MARK THOMAS

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

<u>Traffic:</u>
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.

<u>Site Constraints</u>:
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.

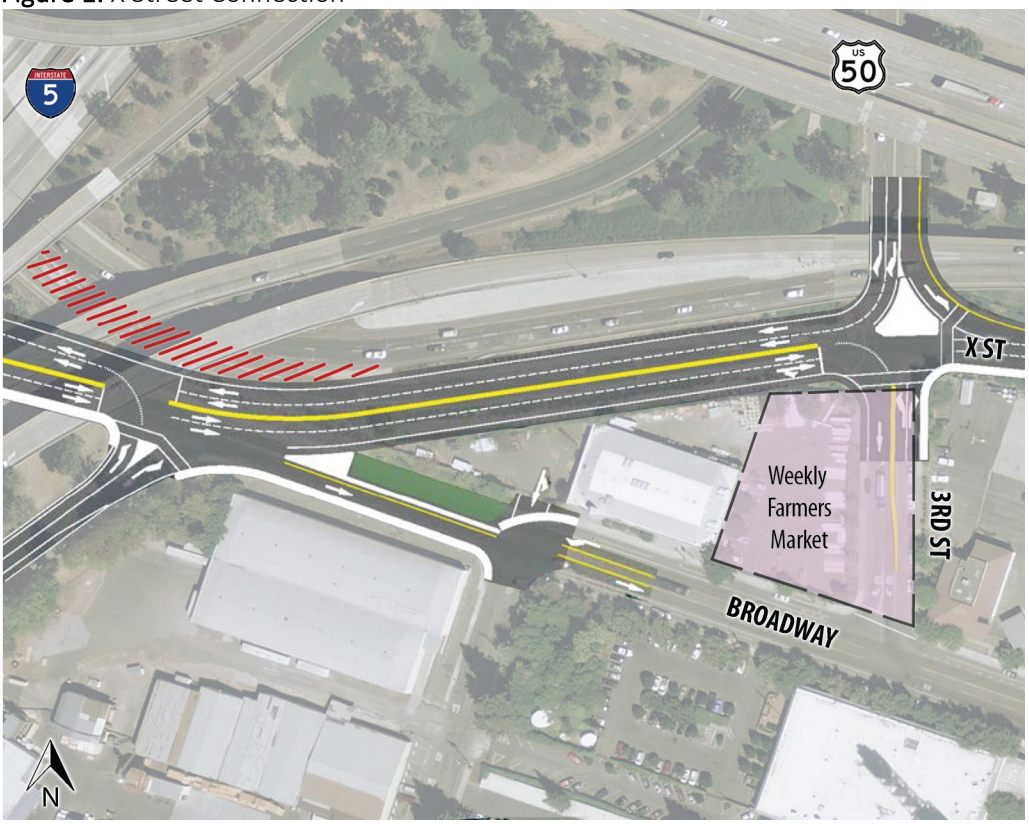
Alignment D, as mentioned in the traffic section, would necessitate Circle Street between Jefferson Boulevard and South River Road be an arterial, instead of the planned local street. It would accelerate the construction of Circle Street to opening year 2030. Alignment D would also require a new signal 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)

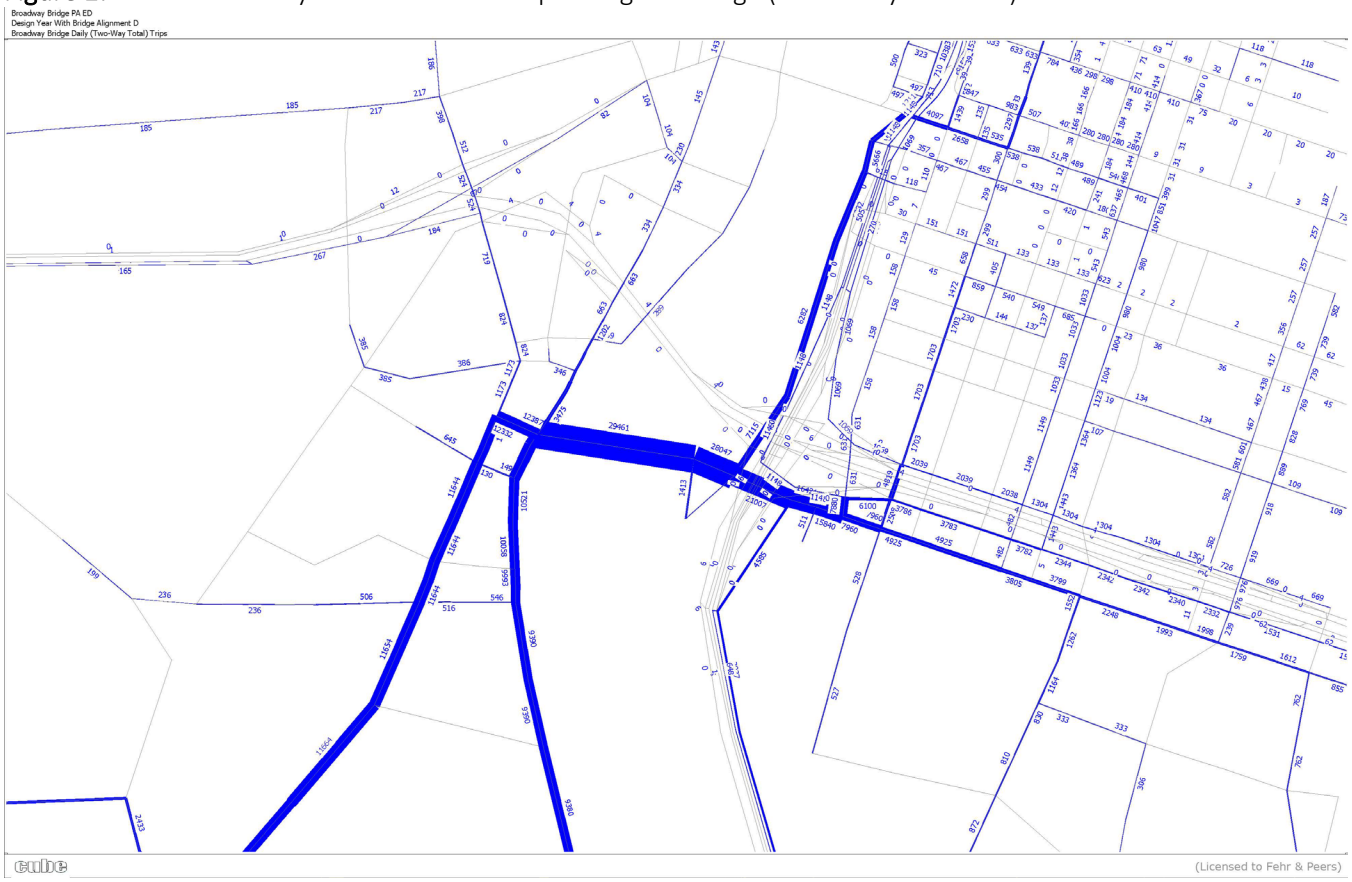


Table 2: The table summarizes the ADT based on Fehr and Peers Memorandum, see Attachment F

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

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

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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'

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

LEGEND

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

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

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Attachment 2

SCALE: 1"=350'

W CAPITOL AVE
MERKELY AVE
WESTACRE RD
JEFFERSON BLVD
TOWER BRIDGE GATEWAY
BALL PARK DR
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
S RIVER RD
PIONEER BRIDGE
BROADWAY
VERMONT AVE
17TH ST
19TH ST
FRONT ST
STONE BLVD
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR
LOCKS DR
VILLAGE PKWY
MARINA GREENS DR
DEVON AVE
GATEWAY DR
STONEGATE DR
JEFFERSON BLVD
LAKE WASHINGTON BLVD
REDDING RD

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
MERKELY AVE
WESTACRE RD
US-50
JEFFERSON BLVD
(4/ 80')
TOWER BRIDGE GATEWAY
(2/ 60')
(2/ 68')
(2/ 48')
BALL PARK DR
GRAND ST
(4/ 98')
BRIDGE ST
(4/ 92')
5TH ST
MILL ST
RIVERFRONT ST
(2/ 80')
DREVER ST
RAIL ST
JACKSON ST
WEBSTER ST
(4/ 105')
PARK BLVD
11TH ST
13TH ST
15TH ST
(2/ 76')
(2/ 60')
(4/ 104)
S RIVER RD
(4/ 92')
(0/ 60')
(0/ 40')
(4/ 80')
PIONEER BRIDGE
CIRCLE ST
ALAMEDA BLVD
VERMONT AVE
(2/ 70')
BROADWAY
17TH ST
(4/ 106')
19TH ST
STONE BLVD
(2/ 80')
FRONT ST
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR
(2/ 48')
MARINA GREENS DR
(2/ 66')
VILLAGE PKWY
LA JOLLA ST
(4/ 100')
MARINA GREENS DR
STONEGATE DR
DEVON AVE
GATEWAY DR
(4/ 110')
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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LANES & ROW
ALTERNATIVE 5 - MARCH 2018

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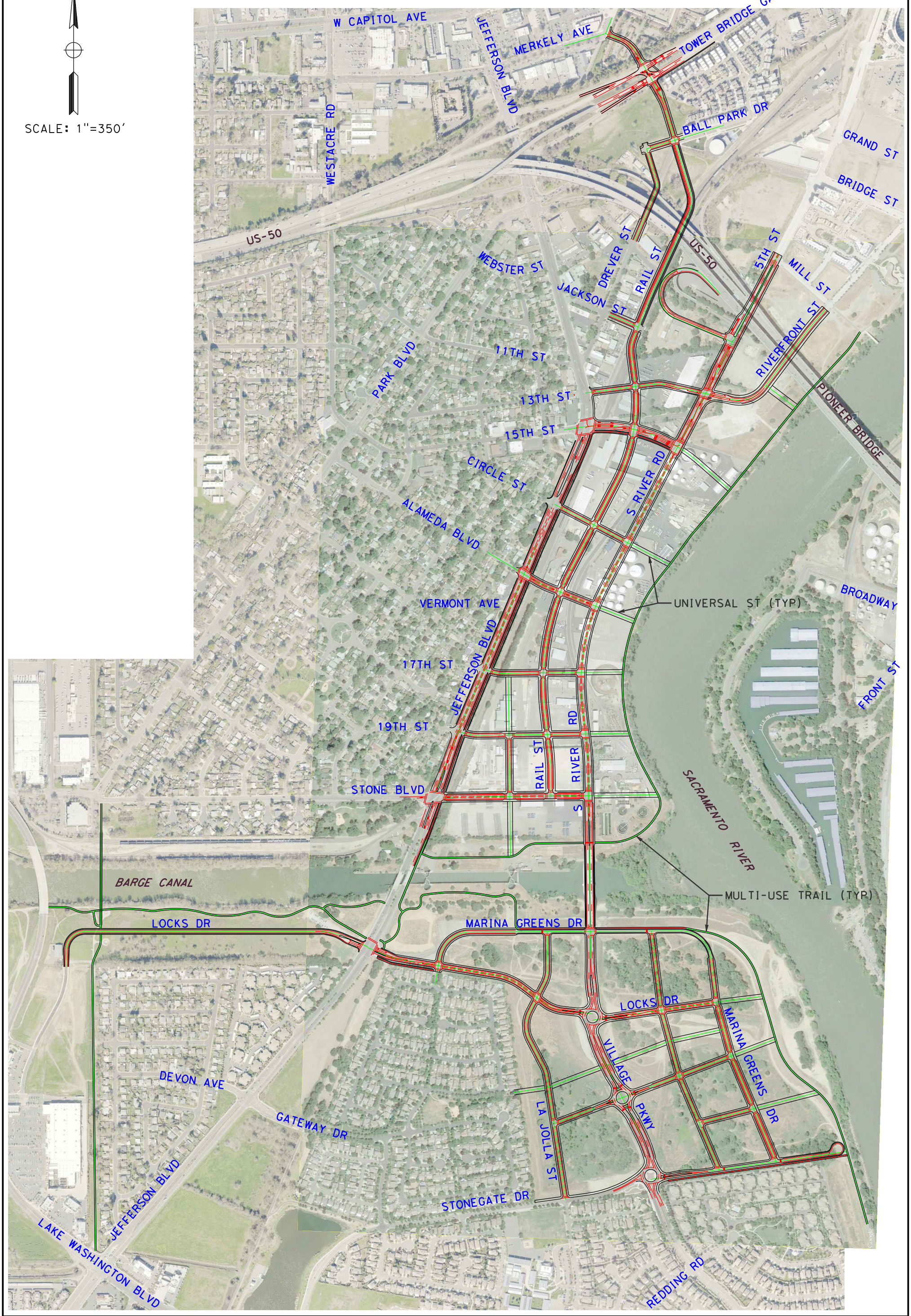
Attachment 4

SCALE: 1"=350'



LEGEND

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

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

CONCEPTUAL LAYOUT
ALTERNATIVE 5 - MARCH 2018

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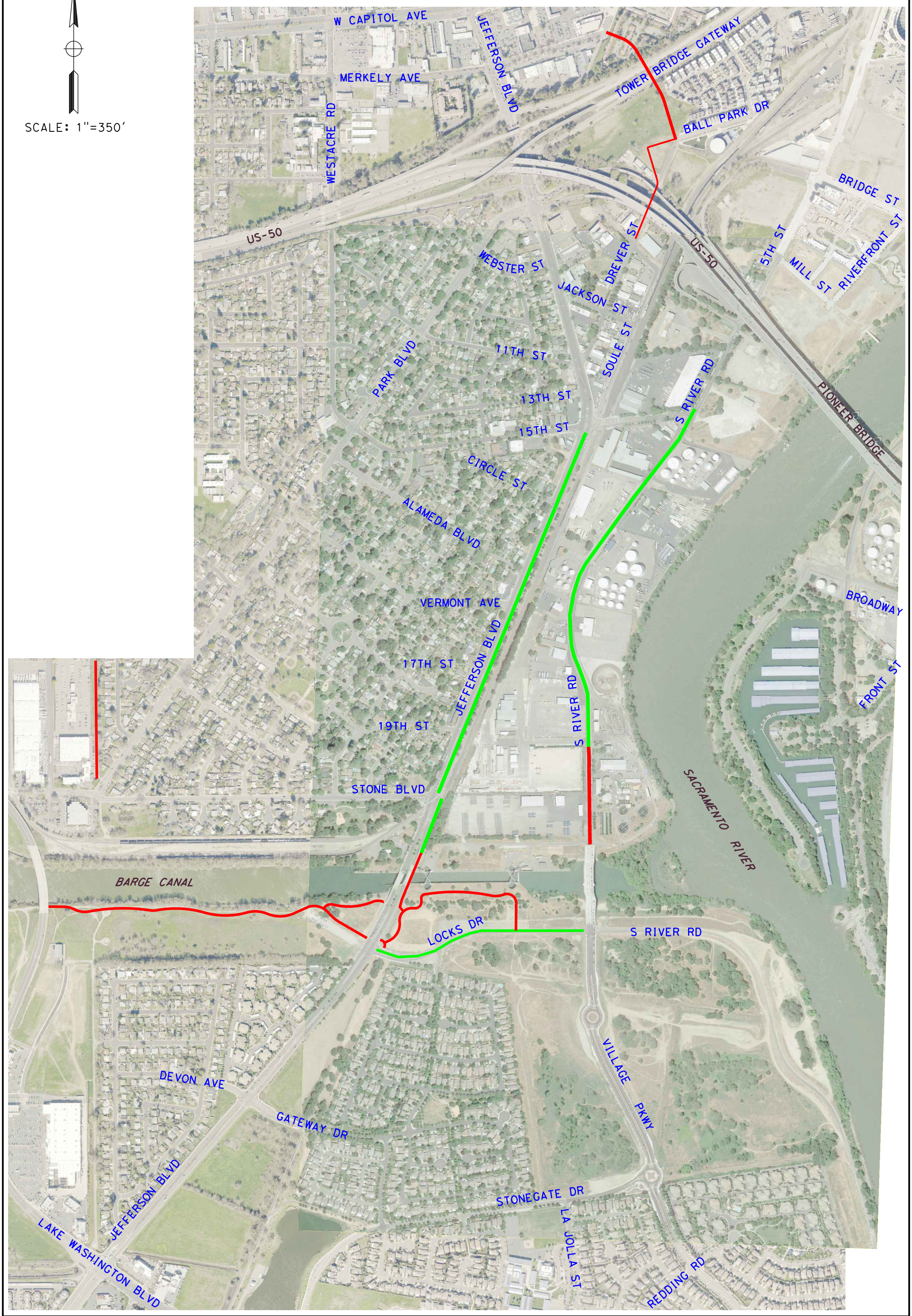
Attachment 5

SCALE: 1"=350'



LEGEND

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

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

MOBILITY NETWORK-PH1
1 TO 5 YEARS - ALTERNATIVE 5 - APRIL 2018

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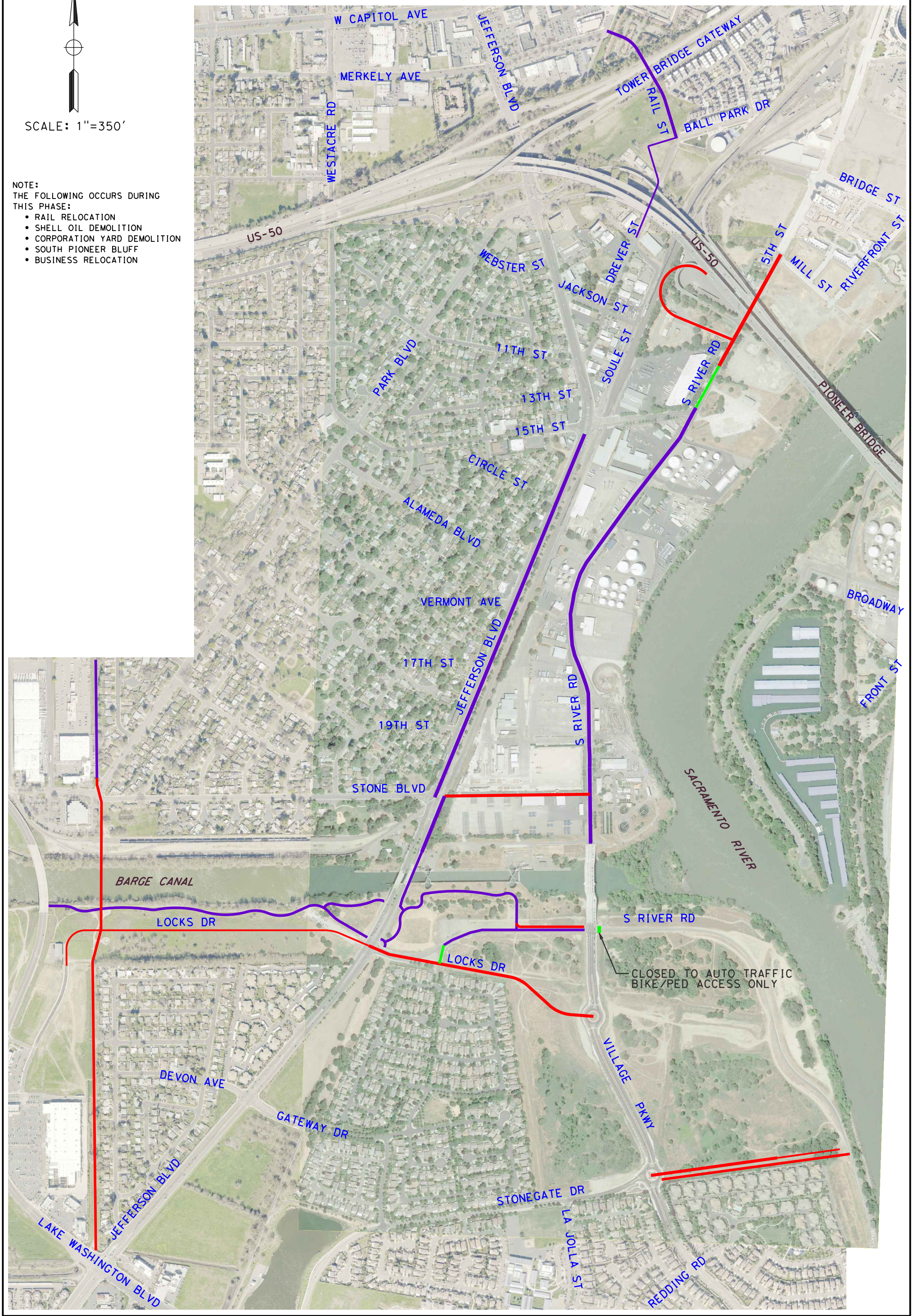
Attachment 6

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

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PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN
MOBILITY NETWORK-PH2
5 TO 10 YEARS - ALTERNATIVE 5 - APRIL 2018

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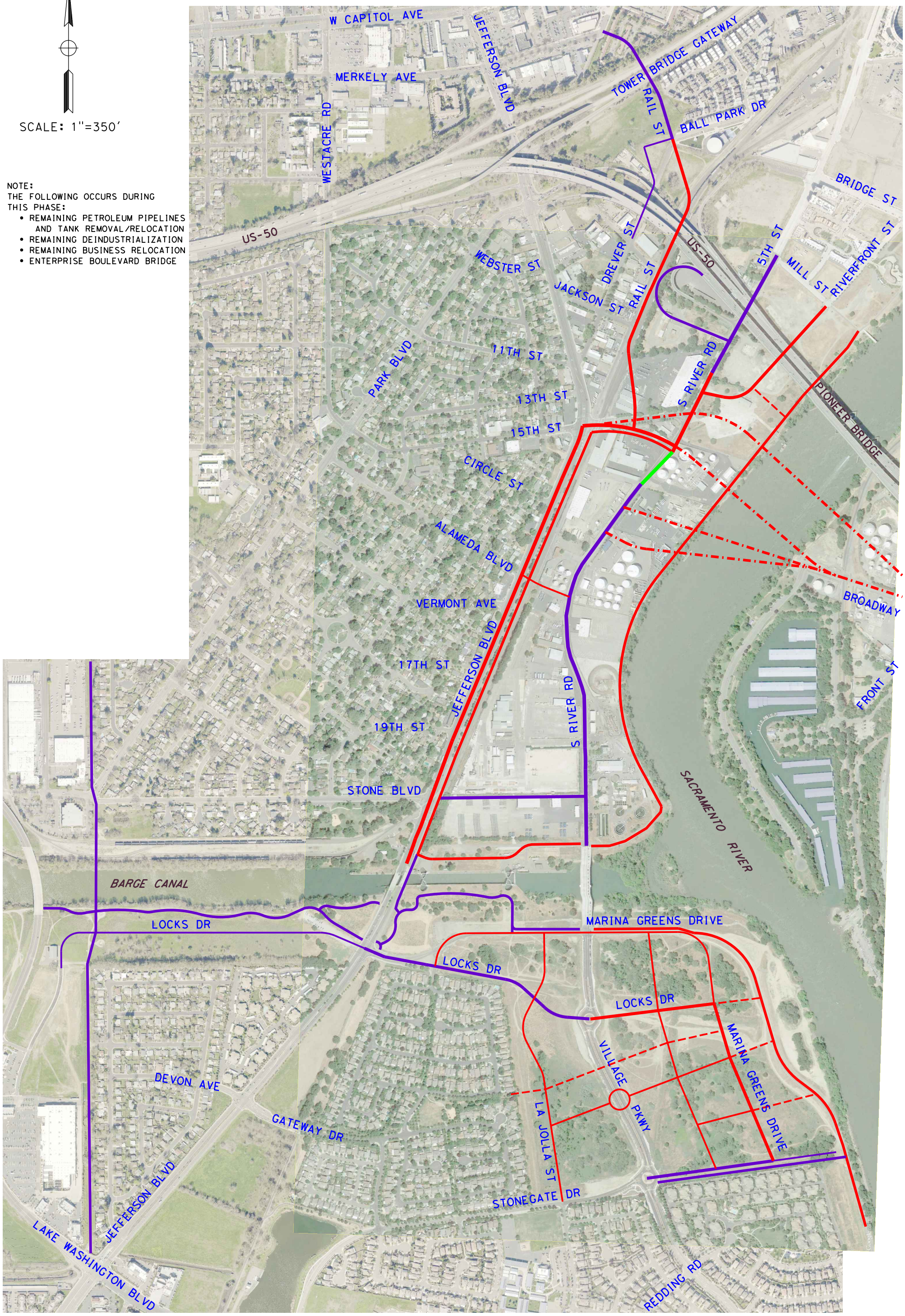
Attachment 7

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

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CITY OF WEST SACRAMENTO

AECOM
ENGINEERING PLANNING ENVIRONMENTAL
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

W CAPITOL AVE
MERKELY AVE
JEFFERSON BLVD
WESTACRE RD
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
S RIVER RD
PIONEER BRIDGE
CIRCLE ST
ALAMEDA BLVD
BROADWAY
VERMONT AVE
17TH ST
19TH ST
STONE BLVD
FRONT ST
SACRAMENTO RIVER
BARGE CANAL
LOCKS DR
MARINA GREENS DR
VILLAGE PKWY
LA JOLLA ST
DEVON AVE
GATEWAY DR
STONEGATE DR
LAKE WASHINGTON BLVD
REDDING RD

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

CITY OF WEST SACRAMENTO

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
US-50
WEBSTER ST
DREVER ST
SOULE ST
JACKSON ST
5TH ST
MILL ST
RIVERFRONT 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
VILLAGE PKWY
DEVON AVE
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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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
DREVER ST
RAIL ST
JACKSON 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
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WEST SACRAMENTO, CALIFORNIA 95691

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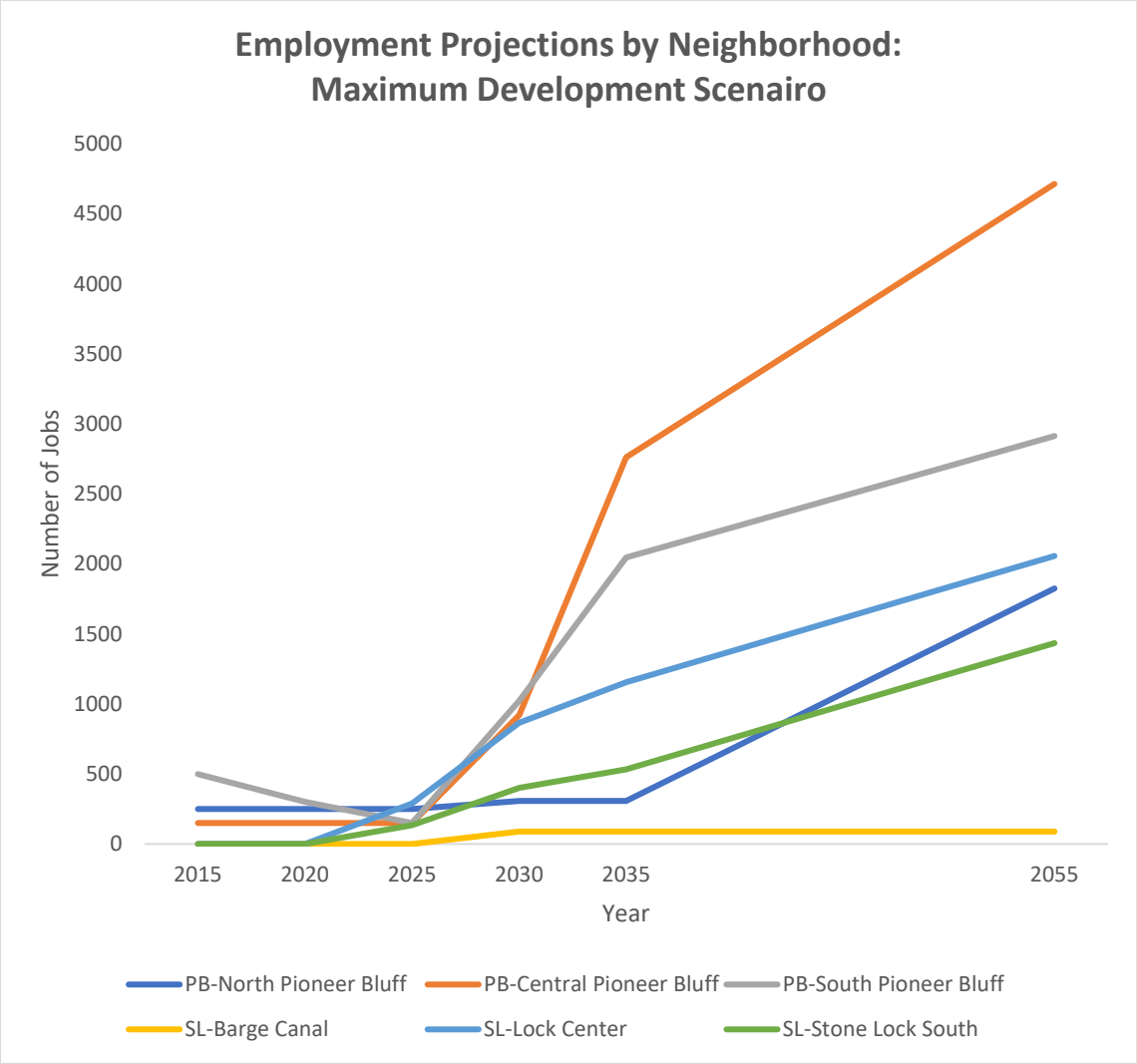
ENGINEERING PLANNING ENVIRONMENTAL
2020 L STREET, SUITE 400
SACRAMENTO, CA 95811 916.414.5800

PIONEER BLUFF & STONE LOCK
REUSE MASTER PLAN

NEIGHBORHOODS
ALTERNATIVE 5 - MARCH 2018

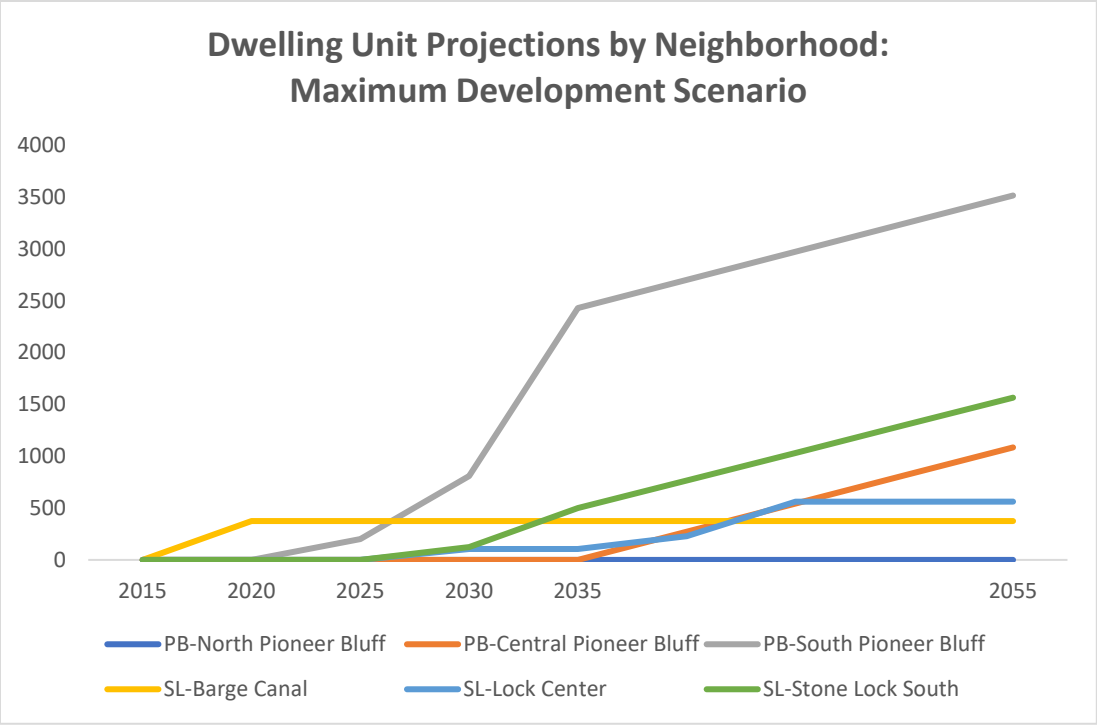
P:\60555240 - Pioneer Bluff Pre Eng\900 CAD_GIS\910 CAD\006-CIVIL\40-EXHIBITS\PIONRBLUF_Exhibit_Alt5.dgn



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**

Source: Google Earth Pro 2016

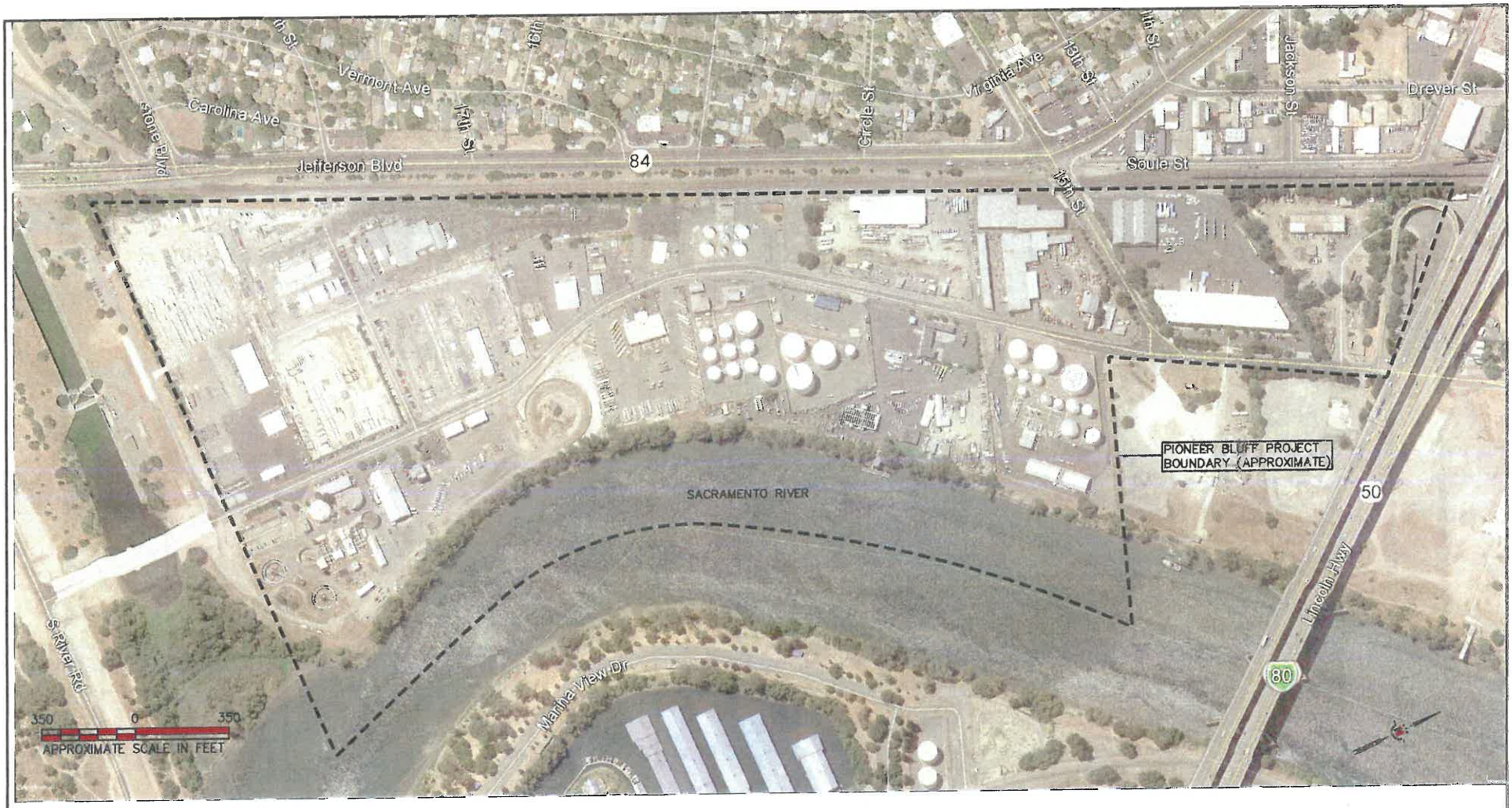
SCS ENGINEERS
Environmental Consultants
And Contractors

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

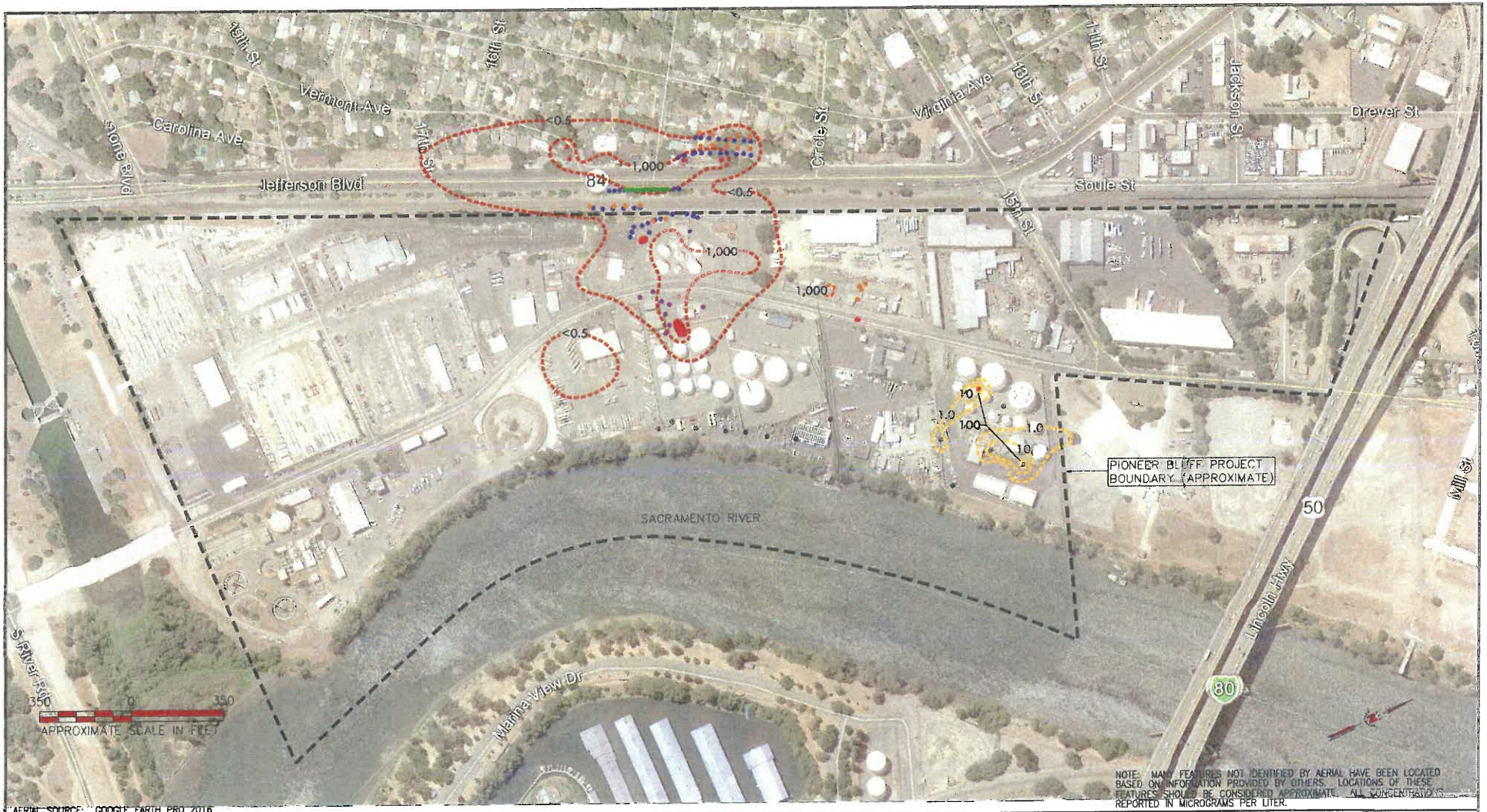
7041 Koll Center Parkway,
Suite 135
Pleasanton, CA 94566
Ph: (925) 426-0080
Fax: (925) 426-0707

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)

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PH. (925) 426-0080 FAX. (925) 426-0707

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

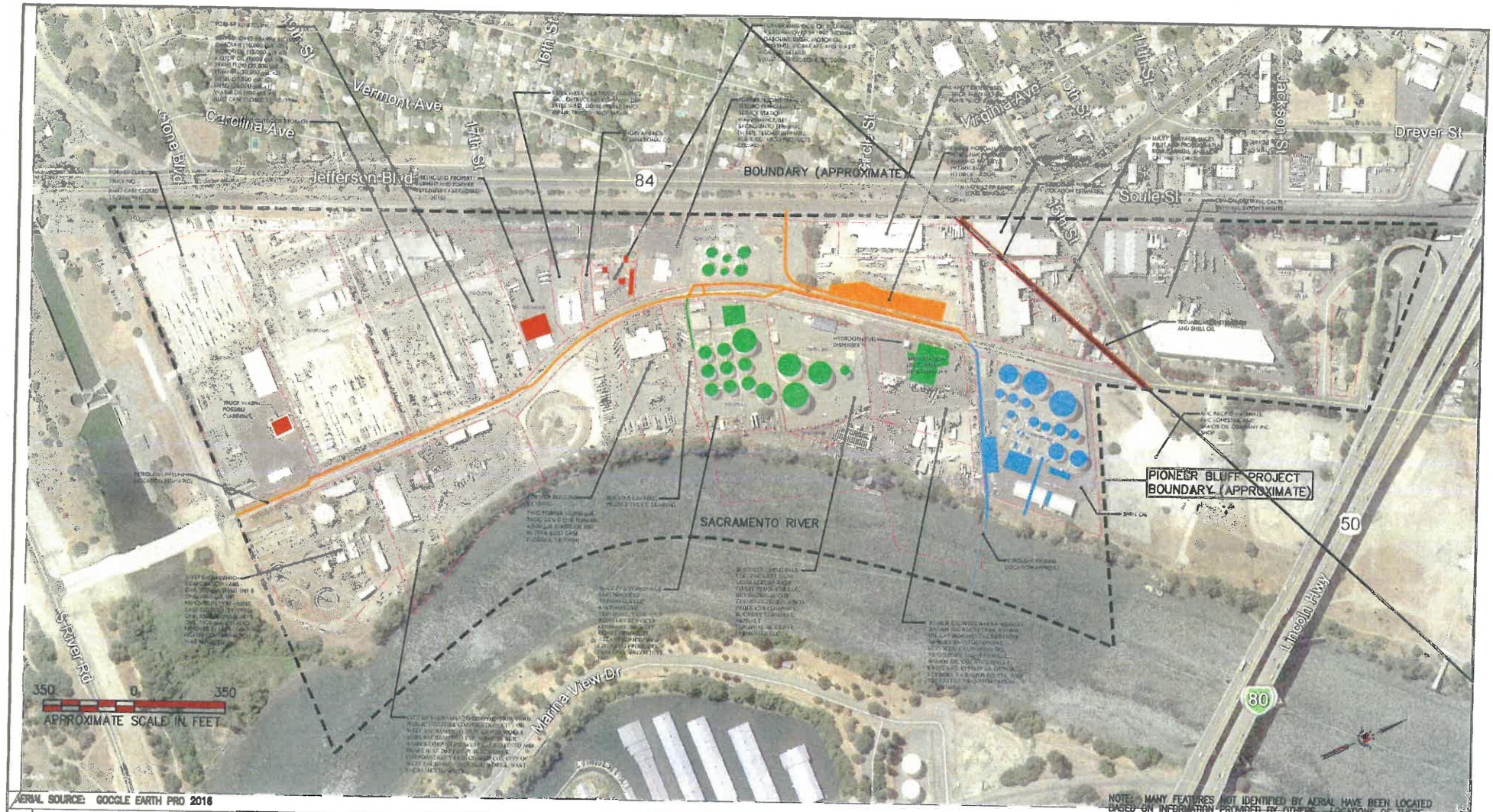
SHEET TITLE: PROJECT AREA WITH DISSOLVED BENZENE DISTRIBUTION

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

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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

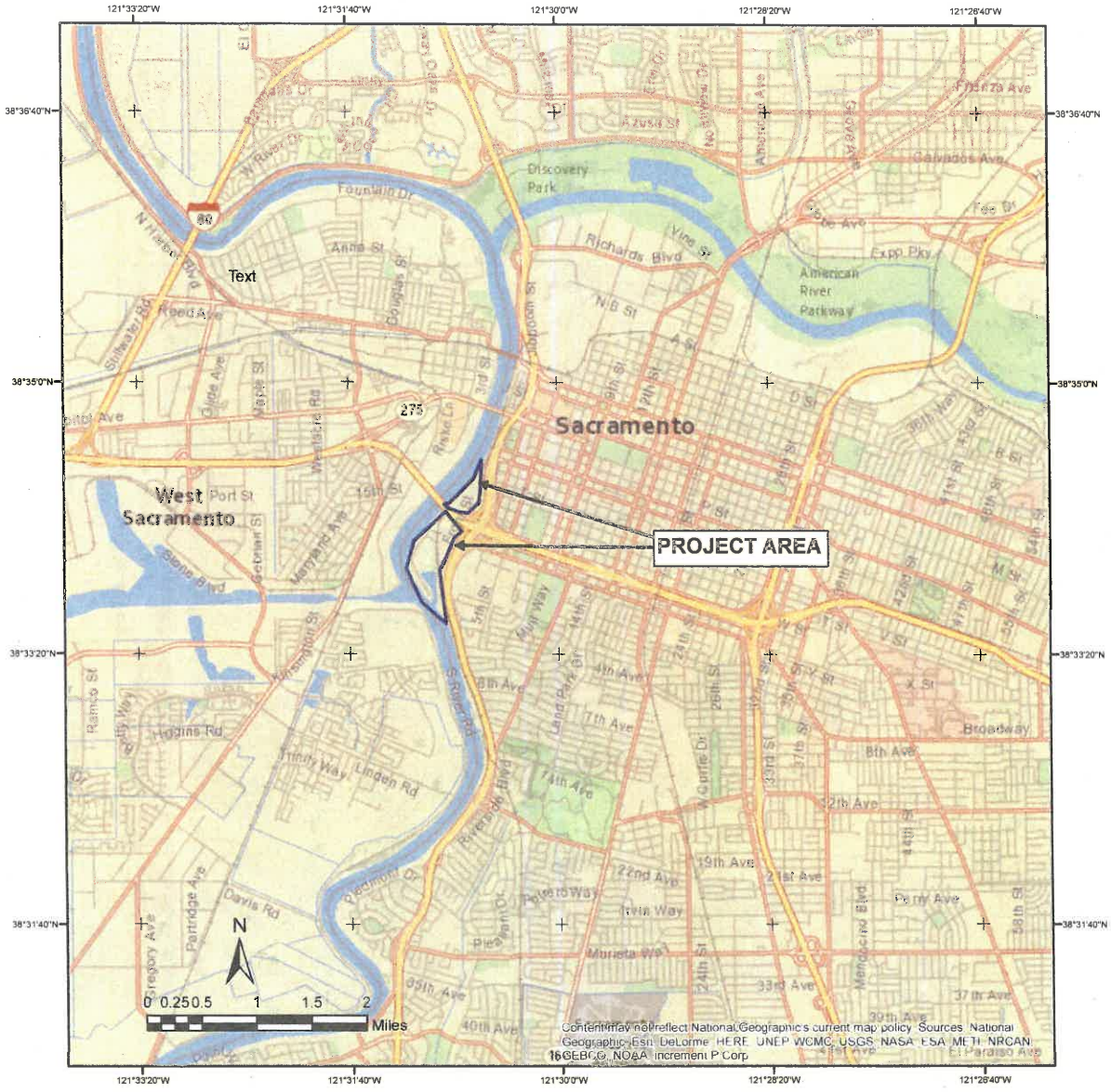
SHEET TITLE: PROJECT AREA WITH FEATURES OF POTENTIAL CONCERN

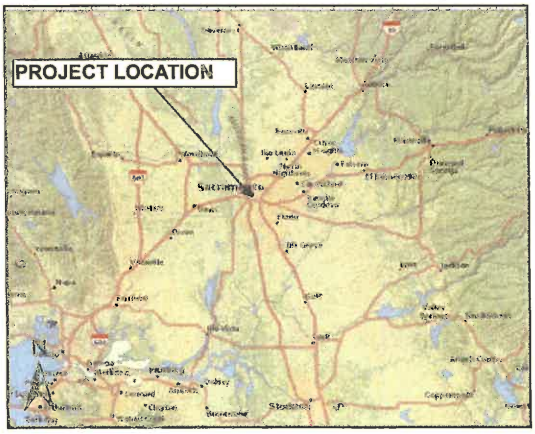
PROJECT TITLE: PIONEER BLUFF PROJECT
WEST SACRAMENTO, CALIFORNIA

DATE: 01/19/17

SCALE: AS SHOWN

FIGURE 5



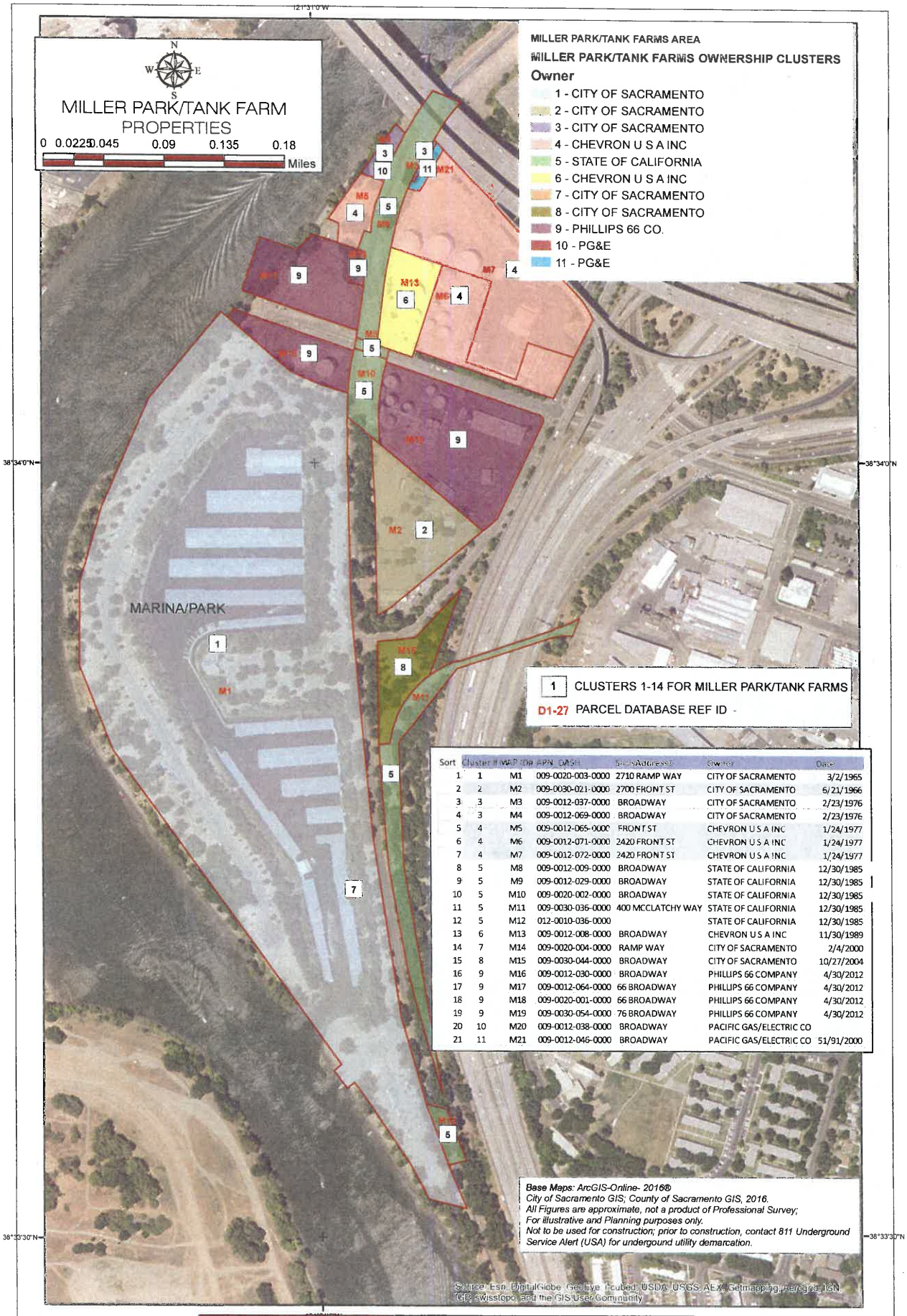


Base Maps: ArcGIS-Online- 2016®
City of Sacramento GIS; County of Sacramento GIS, 2016.
All Figures are approximate, not a product of Professional Survey.

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:** **01215288.01**
	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

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www.scsengineers.com

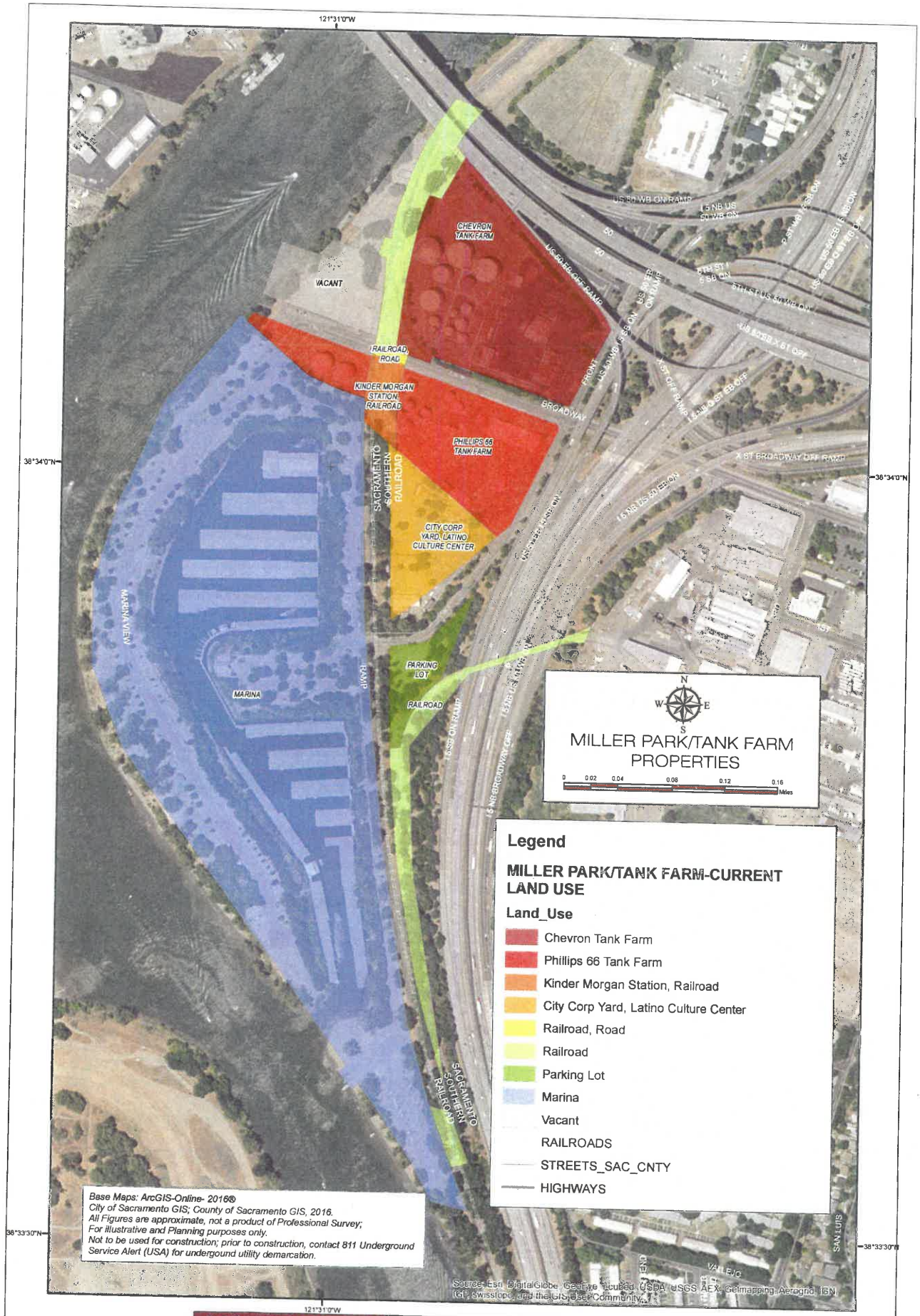
MILLER PARK/TANK FARM AREA:
CURRENT PARCEL OWNERSHIP AND CLUSTERS

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

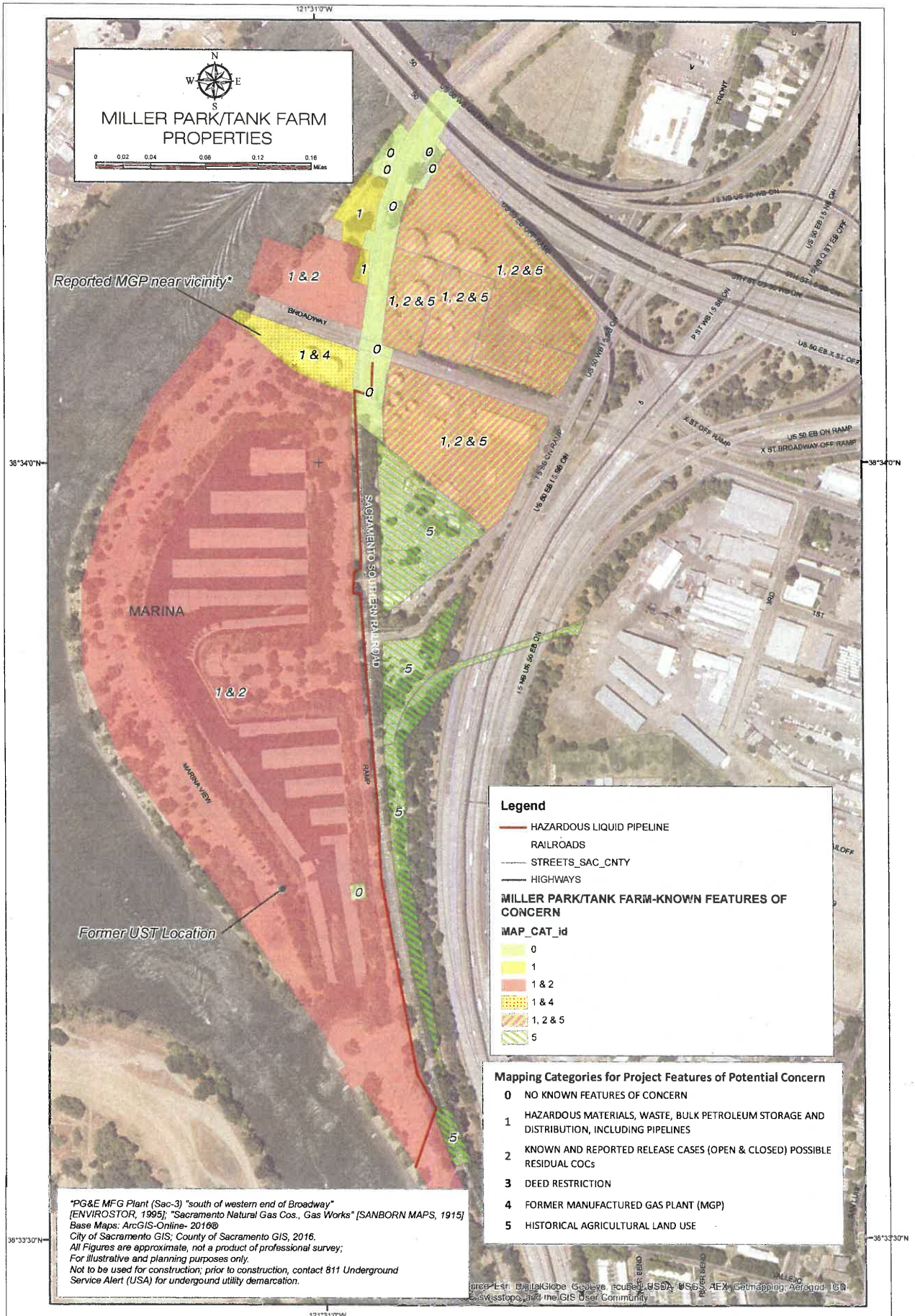
Project No: 01215288.00

Figure 3B

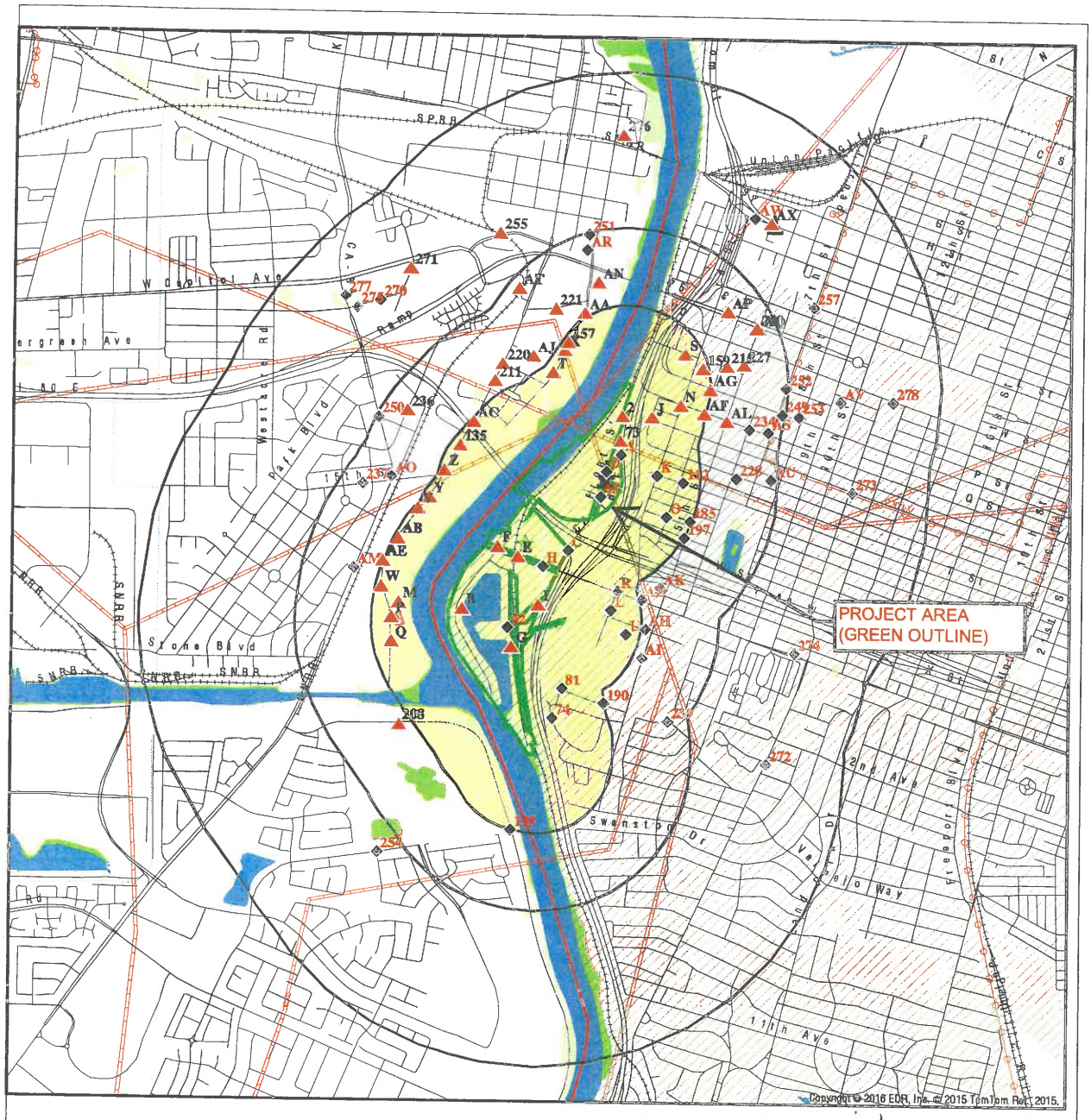
8/18/2016



SCS ENGINEERS 3117 FITE CIRCLE SUITE 108 SACRAMENTO, CALIFORNIA 95827 (916) 361-1297 www.scsengineers.com	MILLER PARK/TANK FARM AREA: SHOWING CURRENT LAND USE	Project No: 01215288.00
	SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY SACRAMENTO, CALIFORNIA	Figure 4B
		8/30/2016



SCS ENGINEERS 3117 FITE CIRCLE SUITE 108 SACRAMENTO, CALIFORNIA 95827 (916) 361-1297 www.scsengineers.com	MILLER PARK/TANK FARM AREA: FEATURES OF POTENTIAL CONCERN SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY SACRAMENTO, CALIFORNIA	Project No: 01215288.00 Figure 5B 9/8/2016

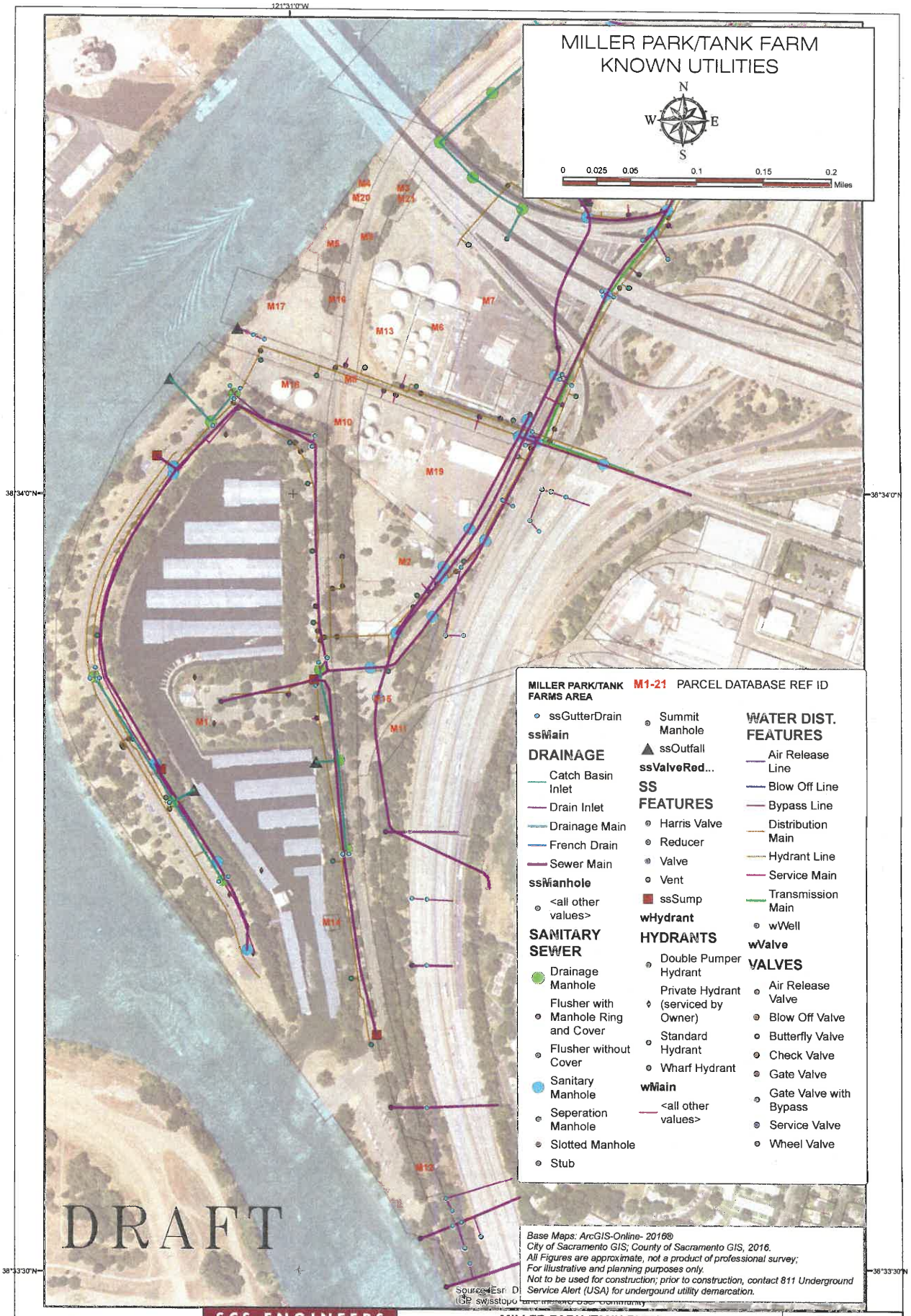


LEGEND

- 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

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



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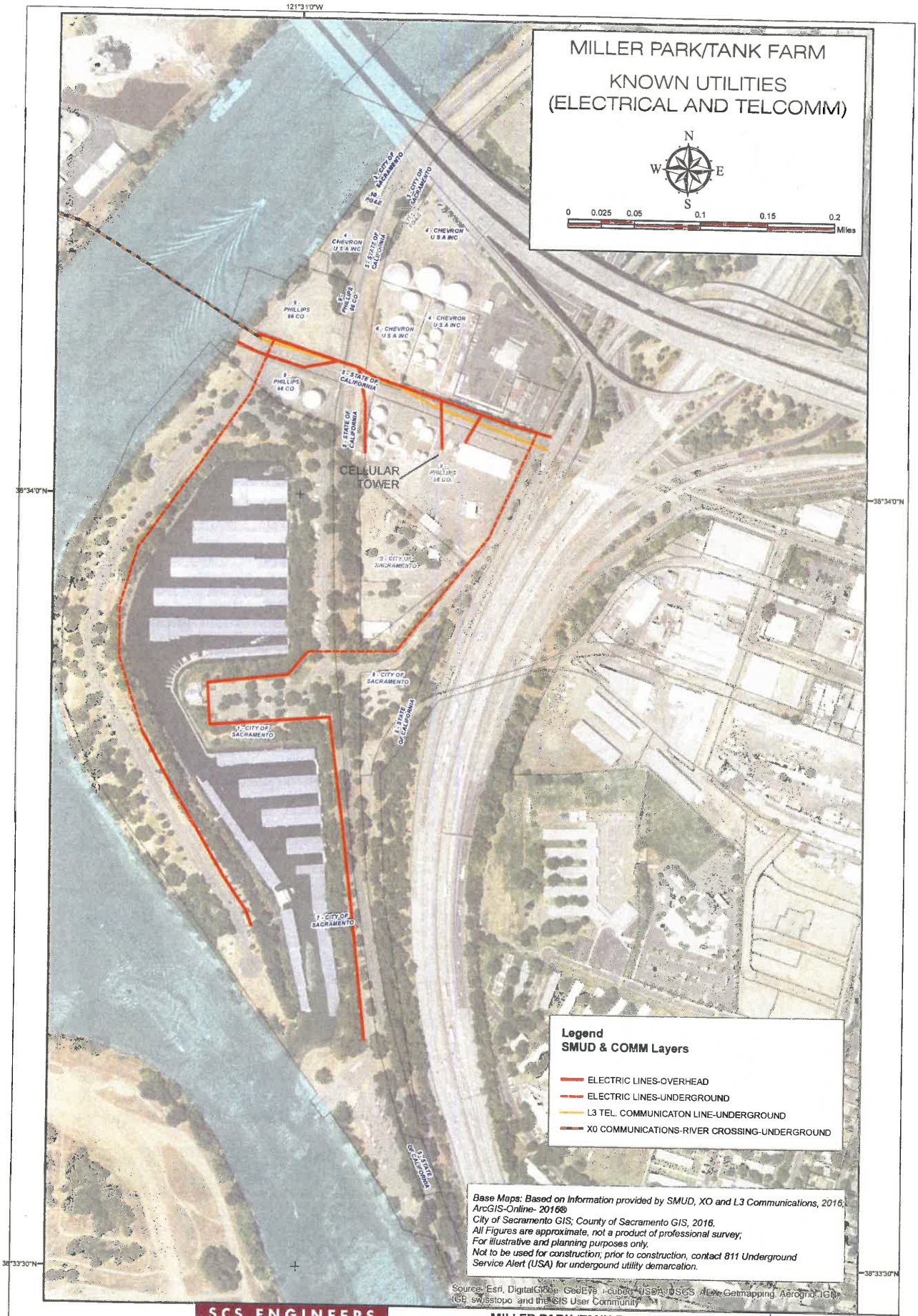
MILLER PARK/TANK FARM:
WATER SUPPLY, SANITARY SEWER AND MS4 LINES

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No: 01215288.00

Figure 8B

8/30/2016



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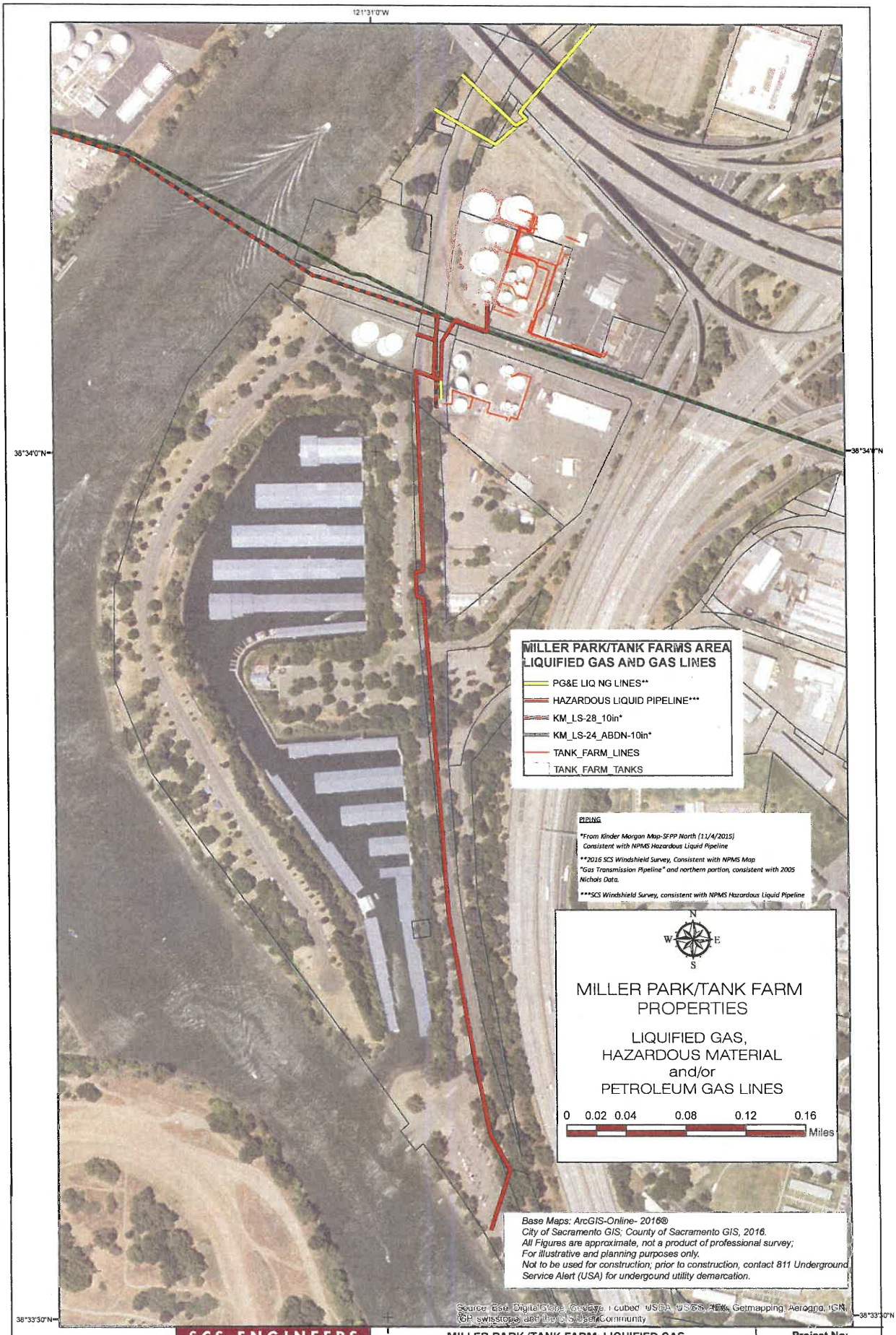
MILLER PARK/TANK FARM:
ELECTRICAL AND TELCOMM. FEATURES

SACRAMENTO RIVERFRONT BROWNFIELD INVENTORY
SACRAMENTO, CALIFORNIA

Project No:
01215288.00

Figure 8B

9/14/2016



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

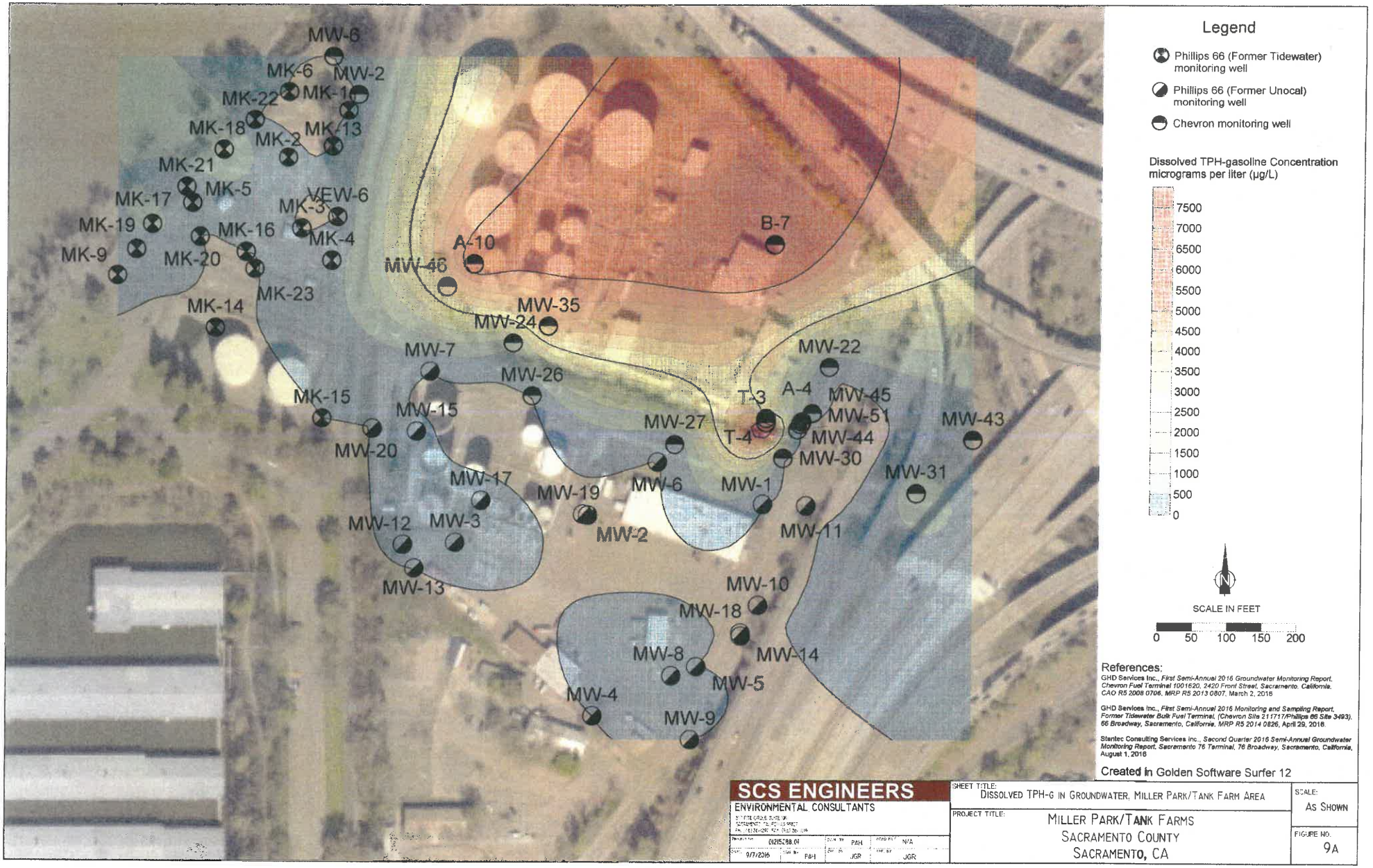
SACRAMENTO RIVERFRONT REUSE PLANNING
PETROLEUM CONTAMINATED BROWNFIELD SITES
SACRAMENTO, CALIFORNIA

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

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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

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

PROJECT NO. 01215288.01	DWN. BY PAH	ACAD FILE N/A	
DATE 9/7/2016	DSN. BY PAH	CHK. BY JGR	APP. BY 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

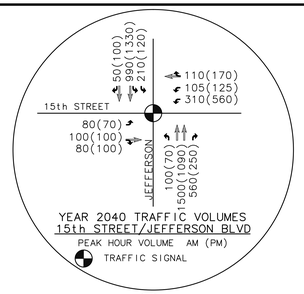
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT A

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 1 OF 3

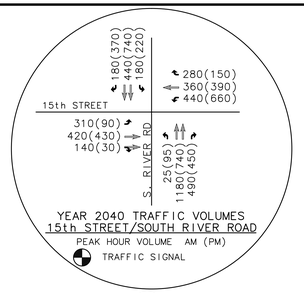
LEGEND/ ABBREVIATIONS

- 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



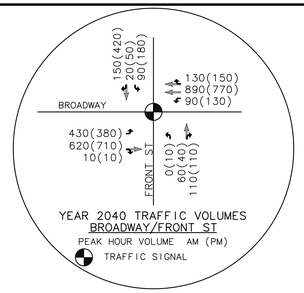
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



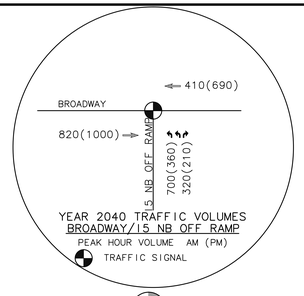
YEAR 2040 TRAFFIC VOLUMES
15th STREET/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



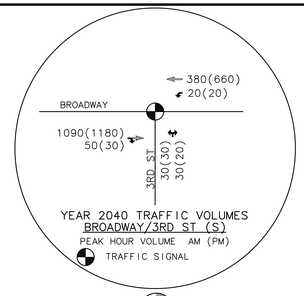
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

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

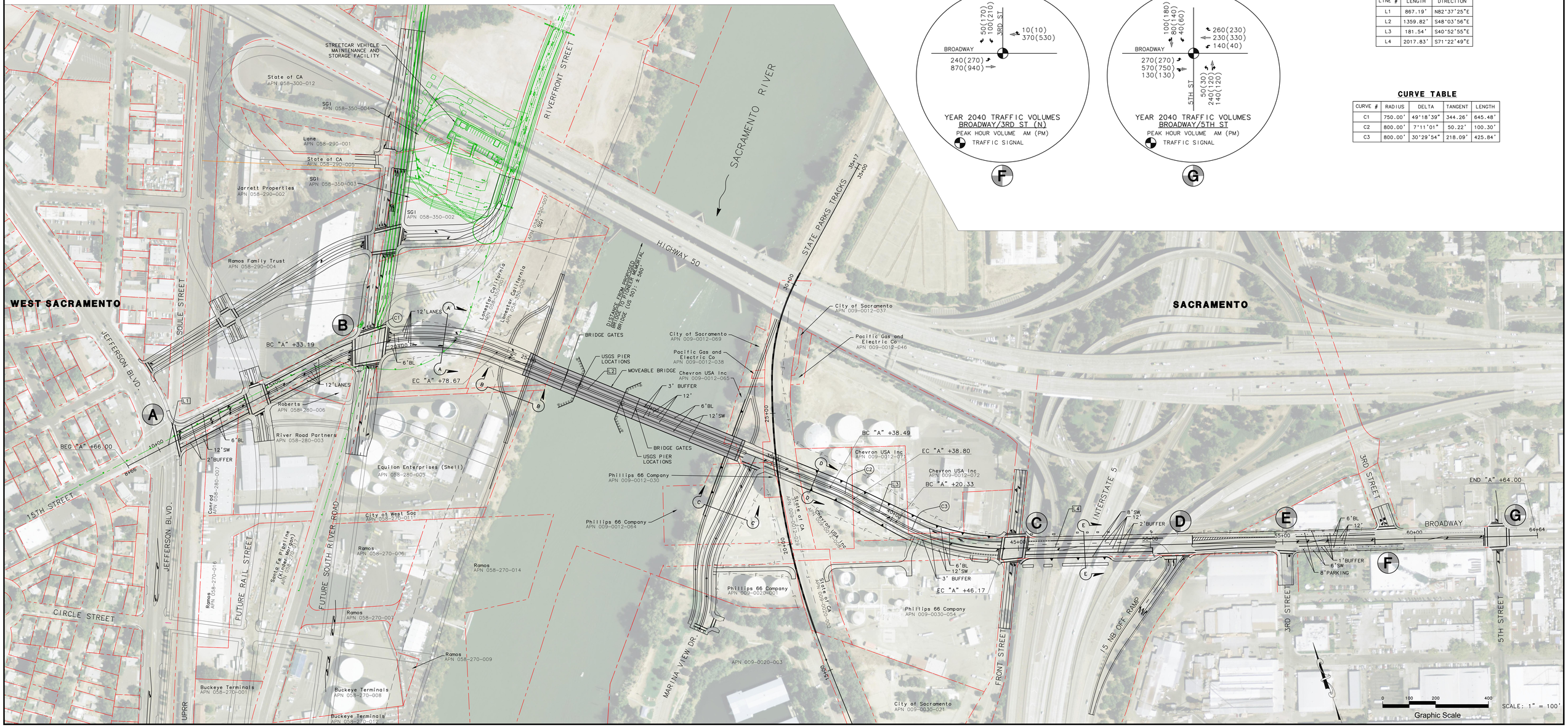
G

LINE 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

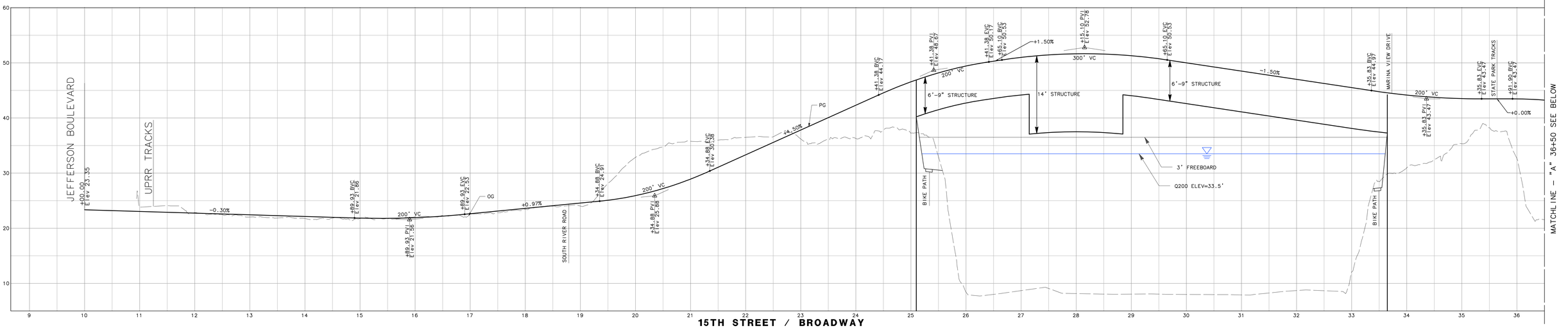
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	750.00'	49°18'39"	344.26'	645.48'
C2	800.00'	7°11'01"	50.22'	100.30'
C3	800.00'	30°29'54"	218.09'	425.84'



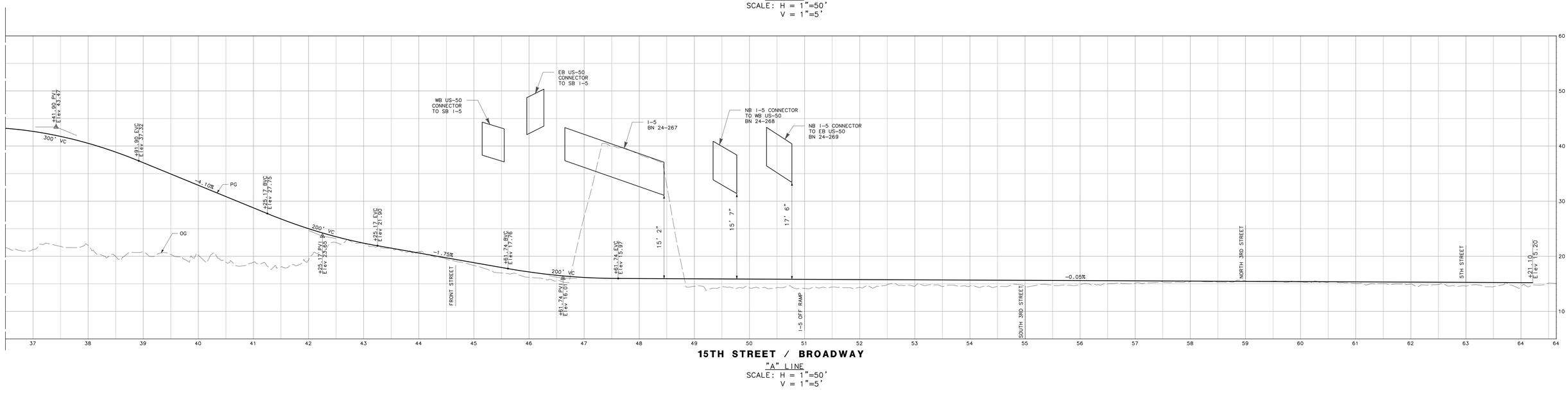
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT A

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
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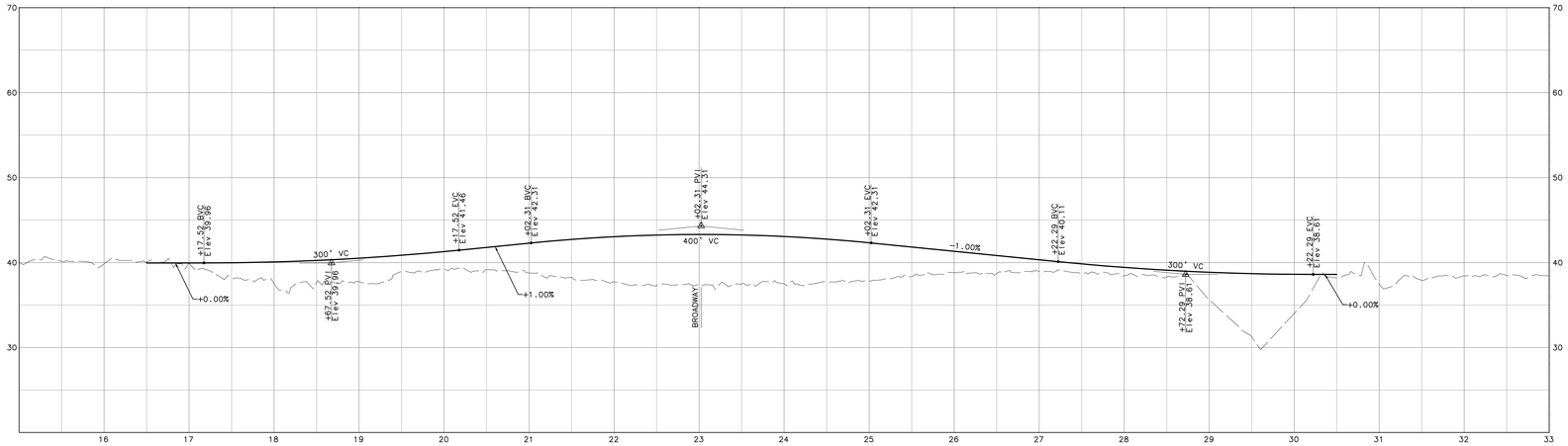
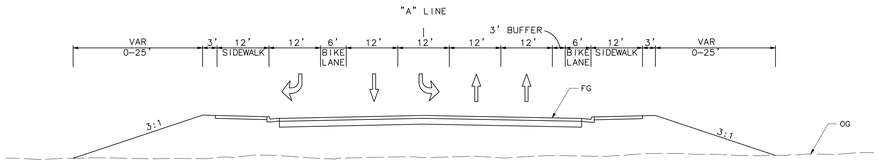
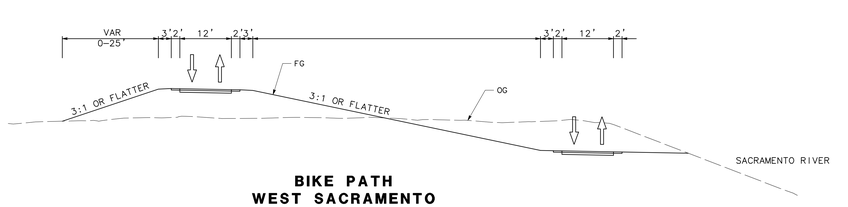


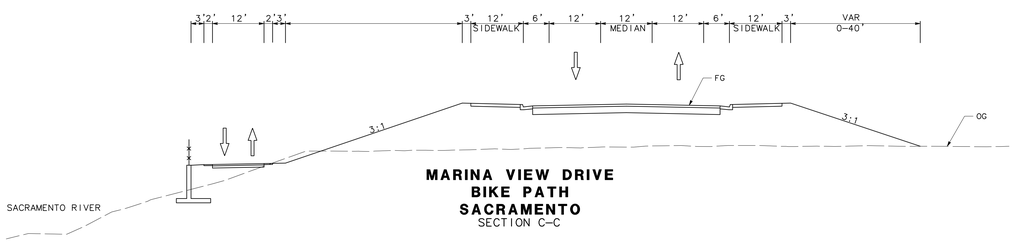
STATE PARKS TRACKS
H = 1"=50'
V = 1"=5'



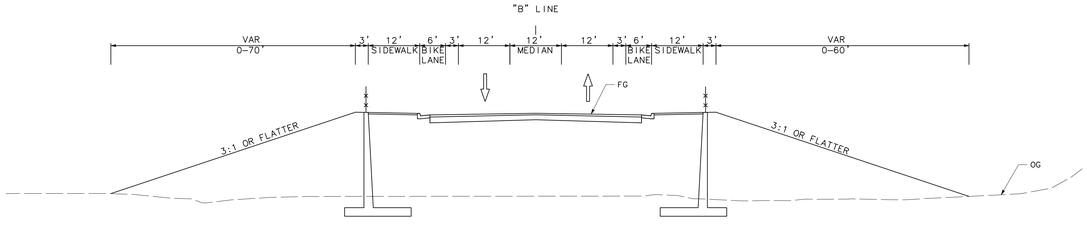
15TH STREET
WEST SACRAMENTO
SECTION A-A



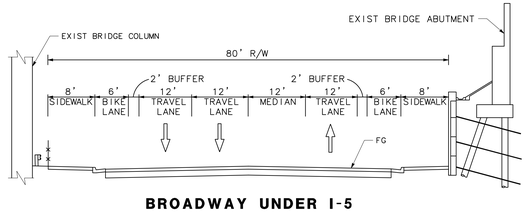
BIKE PATH
WEST SACRAMENTO
SECTION B-B



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

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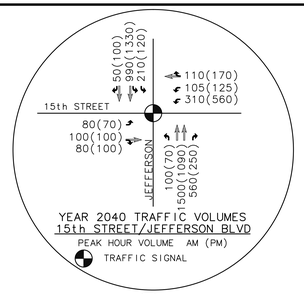
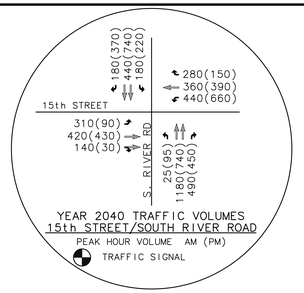


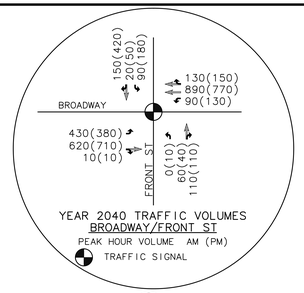
YEAR 2040 TRAFFIC VOLUMES
15th STREET/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



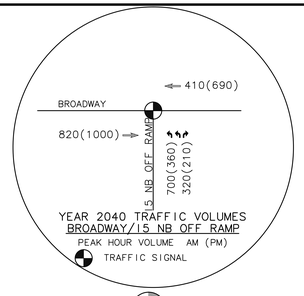
YEAR 2040 TRAFFIC VOLUMES
15th STREET/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



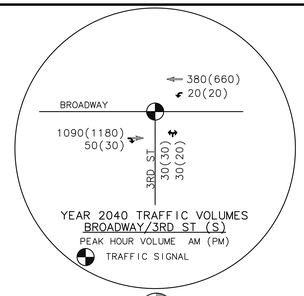
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

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

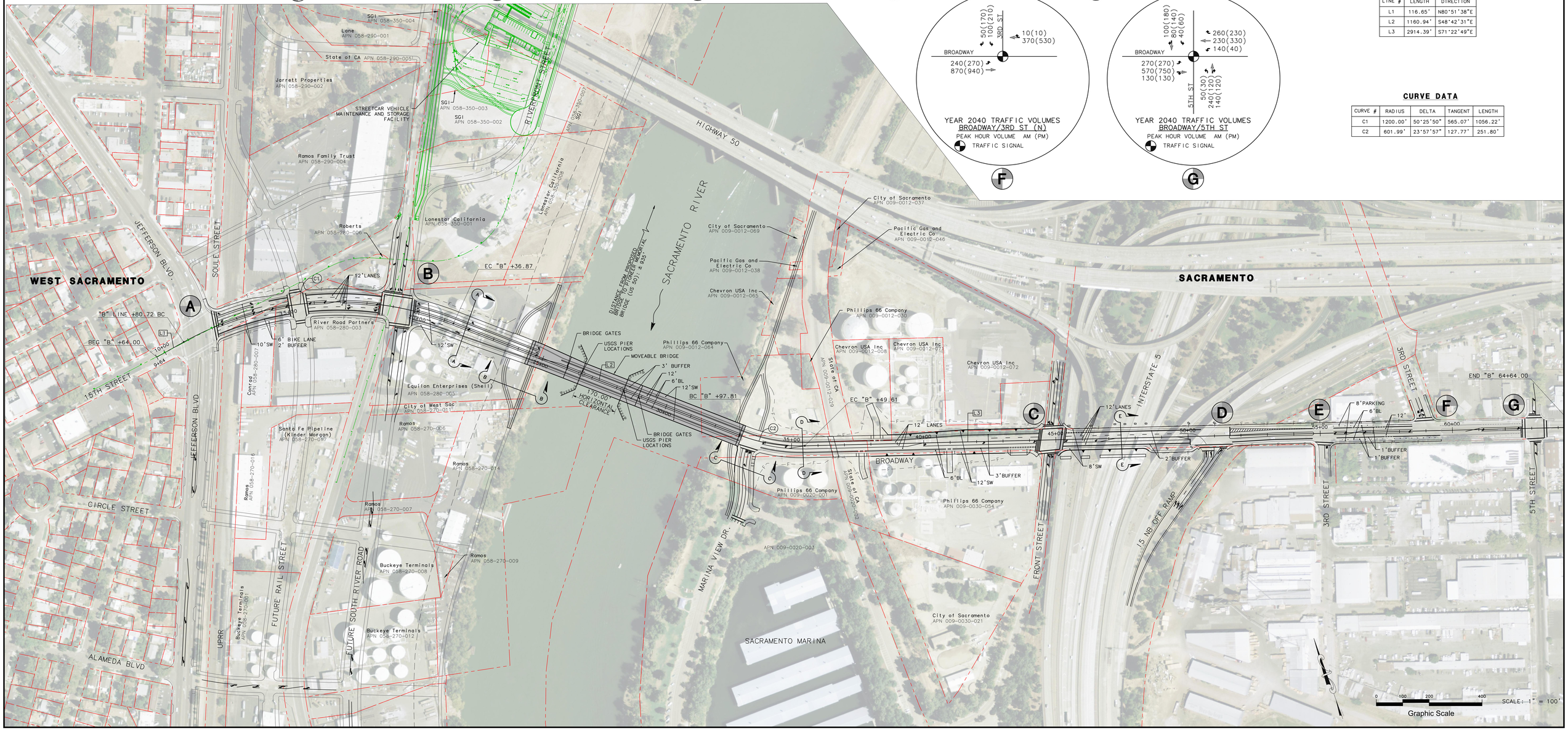
G

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

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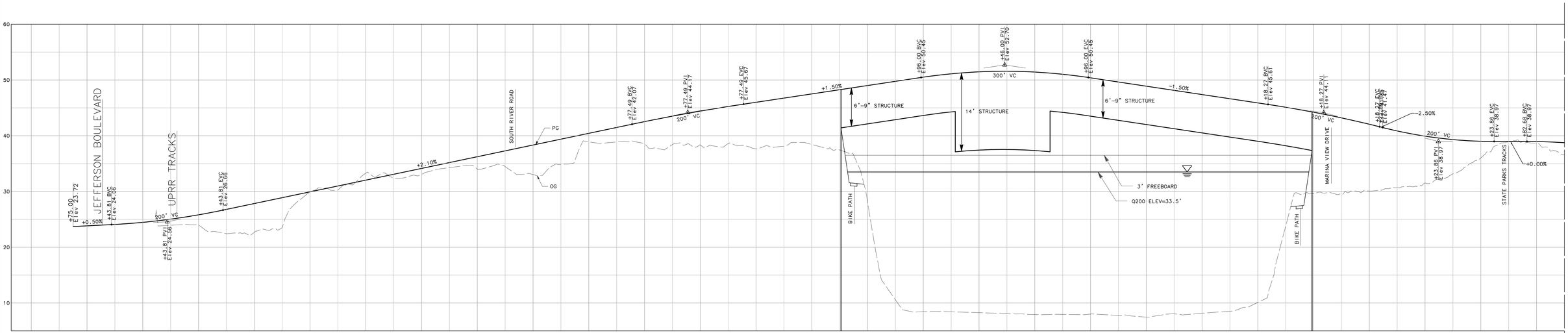
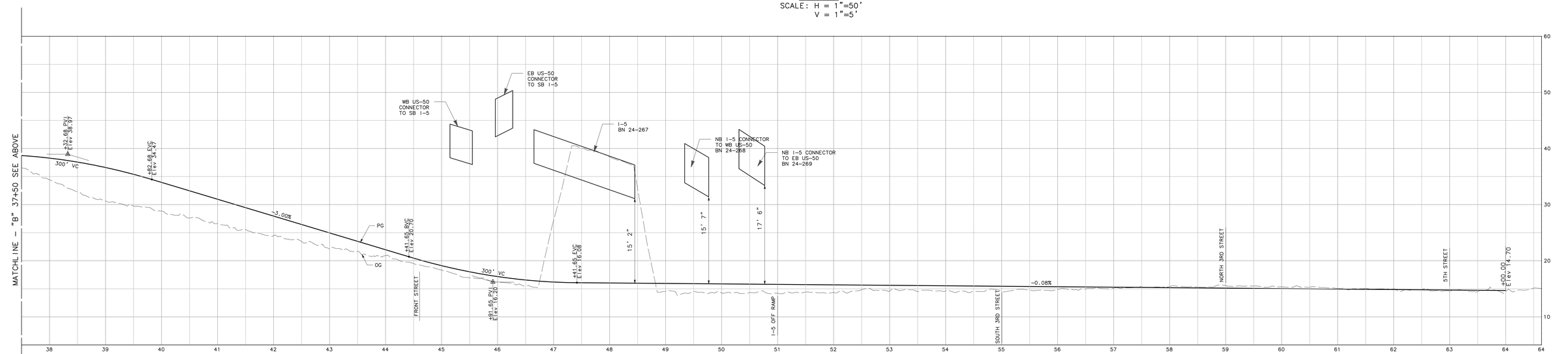


15TH STREET / BROADWAY
"B" LINE
SCALE: H = 1"=50'
V = 1"=5'



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

BROADWAY BRIDGE
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ALIGNMENT B

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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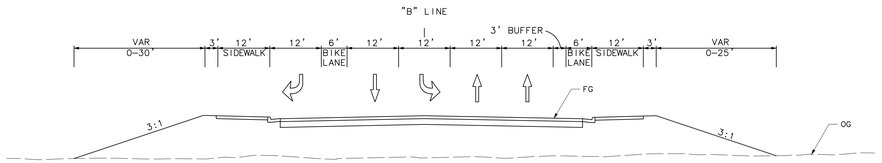
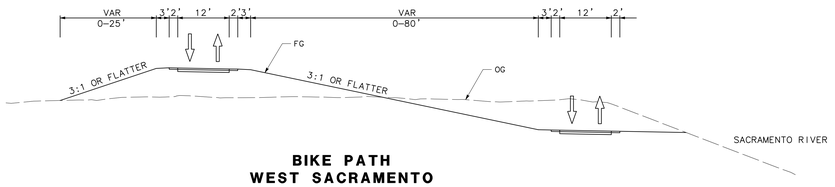
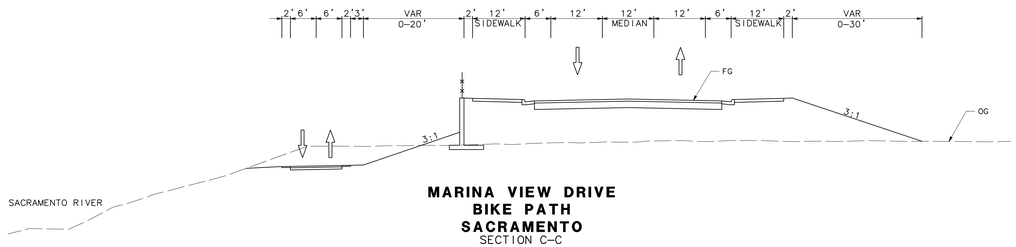
		FILE NO. XXX.dwg	OF 3



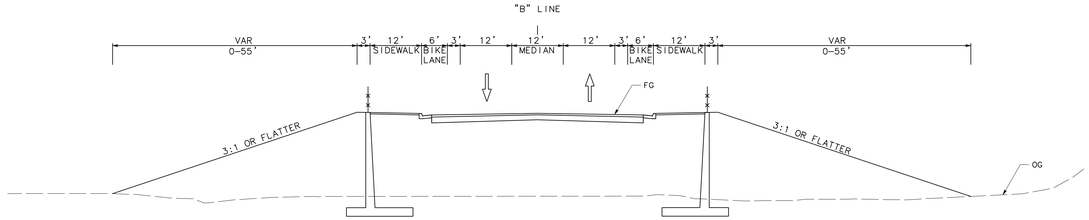
15TH STREET
WEST SACRAMENTO
SECTION A–A



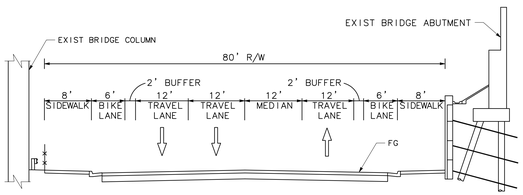
BIKE PATH
WEST SACRAMENTO
SECTION B–B



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 C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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LEGEND/ ABBREVIATIONS

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- EXISTING ROW
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- A — INTERSECTION LOCATION
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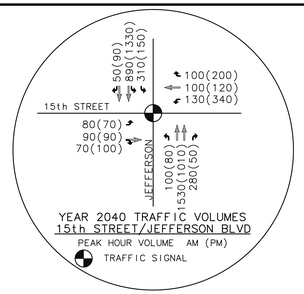
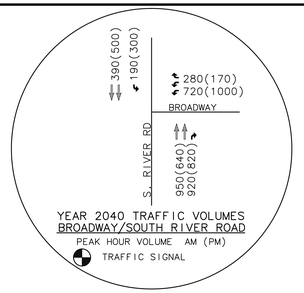
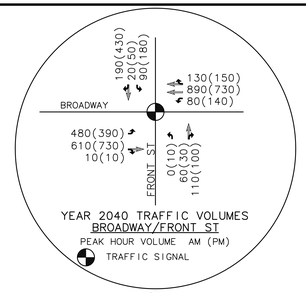
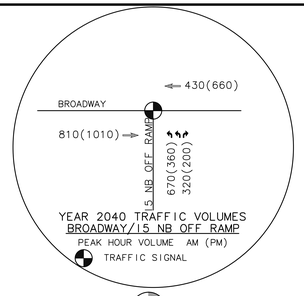
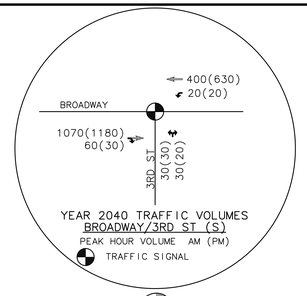








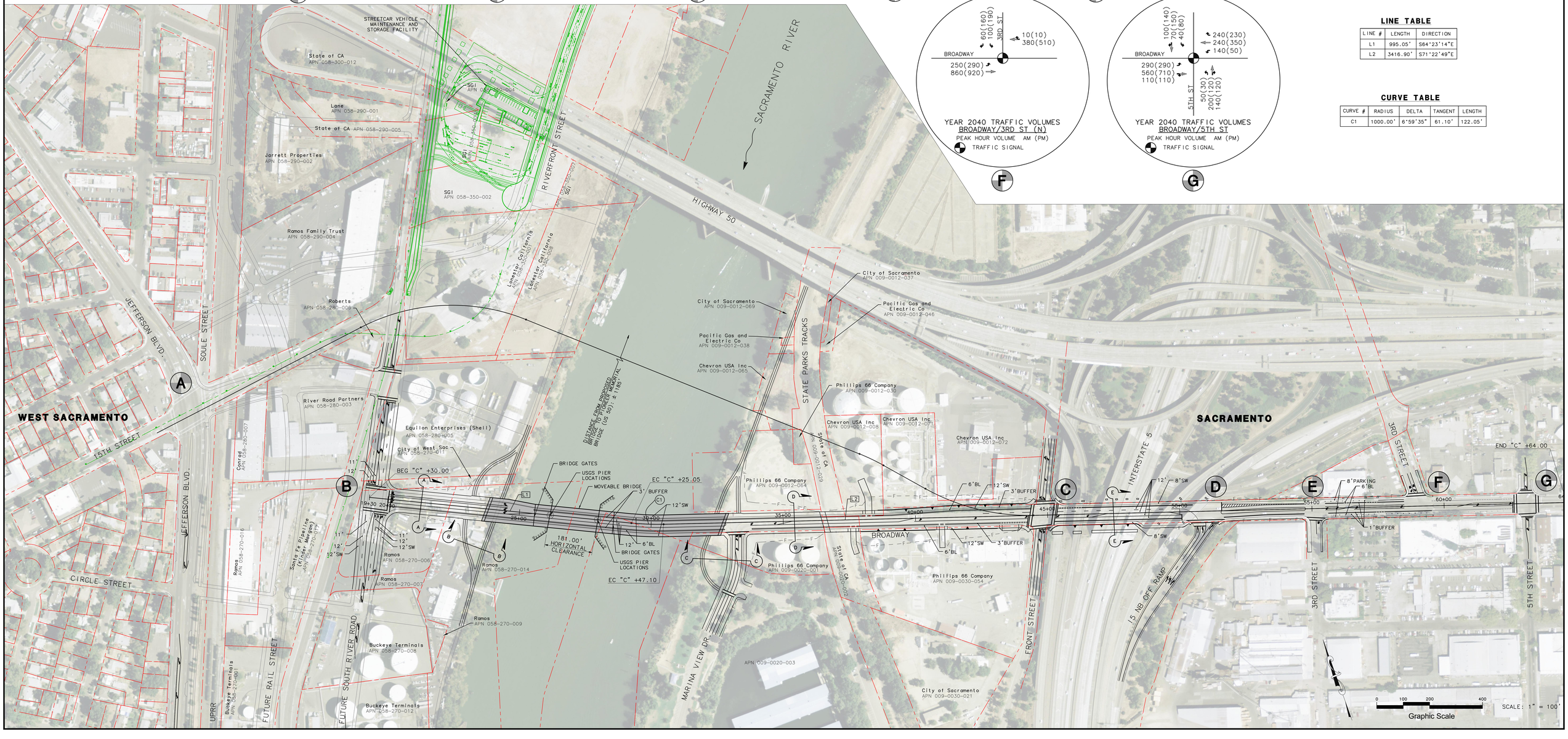


LINE TABLE

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

CURVE TABLE

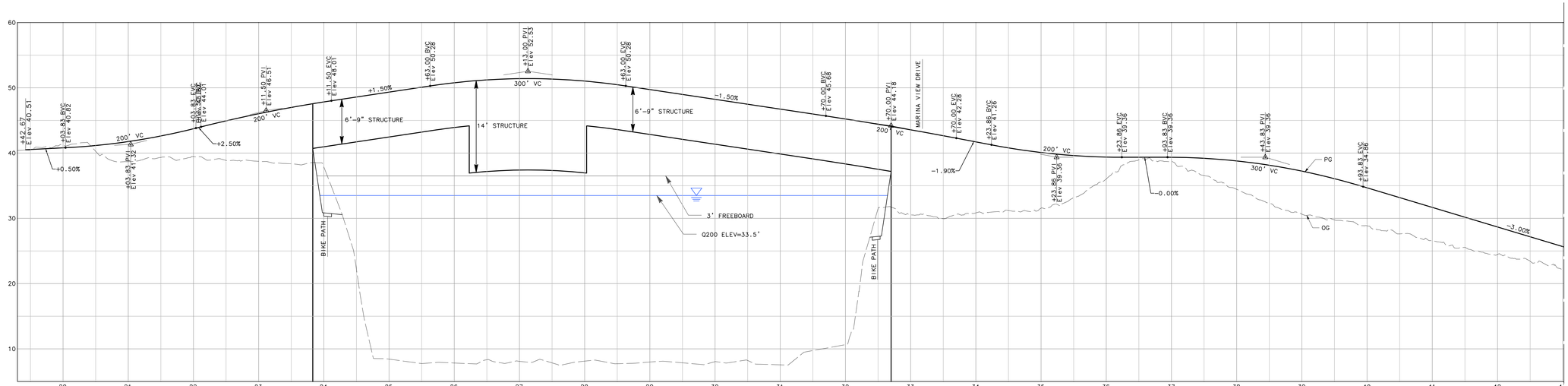
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1000.00'	6°59'35"	61.10'	122.05'



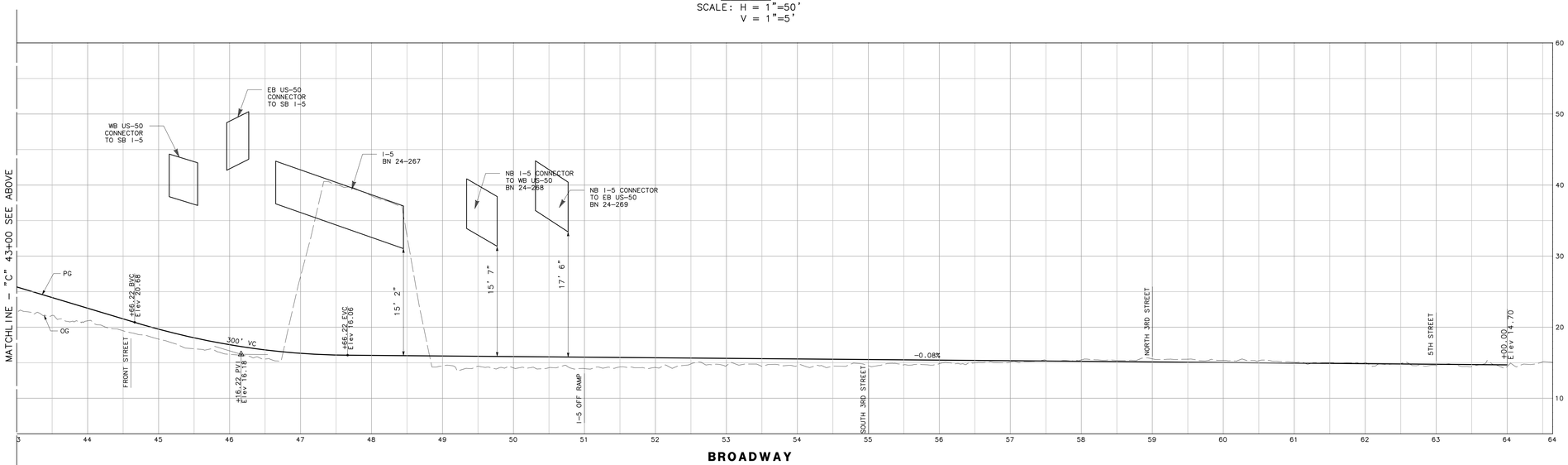
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

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'

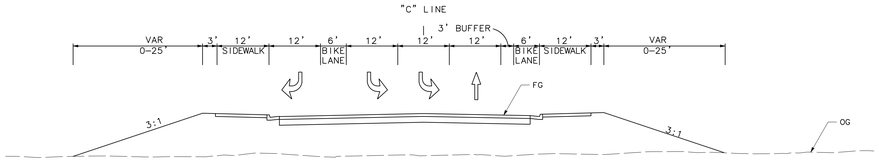


BROADWAY
"C" LINE
SCALE: H = 1"=50'
V = 1"=5'

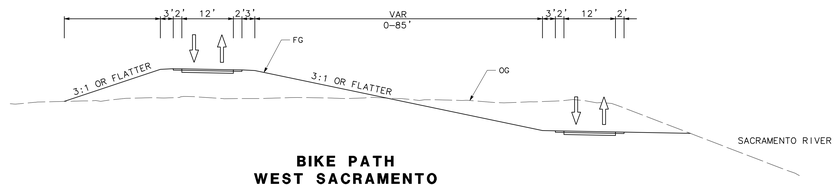
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT C

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

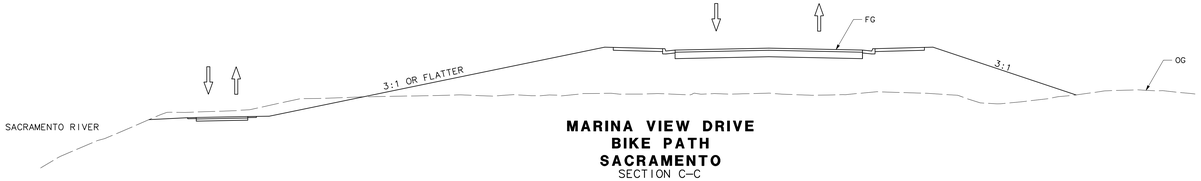
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	**JOB NO.** SA-17110 **FILE NO.** XXX.dwg	**SHEET** 3 **OF** 3



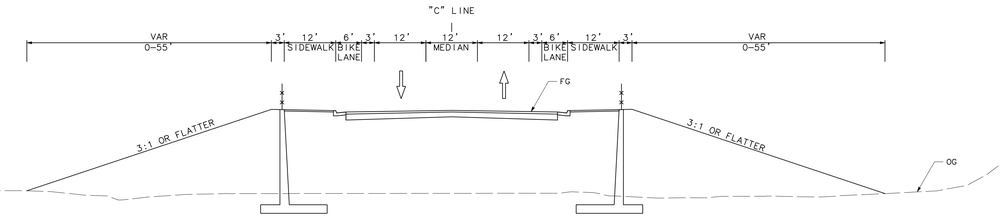
15TH STREET
WEST SACRAMENTO
SECTION A-A



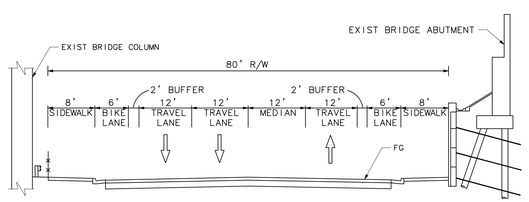
BIKE PATH
WEST SACRAMENTO
SECTION B-B



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

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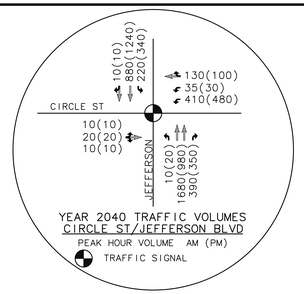
		FILE NO. XXX.dwg	OF 3

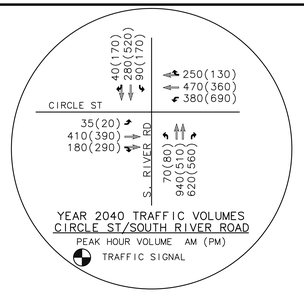
LEGEND/ ABBREVIATIONS

- 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



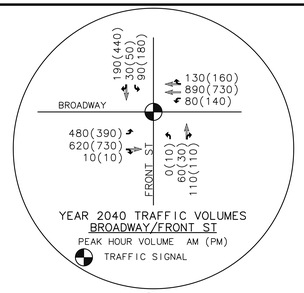
YEAR 2040 TRAFFIC VOLUMES
CIRCLE ST/JEFFERSON BLVD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

A



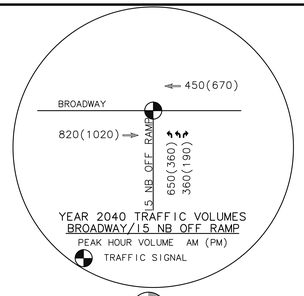
YEAR 2040 TRAFFIC VOLUMES
CIRCLE ST/SOUTH RIVER ROAD
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

B



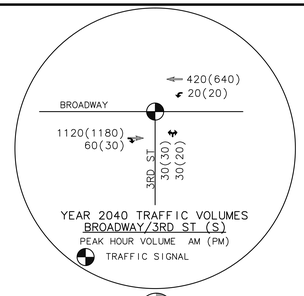
YEAR 2040 TRAFFIC VOLUMES
BROADWAY/FRONT ST
PEAK HOUR VOLUME AM (PM)
TRAFFIC SIGNAL

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

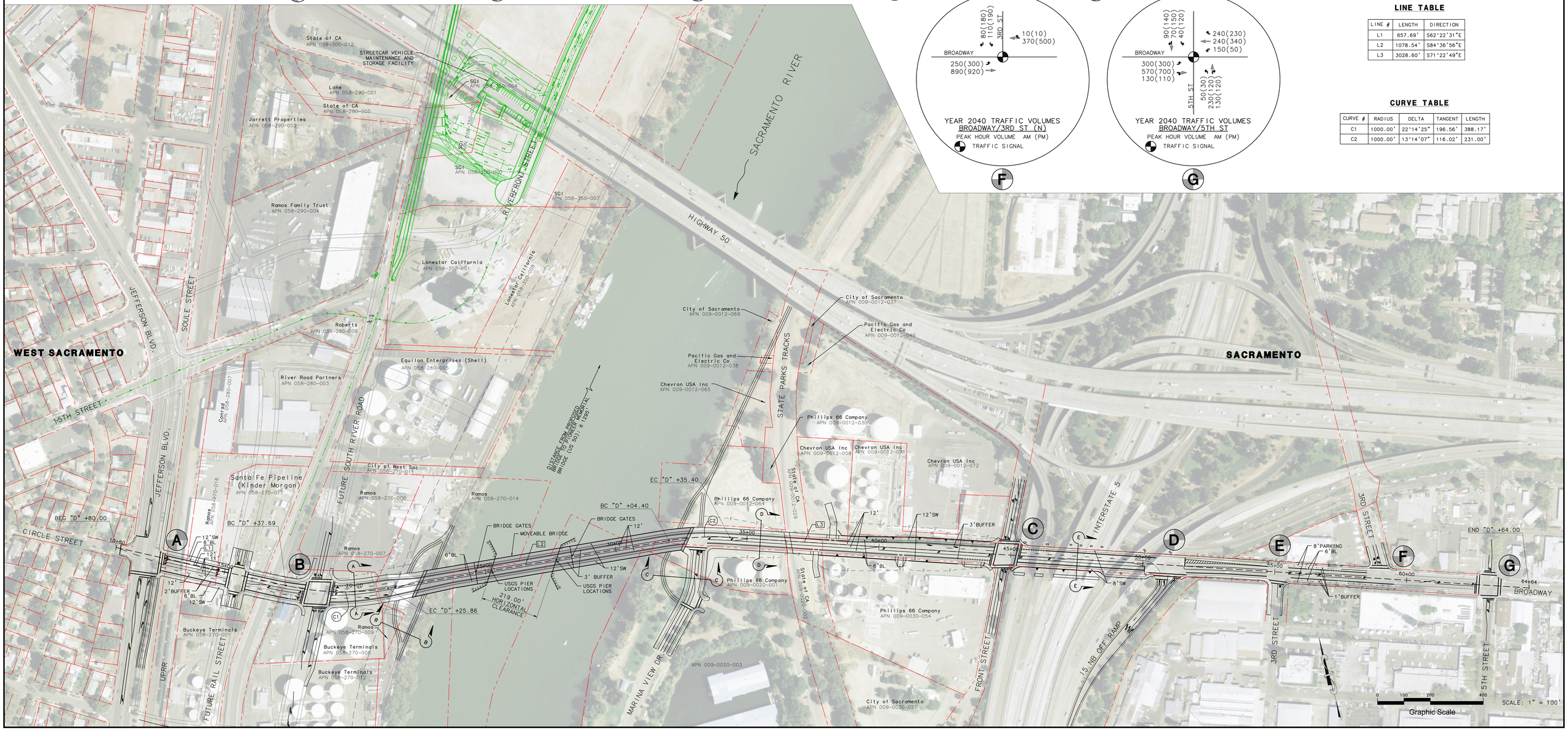
G

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

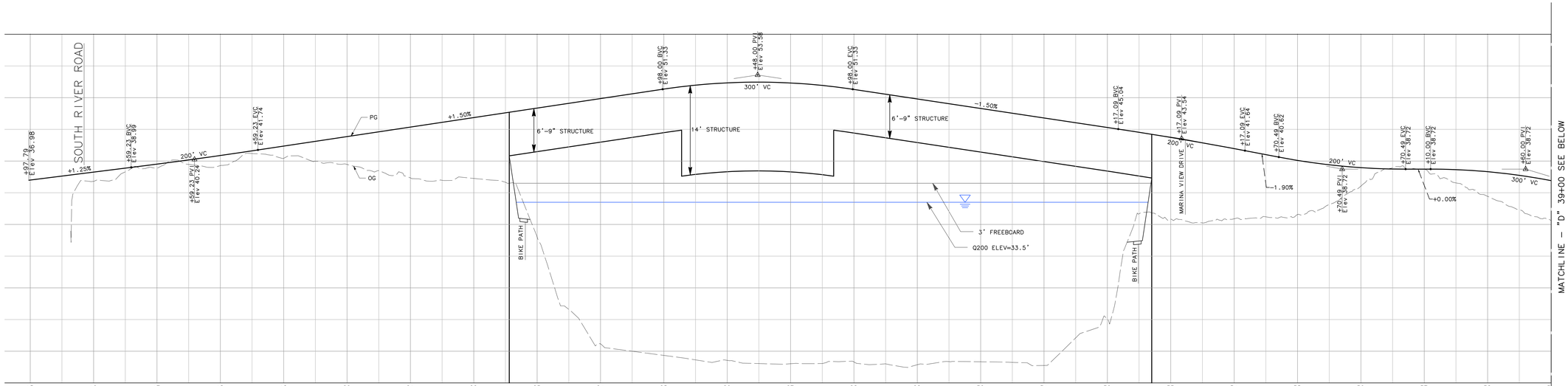
CURVE #	RADIUS	DELTA	TANGENT	LENGTH
C1	1000.00'	22°14'25"	196.56'	388.17'
C2	1000.00'	13°14'07"	116.02'	231.00'



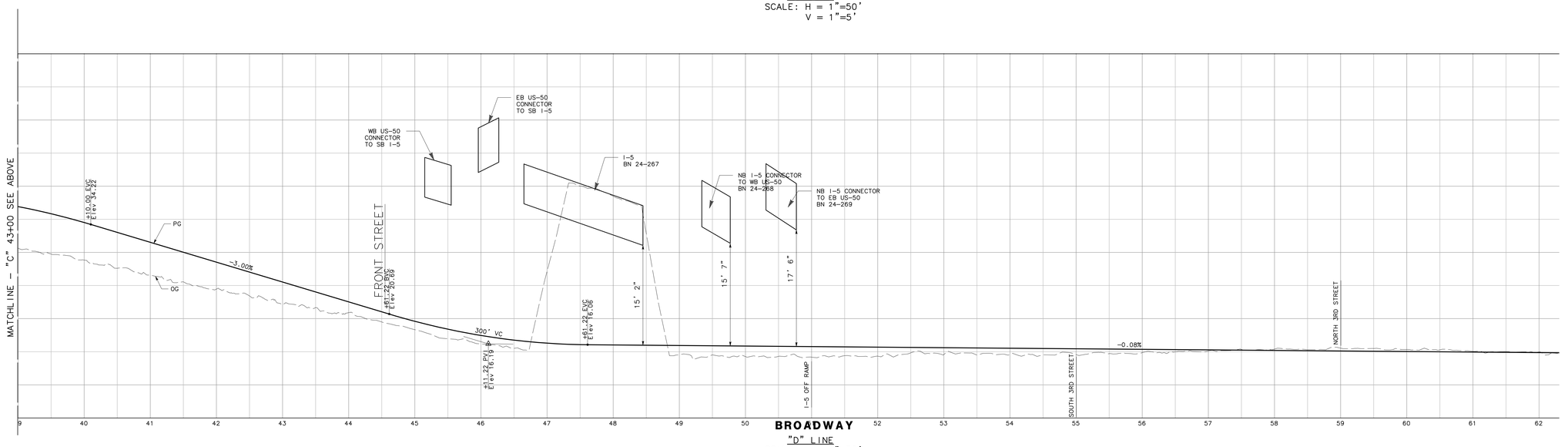
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT D

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

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



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

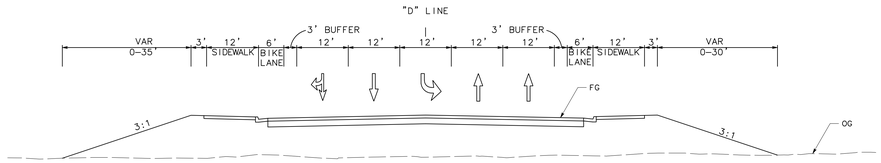


BROADWAY
"D" LINE
SCALE: H = 1"=50'
V = 1"=5'

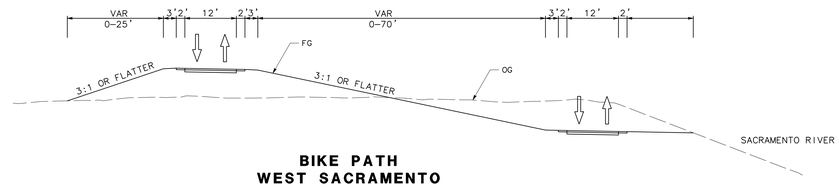
BROADWAY BRIDGE
GEOMETRIC APPROVAL DRAWING
ALIGNMENT D

MARK THOMAS
701 UNIVERSITY AVENUE SUITE 200
SACRAMENTO, CALIFORNIA 95825

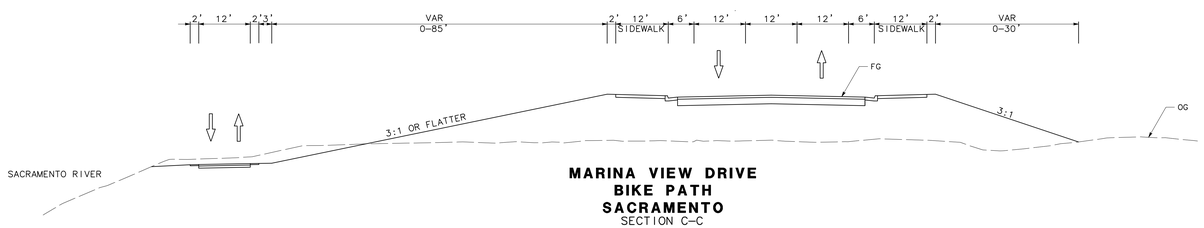
DRAWN BY: KD CKD BY: ZS DATE: 9-2018 SCALE: AS SHOWN	APPROVED ON: BY: RCE NO.:	**JOB NO.** SA-17110 **FILE NO.** XXX.dwg	**SHEET** 3 **OF** 3



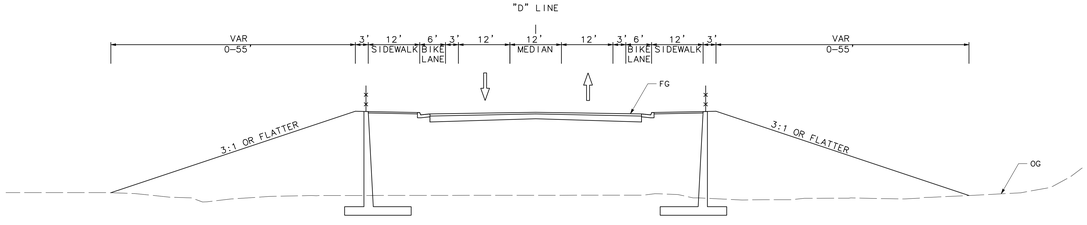
15TH STREET
WEST SACRAMENTO
SECTION A–A



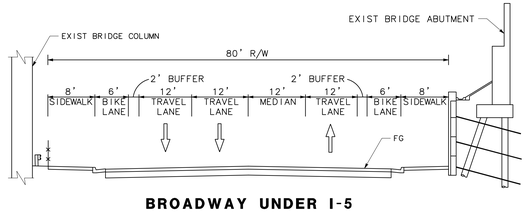
BIKE PATH
WEST SACRAMENTO
SECTION B–B



MARINA VIEW DRIVE
BIKE PATH
SACRAMENTO
SECTION C–C



BROADWAY
SACRAMENTO
SECTION D–D



BROADWAY UNDER I-5
SACRAMENTO
SECTION E–E

MARK THOMAS

MEMORANDUM

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

Project No.: SA-17110

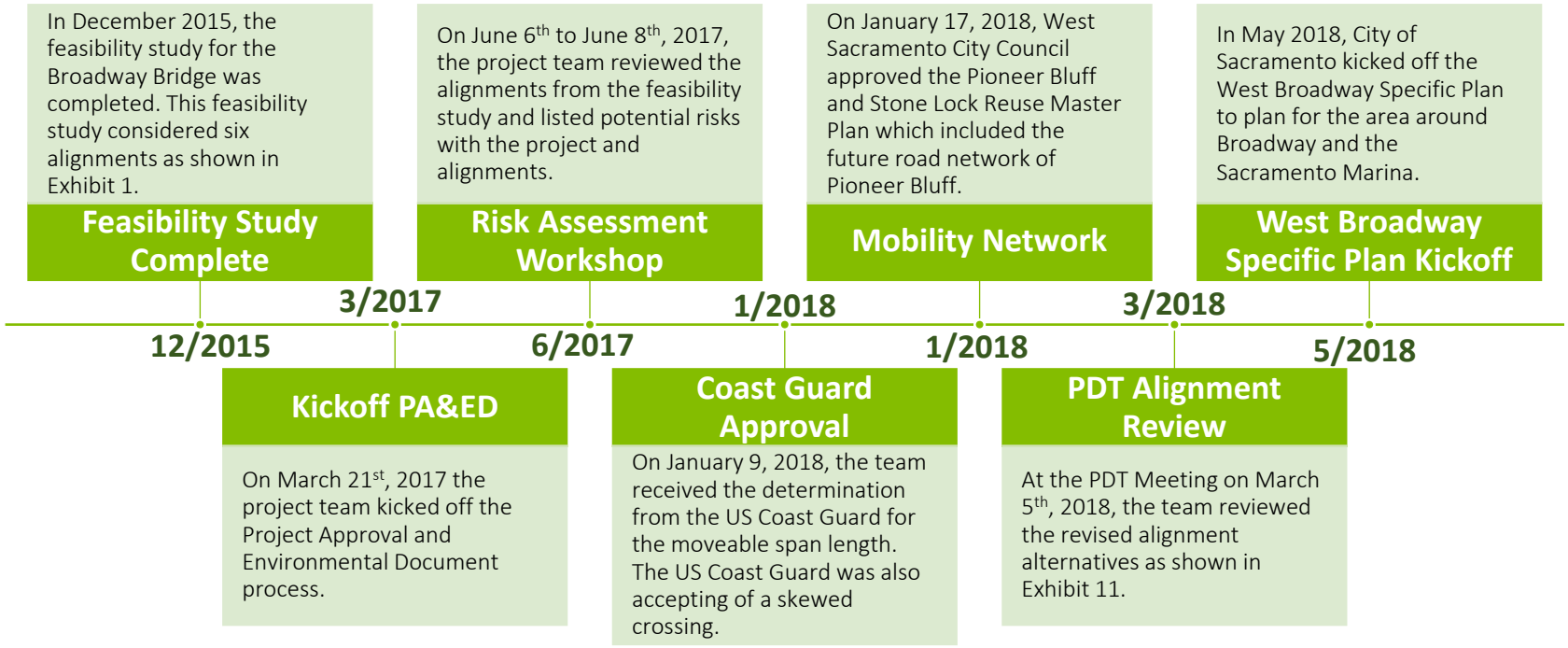
Cc:

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.



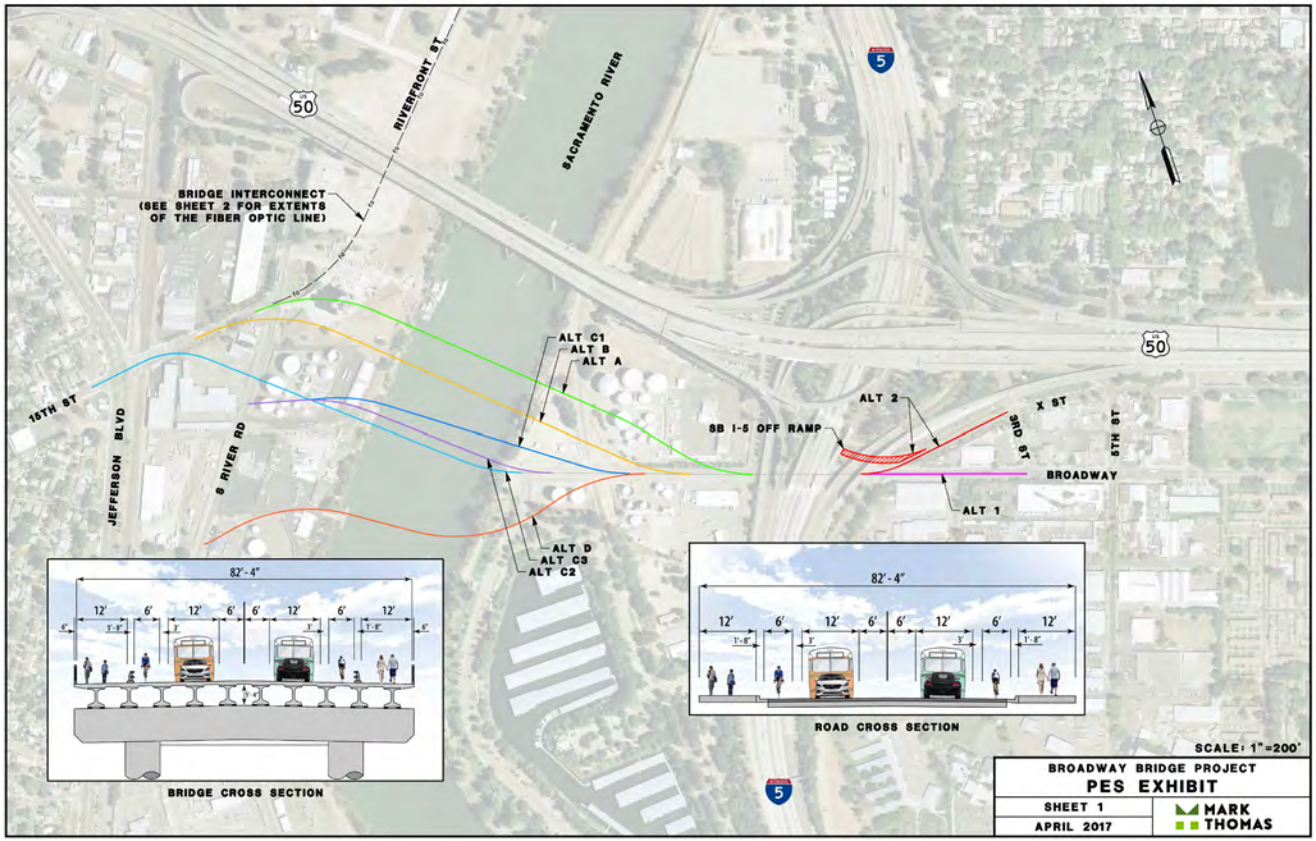


Exhibit 1

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

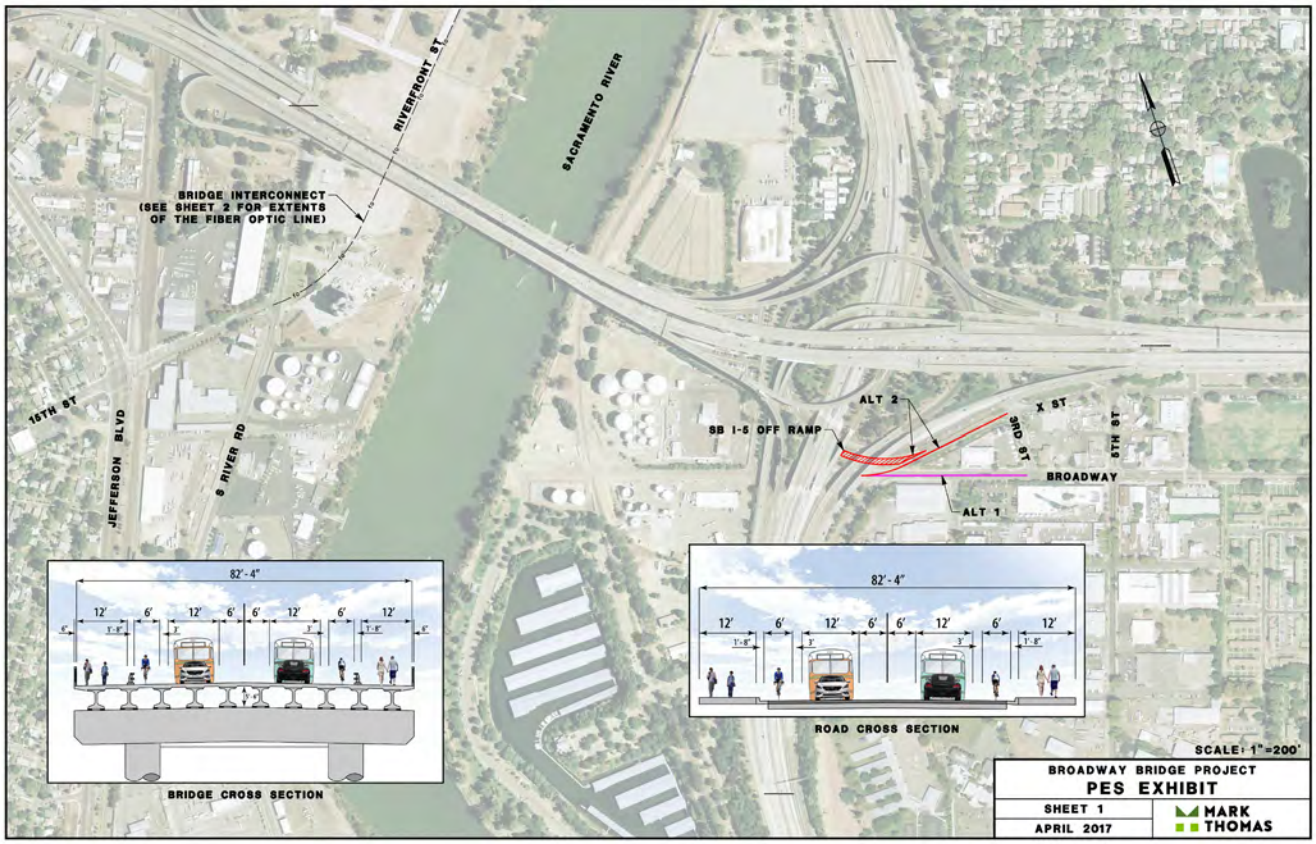


Exhibit 2

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.

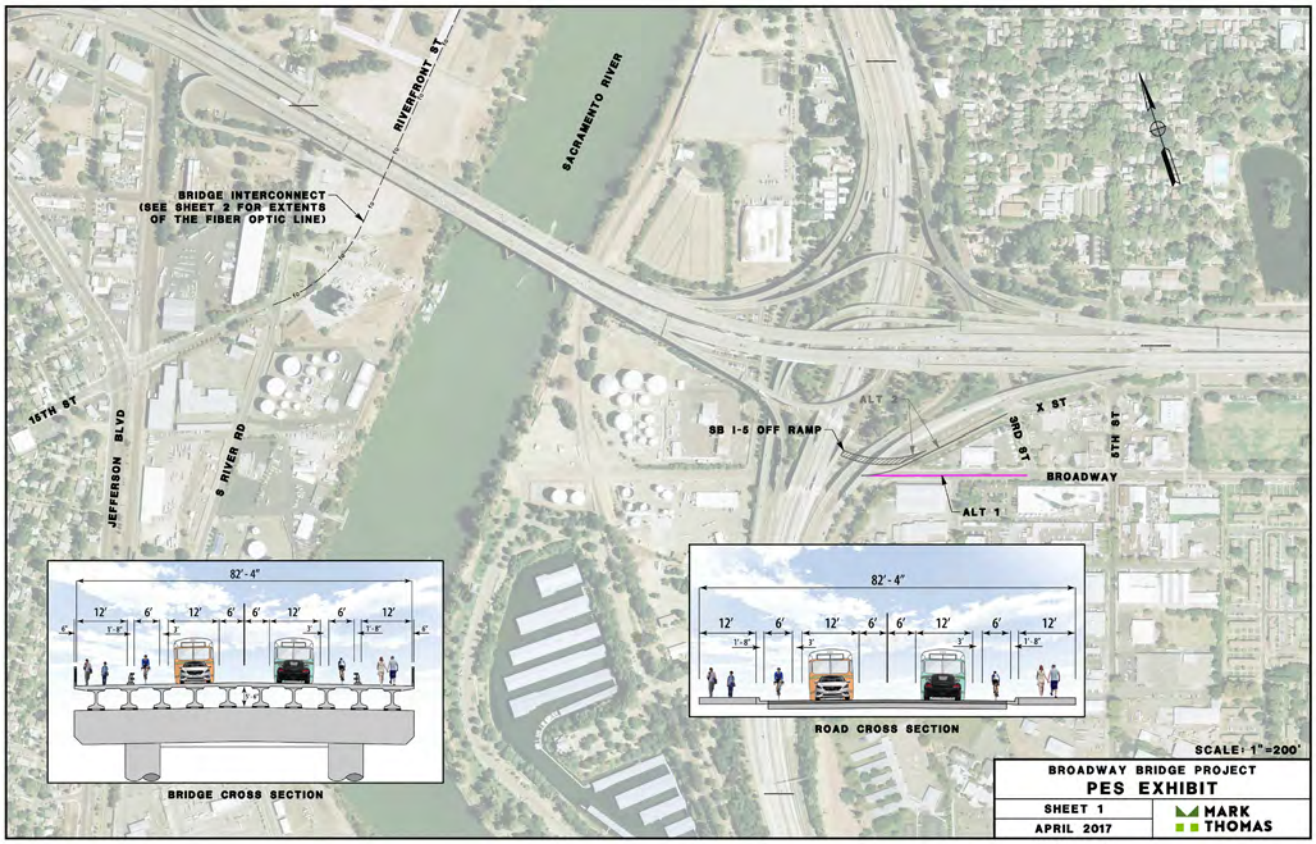


Exhibit 3

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.

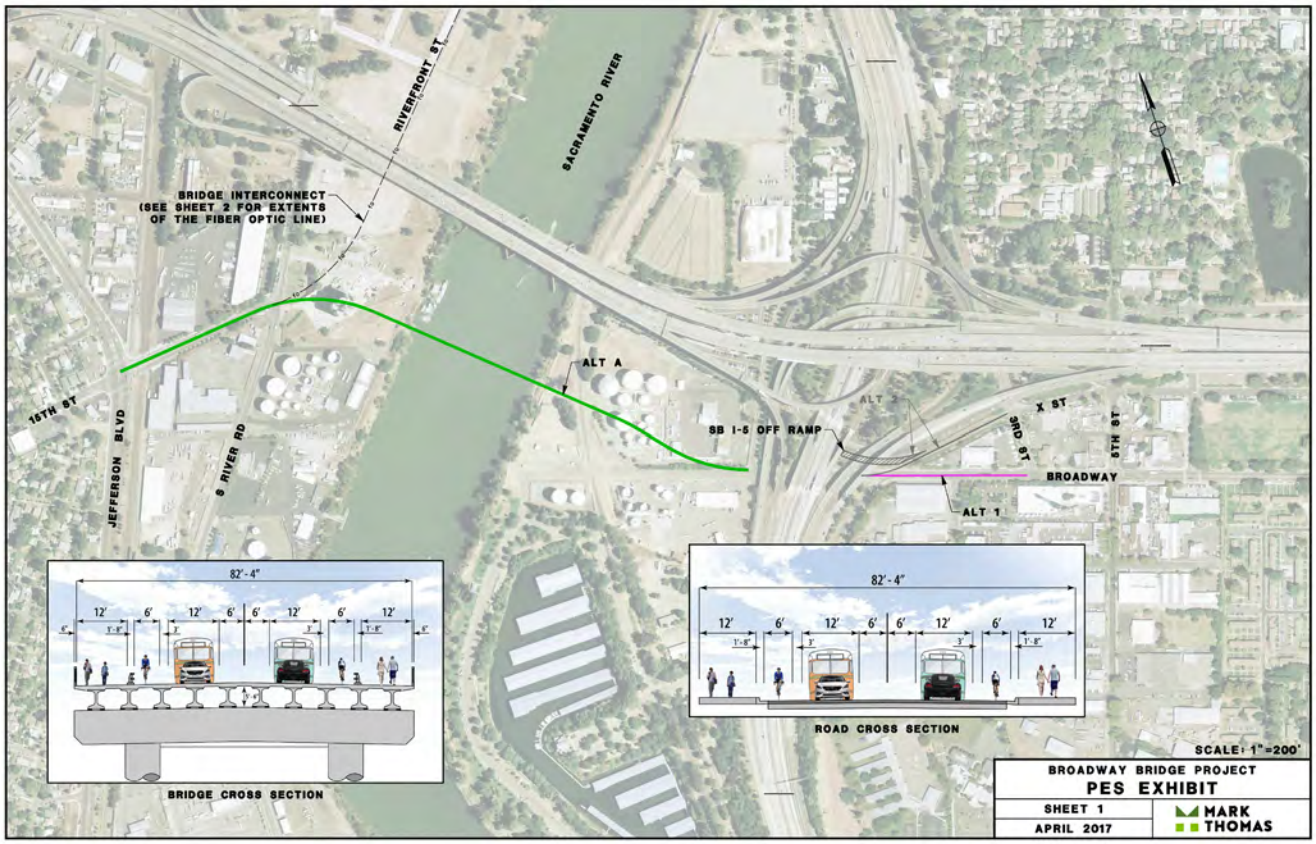


Exhibit 4

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.

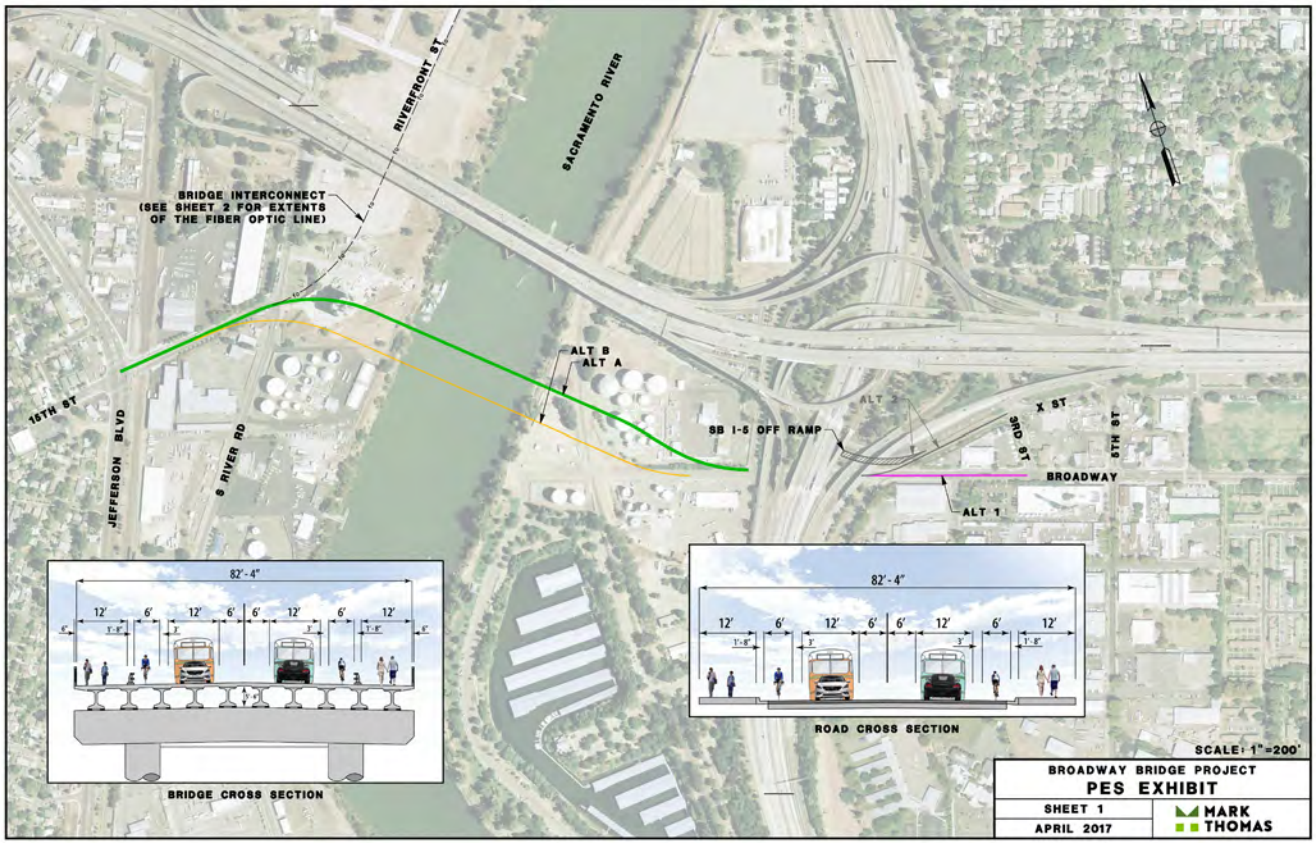


Exhibit 5

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

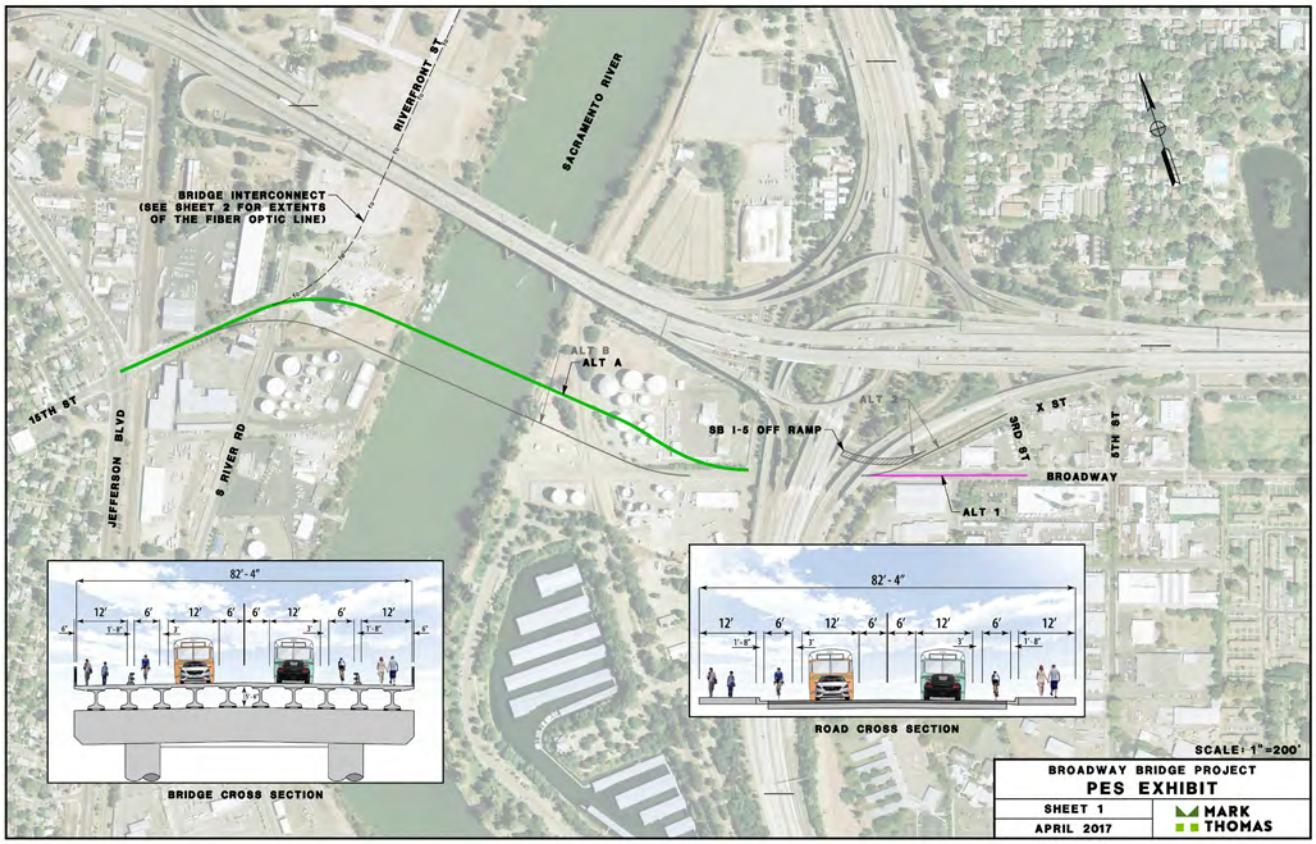


Exhibit 6

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.

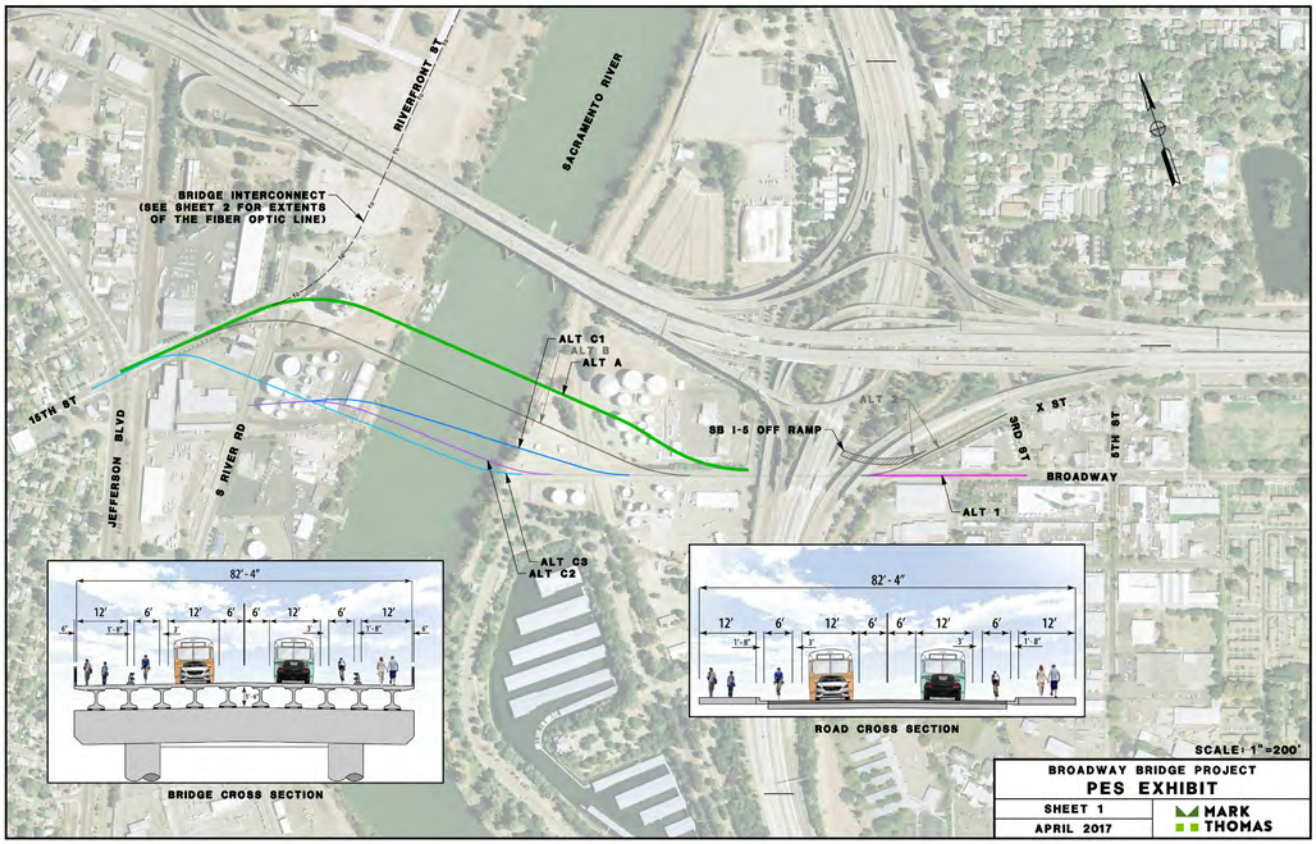


Exhibit 7

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.

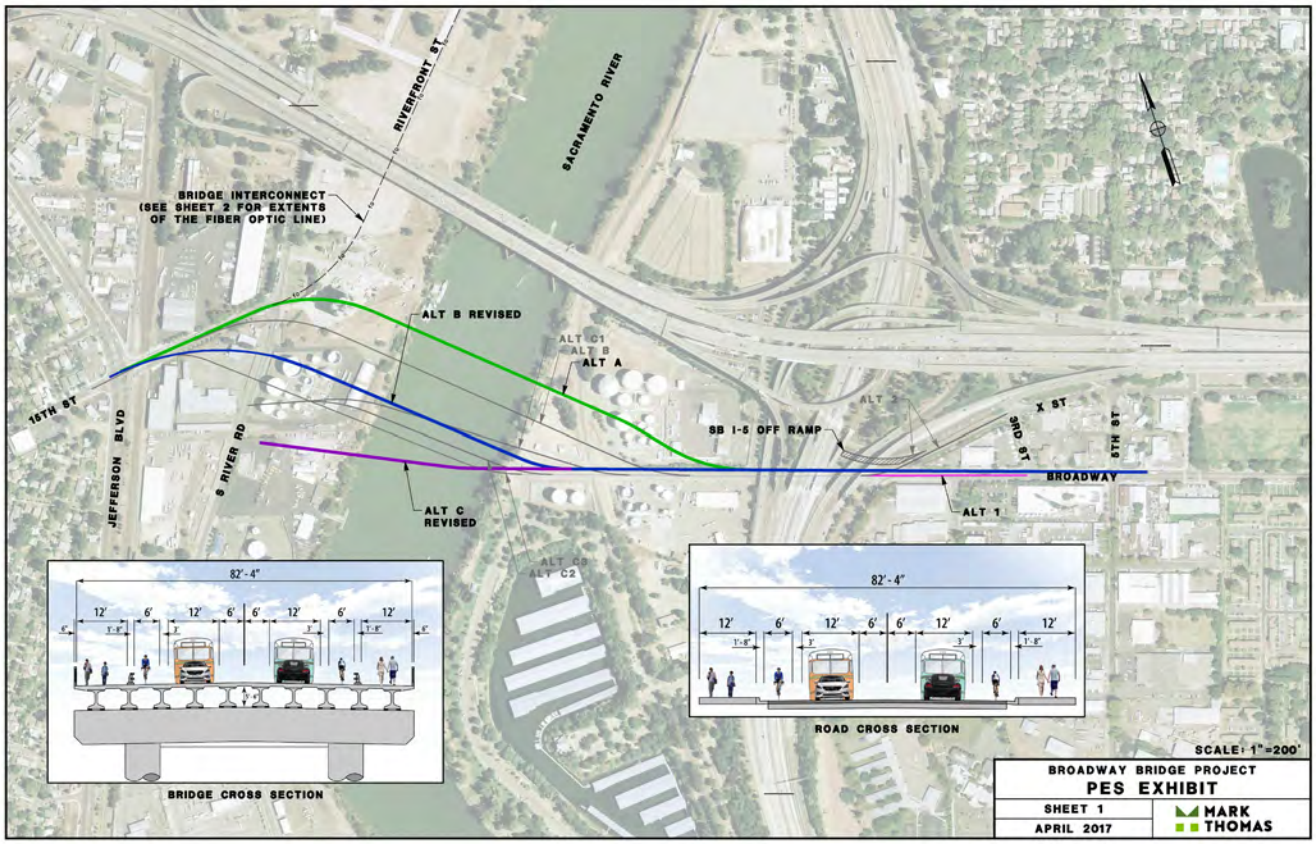


Exhibit 8

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.

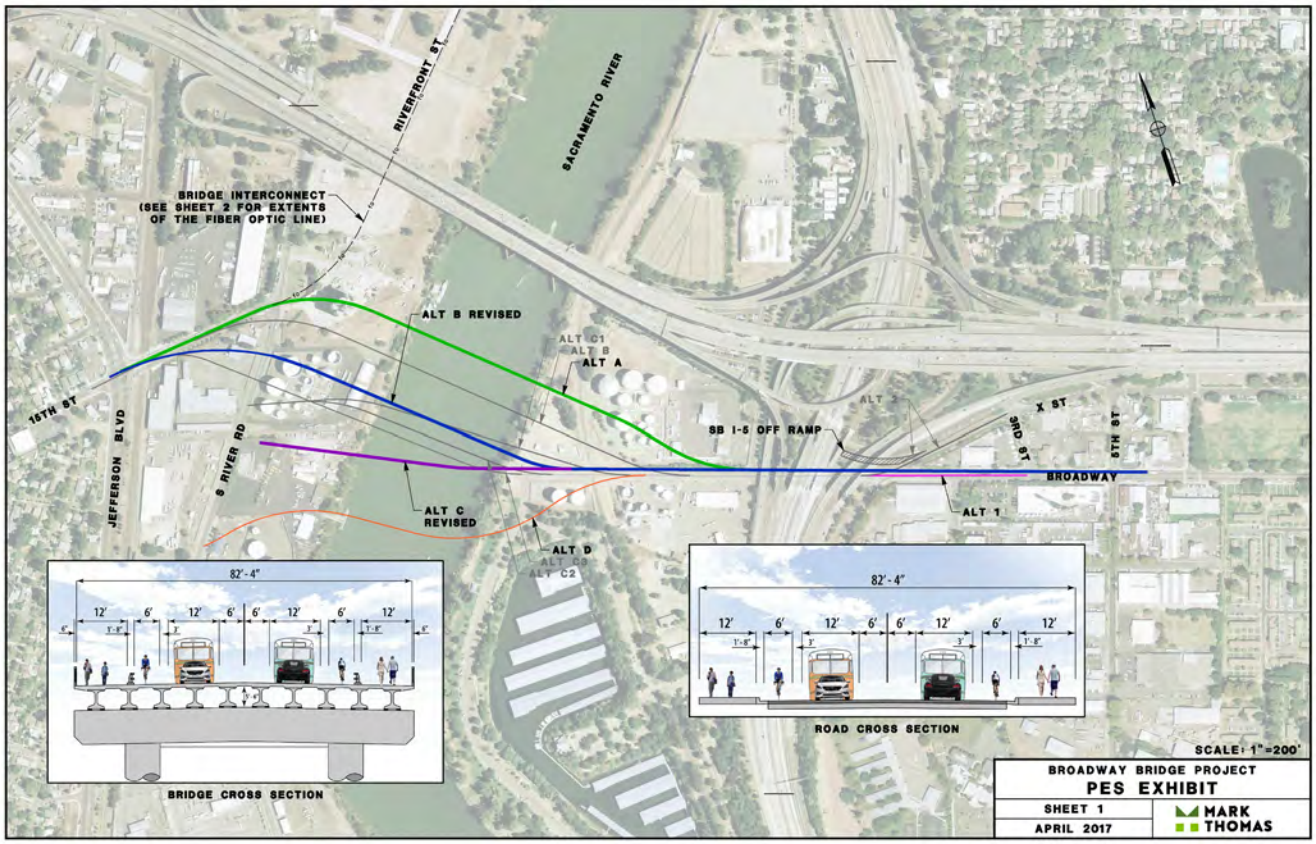


Exhibit 9

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.

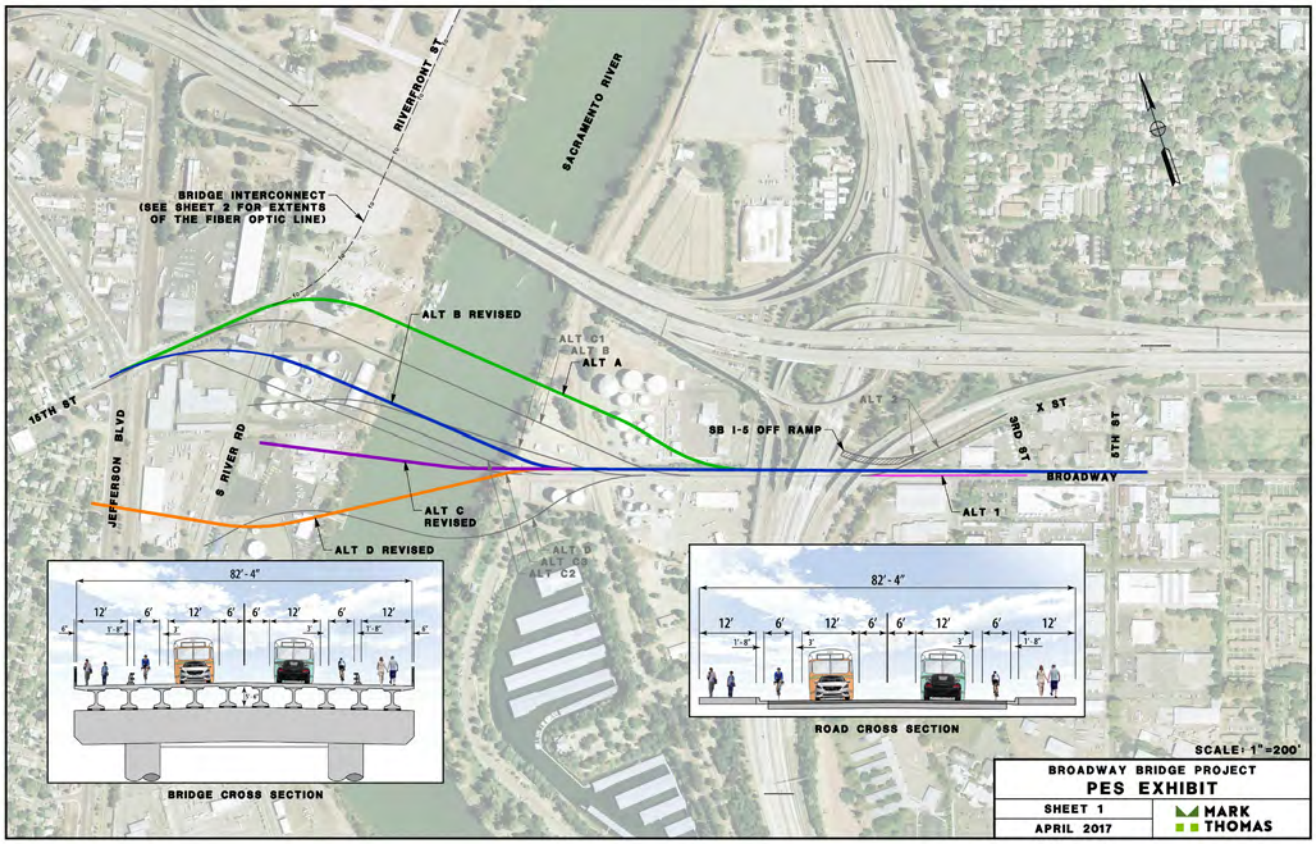


Exhibit 10

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.

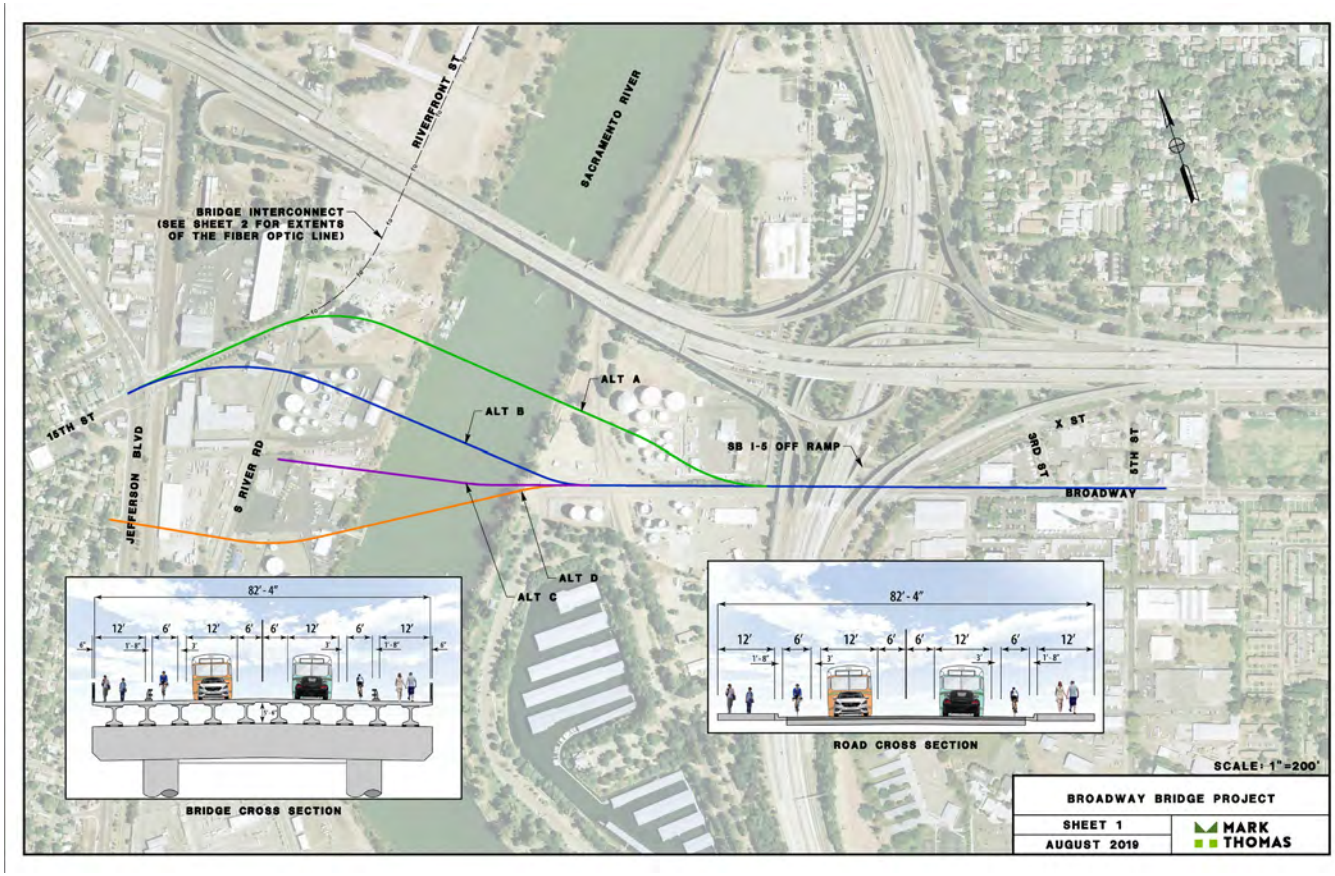


Exhibit 11

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.

DRAFT Risk Assessment Report

Broadway Bridge Feasibility Study: Conceptual Alignment Alternatives Risk Assessment

June 2017

Prepared by

Value Management Strategies, Inc.
& Mark Thomas & Company

VMS
Value Management Strategies, Inc.

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:

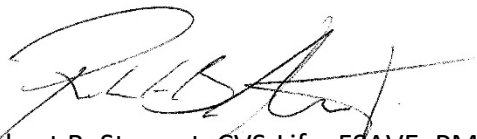
Value Management Strategies, Inc. is pleased to transmit this Draft Report for the referenced project. This report summarizes the events of the study conducted June 6-8, 2017.

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.

TABLE OF CONTENTS

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.

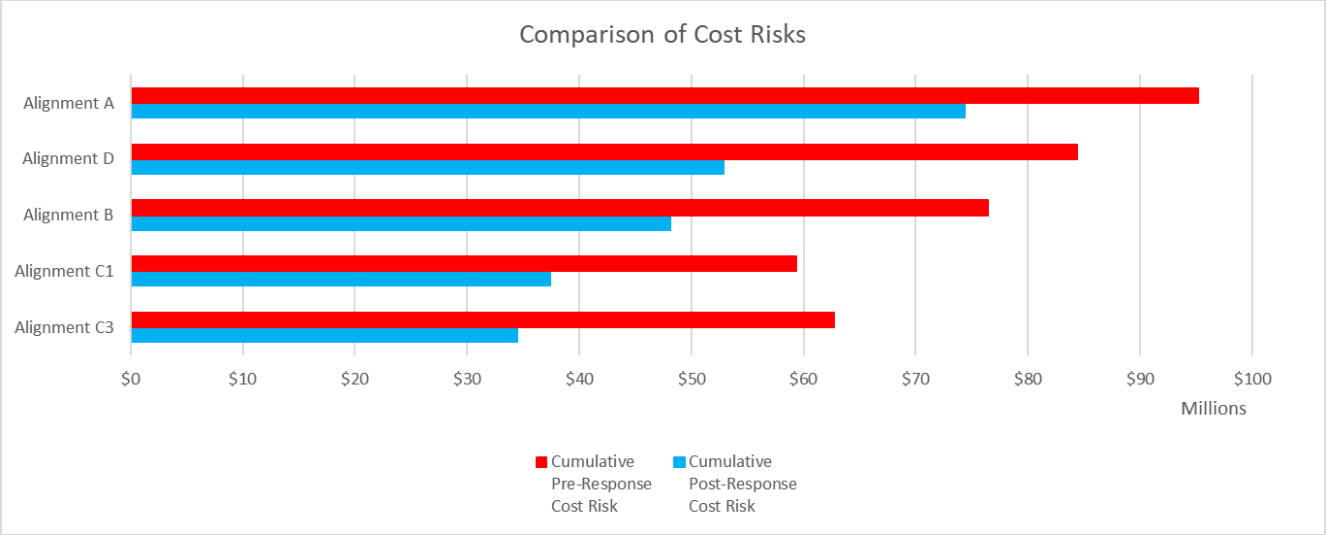
MAJOR FINDINGS

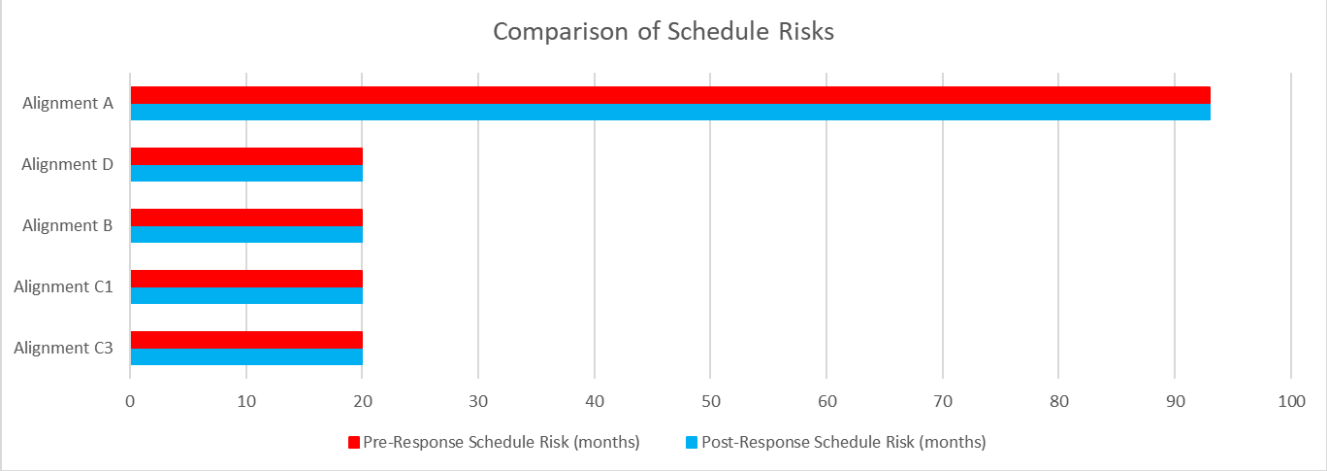
The estimated impact of the risks for each of the alignment alternatives evaluated in this study is summarized in the table below.

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.





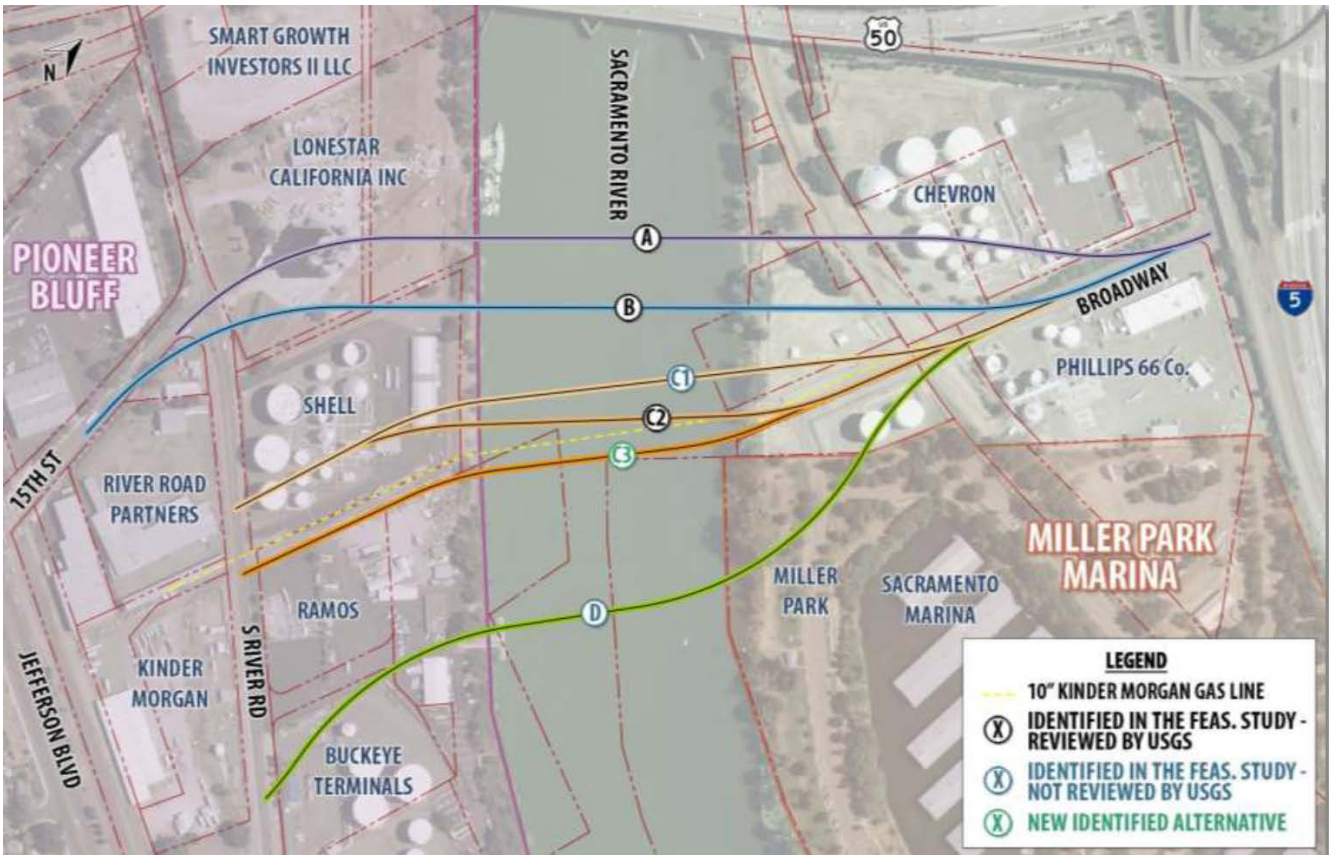
A comprehensive Risk Register was developed as a result of the work completed during the Risk Assessment workshop for each conceptual alignment alternative. The Risk Registers includes the following information:

- 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.

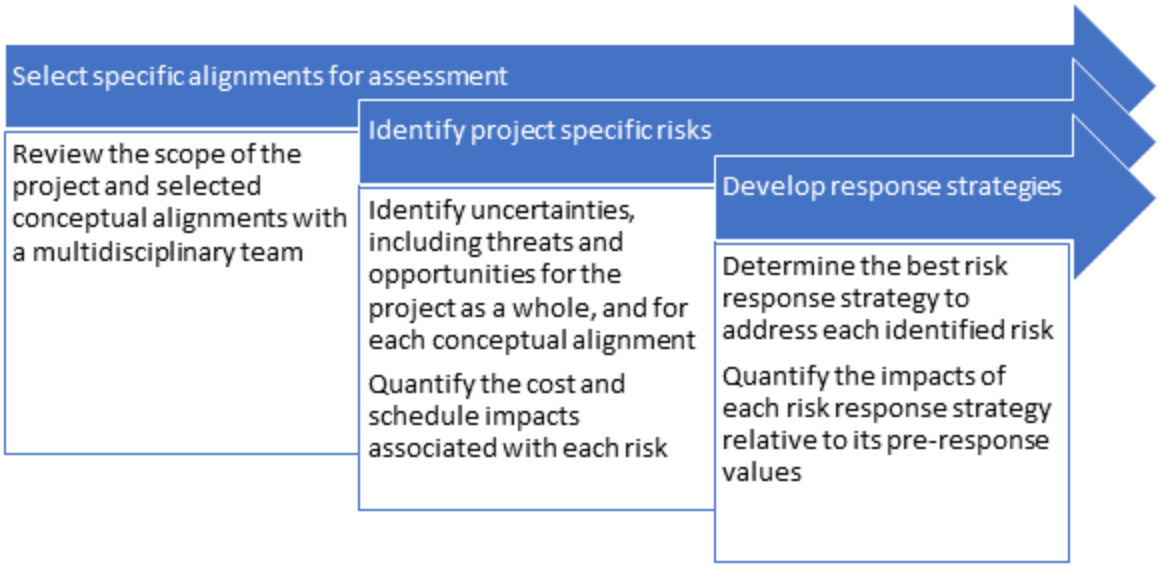
SUPPLEMENTARY DOCUMENTATION

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.

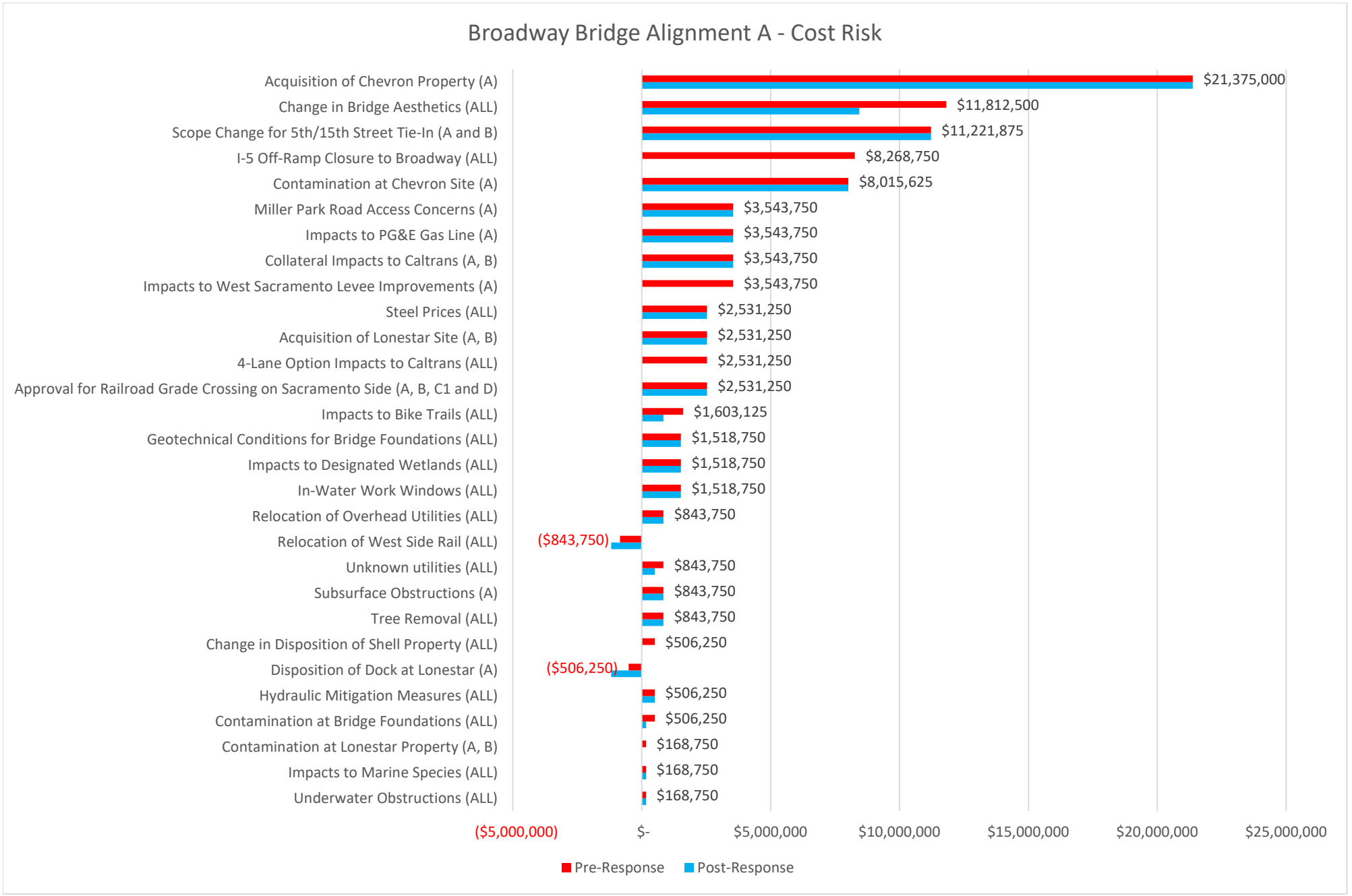
- **Risk Information** – Same as the Risk Register, see above.

- **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
$2,531,250
$2,531,250
$2,531,250
$2,531,250
$1,603,125
$1,518,750
$1,518,750
$1,518,750
$843,750
($843,750)
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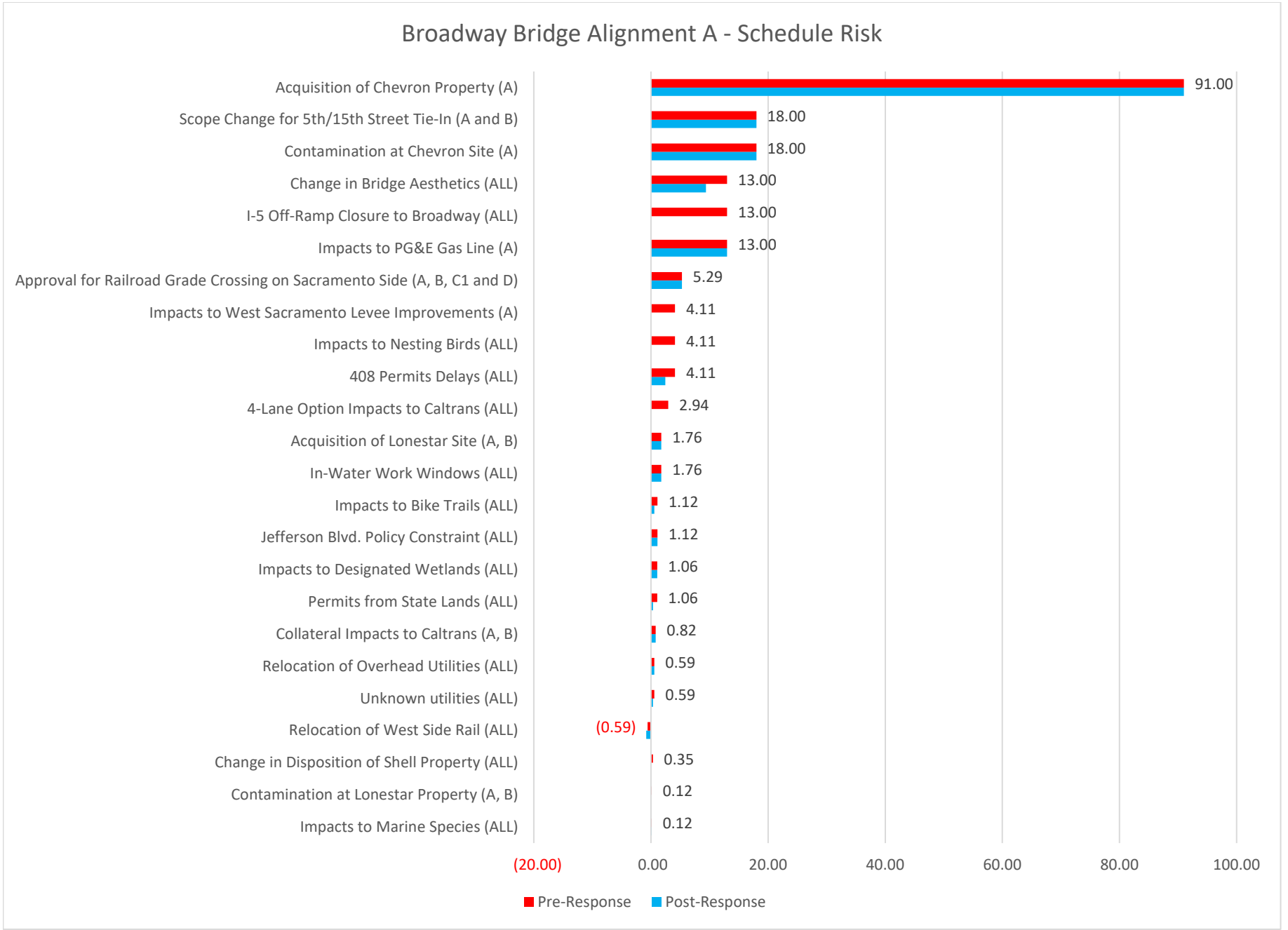
$15,000,000
$20,000,000
$25,000,000
Pre-Response
Post-Response


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

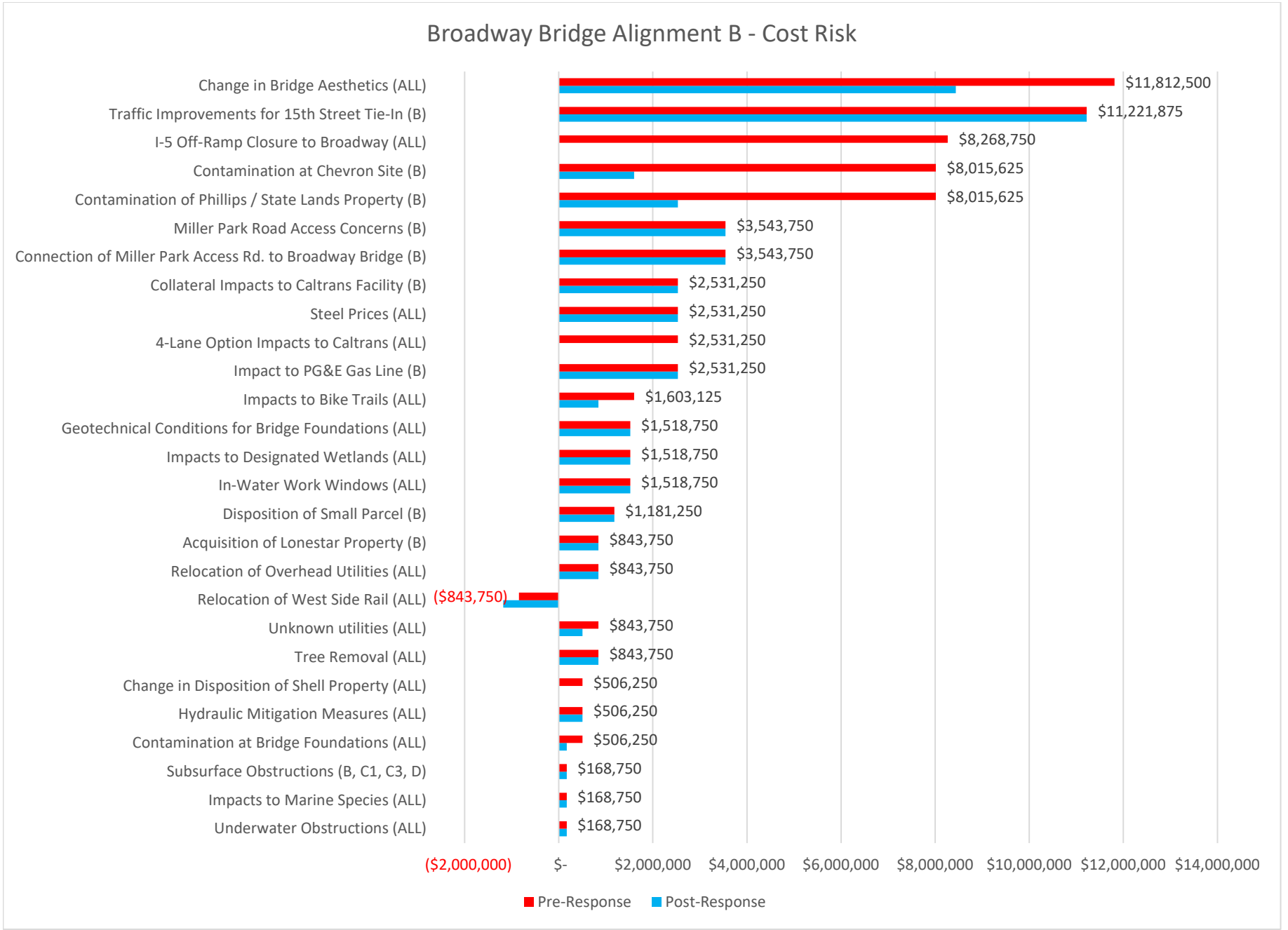
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	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
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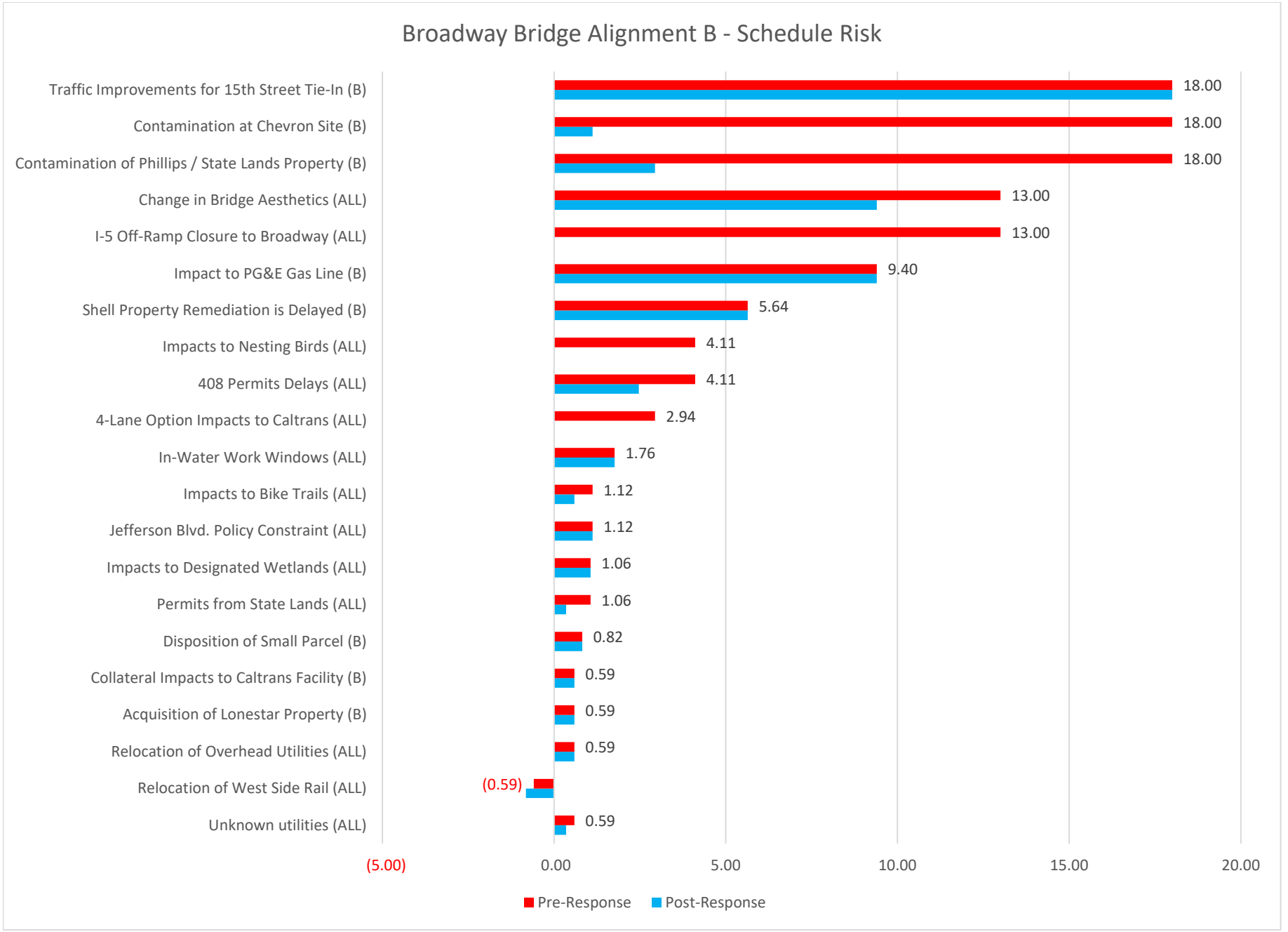
Pre-Response
Post-Response


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

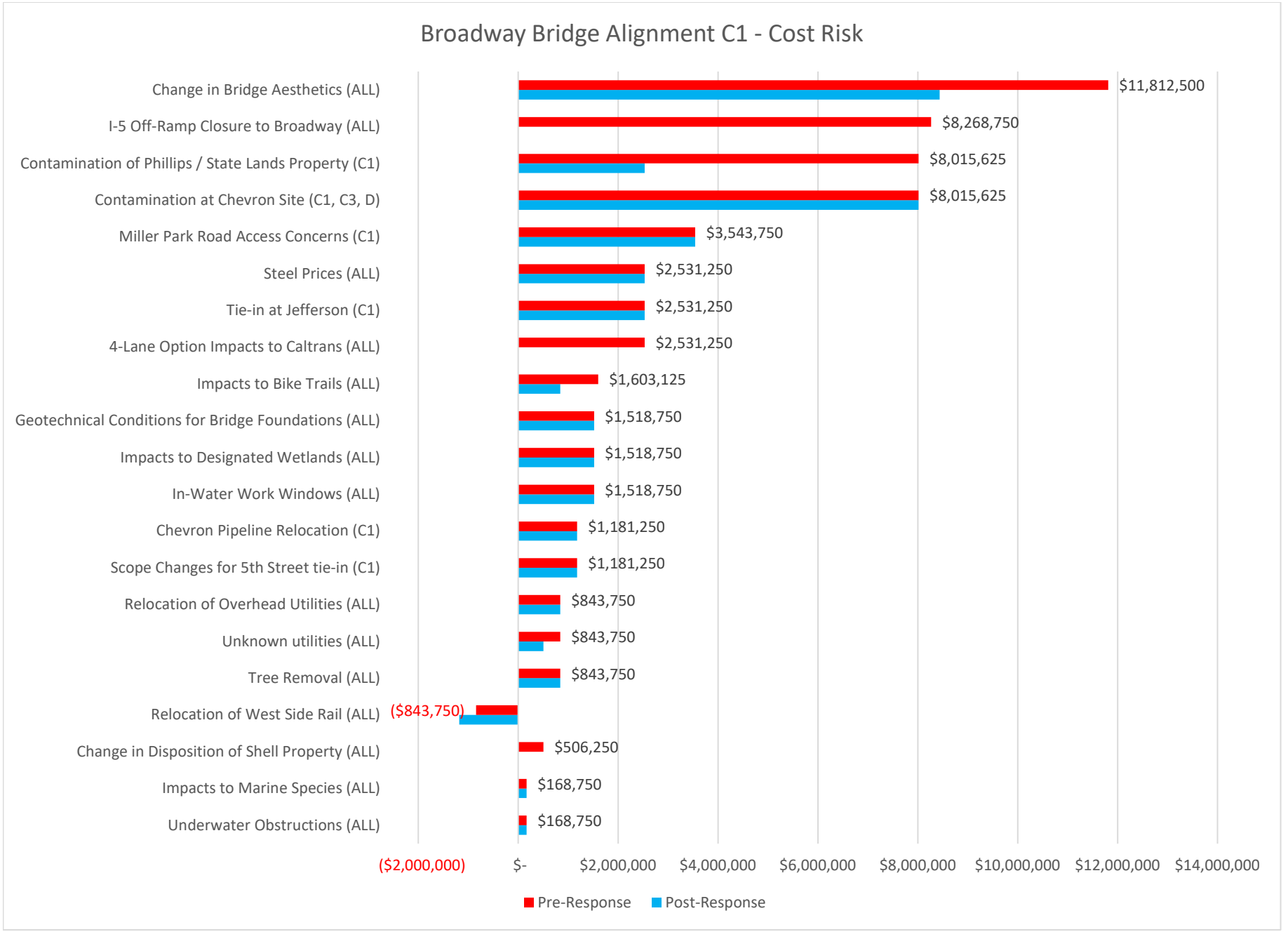
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	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
$2,531,250
$2,531,250
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$2,000,000
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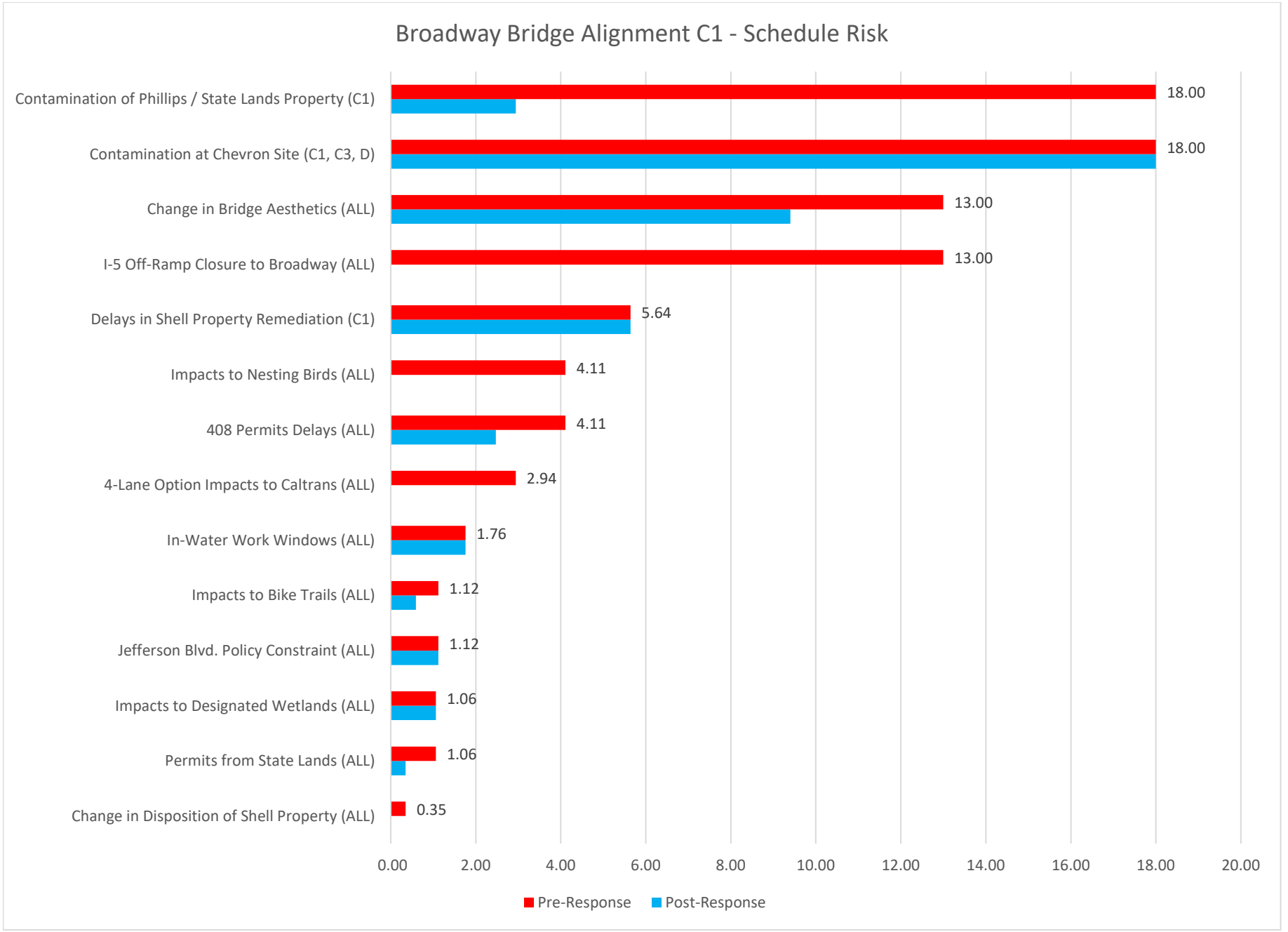
Pre-Response
Post-Response


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)
18.00
18.00
13.00
13.00
5.64
4.11
4.11
2.94
1.76
1.12
1.12
1.06
1.06
0.35
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
Pre-Response
Post-Response

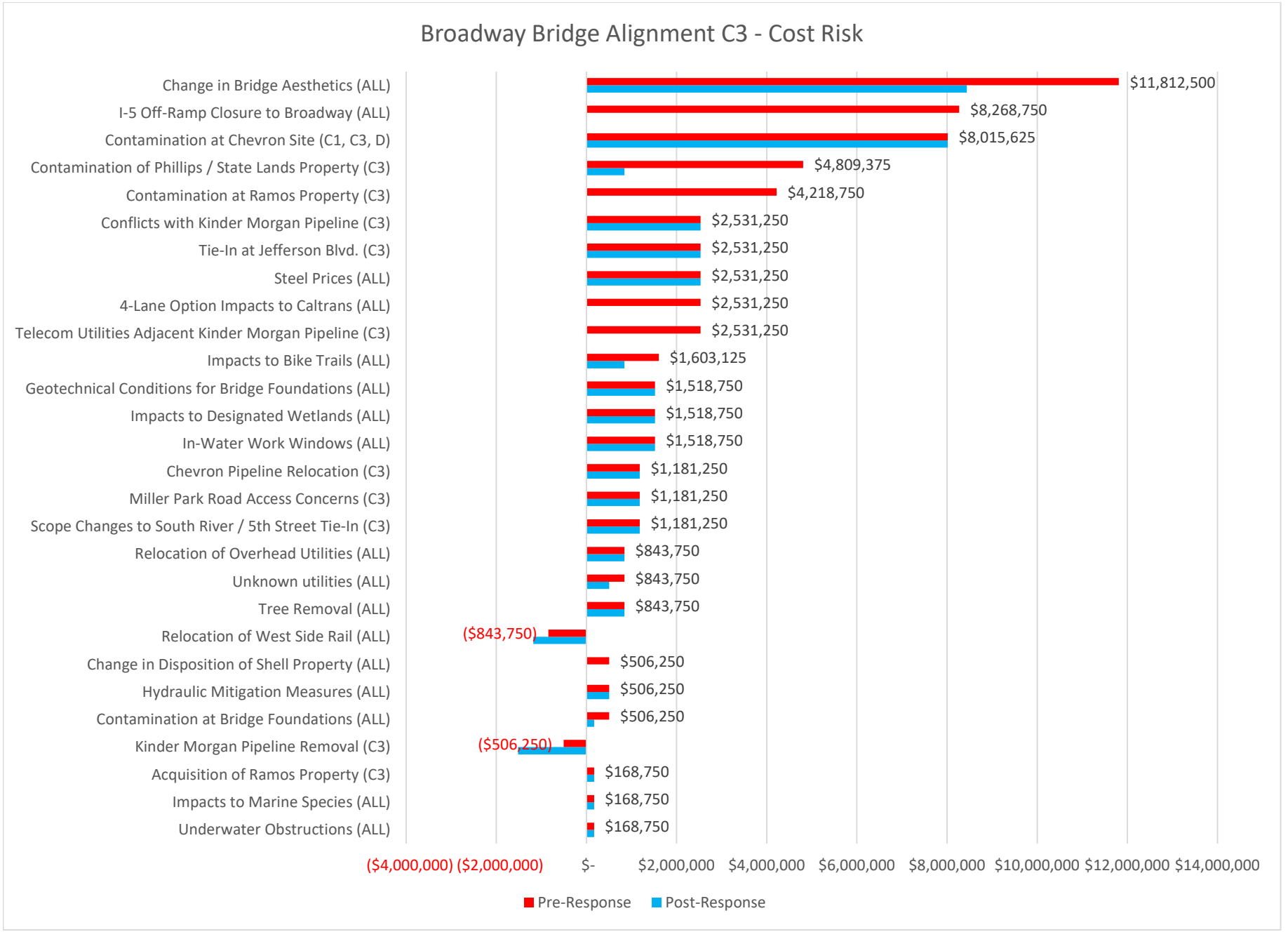
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	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
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
$1,518,750
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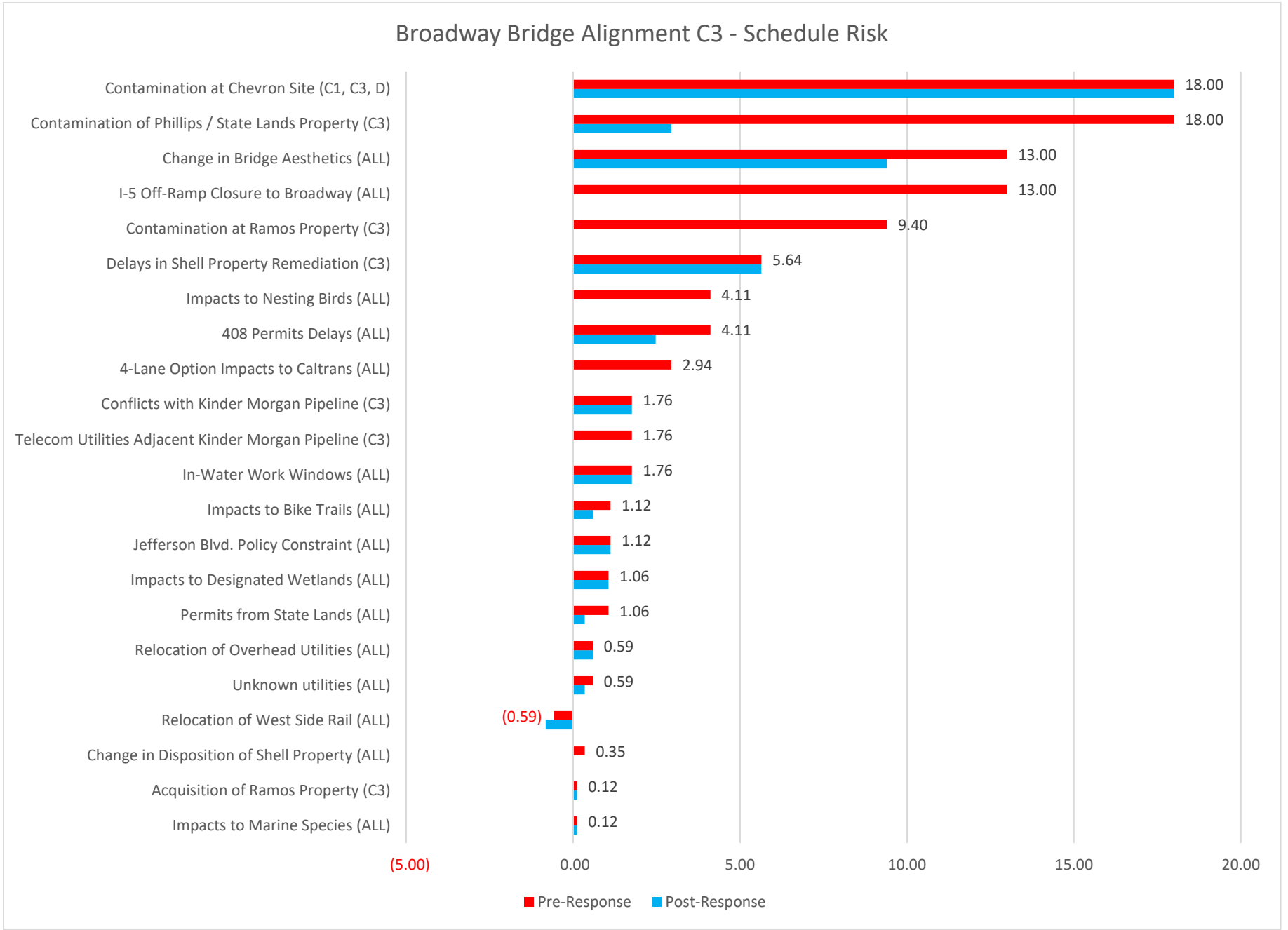
$168,750
$168,750
$168,750
($4,000,000) ($2,000,000) $- $2,000,000 $4,000,000 $6,000,000 $8,000,000 $10,000,000 $12,000,000 $14,000,000
Pre-Response
Post-Response


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

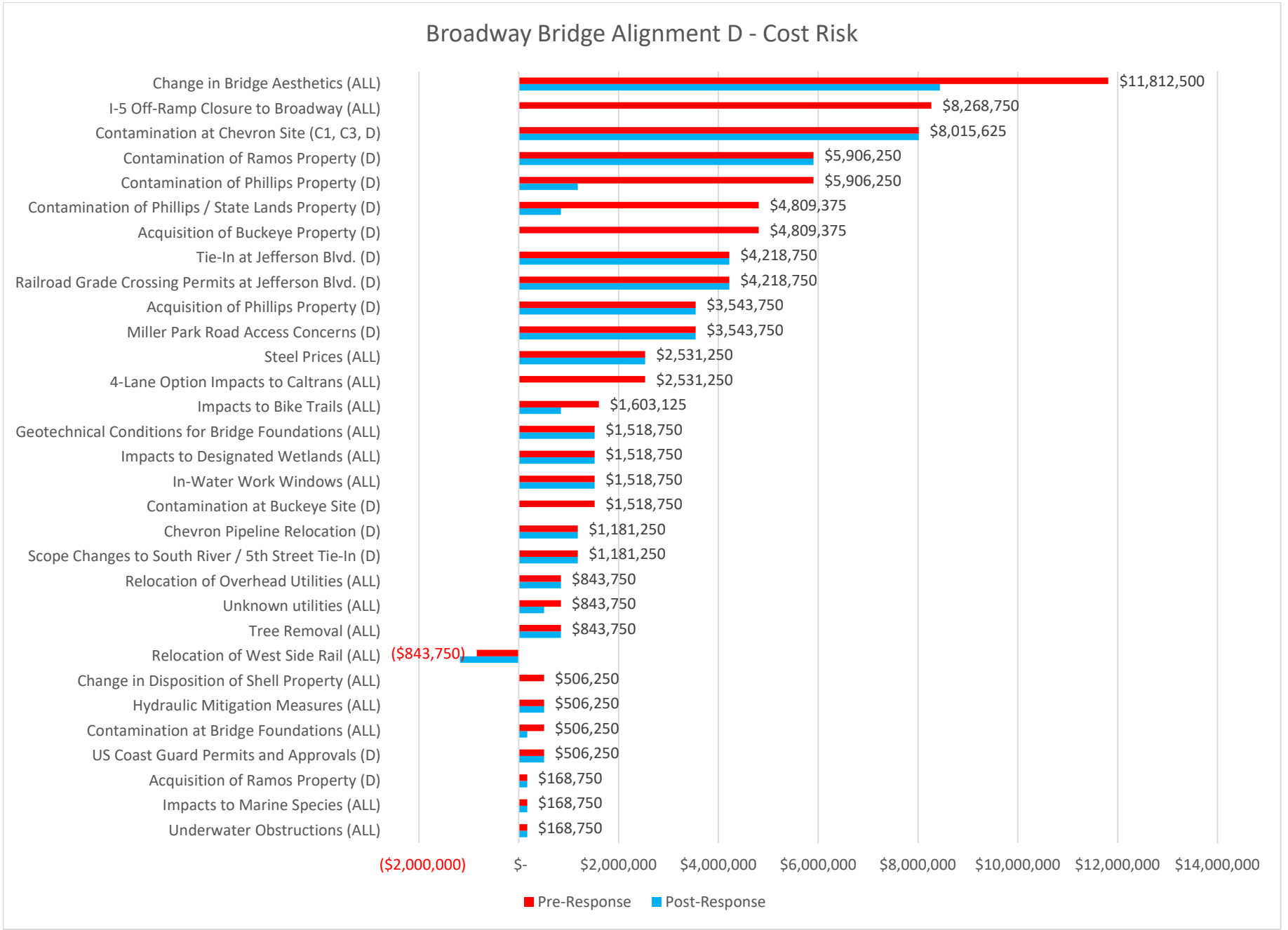
Risk Information								Un-Managed State (Pre-Response)							Managed State (Post-Response)						
									Cost			Schedule				Cost			Schedule		
Risk #	Status Pre - Post	Risk Category	Impacted Phase	Risk Event Name	S.M.A.R.T. Risk Description (Specific, Measurable, Attributeable, Relevant, and Time Bound)	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
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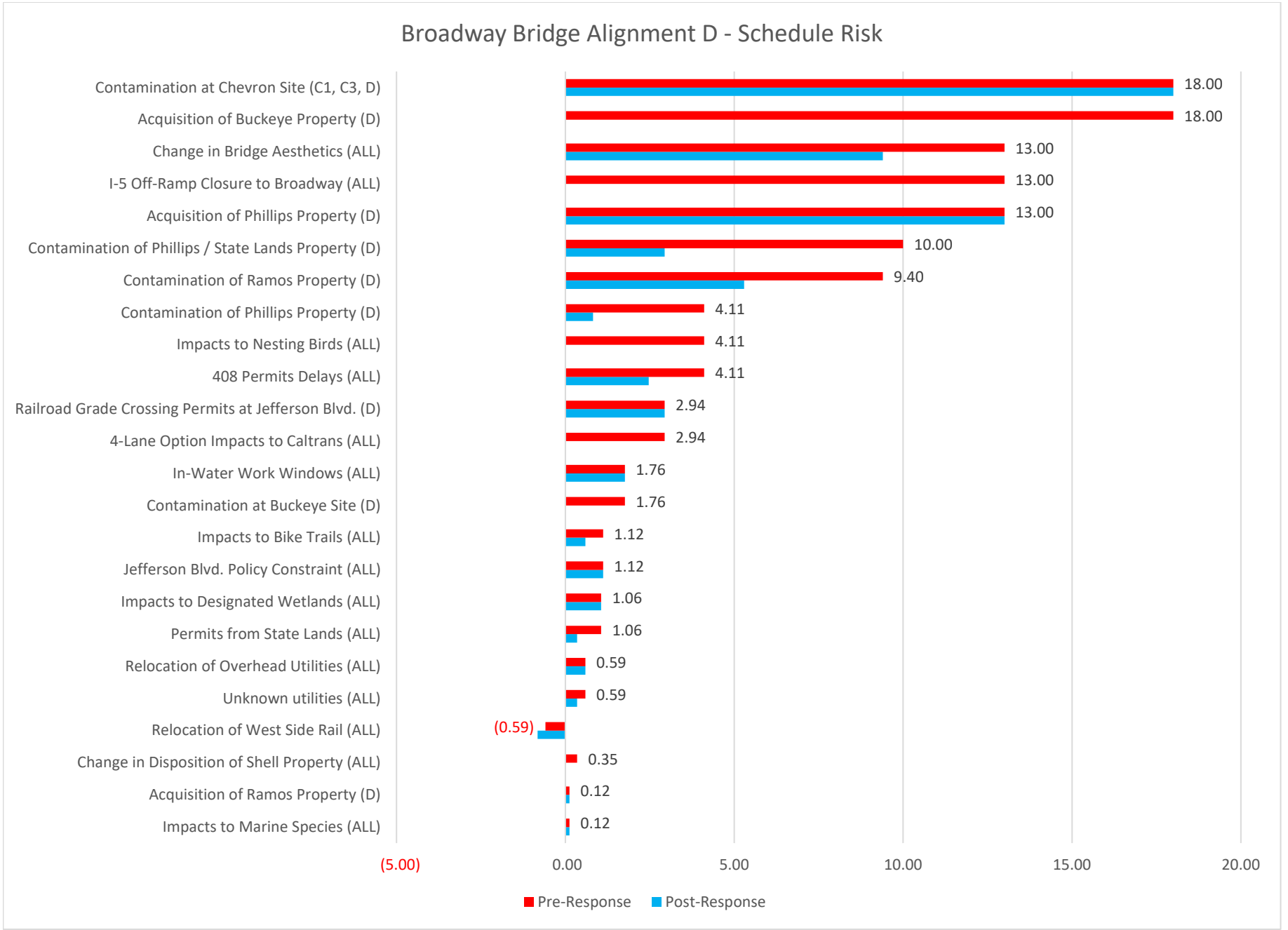
Pre-Response
Post-Response


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;
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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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FEHR PEERS

MEMORANDUM

Date: January 15, 2018

To: Kira Davis (Mark Thomas)

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

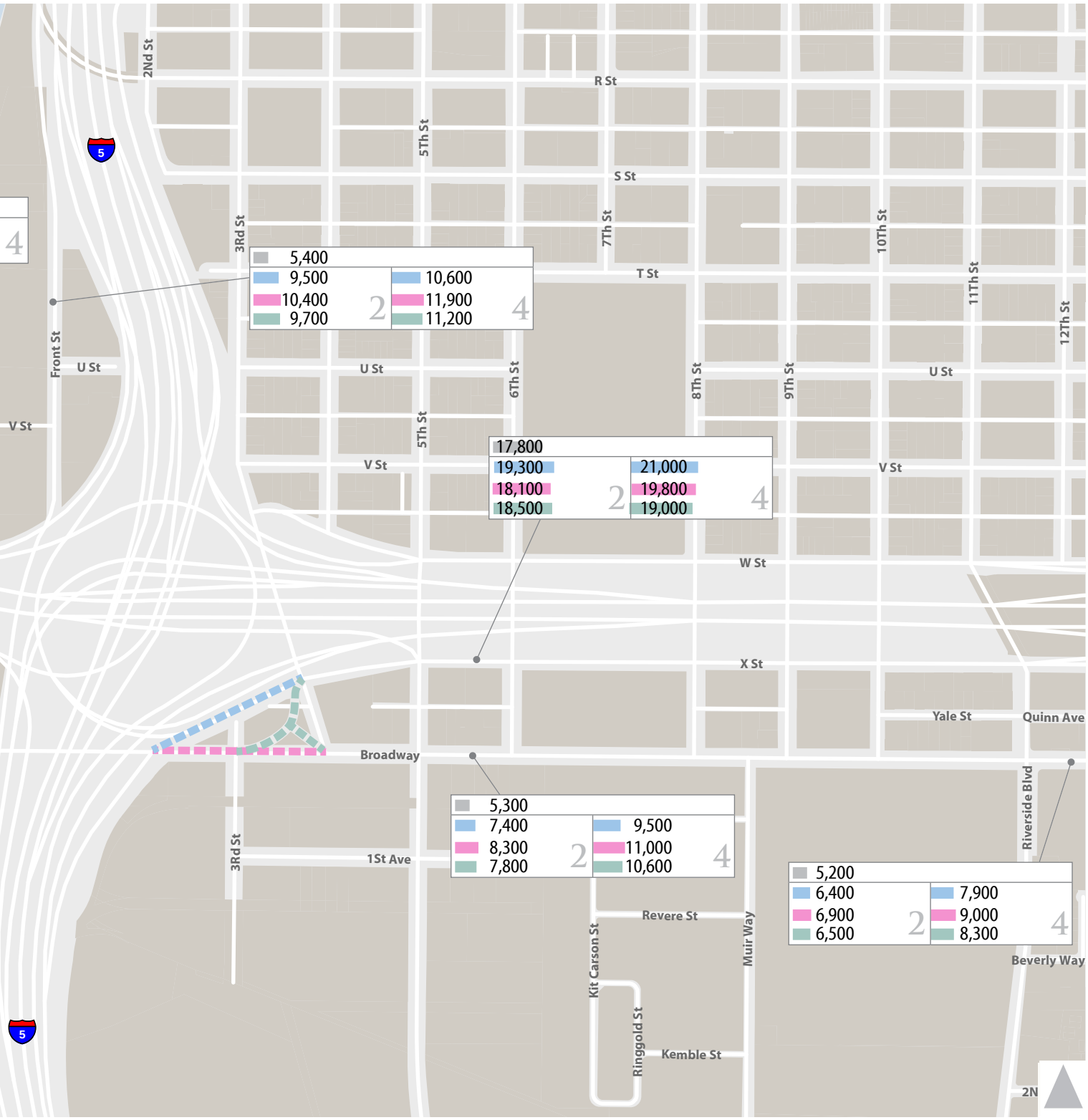
Subject: Broadway Bridge – Broadway / X Street Realignment Connection

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.

FEHR PEERS

Risk Analysis Workshop

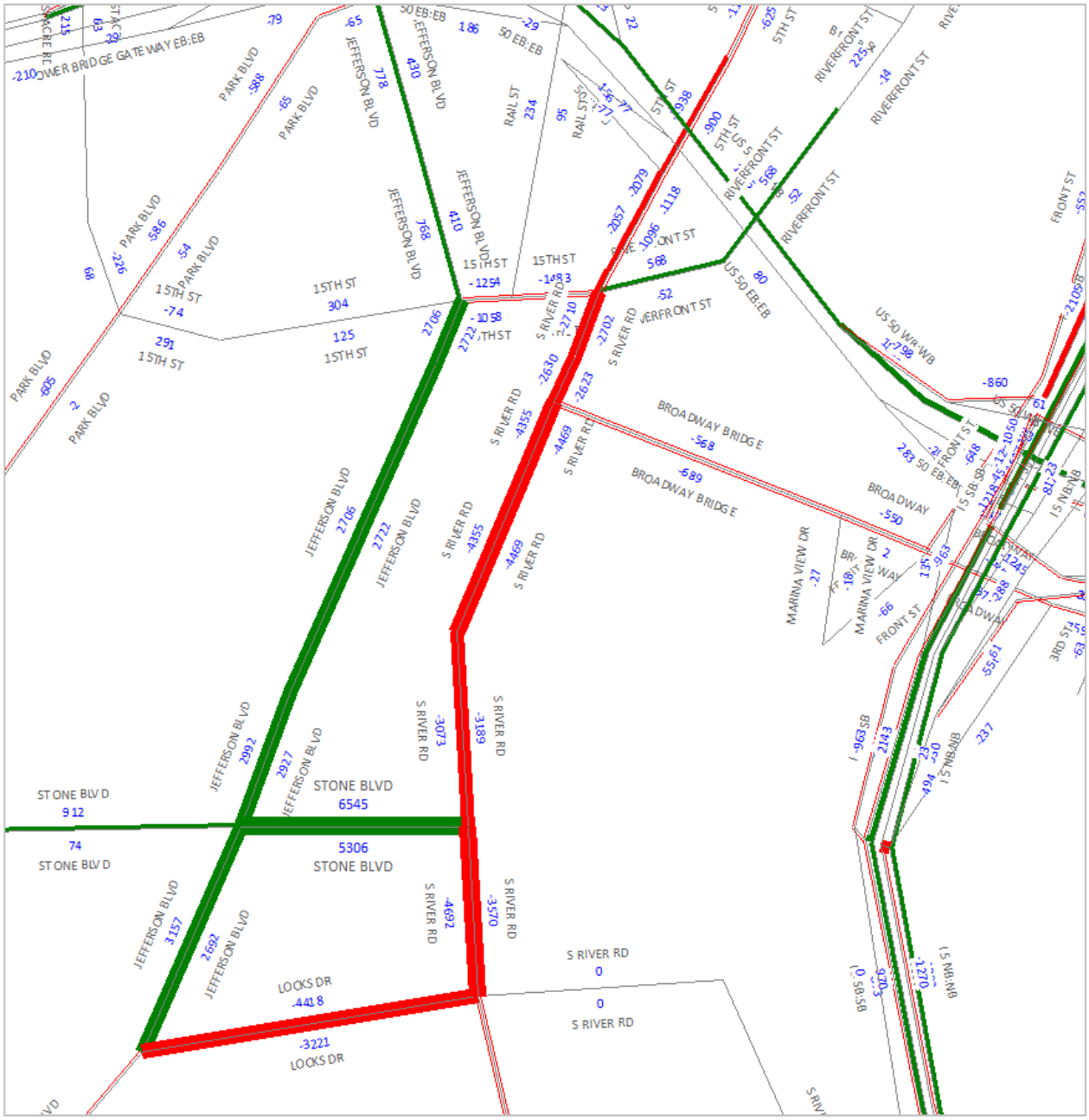
Tuesday, June 6, 2017

2:00 – 3:00 p.m.

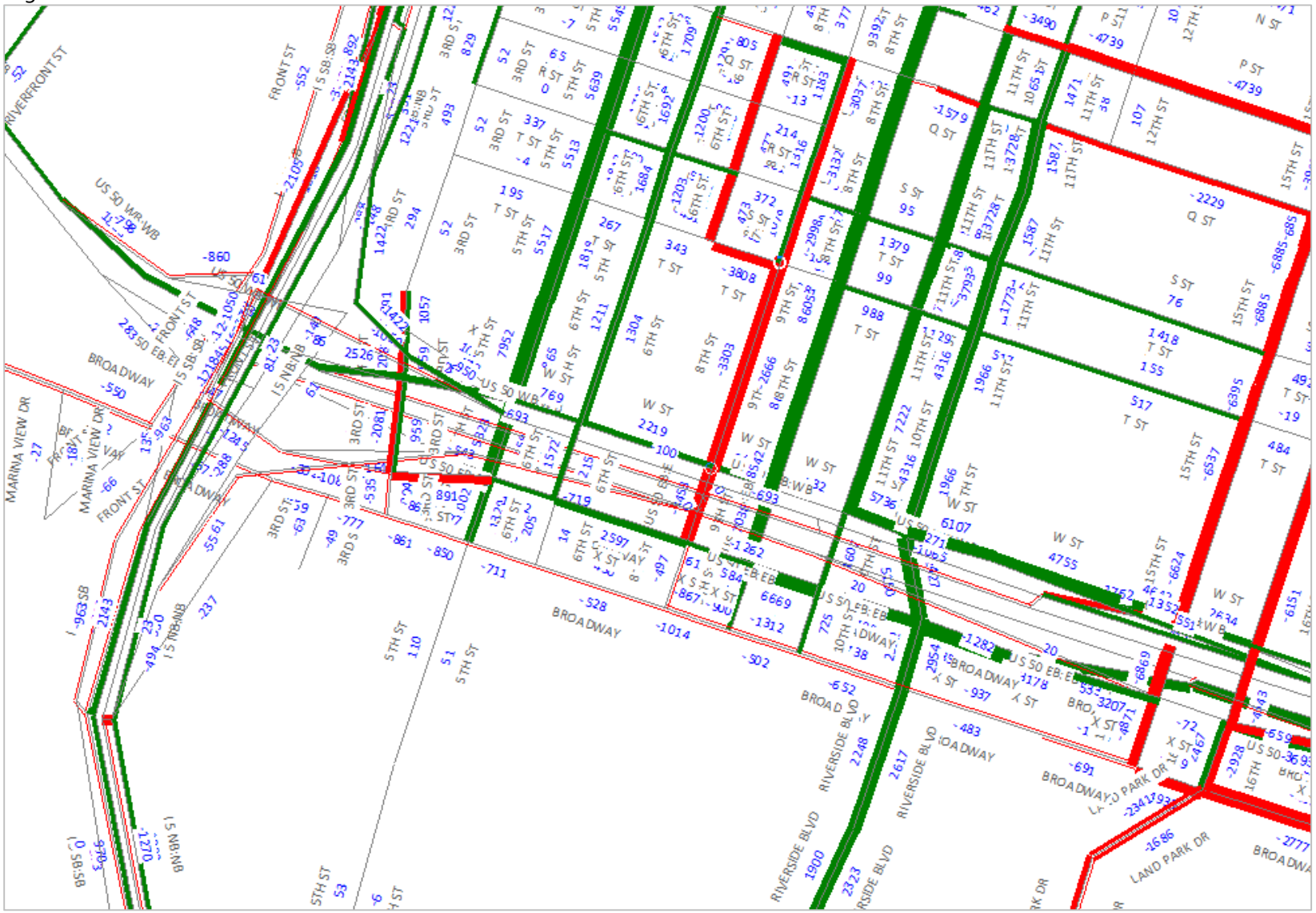
AGENDA

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

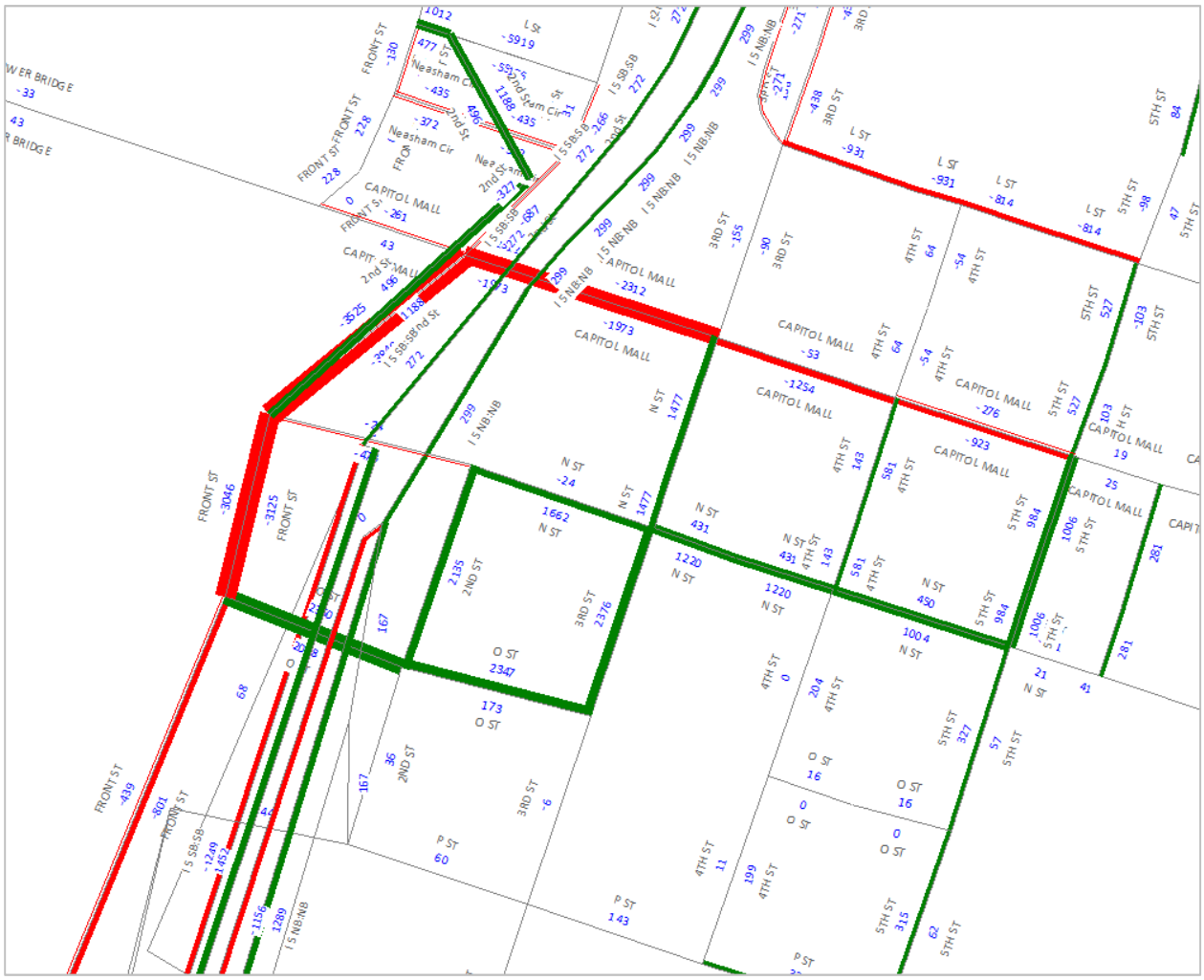


Daily Traffic Forecast Change from 2015 Feasibility Study to 2017 PA/ED – West Sacramento



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

Effects of I-5 Riverfront Reconnection Project Phase 2

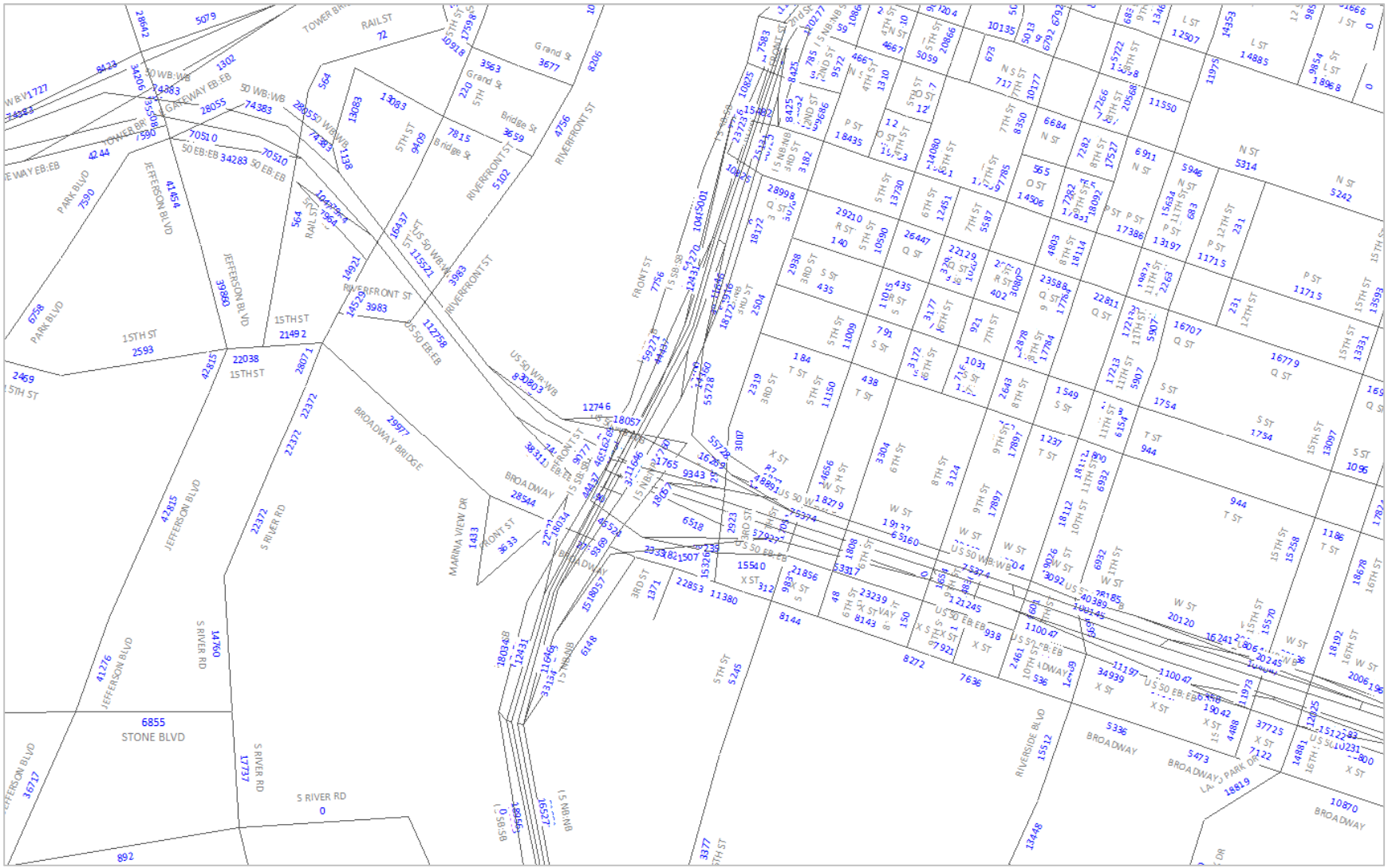


Daily Traffic Forecast Change from With to Without I-5 Riverfront Reconnection Project Phase 2

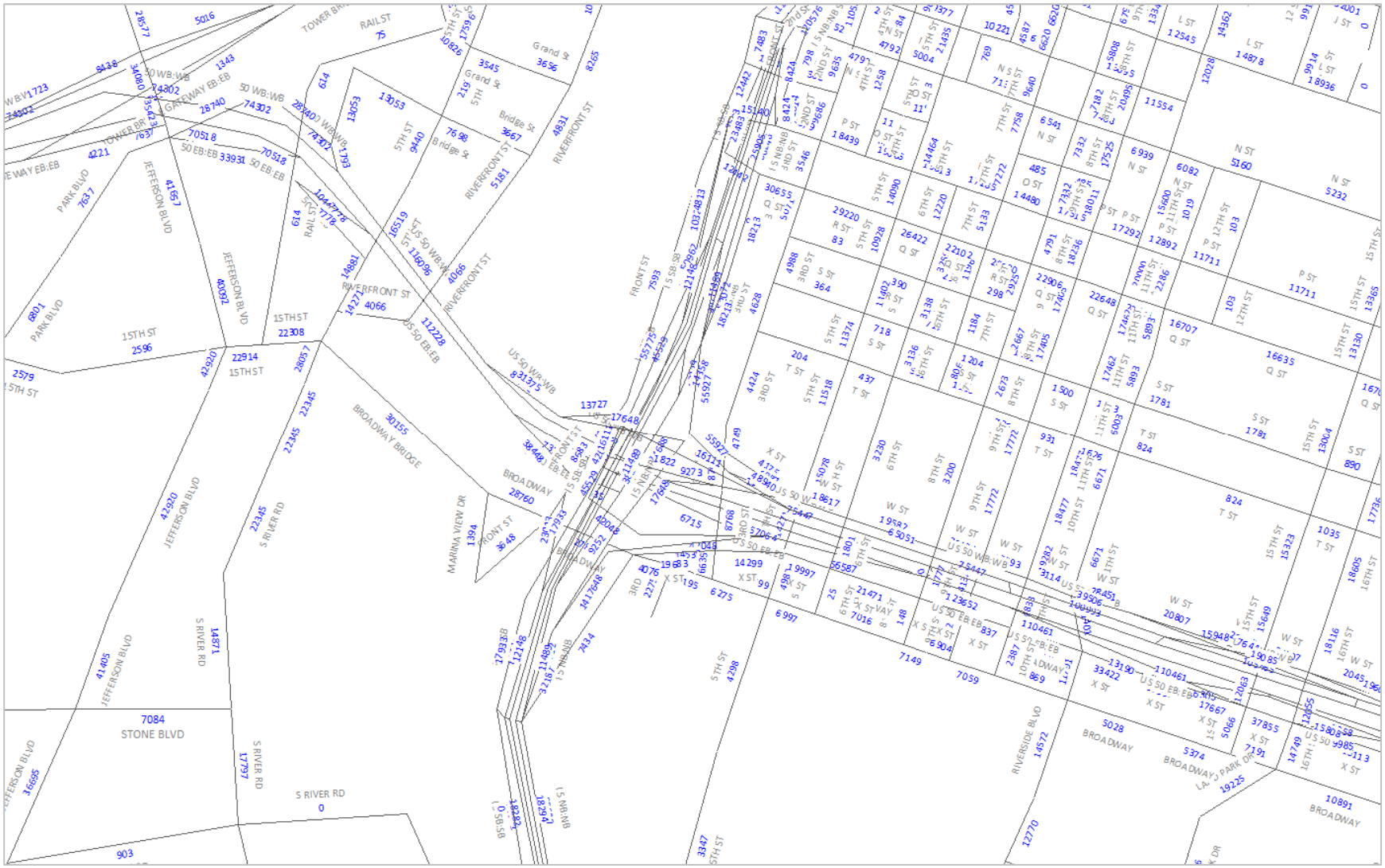
Daily Traffic Forecast for No Build Alternative

Daily Traffic Forecast for Alternative 2:

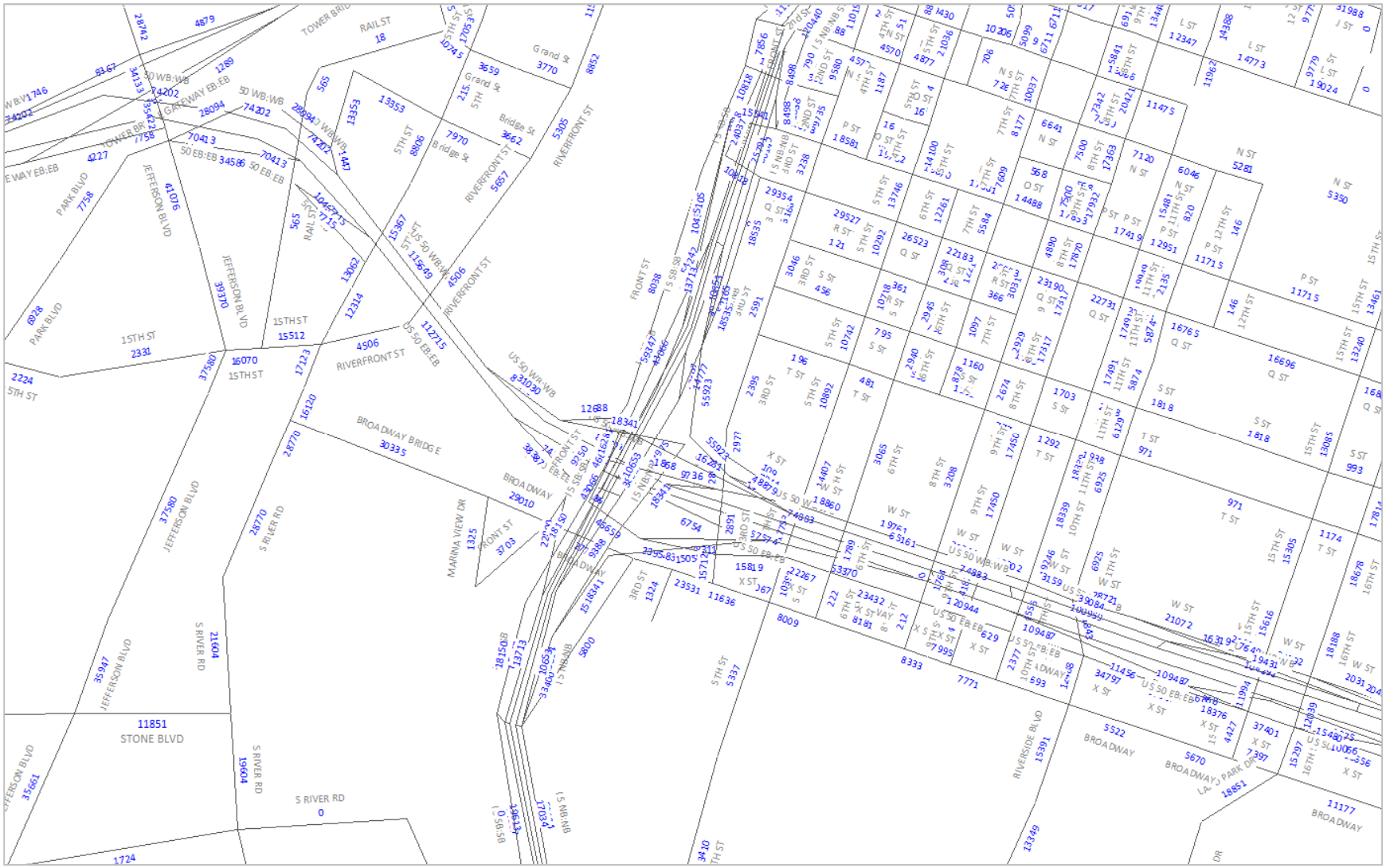
15th Street (West Sacramento) / X Street (Sacramento)



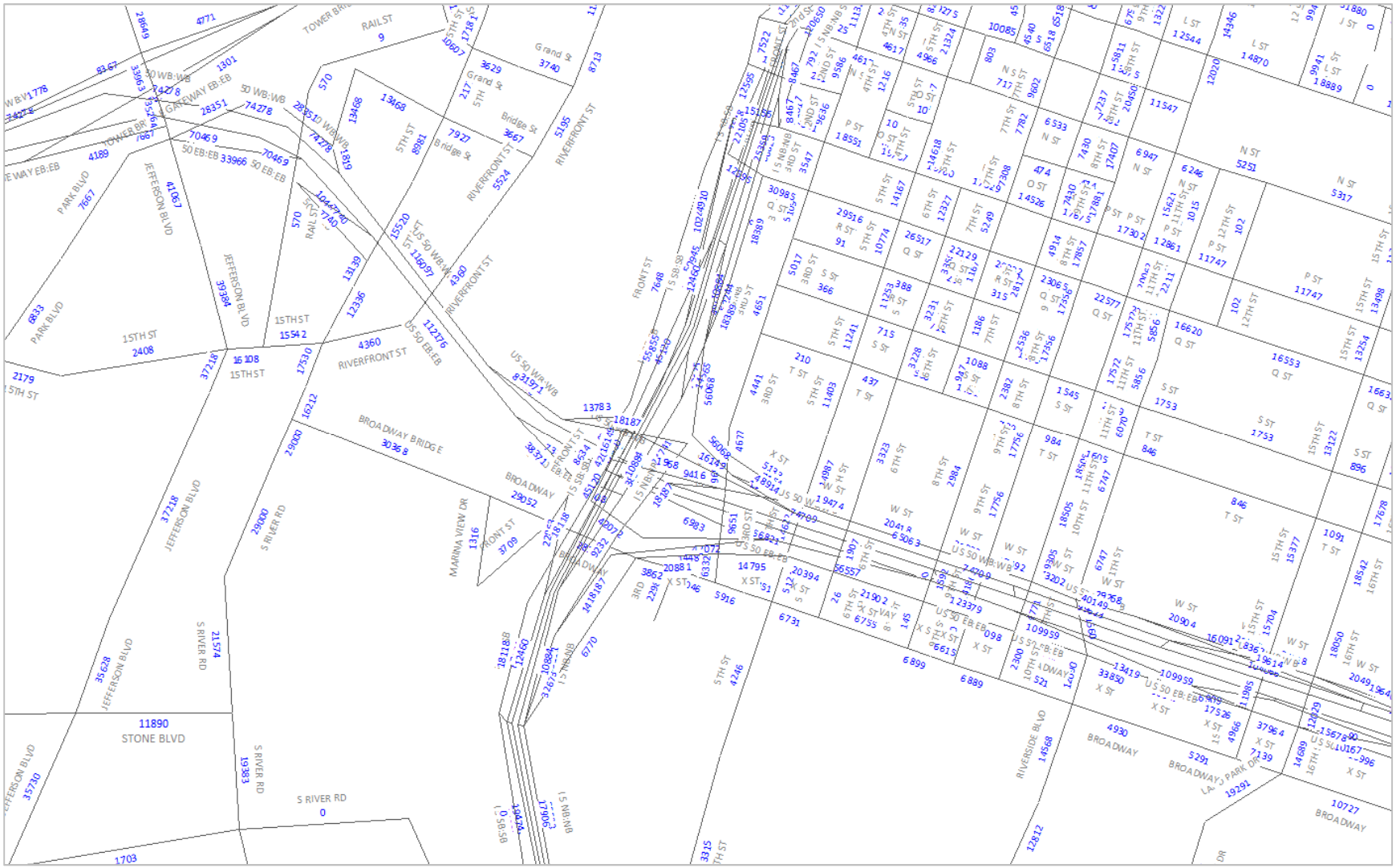
Daily Traffic Forecast for Alternative 2:
15th Street (West Sacramento) / X Street (Sacramento)



Daily Traffic Forecast for Alternative 3:
South River Road (West Sacramento) / Broadway (Sacramento)

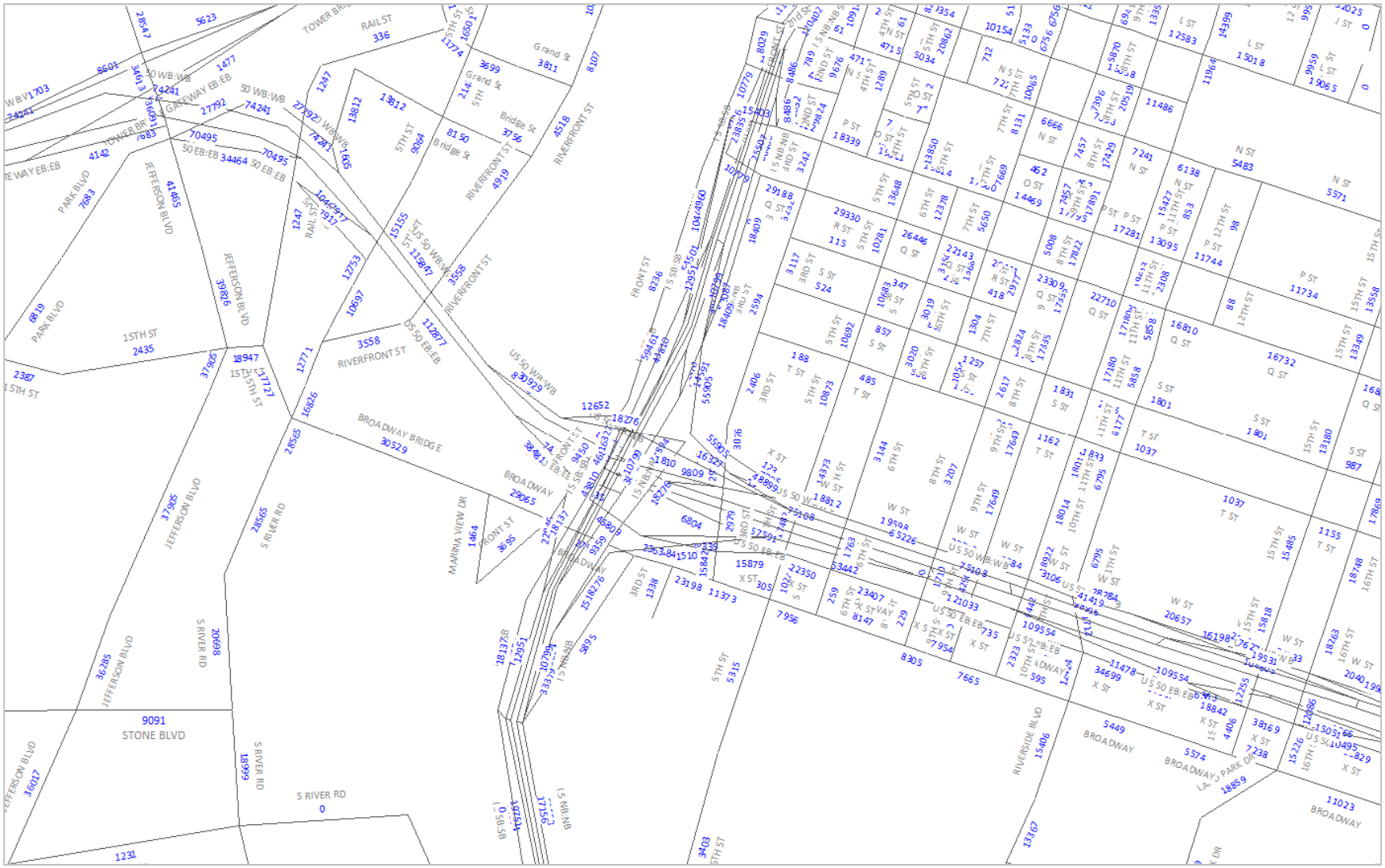


Daily Traffic Forecast for Alternative 4:
South River Road (West Sacramento) / X Street (Sacramento)



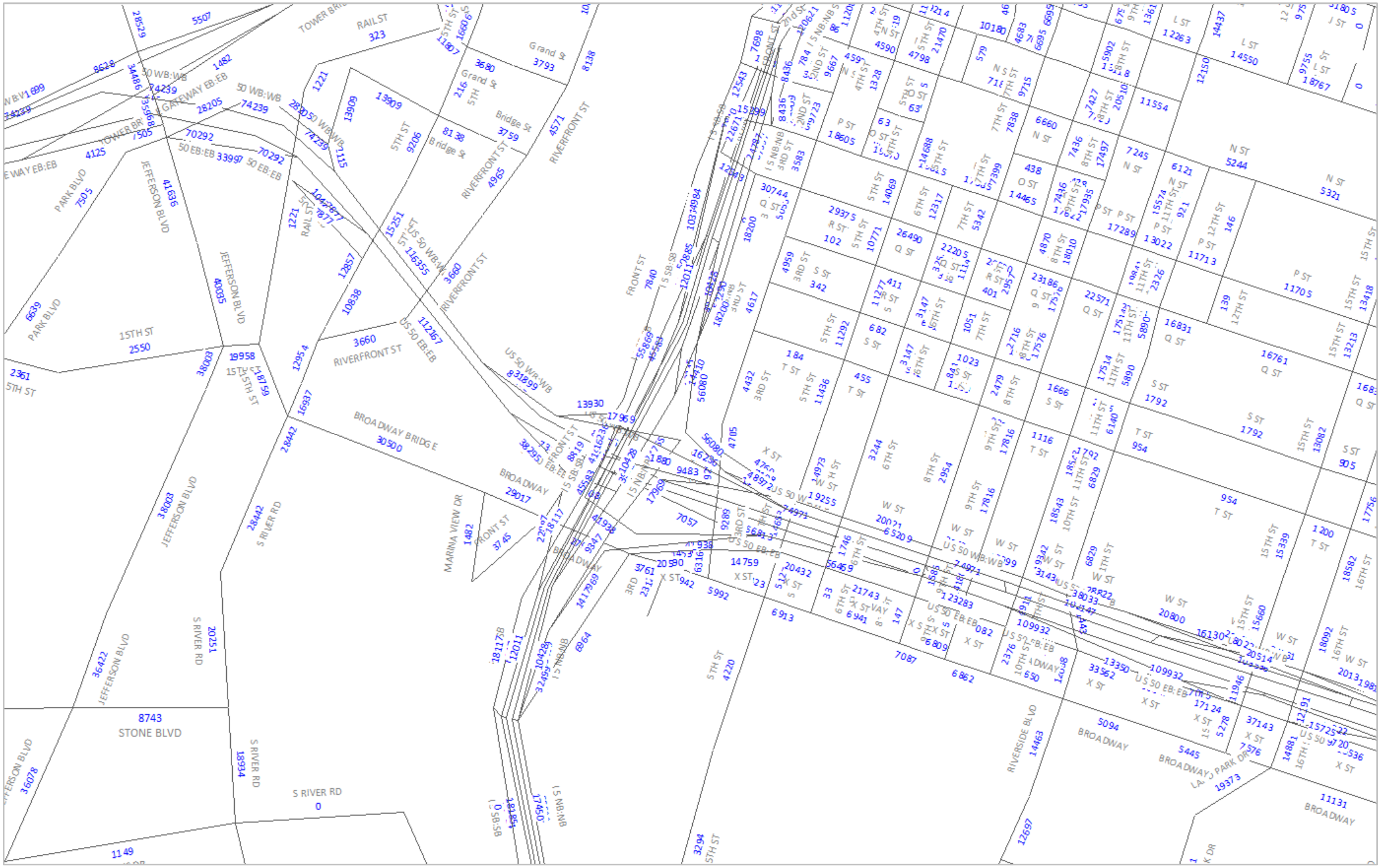
Daily Traffic Forecast for Alternative 5:

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



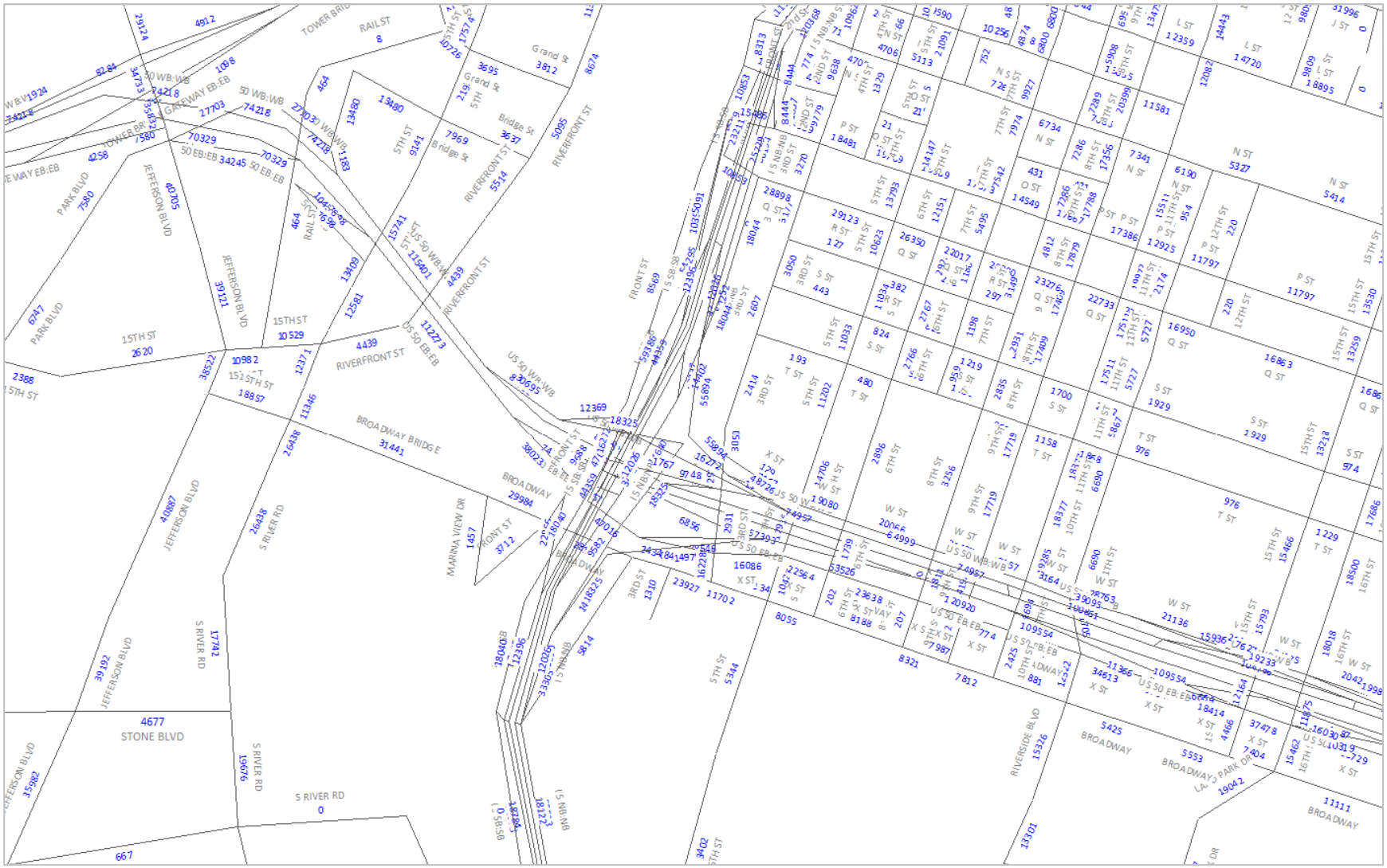
Daily Traffic Forecast for Alternative 6:

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)