ALAMEDA County Transportation Commission

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DATE:	November 12, 2024
SUBJECT:	I-580 Transit and Multimodal Strategy – Evaluation Scenario Performance Analysis and Cost Estimates

Introduction

The I-580 Transit and Multimodal Strategy (I-580 TAMS) is a targeted planning effort to identify and phase a Corridor Strategy consisting of a set of transportation investments that work together to sustainably and equitably reduce VMT, enhance safety, and improve air quality while supporting land use and economic development in the corridor. This memorandum describes the analysis process used to assess the I-580 TAMS Evaluation Scenario based on a subset of the performance measures listed in **Appendix A**.

Analysis and cost estimates presented in this memorandum represent planning-level assumptions and values for a modeled future evaluation scenario. This analysis, along with stakeholder input helped define the I-580 TAMS Corridor Strategy recommendations, which may vary from what was evaluated and are documented in the I-580 TAMS Comprehensive Multimodal Corridor Plan. Recommendations in the corridor plan will move forward on specific timelines with evaluation and cost estimates subject to change through the development process.

Organization of this Memorandum

The I-580 TAMS includes a variety of corridor transportation projects including roadway projects, transit projects, and bicycle and pedestrian projects. The I-580 TAMS goals come from goals in the countywide transportation system, as defined in the Alameda County 2020 Countywide Transportation Plan (CTP), together with regional and state policy objectives for Comprehensive Multimodal Corridor Plan (CMCP) development.

The main goals of the plan are shown in **Table 1**.

Table 1. I-580 TAMS Goals and Objectives

Goals	**Objectives**
Improve sustainability	Reduce vehicle miles traveled (VMT) Reduce greenhouse gas (GHG) emissions
Improve health & safety	Reduce criteria pollutants Reduce the number and severity of collisions
Improve accessibility	Improve job access Increase availability of affordable alternatives to driving alone
Enhance travel reliability and efficiency	Improve travel time reliability Improve transit on-time performance Increase corridor person throughput
Strengthen economic vitality	Increase employment access Improve the efficiency of goods movement
Support efficient land use & existing communities	Promote multimodal travel that supports efficient land use Support placemaking and existing communities
Advance equity in planning process & outcomes	Increase accessibility in equity priority communities Improve safety in equity priority communities Improve mobility in equity priority communities Reduce environmental burdens in equity priority communities

The following specific performance measures were selected to assess the I-580 TAMS Evaluation Scenario and define the I-580 TAMS Corridor Strategy:

1. VMT – does the Corridor Strategy reduce VMT in the corridor?
2. Mode Share – does the Corridor Strategy increase non-automobile mode share?
3. Travel Time – does the Corridor Strategy decrease peak period travel times between key origin-destination pairs?[1]
4. Throughput – does the Corridor Strategy increase the number of travelers moving through the corridor at key screenlines during peak periods?
5. Accessibility – does the Corridor Strategy improve multimodal access, including first/last-mile access to transit?

[1] Travel times were not assessed as part of the evaluation, since travel demand models are limited in their ability to assess freeway travel dynamics at a level of accuracy and detail sufficient to forecast operational impacts to travel time, queuing, and delay.

6. Equitable Benefits – does the Corridor Strategy benefit residents of equity communities in the study area?
7. Health/Sustainability – does the Corridor Strategy improve air quality and decrease pollutants?

The following pages of this document describe the overarching methodology and analysis tools, scenario definitions, and the analysis of each transportation metric, addressing the following topics:

- Data Sources
- Methodology
- Evaluation
- Key Takeaways

Evaluation Scenario Performance

Evaluation Methodology

Analysis Tools

The Alameda-Contra Costa (AlaCC) Travel Demand Model and TravelAccess+ tool were used for evaluating the metrics described in this memorandum.

The AlaCC Travel Demand Model is an activity-based model (ABM) that simulates individual persons and their activities, travel choices, and trips throughout an entire simulated weekday. The AlaCC Model is based on MTC's Travel Model 1.5 (TM 1.5) and is validated against pre-COVID year 2020 data. It incorporates land use and transportation network assumptions consistent with MTC's Plan Bay Area 2050, the current regional transportation plan at the time of model development. The AlaCC Model includes base year 2020 and horizon year 2035 and 2050 scenarios. While the model base year is 2020, it was validated against 2019 data to reflect pre-COVID conditions. It covers the nine county Bay Area, plus San Joaquin County. A beta version of the model was used for this analysis, with the official release of the model expected for Spring 2025.

The AlaCC Model is a macroscopic travel demand model, that does not account for freeway travel dynamics at a level of accuracy and detail sufficient to forecast operational level of impacts such as segment level travel time, queueing and delays. A freeway operations model is required to further assess the Final Corridor Strategy recommendations for the I-580 mainline: General Purpose Lanes to Busway Conversion and General Purpose Lane to Express Lanes Conversion to understand the impacts on freeway performance.

TravelAccess+ is a GIS-based tool that calculates the area accessible from a given set of points within a fixed amount of time, using a particular mode (walking, biking, driving, or transit). It uses a network from Open Street Map (OSM) as input and calculates travel time for each mode based on roadway characteristics such as number of lanes, posted speed limit, and bike facility type (if any). Given a set of points, the tool will generate travel sheds that meet a set of travel time thresholds which can then be used to quantify the accessible land use, such as the number of jobs or community destinations accessible within a certain travel shed.

Analysis Scenarios

Three scenarios were analyzed using the AlaCC Model to assess the impacts and benefits of the proposed investments and to define the I-580 TAMS Final Corridor Strategy[2]. The three scenarios are as follows:

1. **Year 2020** – This scenario utilizes pre-COVID 2020 land use and transportation network inputs (i.e., existing conditions) from the AlaCC Model that are consistent with MTC's year 2020 model from Plan Bay Area 2050.
2. **Comparison Scenario** – This scenario represents 2035 land use conditions and the resumption of pre-pandemic transit service as it existed in 2015. Within the study area (see **Figure 1**), it assumes no modifications to the transportation system beyond the construction of projects that have already been fully funded. Outside the study area, the Comparison Scenario is consistent with transportation projects and policies included in Plan Bay Area 2050 (PBA 2050) for the 2035 network year. Projects and policies included in PBA 2050 that would make it difficult to assess the contribution of elements included in the Evaluation Scenario towards meeting I-580 TAMS goals are

[2] A fourth model run with a Sensitivity Scenario was used to quantify model uncertainty and generate ranges and margins of error for the metrics used in assessing the Evaluation Scenario. This scenario is identical to the Comparison Scenario, with the addition of 1) doubling of transit frequencies in Sonoma County and non-BART serving VTA routes, and 2) adding an additional travel lane to SR116 and SR152. These changes are all far enough away from the I-580 corridor that we expect the compound effects of these changes to be negligible on the metrics generated inside the study, and any quantifiable changes in these metrics compared to those from the Comparison Scenario are attributable to model uncertainty or inherent randomness. While the results from the Sensitivity Scenario are not included in this memorandum, they were used to determine whether each calculated metric produced conclusive results, as shown on the tables included in the metrics results section of this memorandum. More details on how the Sensitivity Scenario was used are found in **Appendix B.**

excluded from the Comparison Scenario, including per-mile tolling, congestion pricing to San Francisco and Treasure Island, and BART service improvements. A full detail of projects included in this scenario is shown in **Table 2**.

3. **Evaluation Scenario** – This scenario builds onto the Comparison Scenario and includes the elements that are under evaluation to be included in the I-580 TAMS Final Corridor Strategy. A full detail of projects included in this scenario is shown in **Table 2**.

For the purposes of this analysis, the Evaluation Scenario is compared against the Comparison Scenario to quantify the effectiveness of the proposed major investments with respect to the performance measures. The Year 2020 metrics are shown for reference. There are four main scales of analysis for the performance measures:

- Study area – model Traffic Analysis Zones (TAZ) within a half-mile buffer around the I-580 corridor, as shown in see **Figure 1**.
- Study subareas – the study area is subdivided into four subareas for higher granularity, as shown in **Figure 1**.
- Study area Equity Priority Communities (EPC) and Priority Development Areas (PDA) – EPC and PDA within a half mile buffer of I-580
- Analysis screenlines – imaginary lines drawn across the corridor that represent the primary corridor transportation facilities at a given location, including freeways, bus routes, and rail lines.

The analysis considers the following screenline locations, shown in **Figure 2.**

I-580 screenlines

- Subarea 1
  - I-80 to I-980/SR 24
  - I-980/SR 24 to SR 13
  - SR 13 to Lake Chabot Road/Estudillo Avenue
  - Estudillo Avenue to I-238
- Subarea 2
  - I-238 to East Castro Valley Boulevard
  - East Castro Valley Boulevard to I-680
- Subarea 3
  - I-680 to SR 84
- Subarea 4
  - North Vasco Road to SR 205

Parallel road screenlines

- Subarea 1
    - MacArthur Boulevard
    - East 14th Street
- Subarea 2
    - Castro Valley Boulevard/Dublin Canyon Road
- Subarea 3
    - Dublin Boulevard
    - Stoneridge Drive/West Jack London Boulevard
- Subarea 4
    - Altamont Pass Road

Figure 1. Study Area TAZs by Subarea

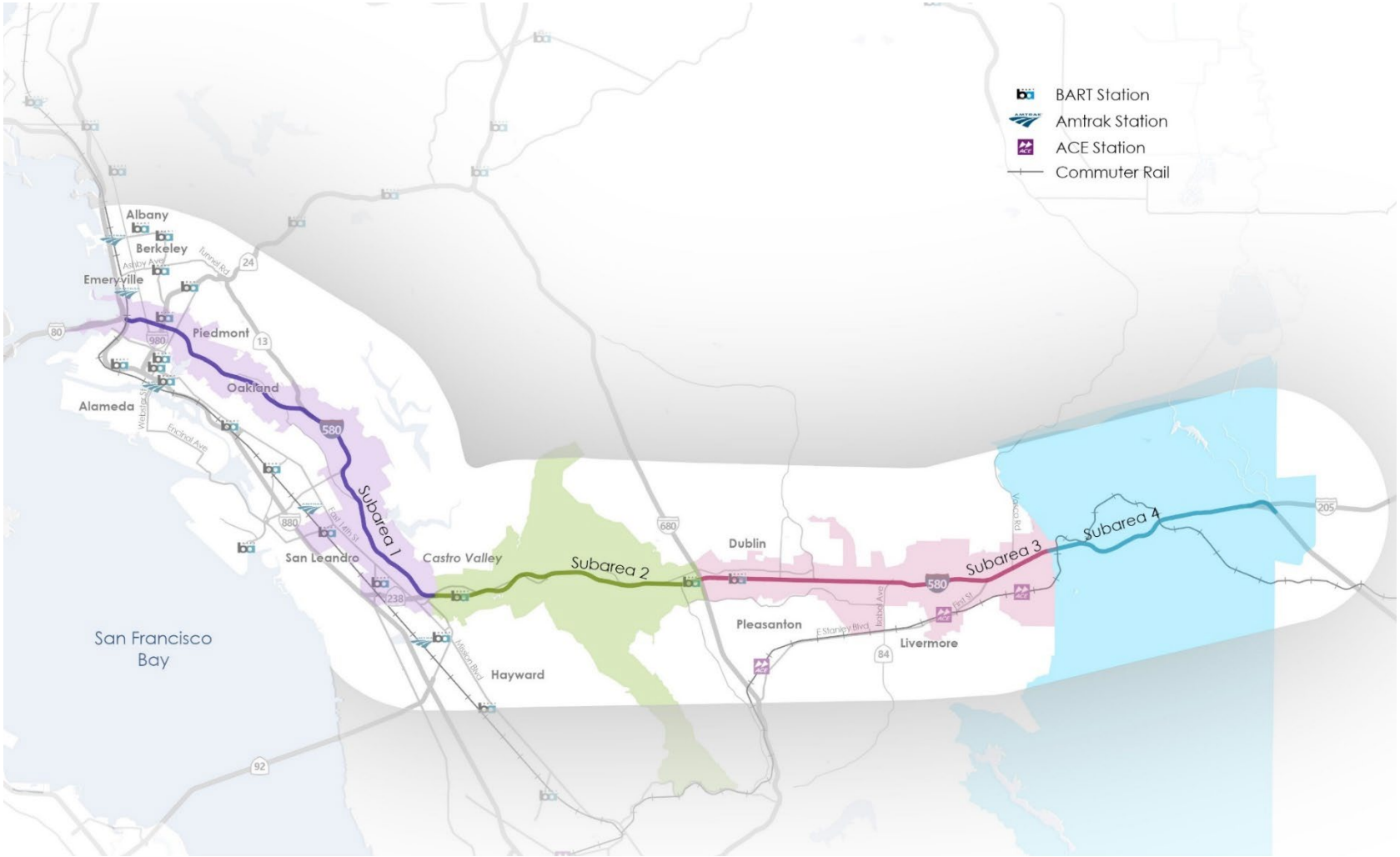
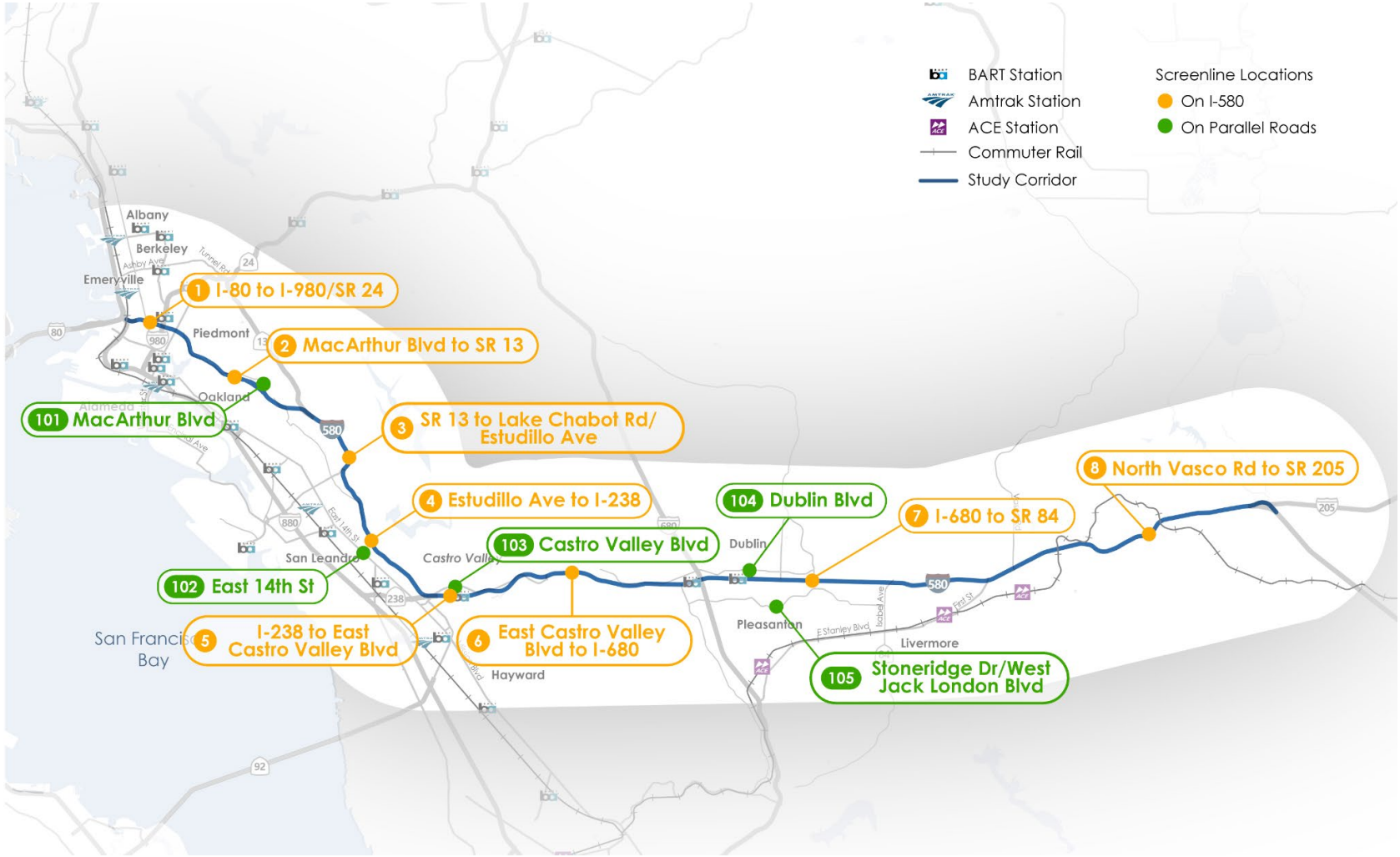


Figure 2. Analysis Screenlines[3]



[3] Altamont Pass Road was used as a proxy for parallel screenline #8, although sections of this segment are not within the study area.

Table 2. Projects and policies evaluated by scenario

Project Type	Project Description
Comparison Scenario (Relative to 2020 baseline)	
Land Use	• Increased commercial and residential density in growth areas per PBA 2050 Build scenario land use
Transit Service	• Study Area: Frequency upgrades (5–10-minute peak headways along routes 72/72M/72R, 18, 51A/B, 6, 20/21, 97, 99, Tempo BRT, F-local and F-Transbay). Service changes or upgrades on lines NL, 40 and 57 are excluded. • Countywide (Outside of Study Area): New rapid bus service; improved bus stops and stations; new/improved transit signal priority (including on street and on-bus equipment); transit priority infrastructure; dedicated bus lanes; queue jumps; and frequency upgrades (5–12-minute peak headways on routes 18, 20/21 and 97)
Mainline	• General Purpose Lane to HOV lane conversion westbound between Bay Bridge and I-980 • General Purpose Lane to express lane conversion on I-205 between I-580 and I-5
Local Roadway Improvements	• Dublin Boulevard Extension
Evaluation Scenario and Final Corridor Strategy (inclusive of Comparison Scenario)	
Transit Policy/ Program	• Regional fare integration and means-based fares and tolls: integrated transit fare (trips exclusively on local bus and/or light rail use a flat fare, and all other trips use a distance-based fare)and 50% fare and toll subsidy to users in lowest income quartile.
Mainline	• General Purpose Lane to HOT lane conversion between Keller Avenue and I-238, between I-238 and I-680, and between Greenville Road and San Joaquin county line • General Purpose Lane to Busway lane conversion between I-980 and SR 13 to just east of 35th Avenue with stations at Grand Avenue, 14th Avenue/Park Avenue, Fruitvale Avenue and 35th Avenue
Transit Service	• New Transbay bus routes, including 98th Avenue, 14th Avenue, Seminary Avenue, Fruitvale Avenue, High Street, Park Boulevard/5th Avenue, MacArthur Boulevard/35th Avenue/Redwood Road • New Intra-Oakland bus route • New express bus route between Castro Valley BART and 19th Street BART • NL removed from operation • All day 15-to-20-minute frequency upgrades on Transbay routes serving the study area

Project Type	Project Description
	• Transit signal priority on local streets used by Transbay routes serving I-580 • 2020 CTP projects: West Grand Avenue and Mission Boulevard bus-only lanes, San Pablo Avenue Corridor Project, Foothill Boulevard Corridor Improvement (Phase 1), Fruitvale Avenue Corridor Short-Term Improvements, Shattuck Avenue/Martin Luther King Jr Way Corridor Short Term Improvements, Broadway bus speed improvements between 51st Street and West Grand Avenue • Extend LAVTA line 30R off of freeway and connect to rail stations, maintaining existing service
Local Roadway Improvements	• Improved bus access to highway by providing an eastbound lane on MacArthur Boulevard between Fairmount Avenue and Harrison Street. Improved bus speed and reliability by adding an eastbound bus only lane between Grand Avenue and Lakeshore Avenue.
Ramp Modifications	• Signalization of Broadway/I-580 EB off-ramp intersection • Slip lane removal at Webster Street/I-580 EB off-ramp intersection • Removal of West Grand Avenue WB off-ramp, Dimond Avenue WB on-ramp and Excelsior Avenue WB on-ramp
Park and ride Facilities	• Caltrans ROW on Broadway under I-580 • Dutton Avenue/MacArthur Boulevard (San Leandro) • Under I-580 at Buell Street (Caltrans)
Station Access	• Station access improvements (reduced walk access time) to MacArthur, San Leandro, Bay Fair and Castro Valley, West Dublin/Pleasanton and Dublin/Pleasanton BART, and Livermore and Vasco ACE
Rail Service Improvements	• Valley Link initial Operating Segment (IOS) service with stations at Dublin/Pleasanton, Isabel, Southfront Road and Mountain House Community. • Four new daily round trips for ACE service
Mobility Hub	• Tri Valley Mobility Hub modeled as zero-minute transfers between BART, Valley Link and connecting bus service at Dublin/Pleasanton station

Source: Fehr & Peers, 2024

VMT – Does the Corridor Strategy reduce VMT in the corridor?

Vehicle Miles Traveled (VMT) is a land use efficiency metric that can be used to express the relationship between land use and transportation systems. One VMT represents one vehicle traveling one mile. VMT is directly related to the total number of vehicle trips and the total miles traveled by each vehicle trip. Changes in VMT can stem from a change in total number of vehicle trips, and/or changes in trip distance. Given the direct relationship between VMT and land use, this section will also describe the expected land use growth in the study area.

Data Sources

The AlaCC travel demand model was used to estimate total trips, network VMT, and VMT per service population for all analysis scenarios.

Methodology

Population and VMT by vehicle type (personal vs commercial) were extracted from the AlaCC travel demand model to estimate network VMT and VMT per service population. These metrics were extracted for a range of geographic scales, including the county, study area, the study subareas, the I-580 mainline and parallel roads. The formulas listed below show the metrics at the study area level for simplicity, but similar calculations were done for the different geographic scales of analysis.

Daily Network VMT

$$Daily\ Network\ VMT = Total\ Study\ Area\ Link\ Level\ Volumes * Study\ Area\ Link\ Distance$$

Residential VMT per Resident

$$All\ VMT\ per\ Resident = \frac{Total\ VMT\ generated\ by\ study\ area\ residents}{Total\ study\ area\ residents}$$

All VMT per Worker

$$All\ VMT\ per\ Worker = \frac{Total\ VMT\ generated\ by\ study\ area\ workers}{Total\ study\ area\ workers}$$

Evaluation

Table 3 shows the 2020 and 2035 study area land use per the model. **Table 4** through **Table 7** show VMT metrics for personal vehicles, and **Table 8** and **Table 9** show VMT metrics for commercial vehicles.

Note that throughout this memo, summary tables will include a Result column with some values shown as "no change" and some values shown as "inconclusive". More details for how these designations were assigned can be found in **Appendix B**.

Table 3. Households, Population and Employment in the Study Area

Study Area Data	Year 2020	Year 2035	Percent Change (2020 vs 2035)
Households	149,000	196,100	32%
Population	382,500	473,700	24%
Employment	218,100	244,200	12%

Source: Fehr & Peers, 2024

Table 4. Total Daily Personal Vehicle Trips Starting or Ending in Select Geography

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	6,483,000	7,662,000	7,649,000	-0.2%	inconclusive
Study Area	2,181,000	2,660,000	2,651,000	-0.3%	inconclusive
Subarea 1	1,377,000	1,617,000	1,613,000	-0.2%	reduced trips
Subarea 2	1,039,000	1,234,000	1,234,000	0.0%	inconclusive
Subarea 3	1,168,000	1,466,000	1,461,000	-0.3%	inconclusive
Subarea 4	860,000	1,026,000	1,025,000	-0.1%	inconclusive
PDA (study area)	1,114,000	1,507,000	1,503,000	-0.3%	reduced trips
EPC (study area)	848,000	1,020,000	1,019,000	-0.1%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 5. Daily Network VMT Generated by Personal Vehicles

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	34,762,000	39,667,000	39,582,000	-0.2%	reduced VMT
Study Area	10,577,000	12,308,000	12,200,000	-0.9%	reduced VMT
Subarea 1 (I-580)	1,800,000	2,044,000	1,997,000	-2.3%	reduced VMT

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Subarea 2 (I-580)	1,421,000	1,634,000	1,627,000	-0.4%	inconclusive
Subarea 3 (I-580)	2,008,000	2,446,000	2,420,000	-1.1%	reduced VMT
Subarea 4 (I-580)	1,268,000	1,520,000	1,503,000	-1.1%	reduced VMT
Subarea 1 (parallel, MacArthur Boulevard & East 14th St)	142,000	106,000	107,000	0.9%	inconclusive
Subarea 2 (parallel, Castro Valley)	24,000	19,000	19,000	0.0%	no change
Subarea 3 (parallel, Dublin Boulevard & Stoneridge Dr)	127,000	113,000	110,000	-2.7%	reduced VMT
Subarea 4 (parallel, Altamont Pass Road)	384,000	430,000	428,000	-0.5%	inconclusive
EPC	2,275,000	2,623,000	2,590,000	-1.3%	reduced VMT
PDA	3,351,000	3,903,000	3,858,000	-1.2%	reduced VMT

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 6. All VMT per Residents

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	14.6	12.6	12.5	-0.8%	inconclusive
Study Area	14.1	13.0	12.8	-1.5%	reduced VMT
Subarea 1	12.0	10.3	10.2	-1.0%	inconclusive
Subarea 2	19.0	18.0	17.9	-0.6%	inconclusive
Subarea 3	18.4	18.5	17.7	-4.3%	reduced VMT
Subarea 4	35.5	40.6	38.6	-4.9%	inconclusive
EPC	10.6	8.4	8.3	-1.2%	inconclusive
PDA	11.5	9.3	9.2	-1.1%	inconclusive

Source: Fehr & Peers, 2024

Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 7. All VMT per Workers

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	26.6	22.0	22.0	0.0%	no change
Study Area	28.0	21.9	21.9	0.0%	no change
Subarea 1	24.1	20.3	20.3	0.0%	no change
Subarea 2	30.0	23.0	22.7	-1.3%	inconclusive
Subarea 3	33.3	23.9	23.7	-0.8%	inconclusive
Subarea 4	37.5	35.0	34.2	-2.3%	inconclusive
EPC	21.2	18.8	18.7	-0.5%	inconclusive
PDA	26.6	22.0	22.0	0.0%	no change

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 8. Total Daily Commercial Vehicle Trips Starting or Ending in Select Geography

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	779,000	851,000	851,000	0.0%	no change
Study Area	245,000	277,000	277,000	0.0%	no change
Subarea 1	140,000	164,000	164,000	0.0%	no change
Subarea 2	38,000	41,000	42,000	2.4%	inconclusive
Subarea 3	76,000	81,000	81,000	0.0%	no change
Subarea 4	5,000	7,000	7,000	0.0%	no change
PDA (study area)	121,000	148,000	148,000	0.0%	no change
EPC (study area)	78,000	97,000	97,000	0.0%	no change

Source: Fehr & Peers, 2024
Notes:

1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 9. Daily Network VMT Generated by Commercial Vehicles

Geography	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	6,347,000	5,737,000	5,724,000	-0.2%	reduced VMT
Study Area	1,535,000	1,445,000	1,420,000	-1.7%	reduced VMT
Subarea 1 (I-580)	263,000	247,000	230,000	-6.9%	reduced VMT
Subarea 2 (I-580)	190,000	163,000	161,000	-1.2%	inconclusive
Subarea 3 (I-580)	301,000	285,000	283,000	-0.7%	inconclusive
Subarea 4 (I-580)	135,000	134,000	130,000	-3.0%	reduced VMT
Subarea 1 (parallel, MacArthur Boulevard & East 14th St)	21,000	15,000	15,000	0.0%	no change
Subarea 2 (parallel, Castro Valley)	3,000	2,000	2,000	0.0%	no change
Subarea 3 (parallel, Dublin Boulevard & Stoneridge Dr)	21,000	16,000	15,000	-6.3%	inconclusive
Subarea 4 (parallel, Altamont Pass Road)	45,000	43,000	42,000	-2.3%	inconclusive
EPC	356,000	353,000	342,000	-3.1%	reduced VMT
PDA	559,000	530,000	519,000	-2.1%	reduced VMT

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Key Takeaways

- Households are expected to grow at a faster rate than population between 2020 and 2035, which implies a significantly smaller average household size in 2035 versus 2020.

- There is no material change in total personal trips between the Comparison Scenario and the Evaluation Scenario. The net variation ranges from -0.2% to +0.2%, but sensitivity tests show these changes are almost all within the model's margin of error.
- The Evaluation Scenario reduces total VMT very slightly relative to the Comparison Scenario, but not relative to the Year 2020.
- Commercial trips increase between Year 2020 and Comparison Scenario, while total Commercial VMT decreased across the same time period. The total trip metric considers only trips that start and end in the study area, while the network-based metric includes trips that pass through the study area. Decrease in total VMT could be attributed to a reduction in pass through commercial trips.
- The Evaluation Scenario lowers total commercial VMT in many geographies, including some significant reductions in some areas such as Subareas 1 (Oakland/San Leandro) and 4 (Altamont Pass), and EPCs.
- Personal vehicle VMT along parallel roads in subarea 3 is reduced by 2.7% and results in no change for subarea 2. Commercial vehicle VMT along parallel roads result in no change for subareas 1 and 2. Findings for subareas 3 and 4 are inconclusive for both vehicle types, so it is not possible to confirm whether the mainline reductions diverted to the parallel roads in these segments.
- VMT per resident declines between 2020 and 2035, except for in the Altamont Pass. The Evaluation Scenario further reduces VMT per Person in Subarea 3 (Tri Valley) compared to the Comparison Scenario.
- VMT per worker declines from 2020 to 2035 due to underlying land use and remote work assumptions. The Evaluation Scenario effects on VMT per worker are generally inconclusive.

Mode Share – does the Corridor Strategy increase non-automobile mode share?

This section describes the share of different modes used for trip making activity across all scenarios, as well as total transit boardings in the system.

Data Sources

The AlaCC travel demand model was used to estimate total trips by mode, and total boardings at the line level.

Methodology

Mode Share

$$Study\ area\ mode_i\ share\ = \frac{Study\ area\ mode_i\ trips}{Total\ study\ area\ trips}, \qquad where\ i\ stands\ for\ each\ mode$$

Total boardings

Total boardings were estimated systemwide by transit mode (bus, rail). Bus boardings include AC Transit and LAVTA bus service, while rail includes BART, ACE and Valley Link. When disaggregating the modes by facility type, we made the following considerations:

- Busway Lines – includes all boardings occurring on a bus line that uses any busway stop. While the busway does not exist under the Comparison Scenario, bus lines that would get rerouted to use the busway under the Evaluation Scenario are included in the calculation.
- Transbay Lines Serving the I-80 Corridor – includes the Transbay lines that serve the I-80 corridor with improved service in the Evaluation Scenario, but which do not use the busway.
- Study Area Lines – includes all other bus lines that have a bus stop inside the study area, but will remain unaffected by the proposed improvements in the Evaluation Scenario.
- Other Bus Lines – includes all other remaining AC Transit and LAVTA bus routes.

Evaluation

Table 10 and **Table 11** show daily transit boardings by mode and facility type, while **Table 12** shows the daily mode share for study area residents. Note that the sensitivity test was not applied to the boarding calculations.

Table 10. Daily Boardings by Transit Mode

Transit Mode	Year 2020	Comparison Scenario	Evaluation Scenario[3]	Net Change
Bus[1]	184,100	294,100	375,100	81,100
Rail[2]	460,500	531,100	536,100	5,000

Source: Fehr & Peers, 2024
Notes:
1. Bus operators include AC Transit and LAVTA.
2. Rail operators include BART, ACE and Valley Link.
3. Note that the sensitivity test was not applied to the boardings calculation.

Table 11. Daily Bus Boardings by Facility Type

Facility Type	Comparison Scenario	Evaluation Scenario	Net Change
Bus Totals	**294,100**	**375,100**	**81,100**
I-580 Busway Lines	300	30,300	30,000
Transbay Lines Serving the I-80 Corridor	18,000	16,800	-1,200

Study Area Lines (Excluding Busway-Serving)	193,500	235,900	42,400
Other Bus Lines	82,300	92,100	9,800

Source: Fehr & Peers, 2024

Table 12. Daily Mode Share by Study Area Residents

Geography	Mode[1]	Year 2020	Comparison Scenario	Evaluation Scenario	Delta (Comp. vs Eval.)	Result[2]
Subarea 1	Drive Alone	44%	41%	41%	0%	no change
	Shared Drive 2+	27%	25%	25%	0%	no change
	Walk/Bike	21%	24%	24%	0%	no change
	Transit	6%	8%	8%	0%	no change
	Taxi/TNC	2%	2%	2%	0%	no change
Subarea 2	Drive Alone	49%	49%	49%	0%	no change
	Shared Drive 2+	30%	26%	26%	0%	no change
	Walk/Bike	16%	20%	20%	0%	no change
	Transit	4%	4%	4%	0%	no change
	Taxi/TNC	1%	1%	1%	0%	no change
Subarea 3	Drive Alone	49%	48%	48%	0%	no change
	Shared Drive 2+	29%	29%	29%	0%	no change
	Walk/Bike	19%	21%	21%	0%	no change
	Transit	1%	1%	1%	0%	no change
	Taxi/TNC	2%	1%	1%	0%	no change
Subarea 4	Drive Alone	45%	42%	41%	-1%	inconclusive
	Shared Drive 2+	41%	35%	35%	0%	no change
	Walk/Bike	13%	23%	23%	0%	no change
	Transit	0%	0%	0%	0%	no change
	Taxi/TNC	1%	0%	1%	1%	inconclusive
Study Area	Drive Alone	45%	43%	43%	0%	no change
	Shared Drive 2+	28%	26%	26%	0%	no change
	Walk/Bike	20%	23%	23%	0%	no change
	Transit	5%	6%	6%	0%	no change
	Taxi/TNC	2%	2%	2%	0%	no change

Source: Fehr & Peers, 2024
Notes:
1. Drive Alone and HOV (2/3) includes vehicles traveling in the express lanes.
2. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Key Takeaways

- The Evaluation Scenario results in a significant increase in boardings on bus routes that serve the study area, with largest effects seen by bus lines within the study area that are not busway serving. This is likely due to the significant all-day frequency increases on these lines. There are some complementary effects of ridership increase on rail services.
- Driving modes are the largest share of all travel modes for study area residents, with little variations within the subareas. Transit shares are larger on the western half of the corridor, and they progressively decrease from Subarea 1 through Subarea 4 respectively. There are no major changes in mode share between 2020 and 2035, and mode share remains largely unchanged with the Evaluation Scenario. This is a compound effect of the following:
    - Boardings are estimated at the line level for bus lines that use the busway or stop within the study area. However, the catchment area of bus lines improved by the Evaluation Scenario extends beyond the half mile buffer around the study area, and boardings include riders outside of the study area.
    - Transit mode share considers linked transit trips as the primary unit of analysis. If someone transfers from one bus line to another within the same trip, this trip is counted as a single linked trip for the purposes of the mode share calculation. However, boarding estimations use unlinked trips as the unit of analysis. Therefore, a transfer trip between two buses is counted as two separate boardings, overestimating the number of boardings compared to the total number of transit trips.
    - Additionally, 80,000 transit boardings account for less than 5% of all daily trips within the study area, a comparatively small number compared to all trips, or trips taken in a private vehicle.

Throughput – does the Corridor Strategy increase the number of travelers moving through the corridor at key screenlines during peak periods?

Person throughput represents the total number of people utilizing each mode of transportation on the screenlines of the I-580 corridor.

Data Sources

The AlaCC model highway network with modeled link-level vehicle volumes, and transit network with link-level transit ridership were used to estimate person throughput.

Methodology

Person throughput for all modes was estimated using AlaCC network data and modeled vehicle occupancy data. Each modeled vehicle mode was converted to person data based on whether the vehicle mode was tagged as Drive Alone, Shared Drive 2 or Shared Drive 3. For each of these modes, person throughput for vehicles traveling in General Purpose Lanes and Express Lanes were aggregated. Bus and rail passenger volumes were obtained from the link level transit files.

Evaluation

Table 13 through **Table 16** show the changes in total person throughput and throughput by mode for the AM and PM peak periods, and at the daily level.

Table 13. Peak Period Total Person Throughput at Select Screenlines

Subarea	Screenline	AM Peak (6:00 AM – 10:00 AM)					PM Peak (3:00 PM – 7:00 PM)				
		Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result	Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[1]
Subarea 1 (I-580)	1	94,080	115,350	122,950	6.6%	increased throughput	83,115	101,700	108,325	6.5%	increased throughput
	2	52,505	61,975	65,925	6.4%	increased throughput	50,870	58,775	62,500	6.3%	increased throughput
	3	43,705	48,275	50,575	4.8%	increased throughput	40,565	45,625	46,750	2.5%	inconclusive
	4	36,535	41,200	43,250	5.0%	increased throughput	33,785	39,250	40,375	2.9%	increased throughput
Subarea 2 (I-580)	5	23,100	24,075	28,300	17.5%	increased throughput	24,110	26,600	30,050	13.0%	increased throughput
	6	29,105	30,250	32,500	7.4%	increased throughput	28,535	29,975	32,125	7.2%	increased throughput
Subarea 3 (I-580)	7	26,460	29,250	34,150	16.8%	increased throughput	26,910	32,550	37,250	14.4%	increased throughput
Subarea 4 (I-580)	8	24,570	27,550	27,400	-0.5%	inconclusive	23,625	28,050	27,775	-1.0%	inconclusive
Subarea 1 (parallel roads)	101	2,025	1,700	1,675	-1.5%	inconclusive	2,800	2,250	2,250	0.0%	inconclusive
	102	3,075	2,000	2,150	7.5%	inconclusive	4,375	2,850	3,050	7.0%	inconclusive
Subarea 2 (parallel roads)	103	2,425	1,725	1,825	5.8%	inconclusive	3,000	2,125	2,175	2.4%	inconclusive
Subarea 3 (parallel roads)	104	2,275	2,250	2,375	5.6%	inconclusive	3,225	3,025	3,075	1.7%	inconclusive
	105	3,025	2,150	2,050	-4.7%	inconclusive	3,275	2,600	2,575	-1.0%	inconclusive

Source: Fehr & Peers, 2024

Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 14. Peak Period Person Throughput by Mode at Select Screenlines

Subarea	Scrl.	Mode[1]	AM Peak (6:00 AM – 10:00 AM)					PM Peak (3:00 PM – 7:00 PM)				
			Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Drive Alone	12,525	13,675	13,525	-1.1%	inconclusive	12,925	14,900	14,475	-2.9%	reduced throughput
	2	Drive Alone	12,875	14,800	14,100	-4.7%	reduced throughput	14,700	16,650	15,000	-9.9%	reduced throughput
	3	Drive Alone	15,175	17,225	16,725	-2.9%	reduced throughput	15,900	17,625	16,425	-6.8%	reduced throughput
	4	Drive Alone	12,725	15,225	14,800	-2.8%	reduced throughput	13,175	15,700	14,675	-6.5%	reduced throughput
Subarea 2 (I-580)	5	Drive Alone	12,500	14,175	14,900	5.1%	increased throughput	13,875	16,150	16,650	3.1%	increased throughput
	6	Drive Alone	17,800	19,375	19,375	0.0%	inconclusive	17,325	19,400	19,425	0.1%	inconclusive
Subarea 3 (I-580)	7	Drive Alone	16,925	18,800	18,600	-1.1%	inconclusive	16,925	20,700	20,400	-1.4%	reduced throughput
Subarea 4 (I-580)	8	Drive Alone	17,775	19,725	19,050	-3.4%	reduced throughput	16,875	19,825	19,250	-2.9%	reduced throughput
Subarea 1 (parallel roads)	101	Drive Alone	875	825	825	0.0%	inconclusive	1,325	1,100	1,125	2.3%	inconclusive
	102	Drive Alone	1,575	875	925	5.7%	inconclusive	2,475	1,450	1,475	1.7%	inconclusive
Subarea 2 (parallel roads)	103	Drive Alone	1,350	1,075	1,075	0.0%	inconclusive	1,700	1,300	1,275	-1.9%	inconclusive
	104	Drive Alone	1,400	1,375	1,375	0.0%	inconclusive	1,925	1,800	1,775	-1.4%	inconclusive

Subarea	Scrl.	Mode[1]	AM Peak (6:00 AM – 10:00 AM)					PM Peak (3:00 PM – 7:00 PM)				
			Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 3 (parallel roads)	105	Drive Alone	2,025	1,450	1,400	-3.4%	inconclusive	2,150	1,725	1,650	-4.3%	reduced throughput
Subarea 1 (I-580)	1	HOV (2/3)	7,800	11,975	11,500	-4.0%	reduced throughput	7,825	11,225	11,075	-1.3%	inconclusive
	2	HOV (2/3)	7,025	8,650	13,200	52.6%	increased throughput	8,200	9,300	14,600	57.0%	increased throughput
	3	HOV (2/3)	6,525	7,675	8,250	7.5%	increased throughput	6,725	8,025	8,825	10.0%	increased throughput
Subarea 1 (I-580)	4	HOV (2/3)	5,800	7,075	7,250	2.5%	inconclusive	6,025	7,400	8,125	9.8%	increased throughput
Subarea 2 (I-580)	5	HOV (2/3)	6,100	6,425	6,700	4.3%	increased throughput	6,725	7,200	7,850	9.0%	increased throughput
	6	HOV (2/3)	8,375	8,850	8,500	-4.0%	inconclusive	8,700	8,725	8,725	0.0%	inconclusive
Subarea 3 (I-580)	7	HOV (2/3)	7,650	9,025	8,850	-1.9%	inconclusive	8,050	10,500	10,450	-0.5%	inconclusive
Subarea 4 (I-580)	8	HOV (2/3)	6,475	7,800	8,300	6.4%	increased throughput	6,450	8,200	8,450	3.0%	inconclusive
Subarea 1 (parallel roads)	101	HOV (2/3)	700	400	450	12.5%	inconclusive	850	575	625	8.7%	inconclusive
	102	HOV (2/3)	1,275	700	700	0.0%	inconclusive	1,675	975	975	0.0%	inconclusive
Subarea 2 (parallel roads)	103	HOV (2/3)	1,050	625	625	0.0%	inconclusive	1,275	800	800	0.0%	inconclusive
Subarea 3 (parallel roads)	104	HOV (2/3)	800	725	725	0.0%	inconclusive	1,150	1,025	1,025	0.0%	inconclusive
	105	HOV (2/3)	975	625	625	0.0%	inconclusive	1,100	850	900	5.9%	inconclusive

Subarea	Scrl.	Mode[1]	AM Peak (6:00 AM – 10:00 AM)					PM Peak (3:00 PM – 7:00 PM)				
			Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Bus	75	125	2,525	1920.0%	increased throughput	325	400	2,375	493.8%	increased throughput
	2	Bus	75	325	2,675	723.1%	increased throughput	300	525	2,675	409.5%	increased throughput
	3	Bus	25	375	650	73.3%	increased throughput	100	475	700	47.4%	increased throughput
	4	Bus	50	375	575	53.3%	increased throughput	75	475	600	26.3%	increased throughput
Subarea 2 (I-580)	5	Bus	-	-	125	NA	increased throughput	-	-	150	NA	increased throughput
	6	Bus	-	-	-	NA	NA	-	-	-	NA	NA
Subarea 3 (I-580)	7	Bus	25	25	25	0.0%	inconclusive	75	50	25	-50.0%	inconclusive
Subarea 4 (I-580)	8	Bus	-	-	-	NA	NA	-	-	-	NA	NA
Subarea 1 (parallel roads)	101	Bus	450	475	400	-15.8%	inconclusive	625	575	500	-13.0%	inconclusive
	102	Bus	225	425	525	23.5%	increased throughput	225	425	600	41.2%	increased throughput
Subarea 2 (parallel roads)	103	Bus	25	25	125	400.0%	increased throughput	25	25	100	300.0%	increased throughput
Subarea 3 (parallel roads)	104	Bus	75	150	275	83.3%	increased throughput	150	200	275	37.5%	increased throughput
	105	Bus	25	75	25	-66.7%	inconclusive	25	25	25	0.0%	inconclusive
Subarea 1 (I-580)	1	Rail	73,680	89,575	95,400	6.5%	increased throughput	62,040	75,175	80,400	7.0%	increased throughput

Subarea	Scrl.	Mode[1]	AM Peak (6:00 AM – 10:00 AM)					PM Peak (3:00 PM – 7:00 PM)				
			Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Year 2020	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
	2	Rail	32,530	38,200	35,950	-5.9%	reduced throughput	27,670	32,300	30,225	-6.4%	reduced throughput
	3	Rail	21,980	23,000	24,950	8.5%	increased throughput	17,840	19,500	20,800	6.7%	increased throughput
	4	Rail	17,960	18,525	20,625	11.3%	increased throughput	14,510	15,675	16,975	8.3%	increased throughput
Subarea 2 (I-580)	5	Rail	4,500	3,475	6,575	89.2%	increased throughput	3,510	3,250	5,400	66.2%	increased throughput
	6	Rail	2,930	2,025	4,625	128.4%	increased throughput	2,510	1,850	3,975	114.9%	increased throughput
Subarea 3 (I-580)	7	Rail	1,860	1,400	6,675	376.8%	increased throughput	1,860	1,300	6,375	390.4%	increased throughput
Subarea 4 (I-580)	8	Rail	320	25	50	100.0%	inconclusive	300	25	75	200.0%	inconclusive
Subarea 1(parallel roads)	101	Rail	-	-	-	NA	NA	-	-	-	NA	NA
	102	Rail	-	-	-	NA	NA	-	-	-	NA	NA
Subarea 2 (parallel roads)	103	Rail	-	-	-	NA	NA	-	-	-	NA	NA
Subarea 3 (parallel roads)	104	Rail	-	-	-	NA	NA	-	-	-	NA	NA
	105	Rail	-	-	-	NA	NA	-	-	-	NA	NA

Source: Fehr & Peers, 2024
Notes:
1. Drive Alone and HOV (2/3) includes vehicles traveling in the express lanes.
2. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 15. Daily Total Person Throughput at Select Screenlines

Subarea	Screenline	Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Eval. vs Comp.)	Result[1]
Subarea 1 (I-580)	1	274,460	332,350	353,375	6.3%	increased throughput
	2	165,390	192,625	199,950	3.8%	increased throughput
	3	134,875	149,475	151,450	1.3%	inconclusive
	4	111,460	126,950	121,750	-4.1%	inconclusive
Subarea 2 (I-580)	5	79,940	87,225	96,600	10.7%	increased throughput
	6	99,315	107,900	111,975	3.8%	increased throughput
Subarea 3 (I-580)	7	93,945	112,850	123,075	9.1%	increased throughput
Subarea 4 (I-580)	8	90,515	108,950	107,000	-1.8%	inconclusive
Subarea 1 (parallel roads)	101	8,525	7,575	6,375	-15.8%	inconclusive
	102	13,275	8,925	8,700	-2.5%	inconclusive
Subarea 2 (parallel roads)	103	8,675	6,550	6,125	-6.5%	inconclusive
Subarea 3 (parallel roads)	104	10,375	10,000	9,475	-5.3%	inconclusive
	105	10,700	8,225	7,325	-10.9%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table 16. Daily Total Person Throughput by Mode at Select Screenlines

Subarea	Screenline	Mode[1]	Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Drive Alone	48,375	51,925	50,925	-1.9%	inconclusive
	2	Drive Alone	48,025	54,925	52,375	-4.6%	reduced throughput
	3	Drive Alone	51,875	57,850	55,950	-3.3%	reduced throughput
	4	Drive Alone	42,500	50,800	48,925	-3.7%	reduced throughput

Subarea	Screenline	Mode[1]	Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 2 (I-580)	5	Drive Alone	44,850	52,625	53,775	2.2%	increased throughput
	6	Drive Alone	60,875	69,900	68,725	-1.7%	inconclusive
Subarea 3 (I-580)	7	Drive Alone	61,575	74,675	73,325	-1.8%	reduced throughput
Subarea 4 (I-580)	8	Drive Alone	64,875	77,225	75,150	-2.7%	reduced throughput
Subarea 1 (parallel roads)	101	Drive Alone	4,050	3,750	3,650	-2.7%	inconclusive
	102	Drive Alone	7,425	4,550	4,475	-1.6%	inconclusive
Subarea 2 (parallel roads)	103	Drive Alone	5,000	4,125	3,950	-4.2%	inconclusive
Subarea 3 (parallel roads)	104	Drive Alone	6,550	6,250	6,000	-4.0%	inconclusive
	105	Drive Alone	7,000	5,550	5,175	-6.8%	inconclusive
Subarea 1 (I-580)	1	HOV (2/3)	28,600	41,575	39,575	-4.8%	inconclusive
	2	HOV (2/3)	26,850	30,550	42,225	38.2%	increased throughput
	3	HOV (2/3)	23,125	26,400	26,850	1.7%	inconclusive
	4	HOV (2/3)	20,250	23,725	24,175	1.9%	inconclusive
Subarea 2 (I-580)	5	HOV (2/3)	22,550	24,025	24,750	3.0%	increased throughput
	6	HOV (2/3)	30,200	32,125	31,000	-3.5%	inconclusive
Subarea 3 (I-580)	7	HOV (2/3)	27,800	34,725	33,525	-3.5%	inconclusive
Subarea 4 (I-580)	8	HOV (2/3)	25,000	31,675	31,725	0.2%	inconclusive
Subarea 1 (parallel roads)	101	HOV (2/3)	2,575	1,750	1,425	-18.6%	inconclusive
	102	HOV (2/3)	5,050	2,975	2,425	-18.5%	inconclusive
Subarea 2 (parallel roads)	103	HOV (2/3)	3,575	2,325	1,900	-18.3%	inconclusive
Subarea 3 (parallel roads)	104	HOV (2/3)	3,475	3,250	2,700	-16.9%	inconclusive
	105	HOV (2/3)	3,625	2,550	2,100	-17.6%	inconclusive

Subarea	Screenline	Mode[1]	Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Bus	475	625	9,525	1424.0%	increased throughput
	2	Bus	425	1,250	8,975	618.0%	increased throughput
	3	Bus	125	1,175	1,900	61.7%	increased throughput
	4	Bus	200	1,225	1,550	26.5%	increased throughput
Subarea 2 (I-580)	5	Bus	-	-	400		increased throughput
	6	Bus	-	-	-		NA
Subarea 3 (I-580)	7	Bus	150	100	50	-50.0%	inconclusive
Subarea 4 (I-580)	8	Bus	-	-	-		NA
Subarea 1 (parallel roads)	101	Bus	1,900	2,075	1,300	-37.3%	inconclusive
	102	Bus	800	1,400	1,800	28.6%	increased throughput
Subarea 2 (parallel roads)	103	Bus	100	100	275	175.0%	increased throughput
Subarea 3 (parallel roads)	104	Bus	350	500	775	55.0%	increased throughput
	105	Bus	75	125	50	-60.0%	inconclusive
Subarea 1 (I-580)	1	Rail	197,010	238,225	253,350	6.3%	increased throughput
	2	Rail	90,090	105,900	96,375	-9.0%	reduced throughput
	3	Rail	59,750	64,050	66,750	4.2%	increased throughput
	4	Rail	48,510	51,200	47,100	-8.0%	inconclusive
Subarea 2 (I-580)	5	Rail	12,540	10,575	17,675	67.1%	increased throughput
	6	Rail	8,240	5,875	12,250	108.5%	increased throughput
Subarea 3 (I-580)	7	Rail	4,420	3,350	16,175	382.8%	increased throughput
Subarea 4 (I-580)	8	Rail	640	50	125	150.0%	inconclusive
Subarea 1 (parallel roads)	101	Rail	-	-	-	NA	NA
	102	Rail	-	-	-	NA	NA
Subarea 2 (parallel roads)	103	Rail	-	-	-	NA	NA
Subarea 3	104	Rail	-	-	-	NA	NA

Subarea	Screenline	Mode[1]	Year 2020	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
(parallel roads)	105	Rail	-	-	-	NA	NA

Source: Fehr & Peers, 2024
Notes:
1. Drive Alone and HOV (2/3) includes vehicles traveling in the express lanes.
2. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Key Takeaways

- The Evaluation Scenario increases total person throughput in much of the corridor. These throughput findings vary across screenlines and as a result of a combination of increases by different modes. During the peak periods:
    - At Screenline 1 (I-580 at SR24/I-980), total throughput increases largely as a result of increased transit ridership which offsets decreases in freeway (Drive Alone, Shared 2 and Shared 3) throughput.
    - Screenline 2 (I-580 at MacArthur Boulevard to SR13) sees an increase in freeway throughput as well as transit.
    - At Screenline 3 (I-580 at SR13 to Estudillo Avenue) and Screenline 4 (I-580 at Estudillo Avenue to I-238) reduced drive alone throughput is offset by increases in Shared 2, Shared 3 and transit throughput.
    - Screenline 5 (I-580 & I-238) sees an increase in person throughput across all modes, with the largest increases driven by rail.
    - For Screelines 6 and 7, total person throughput increases are largely driven by throughput increases in rail.
    - At Screenline 8, the reduced Drive Alone throughput combined with increased with increased Shared 2 and Shared 3 throughput leads to inconclusive results. Transit throughput results are inconclusive.
- These findings carry over to the daily time period, with Screenlines 1, 5 and 7 seeing the largest effects.
- The Evaluation Scenario reduces Drive Alone throughput, which is offset by throughput increases in HOT lanes and on transit. It also increases bus and rail throughput across most screenlines.

Accessibility – does the Corridor Strategy improve multimodal access, including first/last-mile to transit?

Accessibility is a measure of how many destinations are accessible within a certain travel time from a set of points, using a particular mode (walking, biking, driving, or transit).

Data Sources

TravelAccess+ was used to generate 10-min bike sheds for each transit station, with an Open Streets Map (OSM) network as input. AlaCC model outputs including the travel time skims and land use information at the TAZ level were used to estimate jobs accessible within given travel time thresholds between OD pairs.

Methodology

Bicycle Accessibility

When estimating the biking travel time, TravelAccess+ calculates the Level of Traffic Stress (LTS) score for each roadway segment, a measure of the traffic stress faced by bicyclists based on roadway characteristics such as number of lanes, posted speed limit, and bike facility type (if any). LTS scores range from 1 (lowest stress) to 4 (highest stress). Shared Use Paths (Class I) and Protected bike lanes (Class IV) are automatically assigned an LTS score of 1. The TravelAccess+ tool adjusts the time it takes for a cyclist to travel each road segment based on its assigned LTS score, based on the assumption that people will travel faster on segments that feel more comfortable, and will slow down or walk their bike on segments with a higher LTS score.

The types of bicycle network projects included in the Evaluation Scenario are listed in **Table 17,** and were coded as low-stress bicycle facilities. The 10-min bike sheds are calculated based on a speed of 15 feet/second along low stress facilities. On streets with an LTS score of 4, the tool assumes that people would walk their bikes, with a walking speed of 4.4 feet/second. The TravelAccess+ Methodology is further detailed in **Appendix F.**

Table 17. Inputs and outputs of the TravelAccess+ Analysis for the Evaluation Scenario

Inputs	**Outputs**
OSM Network with the following additional bicycle network improvements coded as low-stress facilities: Countywide Bikeways Network (CBN) • Projects included in the 2020 CTP • Other CBN corridors (conceptual alignment) Caltrans D4 Bike Plan • Undercrossing improvement projects proposed in the Caltrans D4 Bike Plan Gap Closure Projects • Projects that close the gap between the I-580 corridor and the CBN Station Access Improvements • Bicycle and pedestrian infrastructure improvements in the vicinity of rail stations serving the I-580 corridors	10-min Bike Sheds around rail stations (Evaluation Scenario)

Car and Transit Accessibility

The AlaCC travel time skims and land use files were used to estimate accessibility at the TAZ level for PDAs and EPCs in the study area. The travel time skims matrix was used to determine the travel time between TAZ OD pairs, based on the modes shown in **Table 18.**

Table 18. Daily Total Person Throughput by Mode at Select Screenlines

Accessibility Modes	**AlaCC Submodes**
Drive	• Drive Alone • Drive Alone Toll • Shared 2 • Shared 2 Toll • Shared 3 • Shared 3 Toll
Transit	• Walk-Transit-Walk • Drive-Transit-Walk • Walk-Transit-Drive
Not considered	• Walk • Bike

The travel time matrix was filtered down to include only:

- TAZ origins in EPC/PDA locations
- OD pairs with travel times below 30 min of driving or 30-45 min of transit
    - Each submode is considered independently from the rest. If at least one of the modes is below the travel time threshold, then the OD pair is considered accessible by driving/transit.

The total number of jobs in those selected TAZ are aggregated to estimate total number of jobs accessible within the travel time threshold.

Evaluation

Figure 3 through Error! Reference source not found. show the 10-min bicycle sheds for all rail stations within the study area, while **Table 19** quantifies the additional miles of coverage gained by construction the bicycle facilities. The bicycle network projects increase connectivity between the stations and existing low-stress bicycle facilities, which leads to the bicycle sheds expanding to cover some areas that have no bicycle facility projects in the Evaluation Scenario. **Table 20** and **Table 21** show the total number of jobs accessible form the study area PDAs.

Figure 3. Low-Stress Bicycle Network Sheds (MacArthur BART)

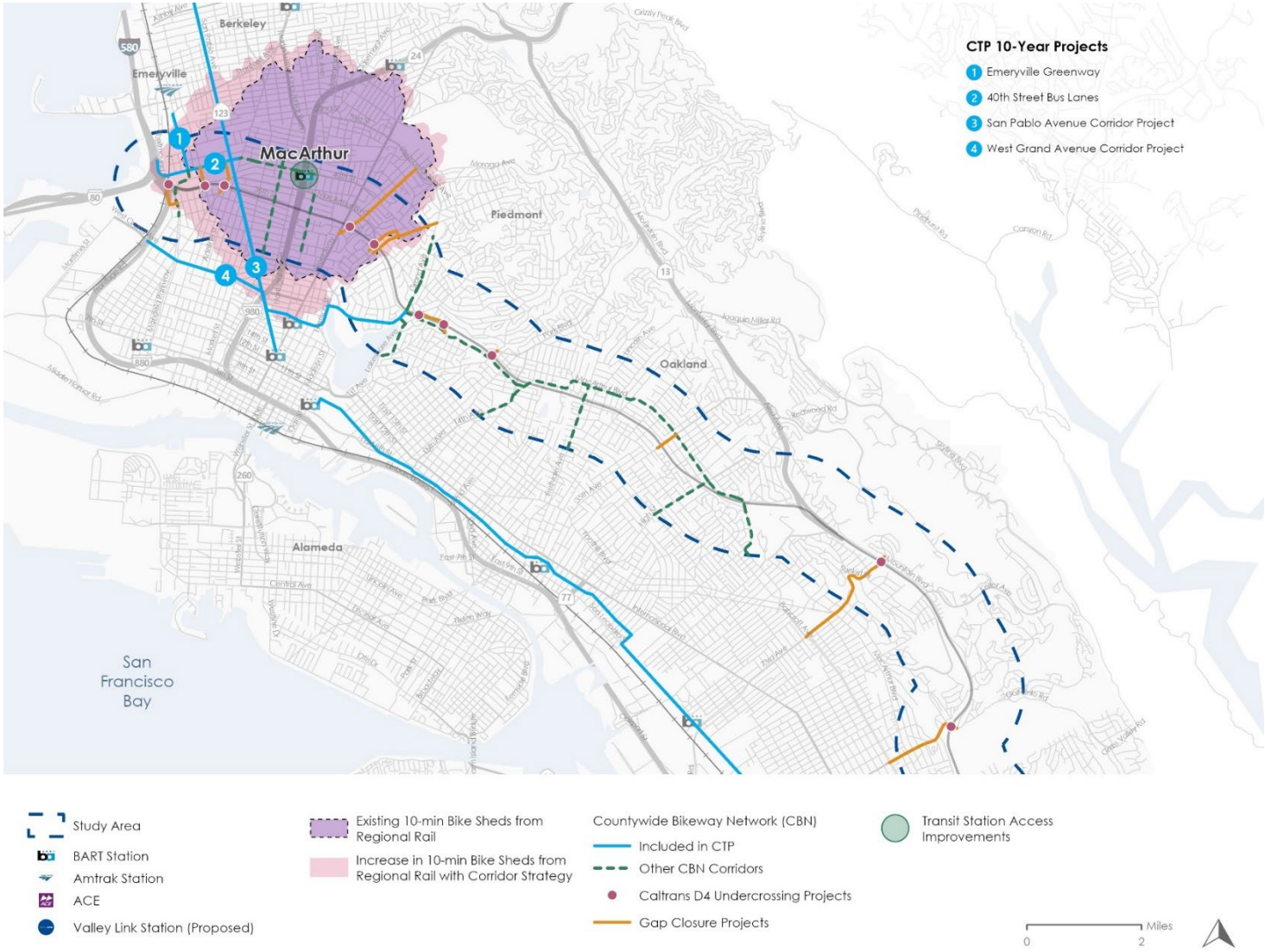


Figure 4. Low-Stress Bicycle Network Shed (San Leandro, Bayfair and Castro Valley)

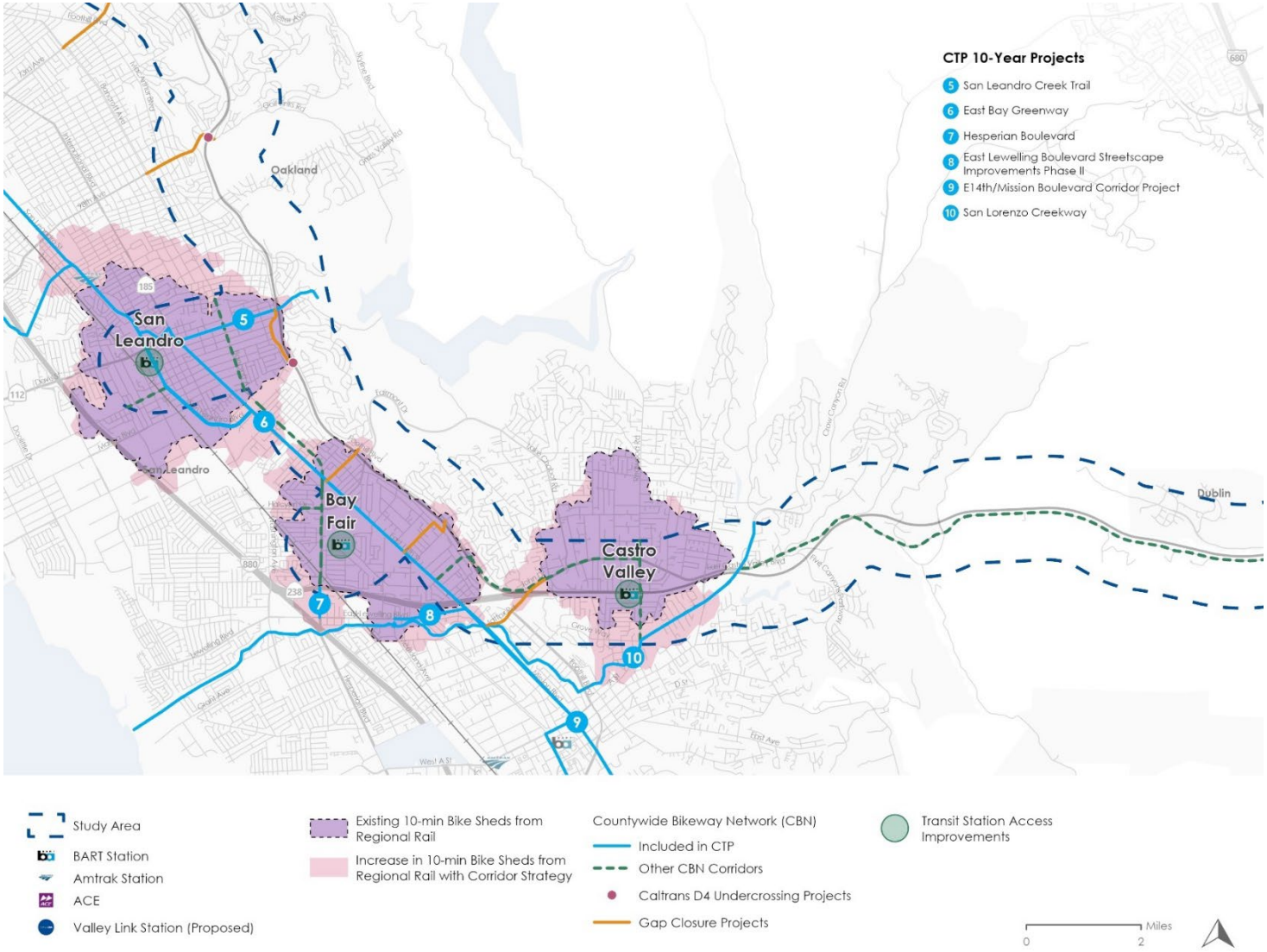


Figure 5. Low-Stress Bicycle Network Sheds (Dublin, Pleasanton, Livermore)

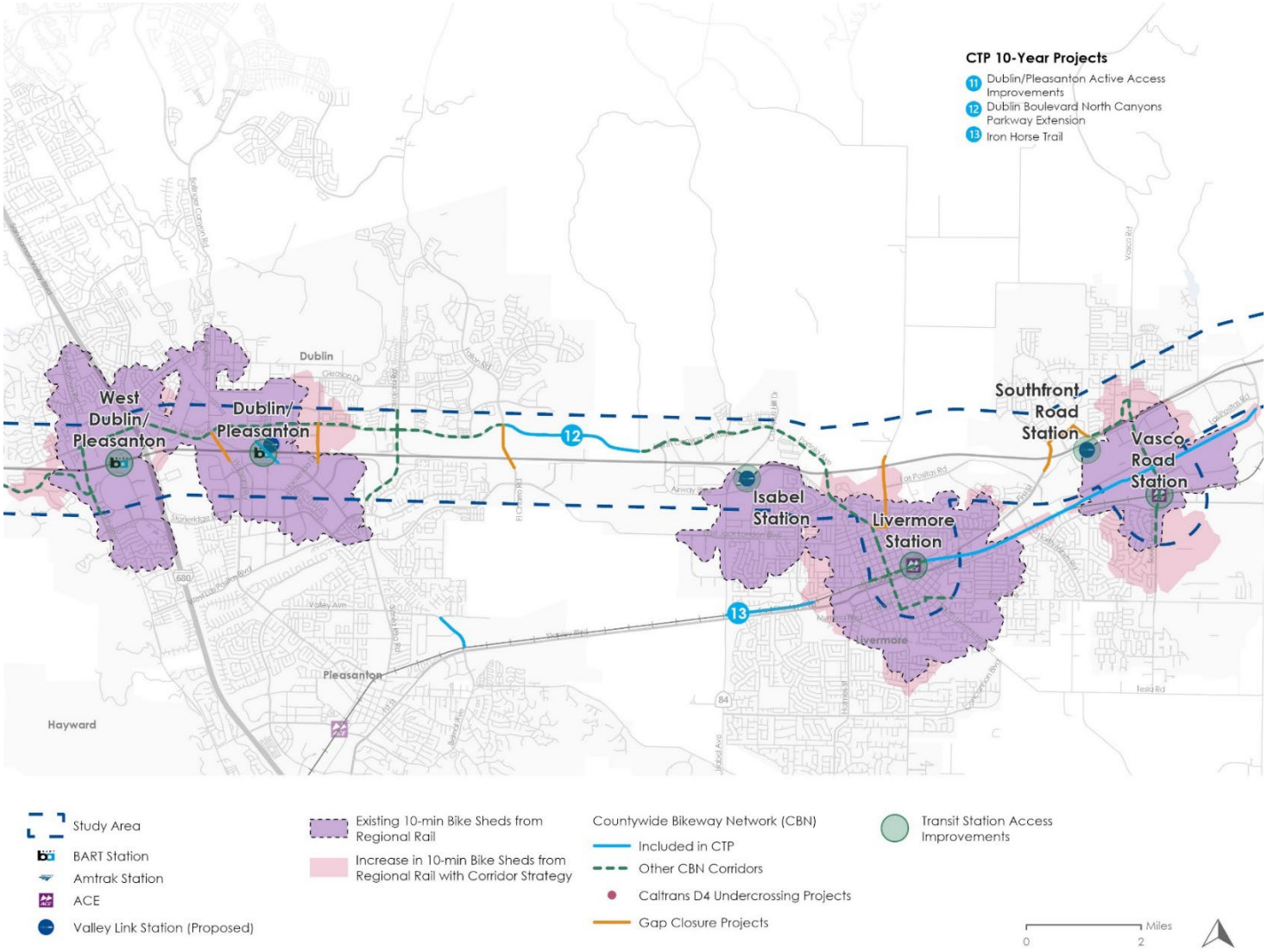


Table 19. Additional Square Miles of Low-Stress Bicycle Network Coverage

Transit Station	Existing Travel Shed (Square Miles)	Travel Shed w/ Projects (Square Miles)	Net Increase	
MacArthur BART	3.7	5.0	+ 1.3	+36%
San Leandro BART	2.8	4.3	+ 1.5	+55%
Bayfair BART	2.1	2.9	+ 0.8	+37%
Castro Valley BART	1.8	2.7	+ 0.9	+49%
West Dublin Pleasanton BART	2.3	3.0	+ 0.6	+28%
Dublin Pleasanton BART	2.8	3.4	+0.6	+21%
Livermore ACE	3.4	4.2	+ 0.8	+22%
Vasco Road ACE	1.0	2.7	+ 1.7	+170%
Dublin Pleasanton Valley Link	2.5	2.9	+0.4	+15%
Isabel Station Valley Link	1.4	1.4	+0.0	0%
Southfront Road Station Valley Link	0.8	1.2	+0.4	+48%
Total Area (excluding overlap)	**22.2**	**29.3**	**+7.1**	**+32%**

Source: Fehr & Peers, 2024

Table 20. Jobs accessible by residents of study area PDA

Within…	Year 2020	Comparison Scenario	Evaluation Scenario	Additional Jobs Accessible[1]
a 30-min car ride	2,520,000	2,138,000	2,141,000	3,000
a 30-min transit trip	1,314,000	1,344,000	1,356,000	12,000
a 45-min transit trip	1,844,000	1,790,000	1,792,000	2,000

Source: Fehr & Peers, 2024
Notes:
1. Note that the sensitivity test was not applied to the accessibility calculation.

Table 21. Jobs accessible by residents of Neighborhoods along Busway (subset of Oakland PDAs[1])

Within…	Year 2020	Comparison Scenario	Evaluation Scenario	Additional Jobs Accessible[2]
a 30-min car ride	2,014,000	1,750,000	1,744,000	-6,000
a 30-min transit trip	628,000	687,000	762,000	75,000
a 45-min transit trip	1,246,000	1,372,000	1,415,000	43,000

Source: Fehr & Peers, 2024
Notes:
1. Subset of Oakland PDAs include TAZs located in MacArthur Blvd Corridor, San Antonio, Fruitvale, Fruitvale and Dimond Areas, and Eastmont Town Center/International Blvd TOD.
2. Note that the sensitivity test was not applied to the accessibility calculation.

Key Takeaways

- The low stress bicycle infrastructure investments increase the accessible low-stress bikeable area by 15%-170%. The Vasco Road rail station has the largest increase, with a net additional 1.7 square miles.
- Job accessibility for PDA residents decreases in 2035 compared to 2020 given that congestion increases at a faster rate than job growth within the corridor. However, job accessibility increases for a subset of Oakland PDA residents closest to the busway between 2020 and 2035, likely due to a larger share of job growth in the vicinity of these PDAs compared to the rest of the study area.
- The Evaluation Scenario makes an additional 3,000 and 12,000 jobs accessible within a 30-min car ride and 30-min transit trip respectively, for residents of PDAs in the study area. While job accessibility also increases with a 45-min transit trips, the overall gains are smaller. In general, these numbers are relatively small compared to the Comparison Scenario.
- When looking at job accessibility increased for a subset of Oakland PDA residents specifically, the increases in accessibility from the transit investments in the Evaluation Scenario are significant, with an additional 75,000 and 43,000 jobs accessible within a 30-min and 45-min transit trip respectively. Jobs accessible within a 30-min car ride decrease by 6,000, likely due to the effects of the conversion of a General Purpose Lane to a Busway.
- The effects of the Evaluation Scenario projects included in the mainline have mixed results. Drive Alone Toll travel times in the Evaluation Scenario are faster than Drive Alone travel times in the Comparison Scenario, which underscores the fact that Express Lanes preserve access to destinations for people who are willing to pay for them. On the other hand, converting a General Purpose Lane to an Express Lane increases transit accessibility for the residents who live closest to the investment, although the effect diminishes with longer travel times. The increased accessibility numbers emphasize the value of access to choices, even if users of the system choose not to access them on a given day.

Equitable Benefits – does the Corridor Strategy benefit residents of equity communities within the study area?

For the purposes of the I-580 TAMS, two metrics were explored to estimate equitable benefits of the evaluation scenario – one that attempted to estimate the distribution of incomes for the users of the studied projects and an estimate of the change in access for residents of equity communities in the study area. Both of these estimates are coarse approximations for equitable benefits acknowledging the difficulty in accurately representing these nuanced conditions in a large activity-based model. The results highlight the importance of deliberate

equity considerations should the Busway and Express Lanes move forward in subsequent efforts.

Data Sources

The AlaCC model stop level boarding data and household information was used to estimate the income distribution of the subarea households, and the income distribution of investment users. The AlaCC travel time skims and land use files were used to estimate accessibility at the TAZ level EPCs in the study area using the data sources and methodology described in the previous section.

Methodology

The income distribution of study area residents was estimated based on the household income for TAZ within the study area.

For the income distribution of Express Lane users, we conducted a select link analysis for the highest loaded segment of the HOT lane in each subarea to determine the AM peak period trip origin TAZ. We assumed the AM peak period trip origin TAZ was the home location of the user, and a simplifying assumption that their income distribution matched that of the TAZ. The household income distribution of each trip origin was then weighted by how many users started their trip in each TAZ.

In the case of the busway, we used the AM peak period stop level data to estimate the origin TAZ of trips that boarded the bus lines that travel through the busway. We made the simplifying assumption that the income distribution of busway users matched the income distribution of the origin TAZ. The household income distribution of each trip origin TAZ was then weighted by how many busway users started their trip in each TAZ.

Note that the sensitivity tests were not applied to these set of metrics so there is an unknown range of uncertainty around these metrics.

Evaluation

Table 22 shows the income distribution of study area residents and users of the major transportation investments, while **Table 23** shows the accessibility metrics for study area EPCs and **Table 24** shows jobs accessible to residents living in PDAs along the busway in Oakland.

Table 22. Busway and Express Lane User Distribution by Income Category

Subarea	Major transportation investment	Income Quartile Distribution of Subarea Households				Income Quartile Distribution of Investment Users				Difference in Share (Net Percentage Points)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Subarea 1	Busway	38%	27%	17%	18%	37%	26%	16%	21%	-1%	-1%	-1%	3%
Subarea 2	Express Lane	30%	22%	21%	27%	27%	23%	19%	31%	-3%	1%	-2%	4%
Subarea 3	Express Lane	25%	23%	22%	30%	27%	22%	20%	31%	2%	-1%	-2%	1%
Subarea 4	Express Lane	25%	23%	22%	30%	23%	24%	24%	29%	-2%	1%	2%	-1%

Source: Fehr & Peers, 2024

Table 23. Jobs accessible by residents of study area EPCs

Within…	Year 2020	Comparison Scenario	Evaluation Scenario	Additional Jobs Accessible[1]
a 30-min car ride	2,470,000	2,043,000	2,047,000	4,000
a 30-min transit trip	1,025,000	1,089,000	1,101,000	12,000
a 45-min transit trip	1,663,000	1,654,000	1,658,000	4,000

Source: Fehr & Peers, 2024
Notes:
1. Note that the sensitivity test was not applied to the accessibility calculation.

Table 24. Jobs accessible by residents of Neighborhoods along Busway (subset of Oakland PDAs[1])

Within…	Year 2020	Comparison Scenario	Evaluation Scenario	Additional Jobs Accessible[2]
a 30-min car ride	2,014,000	1,750,000	1,744,000	-6,000
a 30-min transit trip	628,000	687,000	762,000	75,000
a 45-min transit trip	1,246,000	1,372,000	1,415,000	43,000

Source: Fehr & Peers, 2024
Notes:
1. Subset of Oakland PDAs include TAZ located in MacArthur Blvd Corridor, San Antonio, Fruitvale and Dimond Areas, and Eastmont Town Center/International Blvd TOD.
2. Note that the sensitivity test was not applied to the accessibility calculation.

Key Takeaways

- The users of the major transportation investments in the Evaluation Scenario are proportionally higher income than the study area residents, but only slightly so.
- Job accessibility for EPC residents decreases in 2035 compared to 2020 given that congestion increases at a faster rate than job growth within the corridor.
- The Evaluation Scenario makes an additional 4,000 jobs accessible within a 30-min car ride for EPC study area residents but reduces driving access in a subset of communities in Sub Area 1. Increases in transit accessibility are large for this group suggesting an

opportunity to consider changes in driving access for this group should the major projects advance beyond the study phase.

- The Evaluation Scenario makes an additional 75,000 jobs accessible within a 30-minute transit trip for residents living in PDAs near the busway, demonstrating the very high accessibility benefits of the busway for those who live near it.
- While there are more jobs accessible by transit within 45-min than within 30-min, the effects of the Evaluation Scenario to increase access to study area EPC residents are larger for the 30-min threshold. There are 12,000 more jobs accessible for study area residents within 30-min, while the effects are dampened to 4,000 within 45-min.

Health/Sustainability – does the Corridor Strategy improve air quality and decrease pollutants?

Health and sustainability metrics were assessed through greenhouse gas (GHG) emission associated with changes in VMT.

Data Sources

The AlaCC model highway network with modeled link-level vehicle volumes was used to estimate VMT by speed bin, while California's Air Resources Board (CARB)'s Emissions Inventory was used to estimate emissions rates associated with the 2020 and 2035 vehicle fleet mix for the Bay Area.

Methodology

CARB's inventory of fleet mix by fuel type, along with each fuel type's emission rate by speed bin, was used to estimate emissions from AlaCC Model VMT by speed bin estimates. The fuel type mix was used to convert AlaCC Model passenger vehicles to specific fuel types, and the truck fleet mix was used to assessing emission rates to AlaCC's truck classification for very small, small, medium and heavy vehicles.

Emissions data for different pollutants was converted to Carbon Dioxide Equivalent (CO_2e.) using the Global Warming Potential (GWP) rates shown in **Table 25.**

Table 25. Global Warming Potential Conversions

Pollutant (g/mi)	**Global Warning Potential (GWP)**
Methane (CH4)	25
Nitrous Oxide (N2O)	298
Atmospheric CO2	1

Source: CARB's GHG Global Warming Potentials, 2007

Evaluation

Table 26. Annual tons of CO_2e Emissions in the Study Area by Scenario

Year 2020	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)[1]
1,247,000	1,050,000	1,033,000	-1.6%

Source: Fehr & Peers, 2024

1. Note that the sensitivity test was not applied to the accessibility calculation.

Key Takeaways

- Emissions are expected to decrease between 2020 and 2035 due to the following:
  - The vehicle fleet mix is shifting to a larger proportion of electric vehicles, which have no tailpipe emissions.
  - The posted speed in the I-580 corridor is reduced to 55 mph, which falls within the range of most efficient travel speeds in terms of tailpipe emissions.
- The Evaluation Scenario is expected to decrease emissions by about 1.6%, consistent with the reduction in VMT generated by passenger and commercial vehicles in the study area.

Planning-Level Cost Estimates

This section of the memorandum summarizes planning-level cost estimates developed for the major projects included in the Evaluation Scenario. Cost estimates are rough order of magnitude estimates and are based on a preliminary set of project assumptions. It is expected that cost estimates will be refined as part of the project development process. Each section includes an overview of assumptions and methodology used in the estimation, as well as a summary table with rough order of magnitude costs. For the purposes of cost estimating the projects were bundled into the following categories:

- Highway
- Transit Operations
- Bicycle and Pedestrian Infrastructure
- Mobility Hubs and Station Access

Highway

The rough order of magnitude cost estimates for the freeway mainline, including busway improvements, and ramp modifications were developed using the Caltrans 11-page estimate form. Each estimate assumes a base year of 2024 (unit pricing from Caltrans Contract Cost Data as of December 31, 2023) and an anticipated construction commencement date of January 1, 2030. For consistency, all projects/subprojects are

assumed to be a five-year construction duration; thus, the midpoint of construction is June 2032.

The planning-level cost estimates for freeway mainline are summarized in two technical packages provided in **Appendix D**:

- I-580 Transit and Multimodal Strategy Project Cost Estimates for High-Occupancy Toll (HOT) Lanes, Bus Only Lanes, Median Bus Stations, and Bus "On Shoulder" Stops, dated April 10, 2024.
- I-580 Transit and Multimodal Strategy Project Cost Estimates: Ramp and Local Road Modifications, dated April 10, 2024.

Each package summarizes the proposed project elements and the corresponding planning-level cost summary. Detailed cost estimate information for each project element is included in the appendix of each package.

Freeway Mainline

The evaluated freeway mainline improvements encompass varying limits, several design alternatives, and several combinations of alternatives and/or conditions. The cost estimates have been developed to isolate segments to better inform future project development decisions. Refer to the appendix for additional cost estimate details to evaluate scenarios that are not summarized below. It should be noted that the 11-page estimates include multiple bid items that are anticipated based on knowledge of historical similar projects. The reader should understand that the numerous detailed bid items should not be used to infer that the designs are substantially developed and reflect a rough order of magnitude estimate – for example, the cost for one median station was developed and then duplicated for the other medina stations. The following tables identify the current and forecasted costs for each of the noted projects/scenarios.

Table 27. Proposed High-Occupancy Toll (HOT) Lane (Westbound) Costs

Segments #1WB, #2WB, #3WB and #4WB – Alameda County Line to Lake Park Avenue (Oakland)	**Current Costs (2024)**	**YOE (2032)**
Segment #1WB – Alameda County Line to Greenville Road (Livermore)	$35,950,000	$47,650,000
Segment #2WB – I-680 Interchange (Dublin/Pleasanton) to the I-238 Interchange (Castro Valley)	$46,750,000	$61,900,000
Segment #3WB – I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)	$45,000,000	$59,600,000
Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)	$22,150,000	$29,300,000
Total cost to implement Westbound HOT lanes between the Alameda County Line to Lake Park Ave	**$149,850,000**	**$198,450,000**

Table 28. Proposed High-Occupancy Toll (HOT) Lane (Eastbound) Costs

Segments #1EB, #2EB, #3EB and #4EB – SR-24 Interchange (Oakland) to the Alameda County Line	**Current Costs (2024)**	**YOE (2032)**
Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)	$21,650,000	$28,650,000
Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)	$51,600,000	$68,300,000
Segment #3EB – I-238 Interchange (Castro Valley) to Hacienda Road (Dublin/Pleasanton)	$60,800,000	$80,400,000
Segment #4EB – Greenville Road (Livermore) to the Alameda County Line	$39,000,000	$51,700,000
Total cost to implement Eastbound HOT lanes between SR-24 and the Alameda County Line	**$173,050,000**	**$229,050,000**

Table 29. Proposed Bus Only Lane with Median Bus Stations (Westbound and Eastbound) Costs

Bus Only Lane with Four (4) Median Bus Stations	**Current Costs (2024)**	**YOE (2032)**
Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)	$527,000,000	$697,000,000
Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)	$534,000,000	$707,000,000
Total cost to implement Westbound and Eastbound Bus Only Lanes with Four (4) Median Bus Stations	**$1,061,000,000**	**$1,404,000,000**

Table 30. Proposed Bus Stops "On Shoulder" Costs

"On Shoulder" Bust Stop Locations	**Current Costs (2024)**	**YOE (2032)**
"On Shoulder" bus stop near Northeastern University (Westbound)	$3,110,000	$4,120,000
"On Shoulder" bus stop at Keller Avenue (Westbound)	$2,260,000	$2,990,000
"On Shoulder" bus stop near Northeastern University (Eastbound)	$1,870,000	$2,470,000
"On Shoulder" bus stop at Keller Avenue (Eastbound)	$2,100,000	$2,770,000
Total cost to implement "On Shoulder" Bus Stops	**$9,340,000**	**$12,350,000**

Ramp Modifications

The evaluated ramp modifications are intended to eliminate redundant access to and from I-580, modernize ramp geometry, and improve access and operations for transit vehicles. The proposed local roadway modifications are intended to improve access and operational efficiencies for transit vehicles. Proposed geometric designs (graphical representations) for each of the ramp and local road modifications are included in the report. These graphical representations were used to develop estimated quantities. It should be noted that the 11-page estimates include multiple bid items that are anticipated based on knowledge of historical similar projects. The reader should understand that the numerous detailed bid items should not be used to infer that the designs are substantially developed. The following tables identify the current and forecasted costs for each project.

Table 31. Ramp Modification Costs

Ramp Modifications	**Current Costs (2024)**	**YOE (2032)**
Eastbound I-580 at the Broadway Off-ramp: Remove Webster Street Loop Off-ramp	$6,600,000	$8,750,000
Westbound I-580 at Grand Avenue: Remove Grand Avenue Loop Off-ramp	$4,630,000	$6,150,000
Westbound I-580 at Dimond Avenue: Remove Dimond Avenue Slip On-ramp	$2,940,000	$3,900,000
Westbound I-580 at Excelsior Avenue: Remove Excelsior Avenue Slip On-ramp	$2,560,000	$3,390,000
Total cost to implement All Ramp Modifications	**$16,730,000**	**$22,190,000**

Table 32. Evaluated Local Roadway Modifications Cost

Local Roadway Modification	**Current Costs (2024)**	**YOE (2032)**
Near Harrison Street to Improve Access to Westbound I-580	$3,720,000	$4,930,000
For Bus Priority on MacArthur Boulevard at Lakeshore Avenue	$2,250,000	$2,980,000
Total cost to implement the Local Roadway Modifications	**$5,970,000**	**$7,910,000**

Transit Operations

Transit operating costs were estimated in Remix based on frequency, span, and travel time assumptions for 15 new or modified express routes along the I-580 corridor. For conceptual planning purposes, all routes are assumed to operate bidirectional service every 15 minute from 6:00 AM to 12:00 AM, while the intra-Oakland route includes 10 minute frequency, as

shown in **Table 33**. Travel time estimates assume free-flow bus speed on freeway and existing scheduled travel times of 12 minutes from Toll Plaza to Salesforce Transit Center. One minute of dwell time delay is included per busway station. On-street operations assumes typical operating speeds of 15 miles per hour, assuming bus stop balancing, stop improvements, and TSP are provided.

Table 33. Frequency Assumptions for Transit Operations Cost

Route	Service Change	Assumed Frequency
Intra-Oakland Express	new route	10
14th Transbay	new route	15
98th Avenue Transbay	new route	15
Castro Valley	new route	15
Fruitvale/Foothill Transbay	new route	15
High Transbay	new route	15
Laurel/35th Ave	new route	15
Park/5th Transbay	new route	15
Seminary Transbay	new route	15
West Oakland Transbay	new route	15
D	new route	15
NX3 - MacArthur-Eastmond Transbay	realign and increase frequency	15
V Montclair-Park Boulevard Transbay	realign and increase frequency	15
C	realign and increase frequency	15
J	realign and increase frequency	15
CA	increase frequency	15
CB	increase frequency	15
P Piedmont-Oakland Avenue Transbay	increase frequency	15
E	increase frequency	15
F	remove service	NA
NL	remove service	NA

Source: Fehr & Peers, 2024

The total estimated cost to operate these routes is $80 million a year. This assumes a cost per revenue hour of $254 (consistent with AC Transit's 2021 costs) and 90 vehicles. This would represent a substantial increase in AC Transit's operating costs: the agency's pre-pandemic budget for all transbay services was approximately $35 million with 119 total commuter buses, and the agency's total pre-pandemic budget was $475M. These costs reflect a planning-level estimate and further refinements to routes, frequency, and span would reduce these costs.

Bicycle and Pedestrian Infrastructure

Bicycle and pedestrian improvement projects cost estimated include multimodal corridor projects on the Countywide Bikeways Network, trail projects, and I-580 crossing gap closure projects connecting to Alameda CTC's Countywide Bikeways Network.

Cost estimates for corridors with an associated project in the 2020 Countywide Transportation Plan (2020 CTP) were developed based on capital cost estimates provided by project sponsors in 2019 for the 2020 CTP. Cost estimates from the 2020 CTP were escalated by 28 percent to reflect construction cost increases between 2019 and 2023.[4]

Cost estimates for projects on other corridors were developed by applying a standard per-mile cost estimate by bicycle facility class, as shown in **Table 34**. All projects on the Countywide Bikeways Network, as well as I-580 crossing gap closure projects, were assumed to be Class I or Class IV, in alignment with Alameda CTC's All Ages and Abilities Policy. Detailed assumptions for the standard per-mile cost estimates, including unit costs, quantities, indirect costs, contingency costs, and agency soft costs, are provided in **Appendix E**.

Table 34. Per-Mile Cost Estimates for Bicycle and Pedestrian Improvement projects by bicycle facility class

Facility Class	Per-Mile Cost Estimate
Class I – Shared Use Path	$7,330,000
Class II – Bicycle Lanes	$1,990,000
Class III – Bicycle Boulevard	$608,000
Class IV – Separated Bikeways	$14,840,000

Source: Fehr & Peers, 2024

Cost estimates for the bicycle and pedestrian improvement projects are summarized in **Table 35**. Mileage estimates by corridor for Countywide Bikeways Network and I-580 crossing gap closure projects are provided in Appendix E.

Table 35. Bicycle and Pedestrian project cost estimates – Planning level estimates

Project	Cost Estimate
2020 CTP Projects	
40th Street	$20,490,000
Demarcus Blvd (Dublin/Pleasanton BART Station Access Improvements)	$20,490,000
Dublin Blvd	$210,030,000

[4] Source: Engineering News-Record (ENR) Construction Cost Index (CCI) for San Francisco, 2019-2023

Project	Cost Estimate
East Bay Greenway	$368,830,000
E14th/Mission Blvd	$358,580,000
East Lewelling Blvd	$12,810,000
Emeryville Greenway	$3,840,000
Hesperian	$19,210,000
Iron Horse Trail	$61,470,000
San Leandro Creek Trail	$42,260,000
San Lorenzo Creek Trail	$43,540,000
San Pablo Ave	$399,570,000
West Grand Ave	$119,100,000
Total 2020 CTP Projects	**$1,680,220,000**
Other Countywide Bikeways Network Projects	**$521,490,000**
I-580 Crossing Gap Closure Projects	**$166,020,000**
Total Bicycle and Pedestrian Improvement Projects	**$2,367,730,000**

Source: Fehr & Peers, 2024

Mobility Hubs and Station Access

Cost estimates for station access improvements at each rail station in the study area were developed based on existing station access projects from the 2020 CTP and other planned bicycle improvements within ¼ mile of each station.

The 2020 CTP included one station access project in the study area—the Dublin/Pleasanton BART Station Active Access Improvements. A 28 percent construction cost escalation assumption was applied to the estimate provided in the 2020 CTP, like the assumption for the bicycle and pedestrian improvement projects from the 2020 CTP as described above.

Cost estimates for other station access improvements were developed by applying the per-mile cost estimates shown in **Table 34** to planned bicycle improvements from the BART Walk and Bicycle Network Gap Study, local active transportation plans, and station area specific plans. Cost estimates for the station access projects are summarized in **Table 36** assuming Class IV costs across all projects. Detailed cost estimates are found in Appendix E.

Table 36. Station Access project cost estimates

Project	**Cost Estimate**
Dublin/Pleasanton BART Station Active Access Improvements	$20,490,000
Other Station Access Improvement Projects	$153,590,000
Total Station Access Improvement Projects	**$174,080,000**

Source: Fehr & Peers, 2024

Appendix A – Evaluation Methodology Memo

TO:	Kristen Villanueva, Alameda CTC
CC:	Shannon McCarthy, Alameda CTC
FROM:	Nate Conable and Jordan Brooks, Fehr & Peers
DATE:	August 14, 2023
SUBJECT:	**I-580 TAMS Evaluation Approach Briefing Paper**

Introduction

The I-580 Transit and Multimodal Strategy (I-580 TAMS) is a targeted planning effort to identify and phase a Corridor Strategy consisting of a set of transportation investments that work together to sustainably and equitably reduce VMT, enhance safety, and improve air quality while supporting land use and economic development in the corridor. This briefing paper describes the approach that will be used to help define and evaluate the I-580 TAMS Corridor Strategy.

Statewide Context

In addition to selecting the preferred strategy for the corridor, this study is being developed to satisfy the requirements for a Comprehensive Multimodal Corridor Plan (CMCP) to position recommended projects for funding from California's Solutions for Congested Corridors Program (SCCP). As such, the evaluation framework for the I-580 TAMS has been designed to be consistent with the adopted CMCP Guidelines. Notably, a CMCP must assess how the plan addresses six different topics:

- Congestion/delay
- Safety
- Accessibility
- Economic development, job creation & retention
- Regional air quality and greenhouse gas emission
- Efficient land use

These six topic areas inform the goals and objectives for the I-580 TAMS, as described more fully later in this document.

CalTrans' Project Approval/Environmental Document (PA/ED) process has been evolving to better account for induced VMT associated with projects on the State Highway System.

Planning efforts intended to provide congestion relief should therefore expect to include analysis of induced VMT for each proposed solution and indicate strategies to mitigate induced VMT if applicable.

Goals and Objectives

Goals and objectives for the I-580 TAMS are listed below. These goals come from the goals for the countywide transportation system, as defined in the Alameda County 2020 Comprehensive Transportation Plan (CTP), together with regional and state policy objectives for Comprehensive Multimodal Corridor Plan (CMCP) development.

- Improve sustainability
    - Reduce vehicle miles traveled (VMT)
    - Reduce greenhouse gas (GHG) emissions
- Improve health & safety
    - Reduce criteria pollutants
    - Reduce the number and severity of collisions
- Improve accessibility
    - Improve job access
    - Increase availability of affordable alternatives to driving alone
- Enhance travel reliability and efficiency
    - Improve travel time reliability
    - Improve transit on-time performance
    - Increase corridor person throughput
- Strengthen economic vitality
    - Increase employment access
    - Improve the efficiency of goods movement
- Support efficient land use & existing communities
    - Promote multimodal travel that supports efficient land use
    - Support placemaking and existing communities
- Advance equity in planning process & outcomes
    - Increase accessibility in equity priority communities
    - Improve safety in equity priority communities
    - Improve mobility in equity priority communities
    - Reduce environmental burdens in equity priority communities

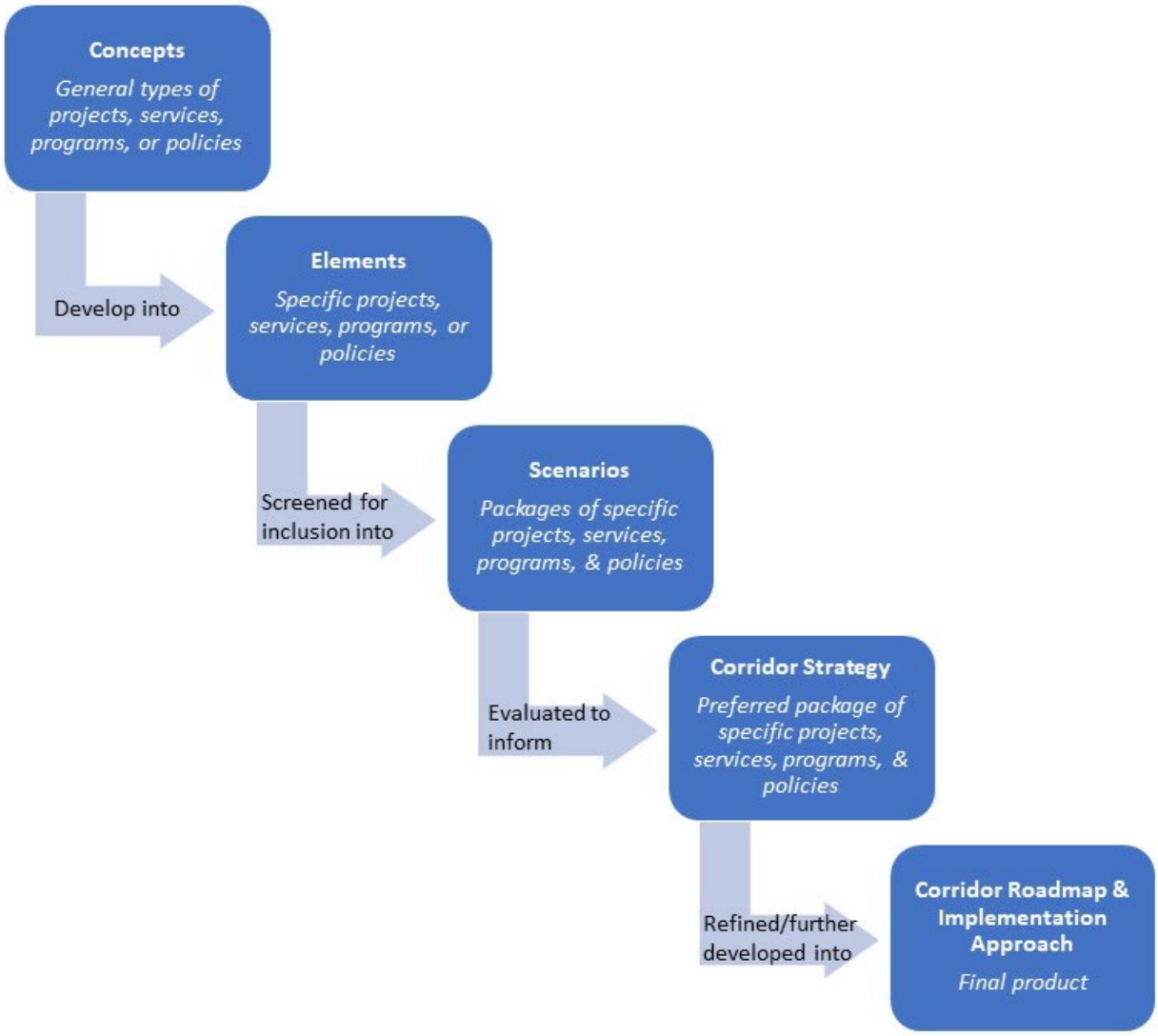
Corridor Strategy Development Technical Process

The overall strategy development technical process shown below in **Figure 1** highlights how evaluation is used to move from one step to the next throughout our overall study framework.

This evaluation approach briefing paper describes how we will:

- Develop the universe of elements that will be considered for the corridor
- Screen the potential elements for feasibility and alignment with the I-580 TAMS goals and objectives
- Package the remaining elements into a Corridor Evaluation Scenario that will be used to explore element effectiveness in supporting the goals and objectives
- Formally evaluate this scenario against a set of performance measures
- Use the evaluation results to help define the Corridor Strategy
- Support implementation planning with capital and operating cost estimates

Figure 1: Process Summary with Terms



Equity Approach

A commitment to advancing equity is a guiding principle for the I-580 TAMS. For the purposes of this project, equity is defined as prioritizing investments that expand accessible and affordable transportation options for vulnerable populations who use the I-580 corridor and ensuring that the package of recommendations mitigates transportation-related burdens, such as cost or air quality, on these populations. The following equity evaluation components are based on best practices and were informed by guidebooks listed in **Appendix A**.

The equity approach for the I-580 TAMS focuses on outcomes for low-income residents and people of color by assessing effects on MTC-defined Equity Priority Communities (EPCs) near I-580. Low-income residents and people of color may face unique barriers and impacts from proposed transportation investments. While all EPCs exhibit high concentrations of low-income residents and people of color, the definition of EPC also includes some low-income areas that have broader equity population concerns, such as limited English proficiency, zero-vehicle households, and high rent burden. Although EPCs do not encompass all members of the vulnerable populations who use the I-580 corridor—there are low-income residents living in other neighborhoods or outside of the nine-county Bay Area entirely—they provide a good representation of the needs of these users and communities and will be used as a proxy for evaluation purposes.

To ensure that the I-580 TAMS advances equity, equity considerations are incorporated into multiple workstreams for the project, including:

- Planning and executing outreach and engagement
- Identifying needs of equity populations
- Defining elements to be included in corridor scenarios
- Developing metrics and methods to evaluate and refine corridor scenarios, including identification of appropriate equity improvement actions and/or other implementation considerations

The I-580 TAMS will incorporate equity into the planning process by conducting engagement in close coordination with Community-Based Organizations (CBOs) that have insight into the needs and concerns of EPCs. CBOs and EPC residents will have meaningful opportunities to participate in each phase of engagement. Equitable engagement will be prioritized by compensating CBO representatives for their time spent providing input and feedback during focus groups. In addition, public engagement with EPC residents will be prioritized by conducting that engagement in person in addition to virtually, which will be the format for engagement broad engagement along I-580.

Public engagement with CBOs and EPC residents will occur in three phases throughout development of the I-580 TAMS. During Phase 1, the project team engaged CBOs representing EPCs along I-580 to confirm existing needs and challenges related to I-580 and received feedback on the Equity Evaluation Framework. In Phases 2 and 3, CBOs and EPC residents will

be engaged to provide feedback and help refine scenarios for evaluation and the final Corridor Strategy, respectively.

In addition to public engagement, evaluation focuses on these populations to ensure that the proposed investments meet their needs. Performance measures assess how the project advances equity across all topic areas through quantitative metrics that will be calculated for EPCs. Some metrics assess how the Corridor Strategy affects all EPCs along the corridor, while others assess key origin-destination pairs to identify how the Corridor Strategy affects specific EPC communities. In addition to the quantitative metrics, qualitative metrics focusing on the effects on equity populations are an effective way of capturing the experiences of narrow population segments that may otherwise be obscured in peak travel periods and systemwide averages.

Scenario Development and Evaluation Process

The results of the qualitative screening assessment and stakeholder feedback will inform the development of a build scenario known as the Corridor Evaluation Scenario. In the first phase of evaluation, this scenario will be evaluated against a No Build Scenario to help assess how well the goals and objectives of the project can be realized through major infrastructure investment in the corridor. The results of this assessment, along with stakeholder and public input, will guide the development of the Corridor Strategy, which is the final set of policies, projects, and programs recommended for near-term implementation on the corridor. In the second phase of evaluation, the Corridor Strategy will then be assessed using the same process as the first phase of evaluation.

No Build Scenario Definition

The No Build Scenario represents 2050 conditions and the resumption of pre-pandemic transit service as it existed in 2015. The No Build scenario in the study area (as defined below) assumes no modifications to the transportation system beyond the construction of projects that have already been fully funded. The only major fully funded planned project is the westbound HOV extension between I-980 and the Bay Bridge. Outside the study area, the No Build scenario would be consistent with transportation projects and policies included in Plan Bay Area 2050 (PBA 2050). However, projects and policies included in PBA 2050 that would make it difficult to assess the contribution of elements included in the Evaluation Scenario towards meeting I-580 TAMS goals would be excluded from the No Build Scenario. These include per-mile tolling, congestion pricing to San Francisco and Treasure Island, and BART service improvements, which might drive additional travel to the I-580 corridor.

Policy assumptions included in PBA 2050 that would be incorporated into the No Build scenario include:

- Auto operating cost increases
- Reduced TNC vehicle occupancy and wider availability
- Higher AV fleet penetration rate

- Larger work from home rates
- Regional Transportation Demand Management (TDM) initiatives, such as increase in parking prices and removal of employer parking subsidies

Although the No Build Scenario represents a scenario without major changes to the transportation system or policies in the study area, it uses land use from the Plan Bay Area 2050 (PBA 2050) Build scenario representing increased commercial and residential density in growth areas. These land use assumptions will be reflected in all Evaluation Scenarios as well, so that the difference in performance between the Corridor Evaluation Scenario and final Corridor Strategy can be attributed solely to the transportation investments included in those scenarios.

Study Area

As shown in **Figure 2**, the study area corresponds to a half-mile buffer around I-580 from the intersection with I-80 to the eastern Alameda County border, as well as a half-mile around the following BART and ACE stations located along or near the mainline:

- MacArthur BART
- San Leandro BART
- Bay Fair BART
- Castro Valley BART
- West Dublin/Pleasanton BART
- Dublin/Pleasanton BART
- Livermore ACE
- Vasco Road ACE

In some instances, areas outside the study area, such as portions of San Joaquin County, will be analyzed to support the evaluation of effects on communities or segments of the transportation network included in the study area.

Four geographical subareas of the study area are defined to support the definition of elements and evaluation results. These are outlined below:

- Subarea 1: Oakland-Castro Valley (Bay Bridge Toll Plaza to I-238)
- Subarea 2: Dublin Grade (I-238 to I-680)
- Subarea 3: Tri-Valley (I-680 to Greenville Road)
- Subarea 4: Altamont (Greenville Road to County Line)

Primary Analysis Tool and Screenlines

The primary tool used for scenario evaluation will be the Alameda Contra Costa Bi County Model (BCM). The BCM is a regional travel demand model derived from MTC's Travel Model One (version 1.5) with additional network and land use zonal detail for these two counties.

Selected screenlines along I-580 and on key parallel roadways will be used to assess the performance metrics detailed later in this briefing paper. Road segments parallel to I-580 are selected to capture potential interactions such as traffic diversion and VMT shifts. These screenlines are listed by segment below and shown in **Figure 3**.

- I-580 screenlines
    - Subarea 1
        - I-80 to I-980/SR 24
        - I-980/SR 24 to SR 13
        - SR 13 to Lake Chabot Road/Estudillo Avenue
        - Estudillo Avenue to I-238
    - Subarea 2
        - I-238 to East Castro Valley Boulevard
        - East Castro Valley Boulevard to I-680
    - Subarea 3
        - I-680 to SR 84
    - Subarea 4
        - North Vasco Road to SR 205

- Parallel road screenlines
    - Subarea 1
        - MacArthur Boulevard
        - East 14th Street
    - Subarea 2
        - Castro Valley Boulevard/Dublin Canyon Road
    - Subarea 3
        - Dublin Boulevard
        - Stoneridge Drive/West Jack London Boulevard
    - Subarea 4
        - (None)

Key Origin-Destination Pairs

As detailed below, some performance measures (e.g. travel times) are assessed for specific geographies. In addition to assessing travel on I-580 for the length of each subarea, the evaluation process will also assess a set of Key O/D Pairs representing key travel markets identified in the travel markets assessment. Origins and destinations included in the Key O/D Pairs will consist of aggregated clusters of Transportation Analysis Zones (TAZs) in the BCM that

represent areas classified as EPCs and/or Priority Development Areas (PDAs). EPCs and PDAs in the study area are shown in **Figure 4** and **Figure 5**. The Key O/D Pairs are listed below:

- East Oakland EPCs (west of CA 13) – Downtown San Francisco
- East Oakland EPCs (west of CA 13) – Downtown Oakland
- East Oakland EPCs (east of CA 13) – Downtown Oakland
- San Leandro EPCs – Downtown Oakland
- Castro Valley EPCs – Downtown Oakland
- Castro Valley EPCs – Dublin/Pleasanton PDAs
- Dublin/Pleasanton PDAs – Livermore PDAs
- Dublin/Pleasanton PDAs – San Joaquin County (Tracy)
- Altamont Pass – San Leandro industrial area (freight-related; automobile travel time and reliability only)

Figure 2. Study Area

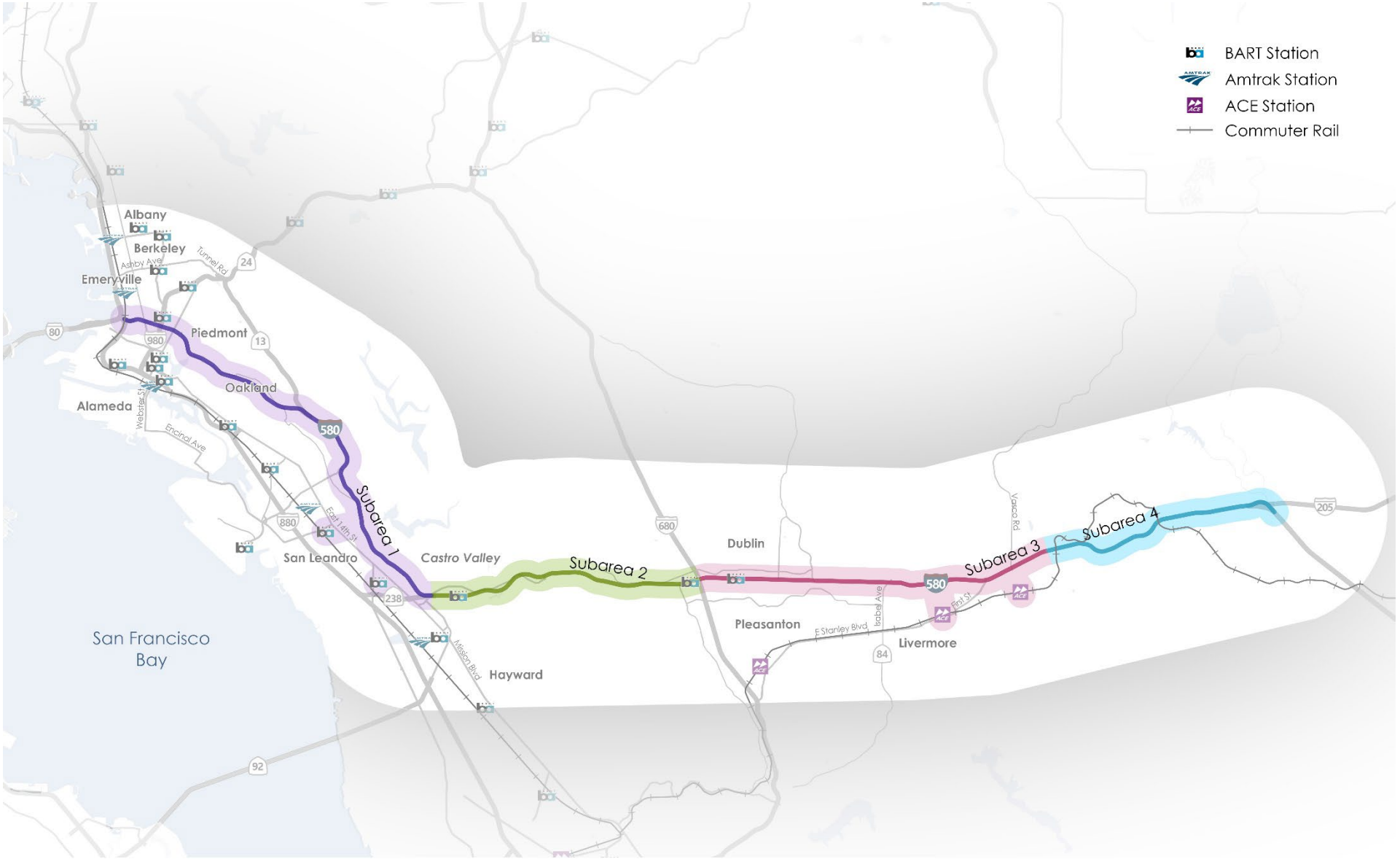


Figure 3. Screenline Locations

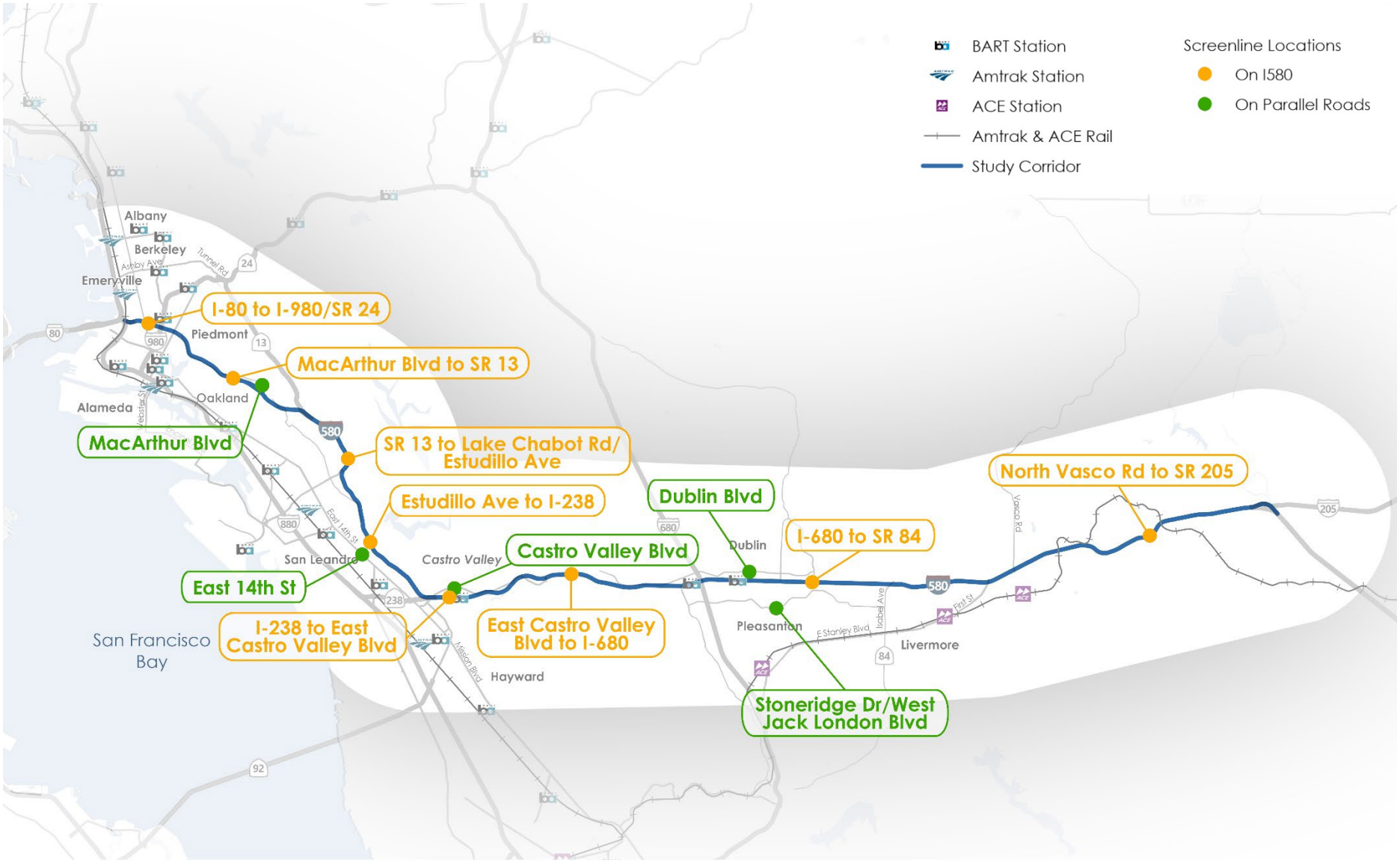
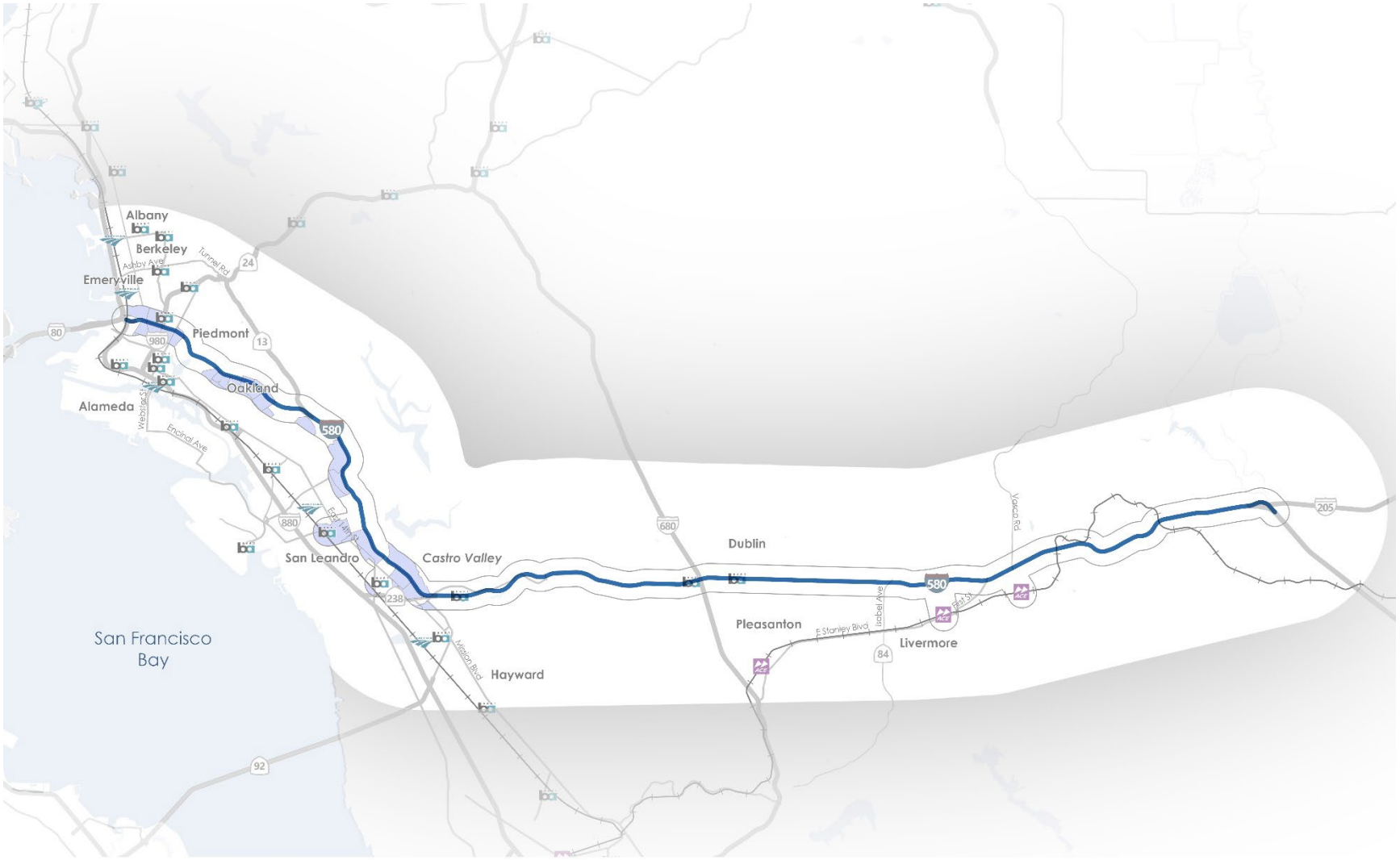


Figure 4. Equity Priority Communities in the Study Area



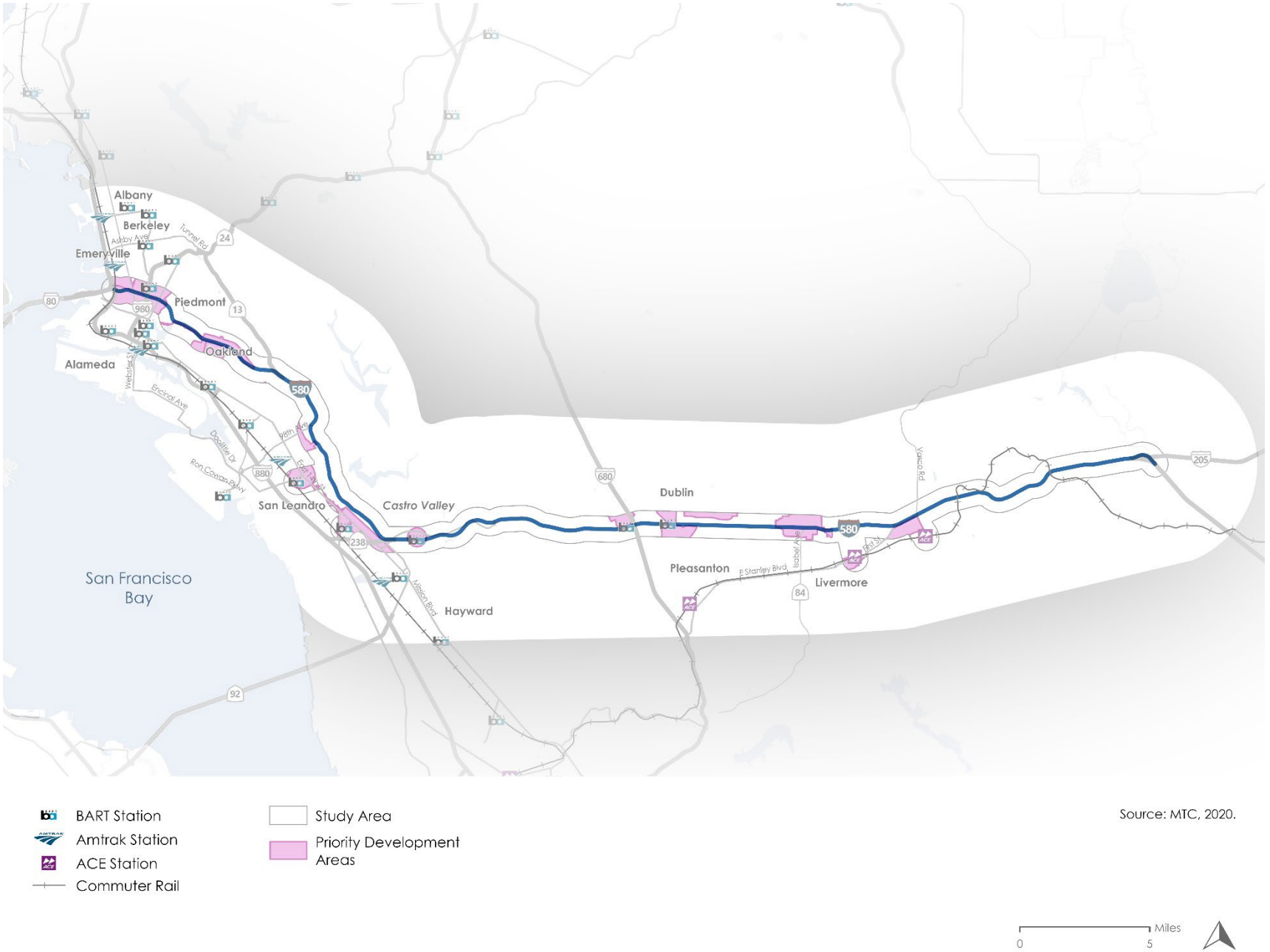
BART Station
Amtrak Station
ACE Station
Commuter Rail

Study Area
Equity Priority Communities

Source: MTC, 2021.

0 5 Miles

Figure 5. Priority Development Areas in the Study Area



Quantitative Performance Measures

The Corridor Evaluation Scenario and Corridor Strategy will be evaluated quantitatively against the No Build Scenario using the BCM to assess how they advance the I-580 TAMS goals and objectives. Quantitative evaluation will be based on five performance measures, with specific metrics for each measure described below.

1. VMT – does the Corridor Strategy reduce VMT in the corridor?
   Vehicle Miles Traveled (VMT) will be analyzed from several perspectives and at multiple geographic scales within the study area and for Alameda County as a whole. County-wide VMT is included to help understand whether VMT reductions within the study area are offset by increases in VMT outside the study area. All VMT will be reported for the daily time period.
   - Network VMT: All vehicle trips modeled as traveling along roadways in the geographic boundaries listed below will be counted. Vehicle volumes on each roadway segment are multiplied by the distance of the segment. Network VMT will be separated into personal automobiles and commercial vehicles.
     - County-wide (all roadways)
     - Study Area by four subareas
       - I-580
       - Parallel roadways
     - Roadways passing through EPCs
     - Roadways passing through PDAs
   - (Residential) VMT per person: All automobile vehicle trips made by residents living within the geographic boundaries listed below are traced back to the residence of the trip-maker, including trips not based at home.
     - County-wide
     - Study area by four subareas
     - EPCs
     - PDAs
   - (Work Tour) VMT per employee: All automobile vehicle trips that are part of home-work tours or work-based tours and which are made by employees working within the geographic boundaries are traced back to the work location.
     - County-wide
     - Study area by four subareas
     - PDAs

2. Mode Share – does the Corridor Strategy increase non-automobile mode share?
   Mode share will be modeled both on the network and for certain groups of trips as described below. All modeled mode shares will be reported both daily and by the BCM's five time periods: Early AM, AM Peak, Midday, PM Peak, and Evening.
   - Mode shares on the network will be calculated at each screenline using the modeled highway and transit network volumes. Note that these mode shares will

by definition only include auto (single-occupancy and high-occupancy) and transit modes.

- Mode shares for groups of trips will be calculated using the model's trip tables. These mode shares can include other travel modes such as bicycles or walking, although these shares are expected to be quite small given the distances involved.
    - Key O/D Pairs
    - All trips with an origin or destination in an EPC
    - All trips with an origin or destination in a PDA

3. Travel Time – does the Corridor Strategy decrease peak period travel times between key origin-destination pairs?
   Travel time during both AM and PM peak periods will be assessed for the following geographies:
    - Subarea: Subarea end-to-end travel time on I-580 will be compared for the following elements, when present:
        - Automobile travel time along General Purpose lanes
        - Automobile travel time along Managed Lanes
        - Transit travel time along bus routes
    - Key O/D Pairs: Modeled automobile and transit travel times

4. Throughput – does the Corridor Strategy increase the number of travelers moving through the corridor at key screenlines during peak periods?
   The modeled number of persons traveling through each screenline will be reported daily and for AM and PM peak periods using the screenlines outlined at the beginning of this briefing paper. These person-volumes will be compared for the following elements when present:
    - Persons in vehicles traveling in General Purpose lanes
    - Persons in vehicles traveling in Managed lanes
    - Persons traveling on transit (buses, and rail where it is within study area)

5. Equitable Benefits – does the Corridor Strategy result in a proportionate share of low-income travelers utilizing planned investments compared to the study area population overall?
   At each screenline, users of the major transportation investment at that location (e.g. HOT lanes, busway) will be disaggregated by income. The income distribution of persons utilizing these facilities will be compared to the income distribution of communities in the corresponding subarea. Subarea 4 has minimal population, so users of facilities at the screenline located in subarea 4 will be compared to communities in the adjacent subarea 3.

Qualitative Performance Measures

In addition to the quantitative evaluation described above, the Corridor Strategy will also be assessed qualitatively on performance measures that are difficult to evaluate using the BCM. The approach to assessing performance on these qualitative measures are described below:

1. Auto Demand – does the Corridor Strategy reduce vehicle travel demand?
   The VMT and mode share metrics obtained from the travel model can help determine whether the Corridor Strategy reduces vehicle travel demand. Indicators for a reduction in vehicle travel demand include:
   - Decrease in VMT
   - Decrease in vehicle mode share
   - Increase in vehicle occupancy

2. Key Trips/Choice – does the Corridor Strategy improve travel options between key origin-destination pairs?
   Travel time, reliability and accessibility metrics will help inform how the Corridor Strategy improves travel options between Key O/D Pairs. Indicators for improvement in travel options between Key O/D Pairs include:
   - Decreased travel time between Key O/D Pairs
   -
   - Increased accessibility to jobs between Key O/D Pairs

3. Transit – does the Corridor Strategy improve the capacity and quality of transit service?
   Transit-related elements will be mapped and locations where capacity and quality of transit service is improved will be highlighted. Additionally, mapped transit elements will be overlaid with PDA and EPC locations to determine whether the Corridor Strategy improves transit in PDA designations and whether the transit improvements result in equitable benefits.
4. Accessibility – does the Corridor Strategy improve multimodal access, including first/last-mile to transit?
   Elements that improve access to transit will be mapped and overlaid with PDA and EPC locations. Using Fehr & Peers' Travel Access+ tool, a map will be produced showing 10-minute bike sheds to each rail station in the study area with and without the Corridor Strategy.

5. Active Transportation – does the Corridor Strategy improve the quality, availability, and connectivity of active transportation facilities?
   Elements which improve active transportation will be mapped and overlaid with PDA and EPC locations to determine whether the Corridor Strategy improves active transportation in PDA designations and whether the active transportation improvements result in equitable benefits.

6. Safety – does the Corridor Strategy reduce collision risk on the corridor?
   All safety-related elements of the Corridor Strategy will be mapped and overlaid with the collision hotspot analysis from the safety needs assessment and the High Injury

Network (HIN) in the study area. Safety-related elements will also be compared against EPCs to identify whether the safety improvements would result in equitable benefits.

7. Economy – does the Corridor Strategy improve freight-supportive facilities (e.g., layover parking, climbing lanes)?
   The Corridor Strategy's freight-supportive elements will be described and mapped. The benefits and drawbacks of the proposed freight-supportive facilities will be described.

8. Affordability – does the Corridor Strategy improve affordable travel options between key origin-destination pairs?
   In addition to the quantitative metrics comparing travel times between Key O/D Pairs, transit fares and auto costs including tolls will be compared.

9. Health/Sustainability – does the Corridor Strategy improve air quality and decrease pollutants?
   Elements that support a reduction in vehicle demand will in turn result in reduction in emissions and air quality improvements. Indicators for improved air quality and decreases in air pollutants include:
   - Decrease in VMT
   - Decrease in auto mode share
   - Increase in auto occupancy
   - Increase in transit ridership

   Air quality indicators will be assessed for EPCs as well as the corridor as a whole.

10. Diversion – does the Corridor Strategy reduce traffic diverting to local streets & roads?
    The person-throughput findings, model outputs related to changes in volumes on parallel streets, and a comparison of assigned travel networks can help identify locations where diversion to local streets could be an issue. Such locations will be mapped and overlaid with identified places where the Corridor Strategy will propose road diets and other elements that could reduce diversion to ensure that efforts are properly focused.

Summary of Equity Performance Metrics

As described above, scenarios will be evaluated based on how they advance equity across a wide range of performance measures. The specific metrics that will be used to assess equitable impacts are summarized below.

Quantitative Equity Metrics

- Network VMT in EPCs
- Residential VMT per resident in EPCs
- Mode share for Key O/D Pairs that include an EPC

- Mode share for all trips with an origin or destination in an EPC
- Automobile travel times for Key O/D Pairs that include an EPC
- Transit travel times for Key O/D Pairs that include an EPC
- Income distribution of users of major transportation investments

Qualitative Equity Metrics

- Travel options for Key O/D Pairs involving an EPC
- Transit capacity and quality in EPCs
- Multimodal access to transit in EPCs
- Active transportation facilities in EPCs
- Safety improvements in EPCs
- Transit fare cost for Key O/D Pairs that include an EPC
- Automobile tolling costs for Key O/D Pairs that include an EPC
- Air quality in EPCs

Capital and Operating Cost Estimates

To support implementation planning for the Corridor Strategy, rough order-of-magnitude capital and operating cost estimates will be developed. Rough order-of-magnitude capital costs will be developed for conceptual highway plans, transit service and capital needs (e.g. vehicles), and transportation demand management (TDM) strategies. For highway cost estimates, rough order-of-magnitude cost estimates will generally follow the Caltrans 11-page estimate (associated with the future development of a Project Initiation Document) with higher levels of contingencies. Rough order-of-magnitude operational cost estimates for transit service will be based on agency costs per revenue-hour multiplied by the assumed amount of service associated with the element. Estimates for other programs and services will draw upon comparable examples.

Appendix B – Sensitivity Testing

The main purpose of running a Sensitivity Test scenario was to identify the magnitude of model uncertainty in the AlaCC model, in order to determine which model results fall outside the Margin of Error (MOE) associated with that model uncertainty. We generated the Sensitivity Scenario by adding network changes to the Comparison Scenario for which we would not expect the model to have any measurable impacts in the results along the I-580 area of influence. By comparing the outputs of this model run against the Evaluation Scenario, we generated margins of error for each performance measure. The projects included in the Sensitivity Scenario are:

a. Doubling transit frequencies in areas far from the I-580 corridor, for buses operated by:
    i. Santa Rosa City Bus
    ii. Sonoma County Transit
    iii. VTA (excluding routes to/from Fremont BART station)
b. Adding a lane in each direction of travel in roadways far from the I-580 corridor, along SR116 and SR152

The steps undertaken to define the significance or conclusiveness of results are listed below. The outputs for daily network VMT generated by personal vehicle is used as an example.

1. Model outputs were rounded to the nearest significant digit. For daily network VMT results were rounded to the nearest 1,000.
2. We established an allowable standard deviation of 1.5 for derived outputs.
3. The MOE was calculated based on the formula below, for each output. In some instances, the difference between the comparison scenario and the evaluation scenario was smaller than the difference in rounding, so we constrained the MOE to be the maximum of the difference between scenarios, or within the rounding difference.

$$MOE = StdDev * \frac{MAX(ABS(Sensitivity\ Scenario\ \# - Comp\ Scenario\ \#);\ Significant\ Digits)}{Comp\ Scenario\ \#}$$

4. Based on the MOE, lower and upper ranges for model uncertainty were generated by multiplying the Comparison Scenario outputs by the percentage change between the Comparison Scenario and Evaluation Scenario, and subtracting and adding the MOE, respectively.

$$model\ noise\ range = Comp\ Scenario\ \# * \left(1 \pm MOE * \frac{Eval\ Scenario\ \# - Comp\ Scenario\ \#}{Comp\ Scenario\ \#}\right)$$

5. Finally, the lower and upper ends of the range were compared against the Comparison Scenario:

a. If both the upper and lower ranges are larger than the Comparison Scenario outputs, the Evaluation Scenario results are greater than the Comparison Scenario and outside the MOE of model uncertainty.
b. If both the upper and lower ranges are smaller than the Comparison Scenario outputs, the Evaluation Scenario results are smaller than the Comparison Scenario and outside the MOE of model uncertainty.
c. If the lower range is below the Comparison Scenario output and the upper range is greater than the Comparison Scenario output, then the differences between the Evaluation Scenario are within the MOE of model uncertainty, and the results are inconclusive. This means that there is an equal chance that the change in metric is above or below the Comparison Scenario, so no conclusion can be drawn from the change in metric.

Table B1. Example of Margin of Error and Result Significance Estimation for Daily Network VMT Generated by Personal Vehicles

Geography	Comp Scenario	Sensitivity Scenario	MOE	Eval Scenario (Lower End)	Eval Scenario (Midpoint)	Eval Scenario (Upper End)	Result
Countywide	39,667,000	39,699,000	0.12%	39,534,000	39,582,000	39,630,000	reduced VMT
Study Area	12,308,000	12,331,000	0.28%	12,166,000	12,200,000	12,235,000	reduced VMT
Subarea 1 (I-580)	2,044,000	2,057,000	0.95%	1,978,000	1,997,000	2,017,000	reduced VMT
Subarea 2 (I-580)	1,634,000	1,642,000	0.73%	1,615,000	1,627,000	1,639,000	inconclusive
Subarea 3 (I-580)	2,446,000	2,444,000	0.12%	2,417,000	2,420,000	2,423,000	reduced VMT
Subarea 4 (I-580)	1,520,000	1,519,000	0.10%	1,502,000	1,503,000	1,505,000	reduced VMT

Source: Fehr & Peers, 2024

Appendix C – Busway with No Station Access, Alternative Scenario

The following tables summarize the metrics for subarea 1 pulled from an Alternative Evaluation Scenario. This scenario is identical to the Evaluation Scenario, but the busway stations have no direct walk access from the surrounding areas. Note that only a subset of the metrics was generated for this scenario.

VMT Metrics

Table C1. Total Daily Personal Vehicle Trips Starting or Ending in Select Geography

Geography	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	7,662,000	7,662,000	0.0%	inconclusive
Study Area	2,660,000	2,657,000	-0.1%	inconclusive
Subarea 1	1,617,000	1,617,000	0.0%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C2. Daily Network VMT Generated by Personal Vehicles

Geography	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	39,667,000	39,635,000	-0.1%	inconclusive
Study Area	12,308,000	12,239,000	-0.6%	reduced VMT
Subarea 1 (I-580)	2,044,000	1,977,000	-3.3%	reduced VMT
Subarea 1 (parallel, MacArthur Boulevard & East 14th St)	106,000	107,000	0.9%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C3. All VMT per Residents

Geography	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	12.6	12.5	-0.8%	inconclusive
Study Area	13.0	12.9	-0.8%	inconclusive
Subarea 1	10.3	10.3	0.0%	no change

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C4. All VMT per Workers

Geography	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	22.0	22.0	0.0%	no change
Study Area	21.9	22.0	0.5%	inconclusive
Subarea 1	20.3	20.4	0.5%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C5. Daily Network VMT Generated by Commercial Vehicles

Geography	Comparison Scenario	Evaluation Scenario	Percent Change (Comp. vs Eval.)	Result[1]
Countywide	5,737,000	5,737,000	-0.7%	reduced VMT
Study Area	1,445,000	1,445,000	-0.4%	reduced VMT
Subarea 1 (I-580)	247,000	247,000	-0.4%	reduced VMT
Subarea 1 (parallel, MacArthur Blvd & East 14th St)	15,000	15,000	-2.2%	inconclusive

Source: Fehr & Peers, 2024
Notes:
1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Mode Share

No mode split metrics were estimated for this alternative scenario.

Table C6. Daily Boardings by Transit Mode

Transit Mode	Comparison Scenario	Evaluation Scenario[3]	Net Change
Bus[1]	294,100	367,200	73,100
Rail[2]	531,100	524,400	-4,300

Source: Fehr & Peers, 2024
Notes:
1. Bus operators include AC Transit and LAVTA.
2. Rail operators include BART, ACE and Valley Link.
3. Note that the sensitivity test was not applied to the boardings calculation.

Table C7. Daily Bus Boardings by Facility Type

Facility Type	Comparison Scenario	Evaluation Scenario	Net Change
Bus Totals	**294,100**	**367,200**	**73,100**
Busway Lines	300	23,100	22,800
Transbay Lines Serving the I-80 Corridor	18,000	16,900	-1,100
Study Area Lines (Excluding Busway-Serving)	193,500	234,400	40,900
Other Bus Lines	82,300	92,800	10,500

Source: Fehr & Peers, 2024

Throughput

Table C8. Peak Period Total Person Throughput at Select Screenlines

Subarea	Screenline	AM Peak (6:00 AM – 10:00 AM)				PM Peak (3:00 PM – 7:00 PM)			
		Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[1]
Subarea 1 (I-580)	1	115,350	110,850	-3.9%	reduced volume	101,700	109,625	7.8%	increased volume
	2	61,975	64,175	3.5%	inconclusive	58,775	61,300	4.3%	increased volume
	3	48,275	49,625	2.8%	inconclusive	45,625	45,950	0.7%	inconclusive
	4	41,200	42,675	3.6%	inconclusive	39,250	39,850	1.5%	inconclusive
Subarea 1 (parallel roads)	101	1,700	1,675	-1.5%	inconclusive	2,250	2,225	-1.1%	inconclusive
	102	2,000	2,100	5.0%	inconclusive	2,850	3,100	8.8%	inconclusive

Source: Fehr & Peers, 2024

Notes:

1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C9. Peak Period Person Throughput by Mode at Select Screenlines

Subarea	Screenline	Mode[1]	AM Peak (6:00 AM – 10:00 AM)				PM Peak (3:00 PM – 7:00 PM)			
			Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Drive Alone	13,675	13,300	-2.7%	reduced volume	14,900	14,450	-3.0%	reduced volume
	2	Drive Alone	14,800	13,575	-8.3%	reduced volume	16,650	14,800	-11.1%	reduced volume

Subarea	Screenline	Mode[1]	AM Peak (6:00 AM – 10:00 AM)				PM Peak (3:00 PM – 7:00 PM)			
			Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
	3	Drive Alone	17,225	16,500	-4.2%	reduced volume	17,625	16,650	-5.5%	reduced volume
	4	Drive Alone	15,225	14,775	-3.0%	reduced volume	15,700	14,825	-5.6%	reduced volume
Subarea 1 (parallel roads)	101	Drive Alone	825	825	0.0%	inconclusive	1,100	1,125	2.3%	inconclusive
	102	Drive Alone	875	925	5.7%	inconclusive	1,450	1,500	3.4%	inconclusive
Subarea 1 (I-580)	1	HOV (2/3)	11,975	11,725	-2.1%	inconclusive	11,225	11,075	-1.3%	inconclusive
	2	HOV (2/3)	8,650	13,075	51.2%	increased volume	9,300	14,425	55.1%	increased volume
	3	HOV (2/3)	7,675	8,425	9.8%	increased volume	8,025	8,775	9.3%	increased volume
	4	HOV (2/3)	7,075	7,550	6.7%	increased volume	7,400	8,225	11.1%	increased volume
Subarea 1 (parallel roads)	101	HOV (2/3)	400	450	12.5%	inconclusive	575	625	8.7%	inconclusive
	102	HOV (2/3)	700	625	-10.7%	inconclusive	975	975	0.0%	inconclusive
Subarea 1 (I-580)	1	Bus	125	2,250	1700.0%	increased volume	400	2,150	437.5%	increased volume
	2	Bus	325	2,275	600.0%	increased volume	525	2,325	342.9%	increased volume
	3	Bus	375	550	46.7%	increased volume	475	600	26.3%	increased volume
	4	Bus	375	500	33.3%	increased volume	475	500	5.3%	inconclusive

Subarea	Screenline	Mode[1]	AM Peak (6:00 AM – 10:00 AM)				PM Peak (3:00 PM – 7:00 PM)			
			Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result	Comp. Sc.	Eval. Sc.	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (parallel roads)	101	Bus	475	400	-15.8%	inconclusive	575	475	-17.4%	inconclusive
	102	Bus	425	550	29.4%	increased volume	425	625	47.1%	increased volume
Subarea 1 (I-580)	1	Rail	89,575	96,875	8.1%	increased volume	75,175	81,950	9.0%	increased volume
	2	Rail	38,200	35,250	-7.7%	reduced volume	32,300	29,750	-7.9%	reduced volume
	3	Rail	23,000	24,150	5.0%	inconclusive	19,500	19,925	2.2%	inconclusive
	4	Rail	18,525	19,850	7.2%	increased volume	15,675	16,300	4.0%	increased volume
Subarea 1 (parallel roads)	101	Rail	-	-	NA	NA	-	-	NA	NA
	102	Rail	-	-	NA	NA	-	-	NA	NA
	105	Rail	-	-	NA	NA	-	-	NA	NA

Source: Fehr & Peers, 2024

Notes:

2. Drive Alone and HOV (2/3) includes vehicles traveling in the express lanes.
3. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C10. Daily Total Person Throughput in at Select Screenlines

Subarea	Screenline	Comparison Scenario	Evaluation Scenario	Percent Change (Eval. vs Comp.)	Result[1]
Subarea 1 (I-580)	1	332,350	354,825	6.8%	increased volume
	2	192,625	194,300	0.9%	inconclusive
	3	149,475	148,575	-0.6%	inconclusive
	4	126,950	119,725	-5.7%	inconclusive
Subarea 1 (parallel roads)	101	7,575	6,350	-16.2%	inconclusive
	102	8,925	8,700	-2.5%	inconclusive

Source: Fehr & Peers, 2024

Notes:

1. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Table C11. Daily Total Person Throughput by Mode at Select Screenlines

Subarea	Screenline	Mode[1]	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
Subarea 1 (I-580)	1	Drive Alone	51,925	50,025	-3.7%	reduced volume
	2	Drive Alone	54,925	50,725	-7.6%	reduced volume
	3	Drive Alone	57,850	55,700	-3.7%	reduced volume
	4	Drive Alone	50,800	48,900	-3.7%	reduced volume
Subarea 1 (parallel roads)	101	Drive Alone	3,750	3,625	-3.3%	inconclusive
	102	Drive Alone	4,550	4,525	-0.5%	inconclusive
Subarea 1 (I-580)	1	HOV (2/3)	41,575	40,225	-3.2%	inconclusive
	2	HOV (2/3)	30,550	41,650	36.3%	increased volume
	3	HOV (2/3)	26,400	26,975	2.2%	inconclusive
	4	HOV (2/3)	23,725	24,450	3.1%	increased volume
Subarea 1 (parallel roads)	101	HOV (2/3)	1,750	1,425	-18.6%	inconclusive
	102	HOV (2/3)	2,975	2,350	-21.0%	inconclusive
Subarea 1 (I-580)	1	Bus	625	8,300	1228.0%	increased volume
	2	Bus	1,250	7,550	504.0%	increased volume

Subarea	Screenline	Mode[1]	Comp. Scenario	Eval. Scenario	Percent Change (Eval. vs Comp.)	Result[2]
	3	Bus	1,175	1,600	36.2%	increased volume
	4	Bus	1,225	1,350	10.2%	inconclusive
Subarea 1 (parallel roads)	101	Bus	2,075	1,300	-37.3%	inconclusive
	102	Bus	1,400	1,825	30.4%	increased volume
Subarea 1 (I-580)	1	Rail	238,225	256,275	7.6%	increased volume
	2	Rail	105,900	94,375	-10.9%	reduced volume
	3	Rail	64,050	64,300	0.4%	inconclusive
	4	Rail	51,200	45,025	-12.1%	inconclusive
Subarea 1 (parallel roads)	101	Rail	-	-	NA	NA
	102	Rail	-	-	NA	NA

Source: Fehr & Peers, 2024

Notes:

1. Drive Alone and HOV (2/3) includes vehicles traveling in the express lanes.
2. Inconclusive is assigned to results that were within the range of model uncertainty as further described in Appendix B.

Accessibility

No accessibility metrics were estimated for this alternative scenario.

Equitable Benefits

No equitable benefits metrics were estimated for this alternative scenario.

Appendix D – Freeway Mainline Cost Estimate Details

I-580 Transit and Multimodal Strategy Project

Cost Estimates for High-Occupancy Toll (HOT) Lanes, Bus Only Lanes, Median Bus Stations, and Bus "On Shoulder" Stops

Prepared for: Fehr & Peers

Prepared by: Diablo Engineering Group

Date: April 10, 2024

Summary

Diablo Engineering Group (Diablo) prepared the attached information as a subconsultant to Fehr & Peers in support of the Alameda CTC I-580 Transit and Multimodal Strategy Project.

The cost estimates herein are based upon conceptual plans and narratives developed by Alameda CTC and Fehr & Peers. These cost estimates assume a base year of 2024 (unit pricing from Caltrans Contract Cost Data as of December 31, 2023) and an anticipated construction commencement date of January 1, 2030. All projects are assumed to be a five-year construction duration – the midpoint of construction is June 2032.

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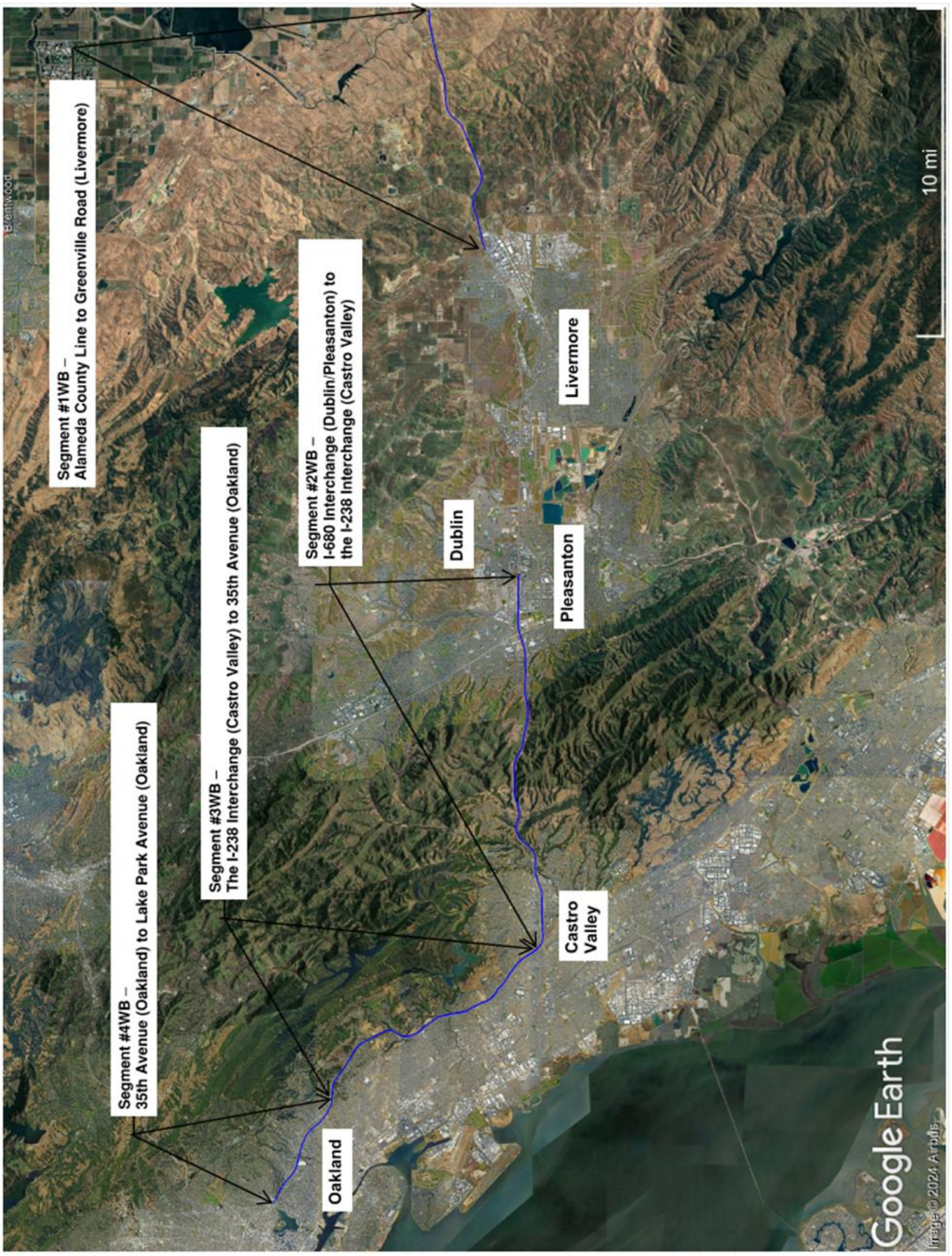
Westbound Segments Along I-580



High-Occupancy Toll (HOT) Lane (Westbound)

Segment #1WB – Alameda County Line to Greenville Road (Livermore)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for Westbound HOT Lanes on I-580 between the County Line and Greenville Road (Livermore)

Program Code : None

Project Limits : Between the County Line and Greenville Road - Join existing HOT lane at Greenville Road

Project Limits (Distance): 6.50 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane to close the gap between the County Line and the existing HOT lane

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 24,621,000	$ 33,696,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 24,621,000	$ 33,696,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 24,621,000	$ 33,696,000
PA/ED SUPPORT	$ 1,477,000	$ 1,598,000
PS&E SUPPORT	$ 4,432,000	$ 5,185,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 5,417,000	$ 7,128,000
TOTAL SUPPORT COST	$ 11,326,000	$ 13,911,000
TOTAL PROJECT COST	$ 35,950,000	$ 47,650,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Westbound)

Segment #2WB – I-680 Interchange (Dublin/Pleasanton) to the I-238 Interchange (Castro Valley)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Westbound HOT Lanes on I-580 between the I-680 interchange (Dublin/Pleasanton) and the I-238 interchange (Castro Valley)

Program Code : None

Project Limits : Between the existing HOT lane at the I-680 Interchange (Dublin/Pleasanton) and the I-238 Interchange (Castro Valley)

Project Limits (Distance): 10.23

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane extension between the existing HOT lane at I-680 interchange and the I-238 interchange

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 31,999,000	$ 43,793,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 31,999,000	$ 43,793,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 31,999,000	$ 43,793,000
PA/ED SUPPORT	$ 1,920,000	$ 2,077,000
PS&E SUPPORT	$ 5,760,000	$ 6,738,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 7,040,000	$ 9,264,000
TOTAL SUPPORT COST	$ 14,720,000	$ 18,079,000
TOTAL PROJECT COST	$ 46,750,000	$ 61,900,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Westbound)

Segment #3WB – I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Westbound HOT Lanes on I-580 between the I-238 interchange (Castro Valley) and 35th Avenue (Oakland)

Program Code : None

Project Limits : Between the I-238 interchange (Castro Valley) and 35th Avenue (Oakland)

Project Limits (Distance): 8.11 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane extension between the I-238 interchange and 35th Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 30,814,000	$ 42,171,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 30,814,000	$ 42,171,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 30,814,000	$ 42,171,000
PA/ED SUPPORT	$ 1,849,000	$ 2,000,000
PS&E SUPPORT	$ 5,547,000	$ 6,489,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 6,779,000	$ 8,921,000
TOTAL SUPPORT COST	$ 14,175,000	$ 17,410,000
TOTAL PROJECT COST	$ 45,000,000	$ 59,600,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Westbound)

Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Westbound HOT Lanes on I-580 from 35th Avenue (Oakland) and Lake Park Avenue (Oakland)

Program Code : None

Project Limits : Between 35th Avenue (Oakland) and Lake Park Avenue (Oakland)

Project Limits (Distance): 4.00 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane extension between 35th Avenue and the existing HOV lane near Lake Park Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 15,153,000	$ 20,739,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 15,153,000	$ 20,739,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 15,153,000	$ 20,739,000
PA/ED SUPPORT	$ 909,000	$ 983,000
PS&E SUPPORT	$ 2,728,000	$ 3,191,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 3,334,000	$ 4,387,000
TOTAL SUPPORT COST	$ 6,971,000	$ 8,561,000
TOTAL PROJECT COST	$ 22,150,000	$ 29,300,000

Programmed Amount

	Month	Year
Date of Estimate (Month/Year)	2	2024
Estimated Construction Start (Month/Year)	1	2030
Number of Working Days =		1040
Estimated Mid-Point of Construction (Month/Year)	6	2032
Estimated Construction End (Month/Year)	12	2034
Number of Plant Establishment Days		0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Westbound)

Segments #1WB, #2WB and #3WB – Alameda County Line to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for implementing a Westbound HOT Lane on I-580 between the County Line and 35th Avenue

Program Code : None

Project Limits : WB between the County Line and 35th Avenue

Project Limits (Distance): 24.83 Miles

Project Description: Convert the existing #1 lane from general purpose to HOT lane

Scope : Assess costs to construct lane conversion and install toll facility on the route

Alternative : Develop a HOT Lane at the County Line and continue to 35th Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 87,434,000	$ 119,660,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 87,434,000	$ 119,660,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 87,434,000	$ 119,660,000
PA/ED SUPPORT	$ 5,246,000	$ 5,675,000
PS&E SUPPORT	$ 15,739,000	$ 18,412,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 19,236,000	$ 25,313,000
TOTAL SUPPORT COST	$ 40,221,000	$ 49,400,000
TOTAL PROJECT COST	$ 127,700,000	$ 169,150,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Westbound)

Segments #1WB, #2WB, #3WB and #4WB – Alameda County Line to Lake Park Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a Westbound HOT Lane on I-580 from the County Line to the existing HOV lane near Lake Park Avenue

Program Code : None

Project Limits : WB between the County Line and the existing HOV lane near Lake Park Avenue

Project Limits (Distance): 24.83 Miles

Project Description: Convert the existing #1 lane from general purpose to HOT lane

Scope : Assess costs to construct lane conversion and install toll facility on the route

Alternative : Develop a HOT Lane at the County Line and continue to Lake Park Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 102,587,000	$ 140,399,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 102,587,000	$ 140,399,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 102,587,000	$ 140,399,000
PA/ED SUPPORT	$ 6,155,000	$ 6,658,000
PS&E SUPPORT	$ 18,467,000	$ 21,603,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 22,570,000	$ 29,700,000
TOTAL SUPPORT COST	$ 47,192,000	$ 57,961,000
TOTAL PROJECT COST	$ 149,850,000	$ 198,450,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Proposed High-Occupancy Toll (HOT) Lane (Westbound)

Cost Estimate Summaries and Clarifications:

Segments #1WB, #2WB and #3WB – Alameda County Line to 35th Avenue (Oakland)	**Current Costs (2024)**
Segment #1WB – Alameda County Line to Greenville Road (Livermore)	$35,950,000
Segment #2WB – I-680 Interchange (Dublin/Pleasanton) to the I-238 Interchange (Castro Valley)	$46,750,000
Segment #3WB – I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)	$45,000,000
Total cost to implement Westbound HOT lanes between the Alameda County Line to 35th Avenue	**$127,700,000**

Notes and Clarifications:

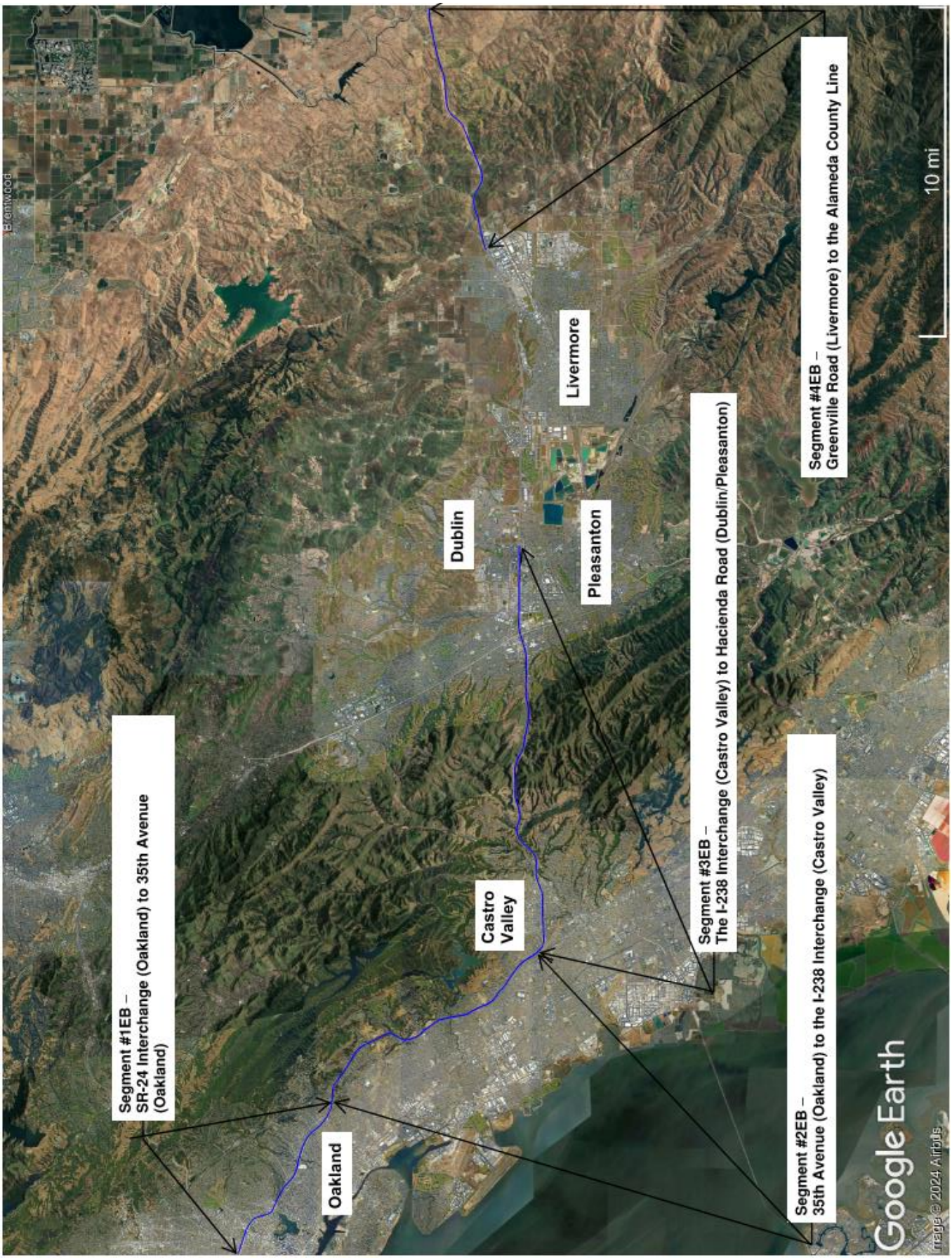
1. Please refer to the above 1-page summaries and/or the detailed 11-page estimates and assumptions in the Appendix for additional information and details.
2. The total cost to implement Westbound HOT lanes between the Alameda County Line and 35th Avenue (the above table) should be used in combination with the proposed Westbound bus only lane and median stations between 35th Avenue and Lake Park Avenue (as identified elsewhere herein – see page 21). If the proposed bus only lane and median stations between 35th Avenue to Lake Park Avenue are not implemented concurrent with the above, then alternative or additional improvements should be considered for the Westbound #1 lane to close the gap between 35th Avenue and Lake Park Avenue. See below.

Segments #1WB, #2WB, #3WB and #4WB – Alameda County Line to Lake Park Avenue (Oakland)	**Current Costs (2024)**
Segment #1WB – Alameda County Line to Greenville Road (Livermore)	$35,950,000
Segment #2WB – I-680 Interchange (Dublin/Pleasanton) to the I-238 Interchange (Castro Valley)	$46,750,000
Segment #3WB – I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)	$45,000,000
Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)	$22,150,000
Total cost to implement Westbound HOT lanes between the Alameda County Line to Lake Park Ave	**$149,850,000**

Notes and Clarifications:

1. Please refer to the above 1-page summaries and/or the detailed 11-page estimates and assumptions in the Appendix for additional information and details.
2. The total cost to implement Westbound HOT lanes between the Alameda County Line and Lake Park Avenue (the above table) assume the proposed Westbound bus only lane and median stations between 35th Avenue and Lake Park Avenue will not be constructed or may be constructed at a later date.

Eastbound Segments Along I-580



High-Occupancy Toll (HOT) Lane (Eastbound)

Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Eastbound HOT Lanes on I-580 between the I-80 interchange and 35th Avenue (Oakland)

Program Code : None

Project Limits : Between the I-80 interchange and 35th Avenue (Oakland)

Project Limits (Distance): 3.54 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane between the I-80 interchange and 35th Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost	Escalated Cost
TOTAL ROADWAY COST	$ 14,796,000	$ 20,249,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 14,796,000	$ 20,249,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 14,796,000	$ 20,249,000
PA/ED SUPPORT	$ 888,000	$ 960,000
PS&E SUPPORT	$ 2,663,000	$ 3,115,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 3,255,000	$ 4,283,000
TOTAL SUPPORT COST	$ 6,806,000	$ 8,358,000
TOTAL PROJECT COST	$ 21,650,000	$ 28,650,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Eastbound)

Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Eastbound HOT Lanes on I-580 between 35th Avenue (Oakland) and I-238 interchange (Castro Valley) and

Program Code : None

Project Limits : Between 35th Avenue (Oakland) and the I-238 interchange (Castro Valley)

Project Limits (Distance): 9.38

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane between 35th Avenue and the I-238 interchange

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 35,314,000	$ 48,329,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 35,314,000	$ 48,329,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 35,314,000	$ 48,329,000
PA/ED SUPPORT	$ 2,119,000	$ 2,292,000
PS&E SUPPORT	$ 6,357,000	$ 7,437,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 7,769,000	$ 10,223,000
TOTAL SUPPORT COST	$ 16,245,000	$ 19,952,000
TOTAL PROJECT COST	$ 51,600,000	$ 68,300,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Eastbound)

Segment #3EB – The I-238 Interchange (Castro Valley) to Hacienda Road (Dublin/Pleasanton)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for installing Eastbound HOT Lanes on I-580 between the I-238 interchange (Castro Valley) and the I-680 interchange (Dublin/Pleasanton)

Program Code : None

Project Limits : Between the I-238 Interchange (Castro Valley) and the existing HOT lane near the I-680 Interchange (Dublin/Pleasanton)

Project Limits (Distance): 11.81 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane between I-238 interchange (Castro Valley) and the I-680 interchange (Dublin/Pleasanton)

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 41,578,000	$ 56,903,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 41,578,000	$ 56,903,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 41,578,000	$ 56,903,000
PA/ED SUPPORT	$ 2,495,000	$ 2,699,000
PS&E SUPPORT	$ 7,484,000	$ 8,755,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 9,147,000	$ 12,037,000
TOTAL SUPPORT COST	$ 19,126,000	$ 23,491,000
TOTAL PROJECT COST	$ 60,800,000	$ 80,400,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Eastbound)

Segment #4EB – Greenville Road (Livermore) to the Alameda County Line

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for Eastbound HOT Lanes on I-580 between Greenville Road (Livermore) and the County Line

Program Code : None

Project Limits : Between Greenville Road (Livermore) to the County Line

Project Limits (Distance): 6.50 Miles

Project Description: Convert the existing #1 lane from a general purpose lane to a HOT lane

Scope : Assess costs to construct lane conversion and install toll facilities on the route

Alternative : Implement a HOT lane to close the gap between Greenville Road (Livermore) and the County Line

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 26,690,000	$ 36,527,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 26,690,000	$ 36,527,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 26,690,000	$ 36,527,000
PA/ED SUPPORT	$ 1,601,000	$ 1,732,000
PS&E SUPPORT	$ 4,804,000	$ 5,620,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 5,872,000	$ 7,727,000
TOTAL SUPPORT COST	$ 12,277,000	$ 15,079,000
TOTAL PROJECT COST	$ 39,000,000	$ 51,700,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Eastbound)

Segments #2EB, #3EB and #4EB – 35th Avenue (Oakland) to the Alameda County Line

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for implementing an Eastbound HOT Lane on I-580 between 35th Avenue and the County Line

Program Code : None

Project Limits : EB between 35th Avenue and the County Line

Project Limits (Distance): 27.69 Miles

Project Description: Convert the existing #1 lane from general purpose to HOT lane

Scope : Assess costs to construct lane conversion and install toll facility on the route

Alternative : Implement a HOT lane between 35th Avenue and the County Line

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 103,582,000	$ 141,759,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 103,582,000	$ 141,759,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 103,582,000	$ 141,759,000
PA/ED SUPPORT	$ 6,215,000	$ 6,723,000
PS&E SUPPORT	$ 18,645,000	$ 21,812,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 22,788,000	$ 29,987,000
TOTAL SUPPORT COST	$ 47,648,000	$ 58,522,000
TOTAL PROJECT COST	$ 151,400,000	$ 200,400,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

High-Occupancy Toll (HOT) Lane (Eastbound)

Segments #1EB, #2EB, #3EB and #4EB – SR-24 Interchange (Oakland) to the Alameda County Line

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for implementing an Eastbound HOT Lane on I-580 between the I-80 interchange and the County Line

Program Code : None

Project Limits : EB between the I-80 interchange and the County Line

Project Limits (Distance): 27.69 Miles

Project Description: Convert the existing #1 lane from general purpose to HOT lane

Scope : Assess costs to construct lane conversion and install toll facility on the route

Alternative : Implement a HOT lane between the I-80 interchange and the County Line

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 118,378,000	$ 162,008,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 118,378,000	$ 162,008,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 118,378,000	$ 162,008,000
PA/ED SUPPORT	$ 7,103,000	$ 7,683,000
PS&E SUPPORT	$ 21,308,000	$ 24,927,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 26,043,000	$ 34,270,000
TOTAL SUPPORT COST	$ 54,454,000	$ 66,880,000
TOTAL PROJECT COST	$ 173,050,000	$ 229,050,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Proposed High-Occupancy Toll (HOT) Lane (Eastbound)

Cost Estimate Summaries and Clarifications:

Segments #2EB, #3EB and #4EB – 35th Avenue (Oakland) to the Alameda County Line	**Current Costs (2024)**
Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)	$51,600,000
Segment #3EB – I-238 Interchange (Castro Valley) to Hacienda Road (Dublin/Pleasanton)	$60,800,000
Segment #4EB – Greenville Road (Livermore) to the Alameda County Line	$39,000,000
Total cost to implement Eastbound HOT lanes between 35th Avenue and the Alameda County Line	**$151,400,000**

Notes and Clarifications:

1. Please refer to the above 1-page summaries and/or the detailed 11-page estimates and assumptions in the Appendix for additional information and details.
2. The total cost to implement Eastbound HOT lanes between 35th Avenue and the Alameda County Line (the above table) could be used to implement HOT lanes between these limits or be complimentary with the proposed Eastbound bus only lane and median stations between the SR-24 Interchange and 35th Avenue (as identified elsewhere herein – see page 22). If the proposed bus only lane and median stations between the SR-24 Interchange and 35th Avenue are not implemented concurrent with the above, then an analysis should be performed to determine the best starting point for the HOT lanes. Such an analysis was not performed for this report.

Segments #1EB, #2EB, #3EB and #4EB – SR-24 Interchange (Oakland) to the Alameda County Line	**Current Costs (2024)**
Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)	$21,650,000
Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)	$51,600,000
Segment #3EB – I-238 Interchange (Castro Valley) to Hacienda Road (Dublin/Pleasanton)	$60,800,000
Segment #4EB – Greenville Road (Livermore) to the Alameda County Line	$39,000,000
Total cost to implement Eastbound HOT lanes between SR-24 and the Alameda County Line	**$173,050,000**

Notes and Clarifications:

1. Please refer to the above 1-page summaries and/or the detailed 11-page estimates and assumptions in the Appendix for additional information and details.
2. The total cost to implement Eastbound HOT lanes between SR-24 and the Alameda County Line (the above table) assume the proposed Eastbound bus only lane and median stations between the SR-24 Interchange and 35th Avenue will not be constructed or may be constructed at a later date.

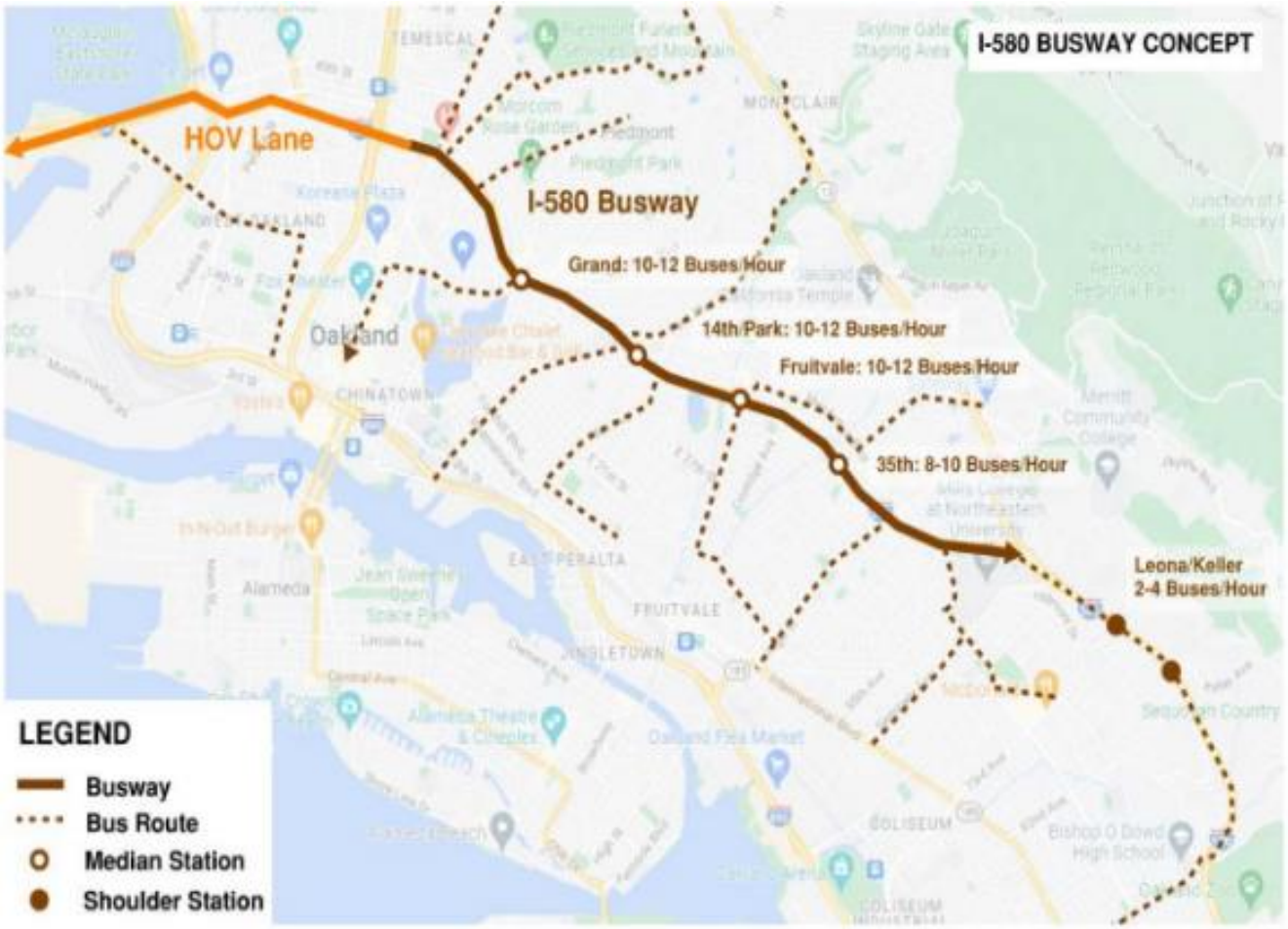
Bus Only Lanes

I-580 Transit Improvements - Bus Only Lane with Median Bus Stations (Westbound)
Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

I-580 Transit Improvements - Bus Only Lane with Median Bus Stations (Eastbound)
Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)

The concept plans for the proposed Bus Only Lanes anticipate four (4) median bus stops along I-580 near Grand Avenue, Park Street, Fruitvale Avenue, and 35th Avenue. Buses would exclusively travel in the #1 (median) freeway lane and directly access new bus stations that are positioned in the median area of the freeway. The proposed bus stations at Grand Avenue, Park Street, Fruitvale Avenue would be below the existing I-580 freeway – positioned at the same elevation as the local street where bus patrons have easy access. The proposed bus station at 35th Avenue would be positioned on the freeway median with bus patrons accessing the station from above via the 35th Avenue overcrossing.

The proposed EB and WB Bus Only Lanes and the associated median stations are assumed to be implemented concurrently. Implementation of an independent Bus Only Lane in either the EB or WB direction does not appear feasible because construction of median stations would mutually benefit both EB and WB buses.



I-580 Transit Improvements - Bus Only Lane with Median Bus Stations (Westbound)

Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for implementing a Westbound Bus Only Lane on I-580 between 35th Avenue and Lake Park Avenue. This estimate includes the construction of half of four (4) median Bus Stations. The other half of each Bus Station will be constructed on EB I-580. The full bus station (accommodating EB and WB) are assumed to be constructed concurrently.

Program Code : None

Project Limits : WB I-580 Between 35th Avenue and Lake Park Avenue

Project Limits (Distance): 4.00 Miles

Project Description: Convert the existing #1 lane from general purpose to Bus Only lane

Scope : Assess costs to construct lane conversion and install bus only lane and medain bus stations

Alternative : Extend the proposed WB I-580 HOT lane from 35th Avenue to Lake Park Avenue as an exclusive Bus Only lane

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 128,374,000	$ 175,688,000
TOTAL STRUCTURES COST	$ 230,880,000	$ 315,975,000
SUBTOTAL CONSTRUCTION COST	$ 359,254,000	$ 491,663,000
TOTAL RIGHT OF WAY COST	$ 1,060,000	$ 1,272,000
TOTAL CAPITAL OUTLAY COSTS	**$ 360,314,000**	**$ 492,935,000**
PA/ED SUPPORT	$ 21,619,000	$ 23,383,000
PS&E SUPPORT	$ 64,857,000	$ 75,874,000
RIGHT OF WAY SUPPORT	$ 212,000	$ 248,000
CONSTRUCTION SUPPORT	$ 79,269,000	$ 104,313,000
TOTAL SUPPORT COST	**$ 165,957,000**	**$ 203,818,000**
TOTAL PROJECT COST	**$ 527,000,000**	**$ 697,000,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus Only Lane with Median Bus Stations (Eastbound)

Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for implementing an Eastbound Bus Only Lane on I-580 between the SR-24 interchange and 35th Avenue. This estimate includes the construction of half of four (4) median Bus Stations. The other half of each Bus Station will be constructed on WB I-580. The full bus station (accommodating EB and WB) are assumed to be constructed concurrently.

Program Code : None

Project Limits : Between I-80 and 35th Avenue

Project Limits (Distance): 5.50 Miles

Project Description: Convert the existing #1 lane from general purpose to Bus Only lane

Scope : Assess costs to construct lane conversion and install bus only lane and medain bus stops

Alternative : Commence an exclusive Bus Only lane at the I-80 connector ramp to 35th Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 133,441,000	$ 182,624,000
TOTAL STRUCTURES COST	$ 230,880,000	$ 315,975,000
SUBTOTAL CONSTRUCTION COST	$ 364,321,000	$ 498,599,000
TOTAL RIGHT OF WAY COST	$ 1,060,000	$ 1,272,000
TOTAL CAPITAL OUTLAY COSTS	**$ 365,381,000**	**$ 499,871,000**
PA/ED SUPPORT	$ 21,923,000	$ 23,712,000
PS&E SUPPORT	$ 65,769,000	$ 76,940,000
RIGHT OF WAY SUPPORT	$ 212,000	$ 248,000
CONSTRUCTION SUPPORT	$ 80,384,000	$ 105,780,000
TOTAL SUPPORT COST	**$ 168,288,000**	**$ 206,680,000**
TOTAL PROJECT COST	**$ 534,000,000**	**$ 707,000,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus Only Lanes with Median Bus Stations (Westbound and Eastbound)

Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a Westbound and an Eastbound Bus Only Lane on I-580 from 35th Avenue to Lake Park Avenue (WB) and SR-24 interchange (EB). This estimate includes the construction of four (4) median Bus Stations.

Program Code : None

Project Limits : EB and WB I-580 Between 35th Avenue and SR-24

Project Limits (Distance): +/- 4.5 Miles

Project Description: Convert the existing #1 lane from general purpose to Bus Only lane

Scope : Assess costs to construct lane conversion and install bus only lane and medain bus stations

Alternative : Construct an exclusive Bus Only lane and median stations

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 261,815,000	$ 358,312,000
TOTAL STRUCTURES COST	$ 461,760,000	$ 631,950,000
SUBTOTAL CONSTRUCTION COST	$ 723,575,000	$ 990,262,000
TOTAL RIGHT OF WAY COST	$ 2,120,000	$ 2,544,000
TOTAL CAPITAL OUTLAY COSTS	**$ 725,695,000**	**$ 992,806,000**
PA/ED SUPPORT	$ 43,542,000	$ 47,095,000
PS&E SUPPORT	$ 130,626,000	$ 152,814,000
RIGHT OF WAY SUPPORT	$ 424,000	$ 496,000
CONSTRUCTION SUPPORT	$ 159,653,000	$ 210,093,000
TOTAL SUPPORT COST	**$ 334,245,000**	**$ 410,498,000**
TOTAL PROJECT COST	**$ 1,061,000,000**	**$ 1,404,000,000**

Programmed Amount

	Month	Year
Date of Estimate (Month/Year)	2	2024
Estimated Construction Start (Month/Year)	1	2030
Number of Working Days =	1040	
Estimated Mid-Point of Construction (Month/Year)	6	2032
Estimated Construction End (Month/Year)	12	2034
Number of Plant Establishment Days	0	

Estimated Project Schedule

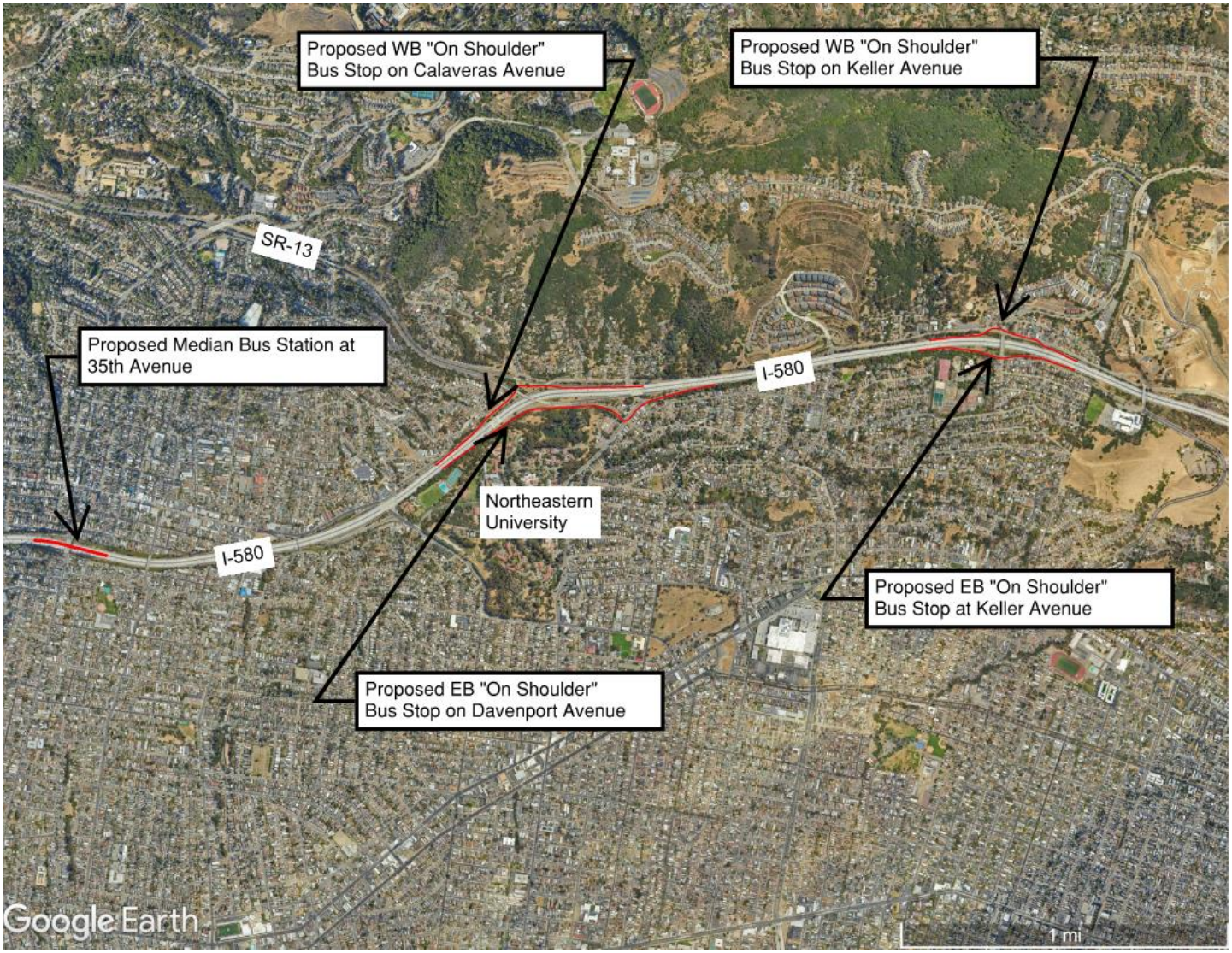
PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Bus Stops "On Shoulder"

I-580 Transit Improvements - Bus Only Lane, Median Stations, and Bus "On Shoulder" (Westbound)
Segment #3WB – The I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)
Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

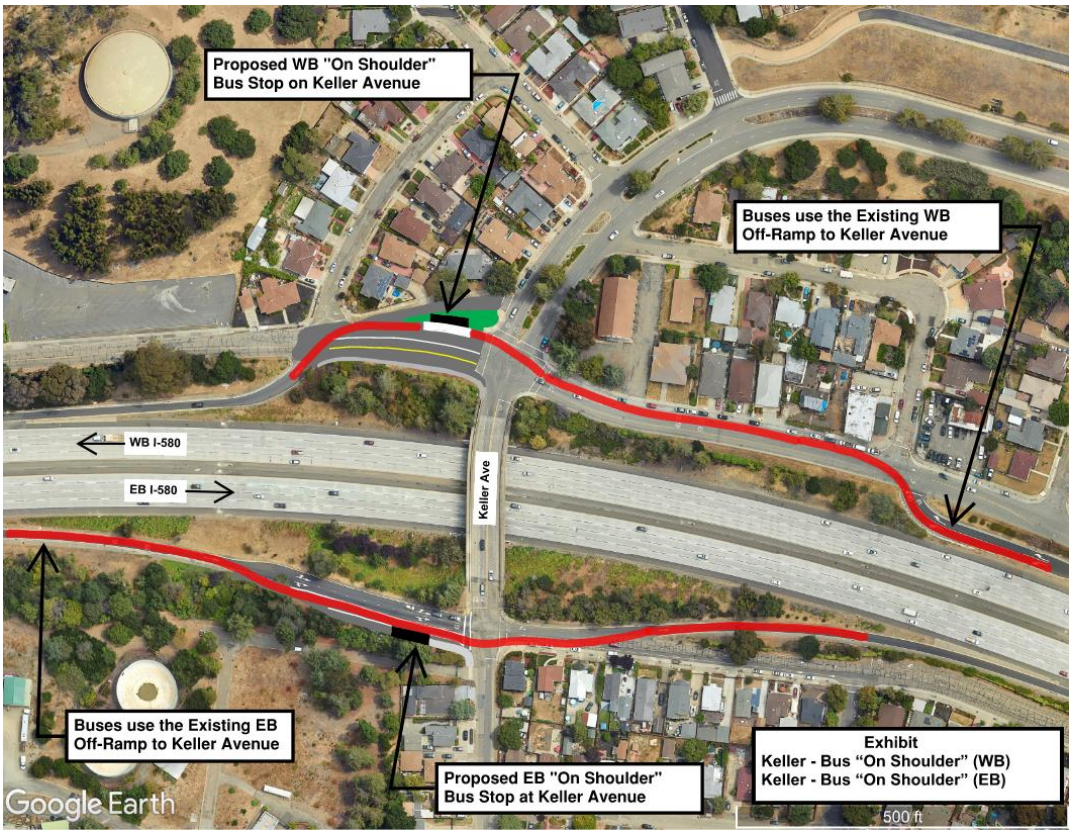
I-580 Transit Improvements - Bus Only Lane, Median Stations, and Bus "On Shoulder" (Eastbound)
Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)
Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)

The proposed Bus "On Shoulder" concepts anticipate paired bus stops for Westbound and Eastbound buses to efficiently exit the freeway, load and unload passengers, and re-enter the freeway. Two paired locations have been identified herein – one WB/EB pair in the vicinity of Northeastern University, Oakland, and one WB/EB pair at the Keller Avenue Interchange.



Proposed Bus "On Shoulder" stops near Northeastern University, Oakland

Proposed Bus "On Shoulder" stops at Keller Avenue, Oakland



I-580 Transit Improvements - Bus "On Shoulder" bus stop near Northeastern University (Westbound)

Segment #3WB – The I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

PM:

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a I-580 Westbound Bus Stop "On Shoulder" near Northeastern University between the Seminary Off-ramp and the Calaveras Avenue On-ramp

Program Code : None

Project Limits : On Westbound I-580 near Northeastern University between the Seminary Off-ramp and the Calaveras Avenue On-ramp

Project Limits (Distance): 0.9 Miles

Project Description: Construct improvements that allows buses to efficiently exit the mainline freeway, load and unload passengers, then re-enter the mainline freeway

Scope : Install signs, striping and bus stop improvements to accommodate the proposed project description. Reconstruct the SB SR-13 off-ramp terminal to eliminate the free right.

Alternative : Westbound Bus Stop "On Shoulder" near Northeastern University

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 2,027,000	$ 2,774,000
TOTAL STRUCTURES COST	$ 100,500	$ 138,000
SUBTOTAL CONSTRUCTION COST	$ 2,127,500	$ 2,912,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	**$ 2,128,000**	**$ 2,912,000**
PA/ED SUPPORT	$ 128,000	$ 138,000
PS&E SUPPORT	$ 383,000	$ 448,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 468,000	$ 616,000
TOTAL SUPPORT COST	**$ 979,000**	**$ 1,202,000**
TOTAL PROJECT COST	**$ 3,110,000**	**$ 4,120,000**

Programmed Amount

	Month	Year
Date of Estimate (Month/Year)	2	2024
Estimated Construction Start (Month/Year)	1	2030
Number of Working Days =		1040
Estimated Mid-Point of Construction (Month/Year)	6	2032
Estimated Construction End (Month/Year)	12	2034
Number of Plant Establishment Days		0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus "On Shoulder" bus stop at Keller Avenue (Westbound)

Segment #3WB – The I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

PM:

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a I-580 Westbound Bus Stop "On Shoulder" at the Keller Avenue interchange between the Keller Avenue Off-ramp and the Keller Avenue On-ramp

Program Code : None

Project Limits : On Westbound I-580 at the Keller Avenue interchange between the Keller Avenue Off-ramp and the Keller Avenue On-ramp

Project Limits (Distance): 0.5 Miles

Project Description: Construct improvements that allows buses to efficiently exit the mainline freeway, load and unload passengers, then re-enter the mainline freeway

Scope : Install signs, striping and bus stop improvements to accommodate the proposed project description.

Alternative : Westbound Bus Stop "On Shoulder" at Keller Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,441,000	$ 1,972,000
TOTAL STRUCTURES COST	$ 100,500	$ 138,000
SUBTOTAL CONSTRUCTION COST	$ 1,541,500	$ 2,110,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	**$ 1,542,000**	**$ 2,110,000**
PA/ED SUPPORT	$ 93,000	$ 101,000
PS&E SUPPORT	$ 278,000	$ 325,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 339,000	$ 446,000
TOTAL SUPPORT COST	**$ 710,000**	**$ 872,000**
TOTAL PROJECT COST	**$ 2,260,000**	**$ 2,990,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus "On Shoulder" bus stop near Northeastern University (Eastbound)

Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

PM:

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a I-580 Eastbound Bus Stop "On Shoulder" near Northeastern University between the Seminary Off-ramp and the Calaveras Avenue On-ramp

Program Code : None

Project Limits : On Eastbound I-580 near Northeastern University between the Seminary Off-ramp and the Calaveras Avenue On-ramp

Project Limits (Distance): 1.0 Miles

Project Description: Construct improvements that allows buses to efficiently exit the mainline freeway, load and unload passengers, then re-enter the mainline freeway

Scope : Install signs, striping and bus stop improvements to accommodate the proposed project description.

Alternative : Eastbound Bus Stop "On Shoulder" near Northeastern University

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,174,000	$ 1,607,000
TOTAL STRUCTURES COST	$ 100,500	$ 138,000
SUBTOTAL CONSTRUCTION COST	$ 1,274,500	$ 1,745,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	**$ 1,275,000**	**$ 1,745,000**
PA/ED SUPPORT	$ 77,000	$ 83,000
PS&E SUPPORT	$ 230,000	$ 269,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 281,000	$ 370,000
TOTAL SUPPORT COST	**$ 588,000**	**$ 722,000**
TOTAL PROJECT COST	**$ 1,870,000**	**$ 2,470,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus "On Shoulder" bus stop at Keller Avenue (Eastbound)

Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

PM:

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for a I-580 Eastbound Bus Stop "On Shoulder" at the Keller Avenue interchange between the Keller Avenue Off-ramp and the Keller Avenue On-ramp

Program Code : None

Project Limits : On Eastbound I-580 at the Keller Avenue interchange between the Keller Avenue Off-ramp and the Keller Avenue On-ramp

Project Limits (Distance): 0.5 Miles

Project Description: Construct improvements that allows buses to efficiently exit the mainline freeway, load and unload passengers, then re-enter the mainline freeway

Scope : Install signs, striping and bus stop improvements to accommodate the proposed project description.

Alternative : Eastbound Bus Stop "On Shoulder" at Keller Avenue

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,331,000	$ 1,822,000
TOTAL STRUCTURES COST	$ 100,500	$ 138,000
SUBTOTAL CONSTRUCTION COST	$ 1,431,500	$ 1,960,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	**$ 1,432,000**	**$ 1,960,000**
PA/ED SUPPORT	$ 86,000	$ 93,000
PS&E SUPPORT	$ 258,000	$ 302,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 315,000	$ 415,000
TOTAL SUPPORT COST	**$ 659,000**	**$ 810,000**
TOTAL PROJECT COST	**$ 2,100,000**	**$ 2,770,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit Improvements - Bus Only Lane, Median Stations, and Bus "On Shoulder" (Westbound and Eastbound)

Segment #4WB – 35th Avenue (Oakland) to Lake Park Avenue (Oakland)

Segment #3WB – The I-238 Interchange (Castro Valley) to 35th Avenue (Oakland)

Segment #1EB – SR-24 Interchange (Oakland) to 35th Avenue (Oakland)

Segment #2EB – 35th Avenue (Oakland) to the I-238 Interchange (Castro Valley)

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost for Westbound and Eastbound Bus Only Lanes and Median Stations on I-580 from 35th Avenue to the SR-24 interchange plus the addition of bus stops "on shoulders" near Northeastern University and Keller Avenue. This estimate includes the construction of four (4) median Bus Stations and four (4) "on shoulder" bus stops.

Program Code : None

Project Limits : EB and WB I-580 Between the Keller Avenue interchange and the SR-24 interchange

Project Limits (Distance): 8.5 Miles

Project Description: Convert the existing #1 lane from general purpose to Bus Only lane, add median bus stations and add bus stops "on shoulder".

Scope : Assess costs to construct lane conversion and install bus only lane and median bus stations and "on shoulder" bus stops

Alternative : Construct an exclusive Bus Only lane, median stations and "on shoulder" bus stops

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 267,788,000	$ 366,487,000
TOTAL STRUCTURES COST	$ 462,162,000	$ 632,502,000
SUBTOTAL CONSTRUCTION COST	$ 729,950,000	$ 998,989,000
TOTAL RIGHT OF WAY COST	$ 2,120,000	$ 2,544,000
TOTAL CAPITAL OUTLAY COSTS	**$ 732,072,000**	**$ 1,001,533,000**
PA/ED SUPPORT	$ 43,926,000	$ 47,510,000
PS&E SUPPORT	$ 131,775,000	$ 154,158,000
RIGHT OF WAY SUPPORT	$ 424,000	$ 496,000
CONSTRUCTION SUPPORT	$ 161,056,000	$ 211,940,000
TOTAL SUPPORT COST	**$ 337,181,000**	**$ 414,104,000**
TOTAL PROJECT COST	**$ 1,070,340,000**	**$ 1,416,350,000**

Programmed Amount

	Month	Year
Date of Estimate (Month/Year)	2	2024
Estimated Construction Start (Month/Year)	1	2030
Number of Working Days =		1040
Estimated Mid-Point of Construction (Month/Year)	6	2032
Estimated Construction End (Month/Year)	12	2034
Number of Plant Establishment Days		0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

I-580 Transit and Multimodal Strategy Project

Cost Estimates

Ramp and Local Road Modifications

Prepared for: Fehr & Peers

Prepared by: Diablo Engineering Group

Date: April 10, 2024

Summary

Diablo Engineering Group (Diablo) prepared the attached information as a subconsultant to Fehr & Peers in support of the Alameda CTC I-580 Transit and Multimodal Strategy Project.

The cost estimates herein are based upon conceptual plans and narratives developed by Alameda CTC and Fehr & Peers. These cost estimates assume a base year of 2024 (unit pricing from Caltrans Contract Cost Data as of December 31, 2023) and an anticipated construction commencement date of January 1, 2030. All projects are assumed to be a five-year construction duration – the midpoint of construction is June 2032.

The cost estimate summary page (page 1 of the 11-page estimate) is included for each of the study locations. See the Appendix for the detailed cost estimate (all 11-pages) for each of the study locations.

The proposed ramp modifications are intended to eliminate redundant access to and from I-580, modernize ramp geometry, and improve access and operations for transit vehicles.

The proposed local roadway modifications are intended to improve access and operational efficiencies for transit vehicles.

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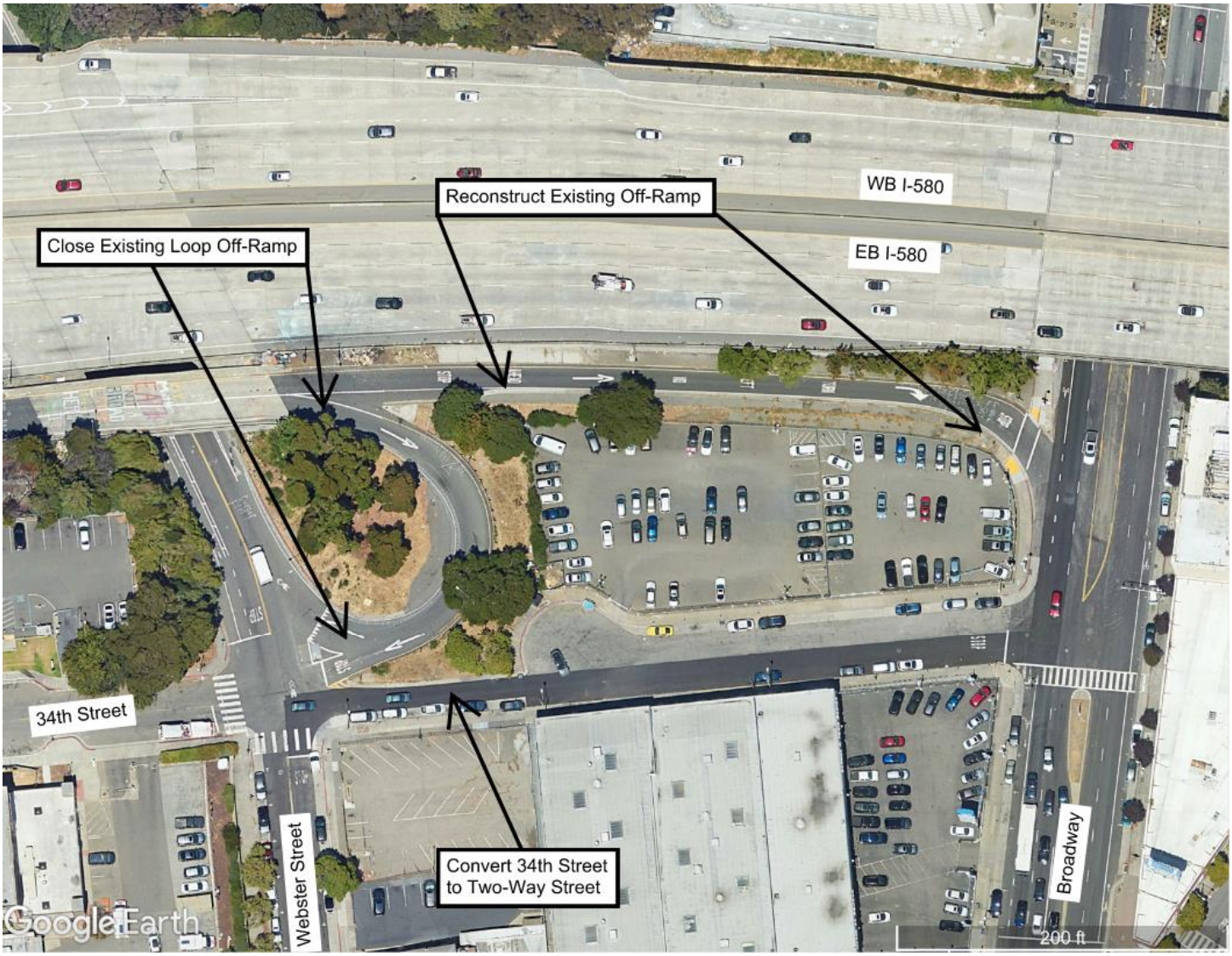
Ramp Modifications – Eastbound I-580 at the Broadway Off-ramp

- **Widen the Off-ramp and Install a New Traffic Signal at Broadway**
- **Remove the Webster Street Loop Off-ramp**
- **Expand the Park and Ride Facility**
- **Remove Cul-de-sac and Convert 34th Street to a Two-way Street**



Ramp Modifications – Eastbound I-580 at the Broadway Off-ramp

- **Widen the Off-ramp and Install a New Traffic Signal at Broadway**
- **Remove the Webster Street Loop Off-ramp**
- **Expand the Park and Ride Facility**
- **Remove Cul-de-sac and Convert 34th Street to a Two-way Street**

Ramp Modifications – Eastbound I-580 at the Broadway Off-ramp
HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to remove the existing Eastbound Webster Street off-ramp and reconstruct the ramp terminal at Broadway

Program Code : None

Project Limits : Eastbound Broadway off-ramp

Project Limits (Distance): 500 Feet

Project Description: Remove the existing Eastbound Webster off-ramp and reconstruct the ramp terminal at Broadway

Scope : Assess costs to remove the existing Eastbound Webster loop off-ramp, widen the off-ramp terminal connection to Broadway, expand the Park and Ride parking area, and convert 34th Street to a two-way street.

Alternative : Remove the off-ramp and restore the area to landscaping and expand the park and ride parking lot

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 4,413,000	$ 6,039,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 4,413,000	$ 6,039,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 4,413,000	$ 6,039,000
PA/ED SUPPORT	$ 88,000	$ 95,000
PS&E SUPPORT	$ 949,000	$ 1,110,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 1,125,000	$ 1,480,000
TOTAL SUPPORT COST	$ 2,162,000	$ 2,685,000
TOTAL PROJECT COST	$ 6,600,000	$ 8,750,000

Programmed Amount

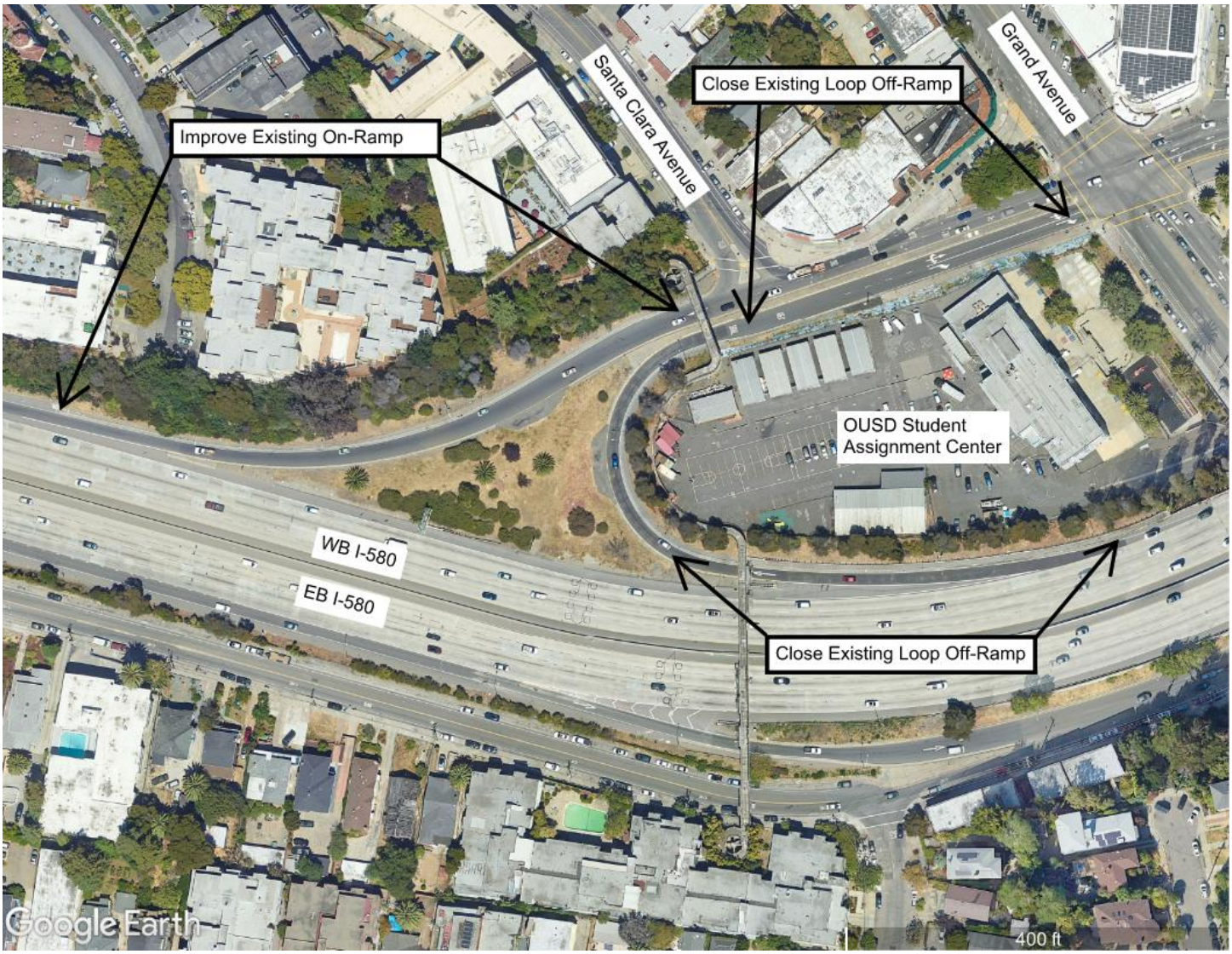
	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Ramp Modifications – Westbound I-580 at Grand Avenue

- **Remove Grand Avenue Loop Off-ramp**
- **Improve Westbound Grand Avenue On-ramp (left shoulder widening)**



Ramp Modifications – Westbound I-580 at Grand Avenue

- **Remove Grand Avenue Loop Off-ramp**
- **Improve Westbound Grand Avenue On-ramp (left shoulder widening)**

Ramp Modifications – Westbound I-580 at Grand Avenue
HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to remove the existing Westbound Grand off-ramp

Program Code : None

Project Limits : Westbound Grand off-ramp and on-ramp

Project Limits (Distance): 1,000 Feet

Project Description: Remove the exsiting Westbound Grand Avenue off-ramp and widen the left shoulder of the Westbound on-ramp

Scope : Assess costs to remove the existing Westbound Grand off-ramp and improve the on-ramp

Alternative : Remove the off-ramp and restore the area to landscaping. Widen the left shoulder of the on-ramp

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 3,107,000	$ 4,252,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 3,107,000	$ 4,252,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 3,107,000	$ 4,252,000
PA/ED SUPPORT	$ 62,000	$ 67,000
PS&E SUPPORT	$ 668,000	$ 781,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 792,000	$ 1,042,000
TOTAL SUPPORT COST	$ 1,522,000	$ 1,890,000
TOTAL PROJECT COST	$ 4,630,000	$ 6,150,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Ramp Modification – Westbound I-580 at Dimond Avenue

- **Remove Dimond Avenue Slip On-ramp**
- **Widen Right Shoulder of Fruitvale Avenue Direct On-ramp**

Ramp Modification – Westbound I-580 at Dimond Avenue

- **Remove Dimond Avenue Slip On-ramp**
- **Widen Right Shoulder of Fruitvale Avenue Direct On-ramp**

Ramp Modification – Westbound I-580 at Dimond Avenue
HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to remove the existing Westbound Dimond Avenue slip on-ramp

Program Code : None

Project Limits : WB Dimond Avenue on-ramp

Project Limits (Distance): 1,000 Feet

Project Description: Remove the exsiting Dimond Avenue on-ramp and improve the existing Fruitvale Avenue on-ramp

Scope : Assess costs to remove the existing Dimond Avenue slip on-ramp

Alternative : Remove a portion of the on-ramp and close access from the Dimond/Montana intersection

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,972,000	$ 2,698,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 1,972,000	$ 2,698,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 1,972,000	$ 2,698,000
PA/ED SUPPORT	$ 39,000	$ 42,000
PS&E SUPPORT	$ 424,000	$ 496,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 503,000	$ 662,000
TOTAL SUPPORT COST	$ 966,000	$ 1,200,000
TOTAL PROJECT COST	$ 2,940,000	$ 3,900,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =			1040
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days			0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Ramp Modification – Westbound I-580 at Excelsior Avenue

- **Remove Excelsior Avenue Slip On-ramp**
- **Widen Right Shoulder of Park Boulevard Direct On-ramp**

Ramp Modification – Westbound I-580 at Excelsior Avenue

- **Remove Excelsior Avenue Slip On-ramp**
- **Widen Right Shoulder of Park Boulevard Direct On-ramp**

Ramp Modification – Westbound I-580 at Excelsior Avenue
HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to remove the existing Westbound Excelsior Avenue slip on-ramp

Program Code : None

Project Limits : Westbound Excelsior Avenue slip on-ramp

Project Limits (Distance): 1,000 Feet

Project Description: Remove the exsiting Excelsior Avenue on-ramp and improve the existing Park Bouldevard on-ramp

Scope : Assess costs to remove the existing Excelsior Avenue slip on-ramp

Alternative : Remove a portion of the on-ramp

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	**$ 1,713,000**	**$ 2,345,000**
TOTAL STRUCTURES COST	**$ -**	**$ -**
SUBTOTAL CONSTRUCTION COST	**$ 1,713,000**	**$ 2,345,000**
TOTAL RIGHT OF WAY COST	**$ -**	**$ -**
TOTAL CAPITAL OUTLAY COSTS	**$ 1,713,000**	**$ 2,345,000**
PA/ED SUPPORT	**$ 34,000**	**$ 37,000**
PS&E SUPPORT	**$ 368,000**	**$ 431,000**
RIGHT OF WAY SUPPORT	**$ -**	**$ -**
CONSTRUCTION SUPPORT	**$ 437,000**	**$ 575,000**
TOTAL SUPPORT COST	**$ 839,000**	**$ 1,043,000**
TOTAL PROJECT COST	**$ 2,560,000**	**$ 3,390,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Local Roadway Modification – Harrison Street at I-580
Bus Highway Access Improvements

Two alternatives were studied for this local roadway improvement. Both alternatives propose improvements to facilitate a more efficient route for buses to access Westbound I-580.

Alternative #1 proposes to convert one block of MacArthur Boulevard from one-way to two-way. Specifically, on MacArthur Boulevard, the block between Fairmount Avenue and Harrison Avenue currently accommodates three vehicle lanes and on-street parking. The alternative proposes to construct a raised median to accommodate one eastbound vehicle lane and two westbound vehicle lanes.

Alternative #2 proposes to convert one block of Santa Clara Avenue from a two-way street to a one-way street. Specifically, on Santa Clara Avenue, the block between Fairmount Avenue and Harrison Avenue currently accommodates two vehicle lanes (one in each direction) and on-street parking. The alternative proposes to convert the street to one way accommodating two eastbound lanes. The #2 lane is proposed to remain as existing – transitioning onto southbound Harrison Street. The #1 lane would be reconfigured to approach a modified signalized intersection at Harrison Street. After transitioning through the signalized intersection, buses (including general purposes vehicles) would use the #1 lane to transition across Harrison Street to access the existing Westbound loop on-ramp.

Local Roadway Modifications Near Harrison Street to Improve Access to Westbound I-580

- **Local Roadway Modifications to Increase Efficient Bus Access onto Westbound I-580**

Alternative 1

Local Roadway Modifications Near Harrison Street to Improve Access to Westbound I-580

- **Local Roadway Modifications to Increase Efficient Bus Access onto Westbound I-580**

Alternative 1

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to improve bus access to Westbound I-580 from Westbound MacArthur Boulevard

Program Code : None

Project Limits : Fairmount Avenue to the Westbound I-580 loop on-ramp

Project Limits (Distance): 750 Feet

Project Description: Improve bus access from Westbound MacArthur Boulevard to Westbound I-580

Scope : Assess costs to reconfigure roadway conditions to accomplish improved bus access to Westbound I-580

Alternative : Alternative #1 proposes to convert one block of MacArthur Boulevard from one-way to two-way. Specifically, on MacArthur Boulevard, the block between Fairmount Avenue and Harrison Avenue currently accommodates three vehicle lanes and on-street parking. The alternative proposes to construct a raised median to accommodate one eastbound vehicle lane and two westbound vehicle lanes.

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 2,492,000	$ 3,410,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 2,492,000	$ 3,410,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	**$ 2,492,000**	**$ 3,410,000**
PA/ED SUPPORT	$ 50,000	$ 54,000
PS&E SUPPORT	$ 536,000	$ 627,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 635,000	$ 836,000
TOTAL SUPPORT COST	**$ 1,221,000**	**$ 1,517,000**
TOTAL PROJECT COST	**$ 3,720,000**	**$ 4,930,000**

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Local Roadway Modifications Near Harrison Street to Improve Access to Westbound I-580

- **Local Roadway Modifications to Increase Efficient Bus Access onto Westbound I-580**

Alternative 2

Local Roadway Modifications Near Harrison Street to Improve Access to Westbound I-580

- **Local Roadway Modifications to Increase Efficient Bus Access onto Westbound I-580**

Alternative 2

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to improve bus access to Westbound I-580 from Westbound MacArthur Boulevard

Program Code : None

Project Limits : Fairmount Avenue to the Westbound I-580 loop on-ramp

Project Limits (Distance): 750 Feet

Project Description: Improve bus access from Westbound MacArthur Boulevard to Westbound I-580

Scope : Assess costs to reconfigure roadway conditions to accomplish improved bus access to Westbound I-580

Alternative : Alternative #2 proposes to convert one block of Santa Clara Avenue from a two-way street to a one-way street. Specifically, on Santa Clara Avenue, the block between Fairmount Avenue and Harrison Avenue currently accommodates two vehicle lanes (one in each direction) and on-street parking. The alternative proposes to convert the street to one way accommodating two eastbound lanes. The #2 lane is proposed to remain as existing – transitioning onto southbound Harrison Street. The #1 lane would be reconfigured to approach a modified signalized intersection at Harrison Street. After transitioning through the signalized intersection, buses (including general purposes vehicles) would use the #1 lane to transition across Harrison Street to access the existing Westbound loop on-ramp.

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,505,000	$ 2,060,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 1,505,000	$ 2,060,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 1,505,000	$ 2,060,000
PA/ED SUPPORT	$ 30,000	$ 32,000
PS&E SUPPORT	$ 324,000	$ 379,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 384,000	$ 505,000
TOTAL SUPPORT COST	$ 738,000	$ 916,000
TOTAL PROJECT COST	$ 2,250,000	$ 2,980,000

Programmed Amount

	Month	/	Year
Date of Estimate (Month/Year)	2	/	2024
Estimated Construction Start (Month/Year)	1	/	2030
Number of Working Days =	1040		
Estimated Mid-Point of Construction (Month/Year)	6	/	2032
Estimated Construction End (Month/Year)	12	/	2034
Number of Plant Establishment Days	0		

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Local Roadway Modifications for Bus Priority on MacArthur Boulevard at Lakeshore Avenue

- **Local Roadway Modifications to Improve Access to Buses on MacArthur Boulevard**

The proposed improvements will eliminate the existing Grand Avenue to MacArthur Boulevard free right turn; eliminate the existing MacArthur Boulevard to Lakeshore Avenue free right turn; development of a bus only lane on MacArthur Boulevard between Grand Avenue and Lakeshore Avenue; provide a protected bike lane along Grand Avenue.

It is noted that the proposed improvements will not encroach into the existing recreation areas of the park. With this condition, the bike lane along MacArthur Boulevard will be a street-grade class 2 bike lane. To incorporate a class 4 bike lane, encroachment into the park would be necessary.

Local Roadway Modifications for Bus Priority on MacArthur Boulevard at Lakeshore Avenue
- **Local Roadway Modifications to Improve Access to Buses on MacArthur Boulevard**

HIGH-LEVEL PLANNING COST ESTIMATE

County-Route: Alameda-580

Type of Estimate : Project feasibility to determine the rough order of magnitude cost to make local roadway modifications for bus priority on MacArthur Boulevard at Lakeshore Avenue

Program Code : None

Project Limits : On MacArthur Boulevard between Grand Avenue and Lakeshore Avenue

Project Limits (Distance): 500 Feet

Project Description: Eliminate the existing Grand Avenue to MacArthur Boulevard free right turn; eliminate the existing MacArthur Boulevard to Lakeshore Avenue free right turn; development of a bus only lane on MacArthur Boulevard between Grand Avenue and Lakeshore Avenue; and provide a protected bike lane along Grand Avenue.

Scope : Impove access to bus service and improve bicycle mobility

Alternative : Develop a bus onel lane on MacArthur Boulevard

SUMMARY OF PROJECT COST ESTIMATE

	Current Year Cost (2024)	Escalated Cost (2032)
TOTAL ROADWAY COST	$ 1,890,000	$ 2,587,000
TOTAL STRUCTURES COST	$ -	$ -
SUBTOTAL CONSTRUCTION COST	$ 1,890,000	$ 2,587,000
TOTAL RIGHT OF WAY COST	$ -	$ -
TOTAL CAPITAL OUTLAY COSTS	$ 1,890,000	$ 2,587,000
PA/ED SUPPORT	$ 38,000	$ 41,000
PS&E SUPPORT	$ 406,000	$ 475,000
RIGHT OF WAY SUPPORT	$ -	$ -
CONSTRUCTION SUPPORT	$ 482,000	$ 634,000
TOTAL SUPPORT COST	$ 926,000	$ 1,150,000
TOTAL PROJECT COST	$ 2,820,000	$ 3,740,000

Programmed Amount

	Month	Year
Date of Estimate (Month/Year)	2	2024
Estimated Construction Start (Month/Year)	1	2030
Number of Working Days =		1040
Estimated Mid-Point of Construction (Month/Year)	6	2032
Estimated Construction End (Month/Year)	12	2034
Number of Plant Establishment Days		0

Estimated Project Schedule

PID Approval	1/1/2025
PA/ED Approval	1/1/2027
PS&E	1/1/2029
RTL	1/1/2029
Begin Construction	1/1/2030

Appendix E – Bicycle and Pedestrian Infrastructure Cost Estimate Details

The following tables detail assumptions for the standard per-mile cost estimates for bicycle and pedestrian infrastructure, including unit costs, quantities, indirect costs, contingency costs, and agency soft costs. This Appendix also includes detailed mileage-based cost estimates for CBN, I-580 gap closure projects and station access projects.

Table E1. Class I Shared Use Path Costs per Mile

Detail	Unit	Unit Cost	Assumptions
New Customized Wayfinding Sign on New Post	Each	$1,200	Assume every 250 feet in each direction
General Striping and Markings	LF	$5	Assume one stripe for the center of path
Path lighting	Mile	$1,924,400	Pedestrian Lighting ($14.5k per light @ 50 feet plus $65 per LF for conduits / conductors plus $10k service cabinets at each of five intersection)
New pavement for Class I path	SF	$11	Assume a 16-foot cross section.
Traffic Signal	Each	$500,000	Assume a traffic signal at each intersecting street.
Subtotal Construction per mile		***$2,930,768***	
Construction Contingency		$879,230	30% of construction cost
Utility Contingency		$293,077	10% of construction cost
Drainage Contingency		$879,230	30% of construction cost
Design		$439,615	15% of construction cost
Environmental		$293,077	10% of construction cost
Traffic Control, SWPP, Mobilization		$732,692	25% of construction cost
CM & inspection		$586,154	20% of construction cost
City Staff Support		$293,077	10% of construction cost
Total Cost per mile		***$7,330,000***	

Source: Fehr & Peers, 2024

Table E2. Class II Bike Lanes Costs per Mile

Detail	Unit	Unit Cost	Assumptions
New Sign and Post	Each	$1,200	Assume every 250 feet in each direction
Class II Bike Lane Striping	LF	$5	6" thermoplastic bike lane each direction
Thermoplastic Bicycle Lane Legend or Sharrow @ 14 Sq Ft each	Each	$210	Bike lane legend every 250' each direction

Detail	Unit	Unit Cost	Assumptions
High-Visibility Crosswalk	LF	$30	Assume 68-foot cross section for major street, 48-foot cross section for minor approach, and 4 intersections per mile.
ADA Curb Ramps	Each	$7,000	Assume 8 per intersection and 4 intersections per mile
Slurry Seal	SF	$1	Assume 68-foot cross section
General Striping and Markings	LF	$5.00	Assume four stripes for a four-lane cross section with turn lanes (no parking)
Subtotal Construction per mile		***$828,838***	
Construction Contingency		$248,652	30% of construction cost
Utility Contingency		$-	NA
Drainage Contingency		$248,652	30% of construction cost
Design		$124,326	15% of construction cost
Environmental		$82,884	10% of construction cost
Traffic Control, SWPP, Mobilization		$207,210	25% of construction cost
CM & inspection		$165,768	20% of construction cost
City Staff Support		$82,884	10% of construction cost
Total Cost per mile		***$1,990,000***	

Source: Fehr & Peers, 2024

Table E3. Class III Bicycle Boulevard Costs per Mile

Detail	Unit	Unit Cost	Assumptions
New Customized Wayfinding Sign on New Post	Each	$1,200	Assume every 250 feet in each direction
Thermoplastic Bicycle Boulevard Legend (@ 51 Sq Ft Each)	Each	$765	Assume 4 per block (2 each way) and 500-foot block length
High-Visibility Crosswalk	LF	$30	Assume 48-foot cross section for major street, 48-foot cross section for minor approach, and 5 intersections per mile.
ADA Curb Ramps	Each	$7,000	Assume 4 per intersection and 5 intersections per mile
Subtotal Construction per mile		***$253,148***	
Construction Contingency		$75,944	30% of construction cost
Utility Contingency		$-	NA
Drainage Contingency		$75,944	30% of construction cost
Design		$37,972	15% of construction cost
Environmental		$25,315	10% of construction cost
Traffic Control, SWPP, Mobilization		$63,287	25% of construction cost
CM & inspection		$50,630	20% of construction cost

Detail	Unit	Unit Cost	Assumptions
City Staff Support		$25,315	10% of construction cost
Total Cost per mile		***$608,000***	

Source: Fehr & Peers, 2024

Table E4. Class IV Separated Bikeway with Raised Median Buffers

Detail	Unit	Unit Cost	Assumptions
New Customized Wayfinding Sign on New Post	Each	$1,200	Assume every 250 feet in each direction
General Striping and Markings	LF	$5	Assume two stripes for a three-lane cross section
Parking T's or L's	EA	$20	Assume a parking T every 22 feet in each direction
High-Visibility Crosswalk	LF	$30	Assume 68-foot cross section for major street, 48 foot cross section for minor approach, and three intersections per mile.
ADA Curb Ramps	Each	$7,000	Assume 8 per intersection and 3 intersections per mile
Thermoplastic Bicycle Lane Legend or Sharrow @ 14 Sq Ft each	Each	$210	Assume every 250 feet in each direction and $8 per square foot
Grind and Overlay	SF	$10	Assume a 68-foot cross section
Buffer median curb - no gutter	LF	$50	Assume curb on both sides of median and in each direction
Buffer hardscape median area	SF	$20	Assume a 5-foot-wide concrete median (excluding curbs) in each direction
Major intersection work	Per Intersection	$600,000	Assume three intersections per mile
Subtotal Construction per mile		***$5,934,038***	
Construction Contingency		$1,780,212	30% of construction cost
Utility Contingency		$593,404	10% of construction cost
Drainage Contingency		$1,780,212	30% of construction cost
Design		$890,106	15% of construction cost
Environmental		$593,404	10% of construction cost
Traffic Control, SWPP, Mobilization		$1,483,510	25% of construction cost
CM & inspection		$1,186,808	20% of construction cost
City Staff Support		$593,404	10% of construction cost
Total Cost per mile		***$14,840,000***	

Source: Fehr & Peers, 2024

Table E5. Miles of CBN Projects by Corridor and Facility Type

Corridor	Cost from 2020 CTP ($)	Class I - Shared Use Path (Miles)	Class IV - Protected Bike Lane (Miles)
14th Ave	-	-	0.5
167th Avenue	-	-	0.4
40th Street	$20,490,000	-	0.8
A St/Redwood	-	-	1.0
Bancroft	-	-	2.0
Castro Valley Blvd	-	-	0.9
Demarcus Blvd	$20,490,000	-	-
Dublin Blvd	$210,030,000	-	4.8
Dublin Grade Trail	-	8.5	-
East Ave	-	-	0.3
East Bay Greenway	$368,830,000	-	-
E14th/Mission Blvd	$358,580,000	-	-
East Lewelling Blvd	$12,810,000	-	-
Emeryville Greenway	$3,840,000	-	-
Foothill Blvd/John Dr	-	0.6	0.3
Foothill/San Ramon Rd	-	-	0.8
Fruitvale	-	-	0.6
Grand	-	-	0.8
Halcyon Drive	-	-	0.2
Hesperian	$19,210,000	-	1.1
High St	-	-	0.6
Iron Horse Trail	$61,470,000	0.7	-
Lake Merritt	-	-	0.5
MacArthur/580	-	0.9	3.6
Mandela Parkway	-	-	0.5
N Canyons to L St Trail	-	-	4.5
San Leandro Creek Trail	$42,260,000	-	-
San Lorenzo Creek Trail	$43,540,000	-	-
San Pablo Ave	$399,570,000	-	-
Santa Rita/Tassajara	-	-	1.2
Sunflower Ct	-	-	0.8
Telegraph	-	-	0.6
Vasco Rd	-	-	1.6
Williams	-	-	0.4
West/Genoa	-	-	1.0
West Grand Ave	$119,100,000	-	-
Total Miles of CBN	***NA[1]***	***10.8***	***41.0***
Per mile cost	***-***	***$7,330,000***	***$14,840,000***
Total Cost of CBN	***$1,680,220,000***	***$78,980,000***	***$442,510,000***

Source: Fehr & Peers, 2024

Notes:

3. CTP project costs consist of additional improvements such as TSP to improve multimodal travel along the corridor. Therefore, mileage estimate of bicycle facilities cannot be inferred from the project cost.

Table E6. Miles of Gap Closure Projects by Corridor and Facility Type

Corridor	**Class IV - Protected Bike Lane (Miles)**
I580/Fairmount Dr	0.4
I580/Foothill Blvd/Liberty St	0.6
I580/35th Ave	0.2
I580/I238/Castro Valley	0.5
I580/Hopyard Rd/Dougherty Rd	0.4
I580/Fallon Rd/El Charro Rd	0.5
I580/First St/Springtown Blvd	1.0
I580/Hacienda Dr	0.4
I580/I238/Castro Valley Blvd	0.2
I580/N Livermore Ave	0.9
Beach St Undercrossing	0.3
Edwards Ave Undercrossing	1.2
Golf Links Rd Undercrossing	0.8
Grand Ave Undercrossing	0.4
Harrison Ave Undercrossing	1.1
Hollis St Undercrossing	0.2
Lake Park Ave Undercrossing	0.3
Lakeshore Ave Undercrossing	0.1
Park Blvd Undercrossing	0.1
Peralta St Undercrossing	0.3
Piedmont Undercrossing	1.0
Total miles	***41.0***
Per mile cost	***$14,840,000***
Total cost (YOE$)	***$166,020,000***

Source: Fehr & Peers, 2024

Table E7. Miles of Station Access Projects by Station and Facility Type

Rail Station	**Projects in 2020 CTP**	**Class IV Separated Bikeway**
MacArthur	-	2.2
San Leandro	-	1.0
Bay Fair	-	0.5
Castro Valley	-	1.3
West Dublin/Pleasanton	-	0.2
Dublin/Pleasanton	$20,490,000	-
ACE - Livermore	-	1.0

ACE - Vasco Road	-	1.5
Valley Link - Isabel	-	1.8
Valley Link - Southfront Road	-	0.9
Total miles	**-**	**10.3**
Per mile cost	-	***$14,840,000***
Total cost (YOE$)	**$20,490,000**	**$153,590,000**

Appendix F – TravelAccess+ Methodology

Bicycle access sheds used to assess changes in bike accessibility in the Evaluation Scenario were created using a custom Fehr & Peers tool called TravelAccess+, which uses an OpenStreetMaps (OSM) network as the base input network. TravelAccess+ is a GIS-based tool that creates travel sheds representing the area accessible from a given set of points within a fixed amount of time using a particular mode.

For the Evaluation Scenario analysis, TravelAccess+ was used to create 10-minute bike sheds around transit stations along the study corridor. The tool uses a 3-step process to create bike sheds, which is detailed below.

Calculating Level of Traffic Stress (LTS) Scores

Level of Traffic Stress (LTS) is a score assigned to a roadway segment indicating the traffic stress it imposes on bicyclists, based on a well-established scoring methodology which includes roadway inputs such as number of travel lanes, prevailing speeds or speed limits, parking lane width, bike lane width, etc.[5] Given the lack of accurate data for widths of bike lanes and parking lanes, the TravelAccess+ script uses number of travel lanes, posted speed limits and bikeway type (if any) from OSM as inputs to calculate the LTS score for each roadway segment. LTS scores can range from 1 (most comfortable) to 4 (least comfortable). Shared use paths and roadways with separated bikeways are automatically assigned an LTS score of 1.

Calculating bike travel times

The TravelAccess+ script then uses LTS as a basis to calculate bike travel time for each segment, adjusting for traffic stress. Travel time on low-stress facilities is calculated for a biking speed of 15 feet/second and travel time for high-stress segments is calculated for a speed of 4.4 feet/second, based on the assumption that bicyclists will slow down or walk their bikes on a high-stress segment.

Creating Bike Sheds

The LTS-based bike travel times are used as an input for ESRI's ArcGIS Pro Network Analysis Toolbox, which is used to visualize the 10-minute service area or "travel sheds" around transit stations. This toolbox calculates how much of a roadway segment a bicyclist would cover within 10 minutes, based on the total travel time assigned to each roadway segment in the previous step. The tool then creates polygons around each transit station encompassing all the segments covered within a 10-min travel time, forming the bike sheds.

[5] Mekuria, M., P. Furth, and H. Nixon. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute Publications, 2012.

Bike sheds were created for both existing conditions (Year 2020) and the Evaluation Scenario. For the existing conditions analysis, LTS scores and bike travel times were calculated based on the existing OSM network, after confirming that it accurately represents the existing trails and paths. For the Evaluation Scenario bike sheds, all the bike projects included in the Corridor Strategy were coded as additional shared-use paths or separated bikeways, which were then assigned a LTS score of 1.

The bike sheds provide a more accurate representation of access than simple distance-based "as-the-crow-flies" buffers around points for several reasons, such as:

- Bike sheds are based on actual streets and facilities that people would bike on to access/egress transit stations and account for barriers such as dead-end streets, freeways, or grade-separation
- Bike sheds consider the Level of Traffic Stress (LTS) scores for each segment, and adjust for the fact that people would prefer biking longer distances on low-stress segments than higher stress segments