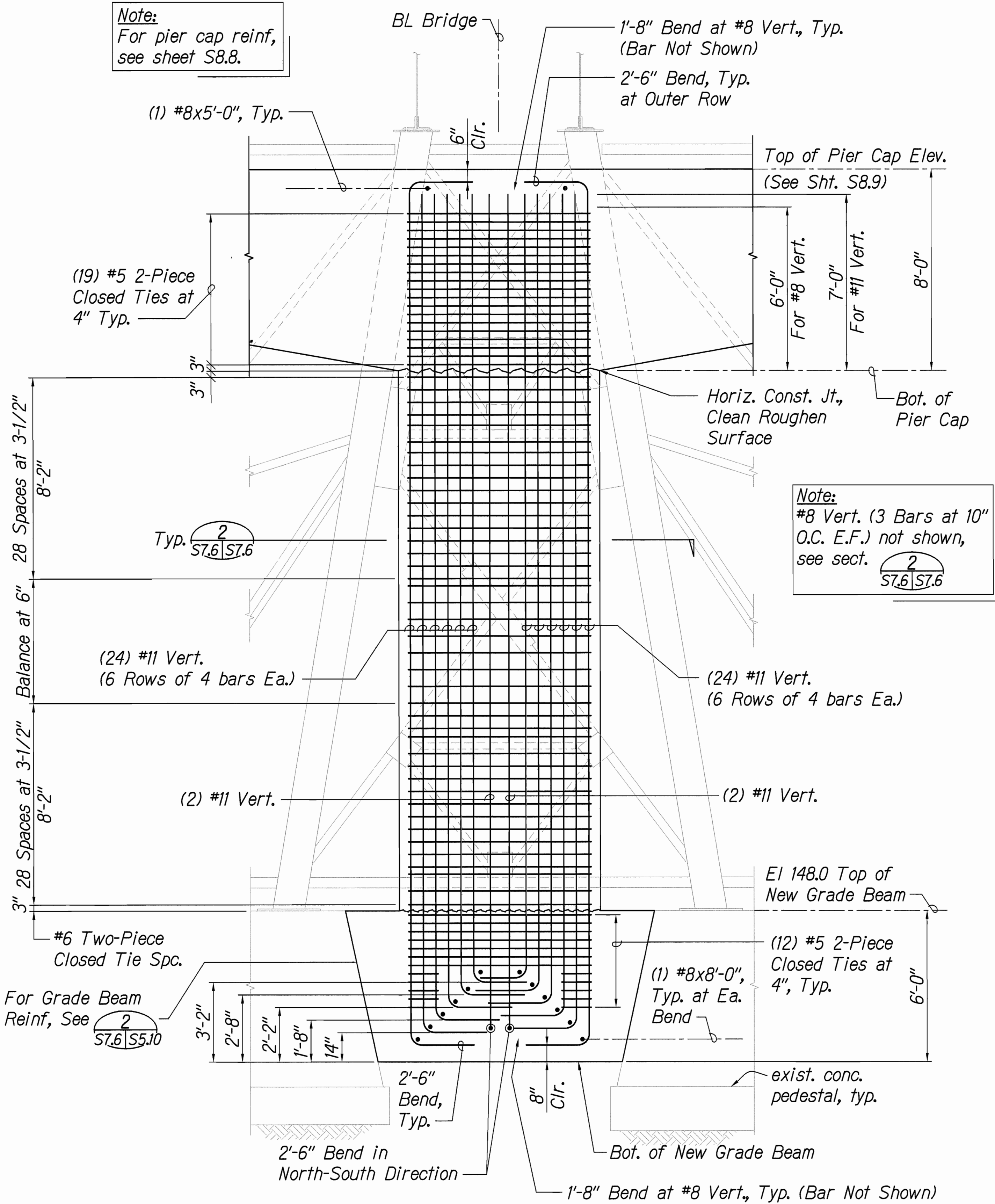
NEW PIER #2 COLUMN - SECTION

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

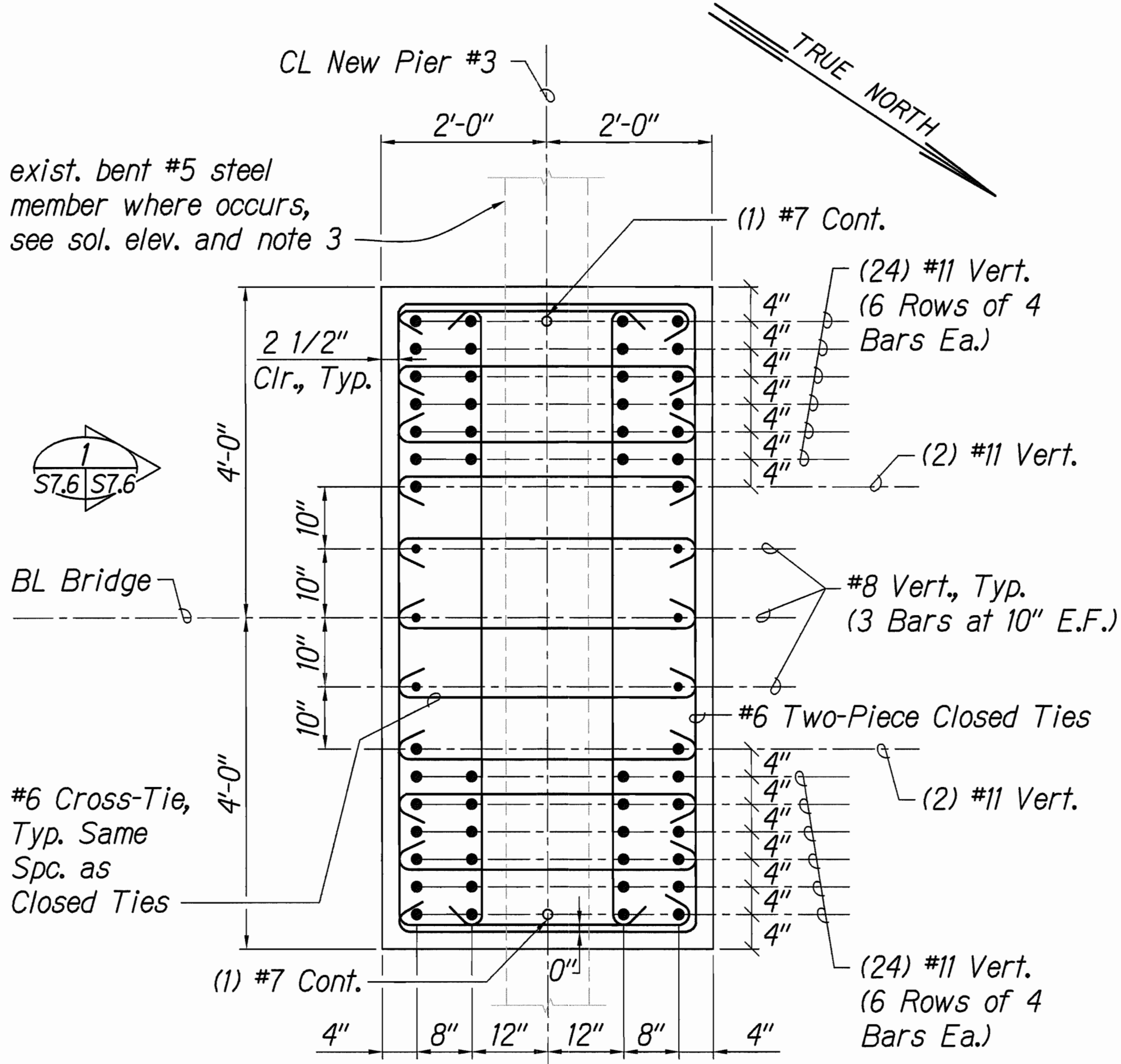
Scale: None Date: July 25, 2012

SHEET No. S7.5 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	93	137

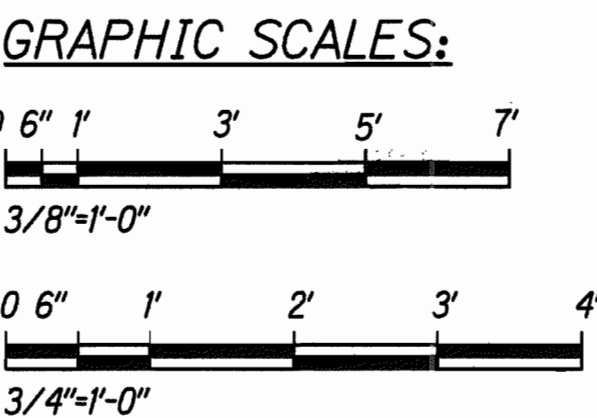


$\frac{1}{S7.6|S7.6}$ NEW PIER #3 - COLUMN ELEVATION (LOOKING NORTH)
S5.10, S6.3 & $\frac{1}{S7.6|S7.6}$ SCALE: 3/8" = 1'-0"



$\frac{2}{S7.6|S7.6}$ NEW PIER #3 - COLUMN SECTION
SCALE: 3/4" = 1'-0"

- Notes:
- For typical pier column notes, see sheet S7.1.
 - All vertical reinforcing (#8 & #11 Bars) shall be ASTM A706, Grade 60.
 - Portions of existing steel members crossing into new column shall be blast cleaned and coated with 2 coats epoxy. See sheet S0.3.
 - Concrete coarse aggregate size shall be 3/4" maximum.



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**NEW PIER #3 - COLUMN
ELEVATION & SECTION**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

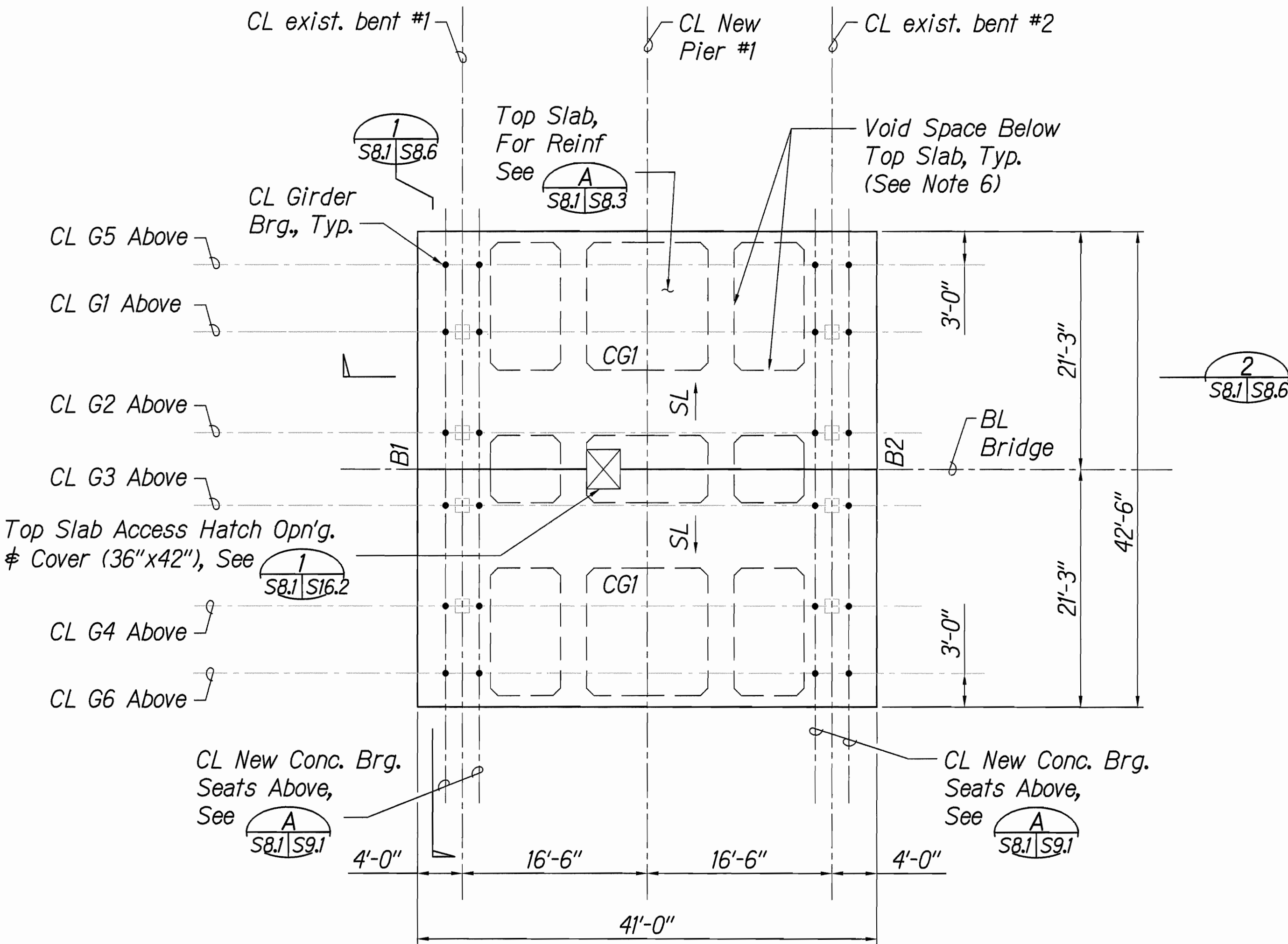
Scale: As Shown Date: July 25, 2012

SHEET No. S7.6 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	94	137

Notes:

- For top of cap elevation, see sheet S6.1.
- New Pier #1 column below not shown for clarity, see .



NEW PIER #1 - PLAN AT TOP OF CAP
S2.3, S7.3  SCALE: 1/8" = 1'-0"

Notes:

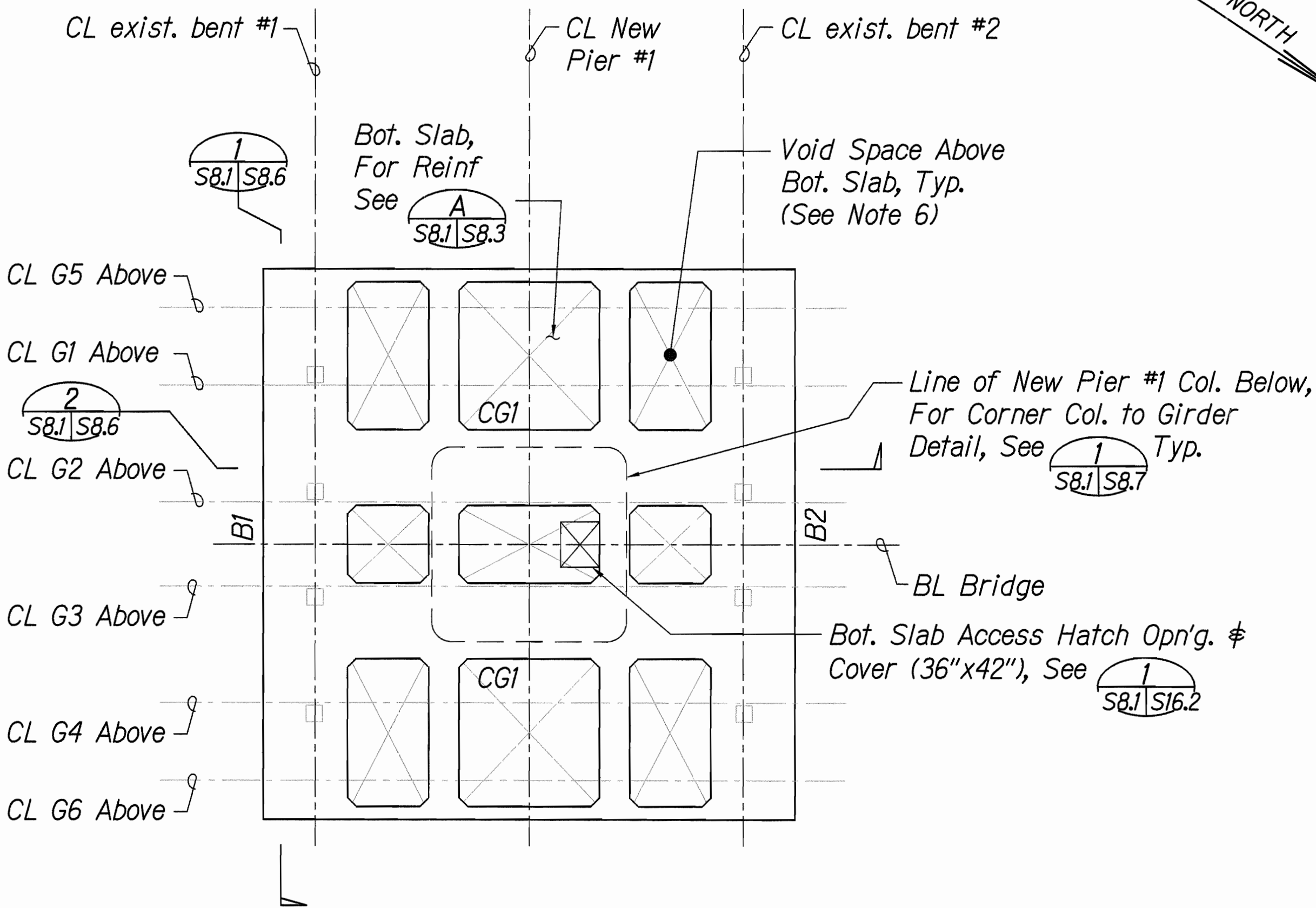
- Portions of existing steel members crossing into new cap beam shall be blast cleaned and coated with 2 coats epoxy prior to concrete pour. See notes on sheet S0.3.
- Construction loads shall not be supported by existing steel tower.
- Vent holes and drain holes not shown. See enlarged plan on sheet S8.3.
- Slope top surface of pier cap, see enlarged plan on sheet S8.3.
- Concrete bearing seats shall be incidental to concrete caps.
- Formwork within void spaces shall be removed. Provide temporary access holes (3'-0"x3'-0" max.) in top slab subject to the Engineer's approval.

NEW PIER #1 CAP

Legend:

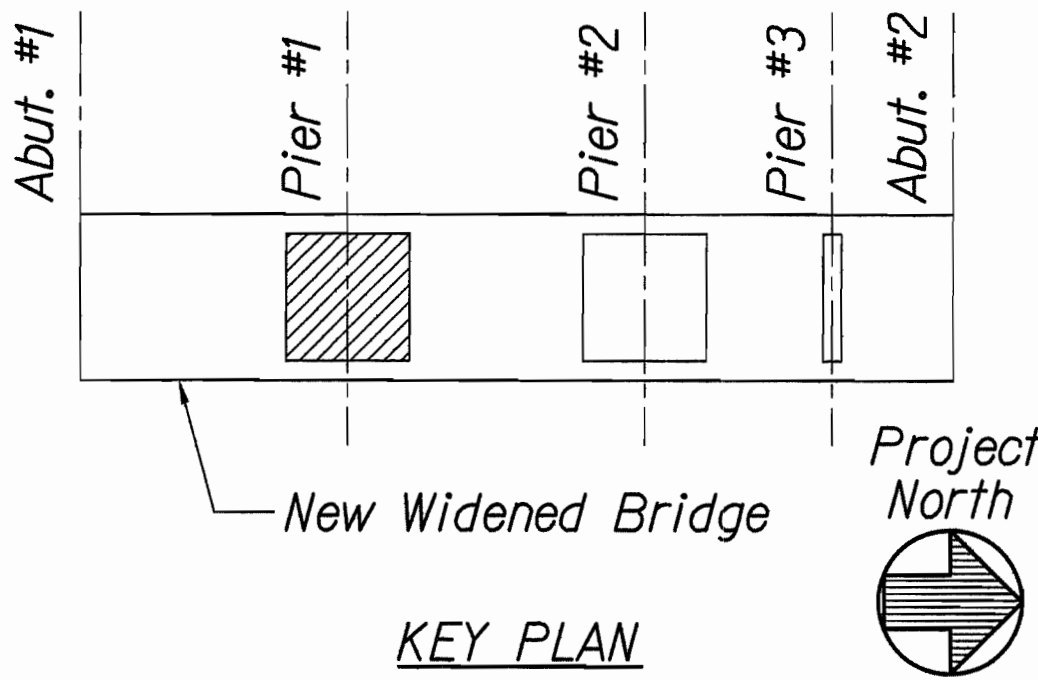
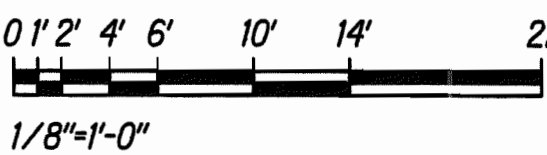
B1 & B2 - Denotes New Conc. Beam
CG1 - Denotes New Conc. Girder

NEW PIER #1 - SECTION AT BOTTOM OF CAP
S7.3  SCALE: 1/8" = 1'-0"

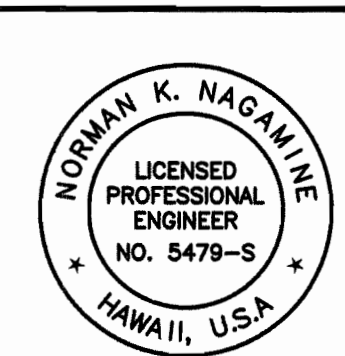


PLAN

GRAPHIC SCALES:



KEY PLAN



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #1 CAP - PLAN & SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

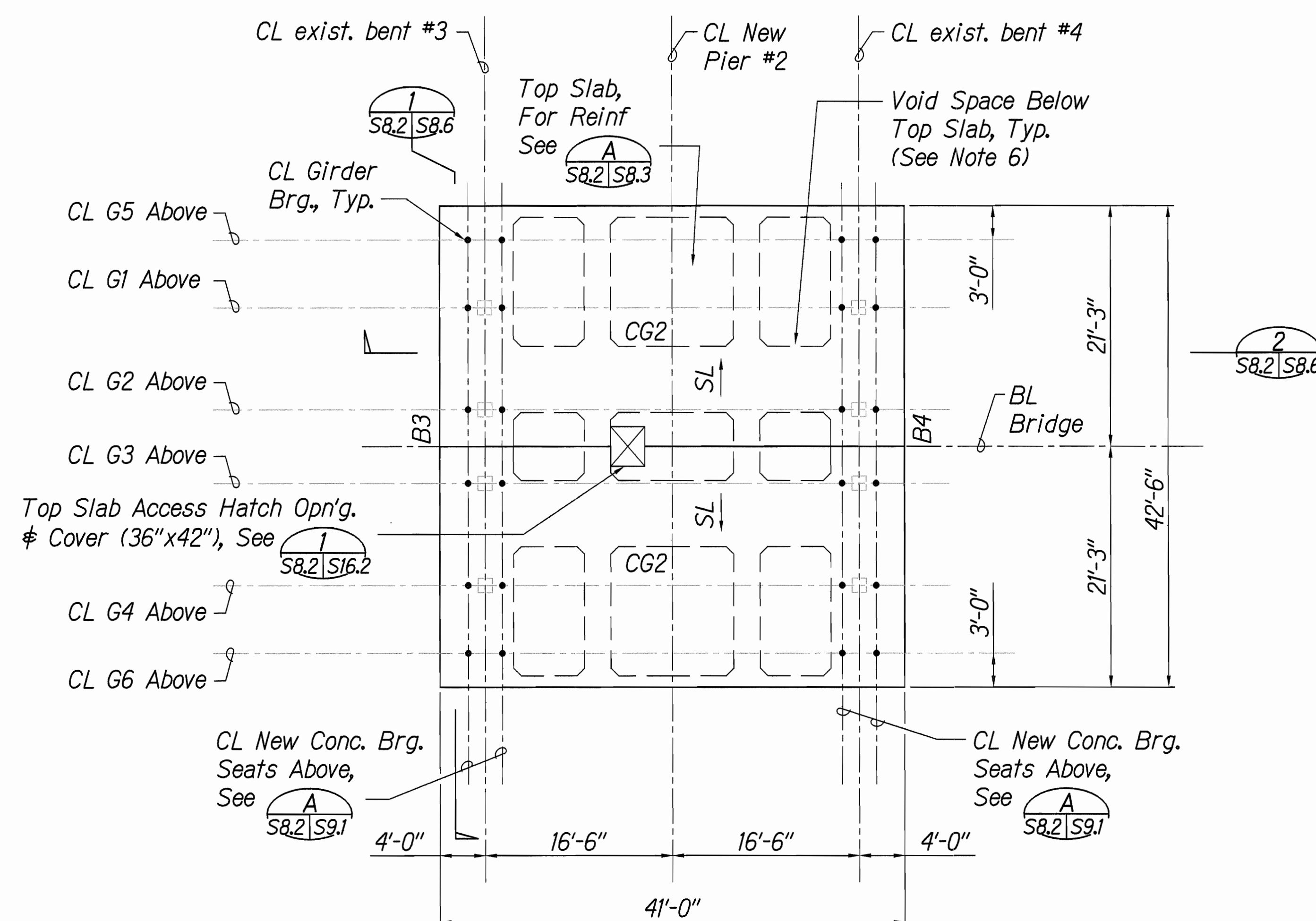
Scale: 1/8" = 1'-0" Date: July 25, 2012

SHEET No. S8.1 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	95	137

Notes:

- For top of cap elevation, see sheet S6.2.
- New Pier #2 column below not shown for clarity, see .



NEW PIER #2 - PLAN AT TOP OF CAP
S2.3, S7.4 &  SCALE: 1/8" = 1'-0"

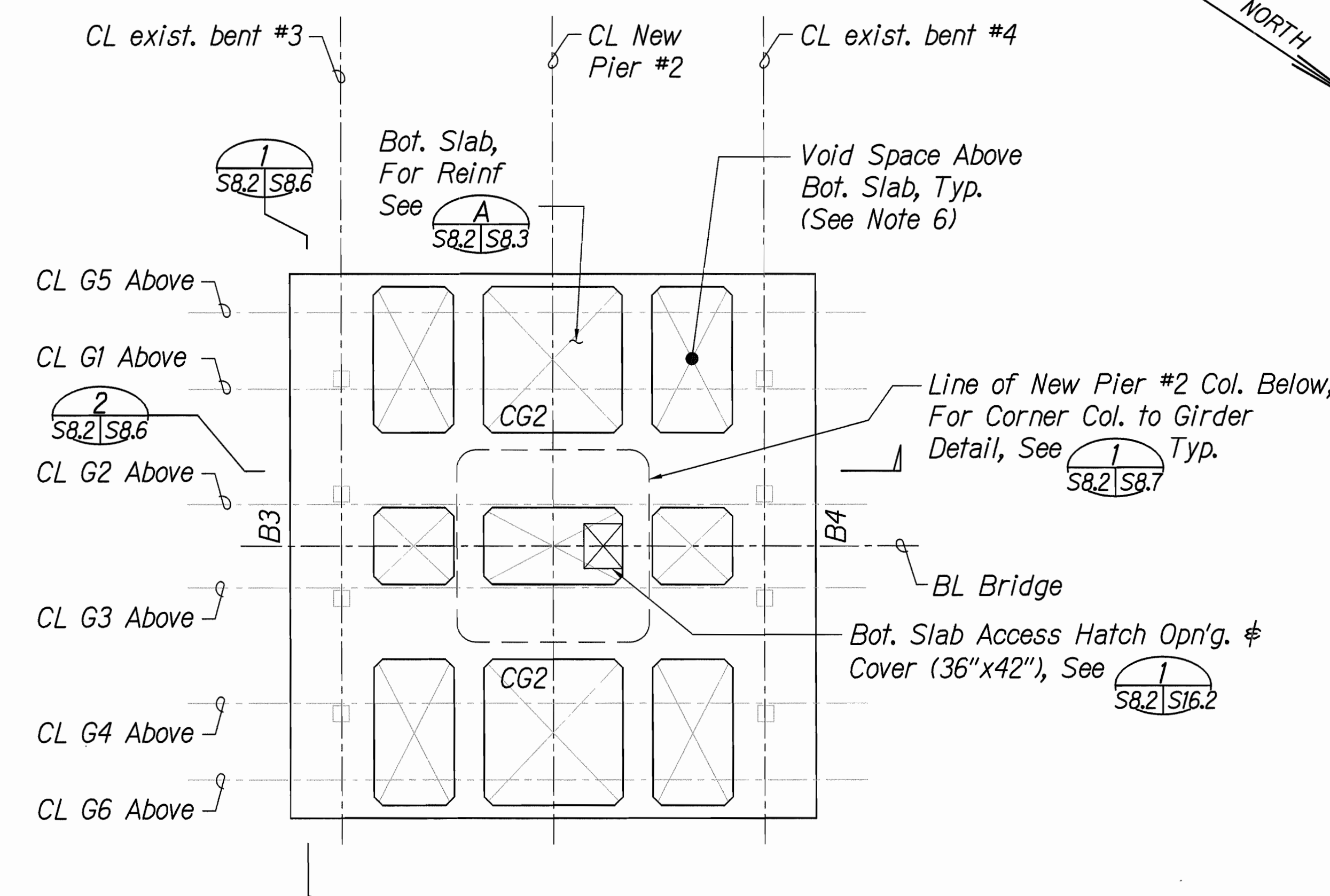
Notes:

- Portions of existing steel members crossing into new cap beam shall be blast cleaned and coated with 2 coats epoxy prior to concrete pour. See notes on sheet S0.3.
- Construction loads shall not be supported by existing steel tower.
- Vent holes and drain holes not shown. See enlarged plan on sheet S8.3.
- Slope top surface of pier cap, see enlarged plan on sheet S8.3.
- Concrete bearing seats shall be incidental to concrete caps.
- Formwork within void spaces shall be removed. Provide temporary access holes (3'-0"x3'-0" max.) in top slab subject to the Engineer's approval.

NEW PIER #2 CAP

Legend:

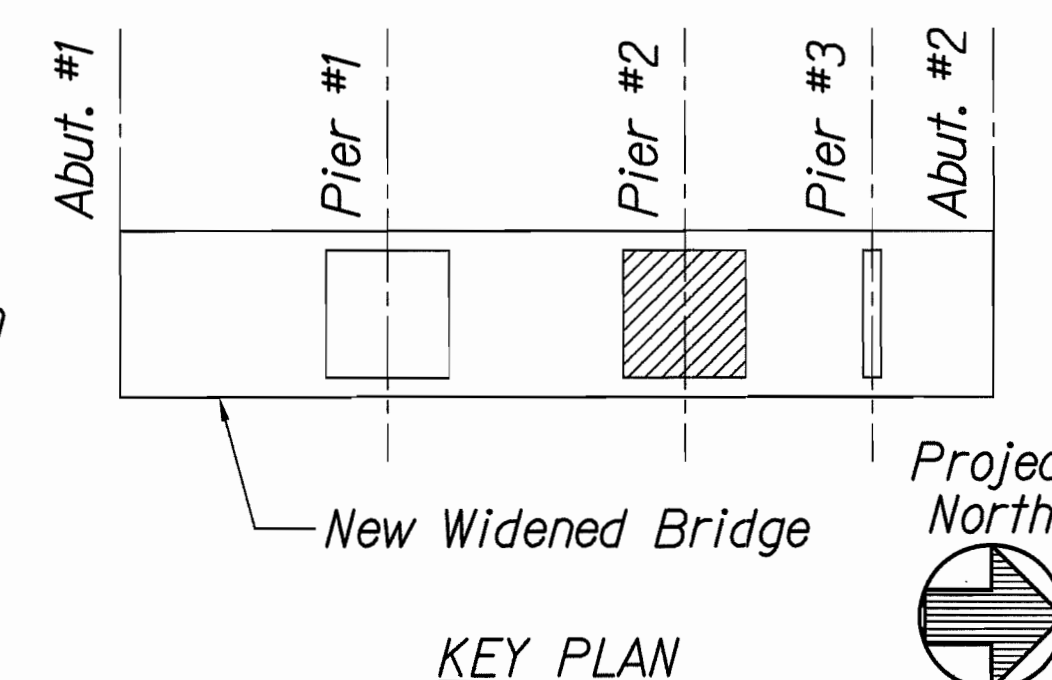
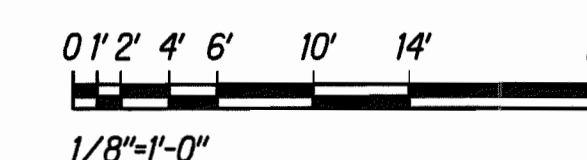
B3 & B4 - Denotes New Conc. Beam
CG2 - Denotes New Conc. Girder



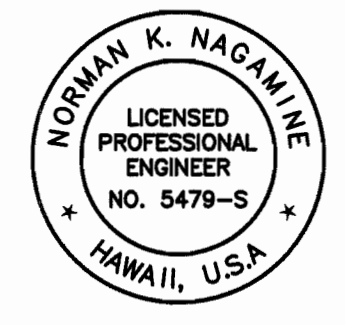
NEW PIER #2 - SECTION AT BOTTOM OF CAP
S7.4 &  SCALE: 1/8" = 1'-0"

PLAN

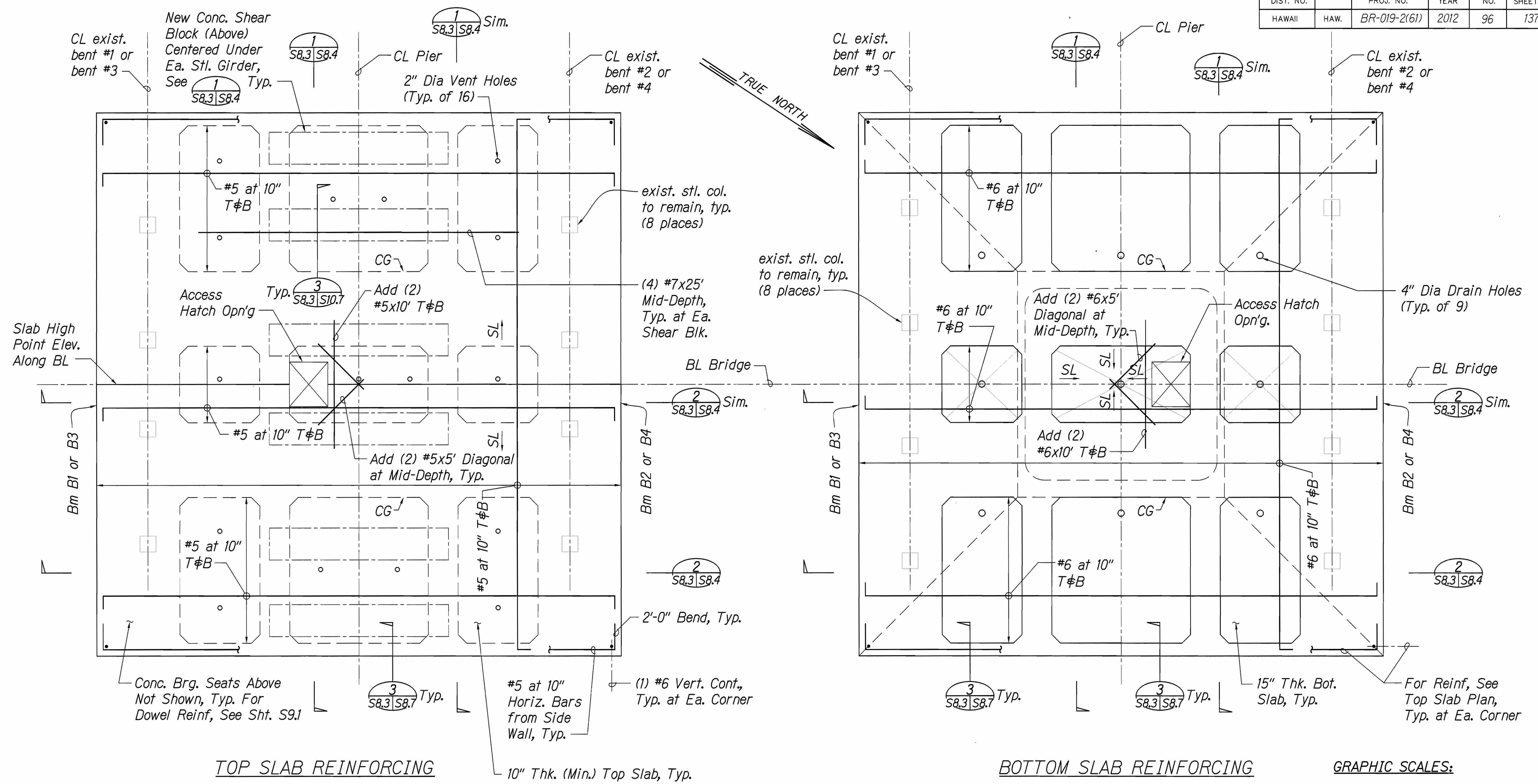
GRAPHIC SCALES:



KEY PLAN

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	NEW PIER #2 CAP - PLAN & SECTIONS
	HAWAII BELT ROAD Rehabilitation of Umauma Stream Bridge Federal Aid Project No. BR-019-2(61)
	Scale: 1/8" = 1'-0" Date: July 25, 2012 SHEET No. S8.2 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	96	137



ENLARGED PLAN - NEW PIER #1 & PIER #2 CAP SLAB REINFORCING
 SCALE: 1/4" = 1'-0"

NORMAN K. NAGAMINE
 LICENSED PROFESSIONAL ENGINEER
 NO. 5479-S
 HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

NEW PIER #1 & #2 CAP SLAB REINFORCING PLAN

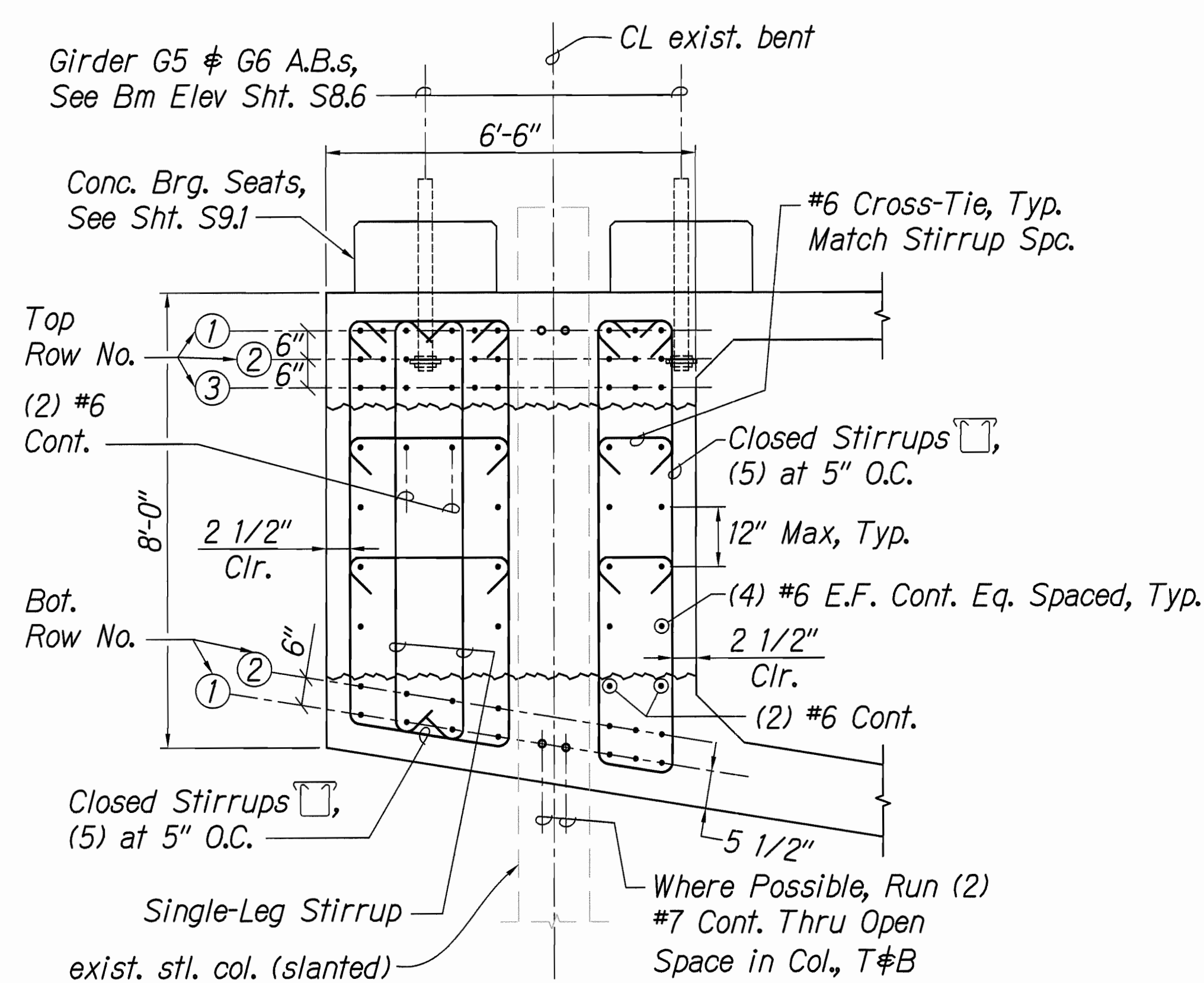
HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: 1/4" = 1'-0" Date: July 25, 2012

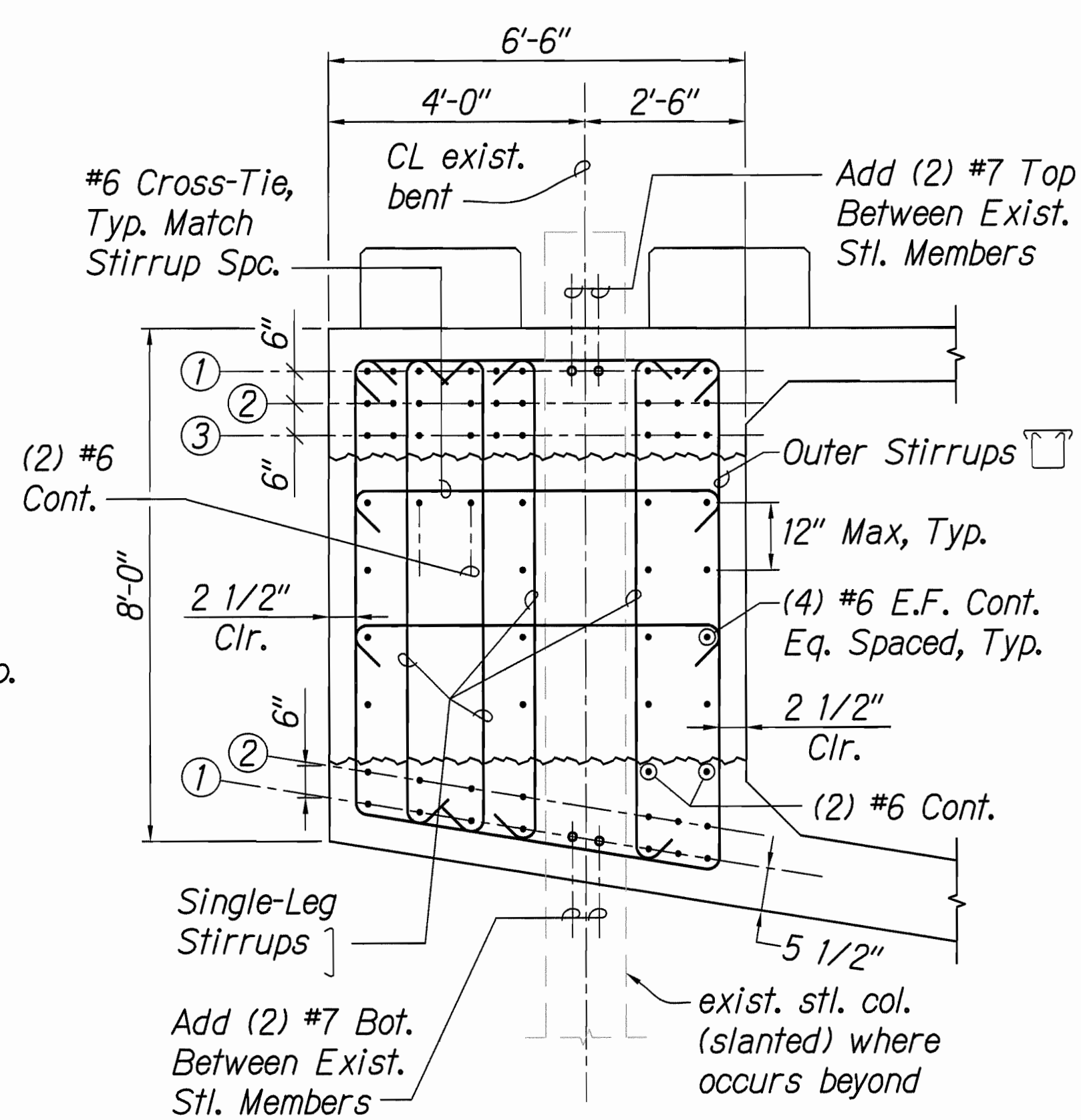
SHEET No. S8.3 OF 9 SHEETS

SURVEY PLOTTED BY	DATE
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	

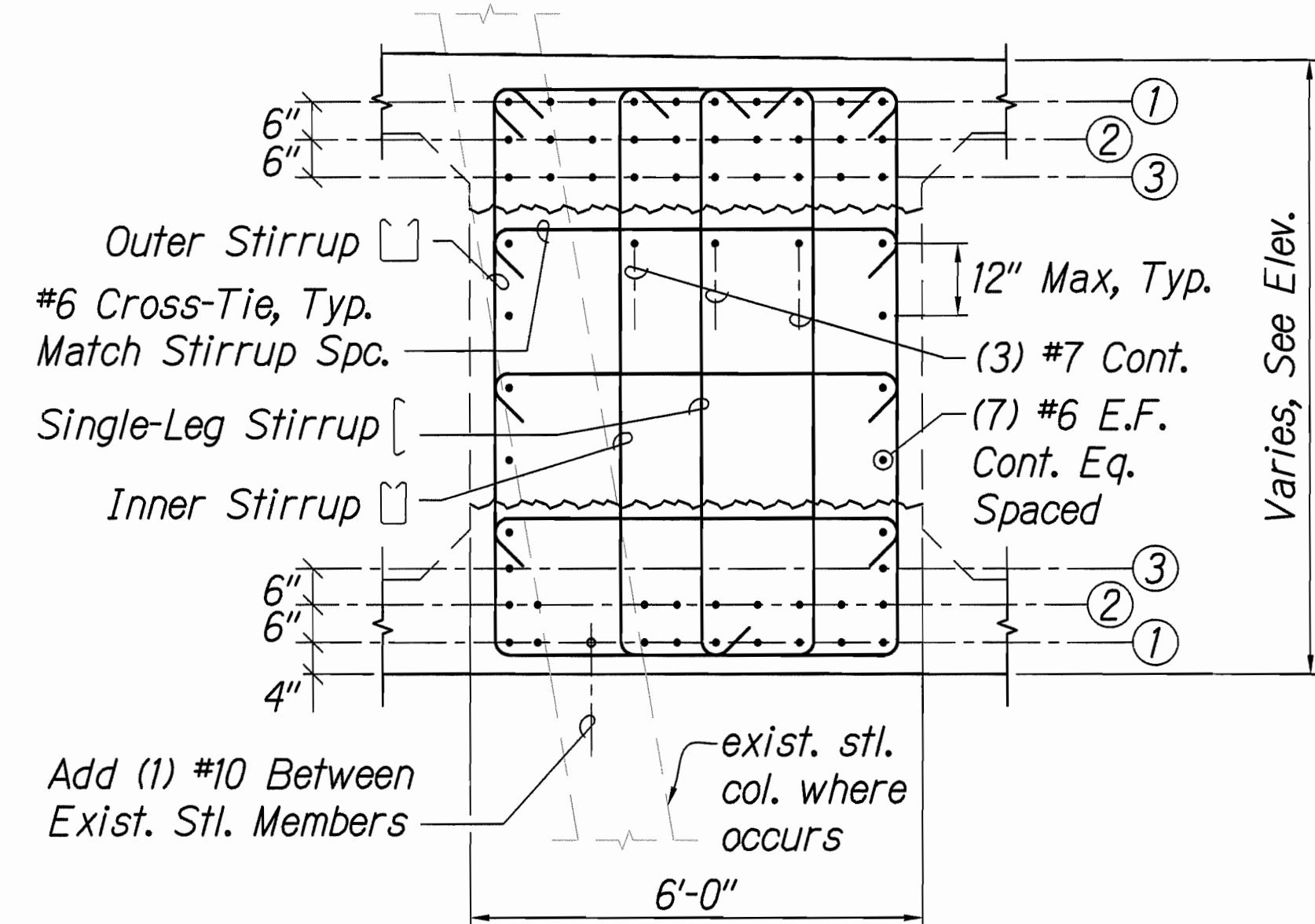
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	98	137



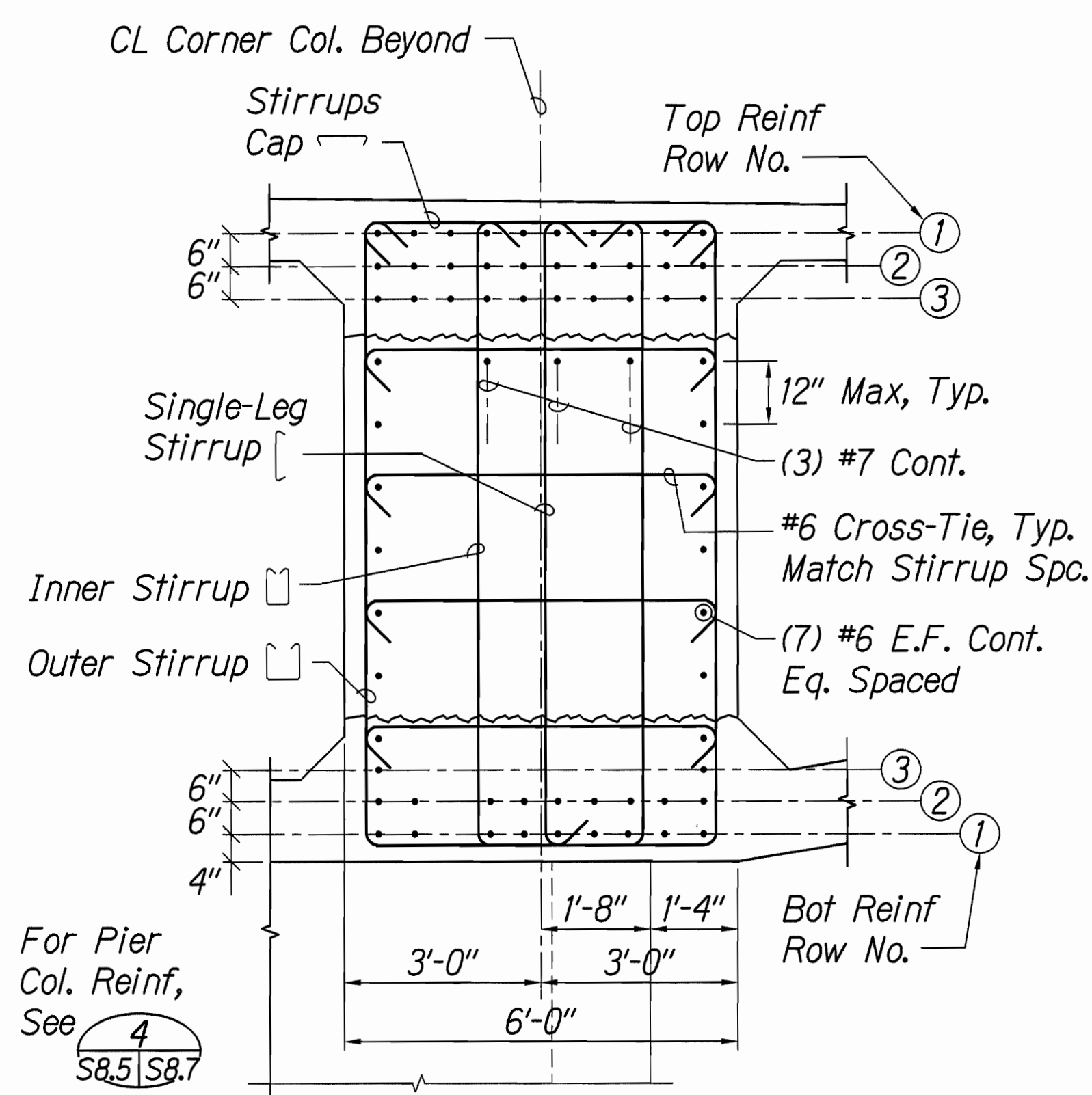
1 TYPICAL SECTION - CAP BEAM "B"
S8.6/S8.5 SCALE: 1/2" = 1'-0"



2 SECTION - CAP BEAM "B"
S8.6/S8.5 SCALE: 1/2" = 1'-0"



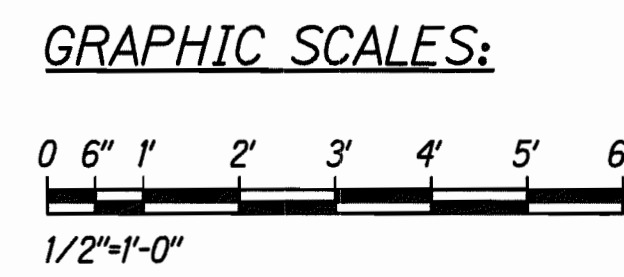
3 TYPICAL SECTION - CAP GIRDER "CG"
S8.6/S8.5 SCALE: 1/2" = 1'-0"



4 SECTION - CAP GIRDER "CG"
S8.6/S8.5 SCALE: 1/2" = 1'-0"

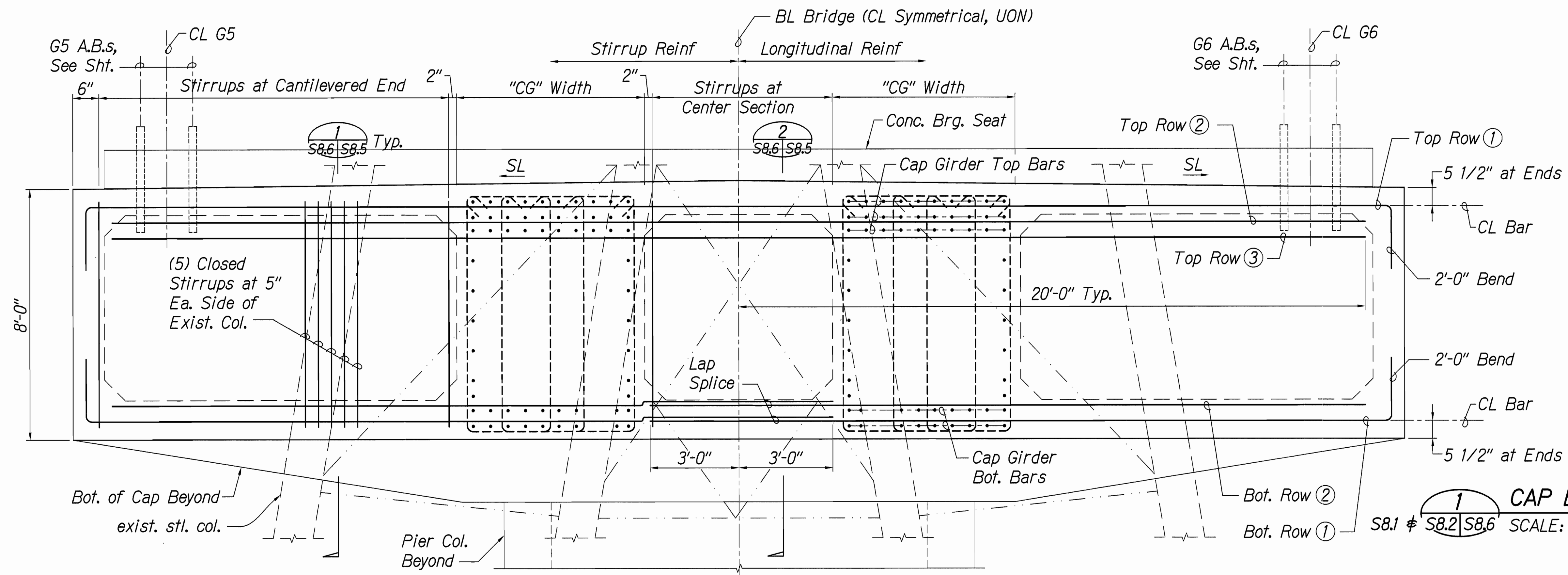
Cap Beam and Cap Girder Reinforcing Schedule												
Mark	Width	Depth	Top Reinforcing			Bottom Reinforcing			Stirrup Reinforcing			
			①	②	③	①	②	③	Cantilevered Ends		Center Section	
									Detail No.	Size & Spc.	Detail No.	Size & Spc.
B1	6'-6"	8'-0" Min., See Section	(9) #10	(9) #10	(9) #10	(7) #10	(7) #10	-	1/S8.5	#6 at 5"	2/S8.5	#6 at 5"
B2	6'-6"	DO	DO	DO	DO	DO	DO	-	DO	DO	DO	DO
B3	6'-6"	DO	DO	DO	DO	DO	DO	-	DO	DO	DO	DO
B4	6'-6"	DO	DO	DO	DO	DO	DO	-	DO	DO	DO	DO
CG1	6'-0"	Varies, See Elev.	(10) #10	(10) #10	(10) #10	(9) #10	(9) #10	(2) #10	3/S8.5	#6 at 5"	4/S8.5	#6 at 8"
CG2	6'-0"	Varies, See Elev.	(10) #10	(10) #10	(10) #10	(9) #10	(9) #10	(2) #10	3/S8.5	#6 at 5"	4/S8.5	#6 at 8"

- Notes:**
- For cap beam and cap girder elevations, see sheet S8.6.
 - ① denotes row number, see sections and elevations.
 - For longitudinal side bars each face, see sections this sheet.
 - For added stirrup reinforcing, see sheet S8.6.
 - For added reinforcing at corner column, see detail **1** S8.5/S8.7.



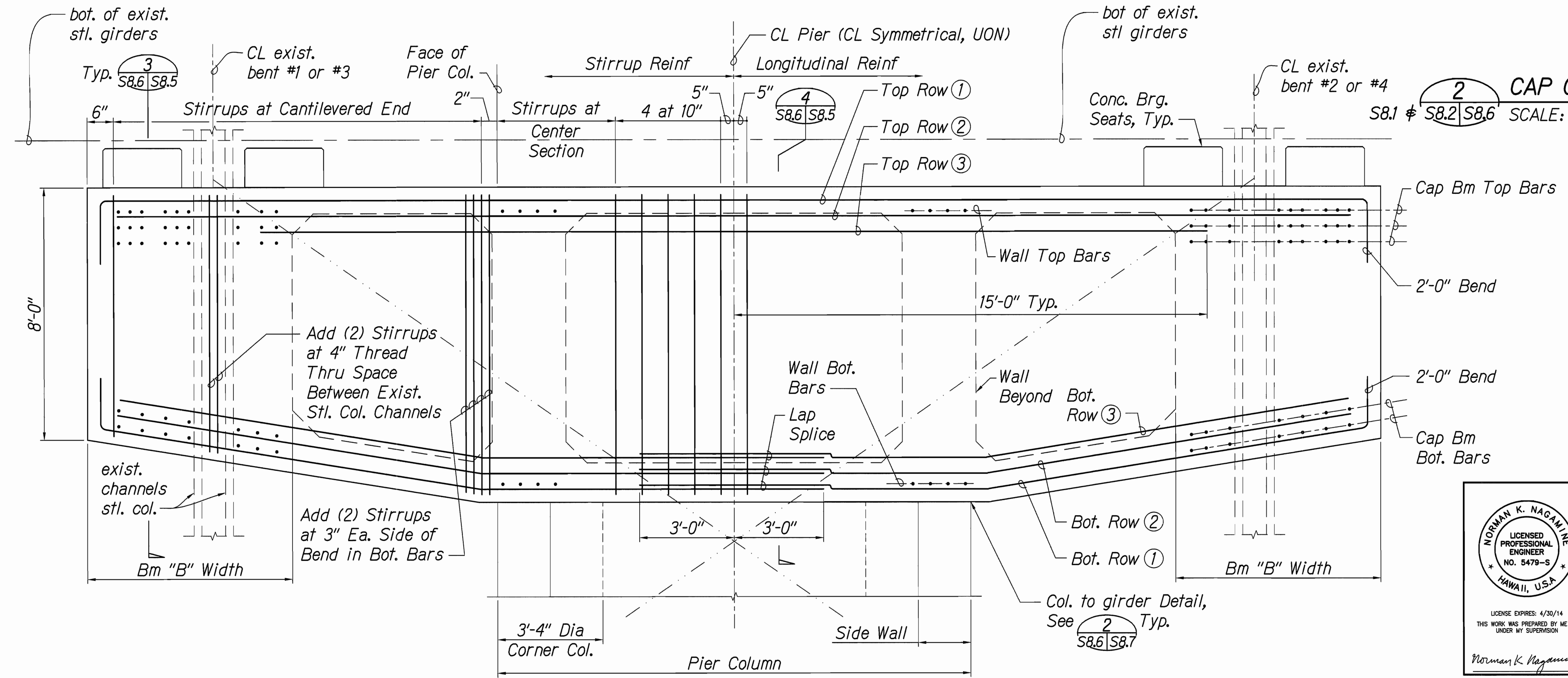
NEW PIER #1 & #2 CAP - BEAM, GIRDER SECTION & SCHEDULE
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)
Scale: 1/2" = 1'-0" Date: July 25, 2012
SHEET No. S8.5 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	99	137



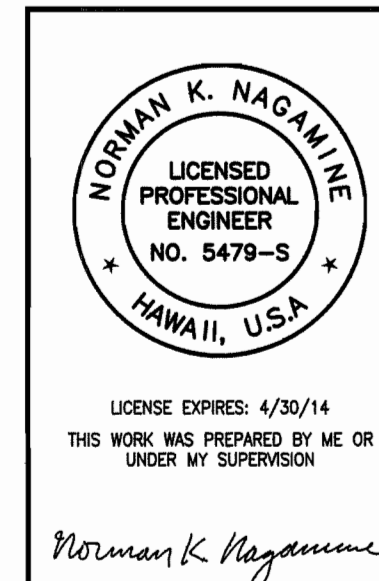
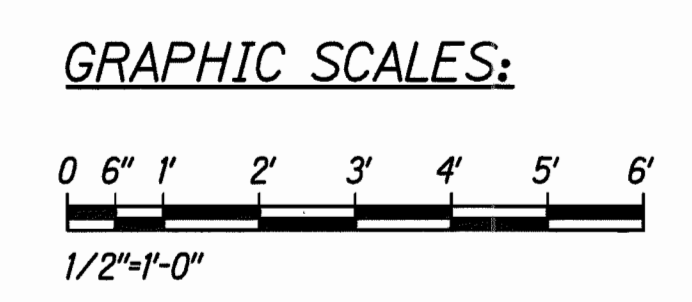
Note:
For stirrups and longitudinal reinforcing, see schedule on sheet S8.5.

1 CAP BEAM - SECTION/ELEVATION
S8.1 # S8.2 S8.6 SCALE: 1/2" = 1'-0"



Note:
For stirrups and longitudinal reinforcing, see schedule on sheet S8.5.

2 CAP GIRDER - SECTION/ELEVATION
S8.1 # S8.2 S8.6 SCALE: 1/2" = 1'-0"



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW PIER #1 #2 CAP
BEAM & GIRDER - SECTIONS**

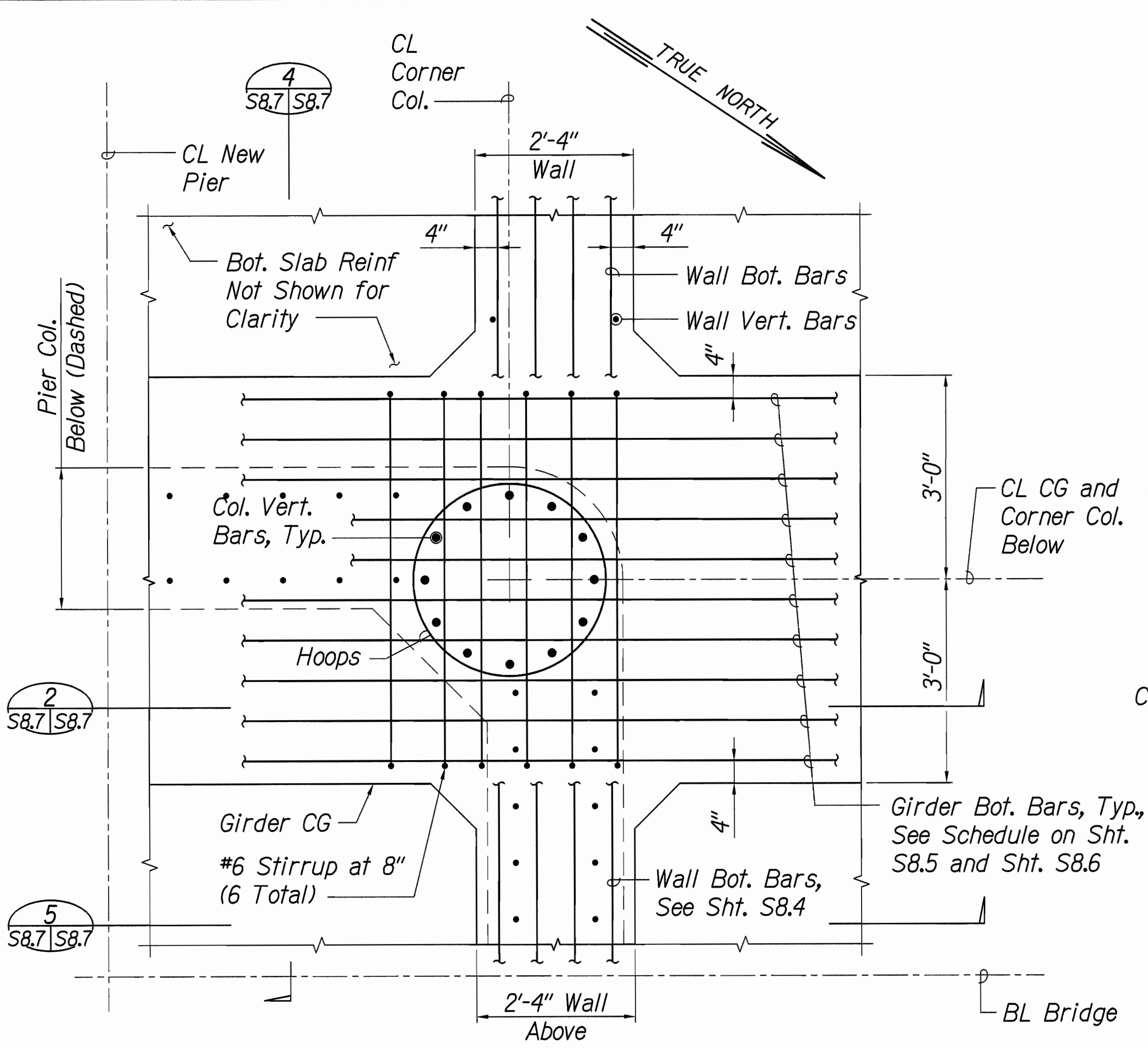
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

SHEET No. S8.6 OF 9 SHEETS

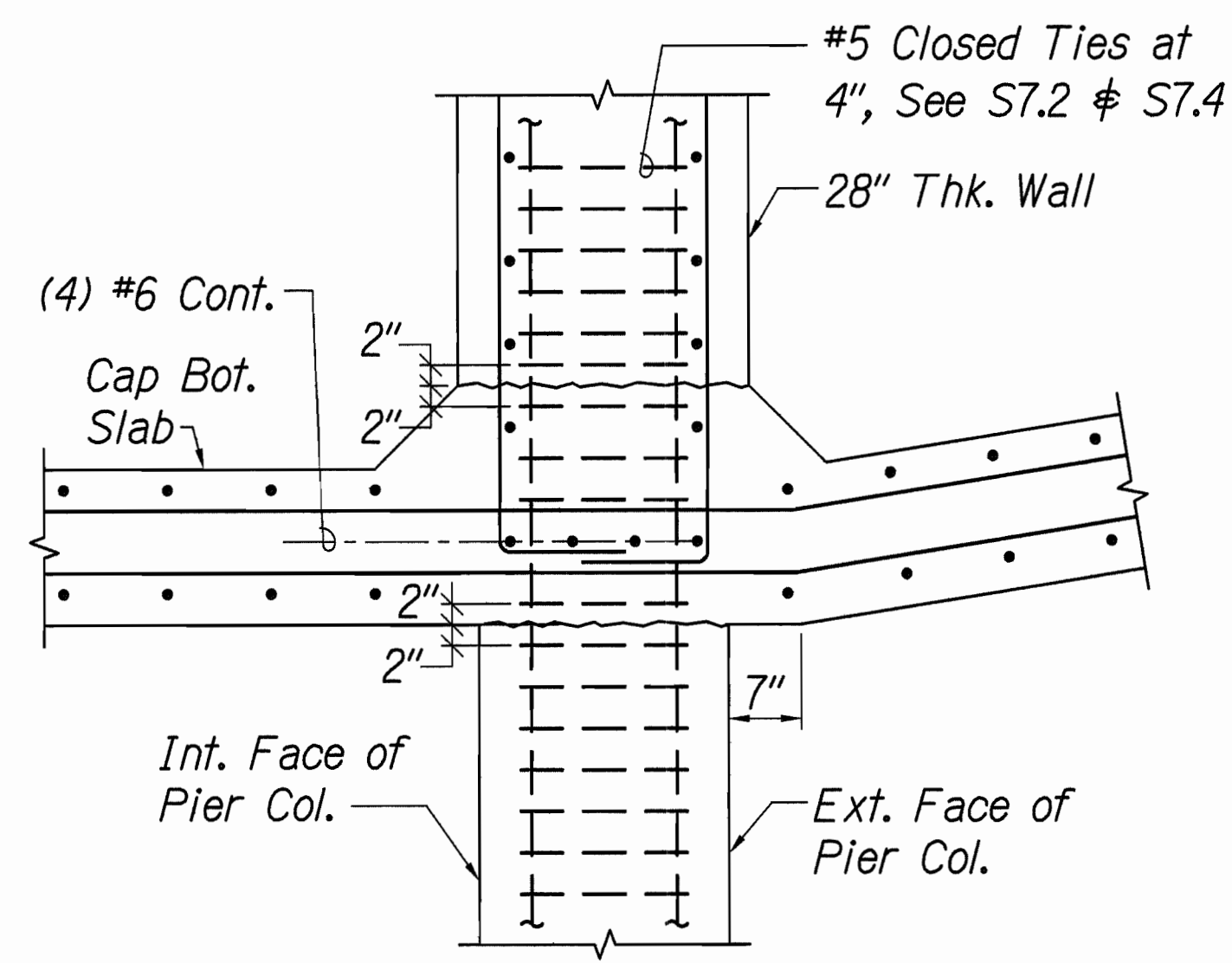
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	100	137

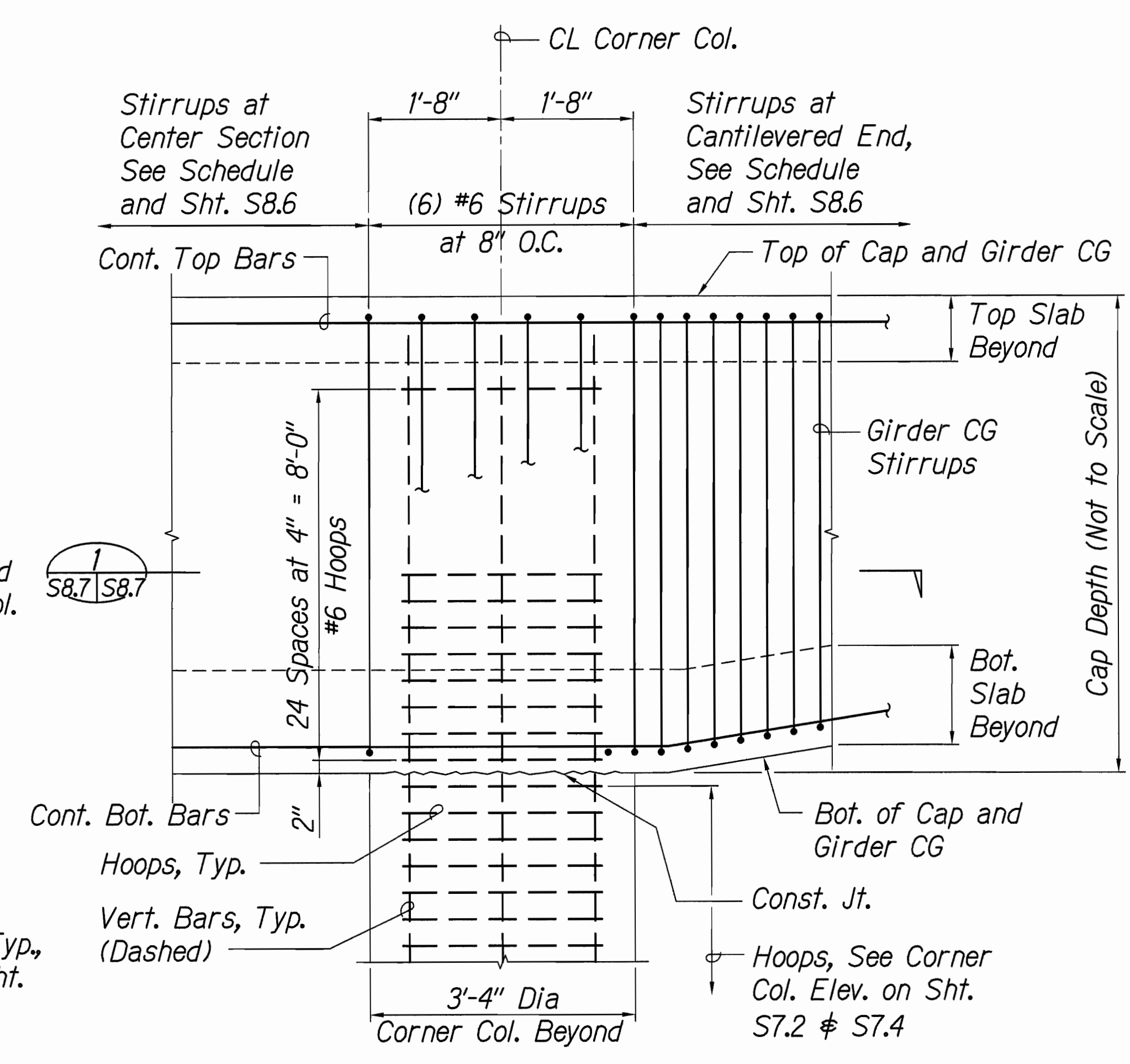


PLAN

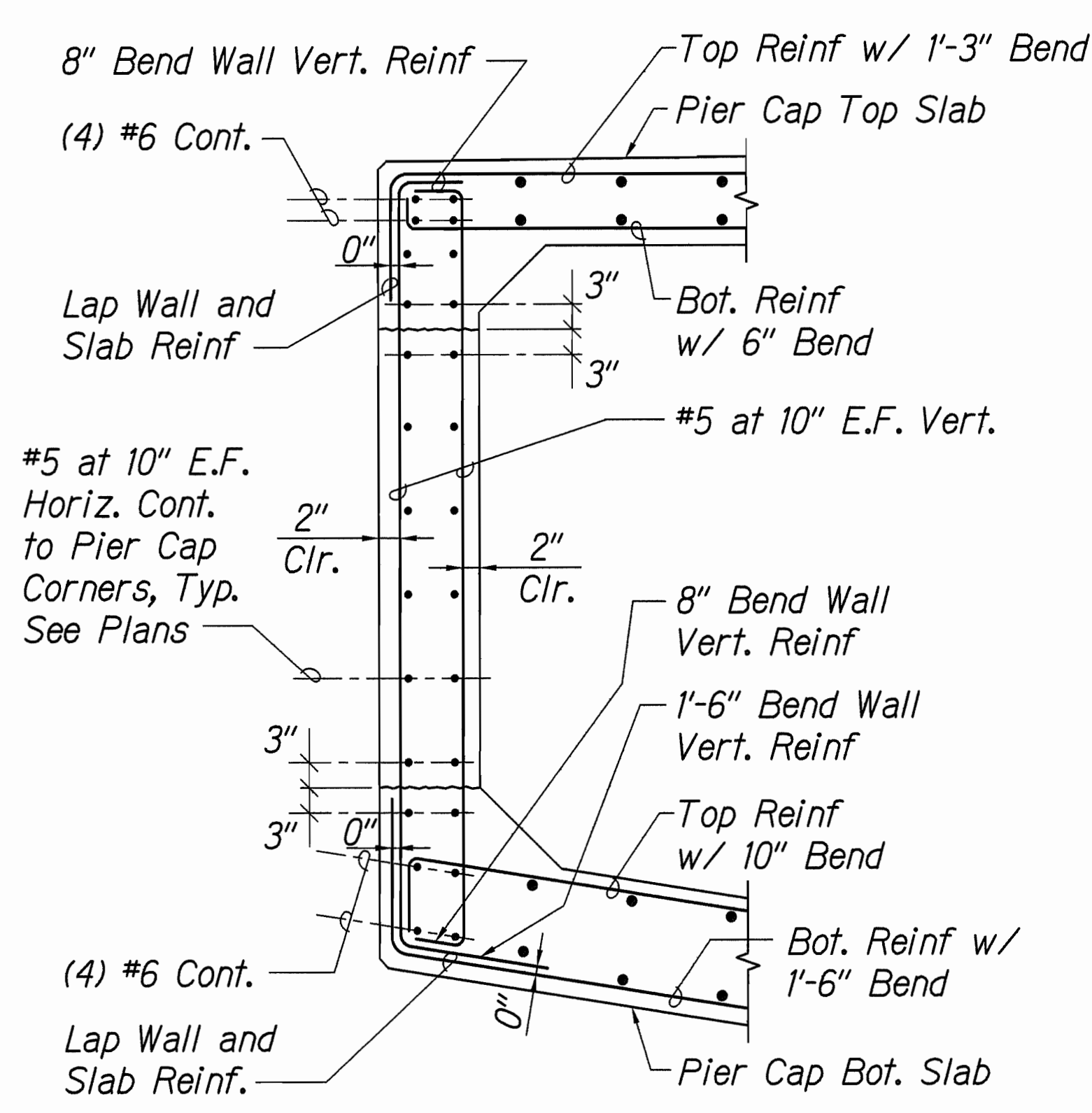
1 CORNER COLUMN TO GIRDER DETAIL
S8.1, S8.2, S8.5 & S8.7 SCALE: 3/4"=1'-0"



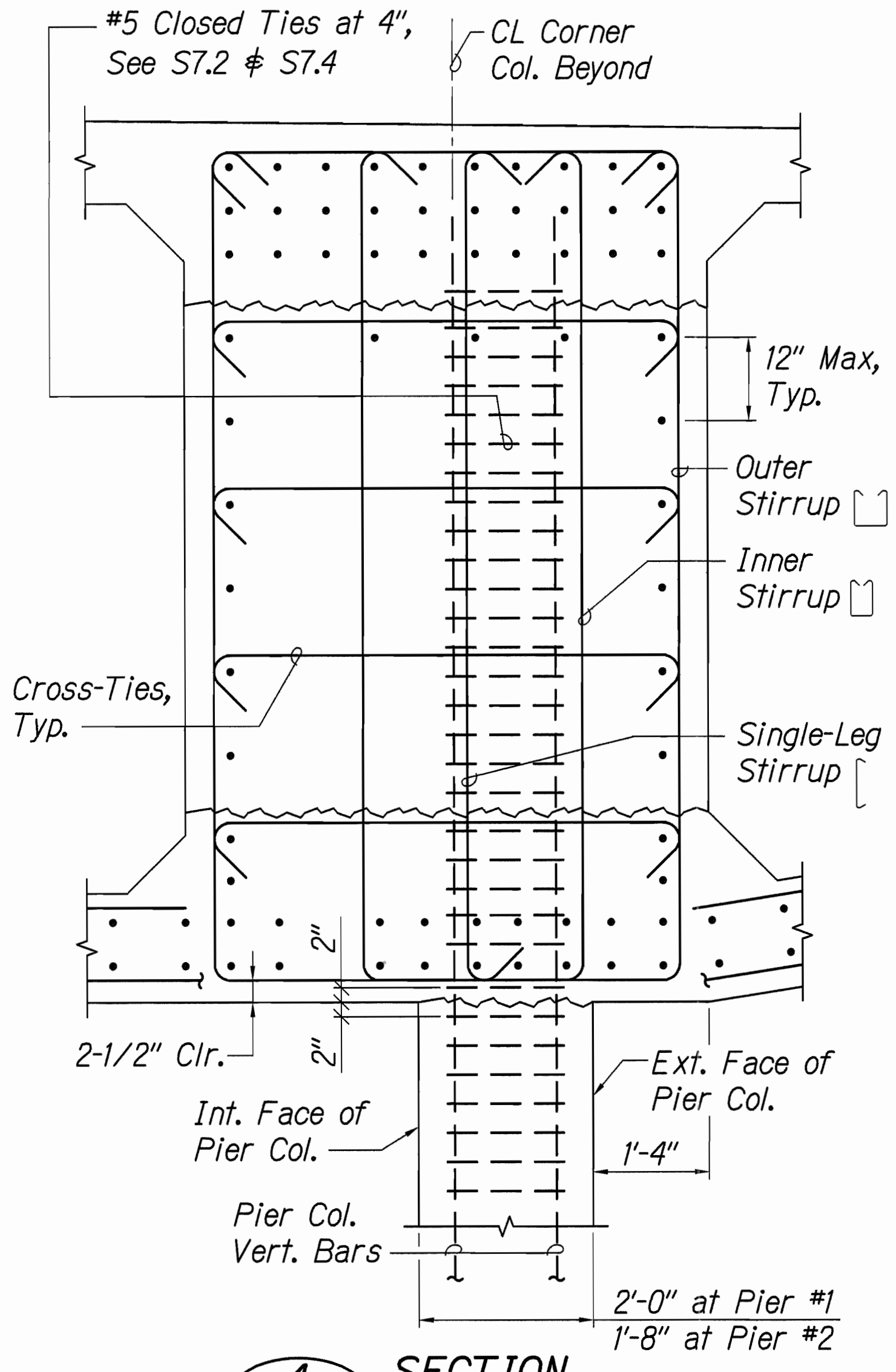
5 SECTION
S8.7 & S8.7 SCALE: 3/4"=1'-0"



2 SECTION (TYP.)
S8.6 & S8.7 & S8.7 SCALE: 3/4"=1'-0"

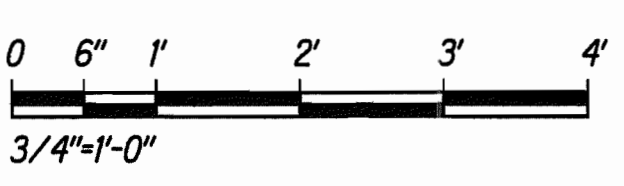


3 SIDE WALL SECTION
S8.3 & S8.4 & S8.7 SCALE: 3/4"=1'-0"



4 SECTION
S8.5 & S8.7 & S8.7 SCALE: 3/4"=1'-0"

GRAPHIC SCALES:



SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED	
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW PIER #1 & #2 CAP BEAM
& GIRDER - DETAILS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/4" = 1'-0" Date: July 25, 2012

SHEET No. S8.7 OF 9 SHEETS

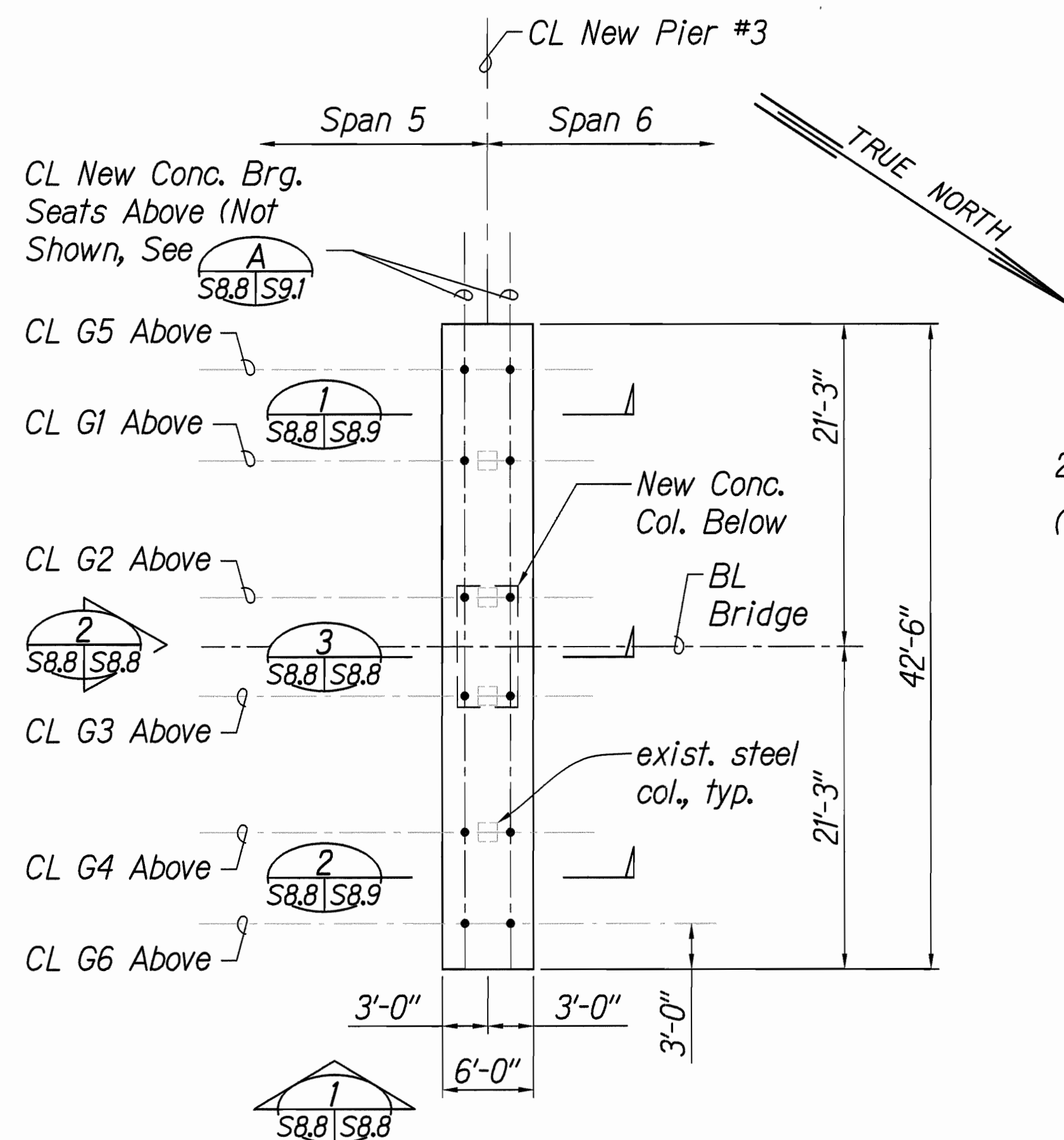
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	101	137

Notes:

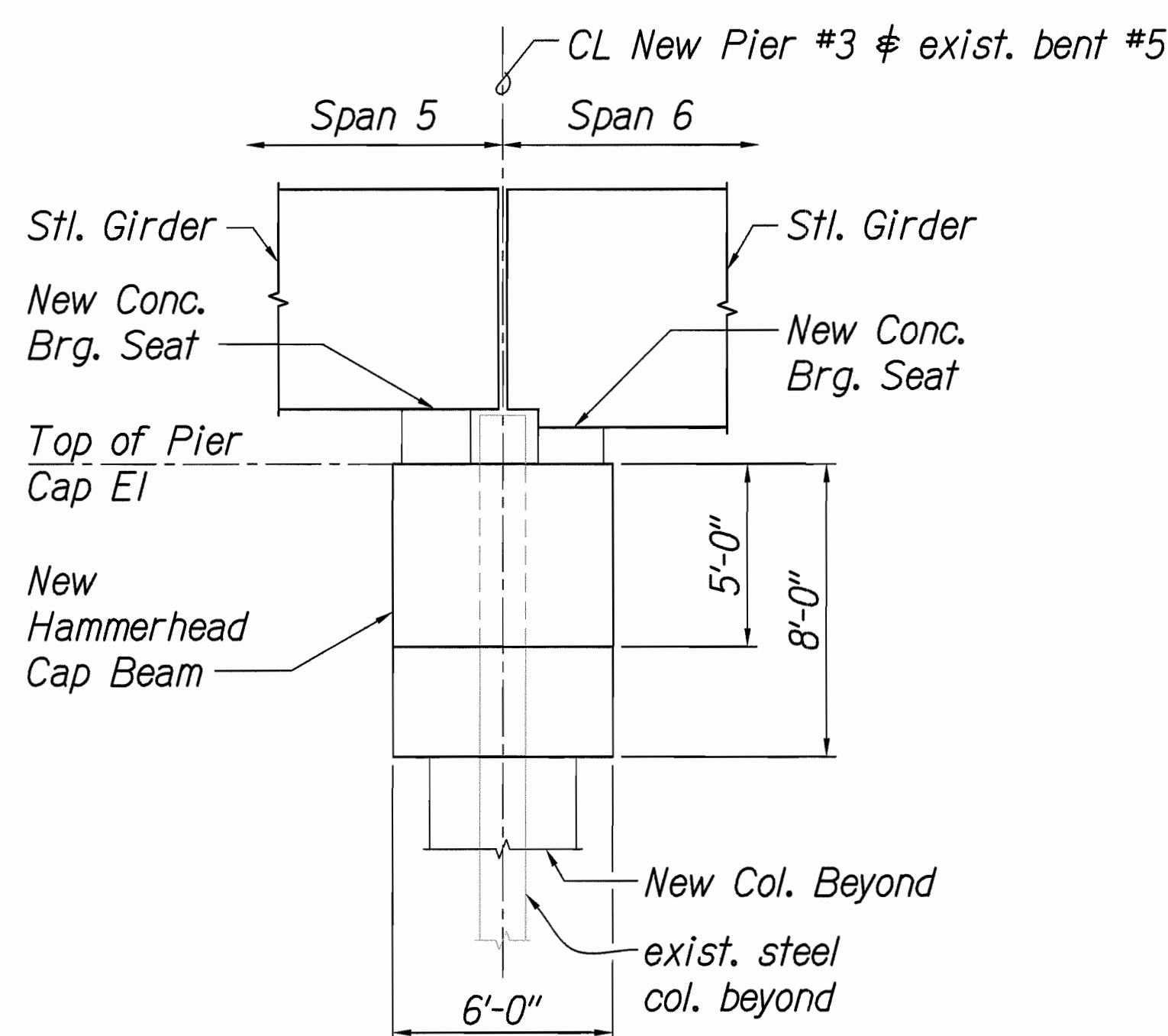
- Portions of existing steel members crossing into new cap beam shall be blast cleaned and coated with 2 coats epoxy. See sheet S0.3.
- Concrete coarse aggregate size shall be 3/4" maximum.
- Concrete bearing seats shall be incidental to concrete cap beam.

Special Note:

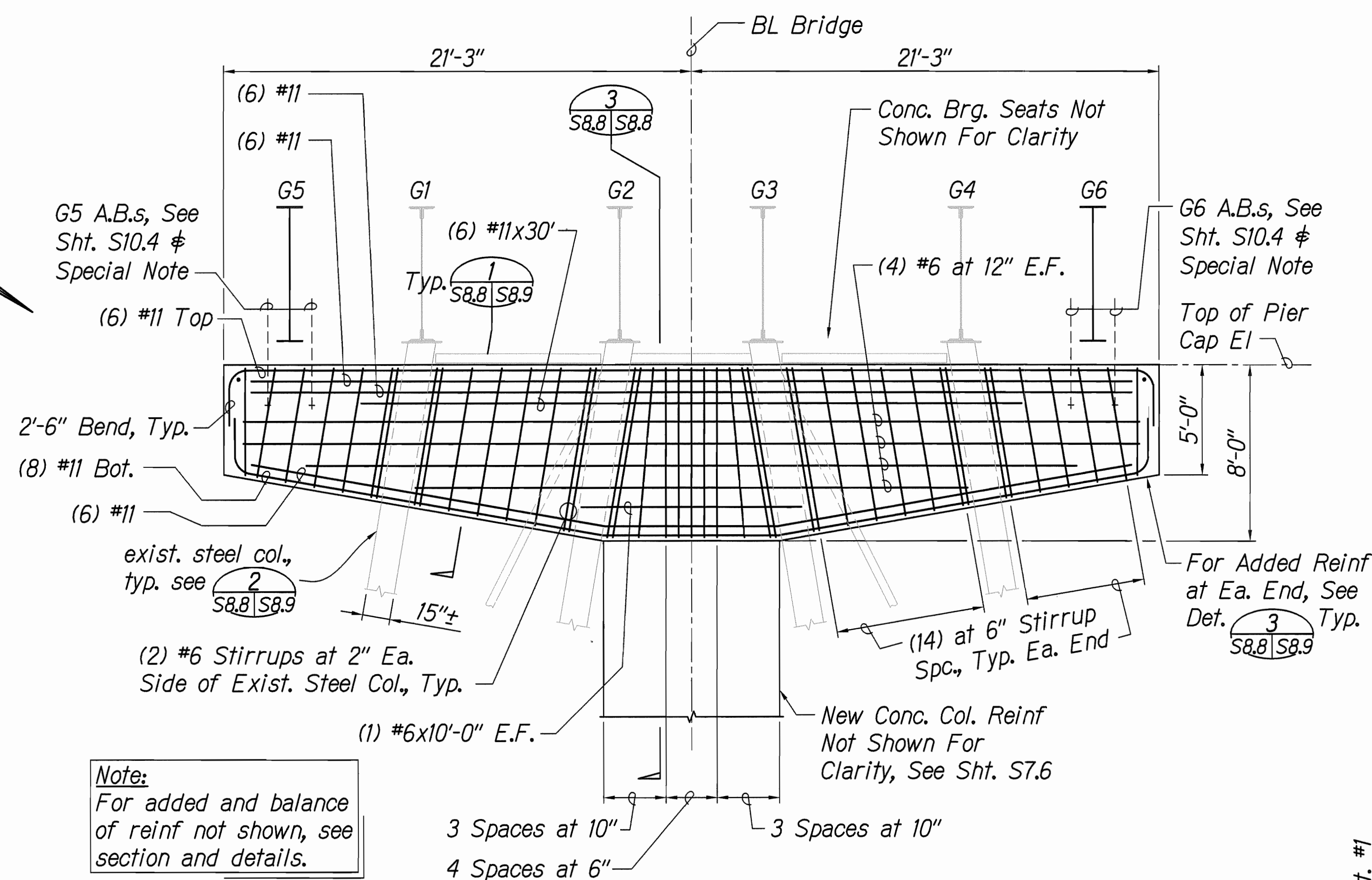
Steel bearing plates under existing girders and all anchor bolts shall be installed prior to pouring pier cap, typical see sheets S9.1 & S10.5. Do not install double nuts on anchor bolts until concrete pier cap is cast and cured (60 days minimum).



NEW PIER #3 CAP BEAM - PLAN
SCALE: 1/8" = 1'-0"

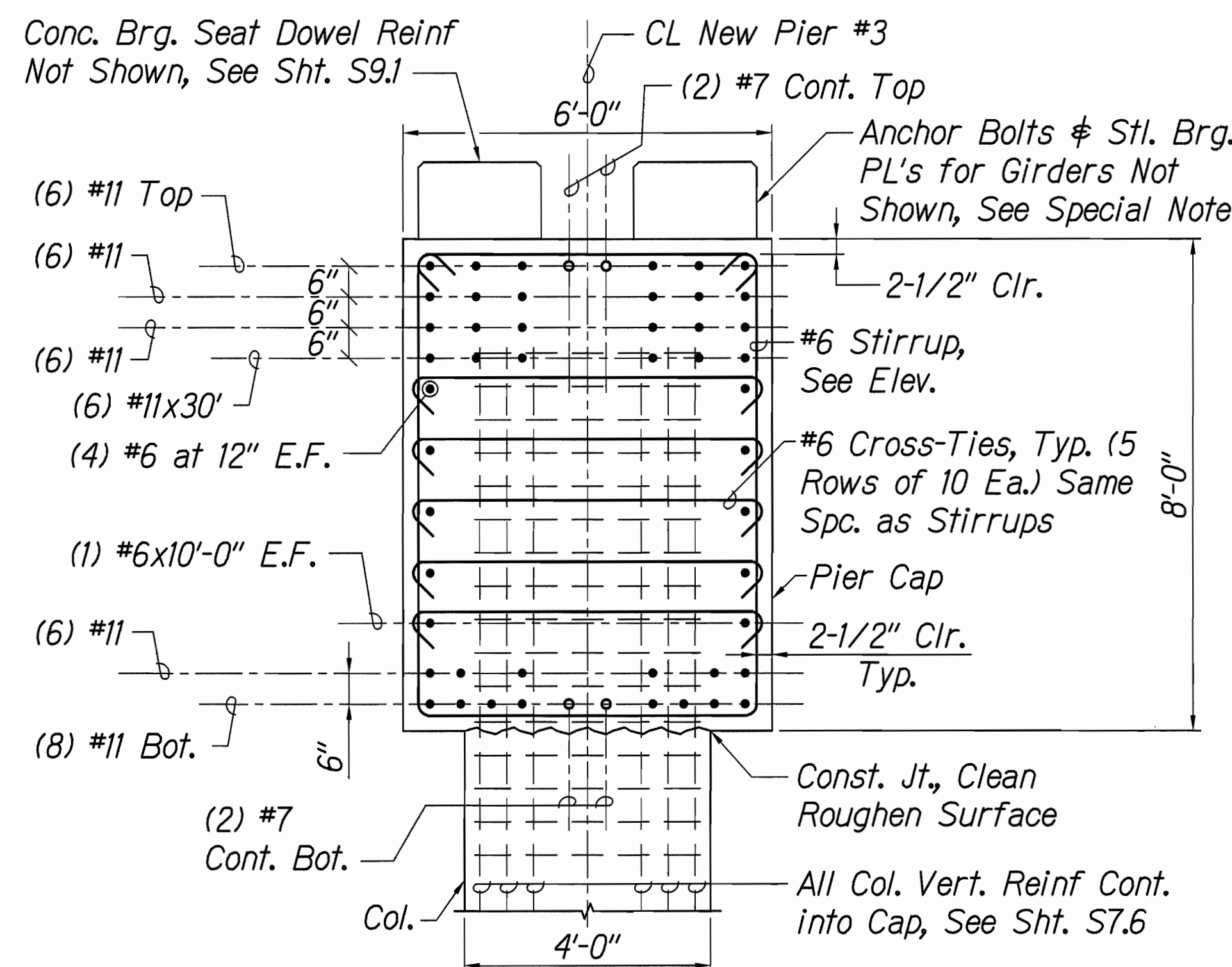


EAST END ELEVATION
SCALE: 1/4" = 1'-0"

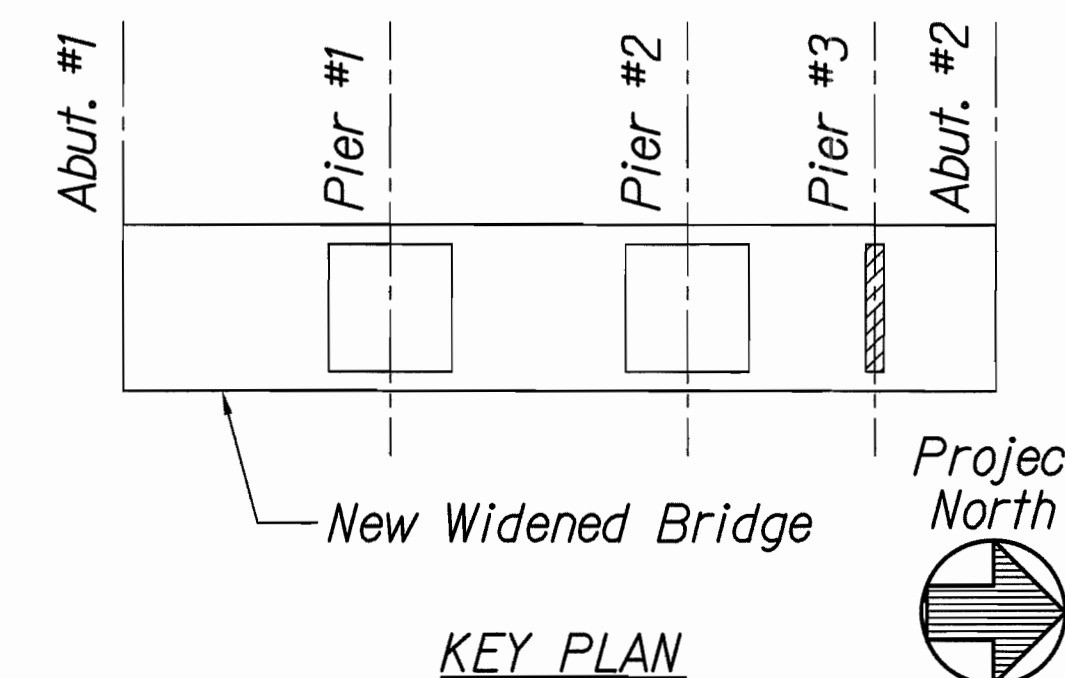


Note:
For added and balance of reinf not shown, see section and details.

ELEVATION - NEW PIER #3 CAP BEAM (LOOKING NORTH)
SCALE: 1/4" = 1'-0"

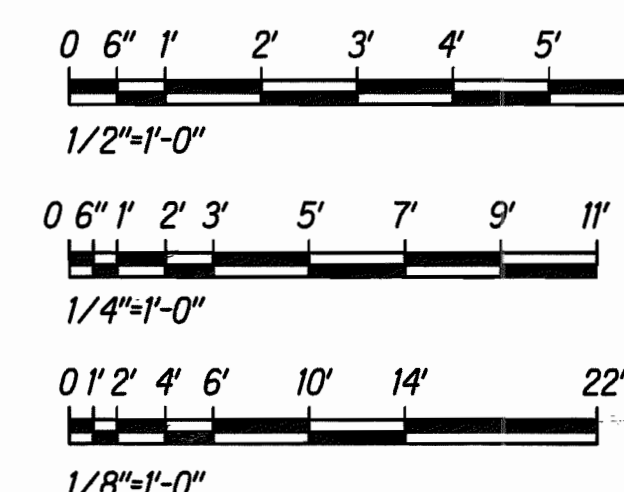


SECTION
SCALE: 1/2" = 1'-0"



KEY PLAN

GRAPHIC SCALES:



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LICENSED PROFESSIONAL ENGINEER
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HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

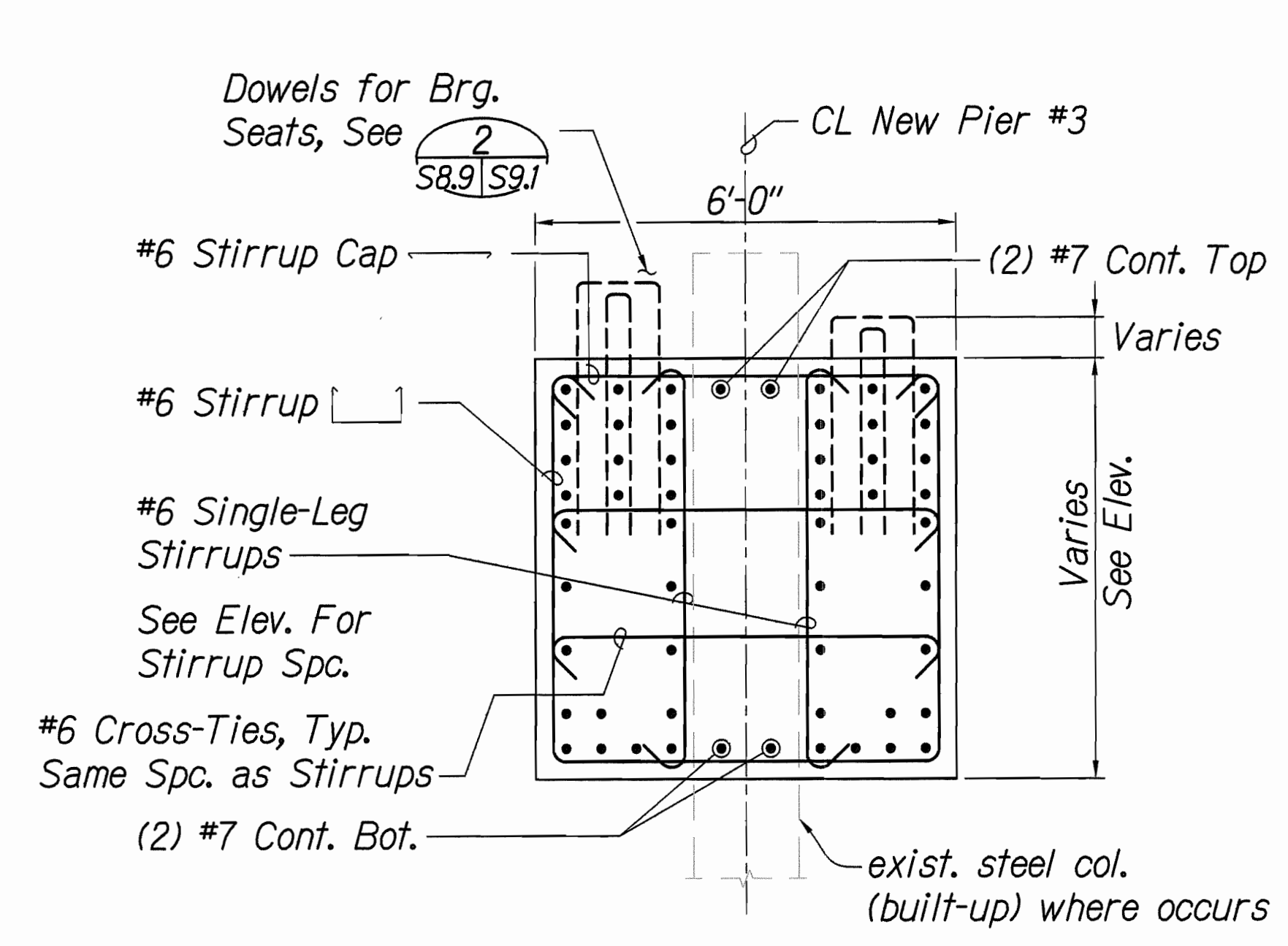
NEW PIER #3 CAP BEAM
- PLAN & SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

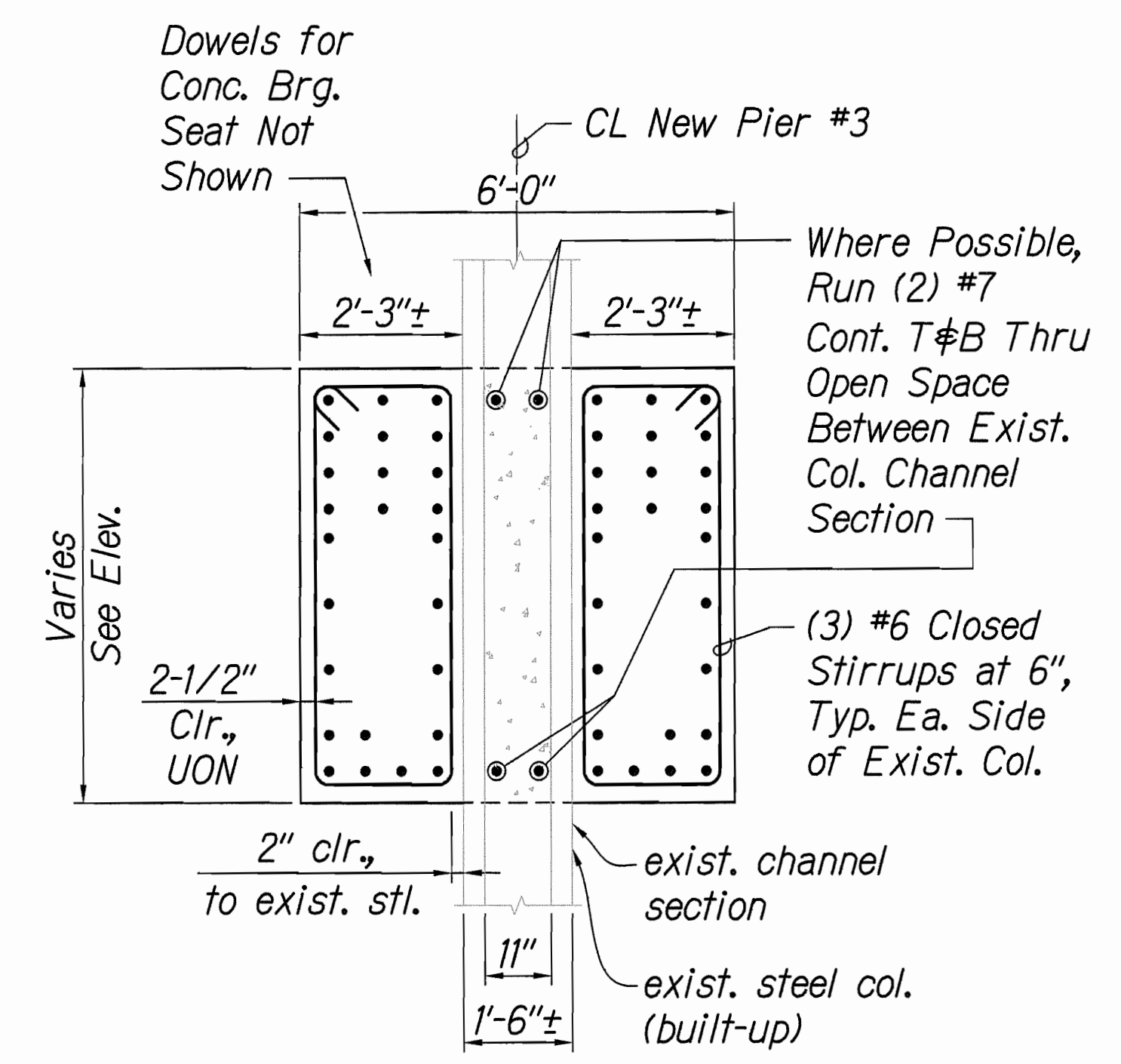
Scale: As Shown Date: July 25, 2012

SHEET No. S8.8 OF 9 SHEETS

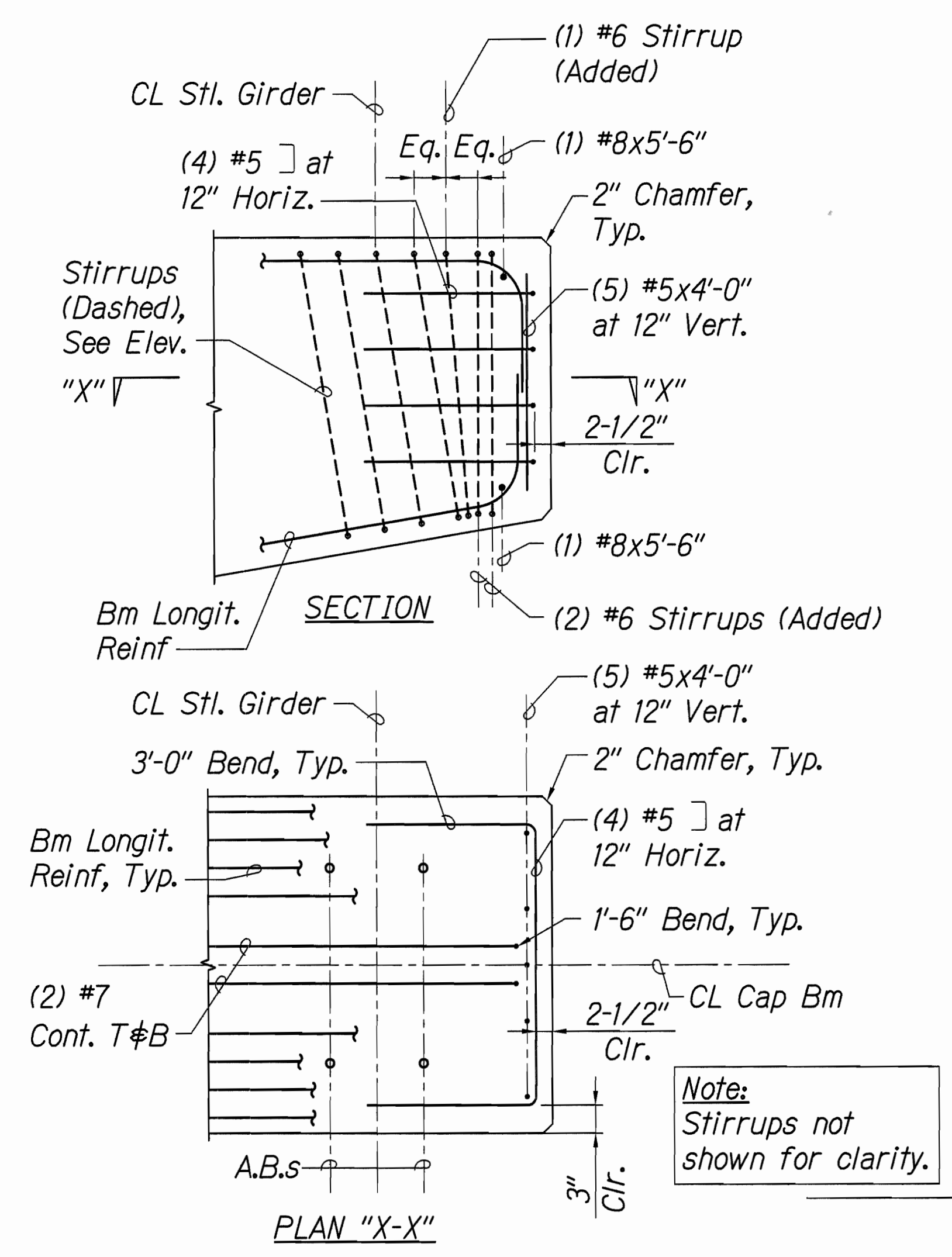
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	102	137



1 SECTION
S8.8 | S8.9 SCALE: 1/2" = 1'-0"

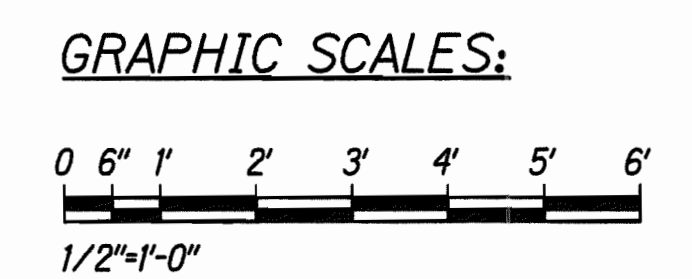


2 SECTION AT EXISTING COLUMN
S8.8 | S8.9 SCALE: 1/2" = 1'-0"



3 END DETAIL
S8.8 | S8.9 SCALE: 1/2" = 1'-0"

SURVEY PLOTTED BY	DATE
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIER #3 CAP REINFORCING
- SECTIONS & DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

SHEET No. S8.9 OF 9 SHEETS

CL New Pier #1 or Pier #2

CL exist. bent

CL New Hinge Brg.

Edge of New Cap

CL New Hinge Brg.

CL New Exp. Brg.

CL New Pier #3

CL exist. bent #5

CL New Hinge Brg.

1'-0"

2'-3"

2'-3"

2'-3"

2'-3"

1'-0"

1'-9"

1'-9"

G5

Cont. Conc. Brg. Seat

A.B.'s Typ.

G1

10" Typ.

10" Typ.

exist. stl. strut, typ.

Typ. S9.1 S9.2

G2

BL Bridge

G3

Typ. S9.1 S9.1

New Creep Blocks Above, Typ. See Elev. 3 S9.1 S9.2

G4

Edge of New Cap

exist. stl. col., typ.

G6

Cont. Conc. Brg. Seat

1'-0"

6"

2'-6"

2'-6"

12"

12"

CL New Pier #3

CL exist. bent #5

CL New Hinge Brg.

1'-0"

1'-9"

1'-9"

G5

A.B.'s Typ.

Edge of New Cap

Cont. Conc. Brg. Seat

exist. stl. strut, typ.

BL Bridge

G2

G3

Typ. S9.1 S9.1

New Creep Blocks Above, Typ. See Elev. 3 S9.1 S9.2

G4

exist. stl. col., typ.

G6

1'-0"

3"

3"

2'-0"

2'-0"

9"

9"

Top Plate

EXIST BENT #5
(NEW PIER #3)

1. *New steel end cross-frames above not shown for clarity. See elevation on sheet S9.2 and plan on sheet S10.2.*
2. *Heights of new concrete bearing seats shall be field verified with new and existing conditions prior to construction.*

[illegible]

L Bridge
 2 Elev.
 S9.1 S9.2
 New Creep Blocks
 Above, Typ. See
 Elev. ϕ 3
 S9.1 S9.2
 exist. stl.
 ol, typ.
 Top of Brg. Seat Deviation from
 Plane Shall Not Exceed 1/16", Typ.
 CL Girder

New Stl. Brg. PL,
 See Sht. S10.5
 (4) #7 Cont. T ϕ B
 Bot. of Exist.
 or New Girders
 1'-2 1/2"
 (See Note 2)
 Top of Pier
 Cap El 176.50
 2'-6" Min.
 2'-0"
 #5 Closed Ties
 at 2 1/2"
 (1) #7 at
 6" E.F.
 CL New Pier #3 ϕ exist. bent #5
 Condition at G2 and G3, For
 Reinf See South Side
 For Reinf,
 See 1
 S9.1 S9.1 Sim.
 Bot. of
 Exist. or
 New Girders
 11" (See Note 2)
 Pier Cap Reinf Not
 Shown For Clarity

(2) 1-1/4" Dia A.B.s,
 Typ. UON
 (2) 1-1/2" Dia A.B.s, at
 G5 & G6

10" 10"

New Stl. Brg. PL
 A.B. Projection,
 See Sht. S10.4

#5 Ties at
 5" OC

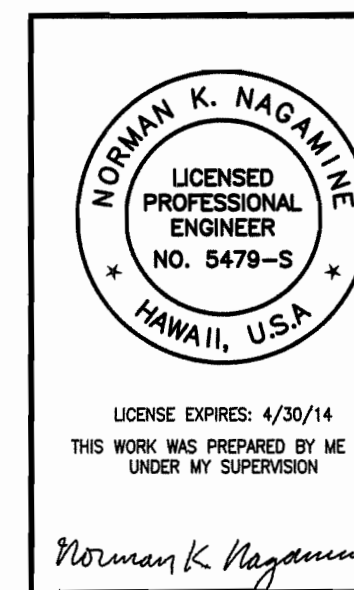
SECTION
 S8.9, S9.1 & S9.2 | S9.1 SCALE: 3/4" = 1'-0"

GRAPHIC SCALES:

0 6" 1' 2' 3' 4'
 3/4" = 1'-0"

0 3" 6" 9" 1' 2' 3'
 1" = 1'-0"

SECTION
SCALE: 1" = 1'-0"



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

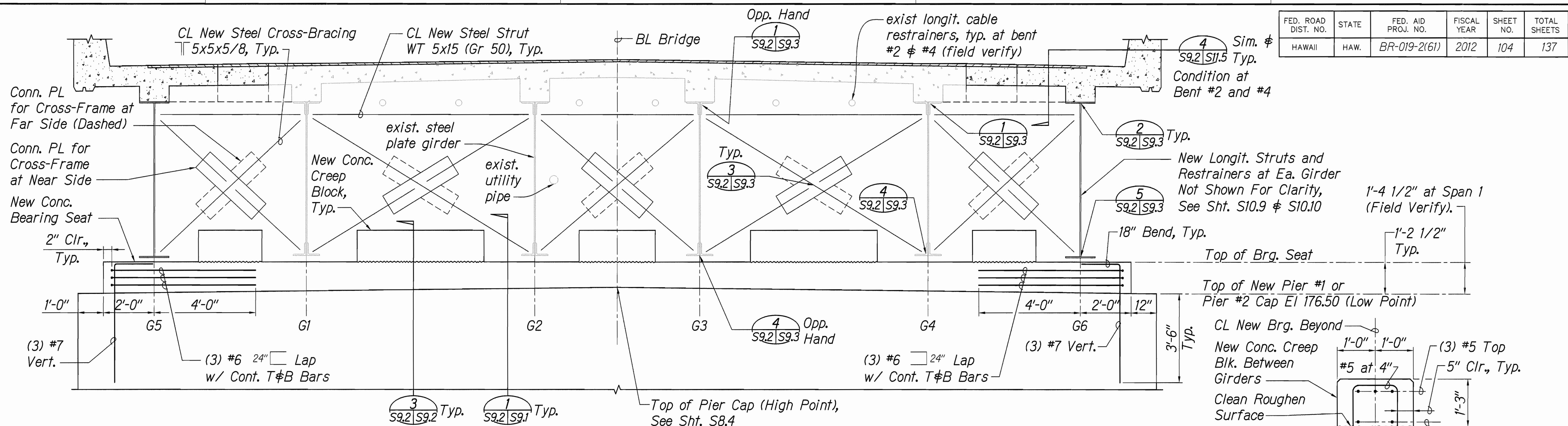
NEW PIERS - CONCRETE BEARING
SEAT PLANS & SECTIONS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

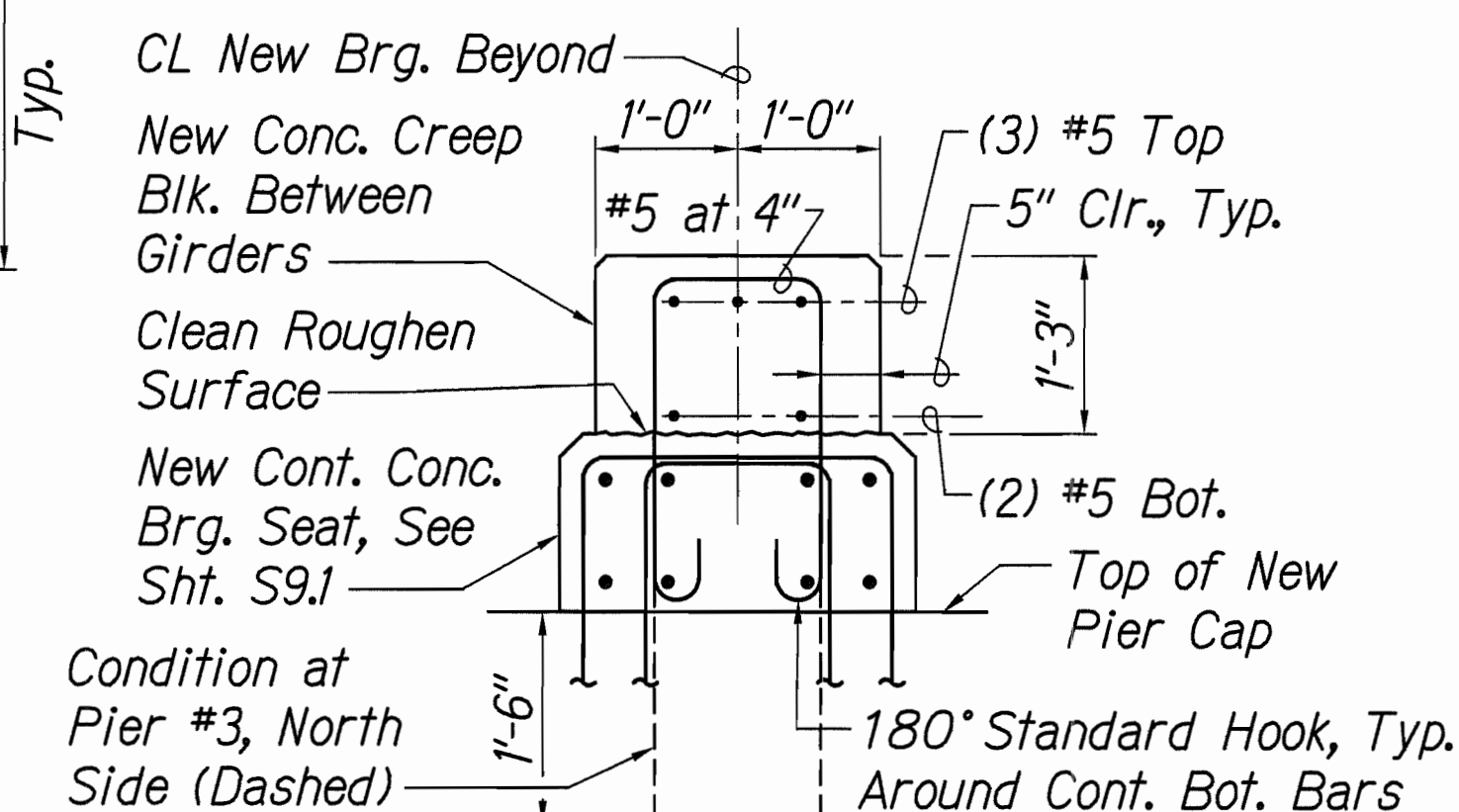
Scale: As Shown Date: July 25, 2012

SHEET No. S91 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	104	137



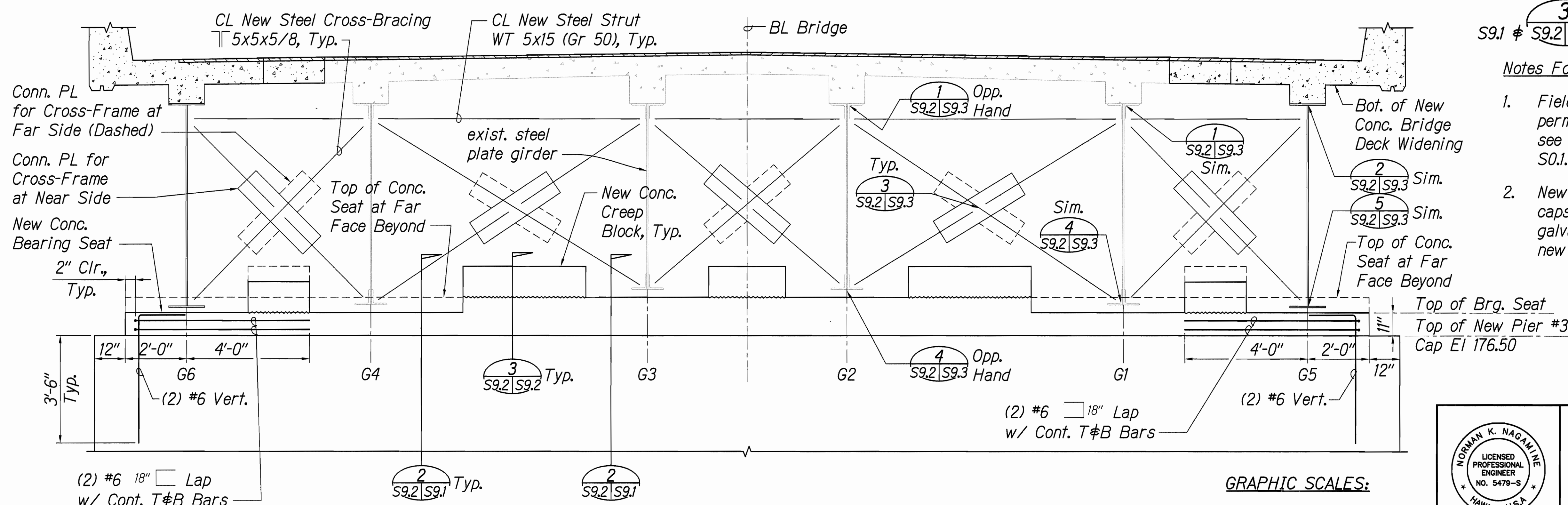
1 ELEVATION - NEW PIER #1 & PIER #2 BEARING SEAT, CREEP BLOCK & END CROSS-FRAME (LOOKING NORTH)
S9.1, S10.1 & S10.2 S9.2 SCALE: 1/2" = 1'-0"



3 CREEP BLOCK SECTION
S9.1 & S9.2 S9.2 SCALE: 3/4" = 1'-0"

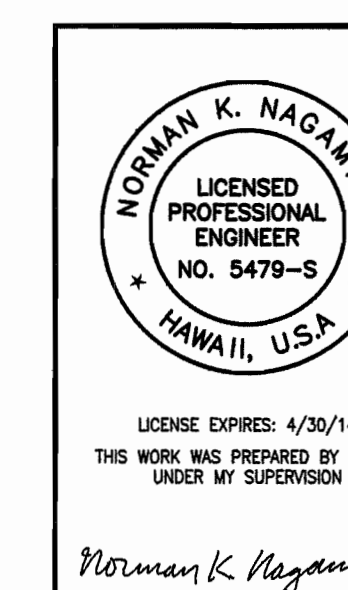
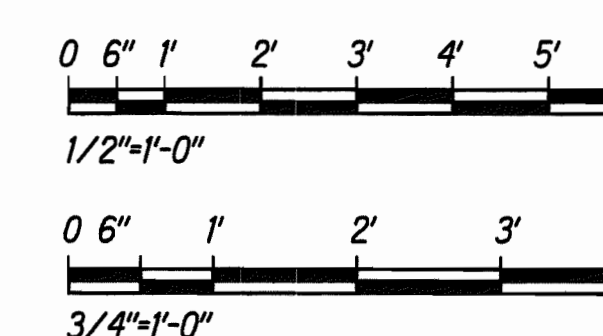
Notes For Piers:

- Field welding to existing steel shall not be permitted unless specifically shown or noted, see Structural Steel general notes on sheet S0.1.
- New anchor bolts embedded in concrete pier caps shall be ASTM F1554, grade 105, hot-dip galvanized. This item shall be incidental to new steel bearing and expansion plates.
- Cast-in anchor bolts shall be inspected by the Engineer, see sheet S0.2.
- Concrete bearing seats and creep blocks shall be incidental to concrete in pier cap.



2 ELEVATION - NEW PIER #3 BEARING SEAT, CREEP BLOCK & END CROSS-FRAME (LOOKING SOUTH)
S9.1 & S10.2 S9.2 SCALE: 1/2" = 1'-0"

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NEW PIERS - BEARING SEAT, CREEP BLOCK & END FRAME

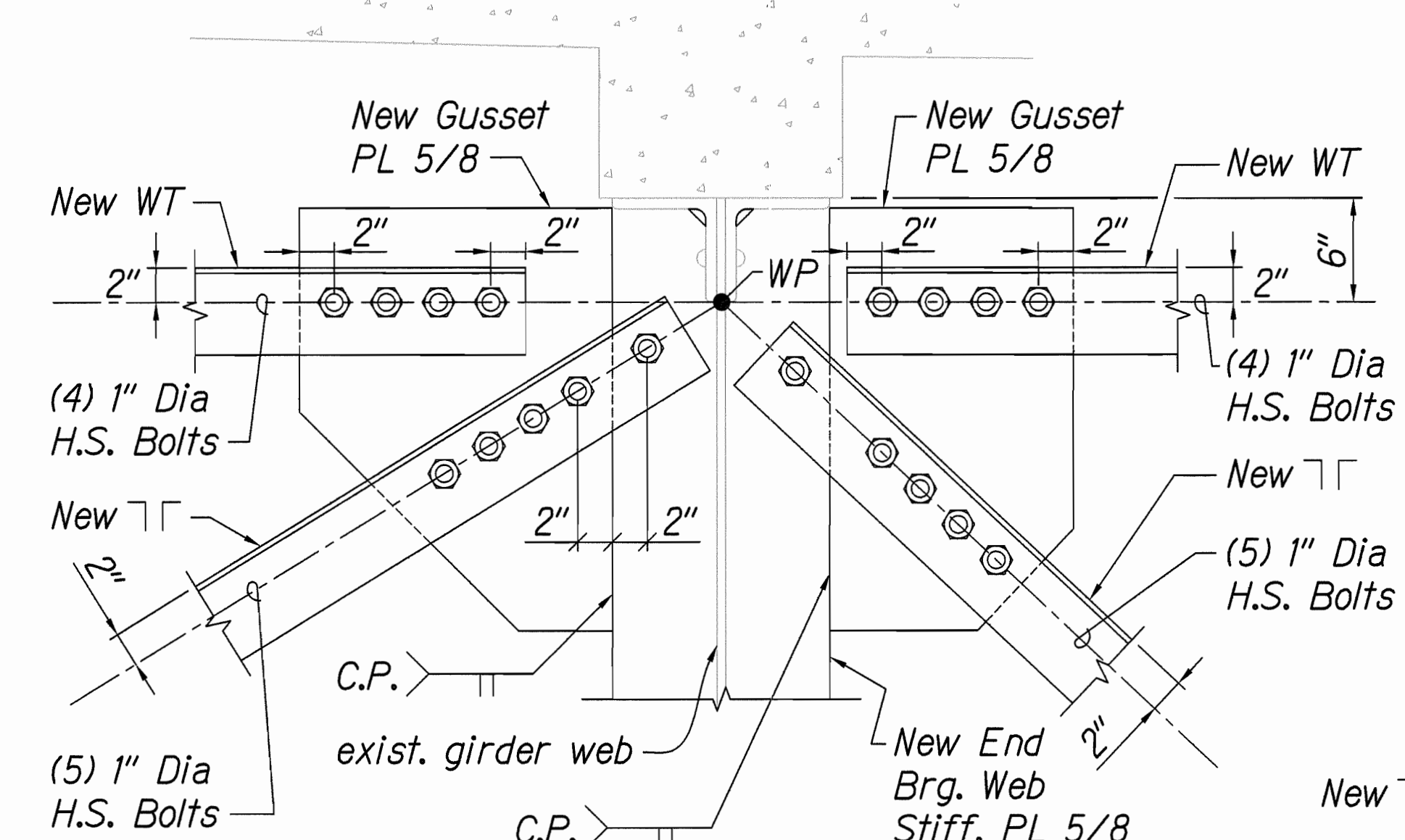
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

SHEET No. S9.2 OF 6 SHEETS

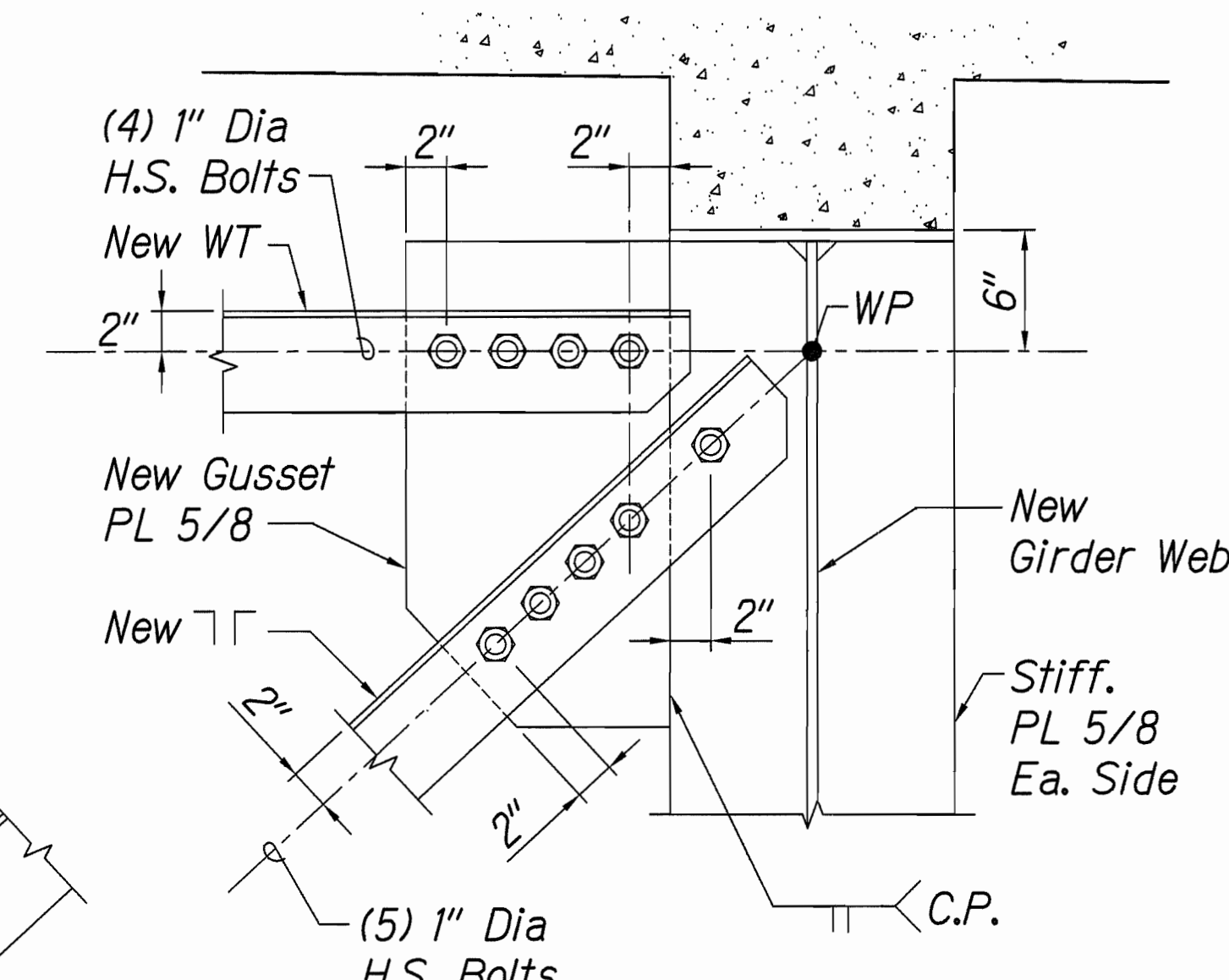
SURVEY PLOTTED BY	DATE
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTED BY	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	105	137

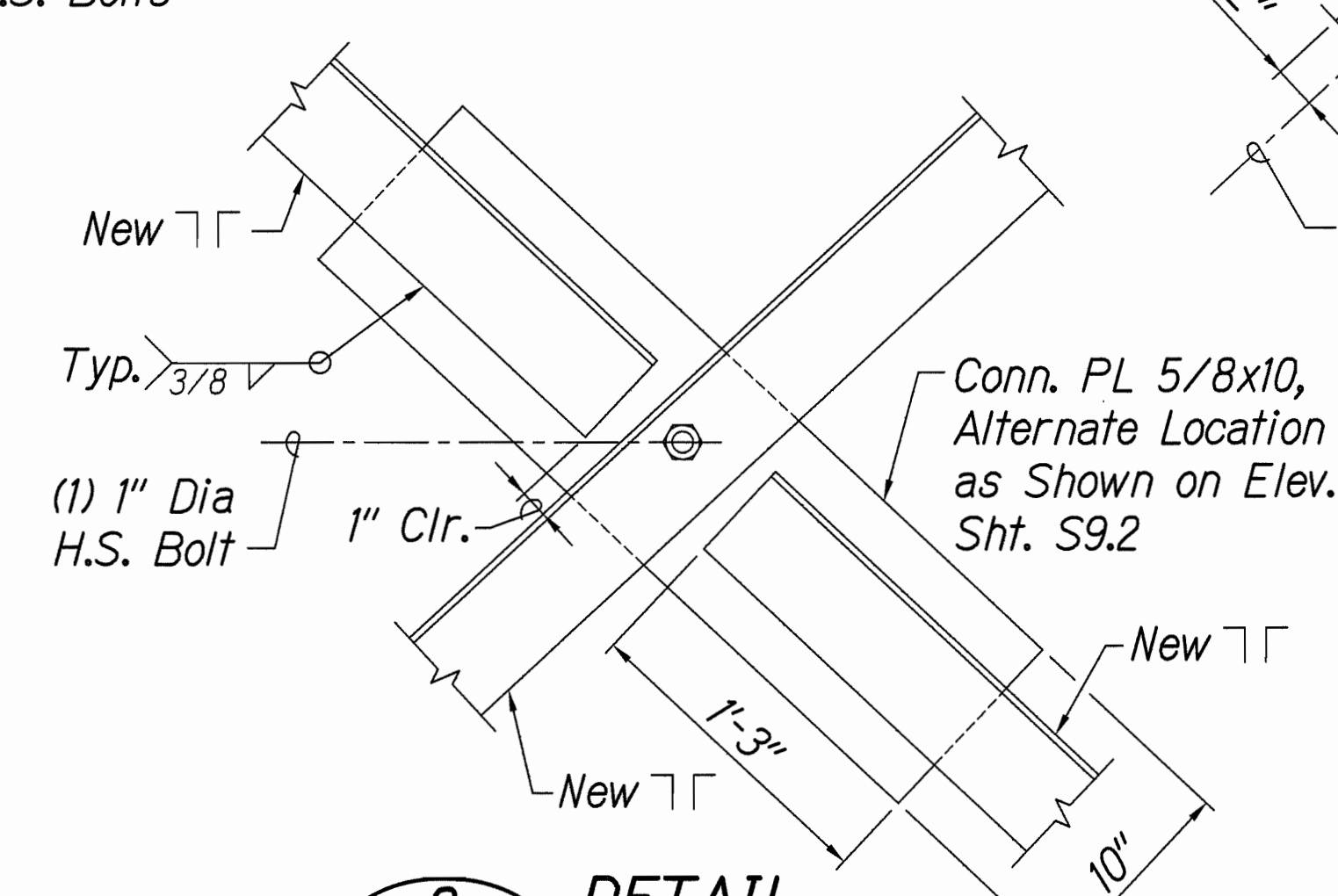


1 DETAIL
S9.2 S9.3 SCALE: 1-1/2" = 1'-0"

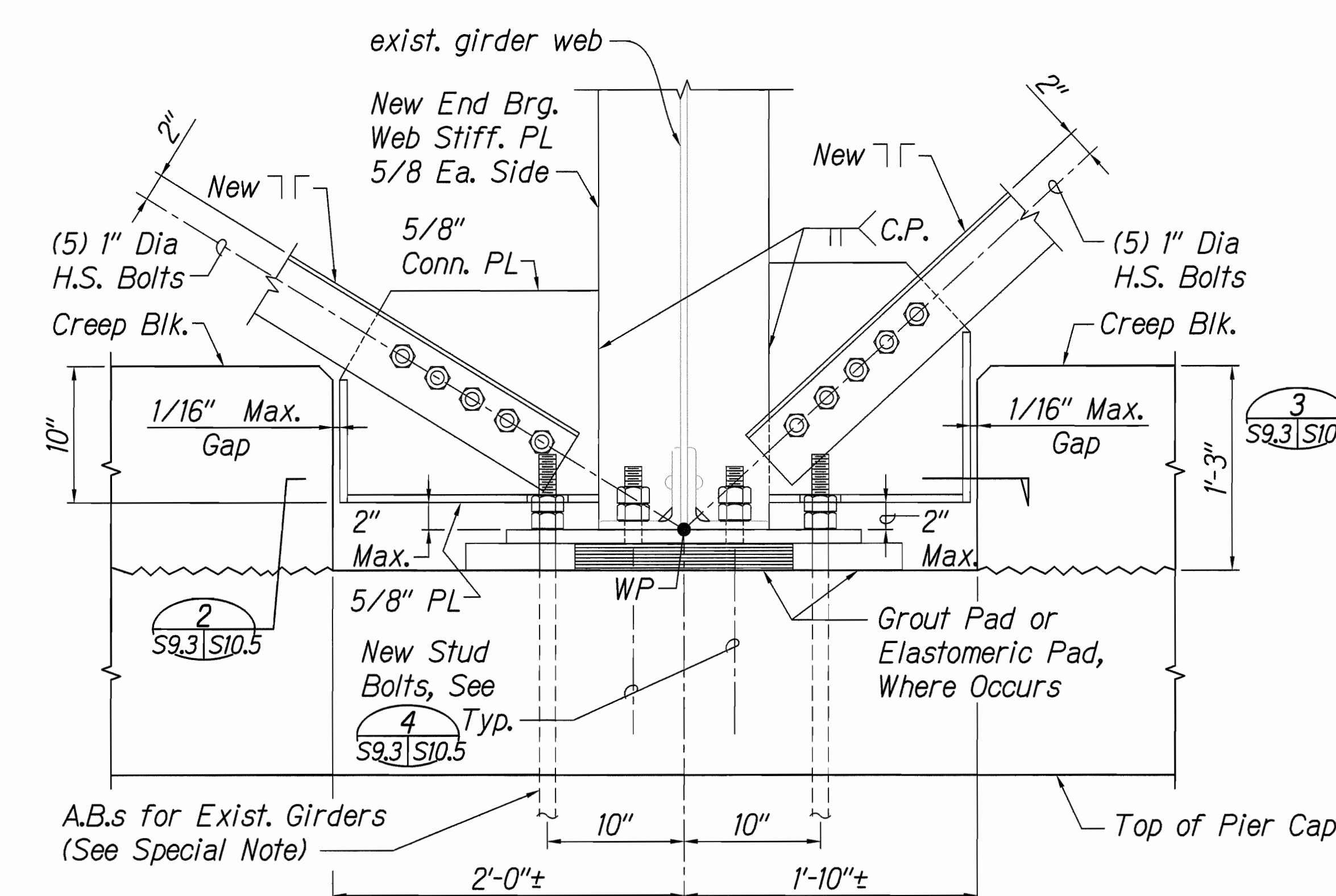
Note:
All bolts shall be spaced at 3" c.c., UON



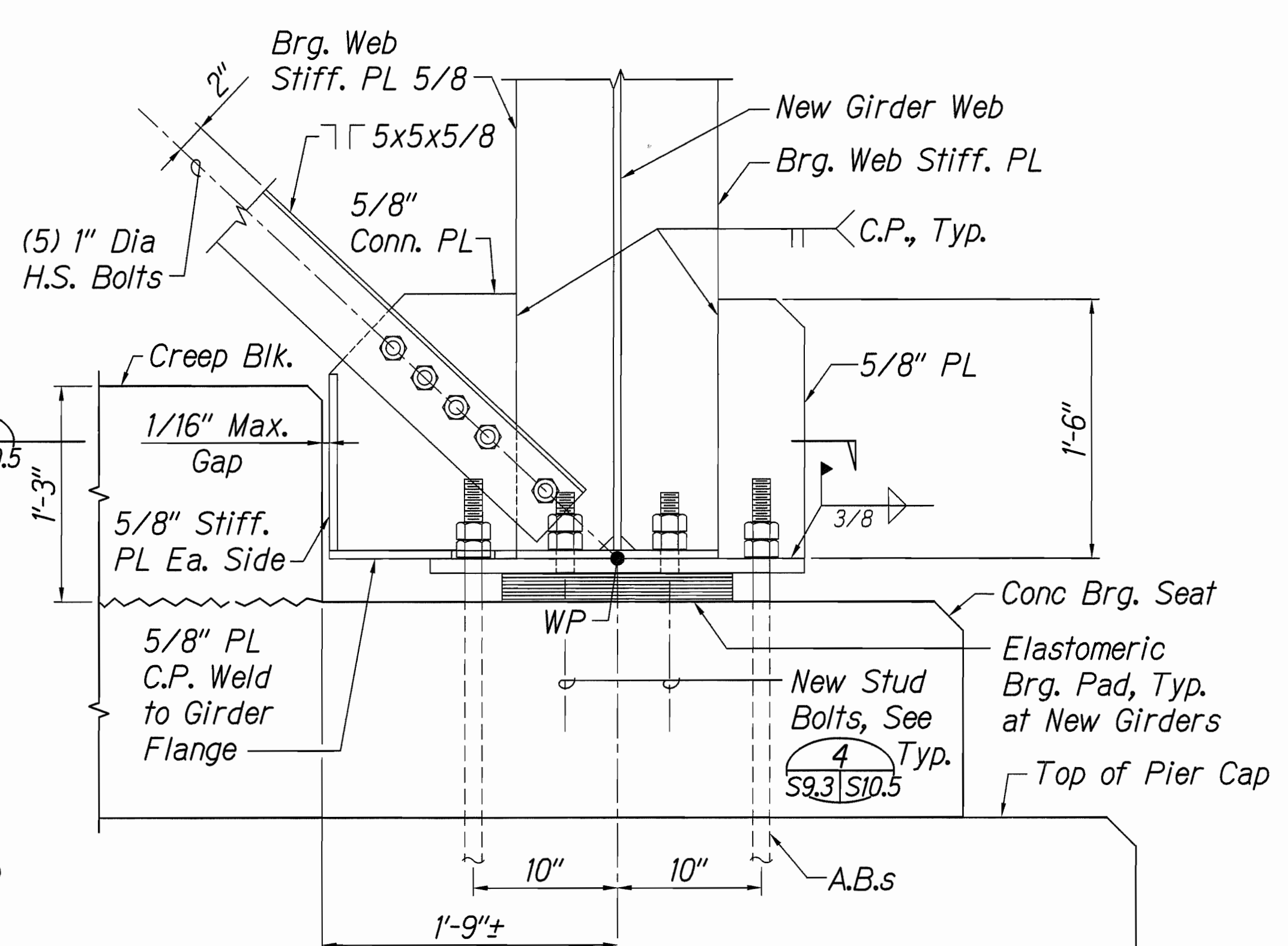
2 DETAIL
S9.2 S9.3 SCALE: 1-1/2" = 1'-0"



3 DETAIL
S9.2 S9.3 SCALE: 1-1/2" = 1'-0"



4 DETAIL
S9.2 & S10.5 S9.3 SCALE: 1-1/2" = 1'-0"



5 DETAIL
S9.2 & S10.5 S9.3 SCALE: 1-1/2" = 1'-0"

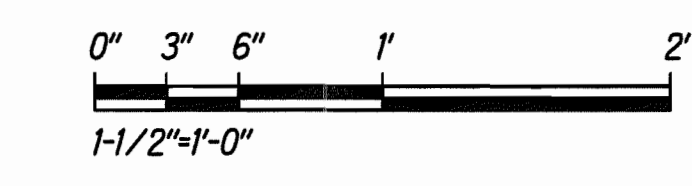
Notes:

- For steel girder bearing plates, see notes on sheet S10.4.

Special Note:

At existing girders, do not install double nuts on anchor bolts until concrete pier cap is cast and cured (60 days minimum).

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**NEW PIERS - END
CROSS-FRAME DETAILS**

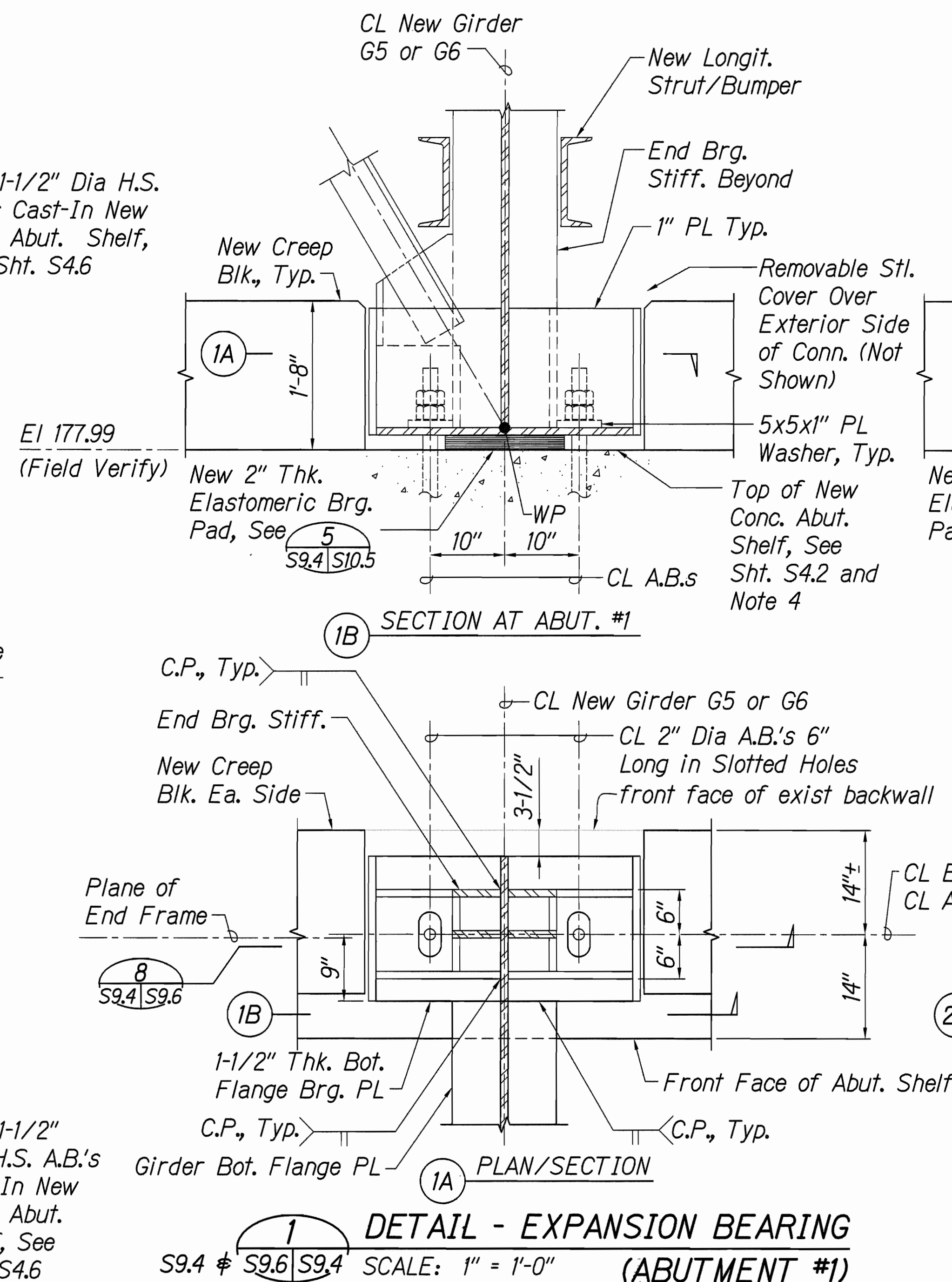
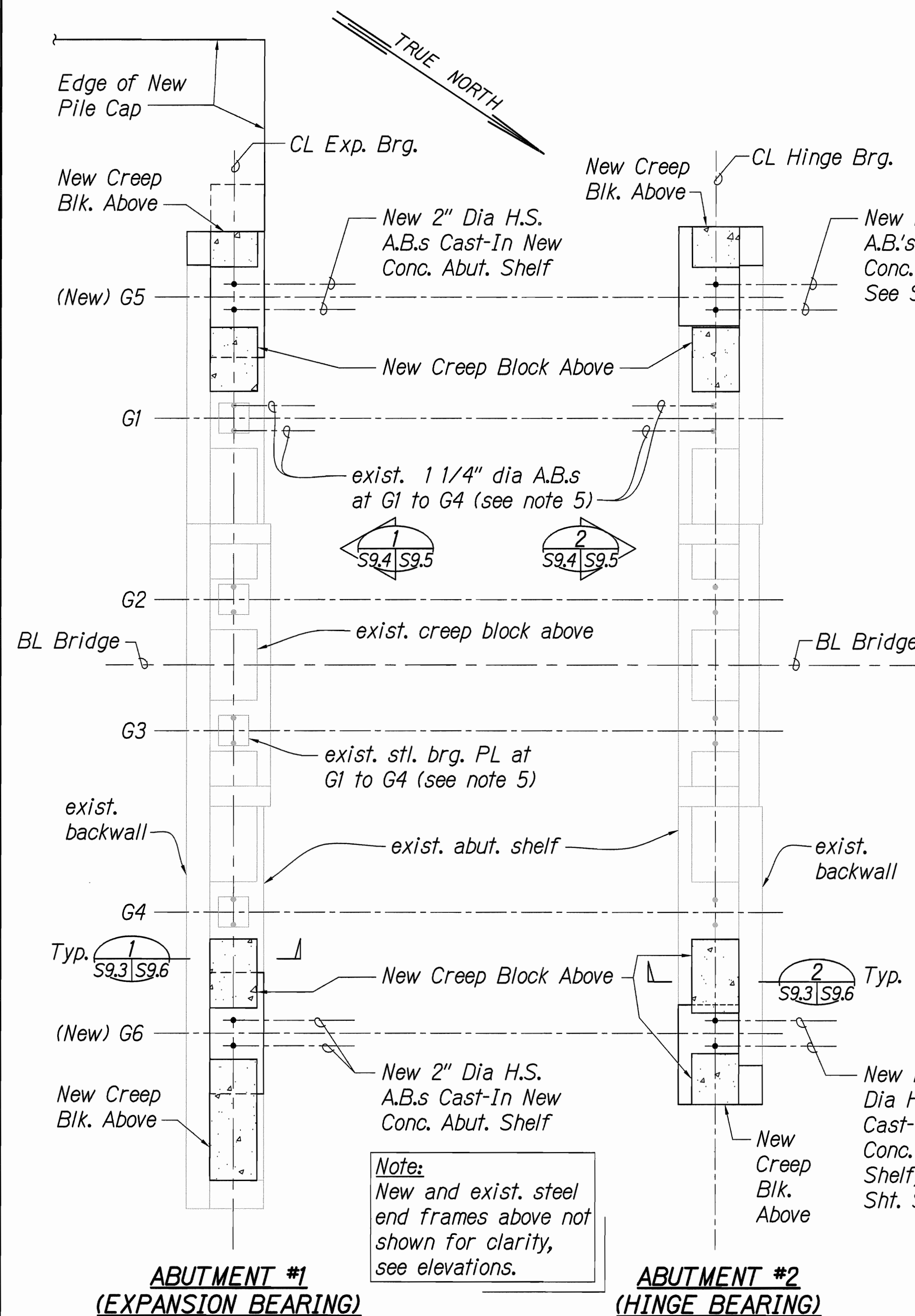
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1-1/2" = 1'-0" Date: July 25, 2012

SHEET No. S9.3 OF 6 SHEETS

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	106	137

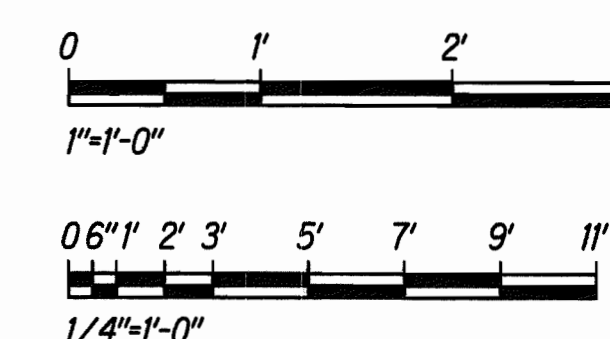


Notes For Abutments:

- Field welding to existing steel shall not be permitted unless specifically shown or noted, see Structural Steel general notes on sheet S0.1.
- New high strength anchor bolts cast in concrete abutments shall be ASTM F 1554 (grade 105), hot-dip galvanized. This item shall be incidental to new steel girders. Anchor bolts shall be snug-tight, do not torque.
- Cast-in anchor bolts shall be inspected by the Engineer, see sheet S0.2.
- Concrete abutment shelf bearing area deviation from plane shall not exceed 1/16-inch.

- Existing steel bearing plates and existing anchor bolts shall be cleaned and painted. See Special Provisions Section 501 and Section 694.

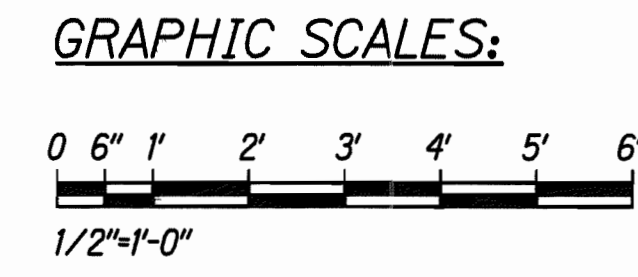
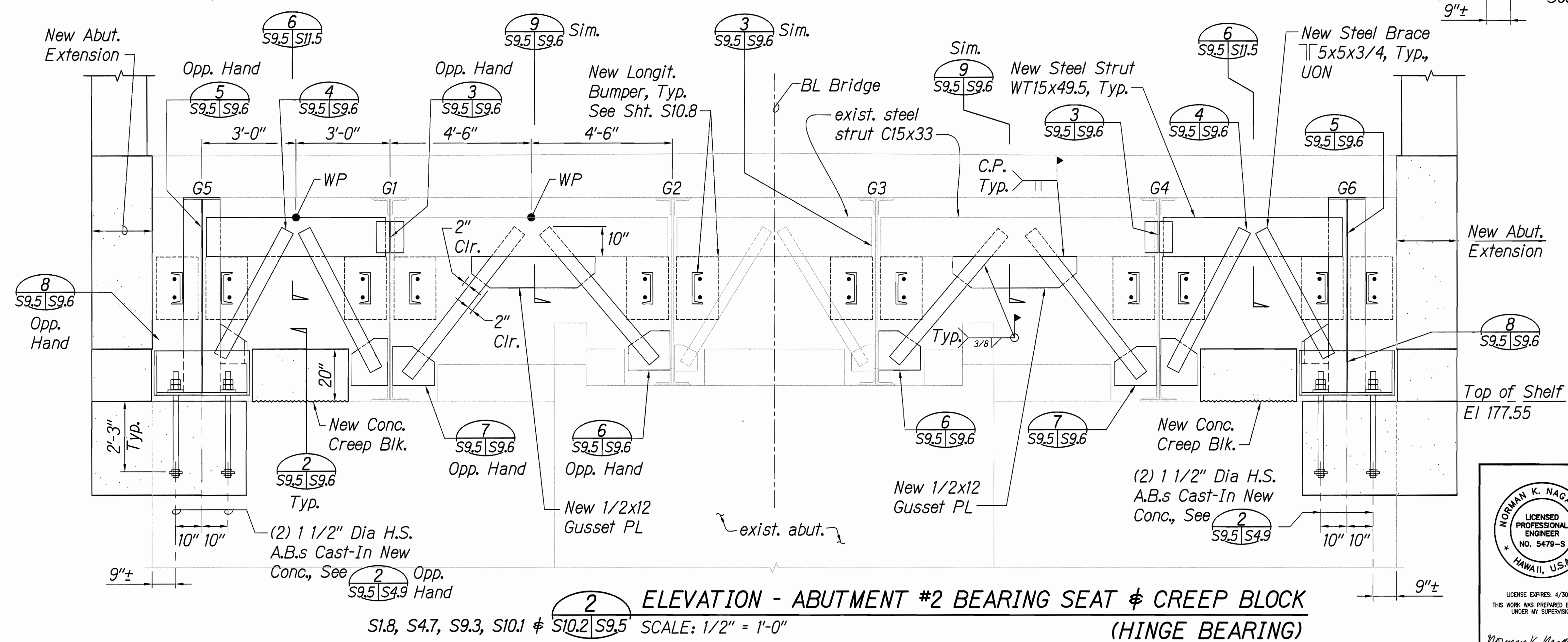
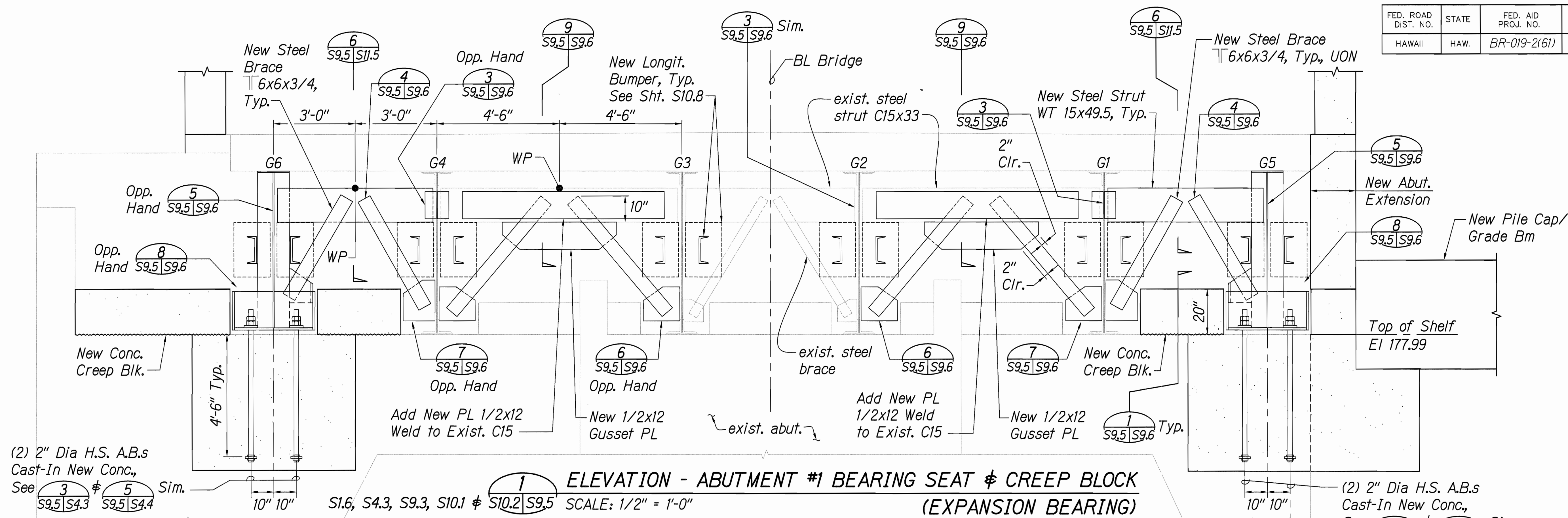
GRAPHIC SCALES:



	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	ABUTMENT - NEW CONCRETE
	BEARING SEAT PLANS & SECTIONS
	HAWAII BELT ROAD Rehabilitation of Umauma Stream Bridge Federal Aid Project No. BR-019-2(61) Scale: As Shown Date: July 25, 2012

SHEET No. S9.4 OF 6 SHEETS

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STATE OF HAWAII
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ABUTMENT - BEARING SEAT & CREEP BLOCK DETAILS

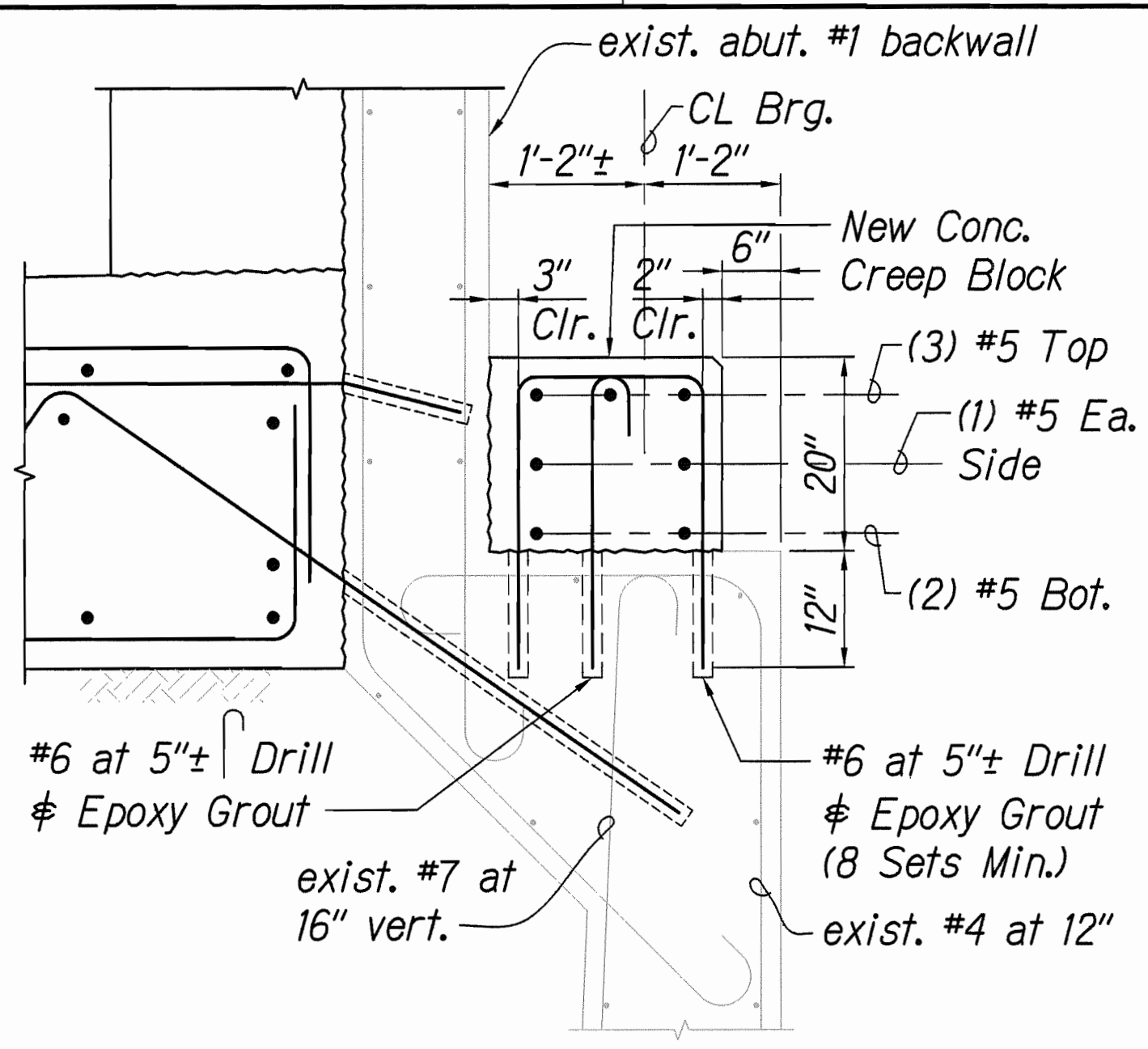
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/2" = 1'-0" Date: July 25, 2012

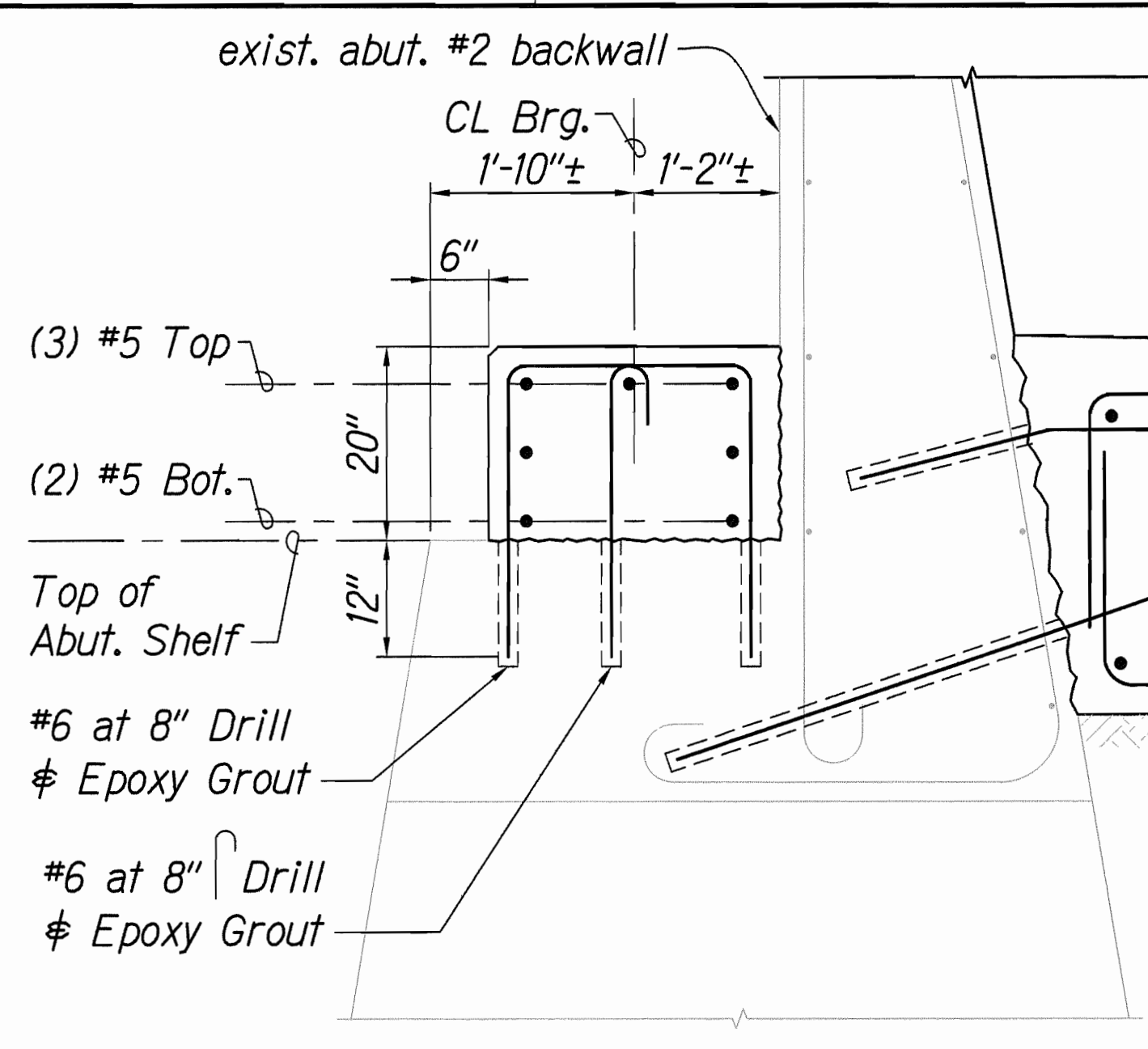
SHEET No. S9.5 OF 6 SHEETS

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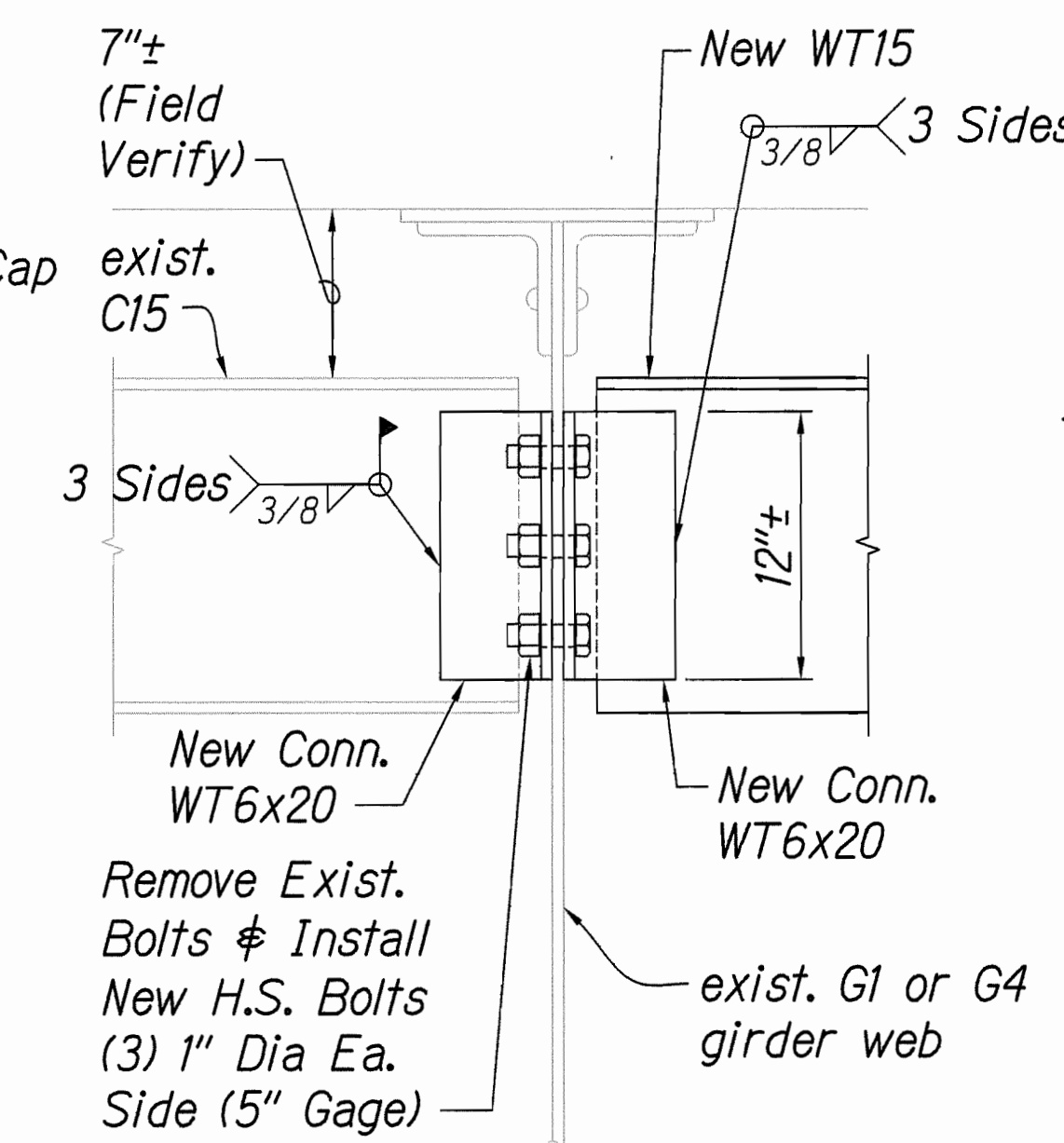
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	108	137



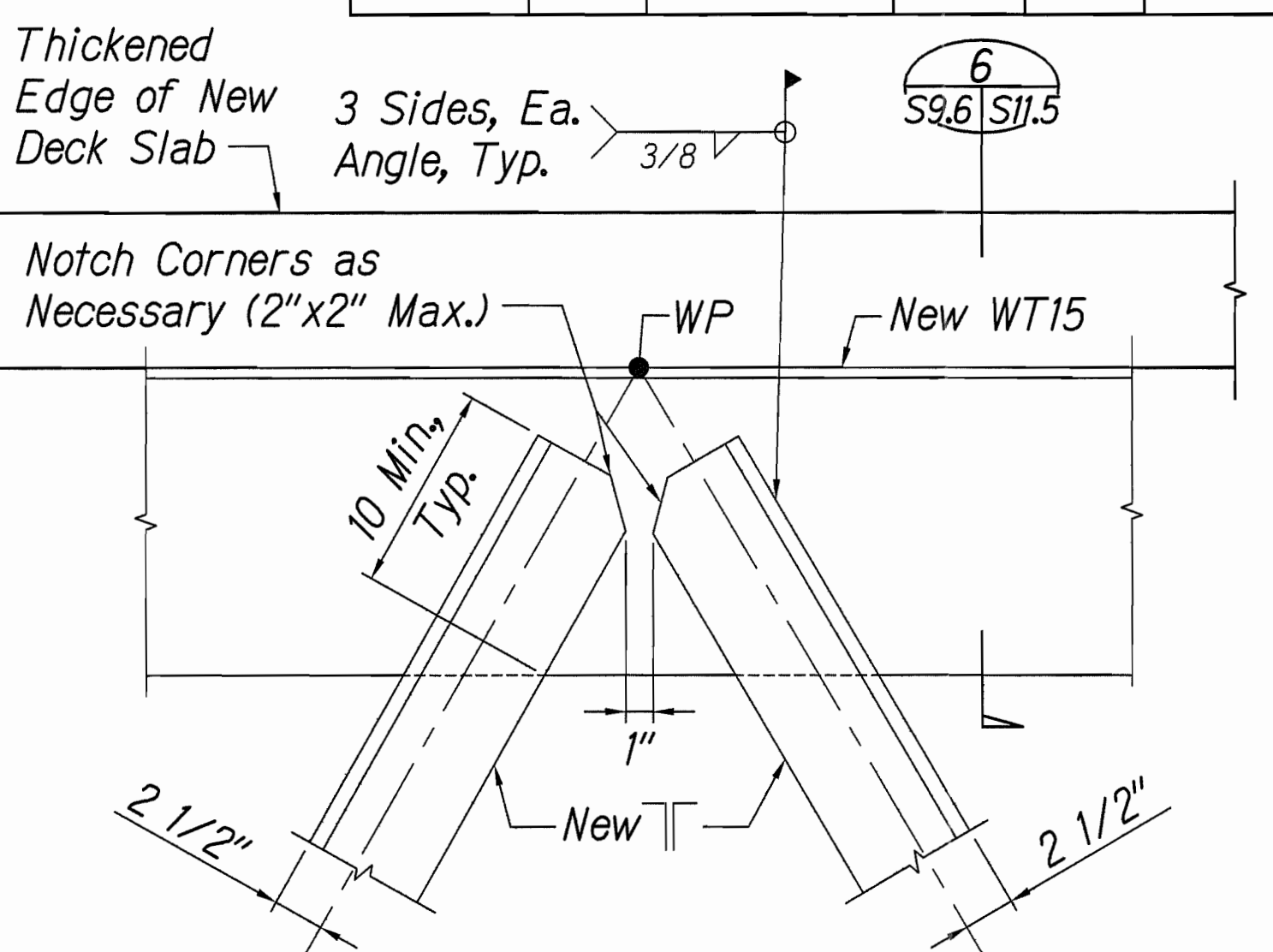
1 SECTION
S9.3, S9.5 & S9.6 | S9.6 | S9.6 SCALE: 3/4" = 1'-0"



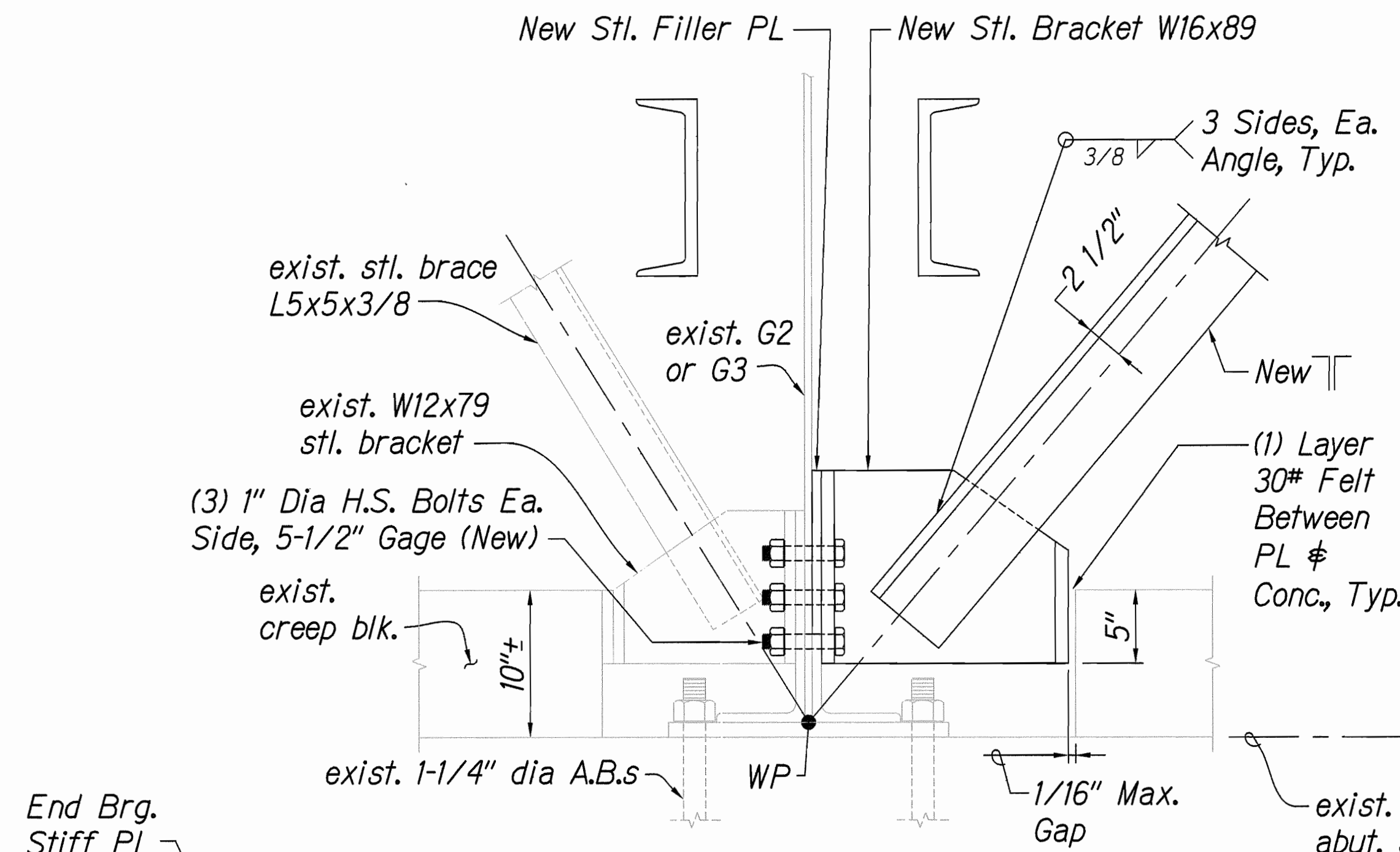
2 SECTION
S9.3 & S9.5 | S9.6 | S9.6 SCALE: 3/4" = 1'-0"



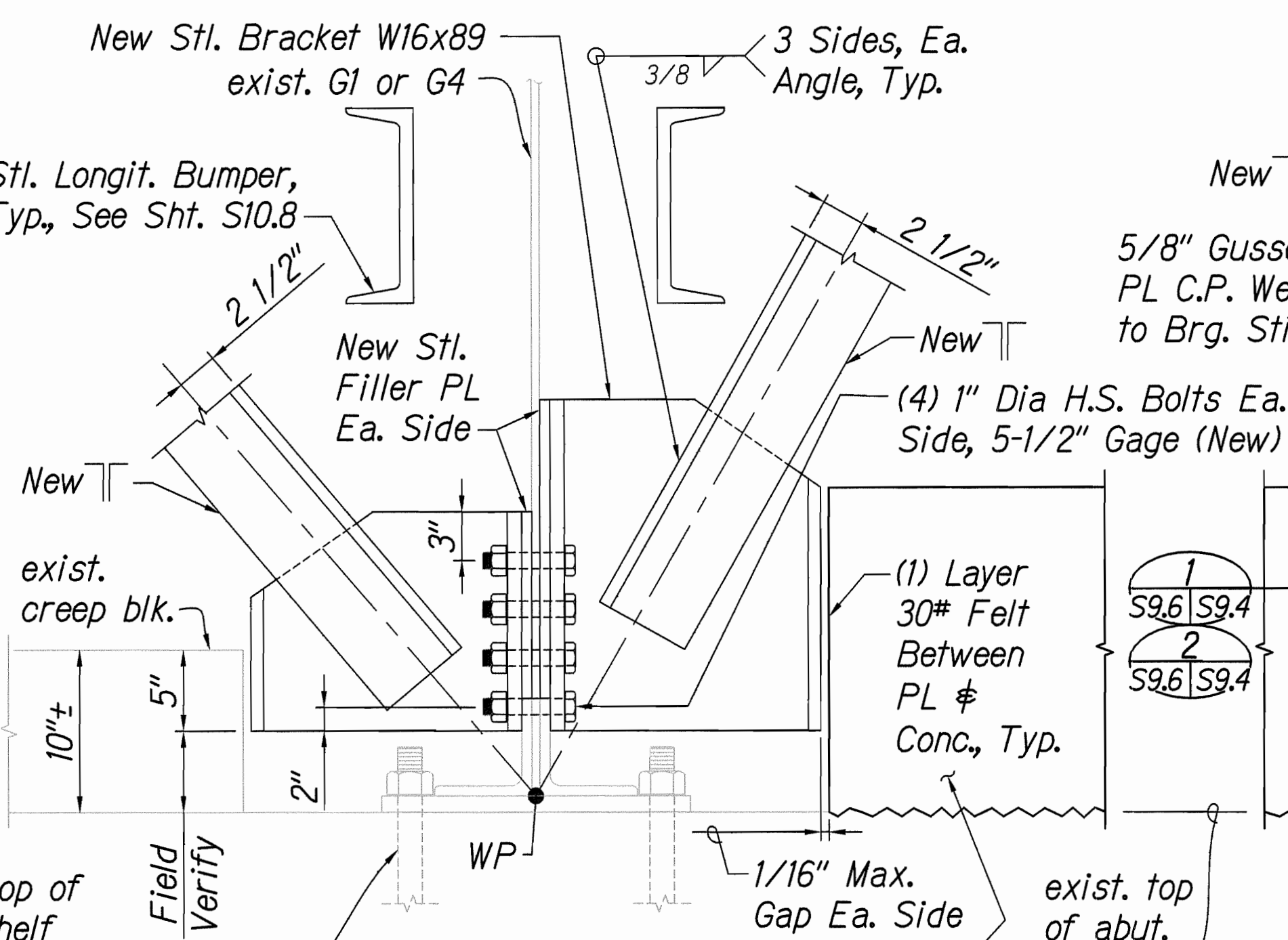
3 DETAIL
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



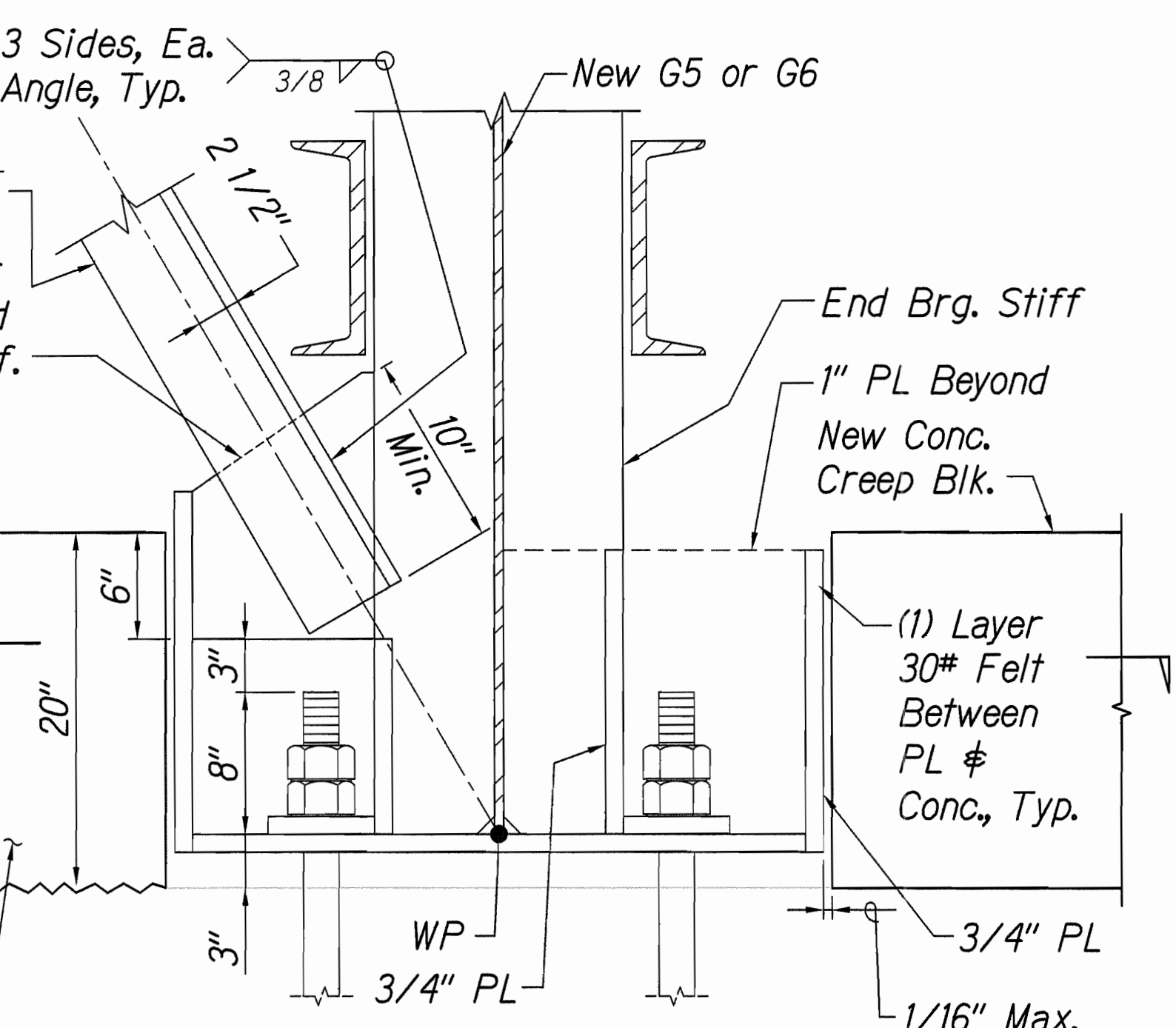
4 DETAIL
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



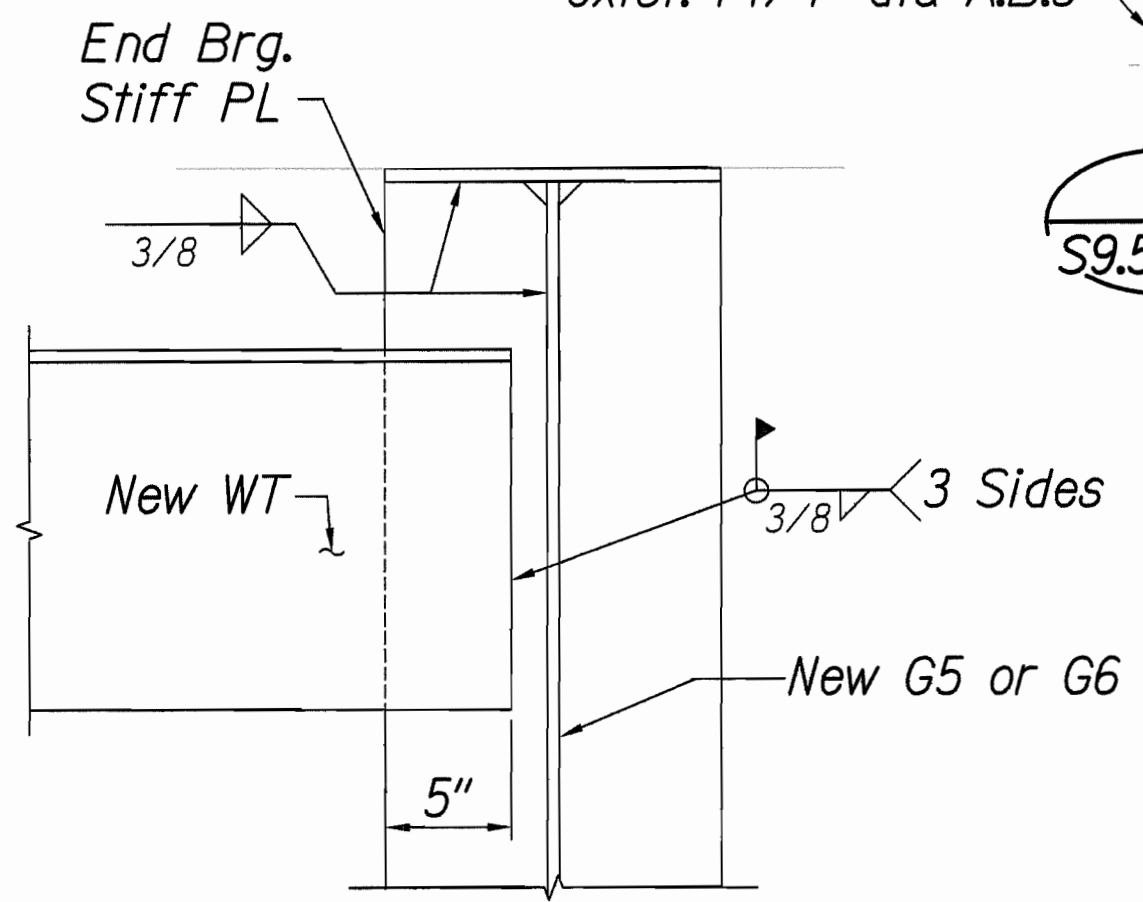
6 DETAIL
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



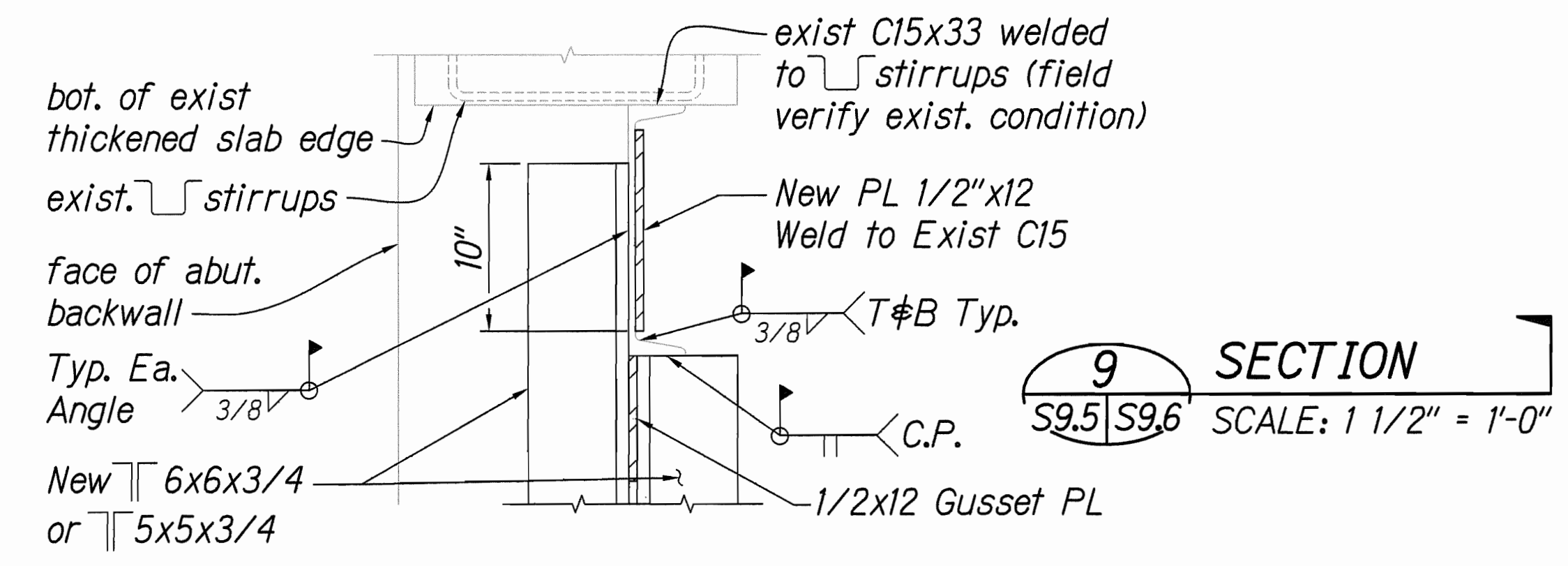
7 DETAIL
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



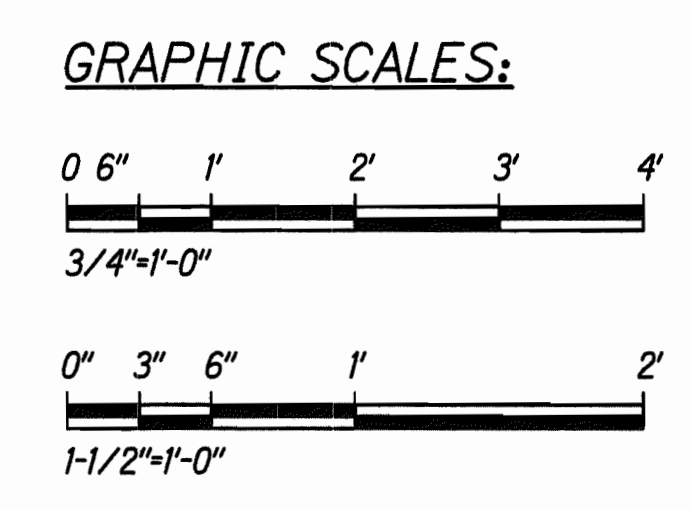
8 DETAIL
S9.4, S9.5 & S10.3 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



5 DETAIL
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



9 SECTION
S9.5 | S9.6 | S9.6 SCALE: 1 1/2" = 1'-0"



STATE OF HAWAII
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**ABUTMENT - BEARING SEAT,
CREEP BLOCK & END FRAME DETAILS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012
SHEET No. S9.6 OF 6 SHEETS

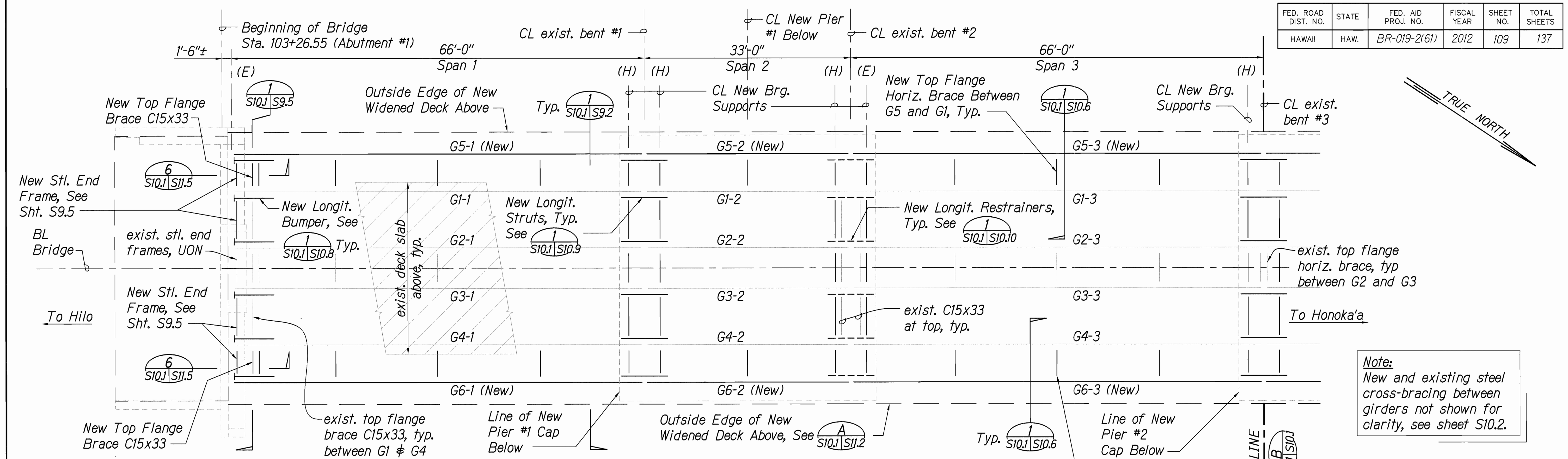
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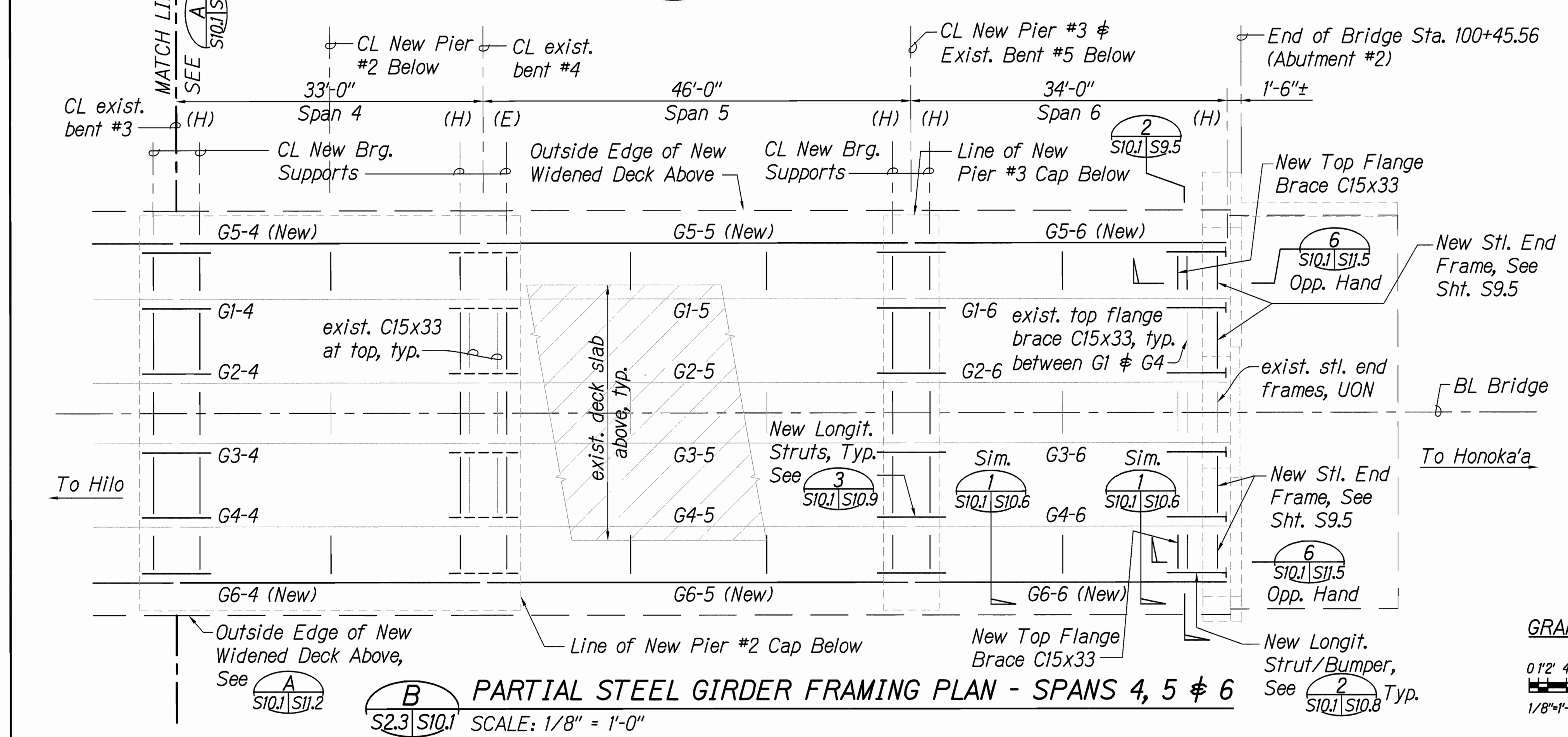
Norman K. Nagamine

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HAWAII	HAW.	BR-019-2(61)	2012	109	137

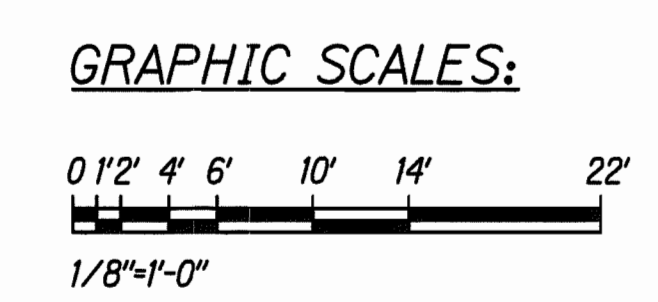


A PARTIAL STEEL GIRDER FRAMING PLAN - SPANS 1, 2 & 3
SCALE: 1/8" = 1'-0"



B PARTIAL STEEL GIRDER FRAMING PLAN - SPANS 4, 5 & 6
SCALE: 1/8" = 1'-0"

- Notes:**
- For overall framing plan, see sheet S2.3.
 - For plan at bottom flange of girder, see sheet S10.2.
 - For new girder typical details, see sheet S10.3.
 - Contractor shall provide temporary and/or permanent lateral bracing of new steel girders as necessary until new deck slab is constructed, see sheet S11.3.



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**NEW WIDENED BRIDGE DECK -
STEEL GIRDER FRAMING PLANS**

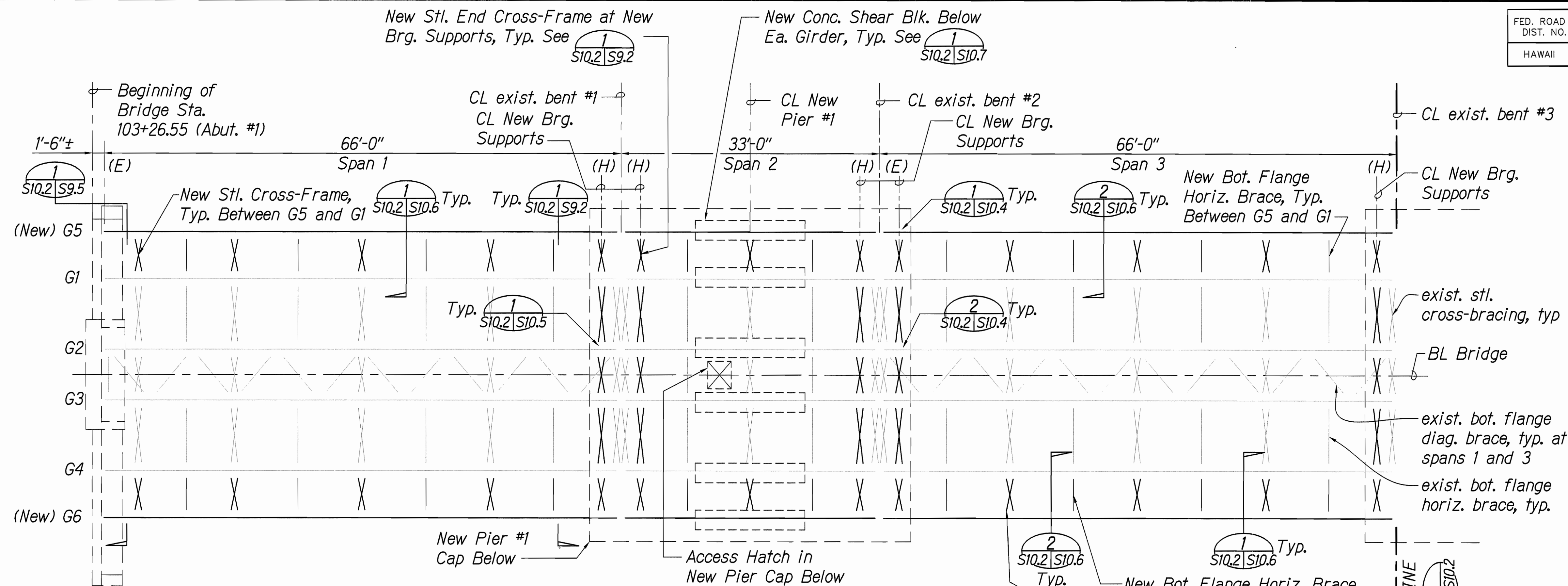
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

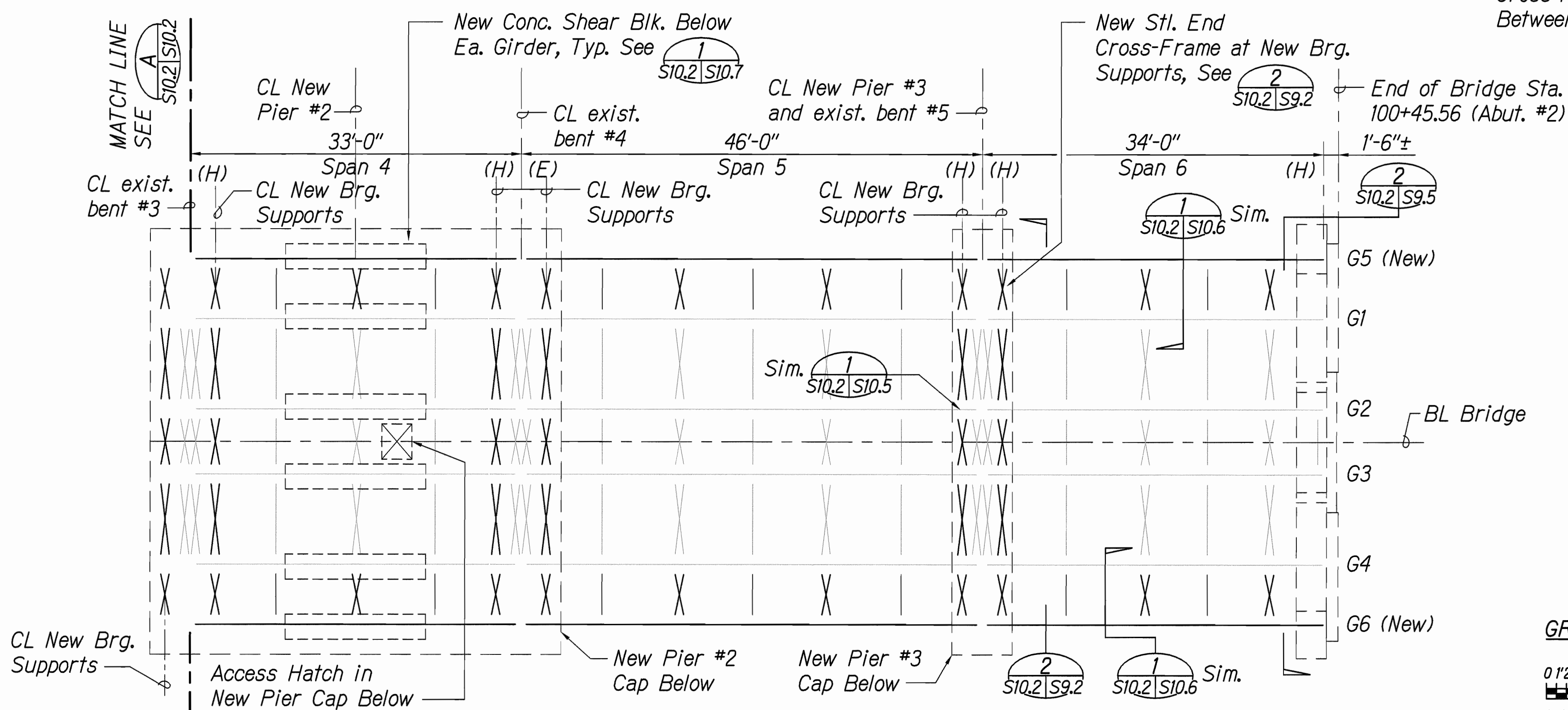
SHEET No. S10.1 OF 10 SHEETS

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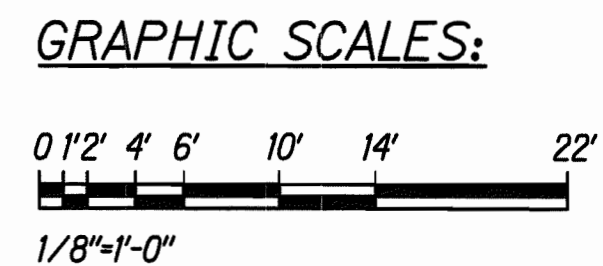


A GIRDER BOTTOM FLANGE BRACING - PARTIAL FRAMING PLAN SPANS 1, 2 & 3
S10.1/S10.2 SCALE: 1/8" = 1'-0"



B GIRDER BOTTOM FLANGE BRACING - PARTIAL FRAMING PLAN SPANS 4, 5 & 6
S10.1/S10.2 SCALE: 1/8" = 1'-0"

- Notes:**
1. For plan at top flange of girder, see sheet S10.1.
 2. For girder bearing details, see sheet S10.4 and S10.5.
 3. For intermediate cross-frame details, see sheet S10.6.
 4. For end cross-frame details, see sheet S9.2 and S9.3.
 5. Contractor shall provide temporary and/or permanent lateral bracing of new steel girders as necessary until new deck slab is constructed, see sheet S11.3.



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**NEW WIDENED BRIDGE DECK - BOTTOM
FLANGE BRACING FRAMING PLANS**

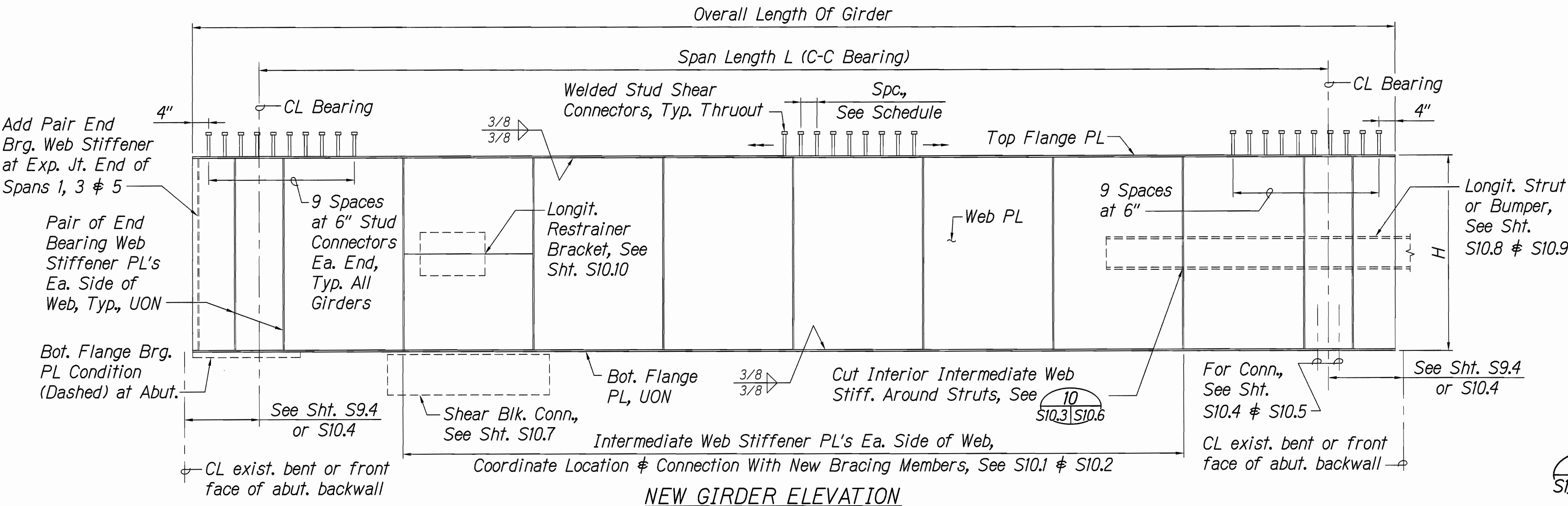
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

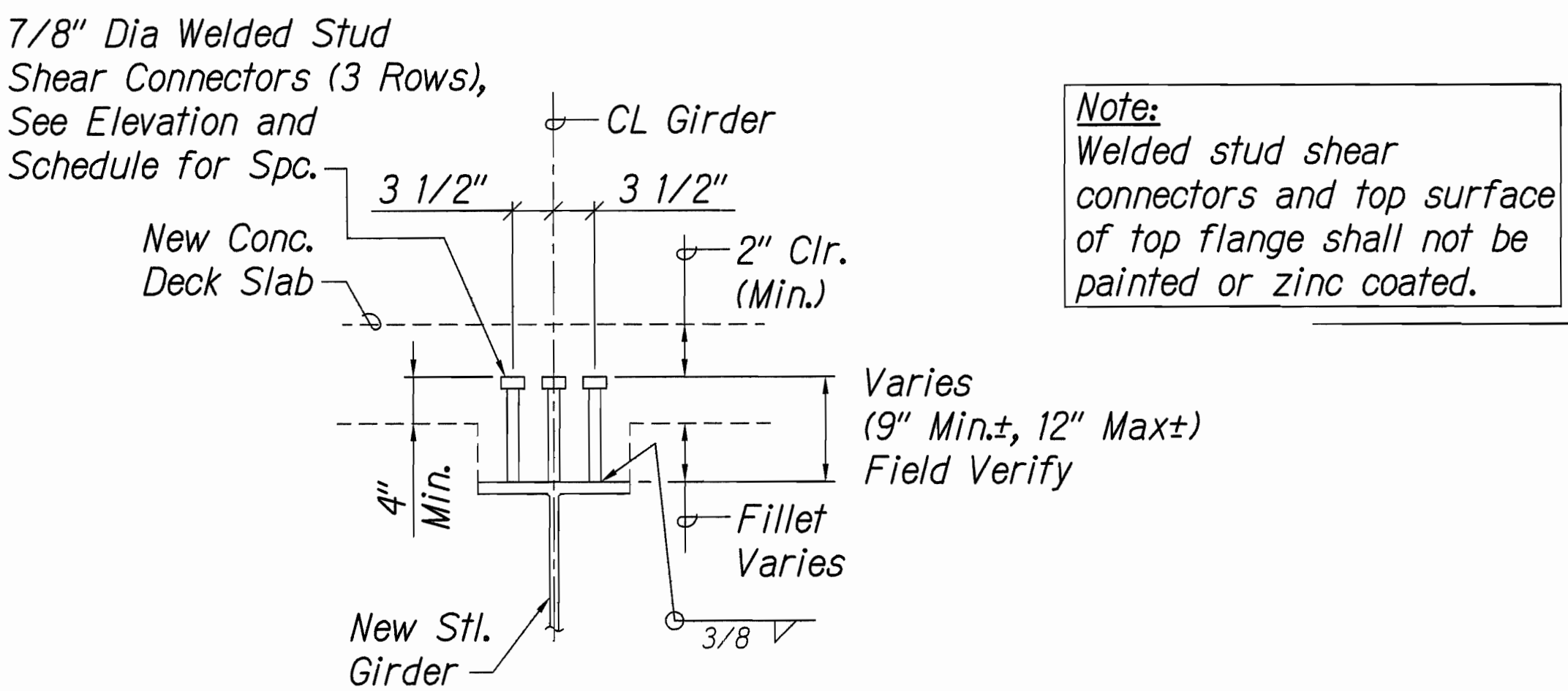
SHEET No. S10.2 OF 10 SHEETS

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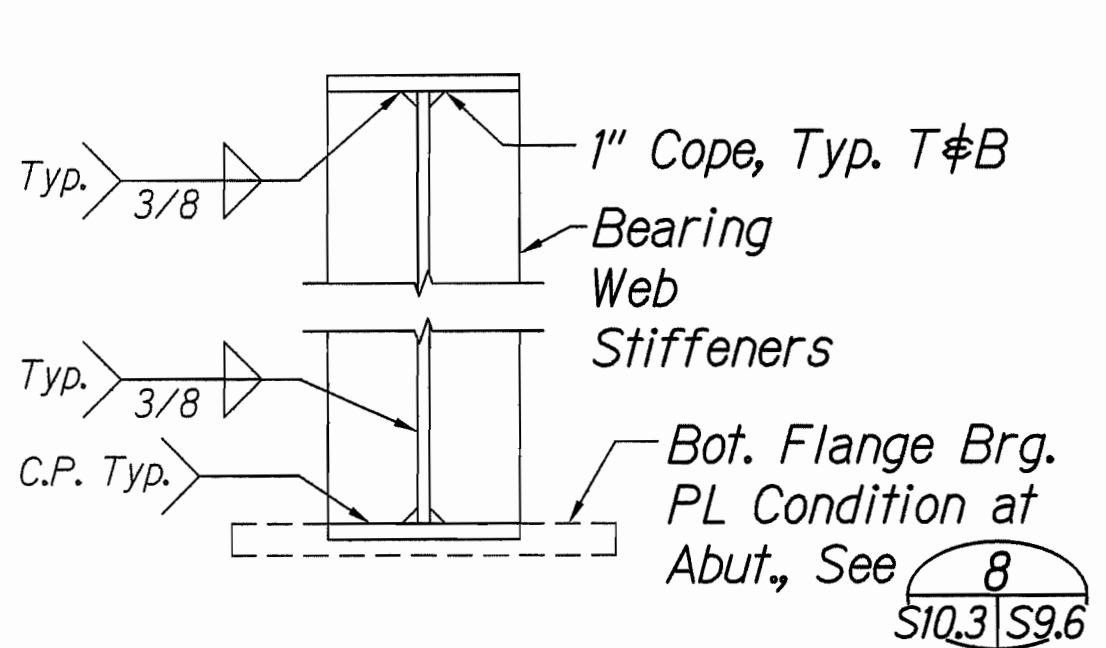
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	111	137



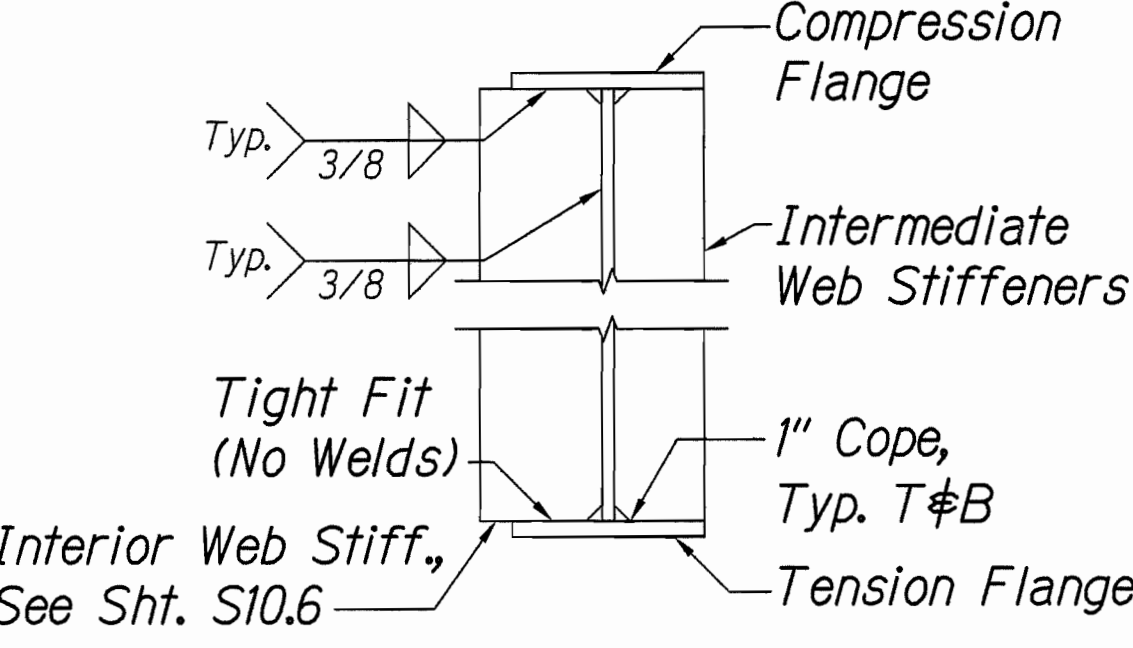
1 NEW STEEL GIRDER SECTION
S10.3/S10.3 SCALE: 1/2"=1'-0"



2 DETAIL - WELDED STUD SHEAR CONNECTORS (TYPICAL)
S10.3/S10.3 SCALE: 1" = 1'-0"



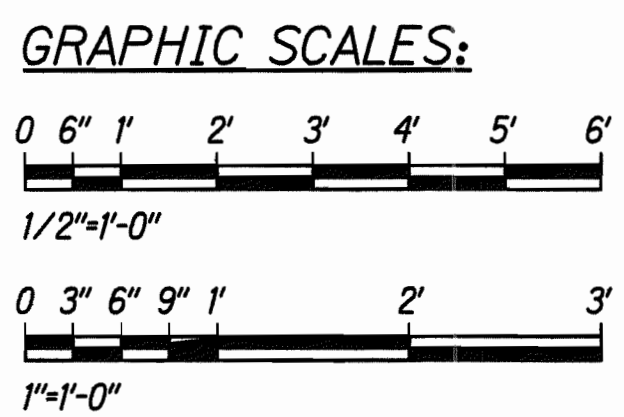
3 DETAIL - END BEARING WEB STIFFENER (TYPICAL, UON)
S10.3/S10.3 SCALE: 1" = 1'-0"



4 DETAIL - INTERMEDIATE WEB STIFFENER (TYPICAL)
S10.3/S10.3 SCALE: 1" = 1'-0"

New Steel Girder Schedule											
Girder No.	Span No.	Span Length L	Overall Depth H (Inches)	Flange PL's Top & Bot.	Web Plate Thk. (Inches)	Intermediate Web Stiff Plates Each Side		End Brg Web Stiff PL Ea. Side Thk.	Welded Stud Shear Spacing, UON	Midspan Camber	Remarks
						Thk. (Inches)	Max Spacing				
G5-1 & G6-1	1	62'-9"	70"	13"x9/16"	1/2"	3/8"	4'-0"	5/8"	12"	1/2"	
G5-2 & G6-2	2	28'-6"	72"	13"x9/16"	1/2"	3/8"	4'-0"	5/8"	6"	0"	
G5-3 & G6-3	3	61'-6"	73"	13"x9/16"	1/2"	3/8"	4'-0"	5/8"	12"	1/2"	
G5-4 & G6-4	4	28'-6"	72"	13"x9/16"	1/2"	3/8"	4'-0"	5/8"	6"	0"	
G5-5 & G6-5	5	42'-0"	72"	13"x9/16"	1/2"	3/8"	4'-0"	5/8"	6"	1/4"	
G5-6 & G6-6	6	31'-3"	76"	13"x5/8"	9/16"	3/8"	4'-0"	5/8"	6"	0"	

- Notes:
- Contractor shall field verify all dimensions, existing conditions, span lengths, overall depths, connection details, etc, prior to fabrication or ordering of materials.
 - Camber values indicated do not include effect of girder self-weight.
 - All web stiffeners shall be full depth.
 - Unless otherwise indicated, all plate girder steel shall be shop primed and painted. See steel notes on sheet S0.1. This item shall be incidental to Section 501 "Steel Structures" and will not be paid for separately.
 - All plate girder steel, including web stiffeners, shall be ASTM A709, grade 50.



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NEW STEEL GIRDER TYPICAL DETAILS & SCHEDULE

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

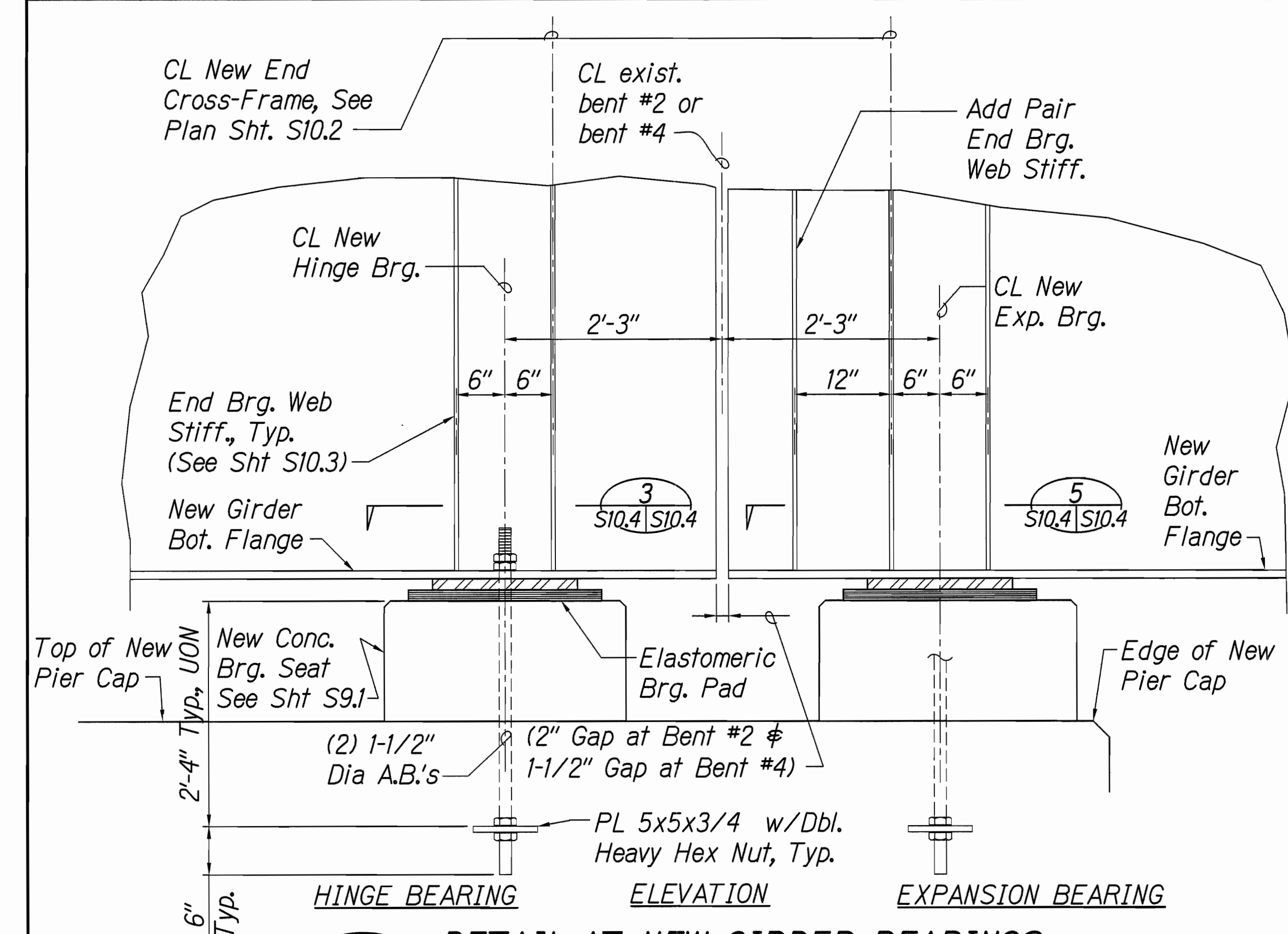
SHEET No. S10.3 OF 10 SHEETS

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HAWAII	HAW.	BR-019-2(61)	2012	112	137

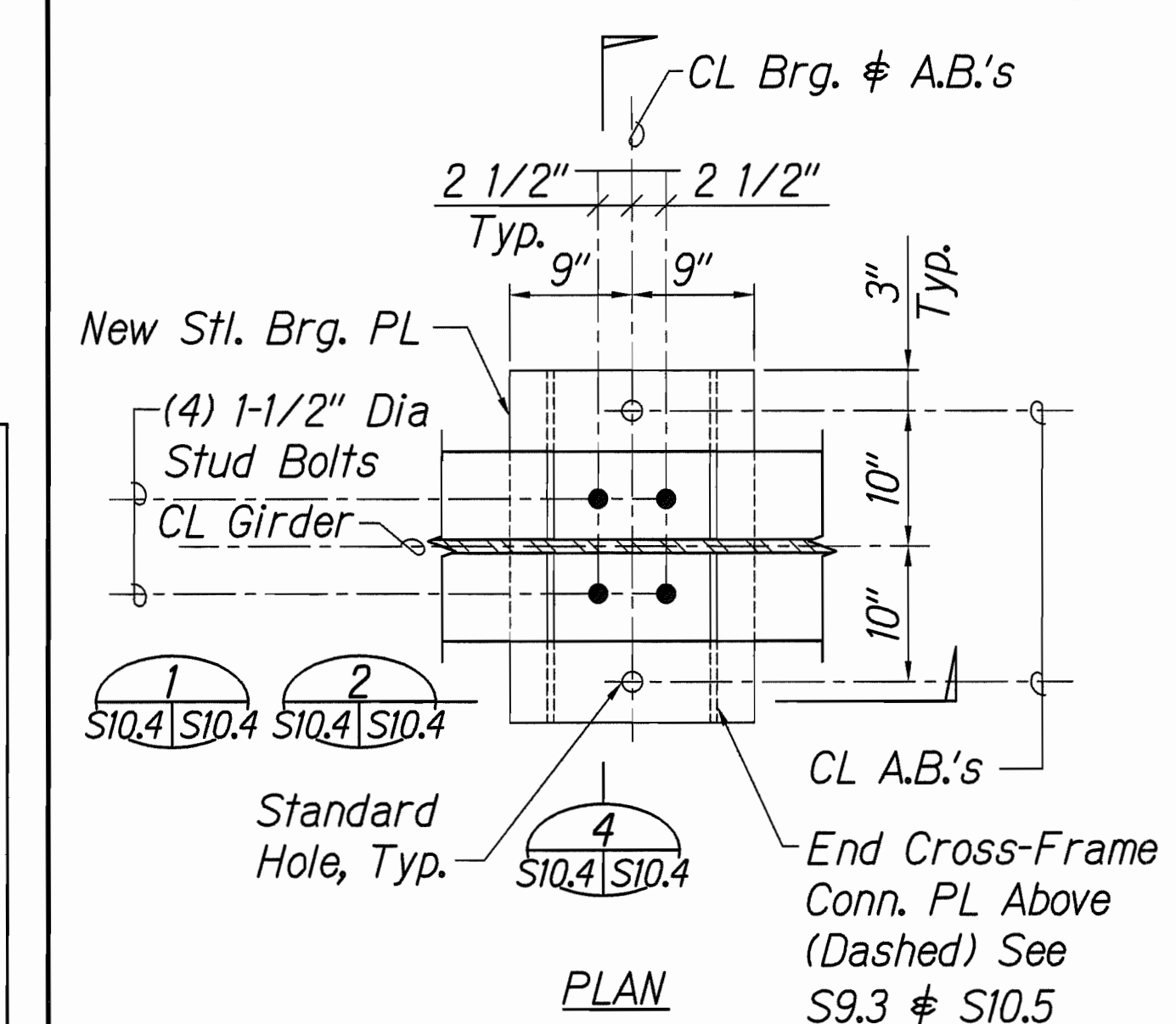
Notes:

- At existing girders, new bearing plates, sole plates and anchor bolts shall be installed prior to pouring concrete bearing seats and top slab of pier caps. Do not install nuts until concrete is cast and cured (60 days minimum).
- All field welds shall be performed slowly to avoid excessive heat build-up. See Standard Specs and Special Provisions for other requirements. Grind all welds smooth and touchup paint.
- New steel on exist. girder shall be incidental to Item 501.2000.
- New elastomeric bearing pads under new and existing girders shall be incidental to Item 501.1000.
- Grout pad under existing steel girder bearing plates shall conform to Standard Spec Section 712.04(A) "Non-Shrink Grout". Grout pad shall be incidental to bearing and expansion plates.

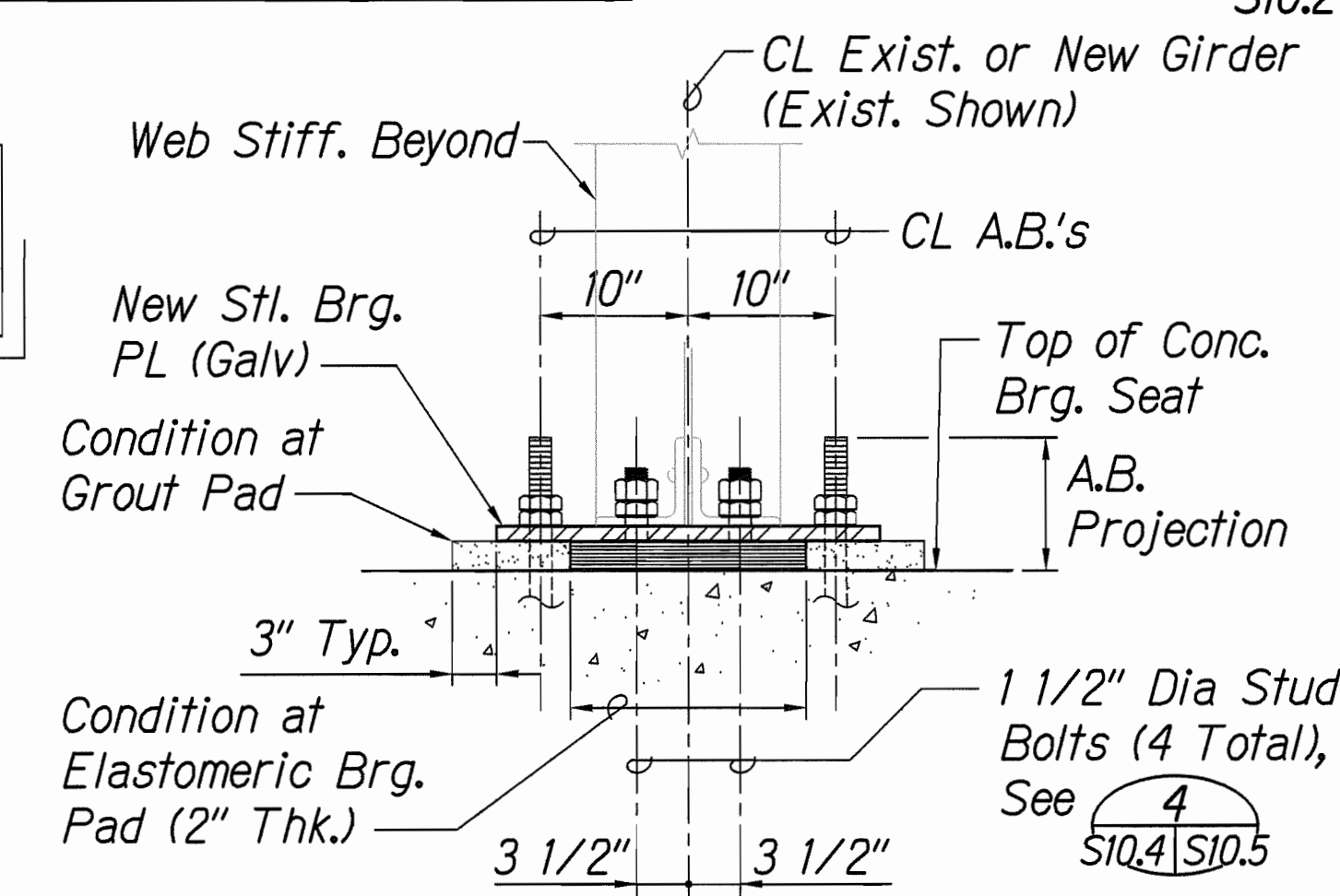


1 DETAIL AT NEW GIRDER BEARINGS
S10.2 S10.4 SCALE: 1"=1'-0"

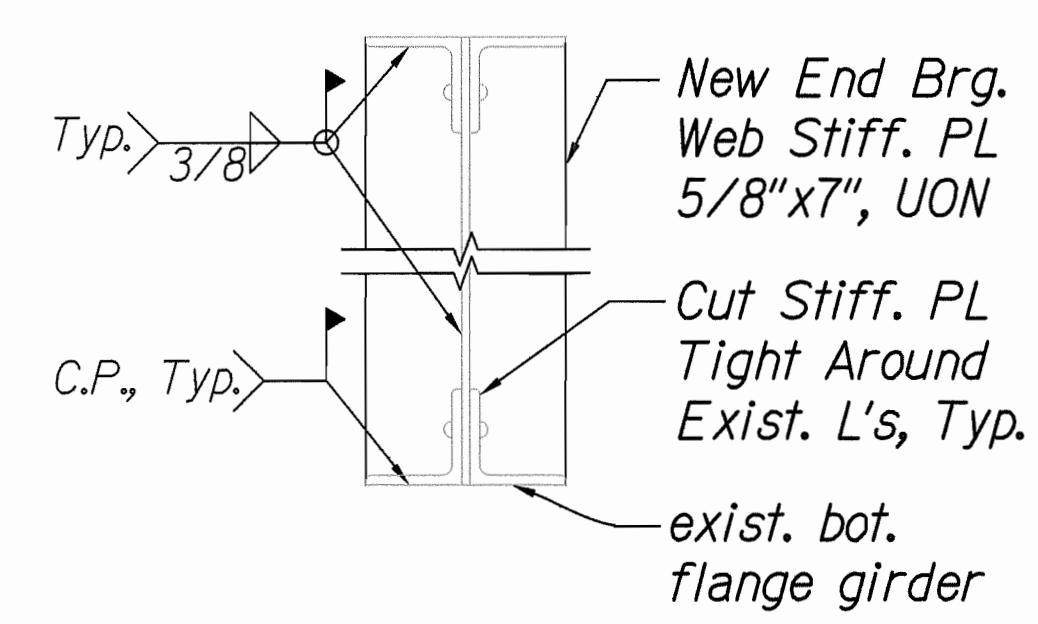
Note:
End cross-frame not shown for clarity



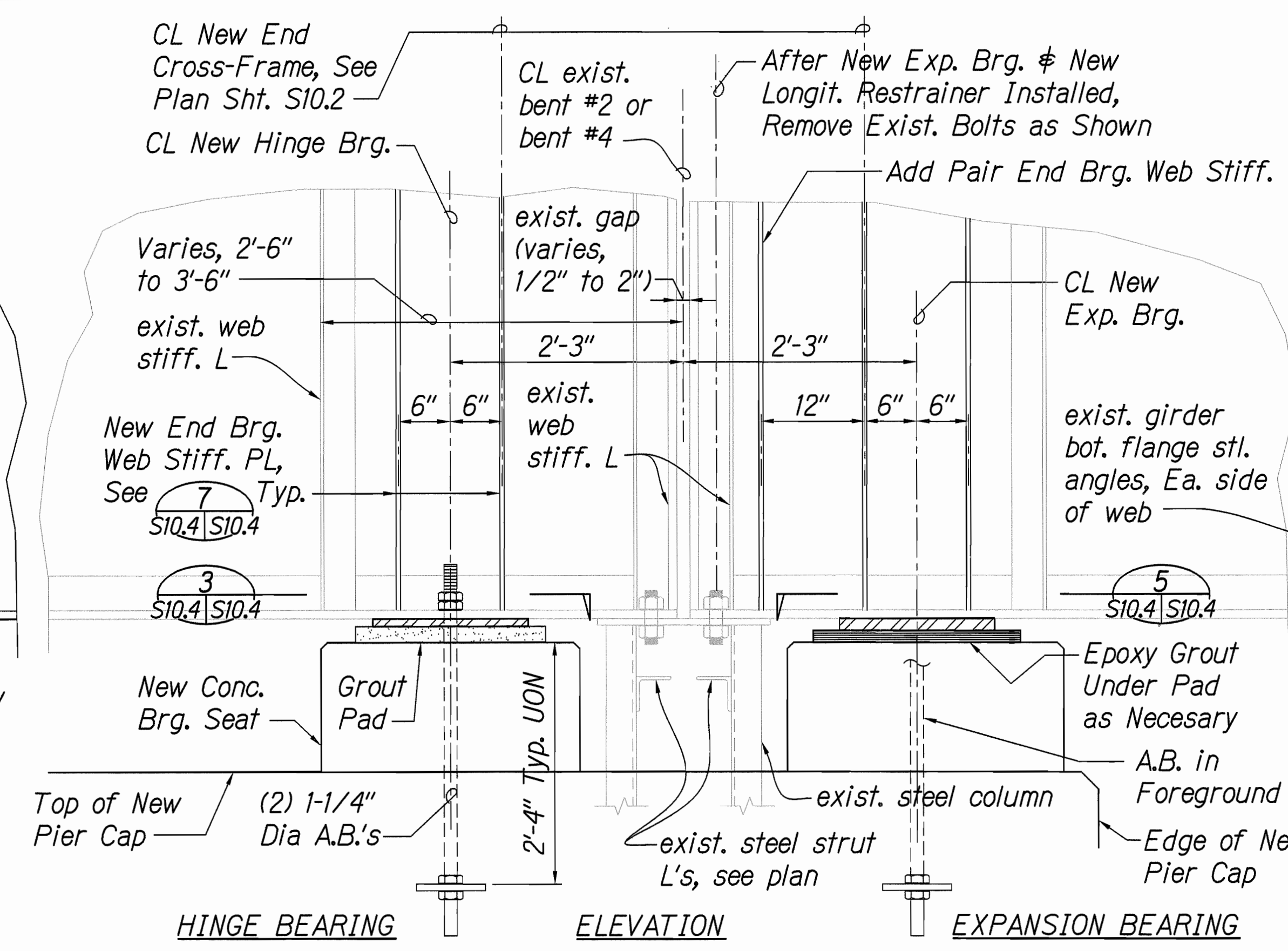
3 DETAIL - HINGE BEARING
S10.4 S10.4 SCALE: 1"=1'-0"



4 SECTION - HINGE BEARING
S10.4 S10.4 SCALE: 1"=1'-0"

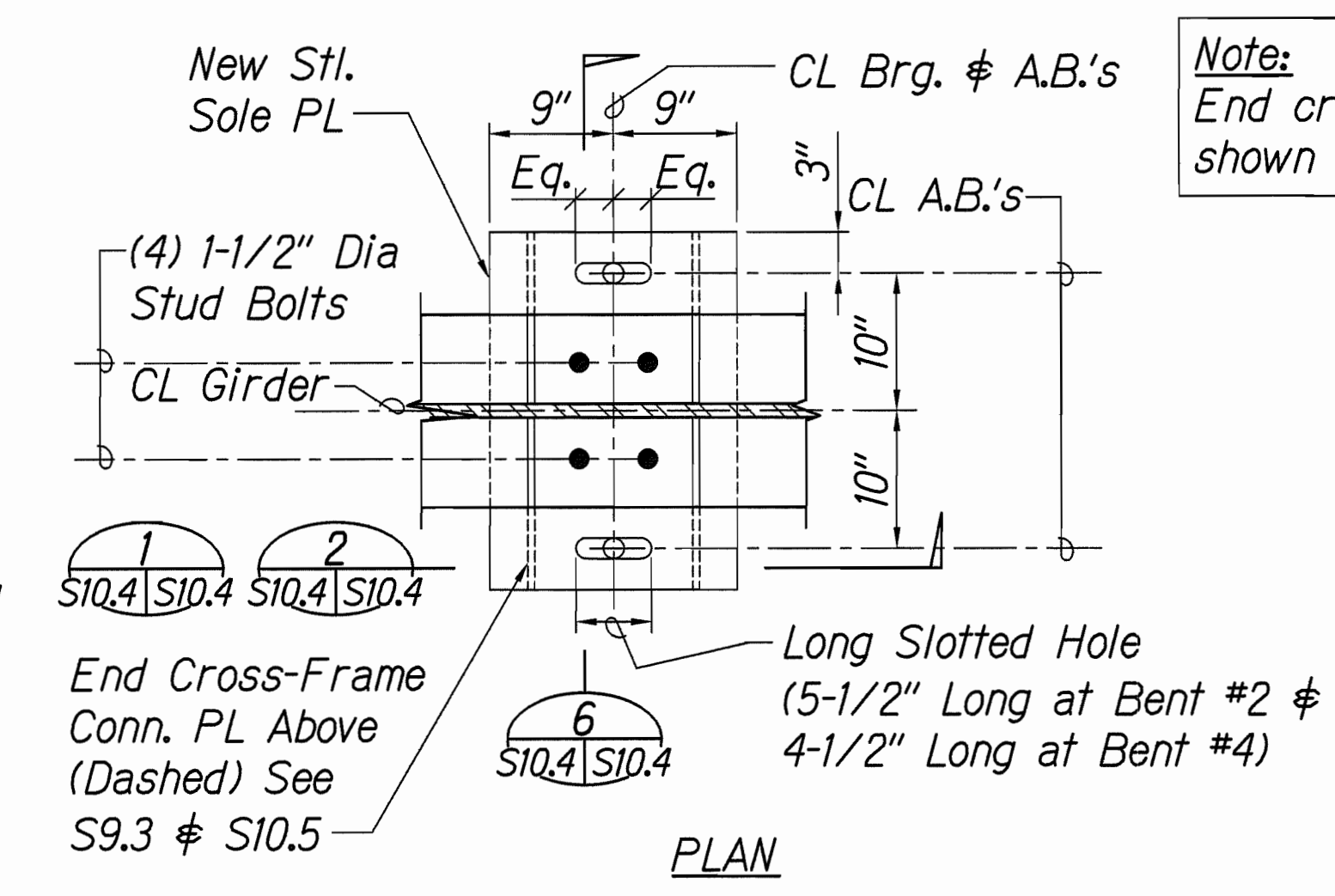


7 SECTION
S10.4 S10.4 SCALE: 1"=1'-0"

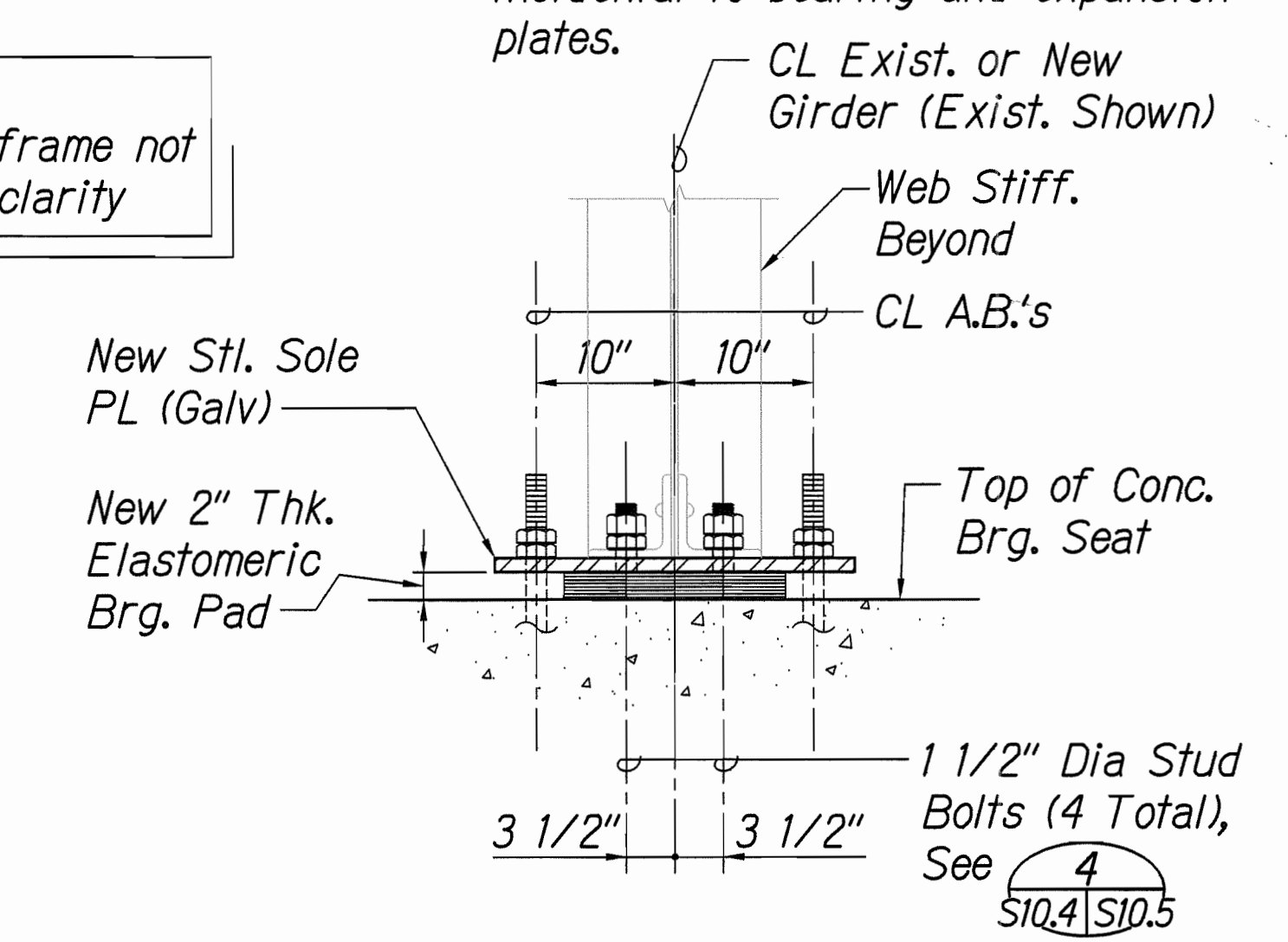


2 DETAIL AT EXISTING GIRDER BEARINGS
S10.2 & S10.4 S10.4 SCALE: 1"=1'-0"

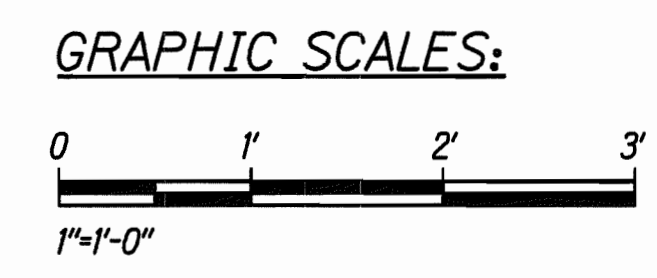
Note:
End cross-frame not shown for clarity



5 DETAIL - EXPANSION BEARING
S10.4 S10.4 SCALE: 1"=1'-0"



6 SECTION - EXPANSION BEARING
S10.4 S10.4 SCALE: 1"=1'-0"



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**STEEL GIRDER BEARING
DETAILS AT BENT #2 & #4**

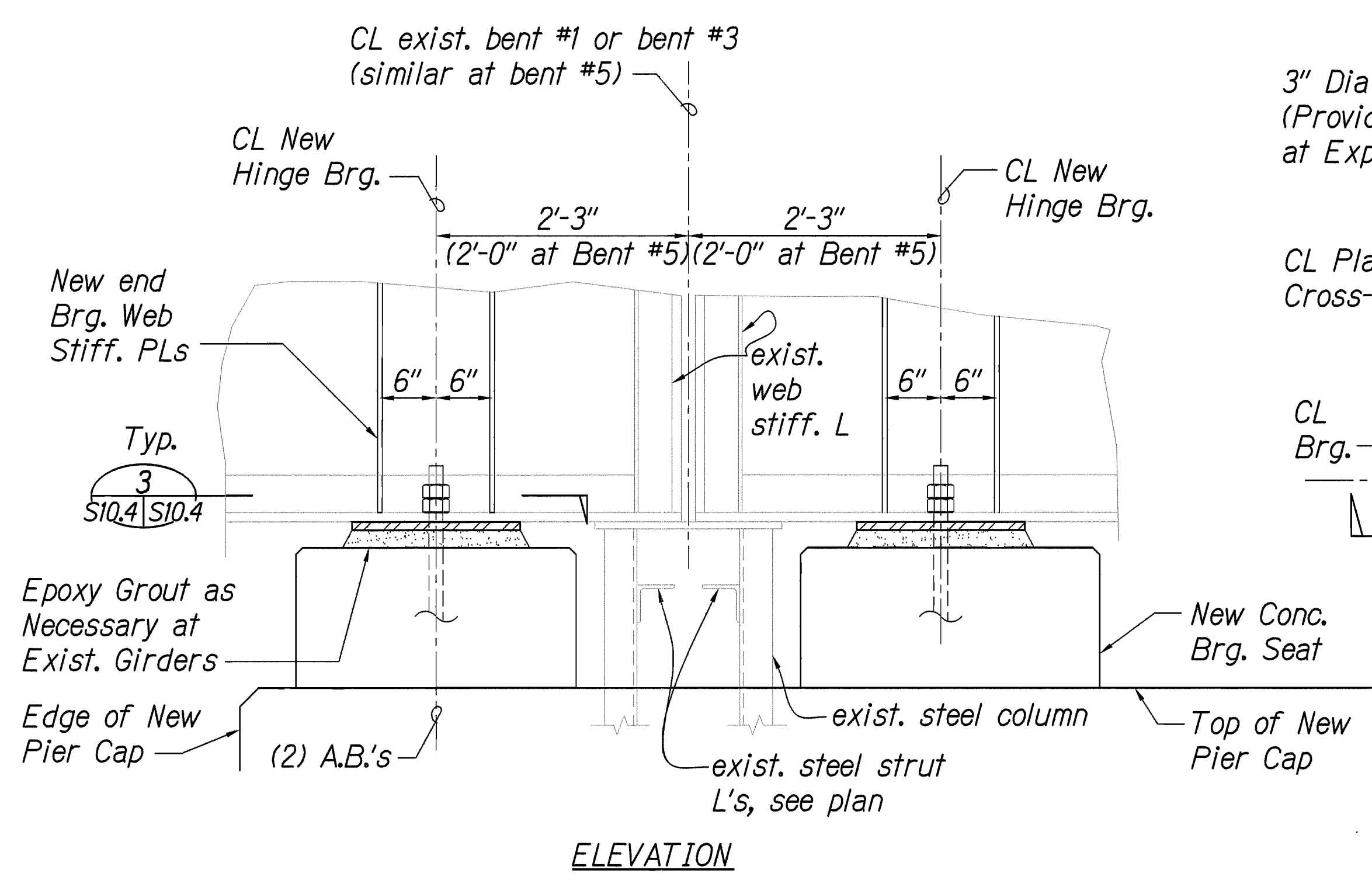
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1" = 1'-0" Date: July 25, 2012

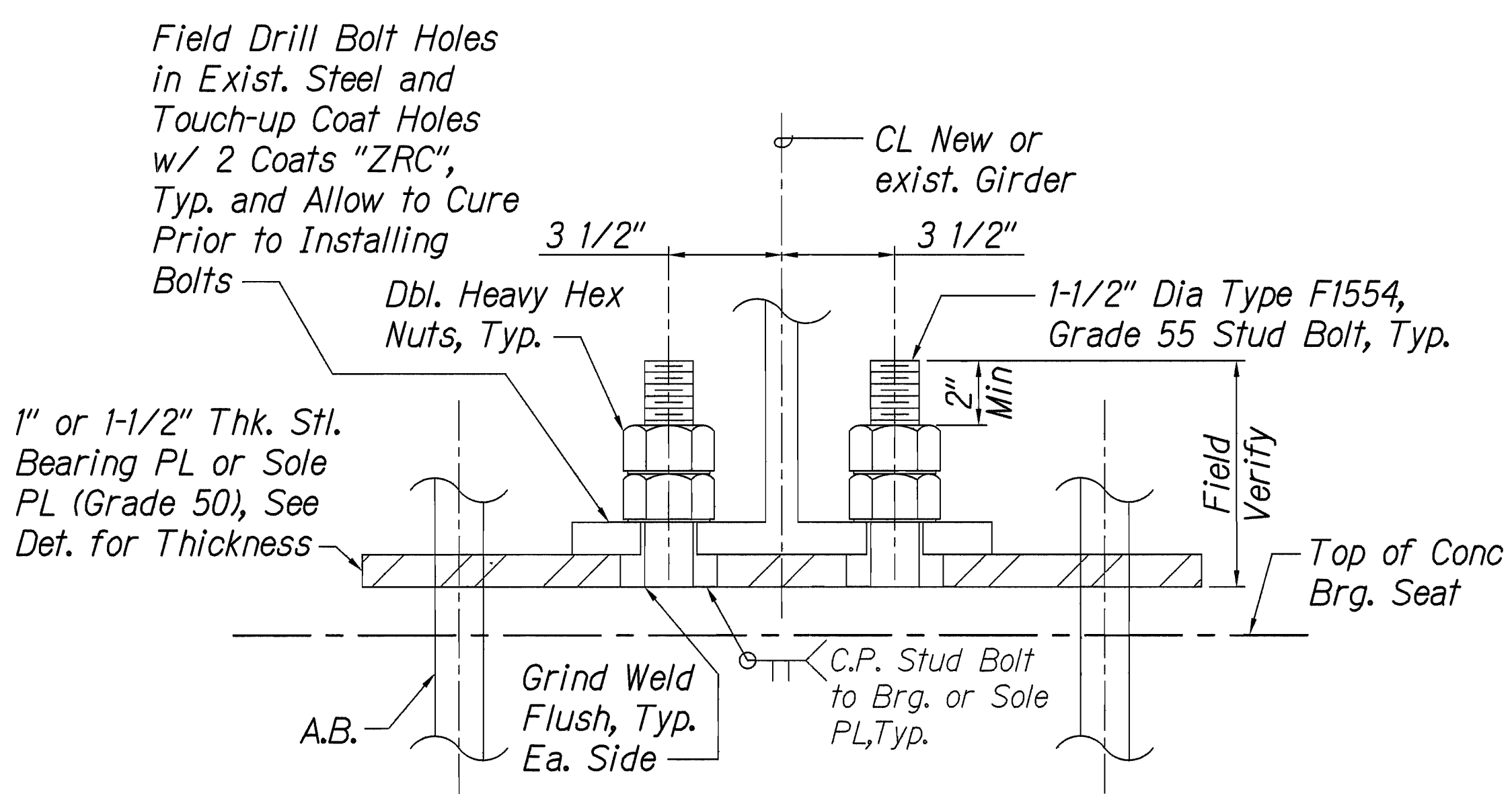
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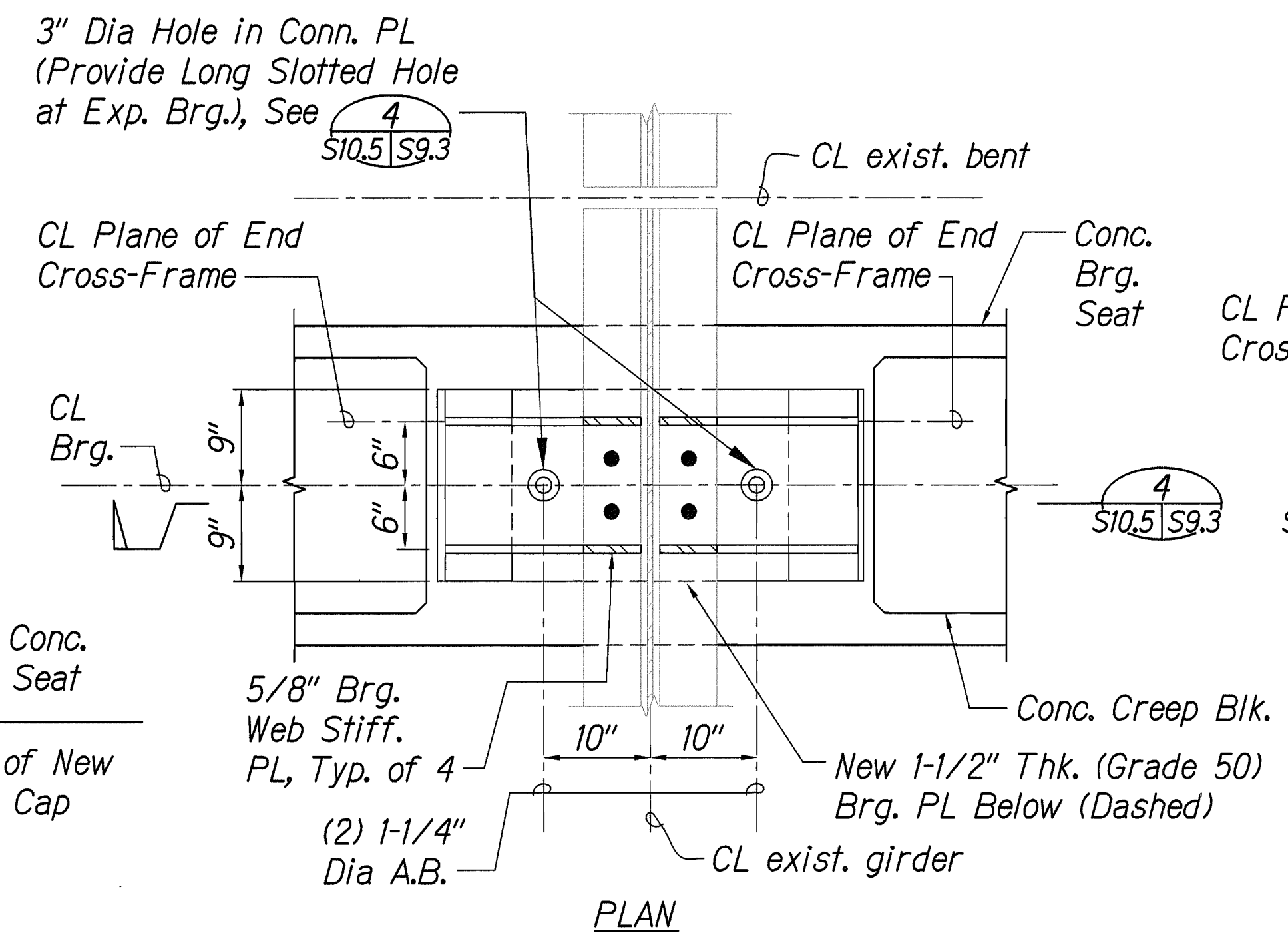


1 **DETAIL - GIRDER BEARING AT BENT #1 & #3**
 S10.2 S10.5 SCALE: 1"=1'-0" (SIMILAR AT BENT #5)

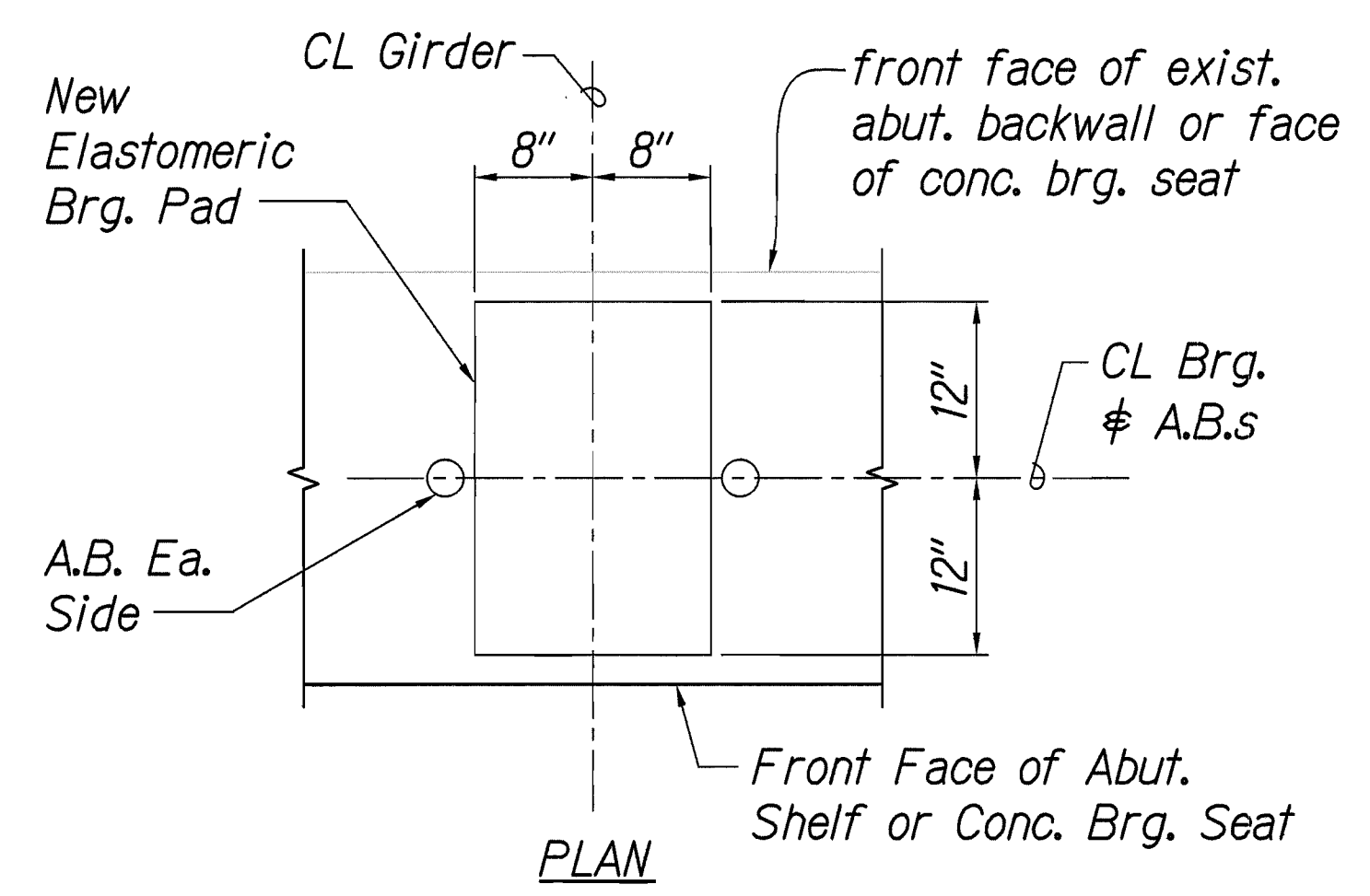


- Notes:**
- Hot-dip galvanize steel bearing plates, sole plates and stud bolts after fabrication.
 - Stud bolts, nuts and plate washers, and welding shall be incidental to steel bearing plates and will not be paid for separately.

4 **STUD BOLT DETAIL**
 S9.3, S10.4, S10.5 S10.5 SCALE: 3" = 1'-0"

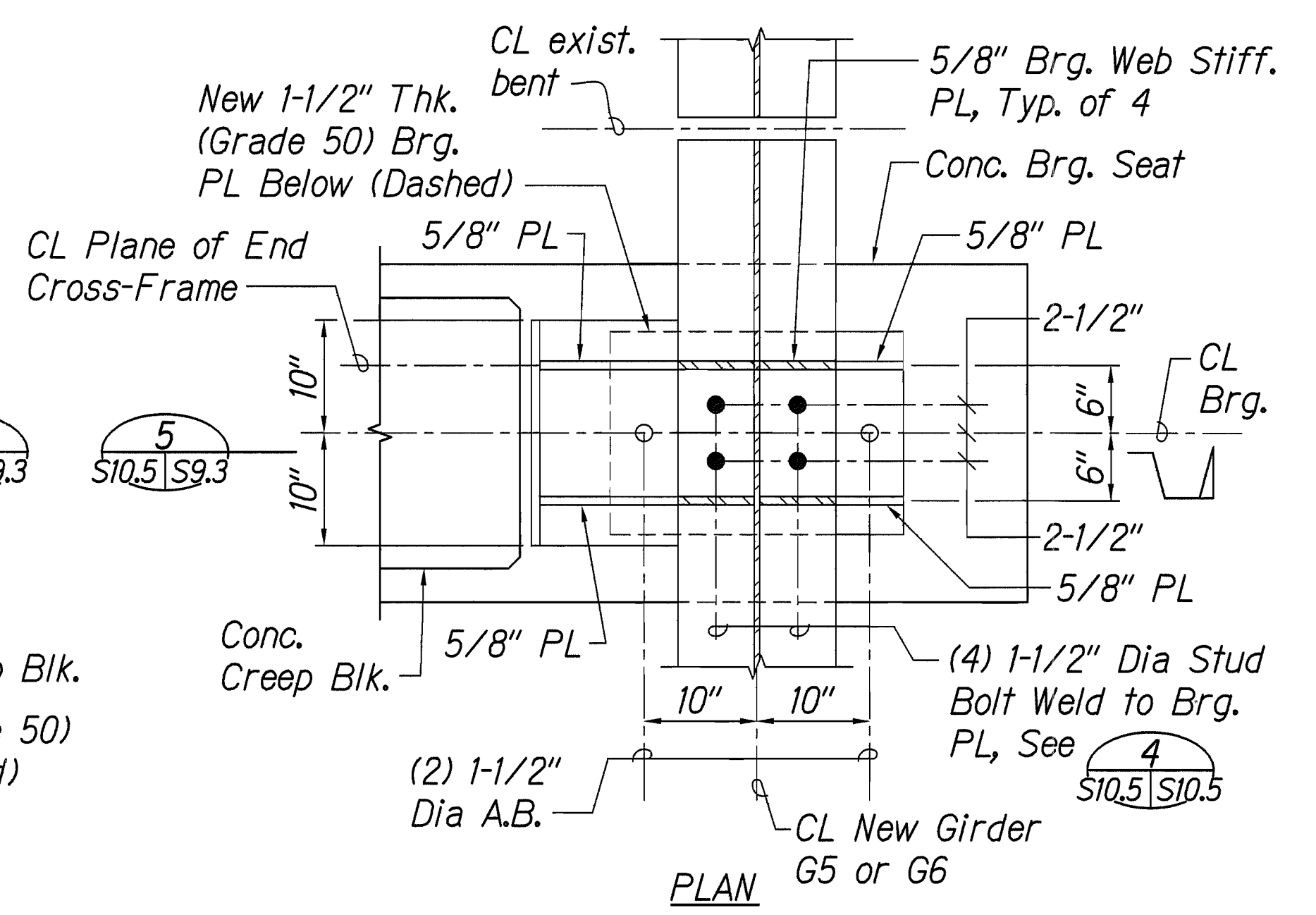


2 **DETAIL**
 S9.3 S10.5 SCALE: 1"=1'-0"



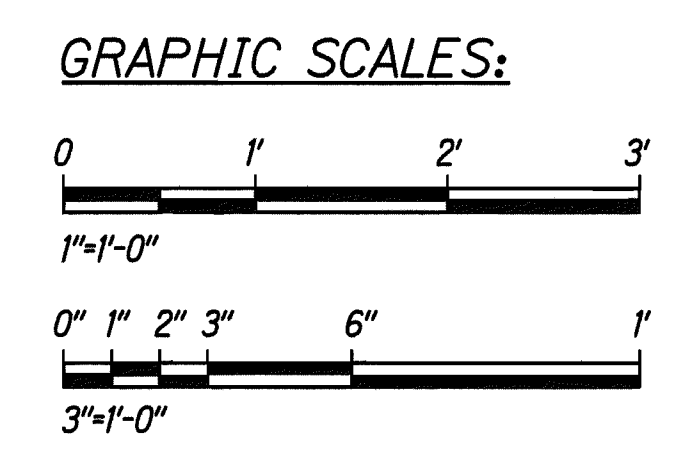
- Notes:**
- Elastomeric bearing pads shall conform to Standard Specs Section 712.09(C) "Elastomeric Bearing Pad".
 - For thickness of bearing pad, see sheet S9.4 and S10.4.
 - Bottom of bearing pads shall be secured with adhesive to concrete abutment shelf and concrete bearing seat, see Standard Specs.
 - Elastomeric bearing pads under new and existing steel girders shall be incidental to "Bearing and Expansion Plates".

5 **DETAIL - ELASTOMERIC BEARING PAD**
 S9.4 & S10.4 S10.5 SCALE: 1"=1'-0"



3 **DETAIL**
 S9.3 S10.5 SCALE: 1"=1'-0"

Note:
 Refer to notes on sheet. S10.4.



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 HIGHWAYS DIVISION

STEEL GIRDER BEARING
DETAILS AT BENT #1, #3 & #5

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

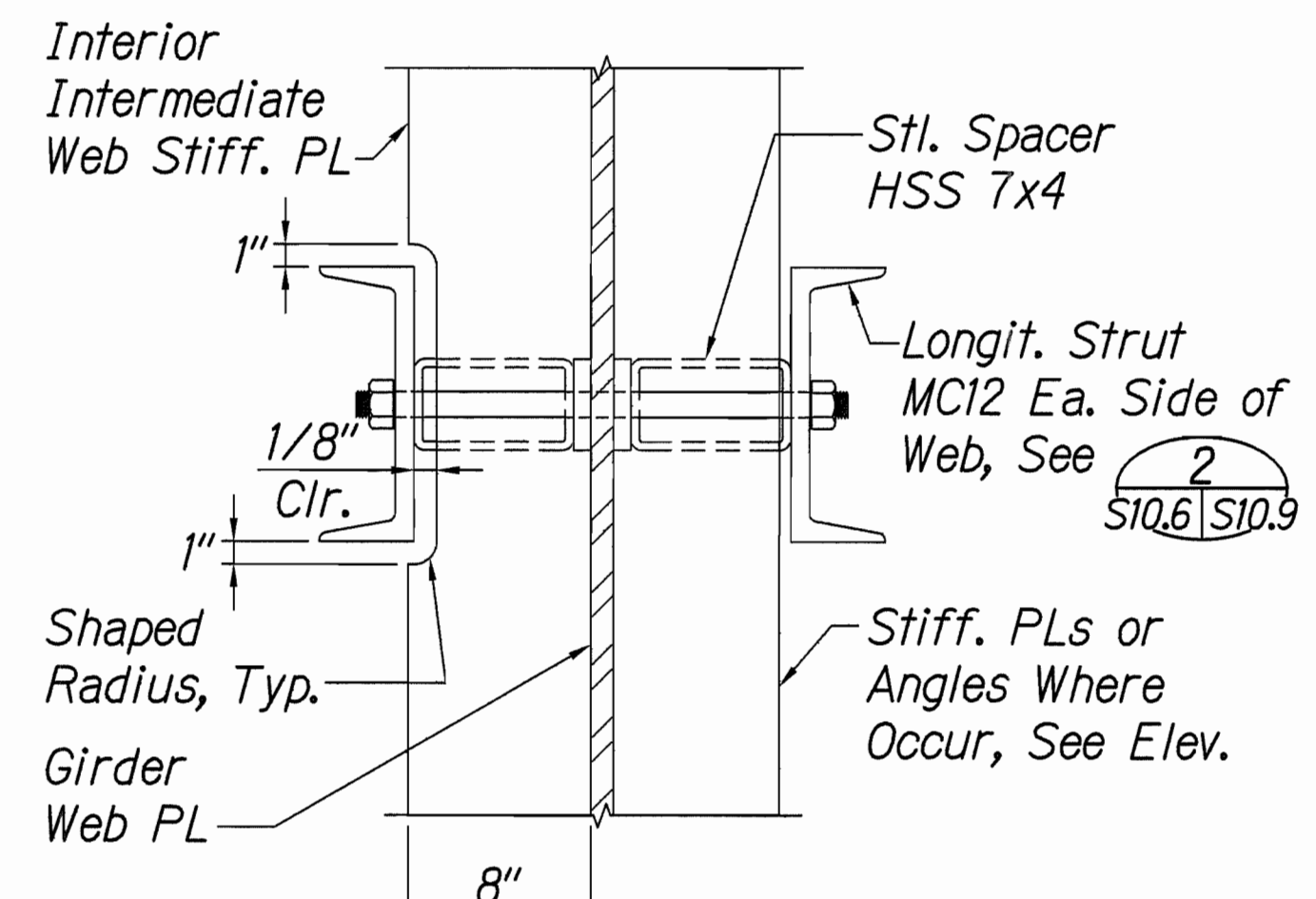
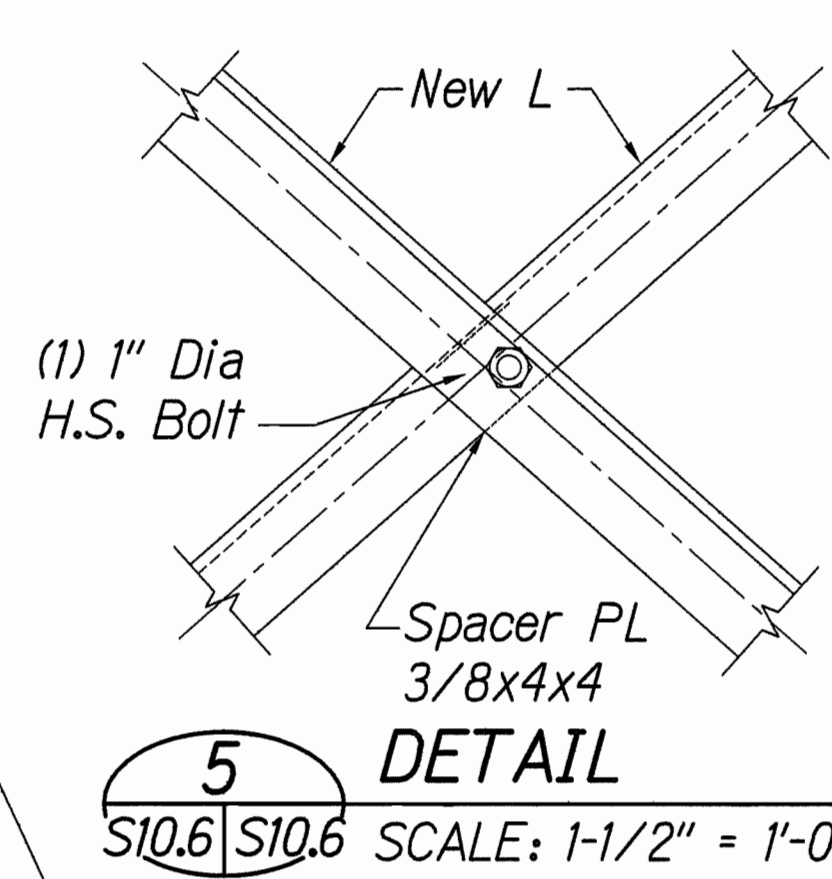
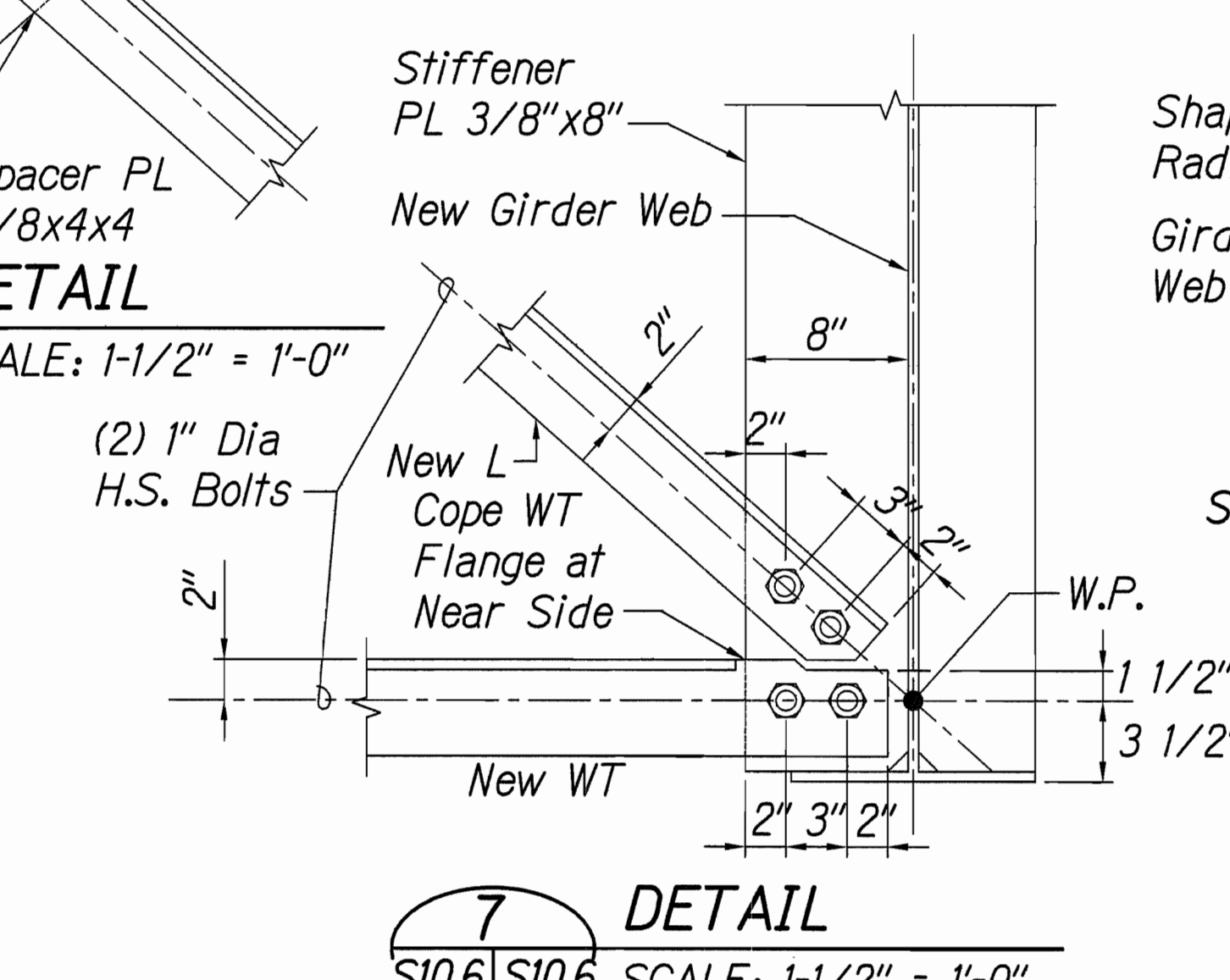
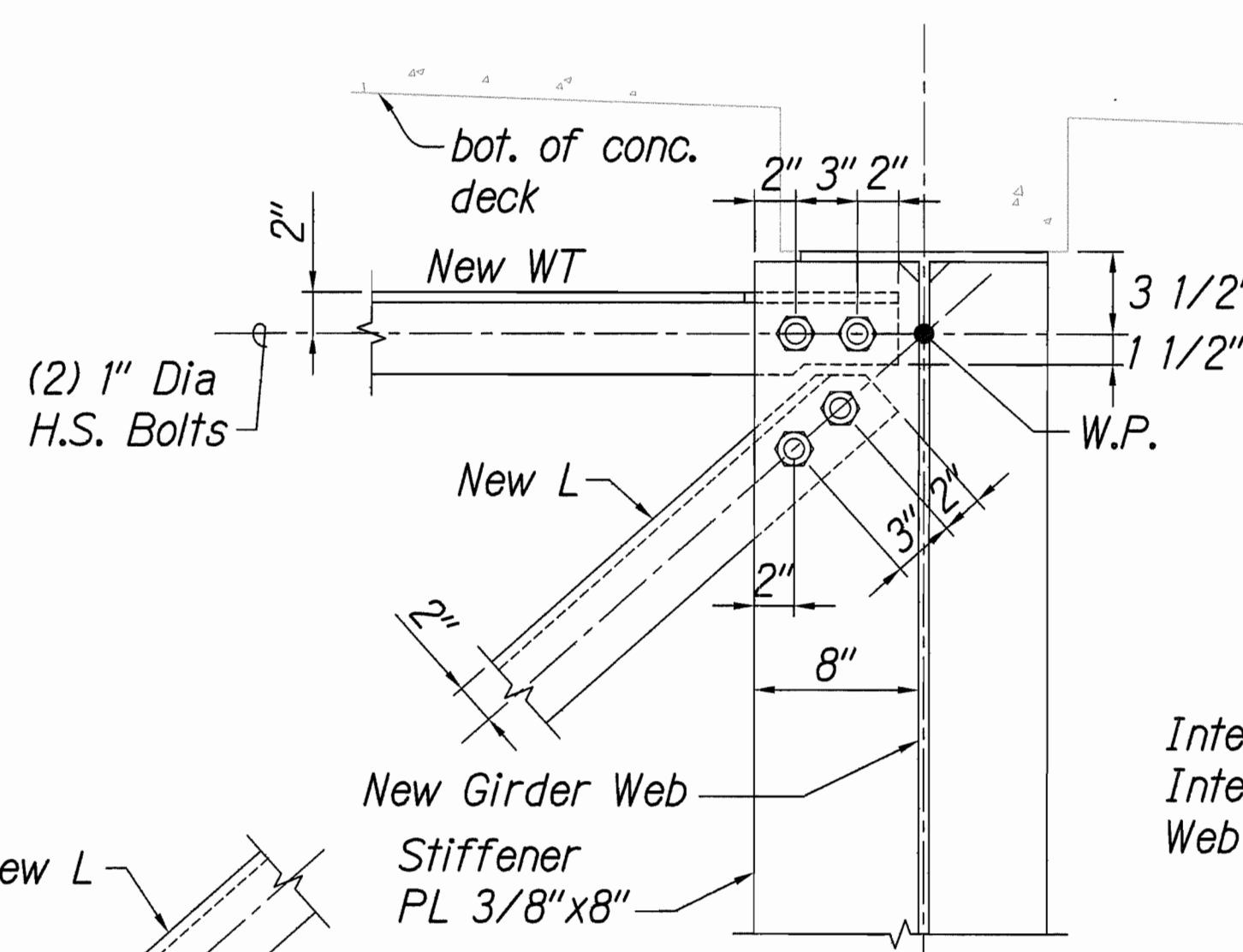
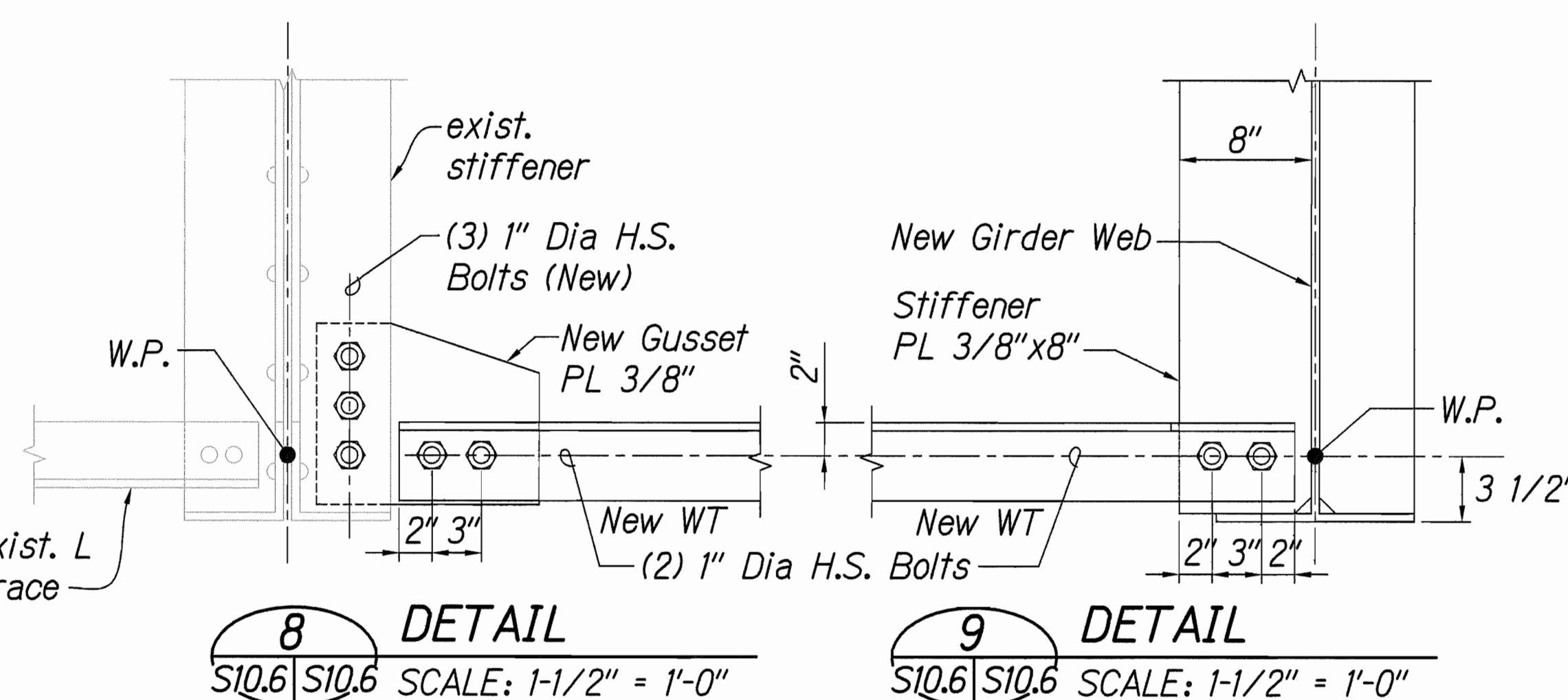
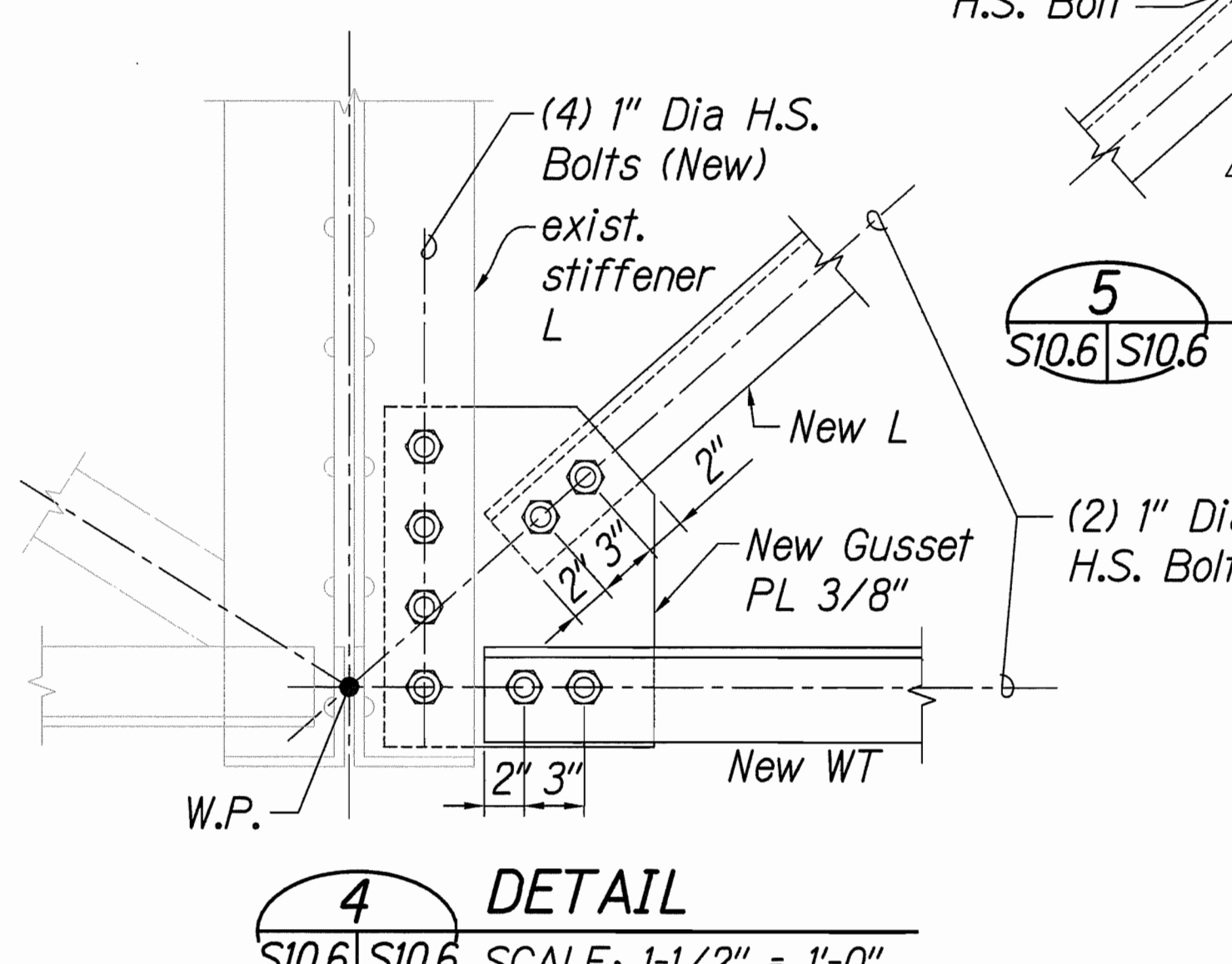
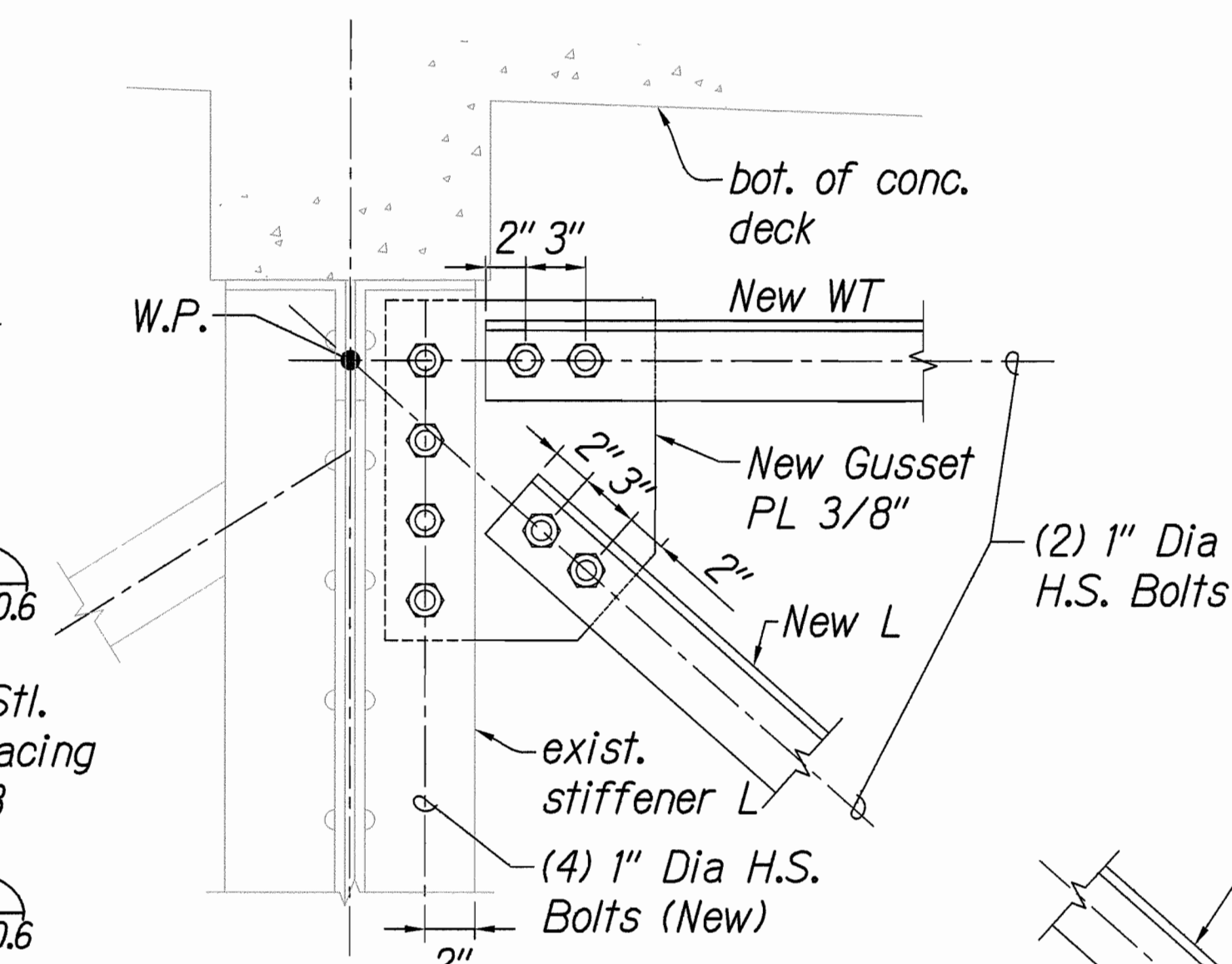
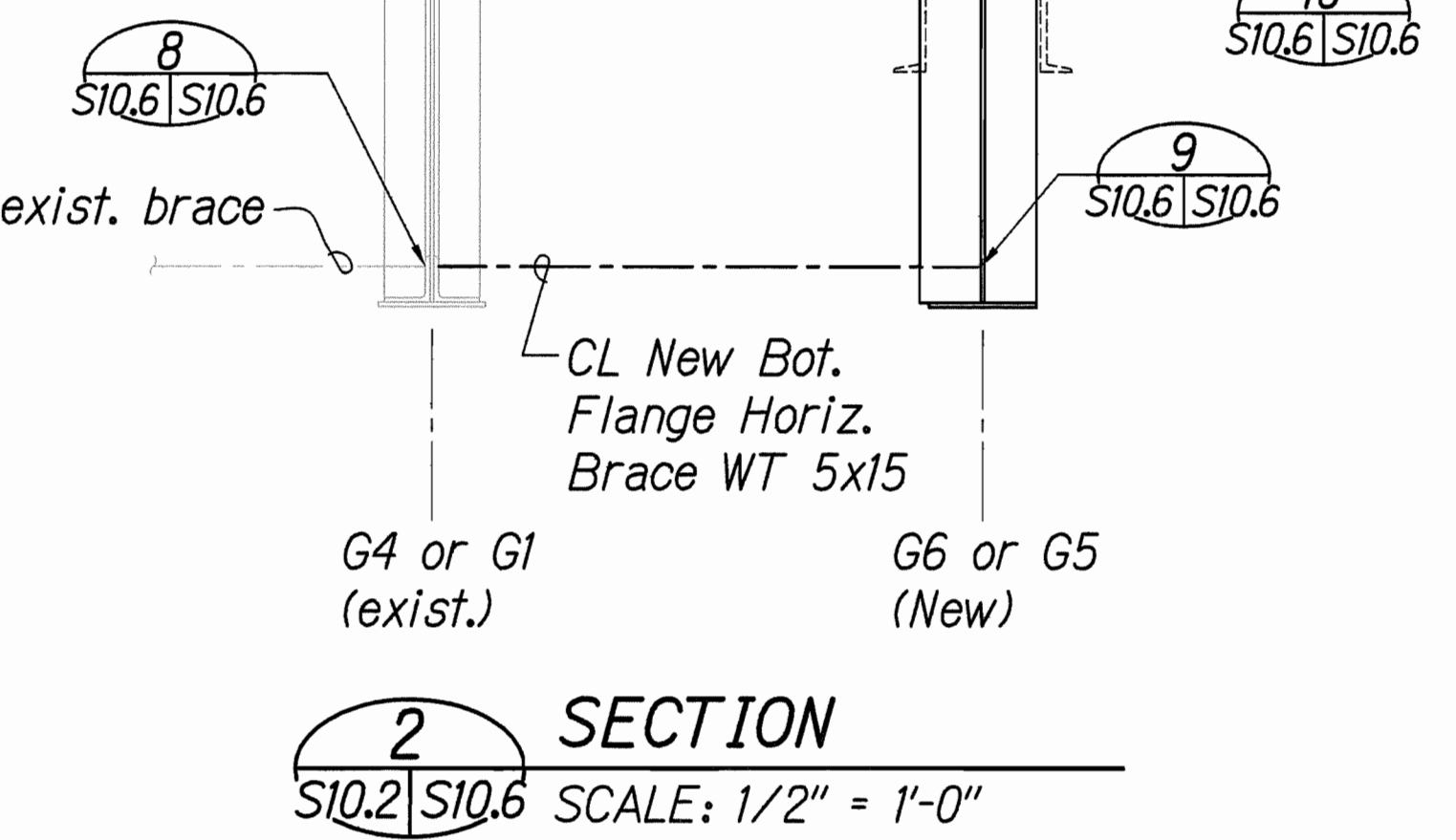
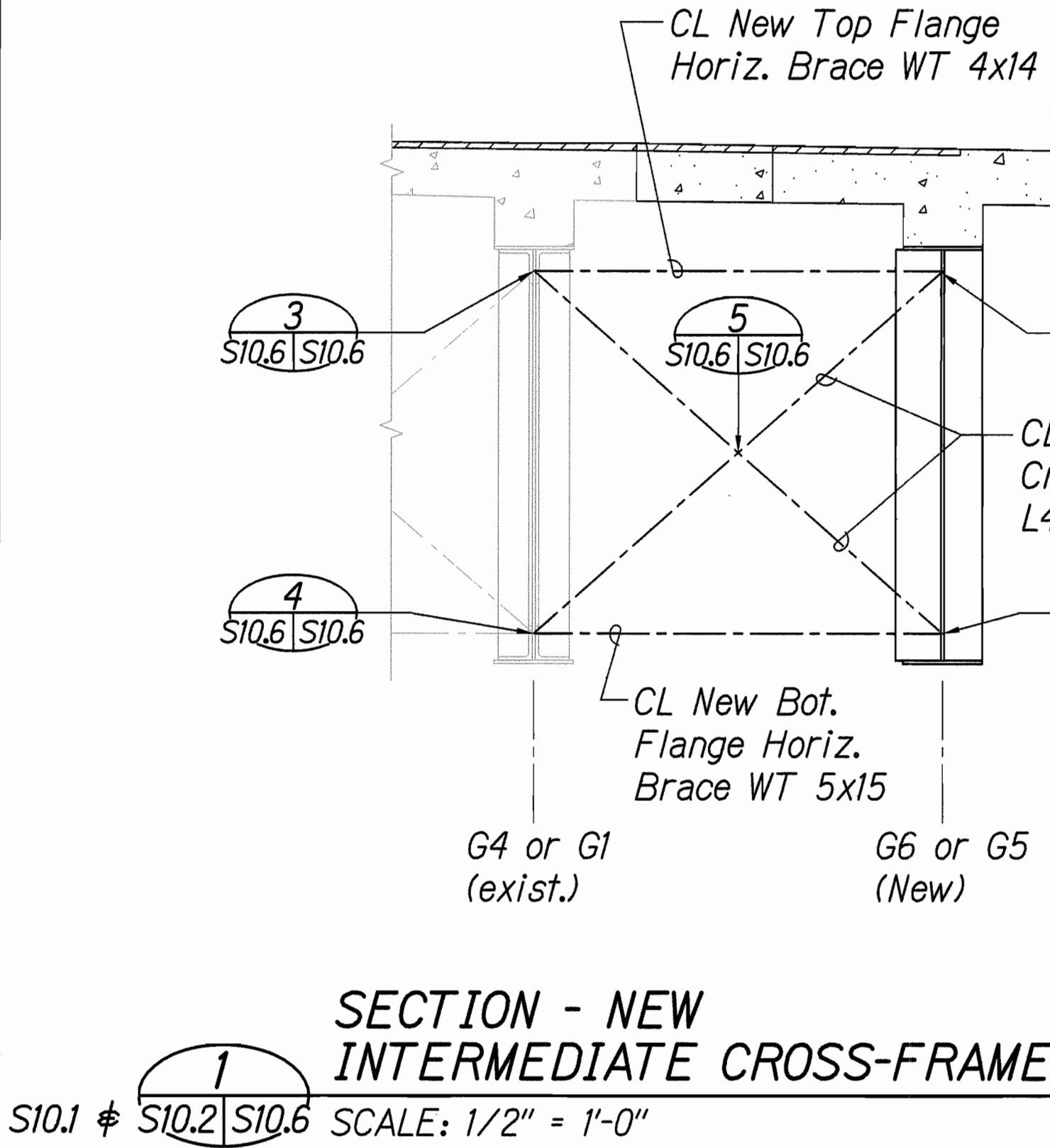
SHEET No. S10.5 OF 10 SHEETS

SURVEY PLOTTED BY	DATE
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TRACED BY	
QUANTITIES BY	
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ORIGINAL PLAN	
NOTEBOOK	
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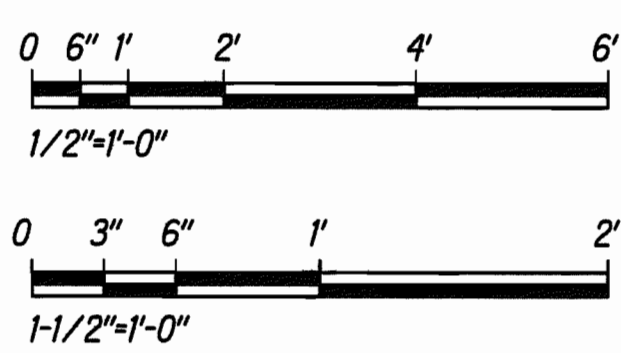
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	114	137

Note:

- Field drill bolt holes in existing steel and touch-up coat holes with 2 coats "ZRC", and allow to cure prior to installing new bolts.



GRAPHIC SCALES:



LICENSE EXPIRES: 4/30/14
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

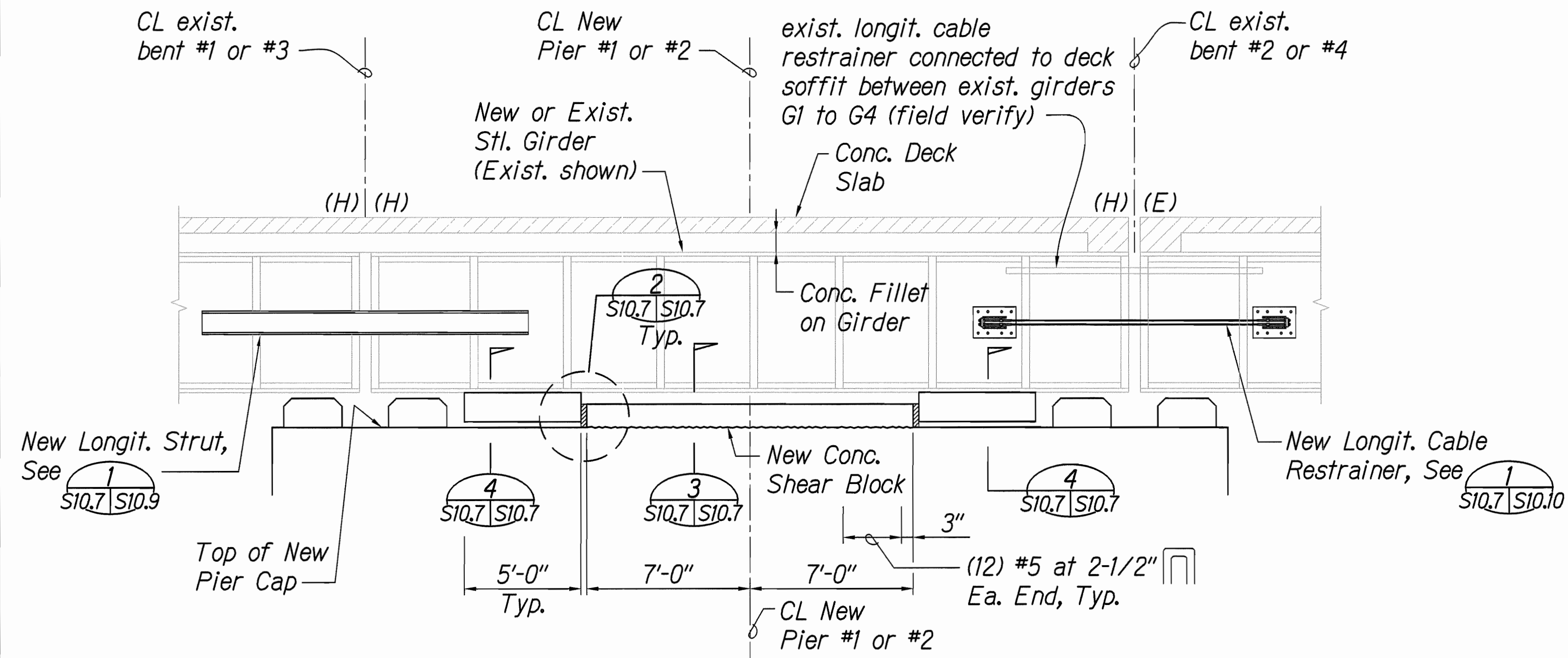
**NEW INTERMEDIATE
CROSS-FRAME DETAILS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

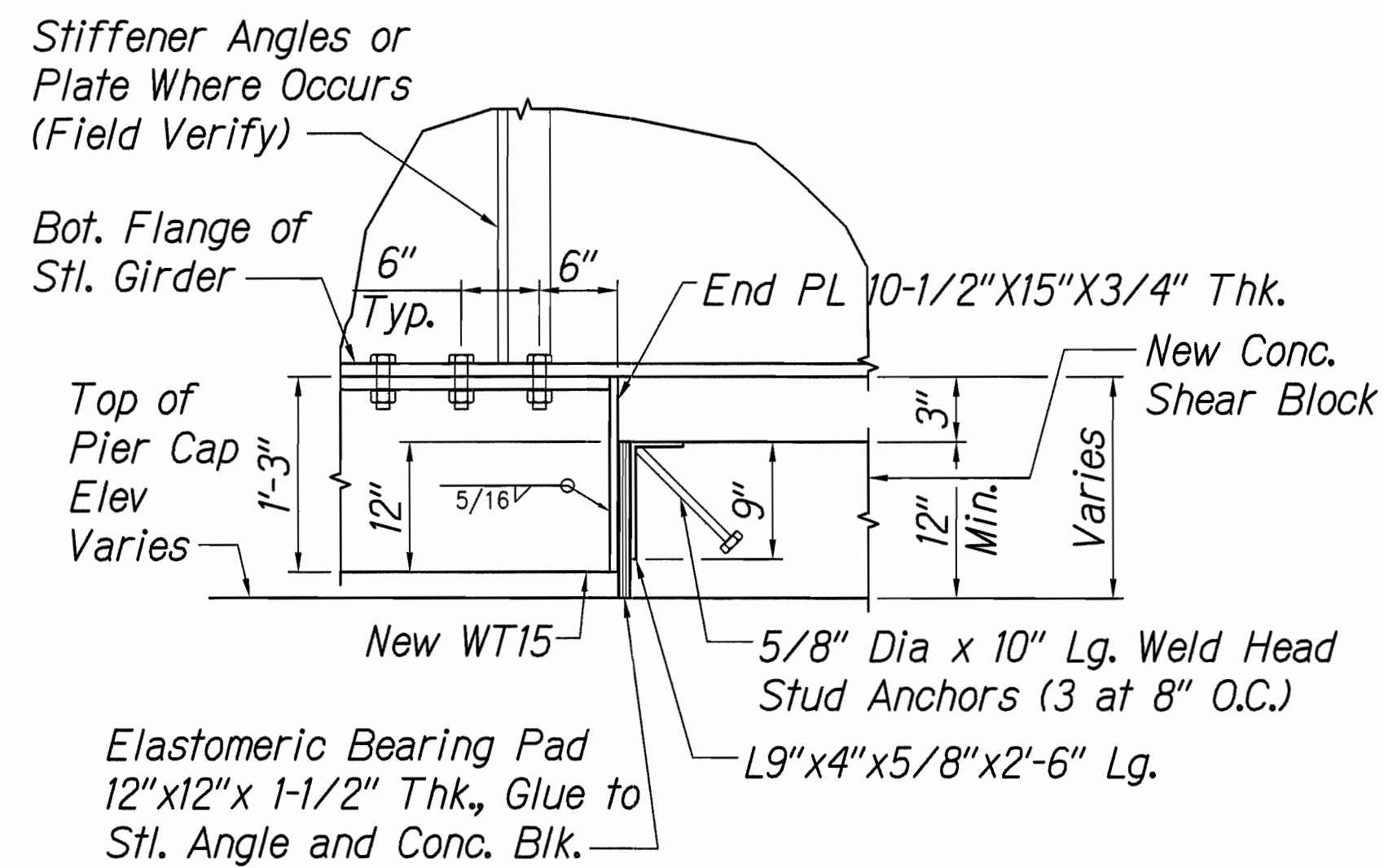
Scale: As Shown Date: July 25, 2012
SHEET No. S10.6 OF 10 SHEETS

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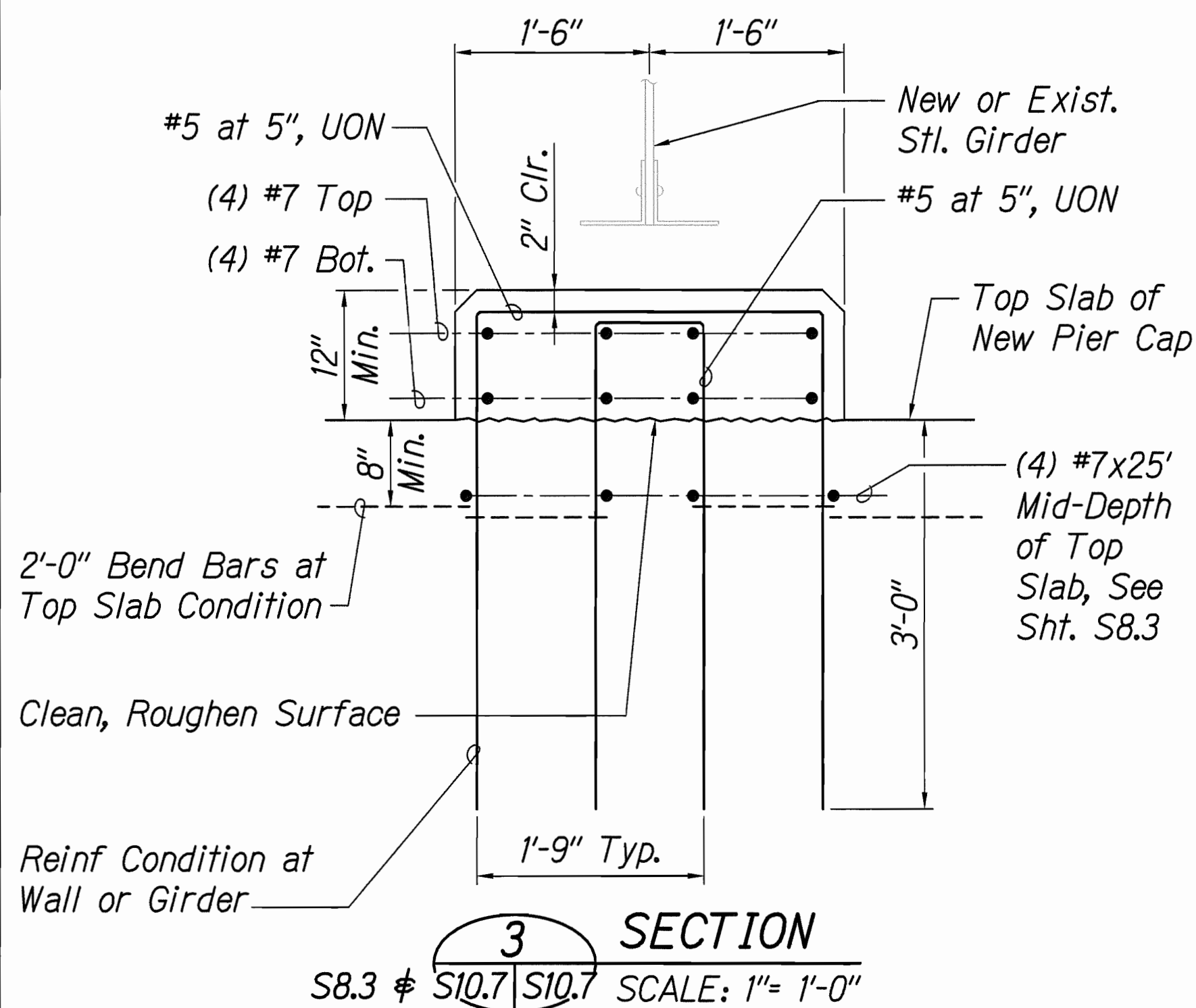
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	115	137



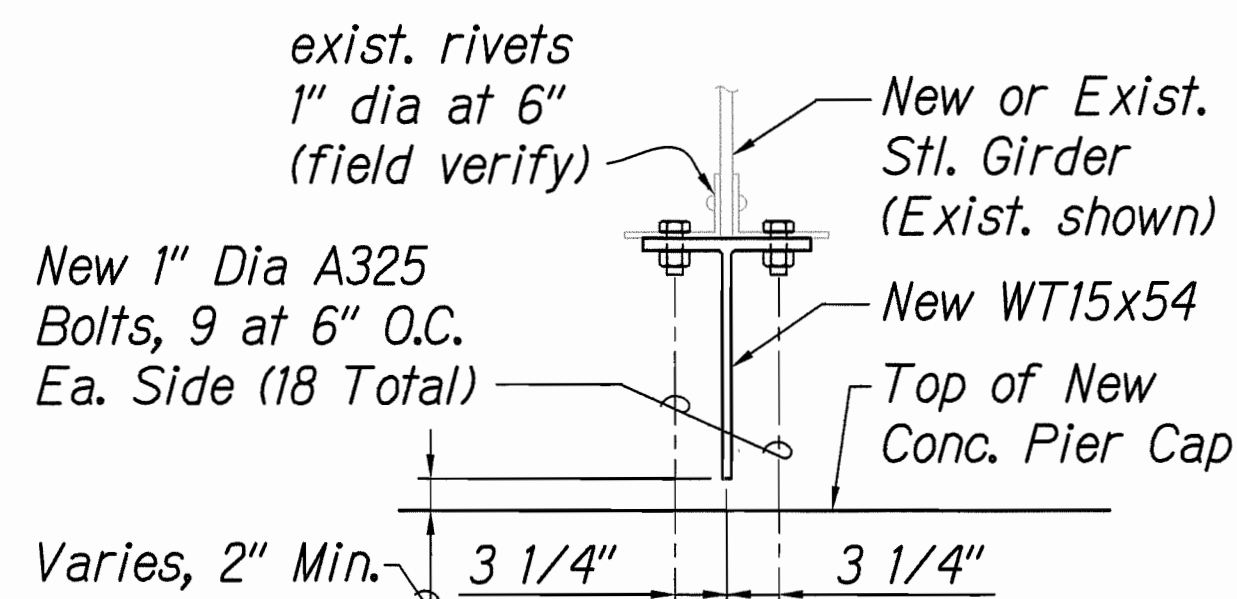
1 ELEVATION - NEW CONCRETE SHEAR BLOCK
SCALE: 1/4" = 1'-0"



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



3 SECTION
SCALE: 1" = 1'-0"

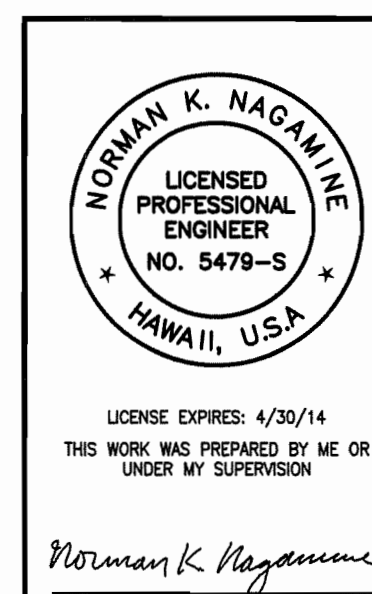


4 SECTION
SCALE: 1" = 1'-0"

Notes:

- Concrete shear blocks shall be incidental to concrete caps.
- Concrete strength shall be 6,000 psi at 28 days.
- Elastomeric bearing pad shall conform to Standard Specs Section 712.09(C), and shall be incidental to concrete caps.
- Field drill bolt holes in existing steel and touch-up coat holes with 2 coats "ZRC", and allow coating to cure prior to installing new bolts.

GRAPHIC SCALES:



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**CONCRETE SHEAR
BLOCK DETAILS**

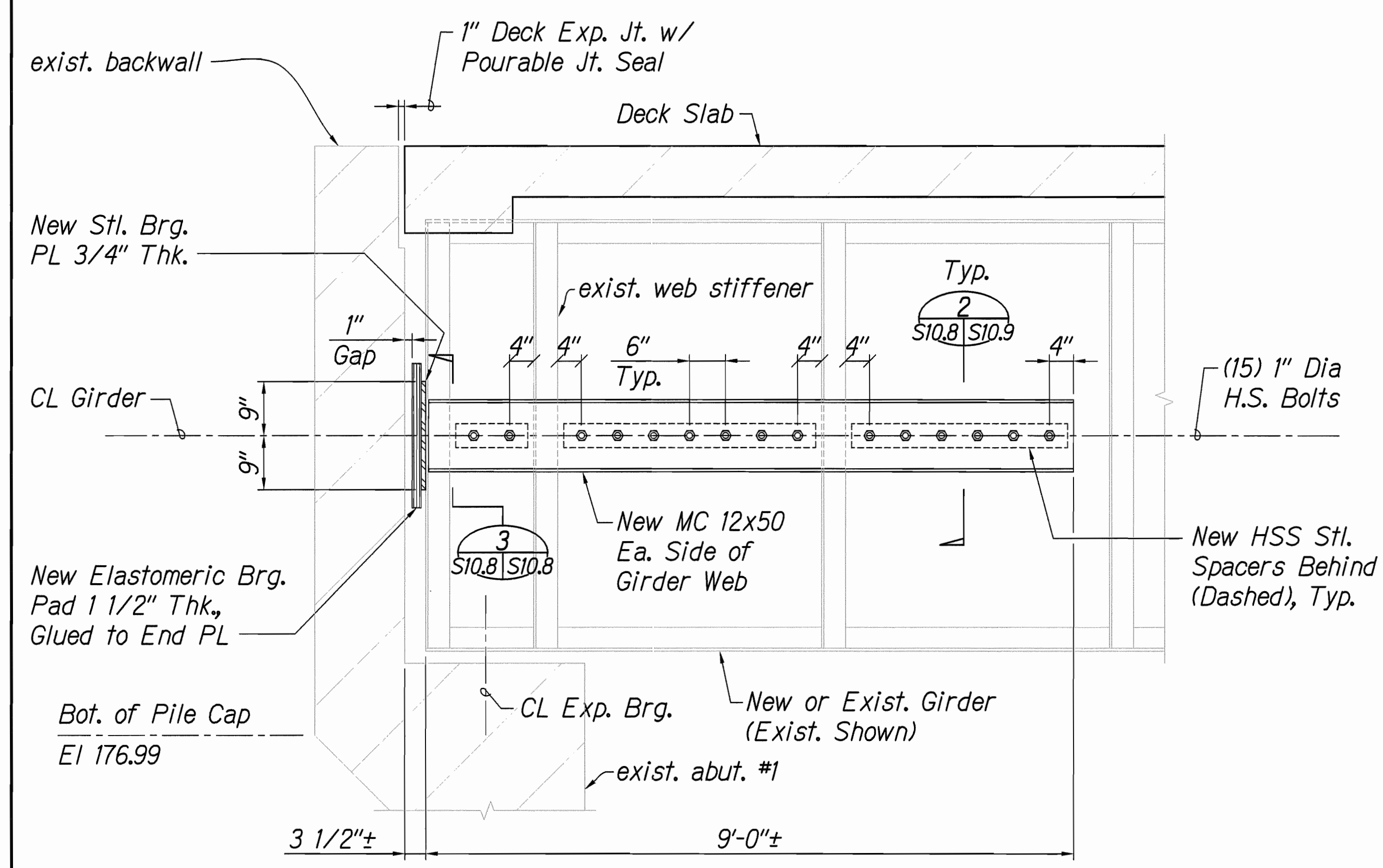
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

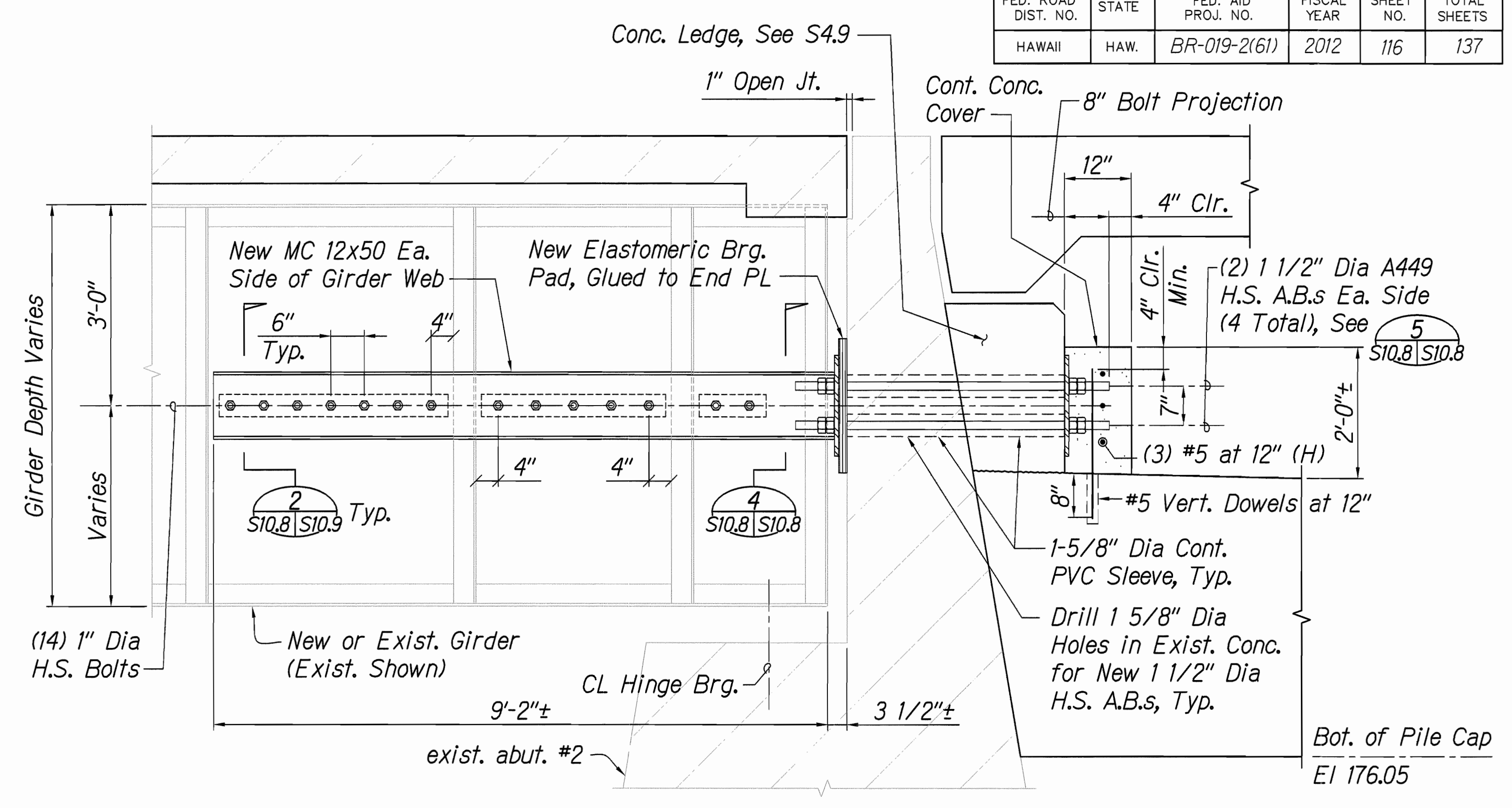
SHEET No. S10.7 OF 10 SHEETS

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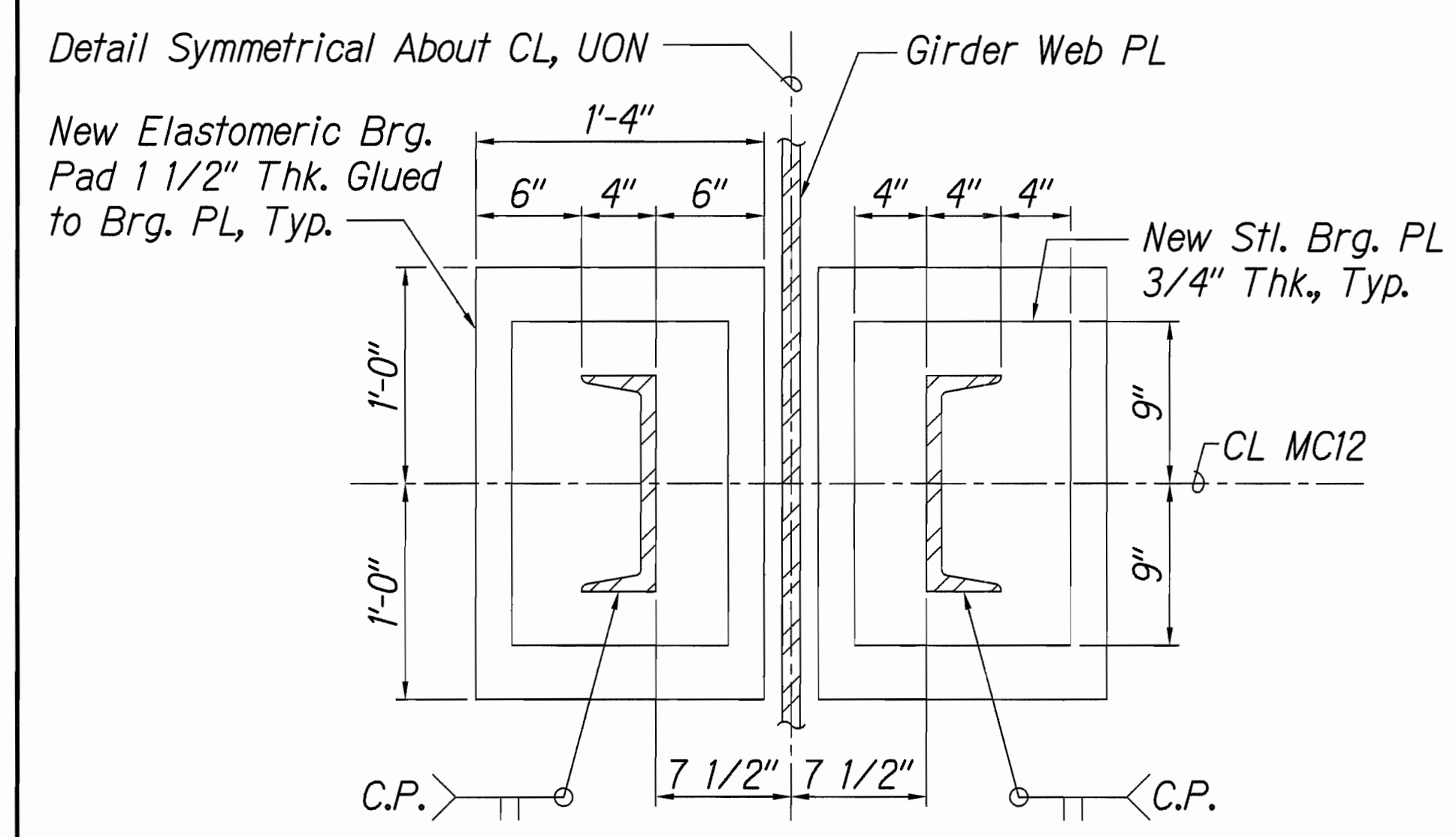
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	116	137



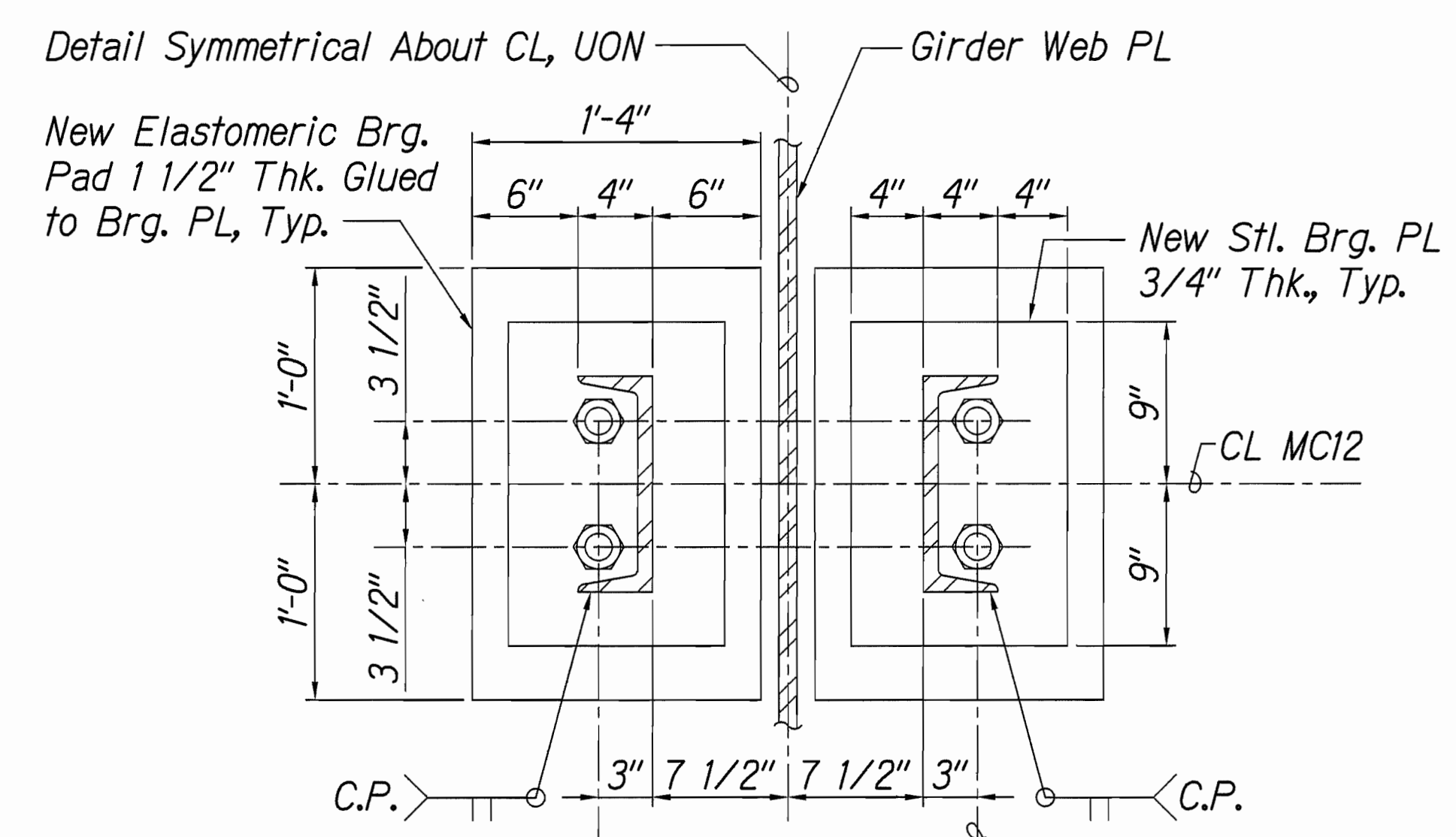
1 LONGITUDINAL BUMPER AT ABUTMENT #1
 SCALE: 3/4" = 1'-0"



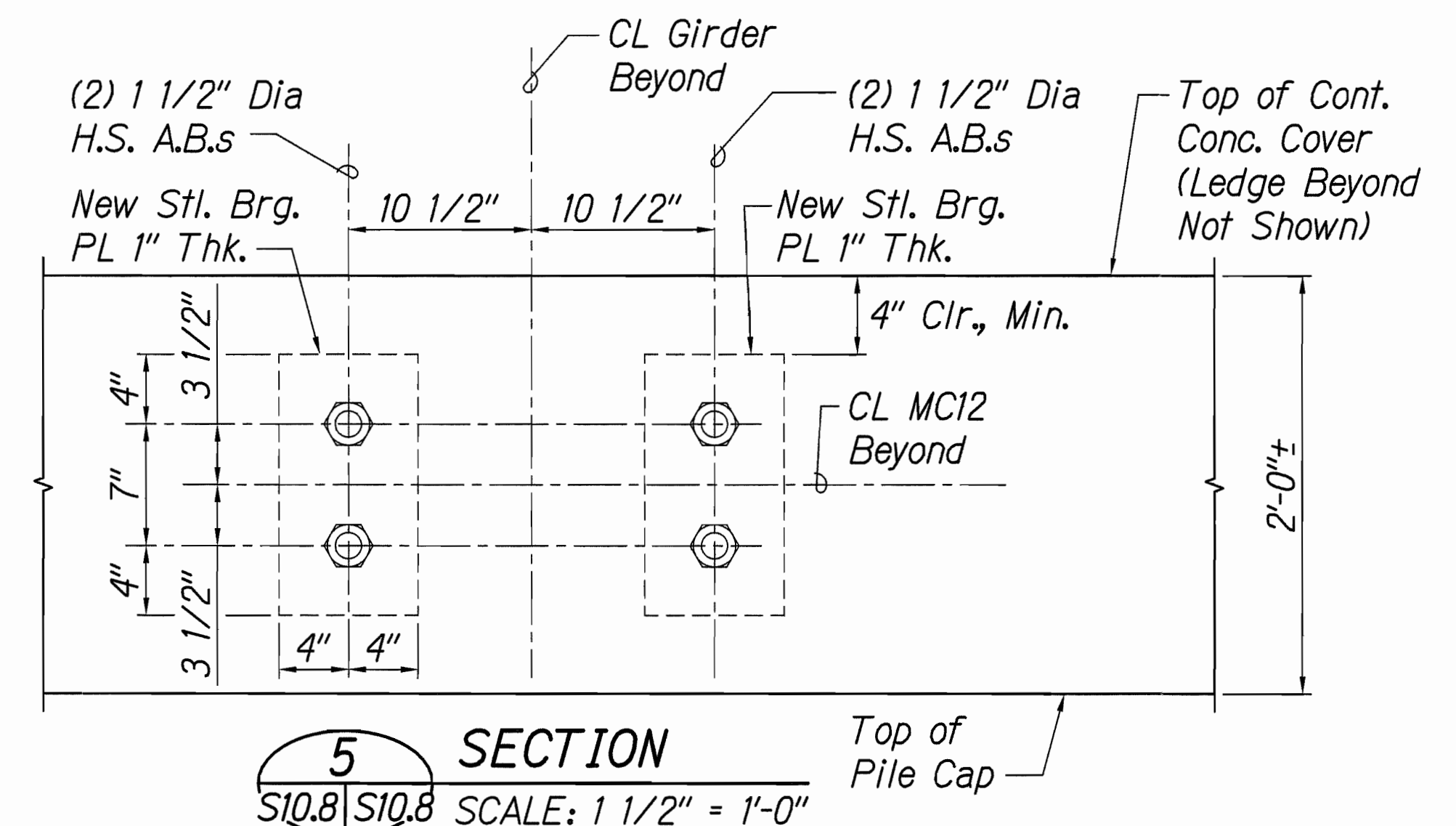
2 LONGITUDINAL STRUT/BUMPER AT ABUTMENT #2
 SCALE: 3/4" = 1'-0"



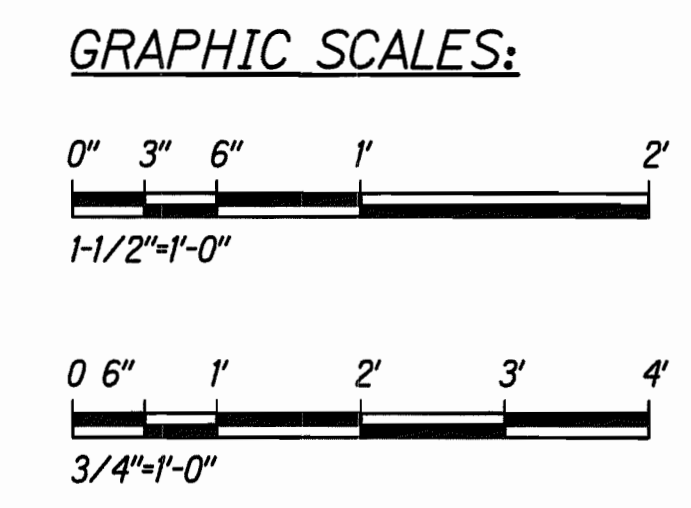
3 SECTION
 SCALE: 1 1/2" = 1'-0"



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



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



STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

LONGITUDINAL BUMPER & STRUT/BUMPER DETAILS

HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S10.8 OF 10 SHEETS

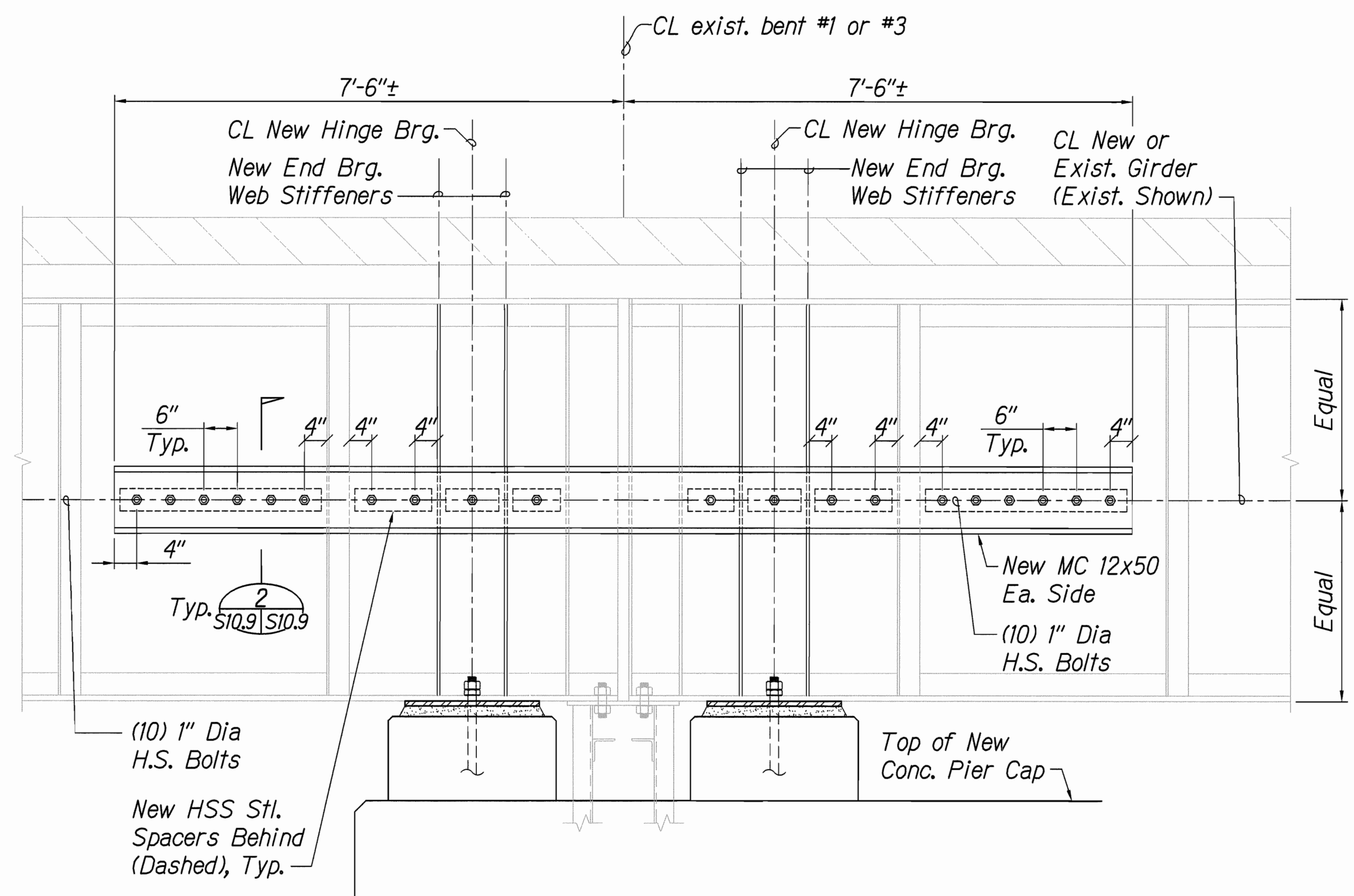
NORMAN K. NAGAMINE
 LICENSED PROFESSIONAL ENGINEER
 NO. 5478-S
 HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Norman K. Nagamine

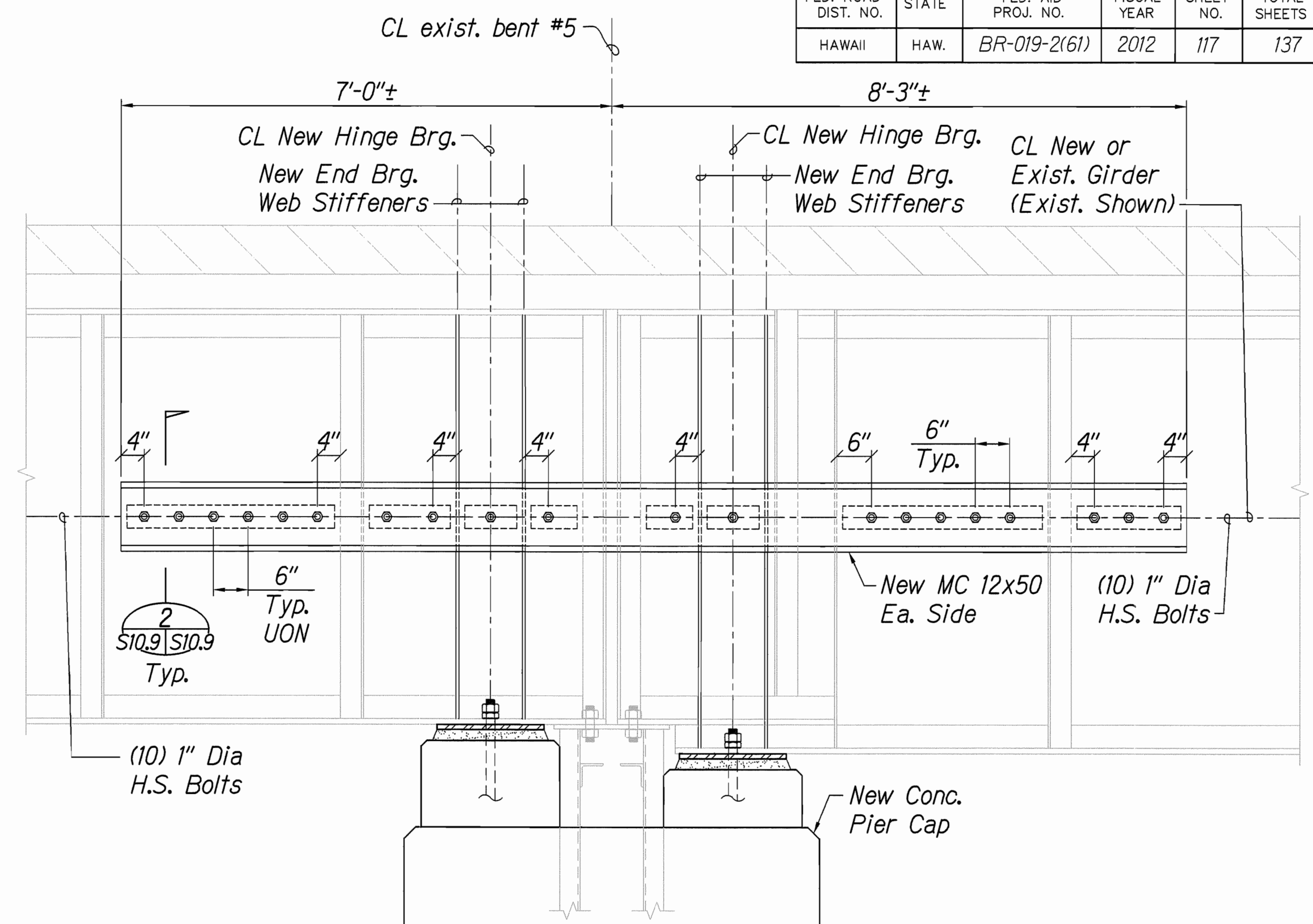
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ORIGINAL PLAN	
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	117	137



ELEVATION

1 DETAIL NEW LONGITUDINAL STRUT AT BENT #1 & #3
S10.1 & S10.7 | S10.9 SCALE: 3/4" = 1'-0"

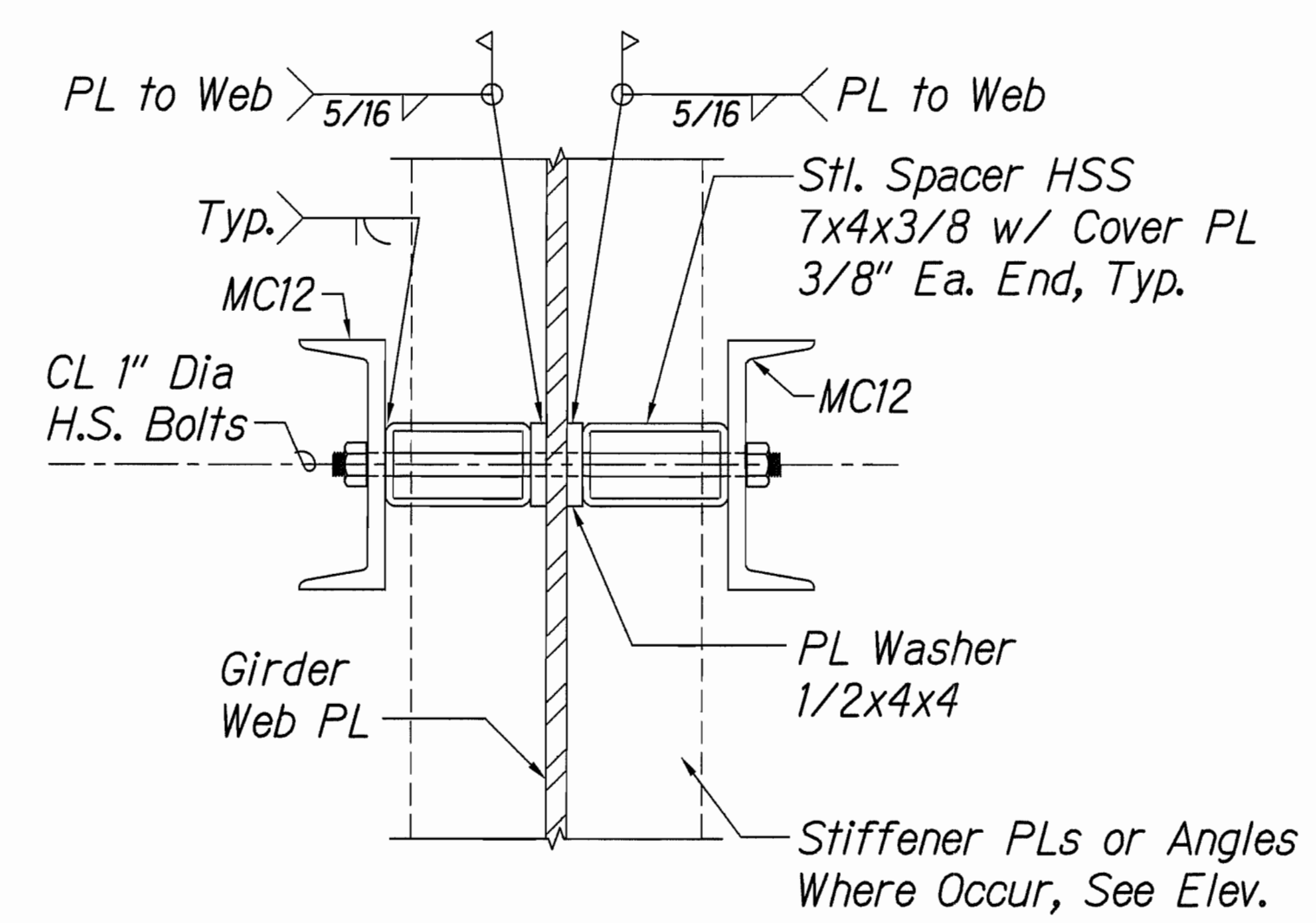


ELEVATION

3 DETAIL NEW LONGITUDINAL STRUT AT BENT #5
S10.1 & S10.9 SCALE: 3/4" = 1'-0"

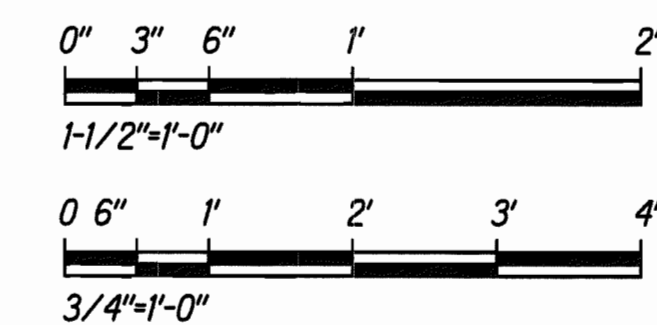
Notes for Longitudinal Strut, Bumper, and Strut/Bumper:

1. Anchor bolts shall be high-strength conforming to ASTM A449, Grade 105.
2. Elastomeric bearing pads shall conform to Standard Specs Section 712.09(C), and shall be incidental to structural steel Pay Item No. 501.3000.
3. Anchor bolts, nuts and plate washers, and elastomeric bearing pads shall be incidental to Pay Item No. 501.3000 and will not be paid for separately.
4. Steel shall be hot-dip zinc coated after fabrication, and painted.



2 SECTION (TYPICAL)
S10.6, S10.8 & S10.9 | S10.9 SCALE: 1 1/2" = 1'-0"

GRAPHIC SCALES:



Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LONGITUDINAL STRUT DETAILS

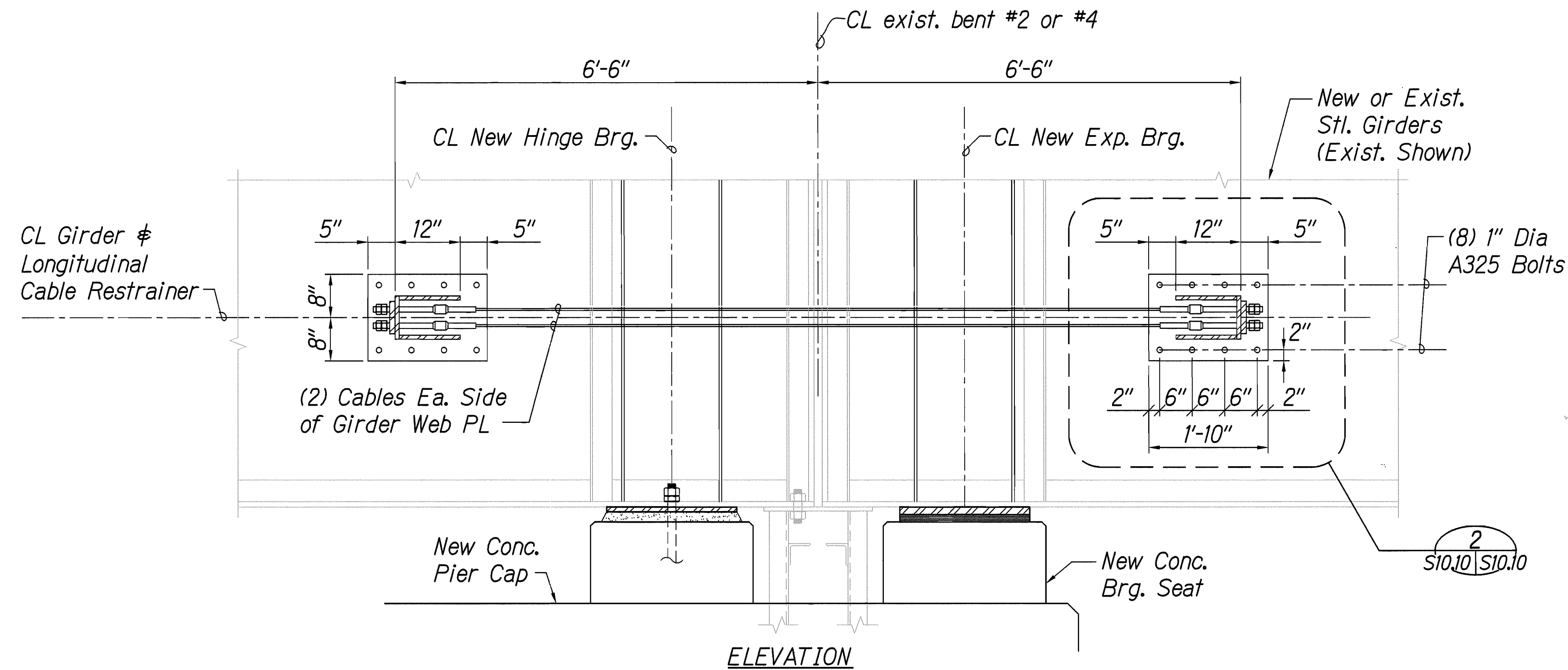
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

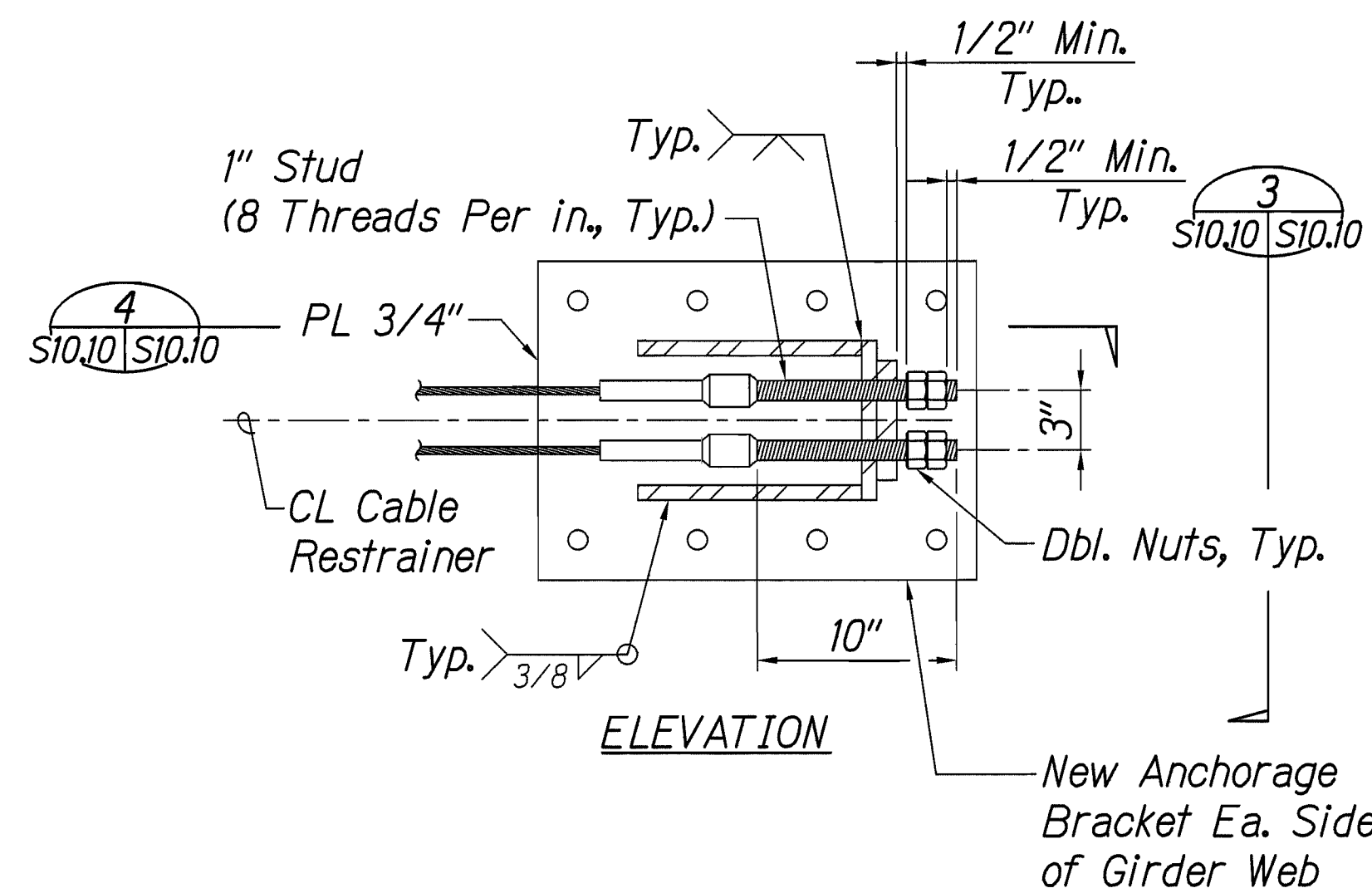
SHEET No. S10.9 OF 10 SHEETS

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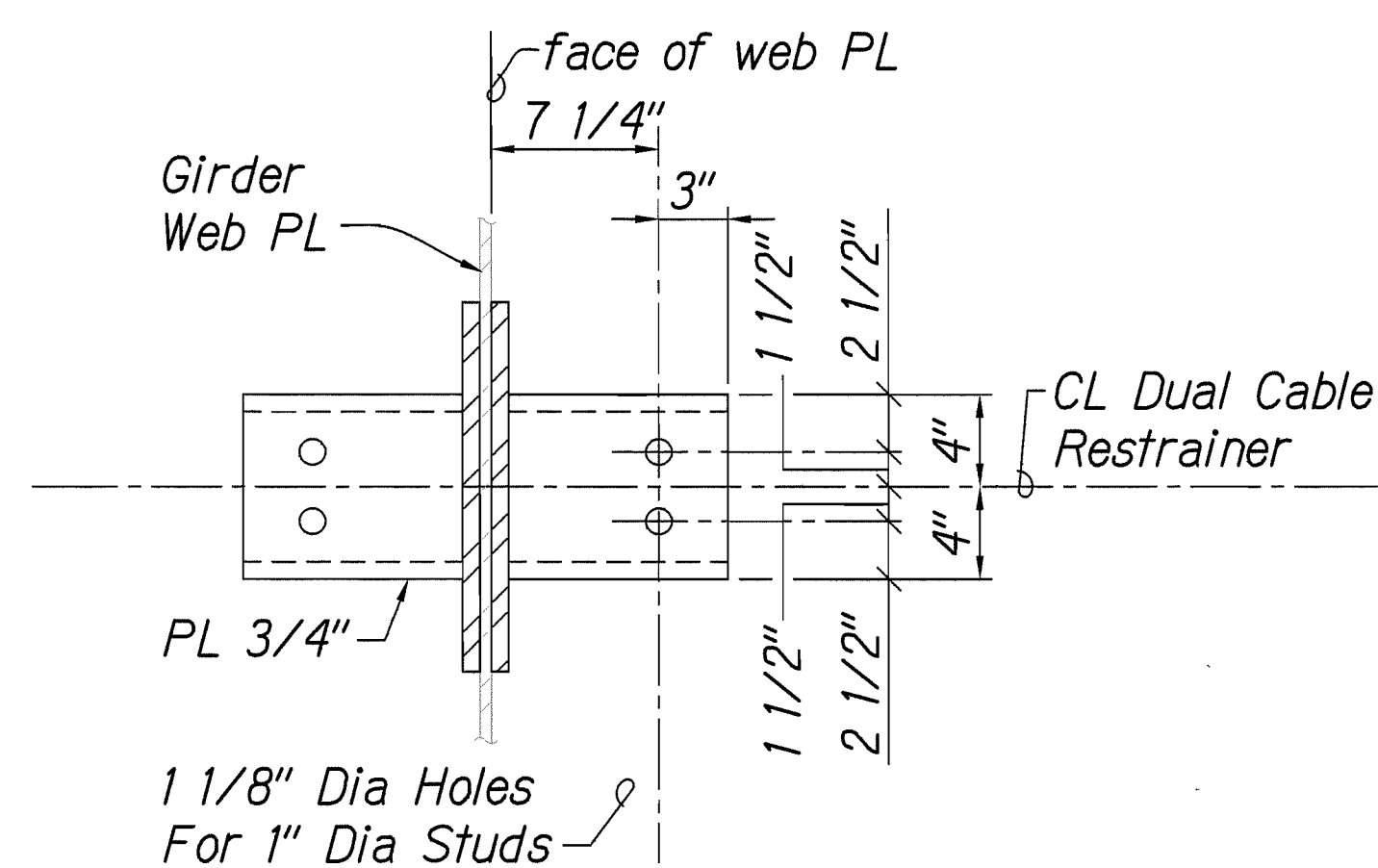
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	118	137



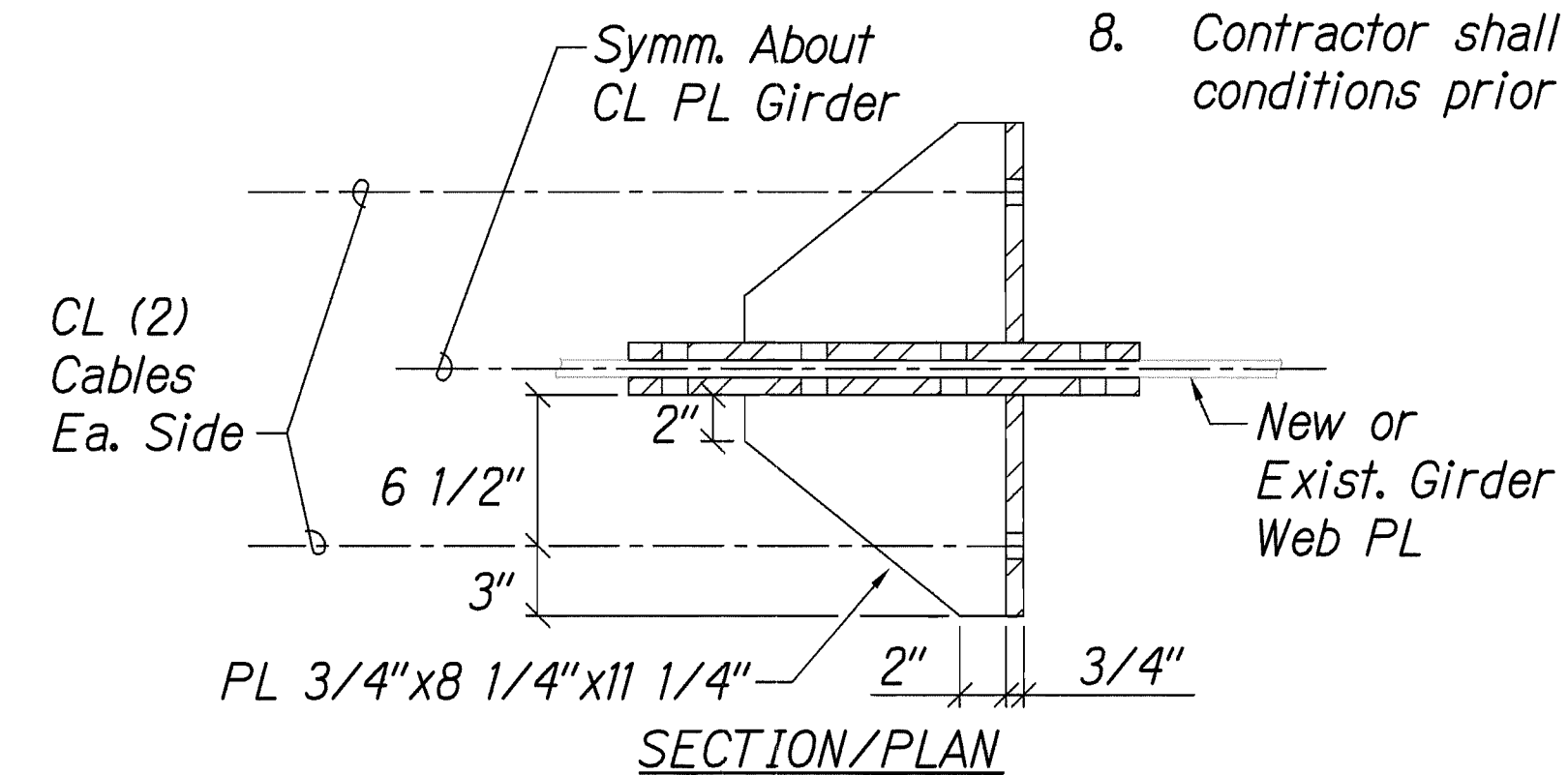
1 LONGITUDINAL CABLE RESTRAINER DETAIL
S10.1 & S10.7 S10.10 SCALE: 3/4" = 1'-0"



2 DUAL CABLE RESTRAINER ASSEMBLIES
S10.10 S10.10 SCALE: 1 1/2" = 1'-0"

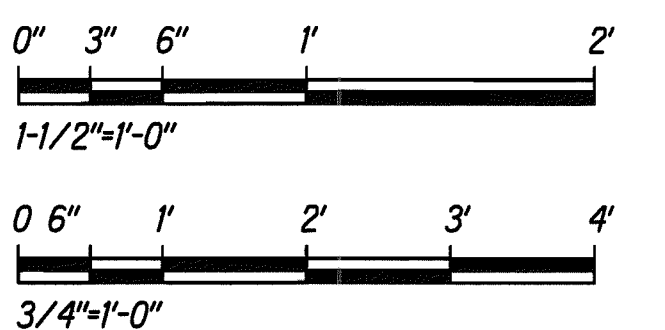


3 SECTION
S10.10 S10.10 SCALE: 1 1/2" = 1'-0"



4 ANCHORAGE BRACKET DETAIL
S10.10 S10.10 SCALE: 1 1/2" = 1'-0"

GRAPHIC SCALES:



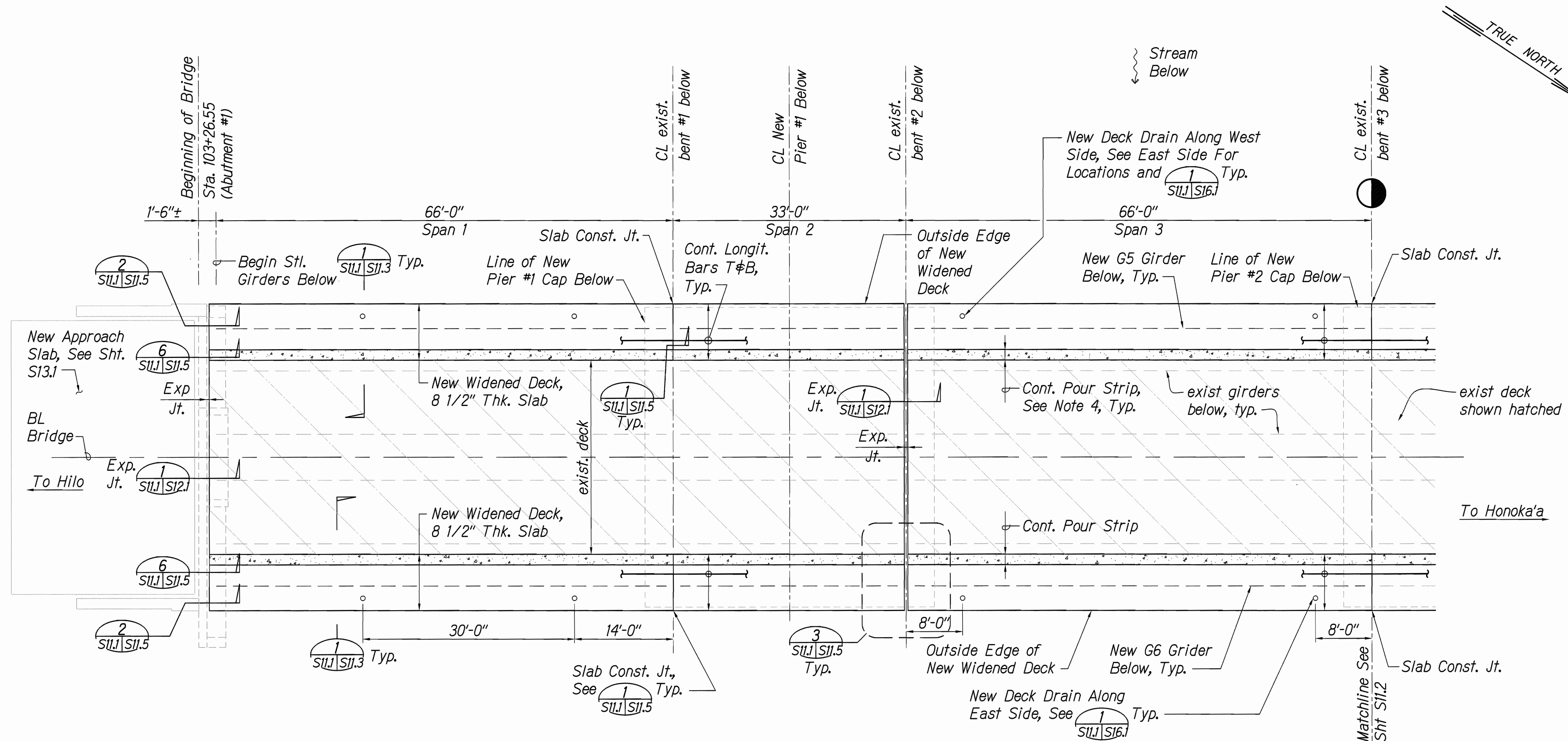
Cable Restrainer Notes:

- Contractor shall refer to Standard Specs Section 654 "Restrainers".
- Wire rope shall be 6x9 Independent Wire Rope Core (IRWC) galvanized in accordance with Fed spec. RR-W-410d, right regular lay with a minimum breaking strength at 46 kips. See Standard Specs Section 709.02.
- Swage fitting shall be machined from 1-5/8" diameter C1035 hot rolled annealed bar stock suitable for cold swaging and galvanized per ASTM A153.
- Threaded stud of the restrainer system shall be 1" diameter (8 Threads per inch) x 10" long A449 threaded stud, Class 2A thread before galvanizing per ASTM 153.
- Nuts and washers shall conform to ASTM A325, galvanized.
- Sheathing covering the wire rope shall be High Density Polyethylene (HDPE) with ultraviolet protection. See Standard Specs Section 712.12 "Sheathing".
- Corrosion inhibiting grease for wire rope shall conform to Standard Specs Section 713.13 "Corrosion-Inhibiting Grease".
- Contractor shall field verify all dimensions and existing conditions prior to fabrication or ordering of materials.

	STATE OF HAWAII	
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	HIGHWAYS DIVISION	
	LONGITUDINAL CABLE RESTRAINER DETAILS	
	HAWAII BELT ROAD	
Rehabilitation of Umauma Stream Bridge		
Federal Aid Project No. BR-019-2(61)		
Scale: As Shown Date: July 25, 2012		
SHEET No. S10.10 OF 10 SHEETS		

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	119	137

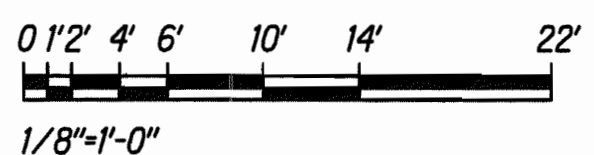


A PARTIAL DECK SLAB REINFORCING PLAN - SPANS 1, 2 & 3
 S2.2 & S10.1/S11.1 SCALE: 1/8" = 1'-0"

Notes:

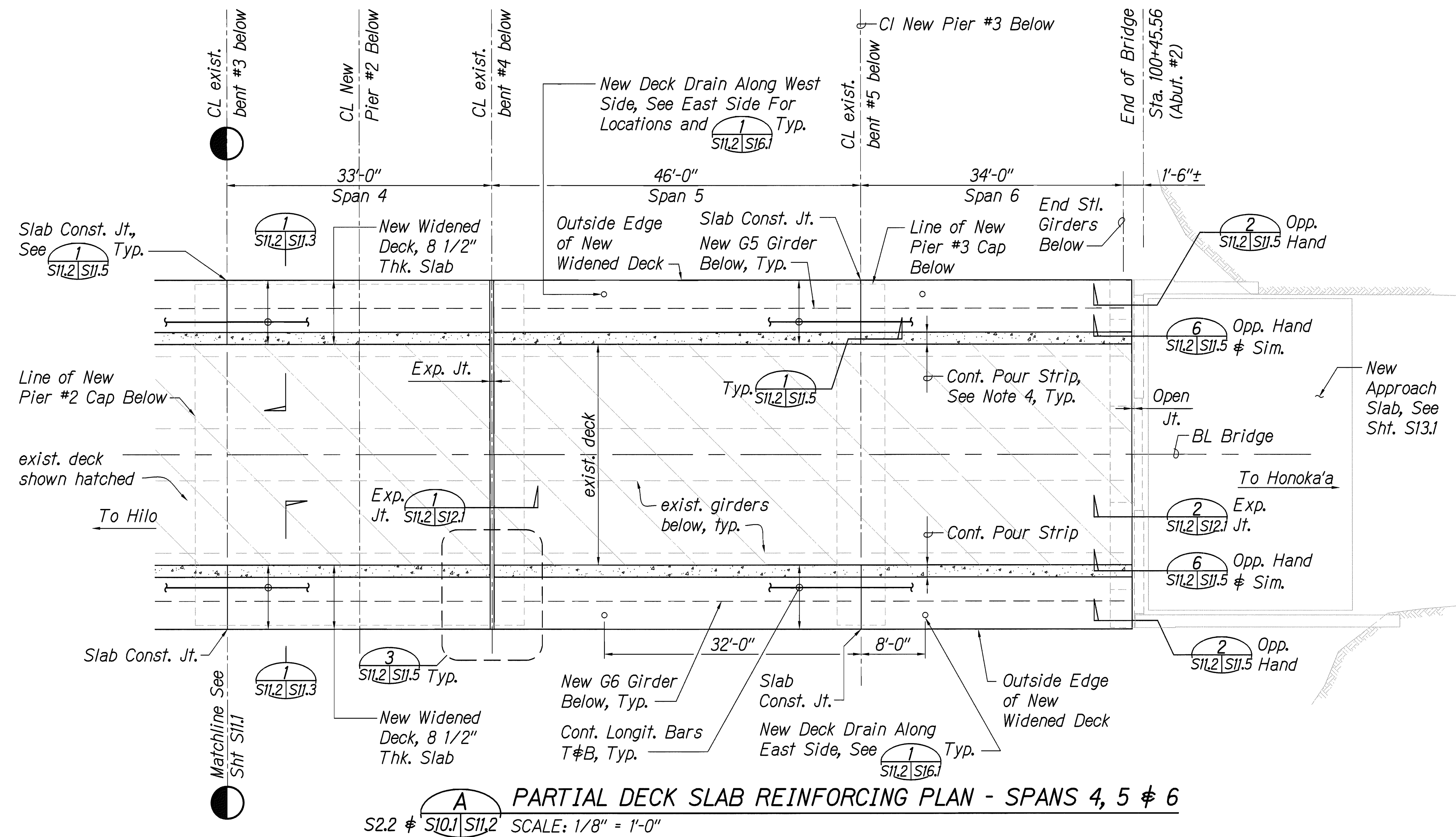
1. For reinforcing not shown, see sheet S11.3.
2. For deck finish elevations and slopes, see sheet S11.4.
3. For construction phasing, see sheet S15.1.
4. For pour strip special notes, see sheet S11.3.

GRAPHIC SCALES:



	STATE OF HAWAII	
	DEPARTMENT OF TRANSPORTATION	
	HIGHWAYS DIVISION	
	PARTIAL DECK REINFORCING	
	PLAN - SPANS 1, 2 & 3	
HAWAII BELT ROAD		
Rehabilitation of Umauma Stream Bridge		
Federal Aid Project No. BR-019-2(61)		
Scale: 1/8" = 1'-0" Date: July 25, 2012		
SHEET No. S11.1 OF 5 SHEETS		

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	120	137



A PARTIAL DECK SLAB REINFORCING PLAN - SPANS 4, 5 & 6
 S2.2 & S10.1/S11.2 SCALE: 1/8" = 1'-0"

Notes:

1. For reinforcing not shown, see sheet S11.3.
2. For deck finish elevations and slopes, see sheet S11.4.
3. For construction phasing, see sheet S15.1.
4. For pour strip special notes, see sheet S11.3.

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NO.	

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

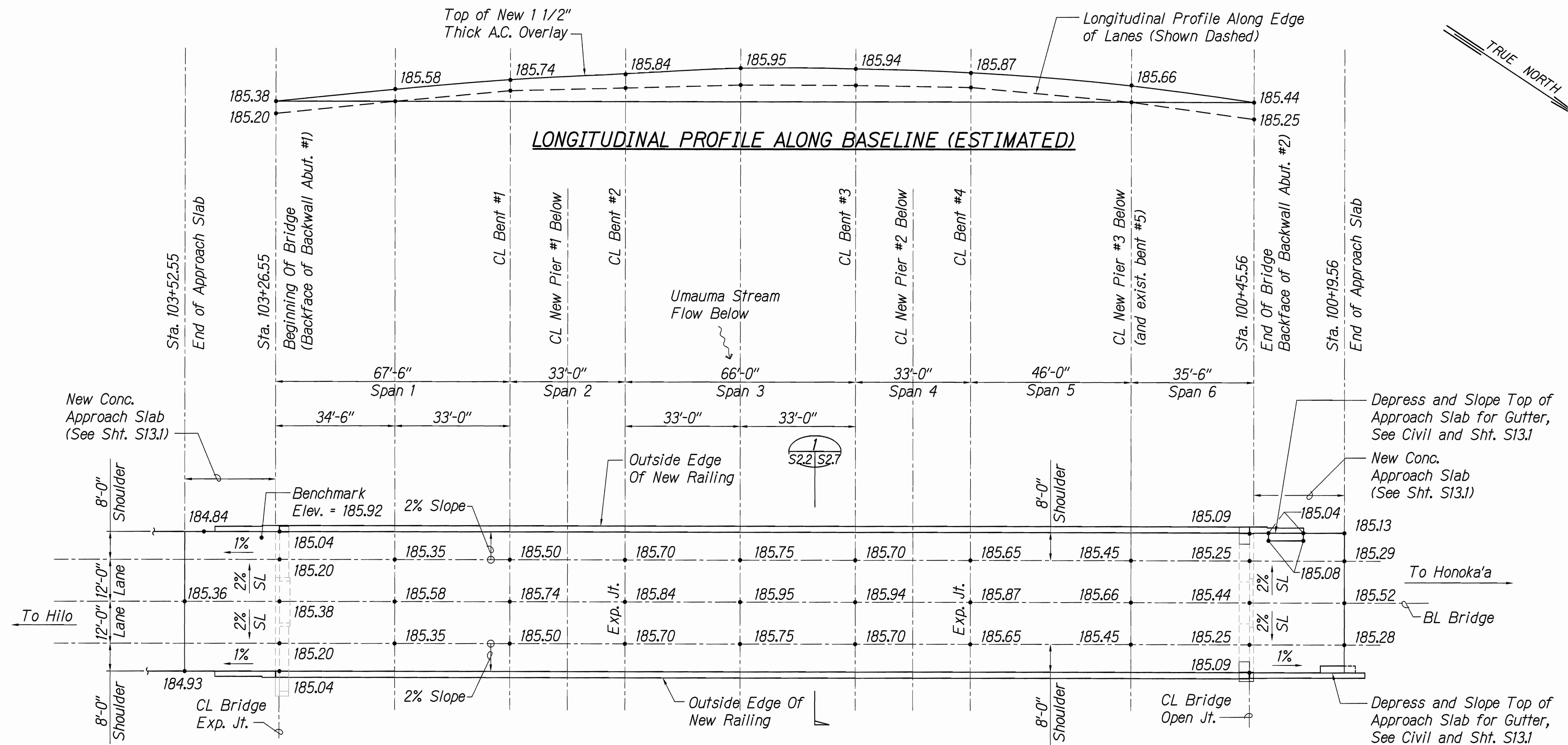
PARTIAL DECK REINFORCING
PLAN - SPANS 4, 5 & 6

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1/8" = 1'-0" Date: July 25, 2012

SHEET No. S11.2 OF 5 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	122	137



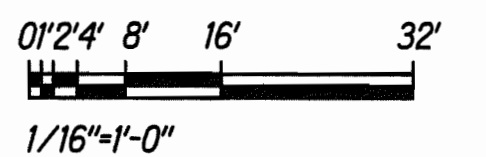
PLAN - NEW WIDENED BRIDGE DECK FINISH ELEVATIONS (ESTIMATED)

SCALE: 1/16" = 1'-0"

Notes:

- For existing spot elevations on bridge deck, contractor shall refer to topo map on sheet T6.
- Contractor shall field verify all existing and new finish deck elevations.
- New A.C. overlay on bridge deck and on approach slabs shall be 1 1/2" thick.

GRAPHIC SCALES:



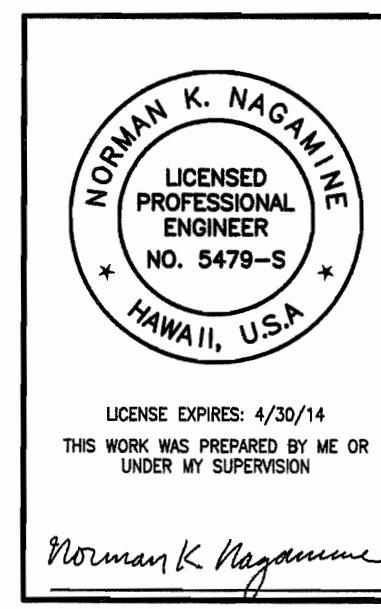
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DECK FINISH ELEVATIONS - PLAN

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

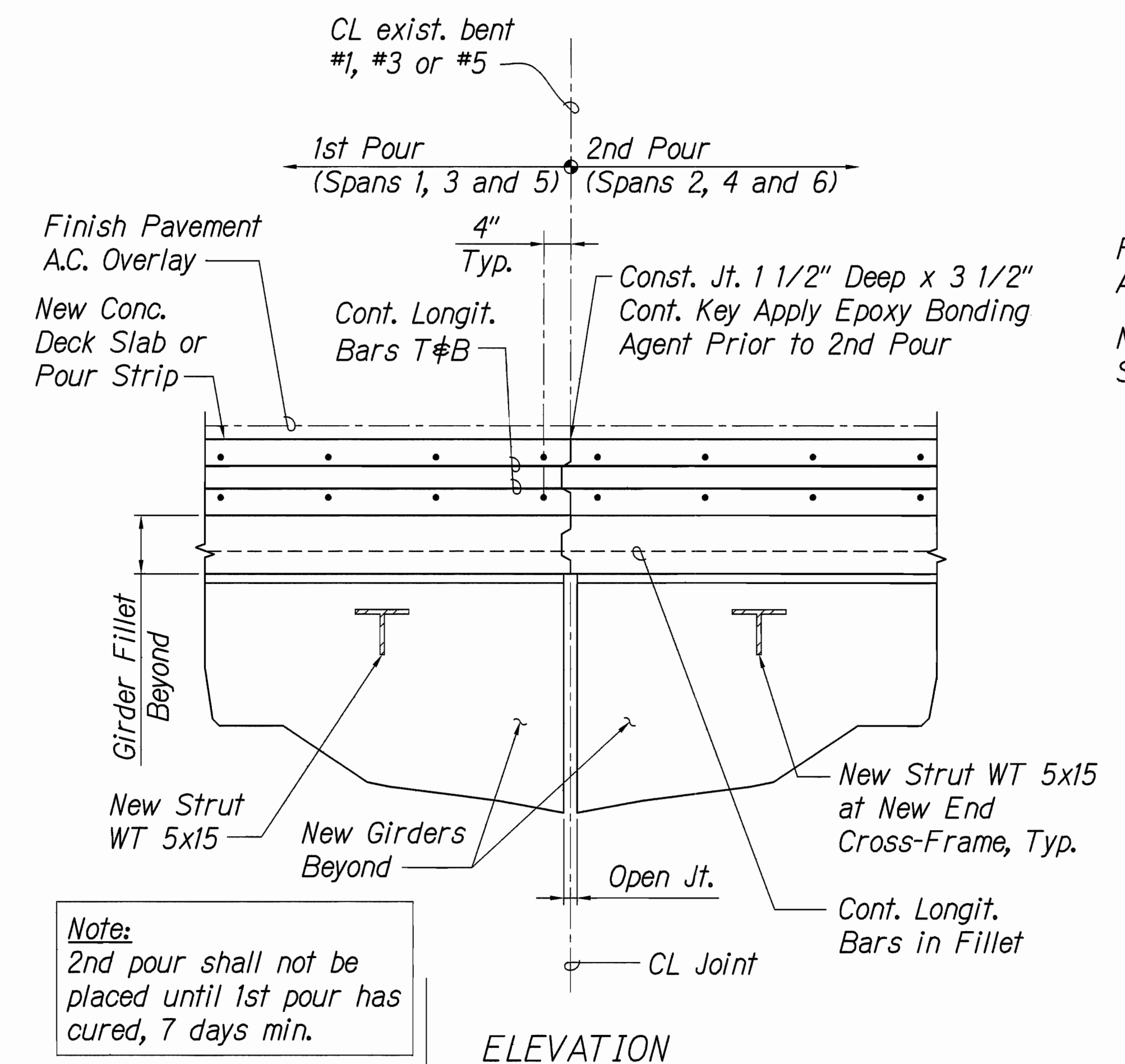
Scale: 1/16" = 1'-0" Date: July 25, 2012

SHEET No. S11.4 OF 5 SHEETS

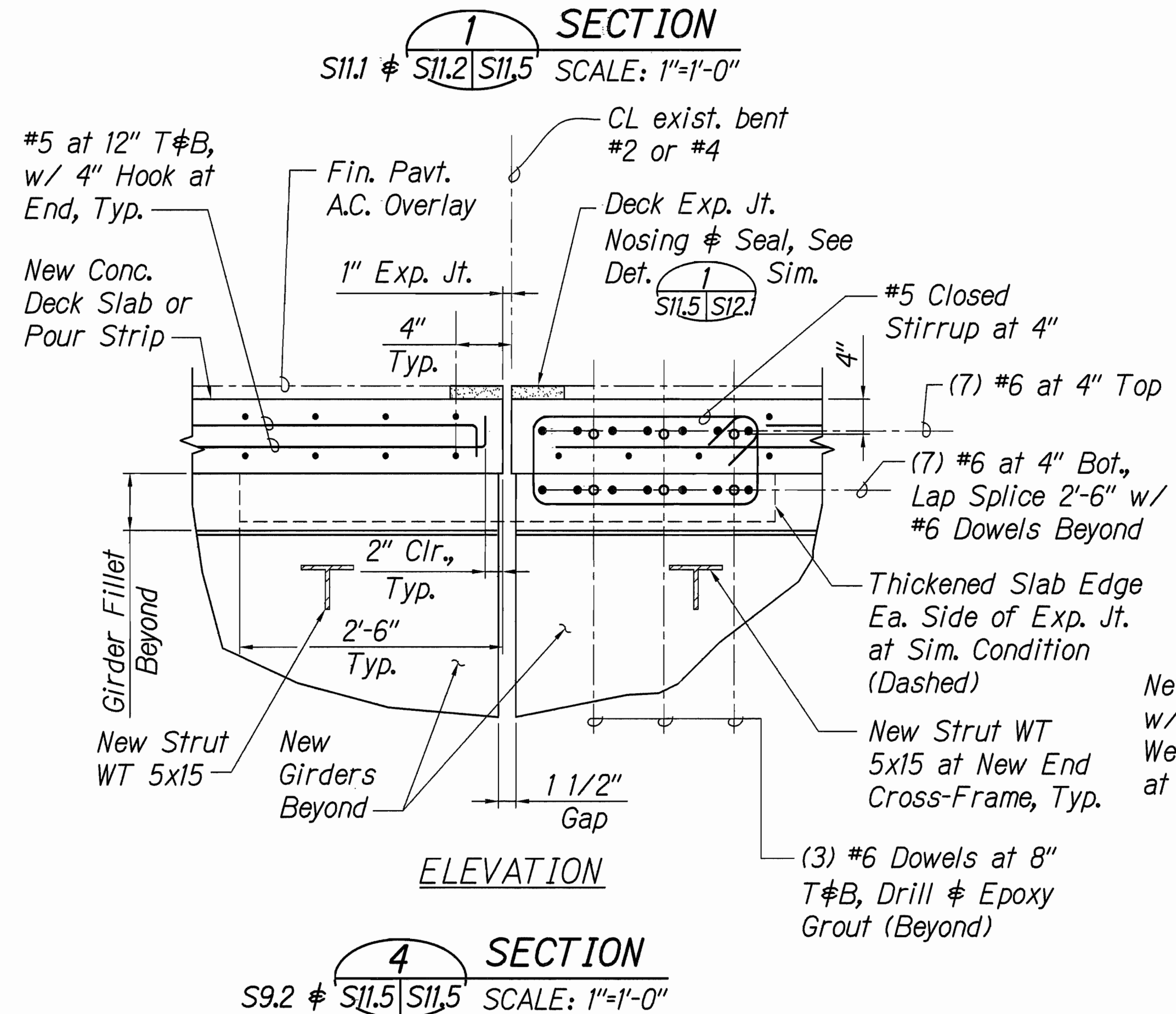
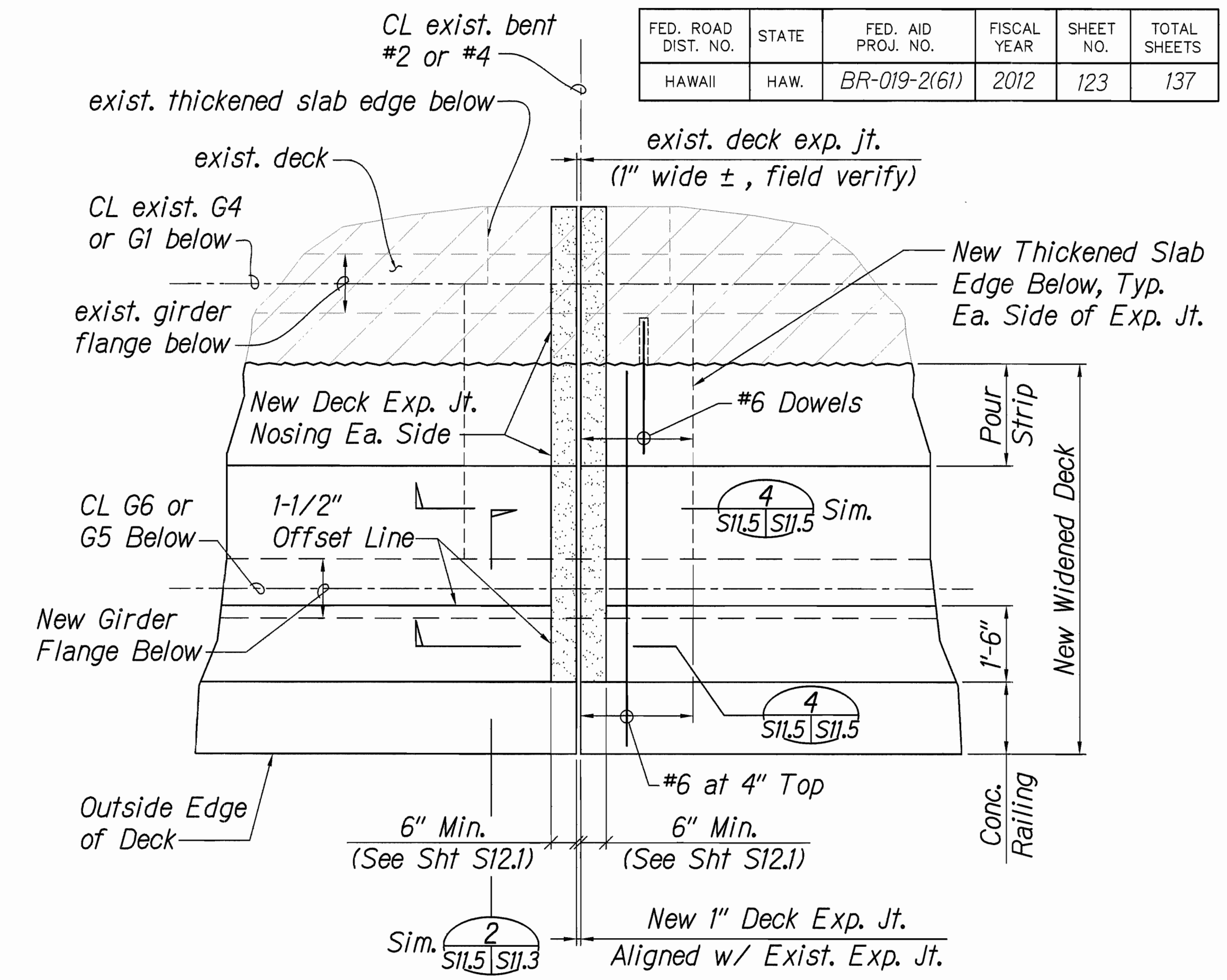
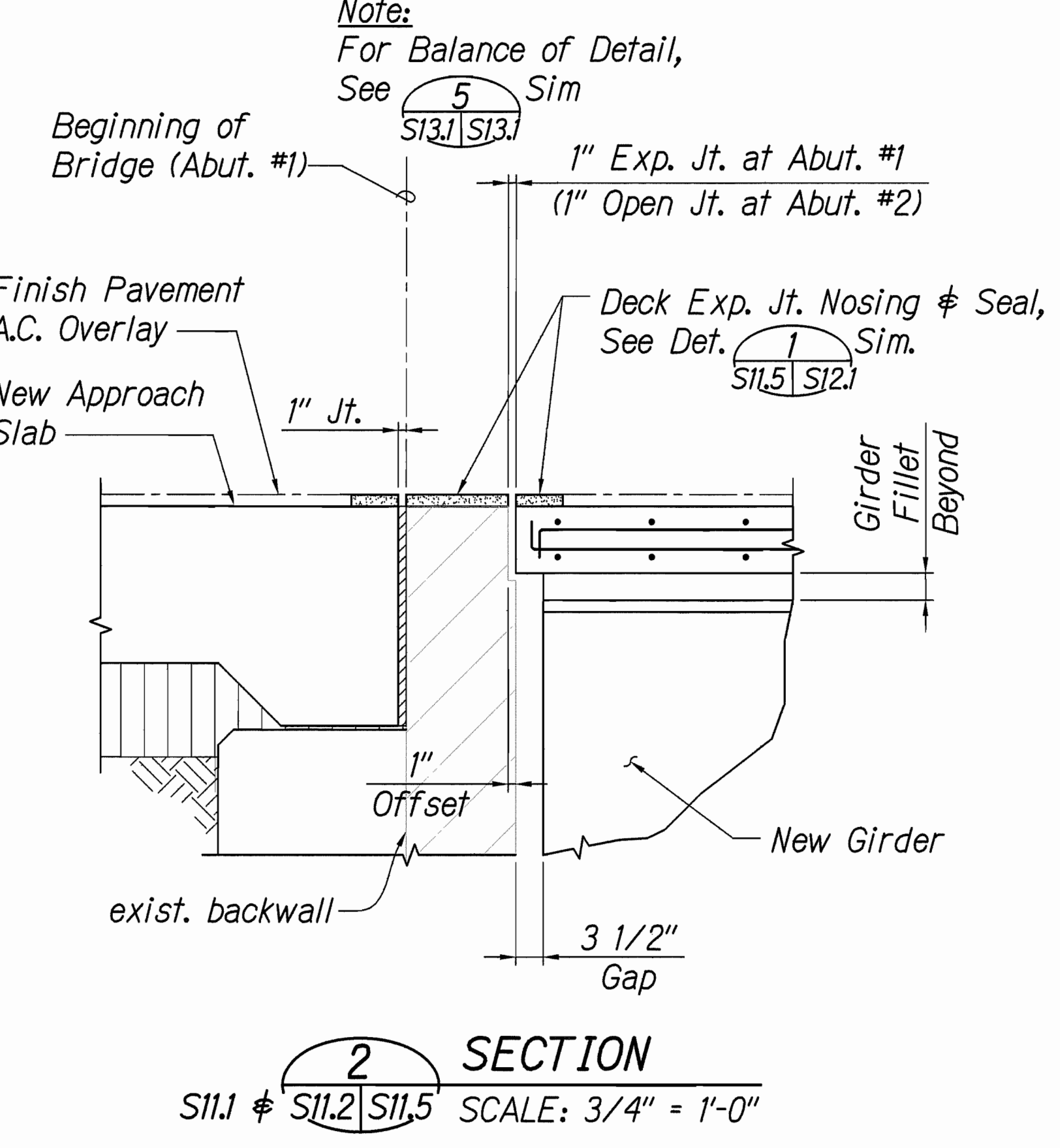


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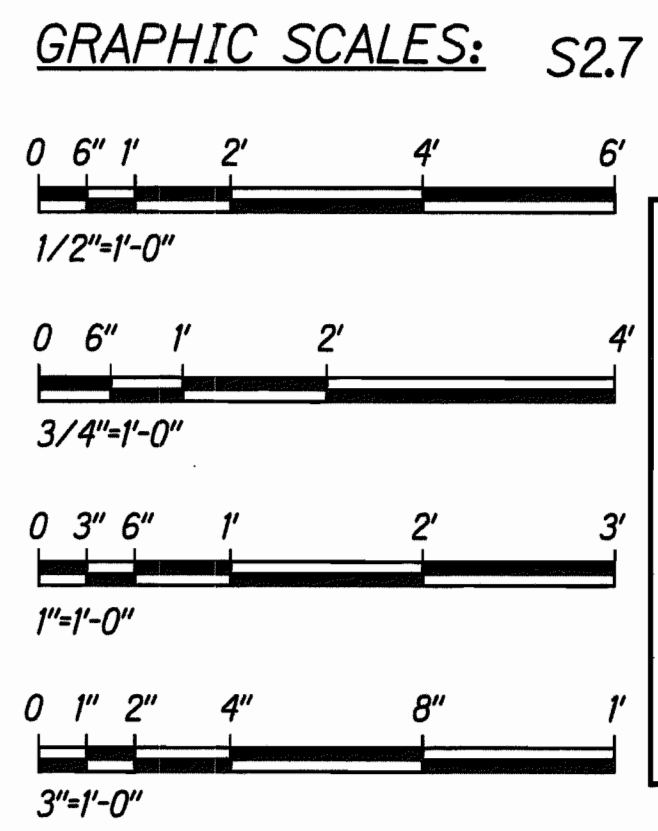
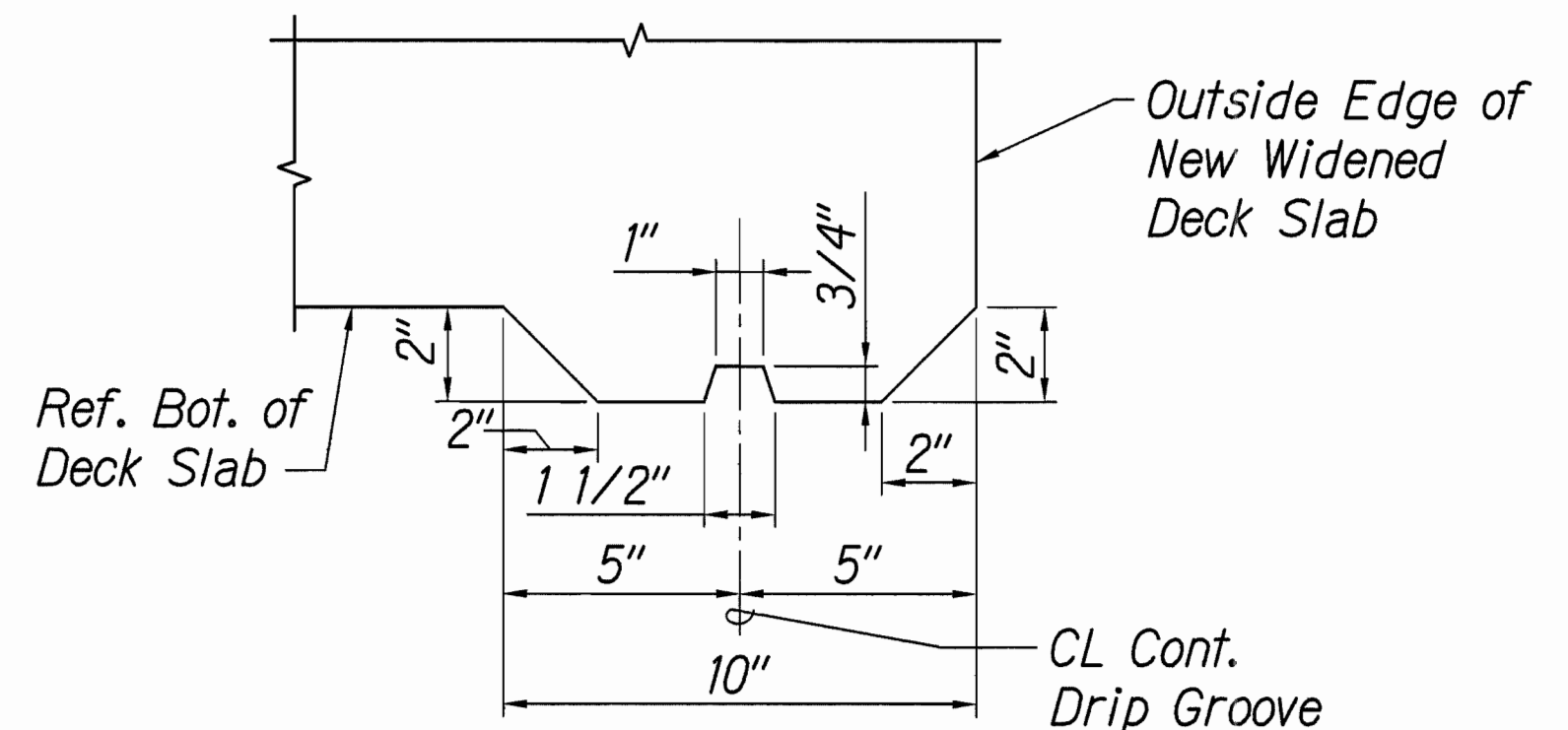
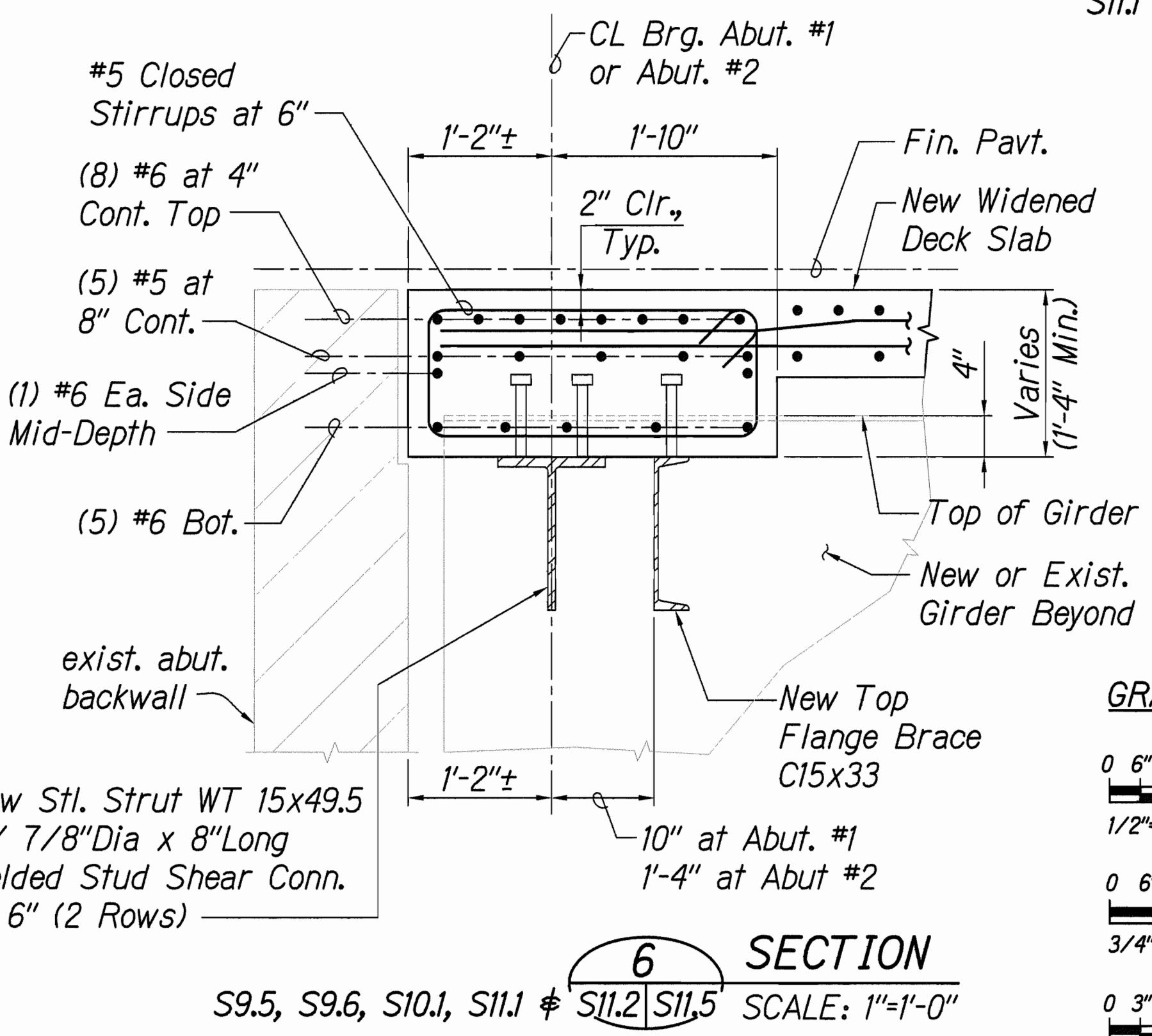
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	123	137



ELEVATION



ELEVATION



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DECK JOINT SECTIONS & DRIP GROOVE DETAIL

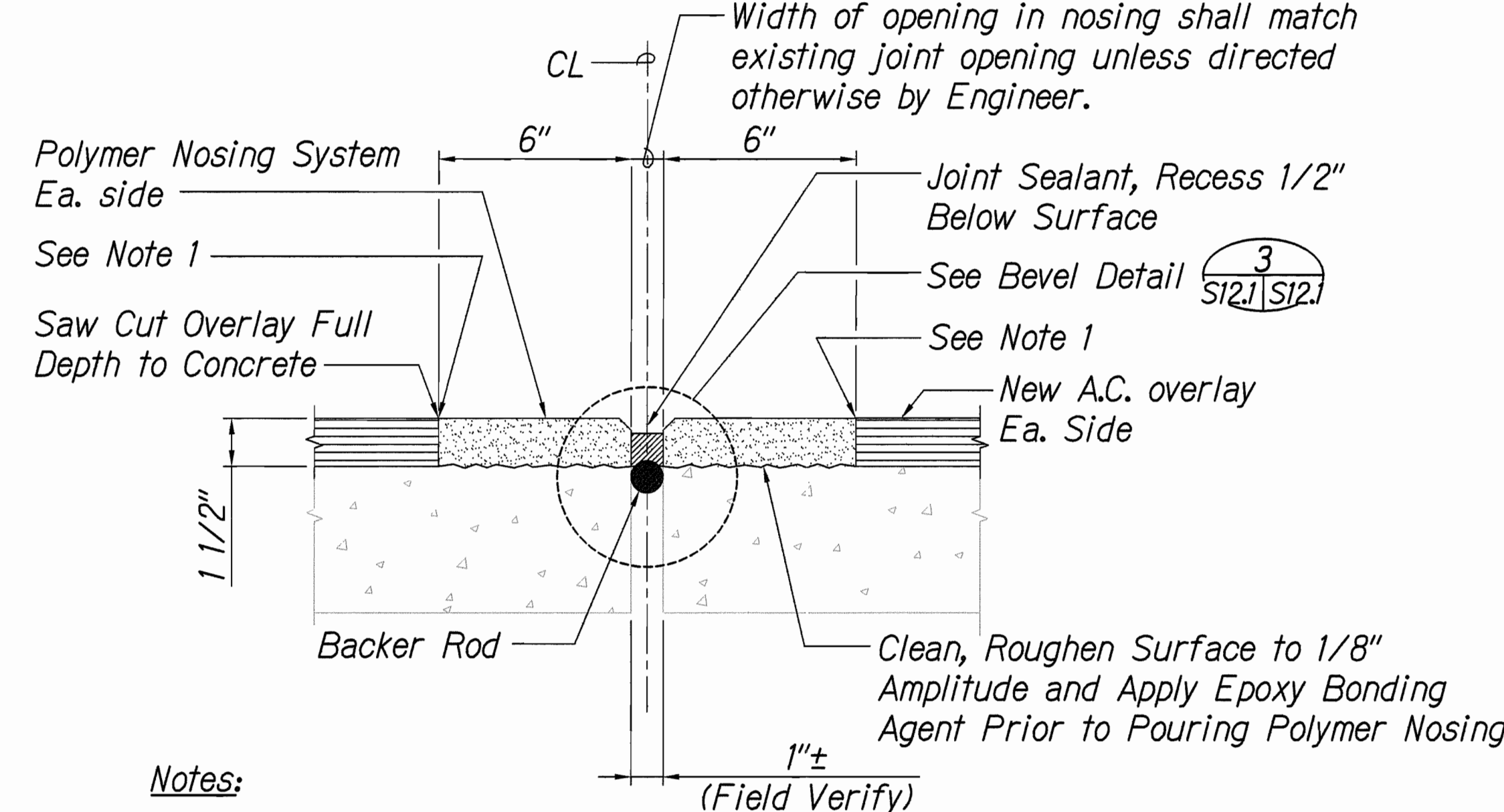
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S11.5 OF 5 SHEETS

SURVEY PLOTTED BY	DATE
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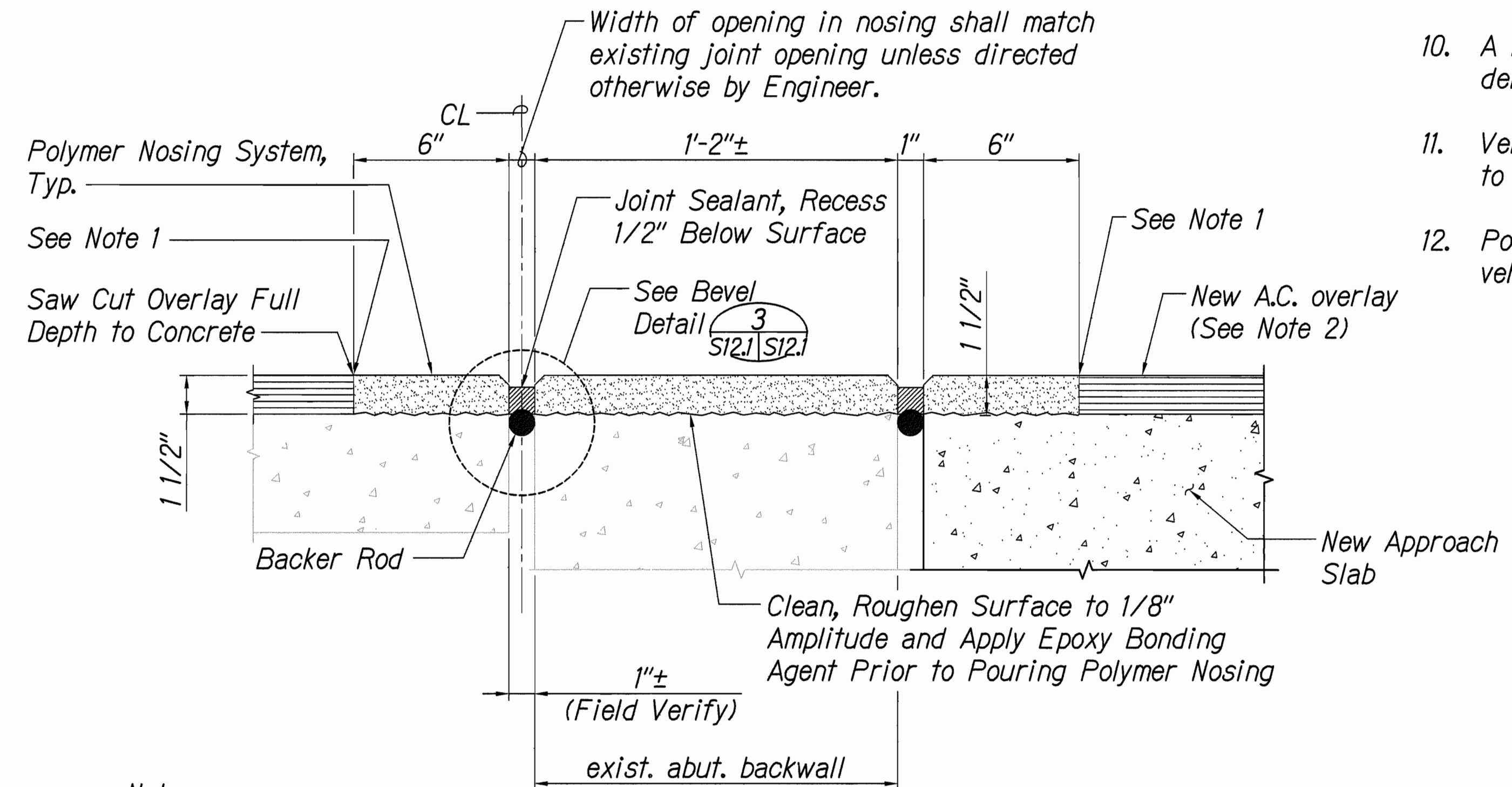
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	124	137



Notes:

1. Finish surface elevation of nosing shall match adjacent A.C. overlay elevation.
2. Finish riding surfaces on bridge deck shall have a smooth transition with no kinks, humps or dips.

1 EXPANSION JOINT DETAIL AT BRIDGE DECK
S11.1, S11.2, S11.5, S12.1 SCALE: 3" = 1'-0"



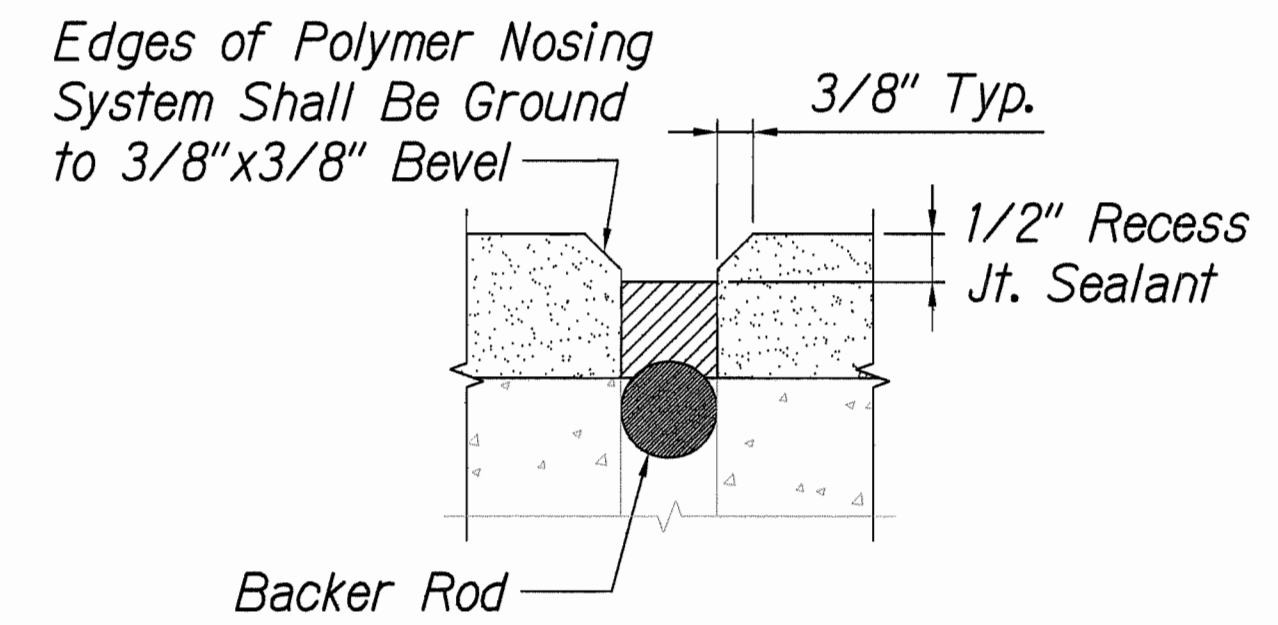
Notes:

1. Finish surface elevation of nosing shall match adjacent A.C. overlay elevation.
2. Finish riding surfaces on bridge deck, abutment backwall and approach slab shall have a smooth transition with no kinks, humps or dips.

2 JOINT DETAIL AT ABUT #2
S11.2, S11.5, S12.1 SCALE: 3" = 1'-0" (SIMILAR AT ABUT #1)

Notes for Deck Joint Details

1. Contractor shall refer to Special Provisions Section 503 "Concrete Structures" for joint sealant. Joint sealant shall be a rapid curing two-component 100% silicone sealant conforming to ASTM C-719 and ASTM C-793.
2. For construction phasing, see sheet S15.1.
3. Information shown on the plans are based on "as-built" plans. Contractor shall field measure actual joint widths prior to ordering of materials.
4. At existing bridge deck, remove existing nosing system down to top of concrete deck.
5. Remove any cracked or weakened concrete deck sections exposed after the existing nosing system has been removed.
6. Existing deck reinforcing steel shall not be damaged or cut. Any damage shall be repaired to the satisfaction of the Engineer and at Contractor's expense.
7. Repair all chipped, spalled, or damaged concrete in existing joint areas.
8. Clean up and remove debris accumulated on bridge members located directly below the joints to the satisfaction of the Engineer.
9. Install new Polymer Nosing System and joint sealant per manufacturer's recommendations.
10. A representative of the manufacturer shall be present at start of work to demonstrate proper cleaning and installation techniques.
11. Vehicular traffic on lane adjacent to deck joint work area shall be restricted to 10 mph until Polymer Nosing System has cured for 4 hours minimum.
12. Polymer Nosing System shall be cured for 8 hours minimum prior to allowing vehicular traffic over new joints.

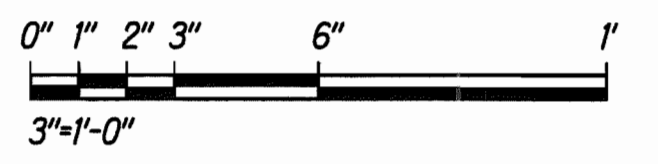


3 BEVEL DETAIL
S12.1, S12.1 SCALE: 6" = 1'-0"

Polymer Nosing System

1. Polymer Nosing System shall consist of a two component, rapid curing liquid polymer, and blended aggregates to form a dense, semiflexible polymer based mortar.
2. Liquid polymer shall have a shore "D" hardness at 77 deg F of 45 to 75.
3. Cured polymer-based mortar shall have a compressive strength (Method B) of 2,500 PSI at 24 hours.
4. Concrete substrate temperature shall be minimum 50 degrees F and rising during installation of mortar.
5. Polymer nosing system and joint sealant shall be compatible with each other, and shall be furnished by the same manufacturer.
6. Polymer nosing system shall be incidental to deck joint sealant.

GRAPHIC SCALES:



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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BRIDGE DECK EXPANSION
JOINT DETAILS

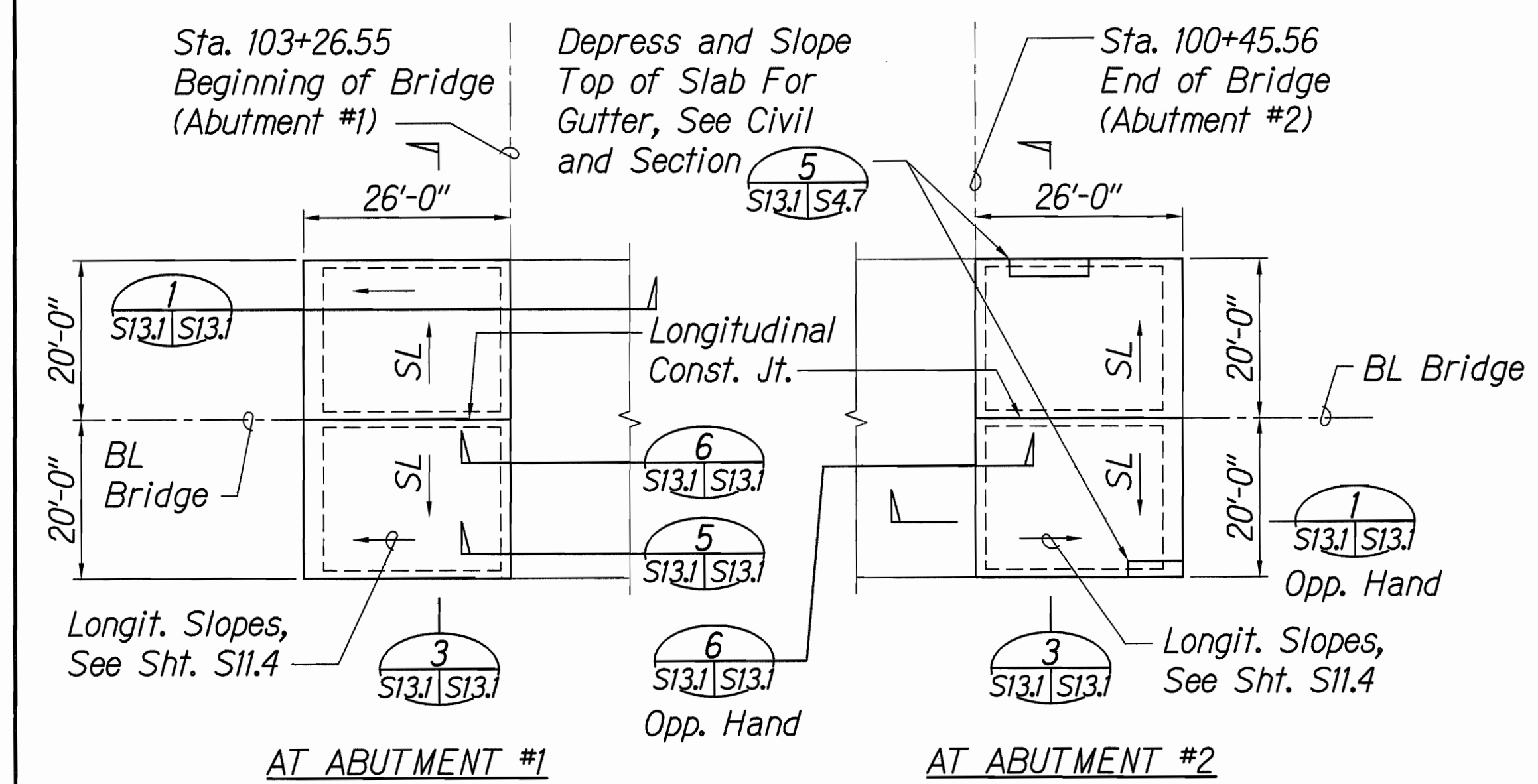
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As AShown Date: July 25, 2012

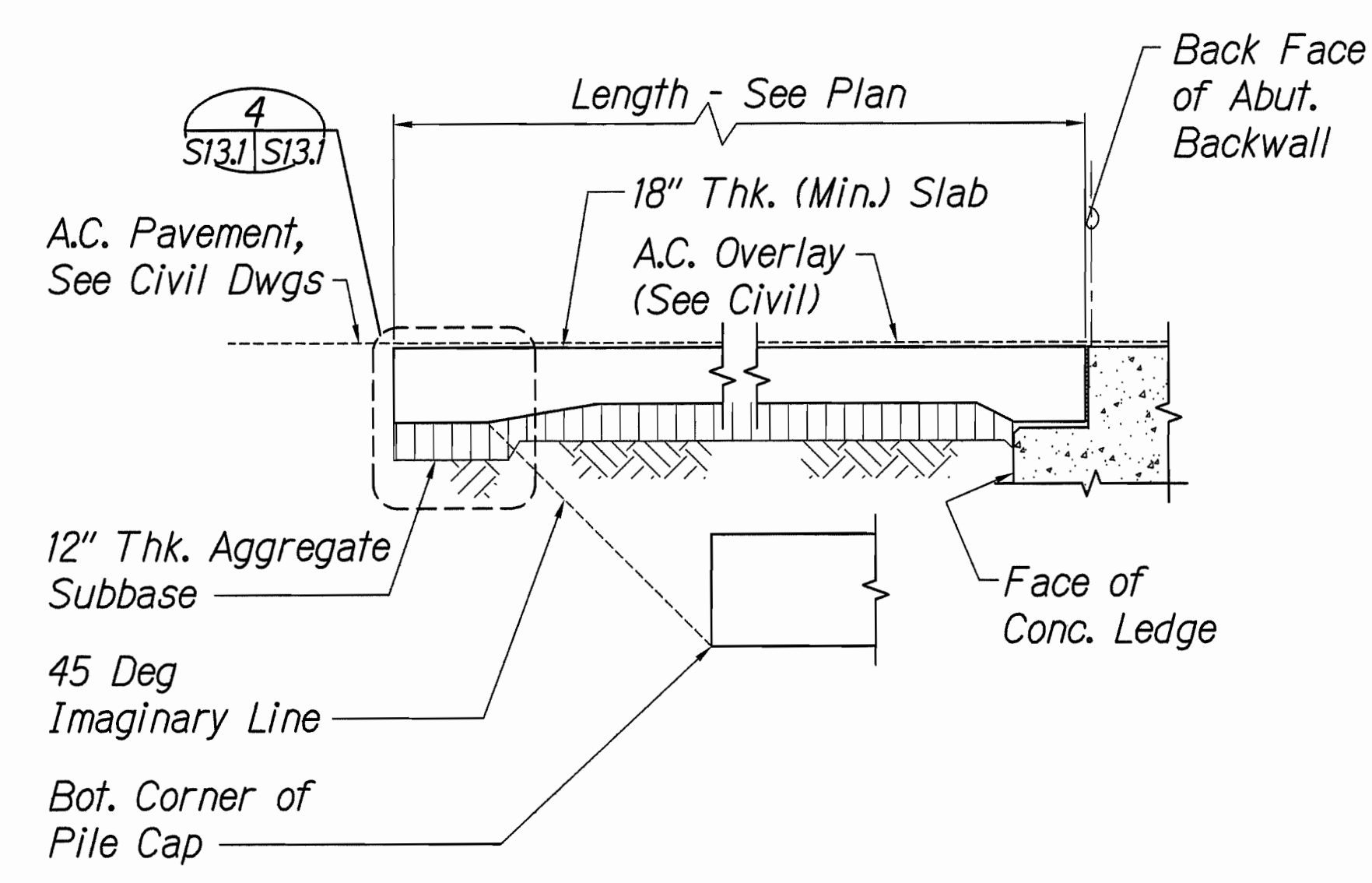
SHEET No. S12.1 OF 1 SHEETS

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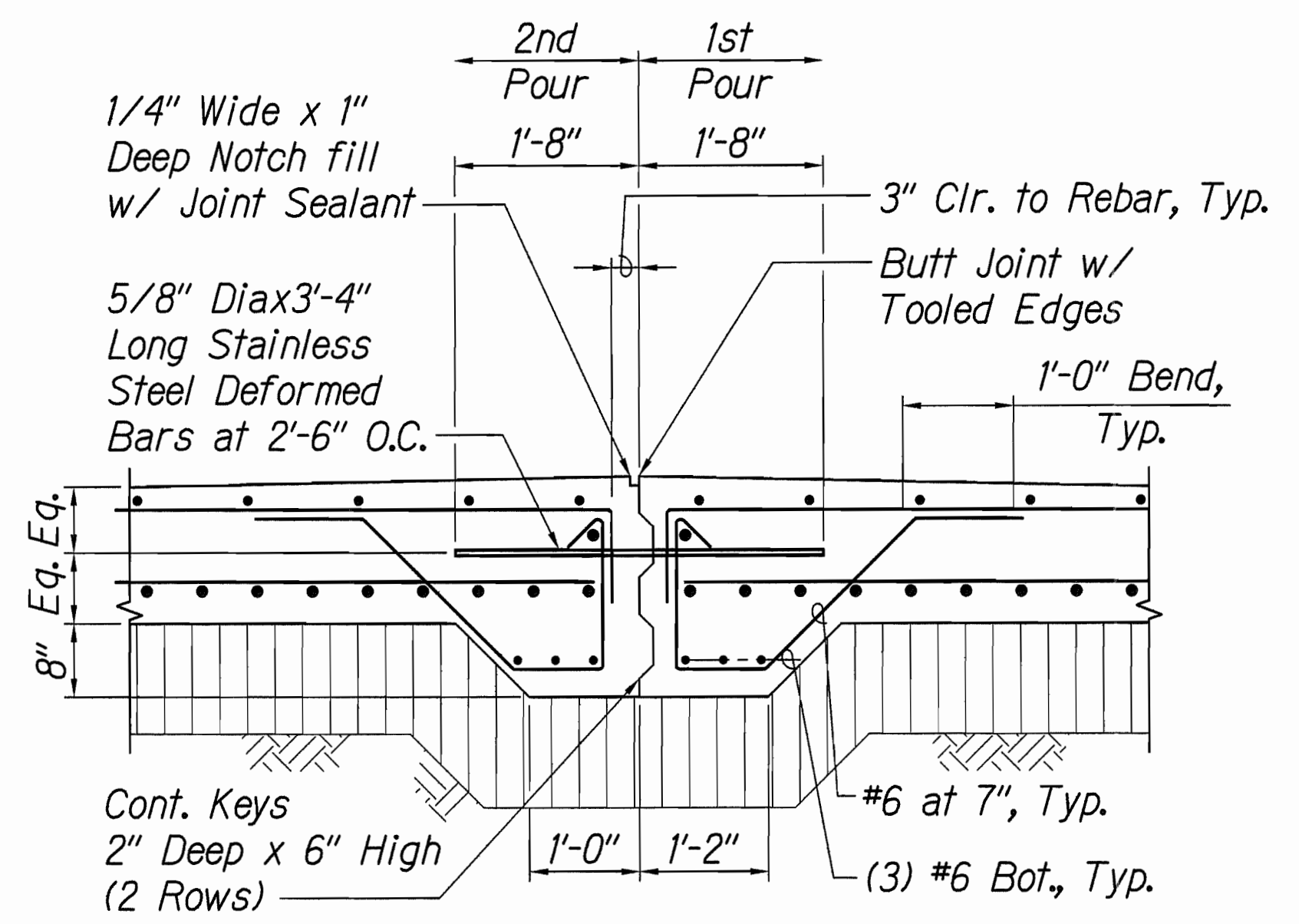
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	125	137



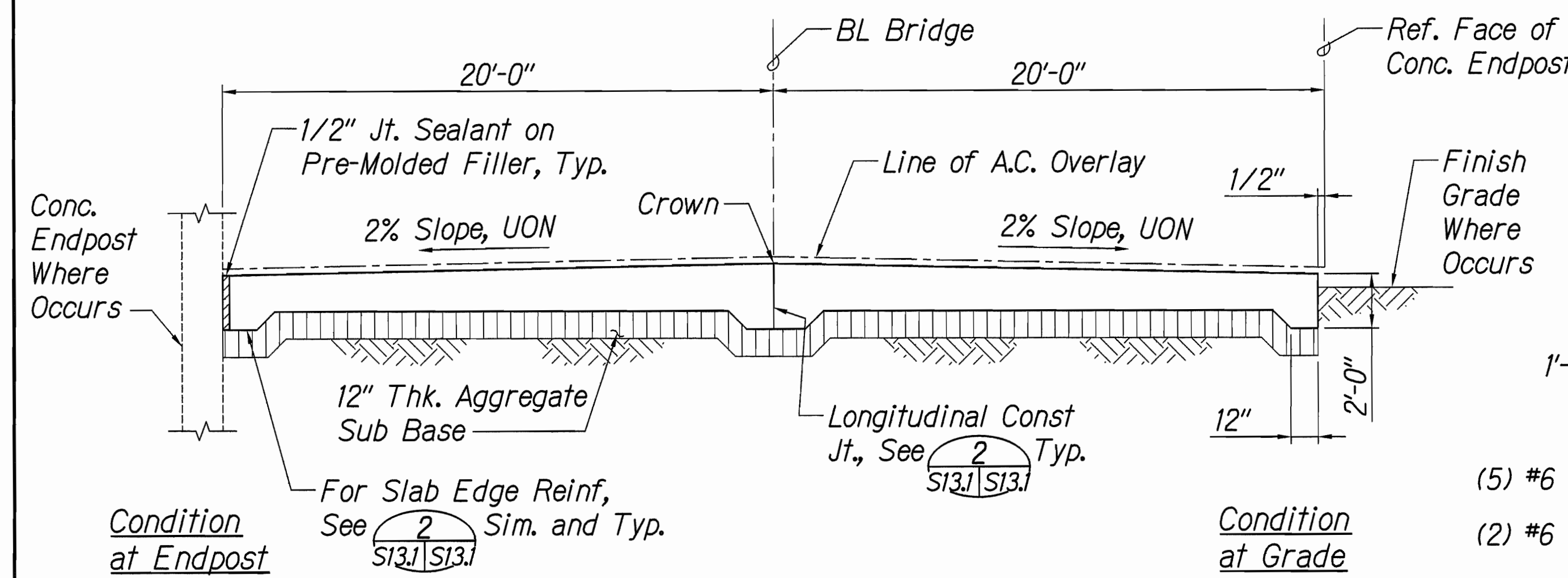
A PLAN - APPROACH SLABS
S2.2 | S13.1 SCALE: 1/16" = 1'-0"



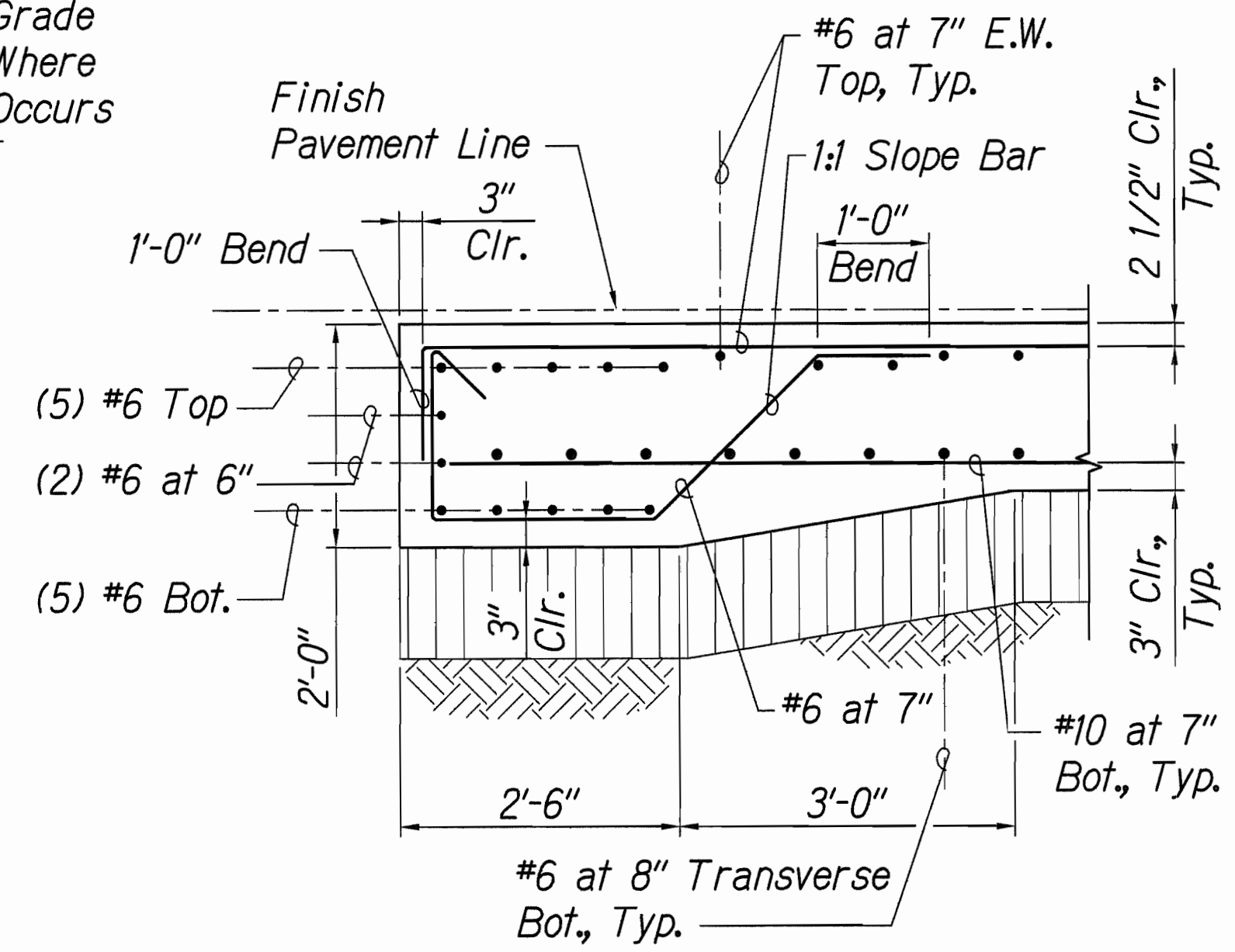
1 LONGITUDINAL SECTION
S13.1 | S13.1 SCALE: 1/4" = 1'-0"



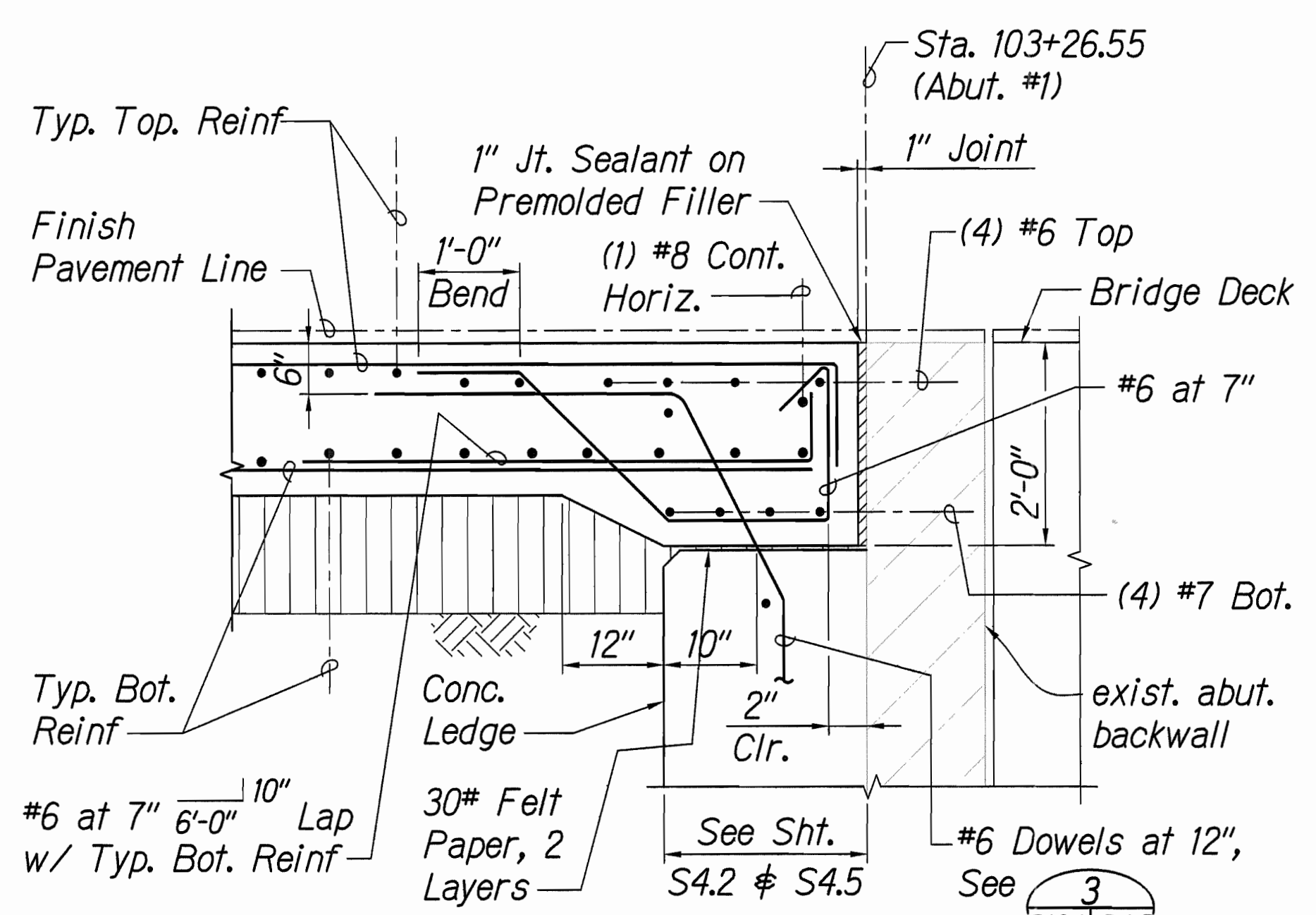
2 LONGITUDINAL CONSTRUCTION JOINT DETAIL
S13.1 | S13.1 SCALE: 3/4" = 1'-0"



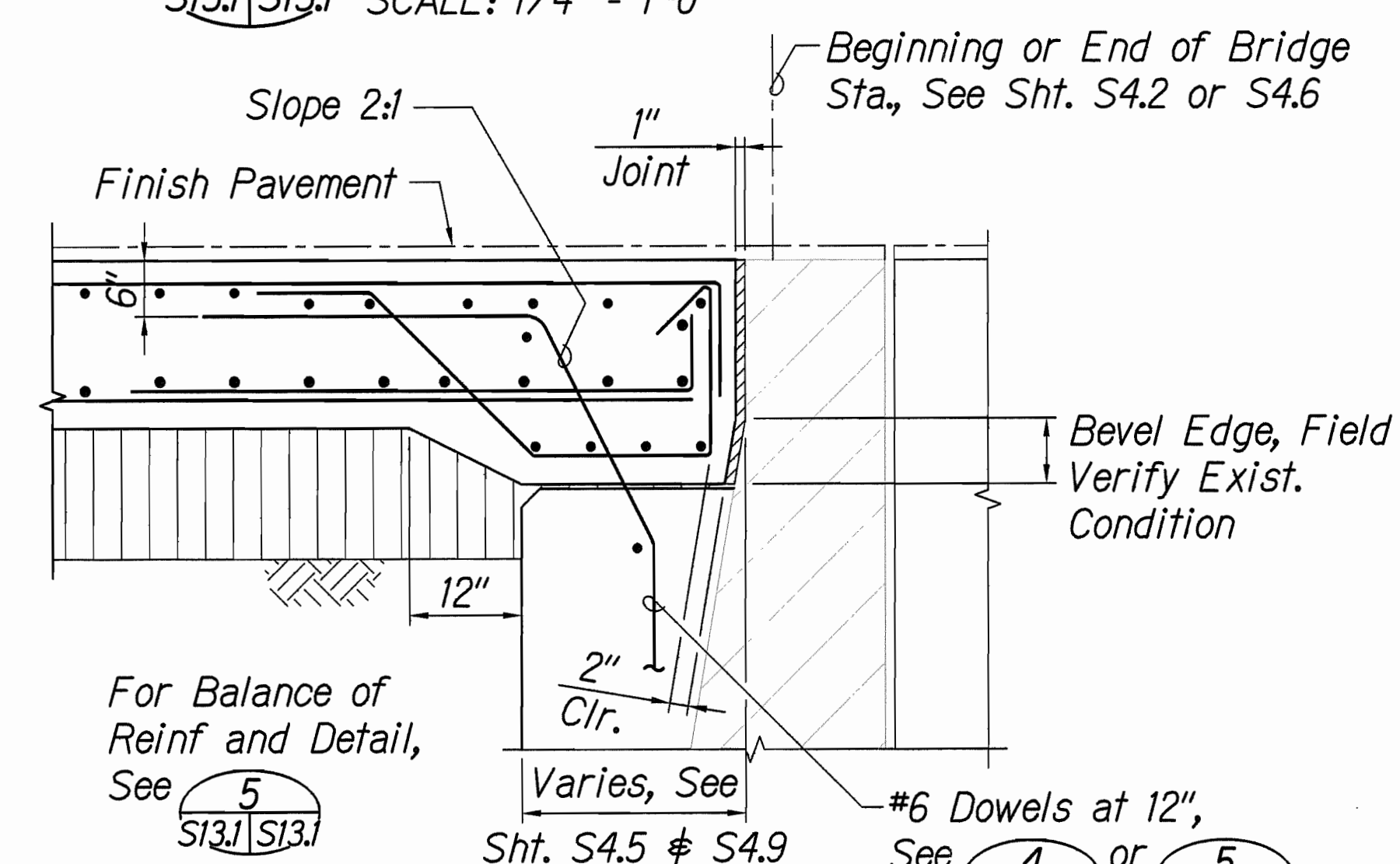
3 TRANSVERSE SECTION
S13.1 | S13.1 SCALE: 1/4" = 1'-0"



4 SECTION
S13.1 | S13.1 SCALE: 3/4" = 1'-0"



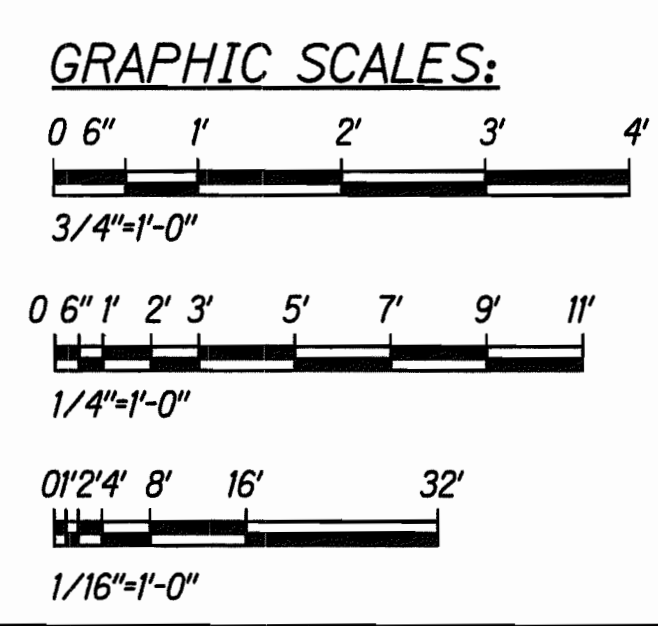
5 SECTION
S13.1 | S13.1 SCALE: 3/4" = 1'-0"



6 SECTION
S13.1 | S13.1 SCALE: 3/4" = 1'-0"

Notes:

- For construction phasing, see sheet S15.1.
- Excavation and backfill for approach slabs shall be incidental to structure excavation and backfill for abutments and wingwalls.
- For finish pavement (A.C. overlay) elevations, see sheet S11.4.



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HIGHWAYS DIVISION

APPROACH SLAB AT ABUTMENT #1

#2 - PLAN, SECTION & DETAIL

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S13.1 OF 1 SHEETS

PROFESSIONAL ENGINEER

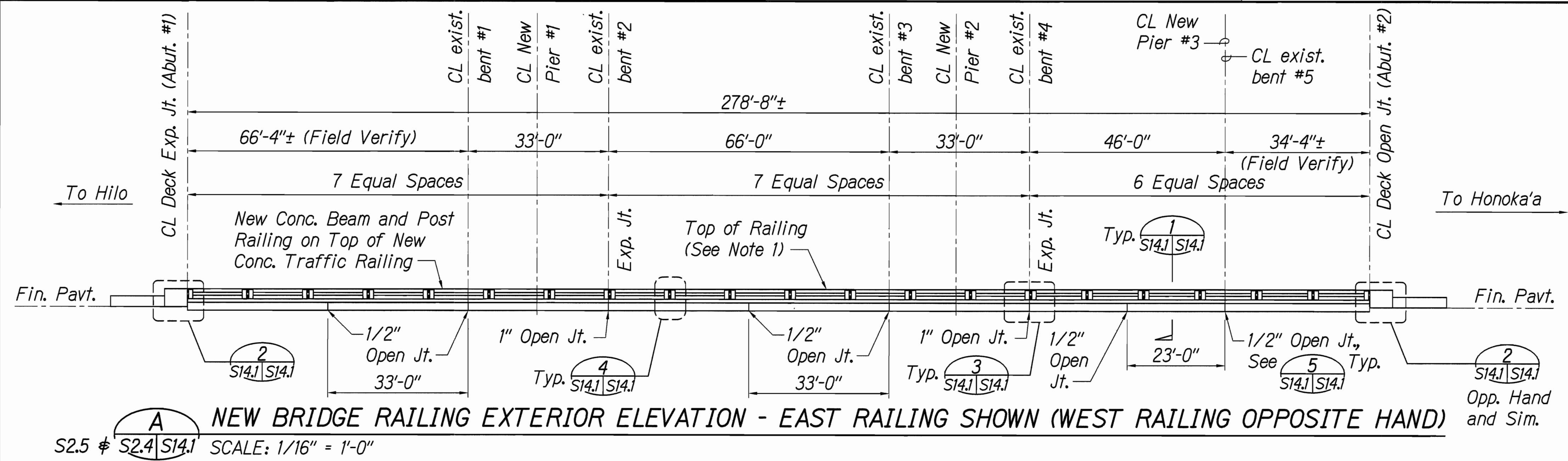
NORMAN K. NAGANOME
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HAWAII, U.S.A.

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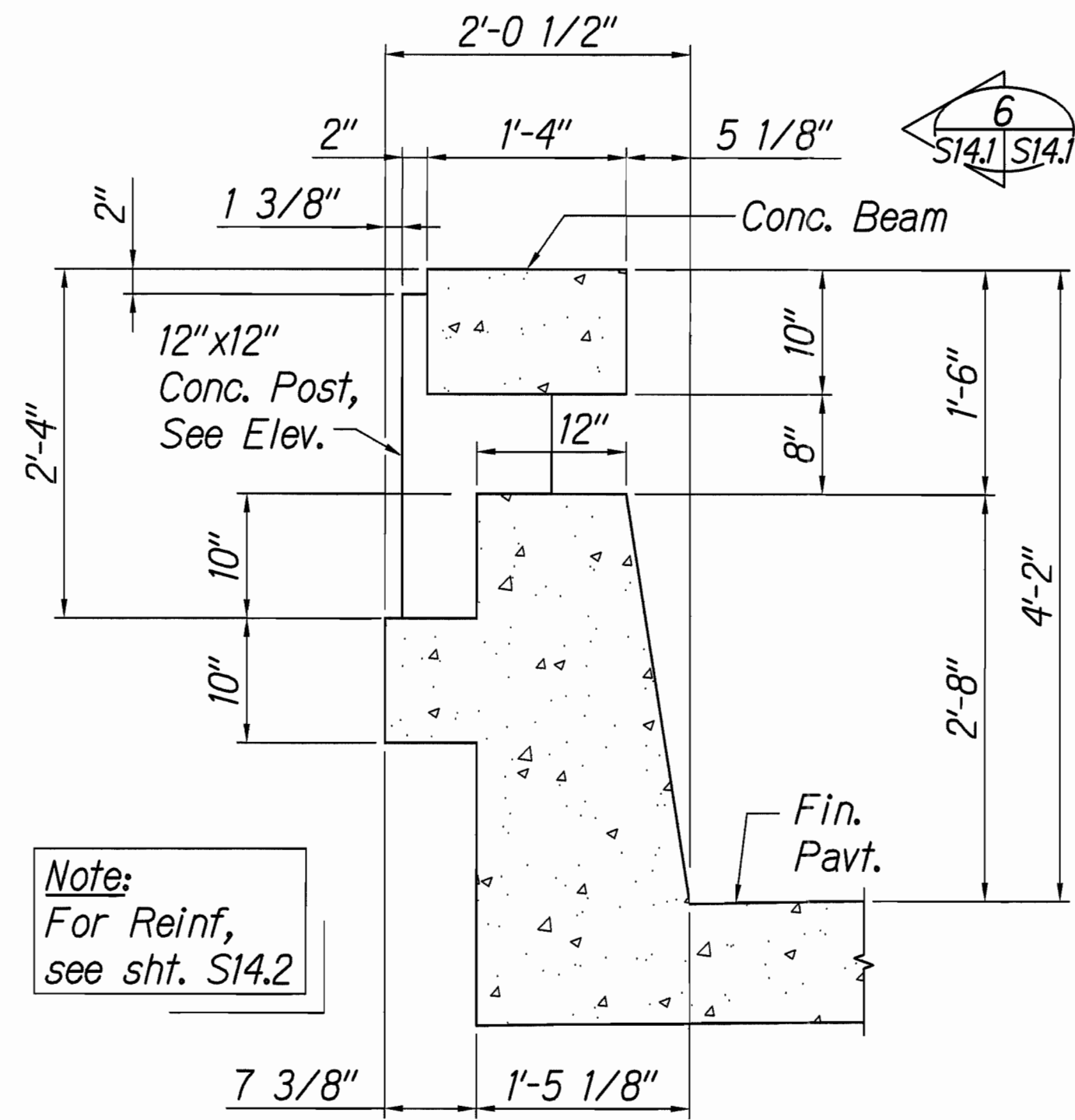
Norman K. Naganome

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ORIGINAL PLAN	
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HAWAII	HAW.	BR-019-2(61)	2012	126	137



A NEW BRIDGE RAILING EXTERIOR ELEVATION - EAST RAILING SHOWN (WEST RAILING OPPOSITE HAND)
 S2.5 # S2.4 S14.1 SCALE: 1/16" = 1'-0"

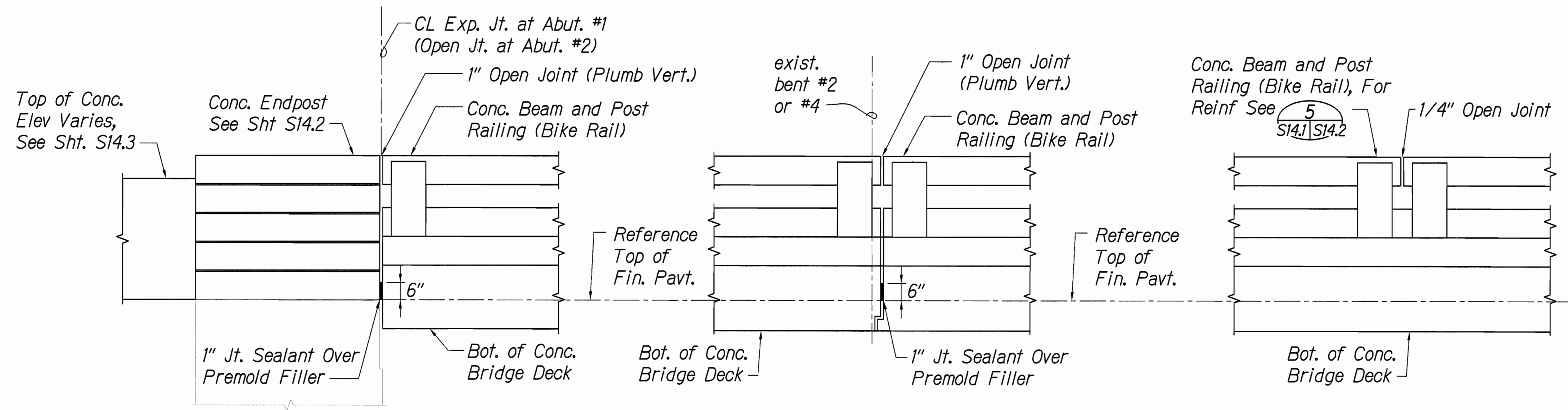
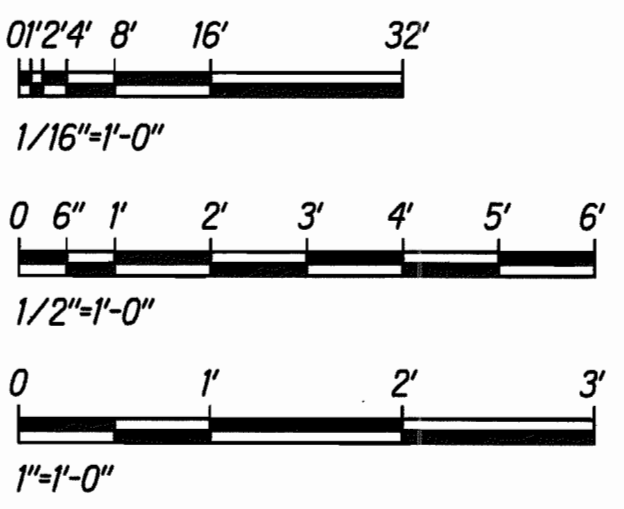


Note:
For Reinf,
see sht. S14.2

1 BRIDGE RAILING SECTION
 S14.1 S14.1 SCALE: 1" = 1'-0"

- Notes:
- Railing elevations shown horizontally (level) for clarity. Top of railing shall follow profile of finish pavement elevation along base of railing. See sheet S11.4.
 - For Railing Reinforcing, see sheet S14.2.
 - Concrete endposts shall be incidental to Section 507 "Railings" and will not be paid for separately.

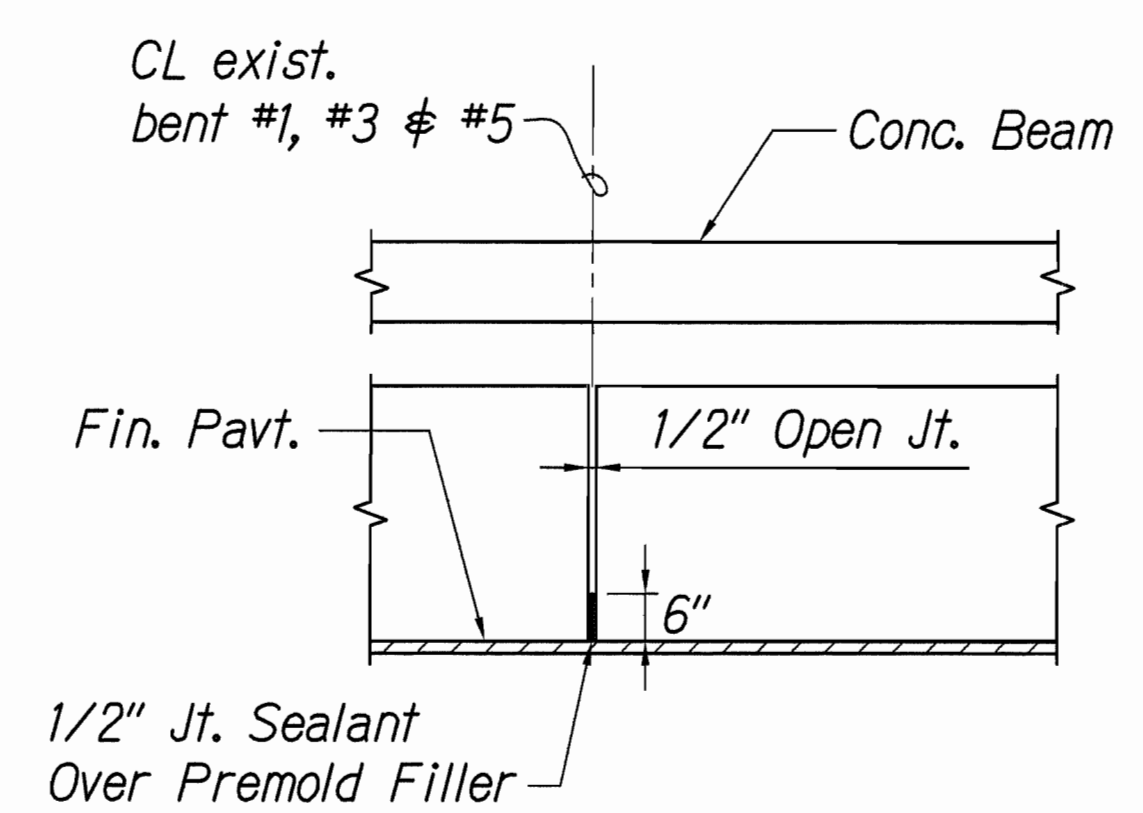
GRAPHIC SCALES:



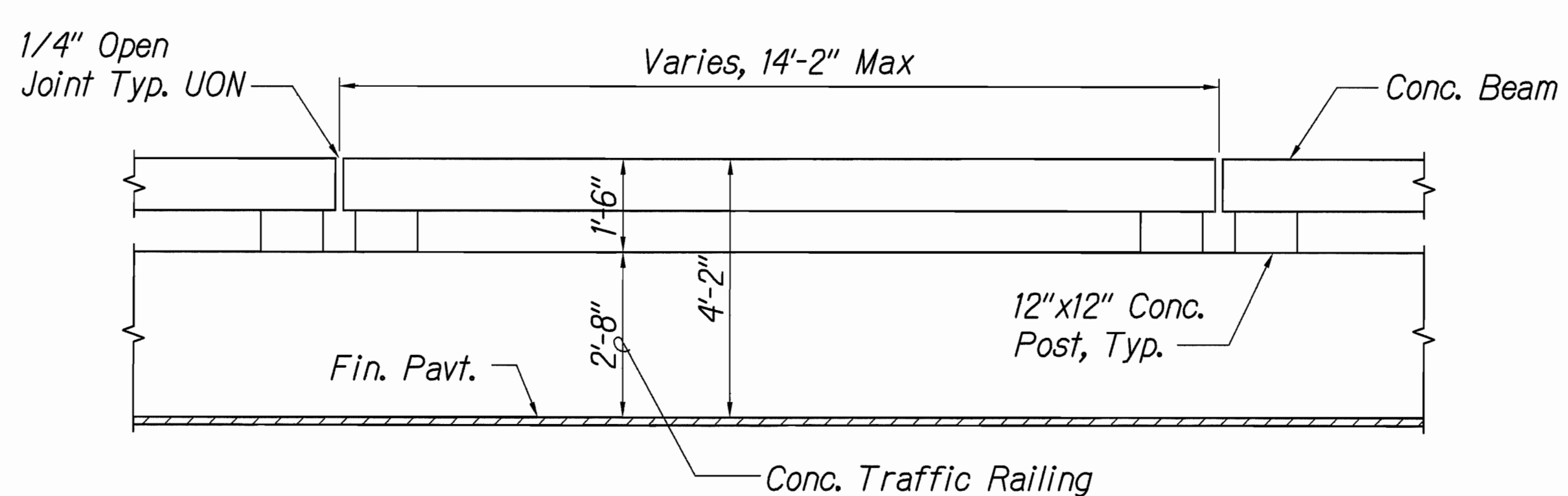
2 TYPICAL DETAIL AT ENDPST (EXTERIOR ELEVATION)
 S14.1 S14.1 SCALE: 1/2" = 1'-0"

3 DETAIL AT EXPANSION JOINTS (EXTERIOR ELEVATION)
 S14.1 S14.1 SCALE: 1/2" = 1'-0"

4 TYPICAL BRIDGE RAILING DETAIL (EXTERIOR ELEVATION)
 S14.1 S14.1 SCALE: 1/2" = 1'-0"



5 DETAIL (INTERIOR ELEVATION)
 S14.1 S14.1 SCALE: 1/2" = 1'-0"



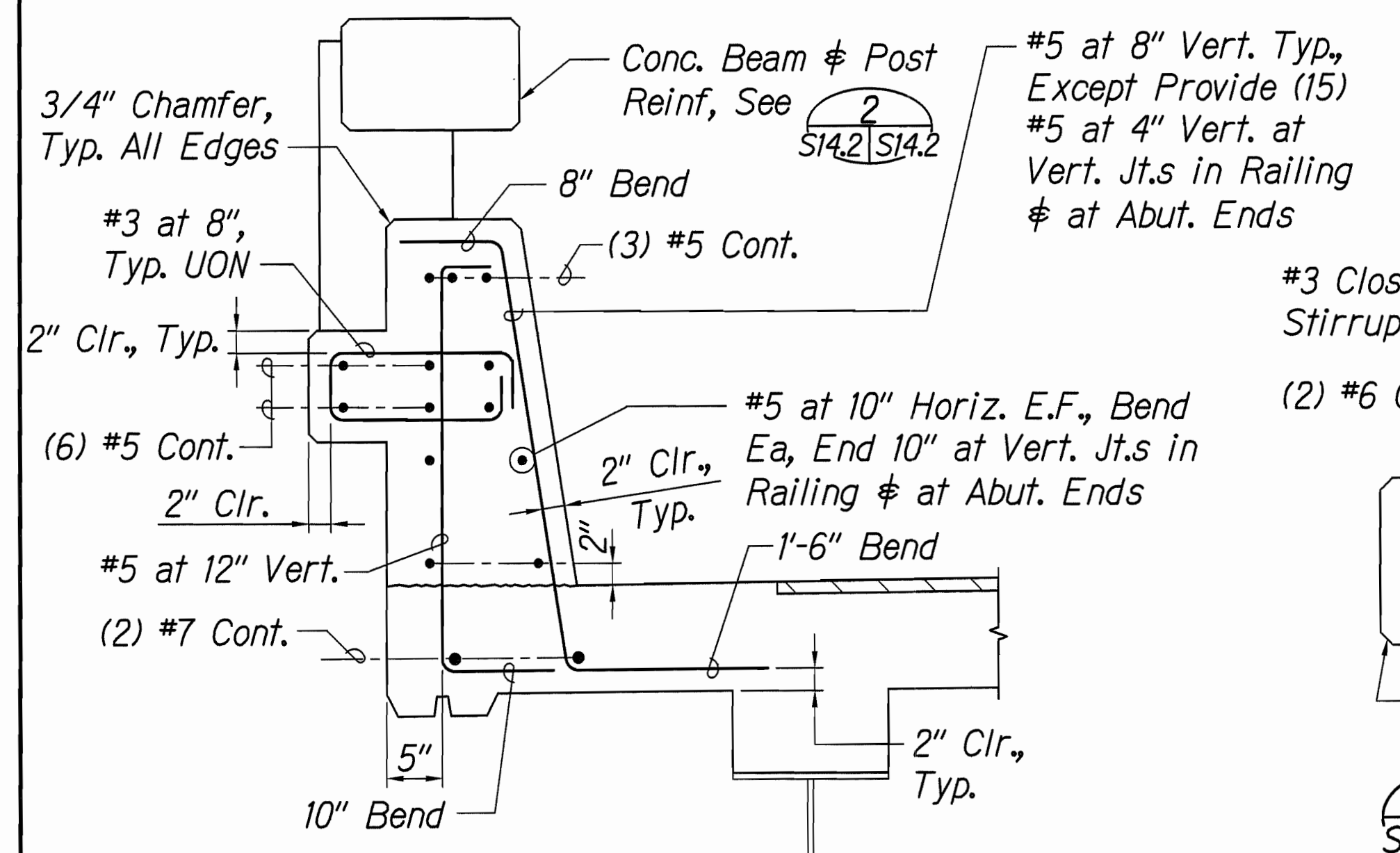
6 PARTIAL INTERIOR ELEVATION OF NEW BRIDGE RAILING
 S14.1 S14.1 SCALE: 1/2" = 1'-0"

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 Norman K. Nagamine

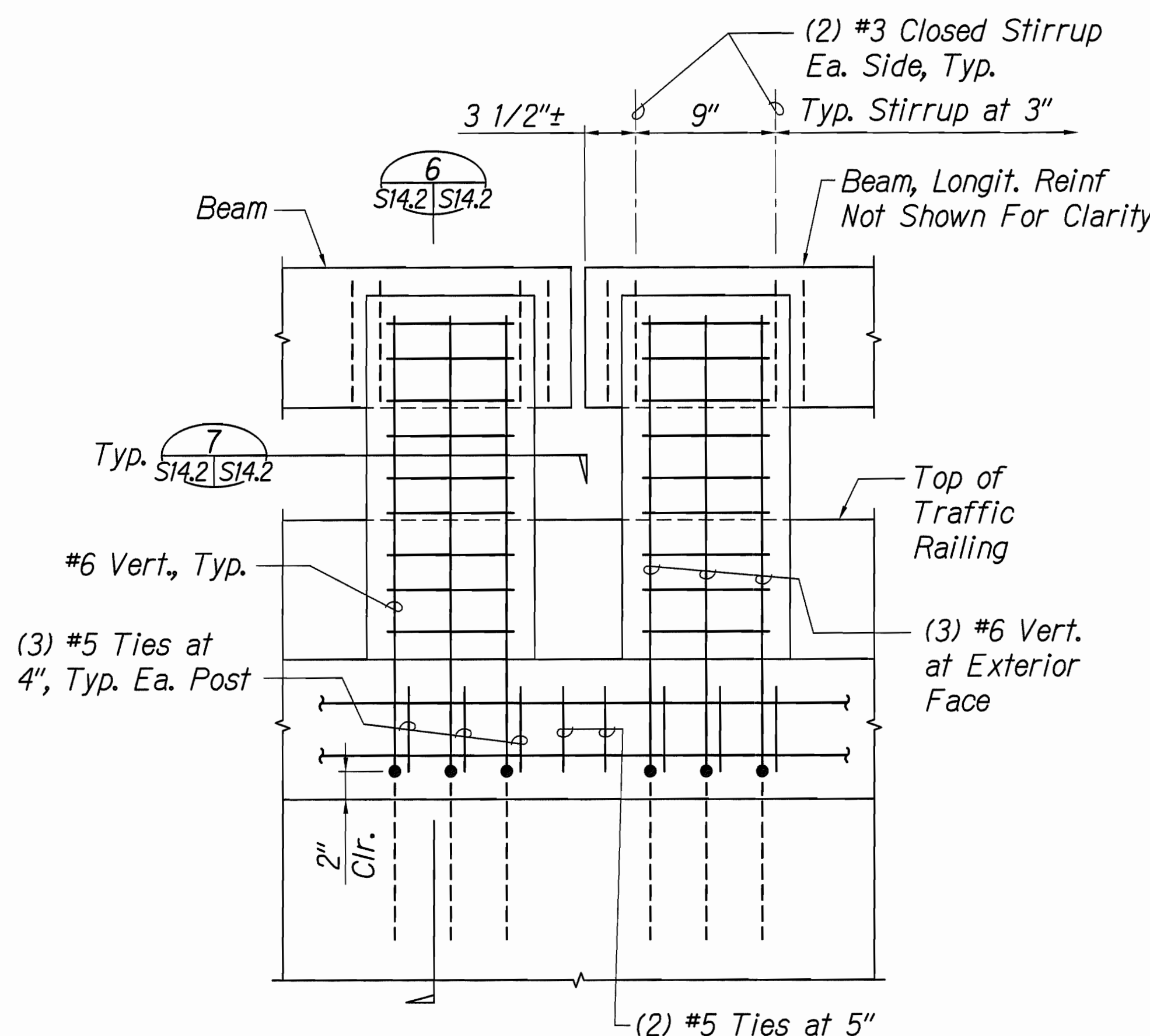
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
NEW BRIDGE RAILING - ELEVATIONS & DETAILS
 HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
 Federal Aid Project No. BR-019-2(61)
 Scale: As Shown Date: July 25, 2012
 SHEET No. S14.1 OF 4 SHEETS

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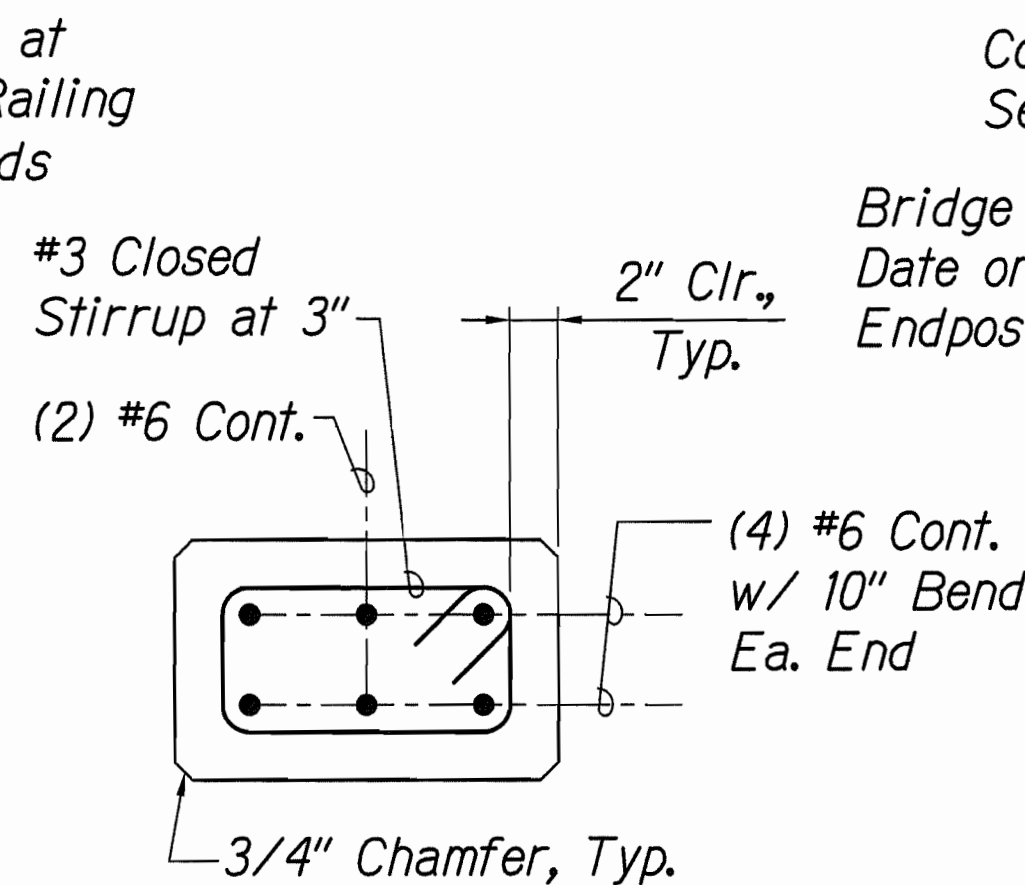
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	127	137



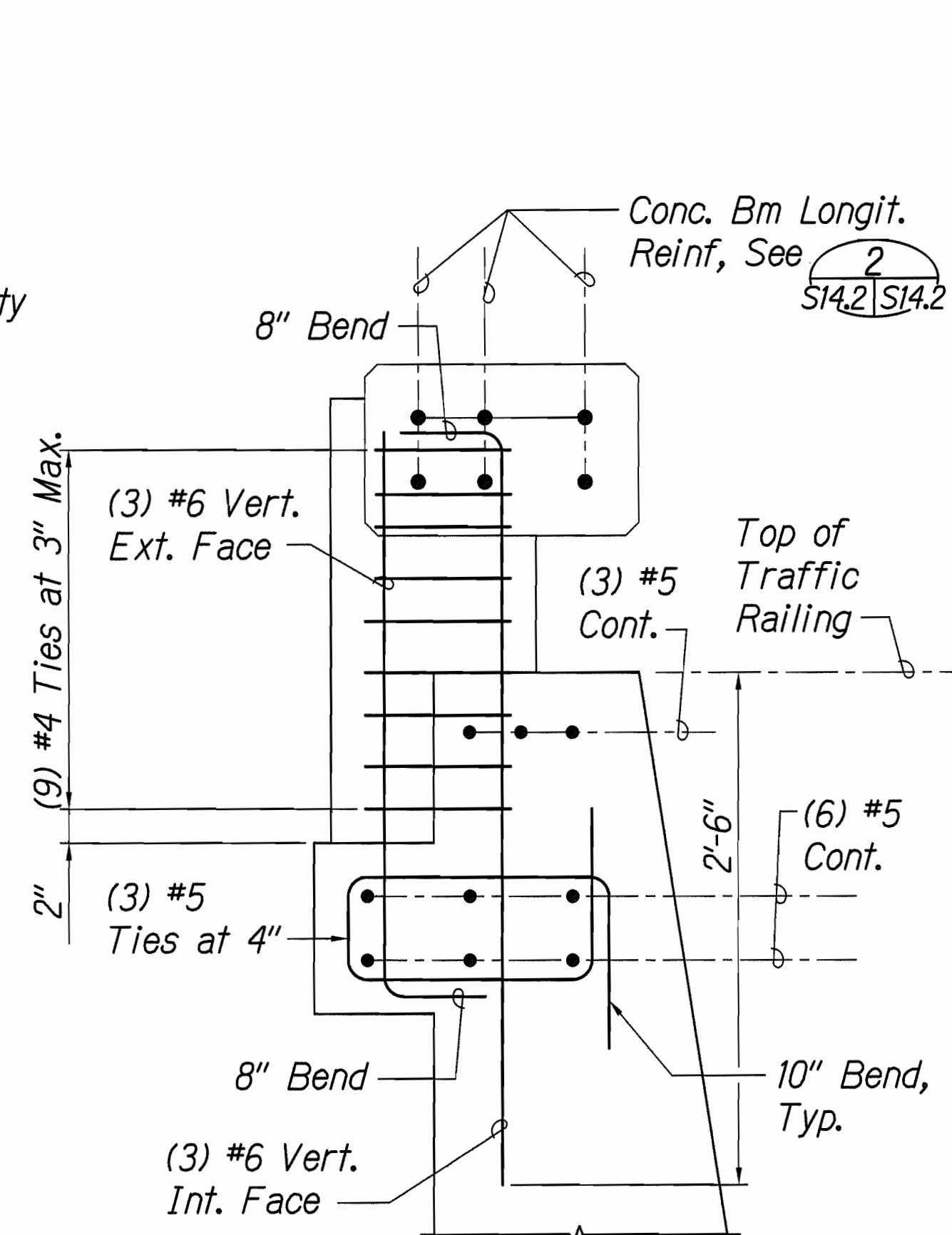
SECTION - TRAFFIC RAILING REINFORCING
S14.1 & S14.2 SCALE: 1" = 1'-0"



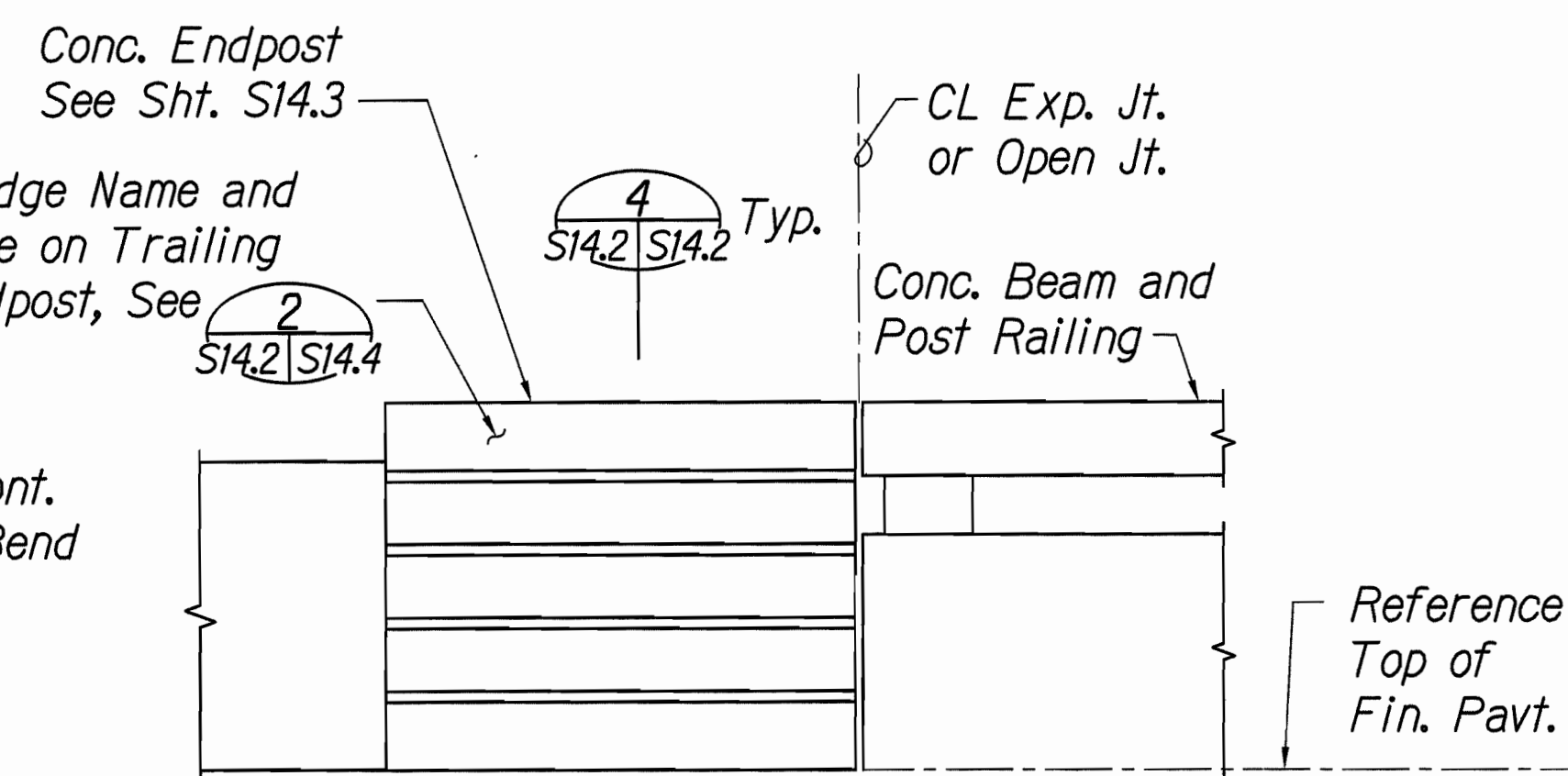
DETAIL - EXTERIOR ELEVATION
S14.1 & S14.2 SCALE: 1-1/2" = 1'-0"



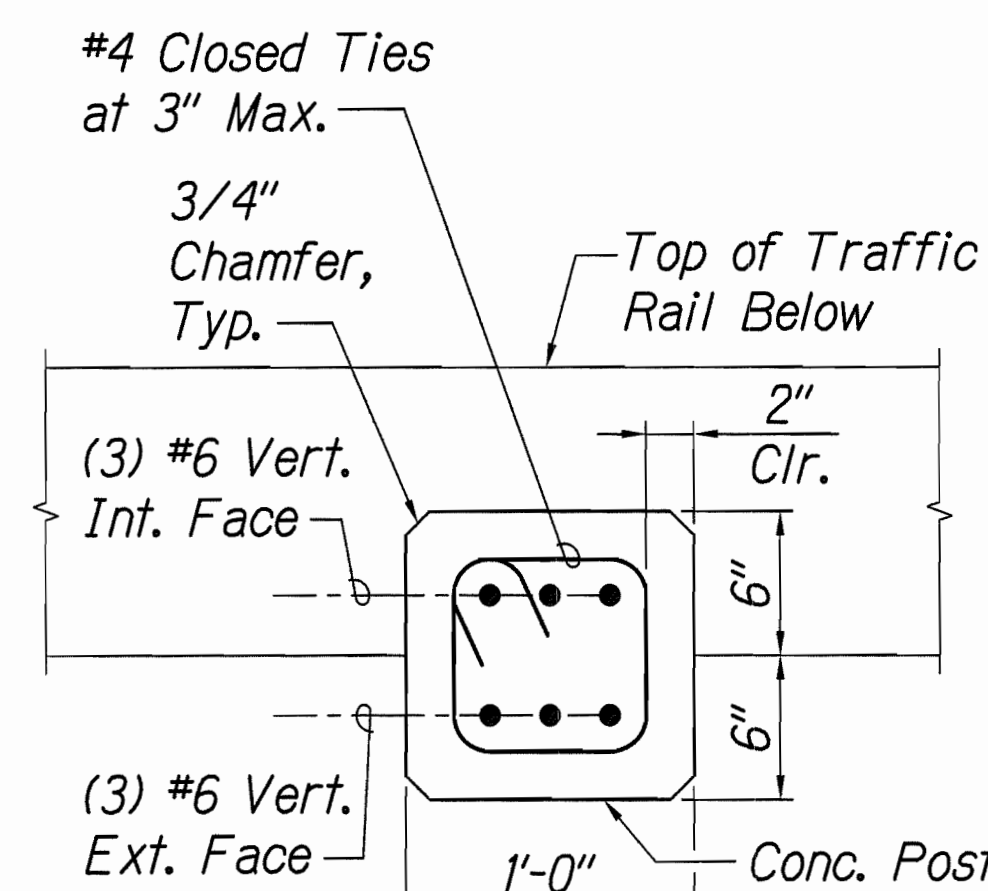
BEAM SECTION
S14.2 & S14.2 SCALE: 1-1/2" = 1'-0"



SECTION AT POST
S14.2 & S14.2 SCALE: 1-1/2" = 1'-0"

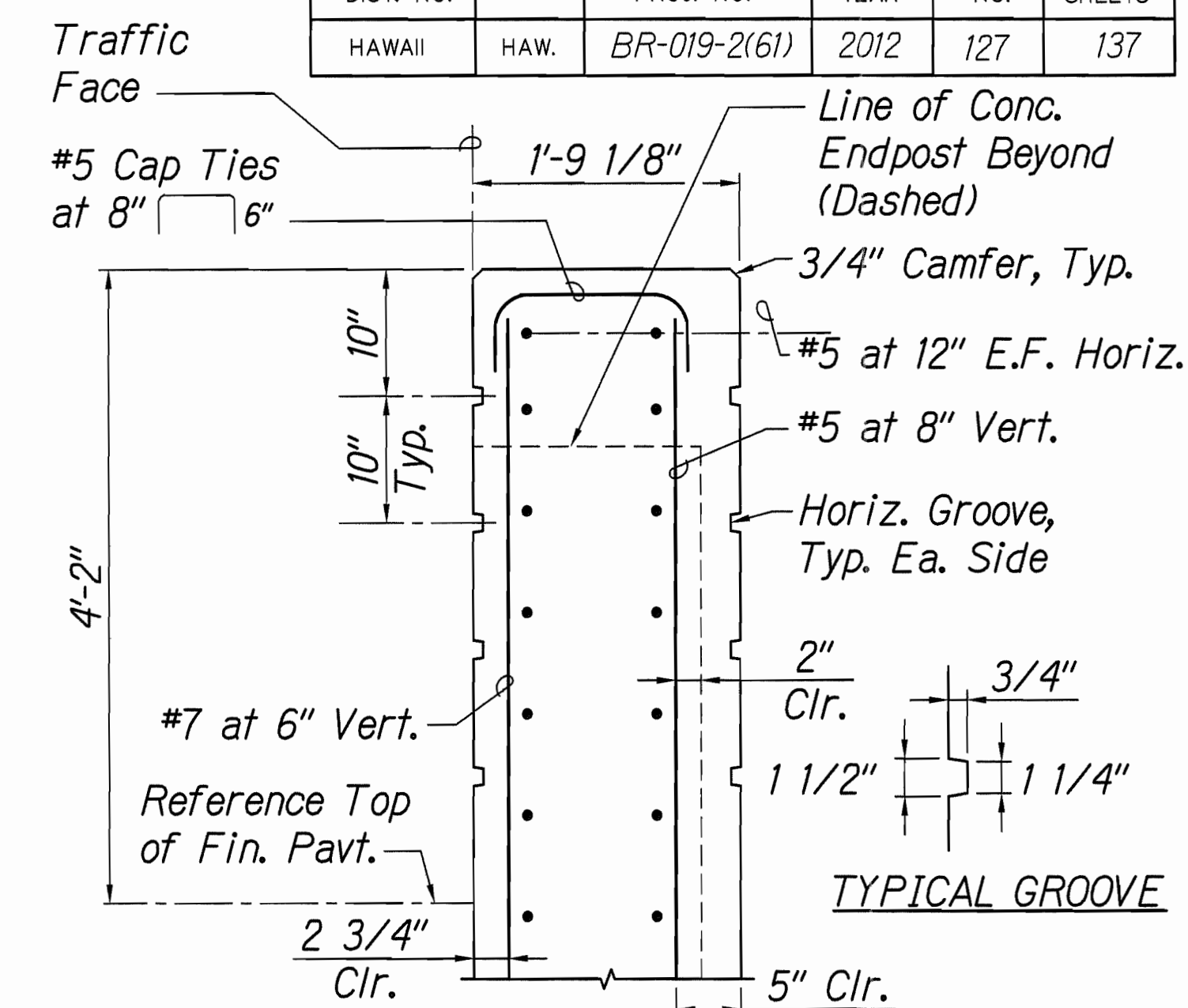
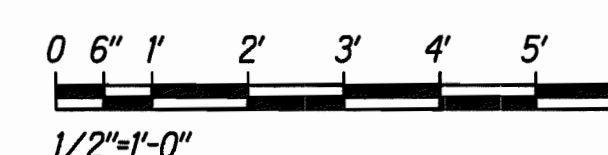
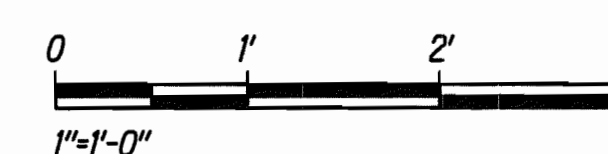
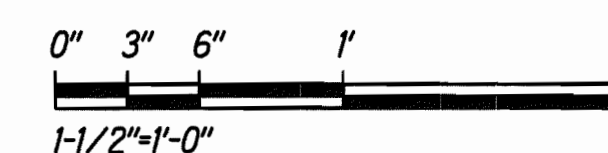


TYPICAL DETAIL AT ENDPST (INTERIOR ELEVATION)
S14.2 & S14.4 SCALE: 1/2" = 1'-0"

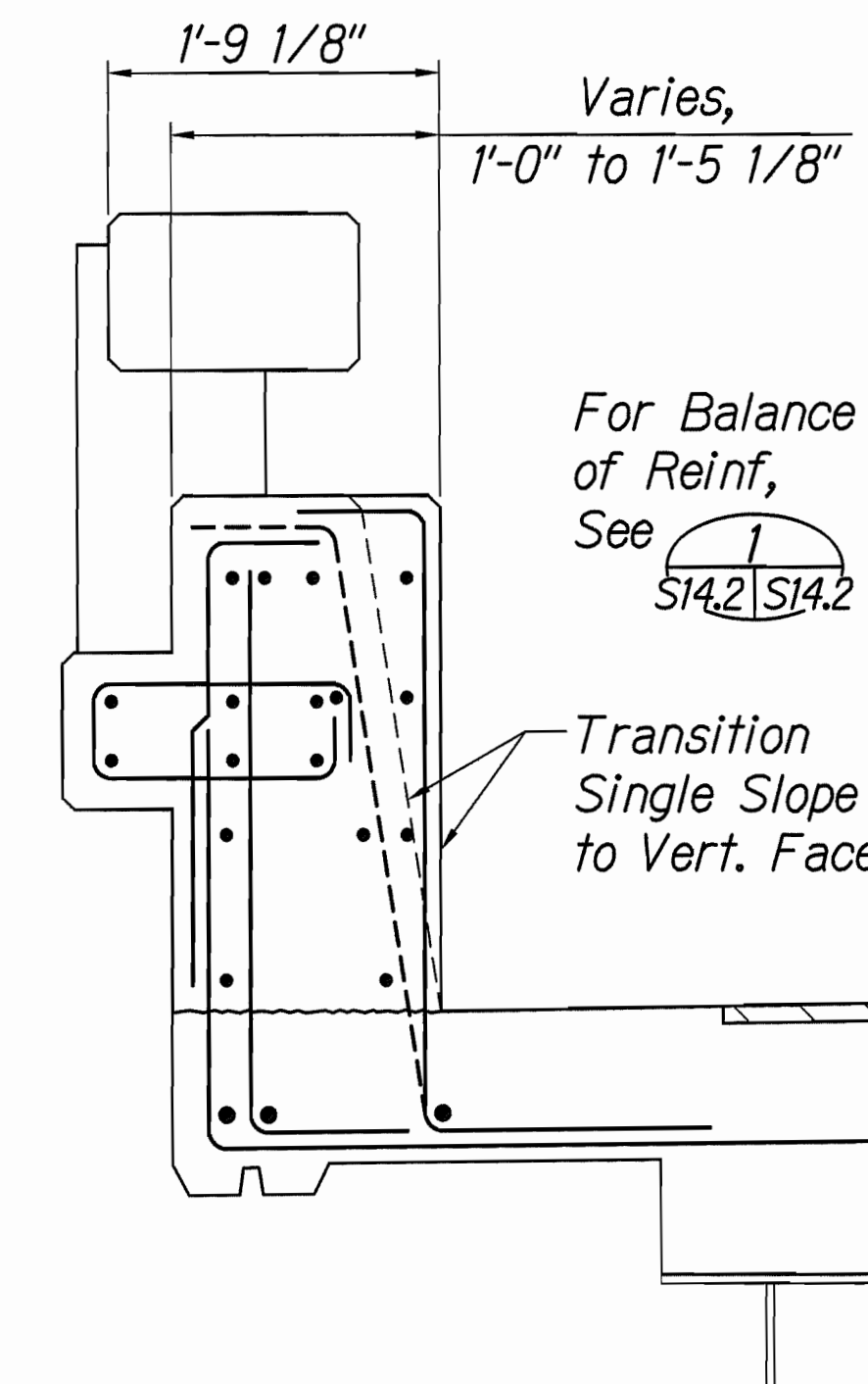


SECTION/PLAN
S14.2 & S14.2 SCALE: 1-1/2" = 1'-0"

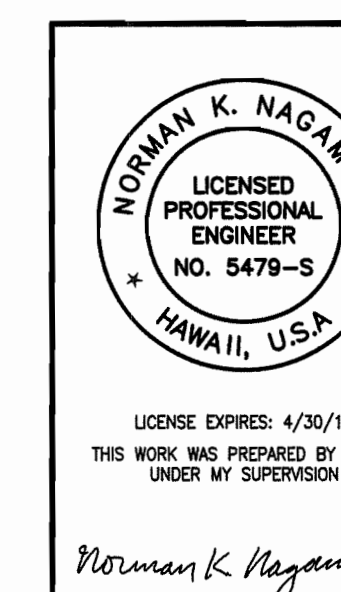
GRAPHIC SCALES:



SECTION
S14.3, S14.7, S14.9 & S14.2 S14.2 SCALE: 1" = 1'-0"

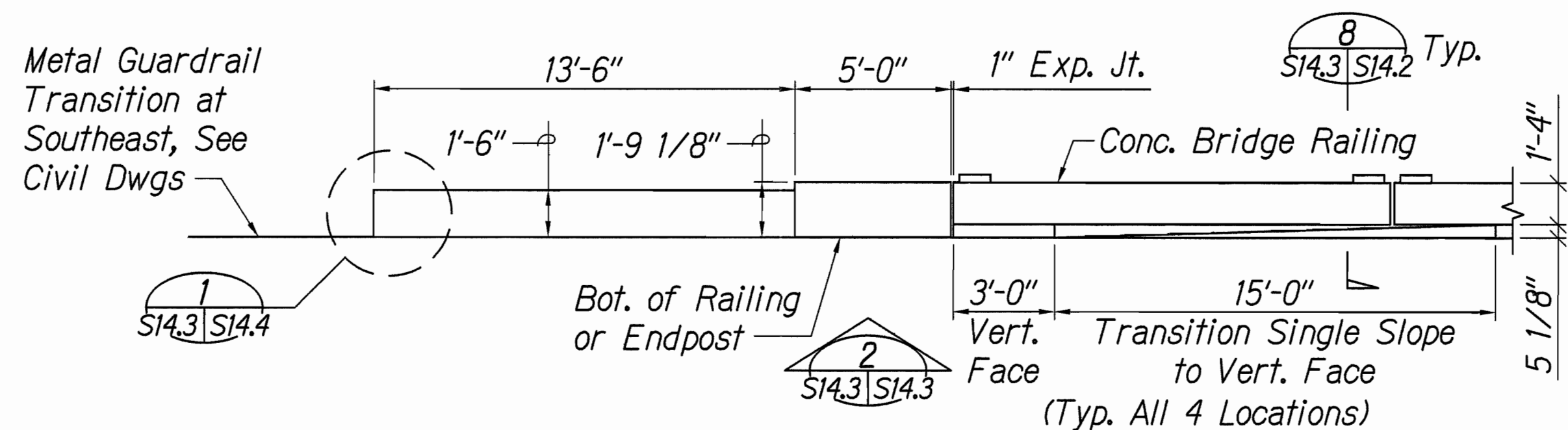


SECTION AT TRANSITION - TRAFFIC RAILING REINFORCING
S14.3 & S14.2 SCALE: 1" = 1'-0"



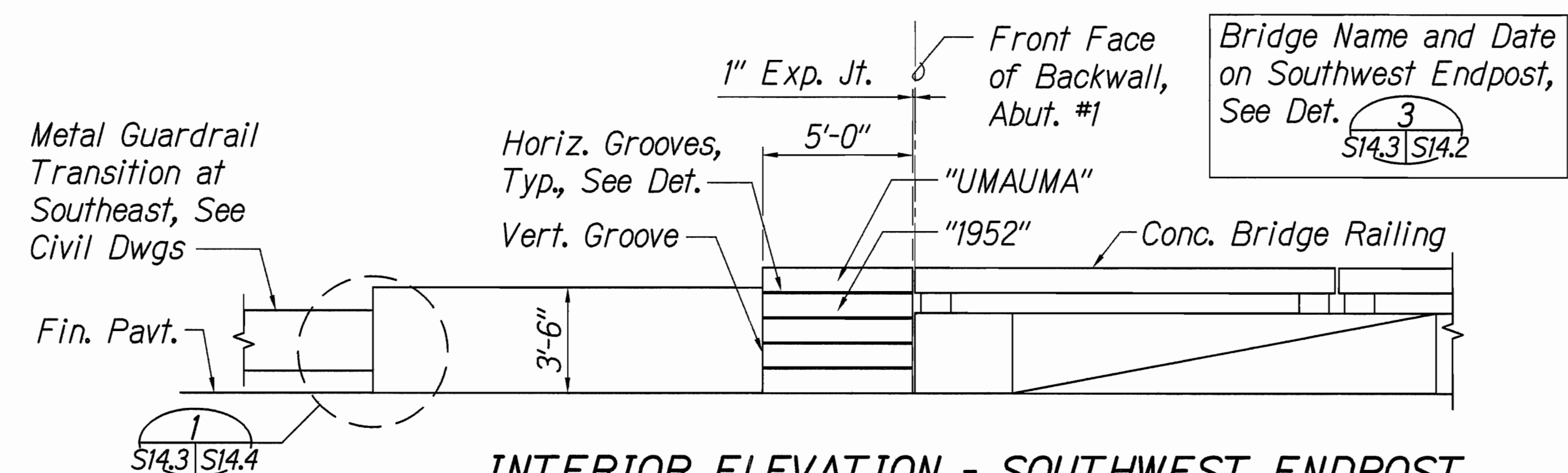
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**NEW BRIDGE RAILING -
REINFORCING SECTIONS & DETAILS**
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)
Scale: As Shown Date: July 25, 2012
SHEET No. S14.2 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	128	137



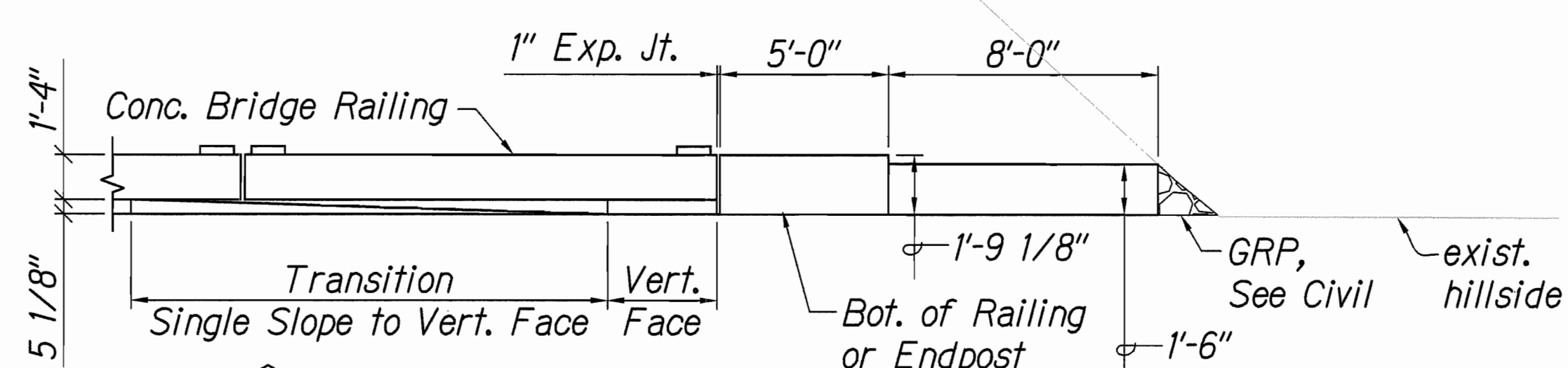
PLAN - SOUTHWEST ENDPOST
(SOUTHEAST SIMILAR & OPPOSITE-HAND)

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



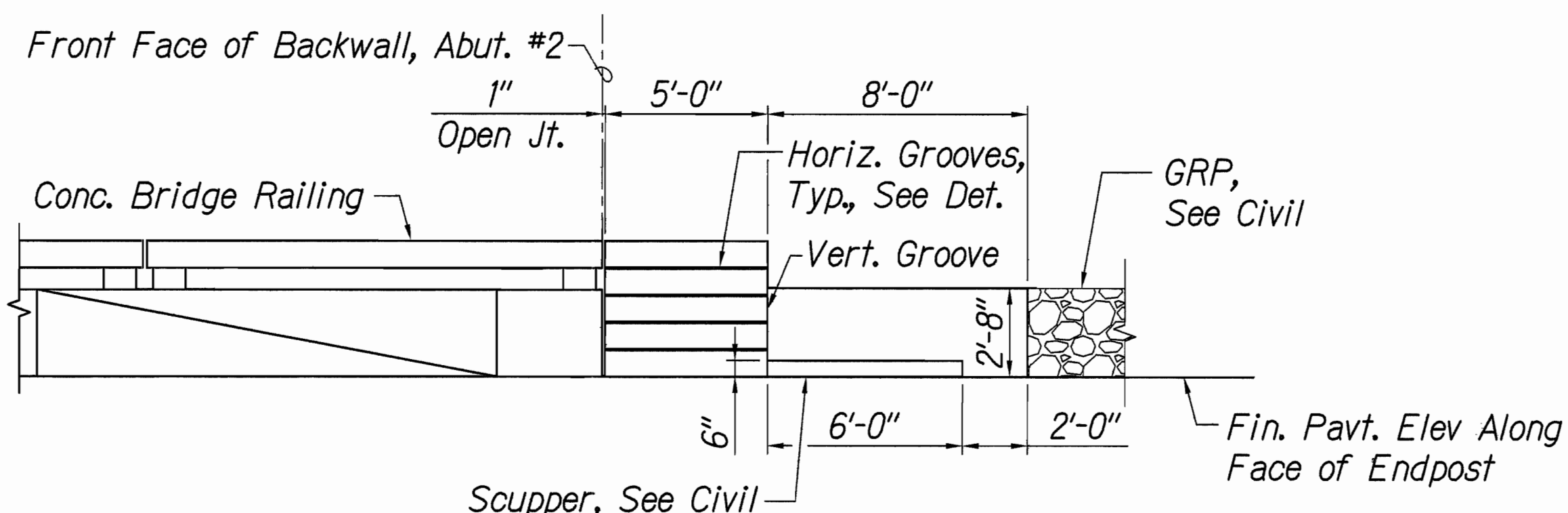
INTERIOR ELEVATION - SOUTHWEST ENDPOST
(SOUTHEAST SIMILAR & OPPOSITE-HAND)

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



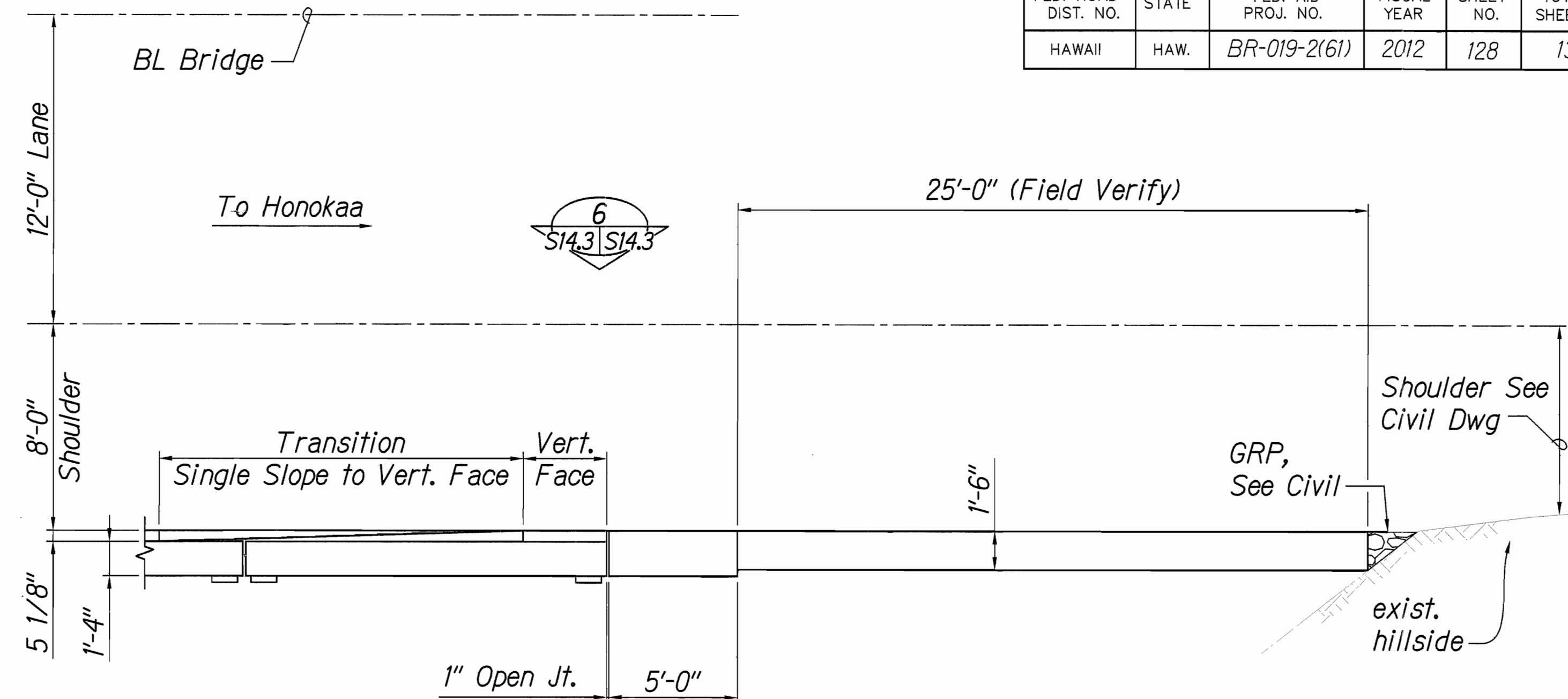
PLAN - NORTHWEST ENDPOST

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



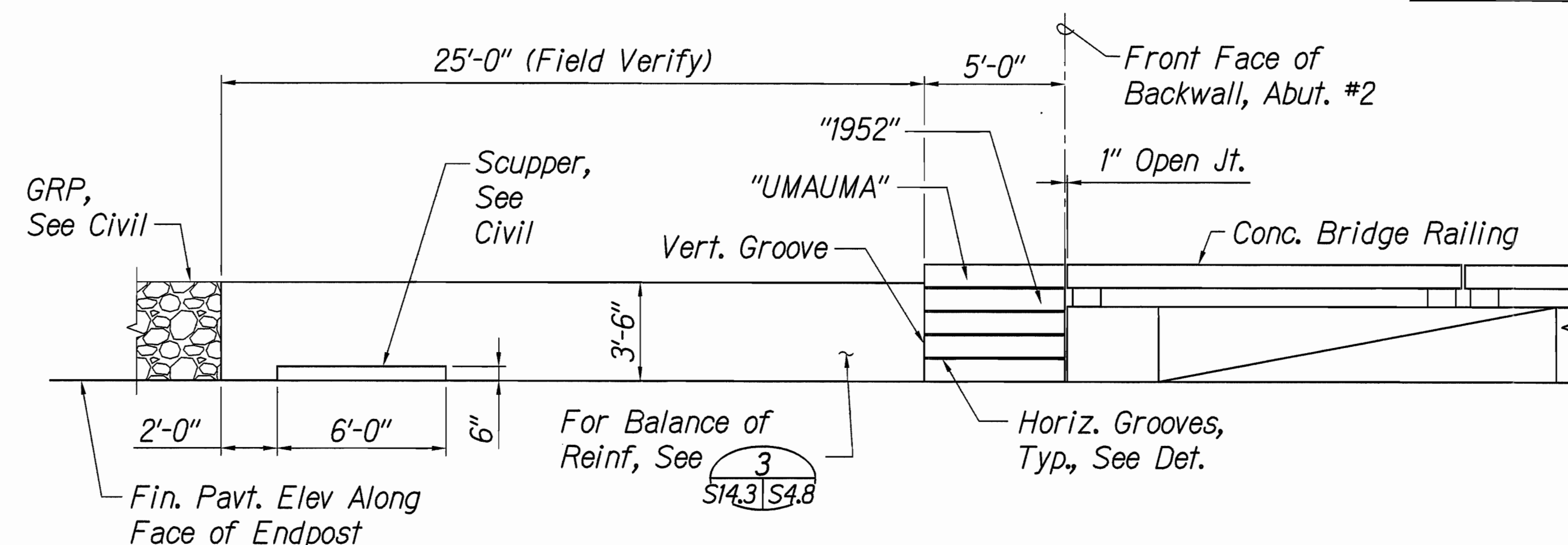
INTERIOR ELEVATION - NORTHWEST ENDPOST

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



PLAN - NORTHEAST ENDPOST

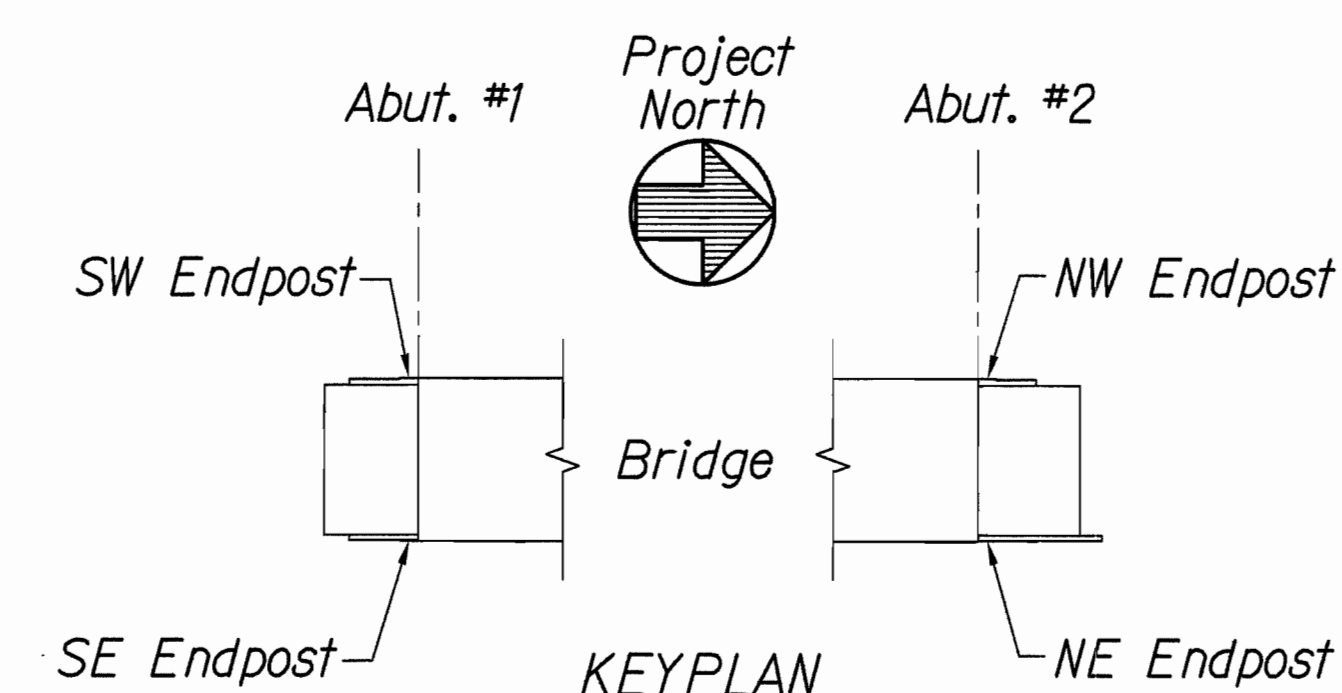
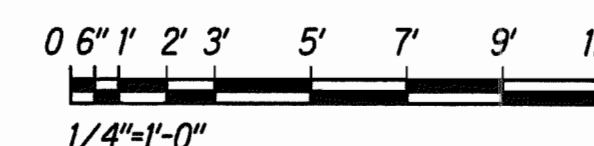
SCALE: 1/4" = 1'-0"



INTERIOR ELEVATION - NORTHEAST ENDPOST

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

GRAPHIC SCALES:



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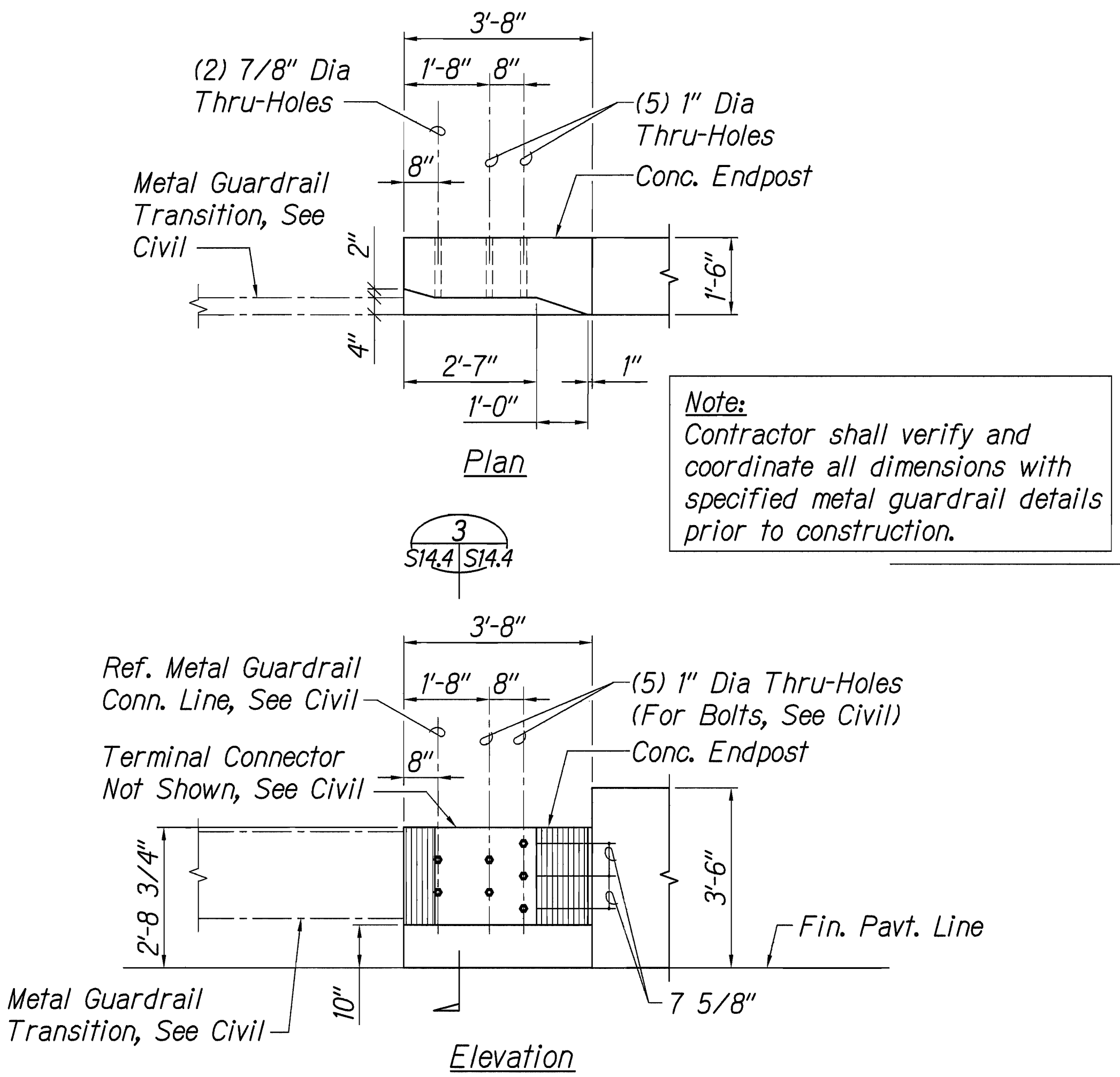
BRIDGE ENDPOST DETAILS -
HILO & HONOKA'A APPROACH

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

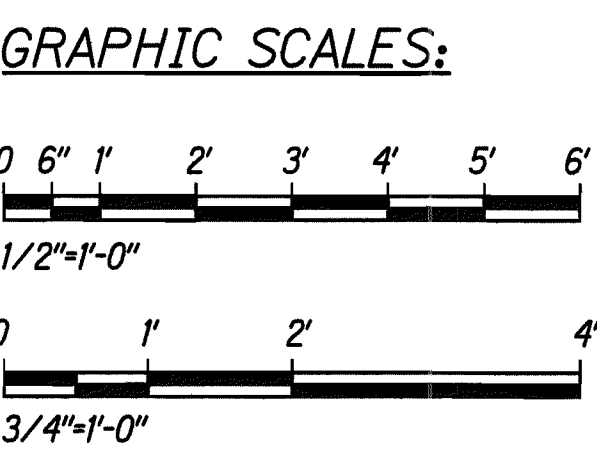
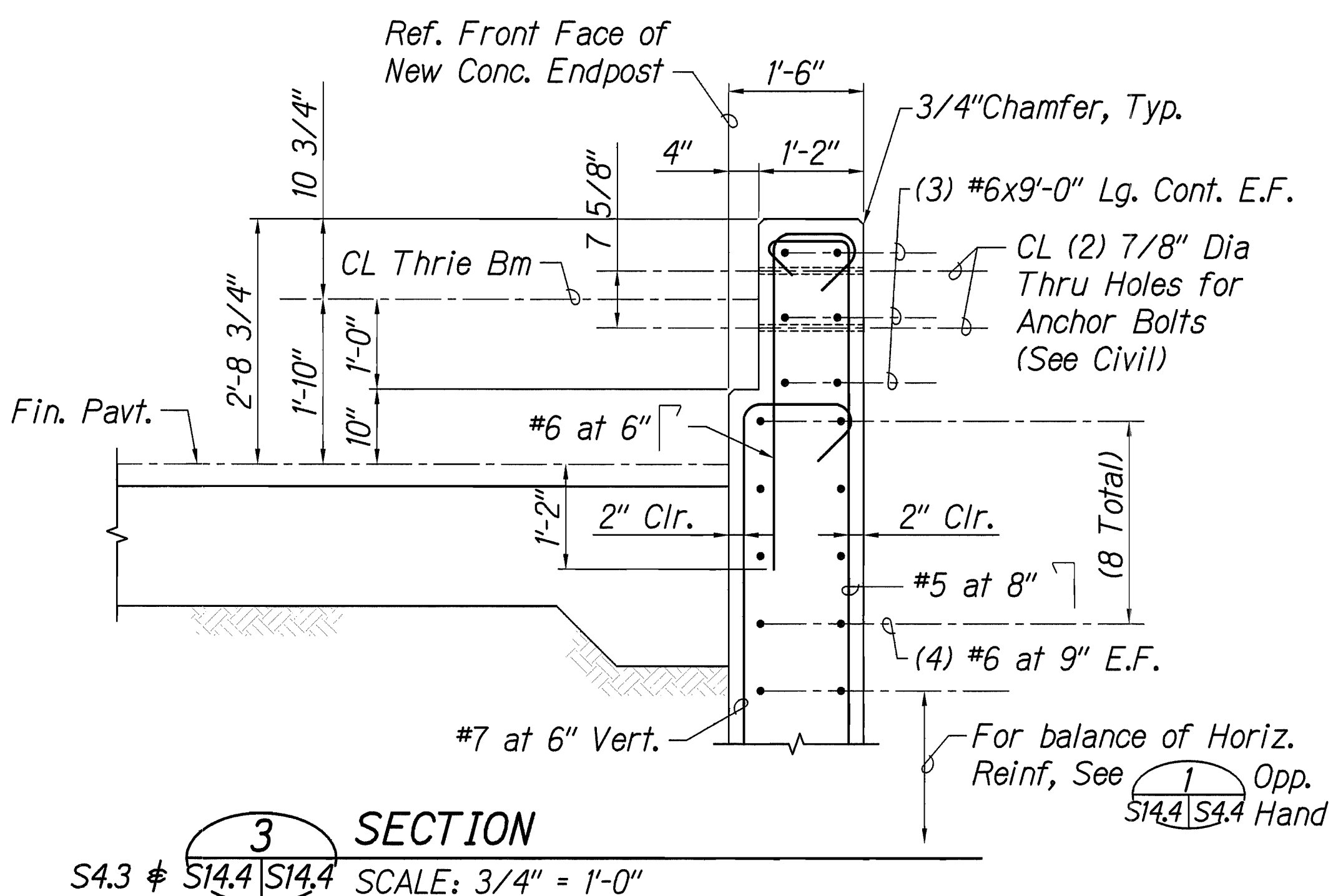
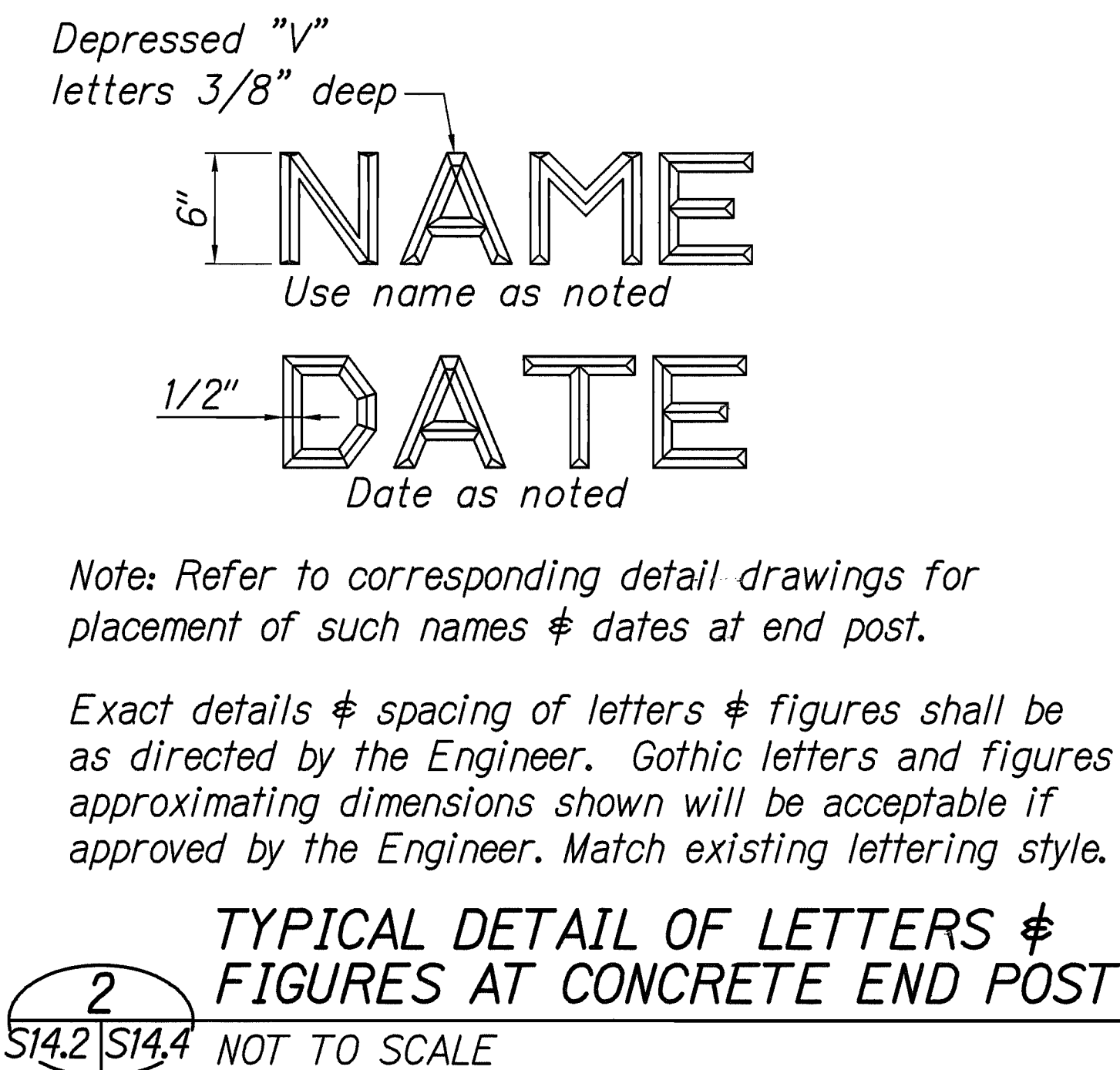
Scale: 1/4" = 1'-0" Date: July 25, 2012

SHEET No. S14.3 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	129	137



1 CONCRETE ENDPOST TO METAL GUARDRAIL DETAIL
 S14.3 S14.4 SCALE: 1/2" = 1'-0"



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BRIDGE ENDPOST DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S14.4 OF 4 SHEETS

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HAWAII	HAW.	BR-019-2(61)	2012	130	137

Construction Phasing - Sequence of Demolition and Construction

- Phase 1: Construct new concrete pier foundations, columns and caps below existing bridge.
- Phase 2: Construct new foundations (drilled shafts and pile cap) and wingwalls on upstream side of existing abutments.
- Phase 3: Demolish existing upstream concrete bridge railing, sidewalk and portion of existing deck slab.
- Phase 4: Construct new steel girders and concrete deck slab along upstream side of bridge. Provide a pour strip to keep new deck slab separate from existing deck slab during curing. Cast pour strip after new upstream deck slab has cured. See note 3 below.
- Phase 5: Construct new concrete bridge railing along upstream side of bridge.
- Phase 6: Construct new foundations (drilled shafts and pile cap) and wingwalls on downstream side of existing abutments.
- Phase 7: Demolish existing downstream concrete bridge railing, sidewalk and portion of existing deck slab.
- Phase 8: Construct new steel girders and concrete deck slab along downstream side of bridge. Provide a pour strip to keep new deck slab separate from existing deck slab during curing. Cast pour strip after new downstream deck slab has cured. See note 3 below.
- Phase 9: Construct new concrete bridge railing along downstream side of bridge.
- Phase 10: Construct new concrete approach slabs in sections to match phasing and lane closures on bridge.

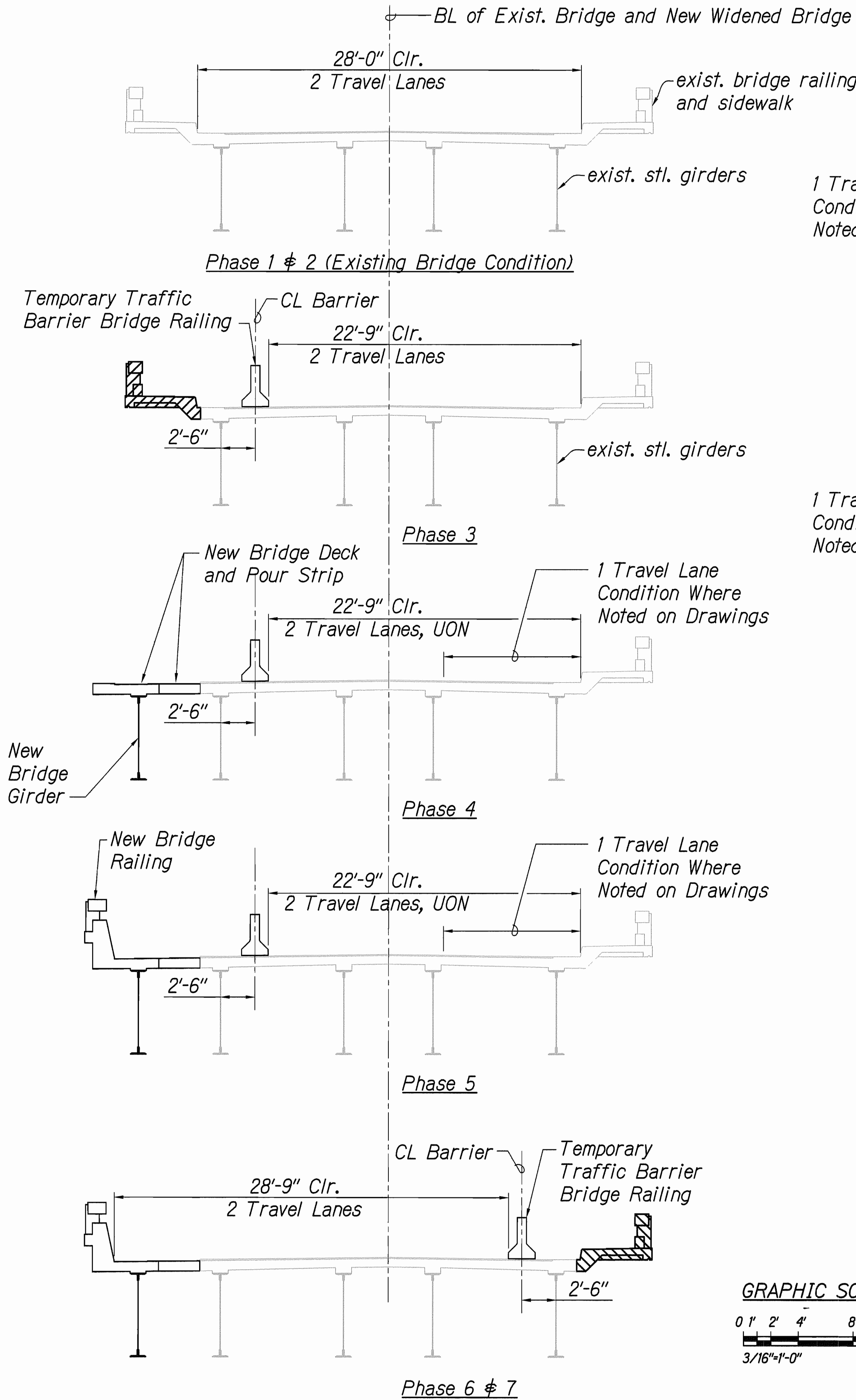
Contractor's Option: Approach slabs may be constructed in earlier phases, subject to Engineer's approval.

Construction Phasing - General Notes

- Two lanes on bridges shall remain open to traffic as much as possible during construction. One of the lanes on the bridge shall remain open to traffic at all times during construction. Full bridge closure for only very short periods of time may be permitted, subject to Engineer's approval.
- For Traffic Control, see Civil sheets.
- During pouring and initial curing of concrete pour strip, vehicular traffic shall be restricted to 5 mph max speed limit and one travel lane. See Special Notes on sheet S11.3.
- New bridge deck and pour strip shall be poured in alternating spans. See sheet S11.3.

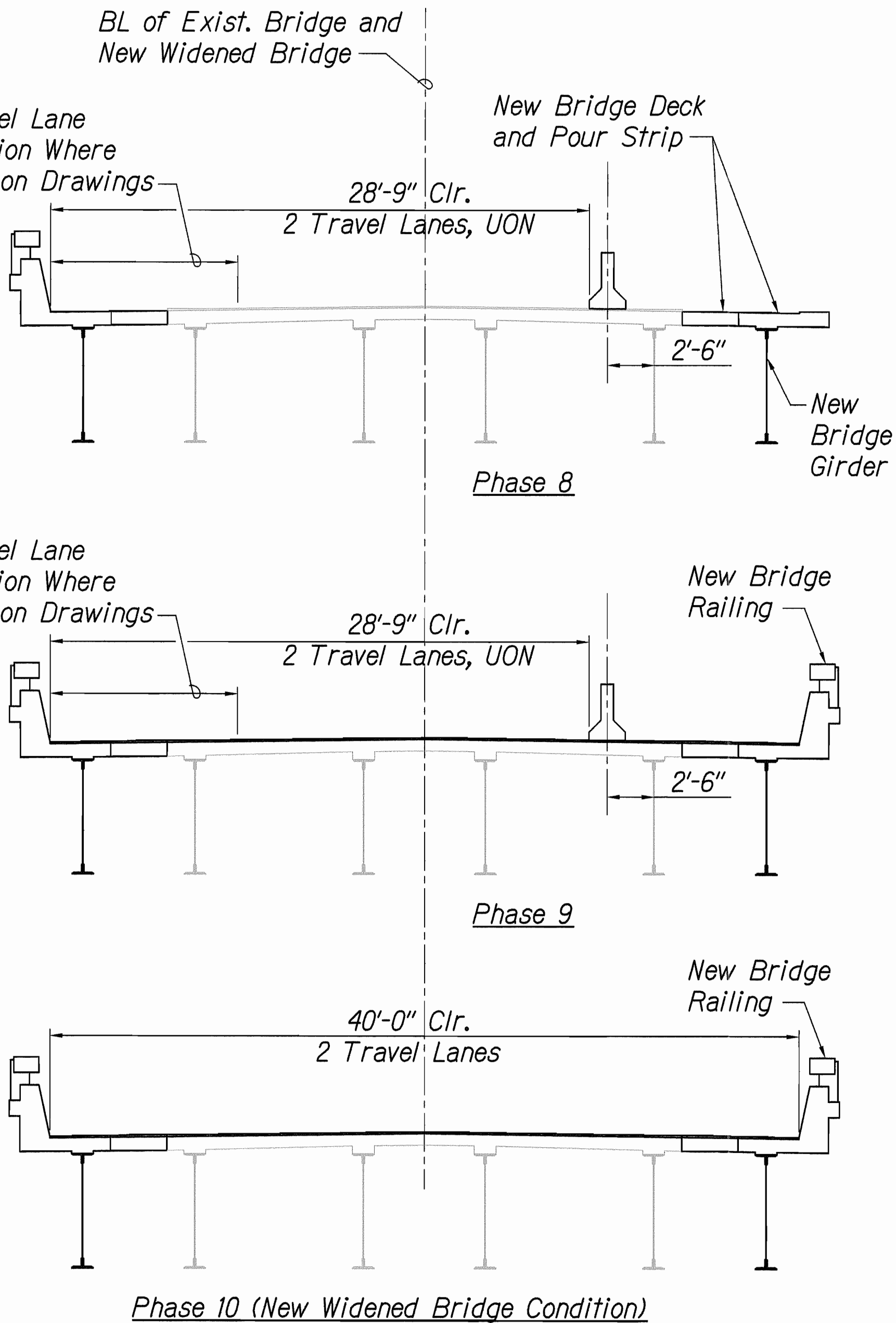
Upstream Side

Downstream Side

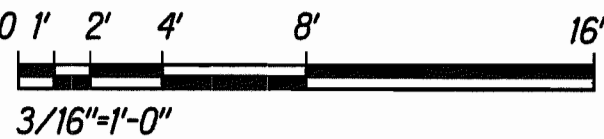


Upstream Side

Downstream Side



GRAPHIC SCALES:



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NO. 5479-S
HAWAII, USA

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION PHASING NOTES

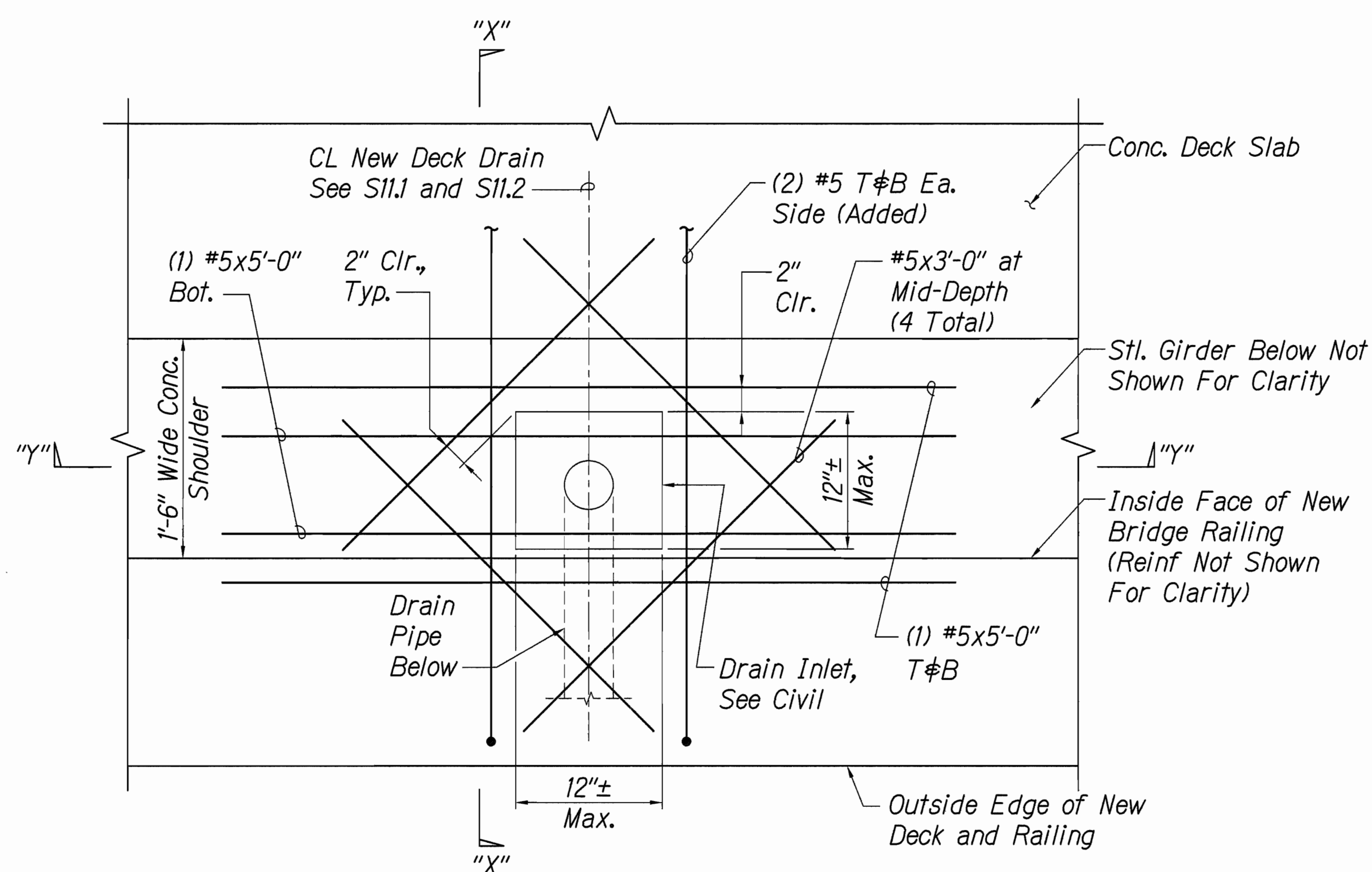
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 3/16" = 1'-0" Date: July 25, 2012

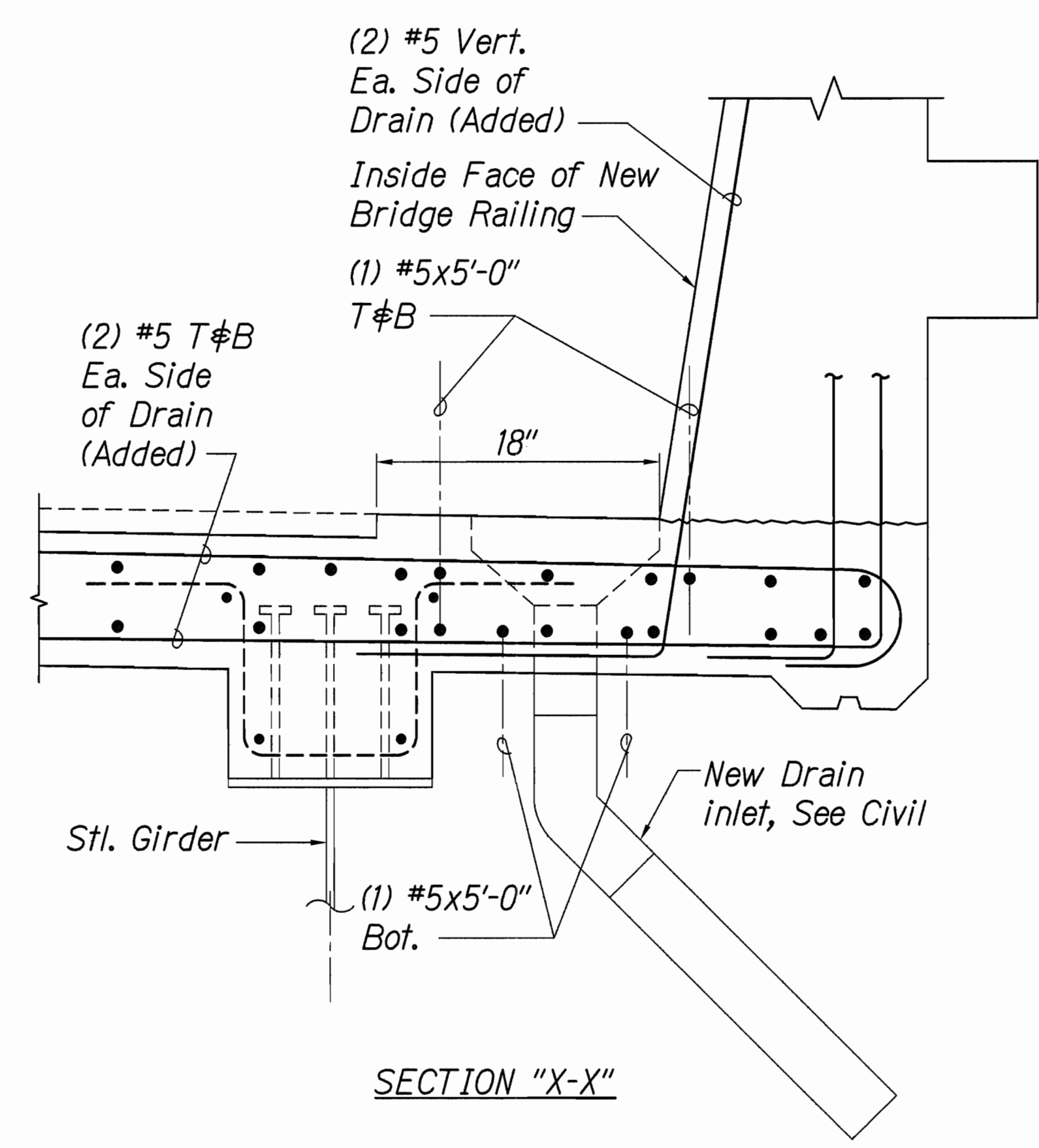
SHEET No. S15.1 OF 1 SHEETS

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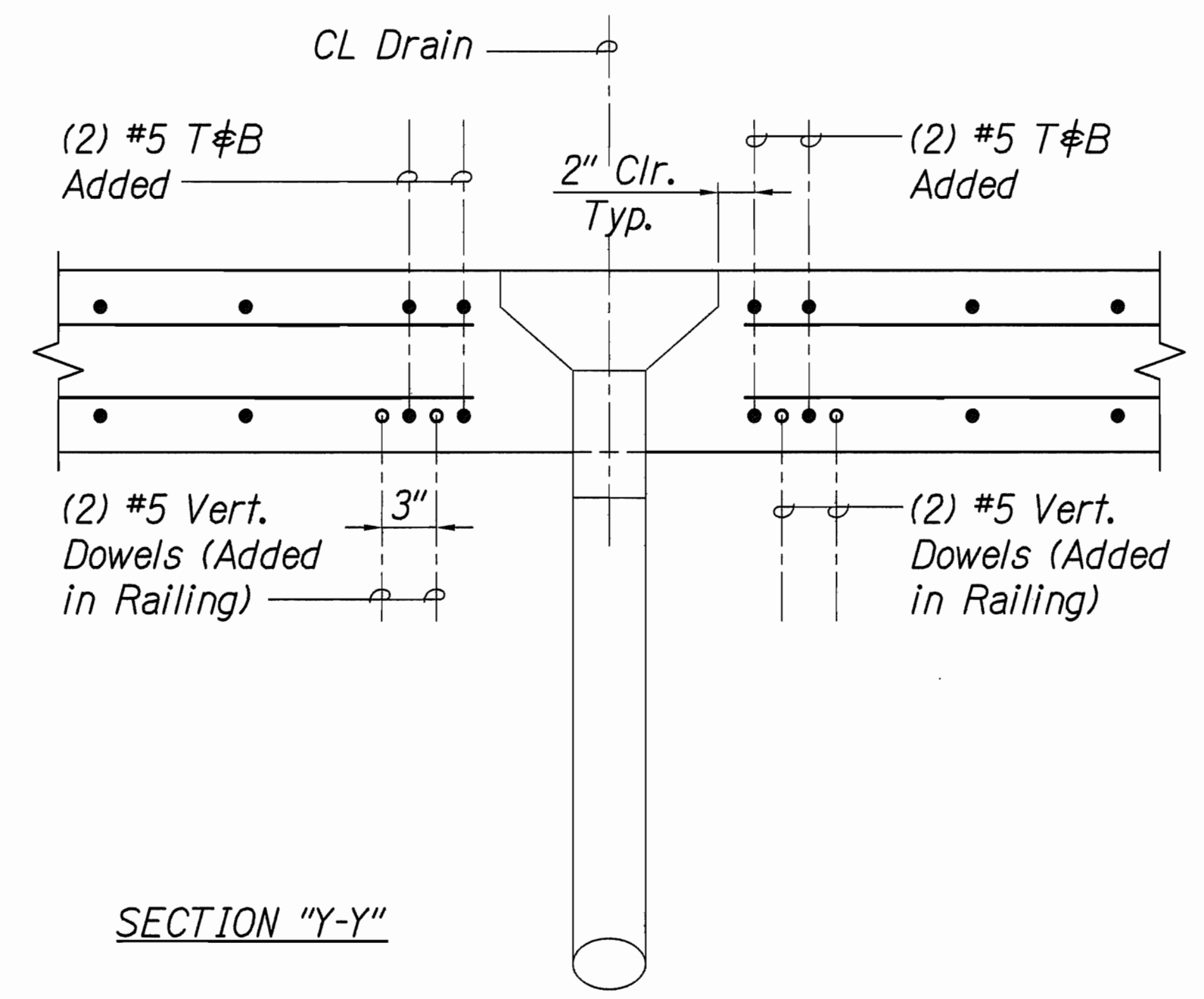
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	131	137



PLAN



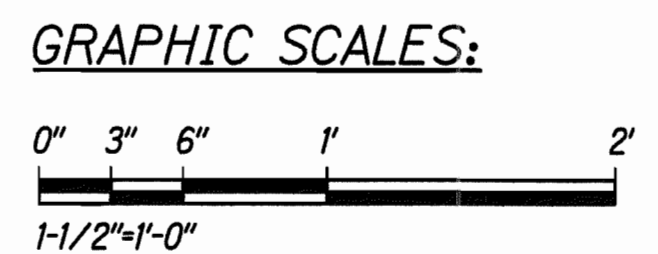
SECTION "X-X"



SECTION "Y-Y"

SURVEY PLOTTED BY	DATE
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CHECKED BY	
ORIGINAL PLAN	
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1
S11.1 & S11.2 S16.1
NEW DECK DRAIN DETAIL
SCALE: 1-1/2" = 1'-0"



LICENSE EXPIRES: 4/30/14
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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

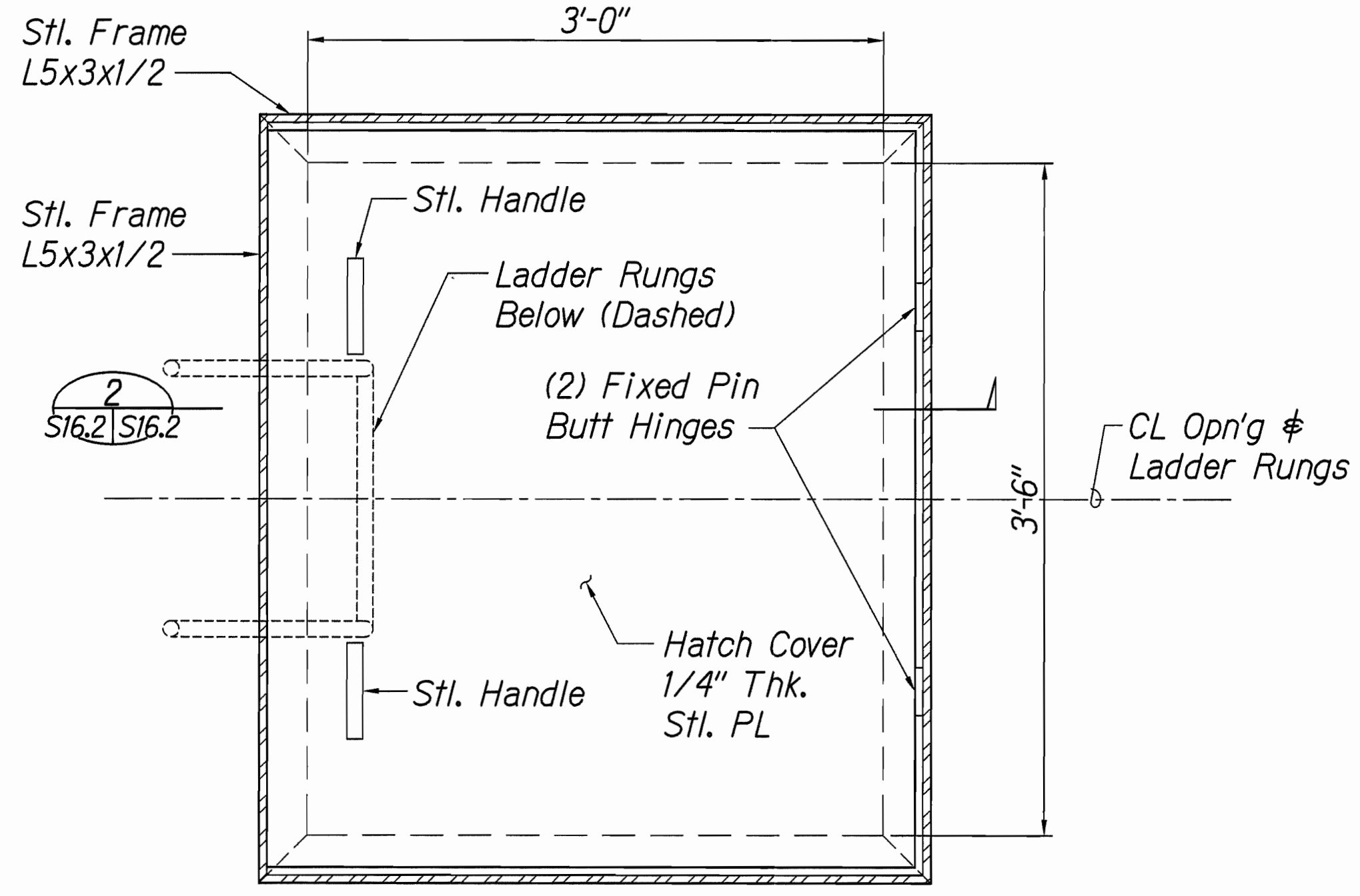
**MISCELLANEOUS DETAILS -
DECK DRAINS**

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

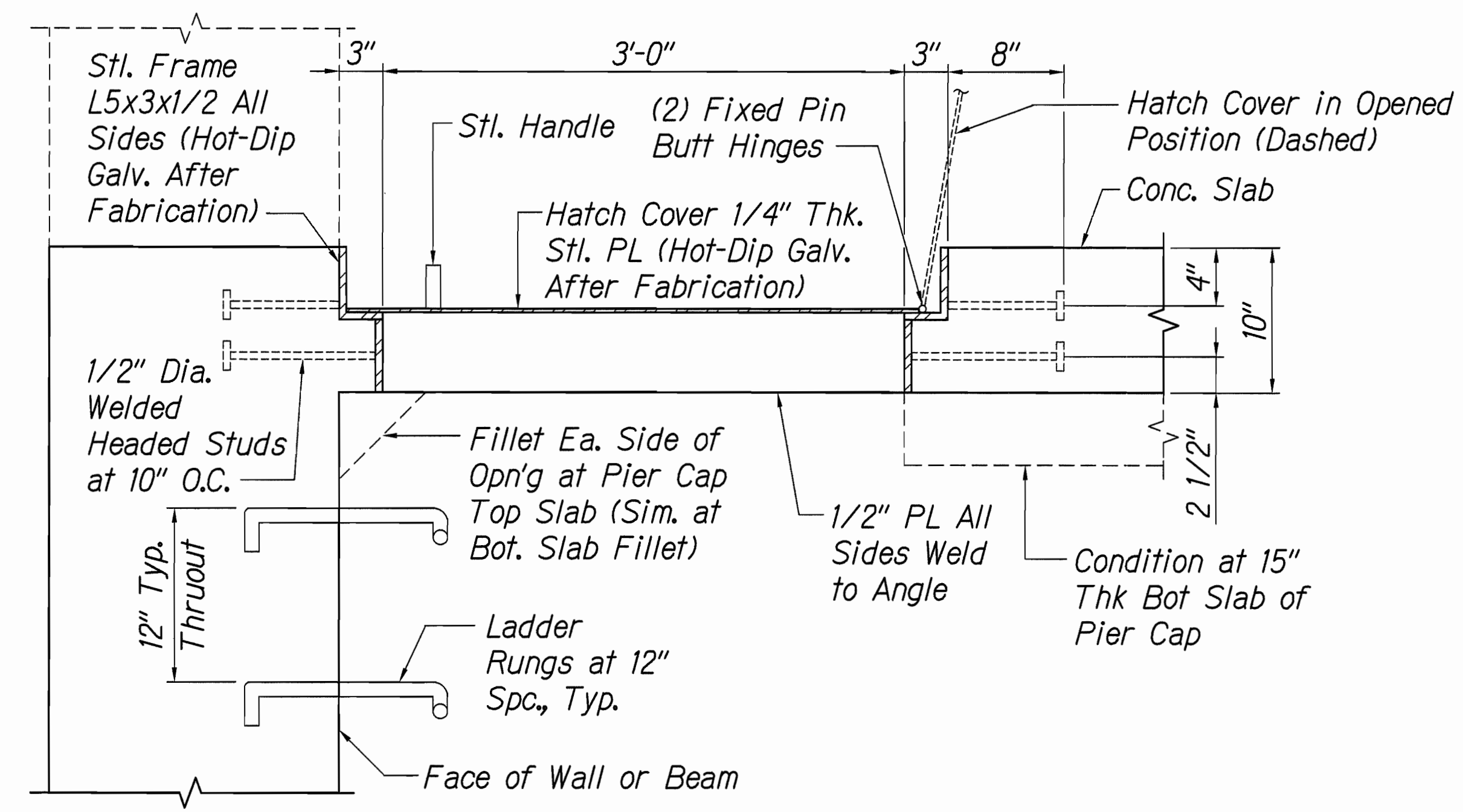
Scale: 1-1/2" = 1'-0" Date: July 25, 2012

SHEET No. S16.1 OF 2 SHEETS

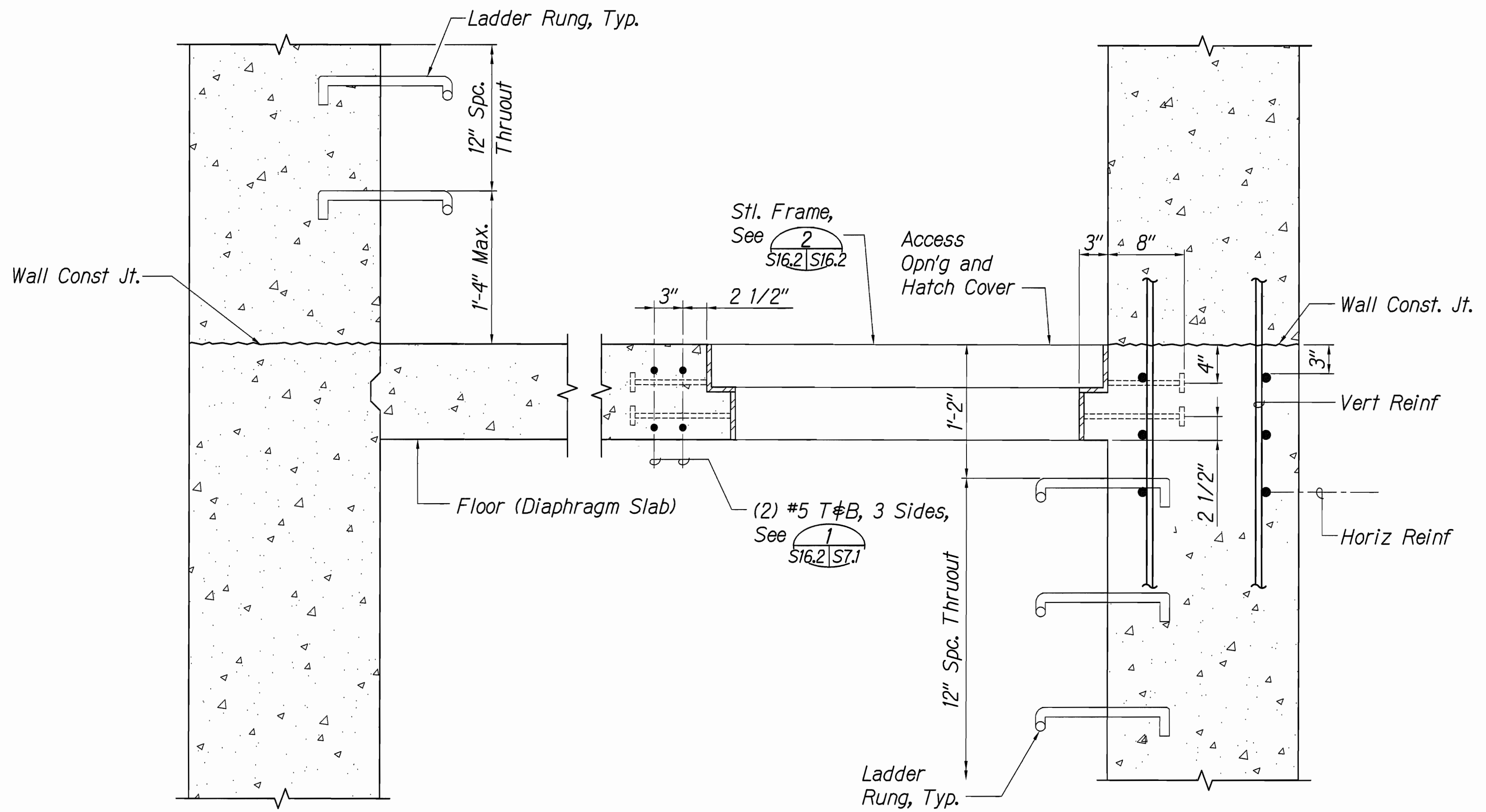
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	132	137



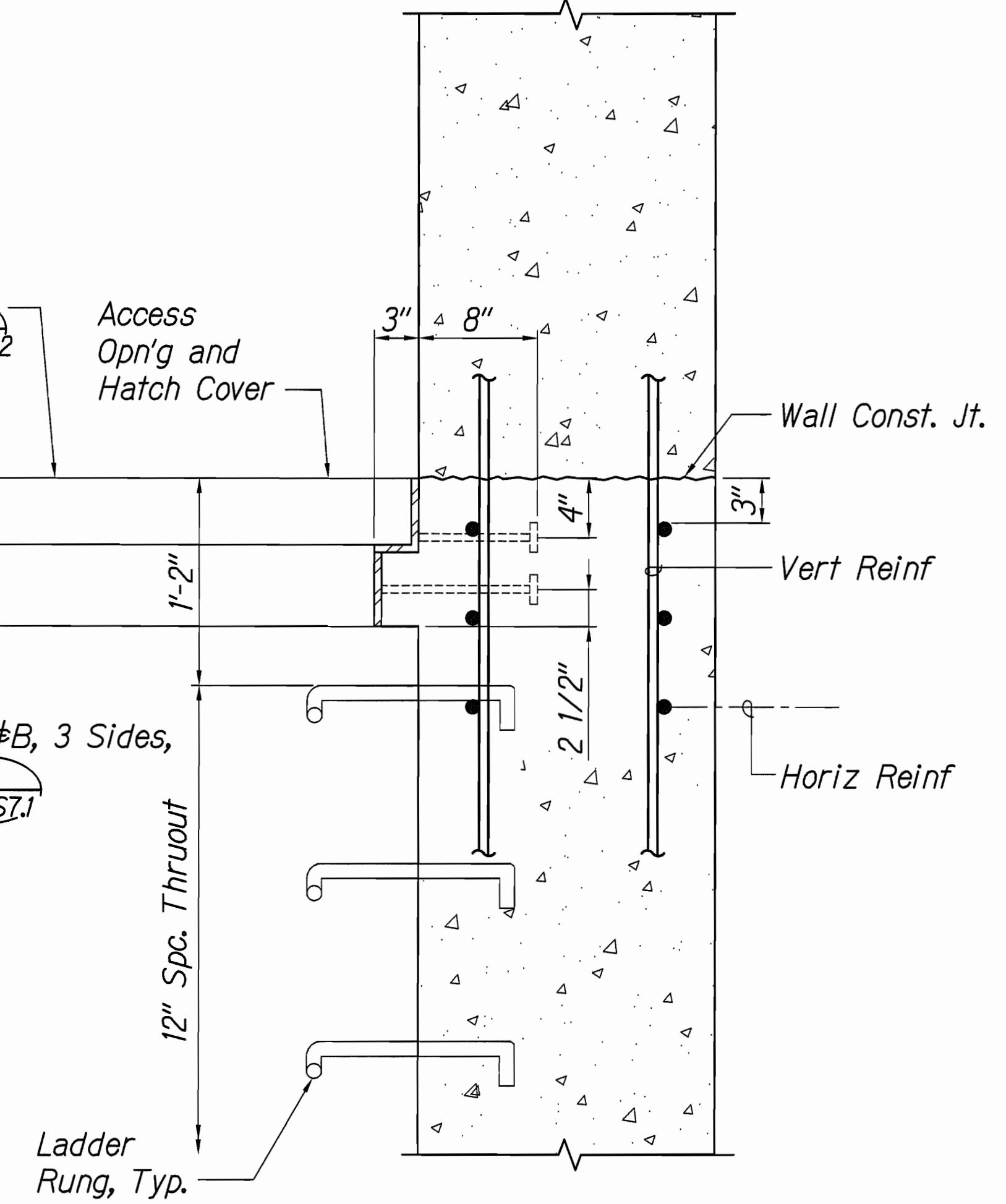
1 PLAN - NEW HATCH COVER
S7.1, S8.1, S16.2 SCALE: 1-1/2" = 1'-0"



2 SECTION
S7.3, S7.5, S16.2 SCALE: 1-1/2" = 1'-0"



3 SECTION AT FLOOR (DIAPHRAGM SLAB)
S16.2 SCALE: 1-1/2" = 1'-0"

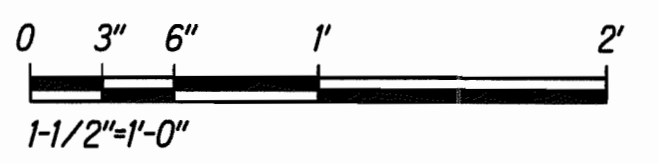


4 SECTION AT ACCESS OPENING
S16.2 SCALE: 1-1/2" = 1'-0"

Notes:

1. Refer to Standard Specs Section 712.07 "Frames, Grates, Covers, and Ladder Rungs", and Special Provisions.
2. Ladder Rungs Shall be 1" diameter wrought iron ASTM A36, hot dip zinc coated. For detail, see Standard Plan H-07, "Manhole Rung".
3. Ladder rungs shall be incidental to steel frame and hatch cover, and will not be paid for separately.
4. For ladder rung locations in pier, see sheet S2.6.

GRAPHIC SCALES:



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DESIGNED BY	
TRACED BY	
NOTED BY	
CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISC. DETAILS - NEW PIER

ACCESS HATCH, STEEL RUNGS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: 1-1/2" = 1'-0" Date: July 25, 2012

SHEET No. S16.2 OF 2 SHEETS

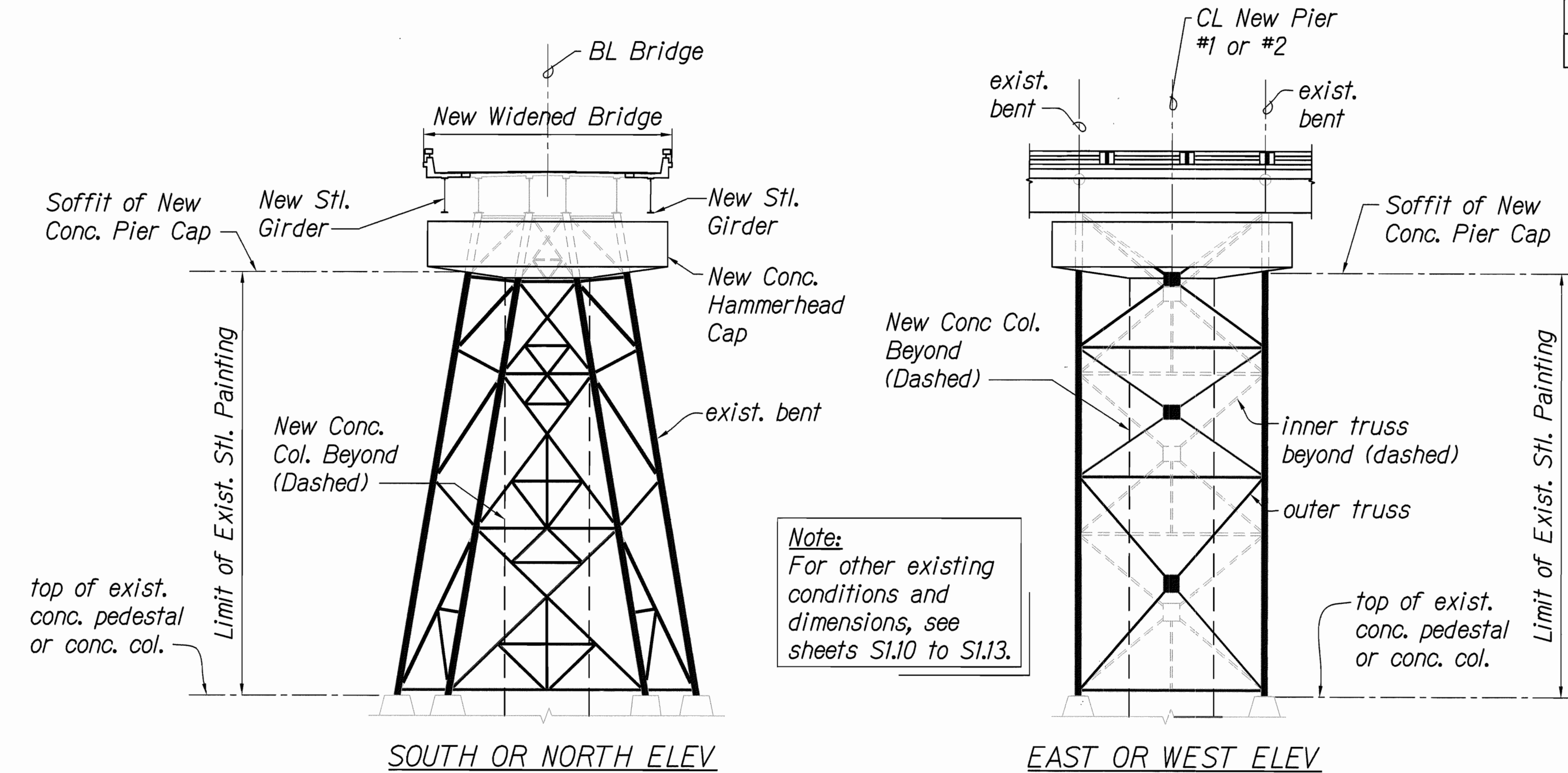
Clean and Paint Existing Steel Towers and Bents - Notes

General

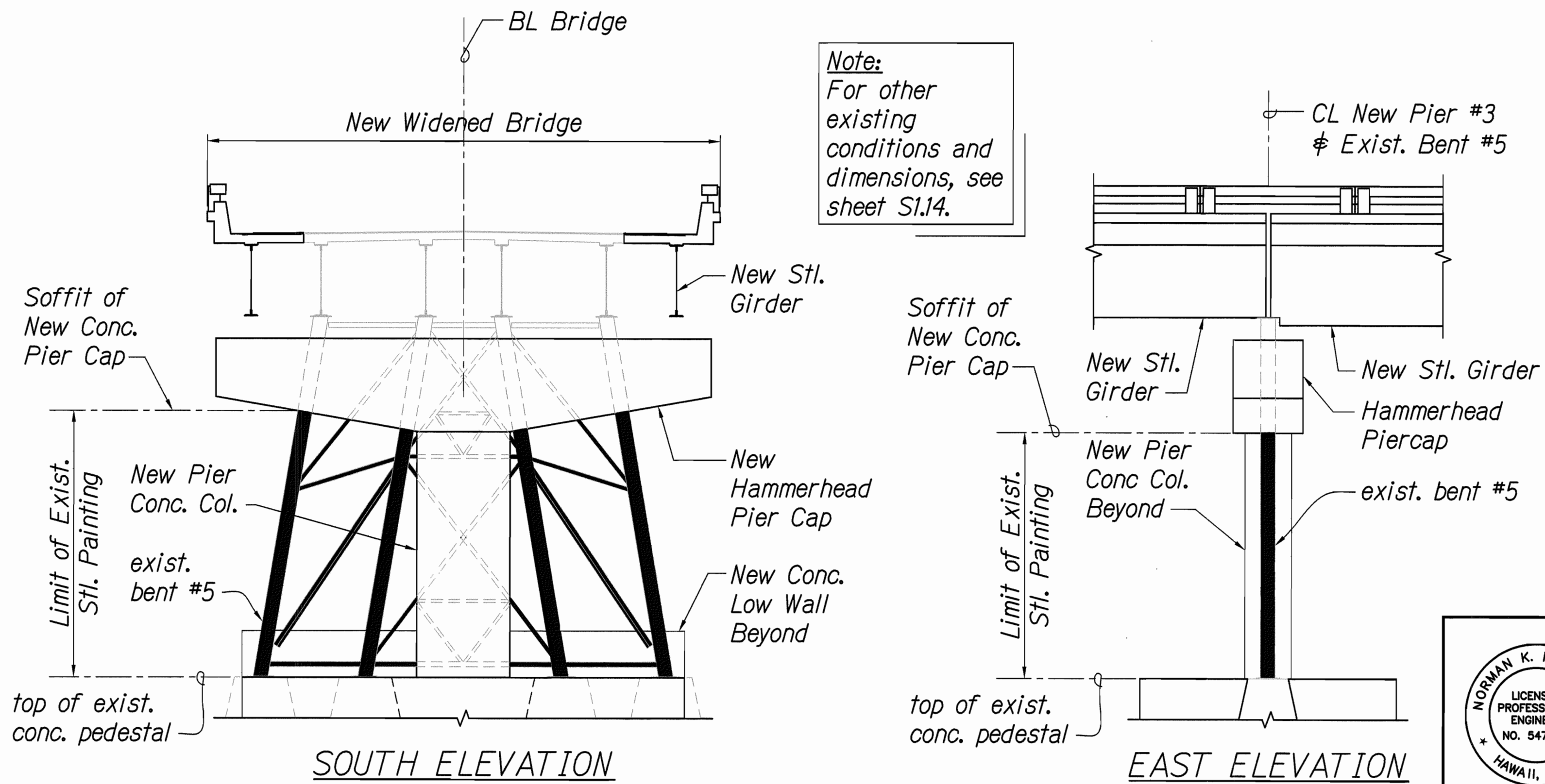
1. Contractor shall refer to Special Provisions Section 694 "Clean and Paint Structural Bridge Steel".
2. For general structural notes, see sheets S0.1, S0.2 and S0.3.
3. For existing and demolition general notes, see sheet S1.1.
4. Existing conditions are shown on the drawings as of December 2010. Where shown on drawings, dimensions and steel member sizes are based on available as-built bridge plans and may not be exact. This is provided for information only. Contractor shall field verify all existing and new dimensions and conditions. All discrepancies shall be promptly reported to the Engineer and shall be resolved prior to commencing work.
5. Contractor shall take adequate measures to protect the environment from all construction materials. See Standard Specs Section 107.13 - "Pollution Control and Protection of Archeological, Historical, and Burial Sites", and Section 209 - "Temporary Water Pollution, Dust and Erosion Control", and "Water Pollution and Erosion Control Notes" on civil sheets C-2 and C-3, and "Site Specific BMP Notes" on sheet C-13.
6. Contractor shall provide temporary containment structures around the work area to protect the environment. See Special Provisions.
7. New paint shall be a three-coat system consisting of a modified aluminum epoxy mastic coating (base coat and intermediate coat) and a polyurethane top coat. Color of top coat shall be black. See Special Provisions.

Surface Preparation and Application

1. Where existing steel members or connections are damaged, steel shall be repaired prior to cleaning and painting work. Contractor shall immediately notify the Engineer. See sheet S17.2 and S17.3 for typical repair details and estimated repair quantities (allowance). For variations in estimated quantities, see Standard Specs Section 104.07.
2. All loose rust and scale shall be removed by hand or power tool clean (SSPC SP2 or SP3).
3. Steel surfaces to be coated shall be solvent wiped (SSPC SP1).
4. Apply specified modified aluminum epoxy mastic coating (base coat and intermediate coat) in strict conformance with manufacturer's recommendations and allow each coat to properly dry.
5. Apply specified polyurethane top coat in strict conformance with manufacturer's recommendations. See Special Provisions.

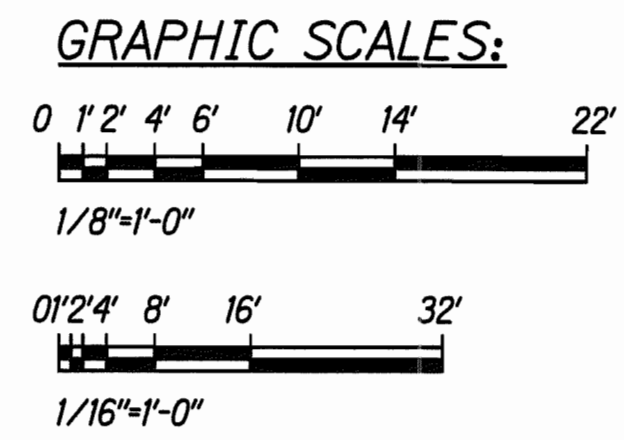
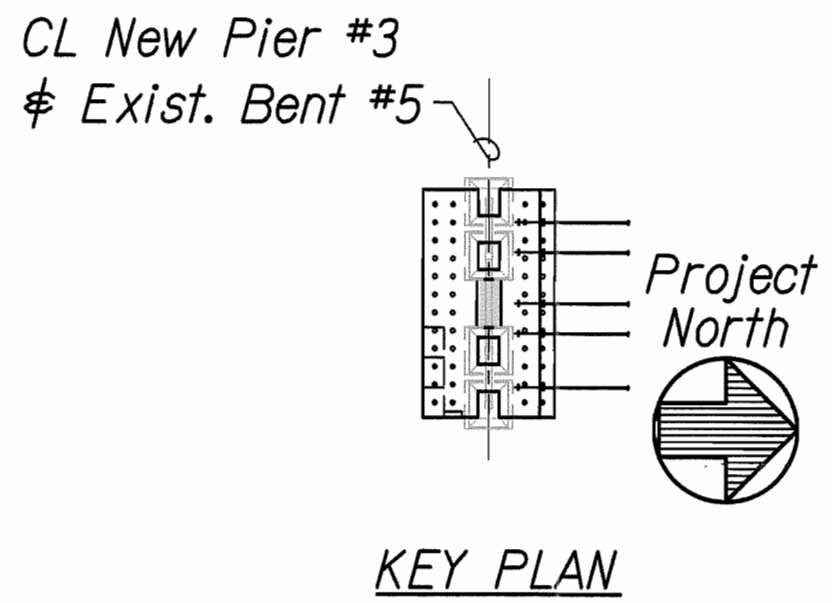
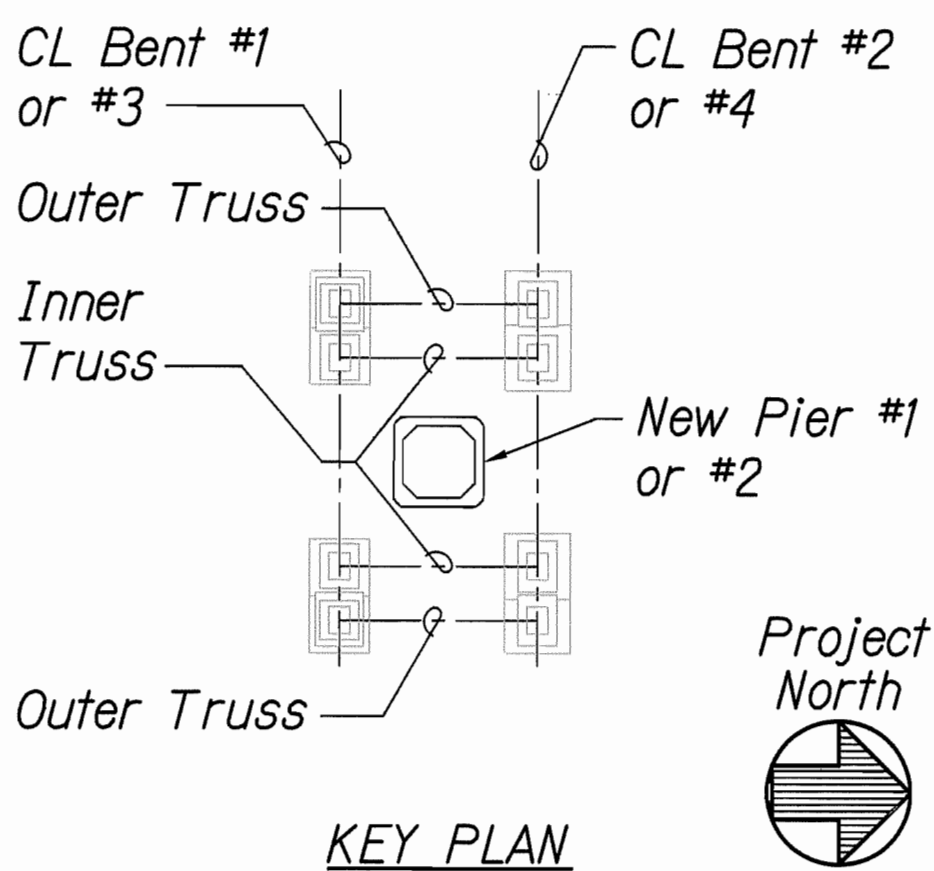


1 ELEVATION - NEW PIER #1 OR PIER #2
S17.1 S17.1 SCALE: 1/16" = 1'-0"



2 ELEVATION - NEW PIER #3
S17.1 S17.1 SCALE: 1/8" = 1'-0"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**CLEAN & PAINT EXISTING
STEEL TOWERS & BENTS**

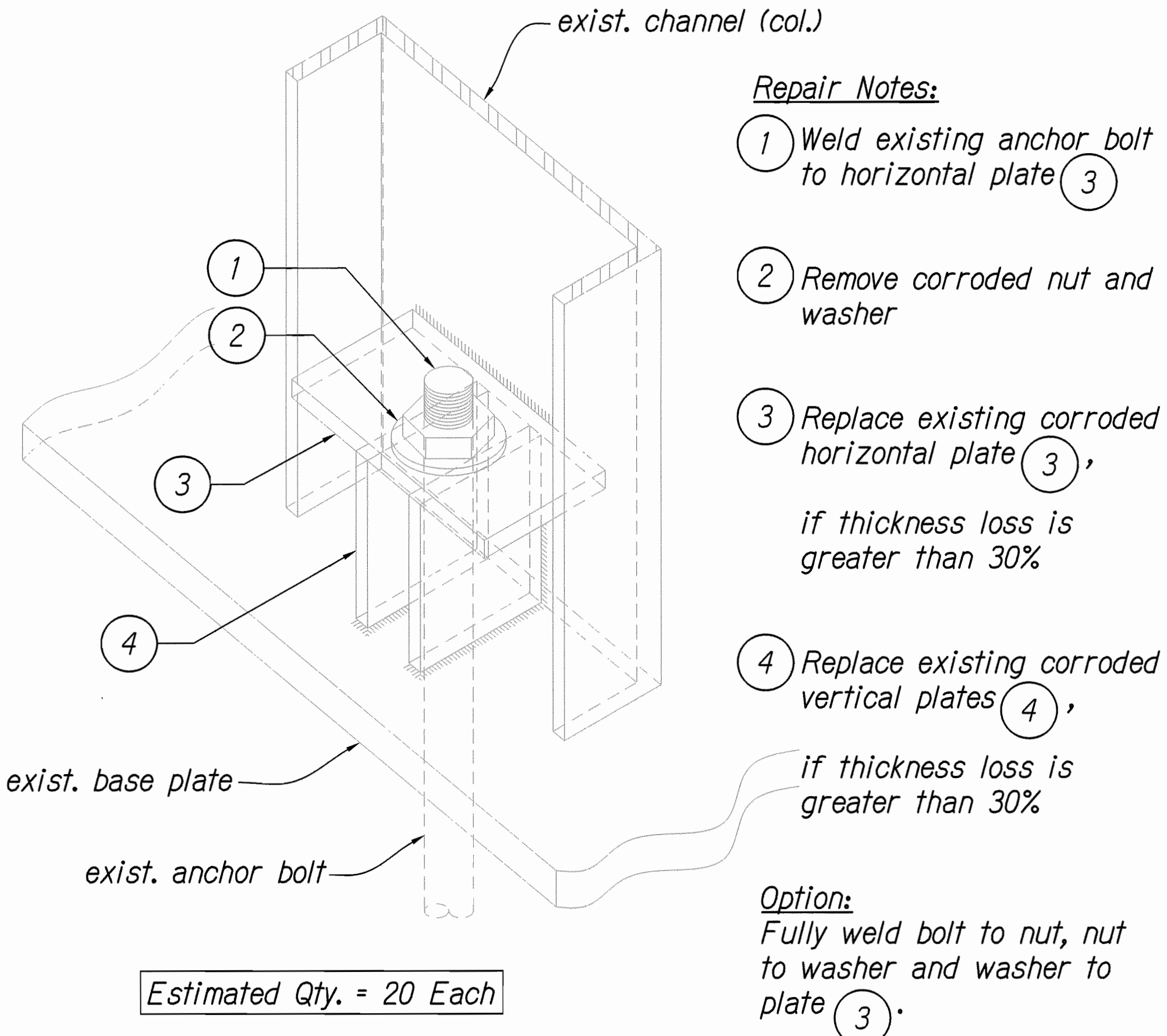
HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

Scale: As Shown Date: July 25, 2012

SHEET No. S17.1 OF 3 SHEETS

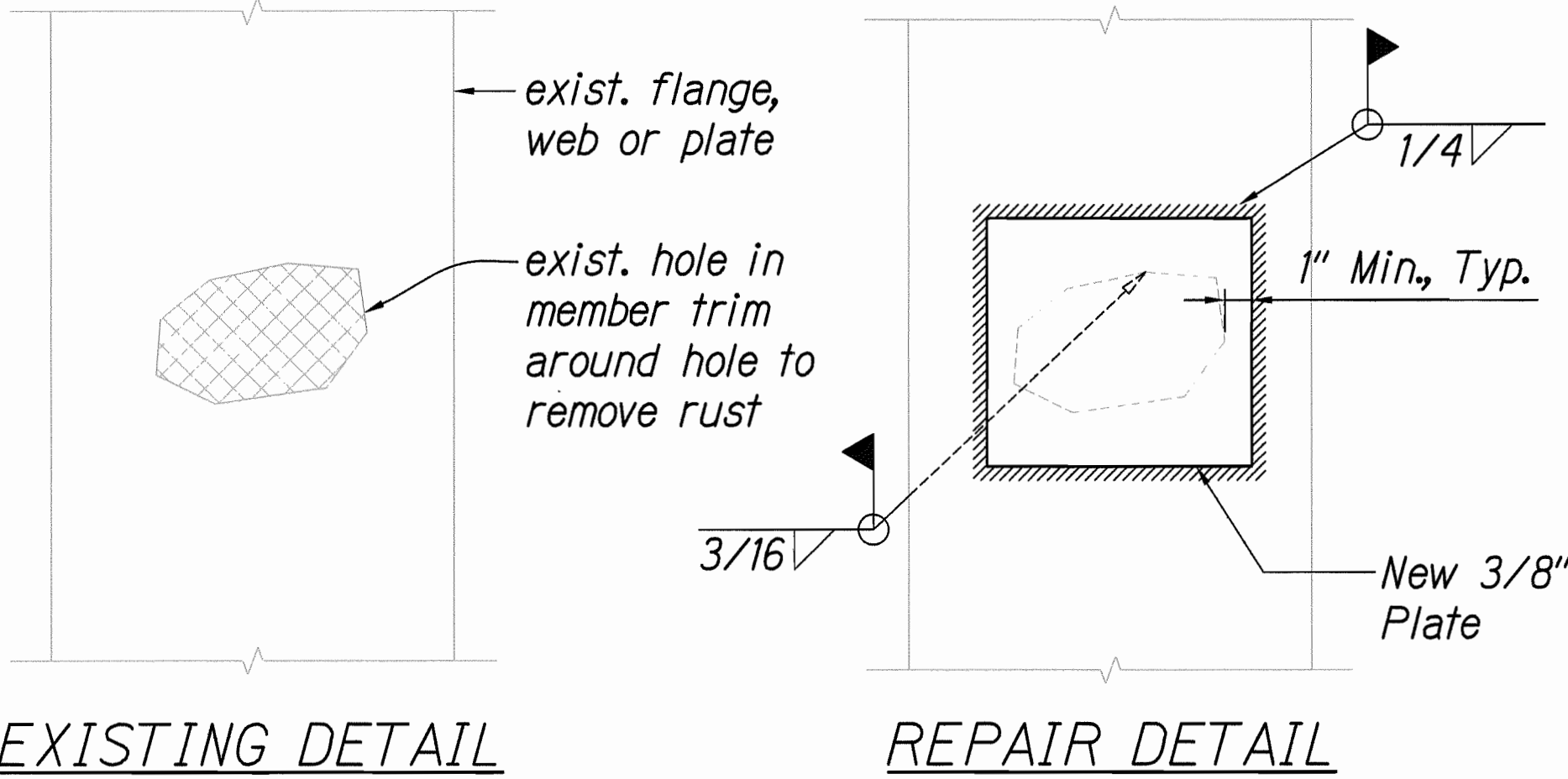
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DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(61)	2012	134	137



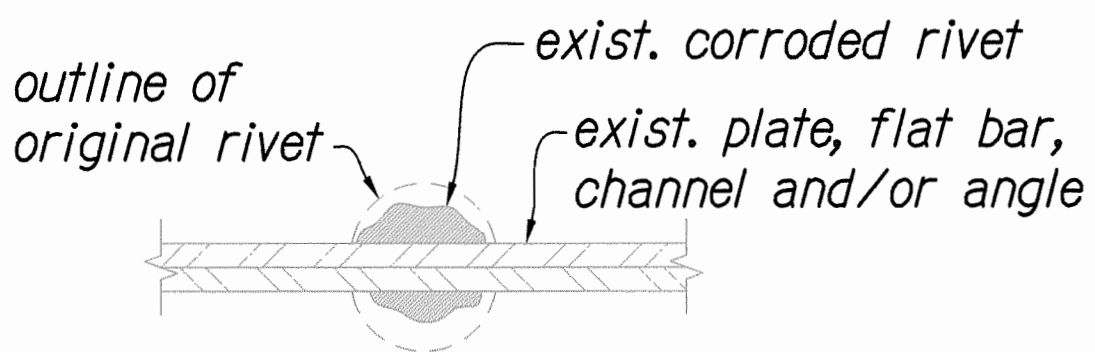
Estimated Qty. = 20 Each

REPAIR DETAIL - TYPE 1
Not To Scale

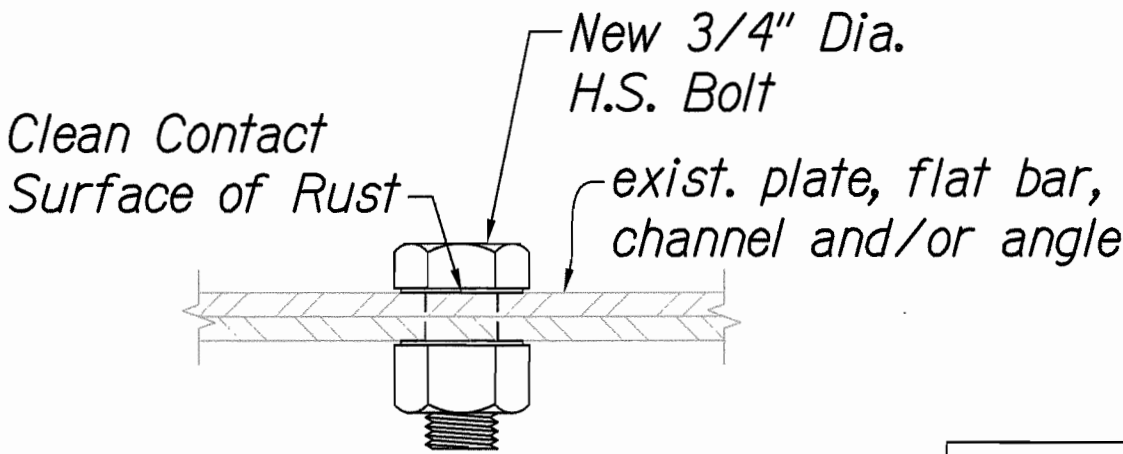


Estimated Qty. = 100 Each

REPAIR DETAIL - TYPE 3
Not To Scale



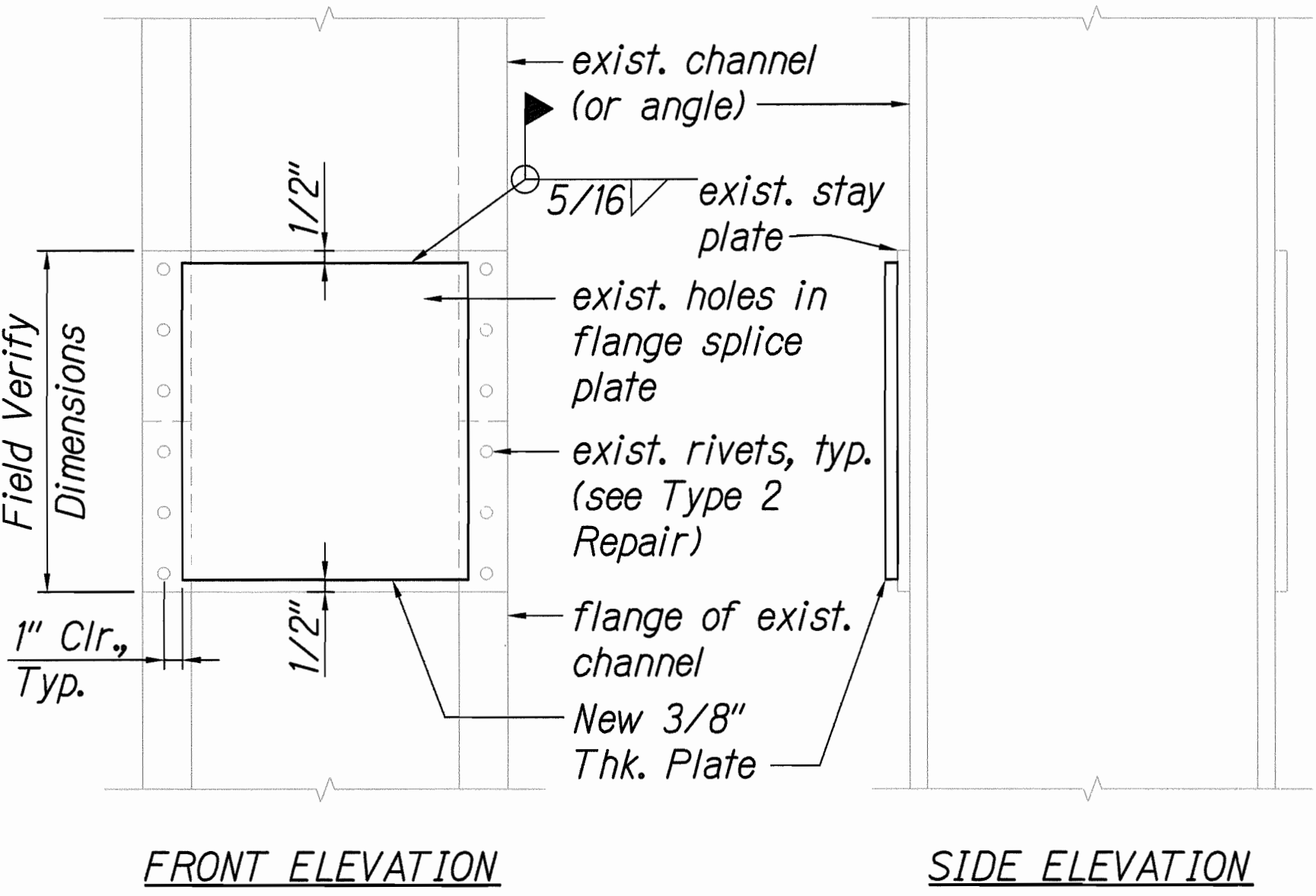
EXISTING CORRODED RIVET



Estimated Qty. = 500 Each

REPLACEMENT BOLT

REPAIR DETAIL - TYPE 2
Not To Scale



Option:
Remove existing corroded stay plate and replace with new 3/8" plate welded or bolted to existing channels or angles.

Estimated Qty. = 100 Each

REPAIR DETAIL - TYPE 4
Not To Scale

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QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
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LICENSED PROFESSIONAL ENGINEER
NO. 5479-S
HAWAII, U.S.A.

LICENSE EXPIRES: 4/30/14
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Norman K. Nagamine

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

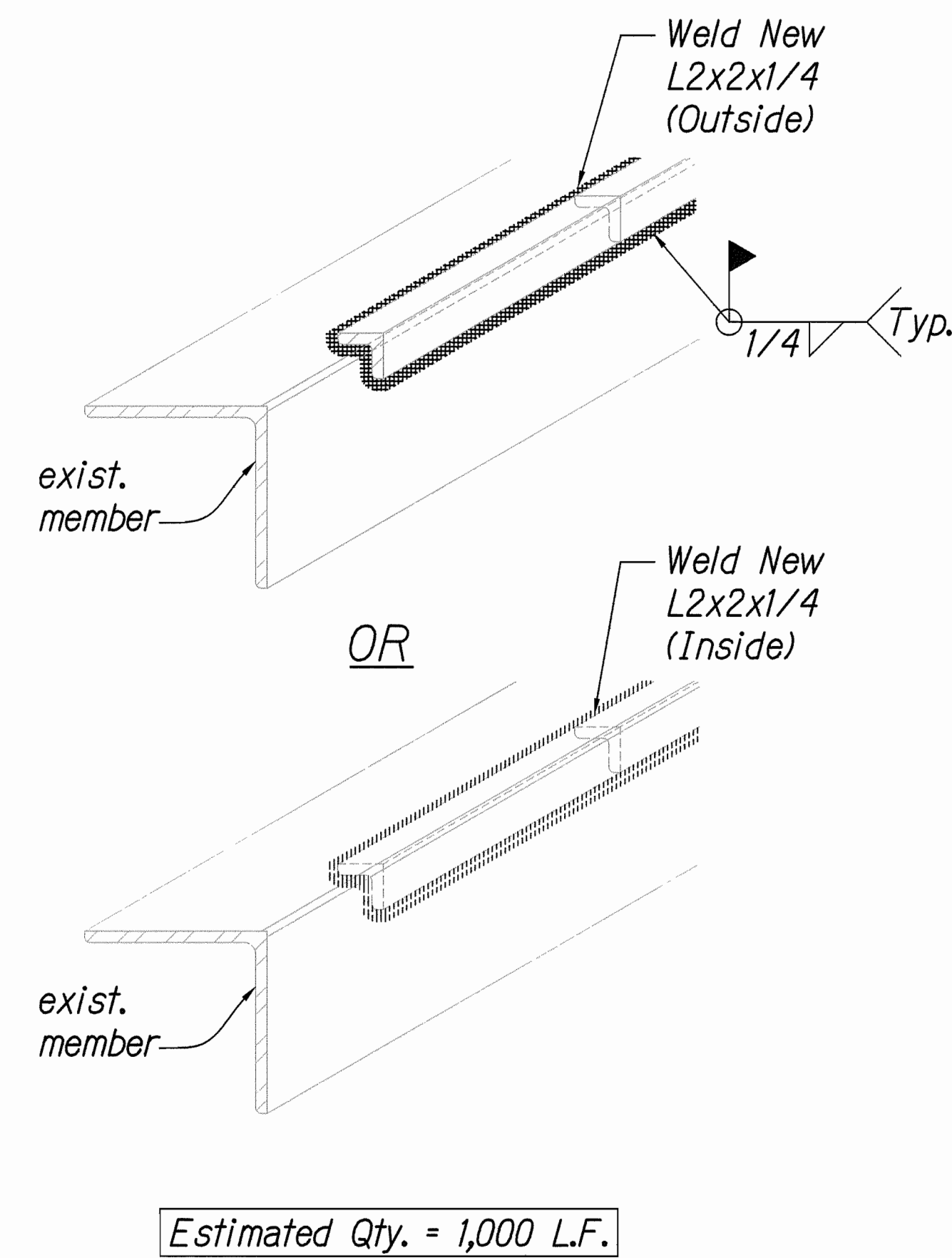
EXISTING STEEL TOWERS
\$ BENTS - REPAIR DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
Federal Aid Project No. BR-019-2(61)

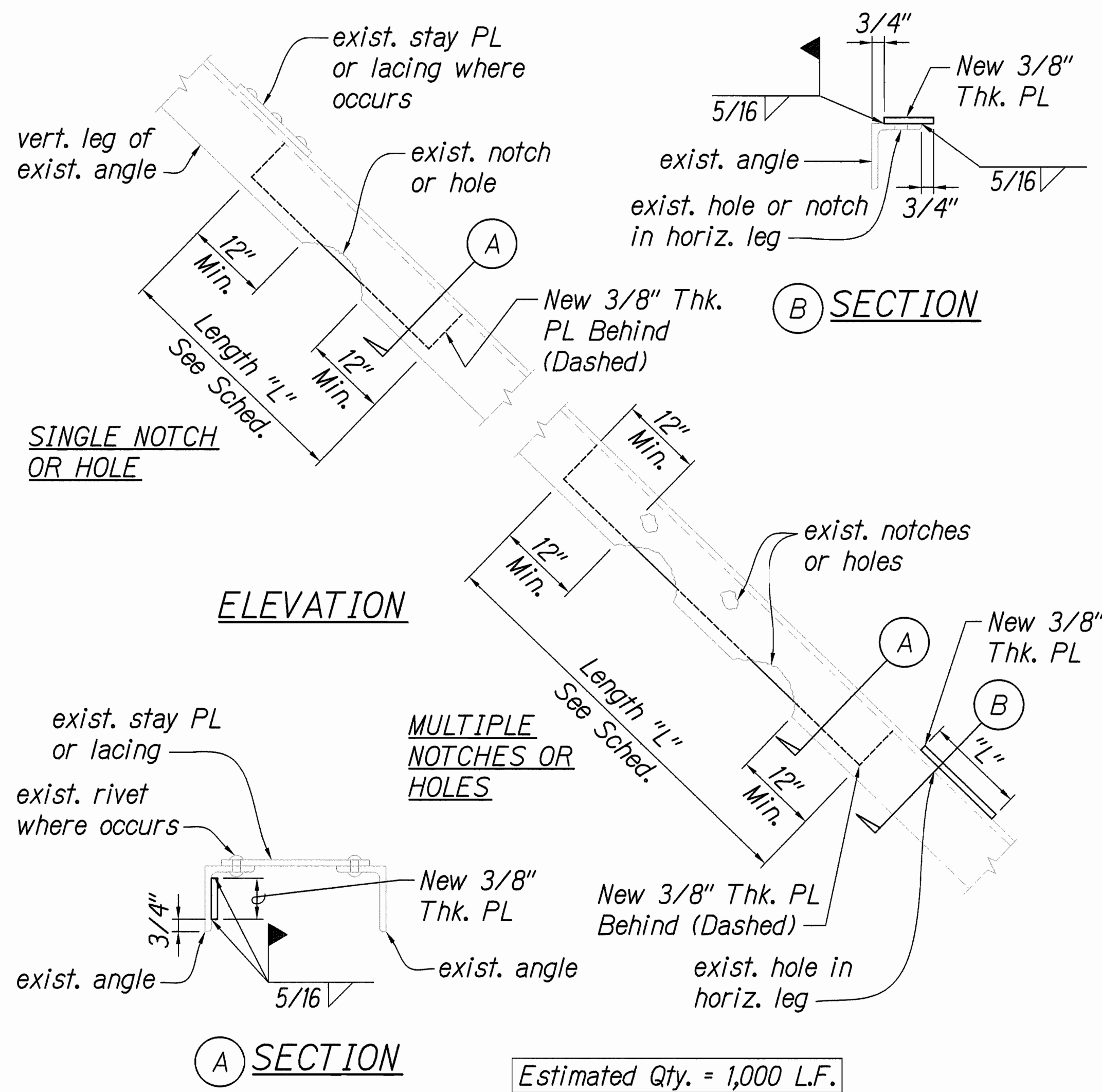
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SHEET No. S17.2 OF 3 SHEETS

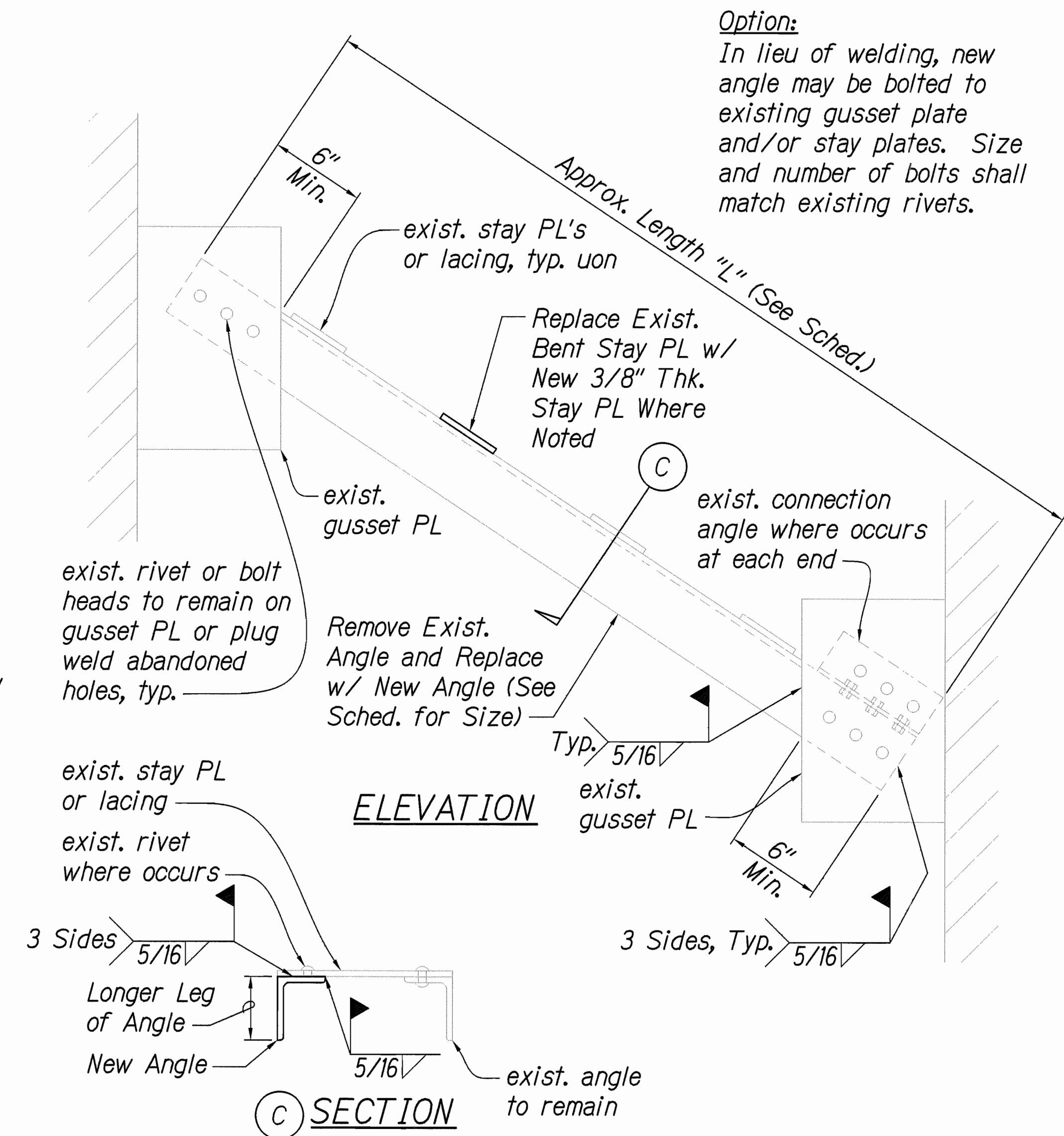
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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REPAIR DETAIL - TYPE 5
Not To Scale



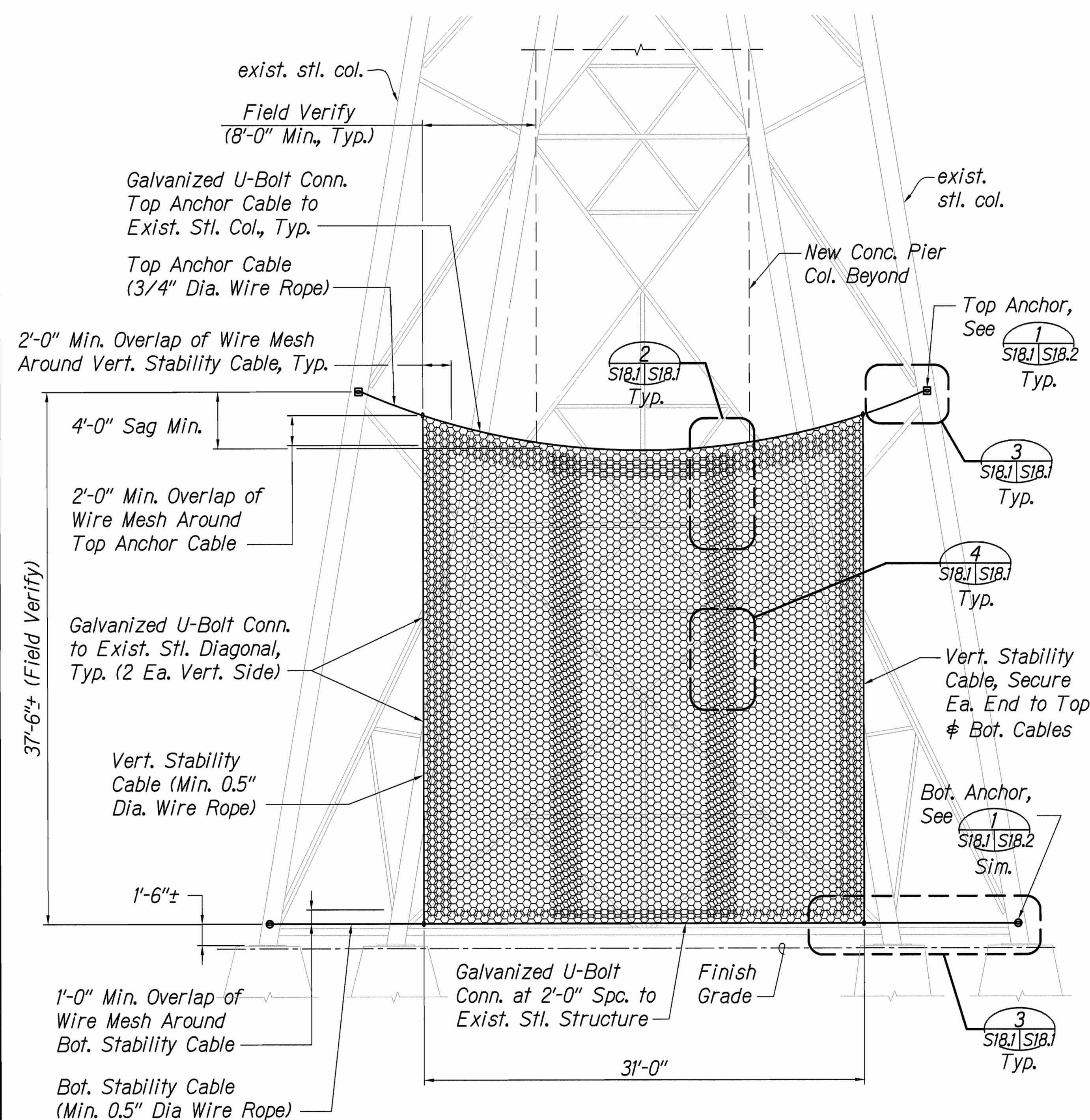
REPAIR DETAIL - TYPE 6
Not To Scale



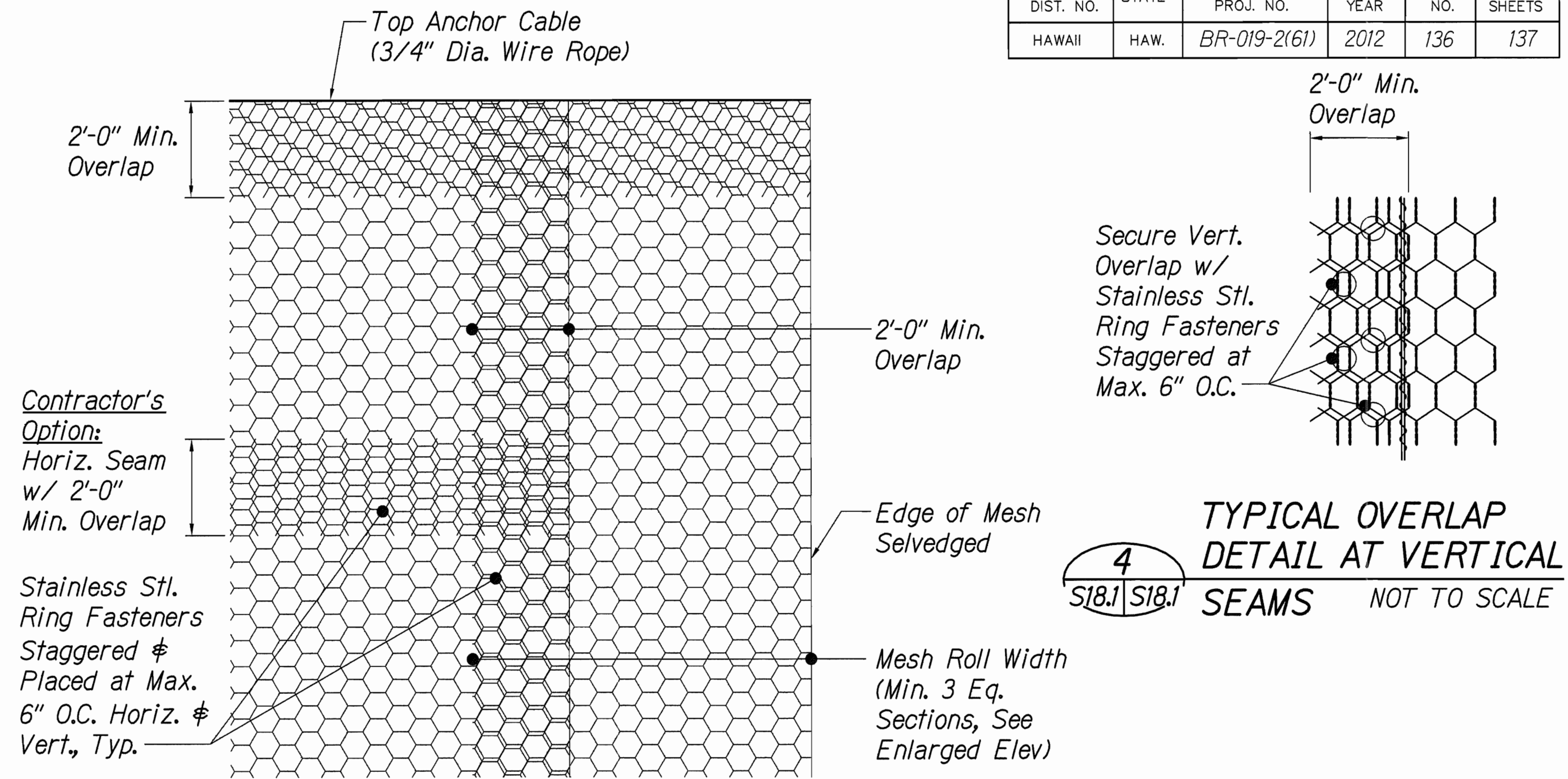
1 REPAIR DETAILS
S17.3 S17.3 Not To Scale

NORMAN K. NAGAMINE LICENSED PROFESSIONAL ENGINEER NO. 5479-S HAWAII, U.S.A. LICENSE EXPIRES: 4/30/14 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION Norman K. Nagamine	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION EXISTING STEEL TOWERS # BENTS - REPAIR DETAILS HAWAII BELT ROAD <i>Rehabilitation of Umauma Stream Bridge</i> Federal Aid Project No. BR-019-2(61) Scale: None Date: July 25, 2012	
	SHEET No. S17.3 OF 3 SHEETS	
	135	
	135	
	135	

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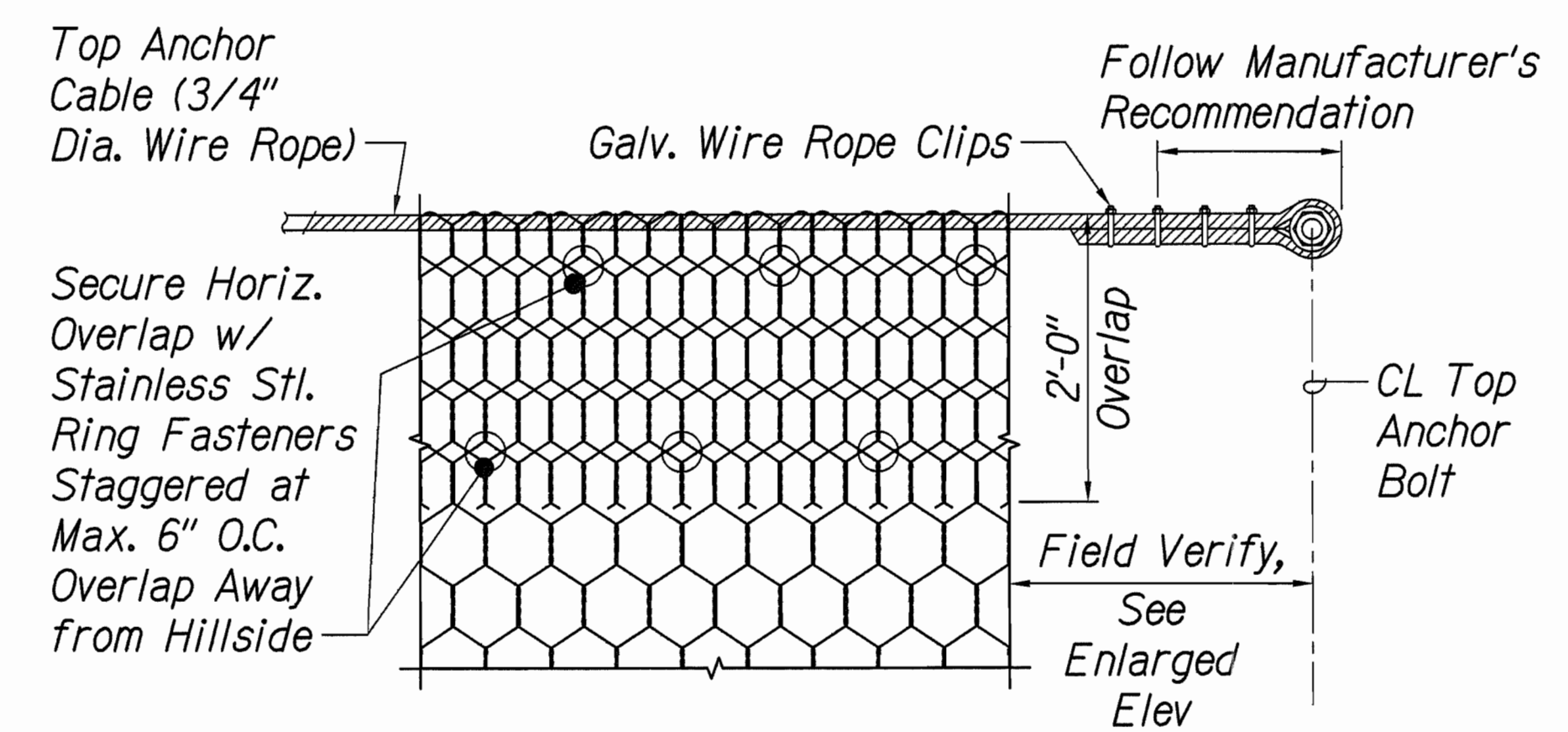


1 DRAPED WIRE MESH - ENLARGED ELEVATION
 S2.4, S2.5, S6.1 & S18.2 S18.1 SCALE: 3/16" = 1'-0" (BENT #1 - SOUTH FACE)

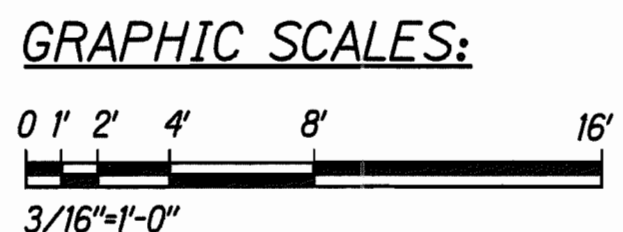


2 WIRE MESH OVERLAP
 S18.1 S18.1 NOT TO SCALE

- Notes:**
- Contractor shall refer to Special Provisions Section 670 "Draped Wire Mesh".
 - Draped wire mesh shall conform closely to face of existing tower.
 - Bottom stability cable shall be loose and shall not be pulled tight against face of existing structure.
 - Wire rope shall be preformed, 6 by 19 wire strand core or independent wire rope core (IWRC) conforming to Standard Specs Section 709.02.
 - All exposed bare steel elements shall be painted with a black colored rubberized paint.



3 TOP ANCHOR CABLE DETAIL
 S18.1 S18.1 & HORIZONTAL TOP OVERLAP NOT TO SCALE



Norman K. Nagamine

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

DRAPED WIRE MESH DETAILS

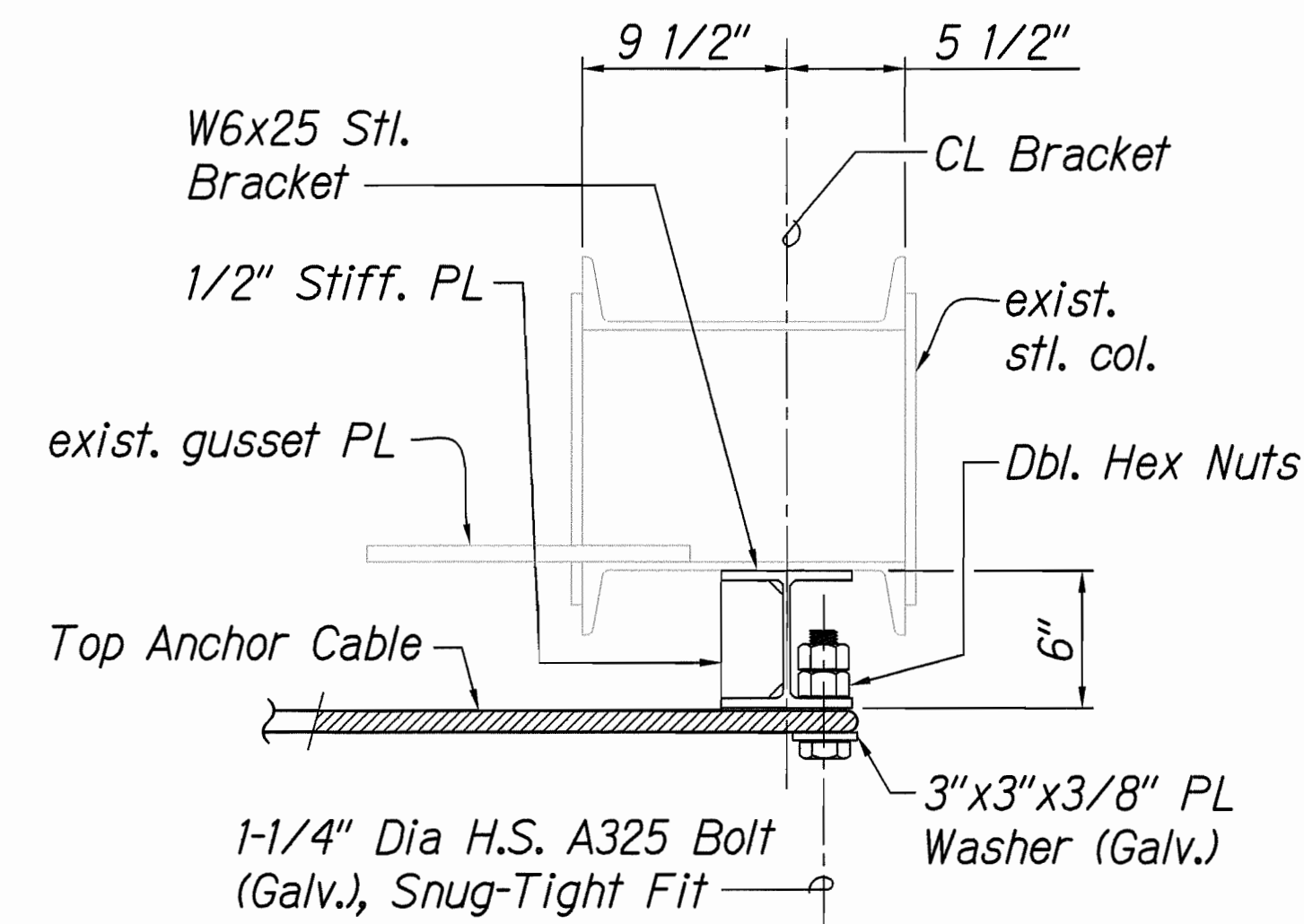
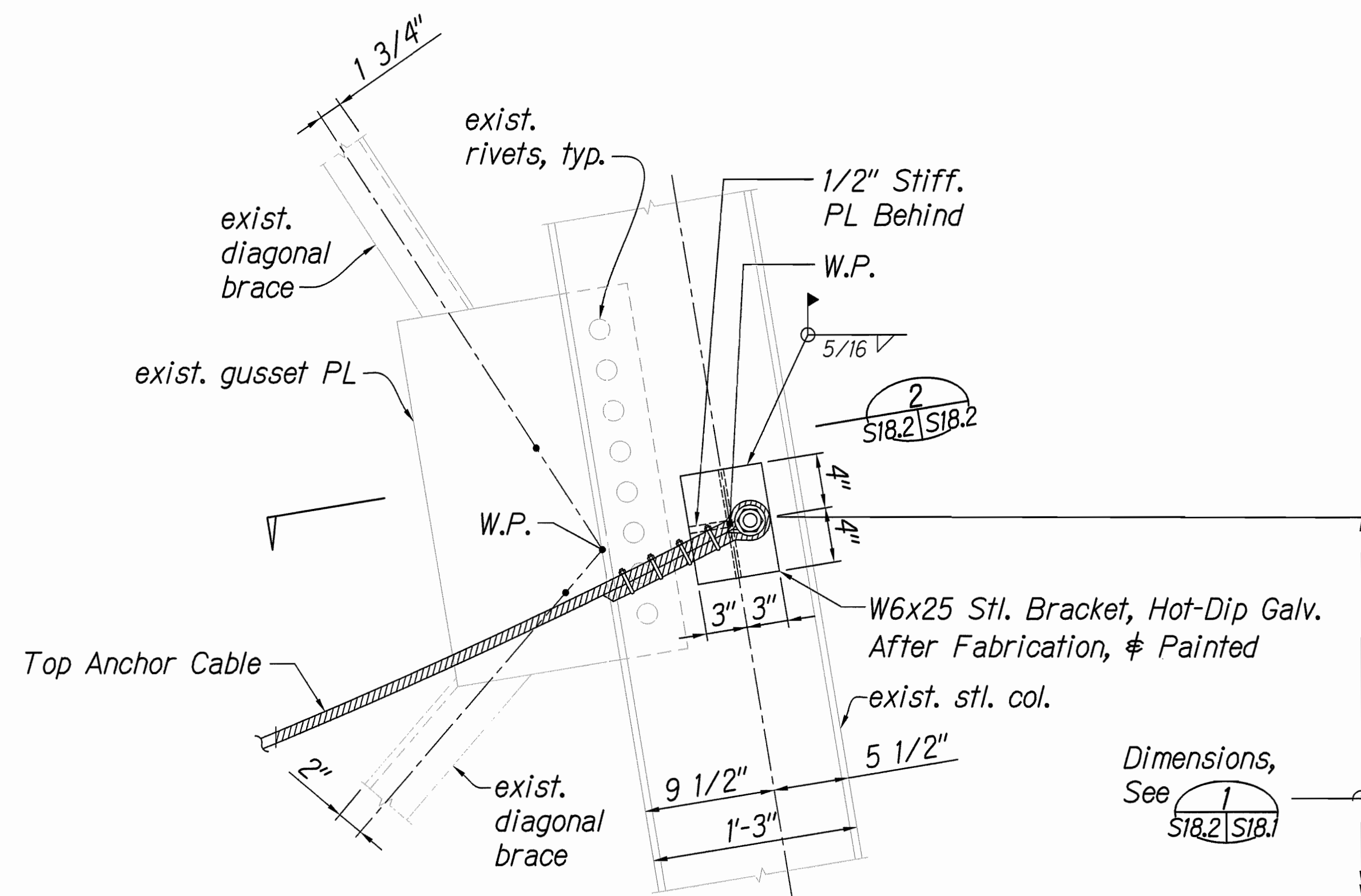
HAWAII BELT ROAD
 Rehabilitation of Umauma Stream Bridge
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Scale: As Shown Date: July 25, 2012

SHEET No. S18.1 OF 2 SHEETS

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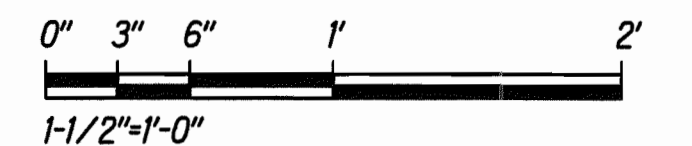
SECTION 2
SCALE: 1 1/2" = 1'-0"

Notes:

1. All dimensions shown shall be field verified by Contractor prior to fabrication or ordering of materials.
2. All field welds shall be performed slowly to avoid excessive heat build-up. Continuous welds shall be done in 1" long intermittent segments.
3. Touch-up coat welds with zinc rich primer and paint.

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

GRAPHIC SCALES:



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HAWAII, U.S.A.

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DRAPED WIRE MESH DETAILS

HAWAII BELT ROAD
Rehabilitation of Umauma Stream Bridge
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Scale: 1-1/2" = 1'-0" Date: July 25, 2012

SHEET No. S18.2 OF 2 SHEETS