



Agenda Item 5D

# **CVFPB Permit No. 19431 COSUMNES RIVER BRIDGE REPLACEMENTS PROJECT (Sacramento County)**

September 27, 2019

Presented by:  
**Mauricio Meza, Engineer, Water Resources**  
Central Valley Flood Protection Board



# Background

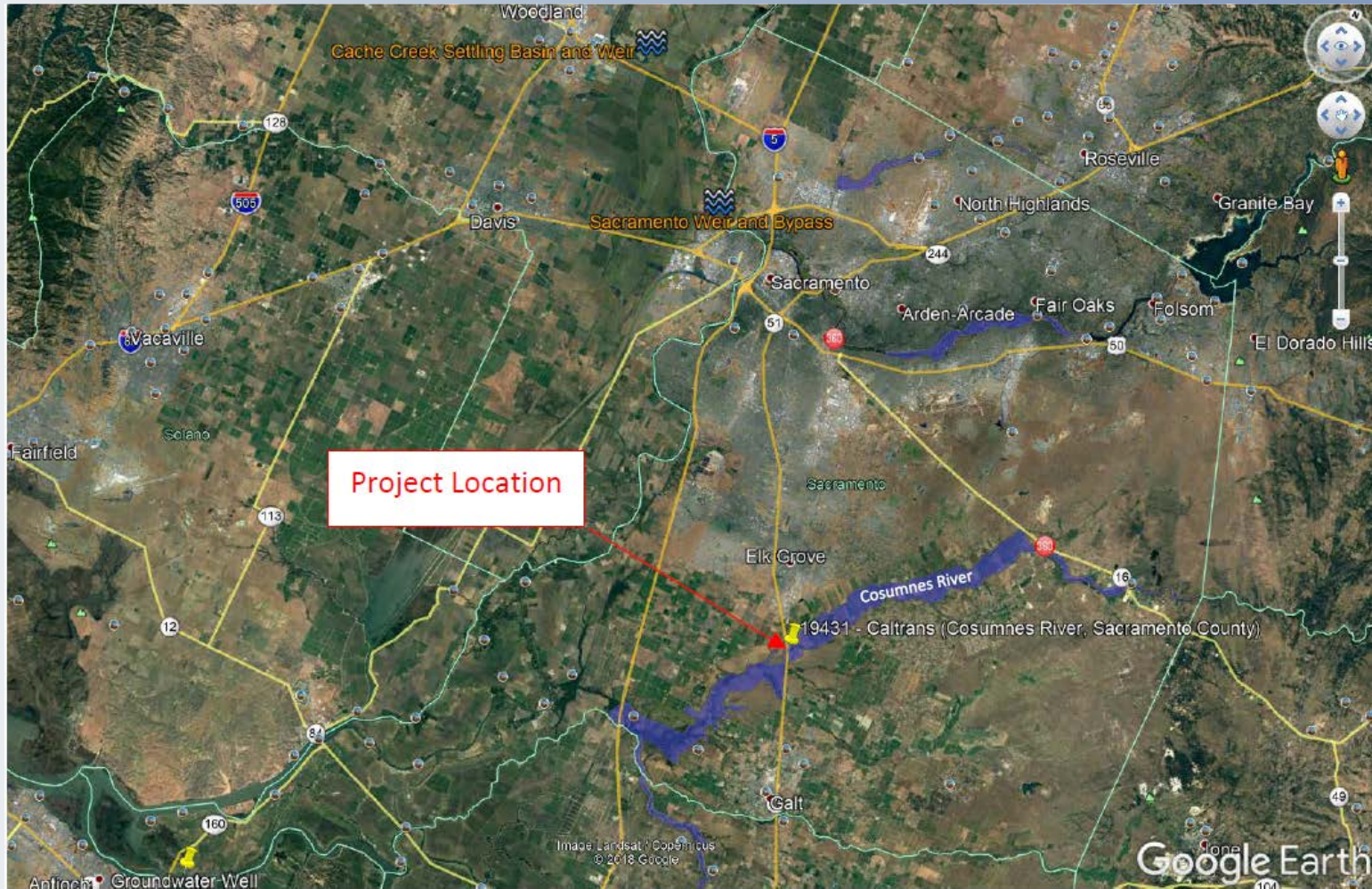
- ❖ Applicant : California Department of Transportation. (Caltrans)
- ❖ Project Location: The project is located where State Route (SR) 99 crosses the Cosumnes River Designated Floodway (DF), approximately 1.6 miles south of the Grant Line Road Overcrossing, about 2.5 miles south of the City of Elk Grove.
- ❖ Stream: Cosumnes River



# Project Description

- ❖ Applicant proposes to:
  - ⦿ Remove four (4) existing bridge structures within the Cosumnes River DF: two (2) bridges span the main channel at Post Mile (PM) 8.4 (Bridge Nos. 24-0020R and 24-0020L) and two (2) bridges span the overflow channel at PM 7.9. (Bridge Nos. 24-0021R and 24-0021L); and
  - ⦿ Construct two new bridge structures (Cosumnes River Bridge Nos. 24-0391 and 24-0390).

# Project Location Map





# Project Location Map (Cont.)

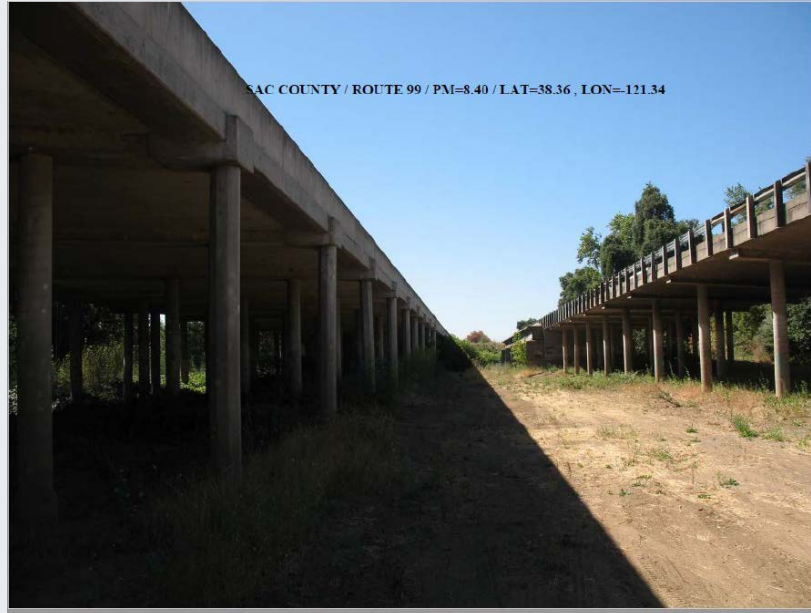


# Project Footprint





# Photos

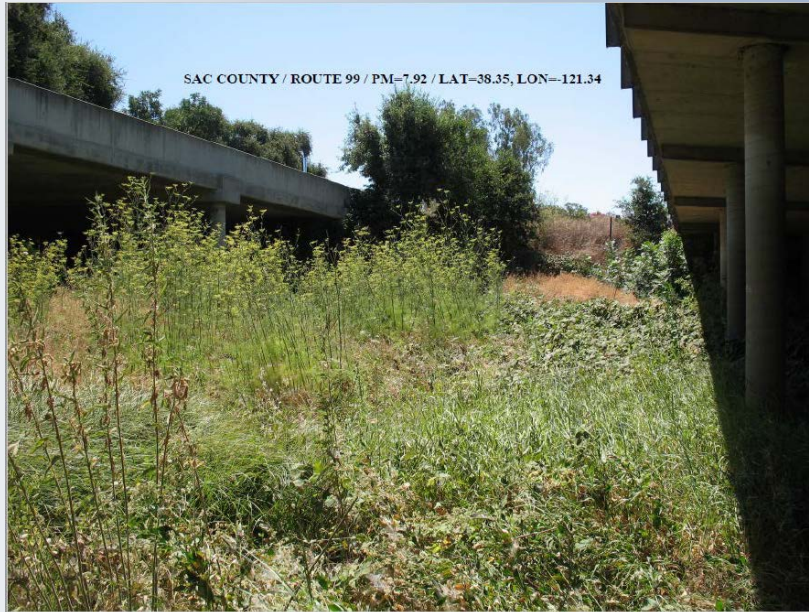


Cosumnes River Bridges spanning the main channel at Post Mile (PM) 8.4 (Bridge Nos. 24-0020R and 24-0020L)



Cosumnes River Bridges spanning the main channel at Post Mile (PM) 8.4 (Bridge Nos. 24-0020R and 24-0020L)

# Photos



SAC COUNTY / ROUTE 99 / PM=7.92 / LAT=38.35, LON=-121.34

Cosumnes River Overflow Bridges spanning the overflow channel at PM 7.9. (Bridge Nos. 24-0021R and 24-0021L);



SAC COUNTY / ROUTE 99 / PM=7.92 / LAT=38.35, LON=-121.34

Cosumnes River Overflow Bridges spanning the overflow channel at PM 7.9. (Bridge Nos. 24-0021R and 24-0021L);





# Authority of the Board

- ❖ California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710
- ❖ California Code of Regulations, Title 23, Division 1 (Title 23):
  - § 6, Need for a Permit
  - § 13.3, Consent Calendar
  - § 107, Permitted Uses in Designated Floodways
  - § 112, Streams Regulated and Nonpermissible Work Periods
  - § 121, Erosion Control
  - § 128, Bridges



# Project Analysis

- ◎ The existing four (4) bridge structures to be replaced were originally constructed in 1958 (Permit No. 2404) and then widened in 1993 (Permit No. 15887).
- ◎ Bridge No. 24-0020R crosses the main channel and is 660.8 feet long, 42 feet wide, 22-span bridge with pier walls on reinforced concrete (RC) pile cap on timber piles.
- ◎ Bridge 24-0020L also crosses the main channel and is 658.2 feet long, 38 feet wide, 22-span bridge with pier walls on reinforced concrete (RC) pile cap on timber piles.
- ◎ Bridge No. 24-0021R crosses the Cosumnes River overflow channel and is a 639.8 feet long, 42-feet wide, 25-span bridge that is constructed with continuous reinforced concrete slab on RC piles/bents.



# Project Analysis (Cont.)

- ◎ Bridge No. 24-0021L also crosses the river's overflow channel and is a 639.8 feet long, 32.2 feet wide, 25-span bridge with continuous RC slab on RC pile/bents.
- ◎ The existing four bridges are thought to be seismically and structurally deficient for rehabilitation. In addition, the two south-bound Cosumnes River bridges (Br No. 24-0020L and 24-0021L) have sub-standard freeway/expressway bridge shoulder widths. The new bridges will meet current Caltrans Bridge Design Standards and all applicable Title 23 Standards.





# Project Analysis (Cont.)

- ❖ The proposed work consist of:
- ⦿ Constructing two new bridge structures:
  - Bridge No. 24-0391 will cross the main channel and will be a 697 feet long, 117.5 feet wide, 5-span precast, pre-stressed wide flange girder bridge on seated abutments on piles; and
  - Bridge No. 24-0390 will cross the overflow channel and will be a 665 feet long, 117.5 feet wide, 6-span precast, pre-stressed wide flange girder bridge on seated abutments on piles.
  - Both new bridges will have piers that will consist of five—5-foot diameter concrete columns on 7-foot diameter case-in-drilled-hole (CIDH) piles.
- ⦿ Removing the existing four bridge structures;
- ⦿ Constructing two temporary bridges adjacent to the existing Bridges (Nos. 24-0020R and 24-0021R) to accommodate traffic during construction of the new bridges, which is expected to last approximately four (4) years; and
- ⦿ Placing rock slope protection at all four abutments for scour protection.



# Hydraulic Analysis

- ◎ The one-dimensional U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center-River Analysis System (HEC-RAS) program was used to assess the impacts.
- ◎ The analysis was done using the Board adopted design flow of 81,000 cubic feet-per-second (cfs) for the Cosumnes River DF.
- ◎ The DF design water surface elevation (DWSE) at the existing bridges was computed to be 44.58 feet and the proposed soffit elevations in the main and overflow channels for the new bridges will be 50.2 feet and 50.1 feet, respectively. This provides 5.62 feet of flowage clearance in the main channel and 5.52 feet of clearance in the overflow channel.



# Hydraulic Analysis

- ❖ The hydraulic analysis indicates there will be a slight rise in water surface elevation upstream of the bridges (0.01 feet) and a slight decrease in stream velocity (0.01 feet-per-second (fps)) due to the reduction of the number of bridge spans and piers within the channels.
- ❖ Caltrans also evaluated a peak flow of 93,000 cfs that was recorded during the 1997 flood that inundated parts of SR-99 in the Cosumnes River floodplain. The peak water surface elevation for that event was determined to be 44.92 feet. Even with this higher flow the bottom members of the proposed bridges will be 5.28 feet and 5.18 feet above the water surface elevation in the main channel and the overflow channels, respectively.
- ❖ The proposed project is not expected to result in any adverse hydraulic impacts to the Cosumnes River DF.



# Geotechnical Analysis



- ◎ There are no levees associated with this project; therefore, a geotechnical analysis was not required for this review.



# Agency comments and endorsements

- ◎ There are no Local Maintaining Agencies in the project area.
- ◎ The USACE Sacramento District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

# CEQA Conclusions:



- ◎ Staff has prepared a CEQA analysis, as included in the Staff Report. For information regarding staff's CEQA analysis, refer to Section 8.0 of the Staff Report.





# Staff Recommendation

## Adopt:

- ◎ CEQA finding: The Board, acting as a responsible agency under CEQA, has independently reviewed and considered the environmental documents prepared for the project. Approving Permit 19431 will not result in any significant adverse impacts related to flood risk and no additional mitigation measures within the Board's jurisdiction are required;

## Approve:

- ◎ Encroachment Permit No. 19431 in substantially the form provided in Attachment A; and,

## Direct:

- ◎ The Executive Officer to take the necessary actions to execute the permit and file a CEQA Notice of Determination with the State Clearinghouse.

# Questions, Comments, Concerns....



Source: [pme-acquisition.com](http://pme-acquisition.com)





# Drawings - Proposed Bridge (Cont.)



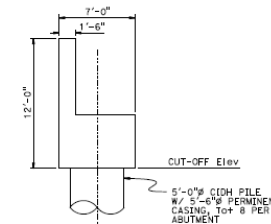
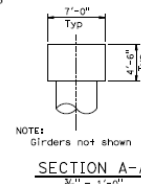
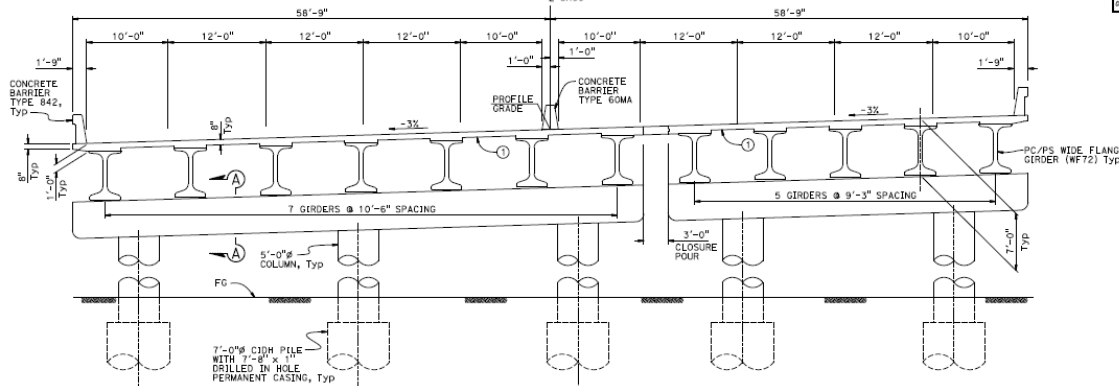
National Geodetic  
Vertical Datum:  
NAVD 88

**65% UNCHECKED DETAILS**

PROGRESS PRINT  
PRINTED  
DATE: 17-JUL-2019  
Office of  
Structure Design  
STATE OF CALIFORNIA

Dist	COUNTY	ROUTE	POST MILES	BRIDGE	NO.	DATE
03	Sac	99	PPPP	7777	####	

REGISTERED CIVIL ENGINEER: X DATE: \_\_\_\_\_  
PLANS APPROVAL DATE: \_\_\_\_\_  
MM/DD/YYYY  
PLANS APPROVAL DATE: \_\_\_\_\_  
MM/DD/YYYY  
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.



- NOTES:  
1. LENGTH OF PILE = 100'-0"  
2. LENGTH OF PERMANENT CASING = 50'-0"

ABUTMENT SECTION  
1/4" = 1'-0"

TYPICAL SECTION  
1/4" = 1'-0"

- NOTES:  
① STAY IN PLACE METAL FORM (SIPMF), Typ  
NOTES:  
1. LENGTH OF Col Avg = 35'-0"  
2. LENGTH OF PERMANENT CASING = 50'-0"  
3. LENGTH OF PILE SHAFT = 125'-0"

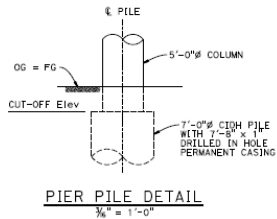
HYDROLOGIC SUMMARY

Frequency	100-Year (Caltrans)	Overlapping Flood/ Flood of Record
Discharge, cfs	91,300	117,000
Channel	Main	n/a
Condition	Existing (Br #24-20C/R)	Proposed (Br #24-0391)
WSE at Bridge, ft (NAVD 88)	44.9	44.9
		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.

PILE CUT-OFF ELEVATION

SUPPORT	CUT-OFF Elev
Abut 1	40.0
Pier 2	36.0
Pier 3	36.0
Pier 4	36.0
Pier 5	36.0
Abut 6	40.0



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

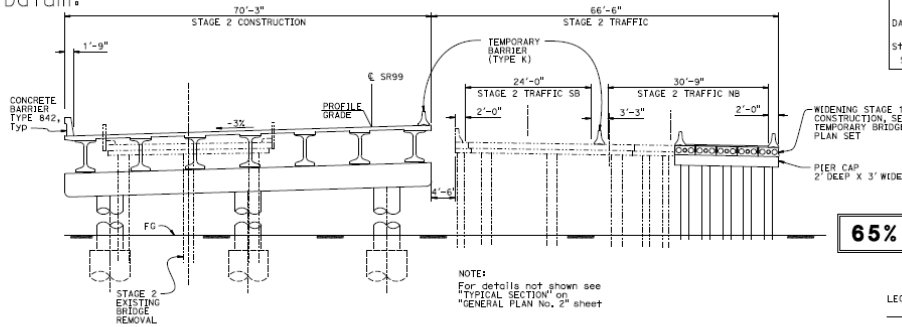
DESIGNER GARY BLUMSLEY BRANCH CHIEF	REVISION BY ALL YOURS DETAILS BY QUANTITIES BY	CHECKED BY BY BY	DATE 17-JUL-2019	THE 17-JUL-2019	DATE 17-JUL-2019	THE 17-JUL-2019	DATE 17-JUL-2019	THE 17-JUL-2019
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STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAY SERVICES  
STRUCTURE DESIGN  
DESIGN BRANCH 6  
BRIDGE NO.  
24-0391  
POST MILE  
8.40  
COSUMNES RIVER BRIDGE (REPLACE)  
GENERAL PLAN No. 2  
SHEET 2 OF 2

# Drawings - Proposed Bridge (Cont.)



National Geodetic  
Vertical Datum:  
NAVD 88



PROGRESS PRINT  
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DATE: 17-JUL-2019  
Office of  
Structure Design  
STATE OF CALIFORNIA

STATE	COUNTY	ROUTE	POST MILES	TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	SAC	99	PPPP	7777	8888	

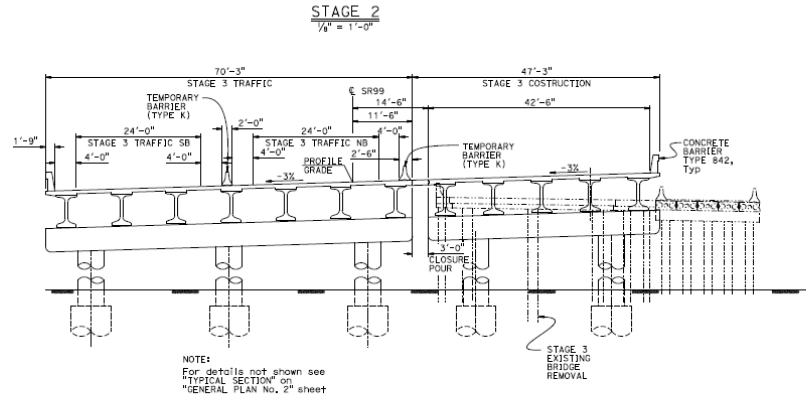
  

REGISTERED CIVIL ENGINEER	X	DATE OF EXPIRATION	MM/DD/YYYY
PLANS APPROVAL DATE			

THE ENGINEER OF CALIFORNIA IN ITS OFFICE OR AGENT SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ISSUED COPIES OF THIS PLAN SHEET.

**65% UNCHECKED DETAILS**

- LEGEND:
- New structure
  - Existing structure
  - Limits of Bridge removal
  - Limits of Bridge removal, Stage 1



NOTE:  
THE CONTRACTOR SHALL VERIFY ALL  
CONTROLLING FIELD DIMENSIONS  
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ANY MATERIAL.

**STAGE 3**  
 $\frac{1}{8"} = 1'-0"$

DESIGN	BY	DATE	DESIGN	BY	DATE	DESIGN	BY	DATE	DESIGN	BY	DATE
DETAILS	BY	DATE	LAYOUT	BY	DATE	PLANS	BY	DATE	PLANS	BY	DATE
QUANTITIES	BY	DATE	SPECIFICATIONS	BY	DATE	PLANS AND SPACE CONFORMING	BY	DATE	PLANS AND SPACE CONFORMING	BY	DATE

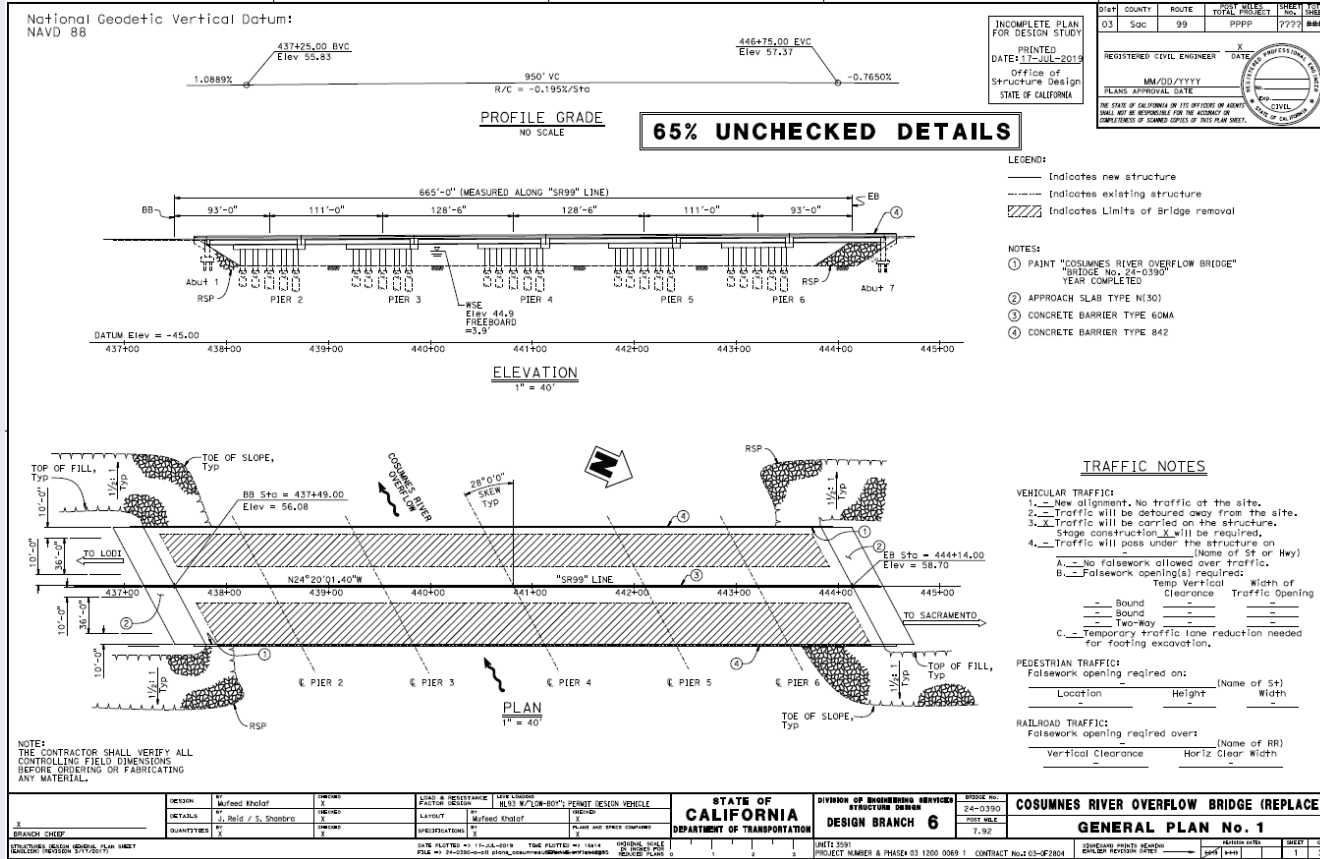
  

DATE PLOTTED: 17-JUL-2019	TITLE PLOTTED: 1824	PROJECT NUMBER: 03-1000-0000-1	CONTRACT NO: 03-0F2804	DESIGN BRANCH: 6	BRIDGE NO: 24-0391	POST MILE: 8.40
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STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION			DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN			COSUMNES RIVER BRIDGE (REPLACE)		
GENERAL PLAN No. 3			DESIGN BRANCH 6			GENERAL PLAN No. 3		

# Drawings - Proposed Bridge (Cont.)







# Drawings - Proposed Bridge (Cont.)

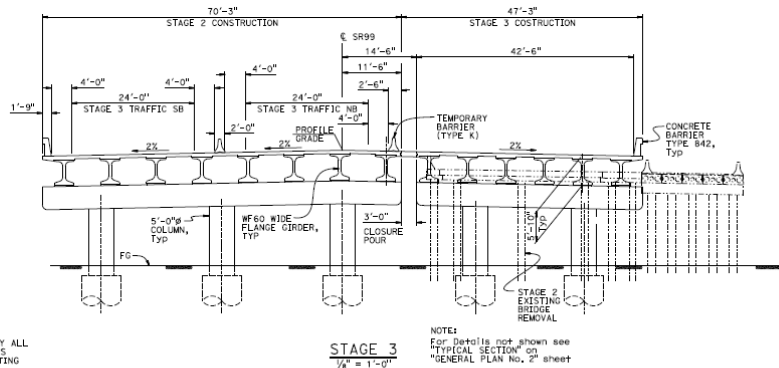
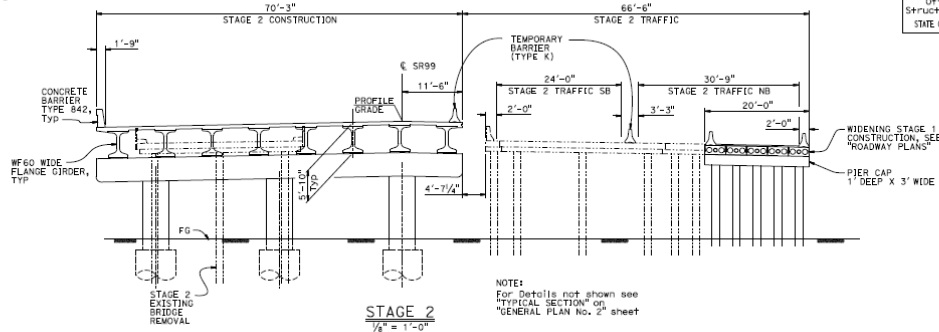


National Geodetic  
Vertical Datum:  
NAVD 88

## 65% UNCHECKED DETAILS

INCOMPLETE PLAN  
FOR DESIGN STUDY  
PRINTED  
DATE: 17-JUL-2019  
Office of  
Structure Design  
STATE OF CALIFORNIA

DIST	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
03	Sac	99	PPPP	7777	####
REGISTERED CIVIL ENGINEER			DATE	PLANS APPROVAL TYPE	
			MM/DD/YYYY	CIVIL	
THE STATE OF CALIFORNIA OR ITS OFFICER OR AGENT SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ANY INFORMATION ON THIS PLAN SHEET.					



LEGEND:  
— New structure  
--- Existing structure  
--- Limits of Bridge removal

NOTE:  
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ANY MATERIAL.

DESIGN	BY: Mufeed Khafar	CHECKED	X	DATE & REVISION	DATE: 17-JUL-2019	PROJECT DESIGN VEHICLE	PROJECT	BRIDGE NO.	24-0390	COSUMNES RIVER OVERFLOW BRIDGE (REPLACE)	
DETAILS	BY: J. Bello / S. Shomro	CHECKED	X	LAYOUT	BY: Mufeed Khafar	CHECKED	X	POST MILE	7.92	GENERAL PLAN No. 3	
QUANTITIES	BY: J. Bello / S. Shomro	CHECKED	X	SPECIFICATIONS	BY: J. Bello / S. Shomro	CHECKED	X				

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DESIGN BRANCH 6	BRIDGE NO. 24-0390 POST MILE 7.92	CONTRACT NO. 03-02804
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# Drawings - Proposed Bridge (Cont.)



National Geodetic  
Vertical Datum:  
NAVD 88

## 90% PLANS

## INDEX TO PLANS

- SHEET NO. TITLE
- 1 GENERAL PLAN
  - 2 GENERAL NOTES
  - 3 FOUNDATION PLAN No. 1
  - 4 ABUTMENT 1 LAYOUT
  - 5 ABUTMENT 13 LAYOUT
  - 6 ABUTMENT DETAILS No. 1
  - 7 ABUTMENT DETAILS No. 2
  - 8 PIER LAYOUT (TYPICAL)
  - 9 PIER LAYOUT (TYPICAL)
  - 10 PIER DETAILS (TYPICAL)
  - 11 PIER LAYOUT (PIER 3 AND 4)
  - 12 PIER DETAILS (PIER 3 AND 4)

PROGRESS PRINT  
PRINTED  
DATE: 17-JUL-2019  
Office of  
Structure Design  
STATE OF CALIFORNIA

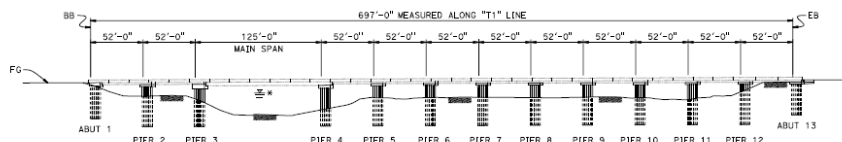
STATE	COUNTY	ROUTE	POST MILE	PROJECT MILE	PROJECT TOTAL
03	SAC	99	PPPP	7777	8888

REGISTERED CIVIL ENGINEER X DATE MM/DD/YYYY  
PLANS APPROVAL DATE  
THE STATE OF CALIFORNIA OR ITS OFFICE OF AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SOURCE DATA OF THIS PLAN SHEET.

- LEGEND:
- Existing Structure
  - Indicates direction of Flow
  - \* 100 year Storm Elevation = 44.90'
  - Indicates future work



PROFILE GRADE  
NO SCALE

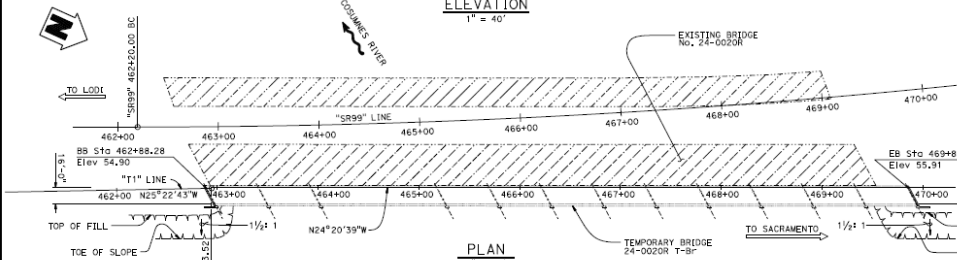


DATUM Elev = -40.00'

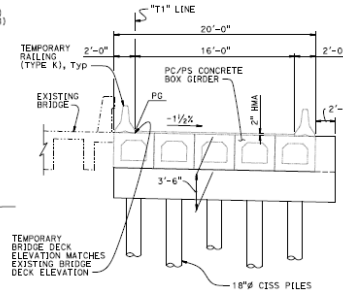
462+00 463+00 464+00 465+00 466+00 467+00 468+00 469+00 470+00

## ELEVATION

1" = 40'

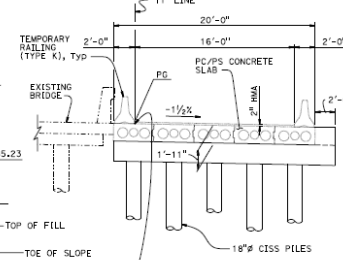


NOTE:  
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ANY MATERIAL.



## MAIN SPAN SECTION

1/4" = 1'-0"



## TYPICAL SECTION

1/4" = 1'-0"

SECTION		DESIGNER		CHECKER		DATE		PROJECT		SHEET	
YOLANDA PILEDO-VILLALBA		R. ENRIQUETA / S. SHAMBA		J. CHOI		17-JUL-2019		COSUMNES RIVER TEMPORARY BRIDGE		1	
DETAILS		LAYOUT		CALCULATIONS		DATE		PROJECT		SHEET	
R. ENRIQUETA / S. SHAMBA		J. CHOI		J. CHOI		17-JUL-2019		COSUMNES RIVER TEMPORARY BRIDGE		1	
REVISIONS		DATE		BY		REASON		PROJECT		SHEET	
								COSUMNES RIVER TEMPORARY BRIDGE		1	

STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
DESIGN BRANCH 6

PROJECT NUMBER: 03-1200-0009-1  
CONTRACT NO: 03-1200-0009-1

[illegible]

# Table 1– Hydraulic Information

HEC-RAS River: main Reach: reach\_5 Profile: FEMA

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
reach_5	10399.81	FEMA	01	81000.00	29.81	44.58	38.47	44.61	0.000162	1.12	63459.78	13267.37	0.09
reach_5	10399.81	FEMA	02	81000.00	29.81	44.58	38.47	44.61	0.000161	1.12	63510.60	13268.13	0.09
reach_5	10399.81	FEMA	01+temp	81000.00	29.81	44.61	38.47	44.63	0.000160	1.12	63736.74	13271.48	0.09
reach_5	10484.85	FEMA	01	81000.00	29.28	44.60	38.18	44.62	0.000122	1.00	70699.51	13807.71	0.08
reach_5	10484.85	FEMA	02	81000.00	29.28	44.61	38.18	44.63	0.000122	1.00	70752.34	13808.12	0.08
reach_5	10484.85	FEMA	01+temp	81000.00	29.28	44.63	38.18	44.65	0.000121	1.00	70987.30	13809.97	0.08
reach_5	10582.74	FEMA	01	81000.00	28.03	44.62	37.18	44.64	0.000111	1.07	76715.01	14114.64	0.08
reach_5	10582.74	FEMA	02	81000.00	28.03	44.62	37.18	44.64	0.000111	1.07	76771.51	14114.68	0.07
reach_5	10582.74	FEMA	01+temp	81000.00	28.03	44.64	37.18	44.66	0.000110	1.07	77022.42	14114.83	0.07
reach_5	10697.89	FEMA	01	81000.00	28.75	44.63	36.52	44.65	0.000098	1.03	79978.63	14189.54	0.07
reach_5	10697.89	FEMA	02	81000.00	28.75	44.64	36.52	44.65	0.000098	1.02	80035.24	14190.00	0.07
reach_5	10697.89	FEMA	01+temp	81000.00	28.75	44.66	36.52	44.67	0.000097	1.02	80286.84	14192.07	0.07
reach_5	10819.66	FEMA	01	81000.00	27.90	44.65	35.87	44.66	0.000088	0.98	84607.98	14268.84	0.07
reach_5	10819.66	FEMA	02	81000.00	27.90	44.65	35.87	44.67	0.000088	0.97	84668.39	14268.92	0.07
reach_5	10819.66	FEMA	01+temp	81000.00	27.90	44.67	35.87	44.69	0.000087	0.97	84936.70	14269.26	0.07
reach_5	10976.11	FEMA	01	81000.00	28.06	44.66	35.05	44.67	0.000077	0.93	88347.02	14490.56	0.06
reach_5	10976.11	FEMA	02	81000.00	28.06	44.67	35.05	44.68	0.000077	0.93	88409.87	14490.61	0.06
reach_5	10976.11	FEMA	01+temp	81000.00	28.06	44.69	35.05	44.70	0.000076	0.93	88688.98	14490.81	0.06
reach_5	11241.99	FEMA	01	81000.00	28.27	44.68	36.09	44.69	0.000075	0.89	91031.95	14624.57	0.06
reach_5	11241.99	FEMA	02	81000.00	28.27	44.69	36.09	44.70	0.000075	0.89	91094.75	14624.61	0.06
reach_5	11241.99	FEMA	01+temp	81000.00	28.27	44.71	36.09	44.72	0.000074	0.89	91374.00	14624.75	0.06
reach_5	11624.10	FEMA	01	81000.00	23.59	44.71	34.98	44.72	0.000072	0.88	93115.94	14962.07	0.06
reach_5	11624.10	FEMA	02	81000.00	23.59	44.71	34.98	44.73	0.000072	0.88	93179.89	14962.11	0.06
reach_5	11624.10	FEMA	01+temp	81000.00	23.59	44.73	34.98	44.75	0.000071	0.88	93464.16	14962.30	0.06
reach_5	11958.70	FEMA	01	81000.00	28.91	44.74	35.90	44.75	0.000119	1.06	76548.16	13759.36	0.08
reach_5	11958.70	FEMA	02	81000.00	28.91	44.74	35.90	44.76	0.000119	1.06	76603.82	13760.85	0.08
reach_5	11958.70	FEMA	01+temp	81000.00	28.91	44.76	35.90	44.78	0.000118	1.05	76851.09	13767.38	0.08

Existing Bridge = Short ID 01

Proposed Bridge = Short ID 02

Temporary Bridge = Short ID 01+temp



# Table 1– Hydraulic Information (Cont.)

HEC-RAS River: main Reach: reach\_5 Profile: FEMA

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
reach_5	12317.60	FEMA	01	81000.00	28.52	44.79	38.25	44.83	0.000316	1.52	53349.71	13240.82	0.12
reach_5	12317.60	FEMA	02	81000.00	28.52	44.79	38.25	44.83	0.000316	1.52	53395.84	13243.33	0.12
reach_5	12317.60	FEMA	01+temp	81000.00	28.52	44.81	38.25	44.85	0.000312	1.51	53601.02	13254.50	0.12
reach_5	12674.99	FEMA	01	81000.00	31.28	44.91	38.71	44.96	0.000394	1.63	49665.54	12938.00	0.13
reach_5	12674.99	FEMA	02	81000.00	31.28	44.92	38.71	44.96	0.000393	1.63	49706.91	12939.88	0.13
reach_5	12674.99	FEMA	01+temp	81000.00	31.28	44.93	38.71	44.98	0.000388	1.62	49890.97	12948.25	0.13
reach_5	13129.82	FEMA	01	81000.00	22.88	45.05	35.56	45.08	0.000182	1.29	62826.98	13219.77	0.09
reach_5	13129.82	FEMA	02	81000.00	22.88	45.05	35.56	45.08	0.000181	1.29	62865.93	13220.84	0.09
reach_5	13129.82	FEMA	01+temp	81000.00	22.88	45.07	35.56	45.09	0.000180	1.29	63039.28	13225.61	0.09
reach_5	13502.94	FEMA	01	81000.00	24.94	45.16	38.60	45.20	0.000407	1.41	51839.90	12035.64	0.13
reach_5	13502.94	FEMA	02	81000.00	24.94	45.16	38.60	45.20	0.000406	1.41	51880.36	12041.05	0.13
reach_5	13502.94	FEMA	01+temp	81000.00	24.94	45.18	38.72	45.22	0.000403	1.41	52059.50	12058.82	0.13
reach_5	13887.86	FEMA	01	81000.00	31.36	45.51	41.01	45.58	0.001013	1.64	39034.15	11393.16	0.19
reach_5	13887.86	FEMA	02	81000.00	31.36	45.51	41.01	45.59	0.001011	1.64	39063.75	11395.62	0.19
reach_5	13887.86	FEMA	01+temp	81000.00	31.36	45.52	41.01	45.60	0.001002	1.64	39193.68	11409.78	0.18
reach_5	14326.09	FEMA	01	81000.00	35.65	46.57	45.35	46.94	0.009315	4.89	16580.69	5671.06	0.50
reach_5	14326.09	FEMA	02	81000.00	35.65	46.57	45.35	46.94	0.009312	4.88	16582.61	5671.27	0.50
reach_5	14326.09	FEMA	01+temp	81000.00	35.65	46.58	45.35	46.95	0.009296	4.88	16592.56	5672.35	0.50

Existing Bridge = Short ID 01

Proposed Bridge = Short ID 02

Temporary Bridge = Short ID 01+temp

# HEC-RAS Work Map

