



DATE: September 23, 2021

TO: Transportation Authority of Marin Board of Commissioners

FROM: Anne Richman, Executive Director *Anne Richman*
Dan Cherrier, Principal Project Delivery Manager

SUBJECT: Update on Richmond San Rafael Bridge Westbound Vehicle Shoulder Use Study and Future Plans (Discussion), Agenda Item No. 7

RECOMMENDATION

This is an informational item. No action is required.

A more detailed version of the traffic study elements of the Richmond San Rafael Bridge (RSRB) improvements was presented to the Administration, Project, and Planning (AP&P) Executive Committee at its September 13 meeting. Comments received from the AP&P Executive Committee included:

- Concern about the cost estimate overall and in particular for signage on RSRB. Staff explained that additional overhead structures for the signage may be necessary; however, staff also recognized that this element of the current Caltrans requirements may be reduced with further evaluation;
- Support for the mode shift goals of the Richmond-San Rafael (RSR) Forward Project;
- Some expressed concern about the 2024 evaluation date for the multi-use path pilot as being too long of a duration; and
- Support for staff to explore low-cost options to open a part time vehicle use lane sooner, including exploring exclusive use by carpools and transit. Staff explained that any low cost alternative would probably have to terminate at the Main Street exit as the majority of the higher cost items are associated with extending the travel lane from the west end of the Bridge to the Sir Francis Drake Boulevard (SFD) exit.

BACKGROUND

One of the recommendations of the Greenbrae Working Group in 2013 was to improve access to the RSRB. This recommendation resulted in several projects, of which some were managed by TAM and others were implemented by the Bay Area Toll Authority (BATA). TAM's projects included the completed modifications to eastbound SFD in the vicinity of the Larkspur Ferry Terminal and on-going improvements to the Bellam Boulevard off-ramp. A joint project between BATA and TAM, along with Caltrans, resulted in the recently opened two-way bicycle connector on the SFD Overcrossing on I-580.

The largest scale improvement was the work on the RSRB consisting of a part-time third traffic lane on the lower eastbound (EB) deck, and a two-way, barrier-separated multi-use path on the upper westbound (WB) deck. The EB part-time traffic lane opened for vehicle use in April of 2018; and the WB Project, the multi-use path, opened for bicycles and pedestrians in November of 2019. Both projects were put in place for a four-year pilot period and are being evaluated during that time.

The EB Project resulted in immediate elimination of the afternoon traffic congestion that could back up as far as US-101. The multi-use path has very high use by recreational users, especially on weekends. Just months after the path opened, the COVID-19 pandemic started, which affected travel considerably and may have reduced some of the expected weekday mode shift.

Morning congestion continues to exist WB approaching the bridge on the Richmond side. TAM, BATA, Caltrans and the Contra Costa Transportation Authority (CCTA) have been investigating the feasibility of a similar part-time travel lane project WB, as was implemented EB, to reduce congestion. BATA, in conjunction with Caltrans, was tasked to study if the Bridge could structurally accommodate the extra loading, while TAM was asked to look at potential traffic impacts. The TAM Board authorized the increase in budget utilizing the team already on board for the US-101 to I-580 Direct Connector Project to complete the traffic study.

DISCUSSION/ANALYSIS

Structural Analysis and RSR Forward Implementation

Staff from Caltrans and BATA will present information regarding the structural analysis and overall asset management plan for the Bridge, as well as an update on the RSR Forward project, at the September 23, 2021 TAM Board Meeting.

In summary:

- Preliminary results indicate that the lowest cost option is to maintain the existing bridge in Desired State of Good Repair through extended service life.
- Caltrans has completed the load rating study and has found that certain elements of the structure are in need of maintenance. Staff from Caltrans will present an overview of these efforts.

BATA is continuing with implementation of the RSR Forward Project. Construction is expected to begin around 2023. Elements include converting the toll plaza to open road tolling and converting one of the three existing general-purpose lanes to a high-occupancy vehicle (HOV) lane, beginning at the I-580/Regatta Avenue Interchange.

Traffic Study

The study assessed the potential impacts of a future third traffic lane on the upper deck of the bridge in weekday morning peak hours only. The study assumed that the moveable barrier currently in place on the upper deck to create the multi-use pathway would be moved every weekday to create this part-time travel lane. The limits of the study were from the junction of I-580/I-80 in Albany to US-101 in Marin. The study also assumed that major elements of the BATA RSR Forward Project would be in place prior to the study year of 2025. The traffic study was completed by Kimley-Horn & Associates and its traffic consultant Fehr & Peers.

The study explored travel times from the intersection of I-80/I-580 to US-101, either northbound (NB) or southbound (SB). For traffic going to NB US-101, the route of travel was simply using I-580. For traffic headed towards SB US-101, two routes of travel were studied, one using WB SFD and the other utilizing a future WB I-580 to SB US-101 direct connector. The study covers 5:00 am to 11:00 am on weekdays only.

In summary, these are the major findings from the study:

- The addition of the third travel lane will cost approximately \$70–90 million, largely due to the need for significant capital improvements on the Marin side in order to make a third WB travel lane feasible. Primary components are signage on the bridge; widening of a portion of the WB trestle section, the Main Street Undercrossing, and the I-580 shoulder; and relocation of the Francisco Boulevard East (FBE) on-ramp to a new location west of SFD. Five years of operating costs were also included in the cost estimate. The costs of the RSR Forward project were not included in this estimate.
- For the 79% of the vehicles that exit the bridge WB and head towards NB US-101 or San Rafael, there will be an average travel time savings of two minutes, with an eleven-minute savings during the peak hour.
- For the 21% of the vehicles that exit the bridge and head towards SB US-101 or points along SFD west of US-101, there will be an increased average and peak hour travel time of three minutes. The increase is due to capacity constraints at the SFD off-ramp and along SFD. The study was not able to assess potential travel time impacts for vehicles that exit the bridge and stay on local roads rather than proceeding to US-101.
- A new WB 580 to SB US-101 direct connector would eliminate congestion on the bridge with the third part-time travel lane.
- WB connectivity between FBE and SFD would need to be eliminated. This could be a significant concern for the community.
- The new WB FBE on-ramp would be a more standard design and result in operational improvements compared to the existing hook ramp with a very short acceleration section.
- MTC/BATA has expressed concern that the part-time third lane may induce WB travel demand, in conflict with the goals of the RSR Forward Project to drive mode shift.
- Concerns have also been raised that the increased backup at SFD will just be moving the congestion from east to west.

Water Pipeline Discussions

Recently, Marin Municipal Water District (MMWD) has begun evaluating the feasibility of placing a 24-inch pipeline on the RSRB to bring water to Marin during the current and potential future extreme drought. Two locations on the bridge are being evaluated, one in the current multi-use path and one placed underneath the upper deck. A pipeline on the upper deck multi-use path would likely mean that there would be insufficient room for a third vehicle travel lane, due to the space needed for the pipeline and the barrier. MMWD is still determining if the multi-use path can co-exist with the water pipeline.

MMWD is considering a very aggressive schedule, targeting construction completion by June 2022. Its staff has been in coordination with Caltrans, with Caltrans committed to try to support the schedule as much as possible. Staff from MMWD have indicated that the alignment choice must be made by October to allow for sufficient time to acquire the necessary materials. The western portion of the pipeline is currently anticipated to be installed along FBE and Bellam Boulevard towards a terminus located along SFD.

FISCAL CONSIDERATION

The cost estimated for improvements needed for a third travel lane WB, including operating costs for five years, is approximately \$70–90 million. A WB I-580 to SB US-101 connector near the Bellam area would be an additional \$220 million. No funding is identified for either of these projects. BATA is funding the RSR Forward project using their own funds.

NEXT STEPS

Staff anticipates making this same presentation to the CCTA Board/Committee in October, and the BATA Oversight Committee in October or November.

A study by University of California (UC) Berkeley of the current multi-use path pilot will be complete in mid-2024 and a decision will be made to either eliminate the barrier or continue with operation of the multi-use path.

Staff will also continue to monitor the development of the possible MMWD water pipeline.

ATTACHMENTS

Attachment A: Presentation

Richmond-San Rafael (RSR) Bridge Updates

Transportation Authority of Marin
Board of Commissioners
September 23, 2021



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AGENDA

1. Load Rating Study/Maintenance Projects
2. RSR Access Improvement Pilot Projects
3. RSR Forward
4. Westbound 3rd Lane Study
5. Marin Water Pipeline



ASSET MANAGEMENT STUDY

Toll Bridge Asset Management Plans (AMP)

- June 2020 RSR Specific Observations:
 - No need for immediate replacement.
 - Replacement cost controls over other costs.
 - Lowest-cost scenario using net present value is to maintain existing bridge in Desired State of Good Repair through extended service life.
 - Other considerations may render an earlier replacement more desirable.



RSR Bridge: Opened in 1956

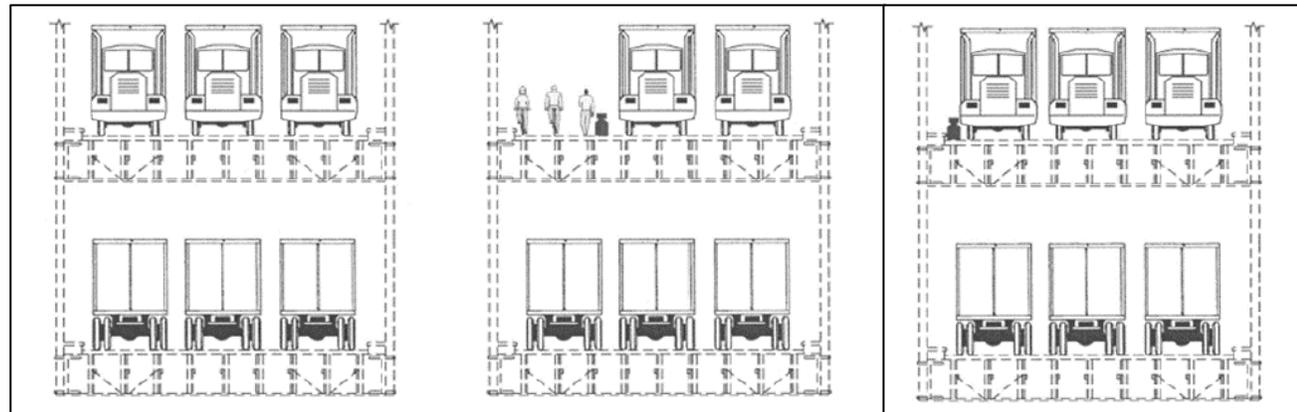


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ASSET MANAGEMENT STUDY

Structural Load Rating Study Update

- Load rating study identified the need for localized strengthening of the superstructure for new Federal load and design requirements from MAP 21.
- Status: Retrofit is scheduled for completion in March 2022.



Original Configuration

Current Configuration

Future Alternative Configuration



BRIDGE REHAB/MAINTENANCE PROJECTS

Current and Upcoming Projects

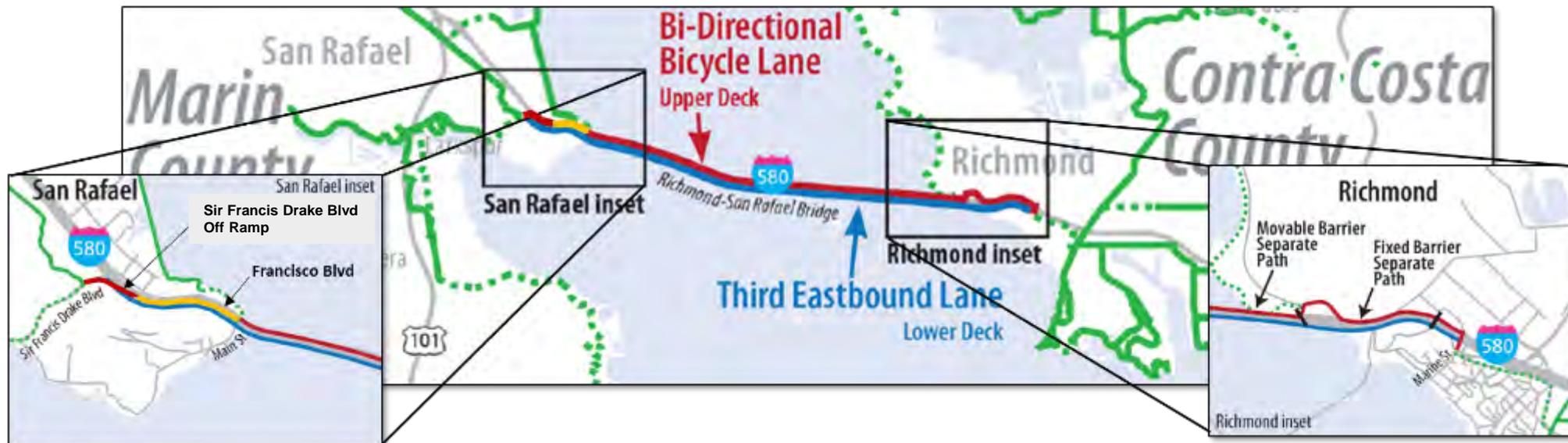
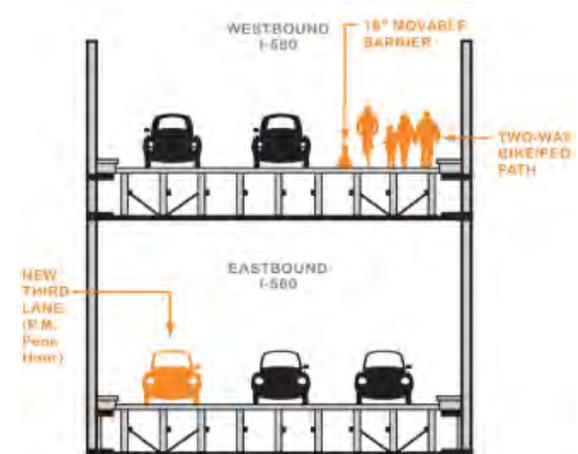
Current	Lead	Expected Completion
All Electronic Tolling	BATA	2021
Bridge Painting and Lower Deck Joint Replacement	Caltrans	2023
Gusset Retrofit	Caltrans	2022

Upcoming	Lead	Expected Completion
Electrical Substation Upgrade	Caltrans	2023



RSR ACCESS IMPROVEMENT PILOT PROJECTS

PKG	DESCRIPTION	STATUS
A	I-580 Eastbound: PEAK PERIOD USE LANE	OPENED APR. 2018
B1	I-580 Westbound: 10' BICYCLE/PEDESTRIAN PATH Sir Francis Drake Blvd Off Ramp: 8' BICYCLE PATH	OPENED NOV. 2019 OPENED AUG. 2020
B2	Francisco Blvd East: BICYCLE/PEDESTRIAN PATH (SIDEWALK)	FINAL DESIGN & R/W



RSR ACCESS IMPROVEMENT PILOT PROJECTS

Pilot Study

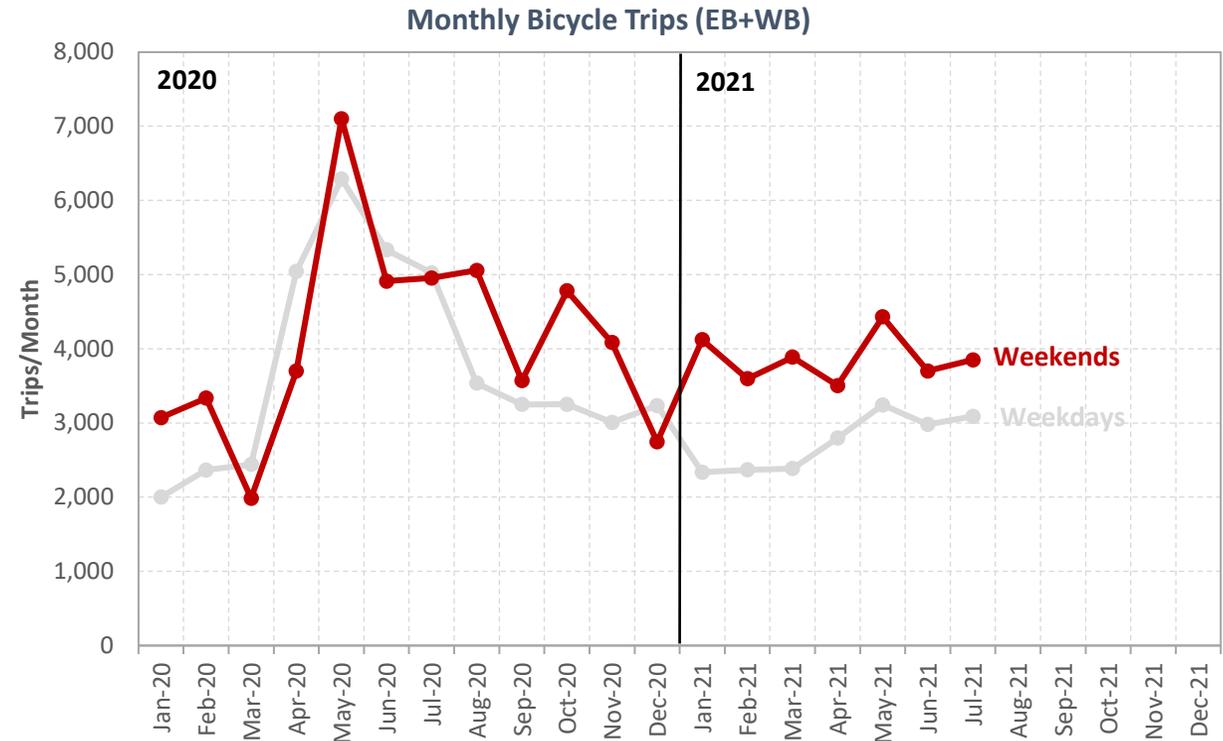
- Caltrans Headquarters and UC Berkeley PATH are leading the pilot studies and reports, which started in Summer 2018 and the Final Report is expected to be completed in Summer 2024.
- Scope includes collecting bike/ped counts, traffic data, maintenance impacts, incident data, surveys, conducting quarterly meetings, and preparing a final report.
- Final decision on pilot projects is not expected until completion of pilot studies.



RSR ACCESS IMPROVEMENT PILOT PROJECTS

Bicycle Counts (up to June 2021)

- General Observations 2020:
 - Peak in May '20, consistent through summer weather.
 - Lower in Fall/Winter '20, likely due to poor air quality and colder weather.
- 2021 Monthly Trip Averages:
 - Weekends: 3,500 – 4,500 trips/month
 - Weekdays: 2,300 – 3,300 trips/month



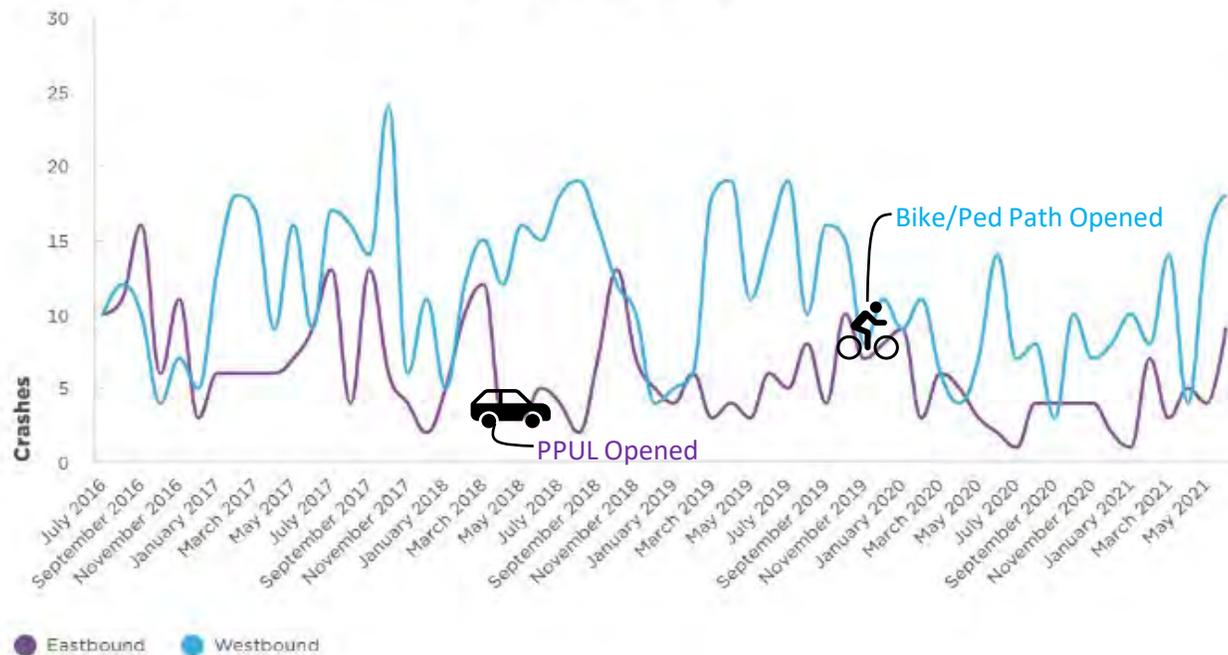
Source: UC Berkeley PATH Quarterly Update 8/2



RSR ACCESS IMPROVEMENT PILOT PROJECTS

Vehicle Crashes Per Month

Directional Crashes: Richmond-San Rafael Bridge



Source: Bay Area Incident Management Dashboard

Incident Management Plan	
	<ul style="list-style-type: none"> Achieve incident response time of 30 minutes
	<ul style="list-style-type: none"> Added mileposts/markers to locate incidents, per Fire officials request
	<ul style="list-style-type: none"> Provide operational and maintenance training to CT, Fire Department, CHP
	<ul style="list-style-type: none"> Upper Deck: Implemented incident response measures due to elimination of shoulder (i.e., ATV, pusher wheels)
	<ul style="list-style-type: none"> Lower Deck: Coordinate with Caltrans to adjust lane arrows to assist with incident response



RSR FORWARD

(2020-2024)

E-BIKE COMMUTE PROGRAM

Rebates and Incentives



RSR RIDES

Rides on Bridge led by local organizations and retailers



REWARDS

Miles App for Green Trips



E-BIKE SHARE

First/Last Mile Connections



QUICK BUILD BIKE ACCESS IMPROVEMENTS

Signing & Striping



COMMUTE MANAGEMENT TECHNOLOGY PLATFORM

Inform & Support Employer TDM



OPEN ROAD TOLLING



I-580 WB HOV LANE

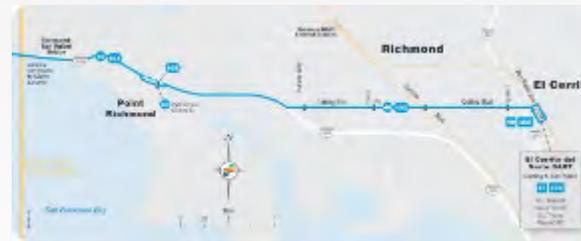


RICHMOND PKWY INTERCHANGE DESIGN ALTERNATIVE ASSESSMENT

Improvements TBD based on Design Alternatives Assessment

INCREASE TRANSIT FREQUENCY

Increase frequency of Golden Gate Transit Transbay Route 40X

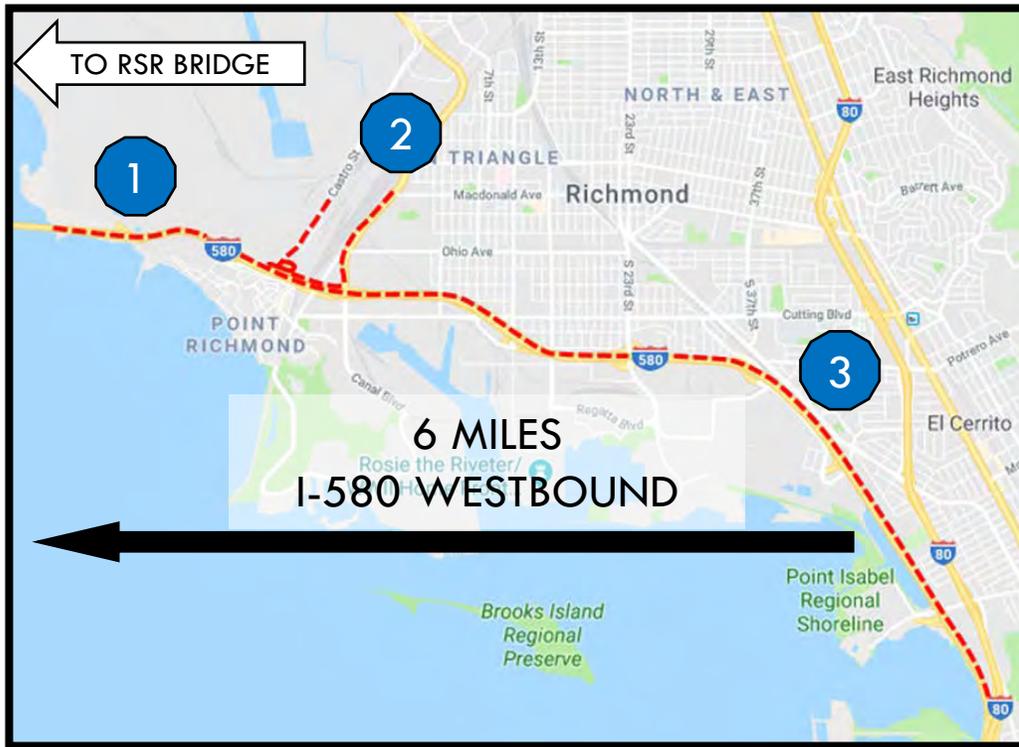


BIKE GAP CLOSURES/IMPROVEMENTS

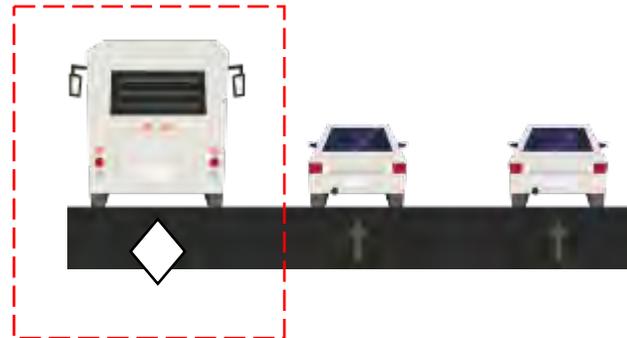


RSR FORWARD

Open Road Tolling/I-580 WB HOV LANE Project (2024)



1 Open Road Tolling



3 Convert GP Lane to HOV



2 Richmond Pkwy Interchange



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WB THIRD LANE STUDY

Traffic Study

- Show benefits/drawbacks of a third WB traffic lane between 5:00AM and 11:00AM on weekdays
 - Lane would be created by moving the barrier on the bridge daily
- Identify improvements in Marin County, if needed
- Previously collected traffic data was used to generate the results
 - Richmond side data: 2016
 - San Rafael side data: 2018-2019
 - Combined data set converted using Year 2019 INRIX data.



WB THIRD LANE STUDY

Scenarios Evaluated

Existing Conditions (2019)

Baseline (2025)

- Assume RSR Forward project is implemented
- Shoulder stays as a multi-use path
- No other improvements in Marin County

Build Alternative 1 (2025)

- Assume RSR Forward project is implemented
- Assume capital improvements on the Marin side are implemented (see next slide)

Build Alternative 2 (2025)

- New Connector from WB I-580 to SB US 101 is added
- Same as Alternative 1 except Third Lane ends at New Connector (instead of SFD)

WB THIRD LANE STUDY

Capital Improvements Summary

Costs Escalated to 2025

Build Alternative 1

- Improvements on RSR Bridge (signage): up to \$20 M
- Widening of portion of RSR bridge: \$30 M
- Relocate Francisco Blvd. on-ramp and widen I-580: \$35 M
- Barrier Operating Costs (\$1M per year for 5-Year Pilot): \$5 M
- **Total: Approximately \$70-\$90 M**

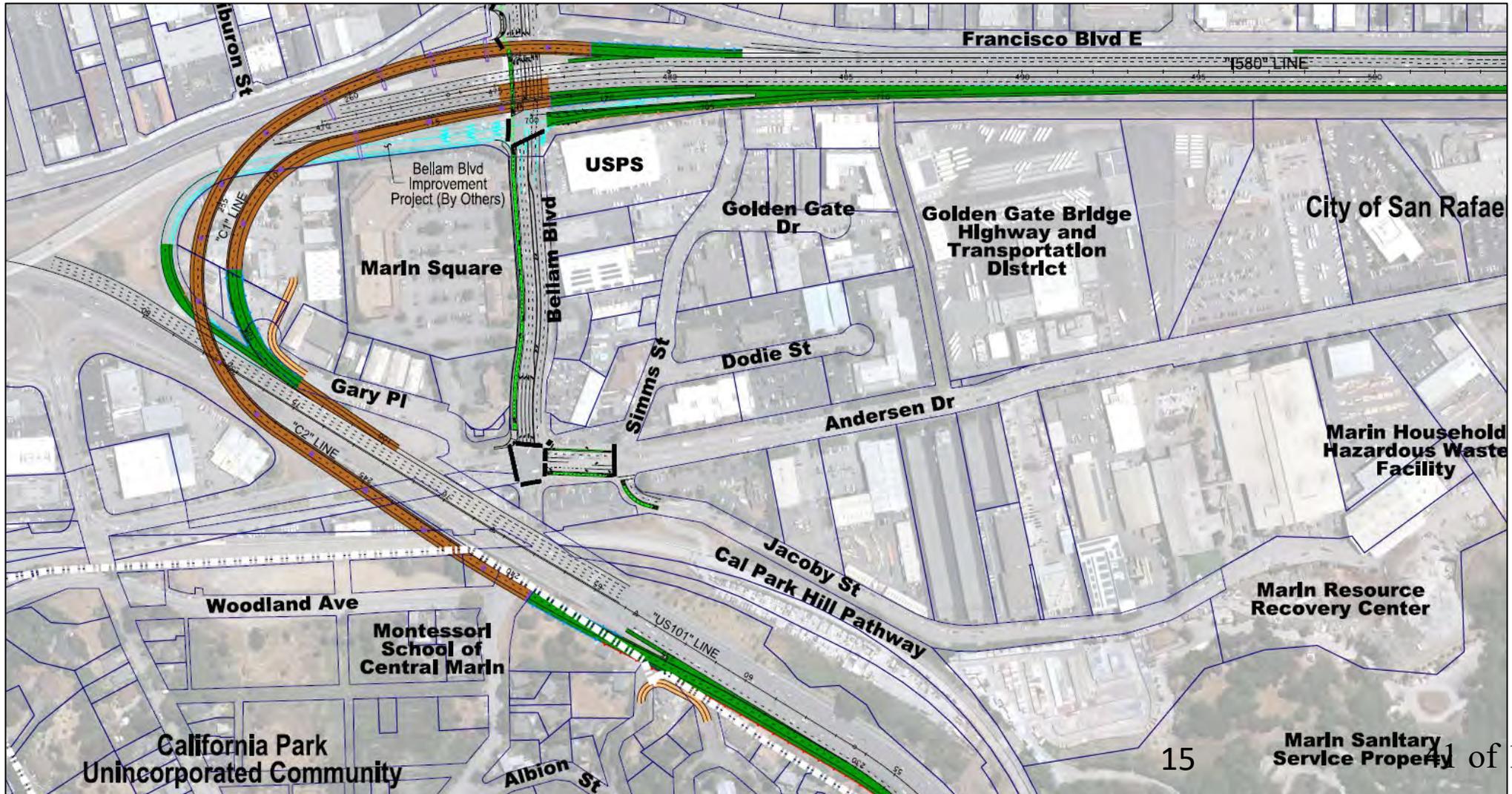
Build Alternative 2

- Build Alternative 1: \$90 M
- Direct Connector near Bellam: \$220 M
- **Total: Approximately \$310 M**



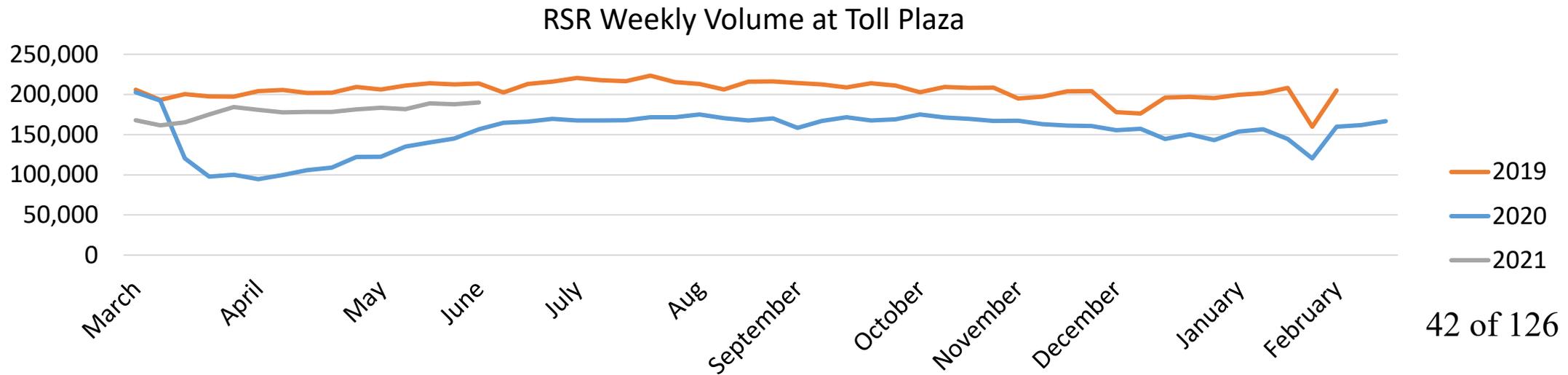
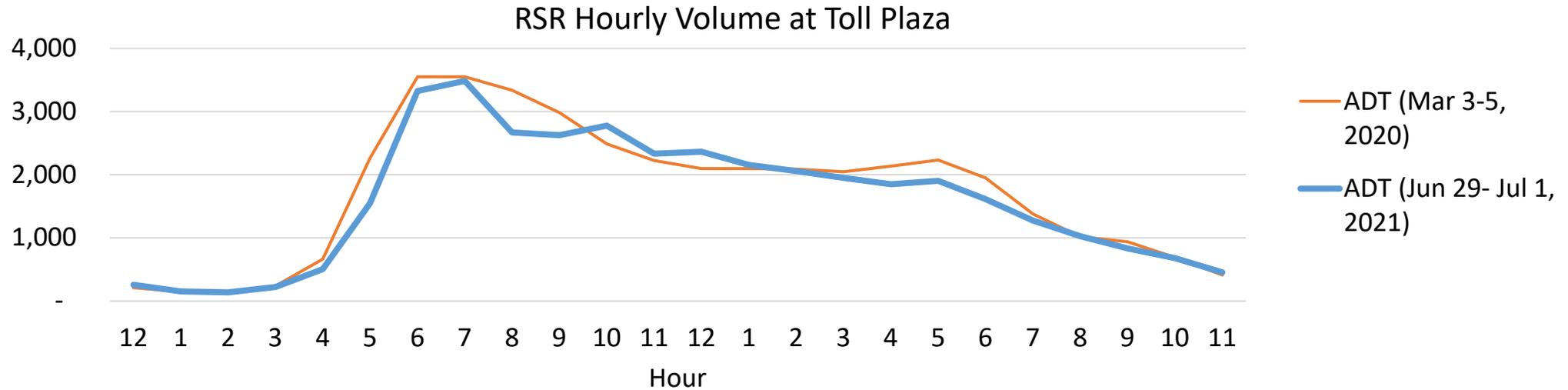
WB THIRD LANE STUDY

Conceptual WB 580 to SB US 101 Connector



WB THIRD LANE STUDY

WB I-580 Bridge Vehicle Travel (2019 to 2021)

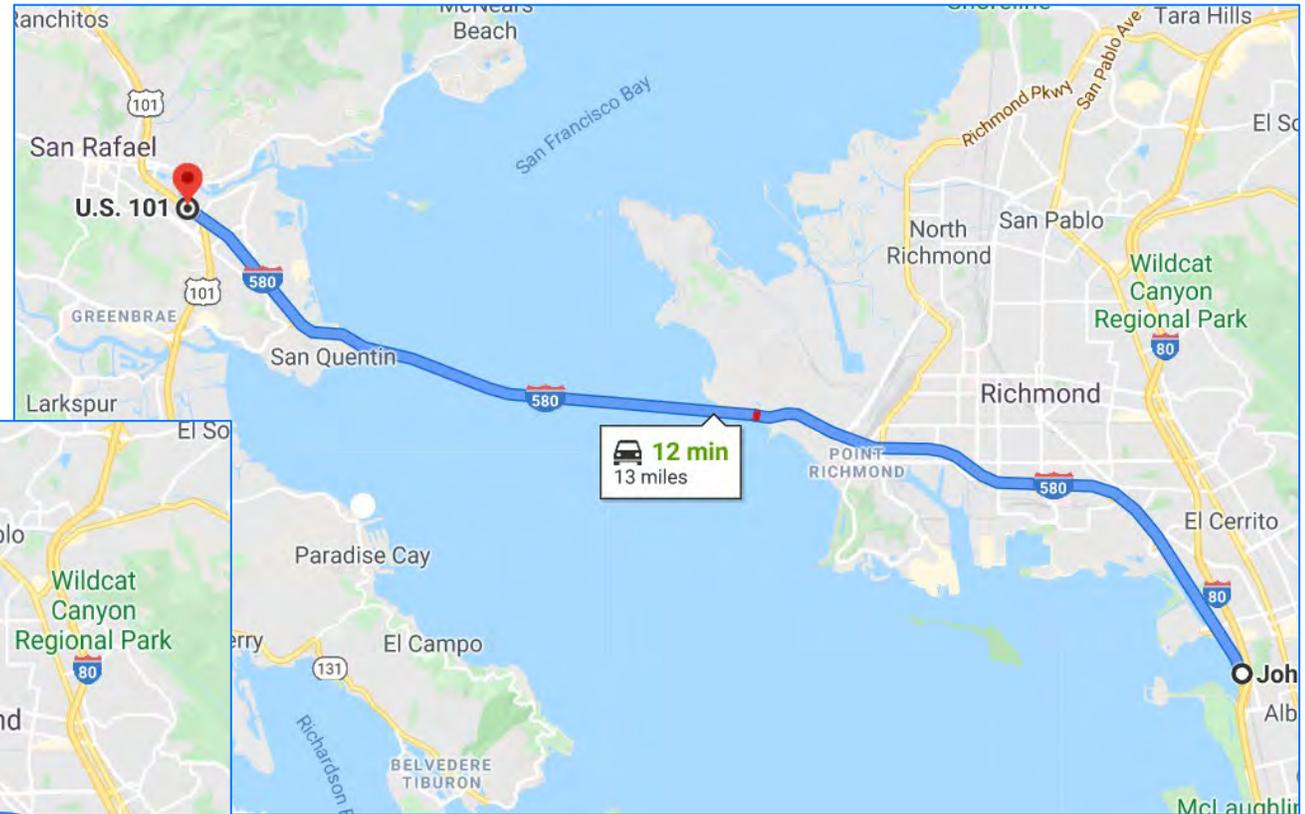
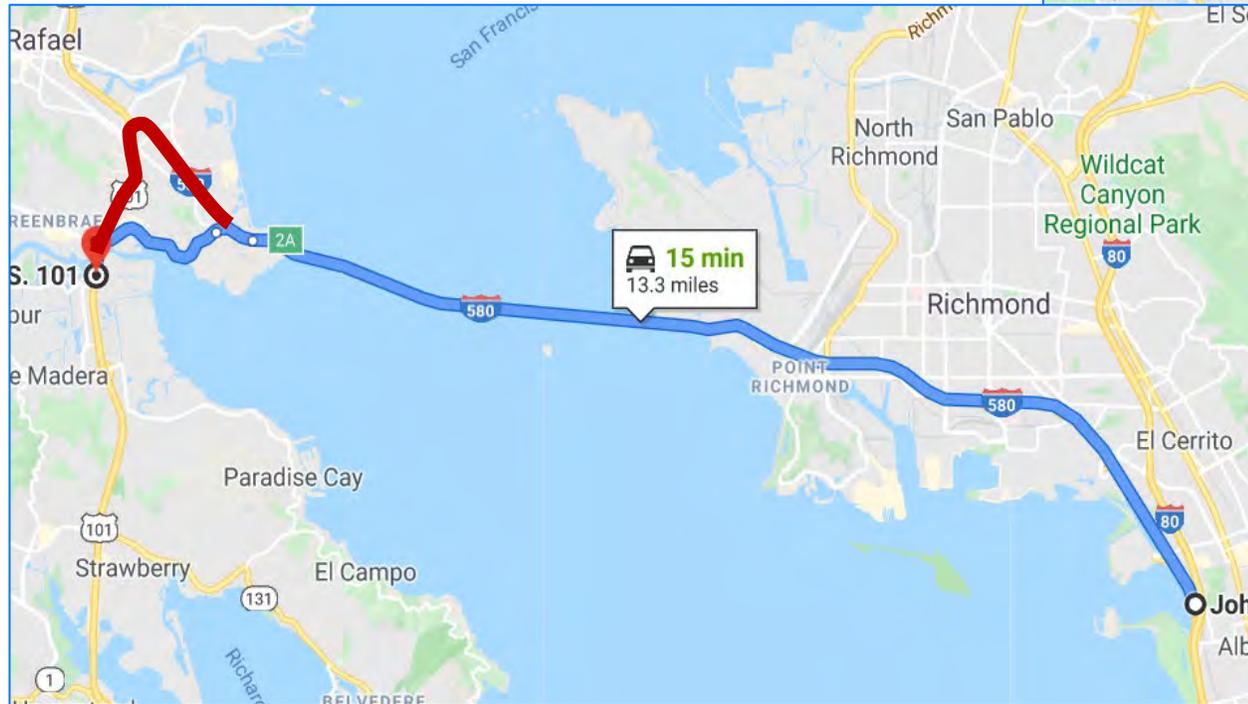


WB THIRD LANE STUDY

Origin-Destination Pairs

Study results are reported by OD Pair

- I-80/I-580 Split to NB US 101
- I-80/I-580 Split to SB US 101



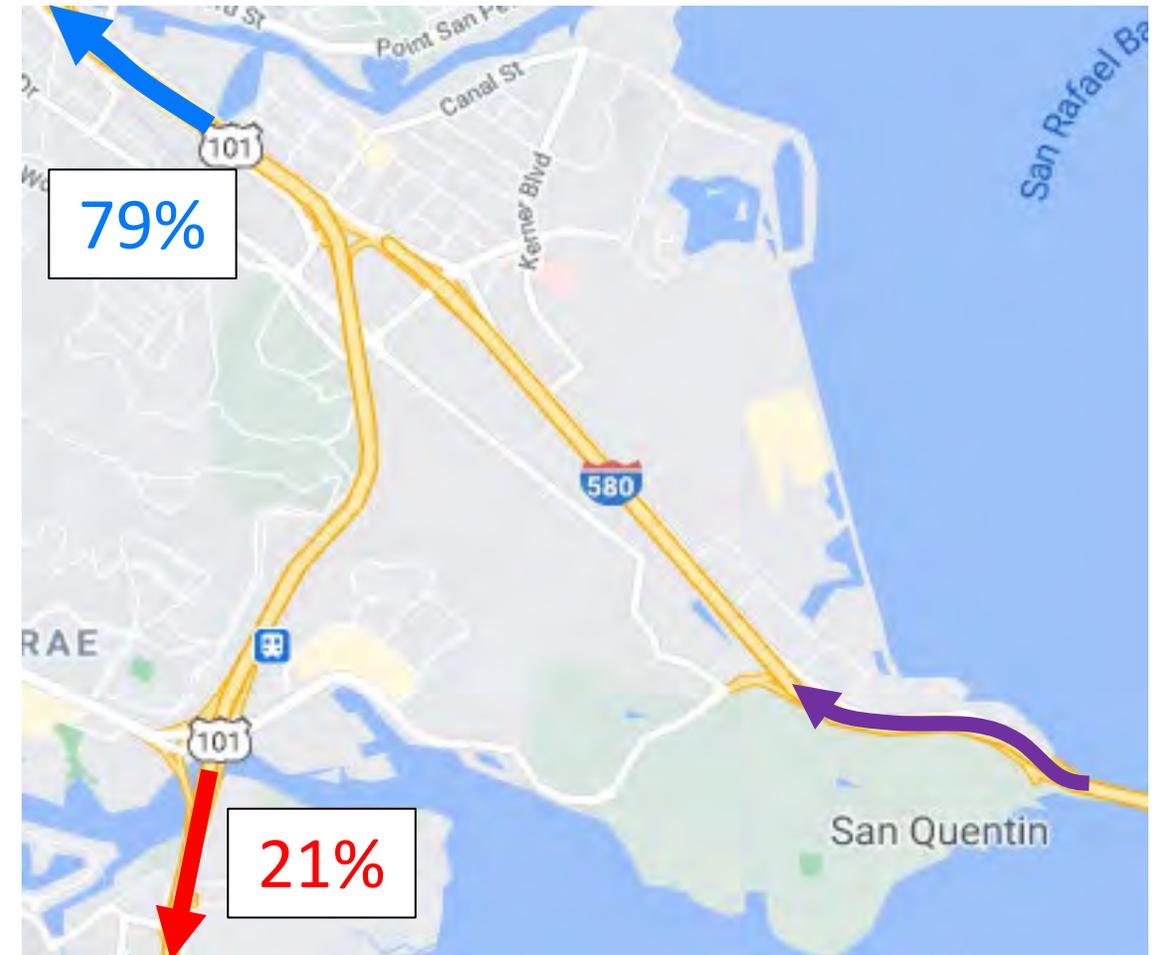
WB THIRD LANE STUDY

WB I-580 to US 101 Traffic Split

2018 Origin/Destination Data Shows:

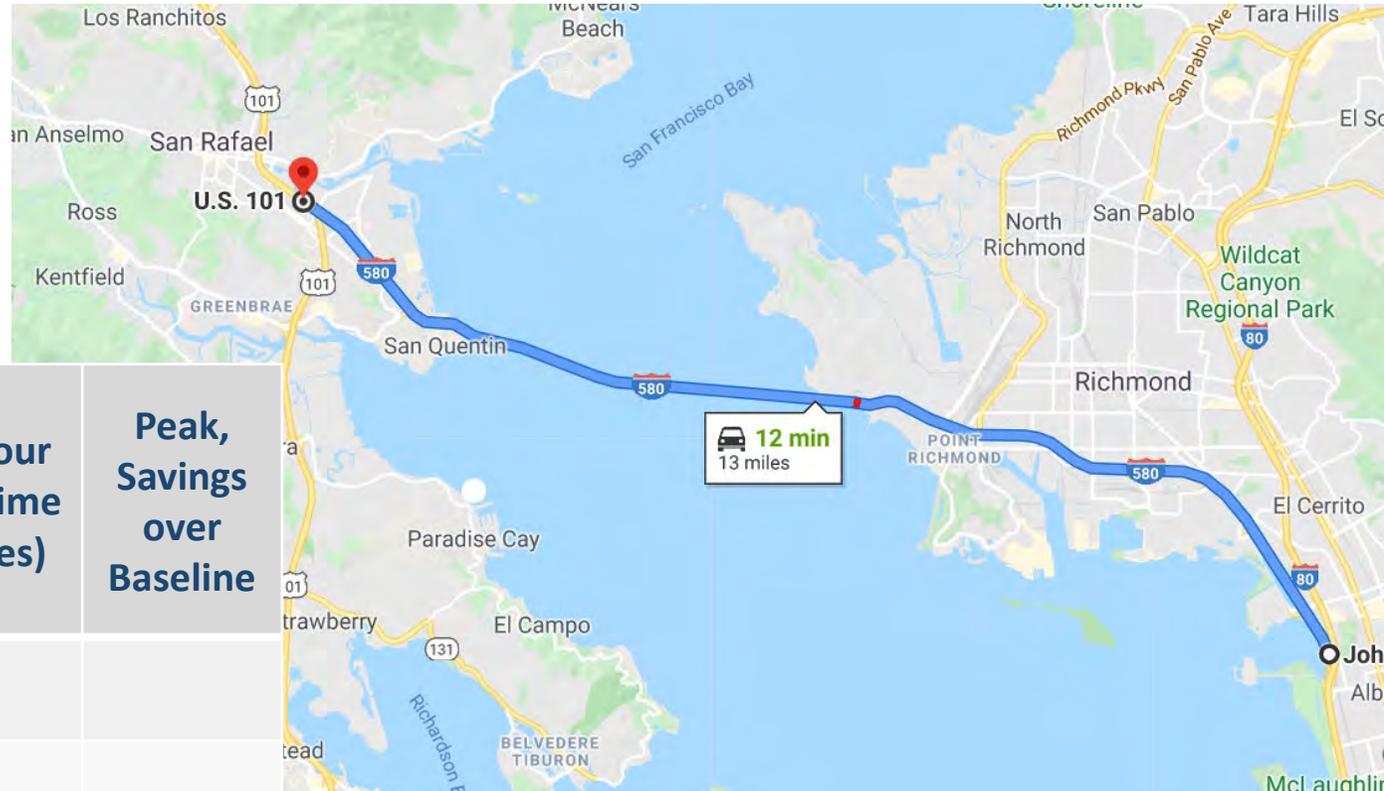
Of the traffic that comes across the bridge and continues to US 101

- **79%** of AM traffic continues north onto NB US 101
- **21%** of AM traffic continues south onto SB US 101
- *These numbers do not include traffic that exits to local roads*



WB THIRD LANE STUDY

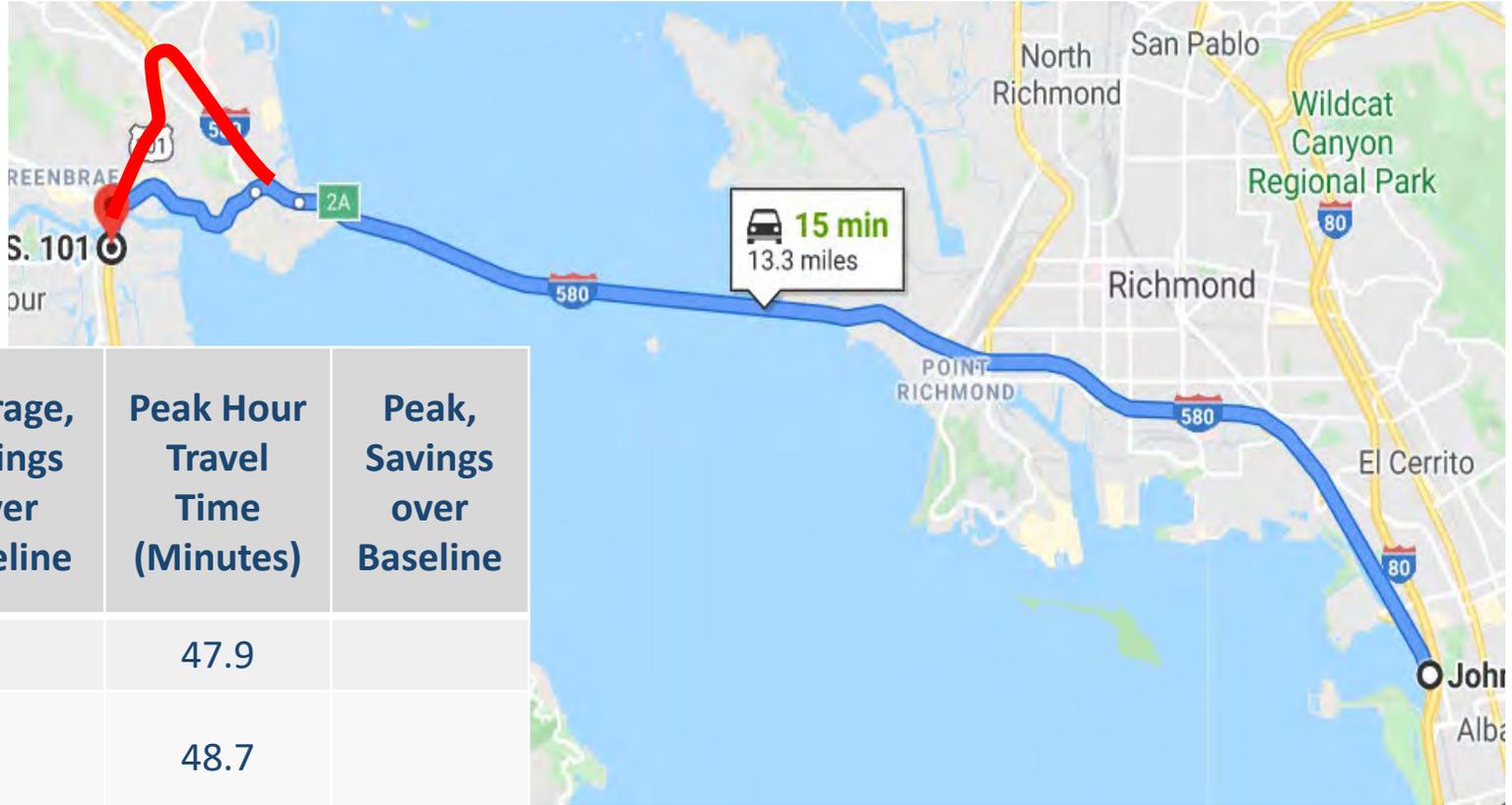
WB I-580 Travel Time: From I-80/I-580 Split to NB US 101 (Downtown San Rafael)



Scenario	Cost Est. (millions)	Average Travel Time Albany to 101 (Minutes)	Average, Savings over Baseline	Peak Hour Travel Time (Minutes)	Peak, Savings over Baseline
Existing (2019)	N/A	23.7		34.7	
Baseline (incl. RSR Forward)	BATA-funded	24.3		43.0	
Alt 1: Part time lane to SFD	\$70-90	22.7	7%	32.0	27%
Alt 2: Part time lane to DC	~\$310	19.2	21%	31.5	27%

WB THIRD LANE STUDY

WB I-580 Travel Time: From I-80/I-580 Split to SB US 101

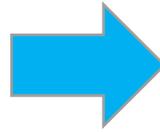


Scenario	Cost Est. (millions)	Average Travel Time Albany to 101 (Minutes)	Average, Savings over Baseline	Peak Hour Travel Time (Minutes)	Peak, Savings over Baseline
Existing (2019)	N/A	30.4		47.9	
Baseline (incl. RSR Forward)	BATA-funded	32.6		48.7	
Alt 1: Part time lane to SFD	\$70-90	35.5	<9%>	52.0	<6%>
Alt 2: Part time lane to DC	~\$310	20.6	37%	32.7	31%

WB THIRD LANE STUDY

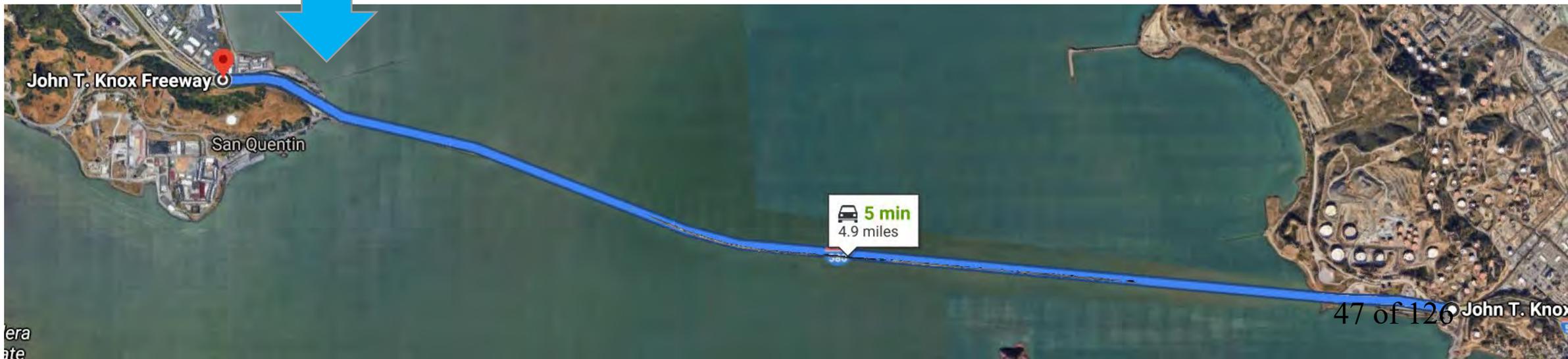
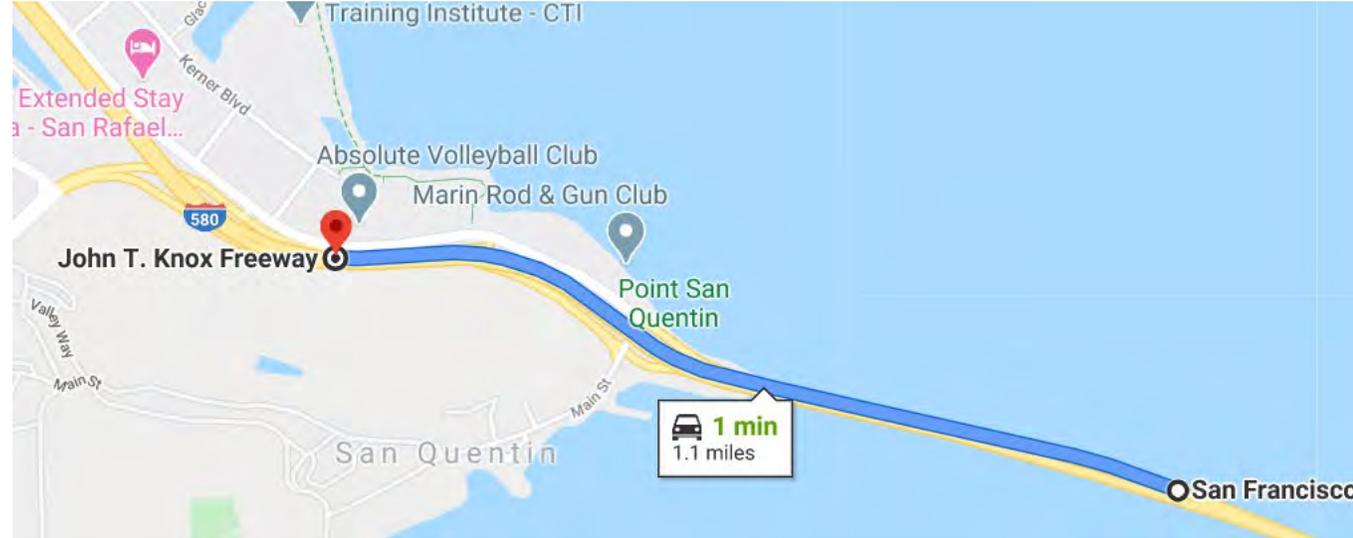
WB I-580 Maximum Queue Length at Sir Francis Drake

Existing: 0.8 Miles (7:45AM)



No Build 2025: 1.1 Miles (8:30AM)

Build Alternative 1: 4.9 Miles (9:15 AM)



WB THIRD LANE STUDY

Summary

- Peak period use lane on the upper deck would require significant new construction on the Marin County side.
- Direct access from Francisco Boulevard East/Morphew Street to Sir Francis Drake Boulevard would not be able to be maintained with the project.
- Traffic headed to northbound US 101 would have a peak hour time savings of 11 minutes with the project (Alt 1) in 2025.
- However, traffic headed to southbound US 101 would have an increased peak hour delay of 3 minutes with the project (Alt 1) in 2025.
 - Travel time savings only possible with construction of WB-SB Direct Connector.
- The Project may shift the congestion and bottlenecks from the toll plaza area to Sir Francis Drake Blvd.
- MTC/BATA has raised concerns that the PPU Lane will result in Induced Demand for vehicles WB on the Bridge, potentially in conflict with the goals of RSR Forward.

MARIN WATER PIPELINE



- Marin Municipal Water District (MMWD) is exploring a water pipeline on the RSR Bridge to mitigate for drought, with an aggressive operational schedule by Summer 2022.
- Caltrans is reviewing feasibility for pipeline on bridge, impacts are unknown at this time.
- MMWD is studying two options for a water pipeline on the RSRB including one in the multi-use path.
- Impacts of the multi-use path option are being evaluated, likely would preclude use of the right lane for any future vehicle lane.



SUMMARY

- **Asset Management Study** resulted in no immediate need for bridge replacement and identified need for retrofit/maintenance projects.
- **RSR Access Improvement Project Pilot** studies are ongoing and Final Report is expected in Summer 2024.
- **RSR Forward** near-term strategies to improve transportation demand management and relieve congestion on the westbound bridge approach.
- **Westbound 3rd Lane Study** shows improvement in peak hour travel time savings for some drivers/destinations, slightly worsens others; would require significant new construction in Marin. Cost to implement estimated at \$70-90M.
- **Marin Water** evaluating pipeline options across bridge in response to drought.



THANK YOU

