

Appendix C

DESIGN GUIDANCE RESOURCES

Fall 2020



MEMORANDUM

Date: October 9, 2020

Project #:
20921.8

To: Saravana Suthanthira and Aleida Andrino-Chavez, Alameda CTC

CC:

From: Laurence Lewis

Project: E. 14th St./ Mission Blvd. and Fremont Blvd. Multimodal Corridor Project

Subject: Design Guidance Resources

This memorandum summarizes the recommended design guidance resources for implementing the recommended long-term concept and near- and mid-term improvements for the E. 14th St./Mission Blvd. and Fremont Blvd. Multimodal Corridor Project (Project).

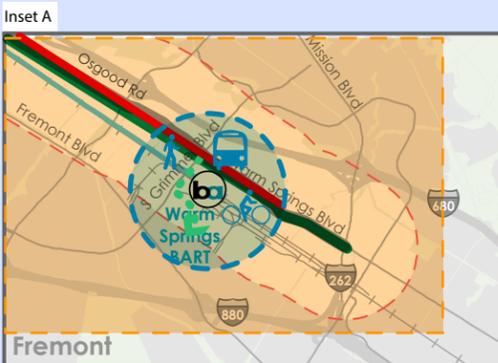
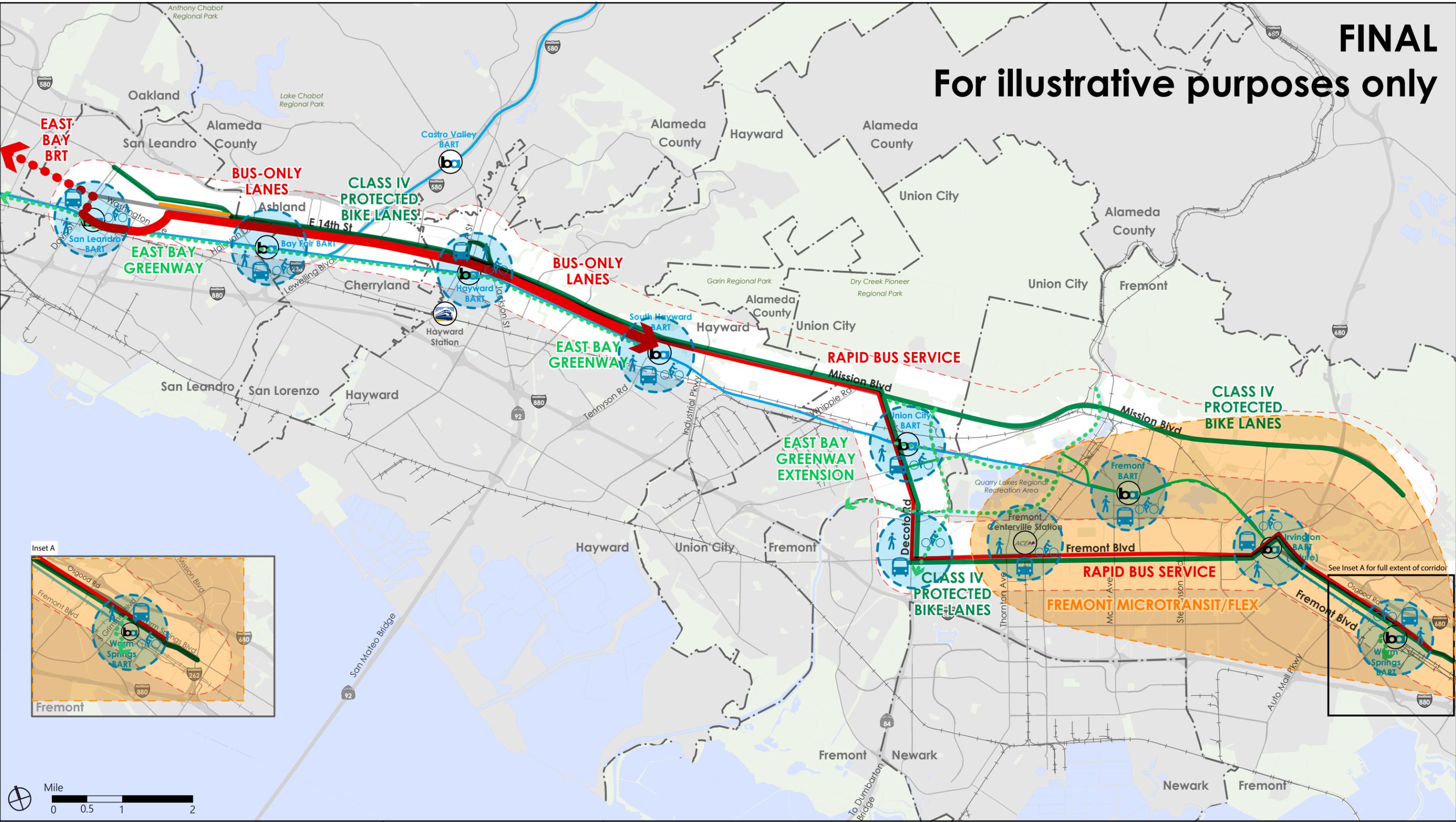
RECOMMENDED LONG-TERM CONCEPT

The recommended long-term concept for the Project is shown in **Figure 1** and consists of the following elements: bus-only lanes/bus rapid transit; Rapid Bus; mobility hubs; microtransit/Flex; the East Bay Greenway Extension; and an on-street protected bike lane network. In addition to these components, near-term safety and traffic operations improvements are included to address existing safety problem areas and to advance the long-term concept.

The design guidance resources presented in this document address the following components of the Project recommendation:

- Bus-only lanes/bus rapid transit
- Rapid Bus
- East Bay Greenway Extension
- On-street protected bike lanes
- Near-term safety and operational improvements

FINAL For illustrative purposes only



E. 14th St./Mission Blvd. and Fremont Blvd. Multimodal Corridor Project

Legend:

- BART Station
- BART Above/Below Ground
- Capitol Corridor Stations
- ACE/Capitol Corridor Station
- Freight Rail and Capitol Corridor Tracks
- Jurisdiction Boundary
- Freeway/Arterial
- Water Bodies
- Parks/Open Space
- Bus-Only Lanes – limited stop service with bus-only lanes
- Rapid Bus – limited-stop service without bus-only lanes
- Off-Street Multiuse Trail
- On-Street Protected Bike Lanes
- Microtransit/Flex – on-demand bus service with flexible route and schedule
- New Class II buffered bike lanes
- Mobility Hub

Dotted lines indicate improvements that are existing or planned to be implemented separately from this project

Exhibit is for illustrative purposes only.

Recommended Long-Term Concept



Bus-Only Lanes/Bus Rapid Transit

Bus-only lanes/bus rapid transit is defined as including the following:

- Exclusive use lanes for buses
- Transit signal priority
- Off-board fare payment
- High-platform stations for level boarding
- High-amenity stations
- New or improved pedestrian crosswalks or boarding islands
- Branded bus stops and vehicles

The recommended configuration of bus-only lanes (center-running versus side-running) has not been decided in this phase and will be addressed in subsequent Project phases.

The East Bay Bus Rapid Transit, AC Transit Tempo, opened for operation in August 2020 between downtown Oakland and San Leandro BART, which is the northern terminus of the Project Corridor. The Project's recommended bus-only lanes/bus rapid transit would extend from San Leandro BART south to South Hayward BART.

Rapid Bus Service

Rapid Bus service is defined as including the following infrastructure improvements:

- Bus signal priority
- Queue jumps
- Enhanced bus stops with expanded passenger amenities

Rapid Bus is assumed to operate in a shared (non-exclusive) travel lane. AC Transit currently operates Rapid Bus service along San Pablo Avenue (Line 72R). The Project's recommended Rapid Bus improvement extends from South Hayward BART to Warm Springs BART. Rapid Bus may also be implemented from San Leandro BART to South Hayward BART as a near-term first step toward implementing bus-only lanes/bus rapid transit.

East Bay Greenway Extension

Within the Study Area, the East Bay Greenway is a planned bicycle and pedestrian path that will extend from the San Leandro BART station to the South Hayward BART station. The Project recommendation includes an extension of the East Bay Greenway from South Hayward BART to Warm Springs BART to support longer distance bike trips and first- and last-mile access to transit.

The East Bay Greenway Extension is defined as an off-street Class I bicycle and pedestrian path to the extent feasible. (Class I bike facilities provide a completely separated facility designed for the exclusive use of bicyclists and pedestrians with crossing points minimized.) On-street Class IV protected bike lanes would be provided where an off-street alignment is not feasible.

On-Street Protected Bike Lanes

On-street Class IV bike lanes provide a separated bikeway for the exclusive use of bicyclists. The physical separation between the bikeway and through vehicular traffic may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, and/or on-street parking. Class IV bike lanes in the Study Area are intended to provide “all ages and abilities” accommodations to support access to schools, parks, transit stations, and other destinations directly along the Project Corridor. On-street protected bikeways are recommended as one-way facilities on each side of the street (as opposed to a two-way facility on one side of the street), as the one-way configuration provides direct access to destinations along both sides of the Project Corridor.

Portions of the Project Corridor in unincorporated Alameda County (Ashland and Cherryland), Hayward, and Fremont have near-term improvement projects to install Class IV protected bike lanes. The Project long-term recommendation includes Class IV protected bike lanes along the remainder of the Project Corridor. For some portions of the Project Corridor, Class II buffered bike lanes are also recommended as a near-term improvement as a first step toward long-term implementation of Class IV bike lanes.

Near-Term Safety and Operational Improvements

Near-term and mid-term projects are recommended throughout the Project Corridor to address safety for pedestrians, bicyclists, transit users, and motorists, and to attract a wider range of multimodal travel in the Study Area. This would be accomplished through improvements focused on network connectivity, safety, and user comfort.

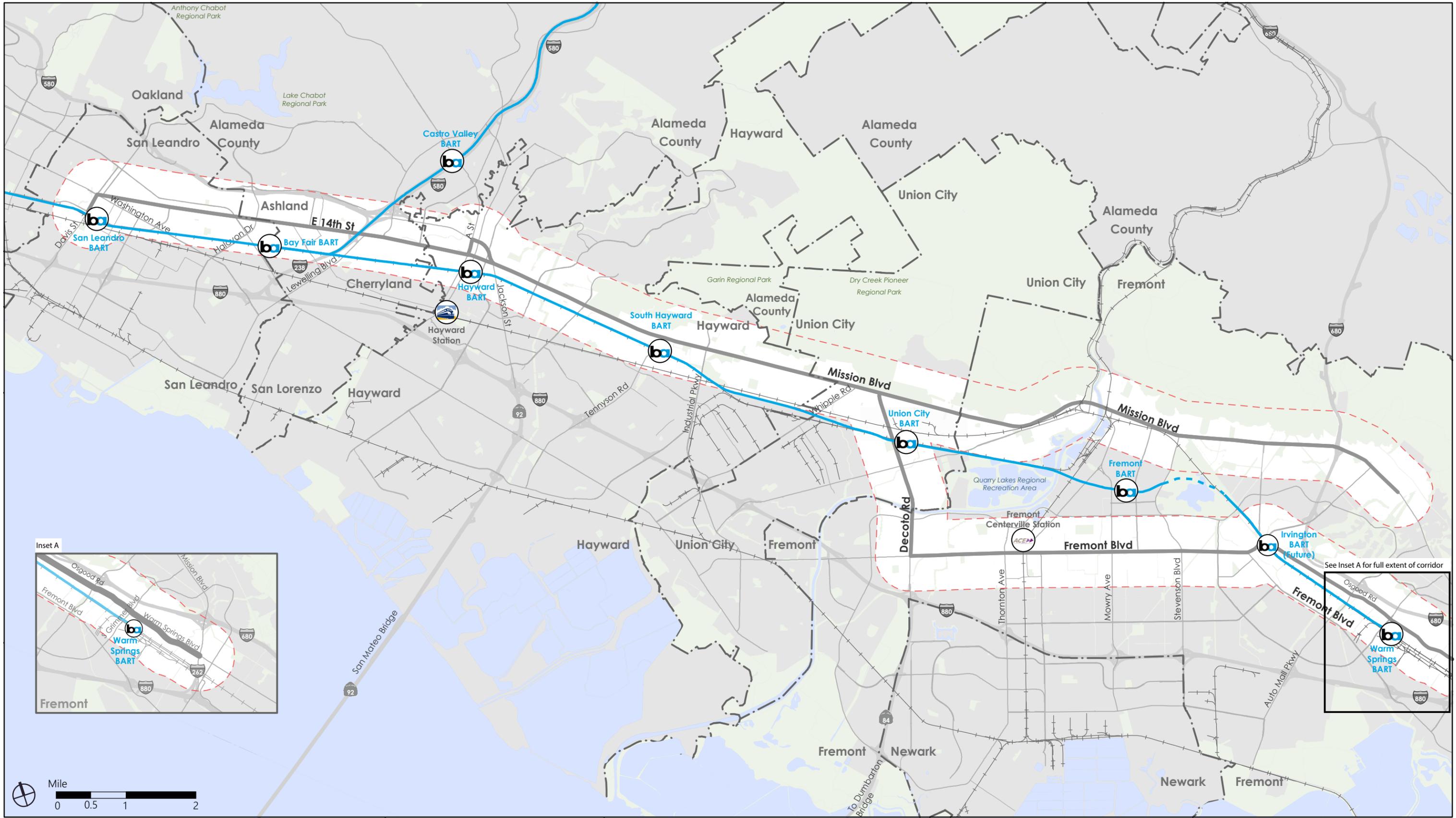
LONG-TERM CONCEPT EXHIBITS

Design concepts illustrating the recommended long-term concept for the Project Corridor are shown in **Exhibits A1 through E** attached to this memorandum. These exhibits show how improvements for multiple modes (transit, bicycle, and pedestrian) are to be integrated within the existing corridor context and right of way widths.

Figure 2 shows the locations for the design concept exhibits along the Project Corridor. The long-term concept exhibits are as follows, with each exhibit showing both intersection and midblock conditions:

- San Leandro – E. 14th St. at Fairmont Dr.
 - **Exhibit A1** – center-running bus lanes, protected bike lanes on both sides
 - **Exhibit A2** – side-running bus lanes, protected bike lanes on both sides
- Ashland and Cherryland – E. 14th St. at 164th Ave.
 - **Exhibit B1** – center-running bus lanes, protected bike lanes on both sides
 - **Exhibit B2** – side-running bus lanes, protected bike lanes on both sides
- Hayward – Mission Blvd. at Berry Ave.
 - **Exhibit C1** – center-running bus lanes, protected bike lanes on both sides
 - **Exhibit C2** – side-running bus lanes, protected bike lanes on both sides
- Union City – Decoto Rd. at Clover St.
 - **Exhibit D** – Rapid Bus queue jump lanes, protected bike lanes on both sides
- Fremont – Fremont Blvd. at Alder Ave.
 - **Exhibit E** – Rapid Bus queue jump lanes, protected bike lanes on both sides

The design concept exhibits are conceptual in nature and do not represent final design drawings or construction plans. Engineering studies, environmental clearance, and stakeholder engagement are required during subsequent project development phases.



E. 14th St./Mission Blvd. and Fremont Blvd. Multimodal Corridor Project

Legend:

- BART Station
- BART Above/Below Ground
- Capitol Corridor Stations
- ACE/Capitol Corridor Station
- Freight Rail and Capitol Corridor Tracks
- Jurisdiction Boundary
- Freeway/Arterial
- Water Bodies
- Parks/Open Space





Dimensions are for planning purposes only and may vary based on actual conditions.

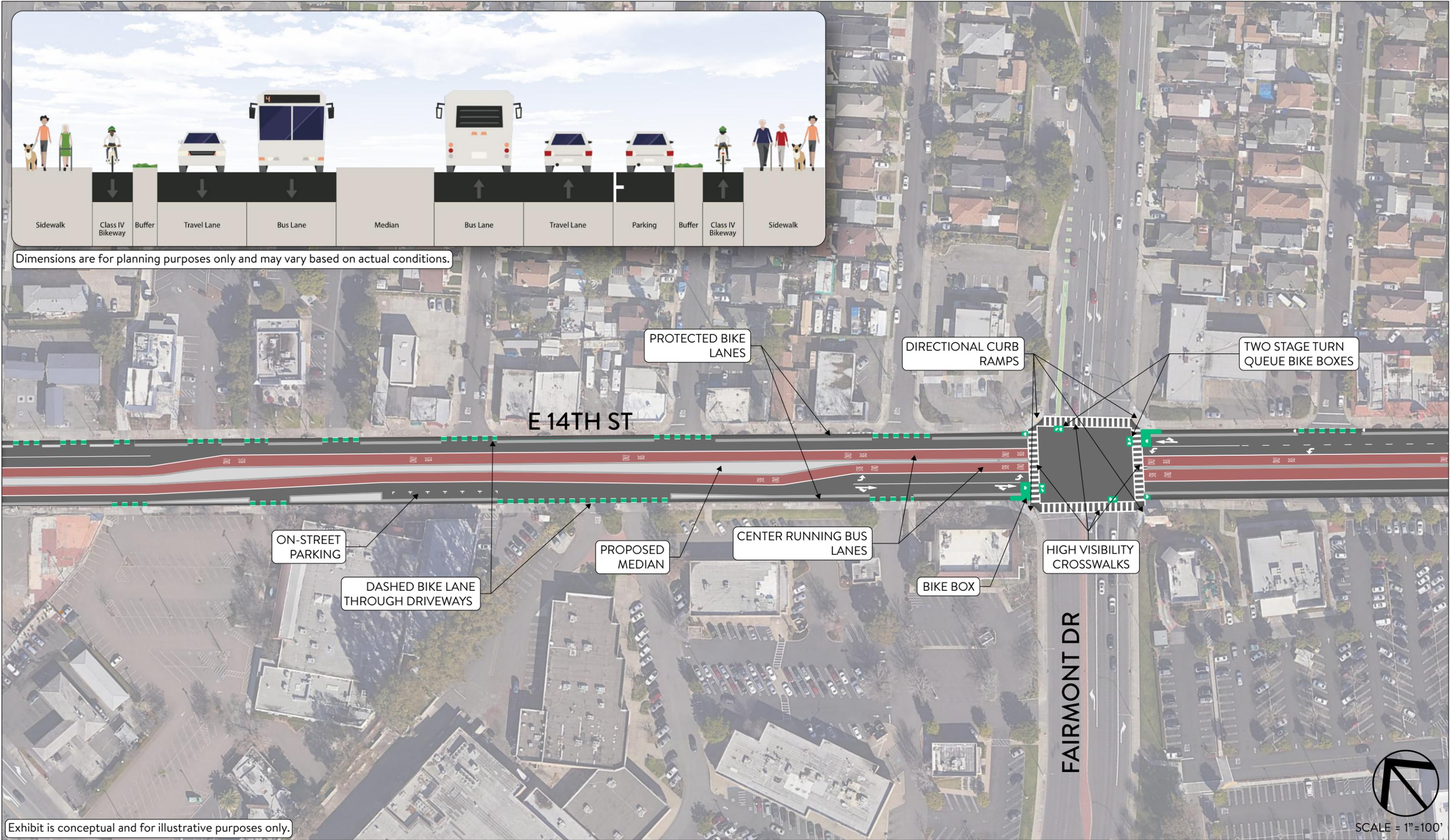


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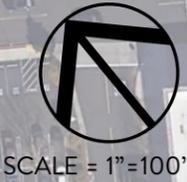
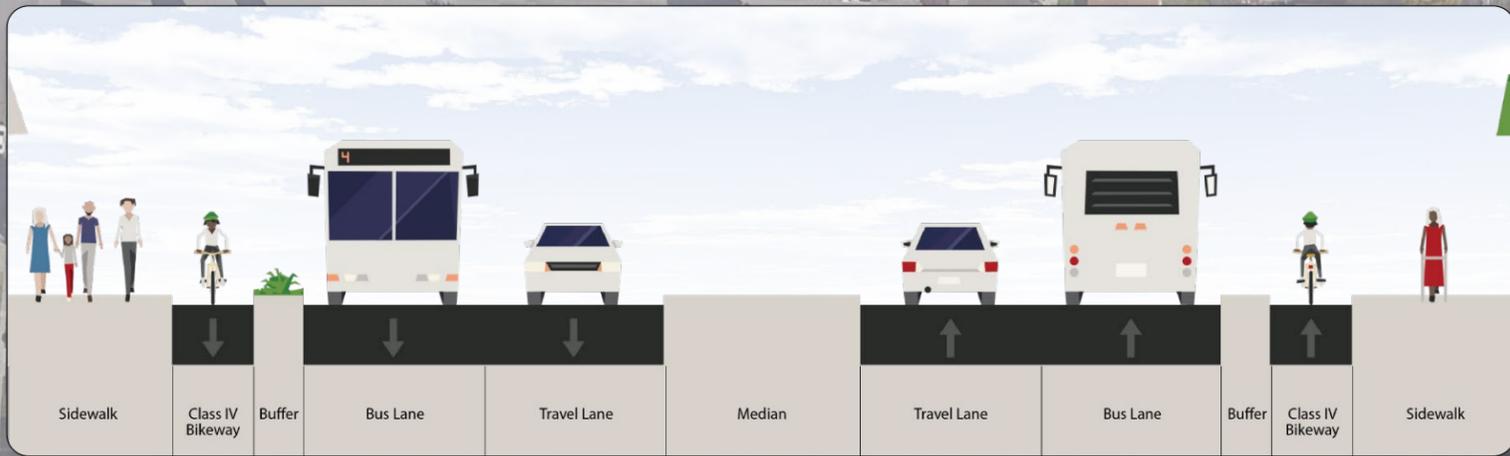


EXHIBIT A1: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT
 E 14TH ST AT FAIRMONT DR, SAN LEANDRO ALTERNATIVE 1: CENTER-RUNNING BUS LANES



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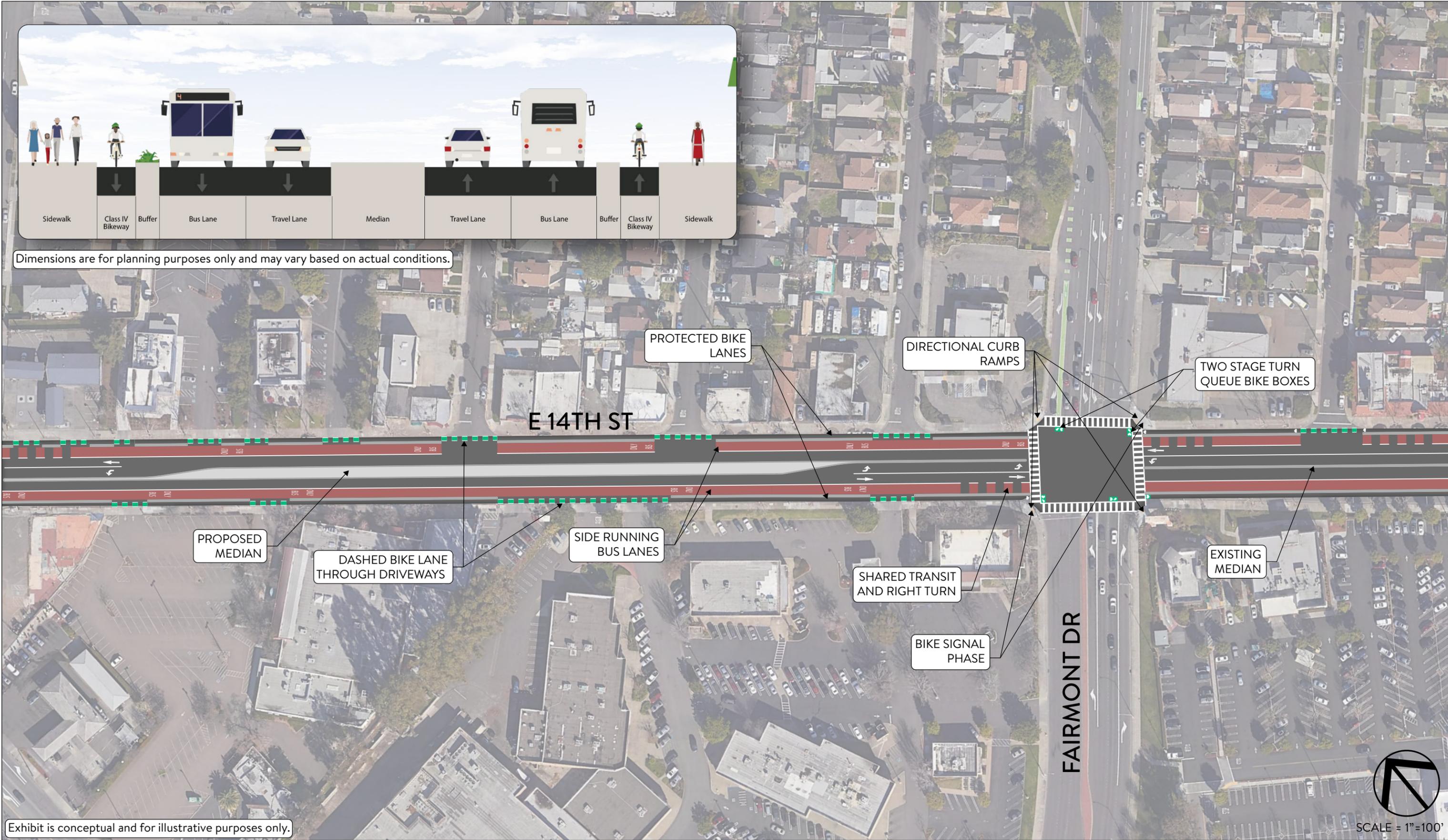


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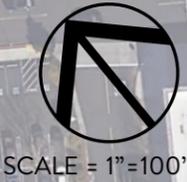
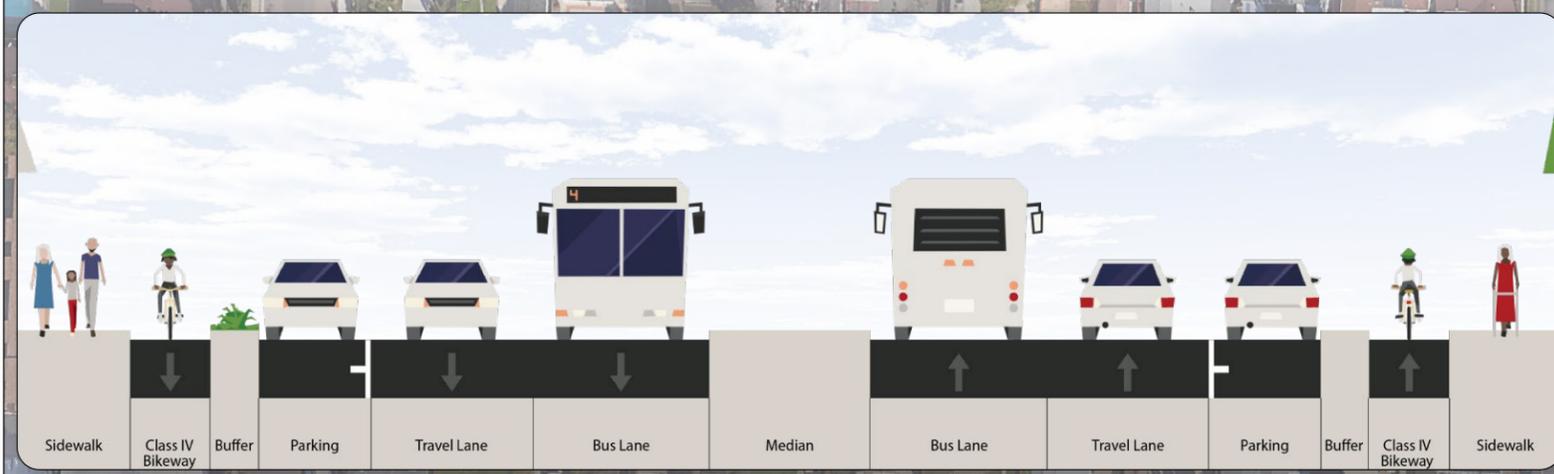


EXHIBIT A2: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT

E 14TH ST AT FAIRMONT DR, SAN LEANDRO ALTERNATIVE 2: SIDE-RUNNING BUS LANES



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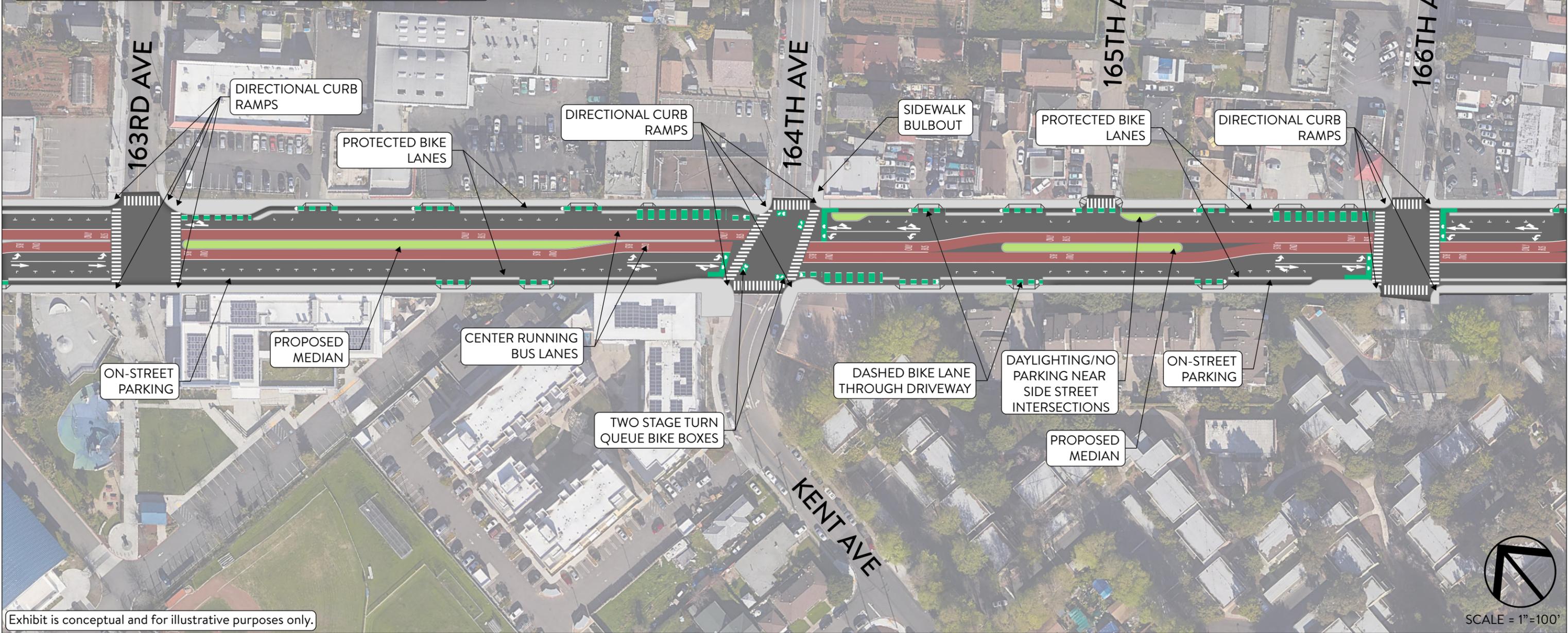
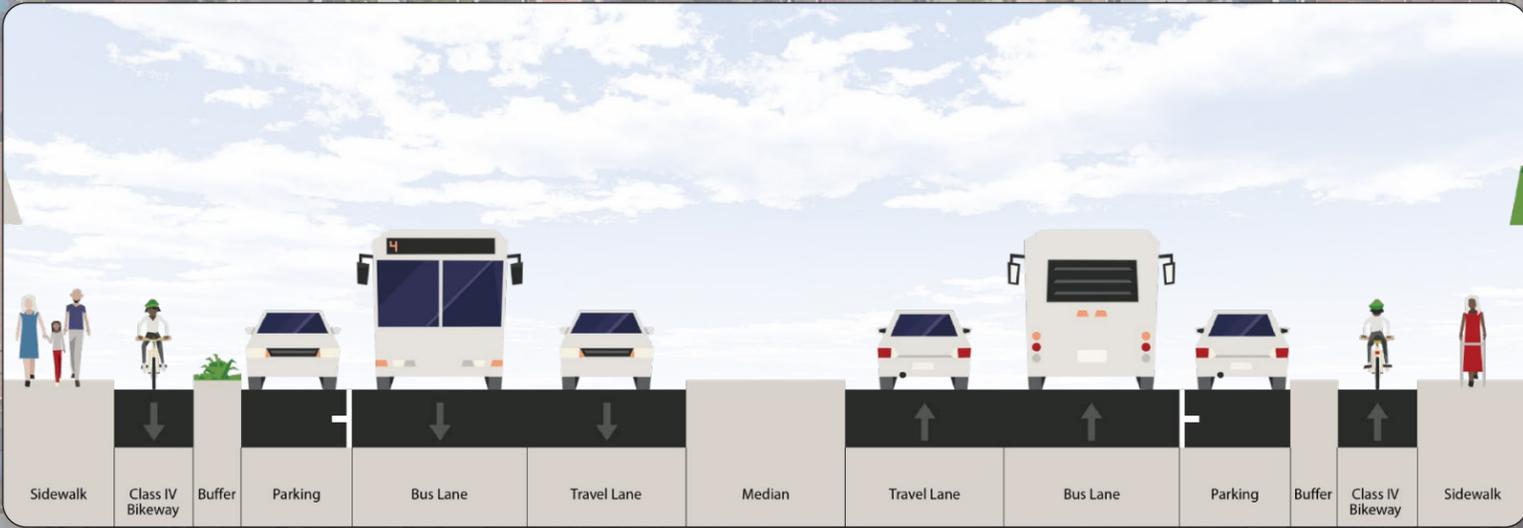


Exhibit is conceptual and for illustrative purposes only.

SCALE = 1"=100'



EXHIBIT B1: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT
 E 14TH STREET AT 164TH AVENUE, ASHLAND ALTERNATIVE 1: CENTER-RUNNING BUS LANES



Dimensions are for planning purposes only and may vary based on actual conditions.

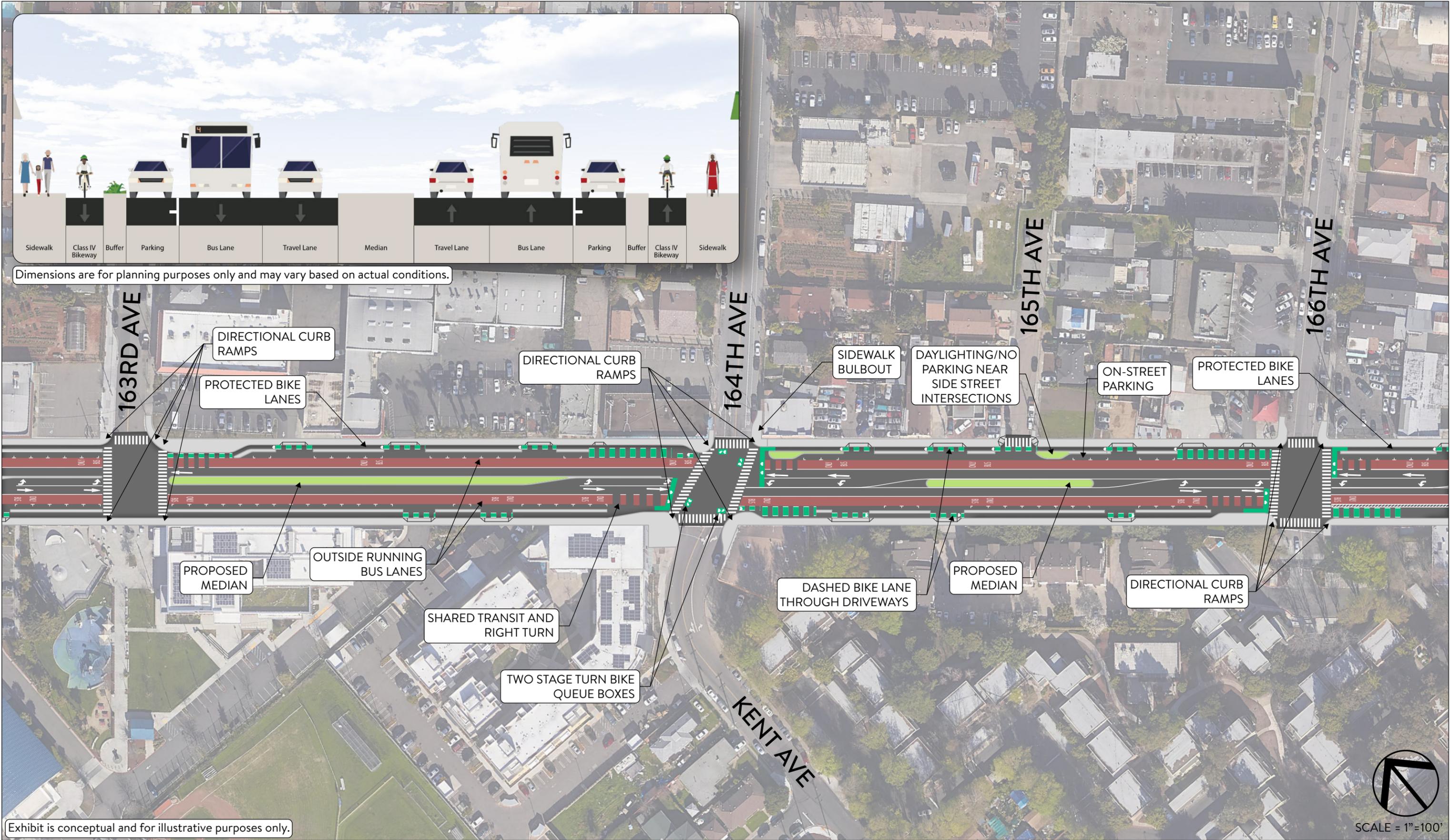


Exhibit is conceptual and for illustrative purposes only.



EXHIBIT B2: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT

E 14TH STREET AT 164TH AVENUE, ASHLAND ALTERNATIVE 2: SIDE-RUNNING BUS LANES



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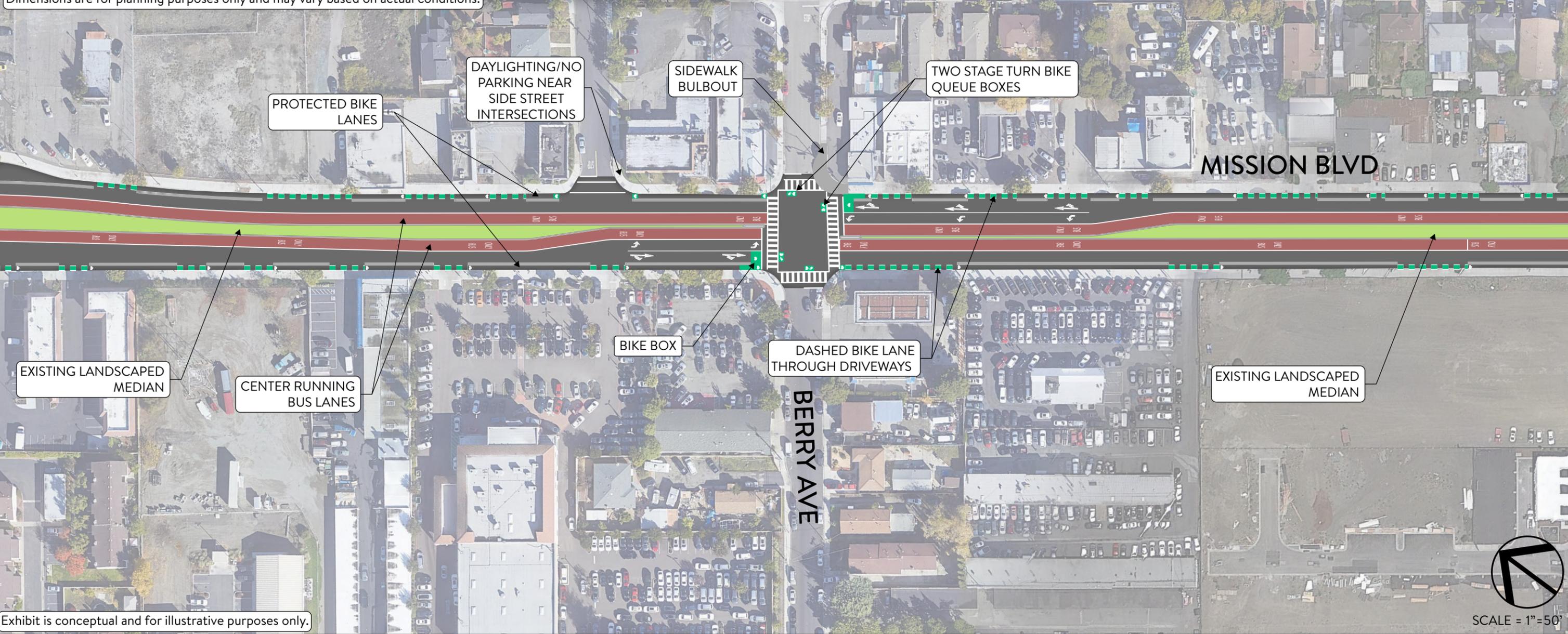
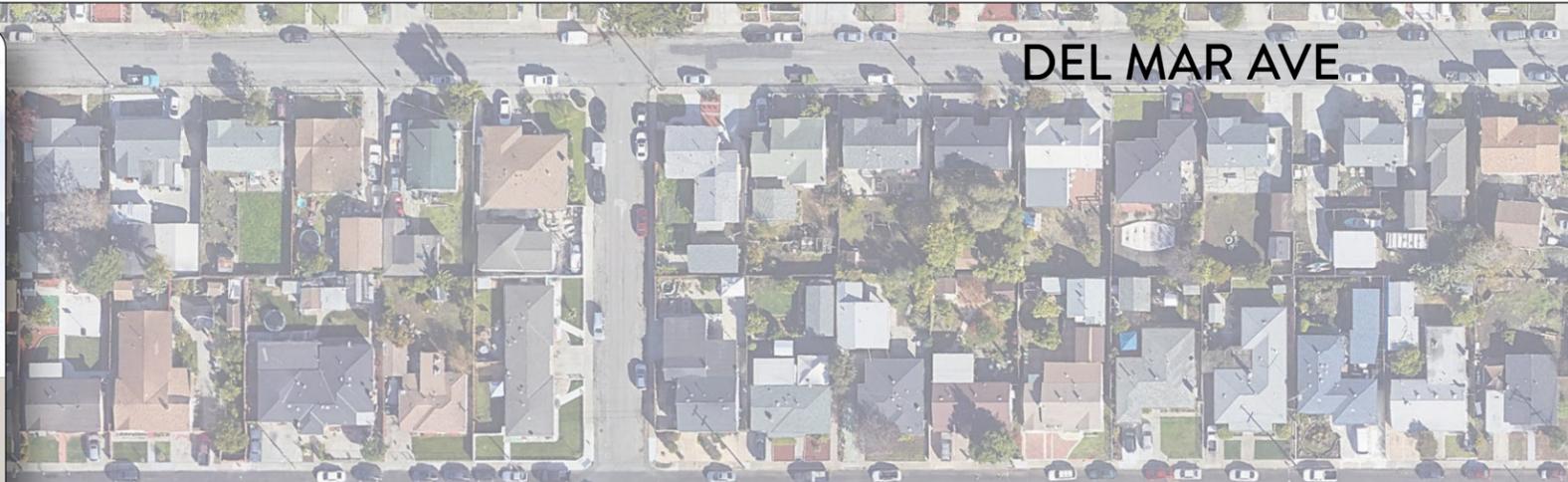
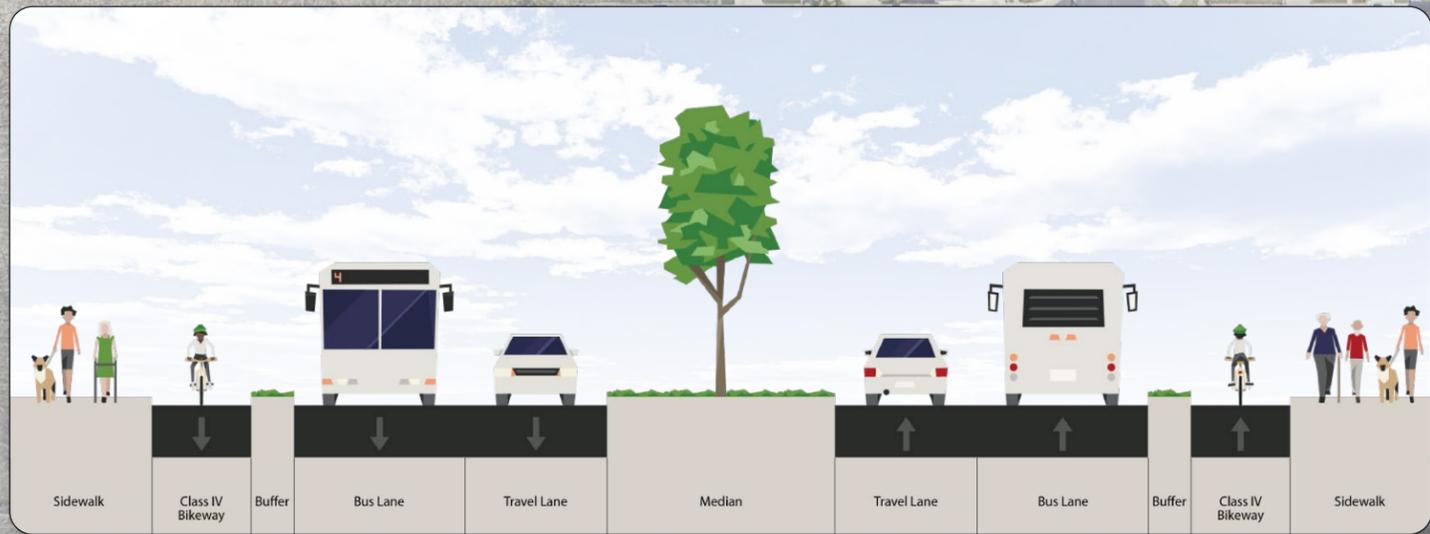


Exhibit is conceptual and for illustrative purposes only.

SCALE = 1"=50'



EXHIBIT C1: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT
 MISSION BOULEVARD AT BERRY AVENUE, HAYWARD ALTERNATIVE 1: CENTER BUS LANES



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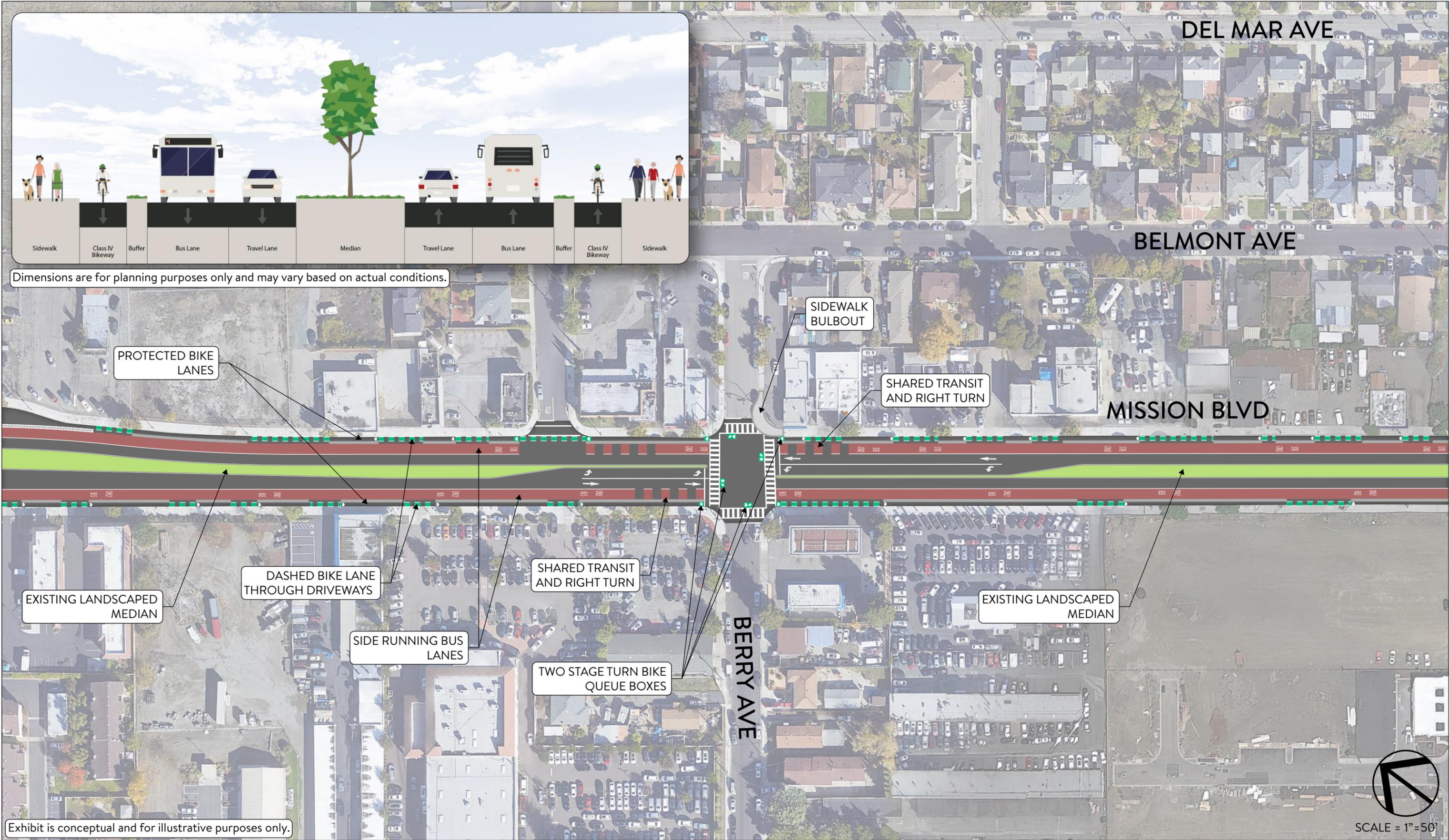


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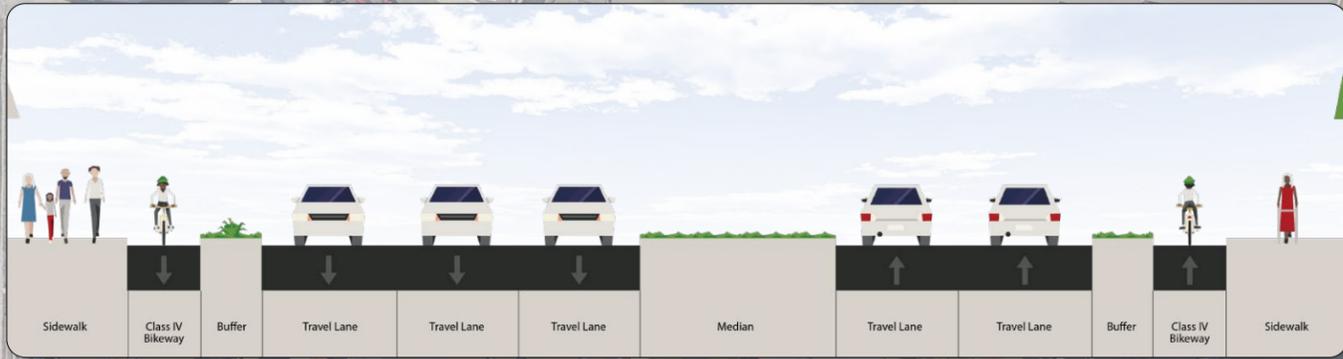
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EXHIBIT C2: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT

MISSION BOULEVARD AT BERRY AVENUE, HAYWARD ALTERNATIVE 2





Dimensions are for planning purposes only and may vary based on actual conditions.



EXISTING LANDSCAPED MEDIAN

ON-STREET PARKING

EXISTING LANDSCAPED MEDIAN

BIKE BOX

HIGH VISIBILITY CROSSWALKS

FLOATING BUS BOARDING ISLAND

EXISTING LANDSCAPED MEDIAN

DIRECTIONAL CURB RAMPS

PROTECTED BIKE LANES

FREMONT BLVD

ALDER AVE



SCALE = 1"=50'

Exhibit is conceptual and for illustrative purposes only.



EXHIBIT E: E 14TH ST/MISSION BLVD AND FREMONT BLVD MULTIMODAL CORRIDOR PROJECT

FREMONT BOULEVARD AT ALDER AVENUE, FREMONT RAPID BUS IN SHARED LANES

DESIGN GUIDANCE RESOURCES

The following documents provide design guidance for the elements included within the long-term concept exhibits presented in the prior section:

Alameda CTC [Central County Complete Streets Design Guidelines](#), May 2017

The Alameda CTC Central County Complete Streets Design Guidelines were developed in 2017 as part of a Complete Streets technical assistance project for the jurisdictions of San Leandro, Hayward, and unincorporated Alameda County. The guidelines were developed in close coordination with public works and planning staffs from the three jurisdictions, with a goal of helping the jurisdictions' staffs understand how to implement Complete Streets projects for various street types, modal priorities, and land use contexts. To aid in the day-to-day use of the Design Guidelines, complete streets checklists were developed for capital projects and land development projects to identify opportunities to integrate multimodal design elements. Since then, the Central County Complete Streets Design Guidelines have been shared as a countywide technical resource for local jurisdictions within Alameda County.

AC Transit [Multimodal Corridor Design Guidelines](#), April 2018

The AC Transit Multimodal Corridor Guidelines were developed to provide clear design standards for a range of typical roadway conditions to help ensure efficient transit operations, accommodate the needs of bicyclists, and facilitate safe access to and from bus stops for AC Transit passengers. The document offers guidance on design elements of bus stops adjacent to bicycle infrastructure. The guide is intended to help create a more predictable, safe, and uniform experience for bus patrons, drivers, bicyclists, and pedestrians as they travel through the jurisdictions that comprise the Alameda-Contra Costa Transit District.

National Association of City Transportation Officials (NACTO) [Transit Street Design Guide](#), 2016

The NACTO Transit Street Design Guide is a national guidance document focused on the development of transit facilities on city streets, and the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit. The guide has been developed based on other design guidance, as well as city case studies, best practices in urban environments, research and evaluation of existing designs, and professional consensus. These sources, as well as the specific designs and elements included in the guide, are based on North American street design practice.

[NACTO Don't Give Up at the Intersection: Designing All Ages and Abilities Bicycle Crossings](#), May 2019

Don't Give Up at the Intersection expands the NACTO Urban Bikeway Design Guide (2011), adding detailed guidance on intersection design treatments that reduce vehicle-bike and vehicle-pedestrian conflicts.

Table 1 summarizes the available design guidance for the key design elements included as part of the Project's recommended improvements and reflected in the design concept exhibits.

Table 1: Design Guidance References for Key Improvement Elements

Design Element	Applicable Project Improvement(s)	Source for Design Guidance	Page Number/ Section
Transit			
Bus-only lane (center-running)	Bus-Only Lanes/ Bus Rapid Transit	NACTO Transit Street Design Guide	Center Transit Lane (1)
Bus-only lane (side-running)	Bus-Only Lanes/ Bus Rapid Transit	NACTO Transit Street Design Guide	Offset Transit Lane (1)
Shared transit/right-turn lane	Bus-Only Lanes/ Bus Rapid Transit	NACTO Transit Street Design Guide	Intersection Design (1)
Median bus stop	Bus-Only Lanes/ Bus Rapid Transit	NACTO Transit Street Design Guide	Stations and Stops (1)
Floating bus boarding island	Bus-Only Lanes/ Bus Rapid Transit Rapid Bus On-Street Protected Bike Lanes	AC Transit Multimodal Corridor Design Guidelines	pg. 36-39 (without on-street parking) pg. 40-43 (with on-street parking)
Queue jump	Rapid Bus Mobility Hubs	NACTO Transit Street Design Guide	Intersections (1)
Bicycle			
Class IV protected bike lane	On-Street Protected Bike Lanes Mobility Hubs	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-32 (on-street with parking) p. 3-33 (raised) p. 3-34 (off-street)
Class II buffered bike lane	Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-20 and 3-21
Class I multiuse path	East Bay Greenway Extension	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-19
Protected bike signal phase	On-Street Protected Bike Lanes East Bay Greenway Extension Mobility Hubs Near-Term Safety and Operational Improvements	NACTO Don't Give Up at the Intersection	p. 35

Table 1, continued

Design Element	Applicable Project Improvement(s)	Source for Design Guidance	Page Number/ Section
Bicycle, continued			
Bike box	Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-36
Protected intersection	On-Street Protected Bike Lanes	NACTO Don't Give Up at the Intersection	p. 9-19
Pedestrian			
High-visibility crosswalks	Bus-Only Lanes/ Bus Rapid Transit Rapid Bus Mobility Hubs Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-51
Mid-block crossing	Mobility Hubs Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-55
Pedestrian refuge island	Bus-Only Lanes/ Bus Rapid Transit Rapid Bus Mobility Hubs Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-49
Bulbouts/ curb extensions	Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-52
Painted safety zones	Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-57
Crosswalk dual ramps	Bus-Only Lanes/ Bus Rapid Transit Rapid Bus Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-54
Daylighting intersections	Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-56
Pedestrian lighting	Bus-Only Lanes/ Bus Rapid Transit Rapid Bus Mobility Hubs Near-Term Safety and Operational Improvements	Alameda CTC Central County Complete Streets Design Guidelines	p. 3-13

(1) The NACTO Transit Street Design Guidelines are provided through a series of webpages. Since no page numbers are shown online, references to the document section are provided instead.

Sources: Alameda CTC [Central County Complete Streets Design Guidelines](#); AC Transit [Multimodal Corridor Design Guidelines](#); NACTO [Transit Street Design Guide](#); NACTO [Don't Give Up at the Intersection: Designing All Ages and Abilities Bicycle Crossings](#),

ADDITIONAL DESIGN CONSIDERATIONS

The following are additional design considerations based on the findings of the baseline conditions data collection and analysis completed for the Project Corridor:

- **Caltrans Jurisdiction** – The following portions of the Project Corridor are under Caltrans jurisdiction:
 - E. 14th St. in San Leandro
 - Mission Blvd. in Union City
 - Mission Blvd. in Fremont (from Union City boundary to I-680)

The design and delivery of multimodal improvements in these areas will require coordination with Caltrans divisions.

- **Right of Way Constraints** - The right of way analysis shows that recorded right of way widths that are narrower than as-built conditions are found in the Union City and Fremont portions of the Project Corridor. (Maps showing the corridor constraints related to right of way, utilities, and other physical infrastructure are attached as an appendix to this memorandum.) As recommended improvements advance into project development, right of way surveys will be completed in conjunction with final design. These surveys will define right of way boundaries for the corridor and determine if any other constraints are present.
- **Utilities Constraints** - Based on the analysis of available utilities data, the most significant constraints identified are the PG&E gas transmission mains present along much of the Decoto Rd. portion of the Project Corridor. Other utilities constraints are generally associated with overhead transmission lines, in particular along Mission Blvd. south of Decoto Rd. and along Decoto Rd. between Mission Blvd. and Fremont Blvd. These constraints can be managed by avoiding right of way impacts in these locations. In some instances, ongoing or near-term projects are being designed or constructed around these utilities, indicating they do not represent fatal flaws in terms of implementing improvements. However, as design concepts are developed for recommended improvements, efforts will be made to avoid disturbance of these areas. As noted earlier, the findings of this analysis are limited by the extent of available data from utility providers and from local agencies through ongoing projects. As recommended improvements advance into project delivery, engineering surveys will be completed in conjunction with final design. These surveys will define remaining utility conditions for the corridor and determine if other significant constraints are present.
- **Other Engineering Constraints** – Other engineering structures such as overcrossings, undercrossings, culverts, and at-grade rail crossings exist throughout the Project Corridor. While the constraints identified do not represent fatal flaws that preclude implementation of the recommended long-term concepts, these locations warrant special consideration as design concepts are developed.