

## American River Flood Control District

### Endorsement of CA CVFPB Permit Application – CalTrans Scour Mitigation

#### Staff Report

**Discussion:**

The CA Department of Transportation (CalTrans) has determined that the State Route 160 bridge crossing of the American River needs additional measures to prevent scour at the bridge piers. Scour is aggressive erosion under high flows that could undermine the footings of the bridge and cause a failure. The engineers at CalTrans have proposed installing sheet piles into the bed of the river in a box configuration around the existing piers. This will protect the piers from being undermined. The space between the sheet piles and the piers would then be filled with concrete.

All of the work proposed under this permit application will happen within the floodway and the levees will not be impacted. CalTrans included a hydraulic analysis of the river conditions both with and without the project. The analysis showed that hydraulic impacts from the proposed work are negligible.

**Recommendation:**

The General Manager recommends that the Board of Trustees endorse the permit application from CalTrans.

# Central Valley Flood Protection Board (CVFPB) Encroachment Permit Application Package



For  
The American River Bridge Scour Mitigation Project

Applicant  
California Department of Transportation (Caltrans)

August 10, 2018

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**SECTION 1**  
**APPLICATION FORM 3615**

**APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD  
ENCROACHMENT PERMIT**

**Application No.** \_\_\_\_\_  
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.

The intent of this project is to mitigate the risk of scour compromising the integrity of the American River Bridge on Highway 160 in Sacramento, California. The project will install permanent steel sheet piles around each bridge foundation. In order for the work to take place, a temporary access trestle/platform must be constructed to facilitate construction activities. See Supplemental Project Description and attached plans for more details.

2. Project  
Location: American River Bridge at SR-160 County, in Section Sacramento County, Section 30  
Township: 9N, Range: 5E, M. D. B. & M.  
Latitude: 38.5965° Longitude: -121.4764°  
Stream: American River, Levee: NA0001 Unit 04 A. River Designated Floodway: Unknown  
APN: State Lands Commision

3. Chris Rockey, District 03 CVFPB Liason of 703 B Street  
Name of Applicant / Land Owner Address  
Marysville CA 95901 (530) 741-4517  
City State Zip Code Telephone Number  
chris.rockey@dot.ca.gov  
E-mail

4. Chris Rockey, District 03 CVFPB Liason of 703 B Street  
Name of Applicant's Representative Company  
Marysville CA 95901 (530) 741-4517  
City State Zip Code Telephone Number  
chris.rockey@dot.ca.gov  
E-mail

5. Endorsement of the proposed project from the Local Maintaining Agency (LMA):

We, the Trustees of The American River Flood Control District approve this plan, subject to the following conditions:  
Name of LMA

- Conditions listed on back of this form       Conditions Attached (see Attachment 1C)       No Conditions

\_\_\_\_\_  
Trustee Date      Trustee Date

\_\_\_\_\_  
Trustee Date      Trustee Date

**APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD  
ENCROACHMENT PERMIT**

6. Names and addresses of adjacent property owners sharing a common boundary with the land upon which the contents of this application apply. If additional space is required, list names and addresses on back of the application form or an attached sheet.

Name	Address	Zip Code
County of Sacramento Dept. of Reg. Parks	4040 Bradshaw Road, Sacramento, CA 95827	
State Lands Commission	100 Howe Avenue, Suite 100 South, Sacramento, CA 95825	
Hart Enterprises, LP	1617 Kingsford Drive, Carmichael, CA 95608	
Frazier Revocable Trust	27038 County Road 92F, Winters, CA 95694	

7. Has an environmental determination been made of the proposed work under the California Environmental Quality Act of 1970?       Yes       No       Pending

If yes or pending, give the name and address of the lead agency and State Clearinghouse Number:

California Department of Transportation (Caltrans)

703 B Street

Marysville, CA 95901

SCH No. 2017072043

8. When is the project scheduled for construction? 07/15/2020 to 10/15/21

9. Please check exhibits accompanying this application.

- A.  Regional and vicinity maps showing the location of the proposed work. (see Section 3)
- B.  Drawings showing plan view(s) of the proposed work to include map scale. (see Section 5)
- C.  Drawings showing the cross section dimensions and elevations (vertical datum?) of levees, berms, stream banks, flood plain,
- D.  Drawings showing the profile elevations (vertical datum?) of levees, berms, flood plain, low flow, etc.
- E.  A minimum of four photographs depicting the project site. (see Section 4)

\_\_\_\_\_  
Signature of Applicant

\_\_\_\_\_  
Date

Include any additional information:

This Caltrans project has two locations as seen in Attachment 3A. This application only concerns the American River Bridge on SR-160 location. A limited number of documents may refer to the other location. One such document is the Final Environmental Document provided in Section 7.

## Supplemental Project Description

The Caltrans Office of Structures Maintenance and Investigations (SM&I) has determined that the American River Bridge (Bridge 24-0001L) on SR-160 is Scour Critical. This bridge crosses the American River at River Mile 1.98<sup>1</sup>. The American River Bridge was originally built in 1915 and was widened in 1934. The bridge is approximately 695 ft. long, and features two abutments and four piers. The southern abutment is located on top of the left bank of the American River (DWR Levee Unit No. 04 American River) while the northern abutment is located within the American River Parkway. The right bank (DWR Levee Unit No. 03) is located further north and is not affected by the scope of this project. The local maintaining agency (LMA) is the American River Flood Control District (ARFCD).

Caltrans previously considered several scour mitigation alternatives. Permanent sheet piles has been selected as the preferred alternative. The permanent steel sheet piles<sup>2</sup> will be driven to a depth of 30 ft. below the mudline and form a rectangular perimeter around each pier. The annulus between the new sheet piles and the existing concrete piers will be filled in with a concrete slurry. The steel sheet piles may be initially stabbed into the channel bottom with a vibratory hammer; however, the balance of the pile driving will be accomplished with an impact hammer. Any existing rip rap (rock slope protection) would be removed prior to installation of the steel sheet piles.

In order to drive the permanent sheet piles the contractor must be able to locate his construction equipment relatively close to each pier. Two methods are being considered that may be deployed as standalone measures or in tandem. The first method is the installation of a temporary access platform (trestle). The trestle would be constructed from the north side of the channel at the bottom of an existing ramp that leads down from a mobile home park<sup>3</sup>. The trestle is expected to be 30 ft. wide and extends past the southernmost pier. The trestle does not extend to the southern levee. Section of the trestle (fingers) will extend laterally from the main trestle along each side of the bridge piers. The fingers will be constructed in the same manner as the main trestle and would also be 30 ft. wide. Temporary steel piles will be driven to support the trestle and will be driven to 30 ft. below the mudline. It is anticipated that the temporary trestle piles will be stabbed into the channel bottom with a vibratory hammer followed by an impact hammer.

The second access method being considered is by floating barge. The use of floating barges would be subject to factors such as channel flow, depth, and vertical clearances under other downstream bridges. The use of barges would be at the contractor's option in order to provide maximum flexibility and efficiency with regards to methods of construction.

<sup>1</sup> Rivermile was determined from the DWR Levee Mile Calculator at <http://ferix.water.ca.gov/webapp/LeveeMile/>. See Attachment 1-B.

<sup>2</sup> See Steel Piling Detail in the Structure Plans for details and type.

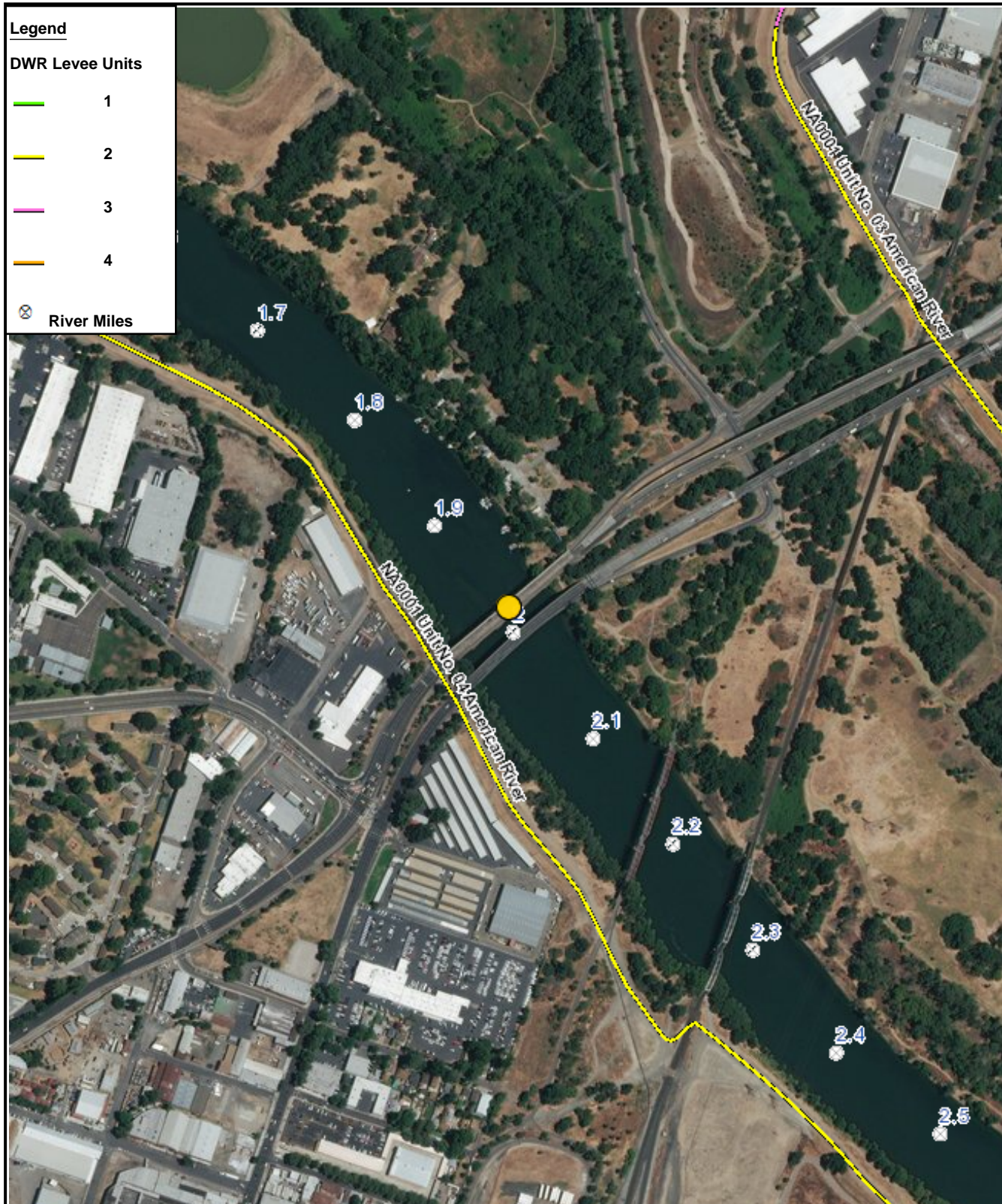
<sup>3</sup> Riverdale Resort, 1501 Northgate Blvd, Sacramento CA 95815.

The amount of work involved in installing the sheet piles may require more than one construction season<sup>4</sup>. If that happens, the trestle can be removed during non-construction months. However, depending on the amount of work remaining, it may be requested to allow some temporary trestle piles to remain until the following construction season. In that case, the wooden decking “crane mats” across the entire trestle would be removed along with any associated framing and bracing. Allowing the piles to remain would reduce the amount of in-water pile driving, channel bottom disturbances, and other impacts in the following construction season.

The contractor will use the existing ramp that extends from the mobile home park down to the river for much of the work. Temporary construction easements (TCEs) are being obtained to allow for equipment access and staging at vacant adjacent portions of the mobile home park. Access to the TCE will be provided from Northgate Boulevard. Other TCEs that will also be used for access and staging are being obtained within the American Rive Parkway.

<sup>4</sup> Per the project Final Environmental Document, the in-water construction season will be from July 15<sup>th</sup> to October 15<sup>th</sup> of each year.







0 600ft

Datum: NAD\_1983 Projection: Albers  
 Zone: Units: Mile  
 Sources:  
 [Enter source here]

[Enter title here]  
 [Enter sub title here]

 	
Prepared By: [Enter name here]	Figure:
Job No:	Date: May 10 2018
File:	

## ARFCD Trustee Approval Conditions

1. XXX
2. XXX
3. XXX

**SECTION 2**  
**ENVIRONMENTAL ASSESSMENT FORM 3615a**

## ENVIRONMENTAL ASSESSMENT QUESTIONNAIRE FOR APPLICATIONS FOR CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMITS

This environmental assessment questionnaire must be completed for all Central Valley Flood Protection Board applications. Please provide an explanation where requested. Incomplete answers may result in delays in processing permit applications. Failure to complete the questionnaire may result in rejection of the application.

1. Has an environmental assessment or initial study been made or is one being made by a local or State permitting agency in accordance with the California Environmental Quality Act?  Yes  No

If yes, identify the Lead Agency, type of document prepared or which will be prepared, and the State Clearinghouse Number:

The CEQA Lead Agency is the California Department of Transportation (Caltrans). An Initial Study with Mitigated Negative Declaration (IS-MIND)/Environmental Assessment (EA) with Finding of No Significant Impact (FONSI) was prepared by Caltrans District 3/North Region. The State Clearinghouse (SCH) number is 2017072043.

2. Will the project require certification, authorization or issuance of a permit by any local, State or federal environmental control agency?  Yes  No

List all other governmental permits or approvals necessary for this project or use, including U.S. Army Corps of Engineer' 404 and Section 10 permits, State Water Quality Certification, Department of Fish and Game 1600 agreement, etc. Attach copies of all applicable permits.

U.S. Army Corps (USACE) - CWA Section 404 Permit  
Central Valley Regional Water Quality Control Board (CVRWQCB) - 401 Certification  
California Department of Fish and Wildlife (CDFW) - 1600 Streambank Alteration Agreement  
USACE - 408 Permit (engineering permit)  
U.S. Coast Guard - use permit  
Central Valley Flood Protection Board (CVFPB) - use permit

3. Give the name and address of the owner of the property on which the project or use is located. Please submit a copy of your current Title Report (Grant Deed), if your proposed project includes a private residence.  
California State Lands Commission - 100 Howe Avenue Suite 100 South, Sacramento, CA 95825

4. Will the project or use require issuance of a variance or conditional use permit by a city or county?  
 Yes  No

Explain:  
Typically Caltrans requests Temporary Construction Easements. This project will require permits from both the City of Sacramento and the County of Sacramento. The County of Sacramento has elected to issue "Permits to Enter and Construct" while the City of Sacramento will provide "Temporary Construction Easements."

5. Is the project or use currently operating under an existing use permit issued by a local agency?  
 Yes  No

Explain:  
Caltrans has an existing maintenance/access permit from the California State Lands Commission in order to facilitate maintenance of the American River Bridge on State Route 160.

Item 5

ENVIRONMENTAL ASSESSMENT QUESTIONNAIRE FOR APPLICATIONS  
FOR CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMITS

6. Describe all types of vegetation growing on the project site, including trees, brush, grass, etc. Natural communities recorded within the study area include ruderal (introduced weedy species), ornamental landscape, annual grassland dominated by wild oats, soft chess, ripgut brome, wild barley (*Hordeum leporinum*; UPL), Italian ryegrass, and rattail fescue and mature mixed riparian forest comprised of valley oak (*Quercus lobata*; FACU), Fremont cottonwood (*Populus fremontii*; UPL), box elder (*Acer negundo*; FACW), black walnut (*Juglans hindsii*; UPL), black willow (*Salix goodingii*; FACW), wild grape (*Vitis californica*; FACU), and Oregon ash (*Fraxinus latifolia*; FACW), in the overstory and with Himalya blackberry (*Rubus armeniacus*; UPL), poison hemlock, and tall verbena (*Verbena bonariensis*) in the understory.
7. Describe what type of wildlife or fish may use the project site or adjoining areas for habitat, food source, nesting sites, source of water, etc.  
Please see the Final Environmental Document prepared by Caltrans is Section 7 of this application.

8. Has the Department of Fish and Game, U.S. Fish and Wildlife Service, or National Marine Fisheries Service been consulted relative to the existence of, or impacts to, threatened or endangered species on or near the project site?  
 Yes       No

Explain:

Formal Consultation with the Fish and Wildlife Service was initiated April 4, 2017 resulting in a Biological Opinion dated May 18, 2017.

Formal Consultation with the National Marine Fisheries Service was initiated April 7, 2017 resulting in a Biological Opinion dated December 1, 2017.

9. Will the project or use significantly change present uses of the project area?  
 Yes       No

Explain:

This project only seeks to mitigate the effects of scour on the existing bridge piers. Once the project is completed, the use of the project will be unchanged.

10. Will the project result in changes to scenic views or existing recreational opportunities?  
 Yes       No

Explain:

An onsite restoration and revegetation plan will be prepared by the District Biologist and Restoration Specialist and submitted to the permitting agencies for review and approval prior to project construction. Once construction is complete, a final site review will be performed by the District Biologist and Restoration Specialist to ensure that pre-project topography is restored.

11. Will the project result in the discharge of silt or other materials into a body of water?  
 Yes       No

Explain:

BMPs utilized for erosion control will be implemented and in place prior to, during, and after construction to ensure that no silt or sediment enters receiving waters. Compliance with all construction site BMPs, specified in the approved Water Pollution Control Program (WPCP) and any other permit conditions, is mandatory to minimize the introduction of construction related contaminants and sediment to receiving waters.

Item 5

ENVIRONMENTAL ASSESSMENT QUESTIONNAIRE FOR APPLICATIONS  
FOR CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMITS

12. Will the project involve the application, use, or disposal of hazardous materials?  Yes  No

If yes, list the types of materials, proposed use, and disposal plan. Provide copies of all applicable hazardous material handling plans.

The application, use, or disposal of hazardous wastes are not anticipated in this project.

13. Will construction activities or the completed project generate significant amounts of noise?

Yes  No

Explain:

In order to drive the steel sheet piles, vibratory hammer for initial placement, and impact hammers will be used and may cause significant amounts of noise. This will only be during construction. No permanent noise generation is associated with this project.

14. Will construction activities or the completed project generate significant amounts of dust, ash, smoke, fumes, or odors?

Yes  No

Explain:

Construction site BMPs will be used to mitigate generation of dust. No significant generation of ash, smoke, fumes, or odors are anticipated.

15. Will the project activities or uses involve the burning of brush, trees, or construction materials, etc?

Yes  No

Explain, and identify safety and air pollution control measures:

No burning, for disposal of deleterious materials or excess construction materials, is anticipated for this project.

16. Will the project affect existing agricultural uses or result in the loss of existing agricultural lands?

Yes  No

Explain:

There are no agricultural lands in the immediate vicinity of the American River Bridge on State Route 160. This bridge is located in the City of Sacramento.

ENVIRONMENTAL ASSESSMENT QUESTIONNAIRE FOR APPLICATIONS Item 5  
FOR CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMITS

17. Have any other projects similar to the proposed project been planned or completed in the same general area as the proposed project?

Yes       No

Explain and identify any other similar projects:

N/A

18. Will the project have the potential to encourage, facilitate, or allow additional or new growth or development?

Yes       No

Explain:

The project does not affect the existing number of lanes of traffic. It is not anticipated that the project will affect new development or growth in any way.

19. Will materials be excavated from the floodplain?  Yes    No   If yes, please answer the remaining questions.

**THE REMAINING QUESTIONS MUST ONLY BE ANSWERED IF THE ANSWER TO QUESTION  
NO. 19 WAS "YES". IF THE ANSWER TO QUESTION NO. 19 WAS "NO", YOU DO NOT  
NEED TO COMPLETE THE REMAINING QUESTIONS.**

A. What is the volume of material to be excavated?

Annually   N/A   Total   N/A  

B. What types of materials will be excavated?

N/A

C. Will the project site include processing and stockpiling of material on site?

Yes    No

Explain:

N/A

D. What method and equipment will be used to excavate material?

N/A

ENVIRONMENTAL ASSESSMENT QUESTIONNAIRE FOR APPLICATIONS <sup>Item 5</sup>  
FOR CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMITS

E. What is the water source for the project?  
N/A

F. How will waste materials wash water, debris, and sediment be disposed of?  
N/A

G. What is the proposed end land use for the project site?  
N/A

H. Has a reclamation plan been prepared for this site in accordance with the Surface Mining and Reclamation Act of 1975?

Yes  No      If yes, please attach a copy.



# **SECTION 3**

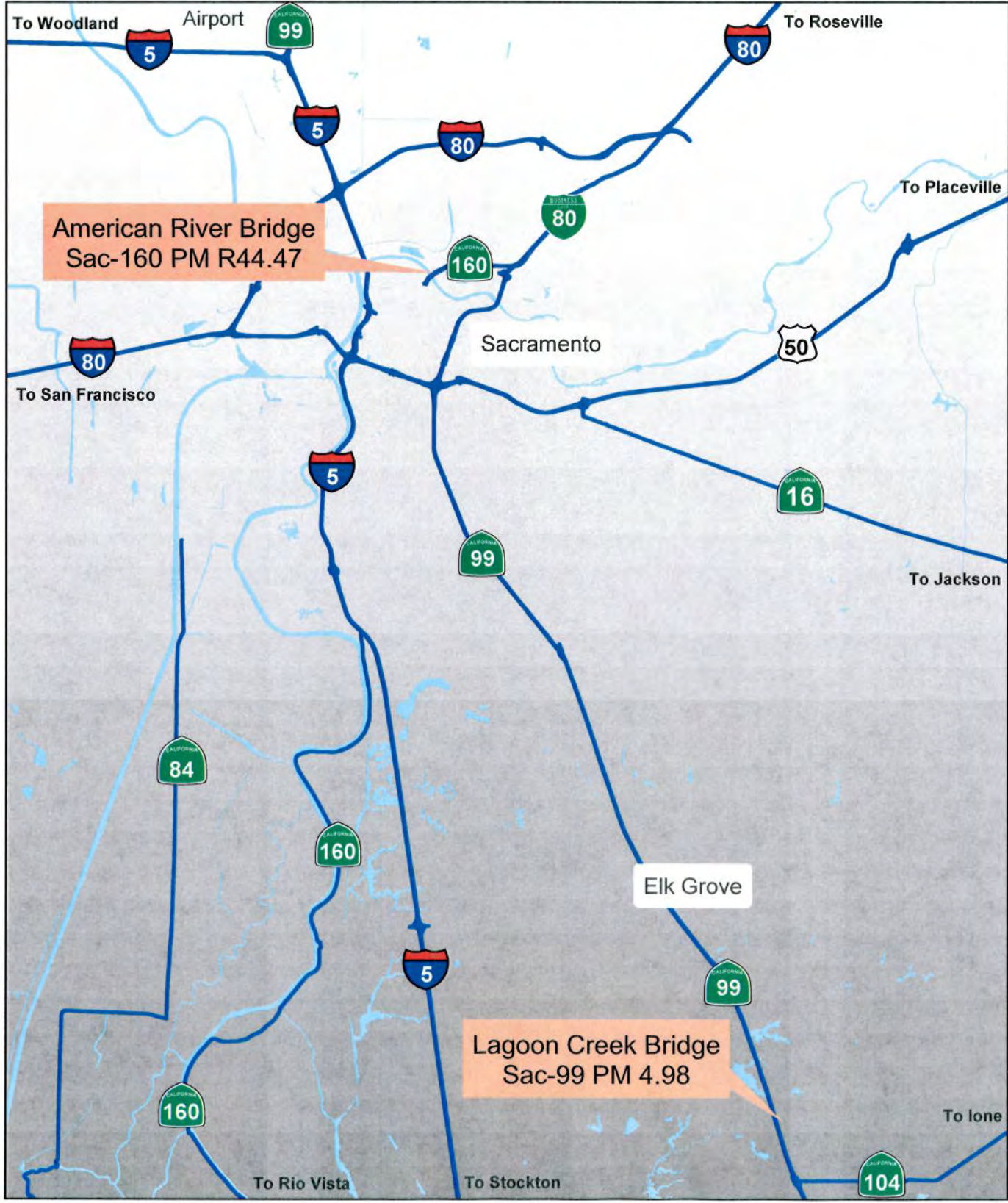
## **LOCATION MAP**

EA 3F540K

# LOCATION MAP

## SCOUR MITIGATION - American River & Lagoon Creek

SAC-160 PM 44.47, SAC-99 PM 4.98



**INDEX OF PLANS**

SHEET No.	DESCRIPTION
1	TITLE, LOCATION, AND VICINITY MAPS
2	PROPOSED PROJECT LAYOUT PLAN
3	SECTIONS

**STRUCTURE PLANS**

4-7 AMERICAN RIVER BRIDGE, Br No. 24-0001L

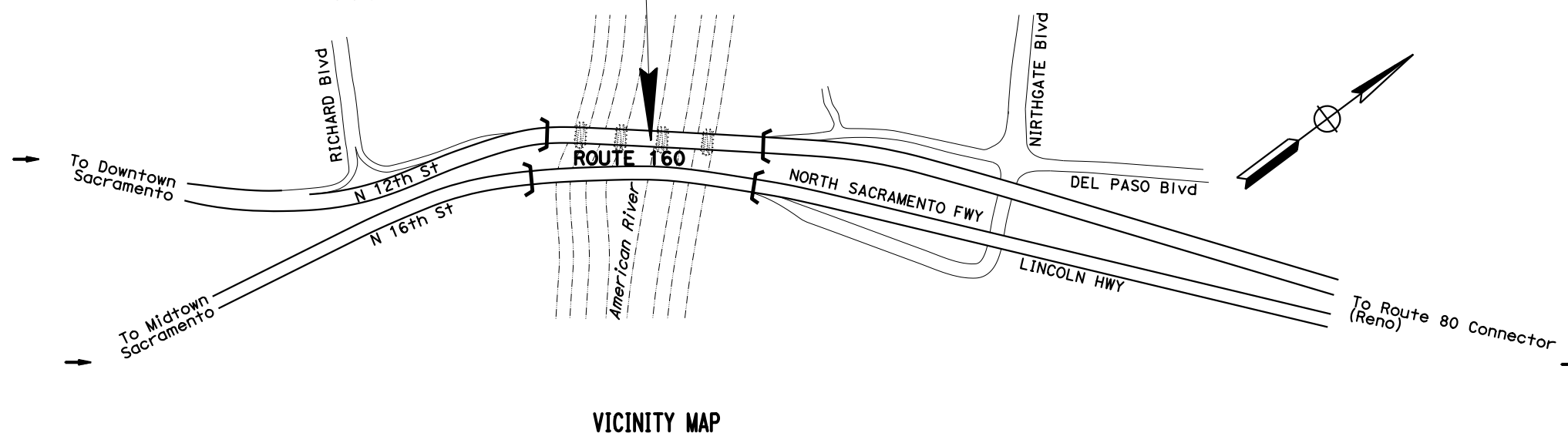
THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO BIDDERS AND SPECIAL PROVISIONS BOOK.

STATE OF CALIFORNIA  
**DEPARTMENT OF TRANSPORTATION**  
**PROJECT PLANS FOR CONSTRUCTION ON**  
**STATE HIGHWAY**  
**IN SACRAMENTO COUNTY AT**  
**THE AMERICAN RIVER BRIDGE**  
 TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2015

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	44.47	1	7



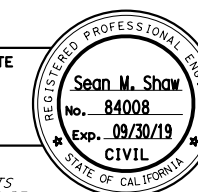
**LOCATION OF CONSTRUCTION**  
**AMERICAN RIVER BRIDGE**  
**Br No. 24-0001L**



VICINITY MAP

PROJECT MANAGER  
  
DESIGN MANAGER

PROJECT ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_  
 REGISTERED CIVIL ENGINEER



PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

<b>CONTRACT No.</b>	<b>03-3F540</b>
<b>PROJECT ID</b>	<b>0313000136</b>

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

# **SECTION 4**

# **PHOTOS**



**Figure 4. 1** - View of the 12<sup>th</sup> Street Bridge (right) and the 16<sup>th</sup> Street Bridge (left) along State Route 160 across the American River. This view is looking south-west. In this view Abutment 1 (south bank) can be seen, as well as Piers 2, 3, 4, and 5. Abutment 6 (north bank) is not shown. A federal levee exists along the south bank but not along the north bank.



**Figure 4. 2** – View of the 12<sup>th</sup> Street Bridge on state route 160 across the American River from the east side. This view is looking south-west. The south bank, where the federal levee is located, has existing rock slope protection.



**Figure 4. 3** - View of the 12<sup>th</sup> Street Bridge on state route 160 across the American River from the west side. This view is looking south. The south bank, where the federal levee is located, has existing rock slope protection. Also seen is the existing north bank which does not feature a levee.

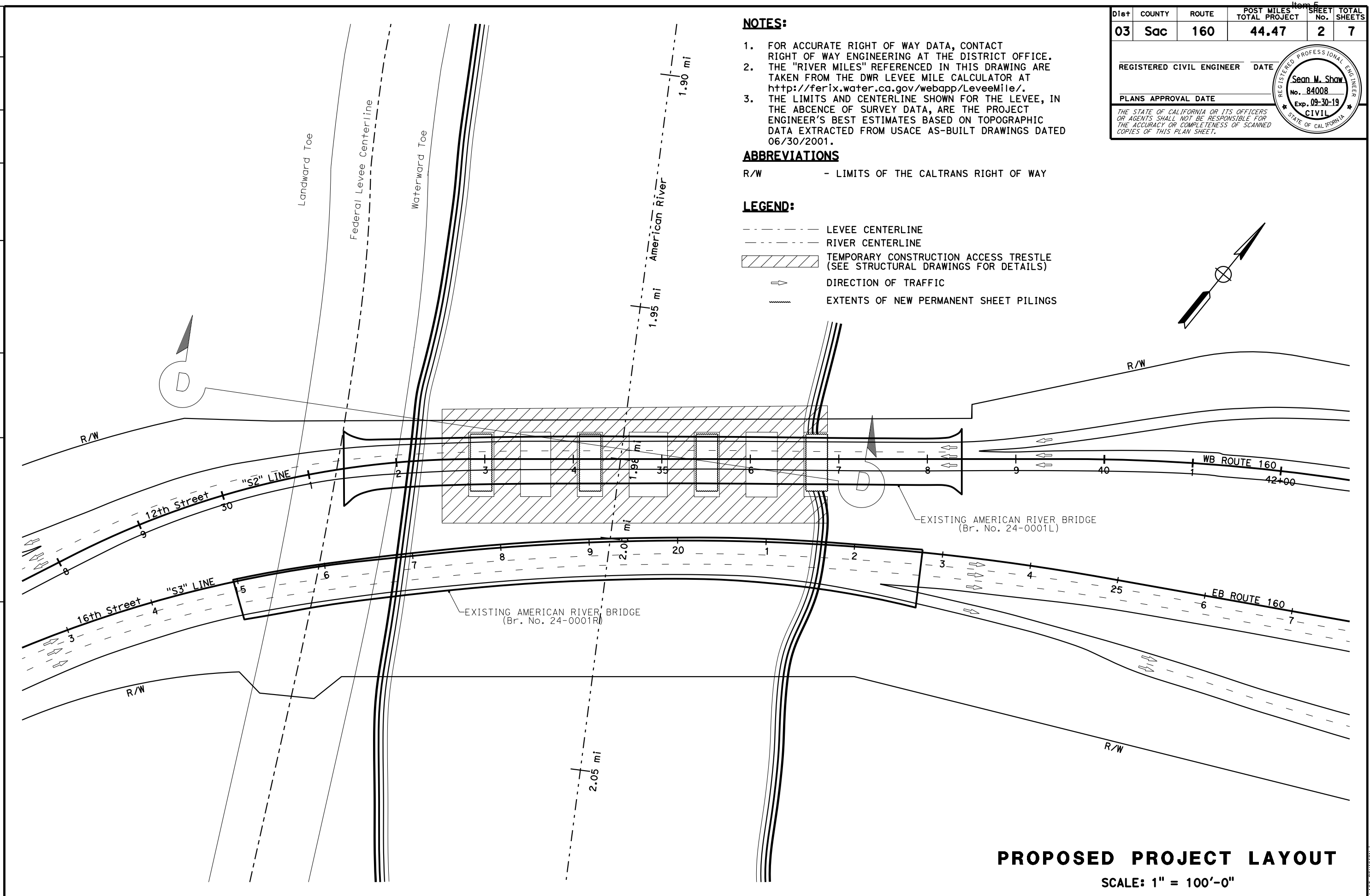


Figure 4. 4 – Example of the existing rock slope protection that will be removed and replaced with new permanent sheet piles. Some of the existing rock slope protection has been carried away while some remains in place. This photo is showing the downstream portion of the pier.



**SECTION 5**  
**PLANS OF PROPOSED WORK**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**03-DESIGN**  
**Seung P Hong** FUNCTIONAL SUPERVISOR  
**Sean M Shaw** TBD  
 REVISIONS: (Grid with 'x' markers)  
 REVISION BY: [ ] DATE REVISION: [ ]  
 CALCULATED-DESIGNED BY: [ ] CHECKED BY: [ ]



**NOTES:**

- FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
- THE "RIVER MILES" REFERENCED IN THIS DRAWING ARE TAKEN FROM THE DWR LEVEE MILE CALCULATOR AT <http://ferix.water.ca.gov/webapp/LeveeMile/>.
- THE LIMITS AND CENTERLINE SHOWN FOR THE LEVEE, IN THE ABCEENCE OF SURVEY DATA, ARE THE PROJECT ENGINEER'S BEST ESTIMATES BASED ON TOPOGRAPHIC DATA EXTRACTED FROM USACE AS-BUILT DRAWINGS DATED 06/30/2001.

**ABBREVIATIONS**

R/W - LIMITS OF THE CALTRANS RIGHT OF WAY

**LEGEND:**

- LEVEE CENTERLINE
- RIVER CENTERLINE
- [Hatched Box] TEMPORARY CONSTRUCTION ACCESS TRESTLE (SEE STRUCTURAL DRAWINGS FOR DETAILS)
- [Arrow] DIRECTION OF TRAFFIC
- [Dashed Line] EXTENTS OF NEW PERMANENT SHEET PILING

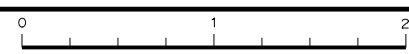
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Sac	160	44.47	2	7

REGISTERED CIVIL ENGINEER DATE  
**Sean M. Shaw**  
 No. 84008  
 Exp. 09-30-19  
 CIVIL  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

**PROPOSED PROJECT LAYOUT**

SCALE: 1" = 100'-0"



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	44.47	3	7

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER  
Sean M. Shaw  
No. 84008  
Exp. 09-30-19  
CIVIL  
STATE OF CALIFORNIA

**NOTES:**

1. THE PROFILE OF THE CHANNEL BOTTOM SHOWN IS PER A CALTRANS BATHYMETRY STUDY CONDUCTED IN JUNE 2016.
2. THE LEVEE CROSS SECTION WAS EXTRACTED FROM USACE AS-BUILT DRAWINGS DATED 06/30/2001.

REVISOR: \_\_\_\_\_

DATE: \_\_\_\_\_

DESIGNED BY: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

FUNCTIONAL SUPERVISOR: **Seung P Hong**

DESIGNATION: **03-DESIGN**

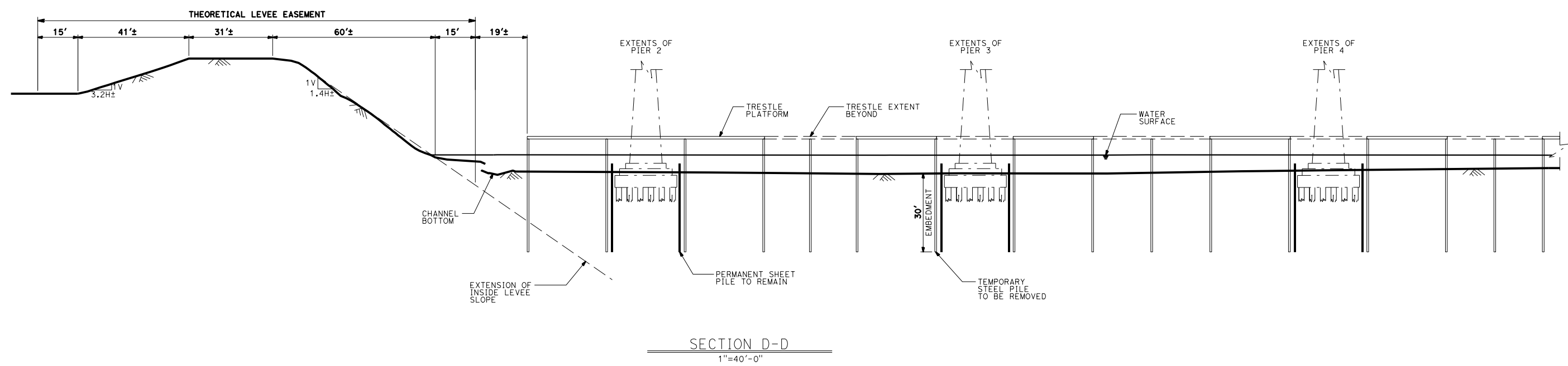
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

**Caltrans**

TBD

DESIGNED BY: \_\_\_\_\_

CHECKED BY: **Sean M Shaw**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	Item 5 PPP	4	7

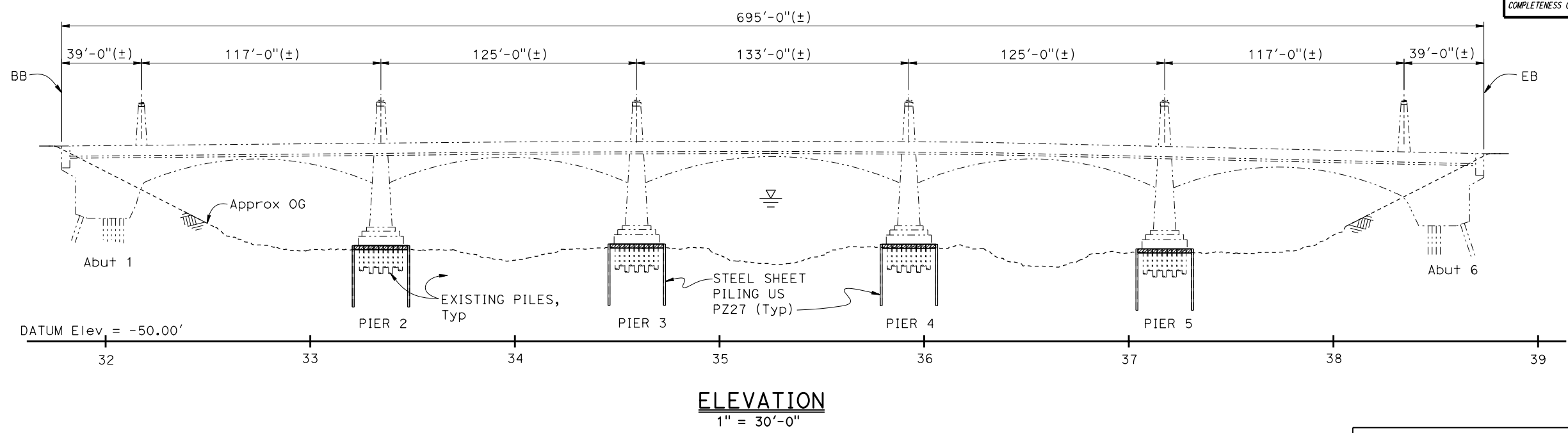
REGISTERED CIVIL ENGINEER	X	DATE
MM/DD/YYYY		
PLANS APPROVAL DATE		

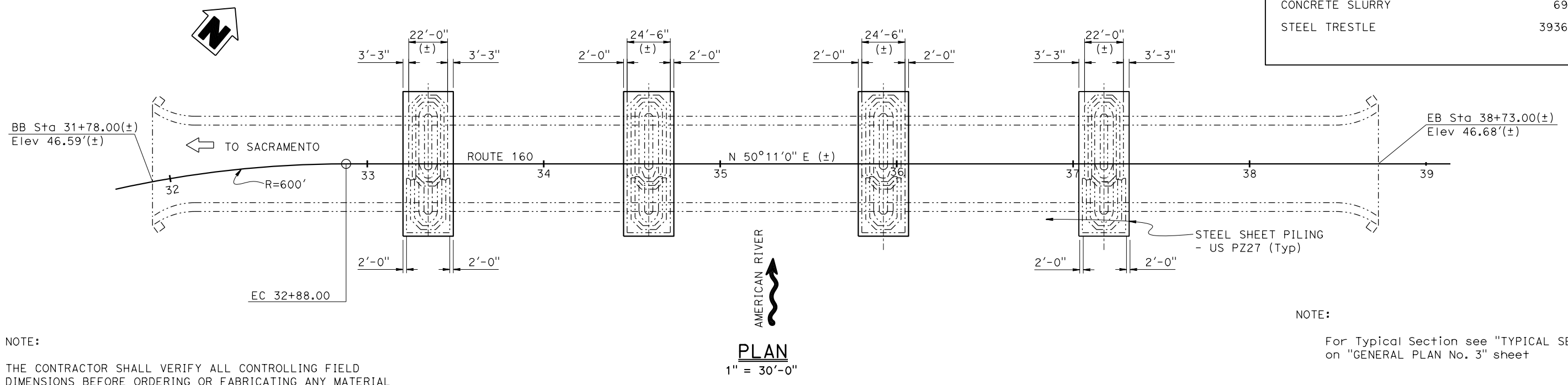
DAVID A. ROMERO
No. 61240
Exp. 06-30-19
CIVIL

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

- LEGEND:
- Indicates High water mark
  - Indicates Existing Structure
  - Indicates 2'-0" Concrete Slurry places around Existing exposed Piles



QUANTITIES		
STEEL SHEET PILING US PZ27	26520	SQFT
REMOVE ROCK SLOPE PROTECTION	1159	CYDS
CONCRETE SLURRY	693	CYDS
STEEL TRESTLE	39360	SQFT



NOTE:  
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

NOTE:  
For Typical Section see "TYPICAL SECTION" on "GENERAL PLAN No. 3" sheet

X DESIGN ENGINEER	DESIGN	BY David Romero	CHECKED X	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE	<b>STATE OF CALIFORNIA</b> DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN <b>DESIGN BRANCH 17</b>	BRIDGE No.	<b>AMERICAN RIVER BRIDGE</b> <b>GENERAL PLAN No. 1</b>
	DETAILS	BY Min Yu	CHECKED X	LAYOUT	CHECKED X			24-0001L	
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	CHECKED X			PLANS AND SPECS COMPARED X	

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REVISION 3/17/2017)     
 DATE PLOTTED => 30-MAY-2018      TIME PLOTTED => 14:04      ORIGINAL SCALE IN INCHES FOR REDUCED PLANS     
 FILE => 24-00011-a-gp01.dgn      USERNAME => s134959     
 UNIT: 3586      PROJECT NUMBER & PHASE: 0313000136 & 1      CONTRACT No.: 03-3F40K     
 DISREGARD PRINTS BEARING EARLIER REVISION DATES     
 REVISION 28      SHEET 4 OF 7

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	Item 5	5	7

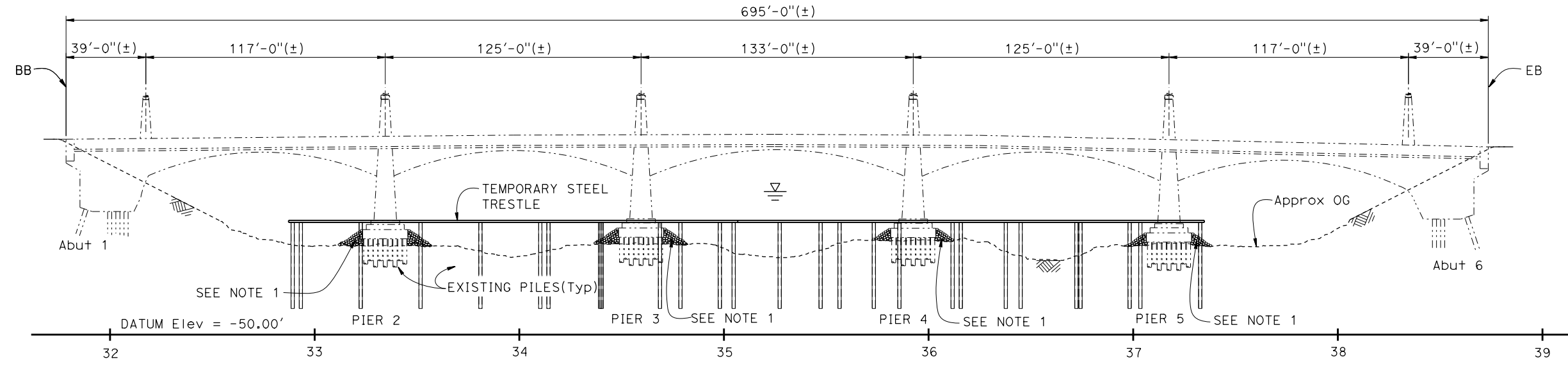
  

REGISTERED CIVIL ENGINEER	X	DATE
MM/DD/YYYY		
PLANS APPROVAL DATE		

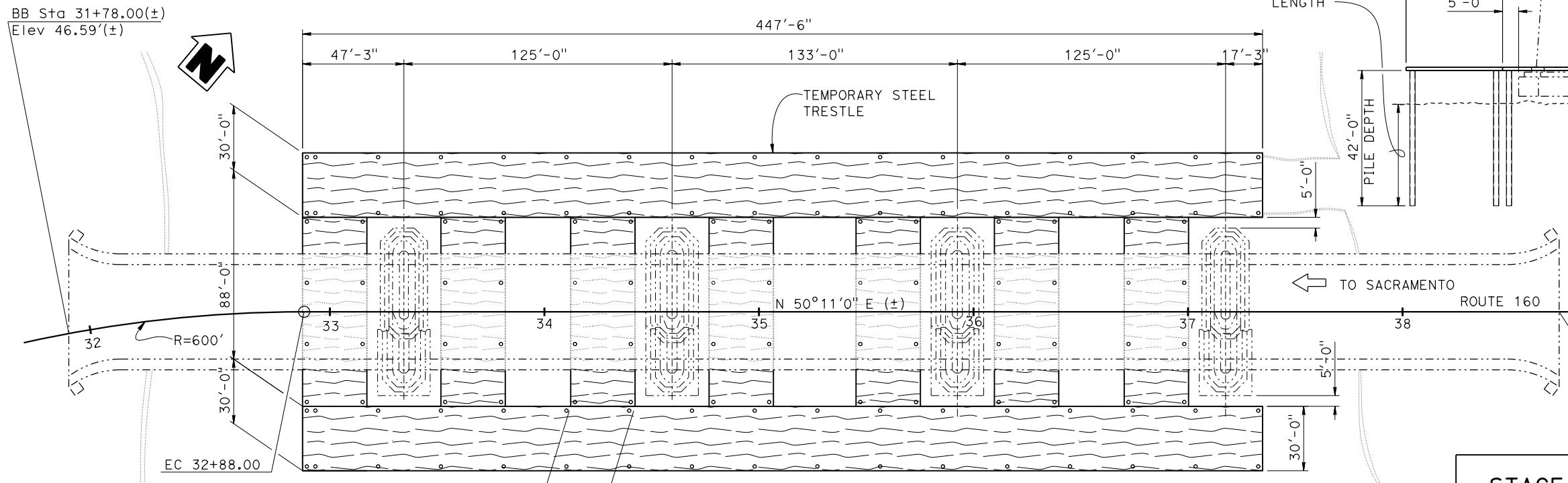
  

REGISTERED PROFESSIONAL ENGINEER	DAVID A. ROMERO
No.	61240
Exp.	06-30-19
CIVIL	

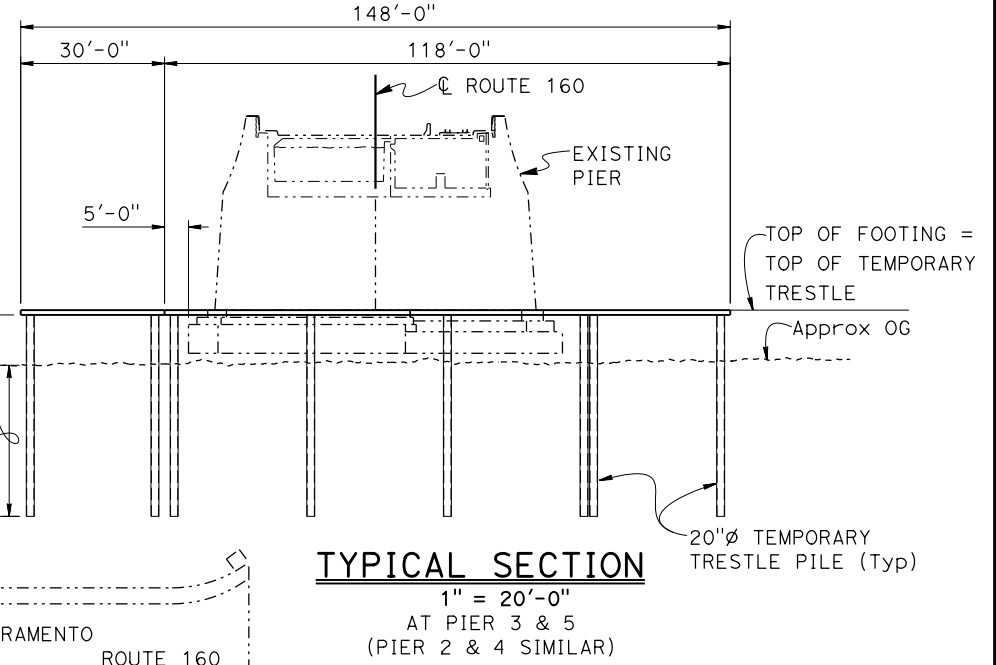
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



**STAGE 1 - ELEVATION**  
1" = 30'-0"



**STAGE 1 - PLAN**  
1" = 30'-0"



**TYPICAL SECTION**  
1" = 20'-0"  
AT PIER 3 & 5  
(PIER 2 & 4 SIMILAR)

NOTE:  
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

- NOTES:
- Existing Rock Slope Protection to be Removed during Installation of Temporary Trestle
  - For Limits of Existing Rock Slope Protection Removal, see "GENERAL PLAN No. 3" sheet
  - Typical Pile Spacing 30' OC



- STAGE 1 - SEASON 1**
- INSTALL TEMPORARY TRESTLE
  - REMOVING EXISTING ROCK SLOPE PROTECTION DURING THE INSTALLING OF TEMPORARY STEEL TRESTLE
  - INSTALL STEEL SHEET PILING AT EXISTING PIER 2 AND PIER 3
  - PLACE CONCRETE SLURRY AT EXISTING PIER 2 AND PIER 3
  - REMOVE TEMPORARY TRESTLE AT EXISTING PIER 2 AND PIER 3

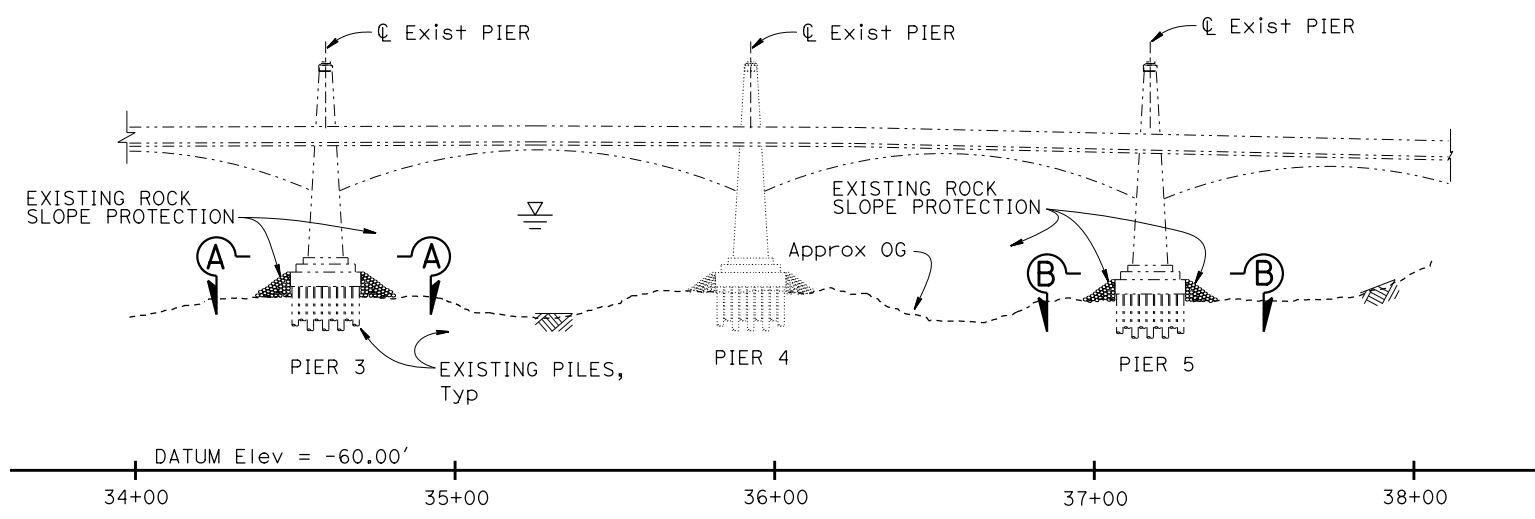
DESIGN ENGINEER	DESIGN	BY David Romero	CHECKED X	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 17	BRIDGE No.	24-0001L	AMERICAN RIVER BRIDGE GENERAL PLAN No. 2
	DETAILS	BY Min Yu	CHECKED X	LAYOUT	CHECKED X			POST MILE	X	
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X			PLANS AND SPECS COMPARED	X	

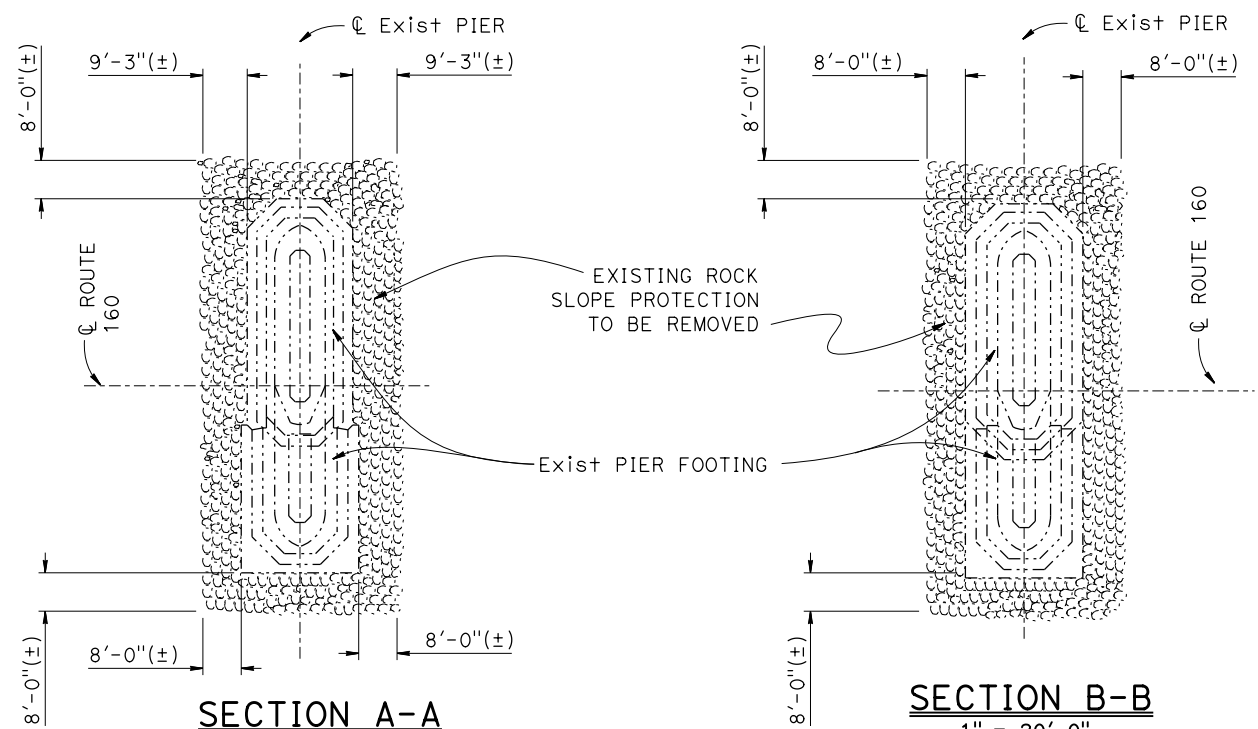
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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	Item 5 PPP	6	7
			X		
REGISTERED CIVIL ENGINEER			DATE		
			MM/DD/YYYY		
PLANS APPROVAL DATE					
			REGISTERED PROFESSIONAL ENGINEER DAVID A. ROMERO No. 61240 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA		
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					

LEGEND:  
 Indicates High water mark  
 Indicates Existing Structure



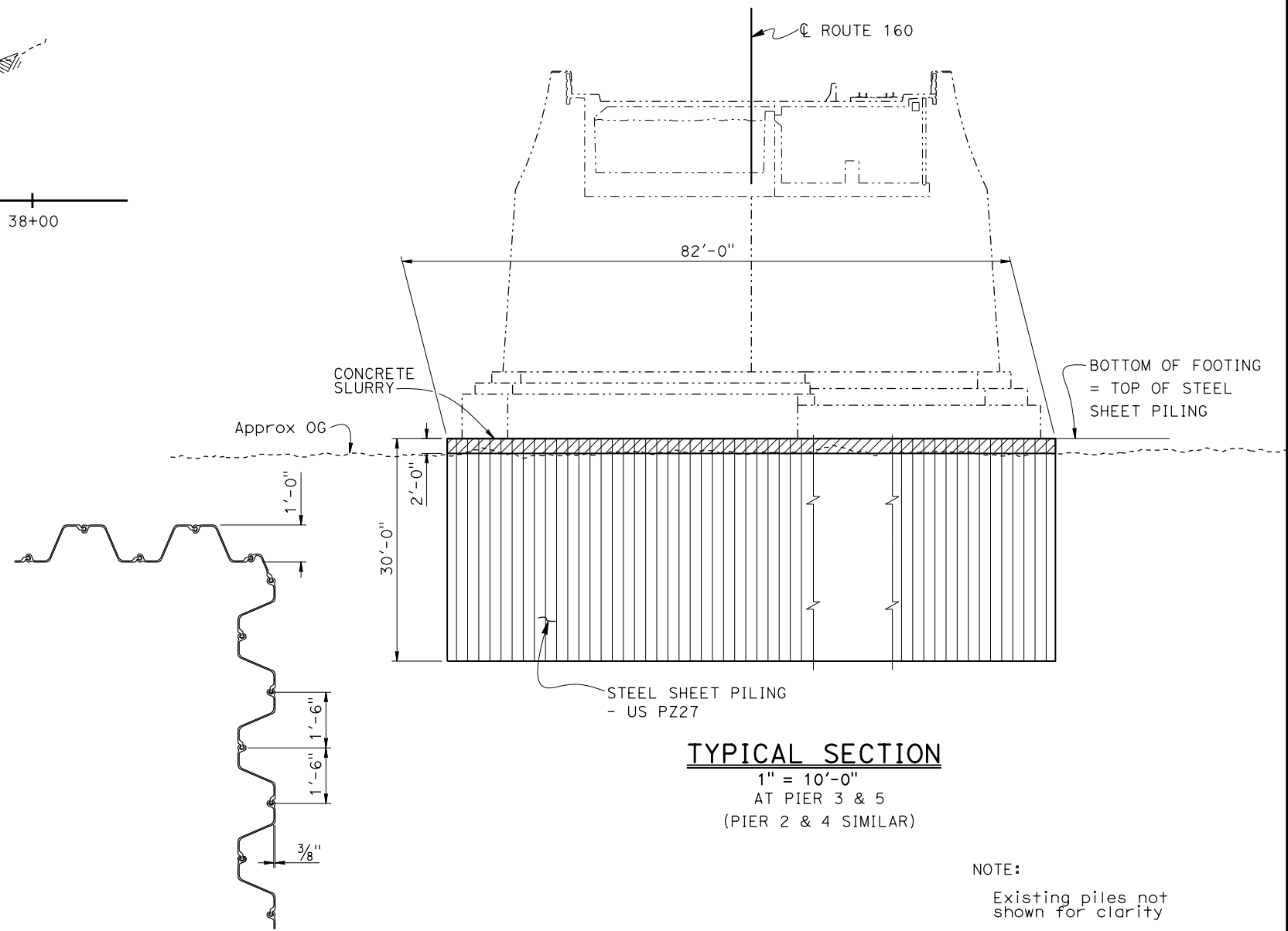
**PARTIAL ELEVATION**  
 1" = 30'-0"



**SECTION A-A**  
 1" = 20'-0"  
 AT PIER 3  
 (PIER 4 SIMILAR)

**SECTION B-B**  
 1" = 20'-0"  
 AT PIER 5  
 (PIER 2 SIMILAR)

**LIMITS OF ROCK SLOPE PROTECTION  
 REMOVAL DURING INSTALLATION OF  
 TEMPORARY TRESTLE**  
 1" = 20'-0"



**TYPICAL SECTION**  
 1" = 10'-0"  
 AT PIER 3 & 5  
 (PIER 2 & 4 SIMILAR)

**STEEL PILING DETAIL**  
 1/2" = 1'-0"  
 (STEEL SHEET PILING - US PZ27)

NOTE:  
 Existing piles not shown for clarity

NOTE:  
 THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

X DESIGN ENGINEER	DESIGN	BY David Romero	CHECKED X	LOAD & RESISTANCE FACTOR DESIGN	BY X	CHECKED X	<b>STATE OF CALIFORNIA</b> <b>DEPARTMENT OF TRANSPORTATION</b>	<b>DIVISION OF ENGINEERING SERVICES</b> <b>STRUCTURE DESIGN</b> <b>DESIGN BRANCH 17</b>	BRIDGE No.	<b>AMERICAN RIVER BRIDGE</b> <b>GENERAL PLAN No. 3</b>
	DETAILS	BY Min Yu	CHECKED X	LAYOUT	BY X	CHECKED X			24-0001L	
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X	CHECKED X			POST MILE X	
STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REVISION 3/17/2017)		DATE PLOTTED => 30-MAY-2018		TIME PLOTTED => 14:04		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		UNIT: 3586		REVISION
FILE => 24-00011-a-gp03.dgn		USERNAME => s134959				PROJECT NUMBER & PHASE: 0313000136 & 1		CONTRACT No.: 03-3F40K		DISREGARD PRINTS BEARING EARLIER REVISION DATES 02-28-18 05-14-18 05-30-18
										SHEET OF 6 7

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	Sac	160	Item 5 PPP	7	7

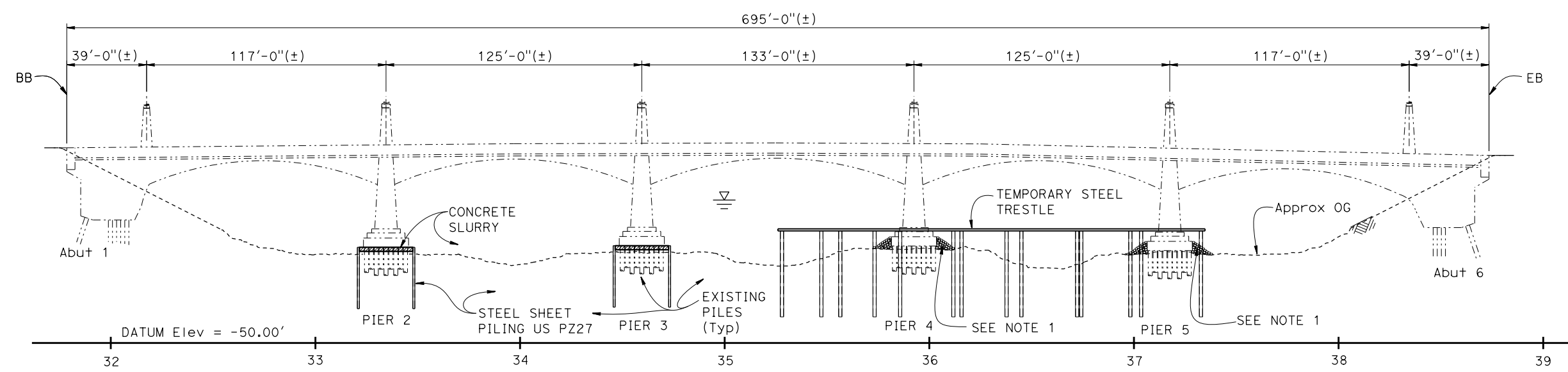
  

REGISTERED CIVIL ENGINEER	X	DATE
MM/DD/YYYY		
PLANS APPROVAL DATE		

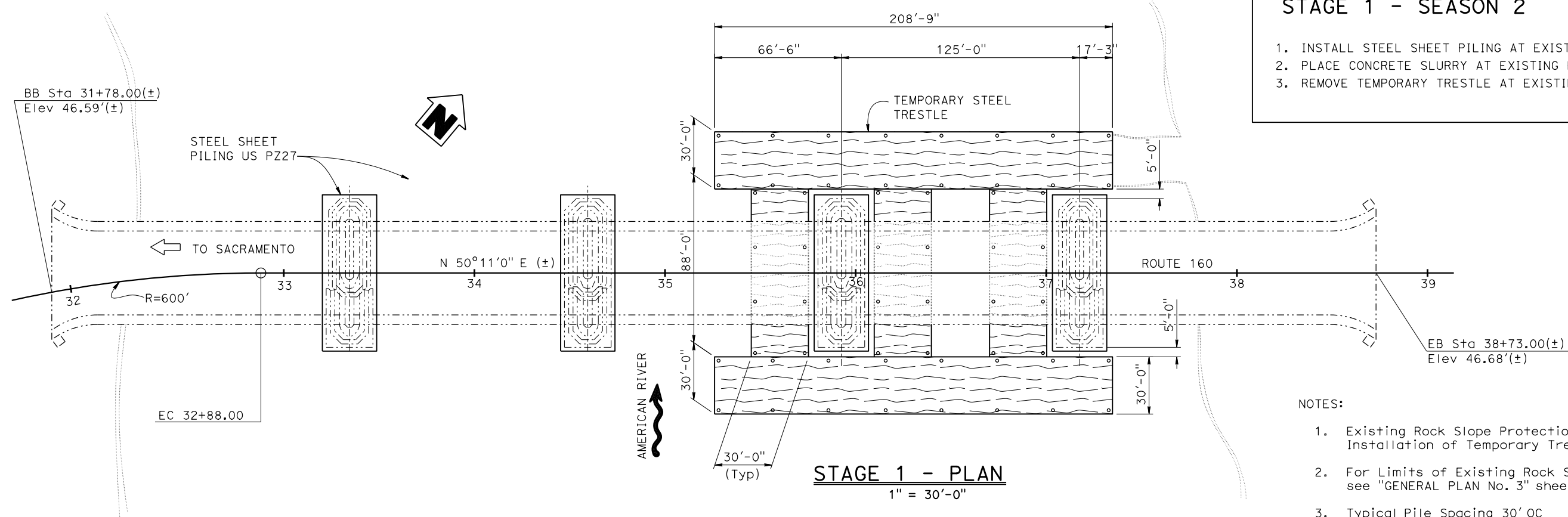
  

REGISTERED PROFESSIONAL ENGINEER
DAVID A. ROMERO
No. 61240
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



**STAGE 1 - ELEVATION**  
1" = 30'-0"



**STAGE 1 - PLAN**  
1" = 30'-0"

**STAGE 1 - SEASON 2**

1. INSTALL STEEL SHEET PILING AT EXISTING PIER 4 AND PIER 5
2. PLACE CONCRETE SLURRY AT EXISTING PIER 4 AND PIER 5
3. REMOVE TEMPORARY TRESTLE AT EXISTING PIER 4 AND PIER 5

- NOTES:
1. Existing Rock Slope Protection to be Removed during Installation of Temporary Trestle
  2. For Limits of Existing Rock Slope Protection Removal, see "GENERAL PLAN No. 3" sheet
  3. Typical Pile Spacing 30' OC

NOTE:  
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

X DESIGN ENGINEER	DESIGN	BY David Romero	CHECKED X	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 17	BRIDGE No.	24-0001L	AMERICAN RIVER BRIDGE GENERAL PLAN No. 4						
	DETAILS	BY Min Yu	CHECKED X	LAYOUT	CHECKED X			POST MILE	X							
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X			PLANS AND SPECS COMPARED	X							
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								REVISED DATE	04-27-18	05-04-18	05-14-18	05-30-18	SHEET	7	OF	7

**SECTION 6**  
**HYDROLOGY/HYDRAULICS**



# Memorandum

*Serious drought.  
Help Save Water!*

**To:** MR. KEN LASTUFKA  
Associate Environmental Planner  
Environmental Management S1 Branch  
Office of Environmental Services - South  
NR Division of Environmental Planning

**Date:** March 3, 2016

**File:** Sac-99/160 PM Var  
EA 03-3F5401  
ID 0313000136

**From:** MR. GURDEEP BHATTAL  
Hydraulics Branch Engineer  
Office of Engineering Services  
Division of Engineering



**Subject:** FLOODPLAIN HYDRAULICS STUDY

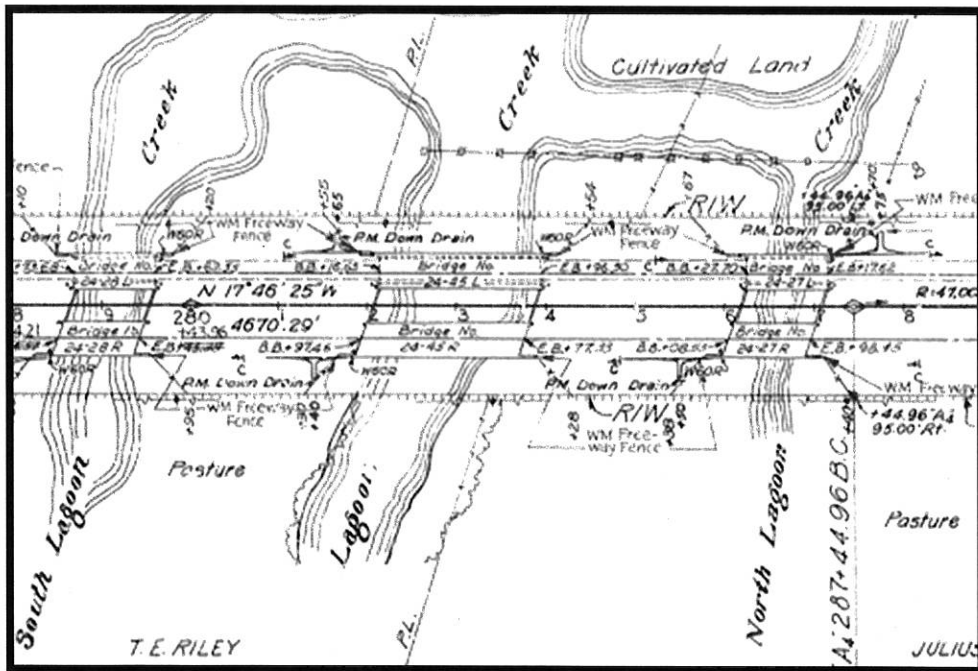
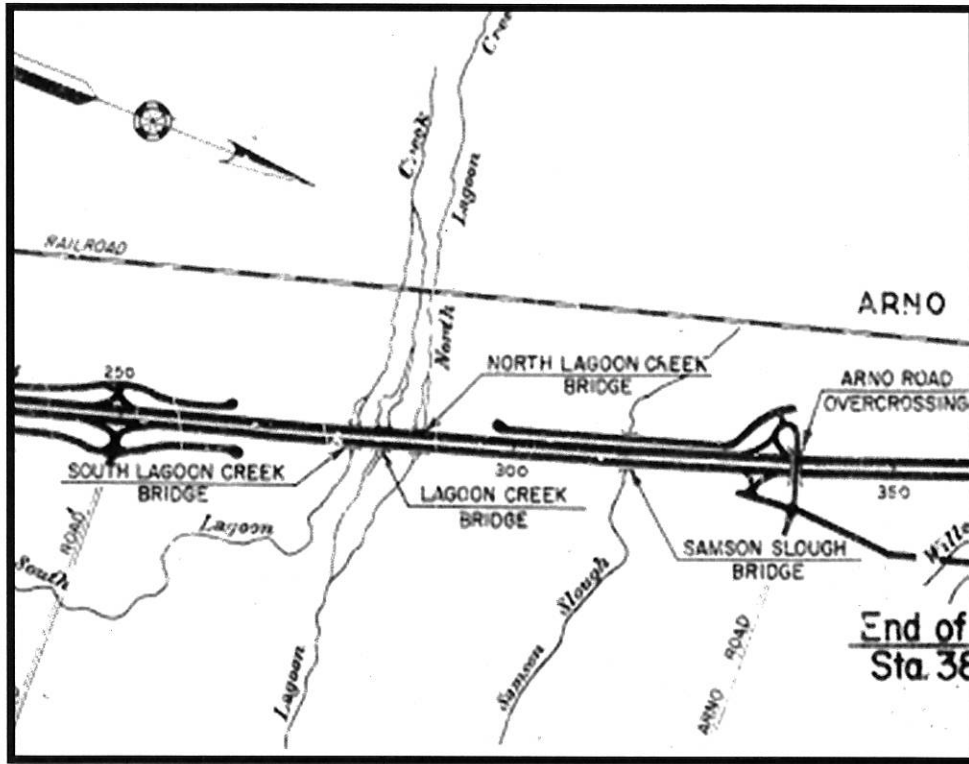
**INTRODUCTION:** The project proposes to mitigate scour at Lagoon Creek Bridge on Sac-99 (Bridge No. 24-0045L) and at the American River Bridge on Sac-160 (Bridge No. 24-0001L). The scope of work at the Lagoon Creek Bridge includes excavation in the channel, placement of rock slope protection (RSP) with the appropriate RSP fabric. The scope of work at the American River Bridge includes encasing piers 2 through 5 with sheet piles, removal of existing RSP, and structural backfill of footings.

**LAGOON CREEK BRIDGE:** A rock-lined channel is proposed to prevent further undermining of the bridge piers. The initial estimate of work included 870 cubic yards of excavation to be replaced with 870 cubic yards of rock (approximate) placed on a Class-8 type of fabric. Backing No. 1 rock is proposed and placement method "B" is selected.

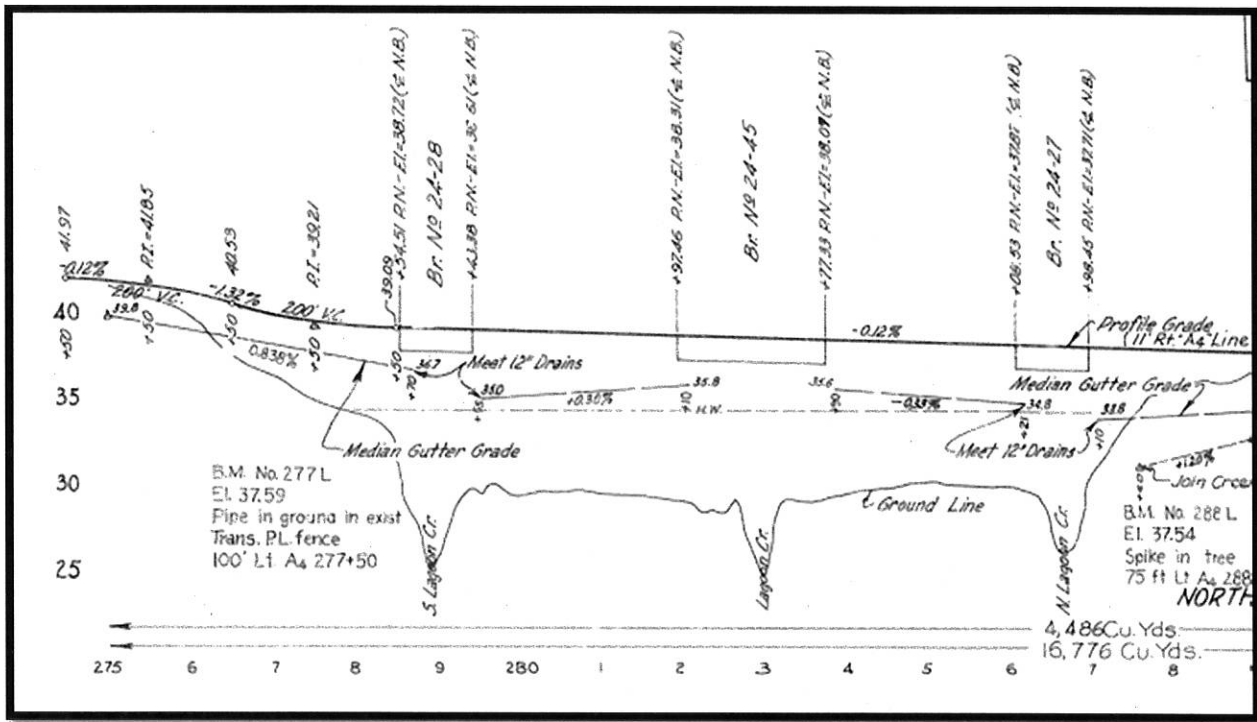
**AMERICAN RIVER BRIDGE:** Sheet pile encasements for piers 2 through 5 are proposed to be constructed. Based on preliminary estimates 700 cubic yards of existing RSP will be removed, and replaced with 700 cubic yards of structural backfill (approximate) at the footings, 31,000 square feet of sheet pile (approximate) will be used.

**BRIDGE REPLACEMENT ALTERNATIVE FOR LAGOON CREEK BRIDGES SB:** Depending upon the availability of funds it is proposed to replace the three SB bridges across Lagoon Creek and raise the profile of the roadway to match the profile of the NB roadway. The floodplain analysis will also consider the impacts (if any) on the floodplain from the proposal to replace the South Lagoon Creek Bridge, Lagoon Creek Bridge, and the North Lagoon Creek Bridge. As-Built plans for the roadway (Plan Sets 56-3TC24F, 03-260204, 60-14TC18) were reviewed to determine the roadway and bridge details. A USGS topo map was reviewed to determine the general slopes of the land on both sides of the highway and the areas expected to be inundated with water in the event that Lagoon Creek overflowed its banks.

MR. KEN LASTUFKA,  
March 3, 2016  
Page 2 of 7



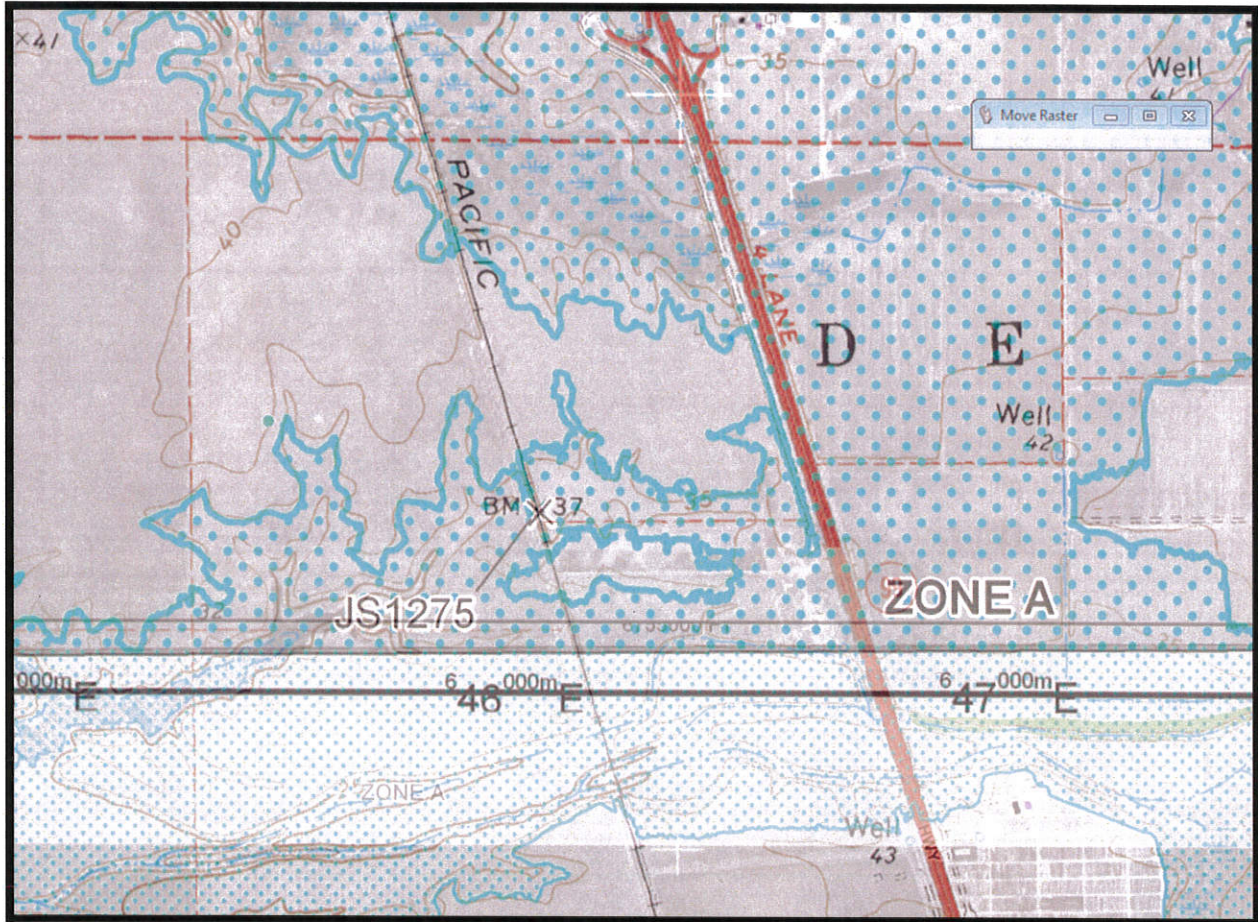
MR. KEN LASTUFKA,  
 March 3, 2016  
 Page 3 of 7



**FLOODPLAIN EVALUATION LAGOON CREEK BRIDGES:** Flood Insurance Rate Maps (FIRM) panels 06067C0465H and 06067C0475H dated August 16, 2012 issued by the Federal Emergency Management Agency (FEMA) were reviewed to determine the extent of the floodplain. The floodplain associated with Lagoon Creek is indicated as Zone "A" on the FIRM's. Zone "A" is defined as "Base flood elevations not determined". A review of the USGS topo map indicates that flood waters from Lagoon Creek on the east side of the highway would overtop the 35-foot contour and would flow towards the north resulting in inundation of areas at and below 35-foot elevations, approximately. The water is expected to spread all the way to Arno Road to the north and beyond. Elevations of the NB bridge across South Lagoon Creek (on the western edge of the bridge deck) are 38.95 and 38.87 (From As-Built Plans). Corresponding spot elevations (from a reconnaissance field survey) on the SB bridge indicate that the SB bridge is 2.6-feet lower than the NB, approximately. A review of the USGS topo map indicates that the channel of Lagoon Creek is confined within the 35-foot contour on the east side of the bridge and is confined within the 30-foot contour on the west side of the bridge. The floodwaters on the west side of the SB bridges are also expected to spread across the area and inundate a wide expanse of land at and below 35-foot elevations. The SB bridge decks across Lagoon Creek are 2.6-feet lower than the bridge decks across the NB lanes and the deck elevations exceed 36 feet. This means that that floodwaters are not expected to overtop the SB bridges.

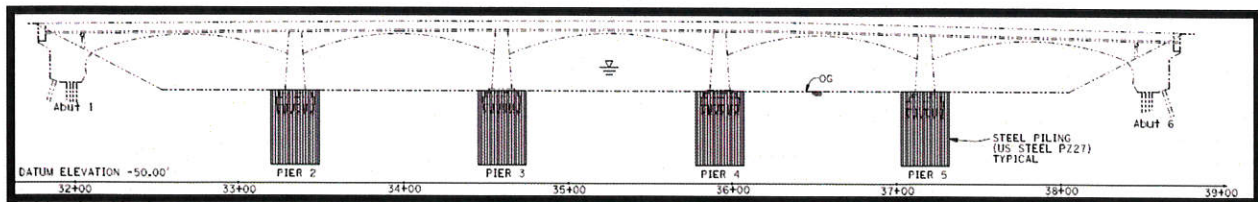
If the bridges are replaced and the profile raised to match the profile of the NB bridges and the area of flow under the bridges exceeds (or matches) the existing area of flow, the project would not be expected to have any adverse impact on the floodplain.

MR. KEN LASTUFKA,  
 March 3, 2016  
 Page 4 of 7



Proposed rock lining of the channel under the Lagoon Creek bridge for scour control involves replacing 870 cubic yards of excavated material with 870 cubic yards of rock. Since the volume of material removed will be replaced with an equivalent volume of rock, the area of flow under the bridge is not expected to be reduced. The voids in the rocks are expected to fill with sediment and coefficient of friction is not expected to undergo a drastic change. Hence no adverse impact is expected on the existing floodplain.

**FLOODPLAIN EVALUATION AMERICAN RIVER BRIDGE:** Existing footings on piers 2, 3, 4, and 5 will be enclosed with sheet piles. The top of the steel sheet piles are expected to be at or below the river bed as shown on the plan below. Existing RSP around the piers would be removed prior to pile driving.



MR. KEN LASTUFKA,  
 March 3, 2016  
 Page 5 of 7

Pile driving operations require an operating platform which may be in the form of one or more barges or a trestle constructed across the river. Barges are temporary platforms and can be removed at the end of one construction season and brought back the following season. Temporary trestles are constructed on piles driven into the river bed. At the conclusion of the project the trestle is removed and the piles are removed by cutting them off three feet below the riverbed.

The FIRM panel 06067C0176J dated June 16, 2015 issued by FEMA indicates that the 100-year water surface elevation within the floodway of the American River immediately upstream of the Sac-160 bridge is 38-feet. The presence of sheet piles surrounding the footings of the piers would not be expected to alter the flow patterns in the river since they would not project into the area of flow within the floodway. The project when completed is expected to have a less than significant impact on the floodplain.

**CENTRAL VALLEY FLOOD PROTECTION BOARD PERMITS:** Lagoon Creek is not a stream that is regulated by the Central Valley Flood Protection Board, (CVFPB). A permit will not be required from the Board for the proposed work.

The American River is a regulated waterway and depending on the construction alternative selected, the following conditions will prevail

- (A): If barges are used for pile driving operations a HEC-RAS study will likely **not** be required. A permit may not be required and a "Minor Alteration" approval could be granted by the CVFPB as long as the project specifies that all materials, barges, etc. will be removed before the flood season and brought back the following construction season, (assuming construction extends beyond one season). The final determination will be made by CVFPB.
- (B): If a trestle is selected as an operating platform, then a HEC-RAS study will be required by the Board. The HEC-RAS model should include existing conditions as well as with a trestle and supporting piles in place. Bathymetry for a half mile upstream and a half mile downstream of the bridge (approximate) will be required.

Requirements for the permit as well as permit application may be downloaded from the CVFPB website at <http://www.cvfpb.ca.gov/>. The District liaison with the Board is Mr. Dennis Jagoda and the permit application to the Board requires his approval. Mr. Jagoda may be by e-mail or at (530) 741-4517.

**SUMMARY:** The project as proposed is expected to have a less than significant impact on the floodplain. The risk of any additional flooding associated with the project is low.

If there are any further questions or concerns please contact me by e-mail at [Gurdeep.Bhattal@dot.ca.gov](mailto:Gurdeep.Bhattal@dot.ca.gov) or phone at (530) 740-4830.

Attachment(s)

- (1) Technical Information for Location Hydraulic Study
- (2) Floodplain Evaluation Report Summary
- (3) Firmettes

## Floodplain Evaluation Report Summary

Item 5

District 03 EA 3F5401 County Sac Route 99/160 P.M. 4.98 / 44.47  
 Project ID: 0313000136

Bridge No. 24-0045L / 24-0001L Bridge Name Lagoon Creek Br, American River Br.

Project Limits: Project locations are at PM 4.98 on Sac-99 and at PM 44.47 on Sac-160.  
The project proposes to provide scour mitigation at both bridges. The channel under the Lagoon Cr. Bridge will be rock lined. The volume of material excavated under the bridge will be replaced with an equivalent volume of rock. Depending on availability of funds the three SB bridges across Lagoon Creek may be replaced and the profile raised to match the profile of the NB lanes. On the American River existing RSP around the pier footings will be removed and 4 piers will be encased in sheet piles. Structural backfill will replace the RSP which was removed. Piles will not extend above river bed.

**Floodplain Description: The Flood Insurance Rate Map panels 06067C0465H, 06067C075H, dated August-16-2012, indicate that the Lagoon Creek Bridges lie in Zone "A" of the floodplain. Zone "A" means "Base flood elevations not determined". The creek would be expected to overflow it's banks and flow under the main Lagoon Creek bridge as well as the two overflow Bridges. The roadway would not be expected to be inundated. FIRM panel 06067C0176J dated June 16, 2015 was reviewed to determine that the proposed work is within the floodway of the American River. At the conclusion of the project the impact of the project on the floodplain is expected to be less than significant**

1. Is the proposed action a longitudinal encroachment of the base floodplain as defined in 23 CFR, Section 650.105? Yes  No
2. Are the risks associated with the implementation of the proposed action significant? Yes  No
3. Does the proposed action constitute a significant total floodplain encroachment as defined in 23 CFR, Section 650.105? Yes  No
4. Are Location Hydraulics Studies that document the above answers on file? Yes  No   
 If not, explain \_\_\_\_\_  
 \_\_\_\_\_
5. Are there any significant impacts on natural and beneficial floodplain values as defined in 23 CFR, Section 650.105? Yes  No
6. Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? Yes  No

**Floodplain Evaluation Report Summary**

Item 5

If yes, explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Will the proposed action support probable incompatible floodplain development? Yes \_\_\_\_\_ No \_\_\_\_\_

PREPARED BY:

*Gurdeep Bhattal*

\_\_\_\_\_  
Signature – Hydraulics Branch Engineer (Items 1-4)

\_\_\_\_\_  
3-3-2016  
Date

\_\_\_\_\_  
Signature – Environmental Branch Chief (Items 5-7)

\_\_\_\_\_  
Date

CONCUR:

\_\_\_\_\_  
Signature – Project Engineer

\_\_\_\_\_  
Date

## Technical Information for Location Hydraulic Study

EA: 3F4501 Project ID: 0313000366

District: 03 County: Sac Route: 99/160 P.M.: 4.98 / 44.47

Br. No.: 24-0045L / 24-0001L Br. Name: Lagoon Creek Bridge / American River Bridge

**Floodplain Description:**

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts): Project locations are at PM 4.98 on Sac-99 and at PM 44.47 on Sac-160. The project proposes to provide scour mitigation at both bridges. The channel under the Lagoon Creek Bridge will be rock lined. The volume of material excavated under the bridge will be replaced with an equivalent volume of rock. Depending on availability of funds the three SB bridges across Lagoon Creek may be replaced and the profile raised to match the profile of the NB lanes. On the American River existing RSP around the pier footings will be removed and 4 piers will be encased in sheet piles. Structural backfill will replace the RSP which was removed. Piles will not extend above river bed.

2. ADT: Current: \_\_\_\_\_ Projected: \_\_\_\_\_

3. Hydraulic Data:

	Q (cfs)	WSE (ft)	Return Period (yrs)
Flood of Record (If > Q <sub>100</sub> ):	N/A	N/A	
Base Flood: Lagoon Creek	N/A	35'	100
American River		38'	
Overtopping Flood:	N/A	N/A	
Datum:	NGVD29 / NAVD 1988		

Are NFIP maps available? Yes X No \_\_\_\_\_  
 Are NFIP studies available? Yes X No \_\_\_\_\_

4. Is the highway location alternative within a regulatory floodway? Yes \_\_\_\_\_ No X

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.

Potential Q<sub>100</sub> backwater damages:

A. Residences? Yes \_\_\_\_\_ No X  
 B. Other Bldgs.? Yes \_\_\_\_\_ No X  
 C. Crops? Yes \_\_\_\_\_ No X  
 D. Natural and beneficial floodplain values? Yes \_\_\_\_\_ No X



### Technical Information for Location Hydraulic Study

6. Type of Traffic:
- |  |     |       |    |       |
|--|-----|-------|----|-------|
| A. Emergency supply or evacuation route? | Yes | _____ | No | _____ |
| B. Emergency vehicle access?             | Yes | _____ | No | _____ |
| C. Practicable detour available?         | Yes | _____ | No | _____ |
| D. School bus or mail route?             | Yes | _____ | No | _____ |
7. Estimated duration of traffic interruption for 100-year event \_\_\_\_\_ 0 \_\_\_\_\_ hours.
8. Estimated value of Q<sub>100</sub> flood damages (if any) – moderate risk level.
- |             |    |       |
|-------------|----|-------|
| A. Roadway  | \$ | _____ |
| B. Property | \$ | _____ |
| Total       | \$ | _____ |
9. Assessment of Level of Risk  
 Low   X   Moderate \_\_\_\_\_ High \_\_\_\_\_  
 For High Risk projects, during design phase, additional Design Study Risk Analysis may be necessary to determine design alternative.
10. Is there any longitudinal encroachment, significant encroachment, or any support of incompatible Floodplain development? Yes \_\_\_\_\_ No \_\_\_\_\_
11. If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

PREPARED BY:

*Gurdeep Bhattal*

Signature – Hydraulics Branch Engineer (Items 3-5, 7, & 9)

March 3 2016

Date

Signature – Project Engineer (Items 1-2, 6, 8, & 10&11)

Date

# Memorandum

To: Gary Joe  
Branch Chief  
Office of Bridge Design North & Central  
At: David Romero

Date: August 9, 2018

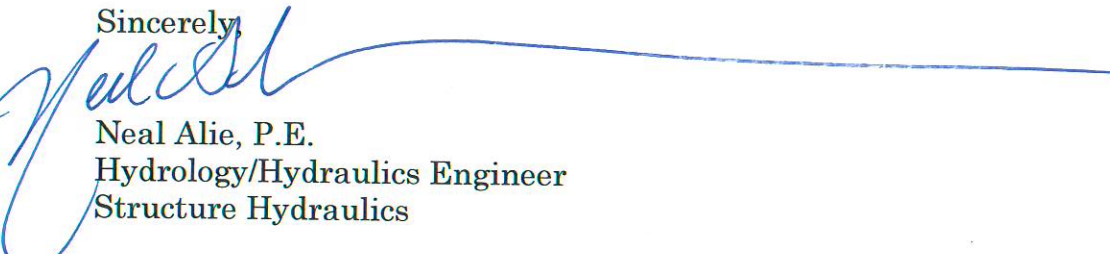
File: American River  
Br. No. 24-0001L  
03-SAC-160-PM 44.47  
EA 03-3F540  
Project ID: 03-1300-0136

From: **Department of Transportation**  
**Engineering Service Center MS #9**  
**Structure Hydraulics and Hydrology**

Subject: Final Hydraulic Report

Attached is the Final Hydraulic Report for the proposed scour countermeasure for the American River Bridge (Left) on SR 160 in Sacramento County at PM 44.47. If you have any questions please call me at (916) 227-0444 or my mobile at (916) 224-9640.

Sincerely,



Neal Alie, P.E.  
Hydrology/Hydraulics Engineer  
Structure Hydraulics

American River Bridge  
Br. No. 24-0001L  
03-Sac-160-PM 44.47  
EA 03-3F540  
Project ID: 03-1300-0136

State of California – Department of Transportation  
Division of Engineering Services  
Structure Design Services

Structure Hydraulics and Hydrology

FINAL HYDRAULIC REPORT

*American River Bridge*

Located in Sacramento County  
Bride No. 24-0001L

03-Sac-160-PM 44.47

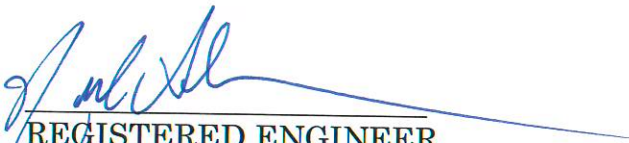
EA 03-3F540  
EFIS: 03 1300 00136

August 9, 2018

WRITTEN BY:  
Neal Alie

REVIEWED BY:  
Ronald McGaugh

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.

  
REGISTERED ENGINEER  
C 56398  
REGISTRATION NUMBER



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## Hydrology/Hydraulic Report

### 1.0 General



Figure 1- American River Bridge, Br. No. 24-0001L on SR 160

The American River Bridge (160 WB) is a 5-span, 620 foot long, 57.4 foot wide structure built in 1915 and widened in 1934. The original 1915 structure is a 5-span filled concrete arch on RC pier walls and RC abutments with non-monolithic wing walls all founded on timber piles. The 1934 left side widening is a 5-span non filled spandrel arch (with side walls to simulate a filled arch) on RC pier walls and RC abutments with non-monolithic wing walls founded on steel piles.

In July, 2010, the Bridge's scour potential was assessed in accordance with FHWA Technical Advisory T5140.23, "Evaluating Scour at Bridges", and within current Caltrans guidelines. The bridge was determined to be scour critical, and the item 113 code "Vulnerability to scour", was changed to 3; "Bridge Foundations determined to be unstable for assessed or calculated scour conditions; scour below spread-footing or piles.

Structure Design in coordination with the District is proposing to install sheet piles at Piers 2 through 5 as a scour counter measure. (Please see scour section 5.0 for more details).

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This report makes extensive reference to the (1) Caltrans Bridge Maintenance Reports, (2) General plans and profiles submitted by structures, (3) Caltrans As-Built Plans (4) Previous Hydrology/Hydraulics Report (5) American River Watershed Report, December 2015, US Army Corps of Engineers (6) Caltrans Geotechnical report, April 2010 (7) SM&I Ratings Report, July 2010 (8) FEMA Report, October 20, 2016 (8) USGS Water Information System.

*All Elevations used in this report are based on the NAVD 88 Datum.*

## **2.0 Drainage Basin**

The American River drains a watershed of approximately 1875 square miles of the Tahoe and El Dorado National Forests, including the Granite Chief Wilderness and Desolation Wilderness. The river flows west from the peaks of the northern Sierra Nevada west of Lake Tahoe. Its streams gradually converge into the South, Middle and North Forks of the American River draining into Folsom Dam.

Although it was originally authorized by Congress in 1944 as flood control unit, Folsom Dam was reauthorized in 1949 as a multipurpose facility to also store water for irrigation, domestic, municipal and industrial use, hydropower generation, recreation, water quality and maintenance of flows stipulated to protect fish. Folsom Lake features roughly 10,000 surface acres of water when full and has 75 miles of shoreline. It extends about 15 miles up the North Fork American River and about 10 ½ miles up the South Fork.

During a 24-hour period, the releases of water from Folsom Dam can vary greatly to meet changing demands for water and power. Nimbus Dam, 7 miles downstream from Folsom Dam, stores these releases and re-regulates them to a steady flow downstream in the American River and allows Folsom Dam releases and power generation to fluctuate with daily power demands. Nimbus Dam forms Lake Natoma located in the town of Folsom. The Lower American River has levees on its north and south banks for about 13 miles from the Sacramento River to Carmichael on the north end. Portions of the floodplain have been acquired by either the City or County of Sacramento and is managed cooperatively as the American River Parkway.

The Lower American River begins at Folsom Dam and flows approximately 30 miles to its confluence with the Sacramento River near downtown Sacramento. The Lower American River Watershed has a number of contributing streams including Coon Creek, Markham Ravine, Auburn Ravine, Pleasant Grove Creek, Curry Creek, Dry Creek, Cordova Creek (aka Clifton's Drain), and Arcade Creek. Most of these creeks enter the floodplain drainage systems of the Natomas Cross Canal and Natomas East

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Main Drainage Canal in southern Sutter and northern Sacramento Counties. The Natomas Cross Canal drains into the Sacramento River just south of the Feather River, and the Natomas East Main Drainage Canal drains into the Sacramento River just to the north of the American River.

The Lower American River watershed elevations range from approximately 400 feet at Folsom Dam to approximately 23 feet at the confluence with the Sacramento River. The channel slope at the bridge site is approximately 0.0003 ft/ft. Average annual precipitation based on the Oregon Climate Service Prism Program (Annual normal from 1981 to 2010) is about 23 inches.

The project is located in a FEMA Special Flood Hazard Area (SFHA) designated as a Zone AE, where the Base Flood Elevations have been determined.

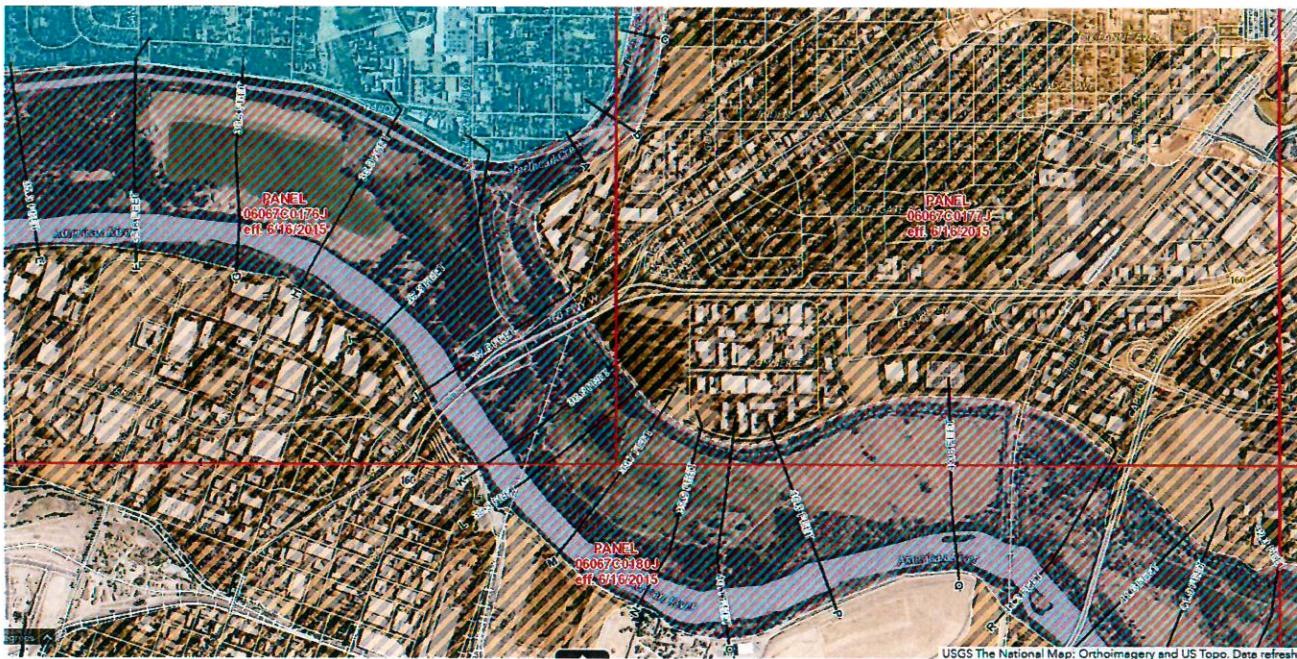


Figure 2-FEMA Inundation Map

### 3.0 Discharge

The American River levees were originally intended to convey a release from Folsom Dam of 115,000 cfs. During several major storm events since the construction of Folsom Dam, flows have equaled or exceeded the design capacity and caused significant erosion at the levees.

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In the 1955 flood event, the peak release from Folsom Dam was 115,000 cfs. Soon after this flood event, the flood magnitude was factored into the hydrology of Folsom Dam operations, which led to the level of protection provided by Folsom Dam being considerably lowered.

In the 1964 flood event, Folsom Dam was again forced to release 115,000 cfs which was the first time the complete American River levee system was tested. This 1964 flood event showed considerable stress on the levee system but no major levee failures.

In the 1986 flood event, Folsom Dam was forced to release 130,000 cfs to avoid a dam failure. The peak flow was passed without any levee failure, but two locations were almost breached. One of the sites upstream from the Capital City Freeway experienced significant erosion and if the discharge was sustained any longer, the levee would have likely failed.

In 1997 Folsom Lake experienced a peak inflow of 255,000 cfs and was able to control it by releasing 115,000 cfs. Significant erosion occurred at five different sites along the American River which required immediate repair.

The objective release from Folsom Dam is currently under review as part of the Folsom dam Reoperations Study and the Joint Federal Project which is currently constructing improvements to the dam for a release of 160,000 cfs.

For the purpose of this project the Design Flood Flow Capacity of **160,000 cfs** will be used.

#### **4.0 Stage, Velocity and Waterway**

The U.S. Army Corps of Engineers Surface Water Modeling System (SMS) program was used to perform a two-dimensional hydraulic analysis to calculate the water surface elevations and velocity for the following conditions:

1. Existing Bridge Pre-Construction Condition.
2. Interim Construction Condition with temporary steel trestle on piles.
3. Post Construction Condition with Sheet Piles Installed.

The General Plans submitted by Structure Design was referenced to acquire the planned deck elevation height. The proposed freeboard is measured from the water surface elevation to the lowest chord of the soffit of the structure (45.27 ft).



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The parameters used to model the existing and post construction conditions include a Design Flood Flow Capacity for the American River of 160,000 cfs, a 100-year discharge of 16,000 cfs for the Natomas East Main Drainage Canal and a 100-year discharge of 120,000 cfs for the Sacramento River. A manning's roughness coefficient of 0.033 was used for the river and 0.03 to .12 for the floodplain and a channel slope of 0.0003 ft/ft for the American River.

The model results for the existing condition is as follows:

4.1 Existing Condition

Discharge (cfs)	Minimum Soffit Elevation (ft)	Water Surface Elevation (ft)	Average Channel Velocity (fps)	Available Freeboard (ft)
Design Flood Flow Capacity 160,000 cfs	45.27	37.00	6.92	8.27

There is adequate freeboard for the projected Design Flood Flow Capacity of 160,000 cfs with a freeboard of 8.27 ft.

4.2 Interim Condition

The interim condition includes the installation of a temporary trestle that will be supported on 20 inch piles. The construction season is normally between the months of May to October and the mean daily flow rate during the summer months for the American River is approximately 5000 cfs.

The parameters used to model the Interim condition with and without the trestle includes an average summer flow for the American River of 5000 cfs, a summer flow of 1000 cfs for the Natomas East Main Drainage Canal and a summer flow of 17,500 cfs for the Sacramento River. A manning's roughness coefficient of 0.033 was used for the river and 0.03 to .12 for the floodplain and a channel slope of 0.0003 ft/ft for the American River.

The model results are as follows:

4.2A Interim Condition with no trestle

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Discharge (cfs)	Minimum Soffit Elevation (ft)	Water Surface Elevation (ft)	Average Channel Velocity (fps)	Available Freeboard (ft)
Mean Summer Flow 5000 cfs	45.27	14.65	1.00	30.62

#### 4.2B Interim Condition with trestle

Discharge (cfs)	Minimum Soffit Elevation (ft)	Water Surface Elevation (ft)	Avg. Channel Velocity (fps)	Available Freeboard (ft)	Δ Existing to Proposed	
					Δ Water Surface Elevation (ft)	Δ Avg. Channel Velocity (fps)
Mean Summer Flow 5000 cfs	45.27	14.66	0.90	30.61	+0.01	-0.10

The trestle will have minimal effect on the water surface elevation during the construction season. The trestle should be installed with the estimated water surface elevation of 14.66 ft in mind.

#### Proposed Condition

The proposed condition includes the installation of Steel Sheet Piles at Piers 2 through 5 encasing the footing's entire width and length. The top of the Steel Sheet Piles will be installed at the bottom of the existing footings and include a 2 foot concrete slurry and will be embedded 30 ft deep. The Steel Sheet Piles will have no effect on the water surface elevation.

The model results are as follows:

Discharge (cfs)	Minimum Soffit Elevation (ft)	Water Surface Elevation (ft)	Avg. Channel Velocity (fps)	Available Freeboard (ft)	Δ Existing to Proposed	
					Δ Water Surface Elevation (ft)	Δ Avg. Channel Velocity (fps)
Design Flood Flow Capacity 160,000 cfs	45.27	37.00	6.90	8.27	0.0	0.0

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There is adequate freeboard for the projected Design Flood Flow Capacity of 160,000 cfs with a freeboard of 8.27 ft.

## 5.0 Streambed and Scour

### 5.1 Scour History

According to the Caltrans Maintenance records this bridge has a history of scour. Underwater Inspections were completed in 1998, 2003 and 2008 and most recently in 2017 revealing various levels of footing and pile exposure at Piers 2 through 5.

In 2010, the bridge scour potential was calculated to be 16.8 ft deep at elevation (-21.6 ft). SM&I Ratings determined that although the steel piles had adequate capacity to carry the load demand, the original timber piles did not have adequate strength and the structure may become unstable.

In July, 2010, the Bridge's scour potential was assessed in accordance with FHWA Technical Advisory T5140.23, "Evaluating Scour at Bridges", and within current Caltrans guidelines. The bridge was determined to be scour critical, and the item 113 code "Vulnerability to scour", was changed to 3; "Bridge Foundations determined to be unstable for assessed or calculated scour conditions; scour below spread-footing or piles.

A peer review meeting was held and four scour mitigation alternatives were discussed.

- 1- Replace the missing RSP at the Piers installed in previous years.
- 2- Install Sheet Piles at Piers 2 through 5.
- 3- Installing supplemental piles.
- 4- Installing properly engineered RSP at the piers.

It was unanimously decided that alternative 2, installing sheet piles at Piers 2 through 5 was the best alternative.

In December, 2015 an updated Plan of Action was completed with no major changes to the previous recommendations. In 2016 a SHOPP project was programmed to install sheet piles at Piers 2 through 5 for scour mitigation.

In August, 2017 a Bridge strategy meeting was held and once again a number of alternatives were discussed including engineered RSP, Sheet piles and bridge replacement. It was unanimously decided to proceed with the sheet pile alternative.

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### 5.2 Current Scour Analysis for proposed Steel Sheet Piles

The FHWA Hydraulic Engineering Circular, (HEC-18), “Evaluating Scour at Bridges” was used to calculate the potential scour for the proposed sheet pile installation at the existing bridge. The scour evaluation requires an assessment of (1) Channel Bed Degradation, (2) Contraction Scour and (3) Local Pier Scour including the effects of debris and hydraulic skew.

No contraction scour was noted at this location and it appears that any past degradation has stabilized. Only local pier scour will be evaluated for this report.

The Design Flood Flow Capacity of **160,000 cfs** was used to evaluate the potential local pier scour with the following results:

<b>Bridge Item</b>	<b>Pier Scour (ft)</b>	<b>Pier Scour Elevation (ft)</b>
Abutment 1	7.45	16.05
Pier 2	33.04	-34.54
Pier 3	32.53	-33.28
Pier 4	33.70	-32.50
Pier 5	33.71	-32.20
Abutment 6	6.17	18.83

### **6.0 Drift**

There is a moderate potential of drift and Structure Hydraulics recommends the removal of any drift build up on a consistent basis, especially after major storm events.

### **7.0 Bank Protection**

The average velocity has been provided in this report to assist the District Hydraulic Engineers in the design of bank protection if necessary.

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### 8.0 Hydrologic and Scour Summary for Design Engineer

HYDROLOGIC SUMMARY Br. No. 24-0001L			
Drainage Area: 1875 square miles			
	Design Flood Flow Capacity	Base Flood	Overtopping Flood/Flood of Record?
Frequency	N/A	N/A	N/A
Discharge	160,000 cfs	N/A	N/A
Water Surface Elevation at Bridge	37.0 ft	N/A	N/A
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.			

### 9.0 Scour Data Table

Support No.	Long Term (Degradation and Contraction) Scour Elevation (ft)	Short Term (Local) Scour Depth (ft)
Abutment 1	23.50*	7.45
Pier 2	-1.50*	33.04
Pier 3	-0.75*	32.53
Pier 4	1.20*	33.70
Pier 5	1.50*	33.71
Abutment 6	25.0*	6.17

\*Although there is no anticipated degradation or contraction scour, this is the existing approximate ground elevation.

# **SECTION 7**

# **ENVIRONMENTAL**