Broadway Bridge Project

YOLO AND SACRAMENTO COUNTY, CALIFORNIA
DISTRICT 3 YOL, SAC
TGR2DGL 5447(043)

Final Environmental Impact Report/ Environmental Assessment with Finding of No Significant Impact Appendixes A through J

Prepared by the
State of California, Department of Transportation
and City of West Sacramento

The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 USC 327 and the Memorandum of Understanding dated December 23, 2016, and executed by the Federal Highway Administration and Caltrans.

Caltrans

CITY OF WEST SACRAMENTO

March 2022

This document may also be downloaded at the following website:
https://www.cityofwestsacramento.org/government/departments/capital-projects-and-transportation/projects/broadway-bridge-projects.

Appendix A Plan View Drawings of Build Alternatives by Phase

Alternative B

MATCH LINE - SEE SHEET 4

MILL ST

SOULE ST

JEFFERSON BLVD

SACRAMENTO RIVER

SACRAMENTO RIVER BIKE TRAIL

13TH ST

15TH ST

S RIVER ROAD

PERMANENT EFFECT

TEMPORARY EFFECT

3RD ST

BROADWAY

MARINA VIEW DR

MILLER PARK CIR

FRONT ST

3RD ST

5TH ST

SCALE: 1"=200'

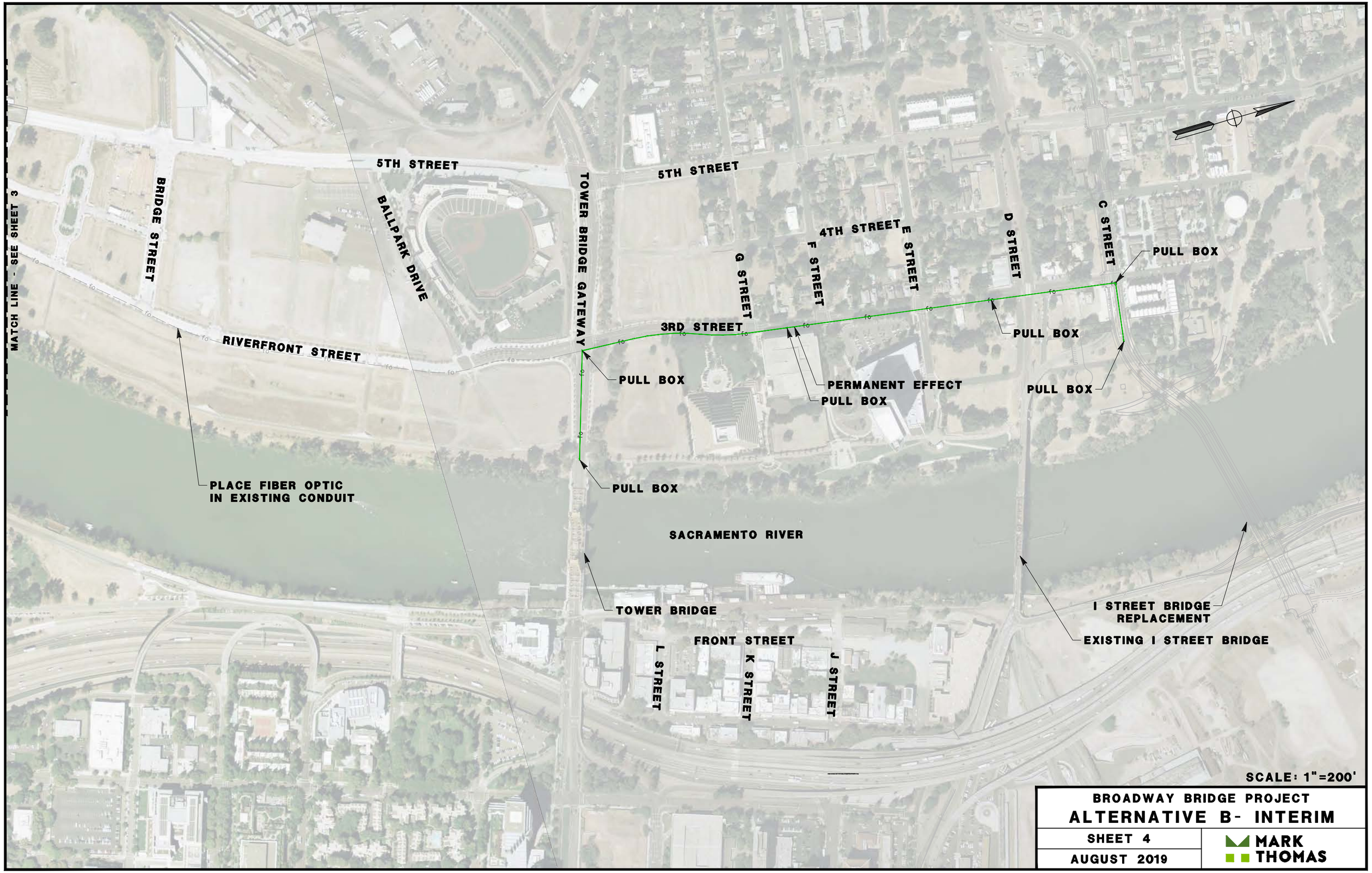
BROADWAY BRIDGE PROJECT

ALTERNATIVE B- INTERIM

SHEET 3

AUGUST 2019

MARK THOMAS



BROADWAY BRIDGE PROJECT

ALTERNATIVE B- INTERIM

SHEET 4

AUGUST 2019

MARK THOMAS

MATCH LINE - SEE SHEET 4

MILL ST

SOULE ST

JEFFERSON BLVD

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13TH ST

15TH ST

RAIL STREET

S RIVER ROAD

PERMANENT EFFECT

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3RD ST

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MARINA VIEW DR

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FRONT ST

3RD ST

5TH ST

SCALE: 1"=200'

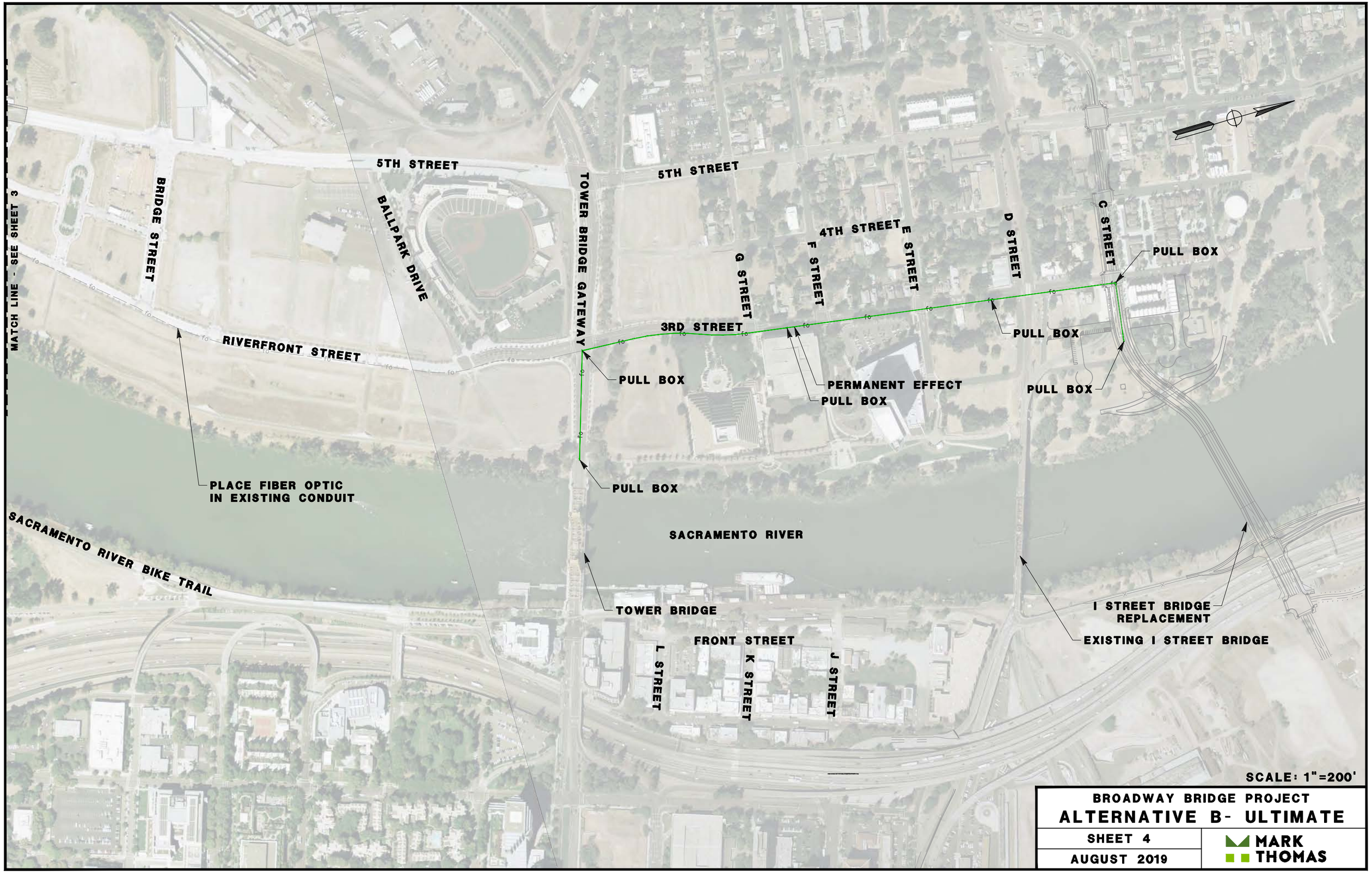
BROADWAY BRIDGE PROJECT

ALTERNATIVE B- ULTIMATE

SHEET 3

AUGUST 2019

MARK THOMAS



BROADWAY BRIDGE PROJECT

ALTERNATIVE B- ULTIMATE

SHEET 4

AUGUST 2019

MARK THOMAS

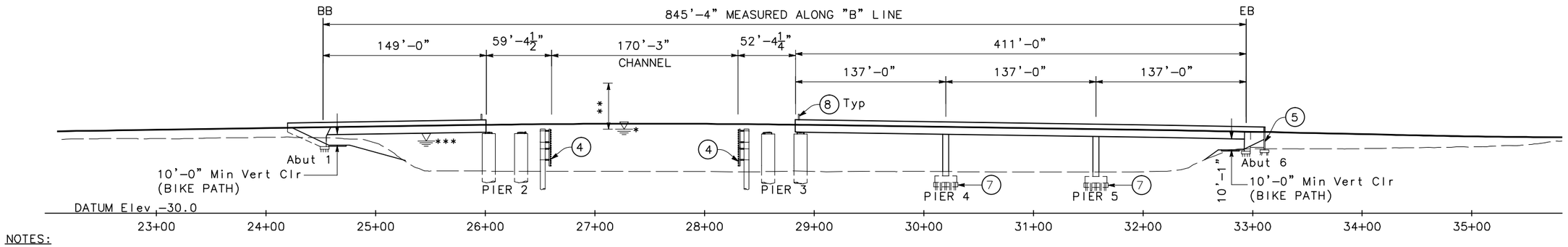
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	YOL/SAC	"B"	N/A

CITY OF WEST SACRAMENTO
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CA 95691

MARK THOMAS
701 UNIVERSITY AVE, SUITE 200
SACRAMENTO, CA 95825

MODJESKI AND MASTERS, INC.
100 STERLING PARKWAY, SUITE 302
MECHANICSBURG, PA 17050

PROFILE GRADE
NO SCALE



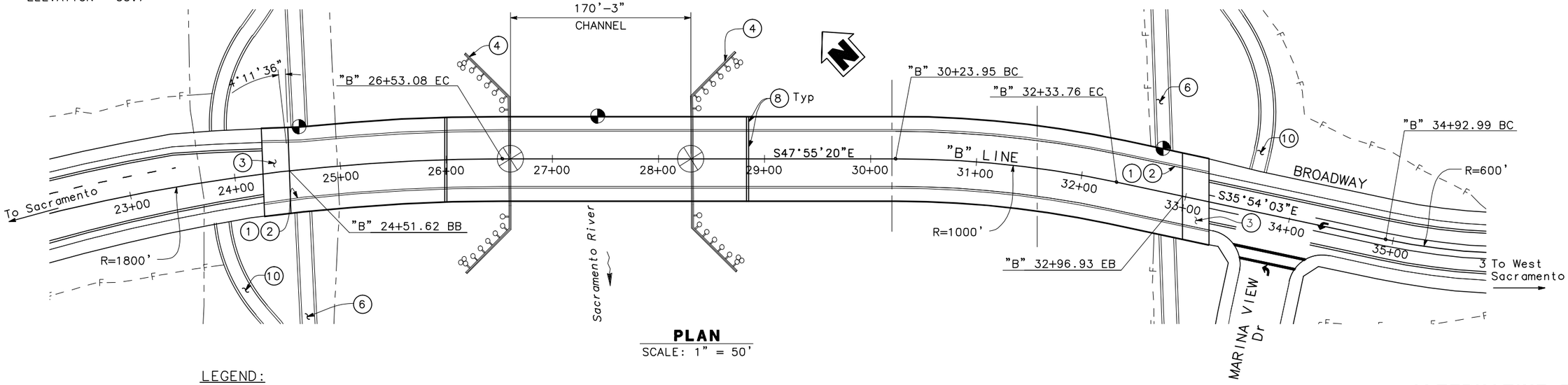
NOTES:

* – 200 YEAR WATER SURFACE ELEVATION = 36.4'

** – 3' Min Vert Clr LOWERED POSITION
55' Min Vert Clr RAISED POSITION

*** – SACRAMENTO RIVER FLOOD CONTROL PROJECT 1957 DESIGN FLOODPLAIN ELEVATION = 33.7'

ELEVATION
SCALE: 1" = 50'



PLAN
SCALE: 1" = 50'

LEGEND:

- (1) PAINT BRIDGE NAME
- (2) PAINT BRIDGE NUMBER
- (3) APPROACH SLAB
- (4) FENDER SYSTEM
- (5) RETAINING WALL
- POINT OF MINIMUM VERTICAL CLEARANCE
- (6) BIKE PATH
- (7) SEAL COURSE
- (8) TRAFFIC/PEDESTRIAN GATE & WARNING SIGNAL
- (9) LEVEE CUTOFF WALL
- (10) ACCESS ROAD
- (11) RSP

DESIGNED BY J. HICKEY	DATE 2-27-18	E. FREDRICKSON PROJECT ENGINEER	ALTERNATIVE B
DRAWN BY J. DOTY	DATE 2-27-18		BROADWAY BRIDGE PROJECT
CHECKED BY	DATE		GENERAL PLAN
APPROVED	DATE		BRIDGE NO. XXX / UNIT:
			SCALE: AS SHOWN / PROJECT NUMBER & PHASE: 03-XXXXXX

ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 7/16/10)

FILE => GP_B.DWG

CONTRACT NO.: X

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USERNAME => JDOTY DATE PLOTTED => 28-Feb-18 TIME PLOTTED => 11:07 AM

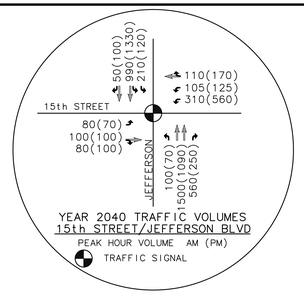
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110	SHEET 1
		FILE NO. XXX.dwg	OF 3

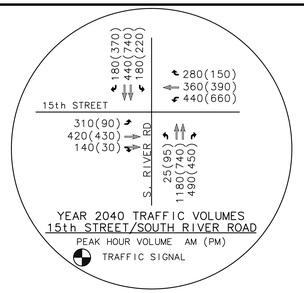
LEGEND/ ABBREVIATIONS

- L1 — LINE DATA (SEE TABLE)
- C2 — CURVE DATA (SEE TABLE)
- —F— FILL LIMITS
- —C— CUT LIMITS
- LEVEE SETBACK
- EXISTING ROW
- PROPOSED RETAINING WALL
- A — INTERSECTION LOCATION
- A-A — CROSS SECTION LOCATION



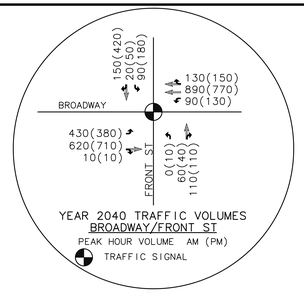
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



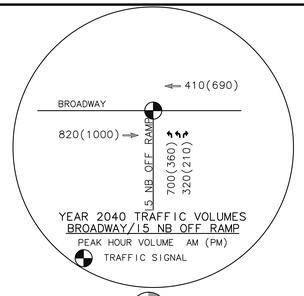
YEAR 2040 TRAFFIC VOLUMES
15th STREET/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



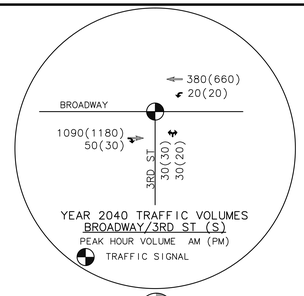
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

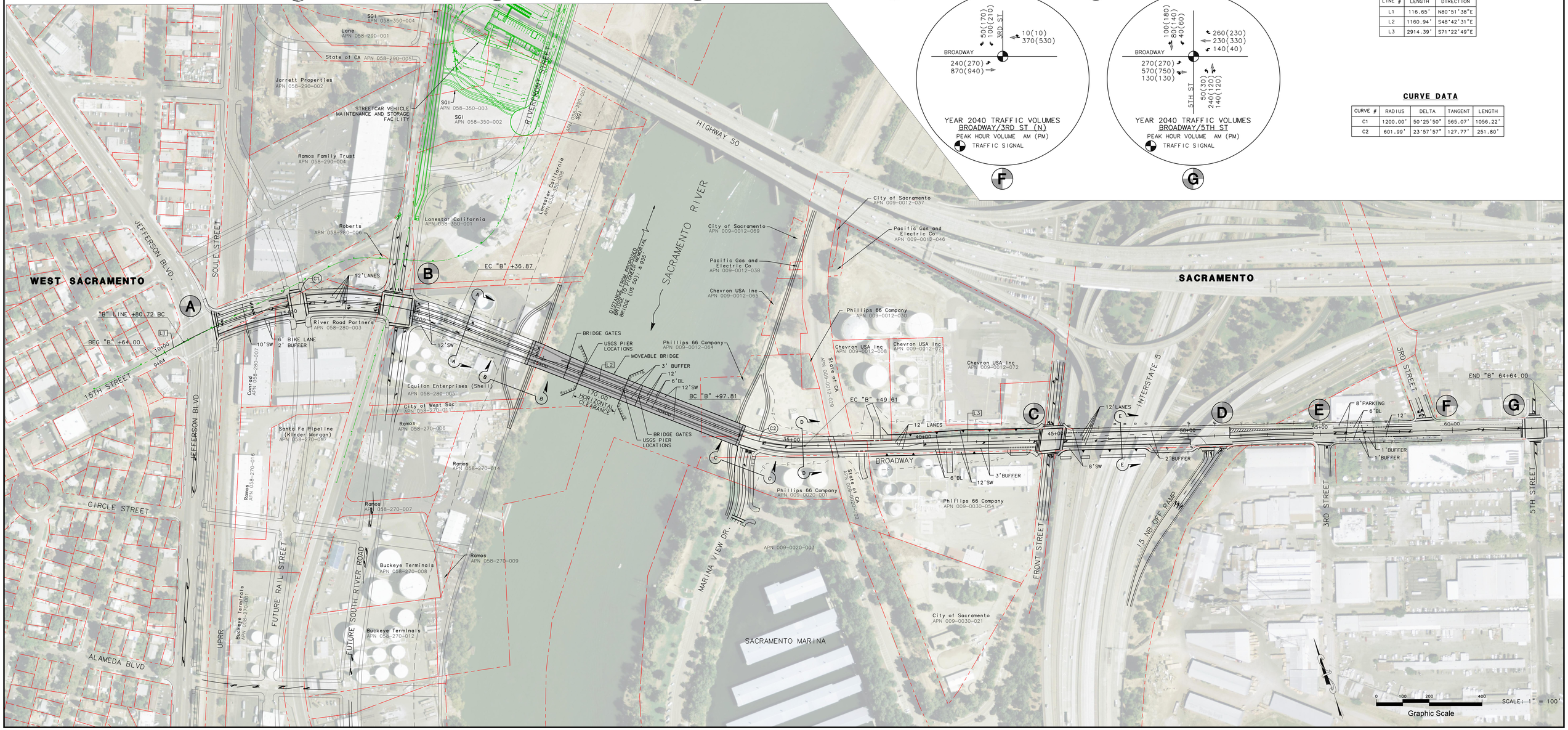
G

LINE DATA

LINE #	LENGTH	DIRECTION
L1	116.65'	N80°51'38"E
L2	1160.94'	S48°42'31"E
L3	2914.39'	S71°22'49"E

CURVE DATA

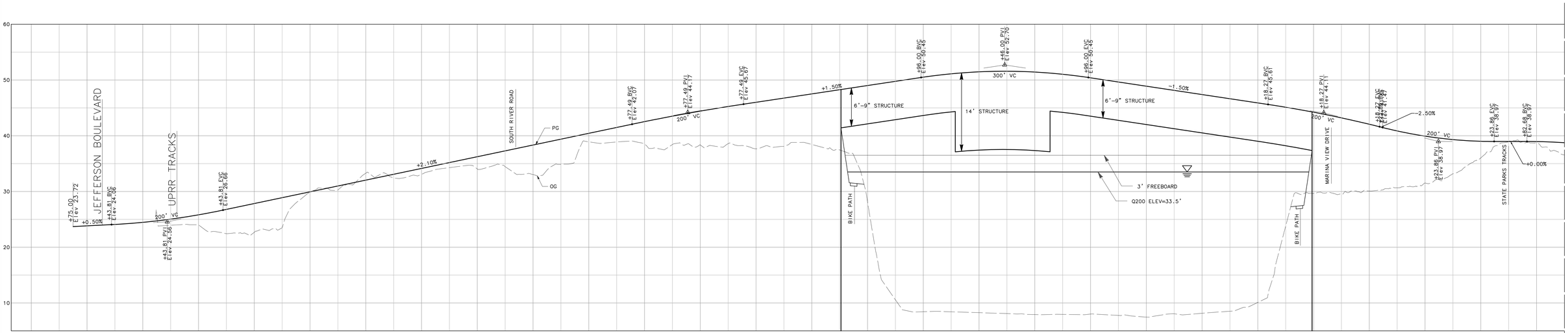
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1200.00'	50°25'50"	565.07'	1056.22'
C2	601.99'	23°57'57"	127.77'	251.80'



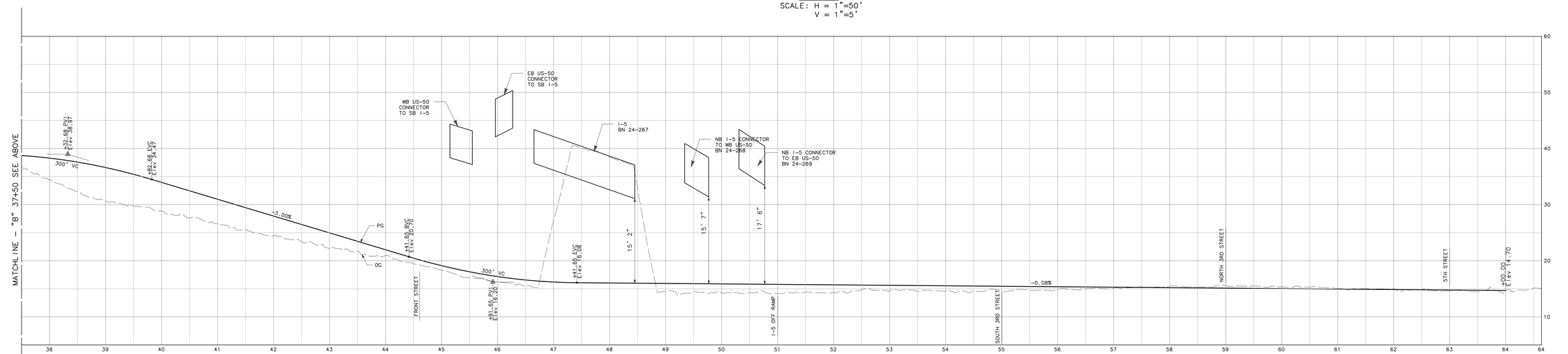
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 2 OF 3



15TH STREET / BROADWAY
"B" LINE
SCALE: H = 1"=50'
V = 1"=5'



15TH STREET / BROADWAY
"B" LINE
SCALE: H = 1"=50'
V = 1"=5'

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

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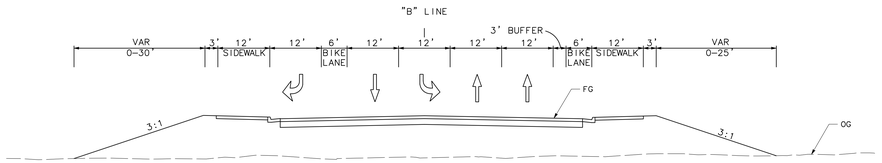
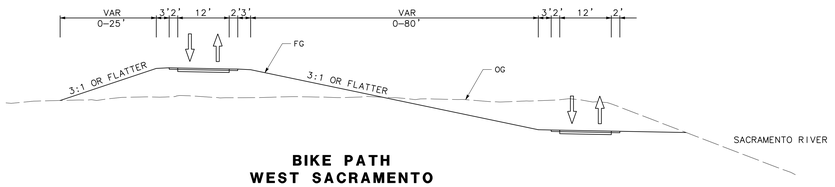
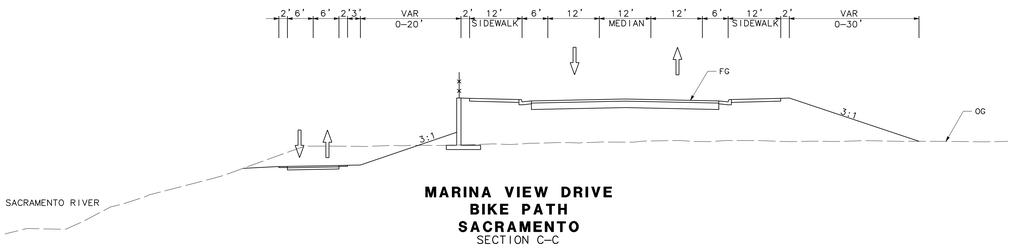
		FILE NO. XXX.dwg	OF 3



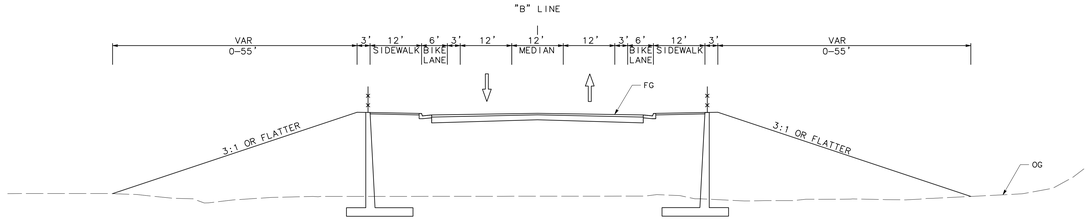
15TH STREET
WEST SACRAMENTO
SECTION A–A



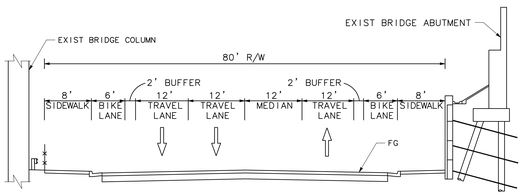
BIKE PATH
WEST SACRAMENTO
SECTION B–B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C–C



BROADWAY
SACRAMENTO
SECTION D–D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E–E

Alternative C

MATCH LINE - SEE SHEET 6

MILL ST

SOULE ST

JEFFERSON BLVD

SACRAMENTO RIVER

SACRAMENTO RIVER BIKE TRAIL

S RIVER ROAD

13TH ST

15TH ST

PERMANENT EFFECT

TEMPORARY EFFECT

3RD ST

BROADWAY

MARINA VIEW DR

MILLER PARK CIR

FRONT ST

3RD ST

5TH ST

SCALE: 1"=200'

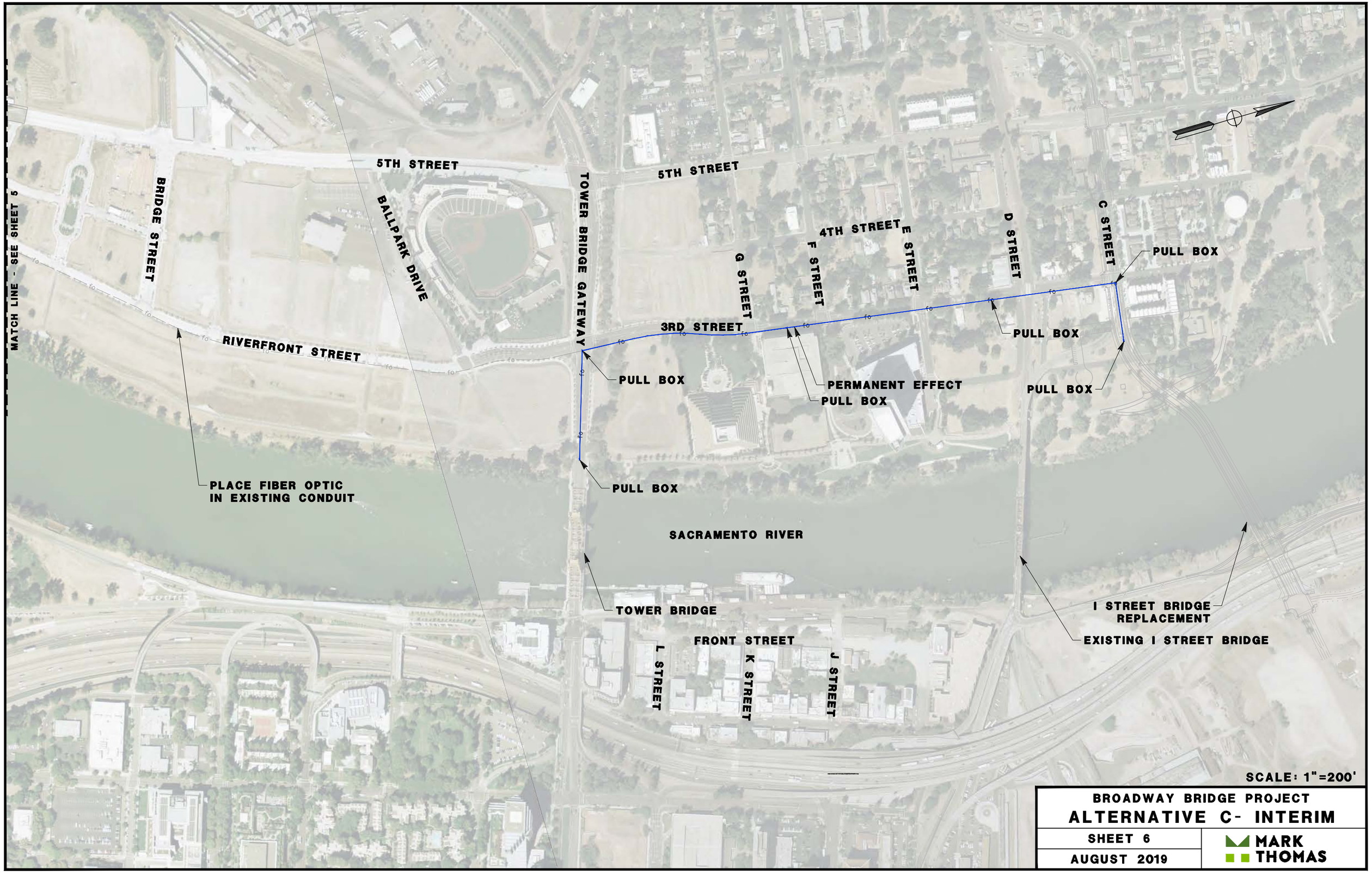
BROADWAY BRIDGE PROJECT

ALTERNATIVE C- INTERIM

SHEET 5

AUGUST 2019

MARK THOMAS



SCALE: 1"=200'

BROADWAY BRIDGE PROJECT

ALTERNATIVE C- INTERIM

SHEET 6

AUGUST 2019

MARK THOMAS

MATCH LINE - SEE SHEET 6

MILL ST

SOULE ST

JEFFERSON BLVD

S RIVER ROAD

SACRAMENTO RIVER

SACRAMENTO RIVER BIKE TRAIL

13TH ST

15TH ST

RAIL STREET

PERMANENT EFFECT

TEMPORARY EFFECT

3RD ST

BROADWAY

MARINA VIEW DR

MILLER PARK CIR

FRONT ST

3RD ST

5TH ST

SCALE: 1"=200'

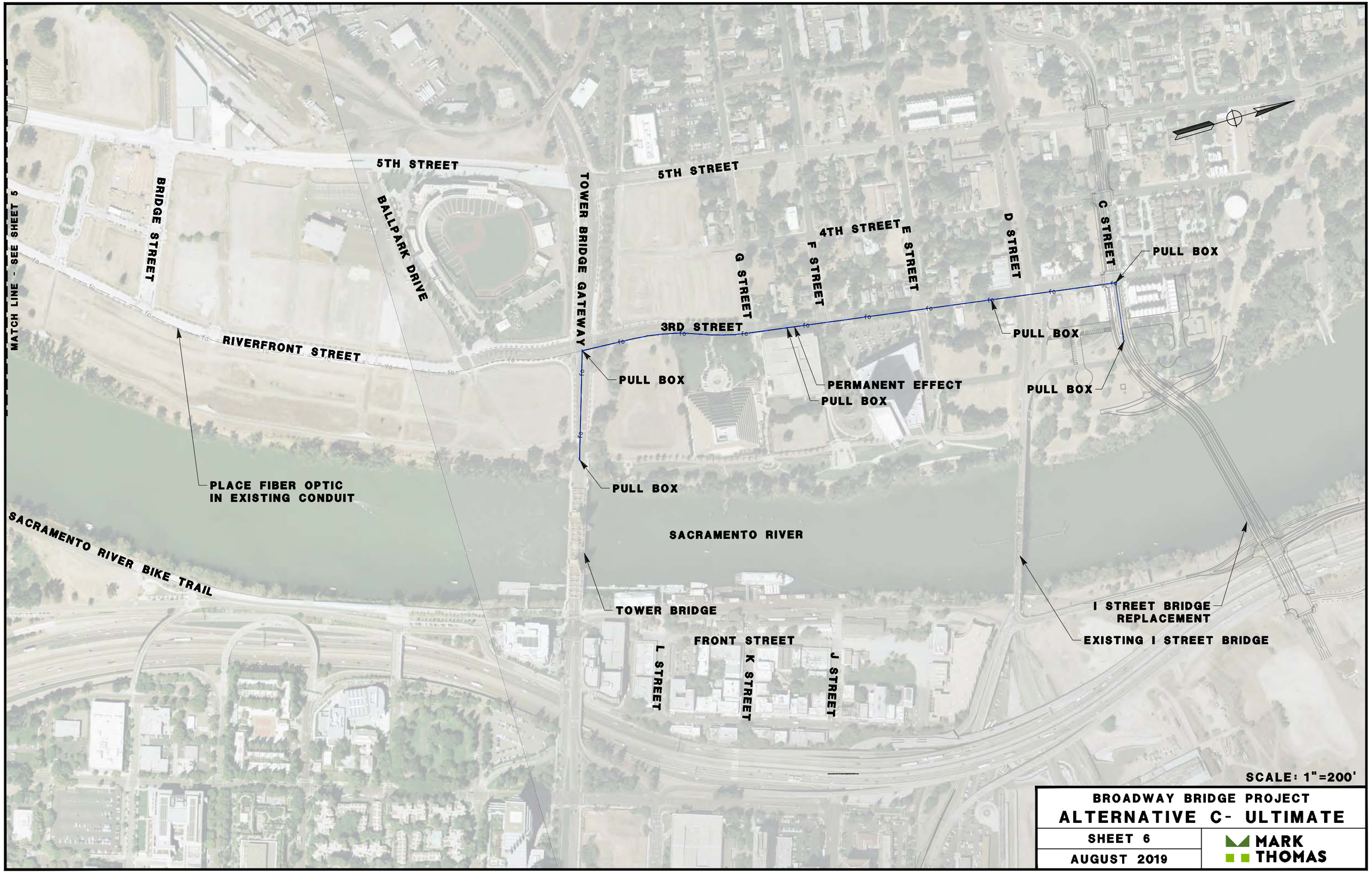
BROADWAY BRIDGE PROJECT

ALTERNATIVE C- ULTIMATE

SHEET 5

AUGUST 2019

MARK THOMAS



BROADWAY BRIDGE PROJECT

ALTERNATIVE C- ULTIMATE

SHEET 6

AUGUST 2019

MARK THOMAS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	YOL/SAC	"C"	N/A

CITY OF WEST SACRAMENTO
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CA 95691

MARK THOMAS
701 UNIVERSITY AVE, SUITE 200
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MODJESKI AND MASTERS, INC.
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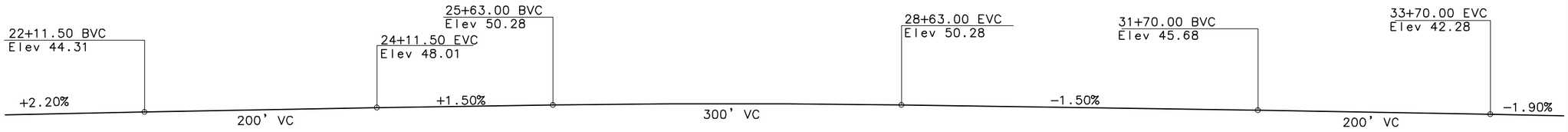
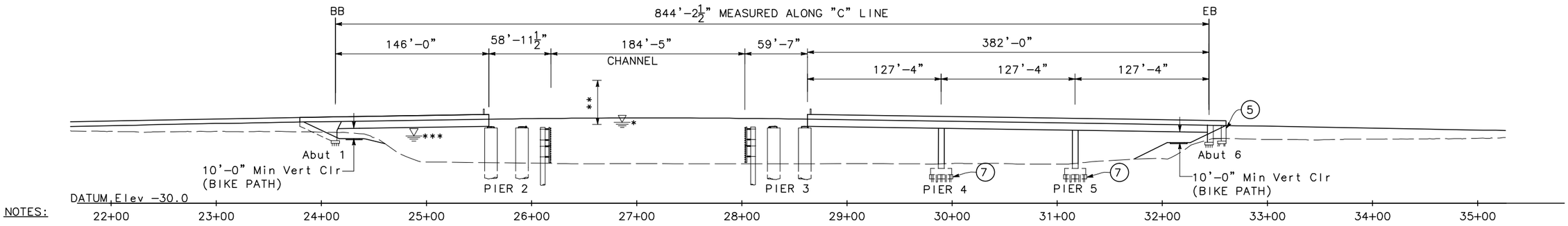


PROFILE GRADE
NO SCALE



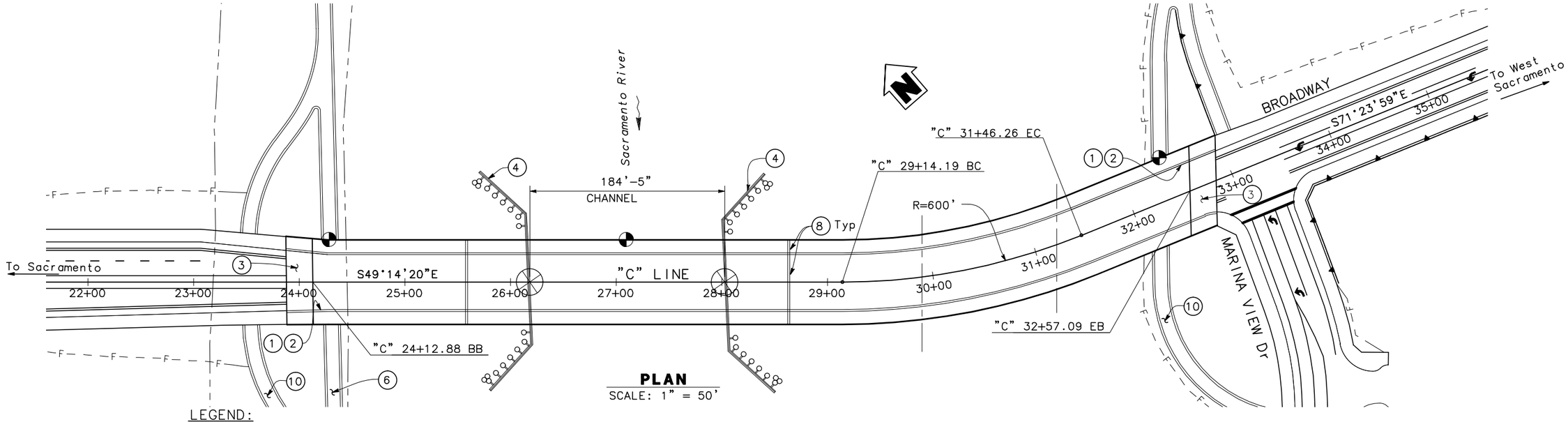
ELEVATION
SCALE: 1" = 50'

NOTES:

* − 200 YEAR WATER SURFACE ELEVATION = 36.4'

** − 3' Min Vert Clr LOWERED POSITION
55' Min Vert Clr RAISED POSITION

*** − SACRAMENTO RIVER FLOOD CONTROL PROJECT 1957 DESIGN FLOODPLAIN ELEVATION = 33.7'



PLAN
SCALE: 1" = 50'

LEGEND:

- POINT OF MINIMUM VERTICAL CLEARANCE
- (1) PAINT BRIDGE NAME
- (2) PAINT BRIDGE NUMBER
- (3) APPROACH SLAB
- (4) FENDER SYSTEM
- (5) RETAINING WALL
- (6) BIKE PATH
- (7) SEAL COURSE
- (8) TRAFFIC/PEDESTRIAN GATE & WARNING SIGNAL
- (9) LEVEE CUTOFF WALL
- (10) ACCESS ROAD
- (11) RSP

DESIGNED BY J. HICKEY	DATE 2-27-18	E. FREDRICKSON PROJECT ENGINEER	ALTERNATIVE C
DRAWN BY J. DOTY	DATE 2-27-18		BROADWAY BRIDGE PROJECT
CHECKED BY	DATE		GENERAL PLAN
APPROVED	DATE	BRIDGE NO. XXX	UNIT:
		SCALE: AS SHOWN	PROJECT NUMBER & PHASE: 03-XXXXXX

ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 7/16/10)

FILE => GP_C.DWG

CONTRACT NO.: X

PROJECT ID: 00000000000

USERNAME => JDOTY DATE PLOTTED => 28-Feb-18 TIME PLOTTED => 11:07 AM

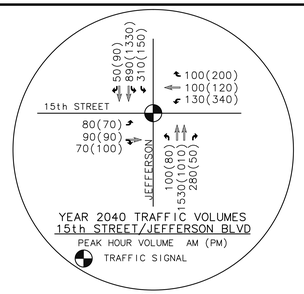
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 1 OF 3

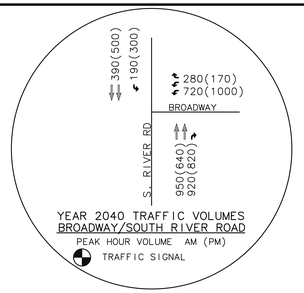
LEGEND/ ABBREVIATIONS

- L1 — LINE DATA (SEE TABLE)
- C2 — CURVE DATA (SEE TABLE)
- —F— FILL LIMITS
- —C— CUT LIMITS
- LEVEE SETBACK
- EXISTING RIGHT OF WAY
- PROPOSED RETAINING WALL
- A — INTERSECTION LOCATION
- A-A — CROSS SECTION LOCATION



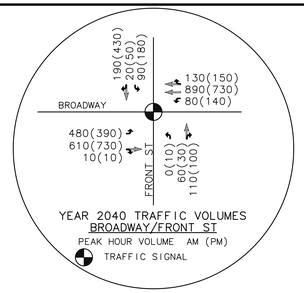
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



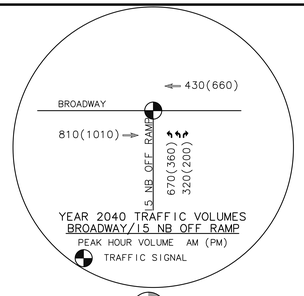
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



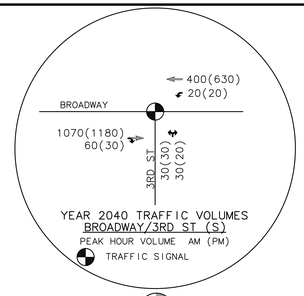
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

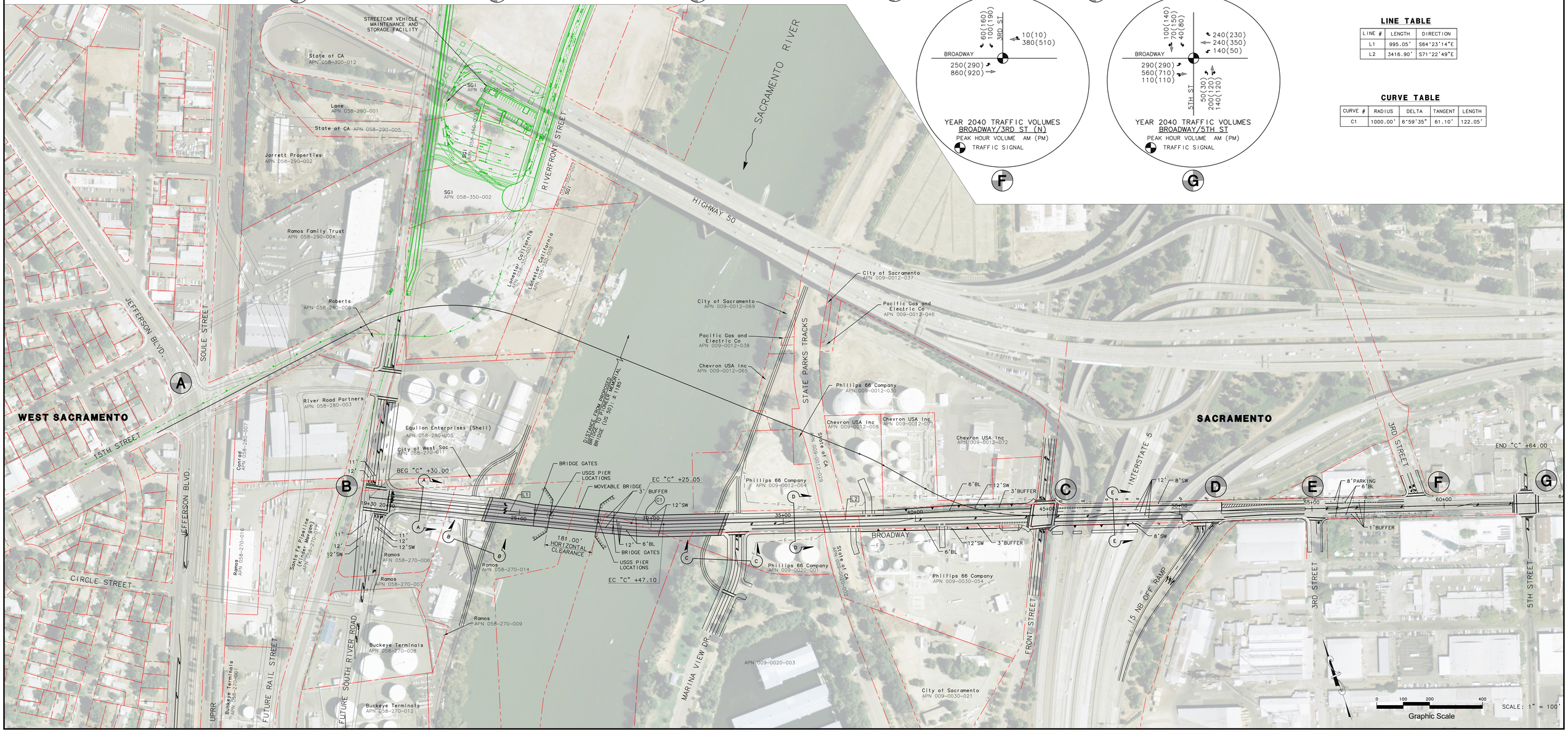
G

LINE TABLE

LINE #	LENGTH	DIRECTION
L1	995.05'	S64°23'14"E
L2	3416.90'	S71°22'49"E

CURVE TABLE

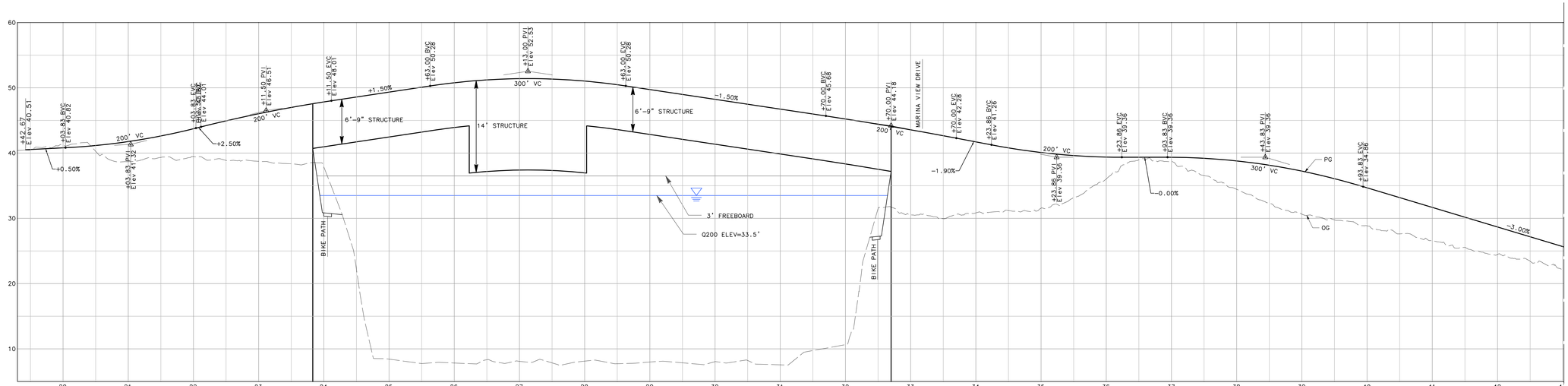
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1000.00'	6°59'35"	61.10'	122.05'



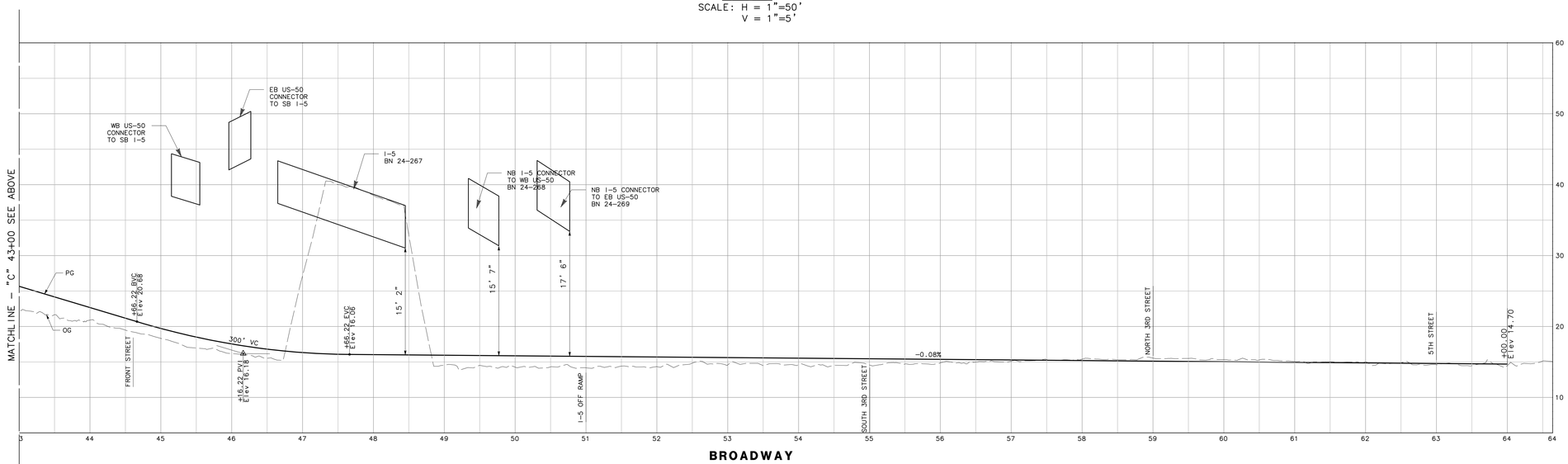
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 2 OF 3



BROADWAY
"C" LINE
SCALE: H = 1"=50'
V = 1"=5'

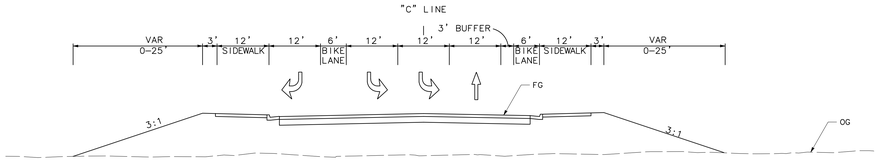


BROADWAY
"C" LINE
SCALE: H = 1"=50'
V = 1"=5'

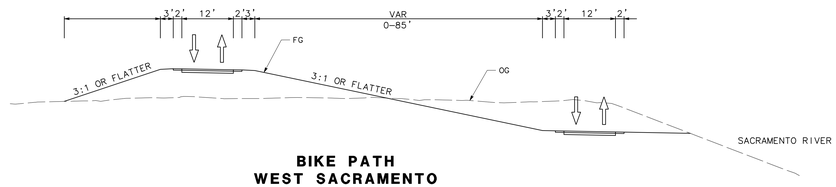
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

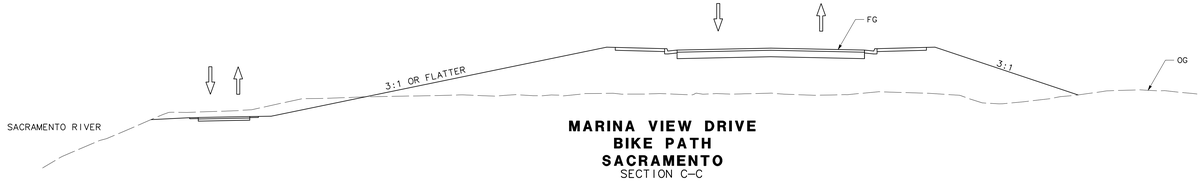
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110	SHEET 3
		FILE NO. XXX.dwg	OF 3



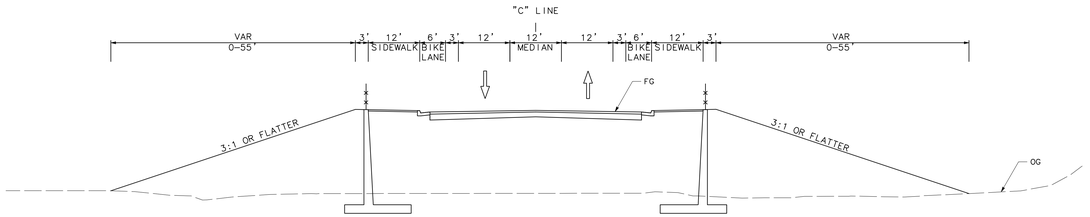
15TH STREET
WEST SACRAMENTO
SECTION A-A



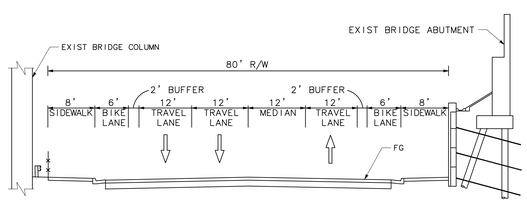
BIKE PATH
WEST SACRAMENTO
SECTION B-B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C-C



BROADWAY
SACRAMENTO
SECTION D-D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E-E

Appendix B Analysis of Alternatives Considered

MEMORANDUM

To:	Jason McCoy, City of West Sacramento	Project No.:	SA-17110
Cc:	Jesse Gothan, City of Sacramento		
From:	Zach Siviglia, Mark Thomas		
Date:	March 17, 2020		
RE:	**Broadway Bridge Alignment Memo**		

Purpose of Memorandum:

The City of West Sacramento requested Mark Thomas evaluate four alternative bridge alignments for the Broadway Bridge. In 2010, the cities of West Sacramento and Sacramento evaluated eight potential new Sacramento River crossings. The cities agreed to further develop two new crossings, one to replace the current I Street Bridge (which would relocate vehicle traffic to a new bridge just to the north of the existing I Street Bridge) and the other would be a new crossing between the Broadway corridor in the City of Sacramento to the Pioneer Bluff district in West Sacramento. This memorandum focuses on the new crossing south of the Pioneer Bridge (US 50), the Broadway Bridge.

On the West Sacramento side of the river, Alignment A connects to the existing alignment of 15th Street, Alignment B connects to the realigned alignment of 15th Street[1], Alignment C connects directly to South River Road, and Alignment D connects to Jefferson Boulevard at Circle Street. All alignments cross though privately-owned Riverfront Mixed-Use properties zoned "Waterfront" and intended to provide for a wide range of river-oriented commercial, retail, residential and public land uses. On the Sacramento side of the river, all alignments connect to Broadway with minimal impact to surrounding land uses with the exception of Alignment A which crosses through property owned by the Chevron Corporation. All other alignments follow the existing Broadway street right-of-way. See attachments for all alignment Geometric Approval Drawings.

In addition to connecting directly to Broadway in Sacramento, a connection to X Street was also considered. This memorandum evaluates the Bridge connection to X Street and Broadway.

The purpose of this memorandum is to evaluate these four alternatives based on evaluation criteria established by engineering and environmental professionals on the project team. Design criteria is used to differentiate the alternative and was determined due to the criteria's varying impacts on the alternatives.

Recommendation:

The evaluation criteria have been developed in coordination with the project team to evaluate the four bridge alignments. Each alignment has various benefits to the project, however, Alignments A and Alignment D, result in significant impacts to cultural resources, hazardous materials, and city planned street networks.

1. The City of West Sacramento developed a Pioneer Bluff and Stone Lock Reuse Master Plan - Broadway Bridge Integration Memorandum which included the future road network of Pioneer Bluff. See attachments for Pioneer Bluff Mobility Network.

Mark Thomas recommends that Alignment B and Alignment C are carried forward into the environmental document, with Alignment B being the preferred alternative. Table 1 provides a summary of the alignment evaluation.

During the Risk Workshop help on June 6th to June 8th, 2017, the team discussed the bridge connecting to X Street in Sacramento. Due to the factors associated with closing the I-5 X Street off ramp, connecting to X Street was eliminated from consideration, see further discussion in the "X Street Connection (Sacramento)" section.

Alignment	Traffic	Site Constraints	Biological Resources	Hazardous Materials	Visual Impacts	Construction Cost	Consistency with the Planned Street Network
A - Connect to existing 15th Street	●	●	○	●	○	○	●
B - Connect to Realigned 15th Street	●	○	○	●	○	●	●
C - Connect to South River Road	●	○	○	●	○	●	○
D - Connect to Jefferson at Circle Street	○	○	○	●	○	●	○
● BEST ○ AVERAGE ● WORSE							

Table 1: Alignment Evaluation

Traffic:

Fehr and Peers (F&P) performed preliminary traffic volume forecasting to determine the traffic patterns for each alternative. Alternative A and Alternative B were modeled together, as there is no difference to the traffic patterns for those alternatives. Alternatives A and B operate well in the existing, opening day, and design year conditions.

Alternative C operated slightly worse than the other alternatives, particularly in the opening day conditions at the South River Road and Broadway Bridge intersection.

Alignment D operates well, however traffic would necessitate that Circle Street between Jefferson Boulevard and South River Road be converted from a local street to an arterial and would also require a signal at Jefferson Boulevard and Circle Street. This arterial designation is not consistent with the residential character of the street, its intended function, or design.

Site Constraints:

Alignment A would also require 1,000 feet of adjustments to the State Parks railroad tracks on the Sacramento

side of the river. Additionally, Alignment A would necessitate a new rail crossing at the State Parks tracks. This is unlike the other alignments that would only require minor modifications to the existing track crossing.

Environmental:

Hazardous Materials

Due to existing industrial land uses that exist within the project area, there are hazardous materials and contamination plumes identified within the project area. There are also industrial storage tanks, petroleum products terminals and pipeline facilities identified within or near proposed alignments. These facilities are owned and operated by Shell (Equilon Enterprises) and Buckeye Terminals in West Sacramento and Chevron and Conoco Phillips in Sacramento.

Alignment A does not impact any tank farms in West Sacramento, however in Sacramento, the Chevron facilities would require relocation with selection of an A Alignment. On the Chevron site there is an existing plume of dissolved TPH-gasoline and multiple plumes of dissolved TPH-diesel, neither of which have been targeted by Chevron or the City of Sacramento for contamination remediation.

Alignment B directly impacts the Shell facilities in West Sacramento; however the alignment does not impact any tank farms in Sacramento. On the Shell site there is an existing plume of benzene, however in May 2017, the Port of West Sacramento secured an option to purchase the Shell property and as part of the purchase agreement, Equilon Enterprises will be required to remediate the contamination before the land is transferred.

Alignment C does not impact tank farm operations in West Sacramento or Sacramento.

Alignment D directly impacts the Buckeye Terminals tank farms that would require relocations, however, does not go through any tank farms in Sacramento. There is a plume of benzene just near the bridge touchdown which has no current plans for contamination remediation.

See Project Area Location Map figures prepared by SCS Engineers.

Construction Cost:

The largest factor in the project cost is the moveable bridge span and the moveable bridge span length. Per coordination with the US Coast Guard, Alignments A and B require a moveable span length of 170 feet, Alignment C requires a moveable span length of 180 feet, and Alignment D requires a moveable span length of 230 feet. Alignment D is about 35% and 28% longer than Alignments A and B and Alignment C respectively. Therefore, we can expect the cost of the moveable span for Alignment D to be in that range of magnitude higher than the other three alignments.

Alignment A also has some additional construction costs. In West Sacramento, due to impacts to planned developments the alignment requires Riverfront Street to be realigned and in Sacramento the cost of relocating 1,000 feet of State Parks tracks is an additional cost not required for Alignments B, C or D.

Consistency with the Planned Street Network:

Planning documents and several planned street networks that could be impacted by the Broadway Bridge project; including the West Sacramento Pioneer Bluff and Stone Lock Reuse Master Plan, the West Sacramento Riverfront Street Extension Project, the Bridge District Specific Plan, and Sacramento West Broadway Specific Plan.

West Sacramento Pioneer Bluff and Stone Lock Reuse Master Plan/Riverfront Street Extension Project/Bridge District Specific Plan

In January 2018, West Sacramento City Council, independent of the Broadway Bridge effort, approved Pioneer Bluff and Stone Lock Reuse Master Plan - Broadway Bridge Integration Memorandum. The memo included a mobility network which was to be used by the Broadway Bridge Project and summarized the approved mobility network and maximum employment and dwelling unit projections for the plan area. The memorandum also included the approximate timeline for implementation of the phases of the mobility network, and the timeline for reuse and development of the other land in the plan area. The West Sacramento City Council approved the Pioneer Bluff and Stone Lock Reuse Master Plan - Broadway Bridge Integration Memorandum under the impression that the Broadway Bridge could potentially impact the approved street network. The memorandum was prepared to understand to what extent the Broadway Bridge would have an impact on the City of West Sacramento's proposed grid network. In addition to the approved mobility network, the City of West Sacramento also proposes to extend Riverfront Street approximately 0.15 mile to the south to accommodate circulation and access to a maintenance facility. Below is a summary of impacts each Broadway Bridge alignment would have on the approved street network.

Alignment A would conflict with the mobility network and the Riverfront Extension Project and would require modifications. This alignment also conflicts with planned development of the former Cemex property as identified in the Bridge District Specific Plan. The intersection of South River Road and 15th Street was planned to be realigned about 270 feet south, however if Alignment A would require 15th Street to remain in place. With 15th Street maintaining its existing alignment, Riverfront Street would need to be realigned from its planned location, reducing the planned development potential of adjacent properties. The maintenance facility, however, would not require modifications. There would be a decrease in the intersection spacing between South River Road and 15th Street, Riverfront Street, and the eastbound US 50 on ramp compared to the mobility network planned.

Alignment B is consistent with the realigned 15th Street and would not require modifications to the planned mobility network.

Alignment C would add a new intersection between 15th Street and Circle Street. This would reduce the developable parcel area, as well as require an additional signal along South River Road, otherwise not anticipated by the mobility network.

Alignment D, as mentioned in the traffic section, would necessitate Circle Street between Jefferson Boulevard and South River Road be an arterial, instead of the planned local street. It would accelerate the construction of Circle Street to opening year 2030. Alignment D would also require a new signal at Jefferson Boulevard and Circle Street, which was planned to be stop controlled in the mobility network. Although there are no traffic implications, another concern would be the optics of connecting directly to a neighborhood and the impact could have public concerns.

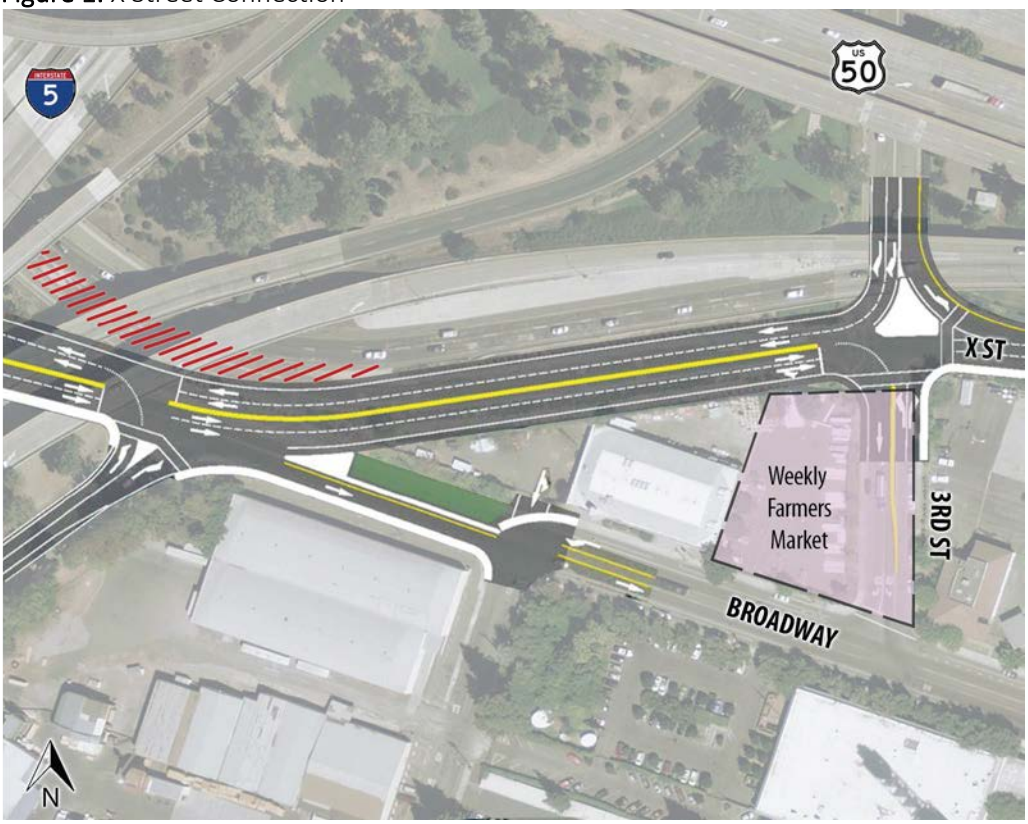
West Sacramento Riverfront Extension Project

West Sacramento proposes to extend Riverfront Street to South River Road. Broadway Bridge Alignment A conflicts with the proposed alignment for the Riverfront Street extension and would require the Riverfront Street to be realigned to the north. Alignments B, C, and D do not conflict.

Sacramento West Broadway Specific Plan
In May 2018, the City of Sacramento kicked off the West Broadway Specific Plan and the public draft Specific Plan EIR is expected to be released in 2019. Per administrative draft review, Alignment A has been identified in conflict with the West Broadway Specific Plan. Alignments B, C, and D do not conflict.

X Street Connection (Sacramento):
A Risk Assessment Workshop was held June 6th to June 8th, 2017, to identify project risks to the cost and schedule. One of the risks identified was if the project connected Broadway Bridge to X Street, see Figure 1 below, the I-5 X Street off-ramp would be required to close. The X Street concept was developed to divert traffic from Broadway due to the community concerns with connecting the new bridge directly to Broadway. The Risk Assessment Workshop, which was attended by the project team members, as well as Caltrans representatives from Project Management, Design, Traffic, Structures, and Environmental, discussed the potential ramp closure. If the X Street off-ramp were to close, the traffic would be diverted to other exits. F&P prepared a Risk Analysis Workshop handout (Attachment G) with daily traffic forecast for the various alternatives. The no build forecast at the 15th Street exit is about 12,800 vehicles per day. If the X Street off ramp were to close, there would be an increase in traffic at US-50 eastbound off-ramp to 15th Street (about 2,100 ADT), increase in traffic on the I-5 SB off-ramp to Q Street (about 1,600 ADT), and an increase in traffic on the I-5 southbound off ramp to Sutterville Road (850 ADT). Caltrans expressed that they would not support closing the X Street off ramp due to the impacts to the off-ramps described above. Based on the feedback from Caltrans, the team decided to develop other strategies of diverting traffic from Broadway.

Figure 1: X Street Connection



The City of Sacramento has a capital project to convert the existing 3rd Street between X Street and W Street

from a southbound one-way road to a two-way road. The City of Sacramento also has plans to convert the existing 5th Street from a northbound one-way road to a two-way road. By converting these roads to two-way travel, there are more opportunities for traffic to disperse through downtown. F&P prepared the Broadway Bridge - Broadway / X Street Realignment Connection Memorandum which evaluated the design year traffic volumes down Broadway based on the X Street connection, direct Broadway connection, and a Broadway / X Street realignment connection. The additional traffic that would result from a direct connection to Broadway is about 400 to 500 vehicles per day more than the Broadway / X Street realignment connection or the X Street connection (see Table 2). The vehicles from the Broadway Bridge will disperse using mostly Front Street, but also 3rd Street, and 5th Street (see Figure 2). F&P also evaluated the intersection level of service and found that with a direct connection to Broadway all intersections operated at a level of service D or better (see Table 3). The X Street Connection was eliminated based on feedback from Caltrans at the Risk Assessment Workshop. After traffic analysis was conducted, it was found that there is not a substantial amount of traffic being added to Broadway due to the redundancy in north-south connections to downtown. Since there was not substantial amount of traffic added to Broadway, there was no need to develop strategies to divert traffic from Broadway.

Figure 2: Select Link Analysis that traces all trips using the bridge (2040 Daily Volumes)

Table 2: The table summarizes the ADT based on Fehr and Peers Memorandum, see Attachment F

2040 ADT Volumes				
Alternative	On Broadway: Between 5th Street to Riverside Boulevard	On Broadway: Between Riverside Boulevard to 16th Street	On Front Street: Between Broadway and V Street	On X Street: Between 5th Street and 8th Street
No Project	5,300	5,200	5,400	17,800
Broadway Connection	8,300	6,900	10,400	18,100
X Street Connection	7,400	6,400	9,500	19,300

Table 3: The table that summarizes intersection LOS based on Fehr & Peers Memorandum, see Attachment F

Intersection	East Connection - Broadway		
	Control Type	Delay / LOS	
		AM	PM
Broadway / Front Street	Signalized	47 / D	39 / D
Broadway / I-5 NB Off-Ramp	Signalized	19 / B	9 / A
X Street / 3rd Street / I-5 SB Off-Ramp	Side Street Stop	10 / B	11 / B
Broadway / 3rd Street	Signalized	13 / B	18 / B
Notes: For Signalized intersections, delay is reported in seconds per vehicles for the overall intersection. For side street stop controlled intersections, delay is reported in seconds per vehicle for the worst movement. Source: Fehr & Peers, 2015.			

Attachments:

- **Attachment A**: West Sacramento Pioneer Bluff and Stone Lock District Reuse Master Plan - Broadway Bridge Integration Memorandum
- **Attachment B**: SCS Engineers - Project Exhibits
- **Attachment C**: Geometric Approval Drawings: Alignments A, B, C, and D
- **Attachment D**: Broadway Bridge Alignment Progression Memo
- **Attachment E:** Broadway Bridge Risk Assessment Report
- **Attachment F:** Broadway Bridge - Broadway / X Street Realignment Connection Memorandum
- **Attachment G:** Risk Analysis Workshop - Traffic Forecast

Broadway Bridge Alignment Memo, Attachment A

West Sacramento Pioneer Bluff and Stone Lock District Reuse Master Plan – Broadway Bridge Integration Memorandum

City of West Sacramento
Memorandum

TO: Jason McCoy, Supervising Transportation Planner

FROM: Katie Yancey, Sr. Program Manager

DATE: 5/14/2018

SUBJECT: Pioneer Bluff and Stone Lock District Reuse Master Plan – Broadway Bridge Integration

---

On January 17, 2018, the City Council approved four recommendations for the Pioneer Bluff and Stone Lock Reuse Master Plan (Master Plan) that materially impact the Broadway Bridge Project. These recommendations are summarized below.

Recommendation #1
The Master Plan is funded by a State Strategic Growth Council Sustainable Communities Planning (SGC) grant. The SCG work program requires that the Master Plan include a recommended conceptual multi-modal circulation network (Mobility Network) for the Master Plan area that includes planned and recommended mobility improvements.

At the January 17th meeting, staff presented four Mobility Network alternatives and recommended an alternative to satisfy the SGC grant requirement. The City Council approved staff's recommendations with modifications. The revised Mobility Network (Alternative 5) is provided as Attachment 1.

Recommendation #2
The recommended Mobility Network was accompanied by a layered network exhibit. This exhibit was to be used for developing the network's cross-sections and ranking the trade-offs of various functions within a right-of-way. The City Council approved the use of the recommended layered network, with modifications, to develop cross-section recommendations for the Master Plan. The revised layered network for Alternative 5 is provided as Attachment 2. This exhibit was used to project the future number of lanes and rights-of-way (ROW) widths for the each of the proposed roads in Alternative 5 which is provided as Attachment 3.

AECOM has developed a preliminary layout for Alternative 5 based on the approved layered network. This layout, and its accompanying cross-sections, will be incorporated into the Master Plan as a recommendation. Alternative 5's preliminary layout is provided as Attachment 4. This recommended layout has not been approved by the City Council. Note, the Master Plan will not be subject to environmental review at the time staff seeks approval of the Master Plan. The Master Plan is an advisory document; the SGC grant work program explicitly states that the Master Plan must be in a format that does not trigger California Environmental Quality Act (CEQA).

Recommendation #3
The City Council approved staff's recommendation to conduct the Broadway Bridge's cumulative traffic impacts analysis using Alternative 5.

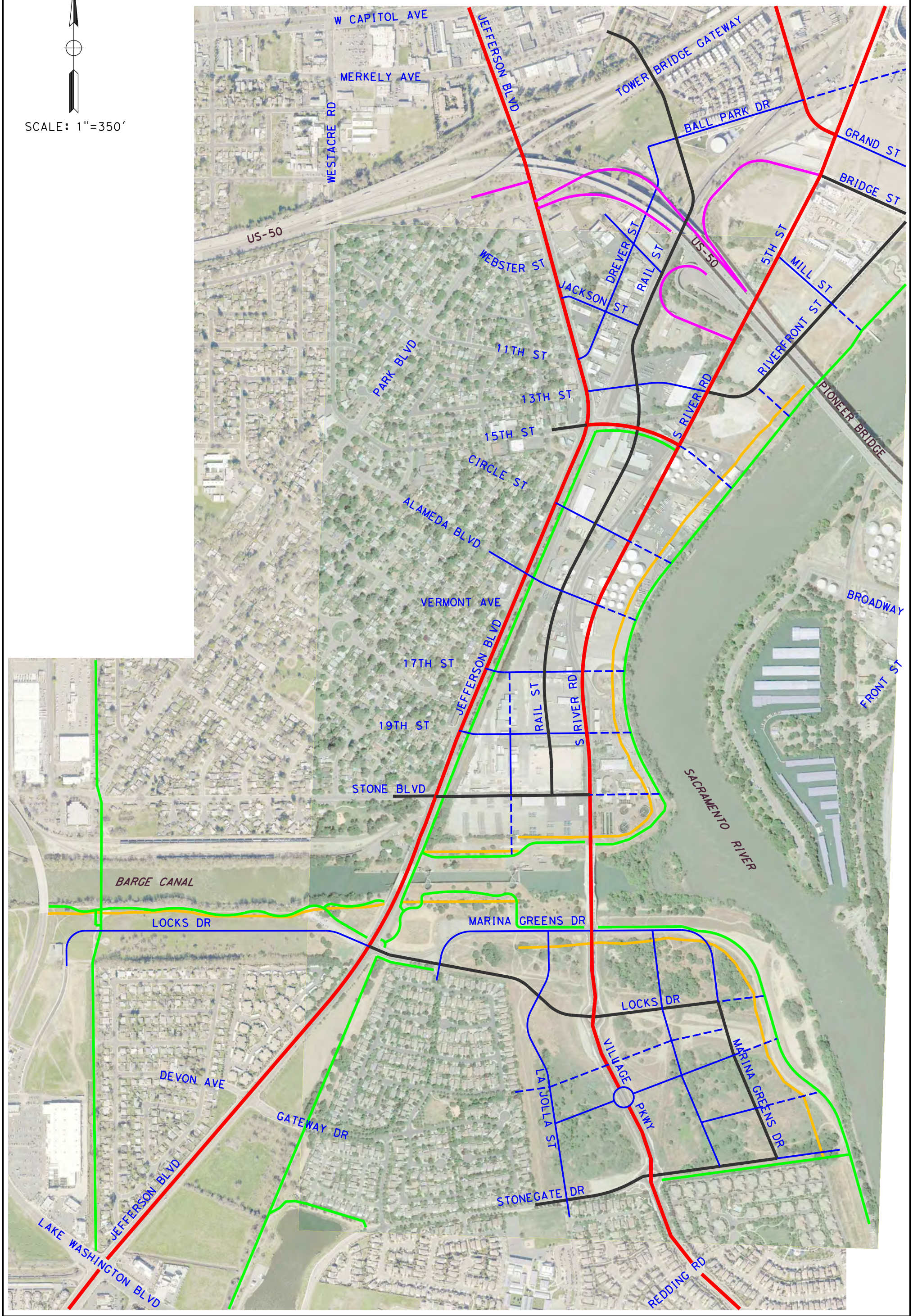
Recommendation #4

The City Council approved staff's recommendation to develop the opening-day condition for the roadway network based on Alternative 5. Attachments 5-8 are the Mobility Network phasing diagrams. Each diagram represents a 5-year period following approval of the Master Plan. On each of the phasing diagram are notes that describe relevant implementation activities contemplated, but not always governed, by the Master Plan. A description of these activities are provided in Volumes III and IV of the Master Plan. On the Attachment 5, interim improvements are shown for Jefferson Blvd, South River Road and Locks Dr. For Jefferson Blvd., the proposed interim improvements are effectively the permanent roadway condition. The interim improvements on South River Road are expected remain 2033. The conceptual layout for the interim conditions are provided as Attachment 9.

Volume III of the Master Plan contains a Land Development Strategy. Sections of that strategy include the identification of conceptual neighborhoods, which organize sub-areas of the Master Plan into six geographic areas with similar character and transition barriers, and their build-out projections. The conceptual neighborhoods will be incorporated into the Master Plan as a recommendation. The conceptual neighborhoods exhibit is provided as Attachment 10. Maximum, target and minimum development scenarios have been developed for the six Master Plan neighborhoods and will also be incorporated into the Master Plan as a recommendation. The neighborhoods' maximum projections for employment and dwelling units are provided as Attachment 11.

Attachment 1

SCALE: 1"=350'



LEGEND

- ARTERIAL
- COLLECTOR
- FREEWAY RAMP
- MULTI-USE TRAIL
- PROPOSED ROUNDABOUT
- LEVEE SETBACK
- LOCAL
- UNIVERSAL ST

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WEST SACRAMENTO, CALIFORNIA 95691

AECOM
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2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

MOBILITY NETWORK
ALTERNATIVE 5 - MARCH 2018

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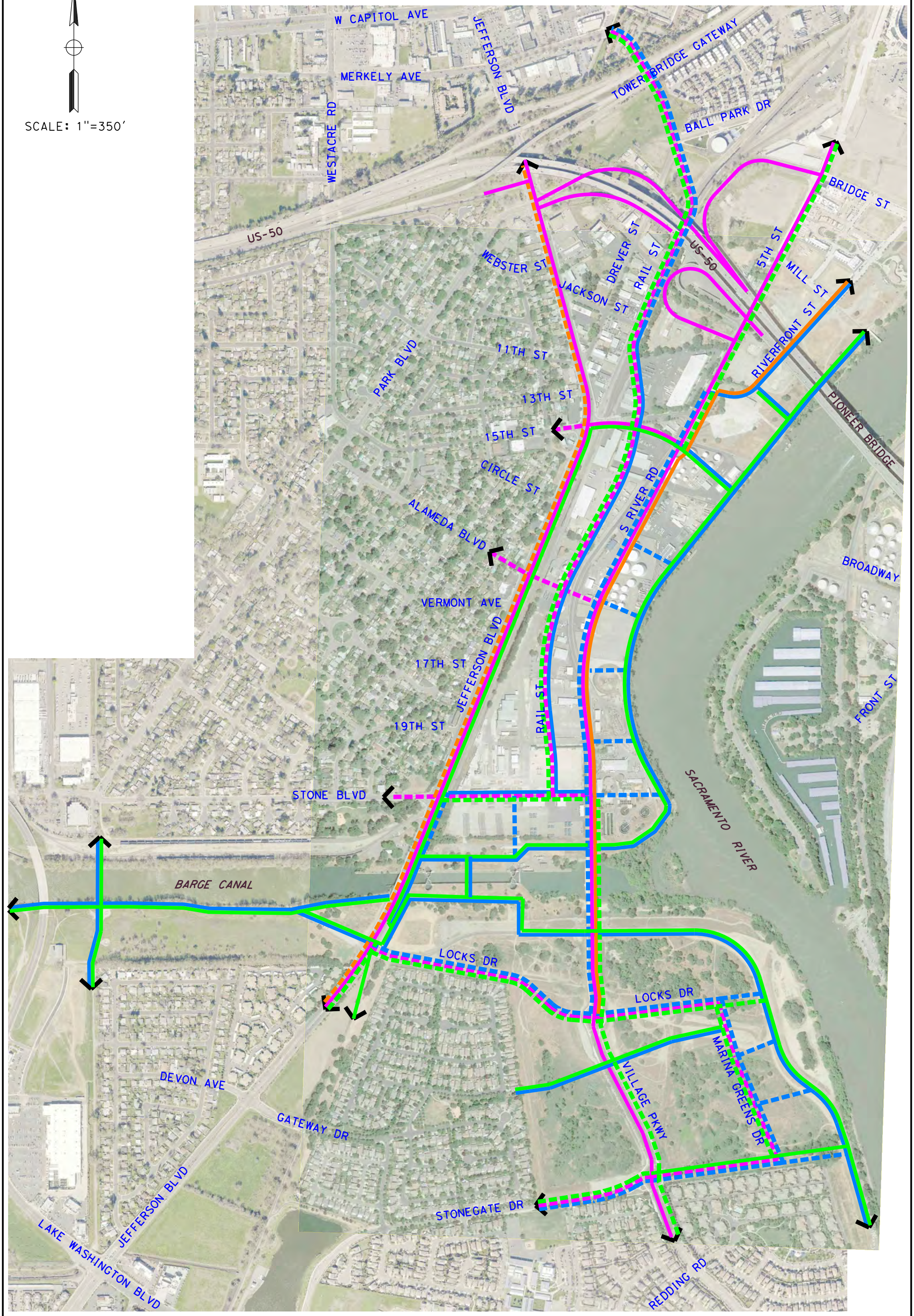
Attachment 2

SCALE: 1"=350'



LEGEND

- AUTO PRIMARY
- AUTO SECONDARY
- PEDESTRIAN PRIMARY
- PEDESTRIAN SECONDARY
- TRANSIT SECONDARY
- BIKE PRIMARY
- BIKE SECONDARY
- TRANSIT PRIMARY

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

LAYERED NETWORK
ALTERNATIVE 5 - MARCH 2018

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Attachment 3

SCALE: 1"=350'

W CAPITOL AVE (4/ 80')
MERKELY AVE
WESTACRE RD
JEFFERSON BLVD
TOWER BRIDGE GATEWAY (2/ 60') (2/ 68')
BALL PARK DR (2/ 48')
GRAND ST (4/ 98')
BRIDGE ST (4/ 92')
US-50
WEBSTER ST (4/ 105')
DREVER ST
RAIL ST
JACKSON ST (2/ 76')
5TH ST
MILL ST
RIVERFRONT ST (2/ 80')
PARK BLVD
11TH ST
13TH ST (2/ 60')
15TH ST (4/ 104')
S RIVER RD (4/ 92') (4/ 80')
PIONEER BRIDGE (0/ 60') (0/ 40')
CIRCLE ST
ALAMEDA BLVD (2/ 60') (0/ 40')
VERMONT AVE (2/ 70') (0/ 40')
BROADWAY
17TH ST (4/ 106') (0/ 40')
19TH ST (0/ 40')
FRONT ST
STONE BLVD (2/ 80') (2/ 60') (0/ 40')
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR (2/ 48')
MARINA GREENS DR (2/ 60') (2/ 48') (2/ 48') (2/ 66') (2/ 60')
(2/ 66') (0/ 40')
VILLAGE PKWY (0/ 40') (2/ 60') (4/ 100') (2/ 60') (2/ 70') (0/ 40')
LA JOLLA ST (2/ 60')
(2/ 60') (2/ 60') (2/ 60')
STONEGATE DR (2/ 80')
DEVON AVE
(4/ 110')
GATEWAY DR
JEFFERSON BLVD
LAKE WASHINGTON BLVD
REDDING RD

LEGEND
(2/ 80') ---------- NUMBER OF THRU LANES/ RIGHT OF WAY WIDTH (FEET)
ARTERIAL
COLLECTOR
FREEWAY RAMP
MULTI-USE TRAIL
LOCAL
UNIVERSAL ST

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
LANES & ROW
ALTERNATIVE 5 - MARCH 2018

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Attachment 4

SCALE: 1"=350'

W CAPITOL AVE
JEFFERSON BLVD
MERKELY AVE
TOWER BRIDGE GA
WESTACRE RD
BALL PARK DR
GRAND ST
BRIDGE ST
US-50
WEBSTER ST
DREVER ST
RAIL ST
US-50
5TH ST
MILL ST
JACKSON ST
RIVERFRONT ST
PARK BLVD
11TH ST
13TH ST
PIONEER BRIDGE
15TH ST
CIRCLE ST
S RIVER RD
ALAMEDA BLVD
VERMONT AVE
UNIVERSAL ST (TYP)
BROADWAY
JEFFERSON BLVD
17TH ST
19TH ST
FRONT ST
RAIL ST
S RIVER RD
STONE BLVD
SACRAMENTO RIVER
BARGE CANAL
MULTI-USE TRAIL (TYP)
LOCKS DR
MARINA GREENS DR
LOCKS DR
VILLAGE PKWY
MARINA GREENS DR
DEVON AVE
GATEWAY DR
LA JOLLA ST
JEFFERSON BLVD
STONEGATE DR
LAKE WASHINGTON BLVD
REDDING RD

LEGEND

- ROAD CENTERLINE
- EDGE OF PAVEMENT
- STRIPING (SOLID)
- STRIPING (LANE LINE)
- STRIPING (2-WAY LEFT TURN LANE)

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CITY OF WEST SACRAMENTO

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
CONCEPTUAL LAYOUT
ALTERNATIVE 5 - MARCH 2018

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Attachment 5

SCALE: 1"=350'

W CAPITOL AVE
JEFFERSON BLVD
MERKELY AVE
TOWER BRIDGE GATEWAY
BALL PARK DR
WESTACRE RD
BRIDGE ST
US-50
DREVER ST
5TH ST
MILL ST
RIVERFRONT ST
WEBSTER ST
JACKSON ST
SOULE ST
PARK BLVD
11TH ST
13TH ST
15TH ST
S RIVER RD
PIONEER BRIDGE
CIRCLE ST
ALAMEDA BLVD
VERMONT AVE
BROADWAY
17TH ST
19TH ST
STONE BLVD
FRONT ST
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR
DEVON AVE
GATEWAY DR
VILLAGE PKWY
STONEGATE DR
LA JOLLA ST
REDDING RD
LAKE WASHINGTON BLVD

LEGEND
- PERMANENT IMPROVEMENTS
- INTERIM IMPROVEMENTS
- PREVIOUSLY CONSTRUCTED
- UNIVERSAL ST
- POSSIBLE BRIDGE CONNECTION

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

AECOM
ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
MOBILITY NETWORK-PH1
1 TO 5 YEARS - ALTERNATIVE 5 - APRIL 2018

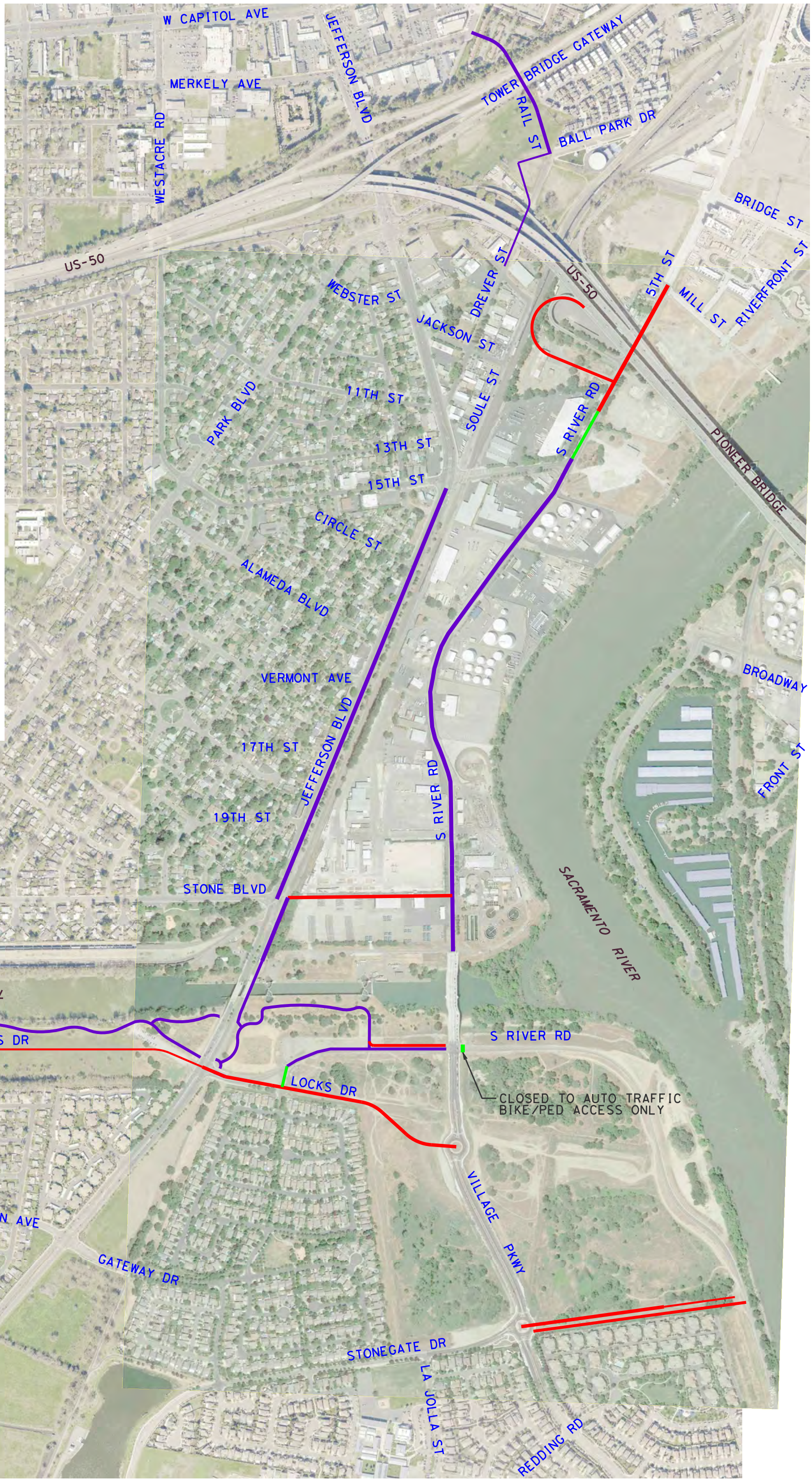
P:\60555240 - Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5-Phase1.dgn

Attachment 6

SCALE: 1"=350'

NOTE:
THE FOLLOWING OCCURS DURING THIS PHASE:

- RAIL RELOCATION
- SHELL OIL DEMOLITION
- CORPORATION YARD DEMOLITION
- SOUTH PIONEER BLUFF
- BUSINESS RELOCATION



LEGEND

- PERMANENT IMPROVEMENTS
- INTERIM IMPROVEMENTS
- PREVIOUSLY CONSTRUCTED
- UNIVERSAL ST
- POSSIBLE BRIDGE CONNECTION

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

AECOM
ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

MOBILITY NETWORK-PH2
5 TO 10 YEARS - ALTERNATIVE 5 - APRIL 2018

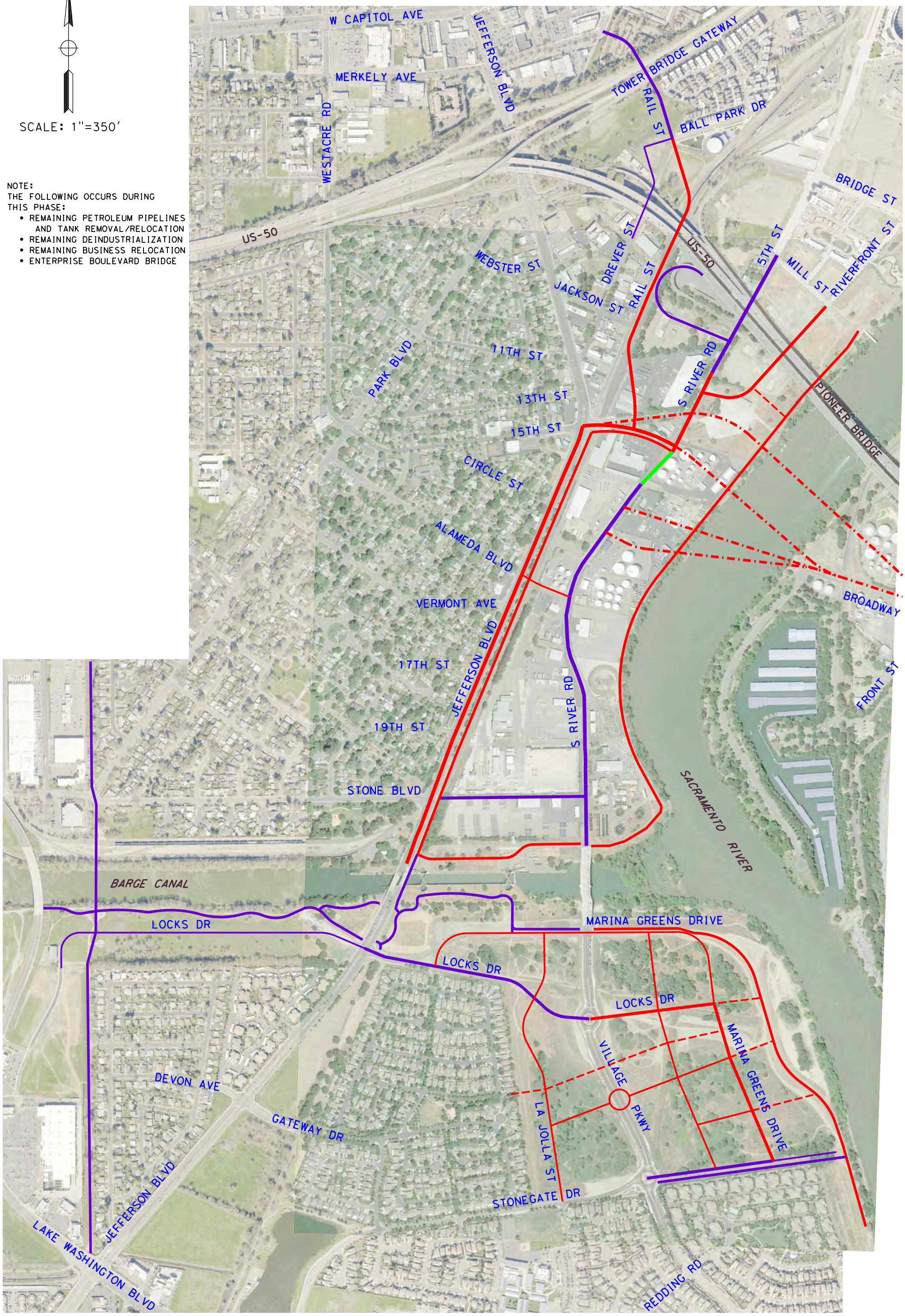
P:\60555240 – Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5-Phase2.dgn

Attachment 7

SCALE: 1"=350'

NOTE:
THE FOLLOWING OCCURS DURING THIS PHASE:

- REMAINING PETROLEUM PIPELINES AND TANK REMOVAL/RELOCATION
- REMAINING DEINDUSTRIALIZATION
- REMAINING BUSINESS RELOCATION
- ENTERPRISE BOULEVARD BRIDGE



LEGEND

- PERMANENT IMPROVEMENTS
- INTERIM IMPROVEMENTS
- PREVIOUSLY CONSTRUCTED
- UNIVERSAL ST
- POSSIBLE BRIDGE CONNECTION

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

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2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

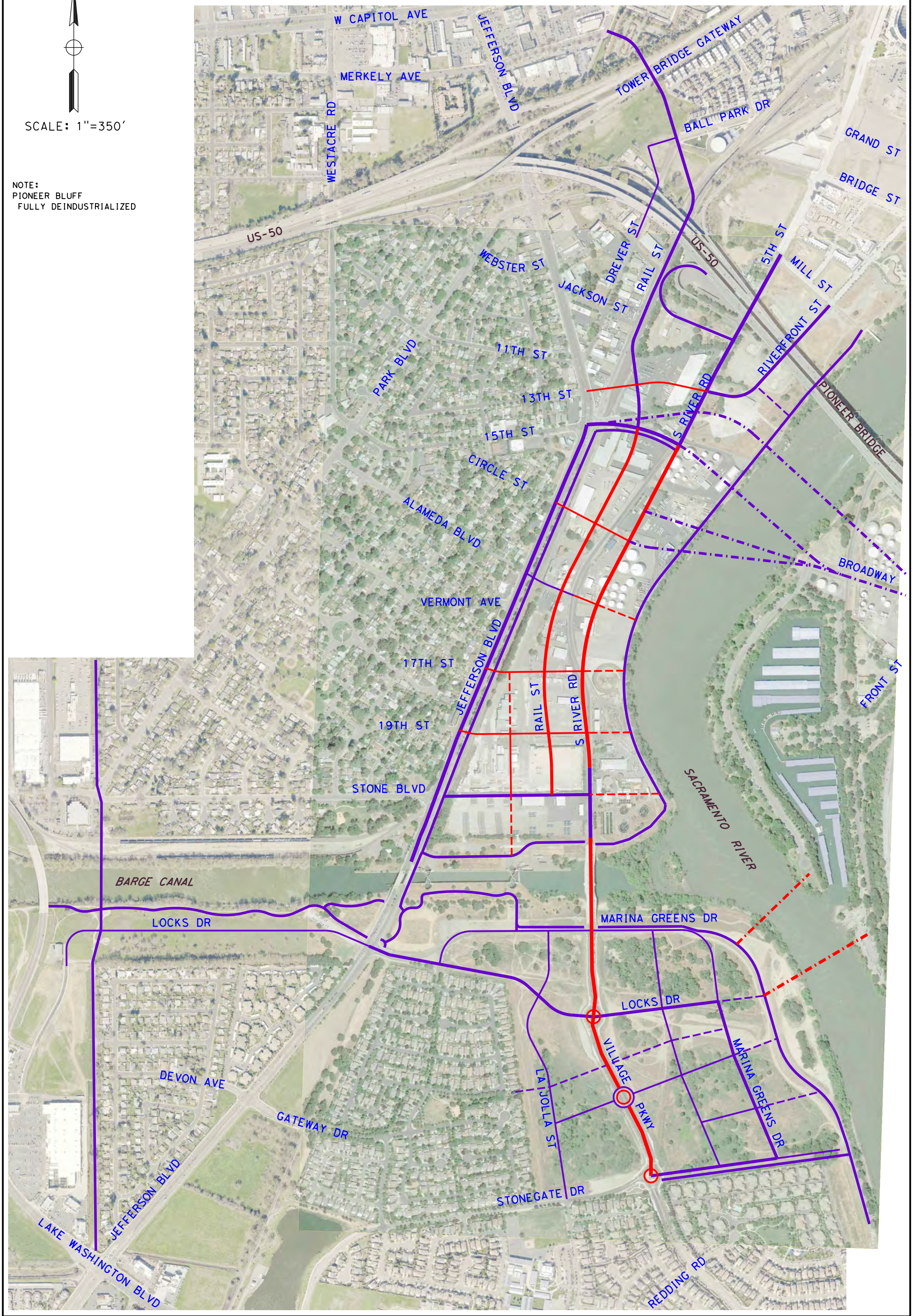
MOBILITY NETWORK-PH3
10 TO 15 YEARS - ALTERNATIVE 5 - APRIL 2018

P:\60555240 – Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5-Phase3.dgn

Attachment 8

SCALE: 1"=350'

NOTE:
PIONEER BLUFF
FULLY DEINDUSTRIALIZED



LEGEND
- PERMANENT IMPROVEMENTS
- INTERIM IMPROVEMENTS
- PREVIOUSLY CONSTRUCTED
- UNIVERSAL ST
- POSSIBLE BRIDGE CONNECTION

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

AECOM
ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

MOBILITY NETWORK-PH4
15+ YEARS - ALTERNATIVE 5 - APRIL 2018

P:\60555240 – Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5-Phase4.dgn

Attachment 9

SCALE: 1"=350'

ABBREVIATIONS:

PED	PEDESTRIAN
ROW	RIGHT OF WAY

W CAPITOL AVE
JEFFERSON BLVD
MERKELY AVE
TOWER BRIDGE GATEWAY
WESTACRE RD
BALL PARK DR
GRAND ST
BRIDGE ST
RIVERFRONT ST
US-50
WEBSTER ST
DREVER ST
SOULE ST
JACKSON ST
5TH ST
MILL ST
PARK BLVD
11TH ST
CONFORM TO PROPOSED CYCLE TRACK IMPROVEMENTS
13TH ST
15TH ST
PIONEER BRIDGE
RESTRIPE LANES AND CONSTRUCT CYCLE TRACK AND PLANTERS
CIRCLE ST
S RIVER RD
ALAMEDA BLVD
CLOSE GAPS IN PED ROUTE
CONSTRUCT TRAFFIC SIGNAL
BROADWAY
VERMONT AVE
INSTALL STREET LIGHTING
17TH ST
JEFFERSON BLVD
MAINTAIN ACCESS TO CITY CORP YARD
FRONT ST
19TH ST
S RIVER RD
SACRAMENTO RIVER
MAINTAIN ACCESS TO BUSINESSES
STONE BLVD
BARGE CANAL
CONSTRUCT PERMANENT IMPROVEMENTS (ROW REQUIRED)
LOCKS DR
ADD BIKE LANES
DEVON AVE
VILLAGE PKWY
GATEWAY DR
JEFFERSON BLVD
STONEGATE DR
LA JOLLA ST
LAKE WASHINGTON BLVD
REDDING RD

LEGEND

- ROAD CENTERLINE
- EDGE OF PAVEMENT
- STRIPING (SOLID)
- STRIPING (LANE LINE)
- STRIPING (2-WAY LEFT TURN LANE)

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

CITY OF WEST SACRAMENTO

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ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
CONCEPTUAL LAYOUT
INTERIM ALTERNATIVE 5 - MAY 2018

P:\60555240 – Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5-Interim Layout.dgn

Attachment 10

SCALE: 1"=350'

W CAPITOL AVE
MERKELY AVE
WESTACRE RD
JEFFERSON BLVD
TOWER BRIDGE GATEWAY
BALL PARK DR
GRAND ST
BRIDGE ST
US-50
WEBSTER ST
JACKSON ST
DREVER ST
RAIL ST
5TH ST
MILL ST
RIVERFRONT ST
PARK BLVD
11TH ST
13TH ST
15TH ST
CIRCLE ST
ALAMEDA BLVD
VERMONT AVE
17TH ST
19TH ST
STONE BLVD
S RIVER RD
PIONEER BRIDGE
BROADWAY
FRONT ST
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR
MARINA GREENS DR
VILLAGE PKWY
LA JOLLA ST
STONEGATE DR
DEVON AVE
GATEWAY DR
LAKE WASHINGTON BLVD
REDDING RD

North Pioneer Bluff
Central Pioneer Bluff
South Pioneer Bluff
Lock Center
Barge Canal
South Stone Lock

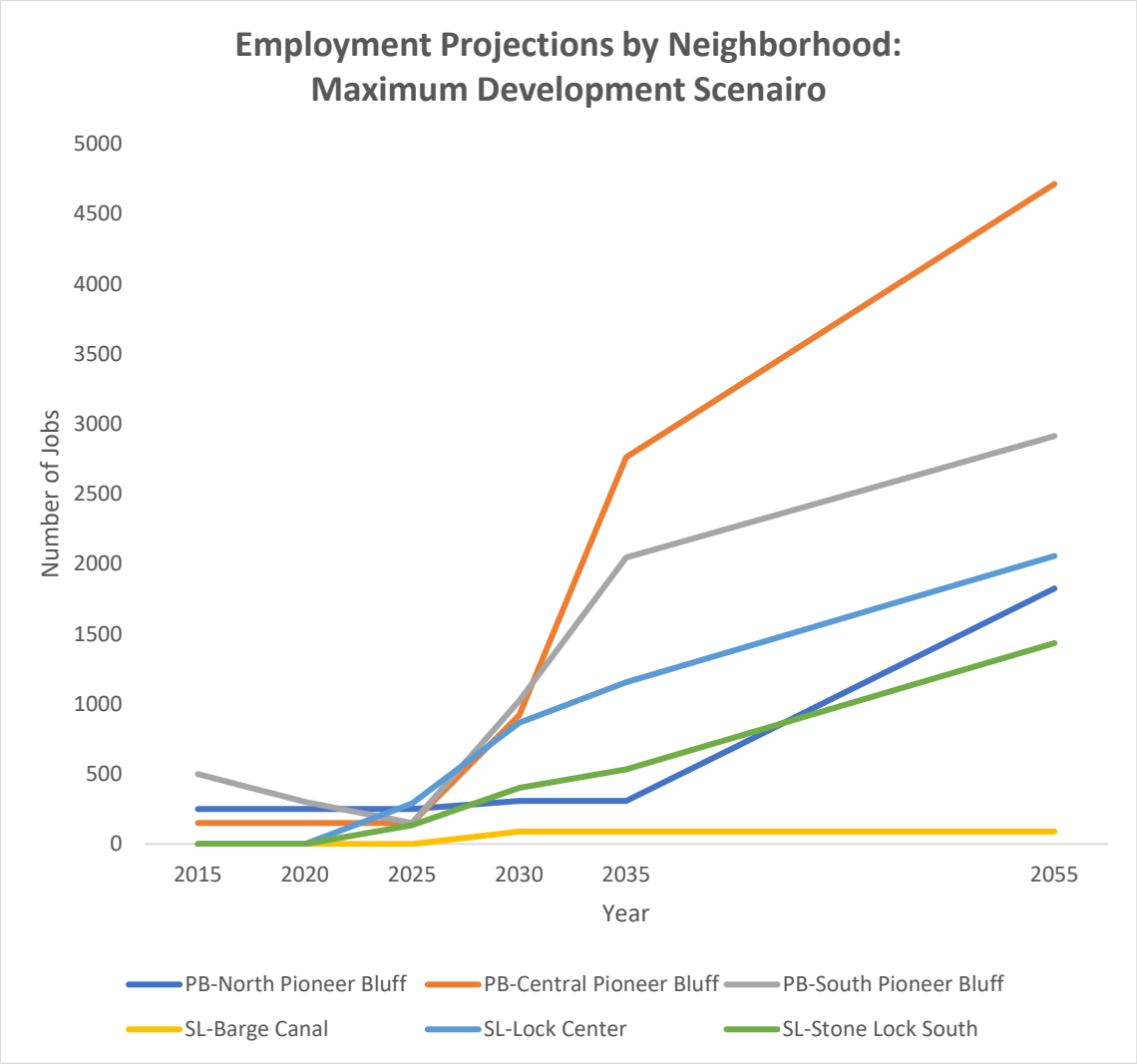
LEGEND
ARTERIAL
COLLECTOR
FREEWAY RAMP
PROPOSED ROUNDABOUT
LOCAL
UNIVERSAL ST

CITY OF WEST SACRAMENTO
ECONOMIC DEVELOPMENT & HOUSING DEPARTMENT
1110 WEST CAPITOL AVENUE
WEST SACRAMENTO, CALIFORNIA 95691

AECOM
ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
NEIGHBORHOODS
ALTERNATIVE 5 - MARCH 2018

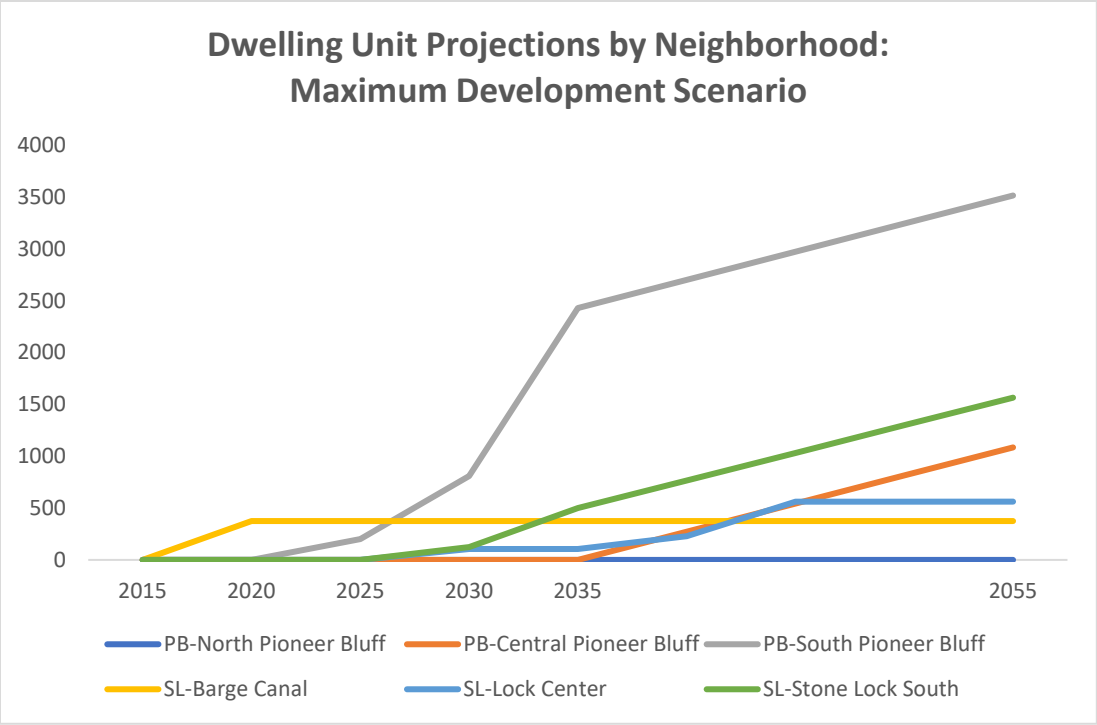
P:\60555240 – Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5.dgn



Employment Projections by Neighborhood: Maximum Development Scenario

Neighborhoods	**2015**	**2020**	**2025**	**2030**	**2035**	**2055***
PB-North Pioneer Bluff	250	250	250	307	307	1,826
PB-Central Pioneer Bluff	150	150	150	921	2,763	4,715
PB-South Pioneer Bluff	500	300	150	1,023	2,047	2,914
SL-Barge Canal	0	0	0	89	89	89
SL-Lock Center	0	0	289	867	1,156	2,057
SL-Stone Lock South	0	0	133	401	534	1,435
Total	**900**	**700**	**972**	**3,608**	**6,895**	**13,036**

*estimated full build out date



Dwelling Unit Projections by Neighborhood: Maximum Development Scenario

Location	2015	2020	2025	2030	2035	2055
PB-North Pioneer Bluff	0	0	0	0	0	0
PB-Central Pioneer Bluff	0	0	0	0	0	1086
PB-South Pioneer Bluff	0	0	200	810	2431	3517
SL-Barge Canal	0	375	375	375	375	375
SL-Lock Center	0	0	0	105	105	562
SL-Stone Lock South	0	0	0	125	500	1566
Total	**0**	**375**	**575**	**1415**	**3411**	**7105**

Broadway Bridge Alignment Memo, Attachment B

SCS Engineers – Project Exhibits

Source: Google Earth Pro 2016

SCS ENGINEERS
Environmental Consultants
And Contractors

7041 Koll Center Parkway,
Suite 135
Pleasanton, CA 94566
Ph: (925) 426-0080
Fax: (925) 426-0707

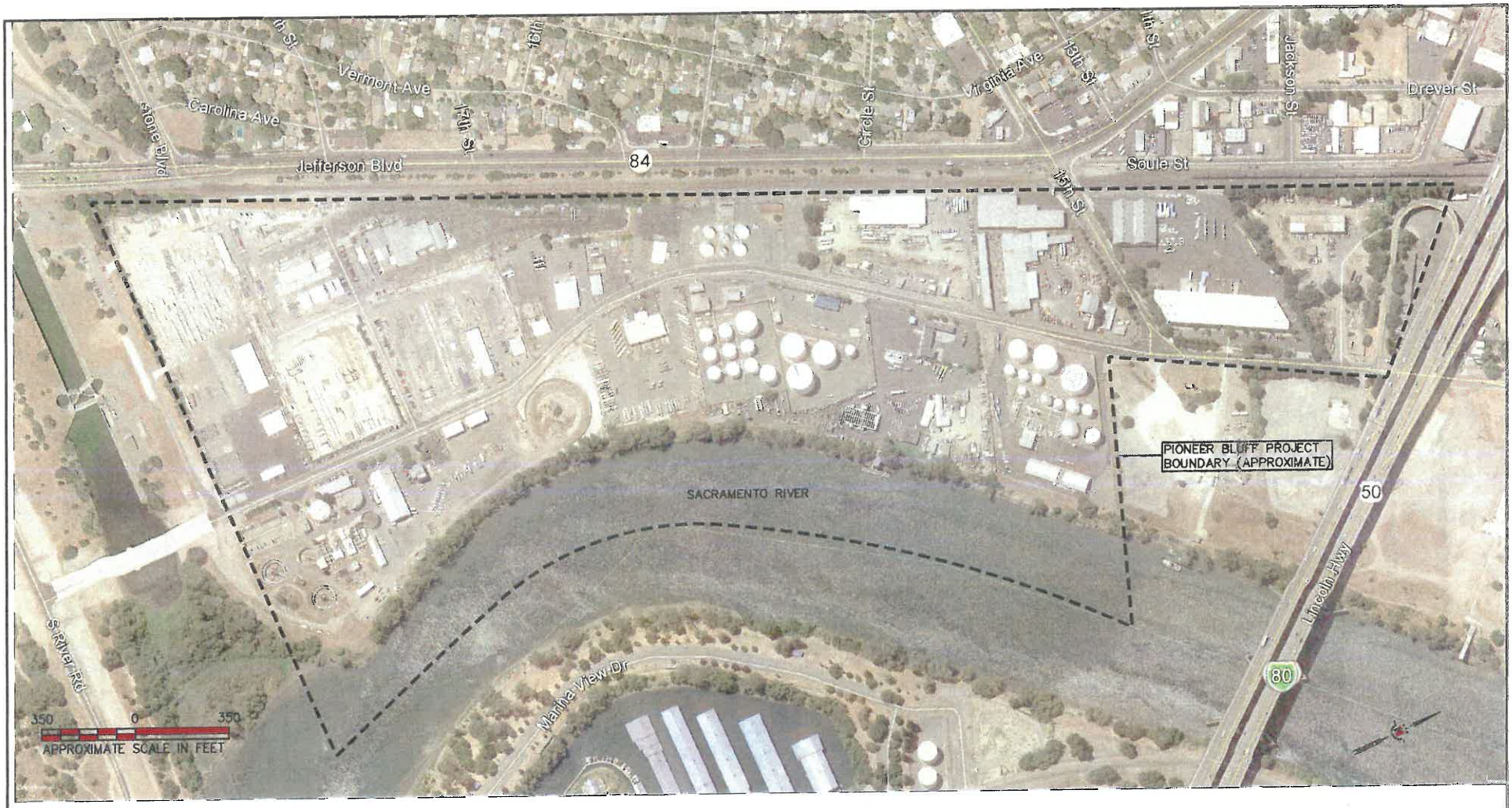
PROJECT NO: 01215214.01		CHECKED BY: TMS
DESIGNED BY: TMS	SCALE: None	APPROVED BY: JR
DRAWN BY: TMS	DATE: 8/16	FILE: Figure 1

PROJECT AREA LOCATION MAP

Pioneer Bluff Project Area

West Sacramento, California

Figure 1



AERIAL SOURCE: GOOGLE EARTH PRO 2016

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
7041 KOLL CENTER PARKWAY, SUITE 135
PLEASANTON, CALIFORNIA 94566
PH. (925) 426-0559 FAX. (925) 426-0707

PROJECT NO. 01215214.01	DESIGN BY TMS	ACAD FILE
DRAWN BY TMS	CHECK BY TMS	APP. BY JR

SHEET TITLE: SITE PLAN – PIONEER BLUFF PROJECT AREA

PROJECT TITLE: PIONEER BLUFF PROJECT
WEST SACRAMENTO, CALIFORNIA

DATE: 01/19/17

SCALE: AS SHOWN

FIGURE 2

Source: EDR 2015

SCS ENGINEERS
Environmental Consultants
And Contractors

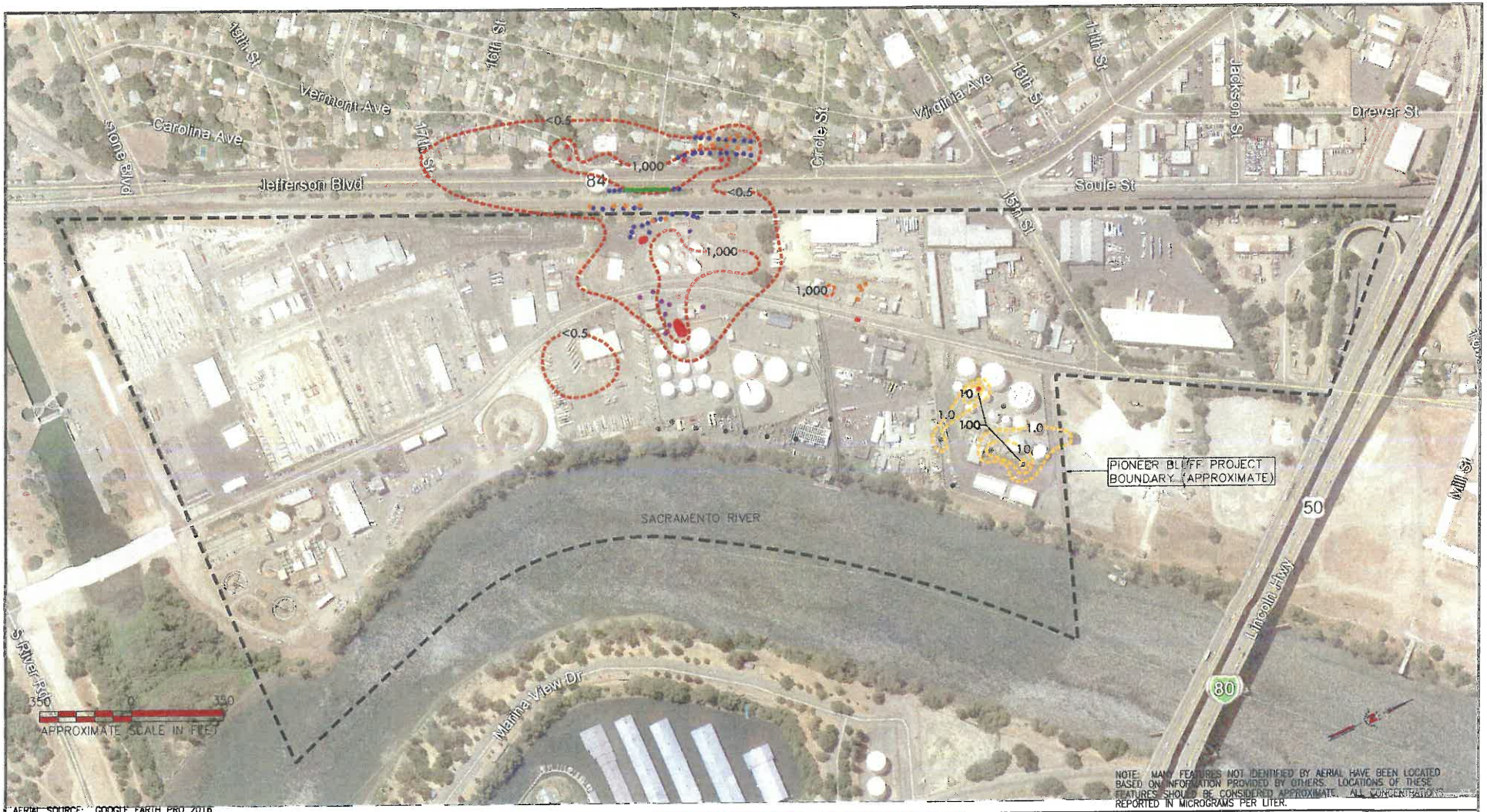
7041 Koll Center Parkway,
Suite 135
Pleasanton, CA 94566
Ph: (925) 426-0080
Fax: (925) 426-0707

PROJECT NO: 01215214.01		CHECKED BY: TMS
DESIGNED BY: TMS	SCALE: None	APPROVED BY: JR
DRAWN BY: TMS	DATE: 1/19/17	FILE: Figure 3

Project Area Map Showing EDR Lightbox Features

Pioneer Bluff Project Area
West Sacramento, California

Figure 3



NOTE: MANY FEATURES NOT IDENTIFIED BY AERIAL HAVE BEEN LOCATED BASED ON INFORMATION PROVIDED BY OTHERS. LOCATIONS OF THESE FEATURES SHOULD BE CONSIDERED APPROXIMATE. ALL CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER.

AERIAL SOURCE: GOOGLE EARTH PRO 2016

NOTES:

- DUAL PHASE EXTRACTION WELL
- GROUNDWATER EXTRACTION WELL
- VAPOR EXTRACTION WELL
- O2 INJECTION WELL
- AIR SPARGE WELL
- FREE PRODUCT IDENTIFIED

CONTOUR IDENTIFICATION

- TARP BENZENE (SOURCE: STANTEC 4/1/2016)
- SHELL BENZENE (SOURCE: AECOM 3/25/2016)
- KINDER MORGAN BENZENE (SOURCE: ARCADIS 1/2016)

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
7041 KOLL CENTER PARKWAY, SUITE 135
PLEASANTON, CALIFORNIA 94566
PH. (925) 426-0080 FAX. (925) 426-0707

PROJ. NO.	DSN. BY:	DWN. BY:	CHK. BY:	ACAD FILE:	APP. BY:
	TMS	TMS	TMS		JR

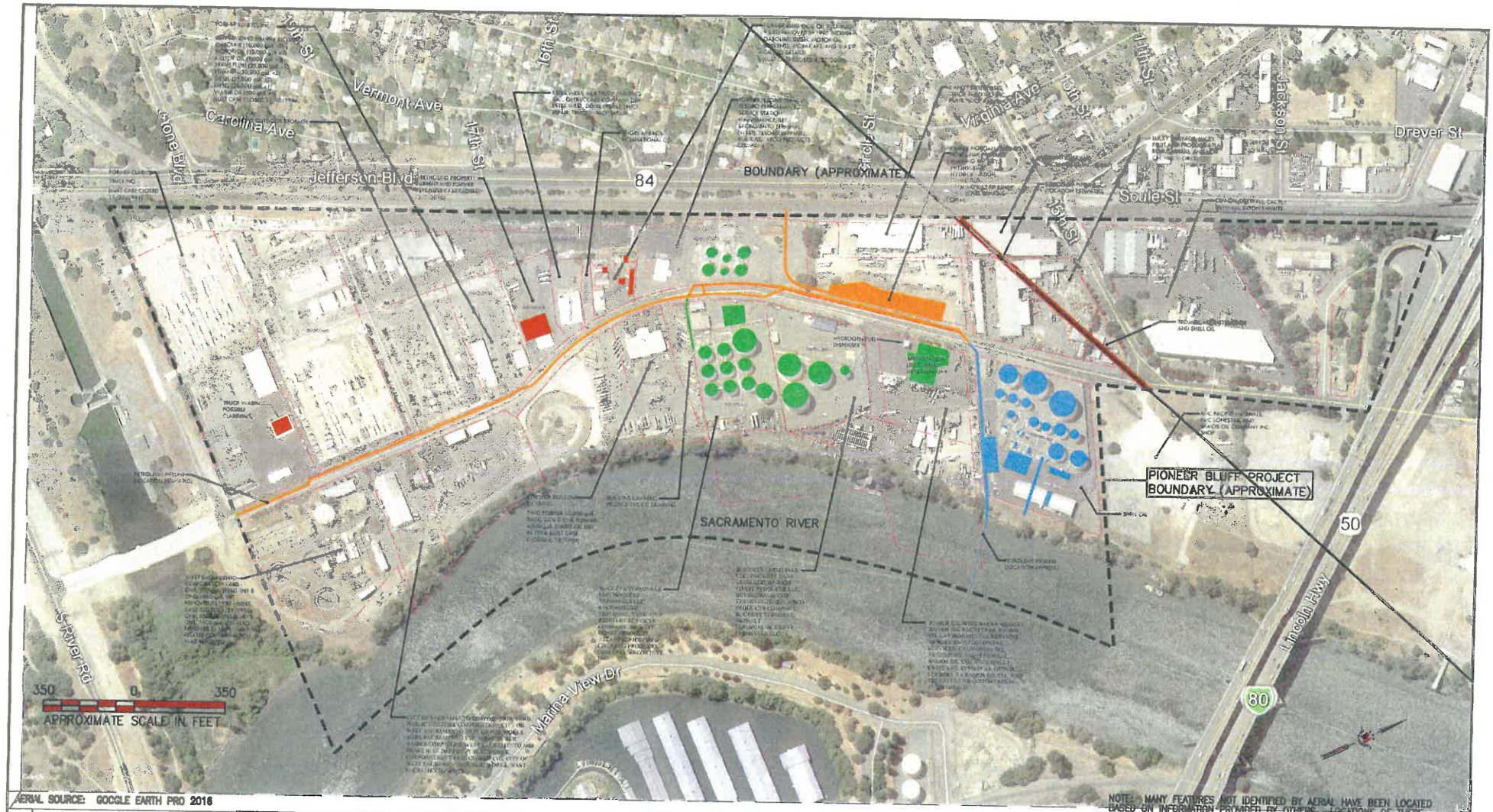
SHEET TITLE: PROJECT AREA WITH DISSOLVED BENZENE DISTRIBUTION

PROJECT TITLE: PIONEER BLUFF PROJECT
WEST SACRAMENTO, CALIFORNIA

DATE: 8/10/16

SCALE: AS SHOWN

FIGURE 4



AERIAL SOURCE: GOOGLE EARTH PRO 2016

NOTE: MANY FEATURES NOT IDENTIFIED BY AERIAL HAVE BEEN LOCATED BASED ON INFORMATION PROVIDED BY OTHERS. LOCATIONS OF THESE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

NOTES:
- POTENTIAL & KNOWN SOIL IMPACTS ASSOCIATED WITH SHELL OPUS SITE
- POTENTIAL & KNOWN SOIL IMPACTS ASSOCIATED WITH KINDER MORGAN SITE
- POTENTIAL & KNOWN SOIL IMPACTS ASSOCIATED WITH TARP SITE
- POTENTIAL & KNOWN SOIL IMPACTS ASSOCIATED WITH OTHER SITES
- ESTIMATED PARCEL BOUNDARY

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
7041 KOLL CENTER PARKWAY, SUITE 135
PLEASANTON, CALIFORNIA 94566
PH. (925) 426-8659 FAX. (925) 463-0707

PROJECT NO.	DWN. BY	ADDED TITLE
01215214.01	TMS	
CHKD. BY	CERT. BY	APP. BY
TMS	TMS	JR

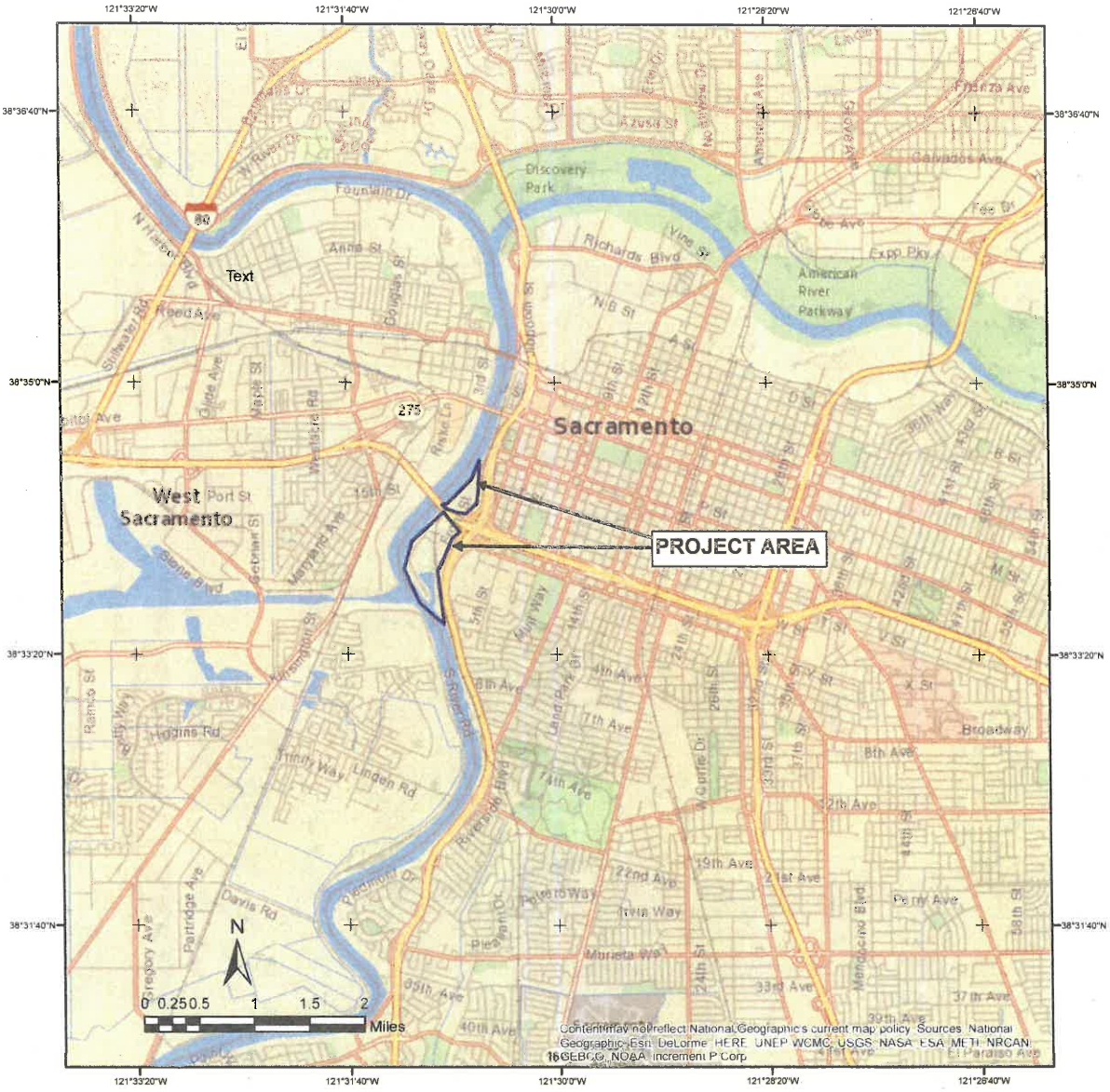
SHEET TITLE: PROJECT AREA WITH FEATURES OF POTENTIAL CONCERN

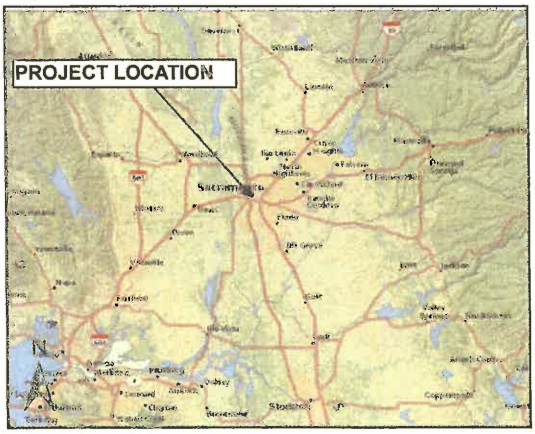
PROJECT TITLE: PIONEER BLUFF PROJECT
WEST SACRAMENTO, CALIFORNIA

DATE: 01/19/17

SCALE: AS SHOWN

FIGURE 5



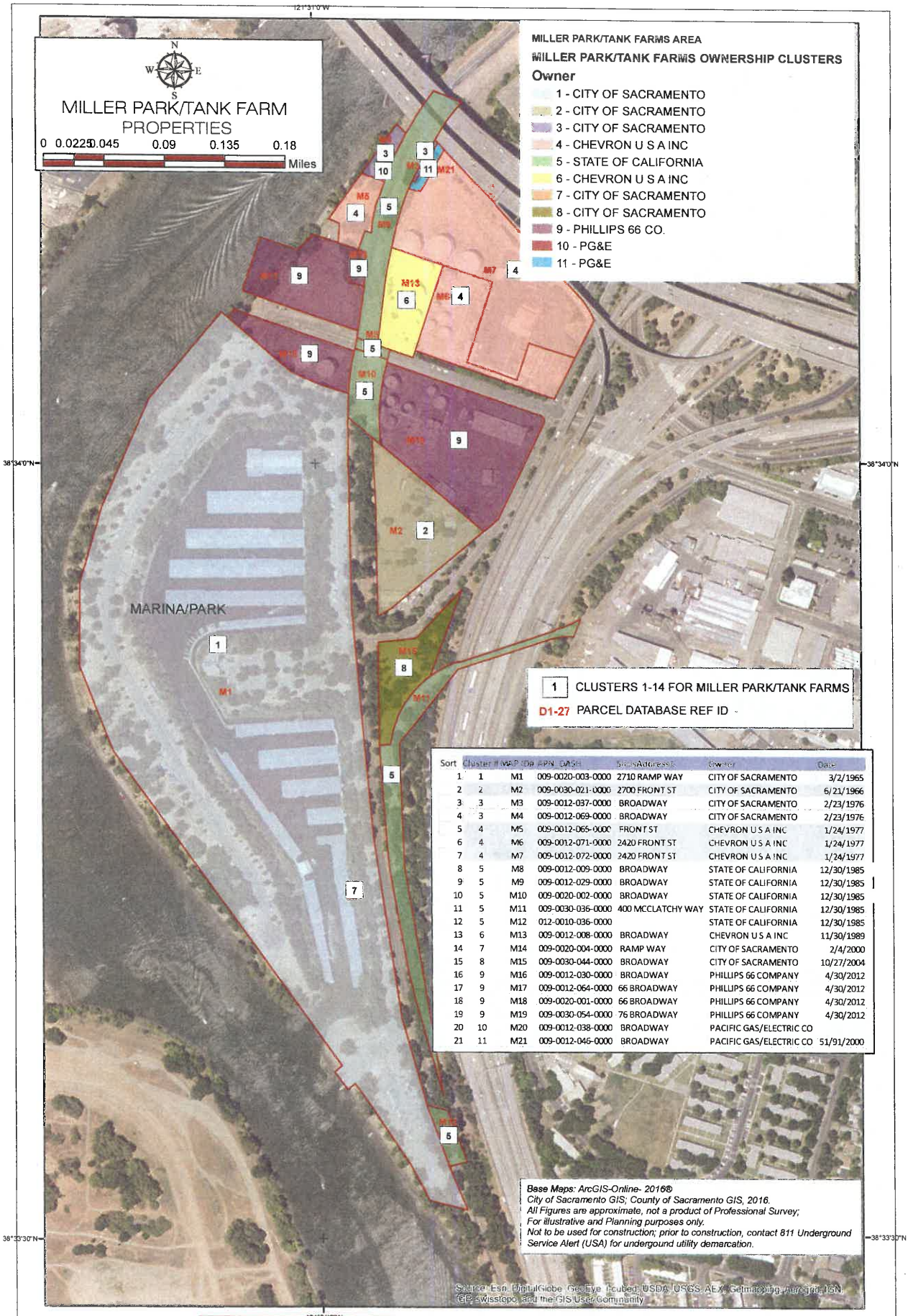


Base Maps: ArcGIS-Online- 2016®
City of Sacramento GIS; County of Sacramento GIS, 2016.
All Figures are approximate, not a product of Professional Survey.

SCS ENGINEERS 3117 FITE CIRCLE SUITE 108 SACRAMENTO, CALIFORNIA 95827 (916) 361-1297 www.scsengineers.com	**REGIONAL VICINITY MAP** SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY SACRAMENTO, CALIFORNIA	**Project No:** 01215288.00 **Figure 1** 8/18/2016

Base Maps: ArcGIS-Online- 2016®
City of Sacramento GIS; County of Sacramento GIS, 2016.
All Figures are approximate, not a product of Professional Survey;
For illustrative and Planning purposes only.
Not to be used for construction; prior to construction, contact 811 Underground Service Alert (USA) for underground utility demarcation.
Coord.System: NAD_1983_StatePlane_California_II_FIPS_0402_Feet

SCS ENGINEERS 3117 FITE CIRCLE SUITE 108 SACRAMENTO, CALIFORNIA 95827 (916) 361-1297 www.scsengineers.com	**SITE PLAN:** **OVERVIEW OF PROJECT AREA**	**Project No:** **01216288.01**
	SACRAMENTO RIVERFRONT REUSE PLANNING **PETROLEUM CONTAMINATED BROWNFIELD SITES** **SACRAMENTO, CALIFORNIA**	**Figure 2** **9/12/2016**



Sort	Cluster #	MAP ID	APN	Site Address	Owner	Date
1	1	M1	009-0020-003-0000	2710 RAMP WAY	CITY OF SACRAMENTO	3/2/1965
2	2	M2	009-0030-021-0000	2700 FRONT ST	CITY OF SACRAMENTO	6/21/1966
3	3	M3	009-0012-037-0000	BROADWAY	CITY OF SACRAMENTO	2/23/1976
4	3	M4	009-0012-069-0000	BROADWAY	CITY OF SACRAMENTO	2/23/1976
5	4	M5	009-0012-065-0000	FRONT ST	CHEVRON U S A INC	1/24/1977
6	4	M6	009-0012-071-0000	2420 FRONT ST	CHEVRON U S A INC	1/24/1977
7	4	M7	009-0012-072-0000	2420 FRONT ST	CHEVRON U S A INC	1/24/1977
8	5	M8	009-0012-009-0000	BROADWAY	STATE OF CALIFORNIA	12/30/1985
9	5	M9	009-0012-029-0000	BROADWAY	STATE OF CALIFORNIA	12/30/1985
10	5	M10	009-0020-002-0000	BROADWAY	STATE OF CALIFORNIA	12/30/1985
11	5	M11	009-0030-036-0000	400 MCCLATCHY WAY	STATE OF CALIFORNIA	12/30/1985
12	5	M12	012-0010-036-0000		STATE OF CALIFORNIA	12/30/1985
13	6	M13	009-0012-008-0000	BROADWAY	CHEVRON U S A INC	11/30/1989
14	7	M14	009-0020-004-0000	RAMP WAY	CITY OF SACRAMENTO	2/4/2000
15	8	M15	009-0030-044-0000	BROADWAY	CITY OF SACRAMENTO	10/27/2004
16	9	M16	009-0012-030-0000	BROADWAY	PHILLIPS 66 COMPANY	4/30/2012
17	9	M17	009-0012-064-0000	66 BROADWAY	PHILLIPS 66 COMPANY	4/30/2012
18	9	M18	009-0020-001-0000	66 BROADWAY	PHILLIPS 66 COMPANY	4/30/2012
19	9	M19	009-0030-054-0000	76 BROADWAY	PHILLIPS 66 COMPANY	4/30/2012
20	10	M20	009-0012-038-0000	BROADWAY	PACIFIC GAS/ELECTRIC CO	
21	11	M21	009-0012-046-0000	BROADWAY	PACIFIC GAS/ELECTRIC CO	51/91/2000

Base Maps: ArcGIS-Online- 2016®
City of Sacramento GIS; County of Sacramento GIS, 2016.
All Figures are approximate, not a product of Professional Survey;
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Not to be used for construction; prior to construction, contact 811 Underground Service Alert (USA) for undergound utility demarcation.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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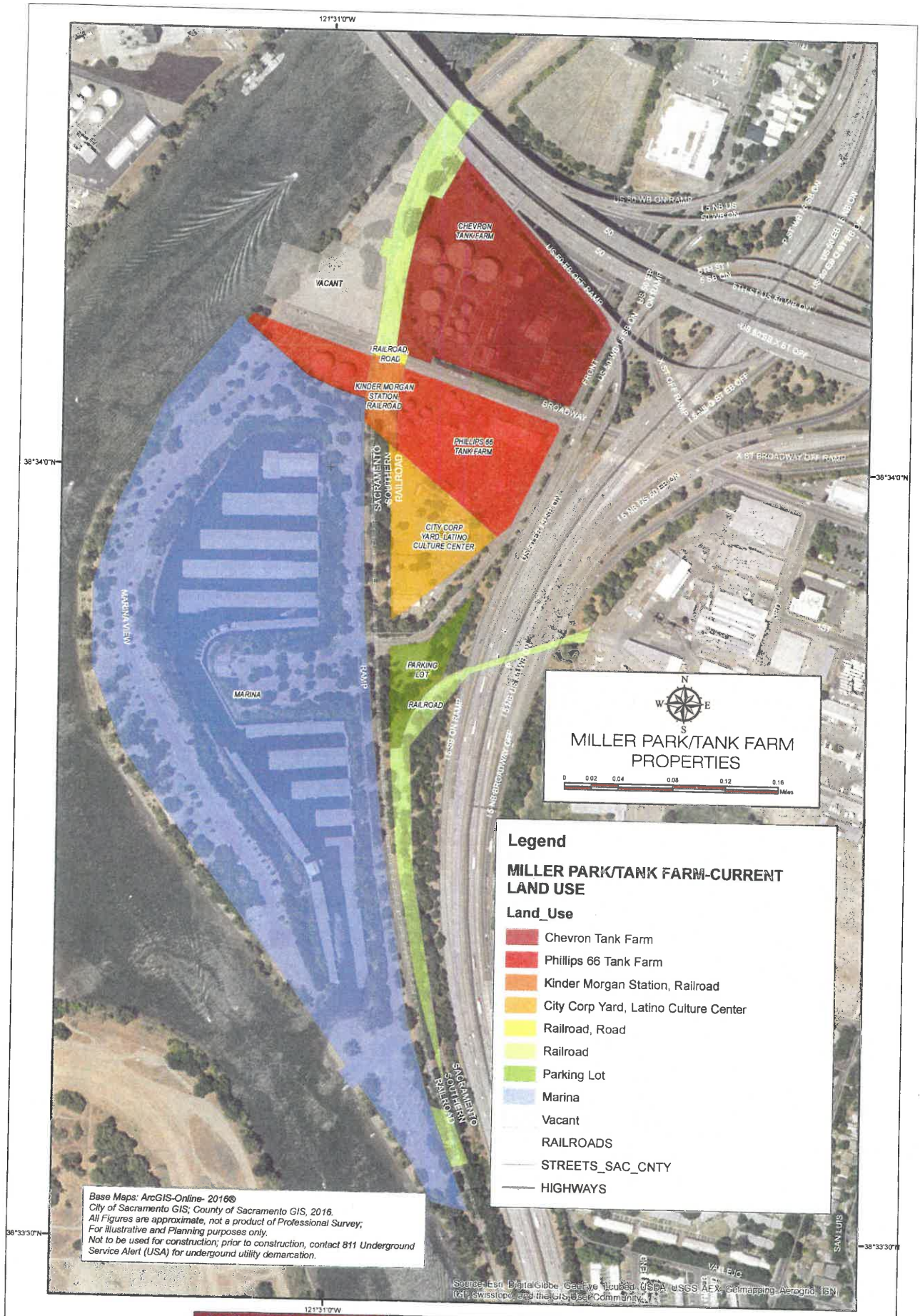
MILLER PARK/TANK FARM AREA:
CURRENT PARCEL OWNERSHIP AND CLUSTERS

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No: 01215288.00

Figure 3B

8/18/2016



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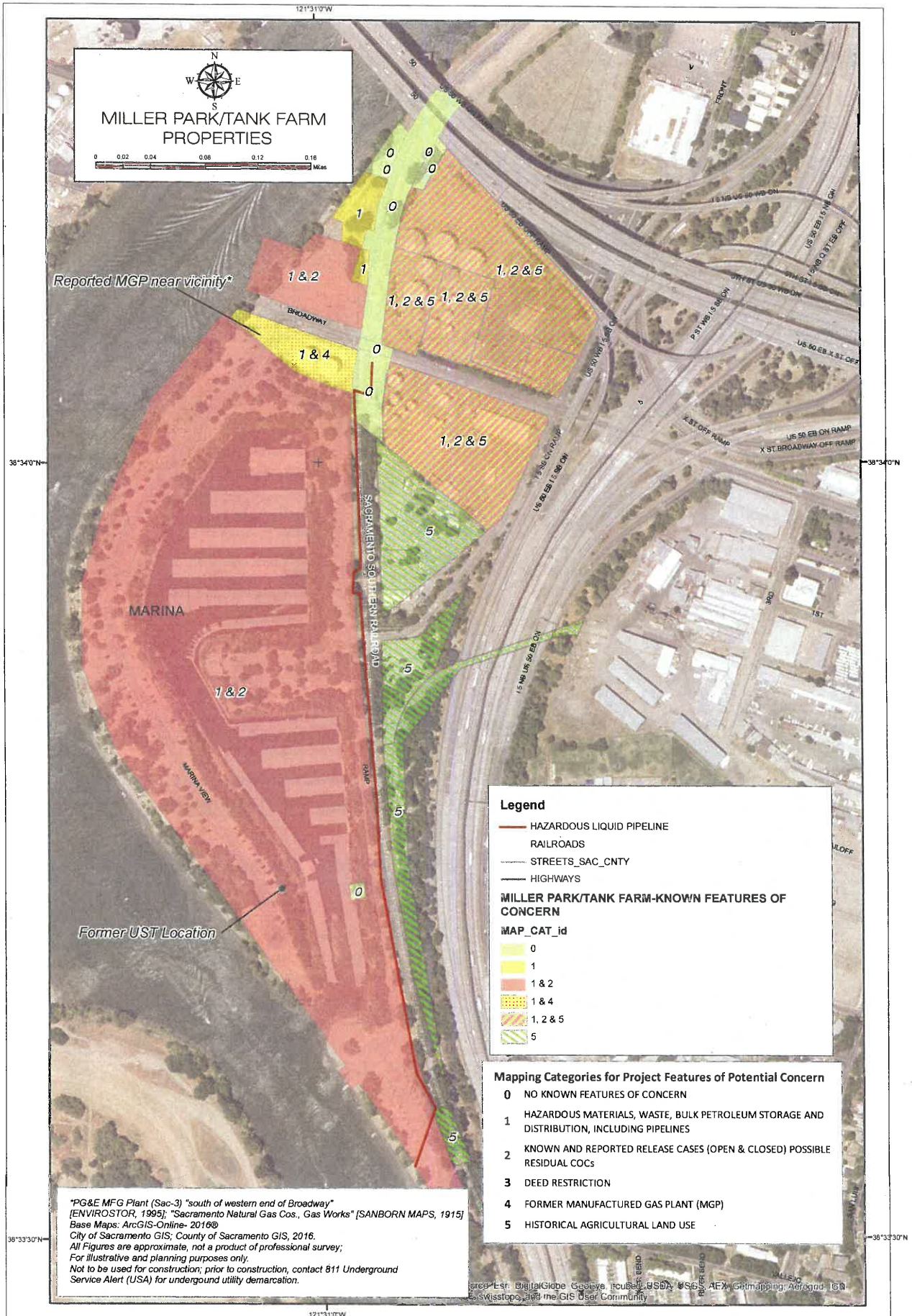
MILLER PARK/TANK FARM AREA: SHOWING CURRENT LAND USE

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No: 01215288.00

Figure 4B

8/30/2016



*PG&E MFG Plant (Sac-3) "south of western end of Broadway" [ENVIROSTOR, 1995]; "Sacramento Natural Gas Cos., Gas Works" [SANBORN MAPS, 1915]
Base Maps: ArcGIS-Online- 2016®
City of Sacramento GIS; County of Sacramento GIS, 2016.
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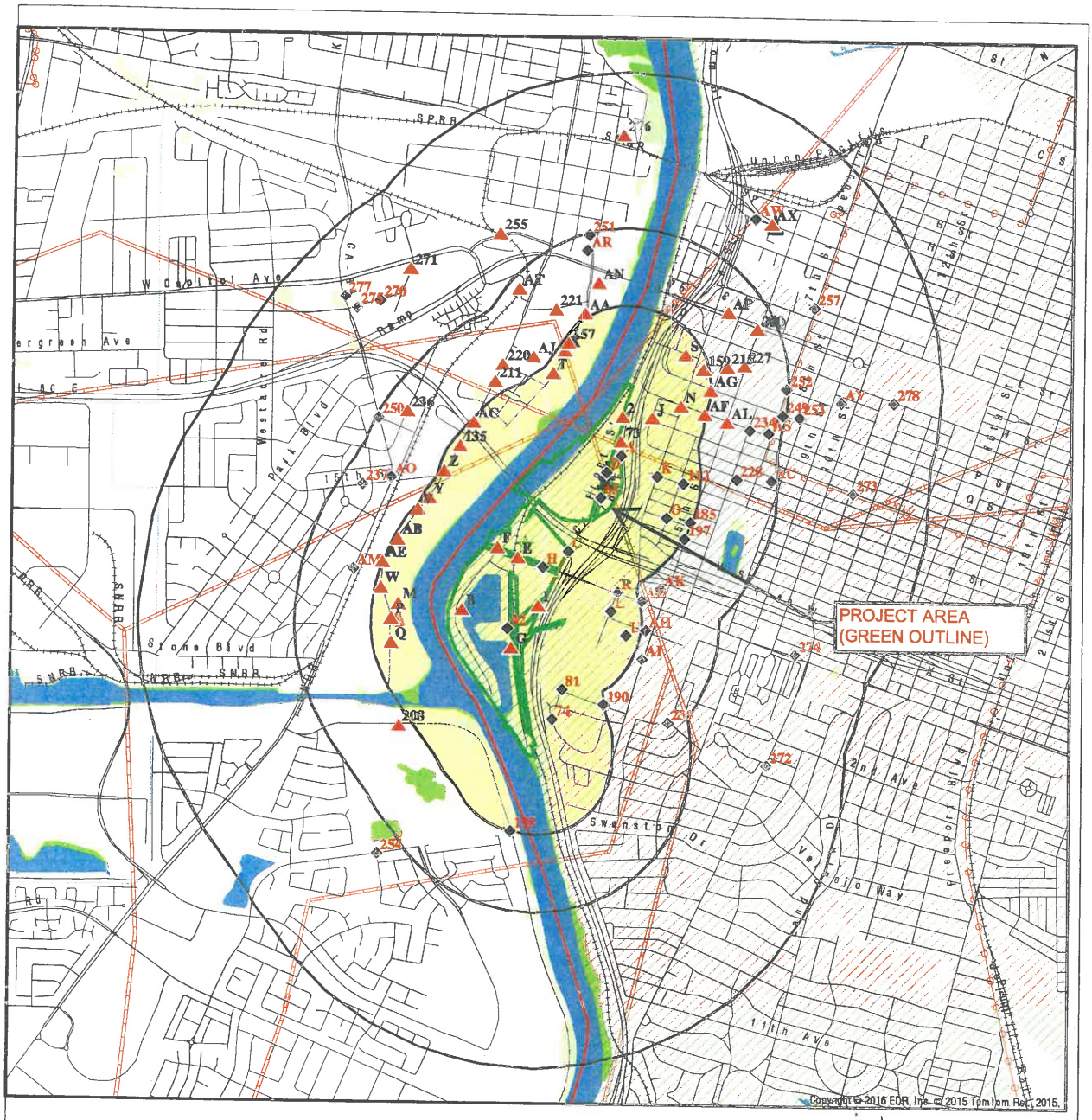
MILLER PARK/TANK FARM AREA:
FEATURES OF POTENTIAL CONCERN

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No: 01215288.00

Figure 5B

9/8/2016



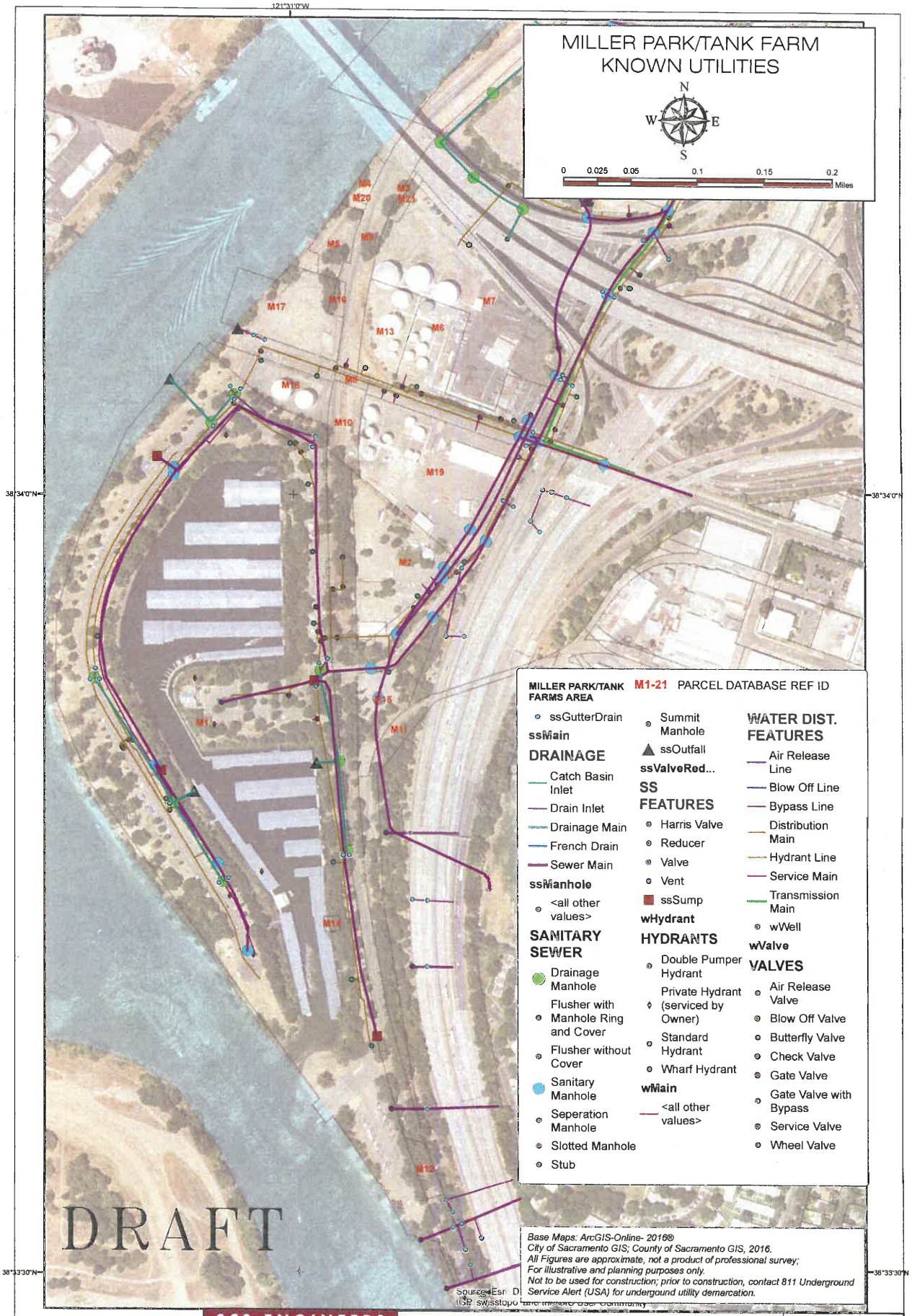
LEGEND

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- National Wetland Inventory
- State Wetlands
- Indian Reservations BIA
- County Boundary
- Power transmission lines
- Pipelines
- Areas of Concern

N

0 1/4 1/2 1 Miles

SCS ENGINEERS 3117 FITE CIRCLE SUITE 108 SACRAMENTO, CALIFORNIA 95827 (916) 361-1297 www.scsengineers.com	PROJECT AREA: ENVIRONMENTAL SITE INVENTORY ITEMS - EDR	Project No: 01215288.00
	SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY SACRAMENTO, CALIFORNIA	Figure 6
		8/30/2016



SCS ENGINEERS
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SACRAMENTO, CALIFORNIA 95827
(916) 361-1297
www.scsengineers.com

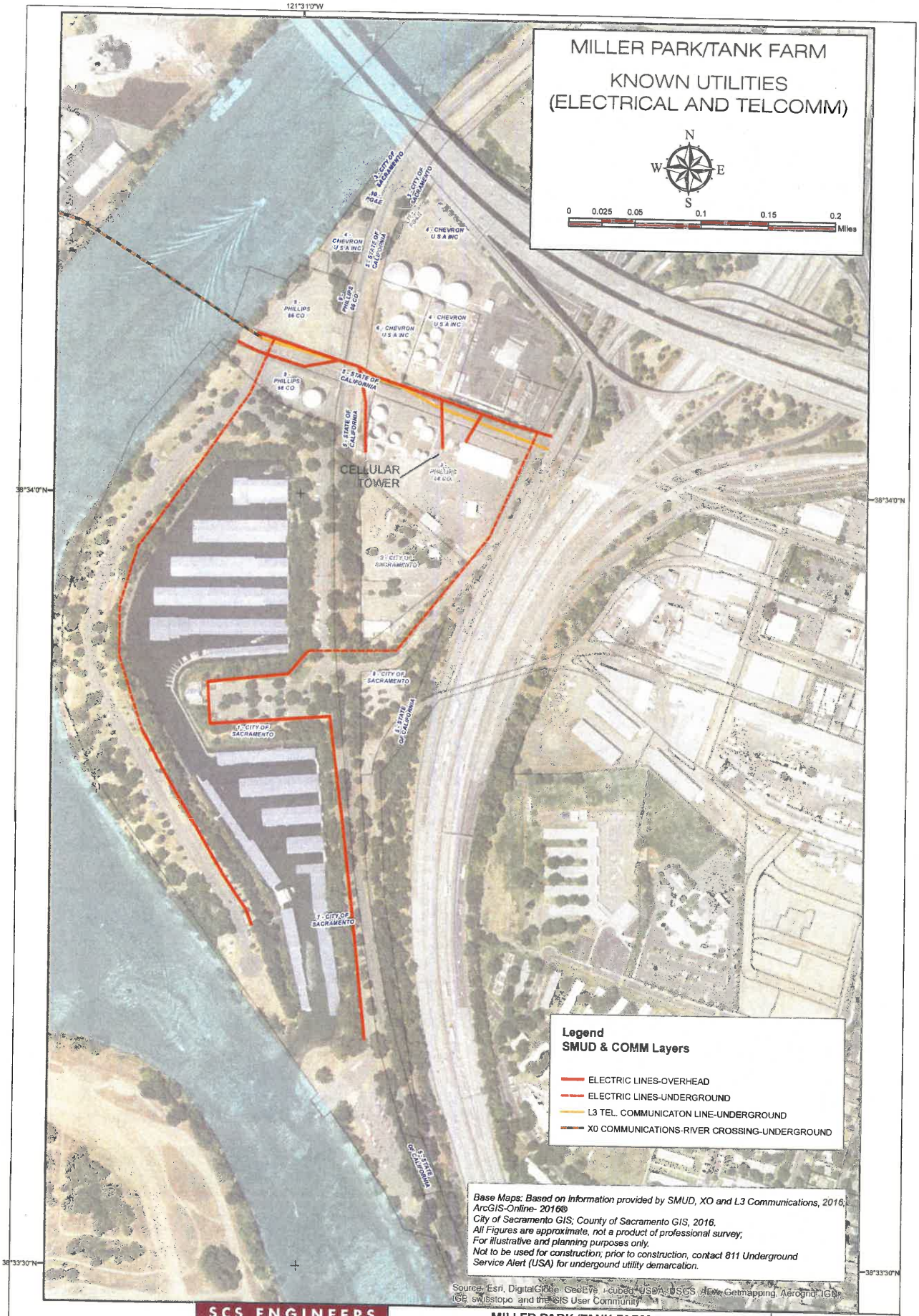
MILLER PARK/TANK FARM:
WATER SUPPLY, SANITARY SEWER AND MS4 LINES

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No: 01215288.00

Figure 8B

8/30/2016



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SACRAMENTO, CALIFORNIA 95827
(916) 361-1297
www.scsengineers.com

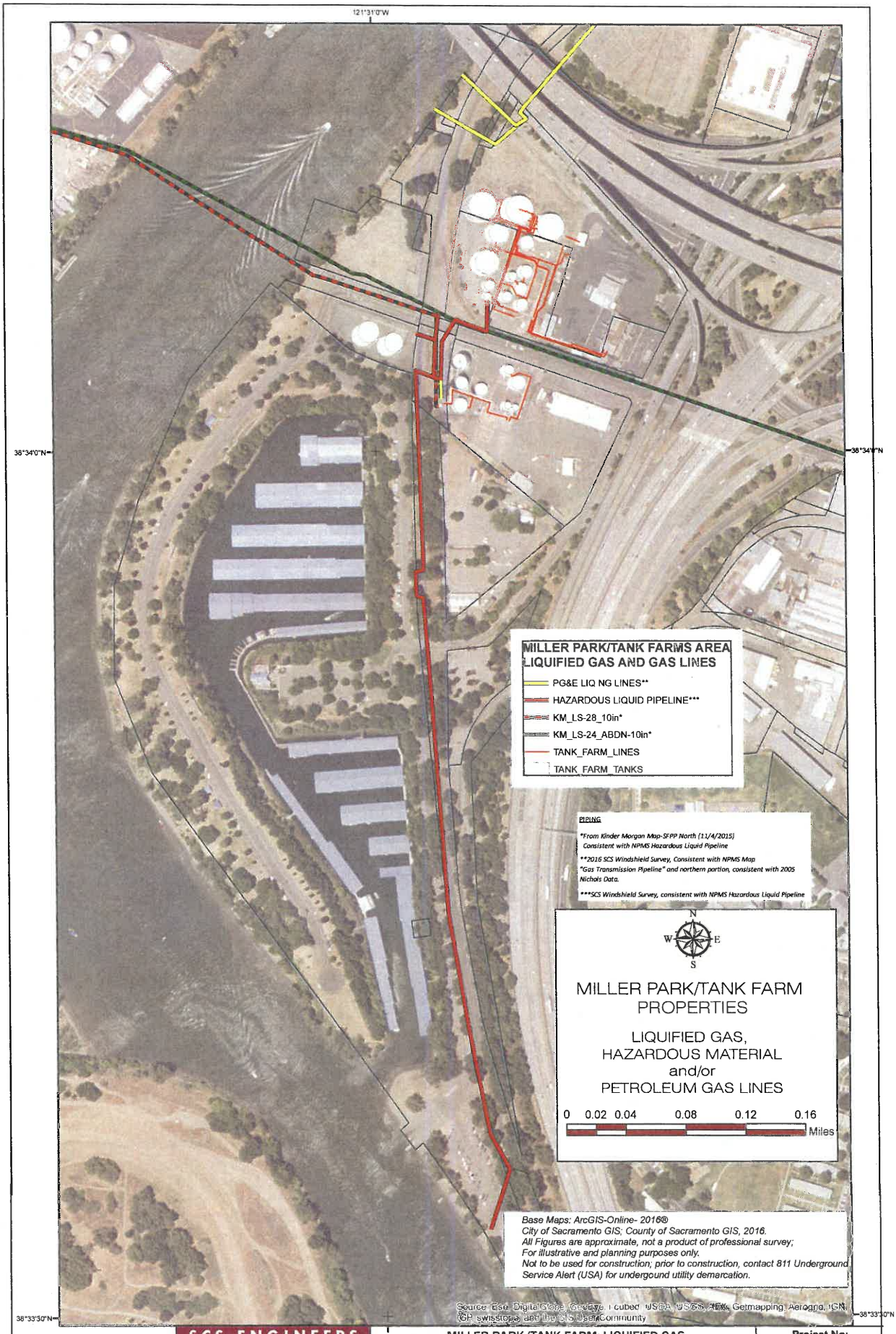
MILLER PARK/TANK FARM:
ELECTRICAL AND TELCOMM. FEATURES

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No:
01215288.00

Figure 8B

9/14/2016



SCS ENGINEERS
3117 FITE CIRCLE SUITE 108
SACRAMENTO, CALIFORNIA 95827
(916) 361-1297
www.scsengineers.com

MILLER PARK/TANK FARM: LIQUIFIED GAS, HAZARDOUS MATERIAL and/or PETROLEUM LINES

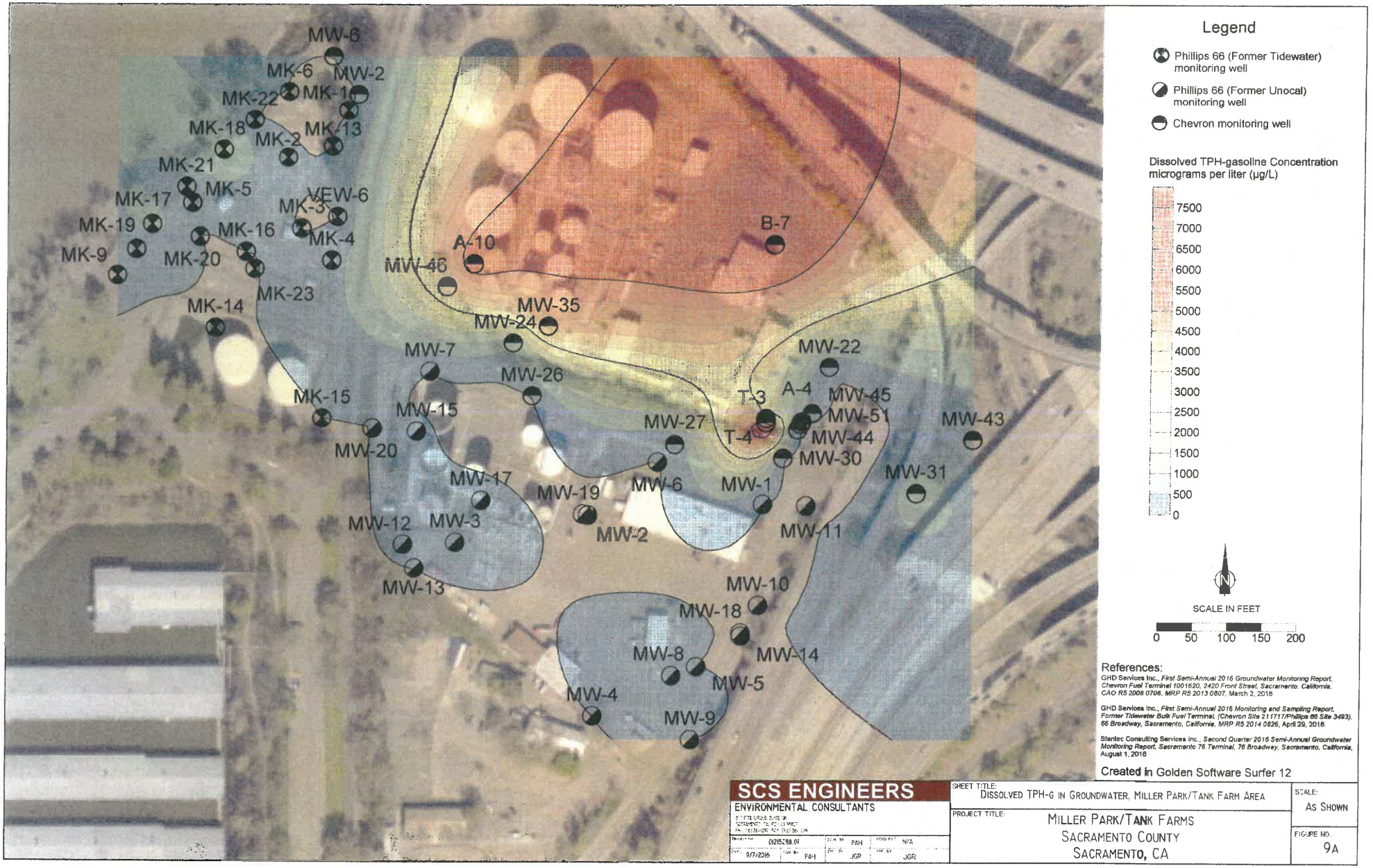
SACRAMENTO RIVERFRONT REUSE PLANNING
PETROLEUM CONTAMINATED BROWNFIELD SITES
SACRAMENTO, CALIFORNIA

Project No: 01215288.01

Figure 8C

9/13/2016

GAS



Legend

- Phillips 66 (Former Tidewater) monitoring well
- Phillips 66 (Former Unocal) monitoring well
- Chevron monitoring well

Dissolved TPH-gasoline Concentration micrograms per liter (µg/L)

7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0

SCALE IN FEET

0 50 100 150 200

References:

GHD Services Inc., *First Semi-Annual 2016 Groundwater Monitoring Report, Chevron Fuel Terminal 1001620, 2420 Front Street, Sacramento, California, CAO R5 2008 0706, MRP R5 2013 0807*, March 2, 2016

GHD Services Inc., *First Semi-Annual 2016 Monitoring and Sampling Report, Former Tidewater Bulk Fuel Terminal, (Chevron Site 211717/Phillips 66 Site 3493), 66 Broadway, Sacramento, California, MRP R5 2014 0826*, April 29, 2016.

Stantec Consulting Services Inc., *Second Quarter 2016 Semi-Annual Groundwater Monitoring Report, Sacramento 76 Terminal, 76 Broadway, Sacramento, California*, August 1, 2016

Created in Golden Software Surfer 12

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS

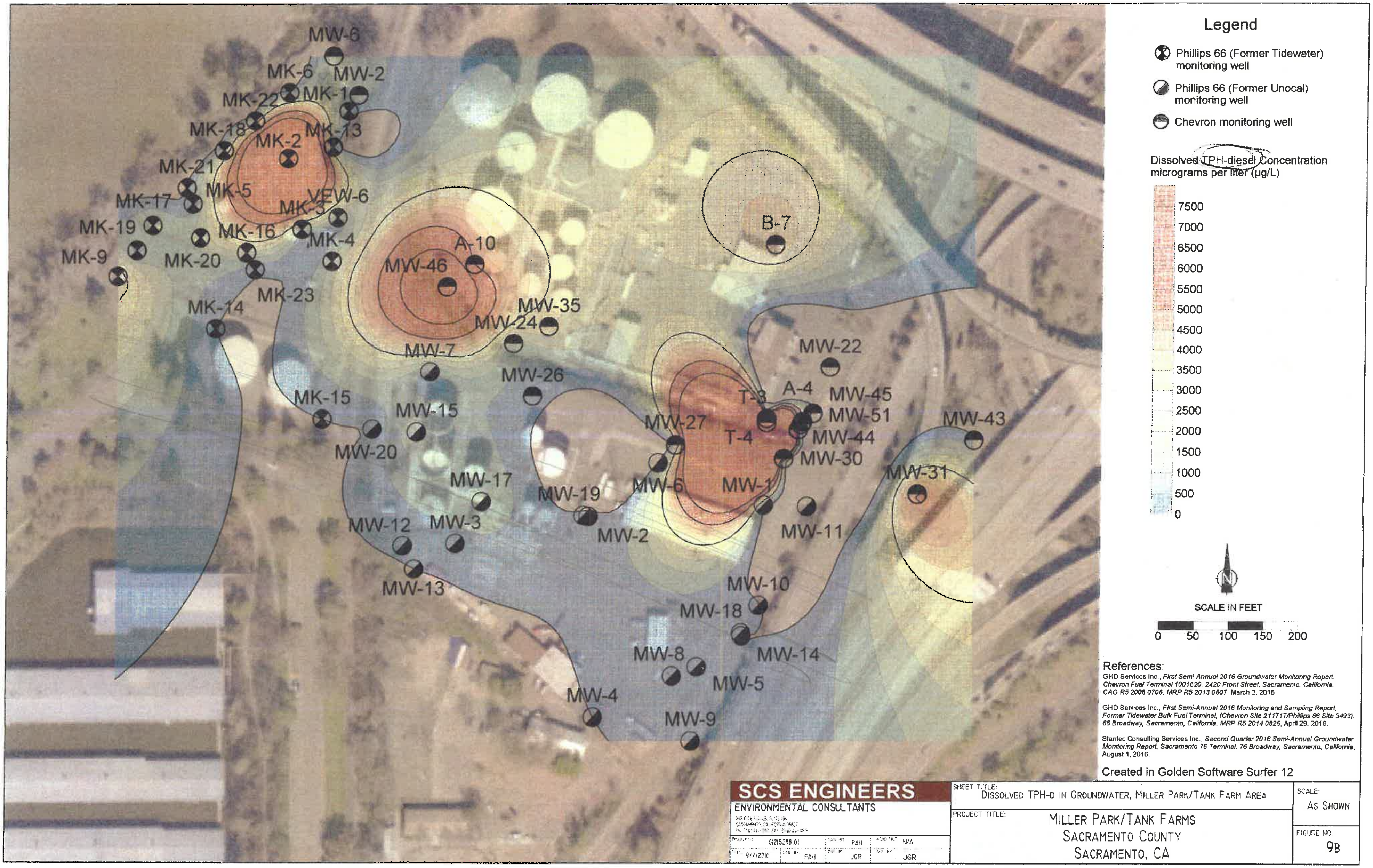
01215288.01		PAH		N/A
9/7/2016	PAH		JGR	JGR

SHEET TITLE: DISSOLVED TPH-G IN GROUNDWATER, MILLER PARK/TANK FARM AREA

PROJECT TITLE: MILLER PARK/TANK FARMS
SACRAMENTO COUNTY
SACRAMENTO, CA

SCALE: AS SHOWN

FIGURE NO. 9A



Legend
Phillips 66 (Former Tidewater) monitoring well
Phillips 66 (Former Unocal) monitoring well
Chevron monitoring well
Dissolved TPH-diesel Concentration micrograms per liter (µg/L)
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
N
SCALE IN FEET
0 50 100 150 200
MW-6
MW-2
MK-6
MK-1
MK-22
MK-18
MK-13
MK-2
MK-21
MK-5
MK-17
VEW-6
MK-3
MK-19
MK-16
MK-4
MK-9
MK-20
MK-23
MK-14
A-10
MW-46
MW-35
MW-24
MW-7
MW-26
B-7
MW-22
MK-15
MW-15
MW-20
T-3
A-4
MW-45
MW-51
MW-43
MW-27
T-4
MW-44
MW-30
MW-31
MW-17
MW-19
MW-6
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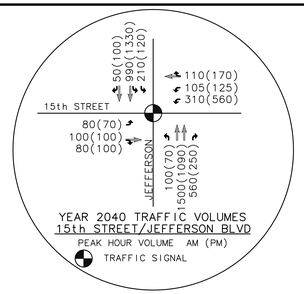
MW-3
MW-2
MW-11
MW-13
MW-10
MW-18
MW-14
MW-8
MW-5
MW-4
MW-9
References:
GHD Services Inc., First Semi-Annual 2016 Groundwater Monitoring Report, Chevron Fuel Terminal 1001620, 2420 Front Street, Sacramento, California, CAO R5 2008 0706, MRP R5 2013 0807, March 2, 2016
GHD Services Inc., First Semi-Annual 2016 Monitoring and Sampling Report, Former Tidewater Bulk Fuel Terminal, (Chevron Site 211717/Phillips 66 Site 3493), 66 Broadway, Sacramento, California, MRP R5 2014 0826, April 29, 2016.
Stantec Consulting Services Inc., Second Quarter 2016 Semi-Annual Groundwater Monitoring Report, Sacramento 76 Terminal, 76 Broadway, Sacramento, California, August 1, 2016
Created in Golden Software Surfer 12
SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
01215288.01
PAH
N/A
9/7/2016
PAH
JGR
JGR
SHEET TITLE:
DISSOLVED TPH-D IN GROUNDWATER, MILLER PARK/TANK FARM AREA
PROJECT TITLE:
MILLER PARK/TANK FARMS
SACRAMENTO COUNTY
SACRAMENTO, CA
SCALE:
AS SHOWN
FIGURE NO.
9B

Broadway Bridge Alignment Memo, Attachment C

Geometric Approval Drawings: Alignments A, B, C and D

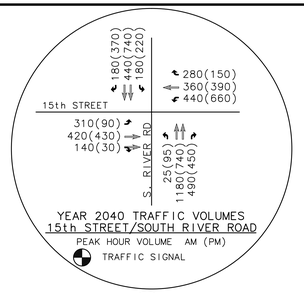
LEGEND/ ABBREVIATIONS

- L1 — LINE DATA (SEE TABLE)
- C2 — CURVE DATA (SEE TABLE)
- —F— FILL LIMITS
- —C— CUT LIMITS
- LEVEE SETBACK
- EXISTING ROW
- PROPOSED RETAINING WALL
- A — INTERSECTION LOCATION
- A A — CROSS SECTION LOCATION



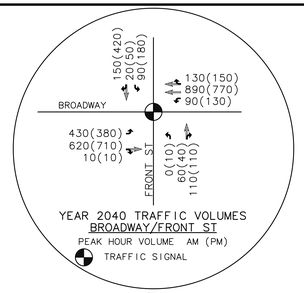
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



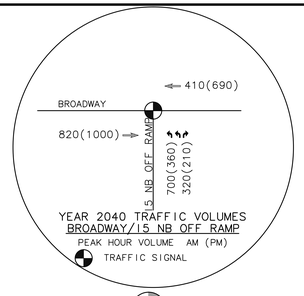
YEAR 2040 TRAFFIC VOLUMES
15th STREET/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



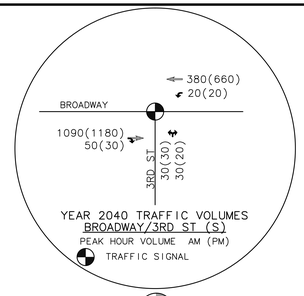
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

G

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT A

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

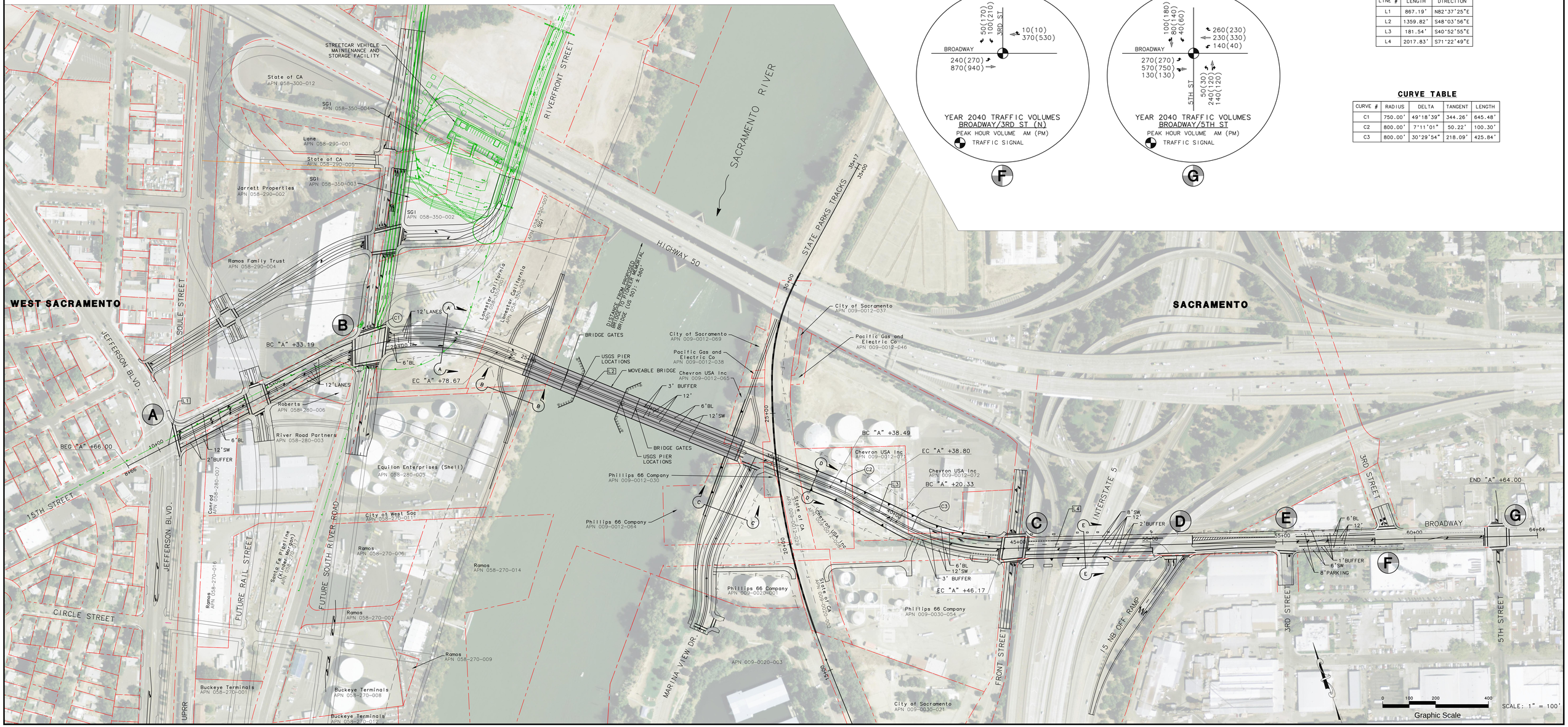
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110	SHEET 1
		FILE NO. XXX.dwg	OF 3

LINE TABLE

LINE #	LENGTH	DIRECTION
L1	867.19'	N82°37'25"E
L2	1359.82'	S48°03'56"E
L3	181.54'	S40°52'55"E
L4	2017.83'	S71°22'49"E

CURVE TABLE

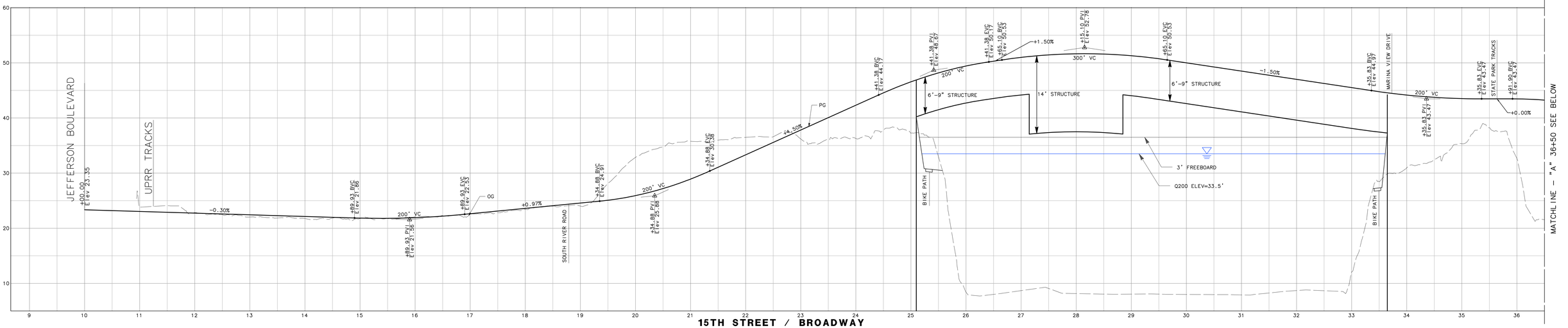
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	750.00'	49°18'39"	344.26'	645.48'
C2	800.00'	7°11'01"	50.22'	100.30'
C3	800.00'	30°29'54"	218.09'	425.84'



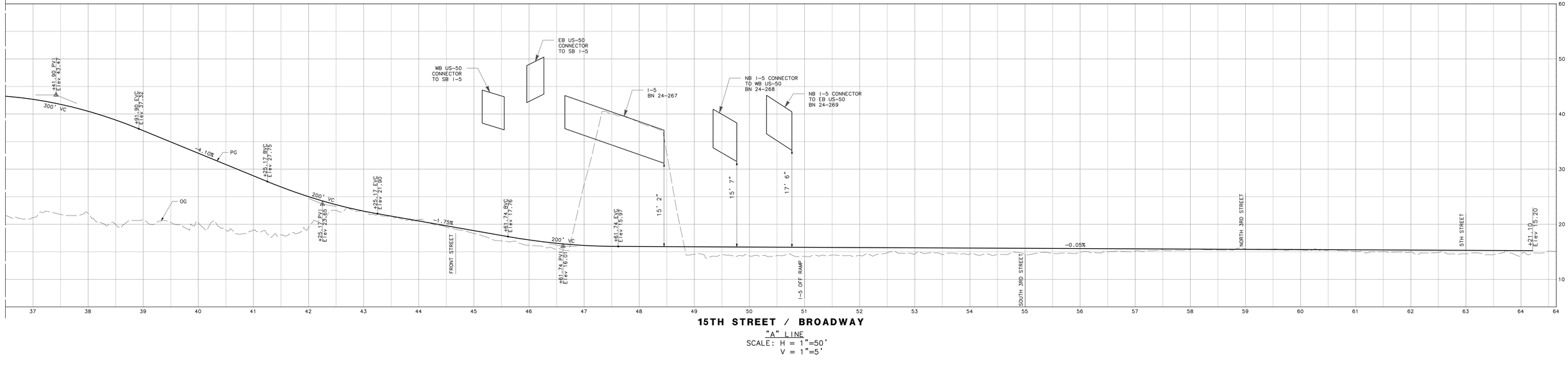
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT A

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 2 OF 3



15TH STREET / BROADWAY
"A" LINE
SCALE: H = 1"=50'
V = 1"=5'

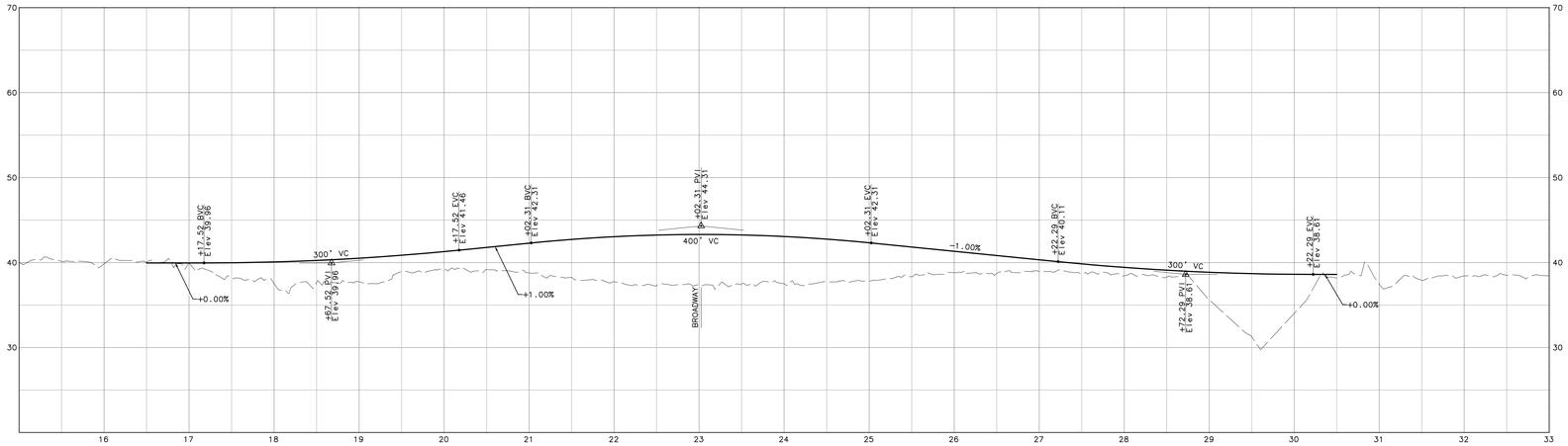


15TH STREET / BROADWAY
"A" LINE
SCALE: H = 1"=50'
V = 1"=5'

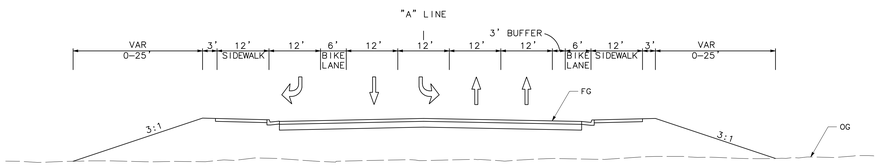
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT A

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

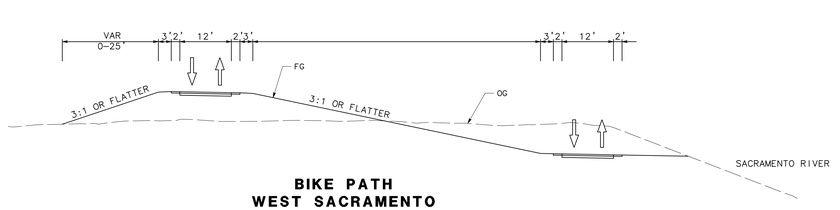
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 3 OF 3



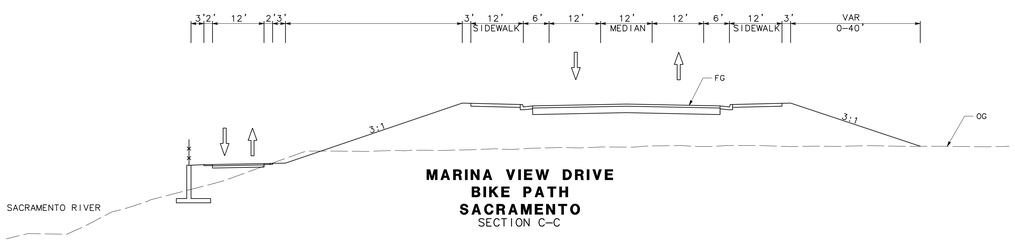
STATE PARKS TRACKS
H = 1"=50'
V = 1"=5'



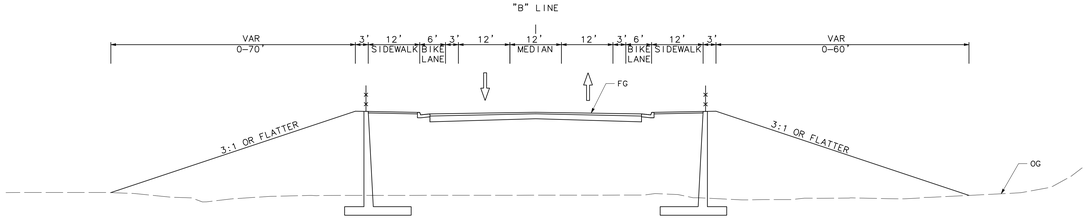
15TH STREET
WEST SACRAMENTO
SECTION A-A



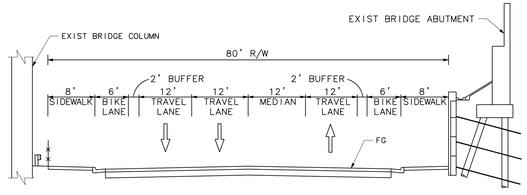
BIKE PATH
WEST SACRAMENTO
SECTION B-B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C-C



BROADWAY
SACRAMENTO
SECTION D-D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E-E

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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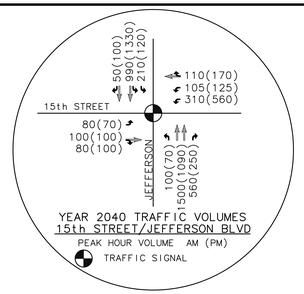
		FILE NO. XXX.dwg	OF 3

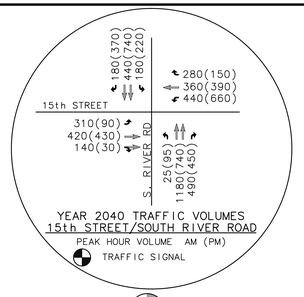
LEGEND/ ABBREVIATIONS

- L1 — LINE DATA (SEE TABLE)
- C2 — CURVE DATA (SEE TABLE)
- —F— FILL LIMITS
- —C— CUT LIMITS
- LEVEE SETBACK
- EXISTING ROW
- PROPOSED RETAINING WALL
- A — INTERSECTION LOCATION
- A A — CROSS SECTION LOCATION



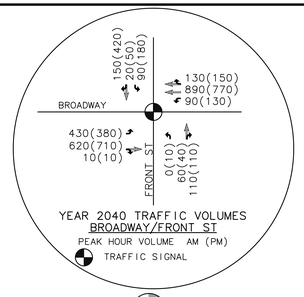
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



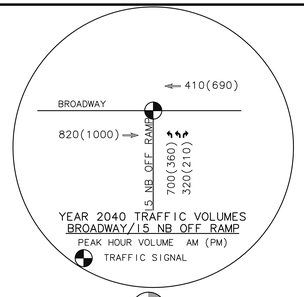
YEAR 2040 TRAFFIC VOLUMES
15th STREET/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



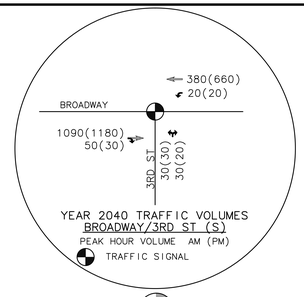
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

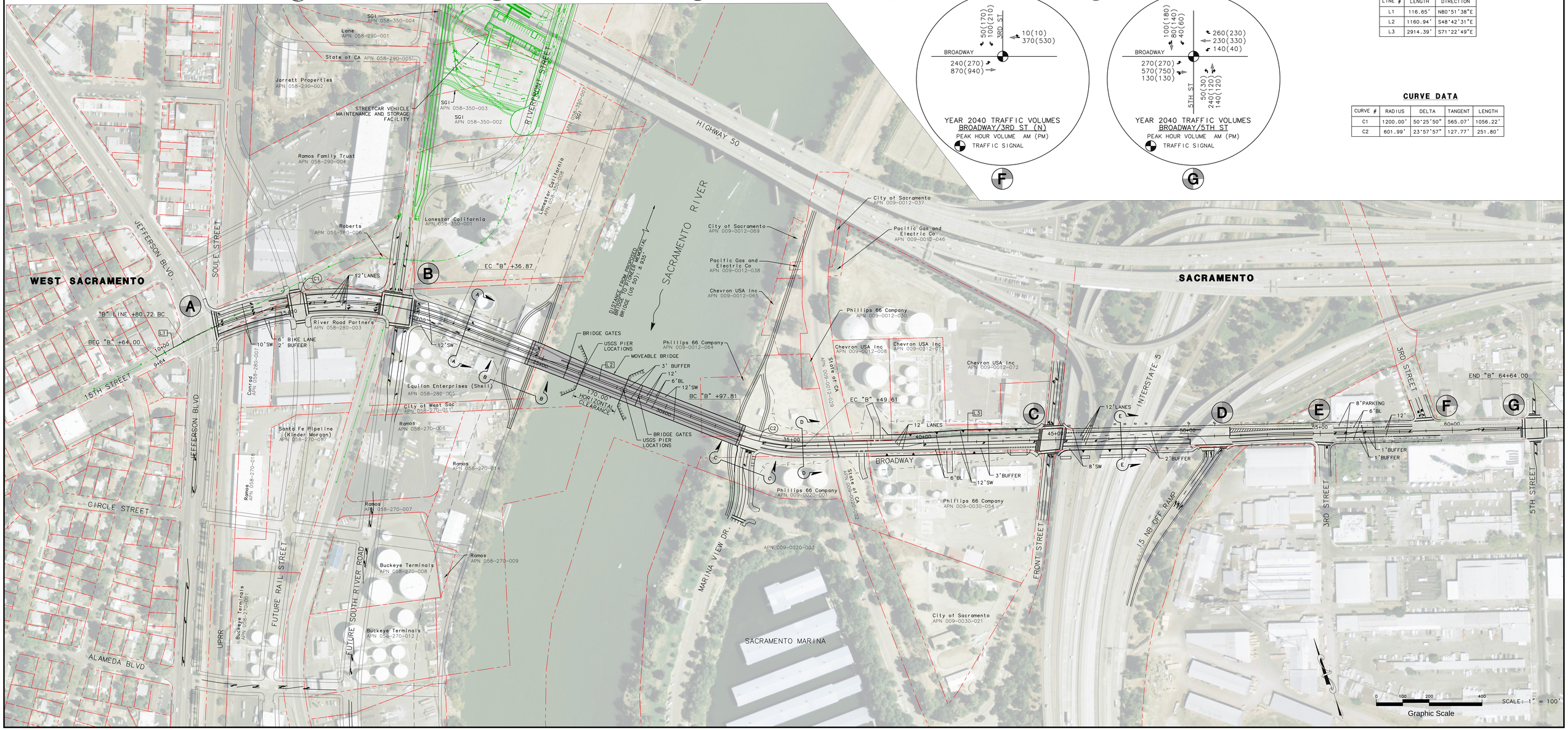
G

LINE DATA

LINE #	LENGTH	DIRECTION
L1	116.65'	N80°51'38"E
L2	1160.94'	S48°42'31"E
L3	2914.39'	S71°22'49"E

CURVE DATA

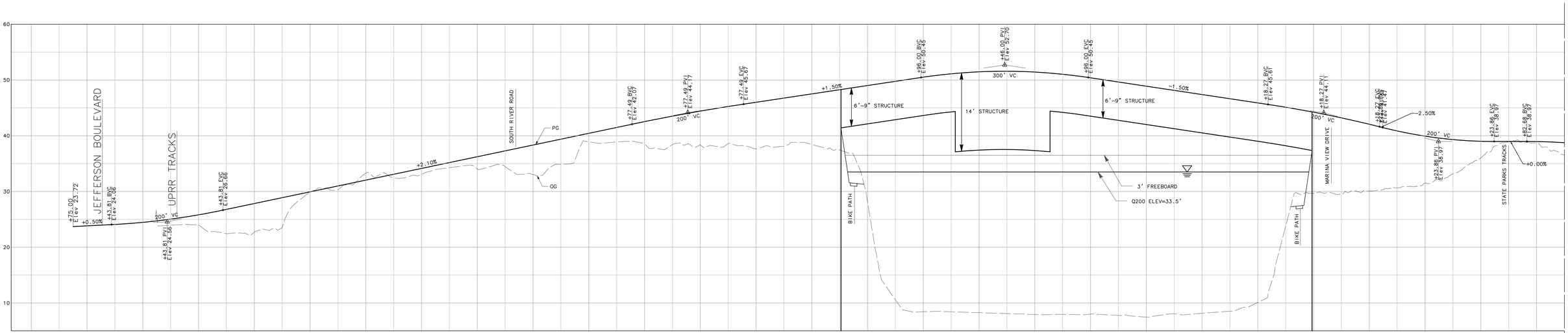
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1200.00'	50°25'50"	565.07'	1056.22'
C2	601.99'	23°57'57"	127.77'	251.80'



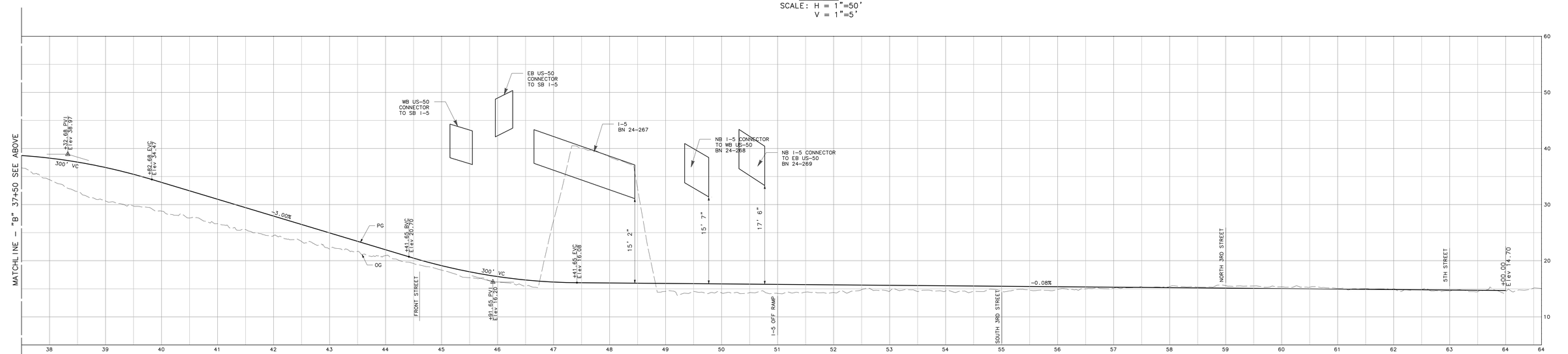
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 2 OF 3



15TH STREET / BROADWAY
"B" LINE
SCALE: H = 1"=50'
V = 1"=5'

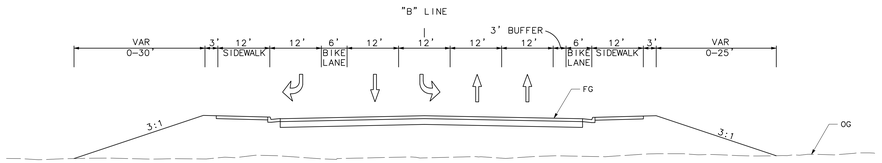


15TH STREET / BROADWAY
"B" LINE
SCALE: H = 1"=50'
V = 1"=5'

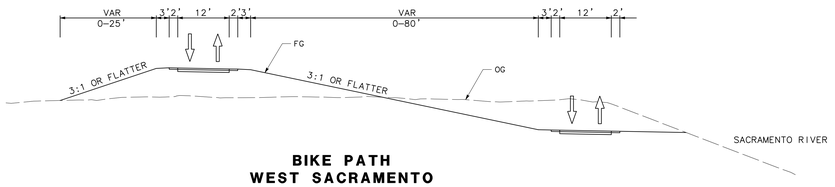
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

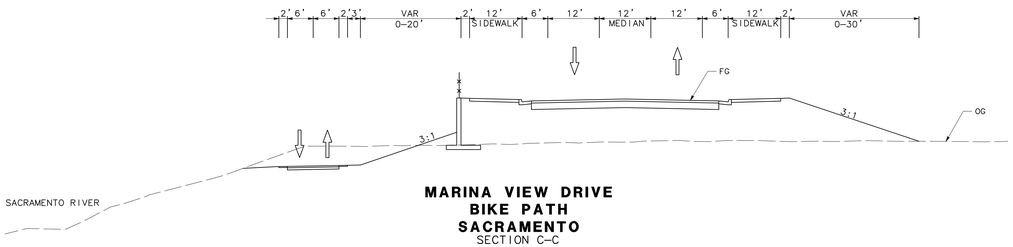
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110	SHEET 3
		FILE NO. XXX.dwg	OF 3



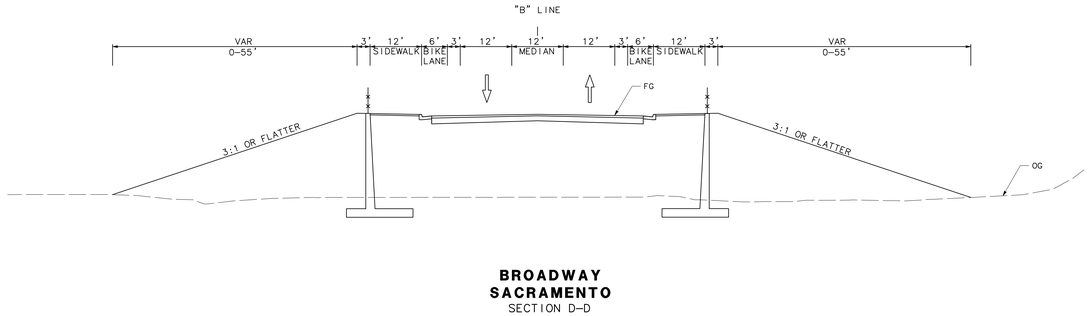
15TH STREET
WEST SACRAMENTO
SECTION A–A



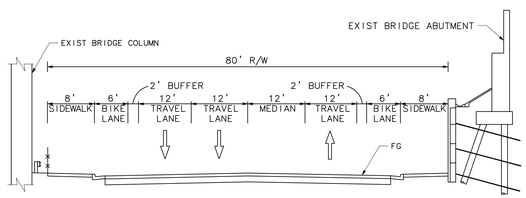
BIKE PATH
WEST SACRAMENTO
SECTION B–B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C–C



BROADWAY
SACRAMENTO
SECTION D–D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E–E

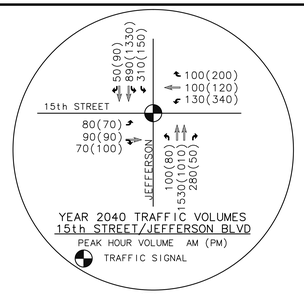
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 1 OF 3

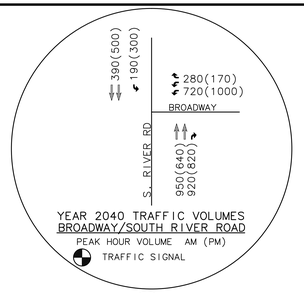
LEGEND/ ABBREVIATIONS

- L1 — LINE DATA (SEE TABLE)
- C2 — CURVE DATA (SEE TABLE)
- —F— FILL LIMITS
- —C— CUT LIMITS
- LEVEE SETBACK
- EXISTING RIGHT OF WAY
- PROPOSED RETAINING WALL
- A — INTERSECTION LOCATION
- A-A — CROSS SECTION LOCATION



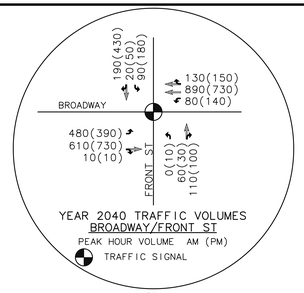
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



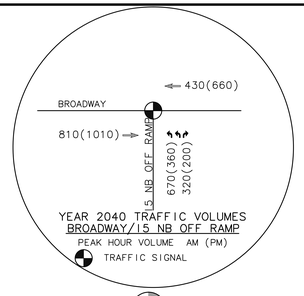
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



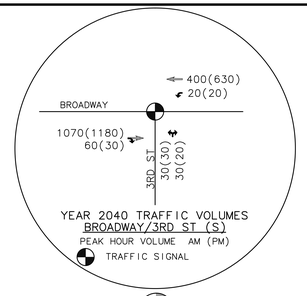
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

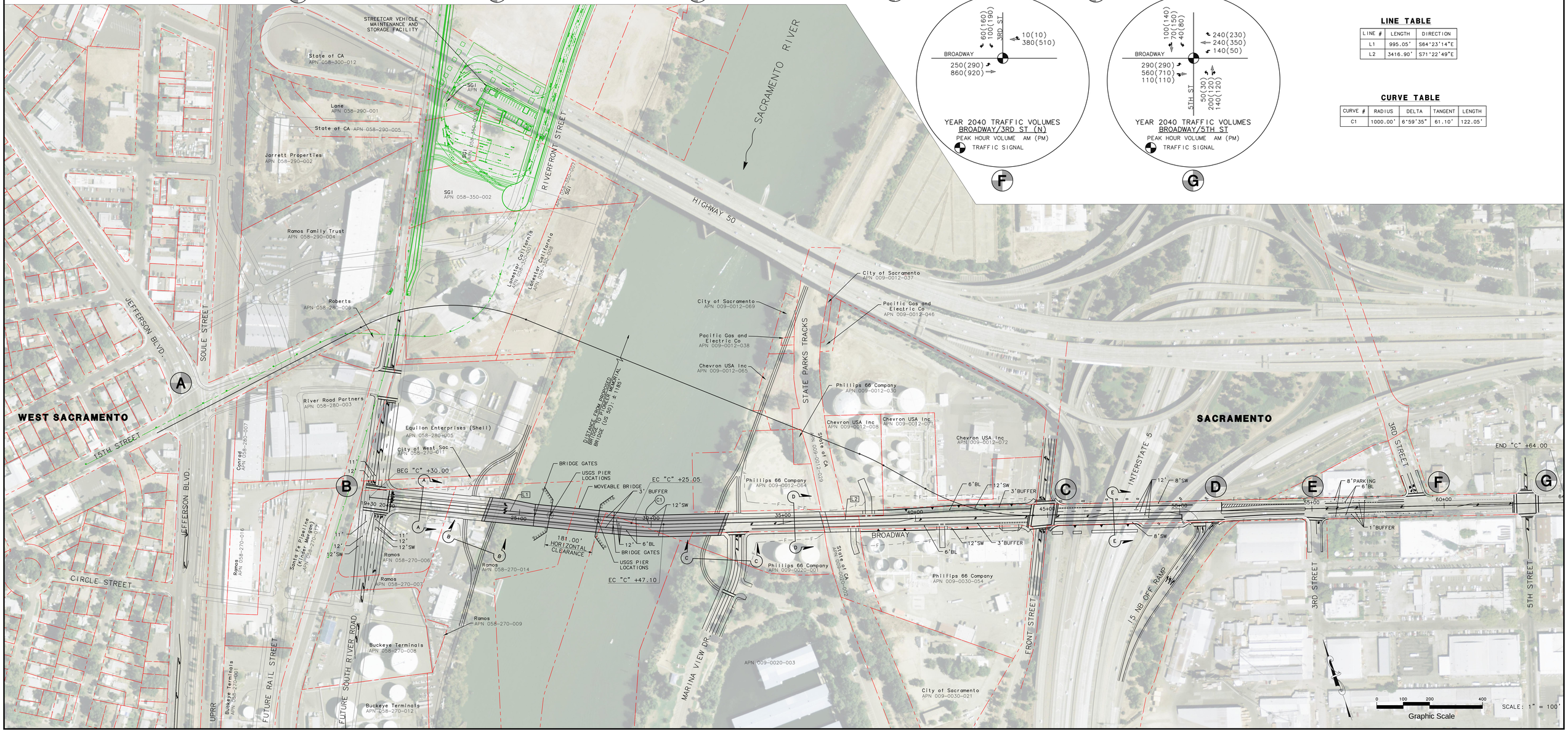
G

LINE TABLE

LINE #	LENGTH	DIRECTION
L1	995.05'	S64°23'14"E
L2	3416.90'	S71°22'49"E

CURVE TABLE

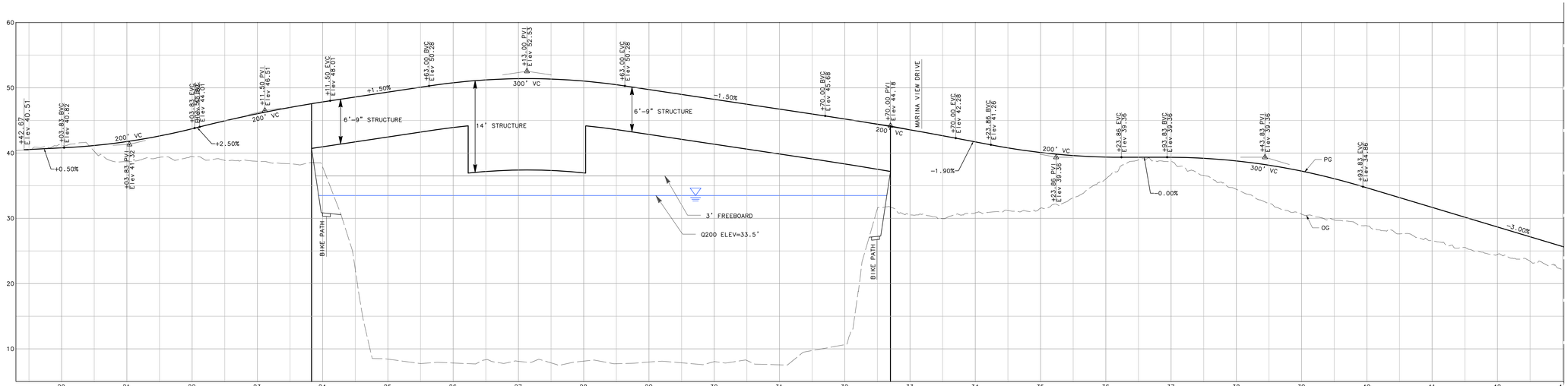
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1000.00'	6°59'35"	61.10'	122.05'



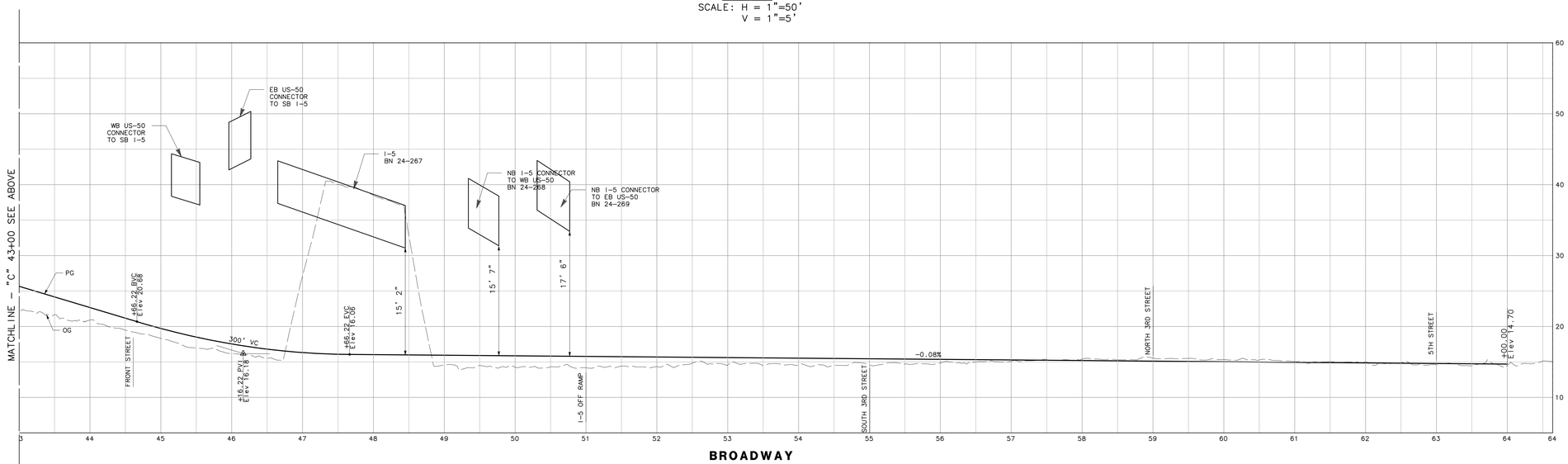
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110 FILE NO. XXX.dwg	SHEET 2 OF 3



BROADWAY
"C" LINE
SCALE: H = 1"=50'
V = 1"=5'



BROADWAY
"C" LINE
SCALE: H = 1"=50'
V = 1"=5'

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
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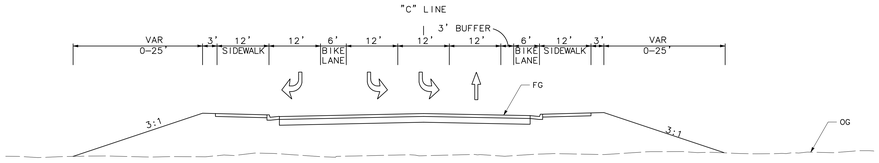
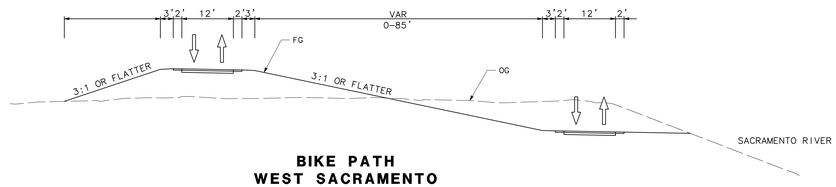
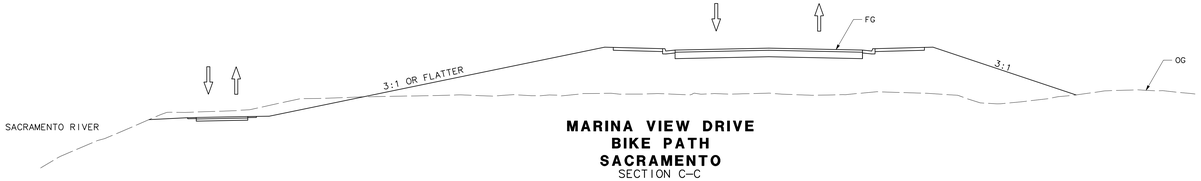
		FILE NO. XXX.dwg	OF 3



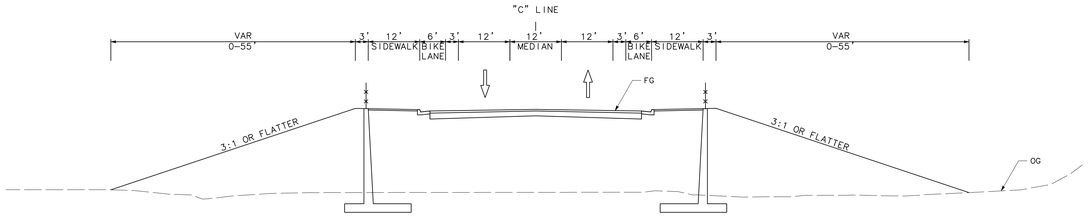
15TH STREET
WEST SACRAMENTO
SECTION A-A



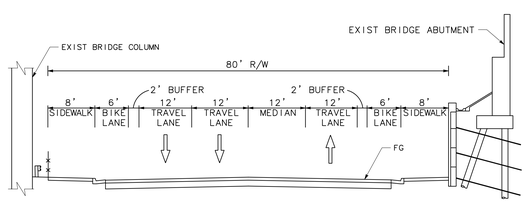
BIKE PATH
WEST SACRAMENTO
SECTION B-B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C-C



BROADWAY
SACRAMENTO
SECTION D-D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E-E

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT D

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	JOB NO. SA-17110	SHEET 1
		FILE NO. XXX.dwg	OF 3

LEGEND/ ABBREVIATIONS

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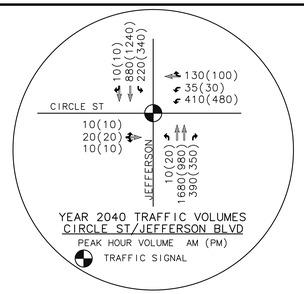
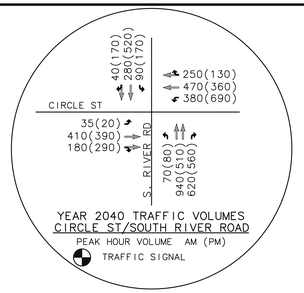


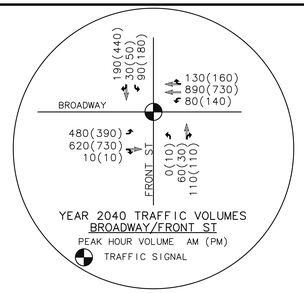
YEAR 2040 TRAFFIC VOLUMES
CIRCLE ST/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



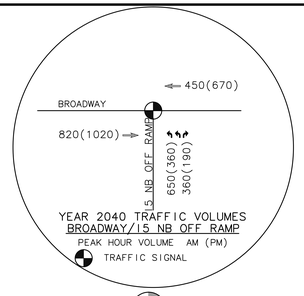
YEAR 2040 TRAFFIC VOLUMES
CIRCLE ST/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



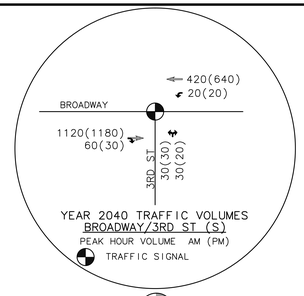
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

C



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/I5 NB OFF RAMP
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

D



YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (S)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

E

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/3RD ST (N)
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

F

YEAR 2040 TRAFFIC VOLUMES
BROADWAY/5TH ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

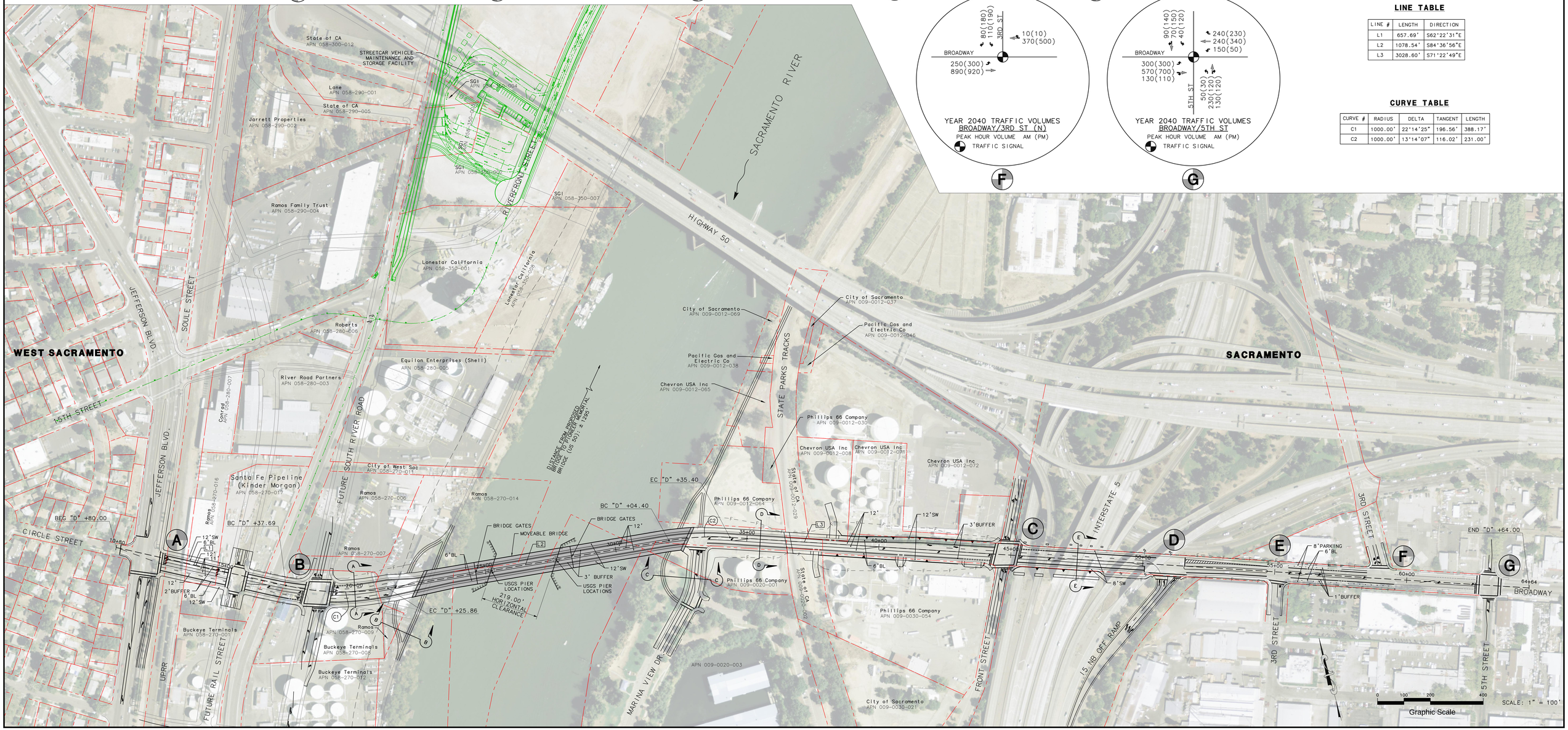
G

LINE TABLE

LINE #	LENGTH	DIRECTION
L1	657.69'	S62°22'31"E
L2	1078.54'	S84°36'56"E
L3	3028.60'	S71°22'49"E

CURVE TABLE

CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1000.00'	22°14'25"	196.56'	388.17'
C2	1000.00'	13°14'07"	116.02'	231.00'



BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT D

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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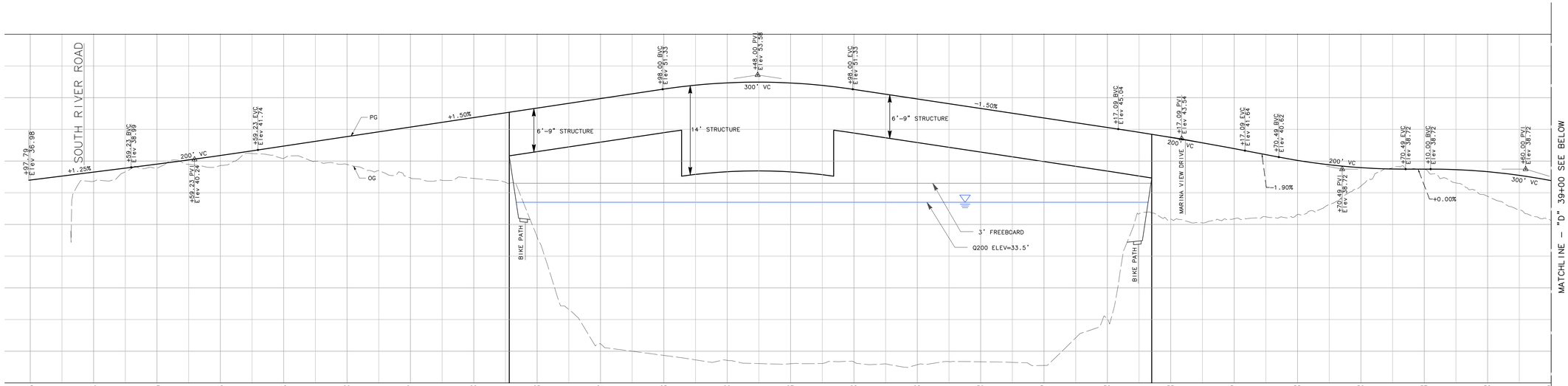
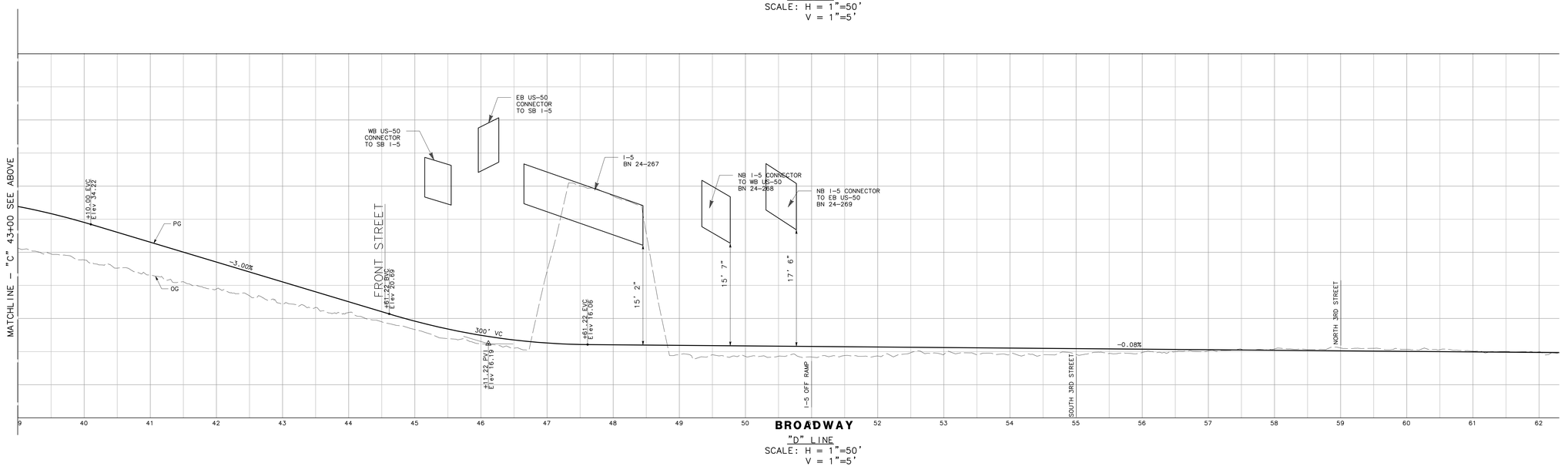


CIRCLE ST/BROADWAY
"D" LINE
SCALE: H = 1"=50'
V = 1"=5'



BROADWAY
"D" LINE
SCALE: H = 1"=50'
V = 1"=5'

BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT D

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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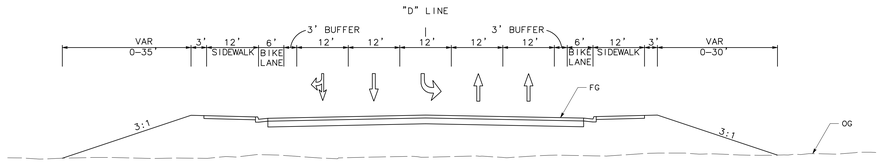
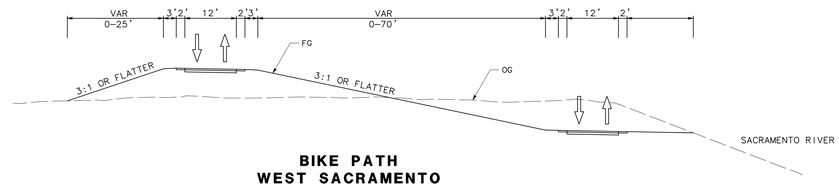
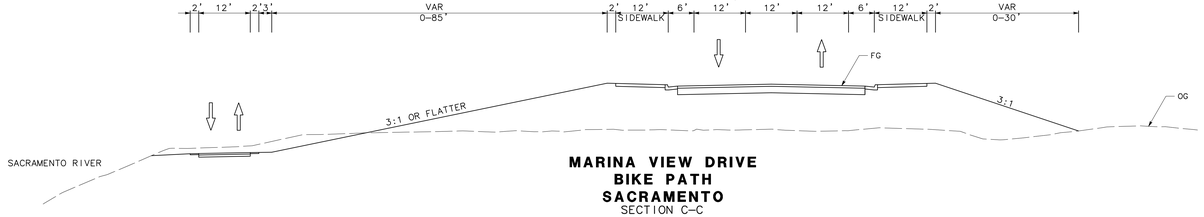


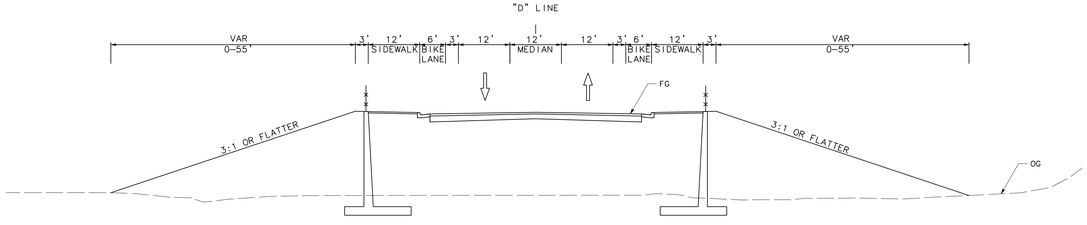
15TH STREET
WEST SACRAMENTO
SECTION A–A



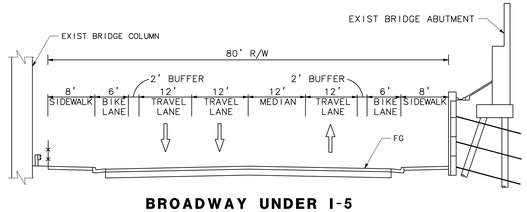
BIKE PATH
WEST SACRAMENTO
SECTION B–B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C–C



BROADWAY
SACRAMENTO
SECTION D–D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E–E

Broadway Bridge Alignment Memo, Attachment D

Broadway Bridge Alignment Progression Memo

MARK THOMAS

MEMORANDUM

To: Jason McCoy, City of West Sacramento
Jesse Gothan, City of Sacramento

Project No.: SA-17110

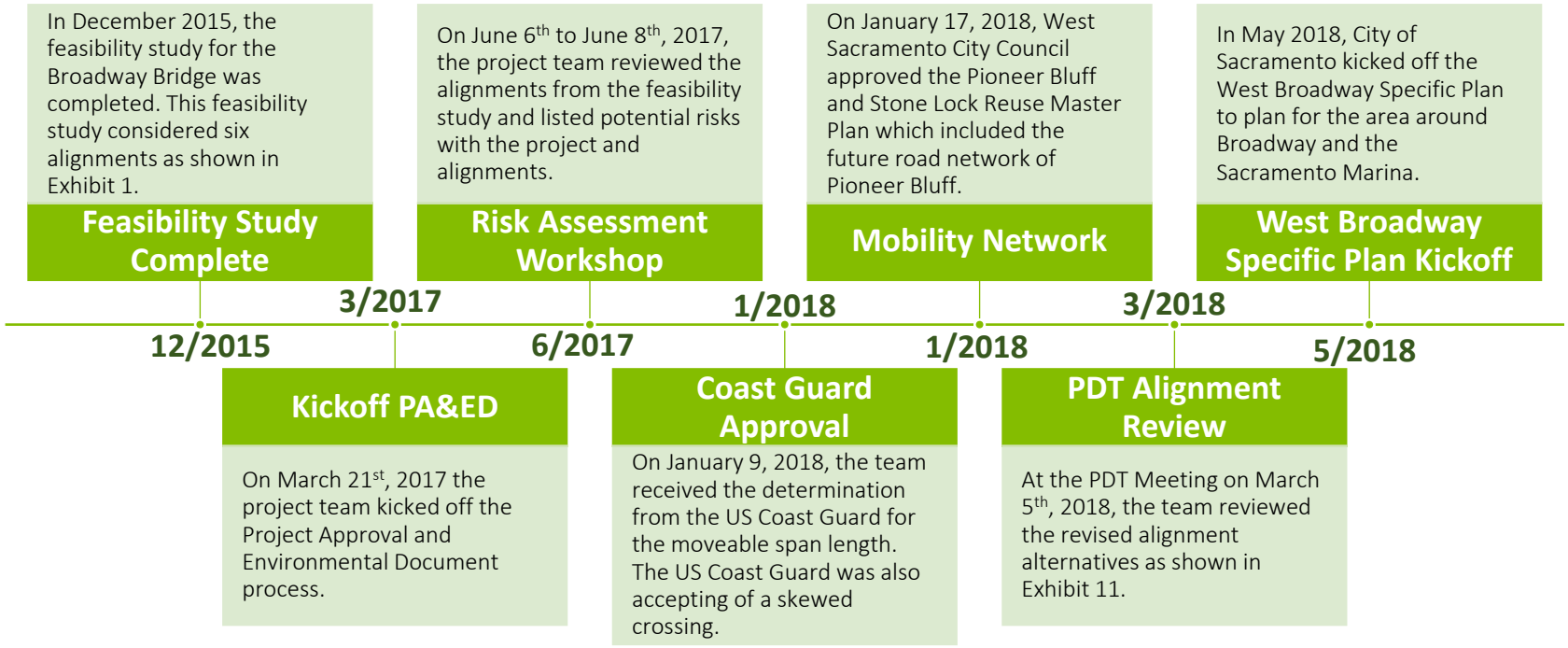
Cc:

From: Mark Thomas

Date: October 31, 2019

RE: Broadway Bridge Alignment Progression

The following memorandum reviews the progression of the Broadway Bridge Alignments. Starting with the original alignments considered in the Feasibility Study to their evolution what is currently presented.



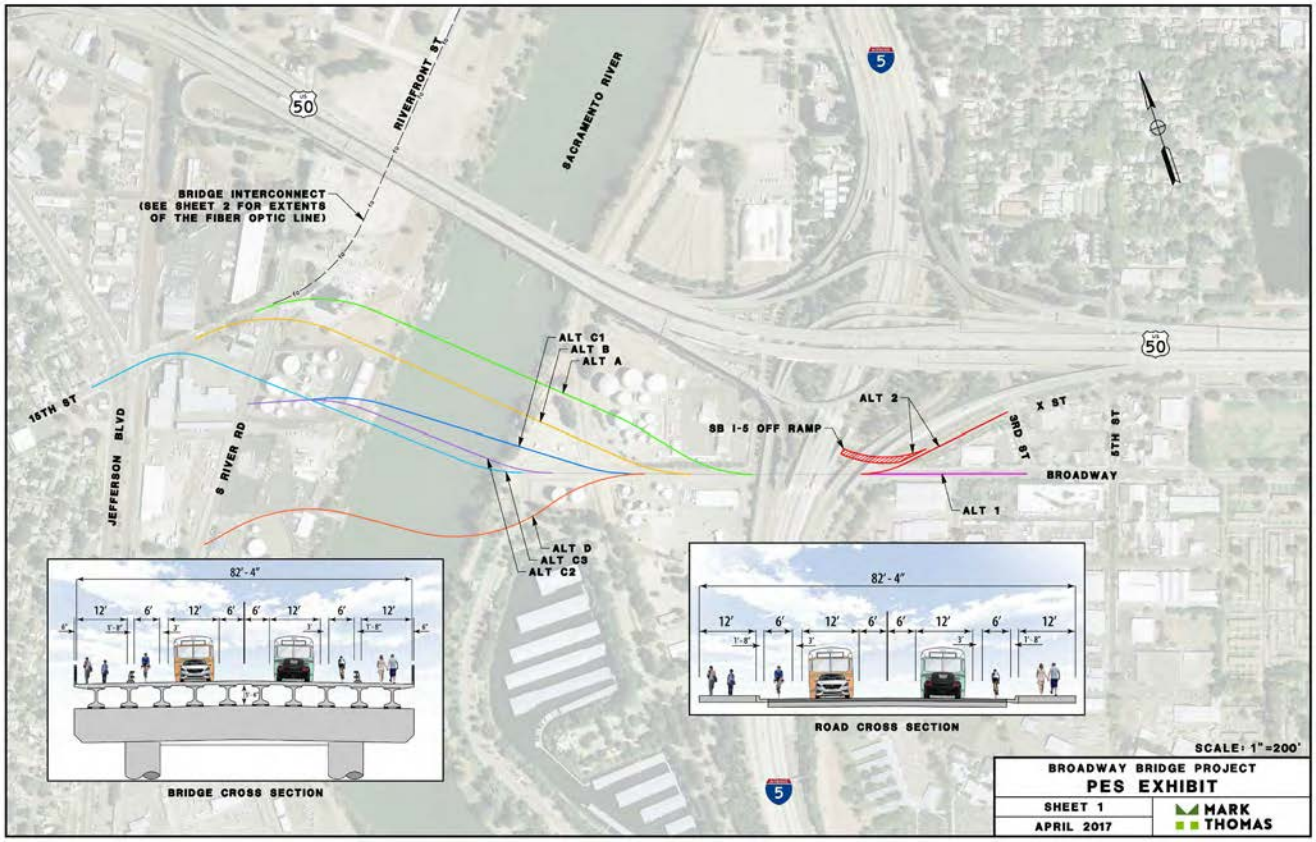


Exhibit 1

These are the alignments presented in the feasibility study and the alignments discussed in the Risk Assessment Workshop on June 6-8, 2017.

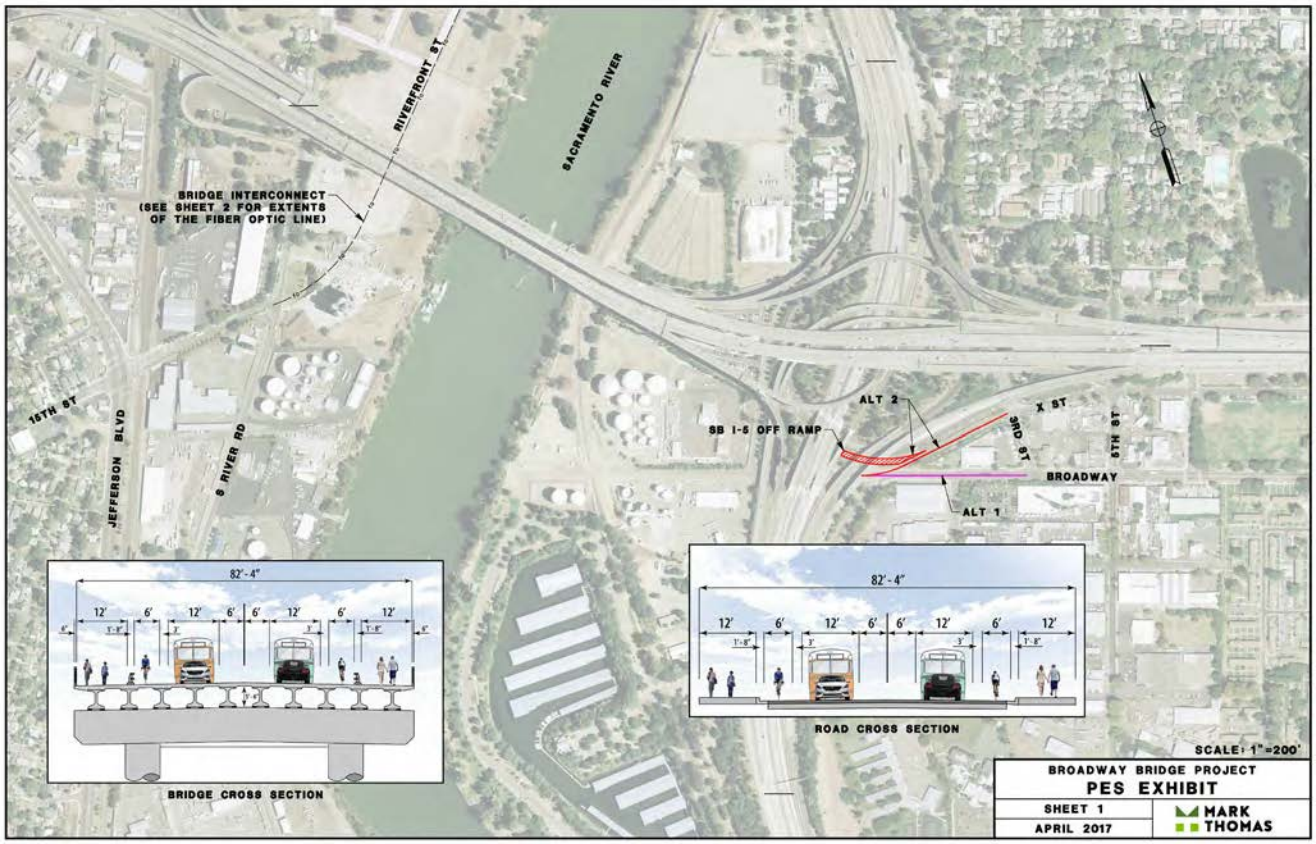


Exhibit 2

The connection to Broadway in Sacramento initially studied two options, close the southbound I-5 off ramp and connect to X Street or connect directly to Broadway.

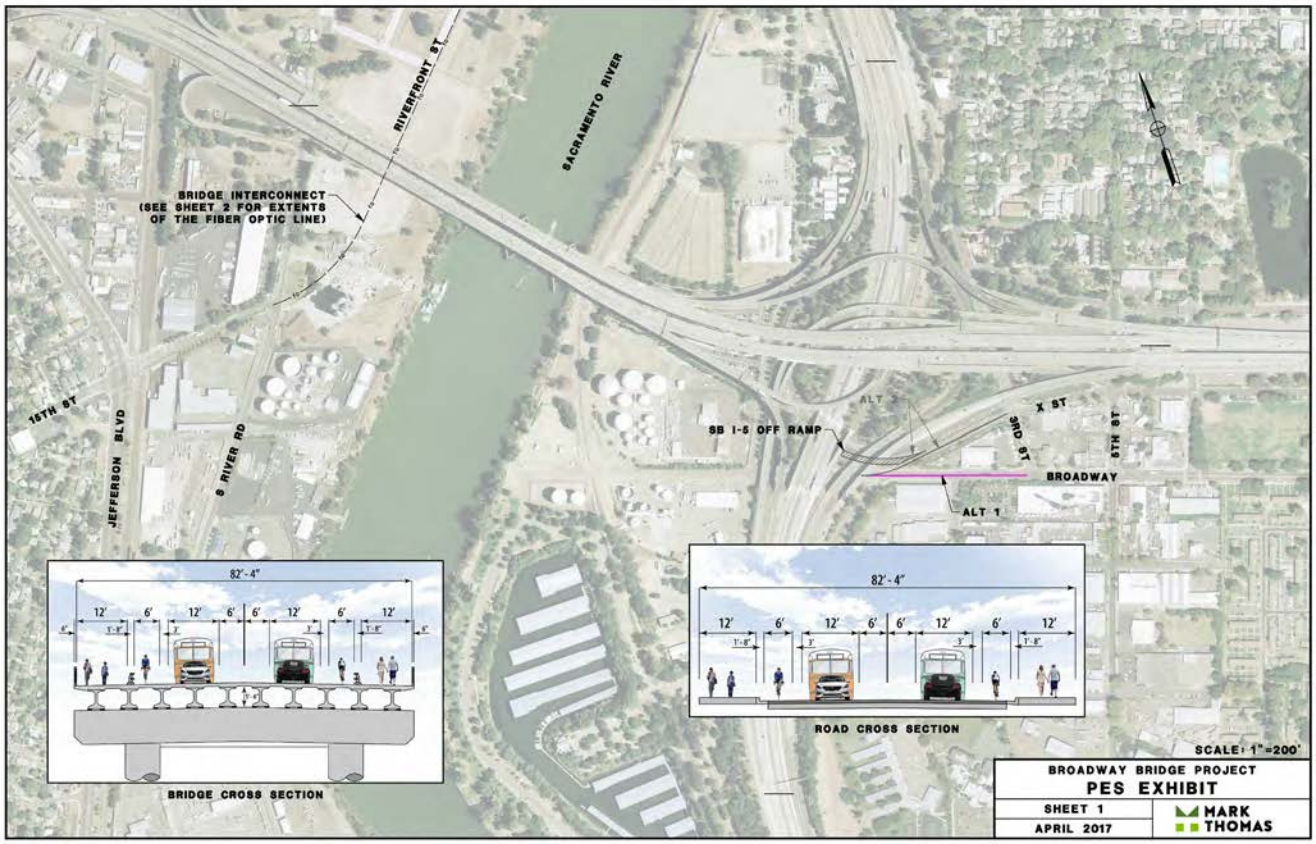


Exhibit 3

At the Risk Assessment meetings on June 6-8, 2017, the team identified the cost and schedule risk associated with closing the I-5 off ramp and opted to avoid the risk by pursing other strategies to divert traffic from Broadway. Per traffic memo prepared by Fehr and Peers dated January 15, 2018, there are not significant traffic implications to connecting directly to Broadway.

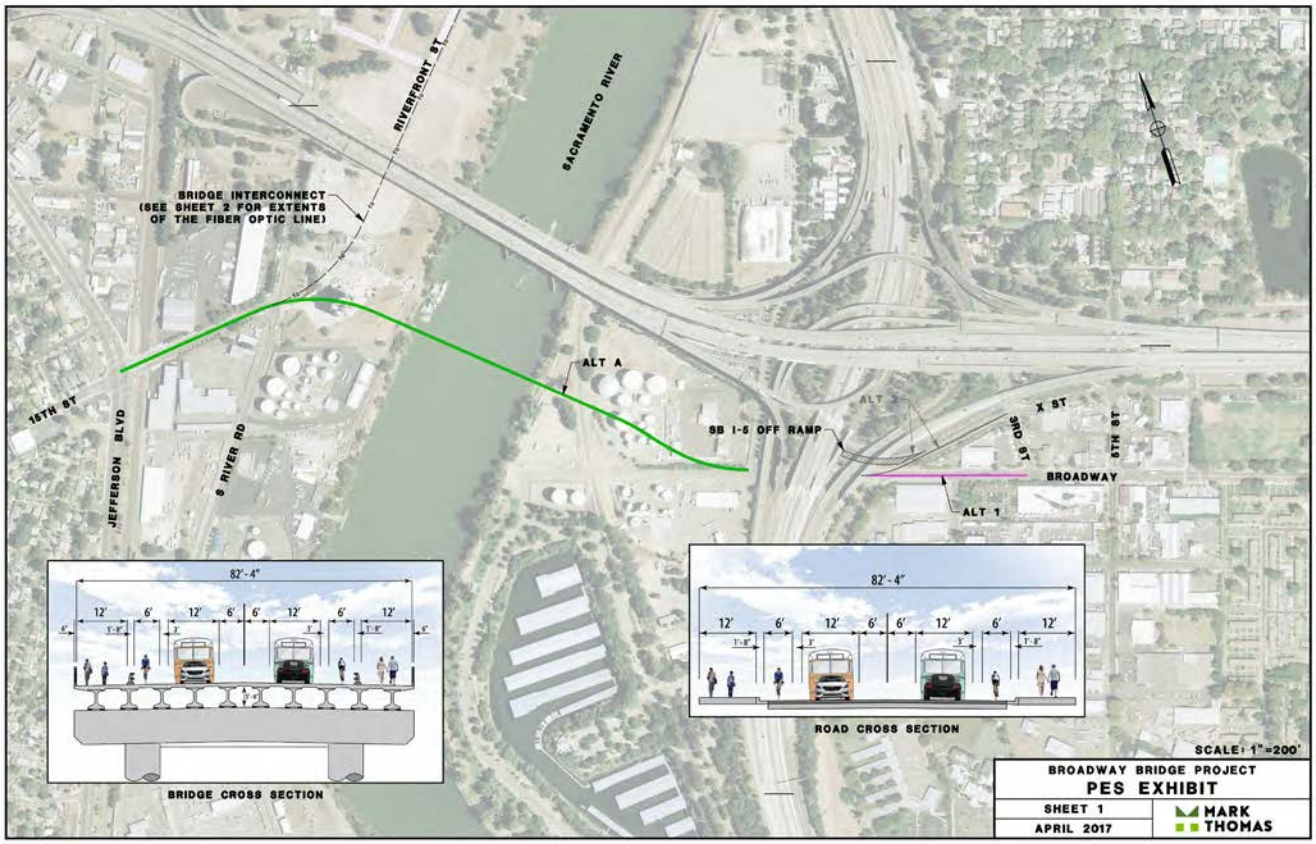


Exhibit 4

The version of Alignment A remains the same from the feasibility study.

The major delay and cost implications for modifying the Lone Star property and the Chevron property were discussed at the risk assessment meeting and the PDT meeting on July 5th, 2017.

Alignment was kept to identify the furthest north alignment considered.

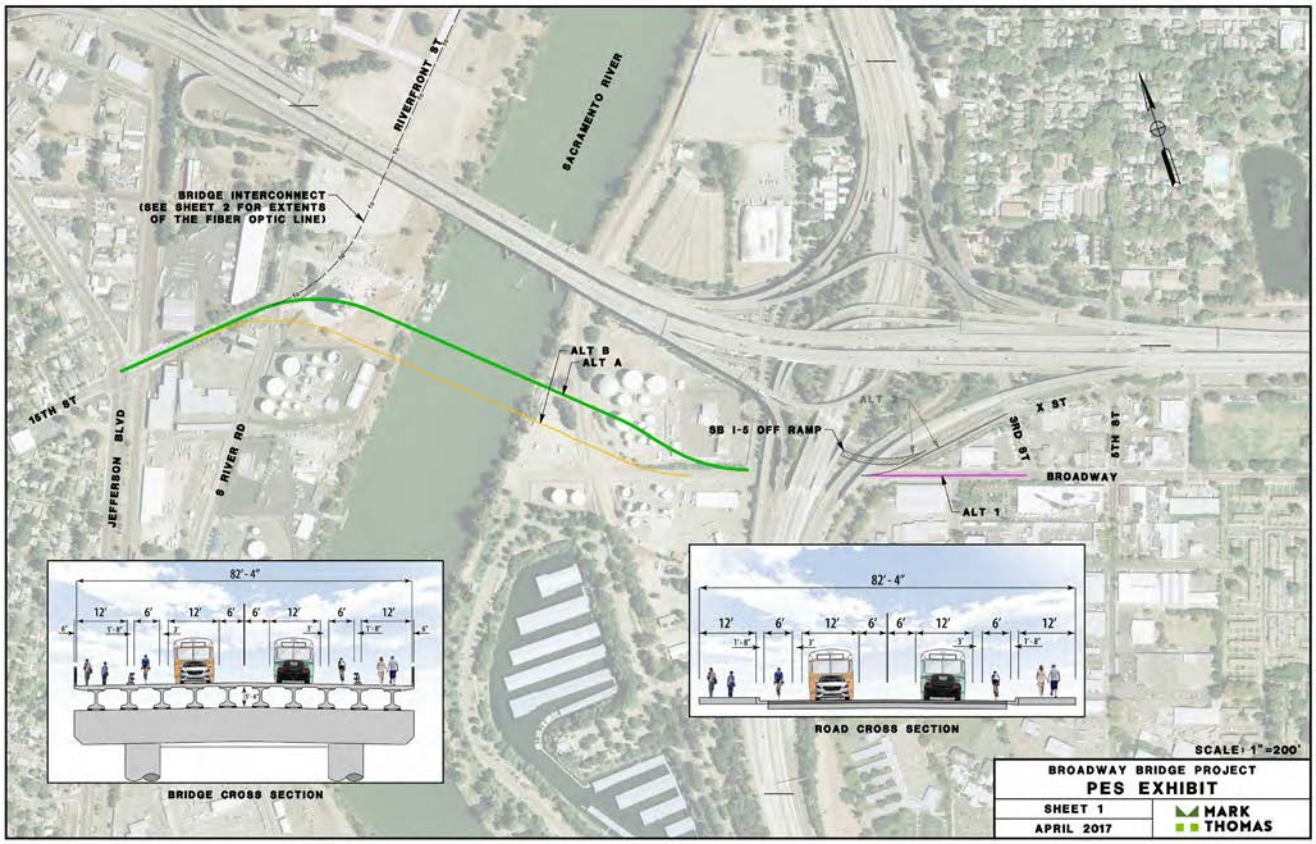


Exhibit 5

Alignment B from the feasibility study was a slight modification to Alignment A, and had similar impacts and risks as Alignment A.

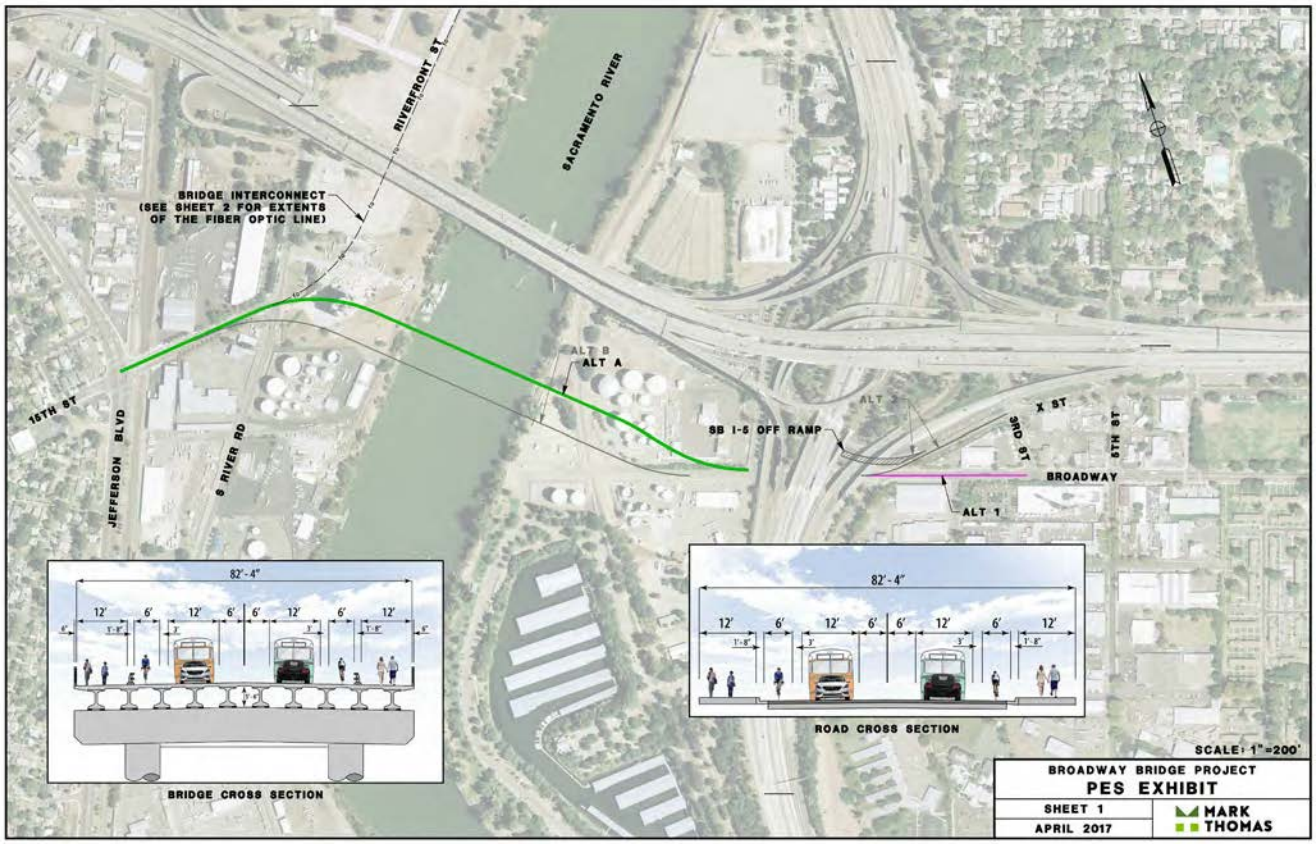


Exhibit 6

The feasibility study version of Alignment B was removed as it has comparable impacts to Alignment A and Alignment A was determined to be the furthest north alignment per PDT meeting August 7, 2017.

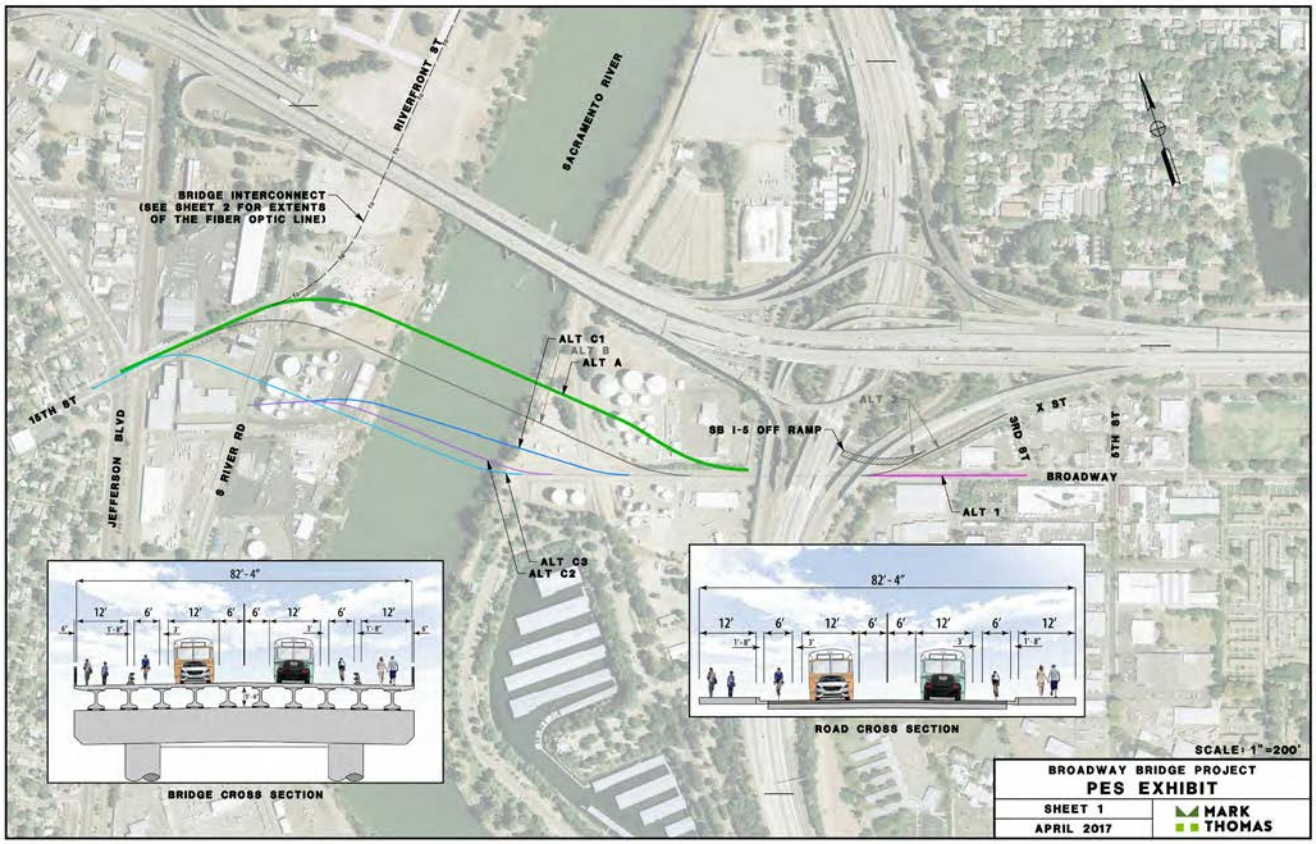


Exhibit 7

Alignment C1, C2, and C3 from the feasibility study were all similar. The main differences were C1 connected directly to Jefferson Blvd at 15th Street and C2 and C3 connected directly to South River Road.

Since environmental study area included the whole area from the furthest north alignment to the furthest south alignment, two alignments with subtle differences were not both needed.

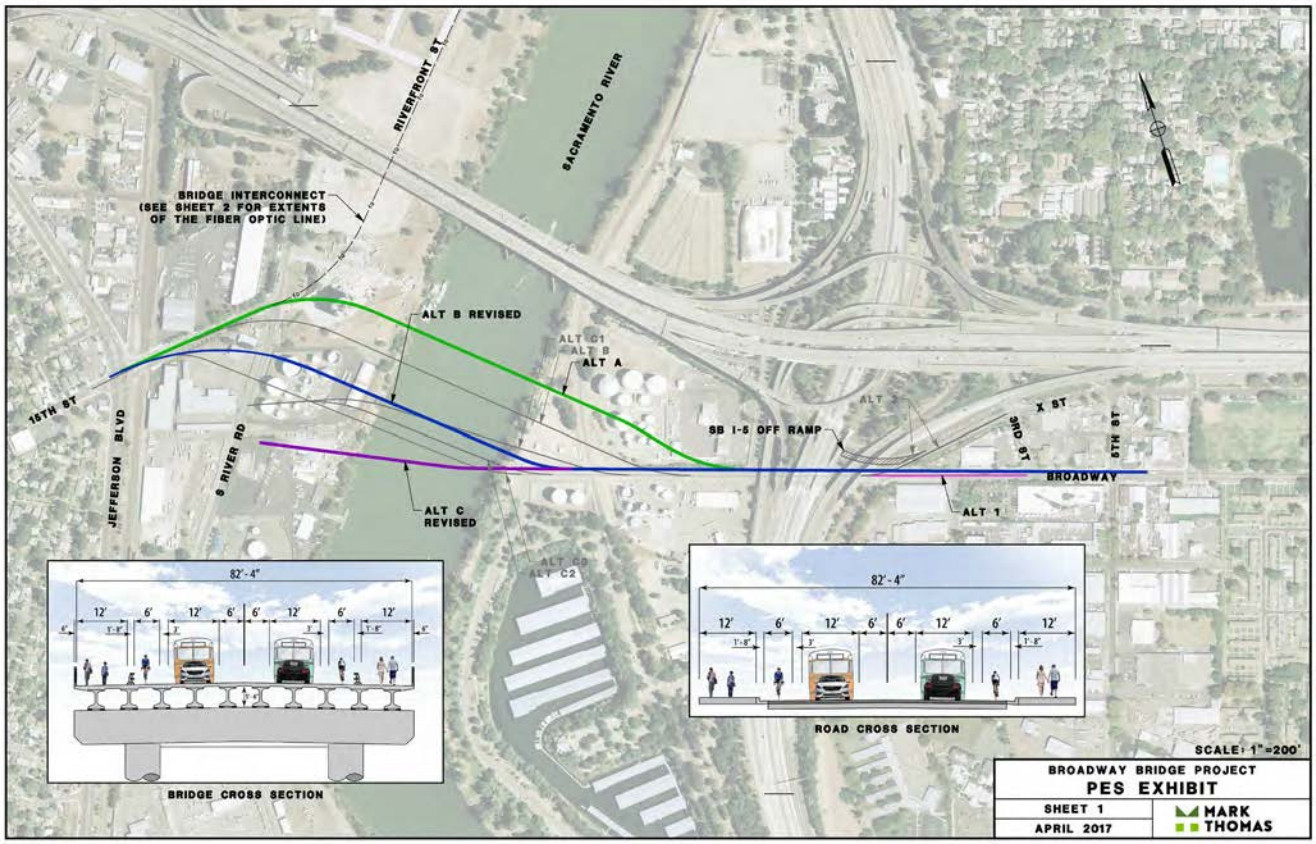


Exhibit 8

The C1 Alignment (that connected directly to Jefferson Blvd) was slightly modified to match up with the realigned 15th Street from the West Sacramento Mobility Network (approved by West Sacramento City Council on January 17th, 2018) and is called the Alignment B revised.

The C2 and C3 Alignments (connected directly to South River Road), so Alignment C revised was established to maximum block spacing in the West Sacramento Mobility Network. Alignment C revised was established after a letter from the US Coast Guard dated January 9, 2018 allowed the bridge alignment to have skew across the river.

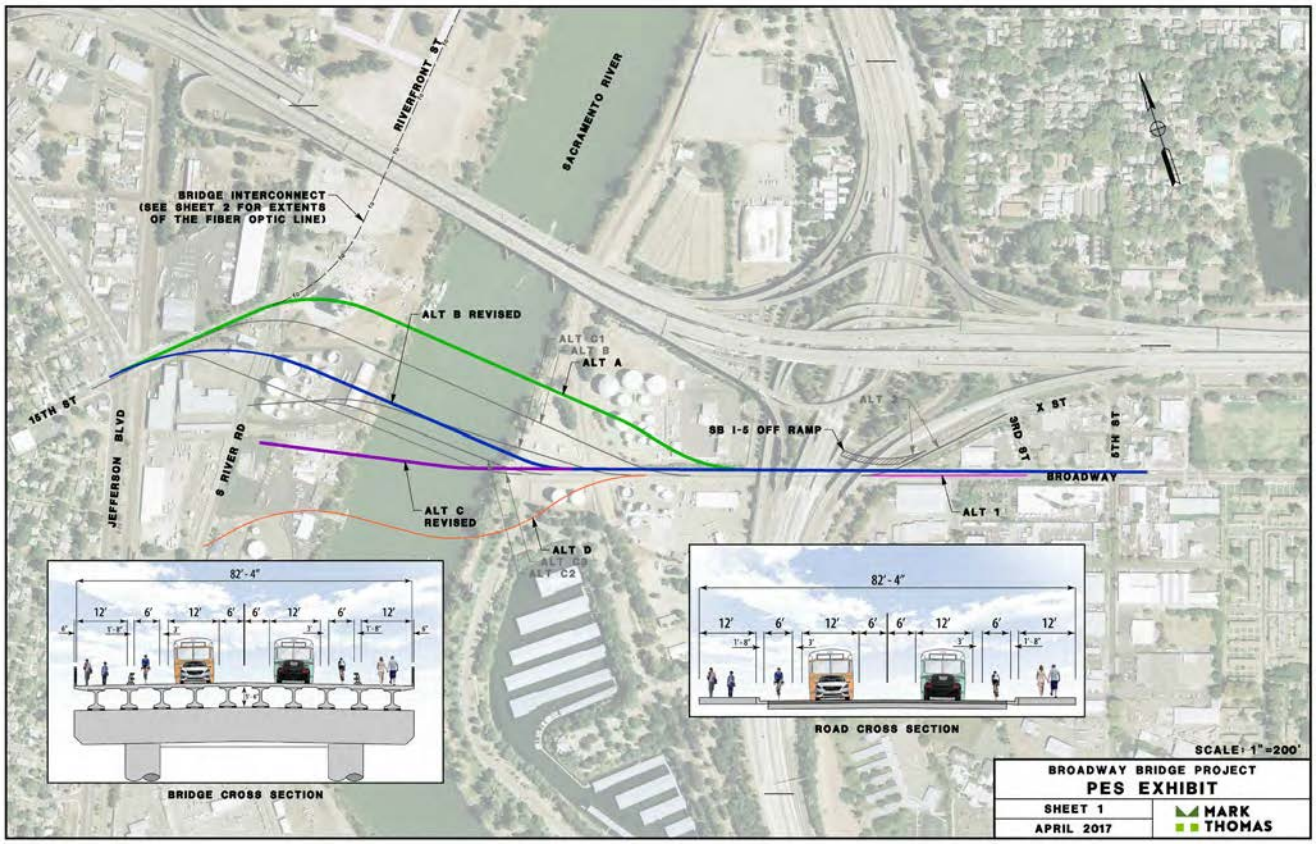


Exhibit 9

Alignment D from the feasibility study curved down into Marina View Drive and impacted the Sacramento Marina.

City of Sacramento had concerns with impacts to the Marina per PDT meeting on August 7, 2017 and requested modifications to avoid impacts.

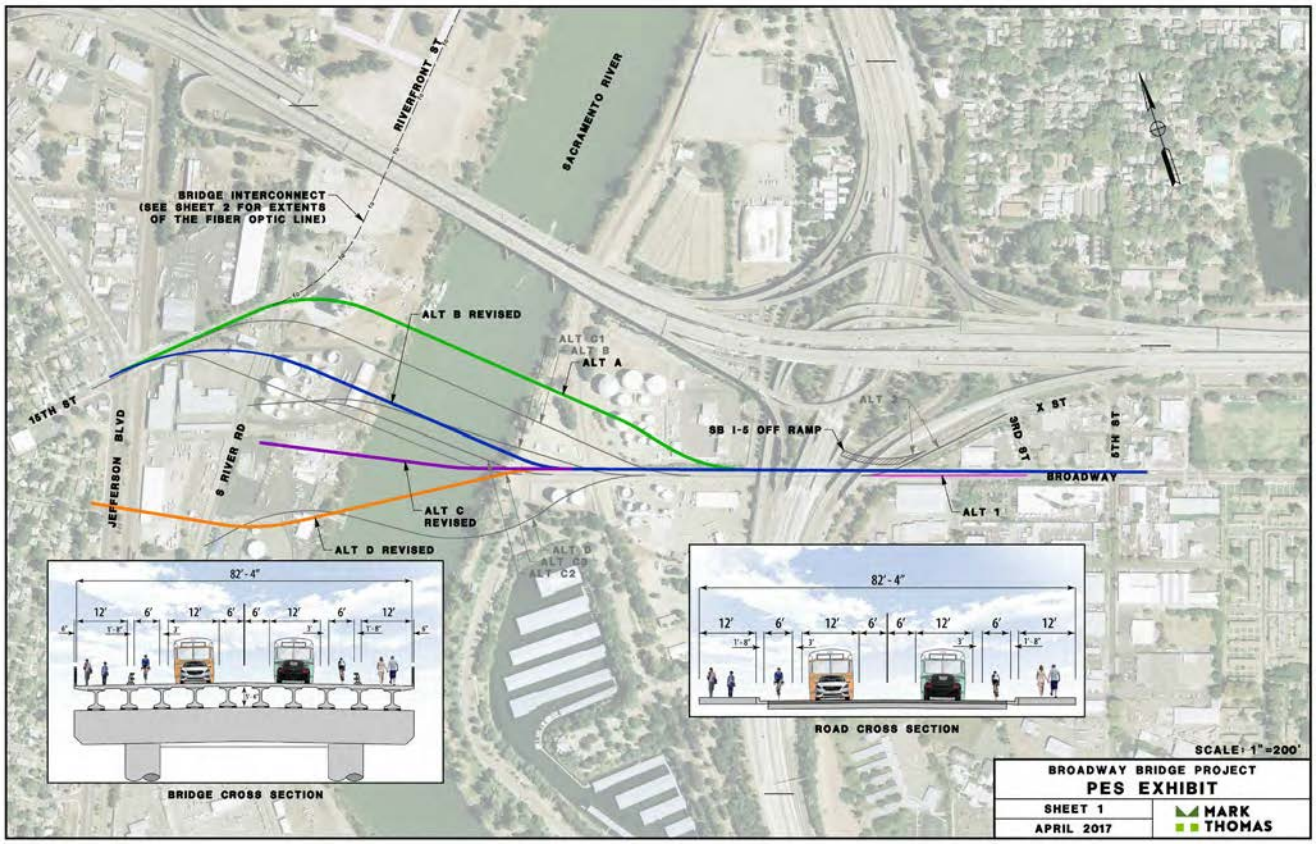


Exhibit 10

Alignment D was revised to avoid impacts to the Sacramento Marina and was connected to Jefferson Blvd at Circle Street. The alignment was unable to connect to Alameda due to restrictions on the Sacramento side to avoid impacts to the Marina and impacts to the grid established in the West Sacramento Mobility Network.

Alignment D revised was established after a letter from the US Coast Guard dated January 9, 2018 allowed the bridge alignment to have skew across the river. The goal was to push the alignment as far south as possible.

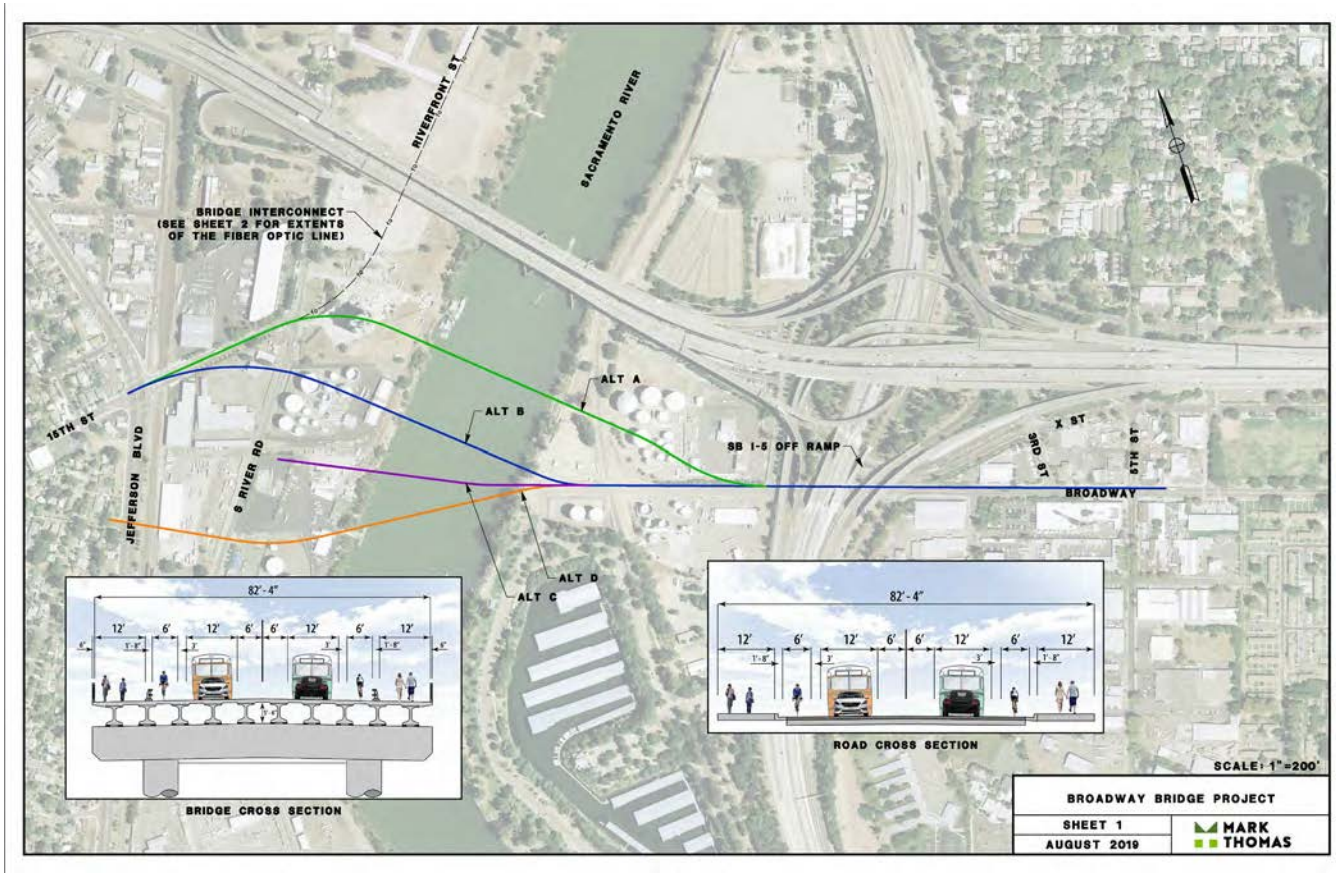


Exhibit 11

Alignment A - A lot of concerns with impacts to Chevron in Sacramento and the Lone Tree property in West Sacramento, cost and schedule delay. It now also conflicts with the West Broadway Specific Plan.

Alignment B - least risky

Alignment C - Does not provide optimum traffic due to the "T" intersection at South River Road.

Alignment D - Connects directly to Circle Street and although there are no traffic implications, the optics of connecting directly to a neighborhood could have public concerns. The desire to have the bridge as far south has changed. Most expensive option due to the moveable structure length.

Broadway Bridge Alignment Memo, Attachment E

Broadway Bridge Risk Assessment Report

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

June 2017

Prepared by

Value Management Strategies, Inc.
& Mark Thomas & Company

CORPORATE OFFICE:
900 Canterbury Place, Suite 330
Escondido, CA 92025
T: 760 741 5518 | F: 760 741 5617

Date: June 16, 2017

To: **Zach Siviglia**
Project Manager
Mark Thomas & Company

Subject: Broadway Bridge Conceptual Alignment Alternatives Risk Assessment
Draft Report

Dear Zach:

Value Management Strategies, Inc. is pleased to transmit this Draft Report for the referenced project. This report summarizes the events of the study conducted June 6-8, 2017.

Please complete your review of this report and provide your comments and recommendations to me for inclusion in the final report.

If you have any questions or comments concerning this report, please contact me at (503) 957-9642 or email rob@vms-inc.com.

Sincerely,

VALUE MANAGEMENT STRATEGIES, INC.

Robert B. Stewart, CVS-Life, FSAVE, PMP, PMI-RMP
President / CEO

Copy: (PDF) Addressee

NOTE TO READERS

The risk based estimating process utilized in the analysis conducted by Value Management Strategies, Inc. (VMS) through its Risk Assessment workshops is iterative in nature and represents a "snapshot in time" for that project and under the conditions known at that point in time. Additionally, the conceptual estimates provided to VMS to conduct the studies, estimate validation, and analysis will require further in-depth analysis and development throughout the program and project delivery process.

The risk assessment tools and techniques employed by VMS traditionally deal with identifiable and quantifiable project-type risks, i.e. those events that can occur in planning, design, bidding, construction, and changed conditions. The risk assessment process could also consider the larger, more difficult risks – political and management continuity and "acts of God" that can have very high impact in cost and schedule – but at this point, these types of risks have generally not been included. This is an area for review and development moving forward, particularly with respect to how to characterize such events in a useful manner for better management and project delivery.

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DRAFT

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY **DRAFT**

This Risk Assessment Study Report summarizes the events of the Risk Assessment workshop conducted on behalf of Mark Thomas & Company for the Broadway Bridge project in Sacramento, and West Sacramento, California. The risk workshop team was comprised of City of Sacramento and City of West Sacramento personnel, Mark Thomas & Company personnel, and led by Value Management Strategies, Inc. (VMS). This report presents the results and findings of the risk assessment workshop conducted from the perspective of identifying and quantifying project cost and schedule risk.

BROADWAY BRIDGE PROJECT OVERVIEW

The Broadway Bridge project seeks to construct a new bridge across the Sacramento River, connecting the City of Sacramento to the City of West Sacramento in the region just southeast of the US-50 Sacramento River crossing, near where US-50 and I-5 intersect in the City of Sacramento. Currently, the project is in a conceptual stage and stakeholders are working to determine an ideal bridge alignment.

Project stakeholders are currently considering six different alignments options (designated A, B, C1, C2, C3, D) which will theoretically initiate from Broadway on the City of Sacramento side of the Sacramento River, and terminate at various potential locations, including South River Rd., 15th St., and Jefferson Blvd., on the West Sacramento side of the Sacramento River. The bridge is currently anticipated to be constructed as an adaptable two-lane precast concrete and steel (for the movable-span) bascule structure. Construction is not expected to begin earlier than 2025, is anticipated to last 94 months, but may begin later depending on the nature of various constraints and factors still under consideration. The project is sited for a stretch of the Sacramento River which is currently home to copious oil and gas facilities owned by various private entities, including Shell, Ramos, Buckeye, Pacific Gas and Electric (PG&E), Phillips 66 Co., Chevron, and Kinder Morgan. Furthermore, a parcel of land formerly owned by Lonestar California Inc., that was recently purchased by a private developer, and the Miller Park Sacramento Marina are in the vicinity of the project site. Additional local features that may be impacted by the Broadway Bridge project include railroads on either side of the river, multiple wharf structures, pipelines, and utilities.

The Broadway Bridge is intended for use by cars, public transportation, rail transit, pedestrians, and bicyclists. The proposed bridge is expected to help relieve severe traffic congestion on US-50 and other thoroughfares connecting Sacramento to West Sacramento, and provide a means of safe transportation across the river for pedestrians and bicyclists.

RISK ASSESSMENT OBJECTIVES

The objectives of the Risk Assessment workshop were to:

- Analyze conceptual alignment alternatives to develop information that will support decision makers involved in determining the final bridge alignment.

- Develop a shared level of understanding among participants regarding threats and opportunities for the various alignments under consideration.
- Identify, validate, and quantify project risks as they relate to cost, schedule, and performance.

The methodology used to perform the analysis is detailed in the following section. A future planned risk assessment effort will perform a more thorough analysis of project cost and schedule risk focusing specifically on the 'preferred' alignment that is ultimately selected by project stakeholders. This risk assessment will conduct an integrated cost and schedule risk assessment to establish project cost and schedule contingencies, and a viable risk management plan, for the purposes of preserving project value. This quantitative risk assessment will be followed by a formal Value Analysis study that will consider alternatives to improve the value of the design while identifying additional risk response strategies.

RISK ASSESSMENT APPROACH

The following approach was used to achieve the key objectives of the risk assessment effort outlined above:

- Select specific conceptual alignments for focus of the risk assessment efforts.
    - Project stakeholders identified six conceptual alignments for the Broadway Bridge in advance of the study. For an overview of the conceptual alignments, see *Exhibit A*, included at the end of this section.
    - The assessment team reviewed the scope of the project as well as each specific alignment (barring alignment C2, which was excluded from study due to its similarity to the other C alignments) with a multi-disciplined team. This was a crucial step in ensuring that the team fully understood the project scope and associated constraints.
- Identify and quantify individual project specific event risks.
    - The assessment team identified event-driven uncertainties, including both threats (negative event risks) and opportunities (positive event risks), for the project in its entirety, and for each specific conceptual alignment.
    - A qualitative assessment was then performed on each risk that characterized the probability and impacts of each risk by assigning them values ranging from very low to very high. These qualitative values were assigned specific cost and schedule values based on quantitative scales that were developed and customized to suit the specific project capital costs in order to assess the magnitude of the cost impacts associated with each identified risk.

- Identify potential risk response strategies.
    - The assessment team developed uniquely tailored response strategies (which include accept, avoid, mitigate, and transfer, for threats, and exploit, enhance and share for opportunities) for each identified risk.
    - The effect of implementing the identified risk response strategies were then assessed, and quantified, wherever possible, to identify the benefits to the cost and schedule impacts of each risk.

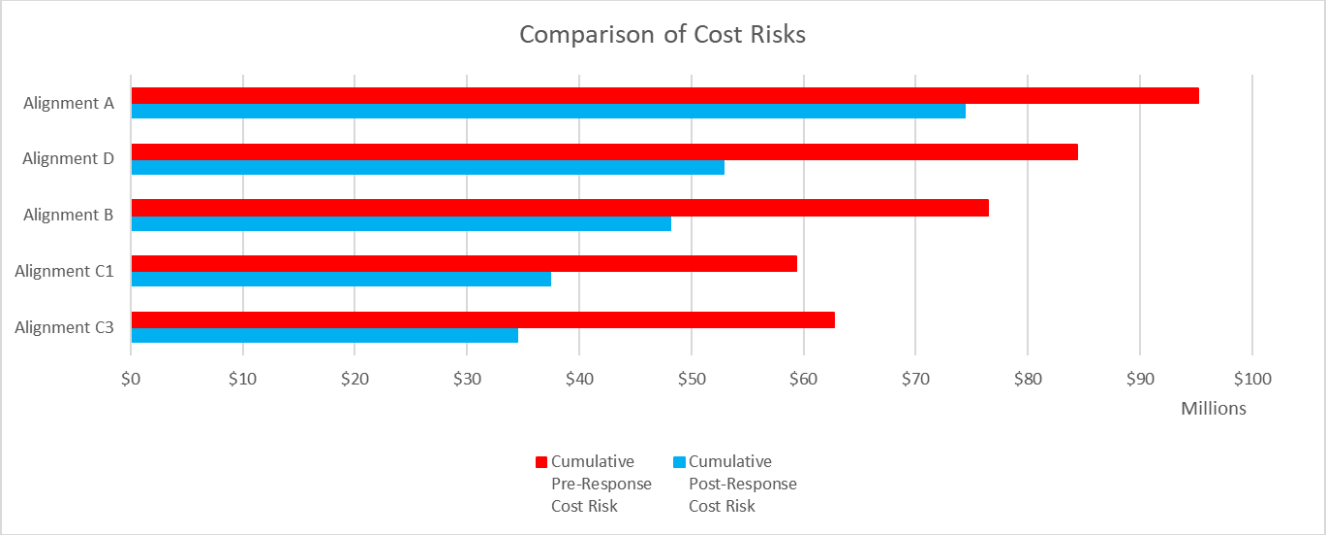
MAJOR FINDINGS

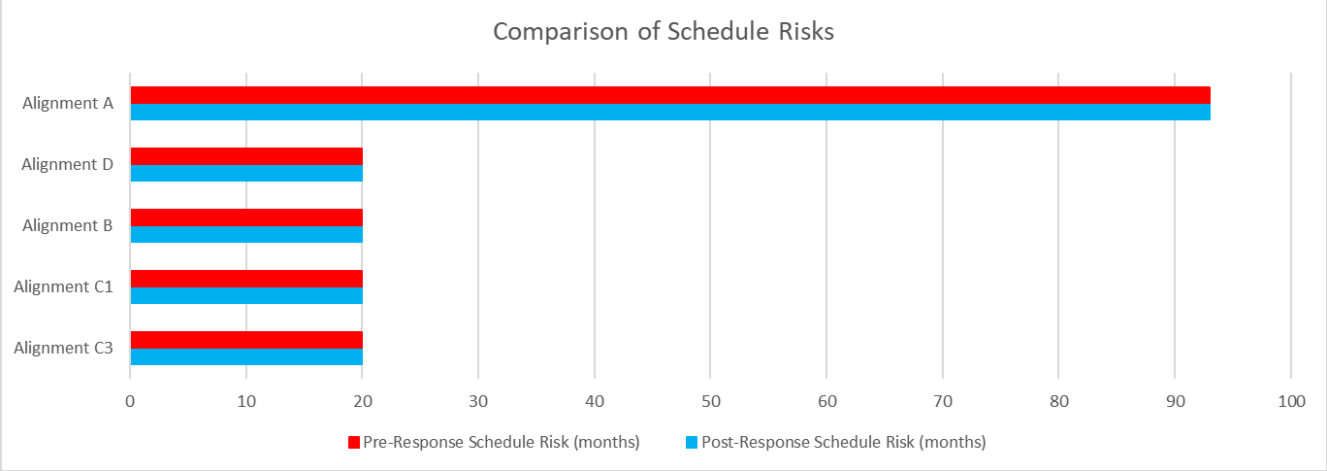
The estimated impact of the risks for each of the alignment alternatives evaluated in this study is summarized in the table below.

Alignment Alternative	Cumulative Pre-Response Cost Risk	Cumulative Post-Response Cost Risk	Pre-Response Schedule Risk (months)	Post-Response Schedule Risk (months)
Alignment A	$95,203,000	$74,363,000	93	93
Alignment B	$76,443,750	$48,093,750	20	20
Alignment C1	$59,315,625	$37,378,125	20	20
Alignment C3	$62,690,625	$34,509,375	20	20
Alignment D	$84,375,000	$52,903,125	20	20

The values for the cost risks represent the cumulative potential impact of all cost risks for both the "Pre-Response" and "Post-Response" conditions to the project. The "Pre-Response" condition assumes that the risks are not proactively managed while the "Post-Response" conditions assumes that the identified risk response strategies are actively implemented.

The schedule risk values are a simplistic representation of the sum of the single longest potential pre-construction (e.g., design, environmental, right-of-way, etc.) and construction risks. It is important to emphasize that these values have not been modeled in an integrated manner and are merely intended to communicate the relative level of risk facing each of the alignment alternatives. Further, the effect of escalation has not been factored into these values. The charts below provide a graphic comparison of these values. Based on the results of this risk assessment, Alignment A possesses significantly more cost and schedule risk relative to the others. At this time, the "C" Alignments appear to possess the least amount of risk to the project.





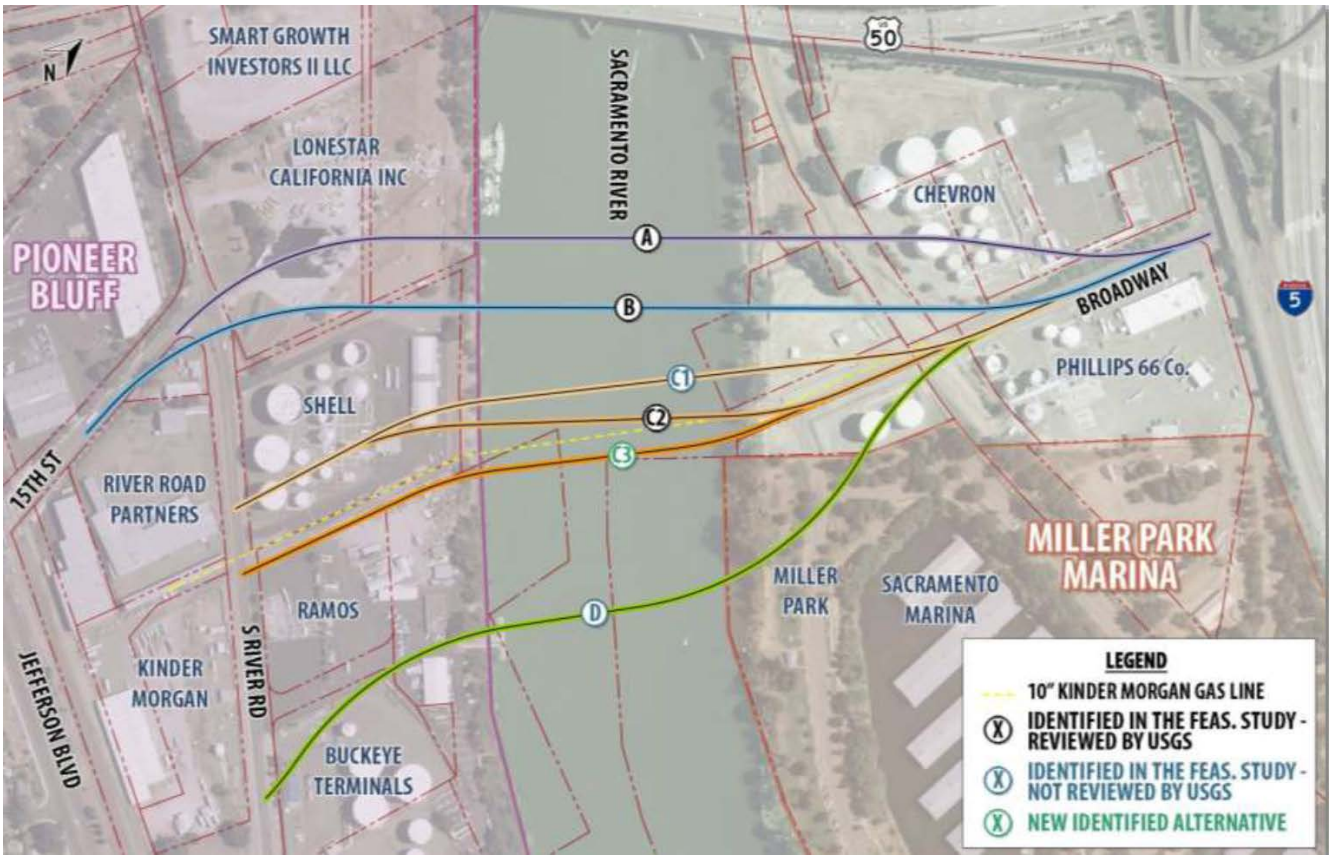
A comprehensive Risk Register was developed as a result of the work completed during the Risk Assessment workshop for each conceptual alignment alternative. The Risk Registers includes the following information:

- A qualitative and quantitative breakdown of all risks identified
- A SMART (Specific, Measurable, Attributable, Relevant, Time-Bound) Description of all risk identified
- Pre-response and post-response qualitative and quantitative data regarding the probability impact, and severity of all risks identified
- Risk Response Strategies, and Action Plan Descriptions (where applicable), for all risks identified

The Risk Register is accompanied by Tornado Charts identifying the relative priorities of key project risks for each alignment alternative, and a Risk Management Plan to help project stakeholders proactively manage and respond to the risks identified. The Risk Registers, Tornado Charts, and Risk Management Plans can be found in the *Risk Information* section of this report.

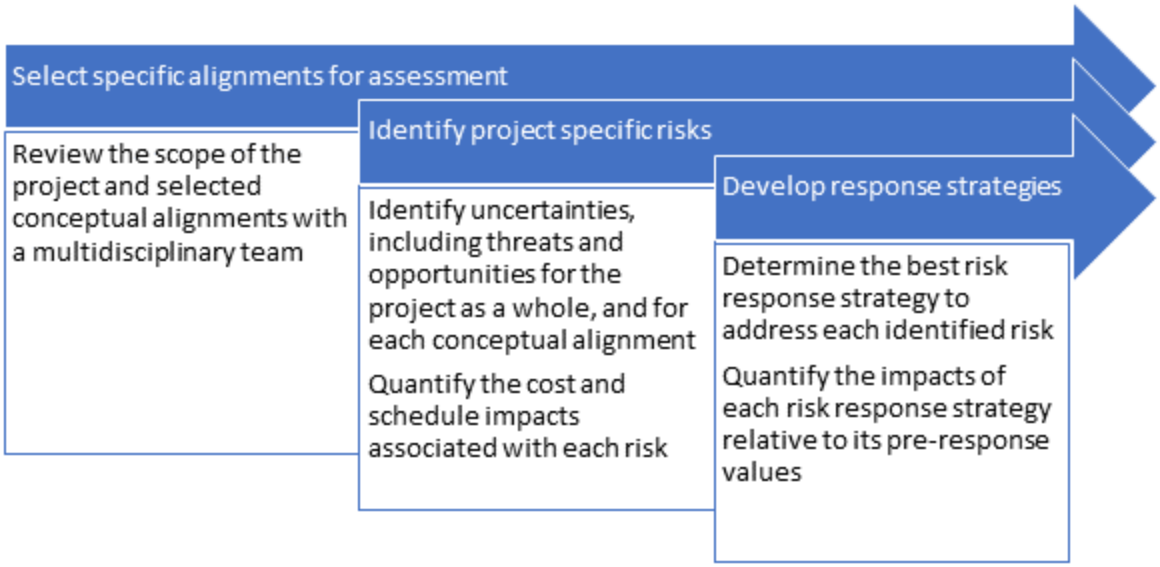
SUPPLEMENTARY DOCUMENTATION

EXHIBIT A: Conceptual Alignment Alternatives



ANALYSIS METHODOLOGY

The methodologies used to perform the risk assessment are described in detail in the following pages. The chart below articulates the general process, hierarchy, and relationship of each of the steps undertaken.



RISK ASSESSMENT APPROACH

The Risk Assessment workshop occurred June 6-8, 2017 at the Sacramento offices of Mark Thomas & Company. The process involved a series discussions and activities that examined the Broadway Bridge project and each conceptual alignment selected for review with respect to scope, cost and schedule risk, and their relationship to project delivery. The following is a brief description of the activities conducted during the workshop as part of the risk assessment effort.

PROJECT SCOPE REVIEW

The team began the risk assessment process by first reviewing its scope information. This included a review of:

- Broadway Bridge Feasibility Study documents
- Concept drawings (plans and profiles)
- Right-of-way maps & Google Maps
- Cost estimates

This was valuable in that it afforded the assessment team an opportunity to develop a shared understanding of the project and its issues. Once a shared understanding of the overall project and each conceptual alignment was established, the team was then able to begin identifying and considering project risks.

RISK ASSESSMENT PROCESS

The risk assessment analysis process included the following steps:

- **Establish Risk Scales:** A standardized quantitative scale was developed in order to help the team assess both the probabilities and cost impacts of project risks. Ranges were defined from "Very Low" to "Very High" for probability, cost risk exposure, and schedule risk exposure as illustrated in the table below. The ranges of likelihood are defined as a percentage. The ranges of cost impact are defined in dollars. The ranges of schedule impact are defined in months. Note that the range of cost and schedule impact (i.e., 'Range ($M)'; 'Range (Months)') presented below is illustrative in nature and is generated as a percentage of total project costs, and total project schedule, respectively.

Level	Probability	% Total (Cost)	Range ($M)	% Total (Schedule)	Range (Months)
Very Low	0-20%	0-2.5%	$0 - $3.375	0-2.5%	0-2.4
Low	20-40%	2.5-5%	$3.375 - $6.75	2.5-5%	2.4-4.7
Medium	40-60%	5-7.5%	$6.75 - $10.125	5-7.5%	4.7-7.1
High	60-80%	7.5-10%	$10.125 - $13.5	7.5-15%	7.1-14.1
Very High	90-99%	10-15%	$13.5 - $20.25	15-25%	14.1-23.5

- **Identify and Characterize Risks:** The team began by identifying risks with respect to the project in its entirety. The list of preliminarily identified risks were further expanded and added to, as each individual conceptual alignment was then evaluated. Each of the risks were discussed and the risk descriptions were articulated and defined to help participants better consider the probabilities and impacts associated with each risk.
    - Each individual identified risk was categorized according to a defined risk breakdown structure (RBS). The consolidated RBS used for the purposes of the risk assessment was developed in order to facilitate and expedite the identification of risks and included the following categories:
        - Construction
        - Design
        - Environmental
        - Geotechnical
        - Hydraulics
        - Market Conditions
        - Permits & Approvals
        - Public Interface
        - Right-of-Way

    - Structures
    - Utilities & Agreements

  - The relative nature of each individual risk was identified. Risks were either defined as "threats," which would result in a negative cost or schedule impact to the project; or "opportunities," which would result in a positive cost or schedule impact to the project.

- **Analyze Risks:** The analysis of risks followed the sequential steps below.

  - The likelihood of each individual risk (probability) was identified. The probability of each risk occurring was discussed by the team using the standard scale presented above. The probability did not consider a specific level of impact occurring, merely the likelihood that it would occur in some way, shape, or form.

  - The degree of risk exposure (expected impact) was identified. The "most likely" range of the cost or schedule impact of the risk was identified using the scale presented above that was standardized to a relative percentage of the total project cost (less unallocated contingencies and cost reserves) and schedule. Where possible, the team described what the impacts could be.

  - The "expected value" for each risk is calculated by using the following algorithm:

$$\left(\frac{(min + (4 \times most\ likely) + max)}{6}\right) \times probability = EV$$

    For example, assume a risk has a potential schedule impact that has a minimum value of 2 months; a most likely value of 4 months; and a maximum value of 12 months. There is a 50% probability that the risk will occur. The expected value (EV) is calculated as follows:

$$\left(\frac{(2 + (4 \times 4) + 12)}{6}\right) \times 0.5 = 2.5\ months$$

    The expected values for cost and schedule impacts for each risk are referred to as the "Pre-Response" condition. In other words, if the risks are not proactively managed, they will likely produce the expected values identified in the analysis.

- **Develop Responses:** Each risk was discussed by the team and potential risk response strategies were identified for each.

  For threats (negative risks), the following potential strategies are possible:

  - Accept – The threat is "accepted" by the project team and the appropriate level of contingency related to cost and schedule will be reserved.

- Avoid – The project will be modified in some way to completely avoid the threat from occurring. This will usually require a change in scope that may impact the base cost and/or schedule of the project.
- Mitigate – The severity and/or probability of the threat will be reduced by implementing the risk response strategy. This is perhaps the most common risk response strategy.
- Transfer – The threat will be transferred to a third party. Transferring a risk generally comes at a cost which the responsible party will pass on to the project owner.

The following possible risk response strategies are possible for opportunities:

- Exploit – The opportunity will be actively pursued to ensure that it happens. This may require additional time and/or money to do so.
- Enhance – The opportunity will be pursued in some way that will increase the cost and/or schedule benefits or probability of it occurring.
- Share – The benefits of the opportunity will be shared between multiple parties. Doing so will likely reduce the total benefit being received by one party but will increase the probability of it occurring.

The effects of the risk response strategies are then assessed regarding how they will modify the probability and impacts of each risk. The process used is similar to what has been described above in the previous step, "Analyze Risks." The expected values for risk response strategies are referred to as the "Post-Response," or managed state assuming that they are proactively implemented.

RISK INFORMATION

The following pages include the Tornado Charts, Risk Registers, and Risk Management Plans for each of the five conceptual alignment alternatives evaluated, and a brief overview of these report elements, intended to assist readers in interpreting the data presented.

BASE COST AND SCHEDULE ASSUMPTIONS

Risk Scales were developed based upon the project cost and schedule. For the purposes of this Risk Assessment, cost data developed by CH2M Hill was used to derive a baseline cost. The team opted to select the adaptable two-lane bridge concept with pre-cast concrete approach spans and a steel lift-span as the basis for the project. The team then backed out escalation and contingency (assumption of 25% of construction costs) to come to a "raw" adjusted project cost. Note that this does not include right of way costs, however, the risks identified do.

CH2M Hill Costs for Alignment C1	
Construction Costs	
Roadway	$27,600,000
Approach Spans	$12,122,000
Life-Span	$96,310,000
Total Construction	$136,100,000
-25% Contingency	$34,025,000
Adjusted Construction	***$102,075,000***
Support Costs	
PA&ED	$4,083,000
PS&E	$10,888,000
Construction Support	$16,332,000
Total Support Costs	***$31,400,000***
Project Cost for Risk Assessment	**$132,475,000**

Costs for Alignments A, B, C1 and C2 in the CH2M Hill estimates were within several million dollars of each other. Based on this, an average "rounded" cost of $135 million was used for the purposes of scaling the risk values.

It is recognized that the project may be delayed for some time before moving forward, however, for the purposes of this Risk Assessment, a baseline schedule was estimated based on a start date of

June 5, 2017 that would result in the completion of construction on April 1, 2025 for a total of 94 months.

Type	Start	End	Description
Phase	6/5/2017	12/31/2019	Design
Milestone	12/31/2019	12/31/2019	Record of Decision
Phase	1/1/2020	12/31/2021	Final Design
Phase	1/1/2022	3/31/2022	Advertise, Bid, Award
Milestone	4/1/2022	4/1/2022	NTP
Phase	4/1/2022	4/1/2025	Construction

EXPLANATION OF RISK TORANDO CHARTS

In order to identify and prioritize risks with the largest cost and schedule impacts, a plot referred to as a Tornado Chart was developed. Threats are plotted to the right of the central axis, while opportunities are plotted to the left. In the context of this project, the number of risks identified in the workshop that could be considered opportunities were limited.

The highest priority risk threats and opportunities are at the top of the Tornado Chart, while the lowest risk threats or opportunities are at the bottom of the Tornado Chart, making the conical tornado shape. In the context of Risk Management, the highest risk opportunities should be strongly considered for implementation to gain cost and schedule advantages. The highest risk threats require the most management and have the highest need for appropriate risk response strategies and proactive risk management. The risks at the bottom of the Tornado Chart are of a lower priority relative to project cost and schedule and will require reduced levels of management or response.

The degree of risk portrayed in the Tornado Chart is based on a calculated value that determines relative risk by multiplying the probability of occurrence and the most likely impact to generate the expected value of impact. The Tornado Charts on the following pages indicate the highest relative cost and schedule risks identified by the risk workshop team prior to responding to the risks. Additionally, Tornado Charts depicting the greatest total risks with combined consideration of both cost and schedule indicate those risks that have the greatest total impact to the project.

The Tornado Charts primarily display the highest priority risks for risk response. The series of Tornado Charts display the ranking of the identified cost and schedule risks relative to each other. Furthermore, the Tornado Charts show the anticipated relative change to the risk event as a result of proactively responding to and managing the risk. The two different states are labeled as “Pre-Response” and “Post-Response” indicating that the risk is in a status of being unmanaged or managed, respectively.

EXPLANATION OF RISK REGISTERS

Risk registers have been prepared for each of the five alignment alternatives. Provided below is a brief description of the organization and content of this information to assist the reader.

- **Risk Information**
    - **Risk #** – A unique numerical identifier assigned to each risk.
    - **Status (Pre/Post)** – A risk's status may be: Active (A), Dormant (D), or Retired (R). Each risk is assigned a pre-response and post-response "status" that assists project stakeholders in quickly determining the disposition of a risk at any given time.
    - **Risk Category** – Each risk is categorized according to a predefined Risk Breakdown Structure (RBS) which, for this project, includes categories like "construction", "design", and "right-of-way" to help project stakeholders easily classify and organize project risks.
    - **Impacted Phase** – Each risk is linked to an "impacted phase", i.e., the part of the project to which it poses a threat or presents an opportunity. For this project, each conceptual alignment alternative was identified as a "phase". In other words, phases for this project include each individual conceptual alignment alternative (A, B, C1, C3, D), and "All Alignments".
    - **Risk Event Name** – The name or designation assigned to each risk during the risk identification process.
    - **S.M.A.R.T. Risk Description** – A Specific, Measurable, Attributable, Relevant, and Time-Bound description used to characterize each risk.
    - **Risk Trigger (Symptoms)** – The event, action, or situation that will cause a risk to occur. Alternative, a risk can be defined by the symptoms that would appear indicating that it has happened.
    - **Additional Comments** – Important supplemental notes for stakeholders to consider when evaluating each risk.

- **Unmanaged State (Pre-Response)** – All columns under this heading display the values assigned to each risk before the risk is addressed or proactively managed.
    - **Probability** – The overall likelihood that a risk will occur.
    - **T/O** – Indicates whether a risk is classified as a threat or an opportunity.
    - **Impact (Cost)** – This number represents the anticipated costs incurred (threat) or saved (opportunity) as the result of a risk occurring. It is the "most likely" value of the cost risk exposure range, determined when quantitative risk scales were established and calibrated for the project, prior to assessment.
    - **Expected Value (Cost)** – The theoretical monetary value of a risk in its pre-response (not proactively managed) state, determined using the algorithm detailed in the above

Analysis Methodology section of the report, which factors together the cost risk exposure range and probability assigned to the risk.

- **Impact (Schedule)** – This number represents the anticipated schedule delays incurred (threat) or improvements to the project schedule (opportunity) as the result of a risk occurring. It is the "most likely" value of the schedule risk exposure range, determined when quantitative risk scales were established and calibrated for the project, prior to assessment.
- **Expected Value (Schedule)** – The theoretical schedule value of a risk in its pre-response (not proactively managed) state, determined using the algorithm detailed in the above *Analysis Methodology* section of the report, which factors together the schedule risk exposure range and probability assigned to the risk.

- **Managed State (Post-Response)** – All columns under this heading display the values assigned to each risk after a risk response strategy has been developed and assumes the risk is being proactively managed.

  - **Probability** – The likelihood that a risk will occur in its managed state.
  - **T/O** – Same as above.
  - **Impact (Cost)** – Same as above, but reflecting any changes precipitated by the selected risk response strategy.
  - **Expected Value (Cost)** – Same as above, but reflecting any changes precipitated by the selected risk response strategy.
  - **Impact (Schedule)** – Same as above, but reflecting any changes precipitated by the selected risk response strategy.
  - **Expected Value (Schedule)** – Same as above, but reflecting any changes precipitated by the selected risk response strategy.

EXPLANATION OF RISK MANAGEMENT PLAN

Risk Management Plans have been prepared for each of the five alignment alternatives. Provided below is a brief description of the organization and content of this information to assist the reader.

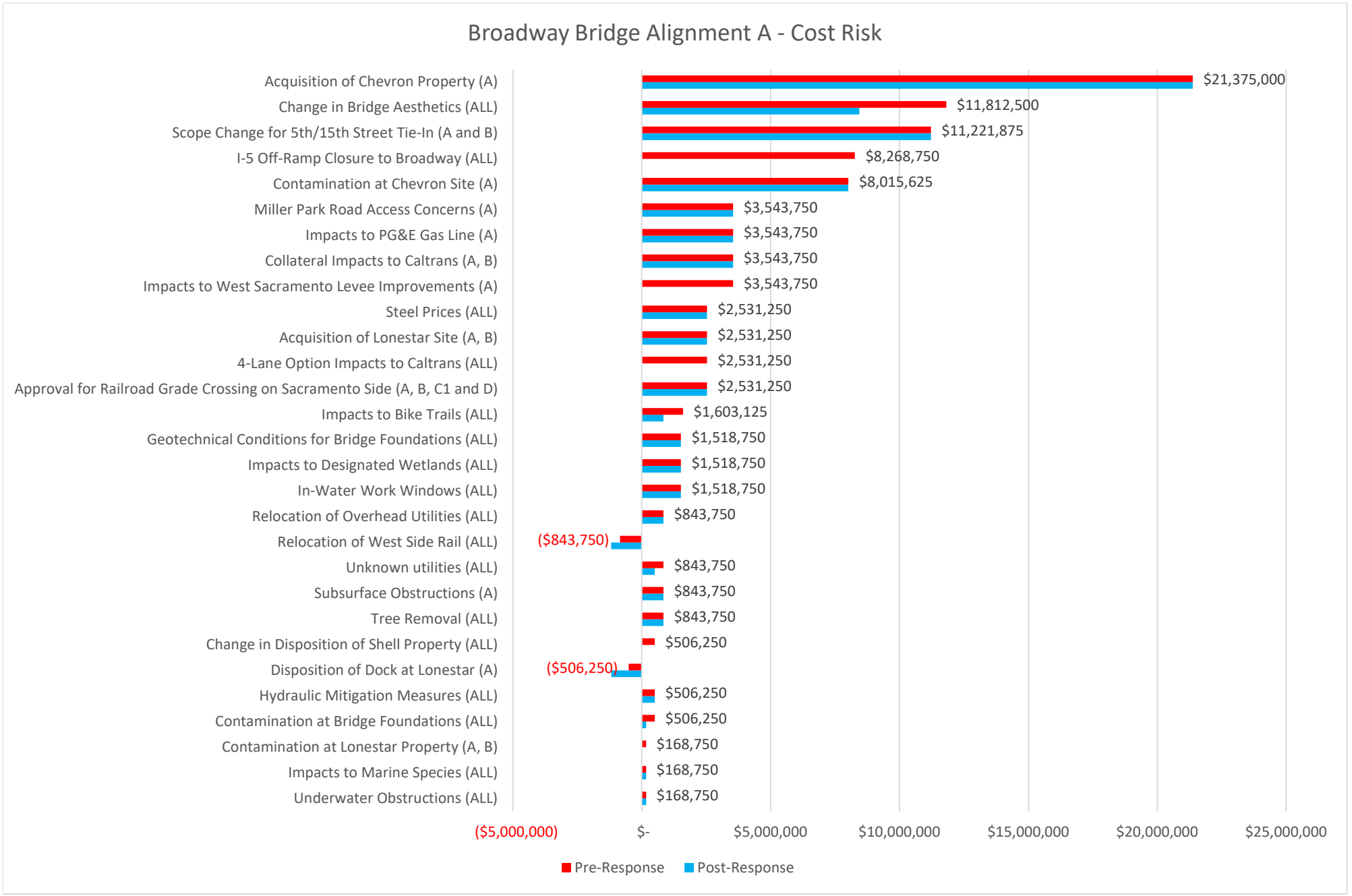
- **Risk Information** – Same as the Risk Register, see above.

- **Risk Management Plan: Monitor and Control**

  - **Risk Response Strategy** – The strategy selected to manage each risk. Response strategies include: accept, avoid, mitigate, and transfer (threats); exploit, enhance, share (opportunities).
  - **Action Plan Description** – A description of the necessary steps to appropriately manage each risk based on the response strategy.
  - **Risk Owner** – The party responsible for monitoring and managing each risk.

- **Risk Review Milestone / Frequency** – The next time or times, or the frequency with which this risk should be evaluated and response strategies reconsidered to ensure its effective management.
- **Base Cost Impacts** – The expected monetary value imposed on the project by implementing the response strategy selected for each risk, if applicable.
- **Base Schedule Impacts** – The expected changes to the project schedule precipitated by the selected response strategy for each risk, if applicable.
- **Updates** – Where updates relevant to each risk are captured as risks are proactively managed.

Summary of Alignment A Risks


Broadway Bridge Alignment A - Cost Risk
Acquisition of Chevron Property (A)
Change in Bridge Aesthetics (ALL)
Scope Change for 5th/15th Street Tie-In (A and B)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination at Chevron Site (A)
Miller Park Road Access Concerns (A)
Impacts to PG&E Gas Line (A)
Collateral Impacts to Caltrans (A, B)
Impacts to West Sacramento Levee Improvements (A)
Steel Prices (ALL)
Acquisition of Lonestar Site (A, B)
4-Lane Option Impacts to Caltrans (ALL)
Approval for Railroad Grade Crossing on Sacramento Side (A, B, C1 and D)
Impacts to Bike Trails (ALL)
Geotechnical Conditions for Bridge Foundations (ALL)
Impacts to Designated Wetlands (ALL)
In-Water Work Windows (ALL)
Relocation of Overhead Utilities (ALL)
Relocation of West Side Rail (ALL)
Unknown utilities (ALL)
Subsurface Obstructions (A)
Tree Removal (ALL)
Change in Disposition of Shell Property (ALL)
Disposition of Dock at Lonestar (A)
Hydraulic Mitigation Measures (ALL)
Contamination at Bridge Foundations (ALL)
Contamination at Lonestar Property (A, B)
Impacts to Marine Species (ALL)
Underwater Obstructions (ALL)
$21,375,000
$11,812,500
$11,221,875
$8,268,750
$8,015,625
$3,543,750
$3,543,750
$3,543,750
$3,543,750
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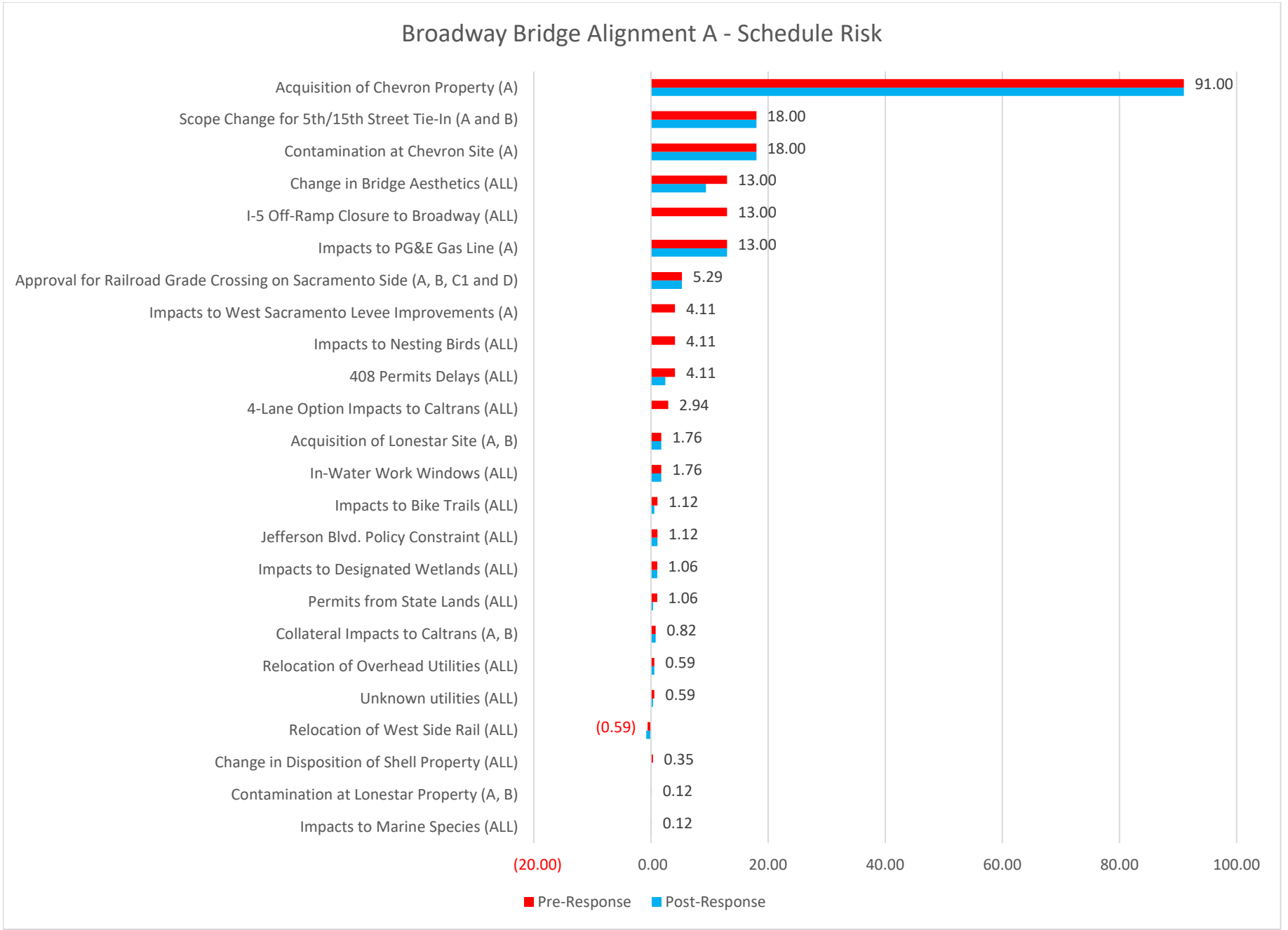
Pre-Response
Post-Response


Broadway Bridge Alignment A - Schedule Risk
Acquisition of Chevron Property (A)
Scope Change for 5th/15th Street Tie-In (A and B)
Contamination at Chevron Site (A)
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Impacts to PG&E Gas Line (A)
Approval for Railroad Grade Crossing on Sacramento Side (A, B, C1 and D)
Impacts to West Sacramento Levee Improvements (A)
Impacts to Nesting Birds (ALL)
408 Permits Delays (ALL)
4-Lane Option Impacts to Caltrans (ALL)
Acquisition of Lonestar Site (A, B)
In-Water Work Windows (ALL)
Impacts to Bike Trails (ALL)
Jefferson Blvd. Policy Constraint (ALL)
Impacts to Designated Wetlands (ALL)
Permits from State Lands (ALL)
Collateral Impacts to Caltrans (A, B)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Contamination at Lonestar Property (A, B)
Impacts to Marine Species (ALL)
91.00
18.00
18.00
13.00
13.00
13.00
5.29
4.11
4.11
4.11
2.94
1.76
1.76
1.12
1.12
1.06
1.06
0.82
0.59
0.59
(0.59)
0.35
0.12
0.12
(20.00)
0.00
20.00
40.00
60.00
80.00
100.00
Pre-Response
Post-Response

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
2	A - A	Right-of-Way	Alignment A	Acquisition of Chevron Property (A)	The acquisition strategy for the Chevron property would involve relocation, not closure. The study team anticipates that a five-year period will be required for all relocation activities after Record of Decision (ROD) is obtained.			95%	T	$22,500,000	$21,375,000	T	96.00	91.00	95%	T	$22,500,000	$21,375,000	T	96.00	91.00
3	A - A	Permits & Approvals	Alignment A	Approval for Railroad Grade Crossing on Sacramento Side (A, B, C1 and D)	Four of the alignments will require permits for new or retrofitted railroad grade crossings on the Sacramento side of the river. There is potential for delays related to CPUC approval and possible additional mitigations that may be required.		A and B would require new crossings while C and D would be retrofit.	50%	T	$5,062,500	$2,531,250	T	10.57	5.29	50%	T	$5,062,500	$2,531,250	T	10.57	5.29
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	T	$5,062,500	$1,518,750	T	5.88	1.76
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			30%	T	$1,687,500	$506,250	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	T	3.53	2.47
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
12	A - A	Hydraulics	Alignment A	Impacts to West Sacramento Levee Improvements (A)	Alignment A is most significantly impacted by this risk. This is primarily related to the dock structure and how it interfaces with the levee structure. It is likely that alignment A will precipitate additional cost and schedule impacts related to addressing flood protection concerns in this area.			70%	T	$5,062,500	$3,543,750	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			30%	T	$5,062,500	$1,518,750	T	3.53	1.06	30%	T	$5,062,500	$1,518,750	T	3.53	1.06
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			95%	T	$1,687,500	$1,603,125	T	1.18	1.12	50%	T	$1,687,500	$843,750	T	1.18	0.59
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			50%	T	$5,062,500	$2,531,250	T	5.88	2.94	50%	--	$-	$-	--	0.00	0.00
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			70%	T	$11,812,500	$8,268,750	T	18.80	13.00	70%	--	$-	$-	--	0.00	0.00
18	A - A	Geotechnical	Alignment A	Subsurface Obstructions (A)	There is the potential risk of encountering subsurface obstructions and/or archeological assets at the Lonestar site for alignment A, mainly related to the foundations of demolished structures.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			50%	T	$1,687,500	$843,750	T	1.18	0.59	30%	T	$1,687,500	$506,250	T	1.18	0.35
20	A - A	Right-of-Way	Alignment A	Acquisition of Lonestar Site (A, B)	This site is currently fully entitled for development as 'mixed use' (commercial and residential). Past experience has indicated that dealing with Lonestar is very challenging. It is likely that there will be cost and schedule impacts associated with acquiring this property.			50%	T	$5,062,500	$2,531,250	T	3.53	1.76	50%	T	$5,062,500	$2,531,250	T	3.53	1.76

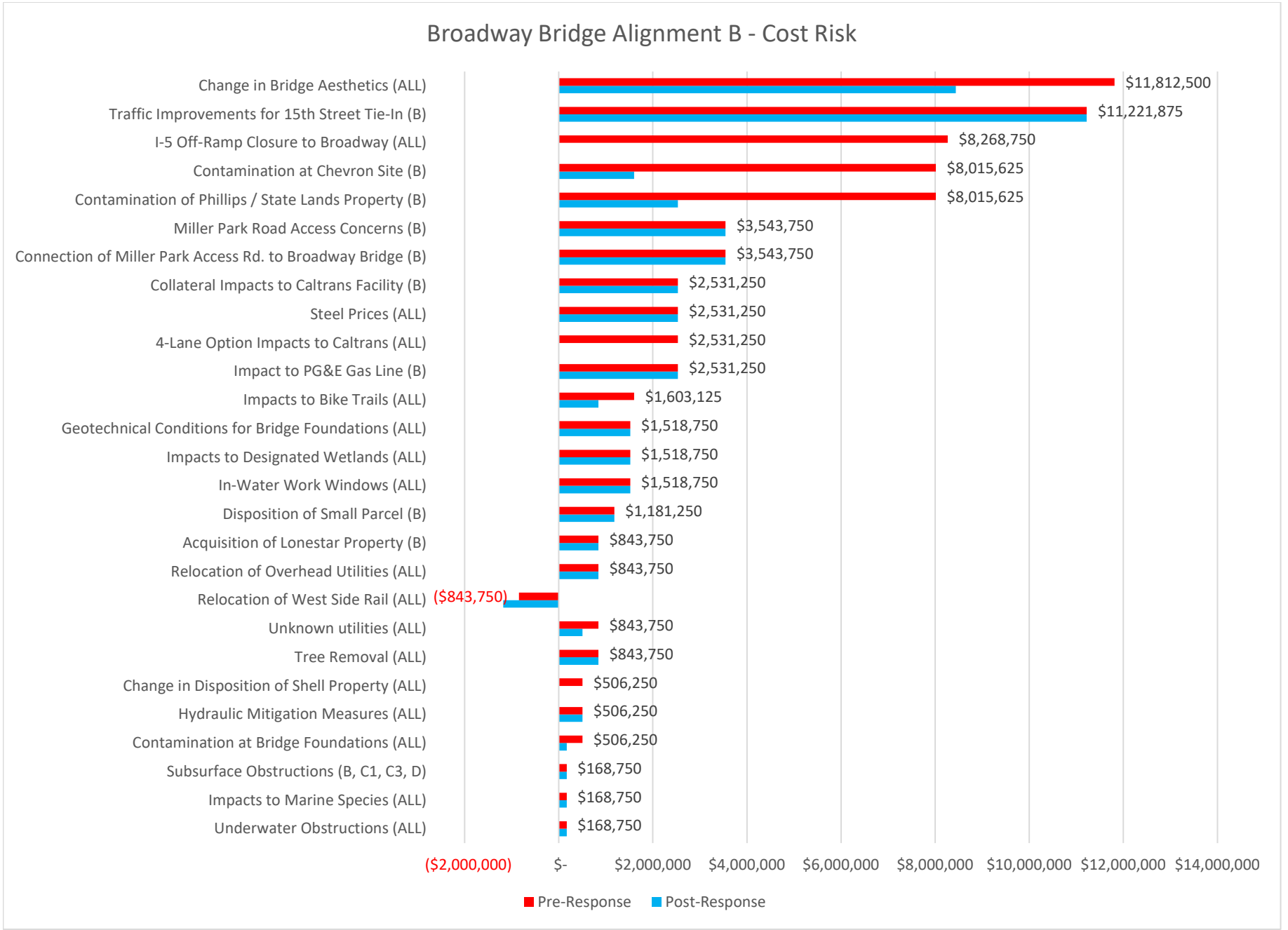
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			30%	T	$1,687,500	$506,250	--	0.00	0.00	30%	T	$1,687,500	$506,250	--	0.00	0.00
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			30%	--	$-	$-	T	3.53	1.06	30%	--	$-	$-	T	1.18	0.35
24	A - A	Design	Alignment A	Collateral Impacts to Caltrans (A, B)	If alignment A is selected, and Riverfront street is redesigned, there is a potential for collateral impacts to Caltrans facilities, including a maintenance facility and the loop on-ramp for SR-50, on the West Sacramento side of the proposed bridge.			70%	T	$5,062,500	$3,543,750	T	1.18	0.82	70%	T	$5,062,500	$3,543,750	T	1.18	0.82
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			95%	--	$-	$-	T	1.18	1.12	95%	--	$-	$-	T	1.18	1.12
26	A - A	Design	Alignment A	Disposition of Dock at Lonestar (A)	If Central Valley Flood Protection Board files a law suit against the Lonestar site developer, the antiquated dock may be removed prior to construction, reducing project costs and schedule.			30%	O	($1,687,500)	($506,250)	--	0.00	0.00	70%	O	($1,687,500)	($1,181,250)	--	0.00	0.00
27	A - A	Environmental	Alignment A	Contamination at Lonestar Property (A, B)	During potential interim Riverfront Street connection (city's limited scope project) all substructures and contamination at Lonestar site may be removed prior to project construction.			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	--	$-	$-	--	0.00	0.00
31	A - A	Utilities & Agreements	Alignment A	Impacts to PG&E Gas Line (A)	Potential to impact PG&E Gas Line on the West Sacramento side of the proposed bridge. Currently, it appears that this pipeline will directly conflict with at least one of the in-water bridge foundations. Additionally, there will likely be impacts to the pipeline on the West Sacramento side of the river with this facility.			70%	T	$5,062,500	$3,543,750	T	18.80	13.00	70%	T	$5,062,500	$3,543,750	T	18.80	13.00
32	A - A	Design	Alignment A	Miller Park Road Access Concerns (A)				70%	T	$5,062,500	$3,543,750	--	0.00	0.00	70%	T	$5,062,500	$3,543,750	--	0.00	0.00
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			10%	T	$5,062,500	$506,250	T	3.53	0.35	10%	--	$-	$-	--	0.00	0.00
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			50%	O	($1,687,500)	($843,750)	O	1.18	0.59	70%	O	($1,687,500)	($1,181,250)	O	1.18	0.82
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
49	A - A	Design	Alignment A	Scope Change for 5th/15th Street Tie-In (A and B)	The alignment A tie-in to 15th St. may require additional right of way to be purchased. There could be additional costs and schedule impacts related to this additional acquisition. This includes all construction and support costs, as well as the reconfiguration of Riverfront St.			95%	T	$11,812,500	$11,221,875	T	18.80	18.00	95%	T	$11,812,500	$11,221,875	T	18.80	18.00
50	A - A	Environmental	Alignment A	Contamination at Chevron Site (A)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	95%	T	$8,437,500	$8,015,625	T	18.80	18.00
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			70%	T	$16,875,000	$11,812,500	T	18.80	13.00	50%	T	$16,875,000	$8,437,500	T	18.80	9.40

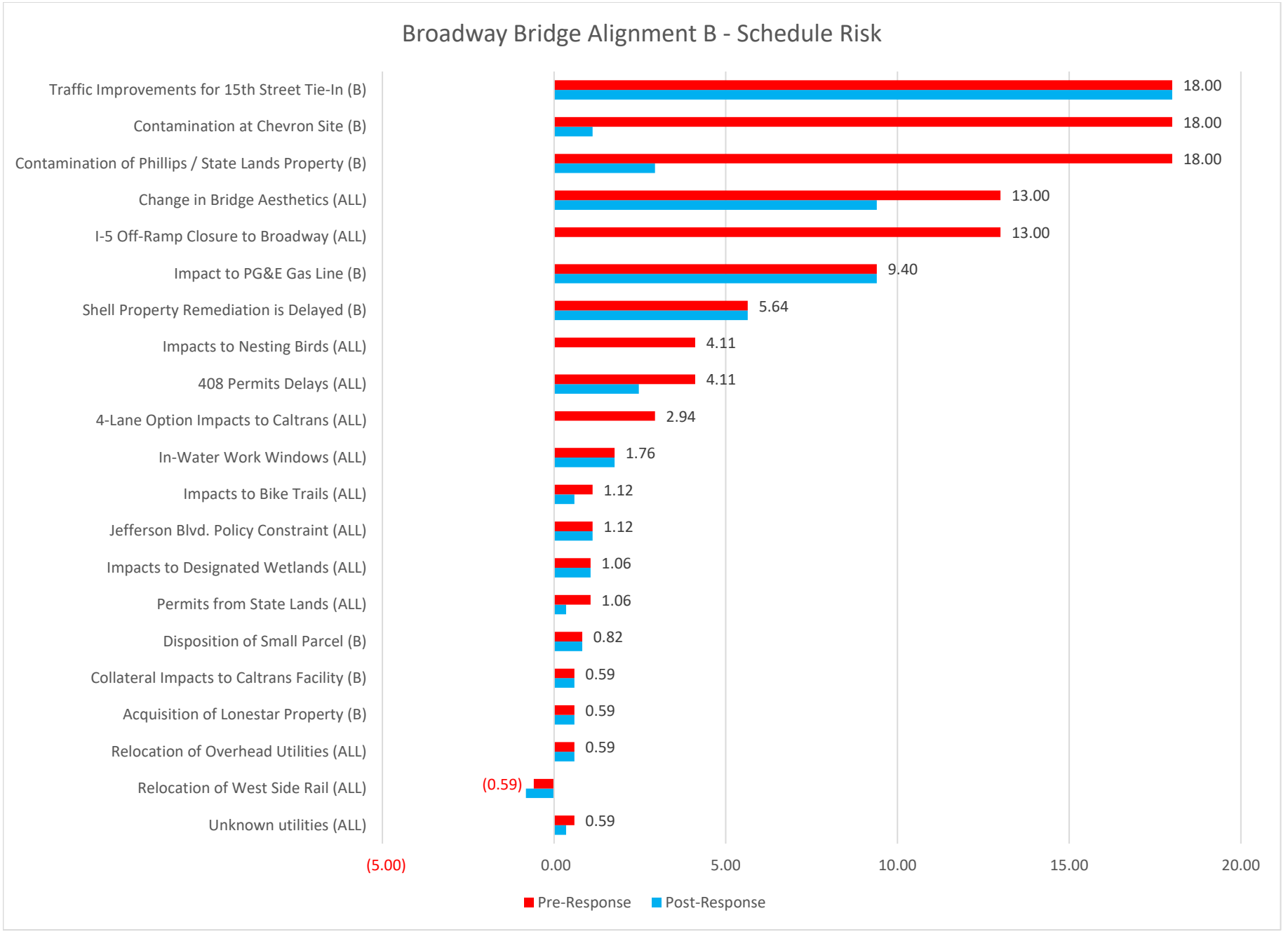
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			30%	T	$5,062,500	$1,518,750	--	0.00	0.00	30%	T	$5,062,500	$1,518,750	--	0.00	0.00
											$95,203,125							**$74,362,500**			

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
2	A - A	Right-of-Way	Alignment A	Acquisition of Chevron Property (A)	The acquisition strategy for the Chevron property would involve relocation, not closure. The study team anticipates that a five-year period will be required for all relocation activities after Record of Decision (ROD) is obtained.			Accept	There is no way to reduce the exposure of this risk.			A preliminary estimate was developed by comparing the costs of the Shell Property acquisition and making		
3	A - A	Permits & Approvals	Alignment A	Approval for Railroad Grade Crossing on Sacramento Side (A, B, C1 and D)	Four of the alignments will require permits for new or retrofitted railroad grade crossings on the Sacramento side of the river. There is potential for delays related to CPUC approval and possible additional mitigations that may be required.		A and B would require new crossings while C and D would be retrofit.	Mitigate	For alignments A and B, consultations with CPUC and the RR line operator should begin as soon as possible to reduce schedule impacts.					
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			Accept	The current in-water work window of 8 months should be sufficient to address any issues.					
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			Mitigate	Perform additional borings at bent locations. Adjust design as necessary, if practical.					
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			Accept	This is a minor risk and the required tree mitigation ratios will have to be met.					
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			Mitigate	Begin 408 consultations early. Begin process to establish location of theoretical levee prism and related improvements.					
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			Mitigate	Consider performing underwater investigations to identify potential obstructions.					
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			Accept						
12	A - A	Hydraulics	Alignment A	Impacts to West Sacramento Levee Improvements (A)	Alignment A is most significantly impacted by this risk. This is primarily related to the dock structure and how it interfaces with the levee structure. It is likely that alignment A will precipitate additional cost and schedule impacts related to addressing flood protection concerns in this area.			Avoid	Enter into negotiations with Cemex to repair and retrofit the dock to allow the wall to be left in place. West Sacramento would pay for these repairs.			Assume that $1 million in repairs would be required.		
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			Avoid	If NTP is at an inopportune time for nesting birds, consider an advance clearing and grubbing contract to remove bird nesting habitats prior to the nesting season.			Small contract administrative cost for advance clearing and grubbing at approximately $50,000.		
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			Accept	Complete wetlands inventory as soon as practical.					
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			Mitigate	Work proactively with cities and bicycle community to develop viable strategies for the bridge / bike path interface.					
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			Avoid	Do not pursue this option.					
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			Avoid	Pursue other strategies to divert traffic from Broadway Blvd. to X St.			Could include diverting traffic via Third St. which would require traffic improvements between $1 and $3 million for		
18	A - A	Geotechnical	Alignment A	Subsurface Obstructions (A)	There is the potential risk of encountering subsurface obstructions and/or archeological assets at the Lonestar site for alignment A, mainly related to the foundations of demolished structures.			Accept						
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			Mitigate	Potholing and/or GPR could be utilized to identify utilities during design.			Approximately $100,000.		
20	A - A	Right-of-Way	Alignment A	Acquisition of Lonestar Site (A, B)	This site is currently fully entitled for development as 'mixed use' (commercial and residential). Past experience has indicated that dealing with Lonestar is very challenging. It is likely that there will be cost and schedule impacts associated with acquiring this property.			Accept						

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			Mitigate	Engage in early consultations with USACE to determine the extent of impacts and possible mitigations.					
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			Mitigate	Perform early consultations with State Lands to identify issues as quickly as possible.					
24	A - A	Design	Alignment A	Collateral Impacts to Caltrans (A, B)	If alignment A is selected, and Riverfront street is redesigned, there is a potential for collateral impacts to Caltrans facilities, including a maintenance facility and the loop on-ramp for SR-50, on the West Sacramento side of the proposed bridge.			Accept	Begin planning early.					
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			Mitigate	Begin consultations with West Sacramento City Council early to reduce potential for delays.					
26	A - A	Design	Alignment A	Disposition of Dock at Lonestar (A)	If Central Valley Flood Protection Board files a law suit against the Lonestar site developer, the antiquated dock may be removed prior to construction, reducing project costs and schedule.			Enhance	Engage with Central Valley Flood Protection Board early and request an enforcement action.					
27	A - A	Environmental	Alignment A	Contamination at Lonestar Property (A, B)	During potential interim Riverfront Street connection (city's limited scope project) all substructures and contamination at Lonestar site may be removed prior to project construction.			Avoid	Expand scope of Riverfront Street Extension to perform necessary investigations.					
31	A - A	Utilities & Agreements	Alignment A	Impacts to PG&E Gas Line (A)	Potential to impact PG&E Gas Line on the West Sacramento side of the proposed bridge. Currently, it appears that this pipeline will directly conflict with at least one of the in-water bridge foundations. Additionally, there will likely be impacts to the pipeline on the West Sacramento side of the river with this facility.			Accept						
32	A - A	Design	Alignment A	Miller Park Road Access Concerns (A)				Accept	Begin early consultations with third parties including USACE, Central Valley Flood					
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			Avoid	West Sacramento to commence acquisition immediately following ROD to minimize potential of Port making an alternative decision.					
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			Accept						
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			Enhance	West Sacramento would continue its technical analysis of rail relocation, move into implementation, and seek funding.					
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			Accept						
49	A - A	Design	Alignment A	Scope Change for 5th/15th Street Tie-In (A and B)	The alignment A tie-in to 15th St. may require additional right of way to be purchased. There could be additional costs and schedule impacts related to this additional acquisition. This includes all construction and support costs, as well as the reconfiguration of Riverfront St.			Accept	Start design and acquisition activities as early as possible.					
50	A - A	Environmental	Alignment A	Contamination at Chevron Site (A)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			Accept	For alignment A, it is likely that full remediation will be required, therefore, the risk value for the pre-response condition would have to be accepted.			The study team noted that the Chevron site acquisition may not be able to follow the 'Shell model' (i.e. friendly acquisition), and that based on the infrastructure present, this would likely need to be a 'total take'.	Schedule delays associated with the Chevron property acquisition are likely to be as high as four years.	
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			Mitigate	Engage early and often to work with the public and apply lessons learned from the I Street Bridge.					
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			Accept						

Summary of Alignment B Risks


Broadway Bridge Alignment B - Cost Risk
Change in Bridge Aesthetics (ALL)
Traffic Improvements for 15th Street Tie-In (B)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination at Chevron Site (B)
Contamination of Phillips / State Lands Property (B)
Miller Park Road Access Concerns (B)
Connection of Miller Park Access Rd. to Broadway Bridge (B)
Collateral Impacts to Caltrans Facility (B)
Steel Prices (ALL)
4-Lane Option Impacts to Caltrans (ALL)
Impact to PG&E Gas Line (B)
Impacts to Bike Trails (ALL)
Geotechnical Conditions for Bridge Foundations (ALL)
Impacts to Designated Wetlands (ALL)
In-Water Work Windows (ALL)
Disposition of Small Parcel (B)
Acquisition of Lonestar Property (B)
Relocation of Overhead Utilities (ALL)
Relocation of West Side Rail (ALL)
Unknown utilities (ALL)
Tree Removal (ALL)
Change in Disposition of Shell Property (ALL)
Hydraulic Mitigation Measures (ALL)
Contamination at Bridge Foundations (ALL)
Subsurface Obstructions (B, C1, C3, D)
Impacts to Marine Species (ALL)
Underwater Obstructions (ALL)
$11,812,500
$11,221,875
$8,268,750
$8,015,625
$8,015,625
$3,543,750
$3,543,750
$2,531,250
$2,531,250
$2,531,250
$2,531,250
$1,603,125
$1,518,750
$1,518,750
$1,518,750
$1,181,250
$843,750
$843,750
($843,750)
$843,750
$843,750
$506,250
$506,250
$506,250
$168,750
$168,750
$168,750
($2,000,000)
$-
$2,000,000
$4,000,000
$6,000,000
$8,000,000
$10,000,000
$12,000,000
$14,000,000
Pre-Response
Post-Response


Broadway Bridge Alignment B - Schedule Risk
Traffic Improvements for 15th Street Tie-In (B)
Contamination at Chevron Site (B)
Contamination of Phillips / State Lands Property (B)
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Impact to PG&E Gas Line (B)
Shell Property Remediation is Delayed (B)
Impacts to Nesting Birds (ALL)
408 Permits Delays (ALL)
4-Lane Option Impacts to Caltrans (ALL)
In-Water Work Windows (ALL)
Impacts to Bike Trails (ALL)
Jefferson Blvd. Policy Constraint (ALL)
Impacts to Designated Wetlands (ALL)
Permits from State Lands (ALL)
Disposition of Small Parcel (B)
Collateral Impacts to Caltrans Facility (B)
Acquisition of Lonestar Property (B)
Relocation of Overhead Utilities (ALL)
Relocation of West Side Rail (ALL)
Unknown utilities (ALL)
18.00
18.00
18.00
13.00
13.00
9.40
5.64
4.11
4.11
2.94
1.76
1.12
1.12
1.06
1.06
0.82
0.59
0.59
0.59
(0.59)
0.59
(5.00)
0.00
5.00
10.00
15.00
20.00
Pre-Response
Post-Response

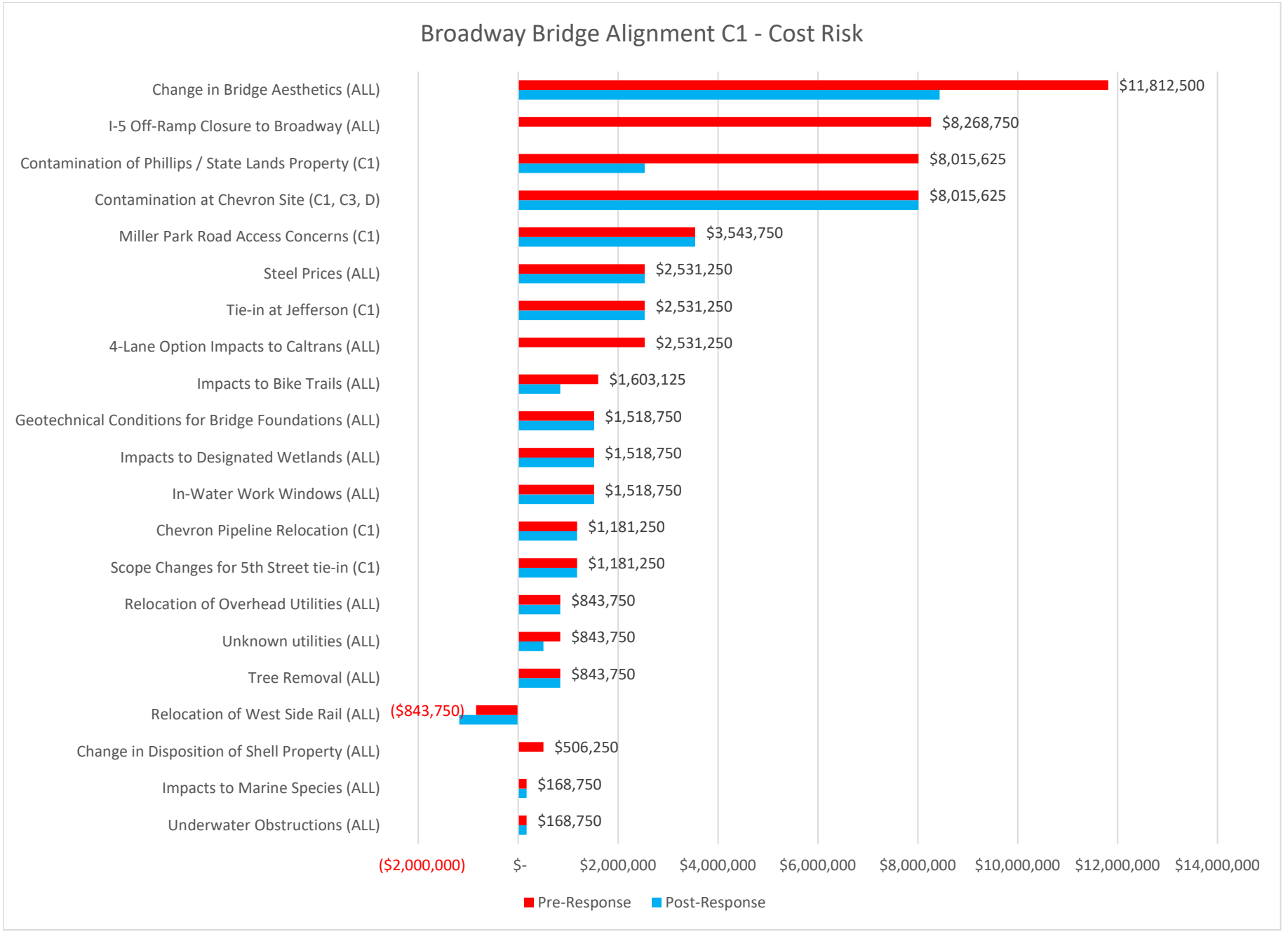
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	T	$5,062,500	$1,518,750	T	5.88	1.76
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			30%	T	$1,687,500	$506,250	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
6	A - A	Utilities & Agreements	Alignment B	Impact to PG&E Gas Line (B)	It is possible that the PG&E pipeline could conflict with the west abutment.			50%	T	$5,062,500	$2,531,250	T	18.80	9.40	50%	T	$5,062,500	$2,531,250	T	18.80	9.40
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	T	3.53	2.47
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			30%	T	$5,062,500	$1,518,750	T	3.53	1.06	30%	T	$5,062,500	$1,518,750	T	3.53	1.06
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			95%	T	$1,687,500	$1,603,125	T	1.18	1.12	50%	T	$1,687,500	$843,750	T	1.18	0.59
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			50%	T	$5,062,500	$2,531,250	T	5.88	2.94	50%	--	$-	$-	--	0.00	0.00
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			70%	T	$11,812,500	$8,268,750	T	18.80	13.00	70%	--	$-	$-	--	0.00	0.00
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			50%	T	$1,687,500	$843,750	T	1.18	0.59	30%	T	$1,687,500	$506,250	T	1.18	0.35
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			30%	T	$1,687,500	$506,250	--	0.00	0.00	30%	T	$1,687,500	$506,250	--	0.00	0.00
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			30%	--	$-	$-	T	3.53	1.06	30%	--	$-	$-	T	1.18	0.35
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			95%	--	$-	$-	T	1.18	1.12	95%	--	$-	$-	T	1.18	1.12
28	A - A	Right-of-Way	Alignment B	Disposition of Small Parcel (B)	This parcel is owned by Phillips 66 according to the assessors records (between the railroad and the river). Because of its location, however, it is likely affected by State Lands rules. This will have a small cost and schedule impact related to acquisition.			70%	T	$1,687,500	$1,181,250	T	1.18	0.82	70%	T	$1,687,500	$1,181,250	T	1.18	0.82
29	A - A	Design	Alignment B	Connection of Miller Park Access Rd. to Broadway Bridge (B)	The connection of Miller Park access road to the proposed bridge (on the Sacramento side) is currently undefined. This may increase hydraulic concerns related to additional fill in the floodplain.			70%	T	$5,062,500	$3,543,750	--	0.00	0.00	70%	T	$5,062,500	$3,543,750	--	0.00	0.00
30	A - A	Environmental	Alignment B	Shell Property Remediation is Delayed (B)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years.			30%	--	$-	$-	T	18.80	5.64	30%	--	$-	$-	T	18.80	5.64

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			10%	T	$5,062,500	$506,250	T	3.53	0.35	10%	--	$-	$-	--	0.00	0.00
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			50%	O	($1,687,500)	($843,750)	O	1.18	0.59	70%	O	($1,687,500)	($1,181,250)	O	1.18	0.82
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
51	A - A	Geotechnical	Alignment B	Subsurface Obstructions (B, C1, C3, D)	There is a potential risk of encountering subsurface obstructions and/or archeological assets at the Lonestar site for alignment A, mainly related to the foundations of demolished structures.			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
52	A - A	Right-of-Way	Alignment B	Acquisition of Lonestar Property (B)	This site is currently fully entitled for development as 'mixed use' (commercial and residential).			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
55	A - A	Design	Alignment B	Collateral Impacts to Caltrans Facility (B)	If alignment B is selected, and Riverfront street is redesigned, there is a potential for collateral impacts to Caltrans facilities on the West Sacramento side of the proposed bridge.			50%	T	$5,062,500	$2,531,250	T	1.18	0.59	50%	T	$5,062,500	$2,531,250	T	1.18	0.59
58	A - A	Design	Alignment B	Miller Park Road Access Concerns (B)				70%	T	$5,062,500	$3,543,750	--	0.00	0.00	70%	T	$5,062,500	$3,543,750	--	0.00	0.00
66	A - A	Environmental	Alignment B	Contamination of Phillips / State Lands Property (B)	There is significant diesel and gas contamination at this site.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	50%	T	$5,062,500	$2,531,250	T	5.88	2.94
73	A - A	Design	Alignment B	Traffic Improvements for 15th Street Tie-In (B)	May need to purchase additional right-of-way for 15th Street and Riverfront Street.			95%	T	$11,812,500	$11,221,875	T	18.80	18.00	95%	T	$11,812,500	$11,221,875	T	18.80	18.00
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			70%	T	$16,875,000	$11,812,500	T	18.80	13.00	50%	T	$16,875,000	$8,437,500	T	18.80	9.40
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			30%	T	$5,062,500	$1,518,750	--	0.00	0.00	30%	T	$5,062,500	$1,518,750	--	0.00	0.00
77	A - A	Environmental	Alignment B	Contamination at Chevron Site (B)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	95%	T	$1,687,500	$1,603,125	T	1.18	1.12
											$76,443,750							**$48,093,750**			

Risk Information								Risk Management Plan: Monitor & Control						
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			Accept	The current in-water work window of 8 months should be sufficient to address any issues.					
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			Mitigate	Perform additional borings at bent locations. Adjust design as necessary, if practical.					
6	A - A	Utilities & Agreements	Alignment B	Impact to PG&E Gas Line (B)	It is possible that the PG&E pipeline could conflict with the west abutment.									
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			Accept	This is a minor risk and the required tree mitigation ratios will have to be met.					
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			Mitigate	Begin 408 consultations early. Begin process to establish location of theoretical levee prism and related improvements.					
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			Mitigate	Consider performing underwater investigations to identify potential obstructions.					
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			Accept						
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			Avoid	If NTP is at an inopportune time for nesting birds, consider an advance clearing and grubbing contract to remove bird nesting habitats prior to the nesting season.			Small contract administrative cost for advance clearing and grubbing at approximately $50,000.		
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			Accept	Complete wetlands inventory as soon as practical.					
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			Mitigate	Work proactively with cities and bicycle community to develop viable strategies for the bridge / bike path interface.					
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			Avoid	Do not pursue this option.					
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			Avoid	Pursue other strategies to divert traffic from Broadway Blvd. to X St.			Could include diverting traffic via Third St. which would require traffic improvements between $1 and $3 million for construction and right of way costs.		
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			Mitigate	Potholing and/or GPR could be utilized to identify utilities during design.			Approximately $100,000.		
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			Mitigate	Engage in early consultations with USACE to determine the extent of impacts and possible mitigations.					
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			Mitigate	Perform early consultations with State Lands to identify issues as quickly as possible.					
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			Mitigate	Begin consultations with West Sacramento City Council early to reduce potential for delays.					
28	A - A	Right-of-Way	Alignment B	Disposition of Small Parcel (B)	This parcel is owned by Phillips 66 according to the assessors records (between the railroad and the river). Because of its location, however, it is likely affected by State Lands rules. This will have a small cost and schedule impact related to acquisition.			Accept				The estimated acquisition cost would conservatively be $2.25 million.		
29	A - A	Design	Alignment B	Connection of Miller Park Access Rd. to Broadway Bridge (B)	The connection of Miller Park access road to the proposed bridge (on the Sacramento side) is currently undefined. This may increase hydraulic concerns related to additional fill in the floodplain.			Accept	Begin early consultations with third parties including USACE, Central Valley Flood Protection Board, and Sacramento Public Works.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
30	A - A	Environmental	Alignment B	Shell Property Remediation is Delayed (B)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years.			Accept/Mitigate	Provide a monetary incentive to Shell to accelerate remediation.					
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			Avoid	West Sacramento to commence acquisition immediately following ROD to minimize potential of Port making an alternative decision.					
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			Accept						
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			Enhance	West Sacramento would continue its technical analysis of rail relocation, move into implementation, and seek funding.					
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			Accept						
51	A - A	Geotechnical	Alignment B	Subsurface Obstructions (B, C1, C3, D)	There is a potential risk of encountering subsurface obstructions and/or archeological assets at the Lonestar site for alignment A, mainly related to the foundations of demolished structures.			Accept						
52	A - A	Right-of-Way	Alignment B	Acquisition of Lonestar Property (B)	This site is currently fully entitled for development as 'mixed use' (commercial and residential).			Accept						
55	A - A	Design	Alignment B	Collateral Impacts to Caltrans Facility (B)	If alignment B is selected, and Riverfront street is redesigned, there is a potential for collateral impacts to Caltrans facilities on the West Sacramento side of the proposed bridge.			Accept						
58	A - A	Design	Alignment B	Miller Park Road Access Concerns (B)				Accept	Begin early consultations with third parties including USACE, Central Valley Flood Protection Board, and Sacramento Public Works.					
66	A - A	Environmental	Alignment B	Contamination of Phillips / State Lands Property (B)	There is significant diesel and gas contamination at this site.			Mitigate	The current horizontal curves for the roadway on the east side of Broadway Blvd. are designed as 55 mph curves. The geometry could be modified to less than 55 mph (45 or 35 mph) which may allow the alignment to miss the contaminated areas. The City of Sacramento could pursue a Gatto action against Chevron that would accelerate and compel clean-up.					
73	A - A	Design	Alignment B	Traffic Improvements for 15th Street Tie-In (B)	May need to purchase additional right-of-way for 15th Street and Riverfront Street.			Accept						
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			Mitigate	Engage early and often to work with the public and apply lessons learned from the I Street Bridge.					
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			Accept						
77	A - A	Environmental	Alignment B	Contamination at Chevron Site (B)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			Mitigate	Mitigation during construction to contain contaminated groundwater could be pursued (such as driving piles).					

Summary of Alignment C1 Risks


Broadway Bridge Alignment C1 - Cost Risk
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination of Phillips / State Lands Property (C1)
Contamination at Chevron Site (C1, C3, D)
Miller Park Road Access Concerns (C1)
Steel Prices (ALL)
Tie-in at Jefferson (C1)
4-Lane Option Impacts to Caltrans (ALL)
Impacts to Bike Trails (ALL)
Geotechnical Conditions for Bridge Foundations (ALL)
Impacts to Designated Wetlands (ALL)
In-Water Work Windows (ALL)
Chevron Pipeline Relocation (C1)
Scope Changes for 5th Street tie-in (C1)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Tree Removal (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Impacts to Marine Species (ALL)
Underwater Obstructions (ALL)
$11,812,500
$8,268,750
$8,015,625
$8,015,625
$3,543,750
$2,531,250
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$1,603,125
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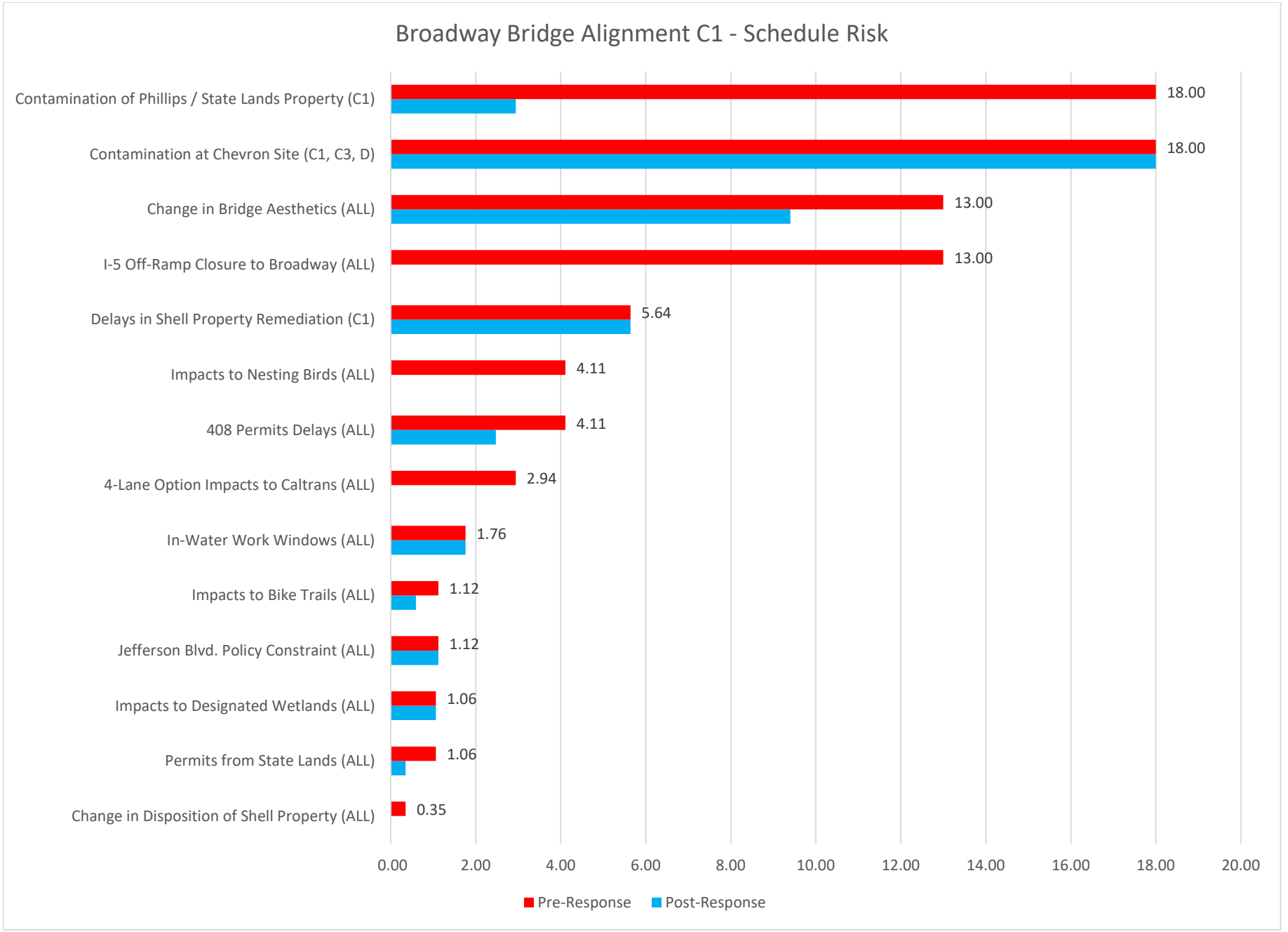
Pre-Response
Post-Response


Broadway Bridge Alignment C1 - Schedule Risk
Contamination of Phillips / State Lands Property (C1)
Contamination at Chevron Site (C1, C3, D)
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Delays in Shell Property Remediation (C1)
Impacts to Nesting Birds (ALL)
408 Permits Delays (ALL)
4-Lane Option Impacts to Caltrans (ALL)
In-Water Work Windows (ALL)
Impacts to Bike Trails (ALL)
Jefferson Blvd. Policy Constraint (ALL)
Impacts to Designated Wetlands (ALL)
Permits from State Lands (ALL)
Change in Disposition of Shell Property (ALL)
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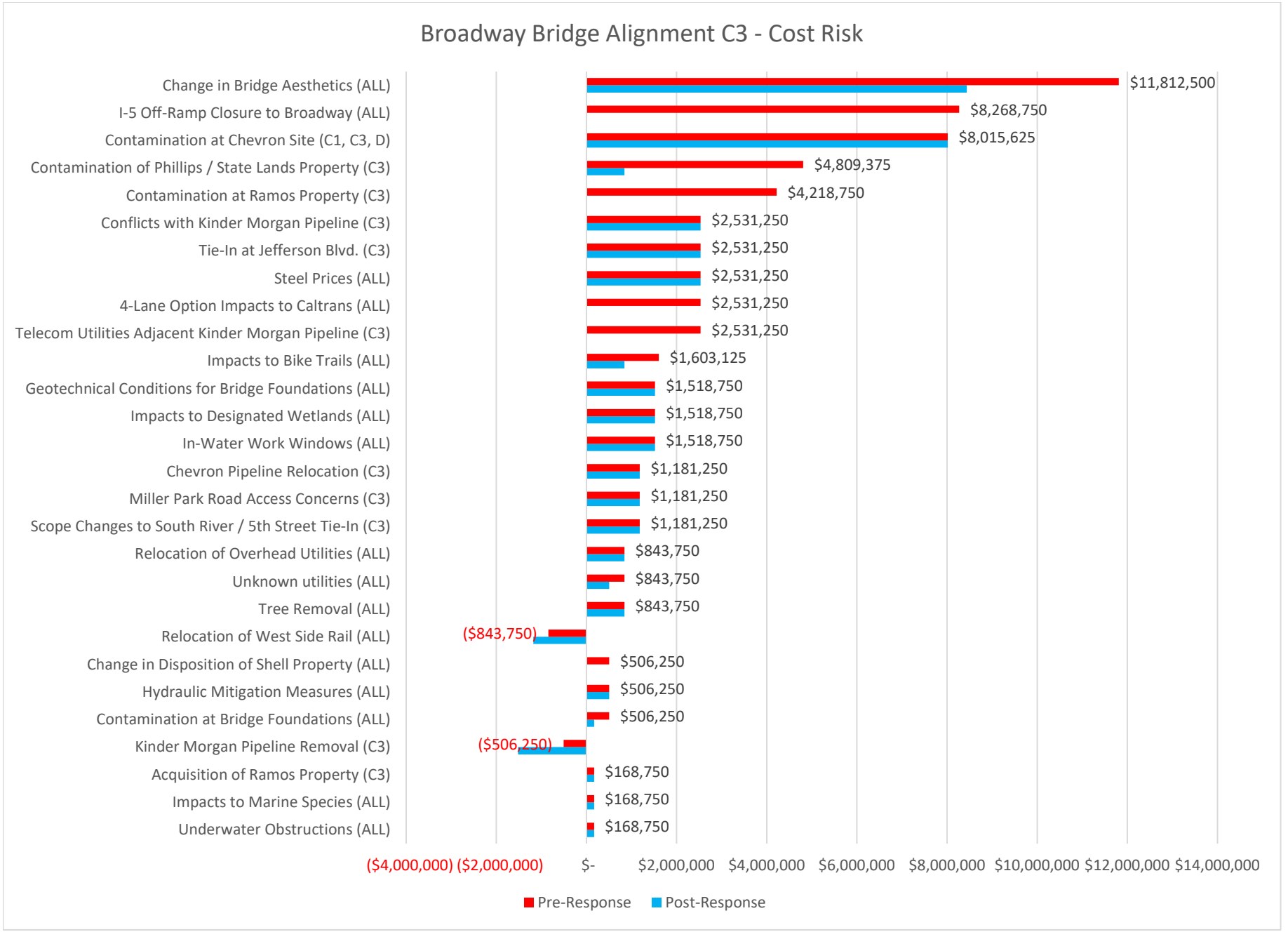
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	95%	T	$8,437,500	$8,015,625	T	18.80	18.00
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	T	$5,062,500	$1,518,750	T	5.88	1.76
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			30%	T	$1,687,500	$506,250	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	T	3.53	2.47
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule.			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			30%	T	$5,062,500	$1,518,750	T	3.53	1.06	30%	T	$5,062,500	$1,518,750	T	3.53	1.06
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			95%	T	$1,687,500	$1,603,125	T	1.18	1.12	50%	T	$1,687,500	$843,750	T	1.18	0.59
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			50%	T	$5,062,500	$2,531,250	T	5.88	2.94	50%	--	$-	$-	--	0.00	0.00
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			70%	T	$11,812,500	$8,268,750	T	18.80	13.00	70%	--	$-	$-	--	0.00	0.00
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			50%	T	$1,687,500	$843,750	T	1.18	0.59	30%	T	$1,687,500	$506,250	T	1.18	0.35
21	A - A	Design	Alignment C1	Scope Changes for 5th Street tie-in (C1)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			30%	T	$1,687,500	$506,250	--	0.00	0.00	30%	T	$1,687,500	$506,250	--	0.00	0.00

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			30%	--	$-	$-	T	3.53	1.06	30%	--	$-	$-	T	1.18	0.35
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			95%	--	$-	$-	T	1.18	1.12	95%	--	$-	$-	T	1.18	1.12
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			10%	T	$5,062,500	$506,250	T	3.53	0.35	10%	--	$-	$-	--	0.00	0.00
34	A - A	Design	Alignment C1	Tie-in at Jefferson (C1)	C and D options require the acquisition of additional right of way to make the connection to Jefferson. Significant associated right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse property.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			50%	O	($1,687,500)	($843,750)	O	(1.18)	(0.59)	70%	O	($1,687,500)	($1,181,250)	O	(1.18)	(0.82)
46	A - A	Environmental	Alignment C1	Chevron Pipeline Relocation (C1)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
56	A - A	Environmental	Alignment C1	Delays in Shell Property Remediation (C1)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years. There is a potential for delays of the Shell property remediation that could extend past the project NTP.			30%	--	$-	$-	T	18.80	5.64	30%	--	$-	$-	T	18.80	5.64
59	A - A	Design	Alignment C1	Miller Park Road Access Concerns (C1)				70%	T	$5,062,500	$3,543,750	--	0.00	0.00	70%	T	$5,062,500	$3,543,750	--	0.00	0.00
67	A - A	Environmental	Alignment C1	Contamination of Phillips / State Lands Property (C1)	There is significant diesel and gas contamination at this site.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	50%	T	$5,062,500	$2,531,250	T	5.88	2.94
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			70%	T	$16,875,000	$11,812,500	T	18.80	13.00	50%	T	$16,875,000	$8,437,500	T	18.80	9.40
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			30%	T	$5,062,500	$1,518,750	--	0.00	0.00	30%	T	$5,062,500	$1,518,750	--	0.00	0.00
											$59,315,625							**$37,378,125**			

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			Mitigate	Cap the existing roadway area wells, install new monitoring wells, and relocate or abandon impacted monitoring wells.					
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			Accept	The current in-water work window of 8 months should be sufficient to address any issues.					
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			Mitigate	Perform additional borings at bent locations. Adjust design as necessary, if practical.					
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			Accept	This is a minor risk and the required tree mitigation ratios will have to be met.					
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			Mitigate	Begin 408 consultations early. Begin process to establish location of theoretical levee prism and related improvements.					
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			Mitigate	Consider performing underwater investigations to identify potential obstructions.					
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule.			Accept						
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			Avoid	If NTP is at an inopportune time for nesting birds, consider an advance clearing and grubbing contract to remove bird nesting habitats prior to the nesting season.			Small contract administrative cost for advance clearing and grubbing at approximately $50,000.		
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			Accept	Complete wetlands inventory as soon as practical.					
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			Mitigate	Work proactively with cities and bicycle community to develop viable strategies for the bridge / bike path interface.					
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			Avoid	Do not pursue this option.					
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			Avoid	Pursue other strategies to divert traffic from Broadway Blvd. to X St.			Could include diverting traffic via Third St. which would require traffic improvements between $1 and $3 million for		
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			Mitigate	Potholing and/or GPR could be utilized to identify utilities during design.			Approximately $100,000.		
21	A - A	Design	Alignment C1	Scope Changes for 5th Street tie-in (C1)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			Accept						
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			Mitigate	Engage in early consultations with USACE to determine the extent of impacts and possible mitigations.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			Mitigate	Perform early consultations with State Lands to identify issues as quickly as possible.					
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			Mitigate	Begin consultations with West Sacramento City Council early to reduce potential for delays.					
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			Avoid	West Sacramento to commence acquisition immediately following ROD to minimize potential of Port making an alternative decision.					
34	A - A	Design	Alignment C1	Tie-in at Jefferson (C1)	C and D options require the acquisition of additional right of way to make the connection to Jefferson. Significant associated right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse property.			Accept						
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			Accept						
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			Enhance	West Sacramento would continue its technical analysis of rail relocation, move into implementation, and seek funding.					
46	A - A	Environmental	Alignment C1	Chevron Pipeline Relocation (C1)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			Accept						
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			Accept						
56	A - A	Environmental	Alignment C1	Delays in Shell Property Remediation (C1)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years. There is a potential for delays of the Shell property remediation that could extend past the project NTP.			Accept	Provide a monetary incentive to Shell to accelerate remediation.					
59	A - A	Design	Alignment C1	Miller Park Road Access Concerns (C1)				Accept	Begin early consultations with third parties including USACE, Central Valley Flood Protection Board, and Sacramento Public Works.					
67	A - A	Environmental	Alignment C1	Contamination of Phillips / State Lands Property (C1)	There is significant diesel and gas contamination at this site.			Mitigate	The current horizontal curves for the roadway on the east side of Broadway Blvd. are designed as 55 mph curves. The geometry could be modified to less than 55 mph (45 or 35 mph) which may allow the alignment to miss the contaminated areas. The City of Sacramento could pursue a Gatto action against Chevron that would accelerate and compel clean-up.					
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			Mitigate	Engage early and often to work with the public and apply lessons learned from the I Street Bridge.					
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			Accept						

Summary of Alignment C3 Risks


Broadway Bridge Alignment C3 - Cost Risk
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination at Chevron Site (C1, C3, D)
Contamination of Phillips / State Lands Property (C3)
Contamination at Ramos Property (C3)
Conflicts with Kinder Morgan Pipeline (C3)
Tie-In at Jefferson Blvd. (C3)
Steel Prices (ALL)
4-Lane Option Impacts to Caltrans (ALL)
Telecom Utilities Adjacent Kinder Morgan Pipeline (C3)
Impacts to Bike Trails (ALL)
Geotechnical Conditions for Bridge Foundations (ALL)
Impacts to Designated Wetlands (ALL)
In-Water Work Windows (ALL)
Chevron Pipeline Relocation (C3)
Miller Park Road Access Concerns (C3)
Scope Changes to South River / 5th Street Tie-In (C3)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Tree Removal (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Hydraulic Mitigation Measures (ALL)
Contamination at Bridge Foundations (ALL)
Kinder Morgan Pipeline Removal (C3)
Acquisition of Ramos Property (C3)
Impacts to Marine Species (ALL)
Underwater Obstructions (ALL)
$11,812,500
$8,268,750
$8,015,625
$4,809,375
$4,218,750
$2,531,250
$2,531,250
$2,531,250
$2,531,250
$2,531,250
$1,603,125
$1,518,750
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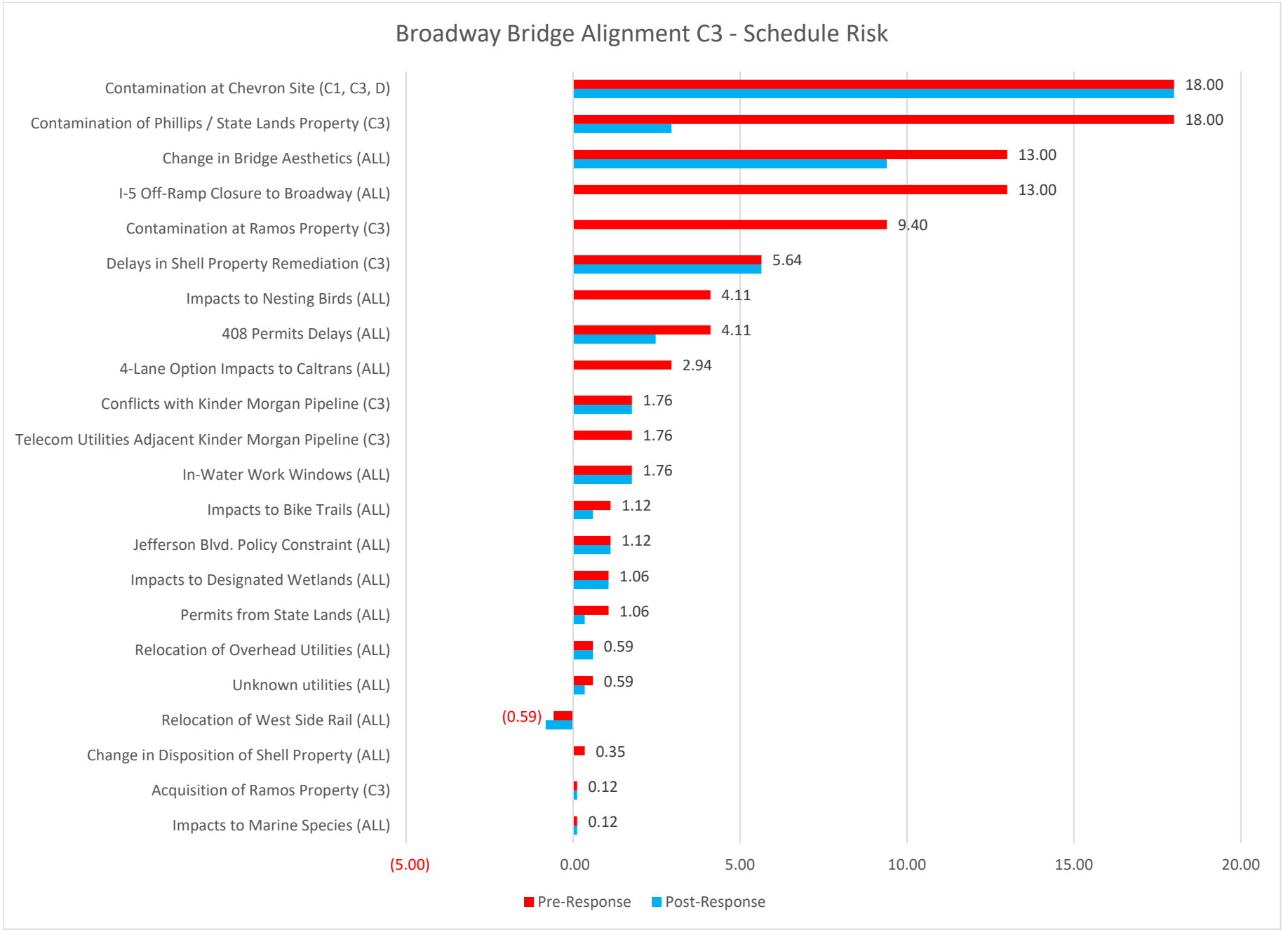
($4,000,000) ($2,000,000) $- $2,000,000 $4,000,000 $6,000,000 $8,000,000 $10,000,000 $12,000,000 $14,000,000
Pre-Response
Post-Response


Broadway Bridge Alignment C3 - Schedule Risk
Contamination at Chevron Site (C1, C3, D)
Contamination of Phillips / State Lands Property (C3)
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination at Ramos Property (C3)
Delays in Shell Property Remediation (C3)
Impacts to Nesting Birds (ALL)
408 Permits Delays (ALL)
4-Lane Option Impacts to Caltrans (ALL)
Conflicts with Kinder Morgan Pipeline (C3)
Telecom Utilities Adjacent Kinder Morgan Pipeline (C3)
In-Water Work Windows (ALL)
Impacts to Bike Trails (ALL)
Jefferson Blvd. Policy Constraint (ALL)
Impacts to Designated Wetlands (ALL)
Permits from State Lands (ALL)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Acquisition of Ramos Property (C3)
Impacts to Marine Species (ALL)
18.00
18.00
13.00
13.00
9.40
5.64
4.11
4.11
2.94
1.76
1.76
1.76
1.12
1.12
1.06
1.06
0.59
0.59
(0.59)
0.35
0.12
0.12
(5.00)
0.00
5.00
10.00
15.00
20.00
Pre-Response
Post-Response

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	95%	T	$8,437,500	$8,015,625	T	18.80	18.00
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	T	$5,062,500	$1,518,750	T	5.88	1.76
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			30%	T	$1,687,500	$506,250	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	T	3.53	2.47
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule.			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			30%	T	$5,062,500	$1,518,750	T	3.53	1.06	30%	T	$5,062,500	$1,518,750	T	3.53	1.06
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			95%	T	$1,687,500	$1,603,125	T	1.18	1.12	50%	T	$1,687,500	$843,750	T	1.18	0.59
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			50%	T	$5,062,500	$2,531,250	T	5.88	2.94	50%	--	$-	$-	--	0.00	0.00
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			70%	T	$11,812,500	$8,268,750	T	18.80	13.00	70%	--	$-	$-	--	0.00	0.00
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			50%	T	$1,687,500	$843,750	T	1.18	0.59	30%	T	$1,687,500	$506,250	T	1.18	0.35
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			30%	T	$1,687,500	$506,250	--	0.00	0.00	30%	T	$1,687,500	$506,250	--	0.00	0.00
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			30%	--	$-	$-	T	3.53	1.06	30%	--	$-	$-	T	1.18	0.35
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			95%	--	$-	$-	T	1.18	1.12	95%	--	$-	$-	T	1.18	1.12

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			10%	T	$5,062,500	$506,250	T	3.53	0.35	10%	--	$-	$-	--	0.00	0.00
35	A - A	Design	Alignment C3	Kinder Morgan Pipeline Removal (C3)	It is possible that the Kinder Morgan pipeline could be removed or abandoned prior to construction of the project.			10%	O	($5,062,500)	($506,250)	--	0.00	0.00	30%	O	($5,062,500)	($1,518,750)	--	0.00	0.00
36	A - A	Right-of-Way	Alignment C3	Acquisition of Ramos Property (C3)	There could be higher than anticipated acquisition and relocation costs related to the purchase of the Ramos property.			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
37	A - A	Utilities & Agreements	Alignment C3	Telecom Utilities Adjacent Kinder Morgan Pipeline (C3)	The telecom facility (an old, re-purposed Kinder Morgan pipeline) adjacent to the existing Kinder Morgan pipeline may be impacted.			50%	T	$5,062,500	$2,531,250	T	3.53	1.76	50%	--	$-	$-	--	0.00	0.00
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			50%	O	($1,687,500)	($843,750)	O	(1.18)	(0.59)	70%	O	($1,687,500)	($1,181,250)	O	(1.18)	(0.82)
47	A - A	Environmental	Alignment C3	Contamination at Ramos Property (C3)	Due to the existence of a wharf at this site, there are likely contaminants in the water. Remediation of the Ramos site will presumably be more expensive than the Chevron and Shell sites, as there are metal contaminants at this site.			50%	T	$8,437,500	$4,218,750	T	18.80	9.40	50%	--	$-	$-	--	0.00	0.00
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
54	A - A	Design	Alignment C3	Scope Changes to South River / 5th Street Tie-In (C3)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
57	A - A	Environmental	Alignment C3	Delays in Shell Property Remediation (C3)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years.			30%	--	$-	$-	T	18.80	5.64	30%	--	$-	$-	T	18.80	5.64
60	A - A	Design	Alignment C3	Miller Park Road Access Concerns (C3)				70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
62	A - A	-	Alignment C3	Tie-In at Jefferson Blvd. (C3)	Requires the acquisition of additional right of way to make the connection to Jefferson. Significant associated right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse facility.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
64	A - A	Utilities & Agreements	Alignment C3	Conflicts with Kinder Morgan Pipeline (C3)	Alignment C3 was designed to avoid the Kinder Morgan pipeline by locating it to the south of the pipeline for most of the pipeline route, however, on the Sacramento side there are concerns that the bridge abutment would conflict with the pipeline.			30%	T	$8,437,500	$2,531,250	T	5.88	1.76	30%	T	$8,437,500	$2,531,250	T	5.88	1.76
68	A - A	Environmental	Alignment C3	Contamination of Phillips / State Lands Property (C3)	There is significant diesel and gas contamination at this site.			95%	T	$5,062,500	$4,809,375	T	18.80	18.00	50%	T	$1,687,500	$843,750	T	5.88	2.94
70	A - A	Environmental	Alignment C3	Chevron Pipeline Relocation (C3)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00

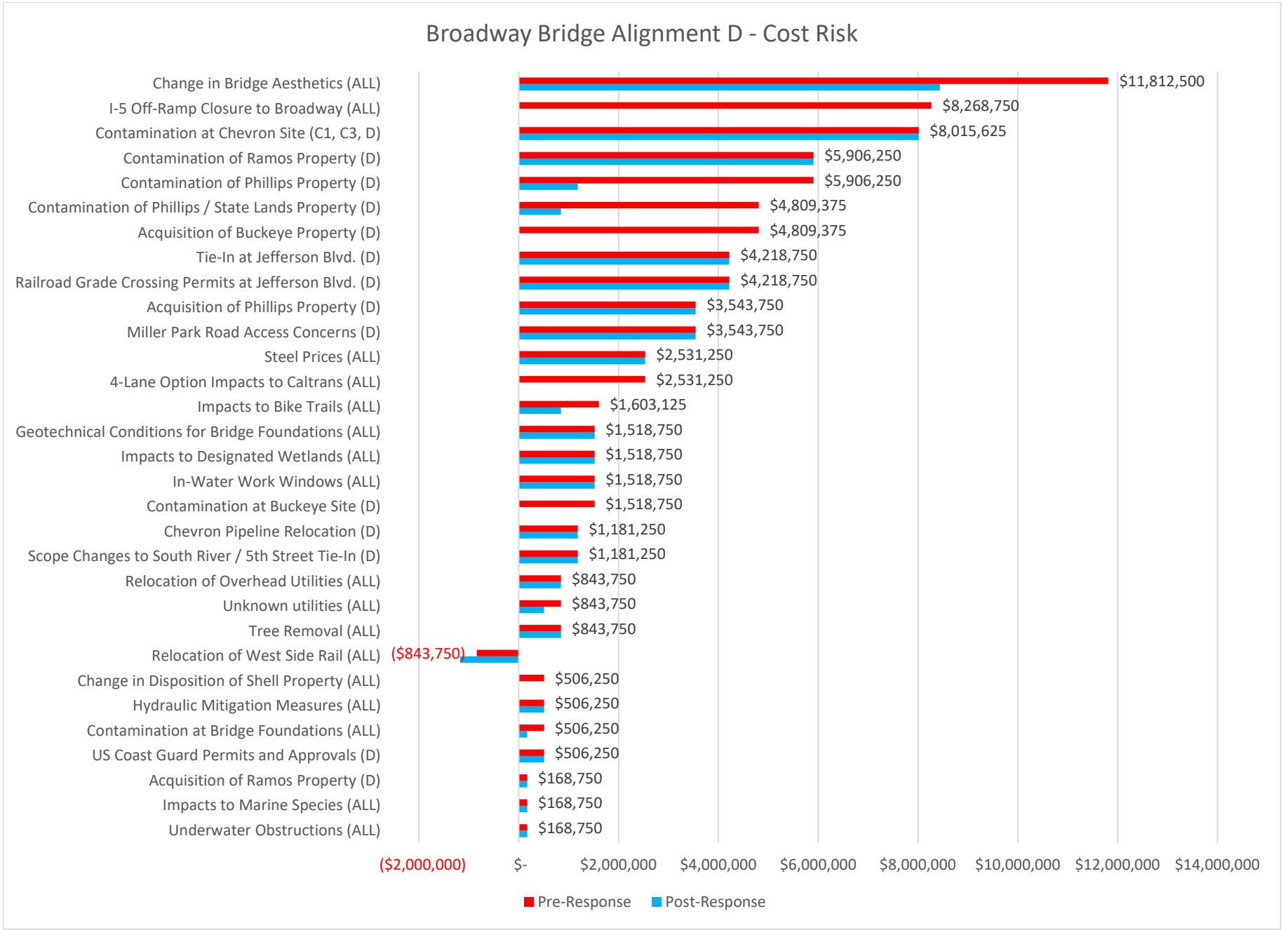
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			70%	T	$16,875,000	$11,812,500	T	18.80	13.00	50%	T	$16,875,000	$8,437,500	T	18.80	9.40
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			30%	T	$5,062,500	$1,518,750	--	0.00	0.00	30%	T	$5,062,500	$1,518,750	--	0.00	0.00
											$62,690,625							**$34,509,375**			

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			Mitigate	Cap the existing roadway area wells, install new monitoring wells, and relocate or abandon impacted monitoring wells.					
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			Accept	The current in-water work window of 8 months should be sufficient to address any issues.					
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			Mitigate	Perform additional borings at bent locations. Adjust design as necessary, if practical.					
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			Accept	This is a minor risk and the required tree mitigation ratios will have to be met.					
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			Mitigate	Begin 408 consultations early. Begin process to establish location of theoretical levee prism and related improvements.					
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			Mitigate	Consider performing underwater investigations to identify potential obstructions.					
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule.			Accept						
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			Avoid	If NTP is at an inopportune time for nesting birds, consider an advance clearing and grubbing contract to remove bird nesting habitats prior to the nesting season.			Small contract administrative cost for advance clearing and grubbing at approximately $50,000.		
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			Accept	Complete wetlands inventory as soon as practical.					
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			Mitigate	Work proactively with cities and bicycle community to develop viable strategies for the bridge / bike path interface.					
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			Avoid	Do not pursue this option.					
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			Avoid	Pursue other strategies to divert traffic from Broadway Blvd. to X St.			Could include diverting traffic via Third St. which would require traffic improvements between $1 and $3 million for		
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			Mitigate	Potholing and/or GPR could be utilized to identify utilities during design.			Approximately $100,000.		
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			Mitigate	Engage in early consultations with USACE to determine the extent of impacts and possible mitigations.					
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			Mitigate	Perform early consultations with State Lands to identify issues as quickly as possible.					
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			Mitigate	Begin consultations with West Sacramento City Council early to reduce potential for delays.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			Avoid	West Sacramento to commence acquisition immediately following ROD to minimize potential of Port making an alternative decision.					
35	A - A	Design	Alignment C3	Kinder Morgan Pipeline Removal (C3)	It is possible that the Kinder Morgan pipeline could be removed or abandoned prior to construction of the project.			Enhance	Further research covenants and agreements related to easements and relocation requirements.					
36	A - A	Right-of-Way	Alignment C3	Acquisition of Ramos Property (C3)	There could be higher than anticipated acquisition and relocation costs related to the purchase of the Ramos property.			Accept						
37	A - A	Utilities & Agreements	Alignment C3	Telecom Utilities Adjacent Kinder Morgan Pipeline (C3)	The telecom facility (an old, re-purposed Kinder Morgan pipeline) adjacent to the existing Kinder Morgan pipeline may be impacted.			Avoid	Further refine C3 alignment to miss utilities. Further research covenants and agreements related to easements and relocation requirements.					
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			Accept						
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			Enhance	West Sacramento would continue its technical analysis of rail relocation, move into implementation, and seek funding.					
47	A - A	Environmental	Alignment C3	Contamination at Ramos Property (C3)	Due to the existence of a wharf at this site, there are likely contaminants in the water. Remediation of the Ramos site will presumably be more expensive than the Chevron and Shell sites, as there are metal contaminants at this site.			Avoid	This risk could be avoided by shifting alignment C3 north into the Shell property.					
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			Accept						
54	A - A	Design	Alignment C3	Scope Changes to South River / 5th Street Tie-In (C3)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			Accept						
57	A - A	Environmental	Alignment C3	Delays in Shell Property Remediation (C3)	Benzine contamination is the primary issue at the Shell site. Water contamination remediation will require four years.			Accept	Provide a monetary incentive to Shell to accelerate remediation.					
60	A - A	Design	Alignment C3	Miller Park Road Access Concerns (C3)				Accept	Begin early consultations with third parties including USACE, Central Valley Flood Protection Board, and Sacramento Public Works.					
62	A - A	-	Alignment C3	Tie-In at Jefferson Blvd. (C3)	Requires the acquisition of additional right of way to make the connection to Jefferson. Significant associated right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse facility.			Accept						
64	A - A	Utilities & Agreements	Alignment C3	Conflicts with Kinder Morgan Pipeline (C3)	Alignment C3 was designed to avoid the Kinder Morgan pipeline by locating it to the south of the pipeline for most of the pipeline route, however, on the Sacramento side there are concerns that the bridge abutment would conflict with the pipeline.			Mitigate	A potential mitigation for this conflict would be to shift the C3 alignment on the Sacramento side further south. However, by doing this, a new risk would occur related to the acquisition of the small parcel of land with the two Phillips tanks.					
68	A - A	Environmental	Alignment C3	Contamination of Phillips / State Lands Property (C3)	There is significant diesel and gas contamination at this site.			Mitigate	The current horizontal curves for the roadway on the east side of Broadway Blvd. are designed as 55 mph curves. The geometry could be modified to less than 55 mph (45 or 35 mph) which could allow the alignment to miss the contaminated areas. The City of Sacramento could pursue a Gatto action against Chevron that would accelerate and compel clean-up.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
70	A - A	Environmental	Alignment C3	Chevron Pipeline Relocation (C3)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			Accept						
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			Mitigate	Engage early and often to work with the public and apply lessons learned from the I Street Bridge.					
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			Accept						

Summary of Alignment D Risks


Broadway Bridge Alignment D - Cost Risk
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Contamination at Chevron Site (C1, C3, D)
Contamination of Ramos Property (D)
Contamination of Phillips Property (D)
Contamination of Phillips / State Lands Property (D)
Acquisition of Buckeye Property (D)
Tie-In at Jefferson Blvd. (D)
Railroad Grade Crossing Permits at Jefferson Blvd. (D)
Acquisition of Phillips Property (D)
Miller Park Road Access Concerns (D)
Steel Prices (ALL)
4-Lane Option Impacts to Caltrans (ALL)
Impacts to Bike Trails (ALL)
Geotechnical Conditions for Bridge Foundations (ALL)
Impacts to Designated Wetlands (ALL)
In-Water Work Windows (ALL)
Contamination at Buckeye Site (D)
Chevron Pipeline Relocation (D)
Scope Changes to South River / 5th Street Tie-In (D)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Tree Removal (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Hydraulic Mitigation Measures (ALL)
Contamination at Bridge Foundations (ALL)
US Coast Guard Permits and Approvals (D)
Acquisition of Ramos Property (D)
Impacts to Marine Species (ALL)
Underwater Obstructions (ALL)
$11,812,500
$8,268,750
$8,015,625
$5,906,250
$5,906,250
$4,809,375
$4,809,375
$4,218,750
$4,218,750
$3,543,750
$3,543,750
$2,531,250
$2,531,250
$1,603,125
$1,518,750
$1,518,750
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$1,518,750
$1,181,250
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$843,750
($843,750)
$506,250
$506,250
$506,250
$506,250
$168,750
$168,750
$168,750
($2,000,000)
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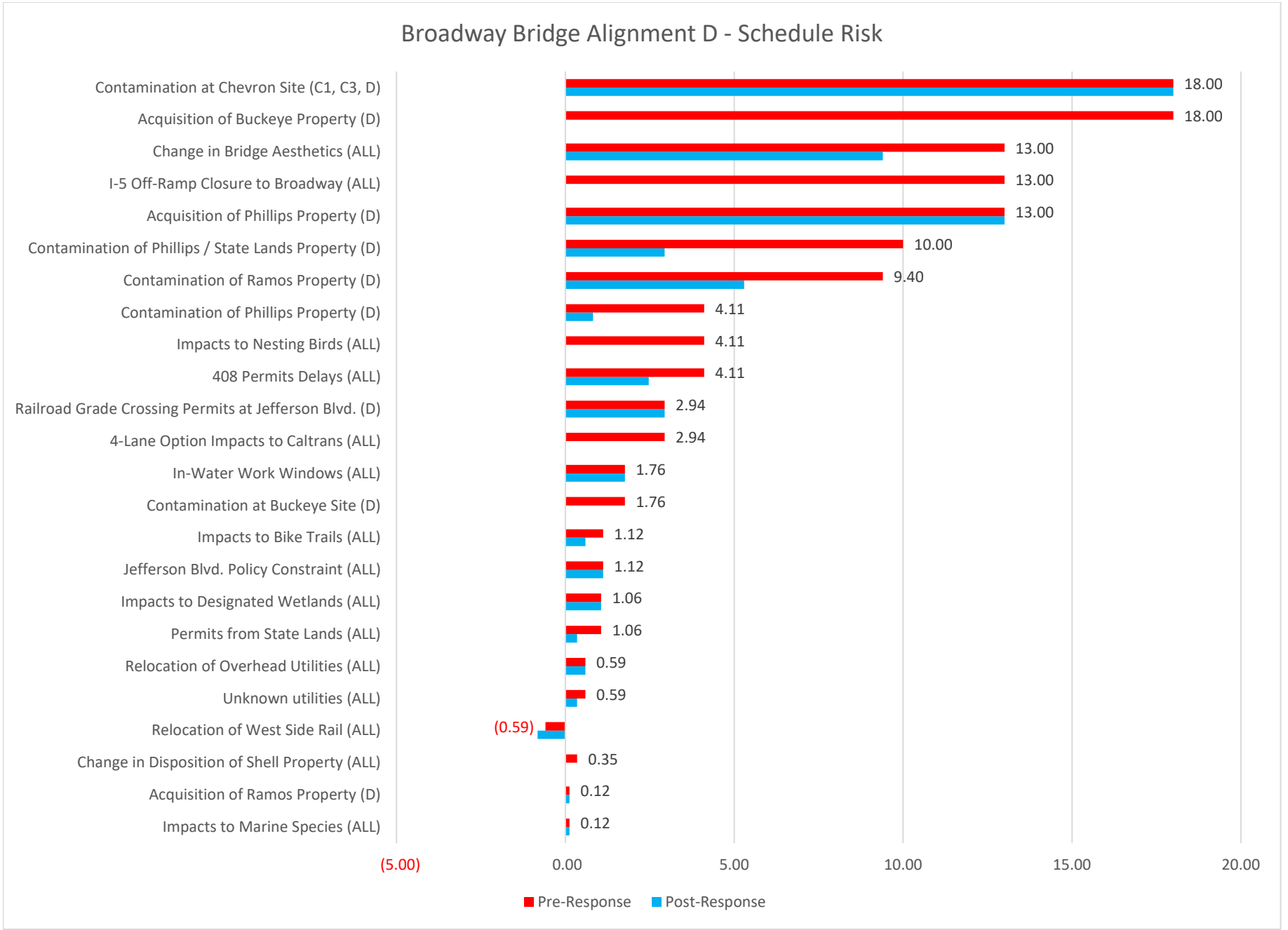
$2,000,000
$4,000,000
$6,000,000
$8,000,000
$10,000,000
$12,000,000
$14,000,000
Pre-Response
Post-Response


Broadway Bridge Alignment D - Schedule Risk
Contamination at Chevron Site (C1, C3, D)
Acquisition of Buckeye Property (D)
Change in Bridge Aesthetics (ALL)
I-5 Off-Ramp Closure to Broadway (ALL)
Acquisition of Phillips Property (D)
Contamination of Phillips / State Lands Property (D)
Contamination of Ramos Property (D)
Contamination of Phillips Property (D)
Impacts to Nesting Birds (ALL)
408 Permits Delays (ALL)
Railroad Grade Crossing Permits at Jefferson Blvd. (D)
4-Lane Option Impacts to Caltrans (ALL)
In-Water Work Windows (ALL)
Contamination at Buckeye Site (D)
Impacts to Bike Trails (ALL)
Jefferson Blvd. Policy Constraint (ALL)
Impacts to Designated Wetlands (ALL)
Permits from State Lands (ALL)
Relocation of Overhead Utilities (ALL)
Unknown utilities (ALL)
Relocation of West Side Rail (ALL)
Change in Disposition of Shell Property (ALL)
Acquisition of Ramos Property (D)
Impacts to Marine Species (ALL)
18.00
18.00
13.00
13.00
13.00
10.00
9.40
4.11
4.11
4.11
2.94
2.94
1.76
1.76
1.12
1.12
1.06
1.06
0.59
0.59
(0.59)
0.35
0.12
0.12
(5.00)
0.00
5.00
10.00
15.00
20.00
Pre-Response
Post-Response

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			95%	T	$8,437,500	$8,015,625	T	18.80	18.00	95%	T	$8,437,500	$8,015,625	T	18.80	18.00
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	T	$5,062,500	$1,518,750	T	5.88	1.76
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			30%	T	$1,687,500	$506,250	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
7	A - A	Permits & Approvals	Alignment D	US Coast Guard Permits and Approvals (D)	The US Coast Guard has stated that they prefer the C alignments. The study team noted that there is a higher potential for the Coast Guard to reject alignment D when compared with other alignments. It is possible that the Coast Guard could require a change in the movable span length.			10%	T	$5,062,500	$506,250	--	0.00	0.00	10%	T	$5,062,500	$506,250	--	0.00	0.00
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			50%	T	$1,687,500	$843,750	--	0.00	0.00	50%	T	$1,687,500	$843,750	--	0.00	0.00
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	T	3.53	2.47
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			10%	T	$1,687,500	$168,750	--	0.00	0.00	10%	T	$1,687,500	$168,750	--	0.00	0.00
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			70%	--	$-	$-	T	5.88	4.11	70%	--	$-	$-	--	0.00	0.00
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			30%	T	$5,062,500	$1,518,750	T	3.53	1.06	30%	T	$5,062,500	$1,518,750	T	3.53	1.06
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			95%	T	$1,687,500	$1,603,125	T	1.18	1.12	50%	T	$1,687,500	$843,750	T	1.18	0.59
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			50%	T	$5,062,500	$2,531,250	T	5.88	2.94	50%	--	$-	$-	--	0.00	0.00
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			70%	T	$11,812,500	$8,268,750	T	18.80	13.00	70%	--	$-	$-	--	0.00	0.00
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			50%	T	$1,687,500	$843,750	T	1.18	0.59	30%	T	$1,687,500	$506,250	T	1.18	0.35
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			30%	T	$1,687,500	$506,250	--	0.00	0.00	30%	T	$1,687,500	$506,250	--	0.00	0.00
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			30%	--	$-	$-	T	3.53	1.06	30%	--	$-	$-	T	1.18	0.35

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			95%	--	$-	$-	T	1.18	1.12	95%	--	$-	$-	T	1.18	1.12
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			10%	T	$5,062,500	$506,250	T	3.53	0.35	10%	--	$-	$-	--	0.00	0.00
38	A - A	Design	Alignment D	Streetcar Interface (C, D)	C and D alignments (more so for the D alignment), may enhance the future streetcar program, making these alignments more attractive.			50%	--	$-	$-	--	0.00	0.00	50%	O	$-	$-	--	0.00	0.00
39	A - A	Environmental	Alignment D	Contamination of Phillips Property (D)	There is a concern that the extent of contamination at the Phillips property could be greater than anticipated and/or the remediation process could delay the project.			70%	T	$8,437,500	$5,906,250	T	5.88	4.11	70%	T	$1,687,500	$1,181,250	T	1.18	0.82
40	A - A	Environmental	Alignment D	Contamination at Buckeye Site (D)	The West Sacramento Buckeye site presents significant contamination concerns (unknown and non-contained). Buckeye doesn't want to move and has litigated with the city in the past.			30%	T	$5,062,500	$1,518,750	T	5.88	1.76	30%	--	$-	$-	--	0.00	0.00
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			50%	T	$5,062,500	$2,531,250	--	0.00	0.00	50%	T	$5,062,500	$2,531,250	--	0.00	0.00
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			50%	O	($1,687,500)	($843,750)	O	(1.18)	(0.59)	70%	O	($1,687,500)	($1,181,250)	O	(1.18)	(0.82)
43	A - A	Permits & Approvals	Alignment D	Railroad Grade Crossing Permits at Jefferson Blvd. (D)	If alignment D is selected, and Broadway Blvd. is extended to Jefferson Blvd., a new railroad grade crossing permit must be obtained. This could result in delays and/or additional mitigation costs.			50%	T	$8,437,500	$4,218,750	T	5.88	2.94	50%	T	$8,437,500	$4,218,750	T	5.88	2.94
45	A - A	Right-of-Way	Alignment D	Acquisition of Buckeye Property (D)	Acquisition of the Buckeye property could be more expensive than anticipated due to the potential for additional relocation costs.			95%	T	$5,062,500	$4,809,375	T	18.80	18.00	95%	--	$-	$-	--	0.00	0.00
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			50%	T	$1,687,500	$843,750	T	1.18	0.59	50%	T	$1,687,500	$843,750	T	1.18	0.59
53	A - A	Design	Alignment D	Scope Changes to South River / 5th Street Tie-In (D)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
61	A - A	Design	Alignment D	Miller Park Road Access Concerns (D)	Would be challenging to maintain dual access to Miller Park given grade changes.			70%	T	$5,062,500	$3,543,750	--	0.00	0.00	70%	T	$5,062,500	$3,543,750	--	0.00	0.00
63	A - A	Design	Alignment D	Tie-In at Jefferson Blvd. (D)	Requires the acquisition of additional right of way to make the connection to Jefferson. Significant right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse property. Alignment D hits the contamination plume, requires the introduction of a railroad grade crossing, and the intersection of Jefferson and alignment-D punch through will require restricted turn movements.			50%	T	$8,437,500	$4,218,750	--	0.00	0.00	50%	T	$8,437,500	$4,218,750	--	0.00	0.00
65	A - A	Right-of-Way	Alignment D	Acquisition of Ramos Property (D)	There could be higher than anticipated acquisition and relocation costs related to the purchase of the Ramos property.			10%	T	$1,687,500	$168,750	T	1.18	0.12	10%	T	$1,687,500	$168,750	T	1.18	0.12
69	A - A	Environmental	Alignment D	Contamination of Phillips / State Lands Property (D)	There is significant diesel and gas contamination at this site.			95%	T	$5,062,500	$4,809,375	T	10.57	10.00	50%	T	$1,687,500	$843,750	T	5.88	2.94

Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Probability	T/O	Impact	Expected Value	T/O2	Impact3	Expected Value4	Probability8	T/O9	Impact10	Expected Value11	T/O12	Impact13	Expected Value14
71	A - A	Environmental	Alignment D	Chevron Pipeline Relocation (D)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			70%	T	$1,687,500	$1,181,250	--	0.00	0.00	70%	T	$1,687,500	$1,181,250	--	0.00	0.00
72	A - A	Environmental	Alignment D	Contamination of Ramos Property (D)	Due to the existence of a wharf at this site, there are likely contaminants in the water. Remediation of the Ramos site will presumably be more expensive than the Chevron and Shell sites, as there are metal contaminants at this site. Worse for alignment D than other alignments.			50%	T	$11,812,500	$5,906,250	T	18.80	9.40	50%	T	$11,812,500	$5,906,250	T	10.57	5.29
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			70%	T	$16,875,000	$11,812,500	T	18.80	13.00	50%	T	$16,875,000	$8,437,500	T	18.80	9.40
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			30%	T	$5,062,500	$1,518,750	--	0.00	0.00	30%	T	$5,062,500	$1,518,750	--	0.00	0.00
76	A - A	Right-of-Way	Alignment D	Acquisition of Phillips Property (D)	There is the potential that the small Phillips tank farm parcel that alignment D bisects could precipitate higher than anticipated cost and schedule impacts.			70%	T	$5,062,500	$3,543,750	T	18.80	13.00	70%	T	$5,062,500	$3,543,750	T	18.80	13.00
											$84,375,000							**$52,903,125**			

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
1	A - A	Environmental	All Alignments	Contamination at Chevron Site (C1, C3, D)	The Chevron property is an operational tank storage site, and has been located in its current location for roughly 50 years. Major concerns related to this site are soil and ground water contamination, though soil contamination is easier to clean up, and is regarded as less problematic than ground water contamination. Contamination at this site is more severe than the contamination at the Shell property. Schedule delays are likely for all alignments.			Mitigate	Cap the existing roadway area wells, install new monitoring wells, and relocate or abandon impacted monitoring wells.					
4	A - A	Environmental	All Alignments	In-Water Work Windows (ALL)	It is possible that in-water work windows could be shortened which could cause construction delays. The current windows are about 8 months long (March through October).			Accept	The current in-water work window of 8 months should be sufficient to address any issues.					
5	A - A	Environmental	All Alignments	Contamination at Bridge Foundations (ALL)	The hazardous materials SME noted the river sediment will likely contain material washed downstream from the agriculture fields.			Mitigate	Perform additional borings at bent locations. Adjust design as necessary, if practical.					
7	A - A	Permits & Approvals	Alignment D	US Coast Guard Permits and Approvals (D)	The US Coast Guard has stated that they prefer the C alignments. The study team noted that there is a higher potential for the Coast Guard to reject alignment D when compared with other alignments. It is possible that the Coast Guard could require a change in the movable span length.			Accept	Perform early consultations.					
8	A - A	Environmental	All Alignments	Tree Removal (ALL)	There is a potential for increased tree mitigation costs related to the removal of mature trees.			Accept	This is a minor risk and the required tree mitigation ratios will have to be met.					
9	A - A	Permits & Approvals	All Alignments	408 Permits Delays (ALL)	There is a risk of schedule delays in obtaining 408 permits from USACE.			Mitigate	Begin 408 consultations early. Begin process to establish location of theoretical levee prism and related improvements.					
10	A - A	Environmental	All Alignments	Underwater Obstructions (ALL)	There is a low potential that unknown obstructions could be encountered during construction (sunken ships or other objects).			Mitigate	Consider performing underwater investigations to identify potential obstructions.					
11	A - A	Environmental	All Alignments	Impacts to Marine Species (ALL)	Impacts to marine species result in permits that increase cost or schedule			Accept						
13	A - A	Environmental	All Alignments	Impacts to Nesting Birds (ALL)	Potential impacts to cost and schedule related to nesting birds.			Avoid	If NTP is at an inopportune time for nesting birds, consider an advance clearing and grubbing contract to remove bird nesting habitats prior to the nesting season.			Small contract administrative cost for advance clearing and grubbing at approximately $50,000.		
14	A - A	Environmental	All Alignments	Impacts to Designated Wetlands (ALL)	Designated wetland inventory has not been completed.			Accept	Complete wetlands inventory as soon as practical.					
15	A - A	Design	All Alignments	Impacts to Bike Trails (ALL)	This project, regardless of alignment, is expected to impact bike paths along either side of the Sacramento river. On the City of Sacramento side of the river, property will need to be acquired to accommodate a route change and maintain a through-path. On the City of West Sacramento side of the river, no property will need to be acquired, but the through-path will need to be altered in light of the selected alignment (design consideration).			Mitigate	Work proactively with cities and bicycle community to develop viable strategies for the bridge / bike path interface.					
16	A - A	Design	All Alignments	4-Lane Option Impacts to Caltrans (ALL)	This risk is linked to the 4-lane option for the Broadway Bridge. If four lanes are carried under I-5, there will be additional right of way impacts.			Avoid	Do not pursue this option.					
17	A - A	Design	All Alignments	I-5 Off-Ramp Closure to Broadway (ALL)	This risk is related to right of way, public opposition, liquidated damages from local businesses, and would require a redesign of said interface, however it will remain an option if the Broadway connection is not used.			Avoid	Pursue other strategies to divert traffic from Broadway Blvd. to X St.			Could include diverting traffic via Third St. which would require traffic improvements between $1 and $3 million for construction and right of way costs.		
19	A - A	Utilities & Agreements	All Alignments	Unknown utilities (ALL)	There is a moderate chance of encountering unknown, buried utilities for all the alignments based on past and current industrial land uses.			Mitigate	Potholing and/or GPR could be utilized to identify utilities during design.			Approximately $100,000.		
22	A - A	Hydraulics	All Alignments	Hydraulic Mitigation Measures (ALL)	Impacts to cost and schedule related to perceived hydraulic impacts could result related to additional mitigation or design modifications. If USACE does not allow for fill in the floodplain, then the structure may have to be increased from 100 to 400 feet in length.			Mitigate	Engage in early consultations with USACE to determine the extent of impacts and possible mitigations.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
23	A - A	Environmental	All Alignments	Permits from State Lands (ALL)	On the City of Sacramento side (for all alignments), there is a concern that the conditions for permits from State Lands are unknown and could take additional time to resolve.			Mitigate	Perform early consultations with State Lands to identify issues as quickly as possible.					
25	A - A	Permits & Approvals	All Alignments	Jefferson Blvd. Policy Constraint (ALL)	There is a policy constraint for all alignments when tying into Jefferson Blvd. on the West Sacramento side of the proposed bridge. It is possible that there could be a short delay as City Council tries to resolve any disputes.			Mitigate	Begin consultations with West Sacramento City Council early to reduce potential for delays.					
33	A - A	Right-of-Way	All Alignments	Change in Disposition of Shell Property (ALL)	The Port of Sacramento could lease the Shell site to a commercial interest, sell the property, or back out of the acquisition altogether (the port is an enterprise fund). Low likelihood due to an existing strong relationship with Port.			Avoid	West Sacramento to commence acquisition immediately following ROD to minimize potential of Port making an alternative decision.					
38	A - A	Design	Alignment D	Streetcar Interface (C, D)	C and D alignments (more so for the D alignment), may enhance the future streetcar program, making these alignments more attractive.			Enhance	Perform financial analysis of tax increment funding related to increased development. Potential to offset the additional costs of alignment D compared to others.					
39	A - A	Environmental	Alignment D	Contamination of Phillips Property (D)	There is a concern that the extent of contamination at the Phillips property could be greater than anticipated and/or the remediation process could delay the project.			Accept						
40	A - A	Environmental	Alignment D	Contamination at Buckeye Site (D)	The West Sacramento Buckeye site presents significant contamination concerns (unknown and non-contained). Buckeye doesn't want to move and has litigated with the city in the past.			Avoid	Shift alignment of intersection to Circle St. and avoid existing contamination plume. Requires acquisition of existing warehouse and additional traffic mitigation.					
41	A - A	Market Conditions	All Alignments	Steel Prices (ALL)	Steel prices could increase over the next decade.			Accept						
42	A - A	Design	All Alignments	Relocation of West Side Rail (ALL)	The West Sacramento side rail may be relocated prior to the construction, thereby better facilitating the extension of Broadway to Jefferson Blvd.			Enhance	West Sacramento would continue its technical analysis of rail relocation, move into implementation, and seek funding.					
43	A - A	Permits & Approvals	Alignment D	Railroad Grade Crossing Permits at Jefferson Blvd. (D)	If alignment D is selected, and Broadway Blvd. is extended to Jefferson Blvd., a new railroad grade crossing permit must be obtained. This could result in delays and/or additional mitigation costs.			Mitigate	Engage in early consultations with CPUC and RR line operator.					
45	A - A	Right-of-Way	Alignment D	Acquisition of Buckeye Property (D)	Acquisition of the Buckeye property could be more expensive than anticipated due to the potential for additional relocation costs.			Avoid	Shift alignment north to avoid/minimize Buckeye acquisition and eliminate relocation costs, and reduce acquisition costs.			$9 million is assumed for potential relocation costs.		
48	A - A	Utilities & Agreements	All Alignments	Relocation of Overhead Utilities (ALL)	There are extensive overhead utilities along Broadway Blvd. on the Sacramento side of the project. These will likely have to be relocated to accommodate the widened facility cross section.			Accept						
53	A - A	Design	Alignment D	Scope Changes to South River / 5th Street Tie-In (D)	May require additional improvements in the vicinity of the project. Depending on the final location of the tie in of the Broadway Bridge to South River / 5th Street (for alignments C and D) there may be a need for additional local road improvements to accommodate traffic movement (i.e. additional lanes, intersection widening, signal modifications). It's likely that additional right-of-way will be required.			Accept						
61	A - A	Design	Alignment D	Miller Park Road Access Concerns (D)	Would be challenging to maintain dual access to Miller Park given grade changes.			Accept	Begin early consultations with third parties including USACE, Central Valley Flood Protection Board, and Sacramento Public Works.					
63	A - A	Design	Alignment D	Tie-In at Jefferson Blvd. (D)	Requires the acquisition of additional right of way to make the connection to Jefferson. Significant right of way costs (though better than alignments A and B). This strategy could be implemented in an incremental fashion over time by first touching down at 5th Street; then modifying the tie-in from bridge terminus to go through the shell property; then purchasing the Ramos warehouse property. Alignment D hits the contamination plume, requires the introduction of a railroad grade crossing, and the intersection of Jefferson and alignment-D punch through will require restricted turn movements.			Mitigate	The phased approach will allow for the removal of the railroad and clean-up of contamination which will reduce the potential for delays and eliminate the grade change precipitated by the railroad alignment which will be removed by the time of the extension. The strategy will be to buy time to ensure the removal of the railroad to avoid mitigations that may otherwise be required by permitting a new railroad grade crossing.					

Risk Information								Risk Management Plan: Monitor & Control							
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	Risk Trigger (Symptoms)	Additional Comments	Risk Response Strategy	Action Plan Description(s)	Risk Owner	Risk Review Milestone / Frequency	Base Cost Impacts	Base Schedule Impacts	Updates
65	A - A	Right-of-Way	Alignment D	Acquisition of Ramos Property (D)	There could be higher than anticipated acquisition and relocation costs related to the purchase of the Ramos property.			Accept						
69	A - A	Environmental	Alignment D	Contamination of Phillips / State Lands Property (D)	There is significant diesel and gas contamination at this site.			Mitigate	The current horizontal curves for the roadway on the east side of Broadway Blvd. are designed as 55 mph curves. The geometry could be modified to less than 55 mph (45 or 35 mph) which could allow the alignment to miss the contaminated areas. The City of Sacramento could pursue a Gatto action against Chevron that would accelerate and compel clean-up.					
71	A - A	Environmental	Alignment D	Chevron Pipeline Relocation (D)	It is possible that some of the alignments may impact the existing 8-inch Chevron pipeline. The pipeline in question is owned by Chevron and feeds the Chevron facility.			Accept						
72	A - A	Environmental	Alignment D	Contamination of Ramos Property (D)	Due to the existence of a wharf at this site, there are likely contaminants in the water. Remediation of the Ramos site will presumably be more expensive than the Chevron and Shell sites, as there are metal contaminants at this site. Worse for alignment D than other alignments.			Mitigate	The City of West Sacramento could pursue a Gatto action against Ramos that would accelerate and compel clean-up.					
74	A - A	Design	All Alignments	Change in Bridge Aesthetics (ALL)	There is a potential that there is political pressure to enhance the aesthetics of the Broadway Bridge to deliver an iconic structure. This could add time and costs to the project and possibly precipitate a change in structure type.			Mitigate	Engage early and often to work with the public and apply lessons learned from the I Street Bridge.					
75	A - A	Geotechnical	All Alignments	Geotechnical Conditions for Bridge Foundations (ALL)	There is limited geotechnical information regarding soil conditions along the Sacramento River. There is a potential that conditions could precipitate changes in the foundation type, cost and schedule.			Accept						
76	A - A	Right-of-Way	Alignment D	Acquisition of Phillips Property (D)	There is the potential that the small Phillips tank farm parcel that alignment D bisects could precipitate higher than anticipated cost and schedule impacts.			Accept				The estimated acquisition and relocation cost is $6.5 million.		

WORKSHOP INFORMATION

WORKSHOP INFORMATION DRAFT

The following pages present a summary of participants and the agenda for the workshop conducted June 6-8, 2017.

PARTICIPANTS

Name	Role	Organization
Jesse Gothan	Supervising Engineer	City of Sacramento
Katie Yancey	ED	City of West Sacramento
Jason McCoy	Project Manager	City of West Sacramento
Rafael Martinez	Engineering Manager	City of West Sacramento
Zach Siviglia	Project Manager	Mark Thomas & Company
Rob Himes	PIC	Mark Thomas & Company
Eric Fredrickson	Structures	Mark Thomas & Company
Kira Davis	Engineer	Mark Thomas & Company
Jason Hickey	Bridge Engineer	Mark Thomas & Company
Scott McHenry	Senior Transportation Engineer	FHWA
Debbie Kern	Economist	Keyser Marston
James Ritchie	Hazmat/Geologist	SCS Engineers
Bob Lagomarsino	Planner	Mintier Harnish
Christine Zdunkiewicz	Engineer/Traffic	Caltrans
Jimmy Fong	Engineer/Planner	Fehr & Peers
David Carter	Senior Associate	Fehr & Peers
Lance Borden	Moveable Structures	Modjeski & Masters
Kevin Johns	Moveable Structures	Modjeski & Masters
Rob Stewart	Risk Lead	VMS, Inc.
Damon Yeutter	Assistant	VMS, Inc.

AGENDA

The agenda for the Risk Assessment workshop conducted June 6-8, 2017 is included on the following pages.

TUESDAY, JUNE 6

8:00 – 8:15 Introductions (All) and Brief Overview of the Risk Analysis Process
8:15 – 9:15 Project Overview (Project Manager and Engineers)
- Alignment Options
- Schedule
- Cost

9:15 – 12:00 RISK IDENTIFICATION: Discuss risks identified by participants and revise risk register
12:00 – 1:00 Lunch
1:00 – 5:00 RISK ANALYSIS: Perform risk analysis (assign probabilities and impacts to risks)
1:00 – 2:00 Right-of-Way/HAZMAT/Utilities SMEs
2:00 – 3:00 Traffic Operations SMEs (Caltrans/Sacramento/West Sacramento)
3:00 – 4:00 Geotechnical/Structural SMEs (Caltrans/Design Team)
4:00 – 5:00 Environmental/Permits SMEs (USACE/Coast Guard/Fish & Wildlife/Etc.)

WEDNESDAY, JUNE 7

8:00 – 12:00 RISK ANALYSIS (continued)
12:00 – 1:00 Lunch
1:00 – 5:00 RISK ANALYSIS (continued)

THURSDAY, JUNE 8

8:00 – 12:00 RISK RESPONSE PLANNING: Identify potential response strategies to manage risks
12:00 – 1:00 Lunch
1:00 – 2:30 RISK RESPONSE PLANNING (continued)
2:30 – 3:30 Review Results and Preparation for Presentation
3:30 – 4:30 Risk Analysis Workshop Presentation
4:30 Adjourn

Value Management Strategies, Inc.

**Offices in Escondido California; Grand Junction, Colorado; Chicago, Illinois;
Portland, Oregon; Seattle, Washington; Las Vegas, Nevada; and Kansas City, Missouri**

Value Management Strategies, Inc.

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

City of Sacramento; City of West Sacramento

June 2016

Value Management Strategies, Inc.

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

City of Sacramento; City of West Sacramento

June 2016

Value Management Strategies, Inc.

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

City of Sacramento; City of West Sacramento

June 2016

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DRAFT Risk Assessment Report

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June 2016

Value Management Strategies, Inc.

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

City of Sacramento; City of West Sacramento

June 2016

Broadway Bridge Alignment Memo, Attachment F

Broadway Bridge - Broadway / X Street Realignment Connection Memorandum

FEHR PEERS

MEMORANDUM

Date: January 15, 2018

To: Kira Davis (Mark Thomas)

From: Jimmy Fong and David Carter (Fehr & Peers)

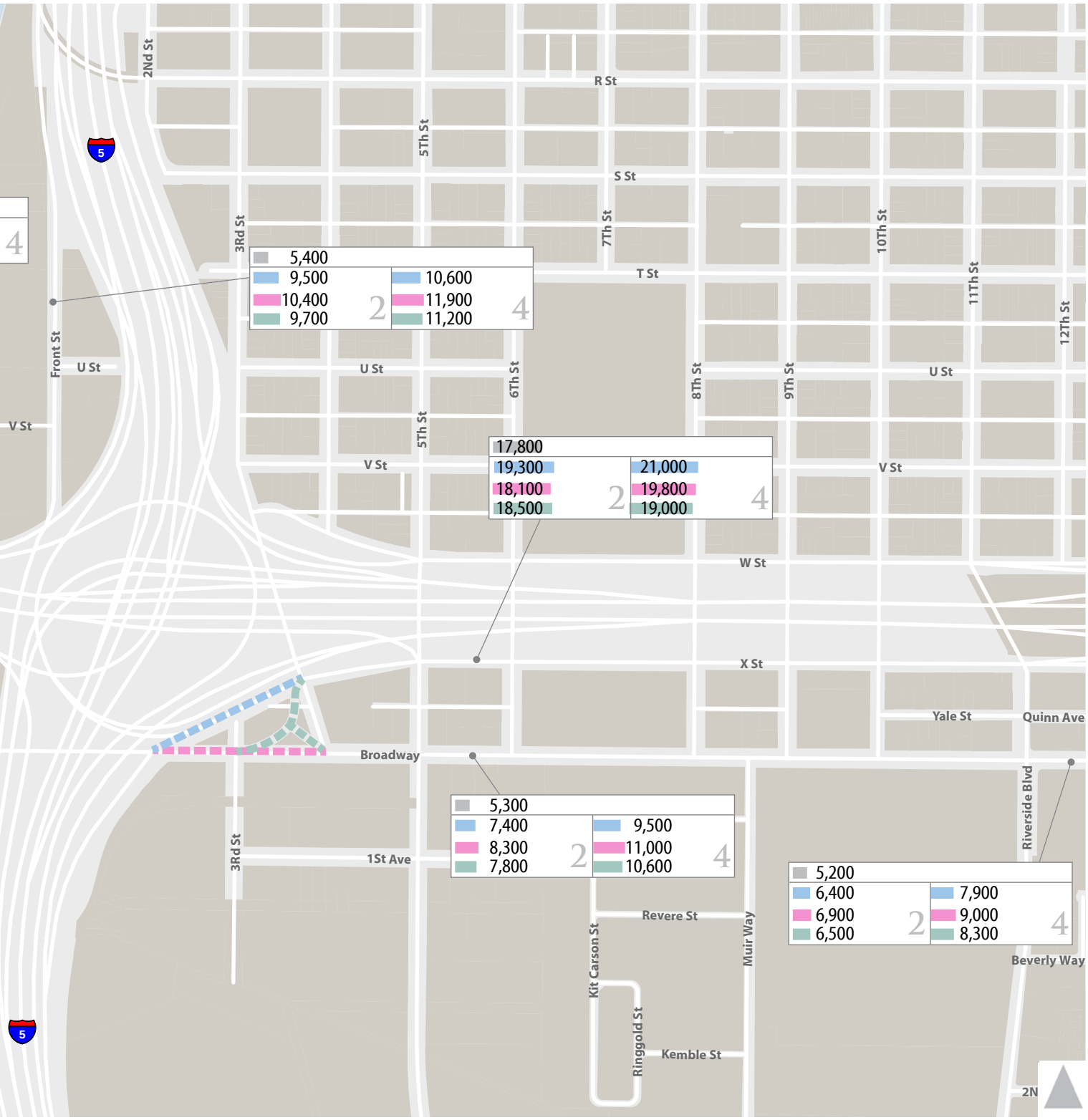
Subject: Broadway Bridge – Broadway / X Street Realignment Connection

RS17-3529

Three east side bridge approach alternatives were evaluated as part of the Broadway Bridge Feasibility Study. The three approach alternatives are described below:

- X Street Connection (no longer considered due to the project team's conclusion to keep I-5 southbound off-ramp open).
    - Bridge approach ties into the 3rd Street/X Street intersection and assumes closure of I-5 Southbound off-ramp to 3rd Street/X Street
    - Bridge connection to Broadway via one eastbound travel lane
- Broadway Connection
    - Bridge approach continues along Broadway as under the existing connection configuration
    - I-5 Southbound off-ramp would remain open
- Broadway / X Street Realignment Connection
    - A hybrid scenario between the X Street Connection and the Broadway Connection
    - Bridge approach along Broadway is realigned with the eastbound through movement tying directly onto X Street
    - I-5 Southbound off-ramp would remain open

Figure 1 shows the daily traffic volumes projected in year 2040 for each of the three approach alternatives, As shown, with a 2-lane bridge, the Broadway Connection would result in approximately 8,300 daily vehicles remaining on Broadway east of 5th Street. The Broadway/X Street Realignment Connection would result in a lower volume on Broadway with 7,800 daily vehicles (-500 vehicles). Either daily volume is well within the City's capacity threshold for a two-lane low access control arterial (15,000 daily vehicles). Traffic volumes on Broadway further east of 5th Street are very similar between the two approach alternatives as bridge traffic is expected to gradually disperse onto the well-connected street grid that serves the area.



East Side Alternatives

No Project	
With 2-Lane New Bridge 2	With 4-Lane New Bridge 4

- No Project
- X St Connection, I-5 SB Off-ramp Closed
- Broadway Connection, I-5 SB Off-ramp Open
- Broadway/X Street Realignment Connection, I-5 SB Off-ramp Open

Figure 1

Broadway Bridge

Year 2040 Average Daily Traffic Volumes

Preliminary planning level traffic operations analysis was also conducted as part of the feasibility study for bridge approach intersections in Sacramento. Table 1 summarizes results for the Broadway connection scenario under year 2040 conditions with a 2-lane bridge (i.e., no direct connection to X Street).

TABLE 1: 2 LANE BRIDGE – LEVEL OF SERVICE

Intersection	East Connection – Broadway		
	Control Type	Delay / LOS	
		AM	PM
Broadway / Front St	Signalized	47 / D	39 / D
Broadway / I-5 NB Off-Ramp	Signalized	19 / B	9 / A
X St / 3rd St / I-5 SB Off-Ramp	Side Street Stop	10 / B	11 / B
Broadway / 3rd St	Signalized	13 / B	18 / B

Notes: For signalized intersections, delay is reported in seconds per vehicles for the overall intersection. For side street stop controlled intersections, delay is report in seconds per vehicle for the worst movement.

Source: Fehr & Peers, 2015.

As shown, the level of service (LOS) at the bridge approach intersections on Broadway would operate at LOS D or better. Notably, bridge traffic turning left from Broadway toward X Street at the Broadway / 3rd Street intersection would not result in substantial travel delays at this location, and the intersection would operate with overall LOS B conditions during both peak hours.

Broadway Bridge Alignment Memo, Attachment G

Risk Analysis Workshop - Traffic Forecast

FEHR PEERS

Risk Analysis Workshop

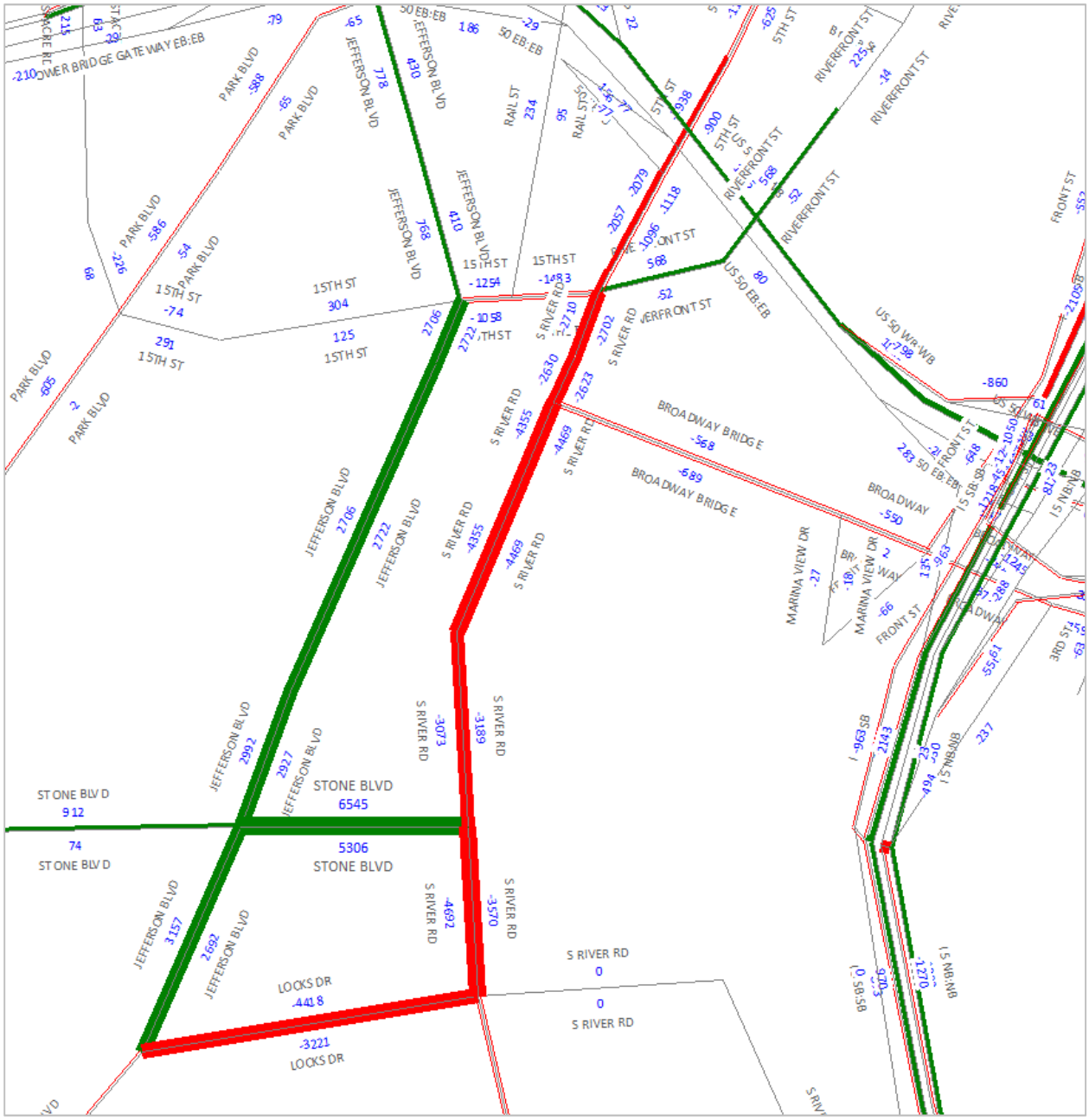
Tuesday, June 6, 2017

2:00 – 3:00 p.m.

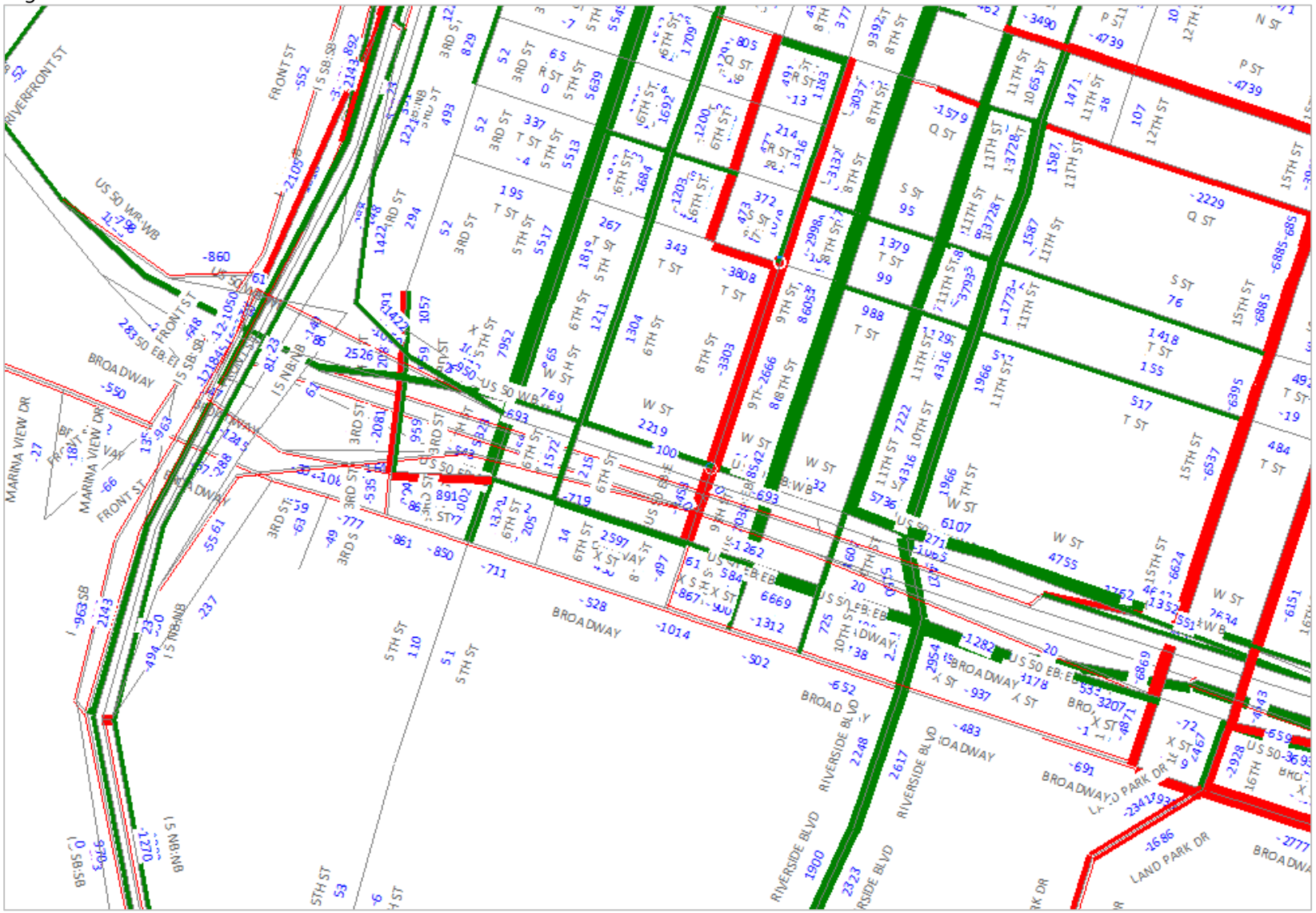
AGENDA

1. Data Collection Update
    - Traffic count data received from both cities
    - Additional traffic counts completed in May 2017
2. Travel Demand Model Refinements
    - Modifications made to model from the Feasibility Study:
        - City of Sacramento: "Grid 3.0" network modifications
        - West Sacramento: Recoding of South River Road from 4 travel lanes to 2 travel lanes, Stone Boulevard connection to South River Road
    - Implications of above network modifications
3. Evaluation of effects of Phase 2 of I-5 Riverfront Reconnection Project on Broadway Bridge project
4. Preliminary Model Runs Conducted for 8 Bridge Alternatives:
    1. Connection to 15th Street / Connection to Broadway
    2. Connection to 15th Street / Connection to X Street
    3. Connection to South River Road / Connection to Broadway
    4. Connection to South River Road / Connection to X Street
    5. Connection to 15th Street realigned to the south / Connection to Broadway
    6. Connection to 15th Street realigned to the south / Connection to X Street
    7. Connection to Jefferson via new roadway south of 15th Street / Connection to Broadway
    8. Connection to Jefferson via new roadway south of 15th Street / Connection to X Street

Differences in Traffic Forecasts from 2015 Feasibility Study to 2017 PA/ED

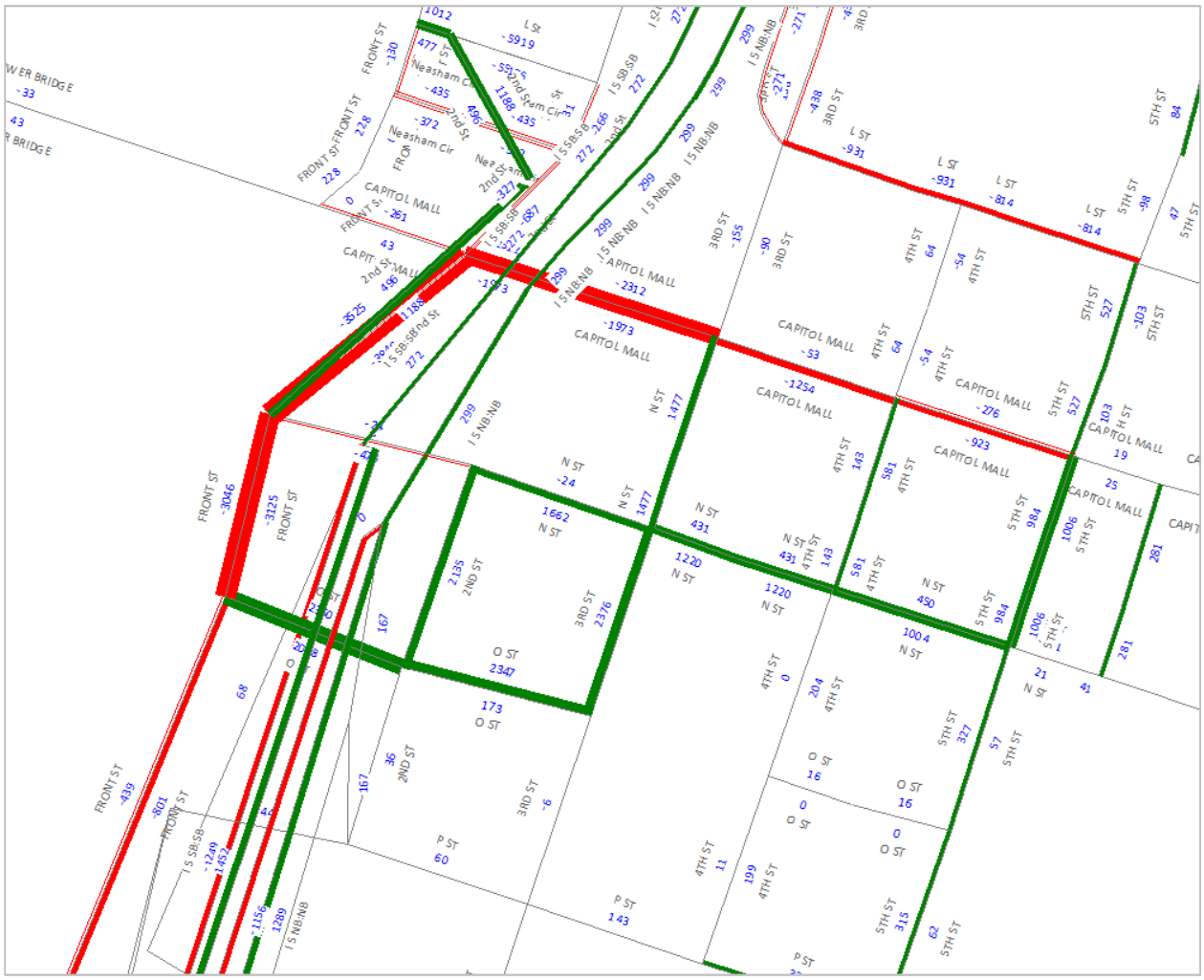


Daily Traffic Forecast Change from 2015 Feasibility Study to 2017 PA/ED – West Sacramento



Daily Traffic Forecast Change from 2015 Feasibility Study to 2017 PA ED – Sacramento

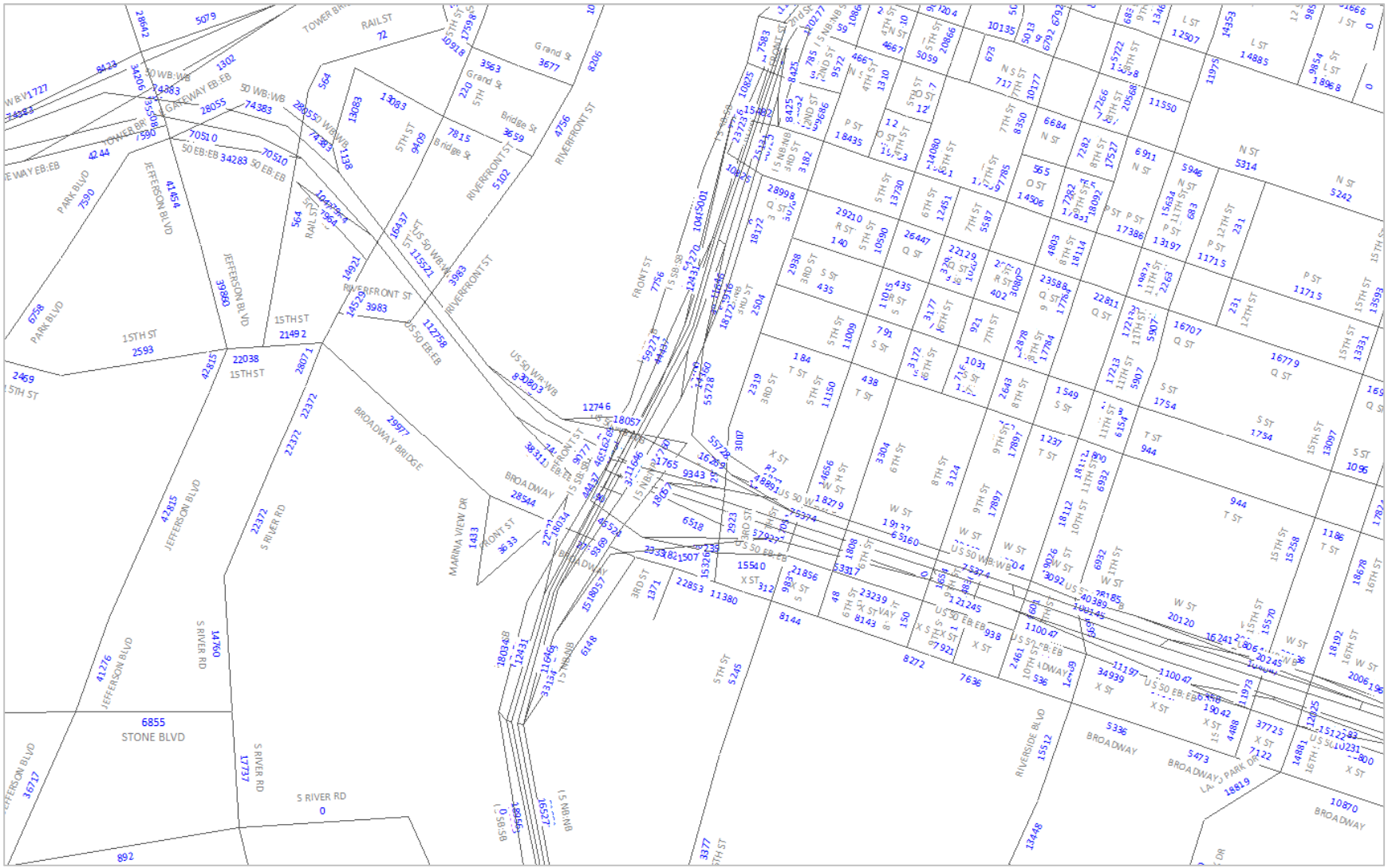
Effects of I-5 Riverfront Reconnection Project Phase 2



Daily Traffic Forecast Change from With to Without I-5 Riverfront Reconnection Project Phase 2

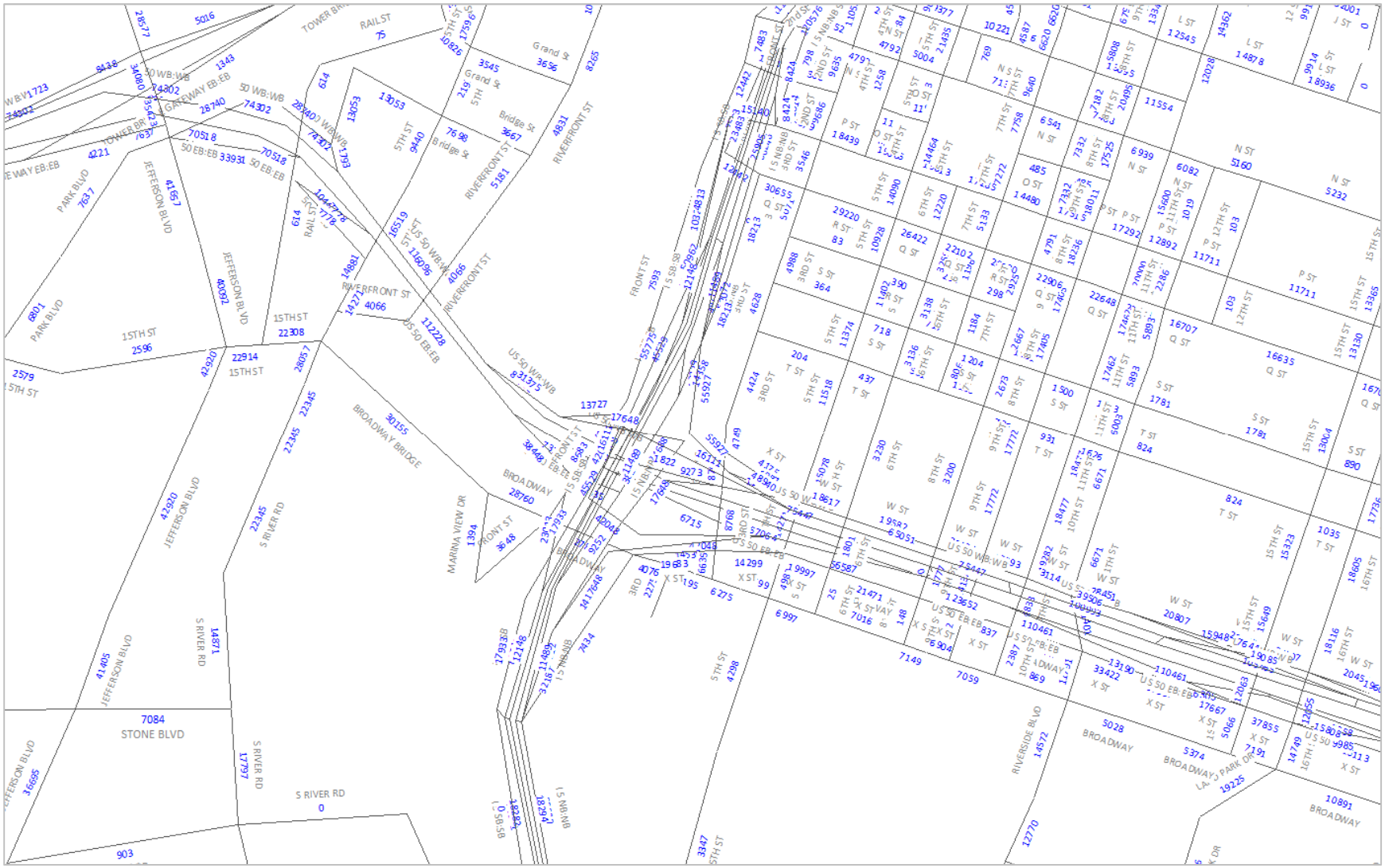
Daily Traffic Forecast for No Build Alternative

Daily Traffic Forecast for Alternative 2:
15th Street (West Sacramento) / X Street (Sacramento)



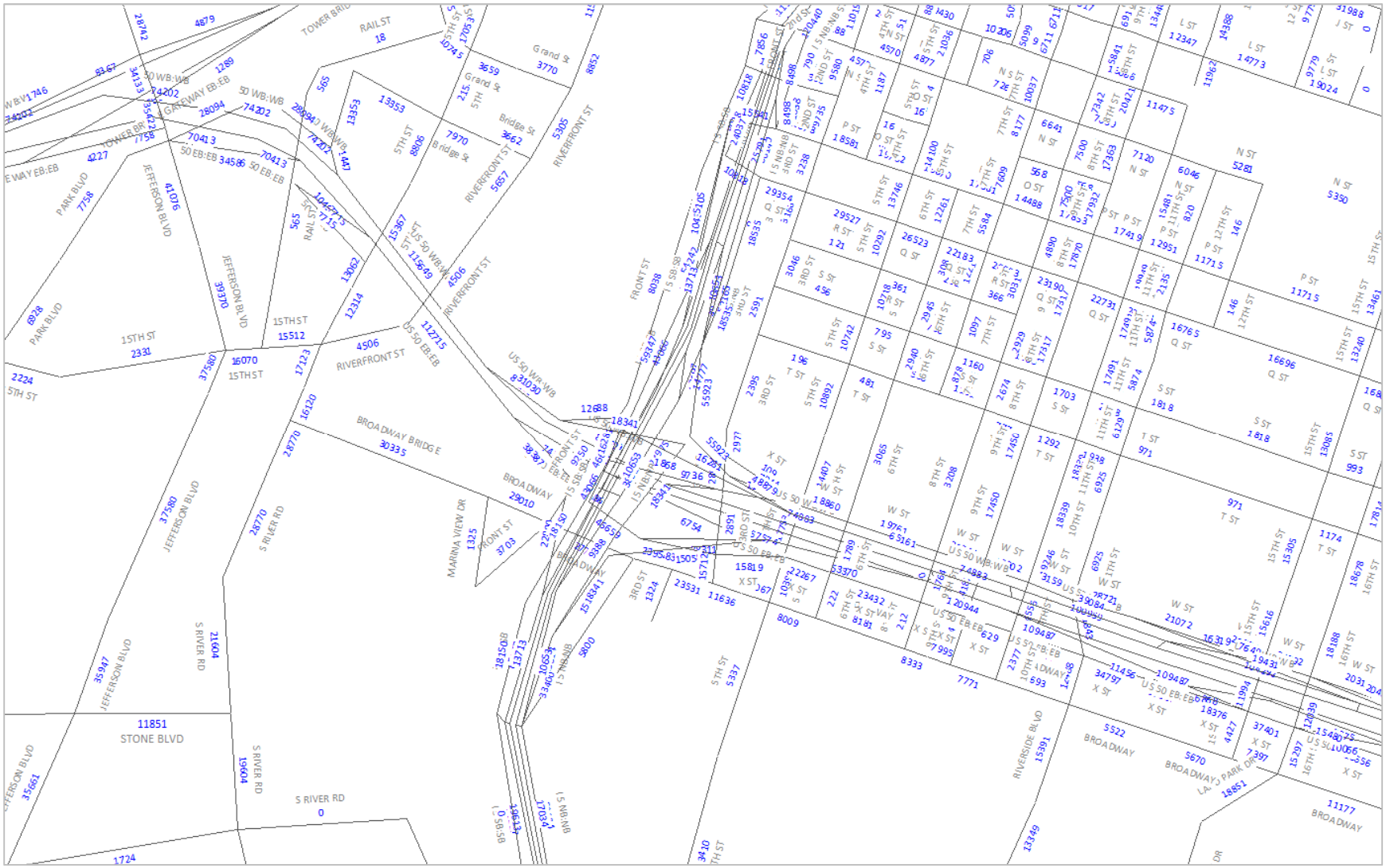
Daily Traffic Forecast for Alternative 2:

15th Street (West Sacramento) / X Street (Sacramento)

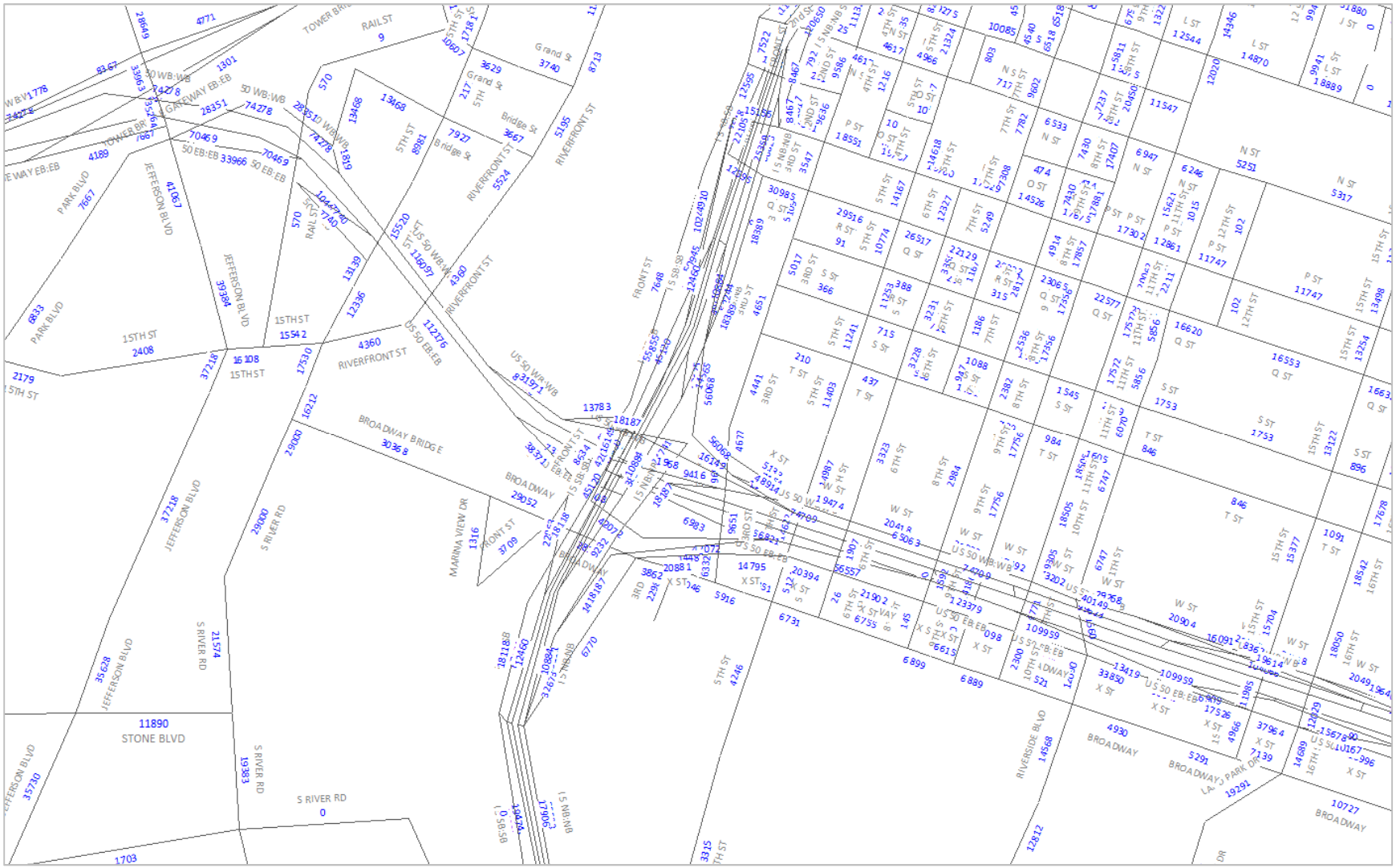


Daily Traffic Forecast for Alternative 3:

South River Road (West Sacramento) / Broadway (Sacramento)

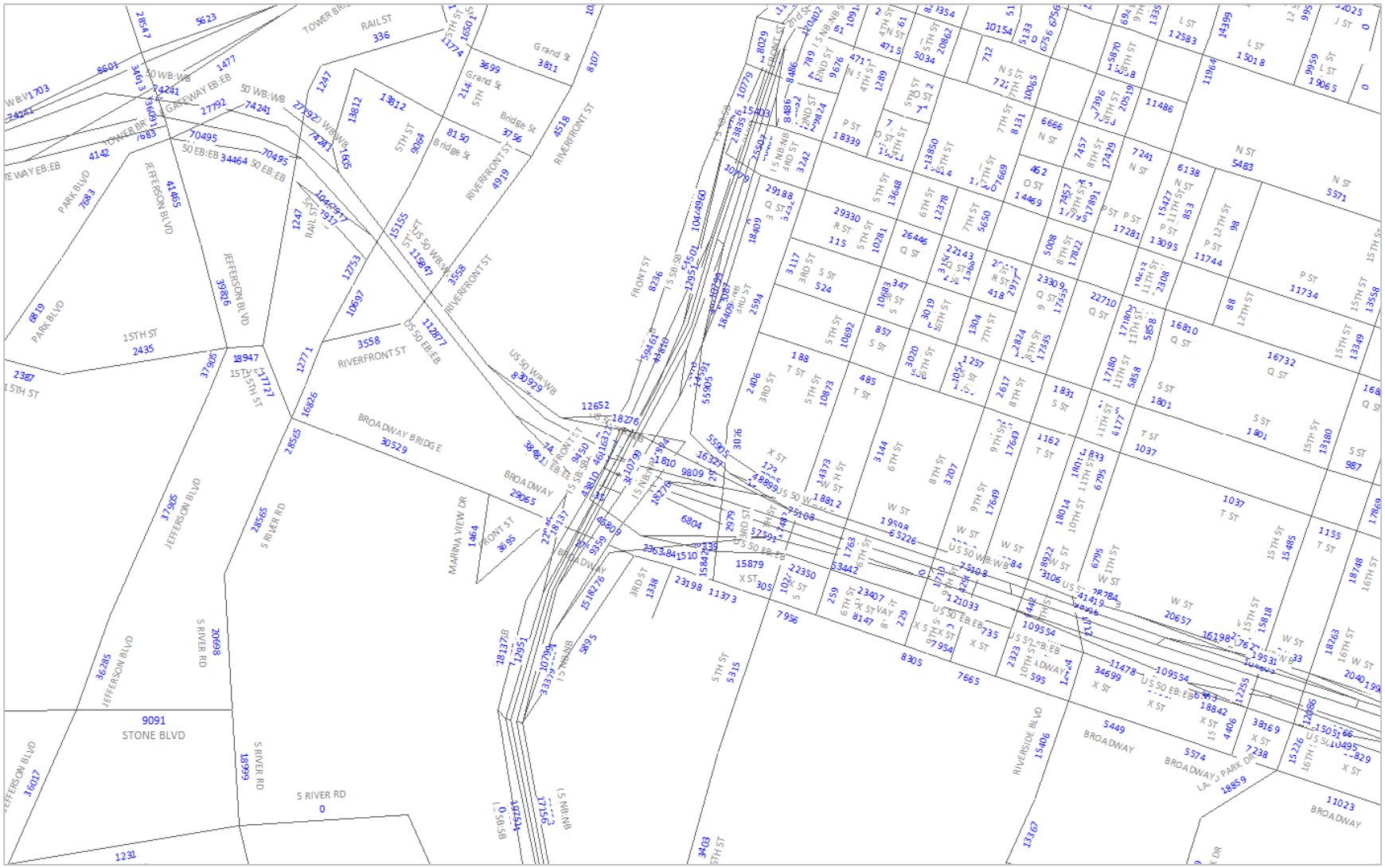


Daily Traffic Forecast for Alternative 4:
South River Road (West Sacramento) / X Street (Sacramento)



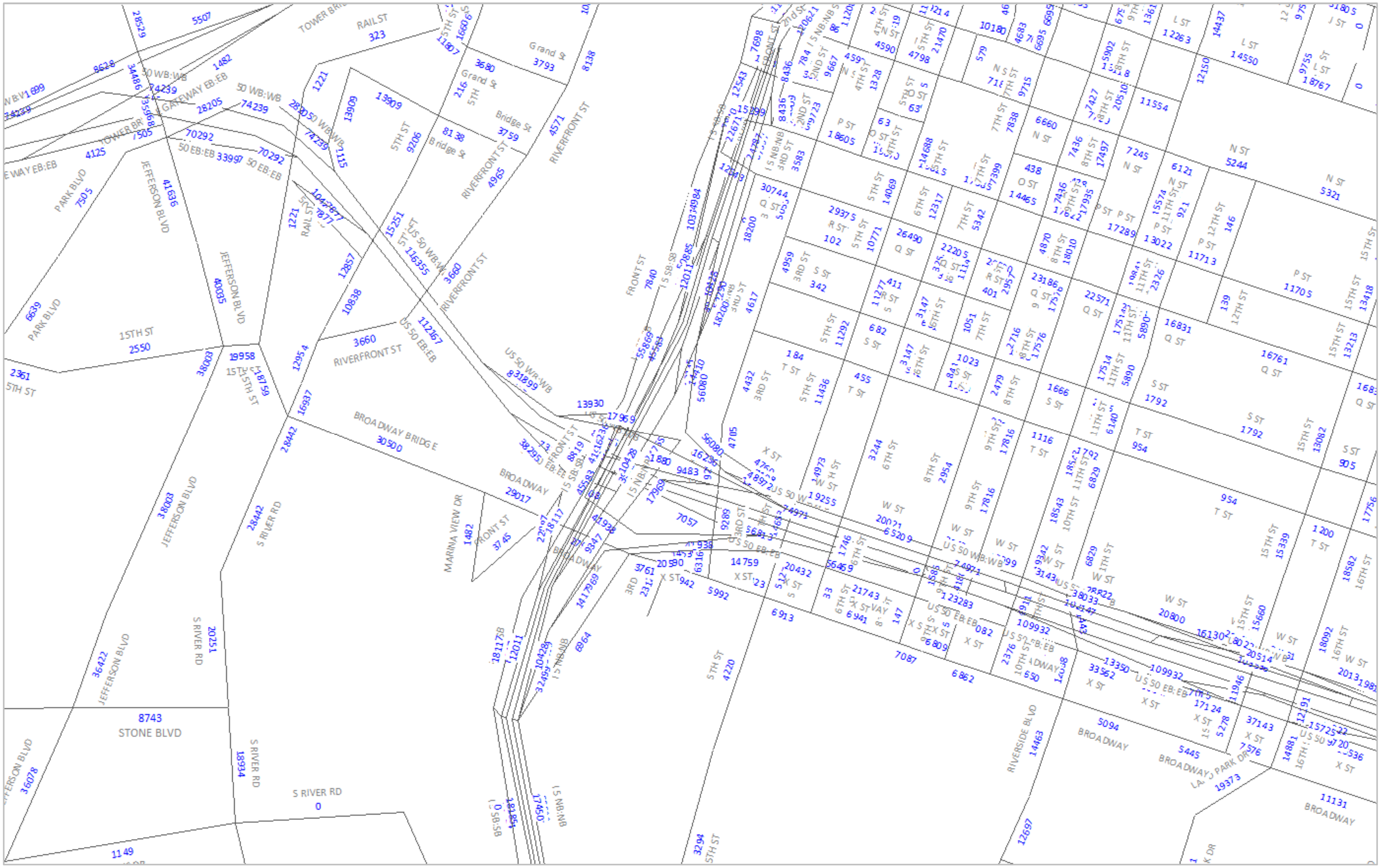
Daily Traffic Forecast for Alternative 5:

15th Street Realigned to the South (West Sacramento) / Broadway (Sacramento)



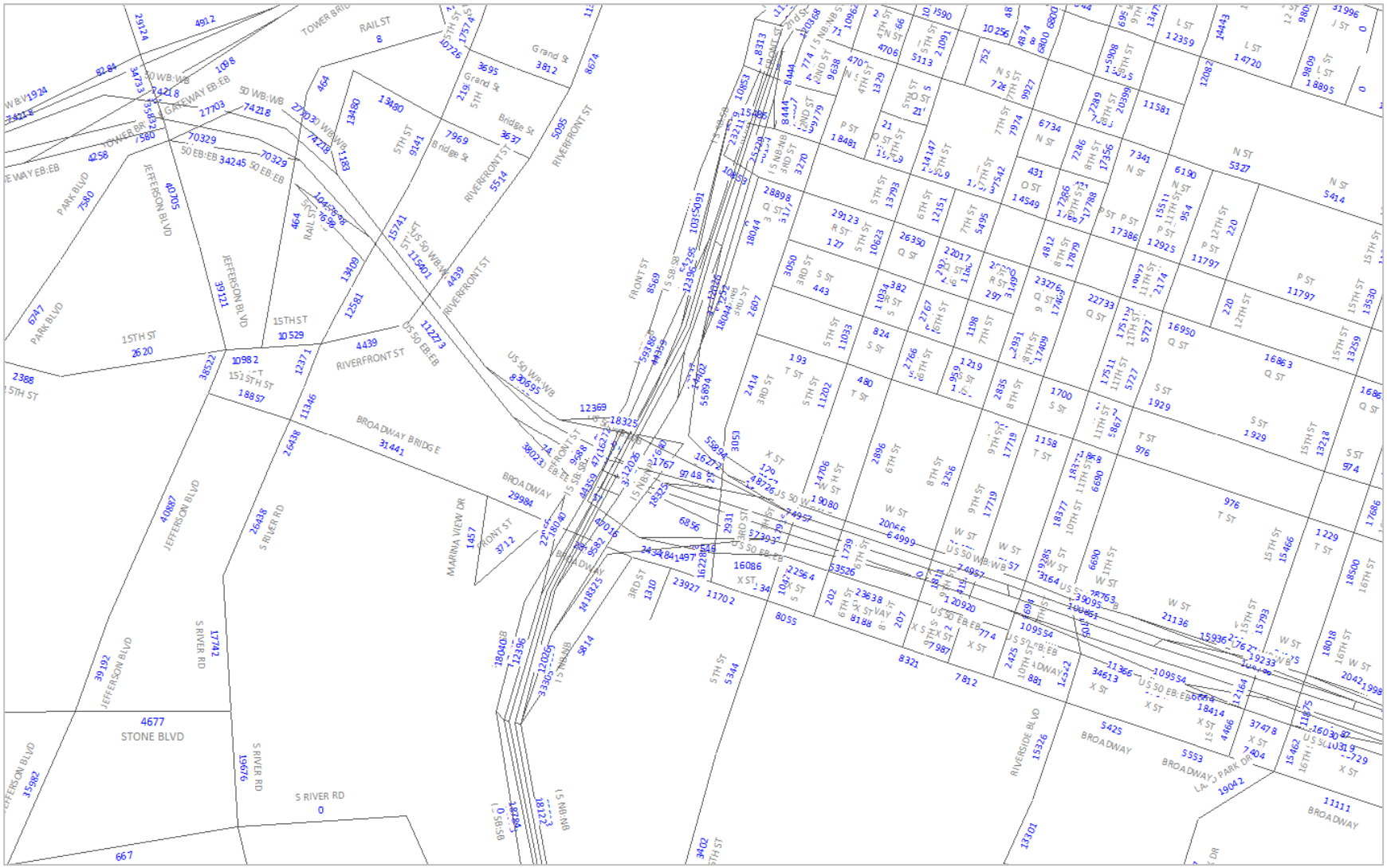
Daily Traffic Forecast for Alternative 6:

15th Street Realigned to the South (West Sacramento) / X Street (Sacramento)



Daily Traffic Forecast for Alternative 7:

Jefferson Boulevard via New Roadway South of 15th Street (West Sacramento) / Broadway (Sacramento)



Daily Traffic Forecast for Alternative 8:
Jefferson Boulevard via New Roadway South of 15th Street (West Sacramento) / X Street (Sacramento)

Appendix C Section 4(f)

C.1 Introduction

C.1.1 Description of the Proposed Project

The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River south of the Pioneer Bridge (US 50) to provide local interconnectivity across the river and between neighborhoods. The new connection would serve multiple modes of transportation and comply with current American Association of State Highway and Transportation Officials (AASHTO), Caltrans, and local agency design standards.

The project is subject to state and federal environmental review requirements because of use of 2014 Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants funds from the Federal Highway Administration (FHWA). Accordingly, project documentation is being prepared in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The proposed project is in both Yolo and Sacramento Counties and would cross over the Sacramento River between the cities of West Sacramento and Sacramento. The proposed project is located approximately 400 to 1,000 feet south of the Pioneer Bridge (Figure 1-1 in Chapter 1, *Proposed Project* of the Environmental Impact Report/Environmental Assessment [EIR/EA]). The total length of the project is approximately 1.0 mile from Jefferson Boulevard in West Sacramento to the 5th Street and Broadway intersection in Sacramento.

The build alternatives under consideration are two alignments for the new bridge and approach roadways. Appendix A of the EIR/EA includes preliminary plan view drawings, by phase. A No Build (No-Project) Alternative also is considered.

- Alternative B would realign 15th Street to connect to Jefferson Boulevard in West Sacramento and connect to Broadway at 5th Street in Sacramento. This alignment would require modification to the planned mobility network for South River Road and 15th Street in Pioneer Bluff.
- Alternative C (a modified Alignment C from the *Broadway Bridge Feasibility Study*) would connect as a "T" intersection to South River Road in West Sacramento and connect to Broadway at 5th Street in Sacramento. This alignment would require modification to the planned mobility network for South River Road in Pioneer Bluff.
- The No Build (No-Project) Alternative would not build a bridge across the Sacramento River from the Pioneer Bluff area of West Sacramento to Broadway in Sacramento. The future no project conditions planned by both cities would be developed as proposed.

C.1.2 Section 4(f) Properties

C.1.2.1 Study Area

Two study area limits were used as part of the identification of Section 4(f) properties. Parks and recreational areas were evaluated using a different study area than that used for the cultural resources analysis because the evaluation of cultural resources as defined in Section 106 requires identification of an area of potential effects (APE). Accordingly, the study area for the Section 4(f) analysis comprises the two study areas described below, which may or may not overlap.

Study Area for Public Parks and Recreational Areas

The study area for public parks and recreation areas includes properties within and immediately adjacent to the project limits, and nearby properties to ensure that proximity impacts can be considered. There are no wildlife or waterfowl refuges in the study area, so refuges are not discussed further.

Study Area for Historic Properties

The study area for historic properties is the APE developed for this project in accordance with 36 Code of Federal Regulations (CFR) 800.4(a)(1). The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties or archaeological sites.

C.1.3 Description of Section 4(f) Properties

C.1.3.1 Public Parks and Recreation Areas

Table C-1 provides a list of the parks, recreational facilities, and other public spaces with recreational use within the study area that are considered Section 4(f) properties. These properties are shown in Figure C-1.

Table C-1. Section 4(f) Parks and Recreation Properties

Name and Description	Distance to Project Footprint	Section 4(f) Property?
City of West Sacramento Parks and Recreational Facilities		
River Walk Park and Trail (Existing), 651 2nd Street **Description and Features:** Riverfront park of 7.5 acres with a Class 1 paved trail along the west bank of the Sacramento River. Picnic areas are located between the trail and the river. Multiple educational signs along the trail describe the settlement of Sacramento and the natural habitat of the river. The existing trail runs along the riverfront between the I Street and Tower Bridges. South of the Tower Bridge, the trail continues south along the river to end of Mill Street. There are three connections to 3rd Street south of the Tower Bridge. **Agency with Jurisdiction**: City of West Sacramento	The existing portion of the park and trail are located 500–600 feet west of the project on 3rd Street. South of Tower Bridge, the trail is located within approximately 350 feet of the project on Riverfront Street.	Yes
Sutter Health Park, 400 Ballpark Drive **Description and Features**: Minor league baseball stadium (13.5 acres), for the Sacramento River Cats baseball team located north of US 50, east of 5th Street. Other activities, such as concerts, community events, and private events, also are held at the park. **Agency with Jurisdiction:** N/A, privately owned	The southern portion of the park is located adjacent to the project on Riverfront Street.	No
Garden Park, 564 Garden Street **Description and Features**: A 0.5-acre park in the Bridge District at the intersection of Garden and Central Streets. Facilities include a picnic table, water fountain, raised garden beds, public art, and open turf areas. **Agency with Jurisdiction:** City of West Sacramento	The park is located approximately 150 feet northwest of the project on Riverfront Street.	Yes

Name and Description	Distance to Project Footprint	Section 4(f) Property?
River Walk Park and Trail (Planned), south of Mill Street on the west bank of the Sacramento River **Description and Features**: The proposed southern extension of the existing park and trail in the Interim Year (2030) conditions. The proposed park and trail would extend approximately 1 mile from Mill Street along the Sacramento River south under the Pioneer Bridge to the Barge Canal, then turn west along the Barge Canal to connect to Jefferson Boulevard. Alignment is proposed on property not yet acquired by the City of West Sacramento. **Agency with Jurisdiction:** N/A, land is privately owned	The project would intersect the future park and trail on the west bank of the Sacramento River.	No
City of Sacramento Parks and Recreational Facilities		
Sacramento River Parkway (Planned) and Bike Trail (Existing) **Size**: Approximately 13.24 acres (Central Area) **Description and Features**: Planned parkway and paved Class I bike trail along the east bank of the Sacramento River extending from Discovery Park to the Pocket Area of Sacramento. In the project vicinity, the trail is paved from Tower Bridge to Broadway where it transitions to a shared bike route on Miller Park Circle through the marina. South of the public boat ramp and parking area, the trail is paved (Class I) and continues south to the Pocket Area. **Agency with Jurisdiction**: City of Sacramento	The project intersects the planned parkway and bike trail on Broadway.	Yes
Sacramento Southern Railroad Excursion Train **Size**: Approximately 3 miles **Description and Features**: An interpretive railway train run by the California Railroad Museum from the Central Pacific Railroad Freight Depot in Old Sacramento State Historic Park, north of the project area. The excursion train operates on weekends, April through September, and on select weekends October through December. The round-trip train ride typically lasts 45 minutes. **Agency with Jurisdiction**: California State Parks	The project crosses the tracks at Broadway.	No
Frederick Miller Regional Park/Sacramento Marina 2701 Marina View Drive **Size**: 40.44 acres **Description and Features**: The park includes a public launch ramp/dock for river access, single picnic areas, four group picnic areas (50–100 people), parking, and restrooms along the riverfront. The marina is off-river behind the park, with 475 boat slips, fuel dock, free public pump-out, public launch ramp, clean restrooms, and showers. The park can accommodate boats up to 50 feet in length. It is open daily (24 hours) 365 days per year. **Agency with Jurisdiction**: City of Sacramento	The project intersects the entrance to the park and marina at the intersection of Broadway with Marina View Drive.	Yes
O'Neil Field, 715 Broadway **Size**: 4.88 acres **Description and Features**: Amenities include a full-size soccer field, two softball fields, and restrooms. **Agency with Jurisdiction**: City of Sacramento	The field is located approximately 365 feet east of the project extent at the intersection of Broadway and 5th Avenue.	Yes

Sources: California State Railroad Museum 2020; City of West Sacramento 2003, 2013, 2020; City of Sacramento 2020a–2020d

C.1.3.2 Historic Properties

Table C-2 lists the historic and cultural resources within the study area for historic properties that are considered Section 4(f) properties.

In accordance with the requirements of Section 4(f) and Section 106, Caltrans consulted with the SHPO regarding determinations of eligibility for five properties identified in the APE. Caltrans received concurrence with its determination of eligibility in a letter from the SHPO dated July 21, 2021. As shown in Table C-2, these five properties are presumed eligible for, or were previously found eligible for, listing in the National Register of Historic Places (NRHP).

Table C-2. Historic Properties Listed in or Eligible for Listing in the NRHP

Name/Location	NRHP Eligibility	Section 4(f) Resource?
Sacramento Northern Railway West Sacramento	Assumed eligible for the purposes of this project only	Yes
Sacramento River West Levee West Sacramento	Assumed eligible for the purposes of this project only	Yes
Walnut Grove Branch Line Sacramento	Previously found eligible for listing	Yes
Sacramento River East Levee Sacramento	Previously found eligible for listing	Yes
P-34-0619 Sacramento	Assumed eligible for the purposes of this project only	No

Sources: ICF 2020a, 2020b

Site P-34-0619 was assumed eligible for listing in the NRHP for the data it contains but not for preservation in place.

C.2 Resources Evaluated Relative to the Requirements of Section 4(f): No-Use Determination(s)

Section 4(f) of the Department of Transportation Act of 1966, codified in federal law at 49 United States Code 303, declares that "it is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

This section of the document discusses parks, recreational facilities, and historic properties found within or next to the project area that do not trigger Section 4(f) protection because (1) they are not publicly owned; (2) they are not open to the public; (3) they are not eligible historic properties; or (4) the project does not permanently use the property and does not hinder the preservation of the property.

C.2.1 Public Parks and Recreation Areas

The project would result in temporary occupancy of three parks and recreation areas, including the River Walk Park and Trail (planned), Sacramento River Parkway (planned) and Bike Trail (existing), and Frederick Miller Regional Park/Sacramento Marina (existing).

C.2.1.1 River Walk Park and Trail (Existing)

The River Walk Park and Trail is located on the west bank of the Sacramento River; the existing portion of the River Walk Park encompasses 7.5 acres and includes a Class 1 paved trail. There are picnic areas along the river and educational signs along the trail describe the settlement of Sacramento and the natural river habitat. The existing paved trail runs along the riverfront between the I Street and Tower Bridges. South of Tower Bridge, the riverbank area is undeveloped, and the trail continues south along the river to Mill Street, with three connections to Riverfront Street.

The park and trail are located north of the construction area under both build alternatives, and no permanent or temporary construction easements would be required from the park or trail for staging or other construction activities. However, the existing portion of the park and trail would be located approximately 500 to 600 feet east of the fiber optic communication line that would be installed within the 3rd Street right-of-way in new conduit between the I Street Bridge and Tower Bridge. Park and trail users may have intermittent and temporary views of construction equipment while the conduit is being installed, but there would be no change in access to or use of the park or trail. Multistory buildings and mature vegetation would block most views of construction activities, but direct views may be possible from the trail in some locations.

South of Tower Bridge, the trail would be within approximately 350 feet of the fiber optic communication line that would be installed in existing conduit in the Riverfront Street right-of-way. Trail users on this section may have intermittent and temporary views of construction equipment, but these views would be localized to areas where trucks are parked while the cable is being inserted or pulled through the existing conduit. Construction-related noise effects would be limited to the immediate installation area on Riverfront Street and would not be audible to trail users along the river. The park and trail are located over 4,600 feet (0.9 mile) north of the proposed bridge on Broadway; there would be no proximity impacts from noise or views related to bridge construction.

Conclusion for River Walk Park and Trail (Existing)

The temporary construction impacts would be the same under both build alternatives. The proposed project would not cause a constructive use related to changes in access to, or visual or noise impacts on, River Walk Park and Trail as defined in 23 CFR 774.15.

In conclusion, River Walk Park and Trail is a Section 4(f) property, but no use would occur.

C.2.1.2 Sutter Health Park

Sutter Health Park in the City of West Sacramento was assessed for its potential as a Section 4(f) property; because it is privately owned, it does not trigger Section 4(f) protection.

C.2.1.3 Garden Park

Garden Park is located in the Bridge District, surrounded by multistory buildings (residential and business) with landscaping, raised garden beds, picnic table, water fountain, and open grassy areas. Access is from Garden and Central Streets (City of West Sacramento 2020).

The park is located approximately 150 feet northwest of Riverfront Street where the fiber optic communication line would be installed in existing conduit in the roadway under both alternatives. There would be no changes in access to the park during construction. Park users could have intermittent views of trucks and equipment installing the fiber optic line; however, landscaping on the west end of the park

would partially block views of the construction activities on Riverfront Street. There would be no views of bridge construction from the park because of the surrounding buildings and distance of over 2,000 feet. Construction-related noise effects from installation of the fiber optic communication line would be limited and would not affect the use or enjoyment of the park. Noise from construction of the bridge would not affect park users because of the distance from the construction site and traffic noise on Pioneer Bridge.

Conclusion for Garden Park

The temporary construction impacts would be the same under both build alternatives. The proposed project would not cause a constructive use related to changes in access to, or visual or noise impacts on Garden Park as defined in 23 CFR 774.15.

In conclusion, Garden Park is a Section 4(f) property, but no use would occur.

C.2.1.4 River Walk Park and Trail (Planned)

The planned southern extension of the existing park and Class I trail is assumed to be constructed and in use by in the Interim Year (2030) conditions. However, the land on which the planned trail would be located is not yet publicly owned. Because the alignment for the planned trail is privately owned, it does not trigger Section 4(f) protection.

C.2.1.5 Sacramento River Parkway (Proposed) and Bike Trail (Existing)

The City of Sacramento has plans to extend the parkway and paved Class I bike trail along the east bank of the Sacramento River from Discovery Park to the north, south to the Pocket Area of Sacramento. In the project vicinity, approximately 8 acres of the parkway along the east riverbank are planned for future development, from Pioneer Landing Park south to Broadway and the entrance to Miller Regional Park. The paved trail runs adjacent to the Sacramento Southern Railroad Excursion Train from Tower Bridge, south through Pioneer Landing Park to Broadway. At Broadway, the trail crosses the roadway and transitions to a shared bike route along Miller Park Circle through the marina. South of the marina's public boat ramp and parking area, the trail is paved and continues south to the Pocket Area. The central area of the parkway includes approximately 13.24 acres (City of Sacramento 2020a).

No right-of-way would be acquired from the parkway or trail on a permanent basis under either alternative; permanent right-of-way acquisition would be from four adjacent private parcels on either side of the trail. The parkway in this area is planned for future development. The new section of bike trail would be realigned to the west along the river, and the existing paved trail adjacent to the railroad would be left in place as is. Approximately 1,000 feet of new trail would be constructed north of Broadway and 300 feet south of Broadway to grade separate the trail under the proposed bridge and connect to Marina View Drive in Miller Regional Park, where trail users could connect to the new structure or cross Marina View Drive to the existing sidewalk on the south side of Miller Park Circle.

Temporary Occupancy of Sacramento River Parkway (Proposed) and Bike Trail (Existing)

Under both build alternatives, a temporary construction easement would be required to connect the existing trail to the new section of trail to the west and closer to the river, and to grade separate it under the proposed bridge. The temporary construction easement would be located on approximately 50 feet of the existing trail near where it crosses under the Pioneer Bridge and would allow the existing portion to conform to the new trail.

- **The duration of the occupancy must be temporary (i.e., less than the time needed for construction of the project), and there should be no change in ownership of the land.**

Construction of the proposed project is anticipated to take up to 36 months. Bridge construction and trail construction would take 18 months. There would be no change in ownership of the land on which the trail is currently located; it would remain under State ownership. Private property would be acquired by the City to construct the portion of relocated trail to the west.

- **The scope of work must be minor (i.e., both the nature and magnitude of changes to the Section 4(f) resource are minimal).**

The trail would be realigned approximately 360 feet to the west along the riverfront/levee within the proposed parkway, where it would cross under the proposed bridge to Miller Regional Park west of Marina View Drive (Figure C-3). Trail users approaching Broadway from the north would use the new connection to the bridge structure that would branch off the main trail north of the new bridge. Trail users approaching Broadway from the south, would use the newly constructed intersection to access the bridge deck. Realigning the trail to the west would be consistent with establishment of the trail within the proposed parkway.

- **There are no anticipated permanent adverse physical impacts, and there will be no interference with the activities or purpose of the resource, on either a temporary or permanent basis.**

Similar to that described for the River Walk Park and Trail, a temporary construction zone would be established around the work area at Pioneer Bridge; and a trail detour would be established approximately 0.64 mile north of Broadway, at the R Street bicycle/pedestrian bridge over I-5 in Pioneer Landing Park. At this location, trail users would be detoured to the bike lane on Front Street and continue south to Miller Park Circle through the Sacramento Marina, a distance of approximately 0.8 mile. The length of the detour would be similar to the existing distance trail users currently travel, with the exception that they would connect to Miller Park Circle approximately 1,090 feet south of where they currently do. While the trail between Pioneer Bridge and Broadway would be closed during construction, the existing trail between Pioneer Landing and Pioneer Bridge would remain open, and trail users could walk or ride to where the trail is closed at Pioneer Bridge. However, southbound users would need to use the detour to connect to the trail south of Miller Park and the Sacramento Marina. Northbound users would use the detour to reach the trail in Pioneer Landing Park. The temporary detour would allow for continued uninterrupted use of the bike trail under either alternative during construction. After bridge construction and paving of the trail are complete, there would be no permanent adverse physical effects. The trail adjacent to the railroad would no longer be used as a Class I trail but would be retained for use for access to the railroad tracks and levee. The existing crossing at Broadway would be eliminated, as trail users would cross under the new bridge and users traveling south would continue east across Marina View Drive to Miller Park Circle on the bike route through the marina. The trail would continue to function as intended in an alignment envisioned for the proposed parkway on the riverfront. Additionally, the new connections to Broadway would provide cyclists and pedestrians options to continue on the trail under the new structure, avoiding the need to cross the roadway, or to connect to the structure and travel east into Sacramento or west across the river to West Sacramento.

The following measures will be incorporated into the project to reduce the effects of the temporary occupancy.

- Maintain safe access to the trail at all times.
- Provide advance notice regarding project-related construction activities along the parkway and trail, at points north and south of the bridge construction area on Broadway. At least 10 days in

advance, notice regarding trail closure and detour will be posted at access points to the Sacramento River Parkway and Bike Trail.

- Coordinate construction activities with the City of Sacramento Department of Youth, Parks, & Community Enrichment at least 10 days in advance of start of construction and regularly while construction activities are ongoing along the trail. Restore any areas along the trail disturbed by construction activities to preconstruction or better conditions.
- Implementation of the TMP will include traffic control measures, such as directional signs and flaggers, to ensure the safety and flow of travel on the rerouted section of trail.

- **The land being used must be fully restored (i.e., the resource must be returned to a condition that is at least as good as that which existed prior to the project).**

No permanent physical impacts on the trail are anticipated as part of the project. Reconstruction of the trail would use the same materials and construction standards as the existing trail. Once the new and existing sections of trail are connected, the physical condition of the trail would be at least as good or better than that prior to project construction. Once bridge construction has been completed, the temporary construction zone and detour would be removed, and use of the trail would be fully restored. If any inadvertent modifications or damage occur to the trail, the affected areas would be restored to the condition that existed prior to construction activities.

- **There must be documented agreement of the appropriate officials having jurisdiction over the resource regarding the foregoing requirements.**

Prior to making Section 4(f) approvals, coordination with the City of Sacramento Department of Youth, Parks, & Community Enrichment, the agency with jurisdiction over the trail, is required in order to obtain concurrence on the temporary occupancy. After the close of the public comment period for the Draft EIR/EA, a letter was sent to the City of Sacramento Department of Youth, Parks, & Community Enrichment requesting their concurrence. The letter and the response affirming the temporary occupancy conclusions is included in Appendix I.

Coordination for Sacramento River Parkway (Proposed) and Bike Trail (Existing)

Coordination with the City of Sacramento Department of Youth, Parks, & Community Enrichment, the agency with jurisdiction over the trail, is required to obtain concurrence on the temporary occupancy. The letter requesting concurrence and the response affirming the temporary occupancy conclusion is included in Appendix I.

Conclusion for Sacramento River Parkway (Proposed) and Bike Trail (Existing)

Temporary construction impacts would be the same under both build alternatives. Implementation of the project would not require a permanent use or closure of the Sacramento River Parkway and Bike Trail. The temporary occupancy of the trail for reconstruction and realignment to the riverfront would meet the criteria in 23 CFR 774.13(d); therefore, the temporary occupancy would not constitute a use under Section 4(f).

For the reasons described, the proposed project would not cause a constructive use related to changes in access to , or visual or noise impacts on the proposed Sacramento River Parkway or existing bike trail as defined in 23 CFR 774.15. The proximity impacts would not substantially impair the protected activities, features, or attributes of the parkway or trail.

In conclusion, the Sacramento River Parkway and Bike Trail are a Section 4(f) property, but no use would occur.

C.2.1.6 Sacramento Southern Railroad Excursion Train

The Sacramento Southern Railroad Excursion Train was assessed for its potential as a park or recreational Section 4(f) property. The Sacramento Southern Railroad Excursion Train is an extension of the California State Railroad Museum in Old Sacramento State Historic Park. The Old Sacramento State Historic Park owns railroad right-of-way along a portion of the Walnut Grove Branch Line (California State Parks 2014) and the California State Railroad Museum operates the excursion train as an interpretive feature of the museum. Publicly owned museums are not normally considered parks, recreational areas, or wildlife and waterfowl refuges. As an interpretive feature of the museum, the excursion train does not trigger Section 4(f) protection. The railroad on which the train operates is a segment of the Walnut Grove Branch Line, an NRHP-eligible historic property, and potential effects under Section 106 on the historic property are discussed in Section C.2.2, *Historic Properties*.

C.2.1.7 Frederick Miller Regional Park/Sacramento Marina

Frederick Miller Regional Park/Sacramento Marina is a regional park on the east bank of the river with a public launch ramp/dock for river access and picnic areas for singles or groups, parking, and restrooms (City of Sacramento 2020b). The marina is off-river behind the park, with 475 boat slips, fuel dock, free public pump-out, public launch ramp, clean restrooms, and showers. The marina operates daily (24 hours), 365 days per year (City of Sacramento 2020c). Access to the park and marina is from Marina View Drive at Broadway and Miller Park Circle at Front Street.

No right-of-way would be acquired from the park or marina on a permanent basis under either build alternative; permanent right-of-way acquisition would be from private parcels north of the park boundary. The project would modify the entrance to the park and marina at the intersection of Marina View Drive and Broadway under both alternatives, but with different configurations where the approach to and new bridge alignment differ. Alternative C maintains its western extension of Broadway, while Alternative B diverges northwest of, and at an angle to, Alternative C (see Appendix A of the EIR/EA). Approximately 350 feet of Marina View Drive would be reconstructed under both alternatives to allow for widening and elevation of Broadway.

Temporary Occupancy of Frederick Miller Regional Park/Sacramento Marina

A temporary construction easement would be required to reconstruct approximately 350 feet of Marina View Drive in order to accommodate the new connection to Broadway north of and outside the park. Of the 350 feet that would be reconstructed on Marina View Drive, approximately 140 feet would be within the park boundary under Alternative B, while Alternative C would affect approximately 290 feet of the roadway within the park boundary. Reconstruction of Marina View Drive under Alternative B would affect approximately 0.6 acre of the park. Under Alternative C, approximately 1.5 acres at the entrance would be affected. Both alternatives would include extension of the Sacramento River Bike Trail under Broadway within the park boundary, two lanes of travel, and sidewalks on both sides of the roadway with connections to the new bridge structure.

- **The duration of the occupancy must be temporary (i.e., less than the time needed for construction of the project), and there should be no change in ownership of the land.**

Construction of the proposed project is anticipated to take up to 36 months. Bridge construction and reconstruction of Marina View Drive would take 18 months. There would be no change in ownership of

the parklands. Temporary night closures or flaggers may be needed so that the reconstructed roadway can be transitioned to connect to the existing portions of Marina View Drive and Miller Park Circle.

- **The scope of work must be minor (i.e., both the nature and magnitude of changes to the Section 4(f) resource are minimal).**

The existing entrance to the park and marina from Broadway would be reconstructed. The intersection of Marina View Drive with Broadway is north of and outside the park boundary. Construction activities in park boundaries would consist of widening the existing roadway to accommodate the transition and intersection with Broadway, including sidewalks, curb and gutter, and paving. The bike trail would be extended in its new alignment along the riverfront and under Broadway in different configurations within the park, depending on alternative (Figure C-3). The areas on either side of Marina View Drive near the park entrance are primarily landscaped areas with grass and trees but have no developed amenities; the picnic sites and public launch ramp/dock are located to south of the park entrance. There are parking stalls on Marina View Drive, starting approximately 150 feet south of the park boundary. A bollard fence extends along the east side of roadway. Under Alternative B, the trail would extend approximately 130 feet southeast into the park, parallel to and west of Marina View Drive. Alternative B's connection to Broadway and Miller Park Circle would be within the existing roadway. Under Alternative C, the trail alignment would remain along the river until it enters the park, where it would extend approximately 175 feet in a semi-circular route to Marina View Drive (Figure C-3). The alignment of the connection to Broadway under Alternative C would extend approximately 25 feet east outside the existing roadway.

- **There are no anticipated permanent adverse physical impacts, and there will be no interference with the activities or purpose of the resource, on either a temporary or permanent basis.**

A temporary construction zone would be established around the work area, primarily north of and outside the park. While bridge construction is underway, park and marina traffic would be detoured to travel westbound on Broadway and turn left onto southbound Front Street. Depending on the destination, traffic would then continue forward on Front Street to the parking lot or turn right onto Miller Park Circle to park or to continue to Marina View Drive. The length of the detour would be similar to the existing distance that park and marina users currently travel, with the exception that traffic would reach Miller Park Circle approximately 1,090 feet farther south than they currently do, and park traffic would travel the same distance north on Miller Park Circle to reach Marina View Drive. The detour would be in place for approximately 18 months while bridge construction is underway. Marina View Drive would remain open south of Miller Park Circle, maintaining access for continued uninterrupted use of the park and marina under either alternative during construction. In addition, in-water work would not interfere with boaters using the Sacramento Marina. The U.S. Coast Guard would require that boating access be maintained during construction, and the design of the bridge provides for adequate passage for vessels. Further, the vehicular route to the boat ramp and trailer parking lot at the southern end of the marina would remain unchanged during construction.

Prior to reopening the new park entrance to traffic, daytime flagging may be required to allow for the temporary pavement transitions between the new entrance and the existing Marina View Drive and Miller Park Circle. Access to the park would be maintained, but short delays could occur. Access to the marina via Miller Park Circle would not be affected by the pavement transitions. Once bridge and roadway connections are completed, access to the park and marina from Broadway would be restored, and there would be no permanent adverse physical effects.

The following measures will be incorporated into the project to reduce the effects of the temporary occupancy.

- Maintain safe access to the park and marina at all times.

- Provide advance notice regarding project-related construction activities and detour for traffic to the park and marina. At least 10 days in advance, notice regarding the closure at Broadway and detour will be posted at several locations throughout the park and marina to inform users.
- Coordinate construction activities with the City of Sacramento Department of Youth, Parks, & Community Enrichment at least 10 days in advance of start of construction and regularly while construction activities are ongoing along Broadway and in the park. Restore any areas in the park disturbed by construction activities to preconstruction or better conditions.
- Implementation of the TMP will include traffic control measures, such as directional signs and flaggers, to ensure the safety and flow of travel along the detour on Front Street and Miller Park Circle.

- **The land being used must be fully restored (i.e., the resource must be returned to a condition that is at least as good as that which existed prior to the project).**

No permanent physical impacts on the park or marina are anticipated as part of the project. Any areas disturbed in the park during construction would be cleaned up and restored with new landscaping, and signage would be replaced. Reconstruction of the entrance and connection to the bridge would be at least as good or better than conditions prior to project construction. If any inadvertent modification or damage occurs to parklands, the affected areas would be restored to the condition that existed prior to construction activities.

- **There must be documented agreement of the appropriate officials having jurisdiction over the resource regarding the foregoing requirements.**

Prior to making Section 4(f) approvals, coordination with the City of Sacramento Department of Youth, Parks, & Community Enrichment, the agency with jurisdiction over the park and marina, is required in order to obtain concurrence on the temporary occupancy. After the close of the public comment period for the Draft EIR/EA, a letter was sent to the City of Sacramento Department of Youth, Parks, & Community Enrichment requesting their concurrence. The letter and the response affirming the temporary occupancy conclusion is included in Appendix I.

Conclusion for Miller Regional Park and Sacramento Marina

The temporary construction impacts would be the similar under both build alternatives, with the exception that Alternative C would require a larger area of temporary occupancy on parklands and result in more pavement than Alternative B. However, implementation of the project would not require a permanent use or closure of Miller Regional Park or Sacramento Marina. The temporary occupancy of the park for reconstruction of the park entrance and connection to the proposed bridge would meet the criteria in 23 CFR 774.13(d); therefore, the temporary occupancy would not constitute a use under Section 4(f).

For the reasons described, the proposed project would not cause a constructive use related to changes in access to, or visual or noise impacts on Miller Regional Park or Sacramento Marina, as defined in 23 CFR 774.15. The proximity impacts would not substantially impair the protected activities, features, or attributes of the park or marina.

In conclusion, Miller Regional Park and Sacramento Marina are Section 4(f) properties, but no use would occur.

C.2.1.8 O'Neil Field

O'Neil Field is located approximately 365 feet east of the intersection of Broadway and 5th Avenue, where the project terminates under both alternatives. The sports field includes a full-size soccer field, two softball fields, and restrooms (City of Sacramento 2020d). The field is accessed from locations on 6th Street, Broadway, and X Street.

There would be no changes in access to the field during construction. Recreationists could have intermittent and temporary views of construction equipment from the field while intersection improvements are underway. However, mature trees on the west end of the field on 6th Street would partially block views of the construction activities on Broadway when the leaves are present. The new bridge would not be visible from the field. Construction-related noise effects would be limited because of the distance from the intersection, and construction noise would not affect the use or enjoyment of the field while soccer or softball games are underway. Noise from bridge construction would not affect players using the field, because of the distance from the construction site west of I-5 and traffic noise on US 50 and I-5.

Conclusion for O'Neil Field

The temporary construction impacts would be the same under both build alternatives. The proposed project would not cause a constructive use related to changes in access to, or visual or noise impacts on O'Neal Field as defined in 23 CFR 774.15.

In conclusion, O'Neal Field is a Section 4(f) property, but no use would occur.

C.2.2 Historic Properties

Based on the analysis conducted for the proposed project as part of Section 106 of the National Historic Preservation Act, four historic properties in the APE are Section 4(f) resources and are listed in Table C-3. One historic property (P-34-0619) is assumed eligible for listing in the NRHP for the purposes of this project. The value of the P-34-0619 site is not in its preservation in place, but rather in the data it contains

No adverse effects under Section 106 were identified for the four historic properties, as shown in Table C-3. The SHPO's concurrence with the No Adverse Effect determination is included in Appendix I.

Table C-3. Section 4(f) Historic Property Use Determination

Name/Location	Use?	Constructive Use?	Temporary Occupancy?	Explanation
Sacramento Northern Railway, West Sacramento	No	No	No	No adverse effect finding under Section 106. Project roadway modifications would cross the railroad corridor but would not destroy or adversely affect any assumed qualifying characteristics of the property. Further, the portion of rail tracks in the APE would be removed prior to implementation of the proposed project.

Name/Location	Use?	Constructive Use?	Temporary Occupancy?	Explanation
Sacramento River West Levee, West Sacramento	No	No	No	No adverse effect finding under Section 106. The new bridge structure would span the levee and the trail undercrossing would be set on the levee, but there would be no adverse effects. No land or portion of the resource would be permanently incorporated, but there would be a temporary occupancy while the undercrossing is built. Construction of the undercrossing would not alter or destroy the attributes that allow the property to convey its historical significance.
Walnut Grove Branch Line, Sacramento	No	No	No	No adverse effect finding under Section 106. No land or portion of the resource would be permanently incorporated or temporarily occupied. The alignment would remain in the same location, and placement of gravel or fill materials adjacent to the tracks would not alter or destroy the attributes that allow the property to convey its historical significance. In addition, the project would not interfere with its continued use as a railway.
Sacramento River East Levee, Sacramento	No	No	No	No adverse effect finding under Section 106. The new bridge structure would span the levee and the realigned trail would be set on the levee, but there would be no adverse effects. No land or portion of the resource would be permanently incorporated.

Sources: ICF 2020a and 2020b

C.3 Section 6(f)

The LWCF Act was established by Congress in 1964 to fulfill a bipartisan commitment to safeguard natural areas, water resources, and cultural heritage, and to provide recreation opportunities to all Americans. The LWCF program provides matching grants to states and local governments for acquisition and development of public outdoor recreation areas and facilities. Section 6(f) of this Act prohibits conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the Department of Interior's National Park Service.

A review of the LWCF listing of grants for Sacramento and Yolo Counties found that grants have been allocated to the Sacramento River Parkway Trail (Project Number 06-00679) and Sacramento Marina (Project Number 06-00261) (California Department of Parks and Recreation 2020). The LWCF funds were used to construct the Sacramento River Parkway Bike Trail from Discovery Park to Old Sacramento, which is north of and outside the project area. At the Sacramento Marina, LWCF funds were used for marina improvements, including a four-lane boat launch ramp, boarding floats, lights, restroom, parking, water, and sewer systems. As described, there would be no permanent acquisition of land from the Sacramento River Bike Trail or from the Sacramento Marina. Therefore, there would be no

conversion of any LWCF-funded recreational lands to a non-recreational use, and protection under Section 6(f) would not apply.

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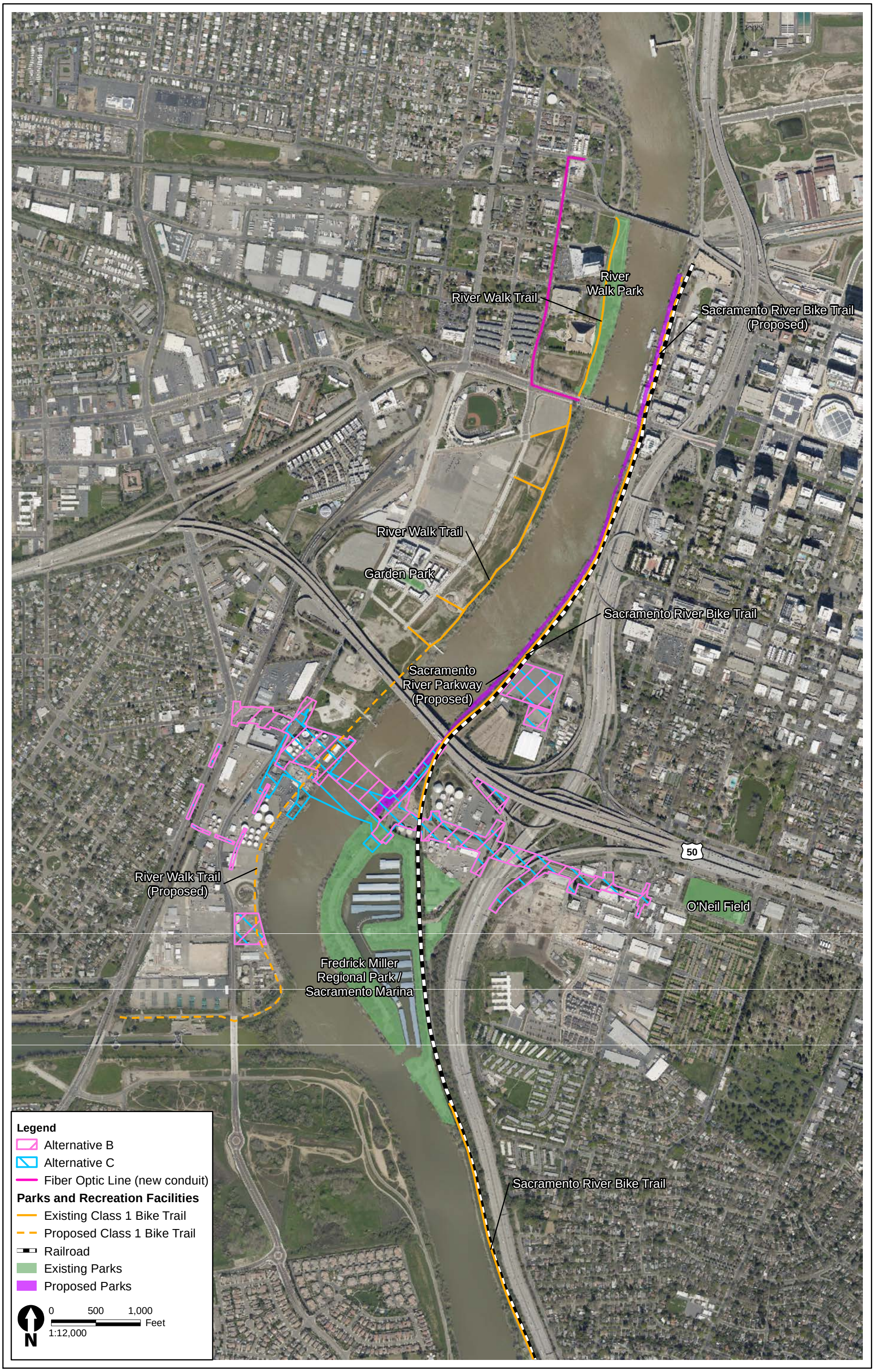

Figure C-1
Parks and Recreation Facilities

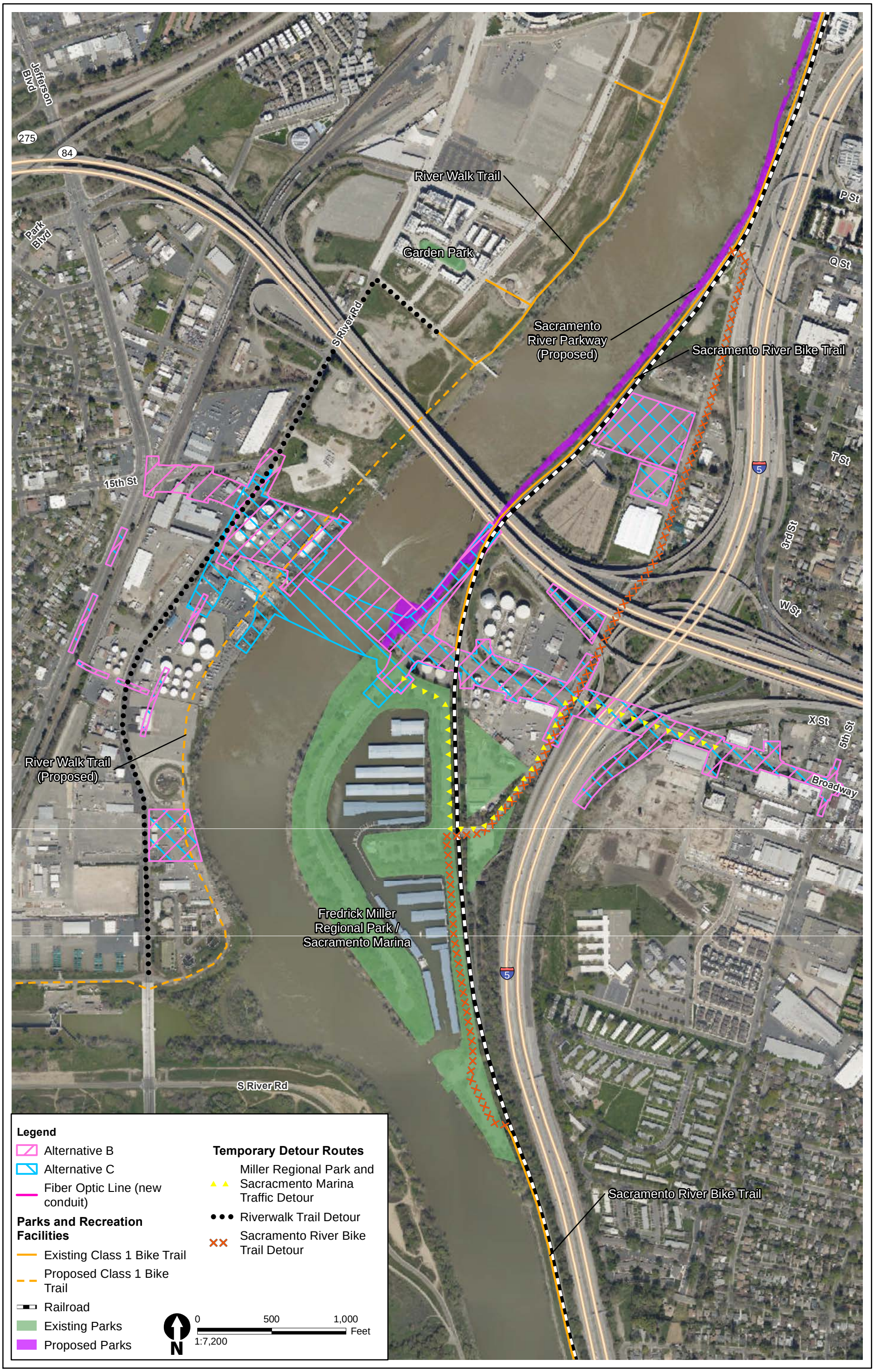

Figure C-2
Temporary Trail and Traffic Detours – Alternatives B and C

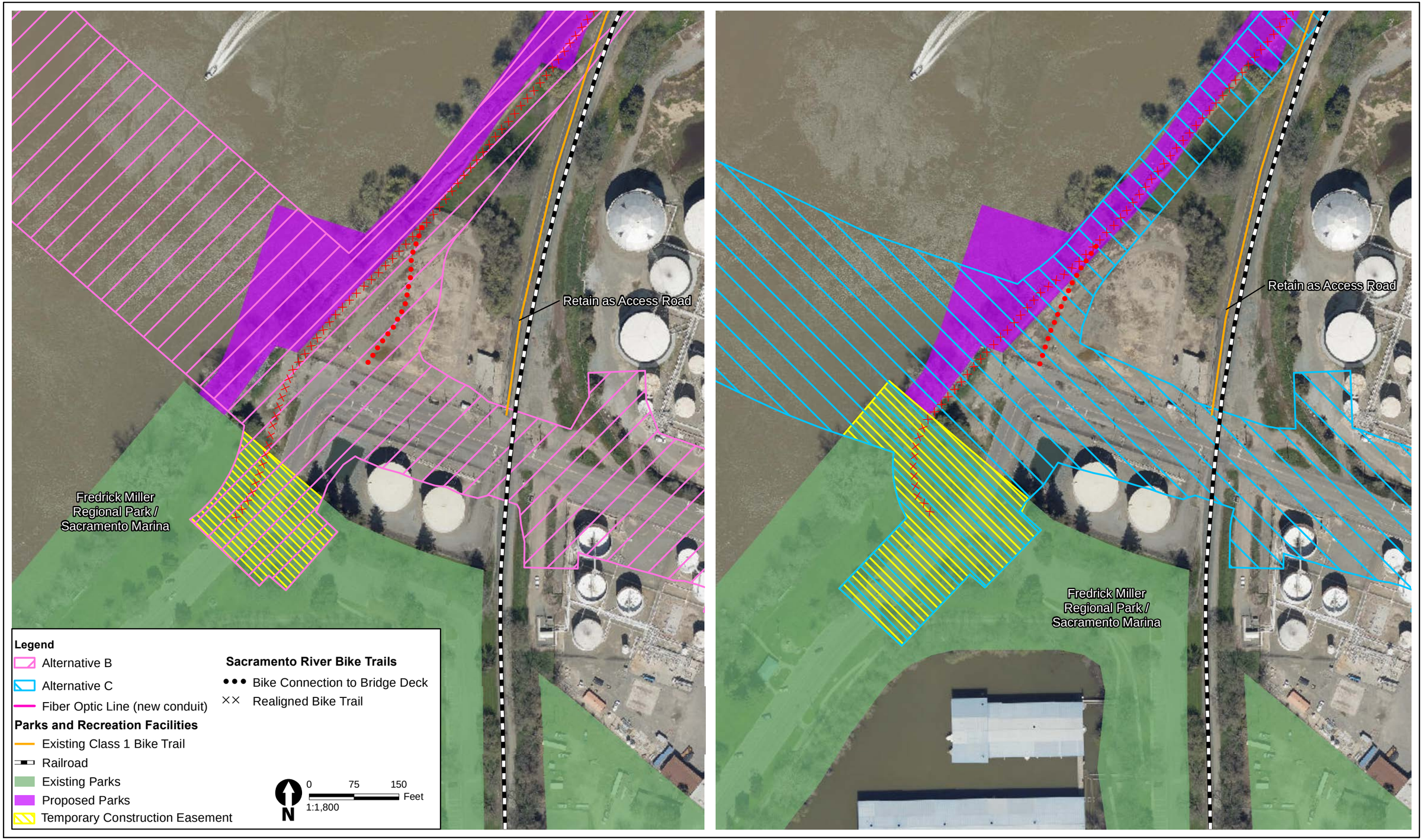

Figure C-3
Recreation Impacts – Alternatives B and C

Appendix D Title VI Policy Statement

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Making Conservation a California Way of Life.

November 2019

NON-DISCRIMINATION POLICY STATEMENT

The California Department of Transportation, under Title VI of the Civil Rights Act of 1964, ensures *"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."*

Related federal statutes, remedies, and state law further those protections to include sex, disability, religion, sexual orientation, and age.

For information or guidance on how to file a complaint, or obtain more information regarding Title VI, please contact the Title VI Branch Manager at (916) 324-8379 or visit the following web page: https://dot.ca.gov/programs/business-and-economic-opportunity/title-vi.

To obtain this information in an alternate format such as Braille or in a language other than English, please contact the California Department of Transportation, Office of Business and Economic Opportunity, at 1823 14th Street, MS-79, Sacramento, CA 95811; (916) 324-8379 (TTY 711); or at Title.VI@dot.ca.gov.

Toks Omishakin
Director

Appendix E Summary of Relocation Benefits

E.1 California Department of Transportation Relocation Assistance Program

E.1.1 Relocation Assistance Advisory Services

E.1.1.1 Declaration of Policy

"The purpose of this title is to establish a ***uniform policy for fair and equitable treatment*** of persons displaced as a result of federal and federally assisted programs in order that such persons ***shall not suffer disproportionate injuries*** as a result of programs designed for the benefit of the public as a whole."

The Fifth Amendment to the U.S. Constitution states, "No Person shall…be deprived of life, liberty, or property, without due process of law, nor shall private property be taken for public use without just compensation." The Uniform Act sets forth in statute the due process that must be followed in Real Property acquisitions involving federal funds. Supplementing the Uniform Act is the government-wide single rule for all agencies to follow, set forth in 49 Code of Federal Regulations (CFR) Part 24. Displaced individuals, families, businesses, farms, and nonprofit organizations may be eligible for relocation advisory services and financial benefits, as discussed below.

E.1.1.2 Fair Housing

The Fair Housing Law (Title VIII of the Civil Rights Act of 1968) sets forth the policy of the United States to provide, within constitutional limitations, for fair housing. This act, and as amended, makes discriminatory practices in the purchase and rental of most residential units illegal. Whenever possible, minority persons shall be given reasonable opportunities to relocate to any available housing regardless of neighborhood, as long as the replacement dwellings are decent, safe, and sanitary and are within their financial means. This policy, however, does not require the California Department of Transportation (Caltrans) to provide a person a larger payment than is necessary to enable a person to relocate to a comparable replacement dwelling.

Any persons to be displaced will be assigned to a relocation advisor, who will work closely with each displacee in order to see that all payments and benefits are fully utilized and that all regulations are observed, thereby avoiding the possibility of displacees jeopardizing or forfeiting any of their benefits or payments. At the time of the initiation of negotiations (usually the first written offer to purchase), owner-occupants are given a detailed explanation of the state's relocation services. Tenant occupants of properties to be acquired are contacted soon after the initiation of negotiations and also are given a detailed explanation of the Caltrans Relocation Assistance Program. To avoid loss of possible benefits, no individual, family, business, farm, or nonprofit organization should commit to purchase or rent a replacement property without first contacting a Caltrans relocation advisor.

E.1.1.3 Relocation Assistance Advisory Services

In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, Caltrans will provide relocation advisory assistance to any person, business, farm, or nonprofit organization displaced as a result of the acquisition of real property for public use, so long as they are legally present in the United States. Caltrans will assist eligible displacees in obtaining comparable replacement housing by providing current and continuing information on the availability and

prices of both houses for sale and rental units that are "decent, safe, and sanitary." Nonresidential displacees will receive information on comparable properties for lease or purchase (for business, farm, and nonprofit organization relocation services, see below).

Residential replacement dwellings will be in a location generally not less desirable than the displacement neighborhood at prices or rents within the financial ability of the individuals and families displaced, and reasonably accessible to their places of employment. Before any displacement occurs, comparable replacement dwellings will be offered to displacees that are open to all persons regardless of race, color, religion, sex, national origin, and consistent with the requirements of Title VIII of the Civil Rights Act of 1968. This assistance will also include the supplying of information concerning federal and state assisted housing programs and any other known services being offered by public and private agencies in the area.

Persons who are eligible for relocation payments and who are legally occupying the property required for the project will not be asked to move without first being given at least 90 days written notice. Residential occupants eligible for relocation payment(s) will not be required to move unless at least one comparable "decent, safe, and sanitary" replacement dwelling, available on the market, is offered to them by Caltrans.

E.1.1.4 Residential Relocation Financial Benefits

The Relocation Assistance Program will help eligible residential occupants by paying certain costs and expenses. These costs are limited to those necessary for or incidental to the purchase or rental of a replacement dwelling and actual reasonable moving expenses to a new location within 50 miles of the displacement property. Any actual moving costs in excess of the 50 miles are the responsibility of the displacee. The Residential Relocation Assistance Program can be summarized as follows:

Moving Costs

Any displaced person, who lawfully occupied the acquired property, regardless of the length of occupancy in the property acquired, will be eligible for reimbursement of moving costs. Displacees will receive either the actual reasonable costs involved in moving themselves and personal property up to a maximum of 50 miles, or a fixed payment based on a fixed moving cost schedule. Lawful occupants who move into the displacement property after the initiation of negotiations must wait until Caltrans obtains control of the property in order to be eligible for relocation payments.

Purchase Differential

In addition to moving and related expense payments, fully eligible homeowners may be entitled to payments for increased costs of replacement housing.

Homeowners who have owned and occupied their property for 90 days or more prior to the date of the initiation of negotiations (usually the first written offer to purchase the property), may qualify to receive a price differential payment and may qualify to receive reimbursement for certain nonrecurring costs incidental to the purchase of the replacement property. An interest differential payment is also available if the interest rate for the loan on the replacement dwelling is higher than the loan rate on the displacement dwelling, subject to certain limitations on reimbursement based upon the replacement property interest rate.

Rent Differential

Tenants and certain owner-occupants (based on length of ownership) who have occupied the property to be acquired by Caltrans prior to the date of the initiation of negotiations may qualify to receive a rent

differential payment. This payment is made when Caltrans determines that the cost to rent a comparable "decent, safe, and sanitary" replacement dwelling will be more than the present rent of the displacement dwelling. As an alternative, the tenant may qualify for a down payment benefit designed to assist in the purchase of a replacement property and the payment of certain costs incidental to the purchase, subject to certain limitations noted under the *Down Payment* section below.

To receive any relocation benefits, the displaced person must buy or rent and occupy a "decent, safe and sanitary" replacement dwelling within one year from the date Caltrans takes legal possession of the property, or from the date the displacee vacates the displacement property, whichever is later.

Down Payment

The down payment option has been designed to aid owner-occupants of less than 90 days and tenants in legal occupancy prior to Caltrans' initiation of negotiations. The one-year eligibility period in which to purchase and occupy a "decent, safe and sanitary" replacement dwelling will apply.

Last Resort Housing

Federal regulations (49 CFR 24) contain the policy and procedure for implementing the Last Resort Housing Program on Federal-aid projects. Last Resort Housing benefits are, except for the amounts of payments and the methods in making them, the same as those benefits for standard residential relocation as explained above. Last Resort Housing has been designed primarily to cover situations where a displacee cannot be relocated because of lack of available comparable replacement housing, or when the anticipated replacement housing payments exceed the limits of the standard relocation procedure, because either the displacee lacks the financial ability or other valid circumstances.

After the initiation of negotiations, Caltrans will within a reasonable length of time, personally contact the displacees to gather important information, including the following:

- Number of people to be displaced.
- Specific arrangements needed to accommodate any family member(s) with special needs.
- Financial ability to relocate into comparable replacement dwelling which will adequately house all members of the family.
- Preferences in area of relocation.
- Location of employment or school.

E.1.1.5 Nonresidential Relocation Assistance

The Nonresidential Relocation Assistance Program provides assistance to businesses, farms and nonprofit organizations in locating suitable replacement property, and reimbursement for certain costs involved in relocation. The Relocation Advisory Assistance Program will provide current lists of properties offered for sale or rent, suitable for a particular business's specific relocation needs. The types of payments available to eligible businesses, farms, and nonprofit organizations are: searching and moving expenses, and possibly reestablishment expenses; or a fixed in lieu payment instead of any moving, searching and reestablishment expenses. The payment types can be summarized as follows:

Moving Expenses

Moving expenses may include the following actual, reasonable costs:

- The moving of inventory, machinery, equipment and similar business-related property, including: dismantling, disconnecting, crating, packing, loading, insuring, transporting, unloading, unpacking, and reconnecting of personal property. Items identified as real property may not be moved under the Relocation Assistance Program. If the displacee buys an Item Pertaining to the Realty back at salvage value, the cost to move that item is borne by the displacee.
- Loss of tangible personal property provides payment for actual, direct loss of personal property that the owner is permitted not to move.
- Expenses related to searching for a new business site, up to $2,500, for reasonable expenses actually incurred.

Reestablishment Expenses

Reestablishment expenses related to the operation of the business at the new location, up to $25,000 for reasonable expenses actually incurred.

Fixed In Lieu Payment

A fixed payment in lieu of moving, searching, and reestablishment payments may be available to businesses that meet certain eligibility requirements. This payment is an amount equal to half the average annual net earnings for the last two taxable years prior to the relocation and may not be less than $1,000 nor more than $40,000.

E.1.1.6 Additional Information

Reimbursement for moving costs and replacement housing payments are not considered income for the purpose of the Internal Revenue Code of 1954, or for the purpose of determining the extent of eligibility of a displacee for assistance under the Social Security Act, or any other law, *except* for any federal law providing local "Section 8" Housing Programs.

Any person, business, farm or nonprofit organization that has been refused a relocation payment by Caltrans relocation advisor or believes that the payment(s) offered by the agency are inadequate may appeal for a special hearing of the complaint. No legal assistance is required. Information about the appeal procedure is available from the relocation advisor.

California law allows for the payment for lost goodwill that arises from the displacement for a public project. A list of ineligible expenses can be obtained from Caltrans' Division of Right of Way and Land Surveys. California's law and the federal regulations covering relocation assistance provide that no payment shall be duplicated by other payments being made by the displacing agency.

Appendix F Avoidance, Minimization and/or Mitigation Summary

To be sure that all of the environmental measures identified in this document are executed at the appropriate times, the following mitigation program would be implemented. During project design, avoidance, minimization, and/or mitigation measures will be incorporated into the project's final plans, specifications, and cost estimates, as appropriate. All permits will be obtained prior to implementation of the project. During construction, environmental and construction/engineering staff will ensure that the commitments contained in the mitigation program are fulfilled. Following construction and appropriate phases of project delivery, long-term mitigation maintenance and monitoring will take place, as applicable. As the following mitigation program is a draft, some fields have not been completed and will be filled out as each of the measures is implemented. Note: Some measures may apply to more than one resource area. Duplicative or redundant measures have not been included.

The Final EIR/EA includes a copy of the mitigation program that the City of West Sacramento will adopt in conjunction with the adoption of CEQA Findings and certification of the EIR.

Mitigation Monitoring Plan for the Broadway Bridge Project

Federal Project No.: TGR2DGL 5447(043)

City of West Sacramento City Council Resolution 2022-_____

March 2022

Broadway Bridge Project

SCH # 2017072019

MITIGATION MONITORING PLAN

Introduction

Public Resources Code section 21081.6 and section 15097 of the California Environmental Quality Act (CEQA) Guidelines require public agencies to establish monitoring or reporting programs for projects approved by a public agency whenever approval involves the adoption of either a mitigated negative declaration or specified environmental findings related to environmental impact reports.

The following is the Mitigation Monitoring Plan (MMP) for the Broadway Bridge Project (proposed project). The intent of the MMP is to aid the City of West Sacramento in its implementation and monitoring of mitigation measures adopted from the Broadway Bridge Project Final Environmental Impact Report (EIR).

Mitigation Measures

The mitigation measures are taken from the Broadway Bridge Project Final EIR. The MMP describes the actions that must take place to implement each mitigation measure, the timing of those actions, and the entities responsible for implementing and monitoring the actions.

MMP Components

The components of the attached table, which contains applicable mitigation measures, are addressed briefly, below.

Mitigation Measure: All mitigation measures identified in the Broadway Bridge Project Draft EIR are presented, as revised in the Final EIR.

Action(s): For every mitigation measure, one or more actions are described. The actions delineate the means by which the mitigation measures will be implemented, and, in some instances, the criteria for determining whether a measure has been successfully implemented. Where mitigation measures are particularly detailed, the action may refer back to the measure.

Implementing Party: This item identifies the entity that will undertake the required action.

Timing: Implementation of the action must occur prior to or during some part of project approval, project design or construction or on an ongoing basis. The timing for each measure is identified.

Monitoring Party: The City of West Sacramento is primarily responsible for ensuring that mitigation measures are successfully implemented. Within the City of West Sacramento, a number of departments and divisions would have responsibility for monitoring some aspect of the overall project. Other agencies, such as the Yolo-Solano Air Quality Management District, may also be responsible for monitoring the implementation of mitigation measures. As a result, more than one monitoring party may be identified.

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Visual/Aesthetics				
Mitigation Measure AES-1: Work with Stakeholders to Determine Bridge Aesthetics The project proponent will conduct a focused outreach effort and will conduct a public meeting, charrette session, or similar public engagement method with public stakeholders to develop an aesthetic design approach. This measure will allow concerned viewers to assist in creating a bridge that is visually appealing to the general public, while balancing the need for increased circulation access at this location. Affected stakeholders will be able to provide input on the preferred architectural style and coloring of the proposed bridge.	Conduct public outreach effort to discuss and receive input on the aesthetic design approach	City of West Sacramento	Prior to approval of final project design	City of West Sacramento, City of Sacramento
Mitigation Measure AES-2: Implement Project Landscaping The project proponent will install landscaping where space and safety considerations allow and in a manner that is consistent with the Cities of West Sacramento and Sacramento planning policies and directives to improve city streetscapes. Prior to approval of the roadway design, the City of West Sacramento and/or City of Sacramento project landscape architect will review project designs to ensure that the following elements are implemented in the project landscaping plan. ● Design and implement low-impact development (LID) measures that disperse and reduce runoff by using such features as vegetated buffer strips/medians between paved areas that catch and infiltrate runoff. Evaluate the use of pervious paving in the proposed project to improve infiltration and to reduce the amount of surface runoff from entering waterways and the storm water system. Do not use LID measures where infiltration could result in adverse environmental effects. Use LID measures, such as cobbled swales and aggregate mulching, as an aesthetic design element to create an attractive view while reducing water use. ● Require construction contractors to incorporate native grass and wildflower seed into standard seed mixes, which may be non-native, for erosion control measures that will be applied to all exposed slopes. If appropriate for the surrounding habitat, use wildflowers to provide seasonal interest to areas where trees and shrubs are removed, and grasslands are disturbed. Incorporate into seed mixes only wildflower and grass species that are native, and under no circumstances use any invasive grass or wildflower plant species as any component of any erosion control measure. Choose species that are indigenous to the area and for their appropriateness to the surrounding habitat. For example, choose upland grass and wildflower species for drier upland areas, and wetter species for areas that will receive more moisture. If not appropriate to the surrounding habitat, do not include wildflowers in the seed mix. ● Require the species list to include trees, shrubs, and an herbaceous understory of varying heights, as well as both evergreen and deciduous types. Increase the effectiveness of roadside planting areas and reduce their susceptibility to disease by increasing plant variety—providing multiple layers, seasonality, and diverse habitat. Use evergreen groundcovers or low-growing plants, such as *Ceanothus* spp., in areas where taller vegetation could cause driving hazards by obscuring site distances. Use species native and indigenous to the project area and California. Use native plant species to create attractive spaces, high in aesthetic quality, that are not only drought tolerant but also attract more wildlife than traditional landscape plant palettes. Use native species to promote a visual character of California that is being lost through development and reliance on non-native ornamental plant species. ● Use vegetative accents and screening to reduce the perceived scale and mass of built features, while accentuating the design treatments that will be applied to those features. Pay special attention to plant choices near residences to ensure that species chosen are of an appropriate height; and rely on evergreen species to provide year-round light screening from nuisance light, if applicable. ● Do not use any invasive plant species at any location. ● Plant vegetation within the first 6 months following project completion. ● Implement an irrigation and maintenance program during the plant establishment period and continue irrigation, as needed, to ensure plant survival. Design the landscaping plan to maximize the use of planting zones that are water efficient. Incorporate aesthetic features such as cobbling swales or shallow detention areas, as appropriate, to reduce or eliminate the need for irrigation in certain areas. ● If an irrigation system is required, use a smart watering system to evaluate the existing site conditions and plant material against weather conditions, and avoid overwatering of such areas. To avoid undue water flows, manage the irrigation system in such a manner that any broken spray heads, pipes, or other components are fixed within 1–2 days; or shut down the zone or system until it can be repaired.	Provide landscaping in areas where vegetation is removed and to reduce visual impacts at reconfigured intersections	City of West Sacramento/ contractor	Prior to design review and approval of roadway design; during construction	City of West Sacramento and City of Sacramento

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AES-3: Apply Minimum Lighting Standards All artificial outdoor lighting and overhead street lighting will be limited to safety and security requirements and the minimum required for driver safety. Lighting will be designed using the Illuminating Engineering Society's design guidelines. All lighting will be designed to have minimum impact on the surrounding environment and will use downcast, cut-off type fixtures that are shielded and direct the light only toward objects requiring illumination. Therefore, lights will be installed at the lowest allowable height and cast low-angle illumination while minimizing incidental light spill onto adjacent properties or open spaces, or backscatter into the nighttime sky. The lowest allowable wattage will be used for all lighted areas, and the amount of nighttime lights needed to light an area will be minimized to the highest degree possible. Light fixtures will have non-glare finishes that will not cause reflective daytime glare. Lighting will be designed for energy efficiency, with daylight sensors or timers with an on/off program. Lights will provide good color rendering with natural light qualities, with the minimum intensity feasible for security, safety, and personnel access. Lighting, including light color rendering and fixture types, will be designed to be aesthetically pleasing. Light-emitting diode (LED) lighting will avoid the use of blue-rich white light (BRWL) lamps and use a correlated color temperature that is no higher than 3,000 Kelvin. In addition, LED lights will use shielding to ensure that nuisance glare and light spill does not affect sensitive residential viewers. Lights along pathways and bridge safety lighting will use shielding to minimize offsite light spill and glare, and will be screened and directed away from adjacent uses to the highest degree possible. The amount of nighttime lights used along pathways will be minimized to the highest degree possible to ensure that spaces are not unnecessarily over-lit. For example, the amount of light can be reduced by limiting the amount of ornamental light posts to higher use areas and by using bollard lighting on travel way portions of pathways. Technologies to reduce light pollution evolve over time; design measures that are currently available may help but may not be the most effective means of controlling light pollution once the project is designed. Therefore, all design measures used to reduce light pollution will use the technologies available at the time of project design to allow for the highest potential reduction in light pollution.	Design lighting to have a minimum impact on surrounding environment using Illuminating Engineering Society's design guidelines Minimize nighttime lighting as much as possible Use the latest technologies available at the time of project design to allow for the highest potential reduction in light pollution Also refer to requirements in *Minimize or Avoid Permanent Bridge Lighting from Directly Radiating on Water Surfaces of the Sacramento River*	City of West Sacramento	During final design, prior to final design review	City of West Sacramento and City of Sacramento

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Air Quality				
Mitigation Measure AIR-1: Implement Additional Control Measures for Construction Emissions of Fugitive Dust Additional measures to control dust in Yolo County will be borrowed from YSAQMD's recommended list of dust control measures and implemented to the extent practicable when the measures have not already been incorporated in, and do not conflict with, the requirements of the Caltrans *Standard Specifications* (California Department of Transportation 2018), special provisions, the NPDES permit, the Biological Opinions, the CWA Section 404 permit, CWA Section 401 Certification, and other permits issued for the project. The following measures are taken from YSAQMD's Construction Dust Mitigation Measures (Yolo-Solano Air Quality Management District 2007). ● Water all active construction sites at least twice daily. Frequency should be based on the type of operation, soil, and wind exposure. ● Haul trucks shall maintain at least 2 feet of freeboard. ● Cover all trucks hauling dirt, sand, or loose materials. ● Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut-and-fill operations and hydroseed area. ● Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least 4 consecutive days). ● Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land. ● Plant vegetative ground cover in disturbed areas as soon as possible. ● Cover inactive storage piles. ● Sweep streets if visible soil material is carried out from the construction site. ● Treat accesses to a distance of 100 feet from the paved road with a 6- to 12-inch layer of wood chips or mulch. ● Treat accesses to a distance of 100 feet from the paved road with a 6-inch layer of gravel. Additional measures to control dust in Sacramento County will be borrowed from SMAQMD's recommended list of dust control measures and implemented to the extent practicable when the measures have not already been incorporated in, and do not conflict with, the requirements of the Caltrans *Standard Specifications*, special provisions, the NPDES permit, the Biological Opinions, the CWA Section 404 permit, CWA Section 401 Certification, and other permits issued for the project. The following measures are taken from SMAQMD's (2021) *Guide to Air Quality Assessment in Sacramento County* and represent their basic control measures for fugitive dust. ● Control of fugitive dust is required by District Rule 403 and enforced by District staff. ● Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads. ● Cover or maintain at least 2 feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered. ● Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited. ● Limit vehicle speeds on unpaved roads to 15 mph. ● All roadways, driveways, sidewalks, and parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used. The following practices describe exhaust emission control from diesel powered fleets working at a construction site. California regulations limit idling from both on-road and off-road diesel-powered equipment. The ARB enforces idling limitations and compliance with diesel fleet regulations. ● Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site. ● Provide current certificate(s) of compliance for ARB's In-Use Off-Road Diesel-Fueled Fleets Regulation [California Code of Regulations, Title 13, sections 2449 and 2449.1]. For more information contact ARB at 877-593-6677, doors@arb.ca.gov, or www.arb.ca.gov/doors/compliance_cert1.html. Although not required by local or state regulation, many construction companies have equipment inspection and maintenance programs to ensure work and fuel efficiencies. ● Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.	Comply with Caltrans' Standard Specification Section 14, Yolo Solano Air Quality Management District's (YSAQMD) and Sacramento Metro Air Quality Management District's (SMAQMD) recommended list of control measures	City of West Sacramento/ contractor	During construction	City of West Sacramento, City of Sacramento, Yolo Solano Air Quality Management District, Sacramento Metropolitan Air Quality Management District, Caltrans

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Biological Resources				
Mitigation Measure NC-1: Install Orange Construction Fencing between the Construction Area and Adjacent Sensitive Biological Resources The project proponent or their contractor will install orange construction fencing between the construction area and adjacent sensitive biological resource areas. Sensitive biological resources that occur adjacent to the construction area that could be directly affected by the project include sensitive natural communities; special-status wildlife habitats, such as nest sites of Swainson's hawk and migratory birds; and protected trees. Barrier fencing around sensitive biological resource areas will be installed as one of the first orders of work and prior to equipment staging. Before construction begins, the construction contractor will work with the project engineer and a resource specialist to identify the locations for the orange construction fencing and will place stakes around the sensitive resource sites to indicate these locations. The protected areas will be designated as environmentally sensitive areas and clearly identified on the construction plans and described in the specifications. To minimize the potential for snakes and other ground-dwelling animals from being caught in the orange construction fencing, the fencing will be placed with at least a 1-foot gap between the ground and the bottom of the fencing. The exception to this condition is where construction barrier fencing overlaps with erosion control fencing and must be secured to prevent sediment runoff. Barrier fencing will be installed before construction activities are initiated, maintained throughout the construction period, and removed after completion of construction.	Install orange construction fencing as a barrier between the construction area and adjacent sensitive biological resource areas	City of West Sacramento/ contractor, resource specialist	Identify locations prior to construction Install prior to construction Maintain during construction	City of West Sacramento, City of Sacramento, U.S. Army Corps of Engineers, California Department of Fish and Wildlife, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Caltrans
Mitigation Measure NC-2: Conduct Environmental Awareness Training for Construction Employees The project proponent will retain a qualified biologist to conduct environmental awareness training for construction crews before project implementation. The awareness training will be provided to all construction personnel and will brief them on the need to avoid effects on sensitive biological resources (e.g., native trees, sensitive natural communities, and special-status species habitats in and adjacent to the construction area). The education program will include a brief review of the special-status species with the potential to occur in the BSA (including their life history, habitat requirements, and photographs of the species). The training will identify the portions of the BSA in which the species may occur, as well as their legal status and protection. The program also will cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on these species during project implementation. This will include the steps to be taken if a sensitive species is found within the construction area (i.e., notifying the crew foreman, who will call a designated biologist). In addition, construction employees will be educated about the importance of controlling and preventing the spread of invasive plant infestations. An environmental awareness handout that describes and illustrates sensitive resources to be avoided during project construction and identifies all relevant permit conditions will be provided to each crew member. The crew foreman will be responsible for ensuring that crew members adhere to the guidelines and restrictions. Education programs will be conducted for appropriate new personnel as they are brought on the job during the construction period.	Retain a qualified biologist to conduct worker awareness training	City of West Sacramento, qualified biologist, contractor	Prior to construction During construction for new crew members	City of West Sacramento, City of Sacramento, U.S. Army Corps of Engineers, California Department of Fish and Wildlife, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Caltrans
Mitigation Measure NC-3: Conduct Periodic Biological Monitoring The project proponent will retain a qualified biological monitor for the project who will visit the site a minimum of once per week to ensure that fencing around environmentally sensitive areas is intact and that activities are being conducted in accordance with the agreed upon project schedule and agency conditions of approval. The monitor will provide the project proponent with a monitoring log for each site visit. Certain activities will require the presence of a biological monitor for the duration of the activity or during the initial disturbance of an area to ensure that impacts on special-status species are avoided. The activities that require specific monitoring are identified in Measures AS-3, AS-5, AS-7, and AS-8.	Retain a qualified biologist to perform periodic monitoring and prepare monitoring logs Retain a qualified biologist to monitor for the duration of an activity, as identified in other biological mitigation measures	City of West Sacramento/ contractor, qualified biologist	During construction	City of West Sacramento, City of Sacramento, U.S. Army Corps of Engineers, California Department of Fish and Wildlife, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Caltrans
Mitigation Measure NC-4: Compensate for Temporary Effects on and Permanent Loss of Cottonwood Riparian Forest (Including SRA Cover) The project proponent will compensate for the permanent loss of up to 1.112 acres of riparian forest under Alternative B or up to 1.176 acres of riparian forest under Alternative C. In addition, any unavoidable temporary loss of riparian forest will be mitigated. The project proponent will implement onsite and, if necessary, offsite compensation measures or purchase mitigation bank credits to compensate for losses of cottonwood riparian forest on the waterside slope of the existing levees, including riparian forest supporting SRA cover habitat (as described in EIR/EA Section 4.4.1.1 [*Survey Results*] in the NES, portions of the cottonwood riparian forest in the BSA also provide SRA cover habitat for fish). Onsite compensation will be used to the maximum extent practicable. Compliance with the USACE levee vegetation policy (U.S. Army Corps of Engineers 2014), the ULDC (California Department of Water Resources 2012), or other engineering constraints may limit the ability to achieve full onsite compensation. Therefore, offsite compensation or purchase of mitigation bank credits may be needed to achieve no net loss of existing in-kind riparian and SRA cover habitat values. Each of these options is discussed below. **Onsite or Offsite Restoration or Enhancement along the Sacramento River.** Riparian habitat restoration or enhancement onsite or offsite should occur in the same year construction is completed. For onsite or offsite replacement plantings, the project proponent will prepare a mitigation planting plan, including a species list and number of each species, planting locations, and maintenance requirements. Plantings will consist of cuttings taken from local plants or plants grown from local material. Planted species for the mitigation plantings will be similar to those removed from the project area and will include native species, such as Fremont's cottonwood, valley oak, black willow, boxelder, Oregon ash, and black walnut. The final planting plan will be developed based on results of the arborist survey for species to be removed (see additional discussion below). All plantings will be fitted with exclusion cages or other suitable protection from herbivory. Plantings will be irrigated for up to 3 years or until established. Plantings will be monitored annually for 3 years or as required in the project permits. If 75% of the plants survive at the end of the monitoring period, the revegetation will be considered successful. If the survival criterion is not met at the end of the monitoring period, planting and monitoring will be repeated after mortality causes have been identified and corrected.	Conduct arborist survey upon completion of 90% design Provide written documentation that riparian forest has been compensated either through onsite/offsite restoration or through mitigation bank credit purchase as described	City of West Sacramento, arborist	Conduct arborist survey upon completion of 90% design Provide compensation or develop and implement plan for restoration/ enhancement to permitting agencies as required by permit terms	City of West Sacramento, City of Sacramento, U.S. Army Corps of Engineers, California Department of Fish and Wildlife, National Marine Fisheries Service, U.S. Fish and Wildlife Service

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Bank Credit Purchase. If this option is chosen, the project proponent will provide written evidence to the resource agencies that compensation has been established through the purchase of mitigation credits. The amount to be paid will be the fee that is in effect at the time the fee is paid. The mitigation will be approved by CDFW and may be modified during the permitting process. Mitigation can be in the form of creation or preservation credits. If mitigation is in the form of restoration/creation credits, the mitigation will be at a minimum ratio of 1:1 (1 acre of restored or created riparian habitat for each acre of riparian habitat removed). If mitigation is in the form of preservation credits, the mitigation will be at a minimum ratio of 2:1 (2 acres of preserved riparian habitat for each acre of riparian habitat removed). The final compensation ratio will be approved by CDFW in order to result in no net loss of riparian habitat. The project proponent will purchase riparian habitat credits from an approved mitigation bank near the project, such as the Liberty Island Conservation Bank, Cosumnes Floodplain Mitigation Bank, Fremont Landing Conservation Bank, Elsie Gridley Mitigation Bank, River Ranch Wetland Mitigation Bank, or other approved bank with available riparian forest credits at the time of project permitting. Replacement riparian forest habitat will include tree species that would support nesting Swainson's hawk (i.e., oak, cottonwood) and will occur within the range of nesting Swainson's hawk within the Sacramento Valley. To provide a current and accurate estimate of tree loss, an arborist survey will be conducted upon completion of 90% design plans for the project and no more than 2 years prior to project construction. In addition to a description of the tree, the arborist survey report will include the precise location of the trunk and size of the dripline for all trees whose trunk or canopy overlap with the project footprint. Riparian forest compensation will be consistent with the requirements of the City of West Sacramento and City of Sacramento tree ordinances to ensure compensation for losses of individual protected trees. In addition to mitigating the loss of riparian forest habitat, specific measures will be included to satisfy NMFS requirements and compensate for the loss of SRA cover (area and linear feet). The acreage will not be duplicated, such that the acreage of riparian forest habitat restored for SRA cover mitigation will apply toward riparian forest habitat mitigation requirements. SRA cover mitigation will include the following riparian replacement requirements. Replace the permanent loss of 302 linear feet and up to 0.368 acre of affected SRA cover vegetation (see EIR/EA Section 4.4.1.2, *Temporary and Permanent Loss of Riparian Vegetation [Including SRA Cover]* in the NES) at a 3:1 replacement ratio (i.e., 3 linear feet replaced for every 1 foot affected and 3 acres replaced for every 1 acre affected) by planting native riparian trees in temporary impact areas and along existing onsite or offsite unshaded banks along the Sacramento River. Plant native riparian trees onsite to the maximum extent practicable, followed by planting on adjacent reaches of the Sacramento River to minimize the need for purchasing offsite mitigation bank credits. Plant riparian trees that are intended to provide SRA cover along the water's edge at summer low flows up to the ordinary high-water mark and at sufficient densities to provide shade along at least 85% of the bank's length when the trees reach maturity. This will ensure that riparian plantings intended for SRA cover mitigation will contribute to instream SRA cover when they are inundated during winter/spring flows and overhead cover (shade) during summer flows when they approach maturity. Monitor and evaluate the revegetation success of riparian plantings intended for SRA cover mitigation as described above. If mitigation for SRA cover is in the form of offsite mitigation bank credits, credits will need to be purchased from an approved mitigation bank within the approved service area for the project that provides riparian forest floodplain conservation credits as offsite compensation for impacts on state- and federally listed fish species, designated critical habitat, and EFH for Pacific salmon.				
Mitigation Measure NC-5: Compensate for Loss of Protected Trees in Landscaping or Ruderal Habitat Within 1 year prior to construction, the project proponent will conduct a preconstruction inventory of all trees to be removed. The inventory will include the location, species, diameter of all trunks, approximate height and canopy diameter, and approximate age—in support of a tree permit for removal of the protected trees. All conditions of the tree permits will be implemented. The project proponent will mitigate the loss of protected street trees using one or a combination of the two following options. ● Because it is unlikely that adequate space will be available in the project area for tree planting after construction, pay in-lieu fees to the City of West Sacramento and the City of Sacramento, based on the tree removal locations, which would be used to purchase and plant trees elsewhere in West Sacramento and Sacramento. Replacement trees will be required at a ratio of 1:1 (i.e., 1-inch diameter of replacement tree planted for every 1-inch diameter of tree removed). Replacement trees will be of the same species, except for replacement of black locust, which is an invasive species and will be replaced with a native tree species. Mitigation will be subject to approval by the City's tree administrator and will take into account species affected, replacement species, location, health and vigor, habitat value, and other factors to determine fair compensation for tree loss. Replacement trees will be monitored annually for 3 years to document their vigor and survival. If any of the original replacement trees die within 3 years of the initial planting, the project proponent will plant additional replacement trees and monitor them until all trees survive for a minimum of 3 years after planting. ● If feasible, plant replacement trees at or near the location of the tree removal, following the same replacement ratio, species, monitoring, and tree survival requirements described for the option above.	Provide written documentation that protected street trees removed have been replaced at a ratio of 1:1	City of West Sacramento/ contractor	Per the terms of each regulatory permit Prior to construction	City of West Sacramento, City of Sacramento

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-1: Conduct Preconstruction Surveys for Western Pond Turtle and Implement Protective Measures To avoid potential injury to or mortality of western pond turtles, the project proponent will retain a qualified biologist to conduct a preconstruction survey for western pond turtles immediately prior to construction activities (including vegetation removal) along the banks of the Sacramento River. The biologist will survey the aquatic habitat, riverbanks, and adjacent riparian and ruderal habitat within the construction area immediately prior to disturbance. If a western pond turtle is found within the immediate work area during the preconstruction survey or during project activities, work shall cease in the area until the turtle is able to move out of the work area on its own. Information about the location of turtles seen during the preconstruction survey will be included in the environmental awareness training (Measure NC-2) and provided directly to the construction crew working in that area to ensure that areas where turtles were observed are inspected each day prior to the start of work to verify that no turtles are present. If a western pond turtle nest is discovered during the preconstruction survey or during project construction, the project proponent will coordinate with CDFW to determine whether additional avoidance measures (e.g., no-disturbance buffer or monitoring) are prudent.	Retain a qualified biologist to perform preconstruction surveys for western pond turtles Retain a qualified biologist to perform and environmental awareness training if turtles are found Cease work if western pond turtle(s) is found on site. Coordinate with CDFW if a turtle nest is identified.	City of West Sacramento	Prior to and during construction	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife
Mitigation Measure AS-2: Conduct Tree Removal during Non-Sensitive Periods for Wildlife The project proponent will remove or trim trees during the non-breeding season for tree-nesting migratory birds and raptors, and prior to periods when bats would be hibernating (generally between September 15 and October 31). If tree removal cannot be confined to this period, the project proponent will retain a qualified wildlife biologist with knowledge of the wildlife species that could occur in the project area to conduct the appropriate preconstruction surveys and establish no-disturbance buffers for sensitive wildlife species, as described under Measure AS-3 (Swainson's hawk), Measure AS-4 (nesting birds), and Measure AS-5 (roosting bats).	Conduct tree removal activities during the non-breeding season (September 15 – October 31)	City of west Sacramento/ contractor	Prior to project construction between September 15 and October 31 or after preconstruction surveys conducted by qualified wildlife biologist and establishment of no-disturbance buffer	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife
Mitigation Measure AS-3: Monitor Active Swainson's Hawk and White-Tailed Kite Nests during Pile Driving and Other Construction Activities Active Swainson's hawk and white-tailed kite nests within 600 feet of the BSA will be monitored during pile driving and other construction activities. Monitoring will be conducted by a wildlife biologist with experience in monitoring Swainson's hawk and white-tailed kite nests. The monitor will document the location of active nests, coordinate with the project proponent and CDFW, and record all observations in a daily monitoring log. The monitor will have the authority to temporarily stop work if activities are disrupting nesting behavior to the point of resulting in potential take (i.e., eggs and young chicks still in nests, and adults appear agitated and potentially could abandon the nest). The monitor will work closely with the contractor, the project proponent, and CDFW to develop plans for minimizing disturbance (e.g., modifying or delaying certain construction activities). A minimum non-disturbance buffer of 600 feet (radius) will be established around all active Swainson's hawk and white-tailed kite nests. No entry of any kind related to construction will be allowed within this buffer while the nest is active, unless approved by CDFW through issuance of an Incidental Take Permit or through consultation during project construction. The buffer size may be modified based on site-specific conditions, including line-of-sight, topography, type of disturbance, existing ambient noise and disturbance levels, and other relevant factors. Entry into the buffer for construction activities will be granted when the biological monitor determines that the young have fledged and are capable of independent survival, or that the nest has failed and the nest site is no longer active. All buffer adjustments will be approved by CDFW.	Retain a qualified biologist to monitor Swainson's Hawk and White-Tailed Kite nests during construction	City of West Sacramento; qualified wildlife biologist	During pile driving and project construction	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-4: Conduct Preconstruction Surveys for Nesting Migratory Birds, Including Special-Status Birds, and Establish Protective Buffers The project proponent will retain a qualified wildlife biologist to conduct nesting surveys before the start of construction. These nesting surveys will be conducted in conjunction with the Swainson's' hawk nesting surveys under Measure TE-2 and will include a minimum of three separate surveys to look for active nests of migratory birds, including raptors. Surveys will include a search of all trees and shrubs, ruderal areas, and grassland vegetation that provide suitable nesting habitat within 50 feet of disturbance. In addition, a 0.25-mile area from the river will be surveyed for nesting raptors in order to identify raptors that might be affected by pile driving. Surveys should occur during the height of the breeding season (March 1 to June 1), with one survey occurring in each of the 2 consecutive months within this peak period and the final survey occurring within 1 week of the start of construction. If no active nests are detected during these surveys, no additional measures are required. If an active nest is found in the survey area, a no-disturbance buffer will be established to avoid disturbance or destruction of the nest site until the end of the breeding season (September 15) or until a qualified wildlife biologist determines that the young have fledged and moved out of the construction area (this date varies by species). The extent of these buffers will be determined by the biologist in coordination with CDFW and will depend on the level of noise or construction disturbance taking place, line-of-sight between the nest and the disturbance, ambient levels of noise and other non-project disturbances, and other topographical or artificial barriers. Suitable buffer distances may vary between species.	Retain a qualified biologist to perform preconstruction surveys and establish a protective buffer for nesting migratory birds, including special-status birds If an active nest is found, coordinate with CDFW regarding extent of buffer.	City of West Sacramento/ contractor	Conduct preconstruction surveys prior to construction per survey guidelines and during height of breeding season (March 1 to June 1) At active nests, establish and maintain no-disturbance buffer until end of breeding season (until September 15) or until qualified wildlife biologist determines young have fledges and moved out of area	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-5: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures To avoid and minimize potential impacts on pallid bat, western red bat, and non-special-status bat species from the removal of trees and buildings, the project proponent will implement the following actions. **Preconstruction Surveys.** Within 2 weeks prior to tree trimming or removal or any building demolition, a qualified biologist will examine trees to be removed or trimmed and buildings planned for demolition with suitable bat roosting habitat. High-quality habitat features (e.g., large tree cavities, basal hollows, loose or peeling bark, larger snags, abandoned buildings, and attics) will be identified, and the area around these features will be searched for bats and bat sign (e.g., guano, culled insect parts, and staining). Riparian woodland and stands of mature broadleaf trees will be considered potential habitat for solitary foliage-roosting bat species. If suitable roosting habitat or bat sign is detected, biologists will conduct an evening visual emergence survey of the source habitat feature, from 0.5 hour before sunset to 1–2 hours after sunset for a minimum of 2 nights. Full-spectrum acoustic detectors will be used during emergence surveys to assist in species identification. If site security allows, detectors should be set to record bat calls for the duration of each night. All emergence and monitoring surveys will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologist will analyze the bat call data using appropriate software and will document the results in a report. **Timing of Tree Removal and Building Demolition.** Exclusion devices will be installed on trees and buildings planned for removal and demolition between September 15 and October 31 to avoid affecting maternal and hibernating bat roosts. The exact timing of removal and demolition will be determined based on the preconstruction surveys of trees and buildings. **Protective Measures.** Protective measures may be necessary if it is determined that bats are using buildings or trees in the BSA as roost sites, or if sensitive bats species are detected during acoustic monitoring. The following measures will be implemented when roosts are found within trees or buildings planned for removal according to the timing discussed above. Specific measures will be approved by the project proponent and CDFW prior to excluding bats from occupied roosts. 1. Exclusion from buildings or bridge structures will not take place until temporary or permanent replacement roosting habitat is available. 2. Exclusion from roosts will take place late in the day or in the evening to reduce the likelihood of evicted bats falling prey to diurnal predators and will take place during weather and temperature conditions conducive to bat activity. 3. Biologists experienced with bats and bat evictions will carry out or oversee the exclusion tasks and will monitor tree trimming and removal and building demolition, if they are determined to be occupied. 4. Trees that provide suitable roost habitat will be removed in pieces, rather than felling the entire tree, should be removed late in the day or in the evening to reduce the likelihood of evicted bats falling prey to diurnal predators, and will take place during warm weather conditions conducive to bat activity. 5. Structural changes may be made to a known roost proposed for removal in order to create conditions in the roost that are undesirable to roosting bats and encourage the bats to leave on their own (e.g., open additional portals so that the temperature, wind, light, and precipitation regime in the roost change). Structural changes to the roost will be authorized by CDFW and will be performed during the appropriate exclusion timing (listed above) to avoid harming bats. 6. Non-injurious harassment at the roost site, such as ultrasound deterrents or other sensory irritants, may be used to encourage bats to leave on their own. 7. One-way door devices will be used where appropriate to allow bats to leave the roost but not to return. 8. Prior to building demolition and tree removal/trimming, and after other eviction efforts have been attempted, any confirmed roost site will be gently shaken or repeatedly struck with a heavy implement such as a sledge hammer or an axe. Several minutes should pass before beginning demolition work, felling trees, or trimming limbs to allow bats time to arouse and leave the roost. A biological monitor will search downed vegetation for dead and injured bats. The presence of dead or injured bats will be reported to CDFW. Injured bats will be transported to the nearest CDFW-permitted wildlife rehabilitation facility.	Retain a qualified biologist to perform preconstruction surveys and establish protective measures for roosting bats Removal of trees and buildings will not occur from September 15 to October 31 to avoid affecting maternal and hibernating bat roosts.	City of West Sacramento/ contractor	Install exclusion devices between September 15 and October 31 at trees planned for removal and buildings planned for demolition (prior to removal/demolition) Conduct evening visual emergence survey according to details in mitigation measure Conduct preconstruction surveys within two weeks prior to tree trimming or removal, or any building demolition	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife
Mitigation Measure AS-6: Implement Measures to Minimize Exceedance of Interim Threshold Sound Levels during Pile Driving The project proponent will require the contractor to implement the following measures to minimize the exposure of listed fish species to potentially harmful underwater sounds. ● The contractor will vibrate all piles to the maximum depth possible before using an impact hammer. ● No more than 20 piles will be driven per day. ● During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work and will limit the total number of hammer strikes to 32,000 strikes per day (i.e., 1,600 hammer strikes per pile, per day) for piles for the temporary trestles), 20,000 strikes per day (i.e., 1,000 hammer strikes per pile, per day) for the piles for the bridge fender system, 12,800 strikes per day (i.e., 1,600 hammer strikes per pile, per day) for piles for the fixed span piers, and 6,000 strikes per day (i.e., 1.500 strikes per pile, per day) for the CISS piles for the movable span piers. ● During impact driving, the project proponent will require the contractor to use a bubble curtain or dewatered cofferdam to minimize the extent to which the interim peak and cumulative SEL thresholds are exceeded (see EIR/EA Chapter 1, *Environmental Commitments* and Natural Environment Study Section 4.4.1.2, *Project Impacts*). ● No pile driving activity will occur at night, thereby providing fish with an extended quiet period during nighttime hours on days pile driving is being conducted for feeding and unobstructed passage.	Implement measures to minimize sound levels during pile driving	City of West Sacramento/ contractor	Prior to final design and during pile driving/impact hammer activities	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-7: Develop and Implement a Hydroacoustic Monitoring Plan The project proponent or their contractor will develop and implement a hydroacoustic monitoring plan. The monitoring plan will be submitted to the resource agencies (CDFW, NMFS, and USFWS) for approval at least 60 days before the start of project activities. The plan will include the following requirements. ● The project proponent or their contractor will monitor underwater noise levels during all impact pile driving activities on land and in water to ensure that peak and cumulative SELs do not exceed estimated values (see NES Tables 4-10 through 4-14). ● The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment. ● The monitoring plan will include a reporting schedule for daily summaries of the hydroacoustic monitoring results and for more comprehensive reports to be provided to the resource agencies on a monthly basis during the pile driving season. ● The daily reports will include the number of piles installed per day; the number of strikes per pile; the interval between strikes; the peak sound pressure level, sound exposure level, and root mean square per strike; and the accumulated sound exposure level per day at each monitoring station. ● The project proponent or their contractor will ensure that a qualified fish biologist is onsite during impact pile driving to document any occurrences of stressed, injured, or dead fish. If stressed, injured, or dead fish are observed during pile driving, the project proponent or their contractor will stop work immediately to provide fish an opportunity to move out of the area. In addition, the project proponent will coordinate with Caltrans to immediately consult with NMFS to determine the cause of the incident and whether any and which type of additional protective measures are necessary. Protective measures that are determined necessary to protect listed fish species will be implemented by the project proponent within 72 hours of the incident..	Develop and implement a hydroacoustic monitoring plan; submit the plan to CDFW, NMFS, and USFWS for approval	City of West Sacramento/ contractor/ fish biologist	60 days prior to start of project activities, during construction	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Wildlife
Mitigation Measure AS-8: Monitor Turbidity in the Sacramento River The project proponent will require their contractor to monitor turbidity levels in the Sacramento River during in-water construction activities (e.g., pile driving, extraction of temporary sheet piles used for cofferdams, and placement of RSP). Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceed the thresholds derived from the *Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region* (Central Valley Regional Water Quality Control Board 2018). If it is determined that turbidity levels exceed the Basin Plan thresholds, the project proponent or their contractor will adjust work to ensure that turbidity levels do not exceed the Basin Plan thresholds.	Monitor turbidity levels in the Sacramento River using standard techniques upstream and downstream of the construction area	City of West Sacramento/ contractor	During in-water construction activities	City of West Sacramento, City of Sacramento, Central Valley Regional Water Quality Control Board, U.S. Fish and Wildlife Service, National Marine Fisheries Service
Mitigation Measure AS-9: Implement Cofferdam Restrictions The following restrictions will be implemented during installation of the cofferdams and cofferdam dewatering. ● The extent of cofferdam footprints will be limited to the minimum necessary to support construction activities. ● Sheet piles used for cofferdams will be installed and removed using a vibratory pile driver. ● Cofferdams will be installed and removed only during the proposed in-water work window (between May 1 and November 30). ● Cofferdams will not be left in place over winter where they could be overtopped by winter/spring flows and when juveniles of listed species are most likely to be present in the construction area. ● All pumps used during dewatering of cofferdams will be screened according to CDFW and NMFS guidelines for pumps. ● Cofferdam dewatering and fish rescue/relocation from within cofferdams will commence immediately following cofferdam closure to minimize the duration that fish are trapped in the cofferdam.	Implement cofferdam restrictions during installation of cofferdams and cofferdam dewatering	City of West Sacramento/ contractor	During installation of the cofferdams and cofferdam dewatering	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Wildlife

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-10: Prepare and Implement a Fish Rescue and Relocation Plan The project proponent or their contractor will develop and implement a fish rescue and relocation plan to recover any fish trapped in cofferdams. The fish rescue and relocation plan will be submitted to the resource agencies (CDFW, NMFS, and USFWS) for approval at least 60 days before initiating activities to install cofferdams. At a minimum, the plan will include the following. ● A requirement that fish rescue and relocation activities will commence immediately after cofferdam closure and that dewatering has sufficiently lowered water levels inside cofferdams to make it feasible to rescue fish. ● A description of the methods and equipment proposed to collect, transfer, and release all fish found trapped within cofferdams. Capture methods may include seining, dip netting, and electrofishing, as approved by CDFW, NMFS, and USFWS. The precise methods and equipment to be used will be developed cooperatively by CDFW, NMFS, USFWS, and the project proponent or their contractor in advance of project implementation. ● A requirement that only CDFW-, NMFS-, and USFWS-approved fish biologists will conduct the fish rescue and relocation. ● A requirement that fish biologists will contact CDFW, NMFS, and USFWS immediately if any listed species are found dead or injured. ● A requirement that a fish rescue and relocation report be prepared and submitted to CDFW, NMFS, and USFWS within 5 business days following completion of the fish relocation. Data will be provided in tabular form and at a minimum will include the species and number rescued and relocated, approximate size of each fish (or alternatively, approximate size range if a large number of individuals are encountered), date and time of their capture, and general condition of all live fish (e.g., good–active with no injuries; fair–reduced activity with some superficial injuries; poor–difficulty swimming/orienting with major injuries). For dead fish, additional data will include fork length and description of injuries and possible cause of mortality if it can be determined.	Develop and implement a fish rescue and relocation plan to recover any fish trapped in cofferdams as detailed in this mitigation measure	City of West Sacramento/ contractor; CDFW-, NMFS-, and USFWS-approved fish biologists	60 days prior to initiating activities to install cofferdams; during construction	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Wildlife
Mitigation Measure AS-11: Develop and Implement a Barge Operations Plan The project proponent or their contractor will develop and implement a barge operations plan. The barge operations plan will be submitted to the resource agencies (CDFW, NMFS, and USFWS) for approval at least 60 days before the start of project activities. The plan will address the following. ● Bottom scour from propeller wash. ● Bank erosion or loss of submerged or emergent vegetation from propeller wash or excessive wake. ● Accidental material spillage. ● Sediment and benthic community disturbance from accidental or intentional barge grounding or deployment of barge spuds (extendable shafts for temporarily maintaining barge position) or anchors. ● Hazardous materials spills (e.g., fuel, oil, and hydraulic fluids). The barge operations plan will serve as a guide to barge operations and to a biological monitor, who will evaluate barge operations during construction with respect to stated performance measures. This plan, when approved by the resource agencies, will be read by barge operators and kept aboard all vessels operating at the construction site.	Develop and implement a barge operations plan to outline barge operations as detailed in this mitigation measure	City of West Sacramento/ contractor; CDFW, NMFS, and USFWS	60 days prior to start of project activities	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Wildlife
Mitigation Measure AS-12: Prevent the Spread or Introduction of Aquatic Invasive Species The project proponent or their contractor will implement the following actions to prevent the potential spread or introduction of aquatic invasive species associated with operation of barges and other in-water construction activities. Species of concern related to the operation of barges and other equipment in the lower Sacramento River include invasive mussels (e.g., quagga mussels [*Dreissena bugensis*] and zebra mussels [*Dreissena polymorpha*]) and aquatic plants (e.g., Brazilian waterweed [*Egeria densa*] and hydrilla [*Hydrilla verticillata*]) (California Department of Fish and Game 2008). ● Coordinate with the CDFW Invasive Species Program to ensure that the appropriate BMPs are implemented to prevent the spread or introduction of aquatic invasive species. ● Educate construction supervisors and managers about the importance of controlling and preventing the spread of aquatic invasive species. ● Train vessel and equipment operators and maintenance personnel in the recognition and proper prevention, treatment, and disposal of aquatic invasive species. ● Prior to departure of vessels from their place of origin and before in-water construction equipment is allowed to operate within the waters of the Sacramento River, thoroughly inspect and remove and dispose of all dirt, mud, plant matter, and animals from all surfaces that are submerged or may become submerged, or places where water can be held and transferred to the surrounding water.	Prevent the spread of aquatic invasive species according to protocol described in this mitigation measure	City of West Sacramento/ contractor	Prior to and during construction	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife; National Marine Fisheries Service, U.S. Fish and Wildlife Service

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure AS-13: Minimize or Avoid Permanent Bridge Lighting from Directly Radiating on Water Surfaces of the Sacramento River The project proponent or their contractor will minimize or avoid the effects of permanent bridge lighting on special-status fish species by implementing the following actions. ● Minimize nighttime lighting of the bridge structure for aesthetic purposes. ● Use the minimal amount of lighting necessary to safely and effectively illuminate vehicular, bicycle, and pedestrian areas on the bridge. ● Shield and focus lights on vehicular, bicycle, and pedestrian areas away from the water surface of the Sacramento River.	Shield construction lights to avoid illuminating river Minimize and shield permanent bridge lighting Also refer to requirements in *Mitigation Measure AES-3: Apply Minimum Lighting Standards*	City of West Sacramento/ contractor, project design team	During final project design and bridge construction Prior to and during nighttime construction activities	City of West Sacramento, City of Sacramento; National Marine Fisheries Service, U.S. Fish and Wildlife Service
Mitigation Measure TE-1: Avoid and Minimize Effects on Valley Elderberry Longhorn Beetle The following measures from the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 2017) have been slightly modified for this project. ● Fencing. The elderberry shrub will be fenced or flagged as close to construction limits as feasible. ● Avoidance area. Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 6 meters (20 feet) from the dripline, depending on the type of activity. ● Worker education. A qualified biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance. ● Construction monitoring. At a minimum, a qualified biologist will monitor the work area on a weekly basis to ensure that all avoidance and minimization measures are implemented. ● Timing. As much as feasible, all activities that could occur within 50 meters (165 feet) of the elderberry shrub will be conducted outside of the flight season of the VELB (March–July).	Install fencing as a barrier between the construction area and elderberry shrub(s) Keep damaging activities at least 20 feet from dripline of elderberry shrub(s) Contractors and construction crews will be educated on VELB status and how to avoid Retain a qualified biological monitor to inspect work weekly	City of West Sacramento/ contractor	Prior to and during ground disturbance such as grading and excavation activities	City of West Sacramento, City of Sacramento, U.S. Fish and Wildlife Service
Mitigation Measure TE-2: Conduct Focused Surveys for Nesting Swainson's Hawk prior to Construction The project proponent will retain a wildlife biologist experienced in surveying for Swainson's hawk to conduct surveys for the species in the spring/summer prior to construction. The surveys will be conducted within the limits of disturbance and in a buffer area up to 0.25 mile from the limits of disturbance. The size of the buffer area surveyed will be based on the type of habitat present and the line-of-sight from the construction area to surrounding suitable breeding habitat. Surveys will follow the methods in Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000). A minimum of six surveys will be conducted according to these methods. If a variance of the survey distance or number of surveys is necessary, the project proponent will coordinate with CDFW regarding appropriate survey methods based on proposed construction activities. Surveys generally will be conducted from February to July. Survey methods and results will be reported to the project proponent and CDFW.	Retain a qualified biologist to determine the presence/absence of Swainson's Hawk	Project proponent; wildlife biologist	Prior to project construction and from February to July	City of West Sacramento, City of Sacramento, California Department of Fish and Wildlife
Mitigation Measure TE-3: Purchase Channel Enhancement Credits for Impacts on Critical Habitat Permanent impacts on critical habitat (bank and substrate below the OHWM and water column habitat), totaling 1.87 acres (up to 57,600 square feet [1.32 acre] from bridge shading of aquatic habitat and new bridge piers; 24,126 square feet [0.55 acre] from RSP; and 84 square feet [0.002 acre] from bridge fender system) will be mitigated at a 3:1 ratio. The project proponent proposes to mitigate the permanent loss of critical habitat through purchase of 5.61 acres of mitigation credits at a NMFS- and USFWS-approved anadromous fish and delta smelt conservation bank.	Compensate for permanent impacts on critical habitat through purchasing credits as a 3:1 ratio	City of West Sacramento	Prior to issuance of grading permit	City of West Sacramento, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Caltrans

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure WW-1: Compensate for Loss of Perennial Stream The project proponent will comply with any regulatory requirements determined as part of the state (Section 401 Water Quality Certification or WDRs, LSAA) and federal (Section 404 and Section 10 permits) processes for the work that would occur in the Sacramento River. The project proponent will compensate for permanent fill of up to 0.431 acre of non-wetland waters of the U.S. in the Sacramento River by purchasing mitigation bank credits, which can be in the form of preservation or creation credits using the following minimum ratios. ● A minimum of 2:1 (2 acres of mitigation for each acre filled), for a total of up to 0.862 acre, if credits are for preservation of habitat; or, ● A minimum of 1:1 (1 acre of mitigation for each acre filled), for a total of up to 0.431 acre if credits are for creation of habitat. The actual compensation ratios will be determined through coordination with the Central Valley RWQCB and USACE as part of the permitting process. The project proponent will compensate for permanent loss of perennial stream by implementing one or a combination of the following options. ● Purchase credits for created riparian stream channel at a USACE-approved mitigation bank with a service area that encompasses the project area, such as the Liberty Island Conservation Bank, Cosumnes Floodplain Mitigation Bank, Fremont Landing Conservation Bank, Elsie Gridley Mitigation Bank, River Ranch Wetland Mitigation Bank, or other approved bank with available riparian stream credits. The project proponent will provide written evidence to the resource agencies that compensation has been established through the purchase of mitigation credits. ● Compensate out-of-kind for loss of perennial stream by implementing compensatory mitigation for cottonwood riparian forest impacts described in Mitigation Measure NC-4. The acreage restored or created to compensate for loss of perennial stream will be added to the acreage restored or created for loss of riparian habitat.	Purchase credits or provide out-of-kind compensation Provide written documentation to resource agencies that credits/compensation has been provided at the required ratios according to permit terms and regulatory agency requirements	City of West Sacramento/ contractor	Per the terms of each regulatory permit Prior to construction	City of West Sacramento, City of Sacramento, U.S. Army Corps of Engineers, Central Valley Regional Water Quality Control Board, California Department of Fish and Wildlife
Cultural Resources				
Mitigation Measure CUL-1: Conduct Mandatory Cultural Resources Awareness Training for Construction Personnel Before any ground-disturbing work occurs in the project area, a qualified archaeologist will be retained to conduct mandatory contractor/worker cultural resources awareness training for construction personnel. The awareness training will be provided to all construction personnel (contractors and subcontractors), to brief them on the need to avoid effects on cultural resources adjacent to and within construction areas and the penalties for not complying with applicable state and federal laws and permit requirements.	Conduct cultural resources awareness training for construction personnel and contact qualified archaeologist Include construction worker training requirements on grading and construction plans.	City of West Sacramento/ contractor; qualified archaeologist	Prior to ground-disturbing construction activities	City of West Sacramento and City of Sacramento, Caltrans
Mitigation Measure CUL-2: Implement Avoidance and Notification Procedures for Cultural Resources Discovered during Construction Prior to project construction the project proponents will implement the phased approach and management plan for site P-34-000619 pursuant to Stipulation XII.B of the Section 106 Programmatic Agreement, as described in the project's *Finding of No Adverse Effect* and its Appendix D, *Phased Identification Plan*. The project proponents shall inform its contractor(s) of the possibility of subsurface archaeological deposits within the project area by including the following directive in contract documents: "If prehistoric or historical archaeological deposits are discovered during project activities, all work within 100 feet of the discovery shall be redirected and a qualified archaeologist contacted to assess the situation, consult with agencies as appropriate, and make recommendations regarding the treatment of the discovery. Project personnel shall not collect or move any archaeological materials or human remains and associated materials. Archaeological resources can include flaked-stone tools (e.g., projectile points, knives, choppers) or obsidian, chert, basalt, or quartzite toolmaking debris; bone tools; culturally darkened soil (i.e., midden soil often containing heat-affected rock, ash and charcoal, shellfish remains, faunal bones, and cultural materials); and stone-milling equipment (e.g., mortars, pestles, handstones). Prehistoric archaeological sites often contain human remains. Historical materials can include wood, stone, concrete, or adobe footings, walls, and other structural remains; debris-filled wells or privies; and deposits of wood, glass, ceramics, metal, and other refuse." If archaeological deposits are identified during project subsurface construction, all ground-disturbing activities within 100 feet shall be redirected and a qualified archaeologist contacted to assess the situation and consult with agencies as appropriate. The archaeologist shall first determine whether such deposits are historical resources as defined in 14 CCR §15064.5(a) and as required of the lead agency at 14 CCR §15064.5(c)(1). If these deposits do not qualify as historical resources, a determination will be made whether they qualify as unique archaeological resources, pursuant to 14 CCR §15064.5(c)(3). If the deposit qualifies as a historical resource or a unique archaeological resource, it will need to be avoided by adverse effects or such effects must be mitigated. Mitigation may consist of, but is not necessarily limited to, systematic recovery and analysis of archaeological deposits, recording the resource, preparation of a report of findings, and accessioning recovered archaeological materials at an appropriate curation facility. Public educational outreach also may be appropriate. Upon completion of the assessment, the archaeologist will prepare a report documenting the methods and results and provide recommendations for the treatment of the archaeological materials discovered. The report will be submitted to the project proponents and the Northwest Information Center.	Conduct cultural resources awareness training for construction personnel and contact qualified archaeologist Include cultural resources discovery, identification, and notification guidelines on grading and construction plans.	City of West Sacramento/ contractor	During ground-disturbing construction activities and immediately upon inadvertent archaeological discoveries, including human remains	City of West Sacramento, City of Sacramento, Caltrans

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Mitigation Measure CUL-3: Stop Work if Human Remains are Encountered during Ground-Disturbing Activities If human remains are encountered, these remains shall be treated in accordance with California Health and Safety Code Section 7050.5. The project proponents shall inform its contractor(s) of the cultural sensitivity of the project area for human remains by including the following directive in contract documents: "If human remains are encountered during project activities, work within 100 feet of the discovery shall be redirected and the County Coroner notified immediately. At the same time, an archaeologist shall be contacted to assess the situation and consult with agencies as appropriate. Project personnel shall not collect or move any human remains and associated materials. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Most Likely Descendant to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods." In the event that human remains are encountered during project activities, work within 100 feet of the discovery will be redirected and the County Coroner notified immediately. At the same time, an archaeologist will be contacted to assess the situation and consult with agencies as appropriate. Project personnel should not collect or move any human remains and associated materials. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission will identify a Most Likely Descendant to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. Upon completion of the assessment, the archaeologist will prepare a report documenting the methods and results, and provide recommendations for the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the Most Likely Descendant. The report will be submitted to the project proponents and the Northwest Information Center.	Conduct cultural resources awareness training for construction personnel and contact County Coroner Include cultural resources discovery, identification, and notification guidelines on grading and construction plans.	City of West Sacramento/ contractor	During ground-disturbing construction activities and immediately upon inadvertent archaeological discoveries, including human remains	City of West Sacramento, City of Sacramento, Caltrans
Geology and Soils				
Mitigation Measure PAL-1: Educate Construction Personnel in Recognizing Fossil Material All construction personnel will receive training provided by a qualified professional paleontologist experienced in teaching non-specialists to ensure that construction personnel can recognize fossil materials in the event that any are discovered during construction.	Conduct paleontological resources awareness training for construction personnel Include construction worker training requirements on grading and construction plans.	City of West Sacramento/ contractor	Prior to ground-disturbing construction activities	City of West Sacramento, City of Sacramento
Mitigation Measure PAL-2: Stop Work if Fossil Remains Are Encountered during Construction If fossil remains (particularly vertebrate remains) are discovered during earth-disturbing activities, activities will stop immediately until a State-registered professional geologist or qualified professional paleontologist can assess the nature and importance of the find and a qualified professional paleontologist can recommend appropriate treatment. Treatment may include preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection, and may include preparation of a report for publication describing the finds. The project proponent will ensure that recommendations regarding treatment and reporting are implemented.	Immediately cease all work activities around the immediate area of discovery and contact a State-registered professional geologist or qualified professional paleontologist to assess the find Include paleontological resources discovery, identification, and notification guidelines on grading and construction plans.	City of West Sacramento/ contractor; State-registered professional geologist or qualified professional paleontologist	During ground-disturbing construction, immediately upon inadvertent paleontological discoveries	City of West Sacramento and City of Sacramento

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Hazards and Hazardous Materials				
Mitigation Measure HAZ-1: Conduct Phase II Site Assessments prior to Construction For sites identified as high or medium risk, a Phase II preliminary environmental screening will be completed within the project boundaries at these parcels to assess subsurface soil and/or groundwater, and the presence of wells. At a minimum, the Phase II preliminary screening will investigate each parcel within the project area where construction is anticipated to disturb the subsurface soil or encounter groundwater. Should the preliminary screening indicate the presence of wells or soil or groundwater contamination within the project area, a Phase II assessment will be conducted to investigate the depth and lateral extent of contamination within the project area. Low-risk sites will be re-evaluated (e.g., conduct owner interviews and a site survey) when site access is obtained. An additional Phase II assessment may be recommended if hazardous materials are identified. The project proponent will conduct a Phase II assessment within the proposed acquisition area of the parcels described below. ● The following APNs in West Sacramento will be assessed for possible soil/groundwater contamination: – Alternative B only: 058-034-028, 058-280-003, 058-350-008, 058-990-007, 058-990-011. – Alternative C only: 058-270-007, 058-270-008, 058-270-009, 058-270-012, 058-270-014. – Alternatives B and C: 058-270-006, 058-270-011, 058-280-005, 058-280-006, 058-350-001. ● The following APNs in Sacramento will be assessed for possible soil/groundwater contamination: 009-0012-008, 009-0012-009, 009-0012-064, 009-0012-029, 009-0012-071, 009-0012-072, 009-0020-001, 009-0020-002, 009-0223-007, 009-0223-012, 009-0223-016, 009-0232-005, 009-0232-009, 009-0232-016, 009-0232-017, 009-0232-018, 009-0235-007, 009-0237-005, 009-0237-010, 009-0237-028, 009-0030-054. ● Areas along South River Road, Jefferson Boulevard, and 15th Street in West Sacramento and along Broadway, Front Street, 3rd Street, and 5th Street in Sacramento will be assessed for potential ADL impacts ● In West Sacramento, APNs 058-270-011 (Alternatives B and C), 058-280-007 (Alternative C only), 058-990-007, and 058-990-11 (Alternative B only); in Sacramento, APNs 009-0012-009, 0090012-29, 009-0020-02, 009-0223-007, 009-0223-012, and 009-0223-016 will be evaluated for the potential for metals, TPH, lead, arsenic, and creosote impacts for all construction activities that will result in soil excavation within railroad or former railroad easements at these parcels. Based on the findings of the Phase II investigation, if a soils management plan and health and safety plan are necessary, they will be prepared and implemented. The Phase II assessment will include sampling and laboratory analysis to confirm the presence of hazardous materials and may include the following. ● Surficial soil and water samples ● Testing of underground storage tanks ● Subsurface soil borings ● Groundwater monitoring well installation, sampling, and analysis (may be appropriate on neighboring properties as well to determine the presence of contamination)	Conduct Phase II Site Assessment at parcels identified as high or medium risk Implement soils management plan and health and safety plan	City of West Sacramento/ contractor	Prior to ground-disturbing construction activities	City of West Sacramento and City of Sacramento
Mitigation Measure HAZ-2: Develop and Implement Plans to Address Worker Health and Safety The project proponent will develop and implement the necessary plans and measures required by Caltrans and federal and state regulations, including a health and safety plan, BMPs, and an injury and illness prevention plan. The plans will be prepared and implemented to address worker safety when working with potentially hazardous materials, including potential lead or chromium in traffic stripes, ADL, and other construction-related materials within the right-of-way during any soil-disturbing activity.	Develop and implement a health and safety plan, BMPs, and an injury and illness prevention plan	City of West Sacramento/ contractor	Prior to ground-disturbing construction activities	City of West Sacramento and City of Sacramento Caltrans

Broadway Bridge Project, Mitigation Monitoring Plan				
Mitigation Measures	**Action(s)**	**Implementing Party**	**Timing**	**Monitoring Party**
Noise				
Mitigation Measure NOI-1: Use Best Noise Control Practices during Construction The contractor(s) will implement noise control methods such that noise does not exceed applicable noise ordinance standards specified by the City of West Sacramento or the City of Sacramento, as applicable. Measures that can be implemented to control noise include the following. ● Limiting heavy equipment use to daytime hours between 7:00 a.m. and 6:00 p.m. ● Limiting pile driving to times of day that would be least disruptive to residences. ● Locating noise-generating equipment as far away as practical from residences. ● Equipping all construction equipment with standard noise attenuation devices such as mufflers to reduce noise, and equipping all internal combustion engines with intake and exhaust silencers in accordance with manufacturer's standard specifications. ● Establishing equipment and material haul routes that avoid residential uses to the extent practical, limiting hauling to the hours between 7:00 a.m. and 10:00 p.m., and specifying maximum acceptable speeds for each route. ● Using electrically powered equipment in place of equipment with internal combustion engines where practical. ● Restricting the use of audible warning devices such as bells, whistles, and horns to those situations that are required by law for safety purposes. ● Providing noise-reducing enclosures around stationary noise-generating equipment. ● Providing temporary construction noise barriers between active construction sites that are near residences. The construction contractor will develop a noise control plan that identifies specific feasible control measures that will be implemented. The noise control plan will be submitted to and approved by the project sponsor before construction begins. Prior to construction, the project sponsor will make a construction schedule available to residents living in the vicinity of construction areas and designate a noise disturbance coordinator. The coordinator will be responsible for responding to complaints regarding construction noise and ensure that reasonable measures are implemented to correct the source of disturbance, where feasible. A sign containing the contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site boundary fencing, and this information also will be included in the notification of the construction schedule.	Use noise-reducing construction practices Develop and submit a construction noise control plan to specific noise ordinance limits	City of West Sacramento/ contractor	Prior to issuance of grading permit and during project construction	City of West Sacramento and City of Sacramento
Traffic/Transportation				
Mitigation Measure TRA-1: Construct Roadway and Intersection Modifications in West Sacramento (Alternative C) By the open-to-traffic year of the project, the City of West Sacramento will construct the following roadway modifications. ● On South River Road at the intersection with Broadway, extend the northbound right-turn pocket to 275 feet, and add a second southbound left-turn lane. ● On Alameda Boulevard at the intersection with Jefferson Boulevard, change the eastbound and westbound protected left turns to permitted left-turn signal phasing. ● On South River Road at the intersection with Alameda Boulevard, extend the northbound left-turn pocket to a 175-foot length, and extend the southbound right-turn pocket to 250 feet. By the design year, the City of West Sacramento will construct the following. ● Install a traffic signal at the intersection of Jefferson Boulevard and Circle Street, add signal coordination with the intersection of Jefferson Boulevard and Alameda Boulevard.	Construct intersection modifications by open-to-traffic year at South River Road at the intersection with Broadway, Alameda Boulevard at the intersection with Jefferson Boulevard, South River Road at the intersection with Alameda Boulevard Install traffic signal at the intersection of Jefferson Boulevard and Circle Street and add signal coordination with the intersection of Jefferson Boulevard and Alameda Boulevard by design year	City of West Sacramento/ contractor	Concurrent with project construction	City of West Sacramento and City of Sacramento

Appendix G List of Acronyms and Abbreviations

2021 MTIP	2021-2024 Metropolitan Transportation Improvement Program
AADT	Average annual daily traffic
AAQS	ambient air quality standards
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADI	area of direct impact
ADL	aerially deposited lead
AEP	Azimuth-over-Elevation Positioning
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
APE	area of potential effects
ARB	California Air Resources Board
BA	Biological Assessment
BGs	block groups
BMPs	best management practices
BRWL	blue-rich white light lamps
BSA	biological study area
Business 80	I-80 Business
Caltrans	California Department of Transportation
CAP	climate action plan
CCR	California Code of Regulations
CCV	California Central Valley
CESA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CIA	Community Impact Assessment
CNEL	community noise exposure level metric
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CT	Census Tract
CV	Central Valley
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWA	Clean Water Act
dB	decibel
dBa	A-weighted decibel
Delta	Sacramento-San Joaquin River Delta
DPM	diesel particulate matter
DPS	distinct population segment
DSA	disturbed soil area
DWR	California Department of Water Resources
EDCAPCD	El Dorado County Air Pollution Control District
EIR/EA	Environmental Impact Report/Environmental Assessment

EO	Executive Order
FCAA	Federal Clean Air Act
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FOE	Finding of No Adverse Effect
FONSI	Findings of No Significant Impact
FRAQMD	Feather River Air Quality Management District
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GHG	greenhouse gas
Guidelines	Section 404 (b)(1) Guidelines
H_2S	hydrogen sulfide
HPSR	Historic Property Survey Report
HUC	Hydrologic Unit Code
I-5	Interstate 5
Business 80	I-80 Business
IBMI	Ione Band of Miwok Indians
ISA	Initial Site Assessment
k	Kelvin
LED	Light-emitting diode
LEDPA	least environmentally damaging practicable alternative
LID	low-impact development
LOS	level of service
msl	mean sea level
MSAT	mobile source air toxics
MTIP	Metropolitan Transportation Improvement Program
MTP/SCS	Metropolitan Transportation Plan/Sustainable Communities Strategy
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NCIC	North Central Information Center
NEPA	National Environmental Policy Act
NES	*Natural Environment Study*
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen dioxide
NOA	naturally occurring asbestos
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSAs	Noise-sensitive areas
NSR	Noise Study Report
NTUs	nephelometric turbidity units
NWIC	Northwest Information Center
O_3	ozone
OHWM	ordinary high-water mark
OSHA	Occupational Safety and Health Act
PAHs	polycyclic aromatic hydrocarbons
Pb	Lead
PCAPCD	Placer County Air Pollution Control District
PCBs	polychlorinated biphenyls

PFYC	Potential Fossil Yield Classification
PG&E	Pacific Gas and Electric Company
PM2.5	particles of 2.5 micrometers and smaller
PM10	particles of 10 micrometers or smaller
PM	particulate matter
POAQC	project of air quality concerns
ppd	pounds per day
PRC	California Public Resources Code
Protocol	*Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects*
Q50	50-year flood
Q100	100-year flood
Q200	200-year flood
RAP	Relocation Assistance Program
RCEM	Roadway Construction Emissions Model
RCRA	Resource Conservation and Recovery Act
RD	Reclamation District
RECs	recognized environmental Conditions
RMS	root mean square
RSP	rock slope protection
RTPs	Regional Transportation Plans
RWQCBs	Regional Water Quality Control Boards
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
Section 106 PA	First Amended Section 106 Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation
Section 4(f)	Section 4(f) of the Department of Transportation Act of 1977
SELs	sound exposure levels
sf	square feet
SFHA	Special Flood Hazard Area
SFNA	Sacramento Federal Nonattainment Area
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Municipal Utilities District
SO_2	Sulfur Dioxide
SQIP	Stormwater Quality Improvement Plan
SRA	shaded riverine aquatic
SRBPP	Sacramento River Bank Protection Project
SSBMI	Shingle Springs Band of Miwok Indians
SVAB	Sacramento Valley Air Basin
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCE	temporary construction easement
TIGER	Transportation Investment Generating Economic Recovery
TMDLs	total maximum daily loads
TMP	Transportation Management Plan
TMP Guidelines	Caltrans' *Transportation Management Plan Guidelines*
TNM	Traffic Noise Model

UAIC	United Auburn Indian Community of the Auburn Rancheria
ULDC	Floodsafe California – Urban Levee Design Criteria
UPRR	Union Pacific Railroad
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/C	volume-to-capacity
VAUs	visual assessment units
VELB	valley elderberry longhorn beetle
VIA	Visual Impact Assessment
VMT	vehicle miles travelled
WDRs	waste discharge requirements
WSAFCA	West Sacramento Area Flood Control Agency
WSE	water surface elevation
WSE50	50-year floodwater surface elevation
Yolo HCP/NCCP	Yolo Habitat Conservation Plan/Natural Communities Conservation Plan
YSAQM	Yolo-Solano Air Quality Management District

Appendix H Notice of Preparation

Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting for the Broadway Bridge Project

Date:	July 12, 2017
To:	Office of Planning and Research State Clearinghouse, Responsible Agencies, Trustee Agencies, Interested Parties
From:	City of West Sacramento
CEQA Lead Agency:	City of West Sacramento Public Works Department 1110 West Capitol Avenue West Sacramento, CA 95691
Contact:	Jason McCoy, Senior Transportation Planner (916) 617-4832 mccoyj@cityofwestsacramento.org
Project:	Broadway Bridge
Project Location:	Downstream of the U.S. 50 Pioneer Bridge, crossing the Sacramento River, connecting South River Road or 15th Street to the Broadway corridor in the Cities of West Sacramento and Sacramento
Scoping Period:	July 12 through August 10, 2017
Public Scoping Meeting:	Thursday, July 27, 2017, 5:00 to 6:30 p.m. Arthur A. Benjamin Health Professions High School 451 McClatchy Way, Sacramento, CA 95818

Notice of Preparation

The City of West Sacramento (City) is the lead agency for preparation of an environmental impact report (EIR) that addresses the potential impacts of the Broadway Bridge project. The EIR will evaluate potential significant environmental effects associated with construction and operation of the project. The City will use the EIR when considering approval of the project. The project is subject to state as well as federal environmental review requirements, and project documentation will be prepared in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The City of Sacramento, co-sponsor of the project, is a Responsible Agency under CEQA. The California Department of Transportation (Caltrans) is the NEPA lead agency and anticipates preparation of an Environmental Assessment. The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 U.S.C. 327 and the Memorandum of Understanding dated December 23, 2016 and executed by FHWA and Caltrans.

The purpose of this Notice of Preparation (NOP) is to obtain the views of agencies and the public as to the scope and content of the environmental information and analysis, including the significant environmental issues, project alternatives, and mitigation measures that should be included in the EIR. Responsible Agencies will likewise need to consider the EIR prepared by the City when issuing approvals for the

project. This NOP has been prepared pursuant to CEQA (14 California Code of Regulations) and State CEQA Guidelines Sections 15082(a), 15103, and 15375 to inform agencies and the public that the EIR is being prepared and to invite early comments and input on the scope and content of the EIR.

Public Review and Comment Period

In accordance with CEQA, comments and suggestions as to the appropriate scope of analysis in the EIR are invited from all interested parties. At a minimum, responses to this NOP should focus on the following.

- The potentially significant environmental effects that the proposed project may have on the physical environment that should be addressed in the EIR;
- Ways in which those effects might be minimized; and
- Potential alternatives to the proposed project that should be addressed in the EIR.

Written comments or questions concerning the EIR for the proposed project should include your name, the name of your agency or organization (if applicable), and contact information. Written comments must be received by the City by 5:00 p.m. August 10, 2017. Please send your comments to:

David Tilley, Principal Planner
City of West Sacramento
1110 West Capitol Avenue
West Sacramento, CA 95691
davidt@cityofwestsacramento.org

Public Scoping Meeting

The City will also conduct a public scoping meeting for the proposed project to receive comments on the scope and content of the EIR at the time and place listed below:

Thursday, July 27, 2017, 5:00 to 6:30 p.m.
Arthur A. Benjamin Health Professions High School
451 McClatchy Way, Sacramento, CA 95818

The scoping meeting will provide an opportunity for the public to learn more about the project and provide input to the environmental process. Anyone who desires to comment on any environmental issue associates with the proposed project will be afforded the opportunity to do so. The City will consider all comments in determining the final scope of the evaluation to be included in the EIR.

Project Description

The City, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road and 15th Street to the Broadway corridor. Several bridge alignment alternatives are being considered as part of the project (see attached figures). The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a future streetcar alignment within the bridge itself. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system.

Scope of Environmental Impact Report

The EIR will contain full analysis of both the construction impacts of the project, such as construction of the new bridge, new roadway approaches, and the bridge interconnect fiber optic line, as well as its operational (long-term) impacts. The full range of environmental issues that will be addressed in the EIR are listed below.

- Aesthetics and visual resources
- Air quality and greenhouse gas emissions
- Biological resources
- Cultural resources, including Tribal cultural resources
- Geology and soils
- Hazards and hazardous materials
- Hydrology and water quality
- Land use/planning
- Noise
- Population and housing
- Public services and utilities
- Recreation
- Transportation/traffic

The issues to be addressed will be finalized after comments on the NOP are received.

The EIR will also examine a reasonable range of alternatives to the project, including the CEQA-required No Project Alternative, in order to explore all possibilities for avoiding or substantially reducing any potentially significant effects of the proposed project.

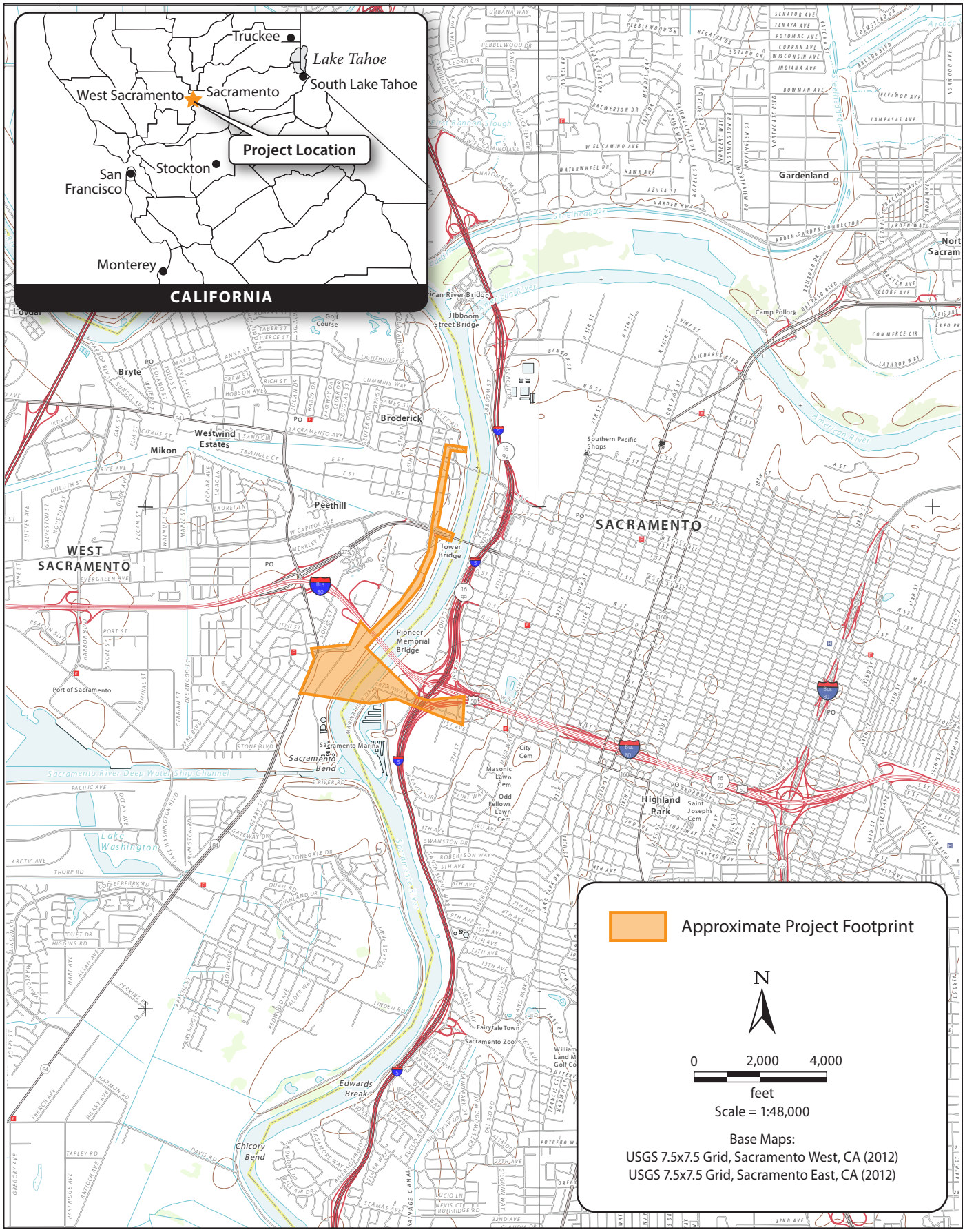
Lastly, the EIR will evaluate the following CEQA-required assessment conclusions: cumulative impacts, growth inducing impacts, effects found not to be significant, unavoidable significant impacts, and significant irreversible changes.

Attached Figures

Figure 1: Regional Location

Figure 2: Project Location

Figure 3: Project Exhibit



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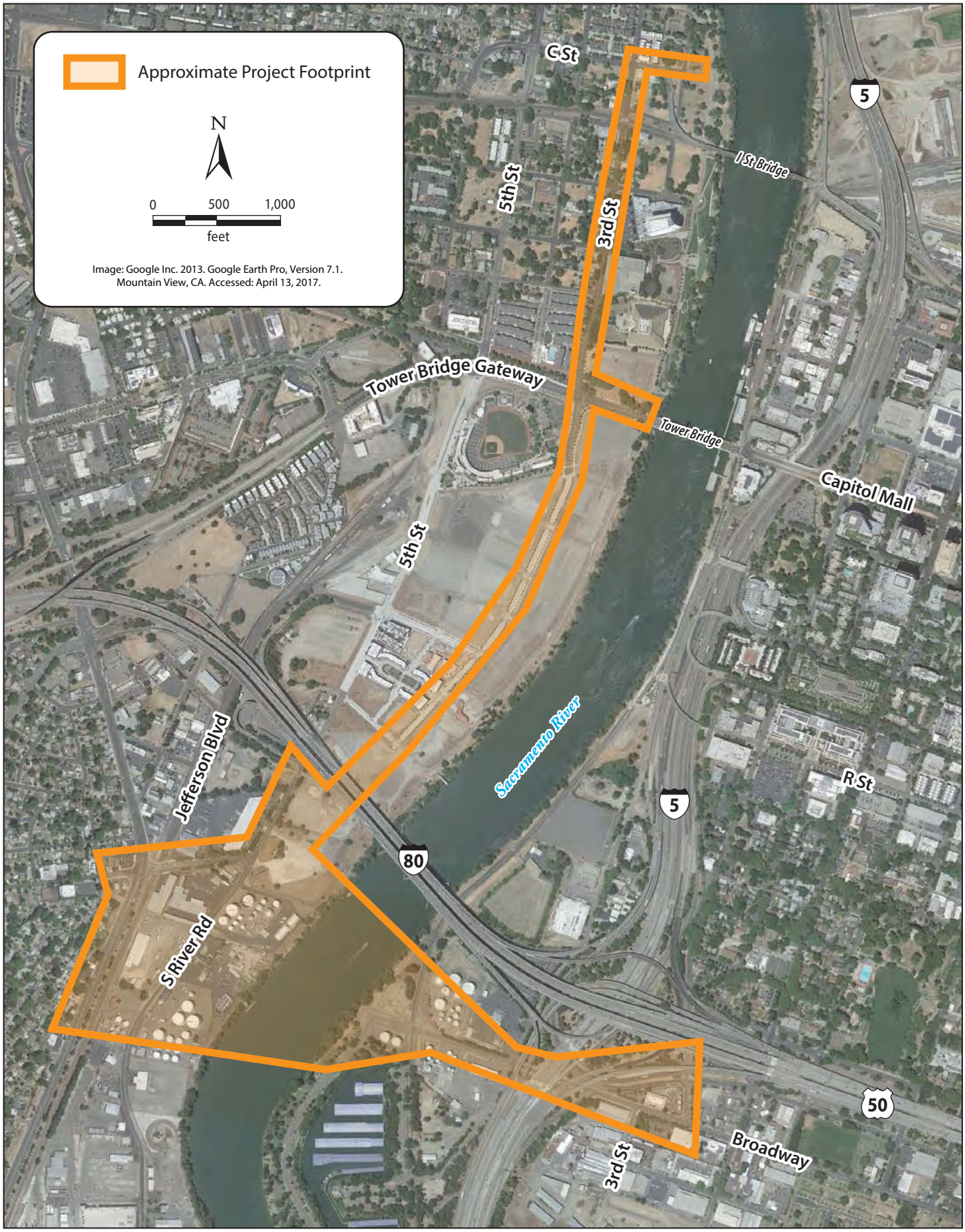
Broadway Bridge Regional Map



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Broadway Bridge
Project Location

RIVERFRONT ST

SACRAMENTO RIVER

US 50

INTERSTATE 5

BRIDGE INTERCONNECT
(SEE SHEET 2 FOR EXTENTS
OF THE FIBER OPTIC LINE)

fo

ALT C1
ALT B
ALT A

ALT 2

SB I-5 OFF RAMP

X ST

3RD ST

5TH ST

BROADWAY

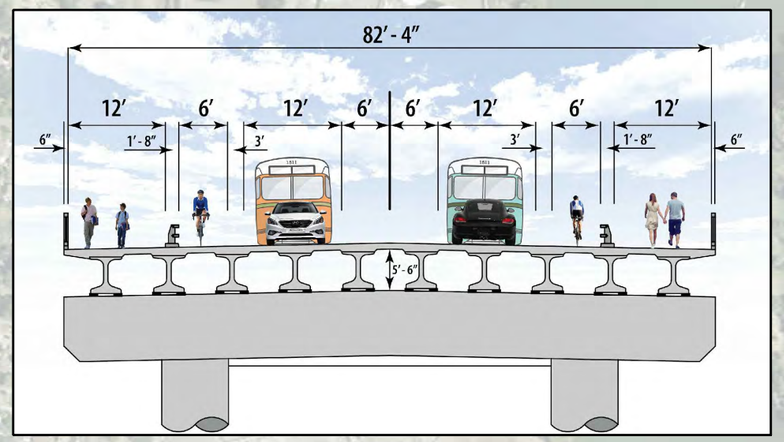
ALT 1

15TH ST

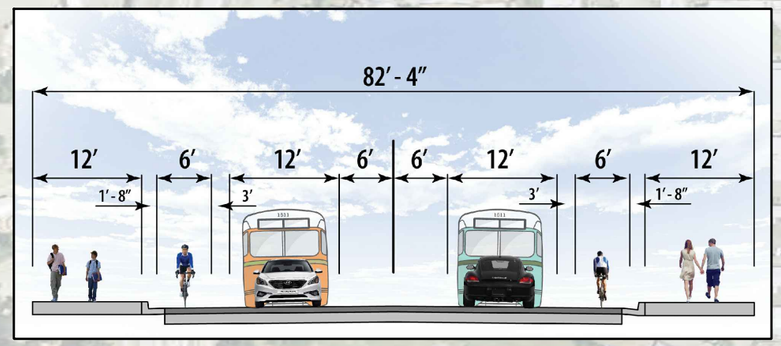
JEFFERSON BLVD

S RIVER RD

ALT D
ALT C3
ALT C2



BRIDGE CROSS SECTION



ROAD CROSS SECTION

SCALE: 1"=200'

BROADWAY BRIDGE PROJECT
EXHIBIT

SHEET 1

APRIL 2017

MARK THOMAS

15TH ST

JEFFERSON BLVD

S RIVER RD

US 50

5TH ST

BRIDGE INTERCONNECT

RIVERFRONT ST

3RD ST

C ST

SACRAMENTO RIVER

TOWER BRIDGE

I ST BRIDGE

INTERSTATE 5

BROADWAY

3RD ST

X ST

5TH ST

US 50

INTERSTATE 5

SCALE: 1"=300'

BROADWAY BRIDGE PROJECT
EXHIBIT

SHEET 2

APRIL 2017

MARK THOMAS

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

Established in 1938

JENNIFER LUCCHESI, *Executive Officer*
(916) 574-1800 *Fax* **(916) 574-1810**
California Relay Service TDD Phone **1-800-735-2929**
from Voice Phone **1-800-735-2922**

***Contact Phone:* (916) 574-1890**
***Contact FAX:* (916) 574-1885**

August 10, 2017

File Ref: SCH # 2017072019

Jason McCoy
City of West Sacramento
Public Works Department
1110 West Capitol Avenue
West Sacramento, CA 95691

Subject: Notice of Preparation (NOP) for an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Broadway Bridge (Project), Yolo and Sacramento Counties

Dear Mr. McCoy:

The California State Lands Commission (Commission) staff has reviewed the subject NOP for the EIS/EIR for the Broadway Bridge (Project), which is being prepared by the City of West Sacramento (City) and the California Department of Transportation (Caltrans). The City, as the public agency proposing to carry out the Project, is the lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.), and Caltrans is the lead agency under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.). The Commission is a trustee agency for projects that could directly or indirectly affect sovereign land and their accompanying Public Trust resources or uses. Additionally, because the Project involves work on sovereign land, the Commission will act as a responsible agency. Commission staff requests that the City consult with us on preparation of the Draft EIR as required by CEQA section 21153, subdivision (a), and the State CEQA Guidelines section 15086, subdivisions (a)(1) and (a)(2).

Commission Jurisdiction and Public Trust Lands

The Commission has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The Commission also has certain residual and review authority for tidelands and submerged land legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6009, subd. (c); 6009.1; 6301; 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the common law Public Trust Doctrine.

As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The state holds these lands for the benefit of all people of the state for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line (MHTL), except for areas of fill or artificial accretion or where the boundary has been fixed by agreement or a court of proper jurisdiction. On navigable non-tidal waterways, including lakes, the state holds fee ownership of the bed of the waterway landward to the ordinary low-water mark and a Public Trust easement landward to the ordinary high-water mark, except where the boundary has been fixed by agreement or a court of proper jurisdiction. Such boundaries may not be readily apparent from present day site inspections.

Based upon the information provided and a preliminary review of our records, the portion of the proposed Project crossing the Sacramento River will be located on State sovereign land under the jurisdiction of the Commission. A lease for the use of sovereign land will be required from the Commission for any portion of the Project encroaching on State sovereign land. In 2000, the Commission authorized Telephone Right-of-Way Permit No. PRC 8156.9 and an amendment of the permit to Level 3 Communications, LLC. The permit authorizes operation and maintenance of a fiber optic cable crossing the Sacramento River at the subject site.

Promotion of public access to and use of California's navigable waters is a mandate of the California Constitution (art. X, § 4), a condition of statehood in the Act of Admission (9 Stat. 452), and a responsibility of public agencies pursuant to the Public Trust Doctrine. In this case, the Legislature has provided for a process to be followed to facilitate and maintain public access to navigable rivers at bridge sites pursuant to California Streets and Highways Code section 1809. During the design hearing process, and prior to Commission consideration of approval of a bridge project, the City is required to fully consider, and prepare a report on, the feasibility of providing public access to the Sacramento River for recreational purposes, and determine if such public access will be provided.

Project Description

The City, in cooperation with Caltrans and the City of Sacramento (as a responsible agency), proposes to construct a new bridge over the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road and 15th Street to the Broadway corridor. Several bridge alignment alternatives are being considered as part of the Project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a future streetcar alignment within the bridge itself. The Project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system.

Environmental Review

Commission staff requests that the City consider the following comments when preparing the EIS/EIR.

General Comments

1. Project Description: A thorough and complete Project Description should be included in the EIS/EIR in order to facilitate meaningful environmental review of potential impacts, mitigation measures, and alternatives. The Project Description should be as precise as possible in describing the details of all allowable activities (e.g., types of equipment or methods that may be used, maximum area of impact or volume of sediment removed or disturbed, seasonal work windows, locations for material disposal, etc.), as well as the details of the timing and duration of activities. Thorough descriptions will facilitate Commission staff's determination of the extent and locations of its leasing jurisdiction, make for a more robust analysis of the work that may be performed, and minimize the potential that subsequent environmental analysis will be required. For example, the Project Description should:
    - explain with illustrations all proposed work below the MHTL of the river, including any land acquisitions and easements adjacent to the river that could affect public access
    - describe full construction details for all bridge support structures located in the river, including any dredging operations, pile driving, use of cofferdams, and use of barges
    - provide a detailed description of any proposed closures or restricted areas during construction operations for watercraft navigation on, and public access to, the river

Aesthetics

2. Scenic Impacts: The Broadway Bridge will have a substantial new visual presence within the river channel and to adjacent Sacramento and West Sacramento land uses. As such, the architectural style of the bridge is critically important and should attempt to serve as a future landmark of identity for both cities. Architectural elements, such as visual design, color, scale, orientation, and glare will need to be carefully selected to minimize scenic impacts. The EIS/EIR should include a visual simulation of the new bridge to illustrate the architectural style and how the bridge will fit in with the surrounding scenic character and corridor of the river.

    The U.S. 50 Bridge provides prominent gateway views to the Sacramento River and the cities of Sacramento and West Sacramento, and serves the greatest capacity of automobiles as a U.S. highway in comparison to the other nearby bridges. The Broadway Bridge has potential to block views of the Sacramento River from the south side of the U.S. 50 Bridge. The EIS/EIR should analyze the location and elevation of the new bridge as viewed from the south side of the Highway 50 Bridge, to minimize impacts on views of the river corridor as an important scenic vista.

Biological Resources

3. Special-Status Species and Habitats: The EIS/EIR should disclose and analyze all potentially significant effects on sensitive species and habitats in and around the Project area, including special-status wildlife, fish, and plants, and if appropriate, identify feasible mitigation measures to reduce those impacts. The City should conduct queries of the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB) and U.S. Fish and Wildlife Service's (USFWS) Special Status Species Database to identify any special-status plant or wildlife species that may occur in the Project area. The EIS/EIR should also include a discussion on consultation with CDFW, USFWS, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), including any recommended mitigation measures, construction work windows, and potentially required permits identified by these agencies.

4. Invasive Species: One of the major stressors in California waterways is introduced species. Therefore, the EIS/EIR should consider the Project's potential to encourage the establishment or proliferation of aquatic invasive species (AIS) such as the quagga mussel, or other nonindigenous, invasive species including aquatic and terrestrial plants. For example, construction boats and barges brought in from long stays at distant projects may transport new species to the Project area via hull biofouling, wherein marine and aquatic organisms attach to and accumulate on the hull and other submerged parts of a vessel. If the analysis in the EIS/EIR finds potentially significant AIS impacts, possible mitigation could include contracting vessels and barges from nearby, or requiring contractors to perform a certain degree of hull-cleaning. The CDFW's Invasive Species Program could assist with this analysis as well as with the development of appropriate mitigation (information at www.dfg.ca.gov/invasives/).

   In addition, in light of the recent decline of native pelagic organisms and in order to protect at-risk fish species, the EIS/EIR should examine if any elements of the Project (e.g., changes in bankside vegetative cover) would favor non-native fisheries within the Sacramento River and adjacent waterways.

5. Construction Noise: The EIS/EIR should also evaluate noise and vibration impacts on fish and birds from in-water construction and dredging activities. Activities of concern include, but are not limited to, pile driving, installation of a coffer dam, dredging, welding, installation of support tower foundations, etc. Mitigation measures could include species-specific work windows as defined by CDFW, USFWS, and NMFS. Again, staff recommends early consultation with these agencies to minimize the impacts of the Project on sensitive species.

Climate Change

6. Greenhouse Gases: A greenhouse gas (GHG) emissions analysis consistent with the California Global Warming Solutions Act (Assembly Bill [AB] 32) and required by the State CEQA Guidelines should be included in the EIS/EIR. This analysis should identify a threshold for significance for GHG emissions, calculate the level of GHGs

that will be emitted as a result of construction and ultimate build-out of the Project, determine the significance of the impacts of those emissions, and, if impacts are significant, identify mitigation measures that would reduce them to the extent feasible. Please include a full evaluation of all the equipment that could be used for any aspect of the dredging activities. Please contact all the Air Quality Management Districts (AQMDs) with regulatory oversight and jurisdiction. Air basins will have different impacts and criteria for analysis based on attainment status. Air impact analysis models for identifying the impacts of the proposed Project should be discussed with the AQMDs.

7. Sea-Level Rise: A tremendous amount of state-owned lands and resources under the Commission's jurisdiction will be impacted by rising sea levels. With this in mind, the EIS/EIR should discuss the effects of sea-level rise on all resource categories potentially affected by the proposed Project. Because of their nature and location, these lands and resources are already vulnerable to a range of natural events, such as storms and extreme high tides. Note that the State of California released the final "Safeguarding California: Reducing Climate Risk, an Update to the 2009 California Climate Adaptation Strategy" (Safeguarding Plan) on July 31, 2014, to provide policy guidance for state decision-makers as part of continuing efforts to prepare for climate risks. The Safeguarding Plan sets forth "actions needed" to safeguard ocean and coastal ecosystems and resources as part of its policy recommendations for state decision-makers.

   In addition, Governor Brown issued Executive Order B-30-15 in April 2015, which directs state government to fully implement the Safeguarding Plan and factor in climate change preparedness in planning and decision making. Please note that when considering lease applications, Commission staff will: (1) request information from applicants concerning the potential effects of sea-level rise on their proposed projects; (2) if applicable, require applicants to indicate how they plan to address sea-level rise and what adaptation strategies are planned during the projected life of their projects; and (3) where appropriate, recommend project modifications that would eliminate or reduce potentially adverse impacts from sea-level rise, including adverse impacts on public access. As the Project EIS/EIR is being developed, please consider Commission policy for the proposed Project and potential impacts on State sovereign land.

Cultural Resources

8. Submerged Resources: The EIS/EIR should evaluate potential impacts to submerged cultural resources in the Project area. The Commission maintains a shipwrecks database that can assist with this analysis. Commission staff requests that the City contact Staff Counsel Jamie Garrett (see contact information below) to obtain shipwrecks data from the database and Commission records for the Project site. The database includes known and potential vessels located on the State's tide and submerged lands; however, the locations of many shipwrecks remain unknown. Please note that any submerged archaeological site or submerged historic resource that has remained in state waters for more than 50 years is presumed to be significant. Because of this possibility, please add a mitigation measure requiring

that in the event cultural resources are discovered during any construction activities, Project personnel shall halt all activities in the immediate area and notify a qualified archaeologist to determine the appropriate course of action.

9. Title to Resources: The EIS/EIR should also mention that the title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the tide and submerged lands of California is vested in the state and under the jurisdiction of the Commission (Pub. Resources Code, § 6313). Commission staff requests that the City consult with Staff Counsel Jamie Garrett, should any cultural resources on state lands be discovered during construction of the proposed Project.

Hydrology/Water Quality

10. Mercury/Methylmercury: The EIS/EIR study area includes the Sacramento River and adjacent lands within the cities of Sacramento and West Sacramento. Staff requests that the EIS/EIR include avoidance and minimization measures to reduce potential release from Project activities of mercury and other toxins into waterways and onto state lands underlying those waterways.

    On April 22, 2010, the Central Valley Regional Water Quality Control Board (CVRWQCB) identified the Commission as both a state agency that manages open water areas in the Sacramento-San Joaquin Delta Estuary, and an agency that affects the transport of mercury and the production and transport of methylmercury (Resolution No. R5-2010-0043), because subsurface lands under the Commission's jurisdiction are impacted by mercury from legacy mining activities dating back to California's Gold Rush. Pursuant to a CVRWQCB Total Maximum Daily Load (TMDL), the CVRWQCB is requiring the Commission to fund studies to identify potential methylmercury control methods in the Delta and to participate in an Exposure Reduction Program. The goal of the studies are to evaluate existing control methods and evaluate options to reduce methylmercury in open waters under jurisdiction with the Commission. Any action taken that may result in mercury or methylmercury suspension within the Sacramento-San Joaquin Delta Estuary may affect the Commission's efforts to comply with the CVRWQCB TMDL.

11. Floodplain Encroachment: The construction of any new bridge support towers, armoring or debris protective structures, and footings within the river bed and waterward of levees will reduce floodplain volume for conveyance of floodwater. The EIS/EIR should analyze the local and regional significance of this impact, and the potential impact on existing flood management systems and facilities. The City is encouraged to work with the Central Valley Flood Control Board and other flood management entities on appropriate design, construction, and siting of bridge support structures within the floodplain of the river, including construction activities affecting existing levees. (Please see the Navigation section for related discussion.)

Navigation

12. Navigation Impediments: The Project involves construction of a new bridge within approximately 1 mile of three other existing bridges across the river (U.S. 50 Bridge,

Tower Bridge, and I Street Bridge). The Tower and I Street Bridges include moveable mid-section spans for passage of larger vessels, and these bridges can become an obstacle for navigation of smaller vessels during high flood stage events when the river is at or near full capacity. When heavy watercraft traffic is present on the river (i.e., summer weekends, holidays, prime fishing seasons, etc.), the in-water support towers for these bridges can pose navigation obstacles, resulting in constrained navigation. The support towers for these bridges also accumulate large woody debris and sedimentation (and everything else that can get caught in the debris piles), which can be a hazard for navigation and snag vessel anchors on the river bottom. Periodic maintenance is required to remove accumulated debris and maintain protective structures for the bridge towers (i.e., Tower Bridge Fender Replacement Project).

The Broadway Bridge has the potential to contribute to these types of navigation impacts on the river. A mitigation approach to offset the navigation impacts of the Project, could include removal of other existing derelict structures and navigation hazards in the surrounding project vicinity of the river. Derelict structures in the Project vicinity could include abandoned pilings, outfall pipelines, piers, floating docks, abandoned vessels, artificial debris, etc.

To the extent feasible, the footings and support towers for the bridge should be designed to minimize navigation impacts, and the bridge deck should be elevated to avoid disruption of navigation by smaller vessels during high flood stage events, when the river is at or near full capacity. The City is encouraged to provide this analysis in the EIS/EIR.

Noise

13. Operational Noise: The long-term operations of the Project will introduce a range of new noise sources to the Sacramento River. Although the Project will be relatively close to the U.S. 50 Bridge, the Broadway Bridge will likely have a bridge deck of lower elevation to the river, similar to the Tower and I Street Bridges, which connect surface streets on both sides of the river. The EIS/EIR should evaluate the impacts of these noise sources on river recreation and uses, and if potentially significant, provide mitigation measures to offset impacts. New noise impact considerations include, but are not limited to:

    - Use of a siren or other amplified noise to operate the moveable span of the bridge for vessel navigation
    - Noise associated with operation of a public transit streetcar
    - Noise from automobiles and emergency service vehicles

Recreation

14. Public Access: For all construction phases of the Project, the EIS/EIR should provide a detailed description of any temporary restrictions on public access from the land side of the river, and for navigation within the river, including for emergency response service providers. Potential mitigation measures could include public notices and posting of signs to inform the public of temporary access restrictions.

Cumulative Impacts

15. Cumulative Impacts: The EIS/EIR should consider the cumulative impacts of other past, present, and probable future projects that could contribute to impacts generated by the Project. Such projects may include the Tower Bridge Fender Replacement project and the Southport Sacramento River Early Implementation Project.

Mitigation and Alternatives

16. Deferred Mitigation: In order to avoid the improper deferral of mitigation, mitigation measures should either be presented as specific, feasible, enforceable obligations, or should be presented as formulas containing "performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way" (State CEQA Guidelines, §15126.4, subd. (a)).

17. Alternatives: In addition to describing mitigation measures that would avoid or reduce the potentially significant impacts of the Project, the City should identify and analyze a range of reasonable alternatives to the proposed Project that would attain most of the Project objectives, while avoiding or reducing one or more of the potentially significant impacts (see State CEQA Guidelines, § 15126.6).

Thank you for the opportunity to comment on the NOP for the Project. As a trustee and responsible agency, Commission staff requests that you consult with us on this Project and keep us advised of changes to the Project Description and all other important developments. Please send additional information on the Project to the Commission staff listed below as the EIS/EIR is being prepared.

Please refer questions concerning environmental review to Jason Ramos, Senior Environmental Scientist, at (916) 574-1814 or via e-mail at Jason.Ramos@slc.ca.gov. For questions concerning archaeological or historic resources under Commission jurisdiction, please contact Staff Counsel Jamie Garrett at (916) 574-0398 or via e-mail at Jamie.Garrett@slc.ca.gov. For questions concerning Commission leasing jurisdiction, please contact Mary Jo Columbus, Public Land Management Specialist, at (916) 574-0204 or via e-mail at MaryJo.Columbus@slc.ca.gov.

Sincerely,

Cy R. Oggins, Chief
Division of Environmental Planning
and Management

cc: Office of Planning and Research
J. Ramos, Commission
M. Columbus, Commission
J. Garrett, Commission

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Notice of Preparation

July 12, 2017

To: Reviewing Agencies

Re. Broadway Bridge Project
SCH# 2017072019

Attached for your review and comment is the Notice of Preparation (NOP) for the Broadway Bridge Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Jason McCoy
City of West Sacramento
1110 W. Capitol Avenue
West Sacramento, CA 95691

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# 2017072019
Project Title Broadway Bridge Project
Lead Agency West Sacramento, City of

Type NOP Notice of Preparation

Description The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River downstream of the US 50 Pioneer Bridge, connecting South River Road or 15th Street to the Broadway corridor. Several bridge alignment alternatives are being considered as part of the project. The new bridge will be movable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a future street car alignment within the bridge itself. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by on system.

Lead Agency Contact

Name Jason McCoy
Agency City of West Sacramento
Phone 916-617-4832 **Fax**
email
Address 1110 W. Capitol Avenue
City West Sacramento **State** CA **Zip** 95691

Project Location

County Yolo, Sacramento
City West Sacramento, Sacramento
Region
Cross Streets South River Road, 15th Street, Broadway
Lat / Long 38° 34' 10" N / 121° 31' 5" W
Parcel No. Various
Township 8N **Range** 4E **Section** **Base** 10

Proximity to:

Highways I-5, US 50, SR 51
Airports
Railways UPRR
Waterways Sacramento and American Rivers
Schools Leataata Floyd, Westmen
Land Use West Sacramento: Riverfront/Mixed Use, Waterfront, Sacramento: Parks&Rec. Urban Corridor Low

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Biological Resources; Flood Plain/Flooding; Geologic/Seismic; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Wetland/Riparian; Landuse; Cumulative Effects

Reviewing Agencies Resources Agency; Department of Boating and Waterways; Central Valley Flood Protection Board; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 2; Delta Protection Commission; Delta Stewardship Council; Native American Heritage Commission; Public Utilities Commission; State Lands Commission; California Highway Patrol; Caltrans, District 3 S; Air Resources Board, Transportation Projects; Regional Water Quality Control Bd., Region 5 (Sacramento)

Date Received 07/12/2017 **Start of Review** 07/12/2017 **End of Review** 08/10/2017

Note: Blanks in data fields result from insufficient information provided by lead

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

2017072019

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title: Broadway Bridge Project

Lead Agency: City of West Sacramento
Contact Person: Jason McCoy
Mailing Address: 1110 West Capitol Avenue
Phone: 916-617-4832
City: West Sacramento Zip: 95691 County: Yolo

Project Location: County: Yolo and Sacramento City/Nearest Community: West Sacramento, Sacramento
Cross Streets: South River Road, 15th Street, Broadway Zip Code: 95691
Longitude/Latitude (degrees, minutes and seconds): 38 ° 34 ′ 10 ″ N / 121 ° 31 ′ 5 ″ W Total Acres:
Assessor's Parcel No.: various Section: Twp.: 8N Range: 4E Base: 10
Within 2 Miles: State Hwy #: I-5, US 50, SR 51 Waterways: Sacramento and American Rivers
Airports: Railways: UPPR Schools: Leataata Floyd, Westmo

Document Type:

CEQA: ☒ NOP ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec Other:

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other:

Governor's Office of Planning & Research
JUL 12 2017
STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Transportation

Development Type:

☐ Residential: Units Acres
☐ Office: Sq.ft. Acres Employees
☐ Commercial: Sq.ft. Acres Employees
☐ Industrial: Sq.ft. Acres Employees
☐ Educational:
☐ Recreational:
☐ Water Facilities: Type MGD
☒ Transportation: Type Bridge
☐ Mining: Mineral
☐ Power: Type MW
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☐ Other:

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☐ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☐ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ☒ Flood Plain/Flooding ☐ Forest Land/Fire Hazard ☒ Geologic/Seismic ☐ Minerals ☒ Noise ☒ Population/Housing Balance ☒ Public Services/Facilities
☒ Recreation/Parks ☐ Schools/Universities ☐ Septic Systems ☐ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☐ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation
☒ Vegetation ☒ Water Quality ☐ Water Supply/Groundwater ☒ Wetland/Riparian ☒ Growth Inducement ☒ Land Use ☒ Cumulative Effects ☐ Other:

Present Land Use/Zoning/General Plan Designation:

West Sacramento: Riverfront/Mixed-Use, Waterfront. Sacramento: Parks & Rec, Urban Corridor Low,

Project Description: *(please use a separate page if necessary)*

The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street to the Broadway corridor. Several bridge alignment alternatives are being considered as part of the project. The new bridge will be movable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a future streetcar alignment within the bridge itself. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

NOP Distribution List

County: Yolo : Sacramento SCH# 2017072019

esources Agency

- [ ] **Resources Agency**
  Nadell Gayou
- [x] **Dept. of Boating & Waterways**
  Denise Peterson
- [ ] **California Coastal Commission**
  Elizabeth A. Fuchs
- [ ] **Colorado River Board**
  Lisa Johansen
- [ ] **Dept. of Conservation**
  Crina Chan
- [ ] **Cal Fire**
  Dan Foster
- [x] **Central Valley Flood Protection Board**
  James Herota
- [ ] **Office of Historic Preservation**
  Ron Parsons

Dept of Parks & Recreation
Environmental Stewardship Section

- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve Goldbeck
- [x] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

Fish and Game

- [ ] **Depart. of Fish & Wildlife**
  Scott Flint
  Environmental Services Division
- [ ] **Fish & Wildlife Region 1**
  Curt Babcock
- [ ] **Fish & Wildlife Region 1E**
  Laurie Harnsberger
- [x] **Fish & Wildlife Region 2**
  Jeff Drongesen
- [ ] **Fish & Wildlife Region 3**
  Craig Weightman
- [ ] **Fish & Wildlife Region 4**
  Julie Vance
- [ ] **Fish & Wildlife Region 5**
  Leslie Newton-Reed
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6**
  Tiffany Ellis
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M**
  Heidi Calvert
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M**
  William Paznokas
  Marine Region

Other Departments

- [ ] **California Department of Education**
  Lesley Taylor
- [ ] **OES (Office of Emergency Services)**
  Monique Wilber
- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Dept. of General Services**
  Cathy Buck
  Environmental Services Section
- [ ] **Housing & Comm. Dev.**
  CEQA Coordinator
  Housing Policy Division

Independent Commissions,Boards

- [x] **Delta Protection Commission**
  Erik Vink
- [x] **Delta Stewardship Council**
  Kevan Samsam
- [ ] **California Energy Commission**
  Eric Knight
- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [x] **Public Utilities Commission**
  Supervisor
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [x] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Cal State Transportation Agency CalSTA

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans – Planning**
  HQ LD-IGR
  Christian Bushong
- [x] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [x] **Caltrans, District 3**
  Eric Federicks – South
  Susan Zanchi - North
- [ ] **Caltrans, District 4**
  Patricia Maurice
- [ ] **Caltrans, District 5**
  Larry Newland
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Dianna Watson
- [ ] **Caltrans, District 8**
  Mark Roberts
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Maureen El Harake

Cal EPA

Air Resources Board

- [ ] **Airport & Freight**
  Jack Wursten
- [x] **Transportation Projects**
  Nesamani Kalandiyur
- [ ] **Industrial/Energy Projects**
  Mike Tollstrup
- [ ] **California Department of Resources, Recycling & Recovery**
  Sue O'Leary
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Cindy Forbes – Asst Deputy
  Division of Drinking Water
- [ ] **State Water Resources Control Board**
  Div. Drinking Water #_____
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resources Control Board**
  Phil Crader
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [x] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____
  _____
  _____
- [ ] _____
  Conservancy

Last Updated 4/28/17

State of California
Governor's Office of Planning and Research
State Clearinghouse
P.O. Box 3044
1400 Tenth Street
Sacramento, California 95812-3044

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Department of Public Works

95691-271710

McCoy, Jason

From: McCoy, Jason
Sent: Friday, July 14, 2017 4:16 PM
To: Moulton. Kelly
Subject: RE: NOP

Kelly,
Thank you for letting me know, yes I will update the database. I'll also be sure to let our Community Development group know to update their records.

JASON McCOY, AICP
Supervising Transportation Planner

Public Works Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: Moulton. Kelly [mailto:moultonk@saccounty.net]
Sent: Friday, July 14, 2017 4:00 PM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Subject: NOP

Hi Jason,

I just received your NOP for the Broadway Bridge Project. Is there any way to update your database to my contact information? Greg Rowe has retired from the County several years ago and his mail does not always make it to my desk.

Many thanks,

Kelly Moulton, CM
Senior Airport Planner
Planning and Environment

Sacramento County Department of Airports

916.874.0190 (office)

www.sacramento.aero

REGIONALSAN
TAKING THE WASTE OUT OF WATER
Sacramento Regional County Sanitation District

Main Office
10060 Goethe Road
Sacramento, CA 95827-3553
Tel: 916.876.6000
Fax: 916.876.6160

Treatment Plant
8521 Laguna Station Road
Elk Grove, CA 95758-9550
Tel: 916.875.9000
Fax: 916.875.9068

www.regionalsan.com

July 18, 2017

Mr. Jason McCoy
City of West Sacramento – Public Works Department
1110 West Capitol Avenue
West Sacramento, CA 95691

Subject: Notice of Preparation of an Environmental Impact Report for the Broadway Bridge Project – City of West Sacramento

Dear Mr. McCoy,

Sacramento Regional County Sanitation District (Regional San) has reviewed the Environmental Impact Report for the City of West Sacramento's Broadway Bridge Project and has the following comments.

The proposed project will have no significant impacts on Regional San facilities.

Regional San Advisories:

1. Both the City of Sacramento (City) and Regional San have a sanitary sewer system that is jointly operated by both jurisdictions (City Interceptor). Portions of the City operated/maintained facility are located within their Sump 1 and Sump 2A facilities which are located within the proposed project's boundaries. The Regional San operated/maintained portion is located outside of the proposed project's boundaries.

If you have any questions regarding this letter, please feel free to contact me at (916) 876-6104 or by email: armstrongro@sacsewer.com.

Sincerely,

Robb Armstrong

Robb Armstrong
Regional San Development Services & Plan Check

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

Alberto Ayala, Ph.D., M.S.E.
AIR POLLUTION CONTROL OFFICER

August 10, 2017

SENT VIA EMAIL

David Tilley, Principal Planner
City of West Sacramento
1110 West Capitol Avenue
West Sacramento, CA 95691
davidt@cityofwestsacramento.org

Subject: ***SMAQMD comments on the NOP for the Broadway Bridge Project***

Dear Mr. Tilley,

Thank you for providing the Sacramento Metropolitan Air Quality Management District (SMAQMD) the opportunity to review and comment on the *Notice of Preparation of an Environmental Impact Report for the Broadway Bridge Project* (NOP). Below are the SMAQMD recommendations for analysis in the Draft Environmental Impact Report (DEIR).

1. The NOP contains a description of the scope of issues to be addressed in the DEIR that includes Air Quality and Greenhouse Gasses. The SMAQMD provides analysis expectation in our *Guide to Air Quality Assessment in Sacramento County* document, which is available on our website[1].

2. The SMAQMD guidance provides significance thresholds against which project emissions should be measured to evaluate air quality impacts. Any impacts analysis should include emissions associated with any haul trips that occur in Sacramento County as well as any equipment used on the Sacramento portion of the project.

3. If any portion of this work, particularly haul trips, will take place in any of the adjacent air districts, it will be important to contact them as well to ensure all appropriate requirements of those jurisdictions have been met.

4. In the Transportation/traffic section of the DEIR, please include analysis of the impacts of an alternative design that features protected bicycle lanes or cycle-tracks[2] in place of the proposed bicycle lanes. Also, please include analysis of the following potential impacts:
    a. The short and long-term effects of the proposed project on the existing Bicycle/Pedestrian pathway that bisects the project site on the east side of the Sacramento River.
    b. The effect the different alignment alternatives have on travel mode split (walk/bike/transit/personal motor vehicle).

[1] The SMAQMD CEQA Guidance, thresholds, & other tools are available at: http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools
[2] National Association of City Transportation Officials (NACTO); *Urban Bikeway Design Guide*: https://nacto.org/publication/urban-bikeway-design-guide/cycle-tracks/one-way-protected-cycle-tracks/

c. Consistency with other plans that may apply to the project (including, but not limited to the Downtown/Riverfront Streetcar Project, the Broadway Complete Streets Plan, the Bridge District Specific Plan, etc.)

All projects are subject to SMAQMD rules in effect at the time of construction. A complete listing of current rules is available at www.airquality.org or by calling 916-874-4800. Attached is a list of specific rules that may relate to construction activities or building design.

Best Regards,

-JJ Hurley

Joseph James Hurley
Associate Air Quality Planner/Analyst
Land Use & CEQA section
Communication, Land Use & Mobile Sources Division
Sacramento Metropolitan Air Quality Management District
777 12th Street, 3rd Floor
Sacramento, CA 95814
jhurley@airquality.org
916.874.2694

ATTACHMENT

SMAQMD Rules & Regulations Statement (revised 1/2017)

*The following statement is recommended as standard condition of approval or construction document language for **all** development projects within the Sacramento Metropolitan Air Quality Management District (SMAQMD):*

All projects are subject to SMAQMD rules in effect at the time of construction. A complete listing of current rules is available at www.airquality.org or by calling 916.874.4800. Specific rules that may relate to construction activities or building design may include, but are not limited to:

Rule 201: General Permit Requirements. Any project that includes the use of equipment capable of releasing emissions to the atmosphere may require permit(s) from SMAQMD prior to equipment operation. The applicant, developer, or operator of a project that includes an emergency generator, boiler, or heater should contact the SMAQMD early to determine if a permit is required, and to begin the permit application process. Other general types of uses that require a permit include, but are not limited to, dry cleaners, gasoline stations, spray booths, and operations that generate airborne particulate emissions.
Portable construction equipment (e.g. generators, compressors, pile drivers, lighting equipment, etc.) with an internal combustion engine over 50 horsepower is required to have a SMAQMD permit or a California Air Resources Board portable equipment registration (PERP) (see Other Regulations below).

Rule 402: Nuisance. The developer or contractor is required to prevent dust or any emissions from onsite activities from causing injury, nuisance, or annoyance to the public.

Rule 403: Fugitive Dust. The developer or contractor is required to control dust emissions from earth moving activities, storage or any other construction activity to prevent airborne dust from leaving the project site.

Rule 414: Water Heaters, Boilers and Process Heaters Rated Less Than 1,000,000 BTU PER Hour. The developer or contractor is required to install water heaters (including residence water heaters), boilers or process heaters that comply with the emission limits specified in the rule.

Rule 417: Wood Burning Appliances. This rule prohibits the installation of any new, permanently installed, indoor or outdoor, uncontrolled fireplaces in new or existing developments.

Rule 442: Architectural Coatings. The developer or contractor is required to use coatings that comply with the volatile organic compound content limits specified in the rule.

Rule 453: Cutback and Emulsified Asphalt Paving Materials. This rule prohibits the use of certain types of cut back or emulsified asphalt for paving, road construction or road maintenance activities.

Rule 460: Adhesives and Sealants. The developer or contractor is required to use adhesives and sealants that comply with the volatile organic compound content limits specified in the rule.

Rule 902: Asbestos. The developer or contractor is required to notify SMAQMD of any regulated renovation or demolition activity. Rule 902 contains specific requirements for surveying, notification, removal, and disposal of asbestos containing material.

Other Regulations (California Code of Regulations (CCR))

17 CCR, Division 3, Chapter 1, Subchapter 7.5, §93105 Naturally Occurring Asbestos: The developer or contractor is required to notify SMAQMD of earth moving projects, greater than 1 acre in size in areas "Moderately Likely to Contain Asbestos" within eastern Sacramento County. The developer or contractor is required to comply with specific requirements for surveying, notification, and handling soil that contains naturally occurring asbestos.

13 CCR, Division 3, Chapter 9, Article 5, Portable Equipment Registration Program: The developer or contractor is required to comply with all registration and operational requirements of the portable equipment registration program such as recordkeeping and notification.

13 CCR, Division 3, Chapter 9, Article 4.8, §2449(d)(2) and 13 CCR, Division 3, Chapter 10, Article 1, §2485 regarding Anti-Idling: Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes. These apply to diesel powered off-road equipment and on-road vehicles, respectively.

SMUD®

Sent Via E-Mail

August 10, 2017

John McCoy
City of West Sacramento
Public Works Department
1110 West Capitol Avenue
West Sacramento, CA 95691
mccoyj@cityofwestsacramento.org

Subject: Notice of Preparation of an Environmental Impact Report for the Broadway Bridge Project (Clearinghouse No. 2017072019)

Dear Mr. McCoy:

The Sacramento Municipal Utility District (SMUD) appreciates the opportunity to provide comments on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Broadway Bridge Project (Project). SMUD is the primary energy provider for Sacramento County and the proposed Project area. SMUD's vision is to empower our customers with solutions and options that increase energy efficiency, protect the environment, reduce global warming, and lower the cost to serve our region. As a Responsible Agency, SMUD aims to ensure that the proposed Project limits the potential for significant environmental effects on SMUD facilities, employees, and customers.

It is our desire that the EIR for the Project will acknowledge any Project impacts related to the following:

- Overhead and or underground transmission and distribution line easements. Please view the following links on smud.org for more information regarding transmission encroachment:
  - https://www.smud.org/en/business/customer-service/support-and-services/design-construction-services.htm
  - https://www.smud.org/en/do-business-with-smud/real-estate-services/transmission-right-of-way.htm
- Utility line routing
- Electrical load needs/requirements
- Energy Efficiency
- Climate Change
- Cumulative impacts related to the need for increased electrical delivery

Based on our review of the NOP and our understanding of the proposed Project, SMUD offers the following input for your consideration:

1. Project Description: SMUD has existing 21kV overhead/underground infrastructure that serves the immediate area. SMUD's 21kV infrastructure is located: (a) on the north and south sides of Broadway west of Interstate 5 (I-5) to Marina View Drive; (b) on the north side of Broadway, just west of I-5 to the train tracks; (c) on both sides (east and west) of Marina View Drive from Broadway continuing south; (d) the north side of Broadway east of I-5 to 3rd Street; and (e) along the north and south side of Broadway under the I-5 interchange.

   SMUD would like to be informed of any anticipated Project related impacts on existing or future SMUD facilities. It is important that information regarding potential impacts to SMUD facilities in the vicinity of the proposed Project be contained in the Project description chapter of the EIR, as well as the existing conditions discussion of the utilities, hazards and hazardous materials, and cumulative impact sections.

2. Planning and CEQA Considerations: As a Responsible Agency, SMUD requests that the following issues be considered during the Project design and planning and any associated impacts be considered in the EIR:
   - In the event the relocation or removal of existing SMUD facilities on or adjacent to the Project site is required, the City of West Sacramento (City) shall coordinate with SMUD. The City shall be responsible for the cost of relocation or removal.
   - SMUD reserves the right to use any portion of its easements on or adjacent to the Project site that it reasonably needs and shall not be responsible for any damages to the developed property within said easement that unreasonably interferes with those needs.
   - If electrical service to the bridge will be coming from SMUD's side of the river, then appropriate easements and/or infrastructure to and on the bridge may be required.

SMUD would like to be involved with discussing the above areas of interest as well as discussing any other potential issues. We aim to be partners in the efficient and sustainable delivery of the proposed Project. Please ensure that the information included in this response is conveyed to the Project planners and the appropriate Project proponents.

Environmental leadership is a core value of SMUD and we look forward to collaborating with you on this Project. Again, we appreciate the opportunity to provide input on this

NOP of an EIR for the Broadway Bridge Project. If you have any questions regarding this letter, please contact Rob Ferrera at rob.ferrera@smud.org or (916)732-6676.

Sincerely,

Angela C. McIntire
Regional & Local Government Affairs
Sacramento Municipal Utility District
6301 S Street, Mail Stop A313
Sacramento, CA 95817
angela.mcintire@smud.org

Cc: Rob Ferrera, SMUD

UPPER LAND PARK NEIGHBORS

Post Office Box 188083
Sacramento, Ca 95818

Mr. David Tilley, Principal Planner
City of West Sacramento
1110 West Capitol Avenue
West Sacramento, California 95691

Dear Mr. Tilley:

Upper Land Park Neighbors (ULPN) submits these recommendations for inclusion in the proposed Environmental Impact Report (EIR), which is required to evaluate and study the impacts from the proposed Broadway Bridge project. Our residential community is located in the City of Sacramento, south of Broadway and west of Riverside and very near to the proposed bridge. The bridge's size, traffic impacts, aesthetics and visual impacts, air quality and greenhouse gas emissions will have a direct effect on our neighborhood.

On October 18, 2011, the City of Sacramento City Council adopted a resolution (Res. No. 2011-577) accepting a Neighborhood Friendly Bridge definition for *any* bridge connection between it and the City of West Sacramento. The Resolution's Appendix B reads:

Neighborhood Friendly Bridge Definition

"New crossings of the Sacramento River between the City of Sacramento and West Sacramento shall be Neighborhood Friendly. A Neighborhood Friendly river crossing shall be defined as:

- A facility whose primary function is local connectivity rather than regional travel and primarily serves short local trips.
- A bridge which serves all users, including motorists, bicyclists, pedestrians, low energy vehicles, and public transit riders.
- A bridge with aesthetics and dimensions which are architecturally pleasing and contextually appropriate for the adjacent neighborhoods.
- A bridge that does not exceed or expand the already-planned capacity of the approach roadways (i.e. no widening of approaches just to accommodate bridge flows.)
- A facility which is designed with a target speed that is equal to or less than the approach roadways.
- A bridge which reduces the growth in vehicle miles traveled in the adjacent communities.
- A bridge that does not connect directly to streets which are primarily residential in character.
- A bridge that is consistent with the Need and Purpose statement as articulated."

The EIR needs to evaluate a bridge design that will ensure a neighborhood friendly bridge that: 1) is used primarily for local, short trips rather than regional travel ; 2) includes all modes of transportation; 3) is designed with a target speed equal to or less than the existing 25 and 30 miles per hour (MPH) approach roadways; and 4) not exceed or expand the planned capacity of Broadway. The bridge should function as a local bridge and not merely remove "through" traffic from the often clogged Highway 50 Freeway and I-5 Interchange freeways.

Bridge Feasibility Studies[1]

The City of West Sacramento, as lead for this project, has completed several studies to evaluate the various bridge alignments. The Sacramento River Crossings and the Broadway Bridge Feasibility Studies incorporated this definition in its efforts to evaluate bridge alternatives. The Feasibility Study Executive Summary states that "the Broadway Bridge would relieve Caltrans from building a freeway interchange at Jefferson Blvd. and Highway 50/Pioneer Bridge." Other studies also stated that the City of West Sacramento did not approve the Neighborhood Friendly Bridge definition and agreed to include four auto lanes as one option for the bridge. The Feasibility Study's Traffic Analyses states that the four-lane option would remove approximately 47,000 vehicles per day from the Highway 50/Pioneer Bridge. It would also increase the amount of traffic entering Broadway, more than doubling the auto traffic over time.

EIR ANALYSES

The Environmental Impact Report (EIR) will evaluate cumulative impacts, growth inducing impacts, efforts found not to be significant, unavoidable significant impacts and significant irreversible changes. As part of the EIR evaluation, ULPN proposes the following issues to be included, studied and addressed:

PROJECT AREA

1. Expand the project area in the City of Sacramento to include the existing Highway 50/I-5 Interchange Area. Because of this benefit, Caltrans should focus on I-5 and Highway 50 interchange improvements and better freeway access. The EIR should evaluate improvements to the I-5/Highway 50 Interchange and access to freeways. For example, to improve circulation coming from the bridge, a new on ramp could be constructed on Front Street to access I-5 South. Also, a new on-ramp going east to Highway 50 could be considered on X Street near 3rd Street or opposite the existing I-5 off ramp to Broadway. This would help direct through-traffic up onto freeways more quickly and reduce surface street traffic. Improving traffic flow on the existing interchange traffic should be considered. There is precedent for this type of cooperation; the City of Roseville and Caltrans worked together to make improvements to one of its major interchanges. The Feasibility Study states Caltrans would not need to build an interchange at Jefferson & Highway 50 because of the proposed Broadway Bridge.

2. Expand the project area's east boundary from 3rd Street along Broadway to 21st Street. The proposed east boundary of the project area ends at 3rd Street on Broadway. This is inadequate and doesn't reflect a serious attention to studying the bridge impacts in the City of Sacramento. As stated in the Feasibility Study, not all traffic will travel downtown. The study admits that a significant amount of traffic will travel to employment centers to the east. The major employment center to the

[1] Feasibility Studies for the Broadway Bridge were conducted by the City of West Sacramento between March and December 2015 and include several technical memoranda, including, but not limited to, a Conceptual Alignment Alternatives and Traffic Analyses. For access to these studies and more information: https://www.cityofwestsacramento.org/city/depts/pw/major_projects/bbfs.asp

east is the medical complex comprised of University of California Davis Medical Center, Shriners' Children Hospital and the Veterans Hospital. Ending the project area at 3rd Street and Broadway is totally inadequate.

BRIDGE OPTIONS

Number of Auto Lanes/Dedicated Public Transit Lanes

Four-lane bridge option was approved by the City of West Sacramento in order to handle West Sacramento's traffic volumes. The Traffic Study indicated that most traffic will come from Southport and future development along South River Road. With a four-lane auto bridge, 47,000 trips/day would be removed from the Highway 50 Pioneer Bridge. This would increase the potential for non-destination, "through" trips. This is contrary to the Neighborhood Friendly Bridge definition which requires the bridge to serve local, short destination trips.

The Feasibility Study states that the number of lanes will have a direct impact on auto traffic volumes. When comparing a two-lane bridge with a four-lane bridge, there is a significant difference in traffic volumes. In 2040, a two-lane bridge would result in 32,000 vehicles per day (VPD) and a four-lane bridge would result in 49,300 vehicles per day (VPD) -- 17,300 more vehicles per day than the two lane option. The consultant report states that a two-lane bridge "may be more compatible with the Neighborhood Friendly definition." We agree that the four-lane bridge option is not neighborhood friendly, particularly the approach lanes in both cities.

Evaluate Public Transit Lane(s): Graphs at the Open House showed two auto lanes (one in each direction), with a proposed ***future*** light rail transit lane and four auto lanes (two in each direction) with a proposed ***future*** light rail use. The EIR must evaluate the proposed future light rail lane as if it would be used for auto traffic. A future light rail system may never ever be built and the lane could be used as an additional lane to help move more traffic during morning and evening commute times, e.g. Golden Gate Bridge. The proposed public transit lane could be used for auto traffic for years. The project must indicate that this lane is dedicated to public transit lane (for buses, light rail) and analyzed with both bus service and light rail. Also, the number of people projected to take public transit must be thoroughly analyzed. Public transit ridership has decreased substantially nationwide and especially in Sacramento. The analysis should include ***local*** public transit ridership projections and not rely only on national projections.

West Sacramento four-lane approaches to Bridge: The Feasibility Study states that the roads approaching the bridge in West Sacramento must be expanded to four lanes in order to handle West Sacramento's traffic volume caused by existing (Southport) and future developments in West Sacramento. It appears the intent is to siphon most Southport traffic onto the new Broadway Bridge, and away from Jefferson Blvd going north the Tower Bridge. The EIR should evaluate reducing the number of approach lanes to direct more West Sacramento traffic onto Tower Bridge and new bridge to the Railyards. It should also study the auto traffic along Jefferson Blvd and north to the Tower Bridge and identify existing and future traffic volumes and traffic circulation for all bridge alternatives.

City of Sacramento Split Approaches: From Bridge to X Street & Broadway: This alternative was studied in the Feasibility Study's Traffic Analysis but was not presented at the "Open House" Scoping Meeting. Proposed by Upper Land Park Neighbors (ULPN) to reduce the traffic volume on Broadway, the study shows that it would reduce new bridge traffic on Broadway. With all bridge traffic directed to Broadway, traffic was projected to double -- from 5,000 vehicles per day to 11,500 vehicles per day. Creating a new connection to X Street for through-traffic would decrease gridlock on

Broadway and reduce "spill over" traffic onto 5th St, Muir Way, Riverside, Land Park Drive and 19th Streets, Franklin Blvd. This split alternative must be studied with all bridge configurations.

The City of Sacramento streets which would approach the bridge should be pedestrian-friendly and pedestrian-scale, not suburban in scale. The EIR should analyze a reduced number of auto lanes and ways to maximize non-auto uses, e.g. pedestrian, bike, jogging. The EIR should study ways for non-auto uses to cross W St, X St, and new lanes that approach the bridge. Moving autos is not the only priority for the bridge; improving connections between the residential areas located south of Broadway, *e.g.* The Mill @ Broadway, Alder Grove and Marina Vista Public Housing, Upper Land Park, and Land Park to areas north of W and X Streets and new approach streets is equally important and must be analyzed and included in the project.

Traffic Circulation in City of Sacramento

The Feasibility Study's Traffic Analysis states that auto trips in the City of Sacramento will be to destinations in downtown Sacramento, and other large employment centers to the east. We assume these centers are University of California Davis Medical Center, Shiners' Hospital and the Veterans' Hospital medical complex at Stockton and Martin Luther King area, as well as other destinations east on Highway 50 and south on Highway 99.

The Feasibility Study's Traffic Analysis shows that 3rd Street would have the most traffic of all north/south streets north of W Street. It shows most traffic would use 3rd Street, rather than 5th or 10th Streets, which are direct routes to state office buildings. 5th Street is a one-way (north), three-lane commute street, while 3rd Street is shown as two-lane south configuration. There needs to be more studies on how people will access employment centers in the Railyards and state offices downtown. In addition, 9th/10th, 15th/16th and 19th/21st Streets must be studied to determine traffic volumes.

More traffic studies must be done for streets east of the proposed project's boundary at 3rd Street/Broadway. Residential streets in Upper Land Park, Land Park and commercial streets of W and X Streets and Broadway going east to at least 21st Street. Earlier traffic analyses focused on streets east of 5th Street, and closer to the bridge. Traffic along W Street, X Street to Alhambra, and Broadway to Stockton Blvd must be analyzed. As stated earlier, the large medical employment center will draw traffic farther east along Broadway and X Street.

More traffic analyses must be completed on streets north of W Street to downtown: 5th Street, 10th Street, 15th Street/ 16th Street, 19th/21st Streets. The traffic analyses should use State of California and employment firms' employee lists showing where current employees reside (# of employees who live in West Sacramento and Sacramento's zip code areas). This would help to better determine commute patterns, *e.g*. how many West Sacramento residents work downtown, east of downtown, e.g. medical centers and in south Sacramento. Because of the bridge's benefits to Caltrans, they should be able to get this information from other state departments.

More traffic analysis must be completed on streets south of Broadway to 21st Street: 5th Street, Muir Way, Riverside Blvd, Land Park Drive, 19th Streets. These streets are close to the bridge. As Broadway traffic increases and becomes gridlock, traffic will cut through the residential neighborhoods. With more traffic volume on Broadway, the problem worsens. Traffic volumes should be studied on all of these streets, south to 11th Avenue.

Evaluate ways to improve traffic flow from X Street 's east termination at Alhambra Blvd. and Broadway to Stockton Blvd and onto Highway 99. Evaluate traffic impacts at the Broadway and Stockton Blvd intersection and develop better street configuration for that intersection. Look for ways to ensure traffic doesn't flow onto residential streets south of Broadway*, e.g.* 19th Street, 24th Street.

Vehicle Speed Limits: The Feasibility Studies indicate that 35 miles per hour (MPH) is recommended because of traffic volume coming from West Sacramento. The EIR must study traffic speeds which do not exceed 25 or 30 miles per hour in order to meet the Neighborhood Friendly Bridge definition. Broadway's current speed limit at Miller Park is 25 miles per hour, increasing to 30 mph at Front Street and east along Broadway.

When analyzing all auto traffic, provide both Level of Services (LOS) evaluation and the reduction in Vehicle Miles Traveled (VMT) and present the results.

AESTHETICS

Ensure that the bridge's height and size is the same or similar size as the Tower Bridge, not larger. The configuration must complement the City of Sacramento's residential neighborhoods. The EIR should evaluate ways to enhance non-auto uses, e.g. walking, biking, jogging, river watching, etc on and approaching the bridge. Amenities that support non-auto uses should be studied and incorporated into the project. These could include "pop out" viewing areas on the bridge to enjoy the river view, landscaping, historic streetlights, benches and other amenities on Broadway and the bridge.

SOUND

Evaluate road materials that reduce the road noise from auto traffic volumes and speeds. Land Park, South side Park, and Upper Land Park, Curtis Park all suffer from freeway noise. Evaluate existing noise levels and ensure that they are not increased. Evaluate lower speed limits 25 miles per hour to reduce traffic road noise.

The residents of Upper Land Park look forward to the inclusion of these recommendations into the EIR process to ensure a Neighborhood Friendly Bridge as supported by the City of Sacramento residents and Council. We look forward to discussing these issues with you in more detail. If you have any questions, please feel free to contact us at 916.447.3803.

Sincerely,

Luree Stetson

Luree Stetson, Chair
Upper Land Park Neighbors

cc: Mayor and Council Members, City of Sacramento
Mayor and Council Members, City of West Sacramento

McCoy, Jason

From: McCoy, Jason
Sent: Friday, July 21, 2017 2:55 PM
To: Luree Stetson
Subject: RE: NOP

Luree,
The City of West Sacramento as the lead agency is required to submit a Notice of Preparation. The NOP identifies all issues to be explored in the EIR/EA. This has been prepared consistent with CEQA/NEPA requirements.

If you'd like more information on the project, please visit our website at:
http://www.cityofwestsacramento.org/city/depts/pw/traffic_n_transportation/broadway_bridge_project/default.asp

Or you can review documentation on the Broadway Bridge Feasibility Study at:
http://www.cityofwestsacramento.org/city/depts/pw/major_projects/bbfs.asp

Thank you,

JASON McCOY, AICP
Supervising Transportation Planner

CITY OF WEST SACRAMENTO

Public Works Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: Luree Stetson [mailto:lstetson2@earthlink.net]
Sent: Friday, July 21, 2017 1:42 PM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Subject: RE: NOP

Jason -- Disregard my last email. I see the governmental agencies that you sent this outline.

The document you sent to me is basically a high level letter asking for comments; it is not a document showing the various issues that West Sac will be considering in the EIR - and asking for any additional issues to evaluate.

I'm interested in this more detailed document. This more detailed document should show the categories outlined in your letter and what issues West Sac will be addressing to date. Then, we could just send you comments on any issues that you don't list.

Then we don't have to submit comments on things you already have decided to evaluate.

Does a detailed draft document exist?

From: McCoy, Jason [mailto:mccoyj@cityofwestsacramento.org]
Sent: Friday, July 21, 2017 11:43 AM
To: Luree Stetson
Cc: jgothan@cityofsacramento.org
Subject: RE: NOP

Attached is the NOP as requested.

JASON McCOY, AICP
Supervising Transportation Planner

Public Works Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: Luree Stetson [mailto:lstetson2@earthlink.net]
Sent: Friday, July 21, 2017 9:16 AM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: jgothan@cityofsacramento.org
Subject:
Importance: High

Jason -- I'd like a copy of the actual Notice of Preparation for the Broadway Bridge. I have the notification and explanation of the process that AIM sent out, but want the actual NOP document that has been developed to date.

Please send as soon as possible because of the deadline of August 10th for comments.

Please let me know as soon as possible.

Luree Stetson
Upper Land Park Neighbors

transmission. If verification is required please request a hard-copy version. City of West Sacramento, 1110 West Capitol Ave, West Sacramento, CA, www.cityofwestsacramento.org

McCoy, Jason

From: Tilley, David
Sent: Friday, August 11, 2017 4:08 PM
To: McCoy, Jason; Bromund, Claire; Zach Siviglia; Jesse Gothan
Subject: FW: Broadway Bridge NOP Comments - Upper Land Park Neighbors
Attachments: Letter Comments on Scopingfinal.pdf

From: Luree Stetson [mailto:lstetson2@earthlink.net]
Sent: Friday, August 11, 2017 3:33 PM
To: Tilley, David <davidt@cityofwestsacramento.org>
Subject: Broadway Bridge NOP Comments - Upper Land Park Neighbors

Hi David --

Attached are comments from the Upper Land Park Neighbors. Thank you for allowing us to submit comments today. We look forward to seeing our comments addressed in the NOP process.

Do you know when the EIR going to be finalized and made available to the public. Is there a tentative date yet?

Thank you,

Luree Stetson

McCoy, Jason

From: Zach Siviglia <zsiviglia@markthomas.com>
Sent: Tuesday, August 8, 2017 8:23 AM
To: Jesse Gothan; Gladys Cornell
Cc: McCoy, Jason; 'Bromund, Claire'
Subject: RE: Broadway Bridge Project Community Feedback

Hi Jesse,

Not a problem, I'll work with Gladys and Claire to draft a response to his comments. Since we are just at the NOP stage, I think we can structure the response to let him know that we are at the starting point for the project and don't have project specific details yet, but his comments will be considered as the project alternatives and environmental document are drafted over the next year.

Thanks,

Zach Siviglia, PE
Transportation Division Manager
(916) 403-5747 direct
(916) 390-5131 mobile
MARK THOMAS

From: Jesse Gothan [mailto:JGothan@cityofsacramento.org]
Sent: Tuesday, August 8, 2017 8:15 AM
To: Gladys Cornell <gcornell@aimconsultingco.com>; Zach Siviglia <zsiviglia@markthomas.com>
Cc: Jason McCoy <mccoyj@cityofwestsacramento.org>
Subject: FW: Broadway Bridge Project Community Feedback

Zach,

Would you please draft a response for me regarding this comment. Thanks, - Jesse

---

From: Consuelo Hernandez
Sent: Monday, August 07, 2017 2:30 PM
To: Jesse Gothan <JGothan@cityofsacramento.org>
Subject: FW: Broadway Bridge Project Community Feedback

Hi Jesse,

Do you have any info responsive to Craig's questions below? Thanks.

Consuelo Hernandez
District Director
Councilmember Steve Hansen, District 4
City of Sacramento

CAHernandez@cityofsacramento.org
Office: (916) 808-1915

From: Craig Chaffee <cjchaffee@comcast.net>
Date: Saturday, August 5, 2017 at 12:24 PM
To: Ashley Baumgartner <abaum@aimconsultingco.com>
Cc: Garrett Norman <GNorman@cityofsacramento.org>, Consuelo Hernandez <cahernandez@cityofsacramento.org>
Subject: Broadway Bridge Project Community Feedback

I attended the recent community meeting on the Sacramento side by 5th and Broadway at the high school. Many others did too. Seemed a fair number were from West Sacramento. I wasn't impressed with the amount of info shared by the consultants. They seemed to be paid by West Sacramento and favor the bridge being bigger to allow more traffic and benefits to West Sacramento (for example - developers).

I focused on the traffic and pollution issues - talked to the rep covering environmental issues. I asked for rough estimate of projected traffic. Told not known -bridge design/specifics still unknown. Maybe fair, but if someone knows –roughly, I'd like to know. I provided her a fact sheet from information obtained from the State Office of Environmental Health Hazard Assessment (OEHHA) and a Sac Bee article that highlights that the Upper Land Park area where the bridge would "land" on the Sacramento side (Tract 6067002200) already falls within the very high 91-95 statewide percentile range of the OEHHA indicator scores –very bad. Traffic and diesel issues are already very high. This is also an area that the City has greatly over-concentrated public housing, with resulting extremely high poverty levels, with so many at risk children. It's critical that bridge planning account for these children, the environment these children and struggling families live in and the air they breathe.

Seems a smaller bridge, with just one lane each way , but also room for bikers and pedestrians creates less risk for increased traffic and resulting pollution in our neighborhoods on both sides of the River. This bridge should NOT be about opportunities to greatly increase development and profits. Everything possible should be done to make sure traffic across the river is not increased a whole bunch and that the Sacramento side "landing" heads traffic towards X street and under the Freeway to the north, and away from funneling down Broadway and into the neighborhoods I mention directly to the south. Traffic studies should include Broadway, W and X Streets -- to Highway 99 and residential streets north and south of Broadway, to 24th Street. Mitigation should be recommended to minimize traffic on residential streets.

I've CCed our Sacramento City Planning and City Councilmember folks too. I didn't know who on the Sacramento side is receiving comments.

Appendix I Required Consultation/Concurrence Documentation

USFWS Species Lists

NMFS Species List

USFWS Biological Opinion

NMFS Biological Opinion

Native American Consultation and Native American Heritage Commission Coordination

SHPO Concurrence

Section 4(f) Concurrence

FHWA Project-Level Conformity Determination

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
Phone: (916) 930-5603 Fax: (916) 930-5654
http://kim_squires@fws.gov

In Reply Refer To:
Project Code: 2022-0016999
Project Name: Broadway Bridge

March 08, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and

bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http:// www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Note: IPaC has provided all available attachments because this project is in multiple field office jurisdictions.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

This project's location is within the jurisdiction of multiple offices. However, only one species list document will be provided for all offices. The species and critical habitats in this document reflect the aggregation of those that fall in each of the affiliated office's jurisdiction. Other offices affiliated with the project:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Project Code: 2022-0016999
Event Code: None
Project Name: Broadway Bridge
Project Type: Bridge - New Construction
Project Description: Construction of new bridge off of Broadway in Sacramento across the Sacramento River to West Sacramento.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.57704005752997,-121.513081866662763,14z

Counties: Sacramento and Yolo counties, California

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Least Bell's Vireo *Vireo bellii pusillus* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5945	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* https://ecos.fws.gov/ecp/species/321#crithab	Final

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20

NAME	BREEDING SEASON
Black-chinned Sparrow *Spizella atrogularis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
California Thrasher *Toxostoma redivivum* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31
Common Yellowthroat *Geothlypis trichas sinuosa* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Lawrence's Goldfinch *Carduelis lawrencei* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Nuttall's Woodpecker *Picoides nuttallii* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	Breeds Apr 1 to Jul 20
Oak Titmouse *Baeolophus inornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	Breeds Mar 15 to Jul 15
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31

NAME	BREEDING SEASON
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Tricolored Blackbird *Agelaius tricolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wrentit *Chamaea fasciata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10
Yellow-billed Magpie *Pica nuttalli* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9726	Breeds Apr 1 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum

probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

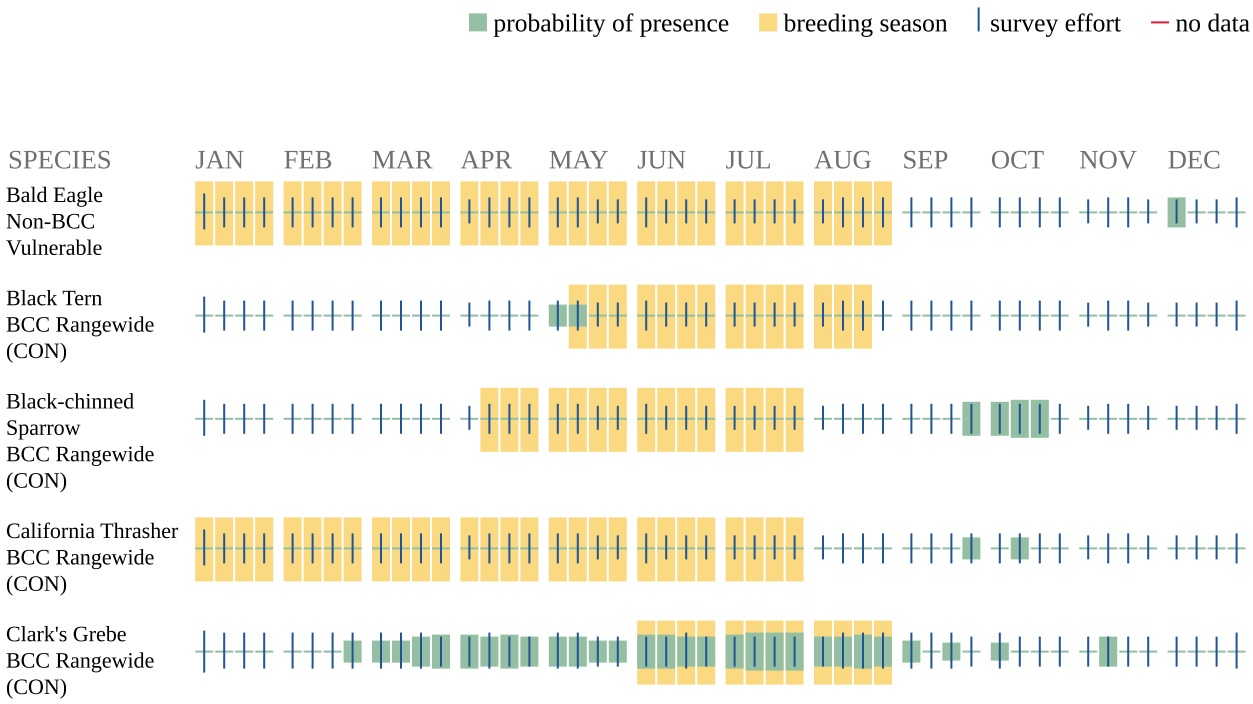
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

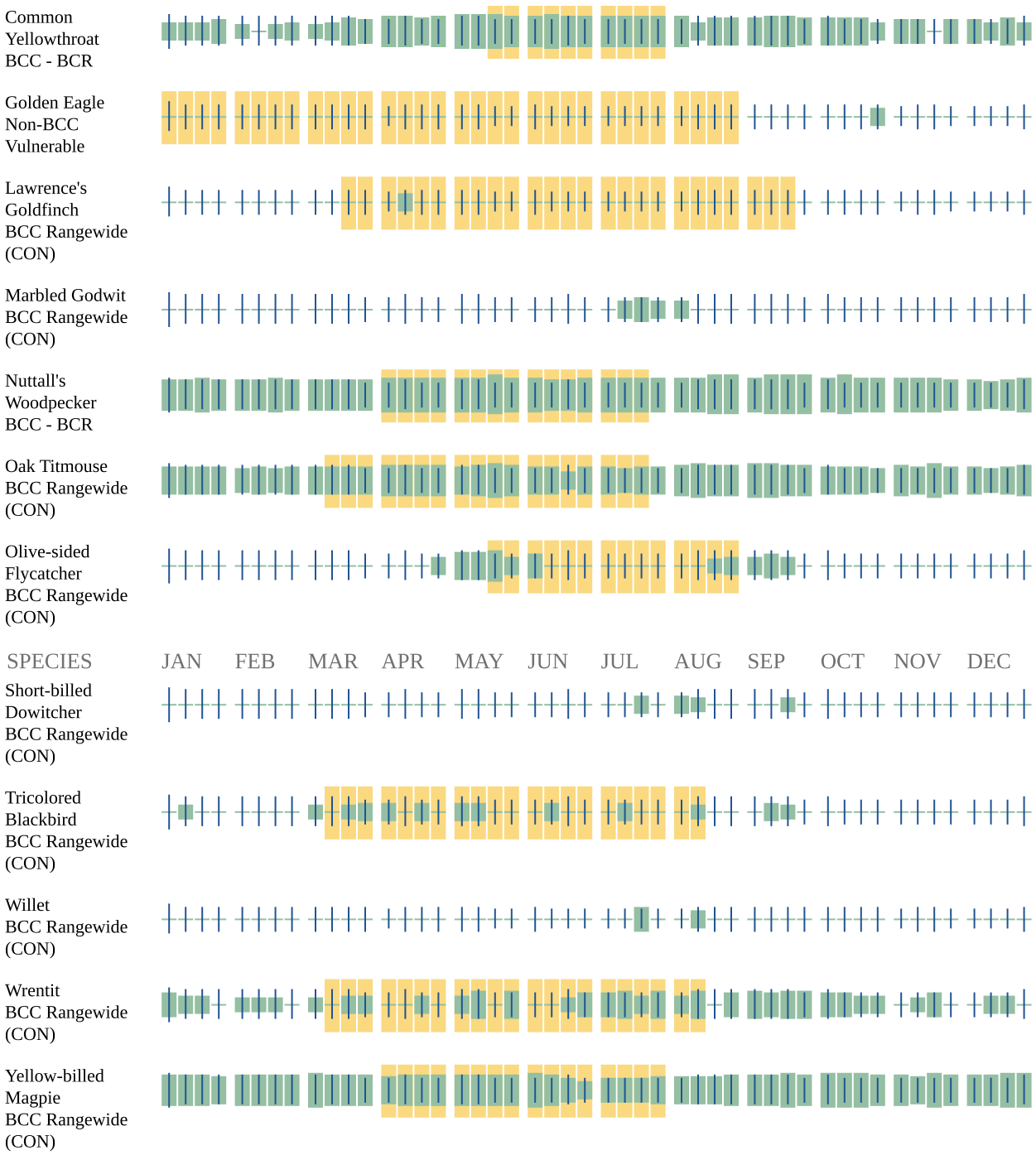
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab

of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be

aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PSSC

RIVERINE

- R2UBH

IPaC User Contact Information

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Lead Agency Contact Information

Lead Agency: Federal Highway Administration

From:	Taylor, Brooks M@DOT
To:	NOAA Species list (nmfs.wcrca.specieslist@noaa.gov)
Cc:	Bromund, Claire; Bhattal, Thaleena@DOT
Subject:	City of West Sacramento, Broadway Bridge 5447 (043)
Date:	Monday, March 7, 2022 3:19:31 PM
Attachments:	image001.png

Federal Agency: Federal Highway Administration – California Division
Federal Agency Address: 650 Capitol Mall, Suite 4-100, Sacramento, CA 95814-4708
Non-Federal Agency Representative: California Department of Transportation
Non-Federal Agency Representative Address: 703 B Street, Marysville, CA 95901
West Sacramento Broadway Bridge 5447 (043)
Point-of-Contact Brooks Taylor, brooks_taylor@dot.ca.gov, (530) 821-8297

Quad Name **Sacramento West**

Quad Number **38121-E5**

ESA Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) - **X**
SRWR Chinook Salmon ESU (E) - **X**
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) - **X**
Eulachon (T) -
sDPS Green Sturgeon (T) - **X**

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat - **X**
SRWR Chinook Salmon Critical Habitat - **X**
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -

CCV Steelhead Critical Habitat - X

Eulachon Critical Habitat -

sDPS Green Sturgeon Critical Habitat - X

ESA Marine Invertebrates

Range Black Abalone (E) -

Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) -

Olive Ridley Sea Turtle (T/E) -

Leatherback Sea Turtle (E) -

North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) -

Fin Whale (E) -

Humpback Whale (E) -

Southern Resident Killer Whale (E) -

North Pacific Right Whale (E) -

Sei Whale (E) -

Sperm Whale (E) -

ESA Pinnipeds

Guadalupe Fur Seal (T) -

Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH -

Chinook Salmon EFH - X

Groundfish EFH - X

Coastal Pelagics EFH -

Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office 562-980-4000

MMPA Cetaceans -

MMPA Pinnipeds -

Brooks Taylor
Associate Environmental Planner
530-821-8297

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish and Wildlife Office
650 Capitol Mall, Suite 8-300
Sacramento, California 95814

In reply refer to:
08FBDT00-2021-F-0072

April 7, 2021

Laura Loeffler
Branch Chief
Environmental Management, M-1 Branch
California Department of Transportation
District 3
703 B Street
Marysville, CA 95901

Subject: Formal Consultation on the Broadway Bridge Project (Fed ID TGR2DGL 5447 (043)), Cities of West Sacramento and Sacramento, Yolo and Sacramento Counties, California

Dear Ms. Loeffler:

This letter is in response to the California Department of Transportation's (Caltrans) January 13, 2021 letter to the U.S. Fish and Wildlife Service (Service) requesting consultation on the City of West Sacramento's Broadway Bridge Project (project) in the City of West Sacramento, Yolo County and in the City of Sacramento, Sacramento County, California. The Service's San Francisco Bay-Delta Fish and Wildlife Office received the email transmittal on January 13, 2021. At issue are the proposed project's effects on the federally threatened delta smelt (*Hypomesus transpacificus*) and its critical habitat and the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

Fixing America's Surface Transportation Act (FAST Act) was signed into law on December 4, 2015. Reauthorized through September 30, 2021, the FAST Act includes provisions to promote streamlined and accelerated project delivery. Caltrans is approved to participate in the FAST Act project delivery program through the National Environmental Policy Act (NEPA) Assignment Memorandum of Understanding (MOU). The MOU allows Caltrans to assume the Federal Highway Administration's (FHWA) responsibilities under NEPA as well as FHWA's consultation and coordination responsibilities under Federal environmental laws for most highway projects in California. Caltrans is exercising this authority as the Federal nexus for section 7 consultation on the proposed project.

The Federal action we are consulting on is the construction of a bridge over the Sacramento River connecting the Cities of West Sacramento and Sacramento. Pursuant to 50 CFR 402.12(j), you submitted a letter and biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, but is not likely to adversely affect the valley elderberry longhorn beetle and may affect and is likely to adversely affect the delta smelt and its critical habitat.

In reviewing this request, the Service has relied upon: (1) Caltrans' January 13, 2021 initiation letter and the enclosed biological assessment dated December 2020 and (2) other information available to the Service.

Valley Elderberry Longhorn Beetle

The Action Area was surveyed for elderberry shrubs on October 29, 2019. One elderberry shrub was identified in an area of ruderal vegetation on the Sacramento side of the Action Area. The shrub was approximately 7 feet tall, with 5 stems just over 1 inch in diameter; no exit holes were observed on the shrub. There are no current occurrences within the Action Area and the shrub will not be impacted by the proposed project. While the shrub will not be impacted by the project, it is located within 160 feet of riparian habitat along the Sacramento River. As such, Caltrans proposes to follow the Service's *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (Service 2017) by including Conservation Measure 5 below in the *Description of the Proposed Action*. Based on this analysis, the Service concurs with Caltrans that the proposed project is not likely to adversely affect the valley elderberry longhorn beetle.

The remainder of this document provides our biological opinion on the effects of the proposed project on the delta smelt and its critical habitat.

Consultation History

December 28, 2020: Caltrans sent the initial consultation request to the Service's Sacramento Fish and Wildlife Office via email.

January 13, 2021: The San Francisco Bay-Delta Fish and Wildlife Office received the consultation initiation request from the Sacramento Fish and Wildlife Office. Within the same day,the San Francisco Bay-Delta Fish and Wildlife Office exchanged emails with Caltrans and received a revised consultation initiation letter.

BIOLGICAL OPINION

Description of the Proposed Action

The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River south of the Pioneer Bridge (U.S. Highway 50) to provide local interconnectivity across the river and between neighborhoods. The new connection would serve multiple modes of transportation and comply with current American Association of State Highway and Transportation Officials, Caltrans, and local agency design standards. The project would be located over the Sacramento River between the cities of West Sacramento and Sacramento, approximately 1,000 feet south of the existing Pioneer Bridge. The proposed project would realign 15th Street to connect to Jefferson Boulevard in West Sacramento and connect to Broadway at 5th Street in Sacramento. The project would require

modification to the planned mobility network for South River Road and 15th Street in the Pioneer Bluff area of West Sacramento.

New Bridge

The total length of the new bridge would measure approximately 845 feet long, with an up to 83-foot-wide deck consisting of two vehicle lanes, a median, on-street buffered bike lanes, and sidewalks along both sides of the bridge. The bridge would include two fixed-span approach structures that tie into the banks of the river; the structures would be approximately 200 feet in length on the West Sacramento bank and approximately 450 feet in length on the Sacramento bank. The center span of the bridge would be movable. The bridge soffit elevation would be set a minimum of 3 feet above the 200-year water surface elevation to comply with the Central Valley Flood Protection Board freeboard requirements. Rock slope protection (RSP) (assumed 1/4 ton stone weight, machine positioned) would be installed on the river side of the bridge abutments both above and below the ordinary high-water mark (OHWM) to stabilize approximately 400 linear feet of shoreline on each side of the river.

The type of bridge has not been decided to date. One of three movable span types would be constructed, either a vertical lift span, a swing span, or a bascule span. To address the possible impacts of the bridge type that ultimately is built, the largest in- and over-water footprint and the greatest number of construction-related impacts of the three types was assumed for the analysis in the biological assessment.

Roadway Modifications

In West Sacramento, a new intersection for the bridge roadway at South River Road would be constructed.

In Sacramento, common roadway modifications include repaving and reconstructing the sidewalk along Broadway from the new bridge east to 5th Street. Roadway modifications also include a modified intersection at Marina View Drive and Broadway; widening of the northbound I-5 off-ramp at Broadway to two left-turn lanes and one right-turn lane; and improvements at intersections of Broadway and Front Street, 3rd Street (south), 3rd Street (north), and 5th Street to transition bridge traffic into the roadway network.

Class I Bikeway Improvements

In West Sacrmanento, a future Class I River Walk trail extension is proposed within the levee setback. As part of the proposed project, the grade of the trail would be separated to allow it to pass under the proposed bridge structure. Cyclists and pedestrians approaching Broadway Bridge in either direction from the trail would have the option to continue along the trail under the new structure, avoiding the need to cross the roadway, or to connect to the structure and cross the river into Sacramento or travel westward in West Sacramento.

In Sacramento, the existing Class I Sacramento River Bike Trail would be reconstructed approximately 1,000 feet north and 300 feet south of Broadway as part of the proposed project. The trail would be grade-separated under the proposed bridge structure. Cyclists and pedestrians approaching Broadway in either direction would have the option to continue along the trail under

the new structure, avoiding the need to cross the roadway, or to connect to the structure and cross the river into West Sacramento or travel westward on Broadway in Sacramento.

Stormwater Drainage Management

Stormwater and road runoff drainage for operation of the proposed roadway would be conveyed in a new storm drain system installed approximately 5 feet below the finished road grade of South River Road, 15th Street, and Circle Street in West Sacramento and of Broadway in Sacramento. New storm drain outfalls into the Sacramento River would be constructed near each of the bridge abutments in West Sacramento and Sacramento.

Bridge Communication Fiber Optic Line

A fiber optic cable is proposed to interconnect operational communications of the proposed project (the new Broadway Bridge), the Tower Bridge, and the I Street Replacement bridge. The fiber optic line would be placed in West Sacramento under Riverfront Street. From the proposed project, the fiber optic line would run north until Riverfront Street turns into 3rd Street and would end at the intersection of 3rd Street and C Street. The fiber optic line would be installed within an existing City of West Sacramento-owned conduit along Riverfront Street to Tower Bridge Gateway. North of Tower Bridge Gateway, a new conduit would be placed within the 3rd Street right-of-way north to the intersection of 3rd Street and C Street. The new conduit would be placed within existing paved areas using a horizontal drilling machine.

Utility Relocations

A number of public and private utilities would need to be relocated or adjusted to the new ground elevation as part of the project, including existing water, sewer, gas, overhead and underground electric, and communication facilities within Broadway, South River Road, 15th Street, and Jefferson Boulevard.

Two existing gas transmission lines, Kinder Morgan and Pacific Gas & Electric, and a communication line run under the Sacramento River. The proposed action could conflict with the locations of the utility lines and require relocation of the utilities. Utility relocations and adjustments would be conducted prior to or during construction. As part of the final project design process, prior rights would be used to determine who is responsible for the utility relocations.

Construction

Over-Water Construction Site Access

Temporary trestles and barges would be used to provide the contractor with access to the river portion of the project area. Together, the trestles and barges would be used to stage construction materials, to provide a working platform for cranes, and for general construction support. The temporary trestles would consist of steel piles that would be driven into place with an impact hammer. Although the temporary work platforms would be removed at the end of the first construction season before the onset of winter, the temporary trestle piles could remain in place for the duration of construction. The barges would be anchored to the river bottom with piles that

would be driven into place with an impact hammer. Up to two barges would be anchored in the river at one time. The barges would be repositioned in the channel throughout construction only as needed to complete the work. The barges and temporary piles would be removed after bridge construction is completed.

In-Water Construction Activities

In-water construction activities consist of those that would occur below the OHWM. The activities would be limited to the period of May 1 to November 30 during the two construction seasons. Other construction activities occurring above the OHWM (e.g., work on the abutments and approach superstructure) would not be limited to the in-water window of May 1 to November 30.

Temporary falsework platforms would be required to construct the proposed bridge foundations and approach structures. The platforms would be constructed using temporary piles within the river. In addition, temporary cofferdams would be required to construct the bridge piers within the water. The cofferdams would consist of temporary sheet piles installed around the individual piers. Dewatering inside the cofferdams would be required. In-water construction activities would include the following:

- Installation and removal of steel piles with a vibratory hammer and an impact hammer for the temporary falsework platforms (trestles).
- Installation and removal of steel piles with an impact hammer for anchoring barges.
- Installation of steel sheet piles with a vibratory driver for temporary cofferdams.
- Installation of steel piles for the piers with an impact hammer for the new bridge.
- Installation of steel casings for the piers with a vibratory hammer or hydraulic oscillator/ rotator system for the new bridge.
- Installation of concrete piles with an impact hammer for the new bridge fender system.

Two temporary construction trestles would be installed to support work platforms during construction, one extending from the Sacramento bank and the other extending from the West Sacramento bank of the river. Each trestle would require piles to be driven on land and in the water. Two pile types are being considered: 16-inch diameter steel pipe piles and 16-inch steel H-piles. This assessment assumes that 10 to 20 piles would be installed per day and that each pile would require approximately 800 blows to install. Installation of the trestle piles would occur during the first proposed in-water construction season (May 1 to November 30) and would require an estimated 3 weeks to complete.

Four temporary construction barges would be used to facilitate bridge construction. Each barge would require four spud piles to be driven in the water to anchor the barge. One pile type is being considered: 16-inch diameter steel pipe piles. This assessment assumes that 4 to 16 piles would be installed on a single day and that each pile would require approximately 800 blows to install. Installation of the spud piles would occur during the first and second in-water construction seasons (May 1 to November 30) and would require approximately 1 week to complete.

Two pile types are being considered for each of the three bridge types (i.e., bascule, vertical lift, and swing): 60-inch-diameter cast-in-steel shell (CISS) piles for the movable span (i.e., piers 2 and 3) and 16-inch diameters steel pipe piles for the in-water piers (i.e., piers 4 and 5) and the

two in-levee abutments (abutments 1 and 6). The only difference would be the number of piles that would be installed for each of the three bridge types. This assessment assumes that the bascule bridge would require 12 60-inch CISS piles, the vertical lift bridge would require 6 to 8 60-inch CISS piles, and the swing bridge would require 18 60-inch CISS piles. It also was assumed that from two to four piles would be driven per day and that each pile would require approximately 1,500 blows to install. For the 16-inch steel pipe piles, 20 piles would be required for the in-water piers for the swing bridge, and 40 piles would be required for the in-water piers for both the bascule and vertical lift bridges. All three bridge types would require 40 16-inch steel pipe piles for the in-levee abutments.

Two pile types are being considered for the bridge fender system: 14-inch-square concrete piles and 16-inch-diameter steel pipe piles. The only difference between the two approaches is the size and type of pile material; the same number of piles would be installed regardless of the type of pile used.

Two cofferdams would be installed to construct piers 4 and 5. The sheet piles for the cofferdams would be installed and removed with a vibratory pile driver. The sheet piles for the two cofferdams would be installed over a 2-week period in late May and early June of the first construction season.

Table 1 summarizes the pile-driving activities (location, timing, and duration) associated with constructing the new bridge.

Table 1. Summary of Pile Driving Activities with the Potential to Affect Fish

Activity	Location	Approximate Timing	Approximate Duration (days)
Vibratory and impact driving of 16-inch steel pipe or H piles for construction trestle	On land and in water	Season 1, May 3–May 21	20
Vibratory and impact driving of 16-inch steel pipe piles for temporary barges	In water	Seasons 1 and 2, May 1–October 27	10
Vibratory driving of sheet piles for cofferdams	In water	Season 1, May 24–June 4	12
Vibratory and impact driving of 16-inch steel pipe piles for fixed span (piers 4 and 5)	In water	Season 1, June 7–June 11	5
Vibratory and impact driving of 16-inch steel pipe piles for abutments 1 and 6	On land	Season 1, June 8–June 14	5
Removal of sheet piles with vibratory driver	In water	Season 1, July 12–July 23	12
Vibratory and impact driving of 60-inch cast in steel shell piles for movable span (piers 2 and 3)	In water	Season 1, May 24–August 13	10
Vibratory and impact driving of 14-inch concrete or 16-inch steel pipe piles for bridge fender system	In water	Season 2, September 25–October 6	6
Removal of 16-inch steel pipe or H piles for construction trestle with vibratory driver	In water	Season 2, September 25–October 17	20

Above-Water Construction Activities

After the temporary cofferdams are installed around the piers, forms would be constructed and concrete poured into the dewatered cofferdams to construct the pile caps. Work then would focus on the pier column construction. After the casings are installed, a rebar cage would be placed

into the pile, and concrete would be poured into the steel shell. A cast-in-place concrete pier cap would be placed atop the columns to serve as the substructure.

Work then would focus on constructing the approach superstructure. The movable span superstructure likely would be constructed offsite, floated in, and erected when construction of the foundations are completed.

Stormwater Drainage Management

During construction, as is standard with all construction projects that disturb soil, the construction contractor would be required to install temporary best management practices (BMPs) to control any runoff or erosion from the project site into the surrounding storm drain systems and waterways in order to be compliant with local, state, and Federal water quality regulations. Temporary BMPs would be installed prior to any construction operations and would be in place for the duration of the contract. Removal of the temporary BMPs would be the final operation, along with project site cleanup.

Staging, Storage, and Proposed Access during Construction

Staging areas would be used to store materials and equipment during construction, such as pipe materials, precast manholes and drop inlets, steel girders, piles, and rebar, along with construction equipment when not in use. In West Sacramento, staging area options are the West Sacramento Corporation Yard (1951 South River Road) or the Shell property recently purchased by the Port of West Sacramento (1509 South River Road). Both staging areas in West Sacramento would be accessed via South River Road and are options on the condition that they are still available (have not been redeveloped) at the time the proposed project is constructed.

In Sacramento, one option for a staging area would be closing Broadway to traffic west of Front Street and using the road as a staging area with access via Broadway to the east. This option would require a traffic detour for continued access to Marina View Drive using Front Street and Miller Park Circle. Another staging area option in Sacramento is use of a vacant lot north of the California Automobile Museum with access via Front Street.

Staging areas would be in use throughout the construction duration. The staging areas consist of areas already developed, and no ground-disturbing activities will take place at these locations.

Traffic Management and Detours during Construction

While most of the project would be constructed outside of existing roadways, some project construction areas would require temporary detours or staged construction.

In West Sacramento, in order to construct the proposed project—including the new intersection at South River Road, a portion of South River Road would be closed to traffic. Closure of 15th Street also may be necessary. Travelers on South River Road south of the project area needing to get to South River Road north of the project area would be detoured around the project to the south and directed to travel over the Mike McGowan Bridge, turn right onto Locks Drive, right onto Jefferson Boulevard, right onto Tower Bridge Gateway, and then right onto

5th Street that becomes South River Road. The detour would be repeated in reverse for travelers on South River Road north of the project area wanting to travel south on South River Road.

In Sacramento, construction of street widening and sidewalk improvements under the I-5 viaduct structures would be phased to allow traffic access to Front Street for the duration of construction. Miller Park and Sacramento Marina traffic would travel on westbound Broadway, turn left onto southbound Front Street, right onto Miller Park Circle, and then left onto Marina View Drive. About 3,400 feet of the Sacramento River Bike Trail would be closed north and south of Broadway and detoured to the bike lane on Front Street between the Sacramento Marina and where the Sacramento River Bike Trail meets the R Street bicycle/pedestrian bridge.

Sequencing and Schedule

The project may be constructed in two phases or in a single phase. The decision to construct in one or two phases will be driven by the extent of redevelopment and implementation of the approved mobility network in the Pioneer Bluff area of West Sacramento at the time project construction starts. If constructed in two phases, an interim (opening day) design phase for the proposed project would include constructing the new bridge and approach roadways with temporary pavement transitions along the existing alignment of South River Road. Construction of this first phase is expected to take approximately 36 months, with two seasons of in-water work. A subsequent phase, the design year phase, would take approximately 6 months and would complete the remaining project roadway construction consistent with full buildout of the approved mobility network. The roadway connection to the bridge and all other project improvements in Sacramento would be constructed during the first phase. If the project is built in a single phase, construction is expected to take 36 months. All in-water work would be conducted between May 1 and November 30.

Interim Year Features

Project features that would be constructed and in operation by 2030 include the following:

- New bridge and roadway modifications, including a redesigned intersection connection for the bridge at 15th Street and new turn pockets on South River Road to facilitate traffic turning movements at the bridge connection in West Sacramento.
- Stormwater drainage management features.
- Utility relocations.
- Fiber optic cable installation for operational communications.

In West Sacramento, modifications to the approved mobility network would be necessary for construction. These modifications include the following:

- Constructing a northbound right-turn pocket on South River Road at 15th Street.
- Constructing a southbound right-turn pocket on South River Road at 15th Street.

In Sacramento, the following modifications to the existing (or planned opening day) conditions would be required:

- Reconstructing 350 feet of Marina View Drive to provide for a new connection to Broadway.
- Modifying property access along Broadway west of Interstate Highway 5 (I-5).

The existing at-grade State Parks railroad crossing at Broadway would remain in the same location. RSP would be installed on the river side of the bridge abutments both above and below the OHWM to stabilize the shoreline on each side of the river.

Design Year Features

Project features that would be constructed by 2040 include the following:

- Roadway alignment modifications in West Sacramento necessary to shift the alignment of South River Road and connection of the new bridge to the east to conform with the approved mobility network alignment of South River Road.
- Roadway striping and turn pocket additions on Jefferson Boulevard, South River Road, and Alameda Boulevard.

Project Operation and Maintenance

During operation of the project, the bridge would open and close to allow boat passage along the river, just like bridges upstream and downstream. Motor vehicle traffic, as well as pedestrians and people on bicycles and other modes of active transportation, would use the bridge deck and adjoining roadways. Routine maintenance of project roadways, the bridge structure, and mechanical features of the bridge would occur at intervals determined by the performance and maintenance standards of the local jurisdictions and the U.S. Coast Guard.

Conservation Measures

1. *Install Orange Construction Fencing between the Construction Area and Adjacent Sensitive Biological Resources*. The project proponent or their contractor will install orange construction fencing between the construction area and adjacent sensitive biological resource areas.

   Barrier fencing around sensitive biological resource areas will be installed as one of the first orders of work and prior to equipment staging. Before construction begins, the construction contractor will work with the project engineer and a resource specialist to identify the locations for the orange construction fencing and will place stakes around the sensitive resource sites to indicate these locations. The protected areas will be designated as environmentally sensitive areas and clearly identified on the construction plans and described in the specifications. To minimize the potential for snakes and other ground-dwelling animals from being caught in the orange construction fencing, the fencing will be placed with at least a 1-foot gap between the ground and the bottom of the fencing. The exception to this condition is where construction barrier fencing overlaps with erosion control fencing and must be secured to prevent sediment runoff. Barrier fencing will be installed before construction activities are initiated, maintained throughout the construction period, and removed after completion of construction.

2. *Conduct Environmental Awareness Training for Construction Employees*. The project proponent will retain a qualified biologist to conduct environmental awareness training for construction crews before project implementation. The awareness training will be provided to all construction personnel and will brief them on the need to avoid effects on sensitive biological resources (e.g., native trees, sensitive natural communities, and special-status species habitats in and adjacent to the construction area). The education program will include a brief review of the special-status species with the potential to occur in the action area (including their life history, habitat requirements, and photographs of the species). The training will identify the portions of the action area in which the species may occur, as well as their legal status and protection. The program also will cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on these species during project implementation. This will include the steps to be taken if a sensitive species is found within the construction area (i.e., notifying the crew foreman, who will call a designated biologist). In addition, construction employees will be educated about the importance of controlling and preventing the spread of invasive plant infestations. An environmental awareness handout that describes and illustrates sensitive resources to be avoided during project construction and identifies all relevant permit conditions will be provided to each crew member. The crew foreman will be responsible for ensuring that crew members adhere to the guidelines and restrictions. Education programs will be conducted for appropriate new personnel as they are brought on the job during the construction period.

3. *Conduct Periodic Biological Monitoring*. The project proponent will retain a qualified biological monitor for the project who will visit the site a minimum of once per week to ensure that fencing around environmentally sensitive areas is intact and that activities are being conducted in accordance with the agreed upon project schedule and agency conditions of approval. The monitor will provide the project proponent with a monitoring log for each site visit. Certain activities will require the presence of a biological monitor for the duration of the activity or during the initial disturbance of an area to ensure that impacts on special-status species are avoided.

4. *Monitor Turbidity in the Sacramento River*. The project proponent will require their contractor to monitor turbidity levels in the Sacramento River during in-water construction activities (e.g., pile driving, extraction of temporary sheet piles used for cofferdams, and placement of RSP). Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceed the thresholds derived from the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region (Central Valley Regional Water Quality Control Board 2018). If it is determined that turbidity levels exceed the Basin Plan thresholds, the project proponent or their contractor will adjust work to ensure that turbidity levels do not exceed the Basin Plan thresholds.

5. Avoid and Minimize Effects on Valley Elderberry Longhorn Beetle. The following measures from the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (Service 2017) have been slightly modified for this project:

- Fencing. The elderberry shrub will be fenced and/or flagged as close to construction limits as feasible.
- Avoidance area. Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 6 meters (20 feet) from the dripline, depending on the type of activity.
- Worker education. A qualified biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance.
- Construction monitoring. At a minimum, a qualified biologist will monitor the work area on a weekly basis to ensure that all avoidance and minimization measures are implemented.
- Timing. As much as feasible, all activities that could occur within 50 meters (165 feet) of the elderberry shrub will be conducted outside of the flight season of the valley elderberry longhorn beetle (March–July).

6. *Conduct All In-Water Construction Activities between May 1 and November 30 and Only during Daylight Hours*. The project proponent will conduct all in-water construction work, including pile driving (in-water and shore-based within 250 feet of the Sacramento River), installation of cofferdams, removal of temporary sheet piles, and placement of rock revetment, between May 1 and November 30 to avoid or minimize causing disturbance and injury to, or mortality of, special status fish species in the affected reaches of the Sacramento River. In addition, in-water work will be conducted only during daylight hours to provide fish in the affected reaches of the Sacramento River an extended quiet period during nighttime hours for feeding and unobstructed passage.

7. *Implement Measures to Minimize Exceedance of Interim Threshold Sound Levels during Pile Driving*. The project proponent will require their contractor to implement the following measures to minimize the exposure of listed fish species to potentially harmful underwater sounds.

    - The contractor will vibrate all piles to the maximum depth possible before using an impact hammer.
    - No more than 20 piles will be driven per day.
    - During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work and will limit the total number of hammer strikes to 32,000 strikes per day (i.e., 1,600 hammer strikes per pile, per day) for piles for the temporary trestles, 20,000 strikes per day (i.e., 1,000 hammer strikes per pile, per day) for the piles for the bridge fender system, 12,800 strikes per day (i.e., 1,600 hammer strikes per pile, per day) for piles for the fixed span piers, and 6,000 strikes per day (i.e., 1.500 strikes per pile, per day) for the cast-in-steel shell piles for the movable span piers.
    - During impact driving, the project proponent will require their contractor to use a bubble curtain or dewatered cofferdam to minimize the extent to which the interim peak and cumulative sound exposure level (SEL) thresholds are exceeded.
    - No pile-driving activity will occur at night, thereby providing fish with an extended quiet period during nighttime hours on days that pile driving is being conducted for feeding and unobstructed passage.

8. *Develop and Implement a Hydroacoustic Monitoring Plan*. The project proponent or their contractor will develop and implement a hydroacoustic monitoring plan. The monitoring plan will be submitted to the resource agencies (California Departement of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), and Service) for approval at least 60 days before the start of project activities. The plan will include the following requirements:

    - The project proponent or their contractor will monitor underwater noise levels during all impact pile-driving activities on land and in water to ensure that peak and cumulative SELs do not exceed estimated values (Tables 4-10 through 4-14 in the biological assessment).
    - The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment.
    - The monitoring plan will include a reporting schedule for daily summaries of the hydroacoustic monitoring results and for more comprehensive reports to be provided to the resource agencies on a monthly basis during the pile-driving season.
    - The daily reports will include the number of piles installed per day; the number of strikes per pile; the interval between strikes; the peak sound pressure level (SPL), SEL, and root mean square (RMS) per strike; and the accumulated SEL per day at each monitoring station.
    - The project proponent or their contractor will ensure that a qualified fish biologist is onsite during impact pile driving to document any occurrences of stressed, injured, or dead fish. If stressed, injured, or dead fish are observed during pile driving, the project proponent or their contractor will reduce the number of strikes per day to ensure that fish are no longer showing signs of stress, injury, or mortality.

9. *Implement Cofferdam Restrictions*. The following restrictions will be implemented during installation of the cofferdams and cofferdam dewatering:
    - The extent of cofferdam footprints will be limited to the minimum necessary to support construction activities.
    - Sheet piles used for cofferdams will be installed and removed using a vibratory pile driver.
    - Cofferdams will be installed and removed only during the proposed in-water work window (between May 1 and November 30).
    - Cofferdams will not be left in place over winter where they could be overtopped by winter/spring flows.
    - All pumps used during dewatering of cofferdams will be screened according to CDFW and NMFS guidelines for pumps.
    - Cofferdam dewatering and fish rescue/relocation from within cofferdams will commence immediately following cofferdam closure to minimize the duration that fish are trapped in the cofferdam.

10. *Prepare and Implement a Fish Rescue and Relocation Plan*. The project proponent or their contractor will develop and implement a fish rescue and relocation plan to recover any fish trapped in cofferdams. The fish rescue and relocation plan will be submitted to the resource agencies (CDFW, NMFS, and Service) for approval at least 60 days before initiating activities to install cofferdams. At a minimum, the plan will include the following:
    - A requirement that fish rescue and relocation activities will commence immediately after cofferdam closure and that dewatering has sufficiently lowered water levels inside cofferdams to make it feasible to rescue fish.
    - A description of the methods and equipment proposed to collect, transfer, and release all fish found trapped within cofferdams. Capture methods may include seining, dip netting, and electrofishing, as approved by CDFW, NMFS, and Service. The precise methods and equipment to be used will be developed cooperatively by CDFW, NMFS, Service, and the project proponent or their contractor.
    - A requirement that only CDFW-, NMFS-, and Service-approved fish biologists will conduct the fish rescue and relocation.
    - A requirement that fish biologists will contact CDFW, NMFS, and Service immediately if any listed species are found dead or injured.
    - A requirement that a fish rescue and relocation report be prepared and submitted to CDFW, NMFS, and Service within 5 business days following completion of the fish relocation. Data will be provided in tabular form and at a minimum will include the species and number rescued and relocated, approximate size of each fish (or alternatively, approximate size range if a large number of individuals are encountered), date and time of their capture, and general condition of all live fish (e.g., good–active with no injuries; fair–reduced activity with some superficial injuries; poor–difficulty swimming/orienting with major injuries). For dead fish, additional data will include fork length and description of injuries and/or possible cause of mortality if it can be determined.

11. *Develop and Implement a Barge Operations Plan*. The project proponent or their contractor will develop and implement a barge operations plan. The barge operations plan will be submitted to the resource agencies (CDFW, NMFS, and Service) for approval at least 60 days before the start of project activities. The plan will address the following:
    - Bottom scour from propeller wash.
    - Bank erosion or loss of submerged or emergent vegetation from propeller wash or excessive wake.
    - Accidental material spillage.
    - Sediment and benthic community disturbance from accidental or intentional barge grounding or deployment of barge spuds (extendable shafts for temporarily maintaining barge position) or anchors.
    - Hazardous materials spills (e.g., fuel, oil, and hydraulic fluids).

    The barge operations plan will serve as a guide to barge operations and to a biological monitor who will evaluate barge operations during construction with respect to stated performance measures. This plan, when approved by the resource agencies, will be read by barge operators and kept aboard all vessels operating at the construction site.

12. *Prevent the Spread or Introduction of Aquatic Invasive Species*. The project proponent or their contractor will implement the following actions to prevent the potential spread or introduction of aquatic invasive species (AIS) associated with the operation of barges and other in-water construction activities.
    - Coordinate with the CDFW Invasive Species Program to ensure that the appropriate Best Management Practices are implemented to prevent the spread or introduction of AIS.
    - Educate construction supervisors and managers about the importance of controlling and preventing the spread of AIS.
    - Train vessel and equipment operators and maintenance personnel in the recognition and proper prevention, treatment, and disposal of AIS.
    - If feasible, prior to departure of vessels from their place of origin and before in-water construction equipment is allowed to operate within the waters of the Sacramento River, thoroughly inspect and remove and dispose of all dirt, mud, plant matter, and animals from all surfaces that are submerged or may become submerged, or places where water can be held and transferred to the surrounding water.

13. *Minimize or Avoid Permanent Bridge Lighting from Directly Radiating on Water Surfaces of the Sacramento River*. The project proponent or their contractor will minimize or avoid the effects of permanent bridge lighting on special-status fish species by implementing the following actions:

    - Minimize nighttime lighting of the bridge structure for aesthetic purposes.
    - Use the minimal amount of lighting necessary to safely and effectively illuminate vehicular, bicycle, and pedestrian areas on the bridge.
    - Shield and focus lights on vehicular, bicycle, and pedestrian areas and away from the water surface of the Sacramento River, to the maximum extent practicable.

14. *Purchase Channel Enhancement Credits for Impacts on Critical Habitat* (Biological Assessment Conservation Measure 16). Permanent impacts on habitat and critical habitat (bank and substrate below the OHWM and water column habitat), totaling 1.87 acres (up to 57,600 square feet [1.32 acre] from bridge shading of aquatic habitat and new bridge piers; 24,126 square feet [0.55 acre] from RSP; and 84 square feet (0.002 acre) from bridge fender system) will be mitigated at a 3:1 ratio. The project proponent proposes to minimize the permanent loss of critical habitat for listed fish species through purchase of 5.61 acres of mitigation credits at a NMFS- and Service-approved anadromous fish and delta smelt conservation bank.

Measures 14 and 15 in the biological assessment are compensatory measures not specific to the delta smelt or valley elderberry longhorn beetle and have been omitted.

Action Area

The Action Area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” For the purposes of the effects analysis, the Action Area includes all terrestrial and aquatic areas disturbed by project activities, including the project footprint (areas proposed for staging, trestle

construction, barge anchoring, new bridge construction) and all areas potentially affected by construction activities (e.g., general construction noise, visual disturbance) and by pile driving-related noise and water quality impacts in excess of ambient conditions. Accordingly, the Action Area includes the Sacramento River (upstream and downstream from pile driving activity) and adjacent upland and urban areas in the vicinity of the proposed project.

The Action Area includes areas both upstream and downstream from pile-driving activity in which pile-driving noise may have a physical or behavioral effect on listed species. Summarizing Caltran's analysis using the example of driving 60-inch diameter cast-in-sheel steel piles and accounting for the diffraction and attenuation of sound levels beyond the major river bends upstream and downstream from the proposed bridge crossing, the Action Area for this project is defined as the entire width of the Sacramento River channel and extending 2,000 feet beyond the straight-line, open-water distances (i.e., a buffer) upstream and downstream of the proposed bridge, or 8,000 feet upstream and 3,900 feet downstream from the proposed bridge crossing (i.e., from approximately river mile [RM] 57 to approximately RM 59.5). The river averages 720 feet wide at the OHWM and the total area of the Action Area is estimated to be 8,568,000 square feet (197 acres).

Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed Federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the Action Area without the consequences to the listed species caused by the proposed action, the factors responsible for that condition, and the relationship of the Action Area to the survival and recovery of the species; (3) the *Effects of the Action*, which includes all effects that are caused by the proposed Federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the Action Area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the proposed action is likely to jeopardize the continued existence of listed species.

Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" (DAM) was published on August 27, 2019 (84 FR 44976). The final rule became effective on October 28, 2019. The revised definition states:

> "*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species."

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the current range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the current condition of the critical habitat in the Action Area without the consequences to designated critical habitat caused by the proposed action, the factors responsible for that condition, and the value of the critical habitat in the Action Area for the conservation/recovery of the listed species; (3) the *Effects of the Action*, which determines all consequences to designated critical habitat that are caused by the proposed Federal action on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) *Cumulative Effects*, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the Action Area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of critical habitat, the Service formulates its opinion as to whether the action is likely to destroy or adversely modify designated critical habitat. The Service's opinion evaluates whether the action is likely to impair or preclude the capacity of critical habitat in the Action Area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the Action Area for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

Status of the Species and Critical Habitat

Delta Smelt

Species Legal Status and Life Cycle Summary

The Service proposed to list the delta smelt as threatened with proposed critical habitat on October 3, 1991 (Service 1991). The Service listed the delta smelt as threatened on March 5, 1993 (Service 1993), and designated critical habitat for the species on December 19, 1994 (Service 1994). The delta smelt was one of eight fish species addressed in the *Recovery Plan for the Sacramento–San Joaquin Delta Native Fishes* (Service 1996). A 5-year status review of the delta smelt was completed on March 31, 2004 (Service 2004). The review concluded that delta smelt remained a threatened species. A subsequent 5-year status review recommended uplisting delta smelt from threatened to endangered (Service 2010a). A 12-month finding on a petition to reclassify the delta smelt as an endangered species was completed on April 7, 2010 (Service 2010b). After reviewing all available scientific and commercial information, the Service determined that re-classifying the delta smelt from a threatened to an endangered species was

warranted but precluded by other higher priority listing actions (Service 2010c). The Service reviews the status and uplisting recommendation for delta smelt during its Candidate Notice of Review (CNOR) process. Each year it has been published, the CNOR has recommended the uplisting from threatened to endangered. Electronic copies of these documents are available at https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=321.

The delta smelt is a small fish of the family Osmeridae. In the wild, very few individuals reach lengths over 3.5 inches (90 mm; Damon *et al.* 2016). At the time of its listing, only the basics of the species' life history were known (Moyle *et al.* 1992). In the intervening 26 years, it has become one of the most studied fishes in the United States. Enough has been learned about the delta smelt to support its propagation in captivity over multiple generations (Lindberg *et al.* 2013), to support the development of complex conceptual models of the species life history (Interagency Ecological Program (IEP) 2015), and mathematical simulation models of its life cycle (Rose *et al.* 2013a). Any synthesis of the now extensive literature on the delta smelt requires drawing conclusions across studies that had disparate objectives, but several syntheses have been compiled from existing information (Moyle *et al.* 1992; Bennett 2005; IEP 2015; Moyle *et al.* 2016). In this biological opinion, the Service relied on these previous syntheses where it remains appropriate to do so. We also relied on source study results and analyses of our own to synthesize across a rapidly growing body of scientific information.

The delta smelt has a fairly simple life history because a large majority of individuals live only one year (Bennett 2005; Moyle *et al.* 2016) and because it is an endemic species (Moyle 2002), comprising only one genetic population (Fisch *et al.* 2011), that completes its full life cycle in the northern reaches of the San Francisco Bay-Delta (Merz *et al.* 2011; Figure 1). The schematic of this simple life cycle developed by Moyle *et al.* (2016) and published again by Moyle *et al.* (2018) is shown in Figure 2. Most spawning occurs from February through May in various places from the Napa River and locations to the east including much of the Sacramento-San Joaquin Delta. Larvae hatch and enter the plankton primarily from March through May, and most individuals have metamorphosed into the juvenile life stage by June or early July. Most of the juvenile fish continue to rear in habitats from Suisun Bay and marsh and locations east principally along the Sacramento River-Cache Slough corridor (recently dubbed the 'North Delta Arc'; Moyle *et al.* 2010). The juvenile fish (or 'sub-adults') begin to develop into maturing adults in the late fall. Thereafter, the population spatial distribution expands with the onset of early winter storms and the first individuals begin to reach sexual maturity by January in some years, but most often in February (Damon *et al.* 2016; Kurobe *et al.* 2016). Delta smelt do not reach sexual maturity until they grow to at least 55 mm in length (~ 2 inches) and 50% of individuals are sexually mature at 60 to 65 mm in length (Rose *et al.* 2013b). In captivity delta smelt can survive to spawn at two years of age (Lindberg *et al.* 2013), but this appears to be rare in the wild (Bennett 2005; Damon *et al.* 2016; Figure 2). The spawning microhabitats of the delta smelt are unknown, but based on adult distribution data (Damon *et al.* 2016; Polansky *et al.* 2018) and the evaluation of otolith microchemistry (Hobbs *et al.* 2007a; Bush 2017), most delta smelt spawn in freshwater to slightly brackish-water habitats under tidal influence. Most individuals die after spawning, but as is typical for annual fishes, when conditions allow, some individuals can spawn more than once during their single spawning season (Damon *et al.* 2016). In a recent study spanning 2 to 3 months, captive males held at a constant water temperature of 12°C (54°F) spawned an average of 2.8 times and females spawned an average of 1.7 times (LaCava *et al.* 2015).

Figure 1. Delta smelt range map. Waterways colored in purple depict the delta smelt distribution described by Merz *et al.* (2011). The Service has used newer information to expand the transient range of delta smelt further up the Napa and Sacramento rivers than indicated by Merz *et al.* (2011). The red polygon depicts the boundary of delta smelt's designated critical habitat. The inset map shows the region known as the North Delta Arc shaded light green.

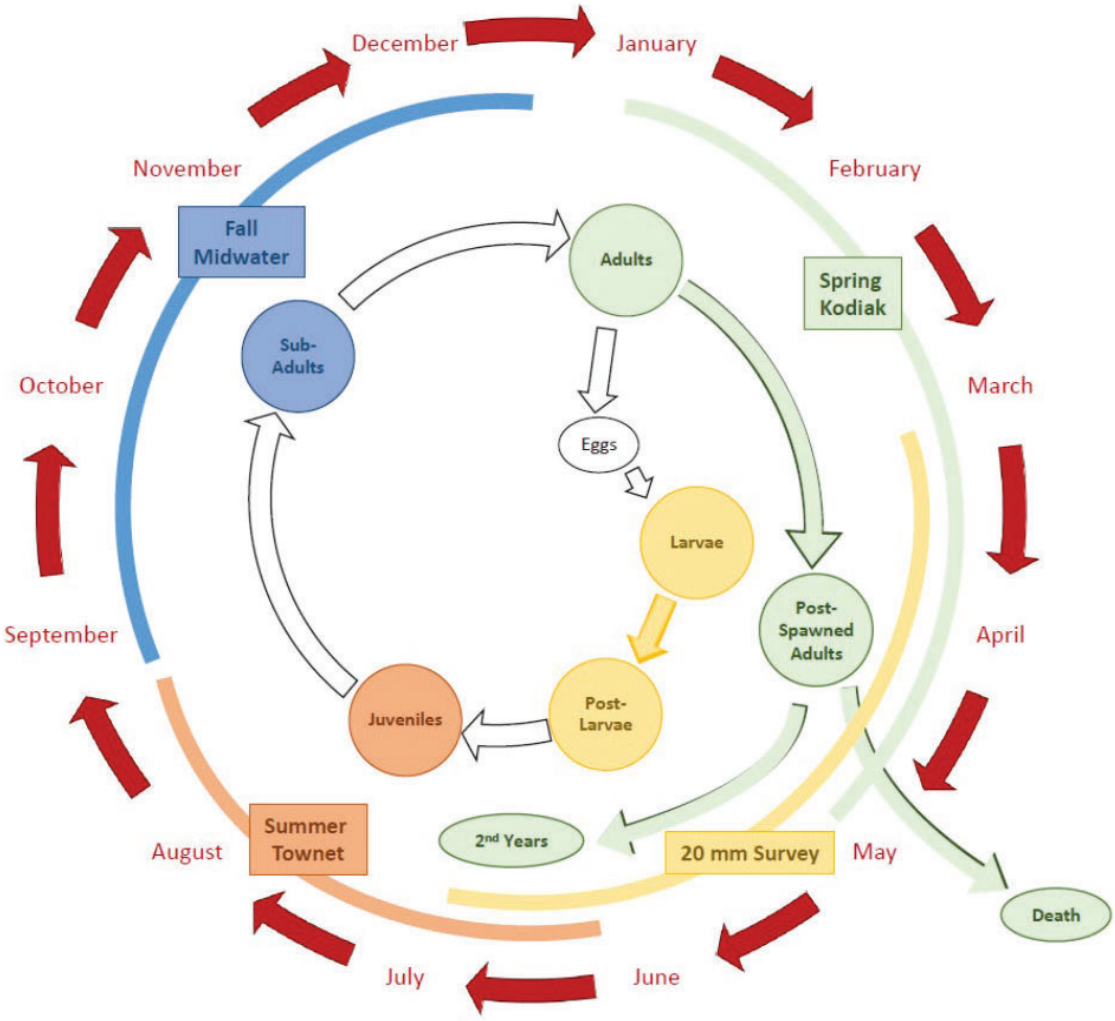


Figure 2. Schematic representation of the delta smelt life cycle. This conceptual model crosswalks delta smelt life stages with calendar months and current monitoring programs (prior to Enhanced Delta Smelt Monitoring) used to evaluate the species' status. Source: Moyle *et al.* 2016

Detailed Review of the Reproductive Biology of Delta Smelt

Delta smelt spawn in the estuary and have one spawning season for each generation, which makes the timing and duration of the spawning season important every year. Delta smelt are believed to spawn in fresh and low-salinity water (Hobbs *et al.* 2007a; Bush 2017). Therefore, freshwater flow affects how much of the estuary is available for delta smelt to spawn (Hobbs *et al.* 2007a). This is one mechanism in which interannual variation in Delta outflow could play a role in the population dynamics of delta smelt. Given the timing of delta smelt reproduction, Delta outflow during February through May would be most important for this mechanism. During this time of year, variation in Delta outflow is largely driven by weather variation and regulated by the California State Water Resources Control Board (SWRCB) Decision-1641 (D-1641).

The locations of delta smelt spawning are thought to be influenced by salinity (Hobbs *et al.* 2007a), but the duration of the spawning season is thought to be driven mainly by water

temperature (Bennett 2005; Damon *et al.* 2016), which is largely a function of regional air temperature (Wagner *et al.* 2011). Thus, the spawning season duration does not appear to be a freshwater flow mechanism, but rather, a climate-driven mechanism (Brown *et al.* 2016a). Delta smelt can start spawning when water temperatures reach about 10°C (50°F) and can continue until temperatures reach about 20°C (68°F; Bennett 2005; Damon *et al.* 2016). The ideal spawning condition occurs when water temperatures remain between 10°C and 20°C throughout February through May. Few delta smelt ≤ 55 mm in length are sexually mature and 50% of delta smelt reach sexual maturity at 60 to 65 mm in length (Rose *et al.* 2013b). During January and February, many delta smelt are still smaller than these size thresholds (Damon *et al.* 2016). Thus, if water temperatures rise much above 10°C in January, the "spawning season" can start before many individuals are mature enough to actually spawn. If temperatures continue to warm rapidly toward 20°C in early spring, that can end the spawning season with only a small fraction of 'adult' fish having had an opportunity to spawn, and perhaps only one opportunity to do so. Delta smelt were initially believed to spawn only once before dying (Moyle *et al.* 1992). It has since been confirmed that delta smelt can spawn more than once if water temperatures remain suitable for a long enough time, and if the adults find enough food to support the production of another batch of eggs (Lindberg *et al.* 2013; Damon *et al.* 2016; Kurobe *et al.* 2016). In a recent study spanning 2 to 3 months, captive males held at a constant water temperature of 12°C (54°F) spawned an average of 2.8 times and females spawned an average of 1.7 times (LaCava *et al.* 2015). As a result, the longer water temperatures remain cool, the more fish have time to mature and the more times individual fish can spawn. Most adults disappear from monitoring programs by May, suggesting they have died (Damon *et al.* 2016; Polansky *et al.* 2018).

The reproductive behavior of delta smelt is only known from captive specimens spawned in artificial environments and most of the information has never been published, but is currently being revisited in new research. Spawning likely occurs mainly at night with several males attending a female that broadcasts her eggs onto bottom substrate (Bennett 2005). Although preferred spawning substrate is unknown, spawning habits of delta smelt's closest relative, the Surf smelt (*Hypomesus pretiosus*), are sand or small gravel (Hirose and Kawaguchi 1998; Quinn *et al.* 2012).

The duration of the egg stage is temperature-dependent and averages about 10 days before the embryos hatch into larvae (Bennett 2005). It takes the fish about 30-70 days to reach 20-mm in length (Bennett 2005; Hobbs *et al.* 2007b). Similarly, Rose *et al.* (2013b) estimated that it takes delta smelt an average of slightly over 60 days to reach the juvenile life stage. Metamorphosing "post-larvae" appear in monitoring surveys from April into July of most years. By July, most delta smelt have reached the juvenile life stage. Thus, subtracting 60 days from April and July indicates that most spawning occurs from February-May.

Hatching success is highest at temperatures of 15-16°C (59-61°F) and lower at cooler and warmer temperatures and hatching success nears zero percent as water temperatures exceed 20°C (Bennett 2005). Water temperatures suitable for spawning occur most frequently during the months of February-May, but ripe female delta smelt have been observed as early as January and larvae have been collected as late as July, suggesting that spawning itself may extend into June in years with exceptionally cool spring weather.

Detailed Review of the Habitat Use and Distribution of Delta Smelt

Because the delta smelt only lives in one part of one comprehensively monitored estuary, its general distribution and habitat use are well understood (Moyle *et al.* 1992; Bennett 2005; Hobbs *et al.* 2006; 2007b; Feyrer *et al.* 2007; Nobriga *et al.* 2008; Kimmerer *et al.* 2009; Merz *et al.* 2011; Murphy and Hamilton 2013; Sommer and Mejia 2013; Mahardja *et al.* 2017a; Simonis and Merz 2019). The delta smelt has been characterized as a semi-anadromous species (Bennett 2005; Hammock *et al.* 2017) and Sommer *et al.* (2011) characterized the species as a partial diadromous migrant, recognizing individual variation in its life-history. However, both terms emphasize a life cycle in which delta smelt spawn in freshwater and volitionally move 'downstream' into brackish water habitat, which is only one endpoint among several individual life cycle strategies that have recently been confirmed through the use of otolith microchemical analyses (Bush 2017). In addition, semi-anadromy and partial diadromy are scale-dependent terms which have caused confusion among researchers and managers alike. For instance, some individual delta smelt clearly migrate between fresh and brackish water during their lives (Bush 2017). Other individuals could appear to have done so based on otolith microchemistry but in reality have moved very little and simply experienced annual salinity variation, which can be very high in much of the range of delta smelt (see Hammock *et al.* 2019). Other individual delta smelt are clearly freshwater and brackish-water resident throughout their lives (Bush 2017). As a result, there are both location-based (*e.g.*, Sacramento River around Decker Island) and conditions-based (low-salinity zone) habitats that delta smelt permanently occupy. There are habitats that some delta smelt occupy seasonally (*e.g.*, for spawning), and there are habitats that a few delta smelt occupy transiently, which we define here as occasional use. Transient habitats include distribution extremes from which delta smelt have occasionally been collected, but were not historically collected every year or even in most years. Thus, the Service suggests the delta smelt may be best characterized as an upper estuary resident species with a population-scale distribution that expands and contracts as freshwater flow seasonally (and interannually) decreases and increases, respectively. This influence of freshwater flow inputs on delta smelt distribution could in turn influence mechanisms that affect the species' population dynamics when those mechanisms are linked to where the fish reside or how they are distributed in the estuary. We note that water temperature, turbidity, water diversion rates, prey availability, and possibly other factors would also affect these spatial recruitment and survival mechanisms.

Delta smelt have been observed as far west as San Francisco Bay near the City of Berkeley, as far north as Knight's Landing on the Sacramento River, as far east as Woodbridge on the Mokelumne River and Stockton on the Calaveras River, and as far south as Mossdale on the San Joaquin River (Merz *et al.* 2011; Figure 1). These extremes of the species' distribution extend beyond the geographic boundaries specified in the critical habitat rule. However, most delta smelt have been collected from locations within the critical habitat boundaries. In other words, observations of delta smelt outside of the critical habitat boundaries reflect transient habitat use rather than permanent or seasonal habitat use. The Napa River is the only location outside of the critical habitat boundaries that may be used often enough to be considered a seasonal habitat rather than a transient one.

The fixed-location habitats that delta smelt permanently occupy span from the Cache Slough complex down into Suisun Bay and Suisun Marsh (Figure 3). The reasons delta smelt are believed to permanently occupy this part of the estuary are the presence of fresh- to low-salinity water year-round that is comparatively turbid and of a tolerable water temperature. These

appropriate water quality conditions overlap an underwater landscape featuring variation in depth, tidal current velocities, edge habitats, and food production (Nobriga *et al.* 2008; Feyrer *et al.* 2011; Murphy and Hamilton 2013; Sommer and Mejia 2013; Hammock *et al.* 2015; 2017; 2019; Bever *et al.* 2016; Mahardja *et al.* 2019; Simonis and Merz 2019). Field observations are increasingly being supported by laboratory research that explains how delta smelt respond physiologically and behaviorally to variation in water quality that can vary with changes in climate, freshwater flow and estuarine bathymetry (e.g., Hasenbein *et al.* 2013; 2016b; Komoroske *et al.* 2014; 2016).

The principal variable-location habitat that delta smelt permanently occupy is the low-salinity zone (LSZ) (Moyle *et al.* 1992; Bennett 2005). The LSZ is a dynamic habitat with size and location that respond to changes in tidal and river flows (Jassby *et al.* 1995; Kimmerer *et al.* 2013; MacWilliams *et al.* 2015; 2016; Bever *et al.* 2016). The LSZ generally expands and moves downstream as river flows into the estuary increase, placing low-salinity water over a larger and more diverse set of nominal habitat types than occurs under lower flow conditions. As river flows decrease, the LSZ contracts and moves upstream. This is perhaps the most frequently assumed freshwater flow mechanism in discussions about X2 regulations, but as shown by Kimmerer *et al.* (2009; 2013), it does not appear to be a major explanatory mechanism for most fishes including the delta smelt.

The LSZ often encompasses many of the permanently occupied fixed locations discussed above. It is treated separately here because delta smelt distribution tracks the movement of the LSZ somewhat (Moyle *et al.* 1992; Dege and Brown 2004; Feyrer *et al.* 2007; 2011; Nobriga *et al.* 2008; Sommer *et al.* 2011; Bever *et al.* 2016; Manly *et al.* 2015; Polansky *et al.* 2018; Simonis and Merz 2019). Due to its historical importance as a fish nursery habitat, there is a long research history into the physics and biology of the LSZ. The LSZ is frequently defined as waters with a salinity range of about 0.5 to 6 ppt (Kimmerer 2004). This and similar salinity ranges reported by different authors were chosen based on analyses of historical peaks in chlorophyll concentration and zooplankton abundance. Most delta smelt collected in California Department of Fish and Wildlife's (CDFW) 20-mm Survey and Summer Townet Survey (TNS) have been collected at salinities of near 0 ppt to 2 ppt and most of the (older) delta smelt in the Fall Midwater Trawl (FMWT) have been collected from a salinity range of about 1 to 5 ppt (Kimmerer *et al.* 2013). These fish of different life stages do not tend to be in dramatically different places (Murphy and Hamilton 2013; Figure 3), suggesting that some of the change in occupied salinity with age is due to the seasonal increases in salinity that accompany lower outflow in the summer and fall.

Each year, the distribution of delta smelt seasonally expands when adults disperse in response to winter flow increases that also coincide with seasonal increases in turbidity and decreases in water temperature (Sommer *et al.* 2011; Figure 3). The annual range expansion of adult delta smelt extends up the Sacramento River to about Garcia Bend in the Pocket neighborhood of Sacramento, up the San Joaquin River from Antioch to areas near Stockton, up the lower Mokelumne River system, and west throughout Suisun Bay and the larger sloughs of Suisun Marsh. Some delta smelt seasonally and transiently occupy Old and Middle rivers in the south Delta each year, but face a high risk of entrainment when they do (Kimmerer 2008; Grimaldo *et al.* 2009). The expanded adult distribution initially affects the distribution of the next generation because delta smelt eggs are adhesive and not believed to be highly mobile once they are spawned (Mager *et al.* 2004). Thus, the distribution of larvae reflects a combination of where spawning occurred and freshwater flow when the eggs hatch.

In summary, the delta smelt population spreads out in the winter and then retracts by summer into what is presently a bi-modal spatial distribution with a peak in the LSZ and a separate peak in the Cache Slough complex. Most individuals occur in the LSZ at some point in their life cycle and the use of the Cache Slough complex diminishes in years with warm summers (Bush 2017). *Microhabitat Use*: The delta smelt has been historically characterized as a pelagic fish, meaning one with a spatial distribution that is skewed away from shorelines (Moyle *et al.* 1992; Sommer *et al.* 2007). This has led to some confusion among researchers and managers alike – usually perpetuating a strawman argument that delta smelt either occupy deep-water habitats or shallow-water habitats. Then, catch data from shallow habitats get used to refute the pelagic characterization, but catches in shallow-water say nothing more about a pelagic tendency than catches in deep water would say about a nearshore habitat tendency. The long-term monitoring programs used to characterize delta smelt status and trend are offshore sampling programs – meaning pelagic sampling programs, and surface-trawling appears to be particularly effective at capturing delta smelt away from shorelines (Mitchell *et al.* 2017). However, numerous studies have reported collecting delta smelt from nearshore environments using fishing gear like beach seines and fyke nets from locations that often had a water depth less than or equal to 1 meter (just over three feet) (e.g., Matern *et al.* 2002; Nobriga *et al.* 2005; Gewant and Bollens 2012; Mahardja *et al.* 2017b). Further, it has been established that onshore-offshore movements are one behavior option delta smelt and other fishes can use to maintain position or move upstream in a tidal-flow influenced estuary (Bennett *et al.* 2002; Feyrer *et al.* 2013; Bennett and Burau 2015). Captive delta smelt have been shown to avoid in-water structure like submerged aquatic vegetation (SAV) (Ferrari *et al.* 2014). SAV tends to grow where tidal current velocities are low, which is a habitat attribute that has also been associated with wild delta smelt (Hobbs *et al.* 2006; Bever *et al.* 2016). Thus, the proliferation of SAV in areas that might otherwise be attractive to delta smelt represents a significant habitat degradation, not only because it creates structure in the water column, but also because it is associated with higher water transparency (Hestir *et al.* 2016), and a fish fauna that delta smelt does not seem to be able to coexist with (Nobriga *et al.* 2005; Conrad *et al.* 2016). Based on our review, the Service suggests that the characterization of delta smelt as an open-water fish appears to be accurate and does not imply occupation of a particular water column depth. The species does appear to have some affinity for surface waters (Bennett and Burau 2015; Mitchell *et al.* 2017), but like any microhabitat descriptor, this is not intended to reflect the location of all individuals because delta smelt are not limited to surface waters (Feyrer *et al.* 2013).

Although the delta smelt is generally an open-water fish, depth variation of open-water habitats is an important habitat attribute (Moyle *et al.* 1992; Hobbs *et al.* 2006; Bever *et al.* 2016). In the wild, delta smelt are most frequently collected in water that is somewhat shallow (4-15 ft deep) where turbidity is often elevated and tidal currents exist, but are not excessive (Moyle *et al.* 1992; Bever *et al.* 2016). For instance, in Suisun Bay, the deep shipping channels are poor quality habitat because tidal velocity is very high (Hobbs *et al*. 2006; Bever *et al.* 2016), but in the Delta where tidal velocity is slower, offshore habitat in Cache Slough and the Sacramento Deepwater Shipping Channel is used to a greater extent (Feyrer *et al.* 2013; CDFW unpublished data).

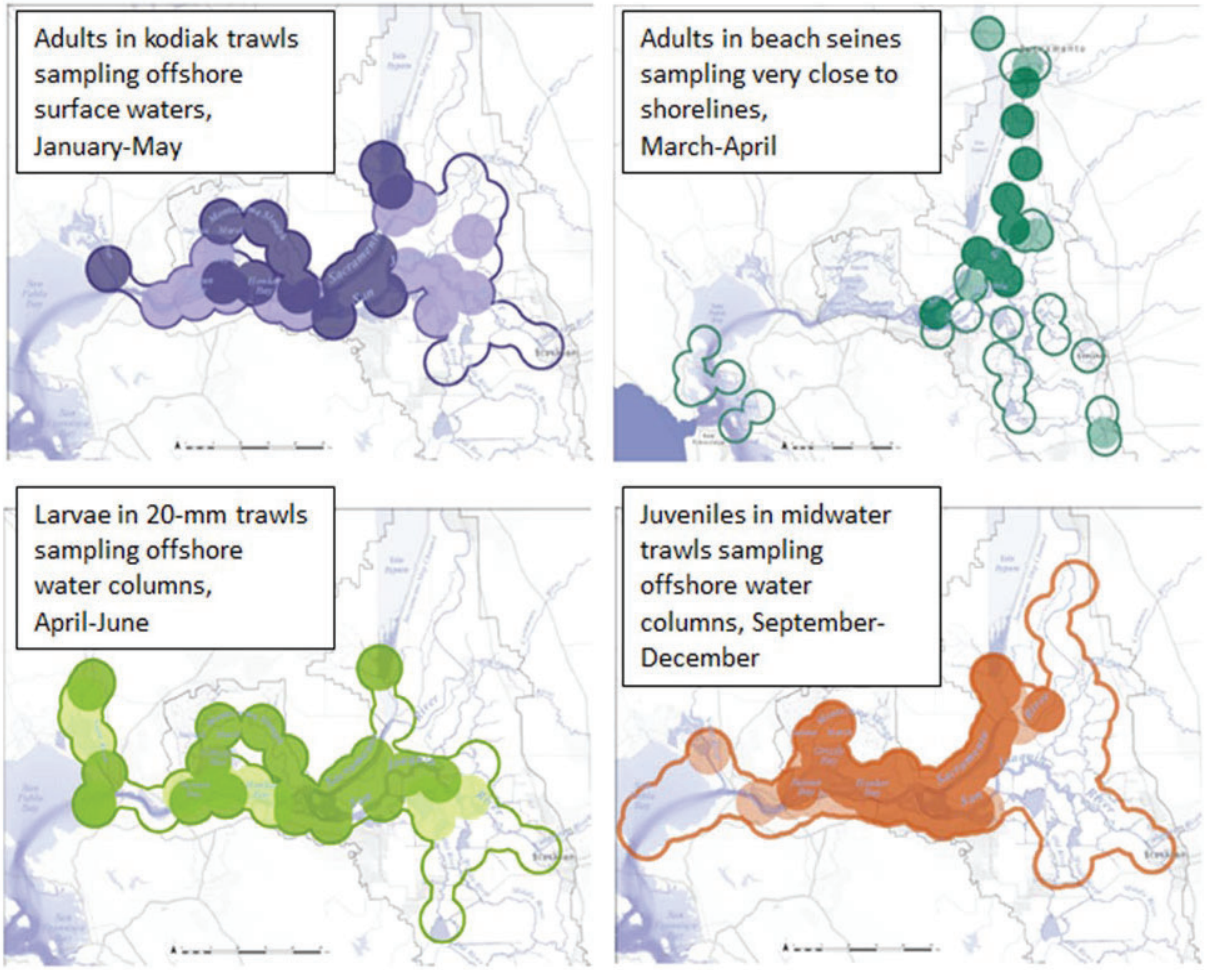


Figure 3. Maps of multi-year average distributions of delta smelt collected in four monitoring programs. The sampling regions covered by each survey are outlined. The areas with dark shading surround sampling stations in which 90 percent of the delta smelt collections occurred, the areas with light shading surround sampling stations in which the next 9 percent of delta smelt collections occurred. Note the lack of sampling sites in Suisun Bay and marsh for the beach seine (upper right panel). Source: Murphy and Hamilton (2013).

Environmental Setting and History of Ecological Change in the Bay-Delta

This section briefly reviews environmental changes that have occurred since 1850; i.e., the California Gold Rush to the present. This section is subdivided into three parts. The first describes the condition that is believed to have existed in 1850. The second covers a period from about 1920 to 1967, which is the year prior to the initiation of State Water Project (SWP) water exports from the Delta. The third sub-section covers 1968, the first year of Central Valley Project (CVP) and SWP dual operations, to the present.

Over the past few years, the scientific information developed to understand pre- and post-water project changes to the estuary's landscape and flow regime has grown substantially. However, as with most scientific endeavors, there are some discrepancies that may affect some conclusions. For instance, Whipple *et al.* (2012) showed the difference between contemporary estimates of unimpaired Delta outflow that were used in the modeling studies reviewed below and measured data from the latter 19th century. These discrepancies can affect the conclusions about the natural

hydrograph of the Bay-Delta ecosystem and should be kept in mind when reviewing what follows. The information on ecosystem changes that have accrued through time provides context for the current status of the delta smelt.

The 1850 Bay-Delta estuary: The historical Delta ecosystem was a large tidal marsh at the confluence of two floodplain river systems (Whipple *et al.* 2012; Andrews *et al.* 2017; Gross *et al.* 2018; Figure 4). The Delta itself experienced flooding over spring-neap tidal time scales and seasonal river runoff time scales. This variability in freshwater input to the estuary was likely important to seasonal and interannual variability in the productivity of the ecosystem for the same reasons that smaller-scale tidal marsh plain and floodplain inundation are today. Specifically, these flood cycles deliver organic carbon, but also increase the production of lower trophic levels due to lengthened water residence times and greater shallow, wetted surface areas (Sommer *et al*. 2004; Grosholz and Gallo 2006; Howe and Simenstad 2011; Enright *et al*. 2013). When freshwater flows out of the Delta and into the estuary, it can generate currents that aggregate particulate matter like sediment and phytoplankton (Monismith *et al*. 1996; 2002; MacWilliams *et al*. 2015) – and presumably also did so in the pre-development ecosystem. Prior to the invasion of the overbite clam, these sediment and phytoplankton aggregations, which occurred near the 2 ppt isohaline, demarcated an important fish nursery region (Turner and Chadwick 1972; Jassby *et al*. 1995; Bennett *et al*. 2002).

The estuary's natural hydrograph reached its annual base flows (annual minimum inputs of fresh water) in August or September toward the end of California's dry summers (Figure 5). Freshwater inputs would generally increase during the fall as precipitation in the watershed resumed. Delta outflow reached a broad winter through spring peak fueled first by precipitation followed by additional contributions from melting snow. The annual peak of Delta outflow often spanned January through May before declining back to base flow conditions by the late summer. The year-to-year variation in Delta outflow was considerable, often varying by about an order of magnitude during each month of the year. Water flowing from the Delta mixed into larger open-water habitats in Suisun and San Pablo bays, which themselves were fringed with marshes and tidal creeks. This pre-development ecosystem was shallower than the modern system. As a result, salinity responded more rapidly to changes in freshwater flow than it does now and less freshwater flow was needed to move salinity isohalines than is presently the case (Andrews *et al.* 2017; Gross *et al.* 2018). Like most native fish, the delta smelt evolved its life history to take advantage of this flow regime (Moyle 2002). In particular, its spawning period and early life stages overlap the months in which historical marsh-floodplain inundation and freshwater inputs to the estuary were highest, and water temperatures were cool, but not as cold as they are in the winter before spawning commences (see above for details of what is known about spawning and early life stages of delta smelt).

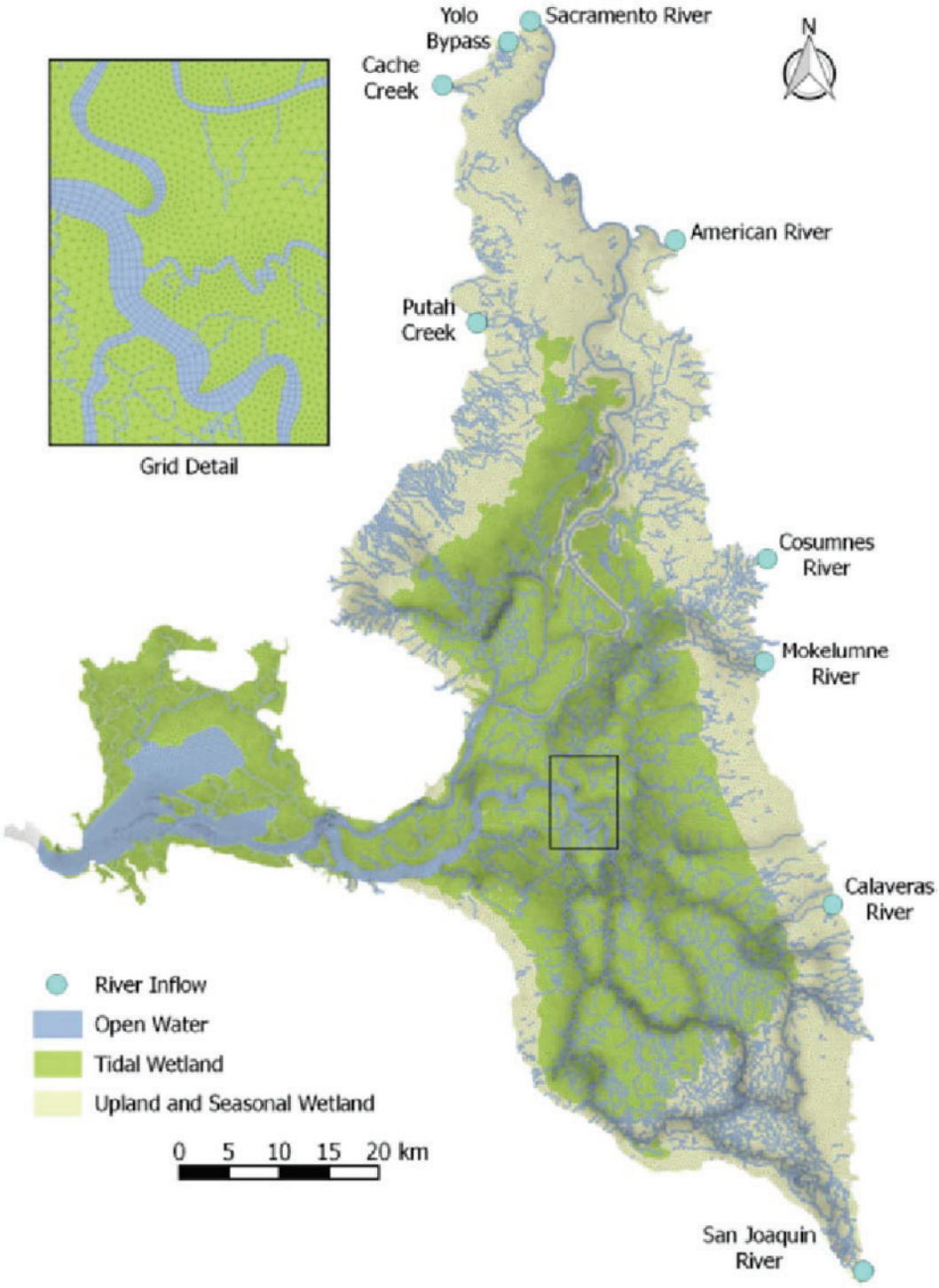


Figure 4. The circa 1850 Delta as depicted in the version of the UnTRIM 3-D hydrodynamic model described by Andrews *et al.* (2017). The model depicts an expansive tidal marsh area of approximately 2,200 square kilometers (km) or 850 square miles. Source: Andrews *et al.* (2017).

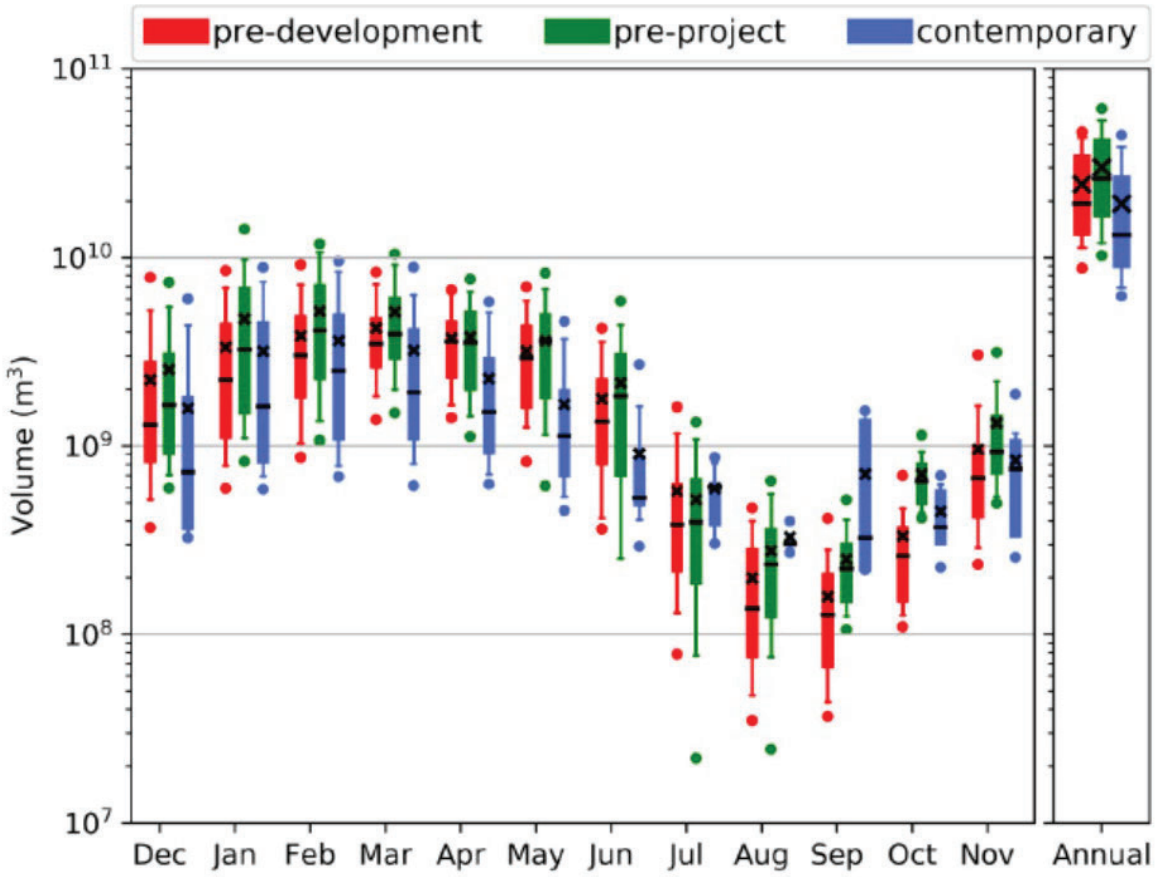


Figure 5. Boxplots of estimated Delta outflow by month for a pre-development Bay-Delta (circa 1850; red boxes), a pre-CVP and SWP Bay-Delta (circa 1920; green boxes), and a contemporary Bay-Delta (blue boxes; precise year not stated by the authors). Source: Gross *et al.* (2018). The inset labeled "Annual" on the x-axis is the boxplot summary of the sum of monthly outflows. Gross *et al.* (2018) attributed the higher outflow in the pre-project era relative to the pre-development era to the levees that had been constructed in the system by 1920.

Many tidal river estuaries form frontal zones where inflowing fresh water begins mixing with seawater (Peterson 2003). In the Bay-Delta, a frontal zone of biological importance is the LSZ (Jassby *et al.* 1995). The LSZ is a mobile and variable habitat region that frequently overlaps the parts of the estuary where many delta smelt reside (as described above). In the Bay-Delta the location and associated function of the LSZ have historically been indexed using a statistic called X2, which is the geographic location of 2 ppt salinity near the bottom of the water column measured as a distance from the Golden Gate Bridge (Jassby *et al.* 1995; MacWilliams *et al.* 2015; Figure 6). When Delta outflow is high, saline water is pushed closer to the Golden Gate, resulting in a smaller distance from the Golden Gate Bridge to X2. Conversely, when Delta outflow is low, salinity intrudes further into the estuary resulting in a larger distance from the Golden Gate Bridge to X2. These changes in how salinity is distributed affect numerous physical and biological processes in the estuary (Jassby *et al.* 1995; Kimmerer 2002a,b; Kimmerer 2004; MacWilliams *et al.* 2015).

X2, rather than another salinity isohaline, was chosen as the low-salinity zone habitat metric because it is a frontal zone or boundary upstream of which, salinity tends to be the same from the surface of the water to the bottom, and downstream of which, salinity varies from top to bottom (Jassby *et al.* 1995). That variability in the vertical distribution of salinity is indicative of currents that help to aggregate sinking particles like sediment and phytoplankton, and as recently modeled, zooplankton (Kimmerer *et al.* 2014a), near X2.

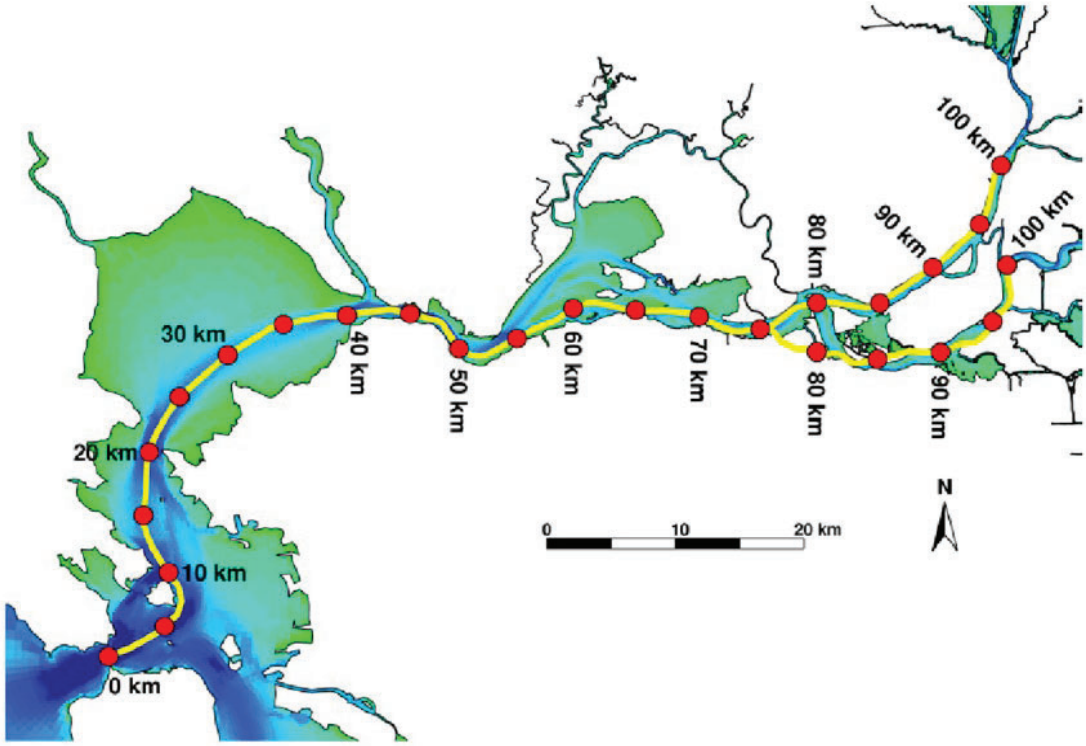


Figure 6. The northern reach of the Bay-Delta as depicted in the UnTRIM 3-D contemporary Bay-Delta model; greener colors represent shallower water and bluer colors represent deeper areas. The yellow lines depict the transect along which the location of X2 is estimated in the model and the associated red circles depict selected km distances from the Golden Gate Bridge along the northern axis of the estuary into the Sacramento and San Joaquin rivers for use in interpreting the variable locations of X2. Source: MacWilliams *et al.* (2015).

Pre-development outflows from the Delta were higher in the winter and spring than they are now while summer and fall outflows may have been lower (Andrews *et al.* 2017; Gross *et al.* 2018; Figure 5). Thus, X2 also varied more within years in the circa 1850 estuary than it now does. In the pre-development estuary, X2 would remain in San Pablo Bay for months at a time in the winter-spring of Above Normal and wetter water year types before retreating landward (upstream) in the summer-fall. In the contemporary estuary, X2 spends nearly all of its wet season time in Suisun Bay (landward or 'upstream' of historical) and dry season time between Collinsville and Rio Vista (~ 80 to 95 km; Figure 6). These contemporary dry season locations of X2 may be seaward or 'downstream' of historical locations (Gross *et al.* 2018).

There are no data on the timing and magnitude of biological productivity in the circa 1850 Bay-Delta, nor are we aware of any information on how delta smelt used the estuary at the time.

However, inferences can be made based on general ecosystem function in the northern hemisphere temperate zone and contemporary information. The input of basal food web materials like nutrients and detritus likely co-varied with the timing, duration, and magnitude of freshwater flows (e.g., Delta inflow; Jassby and Cloern 2000), which would likewise have affected the timing, magnitude, and duration of inundation of the system's expansive floodplains (e.g., Whipple *et al.* 2012; Figure 4). The production of planktonic and epibenthic invertebrates from floodplains, tidal wetlands, and open-water habitats that fuel the production of juvenile fishes that feed in open waters may have generally increased during the spring and peaked during the summer in concert with seasonal variation in water temperature (e.g., Heubach 1969; Orsi and Mecum 1986; Merz *et al.* 2016). The summer months are the warmest months in the Bay-Delta region and thus, they support the highest *average* metabolic rates of invertebrates and fish, which rely on water temperature to control their body temperature and metabolic rates. However, there was likely to have been considerable species-specificity to this generalization (e.g., Ambler *et al.* 1985; Gewant and Bollens 2005) because the Bay-Delta's native biotic community includes numerous cold-water adapted species.

The seasonal timing of delta smelt reproduction (February-May; detailed below) would have more broadly coincided with the general timing of peak freshwater flow into the Bay-Delta (Figure 5). The higher outflow and shallower average depth of the system resulted in frequent occurrence of the LSZ in San Pablo Bay during the wet season. Thus, it is likely that delta smelt reared in San Pablo Bay, taking advantage of its greatly expanded low-salinity habitat area (see MacWilliams *et al*. 2015), to much greater extent prior to development of the system than they are able to now. Lower flows in the summer-fall likely caused delta smelt distribution to seasonally retract back into Suisun Bay/marsh and the Delta; ecosystems which were likely much more productive at the time due to the expansive tidal marshes and greater connection between land and water (Whipple *et al*. 2012). Delta smelt's population-level demand for prey annually peaks at some combination of water temperature and growth of the population's biomass. This timing could be estimated from the model developed by Rose *et al.* (2013a), but we are not aware that such a calculation exists.

1920-1967: By 1920, most of the Delta's tidal wetlands had been reclaimed (Whipple *et al.* 2012; Figure 7). The data provided by Gross *et al.* (2018; Figure 4) suggest that Delta outflow may have been a little higher circa 1920 than it had been circa 1850 due to levee construction. However, this may (Hutton and Roy 2019) or may not be consistent with historical observations (Whipple *et al.* 2012). Regardless, Delta outflow and several other net flow metrics from within the Delta did begin to decline between the early 1920s and 1967 (Hutton *et al.* 2017a; 2019). These changes occurred because of four factors: (1) water storage in the Bay-Delta watershed increased from about 4 million acre feet (MAF) to about 40 MAF because of the construction of dams upstream of the Delta, (2) the CVP began exporting water from the Delta in 1951, (3) non-project water diversions within and upstream of the Delta increased, and (4) shipping channels were dredged through the estuary and into the Sacramento and San Joaquin rivers. These changes facilitated a general water management strategy in California to store water during the wet season and re-distribute it during the dry season to provide a more reliable supply than was available naturally. In addition, the CVP and SWP have had to offset a considerable summertime water deficit to protect the quality of their exported water and to protect water quality for senior water rights holders in the Delta. These uses would be highly impaired without water released from CVP and SWP reservoirs during the summer and fall (Hutton *et al.* 2017b).

During the 1930s to 1960s, the navigation channels were dredged deeper (~12 meters) to accommodate shipping traffic from the Pacific Ocean and San Francisco Bay to ports in Sacramento and Stockton and to increase the capacity of the Delta to convey floodwaters. Channel deepening interacted with the simultaneously increasing water storage to change the Bay-Delta ecosystem into one in which Suisun Bay and the Sacramento-San Joaquin River confluence region became the largest and most depth-varying places in the typical range of the LSZ. Even with these changes, the LSZ remained a highly productive fish nursery habitat for many decades (Stevens and Miller 1983; Moyle *et al.* 1992; Jassby *et al.* 1995).

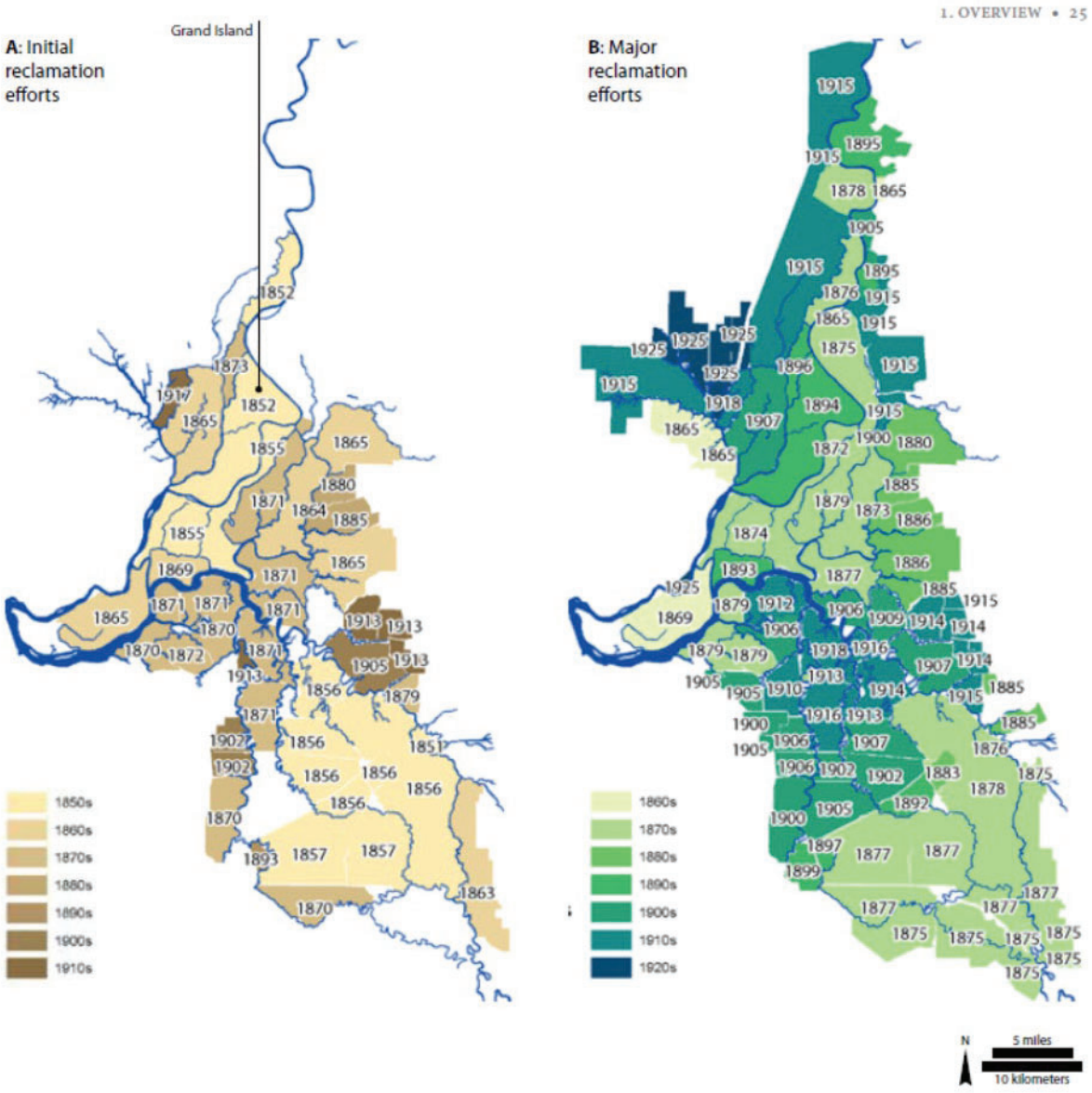


Figure 7. Maps of the Delta showing years of initial land reclamation attempts on the left and major land reclamation efforts on the right. Note that a large majority of the major reclamation efforts were underway by 1915 and the last efforts in the vicinity of Liberty Island began in 1925. Source: Whipple *et al.* (2012).

1968-present: The SWP began exporting water from the Delta in 1968 and its exports generally increased until about 1989 (Figure 8). CVP exports reached present-day levels by the end of the 1970s. During the 1980s water storage capacity in the Bay-Delta watershed reached its present-

day level of a little over 50 MAF (Cloern and Jassby 2012; Hutton *et al.* 2017a). Thereafter, combined CVP-SWP exports began to increase in year-to-year variability, which increased the uncertainty about how much water would be supplied south of the Delta annually. This has combined with the increasing human demand for fresh water to result in a conflict between human water demand and environmental water uses, including the maintenance of the hydraulic salinity barrier needed to protect exported water and other in-Delta water users from salinity intrusion (Hutton *et al.* 2017b; Reis *et al.* 2019).

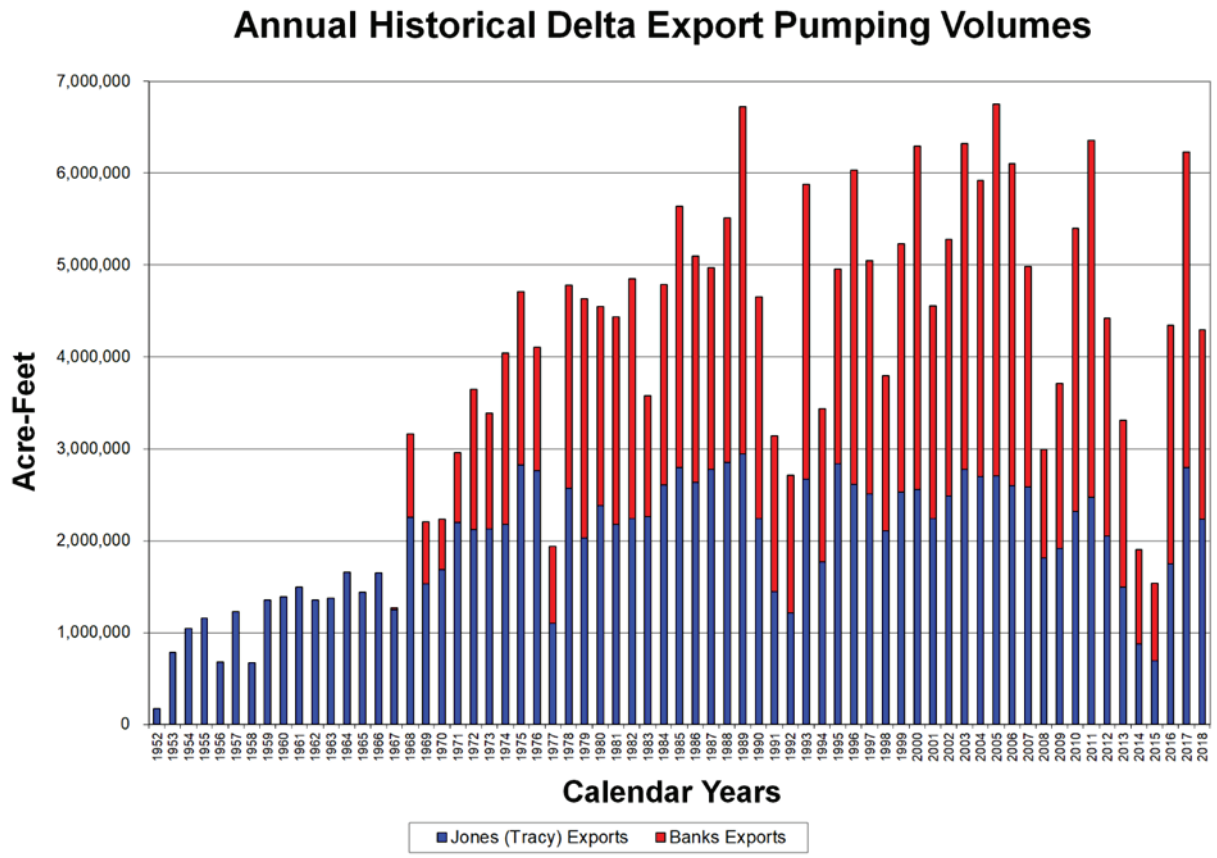


Figure 8. Time series of Central Valley Project and State Water Project exports from the Delta for 1952 through 2018. State Water Project exports began in water year 1968. Source: DAYFLOW data base.

The changes discussed above have continued to lower Delta outflow (Hutton *et al.* 2017a,b; Reis *et al.* 2019; Figures 9 and 10), though D-1641 appears to have halted the trend for years in which the eight river index is lower than 20 MAF (middle panel of Figure 9). In Figure 9, exports were modeled as depletions of water from the system, so the more negative the number on the y-axis of the middle panel, the higher the exports. Thus, the graphic shows that in years when the eight river index is more than 20 MAF, exports continue to increase, but in years when the eight river index is lower than 20 MAF, exports have been trending lower. Both of these trends cause the higher year-to-year variability in water exports shown in Figure 8.

In general, major changes to the flow regime of an aquatic ecosystem are expected to be accompanied by ecological change (Benson 1981; Bunn and Arthington 2002; Poff and Zimmerman 2010; Gillson 2011), and that is what has been observed over time in the Bay and Delta (e.g., Matern *et al.* 2002; Moyle and Bennett 2008; Winder *et al.* 2011; Feyrer *et al.* 2015;

Conrad *et al.* 2016). Delta outflow is a driver of many ecological mechanisms in the Bay-Delta and an indicator of several others (Kimmerer 2002a). Thus, the changes to the estuary's freshwater flow regime have likely interacted with the changes to the estuary's landscape, specifically its deeper channels and greatly reduced land-water connections (Andrews *et al*. 2017), to lower the total biological productivity of the estuary. In addition, changes to the freshwater flow regime detailed above appear to have affected the reproductive success of fishes that use the Delta and Suisun Bay as rearing habitats. The evidence for this is that the native fish assemblage had reproductive seasons timed to winter-spring peak flows, whereas currently dominant non-native species generally spawn later in the spring and into the summer when inflows to the Delta are generally high to support human water use, but outflow from the Delta is generally low (Moyle 2002; Moyle and Bennett 2008). Reis *et al.* (2019) recently described super-critical water years with respect to Delta outflow. Several studies have indicated that low flow years and droughts in particular result in low native fish production in the Bay-Delta (Meng *et al.* 1994; Jassby *et al.* 1995; Kimmerer 2002b; Feyrer *et al.* 2015). Droughts recur and may contribute to cumulative impacts to native fishes like delta smelt. For instance, recent droughts have been particularly problematic for delta smelt (Moyle *et al.* 2018). Thus, the frequency of these super-critical water years, which has been much higher since 1968 than it was from 1920-1967 (Figure 10), is a conservation challenge that the Service and its partners have to contend with.

There are several fish species in the Bay-Delta that have historically been shown to have demonstrable positive population responses to freshwater flows into or out of the Delta. These include the well-described relationships for the survival of emigrating Sacramento basin Chinook salmon (*Oncorhynchus tschawytscha)* smolts with Sacramento River inflows (Kjelson and Brandes 1989; Perry *et al.* 2010), the relationship of Sacramento splittail (*Pogonichthys macrolepidotus*) production to Yolo Bypass flow (Moyle *et al.* 2004; Feyrer *et al.* 2006), and the 'fish-X2' relationships for striped bass (*Morone saxatilis*), longfin smelt (*Spirinchus thaleichthys*), and starry flounder (*Platichthys stellatus*) (Turner and Chadwick 1972; Jassby *et al.* 1995; Kimmerer 2002b). The life-history of delta smelt with its affinity for fresh and low-salinity waters seems consistent with that of a fish one could expect to respond similarly to variation in Delta outflow or X2. Researchers searched for some form of analogous relationship for the delta smelt for several decades, but no persistent relationship was found (Stevens and Miller 1983; Moyle *et al.* 1992; Jassby *et al.* 1995; Kimmerer 2002b; Bennett 2005; Mac Nally *et al.* 2010; Thomson *et al.* 2010; Miller *et al.* 2012). Further, Rose *et al.* (2013a,b) did not find salinity variation *per se* to have much impact on predictions of delta smelt population growth rate. The larger predicted impact in their individual-based model related to flow was due to simulated entrainment in exported water (Rose *et al.* 2013b; Kimmerer and Rose 2018). Although entrainment was predicted to lower the population growth rate, in and of itself, it could not convert a strongly positive growing population into a declining one without at least one additional factor impacting survival at the same time.

The IEP (2015) reported a correlation between February-May X2 and ratios of the 20-mm Survey index for delta smelt and either the Spring Kodiak Trawl (SKT) or FMWT indices of the parental stock that produced the 20-mm fish. This relationship emerged in data beginning at the time of the pelagic organism decline (POD) in 2002. This relationship is stronger when considered in terms of salinity at Chipps Island (He and Nobriga 2018), possibly because salinity can be measured more accurately than Delta outflow when net freshwater flow is very low (Monismith 2016). Castillo *et al.* (2018) used a simulation based on SKT data to suggest a link

between Delta outflow and adult delta smelt abundance. In addition, several teams have reported statistical associations of delta smelt spatial distribution and salinity that imply the population spatial distribution co-varies with Delta outflow, X2, or similar indices of freshwater input to the estuary (Feyrer *et al.* 2007; 2011; Nobriga *et al.* 2008; Kimmerer *et al.* 2009; 2013; Bever *et al.* 2016; Polanksy *et al.* 2018; Simonis and Merz 2019). The strength of this covariation and its management utility have been contested (e.g., Murphy and Hamilton 2013; Manly *et al.* 2015; Latour 2016; Polanksy *et al.* 2018) and supported (Sommer *et al.* 2011; Bever *et al.* 2016; Feyrer *et al.* 2016; Mahardja *et al.* 2017a) in several recently published papers.

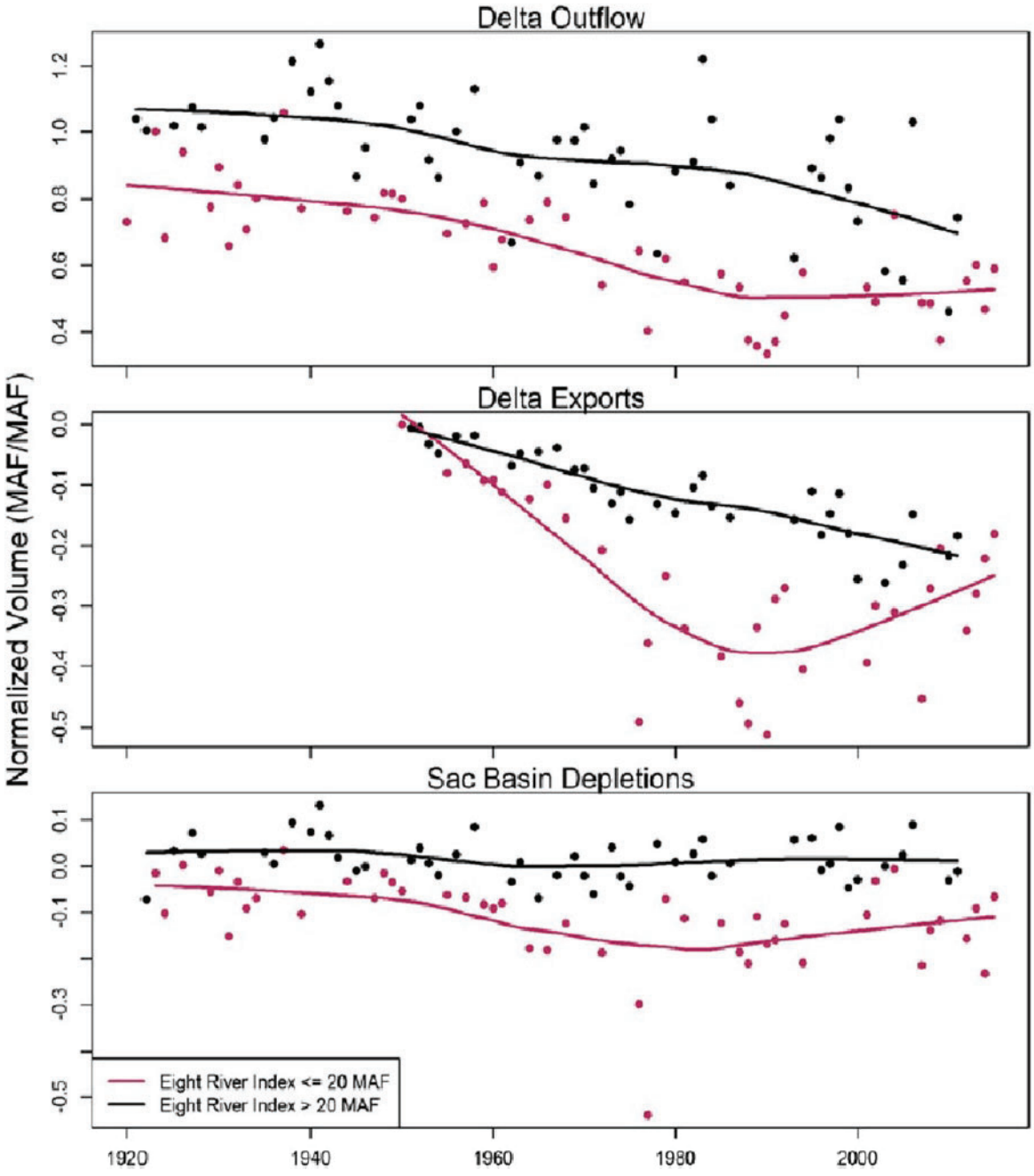


Figure 9. Time series (1922-2015) of statistical trend outputs of annual Delta outflow (top panel), Delta exports treated as depletions so increasing exports are represented by more negative values (middle panel), and water diversions from the Sacramento River basin upstream of the Delta (bottom panel). Black symbols and lines are for years in which the eight river index, a measure of water availability in the Bay-Delta watershed, was greater than 20 MAF. Red symbols and lines are for years in which the eight river index was less than or equal to 20 MAF. Source: Hutton *et al.* (2017b).

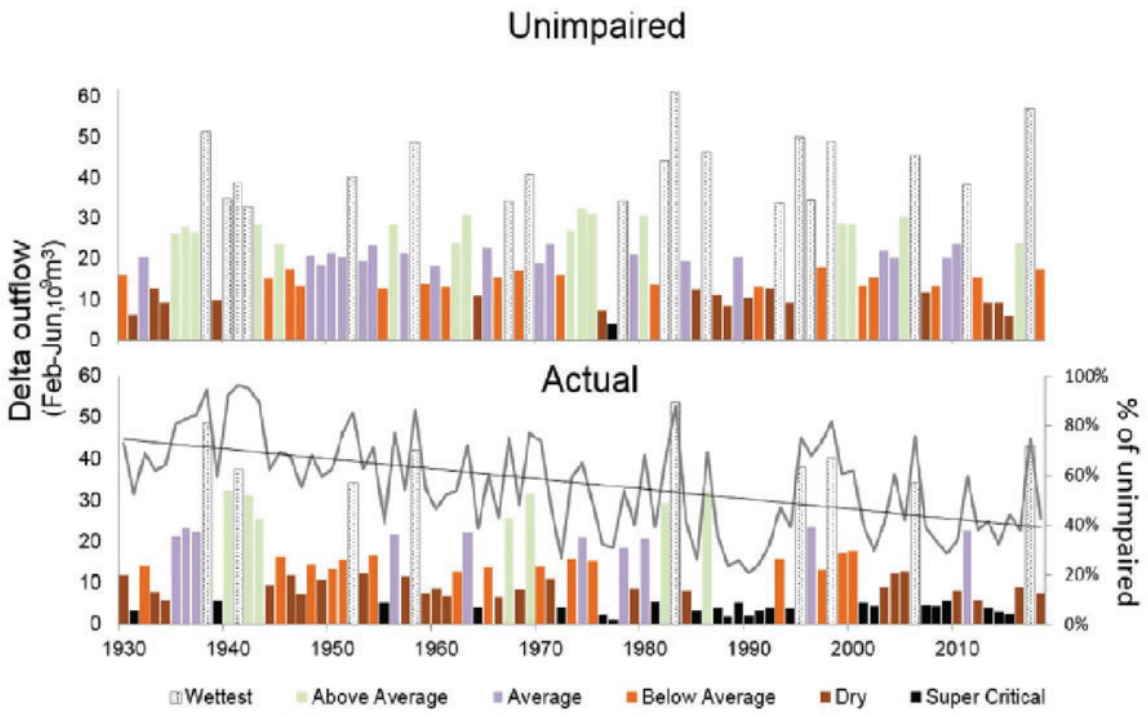


Figure 10. Time series of estimates of unimpaired (upper panel) and actual (lower panel) Delta outflow (February-June) color-coded according to six water year types, 1930-2018. The water year types based on basin precipitation are shown in the upper panel. In the lower panel, the water year types were re-assessed based on their fraction of the estimated unimpaired outflow. The long-term trend in this fraction as "% of unimpaired" is shown on the second y-axis of the bottom panel. Source: Reis *et al.* (2019).

Delta Smelt Population Trend

The CDFW's TNS (http://www.dfg.ca.gov/delta/data/townet/indices.asp?species=3) and FMWT Survey (http://www.dfg.ca.gov/delta/data/fmwt/indices.asp) are the two longest running indicators of the delta smelt's abundance trend. Indices of delta smelt relative abundance from these surveys date to 1959 and 1967, respectively (Figures 11 and 12). The FMWT index has traditionally been the primary indicator of delta smelt trend because it samples later in the life cycle, providing a better indicator of annual recruitment than the TNS (Service 1996). It has also sampled more consistently and more intensively than the TNS. The FMWT deploys more than 400 net tows per year over its four-month sampling season (September through December). The highest FMWT index for delta smelt (1,673) was recorded in 1970 and a comparably high index (1,654) was reported in 1980 (Figure 12). The last FMWT index exceeding 1,000 was reported in 1993. The last FMWT indices exceeding 100 were reported in 2003 and 2011. In 2018, the FMWT index was zero for the first time. The TNS index for delta smelt has been zero four times since 2015. Thus, the TNS and FMWT have recorded a 40-50 year decline in which delta smelt

went from a minor (but common) species to essentially undetectable by these long-term surveys (Figures 11 and 12).

Following the listing of the delta smelt, the CDFW launched a 20-mm Survey (1995) and a SKT Survey (SKT; 2002) to monitor the distribution and relative abundance of late larval stage and adult delta smelt, respectively. These newer indices have generally corroborated the trends implied by the TNS and the FMWT (Figures 11 and 12). The CDFW methods generate abundance indices from each survey but each index is on a different numeric scale. This means the index number generated by a given survey only has quantitative meaning relative to other indices generated by the same survey. Further, the CDFW indices lack estimates of uncertainty (variability) which limits interpretation of abundance changes from year to year even within each sampling program. The Service recently completed a new delta smelt abundance indexing procedure using data from all four of these surveys (Polansky *et al.* 2019). The Service method improves upon the CDFW method because it generates abundance indices in units of numbers of fish, including attempts to correct for different sampling efficiencies among surveys, and the method includes measures of uncertainty. Service indices of spawner abundance based on combined January and February SKT sampling are listed with their confidence intervals in Table 2. The estimates show the most recent 20 years of the delta smelt's longer-term decline in numbers of fish as best as they can be approximated with currently available information. The 2021 abundance estimate based on the January and February SKT sampling is 0 because no delta smelt were caught during those sampling efforts. However, Service's more recent Enhanced Delta Smelt Monitoring (EDSM) surveys did collect delta smelt during January and February, although in low numbers. For both surveys, data collected from January and February of each year were combined to derive a single abundance estimate. EDSM is designed to complete Delta wide surveys at a weekly time scale while SKT does this at a monthly scale, so the Service calculated EDSM abundance estimates using all weekly survey data within the January-February time interval (Table 3). While not 0 like the SKT based abundance, the EDSM calculated abundance estimate of spawning adults is an extremely low 267 individuals.

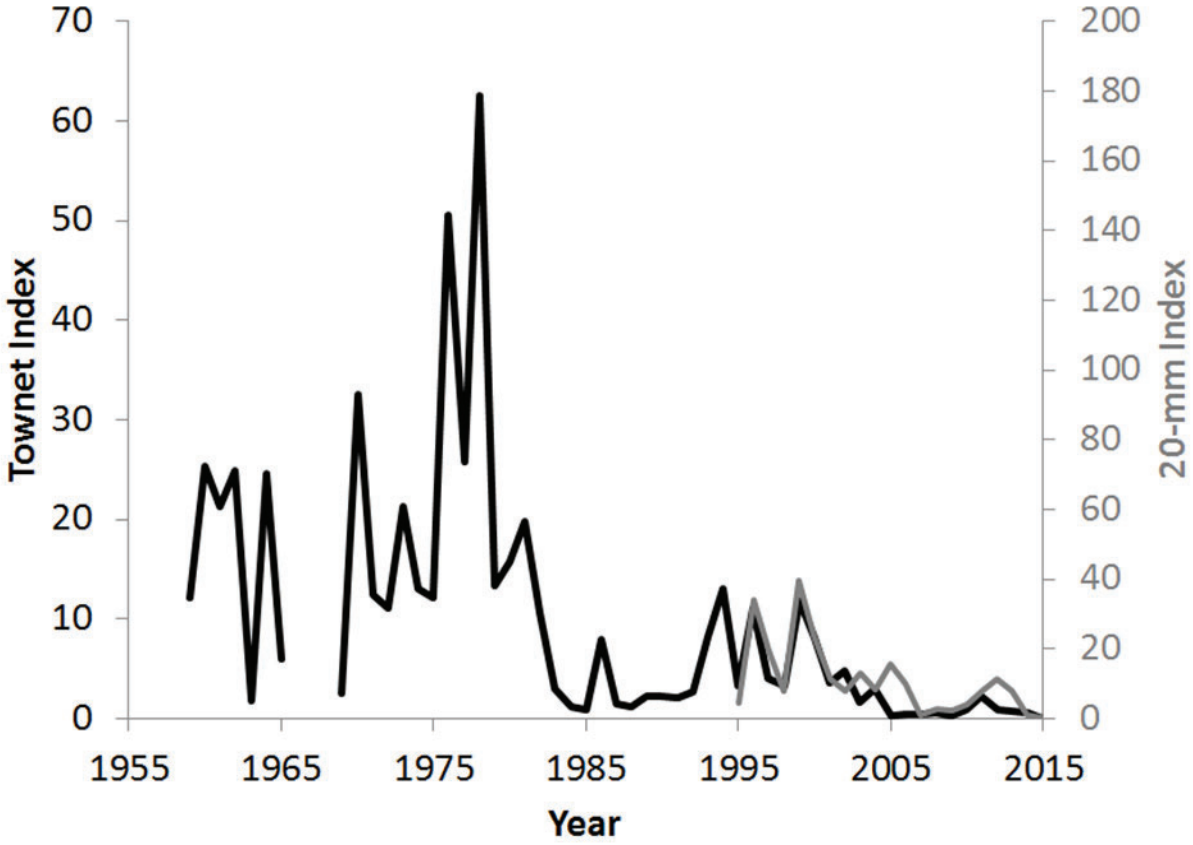


Figure 11. Time series of juvenile and larval delta smelt relative abundance as depicted by the California Department of Fish and Wildlife's TNS and 20-mm Survey, respectively. The TNS began in 1959 and the 20-mm Survey began in 1995. The second y-axis was scaled to better align the indices which are calculated on different numeric scales.

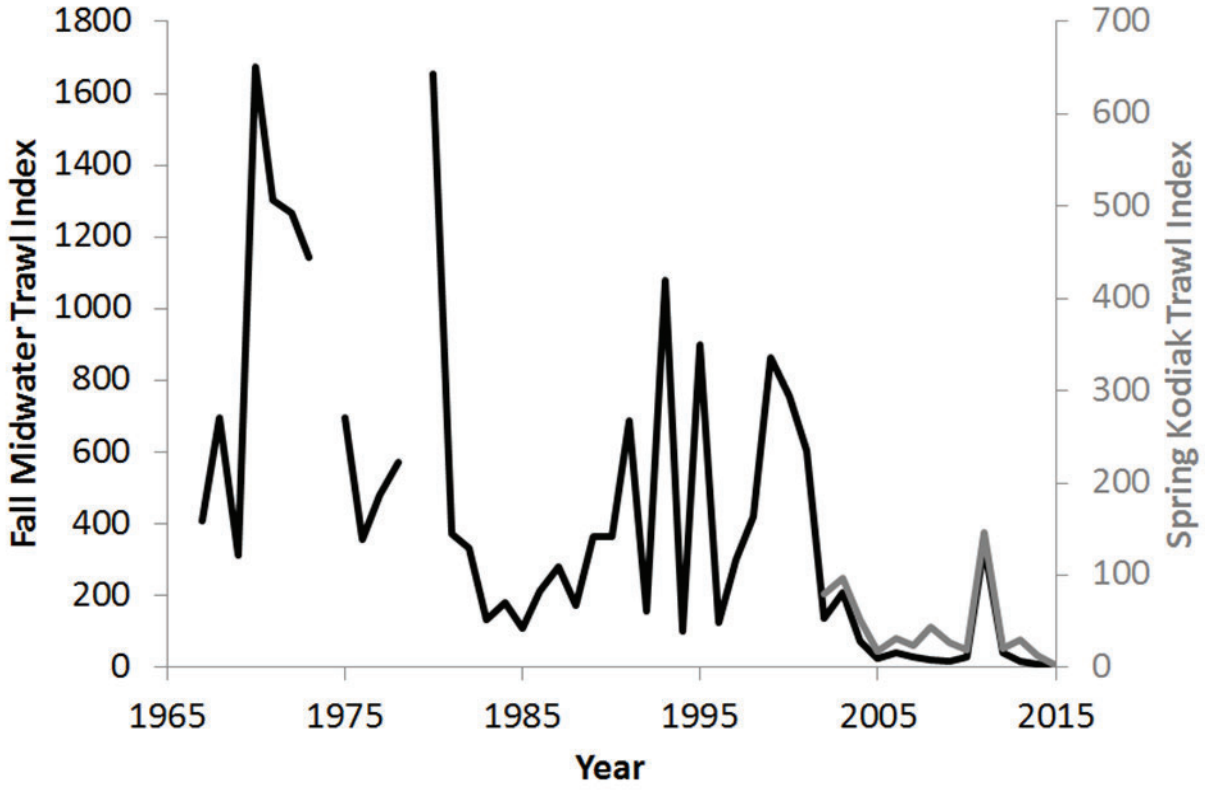


Figure 12. Time series of juvenile and larval delta smelt relative abundance as depicted by the California Department of Fish and Wildlife's FMWT and SKT Survey, respectively. The FMWT survey began in 1967 and the SKT trawl survey began in 2002. The second y-axis was scaled to better align the indices which are calculated on different numeric scales.

Table 2. Estimates of adult delta smelt population size during January-February of 2002 through 2021 with 95% confidence intervals.

			95% Confidence Interval			Number of Delta Smelt Caught (total tows) in the SKT Survey		
Year	Abundance Estimate	Standard Error	Lower Bound	Upper Bound		January	February	Year-to-Year Ratio
2002	1,093,244	195,329	760,332	1,523,294		262 (35)	394(39)	NA
2003	996,055	261,205	581,197	1,597,198		NA (0)	232 (39)	0.91
2004	966,981	262,190	553,729	1,573,002		380 (39)	300 (34)	0.97
2005	715,858	147,190	470,572	1,044,828		220 (39)	218 (40)	0.74
2006	272,327	42,400	198,681	364,438		44 (40)	84 (40)	0.38
2007	449,466	128,731	249,216	749,168		109 (40)	107 (39)	1.65
2008	509,428	188,396	236,859	963,839		132 (40)	36 (39)	1.13
2009	1,166,145	523,856	459,083	2,464,804		579 (40)	61 (42)	2.29
2010	251,863	54,580	161,753	374,582		88 (41)	57 (41)	0.22
2011	461,599	202,547	185,712	962,088		177 (42)	128 (40)	1.83
2012	1,177,201	328,682	662,728	1,939,836		320 (42)	287 (42)	2.55

2013	333,682	89,809	191,886	541,064		100 (41)	125 (41)	0.28
2014	308,972	91,474	167,858	522,884		148 (40)	55 (40)	0.93
2015	213,345	76,639	101,434	397,439		21 (39)	68 (39)	0.69
2016	25,445	9,584	11,661	48,622		7 (40)	6 (39)	0.12
2017	73,331	23,342	38,010	128,459		18 (38)	8 (41)	2.88
2018	26,649	21,397	5,215	82,805		10 (40)	4 (41)	0.36
2019	5,610	4,395	1,138	17,135		1 (40)	1 (39)	0.21
2020	5,213	3,644	1,241	14,710		1 (39)	1 (40)	0.93
2021	0	Not defined	Not defined	Not defined		0 (39)	0 (36)	0

Table 3. Enhanced Delta Smelt Monitoring (EDSM) Survey abundance estimates with columns as in Table 2.

			95% Confidence Interval			**Total delta smelt caught (total tows) by the EDSM survey**		
Year	Abundance Estimate	Standard Error	Lower Bound	Upper Bound		January	February	Year-to-Year Ratio
2017	83,878	20,070	28,770	193,146		63 (477)	33 (684)	NA
2018	6,821	2,778	1,664	19,123		10 (772)	3 (610)	0.08
2019	4,482	1,062	1,546	10,288		18 (730)	7 (518)	0.66
2020	1,027	520	209	3,134		3 (691)	2 (606)	0.23
2021	267	189	41	928		2 (327)	0 (466)	0.26

Climate Change

Climate projections for the San Francisco Bay-Delta and its watershed indicate that changes will be substantial by mid-century and considerable by the year 2100. Climate models broadly agree that average annual air temperatures will rise by about 2°C at mid-century and about 4°C by 2100 if current atmospheric carbon emissions accelerate as currently forecasted (Dettinger *et al.* 2016). It remains highly uncertain whether annual precipitation in the Bay-Delta watershed will trend wetter or drier (Dettinger 2005; Dettinger *et al.* 2016). The warmer air temperature projections suggest more precipitation will fall as rain rather than snow and that storms may increase in intensity, but will have more dry weather in between them (Knowles and Cayan 2002; Dettinger 2005; Dettinger *et al.* 2016). The expected consequences are less water stored in spring snowpacks, increased flooding and an associated decrease in runoff for the remainder of the year (Hayhoe *et al.* 2004). Changes in storm tracks may lead to increased frequency of flood and drought cycles during the 21st century (Dettinger *et al.* 2015).

As of 2009, sea level rise had not had much effect on X2 (Hutton *et al.* 2017b). However, additional sea level rise is another anticipated consequence of a warming global climate and if it is not mitigated, sea level rise will likely increase saltwater intrusion into the Bay-Delta (Rath *et al.* 2017). During the summer of 2015, variation in sea level interacted with very low Delta inflows to cause frequent recurrence of net negative Delta outflow (Monismith 2016).

Since the early 1980s, climate change is thought to have increased wind speed along the central California coast, resulting in a more frequent and longer lasting upwelling season (Garcia-Reyes and Largier 2010). Coastal upwelling causes colder deep water to rise to the ocean surface, bringing with it nutrients that stimulate the coastal food web. One effect of wind blowing over the estuary is that it resuspends sediment deposited in shallow areas like San Pablo Bay, Grizzly Bay, and Honker Bay (Ruhl *et al*. 2001). Thus, higher wind speeds blowing onto the coast might be expected to result in higher turbidity of the water in parts of the estuary. In contrast to this expectation, Bever *et al*. (2018) reported a recent reduction in wind speed over the Bay-Delta during 1995-2015, which these authors associated with lower turbidity in Suisun Bay. The Service notes these contrasting results for completeness but we cannot reconcile these opposing trends in wind speed at this time. We show below that Secchi disk depths (an indicator of water turbidity) have not increased since the mid-1980s near the (mobile) location of X2 even though suspended sediment concentrations in Suisun Bay have decreased since about 2000 (Schoellhamer 2011; Bever *et al*. 2018).

Central California's warm summers are already a source of energetic stress for delta smelt and warm springs can already severely compress the duration of their spawning season (Rose *et al.* 2013a,b). We expect warmer estuary temperatures to present a significant conservation challenge for delta smelt in the coming decades (Brown *et al.* 2013; 2016a; Figure 13). Feyrer *et al.* (2011) and Brown *et al.* (2013; 2016a) have evaluated the anticipated effects of projected climate change on several delta smelt habitat metrics. Collectively, these studies indicate the future will bring chronically compressed fall habitat, fewer 'good' turbidity days (defined by the authors as a mean turbidity greater than or equal to 18 Nephelometric Turbidity Units (NTU)), a spawning window of similar duration but that is shifted 2 to 3 weeks earlier in the year, and a substantial increase in the number of days delta smelt will need to endure lethal or near lethal summer water temperatures.

The delta smelt lives at the southern limit of the inland distribution of the family Osmeridae along the Pacific coast of North America. The anticipated effects of a warming climate are expected to create increasing temperature related challenges for delta smelt at some future point. The amount of anticipated change to the regional climate expected in the near term is lower than it is for the latter half of the century (Figure 13). Therefore, it is less certain that any measurable change from current conditions will occur in the next approximately 10 years than by 2050 or 2100. For the time being, water temperatures are stressful to delta smelt, but not of themselves lethal in most of the upper estuary (Komoroske *et al.* 2015).

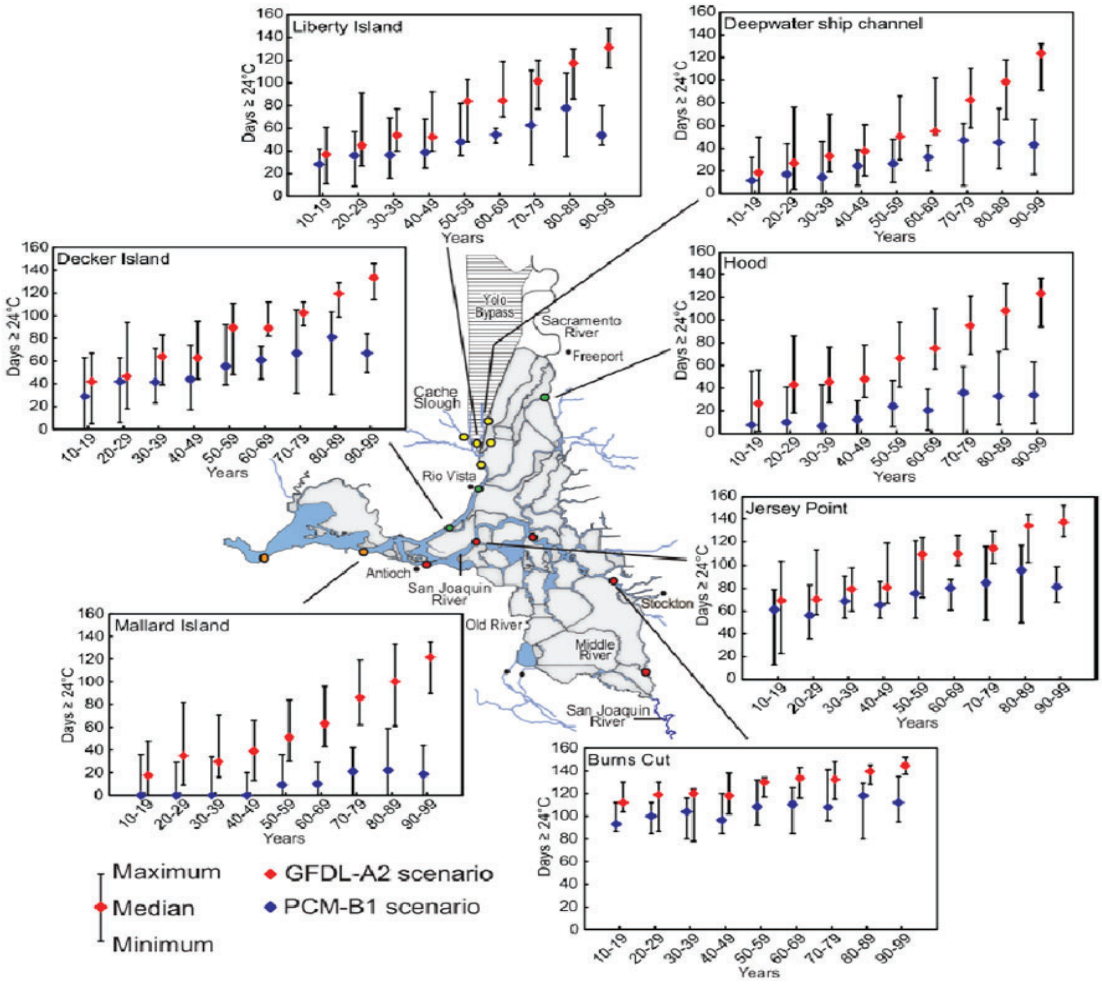


Figure 13. P**lots of median, maximum, and minimum number of days each year with an estimated average daily water temperature greater than or equal to 24°C (75°F) at selected sites in the Delta by decade for the 21st century. The water temperature threshold reflects one chosen by the authors to represent near lethal conditions for delta smelt. Source: Brown *et al.* (2016a).**

Recovery and Management

Following Moyle *et al.* (1992), the Service (1993) indicated that SWP and CVP exports were the primary factors contributing to the decline of delta smelt due to entrainment of larvae and juveniles and the effects of low flow on the location and function of the estuary mixing zone (now called the low-salinity zone). In addition, prolonged drought during 1987-1992, in-Delta water diversions, reduction in food supplies by nonindigenous aquatic species (specifically overbite clam and nonnative copepods), and toxicity due to agricultural and industrial chemicals were also factors considered to be threatening the delta smelt. In the Service's December 15, 2008 *Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP)* (2008 BO), the Reasonable and Prudent Alternative (RPA) required protection of all life stages from entrainment and augmentation of Delta outflow during the fall of Wet and Above-Normal years as classified by the State of California (Service 2008). The expansion of entrainment protection for delta smelt in the 2008 BO was in response to large increases in juvenile and adult salvage in the early 2000s

(Kimmerer 2008; Brown *et al.* 2009). The fall X2 requirement in the 2008 RPA was in response to increased fall exports that had reduced variability in Delta outflow and lowered habitat suitability during the fall months and the 2008 proposed action was anticipated to reduce it further (Feyrer *et al.* 2011).

The Service's (2010c) recommendation to uplist delta smelt from threatened to endangered included a discussion of threats related to reservoir operations and water diversions upstream of the estuary as additional water operations mechanisms interacting with exports from the Delta to restrict the LSZ and concentrate delta smelt with competing and predatory fish species. In addition, Brazilian waterweed (*Egeria densa*) and increasing water transparency were considered new detrimental habitat changes. Predation was considered a low-level threat linked to increasing waterweed abundance and increasing water transparency. Additional threats considered potentially significant by the Service in 2010 were entrainment into power plant diversions, contaminants, and reproductive problems that can stem from small population sizes. Conservation recommendations included: establish Delta outflows proportionate to unimpaired flows to set outflow targets as fractions of runoff in the Central Valley watersheds; minimize reverse flows in Old and Middle rivers; and, establish a genetic management plan for captive-reared delta smelt with the goals of minimizing the loss of genetic diversity and limiting risk of extinction caused by unpredictable catastrophic events. The Service (2012) recently added climate change to the list of threats to the delta smelt.

Maintaining protection of the delta smelt from excessive entrainment, improving the estuary's flow regime, suppression of nonnative species, increasing zooplankton abundance, and improving water quality are among the actions the Service has previously indicated are needed to recover the delta smelt.

There have been several recent papers suggesting it is time to consider supplementation of the wild delta smelt population with captive-bred fish as part of a broad-based conservation strategy to avoid extinction in the wild, also known as extirpation (Moyle *et al.* 2016; 2018; Hobbs *et al.* 2017; Lessard *et al.* 2018). In 2019, pilot research conducted by the California Department of Water Resources (DWR) has demonstrated that captive-bred delta smelt held within steel enclosures can survive in the Delta for at least 30 days. This is long enough to show that the fish can feed themselves and did not die from acute water toxicity in either of two locations tested thus far. The fish will be evaluated for chronic toxic exposure, but that work is not finished. These results are promising and similar research is planned this year.

The status of the delta smelt is poor. The current estimated delta smelt population sizes are so low that it seems unlikely the species can be habitat- or food-limited even though both physical and food web-related habitat attributes have degraded over time. It is more likely that delta smelt have been marginalized by non-native fishes and invertebrates that compete with and prey on them. When fish populations reach very low levels, they can fall victim to demographic problems (often termed Allee effects in the scientific literature). These include problems concentrating enough individuals in particular locations for successful spawning, successful feeding, or maintaining large enough egg supplies, or shoals and schools of juvenile and adult fish to provide effective protection from predators (Liermann and Hilborn 2001; Keith and Hutchings 2012).

Summary of the Status of Delta Smelt

The relative abundance of delta smelt has reached very low numbers for a small forage fish in an ecosystem the size of the Bay-Delta and the species is approaching extinction in the wild (Moyle *et al.* 2016; 2018; Hobbs *et al.* 2017). The extremely low 2018-2020 abundance indices reflect decades of habitat change and marginalization by non-native species that prey on and out-compete delta smelt. The anticipated effects of climate change on the Bay-Delta and its watershed such as warmer water temperatures, greater salinity intrusion, lower snowpack contribution to spring outflow, and the potential for frequent extreme drought, indicate challenges to delta smelt survival will increase.

Delta Smelt Critical Habitat

Legal Status

The Service designated critical habitat for the delta smelt on December 19, 1994 (Service 1994). The geographic area encompassed by the designation includes all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma sloughs; and the existing contiguous waters contained within the legal Delta (as defined in section 12220 of the California Water Code) (Service 1994).

Conservation Role of Delta Smelt Critical Habitat

The Service's primary objective in designating critical habitat was to identify the key components of delta smelt habitat that support successful completion of the life cycle, including spawning, larval and juvenile transport, rearing, and adult migration back to spawning sites. Delta smelt are endemic to the Bay-Delta and the vast majority only live one year. Thus, regardless of annual hydrology, the Bay-Delta estuary must provide suitable habitat all year, every year. The primary constituent elements considered essential to the conservation of the delta smelt as they were characterized in 1994 are physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration (Service 1994). The Service recommended in its designation of critical habitat for the delta smelt that salinity in Suisun Bay should vary according to water year type, which it does. For the months of February through June, this element was codified by the SWRCB "X2 standard" described in D-1641 and the SWRCB's current Water Quality Control Plan.

See the *Detailed Review of the Habitat Use and Distribution of Delta Smelt* above in the Status of the Species section.

Description of the Primary Constituent Elements

PCE #1: "Physical habitat" is defined as the structural components of habitat (Service 1994). As reviewed above, physical habitat in the Bay-Delta has been substantially changed with many of the changes having occurred many decades ago (Andrews *et al.* 2017; Gross *et al.* 2018). Physical habitat attributes are important in terms of spawning substrate, rearing habitat in terms

of how geographic location and bathymetry affect tidal current velocities (Bever *et al.* 2016), and possibly, foraging opportunities near the edges of emergent marshes (Whitley and Bollens 2014; Hammock *et al.* 2019). Information on spawning habitat is incomplete and it is difficult to protect spawning habitat without knowing what it is.

PCE #2: "Water" is defined as water of suitable quality to support various delta smelt life stages that allow for survival and reproduction (Service 1994). Certain conditions of turbidity, water temperature, and food availability characterize suitable habitat for delta smelt and are discussed in detail below. Contaminant exposure can degrade this primary constituent element even when the basic habitat components of water quality are otherwise suitable (Hammock *et al.* 2015).

Turbidity: Turbidity is the measure of relative clarity of a liquid. It is an optical characteristic of water and is a measurement of the amount of light scattered by material in the water when a light is shined through the water sample. The higher the intensity of scattered light, the higher the turbidity. Material that causes water to be turbid can include clay, silt, particulate organic matter, algae, dissolved colored organic compounds, and other microscopic organisms. In the Bay-Delta, turbidity results mainly from sediment suspended in the water column and to a lesser degree phytoplankton (Cloern and Jassby 2012). Turbidity can play an important role in structuring fish communities; one mechanism by which this can occur is the scale dependence in how fish of different sizes can have their prey detection enhanced or impaired (Utne-Palm 2002). Turbidity typically lowers the reactive distance of fishes feeding on zooplankton or each other. However, if the turbidity increases prey contrast (which it often does for fish larvae and planktivorous species), then it can enhance the feeding of these small fishes while still impairing the ability of their predators to see them.

The delivery of suspended sediment to the estuary increased substantially following the era of hydraulic gold mining in the watershed (Schoellhamer 2011). It increased again during rapid regional population growth and development after World War II. Since then, the delivery of new sediment to the estuary has declined (Wright and Schoellhamer 2004; Schoellhamer 2011). In addition, summertime phytoplankton production has been greatly diminished (Cloern and Jassby 2012). These changes have resulted in a general clearing of the estuary's waters (Figure 14); however, the clearing trend has been strongest in the Delta where expansive beds of SAV further filter fine sediment from the water (Kimmerer 2004; Feyrer *et al*. 2007; Nobriga *et al*. 2008; Hestir *et al*. 2016). Water exports from the south Delta may also have contributed to the trend toward clearer estuary water by removing suspended sediment in exported water (Arthur *et al.* 1996); however, the contribution of exports to the total suspended sediment budget in the estuary is small (Schoellhamer 2012).

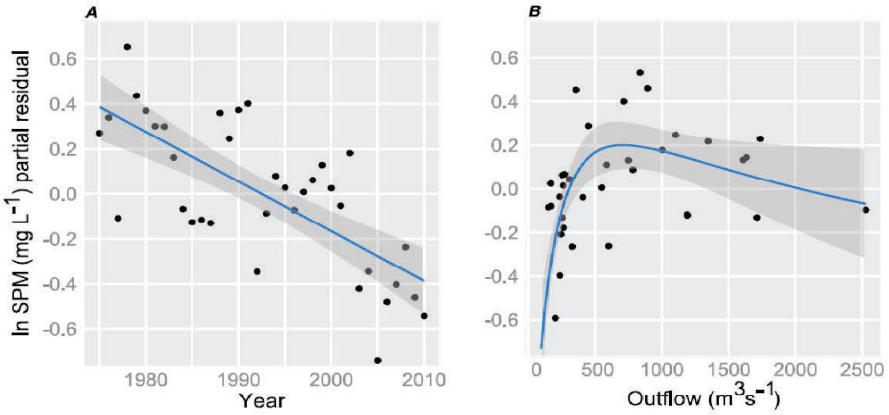


Figure 14. Partial residual plots for a regression model that accounts for variability in annual average concentration of suspended particulate matter at IEP station D8 in Suisun Bay as a result of its long-term trend (left panel) and its relationship to annual average Delta outflow (right panel). The blue lines are loess smoothers and the gray shading is the 95% confidence interval around the line. Source: Cloern and Jassby (2012).

The available catch data for delta smelt imply the species has an affinity for turbid water throughout most, if not all, of its free-swimming life (e.g., Nobriga *et al.* 2005; 2008; Feyrer *et al.* 2007; 2011; Grimaldo *et al.* 2009; Kimmerer *et al.* 2009; Mahardja *et al.* 2017a; Polansky *et al.* 2018; Simonis and Merz 2019), but there have been some recent suggestions that turbidity in the water affects the ability of fishing gears to catch delta smelt perhaps more than it is an actual habitat attribute (Latour 2016). The aquaculture techniques developed for delta smelt include rearing in black tanks under low light conditions because the fish are sensitive to highly lit circumstances (Lindberg *et al.* 2013; Hasenbein *et al.* 2016a). In addition, the tanks are circular and kept free of in-water structures. These captive rearing techniques are consistent with inhabitation of low visibility environments in the wild such as maintaining a spatial association with turbid water.

Below, we review process-based laboratory research that supports the 'turbidity as habitat' hypothesis. Then, we summarize long-term data on Secchi disk depths to demonstrate how water has remained relatively turbid where estuarine physics (Monismith *et al*. 1996; 2002) interacting with shallow water wind wave mixing (Ruhl *et al*. 2001; Bever *et al*. 2016) may contribute to an important refuge for delta smelt even though the biological productivity of this region has been substantially diminished (i.e., that phytoplankton currently contributes less to the turbidity than it once did). This turbid-water refuge occurs in the LSZ and is one of only two remaining in the range of the delta smelt. Turbid water may be a needed present-day habitat attribute because it provides cover for foraging delta smelt (Ferrari *et al*. 2014). By extension, it may be a factor modulating feeding success; one recent study found histopathologic evidence of elevated delta smelt feeding success in the turbid Cache Slough Complex and Suisun Marsh (Hammock *et al.* 2015); a follow-up study found elevated stomach fullness of delta smelt inhabiting the LSZ even though they were spatially disconnected from where zooplankton density was highest (Hammock *et al*. 2017). These findings are also qualitatively consistent with a more macroscopic study of the Delta's fish assemblages that found most native fishes, including delta smelt, to be more common in lower productivity turbid habitats than higher productivity SAV habitats (Nobriga *et al*. 2005). For these reasons, the Service believes delta smelt's association with turbid water, which in the present state of the Bay-Delta system is mainly caused by sediment suspended in the water, is a true habitat association.

It has been shown experimentally that delta smelt larvae require particles in the water to see their transparent prey (Baskerville-Bridges *et al.* 2004). Thus, without some kind of turbidity in the water, delta smelt larvae will starve to death. Another recent laboratory study using late larval stage delta smelt found that feeding success and survival varied across a gradient of turbidity (Hasenbein *et al.* 2016a). The results implied bell-shaped response curves in which both survival and feeding success were highest at intermediate values, though the results among treatment levels were only significantly different in a few cases. A similar experiment using 120-day-old juvenile delta smelt produced different results (Hasenbein *et al.* 2013). In this experiment, the authors reported that feeding success decreased as turbidity was increased; however, their results indicate that statistically speaking, turbidity had no effect except at the highest treatment level. The highest treatment level was 250 NTU which is exceptionally turbid water. It is worth noting two things about these studies. First, the turbidity in the tanks was created using algae, which is not the dominant source of water turbidity in the estuary. Second, in the studies described by Hasenbein *et al.* (2013; 2016b), the experiments were conducted under low light conditions even when turbidity was low (~ 1 lux). In the wild, a surface-oriented fish might have the benefit of both turbidity and high light conditions similar to those that experimentally optimized successful first feeding (Baskerville-Bridges *et al.* 2004).

In another laboratory experiment, the vulnerability of delta smelt to predation by largemouth bass was lower in a circa 3 NTU treatment (again, using algae) than a clear-water treatment (Ferrari *et al.* 2014). In a DNA-based diet study of field-caught predators, the predation of delta smelt larvae was strongly affected by water turbidity (Schreier *et al.* 2016). Thus, the available evidence suggests that delta smelt require turbid water to succeed in the contemporary Bay-Delta food web.

In fish survey data, the longest-term indicator of water turbidity is Secchi disk depth measurements that for several decades have accompanied most individual net tows. Secchi disk depths are basically inverses of turbidity because the less turbid the water is, the deeper into the water column a Secchi disk remains visible. The FMWT Secchi disk depth data set summarized below dates to 1967 (Figure 15).

The Secchi disk depth information suggests the increasing water clarity trends discussed above are not uniform across the upper estuary (Figure 15). From a regional perspective, they have been most pronounced in the San Joaquin River half of the Delta where SAV proliferation has been most expansive (Feyrer *et al.* 2007; Nobriga *et al.* 2008; Hestir *et al.* 2016). Consistent with this, boxplots depicting the time series of Secchi disk depth measurements from the FMWT show the previously reported increasing trend is most pronounced when and where the Secchi disk depths were taken in fresh water (upper left panel of Figure 15). In this upper left panel for which the Secchi disk depth data were summarized only when and where salinity was lower than 1.25 ppt, the previously reported trend of increasing water transparency is apparent; median Secchi disk depths have increased from about 0.5 meters with extreme values seldom exceeding 1 meter early in the time series to medians typically exceeding 1 meter and extreme values near 4 meters in recent years. When data summaries include these freshwater samples along with samples from the LSZ, the trend and extreme data points remain (upper right panel of Figure 15). This could lead to the erroneous conclusion that Secchi disk depths have been similarly increasing in the LSZ.

However, it is also important to consider the hydrodynamic aspect of water turbidity in the estuary. As mentioned above, X2 is a boundary upstream of which salinity tends to be the same from the surface of the water to the bottom, and downstream of which salinity varies from top to bottom (Jassby *et al.* 1995). That variability in salinity from surface to bottom waters is indicative of a front that helps to aggregate turbidity near X2. This does not mean it all aggregates precisely at X2; tidal dispersion results in a spatially complex distribution of sinking particles widely distributed in the LSZ (Kimmerer *et al.* 2014a). Thus, when the FMWT Secchi disk depth data set are constrained to brackish water samples, the long-term trend looks very different (lower panels of Figure 15). There is still an increasing trend over time, but it is much more modest. In particular, at a salinity near 2 to 5 ppt, Secchi disk depths have not consistently increased since the mid-1980s and observations exceeding 1 meter are still rare. Thus, there is a turbid water refuge for delta smelt that persists in the LSZ similar to the one that persists in the Cache Slough Complex.

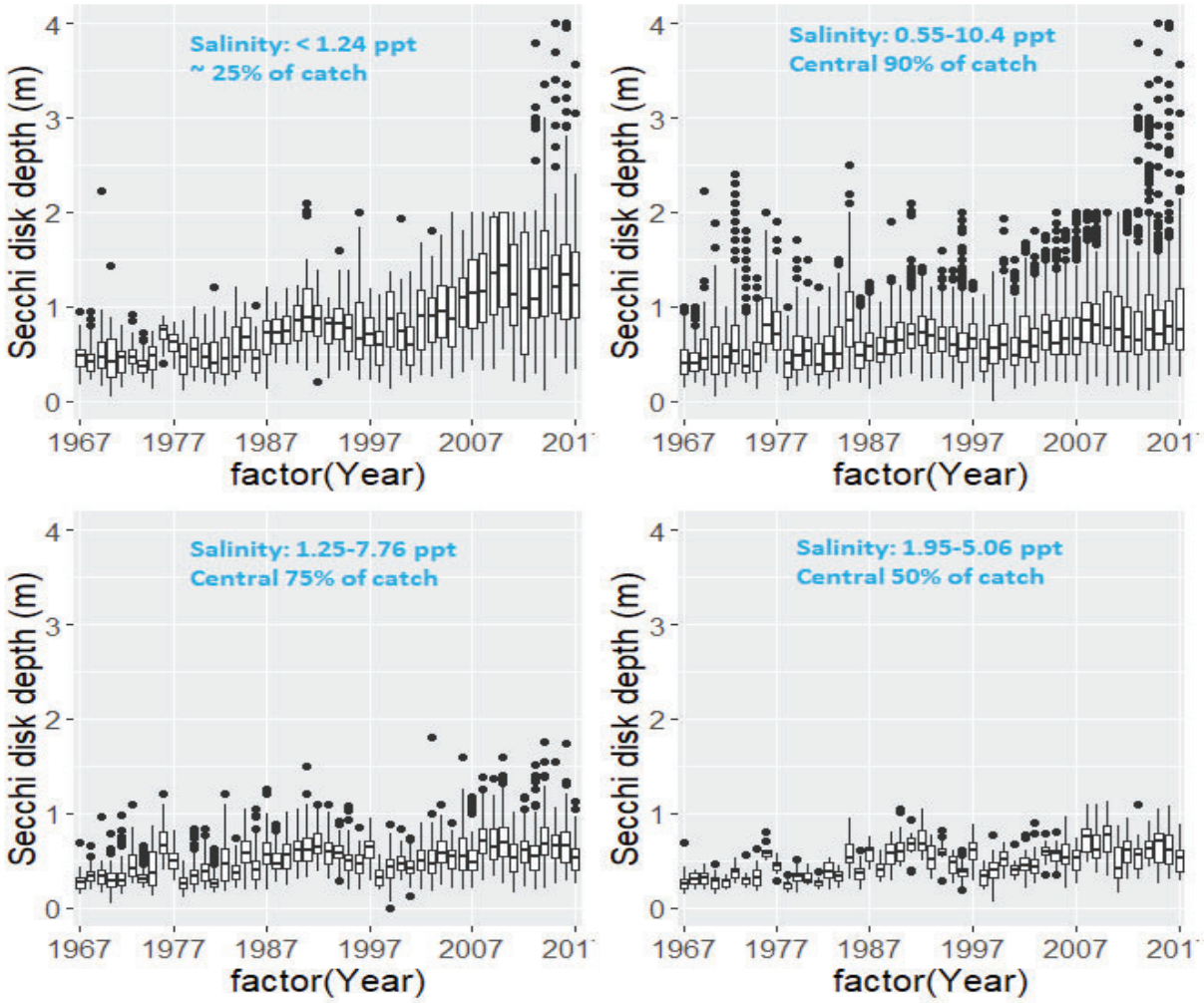


Figure 15. Boxplot time series of Secchi disk depth measurements taken during the California Department of Fish and Wildlife Fall Midwater Trawl Survey, 1967-2017. The boxes depict the central 50% of observations; the line through each box is the median. The black circles are observations outside the central 95% of observations. The data have been grouped into four salinity bins based on statistical summaries of delta smelt data (Kimmerer *et al.* 2013). The salinity range graphed is reported on each panel as is the predicted fraction of FMWT delta smelt catch. Source: Service unpublished data analysis using a specific conductance to

salinity conversion described by Schemel (2001) and generalized additive model results provided by W. Kimmerer.

Water temperature: Water temperature is the primary driver of the timing and duration of the delta smelt spawning season (Bennett 2005). Water temperature also affects delta smelt's metabolic and growth rates which in turn can affect their susceptibility to contaminants (Fong *et al*. 2016), food limitation (Rose *et al*. 2013a), and readiness to spawn (Hobbs *et al.* 2007b). Water temperature is not strongly affected by variation in Delta inflows or outflows except at the margins of the Delta where these inflows enter (Kimmerer 2004). The primary driver of water temperature variation in the delta smelt critical habitat is air temperature (Wagner *et al.* 2011). Very high flows can transiently cool the upper estuary (*e.g.,* flows in the upper 10th percentile, Kimmerer 2004), but the system rapidly re-equilibrates once air temperatures begin to warm. Thus, like duration of the spawning season, other water temperature-driven mechanisms affecting recruitment and survival are not freshwater flow mechanisms.

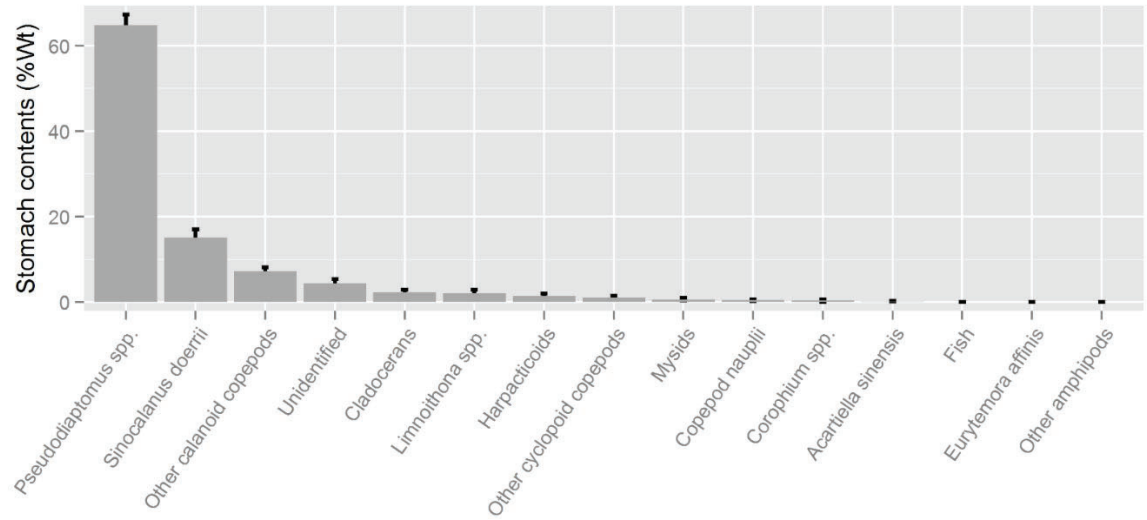
Research initially suggested an upper water temperature limit for delta smelt of about 25°C, or 77°F (Swanson *et al.* 2000). Newer research suggests delta smelt temperature tolerance decreases as the fish get older, but is a little higher than previously reported, ranging from nearly 30°C or 86°F in the larval life stage down to about 25°C in post-spawn adults (Komoroske *et al.* 2014). These are upper *acute* water temperature limits meaning these temperatures will kill, on average, one of every two fish. Subsequent research into delta smelt's thermal tolerances indicated that molecular stress response begins to occur at temperatures at least 4°C cooler than the acute thermal maxima (Komoroske *et al.* 2015).

In the laboratory and the wild, delta smelt appear to have a physiological optimum at temperatures of about 16-20°C or 61-68°F (Nobriga *et al.* 2008; Rose *et al.* 2013a; Eder *et al.* 2014; Jeffries *et al.* 2016). Most of the upper estuary exceeds this water temperature from May or June through September (Komoroske *et al.* 2015). Thus, during summer, many parts of the estuary are energetically costly and physiologically stressful to delta smelt (Komoroske *et al.* 2014). Generally speaking, spring and summer water temperatures are cooler to the west and warmer to the east due to the differences in overlying air temperatures between the Bay Area and the warmer Central Valley (Kimmerer 2004). In addition, there is a strong water temperature gradient across the Delta with cooler water in the north and warmer water in the south. The much higher summer inflows from the Sacramento River probably explain this north-south gradient. Note that water temperatures in the north Delta near Liberty Island and the lower Yolo Bypass where summer inflows are low to non-existent, are also typically warmer than they are along the Sacramento River. This may have consequences for the survival of freshwater-resident delta smelt during comparatively warm summers (Bush 2017).

Food: Food and water temperature are strongly interacting components of the "Water" element of delta smelt critical habitat because the warmer the water, the more food delta smelt require (Rose *et al.* 2013a). If the water gets too warm, then no amount of food is sufficient. The more food delta smelt eat (or must try to eat) the more they will be exposed to predators and contaminants.

The open-water habitat use of delta smelt is reflected in their diet composition, which is largely made up of planktonic and epibenthic crustaceans (Moyle *et al.* 1992; Nobriga 2002; Hobbs *et al.* 2006; Slater and Baxter 2014). Some of the epibenthic crustaceans discussed below (e.g.,

amphipods and mysids) ascend into the water column at times (Kimmerer *et al.* 2002) and are therefore available to predators foraging in the open water. A large majority of the identifiable prey of delta smelt larvae is copepods, particularly the early life stages of copepods (Nobriga 2002; Hobbs *et al.* 2006; Slater and Baxter 2014). Juvenile delta smelt feeding in the summer months also have copepod-dominated diets, but these larger individuals tend to eat adult copepods and also begin to include prey taxa in their diets that grow larger than copepods (Slater and Baxter 2014; Figure 16). The older juveniles and adults continue to prey on copepods, but have less reliance on them and greater diet diversity (Moyle *et al.* 1992; Slater and Baxter 2014; Whitley and Bollens 2014; Figures 17 and 18). All of the delta smelt's major prey taxa (e.g., copepods, amphipods) are ubiquitously distributed, but which prey species are present at particular times and locations changes from early morning to mid-day, season to season, and has changed dramatically over time (Kimmerer *et al.* 2002; Winder and Jassby 2011; Kratina *et al.* 2014). The latter two have likely affected delta smelt feeding success (Kimmerer and Rose 2018).



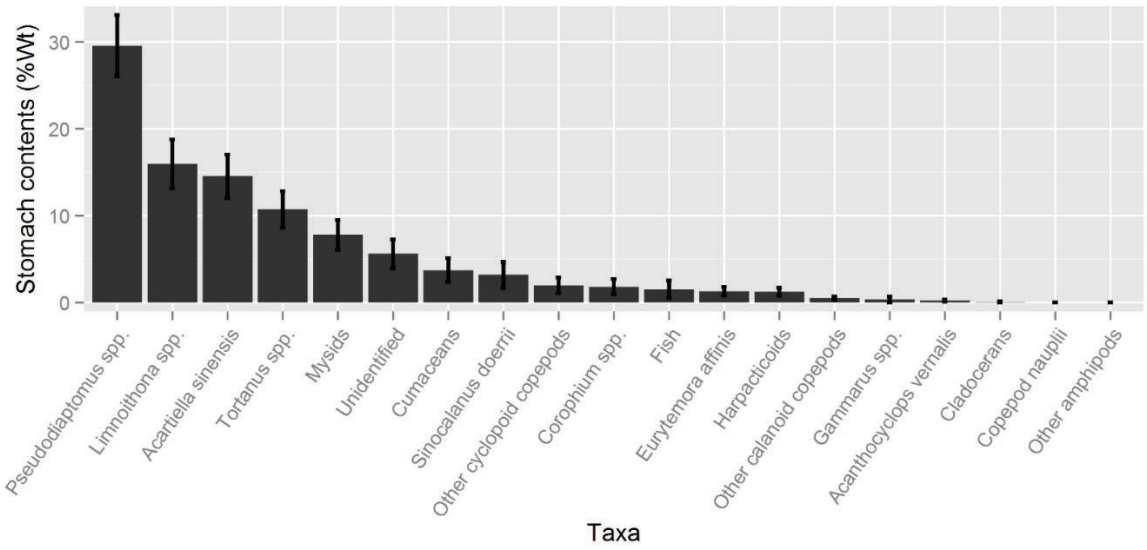


Figure 16. Diet compositions of delta smelt collected by the TNS upper panel for stations with a salinity lower than 0.55 ppt and lower panel for stations with a salinity greater than or equal to 0.55 ppt. Of the prey taxa listed on the x-axis, the ones that are *not* copepods are Cladocerans, Mysids, Corophium spp., Fish, Other Amphipods, Cumaceans, and Gammarus spp. Source: supplemental material for Hammock *et al.* (2017).

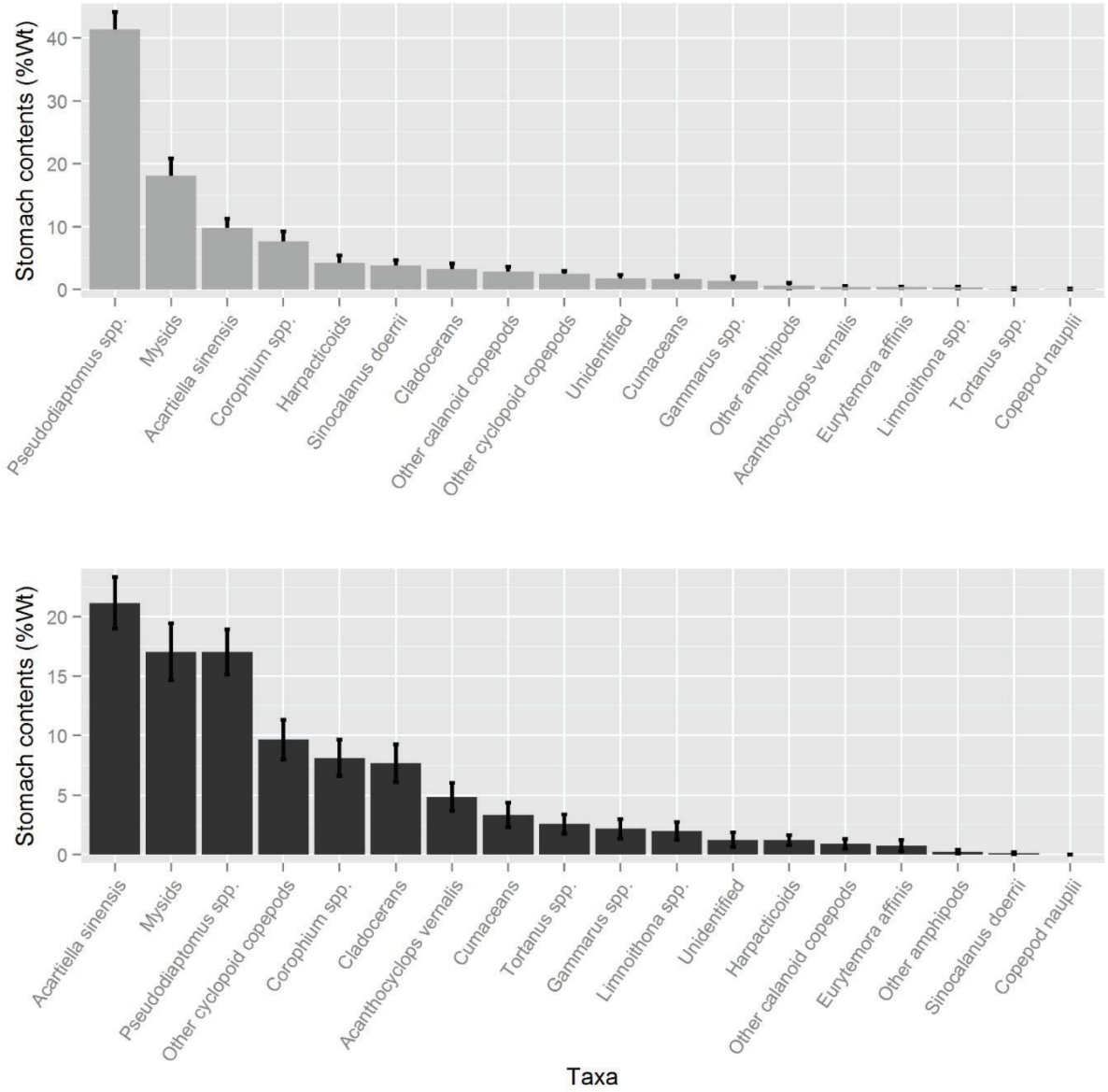


Figure 17. Diet compositions of delta smelt collected by the FMWT upper panel for stations with a salinity lower than 0.55 ppt and lower panel for stations with a salinity greater than or equal to 0.55 ppt. Of the prey taxa listed on the x-axis, the ones that are *not* copepods are Cladocerans, Mysids, Corophium spp., Other Amphipods, Cumaceans, and Gammarus spp. Source: supplemental material for Hammock *et al.* (2017).

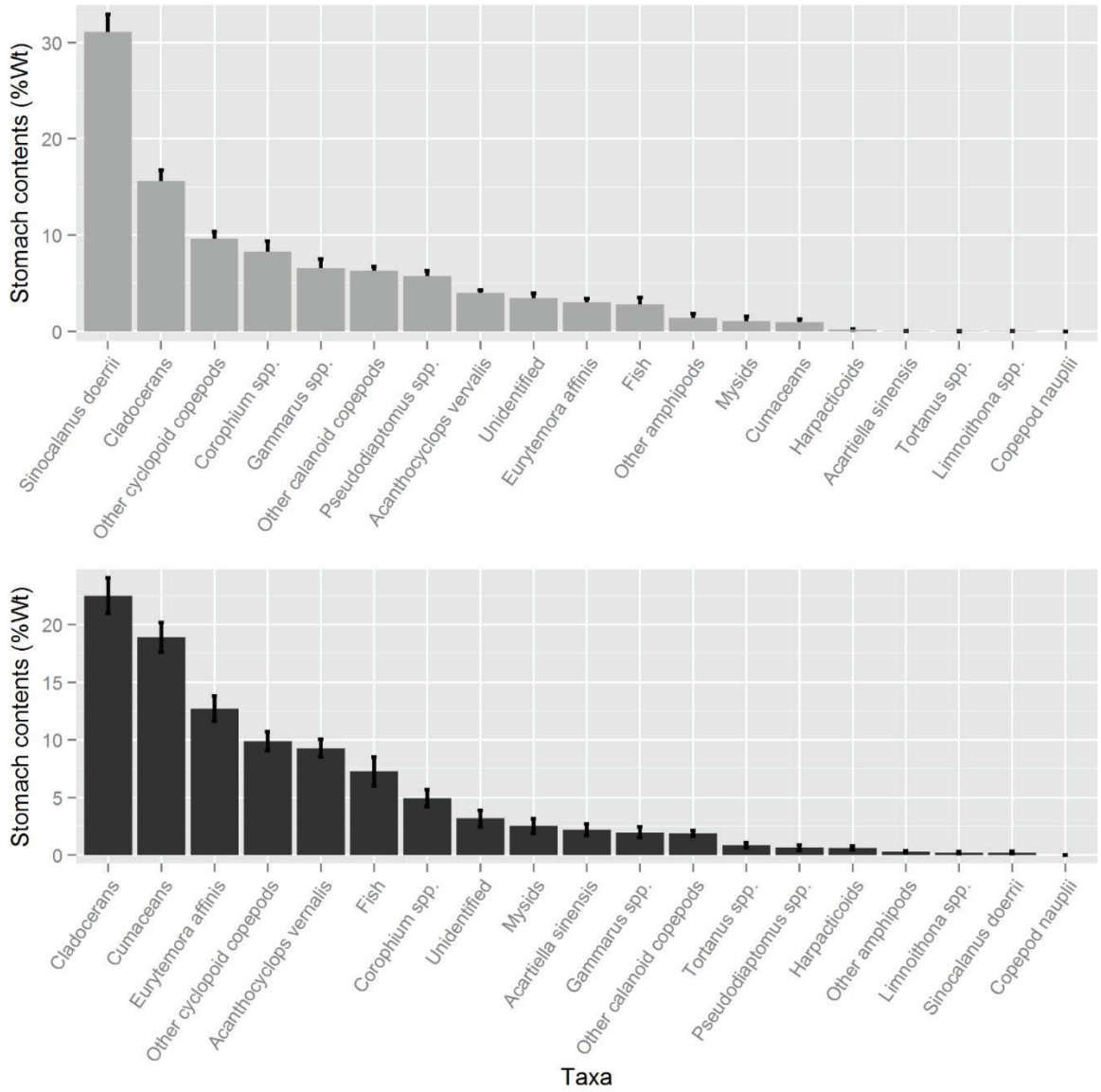


Figure 18. Diet compositions of delta smelt collected by the SKT upper panel for stations with a salinity lower than 0.55 ppt and lower panel for stations with a salinity greater than or equal to 0.55 ppt. Of the prey taxa listed on the x-axis, the ones that are *not* copepods are Cladocerans, Mysids, Corophium spp., Fish, Other Amphipods, Cumaceans, and Gammarus spp. Source: supplemental material for Hammock *et al.* (2017).

An influence of copepod production on the production of delta smelt has been a common finding in quantitative modeling research on delta smelt's population dynamics (Mac Nally *et al.* 2010; Maunder and Deriso 2011; Miller *et al.* 2012; Rose *et al.* 2013a; Hamilton and Murphy 2018; Kimmerer and Rose 2018).

The earliest published paper on a freshwater flow influence on fish production in the Bay-Delta posited that the mechanisms producing striped bass worked primarily through the LSZ food web (Turner and Chadwick 1972). Specifically, these authors suggested that higher Delta inflow stimulated the food web that supported striped bass and increased turbidity which hid them from their predators. Because IEP monitoring was originally set up to better understand striped bass

recruitment, the IEP has monitored the pelagic food web extensively since the 1970s (Brown *et al.* 2016b).

The varied sources of primary productivity that fuel estuarine fish production are an area of active research in the Bay-Delta (Sobczak *et al.* 2002; 2005; Grimaldo *et al.* 2009; Howe and Simenstad 2011; Schroeter *et al.* 2015). As is the general case in open-water food webs of estuaries and coastal marine systems, diatoms are the dominant source of primary productivity supporting open-water fish production (Sobczak *et al.* 2002; 2005; Grimaldo *et al.* 2009). Phytoplankton-based and submerged aquatic vegetation-based food webs can be separated on the basis of stable isotopes of carbon and nitrogen, but phytoplankton-based food web paths cannot be clearly separated from pathways based on terrestrial vegetation using these isotopes (Grimaldo *et al.* 2009; Schroeter *et al.* 2015). Sulfur isotopes may provide greater ability to discern among sources within and near tidal marsh environments, but to date, have not been extensively evaluated in the Bay-Delta (Howe and Simenstad 2011). The production of littoral and bottom-feeding fishes is supported by a greater fraction of non-planktonic primary producer sources (Grimaldo *et al.* 2009; Schroeter *et al.* 2015). These non-planktonic food web pathways likely have some importance to delta smelt (Whitley and Bollens 2014; Hammock *et al.* 2019).

There may be tremendous potential for benthic and epiphytic processes to periodically subsidize delta smelt's food supply, and these subsidies may occur at critical times of need, yet such pathways remain underemphasized and understudied. It is common for estuarine amphipods to rise into the water column to relocate to newly formed depositional areas, where they feed on deposited detritus and other organic materials; their successive landward movements via repeated use of selective tidal stream transport (STST, or "tidal surfing") diminish in terms of distance of upstream travel, but ultimately place them within depositional habitats (Hough and Naylor 1992; Forward and Tankersley 2001; Naylor 2006). This behavior results in the amphipods spending a great deal of time in the water column, especially when the water is dimly lit. Being in the water column may make the amphipods more available as prey for delta smelt, but the amphipods are nevertheless energetically tied to benthic basal resources, despite their spending a great deal of time in the water column (i.e., they are still energetically tied to primary production that is bottom-associated: vascular plant detritus, phytodetritus, or benthic microalgae, as opposed to phytoplankton). Mysids, on the other hand, are harder to generalize, as some species are herbivorous, some are predatory, and some are omnivorous. They also use STST, which likely increases their availability to (adult) delta smelt (Wooldridge and Erasmus 1980; Orsi 1986). Thus, depending on mysid species, they may or may not link delta smelt to benthically driven energy pathways.

Jassby *et al*. (1993) estimated benthic microalgae to be responsible for nearly 30% of the primary production in upper San Francisco Bay, inclusive of delta smelt habitat. Light penetration has since improved as turbidity has decreased (Parker *et al*. 2012a), and so this ~30% contribution may have increased dramatically. Jassby *et al*. (1993) provided no estimate for epiphytic microalgae associated with SAV and the zones of emergent grass stems (in marshes) that are near the surface and within the photic zone. Even if the photic zone is just a few centimeters deep, these substrates, when added together, can provide very large surface areas for epiphytic production.

There are two clam species that affect phyto- and zooplankton biomass within the distribution of the delta smelt population. The freshwater *Corbicula fluminea*, which has been in the Delta and

its tributary rivers since the 1940s, and the estuarine overbite clam *Potamocorbula amurensis*, which started invading the estuary in 1986 and was well-established within a year (Alpine and Cloern 1992). The freshwater clam can suppress diatom production in shallow freshwater habitats (Lucas *et al.* 2002; Lopez *et al.* 2006). However, the overbite clam appears to have a larger impact on the food web than the freshwater clam (Alpine and Cloern 1992; Jassby *et al.* 2002; Kimmerer and Thompson 2014), so the focus of this review will be on the overbite clam.

In the 1970s and early 1980s, scientists had learned that year-to-year variation in Delta inflow (or salinity at Chipps Island) - especially during the spring and summer - drove the year-to-year variation in the productivity of the low-salinity zone food web (Cloern *et al.* 1983; Knutson and Orsi 1983). In wet years, the flow brought a lot of nutrients and organic carbon into the low-salinity zone (Jassby and Cloern 2000) where it fueled food web production as Delta outflow seasonally decreased into an optimal range estimated by Cloern *et al.* (1983) to be about 100 to 350 cubic meters per second (about 3,500 to 12,400 cubic feet per second (cfs)). In dry years, elevated salinity allowed a marine clam (*Mya arenaria*) to colonize Suisun Bay and graze the diatoms down to low levels. This in turn lowered the production of the mysid shrimp (*Neomysis mercedis*), which was a key food source for several fish species, particularly striped bass (Knutson and Orsi 1983; Orsi and Mecum 1996; Feyrer *et al.* 2003). This stimulation of mysid shrimp production was one of the food web mechanisms that Turner and Chadwick (1972) had hypothesized led to higher striped bass production in higher flow years. Similar 'fish-flow' relationships were later established for longfin smelt (*Spirinchus thaleichthys*) and starry flounder (*Platyichthys stellatus*); both of these fish are also mysid shrimp predators and were shown to have step-declines in their abundance indices associated with the overbite clam invasion (Kimmerer 2002b).

The overbite clam, once established (~ 1987), resulted in a permanent source of loss to diatoms and copepods in the LSZ that resulted in rapid step-declines in the abundance of the most important historical food web components: diatoms, mysid shrimp, and *Eurytemora affinis*; the latter is a copepod that was a major prey for both the opossum shrimp (Knutson and Orsi 1983) and delta smelt (Moyle *et al.* 1992). Unlike striped bass, longfin smelt, and starry flounder, no change in delta smelt abundance occurred coincident with the establishment of the overbite clam (Stevens and Miller 1983; Jassby *et al.* 1995; Kimmerer 2002b; Mac Nally *et al.* 2010; Thomson *et al.* 2010). However, the average size of delta smelt declined somewhat (Sweetnam 1999; Bennett 2005).

Some scientists have hypothesized that the diatom decline was caused by wastewater treatment plant inputs of ammonium or changes in the ratios of dissolved forms of nitrogen that support aquatic plant growth more than by overbite clams (Glibert *et al.* 2011; Dugdale *et al.* 2012; Parker *et al.* 2012b; Wilkerson *et al.* 2015). One piece of evidence used to support this hypothesis is an observation that ammonium was frequently crossing a critical 4 micro-molar threshold concentration for diatom growth at about the same time the overbite clam became established. These researchers have established that uptake of dissolved ammonium inhibits the growth rate of diatoms in the Bay-Delta. However, diatoms can still grow on ammonium, and actually take it into their cells preferentially over nitrate; they just grow more slowly using ammonium as their cellular nitrogen source (Glibert *et al.* 2015). This means that 'but for' the overbite clam, the diatom population in the LSZ would eventually build up enough biomass each year to metabolize ambient ammonium concentrations to levels below the 4 micro-molar threshold and then increase their growth rate using the nitrate that is also in the water. Thus,

although nitrogen chemistry could be a problem, a more fundamental one is that as Delta outflow declines during the spring into early summer to levels that could enable diatom blooms, the water temperature is rising and that supports reproduction of the overbite clam. With help from a few other abundant grazers (Kimmerer and Thompson 2014), the growing overbite clam population depletes diatoms faster than they can metabolize the ammonium in the water. Thus, clam grazing is the fundamental reason that summer-fall diatom blooms no longer occur (Cloern and Jassby 2012; Kimmerer and Thompson 2014; Cloern 2019). During spring when Delta outflow is higher, outflow can interact with other factors to limit diatom accumulation as well (Dugdale *et al.* 2012; 2016). Note that Dugdale *et al.* (2016) suggested that available estimates of the overbite clam grazing rate were over-estimates, but this assertion has been contested (Kimmerer and Thompson 2014; Cloern 2019).

The largest source of dissolved ammonium is the Sacramento Regional Wastewater Treatment Plant. Upgrades to the facility are expected to occur in 2021-2023, which will result in reductions in dissolved ammonium concentrations in the Delta. It is scheduled to significantly reduce its nitrogen effluent concentrations beginning in 2023. Once that happens, it should become apparent within a few years how important ammonium ratios are in limiting diatom production in the Bay-Delta.

Because the overbite clam repressed the production of historically dominant diatoms and zooplankton, there were numerous successful invertebrate species invasions and changes in plant communities that followed for a decade or so thereafter (Kimmerer and Orsi 1996; Bouley and Kimmerer 2006; Winder and Jassby 2011). Changing nutrient ratios (including the forms of nitrogen and the ratios of nitrogen and phosphorus) necessary for plant growth may also have contributed to changing phytoplankton and plant communities (Glibert *et al.* 2015; Dahm *et al.* 2016). In addition, extreme drought and propagule pressure are also thought to have directly contributed to the zooplankton species changes (Winder *et al.* 2011). The most important changes for delta smelt have been changes to the copepod community. The copepod invasions of the late 1980s and early 1990s actually helped stem (but not recover the system from) what had been a major decline in copepod abundance (Winder and Jassby 2011). Prior to the overbite clam, delta smelt had diets dominated by *E. affinis* from the time the larvae started feeding in the spring until at least the following fall (Moyle *et al.* 1992). The overbite clam suppressed the production of *E. affinis* (Kimmerer *et al.* 1994; Kimmerer and Orsi 1996) and that seems to have opened the door for several non-native copepods including *Pseudodiaptomus forbesi*, which became the new main prey of delta smelt from late spring into the fall (Moyle *et al.* 1992; Nobriga 2002; Hobbs *et al.* 2006; Slater and Baxter 2014; Hammock *et al.* 2017; Figures 16 and 17).

There is general agreement among quantitative delta smelt models that the production of copepods including *P. forbesi* are important to recruitment and survival (Kimmerer 2008; Maunder and Deriso 2011; Miller *et al.* 2012; Hamilton and Murphy 2018; Kimmerer and Rose 2018; Simonis and Merz 2019). Recognition of *P. forbesi*'s importance to delta smelt led to substantial research into this non-native copepod's population dynamics (Kimmerer and Gould 2010; Sullivan *et al.* 2013; Kimmerer *et al.* 2014b; Kayfetz and Kimmerer 2017; Kimmerer *et al.* 2018a,b). The delta smelt's primary historical prey (*E. affinis*) bloomed from within the LSZ and had peak abundance near X2 (Orsi and Mecum 1986). This copepod still blooms each spring, but disappears by summer due to overbite clam grazing (Kimmerer *et al.* 1994). The same thing happens to *P. forbesi* in the LSZ (Kayfetz and Kimmerer 2017). However, the *P. forbesi*

population survives the summer because its center of reproduction is in freshwater habitats landward of the LSZ. It would disappear from the LSZ altogether were it not for a constant replenishment (or subsidy) from upstream where the overbite clam and a predatory non-native copepod are less abundant. It is the combination of tidal mixing and Delta outflow that seems to provide this subsidy (Kimmerer *et al.* 2018a,b). Thus, this subsidy of *P. forbesi* to delta smelt inhabiting the turbid water refuge of the LSZ appears to be of substantial importance – particularly during the summer and fall.

The most obvious test of whether the overbite clam affected delta smelt is a before-after comparison. As mentioned above, this has been tested several times and no obvious effect like the ones reported for striped bass, longfin smelt, and starry flounder has been established. Rather, the first big decline in delta smelt abundance occurred prior to the overbite clam invasion and the second one about 15 years afterward. Thus, if copepod production limits delta smelt production, it is either a part-time limit (e.g., Hamilton and Murphy 2018), or (a) it was a limiting factor prior to the overbite clam, and (b) it did not become a further limit until sometime thereafter. These are not mutually exclusive hypotheses.

Contaminants: Research conducted over the past 10 years suggests that delta smelt are fairly susceptible to contaminants (e.g., Connon *et al.* 2009; 2011a,b; Hasenbein *et al.* 2014; Jeffries *et al.* 2015; Jin *et al.* 2018). The effects of ambient Sacramento River water, pyrethroid pesticides, several herbicides, copper, and ammonium have all been examined and all of these compounds have shown at least sub-lethal effects represented by changes in gene expression. In some cases, delta smelt were exposed to higher than observed concentrations of some compounds in order to estimate their LC_{50}, the estimated concentration that kills half of the test fish over the study duration. Exposure durations have varied widely among studies (4 hour to 1 week), which limits the ability to quantitatively compare toxicity among studies. The loading of some contaminants into the habitats occupied by delta smelt can be functions of freshwater flow inputs (e.g., Kuivila and Moon 2004; Weston *et al.* 2014; 2015) so in some instances, the impacts of contaminants can be freshwater flow mechanisms. However, the impacts of others may be related to where individuals are located (Hammock *et al.* 2015), what delta smelt eat, or water temperature-based demand for prey, all of which could affect the quantities of biomagnifying substances that get ingested over the life span of the fish.

PCE #3: “River flow” was originally believed to be critical as transport flow to facilitate an extended spawning migration by adult fish and the transport of offspring to LSZ rearing habitats (Service 1994). However, it has since been shown that although some individual fish may embark on what could be considered a short spawning migration, there is no population-scale spawning migration *per se*, and that most transport and retention mechanisms for delta smelt (and their prey) involve the selective use of tidal currents rather than net flows (Kimmerer *et al.* 1998; 2002; Bennett *et al.* 2002; Kimmerer *et al.* 2014a; Bennett and Burau 2015). River flow includes both inflow to and outflow from the Delta, both of which influence the net movements of water through the Delta and further into the estuary (Kimmerer and Nobriga 2008). As mentioned above, these variations in freshwater flow affect the spatial distribution of salinity including X2, which in turn exert some influence on the distribution of delta smelt (Sweetnam 1999; Dege and Brown 2004; Feyrer *et al.* 2007; Nobriga *et al.* 2008; Sommer *et al.* 2011; Manly *et al.* 2015; Polansky *et al.* 2018; Simonis and Merz 2019).

Net water movements in the Delta have recently been reconstructed and analyzed for long-term trend attribution (Hutton *et al.* 2019; Figure 19). This analysis demonstrated several net flow variables have experienced strong time trends since water exports from the Delta began. In particular, cross-Delta flows have increased during the summer and fall, Rio Vista flows have decreased in the winter and spring and increased in the summer, Jersey Point flow and Old and Middle river flow (OMR) have decreased year-around. The change attribution indicated that CVP and SWP operations were predominantly the source of these net flow changes except for Jersey Point flow in the spring, which is also strongly influenced by in-Delta irrigation demand. The net flow changes ultimately influence Delta outflow, which as discussed above, has been trending downward for more than 100 years.

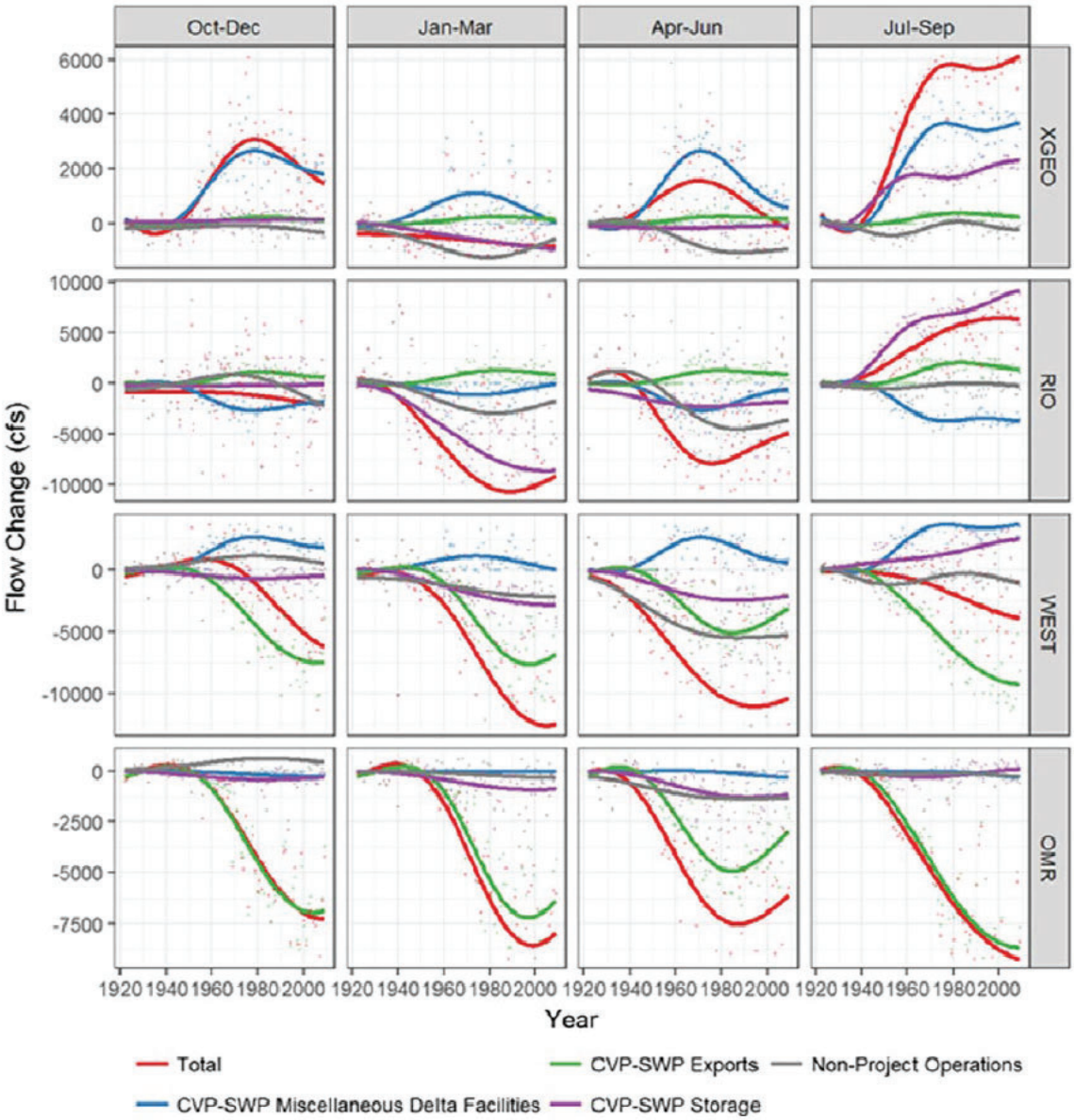


Figure 19. Time series (1922-2009) of statistical trend outputs of annual cross Delta flows (XGEO), net flow at Rio Vista (RIO), net flow at Jersey Point on the San Joaquin River (WEST), and net flow in Old and Middle rivers (OMR). For XGEO net north to south flows have positive values. For RIO and WEST, net seaward (downstream) flows have positive values. For OMR, which seldom has positive values, net north to south

flows are depicted as negative values. The colored lines reflect the statistical trend in the time series with the different colors reflecting the relative contributions of the sources listed in the legend. Source Hutton *et al.* (2019).

A concise summary of the contemporary Delta outflow hydrograph is shown in Figure 20. A value on the y-axis of 0.5 suggests that an outflow on a given day has had an equal chance of being at least as high as one or in some cases all three of the chosen thresholds. Delta outflow at least as high as the Roe Island standard freshens the estuary enough for delta smelt to spawn in typically brackish regions like the Napa River and western Suisun Marsh, and tends to reduce the likelihood of entrainment. Delta outflows at least as high as the Chipps Island standard tend to generate LSZ coverage throughout much or all of Suisun Bay. Outflows near the Collinsville standard are associated with a typical X2 slightly upstream of the confluence of the Sacramento and San Joaquin rivers with low-salinity conditions extending into, but not throughout Suisun Bay and marsh. The water management response to D-1641 has been to increase the intra-annual variability in outflows. The greater intra-annual variability is related to the more frequent meeting of these flow thresholds in the winter and spring as required by D-1641, with lower frequency in the fall. This pattern is especially pronounced for outflows greater than or equal to 7,100 cfs ("Collinsville") and 11,400 cfs (Chipps Island; Figure 20). The same pattern is visible for 27,200 cfs ("Roe Island"; Figure 20), but with less change (mainly days 100-150 and 325-350, which correspond to April and the November-December transition). This does more closely mimic the timing and duration of the natural Delta outflow hydrograph than occurred during the 1968-1994 period, though the magnitude is considerably lower as discussed above (Figures 5, 9, and 10). Note that the DAYFLOW calculations used to make Figure 20 can be highly uncertain at values lower than about 10,000 cfs (Monismith 2016).

The tidal and net flow of water toward the south Delta pumping plants is frequently indexed using OMR (Grimaldo *et al.* 2009; Andrews *et al.* 2017; Figure 19). The tidal and net flows in Old and Middle rivers influence the vulnerability of delta smelt larvae, juveniles, and adults to entrainment at the Banks and Jones facilities (Kimmerer 2008; 2011; Grimaldo *et al.* 2009). Currently available information indicates that OMR is a very good indicator of larval delta smelt entrainment risk (Kimmerer 2008; 2011). When the fish reach the juvenile stage, they can leave the south Delta to avoid adverse water temperatures (Kimmerer 2008). When maturing adults disperse the following winter, their advection into the south Delta can be affected by OMR flow, but turbidity is also an important mediator of their entrainment risk (Grimaldo *et al.* 2009). The Service's experience, particularly since 2008, is that the risk of seeing entrained fish in CVP or SWP fish salvage is low if south Delta turbidity remains less than 12 NTU.

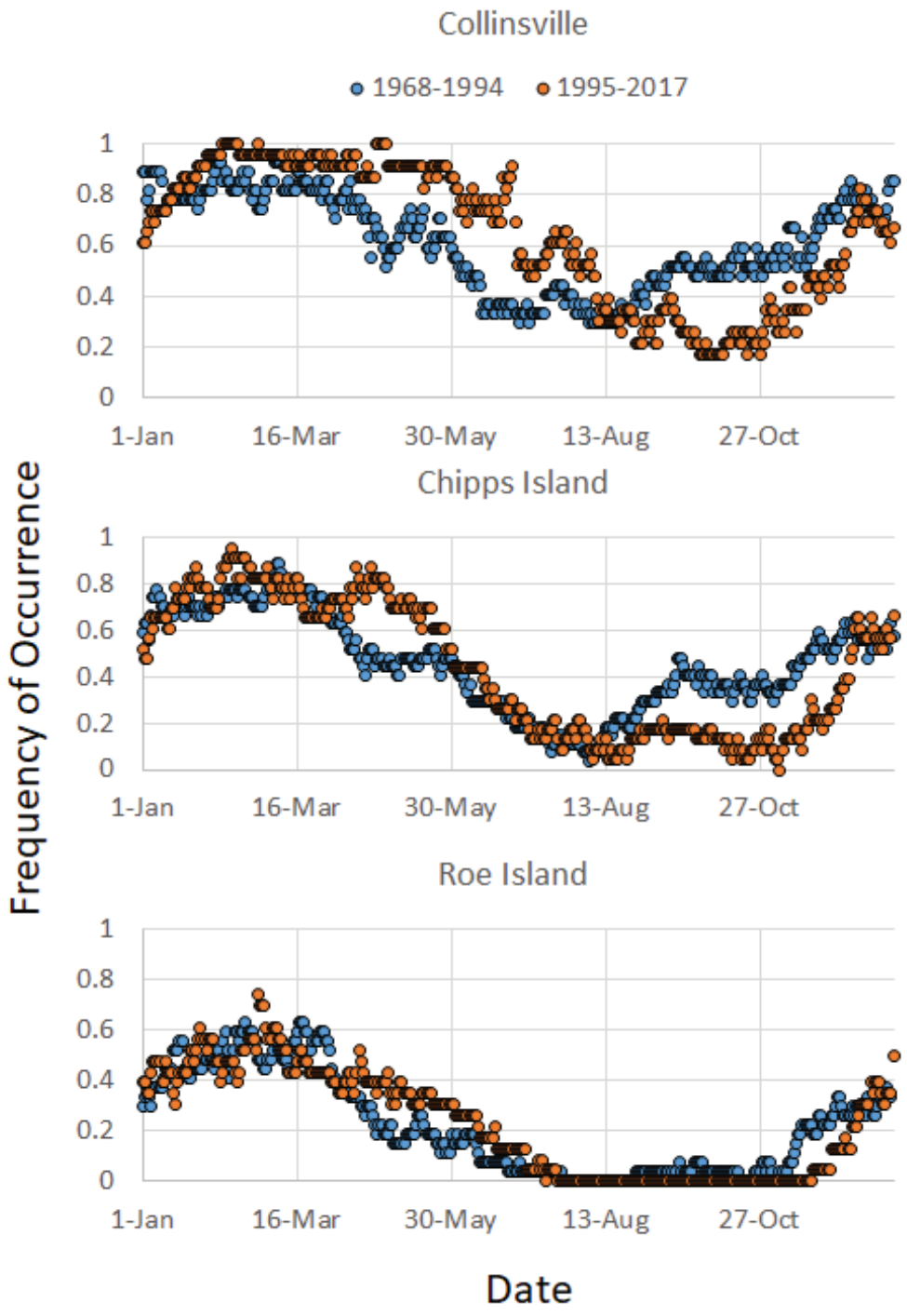


Figure 20. Daily frequency that the Net Delta Outflow Index (NDOI) was at least as high as the steady-state thresholds for the D-1641 'X2 standard' for January 1 to December 31, 1968-1994 (pre-Bay Delta Accord; blue symbols) and 1995-2017 (post Bay Delta Accord; orange symbols). The X2 standards outlined in the Bay Delta Accord were adopted into D-1641. The steady-state NDOI thresholds used to calculate the frequencies were Roe Island ≥ 27,200 cfs, Chipps Island ≥ 11,400 cfs, and Collinsville ≥ 7,100 cfs. For reference, a frequency of 0.5 means an NDOI at least as high as the threshold occurred half of the time on a given day. Note that this plot is intended to provide a concise view of the seasonality of Delta outflow. It is not intended to reflect anything about compliance or non-compliance with D-1641, which can be based on Delta outflow, salinity, or X2. Source: Service unpublished analysis of the DAYFLOW database.

PCE # 4: “Salinity”. Fish assemblages are able to lessen competition among species and life stages by partitioning habitats. For instance, some fish species and life stages are more shoreline oriented whereas others are more offshore oriented. Some species are better adapted to midwater or surface waters, while others are more adapted to stay close to the substrate. Some fish are tolerant of turbidity, while others are not. In estuaries, salinity is often a dominant factor separating different groups of fishes (e.g., Bulger *et al.* 1993; Edgar *et al.* 1999). Similarly, in the Bay-Delta, dominant fishes replace one another at several places along the salinity gradient (Feyrer *et al.* 2015).

Delta smelt is part of the fish assemblage that uses the low-salinity waters of the estuary (Kimmerer *et al.* 2009; 2013). Thus, the Primary Constituent Element “Salinity” helps define its nursery habitat (Service 1994). Freshwater flow into the estuary, and Delta outflow in particular, is the most significant mechanism affecting the salinity distribution of the estuary (Jassby *et al.* 1995; MacWilliams *et al.* 2015). Thus any recruitment or survival mechanisms that change in intensity as functions of salinity, or where particular ranges of salinity are distributed, are ultimately freshwater flow mechanisms (see Kimmerer 2002a). As discussed above, these may include the spatial extent of spawning habitat (Hobbs *et al.* 2007a), the availability of low velocity water refuges that remain turbid (Bever *et al.* 2016), and population-scale entrainment in water diversions (Kimmerer and Nobriga 2008; Kimmerer 2008). Some contaminant exposure and dilution mechanisms are also related to changes in freshwater flow inputs. For instance, the toxicity of water in creeks flowing into Suisun Marsh and the Delta can increase when storms increase flows that mobilize contaminated sediment (Weston *et al.* 2014; 2015). At a larger spatial-temporal scale, water toxicity varies regionally and seasonally, and may on average, be higher in years with low winter-spring inflows (Werner *et al.* 2010).

Initial research indicated that delta smelt have an upper acute salinity tolerance of about 20 ppt (Swanson *et al.* 2000) which is about 60% of seawater’s salt concentration of 32-34 ppt. Newer research suggests that some individual delta smelt can acclimate to seawater, but that about one in three juveniles and one in four adults die within a few days if they are rapidly transitioned from low-salinity water to marine salinity water (Komoroske *et al.* 2014). The survivors can live for at least several weeks in seawater, but lose weight (Komoroske *et al.* 2014; 2016). This clear evidence of physiological stress for delta smelt exposed to seawater has not been observed at lower salinity challenges – including salinities as high as 18-19 ppt. Different molecular responses have been observed, particularly at salinities higher than 6 ppt (Komoroske *et al.* 2016). These different molecular responses may reflect physiological stress, but this is not certain. There are currently several published studies that have examined aspects of delta smelt physiology at salinities in the 12-19 ppt range; none have found obvious evidence of an inability of the delta smelt to adjust its physiology to handle salinity in this range (Komoroske *et al.* 2014; 2016; Kammerer *et al.* 2016; Davis *et al.* 2019).

These findings are interesting because peak catches of early life stage wild delta smelt have occurred in fresh- or very low-salinity water and peak catches of juvenile and sub-adult fish have occurred at salinities that typify the LSZ. This contrast between where most wild delta smelt have been collected and what laboratory research indicates they can tolerate suggests one of three things. One possibility is there is a persistent laboratory artifact, though we are not aware of what such an artifact would be. A second possibility is that the analyses that have been done to date may not have accounted for change through time that has covaried with declining catches.

For instance, in a recent analysis of the SKT Survey, Castillo *et al.* (2018) found that when salinity was higher during sampling (i.e., during periods of low outflow) delta smelt and other fishes were collected from a higher mean salinity. The third possibility is that a discrepancy between field salinity distribution and laboratory results may be evidence that delta smelt's distribution along the estuary salinity gradient is due to a factor or factors other than salinity *per se*. Historically, delta smelt's prey were most abundant in the LSZ, but that has not been the case for more than 30 years. One explanation that may better align with recent laboratory research is that turbidity is the more important physical habitat attribute. Relatively turbid waters occur as a mobile front within the LSZ (Figure 15), occur regularly in Grizzly and Honker bays (Bever *et al.* 2016), and the Cache Slough complex (Sommer and Mejia 2013), all of which are places delta smelt have frequently been collected. This could mean that hiding from predators or minimizing competition are the more relevant drivers of delta smelt distribution. The Service has permitted the use of cultured fish enclosures placed along the estuary salinity gradient to explore this possibility.

The Service used the FMWT data to re-evaluate delta smelt salinity distribution and included equivalent data for five other open-water species to provide context. We analyzed the data separately for pre- and post-overbite clam eras given the large changes in food web function and fish distribution that occurred following its invasion (e.g., Kimmerer 2002b; Kimmerer 2006). To generate Figure 21, we converted the specific conductance data recorded during FMWT sampling to salinity using the equation provided by Schemel (2001) and created salinity bins spanning 1 ppt. We normalized the catch of each species each year relative to salinity so that years of high abundance would not contribute to the results more than years of low abundance. We did this by setting each year's maximum catch of each species to one, and converting smaller catches to fractions of these annual maxima. We then summarized the results with boxplots that show the interannual variability in normalized catch relative to the salinity gradient. Note that catch data were converted to biomass estimates before normalizing.

Of the species summarized in Figure 21, the delta smelt showed the smallest change in distribution relative to salinity after the overbite clam invasion. This is partly because delta smelt is the only one that has never been recorded at a salinity higher than about 20 ppt, which is consistent with previous field data summaries and the laboratory results reviewed above. There are small modes in delta smelt biomass in the LSZ and a general tapering off (with occasional exceptions in particular 1 ppt bins) out to 20 ppt. The northern anchovy data show the skew toward more marine waters that was described by Kimmerer (2006). Longfin smelt and age-0 striped bass had a more even distribution relative to salinity after the overbite clam than they did before. In contrast, American shad had a relatively even distribution across the salinity gradient before the overbite clam, but its distribution has been skewed into somewhat fresher water since. Threadfin shad appear to have greater relative use of the LSZ since the overbite clam, and perhaps higher salinity water more generally. Collectively, these data suggest some re-distribution of the upper estuary fish assemblage has occurred since the 1980s. We note that because mean salinity of the FMWT sampling grid has increased as well (Feyrer *et al.* 2007; 2011) some of these changes may also reflect that trend (e.g., northern anchovy, longfin smelt, striped bass, and threadfin shad). In contrast, the shift toward fresher water by American shad and the lack of major change by delta smelt suggest these species' spatial distribution has changed – if it had not, they would be distributed in more saline water like the other four species. For delta smelt, this distribution shift to the east is consistent with what has been reported previously (Feyrer *et al.* 2007; 2011; Sommer *et al.* 2011; Sommer and Mejia 2013).

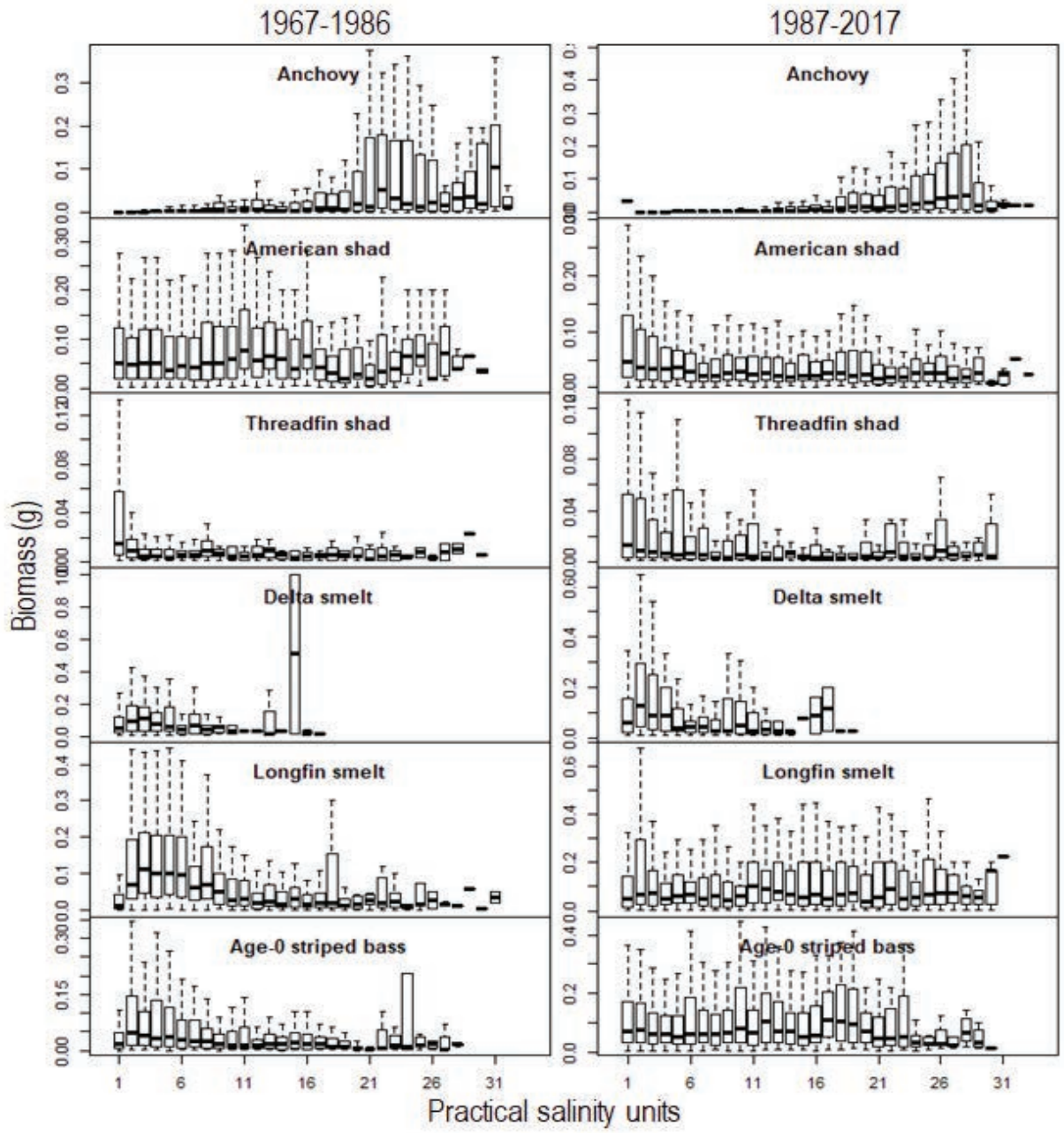


Figure 21. Salinity distributions of Fall Midwater Trawl catch for six pelagic San Francisco Estuary fishes, summarized by pre-overbite clam invasion years (1967-1986) and post-invasion years (1987-2017). Each Fall Midwater Trawl sample was associated with a specific conductance measurement, which was converted to practical salinity units. Annual frequencies of positive catches for each species, binned into one salinity unit increments, were divided by the total positive catch for each year-species combination, to yield proportional positive catch by salinity. Proportions represented annual distributions along the salinity gradient. Within each salinity bin and across years, the distributions of proportional catches were summarized with boxplots.

Summary of Status of Delta Smelt Critical Habitat

The Service's primary objective in designating critical habitat was to identify the key components of delta smelt habitat that support successful completion of the life cycle.

The delta smelt's critical habitat is currently not adequately serving its intended conservation role and function because there are very few locations that consistently provide all the needed habitat attributes for larval and juvenile rearing at the same times and in the same places (Table 4). The Service's review indicates it is rearing habitat that remains most impacted by ecological changes in the estuary, both before and since the delta smelt's listing under the Act. As described above, those changes have stemmed from chronic low outflow, changes in the seasonal timing of Delta inflow, and lower flow variability, species invasions and associated changes in how the upper estuary food web functions, declining prey availability, high water temperatures, declining water turbidity, and localized contaminant exposure and accumulation by delta smelt.

Table 4. Summary of habitat attribute conditions for delta smelt in six regions of the estuary that are permanently or seasonally occupied in most years.

	Landscape	**Turbidity**	**Salinity**	**Temperature**	**Food**
Montezuma Slough	Appropriate	Appropriate	Appropriate *when outflow is sufficient, or when the Suisun Marsh Salinity Control Gates are operated to lower salinity*	Usually appropriate	Appropriate
Suisun Bay (including Honker and Grizzly bays)	Appropriate except in shipping channel	Usually appropriate	Appropriate *when outflow is sufficient*	Usually appropriate	Depleted
West Delta	Limited area 4 to 15 feet deep	Marginal, declining	Appropriate	Can be too high during summer	Depleted
North Delta (Cache Slough region)	Appropriate	Appropriate	Appropriate	Can be too high during summer	Appropriate, but associated with elevated contaminant impacts
Sacramento River above Cache Slough confluence	Limited area 4 to 15 feet deep; swift currents	Marginal except during high flows, declining	Appropriate, but possibly lower than optimal	Usually appropriate	Likely low due to swift currents and wastewater inputs
South Delta	Appropriate except too much coverage by submerged plants	Too low	Appropriate	Too high in the summer	Appropriate

Environmental Baseline

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the Action Area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the *Environmental Baseline*.

The proposed project is located over the Sacramento River south of the Pioneer Bridge (U.S. Highway 50) between the Cities of West Sacramento and Sacramento, California. The river averages 720 feet wide at the OHWM in the Action Area. The riverbanks are levees that are mostly steeply sloped and support riparian forest vegetation with riprap near the bottom of the slope.

Delta Smelt

The Action Area is the northern portion of the delta smelt's range and delta smelt may occur yearly in the Action Area during the winter/spring spawning season. Based on long term survey data, delta smelt are not thought to rear in this portion of their range and are not expected to be present in the summer or fall months. As discussed in the *Status of the Species* section delta smelt abundance is historically low and continues to trend downward. Catch of delta smelt in ongoing surveys in and near the Action Area has historically been relatively low compared to other Delta survey sites. Recent surveys in and near the Action Area have resulted in zero catch of delta smelt.

Delta Smelt Critical Habitat

The proposed project is within the northernmost part of the delta smelt's designated critical habitat and contains all of the Primary Constituent Elements described in the critical habitat designation but quality and amount vary depending on conditions as discussed in the *Status of the Critical Habitat* section.

Effects of the Proposed Action

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. *Effects of the action* may occur later in time and may include consequences occurring outside the immediate area involved in the action.

Delta Smelt

Pile Driving Noise

Underwater sound pressure waves can harass and harm fish species (Reyff 2003; Abbott and Bing-Sawyer 2002; Caltrans 2001; Longmuir and Lively 2001; Stotz and Colby 2001). As the pressure wave passes through a fish, the swim bladder is rapidly squeezed due to the high pressure, and then rapidly expanded as the under-pressure component of the wave passes through the fish. This can cause adverse effects including rupture of the swim bladder, rupture of capillaries, internal hemorrhage, neurological stress, and auditory damage. Extreme sound waves can cause instantaneous death, latent death within minutes after exposure, or can occur several days later.

Elevated noise levels can cause sub-lethal injuries affecting survival and fitness. Similarly, if injury does not occur, noise may modify fish behavior that may make them more susceptible to predation. Fish suffering damage to hearing organs may suffer equilibrium problems and may have a reduced ability to detect predators and prey. Other types of sub-lethal injuries can place the fish at increased risk of predation and disease. Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny *et al.* 1994; Hastings *et al.* 1996).

Among the construction activities likely to generate noise, the use of impact hammers for pile installation poses the greatest risk to fish because the levels of underwater noise produced by impulsive types of sounds can reach levels of sufficient intensity to injure or kill fish (Popper and Hastings 2009). Factors that may influence the potential for injury include species, life stage, and size of fish; type and size of pile and hammer; frequency and duration of pile driving; site characteristics (e.g., water depth); and distance of fish from the source. Dual interim criteria representing the acoustic thresholds associated with the onset of physiological effects in fish have been established to provide guidance for assessing the potential for injury resulting from pile-driving noise (Fisheries Hydroacoustic Working Group 2008) (Table 5). These criteria have been established only for impact pile driving. Other pile-driving methods such as vibratory, oscillatory, and drilling methods generally produce more continuous, lower energy sounds below the thresholds associated with injury. No established noise thresholds currently are associated with continuous sound waves, and vibratory and oscillation methods generally are considered effective measures for avoiding or minimizing the risk of injury of fish from pile-driving noise.

Table 5. Interim Criteria for Assessing the Potential for Injury to Fish from Pile-Driving Activities

Interim Criteria	Agreement in Principle
Peak sound pressure level (SPL)	206 dB re 1µPa (for all sizes of fish)
Cumulative sound exposure level (SEL)	187 dB re 1µPa^2-sec—for fish size ≥ 2 grams 183 dB re 1µPa^2-sec—for fish size < 2 grams
Behavioral (RMS)	150 dB re 1µPa (for all sizes of fish)

Source: Fisheries Hydroacoustic Working Group 2008
dB re 1µPa = dB referenced to a pressure of 1 microPascal
dB re 1µPa^2-sec = dB referenced to a pressure of 1 microPascal squared per second RMS
= root mean square

The dual criteria are: (1) 206 dB for peak SPL and (2) 187 dB for cumulative SEL for fish larger than 2 grams and 183 dB SEL for fish smaller than 2 grams. The peak SPL threshold is considered the maximum SPL a fish can receive from a single strike without injury. The cumulative SEL threshold is considered the total amount of acoustic energy that a fish can receive from single or multiple strikes without injury. The cumulative SEL threshold is based on the total daily exposure of a fish to noise from sources that are discontinuous (in this case, noise that occurs up to 12 hours a day, with 12 hours between exposures). This assumes that fish are able to recover from any effects during this 12-hour period between exposures.

Impact pile driving for the temporary trestles, the permanent bridge piles and vibratory pile driving for the cofferdam sheet piles in the first in-water construction season would overlap the end of the spawning season, thereby exposing spawning adults, eggs, and larvae in May, June, and July depending on aquatic conditions to underwater sound levels that exceed the injury and behavioral thresholds for fish (Table 5).

Any impact driving of spud piles for the temporary barges in August, September, October, or November in either construction season, and impact driving of the bridge fender piles in late September and early October in the second in-water construction season is not expected to expose delta smelt at any life stage to underwater sound levels that exceed the injury and behavioral thresholds for fish because pile driving would occur when they are not present in the Action Area and will not be discussed further.

Temporary Trestles

For the piles driven on land, peak SPLs exceeding the injury threshold are predicted to occur within less than 33 feet for the 16-inch-diameter steel pipe piles and the 16-inch-diameter steel H-piles (Table 6). Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 824 feet from the 16-inch steel pipe piles and 328 feet from the 16-inch steel H-piles, assuming an unimpeded propagation path. These potential impacts would occur over a period of approximately 2 days.

For the piles in water, peak SPLs exceeding the injury threshold are predicted to occur within 46 feet for the 16-inch-diameter steel pipe piles and within less than 33 feet for the 16-inch diameter steel H-piles (Table 6). The use of an attenuation device is expected to reduce these distances to 33 feet or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 1,775 feet from the 16-inch steel pipe piles and 705 feet from the 16-inch steel H-piles, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce these distances for the respective piles by slightly more than 50 percent. These potential impacts could occur over a period of approximately 24 days.

Table 6. Distances to Injury and Behavioral Thresholds for Impact Driving of 16-Inch Steel Pipe or 16-Inch Steel H-Piles for the Temporary Construction Trestles

Pile Size/Type	Location	Number of Piles	Number of Piles per Day	Number of Strikes per Day	Distance to 206-dB Peak Criterion (feet)[a]	Distance to 187-dB Cumulative SEL Criterion (feet)[a]	Distance to 183-dB Cumulative SEL Criterion (feet)[a]	Distance to 150 dB RMS Criterion (feet)[a]
16-inch steel pipe	In water	234	10–20	16,000–32,000[b]	46 (<33)	1,775 (824)[c]	1,775 (824)[c]	9,610 (4,459)[d]
	On land	4	2–4	3,200–6,400[b]	<33	824[c]	824[c]	5,200[d]
16-inch steel H-pile	In water	234	10–20	16,000–32,000[b]	<33	705 (328)[c]	705 (328)[c]	3,281 (1,522)[d]
	On land	4	2–4	3,200–6,400[b]	<33	328[c]	328[c]	1,522

dB = decibels.
RMS = root mean square.
SEL = sound exposure level.
[a] Distances in parentheses are based on a 5-dB level of attenuation.
[b] Based on an estimate of 1,600 strikes per pile.
[c] Pile-driving energy does not accumulate once the single strike SEL drops to 150 dB (i.e., "effective quiet"). The distance to the onset of physical injury therefore cannot extend beyond the distance to effective quiet. Once the daily number of strikes exceeds 5,000 strikes per day, the distance to the onset of injury does not increase. For this reason, the distances to the 183-dB and 187-dB thresholds are the same.
[d] Maximum distance limited to 6,000 feet upstream and 1,900 feet downstream of proposed bridge location due to the presence of river bends.

Permanent Bridge Piles

Table 7 shows the assumed installation rate and computed distances to the injury and behavioral thresholds for each pile type and location for the three bridge types. The computed distances for the in-water piles are shown for both unattenuated and attenuated impact driving.

For the 60-inch CISS piles for piers 2 and 3, peak SPLs exceeding the injury threshold are predicted to occur within 59 feet. The use of an attenuation device is expected to reduce this distance to 33 feet or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 7,067 feet, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by more than 50 percent.

Noise levels exceeding the behavioral threshold of 150 dB RMS would theoretically extend 33,000 feet from pile driving activities, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by approximately 50 percent. River bends located approximately 1,900 feet downstream and approximately 6,000 feet upstream of the proposed location of pile driving activity would likely limit the extent of these noise levels.

Although the distances to injury and behavioral thresholds would be the same for the movable span for all three bridge types, potential impacts on fish associated with piers 2 and 3 would vary by bridge type because of the different number of piles required to construct the fixed spans of each of these three bridge types. For example, potential impacts on fish during construction of the fixed spans would occur over a period of approximately 6 days for the bascule bridge, approximately 4 days for the vertical lift bridge, and approximately 9 days for the swing bridge.

For the 16-inch steel pipe piles for piers 4 and 5 in water, peak SPLs exceeding the injury threshold are predicted to occur within 46 feet from pile-driving activities. The use of an attenuation device is expected to reduce this distance to 20 feet or less. Cumulative SELs

exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 1,775 feet, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by more than 50 percent.

Noise levels exceeding the behavioral threshold of 150 dB RMS would extend 446 feet from pile-driving activities. The use of an attenuation device is expected to reduce this distance by slightly more than 50 percent.

Although the distances to injury and behavioral thresholds would be the same for all three bridge types, potential impacts on fish associated with piers 4 and 5 would vary by bridge type because of the different number of piles required to construct each bridge type. Potential impacts could occur over a period of 10 days for the bascule and vertical lift bridge types, and 5 days for the swing bridge type.

For the 16-inch steel pipe piles for abutments 1 and 6 on land, peak SPLs exceeding the injury threshold are predicted to occur within a radius of 10 feet from pile- driving activities. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 824 feet, assuming an unimpeded propagation path.

Noise levels exceeding the behavioral threshold of 150 dB RMS would extend 5,200 feet from pile-driving activities, assuming an unimpeded propagation path. River bends located approximately 1,900 feet downstream and approximately 6,000 feet upstream of the proposed location of pile-driving activity likely would limit the extent of these noise levels.

The distances to injury and behavioral thresholds associated with abutments 1 and 6 would be the same for all three bridge types because the same number of piles would be required to construct all of the three bridge types. Potential impacts could occur over a period of 10 days for all three bridge types.

Table 7. Distances to Injury and Behavioral Thresholds for Impact Driving of 60-Inch CISS and 16-Inch Steel Pipe Piles for a Bascule, Vertical Lift, and Swing Bridge

Pile Size/Type	Location	Number of Piles (Bridge Type)	Number of Piles Per Day	Number of Strikes Per Day	Distance to 206-dB Peak Criterion (feet)[a]	Distance to 187-dB Cumulative SEL Criterion (feet)[a]	Distance to 183-dB Cumulative SEL Criteria (feet)[a]	Distance to 150-dB RMS Criteria (feet)[a]
60-inch cast-in-steel shell	In water (piers 2 and 3)	12 (Bascule)	2–4	3,000–6,000[b]	59 (<33)	7,067 (3,000)[c]	7,067 (3,000)[c]	33,000 (15,230)[d]
		6–8 (Vertical Lift)						
		18 (Swing)						
16-inch steel pipe	In water (piers 4 and 5)	40 (Bascule)	4–8	6,400–12,800[e]	46 (<33)	1,775 (824)[c]	1,775 (824)[c]	9,610 (4,459)[d]
		40 (Vertical Lift)						
		20 (Swing)						

16-inch steel pipe	On land (abutments 1 and 6)	40 (All)	4–8	6,400–12,800[e]	<33	824[c]	824[c]	5,200[d]

[a] Distances in parentheses are based on a 5-dB level of attenuation.
[b] Based on an estimate of 1,500 strikes per pile.
[c] Pile-driving energy does not accumulate once the single strike SEL drops to 150 dB (i.e., effective quiet). The distance to the onset of physical injury therefore cannot extend beyond the distance to effective quiet. Once the daily number of strikes exceeds 5,000 strikes per day, the distance to the onset of injury does not increase. For this reason, the distances to the 183-dB and 187-dB thresholds are the same.
[d] Maximum distance limited to 6,000 feet upstream and 1,900 feet downstream of proposed bridge location due to the presence of river bends.
[e] Based on an estimate of 1,600 strikes per pile

Sheet Piles for Temporary Cofferdams

Two cofferdams would be installed to construct piers 4 and 5. The sheet piles for the cofferdams would be installed and removed with a vibratory pile driver; this method of installation and removal is not anticipated to generate high underwater noise levels that result in injury to fish as described above in the general *Pile Driving Noise* discussion. The sheet piles for the two cofferdams would be installed over a 2-week period in late May and early June of the first construction season when delta smelt may be present.

Fish Entrapment in Cofferdams

The proposed timing of cofferdam installation (late May to early June) would overlap the end of the spawning season for delta smelt in the Sacramento River. Consequently, the potential would exist for adult delta smelt, eggs, and larvae to become entrapped in the cofferdams. Implementation of a fish rescue plan may reduce effects to adults by returning them back to the river but would not minimize effects to eggs or larvae assuming they are too small for the rescue gear.

Erosion and Mobilization of Sediment

Resuspension of sediments with adsorbed metals during in-water construction potentially could lead to degradation of water quality and food resources in the Action Area. In addition, resuspended particulate material could be transported to other locations in the Sacramento River as a result of transport by river currents, thus leading to potential degradation of water quality and food resources beyond the immediate in-water work area.

In-water construction would be limited to pile driving (trestle, bridge, and barge), installation and removal of sheet piles for cofferdams, and placement of RSP during daylight hours each day. Disturbance of channel substrate and the potential for increased contaminants would be temporary (up to 12 hours each day) and localized but repetitive. Assuming that mobilization of sediment is also an indication of contaminant mobilization, the proposed in-water *Conservation Measures* are anticipated to minimize the increase in contaminants.

Contaminent Spills and Runoff

The operation of heavy equipment, cranes, pile drivers, drilling rigs, barges, and other construction equipment during vegetation removal, excavation, and bridge construction could result in spills and leakage of fuel, lubricants, hydraulic fluids, and coolants. Other sources of potential contamination include asphalt, wet concrete, and other materials that may come into direct contact with surface water during construction activities.

While not specifically called out in the *Description of the Proposed Action*, Caltrans will be required to implement measures and BMPs required by Sections 401 and 402 of the Federal Clean Water Act. These BMPs are designed to avoid and minimize the potential for accidental spills, minimize the extent and potential effects of accidental spills, and avoid and minimize the potential for contaminated runoff from waste materials. Implementation of the BMPs in accordance with an approved Stormwater Pollution Prevention Plan and other requirements of local agency or Caltrans Statewide National Pollutant Discharge Elimination System permits would reduce the potential for accidental spills or unintentional discharges of potentially hazardous materials to the Sacramento River, wetlands, and drainage channels.

The purpose of the new bridge is to improve the connectivity across the river, thereby reducing the trip lengths currently required to cross the river via one of the other three bridges in the project vicinity (i.e., Pioneer, Tower, and I Street). However, the new bridge would result in some added vehicle trips across the river because of the increased convenience the new bridge would offer, thereby potentially increasing the pollutant load that currently is delivered to the river.

Temporary Disturbance to and Permanent Loss of Aquatic Habitat and Shading

The proposed project would result in the temporary disturbance to and permanent loss of aquatic habitat area and volume as described below and in Table 8.

Installation of sheet pile cofferdams to isolate the in-water construction areas for piers 4 and 5 from the water column during pier construction would result in temporary disturbance of aquatic habitat (substrate and water column) equal to the enclosed area and volume of the in-water cofferdams. The proposed dimensions of each cofferdam are 35 feet by 95 feet, or 3,325 square feet. Together, the two cofferdams would result in temporary disturbance of 6,650 square feet (0.15 acre) of substrate habitat and up to 325,850 cubic feet of water column habitat below the OHWM (based on a water surface elevation of +19 feet). The temporary cofferdams would remain in place for 2 months in the first in-water construction season. Similarly, installation of piles for the temporary trestles would result in temporary disturbance to substrate and water column habitat equal to the total area and volume of the in-water piles used to support the temporary trestles. The temporary trestle piles would remain in place throughout the duration of construction, although the work platforms would be removed at the end of the first in-water construction season before the onset of winter. The 234 16-inch-diameter pipe or H piles that would be installed below the OHWM to support the temporary trestles would result in temporary disturbance to 327 square feet (0.007 acre) of substrate habitat and up to 16,023 cubic feet of water column habitat below the OHWM (four of the total 238 piles for the temporary trestles would be installed above the OHWM). Similarly, the 16 16-inch-diameter pipe or H piles that would be installed in the wetted channel to anchor the temporary barges would result in temporary disturbance to 22 square feet (0.0005 acre) of substrate habitat and up to 1,078 cubic feet of water column habitat below the OHWM. Together, this would result in total temporary disturbance to 6,999 square feet (0.16 acre) of substrate habitat and 342,951 cubic feet of water column habitat below the OHWM.

Installation of the new bridge piers (piers 2 through 5) and piles for the new bridge fender system would result in permanent loss of aquatic habitat (substrate and water column) equal to the cumulative area (substrate) and volume (water column) of the in-water piers and bridge fender

piles. Two 75-foot-wide by 95-foot-long piers (piers 2 and 3) that would be installed in the river to support the movable span of the new bridge (bascule bridge) would result in a permanent loss of up to 13,500 square feet (0.31 acre) of substrate habitat and up to 661,500 cubic feet of water column habitat below the OHWM. The footprint of piers 2 and 3 for the vertical lift and swing bridge types would be less. Similarly, two piers (piers 4 and 5) that would be installed in the river to support the fixed spans of the new bridge would result in a permanent loss of 360 square feet (0.01 acre) of substrate habitat and up to 17,640 cubic feet of water column habitat below the OHWM.

Placement of RSP on the waterside slope of the new bridge abutments below the OHWM also would result in permanent loss of natural substrate habitat equal to the net increase in area of rock revetment. Up to 824 linear feet of shoreline (398 linear feet on the City of Sacramento shoreline and 426 linear feet on the City of West Sacramento shoreline), covering up to 24,126 square feet (0.55 acre) of the bank below the OHWM, would be lined with RSP. A total of 2,949 cubic yards of RSP would be placed below the OHWM, and a total of 4,216 cubic yards would be placed above the OHWM. The RSP above and below the OHWM would cover a total of 58,622 square feet (1.35 acre).

Table 8. Amount of Temporarily and Permanently Affected Aquatic Habitat in the Sacramento River

Feature/Habitat	Temporary Impact (square feet [acre])	Permanent Impact (square feet [acre])
Temporary Cofferdams		
Substrate area (square feet [acre])	6,650 (0.15)	NA
Water column volume (cubic feet)	325,850	NA
Temporary Trestle Piles		
Substrate area (square feet [acre])	327 (0.007)	NA
Water column volume (cubic feet)	16,023	NA
Temporary Barge Spud Piles		
Substrate area (square feet [acre])	22 (0.0005)	NA
Water column volume (cubic feet)	1,078	NA
Piers 2 and 3		
Substrate area (square feet [acre])	NA	13,500 (0.31)[a]
Water column volume (cubic feet)	NA	661,500[a]
Piers 4 and 5		
Substrate area (square feet [acre])	NA	360 (0.01)
Water column volume (cubic feet)	NA	17,640
Piles for Bridge Fender System		
Substrate area (square feet [acre])	NA	84 (0.002)
Water column volume (cubic feet)	NA	4,106
Shoreline Rock Revetment (RSP)		
Substrate area (square feet [acre])	NA	24,126 (0.55)
Total		
Substrate area (square feet [acre])	6,999 (0.16)	38,070 (0.87)
Water column volume (cubic feet)	342,951	683,246

Barge shading would occur only during the in-water construction season (May 1 to November 30) as the temporary barges would be removed at the end of the first construction season before the onset of winter. Four barges, each approximately 60 feet wide and 150 feet long (9,000

square feet [0.21 acre]), would be present during construction and would provide a total of 36,000 square feet (0.83 acre) of temporary over-water structure (Table 8). Because the barges would be present only during construction and moved periodically as construction of the bridge progresses, effects of barge shading would be temporary and localized.

Shading by the temporary work platforms would occur only during the in-water construction season (May 1 to November 30) as the temporary work platforms would be removed at the end of the first construction season before the onset of winter (the temporary trestle piles could remain in place). Two trestles, approximately 22 feet wide and varying in length and configuration would be present during construction and would provide a total of approximately 33,500 square feet (0.77 acre) of temporary over-water structure (8). Because the trestles and work platforms would be present only during construction, effects of temporary work platform shading would be temporary and localized. Together, the barges and temporary work platforms would create up to 69,500 square feet (1.60 acres) of temporary overwater structure (i.e., artificial shade) (Table 8).

The new bridge would create approximately 56,000 square feet (1.29 acres) of permanent overwater structure where no over-water structure currently exists. Predatory fish (e.g., striped bass, Sacramento pikeminnow, and largemouth bass) prefer structural and overhead cover (e.g., artificial shade) for ambushing prey. Because of the height of the new bridge over the water, ambient light levels generally would be expected to penetrate into the water, thereby minimizing the effect of bridge shading on aquatic habitats in the Sacramento River.

Table 8. Amount of Artificial Overwater Structure (Shade) Created on the Sacramento River in the Action Area

Overwater Structure	Square Feet (acre) of Shaded Area
Barges (temporary)	36,000 (0.83)
Trestle (temporary)	33,500 (0.77)
Bridge (permanent)	56,000 (1.29)
Total	
Net change (temporary)	69,500 (1.60)
Net change (permanent)	56,000 (1.29)

As noted previously in the *Description of the Proposed Action section*, Caltrans has also proposed a set of conservation measures, including the commitment to provide compensatory habitat as a condition of the action. This compensatory habitat is intended to minimize the effect on the species of the proposed project's anticipated incidental take and loss of critical habitat resulting from the permanent loss of habitat described above. The compensatory habitat proposed will be in the form of purchase of 5.61 acres of mitigation credits at a NMFS- and Service-approved anadromous fish and delta smelt conservation bank.

This component of the action will have the effect of protecting and managing habitat for the species' conservation in perpetuity. The Service-approved conservation bank provides suitable habitat for spawning, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Purchasing credits at a Service-approved conservation bank may contribute to other recovery efforts for the species.

Other proposed conservation measures are intended to minimize the potential to spread or introduce aquatic invasive associated with operation of the barges and other inwater construction equipment and minimize the effects of permanent bridge lighting on special-status fish species.

Delta Smelt Critical Habitat

Substrates suitable for spawning (PCE 1) and will be temporarily disturbed (0.16 acre and 1.6 acres from shading) , permantly lost and shaded (0.87 acre and 1.29 acres respectively), and compensated (5.61 acres) as described above in the *Temporary Disturbance to and Permanent Loss of Aquatic Habitat and Shading* section of the *Effects of the Proposed Action*. Purchasing delta smelt credits at a Service-approved conservation bank will minimize the temporary and permenant loss of habitat by protecting in perpetuity habitat commensurate with or better than habitat lost as a result of the proposed project. Water quality (PCE 2) will be temporarily affected by increased turbidity and potential contaminent exposure during construction and contaminent exposure may increase with runoff from new impervious surfaces and bridge traffic. The other PCEs are not expected to be affected by the proposed project. The effects to PCE 1 and 2 are small and discrete, relative to the relative to the entire designated critical habitat, and with the implementation of compensatory mitigation, are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of the delta smelt.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action or future actions that implement planning efforts that may have adverse effects are not considered in this section. These projects would have a Federal nexus and would require separate consultation pursuant to section 7 of the Act to delta smelt and delta smelt critical habitat as appropriate.

Adverse effects to delta smelt and delta smelt critical habitat may result from point and non-point source chemical contaminant discharges within the Action Area. These contaminants include but are not limited to ammonia and free ammonium ion, numerous pesticides and herbicides from agricultural activities, and oil and gasoline product discharges. Oil and gasoline product discharges may be introduced into Delta waterways from shipping and boating activities and from urban activities and runoff. Implicated as potential stressors, these contaminants may adversely affect fish reproductive success and survival rates.

Conclusion

After reviewing the current *Status of the Species* status for the delta smelt and its critical habitat, the *Environmental Baseline* for the Action Area, the *Effects of the Proposed Action*, and the *Cumulative Effects*, it is the Service's biological opinion that the Broadway Bridge Project, as proposed, is not likely to jeopardize the continued existence of the delta smelt and is not likely to destroy or adversely modify delta smelt critical habitat. The Service reached this conclusion because the project-related effects to the species, when added to the *Environmental Baseline* and analyzed in consideration of all potential *Cumulative Effects*, will not rise to the level of reducing

the likelihood of survival or recovery of the species and will not rise to the level of precluding the function of the delta smelt's critical habitat to serve its intended conservation role for the species based on the following: (1) the action is in the northern-most portion of the smelt's range and delta smelt critical habitat where delta smelt are increasingly rare; (2) in-water work will avoid most of the spawning season; (3) the low abundance of delta smelt reduces the risk of exposure to the temporary disturbance; and (4) the purchase conservation bank credits will minimize the effect of permanent habitat and critical habitat loss.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary and must be implemented by Caltrans. so that they become binding conditions of this action, in order for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Caltrans must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14 (i)(3)].

Amount or Extent of Take

Delta Smelt

The Service anticipates incidental take of delta smelt adults, larvae, and/or eggs will be difficult to detect and quantify because of the species' small size and cryptic nature and therefore it is not possible to provide precise numbers of delta smelt that could be harmed, injured, or killed from the proposed project. There are numerical limitations with respect to detecting individual delta smelt in the wild, and for that reason, it is not practical to express the amount or extent of anticipated take of this species or monitor take-related impacts in terms of individual delta smelt. Due to the difficulty in quantifying the number of delta smelt that will be taken as a result of the proposed project, the Service is using habitat as a surrogate to quantify incidental take of the

species. Therefore, to quantify the level of incidental take associated with the proposed project, the Service anticipates that all delta smelt within the estimated 197-acre Action Area and water column will be subject to incidental take in the form of harm or mortality. Mortality is anticipated to be low because of: (1) the current low relative abundance and (2) location of the project in the smelt's northern-most portion of their range where they are increasingly rare. Upon implementation of the *Reasonable and Prudent Measures*, incidental take associated with the project will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the delta smelt.

Reasonable and Prudent Measure

The following reasonable and prudent measure is necessary and appropriate to minimize the effects of the proposed project to the delta smelt:

1. Caltrans shall minimize the potential for take of the delta smelt.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure Number One (1):

    a. Caltrans shall educate and inform staff and contractors involved in the project as to the *Conservation Measures* and *Terms and Conditions* in this biological opinion.

    b. At least 15 days prior to the onset of any construction-related activities, Caltrans shall submit to the Service, for approval, the name(s) and credentials of biological monitors it requests to conduct activities specified for this project. Information included in a request for authorization must include, at a minimum: (1) relevant education; (2) relevant training on species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized for such activities by the Service; (3) a summary of field experience conducting requested activities (to include project/research information and actual experience with the species); (4) a summary of biological opinions and/or informal consultations under which they were authorized to work with the listed species and at what level (such as construction monitoring versus handling), this should also include the names and qualifications of persons under which the work was supervised as well as the amount of work experience on the actual project including detail on whether the

> species was encountered or not; and (5) a list of Federal Recovery Permits [10(a)1(A)] if any, held or under which individuals are authorized to work with the species (to include permit number, authorized activities, and name of permit holder). No project activities shall begin until Caltrans has received written Service approval for biologists to conduct specified activities.

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, Caltrans must reinitiate formal consultation as per 50 CFR 402.16.

1. The Service must be notified within 24 hours of the finding of any injured or dead listed species or any unanticipated damage to its habitat associated with the proposed project. Injured listed species shall be cared for by a licensed veterinarian or other qualified person. Notification will be made to the contact below in *Reporting Requirements*, and must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle or other maps at a finer scale, as requested by the Service, and any other pertinent information. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the *Disposition of Individuals Taken* section below.

2. Sightings of any listed or sensitive animal species shall be reported to the Service and California Natural Diversity Database (https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data).

3. The applicants shall submit an annual post-treatment compliance report prepared by the on-site biologist to the San Francisco Bay-Delta Fish and Wildlife Office within sixty (60) calendar days of the date of the completion of construction activities. This report shall detail: (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting the avoidance and minimization measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the delta smelt, if any; (v) occurrences of incidental take of this listed species, if any; (vi) documentation of employee environmental education; and (vii) other pertinent information.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is Jana Affonso, Assistant Field Supervisor of the Endangered Species Division at (916) 930-2664.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. The Service recommends Caltrans maintain current knowledge of Delta species biology, ecology, and status to inform project design and species-specific *Conservation Measures*.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes the reinitiation of consultation for the Broadway Bridge Project. As provided in 50 CFR §402.16,

(a) Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

(1) If the amount or extent of taking specified in the incidental take statement is exceeded;

(2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

(3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or

(4) If a new species is listed or critical habitat designated that may be affected by the identified action.

(b) An agency shall not be required to reinitiate consultation after the approval of a land management plan prepared pursuant to 43 U.S.C. 1712 or 16 U.S.C. 1604 upon listing of a new species or designation of new critical habitat if the land management plan has been adopted by the agency as of the date of listing or designation, provided that any authorized actions that may affect the newly listed species or designated critical habitat will be addressed through a separate action-specific consultation. This exception to reinitiation of consultation shall not apply to those land management plans prepared pursuant to 16 U.S.C. 1604 if:

(1) Fifteen years have passed since the date the agency adopted the land management plan prepared pursuant to 16 U.S.C. 1604; and

(2) Five years have passed since the enactment of Public Law 115-141 [March 23, 2018] or the date of the listing of a species or the designation of critical habitat, whichever is later.

Please address any questions or concerns regarding this response to Kim Squires, Section 7 Division Manager, at Kim_Squires@fws.gov. Please refer to Service file numbers 08FBDT00-2021-F-0072, in any future correspondence.

Sincerely,

JANA AFFONSO

Digitally signed by JANA AFFONSO
Date: 2021.04.07 12:36:26 -07'00'

Jana Affonso
Acting Field Supervisor

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS No: WCRO-2021-00056

July 13, 2021

Laura Loeffler
Branch Chief, Environmental
Caltrans District 3
703 B Street
Marysville, California 95901

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the City of West Sacramento Broadway Bridge Construction Project.

Dear Ms. Loeffler:

Thank you for your letter of January 7, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq.*) for the City of West Sacramento Broadway Bridge Construction Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) for this action.

Based on the best available scientific and commercial information, the biological opinion concludes that the City of West Sacramento Broadway Bridge Construction Project is not likely to jeopardize the continued existence of the federally listed threatened Central Valley (CV) spring-run Chinook salmon evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), threatened California Central Valley (CCV) steelhead distinct population segment (DPS) (*O. mykiss*), endangered Sacramento River winter-run Chinook salmon (*O. tshawytscha*), or the threatened southern DPS (sDPS) of North American green sturgeon (*Acipenser medirostris*) and is not likely to destroy or adversely modify the designated critical habitats of the above listed species. For the above species, NMFS has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the project.

NMFS recognizes that Caltrans has assumed the Federal Highway Administration's (FHWA) responsibilities under Federal environmental laws for this project as allowed by a Memorandum of Understanding (National Environmental Policy Act Assignment) with the FHWA effective December 23, 2016. As such, Caltrans serves as the lead Federal Action Agency for the proposed project.

Please contact Lyla Pirkola in NMFS California Central Valley Office via email at lyla.pirkola@noaa.gov or via phone at (916) 930-5615 if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A. Catherine Marcinkevage

Cathy Marcinkevage
Assistant Regional Administrator for
California Central Valley Office

Enclosure

cc: Copy to File: 151422-WCR2021-SA00047
Brooks Taylor, Caltrans D3 Environmental, Brooks.Taylor@dot.ca.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

The City of West Sacramento Broadway Bridge Construction Project

NMFS Consultation Number: WCRO-2021-00056

Action Agency: California Department of Transportation

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU)	Threatened	Yes	No	Yes	No
Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ESU	Endangered	Yes	No	Yes	No
California Central Valley steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS)	Threatened	Yes	No	Yes	No
Southern DPS of North American green sturgeon (*Acipenser medirostris*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: A. Catherine Marcinkevage

Cathy Marcinkevage
Assistant Regional Administrator for California Central Valley Office

Date: July 13, 2021

TABLE OF CONTENTS

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq*.), and implementing regulations at 50 CFR 402, as amended. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 *et seq*.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the NMFS California Central Valley Office.

1.2. Consultation History

- On January 7, 2021, the California Department of Transportation (Caltrans) requested formal consultation with NOAA's National Marine Fisheries Service (NMFS) for the Broadway Bridge Replacement Project (project) located in both Yolo and Sacramento Counties, California.

- On January 20, 2021, NMFS sent an insufficiency letter for Caltrans requesting more information describing project details for barge activities and sequencing.

- On February 11, 2021, Caltrans provided a memorandum with requested details. This memorandum also included an errata to Section 2.5.3 of the biological assessment. At that time, NMFS deemed the formal consultation package complete and formal consultation was initiated.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River south of the Pioneer Bridge (US 50) to provide local interconnectivity across the river and between neighborhoods. The project would be located over the Sacramento River between the cities of West Sacramento and Sacramento, approximately 1,000 feet south of the existing Pioneer Bridge. The proposed project would

realign 15th Street to connect to Jefferson Boulevard in West Sacramento and connect to Broadway at 5th Street in Sacramento.

The project may be constructed in two phases or in a single phase, with the decision to construct in one or two phases to be determined at the time project construction starts. At the interim year, the new bridge across the Sacramento River would be constructed and open to traffic. By the design year, the remaining improvements and roadway connections proposed as part of the project would be constructed to allow the full, final design of the proposed project to be operational. If the project is constructed in a single phase, the efforts needed to construct the new bridge and the ultimate (design year) roadway alignment configuration would be completed at the same time. Regardless of project phasing, two seasons of in-water work would be required to construct the project and all in-water work would be conducted between May 1 and November 30.

If constructed in two phases, an interim (opening day) phase for the proposed project would include constructing the new bridge and approach roadways with temporary pavement transitions along the existing alignment of South River Road. Construction of this first phase is expected to take approximately 36 months, with two seasons of in-water work. A subsequent phase, the design year phase, would take approximately 6 months and would complete the remaining project roadway construction. This subsequent phase would not require any additional in-water work as the bridge would be constructed during the first phase. If the project is built in a single phase, construction is expected to take 36 months and would require two seasons of in-water work to construct the bridge.

The total length of the new bridge would measure approximately 845 feet long, with an up to 83-foot-wide deck consisting of two vehicle lanes, a median, on-street bike lanes, and sidewalks along both sides of the bridge. The bridge would include two fixed-span approach structures that tie into the banks of the river; the structures would be approximately 200 feet in length on the West Sacramento bank and approximately 450 feet in length on the Sacramento bank. Rock slope protection (RSP) would be installed on the river side of the bridge abutments both above and below the ordinary high-water mark (OHWM) to stabilize approximately 400 linear feet of shoreline on each side of the river.

One of three movable span types would be constructed: a vertical lift span, a swing span, or a bascule span. The bridge could be built as any one of the three types. To address the possible impacts of the bridge type that ultimately is built, the largest in- and over-water footprint and the greatest number of construction-related impacts of the three types were assumed for the analysis. Regardless of the bridge type that is constructed over the Sacramento River as part of the proposed project, a bridge fender system would be installed around the movable span piers to protect the piers from errant watercrafts that are navigating along the river.

The project would include a redesigned intersection connection for the bridge, turn pockets for access, reconstructing existing roadways to provide connection, stormwater drainage management features, and utility relocations. Construction of the above-described project would create 2.0 acres of new impervious surface.

RSP would be installed on the river side of the bridge abutments both above and below the OHWM to stabilize the shoreline on each side of the river. The estimated linear feet and area and volume above and below the OHWM are shown in Table 1.

Table 1. Estimated Rock Slope Protection

Location	Linear Feet of Shoreline	Area (square feet)	Area below OHWM (square feet)	Volume below OHWM (cubic yards)	Volume above OHWM (cubic yards)
West Sacramento shoreline	426	31,033	12,833	1,569	2,224
Sacramento Shoreline	398	27,589	11,293	1,380	1,992
Total	824	58,622	24,126	2,949	4,216

Temporary trestles and barges would be used to provide the contractor with access to the river portion of the project area. Together, the trestles and barges would be used to stage construction materials, to provide a working platform for cranes, and for general construction support. The temporary trestles would consist of steel piles that would be driven into place with an impact hammer. Although the temporary work platforms would be removed at the end of the first construction season before the onset of winter, the temporary trestle piles would remain in place for the duration of construction. The barges would be anchored to the river bottom with piles that would be driven into place with an impact hammer. Up to two barges would be anchored in the river at one time. The barges would be repositioned in the channel throughout construction only as needed to complete the work. The barges and temporary piles would be removed after bridge construction is completed.

In-water construction activities consist of those that would occur below the OHWM. The activities would be limited to the period of May 1 to November 30 during the two construction seasons. The in-water construction window allows sufficient time for most in-water work to be completed within the first "in-water work season," thus limiting potential impacts on fish and other species from the activities to primarily one construction season. Other construction activities occurring above the OHWM (*e.g.*, work on the abutments and approach superstructure) would not be limited to the in-water window of May 1 to November 30.

Temporary falsework platforms would be required to construct the proposed bridge foundations and approach structures. The platforms would be constructed using temporary piles within the river. In addition, temporary cofferdams would be required to construct the bridge piers within the water. The cofferdams would consist of temporary sheet piles installed around the individual piers. Dewatering inside the cofferdams would be required, and a total of 0.15 acres is anticipated to be dewatered. In-water construction activities would include the following.

- Installation and removal of steel piles with a vibratory hammer and an impact hammer for the temporary falsework platforms (trestles).

- Installation and removal of steel piles with an impact hammer for anchoring barges.

- Installation of steel sheet piles with a vibratory driver for temporary cofferdams.

- Installation of steel piles for the piers with an impact hammer for the new bridge (although work would occur within dewatered cofferdams, underwater sound would propagate beyond the dewatered cofferdams).

- Installation of steel casings for the piers with a vibratory hammer or hydraulic oscillator/rotator system for the new bridge.

- Installation of concrete piles with an impact hammer for the new bridge fender system.

After the temporary cofferdams are installed around the piers, forms would be constructed and concrete poured into the dewatered cofferdams to construct the pile caps. Work then would focus on the pier column construction. After the casings are installed, a rebar cage would be placed into the pile, and concrete would be poured into the steel shell. A cast-in-place concrete pier cap would be placed atop the columns to serve as the substructure. Work then would focus on constructing the approach superstructure. The movable span superstructure would be constructed offsite, floated in, and erected when construction of the foundations is completed.

During construction, the construction contractor would be required to use temporary best management practices (BMPs, described in Section 1.3.1) to control any runoff or erosion from the project site into the surrounding storm drain systems and waterways in order to be compliant with local, state, and federal water quality regulations. Temporary BMPs would be installed prior to any construction operations and would be in place for the duration of the contract. Removal of the temporary BMPs would be the final operation, along with project site cleanup.

Stormwater and road runoff drainage for operation of the proposed roadway would be conveyed in a new storm drain system installed approximately 5 feet below the finished road grade of South River Road, 15th Street, and Circle Street in West Sacramento and of Broadway in Sacramento. New storm drain outfalls into the Sacramento River would be constructed near each of the bridge abutments in West Sacramento and Sacramento.

Staging areas would be used to store materials and equipment during construction, such as pipe materials, precast manholes and drop inlets, steel girders, piles, and rebar, along with construction equipment when not in use. Staging areas would be in use throughout the construction duration. The staging areas consist of areas already developed, and no ground-disturbing activities will take place at these locations.

1.3.1. Avoidance and Minimization Measures

Measure 1: Install Orange Construction Fencing between the Construction Area and Adjacent Sensitive Biological Resources

- The project proponent or their contractor will install orange construction fencing between the construction area and adjacent sensitive biological resource areas.

- Barrier fencing around sensitive biological resource areas will be installed as one of the first orders of work and prior to equipment staging. Before construction begins, the construction contractor will work with the project engineer and a resource specialist to identify the locations for the orange construction fencing and will place stakes around the sensitive resource sites to indicate these locations. The protected areas will be designated as environmentally sensitive areas and clearly identified on the construction plans and described in the specifications.

- Barrier fencing will be installed before construction activities are initiated, maintained throughout the construction period, and removed after completion of construction

Measure 2: Conduct Environmental Awareness Training for Construction Employees

- The project proponent will retain a qualified biologist to conduct environmental awareness training for construction crews before project implementation. The awareness training will be provided to all construction personnel and will brief them on the need to avoid effects on sensitive biological resources.

- The education program will include a brief review of the special-status species with the potential to occur in the action area (including their life history, habitat requirements, and photographs of the species). The training will identify the portions of the action area in which the species may occur, as well as their legal status and protection. The program also will cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on these species during project implementation. This will include the steps to be taken if a sensitive species is found within the construction area (*i.e.*, notifying the crew foreman, who will call a designated biologist).

- An environmental awareness handout that describes and illustrates sensitive resources to be avoided during project construction and identifies all relevant permit conditions will be provided to each crew member.

- Education programs will be conducted for appropriate new personnel as they are brought on the job during the construction period.

Measure 3: Conduct Periodic Biological Monitoring

- The project proponent will retain a qualified biological monitor for the project, who will visit the site a minimum of once per week to ensure that fencing around environmentally sensitive areas is intact and ensure that activities are being conducted in accordance with the agreed upon project schedule and agency conditions of approval. The monitor will provide the project proponent with a monitoring log for each site visit.

- Certain activities will require the presence of a biological monitor for the duration of the activity or during the initial disturbance of an area to ensure that impacts on special-status

species are avoided. The activities that require specific monitoring are identified in the measures below:

Measure 4: Monitor Turbidity in the Sacramento River

- The project proponent will require their contractor to monitor turbidity levels in the Sacramento River during in-water construction activities (*e.g.*, pile driving, extraction of temporary sheet piles used for cofferdams, and placement of RSP).

- Turbidity will be measured using standard techniques upstream and downstream of the construction area to determine whether changes in ambient turbidity levels exceed the thresholds derived from the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region (Central Valley Regional Water Quality Control Board 2018). If it is determined that turbidity levels exceed the Basin Plan thresholds, the project proponent or their contractor will adjust work to ensure that turbidity levels do not exceed the Basin Plan thresholds.

Measure 5: Conduct All In-Water Construction Activities between May 1 and November 30 and Only during Daylight Hours

- The project proponent will conduct all in-water construction work, including pile driving (in-water and shore-based within 250 feet of the Sacramento River), installation of cofferdams, removal of temporary sheet piles, and placement of rock revetment, all between May 1 and November 30 to avoid or minimize causing disturbance and injury to, or mortality of, special-status fish species in the affected reaches of the Sacramento River.

- In-water work will be conducted only during daylight hours to provide fish in the affected reaches of the Sacramento River an extended quiet period during nighttime hours for feeding and unobstructed passage.

Measure 6: Implement Measures to Minimize Exceedance of Interim Threshold Sound Levels during Pile Driving

- The project proponent will require their contractor to implement the following measures to minimize the exposure of listed fish species to potentially harmful underwater sounds:

    - The contractor will vibrate all piles to the maximum depth possible before using an impact hammer.

    - No more than 20 piles will be driven per day.

    - During impact driving, the contractor will limit the number of strikes per day to the minimum necessary to complete the work and will limit the total number of hammer strikes to 32,000 strikes per day (*i.e.*, 1,600 hammer strikes per pile, per day) for piles for the temporary trestles, 20,000 strikes per day (*i.e.*, 1,000 hammer strikes per pile, per day) for the piles for the bridge fender system, 12,800 strikes per day (*i.e.*, 1,600 hammer strikes per pile, per day) for piles for

the fixed span piers, and 6,000 strikes per day (*i.e.*, 1.500 strikes per pile, per day) for the cast-in-steel shell piles for the movable span piers.

- During impact driving, the project proponent will require their contractor to use a bubble curtain or dewatered cofferdam to minimize the extent to which the interim peak and cumulative SEL thresholds are reached.

- No pile-driving activity will occur at night, thereby providing fish with an extended quiet period during nighttime hours on days that pile driving is being conducted for feeding and unobstructed passage.

Measure 7: Develop and Implement a Hydroacoustic Monitoring Plan

- The project proponent or their contractor will develop and implement a hydroacoustic monitoring plan. The monitoring plan will be submitted to NMFS for approval before the start of project activities. The plan will include the following requirements.

    - The project proponent or their contractor will monitor underwater noise levels during all impact pile-driving activities on land and in water to ensure that peak and cumulative SELs do not exceed estimated values. Pile driving on any day will cease when monitored sound levels reach the cumulative injury threshold at the predicted attenuation distances.

    - The monitoring plan will describe the methods and equipment that will be used to document the extent of underwater sounds produced by pile driving, including the number, location, distances, and depths of the hydrophones and associated monitoring equipment.

    - The monitoring plan will include a reporting schedule for daily summaries of the hydroacoustic monitoring results and for more comprehensive reports to be provided to the resource agencies on a monthly basis during the pile-driving season.

    - The daily reports will include the number of piles installed per day; the number of strikes per pile; the interval between strikes; the peak sound pressure level (SPL), SEL, and root mean square (RMS) per strike; and the accumulated SEL per day at each monitoring station.

    - The project proponent or their contractor will ensure that a qualified fish biologist is on site during impact pile driving to document any occurrences of stressed, injured, or dead fish. If stressed, injured, or dead fish are observed during pile driving, the project proponent or their contractor will stop work immediately to provide fish an opportunity to move out of the area. In addition, the project proponent will coordinate with Caltrans to immediately consult with NMFS to determine the cause of the incident and whether any and which type of additional protective measures are necessary. Protective measures that are determined necessary to protect listed fish species will be implemented by the project proponent within 72 hours of the incident.

Measure 8: Implement Cofferdam Restrictions

- The following restrictions will be implemented during installation of the cofferdams and cofferdam dewatering.
    - The extent of cofferdam footprints will be limited to the minimum necessary to support construction activities.
    - Sheet piles used for cofferdams will be installed and removed using a vibratory pile driver.
    - Cofferdams will be installed and removed only during the proposed in-water work window (between May 1 and November 30).
    - Cofferdams will not be left in place over winter where they could be overtopped by winter/spring flows and when juveniles of listed species are most likely to be present in the construction area.
    - All pumps used during dewatering of cofferdams will be screened according to CDFW and NMFS guidelines for pumps.
    - Cofferdam dewatering and fish rescue/relocation from within cofferdams will commence immediately following cofferdam closure to minimize the duration that fish are trapped in the cofferdam.

Measure 9: Prepare and Implement a Fish Relocation Plan

- The project proponent or their contractor will develop and implement a fish rescue and relocation plan to recover any fish trapped in cofferdams. The fish rescue and relocation plan will be submitted to NMFS for approval before initiating activities to install cofferdams. At a minimum, the plan will include the following:
    - A requirement that fish rescue and relocation activities will commence immediately after cofferdam closure and that dewatering has sufficiently lowered water levels inside the cofferdams to make it feasible to rescue fish.
    - A description of the methods and equipment proposed to collect, transfer, and release all fish found trapped within cofferdams. Capture methods may include seining, dip netting, and electrofishing, as approved by NMFS. The precise methods and equipment to be used will be developed cooperatively by NMFS and the project proponent or their contractor in advance of project implementation.
    - A requirement that only NMFS-approved fish biologists will conduct the fish rescue and relocation.
    - A requirement that fish biologists will contact NMFS immediately if any listed species are found dead or injured.

- A requirement that a fish rescue and relocation report be prepared and submitted to NMFS within 5 business days following completion of the fish relocation. Data will be provided in tabular form and at a minimum will include the species and number rescued and relocated, approximate size of each fish (or alternatively, approximate size range if a large number of individuals are encountered), date and time of their capture, and general condition of all live fish (*e.g.*, good–active with no injuries; fair–reduced activity with some superficial injuries; poor–difficulty swimming/orienting with major injuries). For dead fish, additional data will include fork length and description of injuries and/or possible cause of mortality if it can be determined.

Measure 10: Develop and Implement a Barge Operations Plan

- The project proponent or their contractor will develop and implement a barge operations plan. The barge operations plan will be submitted to NMFS for approval at least 60 days before the start of project activities. The plan will address the following:
    - Bottom scour from propeller wash.
    - Bank erosion or loss of submerged or emergent vegetation from propeller wash or excessive wake.
    - Accidental material spill.
    - Sediment and benthic community disturbance from accidental or intentional barge grounding or deployment of barge spuds (extendable shafts for temporarily maintaining barge position) or anchors.
    - Hazardous materials spills (*e.g.*, fuel, oil, and hydraulic fluids).
- The barge operations plan will serve as a guide to barge operations and to a biological monitor who will evaluate barge operations during construction with respect to stated performance measures. This plan, when approved by the resource agencies, will be read by barge operators and kept aboard all vessels operating at the construction site.

Measure 11: Prevent the Spread or Introduction of Aquatic Invasive Species

- The project proponent or their contractor will implement the following actions to prevent the potential spread or introduction of aquatic invasive species (AIS) associated with the operation of barges and other in-water construction activities. Species of concern related to the operation of barges and other equipment in the lower Sacramento River include invasive mussels (*e.g.*, quagga mussels [*Dreissena bugensis*] and zebra mussels [*Dreissena polymorpha*]) and aquatic plants (*e.g.*, Brazilian waterweed [*Egeria densa*] and hydrilla [*Hydrilla verticillata*]) (California Department of Fish and Game 2008).
    - Educate construction supervisors and managers about the importance of controlling and preventing the spread of AIS.

- Train vessel and equipment operators and maintenance personnel in the recognition and proper prevention, treatment, and disposal of AIS.
- Prior to departure of vessels from their place of origin, and before in-water construction equipment is allowed to operate within the waters of the Sacramento River, thoroughly inspect and remove and dispose of all dirt, mud, plant matter, and animals from all surfaces that are submerged or may become submerged, or places where water can be held and transferred to the surrounding water.

Measure 12: Minimize or Avoid Permanent Bridge Lighting from Directly Radiating on Water Surfaces of the Sacramento River

- Nighttime lighting of the bridge structure for aesthetic purposes will be minimized. The minimal amount of light necessary to safely and effectively illuminate vehicular, bicycle, and pedestrian traffic on the bridge will be used.

- Lights will be shielded and focused away from the water surface.

Measure 13: Compensate for Temporary Effects on and Permanent Loss of Riparian Forest (Including SRA Cover)

The project proponent will compensate for the permanent loss of up to 1.273 acres of riparian forest. In addition, any unavoidable temporary loss of riparian forest will be mitigated. The project proponent will implement onsite and, if necessary, offsite compensation measures and/or purchase mitigation bank credits to compensate for losses of cottonwood riparian forest on the waterside slope of the existing levees, including riparian forest supporting Shaded Riparian Aquatic (SRA) cover habitat. Onsite compensation will be used as conditions allow. Compliance with the USACE levee vegetation policy (U.S. Army Corps of Engineers 2014), the ULDC (California Department of Water Resources 2012), or other engineering constraints may limit the ability to achieve full onsite compensation. Therefore, offsite compensation and/or purchase of mitigation bank credits may be needed to achieve no net loss of existing in-kind riparian and SRA cover habitat values. Each of these options is discussed below.

1. Onsite and/or Offsite Restoration and Enhancement along the Sacramento River
   Riparian habitat restoration and/or enhancement onsite or offsite should occur in the same year construction is completed. For onsite or offsite replacement plantings, the project proponent will prepare a mitigation planting plan, including a species list and number of each species, planting locations, and maintenance requirements. Plantings will consist of cuttings taken from local plants or plants grown from local material. Planted species for the mitigation plantings will be similar to those removed from the project area and will include native species, such as Fremont's cottonwood, valley oak, black willow, boxelder, Oregon ash, and black walnut. The final planting plan will be developed based on results of the arborist survey for species to be removed plantings will be fitted with exclusion cages or other suitable protection from herbivory. Plantings will be irrigated for up to 3 years or until established. Plantings will be monitored annually for 3 years or as required in the project permits. If 75% of the plants survive at the end of the monitoring period, the revegetation will be considered successful. If the

survival criterion is not met at the end of the monitoring period, planting and monitoring will be repeated after mortality causes have been identified and corrected.

2. Mitigation Bank Credit Purchase
   If this option is chosen, the project proponent will provide written evidence to the resource agencies that compensation has been established through the purchase of mitigation credits. The amount to be paid will be the fee that is in effect at the time the fee is paid. Mitigation can be in the form of creation and/or preservation credits. If mitigation is in the form of restoration/creation credits, the mitigation will be at a minimum ratio of 1:1 (1 acre of restored or created riparian habitat for each acre of riparian habitat removed). If mitigation is in the form of preservation credits, the mitigation will be at a minimum ratio of 2:1 (2 acres of preserved riparian habitat for each acre of riparian habitat removed). The project proponent will purchase riparian habitat credits from an approved mitigation bank near the project, such as the Liberty Island Conservation Bank, Cosumnes Floodplain Mitigation Bank, Fremont Landing Conservation Bank, or other approved bank with available riparian forest credits at the time of project permitting.

In addition to mitigating the loss of riparian forest habitat, specific measures will be included to satisfy NMFS requirements and compensate for the loss of SRA cover (area and linear feet). The acreage will not be duplicated, such that the acreage of riparian forest habitat restored for SRA cover mitigation will apply toward riparian forest habitat mitigation requirements. SRA cover mitigation will include the following riparian replacement requirements:

- Replace the permanent loss of 302 linear feet and up to 0.368 acre of affected SRA cover vegetation at a 3:1 replacement ratio (*i.e.*, 3 linear feet replaced for every 1 foot affected and 3 acres replaced for every 1 acre affected) by planting native riparian trees in temporary impact areas and along existing onsite or offsite unshaded banks along the Sacramento River.

- Plant native riparian trees onsite to the maximum extent practicable, followed by planting on adjacent reaches of the Sacramento River.

- Plant riparian trees that are intended to provide SRA cover along the water's edge at summer low flows up to the OHWM and at sufficient densities to provide shade along at least 85% of the bank's length when the trees reach maturity. This will ensure that riparian plantings intended for SRA cover mitigation will contribute to instream SRA cover when they are inundated during winter/spring flows and overhead cover (shade) during summer flows when they approach maturity.

- Monitor and evaluate the revegetation success of riparian plantings intended for SRA cover mitigation as described above (3 years of monitoring).

- If mitigation for SRA cover is in the form of offsite mitigation bank credits, credits will need to be purchased from an approved mitigation bank within the approved service area for the project that provides riparian forest floodplain conservation credits as offsite compensation for impacts on state- and federally listed fish species, designated critical habitat, and EFH for Pacific salmon.

Measure 14: Purchase Channel Enhancement Credits for Impacts on Critical Habitat

- Permanent impacts on critical habitat (bank and substrate below the OHWM and water column habitat), totaling 1.87 acres (up to 57,600 square feet [1.32 acre] from bridge shading of aquatic habitat and new bridge piers; 24,126 square feet [0.55 acre] from RSP; and 84 square feet (0.002 acre) from bridge fender system) will be mitigated at a 3:1 ratio, totaling 5.61 acres.

- The project proponent proposes to mitigate the permanent loss of critical habitat for listed fish species through purchase of 5.61 acres of mitigation credits at a NMFS-approved anadromous fish bank.

Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. See Table 2 for species and Table 3 for critical habitat information.

Table 2. Description of species, current Endangered Species Act (ESA) listing classifications, and summary of species status.

Species	Listing Classification and Federal Register Notice	Status Summary
Sacramento River winter-run Chinook salmon ESU	Endangered, 70 FR 37160; June 28, 2005	According to the NMFS 5-year species status review (NMFS 2016c), the status of the winter-run Chinook salmon ESU, the extinction risk has increased from moderate risk to high risk of extinction since the 2007 and 2010 assessments. Based on the Lindley *et al.* (2007) criteria, the population is at high extinction risk in 2019. High extinction risk for the population was triggered by the hatchery influence criterion, with a mean of 66 percent hatchery origin spawners from 2016 through 2018. Several listing factors have contributed to the recent decline, including drought, poor ocean conditions, and hatchery influence. Thus, large-scale fish passage and habitat restoration actions are necessary for improving the winter-run Chinook salmon ESU viability.
Central Valley spring-run Chinook salmon ESU	Threatened, 70 FR 37160; June 28, 2005	According to the NMFS 5-year species status review (NMFS 2016b), the status of the CV spring-run Chinook salmon ESU, until 2015, has improved since the 2010 5-year species status review. The improved status is due to extensive restoration, and increases in spatial structure with historically extirpated populations (Battle and Clear creeks) trending in the positive direction. Recent declines of many of the dependent populations, high pre-spawn and egg mortality during the 2012 to 2016 drought, uncertain juvenile survival during the drought are likely increasing the ESU's extinction risk. Monitoring data showed sharp declines in adult returns from 2014 through 2018 (CDFW 2018).

Species	Listing Classification and Federal Register Notice	Status Summary
California Central Valley steelhead DPS	Threatened, 71 FR 834; January 5, 2006	According to the NMFS 5-year species status review (NMFS 2016a), the status of CCV steelhead appears to have remained unchanged since the 2011 status review that concluded that the DPS was in danger of becoming endangered. Most natural-origin CCV populations are very small, are not monitored, and may lack the resiliency to persist for protracted periods if subjected to additional stressors, particularly widespread stressors such as climate change. The genetic diversity of CCV steelhead has likely been impacted by low population sizes and high numbers of hatchery fish relative to natural-origin fish. The life-history diversity of the DPS is mostly unknown, as very few studies have been published on traits such as age structure, size at age, or growth rates in CCV steelhead.
Southern DPS of North American green sturgeon	Threatened, 71 FR 17757; April 7, 2006	According to the NMFS 5-year species status review (NMFS 2015) and the 2018 final recovery plan (NMFS 2018b), some threats to the species have recently been eliminated, such as take from commercial fisheries and removal of some passage barriers. Also, several habitat restoration actions have occurred in the Sacramento River Basin, and spawning was documented on the Feather River. However, the species viability continues to face a moderate risk of extinction because many threats have not been addressed, and the majority of spawning occurs in a single reach of the main stem Sacramento River. Current threats include poaching and habitat degradation. A recent method has been developed to estimate the annual spawning run and population size in the upper Sacramento River so species can be evaluated relative to recovery criteria (Mora *et al.* 2018).

Table 3. Description of critical habitat, listing, and status summary.

Critical Habitat	Designation Date and Federal Register Notice	Description
Sacramento River winter-run Chinook salmon ESU	June 16, 1993; 58 FR 33212	Designated critical habitat includes the Sacramento River from Keswick Dam (river mile (RM) 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta (Delta); all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge. The designation includes the river water, river bottom and adjacent riparian zones used by fry and juveniles for rearing. PBFs considered essential to the conservation of the species include: Access from the Pacific Ocean to spawning areas; availability of clean gravel for spawning substrate; adequate river flows for successful spawning, Incubation of eggs, fry development and emergence, and downstream transport of juveniles; water temperatures at 5.8–14.1°C (42.5–57.5°F) for successful spawning, egg incubation, and fry development; riparian and floodplain habitat that provides for successful juvenile development and survival; and access to downstream areas so that juveniles can migrate from spawning grounds to the San Francisco Bay and the Pacific Ocean. Although the current conditions of PBFs for SR winter-run critical habitat in the Sacramento River are significantly limited and degraded, the habitat remaining is considered highly valuable.

Critical Habitat	Designation Date and Federal Register Notice	Description
Central Valley spring-run Chinook salmon ESU	September 2, 2005; 70 FR 52488	Critical habitat for CV spring-run Chinook salmon includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. PBFs considered essential to the conservation of the species include: Spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CV spring-run Chinook salmon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.
California Central Valley steelhead DPS	September 2, 2005; 70 FR 52488	Critical habitat for CCV steelhead includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. PBFs considered essential to the conservation of the species include: Spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CCV steelhead critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

Critical Habitat	Designation Date and Federal Register Notice	Description
Southern DPS of North American green sturgeon	October 9, 2009; 74 FR 52300	Critical habitat includes the stream channels and waterways in the Delta to the ordinary high water line. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Yuba River upstream to Daguerre Dam. Critical habitat in coastal marine areas include waters out to a depth of 60 fathoms, from Monterey Bay in California, to the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are included as critical habitat for sDPS green sturgeon. PBFs considered essential to the conservation of the species for freshwater and estuarine habitats include: food resources, substrate type or size, water flow, water quality, migration corridor; water depth, sediment quality. In addition, PBFs include migratory corridor, water quality, and food resources in nearshore coastal marine areas. Although the current conditions of PBFs for sDPS green sturgeon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

2.2.1. Recovery Plans

In July 2014, NMFS released a final Recovery Plan for Sacramento River (SR) winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead (NMFS 2014, Recovery Plan). The Recovery Plan outlines actions to restore habitat and access, and improve water quality and quantity conditions in the Sacramento River to promote the recovery of listed salmonids. Key recovery actions in the Recovery Plan include conducting landscape-scale restoration throughout the Delta, incorporating ecosystem restoration into Central Valley flood control plans that includes breaching and setting back levees, and restoring flows throughout the Sacramento and San Joaquin River basins and the Delta. In August 2018, NMFS released a final Recovery Plan for the sDPS green sturgeon (NMFS 2018), which focuses on fish screening and passage projects, floodplain and river restoration, and riparian habitat protection in the

Sacramento River Basin, the Delta, San Francisco Estuary, and nearshore coastal marine environment as strategies for recovery.

2.2.2. Global Climate Change

One major factor affecting the rangewide status of the threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change. Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen *et al.* 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). Projected warming is expected to affect Central Valley Chinook salmon. Because the runs are restricted to low elevations as a result of impassable rim dams, if climate warms by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006).

For winter-run Chinook salmon, the embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, so this run is particularly at risk from climate warming. Spring-run Chinook salmon adults are vulnerable to climate change because they over-summer in freshwater streams before spawning in autumn (Thompson *et al.* 2011). Spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia (usually input from springs) will be more susceptible to impacts of climate change. Although steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 14°C to 19°C (57°F to 66°F). The Anderson Cottonwood Irrigation Dam (ACID) is considered the upriver extent of green sturgeon passage in the Sacramento River. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperature is higher than ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected.

In summary, observed and predicted climate change effects are generally detrimental to the species (McClure 2011, Wade *et al.* 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure *et al.* 2013).

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

In general, the project limits start in West Sacramento, along 15th Street at Jefferson Boulevard, continuing east and over the Sacramento River into the City of Sacramento along Broadway to the 5th Street intersection. The project limits also extend along the following roads: Jefferson Boulevard (approximately 1,300 feet south of the 15th Street intersection to Alameda Boulevard), South River Road (approximately 1,300 feet south and 650 feet north of 15th Street), Marina View Drive (approximately 400 feet south of Broadway), Front Street (approximately 350 feet north and south of Broadway), 3rd Street (approximately 350 feet north of Broadway to X Street), and 5th Street (approximately 200 feet north and south of Broadway). The project limits include proposed improvements to the northbound Interstate 5 (I-5) off-ramp to Broadway. Within these limits, the action area includes portions of the Sacramento River within the OHWM that are used by SR winter run Chinook salmon, CCV steelhead, CV spring-run Chinook salmon, and sDPS green sturgeon where these fish could potentially be exposed to construction-related effects, including changes in water turbidity, sedimentation, near-shore impacts to riparian habitat, the acoustic sounds of pile driving within the water column and the area of potential fish relocation actions.

The action area includes areas both upstream and downstream from pile-driving activity in which pile-driving noise may have a physical or behavioral effect on listed species. Based on an analysis of sound expected to be generated the cumulative sound exposure level (SEL) interim criteria of 183 decibels (dB) could be exceeded for a distance of up to 7,067 feet (2,154 meters) upstream and downstream from the source pile. Although noise levels could exceed background levels beyond that point, a distance to any lesser threshold (*i.e.*, 150 dB root mean square, which is used as a behavioral threshold) cannot be realistically predicted because of the physical geography of the river. The Sacramento River has river channel bends, and the straight-line distance of open water is 6,000 feet upstream and 1,900 feet downstream of the proposed bridge crossing. Therefore, to account for the diffraction and attenuation of sound levels beyond the major river bends upstream and downstream from the proposed bridge crossing, the action area for this project is defined as the entire width of the Sacramento River channel and extending 2,000 feet beyond the straight-line, open-water distances (*i.e.*, a buffer) upstream and downstream of the proposed bridge, or 8,000 feet upstream and 3,900 feet downstream from the proposed bridge crossing (*i.e.*, from approximately river mile [RM] 57 to approximately RM 59.5).

Since the proposed action includes the purchase of mitigation credits from a conservation bank, the action area also includes the areas affected by mitigation banks that have service areas relevant to the Project areas. These include the Fremont Landing Conservation Bank, which is a 100-acre site along the Sacramento River; Bullock Bend Mitigation Bank, which is a 116.15-acre site along the Sacramento River; Liberty Island Conservation Bank, which is a 186-acre site located at the southern end of the Yolo Bypass on Liberty Island in the Delta; and the North Delta Fish Conservation Bank, which is an 811-acre site located in Yolo County in the Delta.

2.4. Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the

anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

The action area consists of the Sacramento River and riparian forest along the Sacramento River. The Sacramento River within the action area has a relatively high level of historical and ongoing disturbance. Despite the historical and ongoing disturbance, the action area supports numerous listed species, including SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, sDPS green sturgeon. The action area is within designated critical habitat for all of the above listed species. Due to the life history timing of these species, it is possible for one or more of the following life stages to be present within the action area throughout the year: adult migrants, rearing juveniles, or emigrating juveniles.

2.4.1. Hydrology

The Sacramento River has undergone many changes from its historical condition. The magnitude and duration of peak flows during the winter and spring, which affect listed salmonids and sturgeon in the action area, are reduced by water impoundment in upstream reservoirs. Instream flows during the summer and early fall months have increased over historic levels for deliveries of municipal and agricultural water supplies. Overall, water management now reduces natural variability by creating more uniform flows year-round. Current flood control practices require peak flood discharges to be held back and released over a period of weeks to avoid overwhelming the flood control structures downstream of the reservoirs (*i.e.*, levees) and low lying terraces under cultivation (*i.e.*, orchards and row crops) in the natural floodplain along the basins' tributaries. Consequently, managed flows in the main stem of the rivers often truncate the peak of the flood hydrograph and extend the reservoir releases over a protracted period. These actions reduce or eliminate the scouring flows necessary to mobilize sediments and create natural riverine morphological features. Furthermore, the unimpeded river flow is severely reduced by the combined storage capacity of the different reservoirs located throughout the watershed. Very little of the natural hydrologic input is allowed to flow through the reservoirs to the valley floor sections of the tributaries leading to the Delta. Most is either stored or diverted for anthropogenic uses.

2.4.2. Water Quality

The main sources of water in the Sacramento River below Keswick Dam are rain and snowmelt that collect in upstream reservoirs and are released in response to water needs or flood control. The quality of surface water in the Sacramento River within the action area is also influenced by other human activities along the downstream of the dam, including historical mining, agricultural, and municipal and industrial activities.

The quality of water in the Sacramento River is relatively good; only during conditions of stormwater-driven runoff are water quality objectives typically not met (Domagalski *et al.* 2000). Water quality issues within the Sacramento River include the presence of mercury, pesticides

such as organochlorine, trace metals, turbidity, and toxicity from unknown origin (CALFED 2000). Point sources and non-point sources of pollution resulting from agricultural discharge and urban and industrial development occur upstream of the action area. Environmental stresses resulting from low water quality can lower reproductive success and may account for low productivity rates in fish. Organic contaminants from agricultural drain water, urban and agricultural runoff from storm events, and high trace element (*i.e.*, heavy metals) concentrations may deleteriously affect early life-stage survival of fish in the Central Valley watersheds (USFWS 2015).

2.4.3. Predation

Sacramento pikeminnow and striped bass congregate in RSP and overwater structure along the Sacramento River and prey on juvenile salmon. The Sacramento pikeminnow is a species native to the Sacramento River basin and has co-evolved with the anadromous salmonids in this system. However, rearing conditions in the Sacramento River today (*e.g.*, warm water, low-irregular flow, standing water, and water diversions) compared to its natural state and function decades ago in the pre-dam era, are more conducive to warm water species, such as Sacramento pikeminnow and striped bass than to native salmonids. Tucker *et al.* (1998) reported that predation during the summer months by Sacramento pikeminnow on juvenile salmonids increased to 66 percent of the total weight of stomach contents in the predatory pikeminnow.

2.4.4. Fisheries and Aquatic Habitat

The mainstem Sacramento River is an important migration corridor for adult and juvenile SR winter-run Chinook salmon, CV spring-run Chinook salmon and CCV steelhead. Green sturgeon utilize the upper Sacramento River as a migratory corridor, as well as for spawning and juvenile rearing. Shasta and Keswick Dams have presented impassable barriers to anadromous fish since 1944 (Billington *et al.* 2005). ACID Dam and RBDD presented partial barriers to salmonid migration until improvements were made in 2001 and 2012 (NMFS 2009, 2014a), respectively, although ACID Dam continues to present an impassable barrier to green sturgeon (NMFS 2009).

2.4.4.1. SR winter-run Chinook salmon

The distribution of SR winter-run Chinook salmon spawning and rearing is currently limited to the upper Sacramento River, with managed flows out of Shasta Dam. Approximately 299 miles of tributary spawning habitat in the upper Sacramento River above the dams is now inaccessible to SR winter-run Chinook salmon (NMFS 2014). The proportion of the SR winter-run Chinook salmon spawning above ACID has increased since the ladder improvements in 2001 (CDFW 2014 unpublished aerial redd counts). Data on the temporal distribution of SR winter-run Chinook salmon upstream migration suggest that in wet years about 50 percent of the run has passed the RBDD by March, and in dry years, migration is typically earlier, with about 72 percent of the run having passed the RBDD by March (Poytress *et al.* 2014). The upper Sacramento River contains the only remaining habitat that is currently used by spawning SR winter-run Chinook salmon. As reported by NMFS (2014a), historical SR winter-run Chinook salmon population estimates were as high as over 230,000 adults in 1969, but declined to under 200 fish in the 1990s (Good *et al.* 2005). A rapid decline occurred from 1969 to 1979 after completion of the RBDD. Over the next 20 years, the population eventually reached a low point

of only 186 adults in 1994. At that point, SR winter-run Chinook salmon were at a high risk of extinction, as defined by Lindley *et al.* (2007). However, several conservation actions, including a very successful conservation hatchery and captive broodstock program at Livingston Stone National Fish Hatchery (LSNFH), construction of a temperature control device (TCD) on Shasta Dam, maintaining the RBDD gates up, and restrictions in ocean harvest, have likely prevented the extinction of natural-origin SR winter-run Chinook salmon. LSNFH, which is located at the base of Keswick Dam, annually supplements the in-river production by releasing on average 180,000 SR winter-run Chinook salmon smolts into the upper Sacramento River. The LSNFH operates under strict guidelines for propagation that include genetic testing of each pair of adults and spawning no more than 10 percent of the hatchery returns. This program and the captive broodstock program were instrumental in stabilizing the SR winter-run Chinook salmon population following very low returns in the 1990s.

Since carcass surveys began in 2001, the highest adult escapement occurred in 2005 and 2006 with 15,839 and 17,296, respectively. Since 2007 SR winter-run Chinook salmon have declined in abundance with a low of 827 spawning adults in 2011 (NMFS 2016c). As reported in the most recent 5-year status review (NMFS 2016c), the 10-year trend in run size is -0.15, which suggests an annual 15% population decline. This declining trend is likely due to a combination of factors, such as poor ocean productivity (Lindley *et al.* 2009), drought conditions from 2007 to 2009 and 2012 to 2015, and low in-river survival (NMFS 2016c).

The 2012 to 2015 drought increased water temperatures in the upper Sacramento River. This caused significantly higher mortality (95-97%) in the upper spawning area. Due to the lower-than-average survival in the drought, hatchery production from the LSNFH conservation program was increased to offset the impact on the naturally spawning fish. Adult SR winter-run Chinook salmon returns in 2016 to 2018 were low, as expected, due to poor in-river conditions for juveniles from brood years 2013-2015 during drought years. The 2018 adult SR winter-run Chinook salmon escapement estimate (2,458) improved from 2017 (1,155), though was similarly dominated by hatchery-origin fish. An estimated 85 percent of the adult SR winter-run Chinook salmon spawners in 2017 were hatchery-origin fish from LSNFH (K. Offill, USFWS, Red Bluff, CA, unpublished data), evidence that the emergency measures enacted at LSNFH were successful at avoiding a complete year-class failure and substantially benefited the abundance of spawners in 2017.

2.4.4.2. CV spring-run Chinook salmon

The mainstem of the Sacramento River serves as a primary upstream and downstream migratory corridor for CV spring-run Chinook salmon populations in Butte, Clear, Battle, and Cottonwood Creeks. Within the mainstem Sacramento River, the CV spring-run Chinook salmon population appears to have declined from a high of 25,000 in the 1970s to an average low of less than 800 counted at RBDD beginning in 1991. Significant hybridization with fall-run has made identification of a CV spring-run Chinook salmon population in the mainstem very difficult to determine, and there is speculation as to whether a true CV spring-run Chinook salmon population still exists below Keswick Dam within the mainstem of the Sacramento River.

This shift may have been an artifact of the manner in which CV spring-run Chinook salmon were identified at RBDD. More recently, fewer CV spring-run Chinook salmon were counted at

RBDD because an arbitrary date, September 1, was used to determine CV spring-run Chinook salmon, and, beginning in 2012, gates are open year-round (NMFS 2014). The extent of non-hybridized CV spring-run Chinook salmon spawning in the Sacramento River mainstem is unknown. However, the physical habitat conditions below Keswick Dam are capable of supporting CV spring-run Chinook salmon, although in some years high water temperatures can result in substantial levels of egg mortality.

Recent redd surveys (2001-2014) have observed an average of 41 salmon redds in September, from Keswick Dam downstream to the RBDD, ranging from zero to 105 redds (CDFG, unpublished data, 2015). This is typically when CV spring-run Chinook salmon spawn, however, there is no peak that can be separated out from fall-run spawning, so these redds also could be early spawning fall-run. Additionally, even though habitat conditions may be suitable for CV spring-run Chinook salmon occupancy, CV spring-run Chinook salmon depend on spatial segregation and geographic isolation from fall-run Chinook salmon to maintain genetic diversity. With the onset of fall-run Chinook salmon spawning occurring at the same time and place as potential CV spring-run Chinook salmon spawning, it is likely to have caused extensive introgression between the populations (CDFW 1998).

2.4.4.3. CCV steelhead

CCV steelhead are well distributed throughout the Central Valley below the major rim dams (Good *et al*. 2005). The mainstem of the Sacramento River serves as a primary migratory corridor for both upstream and downstream migration for all Sacramento River Basin populations, connecting spawning habitat within the Sacramento River and tributaries to the San Francisco Bay estuary and the Pacific Ocean. Adults can be found in the mainstem Sacramento River primarily during the fall and winter seasons, while juveniles occupy the river year-round. Juvenile rearing tends to occur in areas with cool, clear fast-moving water where riffle habitat is predominant over pool habitat (Moyle 2002). Therefore, it is more likely that juveniles found within the action area will be migrating rather than rearing.

United States Fish and Wildlife Service (USFWS) staff operate a weir on Battle Creek that controls all upstream fish movement and steelhead counts at this weir provide a decent data source for CCV steelhead (NMFS 2016a). In the two years prior to the 2016 5-year status review, steelhead returns averaged 2,895 fish (NMFS 2016a). Many of these fish are hatchery-origin fish, but the numbers of wild adults remained relatively steady from 2003 to 2014 with about 200-300 fish each year (NMFS 2016a).

Estimates of adult CCV steelhead abundance in the mainstem Sacramento River historically used the RBDD counts for historical trend data. Due to changes in dam operations, counts stopped being collected at RBDD in 1993 (NMFS 2016a). Actual estimates of CCV steelhead spawning in the mainstem Sacramento River below Keswick Dam have never been made due to high flows and poor visibility during the wintertime.

2.4.4.4. sDPS green sturgeon

The upper mainstem Sacramento River is the only area where consistent annual spawning by sDPS green sturgeon has been confirmed via the presence of eggs and larvae (Poytress *et al.*

2015). A migratory corridor is needed for returning adults to access spawning habitat upstream of the action area. The mainstem Sacramento River serves as spawning habitat, juvenile rearing habitat, and as a primary migration corridor for the sDPS of green sturgeon. There is insufficient information available on how long juveniles rear in the mainstem Sacramento River, but it is likely that at least some juvenile rearing occurs in the river prior to their entry into the Delta. Therefore, the exact mechanisms of habitat utilization by juveniles within the action area is unknown, but we do expect subadult green sturgeon could be present in the action area year-round.

In June and July of 2010-2015, Mora *et al.* (2018) estimated that there were between 1,246 and 2,966 sDPS green sturgeon in the reproductive portion of the population. Approximately 45 percent on average (141 fish) of green sturgeon distribution and abundance in the Sacramento River from 2010 to 2014 were observed above RBDD (Mora). Although observations of green sturgeon have been found as far upstream as near the mouth of Cow Creek (RM 280), spawning occurring above RBDD has only been documented as far upstream as the confluence with Ink's Creek (RM 265), and is mostly concentrated in the mid-April to mid-June time period (Poytress *et al.* 2014). Other confirmed spawning sites are at the mouth of Payne's Creek (RM 267), and at the RBDD. Since 2002, rotary screw trap monitoring of juveniles fish passing RBDD has incidentally captured juvenile green sturgeon between May and the end of August, but numbers have been highly variable, with a median of 193 fish (Poytress *et al.* 2014).

2.4.4.5. Status of Critical Habitat

The action area is within designated critical habitat for winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead and green sturgeon. Habitat requirements for Chinook salmon and steelhead are similar. The PBFs of salmonid habitat within the action area include freshwater rearing habitat and freshwater migration corridors. The essential features of these PBFs include adequate substrate, water quality, water quantity, water temperature, water velocity, shelter, food, riparian vegetation, space, and safe passage conditions. The intended conservation roles of habitat in the action area are to provide appropriate freshwater migration conditions for juveniles and unimpeded freshwater migration conditions for adults. Similarly green sturgeon PBFs within the action area include: food resources, substrate type or size, water flow, water quality, migratory corridor free of passage impediments, depth (holding pools) and sediment quality. Currently, many of the PBFs of sDPS green sturgeon are degraded and provide limited high-quality habitat. Additional features that lessen the quality of migratory corridors for juveniles include unscreened or inadequately screened diversions, altered flows, and presence of contaminants in sediment. Although the current conditions of listed salmonid and green sturgeon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain in both the Sacramento/San Joaquin River watersheds, the Delta, and nearshore coastal areas are considered to have high intrinsic value for the conservation of the species. The action area is outside of spawning habitat for salmonids and sturgeon.

2.4.5. Climate Change

One major factor affecting threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change. Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen *et*

al. 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). An altered seasonality results in runoff events occurring earlier in the year due to a shift in precipitation falling as rain rather than snow (Roos 1991, Dettinger *et al.* 2004). Specifically, the Sacramento River basin annual runoff amount for April-July has been decreasing since about 1950 (Roos 1987, Roos 1991). Increased temperatures influence the timing and magnitude patterns of the hydrograph.

Projected warming is expected to affect Central Valley Chinook salmon. Because the runs are restricted to low elevations as a result of impassable rim dams, if temperatures rise by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006). Based on an analysis of an ensemble of climate models and emission scenarios and a reference temperature from 1951- 1980, the most plausible projection for warming over Northern California is 2.5°C (4.5°F) by 2050 and 5°C by 2100, with a modest decrease in precipitation (Dettinger 2005). Chinook salmon in the Central Valley are at the southern limit of their range, and warming will shorten the period in which the low-elevation habitats used by naturally producing fall-run Chinook salmon are thermally acceptable. This would particularly affect fish that emigrate as fingerlings, mainly in May and June, and especially those in the San Joaquin River and its tributaries.

For SR winter-run Chinook salmon, the embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, so this run is particularly at risk from climate warming. The only remaining population of SR winter-run Chinook salmon relies on the cold water pool in Shasta Reservoir, which buffers the effects of warm temperatures in most years. The exception occurs during drought years, which are predicted to occur more often with climate change (Yates *et al.* 2008). Additionally, air temperature appears to be increasing at a greater rate than what was previously analyzed (Lindley 2008, Beechie *et al.* 2012, and Dimacali 2013). These factors will compromise the quantity and/or quality of SR winter-run Chinook salmon habitat available downstream of Keswick Dam. It is imperative for additional populations of SR winter-run Chinook salmon to be re-established into historical habitat in Battle Creek and above Shasta Dam for long-term viability of the ESU (NMFS 2014).

CV spring-run Chinook salmon adults are vulnerable to climate change, because they over-summer in freshwater streams before spawning in autumn (Thompson *et al.* 2011). CV spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia, usually provided by springs, will be more susceptible to impacts of climate change. In years of extended drought and warming water temperatures, unsuitable conditions may occur even in tributaries with cool water springs. Additionally, juveniles often rear in the natal stream for one to two summers prior to emigrating and would be susceptible to warming water temperatures. In Butte Creek, fish are limited to low elevation habitat that is currently thermally marginal, as demonstrated by high summer mortality of adults in 2002 and 2003, and will become intolerable within decades if the climate warms as expected. Ceasing water diversion for power production from the summer holding reach in Butte Creek resulted in cooler water temperatures, more adults surviving to spawn, and extended population survival time (Mosser *et al.* 2013).

Although steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects

may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 14°C to 19°C (57°F to 66°F). Several studies have found that steelhead require colder water temperatures for spawning and embryo incubation than salmon (McCullough *et al*. 2001). In fact, McCullough *et al.* (2001) recommended an optimal incubation temperature at or below 11°C to 13°C (52°F to 55°F). Successful smoltification in steelhead may be impaired by temperatures above 12°C (54°F), as reported in Richter and Kolmes (2005). As stream temperatures warm due to climate change, the growth rates of juvenile steelhead could increase in some systems that are currently relatively cold, but potentially at the expense of decreased survival due to higher metabolic demands and greater presence and activity of predators. Stream temperatures that are currently marginal for spawning and rearing may become too warm to support wild CCV steelhead populations.

The sDPS green sturgeon spawn primarily in the Sacramento River in the spring and summer. ACID is considered the upriver extent of green sturgeon passage in the Sacramento River. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperatures are higher than at ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected. It is uncertain, however, if green sturgeon spawning habitat exists closer to ACID, which could allow spawning to shift upstream in response to climate change effects. Successful spawning of green sturgeon in other accessible habitats in the Central Valley (*i.e.*, the Feather River) is limited, in part, by late spring and summer water temperatures. Similar to salmonids in the Central Valley, green sturgeon spawning in the major lower river tributaries to the Sacramento River are likely to be further limited if water temperatures increase and suitable spawning habitat remains inaccessible.

In summary, observed and predicted climate change effects are generally detrimental to the species (McClure 2011, Wade *et al.* 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure *et al.* 2013).

2.4.6. Species Survival and Recovery in the Action Area

The action area is located along the Sacramento River, which is utilized by all populations of juvenile and adult listed fish in the Sacramento River Basin, as a migratory corridor. The Recovery Plan identifies the mainstem Sacramento River as being of value to the recovery of listed salmonids. The mainstem Sacramento River is identified as a core 1 population for SR winter-run Chinook salmon, a core 2 population for CV spring-run Chinook salmon, and a core 2 population for CCV steelhead (NMFS 2014). Core 1 populations have a known ability or potential to support independent viable populations (NMFS 2014). Core 1 populations form the foundation of the recovery strategy and must meet the population-level biological recovery criteria for low risk of extinction, as described in the Recovery Plan (NMFS 2014). Core 2 populations are assumed to have the potential to meet the moderate risk of extinction criteria.

Core 2 populations are of secondary importance for recovery efforts. Mainstem Sacramento River recovery actions relevant to the action area include: restoring and maintaining riparian and floodplain ecosystems along both banks of the Sacramento River; ensuring that river bank stabilization projects along the Sacramento River utilize bio-technical techniques that restore riparian habitat, rather than solely using conventional RSP techniques; and improving instream refuge cover for salmonids to minimize predatory opportunities for striped bass and other non-native predators. Although current conditions within the Sacramento River are significantly degraded, this area has high intrinsic value for the recovery of these species, especially because all listed salmonid population groups within the Sacramento River Basin utilize the mainstem at varying life stages.

The upper Sacramento River is the only known spawning habitat continuously used by sDPS green sturgeon. Adults must migrate through the mainstem Sacramento to reach spawning habitat and rearing juveniles may be present year round. Restoring habitat below Keswick Dam is a priority recovery action; suitable spawning and rearing habitat downstream of Keswick is needed (NMFS 2018).The NMFS Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon (NMFS 2018) focuses on recovery actions in the Sacramento River as threats to rearing habitat are considered one of the greatest impediments to recovery. Non-point source contaminants are designated a high threat for green sturgeon in the Sacramento River; these contaminants can directly affect fish through reduced fitness or indirectly via reduction of prey base. Continued implementation of BMPs is important to maintain conditions within the Sacramento River, although the current conditions are degraded there is high intrinsic value for green sturgeon which utilize the Sacramento River both as rearing juveniles and migrating adults.

2.4.7. Mitigation Banks and the Environmental Baseline

Mitigation banks present a unique factual situation, and this warrants a particular approach to how they are addressed. Specifically, when NMFS is consulting on a proposed action that includes mitigation bank credit purchases, it is likely that physical restoration work at the bank site has already occurred and/or that a section 7 consultation occurred at the time of bank establishment. A traditional reading of "environmental baseline" might suggest that the overall ecological benefits of the mitigation bank actions therefore belong in the environmental baseline. However, under this reading, all proposed actions, whether or not they included proposed credit purchases, would benefit from the environmental 'lift' of the entire mitigation bank because it would be factored into the environmental baseline. In addition, where proposed actions did include credit purchases, it would not be possible to attribute their benefits to the proposed action, without double counting. These consequences undermine the purposes of mitigation banks and do not reflect their unique circumstances. Specifically, mitigation banks are established based on the expectation of future credit purchases. In addition, credit purchases as part of a proposed action will also be the subject of a future section 7 consultation.

It is therefore appropriate to treat the beneficial effects of the bank as accruing incrementally at the time of specific credit purchases, not at the time of bank establishment or at the time of bank restoration work. Thus, for all projects within the service area of a bank, only the benefits attributable to credits sold are relevant to the environmental baseline. Where a proposed action

includes credit purchases, the benefits attributable to those credit purchases are considered effects of the action. That approach is taken in this opinion.

The Project occurs within the service area of four banks approved by NMFS, with available credits for purchase or which are anticipated to have available credits for purchase prior to construction under the proposed action:

Bullock Bend Mitigation Bank: Established in 2016, the Bullock Bend Mitigation Bank is a 119.65-acre floodplain site along the Sacramento River at the confluence of the Feather River (Sacramento River Mile 106) and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CCV steelhead. There are salmonid floodplain restoration, salmonid floodplain enhancement and salmonid riparian forest credits available. All features of this bank are designated critical habitat for the species analyzed in this opinion. The ecological value (increased rearing habitat for juvenile salmonids) of the credits that have been sold to date is part of the environmental baseline.

Fremont Landing Conservation Bank: Established in 2006, the Fremont Landing Conservation Bank is 100-acre floodplain site along the Sacramento River at the confluence of the Feather River (Sacramento River Mile 80) and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CCV steelhead. There are off-channel shaded aquatic habitat credits, riverine shaded aquatic habitat credits and floodplain credits available. All features of this bank are designated critical habitat for the species analyzed in this opinion. The ecological value (increased rearing habitat for juvenile salmonids) of the credits that have been sold to date is part of the environmental baseline.

Liberty Island Conservation Bank: Established in 2010, the Liberty Island Conservation Bank is a 186-acre site located at the southern end of the Yolo Bypass on Liberty Island in the Delta. It is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead. There are riparian shaded aquatic, salmonid preservation and salmonid restoration credits available. All features of this bank are designated critical habitat for the species analyzed in this opinion. The ecological value (increased rearing habitat for juvenile salmonids) of the credits that have been sold to date is part of the environmental baseline.

North Delta Fish Conservation Bank: Established in 2013, North Delta Fish Conservation Bank is an 811-acre site located in Yolo County and is approved by NMFS to provide credits for impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CCV steelhead. There are salmonid preservation and salmonid enhanced and created credits that are anticipated to be available prior to construction under the proposed action. All features of this bank are designated critical habitat for the species analyzed in this opinion.

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are

caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

The Proposed Action includes activities that are likely to adversely affect Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, green sturgeon, and their associated critical habitats. The following is an analysis of the potential effects to the species and their critical habitat that may occur as a result of the implementation of this project.

2.5.1. Effects to Species

The proposed Project includes actions that may adversely affect several life stages of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon. Adverse effects to these species and their habitat may result from changes in water quality from bridge construction, noise exposure associated with construction, potential handling of fish from dewatering operations, and habitat loss. The project includes integrated design features to avoid and minimize many of these potential impacts.

Species Exposure

Restriction of in-water activities to May 1 to November 30 would avoid the primary migration and rearing periods of SR winter-run Chinook salmon in the Sacramento River and would minimize the overlap of in-water activities with the adult and juvenile migration seasons for CV spring-run and sDPS green sturgeon. Juvenile CV spring-run Chinook salmon may be present in the action area in May. Adult migrating CV spring-run Chinook salmon and sDPS green sturgeon may occur in the action area May-July. Juvenile sDPS green sturgeon and adult and juvenile CCV steelhead may occur in the action area year-round. Based on the general timing of occurrence of listed fish in the action area, the potential for exposure for most life stages would occur in May to mid-August, October, and November when in-water activities with the greatest potential to cause physical injury would occur. However, most listed fish that are likely to be present in the action area during in water construction activities are likely migrating adults and juveniles that would be expected to avoid or move away from active construction areas.

Noise Exposure

Pile Driving

Construction of the Broadway Bridge will require the use of both vibratory and impact pile driving to install steel pipes for temporary trestles, temporary cofferdams and permanent steel/concrete piles and steel casings for the new bridge. All pile driving will occur during the in-water work period of May 1-November 30 for two seasons.

Pile driving near or in water has the potential to kill, injure, and cause delayed death to fish through infection of minute internal injuries, or cause sensory impairments leading to increased susceptibility to predation. The pressure waves generated from driving piles into river bed

substrate propagate through the water and can damage a fish's swim bladder and other internal organs by causing sudden rapid oscillations in pressure, which translates to rupturing or hemorrhaging tissue in the bladder when the air in swim bladders expand and contract (Gisiner 1998, Popper *et al.* 2006). Sensory cells and other internal organ tissue may also be damaged by pressure waves generated during pile driving activities as sound reverberates through a fish's viscera (Caltrans 2015). In addition, morphological changes to the form and structure of auditory organs (saccular and lagenar maculae) have been observed after intense noise exposure (Hastings and Popper 2005). Smaller fish with lower mass are more susceptible to the impacts of elevated sound fields than larger fish, so acute injuries resulting from acoustic impacts are expected to scale based on the mass of a given fish. Since juveniles and fry have less inertial resistance to a passing sound wave, they are more at risk for non-auditory tissue damage (Popper and Hastings 2009) than larger fish (yearlings and adults) of the same species. Beyond immediate injury, multiple studies have also shown responses in the form of behavioral changes in fish due to human-produced noises (Wardle *et al.* 2001, Slotte *et al.* 2004, Popper and Hastings 2009).

Based on recommendations from the Fisheries Hydroacoustic Working Group, NMFS uses interim dual metric criteria to assess onset of injury for fish exposed to pile-driving sounds (Caltrans 2015). The interim thresholds of underwater sound levels denote the expected instantaneous injury/mortality and cumulative injury, as well as a third threshold criterion for behavioral changes to fish. Vibratory pile driving generally stays below injurious thresholds, but often introduces pressure waves that will incite behavioral changes. Even at great distances from the pile driving location, underwater pressure changes/noises from pile driving is likely to cause flight, hiding, feeding interruption, area avoidance, and movement blockage, as long as pile driving is ongoing.

For a single strike, the peak exposure level (peak) above which injury is expected to occur is 206 decibels (dB) (reference to one micro-pascal [1µpa] squared per second). However, cumulative acoustic effects are expected for any situation in which multiple strikes are made to an object with a single strike peak dB level above the effective quiet threshold of 150 dB. Therefore, the accumulated sound exposure level (SEL) level above which injury to fish is expected to occur is 187 dB for fish greater than 2 grams in weight, and 183 dB for fish less than 2 grams. If either the peak SEL or the accumulated SEL threshold is exceeded, then physical injury is expected to occur to fish within the estimated distance thresholds. Underwater sound levels below injurious thresholds are expected to produce behavioral changes. NMFS uses a 150 dB root-mean-square (RMS) threshold for behavioral responses in salmonids and green sturgeon.

Caltrans will employ attenuation methods to reduce noise levels while impact pile driving. Attenuation methods can include, deploying a bubble curtain, a double-walled isolation casing or a dewatered isolation casing. For assessment purposes, the standard practice is to assume between a 5dB reduction from attenuation. Because precise site conditions where the piles would be installed are unknown, it is difficult to predict the effectiveness of an attenuation device. For this reason, it is assumed that a maximum of 5-dB reduction could be achieved with implementation of an attenuation system for the piles that would be impact driven in open water.

The primary source of underwater noise associated with constructing either one of three alternative bridge types (*i.e.*, bascule, vertical lift, or swing) would be driving the following: the two hundred and thirty eight 16-inch steel pipe or H-piles with an impact hammer for the

temporary trestles and work platforms, the sixteen 16-inch spud piles for the barges, the twenty to forty (depending on bridge type) 16- inch steel pipe piles in water for the two in-water piers, the forty 16-inch steel pipe piles on land for the two in-levee abutments, the six to eighteen (depending on bridge type) 60-inch cast-in-steel shell (CISS) piles for the two in-water piers for the movable span, and the sixty 14-inch square concrete or 16-inch steel pipe piles for the bridge fender system. Additional sources of underwater noise associated with the project would occur during installation and removal of temporary sheet piles with a vibratory hammer for the temporary cofferdams used to isolate the in-water construction areas for bridge piers. Only driving of piles with an impact hammer is expected to produce sound levels that could result in injury to fish. A summary of pile driving activities (location, timing and duration) with potential to affect fish can be found in Table 4.

Table 4. Pile Driving Activities with potential to affect listed fish species.

Activity	Location	Approximate Timing	Approximate Duration (days)
Vibratory and impact driving of 16-inch steel pipe or H piles for construction trestle	On land and in water	Season 1, May 3–May 21	20
Vibratory and impact driving of 16-inch steel pipe piles for temporary barges	In water	Seasons 1 and 2, May 1–October 27	10
Vibratory driving of sheet piles for cofferdams	In water	Season 1, May 24–June 4	12
Vibratory and impact driving of 16-inch steel pipe piles for fixed span (piers 4 and 5)	In water	Season 1, June 7–June 11	5
Vibratory and impact driving of 16-inch steel pipe piles for abutments 1 and 6	On land	Season 1, June 8–June 14	5
Removal of sheet piles with vibratory driver	In water	Season 1, July 12–July 23	12
Vibratory and impact driving of 60-inch cast in steel shell piles for movable span (piers 2 and 3)	In water	Season 1, May 24–August 13	10
Vibratory and impact driving of 14-inch concrete or 16-inch steel pipe piles for bridge fender system	In water	Season 2, September 25–October 6	6

Activity	Location	Approximate Timing	Approximate Duration (days)
Removal of 16-inch steel pipe or H piles for construction trestle with vibratory driver	In water	Season 2, September 25–October 17	20

Noise levels for unattenuated impact pile driving are as follows. Attenuated noise levels are summarized in Table 5:

Temporary Trestle Piles

Two temporary construction trestles would be installed to support work platforms during construction, one extending from the Sacramento bank and the other extending from the West Sacramento bank of the river. Each trestle would require piles to be driven on land and in the water. Two pile types may be used: 16-inch diameter steel pipe piles and 16-inch steel H-piles. This assessment assumes that 10 to 20 piles would be installed per day and that each pile would require approximately 800 blows to install. Installation of the trestle piles would occur during the first in-water construction season (May 1 to November 30) and would require an estimated 3 weeks to complete. For the piles driven on land, peak SPLs exceeding the injury threshold are predicted to occur within less than 10m for the 16-inch-diameter steel pipe piles and the 16-inch-diameter steel H-piles. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 251m from the 16-inch steel pipe piles and 100m from the 16-inch steel H-piles, assuming an unimpeded propagation path. These potential impacts would occur over a period of approximately 2 days.

For the piles in water, peak SPLs exceeding the injury threshold are predicted to occur within 14m for the 16-inch-diameter steel pipe piles and within less than 10m for the 16-inch diameter steel H-piles. The use of an attenuation device is expected to reduce these distances to 10m or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 541m from the 16-inch steel pipe piles and 215m from the 16-inch steel H-piles, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce these distances for the respective piles by slightly more than 50 percent. These potential impacts could occur over a period of approximately 24 days.

Noise levels exceeding the behavioral threshold of 150 dB RMS would theoretically extend thousands of feet from pile-driving activities, assuming an unimpeded propagation path. However, river bends located approximately 1,900 feet downstream (579m) and approximately 6,000 feet (1,828m) upstream of the pile driving activity likely would limit the extent of these noise levels. These potential impacts could occur over a period of 4 days.

Temporary Barge Piles

Four temporary construction barges would be used to facilitate bridge construction. Each barge would require four spud piles to be driven in the water to anchor the barge. Temporary barge

piles will be 16-inch diameter steel pipe piles. A total of 4 to 16 piles would be installed on a single day and that each pile would require approximately 800 blows to install. Installation of the spud piles would occur during the first and second in-water construction seasons (May 1 to November 30) and would require approximately 1 week to complete. For spud piles in water, peak SPLs exceeding the injury threshold are predicted to occur within 14m. The use of an attenuation device is expected to reduce this distance to 10m or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 401 and 1541m, respectively, from the pile, on the days one barge (four piles) is anchored, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce these distances by slightly more than 50 percent. If two or more barges (8 to 16 piles) are anchored in a single day, then cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 540m from the pile, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce these distances by slightly more than 50 percent. These potential impacts could occur on 1 or more days throughout each construction season as the barges are periodically repositioned to support construction activities.

Noise levels exceeding the behavioral threshold of 150 dB RMS theoretically would extend thousands of feet from pile-driving activities, assuming an unimpeded propagation path, regardless of whether one or more barges are anchored on the same day. However, river bends located approximately 1,900 feet (579m) downstream and approximately 6,000 feet (1,829m) upstream of the pile-driving activity likely would limit the extent of these noise levels. These potential impacts could occur on 1 or more days throughout each construction season as the barges are periodically repositioned to support construction activities.

Permanent Bridge Piles

Two types of piles will be used for permanent bridge piles. 60-inch-diameter CISS piles for the movable span and 16-inch diameter steel pipe piles for the in-water piers and the two in-levee abutments. The number of piles that would be installed will be dependent on the bridge type design. This assessment assumes that the bascule bridge would require twelve 60-inch CISS piles, the vertical lift bridge would require six to eight 60-inch CISS piles, and the swing bridge would require eighteen 60-inch CISS piles. It also was assumed that from two to four piles would be driven per day and that each pile would require approximately 1,500 blows to install. For the 16-inch steel pipe piles, 20 piles would be required for the in-water piers for the swing bridge, and 40 piles would be required for the in-water piers for both the bascule and vertical lift bridges. All three bridge types would require 40 16-inch steel pipe piles for the in-levee abutments.

60-inch CISS Piles

For the 60-inch CISS piles, peak SPLs exceeding the injury threshold are predicted to occur within 18m. The use of an attenuation device is expected to reduce this distance to 10m or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 2154m, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by more than 50 percent. Noise levels exceeding the behavioral threshold of 150 dB RMS would theoretically extend 10,000m from pile driving activities, assuming an unimpeded propagation path. The use of an attenuation device is expected

to reduce this distance by approximately 50 percent. River bends located approximately 1,900 feet (579m) downstream and approximately 6,000 feet (1,829m) upstream of the proposed location of pile driving activity would likely limit the extent of these noise levels.

Although the distances to injury and behavioral thresholds would be the same for the movable span for all three bridge types, potential impacts on fish associated with piers 2 and 3 would vary by bridge type because of the different number of piles required to construct the fixed spans of each of these three bridge types. For example, potential impacts on fish during construction of the fixed spans would occur over a period of approximately 6 days for the bascule bridge, approximately 4 days for the vertical lift bridge, and approximately 9 days for the swing bridge.

16-inch Steel Pipe Piles

For the 16-inch steel pipe piles on land, peak SPLs exceeding the injury threshold are predicted to occur within a radius of less than 10m from pile-driving activities. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 251m, assuming an unimpeded propagation path. Noise levels exceeding the behavioral threshold of 150 dB RMS would extend 1,585m from pile-driving activities, assuming an unimpeded propagation path. River bends located approximately 1,900 feet (579m) downstream and approximately 6,000 feet (1829m) upstream of the proposed location of pile-driving activity likely would limit the extent of these noise levels. The distances to injury and behavioral thresholds associated with abutments 1 and 6 would be the same for all three bridge types because the same number of piles would be required to construct all of the three bridge types. Potential impacts could occur over a period of 10 days for all three bridge types.

Bridge Fender Piles

The bridge fender system will use either/both 14-inch-square concrete piles and 16-inch-diameter steel pipe piles. The only difference between the two approaches is the size and type of pile material; the same number of piles would be installed regardless of the type of pile used.

For the 14-inch-square concrete piles in water, peak SPLs exceeding the injury threshold are predicted to occur within a radius of 14m from pile-driving activities. The use of an attenuation device is expected to reduce this distance to 10m or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 36m, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by approximately 50 percent. These potential impacts could occur over a period of 6 days.

Noise levels exceeding the behavioral threshold of 150 dB RMS would extend 541m from pile-driving activities, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by slightly more than 50 percent.

For the 16-inch steel pipe piles in water, peak SPLs exceeding the injury threshold are predicted to occur within a radius of 14m from pile-driving activities. The use of an attenuation device is expected to reduce this distance to 10m or less. Cumulative SELs exceeding the 183-dB and 187-dB injury thresholds are predicted to occur within a radius of 541m, assuming an unimpeded propagation path. The use of an attenuation device is expected to reduce this distance by slightly more than 50 percent. These potential impacts could occur over a period of 6 days.

Noise levels exceeding the behavioral threshold of 150 dB RMS would extend 2,929m from pile-driving activities. The use of an attenuation device is expected to reduce this distance by slightly more than 50 percent. River bends located approximately 1,900 feet (579m) downstream and approximately 6,000 feet (1829m) upstream of the proposed location of pile-driving activity likely would limit the extent of these noise levels.

Sheet Piles for Temporary Cofferdams

Two cofferdams will be installed to construct piers 4 and 5. The sheet piles for the cofferdams would be installed and removed with a vibratory pile driver; this method of installation and removal would not generate high underwater noise levels that result in injury to fish. Vibratory pile driving is a preferred method for minimizing the exposure of fish to potentially harmful pile-driving sounds (NMFS 2009). The sheet piles for the two cofferdams would be installed over a 2-week period in late May and early June of the first construction season.

Table 5. Distances to Injury and Behavioral Thresholds for Impact Pile Driving

Pile Type	Driver Type	Number of Strikes Per Pile	Strikes Per Day	Reference Distance (m)	Attenuation (dB)	Distance (m) to Threshold			
						Onset of Physical Injury			Behavior
						Peak dB	Cumulative SEL dB		RMS dB
							Fish >2 g	Fish < 2 g	
						206 dB	187 dB	183 dB	150 dB
16" steel pipe pile in water (trestle, barge spuds, bridge, and fenders)	impact hammer	800	32,000	10	5	10	251	251	1359
16" steel H-pile in water (trestle)	impact hammer	800	32,000	10	5	10	100	100	464
60" cast-in-steel-shell pile in water (bridge)	impact hammer	1500	6,000	10	5	10	914	914	4642
14" square concrete pile in water	impact hammer	1000	20,000	10	5	10	54	54	251

The underwater sound conditions described above would be expected to occur on days when in-water pile driving occurs. Impact pile driving is expected to injure or kill fishes within certain distance thresholds, depending on the number of strikes used in a day, and whether attenuation measures are being employed. Using the greatest numbers of strikes estimated, it is expected that fish would be killed within up to 10 meters (attenuated) to 18 meters (unattenuated) of the driven pile due to in-water impact pile driving. Fish would be injured within up to 914 (attenuated) to 2,154 meters (unattenuated). Behavioral effects would occur up to 4,642 meters (attenuated) to 10,058 meters (unattenuated). However, the likelihood for exposure to these effects to occur will be minimized, since pile driving will occur during the day, and most fish passage is expected to occur at night. Small numbers of juvenile CCV steelhead, CV spring-run, SR winter-run Chinook salmon and sDPS green sturgeon are expected to be affected. Additionally, river bends located approximately 1,900 feet downstream and approximately 6,000 feet upstream of the pile-driving activity likely would limit the extent of these noise levels.

Acoustic Effects of Barge Traffic

Barge and tugboat traffic will create additional sources of noise in the aquatic environment. This could result in negative impacts to listed species present. Ships under power produce a substantial amount of mechanical- and flow-induced noise from motor, propeller, and hull

turbulence. Measurements of sound intensity from commercial shipping have shown sound levels up to approximately 180 dB (ref. 1 μPa) at the point source (1 meter from ship) (Kipple and Gabriele 2007). This level of noise will drop off by 40 dB at 100 yards away and approximately 53 dB lower at one-quarter mile (Kipple and Gabriele 2007). Elevated noise levels generated by the passage of vessels, such as tugboats, would subject fish within the confines of the action area to anthropogenic-produced noise conditions. The relatively rapid passage of the barge and tugboat past a given point will somewhat attenuate these effects by decreasing the duration of the elevated sound levels, but some temporary effects can be anticipated to occur, depending on the proximity of the exposed fish to the sound source.

The presence of underwater noise may adversely affect a fish's ability to detect predators, locate prey, or sense their surrounding acoustic environment (Slabbekoorn *et al*. 2010, Radford *et al.* 2014). Other species of fish have been shown to respond to recorded ambient shipping noise by either reacting more slowly to predators, thus increasing their susceptibility to predation (Simpson *et al.* 2015, Simpson *et al.* 2016), or becoming hyper-alert and reacting more quickly to a visual predator stimulus, causing them to cease feeding and hide (Voellmy *et al*. 2014b). Voellmy *et al.* (2014a) state that elevated sound levels could affect foraging behavior in three main ways: 1) noise acts as a stressor, decreasing feeding behavior directly through reduced appetite, or indirectly through a reduction in activity, locomotion, and alterations to the cognitive processes involved in food detection, classification, and decision making; 2) noise acts as a distracting stimulus, diverting an individual's limited amount of attention from their primary task to the noise stimuli that have been added to the environment; and 3) noise masks crucial acoustic cues, such as those made by both prey and predators.

Fish also may exhibit noise-induced avoidance behavior that causes them to move into less suitable habitat for foraging or will wait to feed when the noise has abated. Voellmy *et al.* (2014a) surmised that sustained decreases in food consumption could have long-term energetic impacts that result in reductions in growth, survival, and breeding success. Moreover, compensatory feeding activities could increase predation risks by increasing time exposed to predators or by forcing animals to feed in less favorable conditions, such as in times or areas of higher predation pressure.

Increased noise, produced by barge and tugboat traffic may result in listed fish fleeing the area of those noises and moving into shallow margins or adjacent habitat. The channel margins of the Sacramento River have submerged and emergent vegetation and rock riprapped levees where predatory species are likely to occur in greater numbers than in the open waters of the channel. This scenario, therefore, could increase the predation risk of salmonids, particularly smolts. Likewise, elevated noise exposure can reduce the ability of fish to detect piscine predators, by either reducing the sensitivity of the auditory response in the exposed fish or masking the noise of an approaching predator. Such would be the case if open water predators, such as striped bass (*Morone saxatilis*), encounter the juvenile fish in the open channel, while a barge and tugboat are present. The estimated total of eight barge-trips per season (four in May as the barges are brought to the work site and four in November as the barges are removed from the work site at the end of the construction season) and periodic repositioning of the barges during the in-water construction season suggest that disturbances to listed fish would be expected to be small.

Water Quality

Sediment and Turbidity

Site clearing, earthwork, driving of permanent piles, driving and removal of piles for the temporary trestles and barges, vibrating and removal of sheet piles for cofferdams, and installation of RSP would result in disturbance of soil and riverbed sediments—potentially resulting in temporary increases in turbidity and suspended sediments in the Sacramento River. In addition, dewatering and soil removal from the inside of the cofferdams could result in temporary increases in turbidity and suspended sediments in the river, if water (and associated spoils) from within the cofferdams is not properly disposed of or contained and treated before being discharged back to the river. Any construction-related erosion or disturbance of sediments and soils would increase turbidity and sedimentation downstream of the Project area. The distance soils would be transported is dependent on river flows. A prolonged increase in sedimentation and turbidity affects the growth, survival, and reproductive success of aquatic species. High levels of suspended sediment reduces the ability of listed fish to feed and respire, resulting in increased stress levels and reduced growth rates, and a reduced tolerance to fish diseases and toxicants (Waters 1995).

NMFS anticipates that some local increases in turbidity and suspended sediment above baseline levels will result from in-water construction activities. Effects resulting from the proposed project may include potential water quality impacts following construction until graded areas have re-vegetated. NMFS expects these water quality impacts to be minor, short-term increases in turbidity and sedimentation and only lasting the duration of the project. Water quality impacts are unlikely to affect migrating adults to the extent of injuring them, but may injure some juvenile fish, which are smaller and less mobile, and are actively feeding and growing, by temporarily disrupting normal behaviors that are essential to growth and survival. Increased sedimentation and turbidity resulting from project construction will be temporary and limited to a small portion of the river during construction activities. The BMPs incorporated into the project plans will further minimize turbidity effects to listed fish in the project construction area.

Responses of salmonids to elevated levels of suspended sediments often fall into three major categories: physiological effects, behavioral effects, and habitat effects (Bash *et al*. 2001). The severity of the effect is a function of concentration and duration (Newcombe and MacDonald 1991, Newcombe and Jensen 1996) so that low concentrations and long exposure periods are frequently as deleterious as short exposures to high concentrations of suspended sediments.

A review by Lloyd (1987) indicated that several behavioral characteristics of salmonids can be altered by even relatively small changes in turbidity (10 to 50 Nephelometric Turbidity Units [NTUs]). Salmonids exposed to slight to moderate increases in turbidity exhibited avoidance, loss of station in the stream, reduced feeding rates and reduced use of overhead cover. Short-term increases in turbidity and suspended sediment may disrupt feeding activities of fish or result in temporary displacement from preferred habitats. Numerous studies show that suspended sediment and turbidity levels moderately elevated above natural background values can result in non-lethal detrimental effects to salmonids.

Suspended sediment affects salmonids by decreasing reproductive success, reducing feeding success and growth, causing avoidance of rearing habitats, and disrupting migration cues (Bash *et al*. 2001). Sigler *et al.* (1984 in Bjornn and Reiser 1991) found that prolonged turbidity between 25 and 50 NTUs reduced growth of juvenile coho salmon and steelhead. MacDonald *et al.* (1991) found that the ability of salmon to find and capture food is impaired at turbidities from 25 to 70 NTUs. Reaction distances of *O. mykiss* to prey were reduced with increases of turbidity of only 15 NTUs over an ambient level of 4 to 6 NTUs in experimental stream channels (Barrett *et al.* 1992). Bisson and Bilby (1982) reported that juvenile coho salmon avoid turbidities exceeding 70 NTUs. Increased turbidity, used as an indicator of increased suspended sediments, also is correlated with a decline in primary productivity, a decline in the abundance of periphyton, and reductions in the abundance and diversity of invertebrate fauna in the affected area (Lloyd 1987; Newcombe and MacDonald 1991). Increased sediment delivery can also fill interstitial substrate spaces and reduce cover for juvenile fish (Platts *et. al.* 1979) and abundance and availability of aquatic invertebrates for food (Bjornn and Reiser 1991).

Although less is known about the timing of rearing and migration of sDPS green sturgeon, both adult and juvenile life stages are known to utilize the Sacramento River as a migration corridor and may exhibit rearing behavior there as well. Less is known about the specific detrimental physical and physiological effects of sedimentation and turbidity to sturgeon. However, it is thought that high levels of turbidity can generally result in gill fouling, reduced temperature tolerance, reduced swimming capacity and reduced forage capacity in lotic fishes (Wood and Armitage 1997).

Increases in turbidity associated with work are likely to be brief and occur only in the vicinity of the site, attenuating downstream as suspended sediment settles out of the water column. Also, avoidance and minimization techniques will be implemented in this project as well as BMPs pertaining to the prevention or minimization of sedimentation and increased turbidity. These actions will minimize the extent and severity of effects associated with the proposed action outside of the construction footprint. Due to their use of the nearshore habitat in the action area, juvenile listed fish in the action area during construction would be subject to mobilized sediment and short-term increases in turbidity resulting in an increase in predation and reduced feeding and survival.

Contaminants

Construction activities that occur in or near the Sacramento River channel can result in the discharge of contaminants that are potentially lethal to fish. The operation of heavy equipment, cranes, pile drivers, drilling rigs, barges, and other construction equipment during vegetation removal, excavation, and bridge construction could result in spills and leakage of fuel, lubricants, hydraulic fluids, and coolants. Other sources of potential contamination include asphalt, wet concrete, and other materials that may come into direct contact with surface water during construction activities. For example, concrete that is being poured for the bridge decking could be discharged accidentally to the river, thereby contaminating the river with uncured concrete (which can raise pH) and related compounds.

High concentrations of contaminants can cause short-term and long-term effects to fish. The severity of these effects depends on the contaminant, the concentration, duration of exposure,

and sensitivity of the affected life stage. Sublethal effects include increased susceptibility to disease that reduces the overall health and survival of the exposed fish. A long-term effect of contamination is reduced prey availability (Kidd *et al.* 2014). Invertebrate prey species survival can be reduced, therefore, less food is available for fish. In addition, fish consuming prey affected by contamination can absorb toxins directly. However, implementation of avoidance and minimization measures and BMPs, would minimize any risk, and therefore, avoid potential for exposure to hazardous chemicals.

Green sturgeon may be more susceptible to aquatic contaminants, since they are benthic foragers. Studies on white sturgeon found that bioaccumulation of pesticides and other contaminants adversely affect growth and reproductive development (Feist *et al.* 2005). However, with the implementation of the water quality conservation measures (as described in the Project description) and in-water work window, exposure to contaminants is expected to be avoided.

Dewatering and Fish Relocation

The proposed timing of cofferdam installation (late May to early June) would overlap the end of the adult and juvenile peak migration season for spring-run Chinook salmon, the end of the adult migration season for steelhead, and the end of the peak rearing season for green sturgeon in the Sacramento River. Consequently, the potential would exist for listed fish to become entrained in the cofferdams, although juveniles would be expected to be at a greater risk because they are likely to be more abundant in the action area than adults at this time of year. Juvenile CCV spring-run Chinook salmon, CCV steelhead, or sDPS green sturgeon present in the action area and unable to avoid cofferdams would be subject to dewatering and fish capture. Fish capture and relocation may be necessary during dewatering activities, if listed fish are present and found in the enclosed area of the cofferdam. Each step during the capture/relocation process could induce physiological stress leading to injury or death, even when a skilled fish biologist performs the relocation. The potential capture and relocation listed fish species associated with the dewatering of the cofferdam are expected to adversely affect a small number of fish if present in the action area. Although upstream-migrating adult CV spring-run Chinook salmon and CCV steelhead, may occur in the Project area during in-water work, the large size and probable avoidance of the enclosed area makes it unlikely that they would be trapped in the cofferdams.

2.5.2. Effects to Critical Habitat

Construction is expected to have short- and long-term effects on habitat quantity and quality, including effects on the PBFs of designated critical habitat of listed species. The PBFs that occur within the action area for SR winter-run Chinook salmon are (1) migratory corridors for both upstream and downstream migration, (2) habitat and prey items that are free of contaminants, and (3) riparian habitat for juvenile rearing. The PBFs within the action area for sDPS green sturgeon are (1) food resources, (2) adequate flow regime for all life stages, (3) water quality, (4) migratory corridors, (5) adequate water depth for all life stages, and (6) adequate sediment quality. The PBFs within the action area for CV spring-run Chinook salmon and CCV steelhead are (1) freshwater rearing sites, and (2) freshwater migration corridors. The Project will temporarily reduce rearing habitat and food resource availability for salmonids. The migratory corridor for juvenile and adult listed salmonids and green sturgeon will be temporarily affected.

Impacts to the migration corridor are only expected to be short-term (during construction), and unimpeded passage will be open throughout construction.

Shaded Riverine Aquatic Habitat (SRA) Loss

Clearing of the existing cottonwood riparian forest vegetation within the proposed project footprint would result in permanent loss of up to 1.273 acres and temporary disturbance to up to 0.625 acre of cottonwood riparian forest within the action area, of which approximately 0.368 acre is below the OHWM and contributes to overhead (shade) and instream SRA cover. The permanent loss of existing cottonwood forest would result from activities related to construction of the two fixed-span bridge approach structures and the bikeways that would pass under the east end of the bridge structure in the City of Sacramento and the west end of the bridge structure in the City of West Sacramento. The temporary disturbance to cottonwood riparian forest would occur from trimming riparian vegetation and removing additional trees and understory vegetation to provide equipment access. Portions of this affected riparian forest also provide SRA cover habitat that is an important component of anadromous fish habitat. Clearing of the existing cottonwood riparian forest that contributes to SRA cover would result in temporary disturbance to up to 330 linear feet and permanent loss of up to 302 linear feet of overhead SRA cover (shade) along the summer (low-flow) shoreline of the Sacramento River.

Riparian vegetation plays a key role in the conservation value of rearing habitat for many salmonid life stages. It provides shading to reduce stream temperatures, increases the recruitment of large woody material into the river that increases habitat complexity, provides shelter from predators, and enhances the productivity of aquatic macroinvertebrates (Anderson and Sedell 1979, Pusey and Arthington 2003). It has also been shown to directly influence channel morphology and may be directly correlated with improved water quality in riverine systems through biogeochemical cycling, soil and channel chemistry, water movement, and erosion (Schlosser and Karr 1981, Dosskey *et al*. 2010). The proposed action will result in the permanent loss of 1.273 acres of riparian habitat due to disturbance from Project activities. This loss of riparian habitat will result in the degradation of migratory corridors and rearing habitat PBFs for listed fish species. With implementation of a riparian restoration plan and/or mitigation bank credit purchase (as described in Section 1.3.1, Measure 13), long-term impacts to critical habitat due to riparian habitat removal are expected to be minimal.

Freshwater Migratory Corridor Loss

Safe and unobstructed migratory pathways are necessary for adult salmonids and sturgeon to migrate to and from spawning habitats, and for larval and juveniles to migrate downstream from spawning/rearing habitats within freshwater rivers to rearing habitats within the estuaries. The main migratory corridor in the Sacramento River will not be blocked at any time during project implementation so SR winter-run Chinook salmon, CCV steelhead, CV spring-run Chinook salmon and green sturgeon using the area to migrate upstream and downstream in the project action area in this reach of the Sacramento River to feed or rest, should not be affected and the effects of the project on the PBFs of migratory corridors for all listed species is minimal. Fish that use the action area as a migratory corridor will be able to continue using the channel during and after construction of the proposed action. The new bridge will shade the Sacramento River, which may increase predation risk to juveniles. Overwater structures can alter underwater light

conditions and provide potential holding conditions for juvenile and adult fish, including species that prey on juvenile listed fishes. The increase in riverine shading may result in associated riparian vegetation receiving less sunlight for photosynthesis, as well as in-water vegetation receiving less light for photosynthesis. This can result in decreased fish habitat quality and decreased insect productivity (Pincetich 2019). Salmonids may benefit from the overwater shade as a cooling measure for water temperatures. Blocking light can also prevent stream eutrophication (an overabundance of nutrients in a water body), such as algal blooms. Eutrophication may reduce oxygen levels for fish and other species (Pincetich 2019). However, because there is suitable habitat for salmon and sturgeon both upstream and downstream of the Action Area, the effects of the structure are expected to be minor.

Freshwater Rearing Habitat Loss

Freshwater rearing habitat provides water quantity, quality, and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility. Rearing habitat condition is strongly affected by habitat complexity, food supply, and presence of predators of juvenile salmonids and green sturgeon. Freshwater rearing habitats have a high intrinsic value to salmonids, as the juvenile life stages are dependent on the function of this habitat for successful survival and recruitment.

The proposed action would not result in a permanent loss of CV spring-run, CCV steelhead and green sturgeon rearing habitat, but would temporarily make small areas unavailable for rearing during construction. These short-term, temporary instream disturbances (physical equipment, turbidity, etc.) would likely result in the displacement of fish from their habitat to downstream areas. However, there is suitable rearing habitat for salmonids and sturgeon downstream of the action area.

Overwater Shading

Barge shading would occur only during the in-water construction season (May 1 to November 30), as the temporary barges would be removed at the end of the first construction season before the onset of winter. Four barges, each approximately 60 feet wide and 150 feet long (9,000 square feet [0.21 acre]), would be present during construction and would provide a total of 36,000 square feet (0.83 acre) of temporary over-water structure. Because the barges would be present only during construction and moved periodically as construction of the bridge progresses, effects of barge shading would be temporary and localized.

Shading by the temporary work platforms would occur only during the in-water construction season (May 1 to November 30), as the temporary work platforms would be removed at the end of the first construction season before the onset of winter (the temporary trestle piles could remain in place). Two trestles, approximately 22 feet wide and varying in length and configuration, would be present during construction and would provide a total of approximately 33,500 square feet (0.77 acre) of temporary over-water structure. Because the trestles and work platforms would be present only during construction, effects of temporary work platform shading would be temporary and localized. Together, the barges and temporary work platforms would create up to 69,500 square feet (1.60 acres) of temporary overwater structure (*i.e.*, artificial shade).

The new bridge would create approximately 56,000 square feet (1.29 acres) of permanent overwater structure where no over-water structure currently exists. The increased shading created by the new bridge could affect the migration of adult and juvenile Chinook salmon and steelhead, and other species. In the Sammamish River in Washington State, migrating adult salmon hold in shaded areas beneath bridges (Carrasquero 2001). Juvenile salmonids also prefer shaded areas created by bridges, which may make them more vulnerable to predatory fish (*e.g.*, striped bass, Sacramento pikeminnow, and largemouth bass) that also prefer structural and overhead cover (*e.g.*, artificial shade) for ambushing prey. Because of the height of the new bridge over the water, ambient light levels generally would be expected to penetrate into the water, thereby minimizing the effect of bridge shading on aquatic habitats in the Sacramento River.

Sedimentation

Effects of increased turbidity and sedimentation in critical habitat are similar to those described for species. Effects on critical habitat can also reduce fisheries habitat quality by mobilizing sedimentation and increasing turbidity. Sedimentation can decrease or reduce rearing habitat. Increased turbidity, especially caused by fine inorganic particles, increase drift of macroinvertebrates. Aquatic invertebrate communities may change as a result of sedimentation or turbidity, which in turn could affect prey items. In addition, suspended materials in slow moving waters can increase absorption of solar energy near the surface causing the heated upper layers to stratify reducing the dispersion of dissolved oxygen and nutrients to lower depths. Due to the base flows in the Sacramento River, it is anticipated that the effects of suspended sediment that may lead to sedimentation in the project action area are expected to be minimal, because most, if not all, of the suspended sediment will dissipate quickly or be diluted substantially by the high base flows in the Sacramento River and move downstream.

Lighting

The design of the new bridge includes the permanent installation of night lighting. Night lighting has the potential to result in permanent adverse effects to critical habitat PBFs. Night lights can shine onto waters during nighttime hours and may facilitate increased predation on juvenile listed fish by predatory fish, birds, and mammals (Kahler *et al.* 2000). BMPs, including placement of permanent lighting away from water surfaces, will be implemented to incorporate night lighting designs, which limit the amount of light shining on water surfaces. The lights will be shielded and focused on the bridge away from water surfaces. This action will minimize the extent of any negative effects associated with night lighting.

Mitigation / Restoration

The project proponent will implement onsite restoration and offsite compensation measures and/or purchase mitigation bank credits to compensate for losses of SRA cover habitat and in-water aquatic habitat. Revegetation onsite will occur at a 3:1 ratio (3 acres restored for every 1 acre lost). Should offsite restoration be required through the use of compensatory mitigation credits, restoration credits will be purchased at a 1:1 ratio and/or preservation credits will be purchased at a 2:1 ratio. Additionally, to address permanent loss of aquatic habitat, the proposed action includes purchase of mitigation bank credits at a 3:1 ratio. Caltrans will purchase 5.61-

acre credits of salmonid or riparian SRA habitat credits for the permanent loss of 1.87 acres of aquatic habitat below the OHWM.

The purchase of compensatory mitigation credits will restore and preserve, in perpetuity, SRA habitat or similar types of riverine habitat that will be beneficial to salmonids. The mitigation banks that serve the action area offer floodplain or other habitat that can support migrating juvenile and adult SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead and sDPS green sturgeon in the same way that river margin habitat otherwise would have, had the project not occurred. SRA habitat types of conservation credits can benefit both adult and juvenile salmonids and sturgeon, even if such banks are located far from the action area and individuals affected by the project would be unlikely to benefit from the compensation purchase.

Both the riparian and aquatic habitat impacts affect designated critical habitat, as well as listed fish species, described above in this opinion. The purchase of mitigation credits will address the loss of ecosystem functions due to the modification of the riverbank. These credit purchases are ecologically relevant to the PBFs of critical habitat and the species affected by the proposed action, because both banks include SRA, riparian forest and floodplain credits with habitat values that are already established and meeting performance standards. Also, the banks are located in areas that will benefit the ESUs and DPSs affected. The purchase of mitigation credits at one of these banks is expected to benefit the PBFs of freshwater rearing habitat and migration corridors for juvenile SR winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead by providing suitable floodplain and riparian habitat. The floodplains and riparian forest in the bank benefit the growth and survival of rearing salmonids by providing habitat with abundant food in the form of aquatic invertebrates, structural diversity, such as instream woody material (IWM) and cooler stream temperatures.

The purchase of credits provides a high level of certainty that the benefits of a credit purchase will be realized, because all of the NMFS-approved banks considered in this opinion have mechanisms in place to ensure credit values are met over time. Such mechanisms include legally binding conservation easements, long-term management plans, detailed performance standards, credit release schedules that are based on meeting performance standards, monitoring plans and annual monitoring reporting to NMFS, non-wasting endowment funds that are used to manage and maintain the bank and habitat values in perpetuity, performance security requirements, a remedial action plan, and site inspections by NMFS. In addition, each bank has a detailed credit schedule, and each tracks their credit transactions and availability on the Regulatory In-lieu fee and Bank Information Tracking System (RIBITS). RIBITS was developed by the U.S. Army Corps of Engineers with support from the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the FHWA, and NMFS to provide better information on mitigation and conservation banking and in-lieu fee programs across the country. RIBITS allows users to access information on the types and numbers of mitigation and conservation bank and in-lieu fee program sites, associated documents, mitigation credit availability, service areas, as well information on national and local policies and procedures that affect mitigation and conservation bank and in-lieu fee program development and operation.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

2.6.1. Water Diversions

Water diversions for municipal and industrial use are found near the action area. Depending on the size, location, and season of operation, these unscreened diversions entrain and kill many life stages of aquatic species, including juvenile listed anadromous species.

2.6.2. Increased Urbanization

Increases in urbanization and housing developments can impact habitat by altering watershed characteristics and changing both water use and stormwater runoff patterns. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure, such as wastewater sanitation plants, roads and highways, and public utilities. Some of these actions, particularly those which are situated away from water bodies, will not require Federal permits, and thus will not undergo review through the ESA section 7 consultation process with NMFS.

Increased urbanization also is expected to result in increased recreational activities in the region. Among the activities expected to increase in volume and frequency is recreational boating. Boating activities typically result in increased wave action and propeller wash in waterways. This potentially will degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity. Wakes and propeller wash also churn up benthic sediments thereby potentially re-suspending contaminated sediments and degrading areas of submerged vegetation. This will reduce habitat quality for the invertebrate forage base required for the survival of juvenile salmonids and green sturgeon moving through the system. Increased recreational boat operation is anticipated to result in more contamination from the operation of gasoline and diesel-powered engines on watercraft entering the associated water bodies. Increases in boating activity also increases likelihood of boat strikes which may injure or kill adult green sturgeon.

2.6.3. Rock Revetment and Levee Repair Projects

Cumulative effects include non-Federal riprap projects. Depending on the scope of the action, some non-Federal riprap projects carried out by state or local agencies do not require Federal

permits. These types of actions and illegal placement of riprap occur within the Sacramento River watershed. The effects of such actions result in continued degradation, simplification, and fragmentation of riparian and freshwater habitat.

2.6.4. Aquaculture and Fish Hatcheries

More than 32 million fall-run Chinook salmon, 2 million CV spring-run Chinook salmon, 1 million late fall-run Chinook salmon, 0.25 million SR winter-run Chinook salmon, and 2 million steelhead are released annually from six hatcheries producing anadromous salmonids in the Central Valley. All of these facilities are currently operated to mitigate for natural habitats that have already been permanently lost as a result of dam construction. The loss of historical habitat and spawning grounds upstream of dams results in dramatic reductions in natural population abundance, which is partially mitigated for through the operation of hatcheries. Salmonid hatcheries can, however, have additional negative effects on ESA-listed salmonid populations.

The high level of hatchery production in the Central Valley can result in high harvest-to-escapements ratios for natural stocks. California salmon fishing regulations are set according to the combined abundance of hatchery and natural stocks, which can lead to over-exploitation and reduction in the abundance of wild populations that are indistinguishable and exist in the same system as hatchery populations. Releasing large numbers of hatchery fish can also pose a threat to wild Chinook salmon and steelhead stocks through the spread of disease, genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production.

Impacts of hatchery fish can occur in both freshwater and the marine ecosystems. Limited marine carrying capacity has implications for naturally produced fish experiencing competition with hatchery production. Increased salmonid abundance in the marine environment may also decrease growth and size at maturity, and reduce fecundity, egg size, age at maturity, and survival (Bigler *et al.* 1996).

2.6.5. Recreational Fishing

While hatchery CCV steelhead and Chinook salmon are targeted, incidental catch of protected species, such as naturally produced CV spring-run Chinook salmon and CCV steelhead, does occur. Since 1998, all hatchery CCV steelhead have been marked with an adipose fin clip, allowing anglers to tell the difference between hatchery and wild CCV steelhead. Current regulations restrict anglers from keeping unmarked CCV steelhead in Central Valley streams, except in the upper Sacramento River.

Current sport fishing regulations do not prevent wild CCV steelhead from being caught and released many times over while on the spawning grounds, where they are more vulnerable to fishing pressure. Recent studies on hooking mortality based on spring-run Chinook salmon have found a 12 percent mortality rate for the Oregon in-river sport fishery (Lindsay *et al*. 2004). Applying a 30 percent contact rate for Central Valley rivers (*i.e.*, the average of estimated Central Valley harvest rates), approximately 3.6 percent of adult steelhead die before spawning from being caught and released in the recreational fishery.

In addition, survival of CCV steelhead eggs is reduced by anglers walking on redds in spawning areas while targeting hatchery CCV steelhead or salmon. Roberts and White (1992) identified up to 43 percent mortality from a single wading over developing trout eggs, and up to 96 percent mortality from twice daily wading over developing trout eggs. Salmon and trout eggs are sensitive to mechanical shock at all times during development (Leitritz and Lewis 1980). Typically, CCV steelhead and salmon eggs are larger than trout eggs, and are likely more sensitive to disturbance than trout eggs. While state angling regulations have moved towards restrictions on selected sport fishing to protect listed fish species, hook and release mortality of steelhead and trampling of redds by wading anglers may continue to cause a threat.

2.6.6. Habitat Restoration

Voluntary state or private sponsored habitat restoration projects may have short-term negative effects associated with in-water construction work, but these effects typically are temporary, localized, and the overall outcome is expected to benefit listed species and habitats.

2.6.7. Agricultural Practices

Non-Federal actions that may affect the action area include ongoing agricultural activities in the Sacramento River watershed. Farming and ranching activities within or adjacent to or upstream of the action area may have negative effects on water quality due to runoff laden with agricultural chemicals. Stormwater and irrigation discharges related to agricultural activities contain numerous pesticides and herbicides that may adversely affect salmonid reproductive success and survival rates (King *et al.* 2014). Grazing activities from cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the associated watersheds.

Agricultural practices in the Sacramento River may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation or reductions in water flow.

2.6.8. Mining Activities

Increased water turbidity levels for prolonged periods of time may result from adjacent mining activities, and increased urbanization and/or development of riparian habitat, and could adversely affect the ability of young salmonids to feed effectively, resulting in reduced growth and survival. Turbidity may cause harm, injury, or mortality to juvenile anadromous fish in the vicinity and downstream of the project area. High turbidity levels can reduce the ability of listed fish to feed and respire, resulting in increased stress levels and reduced growth rates, and reduce tolerance to fish diseases and toxicants. Mining activities may adversely affect water quality, riparian function, and stream productivity.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the

cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

SR winter-run Chinook salmon ESU, CV spring-run Chinook salmon ESU, CCV steelhead DPS, and sDPS green sturgeon have experienced significant declines in abundance and available habitat in the California Central Valley relative to historical conditions. The status of the species (Section 2.2) details the current range-wide status of these ESUs and DPSs and their critical habitat. The environmental baseline (Section 2.4) describes the current baseline conditions found in the Sacramento River, where the proposed action is to occur. Section 2.4.7 discusses the vulnerability of listed species and critical habitat to climate change projections in the California Central Valley and specifically in the Sacramento River. Reduced summer flows and increased water temperatures will likely be exacerbated by increasing surface temperatures in the Sacramento River. The Sacramento River is a highly manipulated system with flow and temperature regimes that differ drastically from their historical condition. Cumulative effects (Section 2.6) are likely to include decreased water flow, increased river traffic, and increased stormwater runoff from increased urbanization and from concurrent state and local projects in the action area.

2.7.1. Summary of the Project Effects to Listed Species

The proposed action has the potential to affect adult and juvenile SR winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead; and adult, juvenile, and subadult sDPS green sturgeon. The project is expected to result in a reduction of SRA habitat, harassment, injury or death, and predation-related mortality of individuals from pile driving, and injury or mortality of individuals resulting from dewatering.

The expected effects to listed salmonids and sturgeon resulting from the proposed action are harassment of juvenile SR winter-run and CV spring-run Chinook salmon, CCV steelhead, and green sturgeon resulting from the noise of pile driving; the entrainment, capture, and relocation of juveniles from construction activities; and turbidity and sedimentation. Pile driving would result in injury or death to outmigrating juveniles that pass within the 914m zone of impact. Pile driving is also expected to result in temporary disruptions in the feeding, sheltering, and migratory behavior of adult and juvenile salmon and steelhead and green sturgeon for fish passing outside of the 914m zone of impact. This disruption would result in reduced growth and increased susceptibility to predation. Adults are not expected to be injured or killed, however, they would experience temporary migration delays that are not expected to prevent successful spawning. Pile driving is also not expected to prevent salmonids and sturgeon from passing upstream or downstream, because pile driving will not be continuous through the entire day, and will not occur at night, when the majority of fish migrate. Death as a result of dewatering is expected to be minimized by salvaging and relocating fish away from the project site, if necessary. Fish would be handled by a biologist, and a low mortality rate of juveniles is expected to result from fish salvage.

2.7.2. Summary of Project Effects to Critical Habitat

Critical habitat has been designated for SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead and sDPS green sturgeon within the Action Area. Relevant PBFs of the designated critical habitats are listed above in section 2.5.2. Based on the effects of the proposed Project described previously in this opinion, the impacts are expected to permanently degrade a small portion of designated critical habitat for all species.

The quality of the current conditions of PBFs in the action area are poor compared to historical conditions (pre-levees). In particular, levees, riprapping, and removal of riparian vegetation have greatly diminished the value of the aquatic habitat in the action area by decreasing rearing area, food resources via food-web degradation, and complexity and diversity of habitat forms necessary for holding and rearing (channel diversity). Creation of overwater structure and in-water structure with the bridge construction would contribute to the degradation of designated critical habitat. The temporary construction impacts to designated critical habitat would negatively affect the ability of listed species to use the action area as rearing habitat and as migratory corridors during the overlap of migration periods and construction, as discussed in the Effects to Species section.

The project will cause a permanent loss of 0.368 acres of riparian vegetation, adversely affecting migration and rearing habitat PBFs of critical habitat through a small reduction of near-shore cover and food production. As mitigation for these impacts, the applicant will replant at a 3:1 ratio on site, or purchase SRA/salmonid credits from a NMFS-approved conservation bank at a 3:1 ratio for SRA lost. Additionally, there will be a permanent loss of approximately 1.87 ac of riverine habitat below the OHWM from placement of the bridge abutments, piers, and RSP. As mitigation for these impacts, the applicant will purchase salmonid credits from a NMFS-approved conservation bank at a 3:1 ratio (5.61 acres total).

Riparian restoration on-site or at a NMFS-approved conservation bank is expected to benefit the PBFs of freshwater rearing habitat and migration corridors for listed species by providing suitable floodplain and riparian habitat. The floodplains and riparian forest on this site will benefit the growth and survival of rearing salmonids by providing habitat with abundant food in the form of aquatic invertebrates, structural diversity, such as IWM, and cooler stream temperatures.

2.7.3. Effects of the Proposed Action at the Population Level

Based on the geographical location of the Action Area, it is expected that all Sacramento River Basin populations of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon have the potential to be exposed and adversely affected by project actions. With the nature and potential duration of the effects, we expect the proposed action to temporarily reduce the productivity of a portion of each species exposed to the project site during construction and for the first 5 years as re-vegetation occurs. The presence of the structure and loss of both in-water and riparian habitats will continue into the foreseeable future, thus creating a minor perpetual source of predation and water quality impacts (both beneficial and adverse, see Section 2.5.2) to the action area, and a permanent adverse effect to rearing

PBFs. However, these permanent effects are expected to be offset by replanting onsite and/or the purchase of credits at a NMFS-approved conservation bank.

2.7.4. Summary of Risk to Diversity Groups for each Species

The Recovery Plan identifies four Central Valley salmon and steelhead diversity groups for SR winter-run Chinook, CV spring-run Chinook, and CCV steelhead. Project effects will affect three of the four diversity groups (Basalt and Porous Lava Group, Northern Sierra Nevada Group and Northwestern California Group) as these groups all use the mainstem Sacramento River as their primary migration and rearing corridor. Key threats to salmonids within these diversity groups include inaccessibility of historic habitat, large and small passage impediments, altered flows and water temperatures, loss of riparian and floodplain habitat, predation, and hatchery impacts.

Recovery criteria for SR winter-run Chinook includes maintenance/establishment of three viable populations for the ESU, all located within the Basalt and Porous Lava Diversity Group. Currently the populations of SR winter-run Chinook below Keswick Dam is the only population considered viable within the ESU. The Sacramento River within the Action Area provides important rearing PBFs for SR winter-run Chinook. Although the proposed Project is expected to adversely affect a small portion of this population, the work window will avoid peak migration timing.

For CV spring-run Chinook salmon, recovery criteria includes maintenance/establishment of two viable populations within the Basalt and Porous Lava Diversity Group, one viable population within the Northwestern California Diversity Group, and four viable populations within the Northern Sierra Diversity Group, and a total of and nine viable populations for the ESU. Currently only one population is considered viable. The Sacramento River within the Action Area provides important rearing PBFs for CV spring-run Chinook. Although the proposed Project is expected to adversely affect a small proportion of the ESU for these species, most of the range-wide habitat supporting the species is outside of the Action Area.

Recovery criteria for CCV steelhead include maintenance and establishment of nine viable populations for the ESU. Of those, two viable populations are to be within the Basalt and Porous Lava Diversity Group, one within the Northwestern California Diversity Group, and four within the Northern Sierra Diversity Group. The proposed Project impacts represent a small loss, which is not expected to reach the designation scale for the CCV steelhead DPS as a whole. Permanent project impacts represent a small loss in the scope of available critical habitat at the designation scale for CVV steelhead though the intrinsic value of the action area for conservation of the species remains high.

The sDPS of green sturgeon includes only one spawning population in the Upper Sacramento River. The Recovery Plan for sDPS green sturgeon identifies a no-net loss of sDPS green sturgeon diversity from current levels as a recovery criteria. Diversity refers to individual and population variability in genetic, life history, behavioral, and physiological traits. Maintaining diversity is critical to retaining the species' ability to adapt to a diverse and variable environment. There are currently no methods to directly measure diversity or compare present and historical levels. However, the loss of spawning habitat can be used as a proxy and it is likely that some loss has occurred (NMFS 2018). Because diversity is closely tied with

abundance, distribution, and productivity, the recovery criteria of no-net loss of diversity may be met by improving and/or increasing spawning and rearing habitat to a level which increases spawning and/or rearing distribution or success. Although the proposed Project is expected to adversely affect a small proportion of the DPS for these species, no spawning habitat occurs within the Action Area and most of the range-wide rearing habitat supporting the species is outside of the Action Area. Permanent project impacts represent a small loss in the scope of available critical habitat at the designation scale for sDPS green sturgeon though the intrinsic value of the action area for conservation of the species remains high.

2.7.5. Summary of Risk to the ESU/DPS for each Species and Critical Habitat at the Designation Level

The Sacramento River contains spawning populations of SR winter-run and CV spring-run Chinook salmon, CCV steelhead, and sDPS green sturgeon, making it an important river in terms of range-wide recovery for these species. Further, the Sacramento River is the only spawning location for SR winter-run Chinook salmon and the only known spawning location for sDPS green sturgeon.

Although construction is expected to cause adverse effects to small numbers of listed salmonids, the impacts will be relatively short in duration and will avoid higher river and peak migration time periods, so that abundance would be low within the project footprint. Additionally, most of the effects are not lethal. Construction-related harassment will be temporary and will not impede adult fish from reaching upstream spawning and holding habitat, or juvenile fish from migrating downstream. Long-term impacts of the bridge structure and riparian loss are expected to result in some brief minor behavioral modifications of migrating or rearing juvenile fish, as they move past the structure.

To mitigate the adverse effects of the project, Caltrans proposes to replant on-site and purchase 5.61 acres of mitigation credits at a NMFS-approved conservation bank. On-site restoration and conservation bank credit purchase will offset impacts by increasing floodplain and shaded aquatic and riverine habitat for the SR winter-run Chinook and CV spring run Chinook ESUs, the CCV steelhead DPS and sDPS green sturgeon. This addresses the priority recovery action of restoration and maintenance of riparian and floodplain ecosystems which provide diverse habitat along the Sacramento River.

Combining the minimal, adverse, and beneficial effects associated with the proposed action described above, including the environmental baseline, cumulative effects, status of the species, and critical habitat, the Project is not expected to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing their numbers, reproduction, or distribution; or appreciably diminish the value of designated critical habitat for the conservation of the species.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological

opinion that the proposed action is not likely to jeopardize the continued existence of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, or sDPS green sturgeon or destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

NMFS anticipates incidental take of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and North American green sturgeon from impacts directly on designated critical habitat PBFs, or related to pile driving and impairment of essential behavior patterns as a result of these activities, and injury or death related dewatering and relocation. The incidental take is expected to be in the form of harm, harassment, injury or mortality of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and North American green sturgeon resulting from the installation and removal of temporary and permanent piles during bridge construction. Incidental take is expected to occur for during the in-water work window (May 1 to November) when juvenile SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and North American green sturgeon individuals are migrating past the site.

It is not practical to quantify or track the amount or number of individuals that are expected to be incidentally taken as a result of the proposed action, due to the variability associated with the response of listed fish to the effects of the proposed action, annual variations in the timing of spawning and migration, individual habitat use within the action area, and difficulty in observing injured or dead fish.

However, it is possible to estimate the extent of incidental take by designating ecological surrogates, and it is practical to quantify and monitor the surrogates to determine the extent of incidental take that is occurring. The most appropriate threshold for incidental take are ecological surrogates of temporary habitat disturbance expected to occur during in-water construction and

pile driving activities and permanent habitat disturbance expected to occur due to riparian removal and bridge structure presence in critical habitat.

Pile driving, dewatering, capture, and handling result in fish behavioral modifications, harm, injury or death. Riparian removal and bridge structure shade reduces primary productivity, decreases prey availability and increase the presence of predatory fish, leading to harm or death. NMFS anticipates incidental take will be limited to the following forms:

1) Take in the form of harm, injury and death to listed fish, due to handling during dewatering of 0.15 acres of river habitat. This habitat disruption will affect the behavior of listed fish resulting in displacement and increased predation, decreased feeding, and increased competition, which will result in decreased survival, reduced growth and reduced fitness, respectively. Fewer than 10 percent captured are expected to die in the process of dewatering.

2) Take in the form of harm, injury and death to listed fish, due to pile driving. Expected impact thresholds for attenuated 60" piles are as follows: The 150dB RMS behavioral threshold is expected to be 4642 meters from the pile resulting in stress to fish, interruptions in migration, increased predation and decreased feeding within this range. The 187dB and 183 dB cumulative thresholds for injury to fish is expected to be 914 meters from the pile. The peak 206dB threshold for injury is expected to be 10 meters from the pile. Impacts to fish within this range includes injury or death. Expected impact thresholds for attenuated 14-16" piles are as follows: The 150dB RMS behavioral threshold is expected to be 1359 meters from the pile resulting in stress to fish, interruptions in migration, increased predation and decreased feeding within this range. The 187dB and 183 dB cumulative thresholds for injury to fish is expected to be 251 meters from the pile. The peak 206dB threshold for injury is expected to be 10 meters from the pile. Impacts to fish within this range includes injury or death. Due to the timing of the activity, actual numbers for each species is expected to be low.

3) Take in the form of harm to listed fish from loss and degradation of riparian and aquatic habitat leading to injury and death by creating habitat conditions that decrease productivity and prey availability and increase predation associated with the riparian removal and new bridge components. Permanent impacts on critical habitat total 1.87 acres (up to 57,600 square feet [1.32 acre] from bridge shading of aquatic habitat and new bridge piers; 24,126 square feet [0.55 acre] from RSP; and 84 square feet (0.002 acre) from bridge fender system).

   If the total acreage of temporary or permanent habitat impacts, including dewatering, as described above is exceeded by more than 10 percent for any impact, then anticipated take levels described are also exceeded, triggering the need to reinitiate consultation. The exceedances allow for flexibility in on-the-ground project changes that might be necessary. For example, the project is expected to dewater 0.15 acres. However, it is possible that the substrate within the originally proposed area could be too dense to facilitate placement of the cofferdams and minor adjustments will be necessary, such as shifting the boundaries of the cofferdam a few feet. Such exceedances within 10 percent are expected to result in minor additional impacts, which

remain consistent with the effects analyzed in this opinion. If monitoring indicates that sound levels greater than 206 dB peak, 187 dB or 183 dB cumulative SEL, or 150 dB RMS extend beyond the above described expected distances for pile size and attenuation type, work should stop and NMFS should be contacted within 24 hours, to determine if incidental take has been exceeded, or if sound levels can be reduced.

2.9.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Dewatering and fish relocation operations shall be conducted according to the specifications provided to NMFS, and the NMFS-approved supervising biologist(s) shall oversee all aspects of dewatering and fish handling operations.

2. Measures shall be taken to minimize the number of piles used and duration of pile driving and its potential impacts on listed salmonids and sturgeon, and to monitor the range and distance of high underwater sound levels generated by pile driving operations;

3. Measures shall be taken to minimize the effect of temporary and permanent habitat loss of riverine and riparian habitat;

4. Caltrans shall monitor and report on the amount or extent of incidental take.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and Caltrans or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). Caltrans or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. All aspects of fish relocation operations shall be supervised by at least one NMFS-approved biologist who shall be on site throughout each phase of the capture/relocation operation.

    b. A written plan for a fish relocation operation specific to this project shall be provided to NMFS for approval 60 days prior to implementation of the project.

The plan shall be thoroughly understood by all individuals that are to be involved and operations shall be conducted in strict accordance with the written plan.

2. The following terms and conditions implement reasonable and prudent measure 2:

    a. Attenuation measures shall be used during impact pile driving to control and dampen underwater pressure wave propagation. Effective attenuation measures include:

        i. Use of a bubble curtain around the pile.

        ii. Use of a dual-casing isolation system.

        iii. Use of a cushion block between the hammer and the pile.

    b. Real-time monitoring shall be conducted to ensure that underwater sound levels analyzed in this BO do not exceed the established distances described for pile driving construction. Monitoring shall follow NMFS standard practices of 1-2 hydrophones used, the first being placed at 10 m from the pile, mid-depth in the water column, and the second being placed further away near the isopleth estimated for the cumulative SEL distance;

    c. Caltrans shall submit to NMFS a monitoring and reporting plan that will incorporate provisions to provide daily, monthly, and seasonal summaries of all hydroacoustic monitoring results during the pile driving season for approval at least 60 days prior to the start of construction activities (FHWG 2013). In regards to the daily reports, Caltrans shall submit to NMFS a monitoring report (by close of business of the day following the pile-driving activities) that provides real-time data regarding the distance (actual or estimated using propagation models) to the thresholds (187 dB accumulated SEL and 150 dB RMS) stated in this BO to determine adverse effects to listed species.

3. The following terms and conditions implement reasonable and prudent measure 3:

    a. To control invasive species, all landscaping and revegetation shall consist of plants or seed mixes from native, locally adapted species.

    b. Caltrans shall limit the amount of RSP used for instream protection to the minimum amount needed for erosion and scour protection. Engineering plans shall be provided to the contractors that clearly show the amount of RSP to be placed.

    c. Caltrans shall submit to NMFS a Restoration and Mitigation Plan outlining the maintenance of all on-site and off-site mitigation. The plan shall include performance goals, monitoring plans, replanting plans, and an adaptive management plan for how mitigation will be addressed if the mitigation site fails.

d. Caltrans shall provide NMFS a post-construction field review and yearly field reviews for five years of the proposed project site, to assure conservation measures were adequately implemented and whether additional plantings are needed to establish adequate riparian vegetation. Caltrans should successfully re-vegetate at a rate of at least 80 percent at the project site. The first review should occur the year following construction completion. The field review shall include the following elements:

   i. Seasonal surveys to determine adequate cover and plant survival throughout the year is being met;

   ii. A survival ratio to ensure planting of new vegetation is implemented during the first five years when necessary; and

   iii. Photo point monitoring shots at the established repair site to be used as a tool to determine success and survival rates. The photos shall be taken annually on the same date, as much as practicable.

4. The following terms and conditions implement reasonable and prudent measure 4:

   a. Caltrans shall provide a report of Project activities to NMFS by December 31 of each construction year.

   b. The report shall include Project schedules, Project completions, and details regarding Project implementation for each given year.

   c. This report shall include a summary description of in-water constraint activities, avoidance and minimization measures taken, and any observed take incidents.

Updates and reports required by these terms and conditions shall be submitted to:

Assistant Regional Administrator
National Marine Fisheries Service
California Central Valley Office
650 Capitol Mall, Suite 5-100
Sacramento California 95814-4607
By email: ccvo.consultationrequests@noaa.gov

2.10. Reinitiation of Consultation

This concludes formal consultation for the City of West Sacramento Broadway Bridge Construction Project.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of

incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA , EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)]

This analysis is based, in part, on the EFH assessment provided by Caltrans and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The geographic extent of salmon freshwater EFH is described as all water bodies currently or historically occupied by PFMC managed salmon within the USGS 4th field hydrologic units identified by the fishery management plan (PFMC 2014). This designation includes the Sacramento River for all runs of Chinook salmon that historically and currently use these watersheds (winter-run, spring-run, fall-run, and late fall-run). The Pacific Coast salmon fishery management plan also identifies Habitat Areas of Particular Concern (HAPCs): complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation, of which the HAPC for complex channel and floodplain habitat are expected to be either directly or indirectly adversely affected by the proposed action.

3.2. Adverse Effects on Essential Fish Habitat

Effects to Pacific Coast salmon HAPCs for complex channel and floodplain habitat are discussed in the context of effects to critical habitat PBFs as designated under the ESA and described in section 2.5.2. A list of adverse effects to EFH HAPCs is included in this EFH consultation. The effects are expected to be similar to the impacts affecting critical habitat and include the following: in-channel disturbance from pile driving and dewatering, and permanent habitat loss/modification.

In-channel disturbance from pile driving

- Degraded water quality
- Reduction/change in aquatic macroinvertebrate production

In-channel disturbance from dewatering

- Degraded water quality
- Reduction/change in aquatic macroinvertebrate production

Permanent habitat loss/modification

- Reduced shelter from predators
- Reduction/change in aquatic macroinvertebrate production
- Reduced habitat complexity

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1) Bank erosion control should use vegetation methods or "soft" approaches (such as vegetative plantings and placement of woody material) to shoreline modifications whenever feasible. Hard bank protection should be a last resort and the following options should be explored (tree revetments, stream flow deflectors, and vegetative riprap).

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, for [*choose all applicable FMPs:* Pacific Coast salmon, Pacific Coast groundfish, coastal pelagic species, and U.S. West Coast highly migratory species].

3.4. Statutory Response Requirements

As required by section 305(b)(4)(B) of the MSA, Caltrans must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a

response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

Caltrans must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. Data Quality Act Documentation and Pre-Dissemination Review

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are Caltrans and the City of West Sacramento. Other interested users could the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. Individual copies of this opinion were provided to Caltrans. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 *et seq*., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion [*and EFH consultation, if applicable*] contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA [*and MSA implementation, if applicable*], and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Native American Heritage Commission 1550 Harbor Blvd, Suite 100 West Sacramento, CA 95691 (916) 373-3710 (916) 373-5471 Fax nahc@nahc.ca.gov	N/A	Early-mid 2017 (initial letter) 11/12/2019	N/A	5/30/2017: NAHC sent response letter addressed to Jason McCoy (City of West Sacramento), stating that the Sacred Lands File search identified sacred sites and tribal cultural resources within the project area. The letter stated that Crystal Martinez-Alire of the Ione Band of Miwok Indians and Jason Camp of the United Auburn Indian Community should be contacted for more information about potential sites and resources within the APE. The NAHC also provided a list of nine Native American contacts. 11/12/2019: S. Pappas sent updated SLF request to NAHC. 11/22/2019: S. Pappas received response from NAHC, indicated the results were positive and to contact the Ione Band of Miwok Indians and United Auburn Indian Community of the Auburn Rancheria for more info. The NAHC also provided an updated list of 12 NA contacts.
Buena Vista Rancheria Rhonda Morningstar Pope, Chairperson 1418 20th Street, Suite 200 Sacramento, CA 95811 rhonda@buenavistatribe. (916) 491-0011 Office (916) 491-0012 Fax	Me-Wuk/ Miwok	4/20/2018 1/30/2020	3/3/2020	4/20/2018: J. McCoy mailed Section 106 consultation letter to Rhonda Pope. 1/30/2020: J. McCoy mailed Section 106 consultation letter to Rhonda Pope. 2/27/2020: S. Pappas rec'd email from Richard Hawkins (THPO coordinator) stating that the tribe does not have any knowledge of resources in the area, and they have no objection to the project; however, if cultural resources are found, they would like to be notified. 3/3/2020: S. Pappas replied stating that ICF would put their info into the consultation record.

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Shingle Springs Band of Miwok Indians Nicholas Fonseca, Chairperson P.O. Box 1340 Shingle Springs, CA 95682 nfonseca@ssband.org (530) 387-1400	Miwok Maidu	4/20/2018	N/A	4/20/2018: J. McCoy mailed Section 106 consultation letter to Nicholas Fonseca. 6/21/2018: Mark Robinson (ICF) received consultation letter from Daniel Fonseca requesting to initiate consultation under Section 106 (and AB 52). He requested any and all record searches/surveys.
Shingle Springs Band of Miwok Indians Regina Cuellar, Chairperson P.O. Box 1340 Shingle Springs, CA 95682 rcuellar@ssband.org (530) 387-4970 (530) 387-8067 Fax	Miwok Maidu	1/30/2020	3/4/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to R. Cuellar. 2/26/2020: S. Pappas rec'd response letter from D. Fonseca stating the tribe would like to initiate consultation under AB 52 and Section 106. The tribe also requested all record searches/surveys in and around the project. 3/4/2020: S. Pappas Emailed K. Perry acknowledging receipt of the letter and sent information to City of West Sacramento to continue consultation. 12/18/2020: S. Pappas emailed K. Perry informing her of the project and cultural studies status. Will provide her with survey report when finished with Caltrans review. Also offered consultation meeting invite. S. Pappas also called K. Perry and left detailed voicemail discussing contents of email and requested continued outreach on behalf of COWS.

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Cortina Rancheria- Kletsel Dehe Band of Wintun Indians Charlie Wright, Chairperson P.O. Box 1630 Williams, CA 95987 (530) 473-3274 Office (530) 473-3301 Fax	Wintun Patwin	4/20/2018 1/30/2020	3/24/2020	4/20/2018: J. McCoy mailed Section 106 consultation letter to Charlie Wright. 1/30/2020: J. McCoy mailed Section 106 consultation letter to Charlie Wright. 3/24/2020: E. Allen called and left message with office

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

United Auburn Indian Community of the Auburn Rancheria Gene Whitehouse, Chairperson 10720 Indian Hill Road Auburn, CA 95603 bguth@auburnrancheria.com (530) 883-2390 Office (530) 883-2380 Fax	Maidu Miwok	7/11/2017 (AB 52) 4/20/2018 1/30/2020	3/24/2020	(AB 52) July 11, 2017 J. McCoy (City of West Sacramento, COWS) sent letter to Gene requesting consultation under AB 52. (AB 52) July 27, 2017: UAIC sent Email to J. McCoy requesting to consult on the project. Also asked for results of RS and assessments, GIS shapefiles for the project, tribal monitor for the project, and a field visit Aug 24 or Aug 28, 2017. Also provided recommendations and mitigation measures for the project. (AB 52) May 2, 2018: UAIC sent Email stated that they received an AB-52 letter from COWS notifying them of the project. (AB 52) May 18, 2018: ICF (Mark Robinson) rec'd letter from UAIC to COWS stating they would like to initiate consultation for the project and asked that Jason McCoy (COWS) contact Marcos Guerrero. 4/20/2018: J. McCoy mailed Section 106 consultation letter to Gene Whitehouse. 1/30/2020: J. McCoy mailed Section 106 consultation letter to Gene Whitehouse. 2/3/2020: J. McCoy mailed AB 52 consultation letter to Gene Whitehouse. 2/20/2020: J. McCoy rec'd AB 52 request letter from Gene. Advised to contact Anna Starkey (See below) 3/24/2020: E. Allen called front office and left message and contact info with receptionist

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
United Auburn Indian Community of the Auburn Rancheria Anna Starkey 10720 Indian Hill Road Auburn, CA 95603 astarkey@auburnrancheria.com (530) 883-2390 Office (530) 883-2380 Fax	Maidu Miwok		(AB 52) 6/4/2020 7/14/2020 8/3/2020 12/22/2020	6/4/2020: J. McCoy emailed A. Starkey confirming receipt of consultation AB 52 request letter. Asked for availability for consultation meetings June 15th through June 26th. 7/14/2020: J. McCoy called A. Starkey. Left detailed voice message 8/3/2020: J. McCoy emailed A. Starkey requesting meeting. 8/3/2020: A. Starkey emailed J. McCoy stating that UAIC is not aware of known tribal cultural resources in the project but is known to be culturally sensitive for deeply buried deposits. 12/22/2020: S. Pappas emailed A. Starkey advising of project updates and let her know that she will receive a copy of the survey report once it has been approved by Caltrans. That same day, Ms. Starkey responded acknowledging the update and asked about any additional studies. Mr. Pappas responded saying that evaluation/testing of a historic refuse site is anticipated.
Ione Band of Miwok Indians Sara Dutschke Setchwaelo, Chairperson 9252 Bush Street, Suite 2 Plymouth, CA 95669 sara@ionemiwok.net 209) 245-5800 (209) 256-9799	Miwok	1/30/2020	3/24/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to S. Dutschke Setchwaelo. 2/7/2020: S. Pappas rec'd emailed letter from Elizabeth Lydell, stating the letter has been sent to the Cultural Heritage Committee for review. 3/24/2020: E. Allen phoned front office. Reception is following up with cultural council regarding project, left name and email *See response from Cultural Committee (Jereme Dutschke)

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Ione Band of Miwok Indians Jereme Dutschke, Cultural Committee jereme@ionemiwok.net culturalcommittee@ionemiwok.net (209) 481-4300	Miwok	N/A	4/16/2020 12/18/2020 12/21/2020	4/16/2020: 3:39 PM Jereme Dutschke, Ione Cultural Committee (209) 481-4300, left a voicemail with Erik Allen, indicating that he would like to speak with an ICF archaeologist about the Broadway Bridge project. 4/16/2020: 4:00 PM S. Pappas spoke with Jereme who mentioned that Ione is interested in the project due to the proximity to the levees. Pappas mentioned that he would forward the information on to COWS for further information regarding consultation. 12/18/2020: S. Pappas emailed J. Dutschke informing him of the project and cultural studies status. Will provide him with survey report when finished with Caltrans review. Also offered consultation meeting invite. 12/21/2020: S. Pappas spoke with J. Dutschke discussing project elements, status on technical reports, and asked about the positive NAHC SLF results with IBMI as a contact. Jereme was not aware of any Sacred Sites in or near the project. Jereme also requested a copy of the survey report when Caltrans has finalized the document.
Ione Band of Miwok Indians Crystal Martinez, Chairperson P.O. Box 699 Plymouth, CA 95669 crystal@ionemiwok.org (209) 245-5800	Miwok	4/20/2018	N/A	4/20/2018: J. McCoy mailed Section 106 consultation letter to Crystal Martinez.

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Ione Band of Miwok Indians Randy Yonemura [no longer their rep.] P.O. Box 699 Plymouth, CA 95669 Randy_yonemura@yahoo.com (209) 245-5800 Office (916) 601-4069 Cell	Miwok	4/20/2018	N/A	4/20/2018: J. McCoy mailed Section 106 consultation letter to Randy Yonemura.
Wilton Rancheria Raymond Hitchcock, Chairperson 9728 Kent Street Elk Grove, CA 95624 rhitchcock@wiltonrancheria-nsn.gov (916) 683-6000 Office (916) 683-6015 Fax	Miwok	4/20/2018 (AB 52 and Section 106) 1/30/2020	3/24/2020	4/20/2018: J. McCoy mailed Section 106 consultation letter to Raymond Hitchcock. (AB 52) April 20, 2018: Jason McCoy sent letter to Raymond requesting consultation under AB 52. 1/30/2020: J. McCoy mailed Section 106 consultation letter to Raymond Hitchcock. 2/3/2020: J. McCoy mailed AB 52 consultation letter (See response from M. Mayberry below) 3/24/2020: E. Allen left a message with cultural resources department.
Wilton Rancheria Mariah Mayberry 9728 Kent Street Elk Grove, CA 95624 rhitchcock@wiltonrancheria-nsn.gov (916) 683-6000 (ext. 2023) Office (916) 683-6015 Fax	Miwok	2/10/2020	6/4/2020 7/14/2020 8/3/2020 (AB 52)	2/10/2020: J. McCoy rec'd email from Mariah Mayberry (916) 683-6000 (ext 2023) requesting consultation under AB 52. J. McCoy responded and requested her availability after June 15. 6/4, 7/14, 8/3/2020: J. McCoy sent Emails/calls to M. Mayberry requesting times to schedule a conference meeting.

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Yocha Dehe Wintun Nation Anthony Roberts, Chairperson P.O. Box 18 Brooks, CA 95606 aroberts@yochadehe-nsn.gov (530) 796-3400 (530) 796-2143 Fax	Wintu (Patwin)	1/30/2020	2/18/2020 3/4/2020 3/18/2020 6/4/2020 7/14/2020 8/3/2020 10/5/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to A. Roberts. 2/18/2020: S. Pappas rec'd letter from the THPO, requesting initiation of formal consultation with the lead agency and detailed project information, including any plans for ground disturbance. The letter also stated that the tribe requests a project timeline and the latest cultural study for the project. 3/4/2020: S. Pappas E-mailed YDWN stating receipt of the letter. 3/18/2020: J. McCoy rec'd email from Kristen Jensen requesting consultation call. 6/4, 7/14, 8/3: J. McCoy send follow-up emails to schedule a conference call. 10/5/2020: AB-52 and Section 106 consultation meetings occurred with YDWN. See meeting notes for details.
Yocha Dehe Wintun Nation Leland Kinter, Chairperson P.O. Box 18 Brooks, CA 95606 lkinter@yochadehe-nsn.gov (530) 796-3400 (530) 796-2143 Fax	Wintun (Patwin)	7/11/2017 (AB 52) 4/20/2018	N/A	7/11/2017 J. McCoy sent letter to Leland requesting consultation under AB 52 4/20/2018: J. McCoy mailed Section 106 consultation letter to Leland Kinter.
Nashville Enterprise Miwok-Maidu-Nishinam Tribe Cosme Valdez, Chairperson P.O. Box 580986 Elk Grove, CA 95758-001 valdezcome@comcast.net (916) 429-8047 Voice/Fax (916) 396-1173 Cell	Miwok	4/20/2018 1/30/2020	3/24/2020	4/20/2018: J. McCoy mailed Section 106 consultation letter to Cosme Valdez. 1/30/2020: J. McCoy mailed Section 106 consultation letter to Cosme Valdez. 3/24/2020: E. Allen left a message on cell number provided

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Broadway Bridge Project - Native American Coordination Tracking Log (Section 106 and AB 52)				
Name	Affiliation	Contact		Results
		Date Letter Mailed/E-mailed	Follow-up Date	
Tsi Akim Maidu Grayson Coney, Cultural Director P.O. Box 510 Browns Valley, CA 95918 Tsi-akim-maidu@att.net (530) 383-7234	Maidu	1/30/2020	3/24/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to G. Coney. Letter was returned to ICF and the address provided did not have a forwarding address. 3/24/2020: E. Allen spoke to Grayson Coney – does not wish to consult at this time, but mentioned that in the case of encountering human remains that a member of his tribe would be a candidate for MLD
Tsi Akim Maidu Don Ryberg, Chairperson P.O. Box 510 Browns Valley, CA 95918 Tsi-akim-maidu@att.net (530) 383-7234	Maidu	1/30/2020	3/24/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to D. Ryberg. 3/24/2020: E. Allen spoke to Grayson Coney – does not wish to consult at this time, but mentioned that in the case of encountering human remains that a member of his tribe would be a candidate for MLD (number provided for Don Ryberg was Grayson Coney's - he spoke on behalf of tribe)
Colfax-Todds Valley Consolidated Tribe Pamela Cubbler, Treasurer P.O. Box 4884 Auburn, CA 95604 PCubbler@colfaxrancheria.com (530) 320-3943	Miwok Maidu	1/30/2020	3/24/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter to P. Cubbler. 3/24/2020: E. Allen spoke to Ms. Cubbler who on behalf of tribe indicated that they did not need to consult so long as other tribes listed on this contact list were consulting on the project.
Colfax-Todds Valley Consolidated Tribe Clyde Prout, Chairman P.O. Box 4884 Auburn, CA 95604 miwokmaidu@yahoo.com (916) 577-3558	Miwok Maidu	1/30/2020	3/24/2020	1/30/2020: J. McCoy mailed Section 106 consultation letter C. Prout. 3/24/2020: E. Allen spoke to Ms. Cubbler who on behalf of tribe indicated that they did not need to consult so long as other tribes listed on this contact list were consulting on the project. (Ms. Cubbler spoke on behalf of Mr. Prout)

*Contacts in gray indicate they were not on the November 2019 list of contacts provided by the NAHC.

Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

☐ **CEQA Tribal Consultation List (AB 52)** – *Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2*

☒ **General Plan (SB 18)** - *Per Government Code § 65352.3.*

Local Action Type:

___ General Plan ___ General Plan Element ___ General Plan Amendment

___ Specific Plan ___ Specific Plan Amendment X Pre-planning Outreach Activity

Required Information

Project Title: Broadway Bridge Project

Local Government/Lead Agency: City of West Sacramento

Contact Person: Jason McCoy

Street Address: 1110 W. Capitol Avenue

City: West Sacramento **Zip:** 95691

Phone: 916-617-4832 **Fax:**

Email: mccoyj@cityofwestsacramento.org

Specific Area Subject to Proposed Action

County: Yolo / Sacramento **City/Community:** West Sacramento / Sacramento

Project Description:

Construct a new bridge across the Sacramento River connecting West Sacramento to Broadway Street in Sacramento.

Additional Request

☐ **Sacred Lands File Search** - *Required Information:*

USGS Quadrangle Name(s):

Township: **Range:** **Section(s):**

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471

May 30, 2017

Jason McCoy
City of West Sacramento

Sent by Email: mccoyj@cityofwestsacramento.org
Number of Pages: 2

RE: Broadway Bridge Project, Sacramento West, Sacramento and Yolo County

Dear Ms. Koenig:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* (SLF) was completed for the area of potential project effect (APE) for the above referenced project. Sacred sites and tribal cultural resources were identified in the project areas provided. Please contact Chairwoman, Crystal Martinez-Alire, of the Ione Band of Miwok Indians, at P.O. Box 699, Plymouth, CA 95669 and Jason Camp of the United Auburn Indian Community, at 10720 Indian Hill Road, Auburn, CA 95603 directly for more information about potential sites and resources within your APE.

The absence or presence site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE. Other sources of cultural resources information should be contacted regarding known and recorded sites. Please contact all of the people on the attached list. The list should provide a starting place to locate areas of potential adverse impact within the APE. I suggest you contact all of those listed, if they cannot supply information, they might recommend others with specific knowledge. **By contacting all those on the list, your organization will be better able to respond to claims of failure to consult under applicable laws.** If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: sharaya.souza@nahc.ca.gov.

Sincerely,

Sharaya Souza
Staff Services Analyst

Native American Heritage Commission
Tribal Consultation List
5/30/2017

Buena Vista Rancheria of Me-Wuk Indians
Rhonda Morningstar Pope, Chairperson
1418 20th Street, Suite 200 — Me-Wuk / Miwok
Sacramento , CA 95811
rhonda@buenavistatribe.com
(916) 491-0011 Office

Cortina Indian Rancheria of Wintun Indians
Charlie Wright, Chairperson
P.O. Box 1630 — Wintun / Patwin
Williams , CA 95987
(530) 473-3274 Office
(530) 473-3301 Fax

Ione Band of Miwok Indians
Crystal Martinez, Chairperson
P.O. Box 699 — Miwok
Plymouth , CA 95669
Crystal@ionemiwok.org
(209) 245-5800 Office

Ione Band of Miwok Indians
Randy Yonemura
PO BOX 699 — Miwok
Plymouth , CA 95669
randy_yonemura@yahoo.com
(209) 245-5800 Office
(916) 601-4069 Cell

Nashville-Eldorado Miwok
Cosme Valdez, Interim Chief Executive Officer
P.O. Box 580986 — Miwok
Elk Grove , CA 95758
valdezcome@comcast.net
(916) 429-8047 Voice/Fax

Shingle Springs Band of Miwok Indians
Nicholas Fonseca, Chairperson
P.O. Box 1340 — Miwok
Shingle Springs , CA 95682 — Maidu
nfonseca@ssband.org
(530) 387-1400

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
(530) 883-2390 Office

Wilton Rancheria
Raymond Hitchcock, Chairperson
9728 Kent Street — Miwok
Elk Grove , CA 95624
rhitchcock@wiltonrancheria-nsn.gov
(916) 683-6000 Office

Yocha Dehe Wintun Nation
Leland Kinter, Chairperson
P.O. Box 18 — Wintun (Patwin)
Brooks , CA 95606
lkinter@yochadehe-nsn.gov
(530) 796-3400
(530) 796-2143 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Public Resources Code Sections 21080.1, 21080.3.1, and 21080.3.2 for the proposed Broadway Bridge Project, Sacramento West, Sacramento and Yolo County.

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Friday, April 20, 2018

The Honorable Raymond Hitchcock, Chairperson
Wilton Rancheria
9728 Kent Street
Elk Grove, CA 95624

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Hitchcock:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

Please consider this letter as the initiation of Section 106 consultation pursuant to the National Historic Preservation Act. The City of West Sacramento requests information you may have regarding sites, traditional cultural properties, values, or other cultural resource considerations within the project area so this information may be incorporated into the planning phase of the project.

ICF archaeologist Mark C. Robinson is a consultant representing the City of West Sacramento, and can serve as a point of contact for this Section 106 consultation. At this point in the project, a survey has not yet been completed. A record search has been completed, and one historic-period archaeological site is located in the project footprint, CA-SAC-505H. This site consists of a 300-foot length of abandoned railroad grade and a refuse scatter.

Your comments and concerns will be important to the City of West Sacramento as they move forward with their project. If you have any questions or concerns with the project, please contact Mark C. Robinson via email (mark.robinson@icf.com) or at his office (916-231-7608). Mr. Robinson's mailing address is:

Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

The Honorable Rhonda Morningstar Pope, Chairperson
Buena Vista Rancheria of Me-Wuk Indians
1418 20th Street, Suite 200
Sacramento, CA 95811

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Pope:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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ICF
630 K Street, Suite 400
Sacramento, CA 95814

If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

The Honorable Charlie Wright, Chairperson
Cortina Indian Rancheria of Wintun Indians
P.O. Box 1630
Williams, CA 95987

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Wright:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

The Honorable Leland Kinter, Chairperson
Yocha Dehe Wintun Nation
P.O. Box 18
Brooks, CA 95606

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Kinter:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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Your comments and concerns will be important to the City of West Sacramento as they move forward with their project. If you have any questions or concerns with the project, please contact Mark C. Robinson via email (mark.robinson@icf.com) or at his office (916-231-7608). Mr. Robinson's mailing address is:

Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

The Honorable Gene Whitehouse, Chairperson
United Auburn Indian Community of the Auburn Rancheria
10720 Indian Hill Road
Auburn, CA 95603

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Whitehouse:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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630 K Street, Suite 400
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If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

The Honorable Nicholas Fonseca, Chairperson
Shingle Springs Band of Miwok Indians
P.O. Box 1340
Shingle Springs, CA 95682

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Fonseca:

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Your comments and concerns will be important to the City of West Sacramento as they move forward with their project. If you have any questions or concerns with the project, please contact Mark C. Robinson via email (mark.robinson@icf.com) or at his office (916-231-7608). Mr. Robinson's mailing address is:

Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

CITY OF WEST SACRAMENTO

CITY HALL
1110 West Capitol Avenue
West Sacramento, CA 95691

City Council
(916) 617-4500

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(916) 617-4567
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(916) 617-4620
Recreation Center
2801 Jefferson Boulevard
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(916) 617-4770
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1075 West Capitol Avenue
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(916) 617-5320

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2040 Lake Washington Boulevard
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(916) 617-4600

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550 Jefferson Boulevard
West Sacramento, CA 95605
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1951 South River Road
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(916) 617-4850

www.cityofwestsacramento.org

Friday, April 20, 2018

The Honorable Cosme Valdez, Interim CEO
Nashville-Eldorado Miwok
P.O. Box 580986
Elk Grove, CA 95758

Reference: Federal Project #TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Interim CEO Valdez:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

Please consider this letter as the initiation of Section 106 consultation pursuant to the National Historic Preservation Act. The City of West Sacramento requests information you may have regarding sites, traditional cultural properties, values, or other cultural resource considerations within the project area so this information may be incorporated into the planning phase of the project.

ICF archaeologist Mark C. Robinson is a consultant representing the City of West Sacramento, and can serve as a point of contact for this Section 106 consultation. At this point in the project, a survey has not yet been completed. A record search has been completed, and one historic-period archaeological site is located in the project footprint, CA-SAC-505H. This site consists of a 300-foot length of abandoned railroad grade and a refuse scatter.

Your comments and concerns will be important to the City of West Sacramento as they move forward with their project. If you have any questions or concerns with the project, please contact Mark C. Robinson via email (mark.robinson@icf.com) or at his office (916-231-7608). Mr. Robinson's mailing address is:

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ICF
630 K Street, Suite 400
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3

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Friday, April 20, 2018

Mr. Randy Yonemura
Ione Band of Miwok Indians
P.O. Box 699
Plymouth, CA 95669

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Mr. Yonemura:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

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(916) 617-4850

www.cityofwestsacramento.org

Friday, April 20, 2018

The Honorable Crystal Martinez, Chairperson
Ione Band of Miwok Indians
P.O. Box 699
Plymouth, CA 95669

Reference: Federal Project # TGR2DGL-5447(043) Broadway Bridge Project

Subject: **Invitation to Consult under Section 106 of the National Historic Preservation Act for the Broadway Bridge Project, City of West Sacramento and City of Sacramento**

Dear Honorable Chairperson Martinez:

The City of West Sacramento, in conjunction with the City of Sacramento and the California Department of Transportation (Caltrans), is proposing to construct a new bridge from West Sacramento to Sacramento, across the Sacramento River. This proposed bridge, currently referred to as the Broadway Bridge, will be a new crossing of the Sacramento River downstream of the U.S. 50 Pioneer Bridge, connecting South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento (see attached map). Several bridge alignment alternatives are being considered as part of the project. The new bridge will be moveable to allow boat passage and will carry vehicular, bicycle and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge itself. No streetcar use is proposed as part of this project; any future streetcar expansion would be considered separately. The project also includes installation of a bridge interconnect fiber optic line to allow the new bridge, and I Street and Tower Bridges, to be operated by one system. Due to federal funding, Caltrans will provide oversight to ensure compliance with Section 106 of the National Historic Preservation Act as well as other federal laws and regulations.

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Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

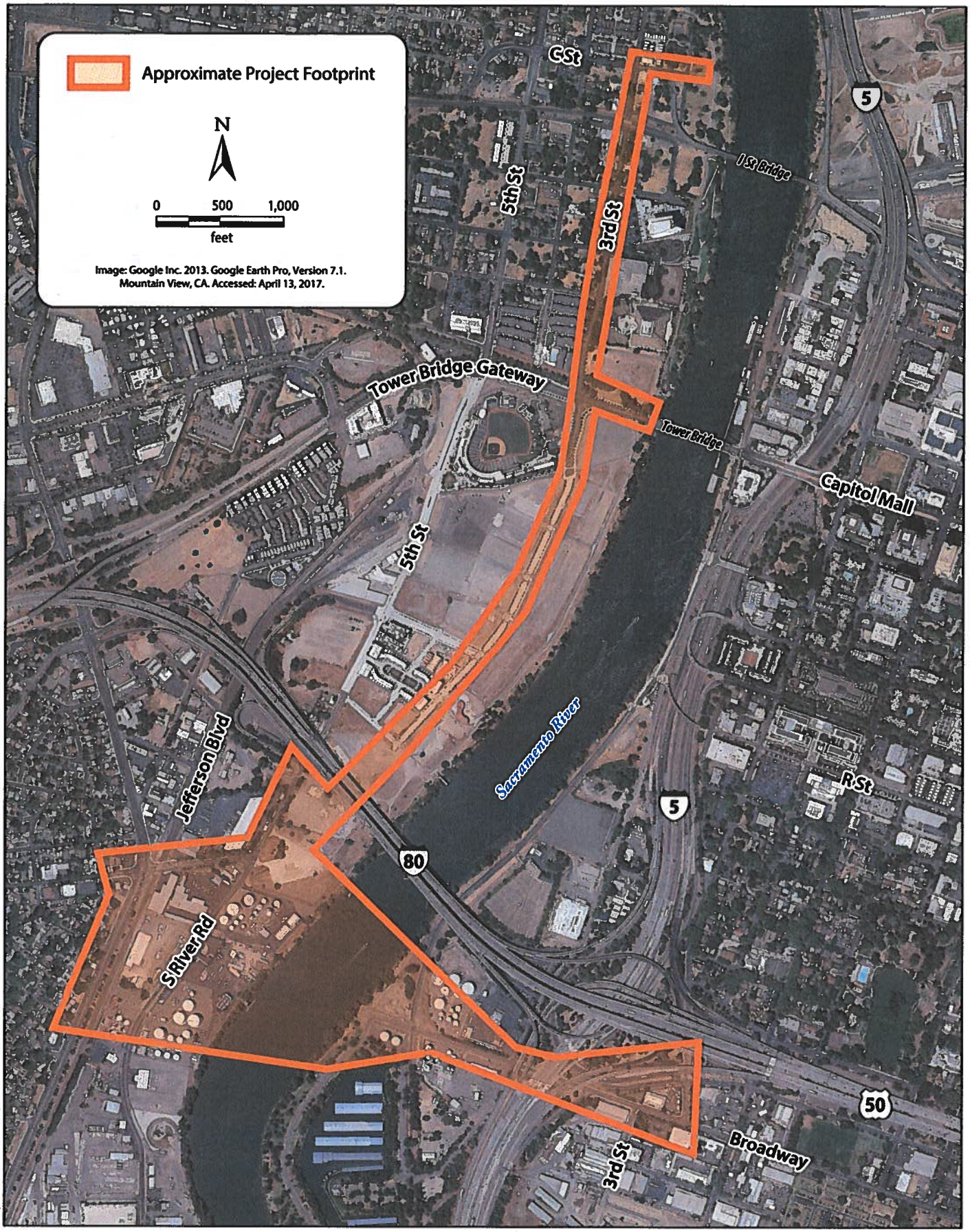
If you have questions regarding the content of this letter you can contact me at mccoyj@cityofwestsacramento.org or 916-617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Public Works Department

ATTACHMENT: Project Location Map

CC: David Price, Caltrans District 3



Graphics ... 205.17 6/12/2017) TG

Broadway Bridge
Project Location

SHINGLE SPRINGS BAND
OF MIWOK INDIANS

Shingle Springs Rancheria
(Verona Tract), California
5168 Honpie Road
Placerville, CA 95667
Phone: 530-676-8010
shinglespringsrancheria.com

CULTURAL RESOURCES

June 16, 2018

Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

Dear Mark C. Robinson,

The Most Likely Descendant, Daniel Fonseca would like to initiate consultation process with you in regard to the Broadway Bridge TGR2DGL-5447 (043) in Sacramento County. Among other things, we would like this consultation to address the cultural and historic resource issues, pursuant to the regulations implementing Section 106 of the National Historic Preservation Act and Assembly Bill 52.

Prior to meeting we would like to request any and all completed record searches and/or surveys that were done in/around the project area up to and including environmental, archaeological and cultural reports.

Please let this letter serve as a formal request for the Shingle Springs Band Of Miwok Indians to be added as a consulting party in identifying any Tribal Cultural Properties (TCPs) that may exist within the project's Area of Potential Effects (APE).

Please contact Kara Perry, Cultural Outreach Coordinator, (530) 488-4049, kperry@ssband.org, to schedule a consultation pursuant to Section 106 of the NHPA and Assembly 52.

Sincerely,

Daniel Fonseca
Cultural Resource Director
Tribal historic Preservation Officer (THPO)
Most Likely Descendant (MLD)

SHINGLE SPRINGS BAND OF MIWOK INDIANS
P.O. BOX 1340
SHINGLE SPRINGS, CA 95682-1340

SACRAMENTO
CA 957
21 JUN '18
PM 1 L

NEOPOST FIRST-CLASS MAIL
05/17/2018
US POSTAGE $000.47⁰

ZIP 95667
041L11256101

Mark C. Robinson
ICF
630 K Street, Suite 400
Sacramento, CA 95814

95814-333100

From:	Pappas, Steve
To:	"NAHC@NAHC"
Cc:	Pappas, Steve; Sorvari, Tina
Subject:	Broadway Bridge SLF request
Date:	Tuesday, November 12, 2019 10:20:00 AM
Attachments:	SLF_Broadway_11_12_19.pdf image001.png

Dear NAHC staff,

Could you please conduct a Sacred Lands File search and provide a Native American contact list for the attached project? If you have any questions, please feel free to contact me.

Thank you,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

Sacred Lands File & Native American Contacts List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Project: Broadway Bridge ___

County: Sacramento and Yolo

USGS Quadrangle Name: Sacramento West

Township: 8N, 9N Range: 4E Section(s): Unsectioned

Company/Firm/Agency: ICF

Street Address: 980 9th Street, Suite 1200

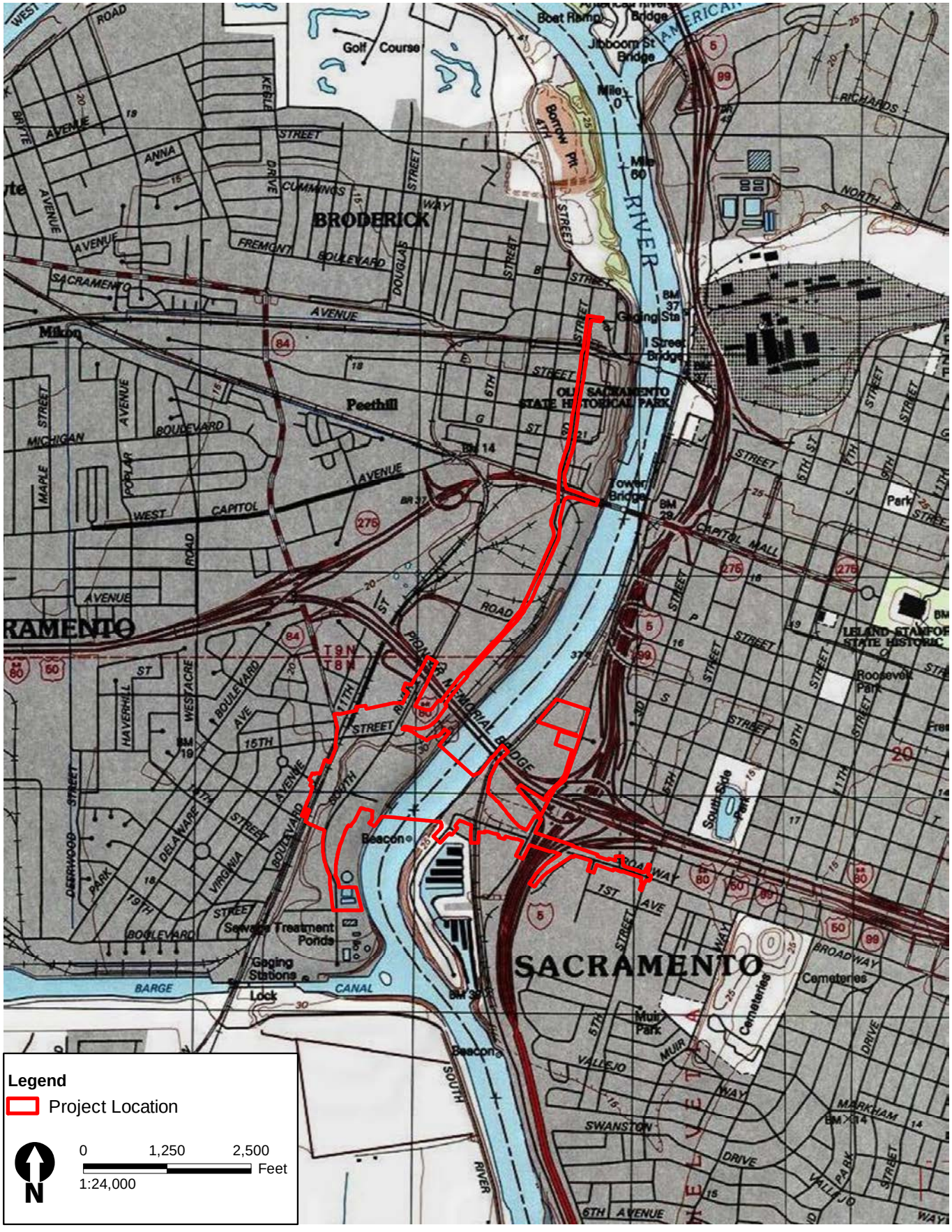
City: Sacramento Zip:95814

Phone: 916-231-7649

Fax:

Email: Steve.pappas@icf.com

Project Description: Project consists of constructing a bridge over the Sacramento River connecting to the cities of West Sacramento and Sacramento. The bridge will extend from Broadway (Sacramento side) to somewhere around 15th Street (West Sacramento side).



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Project Location
Broadway Bridge

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov
Twitter: @CA_NAHC

November 22, 2019

Steve Pappas
ICF

VIA Email to: Steve.Pappas@icf.com

RE: Broadway Bridge, Sacramento and Yolo Counties

Dear Mr. Pappas:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive. Please contact the Ione Band of Miwok Indians and the United Auburn Indian Community of the Auburn Rancheria on the attached list for more information. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez-Lopez
Staff Services Analyst

Attachment

Native American Heritage Commission
Native American Contacts List
November 22, 2019

Buena Vista Rancheria of Me-Wuk Indians
Rhonda Morningstar Pope, Chairperson
1418 20th Street, Suite 200 Me-Wuk / Miwok
Sacramento ,CA 95811
rhonda@buenavistatribe.com
(916) 491-0011 Office
(916) 491-0012 Fax

Colfax-Todds Valley Consolidated Tribe
Pamela Cubbler, Treasurer
P.O. Box 4884 Miwok
Auburn ,CA 95604 Maidu
PCubbler@colfaxrancheria.com
(530) 320-3943

Colfax-Todds Valley Consolidated Tribe
Clyde Prout, Chairman
P.O. Box 4884 Miwok
Auburn ,CA 95604 Maidu
miwokmaidu@yahoo.com
(916) 577-3558

Cortina Rancheria - Kletsel Dehe Band of Wintun Indians
Charlie Wright, Chairperson
P.O. Box 1630 Wintun / Patwin
Williams ,CA 95987
(530) 473-3274 Office
(530) 473-3301 Fax

Ione Band of Miwok Indians
Sara Dutschke Setchwaelo, Chairperson
9252 Bush Street, Suite 2 Miwok
Plymouth ,CA 95669
sara@ionemiwok.net
(209) 245-5800
(209) 256-9799

Nashville Enterprise Miwok-Maidu-Nishinam Tribe
Cosme A. Valdez, Chairperson
P.O. Box 580986 Miwok
Elk Grove ,CA 95758-001
valdezcome@comcast.net
(916) 429-8047 Voice/Fax
(916) 396-1173 Cell

Shingle Springs Band of Miwok Indians
Regina Cuellar, Chairperson
P.O. Box 1340 Miwok
Shingle Springs ,CA 95682 Maidu
rcuellar@ssband.org
(530) 387-4970
(530) 387-8067 Fax

Tsi Akim Maidu
Grayson Coney, Cultural Director
P.O. Box 510 Maidu
Browns Valley ,CA 95918
tsi-akim-maidu@att.net
(530) 274-7497

Tsi Akim Maidu
Don Ryberg, Chairperson
P.O. Box 510 Maidu
Browns Valley ,CA 95918
tsi-akim-maidu@att.net
(530) 383-7234

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road Maidu
Auburn ,CA 95603 Miwok
bguth@auburnrancheria.com
(530) 883-2390 Office
(530) 883-2380 Fax

This list is current as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code,Section 5097.94 of the Public Resources Code, or Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans Tribes for the proposed:
Broadway Bridge, Sacramento and Yolo Counties.

Native American Heritage Commission
Native American Contacts List
November 22, 2019

Wilton Rancheria
Raymond Hitchcock, Chairperson
9728 Kent Street
Elk Grove ,CA 95624
rhitchcock@wiltonrancheria-nsn.gov
(916) 683-6000 Office
(916) 683-6015 Fax

Miwok

Yocha Dehe Wintun Nation
Anthony Roberts, Chairperson
P.O. Box 18
Brooks ,CA 95606
aroberts@yochadehe-nsn.gov
(530) 796-3400
(530) 796-2143 Fax

Wintun (Patwin)

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Broadway Bridge, Sacramento and Yolo Counties.

CITY OF WEST SACRAMENTO

January 30, 2020

Grayson Coney, Cultural Director
Tsi Akim Maidu
P.O. Box 510
Browns Valley, CA 95918

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Mr. Coney:

This letter is an invitation to the Tsi Akim Maidu (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

The Project footprint covers areas under the jurisdiction of the City of West Sacramento, the City of Sacramento, and the California Department of Transportation (Caltrans). As such, the agencies are working together on the Project, but the City of West Sacramento, on behalf of Caltrans, will have primary planning responsibility. Federal funding parameters require Caltrans to provide oversight to ensure compliance with Section 106 as well as other federal laws and regulations.

In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.
Archaeological surveys including field surveys, record searches, and identification efforts, have shown that one historic-period archaeological site is located within the Project footprint, CA-SAC-

Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

505H. This archeological site consists of 300-feet of abandoned railroad grade and an historic-age refuse scatter.

Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

Pamela Cubbler, Treasurer
Colfax-Todds Valley Consolidated Tribe
P.O. Box 4884
Auburn, CA 95604

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Ms. Cubbler:

This letter is an invitation to the Colfax-Todds Valley Consolidated Tribe (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.

Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

Archaeological surveys including field surveys, record searches, and identification efforts, have shown that one historic-period archaeological site is located within the Project footprint, CA-SAC-505H. This archeological site consists of 300-feet of abandoned railroad grade and an historic-age refuse scatter.

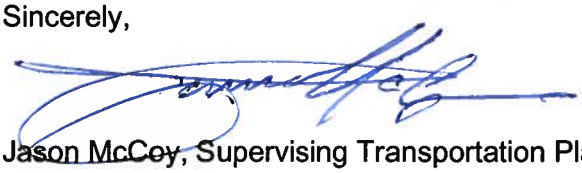
Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,



Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Regina Cuellar, Chairperson
Shingle Springs Band of Miwok Indians
P.O. Box 1340
Shingle Springs, CA 95682

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Ms. Cuellar:

This letter is an invitation to the Shingle Springs Band of Miwok Indians (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

The Project footprint covers areas under the jurisdiction of the City of West Sacramento, the City of Sacramento, and the California Department of Transportation (Caltrans). As such, the agencies are working together on the Project, but the City of West Sacramento, on behalf of Caltrans, will have primary planning responsibility. Federal funding parameters require Caltrans to provide oversight to ensure compliance with Section 106 as well as other federal laws and regulations.

In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. In response to that letter, Daniel Fonseca replied requesting to initiate consultation under Section 106. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.

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1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

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Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Raymond Hitchcock, Chairperson
Wilton Rancheria
9728 Kent Street
Elk Grove, CA 95624

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Hitchcock:

This letter is an invitation to the Wilton Rancheria (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

The Project footprint covers areas under the jurisdiction of the City of West Sacramento, the City of Sacramento, and the California Department of Transportation (Caltrans). As such, the agencies are working together on the Project, but the City of West Sacramento, on behalf of Caltrans, will have primary planning responsibility. Federal funding parameters require Caltrans to provide oversight to ensure compliance with Section 106 as well as other federal laws and regulations.

In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

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Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

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Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Rhonda Morningstar Pope, Chairperson
Buena Vista Rancheria of Me-Wuk Indians
1418 20th Street, Suite 200
Sacramento, CA 95811

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Pope:

This letter is an invitation to the Buena Vista Rancheria of Me-Wuk Indians (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.

Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

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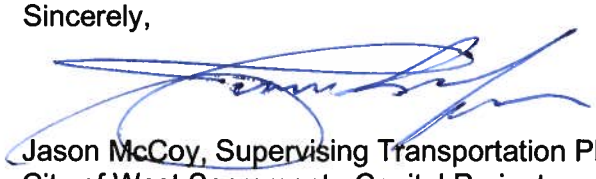
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,



Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Clyde Prout, Chairman
Colfax-Todds Valley Consolidated Tribe
P.O. Box 4884
Auburn, CA 95604

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Mr. Prout:

This letter is an invitation to the Colfax-Todds Valley Consolidated Tribe (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Anthony Roberts, Chairperson
Yocha Dehe Wintun Nation
P.O. Box 18
Brooks, CA 95606

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Roberts:

This letter is an invitation to the Yocha Dehe Wintun Nation (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Don Ryberg, Chairperson
Tsi Akim Maidu
P.O. Box 510
Browns Valley, CA 95918

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Mr. Ryberg:

This letter is an invitation to the Tsi Akim Maidu (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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980 9th Street, Suite 1200
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Sara Dutschke Setchwaelo, Chairperson
Ione Band of Miwok Indians
9252 Bush Street, Suite 2
Plymouth, CA 95669

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Setchwaelo:

This letter is an invitation to the Ione Band of Miwok Indians (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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980 9th Street, Suite 1200
Sacramento, CA 95814

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Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Charlie Wright, Chairperson
Cortina Rancheria- Klestel Dehe Band of Wintun Indians
P.O. Box 1630
Williams, CA 95987

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Wright:

This letter is an invitation to the Cortina Indian Rancheria of Wintun Indians (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

The Project footprint covers areas under the jurisdiction of the City of West Sacramento, the City of Sacramento, and the California Department of Transportation (Caltrans). As such, the agencies are working together on the Project, but the City of West Sacramento, on behalf of Caltrans, will have primary planning responsibility. Federal funding parameters require Caltrans to provide oversight to ensure compliance with Section 106 as well as other federal laws and regulations.

In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.

Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

Archaeological surveys including field surveys, record searches, and identification efforts, have shown that one historic-period archaeological site is located within the Project footprint, CA-SAC-505H. This archeological site consists of 300-feet of abandoned railroad grade and an historic-age refuse scatter.

Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Cosme Valdez, Chairperson
Nashville Enterprise Miwok-Maidu-Nishinam Tribe
P.O. Box 580986
Elk Grove, CA 95758-001

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Mr. Valdez:

This letter is an invitation to the Nashville-Eldorado Miwok (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

The Project footprint covers areas under the jurisdiction of the City of West Sacramento, the City of Sacramento, and the California Department of Transportation (Caltrans). As such, the agencies are working together on the Project, but the City of West Sacramento, on behalf of Caltrans, will have primary planning responsibility. Federal funding parameters require Caltrans to provide oversight to ensure compliance with Section 106 as well as other federal laws and regulations.

In April 2018, the City of West Sacramento sent the Tribe a letter to initiate Section 106 consultation on the proposed Project. Shortly thereafter, the City of West Sacramento decided to pause the project, including any planning and consultation activities. Now that the Project is active again, the City of West Sacramento is renewing its invitation to consult on the Project.

The proposed Broadway Bridge will be a new crossing of the Sacramento River immediately south of the U.S. 50 Pioneer Bridge. It will connect South River Road or 15th Street in West Sacramento to the Broadway corridor in Sacramento. The proposed bridge will allow vehicular, bicycle, and pedestrian traffic, and accommodate future transit options, including a streetcar alignment within the bridge. No streetcar use is proposed as part of this Project; any future streetcar expansion would be considered separately. The proposed bridge will be moveable to permit boat passage, and interconnected fiber optic lines will be installed to allow the proposed bridge, the I Street Bridge, and the Tower Bridge to be operated as one system.

Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

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Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,

Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3

CITY OF WEST SACRAMENTO

January 30, 2020

The Honorable Gene Whitehouse, Chairperson
United Auburn Indian Community of the Auburn Rancheria
10702 Indian Hill Road
Auburn, CA 95603

RE: Invitation for Tribal Consultation on the Broadway Bridge Project pursuant to Section 106 of the National Historic Preservation Act, Federal Project # TGR2DGL-5447(043)

Dear Honorable Chairperson Whitehouse:

This letter is an invitation to the United Auburn Indian Community of the Auburn Rancheria (hereafter "Tribe") to consult with the City of West Sacramento pursuant to Section 106 of the National Historic Preservation Act (Section 106) on the proposed Broadway Bridge project to construct a bridge across the Sacramento River, from the City of West Sacramento to the City of Sacramento (hereafter "Project"). A map of the Project footprint, which includes areas potentially impacted by the Project and proposed Project alternatives, is attached. Our records indicate that the Tribe may attach cultural significance to a portion of the Project footprint. Therefore, the City of West Sacramento invites you to participate in consultation with the cities of Sacramento and West Sacramento, which will include an opportunity to discuss specific sites, traditional cultural properties, uses, or other cultural resource considerations within the Project area that should be considered during Project planning.

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Capital Projects and Transportation Department
1110 West Capitol Avenue
West Sacramento, CA 95691
(916) 617-4980

Archaeological surveys including field surveys, record searches, and identification efforts, have shown that one historic-period archaeological site is located within the Project footprint, CA-SAC-505H. This archeological site consists of 300-feet of abandoned railroad grade and an historic-age refuse scatter.

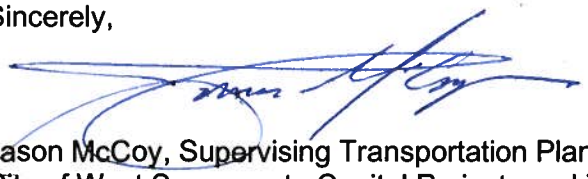
Your comments, concerns, and specialized knowledge of the Project area are important to the City of West Sacramento as it moves forward with Project planning. The City will work to maintain the information's confidentiality, as a matter of respect and as required by law. If you have knowledge of additional historic or traditional cultural properties within the Project footprint, the City of West Sacramento invites you to share such information confidentially during consultation.

If you would like to participate in tribal consultation for this Project, please contact ICF archaeologist Stephen Pappas. While not required, the City would appreciate your response within 30 days. You may reach him via email at steve.pappas@icf.com, via phone at (916) 231-7649, or via mail or in person at the following address.

Stephen Pappas
ICF
980 9th Street, Suite 1200
Sacramento, CA 95814

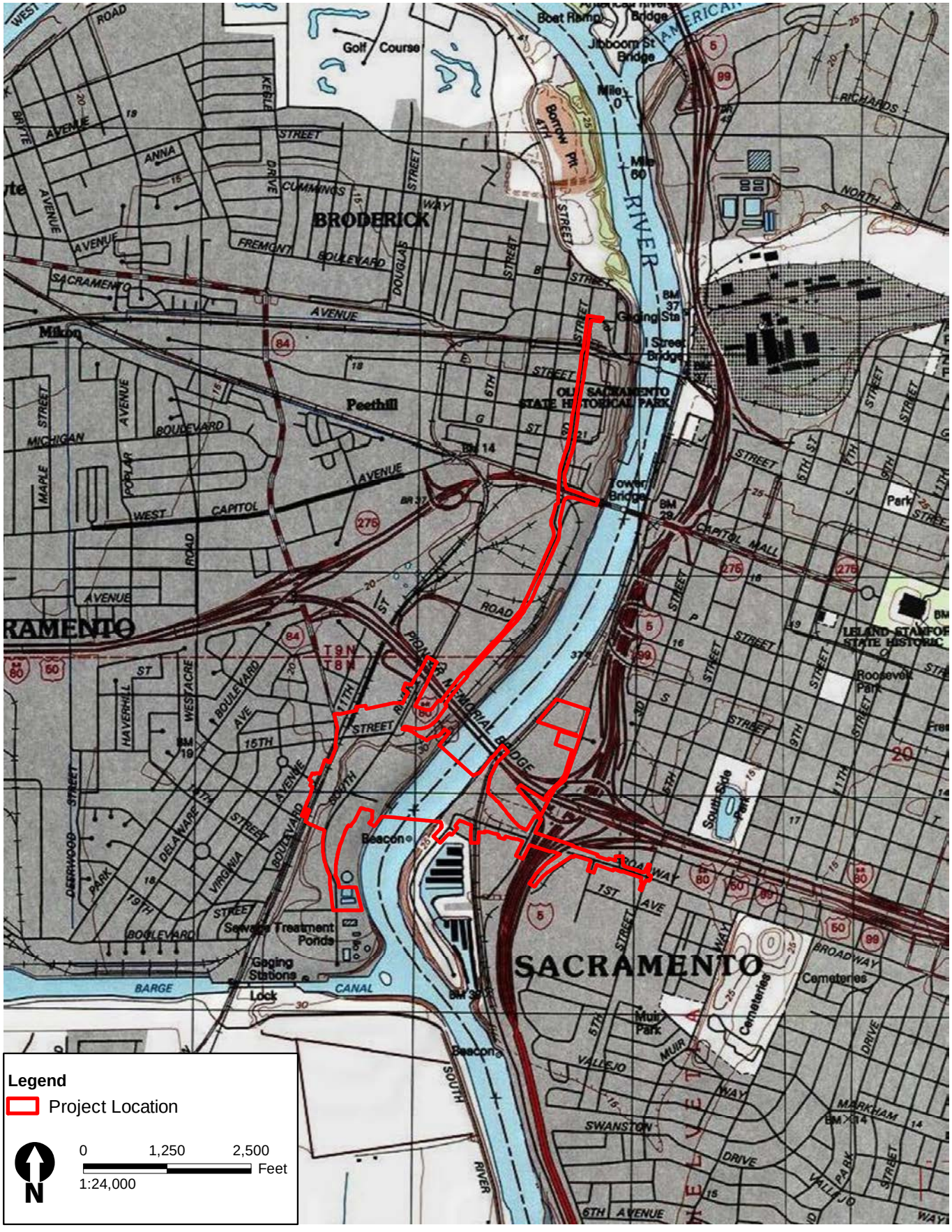
If you have questions regarding the content of this letter, please contact me at mccoyj@cityofwestsacramento.org or (916) 617-4832.

Sincerely,



Jason McCoy, Supervising Transportation Planner
City of West Sacramento Capital Projects and Transportation Department

Enclosure: Project Footprint Map
cc: Lisa Machado, Caltrans D3



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Project Location
Broadway Bridge

Ione Band of Miwok Indians
A Federally Recognized Sovereign Tribe

February 6, 2020

Via email to: steve.pappas@icf.com

Stephen Pappas
ICF
980 9th Street Suite 1200
Sacramento CA 95814

Dear Steven,

We are in receipt of your letter dated December 5, 2019 which you request comments and input from the Ione Band of Miwok Indians ("Tribe") regarding Broadway Bridge Project, Federal Project #TGR2DGL-5447(043). Your request has been forwarded on to the Tribe's Cultural Heritage Committee for review, consideration and comment. The Cultural Heritage Committee generally meets on a bi-monthly basis and we will consider your request at their next regularly-scheduled meetings. Please be advised that the Committee is made up of volunteers and, as a result, it may take some time before they are able to respond substantively to your request. We will, however, make a good faith effort to get back to you as soon as possible.

If the cultural resources inventory report has been prepared, but was not included in the submittal, please send the report at the earliest possible date. Once receive, the Committee will prioritize review of the report.

The Cultural Heritage Committee is responsible for reviewing and making recommendations with regard to requests such as yours so please feel free to correspond directly with us via email to CulturalCommittee@ionemiwok.net, with a copy to Tribal Chairperson Sara Dutschke Setshwaelo (sara@ionemiwok.net).

Again, thank you for requesting the comments of the Tribe. We look forward to working with you in the future.

Sincerely

Elizabeth Lydell
Cultural Heritage Committee Chairperson

PO Box 699 9252 Bush Street • Plymouth • CA 95669 • Ph: 209-245-5800 • Fax 209-245-3112 www.ionemiwok.org

YOCHA DEHE
CULTURAL RESOURCES

February 7, 2020

City of West Sacramento
Attn: Stephen Pappas, ICF Archaeologist
980 9th Street, Suite 1200
Sacramento, CA 95814

RE: Broadway Bridge Project

Dear Mr. Pappas:

Thank you for your project notification letter dated, January 30, 2020, regarding cultural information on or near the proposed Broadway Bridge Project, Yolo and Sacramento Counties. We appreciate your effort to contact us and wish to respond.

The Cultural Resources Department has reviewed the project and concluded that it is within the aboriginal territories of the Yocha Dehe Wintun Nation. Therefore, we have a cultural interest and authority in the proposed project area and would like to initiate a formal consultation with the lead agency. In addition, we would like to request detailed project information, including any plans for ground disturbance.

At the time of consultation, please provide our Cultural Resources Department with a project timeline and the latest cultural study for the proposed project.

Please contact the following individual to coordinate a date and time for the consultation meeting:

Kristin Jensen, CRD Administrative Assistant
Yocha Dehe Wintun Nation
Office: (530) 796-0105
Email: kjensen@yochadehe-nsn.gov

Please refer to identification number YD-07192017-01 in any correspondence concerning this project.

Thank you for providing us the opportunity to comment.

Sincerely,

Tribal Historic Preservation Officer

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MAILED FROM ZIP CODE 95606

City of West Sacramento
Attn: Stephen Pappas
980 9th Street, Suite 1200
Sacramento, CA 95814

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SHINGLE SPRINGS BAND
OF MIWOK INDIANS

Shingle Springs Rancheria
(Verona Tract), California
5168 Honpie Road
Placerville, CA 95667
Phone: 530-676-8010
shinglespringsrancheria.com

CULTURAL RESOURCES

February 24, 2020

ICF
Stephen Pappas
980 9th Street, Suite 1200
Sacramento, CA 95814

Dear Stephen Pappas,

The Most Likely Descendant, Daniel Fonseca would like to initiate consultation process with you in regard to the Broadway Bridge Project in Sacramento County. Among other things, we would like this consultation to address the cultural and historic resource issues, pursuant to the regulations implementing Section 106 of the National Historic Preservation Act and Assembly Bill 52.

Prior to meeting we would like to request any and all completed record searches and/or surveys that were done in/around the project area up to and including environmental, archaeological and cultural reports.

Please let this letter serve as a formal request for the Shingle Springs Band Of Miwok Indians to be added as a consulting party in identifying any Tribal Cultural Properties (TCPs) that may exist within the project's Area of Potential Effects (APE).

Please contact Kara Perry, Site Protection Manager, (530) 488-4049, kperry@ssband.org, to schedule a consultation pursuant to Section 106 of the NHPA and AB 52.

Sincerely,

Daniel Fonseca
Cultural Resource Director
Tribal Historic Preservation Officer (THPO)
Most Likely Descendant (MLD)

SHINGLE SPRINGS BAND OF MIWOK INDIANS
P.O. BOX 1340
SHINGLE SPRINGS, CA 95682-1340

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ICF
Stephen Pappas
980 9th Street, Suite 1200
Sacramento, CA 95814

9514-27159

From:	Pappas, Steve
To:	"kperry@ssband.org"
Cc:	Bromund, Claire; "McCoy, Jason"
Subject:	Consultation for Broadway Bridge project
Date:	Wednesday, March 4, 2020 3:30:00 PM
Attachments:	image001.png

Good afternoon Kara,

I wanted to let you know that we received the Shingle Springs Band of Miwok Indians letter (postmarked February 26, 2020) in response to the City of West Sacramento's Section 106 letter (mailed on January 30, 2020).

In the letter addressed from Daniel Fonseca (SSBMI Cultural Resources Director), it stated that the tribe would like to initiate consultation pursuant to Section 106 of the NHPA and AB 52. Prior to meeting, the tribe would like to request any and all completed record searches and/or surveys that were done in/around the project area. The letter also stated that it serves as a formal request for the Shingle Spring Band of Miwok Indians to be added as a consulting party in identifying any Tribal Cultural Properties within the APE.

I have cc'd the contact for the City of West Sacramento (the CEQA lead for the project) and I wanted to let you know that we are in the currently working on the cultural technical reports. I have added the letter and the SSBMI's requests to the administrative record and will keep you updated on any advancements regarding the cultural investigations.

Thank you for your help and consideration with this project,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From:	Pappas, Steve
To:	"kjensen@yochadehe-nsn.gov"
Cc:	Bromund, Claire; "McCoy, Jason"
Subject:	Broadway Bridge Project Consultation with Yocha Dehe (YD-07192017-01)
Date:	Wednesday, March 4, 2020 3:49:00 PM
Attachments:	image001.png

Good afternoon Kristin,

I wanted to let you know that we received the letter from your Tribal Historic Preservation Officer (postmarked February 18, 2020) in response to the City of West Sacramento's Section 106 letter (mailed on January 30, 2020).

In the letter addressed from the YDWN THPO, it stated that the tribe would like to initiate a formal consultation with the lead agency. The Federal Lead Agency is Caltrans; however, the City of West Sacramento is carrying out consultation efforts on their behalf. I have cc'd Jason McCoy with the City of West Sacramento on this E-mail so they are aware of your interest. In addition, all correspondence will be entered into our project record. I wanted to let you know that we are currently working on the cultural technical reports and the initial investigations are going through review right now and will keep you updated on any advancements regarding the cultural investigations and project information.

Thank you for your help and consideration with this project,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From: McCoy, Jason
To: mmayberry@wiltonrancheria-nsn.gov
Cc: Bromund, Claire
Subject: RE: Broadway Bridge Project Consultation with Wilton Rancheria
Date: Monday, August 3, 2020 2:36:24 PM
Attachments: image001.png
image002.png

Good morning Mariah,
The Broadway Bridge Project consultant team has continued working on environmental analysis and documentation for this project and are now at an appropriate stage to participate in tribal consultation. We are able to conduct consultation using web-based video conferencing through a variety of platforms including Zoom, Microsoft Teams, Skype, or Webex. You had responded to our initial inquiry with request to consult on February 10, 2020. The City has attempted to contact you and the Wilton Rancheria tribe via email on June 4, 2020, and again by telephone July 14, 2020 to schedule participating in web-based video conferencing for formal consultation.

Please respond to this request at your earliest convenience. We are looking forward to scheduling this consultation with you.

Kind regards,

JASON McCOY, AICP
Supervising Transportation Planner

Capital Projects and Transportation Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: Cultural Resource Department Inbox <crd@wiltonrancheria-nsn.gov>
Sent: Monday, February 10, 2020 11:03 AM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: Cultural Resource Department Inbox <crd@wiltonrancheria-nsn.gov>
Subject: Broadway Bridge Project

Good morning,

Wilton Rancheria received a letter from the City of West Sacramento dated January 30, 2020 formally notifying us of a proposed project, the Broadway Bridge Project in City of West Sacramento,

and an opportunity to consult under AB 52. This letter is notice that Wilton Rancheria would like to initiate consultation under AB 52.

We would like to discuss the topics listed in Cal. Public Resources Code section 21080.3.2(a), including the type of environmental review to be conducted for the project; project alternatives; the project's significant effects; and mitigation measures for any direct, indirect, or cumulative impacts the project may cause to tribal cultural resources. As consultation progresses, we may also wish to discuss design options that would avoid impacts to tribal cultural resources; the scope of any environmental document that is prepared for the project; pre-project surveys; and tribal cultural resource identification, significance evaluations and culturally-appropriate treatment.

This letter is also a formal request to allow Wilton Rancheria tribal representatives to observe and participate in all cultural resource surveys, including initial pedestrian surveys for the project. Please send us all existing cultural resource assessments, as well as requests for, and the results of, any records searches that may have been conducted prior to our first consultation meeting. If tribal cultural resources are identified within the project area, it is Wilton Rancheria's policy that tribal monitors must be present for all ground disturbing activities. Finally, please be advised that our preference is to preserve tribal cultural resources in place and avoid them whenever possible. Subsurface testing and data recovery must not occur without first consulting with Wilton Rancheria and receiving Wilton Rancheria 's written consent.

In the letter Jason McCoy is identified as the lead contact person for consultation on the proposed project. Mariah Mayberry will be Wilton Rancheria's point of contact for this consultation. Please contact Mariah by phone (916) 683-6000 ext. 2023 or email at mmayberry@wiltonrancheria-nsn.gov to begin the consultation process.

Thank you for involving Wilton Rancheria in the planning process at an early stage. We ask that you make this letter a part of the project record and we look forward to working with you to ensure that tribal cultural resources are protected.

Sincerely,

Mariah Mayberry
Wilton Rancheria
Tel: 916.683.6000 ext 2023 | Fax: 916.683.6015
9728 Kent Street | Elk Grove | CA | 95624
mmayberry@wiltonrancheria-nsn.gov
wiltonrancheria-nsn.gov

From:	McCoy, Jason
To:	Kristin Jensen
Cc:	Bromund, Claire
Subject:	Broadway Bridge Project Consultation with Yocha Dehe (YD-07192017-01)
Date:	Monday, August 3, 2020 2:32:43 PM
Attachments:	image001.png

Good morning Kristin,
The Broadway Bridge Project consultant team has continued working on environmental analysis and documentation for this project and are now at an appropriate stage to participate in tribal consultation. We are able to conduct consultation using web-based video conferencing through a variety of platforms including Zoom, Microsoft Teams, Skype, or Webex. You had responded to our initial inquiry with request to consult in February 2020. The City has attempted to contact you and the Yocha Dehe tribe via email on March 18, 2020, June 4, 2020, and again by telephone July 14, 2020 to schedule participating in web-based video conferencing for formal consultation.

Please respond to this request at your earliest convenience. We are looking forward to scheduling this consultation with you.

Kind regards,

JASON McCOY, AICP
Supervising Transportation Planner

Capital Projects and Transportation Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: Kristin Jensen <KJensen@yochadehe-nsn.gov>
Sent: Wednesday, March 18, 2020 11:15 AM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: Bromund, Claire <Claire.Bromund@icf.com>
Subject: RE: Broadway Bridge Project Consultation with Yocha Dehe (YD-07192017-01)

Good Morning Jason,

The Cultural Resources Department would still like to participate in a formal consultation with the City of West Sacramento in regards to the Broadway Bridge Street Project. However, due to the current circumstances, and in an effort to ensure the safety of the staff here at Yocha Dehe and the City of Sacramento, we will be trying to move all of our consultations to conference call format until further notice. Please advise as to the best way to move forward in scheduling this consultation.

If an in-person meeting is preferred, please be advised that potential dates are as far out as the end of May.

I look forward to hearing from you.

Thank you,

Kristin Jensen
CRD Administrative Assistant

Yocha Dehe Wintun Nation
PO Box 18 | Brooks, CA 95606
p 530.796.0105 | f 530.796.2143
kjensen@yochadehe-nsn.gov
www.yochadehe.org

Section 106/AB 52 Consultation Meeting for the Broadway Bridge Project
Meeting Notes
October 5, 2020, 9:00 AM

Attendees:

Yoche Dehe Wintun Nation (YDWN) – Isaac Bojorquez, Laverne Bill

City of West Sacramento – Jason McCoy, David Tilley

Caltrans – Bill Larson

Mark Thomas – Kira Davis

ICF – Claire Bromund, Christiaan Havelaar, Tina Sorvari

Notes prepared by ICF.

The call began with introductions.

Laverne B. says they usually have these meetings (Section 106 & AB 52) on separate days and requests separate meetings in the future. This is noted and can be handled that way in the future. It was done this way today for simplicity and because this call was the first, introducing the project.

Project Overview/Deindustrialization

Kira D. went over the project, detailing where excavation would occur. Laverne B. asked about the levees and if [to construct them] they dredged them down and build them back up or are they a combination of dredge materials.

David T. explained that Pioneer Bluff is a natural bluff with fill material on top and that it has some of the highest points in the city. Some levee is native soil under a deep layer of fill.

Laverne B. shared that much of the area appears sensitive based on past experience especially where the 10-ft. excavations would occur.

Jason M. explained the City's plan for de-industrialization and the Pioneer Bluff Specific Plan. The idea is to transform the industrial riverfront area to an urban and open space waterfront area. Laverne B. would like to discuss this plan further. Katie Yancey is the City's project manager for Pioneer Bluff redevelopment and she has more information about plans for this area (not including the bridge project). Jason M. offered to talk to Katie Yancey to get more detail that could be shared with the Tribe.

Consultation Concerns

Laverne B. inquires as to how to ensure continued Tribal involvement as these tank farms are being removed and excavations occur. He related that others (e.g. utility company) are not very good at keeping the Tribe in the loop and he hopes the City can help. Jason M. explains that each project and each property will have their own method for deindustrialization and dealing with contaminated soils. However, there will be subsequent environment review along with the required notification.

David T. says the Pioneer Bluff Specific Plan will involve SB 18 and AB 52 and the housing element, all of which will require Native American consultation. There is nothing imminent, but David T. can give the Tribe an idea of the long-term plan. Jason M. explains that construction of the bridge project is pretty far in the future (2030-2035) and deindustrialization is expected to occur before the bridge project is complete. Claire B. explains timeline and funding and how far away we are from breaking ground.

Laverne B. asks if haz mat training will be required if Tribal members were to monitor deindustrialization activities. Jason M. explains these are separate projects and we don't know yet. All areas are hazardous, however. Christiaan H. (archaeologist) thinks that the standard 40-hour haz mat training would be sufficient.

Consultation Specifics

Laverne B. wants continued involvement and would like to ensure the Tribe's inadvertent discovery protocol be a part of the discussion. He requests meetings like what was done for I Street Bridge project. Jason M. says consultation will be similar to what was done for I Street Bridge Replacement. The City would like to know as soon as possible any specific issues possibly tied to this project. Laverne B. says he will work on that. He also asked that the City inform UAIC that they are consulting with the Yoche Dehe Tribe. This will make cross-tribal communication easier.

Claire B. explains the fiber optic line and how it will be installed through city streets via Horizontal Directional Drilling (HDD) or pulled through existing conduit. Laverne B.'s concern relates to having the latest information and asks how he can get a history of this area, including the levees. His concern is that other projects will piggyback on the analysis conducted for Broadway Bridge. Jason M. says no, some have tried without success assuring Laverne B. that is not going to happen.

Preliminary Thoughts Regarding Possible Database Search Results

Laverne B. thinks the project boundaries are on edge of known resources but he is not aware of sites in the project footprint. At 15-feet below existing grade they have found cultural resources on levees. He has been trying to get a levee history.

There was some discussion about project boundaries shown in the NOP and what we looked at during the meeting today. Isaac B. wants to see a map showing the entire potential project area. He is informed that the map he has encompass all possible alternatives.

Claire B. asks if there is anything specific that needs to be discussed. Laverne B. shares that the Tribe conducted surveys 10-15 years ago to home in on anything Laverne B. requests incorporation of burial treatment protocol, monitoring, inadvertent discovery protocol, to start. Laverne B. says it is the same stuff as for Section 106. Resources can be found in levees and need to be addressed. Oral history sites are located all along that area. Would prefer as little levee disturbance as possible. He thinks we should be ok if we address those issues right now and fine tune concerns in the future.

Discussion regarding Section 106-related topics is done, and Bill Larson (Caltrans) leaves the call.

AB 52 Letters

Laverne B. reiterates that the Tribe wants good communication with the City. He explains that previous consultation letters came off as rude and dismissive, saying, in essence, you can't monitor unless you disclose all of your information. He says the Tribe wants to have good relationship with the City, but the tone of the letters made them feel like they were backed into a corner. He asks that everyone be mindful of these things and that there is a level of confidentiality regarding Tribal information and will not be disclosed. Much of Tribal history is oral and is not generated like the CHRIS (i.e., Information Center).

Jason M. explains that the letters were reviewed and revised by the City attorneys and while no disrespect was intended, he understands the tone could sound off-putting. David T. further explains that the City needs the information to make sure they are protecting resources appropriately. Laverne B. understands this but wanted to make sure to let them know how they felt. David. T. offered to have a conversation with the YDWN later to help refine how the letters are written.

Laverne B. asks Jason M. for his contact information. Jason will send that along with Katie's contact information.

Action Items

- Jason M. will talk to Katie Yancey to get more details about the project area (esp. levee history).
- Jason M. will send Katie Yancey's City Council presentation regarding Pioneer Bluff redevelopment to Laverne B. and Isaac B.
- Laverne B. will research the project area for cultural/tribal resources and let the City know if there are issues.
- David. T. will discuss refinement of consultation letters with the Tribe at a later date.
- Jason M. will send his and Katie's contact information to Laverne B. and Isaac B.

From:	Pappas, Steve
To:	"kperry@ssband.org"
Cc:	Sorvari, Tina; "McCoy, Jason"; Bromund, Claire
Subject:	FW: Consultation for Broadway Bridge project
Date:	Friday, December 18, 2020 10:40:00 AM
Attachments:	image001.png image002.png

Hello Kara,

This email is to follow up regarding your request (Feb. 26, 2020) to consult under Section 106 for the Broadway Bridge project. Also, regarding your request for the completed record searches and surveys for the project area, we are still finalizing the technical reports for Caltrans review and can send them to you when approved. In the meantime, to summarize the archaeological finds, we identified three archaeological sites during the surveys (building pad, wharf posts, and a historic artifact scatter eroding from a raised railroad spur). If you wish to continue consultation, please let us know so that we can schedule a (virtual) meeting in the coming weeks. Conversely, if you do not wish to continue consultation, please let us know and we will document the consultation to date. We appreciate the Shingle Springs Band of Miwok Indians' input and look forward to your input for this project.
Thank you,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From: Pappas, Steve
Sent: Wednesday, March 4, 2020 3:30 PM
To: kperry@ssband.org
Cc: Bromund, Claire <Claire.Bromund@icf.com>; McCoy, Jason <mccoyj@cityofwestsacramento.org>
Subject: Consultation for Broadway Bridge project

Good afternoon Kara,

I wanted to let you know that we received the Shingle Springs Band of Miwok Indians letter (postmarked February 26, 2020) in response to the City of West Sacramento's Section 106 letter (mailed on January 30, 2020).

In the letter addressed from Daniel Fonseca (SSBMI Cultural Resources Director), it stated that the tribe would like to initiate consultation pursuant to Section 106 of the NHPA and AB 52. Prior to meeting, the tribe would like to request any and all completed record searches and/or surveys that were done in/around the project area. The letter also stated that it serves as a formal request for the Shingle Spring Band of Miwok Indians to be added as a consulting party in identifying any Tribal Cultural Properties within the APE.

I have cc'd the contact for the City of West Sacramento (the CEQA lead for the project) and I wanted to let you know that we are in the currently working on the cultural technical reports. I have added the letter and the SSBMI's requests to the administrative record and will keep you updated on any advancements regarding the cultural investigations.

Thank you for your help and consideration with this project,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From:	Pappas, Steve
To:	"jereme@ionemiwok.net"; Cultural Committee
Cc:	Sorvari, Tina; Bromund, Claire; "McCoy, Jason"
Subject:	Broadway Bridge Section 106 Consultation
Date:	Friday, December 18, 2020 10:46:00 AM
Attachments:	image001.png

Hello Jereme,

This email is to follow up regarding your request (April 16, 2020) to consult under Section 106 for the Broadway Bridge project. We are still finalizing the technical reports for Caltrans review and can send them to you when approved. In the meantime, to summarize the archaeological finds, we identified three archaeological sites during the surveys (building pad, wharf posts, and a historic artifact scatter eroding from a raised railroad spur).

If you have any questions, please let us know. If you'd prefer, we can schedule a (virtual) meeting in the coming weeks. We appreciate the Ione Band of Miwok Indians' input and look forward to continued consultation for this project.
Thank you,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From:	Pappas, Steve
To:	Anna Starkey; McCoy, Jason
Cc:	Bromund, Claire; Sorvari, Tina
Subject:	RE: Broadway Bridge Project Consultation with UAIC
Date:	Tuesday, December 22, 2020 10:59:00 AM
Attachments:	image001.png image002.png

There is a historic refuse site in the project which is mostly located outside of APE. That site will eventually be tested and evaluated; however, the majority of the site is in private property and access has not been granted.

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From: Anna Starkey <astarkey@auburnrancheria.com>
Sent: Tuesday, December 22, 2020 10:48 AM
To: Pappas, Steve <Steve.Pappas@icf.com>; McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: Bromund, Claire <Claire.Bromund@icf.com>; Sorvari, Tina <Tina.Sorvari@icf.com>
Subject: RE: Broadway Bridge Project Consultation with UAIC

Good morning,
Thank you for the update. We are looking forward to reviewing the ASR. Can you let me know if any additional cultural studies were recommended?

Thank you,
Anna

From: Pappas, Steve <Steve.Pappas@icf.com>
Sent: Tuesday, December 22, 2020 9:58 AM
To: Anna Starkey <astarkey@auburnrancheria.com>; McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: Bromund, Claire <Claire.Bromund@icf.com>; Sorvari, Tina <Tina.Sorvari@icf.com>
Subject: RE: Broadway Bridge Project Consultation with UAIC

Good morning Anna,

Thank you for your email and providing us the information regarding TRCs and project sensitivity. On behalf of Jason McCoy (City of West Sacramento), I wanted to give you an update regarding the project. We are about to send the Archaeological Survey report to Caltrans for review and once we get the green light, we will send you a copy as requested in your email below. As far as geotechnical and geoarchaeological reports go, I do not believe those have been produced for this project. As part of the ASR, I did include a buried archaeological sensitivity section that was based on data from

multiple projects (involving testing/geoarch) in the immediate area of the project. So, we will send you the ASR when we have it reviewed and hopefully you can coordinate with a follow-up meeting (or email) with the City of West Sacramento to discuss the best options for mitigation measures.

Thank you again for your input and we look forward to continued consultation with UAIC for this project.

Sincerely,

STEPHEN PAPPAS | Senior Archaeologist | 916.231.7649 (o) | stephen.pappas@icf.com | icf.com
ICF | 980 9th Street, Suite 1200, Sacramento, CA 95814 | 530.218.8485 (m)

From: Anna Starkey <astarkey@auburnrancheria.com>
Sent: Monday, August 3, 2020 4:45 PM
To: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Cc: Bromund, Claire <Claire.Bromund@icf.com>
Subject: RE: Broadway Bridge Project Consultation with UAIC

Good afternoon,
My apologies for the delayed response. Thank you for reaching out to UAIC to continue consultation for the Broadway Bridge project. We are not aware of any known tribal cultural resources in the project area, however it is known to be a very culturally sensitive area with the potential for deeply buried deposits.

Do you have a cultural resources/geotechnical/geoarchaeological report that you could share? We can discuss the best options for mitigation measures after I get a chance to review the requested documents.

Thank you.
Best,
Anna

From: McCoy, Jason <mccoyj@cityofwestsacramento.org>
Sent: Monday, August 3, 2020 2:38 PM
To: Anna Starkey <astarkey@auburnrancheria.com>
Cc: Bromund, Claire <Claire.Bromund@icf.com>
Subject: Broadway Bridge Project Consultation with UAIC

Good morning Anna,
The Broadway Bridge Project consultant team has continued working on environmental analysis and documentation for this project and are now at an appropriate stage to participate in tribal

consultation. We are able to conduct consultation using web-based video conferencing through a variety of platforms including Zoom, Microsoft Teams, Skype, or Webex. You had responded to our initial inquiry with request to consult on February 20, 2020. The City has attempted to contact you and the UAIC tribe via email on June 4, 2020, and again by telephone July 14, 2020 to schedule participating in web-based video conferencing for formal consultation.

Please respond to this request at your earliest convenience. We are looking forward to scheduling this consultation with you.

Kind regards,

JASON McCOY, AICP
Supervising Transportation Planner

CITY OF WEST SACRAMENTO

Capital Projects and Transportation Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

JASON McCOY
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

From: McCoy, Jason
Sent: Thursday, June 4, 2020 12:04 PM
To: Anna Starkey <astarkey@auburnrancheria.com>
Subject: Broadway Bridge Project Consultation with UAIC

Ms. Starkey, good afternoon.
Thank you for responding to our request for consultation on the Broadway Bridge Project in your latter from Chairman Whitehouse dated February 20, 2020, and for your patience as the City works toward getting back on track. The COVID-19 pandemic has significantly changed the way the City of West Sacramento is able to conduct formal consultation for our projects. The City has announced that we will be reopening City Hall beginning June 15, 2020 with protections and protocols in-place to ensure the safety of City staff and the public. This includes participating in web-based video conference calls to the extent possible for formal consultation.

The Broadway Bridge consultant team has continued working on environmental analysis and documentation during the pandemic, and we are now at an appropriate stage in the project to initiate tribal consultation. We are able to conduct consultation using web-based video conferencing

through a variety of platforms including Zoom, Microsoft Teams, Skype, or Webex. What is your preferred platform to conduct consultation and availability June 15th through June 26th?

Thank you, we are looking forward to scheduling this consultation with you.

Kind regards,

JASON McCOY, AICP
Supervising Transportation Planner

CITY OF WEST SACRAMENTO

Capital Projects and Transportation Department
1110 West Capitol Ave, 1st Floor
West Sacramento, CA 95691
Telephone: (916) 617-4832
mccoyj@cityofwestsacramento.org

Nothing in this e-mail is intended to constitute an electronic signature for purposes of the Electronic Signatures in Global and National Commerce Act (E-Sign Act), 15, U.S.C. §§ 7001 to 7006 or the Uniform Electronic Transactions Act of any state or the federal government unless a specific statement to the contrary is included in this e-mail.

Table B-1. Summary of Correspondence

Name/Organization	Letters Submitted	Telephone	Follow-up Calls	Summary of Communication
California Council for the Promotion of History	February 13, 2018	916-546-8951	February 20, 2018	No response
California Historical Building Safety Board	February 13, 2018	916-278-6906	February 20, 2018	No response
California Historical Resources Commission	February 13, 2018	916-202-4815	February 20, 2018	No response
Center for California Studies	February 13, 2018	916-653-4272	February 20, 2018	No response
California State Railroad Museum	February 13, 2018	916-893-3480	February 20, 2018	No response
Center for Sacramento History	February 13, 2018	916-808-7072	None	Dylan McDonald at the CSH emailed ICF to confirm reception of the letter and to inform ICF that the CSH has archives relevant to the project study area.
Sacramento County Historical Society	February 13, 2018	916-572-9858	February 20, 2018	SCHS President Greg Voehl telephoned March 14, 2018 and requested electronic copies of the correspondence letter and project map, and stated that he would like to share them with his historical society officers; ICF submitted the requested information March 15, 2018.
Portuguese Historical & Cultural Center	February 13, 2018	916-381-7356	February 20, 2018	No response
West Sacramento Historical Society	February 13, 2018	916-374-1849	February 20, 2018	No response
Yolo County Historical Society	February 13, 2018	530-661-2212	February 20, 2018	No response

REPRESENTATIVE EXAMPLE

ICF sent a letter and vicinity map to all parties listed in the previous table.

February 13, 2018

California Council for the Promotion of History
California State University, Sacramento
6000 J Street
Sacramento, CA 95819-6059

Re: Broadway Bridge Project in Yolo and Sacramento Counties, California.

Dear California Council for the Promotion of History,

ICF International is currently conducting a cultural resources review for the Broadway Bridge Project in Yolo and Sacramento Counties, California.

The City of West Sacramento, in cooperation with the City of Sacramento and the California Department of Transportation (Caltrans) proposes to construct a new bridge spanning the Sacramento River between the City of West Sacramento in Yolo County and the City of Sacramento in Sacramento County. The project site is located at the Sacramento River approximately 0.15 mile southwest of the extant Lincoln Highway (US 50) Pioneer Bridge (see enclosed map). The project would provide local interconnectivity across the river and between neighborhoods, and the new connection would serve multiple modes of transportation.

The proposed project is subject to the provisions of the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA), and the California Environmental Quality Act (CEQA). Caltrans is designated the lead Federal agency under a memorandum of agreement with the Federal Highways Administration. The City of West Sacramento is the CEQA lead agency.

As part of our effort to identify cultural resources in the project area, we are consulting historical societies, museums, and archives, like yourself, to determine if you have any knowledge of, or information on, historical resources that may be affected by the proposed project. We are also interested in any historical information, including photographs, maps, and oral histories that may contain relevant information on cultural resources in the project area.

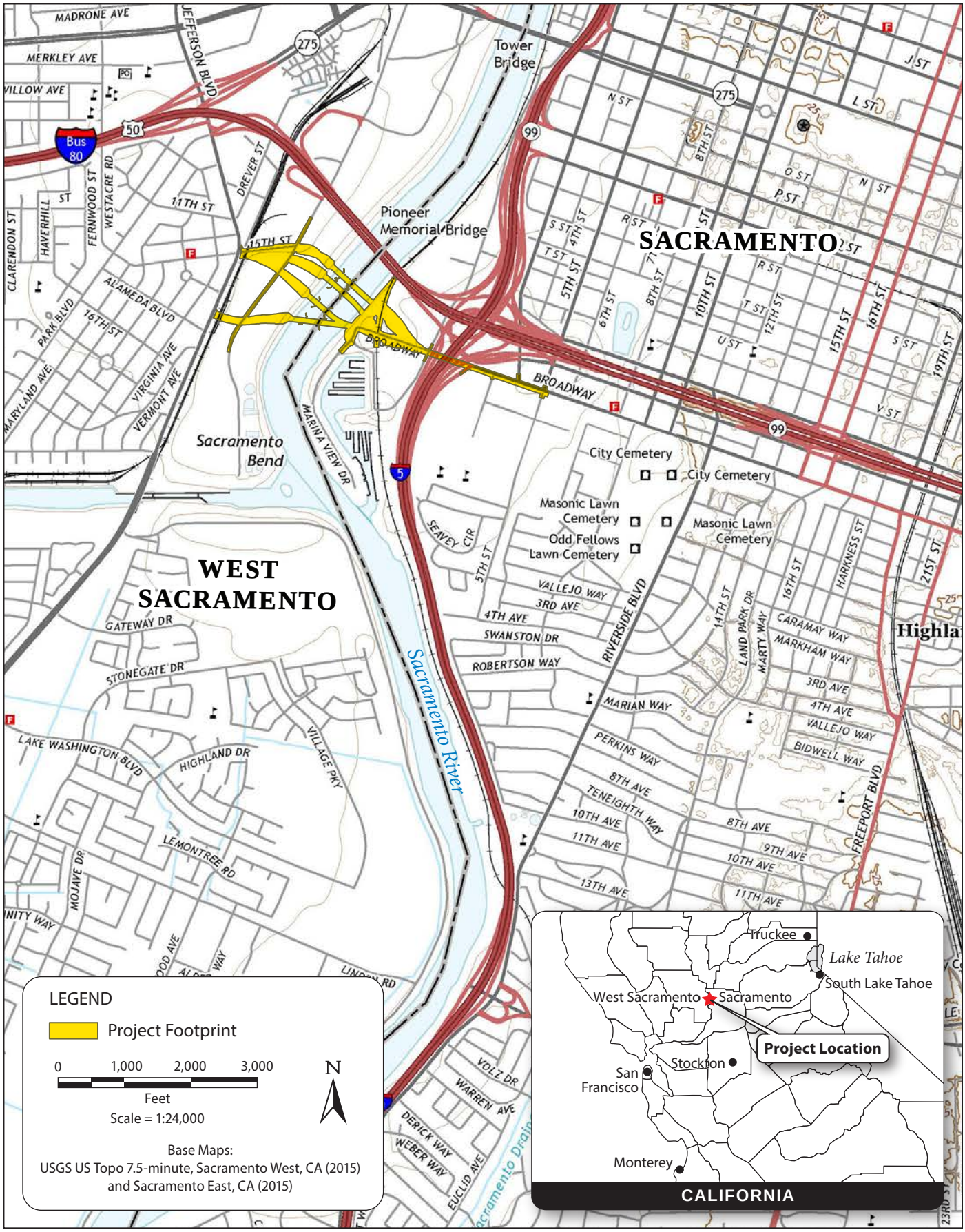
Please do not hesitate to contact me with any questions. Thank you for your assistance.

Sincerely,

Jena Rogers
Architectural Historian
Desk: 916-231-9544
jenifer.rogers@icf.com

Enclosure: Figure 1-1 Vicinity Map

cc: California Historical Building Safety Board
California Historical Resources Commission
California State Railroad Museum
Center for California Studies
Portuguese Historical and Cultural Society
Center for Sacramento History
Sacramento County Historical Society
West Sacramento Historical Society
Yolo County Historical Society



Graphics ... 00205.17 (12-5-2017)

Figure 1-1
Vicinity Map

From: Dylan McDonald
To: Rogers, Jenifer
Subject: Broadway Bridge Project
Date: Friday, February 23, 2018 4:27:58 PM

Jena,

We received your letter regarding the bridge project. You are welcome to schedule a research appointment to work through any material held by the Center relevant to your investigation. We do have maps and photographs of that area.

Our research hours can be found at http://www.centerforsacramentohistory.org/collections.

Dylan McDonald, CA
Deputy City Historian – Manuscripts Archivist
Center for Sacramento History
551 Sequoia Pacific Blvd
Sacramento, CA 95811
TEL (916) 808-7080
FAX (916) 808-7582
dmcdonald@cityofsacramento.org

A Sacramento City/County Agency

Rogers, Jenifer

From: Rogers, Jenifer
Sent: Wednesday, March 14, 2018 3:31 PM
To: 'gvoelm@gmail.com'
Subject: Broadway Bridge Project
Attachments: BroadwayBridge_SCHS.pdf

Dear Greg Voelm,

Thank you for contacting me about the correspondence you received from ICF regarding the proposed Broadway Bridge Project. We welcome any information or comments that you and the Sacramento Historical Society may have about the proposed project.

Please find attached one PDF file containing an electronic copy of the letter and map that you received, as you requested.

Please do not hesitate to contact me if you have additional questions or comments about the project.

Take care,
Jena Rogers

JENA ROGERS | Architectural Historian |  | +1.916.231.9544 direct | Jenifer.Rogers@icf.com
ICF | 630 K Street, Suite 400, Sacramento, CA 95814 USA | +1.916.737.3000 main | icf.com

February 13, 2018

Sacramento County Historical Society
PO Box 160065
Sacramento, CA 95816

Re: Broadway Bridge Project in Yolo and Sacramento Counties, California.

Dear Sacramento County Historical Society,

ICF International is currently conducting a cultural resources review for the Broadway Bridge Project in Yolo and Sacramento Counties, California.

The City of West Sacramento, in cooperation with the City of Sacramento and the California Department of Transportation (Caltrans) proposes to construct a new bridge spanning the Sacramento River between the City of West Sacramento in Yolo County and the City of Sacramento in Sacramento County. The project site is located at the Sacramento River approximately 0.15 mile southwest of the extant Lincoln Highway (US 50) Pioneer Bridge (see enclosed map). The project would provide local interconnectivity across the river and between neighborhoods, and the new connection would serve multiple modes of transportation.

The proposed project is subject to the provisions of the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA), and the California Environmental Quality Act (CEQA). Caltrans is designated the lead Federal agency under a memorandum of agreement with the Federal Highways Administration. The City of West Sacramento is the CEQA lead agency.

As part of our effort to identify cultural resources in the project area, we are consulting historical societies, museums, and archives, like yourself, to determine if you have any knowledge of, or information on, historical resources that may be affected by the proposed project. We are also interested in any historical information, including photographs, maps, and oral histories that may contain relevant information on cultural resources in the project area.

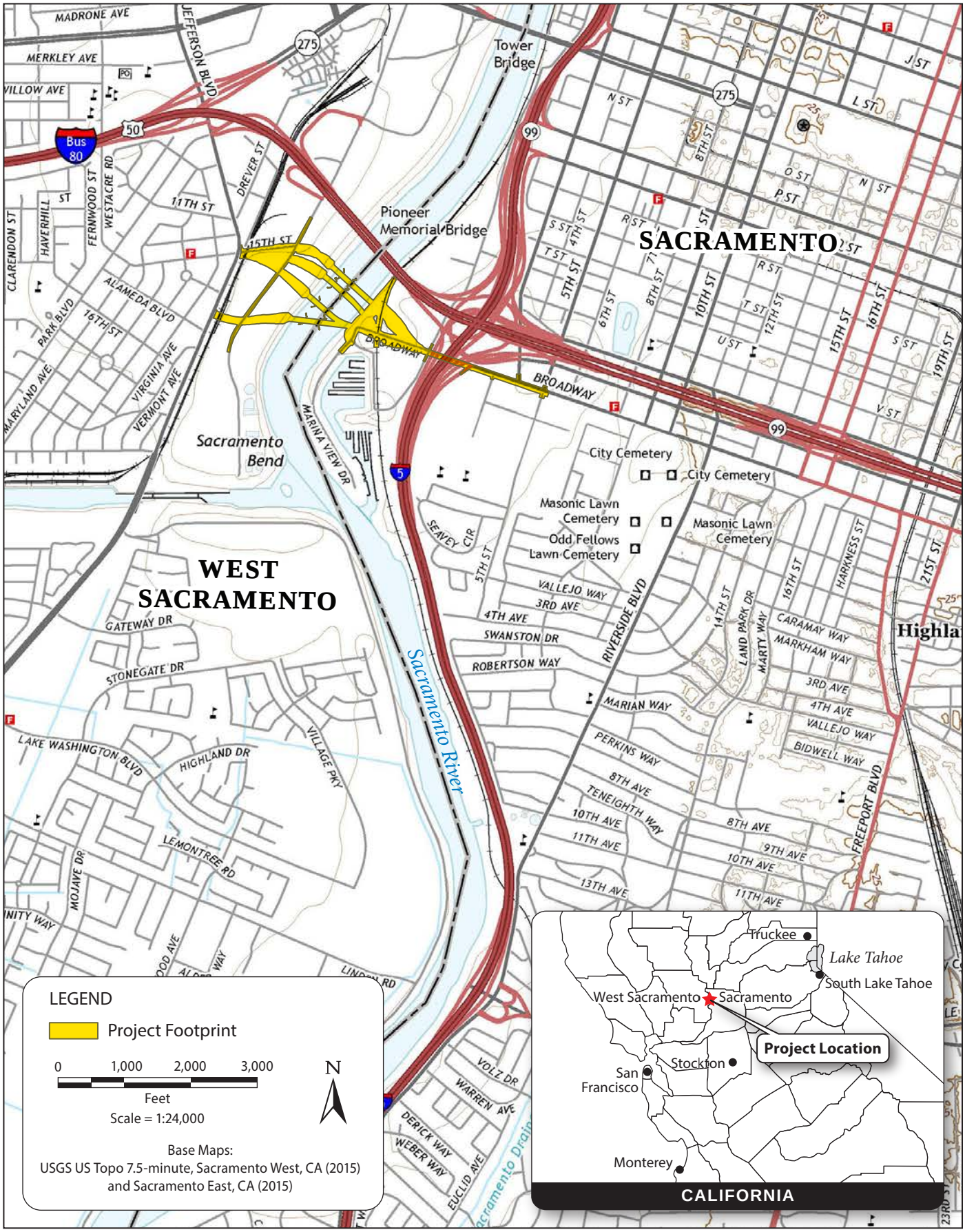
Please do not hesitate to contact me with any questions. Thank you for your assistance.

Sincerely,

Jena Rogers
Architectural Historian
desk: 916-231-9544
jenifer.rogers@icf.com

Enclosure: Figure 1-1 Vicinity Map

cc: California Council for the Promotion of History
California Historical Building Safety Board
California Historical Resources Commission
California State Railroad Museum
Center for California Studies
Portuguese Historical and Cultural Society
Center for Sacramento History
West Sacramento Historical Society
Yolo County Historical Society



Graphics ... 00205.17 (12-5-2017)

Figure 1-1
Vicinity Map

State of California • Natural Resources Agency
Gavin Newsom, *Governor*

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION
Armando Quintero, *Director*

Julianne Polanco, State Historic Preservation Officer
1725 23rd Street, Suite 100, Sacramento, CA 95816-7100
Telephone: (916) 445-7000 FAX: (916) 445-7053
calshpo.ohp@parks.ca.gov www.ohp.parks.ca.gov

July 21, 2021

VIA EMAIL

In reply refer to: FHWA_2021_0517_001

Ms. Gail St. John, Senior Environmental Planner
Caltrans District 3
703 B Street
Marysville, CA 95901

Subject: Determinations of Eligibility for the Proposed Broadway Bridge Project over the Sacramento River, West Sacramento and Sacramento, Yolo and Sacramento Counties, California

Dear Ms. St. John:

Caltrans is initiating consultation regarding the above project in accordance with the January 1, 2014 *First Amended Programmatic Agreement Among the Federal Highway Administration (FHWA), the Advisory Council on Historic Preservation, the California State Historic Preservation Officer (SHPO), and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California* (PA). As part of your documentation, Caltrans submitted a Historic Property Survey Report (HPSR), an Archaeological Survey Report and a Historic Resources Evaluation Report for the proposed project.

The City of West Sacramento (City), in conjunction with the California Department of Transportation (Caltrans) District 3, proposes to construct a new bridge over the Sacramento River between the City of West Sacramento, Yolo County, and the City of Sacramento, Sacramento County, following the current alignment of Broadway in the City of Sacramento.

Field work and archival research has resulted in the identification of 14 resources in the Area of Potential Effects (APE) for the proposed project, two of which were previously determined eligible, nine of which were evaluated and three of which are assumed eligible for listing in the National Register of Historic Places (NRHP) for the purposes of this undertaking only in accordance with Stipulation VIII.C.4 of the Section 106 PA.

The two resources previously determined eligible are:

• Sacramento River East Levee, Sacramento
• Walnut Grove Branch Line Railroad (WGBL), Sacramento

Pursuant to Stipulation VIII.C.6 of the PA, Caltrans determined that that following properties are not eligible for the National Register of Historic Places:

- 1300 South River Road, West Sacramento
- 1500 South River Road West Sacramento
- 1509 South River Road, West Sacramento
- 1515/1555 South River Road, West Sacramento
- 1520 South River Road, West Sacramento
- 1700 South River Road, West Sacramento
- 1701 South River Road, West Sacramento
- 1991 South River Road, West Sacramento
- 76 Broadway, Sacramento

The three resources assumed eligible for the purposes of the undertaking are:

- Sacramento Northern Railway (MR 1)
- Sacramento River West Levee, West Sacramento (MR 10)
- P 34-000619 (CA-Sac-505H), a historic-era refuse scatter and abandoned spur of the WGBL within the Chevron Tank Farm in West Sacramento

Based on review of the submitted documentation, I concur with the above determinations.

If you have any questions, please contact Natalie Lindquist at (916) 445-7014 with e-mail at natalie.lindquist@parks.ca.gov .

Sincerely,

Julianne Polanco
State Historic Preservation Officer

State of California • Natural Resources Agency Gavin Newsom, *Governor*

DEPARTMENT OF PARKS AND RECREATION Armando Quintero, *Director*
OFFICE OF HISTORIC PRESERVATION

Julianne Polanco, State Historic Preservation Officer
1725 23rd Street, Suite 100, Sacramento, CA 95816-7100
Telephone: (916) 445-7000 FAX: (916) 445-7053
calshpo.ohp@parks.ca.gov www.ohp.parks.ca.gov

December 1, 2021

VIA EMAIL

In reply refer to: FHWA_2021_0517_001

Mr. David Price
Section 106 Coordinator
Cultural Studies Office
Caltrans Division of Environmental Analysis
1120 N Street, MS-27
Sacramento, CA 95814

Subject: Finding of No Adverse Effect with Minor Phasing for the Broadway Bridge Project over the Sacramento River, City of West Sacramento and City of Sacramento, Yolo and Sacramento Counties, California.

Dear Mr. Price:

The Office of Historic Preservation (OHP) is in receipt of a letter dated October 28, 2021 from the California Department of Transportation (Caltrans) for the above referenced undertaking. Caltrans is continuing consultation with the State Historic Preservation Officer (SHPO) in accordance with the January 1, 2014 *First Amended Programmatic Agreement Among the Federal Highway Administration (FHWA), the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California* (Section 106 PA). Pursuant to Stipulation X.B.2.b of the Section 106 PA, Caltrans is seeking SHPO comment on a finding of no adverse effect without standard conditions. Enclosed with Caltrans' letter is a Finding of Effect (FOE) and attachments.

In previous consultation, Caltrans, District 3 identified five historic properties in the Area of Potential Effects (APE). The following two properties were previously evaluated as eligible for listing in the National Register of Historic Places (NRHP), and those evaluations remain valid:

- Sacramento River East Levee (MR 12)
- Walnut Grove Branch Line (MR 11)

The following three properties Caltrans assumed eligible for listing in the NRHP for the purposes of this undertaking only pursuant to Stipulation VIII.C.4 of the 106 PA:

- Sacramento Northern Railway (MR 1)
- Sacramento River West Levee (MR 10)

• P-34-000619 (CA-SAC-505H), a historic-era refuse scatter and abandoned spur of the WGBL within the Chevron Tank Farm in Western Sacramento

For this current consultation, Caltrans has applied the Criteria of Adverse Effect set forth in 36 CFR §800.5(a)(1) and Stipulation X.A of the Section 106 PA and has determined that the undertaking will not have an adverse effect on the Sacramento River East Levee, the Walnut Grove Branch Line, the Sacramento Northern Railroad, and the Sacramento River West Levee.

Due to access restrictions caused by the developed roadway, Caltrans could not complete identification efforts to confirm whether P-34-000619 extends into the Area of Direct Impact (ADI) of the APE. The FOE describes the previous development and disturbances that have occurred within the portions of P-34-000619 located in the ADI. Due to these prior disturbances, Caltrans asserts that should any archaeological deposits associated with P-34-000619 exist within the ADI they would be heavily disturbed and not contribute to the assumed eligibility of P-34-000619 under Criterion D. Effects from the undertaking will be limited to the previously disturbed portions of P-34-000619, and therefore Caltrans states that effects from the undertaking will not be adverse. Effects to the portion of P-34-000619 outside of the ADI will be avoided through the establishment of an environmentally sensitive area (ESA) and implementation of the August 2021 *Environmentally Sensitive Area Action Plan* (ESA Action Plan) that was included with Caltrans' October 28th letter.

To address the inaccessible portions of P-34-000619 located within the ADI, Caltrans, District 3 will phase the identification and evaluation of potential archaeological deposits associated with P-34-000619 once access is granted. The August 2021 *Phased Identification Plan* (PIP) included with Caltrans' October 28th letter will guide Caltrans, District 3's completion of these additional efforts through Minor Phasing per Stipulation XII.B of the Section 106 PA.

Pursuant to Stipulation X.B.2.a of the Section 106 PA, Caltrans has found that the proposed undertaking will have no adverse effect to historic properties and is seeking SHPO concurrence on this finding pursuant to Stipulation X.B.2 of the Section 106 PA. The PIP includes a process for Caltrans, District 3's continued consultation with CSO and SHPO on this finding per Stipulation X.B.2 of the Section 106 PA. Based on a review of the submitted documentation, and the proposed conditions to implement the PIP and ESA Action Plan, **I do not object** to this finding. If you have any questions, please contact Associate State Archaeologist Alicia Perez at alicia.perez@parks.ca.gov .

Sincerely,

Julianne Polanco
State Historic Preservation Officer

California Department of Transportation

DISTRICT 3
703 B STREET | MARYSVILLE, CA 95901-5556
(530) (530) 812-4937 | FAX (530) 741-4245 TTY 711
www.dot.ca.gov

September 3, 2021

Mr. Raymond Constantino, Park Planning Manager
City of Sacramento
Department of Youth, Parks and Community Enrichment
915 I Street, Third Floor
Sacramento, CA 95814

Dear Mr. Constantino:

The purpose of this letter is to request concurrence for the temporary occupancy of the Sacramento River Parkway and Bike Trail and the Frederick Miller Regional Park/Sacramento Marina, owned by the City of Sacramento, Department of Youth, Parks and Community Enrichment.

The City of West Sacramento, in cooperation with the City of Sacramento and Caltrans, proposes to construct a new bridge over the Sacramento River south of the Pioneer Bridge (US 50) to provide local interconnectivity across the river and between neighborhoods.

As part of the federal environmental process under the National Environmental Policy Act, Caltrans prepared documentation in accordance to the Section 4(f) regulation. The enclosed Appendix C, which is part of the circulated Draft Environmental Impact Report/Environmental Assessment (Draft EIR/EA), demonstrates how Section 4(f) criteria apply and explains how the criteria are met for temporary occupancy. The Section 4(f) analysis, as Appendix C to the Draft EIR/EA, was circulated for public review from July 7 to August 23, 2021. At the end of the public review period, the public did not submit any comments that pertain to Section 4(f).

Sacramento River Parkway and Bike Trail. The proposed project would realign the Sacramento River Parkway trail approximately 360 feet to the west along the riverfront/levee, where it would cross under the proposed bridge and connect to Miller Regional Park west of Marina View Drive. The existing paved trail adjacent to the railroad would be left in place as is. A temporary detour would be established during construction. A temporary construction easement would be required to connect the existing trail to the new section of trail to the west and closer to the river, and to grade separate it under the proposed bridge. More information can be found in the attached Appendix C.

Frederick Miller Regional Park/Sacramento Marina. The proposed project would reconstruct approximately 350 feet of Marina View Drive at the entrance to Frederick Miller Regional Park to accommodate the new connection to Broadway north of and outside the park. A temporary detour for park access would be established during construction. A temporary construction easement would be required to reconstruct the park entrance. More information can be found in the attached Appendix C.

As described in more detail in the attached Appendix C, the temporary occupancy of the Sacramento River Parkway and Bike Trail, and Frederick Miller Regional Park/Sacramento Marina, during the project construction period meets the criteria of 23 Code of Federal Regulations Section 774.13(d) for temporary occupancy. As specified in the regulation, temporary occupancy of a property does not constitute a "use" of a Section 4(f) resource when the following conditions are satisfied.

- The duration of the occupancy must be temporary (i.e., less than the time needed for construction of the project), and there should be no change in ownership of the land.
- The scope of work must be minor (i.e., both the nature and magnitude of changes to the Section 4(f) resource are minimal).
- There are no anticipated permanent adverse physical impacts, and there will be no interference with the activities or purpose of the resource, on either a temporary or permanent basis.
- The land being used must be fully restored (i.e., the resource must be returned to a condition that is at least as good as that which existed prior to the project).
- There must be documented agreement of the appropriate officials having jurisdiction over the resource regarding the foregoing requirements.

One of the last steps to satisfy Section 4(f) requirements is to have the official with jurisdiction over the Section 4(f) property concur in writing that the criteria can be met for temporary occupancy for the Sacramento River Parkway and Bike Trail, and Frederick Miller Regional Park/Sacramento Marina.

Receipt of written concurrence from the City of Sacramento, Department of Youth, Parks and Community Enrichment enables Caltrans to approve the temporary occupancy in accordance with the requirements of Section 4(f).

Please indicate your concurrence with the findings described in the attached Appendix C by signing below and returning this letter to Laura Loeffler, Branch Chief. If you have any questions, please contact me at (530) 812-4937.

Sincerely,

Laura Loeffler

LAURA LOEFFLER
Branch Chief, M-1
Division of Environmental, North Region

Attachment: Broadway Bridge Draft EIR/EA Appendix C. Section 4(f)

c: Dana Repan, Senior Planner, City of Sacramento Department of Youth, Parks and Community Enrichment
Jason McCoy, Supervising Transportation Planner, City of West Sacramento Community Development Department
Cecilyn Foote, Associate Civil Engineer, City of Sacramento Department of Public Works
Claire Bromund, ICF (consultant)

09/17/2021

/signature line for Mr. Raymond Constantino Date
Park Planning Manager

U.S. Department of Transportation
Federal Highway Administration

California Division

650 Capitol Mall, Suite 4-100
Sacramento, CA 95814
(916) 498-5001
(916) 498-5008 (FAX)

October 28, 2021

In Reply, Refer To:
HDA-CA

ELECTRONIC CORRESPONDENCE ONLY

Amarjeet Benipal,
District 3 Director
California Department of Transportation
703 B Street
Marysville, CA 95901

SUBJECT: Project Level Conformity Determination for the Broadway Bridge Project (MPO ID YOL19328)

Dear Mr. Benipal:

On October 4, 2021, the California Department of Transportation (Caltrans) submitted to the Federal Highway Administration (FHWA) a complete request for a project level conformity determination for the Broadway Bridge Project. The project is in an area that is designated Non-Attainment or Maintenance for Ozone and Particulate Matter (PM 2.5).

The project level conformity analysis submitted by Caltrans indicates that the project level transportation conformity requirements of 40 CFR Part 93 have been met. The project is included in the Sacramento Area Council of Governments' (SACOG) current Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP), as amended. The design concept and scope of the preferred alternative have not changed significantly from those assumed in the regional emissions analysis.

As required by 40 CFR 93.116 and 93.123, the localized particulate matter analyses are included in the documentation. The analyses demonstrate that the project will not create any new violations of the standards or increase the severity or number of existing violations.

Based on the information provided, FHWA finds that the Broadway Bridge Project conforms with the State Implementation Plan (SIP) in accordance with 40 CFR Part 93.

If you have any questions pertaining to this conformity finding, please contact Joseph Vaughn at (916) 498-5346 or Joseph.Vaughn@dot.gov.

Sincerely,

ANTONIO DESHAWN JOHNSON

Digitally signed by ANTONIO DESHAWN JOHNSON
Date: 2021.10.29 08:36:50 -07'00'

Antonio Johnson
Team Leader, Planning and Air Quality
Federal Highway Administration

To:

Amarjeet Benipal, Caltrans
amarjeet.benipal@dot.ca.gov

CC (via email):

Rodney Tavitas, Caltrans
Jason Lee, Caltrans
Thaleena Bhattal, Caltrans
Lucas Sanchez, Caltrans
Paul Schneider, FHWA
Antonio Johnson, FHWA
Joseph Vaughn, FHWA

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List of Technical Studies

Copies of the following technical studies are available in separate appendixes to this EIR/EA from the project website at https://www.cityofwestsacramento.org/government/departments/capital-projects-and-transportation/projects/broadway-bridge-projects.

Human Environment

- Community Impact Assessment (Appendix K)
- Transportation Report (Appendix L)
- Visual Impact Assessment (Appendix M)
- Historic Property Survey Report (Appendix N)
    - Historical Resources Evaluation Report
    - Archaeological Survey Report
    - Finding of Effect Report

Physical Environment

- Water Quality Assessment (Appendix O)
- Phase 1 Initial Site Assessment (Appendix P)
- Air Quality Study (Appendix Q)
- Supplemental MSAT Memorandum (Appendix Q)
- Noise Study (Appendix R)

Biological Environment

- Natural Environment Study (Appendix S)
- Addendum to Natural Environment Study (Appendix S)
- Biological Assessment (Appendix T)