FINAL REPORT

19TH AVENUE TRANSIT STUDY

19th Avenue Transit Study

Feasibility study of relocating the Muni M-Ocean View light-rail from the median to the west side of 19th Avenue through grade-separated crossings

March, 2014

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

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The Transportation Authority is indebted to a number of individuals and organizations who helped make the Study possible.

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The consultant team was led by Arup, North America, (TONY BRUZZONE, JOHN EDDY, MEGAN GEE, DAVE HUNT) and included the Office of Cheryl Barton (CHERYL BARTON, ANDREW SULLIVAN, CHRISTINE REED, JOHN PEARSON), Fehr & Peers (MATT GOYNE, STEVE CROSLEY), Circlepoint (CHRIS COLWICK, MOLLY OSHUN), and Barbary Coast Consulting (JAIME ROSSI, ALEXIS SMITH).

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PHOTO COURTESY PARKMERCED

E.1 Introduction

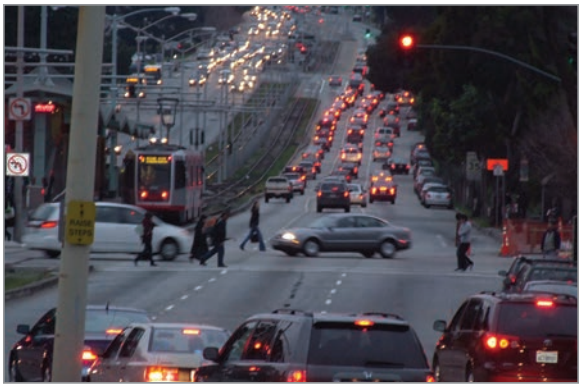
THE 19TH AVENUE TRANSIT STUDY (Study) explores the feasibility of making a major capital investment to re-envision transportation in the 19th Avenue/Highway 1 corridor from Sloat Boulevard to Brotherhood Way in Southwest San Francisco. The Study explores options for re-locating the M-Ocean View light-rail line from where it currently operates in the 19th Avenue median to the west side of the street through new subway or bridge structures that grade-separate the M-Ocean View crossings of 19th Avenue. Such an investment could provide for a major improvement in transit travel times and reliability, while providing the opportunity to dramatically re-orient the street for a safer, calmer corridor that marks San Francisco's southern entrance as a gateway into the city, improves neighborhood quality of life, and supports transit-oriented land use plans.

The purpose of the Study is to determine the feasibility, benefits, and impacts of such an investment, guided by a framework of eight goals centered on improving conditions for all 19th Avenue travellers as well as neighboring residents, businesses, and institutions. This effort represents the first stages of project development by defining potential project alternatives. The next stages of work include further project development, followed by environmental review; and, if a decision is made to move forward implementing the project, then more detailed design engineering, and construction.

Nineteenth Avenue is western San Francisco's major north-south transportation arterial. Carrying approximately 66,000 vehicles per day[1], it is among the busiest surface arterial streets in the entire city. The street is designated as Highway 1 and carries major through traffic between San Francisco's neighboring counties to the north and the south as well as from San Franciscans travelling to and from the western half of the city. The road is three lanes in each direction, and the M-Ocean View light-rail operates in the median for approximately one mile in the southern part of the corridor (see Figure ES-1). The areas just east and west of the street vary distinctly. To the east are lower density residential neigborhoods—West Portal, Lakeside, Oceanview-Merced Heights-Ingleside (OMI). To the west are more intense land uses: the Stonestown Galleria regional shopping center, San Francisco State University (SF State), and the Parkmerced residential neighborhood of high-rise apartment towers and low-rise garden townhomes with an existing population of approximately 8,000.

Figure ES-1. Study Corridor Overview

[1] California Department of Transportation (Caltrans), Average Annual Daily Traffic, 2012.



Left: The M-Ocean View must travel southbound in northbound travel lanes on 19th Avenue to enter the median near Rossmoor Drive. During peak hours, traffic often queues onto the light-rail tracks, delaying the light-rail from proceeding. Right: Access to M-Ocean View stations along 19th Avenue is challenging. Pedestrians and transit riders must cross three travel lanes to access the median stations, while avoiding conflicts with turning cars.

E.2 Predecessor Plans

About seven years ago, San Francisco stakeholders began discussing some major land use changes on the west side of the street, including:

- The *SF State Campus Master Plan*, adopted in 2007, which would add 1 million square feet of new facilities and grow the university's student body by 25%, bringing its total enrollment to 25,000 full-time equivalent students.
- The *Parkmerced Vision* plan, a master development plan proposed by the site's owners and ultimately adopted in 2011, which would result in a net addition of 5,679 new housing units, approximately tripling the residential density of the site, along with a mix of supportive commercial, retail and community uses.

The result of the 19th Avenue Corridor Study was community prioritization of a west-side grade separated alignment of the M-Ocean View and identification of this study as a next step.

Concerns about the transportation impacts of this new growth were raised to then-District Seven Supervisor, Sean Elsbernd. In 2008, Supervisor Elsbernd requested that the San Francisco Planning Department (SF Planning) prepare the *19th Avenue Corridor Study* to analyze the cumulative impacts of these and other potential developments in the vicinity of 19th Avenue. Corridor stakeholders helped the city set goals and infrastructure investment priorities to improve existing conditions and support future plans.

The result of this process was community prioritization of a west-side grade separated alignment of the M-Ocean View and identification of this study as a next step. Since that time, the *Parkmerced Vision* plan was adopted and includes a commitment for the developer to make a major upgrade to the M-Ocean View and 19th Avenue, valued at $70 million,[2] in support of this priority. The Development Agreement between Parkmerced and the City and County of San Francisco spells out three ways this improvement would move forward:

1. Parkmerced would construct the Baseline improvement: a new segment of the M-Ocean View that would travel through the Parkmerced site between Holloway Avenue and Junipero Serra Boulevard through two new at-grade crossings of 19th Avenue. (See Figure ES-2, page after next.)
2. Parkmerced would construct a modified version of the Baseline that supports a west side grade-separated alignment of the M-Ocean View for the entire length it is in the 19th Avenue corridor.
3. Parkmerced would pay the City and County of San Francisco for investment in a modified version of the Baseline that supports a west side-grade separated alignment the cost of which they would have spent implementing the Baseline and not constructing anything.

[2] Cost estimate based on conceptual design subject to refinement. Perkmerced's responsibility is to construct the segment of the M-Ocean View through the Parkmerced site, regardless of the actual cost.

At the time of approval of the *Parkmerced Vision* plan, the second option was no more than an idea and a potential line on a map. One provision of the Development Agreement is an agreement between Parkmerced and the City and County of San Francisco that allows the further definition of a modified version of the Baseline. The agreement gives San Francisco until July of 2018 to develop and approve an alternative investment. This investment would cost more than the investment Parkmerced has committed to make, but could also create larger benefits to adjacent landowners and the surrounding neighborhoods and could therefore potentially leverage significant additional funding, using the Parkmerced investment as local match.

The San Francisco County Transportation Authority (Transportation Authority) conducted the Study to analyze potential alignments; their potential benefits, impacts and costs; as well as funding opportunities, following through on obligations that San Francisco made to the community and other stakeholders at the time of Parkmerced's approval. The alternatives studied represent an opportunity for investments made in support of new growth to address existing transportation needs in the corridor as well as offset needs created by new development.

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Table ES-1. Study Goals and Objectives

GOAL	OBJECTIVE
Improve light-rail system operating performance, capacity, and flexibility	Decrease travel time
	Improve reliability
	Increase capacity
	Increase flexibility
Improve light-rail passenger experience and access	Improve safety and attractiveness of accessing light rail
Enhance bus and shuttle operations and passenger access	Consider opportunities to improve the speed and reliability of bus/shuttle travel time
	Consider opportunities to improve safety and attractiveness of accessing buses/shuttles
Provide attractive and safe walking and cycling conditions	Improve safety and attractiveness of walking conditions along and across 19th Avenue
	Consider opportunities to improve bike connectivity to and through the corridor
Improve neighborhood quality of life	Consider opportunities to allow for place-making, a gateway entrance into Southwest San Francisco
	Consider opportunities to reduce or minimize noise from light rail vehicles, traffic
Manage private vehicle traffic and parking conditions	Improve reliability of vehicle travel
	Maintain Baseline forecast vehicle travel time while maintaining today's lane capacity
	Manage impacts of on-street parking reductions
Support transit-oriented land use plans	Maintain consistency with approved area land use plans, such as those at SF State and Parkmerced
Produce a feasible project	Minimize capital costs
	Decrease operating costs
	Minimize construction duration
	Design a community-supported project

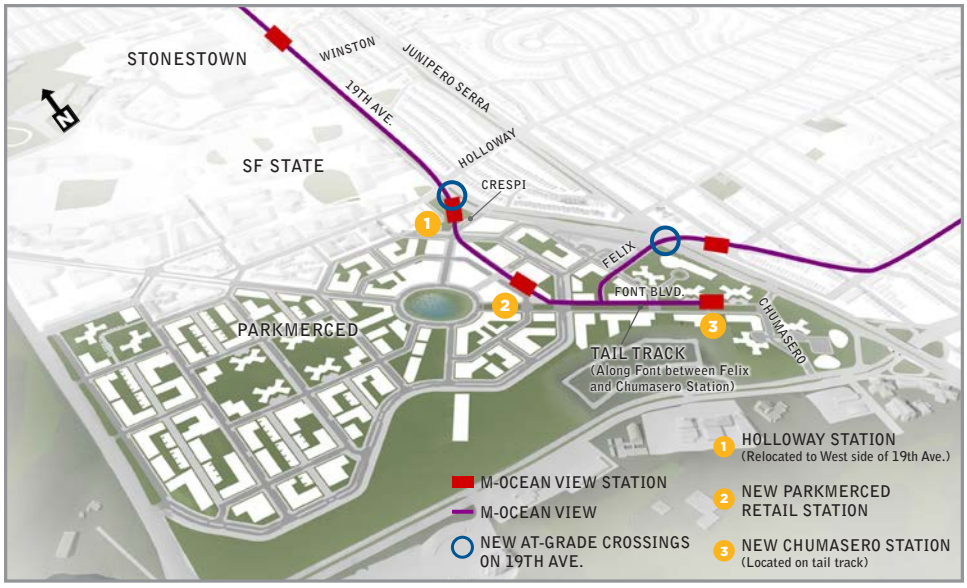


Figure ES-2. Baseline Realignment of M-Ocean View Through Parkmerced

E.3 Study Goals

The Study team established eight goals to guide development and evaluation of the alternatives, as well as more specific objectives under each goal as shown in Table ES-1 (previous page). These goals were generated based on past planning work in the corridor, community input, as well as overarching City policies.

E.4 Study Process

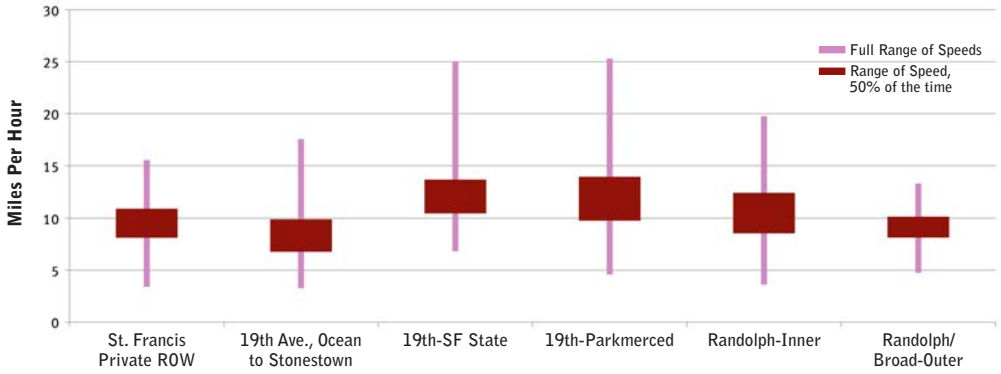
The Study has been carried out over the course of approximately two years: from Spring 2012 to Spring 2014. The Study began by establishing a planning goals framework and documenting existing and expected future land use and transportation conditions in the corridor. Next, the Study generated several alternative ways to bring the M-Ocean View to the west side of the street and back, sharing them with the public during a first round of community outreach between February and April of 2013. Based on feedback received, some options were eliminated, others refined and evaluated to understand how they vary in their ability to achieve the goals and objectives established. A rigorous technical evaluation was completed during Spring and Summer of 2013, culminating in the identification of high-performing alternatives. The results were shared for input during a second round of outreach between September and November 2013. Finally, an initial funding and implementation strategy was prepared and the final work documented in this final report.

Figure ES-3. M-Ocean View Features and Operating Environment

E.5 Existing Transportation Needs

The Study's existing and future conditions analysis identified four needs that the alternatives were designed to address. Some shorter-term related projects—the Transit Effectiveness Project (TEP), the 19th Avenue Bulb-Outs Project and Transit Signal Priority projects—will alleviate some of these needs in the nearer term (see additional discussion, *Related Projects on 19th Avenue,* on page 34). In particular, the TEP and Transit Signal Priority projects will provide treatments to increase speed and reliability of the Muni 28 and 28-L lines. Frequency for the 28/28-L and M-Ocean View will

Figure ES-4. M-Ocean View Variation in Travel Time, PM Peak Hour



SOURCE: SFMTA Automatic Vehicle Location Data, April 2013 as analyzed by Fehr+Peers

increase. The Bulb-outs Project will extend the sidewalk into 19th Avenue at select intersections so that buses do not need to pull into and out of travel lanes and pedestrians have a shorter distance to cross the street. In addition, some improvements adjacent to Parkmerced are planned as a part of the development project and are described as a part of the Baseline alternative (see Chapter 3.2, Refined Alternatives).

TRANSIT PERFORMANCE ISSUES (SPEED, RELIABILITY, CAPACITY)

The M-Ocean View travels slowly, on average 8.5–9.5 miles per hour through the 2-mile Study corridor during pm peak hours[3]. The slow travel time is caused by intersection delay at each of the locations the M-Ocean View must cross traffic, including at Rossmoor, Winston, Holloway, and Junipero Serra (see Figure ES-3, previous page). Other factors that contribute to slow travel time are closely spaced stations (e.g. Ocean and Eucalyptus) and long dwell time for riders boarding and alighting, particularly at the Stonestown and SF State stations with high ridership and narrow platforms. Travel time on the M-Ocean View is also highly variable, meaning the time it takes to travel the two-mile Study corridor can range significantly. Figure ES-4 shows variation in travel time for several corridor segments, showing that the segments of the line along 19th Avenue are those with the highest variability.

Variability of travel time, as well as high ridership, also contributes to crowding on the line. While the most crowded maximum load points on the line are in the Downtown Muni Metro system near Van Ness (outbound) and Civic Center (inbound) stations[4], the variability can result in some trains experiencing crowded conditions throughout the corridor.

UNATTRACTIVE, CHALLENGING TRANSIT ACCESS

All riders boarding and alighting at the existing Winston and Holloway stations must cross a turn lane and three travel lanes to access the median station. When a train is at or approaching the station, riders are tempted to cross against the signal to access the train, creating a potentially unsafe situation (discussed further in the next section, Pedestrian Conditions). The vast majority of these riders, more than 95%, cross to/from the west side of the street.[5]

Both light-rail stations and bus stops (See Figure ES-5, previous page) in the corridor experience significant crowding during peak hours.

[3] SFMTA Automatic Vehicle Location data, April 2013, as analyzed by Fehr & Peers.
[4] San Francisco Planning Department. 19th Avenue Corridor Study.
[5] SFCTA, September 2013, PM Peak Pedestrian Counts at 19th/Winston, 19th/Holloway.

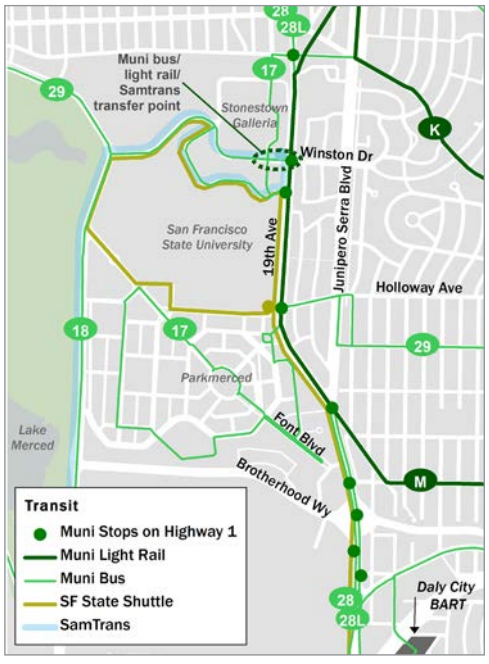


Figure ES-5. Existing Transit Services Serving 19th Avenue

Figure ES-6. Pedestrian Crossing Opportunities Across Highway 1: Ocean to Junipero Serra

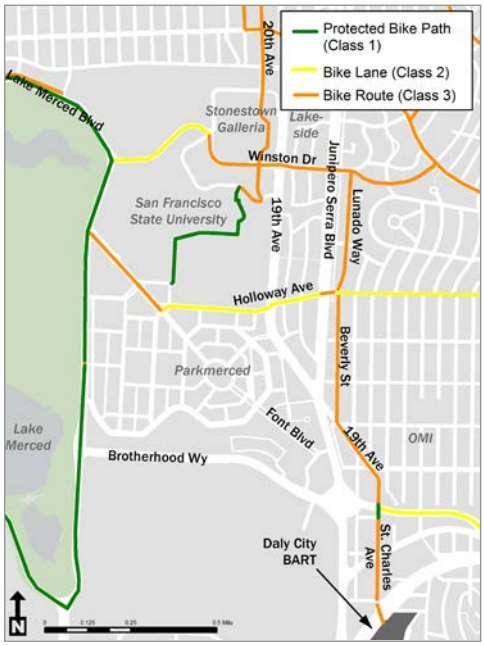


Figure ES-7. Existing Bicycle Network

DIFFICULT PEDESTRIAN CONDITIONS

High transit ridership and pedestrian volumes, long crossing distances, vehicle-pedestrian conflict points, and limited crossing opportunities all contribute to difficult pedestrian conditions. Nineteenth Avenue is designated as a high-injury corridor, meaning it is among the 6% of San Francisco street miles where 60% of all severe and fatal injuries occur.

Conditions can also be unpleasant when walking along the corridor. The only opportunities within the Study corridor to cross 19th Avenue between Eucalyptus and Junipero Serra (a 1-mile distance) are at Winston and Holloway, making for an average distance between crossing opportunities of one-third of a mile (see Figure ES-6). The sidewalk width along 19th Avenue ranges from five to ten feet, less than San Francisco's *Better Streets Plans* guidelines that suggest a minimum of 12 feet and recommend 15 feet for this street. The narrow sidewalk means pedestrians are also walking very close to high-speed traffic noise.

CIRCUITOUS BIKE ROUTING AND CHALLENGING CROSSINGS

Figure ES-7 presents the existing bicycle network in the corridor, with Winston and Holloway as major east-west bike routes, and generally streets adjacent to 19th Avenue (20th Avenue north of Winston), Lunado Way (south of Winston) as the major north-south route. Previous plans, including the San Francisco Bicycle Plan (2009) and the SF State Campus Master Plan, contemplated a separated bike facility on the west side of 19th Avenue as the most direct north-south route through the Study corridor. The improvement would have required removal of some on-street parking as well as re-location of the existing sidewalk onto campus property. Instead, a north-south separated bike path through SF State was implemented, which provides a safe, high-quality facility, but one that is less direct. At times, cyclists ride on 19th Avenue or on sidewalks along 19th Avenue instead. The two locations where the designated bicycle network crosses 19th Avenue (at Winston and at Holloway) also experience the same challenging conditions as pedestrians: a long distance across the street and conflicts with turning vehicles.

E.6 Alternatives Development Process

The Study team divided the corridor into a northern and southern segment (dividing point near Holloway, one segment for each grade separated crossing), and studied feasible ways to make each crossing point grade-separated. In addition to the Baseline, three northern and three southern options were developed, summarized in Table ES-2 (next page) and shared with the public during the first round of outreach. Based on feedback received, two options were rejected and the remaining four were carried through for refinement and evaluation.

The results of the evaluation revealed that the Longer Subway and the Southern Bridge options performed the best and were paired together as an alternative; Shorter Subway and Southern Tunnel were paired together as a second alternative to serve as a point of comparison for the evaluation, although the four options can continue to be mixed and matched to form four distinct alternatives.

Table ES-2. Initial Options Developed and Outcomes

	NAME	DESCRIPTION	OUTCOME
	NORTHERN OPTIONS		
1	Baseline	M-Ocean View crosses from median to west side of 19th Avenue at Holloway, at-grade, re-locating the Holloway station to a new transit plaza between Holloway and Crespi	Carried through evaluation
2	Longer Subway (N1)	Both tracks underground from south of St. Francis Circle to south of Buckingham Way, northbound track underground until south of Gonzalez	Carried through evaluation and selected as part of Highest-Performing alternative.
3	Shorter Subway (N2)	Both tracks underground from south of St. Francis Circle until north of Winston, northbound track underground until south of Winston	Carried through evaluation.
4	Northern Bridge (N4)	Both tracks above ground from south of St. Francis Circle to south of Winston, crossing over 19th Avenue near Rossmoor and elevated over the west side of 19th Avenue in front of Stonestown Galleria	Dropped after first round of outreach.
	SOUTHERN OPTIONS		
5	Baseline	M-Ocean View crosses 19th/Junipero Serra through at-grade crossing	Carried through evaluation
6	Southern Tunnel-19th/ Junipero Serra (S1)	Underground from Felix in Parkmerced emerging in a portal on 19th Avenue, south of Junipero Serra Boulevard	Carried through evaluation.
7	Southern Bridge (S2)	Above ground between Font and Randolph, lowering Junipero Serra to enable a gradual crossing	Carried through evaluation and selected as part of Highest-Performing alternative.
8	Southern Tunnel-Junipero Serra to Brotherhood Way (S3)	Below ground under Junipero Serra emerging at grade on northern extent of Brotherhood Way, returning to existing M-Ocean View alignment at Broad/Orizaba.	Dropped after first round of outreach.

Maps at right are keyed to table, above

E.7 Highest-Performing Alternative: Longer Subway and Bridge

The highest-performing alternative, Longer Subway and Bridge is shown in Figure ES-8. Key features of the alternative, from north to south would include:

- Light-rail tracks descend underground in the Lakeside private right-of-way entering a portal, fully underground before Ocean Avenue.
- Both tracks cross to the west side of the street under 19th Avenue near Rossmoor.
- A new northbound left-turn opportunity is introduced at northern Buckingham Way (allowing for reduction from double to single northbound left-turn pockets at Winston).
- A new Stonestown station that consolidates the Ocean, Eucalyptus, and Winston stations near Macy's and Mercy High School is provided. The station would be fully below 19th Avenue, but exposed at parking lot level of the Stonestown Galleria, one level below street level. It would also serve as a new place to cross the street for pedestrians and cyclists below 19th Avenue, and the station would be staffed to ensure personal security. The actual staffing and maintenance plan would be determined in a future phase and would explore maintenance agreements with Stonestown and Mercy High School.

The results of the evaluation revealed that the Longer Subway and the Southern Bridge options performed the best and were paired together as an alternative.

- The southbound/outbound track surfaces just south of Buckingham Way running adjacent to and west of the 19th Avenue travel lanes, and serving as a shared transit-way with buses and shuttles. The northbound/inbound track surfaces just south of Gonzalez Drive in Parkmerced.
- A new station at SF State could be located as far north as near the SF State Science Building and Wyton Lane (a pedestrian pathway on the east side of the street), or as far south as between Holloway and Crespi on the west side of 19th Avenue in the northeast corner of the Parkmerced site. To ensure east-side connectivity, a new station in the northern location would be accompanied with a new signalized at-grade crossing of the street.
- Vehicle access on Holloway west of 19th Avenue is closed and re-directed to Crespi to allow for faster light-rail travel time and a safer pedestrian crossing of the north leg of 19th Avenue.
- Light-rail tracks travel through Parkmerced at-grade along Font with a new station near the Parkmerced retail core, and another station near Chumasero.
- Light-rail tracks begin to elevate to travel over Junipero Serra where Font on the Parkmerced side meets Randolph on the OMI side. Junipero Serra is lowered by about 10.5 feet to enable a gradual elevation over Junipero Serra.
- Bridge over Junipero Serra is designed for light-rail, pedestrians, cyclists, and emergency vehicles and lands on Randolph coming to grade and joining the existing alignment where Randolph meets 19th Avenue.
- Opportunities to upgrade the existing alignment along Randolph include upgrading the Randolph/Arch station with high-level boarding and consolidating it with the existing 19th/Randolph and 19th/Bright stations. The 19th/Randolph station would need to be eliminated because of the re-located alignment, but consolidating the 19th/Bright station and upgrading the Randolph/Arch station are optional.
- The entire length of 19th Avenue from Junipero Serra to Rossmoor would be re-built, with three travel lanes in each direction maintained, but re-located to re-purpose the median light-rail track space. The street would be re-configured with a landscaped median and wider sidewalks on each side of the street. North of Buckingham there would be somewhat more space available for wider sidewalks because both tracks would be underground.

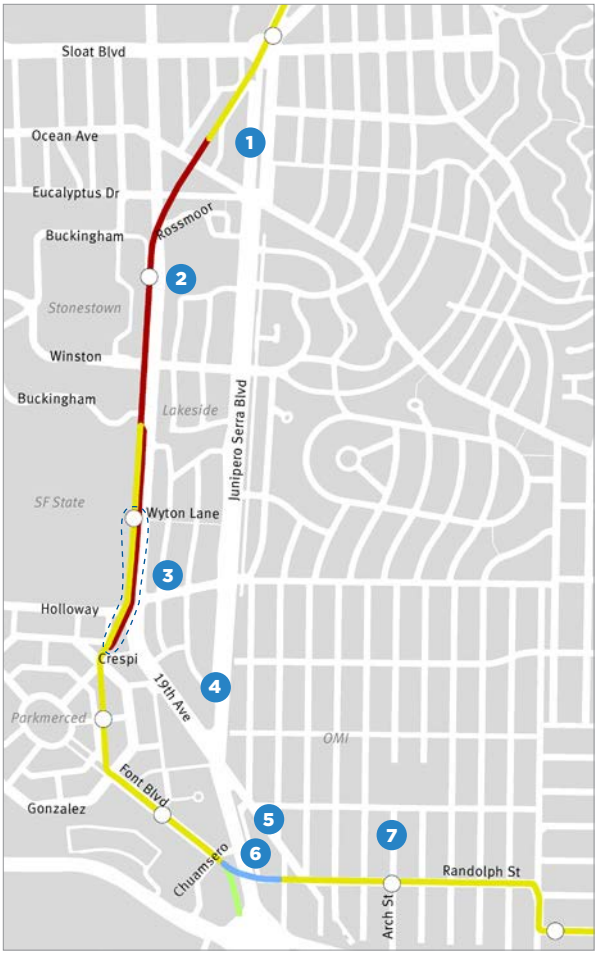
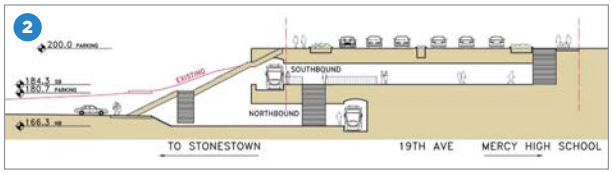


Figure ES-8. Key Features of the Highest-Performing Alternative (Longer Subway and Bridge)

Portal in Lakeside private right-of-way, just south of St. Francis Circle.

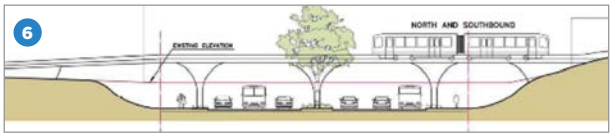


New station between Macy's and Mercy High School with entrances on both sides of the street.

SF State's 19th Avenue frontage, reconfigured with wider sidewalks/bus stops, and a landscaped median.

New buffered pedestrian and bicycle space on both sides of street.

Narrowed, calmer street, providing a signature entranceway to the Broad-Randolph corridor.



Bridge between Font and Randolph for light rail, cyclists, and pedestrians.

Larger versions of the numbered images are available in Chapter 3.

(Optional) Upgraded station on Randolph at Arch with level boarding.

- Approximately 163 parking spaces on 19th Avenue between Rossmoor and Holloway and approximately 22 spaces on Randolph west of 19th Avenue would be removed to enable a major pedestrian environment upgrade and provide room for a bridge landing.
- Major transit access and pedestrian safety upgrades would be made throughout the corridor by decreasing the distance across the street by 33%, introducing four new crossing opportunities that would decrease the temptation to cross mid-block and dramatically decreasing exposure by locating the M-Ocean View stations on the same side of the street as the major trip generators of Stonestown, SF State, and Parkmerced. Excess nearby parking supplies are expected to accommodate this reduction, including more than 700 excess spaces at SF State and almost 200 excess spaces on nearby streets in the OMI neighborhood during peak hours.

Table ES-3. Longer Subway and Bridge Key Benefits and Considerations

GOAL	LONGER SUBWAY AND BRIDGE KEY BENEFITS AND CONSIDERATIONS
Light-rail operating performance	35-45% improvement in light-rail travel time, 7-8 minutes in savings relative to Baseline
	At least 50% increase in capacity in all alternatives
Light-rail access	All light-rail riders boarding/alighting at Stonestown and 97% of those boarding/alighting at SF State no longer cross any lanes of traffic
	5- and 10-minute walk distance to stations stays about the same although some small increases due to stop consolidation.
Bus/shuttle access/ performance	2-3 minute bus/shuttle travel time savings from new shared light-rail bus/shuttle transitway; larger bus stops
Walking and cycling safety/attractiveness	Four new places to cross the street (new Stonestown station, Winston south leg, Wyton Lane, Font-Randolph Bridge)
	33% decrease in distance across the street from 120 to 80 feet
	30-50 feet of space re-purposed for wider sidewalks, cycling facilities, and landscaped median
	Opportunity for new bicycle facility on 19th Avenue between Junipero Serra and Eucalyptus and upgraded facility south of Junipero Serra
Neighborhood quality of life	Opportunity to address neighborhood concerns with light-rail noise, vandalism in private right-of-way
	Opportunity for interesting, attractive visual feature with Bridge, and traffic calmed block of 19th Avenue south of Junipero Serra
	Design challenge on Randolph Street between Junipero Serra and 19th by introducing light-rail and bridge landing on a residential street
Private vehicle conditions	Average vehicle delay through the corridor stays about the same, but reliability improves
	Reduction in on-street parking can be managed with nearby excess supply and parking management
Support transit-oriented land use	All options support visions established in SF State Campus Master Plan and Parkmerced Vision Plan for a west side alignment of the M-Ocean View
Community-supported, feasible project	Longer Subway and Bridge favored by the majority of stakeholders (86% and 57%, respectively) surveyed during second round of outreach (n=156)
	Capital cost $420–780 million, most likely cost $520 million
	Capital cost of Shorter Subway $90 million less than Longer Subway
	Operating cost savings of Longer Subway and Bridge $2 million annually as compared to $0.9 million for Shorter Subway and Tunnel*

* Operating costs calculated using SFMTA operating cost model, SPASM, see Appendix C for methodology. This model is based on average operating costs in the system. The next phase of work will do analysis to better understand the station operating and maintenance cost implication, given the two new stations would require greater level of staffing and maintenance than surface stations.

E.8 Evaluation Results

Using the Study's goals and objectives as a guide, the Study team carried out a rigorous technical evaluation to compare the alternatives in terms of how well each would achieve the Study's eight goals. The results, summarized in Table ES-3 (previous page) reveal that the Longer Subway and Bridge alternative is the highest-performing, including notable improvements to light-rail operating performance and access (7-8 minute travel time savings, 50% capacity increase) and pedestrian safety and attractiveness (distance across the street reduced from 120 to 80 feet, four new places to cross the street, new landscaped median and wider sidewalks) in particular. In the next phase, specific attention will be given to the Randolph landing of the bridge over Junipero Serra, where narrow streets and adjacent residential uses create design challenges. This alternative's capital cost is estimated at $420–$780 million, with a most likely cost of $520 million (in 2013 dollars). It is also expected to save $2 million in operating costs annually, relative to the Baseline.[6] A preliminary analysis of its cost effectiveness using the Federal Transit Administration's criteria for New Starts funding found it received a Medium-High to High rating.

E.9 Alternative Variations

Several variations to the alternatives are also possible but did not undergo the same level of project development and evaluation work as the main alternatives. In the next stage of development, analysis of their ability to further support the Study's goals and objectives relative to their additions in cost will be undertaken to determine whether to fold variants into the main project definition, remove from further consideration, or continue to study in the environmental review phase of the project. The variants, shown in Figure ES-9 include:

Figure ES-9. Alternative Variants

ST. FRANCIS CIRCLE GRADE SEPARATION: This variation would build on the Longer or Shorter Subway option by beginning the underground light-rail alignment north of this complex intersection, which currently causes significant delay for all modes.

OCEAN AVENUE UNDERGROUND STATION: This variation would build on the Longer or Shorter Subway option by adding an underground light-rail station at Ocean in the center of the Lakeside Village retail area.

CONTINUE SUBWAY THROUGH PARKMERCED: This variation would build on the Longer Subway option, keeping both tracks underground from where they descend south of St. Francis Circle through the southeast corner of Parkmerced, emerging as needed to begin elevating over Junipero Serra. Parkmerced is expected to have high levels of pedestrian activity as the site builds out, and underground light-rail may allow for faster speeds than what would be safe to operate through the site at-grade.

[6] Capital and operating costs will be refined in the next phase of work.

E.10 Outreach

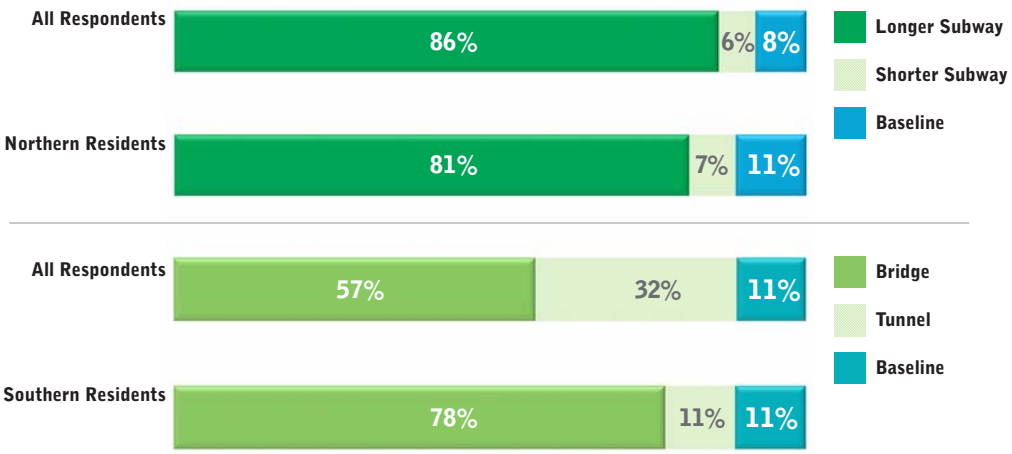
Outreach to the community and key stakeholders was a critical Study activity that informed Study findings and recommendations. The project team engaged in two rounds of intensive outreach, including a community meeting during each round and a series of presentations and discussions with neighborhood groups in the Study area as summarized in Table ES-4. Each round of outreach had a distinct purpose. The first round between February and April 2013 was focused on sharing the findings of the Study's existing and future conditions analysis and seeking input on the initial alternatives the technical team developed. The second round between September and November 2013 was focused on sharing the results of an evaluation of the alternatives and seeking input on community preferences among alternatives. Community and stakeholder involvement included a comprehensive set of multi-lingual notification and input techniques.

As a part of the second round of outreach, the Study team requested input on preferred options from members of the public through a survey administered online and via paper. Figure ES-10 (next page) summarizes preferences among those who responded to the survey, including for all respondents, as well as from only those who lived in the immediate vicinity of the Study corridor. The community overwhelmingly preferred Longer Subway (86%) to Shorter Subway (6%) and Baseline (8%). In the south, the majority (57%) preferred Bridge to Tunnel (32%) and Baseline (11%). Support for the Bridge was higher (78%) among those who indicated they lived in the surrounding neighborhoods.

Table ES-4. Summary of Community Outreach Activities

OUTREACH PHASE	PURPOSE	FEEDBACK SOUGHT	OUTREACH FORMATS
Round 1 (February to April 2013)	Provide an overview of the Study's purpose and goals Share findings of the Study's existing and future conditions analysis Share draft conceptual alternatives	Existing transportation needs in the corridor Areas of interest or concern in draft conceptual alternatives	Community meeting Direct outreach meetings Multilingual communication materials: website, fact sheet, advertisements on transit and in newspaper advertisements, flyers posted in corridor Briefings with District Supervisors
Round 2 (September to November 2013)	Review the Study's purpose and goals; Share the results from the first round of outreach and review how this feedback was incorporated; Summarize the features, benefits, and considerations of the highest-performing alternative, provide more detail on additional options evaluated;	Community input on Study alternative preferences;	Community meeting Direct outreach meetings Multilingual ommunication materials: website, fact sheet, advertisements on transit and in newspaper advertisements, flyers posted in corridor Briefings with District Supervisors Web and paper survey

Figure ES-10. Options Preferred By Survey Respondents (n=158)



E.11 Next Steps

The Study is the first stage of project development for the proposed project—a feasibility study that identifies high-performing alternatives to address significant transportation deficiencies along 19th Avenue. Many more steps lie between conclusion of this phase of work and when the City and County of San Francisco could be ready to recommend the project for implementation.

The subsequent phases of development for the proposed project are shown in Figure ES-11. The overall schedule is uncertain given the early stage in the planning process and would depend on notable questions such as funding availability. An aggressive schedule could see construction begin in 2020 and service opening in 2022, but this would assume a significantly accelerated pace as compared to recent experiences of other major transit capital projects under development and construction in San Francisco.

Figure ES-11. Potential Project Implementation Schedule

Identifying funding to support a project of this scale will be challenging given the number of competing priorities with more advanced project development within San Francisco and the Bay Area region. The proposed project's cost for all future phases of work for the Longer Subway and Bridge option is estimated at $520 million, with greater certainty that its range will be somewhere between $420 and $780 million (in 2013 dollars). Yet, the project is also uniquely competitive for funding because of the significant private sector investment it would leverage, the substantial need and potential benefit to the corridor, the project's location along the State highway system making it eligible for certain funding sources, and

its designation as a Priority Development Area making it competitive for regional funding intended to support integrated land use-transportation plans, among many other considerations.

Although the proposed project is not recommended for funding through the Mayor's 2030 Transportation Task Force (T2030) proposed revenue measures, some elements of the project could be funded through the Task Force's investment in Complete Streets or traffic signal upgrades. T2030 also identifies the project as high-priority for other fund sources. It is expected that the project would be particularly competitive for TIFIA, a federal low-interest loan, if backed partially by development-related revenue.

E.12 Conclusion

The 19th Avenue Transit Study identifies multiple feasible west-side grade-separated alignment alternatives for the M-Ocean View and 19th Avenue between Sloat and Brotherhood Way. It finds that that one of the alternatives—the Longer Subway and Bridge—would provide the greatest benefits including substantial improvements to the speed, reliability, and capacity of the M-Ocean View light-rail line, as well substantial pedestrian and bicycle upgrades by freeing up space to provide wider sidewalks, landscaped medians, and new cycling infrastructure. The estimated capital cost of this alternative ranges from $420 to $720 million (most likely $520 million) in 2013 dollars, including all soft costs. This alternative not only performs best according to the Study's technical evaluation of its ability to meet the Study's goals and objectives, but it also is widely supported by surrounding neighborhood leaders and stakeholders.

These findings will be the basis for the next phase of project development, which will be carried out between approximately Spring 2014 and Summer 2015. This phase will include analysis of multiple variations with potential to provide further transit performance, access, and non-motorized safety benefits (St. Francis Circle grade separation, Ocean Avenue underground station, full subway through Parkmerced) and preparation of a Project Study Report as required for projects affecting the state-owned right-of-way. Between approximately 2015 and 2018, environmental review will be undertaken, in compliance with the National Environmental Policy Act and the California Environmental Quality Act, providing additional information on the project's environmental impacts and mitigations, before making an implementation decision. While the project's most likely cost of $520 million in 2013 dollars is a major investment decision and there are multiple competing priorities within San Francisco and the Bay Area region for capital funds, the project is expected to be competitive for many federal, state, regional, local, and private funding sources. The project represents a unique example of coordinated land use and transportation planning using a collaborative public-private partnership approach. The effort illustrates how investments made in support of new growth can be coordinated in such a way as to not just mitigate their own transportation impacts, but also catalyze improvements that address underlying existing transportation needs.

1 Introduction

THE 19TH AVENUE TRANSIT STUDY (Study) explores the feasibility of making a major capital investment to re-envision transportation in the 19th Avenue/Highway 1 corridor from Sloat Boulevard to Brotherhood Way in Southwest San Francisco. The Study explores options for re-locating the M-Ocean View light-rail line from where it currently operates in the 19th Avenue median to the west side of the street through new subway and bridge structures that grade-separate the M-Ocean View crossings of 19th Avenue. Such an investment could provide for a major improvement in transit travel times and reliability, while providing the opportunity to dramatically re-orient the street for a safer, calmer corridor that marks San Francisco's southern entrance as a gateway into the city, improves neighborhood quality of life, and supports transit-oriented land use plans. As a feasibility study, this effort represents the first stages of project development that defines potential project alternatives, assessing their feasibility, benefits, impacts, and costs. The next stages of work are: further project development, followed by environmental review; and, if a decision is made to move forward implementing the project, then more detailed design engineering, and construction.

This Final Report summarizes the technical work, findings and recommendations of the Study, and next steps in pursuit of the project. The Study identifies several feasible alternatives and identifies one, the Longer Subway and Bridge alternative, as the highest-performer relative to the Study's goals and objectives to be the focus of the next stages of project development. This Final Report presents this work in six chapters, as follows:

- **CHAPTER 1 (INTRODUCTION),** the remainder of this chapter, explains the Study's background, timeline and process, the role of several collaborating Study partners, and the goals established to guide the work.
- **CHAPTER 2 (TRANSPORTATION CONTEXT)** summarizes the background transportation context, focused on the transportation deficiencies the alternatives generated were designed to address.
- **CHAPTER 3 (ALTERNATIVES DEVELOPMENT)** presents the alternatives developed and variations to the alternatives that will be further explored in the next stages of project development.

- **CHAPTER 4 (ALTERNATIVES EVALUATION)** presents the results of the technical evaluation of alternatives that identified a highest-performing alternative.
- **CHAPTER 5 (OUTREACH)** explains how the Study's findings and recommendations were shaped by substantial involvement from corridor stakeholders and the methods used to solicit involvement.
- **CHAPTER 6 (NEXT STEPS)** outlines next steps for the project including a potential implementation pathway, as well as funding and project development/delivery options and considerations.

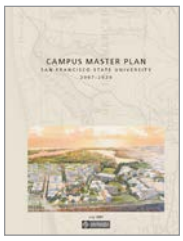
Several appendices referenced in the Final Report Table of Contents, available upon request, present more detailed backup to the summary content contained in the Final Report chapters.

1.1 Background

Figure 1-1. Study Corridor Overview

Nineteenth Avenue is western San Francisco's major north-south transportation arterial. The street is designated as Highway 1 and carries major through traffic between neighboring counties to the north and south as well as San Franciscans travelling to and from the western half of the city. The road is three lanes in each direction with the M-Ocean View light-rail operating in the median for approximately one mile in the southern part of the corridor (Figure 1-1). The areas east and west of the street vary distinctly. To the east are lower density residential neigborhoods—West Portal, Lakeside, Oceanview-Merced Heights-Ingleside (OMI)—adjacent to neighborhood commercial streets—West Portal Avenue, Ocean Avenue, and the Broad-Randolph corridor. To the west are more intense land uses: the Stonestown Galleria regional shopping center, San Francisco State University (SF State), and the Parkmerced residential neighborhood of high-rise apartment towers and low-rise garden townhomes with an existing population of approximately 8,000.

Within this land use context exists a complex array of transportation dynamics and needs. Ridership on the M-Ocean View and bus lines that operate along 19th Avenue are high, but travel times are slow and unreliable as transit vehicles fight through numerous interactions with private vehicles. Transit vehicles, station platforms, and bus loading areas are regularly crowded. The location of the two M-Ocean View stations in the median of 19th Avenue that serve Stonestown Galleria and SF State create challenging conditions, tempting riders to cross against the light if their train is arriving. The corridor is part of the 6% of San Francisco street miles where 60% of the city's severe and fatal pedestrian injuries occur.[1] Drivers experience heavy traffic and unreliable travel times during peak periods.



About seven years ago, San Francisco stakeholders began discussing some major land use changes on the west side of the street, including:

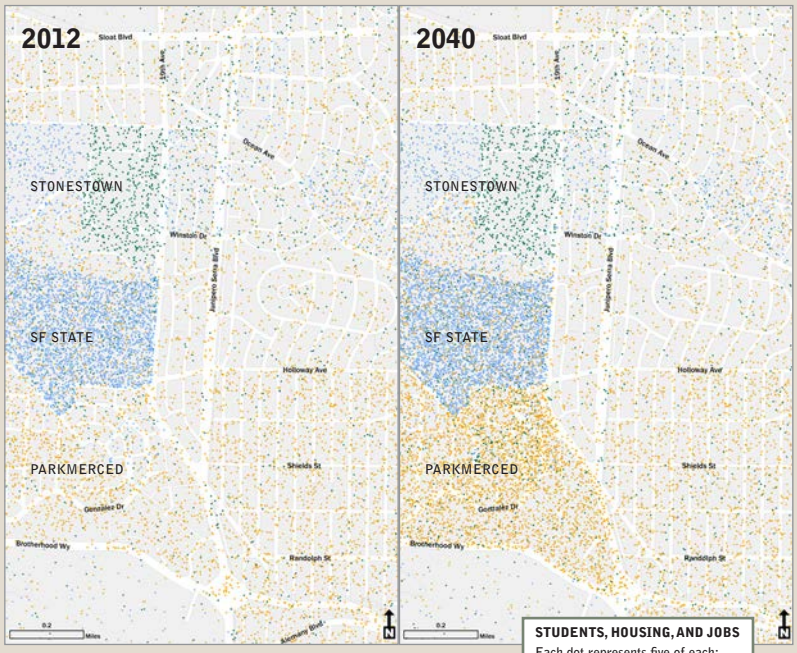
• The *SF State Campus Master Plan,* adopted in 2007, which would add 1 million square feet of new facilities and grow the university's student body by 25%, bringing its total to enrollment to 25,000 full-time equivalent students.

[1] WalkFirst: San Francisco Department of Public Health analysis of California Highway Patrol Statewide Integrated Traffic Record System (SWITRS) data, 2013.

- The *Parkmerced Vision* plan, a master redevelopment plan proposed by the site's owners and ultimately adopted in 2011, which would result in a net addition of 5,679 new units, approximately tripling the residential density of the site, along with a mix of supportive commercial/retail and community uses.

Given the existing transportation needs of the surrounding area that residents were well aware of, concerns about the transportation impacts of new growth on top of this need were raised to then-District Seven Supervisor, Sean Elsbernd. In 2008, Supervisor Elsbernd requested that the San Francisco Planning Department (SF Planning) prepare the *19th Avenue Corridor Study*[2] to analyze the cumulative impacts of these and other potential developments

[2] San Francisco Planning Department. *19th Avenue Corridor Study.*



Significant Growth Projected Over the Coming Decades

Plans for the area call for increases in the number of residents, students, and jobs in the area. The Study provides the opportunity to advance a major transportation investment that will improve transportation conditions from today, while also serving the needs of this growing community.

STONESTOWN GALLERIA: The Stonestown Galleria is a regional shopping center with approximately 900,000 square feet of gross leasable area. The mall's owners, General Growth Properties, may consider additional development at the site.

SF STATE UNIVERSITY: The SF State Campus Master Plan, adopted in 2007, supports an increase in student enrollment from 20,000 to 25,000 full-time students. It calls for rebuilding the HSS and Science buildings along 19th Avenue and the addition of approximately 1 million square feet of new facilities. The plan would add 660 new dwelling units and approximately 700 new employees.

PARKMERCED: The Parkmerced Vision Plan calls for a significant densification and diversification of the site, including a net addition of 5,679 housing units, a new retail corridor along Crespi and Gonzales drives, new streets and circulation patterns, new open space, and community amenities. The plan also calls for bringing the M-Ocean View onto the site to provide residents direct access to transit.

IMAGE CREDITS ABOVE RIGHT, TOP TO BOTTOM: GENERAL GROWTH PROPERTIES, SF STATE, PARKMERCED

The M-Ocean View must travel southbound in northbound travel lanes on 19th Avenue to enter the median near Rossmoor Drive. During peak hours, traffic often queues onto the light-rail tracks, delaying the light-rail from proceeding.

in the vicinity of 19th Avenue. That study, completed in 2010, found that even without intensification in land use, travel conditions along the corridor would worsen. These worsened conditions would be the result of background growth expected in other parts of the city and region, generating additional trips along 19th Avenue. Corridor stakeholders, including community members from West Portal, Lakeside, SF State, Parkmerced, Merced Heights, Merced Extension Triangle, Ingleside Heights, and Ocean View helped the city set goals and infrastructure investment priorities to improve existing conditions and support future plans.

Recognition that traffic along 19th Avenue contributes to slow and unreliable travel time for the M-Ocean View and that most people using the two 19th Avenue stations at Stonestown and at SF State cross to the west side of the street, led to identification of a west side grade-separated alignment of the M-Ocean View as a community priority. Since that time, the *Parkmerced Vision* plan was adopted and includes a commitment by Parkmerced to make a major upgrade to the M-Ocean View and 19th Avenue, valued at $70 million, in support of this priority. The Development Agreement between Parkmerced and the City and County of San Francisco spells out three ways this improvement would move forward:[3]

1. PARKMERCED WOULD CONSTRUCT THE BASELINE IMPROVEMENT: a new segment of the M-Ocean View that would travel through the Parkmerced site between Holloway and Junipero Serra (see Figure 1-2, next page). The new alignment would re-locate the existing station serving SF State to the west side of the street between Holloway and Crespi. It would also create two new stations, one on the main line near the center of the new Parkmerced retail core, and one on a tail track (see Parkmerced Tail Track, next page) along Font and Chumasero. This option would improve transit access to SF State and Parkmerced because riders would no longer need to cross three lanes of traffic to board or alight the light-rail, but it would also create a negative impact to travel time because of the signal time needed to allow these crossings, both for transit and motorists in the corridor. As a result, the plan also would add a fourth southbound travel lane from north of Holloway to Junipero Serra, as well as reconfigure the intersection of 19th Avenue and Junipero Serra with three northbound left-turn lanes (and two through lanes). This option is referred to in this report as the Baseline because, if no further action is taken by San Francisco, this is the transportation investment that will move forward.

2. PARKMERCED WOULD CONSTRUCT A MODIFIED VERSION OF THE BASELINE that supports a west side grade separated alignment of the M-Ocean View for the entire length it is in the 19th Avenue corridor. By decreasing light-rail conflicts with private vehicles, this option would not need to include the travel and turn lane additions that would be implemented in the Baseline. The potential ways to design such a project is the focus of this Study. At the time of approval of the Parkmerced Vision plan, this option was no more than an idea and a potential line on a map. Stakeholders recognized the need for a corridor-level feasibility study to explore this idea separate from the site-level transportation planning done for Parkmerced. Parkmerced and the City and County of San Francisco have an agreement that allows the further definition of a modified version with Parkmerced support provided. The agreement gives San Francisco until July of 2018 to develop and approve an alternative investment. This investment would cost more than the Baseline, but could also create larger benefits to adjacent landowners and the surrounding neighborhoods and could therefore

[3] The 19th Avenue Corridor Study also found that implovements to the network to provide additional entry points into Parkmerced would alleviate traffic impacts. The Parkmerced plan will implement upgrades to Vidal Drive and Higuera that leave traffic conditions better than what they would be in a future without the Parkmerced development.

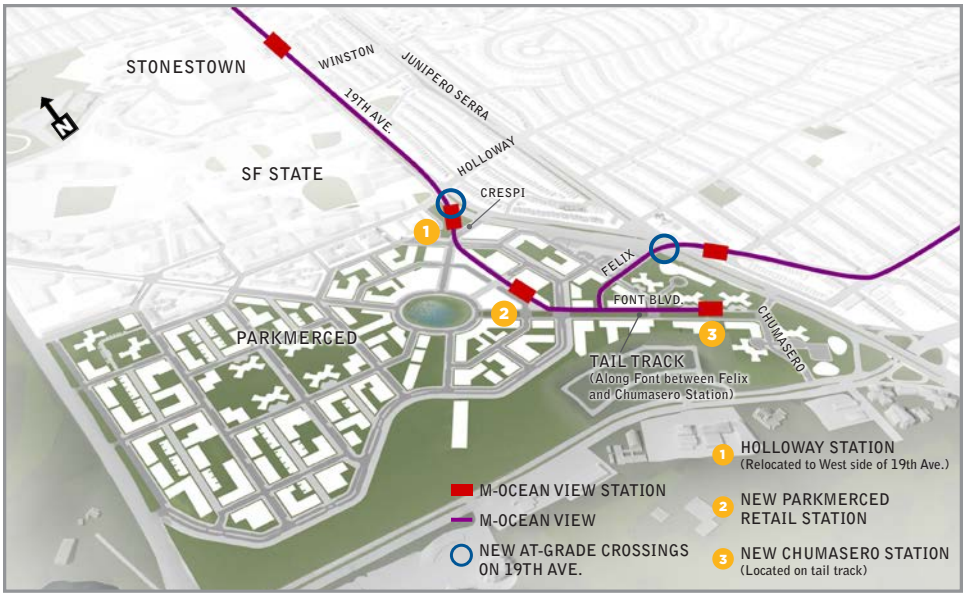


Figure 1-2. Baseline Realignment of M-Ocean View Through Parkmerced

potentially leverage significant additional funding, using the investment Parkmerced is committed to making for the Baseline as local match.

3) PARKMERCED WOULD PAY THE CITY AND COUNTY OF SAN FRANCISCO for investment in a modified version of the Baseline that supports a west side-grade separated alignment the cost of which they would have spent implementing the Baseline and not constructing anything.

The San Francisco County Transportation Authority (Transportation Authority) conducted the Study to analyze potential alignments; their potential benefits, impacts and costs; as well as funding opportunities, following through on obligations that San Francisco made to the community and other stakeholders at the time of Parkmerced's approval. The alternatives studied represent an opportunity for investments made in support of new growth to address existing transportation needs in the corridor as well as offset needs created by new development.

1.2 Study Timeline, Process, and Focus

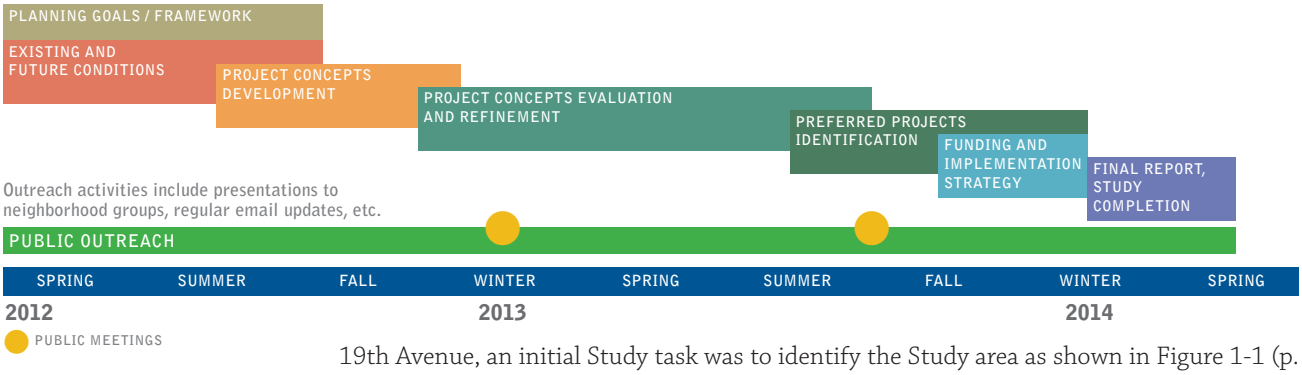
The Study has been carried out over the course of approximately two years: from Spring 2012 to Spring 2014 as shown in Figure 1-3 (next page). The Study began by establishing a planning goals framework and documenting existing and expected future land use and transportation conditions in the corridor. Next, the Study generated several alternative ways to bring the M-Ocean View to the west side of the street and back, sharing them with the public during a first round of community outreach between February and April of 2013. Based on feedback received, some options were eliminated, others refined and evaluated to understand how they vary in their ability to achieve the goals and objectives established. A rigorous technical evaluation was completed during Spring and Summer of 2013, culminating in one alternative identified as the highest-performing in its ability to address the goals and objectives. The results were shared for input during a second round of outreach in September through November 2013. Finally, an initial funding and implementation strategy was prepared and the final work documented in this final report.

With the Study's focus on grade-separating the M-Ocean View crossings of

Parkmerced Tail Track

A tail track is a segment of light-rail track that can be used to provide more flexibility in light-rail operations. It can serve as a place to store disabled trains so they do not block the main line. It can also be used as a place to turn around trains to operate different service patterns. The Parkmerced Transportation Plan includes a tail track on the Parkmerced site. This track would allow for M-Short operation, meaning some trains would turn around at Parkmerced and head back downtown providing more service on the segment of the line where a significant majority of the ridership occurs, while M-Long trains would continue service to Balboa Park BART. The tail track would also point towards Daly City BART, serving as the location for a future extension if San Francisco ever decided to pursue such an extension.

Figure 1-3. Study Timeline and Process



19th Avenue, an initial Study task was to identify the Study area as shown in Figure 1-1 (p. 20). The Study corridor is generally the area surrounding 19th Avenue where the M-Ocean View operates, but also extends as far north as St. Francis Circle and as far east as Orizaba because some of the alternatives studied must extend to these boundaries in order to re-connect to the existing light-rail line.

1.3 Study Partners

The Study is a collaboration among multiple public agency, institutional, and private entities as shown in Table 1-1. The Study is funded by a Caltrans Planning Grant with local match provided by the Prop K sales tax and contributions from three west side landowning partners of General Growth Properties, SF State, and Parkmerced. The Transportation Authority led the Study in close partnership with the San Francisco Municipal Transportation Agency (SFMTA) and the San Francisco Planning Department (SF Planning), who were key partners in the Study's technical work. A Memorandum of Agreement between the three agencies allowed for the Study budget to fund each agency's participation. A larger set of agencies and organizations provided advice on all aspects of the Study's deliverables through attendance at regular Partners meetings that were held at key milestones throughout the Study process. In addition, the Transportation Authority managed a team of technical consultants with a range of expertise areas that produced much of the Study's technical work as shown in Table 1-2 (next page); the consultant team was led by Arup North America.

Table 1-1. Study Partners and Roles

ORGANIZATION	FUNDER	CONTRIBUTOR TO STUDY DELIVERABLES	ADVISOR ON STUDY PRODUCTS
San Francisco County Transportation Authority (Study lead)	✔	✔	
San Francisco Municipal Transportation Agency		✔	✔
San Francisco Planning Department		✔	✔
California Department of Transportation	✔		✔
Parkmerced Investors	✔		✔
San Francisco State University	✔		✔
General Growth Properties (owners of Stonestown Galleria)	✔		✔
Office of Economic and Workforce Development			✔
Bay Area Rapid Transit District			✔
Department of Public Works			✔

Table 1-2. Technical Consultant Team

FIRM	ROLE
Arup North America	Consultant project manager, technical lead developing and evaluating alternatives
Fehr & Peers	Traffic analysis
Office of Cheryl Barton	Urban design, artistic visuals and renderings of alternatives
Circlepoint	Outreach support
Barbary Coast Consulting	Outreach support

1.4 Goals and Objectives

The Study team established eight goals used to guide development and evaluation of the alternatives, as well as more specific objectives under each goal as shown in Table 1-3. These goals were generated based on past planning work in the corridor as well as overarching City policies.

Table 1-3. Study Goals and Objectives

GOAL	OBJECTIVE
Improve light-rail system operating performance, capacity, and flexibility	Decrease travel time
	Improve reliability
	Increase capacity
	Increase flexibility
Improve light-rail passenger experience and access	Improve safety and attractiveness of accessing light rail
Enhance bus and shuttle operations and passenger access	Consider opportunities to improve the speed and reliability of bus/shuttle travel time
	Consider opportunities to improve safety and attractiveness of accessing buses/shuttles
Provide attractive and safe walking and cycling conditions	Improve safety and attractiveness of walking conditions along and across 19th Avenue
	Consider opportunities to improve bike connectivity to and through the corridor
Improve neighborhood quality of life	Consider opportunities to allow for place-making, a gateway entrance into Southwest San Francisco
	Consider opportunities to reduce or minimize noise from light rail vehicles, traffic
Manage private vehicle traffic and parking conditions	Improve reliability of vehicle travel
	Maintain Baseline forecast vehicle travel time while maintaining today's lane capacity
	Manage impacts of on-street parking reductions
Support transit-oriented land use plans	Maintain consistency with approved area land use plans, such as those at SF State and Parkmerced
Produce a feasible project	Minimize capital costs
	Decrease operating costs
	Minimize construction duration
	Design a community-supported project

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Lowell High School students waiting to board the M-Ocean View at Eucalyptus.

2 Transportation Context and Needs

NINETEENTH AVENUE is a corridor heavily used by cars; by light-rail, buses and shuttles; by pedestrians; and by cyclists crossing (and even a brave few who bike along) the street. Transportation conditions in the Study corridor present several needs all of which stem from conflict points between these modes: from cars queued on light-rail tracks blocking the path of the M-Ocean View, to turning cars conflicting with pedestrians crossing the street, to cyclists interfering with pedestrians on crowded sidewalks because of the lack of a safe, convenient facility. This chapter further profiles this transportation context in the corridor and then highlights four issues revealed that the Baseline improvement and Study alternatives were designed to address:

- Transit performance issues (speed, reliability, capacity)
- Unattractive, difficult transit access
- Challenging, unattractive pedestrian conditions
- Circuitous bike routing and challenging crossings

This chapter profiles existing conditions needs, but some related projects—the Transit Effectiveness Project, the 19th Avenue Bulb-Outs Project, Transit Signal Priority, and the Parkmerced Transportation Plan—have already developed plans to alleviate some of these needs (see discussion *Related Projects on 19th Avenue* on page 34).

2.1 Transportation Context

PRIVATE VEHICLE

Vehicle traffic along 19th Avenue, at approximately 66,000 vehicles per day, places it among the very highest traffic surface arterials in San Francisco.[1] As a point of comparison, it experiences almost two-thirds more average weekday daily traffic than Van Ness Avenue.[2] Traffic speeds during pm peak hours average 20 mph in both directions relative to a 35 mph speed limit.[3] The 19th/Junipero Serra intersection is the first major bottleneck point for motorists travelling northbound, as Highway 1 transitions from a higher-speed highway facility to a lower-speed urban arterial street. Afternoon peak hour congestion is more severe than during morning commute hours, with existing corridor vehicle delay approximately

[1] Caltrans, 2012.
[2] Van Ness, Broadway, 2009.
[3] San Francisco County Transportation Authority. *2013 San Francisco Congestion Management Program.*

Figure 2-1. M-Ocean View Features and Operating Environment

four to five minutes over one mile from Sloat to Brotherhood Way.[4] Those who live nearby or travel regularly through the area often use Junipero Serra Boulevard as an alternative route to avoid the more congested 19th Avenue.

LIGHT-RAIL

The M-Ocean View line travels from Downtown San Francisco at Embarcadero, under Market Street and Twin Peaks, emerging at West Portal, approaching the Study corridor at St. Francis Circle. Just north of its entrance to 19th Avenue, the M-Ocean View travels in a designated private right-of-way adjacent to single-family homes in the Lakeside neighborhood from St. Francis Circle to Rossmoor (Figure 2-1). In this right-of-way, the line serves two closely spaced stops at Ocean and at Eucalyptus. The line then enters the median of 19th Avenue through a special traffic signal that controls northbound traffic. The M-Ocean View has three stops in the median of 19th Avenue: at Winston, at Holloway, and at Junipero Serra, after which it transitions out of the corridor at Randolph, continuing east along Broad Street and San Jose ending at Balboa Park BART. The M-Ocean View is a high ridership line, with about 28,000 daily boardings on an average weekday, 8,000 of which occur within the Study corridor as shown in Figure 2-2a (next page).[5] Outside of the Muni Metro stations between Embarcadero and Castro, the Holloway/SF State station sees the highest ridership in the system, with about 4,000 riders boarding at this location on an average weekday.[6]

BUS/SHUTTLE

In addition to the M-Ocean View that travels in the median of 19th Avenue, four local Muni bus lines (the 17, 28, 28-L, and 29), the SamTrans 122, as well as SF State shuttles, all travel through the corridor (Figure 2-3, next page). Bus stops within the Study corridor are located at the same intersections as light-rail stations: at Winston, Holloway, and Junipero Serra (as well as a stop at Buckingham Way that serves the 18). There is also a major intermodal transfer point between bus stops located on Winston just west of 19th Avenue in the Stonestown Galleria, regional SamTrans bus riders transferring to or from local transit lines and M-Ocean View riders. Combined bus/shuttle ridership in the Study corridor is about 14,000 daily boardings, with almost 7,000 at Holloway (see Figure 2-2b, next page).[7] The Daly City BART station, about one mile south of SF State, is a major bus/shuttle destination, as the closest connection to regional transit.

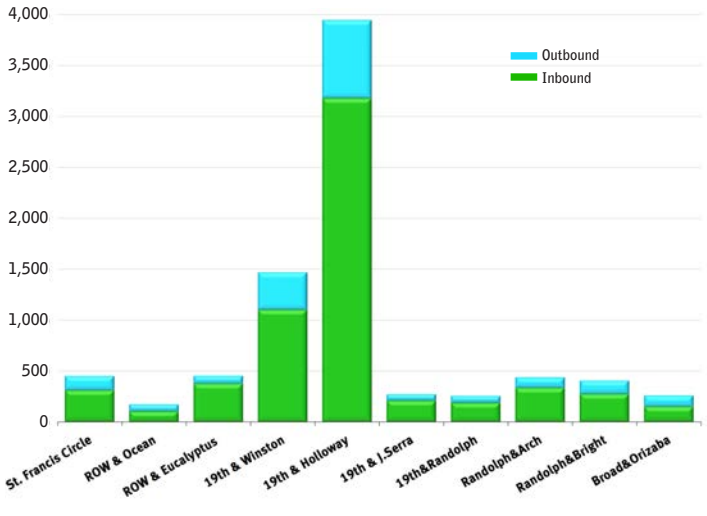
The M-Ocean View is a high ridership line, with about 28,000 daily boardings on an average weekday. Outside of the Muni Metro stations between Embarcadero and Castro, the Holloway/SF State station sees the highest ridership in the system.

PEDESTRIAN

There are sidewalks on both sides of 19th Avenue, ranging from five to ten feet in width, with the east side of the street typically more narrow.[8] The only opportunities within the Study corridor to cross 19th Avenue between Eucalyptus and Junipero Serra (a 1-mile distance) are at Winston and Holloway, making for an average distance between crossing opportunities of one-third of a mile (Figure 2-4, next page). At Winston and Junipero Serra, the south legs of the intersection are closed, requiring pedestrians to cross up to three legs of an intersection to get across the street. Pedestrian volumes in the corridor are among the highest outside of Downtown due to the activity generators of the mall and the university, with volumes as high as ~1,000/hour at Winston and ~2,000/hour at Holloway during the

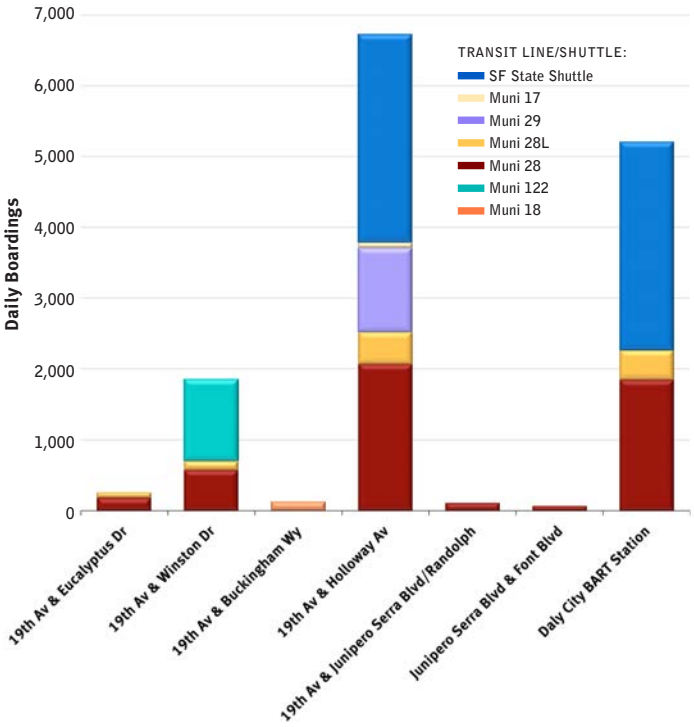
[4] Fehr & Peers Traffix Analysis from 19th Avenue Corridor Study and Parkmerced EIR.
[5] SFMTA Fall Ridership Data: September 2009-February 2010.
[6] Ibid.
[7] Ibid.
[8] San Francisco Planning Department. 19th Avenue Corridor Study.

Figure 2-2a. M-Ocean View Daily Boardings in the Study Corridor



SOURCE: SFMTA Fall 2011 Ridership Data (September 2009-Feburary 2010)

Figure 2-2b. Bus and Shuttle Daily Boardings in the Study Corridor

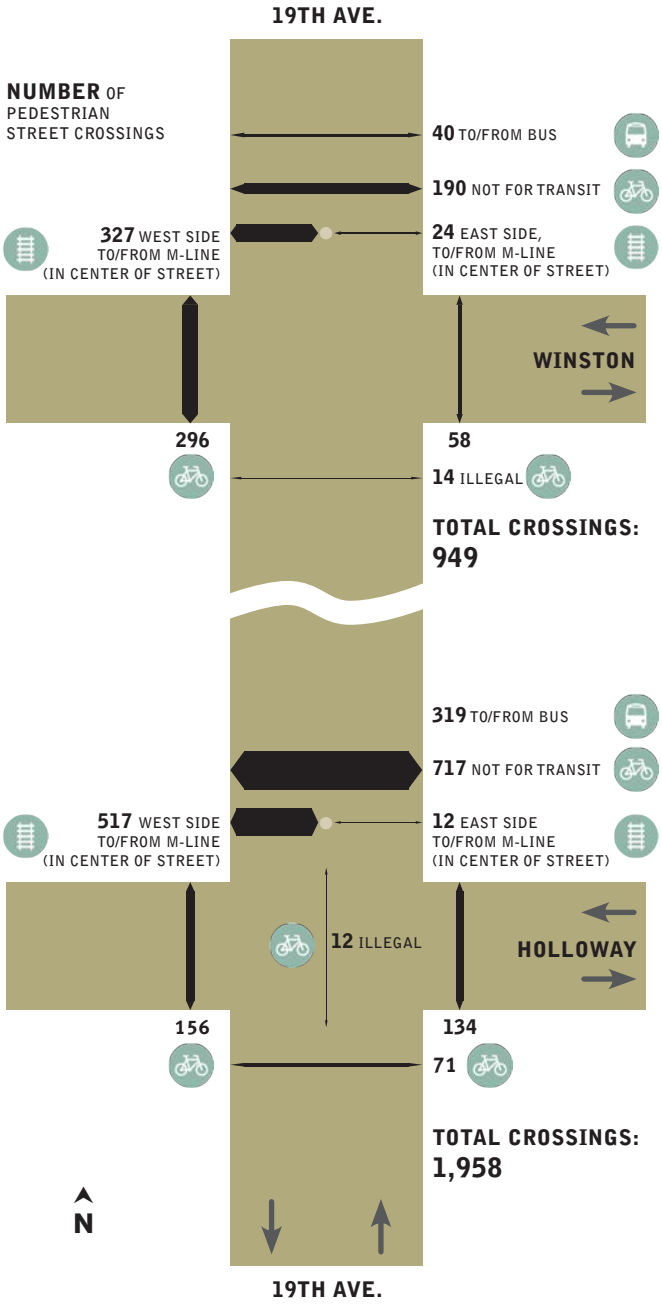


SOURCE: SFMTA Fall 2011 Ridership Data (September 2009-February 2010), SamTrans February 2006, and SF State 2012

Figure 2-3. Existing Transit Services Serving the Study Corridor

Figure 2-4. Crossing Opportunities Across Highway 1, Ocean to Junipero Serra

Figure 2-5. PM Peak Hour Pedestrian Volumes, Winston (top) and Holloway (bottom)



SOURCE: SFCTA September 2012, PM peak pedestrian counts

pm peak hour (Figure 2-5).[9] Some of this high activity is related to students who drive to campus, park on nearby streets such as Junipero Serra, and cross 19th Avenue to get from their parked car to campus. As a point of reference, some intersections in South of Market with similarly high pedestrian activity are 3rd/Howard streets with about 1,400 crossings and 4th/Mission streets with about 2,900 crossings during a one-hour pm peak count.[10]

BICYCLE

The north-south bike route through the Study area is generally off of 19th Avenue, except for the segment south of Junipero Serra (where it is no longer Highway 1), currently a Class III facility as a designated route with sharrows (see Figure 2-6, next page). Cyclists cross 19th Avenue on two east-west routes on Holloway (Class II, bike lanes) and Winston (Class III, sharrows). The major north-south bike route in the corridor (Class III, sharrows) runs on 20th Avenue, transitioning to the east side on Winston to Lunado Way, then continuing south on Beverly Street, 19th Avenue, and ultimately St. Charles Avenue to Daly City BART.

2.2 Transportation Needs

Transportation needs revealed by the Study's existing conditions analysis can be summarized in four main areas.

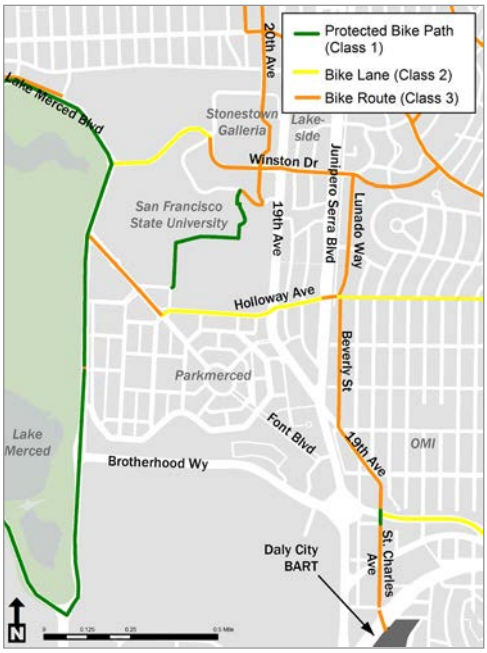
TRANSIT PERFORMANCE ISSUES (SPEED, RELIABILITY, CAPACITY)

The M-Ocean View travels slowly, on average 8.5–9.5 miles per hour through the 2-mile Study corridor.[11] Figure 2-7 (next page) summarizes average speed and the components of travel time and delay estimated for average pm peak conditions. The major contributors to slow M-Ocean View speeds in the Study corridor, from north to south, include:

- Two closely spaced stations at Ocean and Eucalyptus, approximately 300 feet apart and with low-level boarding. The light-rail travels only 3–5 miles per hour during this segment, barely able to accelerate before decelerating to the next stop, and the light-rail waits on average 15–30 seconds for passengers to

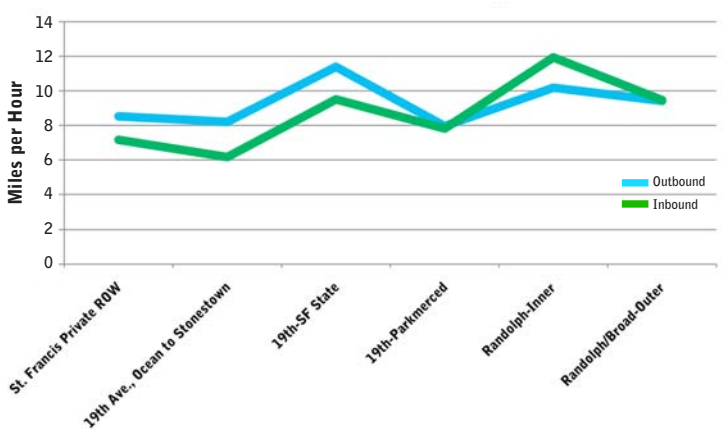
[9] SFCTA, September, 2012. PM Peak pedestrian counts.
[10] Howard/3rd Street (2007), Mission/4th Street (2006).
[11] SFMTA, Automatic Vehicle Location Data, April 2013, as analyzed by Fehr & Peers.

Figure 2-6. Existing Bicycle Network

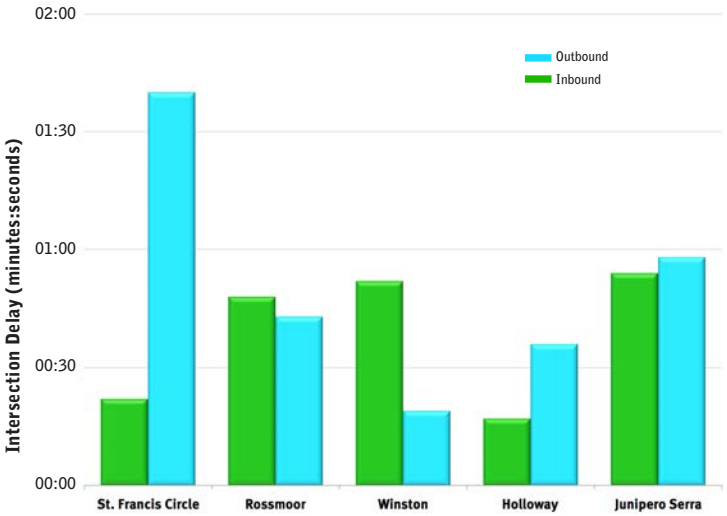


In addition to the M-Ocean View, multiple bus and shuttle routes operate along 19th Avenue. (Top) the SamTrans 122 stop at 19th/Buckingham serves the Stonestown Galleria. (Bottom) The 19th/Holloway bus/shuttle hub serves the 17, 18, 28, 28-L, 29, and SF State campus shuttle.

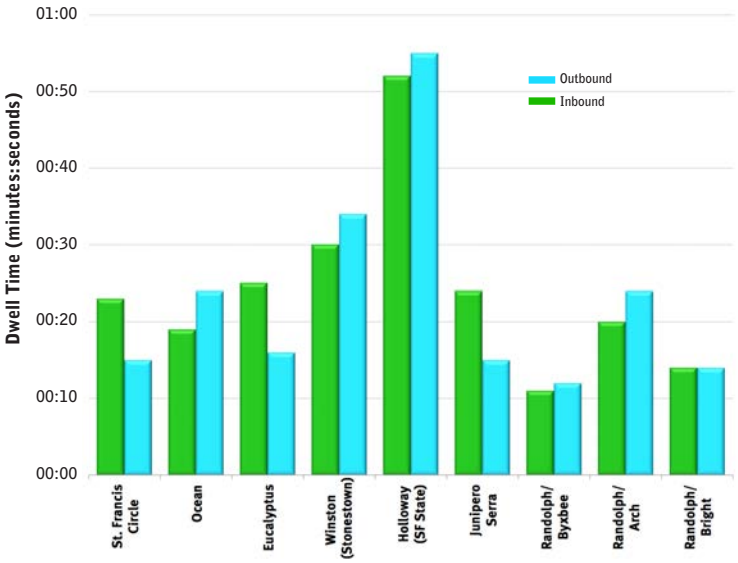
Figure 2-7. Average Speed (Top), Intersection Delay (Middle) and Dwell Time (Bottom), PM Peak



Source: SFMTA, Automatic Vehicle Location Data, April 2013, as analyzed by Fehr & Peers.



SOURCE: SFCTA, September 2012, based on 10 pm peak observations in each direction.



SOURCE: SFCTA, September 2012, based on 10 pm peak observations in each direction.

board/alight by way of the stairs during the pm peak at each of these stations.

- Conflicts with private vehicles as the light-rail enters 19th Avenue near Rossmoor. When 19th Avenue is congested, northbound traffic queues back from Eucalyptus Drive blocking the light-rail tracks. The M-Ocean View waits on average 45 seconds at this location.

19th Avenue near Rossmoor Drive, where conflicts with private vehicle traffic contribute to slow M-Ocean View speeds.

- Conflicts with private vehicles and long dwell time at Winston. The inbound/northbound M-Ocean View track is shared with one of two northbound left-turn lanes providing Stonestown access. When cars queue in this lane, the M-Ocean View must wait behind them, sometimes preventing the light-rail from clearing the intersection in one green cycle. Average pm peak dwell time at this station can last around 30 seconds. While the long dwell time, in part, is simply a function of high ridership, it is also due to crowded platforms, limited number of entry points into the light-rail cars (especially when only one-car trains are operating), and crowded trains that prevent passengers from efficiently boarding or alighting.

- Conflicts with private vehicle traffic and long dwell time at Holloway. These conditions have similar causes to those at Winston. Signal delay is less severe (15–35 seconds) because the light-rail tracks do not overlap with turn lanes. However, dwell time is much longer (almost one-minute), a function of the higher ridership at this station.

SF State students and visitors accessing the M-Ocean View (at Holloway) must cross three travel lanes to access the station. A crossing guard facilitates this crossing to support safer access across Highway 1

- Conflicts with private vehicle traffic at Junipero Serra, which adds, on average almost one minute of signal time during pm peak hours. This location is where Highway 1 continues as Junipero Serra and the M-Ocean View continues on 19th Avenue, departing the highway. The lower demand movement means the light-rail must often wait through a long signal cycle to cross out of Highway 1.
- Closely spaced stations and low-level boarding east of Junipero Serra, although the M-Ocean View travels slightly faster in this part of the corridor.

Bus speeds in the corridor average 9–10 miles per hour during the pm peak period, slightly faster than the light-rail.[12] Slow speeds are largely a result of the impact of traffic congestion, affecting buses more than private vehicles, as they must pull into and out of traffic when stopping to drop off/pick up passengers.

Given the above conditions that contribute to slow speeds, travel time on the M-Ocean View is also highly variable, meaning the time it takes to travel the two-mile Study corridor can range significantly. Figure 2-8 (next page) shows variation in travel time for several corridor segments.

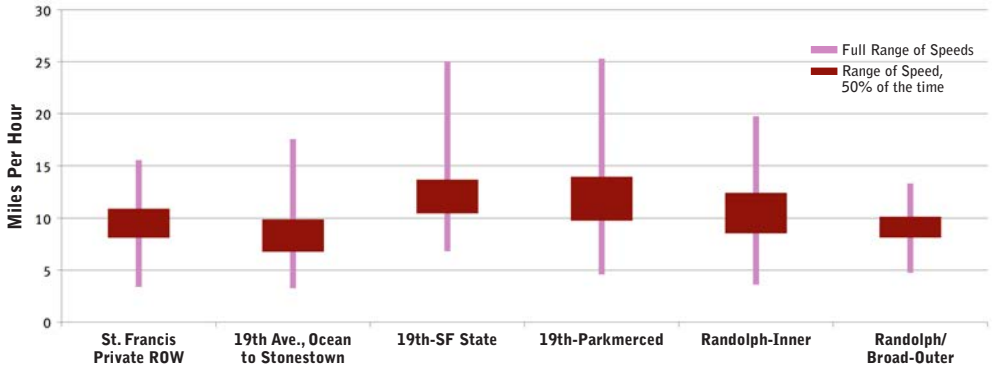
(Above) M-Ocean View SF State/Holloway station, where platform crowding contributes to slow travel time.

(Right) Narrow sidewalks on the east side of 19th Avenue, such as this Muni bus stop at Holloway, contribute to unattractive transit and pedestrian access.

Variability of travel time, as well as high ridership, also contributes to crowding on the line. While the most crowded maximum load points on the line are in the Downtown Muni Metro system near Van Ness (outbound) and Civic Center (inbound) stations,[13] the variability can result in some trains experiencing crowded conditions throughout the corridor.

[12] San Francisco County Transportation Authority. *2013 San Francisco Congestion Management Program.*
[13] San Francisco Planning Department. 19th Avenue Corridor Study.

Figure 2-8. M-Ocean View Variation in Travel Time, PM Peak Hour



SOURCE: SFMTA Automatic Vehicle Location Data, April 2013 as analyzed by Fehr+Peers

UNATTRACTIVE, DIFFICULT TRANSIT ACCESS

All riders boarding and alighting at the existing Winston and Holloway stations must cross a turn lane and three travel lanes to access the median station. When a train is at or approaching the station, riders are tempted to cross against the signal to access the train. At Holloway, a crossing guard enforces pedestrian crossings during peak hours to support safety. The vast majority of these riders, more than 95%, cross to/from the west side of the street, 98% at Holloway, 93% at Winston, as shown in Figure 2-5 (page 30).[14]

Both light-rail stations and bus stops in the corridor are in need of improvement. The Winston and SF State platforms are narrow, resulting in platform crowding during peak hours. Bus stops also experience crowding, particularly the northbound bus stop at Holloway, located along a five-foot sidewalk that is often blocked by riders waiting for the bus.

Many stations/stops also have minimal signage and amenities. The only indication of stations at Ocean, Eucalyptus, Junipero Serra, Byxbee, and Bright is yellow paint on a pole. These stations all also lack wheelchair ramps to allow for accessible boarding. The Ocean and Eucalyptus boarding areas are very narrow, sandwiched between the light-rail tracks and a fence that separates the right-of-way from adjacent properties. This area experiences frequent graffiti and vandalism, as there is little activity or "eyes on the street" in the right-of-way when the light-rail is not in operation.

Graffiti is common in the Lakeside private right-of-way due to little activity or "eyes on the street" when the light rail is not in operation.

The narrow five foot sidewalk on the east side of 19th Avenue makes for uninviting walking conditions.

CHALLENGING, UNATTRACTIVE PEDESTRIAN CONDITIONS

The high pedestrian volumes, long crossing distances, vehicle-pedestrian conflict points, and limited crossing opportunities all contribute to pedestrian condition challenges. Nineteenth Avenue is designated as a high-injury corridor, meaning it is among the 6% of San Francisco street miles where 60% of all severe and fatal injuries occur.[15] Between 2006 and 2011, there were 11 reported pedestrian-vehicle collisions on 19th Avenue: three at Winston, six at Holloway, and two at Junipero Serra. The most common reasons for these collisions include: high-speed/high-volume traffic, left-turns at signalized intersections, pe-

[14] SFCTA, September 2012, PM peak pedestrian counts.

[15] WalkFirst: San Francisco Department of Public Health analysis of California Highway Patrol Statewide Integrated Traffic Record System (SWITRS) data, 2013.

Related Plans for 19th Avenue

Four related plans will address some of the needs described in this chapter: the Transit Effectiveness Project (TEP), the 19th Avenue Bulb-Outs Project, Transit Signal Priority, and the Parkmerced Transportation Plan.

Transit Effectiveness Project

The TEP is a comprehensive effort to improve the speed, reliability, and customer service of the Muni bus and rail system. The plan includes routing and service frequency changes system-wide as well capital improvements (Travel Time Reduction Projects) on certain corridors designated as part of the Rapid Network. Within the Study area, routing changes are made to the 28/28-L-19th Avenue, the 29-Sunset, the 17-Parkmerced, and the 18-46th Avenue as shown in Figure 2-9. Capital improvements are proposed along 19th Avenue to improve the speed and reliability of the 28/28-L, including bus bulbs at the 19th/Winston and 19th/Holloway bus stops. Within this corridor, the TEP also proposes to shorten the northbound left-turn lane from 19th Avenue to Winston Drive so that the number of cars able to queue in the lane does not exceed the number that can be cleared in one signal cycle along with the M-Ocean View. Service frequencies for both the M-Ocean View and the 28/28-L would also be increased: the M-Ocean View would decrease from 9.5 minute headways during pm peak hours to 8.5 minutes. The TEP is currently undergoing environmental review.

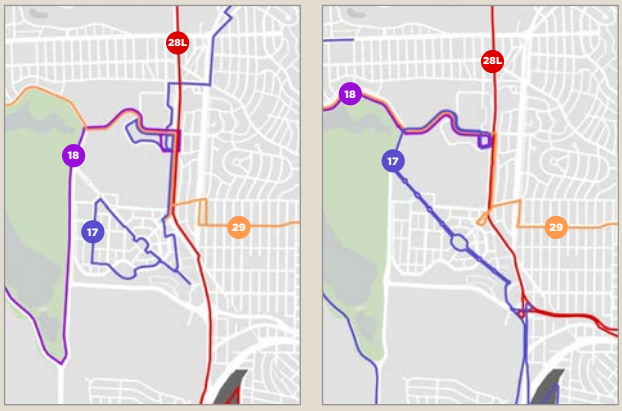


Figure 2-9. Muni routes to be changed by the TEP: (left) Existing Conditions, (right) Planned Changes

19th Avenue Bulb-Outs Project

The 19th Ave Bulb-Outs Project is an effort that proposes improvements to the entire length of 19th Avenue in San Francisco from Lincoln Way to Junipero Serra Boulevard to reduce the distance across the street for pedestrians. Within the Study corridor, plans are underway to implement bulb-outs at Winston and Holloway by widening the sidewalk into 19th Avenue so that buses experience faster travel time by not needing to pull in and out of travel lanes and the distance across the street is reduced. This project is being coordinated with and environmentally cleared by the TEP's 28/28-L bus stop improvements. These improvements would need to be removed at the time of implementation of the proposed grade-separated west-side alignment of the M-Ocean View, but are considered worthwhile to pursue in the short-term because of the substantial transit travel time and pedestrian safety benefit they would provide for low capital cost. The project is expected to complete detailed design engineering by 2015 and complete construction in 2016.

Figure 2-10. Parkmerced Circulation Changes

1. Re-align Crespi to T interesection
2. New Northbound Left-turn Lane from Junipero Serra to Re-aligned Chumasero
3. Reconfigure eastbound to northbound ramp to address weaving; new pedestrian/bicycle path on south side of Brotherhood
4. Right-turn Lane

IMAGE COURTESY PARKMERCED

Transit Signal Priority

The SFMTA Citywide Rapid Corridors Transit Signal Priority project will reduce transit signal waiting time by allowing green phases to be extended for approaching Muni vehicles. This project will include 19th Avenue for the M-Ocean View/28/28-L lines and is expected to be implemented in 2015-2016.

Parkmerced Transportation Plan

The Parkmerced Transportation Plan includes several changes along 19th Avenue/Junipero Serra as shown in Figure 2-10. Those related to the M-Ocean View and new at-grade crossings of 19th Avenue at Holloway and Junipero Serra are discussed in Chapter 3.2 Refined Alternatives. In addition, Crespi Drive would be re-configured to form a conventional T-intersection with a signal. Font Boulevard and Chumasero Drive would also be re-configured. Currently, Font Boulevard ends at Junipero Serra Boulevard, with a right-in/right-out configuration. Instead, Font Boulevard would end at Chumasero Drive, and Chumasero Drive would extend to Junipero Serra Boulevard, with a new right-angle intersection. A new signal would be installed at Junipero Serra/Chumasero allowing northbound left-turns and a pedestrian crossing opportunity (neither of which is possible today).

destrian crossing on red light, mid-block collisions, and pedestrians outside the crosswalk.[16] Collisions between light-rail and pedestrians also occur, with three pedestrian-light-rail collisions between July 2010 and February 2013 within the Study corridor.[17]

Conditions can also be unpleasant when walking along the corridor. The sidewalk width along 19th Avenue at 5–10 feet is less than San Francisco's Better Streets Plans guidelines that suggest a minimum of 12 feet and recommend 15 feet for this street. The narrow sidewalk means pedestrians are also walking very close to high-speed traffic noise, which makes it challenging to carry on conversation while walking the corridor. The narrow sidewalk condition is exacerbated at bus stops or other pinch points where crowding can make it difficult for pedestrians to maneuver.

CIRCUITOUS BIKE ROUTING AND CHALLENGING CROSSINGS

Previous plans, including the San Francisco Bicycle Plan (2009) and the SF State Campus Master Plan, contemplated a separated bike facility on the west side of 19th Avenue as the most direct north-south route through the Study corridor. The improvement would have required removal of some on-street parking as well as re-location of the existing sidewalk onto campus property. Instead, a north-south separated bike path through SF State was implemented, which provides a safe, high quality facility, but one that is less direct. At times, cyclists ride on 19th Avenue or on sidewalks along 19th Avenue instead. The two locations where the designated bicycle network cross 19th Avenue (at Winston and at Holloway) also experience the same challenging conditions as pedestrians: a long distance across the street and conflicts with turning vehicles.

[16] Ibid.

[17] SFMTA Collision Database.

GOOGLE STREET-VIEW

Because the north-south bike route through the area is indirect, cyclists sometimes bike on the sidewalk (above) or in the street (below) through the Study Corridor.

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3 Alternatives Development

THIS CHAPTER describes the multi-step iterative process of alternatives development, refinement, and evaluation that culminated in identification of the Longer Subway and Bridge alternative as the highest-performing alternative. The Study team began with six options for portions of the corridor (three in the north and three in the south) that could have been "mixed and matched" to form nine distinct alternatives to the Baseline. Two options were removed from consideration after a first round of outreach and the remaining six were further evaluated and refined. After completion of the evaluation, one set of options, the Longer Subway and Bridge, was found to be the highest performing, both in results of the technical evaluation and confirmed by community feedback during a second round of outreach. This chapter discusses the design process that created these options, describes their proposed alignments in detail, and closes with a discussion of some variations to the options that will be further explored in the next phase of project development. The next chapter presents the results of the technical evaluation, sharing each alternative's performance relative to the Study's goals and objectives.

3.1 Alternatives Development Process

In developing the alternatives, the Study's technical team was guided by:

- Transportation needs identified in the corridor (as described in Chapter 2). The Study alternatives were developed to address these needs.
- Design criteria shown in Table 3-1 (next page). These criteria reflect the Study's goals and objectives, but also technical requirements, e.g. desirable or acceptable grade changes for light-rail vehicles.

With these guiding the process, the Study team divided the corridor into a northern and southern segment (dividing near Holloway, one for each grade-separated crossing) and studied feasible ways to make the two M-Ocean View crossing points of 19th Avenue grade-separated. In addition to the Baseline, three northern options and three southern options were developed, summarized in Table 3-2 (page after next) and shared with the public during the first round of outreach. For both the north and the south, two underground options and one above ground option were developed. In the north, the two below ground options would cross under 19th Avenue, but would differ in how long they would stay underground (Longer Subway and Shorter Subway). A third option would have crossed above 19th Avenue by way of a bridge (Northern Bridge).

Table 3-1. Design Criteria Guiding Alternatives Development

MODAL ELEMENT	DESIGN CRITERIA	JUSTIFICATION
Transit: All	Provide safe paths of travel from major destinations to transit stops	Ensure safety and improve passenger comfort
	Reduce conflicts between transit vehicles and automobiles	Improve safety and reliability for both modes; improve travel time for light-rail
Transit: Light-rail	Meet SFMTA design criteria for grades (5% desired, 7% accepted, 9% in short sections)	Technical requirement
	Reduce or eliminate conflicts between pedestrians and light-rail vehicles	Improve safety and travel-time for light-rail
	Increase stop/station spacing to the typical spacing between Muni Metro stations	Improve travel time for light-rail while keeping most locations within ½ mile of a station today about the same distance to a station in the future.
	Provide high-quality stations: High platforms (32 inches) for level boarding, 24-foot-wide center platforms or 15-feet-wide side platforms, shelter, and other passenger amenities	Improve speed, safety, comfort, and accessibility, and consistent with Muni's predominant design practices
	Provide 300-foot long station platforms	Increase capacity and enable flexibility to operate up to four-car trains
	Avoid 90-degree turns	Improve safety and speed; reduce wear on infrastructure and light-rail vehicles; decrease noise
	Provide a tail track for light-rail layover and staging operations	Improve reliability and flexibility
	Avoid conflicts with existing utilities during construction	Control costs
Transit: Bus	Explore preferential traffic treatments for buses	Improve bus speed and reliability
	Provide stops with shelters and adequate passenger waiting space, including a minimum of 180 linear feet at stops used by two or three routes.	Improve safety and passenger comfort
Pedestrian and Cyclist	Provide sidewalk space consistent with Better Streets Plan guidance: 12-foot minimum, 15-foot recommended	Improve safety and pedestrian comfort
	In designing new crossings and pedestrian walkways, consider pedestrian desire lines to major destinations	Improve pedestrian comfort
	Upgrade bicycle facilities on streets that are part of the San Francisco Bicycle Plan or could fill in gaps in existing network	Accommodate cyclists and improve bike safety
Vehicle Traffic	Maintain current corridor-wide traffic level of service	Manage congestion
	Reduce conflicts with other modes	Improve safety for all users
Urban Design	Improve the area's "sense of place"	Make 19th Avenue a more inviting place for all residents and visitors to the area
	Develop corridor's "green infrastructure" through strategies like reducing paved surface area and adding landscaping	Improve air and water quality and aesthetics
	Support land use plans in the corridor (Parkmerced, San Francisco State University, Stonestown)	Integrate land use and transportation plans and make 19th Avenue a more inviting place for all residents and visitors

Table 3-2. Initial Options Developed and Outcomes

	NAME	DESCRIPTION	OUTCOME
	NORTHERN OPTIONS		
1	Baseline	M-Ocean View crosses from median to west side of 19th Avenue at Holloway, at-grade, re-locating the Holloway station to a new transit plaza between Holloway and Crespi	Carried through evaluation
2	Longer Subway (N1)	Both tracks underground from south of St. Francis Circle to south of Buckingham Way, northbound track underground until south of Gonzalez	Carried through evaluation and selected as part of Highest-Performing alternative.
3	Shorter Subway (N2)	Both tracks underground from south of St. Francis Circle until north of Winston Drive, northbound track underground until south of Winston Drive	Carried through evaluation.
4	Northern Bridge (N4)	Both tracks above ground from south of St. Francis Circle to south of Winston Drive, crossing over 19th Avenue near Rossmoor and elevated over the west side of 19th Avenue in front of Stonestown Galleria	Dropped after first round of outreach.
	SOUTHERN OPTIONS		
5	Baseline	M-Ocean View crosses 19th/Junipero Serra through at-grade crossing	Carried through evaluation
6	Southern Tunnel-19th/ Junipero Serra (S1)	Underground from Felix in Parkmerced emerging in a portal on 19th Avenue, south of Junipero Serra Boulevard	Carried through evaluation.
7	Southern Bridge (S2)	Above ground between Font and Randolph, lowering Junipero Serra to enable a gradual crossing	Carried through evaluation and selected as part of Highest-Performing alternative.
8	Southern Tunnel-Junipero Serra to Brotherhood Way (S3)	Below ground under Junipero Serra emerging at grade on northern extent of Brotherhood Way, returning to existing M-Ocean View alignment at Broad/Orizaba.	Dropped after first round of outreach.

Maps at right are keyed to table, above

NORTHERN OPTIONS

SOUTHERN OPTIONS

In the south, two options would cross underground, one under the intersection of 19th Avenue/Junipero Serra and the other under Junipero Serra south of Font, surfacing on Brotherhood Way. A third option would cross over Junipero Serra connecting Font and Randolph. Based on feedback received, the Northern Bridge and Southern Tunnel to Brotherhood Way options were rejected and the remaining four were carried through for refinement and evaluation.

The results of the evaluation revealed that the Longer Subway and the Southern Bridge options performed the best and were paired together as an alternative; Shorter Subway and Southern Tunnel were paired together as a second alternative to serve as a point of comparison for the evaluation, although the four options can continue to be mixed and matched to form four distinct alternatives. In addition, several variations to these options were identified to be further considered during the next phase of project development and are discussed at the close of this chapter.

3.2 Refined Alternatives

This section describes and compares the features of the alternatives evaluated: Baseline, Longer Subway and Bridge, and Shorter Subway and Tunnel as summarized in Figure 3-1. The remainder of this section details the features of each alternative across five segments:

1. Between St. Francis Circle and Rossmoor
2. Between Rosmoor and Winston
3. Between Winston and Parkmerced
4. Between Parkmerced and Randolph
5. Along Randolph

Figure 3-1.
Alternatives Summary

1. ST. FRANCIS CIRCLE TO ROSSMOOR: (See Figure 3-2) In this part of the corridor, with the Baseline alternative, the M-Ocean View alignment would stay the same as it is today, running at street level through St. Francis Circle and the private right-of-way in the Lakeside neighborhood, with stops at Ocean and Eucalyptus. The Longer and Shorter subway alternatives are identical in this segment of the corridor: both would move the light-rail alignment underground, transitioning via a portal just south of St. Francis Circle. Light-rail tracks would be fully underground before Ocean. The space currently dedicated to light-rail operation and not needed for a portal would be repurposed through a future decision-making process in partnership with property owners and other stakeholders. These alternatives would consolidate the two stops in the area, and passengers who currently use them would instead use nearby stops either at St. Francis Circle (M-Ocean View, K-Ingleside), at Junipero Serra/Ocean (K-Ingleside), or at the new M-Ocean View Stonestown station between Macy's and Mercy High School (M-Ocean View).

Figure 3-2. Lakeside Private Right-of-Way, Baseline (top), Longer and Shorter Subway (bottom)

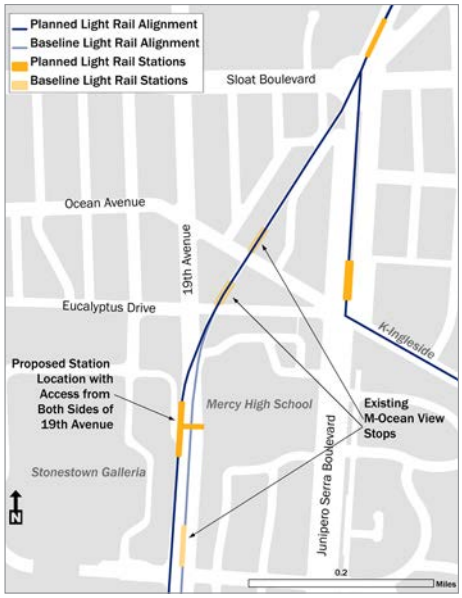


Figure 3-4. Stop Consolidation, Longer and Shorter Subway alternatives

2. ROSSMOOR DRIVE TO WINSTON DRIVE: (see Figure 3-3) In this part of the corridor with the Baseline alternative, the M-Ocean View alignment would also stay the same as it is today, crossing southwest from the private right-of-way to the median of 19th Avenue, with the existing high-platform stop at Winston. With both the Longer and Shorter subway alternatives, the alignment would continue underground to the west side of 19th Avenue, stopping at a new Stonestown station, located about 600 feet north of the existing Winston station between Mercy High School and the Stonestown Galleria Macy's store. With the Longer Subway alternative, both sets of tracks would continue underground into the next section of the corridor, while with the Shorter Subway alternative, the southbound tracks would surface just north of Winston Drive.

Figure 3-4 shows the stop consolidation proposed in the Longer and Shorter subway alternatives. The consolidated Stonestown station would be below street level but exposed at parking-lot level as shown in Figure 3-5 (next page). The station could be located either fully within the existing right-of-way or on Stonestown Galleria property. Pedestrians would be able to cross 19th Avenue via a walkway below street level at the location of the new light-rail station. In this area, 19th Avenue would be reconfigured to repurpose the median area currently occupied by the light-rail tracks: sidewalks would be widened, and a landscaped median would be installed. Approximately 160 on-street parking spaces along both sides of 19th Avenue would be removed between Eucalyptus and Junipero Serra. One of the two northbound left-turn lanes currently provided at the intersection of 19th Avenue and Winston would be removed and replaced with one new northbound left-turn opportunity at a new signalized intersection near 19th Avenue and the northerly Buckingham Way/19th Avenue intersection near Mercy High School that would be re-graded.

Figure 3-3. Rossmoor to Winston drives, Baseline (top), Shorter Subway (bottom), Longer Subway not pictured, similar to Shorter Subway, but southbound track remains underground on north side of Winston Drive.

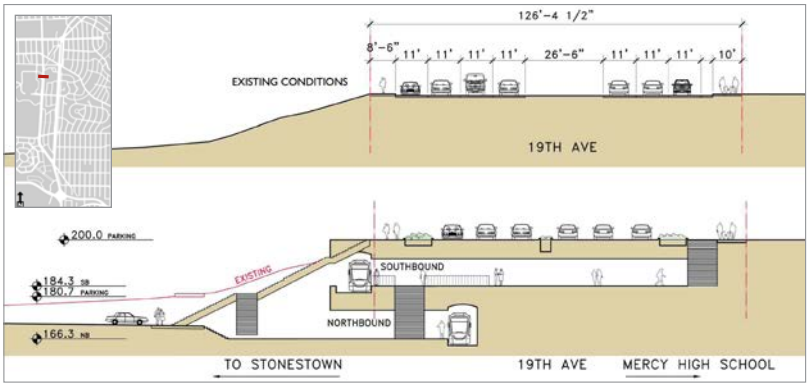


Figure 3-5. (top) 19th Avenue near Macy's/Mercy top, Baseline; (bottom) Longer and Shorter Subway, new consolidated Stonestown station, looking northbound

A new station is proposed near this location. The station would be below 19th Avenue, at parking lot level.

3. WINSTON TO PARKMERCED: In this part of the corridor, the M-Ocean View alignment would change regardless of whether the Baseline or another alternative was implemented. In the existing configuration of the street, the M-Ocean View crosses Holloway in the median of 19th Avenue, continuing towards Junipero Serra (Figure 3-6). With the Baseline alternative, the M-Ocean View would cross the southbound side of the street diagonally at Holloway (Figure 3-7 next page). The 19th/Holloway station would be re-located just southwest of its current location, to a transit plaza in the northeast corner of the Parkmerced site between Holloway and Crespi. To address the increase in delay to motorists caused by the additional signal time needed for a light-rail crossing, a fourth southbound travel lane would encroach on the existing SF State sidewalk north of Holloway, and replace the right-of-way vacated by the light-rail south of Holloway.

With the Longer Subway alternative (Figure 3-9, page after next) the southbound tracks would surface on the west side of 19th Avenue south of Buckingham Way. The northbound tracks would stay underground until just south of Gonzalez Drive. Southbound buses would share a paved surface transit-way with southbound light-rail trains between Buckingham and Holloway. In the Shorter Subway option, (Figure 3-10, page after next), the northbound tracks would come to the surface south of Buckingham, with both light-rail tracks at the surface alongside the SF State campus.

In both the Longer and Shorter subway alternatives, wider sidewalks and a landscaped median would be installed by re-purposing space previously used for median light-rail, although more space would be available to do so with the Longer Subway alternative because

Figure 3-6. 19th Avenue/Holloway, Existing Conditions

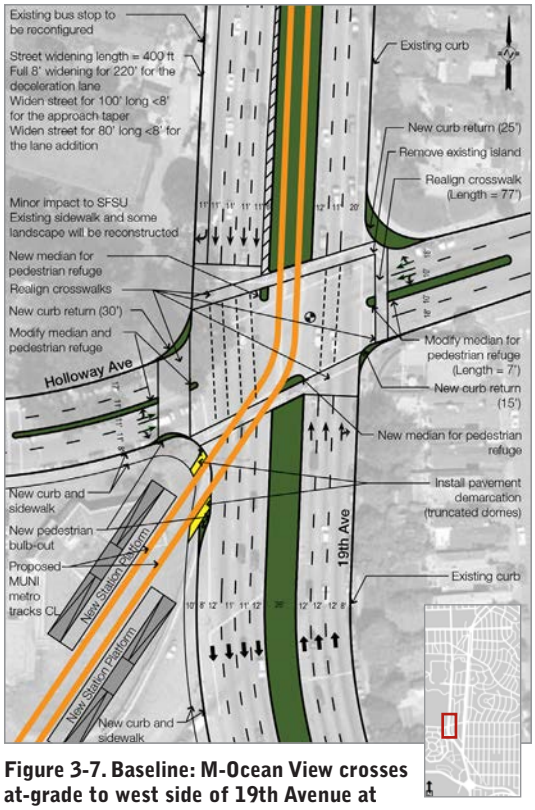


Figure 3-7. Baseline: M-Ocean View crosses at-grade to west side of 19th Avenue at Holloway, re-locating Holloway station

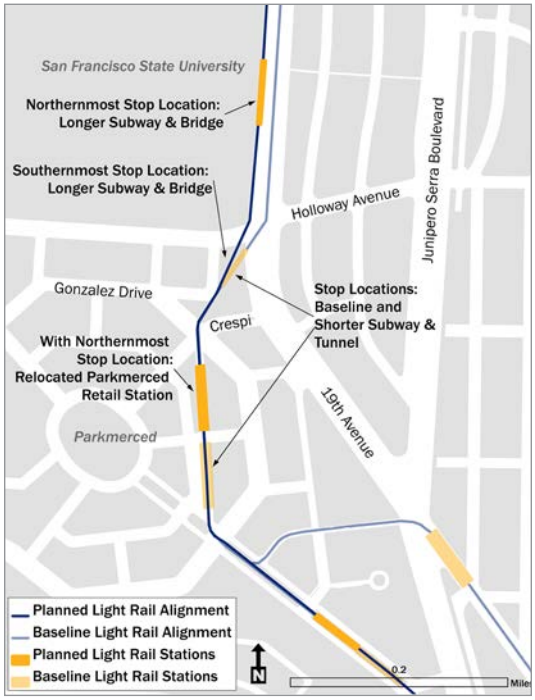


Figure 3-8. Parkmerced to Randolph Station Location: Baseline vs. Longer Subway vs. Shorter Subway

one light-rail track would still be underground. In addition, a ten foot median would be needed between the light-rail tracks and southbound travel lanes because it would be considered contra-flow operation. In both alternatives, on-street parking would be removed, and the existing number of travel lanes (three in each direction) retained, although all travel lanes would shift to allow re-purposed light-rail space to be given to wider sidewalks.

The Shorter Subway alternative would maintain the same SF State/Crespi transit plaza location as the Baseline, while with the Longer Subway alternative, the SF State station could be located as far north as where the current SF State Science building is located, or as far south as the Baseline/Shorter Subway SF State/Crespi transit plaza location (Figure 3-8).

The Longer Subway alternative could potentially also include a bike path on the west side of the street, although there would not be enough space to do so with the Shorter Subway.

Figure 3-9. Longer Subway at 19th/Holloway: (top) plan-view; (bottom left) bird's-eye; (bottom right) view towards campus

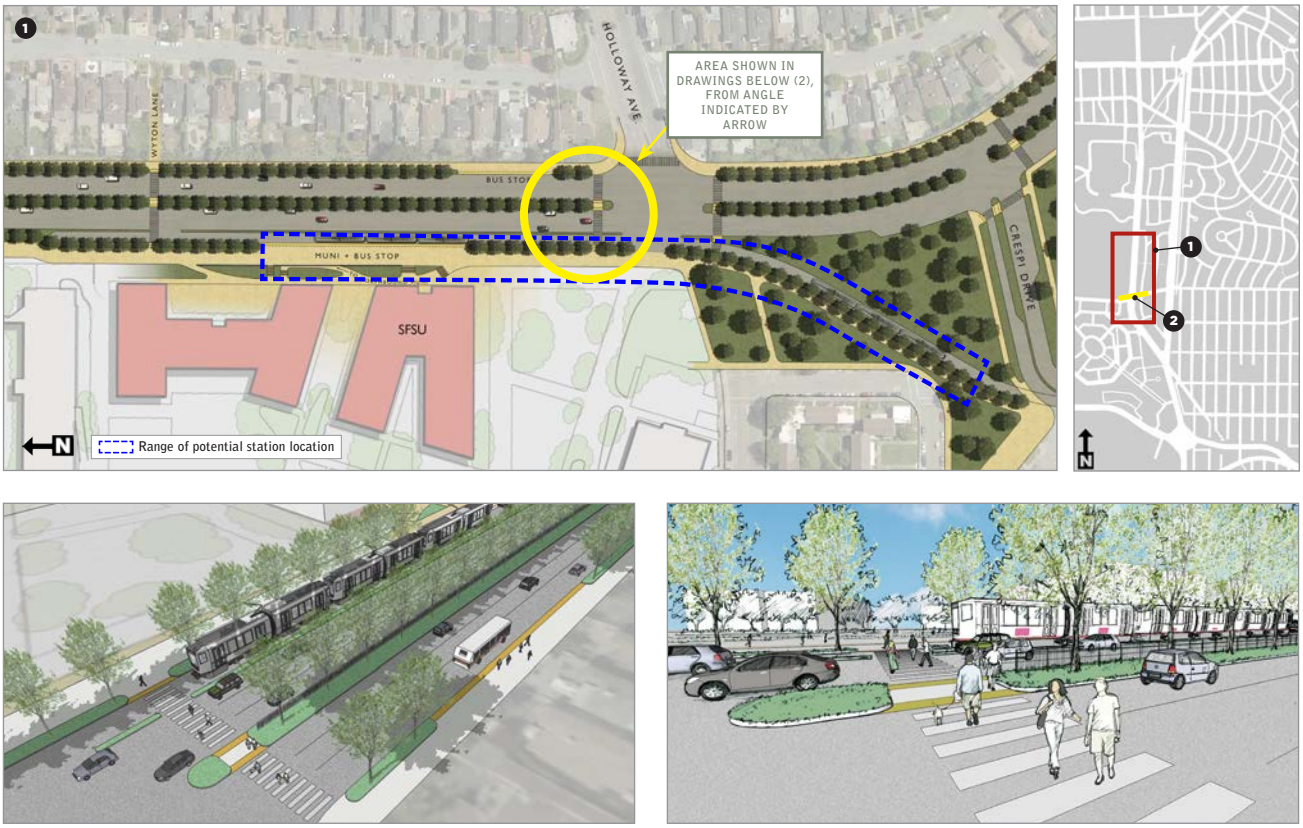


Figure 3-10. Shorter Subway at 19th/Holloway: plan-view (top); bird-eye (middle); view towards campus (bottom)

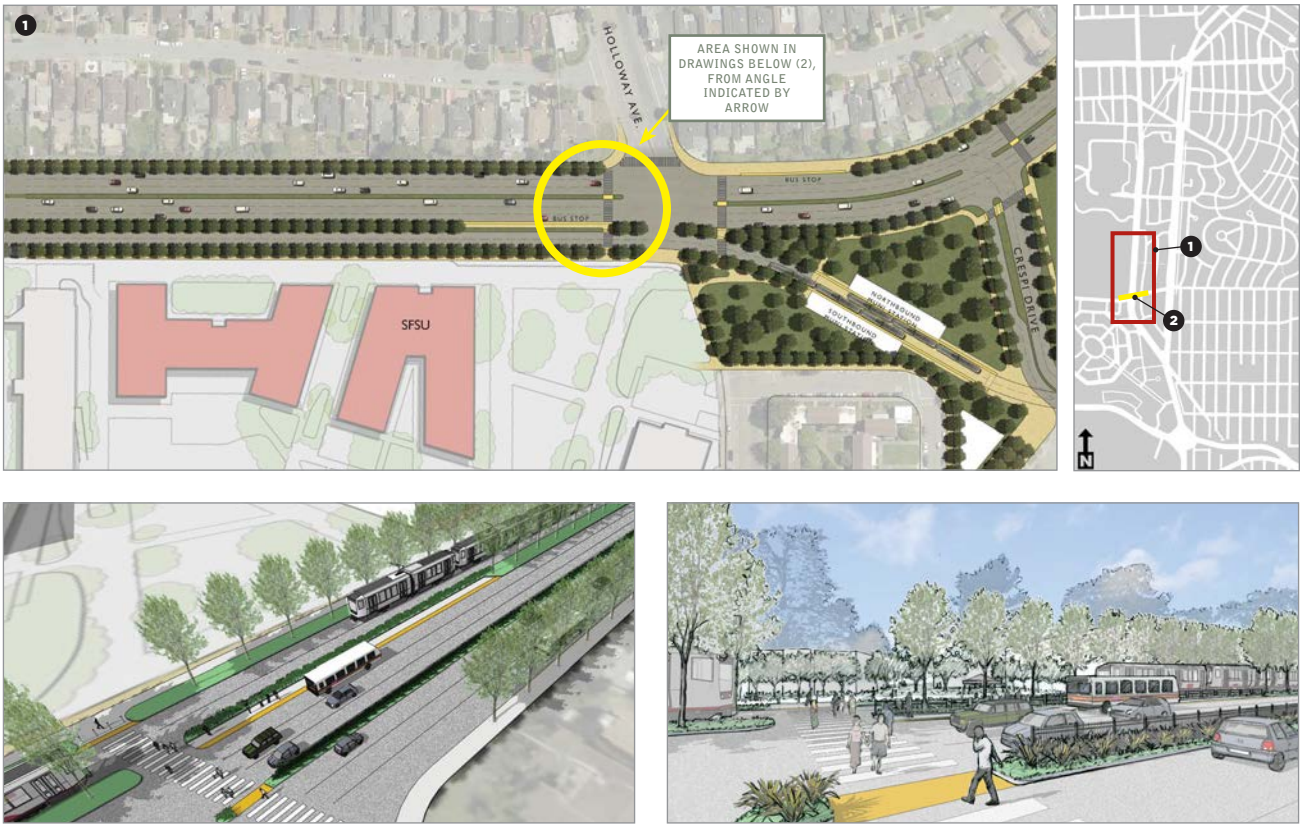
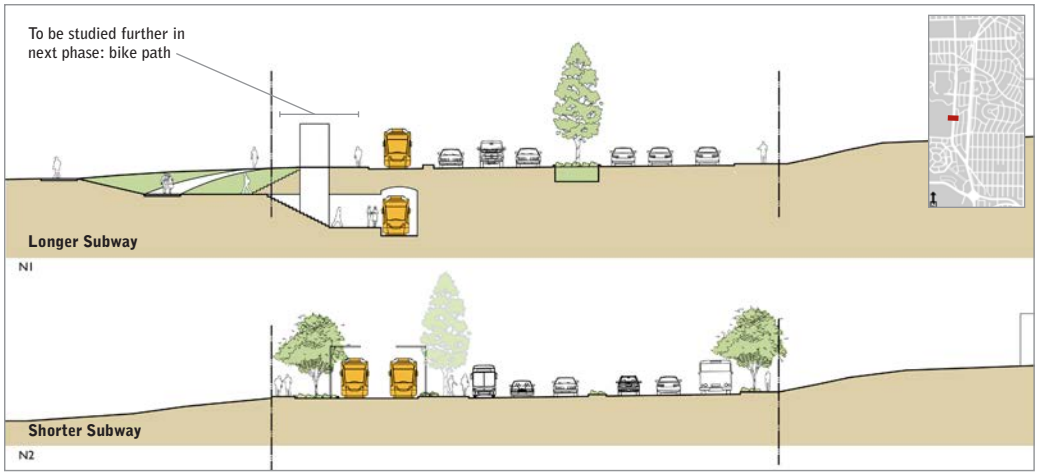


Figure 3-11. Proposed Traffic Re-Routing: Holloway to Crespi

Figure 3-12. 19th Ave. at SF State Cross-Sections. Longer Subway and Shorter Subway.



Along SF State's campus, both the Longer and Shorter Subway alternatives keep the M-Ocean View tracks and station within the existing right-of-way. Both the Longer and Shorter Subway alternatives also propose to close Holloway to private vehicle traffic (but maintain bicycle and pedestrian access) for one block west of 19th Avenue, re-routing vehicle traffic destined west of Holloway to Crespi (Figure 3-11). The two intersections would be controlled by the same signal allowing movements across 19th Avenue from Holloway to Crespi to happen in one signal cycle. This street configuration would improve light-rail speed and reliability by moving the crossing point between the light-rail and private vehicles off 19th Avenue, where it would be easier to give transit signal priority. This configuration would also improve pedestrian safety by eliminating turn conflicts between pedestrians crossing 19th Avenue and motorists making eastbound left-turns from Holloway onto 19th Avenue. Finally, such an arrangement would support SF State's desire to re-orient Holloway to be a major pedestrian street, with limited auto traffic, supporting their vision to build additional campus housing along Holloway.

Figure 3-12 compares the Longer and Shorter subway alternatives at SF State in cross-section.

4. PARKMERCED TO RANDOLPH: In this part of the corridor in the Baseline, the light-rail would travel through the Parkmerced site as shown in Figure 3-13. A new station would be located adjacent to the planned Parkmerced retail core, after which the alignment would join Font for approximately 250 feet before making a sharp ~90 degree turn, travelling along Felix, and departing Parkmerced at the intersection of 19th Avenue and Junipero Serra. This 19th/Junipero Serra intersection would be reconfigured from two northbound left-turn, one shared northbound left-turn, and one through lane to three northbound left-turn and two northbound through lanes to mitigate the travel time disbenefit of the signal time needed for the M-Ocean View to cross the intersection. The light-rail would then join the existing alignment along 19th Avenue to Randolph, maintaining the existing curbside stops at 19th/Junipero Serra and 19th/Randolph. An additional station would be located on the tail track near Chumasero, receiving service from M-Short trains using the tail track.

In the Tunnel alternative, the M-Ocean View would follow the same horizontal alignment as in the Baseline, and serve the same station locations within Parkmerced, but would go

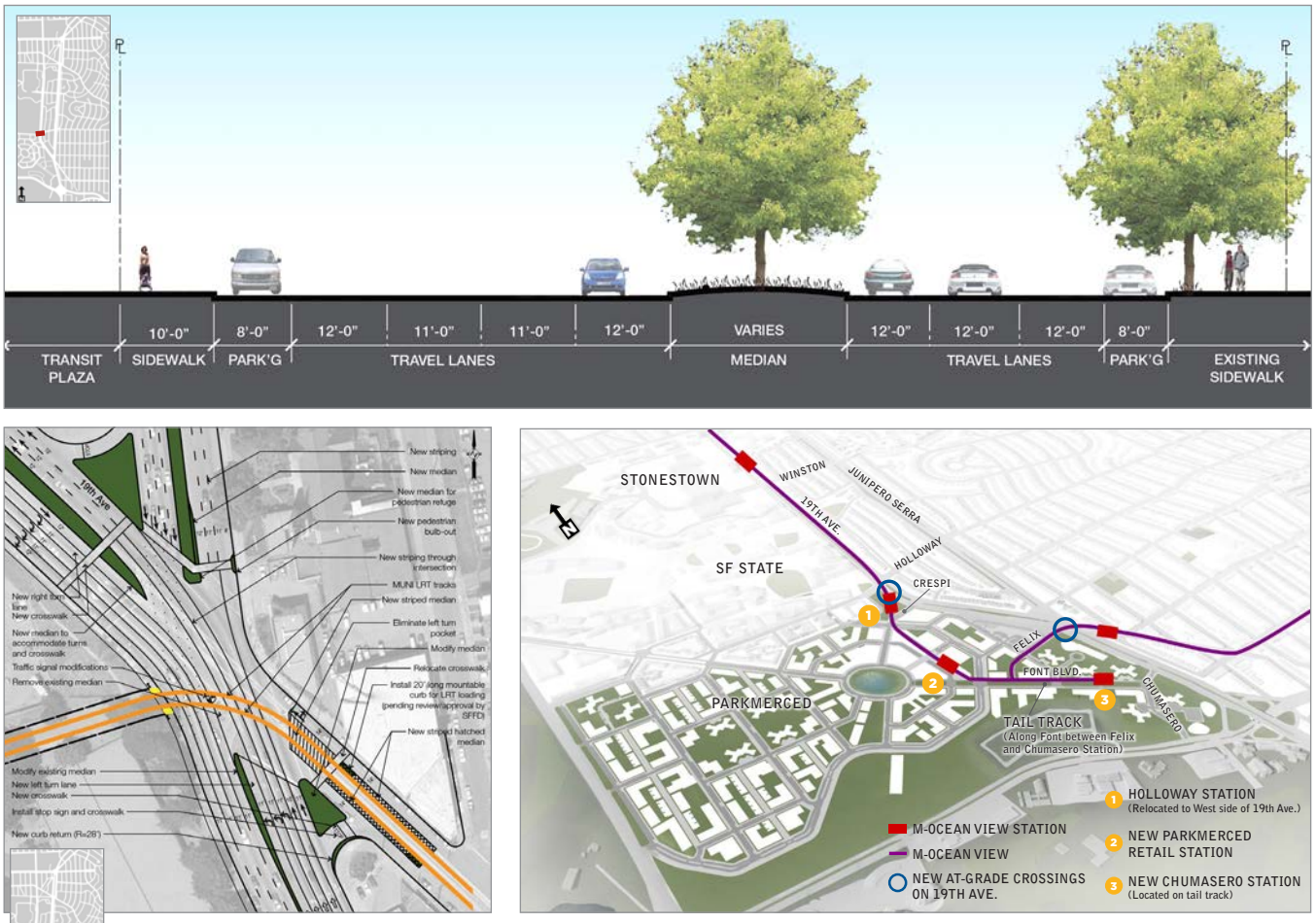


Figure 3-13. Baseline through Parkmerced: (top) cross-section of 19th Avenue south of Holloway without M-Ocean View; (bottom left) 19th/Junipero Serra intersection in plan-view; (bottom right) illustration.

Figure 3-14. 19th Avenue South of Junipero Serra: (top) Existing Conditions and Baseline; (bottom) Tunnel

Approximate location of proposed Bridge over Junipero Serra between Font and Randolph. (Top): Looking East across Junipero Serra from Font. (Bottom): Looking East up Randolph from approximate Bridge landing location.

underground just east of Cambon in Parkmerced, resurfacing at approximately 19th Avenue and Monticello, south of the intersection with Junipero Serra (Figure 3-14). A portal would be constructed that would require removal of approximately 48 on-street parking spaces on 19th Avenue south of Junipero Serra. The station-stop at 19th and Junipero Serra would also need to be eliminated.

The Bridge alternative would eliminate the 90-degree turn within Parkmerced in the Baseline, instead continuing south on Font, crossing Junipero Serra via a bridge touching down on Randolph (Figure 3-15, next page). The same station locations within Parkmerced would be maintained, but the Chumasero station would be located on the main line rather than the tail track and the trail track would be located on either side of the bridge.

The bridge would be designed for light-rail vehicles, accommodating pedestrians and cyclists in a separated lane providing a new connection between OMI and Parkmerced. The bridge would also be designed to accommodate emergency vehicle access. This alternative would lower Junipero Serra by ~10.5 feet at this location, the maximum without affecting the 19th Avenue or Brotherhood Way intersections, to support grades acceptable for light-rail vehicles. A design challenge to be further explored in the next phase of work is the design of the landing of the bridge on Randolph. The street is 60 feet wide, and the bridge would require at least 30 feet, leaving 30 additional feet to accommodate vehicle, walking, cycling, and emergency vehicle access to the adjacent houses. Approximately 22 on-street spaces would need to be removed on the block of Randolph west of 19th Avenue. In the next phase, the team will have a block meeting process to work with neighbors on street design options and preferences. At a later stage in project development, the

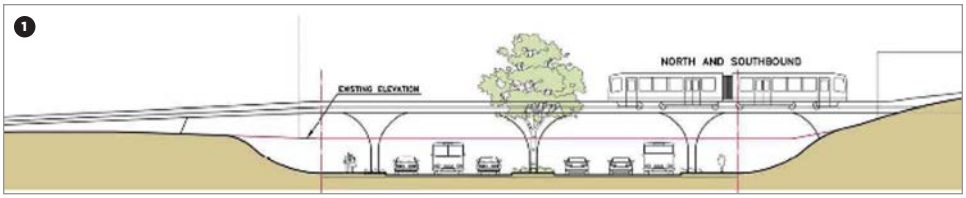


Figure 3-15. Bridge crossing Junipero Serra between Parkmerced (left) and Randolph Street (right)

Figure 3-16. 19th Avenue south of Junipero Serra—traffic calming and place-making opportunity with light-rail re-located one block south

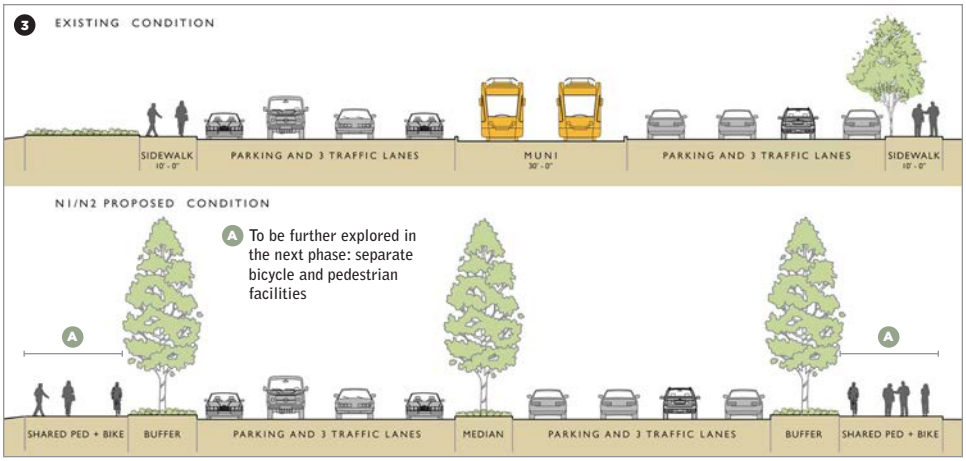


Figure 3-17. 19th Avenue, South of Holloway: (top) Existing Conditions; (bottom) Bridge, Tunnel

aesthetics of the bridge would be considered in partnership with the community to ensure an attractive visual feature that supports the character of the neighborhood.

Because the Bridge alternative would re-locate the light-rail tracks off of the block of 19th Avenue between Junipero Serra and Randolph, the station-stop at 19th/Junipero Serra would be eliminated, but that block would have an opportunity to be re-envisioned. Figure 3-16 indicates a representative potential vision, showing a traffic-calmed street, with narrower travel lanes and a landscaped median with trees. Other ideas that will be further explored in the next phase of project development will be an upgraded cycling facility such as a parking-buffered bike lane.

In both the Tunnel and Bridge alternatives, the segment of 19th Avenue south of Holloway would include more space for widened sidewalks and cycling facilities on both sides of the street, as well as a landscaped median (with the Baseline alternative, this space is used for additional travel and turn lanes). Figure 3-17 illustrates a possible cross-section, although additional options (such as separated, instead of shared, bicycle and pedestrian spaces) will be considered in the next phase of project development.

Figure 3-18. Randolph Street at Arch, Existing and Potential Future (Bridge or Tunnel)

5. RANDOLPH STREET: In this segment of the corridor, the Baseline alternative is the same as existing conditions (Figure 3-18), with stops at Randolph's intersections with 19th Avenue, Arch and Bright. In both the Tunnel and Bridge alternatives, the existing station at Arch could be upgraded to high-level boarding and the Bright Street station could be consolidated to increase light-rail speed, but neither is essential to the alternatives (see Figure 3-19).

Figure 3-19. Randolph Street Station Location: Baseline vs. Longer Subway vs. Shorter Subway

Additional project development and coordination would be needed to determine the feasibility with grades for an outbound/eastbound station and to confirm adherence to California Public Utilities General Order to determine safety of long high platforms in shared right-of-way.

3.3 Alternative Variations

Several variations to the alternatives are also possible but did not undergo the same level of project development and evaluation work as the main alternatives. Analysis of their ability to further support the Study's goals and

objectives relative to their additions in cost will be undertaken in the next phase of work to determine how these alternatives would be treated during the subsequent environmental review stage. In the next stage of development, the project team will undertake analysis to determine whether to fold each variant into the main project definition, remove from further consideration, or continue to study it as a variant. The variants, shown in Figure 3-20, include:

ST. FRANCIS CIRCLE GRADE SEPARATION: This variation would build on the Longer or Shorter Subway option by beginning the underground light-rail alignment north of this complex intersection, which currently causes significant delay for all modes.

OCEAN AVENUE UNDERGROUND STATION: This variation would also build on the Longer or Shorter Subway option by adding an underground light-rail station at Ocean in the center of the Lakeside Village retail area.

CONTINUE SUBWAY THROUGH PARKMERCED: This variation would build on the Longer Subway option by keeping both tracks underground from where they descend south of St. Francis Circle through the southeast corner of Parkmerced, emerging as needed to begin elevating over Junipero Serra. Parkmerced is expected to have high levels of pedestrian activity as the site builds out, and underground light-rail may allow for faster speeds than what would be safe to operate through the site at-grade. An initial sketch evaluation of these alternatives is shared in Chapter 4.

Figure 3-20. Alternative Variants

Several variations to the alternatives, including grade-separating the St. Francis Circle intersection, maintaining an underground station at Ocean Avenue, and continuing the subway through Parkmerced will be studied further in the next phase of project development work.

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4 Evaluation Results

USING THE STUDY'S GOALS AND OBJECTIVES (see Chapter 1) as a guide, the Study team carried out a rigorous technical evaluation to compare how well the alternatives described in Chapter 3 would achieve each of the Study's eight goals. The results reveal that the Longer Subway and Bridge alternative is the highest-performing, including notable improvements to light-rail operating performance and access (7–8 minute travel time savings, 50% capacity increase) and pedestrian safety and attractiveness (33% reduction in distance across the street, four new places to cross the street, new landscaped median and wider sidewalks) in particular. The remainder of this section summarizes more detailed evaluation results for each objective established under the eight goals. More detailed methodology and results are available in Appendix C.

4.1 Improve Light-Rail System Operating Performance, Capacity, and Flexibility

The light-rail operating performance goal area includes four objectives: travel time, reliability, capacity, and flexibility. The Longer Subway and Bridge alternative performs best for this area because it would provide the largest improvements in travel time and reliability, comparable benefits to Shorter Subway and Tunnel in terms of capacity, while all alternatives provide similar benefits in terms of flexibility.

TRAVEL TIME

The Longer Subway and Bridge alternative would reduce light-rail travel time through the Study corridor by 35% to 45% relative to the Baseline, saving transit riders who travel the whole two-mile corridor 7-8 minutes, 50% more savings than the Shorter Subway and Tunnel alternative (see Figure 4-1 and Figure 4-2, page after next).

RELIABILITY

Both alternatives would reduce the range of travel time experienced regularly by eliminating several locations where the light-rail crosses traffic signals at-grade today. As Figure 4-3 (page after next) shows, the Longer Subway and Bridge alternative would avoid all signalized intersections between St. Francis Circle and Crespi by taking the light-rail underground. These changes, along with increased platform size resulting in less variability in dwell time, would narrow the gap between the trip duration experienced 95% of the time (19 out of 20 trips) through the corridor from 10 minutes

in the Baseline (ranging from 9 to 19 minutes)[1] to 8.5 minutes (6 to 14.5 minutes) with the Longer Subway and Bridge alternative.[2] In comparison, the predicted range with the Shorter Subway and Tunnel is 9 minutes (6.5 to 15.5 minutes) because this alternative would create a new conflict point between outbound/southbound light-rail tracks and motorists making southbound right turns from 19th Avenue onto Winston to access the Stonestown Galleria.[3]

CAPACITY

The Longer Subway and Bridge and Shorter Subway and Tunnel alternatives provide a similar benefit in terms of capacity. The Baseline improvement committed to in the Development Agreement requires that the new and re-located station(s) to be built by Parkmerced be sized to serve three-car trains, which would enable 50% more capacity on the line if the Stonestown Station were also upgraded. In both alternatives, the Stonestown station is upgraded in this way. While the level of transit demand in the Randolph corridor is lower, both alternatives could also upgrade the Arch station-stop to enable four-car trains in this part of the corridor. Additionally, there could be potential to enable up to three-car trains through Parkmerced; more work will be done in the next phase of project development to determine whether this level of capacity upgrade is warranted.

The Longer Subway and Bridge alternative would provide the largest improvements in travel time and reliability.

FLEXIBILITY

All options include a tail track within the Parkmerced site, which would provide Muni with operating flexibility to operate M-Short and M-Long service patterns and be a place to store disabled trains. Although some community members in the OMI neighborhood do not like this feature, a decision to approve it was already made as a part of the *Parkmerced Vision* plan approvals. All options also enable a future extension of the light-rail to Daly City BART (see *M-Ocean View Extension to Daly City Initial Analysis* for additional discussion).

Table 4-1 summarizes performance for this goal area.

[1] Note this phase of work did not analyze the level of transit travel time savings that could be achieved in the Baseline through Transit Signal Priority treatments or separate the benefits of stop consolidation from the benefits of grade-separation. This analysis will be conducted in the next phase of project development work.

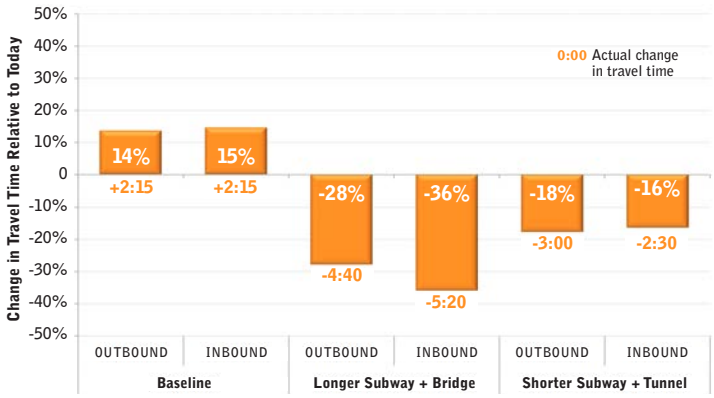
2 SFCTA, 2014, Methodology available in Appendix C.

3 Ibid.

Table 4-1. Light-Rail Performance Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Decrease Travel Time			
Change in travel time relative to existing ~15 minute travel time along 2-mile Study Corridor	+2 minutes	-5 minutes	-3 minutes
Improve Reliability			
Duration to travel 2-mile corridor 95% of time (19 out of 20 trips)	9–19 minutes	6–14.5 minutes	6.5–15.5 minutes
Increase Capacity			
Stations that can accommodate at least three-car stations	SF State, Parkmerced Retail, Parkmerced Tail Track	Stonestown, SF State, Parkmerced Retail, Parkmerced Tail Track, (Optional: Arch)	Stonestown, SF State, Parkmerced Retail, Parkmerced Tail Track, (Optional: Arch)
Increase Flexibility			
Includes tail track to enable storing of disabled trains, M-Short operation, potential future extension to Daly City BART, and ability to operate other service patterns (e.g. J-Church from Balboa Park)	Yes	Yes	Yes

Figure 4-1. Percent Change in Travel Time vs. Today



SOURCE: SFCTA and Arup, 2013. Methodology available in Appendix C

The Longer Subway and Bridge alternative would reduce light-rail travel time through the Study corridor by 35% to 45% relative to the Baseline, saving transit riders who travel the whole two-mile corridor 7-8 minutes.

Figure 4-2. Change in Travel Time for Representative Trips to Civic Center

From 19th/Holloway

BASELINE

26 minutes

With changes currently planned, a 1-minute increase over today

WITH PROJECT

21 minutes

With Longer Subway and Bridge

24 minutes

With Shorter Subway and Tunnel

From Randolph/Arch

BASELINE

36 minutes

With changes currently planned, a 3-minute increase over today

WITH PROJECT

28 minutes

With Longer Subway and Bridge

31 minutes

With Shorter Subway and Tunnel

SOURCE: SFCTA and Arup, 2013. Methodology available in Appendix C

Figure 4-3. Light-Rail Reliability Evaluation Results

- Major conflict with traffic
- Minor conflict
- No conflict
- At surface
- Underground

BASELINE

Light rail vehicles would need to cross Highway 1 three times in the corridor. These crossings, in addition to four other stop lights, introduce major variability in travel times.

TRAVEL TIME THROUGH CORRIDOR, >95% OF TIME:

9–19 minutes

LONGER SUBWAY

Trains would avoid crossing Highway 1 and would be underground for all but two stop lights, decreasing variability.

TRAVEL TIME THROUGH CORRIDOR, >95% OF TIME:

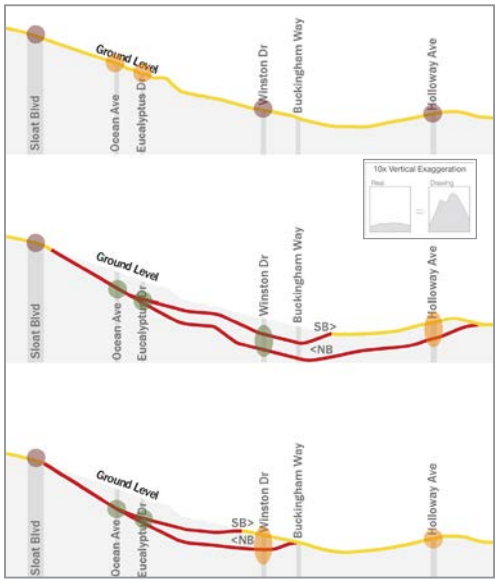
6–14.5 minutes

SHORTER SUBWAY

Trains would still avoid crossing Highway 1 but would be underground for a shorter period of time; southbound trains would be delayed, in particular, by the need to cross Winston Drive, the major vehicle access point to Stonestown Galleria.

TRAVEL TIME THROUGH CORRIDOR, >95% OF TIME:

6.5–15.5 minutes



SOURCE: SFCTA, 2014. Methodology available in Appendix C

4.2 Improve Light-Rail Passenger Experience and Access

The light-rail passenger access goal area considers the ease, comfort, and safety of accessing light-rail stations. For this goal area, all three options provide a significant upgrade from existing conditions at the SF State Station, but both alternatives perform better than the Baseline because they also provide upgrades at additional stations.

In all alternatives, re-locating the SF State Station means that the 98% of M-Ocean View passengers that are destined for or coming from the west side of the street at SF State would no longer need to cross three travel lanes and one turn lane in order to access their destination. The biggest additional upgrade afforded by these alternatives is the upgrade of the Stonestown Station including portals to both sides of the street, removing the conflict point between all passengers alighting at this station and vehicles on 19th Avenue. While it is not essential to the alternatives and there is currently not as high ridership in this part of the corridor, the Arch station at Randolph could also be upgraded to accommodate three-car trains and level boarding.

In all alternatives, new stations would be sized to accomodate at least three-car light-rail trains, increasing capacity by 50%.

Both alternatives also consolidate some stations, guided by design criteria to modify station spacing to be more like the Muni Metro stations in Downtown, which are spaced on average about a half-mile apart. Station consolidations are also proposed based on changes inherent in the alternatives (such as where the alignment is proposed to be re-routed to a different street). As a result, both alternatives consolidate the Ocean, Eucalyptus, and Junipero Serra stations, and the Longer Subway and Bridge alternative also consolidates the 19th/Randolph station. An additional consolidation of the Randolph/Bright station in either alternative could support further travel time savings, but is not essential to the alternatives.

Given the more northerly location of the Winston/Stonestown station and access to the K-Ingleside stop at Junipero Serra and Ocean, most of the areas within a five-minute walk of the existing Ocean and Eucalyptus stops would still be within a five minute walk of a station in either the Longer or Shorter Subway alternative, even with those stations removed, as shown in Figure 4-4 (next page). Likewise, in the southern part of the corridor, most areas within a five-minute walk of a light-rail station today would still be within a five-minute walk with either the Bridge or Tunnel alternative, even with the fewer proposed stations. These small changes in walk distance should be considered in context of the light-rail travel time savings that would be achieved--while the walk-to-transit time may increase slightly, the overall walk-to-transit plus transit trip time would decrease.

Table 4-2 summarizes performance in this goal area.

Table 4-2. Light-Rail Access Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Improve safety and attractiveness of accessing light-rail			
Stations that are upgraded	Holloway/Crespi/SF State	Stonestown, SF State (optional Randolph/Arch)	Stonestown, SF State (optional Randolph/Arch)
Stations consolidated	None	Ocean, Eucalyptus, 19th/Junipero Serra, 19th/Randolph, (optional 19th/Bright)	Ocean, Eucalyptus, 19th/Junipero Serra, (optional 19th/Randolph, 19th/Bright)

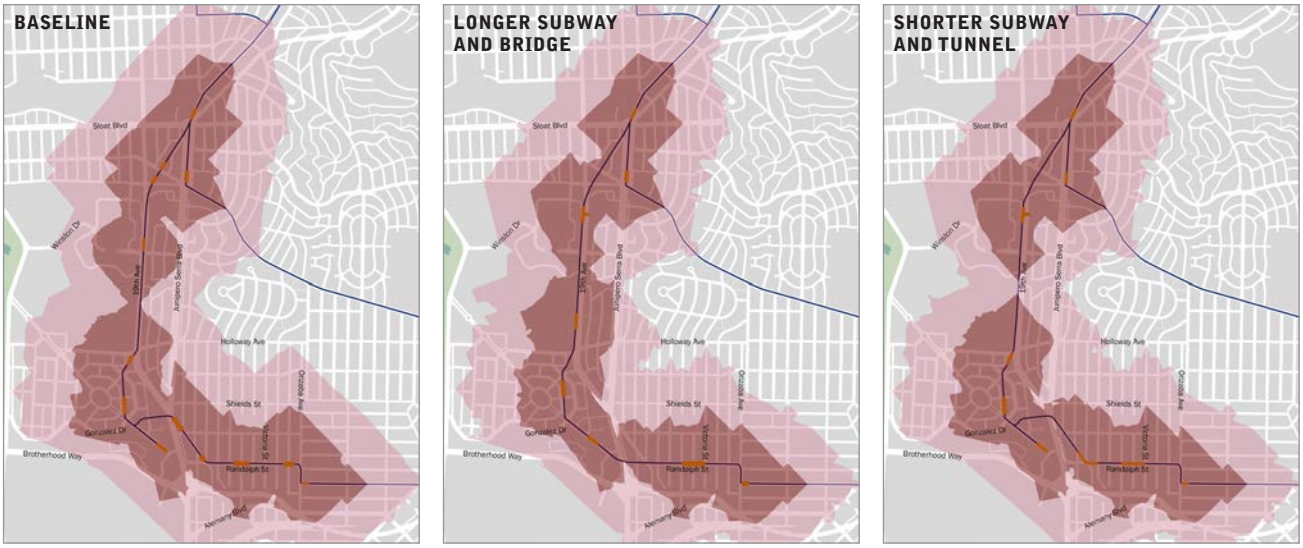


Figure 4-4. Walk Distance to a Station: 5- and 10-minute Walk Distance to Station.*
*assumes an average walk speed of 3.1 MPH.

4.3 Enhance Bus and Shuttle Operations and Passenger Access

The Longer Subway and Bridge alternative provides the largest improvement to bus and shuttle operations because it would allow southbound buses and shuttles to use a dedicated surface transit-way shared with light-rail between the southern branch of Buckingham and Holloway (Figure 4-5). This protected travel lane would save southbound buses and shuttles two to three minutes during the pm peak period, when traffic delay is worst on 19th Avenue.[4]

In addition, both alternatives would improve bus access as compared to the Baseline because wider sidewalks would create more comfortable bus and shuttle waiting areas than exist today. To support inter-modal connectivity, the existing bus stops at Winston (on 19th Avenue and south of 19th Avenue in the mall) would potentially be re-located adjacent to the new light-rail station location, an idea that will be further explored during the next phase of project development.

Table 4-3 (next page) summarizes performance in this goal area.

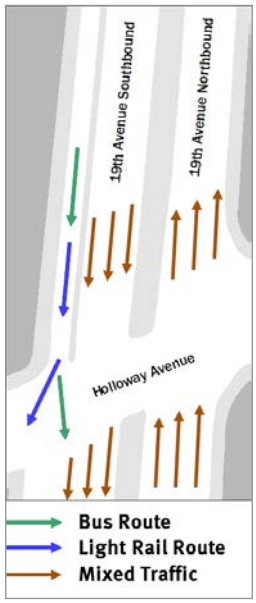


Figure 4-5. Bus/Light-Rail Shared Transitway Operation: Buckingham to Holloway

4.4 Provide Attractive and Safe Walking and Cycling Opportunities

Moving the light-rail tracks completely below ground along most of 19th Avenue within the corridor creates opportunities to significantly improve safety and comfort for pedestrians and cyclists by widening sidewalks, reducing crossing distances, increasing crossing opportunities, and creating new protected bike facilities. Because the light-rail tracks would be below ground for a longer distance and because of the opportunity for a new pedestrian and bicyclist bridge as a part of the light-rail bridge design, the Longer Subway and Bridge alternative provides the most benefits to pedestrian and cyclist conditions.

PEDESTRIAN SAFETY AND COMFORT

The Longer Subway and Bridge alternative would open up the most room for wider sidewalks and a landscaped median, which would act as a refuge for pedestrians crossing the street. In whole, the amount of space given back for pedestrian features ranges from 50 feet adjacent to the Stonestown Galleria and Mercy High School to 30 feet adjacent to SF

[4] Fehr & Peers, SimTraffic analysis. See Appendix C for methodology.

Table 4-3. Bus/Shuttle Operations/Access Evaluation Results*

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Improve bus and shuttle speed and reliability	None	New shared light-rail/ bus transitway between Buckingham and Holloway saves 2-3 minutes	None
Improve safety and attractiveness of accessing buses/shuttles			
Stops that are upgraded with larger loading/waiting areas	SF State	Stonestown, SF State	Stonestown, SF State
Access changes		Potential re-location of Winston bus stops north, adjacent to new station	Potential re-location of Winston bus stops north, adjacent to new station
	Bus stops are re-located south of Holloway	Bus stops are re-located south of Holloway or potentially adjacent to SF State Station (at to be determined location between Wyton and Crespi)	Bus stops are re-located south of Holloway

* Bus and shuttle conditions will also improve relative to existing conditions as a result of the TEP and 19th Avenus Bulbout project discussed in Chapter 3.

State, once the southbound light-rail track comes to the surface. While the Shorter Subway provides the same benefit near Stonestown, less space (about 30 feet) is available once the first light-rail track emerges (north of Winston), and even less space (about 20 feet) once the second track emerges (south of Winston). The change in street space for both alternatives is similar south of Holloway, where about 30 additional feet is available.

The result of the re-allocation in street space is that the distance across the street becomes shorter, from about 120 feet with the Baseline alternative, to ~80 feet with the Longer Subway and Bridge alternative, and ~90 feet with the Shorter Subway and Tunnel alternative.

Both alternatives would provide more frequent crossing opportunities, reducing walk time between crossings from five minutes to three minutes as compared to the Baseline (see Figure 4-6). These new crossing opportunities include: below ground at the Stonestown Station, re-opening the closed crosswalk on the south leg of Winston, and a new signalized pedestrian crossing at Wyton Lane. The Longer Subway and Bridge alternative provides one additional crossing opportunity that the Shorter Subway and Tunnel option does not: the light-rail bridge connecting Parkmerced and Randolph.

Figure 4-6. Alternatives Comparison: Pedestrian Crossing Opportunities

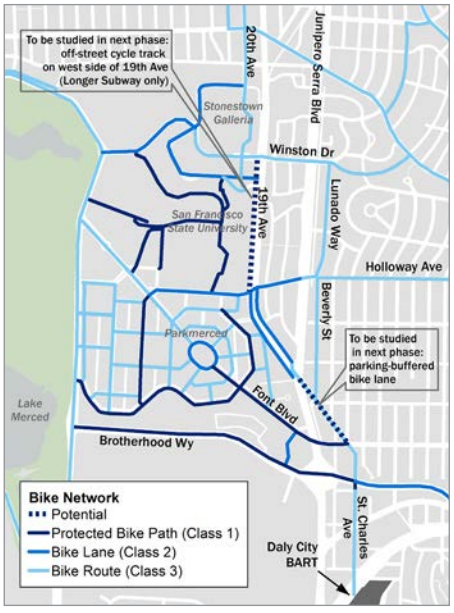


Figure 4-7. Cycling Network with Longer Subway and Bridge

CYCLIST SAFETY AND COMFORT

Both alternatives would improve bike connectivity, but the Longer Subway and Bridge alternative provides more opportunity to do so (see Figure 4-7). In terms of north-south connectivity, both options would be able to provide

a separated facility (either for bikes only or shared with pedestrians) between Holloway and Junipero Serra. The Longer Subway and Bridge alternative provides opportunity to extend this facility further in each direction, with potential to upgrade the segment of 19th Avenue south of Junipero to a bike lane or parking-buffered bike lane, as well as potential fulfilment of the vision established in the 2009 San Francisco Bicycle Plan for a separated bike facility on the west side of 19th Avenue between Holloway and Eucalyptus. More work on the conceptual design of such a facility will be done in the next phase of project development.

In terms of east-west bike connectivity, both alternatives would simplify crossing 19th Avenue at Winston or Holloway, with a shorter distance across the street and fewer light-rail tracks to cross. In addition, the Longer Subway and Bridge alternative would add a new protected bike connection over Junipero Serra in the southern part of the corridor as a part of the light-rail bridge, a connection seen as particularly important for improving the bike connection between SF State and Daly City BART.

Table 4-4 (next page) summarizes performance in this goal area

4.5 Improve Neighborhood Quality of Life

The alternatives were designed to take advantage of opportunities that would be created to improve or enhance neighborhood quality of life, such as through place-making opportunities, visual enhancements, or reducing noise from traffic or light-rail vehicles. Both the Longer Subway and Bridge and Shorter Subway and Tunnel alternatives provide major opportunities to improve neighborhood quality of life, through new public spaces, enhanced landscaping, and distinctive architectural features. Neither alternative performs better in this goal area. The Baseline alternative does not provide the same opportunity for improvement, but also does not present these tradeoffs.

The re-purposing of light-rail space creates an opportunity to re-orient the street with a landscaped median with trees, an intervention that would make the space feel more inviting and pleasant for those travelling to or through the area.

PLACE-MAKING OPPORTUNITIES

In both alternatives, the re-purposing of light-rail space creates an opportunity to re-orient the street with a landscaped median with trees, an intervention that would make the space feel more inviting and pleasant for those travelling to or through the area. A landscaped median on 19th Avenue would narrow the perceived width of the street, calming traffic. It would also serve as a nicer, wider pedestrian refuge. The Longer Subway and Bridge alternative provides additional place-making opportunities that the Shorter Subway and Tunnel alternative does not. The light-rail bridge between Parkmerced and Randolph would create an opportunity for a visually interesting feature that marks San Francisco's southern gateway entrance. And, re-locating the light-rail to Randolph would create the opportunity to re-envision the block of 19th Avenue between Junipero Serra and Randolph as a tree-lined, narrower street.

NOISE, VISUAL, AND TRAFFIC CIRCULATION CHANGES

Both alternatives would also create an opportunity to reduce traffic and light-rail noise along the private right-of-way in the Lakeside neighborhood, once the light-rail transitions underground. The alternatives also present some tradeoffs with respect to light-rail and traffic noise. The Longer Subway and Bridge alternative removes the ~90 degree turn through the Parkmerced site that would create noise near residential units, but introduces light-rail over Junipero Serra and landing on Randolph, creating light-rail noise on a residential block that currently experiences none. However, because the bridge would also require depression of Junipero Serra, traffic noise from Junipero Serra experienced by homes on Randolph today would be attenuated. In contrast, the Shorter Subway and Tunnel alternative would main-

Table 4-4. Pedestrian and Bicycle Safety and Comfort Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Improve safety and attractiveness of walking conditions along and across 19th Avenue			
Change in amount space re-purposed for wider sidewalks, pedestrian refuge	None (light-rail track space re-purposed south of Holloway is used for additional travel and turn lanes)	~50 feet from Eucalyptus to Buckingham	~35-50 feet from Eucalyptus to Buckingham (50 where both light-rail tracks underground, 35 when southbound surfaces)
		~30 feet from Buckingham to Holloway	~20 feet from Buckingham Way to Holloway
		~30 feet from Holloway to Junipero Serra	~30 feet from Holloway to Junipero Serra
New crossing opportunities	None	Stonestown station, Winston south leg crossing, Wyton Lane (optional), Parkmerced-Randolph Bridge	Stonestown station, Winston south leg crossing, Wyton Lane (optional)
Distance across the street	Winston: 120 ft Holloway: 120 ft	Winston: 80 ft Holloway: 80 ft	Winston: 90 ft Holloway: 90 ft
Opportunities to improve bike connectivity to and through the corridor			
Upgrades on 19th Avenue		Potential off-street bike path from Buckingham to Junipero Serra; upgraded cycling facility on 19th south of Junipero Serra (to be considered further in next phase)	Potential off-street bike path from Holloway to Junipero Serra
Upgrades across 19th Avenue and Junipero Serra		No need to cross light-rail tracks at Winston; only cross 1 light-rail track at Holloway	Only 1 light-rail track to cross at Winston
		Safer crossing at Holloway because private vehicle NB left-turn conflicts are eliminated	Safer crossing at Holloway because private vehicle NB left-turn conflicts are eliminated
	Off-site improvements from Chumasero to Brotherhood Way for Daly City access planned in Parkmerced Plan	Off-site improvements from Chumasero to Brotherhood Way for Daly City access planned in Parkmerced Plan	Off-site improvements from Chumasero to Brotherhood Way for Daly City access planned in Parkmerced Plan
		Parkmerced/ Randolph bridge for connectivity to OMI and Daly City BART	

tain the ~90 degree turn through Parkmerced and associated light-rail noise, but would not introduce new light-rail noise on Randolph south of 19th Avenue. Any potential noise impacts would be studied in much greater detail during the environmental review phase, and any significant impacts would be mitigated.

Additionally, the southern bridge and tunnel structures present tradeoffs in terms of visual and traffic circulation impacts (see Figure 4-8). In both cases there would be a change in the street design to accommodate the physical structures of a bridge or a portal. The Tunnel option would be adjacent to more properties, but would be built on a wider street (76-feet), making it easier to continue to maintain traffic circulation. The Bridge option would be adjacent to fewer properties, but would be built on a narrower street (60 feet), requiring some restriction in access to this segment of the street in the future, although local vehicle and pedestrian access to all homes is expected to be maintained. More detailed analysis and vetting of street design options in cooperation with the community would occur in the next phase of project development.

Figure 4-8. Visual, Traffic Circulation Tradeoffs: Tunnel vs. Bridge

Table 4-5 summarizes performance in this goal area.

Table 4-5. Neighborhood Quality of Life Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Place-making opportunities	Parkmerced place-making as envisioned in Parkmerced Vision plan only.	Opportunity to enhance sense of place through landscaped median with trees. Bridge an opportunity for an iconic gateway entrance treatment. Re-location of light-rail onto Randolph street creates an opportunity to re-envision the block of 19th Avenue between Junipero Serra and Randolph.	Opportunity to enhance sense of place through landscaped median with trees.
Opportunities to reduce or minimize noise from light-rail vehicles, traffic, visual impacts		Noise from light-rail in private-right-of-way, once underground would be eliminated.	Noise from light-rails in private-right-of-way, once underground would be eliminated.
	Light-rail through Parkmerced would create noise at ~90 degree turn onto Felix.	Light-rail noise through Parkmerced would be eliminated by removing the~90 degree turn onto Felix.	Light-rail through Parkmerced would create noise at ~90 degree turn onto Felix.
		Introduction of light-rail on Randolph street south of 19th Avenue and bridge landing would create new light-rail noise and be a design challenge to do context sensitively, but depression of Junipero Serra would mitigate existing traffic noise.	Southern Tunnel portal emerging on 19th Avenue near Monticello would be a design challenge to do context sensitively.

4.6 Manage Private Vehicle Traffic and Parking Conditions, Minimize Impacts on Other Modes

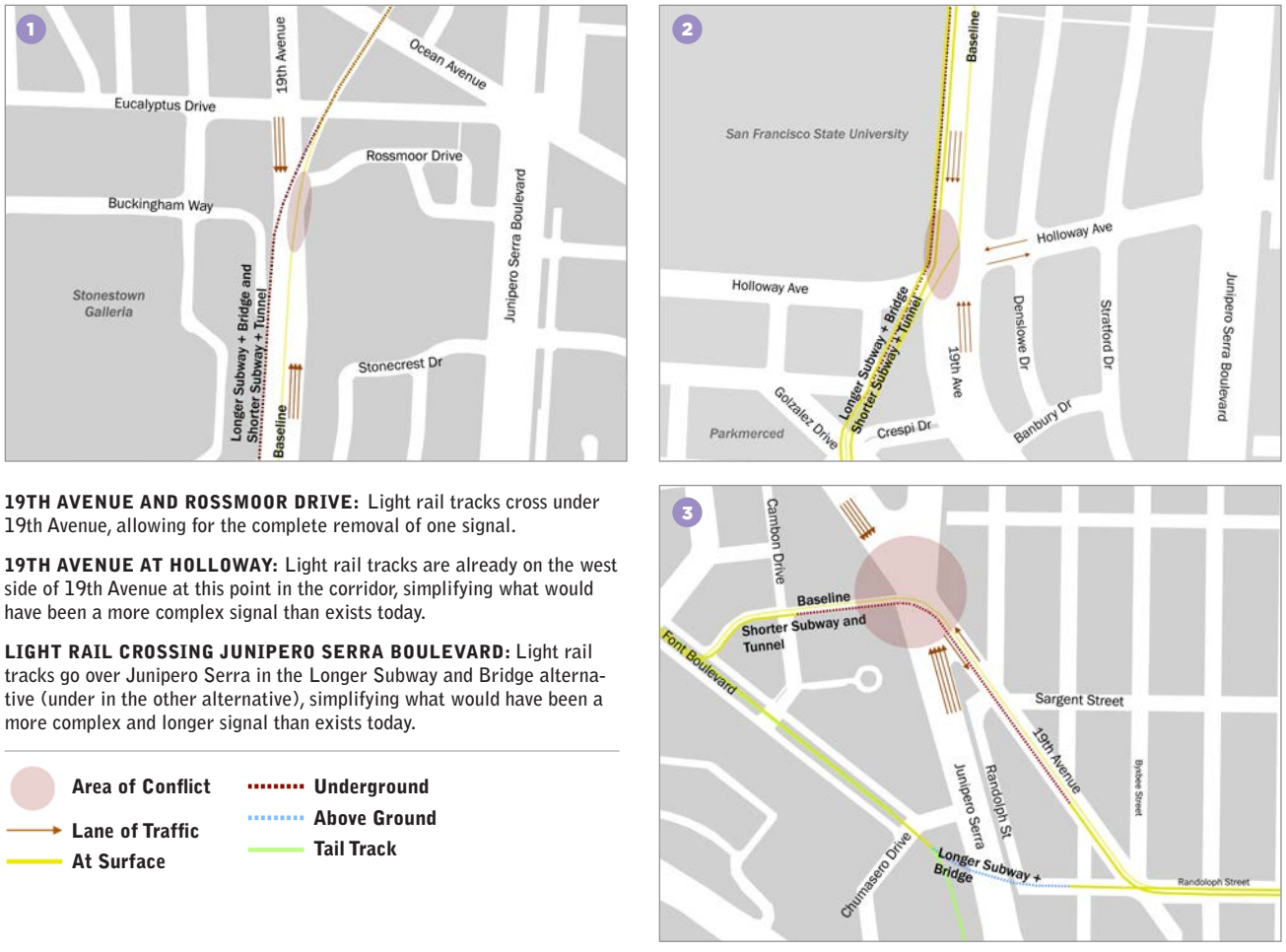
Both the Longer Subway and Bridge and Shorter Subway and Tunnel alternatives perform similarly in this goal area.

PRIVATE VEHICLE TRAFFIC

Given San Francisco's Transit First policy,[5] the Study did not establish a goal to make it faster to travel along 19th Avenue; and, indeed, adjacent neighbors expressed concern with increasing traffic speeds given the existing pedestrian safety issues in the corridor. However, the alternatives were designed to reduce vehicle-light-rail conflict points, which would produce a benefit in the reliability of private vehicle travel. In other words, the range of travel times it might regularly take to travel the corridor would become less varied without the potential need to stop to allow the light-rail to cross in three locations in the corridor. In addition, removing the light-rail crossings makes it easier for the traffic signals in the corridor to be timed, providing for more efficient travel. Figure 4-9 illustrates the reduction in light-rail-private vehicle conflict points that both alternatives would provide at three inter-

[5] State laws, local codes, and Transit First Policy (City Charter). San Francisco City Charter, section 8a.115

Figure 4-9. Reduction in Private Vehicle-Light-rail Conflict Points (Longer Subway and Bridge, and Shorter Subway and Tunnel)



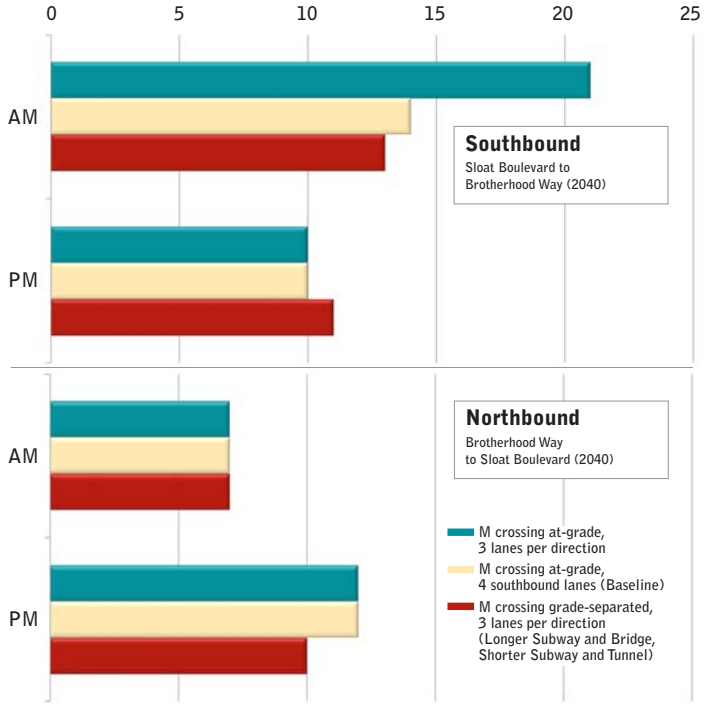
1. **19TH AVENUE AND ROSSMOOR DRIVE:** Light rail tracks cross under 19th Avenue, allowing for the complete removal of one signal.
2. **19TH AVENUE AT HOLLOWAY:** Light rail tracks are already on the west side of 19th Avenue at this point in the corridor, simplifying what would have been a more complex signal than exists today.
3. **LIGHT RAIL CROSSING JUNIPERO SERRA BOULEVARD:** Light rail tracks go over Junipero Serra in the Longer Subway and Bridge alternative (under in the other alternative), simplifying what would have been a more complex and longer signal than exists today.

Area of Conflict
Lane of Traffic
At Surface
Underground
Above Ground
Tail Track

sections: 19th/Rossmoor, 19th/Holloway, and 19th/Junipero Serra.

The result of simplifying these intersections is that future private vehicle travel time in the corridor can be maintained equivalent to the travel time forecast for the Baseline alternative, but without providing the additional travel and turn lane capacity that is included in the Baseline. As shown in Figure 4-10, travel time through the corridor would remain about the same, varying slightly between AM and PM peak hours and between northbound and southbound directions. In the southbound direction, travel time during AM peak hours would decrease by about 1 minute with both alternatives as compared to the Baseline, while during PM peak hours, travel time would increase by about 1 minute because of the modified signalization at 19th/Holloway/Crespi that requires slightly more signal time to allow vehicles travelling westbound on Holloway to cross 19th Avenue and turn onto Crespi in one signal cycle. In the northbound direction, AM peak period travel time would stay the same, while PM peak travel time would get about 1 minute faster with both alternatives, as compared to the Baseline.

Figure 4-10. Private Vehicle Corridor Travel Time Evaluation Results



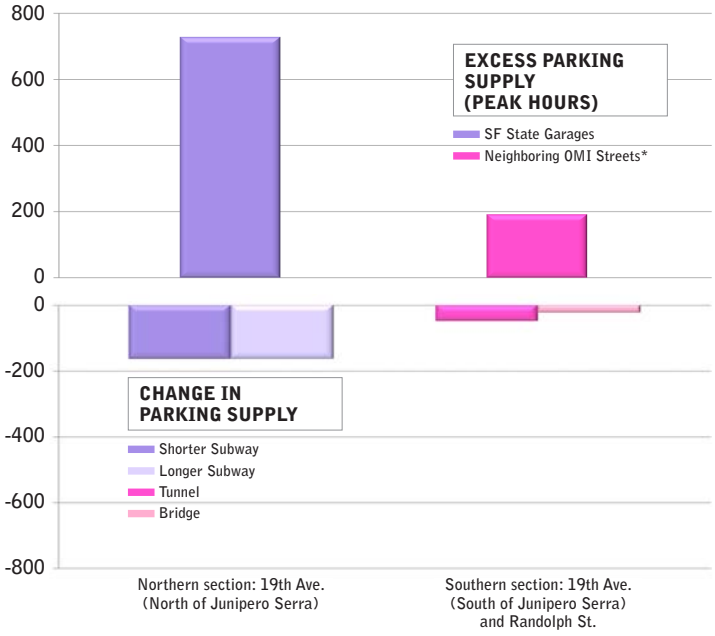
SOURCE: SFCTA and Fehr & Peers, 2013. Delay: SimTraffic analysis based on SF_CHAMP v4.3, 2040 volumes for through trips, 19th Ave Corridor Study volumes for local trips; free-running time: Google Map directions. Methodology available in Appendix 3.

ON-STREET PARKING

This goal area also considered reductions in on-street parking in context of other available supplies of parking nearby. Both alternatives propose to eliminate about 163 on-street parking spaces on 19th Avenue. In the southern part of the corridor, on-street parking would be eliminated with the Tunnel option on the street where the portal would be constructed (19th Avenue between Junipero Serra and Randolph Street), and with the Bridge option on the street where the bridge would be constructed (Randolph Street south of 19th Avenue). The tunnel necessitates more of a reduction in on-street parking (48 spaces) than the bridge (22 spaces).[6]

To consider the impact of these parking space reductions, the Study team inventoried parking supplies nearby. In the northern part of the corridor, those attending SF State utilize most of the on-street parking. SF State has off-street parking on-campus that is priced at $6/day, and has significant excess capacity, even during peak hours.[7] In the southern part of the corridor, the Study team conducted a parking utilization study by counting parked cars on nearby streets during afternoon and pm peak hours, finding some

Figure 4-11. Change in Parking Supply Relative to Excess Supply Evaluation Results



* Includes streets in Ocean View, Merced Heights, and Ingleside Heights: 19th, Randolph, Chester, Byxbee, Ralston, Vernon, Arch, Ramsell, and Victoria

Source: SFCTA, 2013, based on Google map measurements assuming 20-feet per space, and 18-ft per space at end of blocks, and June 2013 field work. Methodology available in Appendix C.

[6] See Appendix C for methodology.

[7] Nelson\Nygaard, Nov. 2012, SF State Parking Utilization Analysis.

excess supply during peak hours (see Appendix C for methodology). Parking supply changes relative to excess supply are summarized in Figure 4-11, finding that the level of excess supply that exists today would allow for the proposed on-street reductions to be absorbed while still maintaining enough spaces for those who currently park in the corridor. At a future phase of the project, more proactive work would be done to develop the right parking management approach, in particular to ensure campus parking generation does not create a spillover impact to neighborhood streets. It is also expected that improving the speed, reliability, and attractiveness of the M-Ocean View would result in less demand for driving access to SF State.

Table 4-6 summarizes performance in this goal area.

4.7 Support Transit-Oriented Land Use Plans

This goal area considers how well the alternatives support transit-oriented land use plans, both the Parkmerced Vision Plan and the SF State Campus Master Plan (described in Chapter 1). All alternatives perform equally in this area, bringing the M-Ocean View to the west side of the street consistent with the transportation visions articulated in these plans. Additional consideration of land use integration would be needed in future stages of project

Table 4-6. Private Vehicle Conditions Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Improve reliability of vehicle travel			
Light-rail/private vehicle conflict points removed	None	Northbound traffic at 19th/ Rossmoor and 19th/Juniero Serra)	Northbound traffic at 19th/ Rossmoor and 19th/Juniero Serra)
Light-rail/private vehicle conflict points created along 19th Avenue	Southbound traffic at 19th/ Holloway and 19th/Junipero Serra)		Southbound right-turns from 19th onto Winston
Maintain Baseline forecast traffic while maintaining today's lane capacity (instead of increasing)			
Road Capacity	3 lanes/direction north of Holloway, 3 northbound lanes, 4 southbound lanes south of Holloway; three northbound left-turn and two northbound through lanes at 19th/ Junipero Serra	3 lanes/direction	3 lanes/direction
Vehicle Travel Time During Peak Hours Between Sloat and Brotherhood Way (AM and PM)			
Northbound	7–12 minutes	7–10 minutes	7–10 minutes
Southbound	10–14 minutes	11–13 minutes	11–13 minutes
Manage impacts of on-street parking reductions			
Reduction in on-street parking	None	-185	-211
Excess supply available nearby greater than on-street parking reduction	Yes	Yes	Yes

development. For example, the Longer Subway and Bridge alternative's station at SF State could be located anywhere between Wyton Lane and the Holloway/Crespi transit plaza, and the project team will coordinate closely to ensure integration of future adjacent land uses. Similarly, this alternative would result in some changes to the Parkmerced plan, in particular the way the alignment enters the Parkmerced site with the northbound track underground until just past Gonzalez, as well as re-programming of the street the light-rail was planned to travel along before crossing Junipero Serra (to be named Felix), which would no longer have light-rail on it. Finally, moving the Stonestown station north, from Winston to near Macy's, could provide an opportunity for transit-oriented development adjacent to the new station. Table 4-7 summarizes performance in this goal area. Closure of Holloway west of 19th Avenue to through traffic would support SF State's Vision for Holloway.

4.8 Produce a Community-Supported, Feasible Project

The final goal area considers both community support and overall feasibility of the project. In this goal area, the Longer Subway and Bridge alternative was by far the alternative most supported by community members, and agency and funding partners. Yet, it represents a tradeoff as compared to the Shorter Subway segment of the Shorter Subway and Tunnel alternative, which while much less popular during community outreach, is expected to cost $90 million less in estimated capital costs than the Longer Subway and take about one year less time to build.

The Longer Subway and Bridge alternative was by far the alternative most supported by community members, and agency and funding partners.

Table 4-7. Transit-Oriented Land Use Support Evaluation Results

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Maintain consistency with approved area land use plans, such as those at SF State and Parkmerced	Yes	Yes	Yes

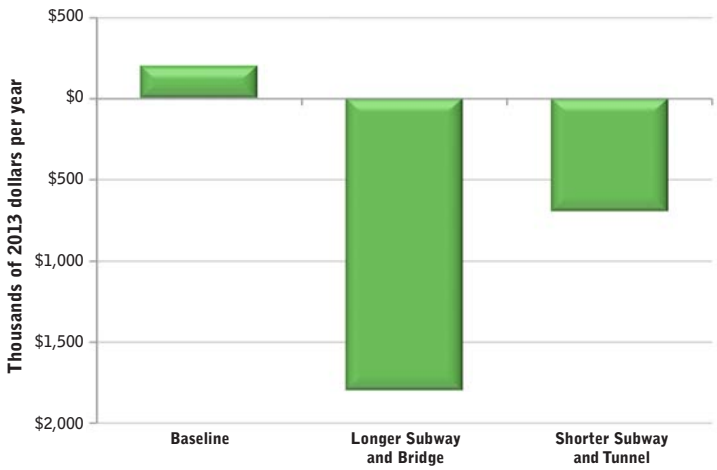
CAPITAL COST

Table 4-8 (next page) summarizes the capital cost for all combinations of the northern and southern options. The Longer Subway and Bridge alternative's most likely cost is $520 million, while the Shorter Subway and Tunnel option's most likely cost is $600 million. The most likely capital cost of the least expensive alternative of Shorter Subway and Bridge is $430 million. In contrast, the Baseline, which would be built by Parkmerced, is valued as a $70 million investment.[8] A preliminary analysis of its cost effectiveness using the Federal Transit Administration's New Starts funding criteria found it would receive a Medium-High to High rating.

OPERATING COST

While capital costs are incurred once over the course of a project lifetime, the cost to operate light-rail is incurred every year. In this case, the Longer Subway and Bridge alternative is expected to produce the highest operating cost savings, $2 million less than the Baseline alternative and more than twice the savings of the Shorter Subway and Tunnel alternative (see Figure 4-12).

Figure 4-12. Evaluation Results, Operating Costs



Operating costs calculated using SFMTA operating cost model, SPASM, see Appendix C for methodology. This model is based on average operating costs in the system. The next phase of work will do analysis to better understand the station operating and maintenance cost implication, given the two new stations would require greater level of staffing and maintenance than surface stations.

[8] Cost estimate based on conceptual design subject to refinement. Perkmerced's responsibility is to construct the segment of the M-Ocean View through the arkmerced site, regardless of the actual cost.

Table 4-8. Evaluation Results, Capital Costs

	NORTHERN CORRIDOR	
	Longer Subway	**Shorter Subway**
SOUTHERN CORRIDOR		
Bridge	Most Likely Cost: $520 million Potential Range: $420–$780 million	Most Likely Cost: $430 million Potential Range: $350–$650 million
Tunnel	Most Likely Cost: $680 million Potential Range: $550–$1,020 million	Most Likely Cost: $600 million Potential Range: $480–$890 million

ARUP, Level 5 Rough Order of Magnitude costs developed in accordance with Association for the Advancement of Cost Engineering internal best practices, +30% soft costs. See Appendix C.

CONSTRUCTION DURATION

The duration of construction is a consideration in a project's feasibility, where longer construction periods can mean longer periods of needing to manage traffic and transit disruptions and their associated costs. Figure 4-13 shows approximate construction duration by segment, indicating that with the Longer Subway alternative, construction for the segment in front of SF State would be the lengthiest construction period of the project, estimated at 2–3.5 years, as compared to 1.5–2 years expected in the Shorter Subway alternative. There are many other aspects of implementation that must be considered as the project moves forward that will be further developed in subsequent phases of project work such as anticipated design exceptions to Caltrans standards, and construction impacts analysis and mitigation.

COMMUNITY SUPPORT

As a part of the second round of outreach, the Study team requested input on preferred options from members of the public through a survey administered online and via paper

Figure 4-13. Evaluation Results: Approximate Construction Duration

(described more in Chapter 5, Outreach). Figure 4-15 summarizes preferences among those who responded to the survey, including for all respondents, as well as from only those who lived in the immediate vicinity of the Study corridor. The community overwhelmingly preferred Longer Subway (86%) to Shorter Subway (6%) and Baseline (8%). In the south, the majority (57%) preferred Bridge to Tunnel (32%) and Baseline (11%). Support for the Bridge was higher (78%) among those who indicated they lived in the surrounding neighborhoods.

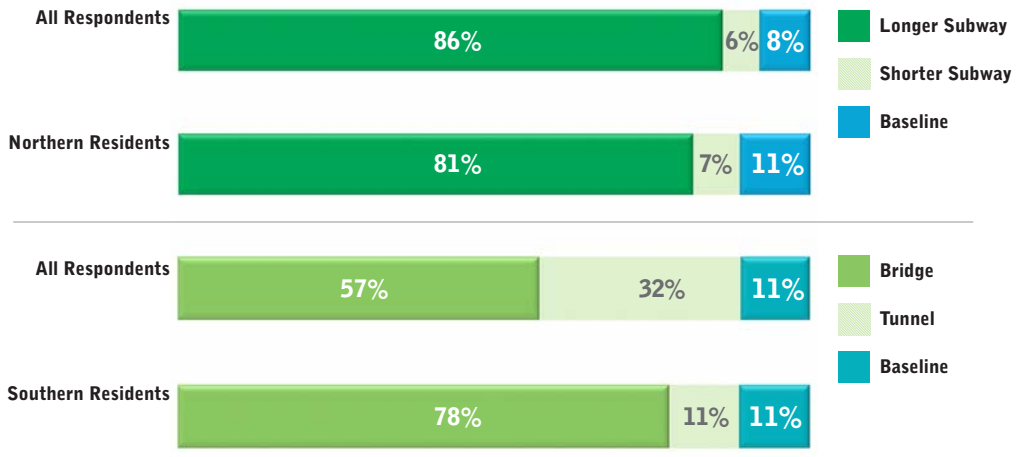
Table 4-9 summarizes performance in this goal area.

Table 4-9. Community-Supported, Feasible Project Evaluation Summary

OBJECTIVE	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL
Minimize capital costs	$70 million*	Total: $520 million (Potential Range $420-$780 million)	Total: $600 million (Potential Range: $480-$890 million)
		Longer Subway Most Likely: $380 million	Shorter Subway Most Likely: $290 million
		Bridge Most Likely: $140 million	Tunnel Most Likely: $300 million
Decrease operating costs	+$200,000/year	-$1,800,000/year	-$700,000/year
Minimize construction duration	4-8 months	2-3.5 years	1.5-2 years
Design a community-supported project			
Percentage of members of public completing survey who preferred this alternative	North: 8% South: 11%	North: 86% South: 57%	North: 6% South: 32%

* Cost estimate based on conceptual design subject to refinement. Perkmerced's responsibility is to construct the segment of the M-Ocean View through the Parkmerced site, regardless of the actual cost.

Figure 4-14. Options Preferred By Survey Respondents



4.9 Alternative Variants Initial Evaluation

The Longer Subway and Bridge alternative would cost $420-$780 million, with the most likely cost $520 million (in 2013$)

While the same level of evaluation was not conducted on the alternative variants, an initial evaluation of light-rail travel time and capital cost implications was conducted as shown in Table 4-10. During the second round of outreach, there was significant support for additional analysis of each variant. As a result of potential performance benefits and community support, more work will be done on each of these variants during the next phase of project development. The key questions for each are described below:

Table 4-10. Evaluation Results, Capital Costs

	ST. FRANCIS CIRCLE GRADE SEPARATION	OCEAN AVENUE UNDERGROUND STATION	CONTINUE SUBWAY THROUGH PARKMERCED
Rough Cost	$50–80 million	$50–70 million	$120–240 million
Travel-Time Implications	Savings: 1:40	Addition: 0:25	Savings: 0:25–1:50

ST. FRANCIS CIRCLE GRADE SEPARATION: How can the intersection be re-designed to allow both the M-Ocean View and the K-Ingleside to travel under this intersection? What are the resultant benefits in intersection operation? How can the space freed up be used to make bicycle and pedestrian access across the intersection safer and more attractive? Can these changes be made within the existing publicly-owned right-of-way? What is the implication for vehicle travel delay through the intersection? What is the estimated capital cost and operating cost savings? What level of benefit could be achieved without grade separation?

OCEAN UNDERGROUND STATION: What are the tradeoffs between access, ridership, and travel time, in maintaining a stop in this location? Are there opportunities to modify the location of the proposed Stonestown station to allow for a station with a portal entrance point closer to the existing Ocean station-stop? Can these changes be made within the existing publicly-owned right-of-way? What is the estimated capital cost and operating cost savings?

CONTINUE SUBWAY THROUGH SF STATE AND PARKMERCED: How can a full subway be designed to coordinate with the existing Parkmerced site plan? What minor modifications to the Parkmerced site plan would be needed to be compatible with such an alternative? Would fewer stations be provided? What opportunities are there to take advantage of site grading and utility work that will already be happening? What is the estimated capital cost and operating cost savings?

4.10 Summary

Table 4-11 summarizes the results of the evaluation. In each goal area, the Longer Subway and Bridge alternative is among the highest-performing, although in many goal areas the Shorter Subway and Tunnel alternative provides commensurate benefits.

Table 4-11. Alternatives Evaluation Summary; Longer Subway and Bridge Key Benefits and Considerations

✔ = Highest-performing

GOAL	BASELINE	LONGER SUBWAY AND BRIDGE	SHORTER SUBWAY AND TUNNEL	LONGER SUBWAY AND BRIDGE KEY BENEFITS AND CONSIDERATIONS
Light-rail operating performance		✔		35-45% improvement in light-rail travel time, 7-8 minutes in savings relative to Baseline
Light-rail access				All light-rail riders boarding/alighting at Stonestown and 95% of SF State/Holloway/Crespi no longer cross any lanes of traffic
		✔	✔	5- and 10-minute walk distance to stations stays about the same although some small increases due to stop consolidation.
				At least 50% capacity increase in all alternatives.
Bus/shuttle access/ performance		✔		2-3 minute bus/shuttle travel time savings from new shared light-rail bus/shuttle transitway; larger bus stops
Walking and cycling safety/attractiveness				Four new places to cross the street (new Stonestown station, Winston south leg, Wyton Lane, Font-Randolph Bridge)
				Decrease in distance across the street from 120 to 80 feet
		✔		30-50 feet of space re-purposed for wider sidewalks, cycling facilities, and landscaped median
				Opportunity for new bicycle facility on 19th Avenue between Junipero Serra and Buckingham and upgraded facility south of Junipero Serra
Neighborhood quality of life				Opportunity to address neighborhood concerns with light-rail noise, vandalism in private right-of-way
		✔	✔	Opportunity for interesting, attractive visual feature with Bridge, and traffic calmed block of 19th Avenue south of Junipero Serra
				Design challenge on Randolph Street between Junipero Serra and 19th by introducing light-rail and bridge landing on a residential street
Private vehicle conditions				Average vehicle delay through the corridor stays about the same, but reliability improves
		✔	✔	Reduction in on-street parking can be managed with nearby excess supply and parking management
Support transit-oriented land use	✔	✔	✔	All options support visions established in SF State Campus Master Plan and Parkmerced Vision Plan for a west side alignment of the M-Ocean View
Community-supported, feasible project				Longer Subway and Bridge favored by the majority of stakeholders (86% and 57%, respectively) surveyed during second round of outreach (n=156)
		✔	✔	Capital cost of Shorter Subway $90 million less than Longer Subway
				Operating cost savings of Longer Subway and Bridge $2 million annually as compared to $0.9 million for Shorter Subway and Tunnel

M-Ocean View Extension to Daly City Initial Analysis

Eric Haas

While the Study's main focus was on assessing the feasibility and benefits of grade-separating the M-Ocean View crossings of 19th Avenue, the team also did initial analysis of options for improving transit connections to the Daly City BART station. Extending the M-Ocean View to Daly City BART was another idea initially considered as a part of the 19th Avenue Corridor Study but (like the grade separations) generally lacked any previous project development or evaluation work. The only previous work to consider such an idea was in the Daly City Intermodal Station Access Study, which identified the best location for a future extension to enter the Daly City BART site, but did not study alignments between Parkmerced and the BART station. This 19th Avenue Transit Study considered the benefits and costs of two different investment packages: an extension of the M-Ocean View, and a package of bus and shuttle improvements as shown in Figure 4-15. The M-Ocean View extension would cost more but provide a faster trip (see Table 4-12). The bus/shuttle improvement package would cost less but save less travel time. Both the Longer Subway and Bridge and Shorter Subway and Tunnel alternatives do nothing to preclude either of these improvement packages from moving forward. However, because of the time sensitive need to advance the grade-separation project as it relates to Parkmerced Development Agreement timeline provisions, and because of the significant and independent benefit the grade separation project would provide, the next phase of project development will focus exclusively on advancing the grade-separation project, while leaving next steps on the question of Daly City transit access upgrades as a future phase of work that could be turned to. (See Appendix E for more detailed discussion.)

Figure 4-15. Light-rail (left) and Bus/Shuttle (right) Daly City Access Improvement Packages

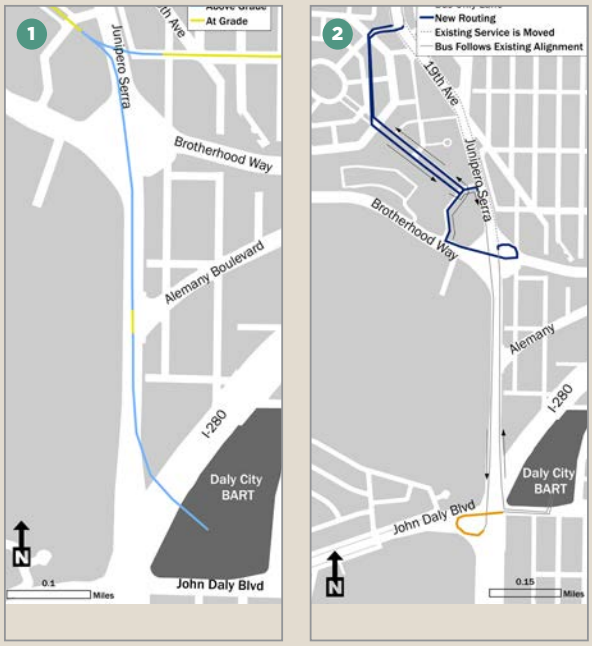


Table 4-12. Performance and Cost Comparison: Light-rail versus Bus/Shuttle

	M-LINE EXTENSION TO DALY CITY	ENHANCED BUS CONNECTION TO DALY CITY
Travel-Time Savings	1–8 minutes	0–2 minutes
Capital Cost	$200–300 million	$30–40 million
Operating Cost	Increase in M-Ocean View operating cost of $300,000/year; potential decrease in SF State and future Parkmerced shuttle costs of ~$800,000/year	Potential savings of $400,000/year in operating costs due to travel time savings

1. **LIGHT-RAIL CONNECTION TO DALY CITY:** The M-Ocean View to Daly City would continue down the middle of Junipero Serra and climb over northbound I-280 just north of John Daly Boulevard, entering the Daly City BART station through the parking lot on the northwest side of the station. The Alemany flyover ramp would be removed or replaced.
2. **ENHANCED BUS CONNECTION TO DALY CITY:** Some potential ways to improve the speed of existing bus and shuttle service include routing through Parkmerced to avoid congestion on Junipero Serra and adding a bus-only lane on John Daly Boulevard. To accomodate more frequent service in the future, Daly City BART will need to expand bus bays and station infrastructure.

5 Outreach

OUTREACH TO THE COMMUNITY and key stakeholders was a critical Study activity that informed Study findings and recommendations. This chapter describes the outreach activities conducted during the Study and summarizes how the key feedback messages heard during outreach were incorporated (Appendix D, Public Involvement includes additional documentation of these activities).

5.1 Outreach Activities

The project team engaged in two rounds of intensive outreach, including a community meeting during each round and a series of presentations and discussions with neighborhood groups in the Study area as summarized in Table 5-1 (next page). Each round of outreach had a distinct purpose. The first round between February and April 2013 was focused on sharing the findings of the Study's existing and future conditions analysis and to seek input on the initial alternatives the technical team developed. The second round between September and November 2013 was focused on sharing the results of an evaluation of the alternatives and to seek input on community preferences among alternatives. Community and stakeholder involvement included a comprehensive set of multilingual notification and input techniques. Some highlights of the resultant engagement include:

- Several hundred stakeholders reached through two large community meetings and more than ten smaller presentations;
- Stakeholder meetings provided focused input from key stakeholders including: Lakeside neighborhood, OMI neighborhood, Merced Extension Triangle neighborhood, West Portal/West of Twin peaks neighborhoods, Walk San Francisco, Transit Riders Union, San Francisco Bicycle Coalition;
- Five media articles generated during the course of the Study;
- ~5,000 visits to the Study website;
- >150 surveys completed during Phase 2 of outreach; and
- Six Partners meetings with key agency and funding partners including: SFMTA, SF Planning, San Francisco Office of Economic and Workforce Development, San Francisco Department of Public Works, Caltrans, BART, Parkmerced, SF State, and General Growth Properties as well as more than 40 smaller, focused meetings.

5.2 How Public Input Was Used

Based on the feedback received from outreach activities, a number of key Study findings and recommendations were informed by input received.

PREFERRED AND REFINED ALTERNATIVES REFLECT SUBSTANTIAL COMMUNITY FEEDBACK

The alternatives described in Chapter 3 reflect substantial public involvement, resulting in some options being removed from consideration, others being modified, and ultimately, the options that performed best against the Study's evaluation were also most highly preferred by stakeholders.

After the first round of outreach, two options had very low levels of support among most stakeholders. These options were the Northern Bridge (N4) and Southern Tunnel to Brotherhood Way (S3). Based on this feedback, these options were eliminated from consideration (see Table 5-2, next page). In addition, a proposed pedestrian bridge over 19th Avenue as a feature of the Longer Subway station connecting to Wyton Lane was also unpopular, and the Longer Subway option was modified to substitute this feature with a new signalized at-grade crossing at this location.

These changes were unveiled to the public during the second round of outreach, along with the evaluation results. Support for these refined options, as measured by a voluntary survey completed by 158 stakeholders, indicated the vast majority of respondents, ~90%, preferred one of the Study options to the Baseline.

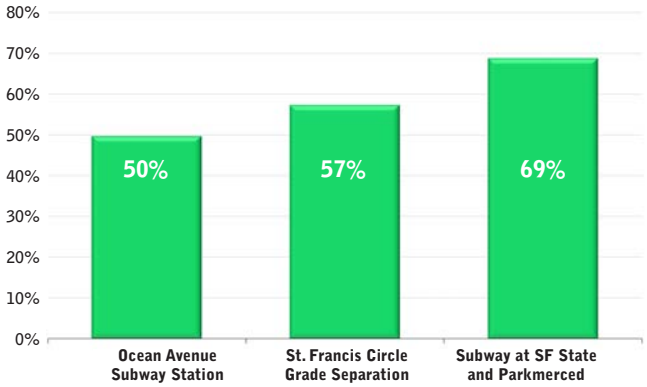
Table 5-1. Summary of Community Outreach Activities

OUTREACH PHASE	PURPOSE	FEEDBACK SOUGHT	OUTREACH FORMATS
Round 1 February to April 2013	Provide an overview of the Study's purpose and goals Share findings of the Study's existing and future conditions analysis Share draft conceptual alternatives	Existing transportation needs in the corridor Areas of interest or concern in draft conceptual alternatives	Community meeting Direct outreach meetings Communication Materials: website, fact sheet, advertisements on transit and in newspaper advertisements, flyers posted in corridor Briefings with District Supervisors
Round 2 September to November 2013	Review the Study's purpose and goals Share the results from the first round of outreach and review how this feedback was incorporated Summarize the features, benefits, and considerations of the highest performing option, provide more detail on additional options evaluated	Community input on Study option preferences	Community meeting Direct outreach meetings Communication Materials: website, fact sheet, advertisements on transit and in newspaper advertisements, flyers posted in corridor Briefings with District Supervisors Web and paper survey

NEXT PHASE WILL INCLUDE ADDITIONAL DISCUSSION AND REFINEMENT OF ALTERNATIVE VARIATIONS AND FEATURES

Another common feedback area was regarding the Study variants described in Chapter 3: St. Francis Circle grade separation, Ocean underground station, and continuing the subway through Parkmerced. Because of strong interest in each of these variations (see Figure 5-1), additional project development and evaluation will be conducted during the next phase of the effort to inform a decision on whether or not to fold any of these variations into the main project definition.

Figure 5-1 Preferred Alternative Variations for Study in Next Phase (n-158)



SOURCE: SFCTA, November 2013 Phase 2 Outreach Survey results.

Other frequent feedback areas included:

- Closure of Holloway to private vehicle traffic for one block west of 19th Avenue and routing traffic on Crespi
- Elimination of on-street parking on 19th Avenue, Randolph Street, and supportive neighborhood parking management
- Additional cycling network improvements, including a separated cycletrack on the west side of the street between Holloway and Buckingham (as envisioned in the 2009 San Francisco Bicycle Plan)
- Further development of light-rail bus intermodal connectivity changes, in particular at the re-located Winston/Stonestown station
- Design and staffing of underground station at Stonestown to ensure personal security.

The scope of work for the next phase of work anticipates ample public involvement around each of these planning and conceptual design questions.

The alternatives reflect substantial public involvement, resulting in some options being removed from consideration, others being modified, and ultimately, the options that performed best against the Study's evaluation were also most highly preferred by stakeholders.

TRANSPARENT PROCESS AND REGULAR COMMUNICATION WILL BE CONTINUED INTO SUBSEQUENT PHASES

Table 5-2. Options Eliminated or Refined Based on Community Feedback

WHAT WE HEARD	WHAT WE DID
Some of these options do not work for my neighborhood. During the first round of outreach, a notable majority of those participating voiced concern with one of the northern crossing options that would have built a light rail bridge over the roadway (N4). In addition, a notable majority voiced concern with one of the southern crossing options that would have tunneled under Junipero Serra and continued on the north side of Brotherhood Way (S3).	**Dropped unpopular options.** The Study team dropped these options from further consideration at the close of the first round of outreach. 
There is one aspect of the option that does not work for my neighborhood. A common criticism of the longer subway option (N1) was that it considered a pedestrian bridge over 19th Avenue to provide east-side connectivity from Wyton Lane to a new northern location of the SF State station. Many expressed concern that such a structure would not support the character of the existing neighborhood.	**Modified options.** We found that an at-grade, signalized crossing at this location would be feasible from a traffic perspective and have changed the option accordingly. 
My neighborhood has an additional idea to study. We received a lot of feedback on other ideas to explore. Four of the most common suggestions included: 1) starting the subway in West Portal, 2) starting the subway before St. Francis Circle, 3) including a subway station at Ocean Avenue, and 4) continuing the subway along the entirety of SF State and Parkmerced.	**Explored variants.** The Study team completed a preliminary assessment of these common variants. The Study team will be interested in additional feedback on these options to determine whether a more comprehensive evaluation of any are merited in future phases of this project or as separate community planning efforts.

Stakeholders expressed strong support and appreciation for the outreach program used during this phase of Study and expressed gratitude that the input shared during the first phase of outreach was substantively used to inform the refined alternatives shared during the second phase of outreach. This sentiment is expressed by a few representative comments provided by survey respondents below.

> "Thank you for an excellent presentation. I represent a few Ocean View neighbors who are excited about the improvements this project will bring, particularly connecting up Randolph Street over 19th Avenue."

> "I appreciate the efforts of the SFMTA and the 19th Ave project team in communicating all the issues and options to the affected communities and in listening to our inputs and feedback. Such openness and transparency will definitely be a win-win approach for a high-impact long-term project like this and will result in success that satisfies the expectations of most residents and users in the areas affected."

The project team will continue and expand outreach based on lessons learned during this phase into the next phase. In particular, stakeholders expressed strong interest in more detailed analysis that will occur during the environmental review phase of the project such as noise, construction, and vibration impacts. The Study team is committed to providing this information to the public in an easy-to-understand manner to support future decision-making regarding project definition details.

6 Next Steps

THE STUDY is the first stage of project development for the proposed project—a feasibility study that identifies high-performing alternatives to address significant transportation deficiencies along 19th Avenue. Many more steps lay between conclusion of this phase of work and when the City and County of San Francisco will be ready to recommend the project for implementation, including additional stakeholder and public coordination and outreach, environmental review and more detailed design and engineering work. Identifying funding to support a project of this scale will be challenging given the number of competing priorities within San Francisco and the Bay Area region. This chapter provides an initial description of key implementation considerations, including: project development steps and schedule, funding strategy options and considerations, and project development and delivery options and considerations.

6.1 Project Development Steps and Schedule

The subsequent phases of development for the proposed project are described below and shown in Figure 6-1. The overall schedule is uncertain given the early stage in the planning process and would depend on notable questions such as funding availability. An aggressive schedule could see construction begin in 2020 and service opening in 2022, but this would assume a significantly accelerated pace as compared to recent experiences of other transit capital projects under development and construction in San Francisco.

Figure ES-11. Potential Project Implementation Schedule

PRE-ENVIRONMENTAL STUDY: The next phase of work for the project will be to advance project development and further define the scope of environmental analysis and range of alternatives. The purpose of this phase is to develop enough project definition to enter environmental review with a clear enough understanding of the project's definition to analyze potential environmental impacts, but not so far along as to interfere with modifying aspects of the project to minimize potential significant environmental impacts. This phase would include advancing engineering design to around 10% and preparation of a Project Study Report[1] as required of projects affecting the state-owned right-of-way of Highway 1 as required by Caltrans. Because of the higher performance of the Longer Subway and Bridge alternative, project development work will focus on this alternative. The Shorter Subway option will continue to be considered because of its lower capital cost, while the Tunnel option will be removed from further consideration because it has lower performance, less public support, and costs significantly more than the Bridge. Finally, this phase would examine project variations or additions identified for further development based on outreach including: St. Francis Circle grade separation, Ocean underground station, and full subway through SF State and Parkmerced. The Study team has secured a $492,000 grant from the Metropolitan Transportation Commission's (MTC) Priority Development Area Planning Grant program to support this work. Local match is expected to be provided through Prop K sales tax, SFMTA funds, as well as contributions from westside Partners: Parkmerced, SF State, and General Growth Properties. During this phase, the role of lead agency for the work will transition from the Transportation Authority to the SFMTA, although both agencies, along with Caltrans and SF Planning will continue to be part of the project team. This phase of work is expected to last approximately one year.

ENVIRONMENTAL REVIEW AND DESIGN: Next, the proposed project's environmental impacts would be analyzed both under the state California Environmental Quality Act (CEQA) as required for any project requiring local action, as well as under the federal National Environmental Policy Act (NEPA) to make the project eligible for federal funding sources. Environmental review would identify resource areas potentially affected by the proposed project (e.g. transportation, air quality, visual, noise, etc.) and quantify and analyze potential impacts. The process would identify any impacts that are found to be significant and mitigations to those impacts. Engineering design would be advanced to 30% in order for impacts to be assessed adequately. The SFMTA typically prepares a Conceptual Engineering Report (CER) after (or in parallel with) environmental review. This is the document that provides the scope, schedule and estimated cost of the project, analyzes alternatives considered, and documents the design criteria and special considerations that will guide detailed design. The CER is approved by SFMTA management to advance the project toward detailed design and construction. A similar document, the Caltrans Project Report, would also be required for the segment of the project within state-owned right-of-way.

The environmental review process might last three to three-and-a-half years and would require identification of new funding (on the order of $5–10 million, to be further scoped during the Pre-Environmental Study phase). SFMTA's Transportation Capital Committee has recommended $4 million from SFMTA's General Fund revenues to support this phase of work although additional funding will be needed. In the Development Agreement between the City and County of San Francisco and Parkmerced, the agreement gives San Francisco until July 2018 to complete this phase of work and obtain non-City approvals, principally from Caltrans and the California Public Utilities Commission, in order for the Parkmerced segment of the alignment to be modified to reflect a west side grade-separated alignment alternative.

DETAILED DESIGN AND CONSTRUCTION: After completion of environmental review, the

[1] The project will pursue a Project Study Report-Project Development Support, a specific type of Project Study Report for projects that are still seeking funding for subsequent phases of work.

Caltrans Project Report and the Conceptual Engineering Report, funding secured and an implementation decision made, detailed design and construction would proceed. There are multiple different models for these phases of work described in section 6.3. This phase could last four to six-and-a-half years, of which the actual construction period might be two to three-and-a-half years. The project would likely be phased given its size and cost (phasing opportunities are further described in section 6.3).

6.2 Funding Strategy Options and Considerations

The proposed project's most likely cost for all future phases of work of the Longer Subway and Bridge option is estimated at $520 million, with greater certainty that its range will be somewhere between $420 and $780 million (in 2013 dollars). This cost is based on a most likely capital cost estimate for construction of $400 million[2] and an assumption of 30% soft costs.

There are few capital projects under consideration or in the process of implementation by San Francisco that are similarly or more expensive, and there are many competing priorities for transportation funding including a several billion dollar shortfall related to maintenance and operations of the existing Muni transit and local street system, and competing enhancement and expansion needs in other parts of San Francisco that are more advanced in their project development. Yet, the proposed project is unique in several ways:

- It comes with investment committments from Parkmerced and SF State that would serve as local match and that could not be used for any other purpose; additional or increases in these non-city sources are possible (such as if General Growth Properties were to pursue additional growth on their site).
- It is part of the 25% of San Francisco land area designated as a Priority Development Area, a designation making it competitive for funding distributed by MTC because it supports regional goals to respond to climate change by supporting transit-oriented growth.
- It is part of the State-owned highway system, making it eligible for sources of funding that cannot be spent in support of non-State facilities.
- It addresses pedestrian safety issues on a street that is part of San Francisco's 6% of road miles where 60% of severe and fatal pedestrian collisions occur,[3] expected to result in saving of lives, as well as monetary savings to the City and County of San Francisco and Caltrans who currently bear liability for M-Ocean View and 19th Avenue collisions.
- It enjoys strong support from stakeholders including community members, adjacent property owners, city and county agencies, and local, state, and federal policy-makers.

The next phase of work for the proposed project will do additional funding strategy work, building on the following section that lays out potential sources of funding. The next phase will also advance a financial feasibility analysis to better quantify the project's direct and indirect costs and savings, as well as seek to gain additional certainty about the availability of other non-city funding sources.

FEDERAL SOURCES

Federal sources potentially available to the project include:

- **TRANSPORTATION INFRASTRUCTURE FINANCE AND INNOVATION ACT (TIFIA)**, a federal low-interest loan program. While generally, the amount of federal transportation au-

[2] Arup North America, Level 5 Rough Order of Magnitude cost in accordance with the Association for the Advancement of Cost Engineering International (ACCEi) best practices

[3] WalkFirst, 2013.

thorizations for grants have declined, TIFIA is the one program that has seen an increase in its authorization levels. TIFIA is ideal for projects that can re-direct future revenue streams to pay back the loan. In the case of the proposed project, several potential revenue streams exist, described later in this section, making the project an ideal candidate for this fund source. Fiscal Year 2014 authorized $1.0 billion for this program nationally, and the program allows for funding up to 49% of the overall project cost, although it's unusual for it to cover more than 33% of a project's costs.

- **NEW STARTS** is a federal discretionary grant program that is the federal government's primary financial resource for supporting locally planned, implemented, and operated major transit capital investments. Several other San Francisco projects are potentially pursuing this funding source and a decision has not been made as to whether the proposed project would pursue this source. A preliminary review of the project relative to the New Starts criteria for cost effectiveness and mobility found that it scored medium high-to high for the former and medium to medium-high for the latter.

STATE SOURCES

State sources potentially available to the project include:

- **STATE HIGHWAY OPERATION AND PROTECTION PROGRAM (SHOPP)** is a funding source used by Caltrans for maintenance and re-paving improvements on the state highway system. The proposed project could coordinate with a SHOPP paving cycle, potentially leveraging this funding source to support the project. Caltrans is already planning its next paving cycle with knowledge of the proposed project, expecting to re-pave the segment north of Eucalyptus in Fiscal Year 2015-2016, while deferring re-paving of the segment through the Study Corridor, in expectation of the project moving forward.
- **CAP-AND-TRADE** is a new funding source created through the sale of greenhouse gas emissions allowances through the cap-and-trade system that is being implemented to reduce greenhouse gas emissions as mandated by Assembly Bill 32. There is ongoing discussion at the state and the regional level regarding how revenue generated will be distributed. Since the proposed project is expected to support reductions in greenhouse gas emissions, it could potentially be available to support the proposed project.

REGIONAL SOURCES

Regional sources potentially available to support the project include:

- **TRANSIT PERFORMANCE INITIATIVE (TPI)** recommended at a 28-year funding level of $500 million in Plan Bay Area, is a program to fund supportive infrastructure to achieve performance improvements in major transit corridors where current and future land use supports high-quality transit, such as in the 19th Avenue corridor.
- **CAP-AND-TRADE** revenue as described above may be distributed at the regional level, again a source that the proposed project may be eligible for due to its nexus with reducing greenhouse gas emissions. The MTC expects the region to receive about $3.1 billion in these funds through 2040.
- **ONEBAYAREA GRANT** is a funding program comprised of federal Surface Transportation Program, Congestion Mitigation and Air Quality, and Transportation Alternatives Program funding sources distributed by MTC to Congestion Management Agencies based on regional share of population, housing and affordable housing production, and future housing/affordable housing plans. In San Francisco, 70% of these funds must be spent on transportation investments that support Priority Development Areas. While the

most recent cycle of funds was just programmed in 2013, future cycles may be available to support the proposed project.

LOCAL CITY/COUNTY SOURCES

Local City/County sources potentially available to support the project include:

- **PROP K SALES TAX** is a half-cent sales tax that funds transportation improvements in accordance with an Expenditure Plan approved by voters in 2003 and that is administered by the Transportation Authority. While the current expenditure plan does not have a specific line item for the proposed project, planning and environmental work would be eligible to be supported under the Transportation/Land Use category. Prop K supported local match for the current feasibility study phase and is expected to also support the next phase. There are also opportunities to coordinate with smaller scale improvements that would otherwise be funded in the corridor through categories such as Pedestrian Safety or Bicycle Circulation, Traffic Calming, and/or Signal Improvements.
- **PROP AA VEHICLE REGISTRATION FEE** is a $10 countywide vehicle registration fee that was passed by San Francisco voters in 2010 and is administered by the Transportation Authority. Given the modest level of expected revenues (about $5 million annually), Prop AA funds are used to fund smaller, high-impact street repair and reconstruction, pedestrian safety, and transit reliability and mobility improvement projects throughout the city. The Prop AA Strategic Plan, which guides the timing of Prop AA expenditures for five year periods (the current plan covers Fiscal Years 2012/13 through 2016/17), will next have available programming starting in Fiscal Year 2017/18.
- **TRANSPORTATION SUSTAINABLE FEE** is a fee proposed by the Transportation Sustainable Program (replacing existing transit-related development fees) to establish a means by which development projects can mitigate their impacts on the system. The proposed fee would supplement existing local transportation funding sources and would fund a $1.4 billion expenditure program, over twenty years, shown to directly offset the impacts on the transportation system made by new development.
- **MAYOR'S 2030 TRANSPORTATION TASK FORCE (T2030)** is an initiative of Mayor Ed Lee, who appointed a task force that met throughout 2013 to develop a set of priorities and actionable recommendations for funding the City's transportation infrastructure between now and 2030. These revenue measures will be reviewed by the Mayor, Board of Supervisors, and ultimately the voters, when/if placed on upcoming ballots. The Task Force recommends pursuing three revenue sources—general obligation bonds, vehicle license fee, and an increase in the sales tax. While the proposed project is not recommended for funding through the proposed T2030 revenue measures, it is identified as a future priority project. However, some line items of the T2030 Investment Plan represent categories that could support the project, such as the Transit Performance Initiative—a placeholder for future transit efficiency upgrades. There are also are opportunities to coordinate with smaller scale improvements that would otherwise be funded in the corridor through T2030 revenue sources, such as rail replacement, Complete Streets improvements, or traffic signal upgrades that would all be built into the proposed project definition.
- **OTHER SFMTA SOURCES:** SFMTA prioritizes other funding sources such as revenue from farebox recovery and parking revenue. SFMTA might dedicate some of these funding sources to support the project, in particular given the high priority given to this project within the agency's 20-Year Capital Plan. The proposed project received the highest rating within the Transit Optimization and Expansion category. Rating is based on perceived community and SFMTA benefits, without explicit consideration of cost effective-

While the proposed project is not recommended for funding through the proposed Mayor's 2030 Transportation Task Force revenue measures, some elements of the project could be funded through the Task Force's investment in Complete Streets or traffic signal upgrades.

ness or funding availability. The project could allow for agency savings for other projects that would no longer be needed were it to move forward. For example, the SFMTA had planned to replace rails and overhead wire poles for the M-Ocean View in this part of the corridor; however, some of this planned construction work could be foregone for other maintenance needs if the existing rail is determined to have sufficient useful life to last until the project were to move forward. With respect to farebox recovery, a few opportunities are worth noting: 1) an increase in ridership on the M-Ocean View as a result of faster travel time and additional land use intensity could lead to increases in farebox revenues; 2) Parkmerced's Development Agreement includes provision of a transit pass fare product whose cost is built into the cost of rent or Homeowners Association dues. This provision is expected to further increase farebox recovery because all households will be subject to the requirement, but not all would necessarily be regular Muni riders; 3) SF State currently has a very high transit mode share to campus. It is possible a new transit pass fare "Class Pass" product could be designed and paid for through SF State student fees—further encouraging transit access to campus and providing an additional fare revenue stream to support the proposed project. Finally, the project may create opportunities to reduce long-term operating and maintenance costs. The forecast $2 million/year in operating cost savings described in Chapter Four is one example of this. Another opportunity that will be pursued is identifying opportunities for station maintenance to be provided by adjacent landowners (e.g. Stonestown station maintained by Stonestown Galleria and/or Mercy High School, SF State continuing existing practice to maintain SF State station, and Parkmerced maintaining stations within their site).

- **JOINT DEVELOPMENT OF CITY-OWNED PROPERTY:** A few opportunities may exist for joint development. This includes the opportunity to develop on land currently used by the M-Ocean View, such as in the Lakeside private right-of-way, if there is sufficient community support. More work will be done in the next phase of Pre-environmental Study to explore options for how land could be re-purposed, but the most likely candidate opportunity site is at the intersection between the private right-of-way and Ocean. While several community members have already expressed a desire for the area between Ocean Avenue and 19th Avenue to be a green, landscaped walkway, the area on the northeast side of Ocean Avenue between two adjacent buildings represents a joint development opportunity. The next phase of work should also identify other city-owned land adjacent to the corridor that might be a candidate for joint development, such as the surface parking lot in the southeast corner of the Ocean Avenue/19th Avenue intersection.

LOCAL NON-CITY SOURCES

Local Non-City sources potentially available to support the project include:

- **CONTRIBUTIONS FROM GENERAL GROWTH PROPERTIES.** General Growth Properties has indicated that they are considering options for additional development or land use changes to their site. While no development plans have been submitted, the progress made during this phase of work in suggesting a new station location adjacent to the more northern part of the Stonestown Galleria property will be instructive to General Growth Properties to inform additional consideration of land use changes in the next phase of work. If a development were to move forward, a financial contribution to this project could be an opportunity to address potential increases in trip generation created by additional uses on the site.
- **CONTRIBUTIONS FROM SF STATE.** SF State has already made a $1.83 million commitment towards a new station on the west side of 19th Avenue. Given the benefits to campus, additional exploration of other creative financing sources is warranted. One idea to be

considered further in the next phase of work is the potential to re-dedicate revenue currently used to fund operations of an extensive shuttle system that circulates campus and to/from the Daly City BART station. SF State currently spends more than $700,000/year on shuttle service that includes a campus circulator shuttle as well as frequent service between campus and the Daly City BART station.[4] Most SF State students who access the campus by transit are travelling from San Francisco or the East Bay and choose the Daly City BART-to-shuttle journey to campus because it is the fastest. In addition, the combination of the free round-trip transfer on the Muni 28/28L and the free campus-run shuttle make Daly City a cost effective choice for East Bay commuters, in particular, compared with paying $1.75 to transfer to the M line at a downtown station. If the proposed project trims five or more minutes off of the journey to campus by way of the M-Ocean View and the travel time by way of M-Ocean View then becomes competitive with the Daly City BART-to-shuttle journey and there is financial incentive comparable to the free transfer at Daly City BART, such as a Muni class pass, it is possible SF State would no longer need to run such an extensive shuttle system and instead could dedicate some of that funding towards the project. This could be an attractive revenue stream to re-pay a TIFIA loan.

- **CONTRIBUTIONS FROM PARKMERCED.** Parkmerced is already committed to building the Baseline, an investment estimated at $70 million, that could be modified to be consistent with a grade-separated alternative.[5] Additionally, Parkmerced's Transportation Plan currently calls for operating of a shuttle system to serve the Daly City BART station as well as a Shopper Shuttle that would service Westlake Shopping Center in Daly City and Stonestown Galleria. The shuttle systems operating cost is estimated at $625,000 year and could represent another opportunity to re-purpose some or all of this funding to support the proposed project.
- **OTHER LAND-BASED SOURCES.** Because of improved transit accessibility, transit service, circulation improvements, and public realm improvements that will make the area more attractive, the proposed project is expected to increase property values adjacent to the Study corridor. As a result, two land-based revenue sources may be in the interest of the adjacent westside property owners to consider: a Community Facilities District (Mello-Roos, CFD) or an Infrastructure Financing District (IFD). Both cases typically require approval by the Board of Supervisors within the CFD or IFD and would be eligible to fund improvements such as the proposed project. They differ in that the CFD levies an additional special tax on real property, while an IFD's revenue is generated by the tax increment on ad valorem property taxes within the district; the increment is the valuation growth above the base valuation established at the time the district is established. A trade-off of IFD is this funding is then lost to the City's general fund, making it less attractive to other city agencies that would need to be involved in pursuing IFD. These types of sources would be more likely to be used to re-pay a TIFIA loan than to provide an up-front capital investment.

While the project's most likely capital cost of $520 million in 2013 dollars is substantial and there are multiple competing priorities within San Francisco and the Bay Area region for capital funds, the project is expected to be competitive for many federal, state, regional, local, and private funding sources.

6.3 Project Development and Delivery Options and Considerations

A project of this scale and cost will require significant coordination to ensure a streamlined project development and implementation process. If a decision is made to pursue the project, then ensuring an expedited timeline will be of great importance given the timeline articulated in the Development Agreement. This section spells out some initial considerations

[4] SF State, FY 2009–10 to FY 2011–12, Shuttle Expenditures.

[5] Cost estimate based on conceptual design subject to refinement. Perkmerced's responsibility is to construct the segment of the M-Ocean View through the Parkmerced site, regardless of the actual cost

that can support a streamlined, efficient project development path. The proposed project seeks to apply the lessons learned from other recent major capital projects under development in the city.

PROJECT PHASING: Given the project's scale, a phasing strategy may be attractive to pursue that allows parts of the project to be implemented before others. The Northern and Southern grade separations can be seen as separate phases of the project, with potential for the Southern Bridge to proceed in advance of the Northern Longer Subway, especially since, as a smaller and less complex project, it could be built in parallel to advancing design on the Longer Subway phase.

INTEGRATED TEAMS AND PROJECT CHARTER: For the feasibility study, the core project team was led by a Transportation Authority project manager in partnership with SFMTA, SF Planning, and the west side landowning partners of General Growth Properties, SF State, and Parkmerced. The team has also consulted with other relevant agencies including Caltrans (also a funder of the Study), the Office of Economic and Workforce Development, BART, the Department of Public Works, and the Public Utilities Commission. The Transportation Authority project manager for the feasibility study phase also managed a technical consultant team (Arup, Fehr & Peers, Office of Cheryl Barton, Circlepoint), although a new consultant procurement process will be needed for consultant assistance in the next phase of work). The partnership worked well in the feasibility study phase, but more vetting and decision-making will need to happen in the next phase and a more formalized level of collaboration is expected to be beneficial. As a result, the team could pursue an integrated project team of SFMTA and Transportation Authority staff to ensure a streamlined process in the next phase of Pre-environmental Study. To support this integrated team model, a Project Charter would be created as a tool to guide the project development process while minimizing scope changes, and cost overruns, and maintaining the project schedule. As the project enters into more detailed design in later phases, a project office, staffed with agency staff and consultants may be formed, following in the model used for the Central Subway.

DELIVERY OPTIONS (DESIGN-BID-BUILD, DESIGN-BUILD): In subsequent phases of project development, the team will need to make a decision about the project delivery method. The traditional method of Design-Bid-Build is a method in which the agency leading the project contracts with separate entities for both the design and construction of a project. This gives the agency more control over design aspects of the project, but can be harder to control costs and schedule and can result in more risk to the agency. In contrast, Design-Build relies on a single entity contracting method that can shift risk from the agency to the contractor and can reduce the overall delivery schedule by overlapping the design and construction phases of a project. The tradeoff is the reduced ability for the agency to influence design decisions without significant impacts to budget and schedule. While more work will be done to inform decision-making on the delivery method, the design-build method may be more attractive for the Northern Longer Subway part of the project which is quite complicated, while the Design-Bid-Build method may be more attractive to pursue for the Southern Bridge, given that the aesthetics of the bridge will be of great interest to have control over. In either case, Parkmerced will design and build the segment through their site Parkmerced as agreed to in the Development Agreement.

6.4 Conclusion

The 19th Avenue Transit Study identifies multiple feasible west-side grade-separated alignment alternatives for the M-Ocean View and 19th Avenue between Sloat and Brotherhood Way. It finds that that one of the alternative—the Longer Subway and Bridge—would provide the greatest benefits including substantial improvements to the speed, reliability, and

capacity of the M-Ocean View light-rail line, as well substantial pedestrian and bicycle upgrades by freeing up space to provide wider sidewalks, landscaped medians, and new cycling infrastructure. The estimated capital cost of this alternative ranges from $420–$720 million (most likely $520 million) in 2013 dollars, including all soft costs. This alternative not only performs best according to the Study's technical evaluation of its ability to meet the Study's goals and objectives, but it also is widely supported by surrounding neighborhood leaders and stakeholders.

These findings will be the basis for the next phase of project development, which will be carried out between approximately Spring 2014 and Summer 2015. This phase will include analysis of multiple variations with potential to provide further transit performance, access, and non-motorized safety benefits (St. Francis Circle grade separation, Ocean Avenue underground station, full subway through Parkmerced) and preparation of a Project Study Report as required for projects affecting the state-owned right-of-way. Between approximately 2015 and 2018, environmental review will be undertaken, in compliance with the National Environmental Policy Act and the California Environmental Quality Act, providing additional information on the project's environmental impacts and mitigations, before making an implementation decision. While the project's most likely capital cost of $520 million in 2013 dollars is substantial and there are multiple competing priorities within San Francisco and the Bay Area region for capital funds, the project is expected to be competitive for many federal, state, regional, local, and private funding sources. The project represents a unique example of coordinated land use and transportation planning using a collaborative public-private partnership approach. The effort illustrates how investments made in support of new growth can be coordinated such that they not only mitigate their own transportation impacts, but also catalyze improvements that address underlying existing transportation needs.