

# ENTRIPS

*EASTERN NEIGHBORHOODS*  
TRANSPORTATION IMPLEMENTATION PLANNING STUDY





## 4 16<sup>TH</sup> STREET CORRIDOR



### 4.1 ISSUES AND OPPORTUNITIES

Sixteenth Street is a major east-west corridor connecting the Eastern Neighborhoods and connecting the Eastern Neighborhoods to the rest of the City. In a part of the city marked by multiple barriers (including hilly terrain, US 101 and Interstate 80, and the Caltrain right-of-way), 16th Street it is the only east-west street that allows for continuous travel all the way from the Mission District to Mission Bay. It is designated as a Major Arterial in the City’s Congestion Management Plan network, a Transit Priority Street recommended by the Transit Effectiveness Project, and a recommended truck route. Portions of the corridor are also included in the city’s bicycle network. Substantial development is expected in several neighborhoods connected by 16th Street, including the north Mission District, Showplace Square, and Mission Bay. The 22 Fillmore currently provides transit service along 16th Street from the Castro district as far east as Kansas Street in Potrero Hill, where it turns south before continuing to Mission Bay on 17<sup>th</sup> and 18<sup>th</sup> Streets. In the future, SFMTA plans to re-route Route 22 so that it serves the full length of 16<sup>th</sup> Street to Mission Bay.

16<sup>th</sup> Street was identified as a high-need corridor in the Eastern Neighborhoods area plans, and streetscape and transit improvements to the corridor were specified as priority projects by the San Francisco Board of Supervisors. From a transportation operations perspective, 16<sup>th</sup> Street is made up of four distinct segments. They include:

- **Guerrero to South Van Ness Avenue.** In this segment, 16<sup>th</sup> Street is a busy neighborhood commercial corridor and an important path to the 16<sup>th</sup> and Mission BART station. There are two travel lanes in the westbound direction and one travel lane in the eastbound direction. Very large numbers of pedestrians use 16<sup>th</sup> Street in this segment

and in the busiest areas the interaction between high pedestrian volumes, buses, and private vehicles causes delays for all modes. This area also suffers from high rates of pedestrian injury collisions. SFMTA's 22 Fillmore route operates in this segment, while bicycle lanes run in parallel on 17<sup>th</sup> Street. The BART station at 16<sup>th</sup> and Mission is an important destination and a major transit transfer point. The parcels surrounding the BART station are zoned for, and likely to be redeveloped, with high density mixed use development at some point in the future.

- **South Van Ness Avenue to Potrero Avenue.** East of South Van Ness Avenue, 16<sup>th</sup> Street shifts to two narrow travel lanes in each direction. Land uses in this segment are less dense than the segment west of South Van Ness, and pedestrian activity is lower. The majority of intersections are unsignalized. The intersection of 16<sup>th</sup> and Potrero is forecast to have substantial traffic delays by 2035. The 22 Fillmore continues on 16<sup>th</sup> Street through this segment, and bike lanes continue on 17<sup>th</sup> Street. Potrero Center shopping center, located on the north side of 16<sup>th</sup> between Potrero and Bryant, is an important destination in this segment. This large property is likely to be redeveloped with a mix of more intensive uses at some point in the future.
- **Potrero Avenue to Seventh Street.** East of US 101, 16<sup>th</sup> Street shifts back to two lanes eastbound and one lane westbound. The 22 Fillmore turns off of 16<sup>th</sup> at Kansas Street proceeding east on 18<sup>th</sup> Street. Bicycle lanes shift from 17<sup>th</sup> to 16<sup>th</sup> at Kansas as well. This segment has been selected as the focus of the EN TRIPS corridor design project and is discussed in more detail below.
- **Seventh Street to Terry Francois Boulevard.** Just east of Seventh Street, 16<sup>th</sup> Street passes under I-280 and over the Caltrain tracks. The future configuration of this intersection is uncertain as the future alignment of Caltrain and California High Speed Rail have not been determined. This issue is discussed in more detail below. East of Seventh, 16<sup>th</sup> Street enters the Mission Bay redevelopment area and the right-of-way widens. While there are currently few people in this area, redevelopment of Mission Bay will transform this area with major investments in the street grid and large increases in residential and employment density. Currently, there is a bicycle route along 16<sup>th</sup> from Illinois Street to Third Street. From Third Street to Henry Adams Street, 16<sup>th</sup> Street has bicycle lanes.

Sixteenth Street will require transit priority treatments in all four of these segments. As an important first step toward these improvements, 16<sup>th</sup> Street between Potrero Avenue and Seventh Streets was selected for an EN TRIPS corridor segment improvement project.

## 16<sup>th</sup> Street Project Segment - Potrero Avenue to Seventh Street

The segment of 16<sup>th</sup> Street between Potrero Avenue and Seventh Street has been prioritized for investment above other segments of 16<sup>th</sup> Street because of expected residential growth, forecast vehicle congestion, transit capacity constraints, and community priority. This segment was identified as an area of need by participants in the EN TRIPS community workshops, stressing the importance of 16<sup>th</sup> Street as a transit corridor. Details on the Potrero to Seventh Street segment are as follows.

### Land Use

Land use densities in this segment of the 16<sup>th</sup> Street corridor are currently low. However, substantial development is forecasted for the Eastern Neighborhoods. The Eastern

Neighborhoods area plans encourage housing and mixed use in the northern portion of Showplace Square, acknowledging an already-developing residential cluster. In the 16<sup>th</sup> and 17<sup>th</sup> Street corridors between Kansas and Seventh Streets, the plan encourages the development of new housing with somewhat increased residential density along the south side of 16<sup>th</sup> Street. In the core Showplace Square Design District between 16<sup>th</sup> and Division Streets, the plan aims to protect design-oriented businesses while encouraging retail and office development. Overall, as many as 3,000 new housing units could be built along this segment of 16<sup>th</sup> by 2035 leading to a substantial growth in residential density as well as increasing vehicle and pedestrian travel demand.

## **Transit**

While it currently turns off of 16<sup>th</sup> Street at Kansas, SFMTA's Transit Effectiveness Project specifies that the 22 Fillmore will run the length of 16<sup>th</sup> Street connecting the Castro District, the Mission District, Showplace Square, and Potrero Hill. Route 22 as a whole currently suffers from delay and poor reliability: Five-year average schedule adherence for the line as a whole is just 72.3%, and schedule adherence is 52.6% (FY2011 Service Standards Reports year-end scorecard). Forecast traffic congestion on 16<sup>th</sup> (particularly at Potrero Avenue) could further delay this route in its future alignment. In 2035, demand for ridership on the 22 Fillmore is forecast to exceed capacity between Guerrero and Arkansas. The 33 Stanyan also currently operates on 16<sup>th</sup> Street between Guerrero and Kansas and will continue to do so in the future.

## **Vehicle Circulation**

Today, there is relatively little traffic in this segment of 16<sup>th</sup> Street. However, as new development occurs at Mission Bay and Showplace Square is redeveloped, more vehicle demand is expected. Major delay is also projected including severe congestions at 16<sup>th</sup> /Potrero and at 16<sup>th</sup>/Third. Interruptions to east-west vehicle travel on most streets in this area present challenges to circulation (illustrated in Figure 4-1). In addition to the Caltrain right-of-way, breaks in the vehicle grid occur at US 101 (18<sup>th</sup> and Mariposa Streets) and large parcel sites (for example, the Best Buy and Potrero Center parcels interrupt 14<sup>th</sup> and 15<sup>th</sup> Streets). In addition, 14<sup>th</sup> and 15<sup>th</sup> Streets are one-way for vehicle circulation between Guerrero and Folsom Streets. Transit priority on 16<sup>th</sup> Street will inevitably reduce vehicle capacity in this corridor. Therefore, it will be valuable to seek opportunities to reconnect the surrounding grid system to accommodate greater choices of routes for all modes.

## **Pedestrian and Bicycle Conditions**

Through much of this segment, sidewalks are narrow, and there are few street trees or pedestrian amenities. Most intersections in this segment are unsignalized, leading to difficult crossings for some pedestrians. The pedestrian environment will require improvements to meet the needs of an increasing residential population. The Eastern Neighborhoods plans envision 16<sup>th</sup> Street as part of a network of 'Green Connector' streets, which feature "wider sidewalks, places to sit and enjoy, landscaping and gracious street trees that would provide linkages between larger open spaces and diffuse the recreational and aesthetic benefits of these spaces into the neighborhood."

Bicycle lanes currently exist on 16<sup>th</sup> between Kansas and Third Streets, and the San Francisco Bicycle plan proposes extending bicycle lanes to Terry Francois Boulevard on the east and Potrero Avenue on the west. West of Potrero, bicycle lanes continue on 17<sup>th</sup> Street. In order to accommodate transit priority treatments on 16<sup>th</sup> Street, it may be possible and desirable to shift bicycle lanes to 17<sup>th</sup> Street, creating a continuous bicycle corridor between the Castro and the

**Caltrain right-of-way.** This proposal is discussed in more detail below. Just as for vehicles, east-west pedestrian and bicycle connectivity is interrupted at numerous places between Division and 19<sup>th</sup> Streets. These interruptions are detailed in Figure 4-1.

### Caltrain/I-280/California High Speed Rail right-of-way

The Caltrain tracks and the I-280 freeway pass through the Eastern Neighborhoods in the same right-of-way, with the train tracks at grade and the freeway in an aerial structure. Together, this corridor presents a physical and psychological barrier for east-west circulation in the Eastern Neighborhoods interrupting 17<sup>th</sup> and 19<sup>th</sup> Streets and requiring overpasses or underpasses at several other streets. Uncertainty about the future of the Caltrain right-of-way due to the unresolved question about the future alignment of California High Speed Rail affects transportation planning in this part of the city.



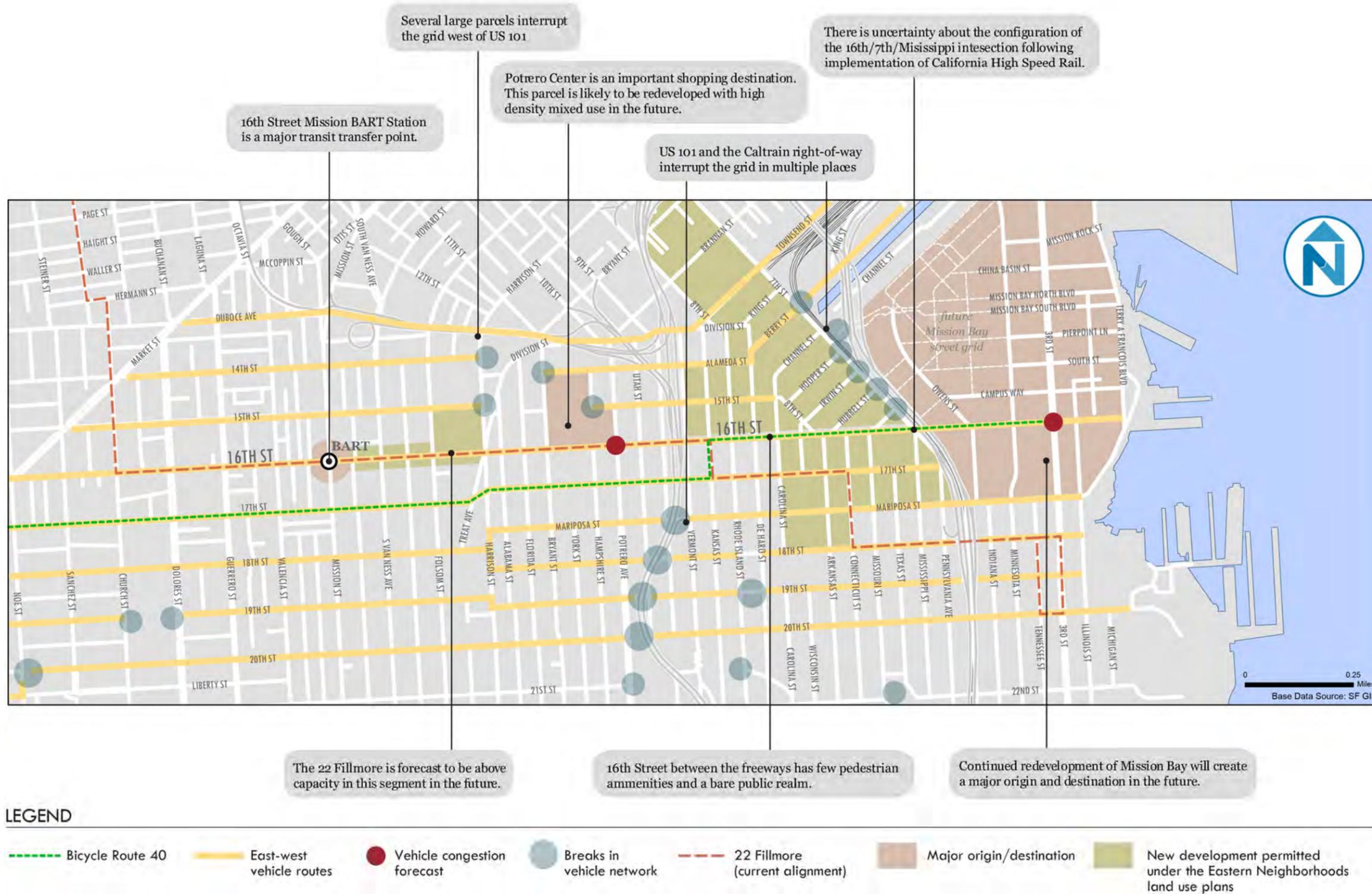
16<sup>th</sup> Street crosses the Caltrain right-of-way at grade just to the east of Seventh Street and Mississippi Street and under the I-280 freeway viaduct. In the future, California High-Speed Rail may operate in this segment, and Caltrain may upgrade from its existing diesel service to more frequent electrified service. As a result of these changes, this complex intersection may change substantially in the coming decades, but its precise configuration is unknown at this time. City agencies, Caltrain, and the High Speed Rail Authority are currently working to develop alternatives. The possibilities are as follows.

- **All trains operate underground.** Both California High-Speed Rail and Caltrain could operate in a tunnel, bypassing this intersection. Vehicle circulation and bus service would encounter fewer interruptions than in the current configuration. This is the optimal configuration for east-west circulation in the Eastern Neighborhoods.
- **Some trains operate underground, some operate at grade.** In another scenario, High-Speed Rail would operate in a tunnel, and Caltrain would operate at grade. A more frequent Caltrain would cause interruptions to circulation on 16<sup>th</sup> Street. If Caltrain is electrified, it will need to grade-separated 16<sup>th</sup> Street, or the 22-Fillmore will need to be configured to "go off-wire" and return to overhead wire while in motion to avoid crossed overhead wires.
- **All trains operate at grade.** In a third scenario, both an electrified Caltrain and California High-Speed Rail would operate at grade. With as many as ten trains per hour crossing 16<sup>th</sup> Street, this arrangement would almost certainly require the City to grade-separate 16<sup>th</sup> Street from the rail right-of-way to maintain acceptable east-west circulation.

The High-Speed Rail Authority's business plan currently envisions extending service to San Francisco beginning in 2026. Given this long time horizon, it is sensible for San Francisco to proceed with plans to improve 16<sup>th</sup> Street and extend the 22 Fillmore assuming that the current configuration will remain in place for at least 15 years.

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Figure 4-1 16th Street Issues and Opportunities



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## 4.2 PROJECT OBJECTIVES

In designing transportation improvements for 16<sup>th</sup> Street, the SFMTA was guided by the principles listed below. With a limited right-of-way, project design requires tradeoffs between each of these priorities, but the project alternatives attempt to strike a balance between priorities.

- **Transit performance.** *The project should maximize transit speed and reliability on 16<sup>th</sup> Street while providing a safe and comfortable waiting environment for passengers.* The project should facilitate the extension of the 22 Fillmore service to the full length of 16<sup>th</sup> Street, while protecting transit from the impacts of vehicle congestion.
- **The public realm.** *Open space, landscaping, and other urban design elements should be enhanced to upgrade 16<sup>th</sup> Street to a "green connector" street.* The project seeks to provide an enhanced public realm, upgrading the 16<sup>th</sup> Street public realm so that it serves as a "green connector" street as envisioned in the Eastern Neighborhoods land use plans. Elements include wider sidewalks, landscaping, and other amenities for the pedestrian realm, as well as storm water management facilities.
- **Pedestrian conditions.** *Pedestrian comfort and safety should be improved.* Currently, this segment has limited pedestrian facilities. Its 10 foot sidewalks fall below Better Streets Plan minimums for Mixed Use streets. There are few signalized crossings of 16<sup>th</sup> Street, and there is a history of pedestrian collisions at some unsignalized crossings. The project will seek to provide reduced crossing distances and additional signalized pedestrian crossings where appropriate.
- **Bicycle conditions.** *A safe, comfortable, and attractive bicycle route should be provided within the corridor.* Both 16<sup>th</sup> and 17<sup>th</sup> Streets currently feature Class II bicycle lanes. Because the lanes continue east on 16<sup>th</sup> only, and west on 17<sup>th</sup> only, lanes on both streets might not be necessary (grades on the streets are similar, and there is less traffic on 17<sup>th</sup>). If an alternative that did not provide lanes on 16<sup>th</sup> were to be adopted, improvements to bicycle facilities on 17<sup>th</sup> street would be made.
- **Vehicle circulation.** *The street grid as a whole should continue to accommodate east-west vehicle travel between the Mission District, Potrero Hill, Showplace Square, and Mission Bay.* This project will tolerate some reduction in vehicle capacity in order to achieve transit priority and other project goals. However, as development occurs in this part of the city, circulation on 16<sup>th</sup> Street would benefit from consideration of "grid repair," or improvements to the connectivity of parallel routes in order to provide alternatives for travel by all modes.
- **Parking and loading.** *Delivery access to businesses should be maintained and parking opportunities should be provided where possible, but parking and loading is less important than through-travel in this segment.* This segment of 16<sup>th</sup> Street has short block lengths (generally about 200 feet), and most properties also front onto side streets, so parking and loading from side streets can maintain easy access to nearly all properties in this segment. In addition, many of the cross streets in this segment have 90 degree parking, providing a large amount of on street parking. As a result, 16<sup>th</sup> Street itself provides only a small share of the total parking spaces available in the corridor as a whole.
- **Deliverability and cost-effectiveness.** *The project should maximize cost-effectiveness and speed delivery of the most crucial transit priority improvements.*

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### 4.3 ALTERNATIVES DEVELOPMENT AND EVALUATION

KEY ●●● Greatest benefit ○ Neutral ●●● Greatest impact

#### Full list of project alternatives

The EN TRIPS project team developed a total of nine project alternatives. These alternatives are described and evaluated for each design principle in the Figure 4-2. The project alternatives share a number of similarities. First, all of them provide dedicated transit lanes (either on the center or the side of the street), as well as other transit priority treatments such as near-level boarding and transit signal priority. All would restrict left turns for vehicles at most intersections on 16<sup>th</sup> in order to maintain capacity for through-travel. Most would remove a large share of the parking on 16<sup>th</sup> Street. It is important to note, however, that with 90 degree parking present on most side streets in this segment, the parking on 16<sup>th</sup> Street represents a relatively small share of the total parking in the corridor (most parcels on the corridor front onto at least one side street). All would require substantial public investment in transit and pedestrian facilities. Key differences between the alternatives include the placement of bicycle facilities (either 16<sup>th</sup> or 17<sup>th</sup> Street), the type of transit only lane (center or side-running), and the placement of bus stops (boarding island or curb stops).

Figure 4-2 16<sup>th</sup> Street: Full List of Project Alternatives

Description	Cross Section	Transit Performance	Bicycle circulation and safety	Vehicle circulation	Pedestrian circulation and safety	The public realm	Parking and loading	Cost comparison	Notes	Disposition
1 Median Transitway		●●●	○	●	●●	●●●	●	\$\$\$	Provides strong transit priority. Removes existing bicycle lane on 16 but replaces it with an enhanced bicycle corridor on 17 <sup>th</sup> . Wide sidewalks would benefit pedestrian safety and the public realm.	Carried forward – evaluated further below.
2 Median Transitway + Bike Lanes		●●●	○	●	●	●●	●●	\$\$\$	This alternative provides most of the same advantages as Alternative 1. However, it reduces sidewalk space to maintain bicycle lanes on 16 <sup>th</sup> street.	Not carried forward because bicycles can be accommodated on 17 <sup>th</sup> Street in an improved facility
3 Median Transitway + Bike Lanes + Curb Stops		●●	○	●	●	●●	●●	\$\$\$	This alternative would maintain space for wide sidewalks by foregoing transit boarding islands, instead bringing buses out of the transitway to stops at the curb.	Not carried forward because of insufficient transit performance improvement and potential bus-bike conflicts.
4 Median Queue Jump Lane + Parking		●●	○	●	●	●●	○	\$\$\$	Provides a center "queue jump" lane that would allow transit to safely bypass traffic in either direction. Would permit both wide sidewalks and maintenance of parking lanes. Carried forward, but most appropriate for other segments of 16 <sup>th</sup> .	Carried forward – evaluated further below.

Figure 4-2 16<sup>th</sup> Street: All Alternatives (Continued)

Description	Cross Section	Transit Performance	Bicycle circulation and safety	Vehicle circulation	Pedestrian circulation and safety	The public realm	Parking and loading	Deliverability and cost-effectiveness	Notes	Disposition
5 Median Queue Jump Lane + Bike Lanes		●	○	●	●	● ● ●	● ●	\$\$\$	Identical to Alternative 4, but would provide bicycle lanes instead of parking.	Not carried forward because bicycle lanes can be accommodated on 17 <sup>th</sup> Street.
6 Median bikeway		●	○	●	●	●	● ●	\$\$	This alternative would provide side-running transit, and would accommodate two-way travel in a 12' median. While this would be a premium facility for through-travel, it is not clear that bicycle turning movements could be safely accommodated.	Not carried forward because of uncertainty about functionality of the bicycle facility.
7 Median Green		●	○	●	● ●	● ● ●	● ●	\$\$\$	Side-running transit lanes would provide some transit priority, but buses would wait behind right turning vehicles. Would provide for a wide landscaped median, improving streetscape.	Carried forward – evaluated further below.
8 Reversible Lane		○	○	●	○	○	● ●	\$\$	This alternative would provide a reversible vehicle lane on 16 <sup>th</sup> , maximizing traffic capacity in the peak direction of travel. It would require overhead gantries that would negatively affect the streetscape.	Not carried forward due to low pedestrian and public realm benefit.
9 Side-Running Transit Lane + Bike Lanes		●	○	●	●	●	● ●	\$\$	Side-running transit lanes would provide some transit priority, but buses would wait behind right turning vehicles and potentially conflict with bicycles.	Not carried forward because bicycle lanes can be accommodated on 17 <sup>th</sup> Street.

## 4.4 RECOMMENDED ALTERNATIVE

The EN TRIPS project team developed a total of nine project alternatives. These alternatives are described and evaluated for each design principle in the Figure 4-2. The project alternatives share a number of similarities. First, all of them provide dedicated transit lanes (either on the center or the side of the street), as well as other transit priority treatments such as near-level boarding and transit signal priority. All would restrict left turns for vehicles at most intersections on 16<sup>th</sup> in order to maintain capacity for through-travel. Most would remove a large share of the parking on 16<sup>th</sup> Street. It is important to note, however, that with 90 degree parking present on most side streets in this segment, the parking on 16<sup>th</sup> Street represents a relatively small share of the total parking in the corridor (most parcels on the corridor front onto at least one side street). All would require substantial public investment in transit and pedestrian facilities. Key differences between the alternatives include the placement of bicycle facilities (either 16<sup>th</sup> or 17<sup>th</sup> Street), the type of transit only lane (center or side-running), and the placement of bus stops (boarding island or curb stops).

Based on the evaluation above, the three most promising concepts were selected for additional analysis, design, and community input. The concepts advanced include the Median Transitway (Alternative 1), the Center Queue Jump (Alternative 4), and the Green Median (Alternative 7).

After detailed review of these options, the Median Transitway is recommended as the concept that provides the greatest benefits across the full range of project objectives. In this section, Alternative 1 has been developed in more detail. The following project elements are described and illustrated in the remainder of this section.

- **Operations Concept.** Recommendations for the design of transportation facilities are explored.
- **Circulation Concept.** A circulation concept for the corridor is presented, focusing on Sixteenth Street and the parallel east-west streets between the Mission District, Showplace Square, Potrero Hill, and Mission Bay.
- **Streetscape, landscape, and public realm improvements.** Recommendations for streetscape, landscape, and public realm improvements are presented. These improvements are integral to the project design and a necessary step towards achieving the vision for this part of the city as laid out in the Eastern Neighborhoods area plans.
- **Phasing plan.** A conceptual phasing plan for this alternative is presented at the end of this section. A more detailed funding and implementation plan will be published under a separate cover in 2012.

In section 4.5, the two other promising alternatives are summarized. It should be noted that, in the judgment of the project team, the recommended alternative is clearly the strongest concept across the range project objectives. However, these additional options are included for stakeholder review and potential inclusion as alternatives in environmental.

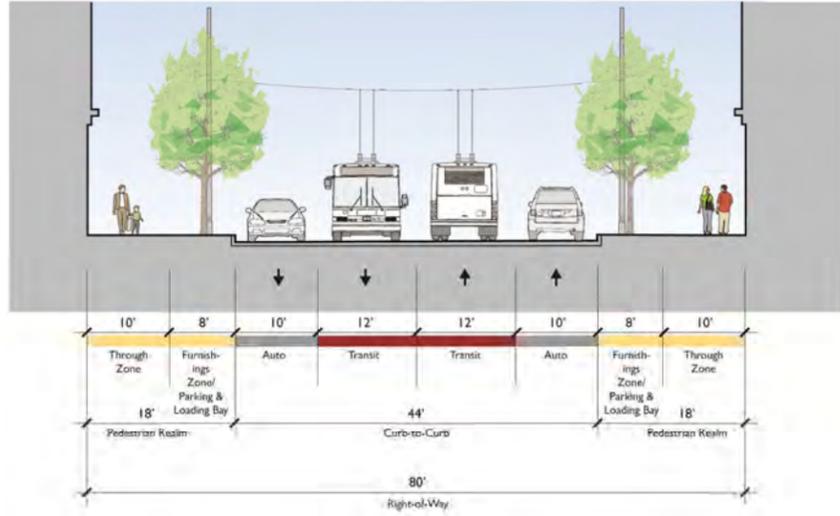
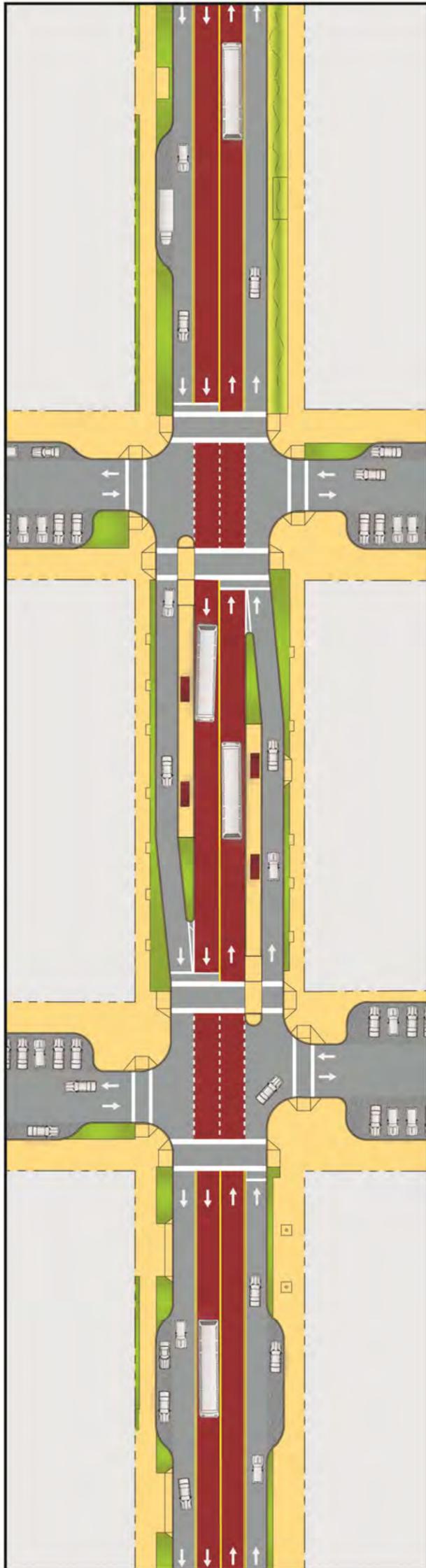
### Highlights of Recommended Alternative

The recommended alternative would provide the strongest transit priority to the re-aligned 22 Fillmore, a service that is of vital importance to the future of the Eastern Neighborhoods as a whole. It would also substantially upgrade pedestrian conditions and improve the public realm. While it would remove a segment of bicycle lanes on Sixteenth Street, bicycles travel would be accommodated in a new high-quality bicycle facility on Seventeenth Street. While this alternative will require major public investment, it can be easily phased, with the most crucial transit priority

and pedestrian safety aspects of the project implemented first, followed by the costlier public realm improvements when funding becomes available.

Traffic impacts of the proposed transit priority treatments will be analyzed in detail as part of the TEP environmental review process. This project will maintain one lane of traffic in the eastbound direction (as today), while reducing westbound vehicle lanes from two to one. A number of factors could help offset this reduced capacity: first, a substantial increase in transit performance could reduce the demand for vehicle trips in this corridor. Second, the City can invest in reconnecting the east-west transportation grid in this part of the City, relieving some of the burden on 16<sup>th</sup> Street as the primary east-west vehicle route. Similarly, continued efforts at Transportation Demand Management and parking management at Mission Bay could also reduce the demand for vehicle trips.

16<sup>th</sup> Street Recommended Alternative (Alternative 1, Median Transitway)



**Transit operations:** This proposal provides the optimum conditions for transit operations, featuring a continuous, two-lane median transitway that private vehicles could not legally enter in the priority project segment (potential treatments for other segments of 16<sup>th</sup> are discussed in the next section under the heading Circulation Concept). Future transit volumes on 16<sup>th</sup> are forecast to be quite high: 14 buses in each direction during the peak hour on Lines 22 and 33 west of Connecticut (or nearly one bus every four minutes), and 10 buses per hour on Line 22 to the east. Island stops with raised platforms enabling near-level boarding would be provided at Wisconsin Street, between Rhode Island and Kansas Streets, and at Potrero Avenue.

**Vehicle circulation:** 16<sup>th</sup> Street between Seventh Street and Potrero Avenue would be reconfigured to consist of one center transit-only lane and one general-purpose travel lane in each direction. Left turns would be prohibited at all intersections except Seventh Street, Vermont Street (eastbound), and San Bruno Avenue (westbound), where left-turn pockets would be provided. The reduction in vehicle capacity is forecast to increase westbound traffic congestion substantially in the future condition if no other changes are made to the network. It may be possible to replace this capacity by improving east-west connectivity elsewhere in the network, as discussed in the next section.

**Bicycle conditions:** Implementation of the Median Transitway alternative would be contingent on removing the existing bicycle lanes on 16<sup>th</sup> Street east of Kansas Street, replacing them with bicycle lanes on 17<sup>th</sup> Street, along with traffic calming treatments at intersections. This proposal is discussed in more detail below in the Circulation Concept section. Given the potential to provide a continuous bicycle corridor from the Castro District all the way to the Mississippi Street bicycle lanes on a street with lower forecast traffic volumes than on 16<sup>th</sup>, shifting bicycle lanes to 17<sup>th</sup> Street presents the opportunity for equal or improved bicycle facility from what is available today.

**Pedestrian conditions and the public realm:** This alternative includes an 18-foot pedestrian space on both sides of the street for much of the corridor. This space would be flexible – it could be used as a full 18-foot sidewalk, a landscaped section up to 8 feet in width where appropriate potentially including planter strips or double rows of trees. Wide sidewalks also provide additional opportunities for sidewalk seating. In select locations, 8-foot bays could be cut into this pedestrian space to allow for limited parking or loading on 16<sup>th</sup> Street. On blocks with bus boarding islands, the sidewalk on the bus stop side of the street would be reduced to 10 feet. Wide sidewalks at all corners would reduce pedestrian crossing distance. Crosswalks would be provided at all nonsignalized intersections.

**Parking and loading:** This alternative would remove the parking lanes on 16<sup>th</sup> Street between San Bruno Avenue and Potrero Avenue. It would allow for curbside loading at select locations using sidewalk cut-out bays similar to those on Market Street. Because it would maintain 90 degree parking on the cross streets (and potential convert one or more side streets from parallel parking to 90 degree parking), the loss of curb parking on 16<sup>th</sup> Street would be a relatively small share of the parking available in the corridor. The remaining parking would be managed for availability by the SFMTA's *SF park* initiative.

**Cost and deliverability:** The substantial benefits of this project would come at substantial cost. While construction of the median transitway (including new overhead wire, island stops, and pavement treatments) would require some expense, moving curb lines on both sides of the street would be costliest element of the project. However, this project could easily be phased: in the first phase, the median transitway and pedestrian bulb-outs could be constructed, and existing curb lines could be left in place, maintaining the parking lanes. Phase II would involve widening the sidewalks and adding additional streetscape elements and landscaping. Specific cost estimates are included in Chapter 8, Funding and Implementation.

**Applicability:** The SFMTA recommends that this alternative be implemented in the project segment. Further detail on this proposal is discussed in the next section.

## 16th Street Operations Concept (Recommended Alternative)

The recommended alternative for 16th Street is based on a few key features, including increasing transit reliability by the creation of a median transitway; extension of sidewalks; and moving bicycle circulation to 17th Street.

Vehicular traffic will travel in one lane in each direction. Vehicle lefts will be prohibited at most intersections, but vehicles would be able to make right turns on to and off from 16th Street. Not-in-service transit vehicles may be able to turn left where required.



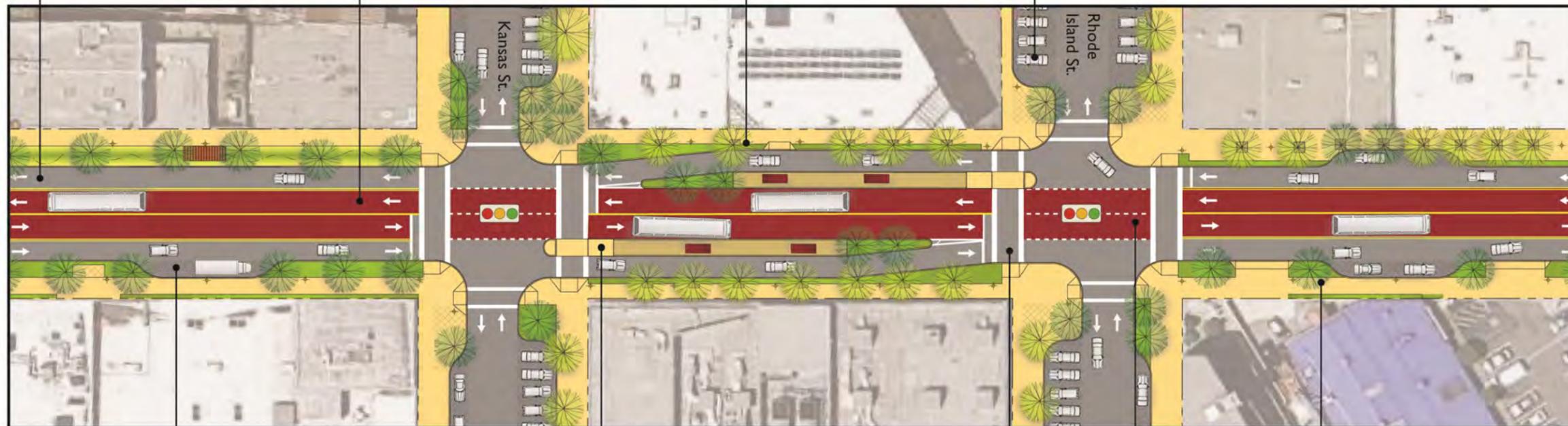
The 22 Fillmore, 33 Stanyan, and potentially private shuttles will run in a median transitway in the center of 16th Street, where buses traveling in dedicated lanes and unimpeded by turning vehicles will dramatically decrease transit delays and increase reliability.

Sidewalks at transit stops will remain 10 feet wide on the stop side to accommodate the bus boarding platform.

While much of the parking on 16th Street will be removed, the maintenance of 90-degree parking on most cross streets means that a majority of the parking in the corridor will be retained. Some additional parking can be added by reconfiguring one or more cross streets for perpendicular parking.



Bike lanes will be removed from 16th Street to allow more room for transit and pedestrians. Bicycle lanes and traffic calming treatments will be added on 17th Streets.



Most parking will be removed from 16th Street, but the 18-foot wide sidewalks will allow for occasional placement of parking or loading bays. Placement of the bays will vary from block to block depending on land uses.



Passengers will board buses on median islands, raised to the level of the bus floor to speed up the boarding process. Boarding islands will be accessed via ramps rising from crosswalks. The boarding process will also be made shorter by ticket machines allowing "prepaid" boarding through all doors.



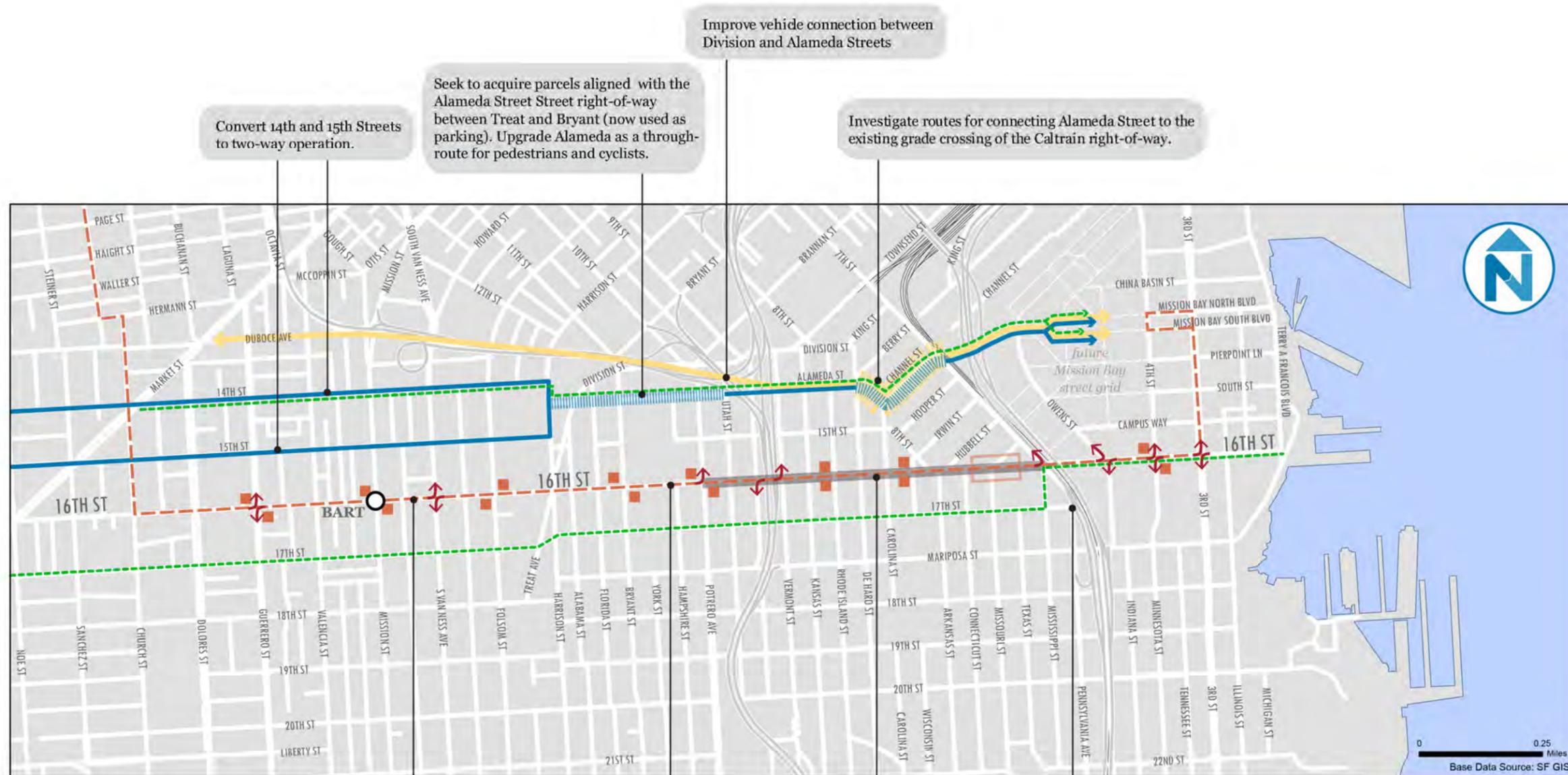
Pedestrian crossings of 16th Street will be 44 feet, approximately 25% shorter than the current condition. Crossings at the transit stops will be 53 feet, but will include an 8-foot pedestrian refuge at the boarding island.

New signals will be added Rhode Island, Wisconsin, and Connecticut to protect transit and improve pedestrian connectivity.

Sidewalks along 16th Street will widen from 10 feet to 18 feet (except at and near transit stops).



### 16th Street Circulation Concept (Recommended Alternative)



LEGEND

- Bicycle Route
- - - 22 Fillmore (proposed)
- Bus Stop
- Potential location area for future bus stop
- ↩ Permitted left turn
- ▨ New east-west bike/pedestrian connection
- ▨ New vehicle route

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## **16<sup>th</sup> Street Corridor Circulation Concept Detail (Recommended Alternative)**

This section proposes refinements to the Eastern Neighborhoods transportation networks to address the opportunities and constraints in and around the 16<sup>th</sup> Street corridor. While the proposals focus on supporting the goals of the proposed 16<sup>th</sup> Street project, they consider issues and opportunities in the surrounding corridors and the wider study area. While some of these proposed changes must be implemented at the same time as the 16<sup>th</sup> Street project, others will require further study and may be implemented later. Key elements of the proposal are discussed below. The concept is illustrated in Figure 4-3.

### **Transit Priority on 16<sup>th</sup> Street between Church and Third Streets**

The Median Transitway treatment proposed for the Potrero to Seventh Street segment of 16<sup>th</sup> Street is part of a larger vision to provide transit priority for the full length of 16<sup>th</sup> Street, as proposed in the SFMTA's TEP. Outside of the EN TRIPS priority project segment, 16<sup>th</sup> Street transit priority could be handled as follows.

#### **Third Street to Seventh Street**

Between Third Street and Seventh Street, 16<sup>th</sup> Street would be reconfigured to consist of one center transit-only lane and one general-purpose travel lane in each direction, plus left-turn lanes at all intersections except Seventh Street and right-turn lanes eastbound at all intersections except Seventh Street, and westbound at Seventh Street. Island stops with raised platforms enabling near-level boarding would be constructed on the far side of the intersection at Fourth Street. Transit signal priority would be implemented. Bicycle lanes would be maintained.

Vehicle left turns from 16<sup>th</sup> Street will be prohibited at most intersections in the corridor. Vehicle lefts will be permitted at Vermont, San Bruno and Seventh streets. At these intersections, a left turn lane will be provided to the right of the transitway, and the turning vehicles will get a dedicated signal phase to turn across the transitway.

#### **Potrero Avenue to Harrison Street**

Between Potrero Avenue and Bryant Street, 16<sup>th</sup> Street would be reconfigured to consist of one center transit-only lane and one general-purpose travel lane in each direction. Left turn pockets would be provided in the eastbound direction at Potrero Avenue and at the central entrance to Potrero Center, and a right turn pocket would be provided in the westbound direction at Bryant Street. A mid-block traffic signal would be introduced at the central entrance to Potrero Center. Existing stops would be removed and island stops would be constructed far-side at Potrero Avenue and at Bryant Street. Curbside parking and loading would be removed from the south side of the street. Between Bryant and Harrison Streets, the median transitway would continue, with parking retained on both sides of the street.

#### **Harrison Street to Church Street**

West of Harrison Street, a different roadway configuration and different land uses introduce new constraints. There are 15-foot sidewalks on both sides of the street, which narrow the available right-of-way to 50 feet from curb-to-curb. In addition, between South Van Ness and Guerrero, 16<sup>th</sup> Street is a busy neighborhood commercial district with heavy pedestrian volumes and a

variety of small-scale retail businesses. This environment creates a higher priority for on-street parking and loading. It also suggests that there may be a greater advantage in having fewer than four lanes to create an improved pedestrian environment. There are a number of possible treatments for robust transit priority in this segment. They include:

- **Continue the median transitway.** A modified median transitway could be implemented between Bryant and Church Street. The 50-foot curb-to-curb right-of-way in this segment is sufficient to provide one outside vehicle lane in each direction, and one center transit lane in each direction while retaining a parking lane along the north side of the street. The parking lane would be removed on the south side of the street, and on both the north and south sides where necessary to make room for transit boarding islands. One or more dedicated loading spaces could be reserved on each block in the remaining parking lane, and loading spaces could also be provided near the corner on cross streets and alleys to serve business on the south side of the street. While this treatment would reduce parking access to this commercial district, this loss of parking would be balanced by substantially improved transit access. This treatment has the disadvantage of providing relatively narrow transit lanes, and of moving vehicle traffic immediately adjacent to the curb, which would reduce pedestrian comfort. Finally, it would introduce four lanes in the roadway, a less than ideal condition for a pedestrian-oriented retail corridor.
- **Provide side-running transit lanes.** During off-peak periods, the current configuration would be retained, with three mixed-flow lanes and parking lanes on both sides of the street. During peak periods, one vehicle lane in each direction would operate in the center of the street, and space for two side-running transit lanes would be provided by removing parking from one side of the street using a tow-away parking lane. While this treatment has the advantage of retaining all existing parking during off-peak periods, it provides weaker transit priority than any of the other options listed here, because buses would still have to wait behind right-turning vehicles in an environment where high pedestrian volumes can create long waits for right turns.
- **Provide a single median transit priority lane.** Such a treatment would be similar to the median queue jump concept presented in Alternative 4. However, rather than dividing the queue jump lane by direction at mid-block, it would allow buses moving in either direction to use the transit lane for up to the full length of the block to bypass traffic. Operator judgment would prevent buses travelling in opposite directions from using this center lane at the same time (as it does for vehicles using a two-way center left turn lane). Alternatively, a signal switching system (similar to those used in a single-track railroad segment) could be used to physically prevent buses traveling opposite directions from using the center lane at the same time in the same segment. Using a single median lane to provide transit priority would have the advantage of allowing 16<sup>th</sup> Street to retain wide sidewalks and on-street parking and loading on both sides of the street through this commercial district, while confining the roadway to just three lanes rather than four, which would benefit pedestrians.
- **Develop an area-wide plan to eliminate congestion-related delay on 16th Street.** Rather than providing buses with a dedicated right-of-way, a comprehensive area-wide plan using signal management, traffic diversion, perimeter traffic bottlenecks, and transit queue jumps at those bottlenecks could be used to reducing congestion delay

enough to speed transit through this segment. This strategy would have to be implemented with attention to traffic calming on 14<sup>th</sup>, 15<sup>th</sup>, and 17<sup>th</sup> Streets.

While a number of options are available, the long-term goal for this segment will be to provide an unobstructed path of travel for transit the full length of the 16<sup>th</sup> Street corridor, creating a truly “no compromise” rapid transit corridor spanning the Eastern Neighborhoods. The TEP environmental review process will evaluate options for near-term transit priority in this segment.

## 17<sup>th</sup> Street Bikeway

Currently, city Bicycle Route 40 runs from Third Street west on 16<sup>th</sup> to Kansas, where it turns south for one block before continuing west along 17<sup>th</sup> Street. With the exception of the single block of Kansas, it features continuous Class II on-street bicycle lanes from Mission Bay through Potrero Hill to Potrero Avenue (then again from Treat to Church Street).



In the recommended 16<sup>th</sup> Street concept, bicycle lanes east of Kansas would be removed from 16<sup>th</sup> and replaced with bicycle facilities on 17<sup>th</sup> Street, 470 feet to the south. There are two potential treatments for 17<sup>th</sup> Street between Kansas and Seventh, both worth exploring further.

**Bicycle lanes.** In this configuration, existing sidewalks and parking lanes would remain. Bicycle lanes would be striped on both sides of the street, leaving the remaining roadway available for two-way vehicle circulation. On the block between Kansas and De Haro Streets, where sidewalks widen to 12 feet, parking would be removed on one side of the street to enable bicycle lanes in both directions. Traffic calming measures should be applied the full length of this segment, including conversion of two-way stop intersections to four-way stops and addition of corner bulb-outs. Corner bulb-outs will be particularly important because the proposed left-turn restrictions on 16<sup>th</sup> Street will cause some eastbound drivers to divert onto 17<sup>th</sup> Street for one block. Narrowing these intersections and providing tight turning radii will encourage these drivers to navigate 17<sup>th</sup> Street slowly and safely.

**Bicycle Boulevard.** An alternative to striping bicycle lanes on 17<sup>th</sup> Street would be to implement bicycle boulevard treatments. Rather than dedicated lanes, cyclists would be encouraged to use the full roadway. Traffic calming, signage, and greening treatments would be applied, and traffic would be diverted from 17<sup>th</sup> Street at one or more locations. De Haro Street and/or Vermont Street present potential locations for traffic diversion.

Bicycle lanes currently extend south from 16<sup>th</sup> Street on Mississippi Street. In the near term, Bicycle Route 40 will transition from 17<sup>th</sup> to 16<sup>th</sup> Street at this point, turning to cross the Caltrain right-of-way and into Mission Bay on 16<sup>th</sup> Street. In the future, depending on the configuration of Caltrain and California High Speed Rail, the 16<sup>th</sup>/Seventh/Mississippi intersection may be challenging for cyclists to navigate. When the configuration of California High Speed rail is determined, the City should investigate adding a pedestrian and bicycle crossing of the Caltrain right-of-way into Mission Bay at the terminus of 17<sup>th</sup> Street.

## On-Street Parking Management

The EN TRIPS 16<sup>th</sup> Street project will remove continuous parking lanes from both sides of 16<sup>th</sup> Street between Potrero and Seventh Street to make additional space for transit and pedestrian facilities, while maintaining parking or loading bays in strategic locations. Parking and loading needs for 16<sup>th</sup> Street will continue to be served by parking on the cross streets, most of which have 90-degree parking, so that the loss of parking on 16<sup>th</sup> Street represents a relatively small share of the overall parking supply in the corridor as a whole.



While a majority of the corridor's parking supply will be maintained, it is likely that in peak times and places, demand for free parking will exceed supply (as it does in many parts of San Francisco). It will be essential to manage parking to ensure availability, both to ensure convenient access along the corridor and so that additional vehicle traffic is not added to 16<sup>th</sup> Street by drivers circling in search of on-street parking.

Under the *SFpark* Mission Bay Parking Management Strategy<sup>1</sup>, the SFMTA has proposed to install parking meters that accept credit cards along 16<sup>th</sup> Street and each of its cross streets between Carolina and Mississippi Streets, on De Haro Street north of 16<sup>th</sup>, and on 17<sup>th</sup> Street between Carolina and Pennsylvania. These changes will support implementation of the EN TRIPS 16<sup>th</sup> Street project (although most of the meters on 16<sup>th</sup> Street itself will eventually have to be removed).

In addition to these already-proposed changes, as part of the implementation of the EN TRIPS project, *SFpark* should continue to monitor parking occupancies along the full length of the 16<sup>th</sup>, and 17<sup>th</sup> Street corridors and cross streets, adding additional parking meters as necessary to ensure availability.

## Grid Repair

Multiple barriers interrupt the east-west street network in the areas surrounding the 16<sup>th</sup> Street corridor. These include hilly terrain, US 101, the Caltrain right-of-way and I-280. Several streets are interrupted by large parcels near Harrison Street, where the Mission District Street grid meets the smaller Potrero Hill grid. Because 16<sup>th</sup> Street is the only continuous through-route between the Mission District and Mission Bay, it carries a large share of the east-west traffic through this part of the Eastern Neighborhoods. The demand for east-west travel in this part of the City will grow as intensity of land uses increase in the north-east Mission District, Showplace Square, and Mission Bay.

An effort to repair some of the breaks in this grid would have multiple benefits, providing the potential for alternate routes for all modes of transportation. Because the proposed project for 16<sup>th</sup> Street would remove westbound vehicle capacity on 16<sup>th</sup> and restrict left turns, providing alternate routes for vehicle travel would help support the project.

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<sup>1</sup> <http://sfpark.org/wp-content/uploads/2011/11/Draft-Mission-Bay-Parking-Management-Strategy-10.28.11.pdf>

In general, the City should explore opportunities to repair the grid as development occurs in the Eastern Neighborhoods over the next 20 years. As large parcels are redeveloped at higher densities, the SFMTA and the Planning Department should work together (in collaboration with developers and property owners) to restore connections in the street grid. Policies in the Eastern Neighborhoods area plans Transportation and Built Form sections encourage breaking up larger parcels to allow for creation of new streets or mid-block alleys, and the Urban Mixed Use zoning category introduced under the Eastern Neighborhoods plans requires that redevelopment of large parcels include the addition of mid-block alleys under some circumstances.<sup>2</sup> The SFMTA and the San Francisco Planning Department should coordinate to ensure that these new routes are established in places where they will have the most positive impact on circulation.



The circulation concept illustrated in Figure 4-3 lays out a feasible scenario for establishing new east-west vehicle, bicycle, and pedestrian and bicycle paths of travel through the Eastern Neighborhoods to complement the transit priority treatment on 16<sup>th</sup> Street.

### Potential vehicle route

A new east-west vehicle path of travel could be established as follows.

- *Upgrade the connection between Division Street and Alameda Street.* Consider the potential for a new right-of-way through the existing parking under interstate 80 at this location to create a smooth transition.
- *Investigate routes for connecting Alameda Street to the existing grade crossing of the Caltrain right-of-way, just south of Channel Street.* Once east of the Caltrain tracks, vehicles could proceed east on the planned Mission Bay Boulevard.<sup>3</sup>

Together, these adjustments would allow for an attractive alternate path of travel to Showplace Square and Mission Bay for eastbound vehicle trips beginning in the north Mission District and all points north and west.

### Potential pedestrian and bicycle routes

A complimentary east-west vehicle path of travel for bicycles and pedestrians could be established as follows:

- *Convert 14<sup>th</sup> and 15<sup>th</sup> Streets in the Mission district to two-way operations.* In the Mission District, the City should investigate converting the existing one-way segments of

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<sup>2</sup> San Francisco Planning Code SEC. 270.2, Special Bulk and open space requirement: Mid-block alleys in large lot development in the Eastern Neighborhoods Mixed Use, South of Market Mixed Use, C-3, C-M, and DRT Districts.

<sup>3</sup> Because Channel Street does not currently align cleanly with the existing grade crossing, connecting Channel Street Mission Bay Boulevard may require limited re-parceling of surrounding land. However, it would not require condemning any existing buildings.

14th and 15th Streets to two-way operation (14th is now one-way between Market and Folsom Street, and 15th is now one-way between Guerrero and South Van Ness). Both streets could be converted to one lane in each direction for vehicles. Both 14<sup>th</sup> and 15<sup>th</sup> Streets could be traffic-calmed and managed as neighborhood streets. On 14<sup>th</sup> Street, the existing eastbound bicycle lane can be maintained on a two-way street, and sharrows added in the westbound direction, creating a new two-way bicycle route in the north Mission (this recommendation also supports implementation of the Folsom and Howard Street circulation proposal discussed in Chapter 5.)

- *Establish a pedestrian and bicycle connection from 14<sup>th</sup> and 15<sup>th</sup> Streets to Alameda Street and points east.* Both 14th and 15th Streets now terminate at Harrison Street, one half-block north and south of Alameda Street, which is then further interrupted by two private parking lots associated with large parcels, before continuing west. In the near term, the City should seek to acquire the portions of these parcels that align with the Alameda Street right-of-way to create an upgraded pedestrian and bicycle connection between Harrison and De Haro Streets. Alameda Street should be maintained as a safe, comfortable, and convenient route for cyclists, pedestrians, and drivers. Combined with the proposal described above, the connection from 14<sup>th</sup> and 15<sup>th</sup> Streets to Alameda Street would allow an attractive, safe, and direct pedestrian and bicycle connection to continue east to Mission Bay and the waterfront.
- As development occurs, redevelopment of large parcels may allow for establishment of new rights-of-way such that 14th and 15th Streets also connect through for pedestrians, cyclists, and possibility vehicles as well. The open space requirements in the Eastern Neighborhoods UMU zoning, which require large parcels to be broken up with new rights-of-way when redeveloped, will facilitate progress toward this goal.



## How will private shuttles operate in the 16<sup>th</sup> Street corridor?

There are numerous private shuttle services operating in the Eastern Neighborhoods study area. These include commuter shuttles connecting downtown with Showplace Square and Mission Bay, and inter-city shuttle connecting San Francisco neighborhoods with employment centers on the Peninsula. Most important for the 16th Street project, the University of California San Francisco operates frequent shuttle service in the 16th Street Corridor.



The UCSF shuttle system provides service between the 16th and Mission BART station and UCSF Mission Bay Campus every 15 minutes from 6 AM to 7:30 PM. The University's Blue, Grey, and Gold Lines also connect its Parnassus and Mission Bay campuses. The level of shuttle service is likely to grow in future years as Mission Bay develops further.

As overall travel demand in the corridor grows, private shuttles may have an important role to play in reducing vehicle travel demand in the corridor. Once a transitway is constructed, private shuttle services may also be able to make use of this facility. However, this permission would require a citywide policy determination by the SFMTA.

Important considerations include the following:

- Speed and reliability of the 22 Fillmore will be prioritized in the corridor. The City will work with private shuttle operators, including UCSF, to ensure that the number of shuttle vehicles, their routes, and their stops do not conflict with SFMTA transit operations.
- If they do not conflict with 22 Fillmore service, shuttles operating on 16<sup>th</sup> Street may be able to travel in the transitway. While they would have to wait behind stopping SFMTA buses, they would be protected from traffic congestion.
- Transit signal priority for buses in the transitway may rely on the signalization system being able to detect approaching buses. Depending on the system for transit signal priority, it may be necessary to place transmitters aboard private shuttles wishing to operate in the transitway.

## 16<sup>th</sup> Street Streetscape and Landscape Concept (Recommended Alternative)

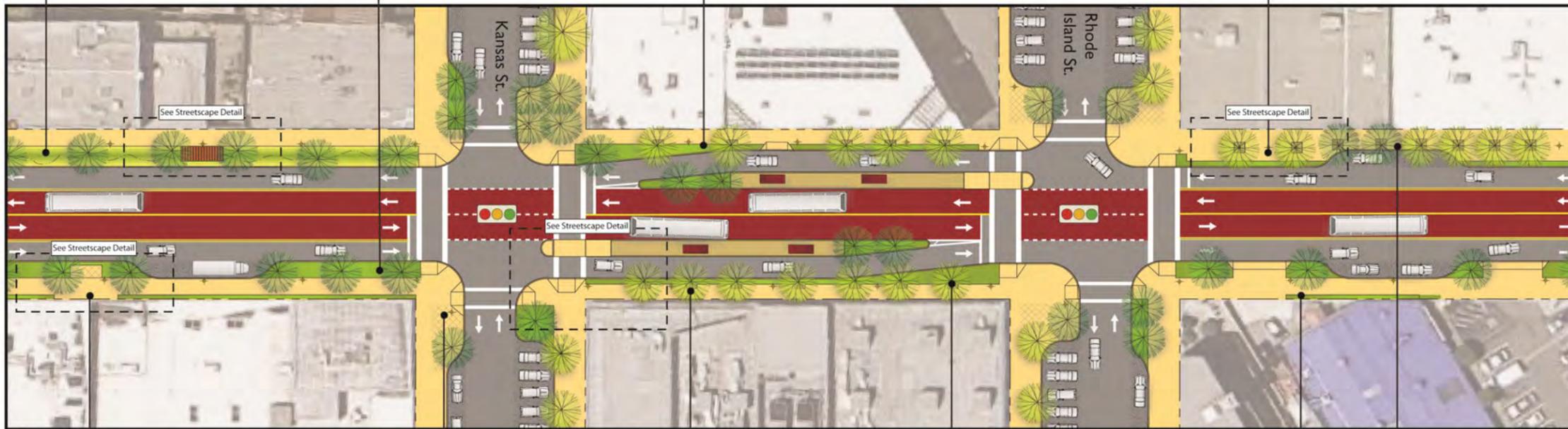
The Streetscape/Landscape Concept for 16th Street relies on the application of four different general Approaches to the streetscape and landscape depending on the particular character and function of the block. The Approaches range from a wide hardscaped area with trees in grates appropriate for areas with lots of pedestrians and retail and restaurant storefronts to a wide stormwater conveyance swale appropriate for the least active areas of the corridor. The Streetscape/Landscape Concept also relies on the incorporation of existing trees into the new streetscape design. The Approaches draw from the design guidance provided by the City of San Francisco Better Streets Plan.

**Streetscape Type 3:**  
 Full swale with boardwalk "bulb-outs" into swale, which can provide opportunities for informal pedestrian activity, bicycle parking, or other appropriate use. Appropriate for the least active street frontages where parking or loading not needed

**Streetscape Type 2:**  
 Green corridor with landscape on both sides of sidewalk. Appropriate for less or moderately active street frontages such as design showrooms and offices, as well as parking lots or loading areas.

**Streetscape Type 4:**  
 Landscape buffer along limited width sidewalks. Appropriate for block faces where transit stop has restricted sidewalk width

**Streetscape Type 1:**  
 Hardscape, trees with grates, and landscape buffer. Appropriate for most active frontages such as retail or restaurant storefronts



Where building entry or active use is present, landscape strip can be broken and pedestrian space can be extended into the wider landscape area.

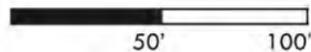
Bulb-outs on side streets provide a variety of public open space opportunities that will depend on the adjacent use and community needs, such as seating areas, rainwater gardens, and small community gardens.

The narrower sidewalks (10 feet) can accommodate both a 3-foot landscape strip buffering pedestrians from moving traffic and trees with grates placed over the portion of the tree pit that is in the sidewalk's through zone.

Existing trees can be accommodated in the new streetscape in most cases.

2-foot landscape strip along less active frontages can accommodate grasses or small shrubs, softening a blank building wall, separating the sidewalk from a parking or loading area, or buffering uses in a building.

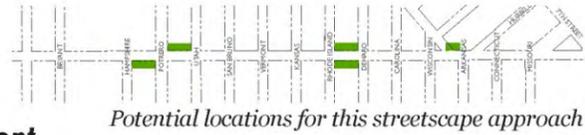
New trees can be added to complete the pattern of existing trees.



### LEGEND

-  Existing tree
-  New tree
-  Public space opportunity
-  Planter strip
-  Permeable paving
-  Tree grate
-  Pedestrian Light

## 16<sup>th</sup> Street Streetscape and Landscape Concept Detail (Recommended Alternative)



Potential locations for this streetscape approach

### Streetscape Treatment Type: *Urban Storefront*

This treatment type is appropriate for 16th Street's most active frontages, such as retail or restaurants, where public entrances are frequent and some activity can extend into the pedestrian realm. Considering existing land uses in the project area, this streetscape approach is most appropriate in the three most pedestrian-intensive areas around Rhode Island Street, Potrero Avenue, and Wisconsin Street near California College of the Arts.



The 16-foot wide hardscape area accommodates a variety of activities, including cafe seating and street furnishings where desired.



Benches provide an amenity for more active areas of the 16th Street corridor.



Existing trees are integrated in the existing 10-foot sidewalk (as shown). Rows of new trees would be planted closer to the curb. Tree pits would be covered with tree grates to expand the space for through movement.



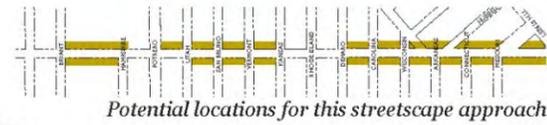
In absence of parking, a 2-to-3-foot planting strip creates a buffer for pedestrians from moving traffic and introduces a greening feature. The buffer can be reinforced by use of a short fence.



Alternately, the buffer planting area could be configured as a stormwater planter.



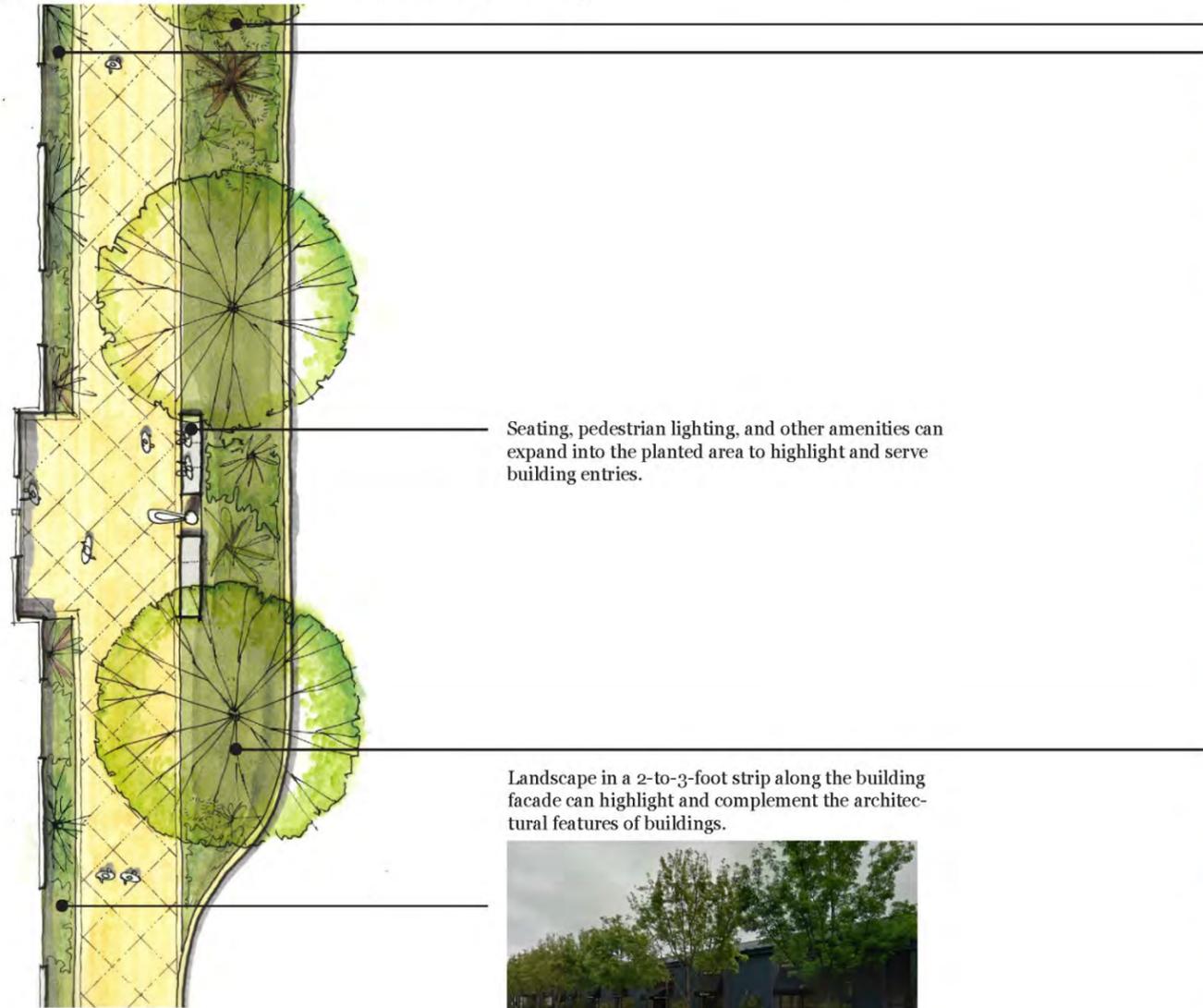
## 16<sup>th</sup> Street Streetscape and Landscape Concept Detail (Recommended Alternative) (Continued)



Potential locations for this streetscape approach

### Streetscape Treatment Type: Green Corridor

This treatment type is appropriate for less or moderately active street frontages such as design showrooms, offices, and multifamily residential buildings, which are likely to have significantly less frequent entries as compared to retail frontages. This approach is also appropriate for frontages along parking lots or other use areas dominated by cars or trucks. The *Green Corridor* treatment type is applicable to significant stretches of 16th Street located between the active pedestrian areas and transit stops.



Seating, pedestrian lighting, and other amenities can expand into the planted area to highlight and serve building entries.

Landscape in a 2-to-3-foot strip along the building facade can highlight and complement the architectural features of buildings.



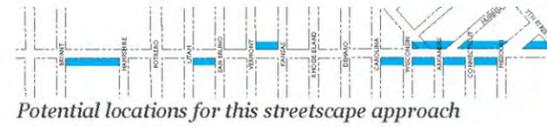
The 18-foot pedestrian realm allows for landscape strips on either side of an 8-foot sidewalk to create a "green corridor" effect that buffers pedestrians from moving traffic, animates and softens the street's building facades, or screens vehicular use areas such as parking lots.



The 8-foot landscape strip with trees and shrubs or grasses/groundcovers can be constructed as a standard landscape strip or a stormwater planter.

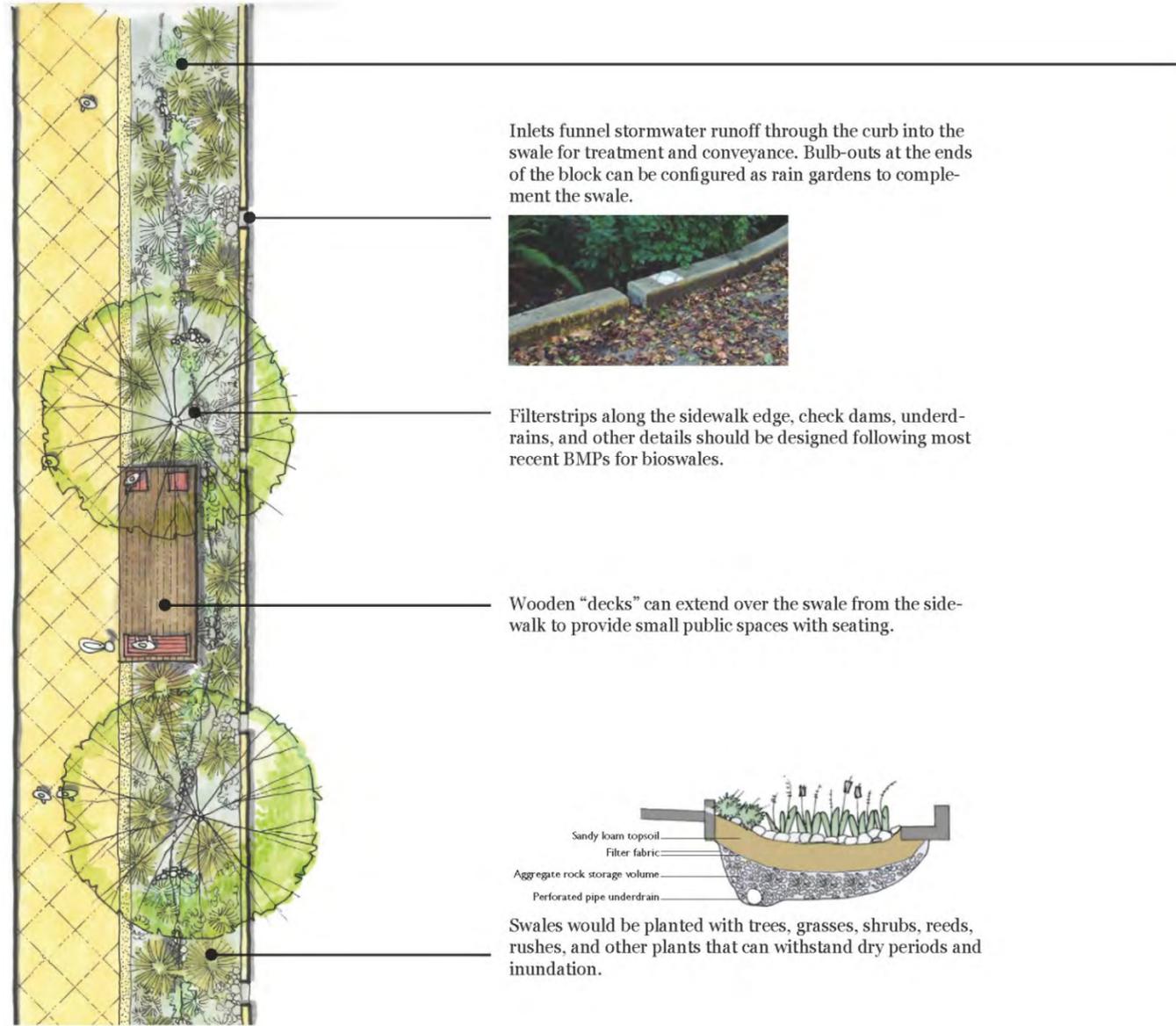


## 16<sup>th</sup> Street Streetscape and Landscape Concept Detail (Recommended Alternative) (Continued)



### Streetscape Treatment Type: Swale

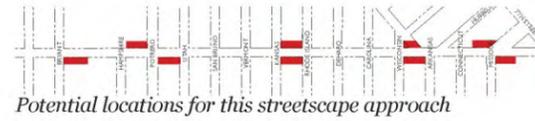
This treatment is appropriate for 16th Street's least active street frontages where parking or loading are not needed and roadway, surrounding streets, and utility configuration allows for the integration of a block-long bioswale.



10-foot wide bioswale acts as stormwater treatment and greening feature and buffers pedestrians from moving traffic.



## 16<sup>th</sup> Street Streetscape and Landscape Concept Detail (Recommended Alternative) (Continued)



Potential locations for this streetscape approach

### Streetscape Treatment Type: Transit Stop

This treatment type is specific to block faces where transit stops restrict the width of the pedestrian realm to as little as 10 feet.



New bulb-outs on cross streets provide significant opportunities for creating small-scale public spaces. This is an example of how the cafe on the corner can use the adjacent space in the bulb-out for seating.



Boarding platforms are accessed by a ramps extending from pedestrian refuges.



The 7-foot through zone accommodates seating or display of merchandise along building frontages.



Trees, existing or new, can be integrated into this planting strip by adding a 5 foot-by-2-foot tree grate or other walkable and permeable surface without diminishing the effective sidewalk width.

A planting strip creates a buffer for pedestrians from moving traffic and introduces a greening feature.



## 16<sup>th</sup> Street Corridor Project Phasing

It is recommended that the 16<sup>th</sup> Street project be implemented in phases. In the first phase, the transitway and pedestrian bulb-outs could be constructed to provide the most crucial transit priority and pedestrian safety treatments at reasonable cost. Existing curb lines could be left in place, and parking lanes could be maintained. Bicycle facilities would be added on 17<sup>th</sup> Street and removed from 16<sup>th</sup>, and traffic calming would be implemented on 17<sup>th</sup>. It is recommended that proposed transit priority treatments also be applied between Church and Potrero during this phase.

A second phase would involve widening the sidewalks and adding additional streetscape elements and landscaping to upgrade 16<sup>th</sup> Street to a "green connector" street as funding becomes available.

Transitway treatments in Mission Bay could be implemented as development warrants. Over the long term, the proposed circulation changes and grid repair proposals should be implemented as opportunities arise. Phasing by element is outlined below. Timeframes, cost estimates, and funding sources for these improvements will be presented in the EN TRIPS Funding and Implementation Plan.

Figure 4-3 EN TRIPS 16<sup>th</sup> Street Priority Project Phasing

	Phase 1	Phase 2	Phase 3
Transitway	Install overhead wire from Kansas street to Mission Bay		
Transitway	Construct median transitway between Potrero and Seventh. (Re-stripe street and color pavement, add bus stops with raised transit boarding islands and pre-paid fares at Potrero, Rhode Island, Wisconsin.		
Signals	Retrofit all signals for transit priority		
Pedestrian/ Public realm	Install pedestrian bulb-outs at all 16 <sup>th</sup> Street intersections between Potrero and Seventh	Remove parking lanes and widen sidewalks to 18 feet between Potrero and Seventh. Add landscaping and pedestrian amenities.	
Bikes	Stripe bike lanes on 17 <sup>th</sup> from Kansas to Mississippi.		
Bikes	Install bulbs to knock down intersections for traffic calming from Kansas to Mississippi		

**Figure 4-4 EN TRIPS 16<sup>th</sup> Street Corridor Associated Circulation Changes—Project Phasing**

	Phase 1	Phase 2	Phase 3
Transit	Transit priority treatments on 16 <sup>th</sup> Street between Church and Potrero. (Median Transitway between Potrero and Bryant, elsewhere various queue jump arrangements)		
Transit		Median transitway in Mission Bay	
Transit	Divert the 10 Townsend so that it intersects with 16 <sup>th</sup> Street at Seventh		
Grid repair		Two-way 14th and 15th Streets between Guerrero and Folsom	
Grid repair	Connect Alameda Street between Treat and Bryant to create a new bicycle and pedestrian route.		
Grid repair			Create vehicle connection between Division and Alameda
Grid repair			Connect Alameda to the existing crossing of Caltrain ROW
Grid repair			Add 17 <sup>th</sup> Street ped/bike crossing of Caltrain ROW.

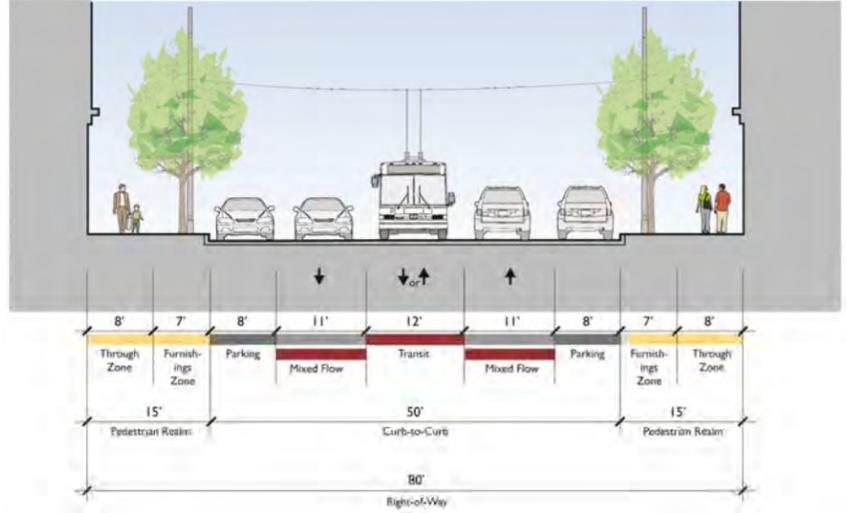
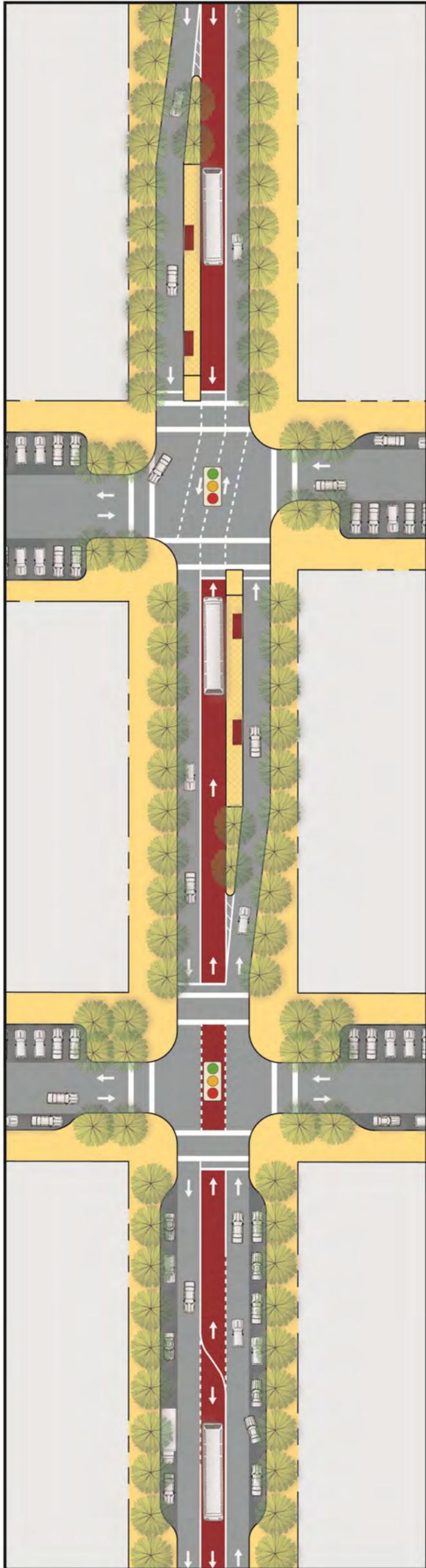
## 4.5 OTHER PROMISING ALTERNATIVES

In addition to the recommended alternative described above (Alternative 5), two other concepts were selected for additional analysis, design, and community input. While the recommended alternative is clearly the strongest in judgment of the project team, these additional options are included for stakeholder review and potential inclusion as Alternatives in environmental analysis. Key differences between these concepts and the recommended alternative are summarized below.

- **Alternative 4: Center Queue Jump.** This alternative seeks to provide some of the benefits of a median transitway while requiring less space by including a center lane that could be used for “queue jump” pockets. Buses would operate primarily in the travel lane, only merging into transit-only lanes, then back into travel lanes at bus stops and otherwise as necessary to bypass traffic. This concept provides less robust transit priority than the full median transitway design. However, space saved by using only one lane for the transitway could be used to provide wide sidewalks while still maintaining continuous parking lanes.
- **Alternative 3: Green Median.** The most distinctive feature of this alternative is a 6-foot landscaped median in the center of the street, which would enhance the appearance of the street will providing a refuge for crossing pedestrians. It also includes 15-foot sidewalk on both sides of the street. This concept provides transit-only lanes on the sides of the street and transit signal priority. While this configuration offers more protection from traffic than mixed flow lanes, it is less robust than the median transitway, because vehicles can legally enter the transit lanes when turning right.

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Alternative 4. Center Queue Jump and Parking



**Transit operations:** This alternative seeks to provide the benefits of a median transitway while requiring less space by including a center lane that could be used for “queue jump” pockets. Buses would operate primarily in the travel lane, only merging into transit-only lanes, then back into travel lanes at bus stops and otherwise as necessary to bypass traffic. Transit boarding islands would be provided at the near side of intersections. While buses traveling both directions would make use of the queue jump lane, the lane would be physically divided at mid block, so at no point would it be possible for a head-on collision to occur. Buses would be provided with an advance phase at signals allowing them to bypass traffic queues. Traffic analysis conducted on the project segment suggests that at some westbound intersections during the PM peak, vehicle queue would be longer than the queue jump lane, which would cause transit delays.



Intersection in Paris featuring a center transit queue jump lane.

**Vehicle circulation:** As in the other alternatives, this project would remove a westbound travel lane, reducing capacity for private vehicles to one lane in each direction. This change is forecast to increase westbound traffic congestion substantially in the future condition if no other changes are made to the network. It may be possible to mitigate this impact by improving east-west connectivity elsewhere in the network, as discussed in the next section (“associated circulation changes”).

**Bicycle conditions:** As in the other alternatives, implementation of the median queue jump project would be contingent on a policy decision to remove the existing bicycle lanes on 16<sup>th</sup> Street east of Kansas Street, replacing them with bicycle lanes on 17<sup>th</sup> Street, along with traffic calming treatments at intersections.

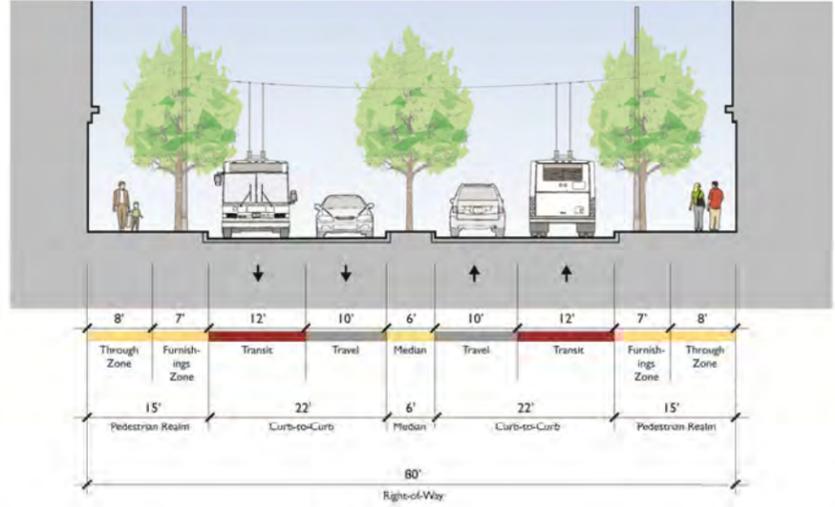
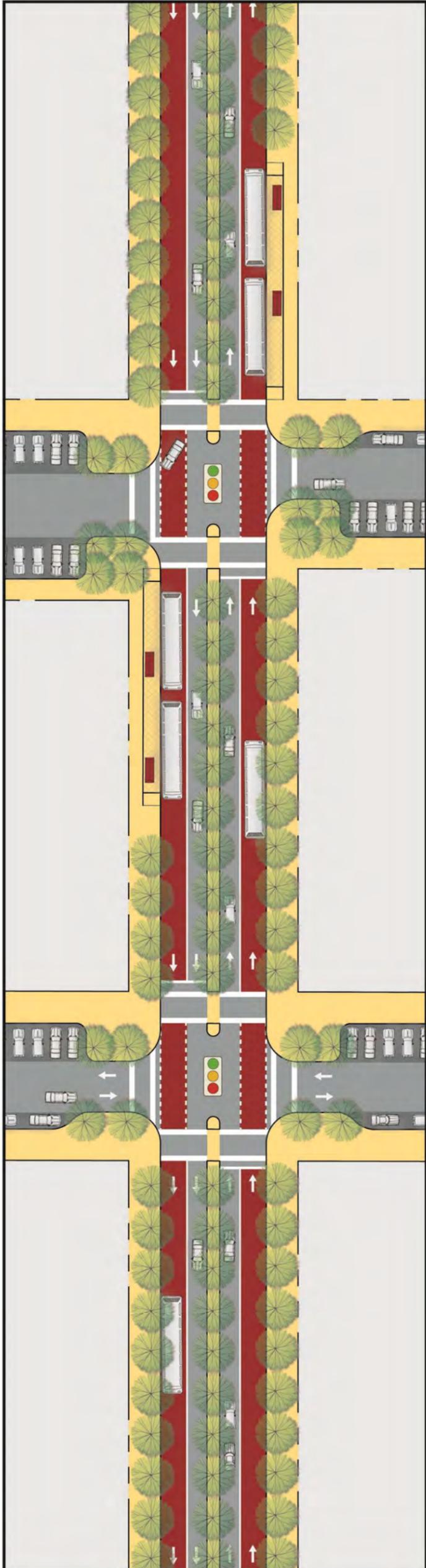
**Pedestrian conditions and the public realm:** This alternative includes 15-foot sidewalks on both sides of the street in addition to parking lanes. On blocks with bus boarding islands, parking lanes would be dropped and sidewalks would be widened to 22 feet. Wide sidewalks at all corners would reduce pedestrian crossing distances to just 34 feet.

**Parking and loading:** This alternative would maintain the existing parking lanes except on blocks with bus stops where parking lanes would be dropped to allow for boarding islands. Parking would be managed for availability through the SFMTA’s *SF park* initiative.

**Cost and deliverability:** As in the other proposals, the major costs of this proposal would include sidewalk widening and construction of the transitway, including new boarding islands and overhead wire. In addition, new signalization systems would have to be developed to enable the queue jump signal priority to work as intended. Because this arrangement has not yet been applied in San Francisco, it would require additional testing by City agencies.

**Applicability:** Traffic analysis conducted on the project segment suggests that at some westbound intersections during the PM peak, vehicle queue would be longer than the queue jump lane, which result in transit delays. It is therefore not recommended for implementation as described. However, an alternative configuration that provides buses traveling either direction to use the single transit lane the full length of the block may be a feasible treatment for 16<sup>th</sup> Street between Bryant and Church. This option is discussed in more detail in the ‘Circulation Concept Detail’ section.

Alternative 7. Green Median



**Transit operations:** This alternative provides transit-only lanes on the sides of the street and transit signal priority. While this configuration offers more protection from traffic than mixed flow lanes, it is less robust than the Median Transitway, because vehicles can legally enter the transit lanes when turning right. It is important to note that, unlike side-running transit lanes in downtown San Francisco, transit vehicles in this configuration on 16<sup>th</sup> Street would not be further delayed by vehicles entering and exiting adjacent parking lanes.

**Vehicle circulation:** As in the other alternatives, this project would remove a westbound travel lane, reducing capacity for private vehicles to one lane in each direction. This change is forecast to increase westbound traffic congestion substantially in the future condition if no other changes are made to the network. It may be possible to mitigate this impact by improving east-west connectivity elsewhere in the network, as discussed in the next section (“associated circulation changes”). All of the alternatives would also restrict left turns at most intersections.

**Bicycle conditions:** As in the other alternatives, implementation of this concept would be contingent on removing the existing bicycle lanes on 16<sup>th</sup> Street east of Kansas Street, replacing them with bicycle lanes on 17<sup>th</sup> Street, along with traffic calming treatments at intersections.

**Pedestrian conditions and the public realm:** The most distinctive feature of this alternative is a 6-foot landscaped median in the center of the street, which would enhance the appearance of the street will providing a refuge for crossing pedestrians. It also includes 15-foot sidewalk on both sides of the street.



Divisadero Street Green Median

**Parking and loading:** This alternative would remove the existing parking lanes. Unlike the Median Transitway concept, this alternative does not allow for maintenance of parking and loading bays. Remaining parking on side streets would be managed for availability under SFMTA’s SF*park* initiative.

**Cost and deliverability:** The major costs of this proposal would include sidewalk widening and construction of the median. Median landscaping would also require ongoing maintenance.

**Applicability:** Because the median transitway project offers superior transit priority, this alternative has not been recommended for the project segment. However, further exploration of this concept in other parts of the 16<sup>th</sup> Street corridor is warranted.