Geneva-Harney BRT Feasibility Study

FINAL REPORT

JULY, 2015

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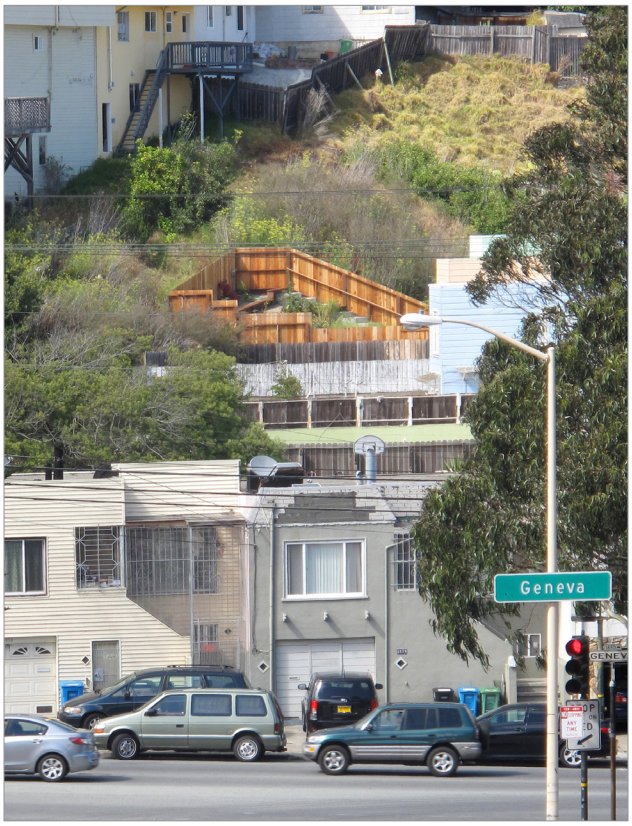

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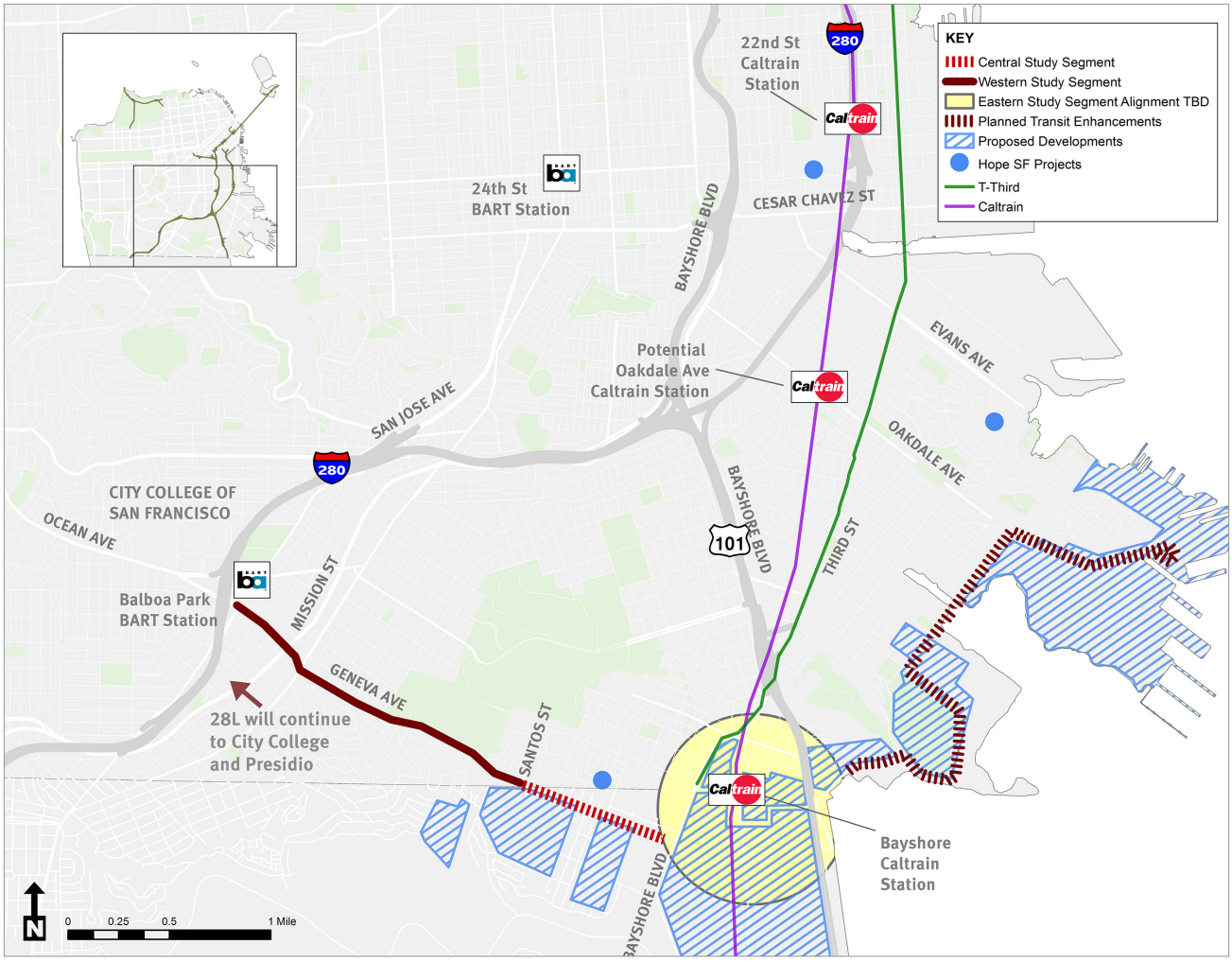
EXECUTIVE SUMMARY

The San Francisco County Transportation Authority, in coordination with the City and County of San Francisco, the City of Daly City, San Mateo County, as well as various community groups, has completed the Geneva-Harney Bus Rapid Transit Feasibility Study, which conducted conceptual feasibility planning and design work and evaluation of several bus rapid transit (BRT) alternatives through the lens of a cross-jurisdictional, community consensus-building process. This Study is the first step in defining a near-term alignment for a rapid transit connection in the Geneva-Harney corridor and prepares the bus project for the environmental clearance phase.

The alternatives have been designed to close the rapid transit gap that currently exists along the Geneva Avenue Corridor and between Bayshore Boulevard and Candlestick Point-Hunters Point Shipyard. Geneva Avenue has been routinely identified as a high priority transit improvement corridor in planning and policy studies by the City/County of San Francisco and partner agencies in San Mateo County. The Study draws heavily on this prior work and development agreements that have identified the need and expectation for improved transit service in the area, and helps to guide project purpose.

The study effort began with development of project need, goals and objectives, and an intensive evaluation of existing conditions and baseline assumption within the Study Area. Regular Technical and Citizens Advisory Committee meetings throughout the project, as well as extensive community outreach helped define the issues and concerns most important to the community and refine the project alternatives. The alternatives evaluation consisted of a multi-modal approach utilizing a set of adopted quan-

FIGURE ES-1. GENEVA BRT STUDY AREA



titative and qualitative evaluation criteria to help differentiate the benefits and costs of each alternative. As the findings and recommendations were presented to various community residents, business, and property owners, and as facilitated through the CAC meetings, an emerging and consistent set of feedback and concerns were expressed. This Study finds that there are, in fact, feasible options that accommodate the City/County's need for bus rapid transit service and connections in this corridor. However, there are several questions remaining that must be addressed before the most beneficial option for each segment of the corridor can be selected. The preferred alternative will not be selected until the environmental phase since it will require environmental and cost analysis information. In addition to the determination of feasibility and recommended next steps, this report documents project purpose and need, summarizes the results of the existing conditions analysis, describes and develops the alternatives considered, and documents findings from the evaluation of alternatives.

Description of the Project

The Geneva-Harney Bus Rapid Transit (BRT) line is a proposed rapid transit service envisioned to provide existing and future neighborhoods along the San Mateo-San Francisco County border with a bus connection to the border area's key regional transit system hubs. The Geneva-Harney BRT would improve Muni 28R operations to provide the faster and more reliable service identified as a requirement in the approval and accommodation of the major developments in the area, and to take advantage of the opportunity to upgrade the safety and amenities of the rights of way for all roadway users. The Geneva-Harney Corridor extends from the Balboa Park BART/Muni Station in the west to Hunters Point Shipyard in the east, including connections to the Bayshore Caltrain Station and Muni T-Third at Sunnydale and Arleta stations (Figure ES-1). The need for this connection is reflected in the public/private partnership agreements, modeling forecasts and investment strategies that anticipate the demand for connections between BART, Caltrain, Muni light rail and the approved, soon-to-be developed mixed-use projects at Candlestick Point/Hunters Point Shipyard, Visitacion Valley/Schlage Lock and Executive Park. This study considers two sets of alternatives—a near-term project (2020 timeframe, Figure ES-2 and Table ES-1) and a long-term project (2040 timeframe, Figure ES-3 and Table ES-2, next page) described below.

TABLE ES-1. NEAR-TERM ALTERNATIVES

	GENEVA	BAYSHORE	LITTLE HOLLYWOOD
2023 Baseline	Mixed-flow	Mixed-flow	Mixed-flow from Executive Park Blvd to Blanken
Alternative 1	4-lane General Purpose/Side Running BRT	4-lane General Purpose/Side Running BRT	Blanken/Lathrop Couplet Option 1
Alternative 2	2-lane General Purpose/Center Running BRT	4-lane General Purpose/Side Running BRT	Blanken/Lathrop Couplet Option 2
Alternative 3	2-lane General Purpose/Center Running BRT	4-lane General Purpose/Side Running BRT	Beatty

Identification of project goals was the first step in definition of the alternatives. Routing, BRT features, complementary streetscape enhancements, connectivity, and accessibility all tiered off what this project would be expected to provide, and deliver to, existing and future residents, employees, and visitors to the Corridor. While the need and obligation for increased transit options was clearly demonstrated in the Study (see Table ES-3), BRT was also been considered within the context of a balanced street-network that accommodates general purpose traf-

FIGURE ES-2. NEAR-TERM ALIGNMENT OPTIONS

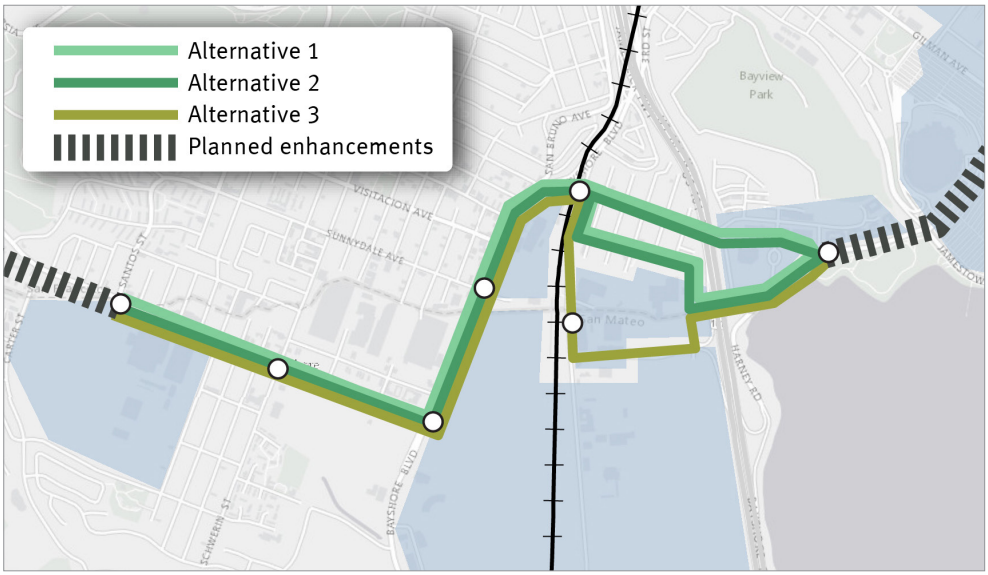


TABLE ES-2. LONG-TERM ALTERNATIVES

	DESCRIPTION	KEY FEATURES
2040 Baseline	BRT in Geneva Extension	2-Lane General Purpose/Side Running BRT on Geneva Ave. BRT continues on Geneva Extension over US 101, including station at Tunnel Ave as Caltrain transfer T-Third is extended to Caltrain
2040 LRT Option 1	LRT on Geneva, Forced BRT to LRT Transfer at Bayshore	T-Third is extended on Bayshore Blvd and Geneva Ave (center-running) to Balboa Park BART. No extension to Caltrain. Harney BRT operates on Geneva Extension, including station at Tunnel Ave as Caltrain transfer. Transfer to Geneva LRT at Bayshore Ave
2040 LRT Option 2	LRT + BRT on Geneva	T-Third is extended on Bayshore Blvd and Geneva Ave (center-running) to Balboa Park BART. No extension to Caltrain. Harney BRT operates on Geneva Extension, including station at Tunnel Ave as Caltrain transfer. BRT continues in same lanes as LRT to Balboa Park BART. Results in greater frequency along Geneva Ave segment

fic, pedestrian, bicycle, and goods circulation and access within the Corridor, as well as maintaining as much on-street parking for residential, commercial, and drop-off access as is feasible.

- Goal 1 – Increase the transportation choices serving the Bi-County Area by improving the multimodal performance of the Corridor.
- Goal 2 – Improve near- and long-term transit solutions on the Corridor.
- Goal 3 – Close the rapid transit network gaps in the Bi-County Area between transit projects east of Geneva Avenue & west of Santos Street.
- Goal 4 – Improve the Bi-County Area transit connectivity between regional transit system hubs and planned developments.
- Goal 5 – Enhance corridor livability and community vitality through urban design.
- Goal 6 – Ensure consistency with local and regional plans and policies.

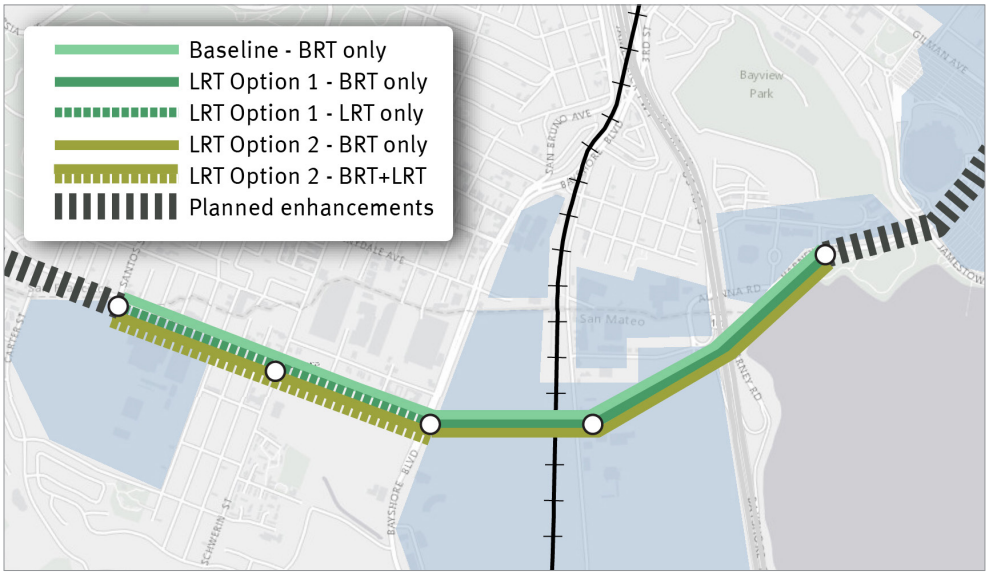
Existing Conditions

The corridor of focus for this study extends from Balboa Park BART/Muni Station in the west to Hunters Point Shipyard in the east, including connections to the Bayshore Caltrain Station and Muni T-Third line at Sunnydale and Arleta stations.

The Study Corridor was split into three segments for planning and analysis purposes: the Western Segment runs on Geneva Avenue from Balboa Park BART to Santos Street; the Central Segment follows Geneva Avenue from Santos Street to Bayshore Boulevard; and the Eastern Segment includes Bayshore Boulevard, the neighborhood of Little Hollywood and the Brisbane Baylands redevelopment site and Highway 101. (The fourth segment, connecting Executive Park east of Highway 101 to the Hunters Point Shipyard, has essentially been planned and environmentally-cleared, but was also included and assumed in the overall corridor analysis).

Geneva Avenue is a major east-west artery connecting the City of San Francisco, City of Daly City, and City of Brisbane to regional transit, US 101, and I-280. The Corridor is ethnically and socioeconomically diverse. Current land use includes lower density residential neighborhoods and several distinct neighborhood commercial districts. While

FIGURE ES-3. LONG-TERM ALIGNMENT OPTIONS



the neighborhoods on Geneva Avenue are mature and have already been built out, the Corridor is anticipated to host major new developments at the eastern and western ends. Existing transit service is provided by a host of operators, including Muni, SamTrans, BART, Caltrain, and privately-operated and/or community-based and first/last mile shuttles. While portions of the Corridor are transit rich, there remains an east-west connectivity gap, which is a primary need for this project. East-west travel demand will increase dramatically above today's levels as major new developments come online. Based on the existing conditions analysis, average transit speed by route varies widely along the Corridor demonstrating that certain segments incur significant congestion that affect operational efficiency and reliability and further the need for BRT treatments.

TABLE ES-3. PROJECT PURPOSE AND NEED

METRIC	PURPOSE	NEED
Transit Performance	Accommodate high existing and projected ridership demand	Separation of transit from auto traffic
		Reduced loading and unloading delays
	Address poor transit speed and reliability	Improved transit efficiencies that reduce operating costs
Customer Experience	Address lack of amenities	Improved Transit Patron In-Vehicle Experience
	Accommodate safety and comfort	Improved transit patron station access and wait experience
Multimodal Circulation	Address lack of contiguous east-west transit connectivity	Improve bicycle network connectivity to augment transit service
		Improve pedestrian safety and comfort.
	Minimize impacts of increasing congestion that will deteriorate bus service without dedicated lanes	Improve operating efficiency.
		Accommodate private vehicles and commercial loading.
		Upgrade streetscape to support a rapid transit and pedestrian-friendly identity.
		Integrate with adjacent land uses.

Pedestrian facilities vary along the corridor. Significant portions of the corridor have narrow sidewalks with frequent barriers such as utility poles and boxes, and parked cars; poor pavement quality; and long distances between marked crosswalks. Walkability is important for preserving Geneva Avenue and its neighboring streets as desirable places to live and work. It is also a critical component of a successful transit system, since every transit trip begins with a walk trip. Much of the Corridor roadways are designated bicycle facilities including Geneva Avenue, Bayshore Boulevard, Tunnel Avenue, and Beatty Avenue. Conditions vary significantly on the route, with a combination of standard and non-standard-width bike lanes, wide curb lanes, "sharrows," and in several segments no facilities exist. The current urban and landscape design, while functional as an automobile corridor, does not include many of the basic amenities necessary to make it an attractive space for use by pedestrians (including transit users) and bicyclists. With that said, traffic generally operates well along the Geneva-Harney Corridor, with all but one study intersection operating at LOS D or better during the AM and PM peak periods. The Geneva-Harney Corridor experiences a range of about 17,000 to 19,000 average daily traffic (ADT). On-street parking on the Corridor not only provides space for delivery vehicles, residents, and shoppers to park, but serves as a buffer between pedestrians on the sidewalk and moving vehicles in the street.

Analysis and Evaluation

This Study developed three near-term BRT alternatives that were evaluated against a baseline scenario that does not include the refinements analyzed in this Study and assumed a mixed-flow operation. While the primary focus of the Study is near-term options that close the rapid transit gap and provide east-west connectivity two long-term visionary options that include BRT and light rail transit (LRT) were also developed and compared against a long-term baseline that has the BRT running on the proposed Geneva Avenue Extension. Each alternative has been further refined based on public input and technical design requirements. The alternatives evaluation assessed the performance of each BRT alternative alternatives with respect to the following metrics: transit operations, transit rider experience, access and pedestrian and bicycle safety and comfort, urban landscape and design, traffic operations and parking, and capital and operating costs. This evaluation framework was approved by the Citizens Advisory Committee in November, 2014. In order to perform the evaluation, data was collected and prepared using a three step traffic and transit modeling approach, conceptual engineering designs, data on the performance of other BRT systems around the world, and stakeholder and community outreach.

In the near-term, all BRT Alternatives improve transit operations and performance over the baseline. The alternative with center running transit lanes on Geneva Avenue (Alternative 2) performed the best on transit travel time because it has the shortest route, and operates on a fully exclusive guideway. This makes it more competitive as compared to auto travel time and ensures that service is

more reliable. All alternatives provide improvements for pedestrians, bicyclists, and access to jobs over the baseline but the evaluation determined that Alternative 2 provided the best pedestrian and bicycle access, safety, and comfort. The alternative that uses Beatty Avenue to traverse the Eastern Segment provided the best access to jobs due to its direct connection with Caltrain and the many major employment centers south along the Peninsula. All BRT alternatives provide an opportunity to create open space and a recognizable design theme while Alternative 2 provides the greatest opportunity; the large bulbouts and buffers along Geneva Avenue and the center-running bus lanes in this alternative provide opportunities for mini plazas and amenities as well as a strong linear access down Geneva Avenue toward the bay.

In Little Hollywood, creation of a multi-use path on Lathrop Avenue, the new right of way, and Alanna Way provides not only opportunities for landscaping improvements but also better access to Little Hollywood Park and through the US 101 undercrossing to the Candlestick Point waterfront and Bay Trail. In terms of BRT treatments affecting traffic operations, all alternatives show limited impact, and in several cases improve traffic operations at intersections on the Geneva-Harney Corridor over the baseline. Parking impacts are greatest in Alternatives 1 and 2 where parking will need to be removed to provide transit-only lanes on Blanken and Lathrop Avenues which have existing capacity issues. All BRT alternatives have a higher capital cost than baseline due re-striping of the pavement, construction of transit-boarding islands, sidewalks and bulbouts, and landscape and design amenities. Alternative 2 is the most expensive, and Alternative 1 is the least expensive to construct.

Investment in a transit expansion project warrants examination not only of the opening year performance (2023), but of the lasting project. The long-term horizon year for this project is 2040 in order to coincide with the San Francisco Transportation Plan 2040 which envisions the extension of Geneva Avenue through the Brisbane Baylands development and over the Caltrain tracks and US 101 connecting Harney Avenue in San Francisco and Geneva Avenue in Daly City. In the long-range plan, light rail options were studied in keeping with previous outreach and potential Muni Metro operational benefits of having an alternative route to several maintenance facilities. In the long-term, Geneva BRT would maintain and improve the ridership benefits observed in the near-term options. The BRT-only option seems adequate to accommodate the demand generated in the Corridor and deliver an attractive connection to destination and transfer points within the Corridor. Initial study of LRT determined that the engineering feasibility poses fewer challenges than initially expected considering the grades and terrain. Tradeoffs between the accessibility east and west of 101, and also the interactions between bus and rail on Geneva, will require additional analysis if and when LRT concepts advance.

Public Outreach

The project team based its outreach strategy on the awareness of the extensive outreach already undertaken with many community groups and leaders (including the Hunters Point Citizens Advisory Committee and its subcommittees) that asserted the need for BRT and shaped its eastern segment. Building on this, the team helped create the Geneva-Harney Bus Rapid Transit Citizens Advisory Committee (CAC), with representatives from residents in both San Francisco and San Mateo Counties. Assisted by this CAC, the team undertook a robust outreach effort to ensure that the community was notified about the study, that a diverse group of people participated in engagement efforts, and that public comments were incorporated into the final recommendations of the Study. Outreach efforts began in the summer of 2014 with initial stakeholder meetings. A second round of outreach was conducted in October and November 2014, and a final round of outreach was conducted in April 2015. The CAC presided over extensive publicly-noticed community discussions and presentations, used as a public forum, and supplemental points of community discussion were provided with the support of the Hunters Point CAC as well as through public meetings led by the project team itself.

As the findings and recommendations were presented to various community residents, business, and property owners, and as facilitated through the CAC meetings, a consistent set of feedback and concerns were expressed which were considered within the context of this Study and will be taken into account during future stages such as the environmental review and preliminary design. Little Hollywood and Visitacion Valley residents, along with many members of the CAC, expressed opposition to the baseline and BRT alternatives that route through Little Hollywood on Blanken and Lathrop Avenues due to concerns about bus frequency and related impacts of safety, congestion, and noise, the likelihood that the SFMTA would remove on-street parking to facilitate bus circulation, and the conversion of two-way streets to one-way streets.

Conclusions and Next Steps

The purpose of this Study was achieved by clearly demonstrating that there are feasible options for routing a rapid transit line in the Geneva Avenue corridor prior to implementation of the Geneva Avenue extension. Over the baseline, BRT would offer substantial benefits to travel times, and more dependable transit service to the many destinations throughout the Corridor as well as regional connectivity. BRT would also provide the higher-quality transit service necessary to attract the increased population of residents and workers in the corridor to transit and away from the automobile, which is essential to achieving the mode-split targets and livability assumptions built into the approvals of the major developments in the corridor (Candlestick Point/Hunters Point Shipyard, the Schlage site, Executive Park).

Several questions remain to be addressed before the most beneficial option for each segment of the corridor can be selected. Though quite detailed, the findings presented here are preliminary, and the alternatives will be evaluated more extensively in a next step pre-environmental study, which received funding in San Francisco in spring 2015. This study is expected to begin in earnest in the fall 2015, lasting approximately six months and focusing on refinements to the existing options for segment by segment solutions and then refining the end-to-end definition of the best-performing option. SFMTA is poised to lead this charge, and has already identified a project team and project manager to conduct the study. Further confirmation of the funding analysis will need to be conducted at the close of the pre-environmental. Following the pre-environmental work, the bi-county team will further refine the next steps involved in project implementation. These steps will likely include environmental analysis, followed by final design, and implementation in the 2020-2023 timeframe.

CHAPTER 1

INTRODUCTION

1.1 Study Purpose and Goals

The Geneva-Harney Bus Rapid Transit (BRT) line is a proposed rapid transit service envisioned to provide existing and future neighborhoods along the San Mateo-San Francisco County line with a high-quality bus connection to the area's key regional transit system hubs. The need for this connection is reflected in the public/private partnership agreements, modeling forecasts and investment strategies that anticipate the demand for connections between BART, Caltrain, Muni light rail and the approved, soon-to-be developed mixed-use projects at Candlestick Point/ Hunters Point Shipyard, Visitacion Valley/Schlage Lock and Executive Park. These projects will be substantially transformative: over 13,000 new housing units, with a 30% affordability component, and over 4 million square feet (sf) of commercial space on the sites of abandoned industrial uses and vacant lots, with occupancy in the first phases expected by 2021. BRT was the determined the best option to accommodate the demand and mitigate the potential negative environmental and life-quality impacts that would otherwise be generated by the developments: a frequent, high-capacity bus service along the Geneva Avenue and Harney Way corridors that would be rapid and reliable as a feasible alternative to relying preponderantly upon the automobile. This Geneva-Harney BRT Feasibility Study provides further feasibility analysis and review that will facilitate the future refinement and environmental clearance of the BRT project itself.

The southeastern corner of San Francisco County and the northeastern corner of San Mateo County, is envisioned for growth and development beyond these projects noted above. The existing residential neighborhoods and commercial corridors of Visitacion Valley, the Excelsior, Crocker-Amazon, Mission Terrace, Cayuga, Sunnydale, the Portola, Little Hollywood and Executive Park already face growth pressures that call for higher-quality transit service and linkages to regional transit hubs in the Geneva/Harney corridor. Proposed developments in the area that will soon enter the approval/entitlement stages include the Sunnydale/HOPE SF (100% affordable) housing project in San Francisco, Brisbane Baylands, Recology's Modernization and Expansion Project in San Francisco and Brisbane, and the Cow Palace area in Daly City.

Candlestick-Hunters Point Shipyard

The Geneva-Harney BRT line was a commitment for the Candlestick-Hunters Point Shipyard development and a core improvement included in that project's transportation plan. The environmental clearance and approval of the development (12,000 DUs and over 4 MSF of institutional/commercial uses) hinged on the BRT and other Muni extensions, supportive bike/ped network, and an aggressive TDM program. The transformative changes that will occur within this redevelopment site encourage the value, attractiveness, and need for BRT in the Bi-County area. The 28R will operate as BRT East of US 101 within the Candlestick-Hunters Point Shipyard Shipyard.

The magnitude of and need to serve the existing and proposed developments in this corridor called for cooperative, multi-jurisdictional planning, leading to the Bi-County Transportation Study (2013). This is a multi-agency effort to develop a priority project list that includes the Geneva-Harney BRT as well as a funding strategy for new investments in the multimodal and regional transportation networks that support the study area's current neighborhood needs and significant anticipated growth.

The bi-county coalition of public and private stakeholders identified a need to determine more specifics surrounding the BRT route, alignment, and character of a rapid transit route within the same relative timeframe. In response, the San Francisco County Transportation Authority (SFCTA) sought and secured grant funds for the Geneva-Harney BRT Feasibility Study through a Planning Grant from the California Department of Transportation (Caltrans), with local match contributions from local partners on both sides of the county line.

TABLE 1. BENEFITS OF BRT

BENEFITS OF BRT	
Faster, more reliable service for riders	More dependable connections to rapid transit network
	Reduction in travel times—dedicated transit lanes, traffic signal priority and signal optimization
	More frequent service, longer service hours
Improved transit rider amenities	More comfortable stations including high quality shelters and real time arrival information
	All door boarding, low floor vehicles
	Safer pedestrian access and streetscape enhancements
Flexibility of design and delivery	Construction period can be condensed
	Service can begin once segments are complete
	Shorter time to benefits compared to rail
	Designed to fit operating need and context

1.2 Study Area

The Corridor stretches from Ocean Avenue near the Balboa Park Station in the west to the Candlestick-Hunters Point Shipyard (CPHPS) in the east (Figure 1). This feasibility study examines four miles of the east-west route between Santos Street and the Executive Park development just east of US 101. For the purposes of this study, the Geneva-Harney Corridor is divided into three distinct segments:

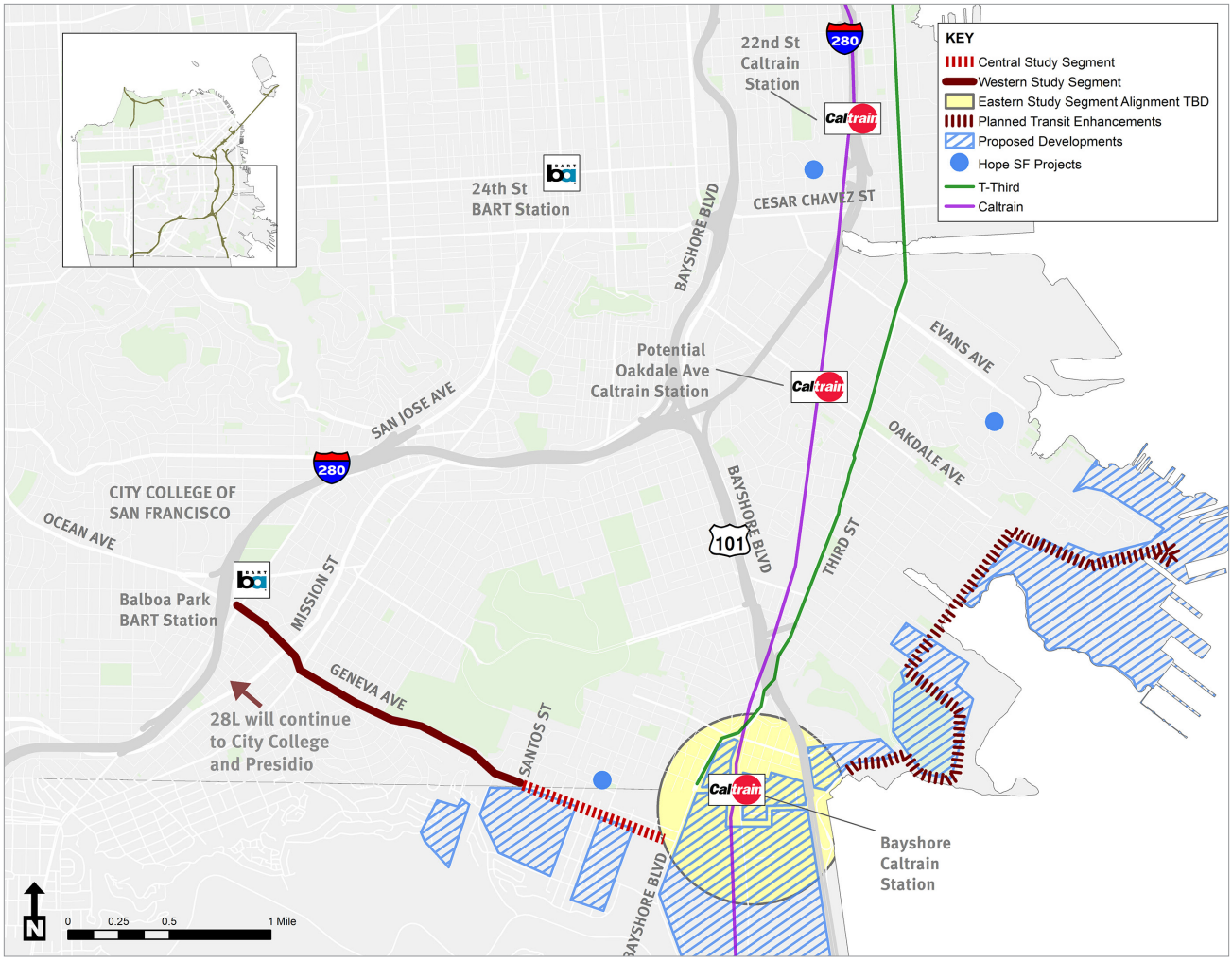
- Western Segment—Geneva Avenue between Balboa Park and Santos Street
- Central Segment—Geneva Avenue between Santos Street and Bayshore Boulevard
- Eastern Segment—Bayshore Boulevard to Executive Park at Thomas Mellon Circle / Harney Way

In the Western Segment (between the Balboa Park Station and Santos Street), SFMTA is planning to construct Muni Forward improvements identified in the Transit Effectiveness Project (TEP) that benefit Muni Routes 8 Bayshore and 29 Sunset. The Geneva-Harney BRT line would utilize the Muni Forward improvements planned for this segment of the corridor as proposed by SFMTA; therefore while part of the Corridor, no additional infrastructure improvements were examined.

East of Executive Park and US 101, the CPHPS has already prepared a detailed transit plan that covers the eastern-most portion of the Geneva-Harney BRT line between US 101 and Candlestick-Hunters Point Shipyard. The project is currently designing the busway and other infrastructure for the BRT line and will fund its construction. Direct and indirect funding from the development project (e.g., general fund increases and transit pass subsidies) are expected to support the operations and maintenance of the BRT line within the Shipyard.

The proposed Geneva-Harney BRT line would serve not

FIGURE 1. GENEVA BRT STUDY AREA



only existing neighborhoods along and near Geneva Avenue and Bayshore Boulevard but also future land uses at Candlestick-Hunters Point Shipyard, on Harney Way, and potentially through the Brisbane Baylands and Brisbane Recology Center sites. Geneva Avenue serves as a primary east-west crosstown link connecting many southern San Francisco neighborhoods, the City of Brisbane, and the City of Daly City to I-280, US 101, BART, Caltrain (Bayshore Station) and Muni T-Third (Sunnydale Station).

PROJECT TIME FRAMES & ALTERNATIVES CONSIDERED

This study considers two sets of alternatives – a near-term project and a long-term project – with the goal of improving mobility and accessibility in the corridor. The project will enhance Muni Route 28R which is planned to operate along Geneva Avenue by determining options for alignments and features that close the existing transit gap and enhance multi-modal connections and safety within the corridor.

NEAR-TERM BRT PROJECT

The near-term project uses 2020 as the planning and analysis year. For the near term project the BRT route alternatives use existing roadways. The alternatives analysis and evaluation framework consider transportation conditions in 2020. Development projects completed by 2020 are either in final planning stages or under construction, so data inputs are highly detailed.

LONG-TERM BRT PROJECT

The long-term project uses 2040 as the planning and analysis year. Under the long-term project, BRT route alternatives use both existing and future planned roadways, including the Geneva Avenue Extension. Potential new land uses, such as in planned developments at Brisbane Baylands, and the Cow Palace are included in this analysis. These potential developments are still in early planning phases so data inputs are approximate, and subject to significant change. The long-term project also considers the feasibility of converting portions of the route to light rail transit (LRT).

1.3 Planning Context

Geneva Avenue has been routinely identified as a high priority transit improvement corridor in planning and policy studies by the City/County of San Francisco and partner agencies in San Mateo County. The following studies identify Geneva-Harney BRT as an essential element of improved transit service in the area and guide the project purpose and bolster the project need. Key studies are described in greater detail below.

- Visitacion Valley/Schlage Lock Plan, SF Planning Dept., 2014
- Bayview Transportation Improvements Project, SF DPW 2013
- San Francisco Transportation Plan 2040, SFCTA 2013
- Plan Bay Area, MTC 2013
- Bi-County Transportation Study, SFCTA 2013
- Daly City General Plan, City of Daly City 2013
- Bicycle and Pedestrian Master Plan, City of Daly City 2013
- Bayshore Intermodal Station Access Study, SFCTA 2012
- Candlestick Point and Hunters Point Shipyard Phase II Transportation Plan, SFRA -OCII and Fehr & Peers 2010
- Brisbane Baylands Specific Plan, Universal Paragon Corporation 2011
- Transit Effectiveness Project, SFMTA 2009
- Bayshore Community-Based Transportation Plan, C/CAG 2008
- Countywide Transportation Plan, SFCTA 2004

CANDLESTICK POINT AND HUNTERS POINT SHIPYARD (CPHPS) PHASE II TRANSPORTATION PLAN

This study describes the transit service plan for the Candlestick Point-Hunters Point Shipyard Phase II project. The transit service plan was the product of close collaboration between the Mayor's Office of Economic and Workforce Development, the Planning Department, and SFMTA. The BRT line was a commitment for development and a core improvement included in the transportation plan.

TRANSIT EFFECTIVENESS PROJECT (TEP)

The TEP was developed and adopted by SFMTA in 2009. The TEP recommended comprehensive revisions to the Muni route structure to improve efficiency and meet emerging travel demand patterns. In addition, the TEP recommended a Rapid Network designation composed of the most critical and productive Muni lines. Geneva Avenue is included in the TEP Rapid Network as a project-level travel time reduction corridor and identified as a high-priority route for rapid transit and BRT treatments. The program that will implement the TEP improvements is known as Muni Forward.

THE SAN FRANCISCO TRANSPORTATION PLAN (SFTP) 2040

The SFTP was adopted by the Transportation Authority Board in December 2013. It presents the "blueprint for San Francisco's transportation system development and investment over the next 30 years." The four SFTP goal areas are to:

- Create a more livable city;
- Strengthen the city's regional competitiveness;
- Provide world-class infrastructure and service; and
- Ensure a healthy environment.

The SFTP emphasizes the continued development of a citywide BRT network as a key strategy in meeting these priorities. According to the SFTP, BRT is an affordable approach to addressing rapid transit needs along major San Francisco corridors. The report highlights Geneva-Harney BRT as one of the critical enhancement projects.

1.4 Project Goals

The following project goals have guided the development and evaluation of alternatives for the Geneva-Harney BRT:

GOAL 1—INCREASE THE TRANSPORTATION CHOICES SERVING THE BI-COUNTY AREA BY IMPROVING THE MULTIMODAL PERFORMANCE OF THE CORRIDOR.

The proposed project aims to address the need to re-balance the Corridor to better serve transit riders and non-motorized travel, without causing a major deterioration in conditions for auto travelers. Currently, Geneva Avenue functions well for autos and other private vehicles, but conditions for other modes need improvement to be competitive with private vehicles. In the future, as development along the Corridor intensifies, travel demand will increase and growth will need to be accommodated sustainably with transit and non-motorized improvements.

GOAL 2—IMPROVE NEAR- AND LONG-TERM TRANSIT SOLUTIONS ON THE CORRIDOR.

The proposed project will provide solutions for both near-term and long-term operating needs. Near-term solutions will focus on BRT treatments to improve the planned 28R line utilizing the existing roadway network, while long-term solutions will address the ultimate need for BRT service along the Geneva Avenue extension and potential for LRT service within the Corridor.

GOAL 3—CLOSE THE RAPID TRANSIT NETWORK GAPS IN THE BI-COUNTY AREA BETWEEN TRANSIT PROJECTS EAST OF GENEVA AVENUE & WEST OF SANTOS STREET.

The proposed project will close the gap in rapid transit that currently exists along the Geneva Corridor and between Bayshore Boulevard and Candlestick-Hunters Point.

GOAL 4—IMPROVE THE BI-COUNTY AREA TRANSIT CONNECTIVITY BETWEEN REGIONAL TRANSIT SYSTEM HUBS AND PLANNED DEVELOPMENTS.

The proposed project would provide access for neighborhoods on the Geneva-Harney corridor to regional transit systems by connecting them to the Balboa Park and Bayshore stations.

GOAL 5—ENHANCE CORRIDOR LIVABILITY AND COMMUNITY VITALITY THROUGH URBAN DESIGN.

Improving transit service within the corridor would enhance livability by improving the ease and appeal for all modes traveling through the corridor. Improving pedestrian comfort and safety through urban design would create a more vital and attractive street for local residential, commercial, and other activities.

GOAL 6—ENSURE CONSISTENCY WITH LOCAL AND REGIONAL PLANS AND POLICIES.

The proposed project would help meet goals set forth in Daly City, Brisbane, and City and County of San Francisco, as well as Muni Forward improvements and Plan Bay Area land use and transportation plans and policies.

Attainment of these study goals will be considered within the context of a balanced street-network that accommodates general purpose traffic, pedestrian, bicycle, and goods circulation and access within the Corridor, as well as maintaining as much on-street parking for residential, commercial, and drop-off access as is feasible.

1.5 Study Process

This study has been conducted as a collaborative inter-jurisdiction, inter-agency, and community process, involving close coordination between the City and County of San Francisco, the City of Daly City, San Mateo County, as well as various community groups leading public involvement. Study partners are described further below.

The study process consisted primarily of the following steps:

- Development of goals for the project were summarized from previous efforts, such as the Bi-County Transportation Study, described in Section 1.4 above.

- Analysis of existing conditions, including substantial data collection and public input provided in the Existing Conditions chapter below.
- Development of design principles and guidelines, using the project goals as a guide, to provide a framework for the creation of conceptual design alternatives, described in Chapter 3.
- Development of an evaluation framework and evaluation of alternatives as summarized in Chapter 4, primarily utilizing travel demand modeling to provide quantitative data on each alternative's performance.
- Community outreach, including general Corridor-area community meetings in the three cities and the creation and sustained engagement of a Citizens Advisory Committee (CAC), which assisted with the designation of goals and objectives, development of evaluation framework, review of alternatives, and discussion of findings and next steps. The CAC held publicly-noticed meetings at key milestones.
- Identification of the next steps in the alternatives development and design process.

STUDY PARTNERS

This study was developed by a multi-disciplinary and inter-agency team of public agency staff and consultants. The project was led by the San Francisco County Transportation Authority in coordination with the following public agencies, community organizations, and consulting firms:

CITY AND COUNTY OF SAN FRANCISCO

- San Francisco Municipal Transportation Agency (SFMTA)
- San Francisco Office of Community Investment and Infrastructure (OCII)
- San Francisco Planning Department (SF Planning)
- San Francisco Mayor's Office of Economic and Workforce Development (OEWD)

CITY OF DALY CITY

- Public Works Department
- Planning Department

CITY OF BRISBANE

- Public Works Department
- Community Development Department

SAN MATEO COUNTY

- San Mateo County Transit District (SamTrans)
- City/County Association of Governments of San Mateo County (C/CAG)

REGIONAL AGENCIES

- California Department of Transportation (Caltrans)
- Peninsula Corridor Joint Powers Board (Caltrain)

CONSULTING FIRMS

- Fehr and Peers
- Nelson Nygaard Consulting Associates
- CH2MHill
- CD+A
- SwitchPoint Planning
- Barbary Coast

COMMUNITY ADVISORY COMMITTEES

The study was guided by the Geneva-Harney Citizens Advisory Committee (GHCAC), a diverse group of 12 stakeholders representing communities along the Corridor and city-wide interests. The GHCAC served as a critical liaison between the Study's technical team and local stakeholders. The GHCAC enabled the Study Team to involve the community early in the planning process, provided guidance and detailed input on study activities, and reviewed and refined several study components including project goals, design guidelines, and the evaluation framework. Additional CACs consulted throughout the study process included:

- Bayview Community Advisory Committee
- Hunters Point Shipyard Community Advisory Committee
- SFCTA Citizens Advisory Committee

COMMUNITY ORGANIZATIONS

Throughout the Study, the Team also consulted many neighborhood residents and merchants through direct outreach and meetings with communities groups. A list of some of these groups is included below, with a more detailed summary of outreach in Appendix B:

- Excelsior Action Group
- Excelsior District Improvement Association
- New Mission Terrace Improvement Association
- Outer Mission Merchants and Residents Association
- Outer Mission – Ingleside Neighbors in Action
- Bayshore School District Community Forum
- Daly City Senior Club

STAKEHOLDER OUTREACH STRUCTURE AND SUMMARY

This section summarizes the key outreach activities that the project team undertook to ensure that the community was notified about the study, that a diverse group of people participated in engagement efforts, and that public comments were incorporated into the final recommendations of the Study. A full summary of study outreach activities is contained in Appendix B.

Outreach efforts began in the summer of 2014 with initial stakeholder meetings. A second round of outreach was conducted in October and November 2014, and a final round of outreach was conducted in April 2015.

COMMUNITY WORKSHOPS AND MEETINGS

FORMAT

A total of five hosted community workshops were held in October 2014 and April 2015. Additionally, a neighborhood-focused community meeting was held in November 2014 (Table 2). These workshops and community meetings were scheduled at different locations in the project study area, at different times of day, and on both weekdays and weekends to provide opportunities for diverse community participation. Translation services were available upon request at all meetings.

WORKSHOP AND MEETING NOTIFICATION

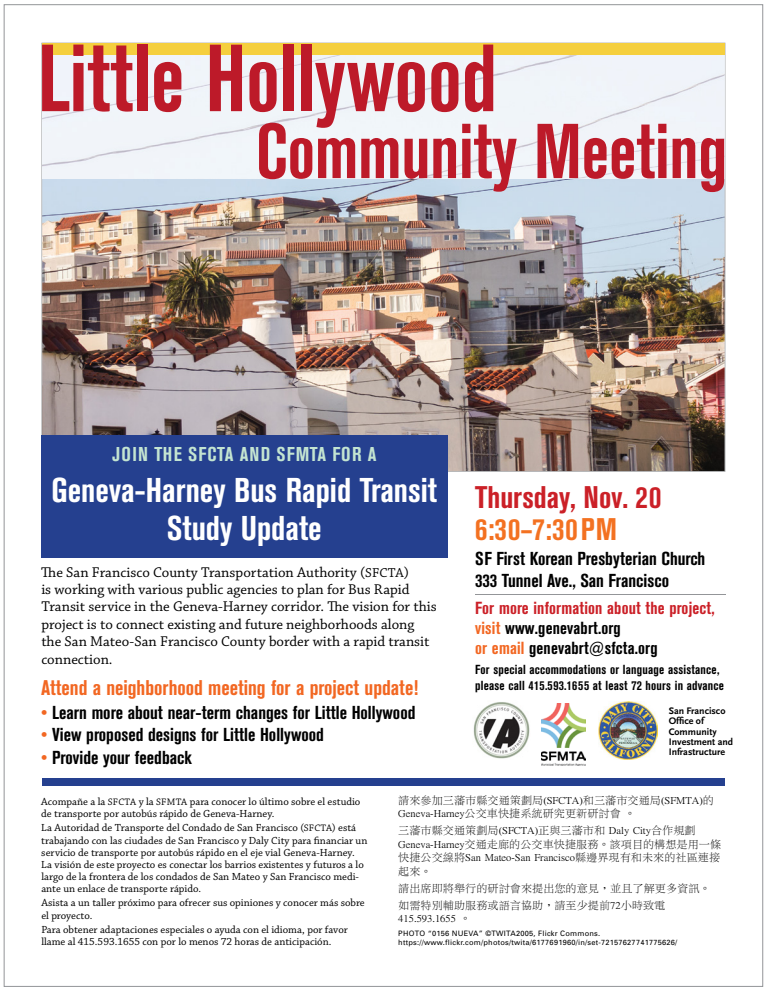
The project team notified the community about these workshops and meetings using several methods, including the following:

- Workshop notices on the project website
- Email to project's contacts database
- Newspaper advertisements
- Meeting flyers and palmcards
- Direct mail
- Neighborhood flyering (Figure 2)
- Social media

TABLE 2. COMMUNITY WORKSHOPS AND COMMUNITY MEETINGS

LOCATION	DATE/TIME	LANGUAGES	TYPE
Bret Harte Elementary School, 1035 Gilman St, San Francisco	Thursday, October 23, 6-8pm	English	Workshop
Bayshore Community Center, 450 Martin St, Daly City	Saturday, October 25, 11am-1pm	English	Workshop
Visitacion Valley Elementary School, 55 Schwerin St, San Francisco	Saturday, October 25, 2-4pm	English, Cantonese	Workshop
First Korean Presbyterian Church, 333 Tunnel Ave, San Francisco	Thursday, November 20, 6:30-7:30pm	English	Meeting
First Korean Presbyterian Church, 333 Tunnel Ave, San Francisco	Wednesday, April 22, 6-8pm	English	Workshop
Bayshore Elementary School, 155 Oriente St, Daly City	Saturday, April 25, 11am-1pm	English, Cantonese	Workshop

FIGURE 2. FLYER FOR LITTLE HOLLYWOOD COMMUNITY MEETING



INFORMATIONAL MATERIALS AT WORKSHOPS AND MEETINGS

Information was presented using multiple visual and verbal communication methods.

- Exhibit Boards: The project team developed large 24"x36" display posters to provide contextual maps of the study area and to convey the potential alternatives. The posters were on easels, spread across tables, and posted on walls to allow the community to both process the information on the posters as well as comment directly on the posters. All posters were translated to Chinese for the two workshops with Cantonese interpretation.
- PowerPoint presentation: The project team delivered a brief introductory presentation at the beginning of each workshop. This overview identified the development forecasts for the corridor and identified the potential alternatives for each segment of the corridor. During the Vis Valley workshop, the presentation was made with on-site interpretation into Cantonese by a member of the project team.
- Project Fact Sheet: The project fact sheet, available at the welcome table, provided a written overview of the project, a summary of the project goals, and an explanation of the project's schedule. This project factsheet was available in English and Chinese.
- Comment cards: Comment cards were distributed at public workshops to facilitate community feedback.

STAKEHOLDER MEETINGS AND COMMUNITY ROADSHOW

The project team conducted two types of targeted stakeholder outreach. The first was a series of one-on-one briefings; the second was two series of "community roadshows," a circuit of meetings in the project neighborhood, conducted in October 2014 and April 2015 to neighborhood and community organizations. Groups included in these efforts included neighborhood groups, community groups, advocacy organizations, merchants groups, and farmers' markets.

MEDIA COVERAGE

The project was the topic of one newspaper article, published by The Examiner. The article detailed the background of the project, and identified the two key alternatives developed for Geneva Avenue in Daly City (Figure 3).

FIGURE 3. MEDIA COVERAGE OF THE STORY


Planned bus rapid-transit project in Daly City aims to expand connectivity

By Brendan P. Bartholomew

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By Jessica Kwong

CINDY CHEW/2009 S.F. EXAMINER FILE PHOTO

The San Francisco County Transportation Authority is proposing a bus rapid transit project along Geneva Avenue in Daly City. A similar BRT system is planned for Muni's lines on Geary Boulevard, above.

A proposed bus rapid-transit line being studied by the San Francisco County Transportation Authority could help improve regional connections for Daly City's Bayshore neighborhood.

The Geneva-Harney Bus Rapid Transit Project would extend Muni's 28-19th Avenue Limited route to travel from 19th Avenue to the Balboa Park BART station and down Geneva Avenue to Bayshore Boulevard. The line would then follow a path adjacent to Little Hollywood to reach Candlestick Park and Hunters Point. Along the way, riders would be able to transfer to Muni's T-Third Street light-rail line or access the Bayshore Caltrain station.

The route would also close a gap in bus service on Geneva Avenue, which currently stops at Santos Street near the Cow Palace in Daly City, leaving several blocks of Geneva Avenue between that stop and Bayshore Boulevard underserved.

Underserved is a term often applied to the Bayshore neighborhood, which Daly City Mayor David Canepa has previously described as a "food desert," referring to the scarcity of stores selling fresh produce in the area. The mayor has also decried the lack of east-west transit options in the area. SamTrans began a free shuttle service in January to address that need.

The free SamTrans shuttle only comes every two hours, however, while the proposed Muni BRT route would have buses coming approximately every eight to 10 minutes, according to Transportation Authority Project Manager Zabe Bent.

1.6 Report Contents

To achieve the project's goals the SFCTA convened an interagency study team to develop and evaluate BRT design alternatives for the Geneva-Harney Corridor. This report documents the complete study process and results according to the following chapters.

CHAPTER 1: INTRODUCTION

This introductory chapter contains an overview of the Geneva-Harney BRT project, an outline of project goals, a brief description of the study area, and summary of the community outreach process.

CHAPTER 2: PURPOSE AND NEED

This chapter outlines the project's purpose and need by considering Corridor improvements that address transit performance, transit patron experience, multimodal circulation needs, and consistency with local and regional plans.

CHAPTER 3: EXISTING CONDITIONS AND TRANSPORTATION NEEDS

This chapter documents the existing demographics, multimodal transportation supply and demand, and urban design conditions in the Geneva-Harney Corridor. The top priority transportation needs, as assessed through a technical process are documented in this chapter.

CHAPTER 4: BRT ALTERNATIVES DEVELOPMENT

This chapter describes the key features of BRT as defined by the interagency study team, the key design principles for developing BRT alternatives in the Geneva-Harney Corridor, as well as the alternative design concepts developed for the Geneva-Harney Corridor, including "no project" alternatives.

CHAPTER 5: BRT ALTERNATIVES EVALUATION

This chapter documents the methodology used and the results of the evaluation of the likely impacts and benefits of the BRT alternatives on the Geneva-Harney Corridor. The evaluation incorporates a number of key project aspects including the following: transit performance, transit rider experience, access and pedestrian amenities, urban and landscape design, traffic operations and parking, cost, and construction impacts. It includes feedback and

a summary of concerns and expectations from key stakeholders, such as the members of the CAC, responsible city and county agencies, community groups and area project sponsors.

CHAPTER 6: FUTURE OUTLOOK

This chapter outlines the next steps in the process of implementing BRT on the Corridor, including a concept implementation plan timeline for follow on studies.

CHAPTER 7: APPENDICES

This chapter provides greater detail on elements that informed the development of and evaluation of BRT alternatives on the Geneva-Harney Corridor. Appendices including the outreach summary, full existing conditions report, the evaluation framework, the long range assessment of LRT feasibility on the Geneva-Harney Corridor, and LOS results worksheets.

CHAPTER 2

PROJECT PURPOSE AND NEED

The Geneva-Harney BRT project is intended to support the area's growth and development demands by addressing expected transportation system performance needs in a cost-effective manner in the near-term, with longer-term solutions also identified. The project is also intended to improve the cost effectiveness and operational efficiency of the area's mature transportation system infrastructure and service. The travel time and reliability benefits of BRT on Geneva Avenue are expected to ripple throughout the region's transit networks, facilitating transfers to other transit routes and systems. The BRT line ultimately represents a commitment between the Candlestick-Hunters Point Shipyard development and the City & County of San Francisco.

The need for the Geneva-Harney BRT project is determined by the transportation problems that currently exist within the Corridor and will be intensified as new development comes online. Without new east-west connectivity, new development will exacerbate the lack of transit options for travel within this Corridor, resulting in even lower transit utility for existing and future residents, employees and visitors. Project need is quantified by analysis of existing and future transportation conditions (both in quantitative and qualitative metrics). The areas of need outlined below include transit performance, customer experience, multi-modal circulation, pedestrian and bicycle safety, and consistency with adopted plans and policies.

2.1 Transit Performance

Transit service in the Geneva-Harney Corridor can be unreliable due to mixed flow operations. Planned Muni Forward investments[1] will improve reliability within the Corridor but only between Santos and Moscow Streets. Travel time variation results from:

- Extended travel through congested segments without transit priority or transit-only lanes
- Dwell time (Loading/unloading)
- Traffic signal delay
- Turn-out time
- Existing street configuration in the Geneva corridor favors car travel
- Operational inefficiency resulting in increased operating costs

There is an existing strong demand, in addition to large ridership growth potential, for high transit service levels in the project corridor. Geneva Avenue transit services, including Muni 8/AX/BX Bayshore and 9 San Bruno lines currently operate at frequent headways and serve high levels of passengers. A number of major transit routes cross Geneva Avenue and key transit system hubs are located on the corridor, including the Balboa Park BART/Muni Station, Bayshore Caltrain Station, and Muni T-Third at Sunnydale and Arleta stations. These transit routes and hubs generate major bus-to-bus and bus-to-rail transfers with Geneva Avenue transit services.

Transit in the Geneva-Harney corridor has the potential to serve substantially more riders both today and in the future. Approximately 12 percent of households in the Geneva-Harney corridor do not own cars (compared to 30 percent in the City of San Francisco and 5.7 percent in San Mateo County). Geneva Avenue has a high existing population density (average of over 10 households units per acre, compared to a San Francisco citywide average of 11.5)[2]. High auto use and high densities establish the Corridor as a strong transit market capable of supporting higher levels of transit ridership and investment. Furthermore, the Association of Bay Area Governments (ABAG) and the San Francisco Planning Department have targeted the Geneva Avenue corridor for significant new development on the western and eastern ends.

Despite the high existing and projected ridership demand, transit speeds and reliability are poor in the Corridor. The following transit performance needs are identified.

SEPARATION OF TRANSIT FROM AUTO TRAFFIC

Transit delay and service reliability (i.e., travel time, headway consistency and schedule adherence) are poor on Geneva Avenue, due in large part to conflicts with mixed-flow traffic. Bus delays occur when moving in traffic, maneuvering to and from the curb to load and unload passengers, and waiting at signals. As buses travel in mixed traffic, variation in headways also increases, and buses begin to bunch (and conversely, lead to gaps). Bus bunching is when transit vehicles arrive at bus stops one after another instead of arriving at evenly distributed intervals. Delays and bunching lead to unreliable service for waiting passengers. Additionally, conflicts with mixed traffic affect transit operating efficiency and productivity.

[1] The Transit Effectiveness Project (TEP) was an effort by the San Francisco Municipal Transportation Agency (SFMTA) to comprehensively overhaul San Francisco's transit network to modernize Muni and make it more efficient, reliable, safe and comfortable. The TEP includes two categories of implementation tools to modernize Muni: 1) "Rapid" Proposals (or Travel Time Reduction Proposals), and 2) Network Service and Route Changes. Both tools will be applied on Geneva Avenue west of Santos Street through improvements to routes 8 Bayshore and 29 Sunset.

[2] 2009-2013 American Community Survey 5-year estimates.

The delays caused by operating in mixed traffic add significantly to transit's route cycle time, increasing the number of vehicles and operators required to provide needed service frequencies.

REDUCED LOADING AND UNLOADING DELAYS

Time spent loading and unloading passengers (dwell time), while part of service, does include unnecessary delays that contribute to slow travel times for buses. Dwell times are lengthy because passengers must ascend from the curb into the bus doorway across a wide distance, and those without passes pay bus fare onboard. Passengers with mobility disabilities often need the assistance of lifts or ramps to enter and exit buses, which can further increase dwell time.

BRT stations with level or near-level boarding platforms, low-floor buses, a proof-of-payment system, and fare prepayment should facilitate faster and easier passenger loading and unloading by enabling passengers to simply walk or roll onto the bus through all vehicle doors. Boarding more passengers in less time would provide more transit capacity without the added costs of additional buses and drivers.

IMPROVED TRANSIT EFFICIENCIES THAT REDUCE OPERATING COSTS

One result of the inadequate transit service on the Geneva-Harney corridor is higher transit expenditures. Slow bus speeds result in longer cycle times for transit vehicles, creating the need for more buses to be in circulation in order to maintain desired headways. Additional buses create additional personnel and vehicle costs.

TRANSIT PATRON EXPERIENCE

Existing transit service on Geneva Avenue lacks many amenities that would make the transit experience attractive to new riders and more comfortable for existing riders, both in and out of the vehicle.

IMPROVED TRANSIT PATRON IN-VEHICLE EXPERIENCE

While riding, transit passengers often encounter crowded buses and reliability problems as a result of bunching and experience poor ride quality as buses must weave around mixed traffic and into and out of sidewalk bus stops. BRT is intended to improve ride quality by eliminating the need to pull in and out of stops, and for most alternatives, the need to weave around mixed traffic. The BRT buses would relieve crowding by accommodating more passengers, offering additional seating, and operating at more reliable headways.

IMPROVED TRANSIT PATRON STATION ACCESS AND WAIT EXPERIENCE

Wide streets, narrow or non-existent sidewalks, infrequent crossing opportunities, high auto travel speeds, inadequate lighting, and generally dated or uninspired urban design create unfavorable conditions for existing and potential bus patrons who arrive on foot or by bicycle. While waiting, transit passengers along Geneva Avenue often lack shelter, seating, and real-time information. Waiting passengers jostle for sidewalk space with passing pedestrians.

BRT will upgrade bus service with station amenities which can include larger shelters, additional seating, communications systems, ticket vending machines, real-time service information, improved lighting, and security features. BRT station platforms would be separated from pedestrian traffic and would include landscape and streetscape features to offer a buffer from vehicular traffic where feasible.

MULTIMODAL CIRCULATION NEEDS

People currently use Geneva Avenue to drive, walk, bike, and ride transit. It is also a key goods-movement corridor for trucks connecting a broad swath of San Francisco to two highways: I-280 and US 101. Geneva Avenue improvements are intended to enhance connectivity, multimodal circulation and the overall transportation effectiveness of the Corridor. Support of non-motorized travel modes and overall system operation is critical to the success of high quality transit in the corridor.

LACK OF CONTIGUOUS EAST-WEST TRANSIT CONNECTIVITY

No existing single transit connection links Candlestick-Hunters Point to regional transit stations, including the Bayshore Caltrain Station and Balboa Park BART Station and key destinations and neighborhoods along the route.

Population and employment growth in the Eastern Segment of the Corridor as well as Candlestick-Hunters Point will create a substantial demand for new transit service to these regional hubs (BART, Caltrain) and major trip attractors.

INCREASING CONGESTION WILL DETERIORATE BUS SERVICE WITHOUT DEDICATED LANES AND COULD CONTRIBUTE TO MODE SHARE LOSS

Planned development in the Geneva-Harney Corridor will significantly increase population and employment. Without transportation alternatives, these developments will contribute to a considerable increase in automobile trips.

The completion of the Geneva Avenue Extension will shift automobile traffic to the Corridor but will also improve the directness and efficiency of planned transit improvements.

IMPROVE BICYCLE NETWORK CONNECTIVITY

Geneva Avenue serves as the sole bicycle connection between Balboa Park BART Station and Bayshore Boulevard. Bicycle facilities along Geneva Avenue and between Geneva Avenue and Bayshore Boulevard and Candlestick-Hunters Point are discontinuous and directly adjacent to fast moving traffic. These facilities should accommodate a range of abilities and comfort levels that will improve safety for all users. Cycletracks or buffered bike lanes would provide the greatest comfort level and safety improvements

IMPROVE PEDESTRIAN SAFETY AND COMFORT

One third of commute trips to, from, or within the Geneva Avenue neighborhoods are a walk, bike, or transit trip, indicating the importance of non-motorized travel in the area along Geneva Avenue. Pedestrians experience significant delay at intersections with long cycles, increasing the likelihood of signal noncompliance and resulting in compromised safety and traffic flow impacts. At crossings without a pedestrian signal, pedestrians can be caught mid-crossing when the signal turns yellow, with little time to reach a curb or median refuge

BRT will improve pedestrian safety and conditions through the implementation of countdown signals and Accessible Pedestrian Signals (APS) at all signalized intersections, as well as through adjusted signal timings to ensure compliance with local and federal targets for walking speeds. BRT will also provide curb extensions (curb bulbs) to create greater pedestrian visibility and shorter crossing distances. These improvements are expected to reduce pedestrian collisions on the Geneva-Harney corridor.

IMPROVE OPERATING EFFICIENCY.

With increased population and employment along the Geneva Corridor, motorized trips are expected to steadily increase in the future. This trend will lead to increased demand on Geneva Avenue's limited ROW and increased congestion, necessitating more efficient operations and use of space. To increase person throughput in the corridor, vehicle capacity and occupancy rates must rise.

BRT will increase transit mode share and improve the road's carrying capacity, helping Geneva Avenue operate more productively. BRT will allow for increased bus operations without impacting the traffic network by creating a dedicated lane for transit, whereby additional buses will not conflict with auto traffic. BRT also makes it possible to provide similar service at a lower operating cost, as each bus can complete its route in less time, requiring fewer vehicles and drivers to maintain the same frequencies.

UPGRADE STREETSCAPE TO SUPPORT A RAPID TRANSIT AND PEDESTRIAN-FRIENDLY IDENTITY.

Existing streetscape conditions on the Geneva-Harney corridor are deficient, lacking in consistency and pedestrian amenities. The street configuration and traffic signal infrastructure heavily favor motorists over transit riders and pedestrians. Given that every transit trip begins and ends as a walk trip, pedestrian conditions play a substantial role in retaining existing riders and attracting new bus patrons. Wide boulevards with limited refuge, infrequent crossing opportunities, high automobile travel speeds, limited sidewalk space, inadequate lighting and generally dated or uninspired urban design all create unfavorable pedestrian conditions that discourage bus patronage on Geneva Avenue.

The Geneva-Harney BRT project will help establish a more unified identity for Geneva Avenue as one of the area's most prominent multimodal arterials with visible rapid transit service. Improved streetscape features such as landscaping, protected bicycle lanes, and bulbouts will enhance Geneva Avenue as a primary gateway connecting the three cities.

INTEGRATE WITH ADJACENT LAND USES

The Geneva-Harney Corridor is already a strong market for transit, due largely to the existing transit-supportive residential land uses in the area and proximate regional transit system hubs. Geneva Avenue is surrounded by high population density and a moderate proportion of households that do not own automobiles, both recognized to be positively correlated with transit use. However, without improvements projected population and employment growth along the Corridor would overload the existing transportation system, resulting in increased traffic congestion, further deterioration of bus service, and a continuing decrease in transit's mode share.

BRT service will alleviate this pressure and contribute to the planned transit-oriented development efforts for the area by providing high-quality, reliable, comfortable transit that improves access to destinations within the corridor and elsewhere in the region. The placement of BRT infrastructure demonstrates an investment in the corridor and provides a greater sense of permanence than traditional bus facilities.

ACCOMMODATE PRIVATE VEHICLES AND COMMERCIAL LOADING

Attainment of project goals must be compatible with the need to accommodate mixed-flow traffic, goods circulation and general access within the Geneva Corridor. On-street parking for residents, loading/unloading, and drop-off access must be also maintained to the maximum extent possible. Additionally, it is essential to accommodate truck maneuverability in order to support land uses along the corridor and regional goods movement.

One of the primary goals of the Project is to address the need to rebalance the street to better serve transit riders, pedestrians, and bicyclists, without causing a major deterioration in conditions for auto travelers. Improving transit service within the Study Area would not only serve current riders, it would dramatically strengthen the citywide transit network. It would also improve mobility for local residents, benefit neighborhood conditions, and improve access to local businesses, by attracting more riders and making it easier for people to get to local restaurants, shops, and services.

CONSISTENCY WITH BI-COUNTY AND REGIONAL TRANSPORTATION POLICIES AND PLANS

BI-COUNTY PLAN

The Bi-County Transportation Study was a multi-city effort to anticipate the effects and infrastructure needs of substantial land use growth in an area of southeast San Francisco and northeast San Mateo counties. Officials and experts from these two counties, as well as Brisbane, Daly City, and San Francisco agency staff, and transit operators, worked together to understand the magnitude of the development impact, define a set of key transportation projects, and develop a fair share analysis for contributing to implementation of the projects. The study found that the current multimodal transportation networks in the area show substantial gaps in coverage between neighborhoods and to important destinations such as the waterfront, and access to the regional road network, such as US 101, and transit networks, such as Caltrain and BART, is either overly circuitous and burdensome, or simply lacking. The Geneva Avenue corridor is specifically identified as a key East–West connector for this new growth area. However, the parties also recognized that it would likely take some time to mobilize funding and development of the major long-term project: extension of existing Geneva Avenue across the Brisbane Baylands site and US 101 to connect with Harney Avenue and a new US 101 Candlestick Interchange. The Geneva-Harney BRT Line was envisioned as both a near- and long-term solution, with the near-term project introducing BRT vehicles, exclusive bus lanes where feasible, signal priority, and enhanced stations along the existing roadway network while the long-term project would take advantage of the Geneva Avenue extension.

REGIONAL TRANSPORTATION POLICIES AND PLANS

Existing transit conditions in the Corridor do not effectively support Daly City, Brisbane, and San Francisco transportation policies and plans. San Francisco's "Transit First Policy," adopted by the San Francisco City Planning Commission and Board of Supervisors in 1973, gave priority to public transit investments to guide the City's transportation policies. More recently, the San Francisco's General Plan Transportation Element specifically identifies BRT in Policy 20.13, which directs the City to "Create dedicated bus lanes and Bus Rapid Transit (BRT) lanes to expedite bus travel times and improve transit reliability." The 2013 San Francisco Transportation Plan (SFTP) also established BRT network development as San Francisco's preferred policy for transportation investment. From a non-motorized perspective, San Francisco's Vision Zero seeks to build safety and livability into the street network; Geneva Avenue west of Santos and the intersection of Bayshore Boulevard and Arleta Avenue have been identified as focus areas within the Corridor for pedestrian improvements. Several related transportation and land use projects are advancing at the same time as this study, including the Bayshore Station Relocation Study, Brisbane Baylands development project, Candlestick-Hunters Point Shipyard development project, and the Visitacion Valley/Schlage Lock development project. Each of these studies identifies Geneva-Harney BRT as an essential element of improved transit service in the area. Further, the The Geneva-Harney BRT is a core commitment between the approved Candlestick-Hunters Point development and the City & County of San Francisco.

CHAPTER 3

EXISTING CONDITIONS

3.1 Overview of the Geneva-Harney Corridor

This chapter summarizes key existing conditions, needs and opportunities for transportation improvements in the Geneva-Harney Corridor. The full existing conditions analysis can be found in Appendix A.

SETTING

The Geneva-Harney Corridor (Corridor) extends from the Balboa Park BART/Muni Station in the west to Hunters Point Shipyard in the east, including connections to the Bayshore Caltrain Station and Muni T-Third line at Sunnydale and Arleta stations. The Corridor passes through numerous established neighborhoods and future development sites in southern San Francisco and northern San Mateo counties. For the purposes of this study, the Geneva-Harney Corridor is divided into three distinct segments:

- Western Segment—Geneva Avenue between Balboa Park and Santos Street
- Central Segment—Geneva Avenue between Santos Street and Bayshore Boulevard
- Eastern Segment—Bayshore Boulevard to Executive Park at Thomas Mellon Circle / Harney Way

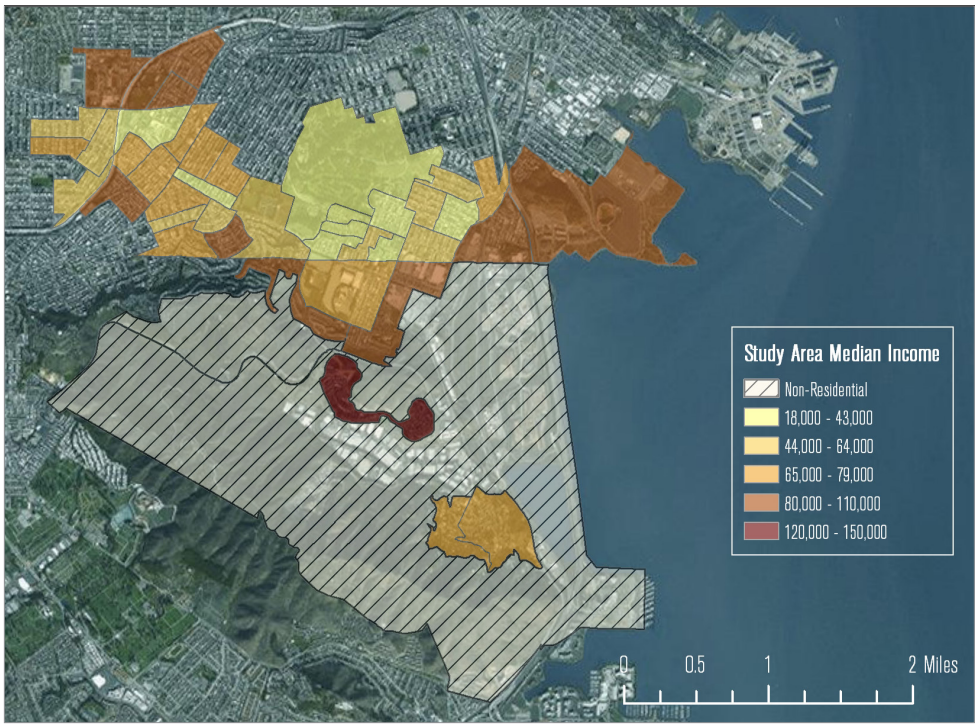
The proposed Geneva-Harney BRT line would serve not only existing neighborhoods along and near Geneva Avenue and Bayshore Boulevard but also future land uses at Candlestick-Hunters Point Shipyard, on Harney Way, and potentially through the Brisbane Baylands and Brisbane Recology Center sites. Geneva Avenue serves as a primary east-west crosstown link connecting many southern San Francisco neighborhoods, the City of Brisbane, and the City of Daly City to I-280, US 101, Balboa Park Station (BART/Muni), Bayshore Station (Caltrain) and Sunnydale and Arleta stations (Muni T-Third).

DEMOGRAPHICS

The demographic analysis described in this section is based on 2011 U.S. Census American Community Survey (ACS) 5-year data from 39 census block groups that fall within a quarter mile of the Corridor, bordering Geneva Avenue, Bayshore Boulevard and Blanken Avenue.

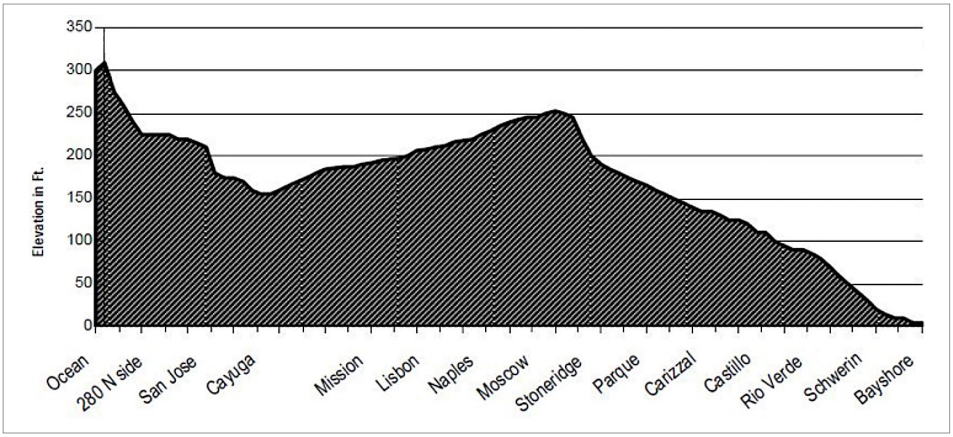
Only 11 percent of residents on the Corridor identify as non-Hispanic White. One quarter identify as Hispanic or Latino, over 50 percent as Asian, eight percent as Black/African American, and one percent each as Native Hawaiian/Pacific Islander and American Indian/Alaska Native. The remaining residents identify as "Two or More races" or as "Other". Median household incomes by Census block group range from $150,000 to $18,000. The wealthiest areas are the neighborhoods to the south of Geneva Avenue in Daly City and Brisbane, and those with the lowest median household income are located in the Central Segment of the Corridor north of Geneva Avenue around San Francisco's Sunnydale housing projects. Income distribution is shown in Figure 4.

FIGURE 4. INCOME DISTRIBUTION ON THE GENEVA-HARNEY CORRIDOR



Travel by residents on the Geneva-Harney Corridor is currently auto-dominated. Only 12 percent of the 19,000 households on the Corridor do not own a vehicle (compared to 30 percent in the City of San Francisco and 5.7 percent in San Mateo County). Thirty two percent of households own one vehicle, and the majority of households on the Corridor own two or more vehicles. Approximately 30

FIGURE 5. ELEVATION PROFILE OF GENEVA AVENUE IN THE WESTERN SEGMENT



percent of the workers residing in the Corridor use transit to get to work. Over 60 percent drive to work, with the vast majority of those drivers (83 percent) driving alone. Fewer than 2 percent reported walking to work, and under 0.5 percent bicycle. The lower rate of walking and bicycling is likely due to the relatively low-density, residential nature of the study area and the peripheral nature of the Corridor in relation to the major employment centers in downtown San Francisco and along the US 101 corridor to the south. Relatively few jobs are within walking and bicycling distance of the homes in this area, when compared to the City of San Francisco as a whole. However, new development, both under construction and planned will attract more transit-dependent and transit-choice residents and workers due partly to aggressive TDM program and affordable housing, increasing the demand for multi-modal travel.

3.2 Street Layout—Configuration and Grade

This section provides an overview of the functional design of the roadways that make up the Geneva-Harney Corridor including configuration and grade. Street grade is an important factor in the accessibility of bicycles and pedestrians along the corridor, as hills make travel more difficult for these users.

WESTERN SEGMENT: GENEVA BETWEEN BALBOA PARK AND SANTOS

CONFIGURATION

In the Western Segment, the total width of the Geneva Avenue corridor right-of-way (including the sidewalks on both sides) varies between 80 feet and 100 feet. West of Mission Street, the Geneva Avenue right-of-way is generally 80 feet and the roadway pavement occupies 64 feet curb-to-curb. East of Mission Street to Santos Street, Geneva Avenue widens to 102 feet with a curb-to-curb pavement width of 75 feet. Geneva Avenue operates both eastbound and westbound, with two lanes in each direction, left turn pockets (most locations) and parking on both sides. There is a narrow median, either painted or concrete, for much of the roadway. Turns are permitted at all intersections.

Narrow sidewalks are provided on both sides of Geneva Avenue in the Western Segment. At signalized intersections, pedestrian crossings are marked with standard or continental striping and are activated with push buttons. Many of the unsignalized intersections along Geneva Avenue do not have marked pedestrian crossings. Geneva Avenue is a designated bicycle facility with interspersed bicycle lanes and "sharrow" pavement markings indicating that a lane is to be shared by bicyclists and drivers.

GRADE

Geneva Avenue's highest point is approximately 310 feet above sea level on the crest of the hill on the short segment of roadway between Ocean Avenue and Howth Street. From this location, Geneva Avenue gently slopes down to a more level area in the vicinity of the I-280 and Balboa Park Station. The roadway then descends to Cayuga Avenue at the base of the Islais Creek valley before climbing up a gentle slope to Prague Street. East of Prague Street, Geneva Avenue enters a wide cut and descends towards the Bay in a long gentle slope. According to City of San Francisco slope maps (Figure 5), the slopes on Geneva Avenue approach 10 percent between San Jose Avenue and Delano Avenue and at the crest of eastbound Geneva

Avenue between Ocean Avenue and Howth Street. The steep grades in this section of the Corridor also create a challenging environment for bicyclists and pedestrians.

CENTRAL SEGMENT: GENEVA BETWEEN SANTOS AND BAYSHORE

CONFIGURATION

Geneva Avenue is widest between Santos Street and Bayshore Boulevard, with a 90-foot curb-to-curb width that generally holds two lanes in each direction, a wide median, left turn lanes, and parking on both sides. Narrow sidewalks are provided on both sides of Geneva Avenue. Signalized intersections have marked pedestrian crossings that are activated with push buttons. There are currently no bicycle facilities on Geneva Avenue in the Central Segment (although they are planned and funded by Daly City together with curb-bulbs).

GRADE

In the Central Segment of the Corridor, Geneva Avenue sits at 150 feet above sea level on the western end and steadily drops to sea level as it reaches Bayshore Boulevard. The roadway makes a gradual descent between Santos Street and Rio Verde Street. It then descends a bit more rapidly to Schwerin Street, while remaining well below the five percent slope threshold for LRT. The remainder of the Central Segment east of Schwerin Street, including both Geneva Avenue and MacDonald Avenue, is generally flat and close to sea level.

EASTERN SEGMENT: BAYSHORE TO EXECUTIVE PARK

CONFIGURATION

The Eastern Segment of the Corridor consists of two distinct geographic areas. One begins at Bayshore Boulevard and includes the surrounding areas between Geneva Avenue and Blanken Avenue / Tunnel Avenue. The second includes the area bounded by Blanken Avenue to the north, Tunnel Avenue to the west, Beatty Avenue to the south, and Executive Park to the east.

Bayshore Boulevard is a wide arterial with two lanes in each direction and the center-running Muni T-Third Line north of Sunnydale Avenue. Parking is prohibited along much of Bayshore Boulevard between Blanken Avenue and Geneva Avenue. Sidewalks are generally wide but are not provided on the east side of Bayshore Boulevard south of Sunnydale Avenue. Pedestrian crossings are marked at signalized intersections, and there are five-foot striped bicycle lanes for much of the roadway segment.

Blanken and Lathrop Avenues are typical residential streets with narrow right-of-way and all-way or side-street stop-controlled intersections. There is on-street parking on both sides of the street, wide sidewalks on either side, standard marked crosswalks, no bicycle facilities, and frequent driveway curb cuts for private residences.

Tunnel Avenue is a two-way, two-lane road that runs along the east side of the Caltrain train tracks and provides direct access to the Bayshore Station. On-street parking is generally permitted on both sides. Between Blanken Avenue and Beatty Avenue, there are no marked pedestrian crossings and no sidewalks south of the Bayshore Station. Tunnel Avenue has “sharrow” pavement markings for bicyclists within the boundaries of San Francisco County. There are no sharrows on Tunnel Road south of the Bayshore Caltrain Station.

Beatty Avenue is a two-way, two-lane road that passes through the existing Recology site. Parking is sporadically permitted along the street. A narrow sidewalk is provided on a portion of the south side of the street.

GRADE

Bayshore Boulevard in the Eastern Segment has a slight grade increase from Geneva Avenue to Blanken Avenue. The slope of Tunnel Avenue also increases slightly from south to north. However, both remain below the five per-

cent slope threshold for LRT. Beatty Avenue and Blanken Avenue are generally flat roadways. The largest hill within the Eastern Segment is in the northeast corner of Recology where the site meets Lathrop Avenue and US 101.

FUTURE ROADWAY INFRASTRUCTURE

The compendium of plans, developer agreements and Bi-County investment strategies include future transportation infrastructure improvements within the Corridor, as shown in Table 3.

TABLE 3. FUTURE ROADWAY INFRASTRUCTURE PROJECTS PROXIMATE TO GENEVA-HARNEY CORRIDOR STUDY AREA

PROJECT NAME	PROJECT LOCATION (COUNTY)	PROJECT DESCRIPTION (LAND USE-SPECIFIC)	STATUS
Geneva Avenue Extension	San Mateo	This proposed connection links Geneva Avenue at its terminus at Bayshore Boulevard with Harney Way at the 101 Interchange, and includes the new network of freeway on- and off-ramps as well as the intersections at new local streets in Brisbane.	Preliminary Planning
US 101 Candlestick Point Interchange	San Mateo	Redesign of interchange to tight-diamond design, to accommodate Geneva Avenue extension and Harney Way widening. Change of configuration will improve traffic operations.	Design
Schlage Lock Street, Sidewalk, and Bicycle network	San Francisco	Includes limited, local vehicular networks off Bayshore Boulevard and complementary pedestrian and bicycle routes, lanes and protected pathways that increase connectivity from Visitaction Valley to the Schlage site and to Bayshore Caltrain.	Approved
Executive Park Street Network	San Francisco	Revises and modifies land use and local vehicular street network, with supplementary pedestrian and bicycle routes and pathways parallel to Harney Way (with limited, improved perpendicular crossings) to further accommodate local multi-modal access supporting an increase of about 1,600 residential units that includes a conversion of existing and allocated office space.	Approved
Brisbane Baylands Street, Sidewalk, and Bicycle network	San Mateo	Creates a gridded street network north and south of the proposed Geneva Avenue Extension with an extensive network of pedestrian and bicycle paths and trails	Environmental Review
Recology Internal and Realigned Streets	San Francisco/ San Mateo	Includes two phases of street development and re-alignment, including a realigned Beatty Avenue and internalized, improved streets that are designed to accommodate the increase of truck and auto traffic that support the expanded needs of the facility.	Environmental Review
Harney Way Rebuild	San Francisco	Harney Way expansion to 3-lanes WB, 2-lanes EB for 4 links north of the US 101 interchange, plus BRT lanes & TSP North/East of Alana Way	Approved

3.3 Land Use

This section describes the existing land uses along the corridor, focusing on jobs, housing and retail.

EXISTING LAND USES

WESTERN SEGMENT: GENEVA BETWEEN BALBOA PARK AND SANTOS

The roadway passes through relatively low density residential neighborhoods and several distinct neighborhood commercial districts. West of Mission Street, Geneva Avenue is primarily residential. East of Mission Street to Santos Street, there are two commercial business districts—one centered on London Street and the other further east at Naples Street. The Western Segment of the Geneva-Harney Corridor along Geneva Avenue is anchored by the Balboa Park Station to the west and the Crocker Amazon Playground to the east.

According to the 2010 Census, Western Segment block groups average 7.5 households per acre and 3.0 jobs per acre. This calculation excludes the Census block group that spans Crocker-Amazon Park. Density figures for the Western Segment of the Corridor are low compared to the San Francisco citywide average of 11.5 households per acre and 18.7 jobs per acre.

CENTRAL SEGMENT: GENEVA BETWEEN SANTOS AND BAYSHORE

The south side of Geneva Avenue between Santos Street and Bayshore Boulevard is dominated by two uses oriented towards vehicle traffic and lacking pedestrian-scale design: Cow Palace and the PG&E power station. Motels and two-story residences line the north side of Geneva Avenue in this segment. Interspersed among the industrial and residential uses are the Bayshore Elementary School and Kelloch/Velasco Park.

The Central Segment has a slightly higher residential density than the Western Segment and a slightly lower employment density. According to the 2010 Census, Central Segment block groups average 9.9 households per acre and 2.7 jobs per acre. This calculation excludes the Census block group that covers the Cow Palace.

EASTERN SEGMENT: BAYSHORE TO EXECUTIVE PARK

The Eastern Segment of the Corridor contains residential and industrial uses, as well as a number of development sites. Between Sunnydale and Arleta Avenues, the west side of Bayshore Boulevard has a few active retail sites. This segment of Bayshore Boulevard borders the residential neighborhood of Visitacion Valley. On the eastern side of the Schlage Lock and Baylands development sites, Tunnel Avenue runs parallel to Caltrain right-of-way. Both

Tunnel Avenue and Beatty Avenue border Recology. Recology itself is a regionally-significant industrial land use with particular auto- and truck-traffic access and circulation needs that are expected to expand and intensify between today and the 2020.

Blanken and Lathrop Avenues are typical residential streets lined with two-story apartment buildings and single family homes. Blanken Avenue passes through the small neighborhood of Little Hollywood, while Lathrop is representative of several narrow streets in Little Hollywood that, bounded by railroad tracks to the west and US 101 to the east, are limited-access, and end ins cul-de-sacs.

Since the number of open spaces and development sites in the Eastern Segment significantly reduce average household and employment densities in the area, only two Census block groups on the northern end of Bayshore Boulevard in Visitacion Valley were included in the density analysis. Household density and employment density in the Eastern Segment average 11.8 households per acre and 3.3 jobs per acre,

FUTURE LAND USES

While the neighborhoods on Geneva Avenue are mature and have already been built out, the Geneva-Harney corridor is anticipated to host major new developments at the eastern and western ends, as shown in Table 4. On the eastern end of the corridor, the former Southern Pacific Railyards in Brisbane (Brisbane Baylands) is undergoing retail and commercial development plans. The adoption of the Visitacion Valley/ Schlage Lock Plan will serve to guide the redevelopment of the former Schlage Lock site at Sunnydale and Bayshore Boulevard. Additional development plans are underway at Candlestick-Hunters Point Shipyard, portions of the Cow Palace, Executive Park, Brisbane Recology Center, and Sunnydale-Velasco HOPE SF. On the western end of the corridor, the Planning Department's Better Neighborhoods Plan has been examining new residential development in the vicinity of the Balboa Park Station and the Phelan Loop.

TABLE 4. ONGOING LAND USE DEVELOPMENT PROJECTS PROXIMATE TO GENEVA-HARNEY CORRIDOR STUDY AREA

PROJECT NAME	PROJECT LOCATION (COUNTY)	PROJECT DESCRIPTION (LAND USE-SPECIFIC)	STATUS
Hunters Point Shipyard	San Francisco	2,650 housing units 5.2M sq.ft. employment (R&D, commercial, community uses)	Approved, Phase 1 under construction
Candlestick Point	San Francisco	7,600 housing units 1.2M sq.ft. employment (office, commercial, community, hotel uses)	Approved, Phase 1 under construction
Visitacion Valley/ Schlage Lock	San Francisco	1,670 housing units 131 ksf employment (commercial, community uses)	Approved
Executive Park	San Francisco	1,600 housing units 73 ksf e,ployment (retail)	Environmental Review
Brisbane Baylands (DSP)	San Mateo	4,400 housing units 7.5M sq.ft. employment (commercial, R&D, entertainment, hotel, office, other uses)	Environmental Review
East Daly City/Cow Palace	San Mateo	1,700 housing units 550,000 ksf employment (commercial uses)	Preliminary Planning
Recology Modernization	San Francisco/ San Mateo	Modernize and expand existing facility to provide additional capacity to recycle and process different streams of refuse	Environmental Review
Sunnydale-Velasco HOPE SF Master Plan	San Francisco	785 replacement housing units 900 integrated tax-credit affordable and market-rate housing units Recreational and educational center, parks, community garden, farmer's market, neighborhood-serving retail, other community services	Environmental Review

FIGURE 6. EXISTING TRANSIT SERVICE ON THE GENEVA-HARNEY CORRIDOR

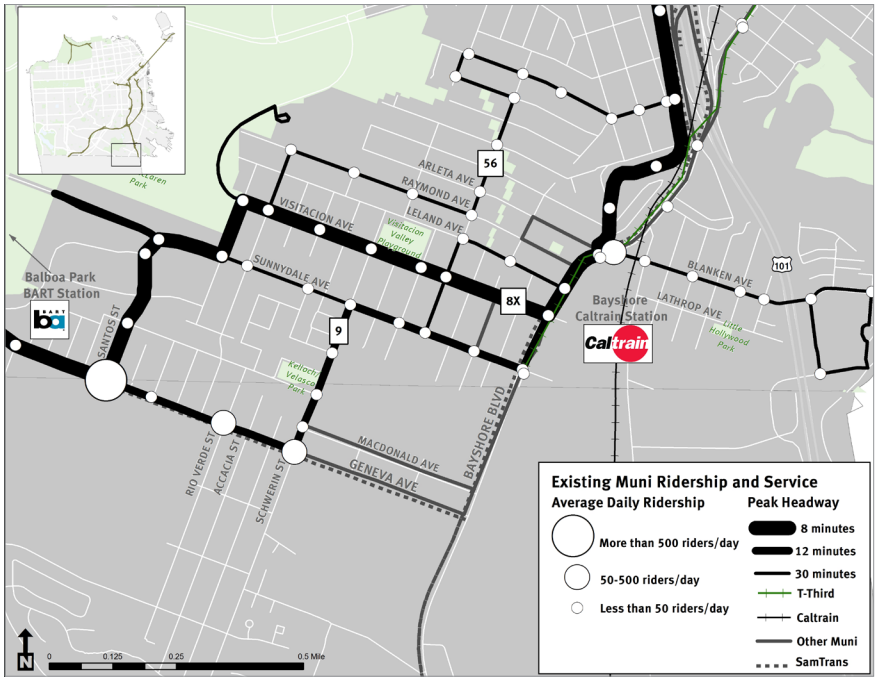


TABLE 5. WEEKDAY TRANSIT SERVICE ON THE GENEVA-HARNEY CORRIDOR

ROUTE	DESTINATION	DAILY HEADWAY RANGE (MIN.)	AM/PM PEAK HOUR HEADWAY (MIN.)	WEEKDAY HOURS OF OPERATION
Muni Bus, Western Segment				
8X Bayshore Express	Balboa Park to Downtown San Francisco via Bayshore Blvd and US 101	8-15	8 / 8	4:40 am–1:15 am
8BX Bayshore B Express	Balboa Park to Downtown San Francisco via Bayshore Blvd and US 101	8	8 / 8	6:20–10:00 am; 3:30–7:50 pm
29 Sunset	Visitacion Valley to Presidio via Balboa Park and Sunset District	10-20	10 / 10	5:15 am–1:30 am
43 Masonic	Balboa Park to Forest Hill (serves CCSF campus)	10-30	10 / 12	5:00 am–1:30 am
54 Felton	Daly City BART to Hunters Point via Balboa Park	20-30	20 / 20	5:30 am–1:00 am
88 BART Shuttle	San Francisco State University to Balboa Park via Mission St	20	20 / 20	6:40–9:00 am; 4:00–6:40 pm
91-Owl	West Portal to Downtown San Francisco to Golden Gate Bridge to SF State	30	30	12:15–5:45 am
Muni Bus, Central Segment				
9 San Bruno	Visitacion Valley to Downtown San Francisco via US 101 and Potrero Ave	12-20	12 / 12	4:55 am–1:40 am
90 San Bruno (Owl)	San Bruno Ave/Arleta Ave to Downtown San Francisco via US 101 and Potrero Ave	30	30	12:40 am–5:50 am
8AX Bayshore A Express	Geneva/Schwerin to downtown San Francisco and North Beach via San Bruno Avenue and US 101	8	8 / 8	6:40–10:00 am; 3:30–7:40 pm
Muni Bus, Eastern Segment				
56 Rutland	Visitacion Valley and Executive Park via Blanken Ave	30	30 / 30	7:00 am–9:30 pm
Muni Metro				
T-Third	Embarcadero to Visitacion Valley via Mission Bay, Dogpatch and Bayview	9-20	9 / 9	5:00 am–12:50 am
SamTrans				
24	Brisbane to Westmoor HS (Daly City) via Geneva Ave and Mission St	(one bus)	—	7:10–7:50 am; 3:00–3:40 pm
29	Templeton/Brunswick (Daly City) to Lipman MS (Brisbane) via Geneva Ave and Bayshore Blvd	(one bus)	—	7:45–8:15 am; 3:10–3:40 pm
292	Hillsdale Shopping Center to Downtown San Francisco via Caltrain line and SFO	15-60	15 / 20	3:55 am–2:35 am
397	San Francisco to Brisbane and Palo Alto via Bayshore (Overnight)	60	—	12:45 am–6:25 am
Daly City Bayshore Shuttle	Serramonte Transit Center to Bayshore Blvd via Daly City and Balboa Park stations	120	120 / 120	6:30–11:40 am; 3:20–8:10 pm
BART/Caltrain				
Caltrain	North to San Francisco; South to Peninsula (Bayshore Station)	60	60	6:35 am–12:10 am
BART	North to San Francisco, East Bay; South to Millbrae/SFO (Balboa Park Station)	2-18	2-6	4:10 am–1:15 am
Shuttle				
Brisbane-Crocker Park BART/Caltrain Shuttle	Balboa Park Station to Brisbane-Crocker Industrial Park via the Bayshore Caltrain Station	10-30	20 / 20	5:45–9:35 am; 2:45–7:30 pm
Brisbane-Bayshore Caltrain Shuttle	Bayshore Caltrain Station to Brisbane-Crocker Industrial Park via Bayshore Blvd and San Bruno Ave	60	60	5:50–9:00 am; 4:45–7:10 pm
Executive Park Shuttle	Balboa Park Station to Executive Park via Recology	30-45	30-45	6:10–8:15 am; 3:05–5:50 pm

Source: SFMTA, 2014; SamTrans, 2014; ; BART, 2014; Shuttle routes, 2014; Fehr & Peers, 2014.

3.4 Transit Supply

This section describes the transit services currently provided in the Corridor, including routes, service hours, frequencies and stop locations. Transit supply is documented based on Muni, SamTrans, and independent shuttle scheduled service. Figure 6 shows transit service through the study area, and Table 5 provides a summary of the weekday service of all transit routes servicing the Geneva-Harney Corridor.

FUTURE TRANSIT SERVICE

There are a wide range of transit improvements that are planned for the Study Area or would affect travel between the Study Area and key destinations. These are listed below in Table 6. These are baseline assumptions for either 2020 or 2040. Figure 7 (next page) illustrates the transit network changes assumed for 2020.

MAJOR TRANSIT HUBS

In addition to bus transit service on the east-west Geneva-Harney Corridor, the study area has several facilities that serve as major transfer centers and a Muni Metro maintenance center.

BALBOA PARK STATION

The Balboa Park Station is a designated transit center in the San Francisco General Plan. It opened for service in 1973. Daily exits (11,500) at the Balboa Park Station are the ninth highest in the BART system; it is the fifth busiest BART station outside of downtown San Francisco, based on BART fiscal year 2014 weekday average exits. The Balboa Park Station is situated between I-280 and San Jose Avenue.

BAYSHORE STATION

The Bayshore Station is presently located just east of Bayshore Boulevard, north of Geneva Avenue. This station is on the Caltrain Peninsula Corridor, which presently runs between San Francisco and Gilroy. This station has several shuttles that provide dedicated service to area workplaces.

SUNNYDALE STATION

The Sunnydale Station is located on Bayshore Boulevard and Sunnydale Avenue, just north of Geneva Avenue. The station has become an important transfer location between the T-Third Line's southern terminus and the 9 San Bruno route.

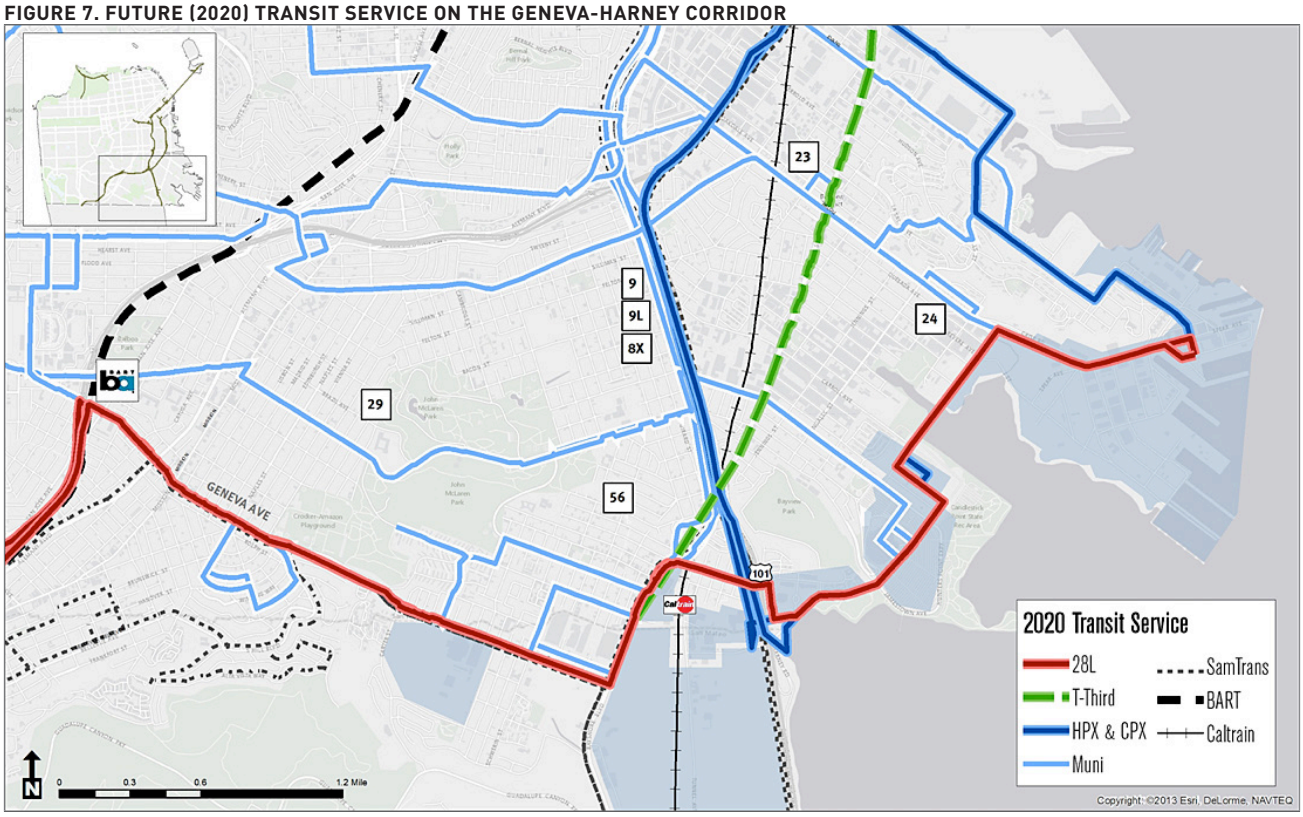
PHELAN LOOP

The Phelan Loop is a City-owned property which serves as a terminal for Muni routes, including the 9 San Bruno and the 49 Mission/Van Ness.

TABLE 6. FUTURE TRANSIT PROJECTS PROXIMATE TO GENEVA-HARNEY CORRIDOR STUDY AREA

TRANSIT NETWORK PROJECT	PROJECT DESCRIPTION (LAND USE-SPECIFIC)	YEAR ASSUMED IN BASELINE
Geneva-Harney Bus Rapid Transit	The "Baseline" assumption of this BRT service does not include the refinements analyzed in this Study, and therefore assumes BRT service outside the CPHPS area as a high-frequency, mixed-flow operation of 60-foot articulated buses west of Executive Park by way of Executive Park West, Blanken, Bayshore and Geneva. Without the specific investments to facilitate BRT service outlined and analyzed in this Study, the SFMTA would likely impose traffic signal, traffic lane design and on-street parking changes along this corridor to ensure that bus operation would be as reliable and traffic-protected as feasibly possible.	2020
Muni Forward	Creates a rapid bus network, improving reliability, safety, and access; enhances 8 Bayshore and 29 Sunset in Study Area	2020
Muni CPX	Express bus service between Downtown/SoMa and Candlestick Point	2020
Muni HPX	Express bus service between Downtown/SoMa and Hunters Point.	2020
Muni Candlestick-Hunters Point Line Extensions	Extensions of 24-Divisadero, 23-Monterey, 44-O'Shaughnessy, 48-Quintara, and 29-Sunset into Candlestick Point and Hunters Point Shipyard neighborhoods. Add Candlestick Point Shuttle (29 short).	2020
Central Subway (Muni T-Third)	Central Subway will run above ground from 4th and King to 4th and Harrison, and below ground from 4th and Harrison, along Stockton, to Chinatown. Phase 1 will have 7.5 minute headways, Full build will have 5 minute headways.	2020 (Phase 1)
2040 (Phase 2)		
Caltrain Electrification	Electrifies the Caltrain Corridor from San Francisco's 4th and King Caltrain Station to Tamien Caltrain Station in San Jose, converts diesel-hauled to Electric Multiple Unit (EMU) trains, and increases service up to six Caltrain trains per peak hour per direction. Increases service at the Bayshore Caltrain Station from 1 train per hour per direction to 2 trains per hour per direction.	2020
Muni T-Third Extension to Bayshore Caltrain	Extends Muni T-Third from its current terminus at Sunnydale Station to the Bayshore Caltrain Station with loop routing from Bayshore Boulevard.	2040
Caltrain Downtown Extension (DTX)	Creates a new San Francisco Caltrain terminus at the Transbay Transit Center extending Caltrain 1.3 miles from Fourth and King streets to the new TTC at First and Mission streets. It also provides accommodations for future high-speed rail service.	2040

FIGURE 7. FUTURE (2020) TRANSIT SERVICE ON THE GENEVA-HARNEY CORRIDOR



GENEVA DIVISION COMPLEX

The Geneva Division Complex consists of three elements: the Geneva Division, the Upper Yard and Muni's Metro Center. The Geneva Division is the home to Muni's Historic Streetcar Fleet.

3.5 Transit Demand

This section describes the patterns of ridership on transit that currently serves the Geneva-Harney Corridor: the overall number of riders and the most heavily used bus stops. Inclusive of Muni bus, Muni Metro, SamTrans, Caltrain, and BART over 50,000 daily boardings and alightings occur within the Corridor demonstrating the high existing demand for transit.

RIDERSHIP

Table 7 presents average daily ridership at the transit stops on Geneva Avenue, Bayshore Boulevard and Blanken Avenue between Phelan Loop and Executive Park for the Muni and SamTrans routes that operate along the Corridor. The bus route with the highest ridership in the study area is the 8X Bayshore, with almost 13,000 average daily boardings and alightings. The next busiest routes in the study area are the 29 Sunset and 43 Masonic, with around 6,000 average boardings and alightings per day. The T-Third Line sees on average around 2,300 daily boardings and alightings at the stops on Bayshore Boulevard in the Corridor. Average weekday ridership on SamTrans route 292 is around 3,300 across the entire line.

The Muni bus stops on the study corridor serve over 32,000 boardings and alightings daily on routes 8X, 8AX, 8BX, 9, 29, 43, 54, 56 and 88. The Western Segment is the busiest by far, serving 92 percent of average daily Muni bus ridership on the Corridor. The Central Segment serves seven percent of average daily ridership, and the Eastern Segment serves the remaining one percent. Table 7 presents average daily Muni bus ridership by corridor segment.

BUSIEST STOPS

Total average daily ridership at the transit stops along the Corridor varies substantially. Ridership depends largely on the number of transit routes serving the stop and whether the stop is a local stop serving the neighborhood or a transfer point to other bus or rail lines. The Western Segment contains the three busiest stops on the Corridor: Balboa Park Station, Geneva Avenue/Mission Street, and Geneva Avenue/Cayuga Avenue. Table 7 (next page) presents average daily ridership at the top five busiest Muni bus stops by corridor segment.

TABLE 7. AVERAGE DAILY MUNI RIDERSHIP AT FIVE BUSIEST TRANSIT STOPS BY SEGMENT ON THE GENEVA-HARNEY CORRIDOR

	AVERAGE DAILY RIDERSHIP WITHIN STUDY AREA*		
STREET/STATION STOP	**BOARDINGS**	**ALIGHTINGS**	**TOTAL**
Western Segment, Eastbound			
Geneva Ave & Ocean Ave	1,125	219	1,344
Balboa Park Station	3,484	1,415	4,899
Geneva Ave & Cayuga Ave	330	285	615
Geneva Ave & Mission St	2,181	2,469	4,650
Geneva Ave & Naples St	244	409	653
WESTERN SEGMENT (EB) TOTAL—BUSIEST STOPS	7,364	4,797	12,161
Western Segment, Westbound			
Geneva Ave & Mission St	2,124	1,839	3,963
Geneva Ave & Cayuga Ave	476	274	750
Balboa Park Station	2,062	3,685	5,747
Geneva Ave & Howth St	232	547	779
Phelan Loop	0	929	929
WESTERN SEGMENT (WB) TOTAL—BUSIEST STOPS	4,894	7,274	12,168
Central Segment, Eastbound			
Geneva Ave & Santos St	276	461	737
Geneva Ave & Rio Verde St	180	30	210
Geneva Ave & Schwerin St	116	0	116
CENTRAL SEGMENT (EB) TOTAL—BUSIEST STOPS	572	491	1,063
Central Segment, Westbound			
Geneva Ave & Schwerin St	0	157	157
Geneva Ave & Rio Verde St	47	149	196
Geneva Ave & Castillo St	1	29	30
Geneva Ave & Santos St	458	357	815
CENTRAL SEGMENT (WB) TOTAL—BUSIEST STOPS	506	692	1,198
Eastern Segment, Eastbound			
Bayshore Blvd & Blanken Ave	33	23	56
Blanken Ave & Tunnel Ave	11	9	20
Blanken Ave & Peninsula Ave	7	10	17
Blanken Ave & Nueva Ave	4	15	19
Blanken Ave & Executive Park	11	20	31
EASTERN SEGMENT (EB) TOTAL—BUSIEST STOPS	66	77	143
Eastern Segment, Westbound			
Executive Park	10	0	10
Blanken Ave & Executive Park	6	0	6
Blanken Ave & Nueva Ave	8	0	8
Blanken Ave & Peninsula Ave	2	0	2
Blanken Ave & Tunnel Ave	6	4	10
EASTERN SEGMENT (WB) TOTAL—BUSIEST STOPS	32	4	36

* Ridership figures include routes 8X, 8AX, 8BX, 9, 29, 43, 54, 56, and 88. The Central Segment has fewer than five Muni bus stops.

Source: SFMTA, 2011; Fehr & Peers, 2014

3.6 Transit Operations

This section analyzes transit operating performance, with respect to the travel times and speeds of buses on the three segments of the Geneva-Harney Corridor. Muni's average bus speed Citywide is approximately 8.1 mph. Within the Corridor, average speed varies between 3.2 mph and 25 mph demonstrating that certain segments incur significant congestion that affect operational efficiency and reliability.

SPEED AND TRAVEL TIME

Table 8 (next page) presents transit pace and travel time under AM and PM peak hour conditions for the Muni bus routes that operate on the Corridor. Route 8AX has been excluded from this analysis, since it has only two stops on the Corridor. Transit pace varies widely on the Corridor, ranging from four to 19 minutes per mile. The Central Segment is the fastest of the three, averaging five minutes per mile during the AM period and four to seven minutes per mile during the PM period. The Western Segment is the slowest, with many lines traveling on average at a pace of over 10 minutes per mile during the AM and PM periods.

Travel time variability on the Corridor is also very high. Almost all Muni bus lines operating on the Geneva-Harney Corridor have a coefficient of variation for travel time over 20 percent. This metric is calculated as the standard deviation of travel time divided by the mean travel time, and it measures travel time reliability. A higher percentage indicates a higher level of variability in travel time, and therefore lower travel time reliability.

3.7 Pedestrian Conditions

The purpose of the pedestrian assessment is to assess walkability along the Geneva-Harney Corridor, as well as pedestrian comfort and safety at intersections. Walkability is important for preserving Geneva Avenue and its neighboring streets as desirable places to live and work. It is also a critical component of a successful transit system, since every transit trip begins with a walk trip. Safety along the corridor is also highlighted through an analysis of collision data.

WESTERN SEGMENT: GENEVA BETWEEN BALBOA PARK AND SANTOS

Pedestrian facilities on Geneva Avenue are of poor quality. Sidewalks provided on both sides of the roadway are narrow, and the pedestrian right-of-way is often blocked by parked cars. Pavement quality is generally poor, with large cracks and tree roots breaking through the sidewalk. Pe-

destrian crossings at signalized intersections are marked with standard or continental striping, are activated with push buttons, and often have pedestrian countdown heads. Many of the unsignalized intersections along Geneva Avenue do not have marked pedestrian crossings, making the spacing between pedestrian crossings exceptionally large. Most transit stops east of Mission Street are post (flag and pole) stops.

CENTRAL SEGMENT: GENEVA BETWEEN SANTOS AND BAYSHORE

Pedestrian conditions on Geneva Avenue in the Central Segment are sparse. Already narrow sidewalks on the north side are reduced to two feet of passable space by parked cars, overgrown trees, and utility poles. Untrimmed weeds tear up the narrow pavement on the south side of the roadway in front of the PG&E power station. Intersections are very wide, and pedestrians are forced to cross as many as six lanes of traffic and two parking lanes with very limited crossing time. A concrete raised median provides minimal refuge for pedestrian between Rio Verde Street and Schwerin Street. There are no tran-

TABLE 8. EXISTING AM AND PM PEAK HOUR TRANSIT PACE AND TRAVEL TIME FOR MUNI BUS ROUTES ON THE GENEVA-HARNEY CORRIDOR

	AM PEAK PERIOD[1]				PM PEAK PERIOD[1]			
ROUTE	**PACE[2]** (min/mi)	**TRAVEL TIME[3]** (min:sec)	**TRAVEL TIME STANDARD DEVIATION[4]** (min:sec)	**COEFFICIENT OF VARIATION[4]** (s.d./mean)	**PACE[2]** (min/mi)	**TRAVEL TIME[3]** (min:sec)	**TRAVEL TIME STANDARD DEVIATION[4]** (min:sec)	**COEFFICIENT OF VARIATION[4]** (s.d./mean)
Western Segment								
8X Bayshore Express								
Westbound	9.01	17:20	02:32	15%	6.63	12:37	00:41	5%
Eastbound	10.67	21:12	05:58	28%	14.92	29:41	05:34	19%
8BX Bayshore B Express								
Westbound	-	-	-	-	8.46	16:13	03:00	19%
Eastbound	11.39	22:29	05:13	23%	-	-	-	-
29 Sunset								
Westbound	10.33	06:49	01:53	28%	10.62	07:00	01:46	25%
Eastbound	7.93	04:37	01:14	27%	8.86	05:05	01:08	22%
43 Masonic								
Westbound	11.52	09:41	03:05	32%	10.16	08:33	02:24	28%
Eastbound	8.21	08:06	02:45	34%	10.67	10:31	02:14	21%
54 Felton								
Westbound	9.06	08:14	01:47	22%	12.23	11:01	01:53	17%
Eastbound	10.77	11:38	02:25	21%	9.47	10:20	02:01	20%
88 BART Shuttle								
Westbound	10.82	05:15	01:15	24%	-	-	-	-
Eastbound	-	-	-	-	19.21	07:36	02:15	30%
Central Segment								
9 San Bruno								
Westbound	5.53	02:10	00:28	21%	7.22	02:57	00:47	26%
Eastbound	5.49	01:24	00:31	37%	4.84	01:14	00:27	36%
Eastern Segment								
56 Rutland								
Westbound	13.43	07:00	02:54	41%	7.75	04:17	01:40	39%
Eastbound	7.51	05:08	01:33	30%	7.43	04:54	01:28	30%

NOTES:

[1] The AM peak period used for this analysis is 6:00 AM to 9:00 AM; the PM peak period used for this analysis is 4:00 PM to 7:00 PM.

[2] Pace is average bus speed through the Corridor Segment, excluding dwell time and re-entry delay at stops. Pace is calculated as travel time, excluding dwell time and re-entry delay, divided by travel distance.

[3] Travel Time is average time for a bus to travel the length of the Corridor Segment, from first stop to last stop. Corridor Segment lengths vary.

[4] Travel Time Standard Deviation and Coefficient of Variation measure the variability of bus travel time on the Corridor. A high value indicates high travel time variability, and .therefore lower travel time reliability. The Coefficient of Variation is calculated as the standard deviation of travel time divided by the mean travel time.

Source: SFMTA APC data, August through October, 2013; Fehr & Peers, 2014.

sit shelters and no pedestrian seating on this segment of Geneva Avenue.

EASTERN SEGMENT: BAYSHORE TO EXECUTIVE PARK

The existing street configuration provides a relatively wide sidewalk on Bayshore Boulevard with around six feet of walking space. However, no sidewalk is provided on the east side of Bayshore Boulevard south of Sunnydale Avenue. Pedestrian crossings between Geneva Avenue and Blanken Avenue are signalized and marked with standard striping. Crossing distances are very long, and signal phases are short in duration such that pedestrians with limited mobility or disabilities are often forced to stop midway across the intersection in medians provided along the light rail tracks. New pedestrian amenities including curb cuts with truncated domes, push buttons, signal heads, and transit shelters were installed during the Muni T-Third construction.

Blanken and Lathrop Avenues are narrow residential streets with wide sidewalks on both sides. Crossings are unsignalized, marked with standard striping, and occur frequently given the short blocks.

Tunnel Avenue has wide sidewalks of good quality around the Caltrain Bayshore Station. North of the train station, sidewalks are narrow and poorly maintained; while south of the station no sidewalks are provided. No pedestrian crossings are marked along this stretch of the roadway.

Beatty Avenue is an industrial street with a narrow sidewalk provided on a portion of its western end. There are no marked pedestrian crossings.

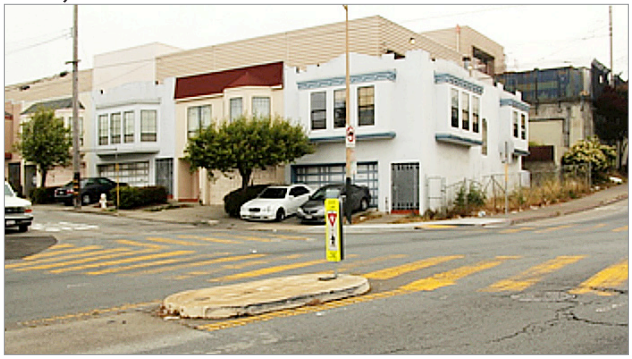
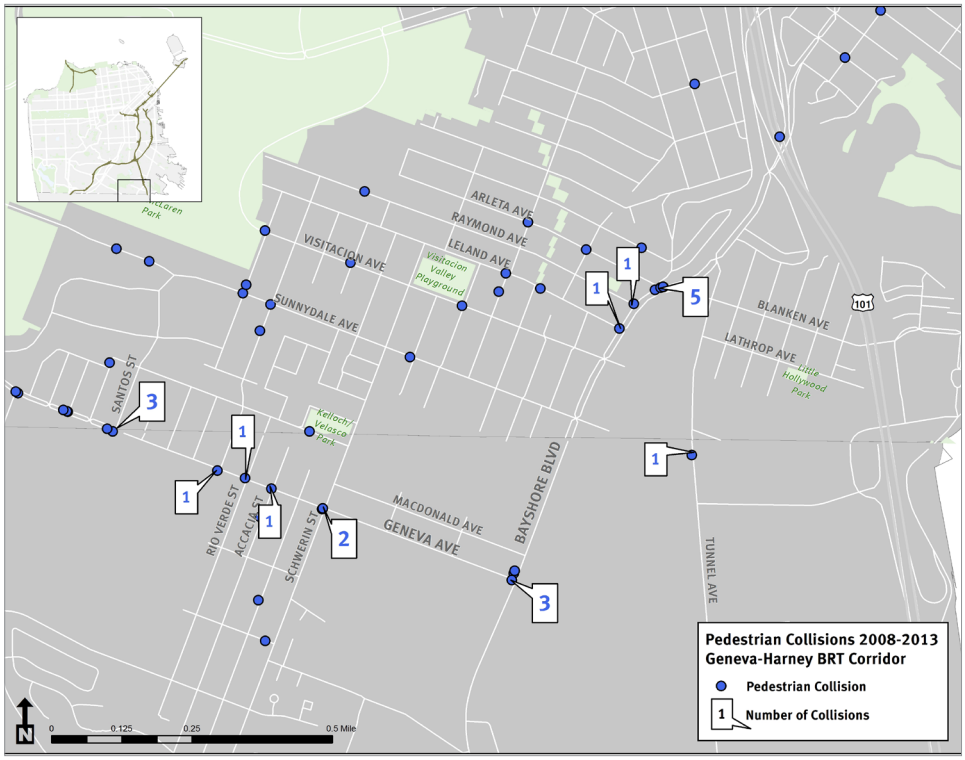


FIGURE 8. REPORTED PEDESTRIAN COLLISIONS ON THE GENEVA-HARNEY CORRIDOR



PEDESTRIAN SAFETY

Walkability and pedestrian safety are critical to a successful transit system. The conditions through which potential transit riders walk, wait, or otherwise access transit often determine whether they choose to ride. This section on pedestrian safety focuses on collisions involving pedestrians on the Corridor.

The pedestrian safety analysis uses data from recorded incidents in SWITRS, the same database utilized for the roadway safety analysis. When analyzing safety data such as SWITRS, it is important to consider both the absolute number of incidents reported, as well as the pedestrian exposure rate. An intersection that has a high number of incidents, but also has high volumes of pedestrian traffic, may require a different treatment than an intersection that has little pedestrian traffic but a disproportionately high incidence of collisions.

Figure 8 shows reported pedestrian collisions that occurred in the Geneva-Harney BRT Study Area between January 2008 and January 2013, including 22 along the Corridor. Notably, the intersection at Bayshore Boulevard and Arleta Avenue experienced five pedestrian collisions during the analysis period, more than any other intersec-

tion in the study area. This result is consistent with the analysis undertaken by SFMTA for WalkFirst, which identified the intersection as a high injury location.

3.8 Bicycle Conditions

This section describes bicycle facilities, comfort and safety in the study area.

FIGURE 9. EXISTING BICYCLE NETWORK ON THE GENEVA-HARNEY CORRIDOR

WESTERN SEGMENT: GENEVA BETWEEN BALBOA PARK AND SANTOS

Geneva Avenue is a designated bicycle facility and is part of Route 90 on San Francisco's Bicycle Network.

Bicycle facilities vary on Geneva Avenue. Full lanes exist on Geneva Avenue between Paris Street and Moscow Street and in the vicinity of the Cow Palace between Brookdale Avenue and Pasadena Street. West of Paris Street, "sharrow" pavement markings are used in locations where there is not enough room for separate lanes. Sharrows serve to inform motorists that cyclists will be in the lane and help guide the bicyclists within the lane.

CENTRAL SEGMENT: GENEVA BETWEEN SANTOS AND BAYSHORE

There are currently no bicycle facilities in the Central Segment of the Geneva-Harney Corridor, although the roadway is still considered part of Route 90. Daly City received a TDA Article 3 Grant to build bicycle lanes and bulb outs on this portion of Geneva Avenue within the city limits, which when constructed will help connect the bicycle facilities on the western section of Geneva Avenue to the bicycle lanes on Bayshore Boulevard.

EASTERN SEGMENT: BAYSHORE TO EXECUTIVE PARK

Bayshore Boulevard is a designated bicycle facility, and between Geneva Avenue and Blanken Avenue it is part of Route 5 on San Francisco's Bicycle Network. There are northbound and southbound bicycle lanes along the stretch of roadway.

Tunnel Avenue and Beatty Avenue are designated bicycle facilities and are part of Route 905 on San Francisco's Bicycle Network. Both roadways are wide, allowing bicyclists to ride outside the path of motor vehicle traffic, and sharrows are marked on the pavement of Tunnel Avenue.

BICYCLE SAFETY

Figure 10 (next page) shows reported bicycle collisions that occurred in the Geneva-Harney BRT Study Area between January 2008 and January 2013. One collision involving a bicyclist occurred on the Corridor during that time period.

FIGURE 10. REPORTED BICYCLE COLLISIONS ON THE GENEVA-HARNEY CORRIDOR

3.9 Auto Conditions

This section documents travel conditions for cars on the Geneva-Harney Corridor, including traffic volumes, operational performance of intersections, and a comparison of auto with transit travel times and speeds.

INTERSECTION OPERATIONS

One way to evaluate intersection operations on an urban street is "level of service," or LOS. Transportation engineers and planners commonly use a grading system called level of service (LOS) to measure and describe the operational status of intersections on a local roadway network. LOS is a semi-quantitative description of an intersection's operation, ranging from LOS A (indicating free flow traffic conditions with little or no delay) to LOS F (representing oversaturated conditions with traffic flows exceeding design capacity, resulting in long queues and delays).

Traffic generally operates well along the Geneva-Harney Corridor, with all but one study intersection operating at LOS D or better during the AM and PM peak periods (see Figure 11, next page, and Table 9). The one exception is the all-way stop-controlled Geneva Avenue/Cayuga Avenue intersection, where the worst approach (Geneva Avenue eastbound) operates at LOS E during the AM and PM peak periods. This intersection has been identified by the SFMTA as a high collision intersection and design for signalization of this intersection is underway.

AVERAGE DAILY TRAFFIC

Average daily traffic (ADT) on segments of the Corridor was estimated using PM peak hour turning movement volumes at selected study intersections. ADT on the Corridor segments to the west of Santos Street is based on traffic counts conducted in 2011; ADT to the east of Santos Street is based on traffic counts conducted in 2013. The Geneva-Harney Corridor experiences a range of about 17,000 to 19,000 ADT. As shown in Table 10 (next page), the highest average daily traffic levels occur in the westbound direction on Geneva Avenue from Bayshore Boulevard to Mision Street.

TABLE 9. INTERSECTION DELAY AND LEVEL OF SERVICE—EXISTING CONDITIONS, AM AND PM PEAK PERIODS

		AM PEAK HOUR		PM PEAK HOUR	
INTERSECTION	**CONTROL**	**DELAY[1]**	**LOS**	**DELAY[1]**	**LOS**
Geneva/San Jose	Signal	30	C	25	C
Geneva/Cayuga	AWSC[2]	**40 (EB)**	**E**	**46 (EB)**	**E**
Geneva/Mission	Signal	18	B	20	C
Geneva/Moscow	Signal	-	-	17	B
Geneva/Carter	Signal	28	C	38	D
Geneva/Santos	Signal	-	-	9	A
Geneva/Schwerin	Signal	-	-	-	-
Geneva/Bayshore	Signal	25	C	24	C
Sunnydale/Bayshore	Signal	19	B	20	C
Blanken/Bayshore	Signal	‹10	A	11	B
Tunnel/Bayshore	Signal	27	C	20	B
Blanken/Tunnel	AWSC[3]	‹10	A	‹10	A
Harney/Alanna/ Thomas Mellon	SSSC[3]	‹10	A	‹10	A

NOTES:

Intersections operating at LOS E or LOS F highlighted in bold. For unsignalized intersections operating at LOS E or LOS F, worst approach presented in ( ). For signalized intersections operating at LOS F, volume-to-capacity (v/c) ratio presented in ( ).

[1] Delay presented in seconds per vehicle using HCM 2000 Method.

[2] AWSC = all-way stop-controlled; SSSC = side street stop-controlled.

Source: Fehr & Peers 2014; TEP Transportation Impact Study, July 2013; Brisbane Baylands Specific Plan EIR, 2014.

FIGURE 11. AUTO STUDY LOCATIONS AND AM/PM LOS

ROADWAY SAFETY

Collision data for the Geneva-Harney Corridor come from the State of California's Statewide Integrated Traffic Records System (SWITRS).

Figure 12 (next page) shows reported automobile collisions that occurred in the Geneva-Harney BRT Study Area between January 2008 and January 2013. Consistent with trends for pedestrian and bicycle collisions, the intersection at Bayshore Boulevard and Arleta Avenue saw more automobile collisions than any other intersection in the study area.

TABLE 10. AVERAGE DAILY TRAFFIC BY SEGMENT ON THE GENEVA-HARNEY CORRIDOR

SEGMENT	AVERAGE DAILY TRAFFIC[1]
Western Segment—Geneva Ave. betw San Jose Ave. and Mission St.	
Eastbound	9,000
Westbound	9,000
TOTAL	18,000
Western Segment— Geneva Ave. betw Mission St. and Santos Ave.	
Eastbound	8,000
Westbound	11,000
TOTAL	19,000
Central Segment—Geneva Ave. betw Santos St. and Bayshore Blvd.	
Eastbound	6,00
Westbound	11,000
TOTAL	17,000
Eastern Segment—Bayshore Blvd. betw Geneva Ave. and Blanken Ave.	
Northbound	9,000
Southbound	9,000
TOTAL	18,000

[1] Source: Fehr & Peers 2014; TEP Transportation Impact Study, July 2013; Brisbane Recology Modernization and Expansion, 2014.

3.10 Parking Conditions

On-street parking on the Geneva-Harney Corridor not only provides space for delivery vehicles, residents, and shoppers to park, but serves as a buffer between pedestrians on the sidewalk and moving vehicles in the street. However, parking conditions can large impacts on transit delay. Crowded buses can be forced to wait while vehicles make parallel parking movements or must attempt to pass double-parked vehicles by merging into traffic. This increases transit travel times and increases transit travel time variability by reducing predictability.

PARKING SUPPLY AND OCCUPANCY

Parking opportunities on Geneva Avenue include on-street parking spaces and off-street parking lots. On-street parking regulations vary by location along the Corridor, as shown in Table 11 (next page). The primary data sources for parking supply and weekday daytime occupancy are a field survey conducted in 2014 and the SFMTA Geneva Avenue Corridor Transit Preferential Street Existing Conditions Report (TPS, 2009). In the Western Segment, parking demand ranges from 80 to 100 percent occupancy west of Mission Street to 60 to 75 percent occupancy east of Mission Street. On-street parking is generally unrestricted in the Central Segment of the Geneva-Harney Corridor on Geneva Avenue between Santos Street and Bayshore Boulevard. Occupancy rates range from 80 to 100 percent on the north side and 50 to 60 percent on the south side. On-street parking is prohibited on the east side of Bayshore Boulevard between Geneva Avenue and Blanken Avenue. The blocks on the west side of Bayshore Boulevard have a combination of meters, unrestricted parking, and prohibited parking. Occupancy rates on the west side range from 50 to 60 percent. On-street parking on the south face of Blanken Avenue between Bayshore Boulevard and Tunnel Avenue is restricted to 2 hours. Blanken and Lathrop Avenues provide unrestricted on-street parking along their length between Tunnel Avenue and US 101. Occupancy rates range between 70 and 90 percent, increasing with proximity to Bayshore Avenue and Tunnel Avenue.

FIGURE 12. REPORTED VEHICLE COLLISIONS ON THE GENEVA-HARNEY CORRIDOR

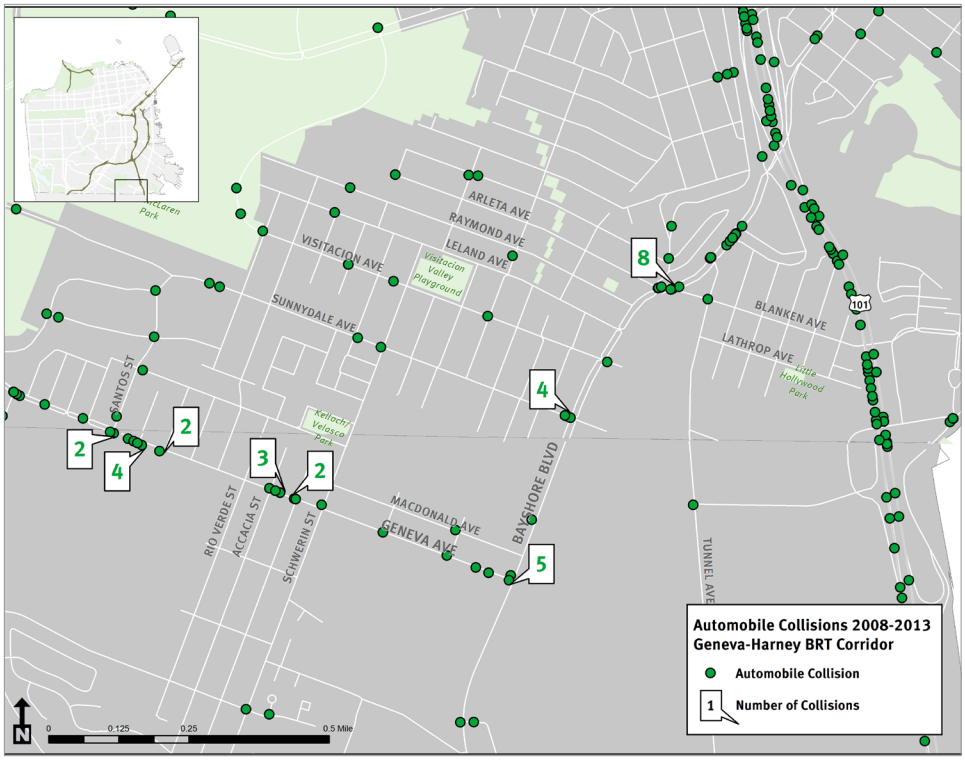


TABLE 11. ON-STREET PARKING SUPPLY

LOCATION	TYPE
Western Segment	
Geneva Avenue between I-280 and San Jose	Parking prohibited
Geneva Avenue between Delano and San Jose	South side: unrestricted North side: parking prohibited
Geneva Avenue between Alemany and Delano	Residential Permit Parking Multiple driveways
Geneva Avenue between Mission and Alemany	Partially metered
Geneva Avenue between Mission and Paris	Metered
Geneva Avenue between Paris and Naples	Un-metered 1 hour
Geneva Avenue between Naples and Santos	Unrestricted
Central Segment	
Bayshore Boulevard between Geneva and Blanken	
Eastern Segment	
Bayshore Boulevard between Geneva and Blanken	East side: parking prohibited West side: metered; unrestricted; parking prohibited
Blanken Avenue between Bayshore and US 101	Unrestricted
Tunnel Avenue between Blanken and Beatty	Unrestricted
Beatty Avenue between Tunnel and Harney	Unrestricted; parking prohibited

Source: TPS, field surveys conducted in 2008 and 2009; Fehr & Peers, 2014.

3.11 Urban and Landscape Design

Urban design addresses the appearance and environmental quality of an area, especially from the perspective of transit riders. At the corridor level, urban design is concerned with the identity and quality of the transit system. At the neighborhood level, it is concerned with the quality of transit riders' experiences at bus stops, on sidewalks and in crosswalks. It also addresses the vitality of businesses fronting the street, particularly as it is affected by parking deliveries and issues of visibility. This section discusses the existing urban and landscape design experienced by walkers, bikers and transit riders on the Geneva-Harney Corridor.

The current design, while functional as an automobile corridor, does not include many of the basic amenities necessary to make it an attractive space for pedestrian use. Narrow sidewalks, large retaining walls, chain link fences, vacant lots, and minimal landscaping make the area uncomfortable and unpleasant to travel through by foot or bicycle.

WESTERN SEGMENT: GENEVA BETWEEN BALBOA PARK STATION AND SANTOS

Between San Jose Avenue and Delano Avenue, the streetscape on the south side of Geneva Avenue is dominated by the twenty foot high retaining wall that supports the Geneva Yard. A number of trees are planted in front of this wall, but they have been pruned to improve public safety. Geneva Avenue has very few street trees on the section between Delano and Cayuga Avenues. The streetscape of this section of Geneva Avenue is dominated by the varied shapes and windows of the houses that are constructed on small street setbacks. Many of these homes have small manicured trees in planters. Irregular red masonry roofs, non-rectangular windows and angled surfaces make this section of Geneva visually interesting. The area between Cayuga Avenue and Mission Street is dominated by the large vacant lot and chain link fencing at the former gas station site at Alemany Boulevard.

On Geneva Avenue, just west of Mission Street, an eclectic mix of older bungalows on the north side of Geneva Avenue provides a contrast with the collection of higher density housing on the south side.

Travelers on Geneva Avenue approaching Mission Street from the west are provided with a unique view of Mission Street store fronts because of the angled approach and the gas station site on the northwest corner. Likewise, travelers on Geneva Avenue approaching Mission Street have a full view of the building store fronts on the southwest corner of the intersection. These views of Mission Street from Geneva provide a unique element of visual interest to the corridor. Between Mission Street and Munich Avenue, Geneva Avenue anchors the Crocker Amazon Community which contains two relatively discrete business centers. Unlike most other sections of the Geneva Avenue Corridor in San Francisco, the section of Geneva Avenue east of Mission Street has a straight and level alignment. A massive set of timber utility poles with high voltage lines on top dominates the north side of the street. Running down the middle of Geneva Avenue is a modest raised concrete median, undecorated and un-landscaped, with 25' tall posts supporting standard twin cobrahead light fixtures. Between Lisbon Street and Edinburgh Street, Geneva Avenue is primarily residential, although several small businesses are set up in converted homes. Like other parts of Geneva Avenue, many of the homes are constructed above garages and have exterior front facing stairways that lead up to a front door on the second floor.

A secondary business district is centered at Naples Street, which serves as a center spine for the Crocker Amazon residential development. The Crocker-Amazon Playground stretches along the north side of Geneva Avenue from Moscow Street to Brookdale Avenue. Opposite the park are single family homes built above garages, occasionally interspersed with a three-story apartment building. Many of the residences have small manicured trees in planters. The apartment complex at Stoneridge Lane is a gated and walled community, creating a blank street frontage on the south side of Geneva Avenue just west of Brookdale Avenue.

CENTRAL SEGMENT: GENEVA BETWEEN SANTOS AND BAYSHORE

The south side of Geneva Avenue from Carter Street (just west of Santos Street) to Rio Verde Street is dominated by the Cow Palace – both the facility itself and its extensive supply of surface parking lots. The entire multi-block complex is surrounded by wire fences and a row of hedge trees and bushes. Across from the Cow Palace on Geneva Avenue is a stretch of small commercial establishments, at times with walk-up apartment units above. Between Rio Verde Street and Schwerin Street, Geneva Avenue is a mix of single-story convenience stores, fast food restaurants and single-family homes. A 72-unit luxury apartment building was recently built on the corner to Geneva Avenue and Rio Verde Street and is a dominant presence in the area. Running down the middle of the roadway is a landscaped median. East of Schwerin Avenue to its terminus at Bayshore Boulevard, Geneva Avenue is home to the PG&E power plant, which lines the south side of the street with a tall wooden fence. The north side of this stretch of Geneva Avenue is two-story single family homes built above garages and motels.

EASTERN SEGMENT: BAYSHORE TO EXECUTIVE PARK

Bayshore Boulevard is the western-most roadway of the Eastern Segment of the Geneva-Harney Corridor. The east side of Bayshore Boulevard is characterized by large development sites with wire fences and a lack of sidewalks south of Sunnydale Avenue to discourage trespassing. The west side of the street contains some active uses, including a grocery store, two gas stations, coffee shop, bank, and auto repair shops. These few commercial establishments are interspersed among a number of surface parking lots and boarded up storefronts. The Muni T-Third light rail line runs down the center of Bayshore Boulevard north of Sunnydale Avenue, and its construction came with streetscape improvements including enhanced street lighting, wider sidewalks, tree plantings, and transit shelters. Blanken and Lathrop Avenues, between Bayshore Boulevard and US 101, are typical San Francisco residential streets in an older residential neighborhood. Brightly painted two-story homes line the roadway, with ground-floor garages and small landscaped plots in front. Tree coverage is sparse. Tunnel Avenue runs along the east side of the Caltrain train tracks. The rail right-of-way is separated from the roadway by a low wire fence and wild plant growth. The west side of Tunnel Avenue is also lined by a fence that separates the street from the buildings and parking lots of the Recology Center. Beatty Avenue functions as a service road through the same Recology Center, lined by fenced-off warehouses and parking lots. To the east, Beatty Avenue meets the US 101 on-ramp and briefly parallels the freeway where it is lined by the trees and foliage that grow on the side.

CHAPTER 4

BRT ALTERNATIVES DESCRIPTION

4.1 Introduction

Muni Route 28R currently operates primarily along 19th Avenue between Fort Mason and Balboa Park BART. An extension between Balboa Park BART and the Candlestick Point- Hunters Point Shipyard development is planned to begin service by completion of Phase II of the development project, in 2023. The Geneva-Harney BRT is a proposal to improve the 28R to provide faster and more reliable service and to take advantage of the opportunity to upgrade the safety and amenities of the rights of way for all roadway users. The basic concept of this route was included in the agreements for the Candlestick Point-Hunters Point Shipyard development, and existed prior to this feasibility study. This study is intended to determine whether BRT is feasible on the Geneva-Harney Corridor, and whether there are feasible options for routing the BRT prior to the construction of the Geneva Avenue Extension.

Section 4.2 outlines the BRT design concepts used in San Francisco, as well as specific design guidelines for the development of alternatives on the Geneva-Harney Corridor. Design alternatives developed for each segment of the corridor are described in summary in Section 4.3, and in detail in Section 4.4 for Geneva Avenue, Section 4.5 for Bayshore Boulevard, and Section 4.6 for Little Hollywood. These segment alternatives were developed by the project team to best meet the project goals (Section 1.4) and design guidelines, described in Section 4.2. In Chapter 5, these segment alternatives are combined into three corridor alternatives for comparison and evaluation, as shown in Figure 15-22. Section 4.7 describes the long-term 2040 alternatives.

METHODOLOGY

The report documents alternative BRT design concepts for Muni Route 28R between Candlestick Point and Balboa Park BART that would improve travel time and reliability. Alternatives were developed by an intercity and interagency team, and through technical evaluation and community outreach. Conceptual designs for the BRT alternatives were developed by planners and engineers on the project team through real-world field reviews and using street survey drawings and satellite imagery. Significant discussion has considered the cost benefit of treatments in terms of transit travel time savings and improvements for pedestrians, bicyclists, general motor vehicle traffic, and streetscape. Some design details will need to be refined in later phases.

This is particularly important on Geneva Avenue where additional east-west alternatives are lacking or are less direct.

4.2 BRT Design Concepts

Bus Rapid Transit (BRT) is a system of improvements intended to cost-effectively reduce transit travel times, improve transit reliability, and increase ridership using bus vehicles. Cities around the world have successfully implemented BRT to achieve these goals. This section describes the key features of BRT as defined by the study team, and the design guidelines used for developing BRT alternatives in the Geneva-Harney Corridor. Design improvements will include pedestrian and bicycle facilities to meet San Francisco Complete Streets goals. This is particularly important on the Geneva-Harney corridor because significant portions of corridor streets are the only through streets.

BUSWAY AND STATION DESIGN

BRT includes high-quality station platforms with extra amenities for waiting passengers. Station platforms are larger than standard Muni stops, with more seating, larger shelters, and route information. BRT stations also include NextBus real-time arrival signs, which display actual arrival times of the next bus.

On a BRT system, passengers may pay fares at ticket-vending machines located on the station platforms. Fare pre-payment reduces delays caused when all passengers board through the front door to pay fares with cash. Fare pre-payment is enforced by a proof-of-payment system and fare inspectors. BRT passengers may also pay cash fares at the front of buses as they do today.

BRT operates in a dedicated right-of-way on the street surface. The dedicated lane allows buses to operate free of conflicts with mixed traffic. Dedicated bus lanes can be located along the curb, alongside parallel parking, or in the center of the street. Dedicated bus lanes are distinguished from mixed traffic lanes by colored pavement or other special markings and if located in the center of a roadway, are separated from mixed traffic lanes by a low curb.

DESIGN GUIDELINES

STATION PLATFORMS: Provide minimum platform width of 8.5 feet and minimum length of 130 feet, to accommodate two 60 foot articulated buses.

SAFETY: All platforms include adequate pedestrian scale lighting to enhance safety and comfort for waiting riders.

INFORMATION AND WAYFINDING: All platforms incorporate improved signage, maps, real-time bus arrival information, enhanced bus shelters. Facilitate convenient transfers by minimizing walking distance between transfers, minimizing number of intersection crossings, providing wayfinding information, and locating stations at major land uses with the most convenient transit transfers

FARE PAYMENT: Accommodate fare prepayment, including clipper and Muni passess. All door boarding would be supported as it is currently system-wide.

TRANSIT ONLY LANES: Accommodate both Muni and SamTrans vehicles. Preferred minimum lane width is 12 feet, although 11.5 feet is acceptable where right-of-way is constrained. Weaving of lanes should be minimized to optimize transit operations.

NEIGHBORHOOD ACCESS

Ensure that BRT and other Corridor improvements are well integrated with and provide access to existing and future land uses.

DESIGN GUIDELINES

LAND USE: Integrate with future potential land uses at major activity nodes.

PARKING: Maintain on-street parking where possible with parking lanes at least eight and 1/2 feet wide, although 8 feet is acceptable where right of way is constrained.

PEDESTRIAN AND BICYCLING ENVIRONMENT

Every transit trip begins with a walking trip, and so BRT includes improvements that support walking and pedestrian safety. Streetscape improvements and amenities provide a more comfortable environment for the users of the BRT system. BRT on the Geneva-Harney corridor will include pedestrian-scale sidewalk lighting, pedestrian countdown signals, and improved landscaping that also serves to buffer pedestrians and waiting passengers from motor vehicle traffic. Bike lanes will be made fully continuous, and will be marked with green paint at key conflict areas, such as at intersection approaches and where general traffic needs to cross to turn right. Some segments and alternatives propose bike lane buffers or improved protection for bicyclists by locating the bikeway between the parking lane and sidewalk.

DESIGN GUIDELINES

CROSSING DISTANCE: Reduce crossing distances between pedestrian refuges to a maximum of four lanes. Pedestrian refuges should be a minimum of four feet wide and extend through the crosswalk.

CROSSING TIMES: Provide a two and 1/2 feet per-second crossing time for pedestrians (including "walk" and flashing "don't walk" phases). Timings should allow enough time for pedestrians to cross the entire street. Pedestrian signal phase should be recalled each cycle.

LIGHTING: Use pedestrian-scale lighting near stations to provide appropriate intensities and coverage while avoiding over-lighting and glare.

BICYCLES: Provide a high quality bikeway treatment along the length of the corridor, either as a bike lane, cycle track, or mixed use pedestrian/bicycle path.

GENERAL PURPOSE TRAFFIC

While implementation of BRT in San Francisco is designed to improve safety and travel time for transit, as well as bicyclists and pedestrians, it is important to ensure efficient access for general-purpose vehicles, particularly due to a lack of alternate routes on the Geneva-Harney Corridor.

DESIGN GUIDELINES

MIXED TRAFFIC: Minimize conflicts with other vehicles, particularly turning vehicles.

LANES: Provide at least one lane in each direction for through traffic of at least 10 feet.

TURNS: Provide right and/or left turn pockets at intersections with high turn volumes. Reduce conflicts between turning vehicles and bus lanes.

SIGNAL PRIORITIZATION

BRT includes technology to ensure that time stopped at traffic signals is minimized. Transit signal priority technology allows buses nearing an intersection to extend a green light long enough for them to pass through. This technology can also provide a "queue jump" signal phase for entering and exiting bus lanes. A queue jump signal gives buses their own signal phase at intersections, allowing the bus to proceed ahead of other traffic.

BRT uses a variety of advanced traffic and transit management systems designed to improve service:

- Automatic Vehicle Location (AVL) is used to manage transit route operations in real-time, keeping buses on schedule and reducing bunching.

- NextBus real-time arrival information at station platforms provides a digital display of the actual arrival times of buses. Real- time information can also be used to notify conductors of re-routing delays or other changes.
- CCTV (closed-circuit television) at station platforms helps to provide passenger security.

DESIGN GUIDELINES

PLATFORM SITING: Platforms are sited on the far side of intersections in order to take advantage of transit signal priority.

SIGNALIZATION: Signalize intersections at stations and where appropriate to reduce delay and increase transit speeds.

TABLE 12. SUMMARY OF NEAR TERM 2020 SEGMENT ALTERNATIVES

Geneva Avenue: Balboa Park BART to Santos Street	
No Project/Baseline	Muni Forward improvements, between Balboa Park BART and Santos Street, including bus lane between Moscow Street and Santos Street.
Geneva Avenue: Santos Street to Bayshore Boulevard	
No Project/Baseline	No Muni Forward improvements Bicycle and pedestrian improvements approved by Daly City.
4-Lane General Purpose/Side Running BRT	Outside traffic lane converted to a dedicated bus lane Stations Santos Street and Oriente Street Sidewalk width remains the same as existing; At some intersections, sidewalk width is extended approx. 2 feet Bike lanes are standard width Some on-street parking removed
2-Lane General Purpose/Center Running BRT	Inside traffic lane converted to a dedicated bus lane Stations at Santos Street and Oriente Street South side sidewalks are expanded to 10 feet At some intersections, sidewalk width is extended approx. 24 feet Bike lanes are standard width with a 5 foot buffer Some on-street parking removed
Bayshore Boulevard: Geneva Avenue to Blanken Avenue	
No Project/Baseline	No Muni Forward improvements planned for this segment. No other improvements are planned.
4-Lane General Purpose/Side Running BRT	Outside traffic lane converted to a dedicated bus lane Stations at Geneva Avenue and Sunnydale Avenue West sidewalk width remains the same as existing; New east sidewalk and landscaping zone Bike lanes are standard width
Little Hollywood: Bayshore Boulevard to Executive Park Boulevard	
No Project/Baseline	There are no Muni Forward improvements planned for this segment. One lane of parking removed on Blanken Avenue to accommodate two-way bus operation
Blanken Lathrop Couplet Option 1	Converts Blanken Avenue and Lathrop Avenue into a one way couplet to provide one bus lane, one travel lane and one parking lane on each street (one lane of parking is removed on each) Construction of new right of way between Lathrop Avenue and Alanna Way Stations at Blanken Transit Mall and Harney Way Class III bike route designation (sharrows) on Blanken and Lathrop Avenues On Alanna Way one lane of westbound traffic is removed to provide a two-way bicycle path to Thomas Mellon Circle.
Blanken Lathrop Couplet Option 2	Converts Blanken Avenue and Lathrop Avenue into a one way couplet to provide one bus lane and one travel lane on each. Blanken Avenue has two lanes of parking Lathrop has one lane of parking Southern sidewalk on Lathrop is expanded to accommodate a Class 1 shared pedestrian and bicycle path Sidewalk width on Blanken reduced to accommodate two parking lanes. Construction of new right of way between Lathrop Avenue and Alanna Way On Alanna Way one lane of westbound traffic is removed to provide a two-way bicycle path to Thomas Mellon Circle. Stations at Blanken Transit Mall and Harney Way
Beatty Avenue	Tunnel Avenue: Blanken Ave to Recycle Road, no bus lane Tunnel Avenue: Recycle Road to Beatty Avenue, option to remove two lanes of parking to provide center-running bus lanes and two lanes for general traffic. Beatty Avenue is redesigned to provide center-running bus lanes and two lanes for general traffic. Sidewalks on Beatty extended to Alanna Way. On Alanna Way one lane of westbound traffic is removed to provide a two-way bicycle path to Thomas Mellon Circle. No separated bikeways Stations at Blanken Transit Mall, Tunnel Avenue/Recycle Road, and Harney Way

4.3 Summary of BRT Alternatives

A summary of the alternatives for each segment of the Geneva-Harney Corridor are shown in Table 12 (previous page). The segment alternatives were then combined into three Corridor alternatives for evaluation, as shown in Table 13.

TABLE 13. SEGMENT OPTIONS USED IN ANALYSIS OF ALTERNATIVES

	GENEVA	BAYSHORE	LITTLE HOLLYWOOD
Alternative 1	4-lane General Purpose/Side Running BRT	4-lane General Purpose/Side Running BRT	Blanken/ Lathrop Couplet Option 1
Alternative 2	2-lane General Purpose/ Center Running BRT	4-lane General Purpose/Side Running BRT	Blanken/ Lathrop Couplet Option 2
Alternative 3	2-lane General Purpose/ Center Running BRT	4-lane General Purpose/Side Running BRT	Beatty

Note:

The differences between Blanken/Lathrop Couplet Options 1 and 2 are not significant enough to provide different results for many of the evaluation criteria

4.4 Geneva Alternatives

There are two key segments of the proposed BRT Route on Geneva Avenue. Between Balboa Park BART Station and Santos Street, improvements proposed for the Muni Bus Route 8 under the TEP Travel Time Reduction Proposal would be used by Route 28R/Geneva-Harney BRT, including the planned bus lanes between Moscow Street/ South Hill and Santos Street. There are no TEP travel time improvements for the segment between Santos Street and Bayshore Boulevard, which is located within Daly City and is not part of the 8-Bayshore corridor. In this segment, there are two alternative proposals for exclusive bus lanes: A four-lane side running BRT and a two-lane center-running BRT option. These alternatives are described in detail below. BRT along this portion of the Geneva Corridor would also include pedestrian, bicycle, and streetscape improvements to improve the safety and usability of the street for all modes.

AREA SUMMARY

WESTERN SEGMENT: GENEVA BETWEEN BALBOA BART AND SANTOS STREET

The Western Segment runs between the Balboa Park Station and Santos Street along Geneva Avenue, an east-west arterial bordering the San Francisco neighborhoods of Sunnyside, Oceanview, Excelsior, Visitacion Valley and Crocker Amazon. Geneva Avenue serves as a primary east-west crosstown link connecting these San Francisco neighborhoods, the City of Brisbane, and the City of Daly City to I-280, US 101, BART, Caltrain (Bayshore Station) and Muni T-Third (Sunnydale Avenue Station).

In the Western Segment, the total width of the Geneva Avenue corridor right-of-way (including the sidewalks on both sides) varies between 80 feet and 100 feet. West of Mission Street, the Geneva Avenue right-of-way is generally 80 feet and the roadway pavement occupies 64 feet curb-to-curb. East of Mission Street to Santos Street, Geneva Avenue widens to 102 feet with a curb-to-curb pavement width of 75 feet.

SANTOS STREET TO BAYSHORE BOULEVARD (PROJECT)

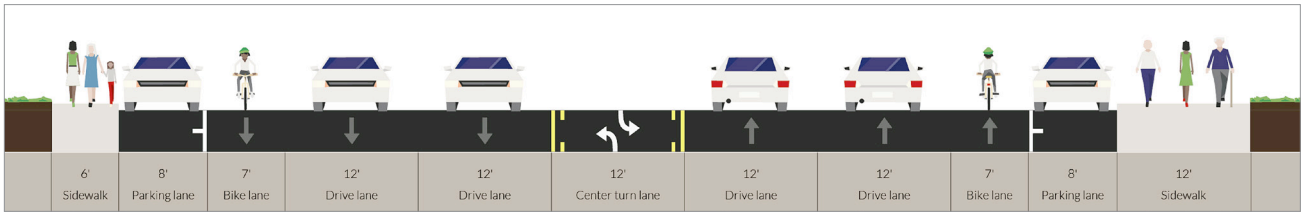
Geneva Avenue is widest between Santos Street and Bayshore Boulevard, with a 90-foot curb-to-curb right-of-way that generally holds two lanes in each direction, a wide median, left turn lanes, and parking on both sides. Narrow sidewalks are provided on both sides of Geneva Avenue. Signalized intersections have marked pedestrian crossings that are activated with push buttons. There are currently no bicycle facilities on Geneva Avenue in the Central Segment. however Daly City currently has plans and funding to close this bikeway gap. Figure 13 shows the existing typical cross section for Geneva Avenue.

CORRIDOR ALTERNATIVES

NO PROJECT (BASELINE) ALTERNATIVE

The No Project alternative assumes Muni Forward travel time reduction improvements between Balboa Park BART and Santos Street and pedestrian and bicycle improvements planned by the City of Daly City between Santos

FIGURE 13. EXISTING TYPICAL CROSS SECTION OF GENEVA AVENUE (EAST OF PASADENA STREET)



Street and Bayshore Boulevard. In the portions of the corridor where the Muni Forward improvements do not propose an exclusive bus lane, Route 28R would operate in mixed traffic lanes.

TRANSIT

Between Balboa Park Station and Santos Street, there would be no change in the bus treatments from the approved 8-Bayshore TEP improvements. Transit accommodation for the No Project alternative includes a bus lane between Moscow Street/South Hill Boulevard and Santos Street, as well as various other transit improvements between Balboa Park Station and Santos Street. As shown in Figure 14, these improvements include stop optimization, converting some flag stops to bus zones, extending some bus zones, installing a traffic signal with transit priority at Cayuga Street, installation of bulb-outs and bus bulbs, and changing the location of some bus stops from one side to the other side of the intersection. These changes are intended to reduce transit travel time, improve pedestrian access to bus stops, and make passenger loading/unloading quicker while enhancing safety.

FIGURE 14. TEP TRAVEL TIME REDUCTION PROPOSAL FOR 8X ALONG GENEVA

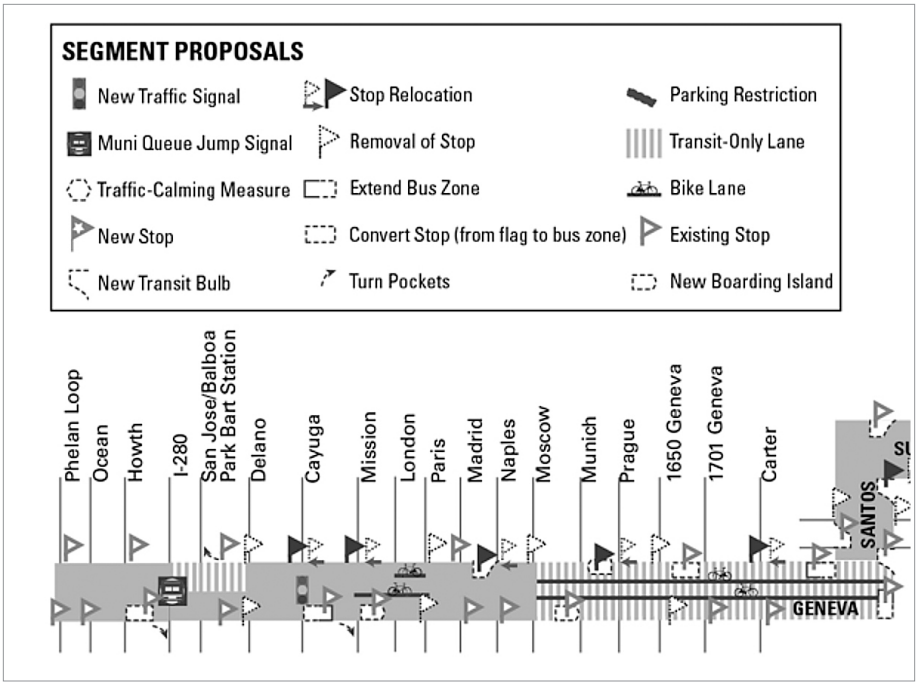
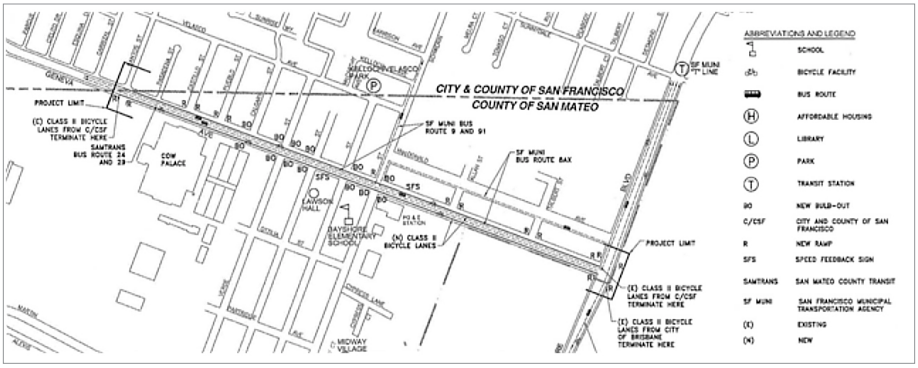


FIGURE 15. PLANNED PEDESTRIAN AND BICYCLE IMPROVEMENTS ON GENEVA AVENUE



PEDESTRIAN ACCOMMODATION

Pedestrian improvements in the TEP proposal include the installation of three new boarding islands and one bus bulb along the Geneva Avenue portion of the route. These will reduce crossing distances for all pedestrians and improve accessibility to passengers boarding and alighting at those stop locations. Daly City plans construction of a number of curb ramps and bulbouts between Santos Street and Bayshore Boulevard, as shown in Figure 15 that will significantly improve pedestrian experience and crossing distance.

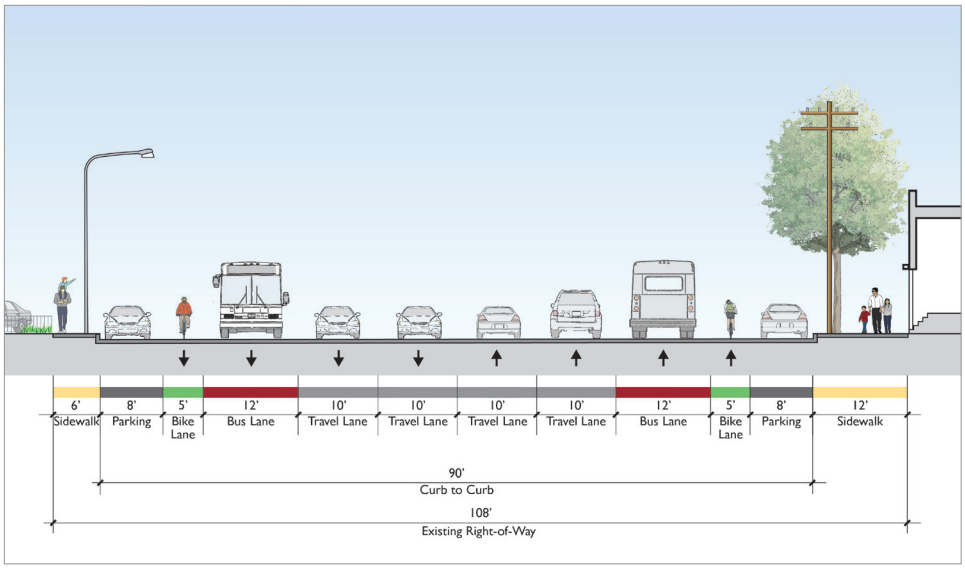
BICYCLE ACCOMMODATION

There are no bicycle improvements proposed by Muni Forward improvement projects. Daly City plans to install bike lanes on Geneva between Santos Street and Bayshore Boulevard, as shown in Figure 15 that will close the existing bicycle network gap between Santos Street and Bayshore Boulevard.

4 LANE GENERAL PURPOSE / SIDE RUNNING BRT ALTERNATIVE

The side running alternative provides four general purpose travel lanes, two in each direction, in addition to parking and bike lanes on both sides of the street. Sidewalk width would remain the same, with 12 feet on the north side and 6 feet on the south side. Some on-street parking is removed near transit stations and intersections. Figure 16 and Figure 17 (next page) show the proposed cross section and conceptual plan drawings of the 4 Lane General Purpose/Side Running BRT option on Geneva Avenue.

FIGURE 16. 4 LANE GENERAL PURPOSE / SIDE RUNNING BRT—TYPICAL MIDBLOCK CROSS SECTION



TRANSIT

In this alternative side running transit lanes are installed adjacent to the bike lanes and parking lanes. Transit lanes would be clearly marked with red paint, pavement stencils, and street signage to discourage general purpose vehicles from using the lanes. No physical barriers are possible in this alternative because vehicles need to enter the lane to park, access driveways, and turn right. Side-running BRT treatments typically provide fewer travel time benefits due to these conflicts. Parking will be removed on both sides of the street on blocks with a station platforms.

GENERAL PURPOSE LANES

Four travel lanes are proposed in this alternative because less street width is needed for stations. Additional general purpose traffic capacity, as compared with the Center Running alternative, may be important due to increased demand or during special events at the Cow Palace. Additional capacity is likely to encourage more people to drive than finding alternative transportation. This option will likely encourage higher speeds which reduces safety for other road users. Some turning movements may need to be prohibited.

PEDESTRIAN ACCOMMODATION

Sidewalks remain the same as existing in this alternative, with 6 foot sidewalks on the south side of Geneva and 12 foot sidewalks on the north side. Sidewalk widths of less than 12 feet are considered substandard under Complete Streets design guidelines for this street type. Pedestrian accommodation in the side running alternative includes improved access to stations, which are located on or adjacent to the sidewalk.

Station shelters may affect sidewalk width to some extent, however if this is the case, they will affect buffer and landscaping zones and not the through travel zones of the sidewalk. Stations can be designed for reduced impact on the sidewalk's through travel zone.

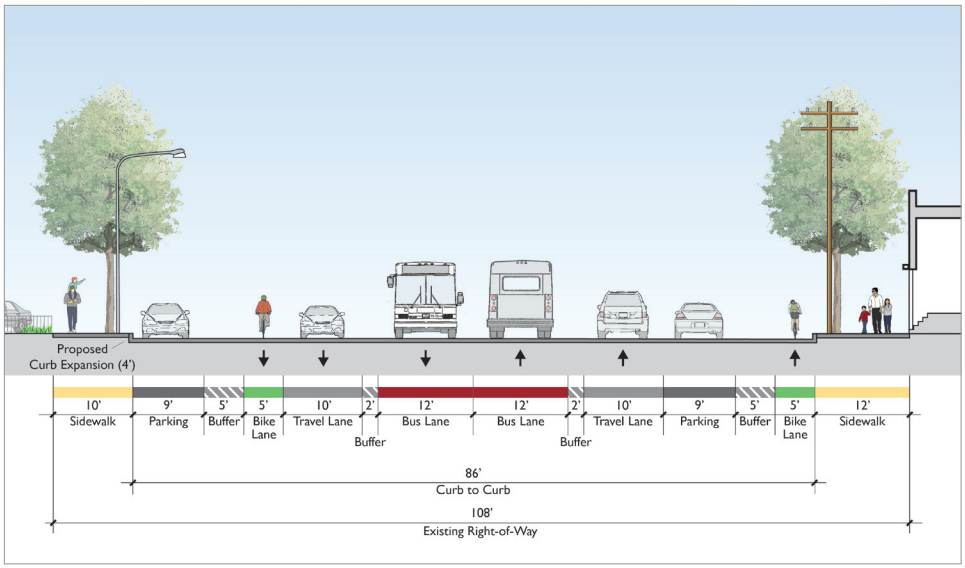
Crossing in this alternative is more stressful for pedestrians. It requires pedestrians to cross two bus lanes, two bike lanes, and four general traffic lanes. Signals would be timed to accommodate pedestrians crossing the street. At crossings without turn lanes, the parking lane can be used to construct a bulb-out; this will not be possible at intersections where turn volumes require exclusive lanes. This alternative includes 6-foot pedestrian refuge islands at stations.

BICYCLE ACCOMMODATION

This alternative includes a 5 to 6 foot bike lane without buffers. The overall street width in this alternative does

FIGURE 17. PLAN DRAWING OF 4 LANE GENERAL PURPOSE / SIDE RUNNING BRT ALTERNATIVE – ORIENTE STREET STATION

FIGURE 18. 2 LANE GENERAL PURPOSE/CENTER RUNNING BRT —TYPICAL MIDBLOCK CROSS SECTION



not allow a wider bike lane or buffers between the bike lane, bus lane, and parking lanes. Bike lanes would be marked with green paint at potential conflict zones such as near intersections to increase visibility.

Both bicycle lanes would be located between the transit lane and parking lane. This is shown in Figure 16.

2 LANE GENERAL PURPOSE / CENTER RUNNING BRT ALTERNATIVE

The center running alternative provides two general purpose lanes, one in each direction, as well as parking and buffered bike lanes on each side of the street. This alternative also provides a two foot buffer between the bus lanes and general purpose lanes, and a wider parking lane than the side running alternative. Some on-street parking is removed near transit stations and intersections. Figure 19 and Figure 20 show the proposed cross section and conceptual plan drawings of the 2 Lane General Purpose/ Center Running BRT option on Geneva Avenue.

TRANSIT

In this alternative transit-only lanes would be installed in the center of the street. Stations would be installed as islands on the right side of the transit lane. This design additionally provides a buffer between the bus and general purpose lanes, which could be designed as a physical barrier. Both the buffer and physical barriers serve to further enforce the exclusivity of the transit lanes. The center running bus lanes in this alternative provide greater travel time benefits to transit as they remove conflicts from side streets, and turning and parking vehicles—these lanes can be fully exclusive to buses. Parking will be removed on one side of the street on blocks with a station platform.

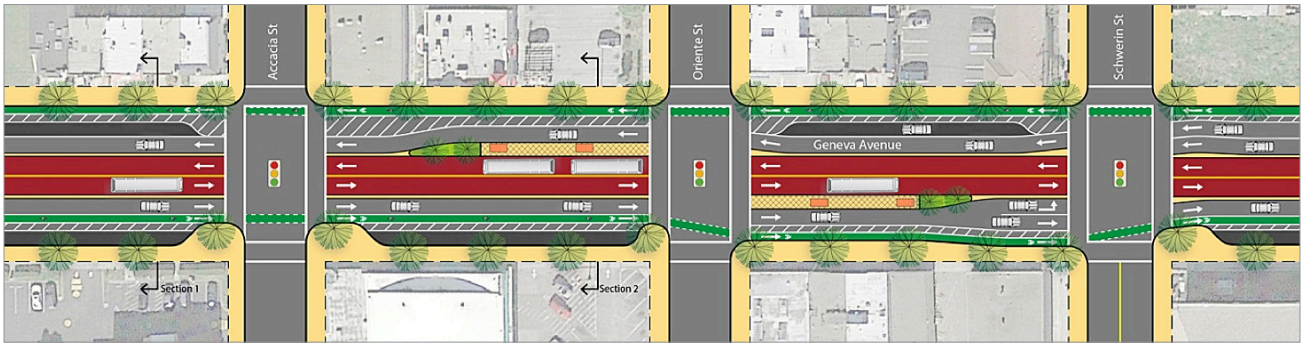
GENERAL PURPOSE LANES

Two general purpose lanes are provided in this option, in addition to turn lanes at some intersections. The two general purpose lanes provide less vehicle capacity than the side running option. However this will likely encourage more potential drivers to find alternatives, and encourage slower driving, which improves safety for other road users. Some turning movements may need to be restricted.

PEDESTRIAN ACCOMMODATION

While sidewalks remain the same width as existing in this alternative, there is space to construct bulb-outs at key crossing locations. Stations provide refuge for pedestrians as they cross and there is greater street width to

FIGURE 19. PLAN DRAWING OF 2 LANE GENERAL PURPOSE / CENTER RUNNING BRT ALTERNATIVE—ORIENTE STREET STATION



potentially provide pedestrian refuges at intersections that don't have stations. Pedestrians accessing the bus will need to cross at least a portion of the street each time they board or alight, rather than only for either their outbound or inbound trip. There is a danger of passengers crossing on a red light to catch a departing bus; however the crossing distance is reduced. Stations will not impinge on sidewalk width.

BICYCLE ACCOMMODATION

The eastbound bicycle lane will be located between the parking lane and the general purpose lane; and the westbound bike lane be located between the parking lane and the curb, as shown in Figure 18. The eastbound direction is downhill and bicyclists will be moving fast, closer to the speed of motor vehicles, so the stress of bicycling adjacent to traffic will be less for bicyclists. This will also give more space to maneuver in the event of an obstacle in the bike lane. Bicyclists in the westbound direction will be traveling slower up hill, so the stress of bicycling adjacent to high speed traffic would be heightened. Conflicts with pedestrians at stations will be reduced and maneuvering obstacles in the bike lane is much easier with limited space at low speeds.

STATION ALTERNATIVES

Two BRT station locations have been identified in the Santos Street to Bayshore Boulevard segment, at Santos Street and at Oriente Street.

Santos Street is proposed for a station because it is currently the entrance to the Cow Palace, a major event destination; it is also the confluence of Routes 8X, 8BX, and 9 where they turn onto Geneva Avenue. Santos Street also provides the best pedestrian access because it runs through to Sunnydale Avenue, where many nearby streets are not through streets.

A station is proposed at Oriente Street, which is equidistant between Santos Street and Bayshore Boulevard. Oriente Street is a through street to the north and south, directly serves a school, and is one block from Schwerin Street which serves as a transfer point with Routes 8AX and 9. Locating the station at Schwerin Street is more challenging because of the need to maintain the left turn movements.

GENEVA AVENUE AT SANTOS STREET

The lane configuration and station design at Santos Street needs to consider significant traffic entering and exiting the Cow Palace during events. Santos Street is a signalized intersection so the station platforms will be on the far side of the intersection for both the 4 Lane Side Running and the 2 Lane Center Running alternatives. Far-side stations at signalized intersections allow buses to take advantage of transit signal priority. Also for the side running options, it allows the vehicles to more easily stop close to the curb for boarding/alighting passengers. Currently there are two westbound left turn lanes, one through lane and one through/right turn lane. The eastbound direction has one right turn lane and one through/right lane into the Cow Palace, one through lane, and one left turn lane onto Santos Street.

4 LANE GENERAL PURPOSE / SIDE RUNNING BRT ALTERNATIVE

TRANSIT

Stations will be on the far side of the intersection allowing buses to take advantage of transit signal priority. Stations will be located on a boarding island on the right side of the bus lane. The bike lane will run between the boarding island and the sidewalk, thus reducing conflicts between bicycles and buses. Boarding islands allow greater passenger waiting areas during peak ridership times and major events, and do not impinge on sidewalk width..

GENERAL PURPOSE LANES

At Santos Street, the 4 Lane Side Running alternative provides an eastbound right turn lane into the Cow Palace, one through lane, and one left turn lane onto Santos Street. For westbound traffic, one left turn lane into the Cow Palace and two through lanes are proposed. During major events at the Cow Palace, one of the westbound through lanes would convert to a left turn lane. Right-turning vehicles must cross both the transit lane and the bike lane to enter the right turn lane.

PEDESTRIAN AND BICYCLE ACCOMMODATION

The sidewalk width at this station remains the as in mid-block sections. Pedestrians crossing Geneva Avenue at Santos Street take advantage of 8-foot pedestrian refuges provided by the transit boarding islands.

At stations, the bike lane is routed between the station platform and the sidewalk. Transit passengers must cross the bicycle lane to access the transit boarding islands. The station structures and platforms should be designed to encourage pedestrians to cross only in designated zones to minimize conflicts with bicyclists. At the Santos Street intersection, eastbound right turning vehicles must cross both the bus lane and bike lane to access the right turn pocket into the Cow Palace.

2 LANE GENERAL PURPOSE / CENTER RUNNING BRT ALTERNATIVE

In the 2 Lane Center Running alternative the stations are also located on the far side of the intersection at Santos Street. Parking is removed near the intersection to provide space for the station platform and left and right turn lanes into the Cow Palace and onto Santos Street.

TRANSIT

Stations are located on the far side of the intersection, to allow the buses to take advantage of transit signal priority. The platforms will be on islands to the right of the bus lane. Stations in the center running option provide less space for waiting passengers in the event of overcrowding, which could potentially be an issue during events at the Cow Palace. This would lead to passenger overflow waiting areas on the sidewalks.

GENERAL PURPOSE LANES

At Santos Street, one lane of through traffic is provided for each direction. Additionally, one left and one right turn lane are provided in the eastbound direction, and one left lane is provided in the westbound direction. This will improve traffic flow on Geneva Avenue and accommodate general traffic accessing the Cow Palace as well as traffic and buses turning onto Santos Street. Parking and buffers are removed to provide space for turn lanes and transit boarding islands.

PEDESTRIAN AND BICYCLE ACCOMMODATION

The sidewalk width at the station location remains the same as in the mid-block sections. Pedestrians crossing Geneva Avenue take advantage of 8.5-foot pedestrian refuges provided by the transit boarding islands. There may be opportunity to provide bulbouts, additional buffers, or increase sidewalk width. Designs will be further developed in later phases of this project. Refuges will increase visibility and reduce crossing distance for pedestrians.

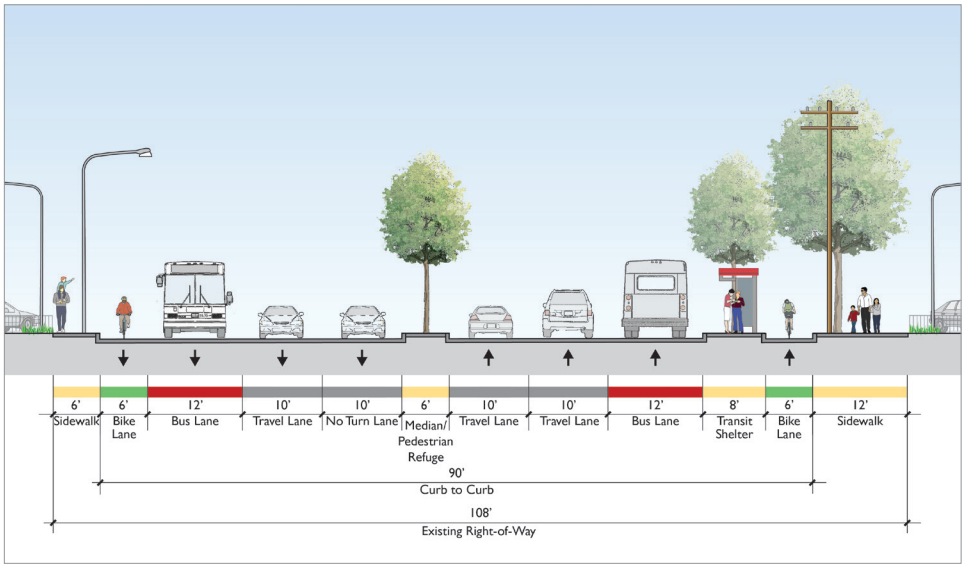
Bicycle lanes are not affected by the station platforms, which are located in the center of the street. Eastbound right turning vehicles must cross the bike lane to access the right turn pocket into the Cow Palace. In the westbound direction, there is no right turn lane, so the bike lane is marked for access by right turning vehicles. On the far side of the intersection, the bike lane is not affected by the station platform.

GENEVA AVENUE AT ORIENTE STREET (SCHWERIN STREET)

A station is proposed at Oriente Street, which is equidistant between Santos Street and Bayshore Boulevard. Oriente Street is a through street to the north and south, and directly serves a neighborhood elementary school. With BRT, this intersection would be signalized, and is one block from Schwerin which serves as a transfer point with SFMTA Routes 8AX and 9. Locating the station at Schwerin is more challenging because of the desire to maintain left turn movements and a conflict with a motel driveway in the 4 Lane Side Running option.

Currently both eastbound and westbound directions have a left turn lanes, two through lanes and a parking lane. Geneva also has a 12 foot median/center turn lane in this section for a total curb to curb width of 90 feet.

FIGURE 20. CROSS SECTION OF 4 LANE GENERAL PURPOSE/SIDE RUNNING BRT ALTERNATIVE —AT ORIENTE ST.



4 LANE GENERAL PURPOSE / SIDE RUNNING BRT ALTERNATIVE

Figure 21 shows the proposed cross sections of the stations at Oriente Street for the 4 Lane Side Running alternative. Figure 17 in the 4 Lane General Purpose / Side Running BRT Alternative (page 39) shows the conceptual plan drawing of the 4 Lane General Purpose/ Side Running BRT Alternative, including the station at Oriente Street.

TRANSIT

Stations will be on the far side of the intersection allowing buses to take advantage of transit signal priority. Stations will be located on a boarding island on the right side of the bus lane. The bike lane will run between the boarding island and the sidewalk. Boarding islands allow greater passenger waiting areas during peak ridership times and major events, and do not impinge on sidewalk width.

GENERAL PURPOSE LANES

Two lanes of through traffic are proposed for each direction, separated by a 6 foot median. At Oriente Street, no left turns are accommodated; drivers may turn left at Schwerin Street

Between Accacia Street and Schwerin Street, parking lane widths are used to accommodate the station platforms, the median, and the left turn lane at Schwerin Street, as well as a bulbout at Accacia Street. Parking is accommodated for a short segment between the end of the westbound station platform and the Accacia Street intersection.

PEDESTRIAN AND BICYCLE ACCOMMODATION

Sidewalk width at the station location remains the same as in the mid-block sections. Pedestrians crossing Geneva Avenue at Oriente Street take advantage of 8-foot pedestrian refuges provided by the transit boarding islands, and 6-foot refuges provided by the median. At Accacia Street, bulbouts expand the width of the sidewalks by 8 feet on three corners, reducing crossing distance for pedestrians.

At stations, the bike lane is routed between the station platform and the sidewalk. Transit passengers must cross the bicycle lane to access the transit boarding islands. The station structures and platforms should be designed to ensure that pedestrians cross only in designated zones to minimize conflicts with bicyclists.

2 LANE GENERAL PURPOSE / CENTER RUNNING BRT ALTERNATIVE

In the 2 Lane Center Running alternative the stations are also located on the far side of the intersection at Oriente Street. Parking is removed near the intersection to provide space for the station platform and left turns. This creates a large lateral transition for the general purpose lanes and bike lanes, which will take place midblock approaching the station intersection. Lateral transitions encourage drivers to reduce speeds slightly, which will improve pedestrian safety near stations. Designs will be reviewed in the next study phase to ensure they meet traffic engineering standards.

TRANSIT

Stations are located on the far side of the intersection to allow the buses to take advantage of transit signal priority. The platforms will be on islands to the right of the bus lane. Stations in the center running option provide less space for waiting passengers in the event of overcrowding.

GENERAL PURPOSE LANES

One lane of through traffic is proposed for each direction. No left turns will be permitted at Oriente Street in order to make room for the transit station platforms and pedestrian improvements. Left turn lanes will be provided at Schwerin Street.

Parking is removed on the side of the street with a station platform to provide space for the station. Like the 4 Lane Side Running alternative, lateral transitions are large. Transitions take place mid-block approaching the station and will encourage drivers to reduce speeds, which will improve pedestrian safety near stations.

PEDESTRIAN AND BICYCLE ACCOMMODATION

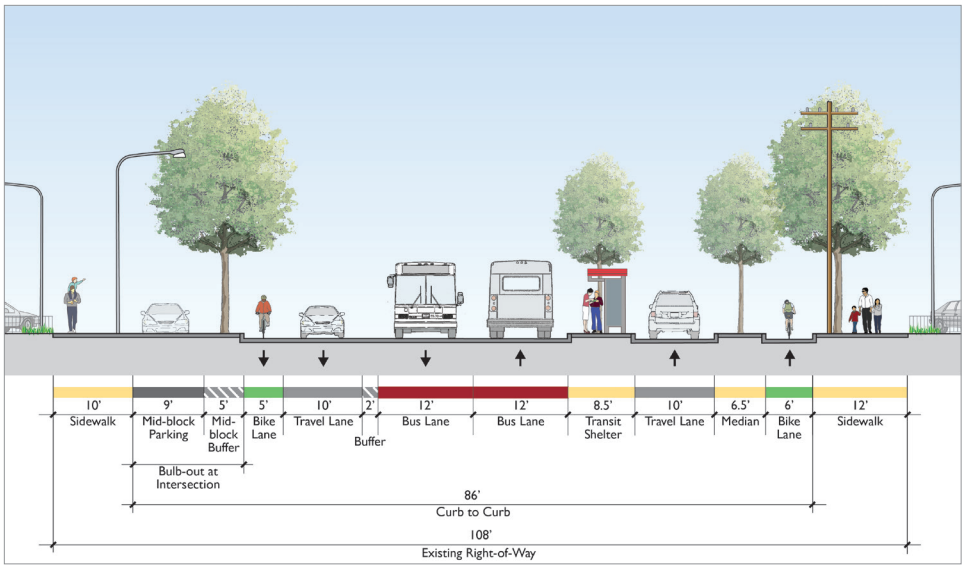
The sidewalk width at the station location remains the same as in the mid-block sections west of Oriente Street. East of Oriente Street, there may be opportunity to increase the width of sidewalks. Designs will be further refined in later phases of this project.

Pedestrians crossing Geneva Avenue take advantage of 8.5-foot pedestrian refuges provided by the transit boarding islands and bulbouts at the two south-side corners of Accacia Street and the south-west corner of Oriente Street that extend sidewalk width to 14 feet. Buffers on the north side of the street between the bike lane and general purpose lane that range from 6.5 to 14 feet wide will provide further protection for pedestrians. Bulbouts and refuges will increase visibility and reduce crossing distance for pedestrians.

Bicycle lanes are not affected by the station platforms, which are located in the center of the street. Lateral transitions will have an insignificant impact on bicyclists, as they travel slower than traffic and have more space to maneuver within the lane.

The cross section in Figure 21 (next page) shows the street configuration with the station at Oriente Street. Figure 19 (page 40) shows the conceptual plan drawing of the 2 Lane General Purpose/Center Running BRT Alternative, including the station at Oriente Street.

FIGURE 21. CROSS SECTION OF 2 LANE GP/CENTER RUNNING BRT ALTERNATIVE—AT ORIENTE ST.



4.5 Bayshore Alternatives

AREA SUMMARY

GENEVA AVENUE TO BLANKEN AVENUE

From Geneva Avenue to Blanken Avenue, the bus route travels north/south on Bayshore Boulevard. The lane configuration varies due to multiple turn lanes at Geneva Avenue, dedicated turn lanes at 2650 Bayshore Boulevard (between MacDonald Avenue and Sunnydale Avenue), and Muni T-Third center-running tracks and stations. Bayshore Boulevard is currently undeveloped on its east side, and has no sidewalks between Geneva Avenue and 2630 Bayshore Boulevard on the approach to Sunnydale Avenue. The northbound bike line has a substandard width between Geneva Avenue and the driveway for 2630 Bayshore Boulevard. There is a gap in it between this point and the far side of the intersection with Sunnydale Avenue. The west (southbound) side of Bayshore Boulevard fronts small businesses and residential uses. Here, the roadway is more complete, with a sidewalk, parking lane, and standard width bike lane along its entire length.

CORRIDOR ALTERNATIVES

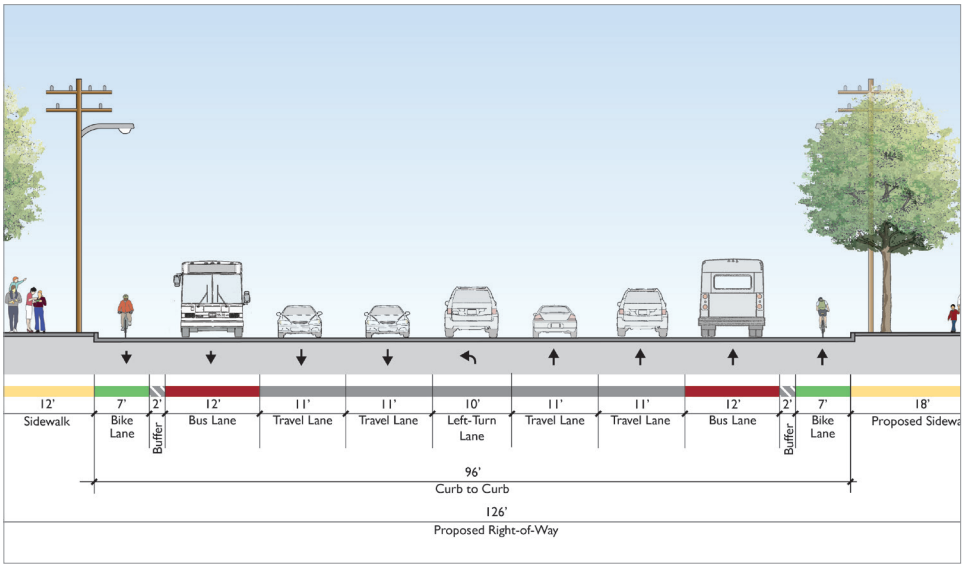
NO PROJECT (BASELINE) ALTERNATIVE

In the No Project Alternative, the Bayshore Boulevard street design would remain as it is today. The 28R bus would operate on street in mixed traffic. A farside northbound stop would be provided at Sunnydale Avenue and the far side southbound stop would be improved. No other on-street improvements are planned in this section until construction of the approved Schlage Lock development (north of Sunnydale Avenue) and eventually the possible Brisbane Baylands (Geneva Avenue to Sunnydale Avenue).

4 LANE GENERAL PURPOSE / SIDE RUNNING BRT ALTERNATIVE

This alternative would provide a side running bus only lane between Geneva Avenue and the T-Third tailing tracks. There would be two general purpose lanes in each direction as well as a buffered bike lane and a center median. The left turn lane serving 2650 Bayshore Boulevard (MacDonald Avenue and Sunnydale Avenue) would remain operational.

FIGURE 22. PROPOSED BAYSHORE BOULEVARD CONFIGURATION



TRANSIT

The side running alternative is preferred in this segment for several reasons. Due to the street width required for the T-Third tail tracks, and a desire to maintain two general purpose lanes and a bike lane, the potential bus lane segment is short in length. At the T-Third tail tracks, the bus lane will need to transition to mixed flow. The enhanced benefits of a center running lane here would be minimal, and it would conflict with the left turn into the facility at 2650 Bayshore Avenue.

STATION ALTERNATIVES

BAYSHORE BOULEVARD/GENEVA AVENUE

If constructed, a station at Bayshore Boulevard and Geneva Avenue would be located westbound on Geneva Avenue and eastbound on Bayshore Boulevard. While included in this feasibility study as a potential stop location, further study will be needed to determine its need in the near-term. While Bayshore Boulevard and Geneva Avenue is an important and high volume intersection, adjacent land uses suggest that it would likely be a low ridership station until the area is more densely developed. No conceptual designs have been developed for it; however it would be similar to the design described below for the Bayshore Boulevard at Sunnydale Avenue Station.

BAYSHORE BOULEVARD AT SUNNYDALE AVENUE

Stations will be on the far side of the intersection allowing buses to take advantage of transit signal priority. Stations will be located curbside; the southbound stop will upgrade an existing SamTrans stop and the northbound stop will be new. Boarding islands allow greater passenger waiting areas during peak ridership times and major events.

A station on Bayshore Boulevard at Sunnydale Avenue is dependent on which alignment alternative is selected between Bayshore Boulevard and Executive Park Boulevard. These alternatives are described in the next section below. A station at this location would only be proposed if the Blanken/Lathrop alternative moves forward, as it is planned to be the transfer station for Caltrain. If the Beatty Avenue alternative moves forward, the transfer with Caltrain would be located on Tunnel Avenue directly adjacent to the Caltrain station.

4.6 Little Hollywood Alternatives

AREA SUMMARY

BAYSHORE BOULEVARD TO US 101/EXECUTIVE PARK BOULEVARD

The section of the BRT route east of 101, serving the Little Hollywood neighborhood, is planned to provide service until the Geneva Avenue extension is constructed over the Caltrain tracks and US 101 to connect to Executive Park Boulevard and Candlestick Point. Three alternatives are being considered for the segment of the route between Bayshore Boulevard and US 101/Executive Park Boulevard. There is currently no preferred alternative; the desired alignment will be a decision for a later stage of study.

Blanken Avenue is the most direct route with an undercrossing under US 101 but it is too narrow for bidirectional operation of buses using the existing configuration (i.e. keeping both lanes of parking) at the frequency planned for this route. Blanken Avenue does not have available street width for transit-only lanes, general purpose lanes, and parking in both directions. Lathrop Avenue is parallel to Blanken Avenue and has similar constraints. The other US 101 undercrossing is at Alanna Way, which requires a longer routing on Tunnel Avenue and Beatty Avenue, but allows for a station directly adjacent to the Caltrain Bayshore Station.

CHALLENGES

The Little Hollywood alternatives for the route present some of the greatest challenges for the proposed BRT in the project area. There are only two existing access points across US 101 in this area. The Blanken Avenue undercrossing requires that the bus pass through a residential neighborhood with narrow streets and parking capacity issues. Two-way high frequency bus operations are not possible while maintaining the existing street configuration. Design alternatives would create a one-way couplet on Blanken Avenue and Lathrop Avenue, remove parking on one side of the street (except noted below for Blanken Avenue Option 2), and require construction of a new right of way on an easement between Lathrop Avenue and Alanna Way.

The second alternative uses Tunnel Avenue, Beatty Avenue, and Alanna Way to cross under US 101. The future of Beatty Avenue is unclear as of this writing; the roadway may be vacated in the future as part of phase 2 of the Recology Expansion and Modernization Project, according to the EIR/NOP. If it is not vacated, it allows a BRT route

alternative that does not pass through the residential portions of Little Hollywood but results in longer travel times and potential delays due to conflicts with Recology trucks.

Both alternatives need to consider bicycle and pedestrian facilities to accommodate future increases in usage and address existing and potential network gaps.

CORRIDOR ALTERNATIVES

NO PROJECT (BASELINE) ALTERNATIVE

The No Project alternative for this segment is different from existing. It assumes that bus route 28R will be implemented as per the Candlestick Point-Hunter's Point Shipyard (CPHPS) development plan, regardless of the decision on routing or design in the the Little Hollywood area. For bidirectional operation, SFMTA requires 12' wide travel lanes, and Blanken Avenue is currently too narrow (two 10' travel lanes and two 8' parking lanes) for bidirectional bus operation based on this requirement. In the baseline configuration for Blanken Avenue, one parking lane is removed to expand the travel lanes to 13' with one 10' parking lane. Figure 23 and Figure 24 show the proposed baseline configuration of Blanken Avenue.

Note, however, that some community residents have expressed concerns that wider lanes may result in faster moving traffic, so design adjustments might be helpful in managing or slowing traffic speeds in observed. There have also been community concerns about removing a lane of parking in this option.

FIGURE 23. BLANKEN AVENUE AND LATHROP AVENUE EXISTING CROSS CONDITIONS

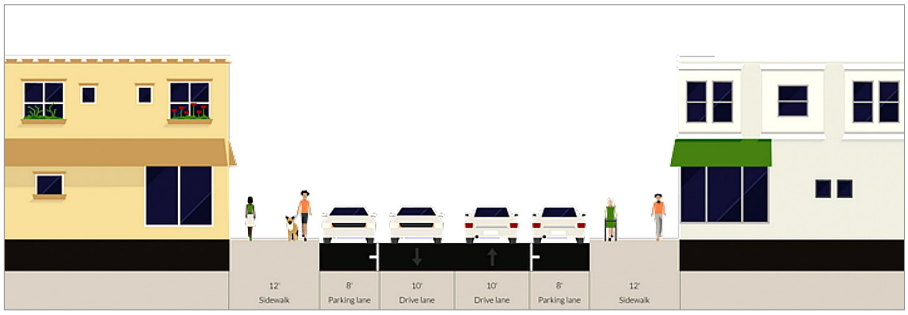
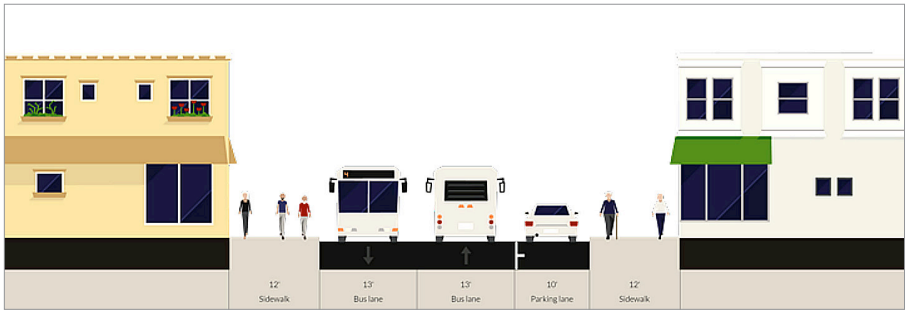


FIGURE 24. BLANKEN AVENUE—BASELINE CONFIGURATION



There would be no change to sidewalk width or pedestrian crossings in this option. There would also be no change in bicycle accommodation in this option; the bike route under US 101 and accessing the Bay Trail would remain on Tunnel Avenue, Beatty Avenue, and Alanna Way.

BLANKEN AVENUE AND LATHROP AVENUE TO COUPLET ALTERNATIVE

In this alternative, the street configurations of Blanken Avenue and Lathrop Avenue are altered to provide transit-only lanes. Two options are proposed for the layout of Blanken Avenue and Lathrop Avenue to account for the necessary trade-offs inherent in this alternative. In both options, Blanken Avenue and Lathrop Avenue are a one-way couplet with traffic and buses operating westbound on Blanken Avenue and eastbound on Lathrop Avenue.

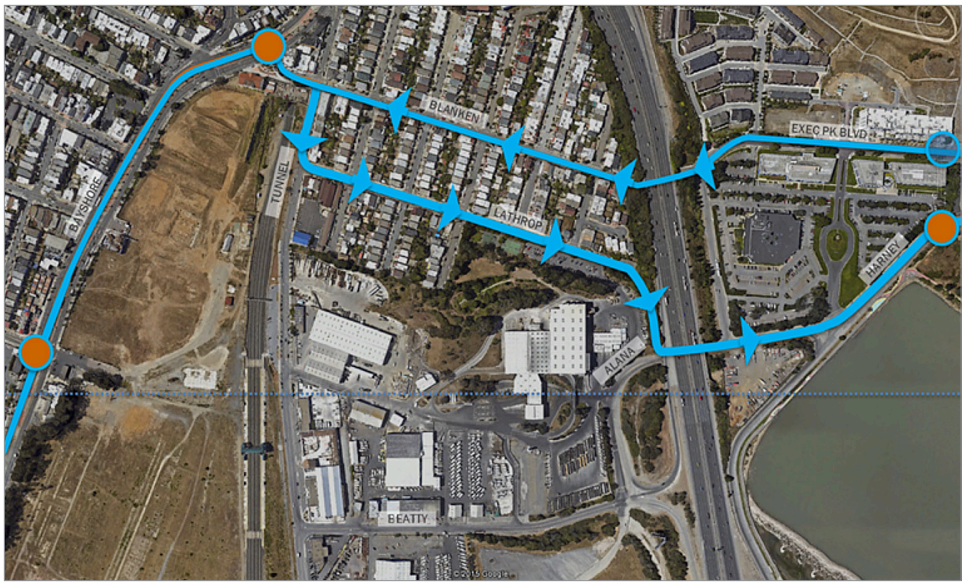
POTENTIAL COUPLET ROUTING

A potential routing for this alternative is shown in Figure 25 (next page). From Bayshore Boulevard, the route turns south on Blanken Avenue. BRT stations would be located on the block between Bayshore Boulevard and Tunnel Avenue. Buses traveling eastbound would turn right onto Tunnel Avenue and then left onto Lathrop Avenue. Where Lathrop Avenue currently dead-ends, a new right of way would be constructed accessing Alanna Way and the tunnel under US 101 and turn left onto Harney Way to Thomas Mellon Circle. Westbound buses will be routed on Blanken Avenue and use the tunnel under US 101 to provide access from Executive Park Boulevard and Harney Way.

BLANKEN/LATHROP COUPLET OPTION 1

In this option, one lane of parking and one travel lane will be removed to make space for a right lane transit only lane that will operate westbound on Blanken Avenue and eastbound on Lathrop Avenue. One general purpose lane will operate in the same direction as the buses. A parking lane will be located on the left side of the street, adjacent to the general purpose lane. General purpose vehicles will have access to the bus lane to make right turns and access driveways. This option maintains the sidewalk width at 12 feet on both sides of the street,

FIGURE 25. ROUTING FOR BLANKEN/LATHROP COUPLET OPTIONS



as existing. Bicycles would ride in mixed traffic on Blanken and Lathrop Avenues or would use the existing bike route on Tunnel Avenue, Beatty Avenue, and Alanna Way. Figure 26 shows the westbound cross-section configuration on Blanken Avenue and Figure 27 shows the eastbound cross-section configuration on Lathrop Avenue.

Figure 28 (next page) shows conceptual plan drawings of the Blanken/Lathrop Couplet, Option 1 at Peninsula Avenue. These drawings are representative of the street reconfiguration and accommodation of all modes within the context of operations within Little Hollywood.

BLANKEN /LATHROP COUPLET, OPTION 2

BLANKEN AVENUE CONFIGURATION OPTION 2

In Option 2, Blanken Avenue would operate one way in the westbound direction. It would have one transit only lane, one general traffic lane, and two parking lanes. The southern sidewalk would be narrowed by two feet in order to provide street width to retain the parking on both sides of the street. Figure 29 (next page) shows the cross-section for this configuration. Utilities would likely need to be undergrounded to remove obstacles for narrowing the sidewalk and maintaining the through travel zone on it. No bicycle accommodations would be provided on Blanken Avenue.

LATHROP AVENUE CONFIGURATION OPTION 2

Lathrop Avenue would operate in the eastbound direction, with one transit only lane, one traffic lane, and one parking lane. Additionally, this option expands the southern sidewalk to provide a multi-use path and wider pedestrian space. In this option, the bicycle route between Bayshore

FIGURE 26. BLANKEN AVENUE CONFIGURATION, OPTION 1

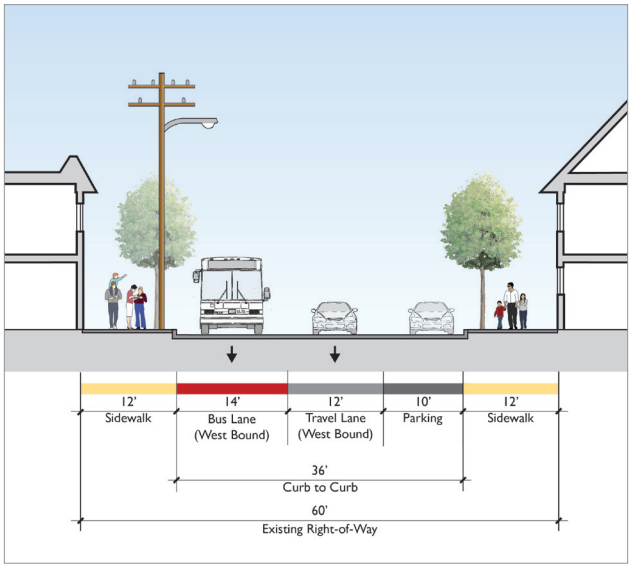


FIGURE 27. LATHROP AVENUE CONFIGURATION OPTION 1

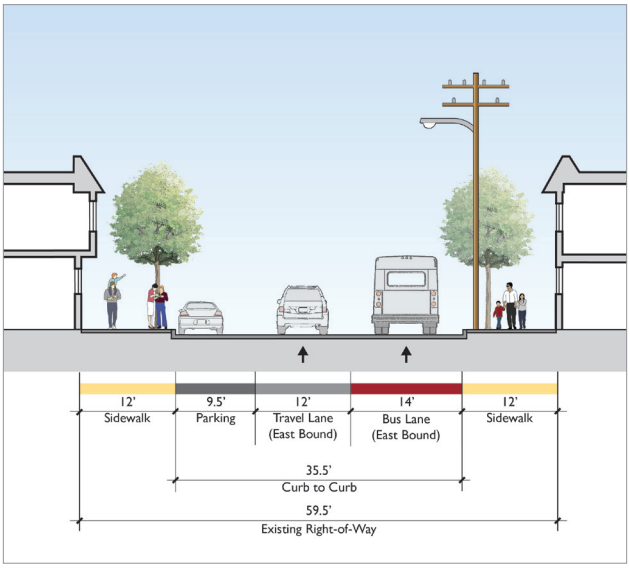
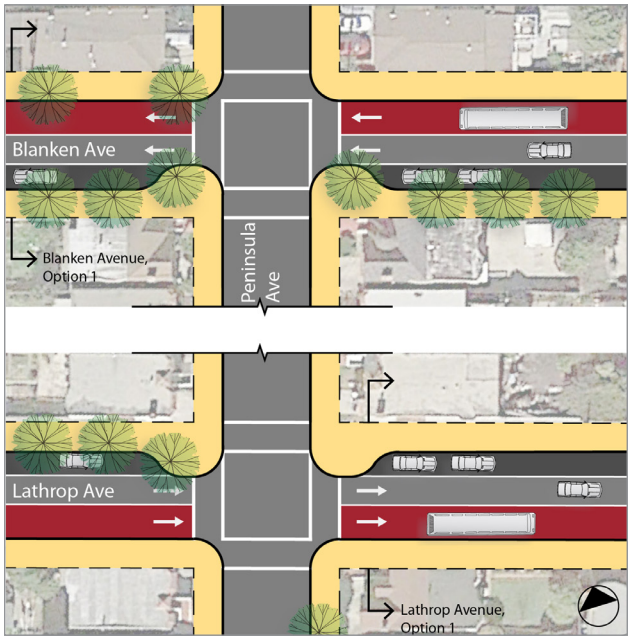


FIGURE 28. PLAN DRAWING OF BLANKEN/LATHROP COUPLET OPTION 1



Boulevard and Candlestick Point and the Bay Trail, which currently runs on Tunnel Avenue, Beatty Avenue, and Alanna Way would be moved to run on the mixed use path on Lathrop Avenue, the new right of way between Lathrop Avenue and Alanna Way, and Alanna Way under US 101. This provides a more direct and safer route for bicyclists by avoiding the US 101 on and off-ramps, and Beatty Avenue which is used frequently by large trucks.

Based on an analysis conducted for this study, there are opportunities to replace parking lost by converting side streets to diagonal parking. Utilities may need to be undergrounded to remove potential obstacles on the sidewalk. This option would also require construction of new right of way connecting Lathrop Avenue and Alanna Way through the Recology property.

PROPOSED PARKING CHANGES

Removal of one lane of parking will be necessary for both Lathrop Avenue options and for Blanken Avenue Option 1. Parking capacity is constrained in this neighborhood. Opportunities to replace some or all parking are available by converting the current parallel parking to diagonal parking on the one-block sections of Tunnel Avenue, Wheeler Avenue, and Tocoloma Avenue, directly to the south of Lathrop Avenue, as shown in Figure 31 (next page).

TUNNEL AVENUE CONFIGURATION

For the Blanken/Lathrop Couplet options, the eastbound route will turn from the Blanken transit mall onto Tunnel Avenue before turning onto Lathrop Avenue. One parking lane will be removed to provide space for one transit lane for this short duration, as shown in Figure 32 (next page). Tunnel Avenue is currently designated San Francisco Bike Route 905 and the general purpose traffic lanes will be shared with bicycles.

EXECUTIVE PARK BOULEVARD CONFIGURATION

The westbound direction of Executive Park Boulevard will need to be expanded to accommodate a transit only lane. This will require narrowing the existing median by 4 feet from 11 feet to 7 feet.

FIGURE 29. BLANKEN AVENUE CONFIGURATION OPTION 2

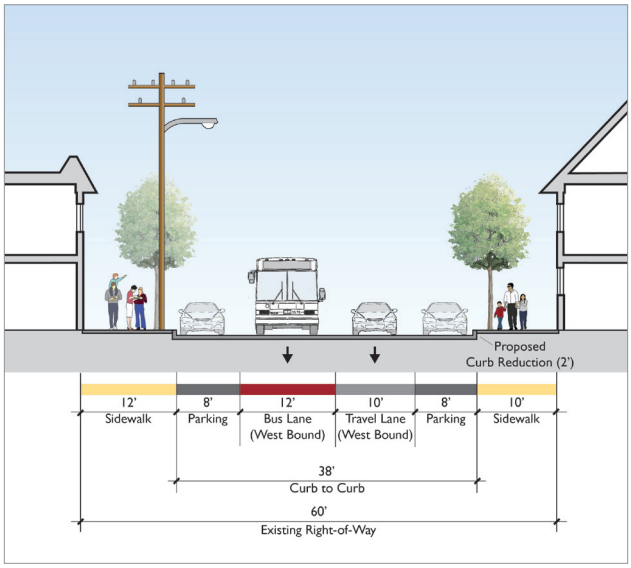


FIGURE 30. LATHROP AVENUE CONFIGURATION OPTION 2

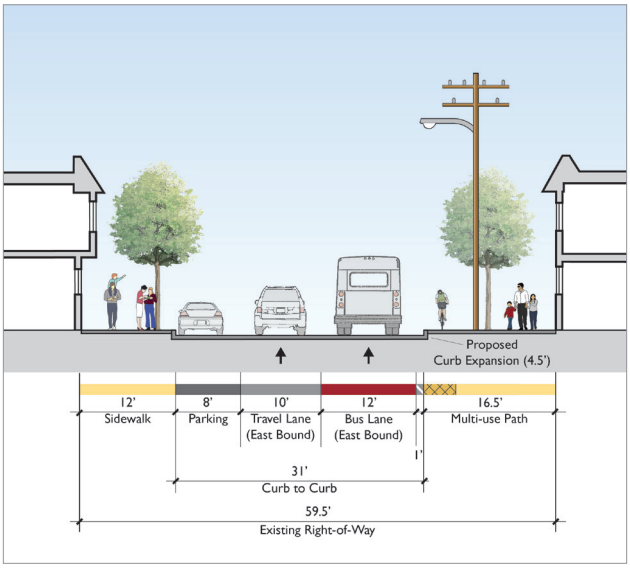


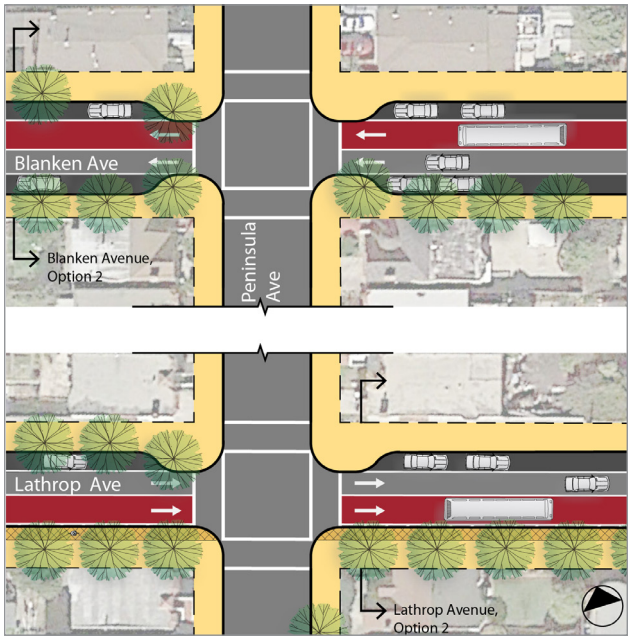
FIGURE 31. PROPOSED PARKING CHANGES FOR BLANKEN/LATHROP COUPLET, SHOWING OPTION 1

ALANNA WAY CONFIGURATION

The eastbound route would connect to Alanna Way via new right of way construction from the dead end of Lathrop Avenue, passing between the Recology campus and US 101. In the Blanken/Lathrop Alternative, a transit only lane is needed only in the eastbound direction as the westbound transit operates on Blanken Avenue.

Alanna Way is currently two general purpose lanes westbound and one general purpose lane eastbound. There are currently no sidewalks west of Executive Park Boulevard. In the proposed layout, one westbound travel lane is replaced with a center eastbound transit only lane.

FIGURE 32. PLAN DRAWING OF BLANKEN/LATHROP COUPLET OPTION 2



BENEFITS AND IMPACTS

This option provides dedicated transit facilities for its entire length, accommodating increased travel demand due to new developments. New bicycle and pedestrian facilities improve comfort and safety for pedestrians and bicyclists. Development of a new right of way between Lathrop Avenue and Alanna Way provides access to US 101 for general purpose traffic and access to Executive Park Boulevard, Candlestick Point, and Hunter's Point Shipyard for pedestrians and bicyclists. By creating a one-way couplet on Blanken Avenue and Lathrop Avenue, local circulation is preserved even with the addition of bus-only lanes. There may be a minor net reduction of on street parking in Little Hollywood, depending on the couplet option and the locations of reconfigured on-street parking.

FIGURE 33. CONFIGURATION OF TUNNEL AVENUE BETWEEN BLANKEN AND LATHROP AVENUES IN THE BLANKEN/LATHROP COUPLET OPTIONS. (FACING NORTH)

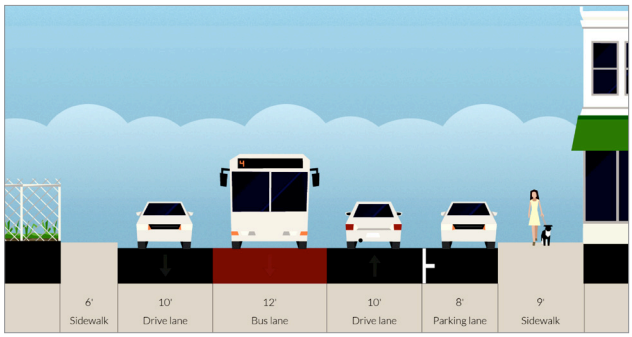


FIGURE 34. CROSS SECTION OF ALANNA WAY PROPOSED CONFIGURATION

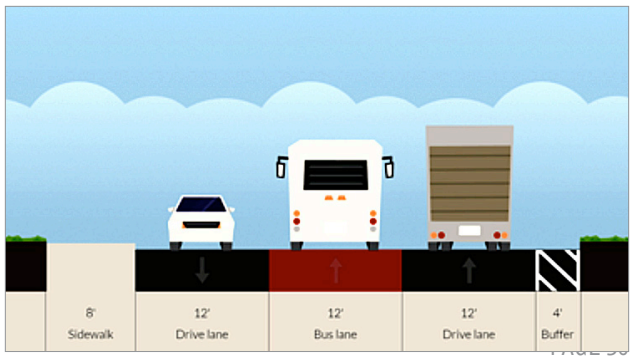


FIGURE 35. ROUTING OF THE BEATTY AVENUE ALTERNATIVE

BEATTY AVENUE ALTERNATIVE

The second alternative for routing between Harney Way and Bayshore Boulevard uses Beatty Avenue. Discussions between the City of Brisbane and Recology to vacate Beatty Avenue are continuing at the time of this study. The request to vacate, if made, would be part of Recology's Modernization and Expansion Project, and is included in their EIR/NOP under Phase 2 of the project. It would provide more efficient operations within their campus. If Beatty Avenue is vacated, an alternate interim connection between Tunnel Avenue and US 101 would be provided until the Geneva Avenue Extension is built. For the purposes of developing this alternative concept, it was assumed that Beatty Avenue would remain open and would be reconfigured as part of the project. This alternative has longer travel time and does not provide bi-directional transit-only lanes along its entire length. It does, however, provide a station directly adjacent to the Bayshore Caltrain station.

From the Blanken Transit Mall, the route travels along Tunnel Road, Beatty Avenue, and on Alanna Way/Harney Way to Thomas Mellon Circle. Alanna Way curves east and passes under US 101 to Harney Way. Stations would be located at the Bayshore Caltrain Station and at Thomas Mellon Circle. Figure 36 shows the Beatty Avenue Alternative routing.

TUNNEL AVENUE CONFIGURATION

Currently Tunnel Avenue has two lanes of parking and two lanes, one in each direction, of general purpose traffic. Bike route 905 shares these lanes. A bus lane in each direction will not fit on the northern portion of Tunnel Avenue without acquisition of right of way or narrowing the sidewalk. For this segment, no changes in the street configuration are proposed on Tunnel Avenue.

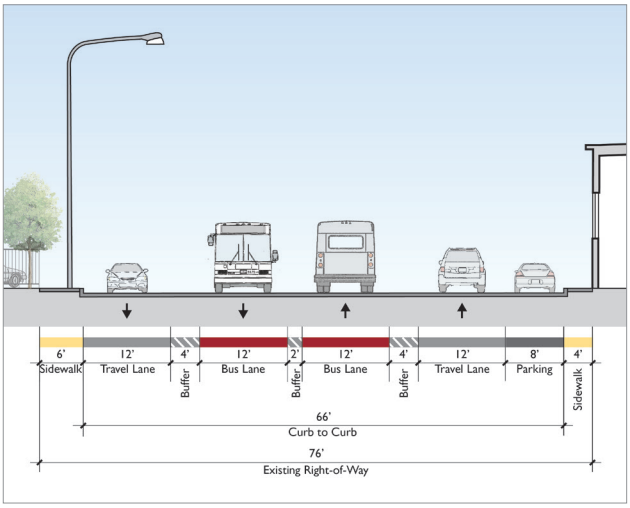
TUNNEL AVENUE OPTION 1

The portion of Tunnel Avenue between Recycle Road and Beatty Avenue has a wider cross section than the northern portion, and includes a median separating the street from diagonal parking. In this segment, both lanes of parallel on street parking could be replaced with center running transit lanes. Center running lanes allow northbound traffic to access driveways and the diagonal parking without interference. This option requires reducing the median width from 3.5 feet to 1.5 feet and may require right of way acquisition.

BEATTY AVENUE CONFIGURATION

Beatty Avenue provides access for large vehicles entering adjacent properties and direct access to US 101 South on and off ramps. Pedestrian facilities, comprised of sidewalks and pedestrian zones marked on the pavement, are incomplete. The proposed configuration of Beatty Avenue

FIGURE 36. POTENTIAL BEATTY AVENUE CONFIGURATION



provides center-running bi-directional transit-only lanes, separated by a buffer from general purpose lanes that support large vehicles. Sidewalks could be installed on Beatty Avenue for its entire length. There may be opportunity to adjust lane widths and buffers to provide street space for a bicycle facility, this should be considered in this next phase of planning.

ALANNA WAY CONFIGURATION—BEATTY AVENUE ALTERNATIVE

Alanna Way provides access under US 101 to Harney Way at Thomas Mellon Circle. The right of way is constrained by this undercrossing to 40 feet. This does not provide adequate street width for bi-directional transit lanes and bidirectional general purpose lanes. Buses will share lanes with general traffic.

BENEFITS AND IMPACTS

The Beatty Avenue alternative does not impact a residential neighborhood, and removes parking in an area where there is lower parking demand. This alternative also provides a station directly adjacent to Caltrain, reducing transfer times for passengers whose final destinations are along the peninsula or in downtown San Francisco.

There are two segments of this alternative that do not include transit-only lanes, which may lengthen travel time and reduce the reliability of service, particularly as traffic increases from new developments. The route distance, and therefore travel time, is longer than the Blanken/ Lathrop Couplet alternative, even without the possibility of traffic delays. Due to the varying widths along Beatty, it will be necessary to determine the extent to which a consistent cross-section can be applied in this segment of the route, to ensure that lanes are legible to drivers of buses, trucks, and private autos.

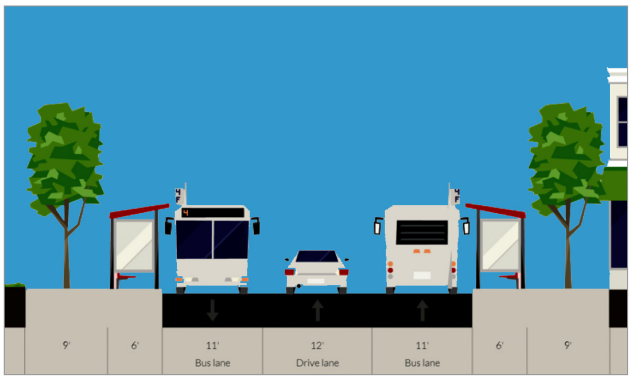
In this option, the bicycle route under US 101 would remain as existing, on Tunnel Avenue, Beatty Avenue, and Alanna Way. There may be opportunity to provide separated bike lanes along portions of the route on Beatty Avenue and Alanna Way, which will need to be determined in the next phase of study. On Tunnel Avenue, bicyclists will need to operate in mixed traffic.

STATION ALTERNATIVES

BLANKEN TRANSIT MALL

The station location for both directions would be located curbside, opposite each other on Blanken Avenue between Bayshore Boulevard and Tunnel Avenue. The T-Third transfer station with Caltrain is currently designated as the Arleta Avenue Station. The Arleta Avenue station is directly adjacent to the proposed BRT station at Blanken Avenue and Bayshore Boulevard, and would serve as the transfer station between the BRT and the T-Third. It is likely that the plaza at the intersection of Blanken Avenue and Bayshore Boulevard would need to be partially reconstructed to accommodate transit turning radii and a bikeway. Detailed design would be determined at a later phase.

FIGURE 37. CROSS SECTION OF BLANKEN AVENUE AT THE BLANKEN TRANSIT MALL, BETWEEN BAYSHORE BOULEVARD AND TUNNEL AVENUE



TRANSIT

In this portion of Blanken Avenue, there will be bidirectional transit lanes turning from Bayshore Boulevard to Blanken Avenue. With two transit-only lanes, the street width only allows one lane of westbound traffic. Station platforms will be located directly opposite each other, adjacent to the sidewalk. The plaza on the south side of the street and wider sidewalks on the north side of the street allow this layout to work.

GENERAL PURPOSE LANES

There will be one lane of westbound traffic, continuing the one-way layout of Blanken Avenue. Travelers headed eastbound into Little Hollywood from Bayshore Boulevard would turn right at Tunnel Road and Bayshore Boulevard, rather than at Blanken Avenue.

PEDESTRIAN AND BICYCLE ACCOMMODATION

Stations will be located directly on the sidewalks, stations should be designed to minimize impact on the sidewalk travel zone, particularly on the north side of the street. There is a plaza on the south side of Blanken Avenue, providing ample pedestrian space as well as opportunities for vendors and other amenities. Location of bicycle facilities will need to be addressed in the next phase of planning. There may be opportunity to provide a bidirectional bikeway adjacent to the southern sidewalk. Sidewalk widths and connections with bike lanes on Bayshore Boulevard will need to be reviewed in more detail in a later study phase.

BAYSHORE CALTRAIN (BEATTY AVENUE ONLY)

The station platforms at the Bayshore Caltrain Station will be located on the far sides of the intersection with Recycle Road. At the station, the parking lane on the far side of Tunnel Avenue, north and south of Recycle Road will be replaced by a bus bulb. This station would also be the transition point between the northern portion of Tunnel Avenue, which has parking, and where transit and general traffic share a lane, and the southern portion of Tunnel Avenue where transit-only lanes could replace parking.

GENERAL PURPOSE LANES

General traffic will need to wait while buses are stopped at the station. Some parallel parking will be removed on the southern portion of Tunnel Avenue to provide bus lanes as described above in Option 1.

PEDESTRIAN AND BICYCLE ACCOMMODATION

Stations will be constructed on bus bulbs because existing sidewalk width is not adequate for platforms. Bus bulbs will reduce pedestrian crossing distance, which is already narrow. There is potential in the southbound direction to expand the sidewalk to accommodate the station. A new crosswalk would be added between the northbound BRT platform and the Caltrain Station to facilitate safe pedestrian movements. Bicyclists will ride in mixed traffic as existing.

4.7 2040 Long-Term Alternatives

The long term alternatives assume that the planned extension of Geneva Avenue is constructed in year 2040. Extension of Geneva Avenue from Bayshore Boulevard to US 101, including crossing of the Caltrain tracks could be built in conjunction with the currently unapproved Brisbane Baylands Development. A new, grade separated, signalized interchange at the convergence of Geneva Avenue and Harney Way would be built as part of a bi-county effort to improve east-west traffic flow and improve access to US 101. The long term routing of Route 28R will use this extension, however the specific design and timing of construction are not yet known. Design of the Geneva Avenue extension should consider the need to provide high quality bus rapid transit facilities, direct transfers with Caltrain, and high quality pedestrian and bicycle facilities. Three alternatives are proposed at this stage, with different configurations of BRT and light rail (LRT) on Geneva Avenue and the Geneva Avenue Extension.

All long-term alternatives assume that the BRT from Candlestick/Hunters Point Shipyard use the Geneva Avenue Extension, and include a station on the Geneva Avenue Extension viaduct at Tunnel Avenue, which would serve as the transfer station with Caltrain. Design of the station would provide direct platform transfers between Caltrain and the BRT.

ALTERNATIVE 1: BASELINE—BRT ON GENEVA AVE AND GENEVA EXTENSION

GENEVA AVENUE: SANTOS STREET TO BAYSHORE BOULEVARD

Converts the inside traffic lane to a dedicated bus lane separated from traffic by two 2-foot buffers, that could include physical separation. Transit station platforms are located on the right side of the lanes on the far side of the intersections. Stations for the two directions are located on opposite sides of the intersection to improve travel time performance and meet needs of limited street width.

GENEVA AVENUE EXTENSION: BAYSHORE BOULEVARD TO THOMAS MELLON CIRCLE

Extends Geneva Avenue to the east side of US 101 connecting Candlestick Point with Visitacion Valley. This extension will be constructed by the Brisbane Baylands development and will be designed to accommodate bus rapid transit, including a station at Tunnel Avenue as a transfer point with Caltrain.

ALTERNATIVE 2—LRT ON GENEVA AVE AND BRT ON GENEVA EXTENSION, WITH FORCED TRANSFER AT BAYSHORE BOULEVARD

Under this alternative, the Muni T-Third LRT line would be extended along Bayshore Boulevard and Geneva Avenue to Balboa Park Station. Muni Route 28R would terminate at Balboa Park Station and Harney BRT would serve Hunter's Point Shipyard, Candlestick Point, Executive Park Boulevard and Brisbane Baylands before terminating at Bayshore Boulevard. LRT would be the primary transit line traveling the length of Geneva Avenue from Balboa Park Station and Bayshore Boulevard; a transfer between LRT and BRT would be required for a trip between Balboa Park Station and Hunter's Point Shipyard.

GENEVA AVENUE: BALBOA PARK STATION TO BAYSHORE BOULEVARD

Converts the inside traffic lanes to center-running LRT with a 9 foot median separated from traffic. Transit station platforms would be center located inside the median. A bike lane would be included for the entire alignment on

Geneva Avenue and Bayshore Boulevard.

BAYSHORE BOULEVARD: GENEVA AVENUE TO SUNNYDALE AVENUE

Converts the inside traffic lanes to center-running LRT with a 9 foot median separated from traffic. Transit station platforms would be center located inside the median. A bike lane would be included for the entire alignment on Geneva Avenue and Bayshore Boulevard.

GENEVA AVENUE EXTENSION: BAYSHORE BOULEVARD TO THOMAS MELLON CIRCLE

Extends Geneva Avenue to the east side of US 101 connecting Candlestick Point with Visitacion Valley. This extension will be constructed by the Brisbane Baylands development and will be designed to accommodate rapid transit, including a station at Tunnel Avenue as a transfer with Caltrain.

ALTERNATIVE 3—LRT AND BRT ON GENEVA AVE, AND BRT ON GENEVA EXTENSION

Under this alternative, the extension of Muni T-Third LRT line would be the same as Alternative 1. The key difference between the two LRT alternatives is Alternative 2 would maintain BRT service on Geneva Avenue. Without truncation of BRT, both modes would share the center lane on Geneva Avenue, resulting in greater combined headways than under either the Baseline or Alternative 1.

GENEVA AVENUE: BALBOA PARK STATION TO BAYSHORE BOULEVARD

Converts the inside traffic lanes to center-running LRT with a 9 foot median separated from traffic. Transit station platforms would be center located inside the median. A bike lane would be included for the entire alignment on Geneva Avenue and Bayshore Boulevard.

BAYSHORE BOULEVARD: GENEVA AVENUE TO SUNNYDALE AVENUE

Converts the inside traffic lanes to center-running LRT with a 9 foot median separated from traffic. Transit station platforms would be center located inside the median. A bike lane would be included for the entire alignment on Geneva Avenue and Bayshore Boulevard.

GENEVA AVENUE EXTENSION: BAYSHORE BOULEVARD TO THOMAS MELLON CIRCLE

Extends Geneva Avenue to the east side of US 101 connecting Executive Park Boulevard and Candlestick Point with Bayshore Boulevard. This extension will be constructed by the Brisbane Baylands development and will be designed to accommodate rapid transit, including a station at Tunnel Avenue as a transfer with Caltrain.

CHAPTER 5

ALTERNATIVES EVALUATION

5.1 Introduction

This section presents the results of the study team's evaluation of likely benefits and impacts of the near-term BRT project on the Geneva-Harney Corridor. The following chapter describes the purpose of each evaluation element, the evaluation approach and criteria, and the performance of the BRT alternatives developed with respect to a set of multimodal evaluation criteria.

Key findings that indicate the benefits and impacts of BRT relative to a future with no BRT are identified at the end of each section. Detailed quantitative and qualitative analysis has been conducted for the horizon year 2020 which includes the near-term project with the greatest need for implementation. A summary analysis has been conducted for the horizon year 2040, which includes variations of the near-term project.

As a result of the extensive discussions and feedback from community meetings and stakeholder outreach, key members and property owners along the Corridor (in particular, in the Little Hollywood/Visitacion Valley area) strongly expressed concerns about select findings and recommendations of this Study. They are summarized in Section 5.6: Community / Stakeholder Feedback and Concerns.

SUMMARY OF EVALUATION RESULTS

5.2 Evaluation Approach and Criteria

This section describes the study team's approach to evaluation of near-term BRT alternatives for the Geneva-Harney Corridor, including measures of evaluation and corresponding methodologies.

MEASURES OF EVALUATION

The following sections document the results of the study team's evaluation of benefits of each BRT alternative, including its performance in meeting the City's complete streets goal. This goal espouses a more balanced approach to street design and performance, where all modes are accommodated, more efficient modes are given appropriate space, and safety for vulnerable users is a prominent principle. The evaluation assesses the performance of each BRT alternative with respect to the following areas of potential impact:

- Transit operations
- Transit rider experience
- Access and pedestrian and bicycle safety and comfort
- Urban landscape and design
- Traffic operations and parking
- Capital and operating costs

The evaluation includes both qualitative and quantitative measures. The primary sources of data for evaluating BRT performance include:

- A three step traffic and transit modeling approach, described further below
- Conceptual engineering designs
- Data on the performance of other BRT systems around the world
- Stakeholder and community outreach

Appendix C provides the full evaluation framework.

TRANSPORTATION MODELING APPROACH

Key aspects of BRT were assessed using a three step approach to modeling transportation conditions, as summarized in Figure 38. The three models used for this evaluation were:

- San Francisco's Countywide Travel Demand Forecasting model (SF-CHAMP), which models Bay Area transportation demand and conditions
- Dynameq, a dynamic traffic assignment model at the level of the Geneva-Harney Corridor
- Synchro, which provides traffic analysis at specific key intersections

FIGURE 38. MODELING APPROACH

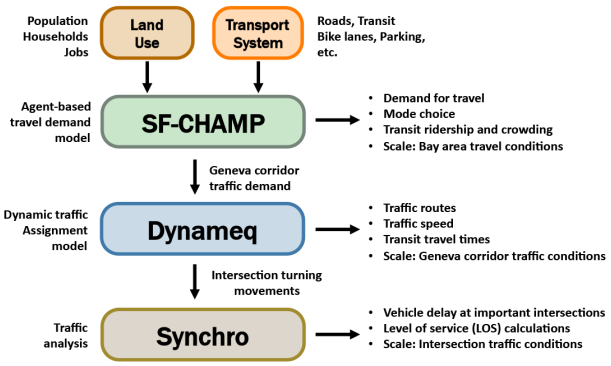


TABLE 14. TRANSIT OPERATIONS AND PERFORMANCE EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/DEFINITION	SOURCES
Transit travel time	The time it takes for buses to travel along the corridor. Overall average transit travel time is modeled and compared to the modeled average auto travel time. Modeled transit operating speeds are also compared as a percentage of modeled auto travel speeds in the corridor.	Transit travel time and speed by segment	Dynameq Traffic Assignment Model (DTA)
		Transit travel time versus auto travel time	DTA
Service reliability	Measures the variation in the time between buses and passenger waiting times. Transit-only lanes improve transit reliability by removing buses from traffic, which can be highly variable. Percent of route mileage in mixed flow versus in transit-only lanes is compared.	% route mileage mixed flow vs. exclusive guideway	Physical design concepts
Equity analysis	Compares the share of travel time savings for transit dependent groups to the share of travel time savings for the non-target groups. Travel time benefits for zero-car households and low income households are tabulated separately from SF-CHAMP model forecasts, and compared to SF-CHAMP model forecasts of travel time savings for San Franciscans in general.	Comparison of benefits for transit-dependent groups relative to general population	SF-CHAMP
Attract/retain transit ridership	Reports how well transit services are attracting trips. The SF-CHAMP model reports the change in the overall number of transit riders on Geneva-Harney Corridor routes, as well as the share of all trips made by transit.	Ridership	SF-CHAMP
		Transit mode share	SF-CHAMP

++	Substantially better
+	Better
0	No notable change
-	Worse
--	Substantially worse

COUNTYWIDE TRAVEL DEMAND FORECASTING MODEL

The Authority's travel demand forecasting model (SF-CHAMP) forecasts how changes in land use, roadway networks, and transit networks are likely to affect travel demand in San Francisco. Key inputs to the model include:

- Expected changes to land use, in terms of number of jobs, households, and employed residents
- Estimates of future travel demand from outside San Francisco
- Known future roadway network modifications, taking into account major roadway projects, such as TEP improvements in the western section of Geneva Avenue, the Geneva Avenue Extension, and planned bicycle and pedestrian improvements
- Planned future transit network modifications, including changes to bus routes and the addition of major projects

An SF-CHAMP model for the year 2020 without BRT (the "Baseline" alternative) was created in addition to SF-CHAMP models for the other three alternatives. A model for the year 2040 was also developed with less detailed data input in addition to the three long term alternatives that include BRT and/or LRT.

The SF-CHAMP modeling yields the following information:

- Changes in numbers of travelers and vehicles on the Geneva-Harney Corridor and parallel streets
- Changes in the proportion of people walking or bicycling
- Changes in transit ridership on each route in the Geneva-Harney Corridor
- Changes in the origins and destinations of travelers in cars and on transit

DYNAMIC TRAFFIC ASSIGNMENT (DTA) MODEL

Dynamic Traffic Assignment is a traffic analysis tool used to understand detailed transportation system performance at a more fine-grained level, capturing signal timing, queue formation, and route-choice decisions. Dynameq, San Francisco's DTA model, is calibrated to obser-

vations of its transportation system and can be used to understand detailed traffic and transit impacts of changes to the system. It identifies the routes that drivers are likely to take, their volumes, and traffic speeds. It also identifies transit travel times, dwell, and delay for the identified corridor.

SYNCHRO TRAFFIC OPERATIONS MODEL

Synchro assesses how well intersections serve expected numbers of vehicles, and estimates the delays caused at intersections. It also models how changes to signal timing and intersection geometry, such as the presence of turn pockets, affect intersection operation. Inputs to the Synchro model include:

- The roadway configuration of the corridor
- Expected vehicle volumes, including on parallel streets
- Number, length, and type of turn pockets
- The signal timing plan
- The Synchro model outputs that are used for evaluation include:
- Queues of vehicles waiting at traffic signals

TABLE 15. TRANSIT TRAVEL TIME AND SPEED BETWEEN CANDLESTICK POINT AND BALBOA PARK STATION

SCENARIO	ROUND TRIP TRANSIT TRAVEL TIME (IN MINUTES	AVERAGE TRANSIT TRIP TRAVEL TIME (IN MINUTES)	TRANSIT TRAVEL SPEED
2020 Baseline	59	50	10
2020 Alternative 1	58	50	10
2020 Alternative 2	57	50	10
2020 Alternative 3	61	50	10
Notes	Transit Travel Time on 28R between Candlestick and Balboa Park BART, PM Peak Period		Average transit trip speed from corridor Districts (AM&PM Peak)

- The average amount of delay to vehicles at each intersection
- An overall metric for the performance of the intersection, called a "level of service" (LOS) grade

5.3 2020 Near Term Evaluation

The near-term evaluation compared a baseline scenario to three project alternatives:

- Baseline - SF Muni Route 28R provides service between Candlestick Point, Balboa Park BART station and 19th Avenue via Geneva Avenue, Bayshore Boulevard, and Blanken Avenue. Includes no BRT treatments in the project study area between Santos Street and Thomas Mellon Circle
- Alternative 1 - 4 Lane General Purpose/Side Running BRT on Geneva + Blanken/Lathrop Couplet Options 1 and 2—Same routing as baseline alternative with BRT treatments on Geneva Avenue, Bayshore Boulevard, and conversion of Blanken and Lathrop Avenues into a one-way couplet, and development of a new right of way between Lathrop Avenue and Alanna Way.
- Alternative 2 - 2 Lane General Purpose/Center Running BRT on Geneva + Blanken/Lathrop Couplet Options 1 and 2—Same as Alternative 1 but with center-running bus-only lanes on Geneva Avenue
- Alternative 3 - 2 Lane General Purpose/Center Running BRT Geneva + Beatty Avenue—Same as Alternative 2 except Little Hollywood routing utilizes Beatty Avenue instead of Blanken and Lathrop Avenues

TABLE 16. TRANSIT VS. DRIVE TRAVEL TIME, IN MINUTES

SCENARIO	TRANSIT EASTBOUND	TRANSIT WESTBOUND	DRIVE EASTBOUND	DRIVE WESTBOUND	TRANSIT/:AUTO RATIO EASTBOUND	TRANSIT/:AUTO RATIO WESTBOUND
2020 Baseline	16.4	15.3	13.2	14.4	**1.25**	**1.06**
2020 Alternative 1	15.9	14.1	13.0	15.3	**1.23**	**0.92**
2020 Alternative 2	14.2	15.2	13.0	15.5	**1.09**	**0.97**
2020 Alternative 3	15.1	15.2	13.2	15.5	**1.14**	**0.98**

TRANSIT OPERATIONS AND PERFORMANCE

PURPOSE

The purpose of this evaluation measure is to assess the benefits of the near-term BRT alternatives on transit performance. As shown in Table 14, transit performance is measured by transit travel time and speed, service reliability, equity analysis (the travel time savings for transit-dependent groups compared to the general population), and attracting/retaining transit riders.

The three step modeling process in Figure 38 above provided the bulk of the quantitative transit performance results. The Dynameq (DTA) model simulated transit and auto travel times and speeds. SF-CHAMP provided estimates of how overall demand for transit trips changes as a result of curb-lane or center-lane BRT, and how changes in transit performance benefit different types of travelers (the equity analysis). Service reliability was assessed using the engineering plans for each scenario.

METHODOLOGY

For the most part, summary tables include the actual values for each metric across each of the alternatives. For comparative tables, the first scenario, the Baseline, will once again note the value for each metric, whereas subsequent alternatives will show the relative change from that value across the alternatives. Throughout this section, the following groupings will be used for comparisons:

FINDINGS

TRANSIT TRAVEL TIME

The BRT alternatives do not significantly improve transit travel times compared to the 2020 Baseline. There is only a minor difference between the two options on Geneva Avenue, with the 2 Lane General Purpose/Center Running BRT option performing slightly better. The Blanken/Lathrop Couplet options provide minor time savings as compared to the Baseline. The Beatty Avenue option has a slightly longer travel time as compared to the Baseline because it operates on a more circuitous route. All alternatives have round trip travel times between Candlestick Point and Balboa Park BART within 3 minutes of each other.

BRT on the Geneva-Harney corridor provides travel time benefits for transit over the baseline alternatives. Alternative 1 provides a 5% total travel time improvement over the 2020 Baseline, Alternative 2 provides 7% improvement, and Alternative 3 provides 4% improvement. For Alternatives 1 and 2, the level of travel time reduction varies significantly by direction, with almost all Alterna-

FIGURE 39. TRAVEL TIME BETWEEN CANDLESTICK AND BALBOA PARK

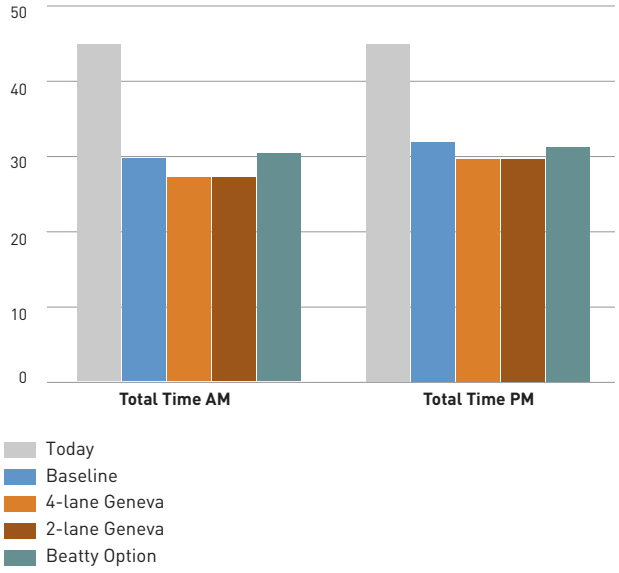


TABLE 17. TRAVEL TIME AND SPEED - SUMMARY OF FINDINGS

SCENARIO	TRANSIT TRAVEL TIME (MINS)	TRANSIT TRAVEL SPEED VS. AUTO TRAVEL SPEED	TRANSIT TRAVEL SPEED (MPH)
2020 Baseline	16.4	1.25	10
2020 Alternative 1	-	0	0
2020 Alternative 2	+	+	0
2020 Alternative 3	+	+	0

TABLE 18. ROUTE MILEAGE BY LANE TYPE - MIXED FLOW VS. EXCLUSIVE GUIDEWAY

SCENARIO	LENGTH IN FEET EXCLUSIVE GUIDEWAY	LENGTH IN FEET MIXED FLOW	% ROUTE MILEAGE EXCLUSIVE GUIDEWAY
2020 Baseline	0	19,900	0%
2020 Alternative 1	16,750	3,500	83%
2020 Alternative 2	16,750	3,500	83%
2020 Alternative 3	16,000	9,000	64%

TABLE 19. SERVICE RELIABILITY - SUMMARY OF FINDINGS

SCENARIO	SERVICE RELIABILITY
2020 Baseline	0% Exclusive Guideway
2020 Alternative 1	++
2020 Alternative 2	++
2020 Alternative 3	+

TABLE 20. OVERVIEW OF FINDINGS

SCENARIO	BENEFIT TO LOW INCOME HOUSEHOLDS	BENEFIT TO LOW INCOME HOUSEHOLDS TRAVEL DISTANCE	BENEFIT TO LOW INCOME HOUSEHOLDS TRIP SPEED
2020 Baseline	1.05	1.14	1.09
2020 Alternative 1	1.05	1.19	1.13
2020 Alternative 2	1.06	1.20	1.14
2020 Alternative 3	1.06	1.19	1.12
Notes	Calculation: Average for low-income households/total for general population. A number over 1 means lower income households benefit more than the general population.		

TABLE 21. EQUITY ANALYSIS – SUMMARY OF FINDINGS

SCENARIO	EQUITY ANALYSIS: BENEFIT TO LOW INCOME HH TRAVEL TIME	EQUITY ANALYSIS: BENEFIT TO LOW INCOME HH TRAVEL DISTANCE	EQUITY ANALYSIS: BENEFIT TO LOW INCOME HH TRIP SPEED	SUMMARY OF EQUITY BENEFITS
2020 Baseline	1.05	1.14	1.09	
2020 Alternative 1	+	++	++	++
2020 Alternative 2	++	++	++	++
2020 Alternative 3	++	++	++	++
Notes	Benefit to low-income households as compared to population as a whole			

TABLE 22. TRANSIT RIDERSHIP AND MODAL SHARE

SCENARIO	PEAK PERIOD RIDERSHIP	CHANGE IN PEAK PERIOD RIDERSHIP (FROM BASELINE)	TRANSIT MODE SHARE	ATTRACT/RETAIN RIDERSHIP SUMMARY
2020 Baseline	8,174		15.2%	
2020 Alternative 1	8,774	600	15.2%	+
2020 Alternative 2	8,742	568	15.2%	+
2020 Alternative 3	8,756	581	15.3%	+
Notes	Boardings on 28R (AM and PM Peak, Inbound and outbound)		Transit mode share in corridor Districts (AM and PM Peak)	

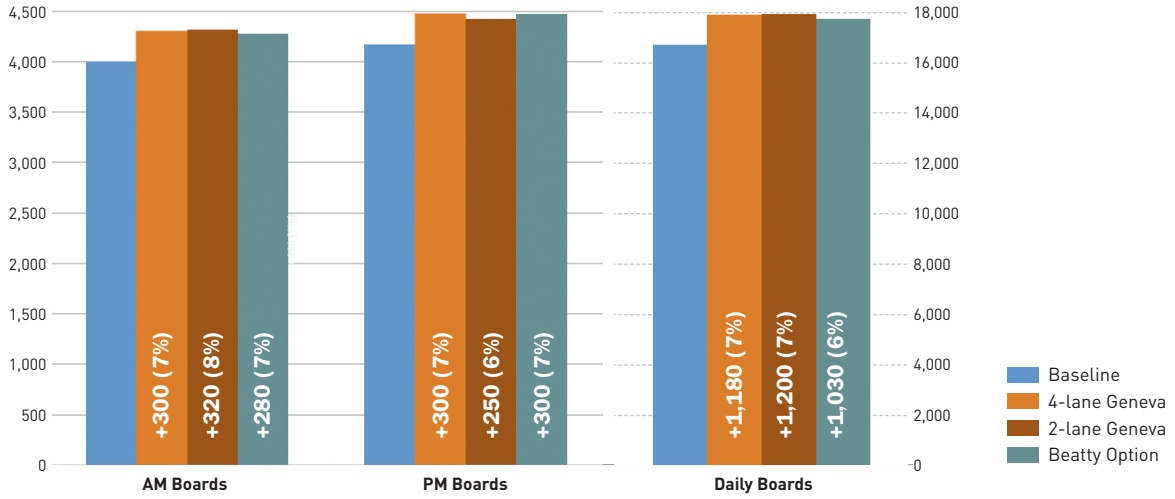
tive 1 reductions taking place in the westbound direction, and most of the Alternative 2 improvements taking place in the eastbound direction.

When compared to drive travel time, BRT on the Geneva-Harney Corridor improves the competitiveness of transit, with transit performing better than driving for all alternatives in the westbound direction. Eastbound, transit is still slower but the travel time gap is reduced.

SERVICE RELIABILITY

All three alternatives improve the reliability of transit service along the Geneva-Harney Corridor by reducing conflicts with mixed traffic and streamlining passenger loading and unloading. Under Alternative 1 and 2, 83% of the alignment is on exclusive guideways, providing the greatest reliability improvements. Side-running BRT, such as the Geneva Avenue portion of Alternatives 1 and the Blanken/Lathrop Couplet portion of Alternatives 1 and 2, is subject to some delays from drivers entering the bus lane to park, turn right, or enter driveways. Center-

FIGURE 40. AM, PM, AND DAILY BOARDINGS



running BRT, such as the Geneva Avenue portion of Alternative 2 and on Beatty Avenue, have exclusive bus lanes that are not permeable to mixed traffic. They are not susceptible to these delays, and show the greatest improvements to service reliability.

In Alternative 3, 62% of the alignment is on exclusive guideways; this means that more than a third of the alignment is subject to delays caused by operating in mixed traffic. In future phases of work, these factors may be used to refine this analysis.

Other factors can impact the travel time and reliability, even when operating in a dedicated lane such as the type of separation, speed of traffic in the adjacent lane, or congestion at intersections. These factors were not considered at this level of evaluation.

Alternative 1 may experience additional delay as compared to Alternatives 2 and 3 at some intersections due to encroachment in the transit only lanes by right turning vehicles. In Alternative 1, the only intersection with LOS C or worse is at Blanken Avenue and Tunnel Avenue, which experiences delays of LOS C.

Table 18 shows the percent of route mileage that uses an exclusive guideway for each alternative.

EQUITY ANALYSIS

A number of steps in the planning process are intended to advance projects with an equitable distribution of benefits and impacts. Broad participation by stakeholders as early as possible helps to ensure that concerns about project design and impacts, as well as about distribution of project benefits, are addressed effectively in the design process.

The SF-CHAMP model can calculate transportation outcomes for different groups of people, such as low-income or zero-car households. To measure the equity of a BRT investment on the Geneva-Harney Corridor, the study team measured the share of project benefits that would accrue to low-income and zero-car households, as well as the share of project benefits that would accrue to households that aren't low income and that have access to a car.

An equitable project is one that benefits "target" populations at least as much as the general population. Table 21 reports how BRT project benefits accrue to target (low income households in corridor districts) and non-target populations (total population in corridor districts). The measures were calculated by dividing the average transit trip travel time for low income households in corridor districts to that for all the households in corridor districts. The same calculation was done for travel distance and trip speed. A ratio equal to one means that the same benefits accrue to low-income households as to the general population in corridor districts. A ratio less than one means that low-income households accrue less benefit from the project than the general population; and a ratio greater than one means that low-income households accrue more benefit from the project.

The analysis shows that for all measures of equity, all alternatives including the baseline provide greater benefit to low-income households than to the population as a whole. For travel time, Alternatives 2 and 3 provide slightly higher benefit than Alternative 1 and the Baseline. For travel distance and trip speed, the three BRT alternatives provide greater benefit to low-income households than the Baseline, with Alternative 2 providing the greatest.

FIGURE 41. 2020 BASELINE, ROUTE 28R BOARDINGS

FIGURE 42. 2020 ALTERNATIVE 1, CHANGE FROM 2020 BASELINE, ROUTE 28R BOARDINGS

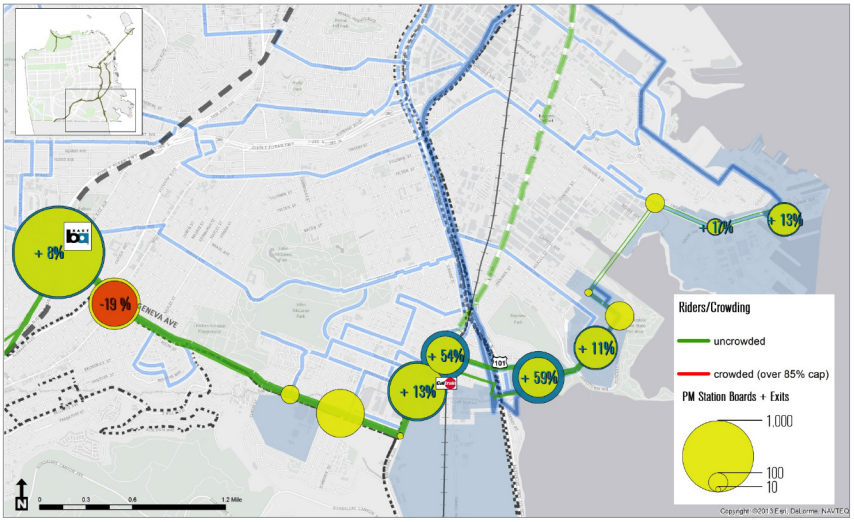
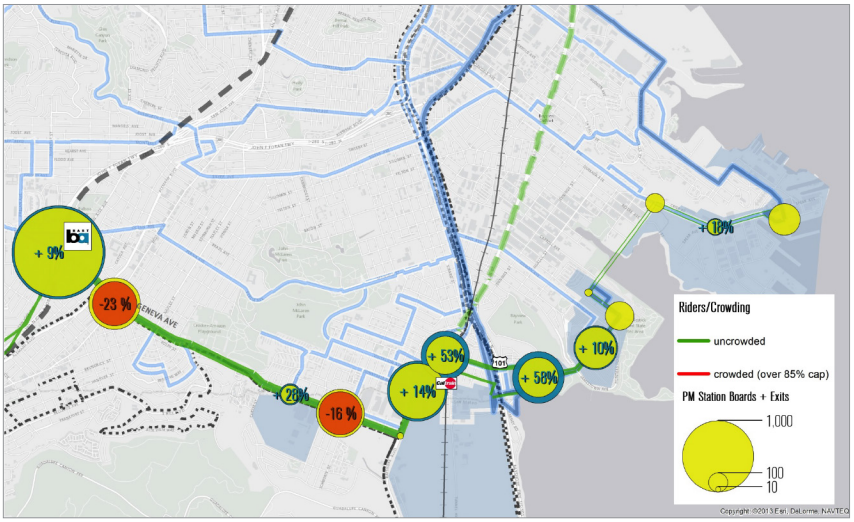


FIGURE 43. 2020 ALTERNATIVE 2, CHANGE FROM 2020 BASELINE, ROUTE 28R BOARDINGS



ATTRACT/RETAIN RIDERSHIP

The SF-CHAMP model estimates a 2020 Baseline peak period (6-9 AM and 4-7 PM) ridership of 8,174 passengers for Route 28R. This is equivalent to just over 150 full buses. Even minor improvements in travel time and reliability can have an impact on ridership, as would greater visibility and legibility of the route. All three of the 2020 Alternatives show significant increases in peak ridership from the Baseline. This is most pronounced in Alternative 1, though the differences in peak ridership between Alternatives 1, 2, and 3 may not be significant. Only Alternative 3 provides a very slight mode share increase from Baseline. This may be because Alternative 3 provides a direct connection with Caltrain; this may encourage some to use transit that would otherwise use other modes.. Alternatives 1 and 2 show neither mode share growth nor loss. Table 22 summarizes ridership and mode share figures. Figure 41 provides greater detail on AM and PM peak period and daily boardings across the three alternatives.

Figure 41 through Figure 43 show boardings and exits by station for the Baseline and the three alternatives.

Figure 42 shows Alternative 1 as compared to the Baseline (Figure 41). Increased activity at the Balboa Park BART and Sunnydale Avenue light rail stations indicate that more passengers are using the route to reach regional transit (BART and Caltrain). Some passengers shift from Route 14R to the T-Third to access Route 28R, particularly those with destinations on the eastern portions of the route, as shown by a decrease in boardings and exits at Mission Street and an increase, from 1,500 to 1,700, at the T-Third transfer station at Blanken Avenue and Bayshore Boulevard. The eastern part of the route adds over 400 additional boardings from Bayshore Boulevard to Hunter's Point.

Alternative 2, in Figure 43, also shows increased usage at Balboa Park BART and Sunnydale Avenue light rail stations indicating increased usage of 28R to access regional transit. Decreases at Mission Street and Schwerin Avenue suggest that fewer people are using Routes 14R, 8AX, 9 and 9R to access Route 28R and more people are using the T-Third.

FIGURE 44. 2020 ALTERNATIVE 3, CHANGE FROM 2020 BASELINE,ROUTE 28R BOARDINGS

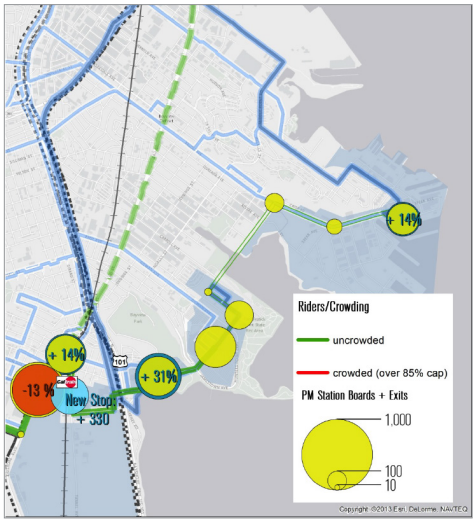


FIGURE 45. COMPARISON BETWEEN BLANKEN/LATHROP COUPLET AND BEATTY AVENUE OPTIONS

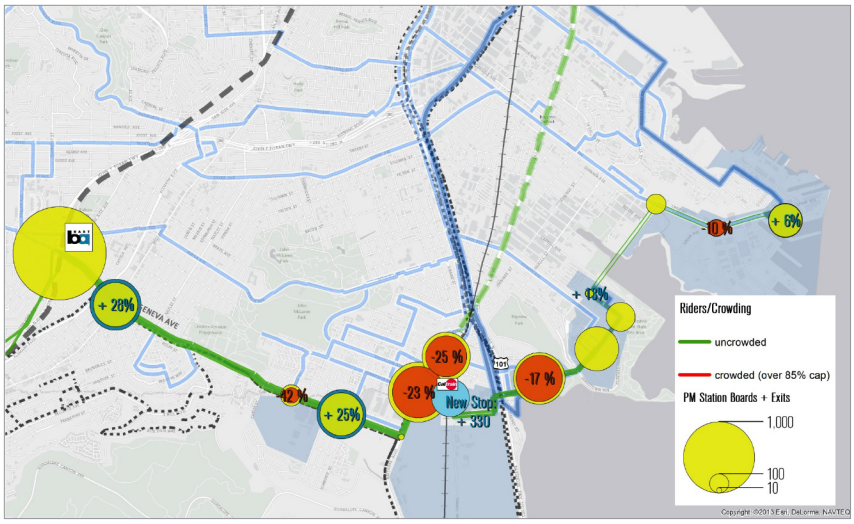


TABLE 23. SUMMARY OF TRANSIT OPERATIONS AND PERFORMANCE EVALUATION

SCENARIO	TRANSIT TRAVEL TIME	SERVICE RELIABILITY	EQUITY ANALYSIS	ATTRACT/ RETAIN TRANSIT RIDERSHIP
2020 Baseline	+	0% of route on exclusive lanes	*	*
Alternative 1	+	+	++	+
Alternative 2	++	++	++	+
Alternative 3	+	+	++	+
Notes	*This evaluation category combines multiple measures so there is no single value for the 2020 Baseline.			

As shown in Figure 44, Alternative 3 includes a stop adjacent to Caltrain on Tunnel Avenue. This stop draws some boardings/exits from nearby stops, particularly Sunnydale Avenue. It shows smaller increases in boardings at other stops, as compared with Alternatives 1 and 2 due to a longer travel time.

Figure 45 shows the changes in ridership between Alternative 2, which uses the Blanken/Lathrop Couplet, and Alternative 3, which uses Beatty Avenue. This figure highlights the benefits and impacts of providing more direct transfers to Caltrain. Alternative 3, by adding a station at Caltrain shifts some riders from using nearby stops at Sunnydale Avenue, Blanken Transit Mall, and Thomas Mellon Circle. There is increased ridership at other key transfer stations such as at Mission Street, the transfer with the 14R, and at Oriente Street (and Schwerin Street), the transfer with routes 8AX, 9 and 9R.

Because of the increased travel time from a longer route in the Beatty Avenue option, fewer riders use the route for destination on the eastern side of US 101. This longer route offsets the travel time reduction from all the other transit treatments.

KEY CONCLUSIONS

Providing a single-ride transit service between the Candlestick Point/Hunter's Point Shipyard developments and Balboa Park station on the Corridor , and continued on 19th Avenue to Fort Mason, will fill a significant transit gap that will exist in the study area when these developments are occupied. Reducing travel time with BRT treatments increases usage of the route, including access to regional transit at both Balboa Park BART and Bayshore Caltrain stations. Alternative 3 (the Beatty Avenue option) provides direct access to Caltrain, but travel time is increased for those not using the route to transfer to and from Caltrain, which discourages ridership. Overall, Alternatives 1 and 2 result in a 7% increase in daily boardings over the Baseline, while Alternative 3 results in a 6% increase in daily boardings over the Baseline.

BRT treatments improve travel time and make transit more reliable along the route. Alternative 2 provides the

best service reliability. It has a high percentage of fully exclusive route mileage, where drivers are not using the transit lane to park or turn right.

Low-income households benefit from BRT on the Corridor more than the general population, across all alternatives.

All three alternatives lead to ridership growth compared to the Baseline, with variation among the options of less than 40 passengers during peak periods. Alternative 1 has the highest estimated ridership growth.

TRANSIT RIDER EXPERIENCE

PURPOSE

The purpose of this evaluation is to measure the benefits of the BRT alternatives on the experience of transit riders. Transit rider experience is measured by the quality of the waiting and boarding experience; quality of the in-vehicle experience; wayfinding ability; and safety and security of waiting riders; and the ability to brand a unique identity for the BRT transit route. At this stage of the process, many aspects of rider experience have not been developed yet. Table 24 describes the sub-criteria that can be measured and assessed at this study stage relative to transit rider experience.

METHODOLOGY

Transit rider experience is measured both qualitatively and quantitatively. Conceptual drawings are the source of assessments of the transfer experience. The SF-CHAMP model provides information on bus crowding.

FINDINGS

QUALITY OF IN-VEHICLE EXPERIENCE

The quality of the in-vehicle riding experience is measured by the degree of crowding in vehicles. This is determined by evaluating the maximum load point along the route for each Alternative, as shown in Table 25. SFMTA service standards plan for peak period operations at or below 85% of the combined seating and standing capacity along entire route in the peak direction. 40-foot standard transit buses have an 85% load standard of 54 passengers while 60-foot articulated transit buses rise to 80 passengers. Regardless of the size coach used on this route initially, all three alternatives fall within the peak load service standard for both 40-foot and 60-foot coaches. Alternative 3 shows the greatest change by direction, with the highest peak loads, 53 passengers, in the PM peak on inbound trips; and the lowest peak loads, 45 passengers, in the PM peak on outbound trips. Other than these, the AM and PM, inbound and outbound peak load points fall within 47 and 50 passengers. Since all peak loads points are close to the 85% load standard for 40-foot coaches, using articulated coaches would improve passengers' in-vehicle experience.

TRANSFER EXPERIENCE

The passenger experience is in large part affected by the transfer experience. Transfers that take place on the same platform or in an obvious location nearby are easier for passengers to navigate than looking for a stop blocks away. On the Geneva-Harney Corridor, local buses would stop at the BRT stations on segments where the transit-only lane is at the curb. They will have separate stops where the BRT lanes are center-running. The Oriente Street Station provides the poorest bus-to-bus transfer, because the other lines stop a block away at Schwerin. Alternative 3 provides the best transfer experience with Caltrain: providing this direct transfer alters ridership

TABLE 24. TRANSIT RIDER EXPERIENCE EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY /DEFINITION	SOURCE
Quality of in-vehicle experience	Captures the quality of the ride on transit from the passenger's perspective. The SF-CHAMP model provides forecasts of how full buses will be at their peak load points.	Passenger loads at maximum load points	Travel demand model
Wayfinding ability	Captures how visible and legible transit routes and information will be to potential riders. Street and transit station platform layout and geometry are reviewed to assess how the designs affect the quality and level of information given to passengers, and the ease of transferring from the Geneva-Harney Corridor service to other intersecting routes.	Combined stops vs. local only at the curb	Physical design concepts
		Transfer experience (including vertical circulation)	Physical design concepts

TABLE 25. PASSENGER LOADS AT MAXIMUM LOAD POINTS

SCENARIO	AM INBOUND	PM INBOUND	AM OUTBOUND	PM OUTBOUND	AVERAGE
2020 Baseline	51	48	45	43	47
2020 Alternative 1	48	49	49	48	49
2020 Alternative 2	49	50	49	48	49
2020 Alternative 3	49	53	47	45	48

TABLE 26. STOP LOCATIONS FOR LOCAL ROUTES AND BRT

SCENARIO	GENEVA AT SANTOS	GENEVA AT ORIENTE	BAYSHORE AT GENEVA	BAYSHORE AT SUNNYDALE	BLANKEN AT BAYSHORE	TUNNEL AT CALTRAIN	HARNEY AT EXECUTIVE PARK
2020 Baseline	Combined	Combined	Combined	Combined	Combined	N/A	Combined
2020 Alternative 1	Combined	Combined	Combined	Combined	Combined	N/A	Combined
2020 Alternative 2	Separate	Separate	Combined	Combined	Combined	N/A	Combined
2020 Alternative 3	Separate	Separate	Combined	N/A	Combined	Combined	Combined
Transfers	8, 8AX, 9	8AX, 9 at Schwerin		Caltrain, T-Third	T-Third	Caltrain	

TABLE 27. KEY CONCLUSIONS

EVALUATION CRITERIA	QUALITY OF IN-VEHICLE EXPERIENCE	TRANSFER EXPERIENCE
2020 Baseline	51 person maximum passenger load	0
Alternative 1	0	+
Alternative 2	0	+
Alternative 3	0	++

and travel patterns as compared to the other alternatives. All alternatives provide a good transfer experience with the T-Third light rail at the Blanken Transit Mall/Arleta Avenue stations.

Other than stop locations, wayfinding factors that affect a passenger's transfer experience are determined at later stages of the planning process. However, in all alternatives key transfers will be signed clearly to ensure the best transfer experience.

ACCESS AND PEDESTRIAN AND BICYCLE SAFETY AND COMFORT

PURPOSE

The purpose of this evaluation is to measure the benefits of BRT on overall accessibility, as well as bicyclist and pedestrian access, safety, and comfort. For pedestrians these are measured by the street-crossing experience and sidewalk conditions. For bicyclists, these are measured by the quality of the bicycle facility, connectivity to other routes, and consistency and compatibility with existing bike plans. Increased employment, retail and consumer accessibility for neighborhoods is measured by the increase in work and shopping opportunities available by transit and walking.

METHODOLOGY

Much of the evaluation results for this measure were assessed through review of the conceptual drawings prepared for each alternative. The SF-CHAMP model measured changes in economic opportunities as a result of BRT.

FINDINGS

CROSSING EXPERIENCE

The pedestrian crossing experience is affected by the total width of the street that needs to be crossed, the portion of the street that a pedestrian is or feels most in danger, and the frequency of crossing opportunities. The design of all three BRT alternatives would replace parking with buffers or bulbouts at intersections; at intersections with stations, a portion of these buffers would be replaced with transit boarding islands that also provide pedestrian refuge. These design techniques provide either shorter total crossing distance (curb to curb width) or shorter crossing distance of travel lanes (width of travel lanes). Width of travel lanes includes general purpose lanes, transit-only lanes, and bicycle lanes, but does not include parking, medians, transit boarding islands, or buffers.

As shown in Table 30 the difference in total curb-to-curb crossing distance between the two design options on Geneva Avenue is minor. However the pedestrian crossing experience is significantly better in the 2 Lane General Purpose/Center Running BRT option (Alternatives 2 and 3), where the crossing distance of travel lanes is only 54 feet as compared to 74 feet in the 4 Lane General Purpose/Side Running BRT option (Alternative 1).

In the 4 Lane General Purpose/Side Running BRT option and the Baseline, a 6-foot median on Geneva between Calgary Street and Bayshore Boulevard serves as a pedestrian refuge. In all alternatives, transit boarding islands provide 8 to 8.5-foot refuges for pedestrians. Street width for refuges is taken from parking lanes, which also provide street width for bulbouts where possible.

TABLE 28. ACCESS AND PEDESTRIAN AND BICYCLE SAFETY AND COMFORT EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/DEFINITION	SOURCES
Crossing Experience	Measures safety and comfort for pedestrians crossing the Geneva-Harney Corridor.	Total crossing distance, crossing of travel lanes	Physical design concepts
	Street and transit station platform layout and geometry are reviewed to calculate the number of traffic lane pedestrians must cross before reaching a refuge island; the width of pedestrian islands; and average crossing distances	Pedestrian Refuges (number and width)	Physical design concepts
Sidewalk conditions	Measures safety and comfort for pedestrians walking along the Geneva-Harney Corridor.	Typical sidewalk width	Physical design concepts
	Street and transit station platform layout and geometry are reviewed to calculate the width of the sidewalks and the number of pedestrian crossing opportunities added and removed under each alternative.	Number of pedestrian crossing opportunities added/removed	Physical design concepts
Quality of bicycle access	Measures the safety, comfort, and route connectivity for bicyclists riding in the corridor.	Typical bike lane width (0 if no bike lane is present)	Physical design concepts
	Street layout and geometry are reviewed to measure the space available for bicyclists to navigate corridor streets, including the width of the vehicle lane next to parking lanes.	Connectivity to intersecting routes (Qualitative—comparison with current and planned routes)	Physical design concepts
		Consistency and compatibility with bicycle plans and existing or planned bicycle facilities (Qualitative—comparison with plans)	Physical design concepts
		Degree of pinching (# of curb extension locations → 6 ft)	Physical design concepts
Increased employment, retail and consumer accessibility for neighborhoods	Captures the increase in work opportunities available by transit.	Change in # jobs reachable within a 30 min transit	SF-CHAMP
	SF-CHAMP model forecasts the change in the number of jobs reachable within a 30 minute transit trip.		

TABLE 29. TRANSIT RIDERSHIP AND MODAL SHARE: PEDESTRIAN CROSSING EXPERIENCE AT TYPICAL INTERSECTIONS ON GENEVA AVENUE AND BAYSHORE BOULEVARD

	GENEVA			BAYSHORE**		
SCENARIO	CURB TO CURB DISTANCE	WIDTH OF TRAVEL LANES	REFUGES	CURB TO CURB DISTANCE	WIDTH OF TRAVEL LANES	REFUGES
2020 Baseline	74'	74'	0'*	94'	80'	7'
2020 Alternative 1 (4 Lane)	74'	74'	0'*	96'	92'	0'
2020 Alternative 2 (2 Lane)	72'	54'	2', 2', 14'	96'	92'	0'
2020 Alternative (2 Lane)	72'	54'	2', 2', 14'	96'	92'	0'
NOTES:	*Geneva Avenue from Calgary Street to Bayshore Boulevard has a 6-foot median			**From Geneva Avenue to Sunnydale Avenue, which will have bus lanes		

TABLE 30. PEDESTRIAN CROSSING EXPERIENCE AT TYPICAL INTERSECTIONS—LITTLE HOLLYWOOD

	BLANKEN/LATHROP		TUNNEL		BEATTY		
SCENARIO	**CURB TO CURB DISTANCE**	**WIDTH OF TRAVEL LANES**	**CURB TO CURB DISTANCE**	**WIDTH OF TRAVEL LANES**	**CURB TO CURB DISTANCE**	**WIDTH OF TRAVEL LANES**	**REFUGES***
Existing	36'/35.5'	20'	40' to 42'	24'	66'	48'	0'
2020 Baseline	36'/35.5'	26'/20'	40' to 42'	24'	66'	48'	0'
2020 Alternative 1 Blanken/Lathrop Option 1	36'/35.5'	26'	40' to 42'	32'	N/A	N/A	N/A
2020 Alternative 2 Blanken/Lathrop Option 2	36'/31'	22'	40' to 42'	32'	N/A	N/A	N/A
2020 Alternative 3 Beatty	N/A	N/A	40' to 42'	24' to 44'	66'	48'	10'
NOTES:	Bulbouts will not be constructed in place of parking at intersections on Blanken Avenue and Lathrop Avenue		Bulbouts will not be constructed in place of parking at intersections on Tunnel Avenue		*Buffers on Beatty Avenue are not designed as pedestrian refuges.		

TABLE 31. PEDESTRIAN CROSSING EXPERIENCE AT TYPICAL INTERSECTIONS—CANDLESTICK HUNTERS POINT

	ALANNA		EXECUTIVE PARK		
SCENARIO	**CURB TO CURB DISTANCE**	**WIDTH OF TRAVEL LANES**	**CURB TO CURB DISTANCE**	**WIDTH OF TRAVEL LANES**	**REFUGES**
Existing	40'	38'	47'	36'	11'
2020 Baseline	40'	38'	47'	36'	11'
2020 Alternative 1 Blanken/Lathrop Option 1	40'	36'	47'	40'	7'
2020 Alternative 2 Blanken/Lathrop Option 2	40'	36'	47'	40'	7'
2020 Alternative 3 Beatty	40'	36'	N/A	N/A	N/A
NOTES:	Bulbouts will not be constructed in place of parking at intersections on Beatty Avenue				

On Bayshore Boulevard, between Geneva Avenue and Sunnydale Avenues, the pedestrian crossing experience is degraded because a 7-foot median is removed to provide space for two transit-only lanes, improved bike lanes, and an east side sidewalk. From Sunnydale to Blanken Avenues, the crossing experience remains the same as existing: there will be no transit-only lane, and pedestrian refuges are available at every intersection.

In the Little Hollywood neighborhood, the streets are narrow so the crossing experience is not stressful. In all the options, adding or removing a few feet to the crossing distance or width of travel lanes will not significantly improve or degrade the crossing experience. The greater impact on these streets will be the increase in traffic. On Tunnel Avenue, Alternatives 1 and 2 propose adding a single transit lane between Blanken and Lathrop Avenues. The crossing experience for this one block will be degraded but it is only a single block section. The street layout will remain as it is today south of Lathrop Avenue.

In the Beatty Avenue option, there is potential for adding transit-only lanes in the segment from Recycle Road to Beatty Avenue. This will increase crossing distance at the station that provides a direct transfer with Caltrain, where high pedestrian volumes are anticipated. Large vehicles also enter and exit the Recology driveway at this location, however this may change as site development for the Recology Master Plan progresses. If this option is pursued, measures should be taken to ensure pedestrian safety, including installation of a high visibility crosswalk and bulbouts.

Alanna Way only has a sidewalk on the north side of the road, and there are no destinations on the south side of the road west of US 101. Pedestrians should be discouraged from crossing in this area. The travel lane width

would be decreased to rationalize the lanes here, which would increase safety for pedestrians, as it would likely reduce vehicle travel speed.

On Executive Park Boulevard the width of the travel lanes would be increased to 40 feet, taking the street width from a large landscaped median. While this degrades the pedestrian crossing experience, there would still be a wide 7-foot median providing low stress crossings.

In all options, the number of crossing opportunities would be increased by providing crosswalks at as many intersections as possible. This includes six intersections on Geneva Avenue and one on Bayshore Boulevard that currently do not have crosswalks, and an additional four on Geneva Avenue that currently do not have crosswalks on all intersection legs. Blanken, Lathrop, Tunnel, and Beatty Avenues would also have crosswalks at all intersections and key crossing locations (such as at Caltrain). Though there are crosswalks on Blanken and Lathrop Avenues, there are no destinations on the south side of Alanna Way, west of US 101, so there are no current plans to add or upgrade crosswalks on Alanna Way. In all, over 25 new crosswalks would be added to the Geneva-Harney Corridor, and others would be upgraded.

SIDEWALK CONDITIONS

All BRT alternatives provide overall improvements in sidewalk conditions on the Geneva-Harney Corridor. This includes new sidewalk on the east side of Bayshore Boulevard and on the north side of Alanna Way. A multi-use path (for pedestrians and bicyclists) would be provided in the US 101 undercrossing on Alanna Way, providing a direct and safe connection between Little Hollywood, Executive Park Boulevard, Candlestick Point, Hunter's Point, and the Bay Trail. Perhaps the only exception would be the Beatty Ave cross section, where the design would reflect right-of-way space and potential pedestrian use of this segment that transects an active industrial use. Sidewalk conditions may remain the same in this area; this

TABLE 32. SIDEWALK WIDTH ON GENEVA AVENUE AND BAYSHORE BOULEVARD

	GENEVA		BAYSHORE	
SCENARIO	**MIDBLOCK NORTH/SOUTH**	**AT INTERSECTIONS NORTH/SOUTH**	**MIDBLOCK EAST/WEST**	**AT INTERSECTIONS EAST/WEST**
Existing	12'/6'	12'/12'*	0'/8'	0'/8'
2020 Baseline	12'/6'	38'	0'/8'	0'/8'
2020 Alternative 1 (4 Lane)	12'/6'	12'/14'	10'/8'	18'/12'
2020 Alternative 2 (2 Lane)	12'/6'	12'/24'	10'/8'	18'/12'
2020 Alternative 3 (2 Lane)	12'/6'	12'/24'	10'/8'	18'/12'
NOTES:	*Except bulbout on southeast corner of Santos Street ** Daly City will be installing bulbouts at several intersections between Santos Street and Bayshore Boulevard. Design to be determined.		All Alternatives use the same street design on Bayshore Boulevard Widths do not include landscaping strip.	

TABLE 33. SIDEWALK WIDTH IN LITTLE HOLLYWOOD AND CANDLESTICK HUNTERS POINT

	BLANKEN*	LATHROP*	TUNNEL*	BEATTY**	ALANNA	EXECUTIVE PARK
SCENARIO	**NORTH/SOUTH**	**NORTH/SOUTH H**	**EAST/WEST**	**NORTH/SOUTH H**	**NORTH/SOUTH H**	**NORTH/SOUTH H**
Existing	12'/12'	12'/12'*	9'/6'	4'/6'	0'/0'	5'/5'
2020 Baseline	12'/12'	12'/12'	9'/6'	4'/6'	0'/0'	5'/5'
2020 Alternative 1	12'/12'	12'/12'	9'/6'	N/A	8'/0'	5'/5'
2020 Alternative 2	12'/10'	12'/16.5'	9'/6'	N/A	8'/0'	5'/5'
2020 Alternative 3	N/A	N/A	9'/6'	4'/6'	8'/0'	5'/5'
NOTES:	Bulbouts will not be constructed in place of parking at intersections on Blanken, Lathrop, Tunnel, or Beatty Avenues. No parking lanes currently exist on Alanna Way and Executive Park Boulevard. *Sidewalk width includes tree wells on Blanken, Lathrop, and Tunnel. Avenues ** On Beatty Avenue, the existing southern sidewalk does not extend the full length of the street. The northern sidewalk is substandard width and is painted.					

TABLE 34. SUMMARY OF PEDESTRIAN CROSSING EXPERIENCE AND SIDEWALK CONDITIONS

SCENARIO	CROSSING EXPERIENCE	SIDEWALK WIDTH
2020 Baseline	0	0
2020 Alternative 1 Blanken/Lathrop Option 1	+	+
2020 Alternative 2 Blanken/Lathrop Option 2	++	++
2020 Alternative 3 Beatty	0	0

will be explored further during the next phase of work.

The only location where a sidewalk would be narrowed is the Blanken/Lathrop Couplet Option 2, which reduces sidewalk width on the south side of Blanken Avenue to 10 feet in order to maintain the second lane of parking. Bulbouts expand the width of the sidewalk at intersections where space is available. The longitudinal length of bulbouts will be determined in later design stages. Alternative 2 provides the greatest improvement in sidewalk conditions over the Baseline. This alternative includes:

- Widened sidewalks and substantial bulbouts, on the south side of Geneva Avenue (also seen in Alternative 3)
- Construction of a multi-use path on the south side of Lathrop Avenue (which widens sidewalks there), on the new right of way between Lathrop Avenue and Alanna Way, and in the US 101 undercrossing on Alanna Way.
- Construction of a new sidewalk on the north side of Alanna Way.

Sidewalk conditions are improved in Alternative 3 by the following:

- Widened sidewalks and substantial bulbouts, on the south side of Geneva Avenue
- Extension of the existing southern sidewalk and construction of a new sidewalk on the north side of Beatty Avenue

Construction of a new sidewalk on the north side of Alanna Way, and providing pedestrian access through the US 101 undercrossing.

All BRT Alternatives provide a new 10-foot sidewalk with 8-foot water garden/landscaping strip on Bayshore Boulevard where there is currently no sidewalk. Table 35 and Table 36 show changes to sidewalk widths for each corridor segment.

QUALITY OF BICYCLE ACCESS

In the 2020 Baseline, the City of Daly City adds bike lanes on Geneva Avenue between Santos Street and Bayshore Boulevard. This closes a major gap in the bike network. All alternatives make further improvements by ensuring that all bike lanes meet or exceed width standards, improving pavement markings, installing green lanes at key conflict zones, and improving wayfinding signage. Bike lane width will not be affected by bulbouts; bulbouts and transit boarding islands use street width provided by buffers and parking lanes. In the US 101 undercrossing on Alanna Way the 12-foot bikeway is shared with pedestrians.

On Geneva Avenue, the 2 Lane General Purpose/Center Running BRT option provides a significantly better bicycling environment than the 4 Lane General Purpose/Side Running BRT option; it provides 5 feet of buffer space, which can be located between the bike lane and traffic, or between the bike lane and parking. This reduces stress for bicyclists, reduces the potential for crashes, close calls, and "dooring" by passengers of parked cars.

On Bayshore Boulevard, all alternatives provide improvements as compared to Baseline; they widen the existing substandard bikeway to 7 feet and provide a 2 foot buffer between it and the transit-only lane.

In Little Hollywood, the only option that provides a bikeway separated from traffic is Alternative 2 (Blanken/Lathrop Couplet Option 2), which widens the southern sidewalk on Lathrop to 16.5 feet to allow for a multi-use path. This continues on the right of way between Lathrop Av-

TABLE 35. EXISTING AND PROPOSED BICYCLE LANE WIDTHS ON GENEVA-HARNEY CORRIDOR

ALTERNATIVE	GENEVA NORTH / SOUTH	BAYSHORE EAST/ WEST	LITTLE HOLLYWOOD NORTH / SOUTH OR EAST / WEST
Existing	0'/0'	4'/5'	0'/0'
2020 Baseline	5'/5'	4'/5'	Sharrows on Tunnel
2020 Alternative 1	5'lane, no buffer both sides	7' lane, 2' buffer both sides	No bike lanes, sharrows to be considered; multi use path on new right of way, Alanna
2020 Alternative 2	5'lane, 5'buffer both sides	7' lane, 2' buffer both sides	multi use path on Lathrop, new right of way, Alanna
2020 Alternative 3	5'lane, 5'buffer both sides	7' lane, 2' buffer both sides	No bike lanes, sharrows to be considered. Multi use path on Alanna

TABLE 36. BICYCLE ACCESS

ALTERNATIVE	AVERAGE BIKE LANE WIDTH	CONNECTIVITY TO INTERSECTING ROUTES	CONSISTENCY AND COMPATIBILITY WITH BICYCLE PLANS AND EXISTING OR PLANNED BICYCLE FACILITIES
2020 Baseline	0	+	
2020 Alternative 1	+	++	++
2020 Alternative 2	+	++	++
2020 Alternative 3	+	+	+

enue and Alanna Way, and on Alanna Way through the US 101 undercrossing. The other Little Hollywood options currently require that bicyclists travel in mixed traffic.

Bicycle access is still to be determined for the Blanken Transit Mall and for the Beatty Avenue option. It may be possible to provide a two way path within the plaza on the south side of Blanken Avenue. The Beatty Avenue option may have space for bike lanes, but sharing that roadway with heavy vehicles is not ideal and further investigation will need to take place to ensure safety of bicyclists, which may relocate the bicycle route to Blanken or Lathrop Avenues even without BRT.

CONNECTIVITY TO INTERSECTING ROUTES

Except for Blanken and Lathrop Avenues, the proposed streets for all routing options currently have bike route designations. Bicycle improvements on these routes contribute to achieving an overall improved citywide bicycle network by closing network gaps and making bicycling safer and more comfortable. Planned improvements nearby that improve connectivity to the study area include the following:

- Installation of bike lanes with buffers along both sides of Bayshore Boulevard between Silver Avenue and Paul Avenue.
- Extension/construction of the Bay Trail on Alanna Way between US 101 and Harney Way, which is included in the San Francisco Bicycle Plan
- Bicycle facilities included in the Candlestick Point/ Hunters Point Shipyard plan.

CONSISTENCY AND COMPATIBILITY WITH BICYCLE PLANS, EXISTING OR PLANNED BICYCLE FACILTIES

All alternatives provide improvements to designated bike routes. The San Francisco Bicycle Plan does not identify improvements on these route segments. However, because they constitute a portion of the citywide designated bicycle network, all bicycle improvements serve to close gaps in locations that are useful for improving overall bicycle access, safety, and comfort. The bikeway included in the Blanken/Lathrop Couplet Option 2 (Alternative 2) is not included in the bike network because the right of way between Lathrop Avenue and Alanna Way was not considered when the Bike Plan was developed. This bikeway would improve connectivity for bicyclists between two segments of the bike network. Bicycle Route 905, which currently runs on Beatty Avenue, could be moved to Blanken or Lathrop Avenues if this alternative is selected. Table 31 shows the existing and proposed bicycle lane widths on the Geneva-Harney Corridor.

INCREASED JOB ACCESSIBILTY

All three BRT alternatives increase the number of jobs available within a 30-minute transit trip as compared to the Baseline. Alternative 1 provides the lowest increase, with 5,100 jobs; Alternative 2 provides access to 8,500 more jobs than Baseline. Alternative 3 provides access to the highest number of jobs, significantly more than the other two alternatives, with 25,800 additional jobs as compare to Baseline, due to its direct connection with Caltrain. Oyster Point, which is just one station to the south on Caltrain, is a major employment center. Caltrain serves several other major employment concentrations along the Peninsula. This is particularly important because of this corridor's high level of benefit to low-income households. Improving transit in this area improves access to jobs for those most in need.

TABLE 37. INCREASED ACCESSIBILITY TO EMPLOYMENT, RETAIL, AND CONSUMER SERVICES

SCENARIO	# JOBS REACHABLE WITHIN 30 MIN BY TRANSIT	CHANGE IN # JOBS REACHABLE WITHIN 30 MIN BY TRANSIT (FROM BASELINE)
2020 Baseline	186,200	--
2020 Alternative 1	191,300	5,100
2020 Alternative 2	194,700	8,500
2020 Alternative 3	212,000	25,800

TABLE 38. KEY CONCLUSIONS

EVALUATION CRITERIA	CROSSING EXPERIENCE	SIDEWALK CONDITIONS	QUALITY OF BICYCLE ACCESS	ACCESS TO JOBS
2020 Baseline	0	0	+	0
Alternative 1	+	+	+	+
Alternative 2	++	++	++	+
Alternative 3	+	+	+	++

URBAN LANDSCAPE AND DESIGN

PURPOSE

The purpose of this evaluation is to measure the benefits of BRT to urban landscape and design. These amenities are measured by the ability to provide a distinctive landscape and design identity, whether public open space is created, how much green space is developed, and its quality and character.

METHODOLOGY

These measures are primarily calculated from conceptual design of each alternative, including the dimensions of landscaped medians where they exist.

FINDINGS

CREATION OF USABLE PUBLIC OPEN SPACE

GENEVA AVENUE SEGMENT: The 2 Lane General Purpose/Center Running BRT option (Alternatives 2 and 3) provides the greatest increase in usable public space. South side bulbouts in this option expand the sidewalk by 14 feet (for a total of up to 24 feet) at intersections. This provides space for benches, landscaping, public art, kiosks, and other place making improvements. An additional 14-foot buffer zone on the north side of the intersection could include urban design elements, such as Pavement-to-Parks type low cost landscaping. The 4 Lane General Purpose/Side Running BRT option (Alternative 1) also includes bulbouts on the south side of Geneva Avenue, but these only expand the width of the sidewalk by 2 feet, which does not provide enough space for significant placemaking. The plan drawings in Figure 17 and Figure 19, in Chapter 4 show the bulbouts and buffer zones in the two Geneva Avenue options.

Transit stations in all alternatives provide additional space that can be used for placemaking, including the platforms as well as the transition zones at the end of platforms. In the 2 Lane General Purpose/Center Running BRT option, platforms are less useable as public space than platforms in the 4 Lane General Purpose/Side Running BRT option which are near the sidewalk and pedestrian zone, and further buffer pedestrians from traffic.

BAYSHORE BOULEVARD SEGMENT: The Bayshore Boulevard design provides a new sidewalk on the east side of the street, which includes an 8 foot wide landscaping zone for rain gardens and tree wells. This not only provides a pleasant walking environment, but also opportunity for creation of useable public space. Benches and other pedestrian amenities can be provided along this segment as well as inclusion of public art.

LITTLE HOLLYWOOD SEGMENT: The Blanken/Lathrop Couplet Option 2 (Alternative 2) provides the best open space opportunities in Little Hollywood by widening the sidewalk space on Lathrop Avenue, and improving pedestrian and bicycle access to Little Hollywood Park.

Both Blanken/Lathrop Options also provide a new right of way connecting Little Hollywood to Alanna Way, and the waterfront and new development at Candlestick Point-Hunters Point Shipyard. This right of way has not been

TABLE 39. URBAN LANDSCAPE DESIGN EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/ DEFINITION	SOURCE
Street Identity	Evaluates the quality of any new open space established by the design alternatives. Street and transit station platform layout and geometry are reviewed to calculate the amount of new open space created and the quality of that space for comfortable, multi-purpose public use.	Creation of usable public open space	Physical design concepts
	Captures the ability of an alternative to support a distinctive design for the Geneva-Harney Corridor. Street and transit station platform layout and geometry are reviewed to determine the opportunities to support distinctive street design through the BRT platforms, street furniture, and landscaping.	Recognizable design theme or street elements	Physical design concepts

fully designed, but could include open space elements.

Alternative 3, does not offer much opportunity for public open space improvement in the Little Hollywood Area, but it does include improved pedestrian facilities on Beatty Avenue and Alanna Way, which could be designed to include some amenities.

Improvements to the Blanken Transit Mall plaza will be included in all options.

RECOGNIZABLE DESIGN THEME OR STREET ELEMENTS

The Geneva Avenue, Bayshore Boulevard, and Blanken Transit Mall portions of the corridor provide the greatest opportunities for design impact. These wide roadways would include dedicated bus lanes and natural viewsheds. The Blanken Transit Mall and adjacent plaza serve as a focal point for transit transfers and community open space.

The presence of dedicated bus lanes and high-quality station platforms alone serve to strengthen the design identity of the Geneva-Harney Corridor, although the permeability of the bus lanes (except in the Geneva Avenue 2 lane General Purpose/Center Running BRT alternative) weakens their design impact somewhat.

Alternative 2 provides a strong linear axis along the center of Geneva Avenue, with wide sidewalks and bulbouts on the south side. This viewshed continues through the proposed Brisbane Baylands development, and the future planned extension of Geneva Avenue.

Portions of the route include center medians, and these serve to provide additional design context, however their inconsistency results in a weaker design impact.

In Little Hollywood, narrower streets and only one station (at Caltrain) provide less opportunity for providing street design improvements. However there are opportunities to improve some design elements, such as lighting and landscaping.

KEY CONCLUSIONS

All Alternatives provide improvements in Urban Landscape and Design Elements. Alternative 2 and 3, which include the 2 lane General Purpose/Center Running BRT option on Geneva Avenue provide the greatest opportunity for creating of a unified street design. Streetscape and open space improvements are planned to be the same on Bayshore Boulevard for under all three Alternatives. In the Little Hollywood area, Alternative 2 provides the best streetscape and design improvement opportunities, and Alternative 3, due to its more industrial setting, provides the fewest.

TABLE 40. SUMMARY OF URBAN LANDSCAPE AND DESIGN ELEMENTS

ALTERNATIVE	CREATION OF USABLE PUBLIC OPEN SPACE	RECOGNIZABLE DESIGN THEME OR STREET ELEMENTS
2020 Baseline	+	0
2020 Alternative 1	++	++
2020 Alternative 2	++	++
2020 Alternative 3	+	+

TRAFFIC OPERATIONS AND PARKING

PURPOSE

The purpose of this evaluation is to measure the effect of BRT on traffic operations and parking. Traffic operations are assessed based on the delay experienced at intersections; the smoothness of traffic flow; overall changes in auto travel times; and the extent of traffic diversions to other streets. Parking is measured by the change in number of spaces available using the conceptual designs.

METHODOLOGY

Measuring traffic operation impacts required extensive use of computer traffic models. The Dynameq and Synchro models were used to assess intersection and roadway performance. The SF-CHAMP model was used to quantify the extent of traffic diversions, and Synchro was used to assess the impacts of those diversions on traffic flow. Parking impacts were tallied based on concept designs.

FINDINGS

ACCOMMODATE TRAFFIC CIRCULATION AND ACCESS

Synchro provides information on intersection "level of service" or LOS. LOS is a measure of delay, in seconds, experienced by vehicles at intersections. LOS is provided as a grade level between A and F for ease of discussion. Table 42 to Table 44 show the LOS grade levels, seconds of delay, and for the BRT alternatives, the change in seconds of delay as compared to the Baseline.

In some cases a change in grade level represents a minor change in delay. Major changes in delay are shown in colors, with

- Green – LOS A or B, and delays of 5 seconds or less than Baseline
- Yellow – LOS C*
- Orange – LOS D, and delays from 5 to 9 seconds longer than Baseline
- Red – LOS E, and delays of 10 or more seconds longer than Baseline

Note: delays of 4 seconds less than to 4 seconds longer than Baseline were not marked.

LOS levels for each Scenario are shown as maps in Figure 46 to Figure 50.

TABLE 41. TRAFFIC OPERATIONS AND PARKING EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/ DEFINITION	SOURCES
Accommodate traffic circulation and access	Provides a direct measure of impacts to drivers. The Synchro traffic operations model produces tabulations of total intersection performance (expressed as the Volume/Capacity ratio) and delays to cars (expressed as Level of Service, or LOS).The number of turn opportunities added or removed is assessed to identify impact on traffic circulation	Intersection LOS for key locations	Synchro
		Number of turn opportunities (to be identified in more detailed design phase)	Physical design concepts
Traffic volumes on parallel streets	Provides an estimate of the amount of traffic diverted from the Geneva-Harney Corridor due to the project and its impact on the traffic flow of parallel streets. The SF-CHAMP model provides estimates of the volumes of traffic diverted and the likely locations of those diversions.	Traffic volumes at screen line locations by segment	SF-CHAMP
On-street parking	Identifies the change in number of on-street parking spaces in the Geneva-Harney Corridor as a result of BRT designs. Street layout and geometry are reviewed to calculate the number of on-street parking spaces added and removed for each scenario.	Net change in on-street parking capacity by segment	Physical design concepts

TABLE 42. INTERSECTION LOS FOR KEY INTERSECTIONS (PM PEAK),, SET 1

SCENARIO	GENEVA/ SAN JOSE			GENEVA/ CAYUGA			GENEVA / MISSION			GENEVA/ MOSCOW			GENEVA / CARTER		
	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline
Current Existing	C	33.8		E	44.2		B	17.3		A	7.7		B	18.4	
2020 Baseline	C	21.2		B	14.6		B	16.9		B	14.3		D	54.7	
2020 Alternative 1	C	23.4	2.2	B	11.9	-2.7	D	35.7	18.8	B	17	2.7	E	68.8	14.1
2020 Alternative 2	C	20.6	-0.6	B	13.8	-0.8	B	16.1	-0.8	B	14.8	0.5	E	55.3	0.6
2020 Alternative 3	C	22.2	1	B	13.2	-1.4	B	18.1	1.2	B	14.4	0.1	C	21.9	-32.8
NOTES (See below)				1											

TABLE 43. INTERSECTION LOS FOR KEY INTERSECTIONS (PM PEAK),, SET 2

	GENEVA / SANTOS			GENEVA / SCHWERIN			GENEVA / BAYSHORE			SUNNYDALE/ BAYSHORE			BLANKEN/ BAYSHORE		
	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline
Current Existing	B	11.6		A	7.3		C	34		B	18		A	8.2	
2020 Baseline	B	12.2		B	16.9		B	16		B	18		C	22.7	
2020 Alternative 1	B	10.6	-1.6	B	12.9	-4	B	15	-1	B	16.5	-1.5	A	1.7	-21
2020 Alternative 2	B	11.1	-1.1	B	17.5	0.6	B	13.7	-2.3	B	16.5	-1.5	A	1.3	-21.4
2020 Alternative 3	B	11.6	-0.6	B	19.8	2.9	C	21.4	5.4	B	17.3	-0.7	C	21.9	-0.8
NOTES (See below)	3			4									5		

TABLE 44. INTERSECTION LOS FOR KEY INTERSECTIONS (PM PEAK), SET 3

	TUNNEL / BAYSHORE			BLANKEN / TUNNEL			ALANNA/HARNEY / THOMAS MELLON (MAIN)			ALANNA /HARNEY THOMAS MELLON (SIDE STREET)		
	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline	LOS	Vehicle Delay	Dif From Baseline
Current Existing	A	8.3		A	9.9		A	7.2		B	12.1	
2020 Baseline	A	7.6		B	13.9		A	10		D	30.4	
2020 Alternative 1	B	17.6	10	C	24.1	10.2	B	12.8	2.8	D	29.7	-0.7
2020 Alternative 2	B	10.3	2.7	C	24.7	10.8	C	21	11	E	48.8	18.4
2020 Alternative 3	B	10.2	2.6	B	17.1	3.2	A	9.5	-0.5	C	16.3	-13.6
NOTES (See below)	6			7			8			9		

TRAFFIC VOLUMES ON PARALLEL STREETS

Converting a lane of mixed traffic in each direction along the length of the BRT corridor to dedicated transit lanes will reduce mixed traffic capacity significantly; this may result in some diversion of traffic from BRT Corridor streets onto other streets. SF-CHAMP was used to assess the magnitude of those diversions and the corridors to which that traffic would likely divert. Table 47 (next three pages) shows traffic volume data with orange and red highlighting indicating significant increases in traffic and green highlighting indicating significant decreases in traffic.

An important purpose of the BRT is to mitigate traffic impacts of new development. The subsections below describe the most significant changes in traffic volumes between the three alternatives studied and the 2020 Baseline model estimates. As a point of reference, even a traffic volume increase of 300 vehicles in the PM peak hour, breaks down to an additional five additional vehicles per minute.

GENEVA AVENUE: The most significant change in traffic is expected between the existing conditions and the 2020 Baseline estimate due to completion of development phases at Candlestick Point/Hunters Point Shipyard, a reduction in general traffic lanes on Geneva Avenue between Santos Street and Moscow Street, and the new 28R transit services which provides direct links with Balboa Park BART and Bayshore Caltrain stations. Almost all links studied increase significantly in the baseline except for Geneva Avenue, where most links show significant decreases in traffic from the existing conditions. There are no direct alternate routes parallel to Geneva Avenue, therefore any diversions are circuitous.

Notable increases were seen in both directions on some or all links of Carter Street, Guadalupe Canyon Parkway, Sunnydale Avenue, Visitacion Avenue, and Mansell Street. Westbound traffic volumes generally increased more than

FIGURE 46. EXISTING CONDITIONS - 2012 LEVEL OF SERVICE

* Side-street stop controlled intersection LOS reported is worst approach.

FIGURE 47. BASELINE - 2020 LEVEL OF SERVICE

* Side-street stop controlled intersection LOS reported is worst approach.

FIGURE 48. ALTERNATIVE 1 - 2020 LEVEL OF SERVICE

* Side-street stop controlled intersection LOS reported is worst approach.

FIGURE 49. ALTERNATIVE 2 - 2020 LEVEL OF SERVICE

* Side-street stop controlled intersection LOS reported is worst approach.

FIGURE 50. ALTERNATIVE 3 - 2020 LEVEL OF SERVICE

* Side-street stop controlled intersection LOS reported is worst approach.

TABLE 45. SUMMARY OF INTERSECTION LOS

EVALUATION CRITERIA	INTERSECTION LOS
2020 Baseline	0
Alternative 1	-
Alternative 2	-
Alternative 3	-

eastbound volumes. This is in contrast to Geneva Avenue itself, where all three alternatives show traffic volume decreases between Bayshore Boulevard and Santos Street in the westbound direction. Though these increases are notable, these findings can help to inform adjustments to project design during subsequent phases of project development in order to mitigate potential impacts on traffic operations, speed, or safety on these streets where warranted.

Both BRT options for the Geneva segment require reduction in general traffic lanes along this segment. However across all alternatives, traffic on parallel streets does not change significantly as compared to the Baseline, except for some segments of Visitacion Avenue and Mansell Street, where traffic volumes decrease in the eastbound direction during the PM peak hour; and some segments of Sunnydale Avenue (most significantly in Alternatives 2 and 3, which both use the 2 Lane General Purpose/ Center Running BRT option), where traffic volumes increase in the westbound direction during the PM peak hour. The westbound traffic decrease on Geneva Avenue is similar to the increases in volumes on Sunnydale Avenue, which is the main through street parallel to Geneva Avenue. Eastbound traffic does not show a similar decrease on Geneva Avenue or increase on Sunnydale Avenue, during the PM peak hour.

BAYSHORE BOULEVARD: All three alternatives show significant traffic volume increases on Bayshore Boulevard over the 2020 Baseline numbers. There are few through streets that provide alternate routes for those traveling on Bayshore Boulevard. Those traveling between the western portion of Geneva Avenue and the southern portion of Bayshore Boulevard, Carter Street and Guadalupe Canyon Parkway provide an alternate route. As mentioned above, these links show significant traffic volume increases between existing conditions and the Baseline, but the most significant change on these links is a 10% decrease in westbound volumes on Guadalupe Canyon Parkway in Alternative 2.

LITTLE HOLLYWOOD: There are a limited number of alternate route for vehicles attempting to cross US-101 in the Study Area: Bayshore Boulevard to 3rd Street, Blanken Avenue (or a Blanken / Lathrop couplet), and Beatty Avenue. Bayshore Boulevard, with its higher capacity and arterial design, will continue to carry the majority of east-west traffic, but Blanken, Lathrop, and Beatty Avenues are also expected to see an increase in traffic. For trips between Executive Park or Candlestick Point and points west, Blanken Avenue is the most direct route, followed by Beatty Avenue. Early in the study it was anticipated that

TABLE 46. TRANSIT RIDERSHIP AND MODAL SHARE 44. SUMMARY OF TRAFFIC VOLUMES ON PARALLEL STREETS

EVALUATION CRITERIA	ITRAFFIC VOLUMES ON PARALLEL STREETS
2020 Baseline	0
Alternative 1	0
Alternative 2	0
Alternative 3	0

Recology would petition the City of Brisbane to vacate Beatty Avenue, leaving it inaccessible to both BRT and general traffic. However, Recology has since committed to maintaining Beatty Avenue or opening a reasonable alternative. This study identified that access to Beatty Avenue would mitigate the traffic burden placed on Blanken and Lathrop Avenues by providing additional capacity to the east-west crossing.

The most significant traffic increases, an estimated increase from the 2020 Baseline of over 350 vehicles during the PM peak hour, occur on Lathrop Avenue in Alternatives 1 and 2, due to it being converted into a through, one way street in the eastbound direction. Lathrop therefore takes on all the traffic that previously used Blanken Avenue in the eastbound direction, as well as providing direct access to US 101. Additionally, because Alternatives 1 and 2 include a new right of way between Lathrop Avenue and Alanna Way, these streets become direct access to the US 101 on-ramp and to the rising population at the Candlestick Point-Hunters Point Shipyard development. These figures may also reflect some out of way travel due to one-way streets, which is a concern for some residents. For most of the Blanken/Lathrop couplet, out of way travel will not be significant due to short block lengths. The most significant impact in this regard will be on the last block of Lathrop Avenue.

Blanken Avenue, Harney Way, and Executive Park Boulevard show decreases in traffic volumes primarily due to ridership increases on the BRT. Alternative 3 reduces traffic on Blanken and Lathrop Avenues by removing the bus traffic, providing an alternate route to Blanken Avenue (Beatty was not included in the model for Alternatives 1 and 2), and not providing a through connection on Lathrop Avenue via the new right-of-way to US 101 and the developments to the east.

ON-STREET PARKING

As part of this study effort, a full parking assessment in the Geneva-Harney Corridor was only conducted for the Blanken/Lathrop Couplet options because parking demand and level of impact is greatest in the Little Hollywood area. A full assessment of parking gains and losses in other segments of the Route will be conducted in the next, more detailed phase of the study process. However, on Geneva Avenue, some parking will be removed to provide transit station platforms and bulbouts at intersections.

Little Hollywood currently has a parking supply of 657 on-street parking spaces. The Blanken/Lathrop Couplet Option 1, which removes one lane of parking from Blanken Avenue and one lane of parking from Lathrop Avenue, reduces parking by 13.7% or 90 spaces. Option 2, which only removes one lane of parking from Lathrop Avenue, and retains both lanes of parking on Blanken Avenue, reduces parking supply by 7.6% or 50 spaces. Both of these options include addition of some parking on blocks south of Lathrop Avenue by converting parallel parking to perpendicular parking on nearby streets. Figure 51 shows the locations of parking removal and replacement. Some residents have concerns that moving replacing some of the parking a few blocks away may pose significant impacts on some residents due to accessibility and personal safety.

FIGURE 51. PROPOSED PARKING CHANGES FOR BLANKEN/LATHROP COUPLET, SHOWING OPTION 1

TABLE 47. CHANGE IN PM PEAK HOUR TRAFFIC VOLUMES ON PROPOSED BRT AND NEARBY STREETS (COLOR LEGEND BELOW)

					2020 Baseline			2020 Alternative 1			2020 Alternative 2			2020 Alternative 3		
	From	To	Segment Length in Miles	Existing Volumes	Estimated Volumes	Change from 2012 Existing	% Change from Existing	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline
Eastbound																
Geneva	Bayshore	Schwerin	0.38	547	614	67	12%	694	80	13%	612	-2	0%	692	78	13%
Geneva	Schwerin	Santos	0.40	545	386	-159	-29%	455	69	18%	361	-25	-6%	383	-3	-1%
Geneva	Santos	Carter	0.20	540	426	-114	-21%	453	27	6%	390	-37	-9%	395	-31	-7%
Geneva	Carter	Moscow	0.64	863	983	120	14%	975	-8	-1%	974	-9	-1%	962	-22	-2%
Geneva	Moscow	Mission	0.46	945	1,004	59	6%	1,017	14	1%	980	-24	-2%	979	-24	-2%
Geneva	Mission	San Jose	0.44	896	913	16	2%	891	-22	-2%	806	-107	-12%	856	-57	-6%
Beatty*			0.28	116	263	148	127%							226	-38	-14%
Lathrop**			0.31	1	91	90	7708%	454	363	398%	425	334	366%	17	-74	-81%
Blanken**			0.34	88	260	172	195%							180	-80	-31%
Blanken	Bayshore	Tunnel	0.06	139	155	17	12%	149	-6	-4%	194	39	25%	174	19	12%
Carter			0.75	336	518	182	54%	510	-8	-1%	539	21	4%	518	0	0%
Guadalupe Canyon			1.11	250	371	121	48%	353	-18	-5%	376	5	1%	401	30	8%
Sunnydale	Bayshore	Schwerin	0.38	227	248	21	9%	241	-6	-3%	238	-10	-4%	248	0	0%
Sunnydale	Schwerin	Santos	0.22	69	79	10	15%	79	1	1%	82	4	5%	87	8	11%
Sunnydale	West of Santos		0.86	101	167	66	66%	179	12	7%	174	7	4%	173	6	4%
Visitacion	Bayshore	Schwerin	0.37	118	123	4	4%	145	23	19%	117	-5	-4%	137	14	12%
Visitacion	Hahn	Mansell	0.53	118	259	141	119%	222	-37	-14%	229	-30	-12%	190	-69	-27%
Visitacion	Schwerin	Hahn	0.25	84	126	41	49%	130	4	3%	110	-16	-13%	115	-10	-8%
Mansell	San Bruno	Visitacion	0.70	174	271	97	56%	222	-50	-18%	239	-33	-12%	265	-7	-3%
Mansell	West of Visitacion		0.88	128	174	46	36%	177	3	1%	160	-14	-8%	212	38	22%
Harney			0.29	11	148	137	1284%	95	-53	-36%	110	-38	-26%	129	-19	-13%
Alanna			0.26	148	186	37	25%	425	239	129%	393	207	111%	485	299	161%
Executive Park			0.17	42	195	153	365%	72	-123	-63%	88	-108	-55%	149	-47	-24%

COLOR LEGEND

Red:	500% and higher change; 400 veh and greater change
Orange:	100% to 499% change; 200-399 veh change
Light Orange:	25% to 99% change; 100 to 199 veh change
Light Green:	-10% to -24% change; -50 to -149 veh change
Green:	-25% and less change; -150 and less change
Beige:	Proposed BRT Corridor
Hot Pink:	Data looks problematic or is missing

TABLE 48. CHANGE IN PM PEAK HOUR TRAFFIC VOLUMES ON PROPOSED BRT AND NEARBY STREETS

					2020 Baseline			2020 Alternative 1			2020 Alternative 2			2020 Alternative 3		
	From	To	Segment Length in Miles	Existing Volumes	Estimated Volumes	Change from 2012 Existing	% Change from Existing	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline
Westbound																
Geneva	Bayshore	Schwerin	0.36	851	586	-264	-31%	492	-94	-16%	472	-115	-20%	467	-119	-20%
Geneva	Schwerin	Santos	0.40	1,127	939	-188	-17%	826	-113	-12%	801	-138	-15%	796	-143	-15%
Geneva	Santos	Carter	0.19	1,101	829	-272	-25%	825	-4	0%	842	13	2%	830	1	0%
Geneva	Carter	Moscow	0.67	1,155	976	-179	-16%	990	15	2%	960	-15	-2%	980	4	0%
Geneva	Moscow	Mission	0.46	1,070	969	-101	-9%	939	-31	-3%	928	-42	-4%	995	26	3%
Geneva	Mission	San Jose	0.45	1,170	1,060	-110	-9%	978	-82	-8%	1,009	-51	-5%	996	-64	-6%
Beatty*			0.28		18									73	56	315%
Lathrop**			0.31	13	43	30	232%							28	-15	-35%
Blanken			0.27	103	217	114	111%	143	-75	-34%	148	-69	-32%	130	-87	-40%
Blanken	Bayshore	Tunnel	0.06	164	621	457	279%	103	-518	-83%	103	-519	-83%	103	-519	-83%
Carter			0.75	369	569	200	54%	617	48	8%	589	19	3%	593	24	4%
Guadalupe Canyon			1.11	330	434	104	31%	468	34	8%	391	-44	-10%	426	-8	-2%
Sunnydale	Bayshore	Schwerin	0.38	46	188	143	310%	235	47	25%	335	147	78%	293	105	55%
Sunnydale	Schwerin	Santos	0.22	54	152	98	179%	177	25	16%	282	130	85%	258	106	70%
Sunnydale	West of Santos		0.86	93	321	228	245%	285	-36	-11%	389	68	21%	347	26	8%
Visitacion	Bayshore	Schwerin	0.37	180	292	112	62%	272	-21	-7%	309	17	6%	279	-13	-5%
Visitacion	Hahn	Mansell	0.53	161	309	149	92%	276	-34	-11%	272	-37	-12%	242	-67	-22%
Visitacion	Schwerin	Hahn	0.25	98	243	145	147%	234	-10	-4%	268	24	10%	210	-34	-14%
Mansell	San Bruno	Visitacion	0.71	424	572	148	35%	598	26	5%	540	-32	-6%	543	-29	-5%
Mansell	West of Visitacion		0.64	250	364	114	46%	344	-19	-5%	334	-30	-8%	338	-25	-7%
Harney			0.29	145	416	271	187%	321	-95	-23%	389	-27	-6%	470	54	13%
Alanna			0.31	60	260	200	331%	301	41	16%	305	45	17%	267	7	3%
Executive Park			0.17	26	90	64	242%	103	13	15%	96	6	7%	79	-11	-13%

TABLE 49. CHANGE IN PM PEAK HOUR TRAFFIC VOLUMES ON PROPOSED BRT AND NEARBY STREETS

					2020 Baseline			2020 Alternative 1			2020 Alternative 2			2020 Alternative 3		
	From	To	Segment Length in Miles	Existing Volumes	Estimated Volumes	Change from 2012 Existing	% Change from Existing	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline	Estimated Volumes	Change from Baseline	% Change from Baseline
Northbound																
Bayshore	South of Geneva		0.91	933	1,264	331	35%	1,505	241	19%	1,632	368	29%	1,434	170	13%
Bayshore	Sunnydale	Geneva	0.31	712	1,389	677	95%	1,806	417	30%	1,859	470	34%	1,747	358	26%
Bayshore	Blanken	Sunnydale	0.31	855	1,257	402	47%	1,628	371	30%	1,535	278	22%	1,544	288	23%
Bayshore	North of Blanken		0.28	999	1,404	405	41%	1,422	18	1%	1,315	-89	-6%	1,389	-15	-1%
Tunnel	Blanken	Bayshore	0.08	182	182	0	0%	86	-96	-53%	120	-62	-34%	145	-37	-20%
Tunnel	Beatty	Blanken	0.37	165	118	-47	-29%	46	-72	-61%	15	-103	-88%	0	-118	-100%
Tunnel*	South of Beatty		1.29	253	436	183	72%							130	-306	-70%
Southbound																
Bayshore	South of Geneva		0.91	504	629	125	25%	633	4	1%	571	-58	-9%	603	-26	-4%
Bayshore	Sunnydale	Geneva	0.31	717	874	157	22%	859	-16	-2%	804	-70	-8%	838	-37	-4%
Bayshore	Blanken	Sunnydale	0.31	1,085	1,222	137	13%	1,234	12	1%	1,202	-20	-2%	1,205	-17	-1%
Bayshore	North of Blanken		0.28	1,398	1,426	29	2%	1,583	157	11%	1,594	168	12%	1,523	97	7%
Tunnel	Blanken	Bayshore	0.08	132	33	-99	-75%	46	13	39%	65	32	97%	41	8	24%
Tunnel	Beatty	Blanken	0.37	113	61	-52	-46%	39	-22	-36%	65	5	8%	52	-9	-15%
Tunnel*	South of Beatty		1.29	9	9	0	0%							12	4	40%
Mansell	West of Visitacion		0.24	233	345	112	48%	314	-31	-9%	312	-33	-10%	321	-24	-7%

TABLE 50. SUMMARY OF NET CHANGE IN ON-STREET PARKING CAPACITY BY SEGMENT

EVALUATION CRITERIA	PARKING CAPACITY
2020 Baseline	0
Alternative 1	-
Alternative 2	--
Alternative 3	N/A
Note	Alternative 3 will result in no change in on-street parking in the residential portions of Little Hollywood, but may result in parking removal on Beatty and Tunnel Avenues. These impacts have not been assessed in this study.

TABLE 51. SUMMARY OF TRAFFIC OPERATIONS AND PARKING

EVALUATION CRITERIA	INTERSECTION LOS FOR KEY LOCATIONS	TRAFFIC VOLUMES ON PARALLEL STREETS	NET CHANGE IN ON-STREET PARKING CAPACITY BY SEGMENT
2020 Baseline	0	0	0
Alternative 1	-	0	-
Alternative 2	-	0	--
Alternative 3	+	0	N/A

Removal of parking also may affect residents and pedestrians by providing less buffer between sidewalks and moving traffic, and removing on-street space that may be used for loading and construction dumpsters, though both options retain at least one lane of parking on both Blanken and Lathrop Avenues.

Alternative 3, which uses Tunnel Avenue, Beatty Avenue, and Alanna Way instead of converting Blanken and Lathrop Avenues into a one-way couplet, would not affect on-street parking in the residential portion of Little Hollywood. Some parking would likely be removed on Beatty Avenue, and possibly on Tunnel Avenue.

CAPITAL AND OPERATING COSTS

PURPOSE

This section provides conceptual capital cost estimates for BRT on the Geneva-Harney Corridor, including all project elements affecting capital cost. Likely impacts to operating costs are also addressed, including estimates by SFMTA for change in transit operations costs and estimates from the Department of Public works for change in street maintenance costs.

METHODOLOGY

The cost of BRT on the Geneva-Harney Corridor was estimated by the study team based on the conceptual designs for each alternative and SFMTA's cost model, adjusted to reflect the historical costs of implementing transit construction projects, maintaining transit capital assets, and operating transit in San Francisco.

FINDINGS

CAPITAL COST

The capital cost estimates for constructing BRT on the Geneva-Harney Corridor were developed by identifying the design elements of each alternative and the appropriate breakdown of roadway components such as curbs, islands, and striping. Estimates use the current cost breakdowns for Caltrans District 4, and are based on material, equipment, and labor pricing as of April 2015, , and escalated to 2020 dollars.

At this stage of feasibility and design, the accuracy of the estimate is in the range of -10% to +50%, which provides a cost range, as shown in the figures below. This level of cost estimation is useful for evaluation of alternatives, however final costs will depend on a number of factors for which there is currently not enough information to include, such as actual labor and material costs, competitive market conditions, and implementation schedule.

TABLE 52. CAPITAL AND OPERATING COSTS EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/DEFINITION	SOURCE
Capital cost	Identifies the cost to construct facilities in each alternative, including material, equipment and labor.	Total construction cost including hard and soft costs	Cost estimate
Operating and maintenance costs	Identifies the cost of operating transit service on the corridor taking into consideration length of route, traffic delay, route distance, and other factors.	Total operating cost (vehicle x hours) and maintenance costs	Muni cost model
Service efficiency and effectiveness	Analyzes the efficiency and effectiveness of providing new facilities by comparing the benefits of ridership increases to the amount of service provided and the cost of providing it.	Operating expense per unlinked passenger trip`	Muni cost model
		Unlinked passenger trips per vehicle revenue hour	Service plans

TABLE 53. GENEVA AVENUE, FROM SANTOS STREET TO BAYSHORE BOULEVARD, IN 2020 DOLLARS

SCENARIO	LOW RANGE	HIGH RANGE	ROUNDED ESTIMATE
4 lane GP/Side Running BRT	$6,500,000	$10,800,000	$7,200,000
2 lane GP/Center Running BRT	$7,300,000	$12,200,000	$8,100,000

TABLE 54. BAYSHORE BOULEVARD, FROM GENEVA AVENUE TO BLANKEN AVENUE, IN 2020 DOLLARS

SCENARIO	LOW RANGE	HIGH RANGE	ROUNDED ESTIMATE
Bayshore Boulevard	$2,400,000	$3,900,000	$2,600,000

TABLE 55. LITTLE HOLLYWOOD, FROM BAYSHORE BOULEVARD TO EXECUTIVE PARK BOULEVARD, IN 2020 DOLLARS

SCENARIO	LOW RANGE	HIGH RANGE	ROUNDED ESTIMATE
Blanken/Lathrop Couplet Option 1	$2,700,000	$4,500,000	$3,000,000
Blanken/Lathrop Couplet Option 2	$4,400,000	$7,400,000	$4,900,000
Beatty Avenue Option	$4,600,000	$7,700,000	$5,100,000
Notes:	Does not include procurement of new right of way in Blanken/Lathrop Couplet Options 1 and 2		

TABLE 56. TOTAL CAPITAL COSTS BY ALTERNATIVE

SCENARIO	LOW RANGE	HIGH RANGE	ROUNDED ESTIMATE
Alternative 1	$11,600,000	$22,100,000	$14,700,000
Alternative 2	$12,400,000	$23,500,000	$15,600,000
Alternative 3	$14,300,000	$23,800,000	$15,800,000

TABLE 57. SUMMARY OF CAPITAL COSTS

EVALUATION CRITERIA	CAPITAL COSTS
2020 Baseline	0
Alternative 1	-
Alternative 2	--
Alternative 3	--

The following costs do not include the cost of acquiring new right of way between Lathrop Avenue and Alanna Way, or costs associated with potential improvements to the plaza at Blanken Avenue and Bayshore Boulevard.

A breakdown of costs by segment shows a higher cost for the 2 Lane General Purpose/Center Running BRT option as compared to the 4 Lane General Purpose/Side Running BRT on Geneva Avenue due to construction of wider sidewalks, bulbouts, and buffers. In Little Hollywood, Blanken/Lathrop Couplet Option 2 shows a higher cost because it requires sidewalk widening on Lathrop and additional pavement striping on Blanken Avenue, as compared to Blanken/Lathrop Couplet Option 1. The Beatty Avenue option includes construction of new sidewalk, as well as bus lane and buffer striping on Beatty Avenue.

By alternative, Alternative 2 has the highest cost, at $5.3 million, and Alternative 1 has the lowest cost, at an estimated $2.8 million

Costs by segment are shown in Table 53 through Table 55, and the total costs by alternative are shown in Table 56.

OPERATING AND MAINTENANCE COSTS

The key determinant of the cost to operate a service is the route "cycle time," which dictates the number of buses and drivers that are required to operate at a given frequency of service. By improving bus travel times and by reducing delays, BRT shortens the amount of time it takes a bus to complete its route. This enables the same number of drivers and buses to operate more cycles and ultimately provide a higher frequency of service.

Existing service hours indicate a lower frequency service than will be provided in 2020, so total hours of service are lower. Alternatives 1 and 2 have quicker travel time, so they require fewer vehicles and drivers to provide the same service frequencies. Their costs are therefore lower than for the 2020 Baseline and Alternative 3. Table 58 shows the total and net operating costs for operating BRT service on the Geneva-Harney Corridor. Total cost is the gross operating expense to operate the route and the net cost is the difference between the gross cost and the cost of the existing 28R, which is extended in the baseline and alternatives.

TABLE 58. OPERATING AND MAINTENANCE COSTS

ALTERNATIVE	VSH (WEEKDAY)	WEEKDAY TOTAL	WEEKDAY NET	ANNUAL TOTAL	ANNUAL NET INCREASE
2020 Baseline	392	$77,300	$32,200	$24,720,540	$10,297,560
2020 Alternative 1	386	$76,100	$31,000	$24,336,780	$9,913,800
2020 Alternative 2	386	$76,100	$31,000	$24,854,260	$10,124,600
2020 Alternative 3	396	$78,100	$33,000	$24,976380	$10,553,400

TABLE 59. SERVICE EFFICIENCY AND EFFECTIVENESS

ALTERNATIVE	LINE	VSH (WEEKDAY)	O&M COST (WEEKDAY)	DAILY BOARDINGS	O&M COST/ BOARDING	BOARDINGS/VSH
Current Existing	28/28R	229	$45,100	N/A	N/A	N/A
2020 Baseline	28/28R	392	$77,300	16,729	$4.62	43
2020 Alternative 1	28/28R	386	$76,100	17,911	$4.25	46
2020 Alternative 2	28/28R	386	$76,100	17,926	$4.25	46
2020 Alternative 3	28/28R	396	$78,100	17,756	$4.40	45

TABLE 60. SUMMARY OF SERVICE EFFICIENCY AND EFFECTIVENESS

EVALUATION CRITERIA	O&M COST/ BOARDING	BOARDINGS/VSH
2020 Baseline	$4.62	43
Alternative 1	+	+
Alternative 2	+	+
Alternative 3	0	0

TABLE 61. SUMMARY OF CAPITAL AND OPERATING COSTS

EVALUATION CRITERIA	CAPITAL COST	OPERATING AND MAINTENANCE COSTS	SERVICE EFFICIENCY AND EFFECTIVENESS
2020 Baseline	0	0	0
Alternative 1	-	+	+
Alternative 2	-	+	+
Alternative 3	-	0	0

SERVICE EFFICIENCY AND EFFECTIVENESS

Service efficiency and effectiveness provides a measure of how much the service costs compared to the number of people using it (operating cost per passenger), and the number of passengers compared to the amount of transit service provided (passengers per vehicle service hour). It is a way to standardize costs across different service modes and types of routes. All BRT alternatives improve the efficiency and effectiveness of transit on the Geneva-Harney Corridor over the 2020 Baseline. Alternatives 1 and 2 are the most efficient in terms of cost per boarding and boardings per service hour for the number of passengers each serves. They both have the highest daily ridership and operate on a shorter route than Alternative 3, which translate into lower operating costs. Alternative 3 provides a more direct route to Caltrain, but overall shows lower ridership. Table 60 shows the service efficiency and effectiveness for each BRT alternative.

5.4 Summary of Results and Conclusions

The following provides a summary of the analysis of alternatives for the 2020 BRT Alternatives. Several alternatives were considered to arrive at the three feasible alternatives presented below; each alternative achieves the overall project goal while addressing key tradeoffs differently. Each is technically feasible, and findings summarized below may lead to additional refinements in the next phase of work. Table 62 provides an overview of the evaluation. Note that Chapter 6 provides a more detailed summary of high-level findings for the project rather than for each alternative, and also outlines recommended next steps drawn from the findings of this analysis

TRANSIT OPERATIONS AND PERFORMANCE

All BRT Alternatives improve transit operations and performance over the 2020 Baseline on the Geneva-Harney Corridor. Alternative 2 performs best on transit travel time because it has the shortest route, and operates on a fully exclusive guideway. This makes it more competitive as compared to auto travel time and ensures that service is more reliable.

TRANSIT RIDER EXPERIENCE

All BRT Alternatives on the Geneva-Harney Corridor improve transfer ease, however transfers are easiest in Alternative 3, primarily due to the direct transfer with Caltrain. Passenger loads at the maximum load point—the most "crowded" point on the line—varies slightly across the three alternatives, but in no case do passenger loads exceed SFMTA's 85% load standard for the "crowded" designation, especially if 60-foot articulated buses are used.

ACCESS AND PEDESTRIAN AMENITIES

All alternatives provide improvements for pedestrians, bicyclists, and access to jobs over the Baseline. Alternative 2 provides the best pedestrian and bicycle access, safety, and comfort. It provides wider sidewalks on Geneva Avenue, large bulbouts at intersections, and the best pedestrian crossing experience, particularly at station locations, which provide pedestrian refuges. Alternative 2 also provides the best bicycle facilities, with bikeways separated from traffic for almost the entirety of the corridor, including buffered bike lanes on Geneva Avenue and a multi-use path on Lathrop Avenue, the new right of way, and Alanna Way.

Alternative 3 provides the best access to jobs within 30 minutes of transit due to its connection with Caltrain and the many major employment centers south along the Peninsula. Alternative 2 provides slightly better access to jobs than Alternative 1 due to faster travel times.

URBAN LANDSCAPE AND DESIGN

All BRT alternatives provide an opportunity to create open space and a recognizable design theme. Alternative 2 provides the greatest opportunity; the large bulbouts and buffers along Geneva Avenue and the center-running bus lanes in this alternative provide opportunities for mini plazas and amenities as well as a strong linear access down Geneva Avenue toward the bay. In Little Hollywood, creation of a multi-use path on Lathrop Avenue, the new right of way, and Alanna Way provides not only opportunities for landscaping improvements but also better access to Little Hollywood Park and through the US 101 undercrossing to the Candlestick Point waterfront and Bay Trail.

TRAFFIC OPERATIONS AND PARKING

All BRT alternatives show limited impact, and in several cases improve traffic operations at intersections on the Geneva-Harney Corridor over the 2020 Baseline. Alternative 3 shows the least impact (or most improvement) to traffic operations and LOS. Alternative 2 has the greatest deterioration to LOS compared to the 2020 Baseline, but the only location where it significantly degrades Level of Service for drivers is for vehicles approaching from the side street at the Alanna Way, Harney Way, Thomas Mellon Circle, who experience an average delay of almost 50 seconds, an increase of 18 seconds over Baseline.

Traffic volumes in the study area mostly show improvements over the 2020 Baseline. The most significant volume increases occur on the following streets:

- Lathrop Avenue—Currently has very low traffic volumes because it is a dead end street
- Alanna Way—Will provide new direct access to US 101 and Candlestick Hunters Point from Bayshore Boulevard via the new right of way
- Bayshore Boulevard—Increases in traffic have no reasonable parallel side street for overflow
- Sunnydale Avenue—provides overflow for Geneva Avenue in the westbound direction, but not the eastbound direction.

Overall, Alternative 3 provides slight benefits, and Alternatives 1 and 2 result in slight impacts to traffic over the 2020 Baseline.

Parking impacts are greatest in Alternatives 1 and 2 where parking will need to be removed to provide transit-only lanes on Blanken and Lathrop Avenues. This area already has a parking capacity issue compared to demand. While these couplet options offset some of the parking loss, they could still reduce parking supply by 50 to 90 spaces across this area. Parking is reduced in other areas of the Geneva-Harney Corridor in all three alternatives, however the parking demand in these areas is not as high. Parking removal in these areas provides street width for bulbouts and transit stations, as well as for transit lanes on Beatty Avenue.

Parking on Geneva Avenue raises slightly different concerns, in that while there seems to be adequate daytime supply, there are a few overnight commercial parking zones. These areas are used for parking large, commer-

TABLE 62. SUMMARY OF ALTERNATIVES ANALYSIS FOR 2020 BRT ALTERNATIVES

	TRANSIT OPERATIONS AND PERFORMANCE	TRANSIT RIDER EXPERIENCE	ACCESS AND PEDESTRIAN AND BICYCLE SAFETY AND COMFORT	URBAN LANDSCAPE AND DESIGN	TRAFFIC OPERATIONS AND PARKING	CAPITAL AND OPERATING COSTS
2020 Baseline	+	+	0	0	+	0
Alternative 1	++	+	+	+	-	++
Alternative 2	++	+	++	++	--	0
Alternative 3	+	+	0	+	0	-

cial vehicles overnight that cannot find accommodation in other, often residential areas of Daly City. Additionally, the need to accommodate high turn volumes at the intersection of Geneva Avenue and Bayshore Boulevard makes it challenging to retain parking. Design refinements made during the next phase of work, there may be some policies that can be helpful in this regard. For example, since nighttime auto demand and transit demand/operations experience fewer conflicts than daytime peak operations, it may be possible to create agreements with the operators to use these spaces during specific hours. Analysis and development of such policies would proceed during subsequent phases of project development.

CAPITAL AND OPERATING COSTS

All BRT alternatives have a higher capital cost than 2020 Baseline due re-striping of the pavement, construction of transit-boarding islands, sidewalks and bulbouts, and landscape and design amenities. Alternative 2 is the most expensive, and Alternative 1 is the least expensive to construct.

Alternatives 1 and 2 decrease operating costs as compared to the 2020 Baseline by providing improvements to travel time. Alternative 2 is slightly more expensive to operate than Baseline service due to an increase in route length.

5.5 Community and Stakeholder Feedback and Concerns

As the findings and recommendations were presented to various community residents, business, and property owners, and as facilitated through the CAC meetings, a consistent set of feedback and concerns were expressed. These are summarized below:

IMPACTS OF THE ASSUMED "BASELINE" 28R BRT SERVICE ON LITTLE HOLLYWOOD STREETS

Little Hollywood and Vistiacion Valley residents, along with many members of the CAC, expressed opposition to the "Baseline" BRT alternative along these points:

- Concern about the frequency and size of large (articulated) buses using Blanken Street
- Concern about the impacts of safety, congestion and noise of frequent, large buses on Blanken
- Concern about the likelihood that the SFMTA would remove on-street parking to facilitate bus circulation.

SFMTA Transit Planning and Operations expressed concerns that:

- The unabated congestion impacts will affect the speed, reliability and convenience of the 28R BRT service between CPHPS, Executive Park, and Caltrain/T-Third
- Diversion of the new and existing residents from the failing BRT service to automobile will further increase local congestion in Little Hollywood, the Portola, Visitacion Valley and the Bayview.

IMPACTS OF THE BLANKEN/LATHROP BRT ALTERNATIVE ON LITTLE HOLLYWOOD STREETS

Little Hollywood and Visitacion Valley residents, along with many members of the CAC, expressed opposition to the Blanken/Lathrop Alternative along these points:

- Concern about the removal of on-street parking in the neighborhood
- Concern about the frequency and size of large (articulated) buses using Blanken and Lathrop Streets
- Concern about the costs of and impacts of measures to mitigate the loss of parking, including the reduction of sidewalk widths
- Concern about the conversion of two-way streets to one-way streets
- Concern about the uncertainty of the possible pedestrian/bus/bike traffic- and crime-inducing aspects of the through-connection link from Alanna to Lathrop.

IMPACTS OF THE ALANNA/BEATTY BRT ALTERNATIVE ON RECOLOGY AND ON MUNI OPERATIONS

Recology and SFMTA expressed concerns to the Beatty/Alanna Alternative along these points:

- Concern about the introduction of BRT service along Beatty, which will be re-aligned and subject to intensified local truck traffic as part of Recology's modernization plan
- Concern about lack of direct, reliable access to Caltrain via the deviating alignment of Beatty
- Lack of certainty that BRT can be sustained along Beatty at all: a "private" street within another jurisdiction.

CHAPTER 6

FUTURE OUTLOOK

6.1 Long Term Analysis

Investment in a transit expansion project warrants examination not only of the opening year performance, but of the lasting project. Examination of the long-term project is typically referred to as the horizon year evaluation, and for this project, focuses on a 2040 model year in order to fit into the context of San Francisco's long range transportation plan. As explained earlier in the report, San Francisco Transportation Plan 2040 (SFTP 2040) already establishes the baseline condition for this corridor. Building on the work of the Bi-County Transportation Study, SFTP 2040 envisions the extension of Geneva Avenue to connect new Harney Avenue improvements in San Francisco to the existing Geneva Avenue in Daly City. It further envisions a full-featured bus rapid transit (BRT) line running in dedicated lanes, also continuing the connection between Muni Forward enhancements on Geneva and on BRT on Harney. It is assumed at this point that an extension of Geneva Ave will have been constructed through the Brisbane Baylands property, and over the Caltrain tracks and US 101, and ending in Candlestick-Hunters Point. BRT will operate in this extension rather than along the near-term options described in the analysis of 2020 alternatives. Additionally, the T-Third LRT line will have been extended to Caltrain.

Because full-featured BRT is relatively new to the region, as it is to many US markets, previous outreach has indicated a desire for light rail transit (LRT) service on Geneva Avenue. Moreover, examination of San Francisco's light rail system indicates that there might well be operational benefits of installing an LRT line on Geneva as a continuation to the existing T-Third Line. These benefits may accrue not only to the T-Line but also to multiple lines in the system that currently terminate at Balboa Park, by providing an alternate route to the Muni Metro maintenance and storage yard rather than a lengthy deadhead run through the Market Street tunnel.

As part of the long-term evaluation, two light rail options were identified and compared to a Geneva BRT operating along the Geneva Extension alignment. More detailed analysis of LRT features, along with an assessment of engineering constraints and opportunities, is available in the forthcoming Appendix D, the Geneva Light Rail Study. Much like the BRT feasibility study, note that the LRT Study is not intended to result in a decision to implement a particular alternative. Instead, this effort focuses on assessing whether it is prudent to invest in further study of LRT in the Geneva corridor and on characterizing any major concerns, key benefits, opportunities, and constraints that should be examined should study of LRT progress further. Below is a summary of the findings of that analysis to provide further context on long-term options in the corridor.

FIGURE 52. GENEVA BRT LONG TERM ALIGNMENT

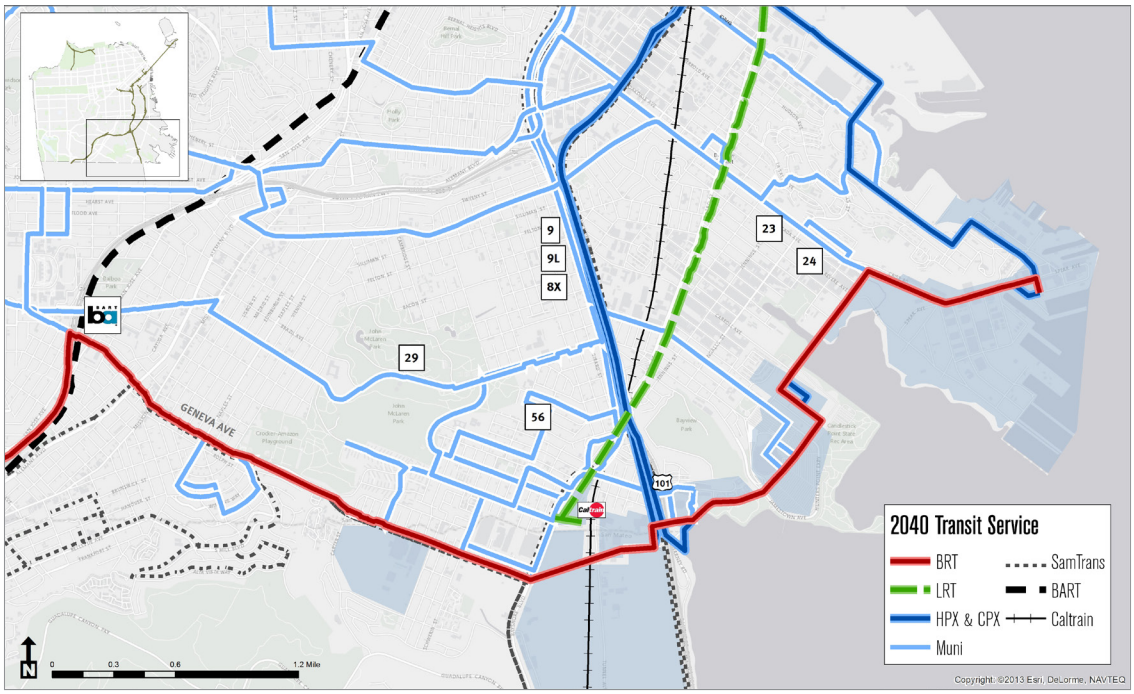


FIGURE 53. LRT OPTION 1 FORCED TRANSFER AT BAYSHORE

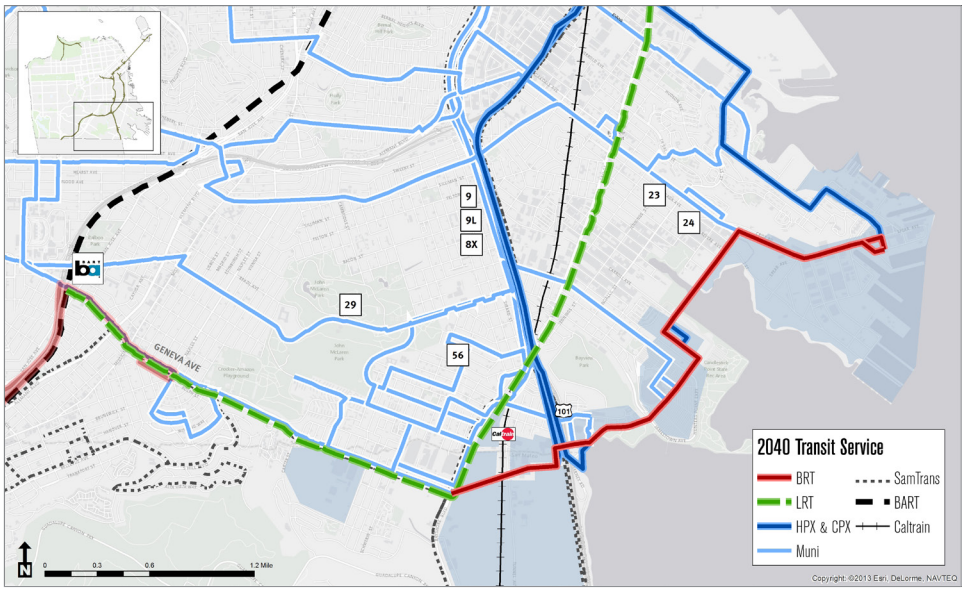
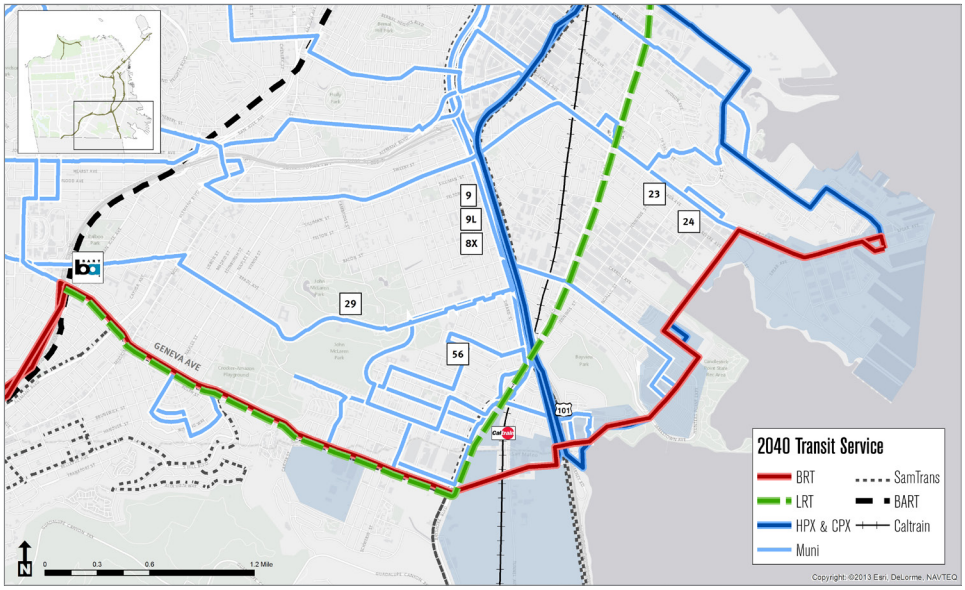


FIGURE 54. LRT OPTION 2 - LRT & BRT ON GENEVA



TRANSIT OPERATIONS AND PERFORMANCE

PURPOSE

The purpose of this evaluation measure is to assess the benefits of the BRT alternatives on transit performance. As shown in Table 14, transit performance is measured by transit travel time and speed, service reliability, equity analysis (the travel time savings for transit-dependent groups compared to the general population), and attracting/retaining transit riders.

The modeling process described in Section 5.2 provided the bulk of the transit performance results. SF-CHAMP provided estimates of how overall demand for all trips changes based on land use growth, transportation network changes and investments, and key metrics such as travel time and ridership. Much like the near-term evaluation, the following reports transit travel time and ridership changes as a result of curb-lane or center-lane BRT, and how changes in network performance benefit different types of travelers. Rather than a definitive study of LRT in the Geneva Corridor, note that the goal of this effort is to highlight initial findings—whether benefits or concerns—that might help to frame analysis of key features that should be carried forward or addressed in future study.

METHODOLOGY

[See Table 65]

FINDINGS

TRANSIT TRAVEL TIME AND SPEED

As currently configured, the BRT only scenario (2040 baseline) produces consistently lower travel times compared to the Light Rail during both the AM and PM peak periods, as shown in Figure 55 (next page), maintaining the travel time benefits observed in the near-term (2020) alternatives. As one would expect, the 2020 options provide a substantial benefit simply by offering a one-seat ride to points along the corridor, including many other local and regional location via transfers to the T-Third, Bayshore Caltrain Station, and Balboa Park BART Station. The addition of the Geneva Extension, with BRT in dedicated lanes, provides a further improvement with a more direct route and protection from additional traffic congestion due to background land use growth in the corridor.

TABLE 63. SUMMARY OF 2040 ALTERNATIVES

	DESCRIPTION	KEY FEATURES
2040 Baseline	BRT in Geneva Extension	Geneva BRT on Geneva extension T-Third extended to Caltrain
2040 LRT Option 1	Forced Transfer at Bayshore	No T-Third extension to Caltrain, extends on Geneva instead Harney BRT transfer to Geneva LRT at Bayshore
2040 LRT Option 2	LRT + BRT on Geneva	LRT on Geneva (T-Third) BRT on Geneva (28R)

TABLE 64. SUMMARY OF 2040 ALTERNATIVE CHARACTERISTICS

	2040 BASELINE	2040 LRT 1 (TRANSFER AT BAYSHORE)	2040 LRT 2 (BRT + LRT)
BRT Headway (mins)	5	10	10
LRT HEADWAY (MINS)	5	5	5
Effective Headway on Geneva (mins)	5	5	3
Service on Geneva	BRT	LRT	BRT + LRT
BRT Coverage	HPS to BART	HPS to Bayshore	HPS to BART
	BRT Transfers (1-Seat)		
to Caltrain	+	+	+
to BART	+	-	+
to LRT	+	+	+
	LRT Transfers (1-seat)		
to Caltrain	+		+
to BART	+	+	+
to BRT		+	+

TABLE 65. TRANSIT OPERATIONS AND PERFORMANCE EVALUATION CRITERIA, METHODOLOGIES, AND DATA SOURCES

EVALUATION CRITERIA	DESCRIPTION	METHODOLOGY/ DEFINITION	SOURCE
Transit travel time	The time it takes for buses to travel along the corridor.	Transit travel time and speed by segment	Dynameq Traffic Assignment Model (DTA)
	Overall average transit travel time is modeled and compared to the modeled average auto travel time. Modeled transit operating speeds are also compared as a percentage of modeled auto travel speeds in the corridor.	Transit travel time versus auto travel time	DTA
Service reliability	Measures the variation in the time between buses and passenger waiting times.	% route mileage mixed flow vs. exclusive guideway	Physical design concepts
	Transit-only lanes improve transit reliability by removing buses from traffic, which can be highly variable. Percent of route mileage in mixed flow versus in transit-only lanes is compared.		
Equity analysis	Compares the share of travel time savings for transit dependent groups to the share of travel time savings for the non-target groups.	Comparison of benefits for transit-dependent groups relative to general population	SF-CHAMP
	Travel time benefits for zero-car households and low income households are tabulated separately from SF-CHAMP model forecasts, and compared to SF-CHAMP model forecasts of travel time savings for San Franciscans in general.		
Attract/ retain transit ridership	Reports how well transit services are attracting trips.	Ridership	SF-CHAMP
		Transit mode share	SF-CHAMP
	The SF-CHAMP model reports the change in the overall number of transit riders on Geneva-Harney Corridor routes, as well as the share of all trips made by transit.		

FIGURE 55. TRAVEL TIME COMPARISON OF LRT ALTERNATIVES

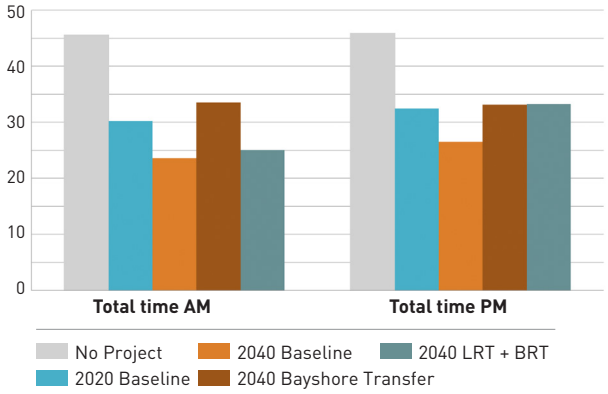


TABLE 66. TRANSIT TRAVEL TIME VS AUTO TRAVEL TIME, IN MINUTES

	TRANSIT	DRIVE	TRANSIT TO DRIVE RATIO
2012 Existing Conditions	25	13	1.9
2020 Baseline	17	12	1.4
2020 BRT 2-Lane Center-Running	15	12	1.2
2040 Baseline (BRT Only)	14	14	1
2040 LRT Alternative 1 (Bayshore Transfer)	24	14	1.7
2040 LRT Alternative 2 (BRT + LRT)	14	14	1

On examining the LRT options, however, there could be an increase in travel time. This could be caused by several factors, including: reintroducing a forced transfer at Bayshore, in LRT option 1; longer wait times due to lower frequencies, particularly east of 101; traffic congestion at mixed flow locations entering the corridor; higher dwell times at key locations. In addition, interactions between bus and rail vehicles should be examined further, and the extent to which non-BRT services might take advantage of dedicated transit lanes that might be best reserved for high-frequency LRT/BRT service. These issues can likely be addressed through adjustments to the LRT service plan in future phases of work, and would help to improve accessibility of LRT options, and through it overall performance of LRT in the corridor. In addition, this high-level analysis covers fewer evaluation metrics than would be employed for decision-making.

Geneva BRT maintains and improves the ridership benefits observed in the near-term options. As development of the surrounding land use projects progresses, the resident and employee population within the corridor increases, and more potential users are able to take advantage of the direct, one-seat ride to corridor locations. The BRT+LRT option also shows increased ridership, however LRT Option 1 shows a decrease in ridership, likely due to the forced transfer at Bayshore. As noted above, this condition can likely be addressed through adjustments to the LRT service plan in future phases of work if study of LRT progresses. Moreover, the BRT only option seems adequate to accommodate demand and deliver an attractive connection to destination and transfer points within the corridor. More study would be necessary to determine an LRT option that could deliver similar benefits within the corridor while also providing the operational benefits expected for the Muni Metro system.

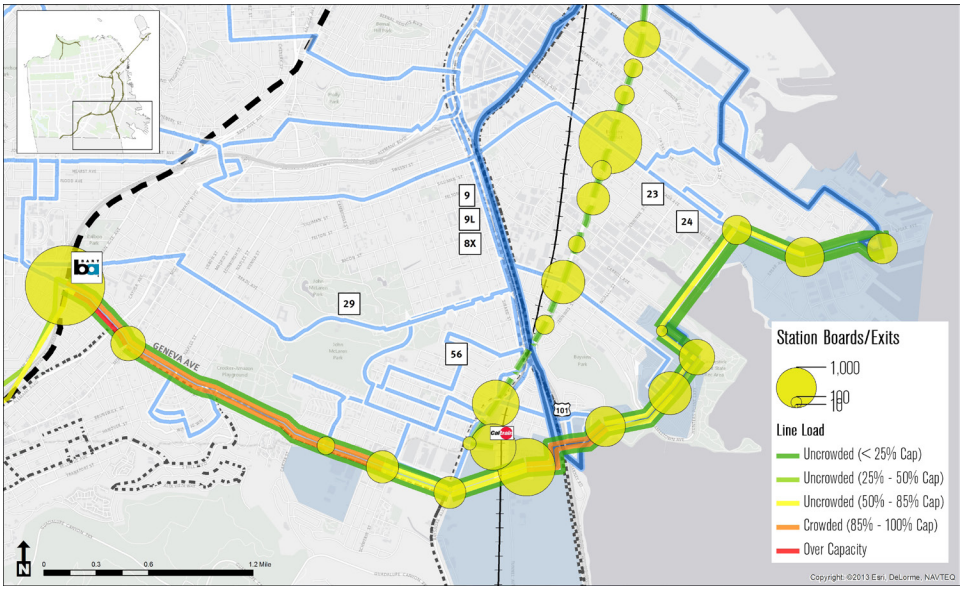
CAPITAL AND OPERATING COSTS

Capital and operating cost estimates were developed to identify a preliminary budget envelope for the LRT project as currently envisioned. Capital cost estimates were prepared using the FTA standard cost category form for LRT projects, while operations and maintenance costs per Vehicle Revenue Hour were developed using SFMTA's FY2014 schedule of hourly rates per mode. Given the complexity of the Geneva corridor and current predictions for component materials and potential headway/frequency of service, we estimate a cost of about $600M (2040$) and a potential $8M (2014$) increase in annual O&M cost for service in the corridor. More detail on estimating the capital and operating costs is offered in the Light Rail Study in the forthcoming Appendix D.

As project development moves forward, the character of the project may well change. For example, on detailed examination of the right of way, it may become necessary to operate transit services in the separate lanes at key locations or in mixed flow at others. In addition, there will likely be changes to the service plan as the project advances, and such changes will have an impact on the accessibility as well as the operating cost of the project. It is also important to note that operating and maintenance costs above capture only the changes in operating costs for revenue hours of this line without accounting for the operational benefits of the more direct connection to MME. There are several non-revenue operational benefits that could have significant impacts on costs; these include the following:

- Greater flexibility on storing and maintaining LRVs, including potential response to earthquakes or other emergencies

FIGURE 56. 2040 BASELINE RIDERSHIP



- Reduce deadhead costs
- Potential to avoid the 4th & King and Market Street tunnel bottlenecks in moving trains among yards and terminal points
- Allows for testing of LRV operations before possible revenue service.
- Potential to use for special service (eg, rail charter for events at City College Phelan campus) even before revenue service instituted.

When considering the reduction in deadhead time for lines terminating at Balboa Park Station, along with the redundancy that more direct access to the facility would create, operations and maintenance benefits could well outweigh the additional cost of revenue service.

KEY CONCLUSIONS

Geneva BRT maintains and improves the ridership benefits observed in the near-term options for the long-term as well. As development of the surrounding land use projects progresses, the resident and employee population within the corridor increases, and more potential users are able to take advantage of the direct, one-seat ride to corridor locations. The BRT-only option seems adequate to accommodate the demand generated in the Corridor and deliver an attractive connection to destination and transfer points within the Corridor. However, the initial study of LRT determined that the engineering feasibility is not as challenging as might have expected given the local grades and terrain. Tradeoffs between the accessibility east and west of 101, and also the interactions between bus and rail on Geneva, will require additional analysis if and when LRT concepts advance. More specifically, further study would be necessary to determine an LRT option that could deliver similar benefits within the corridor while also providing the operational benefits expected for the Muni Metro system.

Key issues for additional development of BRT alternatives include:

- More definition of the timeline for implementing Geneva Avenue extension
- More definition of the timeline for implementing alternatives to the Geneva Avenue extension, particularly in the context of Recology site changes and feasibility of any easements through the site.

Key issues for ongoing examination of potential LRT service include:

- Service that balances the combined headway on Geneva with service to land uses east of 101 (comparable to BRT options)
- Services that reduce transfers between transit services in the corridor
- Further exploration of operational benefits to connections to Muni maintenance facilities

6.2 Next Steps

This bus rapid transit feasibility study is the first step in defining a near-term alignment for a rapid transit connection in the Geneva-Harney corridor. The original goal was to determine whether there are feasible options for routing a rapid transit line in the Geneva Avenue corridor prior to implementation of the Geneva Avenue extension and BRT facilities along that alignment prior to the horizon year currently defined. Through this study we have clearly demonstrated that there are, in fact, feasible options. However, there are several questions remaining that must be addressed before the most beneficial option for each segment of the corridor can be selected. The preferred alternative will not be selected until the environmental phase since it will require environmental and cost analysis information.

In Spring 2015, the San Francisco County Transportation Authority (SFCTA) and San Francisco Municipal Transportation Agency (SFMTA) requested and received an al-

location of Prop K transportation sales-tax funds for pre-environmental work to resolve issues and concerns that will help to select the option that:

- Delivers the best performance;
- Minimizes impacts on neighboring communities; and
- Protects the public investment dollars by heralding the long-term vision

Through the Bi-County Transportation Study, a fair share analysis of funding identified realistic funding sources for the project; however, funding analysis would need further confirmation at the close of the pre-environmental phase to ensure that character and costs remain in line with the range identified in this study.

The pre-environmental study will also be conducted in coordination with a Bi-County agency team, leveraging and building on existing partnerships on both sides of the county line. This study is expected to begin in earnest in the Fall 2015, lasting approximately 6 months and focusing on refinements to the existing options for segment by segment solutions and then refining the end-to-end definition of the best-performing option. SFMTA is poised to lead this charge, and has already identified a project team and project manager to conduct the study. At this time, the team envisions continuing composition of the existing Geneva-Harney Community Advisory Committee, which may need to be revised or replenished as necessary as the project continues to advance.

Following the pre-environmental work, the bi-county team will further refine the next steps involved in project implementation. These steps will likely include some level of environmental analysis, followed by final design, and implementation in the 2020-2023 timeframe.