
SFTP 2050: APPENDIX C

SF-CHAMP Analysis Methodology Memo

1. Overview

The San Francisco County Transportation Authority used the San Francisco Chained Activity Modeling Process (SF-CHAMP) to analyze future year investment scenarios for the San Francisco Transportation Plan 2050 (SFTP). This memo documents contents and evaluation methodology for the two scenarios modeled in the SFTP. Scenarios include the 2050 Baseline Scenario (Baseline) and the 2050 Investment Plan Scenario (Investment). Both scenarios use the same year 2050 land-use forecast and allocation but feature different transportation networks. The Baseline includes projects with fully committed funding while the Investment Plan includes everything in the Baseline Scenario and transportation projects which can be funded with anticipated revenues. Additional detail about the scenario development process is available in Appendix A.

This memo is divided into two sections. The first section documents what is included in the Baseline and Investment model scenarios. The second section documents evaluation metrics and how the Investment scenario performed when evaluated using SF-CHAMP for citywide and low-income populations. Appendix D documents the performance of the SFTP Investment Plan for specific Equity Priority Communities. The full SFTP Investment Plan contains some transportation investments which cannot be represented in SF-CHAMP; these were omitted from the Baseline and Investment scenarios.

2. Scenario Definitions

Two scenarios were developed for modeling in SF-CHAMP. Both scenarios represent conditions in 2050 and were modeled using SF-CHAMP version 6.1.2.

Baseline: The baseline scenario includes 2050 land use projections, year 2022 transportation systems, and future projects that are considered fully funded, shown in Table 2.

Investment Scenario: The investment scenario includes all Baseline projects and additional projects that can be funded with existing and expected new revenue sources, shown in Table 3. Not all projects and programs funded in the SFTP can be modeled; the Investment Scenario only includes projects that can be both fully funded and modeled.

LAND USE

The SFTP uses land use forecasts developed for Plan Bay Area 2050 (PBA50)¹. PBA50 forecasts are made at the regional TAZ level. SF-CHAMP uses the San Francisco

¹ <https://www.planbayarea.org/plan-bay-area-2050-1>

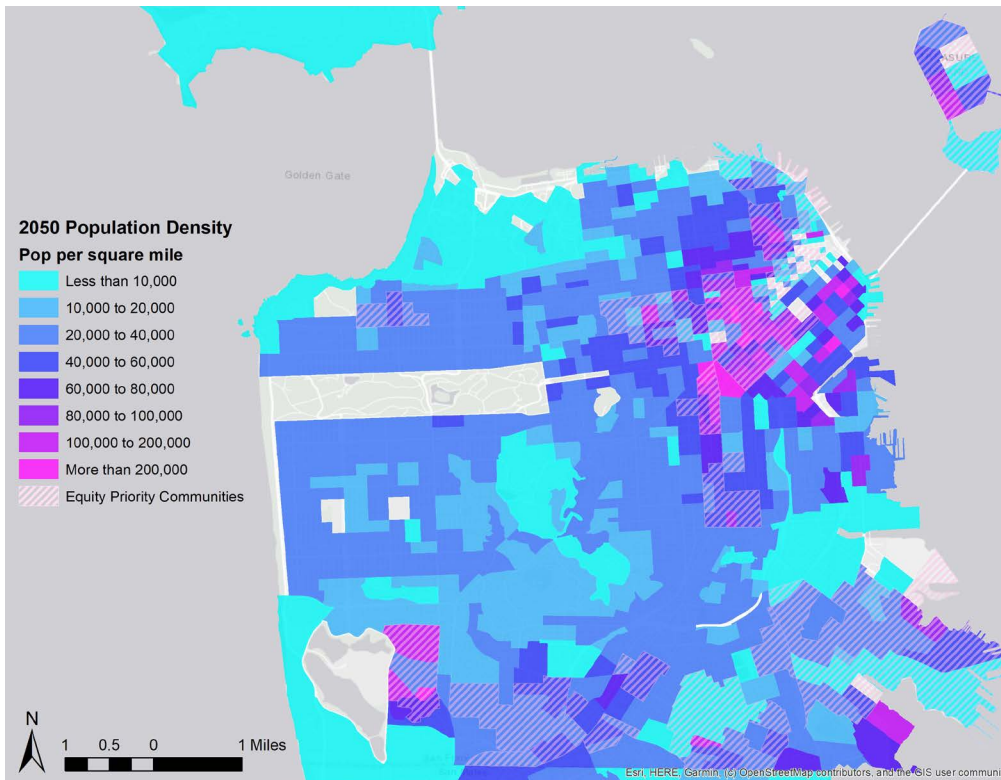
Transportation Analysis Zones (SFTAZ) for representing land use in transportation modeling, a smaller geographic unit than MTC's TAZ system. Land use distribution to SFTAZs within San Francisco is based on San Francisco Planning Department allocations of Plan Bay Area 2040 (PBA40) land use, and the 2040 - 2050 ten-year land use growth increment developed by the San Francisco Planning Department for the ConnectSF Statement of Needs¹. Final San Francisco Planning Department allocations of PBA50 were not completed in time for SFTP analysis.

Table 1, Figure 1, and Figure 2 show 2050 total land use and land use density projections used for SFTP modeling.²

Table 1: SFTP Land Use Forecasts

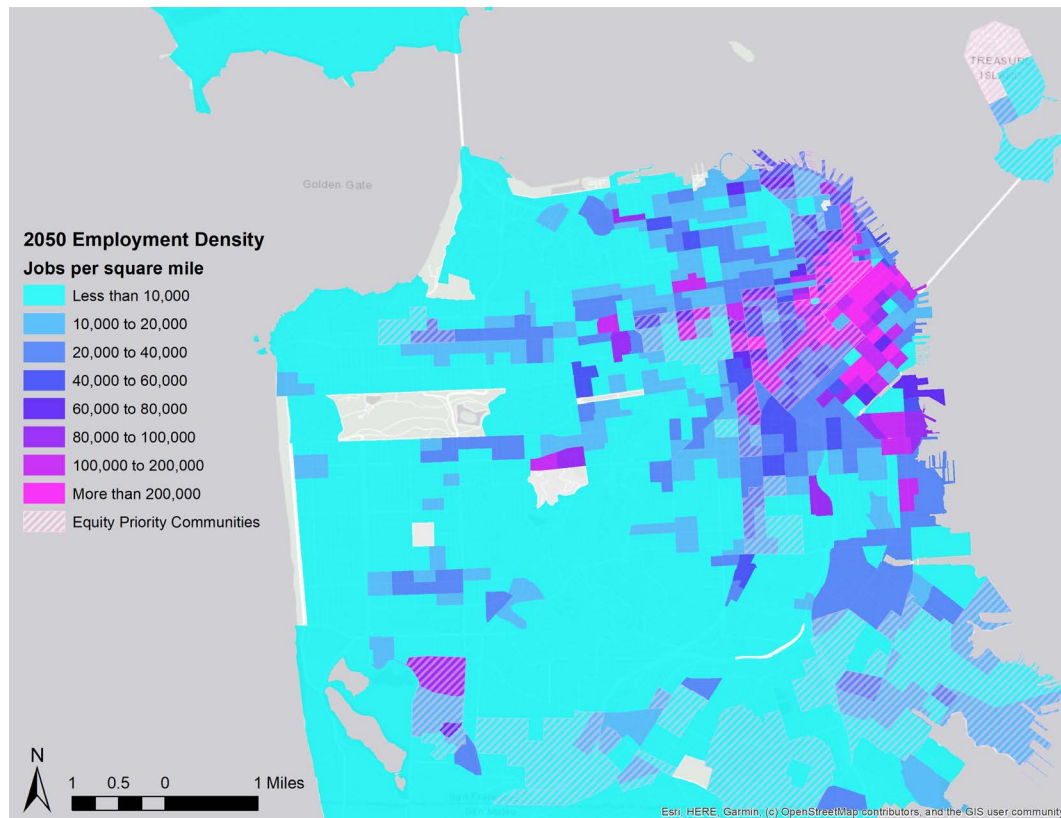
LOCATION	YEAR	HHS	POP.	EMPLOYED RESIDENTS	JOBS
San Francisco	2050 (PBA50)	578,370	1,272,809	708,929	918,214
Bay Area	2050 (PBA50)	4,043,312	10,325,405	5,419,492	5,408,460

Figure 1: SFTP Land Use 2050 – Map of Population Density



1 https://connectsf.org/wp-content/uploads/ConnectSF_Statement-of-Needs-Report-Final.pdf

2 Land Use Forecasts for the SFTP were different than forecasts used for the ConnectSF Statement of Needs. The ConnectSF Statement of Needs used forecasts from Plan Bay Area 2040

Figure 2: SFTP Land Use 2050 – Map of Employment Density

TRANSPORTATION NETWORK ASSUMPTIONS

The SFTP was developed as the COVID-19 pandemic (the Pandemic) drastically altered travel behaviors, San Francisco’s transit network, and the transportation funding ecosystem. The SFTP responded to these unprecedented and changing circumstances by using Muni service levels from Summer 2022 as a starting point for the Baseline scenario. This differs from regional long-range transportation plans which used pre-Pandemic assumptions for transit service levels. The pandemic has created uncertainty about long term travel behavior trends and while the possibility for changes in transit ridership and service provision remain, the SFCTA believes these are reasonable transit service assumptions for forecasting purposes.

Baseline Scenario

The Baseline Scenario includes:

- Summer 2022 SFMTA transit service, including Muni bus and Metro service that was planned to be in operation in Summer 2022.¹

¹ <https://www.sfmta.com/projects/2022-muni-service-network>

- 2019 BART service levels including 15-minute headways on all lines.
- Post-electrification Caltrain service, including 6 trains per hour during peak periods.
- Fully committed transportation projects, and developer committed transportation projects.
- All transportation projects open as of May 2022.

Table 2: 2050 Baseline Scenario Transportation Network Definition

PROJECT	DESCRIPTION
SF Transit	
Muni Baseline Service	Summer 2022 Muni Service (See Attachment A)
Muni Central Subway	New Light Rail Transit (LRT) extension from 4th St. and King St. to Chinatown, including four new stations. 6 minute headways for two separate services – a full T service and a T-short service which operates between Chinatown and 19th St.
Committed Muni Forward Projects	Muni Forward upgrades that are underway as of May 2022 ¹ such as 16th St Improvement Project, Mission Street SoMa Transit Improvements, L Taraval Improvement Project, Fulton St, Potrero Ave, and Haight St.
Geary Bus Rapid Transit Phase 1	Phase 1 of Geary Bus Rapid Transit (BRT) Project: Side running transit lanes east of Stanyan St.
Southeast Waterfront Transportation Improvements (including 28R extension as Geneva BRT, and Geneva Ave extension)	Transit facilities, pedestrian paths, and dedicated bicycle lanes throughout the Candlestick/Hunters Point Shipyard project area with connections to BART, T Third light rail, Caltrain, and local bus lines. The project includes an extension of Geneva Avenue from Bayshore Blvd. to Alana Way. This project includes the new CPX and HPX express bus routes and extensions or re-routes of the Muni 23, 24, 28R, 29, 44, and 48 lines. Some service frequencies on bus lines serving the Southeast Waterfront are improved per existing developer agreements ² .

1 <https://www.sfmta.com/projects/muni-forward>

2 <https://sfocii.org/projects/hunters-point-shipyard-candlestick-point-2/document-library>

PROJECT	DESCRIPTION
Regional Transit	
BART	15 minute peak and off-peak headways on all lines, including the existing extension to Berryessa (2019 service frequencies)
Caltrain Modernization	Post-electrification Caltrain – 6 trains per hour during peak periods service pattern
New BART Trains	Increases BART train length to ensure 10 car trains on all lines during peak periods
VTA Eastridge LRT Extension	Extend Valley Transportation Authority (VTA) light rail to Eastridge
Sonoma-Marín Area Rail Transit (SMART) to Windsor	Extend SMART north from Sonoma County Airport to Windsor
Local Road Projects	
San Francisco Streetscape Improvements	A variety of planned local street improvements to implement bike lanes, road diets, and transit improvements, including the Transit Center District Plan, Central SoMa streets*, San Bruno bike lane, California road diet, Geneva bike lane, 19th Ave, Embarcadero. *Brannan (2nd – 6th), Harrison bus lanes (2nd – 11th), Bryant (2nd – 7th), 3rd/4th (Market – King),
Hunters Point Shipyard and Candlestick Point Local Roads	Local roads constructed in Hunters Point and Candlestick Point as defined by existing developer agreements.
Treasure Island Capital Program	Bike path connecting the Bay Bridge Bike Path (east span) with Treasure Island. Realignment of Southgate Road, the key connection between I-80 ramps and local roads on Yerba Buena Island and Treasure Island.
Express Lane Projects	
SR-85	Express Lanes on SR-85 from SR-87 to US-101. MTC Assumed permissions and toll rates.
101 Express Lanes ¹	Express Lanes on US-101 from I-380 to SR-237. MTC Assumed permissions and toll rates.
SR-237	Express Lanes on SR-237 from I-880 to US-101. MTC Assumed permissions and toll rates.
580 Express Lanes	Express Lanes on I-580 from I-680 to Greenville Rd. MTC Assumed permissions and toll rates.
680 Express Lanes	Express Lanes on I-680 from Marina Vista to Alcosta and from the Alameda/Santa Clara county line to SR-84. MTC Assumed permissions and toll rates.
880 Express Lanes	Express Lanes on I-880 from Hegenberger to SR-237. MTC Assumed permissions and toll rates.

¹ 101 Express Lanes include equity discounts which are not included in the SF-CHAMP modeling

INVESTMENT SCENARIO

The Investment Scenario includes all projects noted in the Baseline Scenario and additional projects as shown in Table 3. Some projects and programs which are fully funded by the Investment Plan, such as freeway ramp safety improvements, cannot be modeled in SF-CHAMP. Such projects are not included in Table 3. The full list of projects and programs funded in the Investment Plan is available in Appendix A.

Table 3: Additional Transportation Projects Included in 2050 Investment Scenario

PROJECT	DESCRIPTION
SFMTA Baseline Operations (2022 service levels for bus, except where modified by SF Transit projects listed above, and 2019 service patterns and frequencies for rail)	Increase Muni Metro service levels from 2022 service to 2019 service. The K line operates at the same frequency as the K/T line in 2019, but runs solely between Balboa Park and Embarcadero stations due to the opening of the Central Subway in the Baseline Scenario.
Muni Reliability and Efficiency	Adds transit priority lanes and transit signal priority capital improvements for the 7, 8, 9, 14, 22, 28, 29, 30, 38, 49, M, N, and T. Does not include service frequency changes. Transit priority is added on any street without existing transit priority where there are at least two auto lanes in a given direction of travel.
Muni Rail Core Capacity	Extend N and M Parkmerced Muni Metro routes to 3-car train lengths
Caltrain Downtown Rail Extension (DTX)	Extend Caltrain from 4th and King to Salesforce Transit Center
F Line Extension	Extend SFMTA F Line to Aquatic Park
Bayview Caltrain Station	Add an additional Caltrain station near Oakdale Avenue in the Bayview neighborhood. Assumes that local Caltrain services stop at Oakdale (4 trains per hour at peak) and express services (2 trains per hour at peak) bypass Oakdale.
Mission Bay Ferry Landing	Add a ferry landing and ferry service to Mission Bay
Priority Active Transportation Network	A combination of quick build and permanent bike lane improvements on the core network recommended in the Active Transportation Study, including mobility hubs
Balboa Park Ramps: Northbound I-280 on ramp Closed	Close the northbound Geneva Ave on-ramp to I-280
Balboa Park Ramps: Southbound I-280 Off-Ramp Reconfiguration	Realign the existing Southbound Ocean Avenue off-ramp from I-280 from a free flow right turn to a signalized T-intersection.
Treasure Island Mobility Management Program Operations	Transit improvements for Treasure Island including increased Muni bus service (improved 25 line frequency and new 109 line), new AC Transit service, local on-island shuttles, new ferry service, and I-80 ramp tolling. New local streets are included in the Baseline.
Downtown Congestion Pricing Program	Implements northeast congestion pricing cordon and increases frequency on transit lines which serve the downtown cordon. Adds 68 one-way Muni bus runs during the AM peak (3-hour) period and 75 additional one-way Muni bus runs during the PM peak (3-hour) period. Increases regional bus service serving the corridor by 18 one-way runs in the AM peak period and 22 one-way runs in the PM-peak period.
101/280 Managed Lanes	Southbound HOV3+ lanes on 101 between the San Francisco / San Mateo county line and the I-280 Interchange. HOV3+ on I-280 between the US-101 interchange and King St in both directions.

3. Performance Metrics

Table 4, below, lists the performance measures SFTP used to evaluate the effectiveness of the Investment Scenario. The performance measures are generally based on metrics applied in previous ConnectSF efforts, including the Statement of Needs and Transit Corridor Study. Metrics shown in purple and marked with an asterisk (*) were evaluated quantitatively through SF-CHAMP modeling and are detailed in Table 4.

Table 4: Goals and Performance Metrics

ENVIRONMENTAL SUSTAINABILITY	ECONOMIC VITALITY	SAFETY & LIVABILITY	ACCOUNTABILITY & ENGAGEMENT
Mode share*	Job access*		Street maintenance investment levels
Vehicle Miles Traveled*	Transit crowding*	Likely reduction in injuries/ fatalities	Transit maintenance investment levels
Greenhouse Gas Emissions*	Average Commute Times*		Jobs created/maintained
	Transportation Affordability		

The SFTP uses an equity evaluation strategy which measures the impacts of investment scenarios on specific citywide populations as well as impacts on individual EPCs. This will allow planners to understand the equity impacts of the investment plan and whether projects are responding to the needs of individual EPC neighborhoods. Additional detail and results of the Equity assessment can be found in Appendix D. Table 5 provides additional detail about how, and for which populations, metrics were measured.

Table 5: Key Performance Metrics

METRIC	BREAKDOWN			OTHER	DETAIL
	CITYWIDE	LOW-INCOME	EPC		
Mode Share	X	X	X	Trips To/From/Within SF Regional Trips – East Bay Regional Trips – Peninsula/SB	SF-CHAMP’s activity-based model estimates trips taken by residents of the 9 county Bay Area (SF-CHAMP also estimates commercial, truck, visitor, and internal-external trips, but these are not included in this summary)
Vehicle Miles Traveled (VMT)	X			On City Streets, Per SF Resident	Vehicle Miles Traveled is measured two ways: Total miles on San Francisco Streets (all vehicles when operating within San Francisco) Miles traveled per San Francisco household (personal travel only, anywhere in the Bay Area)
Greenhouse Gas Emissions (GHG)	X			On City Streets, Per SF Resident	Greenhouse Gas Emissions is measured two ways: GHG emitted within San Francisco (all vehicles when operating within San Francisco) Average GHG emissions per San Francisco resident (personal travel only, anywhere in the Bay Area)
Traffic Exposure			X		VMT on roads located inside or within ¼ mile of EPC boundaries
Job Access	X	X	X	Transit (45 minutes), Driving (30 minutes), Regional Transit (75 minutes)	The average number of jobs accessible for a household within a certain time range by a certain mode during the AM peak period.
Transit Crowding	X			Muni Non-Muni	Percent of passenger miles across the transit network which experience crowded conditions.
Average Commute Times	X	X	X	Driving Transit	Estimated average total trip time for weekday one-way commute trips to work and school. Separate breakdowns are available for driving and transit travel modes.
Reduction in injuries/ fatalities			X		Off-model analysis; See Appendix D

4. Citywide Results

Tables in this section show results from SF-CHAMP modeling for citywide, regional, and low-income populations. Information about the modeling process and results for San Francisco's EPCs is available in Appendix D.

Table 6: SFTP Investment Scenario Results Summary

MODE SHARE SHIFT	VMT / GHG	JOB ACCESS	COMMUTE TIME	TRANSIT CROWDING
High impact Transit trips increase by over 4% citywide and transit mode share expands by 1% while driving mode shares shrink more than 1%	High Impact VMT and GHG both fall by over 3%	Moderate Impact Transit job access increases over 8%. Auto and regional transit job access also improve by 1 – 2%.	High Impact Transit commute times fall by almost 3%, saving commuters about 7 hours per year. Driving commute times are either unchanged or fall modestly.	No benefit Crowding increases, but most transit passenger miles (79% Muni, 85% regional) remain uncrowded.

Table 7: Significance Thresholds for Select Metrics

METRIC	DETAIL	SIGNIFICANCE THRESHOLDS
Mode share	Sum of increase in transit mode share and decrease in driving mode share.	1% for high, 0.5% for med, 0.2% for some
GHG	Changes in GHG released by vehicles on San Francisco roads and per capita auto GHG emissions	More than 1% drop for high, 0.4% for med, 0.1% for some
Job Access	Average of percent change in job access within 30-minutes driving and 45 minutes on transit.	>10% for high, >2% for med, >1% for some
Transit crowding	Decrease in share of transit in-vehicle passenger miles in crowded conditions.	>5% for high, >2% for med, >1% for some
Commute Time	Decrease in school and work commute time, measured separately for transit and driving	<-2% for high, <-1% for med

Table 8 shows Baseline and Investment Scenario model results for mode share. The investment plan has a high effect on mode share, both for all trips to/from/within SF, and for trips to/from/within SF made by low-income residents. For both groups, transit mode share rises by 3 – 5%, while driving mode share decreases by about 2%.

Table 8: Mode Share

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
All Trips To/From/Within SF				
Transit	21%	22%	1.0%	5.0%
Drive / TNC	62%	60%	-1.3%	-2.1%
Walk	15%	15%	0.3%	1.7%
Bike	2.7%	2.7%	0.0%	1.1%
Trips by People with Low Incomes To /From /Within SF				
Transit	25%	26%	0.8%	3.0%
Drive / TNC	51%	50%	-0.9%	-1.7%
Walk	21%	21%	0.1%	0.6%
Bike	3.2%	3.2%	0.0%	0.1%
SF Trips To/From East Bay				
Transit	42%	43%	0.8%	2.0%
Drive / TNC	58%	57%	-0.8%	-1.5%
Walk	0.0%	0.0%	0.0%	-
Bike	0.0%	0.0%	0.0%	-
SF Trips To/From Peninsula or South Bay				
Transit	17%	18%	0.9%	5.4%
Drive / TNC	81%	80%	-1.0%	-1.2%
Walk	1.3%	1.4%	0.0%	2.9%
Bike	1.3%	1.3%	0.0%	0.2%

Table 9 and Table 10 show Baseline and Investment Scenario model results for vehicle miles traveled and greenhouse gas emissions. The Investment Plan has a high effect on greenhouse gas emissions made by SF residents, and a high effect on greenhouse gas emissions for driving in San Francisco.

Table 9: Vehicle Miles Traveled

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
Vehicle miles traveled within San Francisco (THOUSANDS)	11,800	11,400	-0.4	-3.6%
Weekday Per Capita SF Resident VMT	6.5	6.2	-0.3	-3.9%

Table 10: Greenhouse Gas Emissions

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
GHG emissions from driving within San Francisco (lbs of CO ₂ e, THOUSANDS)	8,700	8,500	-0.3	-3.3%
SF Resident GHG Per Capita (lbs of CO ₂ e)	3.2	3.0	-0.1	-3.9%

Table 11 shows a moderate increase in job accessibility for both San Francisco residents and the subset of San Francisco residents with low incomes. 45-minute transit job access increases by at least 6% for both groups, while job access by auto increases by about 2%.

Table 11: Job Access

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
SF Resident 45 Minute Transit Job Access (THOUSANDS)				
All residents	593	640	47	8.0%
Low income	635	676	40	6.4%
SF Resident 30 Minute Auto Job Access (THOUSANDS)				
All residents	1,120	1,140	20	1.7%
Low income	1,140	1,160	23	2.0%
Regional Resident 75 Minute Transit Job Access (THOUSANDS)				
All residents	340	344	4.9	1.4%
Low income	448	454	5.9	1.3%

Table 12 shows that transit crowding increases in the investment plan scenario, however most transit passenger miles (79% Muni, 85% regional) remain uncrowded.

Table 12: Transit Crowding

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
SFMTA				
Passenger miles of crowding (thousands)	438	534	96	21.9%
Crowded % of passenger miles	20.1%	21.8%	1.7%	8.5%
Regional Operators				
Passenger miles of crowding (thousands)	1,520	1,640	124	8.2%
Crowded % of passenger miles	12.5%	13.3%	0.8%	6.5%

Table 13 shows that transit commute times decrease in the investment plan scenario, while driving commutes are moderately faster or remain unchanged.

Table 13: Commute Times

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
Commute time (minutes, any mode)				
All residents	22.0	21.8	-0.2	-0.8%
Low income	22.3	22.0	-0.3	-1.4%
Transit commute time (minutes)				
All residents	28.3	27.5	-0.8	-2.9%
Low income	29.2	28.1	-1.1	-3.8%
Drive commute time (minutes)				
All residents	20.1	20.0	-0.1	-0.6%
Low income	17.1	17.3	0.3	1.4%

Table 14 shows that the in vehicle speed experienced by transit riders on San Francisco streets increases approximately 15% in the Investment Plan scenario. Vehicle speeds are reduced slightly in the investment plan scenario.

Table 14: Transit and Traffic Speeds

	BASELINE	INVESTMENT	CHANGE	PCT CHANGE
Average transit vehicle speed experienced on San Francisco streets (MPH)	10.4	11.9	1.5	14.8%
Average vehicle speed on San Francisco streets (MPH)	18.8	18.1	-0.8	-4.0%

Attachment A. Summer 2022 Muni Service

Table 15: Assumed Summer 2022 SFMTA Service Headways by Time of Day in Minutes

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
1	7.0	7.0	7.0	20.0
1-Short	8.0	8.0	8.0	0.0
2	15.0	15.0	15.0	40.0
5	8.0	8.0	8.0	18.0
5R	10.0	10.0	11.0	0.0
6	20.0	20.0	20.0	60.0
7	12.0	12.0	12.0	30.0
8AX	8.0	0.0	8.0	0.0
8BX	8.0	0.0	8.0	0.0
8X	7.0	7.0	7.0	20.0
9	10.0	10.0	10.0	26.0
9R	10.0	10.0	10.0	0.0
10	15.0	15.0	15.0	40.0
12	7.5	7.5	7.5	30.0
14	7.0	10.0	8.0	16.0
14R	10.0	10.0	10.0	30.0
15	10.0	10.0	10.0	30.0
17	20.0	20.0	20.0	40.0
18	20.0	20.0	20.0	40.0
19	15.0	15.0	15.0	30.0
21	15.0	15.0	15.0	40.0
22	6.0	6.0	7.0	14.0
23	20.0	20.0	20.0	60.0
24	10.0	10.0	10.0	26.0
25	15.0	15.0	15.0	40.0
27	15.0	15.0	15.0	34.0
28	12.0	12.0	12.0	34.0

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
28R	10.0	10.0	10.0	0.0
29	9.0	9.0	9.0	30.0
30	12.0	12.0	12.0	30.0
30-Short	12.0	12.0	12.0	30.0
31	20.0	20.0	20.0	60.0
33	15.0	15.0	15.0	40.0
35	30.0	30.0	30.0	60.0
36	30.0	30.0	30.0	60.0
37	24.0	20.0	20.0	60.0
38	16.0	16.0	20.0	30.0
38-Short	16.0	16.0	20.0	0.0
38R	6.0	6.0	6.0	20.0
39	0.0	20.0	20.0	0.0
43	12.0	12.0	12.0	30.0
44	12.0	12.0	12.0	34.0
45	11.0	12.0	13.0	30.0
48	15.0	15.0	15.0	40.0
49	6.0	7.0	6.0	30.0
52	20.0	20.0	20.0	48.0
54	20.0	20.0	20.0	60.0
55	15.0	15.0	15.0	40.0
56	20.0	20.0	20.0	40.0
58	30.0	30.0	30.0	60.0
59	10.0	8.0	8.0	24.8
60	10.0	8.0	8.0	24.8
61	6.0	8.0	8.0	15.5
66	20.0	20.0	20.0	40.0
67	20.0	20.0	20.0	40.0
F	17.0	12.0	13.0	34.0
J	15.0	15.0	15.0	40.0
K	10.0	10.0	10.0	30.0
L-Bus	10.0	10.0	10.0	30.0
M	11.0	10.0	11.0	30.0
N	10.0	10.0	10.0	20.0

* Summer 2022 service frequencies used in SFTP modeling were provided in Spring of 2022 and may not match actual conditions perfectly

Attachment B. Baseline Scenario Muni Service

Table 16: Assumed 2050 Baseline Scenario SFMTA Service Headways by Time of Day in Minutes

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
1	7.0	7.0	7.0	10.0
2	15.0	15.0	15.0	20.0
5	8.0	8.0	8.0	9.0
6	20.0	20.0	20.0	30.0
7	12.0	12.0	12.0	15.0
8	7.0	7.0	7.0	10.0
9	10.0	10.0	10.0	13.0
10	15.0	15.0	15.0	20.0
12	7.5	7.5	7.5	15.0
14	7.0	10.0	8.0	8.0
15	10.0	10.0	10.0	15.0
17	20.0	20.0	20.0	20.0
18	20.0	20.0	20.0	20.0
19	15.0	15.0	15.0	15.0
21	15.0	15.0	15.0	20.0
22	10.0	12.0	10.0	15.0
23	20.0	20.0	20.0	30.0
24	7.5	10.0	7.5	15.0
25	7.5	10.0	5.0	10.0
27	15.0	15.0	15.0	17.0
28	12.0	12.0	12.0	17.0
29	10.0	10.0	10.0	15.0
30	12.0	12.0	12.0	15.0
31	20.0	20.0	20.0	30.0
33	15.0	15.0	15.0	20.0
35	30.0	30.0	30.0	30.0
36	30.0	30.0	30.0	30.0
37	24.0	20.0	20.0	30.0
38	16.0	16.0	20.0	15.0
39	0.0	20.0	20.0	0.0
43	12.0	12.0	12.0	15.0
44	12.0	12.0	12.0	17.0
45	11.0	12.0	13.0	15.0
48	10.0	15.0	10.0	20.0
49	6.0	7.0	6.0	15.0
52	20.0	20.0	20.0	24.0
54	20.0	20.0	20.0	30.0
55	15.0	15.0	15.0	20.0
56	20.0	20.0	20.0	20.0

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
58	15.0	15.0	15.0	20.0
58	30.0	30.0	30.0	30.0
59	10.0	8.0	8.0	12.4
60	10.0	8.0	8.0	12.4
61	6.0	8.0	8.0	15.5
66	20.0	20.0	20.0	20.0
67	20.0	20.0	20.0	20.0
14R	10.0	10.0	10.0	15.0
1-Short	8.0	8.0	8.0	0.0
22-Short	10.0	12.0	10.0	0.0
28R	8.0	10.0	8.0	30.0
29-Short	10.0	0.0	10.0	0.0
38R	6.0	6.0	6.0	10.0
38-Short	16.0	16.0	20.0	0.0
5R	10.0	10.0	11.0	0.0
8AX	8.0	0.0	8.0	0.0
8BX	8.0	0.0	8.0	0.0
9R	10.0	10.0	10.0	0.0
CPX	15.0	30.0	15.0	30.0
F	17.0	12.0	13.0	17.0
HPX	12.0	30.0	12.0	30.0
J	15.0	15.0	15.0	20.0
K	10.0	10.0	10.0	15.0
L-Bus	10.0	10.0	10.0	15.0
M	17.0	10.0	17.0	10.0
M Parkmerced	17.0	0.0	17.0	0.0
N	10.0	10.0	10.0	10.0
T	8.0	10.0	8.0	15.0
T-Short	8.0	10.0	8.0	0.0

Attachment C. Investment Plan Muni Service

Table 17: Assumed 2050 Investment Scenario SFMTA Service Headways by Time of Day in Minutes

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
1	7.0	7.0	7.0	10.0
2	15.0	15.0	15.0	20.0
5	8.0	8.0	8.0	9.0
6	20.0	20.0	20.0	30.0
7	12.0	12.0	12.0	15.0
8	7.0	7.0	7.0	10.0
9	10.0	10.0	10.0	13.0
10	15.0	15.0	15.0	20.0
12	7.5	7.5	7.5	15.0
14	7.0	10.0	8.0	8.0
15	10.0	10.0	10.0	15.0
18	20.0	20.0	20.0	20.0
19	15.0	15.0	0.0	15.0
21	15.0	15.0	15.0	20.0
22	9.0	12.0	9.5	15.0
23	20.0	20.0	20.0	30.0
24	7.5	10.0	7.5	15.0
25	7.5	10.0	5.0	10.0
27	15.0	15.0	15.0	17.0
28	12.0	12.0	12.0	17.0
29	10.0	10.0	10.0	15.0
30	11.3	12.0	12.0	15.0
31	20.0	20.0	20.0	30.0
33	15.0	15.0	15.0	20.0
35	30.0	30.0	30.0	30.0
36	30.0	30.0	30.0	30.0
37	24.0	20.0	20.0	30.0
38	16.0	16.0	18.0	15.0
39	0.0	20.0	20.0	0.0
43	12.0	12.0	12.0	15.0
44	12.0	12.0	12.0	17.0
45	10.4	12.0	13.0	15.0
48	9.5	15.0	10.0	20.0
49	6.0	7.0	6.0	15.0
52	20.0	20.0	20.0	24.0
54	20.0	20.0	20.0	30.0
55	15.0	15.0	15.0	20.0
56	20.0	20.0	20.0	20.0
57	20.0	20.0	20.0	20.0

ROUTE	AM PEAK	MIDDAY	PM PEAK	EVENING
58	15.0	15.0	15.0	20.0
58	30.0	30.0	30.0	30.0
59	10.0	8.0	8.0	12.4
60	9.5	8.0	8.0	12.4
61	6.0	8.0	0.0	15.5
66	20.0	20.0	20.0	20.0
67	20.0	20.0	20.0	20.0
109	12.0	30.0	12.0	30.0
14R	10.0	10.0	10.0	15.0
1-Short	8.0	8.0	8.0	0.0
22-Short	10.0	12.0	10.0	0.0
28R	8.0	10.0	8.0	30.0
29-Short	10.0	0.0	10.0	0.0
38R	6.0	6.0	5.5	10.0
38-Short	16.0	16.0	20.0	0.0
5R	10.0	10.0	11.0	0.0
8AX	8.0	0.0	7.3	0.0
8BX	8.0	0.0	7.1	0.0
9R	10.0	10.0	9.5	0.0
CPX	15.0	30.0	15.0	30.0
F	7.2	6.0	4.9	10.0
HPX	12.0	30.0	12.0	30.0
J	8.0	10.0	9.0	9.2
K	7.7	10.0	7.7	15.0
L	7.5	10.0	7.5	11.3
M	17.0	10.0	17.0	10.0
M Parkmerced	17.0	0.0	17.0	0.0
N	5.5	10.0	6.0	10.0
T	6.0	10.0	6.0	12.0
TI Shuttle1	10.0	10.0	10.0	10.0
TI Shuttle2	10.0	10.0	10.0	10.0
TI Shuttle3	10.0	10.0	10.0	10.0
T-Short	6.0	10.0	6.0	0.0
