3.3 Transit Conditions

3.3.1 | Regulatory Setting

3.3.1.1 | SAN FRANCISCO GENERAL PLAN

The San Francisco *General Plan* (*General Plan*) addresses seven issues: land use, circulation, housing, conservation, open space, noise, and safety. Ten elements (sections), including the Transportation Element, comprise the plan. The *General Plan* also contains several area plans that cover specific geographic areas of San Francisco. The study area includes portions of the following area plans: Western Shoreline, Van Ness Avenue, Market Octavia, Civic Center, Downtown, South of Market, East SoMa, Northeastern Waterfront, and Rincon Hill.

The following sections of the Transportation Element are relevant to the Geary corridor: Transit First Policy, Policy 1.3, Policy 4.1, Policy 14.3, Policy 14.4, Policy 20.4, Policy 20.9, Policy 20.13, Policy 21.1, and Policy 21.2 are summarized below.

- **Transit First Policy:** The purpose of the Transit First Policy, first adopted by the San Francisco Board of Supervisors in 1973, is to restore balance to the transportation system in San Francisco that has long been automobile-dominant, and to improve overall mobility for all residents and visitors. Transit First encourages multimodalism, the use of transit and other alternatives to single-occupancy vehicles, and gives priority to the maintenance and expansion of the local transit system and improvement of regional transit coordination. Geary (both Boulevard and Street) is identified as a Transit Preferential Street in the Transit First Policy, along with O'Farrell Street between Market Street and Gough Street. The Transit Preferential Street program includes measures to improve transit vehicle speeds and minimize restraints of traffic on transit operations.
- **Policy 1.3:** Give priority to public transit and other alternatives to the private automobile as the means of meeting San Francisco's transportation needs, particularly those of commuters.
- **Policy 4.1:** Rapid transit lines from all outlying corridors should lead to stations and terminals that are adjacent or connected to each other in downtown San Francisco.
- **Policy 14.3:** Improve transit operation by implementing strategies that facilitate and prioritize transit vehicle movement and loading.
- **Policy 14.4:** Reduce congestion by encouraging alternatives to the single-occupant auto through the reservation of right-of-way and enhancement of other facilities dedicated to multiple modes of transportation.
- **Policy 20.1:** Give priority to transit vehicles based on a rational classification system of transit preferential streets.
- **Policy 20.4:** Develop transit preferential treatments according to established guidelines.
- **Policy 20.9:** Improve inter-district and intra-district transit service.

- **Policy 20.13:** Create dedicated bus lanes and Bus Rapid Transit (BRT) lanes to expedite bus travel times and improve transit reliability.
- **Policy 21.1:** Provide transit service from residential areas to major employment centers outside the downtown area.
- **Policy 21.2:** Where a high level of transit ridership or potential ridership exists along a corridor, existing transit service or technology should be upgraded to attract and accommodate riders.

The *General Plan* is regularly amended as necessary. The Transportation Element was last amended in December of 2010.

3.3.1.2 | SAN FRANCISCO TRANSPORTATION PLAN

The San Francisco Transportation Plan is the City's 30-year plan to identify goals, needs, and investment priorities for its transportation system. The plan identifies and supports transportation projects that improve how people travel in and around San Francisco. The San Francisco County Transportation Authority (SFCTA) adopted the first plan in 2004, and it established the City's investment strategy and policy initiatives including BRT. The previous version of the plan was released in December 2013 and described the planned key transportation investments to maintain livability, improve mobility, and provide accessibility for all travelers in Francisco. Among its key goals were to continue developing the City's rapid transit network, which includes BRT corridors, to promote faster transit travel times and increased reliability.

In 2017, SFCTA adopted SFTP 2040, an update to the 2013 SFTP. The updated SFTP reaffirmed the 2013 plan's goals, investment plan, and supporting policy recommendations. SFTP 2040 provided an update on existing and future conditions impacting the San Francisco transportation system, revised transportation funding revenue forecasts, updated project costs, and reassessed projects previously identified for funding in the 2013 plan. The new plan confirmed the importance of Geary BRT to achieving the plan's goals by including the project in the SFTP 2040 Investment Plan.

3.3.1.3 | TRANSIT EFFECTIVENESS PROJECT/MUNI FORWARD

San Francisco Municipal Transportation Agency (SFMTA) completed a comprehensive evaluation and overhaul of San Francisco's transit network known as the Transit Effectiveness Project (TEP) in 2014. Since 2014, many TEP recommendations have been implemented as a part of the Muni Forward program. Recommendations included changes to make Muni service more efficient, reliable, safe, and comfortable for its existing 700,000 daily passengers. The TEP was developed over several years of data collection, intensive planning, and public outreach efforts. Since completion, SFMTA has begun implementation of recommendations that have restructured transit service on certain transit lines to improve efficiency and connectivity and implement transit priority changes on the most heavily used lines to give buses and trains more priority on some City streets. The TEP's Draft EIR was released in 2013, and the Final EIR was published and certified in March 2014. SFMTA implemented the TEP's recommendations for the Geary corridor including increased peak period transit service frequencies on the Geary corridor and introduction of 38-Rapid service on Sundays. The SFMTA Board of Directors approved the final TEP plan on March 28, 2014.

3.3.2 | Affected Environment

San Francisco is served by several agencies providing public transportation services. SFMTA provides most transit operations in San Francisco, operating about 65 bus routes, six light rail lines, three cable car lines, and two historic streetcar lines.

Because it provides a direct route from the northwest part of the City to the downtown area, the Geary corridor is one of the most heavily traveled transit corridors in San Francisco. SFMTA currently operates four Muni bus routes on the Geary corridor that provide connections to both local and regional transit services. The Geary corridor bus routes currently provide local, rapid, and express service on Geary Boulevard, Geary Street, and O'Farrell Street, and can be characterized by high ridership throughout the day, with even higher usage during the a.m. and p.m. peak hours.

3.3.2.1 | SFMTA

SFMTA oversees all Muni transit service, bicycle and pedestrian programs, taxis, parking and traffic control operations in San Francisco. The SFMTA light rail system, a mixture of above- and below-ground service, has six routes serving residential areas and the downtown core. About 65 local, rapid, and express routes comprise the SFMTA bus system.

In addition to light rail and buses, SFMTA operates three cable car routes and two historic streetcar routes (F-Market & Wharves and E Embarcadero). A number of SFMTA transit routes connect to other regional transit providers, including Caltrain, Bay Area Rapid Transit (BART), and SamTrans.

SFMTA routes operate throughout the day; actual hours and headways vary by route and type of service (e.g., Owl service only runs during late-night hours and express routes run during weekday peak hours only). SFMTA's hours of operation for light rail service are between about 4 a.m. to 2 a.m. daily with slight variations by route.

Headway is the amount of time scheduled between two subsequent buses. A headway of 10 minutes means that a bus should arrive once every 10 minutes

3.3.2.1.1 GEARY CORRIDOR ROUTES

Four SFMTA routes currently serve the Geary corridor. Table 3.3-1 displays existing SFMTA transit services on the Geary corridor including hours of operation, headways, and average weekday ridership. Figure 3.3-1 depicts all existing public transit services along the Geary corridor.

Geary corridor bus service primarily operates on Geary Boulevard, Geary Street, O'Farrell Street, and Market Street. In addition to these streets, Geary bus service also operates on short segments of 48th, Point Lobos, 42nd, and 43rd avenues, Fremont and Beale streets, and Veterans Drive.

The 38 Geary (38 or 38 Local) route has a total of 98 stops (both directions) and provides local service along Geary Boulevard, Geary Street, and O'Farrell Street from 48th Avenue to the Transbay Transit Center. There are 48 eastbound[1] stops, 29 of which are located directly on Geary Boulevard, and 50 westbound stops, 41 of which are on Geary Boulevard or Geary Street. These stops are shared with express

[1] The Geary corridor travels in an east-west orientation. Eastbound buses are also considered 'inbound' lines whereas westbound buses are considered 'outbound' lines. As such, the terms eastbound/inbound and westbound/outbound are used interchangeably throughout this Draft EIS/EIR.

route stops where stops overlap. Normal service is from 5 a.m. to 1 a.m., with more frequent service during the a.m. and p.m. peak hours. From 1 a.m. to 5 a.m., Owl service makes all stops, but buses are run less frequently.

The 38 Geary Rapid (38R or 38 Rapid) travels the same route with only 24 stops in both directions. It has higher frequencies during the a.m. and p.m. peak periods and is typically a faster way to traverse the long corridor. The 38R operates from 6 a.m. until about 9:30 p.m.

Geary's current express routes are the 38 Geary B Express (38BX) and 38 Geary A Express (38AX). These routes only operate weekdays during the peak period in the peak direction (eastbound during the a.m. peak and westbound during the p.m. peak). The 38AX begins at 48th Avenue and makes limited stops to 25th Avenue, and then it operates express to the Financial District (via Bush and Sansome streets). In total, this route has 14 stops, 10 of which are west of 25th Avenue. The 38BX has 18 stops between 25th Avenue and its terminus at California and Battery streets. These routes provide weekday peak-direction express service during the peak hour and alleviate crowding on both the local and Rapid routes.

Table 3.3-1 Existing SFMTA Transit Services on Geary Corridor

ROUTES	ROUTE BOUNDARIES	WEEKDAY HOURS OF OPERATION	WEEKDAY A.M./P.M. PEAK HEADWAYS (MIN)	AVERAGE WEEKDAY RIDERSHIP (2011)
38 Geary	48th Avenue to temporary Transbay Transit Center	24 hour service	7.5/7.5	28,100
38R Geary Rapid	48th Avenue to temporary Transbay Transit Center	6 a.m. to 9:40 p.m.	4/5	27,100
38AX Geary A Express	48th Avenue to Davis/Pine streets	a.m. Peak Period/p.m. Peak Period	10/between 10 and 20	800
38BX Geary B Express	48th Avenue to Davis/Pine streets	a.m. Peak Period/p.m. Peak Period	10/between 10 and 20	900

Source: SFMTA, 2017. Headways for each service type represent combined headways east of 25th Avenue.

3.3.2.1.2 TRANSIT ROUTES CROSSING GEARY BOULEVARD

A number of SFMTA bus and light-rail lines cross the Geary corridor, offering multiple transfer opportunities to passengers of bus routes that travel along the Geary corridor. These crossing routes are listed in Table 3.3-2, including information on each route's operating characteristics and average weekday ridership. Figure 3.3-1 depicts all transit services that currently traverse or intersect with the Geary corridor.

Transfer points along the Geary corridor include routes 18 46th Avenue, 19 Polk, 22 Fillmore, 24 Divisadero, 27 Bryant, 28/28R 19th Avenue, 29 Sunset, 30 Stockton, 33 Stanyan, 43 Masonic, 44 O'Shaughnessy, 45 Union Stockton, 47 Van Ness, 49 Van Ness/Mission, Powell-Mason cable car, and Powell-Hyde cable car. Figure 3.3-1 shows bus routes that intersect the 38 and 38R.

Geary corridor bus routes also connect passengers to transit services near Market Street, providing access to regional and local services including BART, Muni light rail, and other Muni bus routes at Market Street.

Table 3.3-2 Existing Transit Routes Crossing the Geary Corridor

ROUTES	CROSS STREET AT GEARY	WEEKDAY HOURS OF OPERATION	WEEKDAY A.M./P.M. PEAK HEADWAYS (MIN)	AVERAGE WEEKDAY RIDERSHIP (2011)
18 46th Avenue	33rd Avenue	5 a.m. to 1 a.m.	20/20	3,700
29 Sunset	25th Avenue	5:45 a.m. 1 a.m.	10/10	18,800
28 19th Avenue	Park Presidio Boulevard	5:45 a.m. 1 a.m.	11/10	12,800
28L 19th Avenue	Park Presidio Boulevard	a.m. Peak and p.m. Peak Only	12/-	3,000
44 O'Shaughnessy	6th Avenue	5 a.m. to 1 a.m.	9/9	16,900
33 Stanyan	Arguello Boulevard	5 a.m. to 1 a.m.	15/15	6,200
43 Masonic	Masonic Avenue	5 a.m. to 1:10 a.m.	10/12	12,000
24 Divisadero	Divisadero Street	24 hours daily	10/10	11,400
22 Fillmore	Fillmore Street	24 hours daily	9/8	16,800
49 Mission/Van Ness	Van Ness Avenue	6 a.m. – 1:15 a.m.	8/8	26,800
47 Van Ness	Van Ness Avenue	6 a.m. – 1:15 a.m.	10/10	13,100
19 Polk	Polk Street	5:20 a.m. to 1:30 a.m.	15/15	7,600
27 Bryant	Leavenworth Street/ Jones Street	5 a.m. to 1 a.m.	15/15	7,900
30 Stockton	Mason Street/ Kearny Street	5:20 a.m. to 1:30 a.m.	7.5/8	32,400
45 Union Stockton	Mason Street/ Kearny Street	5:30 a.m. to 1 a.m.	8/12	11,700
Golden Gate Transit Route 92	Park Presidio to Webster Street	a.m. Peak and p.m. Peak Only	Between 30 and 60/between 30 and 60	230
Other Golden Gate Transit Routes: 10, 70, 101/101x, 54, 93	These routes cross the Geary corridor at Van Ness Avenue	Varies	Varies	Varies by route
BART	Market Street at Montgomery BART	4 a.m. to 12 a.m.	3/3	44,300*

Connecting services at Market Street include the 9R-San Bruno, 9L-San Bruno Limited, F-Market & Wharves, J-Church, KT-Ingleside/Third Street, L-Taraval, M-Ocean View, and N-Judah routes. Connecting services at Market Street and Sansome Street include the 10-Townsend and 12-Folsom/Pacific routes. Connecting services at Market Street between 3rd and 5th Streets include the 8X Bayshore Express, 8AX-Bayshore A Express, 8BX-Bayshore B Express, and 81X-Caltrain Express (NB Only) routes. *Average Weekday Entries to Montgomery Street BART Station, 2015.

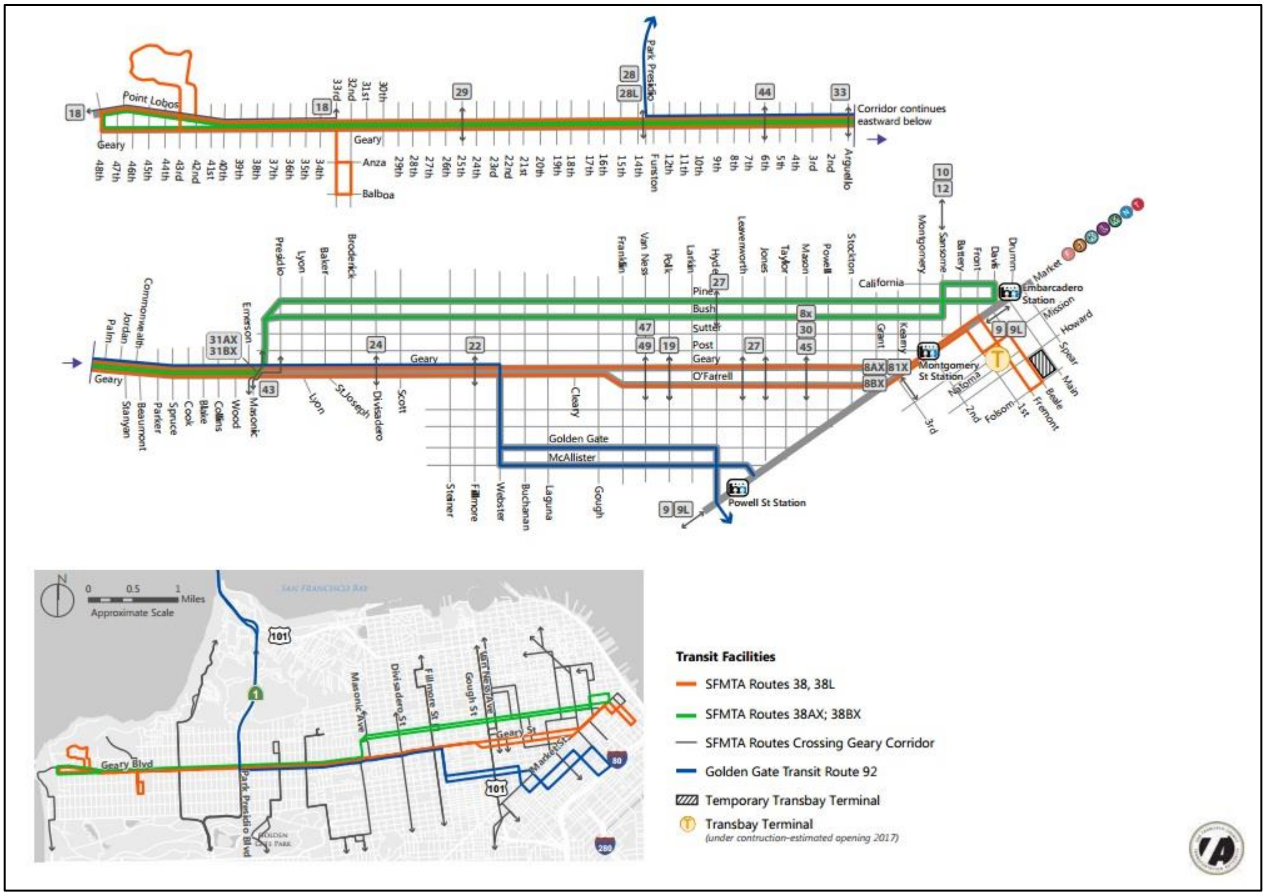
Source: SFMTA, 2013; BART, 2015; Golden Gate Transit, 2013.

3.3.2.2 | GOLDEN GATE TRANSIT SERVICES

Golden Gate Transit is a public transit system serving Marin and Sonoma counties, with connections to San Francisco and Contra Costa counties. The Golden Gate Bridge Highway and Transportation District operates Golden Gate Transit service which has 20 bus routes. Most routes operate weekdays only in the a.m. and p.m. peak-travel periods (about 6 to 9 a.m. and 4 to 8 p.m.). Golden Gate Transit Route 92 provides interregional connections to the Geary corridor from the North Bay. Route 92 operates along Geary Boulevard (between Park Presidio Boulevard and Webster Street) on part of its route. The entire route spans from Manzanita Park and Ride in Mill Valley (Marin County) to Third and Perry streets in San Francisco. Several other Golden Gate Transit routes cross Geary Boulevard at Van Ness Avenue.

Route 92 makes eight eastbound and eight westbound stops along Geary Boulevard. Route 92 operates only in the weekday a.m. and p.m. peak periods. In the southbound direction (Marin County to San Francisco), Route 92 operates between 6:30 and 9:30 a.m. and 3 and 7 p.m. at 30- to 60-minute headways. In the northbound direction (San Francisco to Marin County), Route 92 operates between 7 and 9 a.m. and 3 and 6 p.m. Average weekday ridership on Route 92 is 226 passengers. Of these passengers, an average of 122 travel in the northbound direction from San Francisco into Marin County each day. An average of 104 passengers travel southbound from Marin County into San Francisco. Figure 3.3-1 depicts all transit services that currently traverse or intersect with the Geary corridor, including Golden Gate Transit Route 92.

Figure 3.3-1 Existing Geary Corridor Transit Routes



Source: Fehr & Peers, 2014.

3.3.2.3 | PRIVATE SHUTTLES

The Geary corridor is also served by several private shuttle services. Most shuttles are institutionally based, though several private employer shuttles cross the Geary corridor at various points along their routes. Key private shuttle services are described below.

- **Kaiser Permanente San Francisco Medical Center Downtown Commuter Shuttle Service:** The Kaiser shuttle operates on weekdays in the a.m. peak (6:20 a.m. and 9:45 a.m.) and the p.m. peak (2:30 p.m. and 7:15 p.m.). The shuttle starts at the Transbay Transit Center at First and Mission streets and terminates on Sixth Avenue between Geary Boulevard and Anza

Street. The Kaiser shuttle stops at the Kaiser Campus at 2238 Geary Blvd. near the intersection of Divisadero Street, and at Sixth Street between Geary Boulevard and Anza Street (660 6th Street). Passengers on the Kaiser Shuttle can also connect to Muni service at the Civic Center Station, another stop on the shuttle's route.[2]

- **UCSF Shuttles:** University of California, San Francisco (UCSF), a major educational institution, health-care provider, and regional employer, operates 15 shuttle routes within San Francisco, connecting students, employees, and patients to their facilities and campuses. Three following three UCSF shuttle routes intersect with or travel along the Geary corridor:
  - **The Blue route** crosses Geary Boulevard at Masonic Avenue, but it does not stop on the Geary corridor. This shuttle connects San Francisco General Hospital in Mission Bay to the UCSF Medical Center at Mount Zion.
  - **The Tan route** travels along Geary Boulevard between Stanyan Street to the west and Scott Street to the east; however, the Tan route does not make a stop on the Geary corridor. The Tan route connects the UCSF Medical Center just south of Golden Gate Park on Parnassus Avenue to the UCSF Medical Center at Mount Zion.
  - **The Purple route** connects the UCSF Medical Center on Parnassus Avenue to the UCSF Medical Center at Mount Zion. Along its route, the Purple route shuttle stops at 3360 Geary Street between Commonwealth and Parker avenues. The Purple route stops about 16 times daily at this location between 6:45 a.m. and 6 p.m. on weekdays only.[3]
- **Institute on Aging:** The Institute on Aging has multiple locations along the Geary corridor that are served by shuttles. The main Coronet Campus (3575 Geary Boulevard) and the On Lok Lifeways facility (2700 Geary Boulevard) both have curbside shuttle passenger-loading areas at the entrance to the buildings. A variety of shuttle and paratransit service providers temporarily stop in front of the building and require sidewalk access to load and unload disabled senior passengers.
- **Other Shuttles:** Other shuttles such as the Academy of Art University shuttle, tour buses, private shuttles (such as Chariot), and private technology company shuttles also operate on the Geary corridor. Most private technology company shuttles currently travel on perpendicular streets and do not stop directly on the Geary corridor.

3.3.2.4 | EXISTING SFMTA OPERATING CHARACTERISTICS

This section discusses existing SFMTA bus performance along the Geary corridor. It specifically addresses bus stops and transfer points along the corridor, ridership, crowding, travel time, speed, delay and route segment reliability on routes 38 Geary, 38R, 38AX, and 38BX. In this section, references to Geary Rapid or express service include routes 38R, 38AX, and 38BX; 38 refers to Geary local service. All data was collected in 2011 using SFMTA Automatic Passenger Counter (APC) technology. Figure 3.3-1 shows the locations of current bus routes that operate on or across the Geary corridor.

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[2] http://www.permanente.net/homepage/kaiser/pdf/36879.pdf.

[3] http://campuslifeservices.ucsf.edu/transportation/services/shuttles/routes_timetables.

3.3.2.4.1 RIDERSHIP

The total weekday ridership for routes 38, 38R, 38AX, and 38BX combined is over 50,000 trips, or boardings per weekday. Figures 3.3-4 and 3.3-5 detail boardings by stop along the Geary corridor. In current conditions, 38R ridership is generally slightly higher than Local bus ridership throughout the corridor. The westbound direction experiences the highest number of daily boardings at Geary and Powell streets with about 1,600 boardings per day on route 38, as well as 1,600 boardings per day on route 38R. The 38 eastbound route experiences the highest boardings at Geary Boulevard and Fillmore Street (about 700 passengers per day) and the 38R route has the most daily boardings at Geary Boulevard and Divisadero Street (almost 1,200 passengers per day). Table 3.3-3 summarizes seating capacities for Geary corridor bus routes.

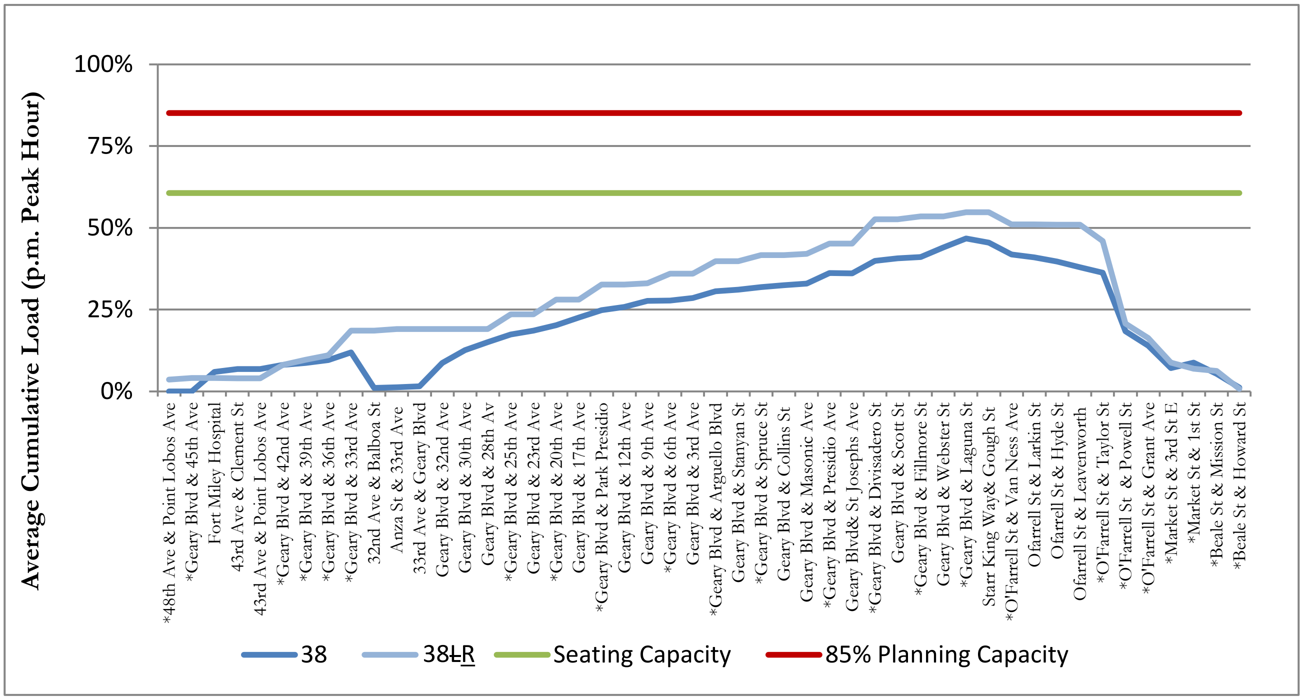
Table 3.3-3 Bus Capacities for Geary Corridor Routes

ROUTES	SEATING CAPACITY	85% CAPACITY	100% CAPACITY
Route 38 (Local)	57	80	94
Route 38R	57	80	94
Route 38AX	36	54	63
Route 38BX	36	54	63

Source: SFMTA

Figures 3.3-2 and 3.3-3 display average peak hour passenger load by stop on both eastbound and westbound 38 and 38R routes. Seating capacity and the 85 percent planning capacity used by SFMTA are also shown. SFMTA seeks to maintain transit frequencies that maintain passenger loads at or below this threshold.

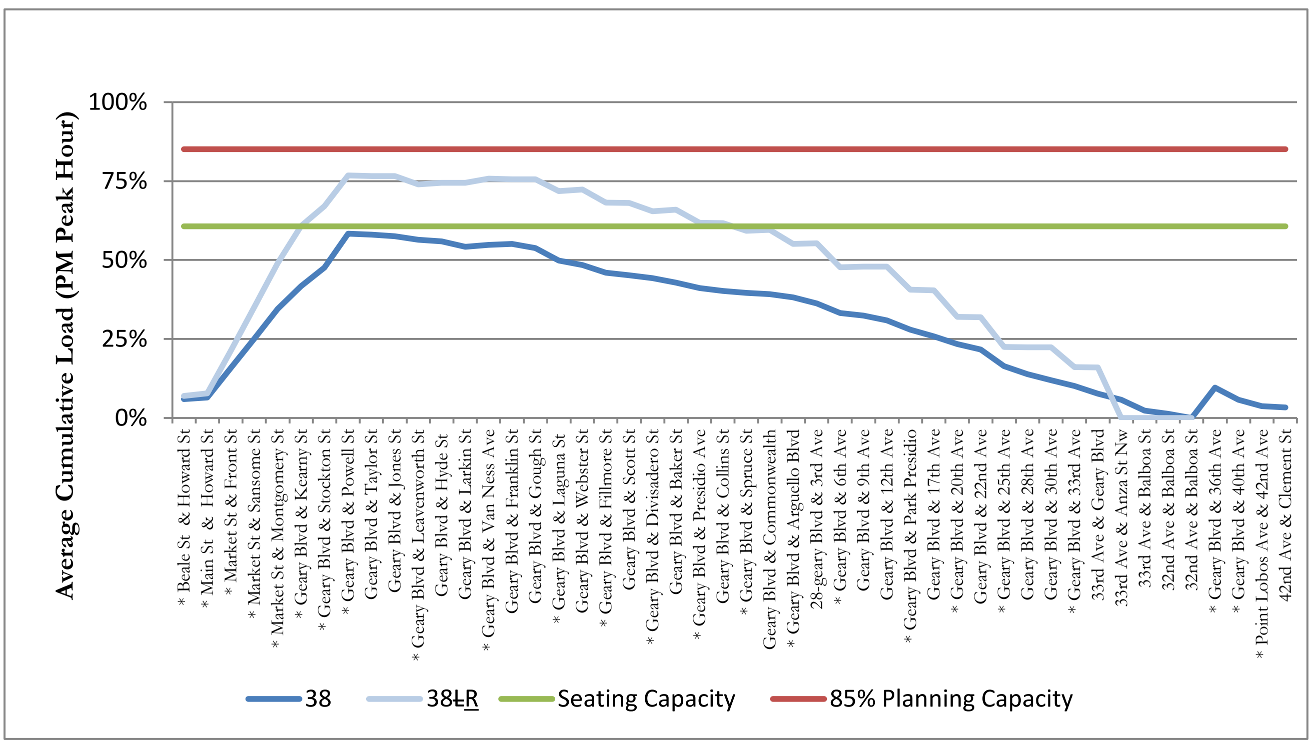
Figure 3.3-2 Average Load by Stop: Eastbound P.M. Peak Hour, 38 and 38R



*Denotes Route 38-Geary and Route 38R-Geary Rapid combined stop.

Source: SFMTA, Fall 2012 APC Data, "Average Max Loads by Stop"

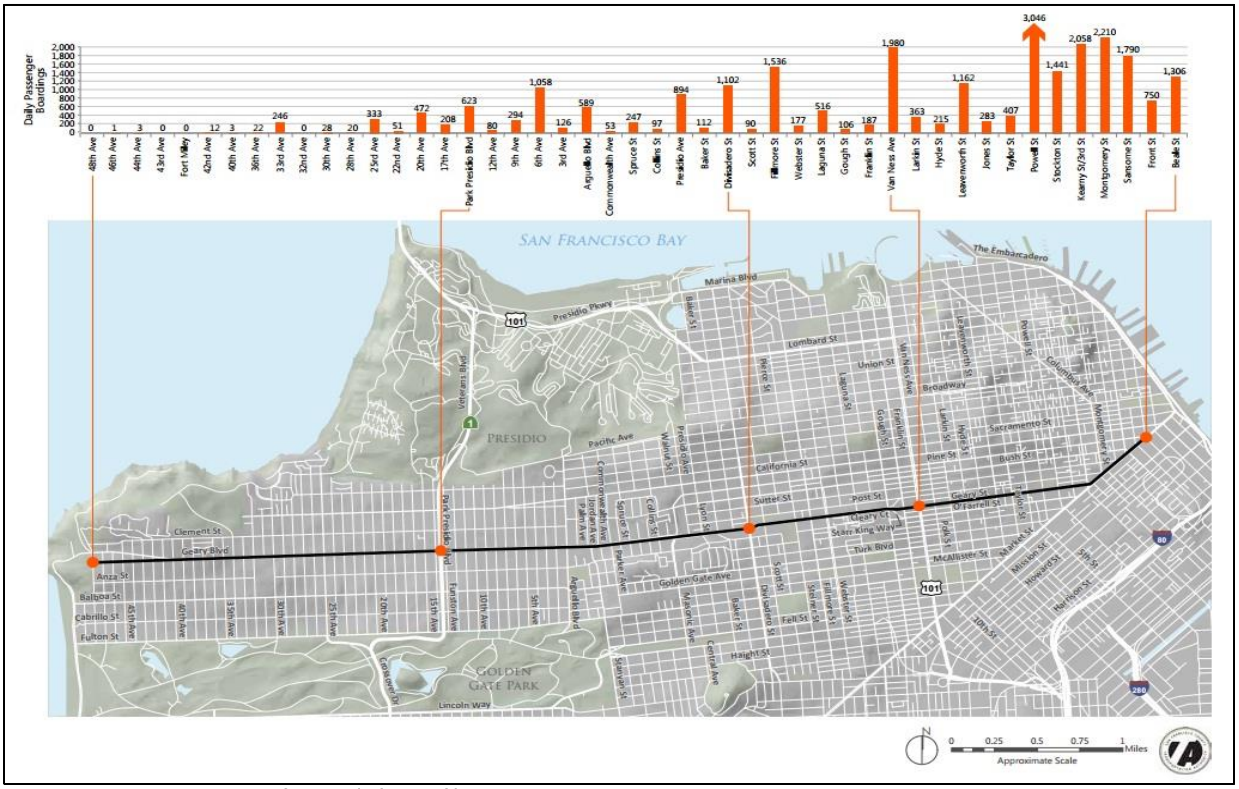
Figure 3.3-3 Average Load by Stop: Westbound P.M. Peak Hour, 38 and 38R



*Denotes Route 38-Geary and Route 38R-Geary Rapid combined stop.

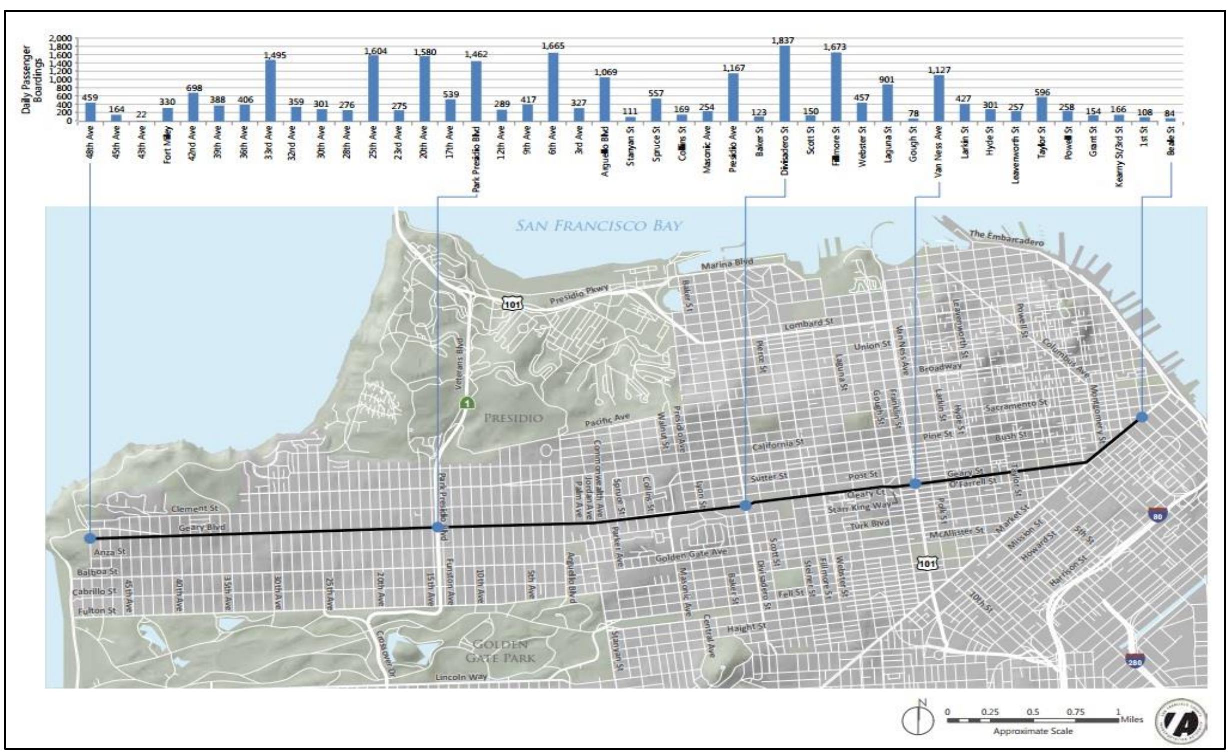
Source: SFMTA, Fall 2012 APC Data, "Average Max Loads by Stop"

Figure 3.3-4 Existing Westbound Transit Boardings along Geary Corridor



Source: Fehr & Peers, 2014.

Figure 3.3-5 Existing Eastbound Transit Boardings along Geary Corridor



Source: Fehr & Peers, 2014.

Afternoon (p.m.) peak-period passenger loads are shown because they represent the period when the maximum use of the transportation system occurs. The focus on p.m. peak hour results is also consistent with the recommendations in the San Francisco Planning Department's Transportation Impact Analysis Guidelines, the document that guides California Environmental Quality Act- analysis in the City of San Francisco. While *average* load during p.m. peak hours does not exceed the 85 percent capacity utilization threshold, a high proportion of buses experience substantially more crowding than the hourly average load, resulting in excessive bus bunching and unreliability throughout the peak periods.

A bus is considered to be bunched if it arrives at a station less than one or two minutes after the previous bus.

3.3.2.4.2 BUS CROWDING (LOAD FACTOR)

Bus crowding, which is also referred to as capacity utilization or "load factor," is measured by the number of passengers on board a bus relative to the vehicle's carrying capacity. SFMTA regularly measures and reports bus crowding on all transit routes. The point along the corridor with the highest number of bus passengers on board is referred to as the "maximum load point." This point differs depending on the route and direction. During the p.m. peak hour, the maximum load point on both the 38 and 38R westbound routes is at the Geary and Powell stop. The maximum load point for the 38AX and 38BX westbound routes during the p.m. peak hour is at the Pine and Montgomery stop. The 38R route experiences the most crowding during the p.m. peak hour of the four Geary corridor routes. During the a.m. peak hour, the maximum load point on the inbound 38 eastbound route is at the O'Farrell and Leavenworth stop; the 38R eastbound route maximum load point is at Geary and Laguna.

The 85 percent planning capacity is SFMTA's established capacity utilization threshold for peak period ridership, meaning total seated and standing loads are at 85 percent of the total bus capacity

3.3.2.4.3 TRAVEL TIME, SPEED, AND DELAYS

Transit performance can be indicated from a route's travel time and speed, as well as the amount of time transit vehicles are spent delayed. Travel times or speed are directly affected by delays on the corridor. Delays can be caused by a multitude of sources, including:

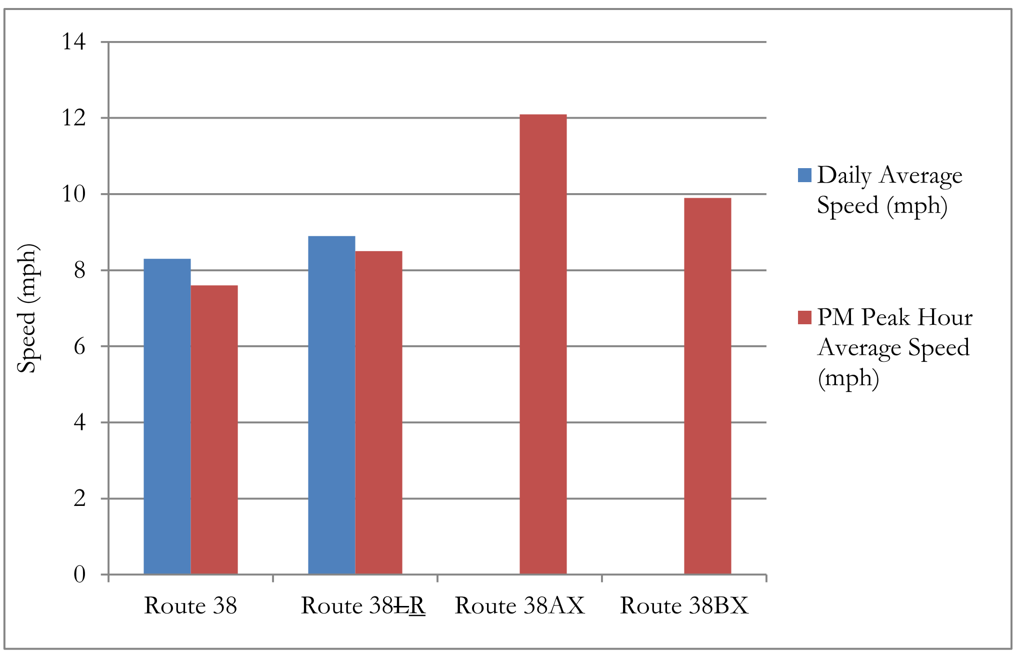
- **Transit Stop Delay**: Delay caused by buses decelerating and pulling into a transit stop as well as accelerating back up to average speed. Buses may delay other buses at transit stops. Local buses that do not pull fully out of the rightmost travel lane to access a stop can obstruct rapid stop buses attempting to pass.
- **Dwell Delay**: Delay caused by Muni customers entering and leaving the transit vehicle. This is measured from the time of opening the doors to closing the doors. Long dwell times can be a result of high passenger demand, a large number of passengers paying cash fares, or slow boarding and exiting due to crowded conditions within a bus.
- **Merge Delay**: Delay caused by a transit vehicle merging back into traffic after serving a transit stop.
- **Congestion Delay**: Delay caused by traffic queues such as those due to turning traffic waiting for gaps in crossing pedestrians or general traffic congestion.

- **Traffic Signal Delay**: Delay caused by a traffic signal, including stopped and congestion delay.
- **Stop Sign Delay**: Delay caused by a stop sign, including deceleration, re-acceleration, and congestion.
- **Parking Delay**: Delay caused by delivery vehicles, parking maneuvers, double parking, driveways, and other on-street parking friction factors. Drivers seeking a parking space may also drive slowly and interfere with bus operations as they search for a spot.

As shown in Figure 3.3-6, during the p.m. peak period, the average vehicle speeds for the 38 and 38R buses is about 7 to 8 mph, including dwell time. Westbound travel speeds for the 38 and 38R buses remain relatively consistent through the study network. The eastbound travel speed for the 38 and 38R buses is also relatively constant throughout the study network, with somewhat higher average speeds west of Divisadero Street and lower average speeds east of Webster Street. Excluding the segment between Webster Street and Van Ness Avenue, the 38R's average travel speed is about 10 mph for the duration of the network. The same is true for the 38 between Park Presidio Boulevard and Steiner Street.

Combining both directions, the average p.m. peak hour rapid (38R) travel time is 47 minutes compared with the local route travel time of 54.5 minutes between 48th Avenue and the Transbay Transit Center.

Figure 3.3-6 Existing Transit Speeds



Note: Average speeds of Geary corridor routes are reported between 48th Avenue and the Transbay Transit Center, except for Express Routes, which are the average speeds of the total express route begin and end points. Daily average speed is not shown for the Express Routes as they only operate during peak periods.

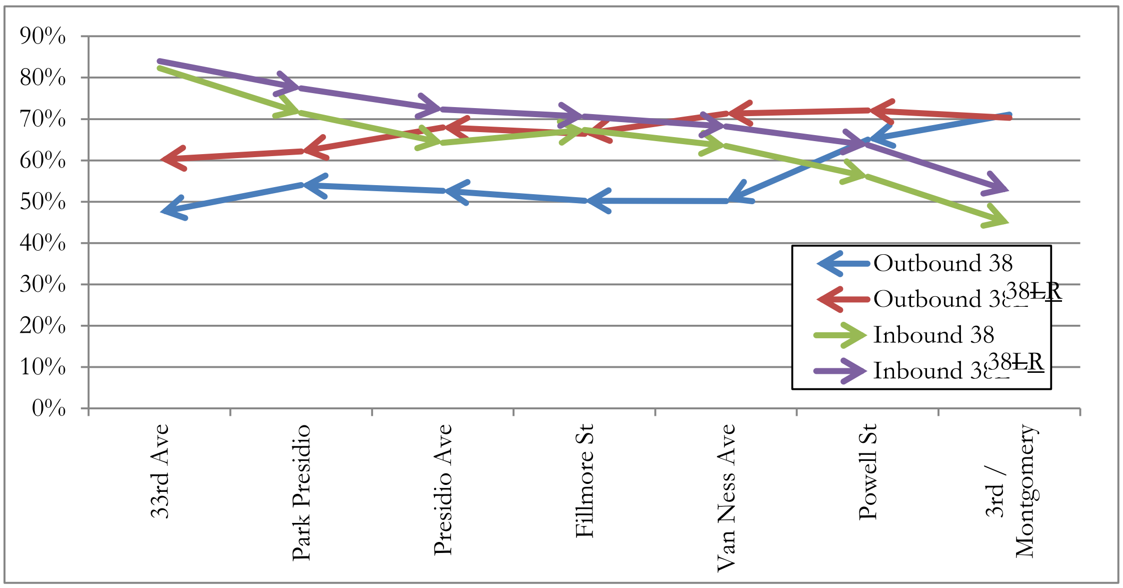
3.3.2.4.4 ROUTE SEGMENT RELIABILITY

Transit travel time reliability is a measure of how well buses adhere to their schedules. Factors that affect transit delay also affect transit reliability, including dwell time, transit congestion, traffic congestion, and parking maneuvers (see Section 3.3.2.4.3).

Bus bunching is one additional factor that affects transit reliability. When a bus becomes delayed due to another cause, the gap in time between the previous bus and the delayed bus grows and, as a result, more passengers arrive at each stop during that time for the delayed bus to load. The additional passengers increase the delayed bus's dwell time at each stop, generating increased delay until the following bus eventually catches up to the delayed bus.

Figures 3.3-7 to 3.3-9 present three measures of existing conditions bus reliability including on-time performance, headway adherence, and bus bunching. These measures represent the p.m. peak hour for an average month in 2013.

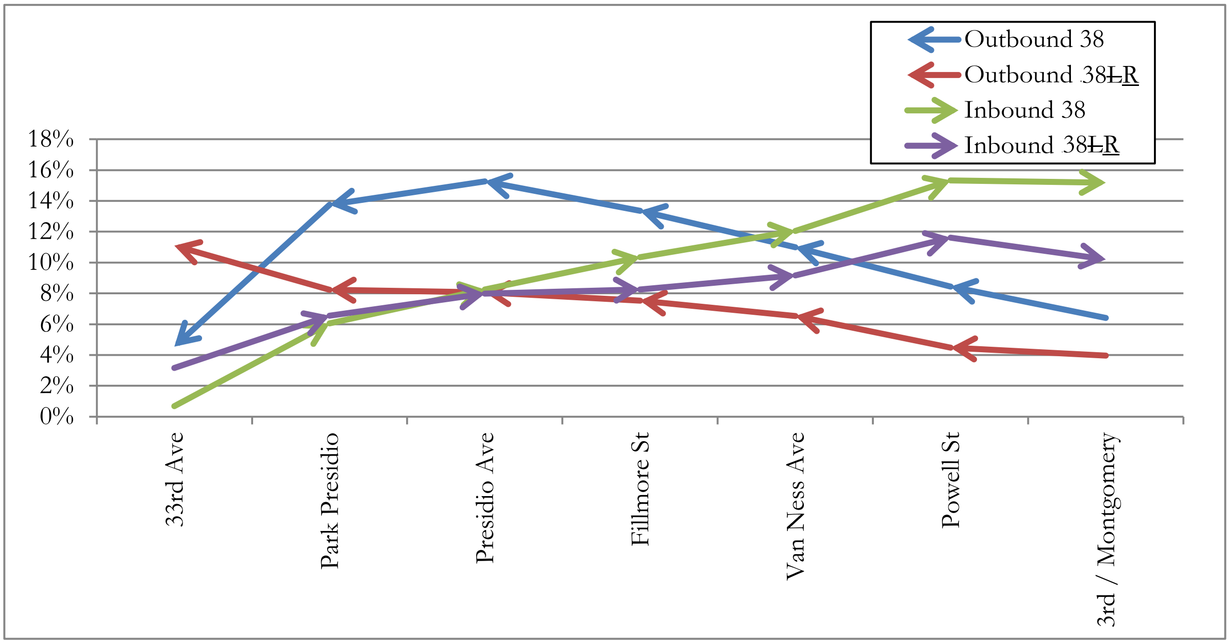
Figure 3.3-7 Geary Corridor Transit On-Time Performance (P.M. Peak Hour, Weekdays, 2013)



Note: Target on-time performance is 85 percent.

Source: SFMTA, 2014

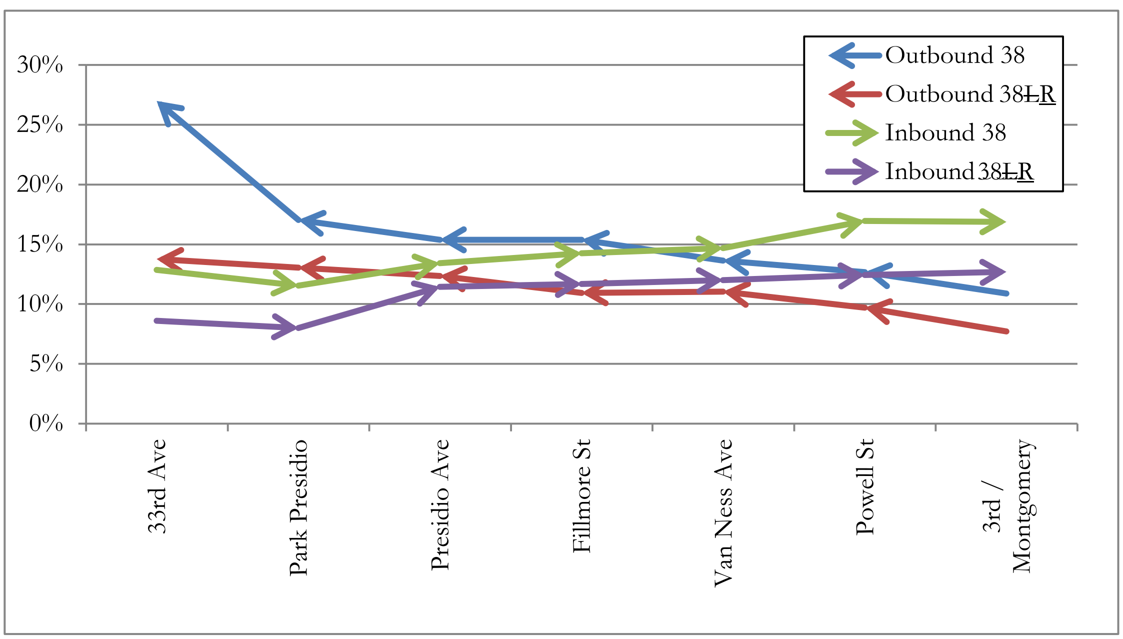
Figure 3.3-8 Geary Corridor Transit Headway Adherence (Headways Exceeding Schedule by More Than Five Minutes, P.M. Peak Hour, Weekdays, 2013)



Note: SFMTA targets for headway adherence are that buses operate without gaps of more than 5 minutes above scheduled headways; thus any proportion of buses exceeding headways by greater than 5 minutes exceeds SFMTA's standard.

Source: SFMTA, 2014

Figure 3.3-9 Geary Corridor Transit Bus Bunching (Gaps Between Buses Less Than One to Two Minutes, P.M. Peak Hour, Weekdays, 2013)



Note: SFMTA targets for bus bunching are that all buses operate without gaps of between one and two minutes; thus any proportion of buses bunching does not meet SFMTA's standard.

Source: SFMTA, 2014

The first measure is on-time performance. For this metric, a bus is considered on time if it reaches a checkpoint no more than one minute early and no more than four minutes later than its scheduled arrival time. SFMTA's target on-time performance standard is 85 percent. On-time performance tends to degrade as a bus travels farther away from the origin station. In the p.m. peak hour, westbound 38 and 38R buses reach selected checkpoints on time between 47 and 71 percent of the time. Eastbound service on the 38 and 38R is more likely to be on time at the beginning of the run, but less likely to be on time by the end of the run than westbound services.

Other measures of transit reliability also have tendencies to show degrading conditions as a bus travels along a route. This pattern is evident in charts of headway adherence and bus bunching on the Geary corridor. Figure 3.3-8 shows the percentage of p.m. peak hour buses that arrive at each checkpoint after a service gap that exceeds scheduled headways by more than five minutes. Westbound p.m. peak-hour 38R buses have headway gaps exceeding scheduled headways by more than five minutes 8 percent of the time at Market and Montgomery streets. This number increases to 14 percent by 33rd Avenue. Figure 3.3.-9 presents p.m. peak hour bus bunching conditions on the Geary corridor. Fewer than 10 percent of buses arrived bunched at early checkpoints, but bus bunching becomes more frequent later in each bus route. P.m. peak hour Geary corridor buses that are approaching their route termini experience bus bunching rates ranging between 10 and 16 percent.

3.3.3 | Methodology

3.3.3.1 | FUTURE YEAR TRANSIT FORECASTS (2020/2035)

Future year transit ridership forecasts were developed using SFCTA's activity-based travel demand forecasting process. SFCTA used the San Francisco Chained Activity Modeling Process (SF-CHAMP) model to estimate transit vehicle boardings, alightings, and vehicle loads by transit route and by time of day for all San Francisco Bay Area transit routes. Year 2020 No Build conditions were used as the environmental baseline to compare future year transit forecasts due to anticipated changes in transit ridership expected between existing conditions (2012) and opening year (2020). Between 2012 and 2020, corridor ridership is expected to increase by almost 30 percent.

METHODOLOGY

SFCTA estimates daily transit ridership projections by applying the difference in transit ridership between the base year model scenario and each future year scenario to existing observed ridership

As described in Appendix D-1 (Modeling Methodology Approach), ridership modeling considers currently planned Muni improvements. The model also accounts for reduced dwell times caused by Muni all door boarding introduced in 2012. For the build scenarios, SF-CHAMP incorporates travel time savings that would be realized from the creation of dedicated bus lanes.

Several key transit projects related to the Geary corridor are anticipated to occur before 2020 and are accounted for in the modeling process. These include the following:

- **Van Ness Avenue BRT "Center A" Scenario**: The project was approved in September 2013, and operational service is expected by 2020. Van Ness Avenue BRT service, which would operate in dedicated bus lanes running in the center median of Van Ness Avenue, is assumed in all future year scenarios for this transportation evaluation.

- **Central Subway Project**: This project is assumed to be operational by 2020. This project will add a new north-south light rail subway tunnel under Stockton and Fourth streets. Geary corridor bus-riders will be able to transfer to or from the Central Subway at Union Square, and they will be able to connect to Chinatown, the Moscone Center, the Caltrain Station at Fourth and King streets, and other destinations along the current alignment of the Muni "T" light rail line.

SFMTA's implementation of Muni Forward/TEP will occur incrementally beyond 2020. Several other SFMTA projects are under construction and will have some interaction with the Geary corridor. The transit ridership effects of other projects are assumed as part of the travel demand forecasts prepared for this document. Appendix D-1 (Modeling Methodology Approach) describes other regional transit projects assumed as part of the travel demand forecasts.

No identified improvements are planned for Golden Gate Transit Route 92 in 2020 or 2035.

VISSIM analysis was conducted under baseline (2013), opening year (2020), and horizon year (2013) conditions

For more detailed information on the VISSIM model development process, please see Appendix D2-1

3.3.3.2 | TRANSIT OPERATIONS ANALYSIS METHODOLOGY

This section summarizes the methodology used to model future transit performance of the five alternatives modeled: No Build Alternative, Alternative 2, Alternative 3, Alternative 3-Consolidated, and the Hybrid Alternative/Locally Preferred Alternative (LPA). The multimodal transportation simulation software package VISSIM was used to simulate transit performance for the No Build and build alternatives. The main assumptions in the VISSIM model are summarized below.

Dwell Times: Dwell time is the amount of time a bus is stationary at a scheduled stop to allow passengers to board and alight from the vehicle, including the time required to bring the vehicle to a full stop, open doors, and close doors. Dwell times were adjusted based on SF-CHAMP model results and normalized based on existing dwell times (2013) to minimize any large variations occurring at some stops. Ultimately, for all alternatives (including the No Build Alternative), the average 85th percentile and maximum dwell times were included in the VISSIM model for both 2020 and 2035. All-door boarding and low-floor buses also have an effect on bus dwell times. Estimated dwell times were calculated for future conditions for the No Build and build alternatives. Appendix D3-1 (SF-CHAMP Validation) provides additional detail about the calculation of future dwell times.

All-Door Boarding: On July 1, 2012, SFMTA began systemwide all-door boarding, which allows passengers to board from both the front and back doors on the vehicle. All-door boarding reduces dwell times and is more convenient for passengers. In keeping with SFMTA's policy, the No Build and build alternatives are assumed to operate with all-door boarding in both the opening and horizon years.

Pedestrian Activity Growth: Pedestrian activity in the Geary corridor is expected to increase by 2020 in response to new land use development and increased ridership. Drawing upon SF-CHAMP model forecasts, pedestrian volumes on Geary Boulevard are assumed to increase as follows: 2 percent between 25th Avenue and Broderick Street; 4 percent between Broderick Street and Laguna Street; and 20 percent between Laguna Street and Van Ness Avenue by 2020. Similar increases are assumed for the year 2035.

Bicyclist Activity Growth: Consistent with recent trends in bicycling growth in San Francisco, additional cyclists are expected on the Geary corridor in the future. By 2020, bicyclist activity is expected to grow by 20 percent across the entire Geary corridor. The same is assumed in 2035.

Transit Signal Priority (TSP): TSP optimizes signal timings along a street segment to prioritize bus clearance through an intersection or series of consecutive intersections. The No Build Alternative and all build alternatives are assumed to have TSP installed at all signalized intersections from 25th Avenue to Gough Street along the Geary corridor by 2020. As further noted in Chapter 2, the build alternatives contemplate a different type (fiber-based) TSP than the No Build Alternative (wireless).

Unconstrained Transit Speed Assumptions: Free-flow transit speeds – the speed that buses travel when fully accelerated and unconstrained by traffic signals or other vehicles – are assumed to remain generally unchanged by 2020, as speed limits are not expected to change. However, in center-running bus lane sections of the corridor for Alternatives 3 and 3-Consolidated, and the Hybrid Alternative/LPA, free-flow transit speeds are assumed to be slightly higher than in sections where buses run adjacent to a lane of parked vehicles. Empirical data related to bus operations indicate that buses can achieve slightly higher maximum speeds when they operate in dedicated roadway that is free from traffic and parking interference.

Bus Service Frequency: Bus service frequencies in 2020 and 2035 vary according to the alternative.

Traffic Signal Cycle Lengths: Signal cycle lengths in 2020 and 2035 were adjusted on the Geary corridor according to future traffic forecasts. These adjustments account for mandated changes in pedestrian crossing times, such as the addition of flashing "don't walk" timings.

New Traffic Signals: The No Build Alternative will result in several newly signalized locations on the Geary corridor by 2020. The project would result in several additional locations that would become newly signalized by 2020. Appendix D-1 (Modeling Methodology Approach) provides additional discussion of planned signals.

Pedestrian Countdown Signals: No new dedicated pedestrian signals are assumed under the No Build Alternative. However, the build alternatives assume several new pedestrian crossings will be constructed (see Appendices D-1 and D3-1). While new signals have a minor effect on auto and bus travel times, they provide walking accessibility and improve safety. For center-running build alternatives, they also, in some cases, provide access to bus platforms. Pedestrian countdown signals would be installed to improve street crossings and facilitate access to bus stops under the No Build and build alternatives. Flashing "don't walk" times were assumed to be longer for 2020 and 2035 conditions, which would reduce the amount of green-signal time for through traffic movements on the Geary corridor.

Parking Delay: On-street parking maneuvers currently affect bus operations on the Geary corridor. Under the No Build Alternative and Alternative 2, buses would continue to operate adjacent to on-street parking for the entirety of the Geary corridor. Under Alternatives 3 and 3-Consolidated, and the Hybrid

Alternative/LPA, bus operations are not assumed to be affected by parking maneuvers (in center-running sections only).

3.3.3.2.1 BUS OPERATIONS AT TRANSITIONS

Some build alternatives would require bus drivers to transition from side-running bus lane operations to center-running operations, and vice versa. This transitional maneuver can cause delay, which can vary depending on traffic conditions at the time a driver is attempting to transition. The VISSIM model assumed a queue-jump[4] traffic signal for buses at the nearest signalized intersection at the beginning of the transition. The VISSIM model results accounted forany delays or travel time penalties associated with a transition.

3.3.3.3 | ANALYSIS METRICS

The output metrics from the VISSIM model used to measure the performance of each alternative are summarized below.

- **Bus Travel Times:** Measure of the amount of time, in minutes, it takes for a bus to travel between designated segment(s) along the Geary corridor.
- **Bus Reliability:** Bus reliability is measured as the difference between average travel time and the 95th percentile travel time for a given segment.
- **Systemwide Multimodal Delay:** Measure of total hours of delay, network-wide, by mode (automobiles, transit, bicyclists, and pedestrians).

3.3.4 | Environmental Consequences

This section describes potential impacts and benefits for transit operations. The analysis compares each build alternative relative to the No Build Alternative.

As set forth in Section 3.3.4.1, the modifications to the Hybrid Alternative/LPA since publication of the Draft EIS/EIR do not change the conclusions regarding transit operations impacts in the Draft EIS/EIR.

3.3.4.1 | HYBRID ALTERNATIVE/LPA MODIFICATIONS: SUMMARY OF POTENTIAL ADDITIVE EFFECTS SINCE PUBLICATION OF THE DRAFT EIS/EIR

As discussed in Section 2.2.7.6, the Hybrid Alternative/LPA now includes the following six minor modifications added since the publication of the Draft EIS/EIR:

1) Retention of the Webster Street pedestrian bridge;
2) Removal of proposed BRT stops between Spruce and Cook streets (existing stops would remain and provide local and express services);
3) Addition of more pedestrian crossing and safety improvements;
4) Addition of BRT stops at Laguna Street;
5) Retention of existing local and express stops at Collins Street; and
6) Relocation of the westbound center- to side-running bus lane transition to the block between 27th and 28th avenues.

This section presents analysis of whether these six modifications could result in any new or more severe effects to transit conditions during construction or operation.

[4] A **queue-jump** signal provides preference to buses at intersections, consisting of a special traffic signal phase specifically for vehicles within the queue jump.

As documented below, the Hybrid Alternative/LPA as modified would not result in any new or more severe effects to transit conditions relative to what was disclosed in the Draft EIS/EIR.

SFMTA conducted supplemental transportation analyses of the modifications, documented in separate memoranda,[5,6,7] the results of which are discussed below.

Retention of the Webster Street Pedestrian Bridge

Construction: The proposed modification would eliminate demolition and excavation activities at this location. This would result in a reduced number of traffic and transit disruptions in the immediate area during construction. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: Retaining the Webster Street pedestrian bridge would require westbound BRT buses to travel in mixed-flow travel lanes approaching the Webster Street intersection. This is because the pedestrian bridge supports would not permit full extension of the westbound bus-only lane across the Webster Street intersection. SFMTA examined whether the change in bus lane configuration here, along with anticipated pedestrian improvements, would have any potential to substantially alter bus service through this area. SFMTA concluded that retaining the Webster Street pedestrian bridge could result in one-second westbound bus delays on average, and such delays would not substantially affect BRT service. Therefore, this modification would not result in any new or more severe transit impacts during operation.

Removal of Proposed BRT Stops between Spruce and Cook Streets

Construction: Given that a new BRT stop would not be built between Spruce and Cook streets, construction (and associated traffic and transit disruptions) would be reduced in this area. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: Without BRT stops in this location, overall BRT travel time would be slightly faster (due to one less BRT stop), which would benefit riders traveling between other stops. BRT buses would stop at Arguello Boulevard to the west and Presidio and Masonic avenues to the east; however, this would result in a greater walking distance to or from a BRT stop (about 5 blocks) for people starting or ending journeys in the Spruce Street-Cook Street area who prefer to use the BRT service. However, the stops would continue to be served by local and commute-period express buses. Therefore, this modification would not result in any new or more severe transit impacts during operation.

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[5] San Francisco Municipal Transportation Agency. *Geary Boulevard Bus Rapid Transit: Pedestrian Bulbout Parking Effects Analysis*. November 15, 2016. This memorandum is available for review at the San Francisco County Transportation Authority, 1455 Market Street, 22nd Floor, San Francisco, CA 94103.

[6] San Francisco Municipal Transportation Agency. *Geary Corridor Bus Rapid Transit Project – Possible Modifications to Staff Recommended Alternative Bus Stops at Laguna and Collins Streets – Supplemental Transportation Analysis Technical Memorandum.* January 4, 2017. This memorandum is available for review at the San Francisco County Transportation Authority, 1455 Market Street, 22nd Floor, San Francisco, CA 94103.

[7] 7 San Francisco Municipal Transportation Agency. *Geary Boulevard Bus Rapid Transit: 27th Avenue Transition – Transportation Analysis Technical Memorandum*. April 18, 2017. This memorandum is available for review at the San Francisco County Transportation Authority, 1455 Market Street, 22nd Floor, San Francisco, CA 94103.

Addition of More Pedestrian Crossing and Safety Improvements

Construction: All pedestrian improvements would be constructed within existing transportation right of way. Construction-period disruptions would be short in duration and similar to that which would occur for other previously proposed pedestrian improvements throughout the corridor. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: None of the additional pedestrian improvements would be constructed where a traffic or transit lane currently exists or is planned to exist, so they would not affect traffic or transit lane configurations or capacity. Therefore, they would not affect vehicle delay and no new or more severe effects to mixed-flow travel lanes or bus/automobile travel times would occur. Therefore, this modification would not result in any new or more severe transit impacts during operation.

Addition of BRT Stops at Laguna Street

Construction: Construction-period disruptions would be short in duration and similar to that which would occur for other previously proposed BRT stops throughout the corridor. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: A separate memorandum[8] analyzed and described the changes to transit performance at Laguna Street from adding Laguna Street as a BRT stop. The analysis concluded that the revision would increase the average travel time of the inbound and outbound BRT service by 49 seconds from end to end compared with the Hybrid Alternative/LPA as analyzed in the Draft EIS/EIR. This would be a negligible increase in travel time. Therefore, this modification would not result in any new or more severe transit impacts during operation.

Retention of Existing Local and Express Stops at Collins Street

Construction: Given that existing bus stops would no longer be removed at Collins Street, construction (and associated traffic and transit disruptions) would be reduced in this area. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: As proposed in the Draft EIS/EIR, the removal of the bus stops at Collins Street would have reduced the travel time of the local bus by removing the delay associated with the stops. Retaining the bus stops at Collins Street would eliminate the travel time savings associated with the stop removal. The potential revision would increase the travel time of the local service by 16 seconds in the inbound direction and 35 seconds in the outbound direction, relative to what was described in the Draft EIS/EIR for the Hybrid Alternative/LPA. This would be a negligible decrease and would thus still result in local service travel time savings for the Hybrid Alternative/LPA. Therefore, this modification would not result in any new or more severe transit impacts during operation.

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[8] San Francisco Municipal Transportation Agency, San Francisco County Transportation Authority. *Analysis of Geary Corridor Stop Options at Laguna Street*. September 14, 2016. This memorandum is available for review at the San Francisco County Transportation Authority, 1455 Market Street, 22nd Floor, San Francisco, CA 94103.

Relocation of the Westbound Center- to Side-Running Bus Lane Transition

Construction: Relocation of the westbound bus lane transition at 27th Avenue would not alter the total level of construction activities but would simply shift about half of it one block to the west. Therefore, this modification would not result in any new or more severe transit impacts during construction.

Operation: Negligible changes to signal timing would result from the relocated transition point. The transition from center- to side-running would remain operationally the same as described in the Draft EIS/EIR, except that transit vehicles in the westbound direction would change from the center-running bus-only lane to the side-running bus-only lane one block farther west. This change would not result in traffic delay or delays to transit operations. Therefore, the relocation of the transition point would not create additional transit delay than what was previously identified in the Draft EIS/EIR.

Travel Time Variability – All Modifications

As described in Section 3.3.4.5 below, travel time variability is an important measure of bus service reliability. Some of the individual modifications to the Hybrid Alternative/LPA since publication of the Draft EIS/EIR may increase transit travel time variability (i.e., Laguna Street bus stop modifications), while others may decrease variability (i.e., Spruce-Cook bus stop modifications). The pedestrian crossing improvements would have no effect on variability because none would alter any travel lane configuration or right-turn movement. The Webster Street bridge retention and relocation of the westbound center- to side-running bus lane transition would have negligible effects on variability. The Collins Street bus stop retention would affect local and express services and would have minimal impacts on variability. The Spruce-Cook and Laguna bus stop modifications would only affect BRT service and, taken together, would have negligible impacts. In sum, any changes to the estimated travel time variations resulting from modifications to the Hybrid Alternative/LPA would be minimal and likely within the round-off error (10 seconds). With all six minor modifications, the Hybrid Alternative/LPA would still provide a travel time reliability benefit relative to the No Build Alternative.

3.3.4.2 | FUTURE GEARY CORRIDOR RIDERSHIP

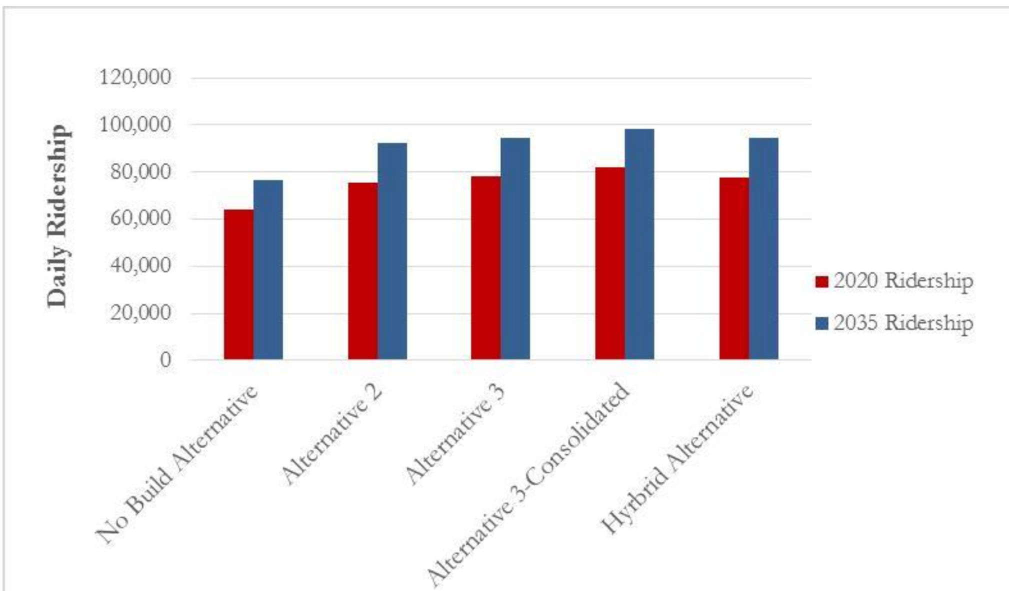
Projections of future Geary corridor bus ridership show that weekday Geary corridor boardings would increase by about 21 percent from over 50,000 in 2012 to about 64,000 in the year 2020 in the No Build Alternative. Ridership is projected to increase by an additional 19 percent to about 77,000 in 2035 under the No Build Alternative. This ridership increase is related directly to the expected increases in study area population. Both the No Build and build alternatives would result in higher ridership on Geary corridor bus routes, but the No Build Alternative would result in substantially lower ridership than any of the build alternatives.

In 2020, the build alternatives would result in daily transit boardings of up to 82,000 boardings (28 percent higher than in the No Build Alternative). In 2035, the build alternatives would serve between 92,000 and 99,000 daily transit riders (20 percent to 28 percent higher than in the No Build Alternative).

In both future years, Alternative 2 would attract the lowest amount of ridership among the build alternatives. Meanwhile, Alternative 3-Consolidated would serve the highest number of projected transit trips. Alternatives 3 and the Hybrid

Alternative/LPA would attract ridership levels somewhere between those of Alternatives 2 and 3-Consolidated. Alternative 3-Consolidated would attract more riders than the other build alternatives because it would offer the shortest waiting times and the shortest average walking distances to stations. In the other build alternatives, travelers may need to wait for a local service or an express service; under Alternative 3-Consolidated all riders would board the first bus that shows up. Because the overall level of service is similar in each scenario, Alternative 3-Consolidated would offer the shortest waiting times. By providing high-frequency and rapid service at all stations, Alternative 3-Consolidated would offer shorter walking distances for travelers wishing to use a rapid or BRT service. Ridership under Alternative 3-Consolidated would suffer from longer minimum walking distances to all stations and slightly slower travel speeds, but the benefit of more BRT stations and shorter waiting times would do more to attract ridership than the lack of local stops and slower travel speeds would do to discourage riders. Projected ridership for 2020 and 2035 is presented in Figure 3.3-10. As shown, projected daily ridership for 2020 varies by build alternative between 75,000 and nearly 82,000. By 2035, build alternative daily ridership would approach 100,000 for Alternative 3-Consolidated.

Figure 3.3-10 2020 and 2035 Daily Transit Ridership



Note: Figure was revised to correct typographical errors.

Source: SFCTA, 2014

3.3.4.3 | STOP LOCATIONS

In the No Build Alternative, the bus stop locations for Geary corridor bus services would remain where they are today. In the build alternatives, some bus stations may be relocated, removed, or be served by different classes of transit service.

Table 3.3-4 quantifies the number of local and rapid stop locations, by direction, for each build alternative. All of the build alternatives would result in fewer overall bus stop locations than the No Build Alternative. The reduced number of bus stops is designed to reduce dwell times at stations and to improve bus travel time along the Geary corridor.

In addition to the total number of stops on the Geary corridor, the average stop spacing would change under the build alternatives. Average stop spacing is presented in Table 3.3-5 below.

Table 3.3-4 Number of Bus Stops between 34th Avenue and Market Street

STOP COUNT	ALTERNATIVE				
	NO BUILD ALTERNATIVE	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE/LPA
LOCAL STOPS					
Eastbound Local Stops	33	30	27	NA	25
Westbound Local Stops	34	31	28	NA	28
BRT STOPS					
Eastbound BRT/Rapid Stops	15	12	13	20	18
Westbound BRT/Rapid Stops	16	13	14	21	19

Source: Fehr & Peers, 2014

Table 3.3-5 Average Bus Stop Spacing from 33rd Avenue to Kearny Street

SERVICE TYPE	AVERAGE STOP SPACING IN FEET				
	NO BUILD ALTERNATIVE	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE/LPA
AVERAGE STOP SPACING (IN FEET)					
BRT/Rapid Stops	1540	2180	2180	1310	1740
Local Stops	720	840	960	1310	1090
AVERAGE DISTANCE TO STOP (IN FEET)					
BRT/Rapid Stops	380	540	540	330	410
Local Stops	180	210	240	330	270

Source: Fehr & Peers, 2014; SFMTA, 2016

3.3.4.4 | SERVICE TYPES

With implementation of any of the build alternatives, bus service would differ from existing conditions. Current route 38 is referred to as local service, and future references to rapid or BRT service are equivalent to the current 38R. Consolidated service would be a new service type that consolidates current 38 and 38R to one route. The existing 38AX and 38BX express routes would be consolidated into a single express service labeled 38X. The existing 38AX and 38BX services now operate as local services outside of the express portions of their routes. The consolidated 38X bus route would operate similarly (i.e., limited stop) service outside of the express portion of the route.

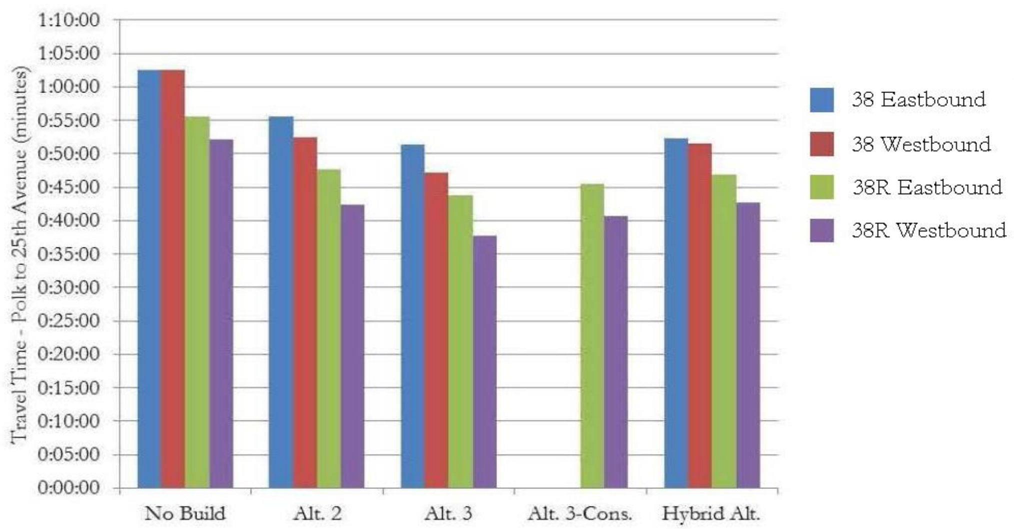
3.3.4.5 | BUS TRAVEL TIMES (2020)

In future scenarios, bus travel times are expected to vary by alternative. In all 2020 scenarios, the No Build Alternative would result in the highest travel times. In the No Build Alternative, anticipated infrastructure improvements will marginally improve travel time, but future increases in vehicular traffic will offset any benefits of these basic improvements. Therefore, the No Build Alternative would perform the worst in terms of bus travel times.

Alternatives 3 and 3-Consolidated would have center-running bus-only lanes that help reduce travel times. Alternatives 3 and 3-Consolidated have the lowest travel times of all alternatives in 2020, with reductions in travel time of between 15 and 30 percent relative to the No Build Alternative for the entire Geary corridor. For the segment between Van Ness and 25th avenues where the build alternatives would have the greatest impact, travel time reductions would be between 30 and 40 percent. Alternative 2 and the Hybrid Alternative/LPA would reduce travel times by 10 to 20 percent for the entire Geary corridor, and by 15 to 30 percent between Van Ness and 25th avenues.

Figures 3.3-11 and 3.3-12 show travel times by alternative in 2020 and 2035. Tables 3.3-6 and 3.3-9 display the percent reduction in travel times from the No Build Alternative.

Figure 3.3-11 Year 2020 Geary Corridor Bus Travel Times (Entire Corridor, 48th Avenue to Transbay Transit Center)



Source: Fehr & Peers and SFCTA, 2014. Figure legend has been revised to correct a typographical error that appeared in the Draft EIS/EIR.

Table 3.3-6 Year 2020 Geary Corridor Bus Travel Time Percent Reduction Compared with No Build Conditions (Entire Corridor, 48th Avenue to Transbay Transit Center)

			TRAVEL TIME REDUCTION FROM NO BUILD				
SCENARIO	ROUTE	DIRECTION	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE/ LPA
2020	38 Geary	EB	-	-11%	-18%		-16%
		WB	-	-16%	-25%		-18%
	38R Geary	EB	-	-14%	-21%	-18%	-16%
		WB	-	-19%	-28%	-23%	-18%

Source: Fehr & Peers and SFCTA, 2014

3.3.4.6 | TRAVEL TIME RELIABILITY (2020)

Travel time reliability improves with the build alternatives compared with the No Build Alternative. Reliability was calculated for all alternatives using bus travel time results from the VISSIM microsimulation model for the section of the Geary corridor between 25th and Van Ness avenues. As indicated in Tables 3.3-7 and 3.3-8, the difference between the 95th percent and average p.m. peak-hour travel time decreases substantially under all build alternatives for westbound and eastbound buses, meaning that service reliability correspondingly improves. Westbound p.m. peak-hour local and BRT buses would have the most improved reliability under Alternative 3, though other build alternatives would improve reliability by almost as much. Eastbound bus service would have the best reliability under the consolidated service of Alternative 3-Consolidated. The No Build Alternative would consistently underperform relative to any of the build alternatives in terms of travel time reliability.

Table 3.3-7 Transit Travel Time Variations, P.M. Peak Hour (2020) Westbound (Difference between 95th Percent Travel Time and Mean Travel Time)

SEGMENT	SERVICE TYPE	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
Van Ness Ave to 25th Ave	Local	0:05:00	0:03:40	0:03:00	NA	0:04:10
	BRT	0:04:20	0:03:10	0:02:30	0:02:40	0:02:50

Source: Fehr & Peers and SFCTA, 2014

Table 3.3-8 Transit Travel Time Variations, P.M. Peak Hour (2020) Eastbound (Difference between 95th Percent Travel Time and Mean Travel Time)

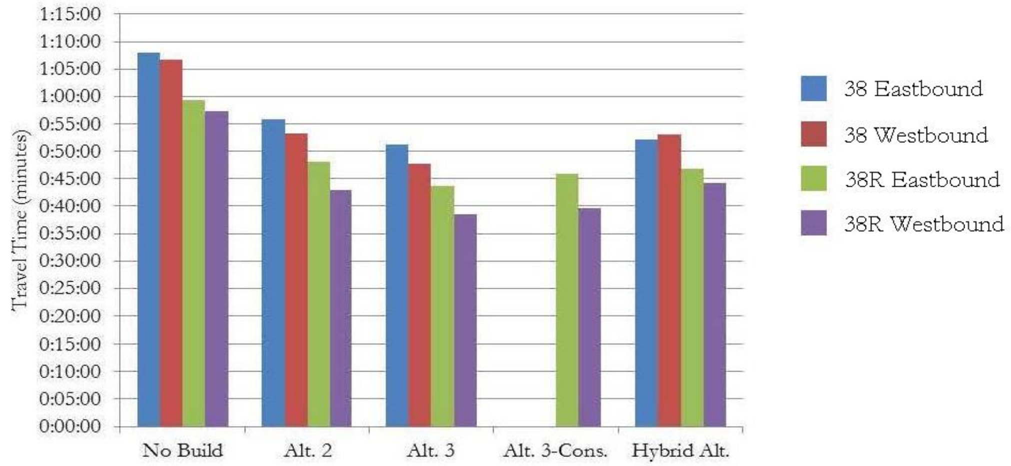
SEGMENT	SERVICE TYPE	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
Van Ness Ave to 25th Ave	Local	0:04:40	0:02:50	0:04:10	NA	0:03:00
	BRT	0:03:40	0:03:00	0:02:30	0:02:20	0:03:20

Source: Fehr & Peers and SFCTA, 2014

3.3.4.7 | BUS TRAVEL TIMES - LONG-TERM HORIZON YEAR (2035)

Similar to 2020, Alternatives 3 and 3-Consolidated have the lowest travel times of all alternatives, with reductions in travel time of between 20 and 35 percent relative to the No Build Alternative for the entire Geary corridor, and 40 to 50 percent between Van Ness Avenue and 25th Avenue. Alternatives 2 and the Hybrid Alternative/LPA would have travel times that are 15 to 25 percent lower than the No Build Alternative for the entire Geary corridor, and 15 to 30 percent lower between Van Ness and 25th Avenues. The following tables (3.3-9 through 3.3-11) show travel times and percent reductions in travel times from 48th Avenue to the Transbay Transit Center by alternative in 2035. Smaller variations between the 95th percent and mean travel times indicate overall improvements – in other words, more buses are completing their routes in a shorter amount of time.

Figure 3.3-12 Year 2035 Geary Corridor Bus Travel Times (Entire Corridor, 48th Avenue to Transbay Transit Center)



Source: Fehr & Peers and SFCTA, 2014. Figure legend has been revised to correct a typographical error that appeared in the Draft EIS/EIR.

Table 3.3-9 Year 2035 Geary Corridor Bus Travel Time Percent Reduction Compared with No Build Conditions (Entire Corridor, 48th Avenue to Transbay Transit Center)

			TRAVEL TIME REDUCTION FROM NO BUILD				
SCENARIO	ROUTE	DIRECTION	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
2035	38-Geary	EB	-	-18%	-25%	-	-23%
		WB	-	-20%	-29%	-	-21%
	38R-Geary	EB	-	-19%	-26%	-23%	-21%
		WB	-	-25%	-33%	-31%	-23%

Source: Fehr & Peers and SFCTA, 2014

3.3.4.8 | TRAVEL TIME RELIABILITY- LONG-TERM HORIZON YEAR (2035)

In Year 2035 conditions, bus travel time reliability would improve with the build alternatives. As indicated in Tables 3.3-10 and 3.3-11, the difference between the 95th percent and average p.m. peak hour travel time decreases substantially under all build alternatives for westbound and eastbound buses.[9] Westbound p.m. peak hour buses would have the best reliability under Alternative 3-Consolidated. Eastbound bus service would have the best reliability for local buses under the Hybrid Alternative/LPA and for BRT buses under Alternative 3.

[9] See note 6 above.

Table 3.3-10 Transit Travel Time Variations, P.M. Peak Hour (2035) Westbound (Difference between 95th Percent Travel Time and Mean Travel Time)

SEGMENT	SERVICE TYPE	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
Van Ness Ave to 25th Ave	Local	0:06:00	0:03:40	0:03:20	NA	0:04:10
	BRT/Rapid	0:05:40	0:03:10	0:03:10	0:02:20	0:04:10

Source: Fehr & Peers and SFCTA, 2014

Table 3.3-11 Transit Travel Time Variations, P.M. Peak Hour (2035) Eastbound (Difference between 95th Percent Travel Time and Mean Travel Time)

SEGMENT	SERVICE TYPE	NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
Van Ness Ave to 25th Ave	Local	0:06:10	0:04:00	0:03:30	NA	0:03:00
	BRT/Rapid	0:05:30	0:03:20	0:02:30	0:02:40	0:03:00

Source: Fehr & Peers and SFCTA, 2014

3.3.4.9 | OTHER TRANSIT OPERATING CHARACTERISTICS: PLATFORM CROWDING AND VEHICLE CROWDING (2020 AND 2035)

3.3.4.9.1 PLATFORM CROWDING

Locations analyzed for potential transit platform crowding were chosen based on the number of boarding passengers as approximated using the SF-CHAMP model and assessed by build alternative. Peak ridership stations are stations with the highest number of boarding passengers during the a.m. or p.m. peak hour. Because transit ridership is forecasted for both a.m. and p.m. peak hours, a.m. period statistics are reported here for additional information, though as described previously the transportation operational analysis focuses only on the p.m. peak-hour time period.

Refer to Tables 3.3-12 and 3.3-13 and Figure 3.3-13 for peak station information in 2020 and 2035. In existing conditions none of the four future peak ridership station locations have boarding platforms. However, the existing sidewalk space would accommodate the increase in passengers in all future scenarios providing substantially more than 5 square feet per person, which is the generally acceptable area. While waiting bus riders may conflict with pedestrians trying to use the sidewalk, there is sufficient sidewalk space farther down the block for passengers to wait under all build alternatives.

Table 3.3-12 Year 2020 Platform Space per Passenger during Peak Hour: Highest Ridership Stations

YEAR	DIRECTION	PEAK HOUR	PEAK STATION	2020 PLATFORM SPACE IN SQUARE FEET PER PERSON				
				NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
2020	Inbound	a.m.	Geary/ 25th	75	63	56	57	68
		p.m.	Geary/ Fillmore	33	30	32	31	29
	Outbound	a.m.	Geary/ Kearny*	95	95	98	86	92
		p.m.	Geary/ Powell	81	94	92	78	92

All measurements in square feet per person – lower numbers indicate more crowded conditions; All calculations made based on peak hour frequency of combined local, rapid, consolidated, and express service. *The Transbay Transit Center is not used as the peak station because platform dimensions are larger than typical platforms. Therefore, the station with the second greatest amount of boarding passengers was chosen.

Source: Fehr & Peers, 2014; SFCTA, 2014

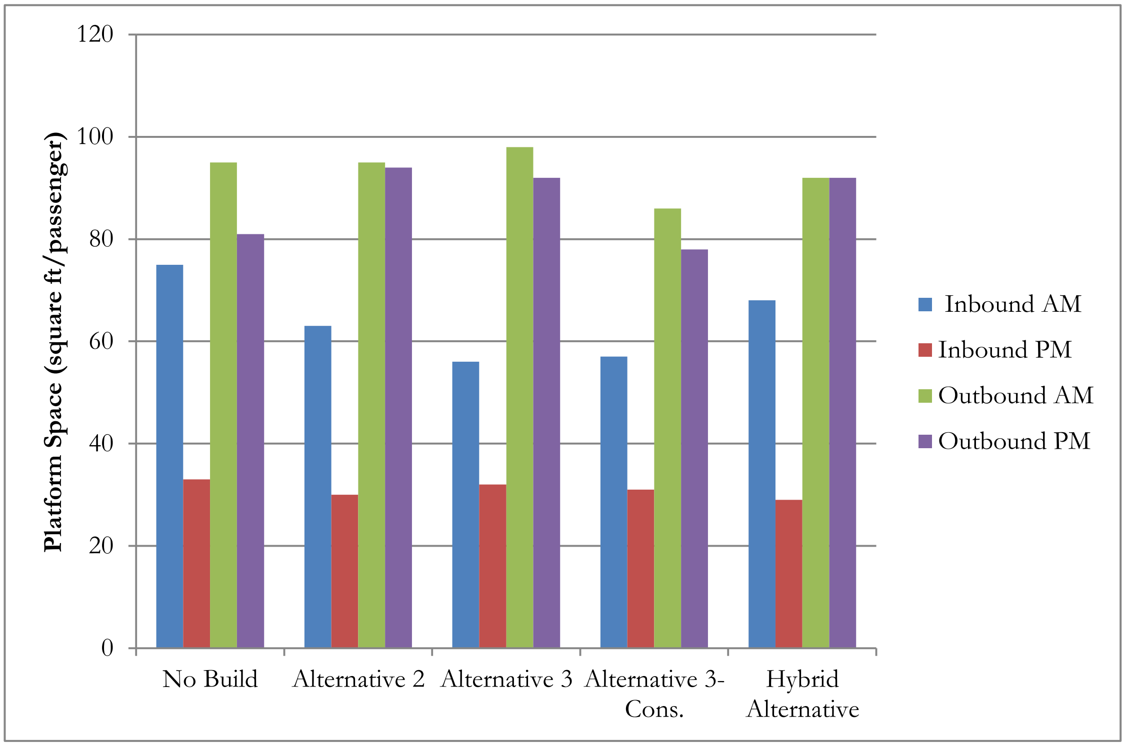
Table 3.3-13 Year 2035 Platform Space per Passenger during Peak Hour: Highest Ridership Stations

YEAR	DIRECTION	PEAK HOUR	PEAK STATION	2035 PLATFORM SPACE IN SQUARE FEET PER PERSON				
				NO BUILD	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
2035	Inbound	a.m.	Geary Blvd/25th	86	73	64	67	82
		p.m.	Geary Blvd/ Fillmore	26	26	25	24	23
	Outbound	a.m.	Geary/ Stockton*	64	68	71	55	70
		p.m.	Geary/ Powell	59	65	65	47	66

All measurements in square feet per person – lower numbers indicate more crowded conditions; All calculations made based on peak hour frequency of combined local, rapid, consolidated, and express service. *The Transbay Transit Center is not used as the peak station because platform dimensions are larger than typical platforms on the corridor. Therefore, the station with the second greatest amount of boarding passengers was chosen.

Source: Fehr & Peers, 2014; SFCTA, 2014

Figure 3.3-13 Year 2020 Platform Space per Passenger during Peak Hour: Highest Ridership Stations



Source: Fehr & Peers and SFCTA, 2014

3.3.4.9.2 CROWDING/VEHICLE LOAD FACTORS

The peak load factor refers to the average peak hour occupancy of the vehicle at its maximum load point along its route. Future load factors can be found in Tables 3.3-14 and 3.3-15 and Figures 3.3-14 through 3.3-17. Because load factor refers to the maximum load point on a route, it is not necessarily the location with the highest number of boardings but rather the location of peak accumulation for passengers on the bus.

Muni's peak period load factor standard is currently 85 percent. Due to increased ridership in all alternatives, the average combined load factor of 38 and 38R buses traveling in the peak direction during the peak hour (a.m. inbound, p.m. outbound) would exceed 85 percent load factor under 2020 and 2035 conditions. Year 2020 inbound a.m. load factors are highest for Alternative 3, while load factors for other alternatives are equal to or lower than No Build Alternative load factors. Year 2020 outbound load factors are lower than No Build Alternative for all build alternatives.

Year 2035 average combined 38 and 38R load factors are slightly higher than Year 2020 factors, and inbound a.m. load factors exceed the No Build Alternative load factor for both Alternative 3 and the Hybrid Alternative/LPA. Similar to 2020 conditions, Year 2035 outbound load factors are lower than No Build Alternative conditions for all build alternatives.

Table 3.3-14 Year 2020 Load Factors at Peak Hour

SCENARIO	ROUTE	ALTERNATIVE	PEAK HOUR LOAD FACTOR 2020			
			A.M. MAX LOAD POINT	A.M. CAPACITY UTILIZATION	P.M. MAX LOAD POINT	P.M. CAPACITY UTILIZATION
Load Factor at Peak Location	Inbound	No Build	Laguna	108%	Laguna	62%
		Alternative 2	Fillmore	102%	Fillmore	55%
		Alternative 3	Laguna	113%	Fillmore	60%
		Alternative 3-Consolidated	Laguna	90%	Laguna	67%
		Hybrid Alternative/LPA	Webster	108%	Fillmore	56%
	Outbound	No Build	Van Ness	60%	Powell	107%
		Alternative 2	Webster	54%	Taylor	95%
		Alternative 3	Laguna	53%	Van Ness Ave	98%
		Alternative 3-Consolidated	Gough	62%	Franklin	82%
		Hybrid Alternative/LPA	Webster	53%	Powell	97%

Note: Load factors are combined average of 38 and 38R routes.

Source: Fehr & Peers, 2014; SFCTA, 2014

Table 3.3-15 Year 2035 Load Factors at Peak Hour

SCENARIO	ROUTE	ALTERNATIVE	PEAK HOUR LOAD FACTOR 2035			
			A.M. MAX LOAD POINT	A.M. CAPACITY UTILIZATION	P.M. MAX LOAD POINT	P.M. CAPACITY UTILIZATION
Load Factor at Peak Location	Inbound	No Build	Laguna	113%	Laguna	77%
		Alternative 2	Fillmore	108%	Fillmore	70%
		Alternative 3	Gough	117%	Fillmore	77%
		Alternative 3-Consolidated	Laguna	92%	Laguna	86%
		Hybrid Alternative/LPA	Webster	114%	Webster	72%
	Outbound	No Build	Kearny	102%	Powell	115%
		Alternative 2	Transbay Transit Center	88%	Taylor	106%
		Alternative 3	Transbay Transit Center	87%	Powell	112%
		Alternative 3-Consolidated	Transbay Transit Center	95%	Powell	86%
		Hybrid Alternative/LPA	Kearny	80%	Powell	111%

Note: Load factors are combined average of 38 and 38R routes.

Source: Fehr & Peers, 2014; SFCTA, 2014

Figure 3.3-14 Geary Transit Load Profiles (2020 Inbound, A.M. Peak Hour)

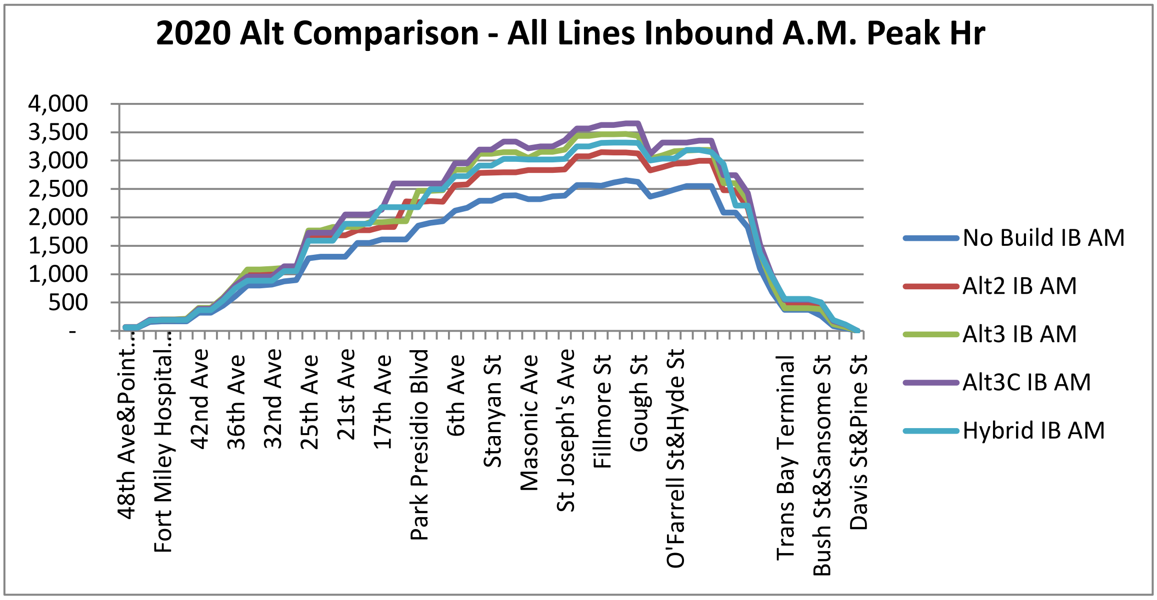


Figure 3.3-15 Geary Transit Load Profiles (2020 Outbound, P.M. Peak Hour)

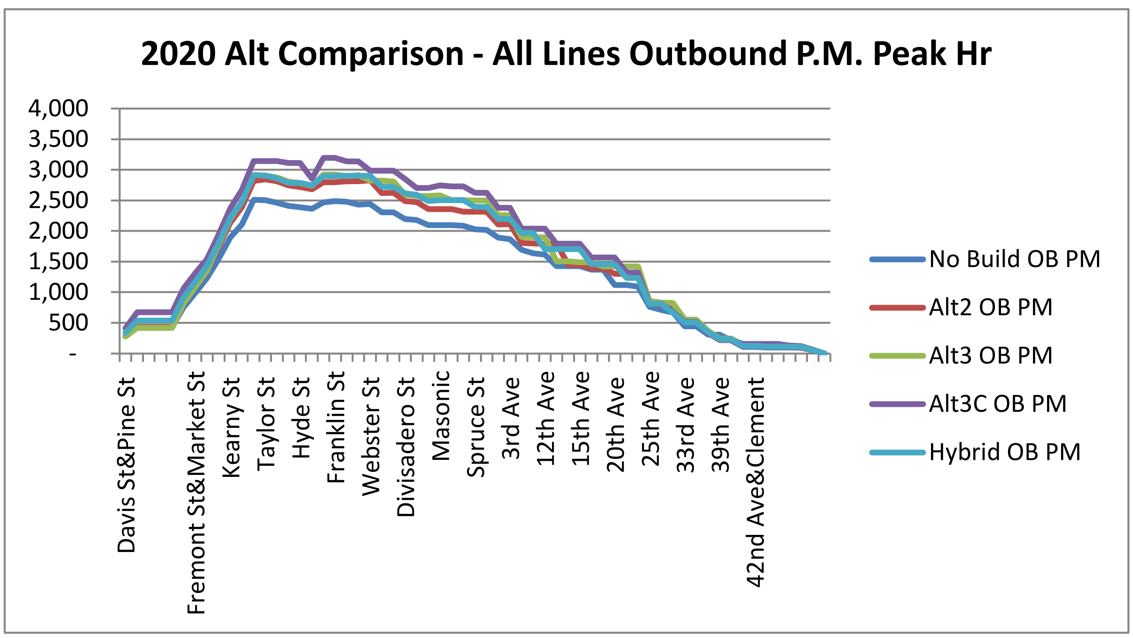


Figure 3.3-16 Geary Transit Load Profiles (2035 Inbound, A.M. Peak Hour)

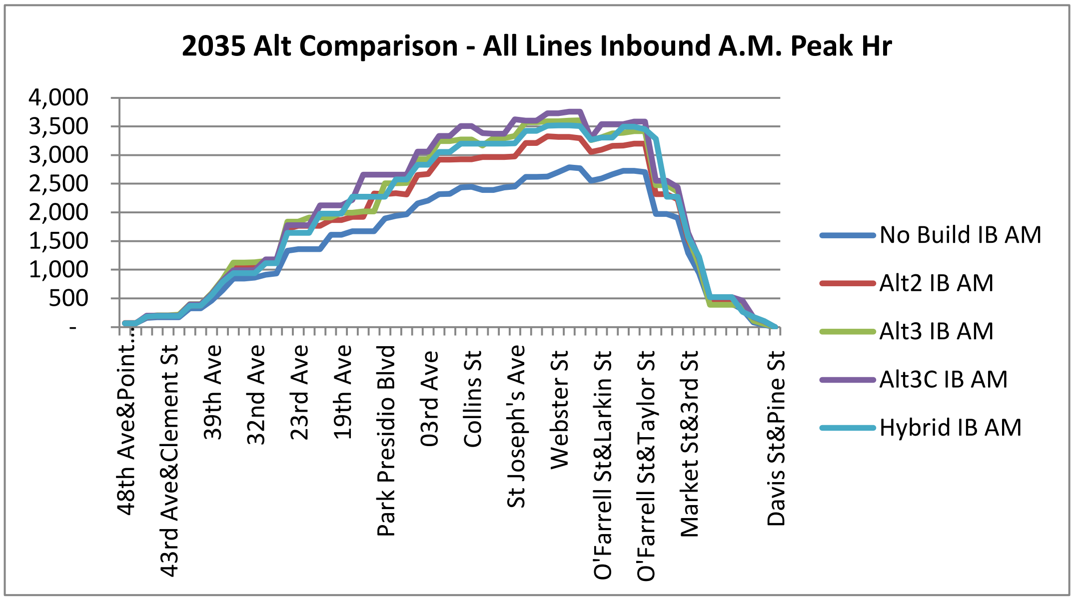
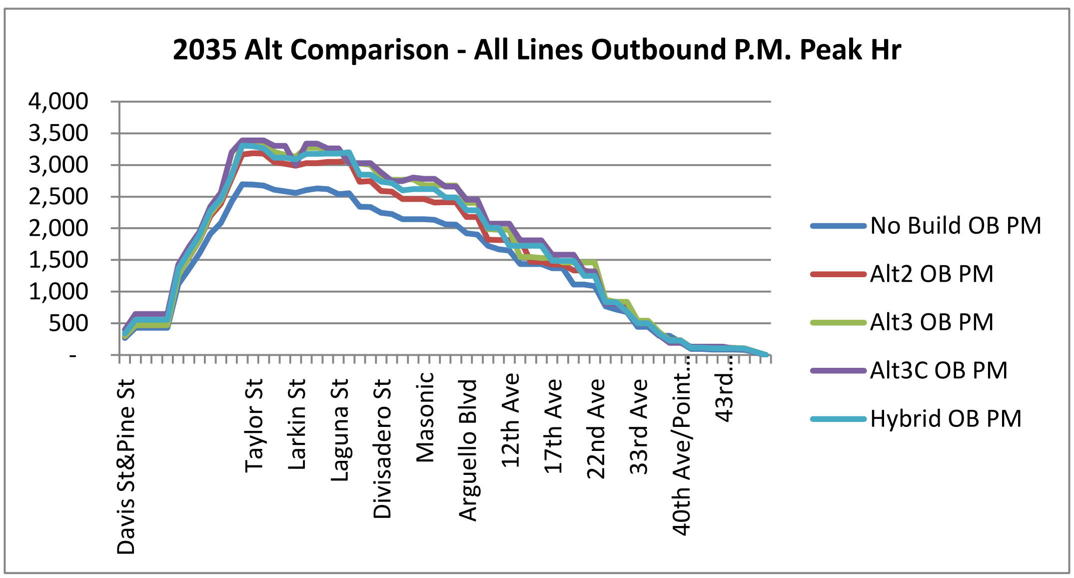


Figure 3.3-17 Geary Transit Load Profiles (2035 Outbound, P.M. Peak Hour)



3.3.4.10 | CONCLUSIONS OF EFFECTS ON TRANSIT

3.3.4.10.1 TRAVEL TIMES/RELIABILITY

By 2020, transit service on the Geary corridor for all build alternatives would operate at faster speeds and be more reliable than local and rapid buses operating under No Build conditions. According to Figure 3.3-11, Alternative 3 would experience the largest travel time improvement, followed by Alternative 3-Consolidated and the Hybrid Alternative/LPA. For transit reliability, Alternative 3 and Alternative 3-Consolidated would experience the greatest improvement, followed by Alternative 2 and the Hybrid Alternative/LPA (Tables 3.3-7 and 3.3-8). Travel time savings in 2035 are estimated to be greater than 2020, indicating that No Build transit operating conditions will deteriorate even further in the long-term horizon. In other words, the No Build Alternative would result in the worst future transit conditions of all the alternatives.

Each build alternative would reduce bus travel times on the Geary corridor as well as improve reliability through transit signal priority, decreased bus bunching and more efficient passenger boarding at platforms

In addition, more intersections that are currently unsignalized will be signalized for all build alternatives, improving the flow of traffic and providing streetscape improvements that would improve pedestrian crossings and safety including for transit riders' beginning and ending legs of their journeys. As a result, the improvements to transit service in the build alternatives would also contribute to improved multimodal accessibility in the Geary corridor.

3.3.4.10.2 CROWDING

Passenger waiting and boarding experience would notably improve for all build alternatives compared to the No Build Alternative. At stations with the heaviest forecasted use, passengers would be accommodated with more than five square feet per passenger. The No Build Alternative and all build alternatives are assumed to operate low-floor buses. This would reduce dwell time and improve accessibility to vehicles, especially for people with disabilities and other mobility-impaired passengers. Lastly, all build alternatives would be designed to be rail-ready consistent with requirements of Proposition K (see Section 1.2 for more detail on Proposition K). As a result, the build alternatives would not present any adverse effects to transit in 2020 or 2035.

3.3.4.11 | COMPARATIVE EFFECTS OF ALTERNATIVES

As demonstrated in the preceding subsections, Alternatives 3 and 3-Consolidated would have the greatest benefits to transit performance in terms of transit travel times, followed by the Hybrid Alternative/LPA, then Alternative 2. The No Build Alternative would perform the worst in terms of transit travel times.

3.3.5 | Avoidance, Minimization and Mitigation Measures

In the peak direction during the peak hour, all build alternatives would exceed Muni's 85 percent capacity utilization threshold under Year 2020 and 2035 conditions. In Alternatives 2, 3, and the Hybrid Alternative/LPA, high capacity utilization would be a result of increased ridership from the project. To reduce or eliminate this effect, additional service hours could be considered for the Geary corridor when the project is implemented and when actual ridership patterns are known.

Muni relies on regularly collected passenger data to inform its service-planning, and occasionally it makes minor modifications to best match service hours to customers. This type of flexibility and responsiveness is necessary to provide the most efficient transit service possible. Therefore, while the specific service plan assumed for this analysis is based on current conditions and best available information, SFMTA would likely need to make adjustments to the service plan to best deploy buses to meet demand along the Geary corridor.

In addition, some additional service on routes serving parallel transit corridors could help absorb increased loads along the Geary corridor. These routes include 1 California, 2 Clement, 5 Fulton, 5R Fulton Rapid, and 31 Balboa. Because service headways would result in only minimal changes to transit operations on parallel routes, transit and traffic conditions would be similar to the No Build Alternative and would not cause a substantial increase in delays to other routes that travel along the same segment, or that may intersect with these routes and lines (e.g., 22 Fillmore, 43 Masonic).