TRANSPORTATION IMPACT ANALYSIS GUIDELINES

APPENDIX I
PUBLIC TRANSIT

San Francisco Planning

Appendix I
Public Transit Memorandum

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Date: February 14, 2019
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RE: **Transportation Impact Analysis Guidelines Update, Public Transit**

INTRODUCTION

This memorandum updates the prior guidance provided in the Transportation Impact Analysis Guidelines for the public transit topic. For the purpose of environmental review, the department defines transit as public transit system operations in the public right-of-way.[1] This consists of public transit services owned and/or operated by local and regional governmental agencies. The department prepared this memorandum in consultation with stakeholders (e.g., city and county agencies, consultants). The department will issue memoranda that provide updates to other topics (e.g., traffic hazards, loading) within the guidelines. When the department issues a memorandum about a topic, it will supersede existing guidance regarding that topic.

This memorandum provides specific guidance on the methodology and impact analysis required for the public transit transportation topic. Overall guidance on conducting transportation analysis for environmental review, including developing the project description, how to address the significance criteria, methodology, and impact analysis, is in the guidelines.

The guidance provided herein assumes a land use development project located outside of an area plan that requires a transportation study. Guidance on other types of projects, such as projects located in an area plan, projects requiring rezoning, and infrastructure projects, is discussed below under the "Other" subsection. The department has discretion on applying the guidance for multiple projects, but the department has discretion on applying the guidance on a project by project basis.

The organization of the memorandum is as follows:

1) Project Description
2) Significance Criteria
3) Existing and Existing plus Project
   a) Methodology
   b) Existing Baseline
   c) Impact Analysis
4) Cumulative
   a) Methodology
   b) Impact Analysis
5) Other (covers different types of projects)

[1] Transit does not include private transit carriers, on-demand services, and/or shuttle services. These private transit carriers are considered private vehicles on the public right-of-way during evaluation of a project's potential transportation-related impacts.

Attachments are under separate cover. The department may update the attachments to the memoranda more frequently than the body of the memoranda.

PROJECT DESCRIPTION

Refer to the Transportation Impact Analysis Guidelines Appendix A, Tables 1-3, for a list of the typical physical, additional physical, and programmatic features for existing and existing plus project conditions, as applicable. The geographic extent of these features must, at a minimum, include the project's frontage and may include the entirety of the project's block. Appendix A, Table 4 of the guidelines provides a non-exhaustive list of approvals from agencies other than the planning department that a project sponsor may need to obtain for the project description features described in the guidelines. Attachment A of this memorandum includes examples of figures that illustrate how to graphically represent public transit conditions.

SIGNIFICANCE CRITERIA

San Francisco Administrative Code Chapter 31 directs the department to identify environmental effects of a project using as its base the environmental checklist form set forth in Appendix G of the California Environmental Quality Act (CEQA) Guidelines. As it relates to people taking public transit and public transit operations, Appendix G states: "would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?" The department uses the following significance criteria to evaluate that question: A project would have a significant impact if it would:

1) Substantially delay public transit; or
2) Creates potentially hazardous conditions[2] for public transit operations

EXISTING AND EXISTING PLUS PROJECT

Methodology

This section describes the typical methodology required to address the significance criteria. The methodology section identifies the collection, generation, and approach to analyze data. The department will determine whether to adjust the methodology as necessary to inform the analysis. For most projects, the department may only require transit impact analysis if the project site fronts or is within one block of a street with transit service.

[2] For the purposes of this memorandum, "hazard" refers to a project generated vehicle potentially colliding with a transit vehicle that could cause serious or fatal physical injury, accounting for the aspects described below. Human error or non-compliance with laws, weather conditions, time-of-day, and other factors can affect whether a collision could occur. However, for purposes of CEQA, hazards refer to engineering aspects of a project (e.g., speed, turning movements, complex designs, substantial distance between street crossings, sight lines) that may cause a greater risk of collisions that result in serious or fatal physical injury than a typical project. This significance criterion focuses on hazards that could reasonably stem from the project itself, beyond collisions that may result from aforementioned non-engineering aspects or the transportation system as a whole.

Period

In San Francisco, the weekday extended p.m. peak period (Tuesday, Wednesday, or Thursday, 3 p.m. to 7 p.m.) is typically the period when the most overall travel happens.[3] Although a substantial amount[4] of travel occurs throughout the day and impacts from projects would typically be less during other periods, the methodology should typically focus on this period (including limiting the hours within the extended p.m. peak period) as changes in travel demand or public right-of-way would be acute compared to other times of the day and days of the week. In some instances, the most overall travel may occur at different periods (a.m., midday, post-p.m. peak, and/or weekend) for smaller geographic areas (e.g., a segment of a street) or certain transit route (e.g. Muni Metro surface service) in existing conditions or as a result of the project, or the project may result in substantial disparity in travel demand at different periods (e.g., special events). In these instances, the methodology may substantiate the use of periods in addition to or other than the weekday p.m. peak period. Attachment B shows ridership by Muni route over different time periods and can substantiate the use of periods in addition to or other than the weekday p.m. peak period. The use of an alternative time period to p.m. peak should be discussed with the planning department during the scoping period.

Existing Conditions

The following identifies the typical methodology for projects. The department will determine the appropriate methodology as necessary to inform the impact determination:

<u>Visual Analysis with Recorded Observations</u>

Data collection for the project should include a site visit for a visual analysis, with recorded observations of the absence, discontinuity, or presence of the features listed in the project description and other relevant features (e.g., the location of a transit-only lane or other transit facilities), and a description of the weather conditions. In addition, the site visit must record any existing hazards to transit operations at locations in the study area, especially along travel lanes where transit vehicles operate and transit stop/station locations. [text, figure]

<u>Transit Travel Time, Delay, and Reliability</u>

Include the travel time of transit vehicles or indicators of transit delay and reliability such as the following to the extent applicable:

- Auto to transit travel time comparison
- Transit Travel time (and variability) between stops and/or time points

Transit travel time, delay, and reliability data may be obtained from in-public transit vehicle automatic vehicle location system, countywide congestion management program, or other San Francisco or regional public transit agency reports.

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[3] Examples that illustrate this statement: within the San Francisco County Congestion Management Program network transit and vehicular travel speeds are lower during the p.m. peak period (4:30-6:30 p.m.) than during the a.m. peak period (7-9a.m.) as documented in San Francisco County Transportation Authority, *Congestion Management Program*, December 2015; demand at transit stations is consistent and generally higher throughout the p.m. peak period relative to demand at transit stations during the a.m. peak period, as documented in the Metropolitan Transportation Commission, *Core Capacity Transit Study Briefing Book*, July 2016; the weekday peak period for for-hire vehicles occurs from 6:30 p.m. to 7p.m., as documented in San Francisco County Transportation Authority, *TNCs Today: a Profile of San Francisco Transportation Network Company Activity*, June 2017.

[4] Throughout this memo, the term "substantial amount" is used but not defined. This is because what constitutes a substantial amount of people, vehicles, etc., depends on the context in which the project is being evaluated (e.g., existing conditions, proposed land uses, and other variables).

Street Design Characteristics

Include the following general characteristics of streets within the study area:

- Location and type of traffic control devices (e.g., stop signs, signals, crosswalk) [text, figure]
- Number of travel lanes by type (e.g., mixed flow, parking, bicycle, transit-only, etc.) [text, figure]
- Posted speed limit and recorded or inferences about observed speeds [text]
- Presence of High-Injury Corridor [text, figure]
- Transit Preferential Streets Program designation,[5] if applicable [text, figure]

Include the following additional characteristics of streets within the study area to the extent applicable:

- Signal timing and phasing of traffic control devices, including presence of transit signal priority [text]
- Width of travel lanes [text, figure]
- Number of travel lanes by type at intersections (if different from the number of travel lanes along midblock) [text, figure]
- Nearby transit stations/stops amenities (e.g., shelters, boarding islands) and service information [i.e., frequency, time of day service, ridership, origins and destinations, and service type (See Attachment C for a description of service type and routes)] [text, figure, table]

Existing plus Project Conditions

The following identifies the typical methodology:

Travel Demand Analysis

Estimate the number of people driving and taking transit to and from the project site. [text, table] In addition, distribute and assign the project's vehicle trips to roadways, intersections, loading zones, and driveways and transit trips to transit stops and routes to the extent applicable. [text, figure]

Transit Delay

Use the travel demand analysis and project elements to determine if the project would result in transit service delay. The department transit delay screening criteria is 300 inbound project vehicle trips during the peak hour. Attachment D provides additional notes on this screening criteria. If a project exceeds the screening criteria, then the methodology should conduct a quantitative transit delay analysis. Example quantitative approaches to assess transit delay include:

- Transit delay analysis based on three components – traffic congestion delay (calculated by summing the average vehicle delay along the transit routes), transit reentry delay (calculated as the sum at each transit stop using empirical data), and passenger boarding delay (calculated by using a second per passenger boarding/alighting and based on transit assignment[6]).
- Transit Cooperative Research Program 165 methodology.[7] The methodology assesses, among other things, bus stop operations, segment travel speeds, transit roadway facilities, bus facility

[5] Transit Preferential Streets Program designations are as follows: Primary Transit Streets (Transit Oriented or Transit Important) and Others (Secondary Transit Street or Transit center).

[6] Transit assignments refers to assignment of project person trips on transit routes

[7] Transit Cooperative Research Program 165 is a reference document that provides research-based guidance and quantitative techniques for calculating transit delays and other operational characteristics.

capacity, and intersection approach to determine transit travel time based on public transit route schedule time points.

Attachment E provides more detail regarding these approaches. The methodology should report delay from each applicable category: traffic congestion delay, passenger boarding/alighting delay, re-entry delay, and/or other delay types.

Potentially Hazardous Conditions

Use the travel demand analysis and project elements to determine if the project would result in potentially hazardous conditions for transit operations. The methodology should qualitatively and/or quantitatively assess:

- The number, movement type, sightlines, and speed of project vehicle trips in and out of project facilities based upon the design of such facilities (e.g., curb-cut dimensions, roadway speeds) in relation to the travel lanes where transit vehicles operate and transit stop/station locations [text, figure]
- The number, type (e.g., left turn, right turn), sightlines, and speed of project vehicle movements at intersections and roadways in relation to the travel lanes where transit vehicles operate and transit stop/station locations [text, figure]

Existing Baseline

Refer to the guidelines for direction on including existing baseline in transportation studies.

Impact Analysis

This section ties the project description, methodology, and existing baseline together to address the significance criteria for existing plus project conditions. This section addresses the typical approach for the impact analysis and provides more details related to hazards and substantial transit delay impacts for transit operations and people taking transit. The impact analysis section should present a format (text, figure, or table) consistent with earlier sections of this memorandum for easy comparison.

The impact analysis must address whether the project would create potentially hazardous conditions for public transit operations and whether the project would create potential delays to public transit.

Refer to the guidelines for direction on what to typically consider when conducting the existing plus project impact analysis and how to present the findings. The subsections below provide specific examples of the types of circumstances that could result in a potentially hazardous condition impact or public transit delay impact under existing plus project conditions.

Potentially Hazardous Conditions

This is not an exhaustive list of circumstances, under which potentially hazardous conditions could occur:

- A project would add a substantial number of moving vehicle trips (e.g., turning movement into the project driveway, curb cut) crossing a transit lane or transit facility (e.g., transit stop) used by a substantial number of people taking transit (e.g., based on Muni service type category or designation)
- A project would construct or be located on a lot with physical obstructions (e.g., trees, utilities, an adjacent curb cut used by a substantial number of people driving, or on-street parking directly adjacent to the curb cut or transit stop) or slopes that would obstruct sightlines between a substantial number of people driving exiting or reversing into an off-street facility and a transit vehicle operating in travel lane next to the off-street facility
- A project would be unable to accommodate vehicle trips, including freight and delivery service vehicle trips, into its off-street facilities thereby resulting in queues on the transit only lane or

near a transit facility (e.g., bus stop) used by a substantial number of people taking transit (e.g., based on Muni service type category or designation)

Transit Delay

For projects that meet the screening criteria as shown in Attachment D, the transit impact analysis must use a quantitative threshold of significance and qualitative criteria to determine whether the project would substantially delay public transit. For individual Muni routes, if the project would result in transit delay greater than or equal to four minutes, then it might result in a significant impact. For individual Muni routes with headways less than eight minutes, the department may use a threshold of significance less than four minutes. For individual surface lines operated by regional agencies, if the project would result in transit delay greater than one-half headway, then it might result in a significant impact. The department considers the following qualitative criteria for determining whether that delay would result in significant impacts due to a substantial number of people riding transit switching to riding in private or for-hire vehicles:

- Transit service routes headways and ridership,
- Origins and destinations of trips,
- Availability of other transit and modes, and
- Competitiveness with private vehicles including for-hire vehicles.

Based on the qualitative criteria, the department will determine the significance. The following examples are some of the circumstances that may result in substantial transit delay. This is not an exhaustive list of circumstances, under which substantial transit delay could occur:

- A project would add a substantial number of moving vehicle trips (e.g., turning movement into the project driveway, curb cut) crossing a transit lane or transit facility (e.g., transit stop) used by a substantial number of people taking transit, resulting in transit delay greater than four minutes, and the qualitative analysis shows that existing automobile travel time is substantially lower than transit travel time on study area roadways where transit operates that could result in people switching from transit to ride in private vehicles and/or for-hire vehicles.
- A project would add a substantial number of moving vehicle trips (e.g., turning movement,) that would require potential traffic signal retiming to the detriment of a substantial number of people taking transit, resulting in transit delay greater than four minutes, and the qualitative analysis shows that the potentially impacted transit routes have high ridership, and serve the same origins and destinations as other travel modes, thereby could result in people switching from transit to these other modes.

CUMULATIVE

Methodology

The guidelines detail the typical methodology for cumulative analysis, including the geographical area, period, cumulative projects, and adjustments (refer to Appendix B) under cumulative conditions. The cumulative section in transportation studies must present (text, figure, or table) the applicable elements included in the methodology.

Impact Analysis

This section ties the methodology and description of cumulative conditions together to address the significance criteria for cumulative conditions. Refer to the guidelines for direction on what to consider when conducting the cumulative impact analysis and how to present the findings. The same examples of the types of circumstances that could result in potentially hazardous conditions to transit operations that were provided for existing plus project conditions apply here, except for cumulative conditions.

If cumulative projects combine to delay individual Muni routes by greater than or equal to four minutes, then it might result in a significant cumulative impact. For individual Muni routes with headways less than eight minutes, the department may use a threshold of significance less than four minutes to determine a significant cumulative impact. For individual surface lines operated by regional agencies, if cumulative projects would result in transit delay greater than one-half headway, then it might result in a significant impact. The department considers the same qualitative criteria as described in existing plus project conditions for determining whether that delay would result in significant impacts due to a substantial number of people riding transit switching to riding in private or for-hire vehicles. The department will determine significance regarding cumulative contribution, as a percentage of overall delay, on a project-by-project basis.

OTHER

The guidance provided in this memorandum assumes a land use development project located outside of an area plan that requires a transportation study. This section describes the type of additional or different information that may be necessary to address transit impacts for the following circumstances: land use development project located within an area plan, an area plan or certain rezoning outside of area plans, unique land use or events, or infrastructure project (which may be located in a different county than San Francisco).

Land Use Development Project Located within an Area Plan

For projects that are consistent with an area plan for which an environmental impact report (EIR) was certified, pursuant to CEQA guidelines section 15183, the assessment must limit its analysis to such conditions specified in that section. The guidelines provide direction on how to analyze a land use development project in an area plan and a list of area plan EIRs that have been certified as of February 2019.

Attachment F of this memorandum identifies mitigation and improvement measures from area plan EIRs related to emergency access. The department will list emergency access-related mitigation and improvement measures from future area plan EIRs in Attachment F after the Planning Commission or Board of Supervisors certifies those EIRs.

Area Plans or Other Substantial Rezoning Outside of Area Plans

For area plans or projects that would require rezoning outside of area plans, such that the development density allowed at a site would substantially increase, the assessment will typically use the significance criteria identified herein.[8] The following subsections describe the type of additional or different information that may be necessary to address transit operations and impacts to people taking transit for project description, methodology, and impact analysis. For area plans that also include infrastructure

[8] Sometimes project sponsors propose redevelopment of large areas consisting of multi-structure, multi-phased development outside a formal plan area. These proposals often require rezoning in the form of special use districts or changes to zoning similar to the rezoning under an area plan. In terms of the project description, a project may have a well-defined aspects or phases, while other projects in the proposal may rely on consistency/conformance with associated design guidelines or performance standards.

changes (e.g., street redesigns), please see the Infrastructure Project subsection for additional or different information that may be necessary.

Project Description

Typically, the department conducts an analysis to estimate the amount of future development that could occur in the area plan or rezoning as a result of its implementation. The department typically does not have all the project description outlines herein for an area plan or rezoning. However, for area plans, the project description may include policies that may relate to the methodology and impact analysis (e.g., curb-cut restrictions) or design guidelines or performance standards.

Methodology

The assessment will typically use the same methodology identified herein, except the methodology will use a larger geographical study area given the typical larger size of these types of projects (e.g., select streets and intersections along transit corridors most impacted by the area plan or rezoning). As described above, the assessment requires less site-specific information (e.g., driveway locations at each building may not be available) except to document circumstances where vehicles may not be allowed (e.g., curb-cut restrictions). Area plan rezoning typically may not require some of the project elements listed in the Existing and Existing plus Project Methodology subsection.

The assessment will evaluate potential changes to travel patterns and assign project transit trips to different transit routes. Based on these changes and transit trip assignment, the methodology may include qualitative and/or quantitative transit analysis as described under the Existing plus Project and Cumulative Impact Analysis subsections.

Impact Analysis

For analysis of area plans or rezoning, assess the projected amount of growth and infrastructure changes associated with the rezoning within the area plan boundaries or project site. The analysis of potentially hazardous conditions for people taking transit or analysis of transit travel delay should be similar to that described under the Existing plus Project Cumulative Impact Analysis subsections. If the area plan or rezoning includes infrastructure changes (e.g., street redesigns), given the potential time gap between land use development and completion of infrastructure changes, the analysis should discuss the potential short-term effects of that time gap in a lesser level of detail than that provided for overall effects. However, the analysis should assume individual land use development projects within the area plan or the proposed project would be subject to property specific infrastructure changes (e.g., Better Streets Plan).

Infrastructure Project

For infrastructure projects (e.g., new roads, bridge repair, sewer line, rail service, roadway modifications, etc.), the assessment of the project description, significance criteria, and impact analysis should be similar to private development projects. The analysis typically does not require trip generation, as infrastructure projects usually do not generate trips.[9] However, some infrastructure project may induce trips, such as

[9] Governor's Office of Planning and Research, *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA*, January 20, 2016.

the addition of through lanes on existing or new highways or streets.[10] In addition, infrastructure projects may generate short-term trips due to construction workers and vehicles accessing the project site.

Project Description

The project description must describe the typical physical, additional physical, and programmatic features for existing and project conditions, as applicable. The project description must provide the geographic boundaries of the project and street cross sections.

Methodology

The assessment will typically use the same methodology identified herein, except the methodology will pay particular attention to proposed closures and rerouting.

Impact Analysis

The analysis of potentially hazardous conditions for public transit operations and substantial transit delay impacts should be similar to that described under the Existing plus Project Cumulative Impact Analysis subsections. Examples of circumstances that would result in significant impacts are described under Existing plus Project Impact Analysis subsection. The following examples are some of the additional circumstances relevant to infrastructure projects, which may result in potentially hazardous conditions for people taking transit and substantial transit delay.

- The project proposes changes that divert vehicles from a roadway without transit service or facilities to a roadway used by a substantial number of people taking transit (e.g., based on Muni service type category or designation)
- A project would remove a travel lane(s) (e.g., for an on-street bicycle facility), thereby limiting to fewer mixed-flow lane(s) used by a substantial number of vehicle trips and a substantial number of people taking transit (e.g., based on Muni service type category or designation)

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[10] Generally, minor transportation projects would not result in additional trips. Examples include, but are not limited to, rehabilitation, maintenance, and repair of transportation infrastructure; installation, removal or reconfiguration of non-through traffic lanes and traffic control devices; removal of through lanes; installation of traffic calming measures and wayfinding; removal of on- or off-street parking. Governor's Office of Planning and Research, *Technical Advisory on Evaluating Transportation Impacts in CEQA*, November 2017.

ATTACHMENT A

Existing and Proposed Project Figure and Table Examples

Introduction

Attachment A represents typical figures necessary to illustrate transit conditions included in a transportation study. All figures should include basic elements (e.g., north arrow, title, legend, references, acronyms, etc.). Symbology should reflect that documents may be printed in black and white. All figures and tables should include all the information the reader would need to understand the information presented. The figures presented below were from previous transportation studies and are illustrative only and may not include all the basic elements.

FIGURE 1

Site Plan

Figure 1 is an example of a site plan that includes a detailed description of existing and proposed streetscape elements that could affect existing transit services. When developing a map similar to the one shown, include the linear dimensions of the existing and proposed alternations to publicly-accessible rights-of-way (e.g., parking, loading zones, bicycle facilities, or transit facilities). The presence of infrastructure or streetscape elements that assist with the operation of transit (e.g., Muni overhead wire poles, transit shelters) should be identified. Any loading zones should match the color of the zones to those used in the SFMTA Color Curb Program. Existing and proposed changes should be explicit.

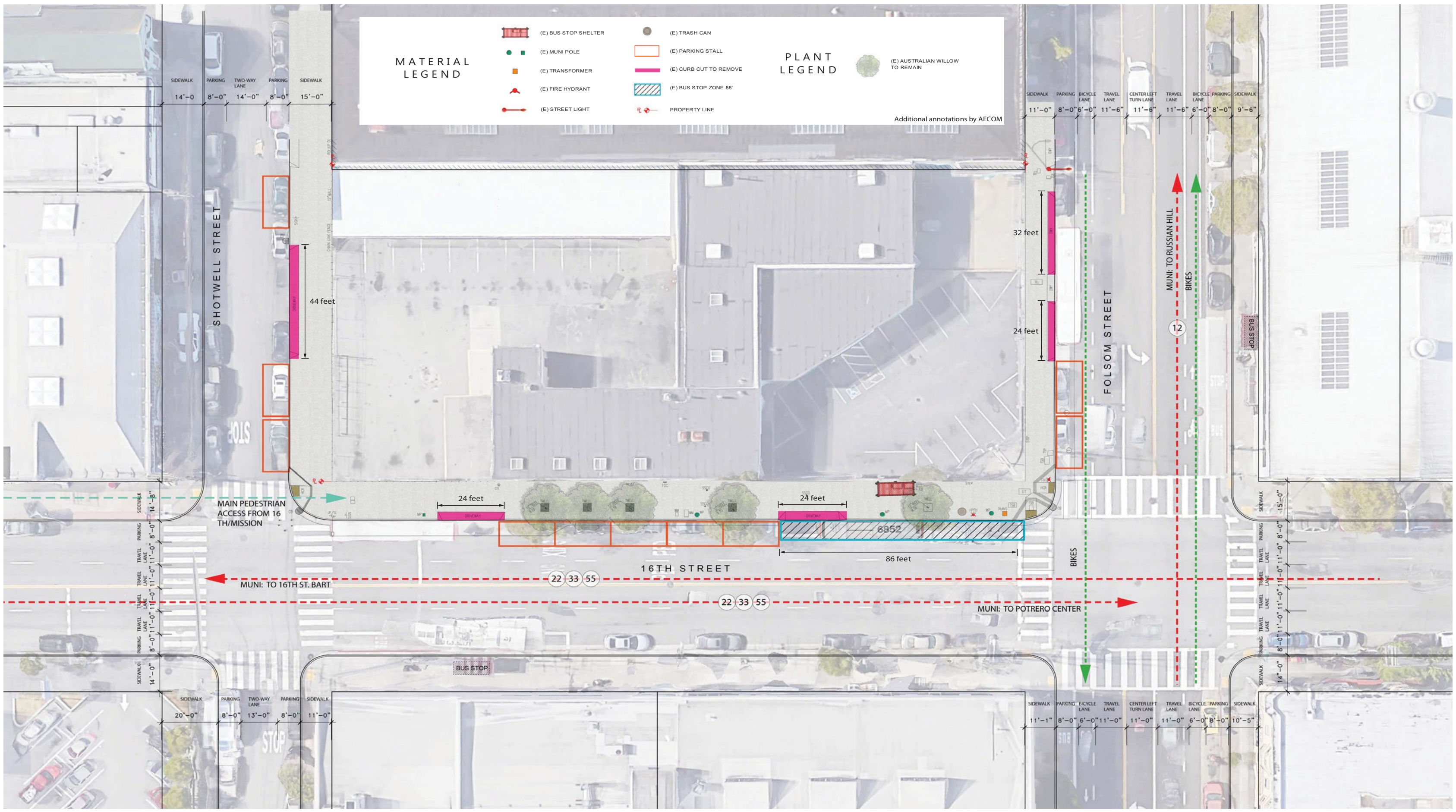


FIGURE 2

Transit Network

Figure 2 shows a transit network map, identifying public transit service that serves the project area and surrounding streets. The dotted lines represent the project study area. Local and regional public transit services are represented through different line colors with labeled route numbers. Service type (i.e., Rail, Rapid Bus, Frequent, Grid, Connector, Specialized, Owl) may also be identified. Additional symbols are included to identify transit stops, stations, and other important transit facilities.

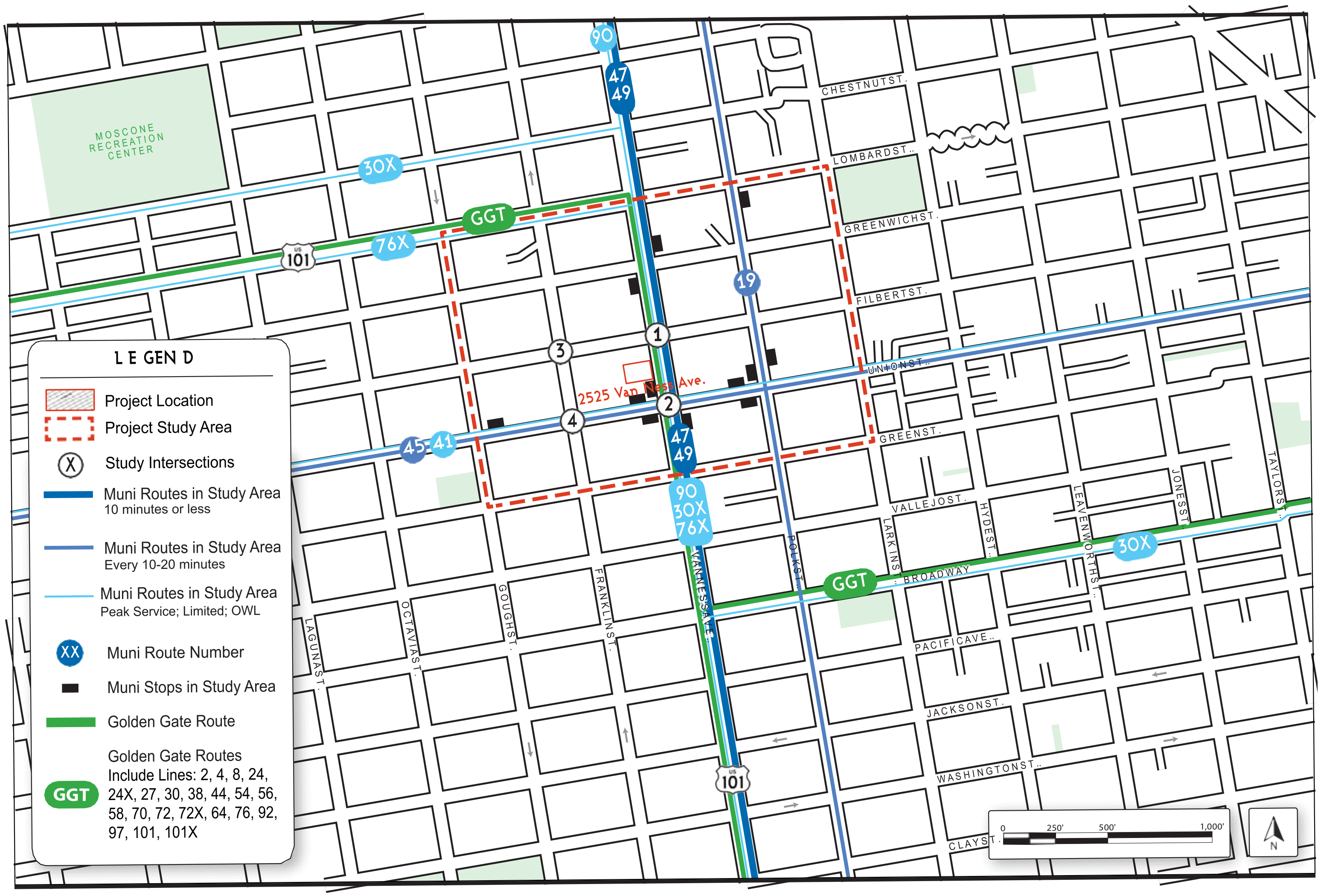


TABLE 1

Existing Public Transit Network Characteristics

Table 1 below presents the existing public transit routes within an approximate quarter-mile of the project site. The table should include all necessary information to describe the existing transit network conditions (e.g., route numbers, service type, and distance to project site). As shown in Table 1, 'x' represents numerical values that would need to be provided and be consistent with project plans.

Route	Direction	Weekday Headways (AM / PM)[1]		Hours of Operation	Nearest Stop Location	Distance to Project Site (feet)[2]	Neighborhoods Served by Route
47-Van Ness	IB	8	8	6:00AM - 1:14AM	Van Ness Ave & Union St	325	Fisherman's Wharf, Fort Mason, Marina, Russian Hill, Polk Gulch, Union Street, Cathedral Hill, Lower Nob Hill, Tenderloin, Civic Center, South of Market, Showplace Square
	OB	8	12	5:43AM - 1:16AM	Van Ness Ave & Union St	110	
49-Van Ness /Mission	IB	8	8	5:13AM - 1AM	Van Ness Ave & Union St	325	Fort Mason, Marina, Russian Hill, Polk Gulch, Union Street, Cathedral Hill, Lower Nob Hill, Tenderloin, Civic Center, South of Market, Mission, Bernal Heights, Holly Park, St. Mary's Park, Mission Terrace, Excelsior, Cayuga, Sunnyside, Oceanview
	OB	8	13	5:40AM - 1AM	Van Ness Ave & Union St	110	
76X-Marin Headlands Express	IB	NA	NA	Weekends 10:30AM - 7:25PM	Van Ness Ave & Union St	110	Marin Headlands, Presidio National Park, Marina, Cow Hollow, Union Street, Russian Hill, Polk Gulch, Lower Nob Hill, Financial District
	OB	NA	NA	Weekends 9:30AM - 6:04PM	Van Ness Ave & Union St	325	
90-San Bruno Owl	IB	NA	NA	12:40AM - 5:12AM	Van Ness Ave & Union St	110	Fort Mason, Marina, Russian Hill, Polk Gulch, Pacific Heights, Cathedral Hill, Lower Nob Hill, Tenderloin, Civic Center, SoMa, Mission, Showplace Square, Potrero Hill, Produce Market, Apparel City, Bernal Heights, Portola, Visitacion Valley
	OB	NA	NA	1:17AM - 5:52AM	Van Ness Ave & Union St	325	

Source: SF Muni, 2017; Prepared by CHS Consulting, 2017

Notes:

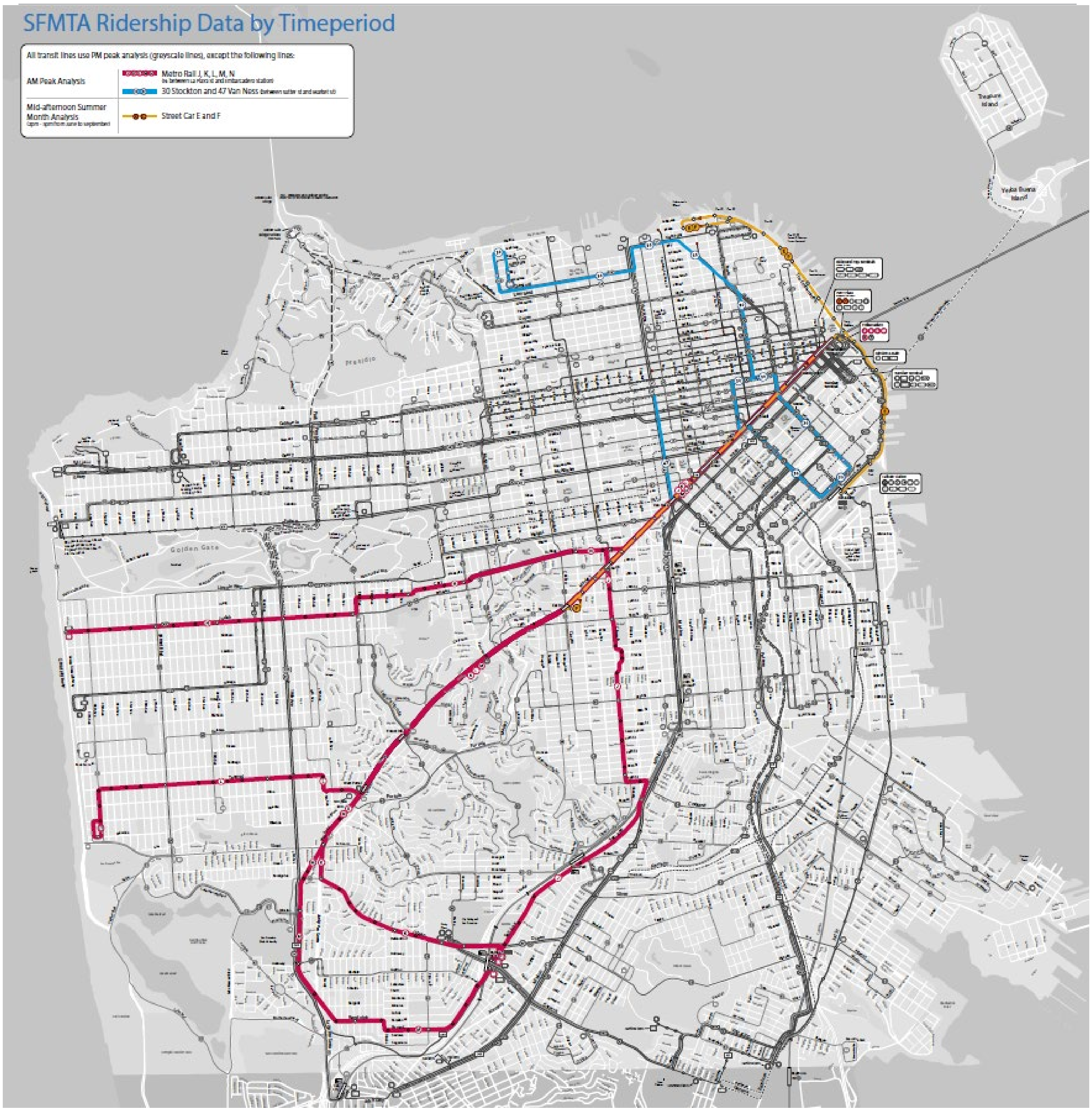
IB= Inbound; OB = Outbound

1. Headway in minutes. AM peak = 7:00 AM to 9:00 AM and PM peak = 4:00 PM to 7:00 PM

2. Distances are approximate and are measured from the center of the project site along local streets to reach nearest stop. Distances are not measured in a straight line between two points or places.

ATTACHMENT B

SFMTA Ridership Data by Timeperiod



SFMTA Municipal Transportation Agency

AM IB

Fall 2015 Baselines (Version 12)

Rubber Tire Counts: Weekdays, Oct. 5 to Nov. 20, 2015 Rail Counts: Fall 2013 & 2014

Route Name	Direction (s)	Vehicle Capacity 100%	Headways in Minutes	Max Load	Cars per Train	Maximum Load Point	Peak Hour Load	Peak Hour Capacity	Peak Hour Capacity Utilization
NX Judah Express	EASTWARD	63	10.0	38	1	JUDAH ST&19TH AVE SW-NS/	237	378	63%
1 California	EASTWARD	63	4.3	46	1	CLAY ST&TAYLOR ST SE-FS/	650	882	74%
2 Clement	EASTWARD	63	12.0	43	1	POST ST&JONES ST SE-FS/B	213	315	68%
3 Jackson	EASTWARD	63	12.0	38	1	POST ST&LEAVENWORTH ST S	191	315	61%
5 Fulton	EASTWARD	63	6.7	56	1	MCALLISTER ST&GOUGH ST S	353	441	80%
6 Haight-Parnassus	EASTWARD	63	10.0	54	1	HAIGHT ST&BUCHANAN ST SW	324	378	86%
7 Haight-Noriega	EASTWARD	63	10.0	47	1	HAIGHT ST&BUCHANAN ST SW	280	378	74%
9 San Bruno	NORTHWARD	63	12.0	34	1	POTRERO AVE&20TH ST NE-F	172	315	54%
10 Townsend	NORTH FR 24TH ST WEST ON PACIFIC	63	10.0	42	1	2ND ST&TOWNSEND. ST N-FS	254	378	67%
12 Folsom-Pacific	NORTH FR 24TH ST WEST ON PACIFIC	63	20.0	40	1	FOLSOM ST&18TH ST NE-FS/	121	189	64%
14 Mission	NORTHWARD	63	8.6	33	1	MISSION ST&26TH ST NE-FS	229	441	52%
18 46th Ave	NORTHWARD	63	20.0	47	1	BALBOA ST&37TH AVE SW-NS	141	189	75%
19 Polk	NORTHWARD	63	15.0	39	1	LARKIN ST&OFARRELL ST SE	156	252	62%
21 Hayes	EASTWARD	63	4.0	36	1	GROVE ST&GOUGH ST SW-NS/	462	819	56%
22 Fillmore	WEST ON 16TH. St. NORTH ON FILLMORE	63	7.5	39	1	16TH ST&GUERRERO ST NE-N	313	504	62%
23 Monterey	EASTWARD	63	20.0	29	1	MONTEREY BLVD&CONGO ST S	87	189	46%
24 Divisadero	NORTHWARD	63	6.7	38	1	CASTRO ST&19TH ST SE-NS/	268	441	60%
25 Treasure Island	WESTWARD	63	10.0	31	1	AVENUE B&9TH AVE NW-NS/S	188	378	50%
27 Bryant	NORTHWARD	63	15.0	39	1	LEAVENWORTH ST&POST ST S	158	252	63%
28 19th Avenue	NORTHWARD	63	10.0	39	1	PARK PRESIDIO BLVD&FULTO	234	378	62%
29 Sunset	NORTHWARD	63	8.6	42	1	PERSIA AVE&PARIS ST E-NS	297	441	67%
30 Stockton	EASTWARD	63	7.5	42	1	STOCKTON ST&JACKSON STS	339	504	67%
31 Balboa	EASTWARD	63	12.0	40	1	TURK ST&STANYAN ST SE-FS	202	315	64%
33 Ashby-18th	WEST THRU MISSION NORTH ON ARGUELLO	63	15.0	33	1	18TH ST&GUERRERO ST NW-F	131	252	52%
35 Eureka	NORTHWARD	45	30.0	23	1	EUREKA ST&20TH ST SE-NS/	45	90	50%
36 Teresita	NORTHWARD	45	30.0	20	1	LAGUNA HONDA BL&CLARENDO	41	90	45%
37 Corbett	NORTHWARD	45	15.0	36	1	CORBETT AVE&DOUGLASS ST	146	180	81%
38 Geary	EASTWARD	94	8.6	60	1	OFARRELL ST&TAYLOR ST S-	418	658	64%
41 Union	EASTWARD	94	5.0	41	1	UNION ST&COLUMBUS AVE S-	496	1,128	44%
43 Masonic	NORTHWARD	63	6.7	52	1	GENEVA AVE&CAYUGA AVE E-	367	441	83%
44 O'Shaughnessy	WESTWARD AND NORTHWARD	63	7.5	43	1	OSHAUGHNESSY BLVD&MALTA	348	504	69%
45 Union - Stockton	EASTWARD	63	7.5	42	1	STOCKTON ST&JACKSON STS	340	504	67%
47 Van Ness	WEST ON HARRISON NORTH ON VAN NESS	63	10.0	48	1	VAN NESS AVE&POST ST E-M	288	378	76%
48 Quintara - 24th Street	EASTWARD	63	12.0	47	1	24TH ST&GUERRERO ST SW-N	237	315	75%
49 Van Ness - Mission	NORTHWARD	94	6.7	43	1	S. VAN NESS AVE&MISSION	301	658	46%
52 Excelsior	NORTHWARD	63	20.0	26	1	ROUSSEAU ST&CAYUGA AVE E	78	189	41%
54 Felton	EASTWARD	63	20.0	42	1	MT VERNON AVE&LOUISBURG	127	189	67%
55 16th Street	WESTWARD	63	15.0	6	1	16TH ST&HARRISON ST NE-N	26	252	10%
56 Rutland	WESTWARD	45	30.0	22	1	SAWYER ST&VISITACION AVE	43	90	48%
57 Parkmerced	EASTWARD	63	20.0	14	1	JUAN BAUTISTA CIR&FONT B	41	189	22%
5R Fulton Rapid	EASTWARD	63	4.0	54	1	MCALLISTER ST&FILLMORE S	810	945	86%
66 Quintara	NORTHWARD	45	20.0	17	1	QUINTARA ST&26TH AVE SE-	52	135	39%
67 Bernal Heights	NORTHWARD	63	20.0	31	1	FOLSOM ST&25TH ST SE-NS/	94	189	50%
7R Haight Noriega Rapid	EASTWARD	63	10.0	50	1	HAIGHT ST&FILLMORE ST SE	301	378	80%
7X Noriega Express	EASTWARD	63	7.5	32	1	LINCOLN WAY&9TH AVE SE-F	254	504	50%
8B BART Shuttle	EASTWARD	63	15.0	35	1	GENEVA AVE&CAYUGA AVE E-	139	252	55%
9R San Bruno Rapid	NORTHWARD	63	7.5	43	1	SF GENERAL HOSPITAL E-MB	342	504	68%
14R Mission Rapid	NORTHWARD	94	8.6	69	1	MISSION ST&RICHLAND AVE	486	658	74%
14X Mission Express	NORTHWARD	94	7.5	55	1	TRUMBULL ST&STONEYBROOK	440	752	59%
1AX California "A" Express	EASTWARD	63	12.0	63	1	CALIFORNIA ST&8TH AVE SW	315	315	100%
1BX California "B" Express	EASTWARD	94	7.5	70	1	CALIFORNIA ST&FILLMORE S	563	752	75%
28R 19th Avenue Rapid	NORTHWARD	63	10.0	38	1	DALY CITY BART STATION W	225	378	60%
30X Marina Express	EASTWARD	63	4.6	48	1	CHESTNUT ST&VAN NESS AVE	621	819	76%
38R Geary Rapid	EASTWARD	94	4.0	75	1	GEARY BLVD&LAGUNA ST SW-	1119	1,410	79%
81X Caltrain Express	NORTHWARD FROM CALTRAIN	63	30.0	25	1	4TH ST&TOWNSEND ST S-FS/	50	126	40%
82X Levi Plaza Express	NORTHWARD FROM CALTRAIN	63	15.0	45	1	4TH ST&TOWNSEND ST S-FS/	179	252	71%
83X Midtown Express	WESTWARD FROM CALTRAIN	63	15.0	7	1	TOWNSEND ST & 8 ST NE-NS	30	252	12%
8AX Bayshore Express	NORTHWARD	94	6.0	61	1	BRYANT ST&5TH ST E-FS/BZ	612	940	65%
8BX Bayshore Express	EASTWARD AND NORTHWARD	94	6.7	66	1	BAYSHORE BLVD&BLANKEN AV	591	846	70%
31AX Balboa "A" Express	EASTWARD	63	10.0	47	1	BALBOA ST&PARK PRESIDIO	281	378	74%
31BX Balboa "B" Express	EASTWARD	63	12.0	43	1	PRESIDIO AVE&GEARY BLVD	215	315	68%
38AX Geary "A" Express	EASTWARD	63	12.0	39	1	GEARY BLVD&25TH AVE SW-N	197	315	62%
38BX Geary "B" Express	EASTWARD	63	12.0	52	1	PRESIDIO AVE&GEARY BLVD	258	315	82%
F Market & Wharves	DOWN MARKET UP EMBARCADERO	60	6.0	57	1	Steuart Loop (to Wharf)	566	600	94%
J Church	NORTHWARD	119	8.0	107	1	Duboce & Church	800	893	90%
K Ingleside (K/T)	NORTHEASTWARD	119	8.0	123	1	Van Ness Station	925	893	104%
L Taraval	NORTHEASTWARD	238	8.0	133	2	Van Ness Station	2001	1,786	112%
M Oceanside	NORTHEASTWARD	238	9.0	131	2	Van Ness Station	1747	1,587	110%
N Judah	NORTHEASTWARD	238	7.0	149	2	Duboce and Church	2558	2,040	125%
T Third (K/T)	NORTHEAST ON MARKET SOUTH ON THIRD ST	119	9.0	78	1	3rd & Marin (from Bayview)	519	793	65%

SFMTA Municipal Transportation Agency

AM OB

Fall 2015 Baselines (Version 12)

Rubber Tire Counts: Weekdays, Oct. 5 to Nov. 20, 2015 Rail Counts: Fall 2013 & 2014

Route Name	Direction (s)	Vehicle Capacity 100%	Headways in Minutes	Max Load	Capacity Utilization 85%	Cars per Train	Maximum Load Point	Net Capacity	Peak Hour Capacity	Peak Hour Capacity Utilization
1 California	WESTWARD	63	4.0	36	0.60	1	SACRAMENTO ST&POLK ST NW	474	819	58%
2 Clement	WESTWARD	63	10.0	23	0.42	1	SUTTER ST&POLK ST NW-FS	136	378	36%
3 Jackson	WESTWARD	63	12.0	14	0.26	1	SUTTER ST&POLK ST NW-FS	70	315	22%
5 Fulton	WESTWARD	63	6.7	23	0.43	1	MCALLISTER ST&LAGUNA ST	162	441	37%
6 Haight-Parnassus	WESTWARD	63	12.0	19	0.35	1	HAIGHT ST&LAGUNA ST NW-F	93	315	30%
7 Haight-Noriega	WESTWARD	63	12.0	22	0.42	1	HAIGHT ST&LAGUNA ST NW-F	112	315	36%
8 Bayshore	SOUTHWARD AND WESTWARD	94	7.5	64	0.6	1	GENEVA AVE&MADRID ST N-F	512	752	68%
9 San Bruno	SOUTHWARD	63	12.0	29	0.54	1	11TH ST&MISSION ST S-FS/	146	315	46%
10 Townsend	EAST ON PACIFIC SOUTH TO 24TH ST	63	20.0	46	0.82	1	BROADWAY&MONTGOMERY ST S	134	189	71%
12 Folsom-Pacific	EAST ON PACIFIC SOUTH TO 24TH ST	63	15.0	41	0.75	1	PACIFIC AVE&MASON ST SW-	163	252	65%
14 Mission	SOUTHWARD	94	8.6	22	0.29	1	MISSION ST&19TH ST SW-FS	157	658	24%
18 46th Ave	SOUTHWARD	63	20.0	27	0.5	1	46TH AVE&SANTIAGO ST NW-	81	189	43%
19 Polk	SOUTHWARD	63	15.0	37	0.69	1	8TH ST & MARKET ST S-FS/	148	252	59%
21 Hayes	WESTWARD	63	8.6	16	0.29	1	HAYES ST&FILLMORE ST NW-	110	441	25%
22 Fillmore	SOUTH ON FILLMORE EAST ON 18TH ST.	63	8.6	36	0.7	1	18TH ST&MISSION ST SW-NS	264	441	60%
23 Monterey	WESTWARD	63	20.0	40	0.76	1	BOSWORTH ST&ROTTECK ST N	121	189	64%
24 Divisadero	SOUTHWARD	63	6.7	20	0.37	1	DIVISADERO ST&HAIGHT ST	119	378	31%
25 Treasure Island	EASTWARD	63	15.0	7	0.12	1	BEALE & FOLSOM MB-M	39	378	10%
27 Bryant	SOUTHWARD	63	15.0	34	0.63	1	OFARRELL ST&TAYLOR ST S-	136	252	54%
28 19th Avenue	SOUTHWARD	63	10.0	32	0.59	1	19TH AVE&NORIEGA ST SW-F	192	378	51%
29 Sunset	SOUTHWARD	63	8.6	51	0.94	1	PERSIA AVE&NAPLES ST W-N	356	441	81%
30 Stockton	WESTWARD	63	5.5	55	0.99	1	STOCKTON ST&SUTTER ST NE	586	693	85%
31 Balboa	WESTWARD	63	12.0	30	0.56	1	EDDY ST&VAN NESS AVE NE-	151	315	48%
33 Ashby-18th	SOUTH ON ARGUELLO EAST THRU MISSION	63	15.0	32	0.59	1	18TH ST&CHURCH ST SE-FS/	127	252	50%
35 Eureka	SOUTHWARD	45	30.0	7	0.16	1	CASTRO ST&20TH ST NW-NS/	15	90	16%
36 Teresita	SOUTHWARD	45	30.0	29	0.75	1	MONTEREY BLVD&ADEN ST S	57	90	63%
37 Corbett	SOUTHWARD	45	15.0	26	0.29	1	14TH ST&CASTRO ST SW-NS/	42	180	23%
38 Geary	WESTWARD	94	7.5	47	0.50	1	GEARY BLVD&VAN NESS AVE	379	752	50%
41 Union	WESTWARD	94	8.6	18	0.24	1	UNION ST&MASON ST NE-NS/	139	658	21%
43 Masonic	SOUTHWARD	63	6.7	33	0.61	1	LAGUNA HONDA BLVD&FOREST	229	441	52%
44 O'Shaughnessy	SOUTHWARD AND EASTWARD	63	8.6	38	0.71	1	SILVER AVE&DARTMOUTH ST	269	441	61%
45 Union - Stockton	WESTWARD	63	7.5	48	0.88	1	STOCKTON ST&SUTTER ST NE	382	504	76%
47 Van Ness	SOUTH ON VAN NESS EAST ON HARRISON	63	12.0	42	0.78	1	VAN NESS AVE&MCALLISTER	210	315	67%
48 Quintara - 24th Street	WESTWARD	63	10.0	42	0.77	1	24TH ST&SOUTH VAN NESS A	250	378	66%
49 Van Ness - Mission	SOUTHWARD	94	6.7	35	0.44	1	VAN NESS AVE&EDDY ST SW-	248	658	38%
52 Excelsior	SOUTHWARD	63	20.0	21	0.39	1	DIAMOND ST&SURREY ST NW-	64	189	34%
54 Felton	WESTWARD	63	20.0	47	0.87	1	GENEVA AVE & MISSION ST	141	189	75%
55 16th Street	EASTWARD	63	15.0	29	0.54	1	16TH ST&SHOTWELL ST SE-F	116	252	46%
56 Rutland	SOUTHWARD	45	30.0	6	0.22	1	SUNNYDALE AVE&SCHWERIN S	16	90	18%
57 Parkmerced	WESTWARD	63	20.0	7	0.14	1	CHUMASERO DR&FONT BLVD W	22	189	12%
5R Fulton Rapid	WESTWARD	63	4.6	20	0.38	1	MCALLISTER ST&FILLMORE S	265	819	32%
66 Quintara	SOUTHWARD	45	20.0	12	0.32	1	16TH AVE&MORAGA ST NW-NS	37	135	27%
67 Bernal Heights	SOUTHWARD	63	20.0	14	0.27	1	831 ELLSWORTH ST SW-NS/P	43	189	23%
9R San Bruno Rapid	SOUTHWARD	63	7.5	28	0.52	1	11TH ST&MARKET ST S-FS/B	225	504	45%
14R Mission Rapid	SOUTHWARD	94	8.6	36	0.38	1	MISSION ST&24TH ST SW-FS	213	658	32%
28R 19th Avenue Rapid	SOUTHWARD	63	10.0	21	0.39	1	19TH AVE&JUDAH ST SW-FS/	126	378	33%
38R Geary Rapid	WESTWARD	94	4.0	56	0.69	1	GEARY BLVD&VAN NESS AVE	830	1,410	59%
83X Midtown Express	SOUTHWARD TO CALTRAIN	63	15.0	12	0.22	1	8TH ST & MARKET ST S-FS/	48	252	19%
F Market & Wharves	DOWN MARKET UP EMBARCADERO	60	6.0	21	0.42	1	Steuart Loop (from Wharf)	213	600	36%
J Church	SOUTHWARD	119	8.0	26	0.26	1	Duboce & Church	197	893	22%
K Ingleside (K/T)	SOUTHWESTWARD	119	8.0	77	0.77	1	Embarc & Folsom	584	893	65%
L Taraval	SOUTHWESTWARD	238	8.0	27	0.13	2	Van Ness OB	399	1,786	22%
M Oceanside	SOUTHWESTWARD	238	9.0	40	0.2	2	Van Ness OB	538	1,587	34%
N Judah	SOUTHWESTWARD	238	7.0	38	0.19	2	Duboce & Church	653	2,040	32%
T Third (K/T)	NORTH ON THIRD SOUTHWEST ON MARKET	119	8.0	123	1.22	1	Van Ness (to Bayview)	822	793	104%

SFMTA Municipal Transportation Agency

PM IB

Fall 2015 Baselines (Version 12)

Rubber Tire Counts: Weekdays, Oct. 5 to Nov. 20, 2015 Rail Counts: Fall 2013 & 2014

Route Name	Direction (s)	Vehicle Capacity 100%	Headways in Minutes	Max Load	Cars per Train	Maximum Load Point	Net Capacity	Peak Hour Capacity	Peak Hour Capacity Utilization
1 California	EASTWARD	63	7.5	28	1	CALIFORNIA ST&LAUREL ST	225	504	45%
2 Clement	EASTWARD	63	12.0	28	1	POST ST&HYDE ST SE-FS/BZ	141	315	45%
3 Jackson	EASTWARD	63	10.0	17	1	POST ST&LEAVENWORTH ST S	102	378	27%
5 Fulton	EASTWARD	63	6.7	27	1	MCALLISTER ST&LAGUNA ST	186	441	42%
6 Haight-Parnassus	EASTWARD	63	10.0	18	1	HAIGHT ST&PIERCE ST SW-N	110	378	29%
7 Haight-Noriega	EASTWARD	63	10.0	33	1	HAIGHT ST&PIERCE ST SW-N	199	378	53%
7 Haight-Noriega	EASTWARD	63	10.0	33	1	HAIGHT ST&PIERCE ST SW-N	199	378	53%
9 San Bruno	NORTHWARD	63	12.0	26	1	11TH ST&HOWARD ST N-FS/B	132	315	42%
10 Townsend	NORTH FR 24TH ST WEST ON PACIFIC	63	20.0	45	1	PACIFIC AVE&STOCKTON ST	136	189	72%
12 Folsom-Pacific	NORTH FR 24TH ST WEST ON PACIFIC	63	20.0	38	1	PACIFIC AVE&POWELL ST NE	113	189	60%
14 Mission	NORTHWARD	63	7.5	28	1	MISSION ST&23RD ST NE-FS	212	504	42%
18 46th Ave	NORTHWARD	63	20.0	27	1	46TH AVE&TARAVAL ST SE-N	81	189	43%
19 Polk	NORTHWARD	63	15.0	36	1	LARKIN ST&GOLDEN GATE AV	145	252	57%
21 Hayes	EASTWARD	63	8.6	22	1	HAYES ST&BUCHANAN ST SE-	155	441	35%
22 Fillmore	WEST ON 16TH. St. NORTH ON FILLMORE	63	6.7	33	1	16TH ST&FOLSOM ST NW-FS/	301	567	53%
23 Monterey	EASTWARD	63	20.0	30	1	DIAMOND ST&BOSWORTH ST S	90	189	47%
24 Divisadero	NORTHWARD	63	6.7	24	1	CASTRO ST&17TH ST SE-NS/	170	441	39%
25 Treasure Island	WESTWARD	63	15.0	30	1	TREASURE ISLAND MAIN GAT	119	252	47%
27 Bryant	NORTHWARD	63	15.0	41	1	ELLIS ST&MASON ST NE-NS/	164	252	65%
28 19th Avenue	NORTHWARD	63	10.0	42	1	19TH AVE&SANTIAGO ST NE-	249	378	66%
29 Sunset	NORTHWARD	63	12.0	41	1	PLYMOUTH AVE&OCEAN AVE S	203	315	64%
30 Stockton	EASTWARD	63	4.0	36	1	STOCKTON ST&SACRAMENTO S	538	945	57%
31 Balboa	EASTWARD	63	15.0	37	1	TURK ST&STANYAN ST SE-FS	149	252	59%
33 Ashby-18th	WEST THRU MISSION NORTH ON ARGUELLO	63	15.0	36	1	18TH ST&CHURCH ST NE-NS/	140	252	56%
35 Eureka	NORTHWARD	45	20.0	6	1	EUREKA ST&20TH ST SE-NS/	19	135	14%
36 Teresita	NORTHWARD	45	30.0	36	1	MONTEREY BLVD&ACADIA ST	69	90	77%
37 Corbett	NORTHWARD	45	20.0	22	1	14TH ST&NOE ST NE-NS/PS	67	135	49%
38 Geary	EASTWARD	94	6.7	41	1	GEARY BLVD&LAGUNA ST SW-	370	846	44%
39 Coit Tower	FROM TOWER TO WHARF	45	20.0	9	1	STOCKTON ST&UNION ST NW-	27	135	20%
41 Union	EASTWARD	63	8.6	26	1	CLAY ST&MONTGOMERY ST SE	176	441	40%
43 Masonic	NORTHWARD	63	10.0	25	1	LAGUNA HONDA BL &CLAREND	149	378	40%
44 O'Shaughnessy	WESTWARD AND NORTHWARD	63	8.6	33	1	SILVER AVE&BOYLSTON ST W	222	441	50%
45 Union - Stockton	EASTWARD	63	12.0	32	1	STOCKTON ST&JACKSON STS	160	315	51%
47 Van Ness	WEST ON HARRISON NORTH ON VAN NESS	63	8.6	36	1	VAN NESS AVE&TURK ST NE-	255	441	58%
48 Quintara - 24th Street	EASTWARD	63	12.0	32	1	24TH ST&MISSION ST SW-NS	158	315	50%
49 Van Ness - Mission	NORTHWARD	94	7.5	43	1	VAN NESS AVE&MCALLISTER	346	752	46%
52 Excelsior	NORTHWARD	63	20.0	21	1	DIAMOND ST&CHENERY ST SE	64	189	34%
54 Felton	EASTWARD	63	20.0	37	1	GENEVA AVE&CAYUGA AVE S-	112	189	59%
55 16th Street	WESTWARD	63	15.0	26	1	16TH ST&HARRISON ST NE-N	104	252	41%
56 Rutland	WESTWARD	45	30.0	10	1	WILDE AVE&GIRARD ST NW-F	20	90	22%
57 Parkmerced	EASTWARD	63	15.0	8	1	OCEAN AVE&JUNIPERO SERRA	30	252	12%
5R Fulton Rapid	EASTWARD	63	6.7	27	1	FULTON ST&MASONIC AVE SW	246	567	43%
66 Quintara	NORTHWARD	45	20.0	6	1	LAWTON ST&LOMITA AVE SW-	16	135	12%
67 Bernal Heights	NORTHWARD	63	20.0	11	1	FOLSOM ST&25TH ST SE-NS/	32	189	17%
9R San Bruno Rapid	NORTHWARD	63	7.5	30	1	11TH ST&HARRISON ST N-FS	238	504	47%
14R Mission Rapid	NORTHWARD	94	8.6	40	1	MISSION ST&30TH ST E-FS/	281	658	43%
38R Geary Rapid	EASTWARD	94	4.6	52	1	GEARY BLVD&LAGUNA ST SW-	673	1,222	55%
83X Midtown Express	WESTWARD FROM CALTRAIN	63	20.0	9	1	TOWNSEND ST & 8 ST NE-NS	28	189	15%
F Market & Wharves	DOWN MARKET UP EMBARCADERO	60	6.0	34	1	Steuart Loop (to Wharf)	341	600	57%
J Church	NORTHWARD	119	8.0	32	1	Duboce & Church	241	893	27%
K Ingleside (K/T)	NORTHEASTWARD	119	8.0	118	1	Van Ness Station	859	893	96%
L Taraval	NORTHEASTWARD	238	9.0	46	2	Van Ness Station	644	1,587	41%
M Oceanside	NORTHEASTWARD	238	9.0	91	2	Van Ness Station	1210	1,587	76%
N Judah	NORTHEASTWARD	238	6.5	66	2	Duboce and Church	1007	2,197	46%
T Third (K/T)	NORTHEAST ON MARKET SOUTH ON THIRD ST	119	9.0	142	1	Embar & Harr (to Bayview)	945	793	119%

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Route Name	Direction (s)	Vehicle Capacity 100%	Headways in Minutes	Max Load	Capacity Utilization 85%	Cars per Train	Maximum Load Point	Net Capacity	Peak Hour Capacity	Peak Hour Capacity Utilization
NX Judah Express	WESTWARD	63	10.0	32	0.59	1	SUTTER ST&SANSOME ST NW-	192	378	0.51
1 California	WESTWARD	63	3.8	51	0.94	1	SACRAMENTO ST&STOCKTON S	812	1,008	81%
2 Clement	WESTWARD	63	12.0	40	0.75	1	SUTTER ST&MASON ST NW-FS	202	315	64%
3 Jackson	WESTWARD	63	12.0	32	0.59	1	SUTTER ST&MASON ST NW-FS	160	315	51%
5 Fulton	WESTWARD	63	6.7	46	0.86	1	MCALLISTER ST&VAN NESS A	277	378	73%
6 Haight-Parnassus	WESTWARD	63	10.0	47	0.88	1	MARKET ST&VAN NESS AVE N	284	378	75%
7 Haight-Noriega	WESTWARD	63	12.0	42	0.78	1	MARKET ST&VAN NESS AVE N	210	315	67%
9 San Bruno	SOUTHWARD	63	12.0	38	0.71	1	POTRERO AVE&24TH ST SW-F	192	315	61%
10 Townsend	EAST ON PACIFIC SOUTH TO 24TH ST	63	20.0	41	0.76	1	TOWNSEND ST&5TH ST N-NS/	123	189	65%
12 Folsom-Pacific	EAST ON PACIFIC SOUTH TO 24TH ST	63	15.0	33	0.6	1	FOLSOM ST&14TH ST SW-FS/	130	252	52%
14 Mission	SOUTHWARD	94	7.5	35	0.44	1	MISSION ST&19TH ST SW-FS	282	752	38%
18 46th Ave	SOUTHWARD	63	20.0	29	0.54	1	46TH AVE&LINCOLN WAY SW-	87	189	46%
19 Polk	SOUTHWARD	63	15.0	32	0.59	1	8TH ST&HOWARD ST S-FS/BZ	127	252	50%
21 Hayes	WESTWARD	63	7.5	42	0.79	1	HAYES ST&VAN NESS AVE NW	339	504	67%
22 Fillmore	SOUTH ON FILLMORE EAST ON 16TH ST.	63	6.7	38	0.7	1	FILLMORE ST&EDDY ST NW-N	342	567	60%
23 Monterey	WESTWARD	63	20.0	30	0.55	1	DIAMOND ST&BOSWORTH ST S	90	189	47%
24 Divisadero	SOUTHWARD	63	6.7	37	0.69	1	CASTRO ST&19TH ST NW-NS/	260	441	59%
25 Treasure Island	EASTWARD	63	15.0	25	0.47	1	TREASURE ISLAND RD&MACAL	102	252	40%
27 Bryant	SOUTHWARD	63	15.0	27	0.49	1	BRYANT ST&17TH ST SW-FS/	107	252	42%
28 19th Avenue	SOUTHWARD	63	10.0	47	0.87	1	19TH AVE&JUDAH ST SW-FS/	281	378	74%
29 Sunset	SOUTHWARD	63	10.0	43	0.8	1	BEVERLY ST&GARFIELD ST N	260	378	69%
30 Stockton	WESTWARD	63	5.0	35	0.64	1	STOCKTON ST&SUTTER ST NE	415	756	55%
31 Balboa	WESTWARD	63	15.0	44	0.82	1	EDDY ST&VAN NESS AVE NE-	177	252	70%
33 Ashby-18th	SOUTH ON ARGUELLO EAST THRU MISSION	63	15.0	28	0.52	1	18TH ST&DOLORES ST SE-FS	112	252	44%
35 Eureka	SOUTHWARD	45	20.0	27	0.71	1	CASTRO ST&19TH ST NW-NS/	81	135	60%
36 Teresita	SOUTHWARD	45	30.0	15	0.4	1	WOODSIDE AVE&PORTOLA DR	31	90	34%
37 Corbett	SOUTHWARD	45	20.0	35	0.92	1	MARKET ST&CASTRO ST W-FS	105	135	78%
38 Geary	WESTWARD	94	6.7	53	0.66	1	GEARY BLVD&TAYLOR ST NW-	473	846	56%
39 Coit Tower	FROM WHARF TO TOWER	45	20.0	9	0.24	1	POWELL ST&LOMBARD ST SW-	27	135	20%
41 Union	WESTWARD	63	7.5	47	0.87	1	UNION ST&MASON ST NE-NS/	375	504	74%
43 Masonic	SOUTHWARD	63	6.7	42	0.77	1	GENEVA AVE&CAYUGA AVE S-	249	378	66%
44 O'Shaughnessy	SOUTHWARD AND EASTWARD	63	7.5	45	0.83	1	SILVER AVE&MISSION ST SE	360	504	71%
45 Union - Stockton	WESTWARD	63	10.0	49	0.91	1	STOCKTON ST&SUTTER ST NE	295	378	78%
47 Van Ness	SOUTH ON VAN NESS EAST ON HARRISON	63	8.6	32	0.59	1	VAN NESS AVE&SUTTER ST S	223	441	50%
48 Quintara - 24th Street	WESTWARD	63	10.0	38	0.7	1	24TH ST&FOLSOM ST NW-FS/	226	378	60%
49 Van Ness - Mission	SOUTHWARD	94	6.7	42	0.53	1	VAN NESS AVE&EDDY ST SW-	337	752	45%
52 Excelsior	SOUTHWARD	63	20.0	28	0.52	1	EXCELSIOR AVE&PARIS ST W	85	189	45%
54 Felton	WESTWARD	63	20.0	43	0.8	1	HOWTH ST&GENEVA AVE W-FS	129	189	68%
55 16th Street	EASTWARD	63	15.0	12	0.22	1	16TH ST&SHOTWELL ST SE-F	48	252	19%
56 Rutland	EASTWARD	45	30.0	5	0.13	1	BAYSHORE BLVD&BLANKEN AV	10	90	11%
57 Parkmerced	WESTWARD	63	20.0	20	0.38	1	95 BUCKINGHAM WAY NE-NS/	61	189	32%
5R Fulton Rapid	WESTWARD	63	6.0	54	1	1	MCALLISTER ST&VAN NESS A	542	630	86%
66 Quintara	SOUTHWARD	45	20.0	14	0.37	1	LAWTON ST&FUNSTON AVE NE	42	135	31%
67 Bernal Heights	SOUTHWARD	63	20.0	28	0.51	1	FOLSOM ST&25TH ST NW-NS/	83	189	44%
7R Haight Noriega Rapid	WESTWARD	63	10.0	44	0.81	1	HAIGHT ST&GOUGH ST NW-FS	263	378	70%
7X Noriega Express	WESTWARD	63	10.0	28	0.52	1	23RD AVE&JUDAH ST NW-NS/	170	378	45%
8B BART Shuttle	WESTWARD	63	20.0	19	0.35	1	MISSION ST&GENEVA AVE W-	57	189	30%
9R San Bruno Rapid	SOUTHWARD	63	8.6	43	0.79	1	POTRERO AVE&24TH ST SW-F	299	441	68%
14R Mission Rapid	SOUTHWARD	94	7.5	64	0.8	1	MISSION ST&24TH ST SW-FS	510	752	68%
14X Mission Express	SOUTHWARD	94	8.6	41	0.52	1	MISSION ST&5TH ST W-FS/B	289	658	44%
1AX California "A" Express	WESTWARD	63	10.0	53	0.98	1	PINE ST&MONTGOMERY ST NE	318	378	84%
1BX California "B" Express	WESTWARD	63	10.0	42	0.77	1	PINE ST&MONTGOMERY ST NE	250	378	66%
28R 19th Avenue Rapid	SOUTHWARD	63	10.0	20	0.38	1	19TH AVE&LINCOLN WAY SW-	122	378	32%
30X Marina Express	WESTWARD	63	7.5	48	0.89	1	SANSOME ST&WASHINGTON ST	386	504	77%
38R Geary Rapid	WESTWARD	94	4.0	70	0.88	1	GEARY BLVD&POWELL ST NW-	1051	1,410	75%
82X Levi Plaza Express	SOUTHWARD TO CALTRAIN	63	15.0	18	0.34	0	BEALE ST & HOWARD ST W-N	74	252	29%
83X Midtown Express	EASTWARD TO CALTRAIN	63	20.0	11	0.2	1	8TH ST & MARKET ST S-FS/	32	189	17%
8AX Bayshore Express	SOUTHWARD	94	6.0	59	0.74	1	STOCKTON ST&SACRAMENTO S	590	940	63%
8BX Bayshore Express	SOUTHWARD AND WESTWARD	94	6.0	57	0.71	1	STOCKTON ST&SACRAMENTO S	571	940	61%
31AX Balboa "A" Express	WESTWARD	63	10.0	43	0.8	1	PINE ST&MONTGOMERY ST NE	258	378	68%
31BX Balboa "B" Express	WESTWARD	63	12.0	37	0.69	1	PINE ST&MONTGOMERY ST NE	187	315	59%
38AX Geary "A" Express	WESTWARD	63	10.0	44	0.81	1	PINE ST&MONTGOMERY ST NE	261	378	69%
38BX Geary "B" Express	WESTWARD	63	10.0	47	0.86	1	PINE ST&MONTGOMERY ST NE	280	378	74%
F Market & Wharves	DOWN EMBARCADERO UP MARKET	60	6.0	79	1.55	1	Steuart Loop (from Wharf)	788	600	131%
J Church	SOUTHWARD	119	8.0	101	1	1	Duboce and Church	758	893	85%
K Ingleside (K/T)	SOUTHWESTWARD	119	8.0	142	1.4	1	Van Ness Station OB	1064	893	119%
L Taraval	SOUTHWESTWARD	238	9.0	124	0.61	2	Van Ness Station OB	1648	1,587	104%
M Oceanside	SOUTHWESTWARD	238	9.0	136	0.68	2	Van Ness Station OB	1836	1,587	116%
N Judah	SOUTHWESTWARD	238	6.5	117	0.58	2	Duboce and Church	2168	2,197	99%
T Third (K/T)	NORTH ON THIRD SOUTHWEST ON MARKET	119	9.0	116	1.13	1	Embar & Harr (from Bayview)	783	793	98%

ATTACHMENT C

SFMTA Transit System Service Categories, Routes, and Designations

TABLE 4

Short Range Transit Plan Service Categories and Routes

Category	Description	Routes
Rapid Bus	These heavily used bus lines include some of the busiest routes in the Muni network. With wider stop spacing, vehicles arriving frequently and transit priority enhancements along the routes, the Rapid bus routes delivers speed and reliability whether customers are heading across town, or simply traveling a few blocks.	5R, 9R, 14R, 28R, 38R
Frequent	These routes combined with Rapid Bus create the Transit Priority Network. They also include transit priority enhancements and frequent service but with more stops along the route than the Rapid bus system.	1, 7, 8, 9, 14, 22, 28, 30, 38, 47, 49
Grid	These citywide routes combine with the Transit Priority Network to form an expansive core grid that lets customers get to their destinations with no more than a short walk, or a seamless transfer. Depending on demand, they typically operate less frequently than the Rapid and Frequent routes.	2, 3, 5, 6, 10, 12, 18, 19, 21, 23, 24, 27, 29, 31, 33, 43, 44, 45, 48, 54
Connector	These bus routes are shorter than the Citywide grid routes and predominantly circulate through San Francisco's hillside residential neighborhoods, filling in gaps in coverage and connecting customers to major transfer hubs, including Muni Metro and BART stations.	25, 35, 36, 37, 39, 52, 55, 56, 57, 66, 67
Specialized	These routes augment existing service during specific times of day to serve a specific need, or serve travel demand related to special events. They include AM and PM commute service, weekend-only service, and special event trips to serve sporting events, large festivals and other San Francisco activities	1AX, 1BX, 7X, 8AX, 8BX, 14X, 30X, 31AX, 31BX, 38AX, 38BX, 41, 76X, 81X, 82X, 83X, 88, NX
Owl	These bus routes operate every 30 minutes from midnight to 6 am, ensuring a basic level of access across the City 24 hours per day.	5, 14, 22, 24, 25, 38, 44, 48, 90, 91, L bus, N bus

ATTACHMENT D

Screening Criteria for Transit Delay Analysis - Supplemental Notes

The following subsections provided additional details supporting the transit delay screening criteria based on a threshold of significance of 4 minutes, or half-headway, if less. Assumptions used to quantify factors that lead to transit delay were determined. The expected number of inbound project vehicle trips at each project driveway during the peak hour that would meet the 4 minute threshold of significance was calculated.

Assumptions		**Notes/Sources**
Delay to each bus from turning vehicle	5 seconds	Based on observed travel time of 63 northbound buses on Mission between 14th and 15th, which cut off buses with green time were delayed by 2.5 seconds. July 5, 2018 for 4840 Mission Transportation Study. 5 seconds is applied conservatively.
# of buses that would be delayed by just project vehicle turning movements to trip 4 minutes	48 buses	240 seconds/5 seconds
Most buses running on any street in one direction in a given hour	31 or one per every 116 seconds	Between 5 and 6 PM in the predominant commute direction, streets with high amounts of transit service: Geary (31 buses), Stockton (31 buses), 3rd Street (29 buses), California (25 buses), Otis/Mission (24 buses) and Van Ness (16 buses). SFMTA, October 5, 2017 email for 30 Otis.
Delay associated with 31 buses	2.6 minutes or 155 seconds	31 buses * 5 seconds

Expected number of buses that would arrive during 200 inbound vehicle trips accessing the curb or driveway	18	**Assumption** 1) The time interval is finite and measures as 10 seconds long (assuming the vehicle clears the ~50 foot conflict area in 10 seconds yields a speed of 3.4mph). 2) That simultaneous bus and vehicle arrival into the conflict area only last 10 seconds. 3) Because of 1) and 2), the peak 1-hour in the denominator is expressed as 360 10-second intervals. 4) We then divide the number of inbound vehicle trips by the 360 to express the probability of a 10-second interval having an inbound vehicle trip. 5) Multiply that by the most number of buses running on any street (31) in a given direction during the PM peak to arrive at the number of buses that would arrive at the same time an inbound vehicle trip would access the driveway.
Expected number of buses that would arrive during 300 inbound vehicle trips accessing the curb or driveway	26	
Expected number of buses that would arrive during 350 inbound vehicle trips accessing the curb or driveway	31	
Expected number of buses that would arrive during 400 inbound vehicle trips accessing the curb or driveway	35	

Assuming that 350 inbound vehicle trips and the associated increase in walking trips would also delays those buses by 1.4 minutes, we landed on this screening criteria.

ATTACHMENT E

Quantitative Approaches to Transit Delay

EXAMPLE 1

Transit Cooperative Research Program 165 methdology.

The following subsections provided additional details regarding quantitative approaches to transit delay analysis. Given that quantitative transit delay analysis could require substantial inputs and data, the department will determine the need for this analysis early in the transportation review process.

- The analysis will quantify to what extent the Project would increase delay experienced by transit on the analysis corridors through the study area. The transit delay analysis will also quantify to what extent transit travel times would be improved by the proposed expanded and upgraded transit-only lanes.
- Data inputs will be gathered at both the individual stop-level and at the corridor-level. Much of the input data has already been collected. SFMTA will provide stop level boarding and alighting data. Plus project and cumulative intersection turning movement volumes will be estimated using the Furnessing method based on SF CHAMP model link volumes.

  Inputs by Proposed Data Source

  - SFMTA Data Request
    - Average boarding volume per bus per stop
    - Average alighting volume per bus per stop
    - Scheduled buses per hour
    - Percent of boarders using farebox
    - Door opening and closing time
  - Observation/General Knowledge
    - Boarding door(s) [All]
    - Fare payment method [Smart Card]
    - Boarding height [Level, Stairs, Steep Stairs]
    - Standees present [Yes, No]
    - Number of doors
    - Available door channels
    - Number of loading areas
    - Loading area design [linear/non-linear]
    - Bus lane type
    - Running way type
    - Stop type [on-line/off-line]
    - Area type [metro CBD, metro non-CBD]
    - Stop location [near-side at signal, far-side at signal, influenced by signal, not influenced by signal]

- The consultant team will request feedback from SFMTA on all tool inputs prior to completing the analysis; although the tool provides default values for many operational measurements, SFMTA may have better, more locally-specific information that could improve accuracy of the tool. Example inputs include: max bus speed on the corridor during the PM peak hour, door opening and closing time, and percent of riders using the farebox.

- The tool outputs average route speed, in MPH, along the defined corridor. This will be easily be converted into travel time, in seconds. This tool will output changes in travel speed and changes in travel time. Therefore, the transit delay threshold, which is yet to be established for this project, should refer to one of these two metrics.

  Outputs

  - Step 1: Average Dwell Time (seconds)
  - Step 2: Bus Stop Capacity (bus/hr) AND Bus facility Capacity (bus/hr)
  - Step 3: Average Travel Speed (mi/hr)

EXAMPLE 2

Transit Delay Analysis Based on Three Components

The following paragraphs detail the methodology used to assess the delay that could potentially be experienced by transit vehicles along a study corridor.

Measures of Delay

The total transit vehicle delay was assumed to be comprised of the three following cumulative elements:

- **Transit Travel Delay** - The transit travel delay represented the additional time experienced by a transit vehicle as it travels between stops across one or more intersections in the corridor due to congestion caused by other vehicular traffic traveling parallel or perpendicular to the transit flow.
- **Transit Reentry Delay** - The transit reentry delay represented the wait for a sufficient gap in traffic flow to allow a bus to pull back into the travel lane.
- **Transit/Bicycle Delay** - The transit/bicycle delay represented the added time caused by the interaction between bicycles and transit vehicles as buses pull in or out of the bus stops.

The three components of the total transit delay were quantified as follows:

Transit Travel Delay

The transit travel delay was quantified using traffic operations data obtained from the intersection LOS calculations performed at study intersections along the corridor. The transit travel delay reflected the approach delay at the intersection for the direction of transit travel. For those intersections within a transit corridor that had not being analyzed for LOS purposes, the travel delay was estimated using the average of the delay (for each approach) for those locations where the intersection delay was available. Average approach delay for signalized and unsignalized intersections was estimated separately. Thus, the total transit travel delay in a transit corridor was calculated as the sum of all the approach delays at those intersections where LOS calculations were available, plus the number of signalized intersections multiplied by the average approach delay for signalized intersections, plus the number of unsignalized intersections multiplied by the average approach delay for unsignalized intersections. The transit travel delay was calculated separately for each direction of transit travel (i.e., eastbound and westbound, or northbound and southbound).

In several instances study intersections operate at LOS F, with average intersection delays above 80 seconds per vehicle and volume-to-capacity (v/c) ratios higher than 1.0, which represent the upper limits of the methodology used to estimate intersection delay. As shown in Figure V.A.3-3, p. V.A.3-16 adapted from the 2000 Highway Capacity Manual (Chapter 16, exhibit 16-14), that displays the relationship between the v/c ratio and the average intersection delay at a given intersection, the average delay increases very rapidly once a v/c value of 1.02 with an associated delay of 100 seconds is reached.

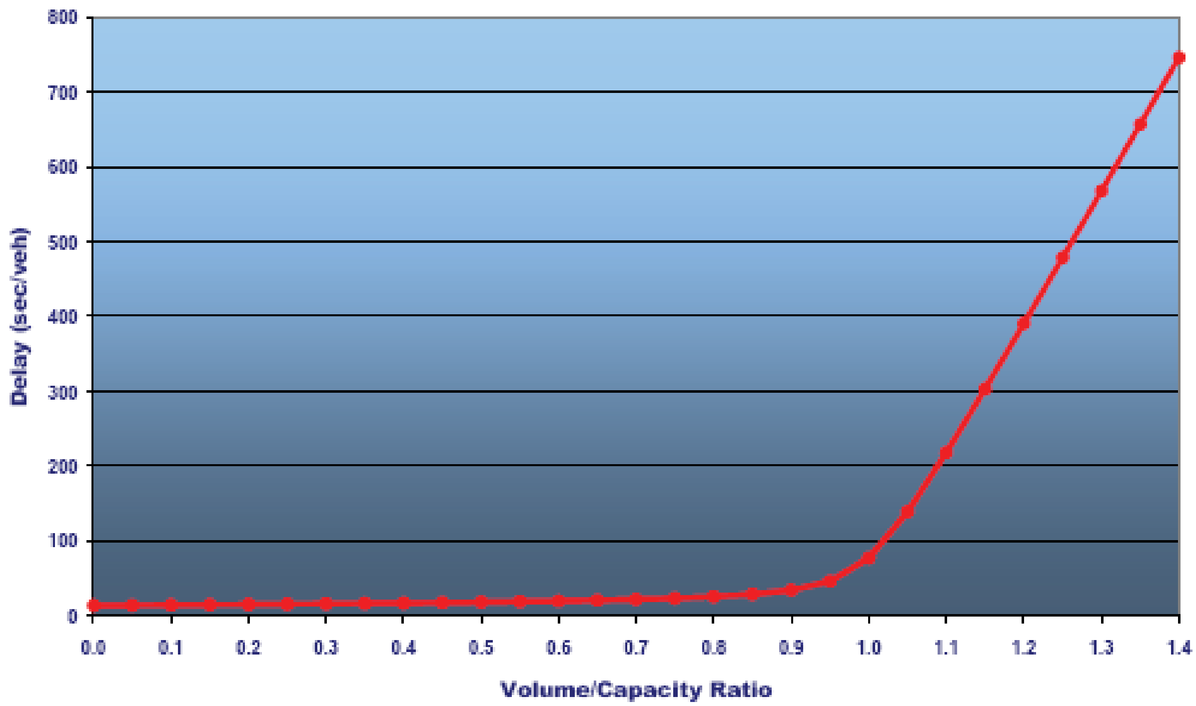


FIGURE V.A.3-3 SENSITIVITY OF VEHICLE DELAY TO VOLUME/CAPACITY RATIO

Source: 2000 Highway Capacity Manual, Chapter 16, exhibit 16-14.

As a result, the vehicle delay values estimated by the HCM methodology in those instances when the intersection operated at LOS F and had a v/c ratio well above 1.02, outside its range of application, would be unrealistically high. Thus, an adjusted methodology was used to calculate transit delays at those locations where the LOS degrades to F for the approach on which transit vehicles operate. The methodology had two components, one that was applied to each individual intersection on a transit corridor and another that was applied globally to each transit corridor.

Individual Intersection Delay Adjustments – Three possible cases occurred:

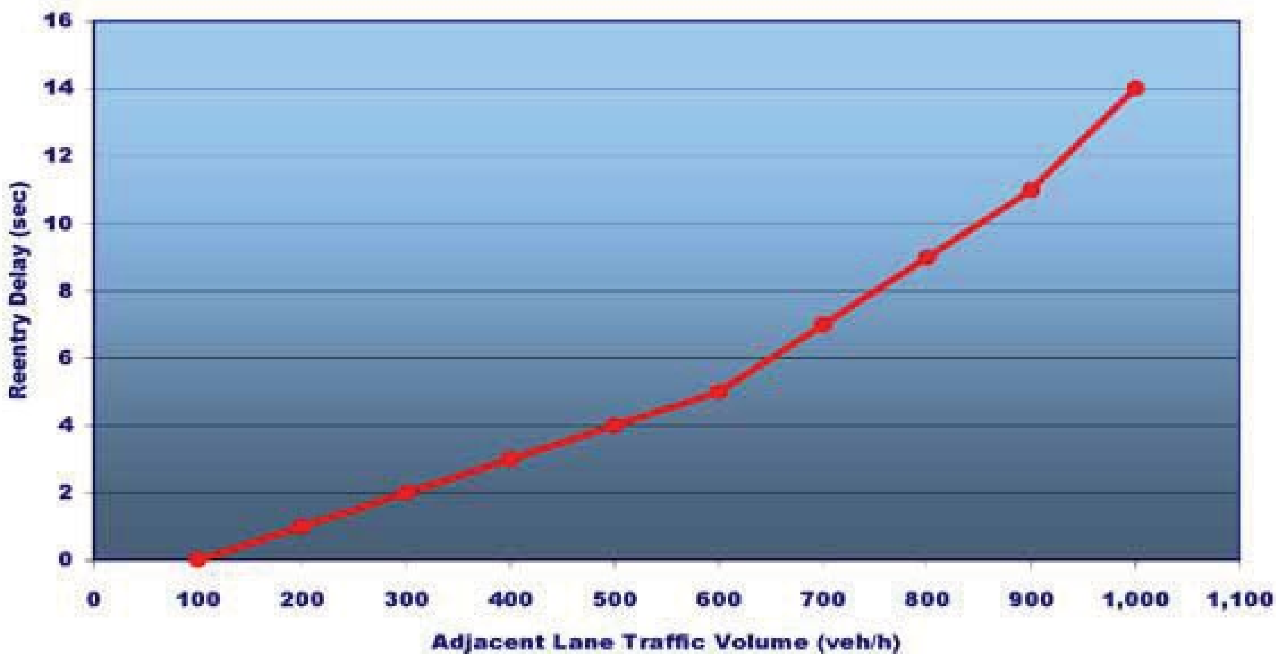
1. Intersection operated at LOS F with a calculated average delay of less than or equal to 100 seconds per vehicle – Used the average delay resulting from the application of the HCM methodology.
2. Intersection operated at LOS F with a calculated average delay greater than 100 seconds per vehicle and the v/c ratio is less than or equal to 1.02 – Assumed an additional 100 seconds of delay per vehicle to a base delay of 100 seconds. The total intersection delay in this case was 200 seconds per vehicle (100+100 = 200).
3. Intersection operated at LOS F with a calculated average delay greater than 100 seconds per vehicle and the v/c ratio was greater than 1.02 – Assumed an additional 140 seconds of delay to a base delay of 100 seconds. The total intersection delay in this case was 240 seconds per vehicle (100+140 = 240).

Corridor Delay Adjustments – Subsequently, additional adjustments were made to calculate the total delay along a transit corridor for those intersections that met any of the three cases noted above:

a. In those instances where there were consecutive intersections operating at LOS F on a transit corridor, the intersection delay calculations was increased by a factor of 10 percent per intersection. For example if there were three consecutive intersections in a transit corridor that operated at LOS F and met the criterion noted under case 3 above, the total delay for these three intersections was increased by 30 percent. In this case, the total intersection delay for these three locations became 312 seconds per vehicle (240 x 1.3 = 312).
b. In those instances where there were transit-only lanes or other meaningful transit priority treatments, the transit travel delay calculated from above was decreased. Adjustments were generally made based on individual transit lane situations and other factors such as lane configurations, external (e.g., freeway) traffic, etc. As general guidelines, at those locations where transit lanes were regularly enforced, the transit travel delay was assumed to be very small. At those locations where there was no strong transit lane enforcement, a 50 percent adjustment was made to decrease the calculated transit corridor delay.

Transit Reentry Delay

The transit reentry delay at a given transit stop was estimated using empirical data presented in the 2000 Highway Capacity Manual (HCM). Figure V.A.3-4, p. V.A.3-18, summarizes the HCM data. The total transit reentry delay in a transit corridor was calculated as the sum of the individual transit reentry delays at each bus stop. The transit reentry delay was calculated separately for each way of transit travel (i.e., eastbound and westbound, or northbound and southbound).



Transit/Bicycle Delay

Thorough analyses of the interaction between transit vehicles and bicycles operating on a parallel path do not exist.

The methodology described in the 2000 HCM as well as similar approaches developed by the Transit Cooperative Research Program (TCRP) and the Federal Transit Administration (FTA) to estimate transit service capacity reduction factors only evaluate a) the amount of motor vehicles traveling in the lane adjacent and to the left of a bus, and b) the number of vehicles turning right in front of a bus. In either case, the presence of bicycles is not accounted for in the calculation of the capacity reduction coefficients and it is assumed not quantifiable for the purposes of this study.

Implementation

The estimated total transit vehicle delay obtained following the methodology discussed above was then reviewed for reasonableness for each transit corridor. Any additional professional judgment factors used was also documented.

The average transit travel delay for the intersections without LOS delay data was estimated based on the average delay data obtained from those intersections where LOS calculation was conducted for the direction of transit travel. Similarly, the calculation of transit reentry delay required the estimation of traffic volumes on the adjacent travel lane using the data obtained from the intersection LOS calculations performed at study intersections along the corridor.

Transit Corridors without Study Intersections

There were some transit corridors without study intersections. No lane reductions or similarly substantial lane changes have been proposed on these corridors as part of the Bicycle Plan. Thus, the transit conditions on these corridors were evaluated qualitatively with a general description of the potential for transit delays.

ATTACHMENT F

Mitigation and Improvement Measures

1. MITIGATION MEASURES FOR LAND USE DEVELOPMENT PROJECTS LOCATED WITHIN AN AREA PLAN

Rincon Hill Plan

No applicable mitigation or improvement measures were identified.

Market and Octavia Neighborhood Plan

No applicable mitigation or improvement measures were identified.

Visitacion Valley Redevelopment Plan

No applicable mitigation or improvement measures were identified.

Balboa Park Station Area Plan

No applicable mitigation or improvement measures were identified.

Eastern Neighborhoods Rezoning and Area Plan

Mitigation Measure E-5: Enhanced Transit Funding: As a mitigation measure to adequately serve increased transit demand generated by the Eastern Neighborhoods rezoning, ensure that sufficient operating and capital funding is secured. Mitigation may be achieved through some or all of the following measures:

- Establish an impact fee to supplement the current Transit Impact
- Development Fee on all new residential and non-residential development in the Eastern Neighborhoods.
- Establish other fee-based sources of revenue such as, for example, parking benefit districts.
- Establish a congestion-charge scheme for downtown San Francisco, with all or a portion of the revenue collected going to support improved transit service on lines that serve downtown and the Eastern Neighborhoods.
- Seek grant funding for specific capital improvements from regional, state and federal sources.

Mitigation Measure E-6: Transit Corridor Improvements: As a mitigation measure to accommodate project transit demand, provide improved transit service in corridors that are affected by new transit trips generated by the Eastern Neighborhoods rezoning and area plans. Corridors may include Mission Street between 14th and Cesar Chavez Streets, 16th Street between Mission and Third Streets, Bryant Street or other parallel corridor between Third and Cesar Chavez Streets, a north- south corridor through portions of SoMa west of

Fifth Street, and service connecting Potrero Hill with SoMa and downtown. Mitigation may be achieved through some or all of the following measures:

- Reduce headways on transit lines serving the Eastern Neighborhoods, so that capacity utilization factors meet Muni's capacity utilization standard of 85 percent. Candidate lines for changes to headways include those along the east-west corridors in the Mission District, especially where these corridors connect with BART and connect with the Showplace Square/Potrero Hill and Central Waterfront neighborhoods (such as the 22-Fillmore and

48-0uintara), along the north-south corridors that serve the eastern half of the Mission District and Showplace Square/Potrero Hill neighborhoods (such as the 9-San Bruno and the 27-Bryant), and lines linking the Market Street subway with East SoMa, with Mission Bay, and with Showplace Square. On some lines where peak load demand would be the greatest, peak period headways may be reduced by half (for example, on the 22-Fillmore and 9-San Bruno).

- Decrease travel times and improve reliability on transit lines through a variety of means, including transit-only lanes, transit signal priority, transit "queue jumps," lengthening of spacing between stops, and establishment of limited or express service.
- On key routes expected to carry a significant portion of new ridership generated by the Eastern Neighborhood rezoning and area plans (such as the 22-Fillmore between Market Street and the Central Waterfront, and the 9-San Bruno along Potrero Avenue) develop "premium" service such as a Bus Rapid Transit line or a corridor enhanced with high-level transit preferential treatments.

Mitigation Measure E-7: Transit Accessibility: As a mitigation measure to enhance transit accessibility, establish a coordinated planning process to link land use planning and development in the Eastern Neighborhoods to transit and other alternative transportation mode planning in the eastern portion of the City. Mitigation may be achieved through some or all of the following measures:

- Implement the service recommendations from the Transit Effectiveness Project (TEP}, which is currently in progress. The TEP will focus on near- term and medium-term transit improvements.
- Implement recommendations of the Better Streets Plan that are designed to make the pedestrian environment safer and more comfortable for walk trips throughout the day, especially in areas where sidewalks, crosswalks and other realms of the pedestrian environment are notably unattractive and intimidating for pedestrians and discourage walking as a primary means of circulation. This includes traffic calming strategies in areas with fast-moving, one-way traffic, long blocks, narrow sidewalks and tow-away lanes, as may be found in much of South of Market.
- Implement building design features that promote primary access to buildings from transit stops and pedestrian areas, and discourage the location of primary access points to buildings through parking lots and other auto-oriented entryways.
- Implement key portions of the 2005 Bicycle Plan when it is ready for implementation, particularly along segments called out in the 2005 Bicycle Plan that close gaps in the bicycle network in the Eastern Neighborhoods.
- Develop Eastern Neighborhoods transportation implementation programs that manage and direct resources brought in through pricing programs and development-based fee assessments, as outlined above, to further the multimodal implementation and maintenance of these transportation network

Mitigation Measure E-8: Muni Storage and Maintenance: As a mitigation measure to ensure that Muni is able to service additional transit vehicles needed to serve increase demand generated by development in the rezoned areas in the Eastern Neighborhoods, provide maintenance and storage facilities. Mitigation may be achieved through some or all of the following measures:

- Provide a portion of the cost of expanding or constructing a bus facility that may be linked to the increased demand created by land use development pursuant to the Eastern Neighborhoods rezoning and area plans.
- Employ transit-preferential treatments for non- revenue service where transit vehicle volumes are high, and where access to these facilities may be impaired by other traffic.

Mitigation Measure E-9: Rider Improvements: As a mitigation measure to make it easy and comfortable to use transit service in the Eastern Neighborhoods, provide improved passenger information and amenities. Mitigation may be achieved through some or all of the following measures:

- Provide "Next Bus" type passenger information for all lines at key stops.
- Provide for facilities that allow cross-agency sharing of real time arrival information for transit vehicle operators where regional and local feeder transit agencies connect, but where operators do not have visual contact with each other or with the complete connection path that transferring passengers must make (for example, between BART and feeder buses, such as the 53-Southern Heights, which terminates at the 16th Street BART station and the 67-Bernal Heights, which terminates at the 24th Street BART station).
- Provide accurate and usable passenger information and maps.
- Provide adequate light, shelter and spaces to sit at all stops, with enhanced amenities at key stops.
- Encourage the consolidation of sheltered, well-lit, Next-Bus-served ground floor land uses open to the public for extended hours (e.g., cafes, bookstores and institutional building lobbies) within immediate sightline/walking distance of major surface transit stations and stops to allow waiting transit customers options to sit in sheltered comfort, and to increase pedestrian activity and casual monitoring around the transit stations.

Mitigation Measure E-10: Transit Enhancement: As a mitigation measure to minimize delays to transit vehicles due to projected traffic congestion, provide improved transit service in corridors that are subject to traffic congestion induced at least in part by the land use growth due to Eastern Neighborhoods rezoning and area plans. Mitigation may be achieved through some or all of the following measures:

- Reduce headways on transit lines serving Eastern Neighborhoods, including those corridors that connect with BART, AC Transit, SamTrans, Golden Gate Transit and Caltrain, to reduce the overall transit travel time for regional trips that when made by automobiles add to the congestion in the street grid and freeway ramp system in the Eastern Neighborhoods.
- Prioritize and expand the use of Transit Preferential Street technologies to prioritize transit circulation in the Eastern Neighborhoods.
- Improve and expand the use of programs that increase transit rider awareness, real-time connectivity and transfer reliability, such as Next Bus, and the display of schedules and maps.

Treasure Island and Yerba Buena Island Redevelopment Plan

No applicable mitigation or improvement measures were identified.

Glen Park Community Plan

No applicable mitigation or improvement measures were identified.

Transit Center District Plan and Transit Tower

M-TR-3a: Installation and Operation of Transit-Only and Transit Queue-Jump Lanes: To reduce or avoid the effects of traffic congestion on Muni service, at such time as the transit-vehicle delay results in the need to add additional vehicle(s) to one or more Muni lines, the Municipal Transportation Agency (MTA) could stripe a portion of the approach lane at applicable intersections to restrict traffic to buses only during the p.m. peak period, thereby allowing Muni vehicles to avoid traffic queues at certain critical intersections and minimizing transit delay. Each queue-jump lane would require the prohibition of parking during the p.m. peak period for the distance of the special lane. For the 41 Union, MTA could install a p.m. peak-hour transit-only lane along Beale Street approaching and leaving the intersection of Beale/Mission Street, for a distance of 150 to 200 feet. Five parking spaces on the west side of Beale Street north of Mission Street could be eliminated when the transit lane is in effect to allow for a right-turn pocket. MTA could also install a p.m. peak-hour queue-jump lane on the eastbound Howard Street approach to the intersection of Beale/ Howard Streets, for a distance of 100 feet. If the foregoing were ineffective, MTA could consider re-routing the 41 Union to less-congested streets, if available, or implementing actions such as providing traffic signal priority to Muni buses.

For the 11-Downtown Connector and 12 Folsom Pacific, MTA could install a p.m. peak-hour queue- jump lane on the southbound Second Street approach to the intersection to the intersection of Second/Folsom Streets, for a distance of approximately 150 feet. When the lane is in effect, five on-street parking spaces on the west side of Second Street north of Folsom Street could be eliminated, as well as a portion of the southbound bicycle lane approaching the intersection. If the foregoing were ineffective, MTA could consider re-routing the 11-Downtown Connector and 12 Folsom to less-congested streets, if available, or implementing actions such as providing traffic signal priority to Muni buses.

The MTA could also evaluate the effectiveness and feasibility of installing an eastbound transit-only lane along Folsom Street between Second and Third Streets, which would minimize delays incurred at these intersections by transit vehicles. The study would create a monitoring program to determine the implementation extent and schedule, which may include conversion of one eastbound travel lane into a transit-only lane.

M-TR-3b: Exclusive Muni Use of Mission Street Boarding Islands: To reduce or avoid conflicts between Muni buses and regional transit service (Golden Gate Transit and SamTrans) using the relocated transit-only center lanes of Mission Street between First and Third Streets, MTA could reserve use of the boarding islands for Muni buses only and provide dedicated curbside bus stops for regional transit operators. Regional transit vehicles would still be allowed to use the transit-only center lanes between stops, but would change lanes to access the curbside bus stops. This configuration would be similar to the existing Muni stop configuration along Market Street, where two different stop patterns are provided, with each route assigned to only one stop pattern.

M-TR-3c: Transit Improvements on Plan Area Streets: To reduce or avoid the effects of traffic congestion on regional transit service operating on surface streets (primarily Golden Gate Transit and SamTrans), MTA, in coordination with applicable regional operators, could conduct study the effectiveness and feasibility of transit improvements along Mission Street, Howard Street, Folsom Street, First Street, and Fremont Street to reduce delays incurred by transit vehicles when passing through the Plan area. The study would examine a solution including, but not limited to the following:

- Installation of transit-only lanes along Howard Street and Folsom Street, which could serve both Muni buses (e.g., 12 Folsom-Pacific) and Golden Gate Transit buses heading to / from Golden Gate's yard at Eighth and Harrison Streets.
  - Extension of a transit-only lane on Fremont Street south to Howard Street and installation of transit-actuated queue-jump phasing at the Fremont Street / Mission Street intersection to allow Golden Gate Transit buses to make use of the Fremont Street transit lane (currently only used by Muni vehicles); and
  - Transit signal priority treatments along Mission, Howard, and Folsom Streets to extend major- street traffic phases or preempt side-street traffic phases to reduce signal delay incurred by SamTrans and Golden Gate Transit vehicles.
  - Golden Gate Transit and SamTrans could consider rerouting their lines onto less-congested streets, if available, in order to improve travel times and reliability. A comprehensive evaluation would need to be conducted before determining candidate alternative streets, considering various operational and service issues such as the cost of any required capital investments, the availability of layover space, and proximity to ridership origins and destinations.

M-TR-3d: Increased Funding to Offset Transit Delays: Sponsors of development projects within the Plan area could be subject to a fair share fee that would allow for the purchase of additional transit vehicle(s) to mitigate the impacts on transit travel time. In the case of Muni operations, one additional vehicle would be required. For regional operators, the analysis also determined that on-street delays could require the deployment of additional buses on some Golden Gate Transit and SamTrans routes.

- Funds for the implementation of this measure are expected to be generated from a delineated portion of the impact fees that would be generated with implementation of the draft Plan, and are projected to be adequate and sufficient to provide for the capital cost to purchase the additional vehicle and facility costs to store and maintain the vehicle.

M-TR-3e: Increased Funding of Regional Transit: Sponsors of development projects within the Plan area could be subject to one or more fair share fees to assist in service improvements, such as through the purchase of additional transit vehicles and vessels or contributions to operating costs, as necessary to mitigate Plan impacts. These fee(s) could be dedicated to Golden Gate Transit, North Bay ferry operators, AC Transit, BART, and/or additional North Bay and East Bay transit operators. Depending on how the fee(s) were allocated, Caltrain and SamTrans might also benefit, although lesser impacts were identified for these South Bay operators.

Funds for the implementation of this measure are expected to be generated from a delineated portion of the impact fees that would be generated with implementation of the draft Plan, and are projected to be adequate and sufficient to provide for the capital cost to purchase the additional vehicle and facility costs to store and maintain the vehicle.

Western SoMa Community Plan

M-C-TR-2: Impose Development Impact Fees to Offset Transit Impacts: Additional transit capacity would be required in order to reduce the corridor impacts identified above for the Draft Plan, and reduce capacity utilization to levels below the 85 percent capacity utilization threshold. In order to increase capacity, however, additional funding would have to be identified, either from public or private sources, or a combination, thereof, potentially including project sponsors of individual development projects within the Draft Plan Area. Sponsors of development projects within the Draft Plan Area could be subject to a fair share fee that would pay for augmenting transit capacity. These funds would be used to purchase and operate additional transit vehicles, or if necessary, to reduce the corridor impacts, execute large-scale upgrades to transit network capacity.

Adoption of the Western SoMa Community Plan is anticipated to be accompanied by development impact fees, such as those adopted for the Eastern Neighborhoods Area Plan and Market/Octavia Area Plan. Funds are expected to be generated from a delineated portion of the impact fees that would be generated with implementation of the Draft Plan. However, it is not known whether or how much additional funding would be generated for transit service improvements, and no other definite funding sources have been identified. As a result, the Draft Plan's contribution to the 2030 Cumulative capacity utilization exceedances for Muni operations would remain significant and unavoidable.

Central SoMa Plan

Mitigation Measure M-TR-3a: Transit Enhancements: The following are City actions that would reduce local and regional transit impacts associated with implementation of the Central SoMa Plan and proposed street network changes.

- **Enhanced Transit Funding**. To accommodate project transit demand, the City shall ensure that sufficient operating and capital funding is secured, including through the following measures:

- Establish fee-based sources of revenue such as parking benefit districts.
- Establish a congestion-charge scheme for downtown San Francisco, with all or a portion of the revenue collected going to support improved local and regional transit service on routes that serve Downtown and the Central SoMa Plan Area.
- Seek grant funding for specific capital improvements from regional, State and federal sources.

- **Transit Corridor Improvement Review.** During the design phase, the SFMTA shall review each street network project that contains portions of Muni transit routes where significant transit delay impacts have been identified (routes 8 Bayshore, 8AX Bayshore Express, 8BX Bayshore Express, 10 Townsend, 14 Mission, 14R Mission Rapid, 27 Bryant, 30 Stockton, 45 Union-Stockton, and 47 Van Ness). Through this review, SFMTA shall incorporate feasible street network design modifications that would meet the performance criteria of maintaining accessible transit service, enhancing transit service times, and offsetting transit delay. Such features could include, but shall not be limited to, transit-only lanes, transit signal priority, queue jumps, stop consolidation, limited or express service, corner or sidewalk bulbs, and transit boarding islands, as determined by the SFMTA, to enhance transit service times and offset transit delay. Any subsequent changes to the street network designs shall be subject to a similar review process.
- **Transit Accessibility**. To enhance transit accessibility, the Planning Department and the SFMTA shall establish a coordinated planning process to link land use planning and development in Central SoMa to transit and other alternative transportation mode planning. This shall be achieved through some or all of the following measures:
  - Implement recommendations of the Better Streets Plan that are designed to
    make the pedestrian environment safer and more comfortable for walk trips throughout the day, especially in areas where sidewalks and other realms of the pedestrian environment are notably unattractive and intimidating for pedestrians and discourage walking as a primary means of circulation. This includes traffic calming strategies in areas with fast-moving, one-way traffic, long blocks, narrow sidewalks and towaway lanes, as may be found in much of the Central SoMa area.
  - Implement building design features that promote primary access to buildings from transit stops and pedestrian areas, and discourage the location of primary access points to buildings through parking lots and other auto-oriented entryways.
  - Develop Central SoMa transportation implementation programs that manage and direct resources brought in through pricing programs and development-based fee assessments, as outlined above, to further the multimodal implementation and maintenance of these transportation improvements.
- **Muni Storage and Maintenance**. To ensure that Muni is able to service additional transit vehicles needed to serve increased demand generated by development in Central SoMa, the SFMTA shall provide maintenance and storage facilities. In 2013, the SFMTA prepared a Real Estate and Facilities Vision for the 21st Century report.1

  The document provides a vision for addressing Muni's storage and maintenance needs, particularly in light of substantial growth in fleet as well as changes in the fleet composition.

Mitigation Measure M-TR-3b: Boarding Improvements: The SFMTA shall implement boarding improvements such as low floor buses and pre-payment that would reduce the boarding times to mitigate the impacts on transit travel times on routes where Plan ridership increases are greatest, such as the 8 Bayshore, 8AX/8BX Bayshore Expresses, 10 Townsend, 14 Mission, 14R Mission Rapid, 27 Bryant, 30 Stockton, 45 Union-Stockton, and 47 Van Ness routes. These boarding improvements, which would reduce delay associated with passengers boarding and alighting, shall be made in combination with Mitigation Measures M-TR-3c, Upgrade Transit-only Lanes on Third Street, M-TR-3d, Signalization and Intersection Restriping at Townsend/Fifth Streets, and M-TR-3e, Implement Tow-away Lanes on Fifth Street, which would serve to reduce delay associated with traffic congestion along the transit route.

Mitigation Measure M-TR-3c: Signalization and Intersection Restriping at Townsend/Fifth Streets: The SFMTA shall design and construct a new traffic signal at the intersection of Townsend/Fifth Streets, and reconfigure the Townsend Street eastbound approach to provide one dedicated left-turn lane (with an exclusive left turn phase) adjacent to a through lane. This reconfiguration would require restriping of the two existing travel lanes at the eastbound approach to this intersection.

Mitigation Measure M-TR-3d: Implement Tow-away Transit-only Lanes on Fifth Street: The SFMTA shall implement a northbound tow-away transit-only lane on Fifth Street between Townsend and Bryant Streets during the p.m. peak period to mitigate the impacts on transit travel times on the 47 Van Ness. This peak period transit-only lane can be implemented by restricting on-street parking (about 30 parking spaces) on the east side of Fifth Street between Townsend and Bryant Streets during the 3:00 to 7:00 p.m. peak period.

2. MITIGATION AND IMPROVEMENT MEASURE EXAMPLES FOR POTENTIALLY HAZARDOUS CONDITIONS

The following lists the typical types of measures that can mitigate or lessen impacts of potentially hazardous conditions to transit.

Potentially Hazardous Conditions	Measures
Inadequate Sightlines and visibility	» Remove or relocate bus zone, bus stop shelter, loading, or parking spaces to increase sightline(s) and visibility; » Establish safe sight distances (e.g., daylighting, relocation of curb cuts or new structures) » Provide on-site signs promoting safety for people walking, bicycling, driving, or riding transit (e.g., signs at the garage exit reminding people driving to slow down and yield to people walking on the sidewalk), including where the slope or curvature of the right-of-way or driveway results in inadequate sightlines;
Inadequate transit facilities and/or potential conflicts with transit operations	» Improve or provide adequate transit facilities adjacent to the project site, and/or network improvements such as transit bulbouts, between the project site and intersections, adjacent transit stations/stops, and other major destinations to meet Better Street Plan policies; » Relocate convenient off-street or on-street loading space(s) away from travel lane which transit operates in or at a transit stop/station location » Coordinate freight and service deliveries to reduce conflicts with transit facilities adjacent to on-site and off-site loading zones;
Hazardous vehicle turning movements	» Signalize vehicle turning movements or restrict vehicle movements on red; » Employ Queue Abatement Measures or pursue design modifications to proposed garage or driveway entrances/exits to accommodate queuing vehicles (see next page for Queue Abatement Sample Language)

3. MITIGATION AND IMPROVEMENT MEASURE EXAMPLES FOR TRANSIT DELAY

Based on the report of delay identified, the following lists the typical SFMTA Travel Time Reduction Proposal Time-Savings (TTRP) Measures that could address transit delay. (See next page for definitions of TTRP measures).

Delay Type Addressed	TTRP Measures	Estimated Travel Time Savings (in seconds unless otherwise noted)
Traffic congestion delay	» Establish transit-only lanes	» 30
	» Establish transit queue jump/bypass lanes	» 5 – 30
	» Establish dedicated turn lanes	» 5
	» Widen travel lanes through lane reductions	» 5 – 30
	» Implement turn restrictions	» 5 - 30
	» Widen travel lanes through parking restrictions	» 5
	» Install traffic signals at all-way stop-controlled intersections	» 5 – 30
	» Replace all-way stop-controlled intersections with traffic calming measures	» 10 – 30
	» Install pedestrian bulbs	» 2
Passenger boarding/ alighting delay	» Install transit boarding islands	» 5
Re-entry delay	» Install transit bulbs	» 5
	» Install transit boarding islands	» 5
	» Convert flag stops to transit zones	» 5
	» Install pedestrian refuge islands	» 5
Other/multiple	» Remove or consolidate stops	» 5-30
	» Optimize transit stop locations at intersections	» 15-30
	» Extend transit zone to accommodate two vehicles at a time	» 2

Source: SFMTA Transportation Engineering. “Travel Time Reduction Proposals: Transit Preferential Toolkit,” December 6, 2012

TRANSIT PREFERENTIAL TOOLKIT MEASURE DEFINITIONS

Measure	Definition
» Establish transit-only lanes	» "A transit-only lane is a travel lane that is dedicated for the exclusive use of transit vehicles."
» Establish transit queue jump/bypass lanes	» "A transit queue jump/bypass lane allows transit vehicles to bypass general traffic stopped at a signalized intersection and move through the intersection with an exclusive traffic signal phase ahead of general traffic."
» Establish dedicated turn lanes	» "Dedicated turn lanes can reduce transit travel times by providing a dedicated space for turning vehicles to queue at an intersection approach without blocking the thru-movement of transit vehicles and other traffic."
» Widen travel lanes through lane reductions	» "Widening travel lanes can decrease transit travel times and improve reliability by reducing friction with other vehicles, eliminating the need for buses and other large vehicles to straddle two travel lanes and providing additional space for maneuvering around parking vehicles."
» Implement turn restrictions	» "Turn restrictions can reduce transit travel times by preventing turning vehicles from blocking the thru-movement of transit vehicles and other traffic."
» Widen travel lanes through parking restrictions	» "Widening travel lanes through parking restrictions can reduce transit travel times by eliminating the need for buses and other large vehicles to straddle two travel lanes, by reducing delays associated with parking maneuvers and by providing additional space for through-moving transit vehicles."
» Install traffic signals at all-way stop-controlled intersections	» "Replacing all-way STOP sign intersection controls with traffic signals."
» Replace all-way stop-controlled intersections with traffic calming measures	» "Removing STOP signs and adding traffic calming measures at intersection approaches with transit service can reduce transit travel time along a corridor by allowing transit vehicles to proceed slowly through intersections without coming to a complete stop."

TRANSIT PREFERENTIAL TOOLKIT MEASURE DEFINITIONS

Measure	Definition
» Install pedestrian bulbs	» “Pedestrian bulbs are sidewalk extensions at non-transit stop intersection corners, typically about the same width as the adjoining parking lane.”
» Install transit boarding islands	» “Transit boarding islands are raised islands within the street that allow vehicles to use a center lane within the roadway to pick-up and drop-off customers at transit stops.”“Transit bulbs are sidewalk extensions at the location of a transit stop, typically about the same width as the adjoining parking lane.”
» Convert flag stops to transit zones	» “Converting flag stops to transit zones allows buses to pull into the zone to serve customers directly at the curb, rather than from the street.”
» Install pedestrian refuge islands	» “Pedestrian refuge islands are raised island in the street that provide space for pedestrians to wait while crossing a street.”
» Remove or consolidate stops	» “Consolidating transit stops involves removing two adjacent transit stops and establishing a new transit stop at an intermediate location.”
» Optimize transit stop locations at intersections	» “Placement of a transit stop either near or far-side at an intersection to reduce STOP sign or traffic signal delay.”
» Extend transit zone to accommodate two vehicles at a time	» “Providing sufficient space at transit stops to allow all doors of transit vehicles to align with curb or boarding island and to allow multiple transit vehicles to serve stops concurrently.”