CHAPTER SUMMARY: This chapter presents the results of the alternatives analysis for the Van Ness Avenue BRT Project. The BRT alternatives were analyzed based on their performance in meeting the project purpose and need (see Chapter 1), as well as based on considerations of importance to multiple agency and public stakeholder groups. The performance categories and related performance measures analyzed consist of the following: transit performance; passenger experience, access and pedestrian safety; urban design/landscape; system performance; environmental and social effects; operations and maintenance; and constructability and capital cost. The purpose of the analysis is to identify and compare differences between the alternatives, including the Build and No Build Alternatives. The results of this alternatives analysis were combined with public input on the Draft EIS/EIR and agency input to inform the selection of a locally preferred alternative (LPA), which is a refinement of the center-running alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B) and is referred to as Center Lane BRT with Right Side Boarding/Single Median and Limited Left Turns. In addition, the performance analysis of the LPA and the Vallejo Northbound Station Variant pertaining to the project purpose and need is presented, along with the results of additional analysis undertaken to identify environmental impacts of the LPA. This chapter of the Final EIS/EIR also provides an overview of the FTA New Starts Criteria for evaluating projects that are candidates for funding and a summary of the revised project evaluation and rating for the FTA New Starts/Small Starts program based on the LPA.

CHAPTER 10

Alternatives Analysis and the Locally Preferred Alternative

10.1 Introduction and Approach

This chapter presents an analysis of the relative benefits and impacts of the Van Ness Avenue BRT alternatives, describes the framework and process for selecting the Locally Preferred Alternative (LPA), and presents the environmental impacts of the LPA relative to Build Alternatives 3 and 4 as presented in the Draft EIS/EIR; specific mitigation measures are described in Chapters 3 through 7. The BRT alternatives were analyzed based on their performance in meeting the project purpose and need, as well as based on considerations of importance to multiple agency and public stakeholder groups, including the project Technical Advisory Committee (TAC) and Citizens Advisory Committee (CAC). The purpose of the analysis was to identify and compare differences between the alternatives, including the No Build Alternative (Alternative 1). In so doing, the chapter highlights the ability of each alternative to advance the project purpose and need (Chapter 1).

The results of this alternatives analysis were combined with public input on the Draft EIS/EIR and agency input to inform the selection of a LPA, which is documented at the end of this chapter. Based on additional stakeholder input received on the project alternatives through public circulation of the Draft EIS/EIR, an LPA Report was prepared and presented to the TAC and CAC for input. The SFMTA and SFCTA boards then considered and approved selection of an LPA for inclusion in this Final EIS/EIR.

10.1.1 | Alternatives Analyzed

To identify a limited set of build alternatives to be analyzed in this EIS/EIR, SFCTA prepared an *Alternatives Screening Report* in March 2008. The alternatives analyzed in the screening report included a No Build Alternative, multiple BRT alternatives, including center-running and side-running BRT, and surface light-rail and subway alternatives. The *Alternatives Screening* report recommended the three main build alternatives analyzed in this EIS/EIR for further study in addition to the No Build Alternative (see Section 2.2 for complete descriptions of the alternatives). The LPA is a combination and refinement of the two center-running alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B) presented in the Draft EIS/EIR.

10.2 Alternatives Analysis

10.2.1 | Indicators Based on Project Purpose and Need

The most important performance indicators analyzed in this chapter measure the ability of the alternative to advance the project purpose and need. The purpose and need statement for the Van Ness Avenue BRT project (see Chapter 1 of this EIS/EIR) supported the project scoping and alternatives screening process in 2008 and guide the development of the alternatives evaluation criteria. As the purpose and need outlines, the project is intended to address citywide transportation system development needs, as well as the specific needs of the Van Ness Avenue corridor. Accordingly, the build alternatives, including the LPA, are evaluated based on the extent to which they:

- Significantly improve transit reliability, speed, connectivity and comfort;
- Improve pedestrian comfort, amenities, and safety;
- Enhance the urban design and identity of Van Ness Avenue, creating a more livable street; and
- Accommodate safe multimodal circulation and access within the corridor.

In addition, the alternatives are evaluated on the extent to which they:

- Address expected transportation system performance;
- Counteract transit mode share loss;
- Are affordable and deliverable in the near term; and
- Improve transit cost effectiveness and operational efficiency.

10.2.2 | Additional Considerations

In addition to analyzing performance based on the project's purpose and need, the project team has analyzed how well each alternative, including the LPA, performs according to additional considerations of importance to project stakeholders. This input was obtained through project TACs and public outreach, in particular the project CAC. This greater detail provides additional insight into the differences among the four distinct alternatives (i.e., three build alternatives and the No Build Alternative) and the LPA.

10.2.3 | List of Performance Indicators

The indicators described in this section assess the performance of each alternative within eight key areas:

- Transit Performance
- Passenger Experience
- Access and Pedestrian Safety

- Urban Design and Landscape
- System Performance
- Environmental and Social Effects
- Operations and Maintenance
- Constructability and Capital Cost

Each of the eight categories includes multiple indicators, each of which are shown in Table 10-1 and presented in detail in this section. Those indicators that are directly related to the project's purpose and need, and which were used to evaluate potential alternatives in the Alternatives Screening Report, are starred. The remaining indicators capture additional considerations of importance to project stakeholders and decision makers.

Table 10-1: Performance Indicators and Definitions

	INDICATOR ID *	PERFORMANCE INDICATORS	DEFINITIONS
	A	TRANSIT PERFORMANCE	
☆	A-1	Transit travel time (Part 1)	Reduction in travel time
	A-2	Transit travel time (Part 2)	Bus passing capability
☆	A-3	Reliability (passenger perspective)	Likelihood of unexpected stops
	A-4	Flexibility	Performance during special circumstances
	A-5	Vehicle operational safety	Safety of operating vehicles based on SFMTA operator's survey
☆	A-6	Attract/retain transit riders	Van Ness Avenue BRT route and SFMTA systemwide transit ridership
	A-7	Golden Gate Transit performance	Golden Gate Transit passenger travel time
	B	PASSENGER EXPERIENCE	
☆	B-1	Waiting experience (Part 1)	Platform crowding (above or below threshold)
☆	B-2	Waiting experience (Part 2)	Amount of buffer between platform and auto traffic
☆	B-3	In-vehicle experience (Part 1)	Lane weaving (number of lane transitions)
☆	B-4	In-vehicle experience (Part 2)	Vehicle crowding at maximum load point (above or below threshold)
	C	ACCESS AND PEDESTRIAN SAFETY	
☆	C-1	Pedestrian crossing experience/exposure	Average median refuge width
☆	C-2	Pedestrian crossing exposure	Average distance to cross Van Ness Avenue
	C-3	Universal design	Adherence to universal design principles
	C-4	Quality of bicycle access	Number and types of other street user movements in conflict with bicycles
	D	URBAN DESIGN/LANDSCAPE	
☆	D-1	Street identity	Consistency of median footprint
	D-2	Quality of landscape (Part 1)	Edge length to total area ratio of landscaped median
	D-3	Quantity of landscape (Part 2)	Square feet of permeable/landscaped surface area
	E	SYSTEM PERFORMANCE	
☆	E-1	Average person-delay	Average total intersection person-delay for all users of Van Ness Avenue
☆	E-2	Person throughput capacity	Average persons per lane per hour on Van Ness Avenue in the PM peak

Table 10-1: Performance Indicators and Definitions

	INDICATOR ID *	PERFORMANCE INDICATORS	DEFINITIONS
☆	E-3	Accommodate automobile traffic circulation and access	Number of intersections with average automobile delay greater than 55 seconds (LOS E or F) in Year 2015
	E-4	Accommodate traffic circulation and access	Number of turning restrictions
	F	ENVIRONMENTAL AND SOCIAL EFFECTS	
	F-1	Air pollutant emissions (Part 1)	Countywide air pollutant emissions
	F-2	Air pollutant emissions (Part 2)	Countywide GHG emissions
	F-3	Energy impact	Countywide motorized vehicle fuel consumption
	F-4	Noise impacts	Number of affected sensitive receptors above significance threshold
	F-5	Parking opportunities	Number of on-street parking spaces
	F-6	Biological	Number of healthy existing trees preserved
	G	OPERATIONS AND MAINTENANCE	
☆	G-1	Operations cost	Cost to operate on-street service
	G-2	Maintenance cost (Part 1)	Cost to maintain vehicles
	G-3	Maintenance cost (Part 2)	Cost to maintain runningway, landscaping, and amenities
	G-4	Ease of access for maintenance	Number of special maintenance conditions
	H	CONSTRUCTION AND CAPITAL COSTS	
☆	H-1	Total capital cost	Total capital construction cost
☆	H-2	Construction duration	Construction duration (months)
	H-3	Construction intensity	Linear feet of utility relocation and curb rebuild
	H-4	Ease of access to land uses during construction	Degree of sidewalk disruption

* Indicators that are directly related to the project's purpose and need, and which were used to evaluate potential alternatives in the Alternatives Screening Report, are identified with a star (☆).

10.2.4 | Alternatives Performance

10.2.4.1 | TRANSIT PERFORMANCE

The transit performance category is intended to capture how well each alternative improves transit performance from the perspective of the passenger as well as the operator. The following indicators have been selected to best distinguish between the alternatives in this EIS/EIR in terms of transit performance.

☆ **A-1: Transit Travel Time.** Travel time is a key measure of performance related to the project's purpose and need to significantly improve transit performance, especially relative to driving. This performance measure, described in Section 3.2, documents the percent reduction in travel time for the SFMTA BRT routes (#47 and #49) compared with existing conditions.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Percent reduction in travel time in Year 2015 compared with existing conditions	3%	19%	28%	28%	33%

In Year 2015, the No Build Alternative (Alternative 1) will improve travel times compared with existing conditions by 3 percent due to the expected transit enhancements such as low-floor boarding and proof of payment. Build Alternative 2 would improve travel times by 19 percent over current conditions. Build Alternative 2 would not reduce travel time as much as Build Alternatives 3 and 4 due to conflicts with automobile right-turning movements at intersections and conflicts from passenger vehicles moving to and from parking spaces along the corridor. Build Alternatives 3 and 4 would reduce travel time by 28 percent along the corridor. Incorporation of Design Option B into Build Alternatives 3 and 4 would provide the greatest reduction in travel times (33 percent relative to existing conditions) due to the removal of left-turn movements and the left-turn signal phases at those intersections along Van Ness Avenue, allowing for extended transit signal priority (TSP).

LPA Performance. The LPA performs similarly to Build Alternatives 3 and 4 with Design Option B on this indicator and would provide the greatest reduction in travel times (33 percent relative to existing conditions). The inclusion of the Vallejo Northbound Station Variant, as described in Section 2.2.2.4, could increase transit travel time by up to 15 seconds, meaning the LPA would perform similar to Build Alternatives 3 and 4, with a 28 percent reduction in transit travel time.

A-2: Bus Passing Capability. This performance indicator looks at the ability of buses to pass other vehicles that may impede the operation of the system, such as in the event of a breakdown or bus bunching.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Bus passing capability	Yes	Yes	No, except with delays	Yes

Buses would undergo significant delays and unusual operations in Build Alternative 3 in order for buses to pass each other due to the configuration of the dual medians.

With Build Alternative 4 (with or without Design Option B), buses would pass each other on the right, which would require special operator training.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternative 4 (with or without Design Option B) on this indicator; buses would be able to pass each other outside of station locations, and would need to pass each other on the right, which would require special operator training.

☆ **A-3: Likelihood of Unexpected Stops.** In addition to travel time, transit reliability is a key performance indicator and part of the project's purpose and need. This performance indicator, which is discussed in Section 3.2, considers the extent to which each alternative would improve the reliability of transit service by reducing the likelihood of unexpected stops during service. The fewer unexpected stops there are at each intersection, the greater the reliability of transit operations. Unexpected stops are defined as stops made outside of passenger loading/unloading and are due to mixed traffic and traffic signal delays.

Unexpected stops are estimated by the VISSIM microsimulation model and are shown per intersection.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	BUILD ALTERNATIVES 3 AND 4 DESIGN OPTION B
Likelihood of an unexpected stop per block	70% chance of an unexpected stop/block	50% chance of an unexpected stop/block	35% chance of an unexpected stop/block	36% chance of an unexpected stop/block	34% chance of an unexpected stop/block

Under the no-build (Alternative 1) scenario, the 47 and 49 routes would have a 70 percent chance of an unexpected stop along each block. Build Alternative 2 would reduce this chance to 50 percent along each block, and Build Alternatives 3 and 4 would reduce this further to a 36 percent chance of an unexpected stop. Design Option B would reduce Alternatives 3 and 4 to a 34 percent chance of stopping along each block.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B on this criterion, and would have a the lowest chance (34%) of an unexpected stop per block.

A-4: Performance during Special Circumstances. This performance indicator considers the ability to operate Muni service in the corridor in the case of special events (e.g., event at Fort Mason) or citywide emergencies during which vehicles other than the dedicated BRT vehicles may need to be used along the Van Ness Avenue corridor. The capacity of the facility to carry large flows of passengers in these situations is also considered.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Ability to handle special events/ evacuations	Any SFMTA bus can serve the corridor; medium capacity	Any SFMTA bus can serve the corridor; medium-high capacity	Any SFMTA bus can serve the corridor; high capacity	Special operating requirements; high capacity

The No Build Alternative (Alternative 1) and Alternatives 2 and 3 (including Design Option B) would provide an equivalent ability to add emergency service along the corridor, although Build Alternative 3 would have higher capacity to handle large passenger flows. Build Alternative 4 (with or without Design Option B) would have less operating flexibility due to the requirement for buses to load from the left at some stations/stops, combined with potentially high operational capacity. In the event of a high-demand situation, MTA may need to employ special operating plans, including using the reserve fleet of BRT vehicles (up to 60 total); operating right-side-door buses and only stopping at Geary/O'Farrell; or operating right-side-door buses and stopping on the curb with temporary stops. These scenarios reflect a range of passenger-handling capacities from medium to high.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternative 3 for this indicator; any SFMTA vehicle could serve the corridor during a special event, and the center lane would provide high capacity.

A-5: Vehicle Operational Safety. This performance indicator considers the relative ease of operating an alternative from the bus operators' perspective. SFMTA conducted a focus group survey with operators and took operator input on a range of issues related to the ease of operation, including conflicts with other bus vehicles and road users and unique operational characteristics.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Operator Comments	No major changes from existing service	Side-lane operation similar to existing Some conflicts with private vehicles and bicycles remain	Limited conflicts with private vehicles/ bicycles Loading similar to existing Head-on bus approaches are undesirable Design Option B would reduce conflicts with left-turning vehicles	Limited conflicts with private vehicles/ bicycles Loading different than existing Design Option B would reduce conflicts with left-turning vehicles

The No Build Alternative (Alternative 1) would share the same operational challenges as the existing condition. Build Alternative 2 would offer the operational benefits of nearly eliminating lane weaving, and it would reduce conflicts with private vehicles and bicycles relative to existing conditions; however, conflicts with automobiles would still occur because private vehicles would cross the transitway to turn right and to access on-street parking along Van Ness Avenue. Build Alternatives 3 and 4 would remove nearly all of the conflicts with private vehicles and bicycles; however, Build Alternative 3 (with or without Design Option B) would result in bus vehicles approaching each other from opposite directions without a separating buffer, creating a concern about head-on bus collisions. This was considered the greatest operational drawback from operators' perspectives, so Build Alternative 3 (with or without Design Option B) has the lowest performance on this criterion. Build Alternative 4 would require buses to load from the left at some stations/ stops and from the right at others, presenting the potential for operational complications. Concerns surrounding this issue could be minimized through enhanced technology (sensors on vehicles) and operator training. Thus, Build Alternatives 2 and 4 share similar degrees of operational complication. Incorporation of Design Option B for Alternatives 3 and 4 would further reduce conflicts with private vehicles by removing the left-hand turn lanes along Van Ness Avenue.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternative 4 with Design Option B for this indicator for most of the corridor. There would be limited conflicts with private vehicles, bicycles, and left turns. However, because the LPA would use standard loading, it would not have the operational complications associated with Build Alternative 4. The LPA would have head on approaches at (and sometimes near) station locations. Because the LPA includes a minimum 1-foot buffer between transit lanes, and a minimum of 11.5-foot-wide transit lanes, the potential safety risk of head on approaches is minimized (see Appendix A for engineering drawings of the LPA), In addition, because vehicles would be traveling at lower speeds near stations, the safety concern is further reduced.

☆ **A-6: Van Ness Avenue BRT Route and SFMTA Systemwide Ridership.** The ability to attract and maintain riders is directly related to the project's purpose and need to reverse the trend towards declining transit mode share and is reported for Routes 47 and 49 specifically, as well as for the overall SFMTA transit system, as discussed in Section 3.2. The BRT route ridership for each alternative (shown for 2015 relative to existing conditions) helps show the success in attracting various types of trips to transit, including:

- Totally new or "induced" trips that were not made before by transit or any other mode. In the case of the No Build Alternative, much of this can be attributed to population and employment growth;

- Trips that were made by another nontransit mode (i.e., driving alone, carpool, walk, or bicycle) now using the new service; and
- Existing transit trips diverted from other routes to service on the corridor due to the relative attractiveness of the BRT routes.

The SFMTA systemwide ridership for each project alternative indicates the success in attracting the first two types of trips listed above to the system as a whole.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Route and systemwide transit ridership in Year 2015 (relative to existing)	7 percent increase on BRT routes relative to existing conditions; 5 percent increase systemwide relative to existing conditions	29 percent increase on BRT routes relative to existing conditions; 6 percent increase systemwide relative to existing conditions	37 percent increase on BRT routes relative to existing conditions; 7 percent increase systemwide relative to existing conditions	37 percent increase on BRT routes relative to existing conditions; 7 percent increase systemwide relative to existing conditions

Build Alternatives 3 and 4 (with or without Design Option B) attract the most ridership due to their greater reduction in travel time. Build Alternative 2 attracts significantly more ridership on the BRT routes than the No Build Alternative.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 for this indicator, attracting the highest ridership (37 percent increase on BRT routes and 7 percent systemwide relative to existing conditions).

A-7: Golden Gate Transit Passenger Travel Time. This analysis examined the impact of the project alternatives on the travel time for Golden Gate Transit (GGT) passengers. The travel time calculations considered average total travel time (i.e., on and off the bus) per GGT passenger within San Francisco, for all routes that use Van Ness Avenue. The overall travel time per passenger reflects the increased walk access time that some GGT passengers would incur under Build Alternative 4, which would consolidate all stops on Van Ness Avenue, except for Geary/O'Farrell, and require passengers to walk additional distance to and from another station or transfer to and from the BRT routes at a GGT station (travel time estimates below assume walking). It also reflects the increased travel time for GGT buses to alternative routing along Chestnut Street between Laguna Street and Van Ness Avenue (see Section 2.2 for a full description)

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Average total travel time per passenger (in minutes) within San Francisco	13.1 minutes	11.6 minutes	10.9 minutes (10.6 minutes with Design Option B)	12.5 minutes (12.1 minutes with Design Option B)

Almost 80 percent of existing GGT Van Ness Avenue passengers use either the stops at Geary/O'Farrell or a stop that is not located on Van Ness Avenue (i.e., Civic Center, Financial District). These passengers would all benefit from the decreased travel time under any of the build alternatives, and all of the build alternatives would reduce the average total travel time for existing GGT passengers. Build Alternative 3 would reduce travel time the most due to the greatest reduction in bus travel time and the lowest walk or transfer times

for GGT passengers. Travel time for Build Alternative 3 would be further reduced under Design Option B. Build Alternative 2 does not decrease bus travel time as much as Build Alternatives 3 and 4. Build Alternative 4 would increase in-vehicle travel time off the corridor from Laguna Street to Van Ness Avenue due to the rerouting of the buses along Chestnut Street. Build Alternative 4 would also increase walking or transfer time for GGT riders whose stops would be consolidated; therefore, Build Alternative 4 would not reduce the average total travel time as much as the other build alternatives. Travel time for Build Alternative 4 would be further reduced under Design Option B.

LPA Performance. The LPA performs similarly to Build Alternative 3 with Design Option B for this indicator, providing the greatest reduction in travel time for GGT passengers. The Vallejo Northbound Station Variant could cause a slight increase (up to 10 seconds, on average) in travel time for GGT passengers due to Muni buses being stopped at the NB Vallejo Street station.

10.2.4.2 | PASSENGER EXPERIENCE

In this analysis, passenger experience is considered for the in-vehicle experience, as well as the waiting experience at the station platforms. The following performance measures have been selected to best distinguish between the alternatives in terms of passenger experience.

☆ **B-1: Platform Crowding.** Platform crowding contributes to the comfort and safety of passengers at bus stops and BRT stations; therefore, it is directly related to the project's purpose and need to improve the experience for transit patrons. This analysis, which is described in Section 3.2, calculates whether the highest-demand station platform, which is at Market Street, would become overcrowded under any of the build alternatives by comparing the area (i.e., square feet) per waiting passenger to SFMTA minimum standards of 5 square feet per passenger at subway stations.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Platform crowding (square feet per passenger)	Same as existing (no platforms)	More than 13 square feet per passenger (below threshold)	More than 12 square feet per passenger (below threshold)	More than 12 square feet per passenger (below threshold)

All of the build alternatives would provide sufficient platform capacity when compared against the SFMTA threshold of 5 square feet per passenger. Design Option B would not alter platform size or result in increased ridership; therefore, it does not change the results from Build Alternative 3 or 4.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 for this indicator, and would provide sufficient platform capacity.

☆ **B-2: Amount of Buffer between Platform and Auto Traffic.** Presence of space or buffer between waiting passengers and moving traffic increases comfort and is directly related to the project's purpose and need to improve the experience for transit patrons. This analysis, which is described in Section 3.4, calculates the amount of buffer in feet.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Width of buffer in feet between platform and traffic	16 feet (8 feet from center of sidewalk plus 8-foot parking lane)	15 feet (4.5 feet from center of platform plus 10.5-foot BRT lane)	4.5 feet (4.5 feet from center of platform)	17.5 feet (7 feet from center of platform plus 10.5-foot BRT lane)

Build Alternative 2 would reduce the buffer size slightly versus existing conditions and the No Build Alternative, although there would be room to wait on the sidewalk behind the platform. Build Alternative 3 (with or without Design Option B) would reduce the size of the buffer significantly relative to existing conditions. Build Alternative 4 (with or without Design Option B) would increase the buffer zone slightly.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 for this indicator, although it would provide an additional 1-foot buffer between the station and the adjacent traffic lane, for a total of 5.5 feet of buffer between the center of the platform and traffic.

☆ **B-3: Number of Lane Transitions.** Lane weaving, which is measured by the number of lane transitions the vehicle must make along its route, detracts from the passenger in-vehicle experience by reducing the smoothness of the ride, especially for standing passengers. This analysis, which is directly related to the project's purpose and need to improve transit patron experience, identifies all lane weaves and calls out "major weaves," or those that require the horizontal movement of at least 8 feet (or an entire lane of traffic) over a short distance (e.g., pulling in and out of bus stops). "Minor weaves" are smoother transitions that passengers would still notice but are not as severe (e.g., lane transition to accommodate a left-turn pocket).

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Lane weaving (number of lane transitions)	58 major weaves	0 weaves	21 weaves (8 major plus 13 minor	6 weaves (2 major plus 4 minor)

Under the No Build Alternative (Alternative 1), buses would be required to transition as much as in the existing conditions, pulling in and out of bus stops along the length of the corridor. Build Alternative 2 would remove all lane weaving. Build Alternative 3 (with or without Design Option B) would reduce the number of weaves by more than half (to 21), as well as significantly reduce the number of "major weaves." Build Alternative 4 (with or without Design Option B) would reduce the number of weaves by 90 percent, with only 2 major weaves, which are associated with the transition to and from the dual platform alignment at the Geary/O'Farrell stop to accommodate the right-door loading of GGT vehicles.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, would have the most lane weaving of the build alternatives, with 20 minor weaves and 6 major weaves. The LPA is designed to make these transitions as smooth as possible, with a 40-mph design speed for the BRT for nearly all of the corridor.

☆ **B-4: In-Vehicle Passenger Crowding.** Comfort in the vehicles is part of the project's purpose and need, and it is also a function of crowding (load factor), which refers to the number of people on the bus relative to capacity. This analysis, which is found in Section 3.2, considers the vehicle load factor at the highest-demand points in 2015 and compares it to SFMTA's threshold for crowding, which is set at 85 percent of total vehicle capacity.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Load factor at maximum load point in Year 2015 (above or below threshold)	0.50 (Route 49 SB at McAllister); below threshold	0.71 (Route 49 SB at McAllister); below threshold	0.80 (Route 47 SB at Oak Street); below threshold	0.80 (Route 47 SB at Oak Street); below threshold

All of the project alternatives (Alternatives 1 through 4, including Design Option B) would not have crowding in excess of SFMTA's 0.85 threshold in Year 2015. It should be noted that this analysis does not take into account transit reliability, which is a major contributor to vehicle crowding (i.e., bus bunching means that people can wait significantly longer for a vehicle than is scheduled, causing a buildup of people at station locations and additional crowding; see Section 3.2). In addition, this analysis maintains bus frequencies at the no-build levels; however, if the travel time savings were to be reinvested into more frequent service at no additional operating cost, the load factors would decrease for all of the build alternatives, with the greatest reduction in the center-lane configured alternatives (Build Alternatives 3 and 4), especially with incorporation of Design Option B.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 for this indicator, and would not have crowding in excess of SFMTA's 0.85 threshold in Year 2015.

10.2.4.3 | ACCESS AND PEDESTRIAN SAFETY

All transit trips in the corridor begin and end with pedestrian or bicycle trips (cyclists can load their bicycles on the front of the bus). Providing safe and comfortable access to and from the stations and within the corridor is a key element of the project purpose and need. This performance category has four indicators that are directly related to the project purpose and need, and are described below.

☆ **C-1: Average Median Refuge Width.** Median refuges are found in crosswalks and provide a protected waiting area outside of traffic for pedestrians crossing the street if the traffic signal changes when they have not completed crossing. Medians greater than 9 feet in width allow sufficient space for detectable warning strips on both sides, as well as a waiting area in between for wheelchair users. Medians less than 5 feet may not provide sufficient space for all users and would provide poor conditions for pedestrians forced to use them. This indicator is directly related to the project's purpose and need to improve the safety and comfort of pedestrians. Analysis of median width can be found in Section 3.4.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Medians greater than 9 feet wide	28 (48%)	44 (76%)	3 (3%)	48 (80%)	54 (88%)
Medians between 5 and 9 feet wide	3 (5%)	2 (3%)	58 (53%)	6 (10%)	4 (9%)
Medians less than 5 feet wide	27 (47%)	12 (21%)	47 (44%)	6 (10%)	2 (3%)

Under existing conditions and with the No Build Alternative (Alternative 1), approximately half (48 percent) of the crossings have a median wider than 9 feet, with most of the remainder (47 percent) crossings having medians less than 5 feet wide. Build Alternative 2 would provide high-quality median refuges, with 76 percent of the crossings with a median that is wider than 9 feet. In contrast, under Build Alternative 3 (with or without Design Option B), 3 percent of the crossings would have a median wider than 9 feet. Build Alternative 4 would include the most intersections with medians wider than 9 feet at 80 percent (88 percent under Design Option B).

LPA Performance. With the LPA, including the Vallejo Northbound Station Variant, 41 median refuges (71 percent) would have widths between 6 and 9 feet, while 17 refuge

locations (29 percent) would have medians wider than 9 feet (mostly 11 feet wide). The refuges in the LPA would all be on medians at least 6 feet wide except for the south crossing leg of the Mission/South Van Ness Avenue intersection.

☆ **C-2: Average Crossing Distance.** Long crossing distances require more time for pedestrians to cross the street, increasing time spent exposed to traffic in the intersection. The average crossing distance, measured in feet, was analyzed in Section 3.4. The crossing distance is directly related to the project's purpose and need to improve the safety and comfort of pedestrians.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Average crossing distance (curb to curb)	91 feet	87 feet	90 feet	89 feet	89 feet	88 feet

The No Build Alternative (Alternative 1) would not modify the street configuration and would maintain the existing average crossing distance of 91 feet. The build alternatives all provide similar crossing distances, although Build Alternative 2 would provide the greatest number of opportunities for pedestrian curb bulbs.

LPA Performance. Average crossing distance for the LPA, including the Vallejo Northbound Station Variant, would be 90 feet.

C-3: Adherence to Universal Design Principles. This performance indicator summarizes the extent to which each project alternative advances the seven Universal Design Principles, which evaluate how accessible projects are for all potential users of the street, including those with disabilities. Universal Design is analyzed in Section 3.4.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Adherence to universal design principles (checklist)	NA (baseline)	Improves on 5 principles Neutral on 1 principle Worse on 1 principle	Improves on 2 principles Neutral on 2 principles Worse on 3 principles	Improves on 4 principles Neutral on 1 principle Worse on 2 principles

The No Build Alternative (Alternative 1) would perform similarly to existing conditions, with small enhancements to universal design through elements such as low-floor buses, pedestrian countdown signals, and implementation of APS at some, but not all, intersections. Build Alternative 2 performs strongest with respect to universal design, enhancing Principles 1, 2, 3, 5, and 7, while performing worse on Principle 6. Build Alternative 3 performs the lowest with respect to universal design, enhancing Principle 1, while performing worse on Principles 4, 5, and 6. Build Alternative 4 would enhance Principles 1, 2 (although not as much as Build Alternative 2), 5, and 7, while performing worse on Principles 4 and 6. See Section 3.4 for more details on Universal Design.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternative 3 (lowest) for this indicator, enhancing Principles 1 and 2 while performing worse on Principles 4, 5, and 6.

C-4: Bicycle Performance. This performance indicator, which is analyzed in Section 3.4, evaluates the increase or decrease in potential conflicts between bicycles and all other travelers in the corridor.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Number and types of other street user movements in conflict with bikes	Same as existing (more vehicles on Van Ness Avenue)	Similar amount of conflicts as Alternative 1	Similar amount of conflicts as Alternative 1	Similar amount of conflicts as Alternative 1

The No Build Alternative (Alternative 1) would have the same types of conflicts as existing conditions. The improvement of the bicycle facility on Polk Street, which is the designated bicycle route in the corridor (see Section 3.4 for a description of Polk Street and the proposed improvements to the facility), would create a better alternative for cyclists than traveling along Van Ness Avenue under the No Build Alternative, decreasing conflicts for riders using that street. Under the build alternatives, buses would no longer weave into the bicycle path of travel when pulling into and out of bus stops. There would be some difference in the types of conflicts under the build alternatives (e.g., riding next to parked vehicles in Build Alternatives 3 and 4 versus riding next to buses in Build Alternative 2); however, these differences were not considered appreciable enough to be considered enhancements or impacts to cyclists' experience on Van Ness Avenue; therefore, all of the project alternatives were considered to perform the same for this indicator.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 for this indicator, and would have a similar amount of conflicts as the No Build Alternative.

10.2.4.4 | URBAN DESIGN/LANDSCAPE

The purpose and need for the Van Ness Avenue BRT Project calls for a project that improves the overall design of the street. This category considers the strength of the street design from an urban and landscape design perspective. Having attractive and cohesive urban design and landscaping encourages transit usage, links transit usage to the adjacent land uses, and enhances the overall experience of using the street. The measures in this section evaluate each alternative's performance in providing a quality landscape and urban design.

☆ **D-1: Consistency of the Median Footprint.** The consistency of the median is a key measure of streetscape quality and a good assessment of how well each alternative advances the project's purpose and need to provide a strong street identity. A median that has a consistent shape or footprint from block to block has a stronger identity than a median that has varied shape and size from block to block. Performance is measured by the number of different configurations in conceptual engineering documents, as well as the number of changes between those various configurations along the corridor. The lower the number for each of these indicators means a superior performance or the more consistent the median footprint is considered to be. Conceptual drawings showing the median footprints can be found in Appendix A.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Consistency of median footprint (number of different configurations)	10 configurations/ 23 changes	6 configurations/ 13 changes	9 configurations/ 14 changes	6 configurations/ 7 changes	5 configurations/ 7 changes	4 configurations/ 4 changes

The No Build Alternative (Alternative 1) would maintain the existing roadway geometry and median consistency. The current roadway geometry of the corridor has 10 configurations of the median, and there are 23 block-to-block changes. Build Alternative 3 would perform the worst, with 9 configurations and 14 changes in the median design. Build Alternative 2 would perform better, with 6 configurations and 13 changes in the median design from block to block. Build Alternative 4 would provide the most consistent footprint, and even more so with Design Option B.

LPA Performance. The LPA would have 8 different configurations and 23 block-to-block changes. The LPA is the least consistent of any of the alternatives due to the transitions from a center median similar to Build Alternative 4 outside of station locations to an alignment similar to Build Alternative 3 at station locations. The Vallejo Northbound Station Variant would add a ninth configuration, making it less consistent than the LPA without the variant.

D-2: Edge to Total Area Ratio of Landscape. Another consideration is the "edge-area ratio" of the landscape. A higher quality of landscaping can be achieved when there is less "edge" and more "area;" in other words, large landscaped sections provide more opportunities for landscaping than smaller, narrower sections; therefore, the lower the ratio, the better the alternative would perform in this analysis.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Edge-area ratio of landscape	28% edge/area ratio	22% edge/area ratio	35% edge/area ratio. Design Option B would result in even lower edge-area ratio	21% edge/area ratio. Design Option B would result in even lower edge-area ratio

The current edge area ratio of landscaping in the corridor is 28 percent. Build Alternatives 2 and 4 would improve over the existing condition with ratios of 22 percent and 21 percent, respectively, indicating the larger areas of landscaping proposed under both alternatives. Build Alternative 3 would increase the ratio due to the smaller dual medians, providing landscaping in smaller sections. Design Option B would allow for larger, fuller sections of landscaped median due to the consolidation of left turns in Alternatives 3 and 4. Build Alternative 4 with Design Option B would perform the strongest on this indicator overall.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs between Build Alternatives 3 and 4 with an approximate 33 percent edge/area ratio, because the LPA combines the dual median design of Build Alternative 3 on blocks with stations, and the single median design on blocks without stations.

D-3: Permeable/Landscape Surface Area. This analysis, which is found in Section 4.9, evaluated the net amount of permeable or landscaped surface under each alternative.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Acres of permeable/ landscaped surface	0.7	1.3	0.8	0.8	1.2	1.3

The No Build Alternative (Alternative 1) reflects the current conditions with 0.7-acre of landscaping in the corridor. Build Alternatives 2 and 4 would nearly double the amount of landscaping to 1.3 and 1.2 acres, respectively (Build Alternative 4 with Design Option B would also have 1.3 acres). Build Alternative 3 would also increase the amount of permeable/landscaped surface relative to the No Build Alternative, but to a slightly lesser

extent than Build Alternatives 2 and 4. Incorporation of Design Option B under Build Alternative 3 would not substantially change the landscape area.

LPA Performance. The LPA would have 0.9-acre of permeable surface, a similar amount to Build Alternative 3.

10.2.4.5 | SYSTEM PERFORMANCE

As discussed in the project's purpose and need statement (Chapter 1), a major goal of BRT is to optimize system performance. The BRT alternatives have varying effects on overall circulation, access, and mobility, as the performance of a BRT system on Van Ness Avenue will vary based on lane configuration, signal timing, and demand shifts. This performance category is intended to present those differences by comparing the following:

☆ **E-1: Average Total Intersection Person-Delay.** This is a multimodal performance indicator that looks at the average delay for all travelers along and crossing Van Ness Avenue, including people in cars, buses, and pedestrians. This is reported as average person-delay at intersections, and the project performs similarly across all alternatives.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Average total intersection person-delay on Van Ness Avenue in Year 2015 (seconds per person)	18 sec	18 sec	18 sec	18 sec	17 sec

In Year 2015, under the build alternatives, the decreased delay for BRT and autos traveling along Van Ness Avenue would offset any increase in delays for other auto and transit movements. Therefore, total person-delay would be the same for all of the build alternatives. Incorporation of Design Option B under Build Alternatives 3 and 4 would decrease average intersection delay by 1 second per person through the removal of left turns.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, reducing average total intersection person-delay by 1 second versus the No Build Alternative.

☆ **E-2: Lane Productivity.** By reporting the number of people (in cars and on transit) that are using each lane of Van Ness Avenue, the efficiency of use and potential capacity of the system was measured in Section 3.1. The analysis below shows the number of trips in autos and on transit in each lane during the PM peak hour in Year 2015.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Average persons per lane per hour on Van Ness Avenue in Year 2015	605 transit / 630 auto	760 transit / 675 auto	930 transit / 680 auto	930 transit / 680 auto

The No Build Alternative (Alternative 1) moves approximately 605 transit patrons and 630 people in private vehicles in each lane on Van Ness Avenue. Build Alternative 2 would increase the person throughput in each lane during the peak hour relative to the No Build Alternative. Build Alternatives 3 and 4 (with or without Design Option B) would further increase the number of people moved per lane, both in the transit lane as well as in the automobile traffic lanes.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 for this indicator, increasing the person throughput in each lane during the peak hour relative to the No Build Alternative and Build Alternative 2.

☆ **E-3: Traffic Operations/Delay.** This performance indicator, analyzed in Section 3.3, identifies the number of intersections in the auto traffic study area that experience an average delay of 55 seconds or greater (i.e., LOS E or LOS F) in year 2015. The indicator is a good approximation for the ability of each alternative to meet the project's purpose and need to accommodate safe multimodal circulation and access within the corridor.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Number of intersections in the traffic study area with average auto delay of 55 seconds or greater	4	3	4	4	4

The No Build Alternative (Alternative 1) is expected to have 4 intersections with delays greater than 55 seconds, caused in part by the reconfiguration of Hayes to be a two-way street (see Section 2.2 for details). All of the build alternatives would have the same or fewer intersections operating with average delays greater than 55 seconds in 2015 compared with the No Build Alternative, due to the improvement of the Mission/Otis/South Van Ness Avenue intersection (see Section 3.3).

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, and would have 4 intersections that operate at LOS E or F in Year 2015.

E-4: Number of Turning Restrictions. The inability to turn off of Van Ness Avenue reduces the number of choices for auto travelers and trucks in the corridor. The project team determined the number of left-turn restrictions proposed for automobiles on Van Ness Avenue for each alternative.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Number of new turn restrictions	0	6 NB / 7 SB	6 NB / 7 SB	6 NB / 7 SB	11 NB / 10 SB

Van Ness Avenue currently provides 12 NB left-turn opportunities and 11 SB left-turn opportunities. The No Build Alternative (Alternative 1) would not further restrict left-turns on Van Ness Avenue relative to existing conditions. All of the build alternatives would reduce the number of left-turn opportunities by 6 NB and 7 SB. Design Option B for Build Alternatives 3 and 4 would only permit left turns in the corridor heading NB at Lombard Street and SB at Broadway. No left- or right-turn restrictions onto Van Ness Avenue for automobiles would be implemented as part of any of the build alternatives; however, as a result of some new medians, curb bulbs, and station platforms, some cross streets could no longer accommodate the turning movements of very large trucks. Build Alternatives 2 and 4 would require restricting very large trucks from turning onto Van Ness Avenue from Hayes Street. Build Alternative 3 would require restrictions on large trucks turning at the intersections of Market Street, Hayes Street, O'Farrell Street, Geary Street, and Broadway.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, since there would only be one left turn opportunity in each direction along the corridor. Because the

LPA uses predominantly near side stations, it would not require any turning restrictions onto Van Ness Avenue. The Vallejo Northbound Station Variant would require a turning restriction preventing trucks traveling WB on Vallejo Street from turning right onto Van Ness Avenue.

10.2.4.6 | ENVIRONMENTAL AND SOCIAL EFFECTS

The project team identified the following environmental and social effects as potential distinguishing performance indicators that could be used to compare the project alternatives.

F-1: Countywide air pollutant emissions. Countywide operational emissions were estimated for the proposed BRT in Year 2035 (see Section 4.10). The emission rates, in combination with the calculated VMT, provide countywide emissions associated with each project alternative.

SAN FRANCISCO COUNTYWIDE AIR POLLUTANT EMISSIONS (POUNDS PER DAY)	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
ROG	2,084	2,071	2,070	2,070	2,082
NO_X	7,439	7,393	7,390	7,390	7,431
PM_{10}	1,820	1,809	1,808	1,808	1,818
$PM_{2.5}$	1,372	1,363	1,363	1,363	1,370

All of the build alternatives would result in a slight (0.1-percent to 0.7-percent) reduction in citywide VMT relative to the No Build Alternative (Alternative 1). These small differences between the alternatives do not distinguish them in terms of air quality performance.

LPA Performance. The LPA, with or without the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, and is not distinguished versus the other build alternatives in terms of air quality performance.

F-2: Countywide Greenhouse Gas Emissions. Air pollutants can also be measured by GHG emissions at the countywide level in Year 2035 (see Section 4.10). GHG emissions are of emerging importance with the recent passage of Assembly Bill (AB) 32 and State Bill (SB) 375, which mandate GHG emission levels; the City's Climate Action Plan also calls for substantial reduction in GHG emissions from the transportation sector by 2050.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
GHG emissions – countywide (metric tons per year)	3.47	3.45	3.44	3.44	3.46

These small differences between the alternatives do not distinguish them in terms of GHG emissions performance.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, and is not distinguished versus the other build alternatives in terms of GHG emissions performance.

F-3: Countywide Motorized Vehicle Fuel Consumption. Energy consumption varies among the alternatives as a function of differences in motorized fuel consumption. The calculation, which is shown in Section 4.12, is based on countywide fuel consumption by all vehicles, including buses in Year 2035.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Annual Motorized vehicle fuel consumption – countywide (trillions of BTUs)[1]	14.36	14.27	14.26	14.26	14.34

[1]One gallon of gasoline = 125,000 BTUs

All of the build alternatives would result in a reduction of 0.1-percent to 0.6-percent of energy consumption in Year 2035, which is the equivalent of 115,000 to 750,000 gallons of gasoline annually. These small differences between the alternatives do not distinguish them in terms of energy performance.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, and is not distinguished versus the other build alternatives in terms of energy performance.

F-4: Noise Impacts. The project team analyzed whether the project would cause increases in noise in excess of City thresholds. This analysis was conducted for Van Ness Avenue, as well as parallel streets Franklin and Gough, to determine whether additional traffic on those streets would create noise impacts. The analysis determined that noise levels would not increase audibly on Van Ness Avenue or parallel streets.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 4	DESIGN OPTION B (BUILD ALTERNATIVES 3 AND 4)
Noise impacts beyond significance threshold	NA (baseline)	No impact	No impact	No impact	No impact

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator.

F-5: On-Street Parking Supply. Changes to the on-street parking supply resulting from each build alternative are reported in Section 3.5. The proposed project would require removal of on-street parking along parts of the corridor; however, new spaces would also be created through restriping, stop consolidation, and infill of spaces where they do not exist today. The resulting net number of spaces for each alternative is shown below. The project is directly related to the project's purpose and need to enhance pedestrian comfort and safety, as discussed in Section 3.4.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Parking capacity (number of parking spaces)	442	409	356	411	397	455

Parking studies conducted in 2010 and 2011 identified 442 on-street parking spaces on Van Ness Avenue, all of which would be maintained under the No Build Alternative (Alternative 1). Build Alternative 2 would result in a net loss of 33 parking spaces (7 percent), Build Alternative 3 would remove 100 spaces (31 with Design Option B), and Build Alternative 4 would remove 45 spaces. With Design Option B, Build Alternative 4 would result in a net gain of 13 spaces.

LPA Performance. Based on a refined parking analysis conducted in 2012, the LPA would provide a total of 351 parking spaces, which is fewer than the build alternatives presented in the Draft EIS/EIR. Incorporation of the Vallejo Northbound Station Variant into LPA design would provide a total of 352 parking spaces. The parking impacts of the LPA, compared with other alternatives, is due in part to the inclusion of the following factors in the refined analysis, which were not part of the analysis of the other build alternatives: use of updated existing conditions data; incorporation of longer curb bulbs per the Caltrans Highway Design Manual May 2012 update; inclusion of wider BRT lanes per MTA requirements set forth in 2012; and stricter adherence to ADA design requirements such as provision of curb ramps behind handicapped spaces (which largely are not present in existing conditions). A sensitivity analysis taking into account the aforementioned factors was performed for Build Alternative 3; this analysis indicated that applying the methodology used for the LPA to the build alternatives would result in up to 32 more spaces removed for the alternatives than as presented in the table above from the Draft EIS/EIR. This would result in a similar number of on-street parking opportunities for the LPA as Build Alternative 3.

F-6: Number of Existing Trees Preserved. The overall number of trees that must be removed and replaced under each build alternative is evaluated in Section 4.4, Aesthetics/Visual Resources. Each build alternative would result in a net increase in the total number of trees along Van Ness Avenue; however, the alternatives differ in the number of trees that would need to be removed and replaced at specific locations. The number of existing trees that would remain under each alternative, identified in the table below, excludes those trees that could be pruned to clear the OCS wires under each alternative and be preserved.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Number of existing median trees preserved	102 (0 removed)	82 (20 removed)	0 (102 removed)	38 (64 removed)
Number of existing sidewalk trees preserved	314 (0 removed)	276 (38 removed)	314 (0 removed)	314 (0 removed)

Note: Revisions to figures in table are a result of the findings of the Tree Removal Evaluation and Planting Opportunity Analysis undertaken in fall 2012, presented in Section 4.4.3.4 (BMS Design Group, 2013).

The No Build Alternative (Alternative 1) would leave trees the same as in the existing conditions, with 102 trees in the median, 314 trees along the sidewalk, and no trees being added or removed. Build Alternative 2 would remove 20 median trees, including two mature and healthy trees, and it would remove 38 trees from the sidewalk, including four mature, healthy trees, to accommodate the new bus platforms. Build Alternative 3 (with or without Design Option B) would remove and replace all of the 102 trees along the median, including 28 mature, healthy trees, but it would not remove any trees from the sidewalk. Build Alternative 4 (with or without Design Option B) would remove and replace most of the trees (64) along the median, including 11 mature, healthy trees, leaving 38 trees. No trees would be removed from the sidewalk with this alternative.

LPA Performance. The number of trees the LPA, including the Vallejo Northbound Station Variant, would remove falls within the range of Build Alternatives 3 and 4. The LPA would remove 90 median trees, including 23 mature, healthy trees. Thus, the LPA would remove 12 fewer trees than Build Alternative 3 and would remove 26 more trees than Build Alternative 4. The LPA would remove 5 fewer healthy, mature trees than Build Alternative 3 and would remove 12 more healthy and mature trees than Build Alternative 4. Incorporation of the Vallejo Northbound Station Variant in the LPA design would not affect tree removal or planting opportunities under the LPA. .

10.2.4.7 | OPERATIONS AND MAINTENANCE

O&M costs and level of effort are key performance indicators that indicate the sustainability of the project throughout its life.

☆ **G-1: Cost of Muni Service.** The BRT alternatives would reduce the cost of operating Routes 47 and 49, as shown in Chapter 9, because the travel time savings projected from BRT allow the same service frequencies to be provided using fewer buses and drivers. This is directly related to the project's purpose and need to improve the cost efficiency of Muni operations.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Annual cost to run on-street service from Mission Street to Lombard Street	$8.3M	$6.9M	$6.1M	$5.6M	$6.1M	$5.6M

In the existing conditions and in the No Build Alternative (Alternative 1), on-street service for the segment from Mission to Lombard streets costs approximately $8.3 million to provide. Build Alternative 2 would cost approximately 17 percent less ($1.4 million) to operate annually, while Build Alternatives 3 and 4 would cost approximately 27 percent less ($2.2 million) annually. Incorporation of Design Option B into Build Alternatives 3 and 4 would result in the lowest annual operating cost, saving approximately 33 percent ($2.7 million) annually.

LPA Performance. The LPA performs similarly to Build Alternatives 3 and 4 with Design Option B for this indicator, having the greatest reduction in annual operations costs. The Vallejo Northbound Station Variant, due to a slightly slower travel time, would perform similar to Build Alternatives 3 and 4 ($6.1 million annually).

G-2: Vehicle Maintenance Cost. The BRT vehicles would incur an incremental maintenance cost relative to the existing vehicles.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Incremental life-cycle cost to maintain vehicles	NA (baseline)	$160,000	$160,000	$160,000

The incremental cost to maintain the BRT vehicles is due to the proposed fleet change under each build alternative from 40-foot standard-length motor coaches to 60-foot articulated motor coaches for the 47 route. These longer vehicles would require shuttling for maintenance due to near-term SFMTA storage constraints. Shuttling would remain in place while SFMTA expands systemwide vehicle maintenance capacities over the next 5 years. To account for the near-term nature of this expense, the analysis annualized the cost over the 25-year expected useful life of the BRT facility to create the incremental life-cycle cost. All of the build alternatives would incur the same incremental costs. Build Alternative 4 would have slightly higher maintenance costs due to the additional doors on the vehicles required to operate that alternative.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to the other build alternatives for this indicator. Due to updates to the maintenance

and storage plans for the vehicles, shuttling is no longer anticipated for the vehicles, meaning the costs would be $0 for all alternatives, including the LPA, for this indicator.

G-3: BRT Transitway Maintenance Cost. The BRT transitway and street facilities would also incur maintenance costs beyond no-build levels. The elements of the transitway that would contribute to the increased maintenance costs include the transitway, station platforms, landscaping, and other amenities such as TVMs at selected stations. Chapter 9 analyzes the incremental maintenance cost of each project alternative relative to the No Build Alternative.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Annual incremental cost to maintain transitway, landscaping, and amenities	$0	$200,000	$400,000	$300,000

Build Alternative 2 would cost $200,000 more than No Build Alternative maintenance expenses to maintain the runningway, new platforms, and TVMs at selected stations. Build Alternative 3 would have the highest maintenance increment over the No Build Alternative due to the additional costs associated with maintaining the narrower landscaped medians. Build Alternative 4 would have a higher maintenance cost increment than Build Alternative 2 because of the more frequent need to prune the trees in the median to keep them from growing into the OCS wires.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performs similarly to Build Alternative 3 for this indicator, with higher incremental maintenance costs to cover the additional, narrower platforms in the center of the street.

G-4: Ease of Maintenance. The ease of maintaining and operating each project alternative is a function of the number of special conditions or service interruptions that would be required to maintain the transitway, landscaping, or utilities in the ROW. For instance, the logistics of maintaining the landscaped medians depends on the width of the median that workers can operate in safely and special conditions such as the need in some alternatives to close the bus lane in off-hours to maintain landscaping.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Ease of accessing transitway, landscaping, or utilities maintenance (number and type of special maintenance conditions)	No change	1. Platforms moved closer to OCS wires. OCS could need to be depowered to perform some platform maintenance	1. Access to transitway limited by twin planted medians 2. Landscaping would be performed on platforms with smaller widths, creating a higher chance of shutting down a transit or traffic lane or needing to depower the OCS for maintenance. 3. Bus rerouting for roadway maintenance would be more difficult (trees/platforms in way of trolley poles connecting to bus outside transitway)	1. OCS wires located near center median. OCS could need to be depowered to perform pruning/platform maintenance.

The No Build Alternative (Alternative 1) does not change the street's maintenance approach. Build Alternative 2 is not anticipated to substantially change from current conditions because the side-running lanes would not have significant additional conditions for maintenance, except for the slightly higher potential to need to depower the OCS in the event of some platform maintenance due to the sidewalk extension of the bus bulbs at station platforms; however, because the OCS wires are horizontally separated from the sidewalks, there is more room for sidewalk tree and general sidewalk maintenance outside of platform areas.

Build Alternative 3 (with or without Design Option B) would have two identified special conditions for maintenance. Maintenance of the landscaped medians and platforms would be complicated by the fact that the medians are narrower than what currently exists, which is a combination of 9–foot-wide and 4–foot-wide medians. This creates a much higher likelihood of needing to shut down a transit lane or mixed traffic lane or to depower the OCS wires for routine maintenance on the landscaped medians or the platforms. In addition, the dual-median configuration presents challenges to rerouting buses for maintenance because the trolley poles connecting to the vehicles would not be able to clear the trees and platforms along the dual medians.

Build Alternative 4 (with or without Design Option B) could also require a depowering of the OCS to maintain the landscaped median.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, would have similar ease of access as Build Alternative 4 outside of station locations. Rerouting the vehicles outside the transit lanes for blocks where maintenance is being performed would be possible, and similar to Build Alterative 4. On blocks with stations and blocks where the buses transition towards stations, ease of access would be similar to Build Alternative 3.

10.2.4.8 | CONSTRUCTION AND CAPITAL COSTS

This performance category deals with the cost and impacts associated with construction and implementation of the BRT alternatives.

☆ **H-1: Total Construction Costs.** Capital costs are presented in detail in Chapter 9 and include the total construction costs of street modifications, new stations, landscaping, and utility relocations (with center-running alternatives), as well as the incremental cost of vehicles. The Van Ness Avenue BRT Project is estimated to cost between $87 million and $130 million to design and construct, depending upon the alternative. Total capital costs are in YOE and based on the Small Starts application submitted in fall 2010. This is directly related to the project's purpose and need to deliver cost-effective improvements.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3	BUILD ALTERNATIVE 3 (WITH DESIGN OPTION B)	BUILD ALTERNATIVE 4	BUILD ALTERNATIVE 4 (WITH DESIGN OPTION B)
Total construction cost	NA	$93 M	$136M		$112M	

The No Build Alternative (Alternative 1) would not require any additional capital costs beyond parallel projects that are currently planned (see Chapter 2 for more details). Build Alternative 2 would have the lowest capital cost, and Build Alternative 3 would have the highest capital cost (slightly higher with Design Option B).

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, would have an approximate $126 million construction cost,[106] between the costs of Build Alternatives 3 and 4.

☆ **H-2: Construction Duration.** Construction duration, measured in months and described in Section 4.15, varies between alternatives. A shorter construction period is preferential. This is directly related to the project's purpose and need to deliver improvements in the near term. The durations shown below are for the preferred construction approach (i.e., working in three-block segments in two parts of the corridor at once; see Section 2.3.1 for details).

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Construction duration (in months) using the preferred construction approach	NA	19	21	14

The No Build Alternative (Alternative 1) would not require construction. Build Alternative 3 would take the longest to construct (19 months), and Build Alternative 4 (with or without Design Option B) would result in the shortest construction duration at 14 months. This estimate is based on preliminary construction staging and phasing plans developed for this EIS/EIR.

LPA Performance. Construction of the LPA is anticipated to last 20 months until substantial completion. Incorporation of the Vallejo Northbound Station Variant could increase construction duration by up to 1 month.

H-3: Linear Feet of Utility Relocation and Curb Rebuild. Construction intensity, or the amount of disruption caused by construction activity, can be approximated by length of expected utility relocations and curb rebuild involved with the project. Fewer feet of utility relocation or curb rebuild equates to a less intense and less disruptive construction project.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Linear feet of utility relocation and curb rebuild	NA	0 feet of sewer; 6,100 feet of curb rebuild/ bulb outs	Up to 10,900 feet of sewer; 2,100 feet of curb rebuild/bulb outs	2,500 feet of sewer; 2,500 feet of curb rebuild/bulb outs

The No Build Alternative (Alternative 1) would not require construction; therefore, it would not require utility relocation. Build Alternative 2 would not require sewer reconstruction or relocation, but it would require the most curb reconstruction (6,100 linear feet). Depending on the condition of sewers, Build Alternative 3 (with or without Design Option B) could require the most reconstruction or relocation of the sewer system under Van Ness Avenue at 10,900 feet, and would require 2,100 feet of curb reconstruction. Build Alternative 4 (with or without Design Option B) would require some sewer reconstruction and some sidewalk rebuild. Build Alternative 4 would require the least amount of total linear feet of construction using this methodology.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, would involve replacement or repair of the sewer in locations where construction of the transitway above

[106] The Small Starts cost estimate discussed in Chapter 9 did not incorporate the SB Vallejo Street station now included in the LPA (see Section 2.2.2.4.), nor did it include the Vallejo Northbound Station Variant as part of the LPA. Construction of these stations is projected to cost approximately $500,000 per station. The up to $1 million cost increase is less than the contingency amount in the cost estimate. A revised cost estimate based on the final LPA adopted by the Authority Board at the time of certification would be included as part of the Conceptual Engineering Report and 30% design.

could cause damage to the existing sewer. Full analysis of the sewer condition has not been completed, so it is assumed that up to full replacement (10,900 feet) could be necessary for the LPA as under Build Alternative 3; however, it is likely that sewer replacement or relocation would be carried out only at locations where new transitway or mixed traffic lanes are proposed directly over the existing sewer facility.

H-4: Level of Sidewalk Impact. The impact of construction on adjacent land uses is approximated by the number and duration of sidewalk closures and detours that pedestrians must take to reach an adjacent land use.

	NO BUILD ALTERNATIVE (ALTERNATIVE 1)	BUILD ALTERNATIVE 2	BUILD ALTERNATIVE 3 (WITH OR WITHOUT DESIGN OPTION B)	BUILD ALTERNATIVE 4 (WITH OR WITHOUT DESIGN OPTION B)
Level of sidewalk impact	NA	Medium-High Impact	Low-Medium Impact	Low Impact

Based on estimates in the Construction Management Plan, Build Alternative 2 would have the highest impact to sidewalks. Build Alternative 4 (with or without Design Option B) would have the lowest impact on sidewalks.

LPA Performance. The LPA, including the Vallejo Northbound Station Variant, performance on this indicator is similar to Build Alternative 3 with Design Option B and would involve a low-medium impact.

10.3 Locally Preferred Alternative Selection

10.3.1 | Introduction

The Draft EIS/EIR was distributed and made available to the public for review and a 45-day comment period. During the review period, the project team solicited further public and agency input on the alternatives analysis, including input on the selection of an LPA, through a public hearing, webinar, and stakeholder meetings held during release of the Draft EIS/EIR. In particular, input on those performance indicators that are directly related to the project purpose and were sought. Once input was gathered from all of the parties, including comments received on the Draft EIS/EIR, the lead agency (SFCTA) and partner agency SFMTA proposed an LPA based on the project's purpose and need. An LPA Report was prepared including a summary of public and agency input, the alternatives' performance, and the recommended LPA (SFCTA, 2012). The LPA Report was presented to the SFCTA and SFMTA Boards for adoption, and was unanimously approved in summer 2012. Additional detail about the LPA selection process is provided in the following subsections.

10.3.2 | Performance Evaluation Process

As explained above in Sections 10.2.1 and 10.2.2, the purpose of alternatives analysis is to identify and compare differences between the project alternatives, including the No Build Alternative. In so doing, the ability of each alternative to advance the project purpose and need is identified. Section 10.2 documents the alternatives analysis concerning the relative benefits and impacts of the Van Ness Avenue BRT alternatives. The BRT alternatives were analyzed based on their performance in meeting the project purpose and need, as well as based on considerations of importance to multiple agency and public stakeholder groups, including the TAC and CAC. The next step involved quantifying the performance of each of the alternatives.

Memorandum of Agreement 07/08-34 stipulates that the SFCTA Board of Commissioners and the SFMTA Board of Directors must adopt the same LPA for the Van Ness Avenue BRT project. With this in mind, staff at the two agencies established a process by which they would reach a consensus decision on the LPA. First, the two agencies agreed on a method for quantifying the performance of each of the alternatives. Project staff from each agency undertook a series of exercises to score the performance of each build alternative presented in the Draft EIS/EIR. Secondly, the two agencies reviewed public and agency input on the Draft EIS/EIR findings provided through comments and stakeholder meetings on the Draft EIS/EIR. Once the above information was compiled, the two agencies formed a steering committee, comprised of the Deputy Directors of the relevant sections of each agency, to discuss the strengths and challenges of each alternative. A consensus LPA emerged that was a refinement of the center-running build alternatives. More detail on this process is provided below.

10.3.3 | Steering Committee and Agreement on Consensus Alternative

Based on the alternatives performance in Chapter 10 of the EIS/EIR, Authority and SFMTA staff attempted to perform a quantitative analysis to select the LPA. However, due to the strengths and challenges of each of the alternatives, staff was unable to reach consensus on an LPA. Thus, the two agencies formed a steering committee comprised of the following members:

SFMTA

- Director of Transit
- Director of Finance and Information Technology
- Director of Sustainable Streets
- Director of Capital Programs and Construction
- Chief Safety Officer

Authority

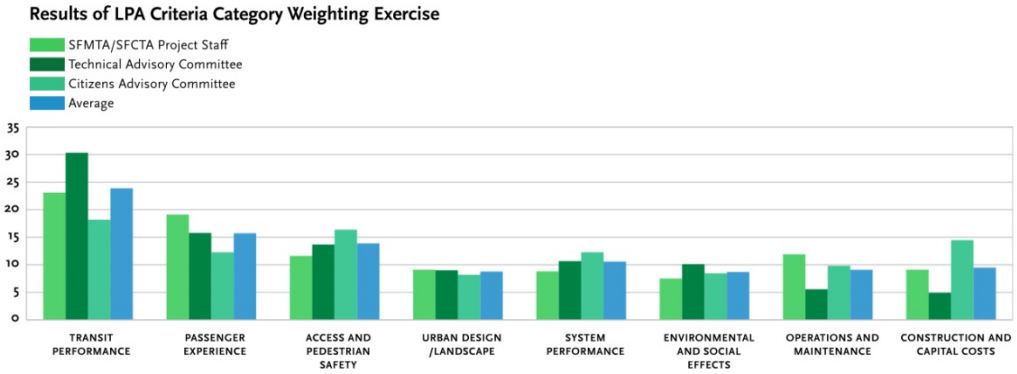
- Deputy Director for Planning
- Deputy Director for Capital Projects
- Deputy Director for Policy and Programming

The Steering Committee met four times over a 3-month period to discuss the various strengths, risks and challenges of each of the alternatives. Staff from both agencies made presentations and submitted analysis to the Steering Committee for each of the alternatives. Additional analyses included the scoring of alternatives by each staff, a risk analysis for each alternative and further refinement of costs and funding for all alternatives. A fifth steering committee meeting was held, which the Directors of the SFCTA and SFMTA attended. After this fifth and final meeting, the Directors and staff met with various agency stakeholders before making a consensus decision on the staff recommended LPA.

10.3.4 | Weighting of Criteria and Subcriteria

Alternatives performance outlined in Section 10.2 shows that each alternative performs better on some indicators than others, meaning that each had its strengths and challenges. For this reason, a series of weighting exercises were conducted with the project team, the TAC, and the CAC to get a sense of stakeholder priorities. Each person participating in the exercise was given 100 points to divide between the eight categories of performance indicators identified in Section 10.2.3. The results, shown in Figure 10-1, indicate that transit performance was by far the most important factor for all stakeholders. Passenger experience was next, followed by pedestrian safety. All of the other categories were weighted less than half the amount of transit performance on average.

Figure 10-1: Results of LPA Criteria Category Weighting Exercise



The center-running BRT alternatives (Build Alternatives 3 and 4) performed strongest on the transit performance indicators related to the project purpose and need (the starred indicators), particularly Build Alternatives 3 and 4 with Design Option B. In fact, the center-running alternatives with Design Option B showed nearly twice the travel time benefit, twice the reliability benefit, and a significantly higher increase in both BRT route and systemwide ridership versus Build Alternative 2. Given the strong weighting of transit performance as a priority of agency and public stakeholders and the strong performance of the center-running BRT alternatives, Authority and SFMTA then ran a risk analysis described below to determine what was needed to ensure a successful implementation of a center-running alternative.

10.3.5 | Risk Analysis of Center-Running Alternatives

In spite of their strong performance in the most heavily weighted evaluation criteria category (Transit Performance), both of the center-running alternatives had challenges. Two major risk areas were identified, as described in the following subsections.

10.3.5.1 | LANDSCAPING AND MEDIAN CHALLENGES FOR BUILD ALTERNATIVE 3

In the case of Build Alternative 3, the project team identified the need to rebuild the median, including removal of all existing median trees and potential impacts to underground sewer systems directly beneath the transitway, as important factors to consider. These factors associated with rebuilding the entire median increased the complexity and cost of the project and raised urban design, landscaping, and tree removal concerns among some agency and public stakeholders.

10.3.5.2 | FIVE DOOR VEHICLES CHALLENGES FOR BUILD ALTERNATIVE 4

The major risk of Build Alternative 4 related to the need to procure dual-side vehicles capable of loading passengers on the left side and right side. Currently, five-door motorcoach vehicles (3 doors on the right side and two on the left) that would be needed to operate Muni Route 47 are in operation in some North American cities. However, no five-door electric trolley coaches (that would be needed for Muni Route 49) are known to be in operation in North America at this time. This creates a procurement and cost risk because SFMTA would need to create specifications and purchase two small custom sub-fleets to support the Van Ness Avenue BRT. Moreover, the risk analysis revealed the need for higher spare ratios for both types of vehicles in order to ensure the reliability of BRT service that would utilize dedicated sub-fleets within the overall SFMTA vehicle fleet. This would result in a higher project vehicle cost and potentially add to BRT maintenance and storage needs. The higher initial capital investment and vehicle maintenance needs was analyzed as a risk to systemwide rapid network performance.

10.3.6 | Staff Recommended LPA: Center-Lane BRT with Right-Side Boarding/Single Median and Limited Left Turns

Due to the risk factors described above, the SFMTA and Authority staff developed the staff recommended LPA which is a refinement of the center-running alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B), and is referred to as Center Lane BRT with Right Side Boarding/Single Median and Limited Left Turns. The staff recommended LPA combines features of Build Alternatives 3 and 4 in such a way that the risk factors of needing to rebuild the median under Build Alternative 3 (and associated environmental and cost impacts) and needing to procure dual-side door vehicles are reduced without compromising the ability of the project to best fulfill the established purpose and need.

Under the staff recommended LPA, BRT vehicles would run alongside a single median for most of the corridor, similar to Build Alternative 4. However, at station locations, BRT vehicles would transition to the center of the roadway, allowing for right side loading at station platforms as presented under Build Alternative 3. Figure 10-2 depicts the LPA. Figure 10-3 provides an aerial schematic of the LPA, which shows the transition between a single median and dual median configuration. The LPA would have the performance attributes of center-running BRT (e.g., faster, more reliable service), while avoiding the need to acquire left-right door vehicles and completely rebuild the median (which would likely involve removal of all median trees and complete relocation and replacement of the sewer system). The LPA incorporates Design Option B, the left-turn removal design option which would eliminate all left turns from Van Ness Avenue between Mission and Lombard streets with the exception of a SB (two-lane) left turn at Broadway Street. Incorporation of Design Option B would provide the greatest transit travel time benefits, reduce the weaving associated with the transitions buses must make between station locations and blocks without stations, and would aid with the flow of north-south traffic along Van Ness Avenue. Thus, the staff recommended LPA for the Van Ness Avenue BRT Project is termed the "Center Lane BRT with Right Side Boarding/Single Median and Limited Left Turns."

Figure 10-2: LPA Cross Sections and Station and Left-Turn Pocket Location Map

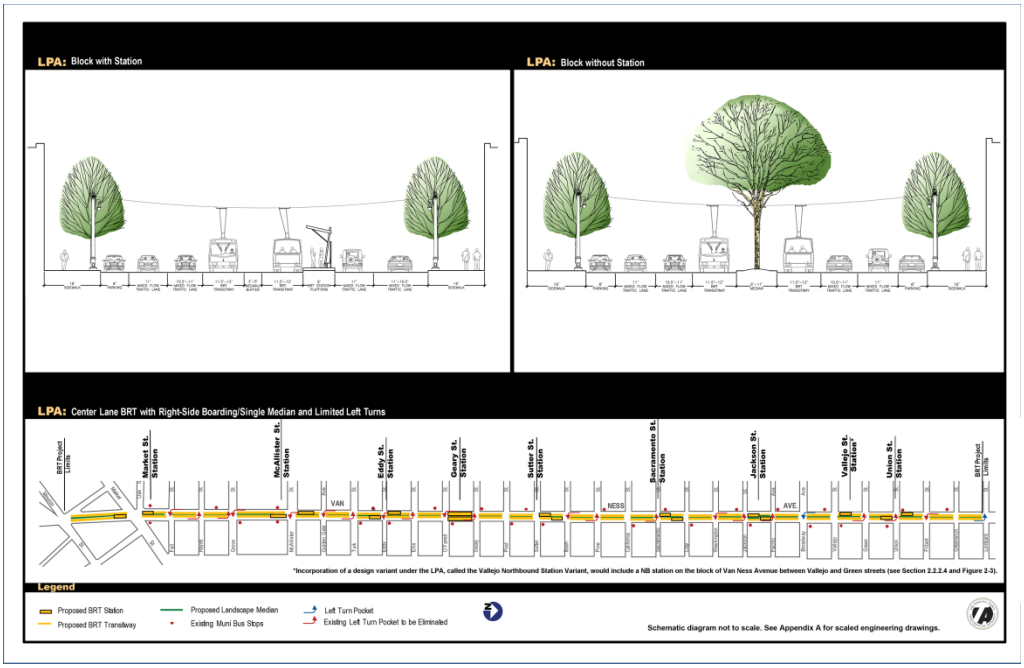
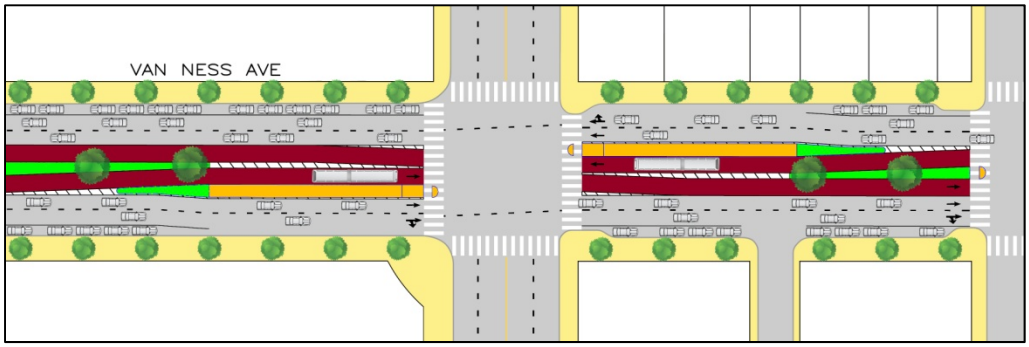


Figure 10-3: Aerial Schematic of LPA



10.3.7 | Additional Outreach in Support of Staff Recommended LPA

The project team conducted outreach surrounding the staff recommended LPA. The project team presented the staff recommended LPA at the following public meetings and commissions:

- San Francisco Environment Commission's Policy Committee: Monday, April 30, 2012, 5 p.m.
- Van Ness Avenue BRT CAC*: Tuesday, May 1, 2012, 5:30 p.m.
- SFMTA Citizens' Advisory Council: Thursday May 3, 2012, 5:30 p.m.
- San Francisco Planning Commission: Thursday, May 10, 2012, 1 p.m.
- Transportation Authority Plans and Programs Committee: Tuesday, May 15, 2012, 10:30 a.m.
- SFMTA Board*: Tuesday, May 15, 2012, 1 p.m.
- Transportation Authority Plans and Programs Committee*: Tuesday, June 19, 2012, 10:30 a.m.
- Transportation Authority Board*: Tuesday, June 26, 2012

*Action item on Staff Recommended LPA

Project staff also presented the recommended LPA at over 15 stakeholder meetings before the June 26 Authority Board action, including the following:

- Transportation Working Group: April 19, 9:30 a.m.
- Directors Working Group: April 20, 11 a.m.
- Van Ness Corridor Association: Monday, April 30, 6 p.m.
- Pacific Heights Residents Association: Monday April 30, 7:30 p.m.
- Van Ness Avenue BRT Technical Advisory Committee: Friday, May 4, 1 p.m.
- Friends of the Urban Forest: Tuesday May 8, 11 a.m.
- Japantown Better Neighborhood Plan Organizing Committee: Wednesday May 9, 6 p.m.
- Lower Polk Neighbors: Wednesday May 9, 7 p.m.
- Civic Center Community Benefit District: Thursday, May 10, 10 a.m.
- San Francisco Transit Riders Union: Monday May 14, 6 p.m.
- Chinatown Community Development Center + Chinatown Transportation and Research Improvements (TRIP): Wednesday, May 16, 6 p.m.
- Polk District Merchants Association: Thursday, May 17, 9 a.m.
- Geary Bus Rapid Transit Citizens Advisory Committee: Thursday, May 17, 5 p.m.
- Alliance for a Better District 6: Tuesday, June 12, 6 p.m.
- SFMTA Multimodal Accessibility Advisory Committee: June 16, 1 p.m.
- Middle Polk Neighborhood Association: Monday, June 18, 7 p.m.

In addition, two electronic updates translated into Cantonese and Spanish outlining the staff recommended LPA were e-mailed to the project e-mail mailing list, and a postcard containing similar translated information was mailed to constituents without e-mail

addresses. Media advisories and press releases were sent to multilingual media organizations. Information about the staff recommended LPA was posted in Spanish and English on the Authority's project website, and information about the project and public hearings were featured on the Authority's social media sites, including Facebook and Twitter.

10.3.8 | Selection of LPA

On May 1, 2012, the Van Ness Avenue BRT CAC voted 6-3 to support a center lane configured BRT with right side boarding/single median and incorporation of Design Option B, the left-turn removal design option which would eliminate all left turns from Van Ness Avenue between Mission and Lombard streets with the exception of a SB (two-lane) left turn at Broadway Street, as the LPA for the Van Ness Avenue BRT Project. On May 15, 2012, the SFMTA Board of Directors voted unanimously to adopt "Center-Running Bus Rapid Transit with Right Side Boarding Platforms, Single Median and Limited Left Turns" as the LPA for the Van Ness Avenue BRT Project. On June 26, 2012, the SFCTA Board of Commissioners voted unanimously to select the "Center Lane Bus Rapid Transit with Right Side Boarding/Single Median and Limited Left Turns" as the LPA for the Van Ness Avenue BRT project, authorized the Executive Director to analyze the Staff Recommended LPA in the Final EIS/EIR, and approved the Draft Van Ness Avenue BRT LPA Report.[107]

10.4 LPA Environmental Consequences and Performance

10.4.1 | LPA Environmental Consequences

As explained above in Section 10.3.6, the LPA is a combination of design features presented under Build Alternatives 3 and 4 in the Draft EIS/EIR. All potential environmental impacts and consequences for the LPA were identified in the Draft EIS/EIR as part of the analysis presented for either Build Alternative 3 or 4 in Chapters 3 through 7. Refinement of the evaluation of the environmental impacts in Chapters 3 through 7 of the Draft EIS/EIR is shown with a line in the margin in this Final EIS/EIR.

Additional analysis was undertaken to explain the effects specifically of the LPA design for the following environmental factors: community impacts, aesthetics/visual resources, biological resources, cultural resources, utilities and public services, hydrology and water quality, transportation and circulation, and construction impacts. The analysis for these factors is discussed in the following subsections. The affected environment, environmental consequences, and any associated improvement or mitigation measures for the following remaining environmental factors are not further discussed for the LPA because the Draft EIS/EIR identified no differences in effects from either alternative for: land use, growth, geology/soils./seismic/topography, hazardous waste/materials, air quality, noise and vibration, energy, environmental justice and Section 4(f). The discussion of these topics in Chapters 3 through 7 of the Draft EIS/EIR for Build Alternatives 3 and 4 applies equally to the LPA design.

[107] A NB transit station at Vallejo Street was subsequently included as a design variant, referred to as the Vallejo Northbound Station Variant. The decision on whether to include the variant will be made at the time of project approval and will be reflected in the Record of Decision (ROD).

10.4.1.1 | TRANSPORTATION AND CIRCULATION

Nonmotorized Transportation

The environmental consequences related to nonmotorized transportation under the LPA are identified as part of the analysis presented for the build alternatives in Section 3.4, Nonmotorized Transportation. For many of the pedestrian and bicycle conditions described in this section, the LPA has identical environmental consequences to Build Alternatives 3 or 4 with Design Option B. Areas where additional analysis was needed to determine impacts of the LPA include: crosswalk conditions and crossing experience, pedestrian signals and timing, sidewalk safety, and pedestrian accessibility.

Crosswalk Conditions and Crossing Experience. Average median refuge width and crossing distances were calculated for the LPA to evaluate crosswalk conditions and crossing experience. The average median refuge width for the LPA would be 9.5 feet, or 9.6 feet with the Vallejo Northbound Station Variant, which is greater than the No Build Alternative (9.0 feet) and Build Alternative 3 with Design Option B (6.4 feet), but less than Build Alternatives 2 (11.8 feet) and 4 with Design Option B (13.4 feet). Thus, the average crossing distance under the LPA would be 89.5 feet, which on average is 1.5 feet less than existing conditions and No Build Alternative, 0.9-foot less than Build Alternative 3 with Design Option B, and 1.6 feet greater than the average crossing distance for Build Alternative 4 with Design Option B. The average median with of the LPA reflects Caltrans' new guidance in the 2012 Highway Design Manual, which effectively results in a narrower, 5-foot-wide dimension for curb bulbs on Van Ness Avenue[108] compared to the 6-foot dimension assumed for the other build alternatives in the Draft EIS/EIR. Thus, the build alternatives would have a slightly greater crossing distance if the new Caltrans standard were to be applied in a similar manner as it was applied to the LPA. Even with this standard taken into account, the LPA shortens the crossing distance over existing conditions and would provide median refuges consistently 6 feet or wider (only one refuge would be narrower than 6 feet, at Mission/South Van Ness Avenue – a result of the existing condition) compared to the No Build Alternative, which has 27 median refuges that are less than 6 feet wide. Therefore, the LPA improves the crossing experience compared with the No Build Alternative.

Pedestrian Signals and Timing. A crossing speed analysis was undertaken for the LPA to evaluate pedestrian signals and timing. The crossing speed analysis estimates how quickly pedestrians would have to cross an intersection given the allotted signal time, also known as the full walk split (Arup, 2013). City and FHWA guidelines were considered. For side street crossings, the LPA would have the same number of side street crossings meeting the City and FHWA targets as the No Build Alternative and build alternatives, and thus the same number of crossings (i.e., one, at Mission Street) that do not meet the FHWA target of 3.0 fps or slower. For Van Ness Avenue crossings, 6 intersections would meet the City target and 24 intersections would meet the FHWA target, with 5 not meeting the FHWA standard under the LPA. The LPA would have more east-west Van Ness Avenue crossings that meet the City and FHWA targets than the No Build Alternative, and conversely, fewer crossings exceeding FHWA targets; therefore, the LPA would improve existing conditions and meet required crossing speeds for pedestrians at nearly all intersections.

Sidewalk Safety. One measurement of sidewalk safety for which additional analysis was needed to determine impacts under the LPA is the presence of curbside parking as a buffer between the sidewalk and vehicular traffic. Since the LPA would result in different removal of parking than the build alternatives, removal of parking under the LPA was considered in the context of pedestrian safety. Under the LPA (with or without the Vallejo Northbound

[108] Caltrans. 2012. Highway Design Manual. May 7. (http://www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm#hdm). Note the standard is for a 3-foot-wide buffer between the edge of the travelway and a curb bulb. Given the design constraints along Van Ness Avenue, the standard results in a 5-foot-wide curb bulb.

Station Variant), parking would be completely removed or almost completely removed along both sides of the street on the following blocks of Van Ness Avenue:

- Between Sutter and Bush streets;
- Between Sacramento and Clay streets;
- Between Jackson and Pacific streets; and
- Between Broadway and Vallejo Street
- Between Vallejo and Green streets

The following blocks represent the only location where parking would be removed on the same side of the street for two consecutive blocks:

- Between Broadway and Vallejo Street (east and west side); and
- Between Vallejo and Green streets (east and west side).[109]

The Van Ness Avenue corridor would retain a fairly even distribution of most curbside parking throughout the corridor under the LPA, and the loss of the street parking buffer on limited blocks would not substantially change overall sidewalk safety and comfort along Van Ness Avenue. In summary, the LPA would result in improvements to sidewalk safety through the creation of curb bulbs, removal of existing bus shelters from sidewalks, and improved sidewalk lighting. Removal of a street parking buffer would occur in limited locations under the LPA, as under the build alternatives; however, most street blocks would retain a street parking buffer.

Pedestrian Accessibility. Flexibility in use was considered as part of a pedestrian accessibility analysis, which considers the ability of Van Ness Avenue to accommodate a range of physical abilities. The LPA (with or without the Vallejo Northbound Station Variant) would improve flexibility in use over existing conditions and the No Build Alternative, with provision of 30 corner bulbs in the SB direction and 34 corner bulbs in the NB direction for a total of 64 new corner bulbs on Van Ness Avenue. Additionally, the LPA would improve flexibility in use over existing conditions and the No Build Alternative with provision of 56 nose cones at intersections, providing refuge space for slower pedestrians to rest if they are unable to cross the street during one light cycle. The number of nose cones and corner bulbs provided by the LPA falls within that proposed under the build alternatives, and would substantially improve flexibility in use of pedestrian conditions on Van Ness Avenue.

Physical effort to reach bus stops is another factor in analyzing pedestrian accessibility. Thus, the average distance between BRT stops under the LPA was calculated and determined to be 1,150 feet (1,080 feet under the LPA with the Vallejo Northbound Station Variant), which falls within the applicable Muni guidelines for stop spacing for rapid bus and light rail. Grade was also considered. Van Ness Avenue has few hills, with no grades above 10 percent. The LPA, like the build alternatives, would increase the physical effort required to reach transit relative to the No Build Alternative and may pose a burden on some passengers. The proposed stop consolidation has been reviewed by multiple accessibility-focused organizations and agency staff.

Parking

A refined parking analysis was completed in October 2012 to evaluate parking impacts under the LPA. The following additional factors were considered for the LPA but not for the analysis of the build alternatives in the Draft EIS/EIR: updated existing conditions, longer curb bulbs per the Caltrans Highway Design Manual May 2012 update, wider BRT lanes per MTA requirements set forth in 2012, and current, more refined adherence to ADA design requirements such as provision of curb ramps behind handicapped spaces (which largely are not present in existing conditions). The analysis shows that the LPA would provide 351 parking spaces, a loss of 105 spaces, while the Vallejo Northbound Station

[109] For the Vallejo Northbound Station Variant, parking would be removed on both sides of the street for this two-block stretch.

variant would provide 352 parking spaces, a loss of 104 spaces. Thus, the LPA would provide fewer spaces than the build alternatives presented in the Draft EIS/EIR. A sensitivity analysis taking into account the aforementioned factors was performed, indicating that applying the methodology used for the LPA to the build alternatives would result in up to 32 more spaces removed than for the alternatives presented in the Draft EIS/EIR. For Build Alternative 3, this would mean 100 spaces removed, representing the same number of removed spaces as under the LPA. As described in Section 3.5.3, no significant environmental impact from changes in parking would occur under any of the project alternatives, including the LPA, and no mitigation is required. Nonetheless, improvement measures IM-TR-1 through IM-TR-5 presented in Section 3.5.3 have been incorporated to the extent feasible in the LPA, and would continue to be applied throughout project final design to minimize removal of parking spaces.

10.4.1.2 | COMMUNITY IMPACTS

As part of the community impact analysis, changes in parking, including colored parking, are considered. The changes in parking under the LPA are identified as part of the analysis presented for the build alternatives in Chapters 3.5 Parking and 4.2 Community Impacts; the LPA has slightly different results for parking gains and losses than the build alternatives. Nonetheless the community impact findings with the LPA (with or without the Vallejo Northbound Station Variant) are consistent with the findings for Build Alternatives 3 and 4 with Design Option B. Aside from changes in parking, there would be no other areas of the community impacts where additional analysis was needed to determine if/how the LPA may result in differing impacts than those presented for the build alternatives.

Blocks of Van Ness Avenue where substantial curbside parking would be removed under the LPA are identified in Table 4.2-8 in Section 4.2 of this EIS/EIR, and are summarized as bullets above in Section 10.4.1.1. The LPA (with or without the Vallejo Northbound Station Variant) would result in a net increase of parking in the Civic Center segment of the project corridor and would result in a percentage decrease of parking in the mixed-use commercial/ residential mid-segment of the corridor (Golden Gate Avenue – Broadway Street), slightly higher than that of the build alternatives. In the predominantly residential northern segment of the project corridor (Broadway – Lombard streets), however, the LPA would result in a notably higher reduction in parking (51 percent) compared with the build alternatives (Build Alternatives 3 and 4 with Design Option B, with differences of 12 and 14 percent, respectively). Nonetheless, as explained in Section 3.5, street parking would generally be maintained throughout Van Ness Avenue, there are only two blocks under the LPA where parking would be entirely removed on both sides of Van Ness Avenue (Broadway to Vallejo streets and Vallejo to Green streets), and only two scenarios where all parking is removed on one side of the street for two consecutive blocks (east and west side of Van Ness Avenue from Broadway to Vallejo streets and Vallejo to Green streets).[110] This area in the northern segment of the project corridor is mixed commercial and residential uses, of lower density than the corridor mid-segment.

An updated field survey was conducted in October 2012 to identify the specific commercial and residential properties that could be affected by displacement of colored parking spaces. Based on the survey, it was confirmed that in most cases colored spaces would be able to be retained on the same street block or on adjacent blocks. Passenger and truck loading zones could be provided on the same side of the street, where feasible, so that crossing a street for loading would not be needed; however, specific locations were identified where provision of replacement colored spaces on an adjoining block may be challenging or not feasible. Adverse colored parking impacts on the area's adjacent uses that could occur under the LPA are identified in Section 4.2 Community Impacts, Table 4.2-9, and are summarized in Table 10-2.

[110] For the Vallejo Northbound Station Variant, parking would be removed on both sides of the street for the two-block stretch from Broadway to Green Street.

Table 10-2: Adverse Colored-Zone Parking Impacts under the LPA[111]

VAN NESS AVENUE BLOCK	COLORED SPACE PARKING IMPACTS[1]
O'Farrell Street – Geary Street (east side)	The two passenger loading spaces serving the Opal Hotel would be displaced under the LPA. These spaces could be replaced on Geary Street or Alice B. Toklas alley.
Sutter Street to Bush Street (east side)	The one green short-term parking space and the two truck loading spaces that serve a sports bar would be displaced under the LPA. These spaces could be replaced along Fern alley.
Sutter Street to Bush Street (west side)	The five green short-term parking spaces that serve the Chevrolet dealership, an Antique store, and BevMo would be removed under the LPA; however none of these businesses currently pay for these spaces.
Sacramento Street to Clay Street (east side)	The one passenger loading space that serves the St Luke's Episcopal Church would be displaced under the LPA.
Broadway Street – Vallejo Street (west side)	The three passenger loading spaces that serve the Academy of Art University (shuttle stop) and a dental office would be displaced under the LPA.[2]
Vallejo Street to Green Street (west side)	The one short-term green parking space that serves the mini-mart and the three passenger loading spaces that serve a Swiss restaurant and a chiropractor's office would be displaced under the LPA.
Greenwich Street to Lombard Street (west side)	The one short term parking space that serves dry cleaners and the four passenger loading spaces that serve the Comfort Inn By the Bay hotel would be displaced under the LPA. The loading spaces could be relocated to Lombard Street.

[1] Colored parking spaces include green (short-term parking), white (passenger loading), yellow (truck loading), and blue (disabled parking).

[2] Build Alternatives 3 and 4 with Design Option B would result in the same potential colored parking impact.

As stated in Section 3.5.2, SFMTA would give priority to retaining on-street colored parking spaces (i.e., green [short-term parking], white [passenger loading], yellow [truck loading], and blue [disabled parking]). As part of the project design, in any cases of conflicting needs for color zones, SFMTA would work to build consensus among fronting business owners and determine the best allocation of colored spaces to suit the needs of these establishments. Implementation of mitigation measures CI-IM-1 and CI-IM-2 presented in Section 4.2.5 would be required under the LPA, including the Vallejo Northbound Station Variant, to minimize any economic impacts to adjacent properties that could result from displacement of colored parking they utilize.

10.4.1.3 | CULTURAL RESOURCES

FTA and SFCTA, in applying the "criteria of adverse effect" pursuant to the National Historic Preservation Act and implementing regulations (36 CFR 800.5(c)), determined that the LPA would not adversely affect cultural resources in the Van Ness Avenue area of potential effects (APE), and the SHPO concurred with that determination on May 17, 2013, (see Appendix C). Going from the south part of the project area to the north, the following are descriptions of effects on each of the National Register of Historic Places-eligible historic properties within the APE resulting from the LPA. Altogether, the changes introduced by the LPA would not diminish the integrity of the historic properties or the characteristics that qualify their designation National Historic Landmark or National Register properties.[112] No NRHP-eligible or listed architectural resources were identified in the block of Van Ness Avenue between Vallejo and Green streets where the Vallejo

[111] No additional color parking spaces would be removed with the implementation of the Vallejo Northbound Station Variant.

[112] The San Francisco Civic Center Historic District/War Memorial is both a National Historic Landmark and listed in the National Register.

Northbound Station Variant is under consideration. The Vallejo Northbound Station Variant is located on the block of Van Ness Avenue between Vallejo to Green streets, which is outside the Civic Center Historic District.

- **11-35 Van Ness Ave (Masonic Temple)**
  The LPA, including the Vallejo Northbound Station Variant, would include a SB BRT station platform adjacent to the center, dedicated bus lane (transitway) on Van Ness Avenue, perpendicular to this building. As with all the proposed center lane BRT with right side boarding stations, the proposed SB Market Street BRT station would be separated from adjacent land uses by two lanes of mixed-flow traffic, the parking lane, and the 16-foot-wide sidewalk. The marble and terracotta building, rectangular in form and solid in its massing, has its greatest proportion of most distinctive design features located well above the proposed station's 8-foot to 11-foot-tall canopy and adjacent wind turbine (potentially taller than the 11-foot canopy)[113], and the setting and feeling of balance reflected in the historic property would be unaffected by the placement of the new bus station platform in the Van Ness Avenue median, approximately 45 feet from the street level façade. The proposed undertaking would also replace an existing 25-foot-tall OCS support pole/streetlight with a 30-foot-tall pole. Neither the replacement OCS support pole/streetlight nor the station canopy would appreciably obstruct the views of the building from across the street. Therefore, the proposed undertaking would not change the property's NRHP eligibility status.

- **San Francisco Civic Center Historic District/War Memorial**
  The section of Van Ness Avenue between McAllister and Grove streets is dominated by civic/government buildings of historic importance that have been collectively recognized as the Civic Center Historic District. A NB BRT station is proposed adjacent to the center lane on Van Ness Avenue extending 150 feet south from the McAllister Street intersection in front of City Hall. A SB BRT station is proposed adjacent to the center lane on Van Ness Avenue extending 150 feet north from the McAllister Street intersection. These BRT stations would replace the existing curbside bus shelters on both sides of Van Ness Avenue in front of City Hall and the War Memorial Building/Opera Hall.

  The viewshed to either of the War Memorial Building/Opera Hall paired buildings on the west side of Van Ness Avenue, and City Hall on the east side, would be only slightly changed under the LPA (see Figure 4.4-8), including the Vallejo Northbound Station Variant. Given the size and scale of these historic properties from the street perspective, the removal of the existing curbside shelters and installation of a larger BRT station and platform in the median of Van Ness Avenue would be largely inconsequential to the overall monumental size of the civic structures and their respective prominent architectural features. The significant character-defining features are never out of view, and the placement of the new BRT infrastructure would not appreciably detract from the view by an observer on either side of the street. The new NB bus platform and canopy, since it would be in the median and the present curbside stops would be removed, would arguably eliminate the existing partial obstruction of each of these historic buildings created by the existing curbside bus stop canopies. (The new SB BRT station would be located in the block north of the historic district, between McAllister Street and Golden Gate Avenue.) The perspectives offered from those looking on from the immediate, curbside foreground to the east or west elevation would be more open with the LPA, and street-level views from across Van Ness Avenue to either of the large civic buildings would be only minimally affected due to the large massing and scale of the buildings relative to the new median station canopy.

[113] Incorporation of wind turbines into the proposed BRT station design is still under evaluation. The turbines are included in the visual simulations (see Figures 4 and 5) to depict a scenario of the maximum anticipated visual changes that could occur with project implementation.

There are also sixteen 25-foot-tall OCS support poles/streetlights on Van Ness Avenue between Grove and McAllister streets, some of which date back to 1914 when Muni first established a trolley line on Van Ness Avenue; these were subsequently modified and restylized in 1937 with the opening of the Golden Gate Bridge and the rebirth of the boulevard. The California SHPO agreed with FTA's finding that the OCS support poles/streetlights are not uniquely associated with the Civic Center Historic District.[114] The replacement poles for the LPA as part of the BRT system are proposed to be of compatible architectural design and would be approximately 30 feet tall. Though slightly taller than the original height, the OCS structures would not be out of character with the setting of the Civic Center Historic District, and approval of their design and implementation would require a certificate of appropriateness from the San Francisco Historic Preservation Commission (see Section 6.2).

- **799 Van Ness Avenue (Wallace Estate Co. Auto Garage)**
  At the most proximate location to this building, the LPA, including the Vallejo Northbound Station Variant, would result in the removal of an existing curbside bus shelter fronting the property and replacement with a NB 150-foot-long BRT station (platform and canopy) adjacent to the center lane on Van Ness Avenue perpendicular to this building. This is at the location of the proposed Eddy Street BRT station. (The new SB BRT station would be located in the block north of this historic property, between Eddy and Ellis streets.) As the reinforced concrete frame building's most character-defining features are its massing and industrial fenestration reflecting a symmetrical arrangement at its second- and third-floor levels, the historic property's setting, feeling and association would not be greatly diminished by implementation of the proposed BRT system changes, as they would occur at ground-level in the median on the opposite side of the street, further removed from the building than the existing bus stop canopy. The proposed undertaking would also replace the existing 25-foot-tall OCS support pole/streetlight adjacent to the building with one approximately 30 feet in height.

- **945-999 Van Ness Avenue (Ingold Chevrolet Auto Showroom**)
  With the exception of the removal of the existing SB curbside bus shelter fronting this historic property, replacement of some existing 25-foot-tall OCS support poles/ streetlights with 30-foot-tall ones, and reduction in median width/change in median landscaping, there are no physical changes anticipated under the LPA, including the Vallejo Northbound Station Variant, in front of this property located south of O'Farrell Street. The proposed BRT stations would be located north of O'Farrell Street and thus would not be on the same block as the Ingold Chevrolet Auto Showroom. Therefore, none of the building's significant character-defining features, nor its setting, feeling, or association would be altered by the proposed project.

- **1320 Van Ness Avenue (Scottish Rite Temple)**
  The LPA, including the Vallejo Northbound Station Variant, would remove the current bus shelter directly in front of this building. The proposed NB and SB Sutter Street BRT stations would be located on the block of Van Ness Avenue north of Sutter Street, in the median, with the SB station being perpendicular to the Scottish Rite Temple (see Figure 4.4-9). This symmetrical steel-frame reinforced concrete building rests on a smooth granite base. The upper stories of the building are dominated by seven two-story arched window insertions. The fourth story is demarcated by a narrow course of windows, separated by eight embossed panels and a highly designed cornice. Because the greatest proportion of significant character-defining features are located well above the height of the proposed station canopy and wind turbine in the median of Van Ness Avenue, the visual character of the historic property to the observer would only be slightly diminished by placement of a BRT station in the street median, and the property's setting and feeling as a result would be minimally altered. In addition, the

[114] Nor do the poles located throughout the greater Van Ness Avenue corridor constitute a National Register-eligible property in and of themselves due to major compromises in their overall integrity.

proposed project would replace an existing 25-foot-tall OCS support pole/streetlight adjacent to the building with a 30-foot-tall pole.

- **1699 Van Ness Avenue (Paige Motor Car Co. Auto Showroom)**
  The proposed Sacramento Street BRT stations would be located on the block of Van Ness Avenue north of Sacramento Street; thus, no BRT stations would be located in the median perpendicular to this property. The LPA, including the Vallejo Northbound Station Variant, would replace the existing 4-foot-wide, unlandscaped left-turn pocket median with a tapering (to the north) 11-foot-wide landscaped median and would replace the adjacent existing 25-foot-tall OCS support pole/streetlight with a 30-foot-tall pole, therefore changing the street setting. This minor change with the LPA would not influence the property's NRHP eligibility status. Therefore, it has been determined the LPA would cause No Adverse Effect to this property.

- **1946 Van Ness Avenue (California Oakland Motor Co.)**
  The Jackson Street BRT stations would be located on the block of Van Ness Avenue north of Jackson Street; thus, no BRT stations would be located in the median perpendicular to the California Oakland Motor Co. property. The LPA, including the Vallejo Northbound Station Variant, would replace the existing 4-foot-wide, unlandscaped left-turn pocket median with a tapering (to the north) 11-foot-wide landscaped median and would replace the adjacent existing 25-foot-tall OCS support pole/streetlight with a 30-foot-tall pole, therefore changing the front street setting.

10.4.1.4 | AESTHETICS/VISUAL RESOURCES

The environmental consequences related to visual resources under the LPA (with or without the Vallejo Northbound Station Variant) are identified as part of the analysis presented for the build alternatives in Section 4.4 Aesthetics/Visual Resources. Because the LPA configuration is a variation of the configurations analyzed for the center-running alternatives in the Draft EIS/EIR, the LPA has different tree removal impacts and replanting opportunities than presented for the build alternatives, but the overall impact findings with the LPA (with or without the Vallejo Northbound Station Variant) are consistent with the findings for Build Alternatives 3 and 4, as presented in Section 4.4 /Visual Resources. For other aspects of impact analysis for visual resources (beside tree removal/replanting), the LPA (with or without the Vallejo Northbound Station Variant) would result in identical environmental consequences as Build Alternatives 3 or 4.

A comprehensive Tree Removal Evaluation and Planting Opportunity Analysis was undertaken in fall 2012 to identify the maturity and health of trees in the corridor and therefore better understand the impacts of tree removal and the opportunities for preserving trees, and the parameters of new tree plantings (BMS Design Group, 2013). This analysis was undertaken for all of the build alternatives, including the LPA, and is presented in Section 4.4.3.4. The analysis concludes that the LPA would require the removal of 90 median trees and is anticipated to increase the total number of trees in the project corridor, relative to existing conditions, by 53 trees. The LPA would result in the removal of approximately 23 trees that are mature and of healthy condition, which is approximately 82 percent of existing healthy and mature, median trees in the corridor. Incorporation of the Vallejo Northbound Station Variant into the LPA design would not affect tree removal or planting opportunities under the LPA.

The effects of tree removal and planting opportunities under the LPA fall within the range of tree removal and planting opportunities identified for Build Alternatives 3 and 4 in the Draft EIS/EIR. As under Build Alternative 4, removal of existing trees under the LPA would primarily occur at station locations. In addition, the LPA would require reconstruction of areas north and south of stations to accommodate the transition between dual and single medians. Thus, the LPA would result in the removal of more trees than Build Alternative 4. As under Build Alternative 4, reconstruction of the existing median to accommodate BRT stations would be most noticeable along the blocks of Van Ness Avenue

that feature high-quality landscaped medians with mature trees, identified in Section 4.4.2.5 in Table 4.4-1. Overall, the LPA would preserve all trees on 1 out of the 10 blocks and would remove all trees on 4 blocks. One or more trees would be preserved on the remaining 5 blocks. Table 10-3 reports the tree removal and planting opportunity under the LPA on those blocks featuring high-quality landscaped medians and mature tree canopies.

Table 10-3: LPA – Project Impact on High-Quality Landscaped Medians Featuring Mature Tree Canopies

VAN NESS AVENUE BLOCK	EXISTING TREES	TREE REMOVAL & PLANTING OPPORUNITY	NET TREE GAIN/LOSS
Hayes – Grove streets	2	All trees preserved and 7 trees planted.	+5
Grove – McAllister streets	6	2 out of 6 trees preserved and 6 trees planted.	+2
McAllister Street – Golden Gate Avenue	6	No existing trees preserved and no trees planted.	-6
Turk – Eddy streets	4	No existing trees preserved and no trees planted.	-4
Ellis – O'Farrell streets	4	2 out of 4 existing trees preserved and 4 trees planted.	+2
Sutter – Bush streets	4	No existing trees preserved and no trees planted.	-4
Pine – California streets	4	1 out of 4 trees preserved and 3 trees planted.	0
Sacramento – Clay streets	6	No trees preserved and no trees planted.	-6
Pacific - Broadway streets	5	No trees preserved and 2 trees planted.	-3
Union – Filbert streets	6	No trees preserved and 1 tree planted.	-5

A BRT station would be located on 6 of these 10 street blocks (Grove to McAllister streets, McAllister to Golden Gate streets, Turk to Eddy streets, Sutter to Bush streets, Sacramento to Clay streets, and Union to Filbert streets), which would require approximately 150 feet of the existing median (i.e., approximately half the block) to be converted to a BRT station platform. Trees and landscaping along the other half of the block would be preserved, although some trees would need to be pruned to provide clearance for the replacement OCS. In addition, the station platforms would extend the length of the block between O'Farrell and Geary streets, preventing tree planting on this block.

Tree removal under the LPA, like Build Alternatives 3 and 4, would result in a notable, adverse change in the visual quality of the project corridor until new tree plantings mature. Impacts resulting from the removal of some existing median landscape and trees under the LPA would be reduced with implementation of a median design plan, as described in mitigation measures M-AE-3 and M-AE-4 in Section 4.4.4.

10.4.1.5 | HYDROLOGY AND WATER QUALITY

The environmental consequences related to hydrology and water quality under the LPA are identified as part of the analysis presented for the build alternatives in Section 4.9 Hydrology and Water Quality. Since the LPA configuration is a variation of the configurations analyzed for the center-running alternatives in the Draft EIS/EIR, the LPA has slightly different results for the total disturbed soil area and pervious surface area; however, the overall impact findings with the LPA are consistent with the findings for Build Alternatives 3 and 4.

The LPA would result in a net increase of approximately 0.2-acre pervious surface area. This would be slightly higher for the Vallejo Northbound Station Variant; however, the net increase remains 0.2-acre. This figure compares to the net increase of approximately 0.8-acre

pervious surface area under Build Alternative 3 with Design Option B, and approximately 1.3 acres under Build Alternative 4 with Design Option B.

Therefore, the LPA (including the Vallejo Northbound Station Variant), like the build alternatives, would result in a marginal increase of pervious surface area throughout the project limits over the existing condition. The increase in pervious surface area is primarily due to the establishment of landscaped medians where existing medians are impervious surface (e.g., left-turn pocket locations that are filled in with new planted median). In addition, the LPA presents an opportunity to reduce storm flows into the CSS and improve groundwater recharge through *Better Streets Plan* concepts; however, at this stage of design, it is unclear which concepts are feasible. Stormwater BMPs would be incorporated into project final design and operations to the maximum extent practicable to avoid water quality impacts. Overall, the LPA would result in permanent, beneficial impacts to storm drainage facilities and hydrology along Van Ness Avenue. Implementation of improvement measures IM-HY-1 through IM-HY-4 presented in Section 4.9.4 would avoid adverse impacts to stormwater quality and facilities.

Construction of the LPA would result in the same water quality impacts as the build alternatives. The total DSA for the LPA would be approximately 5.8 acres (5.9 acres for the Vallejo Northbound Station Variant), compared with the DSA of 8.4 acres for Build Alternative 3 with Design Option B and 3.8 acres for Build Alternative 4 with Design Option B. The impacts related to such construction would be minimal because the proposed project would require nominal earthwork, and the area of soil to be disturbed would be limited. Improvement measures IM-HY-C1 through IM-HY-C3 specified in Section 4.15.8.2 would be implemented under the LPA to minimize potential water quality and hydrology impacts during construction.

10.4.1.6 | UTILITIES AND PUBLIC SERVICES

The environmental consequences related to utilities under the LPA are identified as part of the analysis presented for the build alternatives in Section 4.6 Utilities. Since the LPA configuration is a variation of the configurations analyzed for the center-running alternatives in the Draft EIS/EIR, the LPA has slightly different implications to utilities (namely sewer) than as described for Build Alternatives 3 and 4. Nonetheless, the overall impact findings for the LPA are consistent with the findings for Build Alternatives 3 and 4, as presented in Section 4.6.3.

Under the LPA (including the Vallejo Northbound Station Variant), replacement of the aging sewer pipeline would be required at station locations and in areas where the transitway would cause direct load (weight) on the sewer. An inspection of the sewer pipeline was performed in spring 2012. Based on preliminary results, 14 segments on 7 blocks are in poor condition and need to be replaced regardless of whether the Van Ness Avenue BRT Project is implemented. An additional 16 segments on 13 blocks need to be repaired. Even though the entire analysis of the sewer pipeline is still in progress, it can be assumed based on available data that adverse impacts to the sewer would result from the LPA that are comparable to Build Alternatives 3 and 4. For the segments where the inspection revealed that the sewer is deteriorated to the point at which construction of the BRT lane could damage it, the SFPUC and SFMTA would coordinate to accelerate planned replacement, rehabilitation, or relocation of the sewer main as needed.

Thus, under the LPA, replacement of the sewer pipeline is assumed at station locations and in areas where the transitway would cause direct load (weight) on the sewer. This would ensure that construction of the BRT transitway would not damage the sewer pipeline and would minimize the likelihood that the new pavement constructed for the transitway would need to be excavated for future pipeline repair work per the goals of the City's Five-Year Plan and Streets under Excavation Moratorium. This relocation and replacement of the sewer pipeline is accounted for in the project construction schedule presented in Sections 2.6 and 4.15. Since the project has not completed a load (weight) analysis, there currently is

no estimate for lengthening the construction duration to include replacement of sewer pipeline under the LPA, but it can be assumed the construction duration will fall between the full sewer replacement indentified for Build Alternative 3 and the partial sewer replacement identified for Build Alternative. 4.[115] A more refined definition of the sewer replacement work and its timeline will be part of 30% design work.

10.4.2 | Summary of LPA Performance against Purpose and Need

The LPA performance, including the Vallejo Northbound Station Variant, falls within the range of Build Alternatives 2 through 4, with the exception of parking supply. Table 10-4 below lists 16 performance indicators which are most closely tied to the project purpose and need. The LPA performance is ranked among the project alternatives in its ability to meet the project purpose and need. Six of the criteria do not differentiate the alternatives, and are listed as "N/A" in Table 10-4. Of the remaining 10 criteria, the LPA ranks 1st (or tied for 1st) on six.[116]

Table 10-4: LPA Performance Summary Against Purpose and Need Evaluation

INDICATOR #	EVALUATION CRITERIA	RANK[1]
A-1	Transit Travel Time	1st (T)[2]
A-3	Reliability (Likelihood of Unexpected Stops)	1st (T)
A-6	Ridership (Van Ness Avenue BRT and Systemwide)	1st (T)
B-1	Platform Crowding	n/a[3]
B-2	Amount of Buffer between Platform and Auto Traffic	4th
B-3	Number of Lane Transitions	4th
B-4	In Vehicles Passenger Crowding	n/a
C-1	Average Median Refuge Width	1st (T)
C-2	Average Crossing Distance	n/a
D-1	Consistency of Median Footprint	4th (T)
E-1	Average Total Intersection Person-Delay	n/a
E-2	Lane Productivity	1st (T)
E-3	Traffic Operations Delay	n/a
G-1	Cost of Muni Service	1st (T)
H-1	Total Construction Cost (build alternatives only)	3rd
H-2	Construction Duration	n/a

1. Rank includes the No Build Alternative, the 3 build alternatives in the Draft EIS/EIR, and the LPA, for a total of 5, with the highest performing alternative ranked 1 and the lowest performing ranked 5.

2. (T) indicates tie.

3. An indication of "n/a" signifies a criterion where no significant difference was demonstrated between the alternatives.

[115] As described in Section 4.6.3, complete relocation and replacement of the sewer pipeline within the project area is assumed under Build Alternative 3 (including Design Option B), and relocation and replacement of the sewer pipeline approximately between Geary and O'Farrell streets is assumed under Build Alternative 4 (including Design Option B). For estimating the sewer replacement cost for the LPA, it is assumed that up to full replacement (10,900 feet) could be necessary as under Build Alternative 3 (see Section 10.2.4.8); however, it is likely that sewer replacement or relocation would be carried out only at locations where new transitway or mixed traffic lanes are proposed directly over the existing sewer facility.

[116] The Vallejo Northbound Station Variant would perform slightly lower than the LPA on indicators A-1, A-3, D-1, G-1, and H-1.

10.5 Small Starts Evaluation Process

This section describes how the Van Ness Avenue BRT Project is evaluated and rated by the FTA as part of a standardized federal decision making process through which projects will be recommended for Section 5309 New or Small Starts, with cost under $250 million.

The FTA has developed a consistent set of information that it requests from project sponsors and then reviews to first determine if a project will be approved into the Section 5309 "pipeline;" the pipeline refers to the set of projects that have been reviewed by FTA and determined to achieve established criteria and other requirements, and are therefore eligible for future federal funding.

As projects are further developed through environmental review and design, updated information is provided to the FTA at key decision points or if significant changes are made to the project. Ultimately, a grant agreement is executed between the FTA and the project sponsor, providing Section 5309 funds for the project's implementation.

Ratings for projects in the New or Small Starts pipelines are reported each year to Congress, which approves all grant agreements, and are also disclosed in the environmental documents prepared for the projects. These ratings help inform reviewers of environmental documents of the likely receipt of future federal funds.

The Van Ness Avenue BRT Project was approved into the Small Starts pipeline in December 2008. The following sections summarize FTA's revised rating for the LPA.

10.5.1 | Current Rating

FTA's rating is divided into two basic categories: project justification and local financial commitment. Additionally, FTA considers the overall technical capacity of the Authority and SFMTA to manage the design, construction, and eventual operation of the project. FTA's most recent overall evaluation and rating of the Van Ness Avenue BRT is "Medium-High" (Annual Report on Funding Recommendations, Fiscal Year 2014 Capital Investment and Paul S. Sarbanes Transit in Parks Programs, released February 2012).

10.5.2 | Project Justification

For Small Starts projects, project justification is evaluated based on the following three criteria, which are all weighted equally:

- Cost effectiveness, measured in terms of the cost of providing each hour of travel time savings;
- Land use in the corridor served by the project; and
- Economic development associated with the project, generally considered in terms of transit supportive plans and policies and how well they have performed.

FTA's most recent evaluation and rating of the Van Ness Avenue BRT is "Medium-High" for "project justification" (Annual Report on Funding Recommendations, Fiscal Year 2014 Capital Investment and Paul S. Sarbanes Transit in Parks Programs, released February 2012). This project justification rating is comprised of the following factor ratings:

- Cost effectiveness, rated as "High"
- Land use, rated as "High"
- Economic development, rated as "High"

10.5.3 | Local Financial Commitment

FTA assigns a summary local financial commitment rating of *High, Medium-High, Medium, Medium-Low or Low* to each project following consideration of individual ratings applied to the following measures for local financial commitment:

1. Share of non-Section 5309 New Starts funding;
2. Stability and reliability of the proposed project's capital finance plan, including the following factors:
   - Current capital condition;
   - Commitment of capital funds; and
   - Reasonable capital planning assumptions and cost estimates and sufficient capital funding capacity.
3. Stability and reliability of the proposed project's operating finance plan, including the following factors:
   - Current operating financial condition;
   - Commitment of operations and maintenance (O&M) funds; and
   - Reasonable operations planning assumptions and cost estimates and sufficient O&M funding capacity.

These ratings are based on an analysis of the financial plans and documentation submitted to FTA by local agencies. FTA's evaluation takes into account the stage of project development, particularly when considering the stability and reliability of the capital and operating finance plans. Expectations for firm commitments of non-Federal funding sources become increasingly higher as projects progress further through development (preliminary engineering, followed by final design), and are rated accordingly.

FTA's most recent evaluation and rating of the Van Ness Avenue BRT project justification is "Medium" for "Local Financial Commitment" (Annual Report on Funding Recommendations, Fiscal Year 2014 Capital Investment and Paul S. Sarbanes Transit in Parks Programs, released February 2012).

10.5.4 | Summary

The Van Ness Avenue BRT has received FTA's highest cost-effectiveness rating,. It is the only Small Starts Project in the country to receive a "medium-high" rating for project justification.

This page intentionally left blank.