State Route 37 Ultimate Sea Level Rise Resilience Design Alternatives Assessment
Marin–Sonoma (US 101 – SR 121)

Appendix E: Transportation Technical Memorandum

February 2022
Introduction

State Route (SR) 37 is a critical east/west regional link serving four of the nine San Francisco Bay Area (Bay Area) counties (Marin, Sonoma, Napa, and Solano). It connects to major travel routes on the west side of the Bay Area (US 101) and east side (SR 29 and I-80). Previous studies for SR 37 have divided the corridor into three segments reflecting a change in the number of lanes as well as in the designation of the facility. West Reach between US 101 and SR 121 is a four-lane expressway (two lanes in each direction), Central Reach between SR 121 and the Mare Island interchange is a two-lane conventional highway, and East Reach between the Mare Island interchange and I-80 is a four-lane freeway. SR 37 serves both commute and recreational traffic and experiences high levels of traffic congestion on both weekdays and weekends primarily in the Central Reach (two-lane roadway section).

Based on sea level rise evaluations, portions of SR 37 are anticipated to become completely inundated by 2050, as well as increased flooding events along several sections of the corridor leading up to 2050. Inundation on SR 37 would divert traffic to other parallel routes (e.g., SR 12 and I-580) and roads serving those parallel routes (e.g., SR 29 and I-80) to complete their trips.

One main purpose of the SR 37 Design Alternatives Assessment (SR 37 DAA) is to identify new and existing roadway alignments that would preserve a critical regional link (for life safety access, goods, services and travel needs) that is resilient through extreme events (earthquakes, fire, king tides) and adaptive to sea level rise through year 2100 and beyond. It is anticipated that detailed transportation studies will be performed at a later date as part of the Caltrans’ project development process. For this initial study, the transportation evaluation focused primarily on the potential change in vehicle miles of travel (VMT) and the likely impact on traffic congestion from the various alternatives under consideration.
The intent of this preliminary transportation evaluation is to help identify alternatives that can be advanced for further study.

**Project Alternatives Description**

The full range of potential of roadway alignment alternatives under consideration for the Project\(^1\) are described briefly from US 101 to I-80 and include:

- Alternative 1: On-SR 37 Alignment (four-lane cross section)
- Alternative A2: Over-Bay Alignment (four-lane cross section)
- Alternative A3: Bahia/Atherton Alignment to On-SR 37 (four-lane cross section)
- Alternative A4: Burdell/Hog Island Alignment to On-SR 37 (four-lane cross section)
- Alternative A5: Mountain Burdell/Cougar Alignment and along Railroad (four-lane cross section)
- Alternative A6: Northern/Highway 12 Alignment (six-lane cross section)

One key consideration for this study is that a “do nothing” alternative is not under consideration because it would not meet the Project purpose to preserve a critical regional link. For the VMT and congestion

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\(^1\) Managed lanes are proposed to be a part of all the project alternatives. However, they are not explicitly considered in the transportation evaluation. Not considering the managed lanes in the transportation evaluation is not expected to favor one alternative over another since all of the project alternatives would include managed lanes. However, future transportation studies should consider the effect of the managed lanes on transportation system for the alternatives that advance for further study.
exercise, the alternatives are best described as lines on a map that provide the approximate start and end points, general roadway alignment, and travel distance. For this planning level evaluation, each project alternative is assumed to be able to accommodate the anticipated future travel demand. In cases when SR 12 would remain a viable east/west travel route the project alternative would provide a four-lane cross section; however, in the case where project alignment includes the existing SR 12 alignment (Alternative 6) a six-lane cross section may be necessary to serve the existing travel demand on SR 12 and the traffic that could divert from SR 37.

Available Traffic Data

The MTC regional travel demand model (Travel Model One) was initially considered as the primary source of traffic data. However, after closer inspection it was determined that the “off the shelf” regional travel demand model would not be suitable for this initial study without substantial additional modeling effort for the following reasons:

1. The base year model has not been locally calibrated/validated to the project area

2. The traffic analysis zone (TAZ) structure was not sufficiently disaggregated in some areas to fully capture the potential trip diversion that might occur with the project alternatives. As an example, the entire City of American Canyon is currently modeled by a single TAZ.

3. With the limited resources available for this initial study, the origin-destination (O-D) travel patterns on SR 37 from the model could not be verified to ensure that traffic on SR 37 was coming and going to the represent locations based on available O-D data.

When this project advances for further study it is recommended that MTC’s regional travel demand model be reconsidered as a primary source for traffic data by providing additional resources to address the three main issues raised above.

As part of this study, the following traffic data was readily available:

1. **SR 37 Travel Behavior & Transit Feasibility (May 2019)** – This study provides detailed O-D data for SR 37 and was prepared for NVTA, TAM, STA, and SCTA to understand the demand and propensity to use transit and non-single occupant vehicles options on SR 37 to relieve congestion and address equity concerns. The O-D data was used for the SR 37 DAA.

2. Performance Measurement System (PeMS) 2019 daily traffic count on SR 37 east of SR 121. This data was used to be representative of the existing (2019) average daily traffic (ADT) volume on SR 37.
SR 37 Segment B PSR/PDS (December 2018) – This study presents two ultimate concepts to widen the existing two-lane section of SR 37 (SR 121 to Mare Island interchange) to four lanes\(^2\) and addresses sea level rise for this segment of SR 37. The study also provides initial traffic forecasts for the SR 37 corridor and indicates that SR 37 will have an average annual growth rate of about 0.8% per year. The growth rate information was used to estimate a year 2040 ADT volume for SR 37.

\(^2\) The new travel lanes are proposed to be managed lanes to incentivize mode shift from single occupant vehicles.
Vehicle Miles Traveled Evaluation

VMT is comprised of two variables: the number of vehicles and the distance those vehicles travel. When the two variables are multiplied together the result is VMT. For this planning-level study, a relatively straightforward VMT estimation method was employed based on readily available data. For future studies, it is recommended that the MTC regional travel demand model be considered to estimate VMT (after addressing the issues presented earlier) as the model would better capture the changes in trip generation, trip distribution, mode choice, and route choice that would result from the project alternatives. For this reason, the results and findings presented in this section should be considered rough approximations and preliminary.

The year 2040 ADT volume on SR 37 was estimated based on the existing ADT traffic volume and projected average annual growth rate. The existing ADT volume is 37,500 while the projected 2040 ADT volume is 44,000.

The available O-D data on SR 37 was ranked to identify the top ten O-D pairs that currently use the SR 37 corridor. The top ten O-D pairs represent about 34% of all travel on SR 37. For each of the top ten O-D pairs the travel distance was estimated based on available internet mapping tools using the conceptual roadway alignments developed for each of the project alternatives. Table 1 presents the change in VMT compared to a No Build scenario that assumes SR 37 remains “As-Is”.³

In addition, another No Build scenario was tested assuming that SR 37 has been inundated and about 44,000 daily vehicles that would need to divert to other roadways to complete their trip. The out of direction travel is anticipated to increase VMT for the top ten O-D pairs by about 19%. Alternative 1, which uses the existing SR 37 roadway alignment, would not result in any change to VMT for the top ten O-D pairs.⁴ The only alternative that would potentially reduce VMT (-2%) is Alternative 2 (Over Bay Alignment). Alternatives 3, 4, 5, 6 are all anticipated to increase VMT by different amounts with Alternative 3 (Bahia/Atherton Alignment) increasing VMT the least (1%) and Alternative 6 (Northern/Highway 12 Alignment) increasing VMT the most (12%).

Per recent changes in the California Environmental Quality Act (CEQA), VMT is the new transportation metric for determining project impacts for CEQA: the metric was previously vehicle delay and level of

³ For the purposes of this study, SR 37 “As-Is” assumes that the existing two-lane section of SR 37 has been widened to four lanes resulting in a four-lane cross section for the entire SR 37 corridor (US 101 to I-80).

⁴ From a traffic operations perspective Alternative 1 and SR 37 “As-Is” are nearly identical. The primary differences are that Alternative 1 would convert one of the existing general-purpose lanes in Segment A to a managed lane and Alternative 1 would address sea level rise for the entire SR 37 corridor (the SR 37 Segment B PSR/PDS addresses sea level rise for only Segment B).
service (LOS). The SR 37 DAA is considering changes to VMT as one of several criteria to help identify project alternatives to advance for further study.

### Roadway Traffic Congestion

While vehicle LOS is no longer considered a transportation metric for CEQA, roadway traffic congestion still plays a critical role in decision making for transportation projects for a couple of reasons including its direct impact on the quality of life for a majority of roadway users (i.e., drivers) and its effect on greenhouse gas (GHG) emissions. While several models exist to estimate GHG emissions from transportation projects, two common model inputs are VMT and travel speeds. Assuming VMT remains unchanged, increased traffic congestion results in lower travel speeds which in turn increases GHG emissions.

A detailed traffic operations study was not performed for the SR 37 DAA. However, a qualitative assessment was performed to determine where traffic congestion is likely to worsen as a result of each project alternative. The qualitative assessment primarily focused on a few major travel routes including SR 12, SR 116, I-580, I-80, and SR 29. **Table 2** presents the likely effect on traffic congestion (lessen, no change, worsen) compared to a No Build scenario that assumes SR 37 remains “As-Is”. This is a subjective evaluation based on a “best guess” estimate of how travel would change as a result of each project alternative. In future studies it is recommended that the MTC regional travel demand model be considered to estimate travel speeds (after addressing the issues presented earlier) as the model would better capture the redistribution of traffic and take into consideration roadway capacity.

Figure 2 illustrates the alternative alignments evaluated and transportation corridors that are likely to be affected with each alternative.
As shown in Table 2, under a No Build scenario that assumes SR 37 has been inundated the high amount of traffic diversion (44,000 daily vehicles) would undoubtedly worsen traffic congestion on nearby roadways. Alternatives 1 and 2 are not anticipated to result in traffic diversion and are unlikely to worsen traffic congestion on nearby roadways. Alternatives 3, 4, 5, and 6 are likely worsen traffic congestion on I-580 and I-80. This can be attributed to travel between a few O-D pairs (e.g., Vallejo/San Rafael and Vallejo/Larkspur) that might find it more convenient to use I-580 and I-80 due to a shorter travel distance and potentially lower travel time. From all of the project alternatives considered, Alternative 6 would likely worsen traffic congestion on the most nearby roadways.

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5 Travel time is likely to be the largest factor in route selection for all of the alternatives. Travel time will vary significantly by time of day due to congestion and for this reason the preferred travel route between O-D pairs could also vary throughout the day. Determining travel times by time of day between O-D pairs is outside the scope of this study but should be considered in future studies as travel times will determine route selection and ultimately determine the impacts to VMT and congestion from the project alternatives.
<table>
<thead>
<tr>
<th>O-D Pair Rank</th>
<th>Vehicle Trips Between</th>
<th>Daily</th>
<th>No Build</th>
<th>Inundated</th>
<th>On-Alignment</th>
<th>Over Bay Alignment</th>
<th>Bahia / Atherton Alignment</th>
<th>Burdell / Hog Island Alignment</th>
<th>Mtn Burdell / Cougar Alignment</th>
<th>Northern / Hwy 12 Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Vallejo - Novato</td>
<td>6.4%</td>
<td>2816</td>
<td>21.9</td>
<td>61670</td>
<td>4.8%</td>
<td>40.8</td>
<td>21.9</td>
<td>61670</td>
<td>0%</td>
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<tr>
<td>2</td>
<td>Fairfield - Novato</td>
<td>6.3%</td>
<td>2780</td>
<td>36.9</td>
<td>102591</td>
<td>46.6</td>
<td>135120</td>
<td>32%</td>
<td>36.9</td>
<td>102591</td>
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<tr>
<td>3</td>
<td>Vallejo - Petaluma</td>
<td>4.3%</td>
<td>1878</td>
<td>26.5</td>
<td>49774</td>
<td>34.3</td>
<td>64424</td>
<td>29%</td>
<td>26.5</td>
<td>49774</td>
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<tr>
<td>4</td>
<td>Vallejo - San Rafael</td>
<td>3.8%</td>
<td>1658</td>
<td>28.1</td>
<td>46597</td>
<td>29.1</td>
<td>48172</td>
<td>3%</td>
<td>28.1</td>
<td>46597</td>
</tr>
<tr>
<td>5</td>
<td>I-80 East - Santa Rosa</td>
<td>2.7%</td>
<td>1202</td>
<td>76.0</td>
<td>91333</td>
<td>73.0</td>
<td>87728</td>
<td>-4%</td>
<td>76.0</td>
<td>91333</td>
</tr>
<tr>
<td>6</td>
<td>Fairfield - San Rafael</td>
<td>2.7%</td>
<td>1174</td>
<td>43.1</td>
<td>50610</td>
<td>44.0</td>
<td>51608</td>
<td>2%</td>
<td>43.1</td>
<td>50610</td>
</tr>
<tr>
<td>7</td>
<td>Vallejo - Larkspur / Corte Madera</td>
<td>2.4%</td>
<td>1048</td>
<td>31.8</td>
<td>33318</td>
<td>29.2</td>
<td>30594</td>
<td>-8%</td>
<td>31.8</td>
<td>33318</td>
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<tr>
<td>8</td>
<td>I-80 East - Novato</td>
<td>2.4%</td>
<td>1051</td>
<td>55.8</td>
<td>58618</td>
<td>67.4</td>
<td>70804</td>
<td>21%</td>
<td>55.8</td>
<td>58618</td>
</tr>
<tr>
<td>9</td>
<td>Fairfield - Sonoma County</td>
<td>1.7%</td>
<td>734</td>
<td>84.6</td>
<td>62118</td>
<td>82.1</td>
<td>60282</td>
<td>-3%</td>
<td>84.6</td>
<td>62118</td>
</tr>
<tr>
<td>10</td>
<td>Benicia - Santa Rosa</td>
<td>1.1%</td>
<td>490</td>
<td>52.6</td>
<td>25748</td>
<td>57.9</td>
<td>28342</td>
<td>10%</td>
<td>52.6</td>
<td>25748</td>
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<tr>
<td>Other</td>
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<td>66.3%</td>
<td>29169</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.0%</td>
<td>44000</td>
<td></td>
<td>582377</td>
<td>691826</td>
<td>19%</td>
<td>582377</td>
<td>0%</td>
<td>568639</td>
</tr>
</tbody>
</table>

**Notes:**
- The table shows the percentage change in Vehicle Miles Traveled (VMT) compared to the As-Is scenario for different O-D pairs in Year 2040.
- Travel time for this specific O-D pair would result in traffic to shift to the Richmond-San Rafael Bridge (via either Richmond Parkway or I-80/I-580) instead of using Project Alternative.

**Source:** BTC

**Date:** September 10, 2021
### Table 2 - Traffic Congestion Change Compared to SR 37 As-Is

<table>
<thead>
<tr>
<th>Location</th>
<th>From</th>
<th>To</th>
<th>No Build</th>
<th>On-Alinement</th>
<th>Over Bay Alignment</th>
<th>Bahia / Atherton Alignment</th>
<th>Burdell / Hog Island Alignment</th>
<th>Mtn Burdell / Cougar Alignment</th>
<th>Northern / Hwy 12 Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 12</td>
<td>SR 29</td>
<td>I-80</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>Worsen</td>
<td>Worsen</td>
</tr>
<tr>
<td>SR 12</td>
<td>SR 121</td>
<td>SR 29</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>Lessen</td>
<td>Worsen</td>
</tr>
<tr>
<td>SR 12</td>
<td>SR 116</td>
<td>SR 121</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>Lessen</td>
<td>N/A</td>
</tr>
<tr>
<td>I-580</td>
<td>RSR Bridge</td>
<td>I-80</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>Worsen</td>
<td>Worsen</td>
<td>Worsen</td>
<td>Worsen</td>
</tr>
<tr>
<td>I-80</td>
<td>SR 37</td>
<td>I-580</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>Worsen</td>
<td>Worsen</td>
<td>Worsen</td>
<td>Worsen</td>
</tr>
<tr>
<td>SR 29</td>
<td>SR 37</td>
<td>SR 12</td>
<td>Worsen</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>Worsen</td>
<td>Worsen</td>
</tr>
</tbody>
</table>

**N/A** - Alternative uses existing roadway alignment.