DRAFT ENVIRONMENTAL IMPACT REPORT

Better Market Street Project EIR

VOLUME II

PLANNING DEPARTMENT
CASE NO. 2014.0012E

STATE CLEARINGHOUSE NO. 2015012027

	Draft EIR Publication Date:	**February 27, 2019**
	Draft EIR Public Hearing Date:	**April 4, 2019**
	Draft EIR Public Comment Period:	**February 28, 2019 – April 15, 2019**

SAN FRANCISCO
PLANNING
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Written comments should be sent to:

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List of Acronyms and Abbreviations

ABAG	Association of Bay Area Governments
ADA	Americans with Disabilities Act
AQI	Air Quality Index
AWSS	Auxiliary Water Supply System
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
Bay Trail Plan	San Francisco Bay Trail Plan
Better Streets Plan	San Francisco Better Streets Plan
Bicycle Plan	San Francisco Bicycle Plan
Blue Book	San Francisco Regulations for Working in San Francisco Streets
BMPs	best management practices
BRT	bus rapid transit
BSM	Bureau of Street Use and Mapping
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City and County of San Francisco
CLE	Cultural Landscape Evaluation
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CRHR	California Register of Historic Resources
dB	decibel
dBA	A-weighted decibel
DPM	diesel particulate matter
DPR	Department of Parks and Recreation
DTA	Dynamic Traffic Assignment
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
FTA	Federal Transit Administration
GBN	ground-borne noise
GBV	ground-borne vibration
General Plan	San Francisco General Plan
GHG	greenhouse gas
HNL	hourly noise level

HOT	high-occupancy toll
HOV	high-occupancy vehicle
HRA	health risk assessment
HRE	Historic Resource Evaluation
HRER	Historic Resource Evaluation Response
Hz	Hertz
L_{dn}	day-night level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_n	percentile level
LOS	level of service
LPI	leading pedestrian interval
MEI	maximum exposed individual
mph	miles per hour
MIR	maximally impacted receptor
MMRP	mitigation monitoring and reporting program
MTC	Metropolitan Transportation Commission
Muni	San Francisco Municipal Railway
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO	nitric oxide
NO_2	nitrogen dioxide
NOA	notice of availability
NOP	notice of preparation
NO_X	nitrogen oxide
NPS	National Park Service
NRHP or National Register	National Register of Historic Places
OCS	overhead contact system
OEHHA	Office of Environmental Health Hazard Assessment
OHP	Office of Historic Preservation
OPR	Office of Planning and Research
Particulate Matter Policy Assessment	Policy Assessment for the Particulate Matter Review of the National Ambient Air Quality Standards
PEZ	Pollutant Exposure Zone
Planning Code	San Francisco Planning Code
PM	particulate matter
PM10	particulate matter of 10 microns in diameter or less

PM2.5	particulate matter of 2.5 microns in diameter or less
ppm	parts per million
PPV	peak particle velocity
PRC	Public Resources Code
proposed project	Better Market Street Project
Public Works or project sponsor	San Francisco Public Works
RCEM	Road Construction Emissions Model
RMS	root mean square
SB	Senate Bill
SCM	standard construction measure
SEL	sound exposure level
SF-CHAMP	San Francisco Chained Activity Modeling Process
SFBAAB	San Francisco Bay Area Air Basin
SFCTA	San Francisco County Transportation Authority
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SO_2	sulfur dioxide
SOI Guidelines	Secretary of the Interior's Illustrated Guidelines for Rehabilitating Historic Buildings
SOI Rehabilitation Standards	Secretary of the Interior's Standards for Rehabilitation
SoMa	South of Market
TACs	toxic air contaminants
TASC	Transportation Advisory Staff Committee
TAZ	Traffic Analysis Zone
TDM	Transportation Demand Management
TOG	total organic gas
TSP	Transit Signal Priority
USC	United States Code
VdB	vibration decibel
VMT	vehicle miles traveled
WETA	Water Emergency Transportation Authority
WHO	World Health Organization
$\mu g/m^3$	micrograms per cubic meter
µin/sec	microinch per second
µPa	micropascal

Glossary

Bicycle box	Demarcated bicycle queuing area to prioritize bicycle movements at intersections
Class II Bikeway (Bike Lane)	Bike lanes are a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Conventional bike lanes run curbside when no parking is present, and between vehicle traffic and parked cars when parking is present on the right-hand side of the street.
Class III Bikeway (Bike Route)	Bike routes are shared streets, i.e., there is not a dedicated lane for bicyclists, used to designate preferred routes for bicyclists or provide continuity to other bicycle facilities. Bike routes are intended for streets with low motorized traffic volumes and speeds that are suitable for shared use between bicyclists and motor vehicles.
Class IV Bikeway (Separated Bikeways or Cycle Tracks)	Separated bikeways are facilities for the exclusive use of bicycles that include a separation between the bikeway and the through vehicular traffic. The separation may include, but is not limited to, grade separation, flexible posts, inflexible posts, inflexible barriers, or on-street parking.
Complete street	Complete streets are streets planned, designed, operated and maintained to support the mobility of individuals of all abilities and ages and to provide safe and efficient access for all users regardless of the form of transportation, including walking, bicycling, riding transit, and operating automobile for commercial or private purposes.
Detectable warning pavers	Often installed in places where a pedestrian crossing blends with the vehicular road without a railing or curb. Common pavers include flexible maps as well as rigid tiles, which are distinct in both color and texture from the adjacent paving.
Direct-fixation track	Configuration where the rail is fastened directly to a concrete bed (invert) without the use of ballast.

Inbound	Traveling in the eastbound direction within the project corridor.
Outbound	Traveling in the westbound direction within the project corridor.
Overhead Contact System	Part of Muni's trolley bus overhead electric wire system for powering buses, in combination with the traction power (also see Traction Power below). Consists of copper-alloy wires along the transit route that provides power to the trolleybuses or streetcars, guy wires stabilizing the copper-alloy wires, and poles that hold up the guy wires.
Non-revenue purposes	An example is when Muni vehicles are pulling into or out of vehicle depots or unplanned events such as marches or protests.
Path of Gold light standards	The Path of Gold light standards consist of decorative 33-foot-high light poles with a three-part ("trident") top, with each prong containing a light globe. A total of 327 Path of Gold light standards are located along both sides of Market Street between Steuart Street and Collingwood Street.
Pedestrian through zone	The area intended for pedestrians on sidewalks.
Safe-hit posts	Flexible polyethylene posts with portable bases. Safe-hit posts are used to delineate and separate specific zones, such as bike lanes.
Sharrows	Shared lane markings that indicate a shared lane environment for bicycles and automobiles.
Sidewalk-level bikeway	A bicycle facility that is vertically separated from vehicles. It would be paired with a Streetlife Zone (also see Streetlife Zone below) between the bicycle facility and the pedestrian through zone (also see pedestrian through zone above). The project's sidewalk-level bikeway would meet the California Department of Transportation (Caltrans) standard for class IV separated bikeways.
State of good repair	Term employed by the Federal Transit Administration relating to transit infrastructure; it is achieved by having

	well maintained, reliable transit infrastructure to provide safe, dependable and accessible transit service
Streetlife Zones	Streetlife Zones would help create a buffer between the pedestrian access routes and the bikeways. Streetlife Zones would allow the installation of features such as street trees, street furniture, benches, moveable tables and chairs, sidewalk planting areas, small retail stands (e.g., flower sellers, food carts), public restrooms, advertising kiosks, wayfinding signs, real-time transit information, newsstands, bike-share stations, dockless bicycle-/scooter-share parking, and bicycle racks.
Traction power	Part of Muni's trolley bus overhead electric wire system for powering buses, in combination with the Overhead Contact System (see Overhead Contact System above).
Two-stage turn-queue bicycle boxes	Provide bicyclists with a way to make left turns at multi-lane signalized intersections from a right-side bicycle facility. A two-stage turn-queue bicycle box is a protected area that has been designated for holding queuing bicyclists. Bicyclists need to receive two separate green signal indications (including one for the through street and then one for the cross street) to turn left.

4. ENVIRONMENTAL SETTING AND IMPACTS

INTRODUCTION TO THE ANALYSIS

This chapter provides a project-level environmental impact analysis of the Better Market Street Project (proposed project) and the project variant described in Chapter 2, *Project Description*. Sections 4.A through 4.E present the impact analysis for the resource topics identified in the initial study as requiring further study. In addition, Sections 4.A through 4.E each include descriptions of the environmental setting and regulatory framework, the approach to the analysis, assessments of project impacts (i.e., offsite, onsite, construction-related, operational, direct, and indirect impacts) and cumulative impacts, and identification of mitigation measures that would avoid, minimize, or compensate for identified significant environmental impacts.

SCOPE OF ANALYSIS

INITIAL STUDY

As described in Chapter 1, *Introduction*, the San Francisco Planning Department (planning department) determined that the proposed project would require an environmental impact report (EIR) for California Environmental Quality Act (CEQA) compliance. In January 2015, the planning department published a notice of preparation (NOP) (see Appendix 1).

As part of preparation of the EIR, the planning department identified several resource topics that could be adequately addressed in an initial study. The planning department published an initial study for the project in March 2016 (see Appendix 2). The initial study concluded that many of the physical environmental impacts of the proposed project would be less than significant or that mitigation measures agreed to by the project sponsor and required as conditions of approval would reduce significant impacts to a less-than-significant level. Accordingly, the initial study "screened out" several topics from further analysis in the EIR. These topics were:

- Land use
- Aesthetics
- Population and housing
- Cultural resources (archaeological resources and human remains)
- Transportation and circulation (air traffic patterns)
- Noise (excessive noise levels from airport land use plan area or private airstrip and exposure to existing noise levels)

- Air quality (objectionable odors)
- Greenhouse gas emissions
- Shadow
- Recreation
- Utilities and service systems
- Public services
- Biological resources
- Geology and soils
- Hydrology and water quality
- Hazards and hazardous materials
- Mineral and energy resources
- Agricultural and forest resources

Although the initial study had "screened out" the topic of archaeological resources from further consideration, the planning department (as CEQA lead agency) determined that the EIR should include archaeological resources analysis, owing to refinements in the design of the proposed project since publication of the initial study, resulting in the need for increased excavation in several locations along Market Street, including locations where there is potential to encounter unrecorded archaeological resources. A description of refinements to the design of the proposed project since publication of the initial study follows.

PROJECT CHANGES SINCE THE INITIAL STUDY

Since the March 2016 publication of the initial study, the project sponsor has continued to make minor changes in project design as a result of ongoing public engagement efforts and in coordination with partner City and County of San Francisco (City) agencies (including the planning department and the San Francisco Municipal Transportation Agency [SFMTA]).

The initial study described and analyzed three alternatives and two design options (see "Initial Study" discussion in Chapter 2). As further elaborated in Chapter 6, *Alternatives*, through consultation and coordination with project partners after publication of the initial study, some elements of the alternatives and design option were found to be infeasible. The project sponsor, in coordination with SFMTA and the planning department, reviewed elements of each of the three alternatives and two design options, ultimately synthesizing them into a single proposed project, as described in Chapter 2, *Project Description*. The intent of this synthesis was to achieve the project objectives while avoiding issues of feasibility associated with the three alternatives and two design options.

The following is a summary of project changes since publication of the initial study. As summarized below, the changes include elements deleted, elements added, and elements modified. Analysis of the deletions, additions, and modifications relative to the initial study is also included.

ELEMENTS DELETED

MISSION STREET ALTERNATIVE

- The alternative included plans for enhanced bicycle facilities and the addition of a cycle track in both directions on Mission Street.[1]

ELIMINATING THE MODIFICATIONS TO UNITED NATIONS AND HALLIDIE PLAZAS

- Major modifications to these two plazas, which had been discussed and analyzed in the initial study, will no longer be incorporated into the proposed project analyzed in the EIR.[2]

ANALYSIS

The deletion of these elements from the proposed project would reduce the physical extent of the project and remove proposed modifications to the two noted plazas.

The United Nations Plaza remains within the project area, and other elements of the proposed project would continue to make changes in the plaza and in the vicinity of the plaza, including changes to sidewalk surfaces and the potential relocation of the street-level elevator serving the Civic Center BART/Muni station. Appropriate sections of this EIR, particularly Section 4.A, *Cultural Resources*, analyze those changes.

Although project-related elements have been removed from Mission Street, where applicable, the analysis of the proposed project in this EIR still considers impacts on traffic and circulation along Mission Street as well as the exposure of sensitive receptors to noise and air quality impacts from changes in traffic and circulation patterns. For example, Section 4.B, *Transportation and Circulation*, considers the potential for the proposed project to redirect private vehicle traffic

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1 This alternative would result in a substantial delay to some San Francisco Municipal Railway (Muni) routes. Relocating all transit currently on Mission Street to Market Street would have resulted in the removal of all loading spaces on Market Street and a significant number of loading spaces on Mission Street, and it would not provide the highest achievable quality bicycle facility that maximizes the safety of bicyclists on Market Street. As a result, this alternative was eliminated from further consideration because it would not have met most of the basic project objectives, including reducing fatalities, reducing conflicts between different modes of transportation, and providing a protected bicycle facility on Market Street.

2 Modifications to United Nations and Hallidie plazas were removed from the proposed project because they are not expected to be able to be funded as part of the Better Market Street Project, and they are not essential to achieve the mobility objectives of the Better Market Street Project.

from Market Street onto nearby streets, including Mission Street. Similarly, Section 4.C, *Noise*, and Section 4.D, *Air Quality*, consider the potential for changes to the number of vehicles on Mission Street to increase the exposure of sensitive receptors to increased noise levels and air quality pollutants, respectively, as a result of redirected vehicle traffic.

Based on the foregoing, these deletions would not have the ability to change any of the significance conclusions of the initial study.

ELEMENTS ADDED

Upgrades to the Civic Center and Downtown traction power substations. The traction power substations would be upgraded to be in compliance with current codes as part of the proposed project. These upgrades would include state-of-good-repair replacements of traction power equipment internal to the substation structure.

Relocation or rehabilitation of San Francisco Municipal Railway (Muni) traction power duct banks and overhead catenary system (OCS) wires. This includes a new traction power duct bank on Second Street between Market and Stevenson streets and along approximately 250 feet of Stevenson Street between Second Street and the Downtown traction power substation.

Adding the Western Variant. The Western Variant would include an approximately 0.6-mile portion of Market Street between Octavia Boulevard and a point approximately 300 feet east of the intersection of Hayes and Market Streets. The Western Variant seeks changes beyond those of the proposed project related to pedestrian and bicyclist safety, comfort, and mobility through additional reductions to conflicts between different modes of transportation.

ANALYSIS

Substation, traction power duct bank, and OCS wires. Of the elements added, the traction power duct bank work and substation work are substantially similar in nature and in the same general locations as other infrastructure replacement or repair work that was part of the alternatives described in the initial study. The Downtown substation is located on Stevenson Street; the project corridor was extended to encompass the substation and the public right-of-way between the substation and Market Street, which includes an area that was not previously evaluated for archaeological resources. The proposed project in the EIR will take into account this additional construction work in all analyses. Owing to their location within or in proximity to the project corridor, the traction power duct bank work and substation work would not introduce any new or different conditions or potential impacts in areas of biological resources, agricultural resources, shadow, greenhouse gas emissions, or recreation. Conditions regarding geology and soils, hazards, mineral resources, and hydrology and water quality would be similar to those identified within the initial study; the additional work not would have the potential to alter any of the initial study's (less-than-significant) impact conclusions in these areas. Finally, the additional work would not result in increased demand for public services or utilities/service systems beyond what was analyzed in the initial study.

Project Variant. The Western Variant contemplates slightly modified roadway access and/or pedestrian/streetscape features in a selected (and limited) area of the project corridor. Because the project variant includes the same types of features and elements that were analyzed in the initial study, it would not introduce any new impacts in any of the topical areas screened out through the initial study. Because the project variant is the same or similar in nature to the proposed project, the project variant is studied in each topical section of the EIR at an equal level of detail as the proposed project.

Elements Modified

Changing Physically Separated Bikeways to Sidewalk-level Bikeways on Market Street

Background and Analysis

Each of the alternatives addressed in the initial study included bikeways with physical separation from other uses for at least some portion of Market Street. Separated bikeways were proposed at street level as part of Design Option A, and a raised-from-street-level but lower-than-sidewalk-level design was proposed as part of Design Option B. Both Design Option A and Design Option B were determined to be infeasible.[3] The proposed project in this EIR still incorporates physically separated bikeways on Market Street; the bikeways have been modified to be at sidewalk level to maximize the safety and performance of the bicycle facilities. Associated transitions at intersections have been added to the proposed project as well. No change to the initial study's conclusions would result, however, because the project considered in the initial study had assumed either separated cycle tracks and/or similar bicycle facilities for the same extent as the proposed project.

[3] The shared vehicle and bicycle lane proposed under Design Option A would not constitute the "highest achievable quality" of infrastructure as required by Executive Directive 16-03 because it would not include a buffered bicycle facility and therefore inadequate protection for bicyclists. SFMTA and the project sponsor collaborated to construct a raised bikeway pilot project, similar in concept to Design Option B, on a two-block stretch of Market Street between 12th and Gough streets in late 2015. The results of this pilot project indicated that there were safety issues for bicyclists due to commercial vehicles blocking the bikeway to perform loading activities, requiring bicycles to enter the vehicle travel lanes. This also reduced the performance of the bicycle facility. Therefore, the design of the bicycle facilities under Alternatives 1 and 2, Design Options A and B, and Alternative 3 would not fully meet the project objectives and would conflict with Executive Directive 16-03. The shared lane or bicycle lane designs for Market Street are included in some of the alternatives described in Chapter 6, *Alternatives*, because those alternatives meet requirements for CEQA alternatives.

Changing Private Vehicle Access Restrictions, Including Turn Restrictions onto and from Market Street

Background and Analysis

The alternatives in the initial study contemplated private vehicle access restrictions along numerous blocks of Market Street. Alternative 1 would have banned private vehicle access on Market Street between 10th and Main streets in the eastbound direction and between Steuart Street and Van Ness Avenue in the westbound direction. Alternative 1 proposed turn movement restrictions from intersecting streets in order to achieve private vehicle access onto Market Street. Alternative 2 was less restrictive but still incorporated turn restrictions at selected locations. Alternative 3 would have proposed the same private vehicle restrictions as Alternative 1. The continued operation of private vehicles on Market Street as part of Alternative 2 would continue to result in conflicts between vehicles, bicyclists, and pedestrians. These conflicts would result in a corresponding reduction in performance of the surface transit system and bicycle facilities, which in turn would conflict with multiple project objectives.

Based on the safety and operational improvements observed after implementing the Safer Market Street project,[4] as well as public input,[5] the project sponsor determined that private vehicle restrictions could be effective if implemented from 10th to Steuart streets as part of the proposed project.

The alternatives in the initial study included numerous vehicle access restrictions, which were found to have potentially significant impacts in topic areas like Transportation but no potential for significant effect in the topic areas screened out. The private vehicle restrictions are part of the larger Better Market Street proposed project, which states improved mobility as a key project objective. The modification of vehicle restrictions was intended to help fulfill this objective. While some new individual streets connecting to Market Street would have changes in access and/or directionality relative to what was reviewed in the initial study, these changes would not create any community barriers or otherwise result in any new or substantially worsened effects relative to what was analyzed in the initial study.

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4 Safer Market Street is a SFMTA project that will help to achieve the Vision Zero goal of eliminating all traffic fatalities by improving safety across all modes of transportation. The Safer Market Street project features turn restrictions extension of transit-only lanes, new loading zones, and supplemental safety treatments. More detail is provided at this location: https://www.sfmta.com/sites/default/files/projects/2015/Safer%20Market%20Street%20Factsheet%20Post%20MTAB_August.pdf.

5 The project sponsor held 74 activities and events between 2011 and 2017 involving members of the public and stakeholders. Taking into account input received, the project sponsor concluded that an alternative that evaluates varying levels of vehicle restrictions would not be necessary.

CHANGES TO THE PATH OF GOLD LIGHT STANDARDS

BACKGROUND

Each of the alternatives considered in the initial study proposed modifications to the 236 Path of Gold light standards within the project corridor. The initial study noted that the light standards would be relocated in places where the sidewalk would be narrowed in response to widened center transit boarding islands and/or the addition of physically separated cycle track. The alternatives as conceived then would have permanently removed one of the 236 light standards.

The proposed project would remove, partially restore, reconstruct, and realign all 236 Path of Gold light standards and associated utility boxes within the project corridor. The existing poles would be replaced with larger poles, the tridents would be salvaged, restored, and reinstalled with new interior lighting systems; and the clamshell bases would be removed, recast in a modified size to accommodate the larger poles, and re-installed.

The standards would be reinstalled in a more consistent linear arrangement to maintain a visible linear edge to the pedestrian through zone. With the exception of some individual standards, the current linear arrangement of the standards follows the Market Street Redevelopment Plan– (MSRP-) era installation of replicated Path of Gold standards between The Embarcadero and Octavia Street. The installation was completed in 1976 and included placement of the standards approximately 100 feet apart in pairs on the north and south sides of Market Street; the standards are located an average of 12 feet from the curb.

Understanding that standards would need to be moved or removed from their existing locations to accommodate project-related streetscape changes and/or conflicts in the furnishing zone or sub-sidewalk basements, no more than 25 percent (or 58) of the 236 standards would be located out of alignment with other standards. Realignment may occur for the following reasons: potential conflicts with existing sub-sidewalk basements, proposed tree alignment, the proposed bikeway location, proposed loading zone location, and proposed curbside and center boarding islands. This percentage translates to an estimated 58 of the 236 light standards in the project corridor, less than 18 percent of the total number of standards (327) within the entire article 10 landmark. Of the 58 light standards that could be located out of alignment with other standards, it is estimated that the project may remove approximately six standards if relocation and realignment are not feasible, based on the preceding factors. The proposed alignment would maintain the overall MSRP-era linear arrangement and historic character of the resource. Moreover, existing artistic depictions on the clamshell bases would be reviewed and potentially modified, as the Historic Preservation Commission (in consultation with Native American tribal organizations) directs.

ANALYSIS

Of environmental topic areas screened out in the initial study, the changes to the Path of Gold light standards are not relevant to impact conclusions for most topic areas. The changes do not alter the project location or modify any environmental resource beyond what the initial study considered. However, two discussions within the initial study aesthetics section specifically called out the Path of Gold light standards in support of less-than-significant impact conclusions (visual character/quality and light and glare). The aesthetics discussion of scenic vistas is also relevant in considering these changes to the Path of Gold light standards. In addition, the land use section made a conclusion regarding existing character. All of the above conclusions are revisited here in light of the proposed project's changes to the Path of Gold light standards.

Visual character/quality/overall character and scenic vistas. Initial study impact statements AE-3 and LU-3 concluded that the proposed project "would not substantially degrade the existing visual character or quality of the site and its surroundings" (AE-3) and that the proposed project "would not have a substantial impact on the existing character of the vicinity" (LU-3).

Before concluding that the proposed project would have a less than significant effect on visual character, the initial study acknowledged that the Path of Gold light standards constitute "a defining visual character" of Market Street from both a street-level perspective as well as from higher elevation areas (like Twin Peaks or Corona Heights Park). The initial study stated that at the street level, a typical viewer perspective will only take in a very small number of light standards, as views between light standards are interrupted by street trees, street furniture, traffic signals, and other streetscape elements.

From the vantage points west of the project corridor of Twin Peaks (1.9 miles west) and Corona Heights (1.2 miles west), existing conditions (at nighttime) depict a "brilliant linear pathway heading east."

Although the proposed project would remove more light standards than was anticipated at the time of the initial study, this change would not be perceptible at either the street level or landscape level. At the street level, the new wider clamshell bases and taller poles would be arranged in a more consistent linear pattern than existing conditions. The taller poles would increase the height of each standard from about 33 feet to 38 feet. The increased height may actually facilitate street-level views of more light standards than is currently possible, offsetting to an extent the proposed project's removal or relocation of up to 58 of the standards. The light standards would remain as prominent visual features with the proposed project's comprehensive program of streetscape upgrades to Market Street. Therefore, from a street-level perspective, the proposed project's changes to the light standards would not result in a new or worsened visual character/visual quality effect relative to what was disclosed in the initial study. Similarly, the proposed project's changes would not result in any new or worsened effect related to the existing character of the project vicinity.

From a landscape perspective, the proposed project would result in the light standards being placed in a more consistent alignment, enhancing the "brilliant linear pathway" more effectively than the project as constituted at the time of the initial study. Although the proposed project would relocate or remove more light standards than anticipated in the initial study, from vantage points more than a mile away, relocation or a reduction in the number of standards would most likely be offset by the more consistent alignment of the light standards. The increased height of the light standards and other features associated with the rehabilitation would not be perceptible from the landscape level. Accordingly, the proposed project's changes to the light standards would not worsen landscape-level visual quality relative to the conclusion of the initial study. These changes would also not result in any new or worsened impacts on a scenic vista relative to the conclusion of the initial study.

New sources of light and glare. The initial study assumed that the proposed project would relocate some Path of Gold light standards and remove one entirely. Noting that streetlights are a typical element of the urban streetscape, the initial study concluded that this element of the then proposed project would not create a new source and thus not increase the potential for light and glare nor degrade day or nighttime views.

The changes to the Path of Gold light standards since the initial study would further reduce the total number of light standards (from one to up to six of the 236 standards). The rehabilitation of the light standards would include increasing the height of the support poles by about 5 feet. At present, the illuminated portions of the light standards are at the same level as several second-story windows along Market Street. The change in height may make the illuminated portions of the light standards less visible from second stories and somewhat more visible from third story windows. However, none of these changes would result in any significant new source of light or glare on Market Street beyond what was assumed in the initial study.

Please refer to the initial study in Appendix 2 for a discussion and the impact analysis of the proposed project with respect to these resource topics.

EIR Topics

The resource topic areas addressed in this chapter of the EIR are listed below, and the abbreviations for each resource topic that are used in the naming of impact statements and mitigation measures are shown in parentheses.

- Section 4.A, *Cultural Resources* (archaeological resources and historic architectural resources) (CP)
- Section 4.B, *Transportation and Circulation* (TR)
- Section 4.C, *Noise* (NO)
- Section 4.D, *Air Quality* (AQ)
- Section 4.E, *Wind* (WS)

FORMAT OF THE ENVIRONMENTAL ANALYSIS

Each environmental topic considered in this chapter comprises three primary sections: 1) setting, 2) regulatory framework, and 3) impacts and mitigation measures. An overview of the general organization and the information provided in the three sections is provided as follows:

- *Environmental Setting*. The setting section for each environmental topic provides a description of the baseline physical setting for the project site and its surroundings at the beginning of the environmental review process (e.g., noise environment, traffic conditions).
- *Regulatory Framework*. The regulatory section provides an overview of statutory and regulatory considerations that are applicable to the specific environmental topic.
- *Impacts and Mitigation Measures*.
  - **Significance Criteria** This subsection lists the criteria specific to each resource topic used to identify and determine significant environmental effects of the project. Under CEQA, a significant effect is defined as a substantial, or potentially substantial, adverse change in the environment. The guidelines implementing CEQA direct that this determination be based on scientific and factual data, including the entire record for the project, and not on argument, speculation, or unsubstantiated evidence. The significance criteria used in this EIR are based on CEQA Guidelines Appendix G, with procedures set forth in San Francisco Administrative Code chapter 31.10.
  - **Approach to Analysis** This subsection first describes the relevant project features that are pertinent to the impact analysis of that resource topic, followed by the methodology used to analyze potential environmental impacts based on identified significance criteria and thresholds. The Approach to Analysis subsection describes the approach used to assess construction, operational, and cumulative impacts. Depending on the resource topic and applicable significance criteria, some evaluations (e.g., vehicle miles traveled and transit capacity in transportation and circulation) are quantitative, while the evaluations for other topics (e.g., cultural resources) are qualitative.
  - **Impact Evaluation** This subsection evaluates the potential for the proposed project to result in direct and indirect adverse effects on the existing physical environment, with consideration of both short-term and long-term effects. The analysis covers all phases of the proposed project, including construction and operation, and is based on the significance criteria/thresholds and the approach to analysis described in the previous subsection. The impacts are grouped in individually numbered impact statements (shown in boldface type) that address each significance criterion. If the impact analysis concludes that an impact is significant and that feasible mitigation measures are available that could reduce the severity of the impact, the feasible mitigation

measure(s) are presented immediately following the impact analysis, indented and numbered corresponding to the number of the impact analysis. The conclusion of each impact analysis is expressed in terms of the impact significance as no impact, less-than-significant impact, less-than-significant impact with mitigation, significant and unavoidable impact with mitigation, or significant and unavoidable impact.

The impacts of the proposed project are organized into separate categories based on the criteria listed in each topical section. Project-specific impacts are discussed first, followed by cumulative impacts.

Significance Determinations

A "significant effect" is defined by CEQA Guidelines Section 15382 as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment [but] may be considered in determining whether the physical change is significant." The planning department uses CEQA Guidelines Appendix G and Chapter 31 of the Administrative Code for questions to consider and their own guidance regarding the significance criteria and, if applicable, case-by-case thresholds of significance for assessing the severity of the environmental impacts of the proposed project. The categories used to designate impact significance are:

- *No Impact (NI)*. No adverse changes (or impacts) on the environment are expected.
- *Less than Significant (LTS)*. An impact that would not involve an adverse physical change to the environment, does not exceed the defined significance criteria, or would be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations.
- *Less than Significant with Mitigation (LSM)*. An impact that is reduced to a less-than-significant level though implementation of the identified mitigation measures.
- *Significant and Unavoidable with Mitigation (SUM)*. An adverse physical environmental impact that exceeds the defined significance criteria and can be reduced through compliance with existing local, state, and federal laws and regulations and/or implementation of all feasible mitigation measures but cannot be reduced to a less-than-significant level.
- *Significant and Unavoidable (SU)*. An adverse physical environmental impact that exceeds the defined significance criteria and cannot be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations and for which there are no feasible mitigation measures.

MITIGATION MEASURES

Section 15126.4 of the CEQA Guidelines directs preparers of an EIR to describe feasible measures that could minimize significant adverse impacts. Mitigation measures are developed to avoid, minimize, rectify, reduce, or eliminate an impact or compensate for an impact resulting from project implementation. Section 15041 of the CEQA Guidelines grants authority to the lead agency to require feasible changes in any or all activities involved in a project to substantially lessen or avoid significant effects on the environment. Feasible mitigation measures have been included in this chapter for specific environmental impacts where applicable.

ENVIRONMENTAL BASELINE

According to Section 15125 of the CEQA Guidelines:

> An EIR must include a description of the physical environmental conditions in the vicinity of the project. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines an impact is significant.
>
> 1) Generally, the lead agency should describe physical environmental conditions as they exist at the time the notice of preparation is published or, if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Where existing conditions change or fluctuate over time, and where necessary to provide the most accurate picture practically possible of the project's impacts, a lead agency may define existing conditions by referencing historic conditions or conditions expected when the project becomes operational, or both, that are supported with substantial evidence. In addition, a lead agency may also use baselines consisting of both existing conditions and projected future conditions that are supported by reliable projections based on substantial evidence in the record.
> 2) A lead agency may use the projected future conditions baseline (beyond the date of project operations) as the sole baseline for analysis only if it demonstrates with substantial evidence that use of existing conditions would be either misleading or without informative value to decision makers and the public. Use of projected future conditions as the only baseline must be supported by reliable projections based on substantial evidence in the record.

Existing conditions as of the date of publication of an NOP are typically used in an EIR against which project impacts are determined. However, updated environmental baselines were used for some analyses in this EIR, instead of the conditions at the time of publication of the NOP (January 2015), because numerous changes have occurred since January 2015 that have the potential to influence some of the analyses presented in this EIR. The updated baseline includes projects that were under construction at the time when the NOP was published, and projects that are approved and funded and therefore likely to be completed by the time the proposed project is under construction. For example, two transportation infrastructure projects directly affect the Market Street project corridor: the SFMTA's Safer Market Street Project and the signal timing changes on Market and Mission streets, both of which were completed between publication of the NOP and prior to circulation of this Draft EIR. The Safer Market Street Project focused on the section of Market Street between Third and Eighth streets and included turn restrictions, an extension of transit-only lanes, corner sidewalk extensions, daylighting, continental crosswalks, as well as other measures to enhance visibility for people walking, biking, and driving at intersections. Signal timing changes on Market and Mission streets within the transportation study area included changes to the signal cycle duration from 60 to 90 seconds, the addition of protected phases, and the provision of leading pedestrian intervals at many intersections. Other transportation projects do not directly change the Market Street project corridor; however, they modify the transportation network on streets that cross and/or connect with Market Street. Therefore, they affect the circulation of vehicles and bicyclists along and across the Market Street project corridor and therefore influence the transportation, noise, and air quality analyses in this EIR.

Construction of the proposed project is projected to begin in 2020, occurring at up to seven location-specific segments along Market Street over at least a six-year period, including inactive periods. The first segment is assumed to be completed in the same year (2020). Therefore, the opening year for the proposed project is assumed to be as early as 2020, and the cumulative analysis year is 2040. The opening year is assumed to be 2020 because this is the year when the first of the construction segments is anticipated to be completed. The proposed project would complete construction after a number of additional approved transportation improvements and land use development projects are implemented (see Appendix 5). Some of these projects were under construction as of the date of publication of the NOP or approved and reasonably likely to be completed and occupied, or in operation, when the proposed project is fully constructed.

For some environmental topics, using an existing plus project analysis would not accurately reflect the conditions that will exist at the time the project's impacts actually occur and an existing plus project conditions analysis could be misleading to the public and decision makers. The following describes the environmental baselines used for each environmental topic, including those where adjusted "existing conditions" have been applied for the environmental analyses in this EIR to fully account for the rapid land use and transportation changes that are occurring throughout the project corridor:

- **Cultural Resources.** The baseline for evaluating cultural resource impacts is the date of publication of the NOP. This baseline is the date from which resources are determined to be eligible for listing in the California Register of Historical Resources as cultural resources under CEQA (properties within the cultural resources CEQA study area that are 50 years or older from the date of January 2015). The land use changes that have occurred since January 2015 have not materially affected the resources being evaluated in this EIR, therefore an updated baseline is not appropriate. For more information, see the Environmental Setting discussion in Section 4.A, *Cultural Resources*.
- **Transportation and Circulation.** The baseline for evaluating transportation impacts is 2020. Baseline conditions were determined based on increases in employment and

population included in the planning department's land use forecasts for the San Francisco travel demand model (SF-CHAMP) and SF-CHAMP model analyses for existing (2012) and 2020 conditions. SF-CHAMP is a regional travel demand model used to assess the impacts of socioeconomic, land use, and transportation system changes on the performance of the local transportation system. The increment in trips by mode for vehicles, transit and pedestrians between model output for existing and 2020 conditions was applied to existing conditions to develop the 2020 baseline conditions. The baseline for evaluating loading impacts includes specific development projects that are either recently completed or under construction. Baseline conditions also assumes completion of transportation projects such as the Van Ness Bus Rapid Transit/Van Ness Improvement Project, Central Subway Project, Second Street Improvement Project, Upper Market Street Safety Project, Transbay Transit Center, Muni Forward and various Vision Zero projects that are anticipated to be implemented by 2020. Use of a 2020 baseline condition is reasonably conservative because it takes into account incremental increases in the number of trips for all modes of transportation that are anticipated to occur as a result of growth by 2020. For more information, see the discussion in the section titled *Baseline Conditions* in Section 4.B, *Transportation and Circulation*.

- **Noise.** Existing noise measurements (representing ambient noise levels for both vehicular traffic and the F Market & Wharves historic streetcar) were taken in 2018. The baseline for evaluating traffic-related noise impacts is 2020. This 2020 baseline accounts for projects that have been proposed since the NOP was published for the proposed project, and relies upon, and is consistent with, the vehicle volumes predicted using the SF-CHAMP travel demand model and utilized in the transportation analysis. This future baseline for evaluating traffic-related noise is reasonably conservative because it takes into account incremental increases in the number of trips as well as circulation patterns for all modes of transportation that are anticipated to occur as a result of growth by 2020. A comparison of existing (2018) measured noise levels to projected 2020 noise levels is also provided for comparative purposes. The evaluation of transit-related noise impacts follows the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment*,[6] which stipulates that a project's potential impact be measured in terms of its contribution to existing noise levels. Therefore, baseline conditions on Market Street and the proposed F Market & Wharves Historic Streetcar (F-Line) loop (F-loop) are described in terms of existing 2018 measurements and are compared to modeled 2020 Plus Project noise levels for the evaluation of transit noise pertaining to the F-Line, the addition of the F-loop, and F-Short service.

[6] Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report No. 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 31, 2018.

The baseline for evaluating vibration impacts is the date of publication of the NOP (January 2015). Existing vibration measurements (representing vibration levels for the F Market & Wharves historic streetcar) were taken in 2018 to provide context for the analysis; however, a future 2020 baseline for the evaluation of vibration impacts is not necessary because the changes described above, as they pertain to traffic and circulation patterns, do not meaningfully influence existing or anticipated vibration levels in the project corridor. This is because vehicle-generated vibration is generally not a source of vibration that causes annoyance or building damage because of the extremely limited propagation potential of vehicle-generated vibration, and changes in vehicle volumes and circulation patterns do not meaningfully influence that analysis. For more information on the baselines as they pertain to the noise analyses, see the discussion in the section titled *Baseline Conditions for Noise Analysis* in Section 4.C, *Noise*.

- **Air Quality.** The baseline for evaluating air quality impacts is 2020. This baseline accounts for projects that have been proposed since the NOP was published for the proposed project, and relies upon, and is consistent with, the vehicle volumes predicted using the SF-CHAMP travel demand model and utilized in the transportation analysis. This future baseline for evaluating air quality impacts is reasonably conservative because it takes into account incremental increases in the number of trips for all modes of transportation that are anticipated to occur as a result of growth by 2020. An opening year for operation of the proposed project is assumed to be 2020 because this is the year when the first of the construction segments is anticipated to be completed; this assumed opening year is reasonably conservative with respect to the air quality analysis in that changes in vehicle emission factors decline over time due to improvements in engine technologies and increasingly stringent vehicle regulations. For more information, see the Environmental Setting discussion in Section 4.D, *Air Quality*.
- **Wind.** The baseline for evaluating wind impacts is the date of publication of the NOP (January 2015). A future 2020 baseline for the evaluation of wind impacts is not necessary because the changes described above, as they pertain to traffic and circulation patterns, as well as other land use changes and development projects that have occurred since that time, do not meaningfully influence existing or anticipated wind levels in the project corridor.

These adjusted existing conditions take into consideration transportation and land use development projects that have been implemented since publication of the NOP as well as other factors that influence the relevant analyses, and therefore form an appropriate baseline against which to measure the analysis topics in this EIR rather than the existing conditions as of the time when the NOP was published.

APPROACH TO CUMULATIVE IMPACTS

Section 15130 of the CEQA Guidelines stipulates that EIRs must consider the significant environmental effects of a proposed project as well as "cumulative impacts." A cumulative impact is defined as an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects that cause related impacts (CEQA Guidelines Section 15355). CEQA Guidelines Section 15130(a)(1) states that a "cumulative impact consists of an impact which is created as a result of the combination of the proposed project evaluated in the EIR together with other proposed projects causing related impacts." Other proposed projects include past, present, and reasonably probable future proposed projects.

CEQA Guidelines Section 15130(b)(1) states that the approach to the cumulative impact analysis may be based on either of the following approaches, or a combination thereof:

- A list of past, present, and probable future projects producing related or cumulative impacts and/or
- A summary of projections contained in an adopted general plan or related planning document that describes or evaluates conditions that contribute to the cumulative effect.

For the purposes of this EIR, the analysis of the potential for the proposed project's incremental effects to be cumulatively considerable is based on past and present projects, described as part of the Environmental Setting, and a list of related proposed projects and plans identified by the City and neighboring jurisdictions and/or on full implementation of the San Francisco General Plan and/or other planning documents, depending on the specific impact being analyzed. Appendix 5 describes the proposed plans and projects that were considered in the cumulative analysis.

The geographic scope of the cumulative impact analyses and the specific past, present, and future projects and plans that are included in the analyses may also vary, depending on the specific environmental issue being analyzed. For instance, Section 4.E, *Wind*, uses the list-based approach by considering related projects near to and immediately adjacent to the project site, given the limited nature of related impacts that would occur as a result of the proposed changes in use and associated tenant improvements. In contrast, Section 4.B, *Transportation and Circulation*, uses the projections approach by relying on the SF-CHAMP regional travel demand model to assess some transportation impacts, which encompasses the many individual projects that are anticipated in and surrounding the project area. The growth projections account for the cumulative development projects described in Appendix 5. In addition, the future year 2040 cumulative transportation analysis assumes completion of certain planned and reasonably foreseeable transportation network changes which could affect circulation in the vicinity of the Market Street project corridor. Each technical section of this EIR designates the cumulative context for each cumulative impact analysis.

The EIR presents a cumulative impact analysis only where the proposed project, under baseline plus project conditions, would result in a less-than-significant or significant impact. The EIR does not present a cumulative impact analysis if the proposed project, under baseline plus project conditions, would result in no impact.

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4.A CULTURAL RESOURCES

This section discusses the potential for the Better Market Street Project (proposed project or project) to adversely affect cultural resources, also known as historical resources. A "historical resource" is defined in California Environmental Quality Act (CEQA) section 15064.5(a) as one that is listed in, or determined eligible for listing in, the California Register of Historic Resources (CRHR or California Register) or that has been included in a qualified local register of historical resources. Such a resource may include historic districts, buildings, structures, objects, or archaeological sites. A "cultural landscape" is also referenced throughout this document and defined as a geographic area associated with a historic event, activity, or person or exhibiting cultural or aesthetic values.[1]

In this section of the environmental impact report (EIR), "historic architectural resources" is used to distinguish built resources (including districts, cultural landscapes, buildings, structures, and objects) from archaeological resources, although both may be considered historical resources under CEQA and are discussed in this section. Under CEQA, archaeological resources are "historical resources" whether they are of historic or prehistoric age. CEQA also defines "tribal cultural resources" as certain sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe.[2] Supporting detailed technical information is included in Appendix 6, *Cultural Resources Supporting Information*.

The process for analyzing project impacts on historical resources, as defined by CEQA Guidelines section 15064.5, includes the identification of resources, as defined by CEQA, and a determination of whether the effects of the project would result in a substantial adverse change in the resources. According to CEQA Guidelines section 15064.5(b), a project is considered to have a significant effect on the environment if it causes a substantial adverse change in the significance of a historical resource.

This section describes cultural resources in the project corridor, identifies potential historical resources in the vicinity of the project corridor, and evaluates potential direct and indirect impacts on those resources that could result from the proposed project. The content of this section is based on information provided in the *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA* (hereafter referenced as the CLE);[3] *Revised Archaeological Sensitivity*

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1 National Park Service. 1995. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes,* 4.

2 California Public Resources Code section 21074.

3 *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA*. 2016. Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA. This is included within Appendix 6.

Assessment for the Better Market Street Project, San Francisco, California;[4] as well as historical resource evaluations and California Department of Parks and Recreation (DPR) 523 forms, which were used in the identification of historic architectural resources analysis. These documents are cited where appropriate in the "Environmental Setting" section.

Comments submitted in response to the notice of preparation (NOP) (Appendix 1) were considered in preparing this analysis. The NOP comments were related to potential project impacts on the Crown-Zellerbach Building at 1 Bush Street, a designated City and County of San Francisco (City) landmark, resulting from the removal of Market Street access for private vehicle traffic exiting the building's below-grade parking garage.

ARCHAEOLOGICAL RESOURCES

The initial study found that impacts on archaeological resources would be less than significant with implementation of mitigation requiring accidental discovery protocols. Refinements to the proposed project have occurred since the initial study, including, but not limited to, the proposed excavation at Second and Stevenson streets (discussed in Chapter 2, *Project Description*), and have the potential to affect archaeological resources beyond the extent to which they were considered in the 2016 initial study. Therefore, a discussion of impacts on archaeological resources is included in this chapter.

The initial study also determined that the proposed project would not cause significant adverse impacts on paleontological resources because of the previously disturbed nature of the urban environment as well as the lack of geologic features beneath the project corridor that would yield unique fossils. Therefore, no further discussion of impacts on paleontological resources is included in this EIR.

ENVIRONMENTAL SETTING

The project corridor's environmental setting consists of the historical context and a description of known historic resources within the historic resources CEQA study area and known archaeological resources within the archaeological resources CEQA study area. The historic resources CEQA study area encompasses the project corridor and the Market Street Cultural Landscape District, as shown in Figure 4.A-1, on the next page. The archaeological resources CEQA study area consists of the limits of all proposed project activities that could cause direct impacts on known and as-yet unknown archaeological resources.

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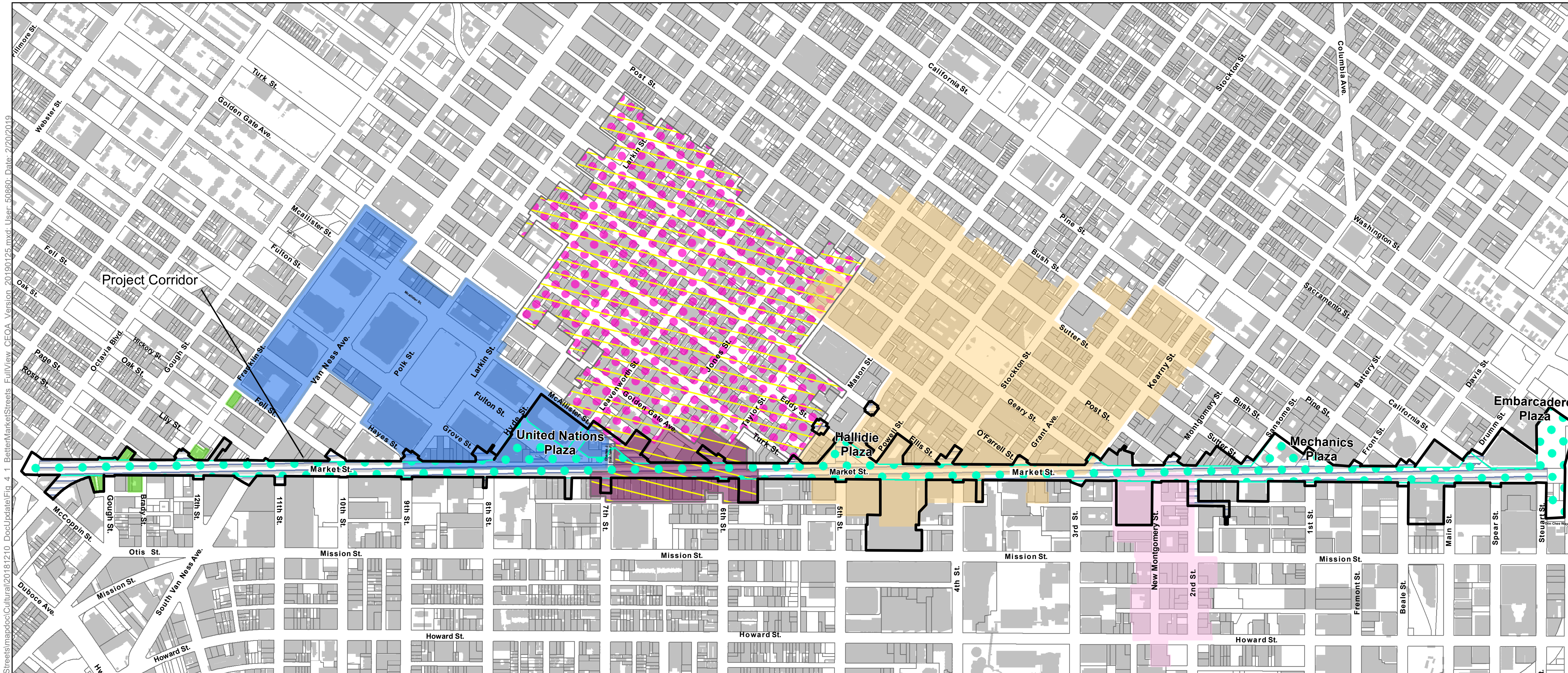
4 *Revised Archaeological Sensitivity Assessment for the Better Market Street Project, San Francisco, CA.* Revised. February 2019. San Francisco, CA. Prepared for San Francisco Planning Department, San Francisco, CA. Because of the sensitive nature of archaeological sites, this report is not included in Appendix 6.



Legend

- Historic Resources CEQA Study Area
- Archaeological Resources CEQA Study Area
- Market Street Masonry Landmark District
- Market Street Cultural Landscape District
- New Montgomery-Mission-2nd Street Conservation District
- Kearny-Market-Mason-Sutter Conservation District
- Uptown Tenderloin National Register Historic District
- Market Street Theatre and Loft National Register Historic District
- Civic Center Landmark District
- LGBTQ Tenderloin Historic District

0 500 1,000
Feet

Note: Portions of the Path of Gold, Path of Gold Associated Historic Utility Boxes, Golden Triangle Light Standards, San Francisco Auxiliary Water Supply System, and San Francisco Cable Cars National Historic Landmark are located within the Historic Resources CEQA Study Area but are not identified in this map to maintain the map's clarity. The locations of individual architectural historic resources within the Historic Resources CEQA Study Area are identified in Appendix 6. The historic districts shown in this figure were determined eligible for listing in local, state, or national inventories. Refer to Section 4.A, Cultural Resources, for more information on each district's eligibility.

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Source: Parcels, City and County of San Francisco 2014; Streets, City and County of San Francisco 2014; Building Footprints, City and County of San Francisco 2011; Historic Resources CEQA Study Area, ICF and San Francisco Public Works 2018; Historic Districts, San Francisco Planning Department 2018.

Figure 4.A-1
CEQA Study Areas for Historic and Archaeological Resources

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The project corridor is along the boundary of, or within, several northeast and southeast neighborhoods of the city, specifically, the Western Addition, Mission, Downtown/Civic Center, South of Market, and Financial District neighborhoods. The locations of additional buildings, objects, structures, and districts within the historic resources CEQA study area are illustrated in Appendix 6.

EXISTING CONDITIONS

The historic and archaeological resource CEQA study areas include a variety of districts, buildings, structures, objects, and sites in the vicinity of and immediately adjacent to the proposed project. The following summary identifies the historic resources that were surveyed and evaluated to determine whether they are recognized as historic resources or may qualify as historical resources for purposes of CEQA evaluation. The following section is organized into three main sections: 1) Historic Context; 2) Archaeological Context, including two sub-sections: Archaeological Resources and Geoarchaeological Analysis; and 3) Historic Architectural Resources Context, including three sub-sections: Market Street Cultural Landscape District, Other Historic Districts, and Buildings, Structures, and Objects. The locations of historic architectural resources within each sub-section are provided on the maps presented in Appendix 6. Additional details on the historic architectural resources are provided in Appendix 6, including the following: level of designation, eligibility criteria, contributing properties and character-defining features, period of significance, and the historic resource boundary description. Archaeological resources are described but not mapped herein because of the sensitivity of the location information.

HISTORIC CONTEXT

The methodology for the identification of historic properties includes development of historic themes and contexts. Such contexts characterize the cultural environment of the historic resources CEQA study area and provide the baseline against which historic architectural resources are evaluated for historic significance and integrity. Robust historic contexts (chronological historical narrative and comparative contexts) were prepared for the archaeological sensitivity assessment (ASA) and CLE, which are summarized below and may be referenced for more information about the historic context for the historic resources CEQA study area.

ARCHAEOLOGICAL CONTEXT

The earliest evidence of human occupation of California occurs near the end of the Pleistocene epoch (around 9550 before present [BP]). Sites dating to this period are located primarily on the Channel Islands and the nearby mainland shores in Southern California. These sites have contents that indicate an emphasis on marine resource collection (e.g., shellfish and fish remains). Within the Bay Area, archaeological deposits associated with this period are considered likely to either have been deeply buried or destroyed. Evidence of early Holocene (7650–3750 BP) land use has been found at a small number of sites throughout the Bay Area, with some of the earliest sites dating to around 7050 BP, including CA-SCL-178 and CA-CCO-696. The contents of these sites, including terrestrial mammal remains and chipped and ground stone tools, indicate an emphasis on terrestrial resources by semi-mobile hunter-gatherers. During the middle of the Holocene epoch (3750 BP–150 common era [CE]), the emergence of specialized tools, a range of nonutilitarian artifacts, and the presence floral and faunal remains from a range of seasons indicates a transition toward sedentism in the Bay Area during this period. The early part of the late Holocene epoch (150–1780) saw an increase in the exploitation of marine resources, as demonstrated by the presence of numerous shell middens, including several large shell mounds, while the latter part of the late Holocene epoch saw decreased reliance on marine resources and an increase in the diversity of resource types exploited by the people of the Bay Area.

The archaeological resources CEQA study area was traditionally inhabited by the Yelamu people, one of several small tribes (or tribelets) of the Ohlone people, whose territory extended along the coast from the Golden Gate in the north to just below Carmel in the south along several inland valleys that led from the coastline.[5] The Yelamu were primarily hunter-gatherers and focused on terrestrial game, both large and small; marine resources; fish; shellfish; and waterfowl as well as a wide variety of plant resources. The Yelamu's way of life was disrupted by the arrival of the Spanish in the Bay Area and the establishment of missions in Ohlone territory between 1776 and 1797. The forced missionization of the Ohlone was detrimental to the native population because of disruptions in traditional subsistence patterns, physical punishment, new forms of European labor discipline, clerics' efforts to eradicate native religion, and the introduction of European diseases. Today, although they have yet to receive formal recognition from the federal government, the Ohlone are active in preserving their ancestral heritage.

Archaeological Resources

Based on the findings of the revised ASA, the following archaeological resources were identified within the archaeological resources CEQA study area.

- **CA-SFR-28 (P-38-000028)** – Known as the Bay Area Rapid Transit (BART) skeleton or BART woman, the site, originally recorded in 1970, consists of one partial prehistoric burial 7.9 meters below mean sea level (21 meters, or nearly 70 feet, below the street surface) in bay mud overlain by sand dunes on the north side of the original Hayes Creek and east of Mission Bay. The burial consisted of one female, carbon dated to between 6270 and 4880 before present [BP] (Middle Holocene).[6] The burial was not formally evaluated for the

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[5] Levy, R. 1978. Costanoan. In *California*, R.F. Heizer, ed., pp. 485–495. Handbook of North American Indians. Vol. 8. Washington, D.C.: Smithsonian Institution.

[6] Kerr, S. 1978. *Cabrillo College Archaeological Site Survey Record for P-38-0000028/CA-SFR-28*. Record on file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

CRHR, was recovered, and is no longer extant. Subsequent geoarchaeological testing conducted for a building replacement project northeast of CA-SFR-28 did not identify any archaeological material from a context similar to where the BART woman was found.[7]

- **CA-SFR-156H (P-38-004362)** – This historic resource, also known as Block 6 of the Octavia Boulevard Improvement Project, Features 1 and 2, consists of a refuse pit (Feature 1) and a brick wall remnant with a concrete slab (Feature 2). These features were discovered between 22 and 28 inches below ground surface. Neither feature had any of the temporal artifacts necessary to accurately date the site; however, generally speaking, these features date to the middle to late 19th or early 20th century. Both features were recommended as "historically insignificant" and removed in the field (based on National Register of Historic Places [NRHP or National Register] criteria).[8] This resource was later determined ineligible for listing in the NRHP or CRHR.[9]
- **CA-SFR-157H (P-38-004363)** – This historic resource, also known as Block 7 of the Octavia Boulevard Improvement Project, Features 3 through 7, consists of brick walls, associated cultural material (Features 3, 5, and 6), and burned cultural deposits (Features 4 and 7). These features were found between 3 and 4 feet below ground surface. None of the features had any of the temporal artifacts necessary to accurately date the site; however, generally speaking, these features date to the middle to late 19th or early 20th century. Because of the lack of information obtainable from these features, they were determined to be ineligible for the NRHP and CRHR (Vanderslice and Gottsfield 2004b; St. Clair and Dobkin 2006).
- **Yerba Buena Cemetery (no trinomial)** – The Yerba Buena Cemetery was the City's first official burial ground, designated in 1850. During the late 1860s and early 1870s, the City decided to move the interred individuals and develop a public park in its place. Various contractors were hired to move gravestones and individuals to other locations; however, the job was notoriously mismanaged. There are reports of coffins and gravestones being encountered during construction in the area through the late 1890s and up until 2018. The reports did not identify the depth of these materials, only that they were found within a sandy context. Archaeological testing conducted in 2018 as part of the Asian Art Museum Expansion and Improvements Project identified seven archaeological features

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7 Kaijankoski, P., and M. Meyer. 2016. *Updated Primary Record for P-38-000028/CA-SFR-28*. Record on file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

8 Vanderslice, A., and A. Gottsfield. 2004a. *Primary Record for P-38-004362/CA-SFR-156H*. Record on file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA; 2004b. *Primary Record for P-38-004363/CA-SFR-157H*. Record on file at the Northwest Information Center, Sonoma State University, Rohnert Park, CA.

9 St. Clair, M. and B. Dobkin. 2006. *Report on Technical and Interpretive Studies for Historical Archaeology Central Freeway Replacement Project* (04-SF-101 Post Miles 4.7 /5.1/EA 291002 in the City of San Francisco, San Francisco County, California). On file at the Northwest Information Center(S-31394).

within a deposit of dune sands that extended 3 to 10 feet below the ground surface. These features consisted of five intact burials, isolated bone fragments, and a wooden board, all of which were discovered within a 3- to 4-foot-thick deposit of dune sands. Of the seven features, six were recorded and removed; one intact burial (Feature 6) was encased in concrete and preserved in-situ with an informational plaque to allow for future identification Formal evaluation of the burials associated with the Yerba Buena Cemetery recently discovered during work at the Asian Art Museum is still in process, but the department assumes eligibility under CRHR Criterion 4.

Georchaeological Analysis

During desktop geoarchaeological analysis, four landform types were identified as being likely to occur in the archaeological resources CEQA study area, based on the study area vicinity's landscape history and the findings of previous geoarchaeological and geotechnical studies. These landform types include anthropogenic fill, dunes, tidal flats, and older landforms. The latter represents multiple landform types (e.g., Colma formation, old bay mud) that predate the period for which there is scientific consensus regarding human occupation of North America. Each landform type is delineated by important differences in the timing of their formation, stability, accessibility, and archaeological sensitivity. These attributes are presented in Table 4.A-1, below, and described in greater detail below.

TABLE 4.A-1. ANTICIPATED LANDFORM TYPES, AGE, ACCESSIBILITY, STABILITY, ARCHAEOLOGICAL SENSITIVITY, AND POSSIBLE RESOURCE TYPES IN THE ARCHAEOLOGICAL RESOURCES CEQA STUDY AREA

Landform	Age	Accessibility	Stability	Archaeological Sensitivity	Possible Resource Types
Fill	Post-1850	Permanently accessible	Stable	Moderate	Historical residential, commercial
Dunes	Late Pleistocene to Holocene	Permanently accessible	Periodic accretion and erosion	High	Pre-contact habitation, resource collection, resource processing
Tidal Flats	Middle to late Holocene	Frequently inaccessible	Slow accretion	Upper interface, moderate Below interface, limited	Pre-contact resource collection, historical commercial
Older landforms	Pleistocene or older	Variable – limited to the upper interface	Variable – limited to the upper interface	Low	None below upper interface

Source: ICF. 2018. *Archaeological Sensitivity Assessment for the Better Market Street Project*. December. Chapter 5, Figure 5.

In some instances, fill may contain intact archaeological deposits. Successive historic fill events, occurring years apart, may in fact encompass intact archaeological deposits. However, within the archaeological resources CEQA study area, fill deposits are unlikely to contain intact archaeological deposits because of the timing and nature of the filling that occurred. The nature and extent of ground-disturbing activities, such as construction of BART and San Francisco Municipal Railway (Muni) facilities, have played a role in affecting the sensitivity of fill material. As a result, fill deposits associated with BART and Muni facility construction, within the archaeological resources CEQA study area, are considered to have limited sensitivity for archaeological resources. However, the potential remains for intact historic-era deposits in the form of refuse dumps or sheet refuse associated with individual fill events to be present within the archaeological resources CEQA study area. On average, fill extends from the ground surface to around 12 feet below the ground surface within the archaeological resources CEQA study area.

Dunes hold the highest potential for containing archaeological deposits because they could have served as a terrestrial surface upon which human activities could have occurred. Sand dunes may shift over time, which has the potential bury archaeological resources, as well. This high degree of archaeological sensitivity is illustrated by the nine intact archaeological resources located within dune sand deposits in the vicinity of the archaeological resources CEQA study area. Dune sands are present between 7 and 20 feet below surface along the majority of the archaeological resources CEQA study area. East of roughly First Street, bayward of the historic shoreline, dune sands are not present within the archaeological resources CEQA study area.

Tidal flats, which are commonly identified in geotechnical studies in the archaeological resources CEQA study area as being *marsh deposits*, have limited potential to contain archaeological resources because they are regularly inundated, thereby preventing long-term activities that are likely to result in the formation of archaeological resources, such as habitation and resource processing. Although activities such as resource collection undoubtedly occurred in marshes, these activities are unlikely to have resulted in accumulations of artifacts and features; however, occasional isolated artifacts in marsh deposits are possible. The discovery of CA-SFR-28, discussed above, indicates that the potential exists for isolated burials to be found this context. The upper interface of marsh deposits was identified at depths between 20 and 25 feet below the ground surface. Occasional pockets of marsh deposits are immediately west of Fremont Street; thick deposits of tidal mud overlain by marsh deposits are present east of Fremont Street within the archaeological resources CEQA study area. The upper interface of tidal mud deposits retains the potential to contain items and features associated with historic activities, such as refuse, sunken ships, and pier and wharf remnants. Therefore, this interface retains a moderate degree of sensitivity for historic-period resources.

The Colma formation is generally believed to have formed during the mid- to late Pleistocene, prior to the period of human occupation of North America. The upper interface of this formation could have been available as a stable surface during the period of human occupation of North America in some instances. As such, the upper interface of the Colma formation is considered to have moderate to high sensitivity, while anything below the interface is considered to have low archaeological sensitivity. During geotechnical investigations in the area of the archaeological resources CEQA study area, the upper interface of the Colma formation was identified between 26 and 155 feet below the ground surface west of Main Street.[10]

HISTORIC ARCHITECTURAL RESOURCES CONTEXT

The term "historic architectural resources" is used to distinguish built resources (including districts, cultural landscapes, buildings, structures, and objects) from archaeological resources, although both may be considered historical resources under CEQA. The CLE provides the basis for the historic architectural resources context for the Better Market Street project area. The CLE chronological historical narrative includes the following topics: Spanish and American Periods (1768-1846), the Gold Rush and Early Urban Development in San Francisco (1847–1860), Intensive 19th-century Urbanization (1860–1906), Market Street at the Turn of the 20th Century, the 1906 Disaster and Aftermath, Market Street Reconstruction (1906–1920), Market Street from Boom to Bust to World War II (1920–1945), Decline and Redevelopment (1945–1985), and Alterations to the Market Street Redevelopment Plan Landscape (1986–present).

The CLE comparative context includes the Labor Movement (1865–1902); Women's Suffrage Movement (1840–1920); Modern Civil Rights Movement (1954–1964); Gay Liberation, Pride Celebration, and LGBTQ Political Protest (1960–1995); Protesting War and Celebrating Peace: World War I, World War II, Cold War, and Vietnam; Urban Renewal and Revitalization through Landscape Design and Urban Planning in the United States and San Francisco (1945–1980); and Market Street Redevelopment Plan: A Collaboration of Modern Design Masters.

MARKET STREET CULTURAL LANDSCAPE DISTRICT

The Market Street Cultural Landscape District is a complex historic architectural resource that is eligible for listing in the CRHR and NRHP under three distinct areas of significance (period of significance shown in parentheses):

- **Significance 1 (**1847–1929)**:** Market Street is nationally significant under NRHP Criterion A and CRHR Criterion 1 for its historic role as San Francisco's main circulation artery and facilitator of urban development, based on its association with the early urban and economic growth of San Francisco. As San Francisco's main circulatory artery, Market Street provided the physical foundation and transportation infrastructure mechanism that facilitated the city's development.

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10 ICF. 2019b. *The HUB Archaeological Research Design and Treatment Plan, San Francisco, California*; Byrd, B., P. Kaijankoski, J. Meyer, A. Whitaker, R. Allen, M. Bunse, and B. Larson. 2010. *Archaeological Research Design and Treatment Plan for the Transit Center District Plan Area, San Francisco, California*. Prepared for: R. Dean, Major Environmental Analysis, San Francisco Planning Department, San Francisco, CA.

- **Significance 2** (1870s-1979)**:** Market Street is nationally significant under NRHP Criterion A and CRHR Criterion 1 for its historic role as venue for civic engagement in San Francisco, based on association with the public demonstrations that elevated issues of LGBTQ rights to national attention beginning in the 1960s through 1979, and locally significant for its association with public civic events and demonstrations that elevated civic discourse about other important themes, from labor protests in the 1870s through the civil rights demonstrations and protests regarding U.S. participation in the Vietnam conflict during the 1960s.
- **Significance 3** (1979)**:** Market Street is nationally significant under NRHP Criterion C and CRHR Criterion 3 for its association with the work of master architects John Carl Warnecke and Mario J. Ciampi as well as master landscape architect Lawrence Halprin. As a collaboration of these designers, the Market Street Redevelopment Plan is significant for its early application of an interdisciplinary approach to urban design, which helped elevate the influence of landscape architecture as a discipline that provides perspective on modern urban planning.

Although agencies have altered Market Street since these periods of significance, Market Street retains its status as eligible for listing in the CRHR and NRHP under each area of significance. Additional details regarding character-defining features, character-defining feature priority levels, period of significance, and the historic property boundary for each of these significances are summarized in the tables presented in Appendix 6. Table A-1 in Appendix 6 provides information about Market Street in terms of its significance as San Francisco's main circulation artery and facilitator of urban development. Table A-2 in Appendix 6 provides information about Market Street in terms of its significance as a venue for civic engagement in San Francisco. Table A-3 in Appendix 6 provides information about Market Street in terms of its significance as the Market Street Redevelopment Plan designed landscape. The CLE report documenting evaluation of the Market Street Cultural Landscape District is cited in the footnotes in the summary table.

OTHER HISTORIC DISTRICTS

In addition to the eligible Market Street Cultural Landscape District, nine historic districts intersect with or are adjacent to the project corridor. These include:

- Civic Center Landmark District (which includes the Civic Center National Historic Landmark, Civic Center National Register, and Civic Center article 10 Landmark districts)
- Market Street Theatre and Loft National Register Historic District
- Uptown Tenderloin National Register Historic District

- Market Street Masonry Landmark District (City of San Francisco article 10 local designation)
- New Montgomery-Mission-Second Street Conservation District (City of San Francisco article 11 local designation)
- Kearny-Market-Mason-Sutter Conservation District (City of San Francisco article 11 local designation)
- LGBTQ Tenderloin Historic District (eligible for listing in the California Register)
- San Francisco Auxiliary Water Supply System (eligible for listing in the National Register and California Register)
- San Francisco Cable Cars National Historic Landmark

The maps presented in Appendix 6 show the locations where these districts intersect with the historic resources CEQA study area. The tables presented in Appendix 6 include the character-defining features of the historic districts and list the contributors that fall within the historic resource CEQA study area.

Additional details regarding name, address, local designations, NRHP/CRHR eligibility criteria, contributing buildings and character-defining features, period of significance, and the historic property boundary for each of the historic districts are summarized in Appendix 6. The technical reports, DPR forms, and additional sources for documenting these evaluations are cited as footnotes in each summary table.

BUILDINGS, STRUCTURES, AND OBJECTS

Fifty historic-age buildings, structures, and objects within or adjacent to the project corridor were included in the historic resources CEQA study area, documented, and evaluated for CRHR/NRHP eligibility. Forty-one of these properties are individually eligible CEQA resources, including 32 buildings that are immediately adjacent to Market Street and nine structures or objects within the Market Street streetscape. The following lists itemize individual historic architectural resources, as oriented from east to west along the project corridor:

BUILDINGS

- Hyatt Regency, 22 Drumm Street
- Matson Building and Annex, 215 Market Street
- Pacific Gas and Electric Company General Office Building and Annex, 245 Market Street
- 1 California Street
- Standard Oil Building/Chevron Towers, 555 Market Street
- Crown-Zellerbach Building, 1 Bush Street

- Flatiron Building, 540–548 Market Street
- Market Street Railway Substation/Downtown Traction Power Substation
- 550 Market Street
- 554 Market Street
- 560 Market Street
- The Chancery Building, 562–566 Market Street
- The Finance Building, 576–580 Market Street
- Palace Hotel, 2 New Montgomery Street (633 Market Street)
- 660 Market Street
- The Old Chronicle Building, 690 Market Street
- Humboldt Savings Bank Building, 785 Market Street
- James Bong Building, 833 Market Street
- Flood Building, 870 Market Street
- The Emporium, 835 Market Street
- Bank of Italy/Bank of America, 1 Powell Street
- Wilson Building, 973–977 Market Street
- 979–989 Market Street
- Hibernia Bank, 1 Jones Street
- Hotel Shaw, 1100–1112 Market Street
- Francesca Theater, 1127 Market Street
- Federal Building, 50 United Nations Plaza
- Orpheum Theater, 1182 Market Street (2 Hyde Street)
- Tourist Hotel, 1666–1668 Market Street
- Gaffney Building, 1670–1680 Market Street
- Edward McRoskey Mattress Factory, 1687 Market Street
- Hotel Fallon, 1693–1695 Market Street

Structures and Objects

- The series of 327 Path of Gold light standards and associated historic utility boxes in the sidewalk area adjacent to Market Street, from The Embarcadero at Steuart Street to 2490 Market Street (Figure 2-2 shows the locations of the 236 standards, of the full series of 327 within the CEQA study area, the would be partially restored, reconstructed, and realigned under the project)[11]
- Mechanics Monument, intersection of Bush, Battery, and Market streets
- Shoreline Markers, located adjacent to Bush Street and First Street at their intersection with Market Street
- Site of invention of the three-reel Liberty Bell slot machine, intersection of Market, Bush, and Battery streets
- California Statehood Monument, intersection of Market, Montgomery, and Post streets
- Lotta's Fountain, intersection of Market, Geary, and Kearny streets
- The Golden Triangle light standards in the sidewalks along city streets on blocks within a triangle-shaped area north of Market Street, roughly bounded by Mason Street to the west, Sutter Street to the north, and Market Street to the south/east (Figure 2-2 shows the existing locations of the Golden Triangle light standards within the CEQA study area)
- Samuel's Clock, 856 Market Street
- United Nations Plaza, open space bounded by 50 United Nations Plaza, 10 United Nations Plaza, the Orpheum Theatre (1192 Market Street), and 1170 Market Street cluster in the southwest corner

Appendix 6 summarizes the name, address, local designations, NRHP/CRHR eligibility criteria, contributing buildings and character-defining features, period of significance, and the historic property boundary for each of these properties. In addition, for historic buildings adjacent to Market Street, the table indicates the presence or absence of sub-sidewalk basements.

In addition to these CEQA-eligible properties, nine historic-age properties adjacent to the proposed project were documented, evaluated, and found to be ineligible for listing in the CRHR or NRHP. These include:

- 44 McAllister Street (district contributor, not individually eligible)
- 45 McAllister Street (1114 Market Street) (ineligible)

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[11] The series of all Path of Gold light standards is considered the historical resource. Individual light standards and utility boxes contribute to the larger resource but are not considered individually significant resources on their own.

- 570 Market Street (ineligible)
- 609–611 Market Street (district contributor, not individually eligible)
- 995–997 Market Street (district contributor, not individually eligible)
- 1028–1056 Market Street (to be demolished; district contributor, not individually eligible)
- 1133 Market Street (district contributor, not individually eligible)
- 1640–1658 Market Street (ineligible)
- Seaboard Bank Building, 1554–1564 Market Street (demolished)

REGULATORY FRAMEWORK

This section outlines the federal, state, and local regulatory contexts applicable to the evaluation of the proposed project, including a summary of the National Historic Preservation Act and NRHP criteria; the Secretary of the Interior's Standards for Rehabilitation and the Secretary of the Interior's Illustrated Guidelines for Rehabilitating Historic Buildings; the Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes; CRHR criteria; CEQA; San Francisco General Plan; San Francisco Planning Code, including articles 10 and 11; and City and County of San Francisco Preservation Bulletin No. 16.

FEDERAL

NATIONAL HISTORIC PRESERVATION ACT AND NATIONAL REGISTER OF HISTORIC PLACES

Archaeological and architectural resources (buildings and structures) are protected through the National Historic Preservation Act (NHPA) of 1966, as amended (16 United States Code [USC] 470f), and its implementing regulations: Protection of Historic Properties (36 Code of Federal Regulations [CFR] part 800), Archaeological and Historic Preservation Act of 1974, and Archaeological Resources Protection Act of 1979.

The NRHP is the nation's official comprehensive inventory of historic resources. Administered by the National Park Service, the NRHP includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. Typically, a resource that is more than 50 years of age is eligible for listing in the NRHP if it meets any one of the four eligibility criteria *and* retains sufficient historic integrity. A resource less than 50 years old may be eligible if it can be demonstrated that it is of "exceptional importance" or a contributor to a historic district. NRHP criteria are defined in *National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation*.

There are four criteria under which a structure, site, building, district, or object may be eligible:

- **Criterion A (Event):** Properties associated with events that have made a significant contribution to the broad patterns of our history;
- **Criterion B (Person):** Properties associated with the lives of persons significant in our past;
- **Criterion C (Design/Construction):** Properties that embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant distinguishable entity whose components lack individual distinction; and
- **Criterion D (Information Potential):** Properties that have yielded, or may be likely to yield, information important in prehistory or history.

A resource can be significant to American history, architecture, archeology, engineering, and/or culture at the national, state, or local level. In addition to meeting at least one of the four criteria, a property or district must retain integrity, meaning that it must have the ability to convey its significance through the retention of seven aspects, or qualities, that, in various combinations, define integrity:

- **Location**: Place where the historic property was constructed;
- **Design:** Combination of elements that create the form, plans, space, structure, and style of the property;
- **Setting:** The physical environment of the historic property, inclusive of the landscape and spatial relationships of the buildings;
- **Materials**: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form the historic property;
- **Workmanship:** Physical evidence of the crafts of a particular culture or people during any given period in history;
- **Feeling:** The property's expression of the aesthetic or historic sense of a particular period of time; and
- **Association**: Direct link between an important historic event or person and a historic property.

CRITERIA CONSIDERATION G

Significant properties that retain integrity but are less than 50 years old must also be evaluated against NRHP Criterion Consideration G. When first establishing the NRHP in the 1960s, the National Park Service recognized that certain property types (e.g., birthplaces, religious properties, reconstructed properties, moved properties, properties built within the past 50 years) would not usually be considered for listing in this register. The National Park Service recognized that it is often difficult to have a clear historical perspective on properties built within the past 50 years and established Criterion Consideration G to "guard against the listing of properties of passing contemporary interest."[12] To ensure that such properties are deserving of recognition, the National Park Service requires additional consideration of their relative importance within history. According to the Criterion Consideration G, properties that have achieved significance within the last 50 years may be eligible for listing if they are of "exceptional" importance.[13]

SECRETARY OF THE INTERIOR'S STANDARDS FOR REHABILITATION AND ILLUSTRATED GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS

The Secretary of the Interior's Standards for Rehabilitation and the Secretary of the Interior's Standards Illustrated Guidelines for Rehabilitating Historic Buildings provide guidance for reviewing work to historic properties.[14] Developed by the National Park Service for reviewing certified rehabilitation tax-credit projects, the Secretary of the Interior's Standards for Rehabilitation have been adopted by local government bodies across the country for reviewing proposed work to historic properties under local preservation ordinances. The Secretary of the Interior's Standards for Rehabilitation provide a useful analytical tool for understanding and describing the potential impacts of changes to historic resources, including new construction inside or adjoining historic districts.

SECRETARY OF THE INTERIOR'S STANDARDS GUIDELINES FOR THE TREATMENT OF CULTURAL LANDSCAPES

The Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes provide a foundation for interpreting if project activities are consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, particularly as they apply to the unique qualities of cultural landscapes. These guidelines acknowledge the evolution and change that is

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12 Andrus. 2002. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. U.S. Department of the Interior, National Park Service, National Register of Historic Places. Washington, D.C. Available: https://www.nps.gov/nr/publications/bulletins/nrb15/. Accessed: February 18, 2016.

13 Sherfy and Luce. 1998. *National Register Bulletin 22: Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years*. U.S. Department of the Interior, National Park Service, National Register of Historic Places. Washington, D.C. Available: https://www.nps.gov/nr/publications/bulletins/nrb22/. Accessed: July 4, 2018.

14 U.S. Department of Interior, National Park Service, Cultural Resources, Preservation Assistance Division. 1992. *Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines for Rehabilitating Historic Buildings*. The standards, revised in 1992 and 1996, were codified as 36 CFR part 68.3 in the July 12, 1995, *Federal Register* (vol. 60, no. 133). The revision replaces the 1978 and 1983 versions of 36 CFR 68 entitled *The Secretary of the Interior's Standards for Historic Preservation Projects*. The 36 CFR 68.3 standards are applied to all grant-in-aid development projects assisted through the National Historic Preservation Fund. Another set of standards, 36 CFR 67.7, focuses on "certified historic structures," as defined by the IRS Code of 1986. The standards in 36 CFR 67.7 are used primarily when property owners are seeking certification for federal tax benefits. The two sets of standards vary slightly; the differences are primarily technical and non-substantive in nature. The guidelines, however, are not codified in the *Federal Register*.

characteristic of landscape features and inform tolerance for change and expectations for continuity relative to the landscape's significance in history, integrity and existing physical condition, geographical context, use, archaeological resources, natural systems, management and maintenance, interpretation, accessibility considerations, health and safety considerations, environmental protection requirements, and energy efficiency.[15]

State

California implements the NHPA through its statewide comprehensive cultural resource preservation programs. The California Office of Historic Preservation, an office of the California DPR, implements the policies of the NHPA on a statewide level. The Office of Historic Preservation also maintains the California Historical Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdiction.

The criteria used for determining CRHR eligibility are closely based on those developed by the National Park Service for the NRHP. To be eligible for listing in the CRHR, a property must demonstrate significance under one or more of the following criteria:

- **Criterion 1 (Events):** Resources that are associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States.
- **Criterion 2 (Persons):** Resources that are associated with the lives of persons important to local, California, or national history.
- **Criterion 3 (Design/Construction):** Resources that embody the distinctive characteristics of a type, period, region, or method of construction; represent the work of a master; or possess high artistic values.
- **Criterion 4 (Archaeological/Source of New Information):** Resources or sites that have yielded or have the potential to yield information important to the prehistory or history of the local area, California, or the nation.

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15 National Park Service. n.d. *National Park Service Guidelines for the Treatment of Cultural Landscapes*. Available: https://www.nps.gov/tps/standards/four-treatments/landscape-guidelines/acknowledgments.htm. Accessed: August 12, 2016.

In addition to meeting the significance criteria, a significant historic resource must possess integrity to be considered eligible for listing in the CRHR. Consideration of integrity for evaluation of CRHR eligibility follows the same definitions and criteria from the National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*[16] 3.1, *National Register of Historic Places Criteria*.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA, as codified in Public Resources Code (PRC) section 21000 et seq. and implemented through the CEQA Guidelines (14 California Code of Regulations [CCR] section 15000 et seq.), is the principal statute governing the environmental review of projects in the state. In order to be considered a historical resource, it generally must be at least 50 years old. Section 21084.1 of CEQA and section 15064.5 of the CEQA Guidelines define a historical resource for purposes of CEQA. A historical resource includes:

- A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in, the CRHR (PRC section 5024.1, title 14 CCR, section 4850 et seq.);
- A resource included in a local register of historical resources, as defined in section 5020.1(k) of the PRC or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the PRC, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
- Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing in the CRHR (PRC section 5024.1, title 14 CCR, section 4852).

The fact that a resource is not listed in, or determined to be eligible for listing in, the CRHR; not included in a local register of historical resources, pursuant to PRC section 5020.1(k); or identified in a historical resources survey meeting the criteria of PRC section 5024.1(g) does not preclude a lead agency from determining that the resource may be a historical resource, as defined in PRC sections 5020.1(j) or 5024.1.

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16 Andrus. 2002. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. U.S. Department of the Interior, National Park Service, National Register of Historic Places. Washington, D.C. Available: https://www.nps.gov/nr/publications/bulletins/nrb15/. Accessed: February 18, 2016.

The CRHR is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC section 5024.1[a]). The CRHR criteria are based on NRHP criteria (PRC section 5024.1[b]). Certain resources are determined by CEQA to be automatically included in the CRHR, including California properties formally eligible for or listed on the NRHP. To be eligible for the CRHR as a historical resource, a prehistoric or historic-period resource must be significant at the local, state, and/or federal level under one or more of the following criteria:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage (Events);
- Is associated with the lives of persons important in our past (Persons);
- Embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values (Design/Construction); or
- Has yielded, or may be likely to yield, information important in prehistory or history (Informational Potential) [14 CCR section 4852(b)].

For a resource to be eligible for the CRHR, it must also retain enough integrity to be recognizable as a historical resource and convey its significance. A resource that does not retain sufficient integrity to meet the NRHP criteria may still be eligible for listing in the CRHR.

California Health and Safety Code

Under section 8100 of the California Health and Safety Code, six or more human burials at one location constitute a cemetery. Disturbance of Native American cemeteries is a felony (California Health and Safety Code section 7052). Section 7050.5 of the California Health and Safety Code requires that construction or excavation be stopped in the vicinity of discovered human remains until the county coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must then contact the Native American Heritage Commission, which has jurisdiction pursuant to PRC section 5097.

Discovery of Human Remains

With respect to the potential discovery of human remains, section 7050.5 of the California Health and Safety Code states the following:

a) Every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in section 5097.99 of the PRC. The provisions of this subdivision shall not apply to any person carrying out an agreement developed pursuant to subdivision (l) of section 5097.94 of the PRC or to any person authorized to implement section 5097.98 of the PRC.

b) In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with chapter 10 (commencing with section 27460) of part 3 of division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of section 27491 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner, and cause of any death and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in section 5097.98 of the PRC. The coroner shall make his or her determination within 2 working days from the time the person responsible for the excavation, or his or her authorized representative, notifies the coroner of the discovery or recognition of the human remains.

c) If the coroner determines that the remains are not subject to his or her authority and if the coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission (California Health and Safety Code section 7050.5).

Of particular note to historical resources is subsection (c), requiring the coroner to contact the Native American Heritage Commission within 24 hours if discovered human remains are thought potentially to be of Native American origin. After notification, the Native American Heritage Commission will follow the procedures outlined in PRC section 5097.98, which include notification of most likely descendants, if possible, and recommendations for treatment of the remains. Also, knowing or willful possession of Native American human remains or artifacts taken from a grave or cairn is a felony under California law (PRC section 5097.99).

PUBLIC RESOURCES CODE SECTION 5097.9

PRC section 5097.9 states that no public agency or private party on public property shall "interfere with the free expression or exercise of Native American religion." The code further states that:

> No such agency or party [shall] cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine … except on a clear and convincing showing that the public interest and necessity so require. County and city lands are exempt from this provision, except for parklands larger than 100 acres.

Local

San Francisco General Plan

The San Francisco General Plan Urban Design Element addresses historic preservation by providing policies that emphasize the preservation of notable landmarks and historic features, remodeling of older buildings, and respecting the character of older buildings adjacent to new development.

The San Francisco General Plan Housing Element also includes a relevant policy that calls for the preservation of landmark buildings and maintaining the consistency of historic districts.

San Francisco Planning Code

The City′s commitment to historic preservation is codified in section 101.1(b) of the planning code, which establishes eight City General Plan priority policies. Priority Policy 7 of section 101.1(b) of the planning code addresses the City's desire to preserve landmarks and historic buildings.[17]

San Francisco Historic Preservation Commission and Planning Code, Articles 10 and 11

The San Francisco Historic Preservation Commission is a seven-member body that makes recommendations directly to the board of supervisors regarding the designation of landmark buildings, historic districts, and significant buildings. The commission also approves certificates of appropriateness for landmarks and properties within article 10 historic districts. The Historic Preservation Commission reviews and comments on CEQA documents for projects that affect historic resources as well as projects that are subject to review under section 106 of the National Historic Preservation Act. In addition, the Historic Preservation Commission makes recommendations on permit applications that involve construction, alteration, or demolition of landmark sites and resources located within historic districts.

Article 10 of the planning code gives San Francisco the ability to identify, designate, and protect historic landmarks from inappropriate alterations. Since the adoption of article 10 in 1967, the City has designated 282 landmark sites and 14 historic districts.[18]

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17 City and County of San Francisco. 2018. San Francisco Planning Code, section 101.1(b). June 23. Available: http://library.amlegal.com/nxt/gateway.dll/California/planning/article1generalzoningprovisions?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$anc=JD_102.32. Accessed: August 3, 2018.

18 San Francisco Planning Department. 2003. *San Francisco Preservation Bulletin No. 10: Historic and Conservation Districts in San Francisco.* January. *Available: http://default.sfplanning.org/Preservation/bulletins/HistPres_Bulletin_10.PDF. Accessed June 28, 2018.*

Article 11 of the planning code addresses conservation districts in San Francisco, which are located in the city's downtown core area but differ from traditional historic districts in that they are designated for architectural quality and their contribution to the environment instead of historic or cultural significance. Article 11, which was adopted on September 17, 1985, designated six downtown conservation districts, including the Commercial-Leidesdorff Conservation District, Front-California Conservation District, Kearny-Belden Conservation District, Kearny-Market-Mason Conservation District, New Montgomery-Second Street Conservation District, and Pine-Sansome Conservation District.[19]

City and County of San Francisco Preservation Bulletin No. 16

San Francisco Preservation Bulletin No. 16 provides procedures for addressing historic resources in the city and county of San Francisco. The bulletin states:

> The California Environmental Quality Act [Public Resources Code sections 21000–21178] and the Guidelines for Implementing CEQA (CEQA Guidelines section 15064.5) give direction and guidance for evaluation of properties for purposes of CEQA as well as the preparation of categorical exemptions, negative declarations, and environmental impact reports. This section defines in general terms what types of property would be considered a "historical resource." Such a resource may include historic buildings, structures, districts, objects, or sites. Continuing consultation by the staff with the planning department's Preservation Coordinator and the Neighborhood Planning Team's Preservation Technical Specialists during the entire planning and environmental review process is vital.[20]

Public Works Standard Construction Measures

As discussed in Chapter 2, *Project Description*, San Francisco Public Works (Public Works) requires all construction contractors to include standard construction measures (SCMs) in bid packages for the purposes of environmental protection.

The SCMs for historic architectural resources establish procedures related to Public Works projects that have the potential to alter historic architectural resources. The historic resource SCMs require Public Works to consult with the San Francisco Planning Department's (planning department's) preservation staff to determine whether a Historic Resource Evaluation will be required for projects with the potential to alter buildings, structures, or landscape features. The historic resource SCMs also specify that Public Works will develop a Construction Best Practices for Historic Resources Plan and Construction Monitoring for Historic Resources Program, in consultation with the planning department's preservation staff. Implementation of

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19 San Francisco Planning Department. 2003. *San Francisco Preservation Bulletin No. 10: Historic and Conservation Districts in San Francisco.* January. *Available: http://default.sfplanning.org/Preservation/bulletins/HistPres_Bulletin_10.PDF. Accessed June 28, 2018.*

20 San Francisco Planning Department. 2008. *San Francisco Preservation Bulletin No. 16: City and County of San Francisco Planning Department CEQA Review Procedures for Historic Resources. Draft.* March 31. Available: http://www.sf-planning.org/Modules/ShowDocument.aspx?documentid=5339. Accessed: May 11, 2015.

the protective measures outlined in these plans, such as the use of protective barriers during construction, is intended to prevent inadvertent collisions with and damage to adjacent historic architectural resources by construction equipment.

The historic resource SCMs also address issues related to vibration produced during construction occurring adjacent to historic architectural resources. The SCMs specify that Public Works will consult with the planning department's preservation staff to determine whether historic architectural resources would be located adjacent to project construction activities such that they would be susceptible to damage caused by construction-related vibration. Vibration control procedures will be incorporated into the construction contract and require the contractor to prepare a vibration monitoring plan and vibration control plan. The vibration control plan must identify vibration-sensitive resources, standards for vibration criteria that are not to be exceeded by construction activities, real-time activity monitoring to identify when vibration levels approach the predetermined value at which damage could occur, requirements to immediately cease construction activities when vibration levels reach levels at which damage could occur, and procedures for restoring resources to their pre-construction condition should damage occur as a result of construction-related vibration. A copy of the vibration control procedures that Public Works requires to be incorporated into such contracts is included in Appendix 4.

The SCMs for archaeological resources establish procedures for Public Works projects with related ground disturbance that exceeds any previous depth of ground disturbance or proposed ground disturbance within previously undisturbed areas, in which cases additional screening will be carried out. The SCMs require Public Works to coordinate with a planning department archaeologist to complete the preliminary archaeological assessment; the archaeologist will recommend one of the following measures: 1, Discovery; 2, Monitoring; and 3, Testing/Data Recovery. Implementation of these measures is anticipated to protect identified and as-yet unidentified archaeological resources. These procedures will be reviewed by Public Works and a planning department archaeologist yearly.

The SCMs are required of all Public Works contracts. Refer to Appendix 4 for additional information on the SCMs for historic resources.

ENVIRONMENTAL IMPACTS

This section describes the methods used to identify CEQA historical resources, defines the conditions under which a project would be considered to have a significant impact on a historical resource, and identifies the approaches applied to analyze project impacts. This section also includes analysis of the impacts of the proposed project and the project variant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact.

SIGNIFICANCE CRITERIA

Implementation of the proposed project would have a significant effect on cultural resources if the project would:

- Cause a substantial adverse change in the significance of a historical resource, as defined in PRC section 21084.1 and CEQA Guidelines section 15064.5, including resources listed in article 10 or article 11 of the San Francisco Planning Code.
- Cause a substantial adverse change in the significance of an archaeological resource, pursuant to PRC section 21083.2 and State CEQA Guidelines section 15064.5.
- Disturb any human remains, including those interred outside of formal cemeteries.
- Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC section 21074.[21]

Per section 15064.5b of the CEQA Guidelines, a substantial adverse change in the significance of a historical resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the historical resource would be materially impaired. The historical resource would be materially impaired if the project demolishes or incompatibly alters those characteristics that qualify the resource for CRHR eligibility or local designation.

This study analyzes substantial adverse change on the following historical resource types: archaeological resources, cultural landscapes, historic districts, and buildings, objects, and structures.

APPROACH TO ANALYSIS

The approach for the analysis of project impacts includes delineation of the historic and archaeological resource CEQA study areas, identification of eligible CEQA historical resources, and development of approaches for impact analysis.

APPROACH FOR DELINEATING THE HISTORIC RESOURCES CEQA STUDY AREA

The historic resources CEQA study area encompasses the geographic area in which the proposed project has the potential to directly or indirectly affect historical resources. Under CEQA, direct impacts include project activities that could alter historical resources. Indirect impacts could result from project activities that could change the setting of historical resources

[21] Note that this provision applies only to projects whose NOP was issued after July 1, 2015. The NOP for this project was issued in January 2015, and thus, consultation under Assembly Bill 52 is not applicable to this project. However, analysis of tribal resources is included below under Impact CP-8.

by altering the character or use of the resource by visual, audible, or atmospheric intrusions; shadow effects; the blocking of existing views; or changes to access or use.

The historic resources CEQA study area was delineated to include the project's limits of work, which were considered to be the project footprint within which project activities would occur.[22] Adjacent properties were included in instances where:

- The adjacent property is located within the boundary of the Market Street Cultural Landscape District.
- The adjacent property's character-defining features include streetscape or landscape features that may be directly affected by the project.

HISTORIC RESOURCES CEQA STUDY AREA EXCLUSIONS

STREETSCAPE SETTING

The setting for individual historic resources within the Market Street corridor has not been static over time. The majority of proposed alterations to the streetscape would be new, but consistent, examples of physical change within a continuum of modifications to Market Street. Compatible alterations to the setting of historic resources along Market Street include features that are contemporary in design but consistent with the types of pedestrian, safety, and streetscape improvements that already exist within the Market Street streetscape. Given that historic-age buildings, structures, and objects have borne witness to similar changes, with almost no alteration to the character-defining features that convey their historic significance, the following project features are part of the continuum of change to the visual landscape and setting of the Market Street streetscape over time:

- Pedestrian furnishings
- Light, overhead catenary system (OCS), or traffic signal poles
- Wayfinding signage

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22 The historic resources CEQA study area was first delineated in 2014 to guide cultural resources technical documentation in support of the Better Market Street EIR. The study area was updated in 2018 to account for changes to the project description, understanding of project design, and area of construction. The original 2014 delineation included adjacent properties where new and relocated unique project features (such as mini-highs and bus shelters) may have had the potential for indirect impacts associated with alterations to the setting of adjacent properties. Upon further project refinement and analysis, it was determined that none of the project elements located within the public right-of-way have the potential to impact adjacent properties except in rare cases where the individual property's character-defining features include streetscape elements. The historic resources CEQA study area was refined in 2018 according to this understanding and no new adjacent properties were added. The adjacent properties included in the 2014 delineation were retained within the historic resources CEQA study area.

- Street restriping and repaving
- Bike lanes
- Muni mini-high platforms
- Bus shelters
- Streetlife zone furnishings
- Public toilets/Muni operator toilets

As noted in Chapter 2, *Project Description*, the proposed project would include construction of an aboveground restroom for Muni operators on the sidewalk on the east side of Charles J. Brenham Place, at the intersection with McAllister Street. The restroom would be approximately 14 feet long, 6 feet wide, and 8 feet tall. The proposed restroom is adjacent to but outside the boundaries of the Civic Center Landmark District. The structure would not affect the district or adjacent historic resources.

Project activities would not represent significant change in the setting of historic resources adjacent to the project footprint, nor would they have the potential to directly affect adjacent historic resources, unless the character-defining features of an adjacent historic resources include streetscape or landscape elements.

CONSTRUCTION AND OPERATIONAL VIBRATION

The project's SCMs and vibration control procedures, requiring pre-construction condition assessments to identify buildings that are vulnerable to vibrational damage as well as vibration monitoring during construction and requirements to restore structures to pre-construction conditions if vibration-related damage were to occur, would avoid impacts on adjacent properties. Therefore, adjacent properties were not included in the historic resources CEQA study area merely for their association with potential vibrational damage.

SUB-SIDEWALK BASEMENT LOCATIONS

Sub-sidewalk basements are a common feature among historic-age buildings adjacent to Market Street. Although historic resources in the historic resources CEQA study area have sub-sidewalk basements, none of the properties analyzed in this section identify sub-sidewalk basements as character-defining features that contribute to conveying their historic significance. As such, project modifications to sub-sidewalk basements that may be triggered by project activities would not result in incompatible changes to character-defining features and would not represent significant impacts on the historic architectural resources. They are not discussed further in this section in relation to historic architectural resources.

Eyebolt Locations

Although the project does include replacement of existing eyebolts (hardware anchored into buildings located adjacent to Market Street that support OCS wires where streetcar poles are not able to be installed) and the installation of new eyebolts in locations where they are not currently present, these activities do not have the potential to substantially change the character-defining features of individual buildings. As such, these project activities would not represent significant impacts on the historic properties. They are not discussed further in this section.

Approach for Delineating the Archaeological Resources CEQA Study Area

The archaeological resources CEQA study area was defined to include the outer boundary of all proposed project activities that could cause ground disturbance. Such ground disturbance could result in direct impacts on known and as-yet unknown archaeological resources.

Identification of CEQA Resources

Archaeological Resources

Methods for Identifying Archaeological Resources

To determine whether the proposed project would have impacts on archaeological resources, three methods were employed. The first method consisted of a records search and literature review to identify any previously recorded archaeological resources in or adjacent to the archaeological resources CEQA study area. The second method consisted of reviewing the findings of previously conducted geoarchaeological and geotechnical studies to determine the potential for encountering buried and as-yet undocumented archaeological resources and the depth at which such resources could be encountered. The third method consisted of historical research and map review to determine the potential for as-yet undocumented historic-period archaeological resources in the archaeological resources CEQA study area.

Record Search and Literature Review

A records search was conducted as part of the analysis for the ASA at the Northwest Information Center to identify any previously recorded archaeological resources in the vicinity of the archaeological resources CEQA study area. This search identified four archaeological resources in or adjacent to the project corridor. These resources were either previously determined ineligible for the CRHR or have not been formally evaluated for their eligibility for listing in the CRHR.[23]

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[23] ICF. 2019a.

GEOARCHAEOLOGICAL SENSITIVITY REVIEW

As described previously, dune deposits, which have elevated sensitivity for containing archaeological resources, are located west of Fremont Street in the archaeological resources CEQA study area. The upper interface of these deposits ranges from 12 to 20 feet below the ground surface. The majority of project elements planned in the area of archaeological sensitivity would extend 12 to 15 feet below ground surface.

HISTORIC ARCHITECTURAL RESOURCES

METHODS FOR IDENTIFYING HISTORIC ARCHITECTURAL RESOURCES

The identification of CEQA historical resources and analysis of the proposed project's impacts on historic architectural resources, in particular, is based primarily on information contained in the DPR 523 forms and NRHP nomination forms for districts and individual buildings, structures, and objects as well as the following reports:

- Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA[24]
- 1028–1056 Market Street Project, Historic Resource Evaluation Response, San Francisco, CA[25]
- San Francisco Civic Center Historic District Cultural Landscape Inventory, Portland, OR[26]
- 1 Jones Street (Hibernia Bank), Historic Resource Evaluation Response, San Francisco, CA[27]
- 950–974 Market Street, Historic Resource Evaluation Response, San Francisco, CA[28]
- San Francisco Auxiliary Water Supply System Department of Parks and Recreation Form, San Francisco, CA[29]

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24 ICF. Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA. 2016. Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA.

25 San Francisco Planning Department. 2016. 1028–1056 Market Street Project, Historic Resource Evaluation Response. August. San Francisco, CA.

26 MIG. 2015. San Francisco Civic Center Historic District Cultural Landscape Inventory. June. Portland, OR. Prepared for San Francisco Planning Department, San Francisco, CA., accessed: http://www.sf-planning.org/ftp/files/Preservation/cultural_landscape/CivicCenterCLI_FinalReport.pdf.

27 San Francisco Planning Department. 2012. 1 Jones Street (Hibernia Bank) Historic Resource Evaluation Response. November. San Francisco, CA.

28 San Francisco Planning Department. 2016. 950-974 Market Street Historic Resource Evaluation Response. June. San Francisco, CA.

29 ICF. 2018. San Francisco Auxiliary Water Supply System Draft Department of Parks and Recreation 523A and 523D Forms. September 2018. San Francisco, CA.

RECORD SEARCH AND REVIEW OF PRIOR SURVEYS

To identify historic resources, researchers conducted a records search at the Northwest Information Center at Sonoma State University, a field survey, property-specific research, and archival research at the Environmental Archives at the University of California, Berkeley and the Architectural Archives at the University of Pennsylvania. This effort supported development of the CLE,[30] which employed a wide range of primary and secondary materials to evaluate the significance and integrity of Market Street and determine its NRHP/CRHR eligibility. These activities also supported preparation of DPR 523A and 523B forms for Embarcadero Plaza/Justin Herman Plaza, Hallidie Plaza, United Nations Plaza, the Auxiliary Water Supply System (AWSS), the Path of Gold, and 38 individual buildings and sites in the historic resources CEQA study area. Additional research identified bibliographic references, previous cultural resource survey reports, prior historic architectural studies, historic-period maps, aerial photography, newspaper and journal articles, and existing DPR 523 form documentation for individual historic architectural resources within and adjacent to the historic resources CEQA study area. Planning department personnel provided additional research and summary information to identify and characterize known historic architectural resources.

IMPACT ANALYSIS APPROACHES

The following section summarizes the specific approaches applied to analyze project impacts on historic resources in the historic resources CEQA study area.

GENERAL APPROACH

CEQA Guidelines section 15064.5(b) establishes the criteria for assessing a significant environmental impact on historical resources as "[a] project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment." According to the CEQA Guidelines, a "substantial adverse change in the significance of a historical resource" is considered to be "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired" (section 15064.5[b][1]). When a project demolishes or materially alters the physical characteristics that justify inclusion of the resource in the CRHR or a local register, or justify its eligibility for inclusion in the CRHR, as determined by the lead agency for the purposes of CEQA (section 15064.5[b][2]), the significance of the historical resource is considered to be "materially impaired."

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30 ICF. Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA. 2016. Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA.

An effect on a historical resource is considered adverse when it diminishes the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association such that the resource can no longer convey its significance. Consideration is given to all qualifying characteristics of a historic property during effects analysis, including those that may have been identified after the property's original NRHP/CRHR eligibility evaluation. Adverse effects may include reasonably foreseeable effects caused by the project that occur later in time, are farther removed in distance, or are the result of the cumulative effects of the project in combination with those of other projects. With uncommon exceptions, adverse effects on archaeological resources consist primarily of physical destruction of or damage to all or part of the resource. Examples of adverse effects on historic architectural resources include the following:

- Physical destruction of or damage to all or part of the historic architectural resource.
- Alteration to a historic architectural resource's character-defining features, including through restoration, reconstruction, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR section 68) and applicable guidelines.
- Removal of the historic architectural resource from its historic location.
- Changes in the character of the property's use or physical features in the setting that are considered character-defining features, which convey the significance of the historic architectural resource.
- The introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's character-defining features.
- Alteration of historic district contributors such that there is a substantial adverse change in the significance of the historic district.

ARCHAEOLOGICAL RESOURCES

To assess the potential for encountering as-yet undocumented buried archaeological resources (referred to here as *archaeological sensitivity*) during project development, historical maps, archival data, previous studies, and logs of previous geotechnical bores (excavated as part of the project's geotechnical investigations) were reviewed. The results of this analysis are presented in the ASA and briefly summarized below.

Synthesis of the findings of previous geoarchaeological and geotechnical studies provides the basis for an assessment of landscape age and depositional context across the archaeological resources CEQA study area. This, in turn, along with historical maps and archival research, is used to assess the potential for encountering as-yet undocumented archaeological resources and determining the depth at which such resources could be encountered.

Landscape age, depositional environment, and a given landform's potential for containing archaeological resources are linked because the age and environment in which a landscape formed have direct bearing on when it became accessible for human use, how humans interacted with it once it became accessible, and how the material remains of these activities are preserved. Therefore, this analysis relies on landforms and geologic units with shared geomorphic origin as the unit of analysis. It also considers the timing for the formation of the various landform types that occur in the archaeological resources CEQA study area.

HISTORIC ARCHITECTURAL RESOURCES

In instances where historic architectural resources may be affected, conformance with the Secretary of the Interior's Standards for Rehabilitation does not determine whether a project would cause a substantial adverse change in the significance of a historic resource under CEQA. Rather, a project that complies with the Secretary of the Interior's Standards for Rehabilitation benefits from a regulatory presumption that it would have a less-than-significant adverse impact on the environment (section 15064.5(b)(3)). In evaluating a project's compliance with the Secretary of the Interior's Standards for Rehabilitation, rehabilitation is the only treatment of the four treatments in the standards (the others being preservation, restoration, and reconstruction) that allows for construction of an addition or other new construction to accommodate a change in use or program.

The first step in analyzing a project's compliance with the Secretary of the Interior's Standards for Rehabilitation is to identify the resource's character-defining features, including characteristics such as design, materials, detailing, and spatial relationships. According to the Secretary of the Interior, once the property's character-defining features have been identified, it is essential to devise a project approach that protects and maintains these important materials and features, meaning that the work constitutes the "least degree of intervention" and important materials and features are safeguarded throughout the duration of construction. According to the Secretary of the Interior, it is critical that new work does not result in permanent removal, destruction, or radical alteration of any significant character-defining features. Projects that do not comply with the Secretary of the Interior's Standards for Rehabilitation may or may not cause a substantial adverse change in the significance of a historic resource and would require analysis to determine whether the historic resource would be "materially impaired" by the project under CEQA Guidelines section 15064.5(b)(2).

APPROACH TO HISTORIC DISTRICT IMPACTS ANALYSIS

As discussed above, the evaluation of potential impacts on districts includes consideration of the way in which changes to the contributing elements alter the ability of the resources to convey their significance as a whole. Although project activities may alter the contributing components of a district, the project would not result in a substantial adverse change until a high number of contributors, or a smaller number of disproportionately more significant contributors, were impaired to the degree that the district was determined to no longer convey "a visual sense of the overall historic environment" or "arrangement of historically or functionally related properties."[31]

Portions of nine historic districts are located within the historic resources CEQA study area. The boundaries of these districts extend beyond the study area. Furthermore, the majority of the contributing elements are located beyond the study area boundary. All activities associated with the project are proposed to occur in the public right-of-way, either within the roadway or the sidewalk area. Such activities represent change that is similar to the change that has occurred over time within the setting of the historic districts that intersect with or are adjacent to Market Street. Therefore, changes to streetscape features would constitute a direct or indirect impact on a historic district that intersects with or is adjacent to Market Street if elements of the streetscape are considered to be the character-defining features of the historic district or if Market Street is considered to be significant as a historic setting for these historic districts.

Approach to Cultural Landscape Impact Analysis

Within the historic resource property type framework, which consists of buildings, structures, objects, sites, and historic districts, cultural landscapes are most appropriately categorized as historic districts because they are characterized as having many associated features that contribute to a thematically unified whole. As such, the approach to evaluating potential impacts on cultural landscapes is similar to that for historic districts. Whereas historic districts are often a collection of associated buildings, a cultural landscape may contain other types of features, such as views and circulation, vegetation, and small-scale features. In order to evaluate potential impacts on cultural landscapes, the collective change the proposed project may cause needs to be considered in the context of the entire resource to determine if a substantial adverse change in the significance of the historic resource would occur. Given that the historic resources CEQA study area includes several cultural landscapes, as well as individual buildings that include landscape elements as character-defining features, activities associated with the proposed project must be evaluated across the entire landscape to determine holistically if the project would cause a substantial adverse change in the resource.

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31 Andrus. 2002. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. U.S. Department of the Interior, National Park Service, National Register of Historic Places. Washington, D.C. Available: https://www.nps.gov/nr/publications/bulletins/nrb15/. Accessed: February 18, 2016.

The process of identifying project impacts on a cultural landscape is facilitated by the development of criteria, based on the Secretary of the Interior's Standards and Guidelines for the Treatment of Cultural Landscapes. These guidelines acknowledge the evolution and change that is characteristic of landscape features and inform tolerance for change and expectations for continuity relative to the landscape's significance.[32]

The Secretary of the Interior's Standards for the Treatment of Historic Properties offers four treatment options: preservation, rehabilitation, restoration, and reconstruction. Rehabilitation is defined as "the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values." Rehabilitation is the most applicable treatment option in cases "when repair and replacement of deteriorated features are necessary, when alterations or additions to the property are planned for a new or continued use, and when its depiction at a particular period of time is not appropriate."[33]

The Secretary of the Interior's Standards and Guidelines for Treatment of Cultural Landscapes acknowledges that work related to accessibility, health and safety, environmental protection, or energy efficiency is usually not part of the overall process of protecting cultural landscapes; rather, this work is assessed for its potential impact on the cultural landscape and represents special considerations. Although it is often necessary to modify cultural landscapes so that they will be in compliance with current codes, the goal is to provide the highest level of access, health and safety, environmental protection, and energy efficiency with the lowest level of impact on the integrity of the landscape.[34] In addition, because the CLE documentation identified Market Street as a historic district, defined the character-defining features of the cultural landscape, and also identified a hierarchy of priority levels for those character-defining features, that hierarchy informs the analysis of impacts by establishing:

- Priority 1 character-defining features as those most critical to expressing association with a given area of significance;
- Priority 2 character-defining features as those that contribute meaningfully to expressing association with a given significance where aggregate loss can greatly diminish the ability to read Market Street's associations with history; and

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32 National Park Service. n.d. *National Park Service Guidelines for the Treatment of Cultural Landscapes*. Available: https://www.nps.gov/tps/standards/four-treatments/landscape-guidelines/acknowledgments.htm. Accessed: August 12, 2016.

33 National Park Service. n.d. *The Secretary of the Interior's Standards, Four Approaches to the Treatment of Historic Properties, Rehabilitation as a Treatment*. Available: https://www.nps.gov/tps/standards/four-treatments/treatment-rehabilitation.htm. Accessed: July 4, 2018.

34 National Park Service. n.d. *National Park Service Guidelines for the Treatment of Cultural Landscapes*. Available: https://www.nps.gov/tps/standards/four-treatments/landscape-guidelines/acknowledgments.htm. Accessed: August 12, 2016.

- Priority 3 character-defining features as those that are least essential to the expression of Market Street's associations with history and whose loss will diminish Market Street's integrity but not to the extent of making the landscape unreadable as a cultural resource.[35]

APPROACH TO VIBRATION IMPACTS ANALYSIS

Vibration caused by construction has the potential to cause physical distress to historic buildings that can lead to structural or ornamental damage. The process of identifying project impacts on historic architectural resources has been facilitated by development of vibration impact criteria, based on the Konan Vibration Criteria for Historic and Sensitive Buildings and California Department of Transportation's vibration-related damage potential threshold criteria, as presented in the *Transportation and Construction Vibration Guidance Manual*.[36] The criteria, summarized in Table 4.A-2, on the next page, describe the peak particle velocity (PPV)[37] that would need to be reached or exceeded at a building or structure for construction to cause damage to the property. Damage criteria are identified for various forms of building construction and building condition (i.e., susceptibility to vibration-related damage). Damage criteria, measured in PPV, are also identified for transient sources and continuous/frequent intermittent sources where transient sources create a single isolated vibration event (e.g., blasting or drop balls) and continuous/frequent intermittent sources create ongoing vibration events (e.g., pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, vibratory compaction equipment).

For the purposes of the current study, the PPV damage threshold for fragile buildings is 0.2 inch per second for transient sources and 0.1 inch per second for continuous/frequent intermittent sources. The PPV damage threshold for historic buildings is 0.5 inch per second for transient sources and 0.25 inch per second for continuous/frequent intermittent sources. The PPV damage threshold for modern commercial construction is 2.0 inches per second for transient sources and 0.5 inch per second for continuous/frequent intermittent sources.[38]

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35 Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA. 2016. Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA.

36 California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

37 Peak particle velocity is a measurement of ground vibration, defined as the maximum speed at which a particle in the ground is moving, expressed in inches per second (in/sec). Refer to Section 4.C, *Noise*, for additional details.

38 California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

TABLE 4.A-2. GUIDELINE VIBRATION DAMAGE POTENTIAL CRITERIA

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Table 19 Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

The evaluation of vibration impacts on historic architectural resources is based on the assumed PPV values of vibration sources. The ground-borne vibration levels experienced 25 feet from the vibration source range from 0.003 PPV for a small bulldozer to 0.210 PPV for a vibratory roller. For additional details, refer to Table 4.C-13 in Section 4.C, *Noise*.

Various vibration-generating activities would occur with demolition and construction of the proposed project, including demolition of boarding islands, removal of the brick sidewalk surface, excavation for replacement of utilities, and compacting of the street and sidewalk sub-surfaces in preparation for paving and resurfacing. Based on assumed PPV values associated with vibration sources expected to be used as part of the project and the project variant, vibration buffer distance criteria for historic architectural resources are summarized in Table 4.A-3, on the following page, based on the following:

Buffer distance (feet) = $(PPV_{ref}/PPV_{limit})^{1/n} * 25$

PPV_{ref} = Source reference vibration at 25 feet

PPV_{limit} = target criteria limit

n = soil attenuation rate[39]

[39] The Federal Transit Administration recommends the use of 1.5 for "typical soils." The California Department of Transportation suggests the use of 1.3 for competent soils (i.e., most sands, sandy clays, silty clays which are characteristic of soils in the project corridor).

TABLE 4.A-3. VIBRATION BUFFER DISTANCE CRITERIA FOR HISTORIC ARCHITECTURAL RESOURCES

						Criteria: Fragile		Criteria: Historic		Criteria: Modern	
						Transient	Continuous/ Frequent Intermittent	Transient	Continuous/ Frequent Intermittent	Transient	Continuous/ Frequent Intermittent
						0.2 (max. PPV in./sec.)	0.1 (max. PPV in./sec.)	0.5 (max. PPV in./sec.)	0.25 (max. PPV in./sec.)	2.0 (max. PPV in./sec.)	0.5 (max. PPV in./sec.)
Project Element	**Construction Activity**	**Maximum Vibration Sources**	**Reference Source Distance**	**Reference Source Vibration**	**Character of Vibration**	**Buffer Distance**	**Buffer Distance**	**Buffer Distance**	**Buffer Distance**	**Buffer Distance**	**Buffer Distance**
Center Lanes/ Rail Track	Demolition, utilities	Backhoe, excavator	25	0.089	Transient	13		7		2	
Outside/Curb Lanes	Demolition, utilities	Backhoe, excavator	25	0.089	Transient	13		7		2	
	Paving	Vibratory Roller	25	0.21	Continuous/ frequent intermittent		44		22		13
Sidewalks	Demolition, grading, utilities	Backhoe	25	0.089	Transient	13		7		2	
Intersections	Demolition, grading, utilities	Backhoe, excavator	25	0.089	Transient	13		7		2	
	Paving	Vibratory Roller	25	0.21	Continuous/ frequent intermittent		44		22		13
	Utilities	Plate compactors	25	0.035	Continuous/ frequent intermittent		11		6		3
Traction Power	Demolition, grading, utilities	Backhoe, excavator	25	0.089	Transient	13		7		2	
	Paving	Vibratory Roller	25	0.21	Continuous/ frequent intermittent		44		22		13
	Utilities	Plate compactors	25	0.035	Continuous/ frequent intermittent		11		6		3
Special Track Construction	Demolition, grading, utilities	Backhoe, excavator	25	0.089	Transient	13		7		2	
	Paving and grading	Vibratory Roller	25	0.21	Continuous/ frequent intermittent		44		22		13
	Utilities	Plate compactors	25	0.035	Continuous/ frequent intermittent		11		6		3

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Wilson Ihrig 2018.

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The transient vibration buffer distances and continuous/frequent intermittent vibration buffer distances are the distances in feet beyond which no possible vibration impact is associated with project element construction and maximum vibration sources.

Based on the distances specified above, historic architectural resources meeting the definition of the "fragile" criterion would be susceptible to vibration-related damage if located within 13 feet of center-lane track construction or sidewalk work or within 44 feet of outside/curb lanes, intersections, traction power locations, or special track construction locations. Historic architectural resources meeting the definition of the "historic" criterion would be susceptible to vibration-related damage if located within 7 feet of center-lane track construction or sidewalk work or within 22 feet of outside/curb lanes, intersections, traction power locations, or special track construction locations. Historic architectural resources meeting the definition of the "modern" criterion would be susceptible to vibration-related damage if located within 2 feet of center-lane track construction or sidewalk work or within 13 feet of outside/curb lanes, intersections, traction power locations, or special track construction locations.

Operation of the proposed project also has the potential to generate ground-borne vibrations that may cause cosmetic or structural damage at historic architectural resources. Under the proposed project, the primary source of operations-related vibration would be the streetcars. Because streetcars currently operate across the extent of Market Street, the only area of the project corridor where operations-related vibration would be anticipated to exceed current levels is at the location of the proposed F-loop tracks at McAllister Street and Charles J. Brenham Place. As presented in Section 4.C, *Noise*, the Federal Transit Administration establishes vibration impact standards of 65 VdB (velocity levels in decibels) for special-use buildings requiring low ambient vibrations, 72 VdB for residential uses, and 75 VdB for institutional uses. However, these impact standards are related to the disruption of building uses and human annoyance. As specified in Table 4.C-3 in Section 4.C, *Noise*, the standard for minor cosmetic damage to fragile buildings is set significantly higher, at 100 VdB.[40] Therefore, operations-related vibrations determined to be below the Federal Transit Administration vibration impact standards are assumed not to have the potential to cause damage to historic architectural resources to the extent that their significance would be materially impaired.

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40 California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: December 11, 2018.

IMPACTS AND MITIGATION MEASURES

Impact CP-1. The proposed project and project variant would cause a substantial adverse change in the significance of the Market Street Cultural Landscape District, which is considered to be a historical resource, as defined in section 15064.5. (Significant and Unavoidable with Mitigation)

The historic significance of the Market Street Cultural Landscape District relates to three main functions of Market Street.

- As San Francisco's main circulation artery and facilitator of urban development (Impact CP-1.A)
- As a venue for civic engagement in San Francisco (Impact CP-1.B)
- As a designed landscape associated with the Market Street Redevelopment Plan (Impact CP-1.C)

The following assessments consider each of these separately and make individual impact conclusions.

Impact CP-1.A. The proposed project and project variant would not cause a substantial adverse change in the significance of the Market Street Cultural Landscape District as San Francisco's main circulation artery and facilitator of urban development. (Less than Significant)

Market Street is historically significant under Criterion A/1 for its role as San Francisco's main circulation artery and facilitator of urban development, based on its association with early urban and economic growth in the city. This significance is based on its historic use:

> As San Francisco's main circulatory artery, Market Street provided the physical foundation and transportation infrastructure mechanism that facilitated the city's development. Jasper O'Farrell's linear plan for Market Street, which formed an east–west axis joining the waterfront with the interior, helped spur early urban development from 1847–1860. Improvements to the street paving, municipal infrastructure, and the introduction of multi-modal transportation prompted private investment along the corridor during a period of increasing urbanization from 1860–1906. Market Street provided the organizing space needed to facilitate rapid reconstruction after the 1906 earthquake and fire and, from 1906–1929, was the venue where new progressive-era public urban infrastructure was most aggressively introduced and new private investment in development of landmark-quality buildings was made.[41]

[41] ICF. Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA. 2016. Final. November. San Francisco, CA. Prepared for the San Francisco Department of Public Works, San Francisco, CA. See Appendix 6.

Twenty-one extant character-defining features along Market Street retain sufficient integrity to convey significance. Of these character-defining features, six are priority 1, seven are priority 2, and eight are priority 3. None of the priority 1, 2 or 3 character-defining features would be demolished or incompatibly altered by the proposed project.

Table 4.A-4, below, summarizes the character-defining features, identifies each feature's priority level, and indicates if the proposed project would demolish or incompatibly alter that feature. The table is followed by a detailed analysis of proposed project activities as they relate to each character-defining feature. In evaluating character-defining features within a larger historical resource (e.g., Hallidie Plaza, a contributing element of the Market Street Cultural Landscape District), the term "incompatibly altered" is used to identify if the proposed scope would change an individual feature in a way that would prevent it from being a contributing feature of the larger resource.

TABLE 4.A-4. SUMMARY OF CHARACTER-DEFINING FEATURES THAT CONVEY THE MARKET STREET CULTURAL LANDSCAPE DISTRICT'S SIGNIFICANCE AS SAN FRANCISCO'S MAIN CIRCULATION ARTERY

Character-Defining Features	Character-Defining Feature Priority Level[1]	Demolished or Incompatibly Altered? (Yes or No)
Alignment as axis	1	No
Linear plan	1	No
Multi-modal transportation systems	1	No
Landmark buildings	1	No
Line of sight from west to east	1	No
Path of Gold light standards and associated historic utility boxes	1	No[42]
Grid alignment	2	No
Presence and location of sidewalk area	2	No
Presence and location of roadway	2	No
Rails	2	No
Electric catenary wire system	2	No
Cable car turnarounds	2	No
Line of sight from east to west	2	No
Grade	3	No
View of Market Street from Twin Peaks	3	No

[42] The 236 Path of Gold light standards within the project corridor would be partially restored (the tridents), reconstructed (base and poles), and realigned.

Character-Defining Features	Character-Defining Feature Priority Level[1]	Demolished or Incompatibly Altered? (Yes or No)
Lotta's Fountain	3	No
AWSS fire hydrants	3	No
Samuel's Clock	3	No
Mechanics Monument	3	No
California Statehood Monument	3	No
Emergency call boxes	3	No

[1] *Priority 1* character-defining features are those most critical to expressing association with a given area of significance

Priority 2 character-defining features are those that contribute meaningfully to expressing association with a given significance where aggregate loss can greatly diminish the ability to read Market Street's associations with history; and

Priority 3 character-defining features are those that are least essential to the expression of Market Street's associations with history and whose loss will diminish Market Street's integrity but not to the extent of making the landscape unreadable as a cultural resource.

Source: ICF 2016. *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA.*

SUMMARY OF CHARACTER-DEFINING FEATURES THAT WOULD NOT BE DEMOLISHED OR INCOMPATIBLY ALTERED BY THE PROPOSED PROJECT

PRIORITY 1 CHARACTER-DEFINING FEATURES

- **Alignment as axis:** The proposed project would not alter the east–west alignment of Market Street.
- **Linear plan:** The proposed project would include roadway and sidewalk improvements, but these project activities would be within the existing public right-of-way and would not change the linear plan of Market Street.
- **Multi-modal transportation systems:** The proposed project would include alterations to transportation systems, but the multi-modal transportation systems on Market Street would be retained. This would be consistent with Market Street's historic use, and changes associated with the project would be consistent with changes in multi-modal transportation systems that evolved during the 1847–1929 period of significance.
- **Landmark buildings:** The proposed project would not alter the presence of landmark buildings adjacent to the streetscape.
- **Line of sight from west to east:** Although the project would include the addition of new bus shelters, new boarding islands, new mini-high platforms, and new mini-high ramps in multiple locations along Market Street, which could obstruct the line of sight in some locations, the proposed project would not alter the overall line of sight from west to east.

- **Path of Gold Light Standards and associated historic utility boxes:** A total of 236 Path of Gold light standards within the project corridor would be partially restored (the three-part trident top with each prong containing a light globe), reconstructed (base and pole), and realigned. Specifically, the existing poles would be replaced with larger poles, and the existing trident light fixtures and light globes would be restored and reused at the top of the new poles. Where cast iron components of the trident have deteriorated, they would be recast and reinstalled. The high-pressure sodium lights installed in 1972 would be replaced with energy-efficient LED lights; the new lighting units would match the color and tone of the historic lights as much as possible. The clamshell bases would be recast and modified to accommodate the larger poles (see Figure 2-4, p. 2-43).

  The standards would be reinstalled in a consistent alignment to create a visible linear edge to the "pedestrian zone." Although some individual standards may need to be located out of alignment with adjacent standards or removed to accommodate conflicts in the furnishing zone or sub-sidewalk basements, no more than 25 percent of the 236 standards would be located out of alignment with other standards. Realignment may occur because of the following: potential conflicts with existing sub-sidewalk basements, the proposed tree alignment, proposed bikeway location, proposed loading zone location, and proposed curbside and center boarding islands. The percentage (25 percent) translates to an estimated 58 of the 236 light standards in the project corridor, less than 18 percent of the total number of standards (327) within the entire article 10 landmark.

  Of the 58 light standards that could be located out of alignment with other standards, it is estimated that the project may remove approximately six light standards if relocation and realignment are not feasible, based on the preceding factors. At the level of project design available as of publication of this document, the project sponsor cannot conclude with certainty exactly how many standards would need to be relocated out of alignment or permanently removed.

  Generally, the current linear arrangement of the standards follows the Market Street Redevelopment Plan– (MSRP-) era installation of replicated Path of Gold standards between The Embarcadero and Octavia Boulevard. Since the re-installation was completed in 1976, individual standards have been moved as needed to accommodate changes within the public right-of-way. Currently, there is a variation in spacing between the standards, with an average of 100 feet between the standards and 11 to 23 feet between the property lines and the standards. The associated utility control boxes would be relocated to the furnishing zone, if necessary, which is consistent with their existing locations. The proposed alignment would maintain the overall MSRP-era linear arrangement and historic character of the resource. The existing artistic depictions on the

Path of Gold clamshell bases would be reviewed and possibly modified in consultation with the Native American community. The review process for the clamshell base depictions will be further developed by the planning department.

The new standards would increase in size by approximately 15 percent and be scaled to match the overall proportions of the existing standards. The existing clamshell bases would be recast and enlarged to accommodate the larger support poles. The existing support poles would be replaced with larger poles to better support the OCS wires (i.e., the wider spans for the OCS would require the poles to resist more weight and tension). Existing poles are 24 feet, 10 inches tall and have a 9-inch diameter. The replacement poles would be 30 feet tall and 13 inches in diameter. The existing trident light fixtures and light globes would be restored and reused on the tops of the new poles. Where cast iron components of the trident have deteriorated, they would be recast and reinstalled atop the new poles. The existing and proposed tridents would be 8 feet tall (total height of each standard would be 38 feet). The modified base cover would have a diameter of approximately 2 feet, 9 inches.

The project would require no more than 25 percent (approximately 58 of 236) of the existing Path of Gold light standards and associated utility boxes within the project corridor to be relocated out of alignment because of proposed modifications to the roadway configuration.

Of the 58 light standards that could be located out of alignment with other standards, the project may remove approximately six light standards if relocation and realignment are not feasible because of conflicts with the project design. The proposed locations for the relocated standards would reproduce the overall existing visual alignment. The realignment of the standards would be determined block by block, and the distances between the light standards could be modified. Every feasible effort would be made to realign and relocate standards. Removal of individual light standards would be a final option if relocation is not possible. Realignment and removal would be reviewed and approved by the Historic Preservation Commission, per guidance provided by the Architectural Review Committee, as part of the review process for the Certificate of Appropriateness.[43]

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43 Article 10 of the planning code gives San Francisco the ability to identify, designate, and protect historic landmarks from inappropriate alterations. The San Francisco Historic Preservation Commission is a seven-member body that makes recommendations directly to the board of supervisors regarding the designation of landmark buildings, historic districts, and significant buildings, pursuant to article 10 of the planning code. The commission also approves certificates of appropriateness for landmarks; this appropriateness process requires that landmarks proposed for modification be treated in accordance with the Secretary of the Interior's Standards and thus retain eligibility as a historic resource.

The alterations to the Path of Gold would be consistent with Market Street's historic use and the evolution of the Path of Gold during the 1847–1929 period of significance.

PRIORITY 2 CHARACTER-DEFINING FEATURES

- **Grid alignment:** The proposed project would not alter the northern or southern grid alignments that meet at Market Street.
- **Sidewalks:** The proposed project would include widening of sidewalks and replacement of existing brick pavers along the length of Market Street. Although these alterations would change the design and materials of the sidewalks, the presence and location of the sidewalk are the aspects that make it a character-defining feature of Market Street, and the proposed project would not change these characteristics. Alterations associated with this project would be consistent with Market Street's historic use and the evolution of Market Street's sidewalk area during the 1847–1929 period of significance.
- **Roadway:** The proposed project would include changes to the roadway, including a new sidewalk-level bikeway in each direction on Market Street between curbside lanes and sidewalks; reconfiguration of some intersections; installation of bike boxes, protected by small islands in the intersections; construction of new street-level parking, protected bicycle lanes on Valencia Street between Market and McCoppin streets; removal of the existing loading bays on Market Street to create new loading areas with mountable curbs; construction of new wastewater, stormwater collection, conveyance, or treatment facilities (to be located primarily under the street), along with minor changes to existing stormwater collection facilities, which would require roadway excavation; and closure of center lanes to allow for track replacements and demolition and installation of some new center transit islands. These alterations would be consistent with Market Street's historic use and consistent with the evolution of Market Street's roadway area during the 1847–1929 period of significance.
- **Rails:** The proposed project would include full replacement of existing Muni streetcar rail tracks on Market Street to maintain a state of good repair. There would be minor adjustments to the locations of existing streetcar rail tracks at a few locations. The project would also include the introduction of new rails spurs from Market Street to McAllister Street and Charles J. Brenham Place to create the new F-loop. These alterations would be consistent with Market Street's historic use and the evolution of Market Street's rail features during the 1847–1929 period of significance.
- **Electric catenary wire system**: The proposed project would include replacement of the traction power system and electric OCS. OCS pole locations would be adjusted to accommodate sidewalk widening as well as curb islands and shifts of outbound tracks. Additional OCS wires between 10th and Eighth streets would be included to accommodate curb-lane trolleybus operations. Although these alterations would alter

OCS materials, the OCS would be retained as a streetscape feature on Market Street. The proposed alterations would be consistent with Market Street's historic use and the evolution of Market Street's electric OCS during the 1847–1929 period of significance.

- **Cable car turnarounds:** The proposed project would not include alterations to cable car turnarounds at the corners of California, Drumm, and Market streets or the cable car turnaround at Powell Street.
- **Line of sight from east to west:** Although the project would include the addition of new bus shelters, new boarding islands, new mini-high platforms, and new mini-high ramps in multiple locations along Market Street, which could obstruct the line of sight in some locations, the proposed project would not alter the overall line of sight from east to west.

PRIORITY 3 CHARACTER-DEFINING FEATURES

- **Grade:** The proposed project would not alter the grade of Market Street.
- **View of Market Street from Twin Peaks:** The proposed project would not alter the view of Market Street from Twin Peaks.
- **Lotta's Fountain:** The proposed project would avoid demolition, destruction, relocation, or alteration of Lotta's Fountain because the bikeway would circumvent the existing location in the island at the intersection of Market, Geary and Kearny streets.
- **AWSS Hydrants:** The proposed project would shift the location of the majority of the AWSS fire hydrants within the project corridor to nearby locations to accommodate the proposed traffic lanes, pedestrian through zone, and other project elements. (AWSS hydrants have been moved within the sidewalk area in the past.) This work would follow Public Works' contract specifications related to the protection of existing water and AWSS facilities (see *Construction Protocols,* Appendix 4). Public Works' contract specifications require preparation of a work plan and drawings detailing the existing conditions, protection, and proposed work for all AWSS facilities, as well as close conformance to the contract specifications, to protect and provide uninterrupted service to these facilities. The project would retain the hydrants as streetscape features within the sidewalk area in proximity to their existing locations. One AWSS hydrant located along the northern edge of Market Street between Front and Pine streets may be removed as a result of the project. In addition, the proposed project would retain or replace in kind the utility covers on the AWSS cisterns within the project corridor. The utility covers would continue their function in identifying the locations of the cisterns after the completion of the proposed project. Although the location of some AWSS hydrants would shift as a result of the proposed project, the design, material, workmanship, feeling, and association of the AWSS would not be altered.
- **Samuel's Clock**: Samuel's Clock is currently in the sidewalk area in front of 856 Market Street. The proposed project would preserve this feature in place.

- **Mechanics Monument:** Mechanics Monument is currently located in Mechanics Monument Plaza. The proposed project would preserve this feature in place.
- **California Statehood Monument:** The California Statehood Monument (also known as the Admission Day Monument) is located in the sidewalk area on the north side of Market Street at the intersection of Post and Montgomery streets. The proposed project would preserve this feature in place.
- **Emergency Call Boxes:** The proposed project would relocate emergency call boxes to accommodate the proposed pedestrian furnishing zone in the sidewalk area, altering this feature's integrity of location. However, the project would retain emergency call boxes as streetscape features within the general area of their current sidewalk locations and would not alter the design, material, workmanship, feeling, or association of the emergency call boxes.

Analysis

Market Street is historically significant under Criterion A/1 for its role as San Francisco's main circulation artery and facilitator of urban development, based on its association with early urban and economic growth in the city.

Given the nature of Market Street's significance, priority 1 features are most essential to conveying this significance because they are most clearly associated with the street's historic use as the city's most prominent thoroughfare. The proposed project would not demolish or incompatibly alter any of the six priority 1 character-defining features, and therefore, each of the priority 1 features would continue to contribute meaningfully to expressing association with Market Street's role as San Francisco's main circulation artery and facilitator of urban development. Likewise, the proposed project would not demolish or incompatibly alter any of the seven priority 2 character-defining features or any of the eight priority 3 character-defining features.

Conclusion

The 21 character-defining features associated with conveying Market Street's historical significance as San Francisco's main circulation artery and facilitator of urban development would not be demolished or incompatibly altered by the proposed project. As such, the character-defining features that qualify the Market Street Cultural Landscape District for listing in the CRHR under Significance 1 would not be demolished, destroyed, relocated, or altered such that the significance of the landscape would be materially impaired. The Path of Gold would be altered in a manner compatible with the Market Street Cultural Landscape District such that the Path of Gold would continue to contribute to the district. Because of the Path of Gold's status as an article 10 landmark, the review process for the Certificate of Appropriateness requires the Path of Gold light standards that fall within the boundaries of any proposed project to be treated in accordance with the Secretary of the Interior's Standards and retain eligibility as a historic resource. The proposed project would not constitute a substantial adverse change to the Market Street Cultural Landscape District or its significance as a main circulation artery and facilitator of urban development. Therefore, the impact of the proposed project would be ***less than significant***.

Impact CP-1.B. The proposed project and project variant would not cause a substantial adverse change in the significance of the Market Street Cultural Landscape District as a venue for civic engagement in San Francisco. (Less than Significant)

Market Street is historically significant under Criterion A/1 for its role as a venue for civic engagement in San Francisco. This significance is based on historic use:

> The route from Justin Herman Plaza to Market Street and through [United Nations] Plaza to city hall was used as a ceremonial and processional route through the city for protest marches, community celebrations, and civic parades. Historically notable protests and celebrations that used Market Street as a venue for public engagement related to issues of LGBTQ rights included the Gay Freedom Day Parade (later known as the Pride Parade) beginning procession along Market Street in 1977 and the May 21, 1979, White Night Riot. In this role as a venue for large public civic events such as political rallies, civic ceremonies, and public speeches, Market Street is also significant at the local level for association with social history themes, including the labor rights and civil rights movements, war protest and peace celebration, and women's suffrage. Examples of these events include Labor Day parades and labor protests by the Working Men's Party and anti-Chinese movement during the 1870s; the Preparedness Day bombing on July 11, 1916, during a parade held in anticipation of the United States imminent entry into World War I; the first Armistice Day Parade on November 11, 1918; suffrage activist parades during the 1900s–1920s; a funeral procession for men killed during the July 5, 1934, "Bloody Thursday" Longshoremen's Association Strike; protests during the San Francisco General Strike, July 16–19, 1934; picketing in 1937 and 1938 in response to the Wagner Act of 1935; Victory Day Parade and associated rioting in 1945; Cuba intervention protests crossing Market Street on April 19, 1961; human rights march on July 12, 1964; torchlight procession for Selma on March 14, 1965; Vietnam War protest march on August 6, 1968; and the GI protest march against Vietnam on October 12, 1968.[44]

The period of significance is from the 1870s through 1979. This period defines the span of time in which Market Street, as a venue for civic engagement, had the greatest impact with respect to facilitating protest and celebration by participants as well as the observation of these activities by audiences. The district conveys significance through 18 extant character-defining features. Of the 18 character-defining features, nine are priority 1, two are priority 2, and seven are priority 3. None of the priority 1, 2 or 3 character-defining features would be demolished or incompatibly altered.

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44 ICF. 2016. *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA.* Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA:6-10.

Table 4.A-5, on the following page, summarizes the character-defining features, identifies each feature's priority level, and indicates if the proposed project would demolish or incompatibly alter the feature. The table is followed by a detailed analysis of proposed project activities as they relate to each character-defining feature. In evaluating character-defining features within a larger historical resource (e.g., Hallidie Plaza, a contributing element of the Market Street Cultural Landscape District), the term "incompatibly altered" is used to identify if the proposed scope would change an individual feature in a way that would prevent it from being a contributing feature of the larger resource.

SUMMARY OF CHARACTER-DEFINING FEATURES THAT WOULD NOT BE DEMOLISHED OR INCOMPATIBLY ALTERED BY THE PROPOSED PROJECT

PRIORITY 1 CHARACTER-DEFINING FEATURES

- **Verticality of streetscape:** The proposed project would not alter any of the buildings that flank the northern or southern boundaries of the Market Street streetscape, and there would be no change to the vertical character of the streetscape.
- **Alignment as axis:** The proposed project would not alter the east–west alignment of Market Street.
- **Grid alignment:** The proposed project would not alter the northern or southern grid alignments that meet at Market Street.
- **Plazas arrangement along Market Street**: The proposed project would not alter the plaza arrangement along Market Street.
- **North–south intersections**: Although the project would include reconfiguration of existing intersections to include new curb bulb-outs that would extend 4 to 8 feet into the street and typically measure 20 to 25 feet long, thereby shortening the side-street intersection crossing areas, the project would not introduce any new north–south intersections crossing Market Street.
- **Presence and location of sidewalks**: The proposed project would include widening of sidewalks and replacement of existing brick pavers along the length of Market Street. Although these alterations would change the design and materials of the sidewalks, the presence of a sidewalk as a character-defining feature of Market Street would be unchanged. Alterations associated with the project would be consistent with Market Street's historic use and the evolution of Market Street's sidewalk area during the 1870s–1979 period of significance.
- **Presence and location of roadway**: The proposed project would include changes to the roadway, including a new sidewalk-level bikeway in each direction on Market Street between curbside lanes and sidewalks; reconfiguration of some intersections;

TABLE 4.A-5. SUMMARY OF CHARACTER-DEFINING FEATURES THAT CONVEY THE MARKET STREET CULTURAL LANDSCAPE DISTRICT'S SIGNIFICANCE AS A VENUE FOR CIVIC ENGAGEMENT IN SAN FRANCISCO

Character-Defining Features	Character-Defining Feature Priority Level[1]	Demolished or Incompatibly Altered? (Yes or No)
Verticality of streetscape	1	No
Alignment as axis	1	No
Grid alignment	1	No
Plazas arrangement along Market Street	1	No
North–south intersections	1	No
Presence and location of sidewalks	1	No
Presence and location of roadway	1	No
Grade	1	No
Vista of city hall from United Nations Plaza	1	No
Linear plan	2	No
Broad view of the streetscape	2	No
View of Embarcadero Plaza/Justin Herman Plaza open space	3	No
Lotta's Fountain	3	No
Path of Gold light standards and associated historic utility boxes	3	No[2]
AWSS fire hydrants	3	No
Samuel's Clock	3	No
Mechanics Monument	3	No
California Statehood Monument	3	No

[1] *Priority 1* character-defining features are those most critical to expressing association with a given area of significance

Priority 2 character-defining features are those that contribute meaningfully to expressing association with a given significance where aggregate loss can greatly diminish the ability to read Market Street's associations with history; and

Priority 3 character-defining features are those that are least essential to the expression of Market Street's associations with history and whose loss will diminish Market Street's integrity but not to the extent of making the landscape unreadable as a cultural resource.

[2] The 236 Path of Gold light standards within the project corridor would be partially restored (the tridents), reconstructed (base and poles), and realigned.

AWSS = Auxiliary Water Supply System

Source: ICF 2016. *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA*.

installation of bike boxes, protected by small islands in the intersections; construction of new street-level parking; protected bicycle lanes on Valencia Street between Market and McCoppin streets; removal of the existing loading bays on Market Street to create new loading areas with mountable curbs; construction of new wastewater, stormwater collection, conveyance, or treatment facilities (to be located primarily under the street), along with minor changes to existing stormwater collection facilities, which would require roadway excavation; and closure of center lanes to allow for construction of track replacements and demolition and installation of some new center transit islands. These alterations would be consistent with Market Street's historic use and the evolution of Market Street's roadway area during the 1870s–1979 period of significance.

- **Grade**: The proposed project would not alter the grade of Market Street.
- **Vista of city hall from United Nations Plaza:** Although the proposed project would include work at the Civic Center traction power substation, located at United Nations Plaza, this feature would be underground and would not obstruct the view of city hall from United Nations Plaza. Furthermore, the potential relocation site for the BART/Muni elevator at United Nations Plaza is within the existing portal providing access into the Civic Center station. Although the dimensions of the aboveground structure belonging to the elevator are not yet known, the proposed location within United Nations Plaza would be immediately south of the view toward city hall, along the Fulton Street alignment. As such, the proposed project would not introduce any features that would alter the view of city hall from United Nations Plaza. The line of sight from United Nations Plaza to city hall would be retained.

PRIORITY 2 CHARACTER-DEFINING FEATURES

- **Linear plan:** The proposed project would include roadway and sidewalk improvements, but these project activities would be within the existing public right-of-way and would not change the linear plan of Market Street.
- **Broad view of the streetscape**: Although the proposed project would include the addition of new bus shelters, new boarding islands, new mini-high platforms, and new mini-high ramps in multiple locations along Market Street, which could obstruct broad views of the streetscape in some locations, overall, the broad views of the streetscape would be retained.

PRIORITY 3 CHARACTER-DEFINING FEATURES

- **View of Embarcadero Plaza/Justin Herman Plaza open space**: The proposed project would not alter the view of Embarcadero Plaza/Justin Herman Plaza open space.

- **Lotta's Fountain:** The proposed project would avoid demolition, destruction, relocation, or alteration of Lotta's Fountain because the bikeway would circumvent the existing location in the island at the intersection of Market, Geary and Kearny streets.
- **Path of Gold Light Standards and associated historic utility boxes:** Please refer to Impact CP-1.A on page 4A-40 for a description of the project's treatment of the Path of Gold.

  The alterations to the Path of Gold would be consistent with Market Street's historic use and the evolution of the Path of Gold during the 1870s–1979 period of significance.
- **AWSS Hydrants:** The proposed project would shift the location of the majority of the AWSS fire hydrants within the project corridor to nearby locations to accommodate the proposed traffic lanes, pedestrian through zone, and other project elements. (AWSS hydrants have been moved within the sidewalk area in the past.) This work would follow Public Works' contract specifications related to the protection of existing water and AWSS facilities (see *Construction Protocols,* Appendix 4). Public Works' contract specifications require preparation of a work plan and drawings detailing the existing conditions, protection, and proposed work for all AWSS facilities, as well as close conformance to the contract specifications, to protect and provide uninterrupted service to these facilities. The project would retain the hydrants as streetscape features within the sidewalk area in proximity to their existing locations. In addition, the proposed project would retain or replace in kind the utility covers on the AWSS cisterns within the project corridor. The utility covers would continue their function in identifying the locations of the cisterns after the completion of the proposed project. Although the location of some AWSS hydrants would shift as a result of the proposed project, the design, material, workmanship, feeling, and association of the AWSS would not be altered.
- **Samuel's Clock**: Samuel's Clock is currently in the sidewalk area in front of 856 Market Street. The proposed project would preserve this feature in place.
- **Mechanics Monument:** Mechanics Monument is currently located in Mechanics Monument Plaza. The proposed project would preserve this feature in place.
- **California Statehood Monument:** The California Statehood Monument (also known as the Admission Day Monument) is located in the sidewalk area on the north side of Market Street, at the intersection of Post and Montgomery streets. The proposed project would preserve this feature in place.

ANALYSIS

Market Street is historically significant under Criterion A/1 for its role as a venue for civic engagement in San Francisco. This significance is based on Market Street's role as a gathering place for celebration and protest, based on its association with the public demonstrations that elevated the issue of LGBTQ rights to national attention beginning in the 1960s and continuing through 1979. Market Street is also locally significant for its association with public civic events and demonstrations that elevated civic discourse about other important themes in civil rights.

Given the nature of Market Street's significance, character-defining features identified as priority 1 are most essential to conveying this significance because they are most clearly associated with the street's historic use as a venue for civic engagement in San Francisco. All nine of the priority 1 character-defining features associated with Market Street's role as venue for civic engagement in San Francisco (i.e., the verticality of the streetscape, alignment as an axis, grid alignment, the arrangement of plazas along Market Street, north–south intersections, presence and location of sidewalks, presence and location roadway, grade, and the vista of city hall from United Nations Plaza) would be retained by the proposed project.

Aggregate loss of priority 2 features could greatly diminish the ability to read Market Street's associations with history. However, both of the priority 2 features (i.e., linear plan and broad view of the streetscape) would continue to contribute meaningfully to expressing association with Market Street's role as a venue for civic engagement in San Francisco. Although priority 3 features are those that are least essential to expressing Market Street's associations with history, retention of these features does contribute to conveying Market Street's role as San Francisco's main circulation artery and facilitator of urban development. Each of the eight priority 3 character-defining features would continue to convey the resource's significance.

Finally, although staged construction of the proposed project would make segments of Market Street unavailable for use as a ceremonial and processional route through the city for protest marches, community celebrations, and civic parades, this loss of use would be temporary and would not completely and permanently inhibit the streetscape's ability to convey its significance.

Conclusion

None of the 18 character-defining features associated with conveying Market Street's historical significance as a venue for civic engagement in San Francisco would be demolished or incompatibly altered by the proposed project. As such, the character-defining features that qualify the Market Street Cultural Landscape District for listing in the CRHR under Significance 1 would not be demolished, destroyed, relocated, or altered such that the significance of the landscape would be materially impaired. The Path of Gold would be altered in a manner compatible with the Market Street Cultural Landscape District such that the resource would continue to convey its historic significance. The proposed project would not constitute a substantial adverse change to the Market Street Cultural Landscape District and its significance as a venue for civic engagement. Therefore, the impact of the proposed project would be ***less than significant***.

Impact CP-1.C. The proposed project and project variant would cause a substantial adverse change in the significance of the Market Street Cultural Landscape District as a designed landscape associated with the Market Street Redevelopment Plan. (Significant and Unavoidable with Mitigation)

Market Street is historically significant under Criterion C/3 for its association with the Market Street Redevelopment Plan, designed by master architects John Carl Warnecke and Mario J. Ciampi and master landscape architect Lawrence Halprin. The period of significance under this criterion is 1979, corresponding with substantial completion of the redevelopment plan. This significance is based on the importance of the streetscape design as an early application of an interdisciplinary approach to urban design, which helped elevate the influence of landscape architecture as a discipline that provides perspective on modern urban planning:

> At a time when federal redevelopment programs across the country were facilitating demolition of historic buildings at the neighborhood scale and privileging the needs of the automobile over the pedestrian, the Market Street Redevelopment Plan is significant as an early example of a designed urban landscape that prioritized the pedestrian experience and responded sympathetically to the existing historic context. We would not characterize the demolition of historic buildings for plaza development that occurred as part of this project as being consistent with preservation best practices today. However, during the time of construction, preservation planning was in the early stages, and the Market Street Redevelopment Plan was progressive within that context for its demonstration that modern transportation infrastructure could be integrated into a historic environment without mass demolition of historic buildings or widening of roads to accommodate more vehicular traffic. Rather, through integration of public spaces in the form of plazas, development of a unified streetscape aesthetic, incorporation of existing built environment features, expansion of sidewalks, and removal of street-level rail transit, an alternative approach to redevelopment was possible.
>
> These approaches, which countered typical contemporary modern design practices, combined the strengths of the three joint venture masters, leveraging their professional expertise in the fields of architecture, urban planning, and landscape design to respond to the project's programmatic goal of fostering revitalization in San Francisco through redevelopment of its primary transportation artery, Market Street. Although Halprin, Warnecke, and Ciampi acknowledged that improving deep-seated social and economic problems through a street redevelopment project was not always possible, they offered the Market Street Redevelopment Plan as a starting point. Each master brought essential sensibilities and expertise to the effort: Warnecke's early support for the elevation of interdisciplinary design as an essential component of urban planning and his leadership as a champion for sensitivity to historic context (Brown 2010b:142–143; Brown 2010a), Ciampi's extensive experience guiding San Francisco urban development projects that prioritized development as a tool for economic and social impact (Brown 2010b:209; Temko 1991; Lowell 2011), and Halprin's innovative approaches to prioritizing human experience through creation of public spaces that are inspired by socially progressive ideals and design processes (Halprin 1963:216–217; Hirsch 2014:11–13; Hirsch 2014:4–5; Meyer 2008). Through the combination of these complementary talents, the Market Street Redevelopment Plan for Market Street yielded a cultural landscape that offered an alternative to the destructive and divisive approach to urban redevelopment that preceded it.[45]

[45] ICF. 2016. *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA.* Final. November. San Francisco, CA. Prepared for San Francisco Public Works, San Francisco, CA:6-19.

Market Street has 30 extant character-defining features that convey significance. Of the 30 character-defining features, 13 are priority 1, 14 are priority 2, and three are priority 3 character-defining features. The proposed project would include activities that would demolish or incompatibly alter three priority 1 features and seven priority 2 features. None of the priority 3 features would be demolished or incompatibly altered.

Table 4.A-6, below, summarizes the character-defining features, identifies each feature's priority level, and indicates if the proposed project would demolish or incompatibly alter the feature. The table is followed by a detailed analysis of proposed project activities as they relate to each character-defining feature. In evaluating character-defining features within a larger historical resource (e.g., Hallidie Plaza, a contributing element of the Market Street Cultural Landscape District), the term "incompatibly altered" is used to identify if the proposed scope would change an individual feature in a way that would prevent it from being a contributing feature of the larger resource.

TABLE 4.A-6. SUMMARY OF CHARACTER-DEFINING FEATURES THAT CONVEY THE MARKET STREET CULTURAL LANDSCAPE DISTRICT'S SIGNIFICANCE AS A DESIGNED LANDSCAPE ASSOCIATED WITH THE MARKET STREET REDEVELOPMENT PLAN

Character-Defining Features	Character-Defining Feature Priority Level[1]	Demolished or Incompatibly Altered? (Yes or No)
Alignment of 120-foot-wide street diagonally from east to west	1	No
Pedestrian-oriented separation of foot, vehicle, and rail traffic	1	No
Large plazas (Embarcadero Plaza/Justin Herman Plaza, Hallidie Plaza, and United Nations Plaza)	1	No
Small plazas (Robert Frost Plaza, Mechanics Monument Plaza, Crocker Plaza, Mark Twain Plaza)	1	Yes
Plazas placement along length of Market Street	1	No
Red brick paving in herringbone pattern that distinguishes pedestrian from vehicular space	1	Yes
Street trees (species vegetation characteristics)	1	Yes
Retained view of city hall from Market Street	1	No
Path of Gold light standards and associated historic utility boxes (small-scale feature retained from earlier periods)	1	No[2]
AWSS fire hydrants (small-scale feature retained from earlier periods)	1	No
Samuel's Clock (small-scale feature retained from earlier periods)	1	No
California Statehood Monument (small-scale feature retained from earlier periods)	1	No
Emergency call boxes (small-scale feature retained from earlier periods)	1	No
Repeating pattern of BART/Muni subway entrances along length of Market Street	2	No

Character-Defining Features	Character-Defining Feature Priority Level[1]	Demolished or Incompatibly Altered? (Yes or No)
Repeating pattern of street signage (square and circular)	2	No
Repeating pattern of traffic lights and traffic signage	2	No
Cluster arrangement of street trees in double and single rows down sidewalks	2	Yes
Tree allées (circulation feature)	2	No
Vertical circulation features (elevator, escalator, and stairs) of BART/Muni stations (Civic Center, Embarcadero, Montgomery, and Powell) and Muni-only station (Van Ness)	2	Yes[3]
BART street entrances (Embarcadero Station, Montgomery Station, Powell Station, and Civic Center Station)	2	No
Van Ness Muni station street entrances	2	No
Granite bollards with chain links	2	Yes
Bronze BART/Muni street-level elevators	2	Yes
Bronze four-sided street clocks	2	No
Square and circular pole-mounted street signs	2	Yes
Semaphore-style traffic signage and traffic signal lights	2	Yes
Bronze tree grates	2	Yes
Retained broad view of Market Street width	3	No
Lotta's Fountain (water feature)	3	No
Sunlight channeled through northern diagonal street grid into triangular plazas	3	No

1 *Priority 1* character-defining features are those most critical to expressing association with a given area of significance

Priority 2 character-defining features are those that contribute meaningfully to expressing association with a given significance where aggregate loss can greatly diminish the ability to read Market Street's associations with history; and

Priority 3 character-defining features are those that are least essential to the expression of Market Street's associations with history and whose loss will diminish Market Street's integrity but not to the extent of making the landscape unreadable as a cultural resource.

2 The 236 Path of Gold light standards within the project corridor would be partially restored (the tridents), reconstructed (base and poles), and realigned

3 Of all BART/Muni vertical circulation features, the proposed project would affect only one at the Civic Center BART/Muni station.

AWSS = Auxiliary Water Supply System; BART = Bay Area Rapid Transit

Source: ICF 2016. *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA*.

Summary of Character-Defining Features that Would Be Demolished or Incompatibly Altered by the Proposed Project

Priority 1 Character-Defining Features

- **Small plazas (Robert Frost Plaza, Mechanics Monument Plaza, Crocker Plaza, Mark Twain Plaza):** The proposed project would include sidewalk demolition and replacement. Therefore, it is assumed that small plazas and small-scale features (e.g., benches, lighting) would be removed or replaced. However, the proposed project would preserve the monument associated with Mechanics Monument Plaza in place and would not alter the physical dimensions of the small plazas.
- **Red brick paving in a herringbone pattern that distinguishes pedestrian from vehicular space:** The proposed project would include demolition and replacement of all existing paving materials within the public right-of-way. This includes widening the sidewalk area and complete replacement of existing surface pavement and curbing. Existing red brick paving in herringbone patterns would be replaced with unit pavers, according to the City's standard paving material palette and consistent with Americans with Disabilities Act (ADA) standards and the San Francisco Downtown Streetscape Plan.[46] Although the new pavement would differentiate the pedestrian sidewalk area from the vehicular space, paver sizes, materials, and finishes may differ in various locations within the sidewalk area. For example, a paver used in the pedestrian through zone may be different from what is used in the furnishing zone/Streetlife Zone. The proposed project would include detectable warnings in the paving between the sidewalk through zone and the proposed bikeway to prevent people with limited vision from accidentally crossing into the bikeway. Therefore, the change in material would not be consistent with the uniformity present in the historic landscape. Changes in paving for sidewalks and small plazas would also result in a lack of uniformity across the entire range of design components for the Market Street Redevelopment Plan, given that paving for the large plazas (Embarcadero Plaza/Justin Herman Plaza, Hallidie Plaza, United Nations Plaza) would not be altered as part of the proposed project. In addition, a raised sidewalk-level bikeway would be constructed immediately adjacent to the sidewalk and include buffers on both sides of the bikeway as well as a distinct paving pattern or material to help identify the designated space for bicyclists. This would change the setting of the sidewalk, which is now immediately adjacent to the roadway and separated by the granite curb.

[46] San Francisco Department of Public Works. 2000. *Establishing Guidelines and Implementing the Processing and Issuance of Special Sidewalk Permits within the Downtown Streetscape Areas. Ordinance No. 172,596*. October. San Francisco, CA.

- **Street trees (species vegetation characteristics):** The proposed project would include removal of London plane trees (*Platanus acerifolia*) that were installed as part of the Market Street Redevelopment Plan. Because the existing trees have experienced an approximately 60 percent mortality rate, the proposed project would install replacement trees of an alternative type. When the London plane trees were selected for the Market Street Redevelopment Plan, they were chosen for scale and canopy size (40 feet tall, with a spread of 30 feet) relative to the planned sidewalk width and height of the Path of Gold light standards, as well as quick rate of growth to maturity. The deciduous species was perceived as preferable because the canopy would shade pedestrians from the sun in summer and allow sunlight through the bare branches when the tree was leafless in the winter. In addition, the lowest tree branches grow about 12 feet from the base of the trunk and would not obscure views of storefronts from the street. Trees would be replaced or relocated in areas where sidewalks would be reconfigured to accommodate wider and longer transit boarding islands and the new sidewalk-level bikeway. It is assumed that the tree selection would not be a single species, as was the case with the historic design, and that not all of the trees in the new planting palette would be consistent in height, canopy size, canopy shape, leaf size, color, etc. Trees would be selected from the following list of genera: *Ginkgo* (selections), *Lophostemon* (*L. confertus*, Brisbane box), *Magnolia* (selections of *M. grandiflora*, southern magnolia), *Pittosporum* (*P. undulatum*, Victorian box), *Platanus* (plane trees, sycamores, and selected hybrids), *Quercus* (evergreen "live oak" species), and *Ulmus (U. parviflora* selections and hybrids).

PRIORITY 2 CHARACTER-DEFINING FEATURES

- **Cluster arrangement of street trees in double and single rows within pedestrian sidewalk area:** The proposed project would remove all existing street trees and install new street trees in the sidewalk area in an alignment parallel with the roadway. The proposed street tree alignment would be a single-row arrangement, unlike the Market Street Redevelopment Plan design, which included double rows of trees in some locations along the corridor. Some street trees are currently missing in locations throughout the streetscape. In some cases, only single rows are present where double rows were originally designed and installed. In other locations, no trees are present where single rows were originally designed and installed. In places where the original design featured a single row of street trees, the proposed cluster arrangement would be consistent with the historic design. However, in places where the historic design included double rows of streets, the proposed project would not be consistent with the historic cluster arrangement. In multiple locations along the corridor where the proposed project includes reduced sidewalk width, street trees would not be included because of the lack of clearance to adjacent building façades.

- **Vertical circulation features (elevator, escalator, stairs) of the Civic Center BART/Muni station:** The proposed project would either retain or relocate the existing BART/Muni elevator at the Civic Center station on the north side of Market Street near United Nations Plaza. The potential relocation site is within an existing staircase and escalator area in United Nations Plaza, approximately 80 feet to the west. The escalator and stairs associated with this character-defining feature would not be altered by the relocation of the elevator at Civic Center station (see discussion below under United Nations Plaza).
- **Granite bollards with chain links**: The project would remove the existing granite bollards with chain links.
- **Bronze BART/Muni street-level elevators**: The proposed project would either retain or relocate the existing BART/Muni elevator at the Civic Center station on the north side of Market Street near United Nations Plaza. This elevator has already been substantially altered and no longer retains its bronze exterior. However, the location of the extant elevator contributes to the significance of the Market Street Cultural Landscape District. The potential relocation site is within an existing staircase and escalator area in United Nations Plaza, approximately 80 feet to the west.
- **Square and circular pole-mounted street signs:** The proposed project would remove all of the square and circular pole-mounted street signs associated with the Market Street Redevelopment Plan design and replace them with new pole-mounted street signs, consistent with contemporary traffic safety standards.
- **Semaphore-style traffic signage and traffic signal lights:** The proposed project would remove all of the square and circular regulatory, street name, and guide signs that were designed specifically for Market Street. This change would also include removal of the traffic lights and semaphore-design signal assemblies, which are unique to Market Street, where the signs and signals are mounted. The proposed project would replace these features with new traffic signs, signals, and mounting structures, consistent with contemporary traffic safety standards.
- **Bronze tree grates**: The proposed project would remove all of the existing bronze tree grates associated with the Market Street Redevelopment Plan design. Consistent with contemporary horticultural standards, no new tree grates would be introduced as part of the proposed project.

Priority 3 Character-Defining Features

- No extant priority 3 character-defining features would be substantially demolished, destroyed, relocated, or altered by the proposed project.

SUMMARY OF CHARACTER-DEFINING FEATURES THAT WOULD NOT BE DEMOLISHED OR INCOMPATIBLY ALTERED BY THE PROPOSED PROJECT

PRIORITY 1 CHARACTER-DEFINING FEATURES

- **Alignment of 120-foot-wide street diagonally from east to west:** The proposed project would not alter the diagonal east–west alignment of Market Street. Although reconfiguration of the roadway and sidewalks, including the addition of sidewalk-level bikeways, would alter the streetscape, the overall width would be retained.
- **Pedestrian-oriented separation of foot, vehicle, and rail traffic:** The proposed project would include the following features: raised crosswalks; ADA-compliant accessibility ramps and curb modifications; the addition or relocation of new curbside transit stops; the introduction of new or replacement advertising signs, transit shelters, and ticket vending machines; sidewalk widening; the addition of street-level parking-protected bike lanes; alteration of existing transit boarding island platforms and the introduction of new transit boarding island platforms; alteration of existing mini-high platforms or ramps and the introduction of new mini-high platforms or ramps; new street furniture, such as benches, moveable tables and chairs, sidewalk planting areas, small retail stands, public restrooms, advertising kiosks, wayfinding signs, newsstands, pedestrian-scale lighting, bicycle-share facilities, bicycle racks, public art, and gateway features. While these new streetscape features would alter specific ways in which pedestrians interact with the streetscape, the project would retain and enhance a pedestrian-oriented separation of foot, vehicle, and rail traffic. In addition, reconfiguration of bicycle traffic would further differentiate areas for pedestrian and vehicle use.
- **Large plazas:**
  - **Embarcadero Plaza/Justin Herman Plaza:** The proposed project would not include any direct alterations to Embarcadero Plaza/Justin Herman Plaza. Alterations to Market Street's paving would indirectly affect the setting of the plaza.
  - **Hallidie Plaza:** The proposed project would not include any direct alterations to Hallidie Plaza.
  - **United Nations Plaza:** The proposed project would include work at the Civic Center traction power substation located at United Nations Plaza, but this work would be underground. Areas of brick paving within the plaza that would require removal during the substation work would be replaced in kind and in compliance with the Secretary of the Interior's Standards. Thus, the substation work would not permanently alter the character-defining features of United Nations Plaza and would not alter the presence of United Nations Plaza as a component of the Market Street streetscape.

The proposed project would either retain or relocate the existing BART/Muni elevator at the Civic Center station on the north side of Market Street near United Nations Plaza. The potential relocation site is within an existing staircase and escalator area in United Nations Plaza, approximately 80 feet to the west. This would require removal of a limited area of original materials within the sloped surface of the portal adjacent to the current steps and escalators. The dimensions of the aboveground elevator structure are not yet known; it is possible that the insertion of this feature would result in a degree of incompatible alteration to United Nations Plaza. The feature would be placed adjacent to an existing circulation path into the BART/Muni station, and the plaza's character-defining spatial organization, vegetation, circulation, and small-scale features would not be substantially changed as a result of the relocated elevator. Furthermore, the proposed project would include demolition of all materials of United Nations Plaza that fall within the Market Street sidewalk area, which would include granite paving with a brass inlay indicating the city's latitude and longitude that extends from the United Nations Plaza fountain area and through the sidewalk area to the granite curb. This granite inlay is considered a character-defining feature of United Nations Plaza, but only the outermost segments of the granite inlay near Market Street would be removed; enough of the granite inlay would remain so that this feature would continue to delineate quadrants of the plaza and indicate the city's latitude and longitude, as in the original design of the plaza. In addition, the materials within the Market Street sidewalk area are minimal in scale compared to the overall area plaza. These changes are restricted to the pedestrian through zone (sidewalk along Market Street only) and encompass approximately 13,000 square feet. The plaza as a whole comprises more than 110,000 square feet, meaning that the proposed project alterations would affect less than 15 percent of the area.

Lastly, the onboarding ramp included as a feature of the F-loop tracks to be installed in the southbound lane of Charles J. Brenham Place would result in the removal of two trees, a small portion of red brick paving, and a span of the granite curb. These changes are at the eastern periphery of the plaza and minimal in scale; as such, they would not affect the major character-defining features of the plaza, including the plaza's views, spatial organization, relationship to city hall or Market Street, or circulation. Vegetation and small-scale features would see minimal alteration but not to an extent that would preclude character-defining features of the plaza from conveying significance. For these reasons, the project would not represent a substantial change that would undermine the United Nations Plaza's overall ability to serve as contributing feature to the Market Street Cultural Landscape.

- **Plazas placement along length of Market Street:** The proposed project would not include alteration to the spatial organization that characterizes the arrangement of large and small plazas along Market Street.
- **Retained view of city hall from Market Street:** The proposed project would include alterations to the Civic Center traction power substation located in United Nations Plaza. Although this work would be in a location that has the potential to obstruct the line of sight between Market Street and city hall, this project activity would not include the introduction of any features that would obscure the view. The project would also include the addition of new bus shelters, new boarding islands, new mini-high platforms, and new mini-high ramps in multiple locations along Market Street, but none of these features would be located such that the vista of city hall would be obscured. As such, the line of sight from Market Street through United Nations Plaza to Civic Center would be retained.
- **Path of Gold Light Standards and associated historic utility boxes:** Please refer to Impact CP-1.A on page 4A-40 for a description of the project's treatment of the Path of Gold.
- **Small-scale features retained from earlier periods:**
  - **AWSS Hydrants:** The proposed project would shift the location of the majority of the AWSS fire hydrants within the project corridor to nearby locations to accommodate the proposed traffic lanes, pedestrian through zone, and other project elements. (AWSS hydrants have been moved within the sidewalk area in the past.) This work would follow Public Works' contract specifications related to the protection of existing water and AWSS facilities (see *Construction Protocols*, Appendix 4). Public Works' contract specifications require preparation of a work plan and drawings detailing the existing conditions, protection, and proposed work for all AWSS facilities, as well as close conformance to the contract specifications, to protect and provide uninterrupted service to these facilities. The project would retain the hydrants as streetscape features within the sidewalk area in proximity to their existing locations. In addition, the proposed project would retain or replace in kind the utility covers on the AWSS cisterns within the project corridor. The utility covers would continue their function in identifying the locations of the cisterns after the completion of the proposed project. Although the location of some AWSS hydrants would shift as a result of the proposed project, the design, material, workmanship, feeling, and association of the AWSS would not be altered.
  - **Samuel's Clock**: Samuel's Clock is currently in the sidewalk area in front of 856 Market Street. The proposed project would preserve this feature in place.

- **Mechanics Monument:** Mechanics Monument is currently located in Mechanics Monument Plaza. The proposed project would preserve this feature in place.
- **California Statehood Monument:** The California Statehood Monument (also known as the Admission Day Monument) is located in the sidewalk area on the north side of Market Street at the intersection of Post and Montgomery streets. The proposed project would preserve this feature in place.
- **Emergency Call Boxes:** The proposed project would relocate emergency call boxes to accommodate the proposed pedestrian furnishing zone in the sidewalk area, altering this feature's integrity of location. However, the proposed project would retain the emergency call boxes as streetscape features within the general area of their current sidewalk locations and would not alter the design, material, workmanship, feeling, or association of the emergency call boxes.

PRIORITY 2 CHARACTER-DEFINING FEATURES

- **Repeating pattern of BART/Muni subway entrances along length of Market Street**: The proposed project would not include alteration to the repeating pattern of BART/Muni subway entrances along the length of Market Street.
- **Repeating pattern of street signage (square and circular)**: The proposed project would remove the square and circular pole-mounted street signs associated with the Market Street Redevelopment Plan design and replace them with new pole-mounted street signs. The project would not include alterations to the street grid. Under the project, the repeating pattern of street signs, with pole-mounted signs at street corners, would remain intact even if the signs themselves are replaced.
- **Repeating pattern of traffic lights and traffic signage**: The proposed project would include removal of semaphore-style traffic signals associated with the Market Street Redevelopment Plan design and replacement with new traffic signals and signs. There would be a complete upgrade of all the existing signal infrastructure on Market Street between Octavia Boulevard and Steuart streets, which would include new poles, conduits, accessible pedestrian signal buttons, vehicle/bicycle/pedestrian signals, signal cabinets, and interconnects. In addition, the project would install two new signals at 11th and Market streets and at Steuart and Market streets. However, given that the project does not propose alterations to the street grid, the repeating pattern of traffic signals and signs would remain intact, even if the signals and signs themselves are replaced.
- **Tree allées (circulation feature)**: The proposed project would include street trees aligned along the north and south sides of Market Street to create an allée-style boulevard. Although the proposed project is not consistent with the Market Street Redevelopment Plan design in that the London plane trees (*Platanus acerifolia*) would be replaced with new species and the double allée would be reduced to a single row of

trees along the corridor, the single row would continue to serve as a circulation feature by physically differentiating pedestrian space (the sidewalk area between the trees and building facades) from the road right-of-way.

- **BART street entrances (Embarcadero Station, Montgomery Station, Powell Station, and Civic Center Station):** The proposed project would not include alterations to the location, design, or materials of the BART/Muni station street entrances.
- **Van Ness Muni station street entrances**: The proposed project would not alter the location, design, or materials of the Van Ness Muni station street entrances.
- **Bronze four-sided street clocks**: The proposed project would preserve in place the bronze four-sided street clocks.

PRIORITY 3 CHARACTER-DEFINING FEATURES

- **Retained broad view of Market Street width**: The proposed project would include new bus shelters, new boarding islands, new mini-high platforms, and new mini-high ramps, which could obscure the view of Market Street's width in some locations. However, these features are not so large or numerous that they would alter a pedestrian's sense of the streetscape's width. Overall, the broad view of the Market Street streetscape would be retained.
- **Lotta's Fountain (water feature)**: The proposed project would avoid demolition, destruction, relocation, or alteration of Lotta's Fountain because the bikeway would circumvent the existing location in the island at the intersection of Market, Geary and Kearny streets.
- **Sunlight channeled through northern diagonal street grid into triangular plazas**: The proposed project would not alter the diagonal street grid, and sunlight would continue to be channeled into triangular plazas on the north side of Market Street.

ANALYSIS

Market Street is historically significant under Criterion C/3 for its association with the Market Street Redevelopment Plan, designed by master architects John Carl Warnecke and Mario J. Ciampi and master landscape architect Lawrence Halprin. The period of significance under this criterion is 1979, the year that corresponds to substantial completion of the redevelopment plan. Given the nature of Market Street's significance, character-defining features identified as priority 1 are most essential to conveying this significance because they are most clearly associated with expressing the Market Street Redevelopment Plan's innovative design concepts. Three of the 13 priority 1 features (i.e., small plazas [Robert Frost Plaza, Mechanics Monument Plaza, Crocker Plaza, Mark Twain Plaza], red brick paving in herringbone pattern that distinguishes pedestrian from vehicular space, and street trees [species vegetation characteristics) would be demolished or incompatibly altered by the proposed project. In addition, because the red brick paving spans the entire district, its removal would also indirectly affect other intersecting character-defining features by altering their setting. Changes to these three priority 1 features would undermine Market Street's ability to convey its association with the Market Street Redevelopment Plan design.

Although not as fundamental to expressing the Market Street Redevelopment Plan design, priority 2 character-defining features do contribute meaningfully to expressing Market Street's significance. Aggregate loss of priority 2 features would greatly diminish the ability to read Market Street as the landscape associated with Halprin, Ciampi, and Warnecke. Seven of the 14 priority 2 features (i.e., cluster arrangement of street trees in double and single rows down sidewalks, a vertical circulation feature [elevator] at the Civic Center BART/Muni station, granite bollards with chain links, bronze BART/Muni street-level elevators, square and circular pole-mounted street signs, semaphore-style traffic signage and traffic signal lights, and bronze tree grates) would be demolished or incompatibly altered by the proposed project.

No extant priority 3 character-defining features would be demolished or incompatibly altered by the proposed project. However, it is important to note that, because of the period of significance, the majority of priority 3 character-defining features, most notably the street furnishings, have been removed from the streetscape. Although none of the extant priority 3 character-defining features would be altered by the proposed project, the aggregate outcome of the loss of character-defining features over time makes the landscape's current integrity more vulnerable to changes that undermine the resource's ability to convey its significant association with the Market Street Redevelopment Plan design.

Conclusion

One-third of the extant character-defining features that qualify the Market Street Cultural Landscape District for listing in the CRHR would be demolished or incompatibly altered such that the significance of the historic landscape would be materially impaired. The resource would no longer convey its significant association with the Market Street Redevelopment Plan or with master designers Halprin, Ciampi, and Warnecke. Iconic physical materials that are consistently applied throughout the district, such as the brick paving and street trees, would be demolished. Other character-defining features would be incompatibly altered. As such, the proposed project would constitute a substantial adverse change to the Market Street Cultural Landscape District. The impact of the proposed project would be ***significant***.

The proposed project would result in a substantial adverse change to the significance of the Market Street Cultural Landscape District. Implementation of Mitigation Measures M-CP-1a, Prepare and Submit Additional Documentation for the Market Street Cultural Landscape District; M-CP-1b, Develop and Implement an Interpretive Program; and M-CP-1c, Hold Public Commemorative and Educational Program Series, would partially compensate for impacts associated with the proposed project, including demolishing or altering character-defining features that convey the district's significance as a designed landscape associated with the

Market Street Redevelopment Plan, through comprehensive documentation and memorialization of the resource to ensure the intention behind its historic design is not lost, in spite of its material impairment. However, because these measures would not be *enough* to avoid, rectify, reduce, or compensate for the proposed project's impact on the Market Street Cultural Landscape District, the impact would remain ***significant and unavoidable with mitigation***.

M-CP-1a: Prepare and Submit Additional Documentation for the Market Street Cultural Landscape District

The project sponsor shall prepare Historic American Landscape Survey (HALS) documentation of the Market Street Cultural Landscape District to level 1 standards. The objective of the documentation shall be to record the extant character-defining cultural landscape features, spatial arrangement, and setting of the resource. The project sponsor shall retain a professional who meets the Secretary of the Interior's Qualification Standards for Architectural Historian or Historian (36 CFR, Part 61) and a photographer with demonstrated experience in HALS/Historic American Building Survey (HABS) photography to prepare written and photographic documentation for the Market Street Cultural Landscape District. The HALS documentation package for the Market Street Cultural Landscape District shall be reviewed and approved by the planning department's preservation staff prior to issuance of an excavation permit for the proposed project or commencement of construction.

The documentation shall consist of the following:

- **HALS-level photographs:** HALS standard large-format photography shall be used to document the Market Street Cultural Landscape District and surrounding context. The scope of the photographs shall be reviewed and approved by the planning department's preservation staff for concurrence, and all photography shall be conducted according to the current National Park Service HALS standards. Photographs for the dataset shall include (a) contextual views of existing settings for the Market Street Cultural Landscape District in order to document the resource's overall spatial organization, circulation patterns, and physical features in relation to the surrounding built environment of downtown San Francisco; (b) general landscape and detailed views of all plazas within the Market Street Cultural Landscape District; and (c) detailed views of the resource's priority 1, priority 2, and priority 3 character-defining structures/objects, circulation patterns, and vegetation. The photograph set shall include distant/elevated views to capture the extent and context of the resource.

  - All views shall be referenced on a key map of the property, including each photograph number with an arrow to indicate the direction of the view.
  - Draft photograph contact sheets and the key map shall be provided to the planning department's preservation staff for review to determine the final number and views for inclusion in the final dataset.
  - Historic photographs identified in previous studies shall also be collected, scanned as high-resolution digital files, and reproduced in the dataset.

Written HALS Narrative Report: A written historical narrative, using the outline format, shall be prepared in accordance with the HALS Historical Report Guidelines.

Measured Drawings: A set of measured drawings shall be prepared to document the overall design, dimensions, location of character-defining features, circulation patterns, and spatial arrangement of the Market Street Cultural Landscape District. Original design drawings of the resource, if available, shall be digitized and incorporated into the measured drawings set. The planning department's preservation staff shall assist the consultant in determining the appropriate level of measured drawings.

Print-on-Demand Booklet: Following preparation of HALS photography, narrative report, and drawings sets, a print-on-demand softcover book shall be produced for the resource that compiles the documentation and historical photographs. The print-on-demand book shall be made available to the public for distribution.

- Format of Final Dataset:
  - The project sponsor shall submit a final/archival version of photographs, historical photographs, narrative report, drawings sets, and booklet to the Library of Congress as an official submittal through the HALS program.
  - The project sponsor shall contact the History Room of the San Francisco Public Library; Northwest Information Center; California Historical Society; Environmental Design Archives at the University of California, Berkeley, the San Francisco Planning Department; and the Architectural Archives at the University of Pennsylvania to inquire whether the research repositories would like to receive a hard or digital copy of the final dataset. Labeled hard copies and/or digital copies of the final book, containing the photograph sets, narrative report, and measured drawings, shall be provided to these repositories in their preferred format.
  - The project sponsor shall prepare documentation for review and approval by the planning department's preservation staff, along with the final HALS dataset, that outlines the outreach, response, and actions

taken with regard to the repositories listed above. The documentation shall also include any research conducted to identify additional interested groups and the results of that outreach. The project sponsor shall make digital copies of the final dataset, which shall be made available to additional interested organizations, if requested.

M-CP-1b: *Develop and Implement an Interpretive Program*

The project sponsor shall develop an interpretive program that commemorates the history of Market Street, focusing on its significant association with the Market Street Redevelopment Plan design of architects John Carl Warnecke and Mario Ciampi and landscape architect Lawrence Halprin. To contextualize the Market Street Redevelopment Plan design, interpretive materials shall also include context themes related to the Market Street Cultural Landscape District's additional reasons for significance (e.g., Market Street's role as San Francisco's main circulation artery and facilitator of urban development, Market Street's role as a venue for civic engagement in San Francisco). Interpretive materials shall also be informed by historic context studies of the design work of architects John Carl Warnecke and Mario Ciampi and landscape architect Lawrence Halprin. The content of the studies shall include, but not be limited to, the respective designer's biography, design process, and overall body of work (with a focus on Bay Area projects) as well as the social and cultural context of post–World War II San Francisco Bay Area that influenced the designer's career in relationship to this district. The context studies shall also include a list of known projects in the Bay Area (buildings and/or landscapes) designed by the respective designer.

The project sponsor shall retain a qualified consultant meeting the Secretary of the Interior's Professional Qualification Standards for Architectural History or History to develop an interpretive program that conveys the historic context themes listed above. The selected consultant preparing the context study of Lawrence Halprin shall have a demonstrated specialization in landscape design history.

In consultation with the project sponsor and the planning department, the qualified consultant shall prepare an interpretive plan that describes the general format, locations, materials, and content of the full interpretive program. The interpretive plan shall be reviewed and approved by the planning department's preservation staff prior to the issuance of an excavation permit for the proposed project or commencement of construction. The interpretive plan shall include, at a minimum, the following interpretive projects, methods, and materials:

- **Temporary Public Exhibition**: The project sponsor shall hire a qualified architectural historian or historian who meets the Secretary of the Interior's Professional Qualification Standards and a professional exhibition designer to prepare an exhibition for public display in venues physically proximate to Market Street, such as the San Francisco Public Library; California Historical Society; San Francisco Bay Area Planning and Urban Research Association; American Institute of Architects, San Francisco; or a similar space within an educational or civic organization. The qualified historian(s), working in cooperation with professional exhibit designer(s), shall craft a public exhibition about the significant history of the resource using, at a minimum, the HALS documentation identified above and the existing Better Market Street CLE. In consultation with the planning department, the project sponsor and consultants shall identify a minimum of one publicly accessible location for installation of the exhibition and work with the selected venue(s) to secure a commitment to house the display for an agreed upon length of time; the interpretive plan shall include documentation of this commitment and be submitted for review and approval to the planning department's preservation staff prior to the issuance of an excavation permit for the proposed project or commencement of construction. If the required documentation shows that a good-faith effort was put forward by the project sponsor to locate an appropriate display location but no commitment could be procured, then the project sponsor shall consult with the planning department's preservation staff and the qualified consultants mentioned above to discuss an alternative temporary installation of the exhibition at the project site where it shall be visible and accessible to the public and maintained for the duration of the construction process.
- **Educational Website:** The project sponsor shall hire a qualified architectural historian or historian who meets the Secretary of the Interior's Professional Qualification Standards, working in cooperation with professional website designers, to prepare a Better Market Street educational webpage about the significant history of the resource using, at a minimum, the HALS documentation identified above and the existing Better Market Street CLE. The project sponsor shall house and maintain the webpage in perpetuity on the project sponsor's website (http://www.sfpublicworks.org/projects), with links to the HALS documentation and other interpretive materials outlined in the project mitigations. A template webpage for the project website shall be reviewed and approved by the planning department's preservation staff prior to the issuance of any site or construction permits.

- **Interpretive Signage:** The project sponsor shall incorporate between six and 10 permanent interpretive markers or signs into the design of the proposed project that interpret the significant history of the resource. The markers shall be located within the project footprint (on Market Street between Steuart Street and Octavia Boulevard), and the content shall relate to the specific locations of the markers/signs within the corridor. The project sponsor shall work with qualified architectural historians or historians who meet the Secretary of the Interior's Professional Qualification Standards, professional graphic designers, and signage fabricators to determine the designs, placement locations, and fabrication specifications of the interpretive signage within the project corridor. The project sponsor shall submit for review and approval an outline of the proposed permanent interpretive signage to the planning department's preservation staff as part of the interpretive plan before issuance of any site or construction permits for the proposed project.
- Following approval of the interpretive plan by the planning department and working with the project sponsor and technical professionals identified above, the qualified historians shall then develop detailed interpretive content and applicable design specifications for the public exhibition, educational website, and interpretive signage. The planning department's preservation staff shall review and approve the text, images, and applicable design specifications prior to production and installation of the interpretive materials and prior to substantial completion of the proposed project. Implementation of the interpretive plan can occur after construction has commenced but must be fully implemented within 2 years of final completion.

M-CP-1c: *Hold Public Commemorative and Educational Program Series*

The project sponsor shall develop and implement a public educational event series to engage community members and pay tribute to the Market Street Redevelopment Plan design. The program series shall be developed in collaboration with a qualified consultant meeting the Secretary of the Interior's Professional Qualification Standards for Architectural Historian or Historian and a professional public arts programmer or partner arts institution. The selected arts programmer or partner institution shall have experience developing concepts for, promoting, and implementing large-scale and site-specific public events. The program series shall include three to five public programs to tell the story of development of the Market Street Redevelopment Plan. Programs may include panel discussions and lectures with scholars and designers; collaborative artistic performances, such as re-enactment of

Lawrence and Anna Halprin's RSVP cycles; walking tours; parades; and related activities on Market Street. The planning department's preservation staff shall review and approve a preliminary schedule of the program series before the content and participants are finalized. The program series must occur prior to issuance of an excavation permit for the proposed project or commencement of construction. All programs held as part of the program series shall be recorded by a professional videographer, and the recordings shall be made available on the educational website specified under M-CP-1b.

WESTERN VARIANT

The Western Variant would include the approximately 0.6-mile portion of Market Street between Octavia Boulevard and a point approximately 300 feet east of the Hayes and Market Street intersection. However, the Western Variant would not introduce entirely new project activities and features compared with what is proposed as part of the project. Because no unique character-defining features associated with the Market Street Cultural Landscape District are present in the area of the Western Variant, no additional or unique material impairment and substantial adverse change would apply to the Western Variant. As such, the variant would not represent material impairment or a substantial adverse change to the Market Street Cultural Landscape District's significance under CP-1A or CP-1B but would represent material impairment and substantial adverse change to the district's significance under CP-1C, based on inclusion of project activities already occurring east of the geographic location of the Western Variant. Mitigation Measures M-CP-1a through M-CP-1c would be applicable to the Western Variant, but as described above for the proposed project, adherence to these measures would not avoid, rectify, reduce, or compensate for the proposed project's impact on the Market Street Cultural Landscape District. Therefore, the impact of the Western Variant on the Market Street Cultural Landscape District would be ***significant and unavoidable with mitigation***.

Impact CP-2. The proposed project and project variant would not cause a substantial adverse change in the significance of a historic district considered to be a historical resource, as defined in section 15065.5. (Less than Significant)

Portions of nine historic districts are located within the historic resources CEQA study area. All of the boundaries of these districts extend beyond the study area. The character-defining features of the districts and the contributing properties within the district boundaries that intersect with the historic resources CEQA study area are included in Appendix 6 and Table 4.A-7, on the following page. The potential impacts on these districts are analyzed below.

TABLE 4.A-7. SUMMARY OF HISTORIC DISTRICTS THAT INTERSECT WITH THE HISTORIC RESOURCES CEQA STUDY AREA

Historical Resource	Significant Impact? (Yes or No)
Civic Center Landmark District	No
Market Street Theatre and Loft Historic District	No
Uptown Tenderloin Historic District	No
Market Street Masonry Historic District	No
New Montgomery-Mission-Second Street Conservation District	No
Kearny-Market-Mason-Sutter Conservation District	No
LGBTQ Tenderloin Historic District	No
San Francisco Auxiliary Water Supply System	No
San Francisco Cable Cars National Historic Landmark	No

Source: This list was determined using known historic resources and through consultation between the consultant team and the planning department.

This discussion groups the following five historic districts: Market Street Theatre and Loft Historic District, Uptown Tenderloin Historic District, Market Street Masonry Historic District, New Montgomery-Mission-Second Street Conservation District, and Kearny-Market-Mason-Sutter Conservation District. These five districts share similarities in that their contributing properties are architecturally significant buildings rather than other property types in the public right-of-way (such as objects or landscape features). Thus, their contributing properties would not experience physical demolition or alteration as a result of project activities. These similarities allow potential historic resource impacts on the five districts to be discussed in tandem. The remaining four historic districts have unique reasons for significance and character-defining features in the public right-of-way, which would be altered by the proposed project. As a result, potential project impacts on these four districts are analyzed individually below.

MARKET STREET THEATRE AND LOFT HISTORIC DISTRICT, UPTOWN TENDERLOIN HISTORIC DISTRICT, MARKET STREET MASONRY HISTORIC DISTRICT, NEW MONTGOMERY-MISSION-SECOND STREET CONSERVATION DISTRICT, AND KEARNY-MARKET-MASON-SUTTER CONSERVATION DISTRICT

The Market Street Theatre and Loft Historic District, Uptown Tenderloin Historic District, Market Street Masonry Historic District, New Montgomery-Mission-Second Street Conservation District, and Kearny-Market-Mason-Sutter Conservation District each comprise concentrations of buildings that are located along or adjacent to the project corridor. These five historic districts convey the architectural qualities and physical development of portions of San Francisco's business and retail core during the early 20th century. The Market Street streetscape is not considered to be a character-defining feature of these five historic districts. Proposed project activities would be limited to the public right-of-way and would not physically alter the character-defining features of these historic districts or the architectural characteristics (e.g., materials, stylistic elements, visual patterns) that form the physical attributes of the contributing buildings.

The streetscape within the public right-of-way is a component of the setting of all five of the historic districts listed above. Although not identified as a character-defining feature, the grid of public roadways and pedestrian sidewalks traverses each district and is important in delineating the spatial arrangement of contributing buildings within city blocks. However, the proposed project would not alter the setting of any historic district to the extent that the historic district's significance would be materially impaired. Few contributing properties within the Uptown Tenderloin Historic District, New Montgomery-Mission-Second Street Conservation District, and Kearny-Market-Mason-Sutter Conservation District are adjacent to the project corridor, which is located at the edge of each of these districts. Rather, most of the three districts' contributing properties are located along city streets and alleys north or south of Market Street that would experience no change as a result of the proposed project. The proposed project would result in changes that would be largely imperceptible from most areas within the Uptown Tenderloin Historic District, New Montgomery-Mission-Second Street Conservation District, and Kearny-Market-Mason-Sutter Conservation District.

The project corridor leads through the Market Street Theatre and Loft Historic District and Market Street Masonry Historic District and is adjacent to the majority of contributors within these two districts. As such, Market Street can be seen as having a more important role within the setting of these two districts. However, the Market Street streetscape has been reconfigured multiple times and in varying degrees since it was first surveyed in 1847. The current Market Street streetscape does not have the same paving materials or exact configuration of travel lanes as during the first decades of the 20th century, the period in which the Market Street Theatre and Loft Historic District and Market Street Masonry Historic District achieved significance. Project activities would alter the paving materials, traffic lane configuration, infrastructure, and small-scale features along Market Street and McAllister Street between Market Street and Charles J. Brenham Place, but these project activities represent a continuation of streetscape improvement campaigns that have been implemented along Market Street since the 19th century. In addition, the project would include the introduction of new rail spurs from Market Street to McAllister Street and Charles J. Brenham Place to create the new F-loop. These alterations also represent a continuation of transit improvements that have been implemented within the Market Street streetscape since the 19th century. As such, the proposed project would not alter those aspects of the Market Street streetscape that are most important in contextualizing the significance of the Market Street Theatre and Loft Historic District and Market Street Masonry Historic District (i.e., the angled orientation of Market Street, Market Street's function as the city's primary commercial corridor, the spatial arrangement of contributing buildings in relationship to Market Street and to one another). Each district would remain a unified entity lining either side of Market Street, and the historical and architectural linkages that convey the districts' significance would remain intact. Therefore, the proposed project would not include activities that would materially impair the significance of these historic districts. As such, the impact of the proposed project would have a ***less-than-significant impact*** on the Market Street Theatre and Loft National Register Historic District, Uptown Tenderloin National Register Historic District, Market Street Masonry Landmark District, New Montgomery-Mission-Second Street Conservation District, and Kearny-Market-Mason-Sutter Conservation District.

CIVIC CENTER LANDMARK DISTRICT

A two-block area at the southeast corner of the Civic Center Landmark District intersects with the historic resources CEQA study area. All project activities are planned to occur in the Market Street right-of-way or in public plazas; the project does not include activities with the potential to demolish or alter any of the buildings identified as contributors to the Civic Center Landmark District. Therefore, the following analysis addresses changes to the Civic Center Landmark District's cultural landscape features and the potential for these changes to materially impair the district.

The proposed project would modify or replace character-defining cultural landscape features of the district located in the public right-of-way within the two city blocks adjacent to Market Street where the Civic Center Landmark District intersects with the project area. Streetscape improvements in the sidewalk area would include removal and replacement and/or reuse and reinstallation of granite curbs, as feasible, along Market Street; relocation of AWSS hydrants and emergency call boxes; removal/relocation of some Path of Gold light standards out of alignment; and relocation of some associated historic utility boxes. These features, which are associated with the Civic Center public realm, date to the Civic Center Landmark District's period of significance (1896–1951) and are considered to be character-defining and contributing features to the fine-grained character of the district's City Beautiful/Beaux Arts–era streetscape.

The replaced and reinstalled granite curbs would continue to convey the same materiality and design as those currently in place; the AWSS hydrants and emergency call boxes would be relocated within the Market Street streetscape in proximity to their original locations and would continue to convey the broad aesthetic qualities of the streetscape within the district. Furthermore, the granite curbs, AWSS hydrants, and emergency call boxes represent small-scale and/or ubiquitous streetscape features that are found on other blocks throughout the district's cultural landscape, and numerous other examples of these features within the Civic Center Landmark District would not be altered as a result of the proposed project. Even with select instances of these features being replaced or relocated along the southeastern edge of the district, unchanged examples of granite curbs, AWSS hydrants, and emergency call boxes would remain in adequate numbers, and the geographic distribution of these features throughout the district would enable them to continue to convey the character of the City Beautiful/Beaux Arts–era streetscape.

The Path of Gold light standards and associated historic utility boxes within the Civic Center Landmark District would be partially restored and reconstructed; some would be removed or relocated out of alignment as a result of the proposed project. However, the alteration and removal of these features would not substantially diminish the district's ability to express its historical and landscape design significance. The light standards are located along the southeastern perimeter of the Civic Center Landmark District rather than in the core of the district surrounding Civic Center Plaza and the Pioneer Monument. The Path of Gold reinforces the aesthetic character of the Civic Center Landmark District, dating to the City Beautiful/Beaux Arts era. However, these light standards play a less central role in defining the district's broader historical and design significance than the character-defining spatial organization, circulation patterns, and buildings/structures, which are most important in expressing the formal City Beautiful planning and landscape design of the district. As such, partial restoration and reconstruction of the Path of Gold light standards and removal/relocation of some of the light standards out of alignment, as well as relocation of some associated historic utility boxes within the district boundary, would result in changes that would be largely imperceptible within most areas of the Civic Center Landmark District.

Project activities also include retaining or relocating a BART/Muni elevator at United Nations Plaza, which lies within the boundary of the Civic Center Landmark District. The potential relocation site is within an existing staircase and escalator area in United Nations Plaza, approximately 80 feet to the west. The existing aboveground escalator structure is not a contributing feature within the Civic Center Landmark District cultural landscape, and its removal from its current location would not alter any cultural landscape features that contribute to the significance of the district. Furthermore, in either possible location, the relocated elevator structure would be situated in an area of the Civic Center Landmark District cultural landscape that has been substantially changed since the district's period of significance. If moved within United Nations Plaza, the elevator structure would be located in an existing BART/Muni portal that is non-contributing to the Civic Center Landmark District cultural landscape. This portal lies south of and adjacent to the Fulton Street Mall, which is a contributing cultural landscape element of the district and forms a central axis and viewshed between city hall, Pioneer Monument, and Market Street. Although the dimensions of the new elevator structure are not yet known, this structure would lie beyond the primary spatial and visual axis of the Fulton Street Mall. As such, in this location, the new elevator structure would not interrupt the broad visual and spatial relationships that are most important in conveying the historic qualities of the Civic Center Landmark District from its period of significance.

Finally, the project would include the introduction of new rail spurs from Market Street to McAllister Street and Charles J. Brenham Place to create the new F-loop. The new rails would involve the construction of a boarding ramp in the public right-of-way along the sidewalk adjacent to the southbound lane on Charles J. Brenham Place. The ramp would require the removal of two trees, a small swath of red brick pavers, and a span of the granite curb. These changes would be minimal and would not affect the major character-defining features of the district, such as the spatial arrangement of United Nations Plaza and the views of Civic Center from Market Street.[47] The vegetation and small-scale features would see minimal alteration but not to an extent that would preclude character-defining features of the plaza from conveying significance. This addition represents a continuation of transit improvements that have been implemented within the Market Street streetscape since the 19th century.

For the reasons described above, project activities would alter several instances of small-scale features within the Civic Center Landmark District where it intersects with the project corridor. However, none of these project activities would physically alter the contributing buildings, spatial relationships, and circulation patterns of the Civic Center Landmark District or diminish the City Beautiful/Beaux Arts–era design that imbues the district with significance. As such, the impact of the proposed project would be ***less than significant*** on the Civic Center Landmark District.

LGBTQ Tenderloin Historic District

This district is eligible for listing in the California Register under Criterion 1 for its association with businesses, nightlife establishments, low-rent residences, and other uses that served members of San Francisco's LGBTQ communities between 1933 and 1990. Neither boundaries nor contributing features of the district have been formalized. However, the district boundaries are considered to generally align with the Uptown Tenderloin National Register District and the Market Street Theatre and Loft Historic District boundaries.[48] In addition, a handful of contributing buildings along Market Street have been identified for potential inclusion in the district through individual project-level reviews. Market Street itself is not currently considered to be contributing to the LGBTQ Tenderloin Historic District.

Project activities would not lead to demolition or alteration of any of the buildings that could contribute to the LGBTQ Tenderloin Historic District. Although project activities would alter the Market Street streetscape, these changes would be consistent with streetscape improvement campaigns that began along Market Street during the district's period of significance. Continued changes to the Market Street streetscape would not alter the overall geographic arrangement and architectural characteristics of its potentially contributing buildings. As such, following completion of the proposed project, the district would remain a concentration of historically linked buildings that housed numerous establishments that supported the early and significant LGBTQ enclave along Market Street and throughout the Tenderloin. As such, the LGBTQ Tenderloin Historic District would continue to convey the

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47 Appendix 6 includes information on extant historic resources within the historic resources CEQA study area and further information on the Civic Center Landmark Historic District, including character-defining features.

48 San Francisco Planning Department. 2016. *1028 Market Street Project, Draft Environmental Impact Report.* August. San Francisco, CA: 4.A.10-4.A.11.

historic context themes that have imbued the district with significance, as described in Appendix 6. The impact of the proposed project would be ***less than significant*** on the LGBTQ Tenderloin Historic District.

San Francisco Auxiliary Water Supply System

The AWSS, a discontiguous historic district eligible for listing in the National Register and California Register, is a gravity-fed fire suppression water supply system comprising numerous buildings, structures, and infrastructural features throughout San Francisco. The contributing elements of the AWSS that are located within the project corridor include underground cast iron pipes leading below Market Street, three cisterns (located near Market Street's intersections with Battery Street, Van Ness Avenue, and Valencia Street), and approximately 65 AWSS fire hydrants that line both edges of Market Street.

Some of the character-defining features of the AWSS in the historic resources CEQA study area would be altered by project activities, including relocation or replacement of portions of the underground AWSS pipes within the project corridor to maintain a state of good repair or match curb movement and shifting the majority of AWSS fire hydrants within the project corridor to accommodate the proposed traffic lanes, pedestrian through zone, and other project elements. Utility covers on the three AWSS cisterns within the project corridor would be retained or replaced in kind. However, these project activities would not constitute substantial adverse change to the AWSS. Although subsurface pipes may be relocated or replaced as part of the proposed project, many segments of the original cast iron AWSS pipes under Market Street have previously been replaced by ductile iron pipes.[49] Where the proposed project may remove original cast iron AWSS pipes in select locations, the replacement pipes would continue to support the system's fire suppression function and ability to withstand a supply of pressurized water. Furthermore, the majority of the approximately 65 AWSS hydrants within the project corridor would remain within the Market Street streetscape at or near their current locations. One AWSS hydrant located along the northern edge of Market Street between Front and Pine streets may be removed as a result of the project; this hydrant was installed after the period of significance of the resource and is not considered a contributing element regarding the significance of the AWSS. The remainder of the AWSS hydrants within the project corridor may be moved slightly but would essentially retain their current locations and alignments adjacent to the city street. The AWSS hydrants would continue to be located adjacent to Market Street, predominantly at corners and mid-block locations (similar to the current hydrant arrangement). As a result of the reconfigured traffic lanes and pedestrian through zone, the distance between hydrants and the nearest front lot line of adjacent parcels would have less consistency than is currently the

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[49] ICF. 2018. *San Francisco Auxiliary Water Supply System Draft Department of Parks and Recreation 523A and 523D Forms.* September. San Francisco, CA.

case within the project corridor. This work would follow Public Works' contract specifications related to the protection of existing water and AWSS facilities (see Appendix 4*)*. Public Works' contract specifications require preparation of a work plan and drawings detailing the existing conditions, protection, and proposed work for all AWSS facilities, as well as close conformance to the contract specifications, to protect and provide uninterrupted service to these facilities. Overall, the AWSS hydrants would retain their significant function and distinctive wide-barrel designs. They would still appear as continuous bands, as viewed from within the Market Street streetscape, and remain discernible as part of a unified fire suppression infrastructure system. Furthermore, the AWSS district and its contributing elements include more than 68 miles of subsurface pipes and approximately 950 hydrants, which are concentrated within the northeastern quadrant of San Francisco. The majority of the contributing elements of the overall district would remain unchanged as a result of project activities. Those changes occurring within the project corridor would include limited replacement of pipe materials and relocation of hydrants (i.e., *limited* relative to the far larger size of the district, which also includes discreet buildings and structures that would not be altered). The proposed project would not prevent the AWSS from conveying its significance as an expansive fire suppression system, with designs and materials dating to the post-1906 earthquake reconstruction period in San Francisco. As a result, project activities would not result in substantial adverse change to the district as a whole. Therefore, the impact of the project on the AWSS would be ***less than significant***.

SAN FRANCISCO CABLE CARS NATIONAL HISTORIC LANDMARK

The San Francisco Cable Cars National Historic Landmark is a historic district that comprises multiple features that belong to San Francisco's cable car transit system, which dates to the late 19th century. The resource includes the following: cable cars; 10 miles of track located on eight city streets, with below-grade cables to propel the cars; turnaround structures at the end of some cable car lines; and a car barn and power house at 1390 Washington Street. The San Francisco Cable Cars National Historic Landmark intersects with the historic resources CEQA study area at two locations: the tracks, below-grade cables, and turnaround at Powell Street north of Market Street and the tracks and below-grade cables at the center of California Street that terminate east of Drumm Street.

Proposed project activities would not lead to demolition or alteration of the contributing features of the San Francisco Cable Cars National Historic Landmark located at the Powell Street turnaround and California Street terminal. The character-defining features that convey the significance of the resource would be preserved in place, and the features that contribute to the resource would be preserved in place. Furthermore, paving materials and streetscape features within the public right-of-way surrounding the components of the cable car system have been changed numerous times since the San Francisco Cable Cars National Historic Landmark achieved significance during the final quarter of the 19th century. Continued changes to the Market Street streetscape near the cable car system would not alter any aspect of design, engineering, or operation that conveys the San Francisco Cable Cars National Historic Landmark's significance as a rare, extant 19th-century urban transit system. Therefore, the impact of the proposed project would be ***less than significant*** on the San Francisco Cable Cars National Historic Landmark.

WESTERN VARIANT

The Western Variant involves project activities within the Market Street streetscape between Octavia Boulevard and approximately 300 feet east of Hayes Street. This project variant therefore would be located adjacent to three of the historic districts discussed above: the Civic Center Landmark District, Market Street Masonry Historic District, and AWSS. Project activities within the Western Variant would remain limited to the public right-of-way, as under the CP-2 analysis. Project activities under the Western Variant would be similar to those of the proposed project with respect to streetscape and utilities work and would alter contributing elements to the Civic Center Landmark District (i.e., Path of Gold light standards and associated historic utility boxes, AWSS hydrants, emergency call boxes) and AWSS (i.e., hydrants, underground pipes, cistern covers) in the same manner as the proposed project. The Western Variant would change the setting of these three districts to a degree equal to that of the proposed project. As such, the analysis described in Impact CP-2 applies to the Western Variant analysis, and this impact would be ***less than significant*** on all historic districts.

Impact CP-3. The proposed project and project variant would not cause a substantial adverse change in the significance of a building, structure, or object considered to be a historical resource, as defined in section 15064.5. (Less than Significant)

Forty-one buildings, structures, and objects within the historic resources CEQA study area are identified as historical resources. Thirty-two of these resources are buildings, and nine are structures and objects. The character-defining features of 41 buildings, structures, and objects are listed in Appendix 6 and Table 4.A-8, below.

TABLE 4.A-8. SUMMARY OF INDIVIDUAL RESOURCES THAT INTERSECT WITH THE HISTORIC RESOURCES CEQA STUDY AREA

Historical Resource	Significant Impact? (Yes or No)
Flood Building	No
The Emporium, 835 Market Street	No
Hotel Shaw, 1100–1112 Market Street	No
Wilson Building, 973–977 Market Street	No
979–989 Market Street	No
Orpheum Theater, 1182 Market Street	No

Historical Resource	Significant Impact? (Yes or No)
Flatiron Building, 540–548 Market Street	No
The Old Chronicle Building, 690 Market Street	No
Crown-Zellerbach Building, 1 Bush Street	No
Matson Building and Annex, 215 Market Street	No
Pacific Gas and Electric Company General Office Building and Annex, 245 Market Street	No
The Chancery Building, 562-566 Market Street	No
The Finance Building, 576–580 Market Street	No
660 Market Street	No
1 California Street	No
Market Street Railway Substation/Downtown Traction Power Substation	No
550 Market Street	No
554 Market Street	No
Standard Oil Building/ Chevron Towers, 555 Market Street	No
560 Market Street	No
Francesca Theater, 1127 Market Street	No
Palace Hotel, 2 New Montgomery Street	No
Bank of Italy/Bank of America, 1 Powell Street	No
Federal Building, 50 United Nations Plaza	No
Humboldt Savings Bank Building, 785 Market Street	No
James Bong Building, 833 Market Street	No
Hyatt Regency, 22 Drumm Street	No
Hibernia Bank, 1 Jones Street	No
Tourist Hotel, 1666–1668 Market Street	No
Gaffney Building, 1670–1680 Market Street	No
Edward McRoskey Mattress Factory, 1687 Market Street	No
Hotel Fallon, 1693–1695 Market Street	No
Samuel's Clock, 856 Market Street near Powell Street	No
California Statehood Monument	No
Lotta's Fountain, intersection of Market, Geary, and Kearny streets	No
United Nations Plaza	No
Path of Gold light standards and associated historic utility boxes	No
Golden Triangle light standards	No
Mechanics Monument	No
Shoreline Markers	No
Site of invention of the three-reel Liberty Bell slot machine	No

Source: This list was determined using known historic resources and through consultation between the consultant team and the planning department.

The proposed project activities would not include demolition or incompatible alteration of the character-defining features of the following 41 buildings, structures, and objects within the historic resources CEQA study area:

- Alterations to the streetscape (i.e., roadway or sidewalk areas) adjacent to buildings, structures, and objects that flank the Market Street corridor would be new but consistent with other physical changes in this setting, which has experienced a continuum of modification throughout Market Street's history. As such, project activities in the public right-of-way would not result in significant impacts on individual buildings, structures, and objects located outside of the public right-of-way and would not change the setting of the resources adjacent to the project footprint to the extent that the significance of the resources would be materially impaired. Proposed project activities would be restricted to the public right-of-way and would not include any activities that would demolish or incompatibly alter the character-defining features of the historic resources; thus, their significance would not be materially impaired. The project's impact would be ***less than significant*** for the following 30 buildings:
  - Flood Building
  - The Emporium, 835 Market Street
  - Hotel Shaw, 1100–1112 Market Street
  - Wilson Building, 973–977 Market Street
  - 979–989 Market Street
  - Orpheum Theater, 1182 Market Street
  - Flatiron Building, 540–548 Market Street
  - The Old Chronicle Building, 690 Market Street
  - Matson Building and Annex, 215 Market Street
  - Pacific Gas and Electric Company General Office Building and Annex, 245 Market Street
  - The Chancery Building, 562–566 Market Street
  - The Finance Building, 576–580 Market Street
  - 660 Market Street
  - 1 California Street
  - 550 Market Street
  - 554 Market Street
  - Standard Oil Building/ Chevron Towers, 555 Market Street
  - 560 Market Street
  - Francesca Theater, 1127 Market Street
  - Palace Hotel, 2 New Montgomery Street

- Bank of Italy/Bank of America, 1 Powell Street
- Federal Building, 50 United Nations Plaza
- Humboldt Savings Bank Building, 785 Market Street
- James Bong Building, 833 Market Street
- Hyatt Regency, 22 Drumm Street
- Hibernia Bank, 1 Jones Street
- Tourist Hotel, 1666–1668 Market Street
- Gaffney Building, 1670–1680 Market Street
- Edward McRoskey Mattress Factory, 1687 Market Street
- Hotel Fallon, 1693–1695 Market Street

The following list discusses 11 individual resources where proposed project activities could affect associated character-defining features:

- **Crown-Zellerbach Building, 1 Bush Street:** The Crown-Zellerbach Building is an article 10 landmark and an individually eligible CEQA resource. The Crown-Zellerbach Building at 1 Bush Street has a below-grade parking garage that is currently accessed via an entrance ramp at Battery Street. Vehicles exit the parking garage using one of two driveways: one that allows an immediate right turn onto Market Street and one that joins Bush Street via a tunnel and allows access onto First Street. The proposed project would close the Battery Street Bridge between Bush and Market streets. The portion of Battery Street that passes east of the Crown-Zellerbach Building would be closed to vehicle traffic and paved for pedestrian use. The proposed project would not include any modifications to the Crown-Zellerbach Building or the sunken plaza.

  Based on project plans available at the time of publication, it is uncertain whether the proposed modification of the Battery Street Bridge would entail or necessitate any alteration to adjacent landscape features, including a small area of river rock paving and two trees on the traffic island adjacent to the parking garage tunnel exit driveway. These landscape features are not located on the same parcel as the landmark but match the design of landscape features within the street-level plaza of the Crown-Zellerbach Building and are character-defining features of the historic resource. If these features (off the parcels of the resource) were altered to accommodate closure and re-paving of the Battery Street Bridge, elements of the original design of the Crown-Zellerbach Building that match the materials and plantings found within the resource's street-level plaza would be removed. However, the driveway and pedestrian paving at Battery Street are on the periphery of the site and separated from the main sunken plaza such that they read as secondary features of the resource. Therefore, project activities that could alter the secondary adjacent landscape features would not be expected to interrupt the overall spatial organization, design, or primary character-defining features of the resource. As such, the project would not involve any activities that would demolish or incompatibly alter the character-defining features of the Crown-Zellerbach Building or its associated site features; thus, its significance would not be materially impaired. Based on the foregoing, the project's impact on the Crown-Zellerbach Building would be ***less than significant***. Furthermore, the Crown-Zellerbach Building is an article 10 landmark and alterations to the landmark fall under the jurisdiction of the Historic Preservation Commission. The boundary of the landmark is limited to two city parcels and does not include the Battery Street Bridge. The review process for the Certificate of Appropriateness administered by the Historic Preservation Commission would ensure that any proposed modifications to the landmark associated with the proposed project would comply with the Secretary of the Interior's Standards.

- **Market Street Railway Substation/Downtown Traction Power Substation:** The proposed project would include construction of Muni traction power duct banks under Market Street as well as under portions of Second and Stevenson streets to connect to the Downtown Traction Power Substation (known historically as the Market Street Railway Substation). Project activities would also include interior alterations to the substation building. These changes would not affect the resource's character-defining features; thus, its significance would not be materially impaired. The project's impact on the Market Street Railway Substation would be ***less than significant***.
- **Samuel's Clock, 856 Market Street near Powell Street:** Samuel's Clock would be retained and preserved in place. Project activities would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on Samuel's Clock would be ***less than significant***.
- **California Statehood Monument, intersection of Market, Montgomery, and Post streets:** The California Statehood Monument (also known as the Admission Day Monument) would be retained and preserved in place. Project activities would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on the California Statehood Monument would be ***less than significant***.
- **Lotta's Fountain**, intersection of Market, Geary, and Kearny streets: Lotta's Fountain would be retained and preserved in place. Project activities would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on Lotta's Fountain would be ***less than significant***.
- **United Nations Plaza**: The analysis under Impact CP-1 considers potential impacts on United Nations Plaza as a contributing feature within the Market Street Cultural Landscape District. The following discussion analyzes potential project impacts on United Nations Plaza as an individually eligible historic resource.

The project would include upgrades to the power traction substation at United Nations Plaza, which would include removal of an approximately 12- by 15-foot area of brick paving in the plaza; following completion of the substation upgrades, this area would be repaved using the removed bricks or, if necessary, in-kind replacement bricks that meet the Secretary of the Interior's Standards. Thus, the substation work at United Nations Plaza would not result in permanent changes to the resource. In addition, the BART/Muni elevator at the Civic Center station on the north side of Market Street, near United Nations Plaza, may be retained or relocated approximately 80 feet to the west where it would be inserted within the existing transit station portal in United Nations Plaza. If relocated to the BART/Muni station portal, the elevator would require removal of a limited area of original materials in the sloped surface of the portal, adjacent to the current steps and escalators. The dimensions of the aboveground elevator structure are not yet known; however, this feature would be placed adjacent to an existing circulation path into the BART/Muni station and south of the rows of trees and light standards that define the central axial view toward city hall from United Nations Plaza along Fulton Street. The relocated elevator would be a visible aboveground feature within the plaza but would not block any significant views or be located where it would interrupt the plaza's character-defining spatial organization or circulation patterns.

In addition, because the inlaid granite bands that indicate the city's latitude and longitude extend from the plaza across the sidewalk right-of-way to meet the granite curb on the north side of Market Street, the project's removal of brick paving within the Market Street sidewalk would remove a portion of one of United Nations Plaza's character-defining small-scale features. However, only the outermost segments of the granite inlay near Market Street would be removed; enough of the granite inlay would remain at the center of United Nations Plaza so that this feature would continue to delineate quadrants of the plaza and indicate the city's latitude and longitude, as in the original design. In addition, these materials within the Market Street sidewalk area are minimal in scale when compared to the overall area of the plaza. The changes would be restricted to the pedestrian through zone (sidewalk along Market Street only) and encompass approximately 13,000 square feet. The plaza as a whole comprises more than 110,000 square feet, meaning that the proposed project alterations would affect less than 15 percent of the area. Removal of the sidewalk brick and construction of new streetscape elements along Market Street would also remove the continuous surface paving that unifies United Nations Plaza with the adjacent sidewalk.

Although this change would degrade the resource's relationship with its immediate setting to an extent, the change would not render the plaza inaccessible from Market Street or remove or alter character-defining features within the resource boundary beyond those described above. Lastly, the onboarding ramp included as a feature of the

F-loop tracks to be installed in the southbound lane of Charles J. Brenham Place would result in the removal of two trees, a small portion of red brick paving, and a span of the granite curb. These changes would be at the eastern periphery of the plaza and minimal in scale; as such, they would not affect the major character-defining features of the plaza, including the plaza's views, spatial organization, relationship to city hall or Market Street, or circulation. The vegetation and small-scale features would see minimal alteration but not to an extent that would preclude character-defining features of the plaza from conveying significance

Overall, the project would involve minimal changes to United Nations Plaza relative to the resource's 2.6-acre size; taken together, these changes would not interrupt the resource's overall character-defining spatial organization, circulation, vegetation, views/vistas, water features, and small-scale features. United Nations Plaza's ties to its reasons for significance (i.e., its original landscape design and role as the setting for the 1985–1995 ARC/AIDS Vigil) would remain discernible, and the property would remain an individually eligible historic resource. Therefore, the project's impact on United Nations Plaza would be ***less than significant***.

- **Path of Gold Light Standards and associated historic utility boxes**: Please refer to Impact CP-1.A on page 4A-40 for a description of the project's treatment of the Path of Gold.

  Overall, the treatment of the character-defining features of the Path of Gold is compatible with the significance of the resource. Thus, the resource would not be altered to the point where the resource would be materially impaired. The proposed activities would not result in a substantial adverse change to the significance of the resource, and the project's impact on the Path of Gold would be ***less than significant.***

- **Golden Triangle Light Standards:** Golden Triangle light standards in the historic resources CEQA study area are within the public right-of-way at several intersections north of Market Street. The Golden Triangle light standards would be retained and preserved in place as part of this project. Project activities would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on the Golden Triangle light standards would be ***less than significant***.

- **Mechanics Monument, intersection of Bush, Battery, and Market streets**: Mechanics Monument would be retained and preserved in place. Project activities would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on the Mechanics Monument would be ***less than significant***.

- **Shoreline Markers, intersection of Bush, First, and Market streets**: The Shoreline Markers, designated as California Historical Landmark No. 83, would be retained. The marker at the southwest corner of the intersection would be moved west from its current location but would remain near the intersection of Market Street and First Street in order to accommodate new ADA-accessible curb ramps. By retaining this marker's geographic relationship to its current corner, the project would not divorce the resource from the historic location of the shoreline, which it commemorates. The second marker, at the northeast corner of the intersection, would be preserved in place. Project activities therefore would not demolish or alter the resource in an adverse manner; thus, its significance would not be materially impaired. The project's impact on the Shoreline Markers would be ***less than significant***.
- **Site of invention of the three-reel Liberty Bell slot machine, intersection of Market, Bush, and Battery streets:** The site of the invention of the three-reel Liberty Bell slot machine contains no physical remnants of Charles August Fey's workshop at 406 Market Street where the slot machine was invented in 1898. The site is designated as California Historical Landmark No. 937 and thus is a historical resource for the purposes of CEQA. A monument commemorating the former location of 406 Market Street workshop was installed on the site in 1984. With project implementation, the site of the invention of the three-reel Liberty Bell slot machine would remain publicly accessible adjacent to Market Street, within an area with new paving. Furthermore, the 1984 monument would be retained and preserved in place; as such, it would continue to commemorate the former location of the 406 Market Street workshop and the significance of the site. Therefore, the project's impact on the site would be ***less than significant***.

In sum, project activities would result in a ***less-than-significant*** impact on all buildings, objects, or structures within the project corridor that have been identified as historical resources.

WESTERN VARIANT

Six of the buildings, structures, or objects listed above are adjacent to the segment of Market Street where the Western Variant would occur. These six historic resources are the United Nations Plaza, the Path of Gold light standards and associated historic utility boxes, and the following four buildings: Tourist Hotel at 1666–1668 Market Street, Gaffney Building at 1670–1680 Market Street, Edward McRoskey Mattress Factory at 1687 Market Street, and Hotel Fallon at 1693–1695 Market Street. The streetscape elements of the Western Variant would be similar to those of the proposed project or the same. Furthermore, as with the project, Western Variant project activities would be limited to the public right-of-way. The Western Variant would not result in a greater degree of change to the character-defining features of the United Nations Plaza, the Path of Gold, or the adjacent four buildings compared with the project. As such, the analysis described in Impact CP-3 applies to the Western Variant analysis, and this impact would be ***less than significant***.

Impact CP-4. The proposed project and project variant's vibration impacts on built resources caused by construction activities would not result in a substantial adverse change in the significance of a historical resource, as defined in section 15064.5. (Less than Significant)

Built resources are vulnerable to physical damage from nearby construction activities that generate vibration levels that crack foundations or walls, dislodge ornamental details on façades, misalign doors or windows, or cause other types of permanent physical damage. As outlined in the Approach to Vibration Impacts Analysis section on p. 4A-33, such damage can occur at fragile (unreinforced) buildings when PPV levels reach 0.2 inch per second for intermittent vibration or 0.1 inch per second for continuous vibration, historic (reinforced) buildings when PPV levels reach 0.5 inch per second for intermittent vibration or 0.25 inch per second for continuous vibration, or modern commercial (reinforced concrete) buildings when PPV levels reach 2.0 inches per second for intermittent vibration or 0.5 inch per section for continuous vibration.

Historic architectural resources that lie adjacent to the project corridor can be classified as fragile buildings (unreinforced), historic buildings (reinforced), or modern buildings (reinforced concrete). Based on the vibration buffer distances outlined in Table 4.A-3, p. 4.A-37, historic architectural resources meeting the definition of "fragile buildings" would be located at distances that could result in damage from construction activities that generate vibration.

As stated under *Regulatory Framework*, above, the project sponsor would require construction contractors to adhere to SCMs, including vibration control procedures, during construction of the project. These procedures require the identification of all resources that could be affected by construction-related vibration; real-time monitoring to avoid exceedance of the threshold at which damage could occur, as determined for each resource; cessation of construction activities if that threshold is reached; and procedures to restore resources to their pre-construction condition should they be damaged as a result of construction-related vibration. As a result, the application of the SCMs and vibration control procedures would avoid damage to historical resources throughout the project corridor, and the impact would be ***less than significant***.

WESTERN VARIANT

The locations and construction methods of project activities would be the same for the Western Variant as they would be for the project; Public Works would require construction contractors to implement SCMs and include vibration control procedure specifications in construction contracts under the Western Variant. As such, the analysis described in Impact CP-4 applies to the Western Variant analysis. This impact would be ***less than significant***.

Impact CP-5. The proposed project and project variant would not result in vibration impacts on built resources caused by operations resulting in a substantial adverse change in the significance of a historical resource, as defined in section 15064.5. (Less than Significant)

Operations-related vibration from the proposed project include the potential for the existing F-Line rail to be moved closer to existing buildings, with the addition of a new source of vibration resulting from operation of the F-loop. With respect to changes to the alignment of the F-Line on Market Street, levels of vibration generated by streetcars on the F-Line generate approximately 83 VdB or less at 15 feet from the centerline of the track alignment, which is less than the 90 VdB (0.12 in/sec PPV) at which damage could occur to extremely fragile buildings. The proposed minor realignment of the F-Line on Market Street would place the centerline of the rail tracks farther than 15 feet away from all buildings, and therefore, no buildings would be exposed to levels of vibration at which damage could occur. Furthermore, increases in the number of streetcars on the F-Short route would increase the frequency of such events; however, such increases in frequency would not increase the intensity of vibration events and therefore would not expose any buildings to levels of vibration at which damage could occur.

With respect to the addition of the F-loop, the placement of new tracks on McAllister Street and Charles J. Brenham Place would expose buildings to vibration from operation of streetcars on the F-loop; previously, these buildings were not exposed to streetcar vibration. As noted above, damage to the most fragile of buildings would occur only at distances closer than 15 feet from the centerline of the track alignment. The façades of historic architectural resources along McAllister Street and Charles J. Brenham Place would be located, at nearest, approximately 25 feet from the F-loop near-track centerline at McAllister Street, at which distance vibration levels from the operation of streetcars on the F-loop would not have the potential to result in damage.

As such, vibration associated with streetcar operations would not generate vibration levels that are known to lead to damage such as cracks in foundation or walls, dislodging of ornamental details on façades, misalignment of doors or windows, or other types of permanent physical damage that would demolish or alter historic resources in an adverse manner. Therefore, this operational activity would not constitute substantial adverse change to the adjacent historic properties, and the impact would be ***less than significant***.

WESTERN VARIANT

Under the Western Variant, changes to the alignment of the F-Line and the addition of the F-loop would be the same as the proposed project. Therefore, the analysis described in Impact CP-5 applies to the Western Variant analysis, and this impact would be ***less than significant***.

Impact CP-6. The proposed project and project variant would not cause a substantial adverse change in the significance of an archaeological resource, as defined in section 15064.5. (Less than Significant)

The ASA completed for this project identified archaeological resources in or directly adjacent to the archaeological resources CEQA study area. These resources consist of three historic-era resources and one precontact resource. Two of the historic-era resources, CA-SFR-156H and CA-SFR-157H, were determined ineligible for listing to the CRHR and removed at time of recordation. The remaining historic-era resource and the precontact resource were identified near the San Francisco Civic Center at Market Street, Larkin Street and McAllister Street (CA-SFR-28 and Yerba Buena Cemetery). These resources, and the project activities proposed in the vicinity, are discussed below. Project activities planned in the vicinity of CA-SFR-28 and the Yerba Buena Cemetery include construction of Muni track alignments and curb modifications, sidewalk removal, sidewalk bulb-outs, and installation of stormwater and sewer mains. Ground disturbance varies by location and planned activity, but the average depth of excavation would be 3 to 15 feet below the ground surface. For example, excavations associated with installation/replacement of stormwater lines would extend to a depth of 15 feet below surface, while the replacement of sewer mains would extend up to 12 to 15 feet below surface.

The proposed project would either retain or relocate the existing BART/Muni elevator at the Civic Center station on the north side of Market Street near United Nations Plaza. The potential relocation site is within an existing staircase and escalator area in United Nations Plaza, approximately 80 feet to the west. This location would be within the known boundaries of the Yerba Buena Cemetery and in the vicinity of CA-SFR-28 (320 feet to the east). This activity would extend below the known depth of fill, into undisturbed dune deposits, which have elevated potential for containing buried archaeological resources.

As-yet Undocumented Archaeological Resources

The ASA completed for the project identified the potential for project activities to affect as-yet undocumented archaeological resources. A desktop geoarchaeological review, along with archival research, revealed that sediments exist within the archaeological resources CEQA study that hold increased sensitivity for archaeological resources, with dune deposits considered the most sensitive. Sensitivity is also increased because of the presence of previously recorded archaeological resources in the archaeological resources CEQA study area. Several of the proposed project activities have the potential to extend to depths that would encounter dune deposits, which have the potential to contain archaeological resources. These activities include:

- Installation of signal posts (15 feet below ground surface)
- Underground utility rehabilitation/replacement (12 to 15 feet below ground surface)
- Modifications to sub-sidewalk basement (35 feet below ground surface)

Incorporation of the SCMs and Standard Archaeological Measure II, Monitoring (Appendix 6), into construction contracts, as required by Public Works, would provide early identification of archaeological material during construction. The measures also outline protocols for development of a monitoring program, to be reviewed and approved by the planning department's archeological staff, and further research and reporting should any resources be encountered during construction, thereby minimizing potential impacts. Therefore, the proposed project's impact on CA-SFR-28, Yerba Buena Cemetery, and other undocumented archaeological resources would be ***less than significant***.

WESTERN VARIANT

The locations and construction methods of project activities would be the same for the Western Variant as with the project. As such, the analysis described in Impact CP-6 applies to the Western Variant analysis. SCMs and Standard Archaeological Measure II, Monitoring, would be incorporated into construction contracts, as required by Public Works. Therefore, this impact would be ***less than significant***.

Impact CP-7. The proposed project and project variant would not disturb human remains, including those interred outside of formal cemeteries. (Less than Significant)

As described above, two known archaeological resources (CA-SFR-28 and Yerba Buena Cemetery) contained human remains in the vicinity the San Francisco Civic Center. As indicated under Impact CP-6, the potential relocation site for the BART/Muni elevator at the Civic Center station is within the known boundaries of the Yerba Buena Cemetery and the vicinity of CA-SFR-28. In addition, a number of project activities, such as the installation of Path of Gold light standards, installation of signal posts, and underground utility rehabilitation/replacement, have the potential to extend into archaeologically sensitive deposits.

The project is in an early stage of design. The final design may include activities that may affect the resources identified above or extend into additional archaeologically sensitive deposits that also retain the potential to contain human remains and associated burial objects. Therefore, the project has the potential to remove or destroy human remains.

The proposed project could result in the disturbance of both known and as-yet undocumented archaeological resources that include human remains. Public Works requires that all construction contracts incorporate SCMs and Standard Archaeological Measure II, Monitoring (Appendix 6). These measures outline correct procedures to follow when human remains are encountered, including notification of the Native American Heritage Commission; consultation between the project sponsor, Most Likely Descendant, and Environmental Review Officer; and steps for proper excavation, removal, and analysis. The steps outlined in these measures would minimize impacts through the dignified treatment of human remains or other funerary objects, should they be encountered during construction activities. Therefore, the proposed project's impact on human remains, including those interred outside of formal cemeteries, would be ***less than significant.***

WESTERN VARIANT

The locations and construction methods of project activities would be the same under the Western Variant as under the project. As such, the analysis described in Impact CP-7 applies to the Western Variant analysis. SCMs and Standard Archaeological Measure II, Monitoring, would be incorporated into construction contracts, as required by Public Works. Therefore, this impact would be ***less than significant***.

Impact CP-8. The proposed project and project variant would result in a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC section 21074. (Less than Significant with Mitigation)

Native American outreach was conducted during completion of the ASA. In March 2015, ICF's cultural resources staff contacted the Native American Heritage Commission to request a search of its Sacred Lands File. The Native American Heritage Commission responded on March 11, 2015, with a list of Native American contacts for San Francisco County and indicated that the results of the Sacred Lands File search were negative for the archaeological study area. On April 14, 2015, ICF sent letters to the Native American contacts on the lists provided by the Native American Heritage Commission. Letters were sent to nine Native American representatives. The correspondence included a map depicting the project corridor, a brief description of the project, and a request for the contacts to share any knowledge or concerns they may have regarding cultural resources in or adjacent to the archaeological study area.

Letters were sent to the following contacts:

- Rosemary Cambra, chairperson, Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- Tony Cerda, chairperson, Coastanoan Rumsen Carmel Tribe
- Andrew Galvan, the Ohlone Indian Tribe
- Ramona Garibay, representative, Trina Marine Ruano Family
- Jakki Kehl, Ohlone/Coastanoan
- Ann Marie Sayers, chairperson, Indian Canyon Mutsun Band of Costanoan
- Linda G. Yamane, Ohlone/Coastanoan
- Michelle Zimmer, Amah Mutsun Tribal Band of Mission San Juan Bautista
- Irene Zwierlein, chairperson, Amah Mutsun Tribal Band of Mission San Juan Bautista

Follow-up phone calls were made on August 6, 2018, to all nine individuals listed above. As a result, both Ms. Kehl and Ms. Sayers requested updated project information, which was sent by email on August 8, 2018. Ms. Sayers also requested that a Native American be present during ground disturbance and recommended Indian Canyon Native American monitors. Mr. Galvan requested a copy of the final archaeological recommendation but believed that all work would occur within the previously disturbed context if excavation were shallow enough. Ms. Zwierlein also believed work would occur within the previously disturbed context but requested that all construction crew members receive archaeological sensitivity training and that a Native American monitor be present if needed. Ms. Sayers stated she had stepped down as chairperson and that Ms. Charlene Nijmeh should be contacted for all further consultation requests. Mr. Cerda, Ms. Garibay, Ms. Yamane, and Ms. Nijmeh could not be reached. Phone messages were left with project information and a request for a return call if consultation was needed.

CEQA section 21074.2 requires the lead agency to consider the effects of a project on tribal cultural resources. As defined in section 21074, tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are listed, or determined to be eligible for listing, on a national, state, or local register of historical resources. CEQA section 21080.3.1 requires projects with NOPs dated July 1, 2015, and beyond to conduct consultation with California Native American tribes. The NOP for this project was issued in January 2015, and thus, consultation under Assembly Bill 52 is not applicable to this project. Although consultation per CEQA Section 21080.3.1 was not conducted, Native American outreach was undertaken by the planning department and ICF as part of the archaeological sensitivity analysis.

Based on background research, as well as correspondence with the Native American Heritage Commission and the Native American community, there are no known tribal cultural resources in the project area. However, as discussed under Impact CP-6 and Impact CP-7, CA-SFR-28, an isolated burial, was discovered within the project area during construction of BART, and the project site is in an archaeologically sensitive area with the potential for prehistoric archaeological resources. Based on discussions with local Native American tribal representatives, prehistoric archaeological resources are the most likely tribal cultural resources to be identified within San Francisco. In the event that construction activities disturb unknown archaeological sites that are considered tribal cultural resources, any inadvertent damage would be considered a significant impact.

With implementation of Mitigation Measure M-CP-4, Tribal Cultural Resources Interpretive Program, developed in coordination with local Native American tribal representatives, impacts on previously unknown tribal cultural resources would be ***less-than-significant with mitigation.***

M-CP-4: ***Tribal Cultural Resources Interpretive Program***

If the Environmental Review Officer (ERO) determines that a significant archeological resource is present and, in consultation with the affiliated Native American tribal representatives, the ERO determines that the resource constitutes a tribal cultural resource (TCR) that could be adversely affected by the proposed project, the proposed project shall be redesigned so as to avoid any adverse effect on the significant TCR, if feasible. If the ERO determines that preservation in place of the TCR is both feasible and effective, then the archeological consultant shall prepare an archeological resource preservation plan (ARPP). Implementation of the approved ARPP by the archeological consultant shall be required when feasible.

If the ERO, in consultation with the affiliated Native American tribal representatives and the project sponsor, determines that preservation in place for the TCR is not a sufficient or feasible option, the project sponsor shall implement an interpretive program for the TCR in consultation with affiliated tribal representatives. An interpretive plan produced in consultation with the ERO and affiliated tribal representatives, at a minimum, would be required to guide the interpretive program. The plan shall identify, as appropriate, proposed locations for installations or displays, the proposed content and materials for those displays or installations, the producers or artists of the displays or installations, and a long- term maintenance program. The interpretive program may include artist installations, preferably by local Native American artists; oral histories with local Native Americans; artifacts, displays, and interpretation; and educational panels or other informational displays.

In the event that construction activities disturb unknown archeological sites that are considered tribal cultural resources, any inadvertent damage would be considered a significant impact. With incorporation of SCMs and Standard Archaeological Measure II, Monitoring, as required by Public Works, and implementation of Mitigation Measure M-CP-4, as described above, the proposed project would have a ***less than significant impact with mitigation*** on previously unknown tribal cultural resources.

Western Variant

The locations and construction methods for project activities would be the same under the Western Variant as under the project. As such, the analysis described in Impact CP-8 applies to the Western Variant analysis. SCMs and Standard Archaeological Measure II, Monitoring, would be incorporated into construction contracts, as required by Public Works. Mitigation Measure M-CP-4 would be required for the variant. Based on the foregoing, this impact would be ***less than significant with mitigation***.

CUMULATIVE IMPACTS

Impact C-CP-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would result in a cumulatively considerable contribution to a significant cumulative impact on the Market Street Cultural Landscape District but not on any other historic architectural resources. (Significant and Unavoidable with Mitigation)

The resource study area for cumulative analysis of historic architectural resources includes the following: the historic resources CEQA study area (Figure 4.A-1, p. 4.A-3) for the proposed project plus the boundaries of the known historic districts that intersect the study area and the physical locations of features within the discontiguous districts and landmarks that intersect with the study area, including buildings, structures, and objects, such as the Path of Gold and Golden Triangle light standards and the AWSS. The past, present, and reasonably foreseeable future projects that are within or adjacent to this cumulative resource study area are considered in this analysis (see Appendix 5 for a list of cumulative projects). The projects generally involve new construction and modifications of existing buildings, both within and outside of known historic districts, as well as improvements to transportation and streetscape systems and features.

Cumulative impacts on historic architectural resources would occur should the impacts of the considered projects combine to result in the material impairment of resources that have been determined significant consistent with the NRHP and/or the CRHR. Identified historical built resources are listed in Appendix 6-2, along with their areas of significance and character-defining features. The analysis below considers the potential for significant cumulative impacts on historical built resources.

HISTORIC DISTRICTS SIGNIFICANT FOR THEIR ARCHITECTURE

Several of the historic districts in the CEQA study area comprise groups of contributing buildings and derive their significance from the cohesive architectural character of these buildings. As further detailed below, some of these districts have a local landmark designation, whereas others do not.

The following districts are article 10 or article 11 districts under San Francisco's Planning Code:

- Market Street Masonry Landmark District
- New Montgomery-Mission-Second Street Conservation District
- Kearny-Market-Mason-Sutter Conservation District.

Because these are article 10 or article 11 districts, alterations to contributing and non-contributing buildings and new construction within the districts would be subject to a Permit to Alter or review process by the San Francisco Historic Preservation Commission for a Certificate of Appropriateness in order to ensure project compliance with the Secretary of the Interior's Standards. The Historic Preservation Commission review ensures that individual projects do not affect a district. Therefore, no significant cumulative impact is anticipated for these three districts.

The Market Street Theatre and Loft District comprises a group of about 20 contributing buildings that derive eligibility for their cohesive architectural character. However, this historic district is not an article 10 or 11 district but instead listed in the National Register. Several contributors to this district are listed in Appendix 5, including projects at 1028 Market Street, 1095 Market Street, 1100 Market Street, 1075 Market Street, and 1053 Market Street. Given that two of these projects include demolition of existing contributing resources and new construction at their subject sites (1028 Market Street and 1075 Market Street), as well as the relatively small size of this historic district, the analysis assumes that a significant cumulative impact could occur. However, the Better Market Street Project would not include modification or demolition of any contributing resources within this historic district. Accordingly, the Better Market Street Project would not contribute considerably to the significant cumulative impact.

Uptown Tenderloin Historic District

The Uptown Tenderloin Historic District is a large district that includes more than 400 contributing buildings and one contributing site. Although the district is significant primarily for its architecture, the list of character-defining features also includes several streetscape features that date to its period of significance, including granite curbs and AWSS hydrants. As was the case with the Market Street Theater and Loft District, above, this historic district is listed in the National Register. Several past, present, and reasonably foreseeable future projects are occurring within the district boundary, including new construction on vacant lots and parking lots, modifications to existing contributing and non-contributing buildings, and streetscape projects. The CEQA process involves analysis of these proposed projects for compatibility with the historic character of the district. In addition, Public Works and planning abide by an agreement that ensures that granite curbs are retained, replaced in kind, and/or re-installed within the district; Public Works requires that all projects affecting AWSS features follow contract specifications related to the protection of existing water and AWSS facilities (see Construction Protocols, Appendix 4). These practices provide protection for the character-defining streetscape features of the district. As such, this analysis assumes that no significant cumulative impact on the Uptown Tenderloin Historic District could occur.

LGBTQ Tenderloin Historic District

This California Register–eligible historic district is understood to include buildings that housed businesses, nightlife establishments, low-rent residences, and other uses that served members of San Francisco's LGBTQ communities between 1933 and 1990. Contributing buildings and features of the district have not been formalized, though a handful of contributing buildings along Market Street have been identified for potential inclusion in the district through individual project-level CEQA review. Market Street itself is not currently considered to be a character-defining feature of the district.

Of the identified contributors to the district, two are listed in Appendix 5, including projects at 1028 Market Street and 950–974 Market Street. Given that both of these projects include demolition of contributing resources and new construction at their subject sites, this analysis assumes a significant cumulative impact on the district could occur. However, the Better Market Street Project would not result in individual alteration or demolition of any potential contributing buildings or features within the district identified to date. Accordingly, the Better Market Street Project would not contribute considerably to the significant cumulative impact.

MARKET STREET CULTURAL LANDSCAPE DISTRICT

Past, present, and reasonably foreseeable future projects that have or will propose changes to character-defining features that convey the significance of the Market Street Cultural Landscape District include the BART Market Street Canopies and Escalators Modernization Project and the Civic Center Public Realm Plan (see Appendix 5 for descriptions of these related projects).

The Better Market Street Project would result in incompatible alterations to many of the character-defining features of the Market Street Cultural Landscape District related to its association with the Market Street Redevelopment Plan or with master designers Halprin, Ciampi and Warnecke, including the following: small plazas, red brick paving in herringbone pattern, and street trees (species). As such, the proposed project would constitute a substantial adverse change to the Market Street Cultural Landscape District.

The environmental review for the BART Market Street Canopies and Escalators Modernization Project found that although that project would alter some character-defining features of the Market Street Cultural Landscape District, the alterations would not materially alter in an adverse manner any of the character-defining features that lend significance to the district.[50]

The Civic Center Public Realm Plan is currently under design development. Based on preliminary designs, the plan would alter United Nations Plaza (outlined in detail under a separate heading below). Any additional elements of these cumulative projects that would be incompatible with the Market Street Cultural Landscape District would further diminish the ability of the district to convey its association with the Market Street Redevelopment Plan or with master designers Halprin, Ciampi, and Warnecke.

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50 Bay Area Rapid Transit District. 2018. *Draft Initial Study/Mitigated Negative Declaration for BART Market Street Canopies and Escalators Modernization Project.* April. Available: https://www.bart.gov/sites/default/files/docs/BART_Market%20_Street_IS_MND_043018.pdf. Accessed: February 19, 2019.

Based on the analysis above, past, present, and reasonably foreseeable future projects would result in a significant cumulative impact on the Market Street Cultural Landscape District. The Better Market Street Project would contribute considerably to this significant cumulative impact.

CIVIC CENTER LANDMARK DISTRICT AND UNITED NATIONS PLAZA

Past, present, and reasonably foreseeable future projects that propose changes to character-defining features that convey the significance of the Civic Center Landmark District and United Nations Plaza include the Civic Center Public Realm Plan, the Polk Street Streetscape Project, and the BART Market Street Canopies and Escalators Modernization Project (see Appendix 5 for descriptions of these related projects).

Character-defining features of the Civic Center Landmark District include several buildings, granite curbs, AWSS hydrants, tree allées, London plane trees, and other infrastructure. Character-defining features of United Nations Plaza include its asymmetrical design, pedestrian promenades, view axes and corridors, red brick and concrete strip paving, tree allées and columns, granite light standards, rectangular planting beds, flag poles, below-ground fountain, vertical circulation function at the Civic Center BART/Muni station (stair, escalator, and elevator), and concrete bollards that separate the stair/escalator from the elevator entrance (see Appendix 6-2 for more information on the character-defining features of this district).

Environmental reviews were completed for two of the related projects; neither identified any significant impacts on any historic resources. The BART Market Street Canopies and Escalators Modernization Project would make some alterations to character-defining features of the district, but the environmental review for this project concluded that the project would not result in a substantial adverse change to the significance of this district (or any other district), and effects were deemed less-than-significant.

The Polk Streetscape Project was found categorically exempt from CEQA (under exemption classes 1, 2 and 4). In the exemption determination, the planning department concluded the project would have no significant impact on historic resources.[51]

The Civic Center Public Realm Plan, if adopted, could make improvements to the United Nations Plaza and Civic Center Plaza areas. Preliminary plans for these in-progress projects include streetscape reallocations, plaza modifications, and related elements. Plans available as of the publication date of this EIR indicate that the Civic Center Public Realm Plan would modify several of the character-defining features of the Civic Center Landmark District and United Nations Plaza.

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51 San Francisco Planning Department. n.d. *Certificate of Determination for Case No. 2013.1721E*. Available: https://www.sfmta.com/sites/default/files/agendaitems/2015/3-3-15%20Item%2012%20Polk%20St%20%20 Environmental%20Review_0.pdf. Accessed: February 19, 2019.

Based on preliminary design, which could change, the Civic Center Public Realm Plan proposes demolition that would affect the spatial arrangement and circulation patterns of the resources and materially alter multiple character-defining features of United Nations Plaza, including the fountain, planting beds, trees located along Fulton Street Mall, brick paving, and other small-scale features. The plan would also relocate the Simon Bolivar monument.

The Better Market Street Project would not significantly affect any buildings; it would affect only character-defining features of resources that are located within sidewalk areas along Market Street and Charles J. Brenham Place. The Better Market Street Project would modify granite curbs (removing existing curbs and reusing in the project as feasible), remove and replace street trees in the sidewalk area (including along United Nations Plaza), and replace the existing red brick sidewalk and concrete strip paving alongside United Nations Plaza with accessible paving materials, consistent with Public Works Order 200369. The Better Market Street Project would also add an onboarding ramp to service the new F-loop. This would result in the removal of two trees, a small portion of red brick paving, and a span of the granite curb.

Lastly, project activities would either retain or relocate the BART/Muni elevator at the Civic Center station on the north side of Market Street at United Nations Plaza. The potential relocation site is within the existing BART staircase and escalator at United Nations Plaza, approximately 80 feet to the west. This would require removal of a limited area of original materials within the sloped surface of the portal adjacent to the current steps and escalators and result in a small degree of incompatible alteration to the plaza. The bollards would not be modified.

Based on the foregoing, the cumulative impact on the Civic Center Landmark District and United Nations Plaza would be significant.

Because the Better Market Street Project's improvements would generally be limited to public right-of-way areas on and immediately adjacent to Market Street, would not affect any buildings, and would not modify United Nations Plaza beyond the sidewalk areas fronting Market Street and Charles J. Brenham Place and the BART circulation features, the Better Market Street Project would not considerably contribute to the significant cumulative impact.

San Francisco Cable Cars National Historic Landmark

The San Francisco Cable Cars National Historic Landmark's character-defining features include the rails, the cable cars, the turnarounds at the end of the lines, the moving cables embedded in the tracks, and a car barn and repair shop. Although both the Powell Streetscape Project and the proposed Better Market Street Project would alter the setting of this resource at its Powell Street turnaround location, it does not appear that these activities would combine to result in significant cumulative impacts. The Powell Streetscape Project would include modifications to the sidewalks and boarding areas along Powell Street in order to improve accessibility and overall safety for cable car riders. The Better Market Street Project would repave adjacent sections of Market Street and reallocate street space in the vicinity in order to improve both accessibility and safety.

No alteration or new construction is proposed as part of these projects that would result in incompatible alterations to the character-defining features of the district or diminish the district's ability to convey its significance and remain eligible as a National Historic Landmark. As such, there would be no significant cumulative impact on this resource.

AWSS

The AWSS is a historic district that encompasses the entire city of San Francisco. The character-defining features include several hundred hydrants, reservoirs (including one on Twin Peaks), and a network of underground conveyance pipes, cisterns, and pumping stations. Past, present, and reasonably foreseeable future projects that propose changes to the character-defining features that convey the historic district's significance include the Civic Center Public Realm Plan, the Hub Plan, and any other project anywhere else in San Francisco that would involve modification, relocation, or elimination of AWSS features (hydrants, cisterns, conveyances, reservoirs, and related features).

Public Works requires that all projects affecting AWSS features follow contract specifications related to the protection of existing water and AWSS facilities (see Draft Water and AWSS Protection Procedures for Inclusion in Construction Contracts, Appendix 4). In all projects proposing alterations to AWSS features, the project sponsor's contractor would be required to follow construction protocols to ensure that the features are protected during construction and relocated in proximity to their existing locations, thereby maintaining their functional relationship within the system as a whole. For example, relocation of approximately 65 AWSS hydrants as part of the proposed Better Market Street Project would represent a limited portion of the AWSS as a whole, which comprises approximately 950 contributing hydrants and associated features. When implemented consistently with the construction protocols, any project involving relocation of AWSS features would not prevent the AWSS from conveying its significance as a citywide backup fire suppression system. Adherence to the foregoing would preclude any significant cumulative impact on the AWSS district.

BUILDINGS, STRUCTURES, AND OBJECTS

Of the 32 individually significant historic buildings located within the cumulative resource study area, only two are subject to past, present, or reasonably foreseeable projects: 2 New Montgomery (the Palace Hotel) and 1100 Market Street (Hotel Shaw). These resources are subject to the same Permit to Alter or review process by the San Francisco Historic Preservation Commission for a Certificate of Appropriateness that applies to the article 10 and 11 historic districts discussed earlier in this analysis. This process intends to ensure project compliance with the Secretary of the Interior's Standards, which would avoid incompatible alteration of these buildings. Therefore, there would be no significant cumulative impact on any of the 32 individually significant historic buildings. In addition, no known projects, including the Better Market Street Project, would result in alteration or demolition of their character-defining features (Mechanics Monument, shoreline markers, the marker at the site of invention of the Liberty Bell slot machine, California Statehood Monument, Lotta's Fountain, or Samuels Clock). Therefore, no significant cumulative impacts on those objects and structures are anticipated.

The Path of Gold Light Standards and the Golden Triangle Light Standards are discontiguous resources and also city landmarks. Thus, they are addressed separately below.

Path of Gold Light Standards

As is the case with the AWSS, multiple projects have the potential to affect the Path of Gold light standards landmark because of its character as a linear feature that extends across a broad swath of the city (the length of Market Street, from Ferry Plaza to the Castro District). Such projects include the Civic Center Public Realm Plan, still in development, which is envisioned to entail substantial streetscape and public realm changes.

Because of the Path of Gold's status as a city landmark, the review process for the Certificate of Appropriateness requires the Path of Gold light standards that fall within the boundaries of any proposed project to be treated in accordance with the Secretary of the Interior's Standards and retain eligibility as a historical resource. The Better Market Street Project has incorporated appropriate treatment for the Path of Gold, and accordingly, the project would not result in substantial adverse change to the landmark. Other projects proposing modifications to this resource would be held to the same standard; accordingly, the cumulative impact on the Path of Gold light standards landmark would be less than significant.

Golden Triangle Light Standards

As is the case with the AWSS and the Path of Gold, multiple projects have the potential to modify the 189 Golden Triangle light standards, which are generally located between Mason, Market, and Sutter streets. However, because of the Golden Triangle's status as an article 10 city landmark, the review process for the Certificate of Appropriateness requires the Golden Triangle light standards that fall within the boundaries of any proposed project to be treated in accordance with the Secretary of the Interior's Standards and retain eligibility as a historical resource. Therefore, it is anticipated than any cumulative impacts on this landmark would be less than significant.

Summary

Based on the foregoing analysis, the Better Market Street Project would contribute considerably to a significant cumulative impact on the Market Street Cultural Landscape District. The Better Market Street Project would not contribute considerably to any other significant cumulative impact on any other historical resource.

Mitigation Measures M-CP-1a through M-CP-1c would partially compensate for impacts on the Market Street Cultural Landscape District associated with the proposed project and thus would also lessen the proposed project's cumulatively considerable contribution to the significant cumulative effect on this resource. However, these measures would not be enough to avoid, rectify, reduce, or compensate for the impacts on the Market Street Cultural Landscape District; no additional feasible mitigation measures are available. Therefore, the impact would be ***significant and unavoidable with mitigation***.

WESTERN VARIANT

The Western Variant would be similar to or the same as the proposed project with regard to project scope but very different in its proposed design within the public right-of-way in the westernmost portion of the historic resources CEQA study area. The variant would result in the same degree of demolition and alteration to the character-defining features of the historical resources as the proposed project, and the same mitigation required for the proposed project would be applicable to the variant. However, these measures would not be enough to avoid, rectify, reduce, or compensate for the impacts on the Market Street Cultural Landscape District; no additional feasible mitigation measures are available. Therefore, the impact would be ***significant and unavoidable with mitigation***.

Impact C-CP-2. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would not contribute considerably to a significant cumulative impact on archaeological resources. (Less than Significant)

The area for cumulative analysis of archaeological resources is the same as the archaeological resources CEQA study area, which encompasses the project footprint. The archaeological resources CEQA study area includes approximately 2.2 miles of Market Street, which is the location of several past, present, and reasonably foreseeable future projects. Many of these projects involve or contemplate improvements which include street repair and improvements to safety and streetscape features.

Four archaeological resources have been identified within the archaeological resources CEQA study area; two have been determined to be ineligible for listing in the NRHP and CRHR and thus do not require further discussion.

The two remaining (known) resources consist of one historic-era deposit (Yerba Buena Cemetery) and one precontact burial (CA-SFR-28) which was located over 70 feet below the street surface. While the latter is currently understood to be an isolated burial that was recovered during BART construction, it is possible that additional burials, associated features or stratigraphic features that may provide additional data about the burial may still exist in the vicinity.

The remainder of this discussion considers the potential for significant cumulative impacts related the following types of archaeological resources:

- Known archaeological resources
- Unknown archaeological resources
- Tribal cultural resources

Past projects that intersect with the study area include the BART Market Street Canopies and Escalators Modernization Project (environmental review completed 2018) and the Market and Octavia Area Plan (environmental review completed 2007).

Current and reasonably foreseeable projects include the Hub Plan and the Civic Center Public Realm Plan. As of the publication date of this document, the Hub Plan and Civic Center Public Realm Plan are both in development with environmental review expected to follow.

Known archaeological resources represent relatively discrete features or deposits where project activities would result in impacts on archaeological resources. The two known archaeological resources located within the archaeological resources CEQA study area are Yerba Buena Cemetery and CA-SFR-28.

As described in the *Archaeological Context* section, various landforms tend to have increased potential for containing as-yet unidentified archaeological resources and human remains. The landforms comprising the archaeological resources CEQA study area include fill, dunes, tidal flats, and older landforms. Archaeological sensitivity (in other words, the likelihood that the landform will contain archaeological resources) is considered high for dunes, moderate for fill and tidal flats, and low for older landforms.

Dune sands are present between 7 and 20 feet below surface along the majority of the CEQA study area for archaeological resources. East of roughly First Street, bayward of the historic shoreline, dune sands are not present within the study area.

The consideration of a potential significant cumulative impact on unknown resources differs from that for known resources in that ground-disturbing activities in deposits considered to be archaeologically sensitive does not mean that archaeological resources would be affected; rather, there is increased potential for previously undocumented resources and human remains to be encountered unexpectedly and thus potentially affected.

As stated in Impact CP-8, no known tribal cultural resources were identified within the archaeological resources CEQA study area. However, the archaeological resources CEQA study area is considered sensitive for as-yet undocumented prehistoric resources. Therefore, currently unknown prehistoric archaeological resources hold the potential to be considered tribal cultural resources.

An initial study/mitigated negative declaration was completed for the BART Market Street Canopies and Escalators Modernization Project. According to the environmental review prepared for that project, the excavation locations are understood to contain previously disturbed soils (artificial fill and Bay Mud). The project was found to have no impact on any archaeological resources including human remains and tribal cultural resources because of the shallow depth of excavation associated with project activities (6 to 10 feet below ground surface within previously disturbed soils).

The Market and Octavia Area Plan set forth new land uses as well as called for substantial streetscape and public realm improvements. The EIR for the Market and Octavia Area Plan found no significant project-level impact on archaeological resources, assuming adherence to mitigation measures, and no significant cumulative impact.

The Hub Plan, still in development, covers a subset of the Market and Octavia Plan area and is expected to propose a program of land use changes as well as further streetscape and public realm enhancements. Similarly, the Civic Center Public Realm Plan, if adopted, would make improvements to the United Nations Plaza and Civic Center Plaza areas. Preliminary plans for these in-progress projects include streetscape reallocations, plaza modifications, and related elements. Because these projects would occur in locations with known archaeological resources and locations with higher sensitivity with respect to yielding currently unknown archaeological resources, including both human remains and tribal cultural resources, there could be a significant cumulative impact on archaeological resources.

Construction of streetscape and public realm improvements associated with the proposed project would be conducted by Public Works. Public Works requires that all construction contracts incorporate SCMs and, depending on the nature of the work, additional Standard Archaeological Measures to mitigate for impacts on cultural resources. These measures, along with M-CP-4 to address potential impacts on tribal cultural resources, would avoid and/or lessen the proposed project's impacts on known and unknown archaeological resources, including human remains and tribal cultural resources. With adherence to these measures, the proposed project's contribution to the significant cumulative impact would not be cumulatively considerable.

Impact C-CP-3. Construction-related vibration caused by the proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would not result in a significant cumulative impact on historic architectural resources. (Less than Significant)

The geographic context for cumulative vibration impact analysis upon historic built resources is the historic resources CEQA study area for the proposed project in addition to its immediate vicinity. Appendix 5 outlines past, present, and reasonably foreseeable future projects, which include projects located within one block of the proposed project footprint. Some of the present and reasonably foreseeable projects may occur simultaneous to the project and are anticipated to involve construction activities (such as demolition of existing buildings, ground disturbance, and pile driving) that would generate ground-borne vibrations.

The potential for construction-related vibrations to cause structural or ornamental damage to historic built resources is typically assessed on a per-event basis from vibration sources. While the individual projects, when considered separately, may not generate continuous or intermittent ground-borne vibrations at PPV levels surpassing the damage thresholds outlined in the approach to Vibration Impacts Analysis (Section 4.C, Table 4C-15), it is theoretically possible that the ground-borne vibrations from multiple concurrent projects could combine to reach PPV levels that surpass the vibration damage thresholds.

In order for concurrent projects to generate ground-borne vibrations at intensities above the damage thresholds, the concurrent projects would need to be located within 44 feet of unreinforced historic buildings, within 22 feet of historic (reinforced) buildings, and within 13 feet of modern (reinforced concrete) buildings. Present and reasonably foreseeable future projects that would be located within these buffer distances from historic built resources that are adjacent to the project corridor include, but are not limited to, the BART Market Street Canopies and Escalators Modernization Project, 1028 Market Street, 1125 Market Street, 1629 Market Street, and 1699 Market Street.

Although the project and concurrent vibration-causing projects would be located within these buffer distances from the same historic built resources, the likelihood of simultaneous peak events from high-impact/vibration construction activities in this proximity would be exceedingly small and unlikely to occur. Therefore, there would be no significant cumulative impact resulting from construction-related impacts on historic architectural resources.

4.B TRANSPORTATION AND CIRCULATION

This section presents existing transportation and circulation conditions and analyzes the potential project-level and cumulative impacts on transportation and circulation during construction and operation of the proposed project. Transportation-related issues consist of vehicle miles traveled (VMT), traffic hazards, transit, people walking, people bicycling, loading, emergency access, parking, and construction activities that would affect the transportation network. Supporting detailed technical information is included in Appendix 7, *Transportation Supporting Information*. The initial study prepared for the proposed project (Appendix 2) documented that the proposed project would not result in a change in air traffic patterns or air safety because the project site is not in proximity to an airport. Therefore, further discussion of air traffic and air safety are not required in this EIR.

Comments pertaining to transportation and circulation received in response to the notice of preparation (NOP) (Appendix 1) were considered in preparing this analysis. The NOP comments provided suggestions for the design of the proposed bicycle and transit facilities on Market Street, and expressed concerns regarding impacts of the proposed project travel lane changes and private vehicle restrictions on increased traffic congestion on city streets and state facilities, access, circulation and safety impacts for bicyclists and people walking, impacts on regional transit operations, and impacts on commercial and passenger loading activities. Some NOP comments expressed concerns related to private vehicle restrictions on operation of the One Bush Street parking garage. Other NOP comments also requested a cumulative assessment of other projects that would change the transportation network in the area, and an assessment of secondary impacts of implementation of mitigation measures.

The analysis uses methods consistent with the 2002 San Francisco Transportation Impact Analysis Guidelines (SF Guidelines) and subsequent updates, and San Francisco Planning Commission Resolution No. 19579, adopted on March 3, 2016. Planning Commission Resolution No. 15979 removes automobile delay as described solely by level of service (LOS) or similar measure of vehicular capacity or traffic congestion as a factor in determining significant transportation impacts on the environment, pursuant to California Environmental Quality Act (CEQA). The resolution replaces automobile delay with VMT criteria, which are designed to promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses, consistent with changes to the CEQA Guidelines by the Office of Planning and Research, as mandated by Senate Bill 743.

The assessment of transportation impacts includes a description of existing conditions[1] as well as an evaluation of project impacts for both a 2020 baseline and 2040 cumulative scenario. The impact analysis was conducted for the proposed project and a project variant for the western segment of the Market Street corridor (i.e., the Western Variant). The cumulative scenario includes reasonably foreseeable transportation network changes and forecasts of growth in jobs and population in San Francisco by 2040.

ENVIRONMENTAL SETTING

The transportation study area encompasses the area surrounding the Market Street project corridor where the project could affect transportation and circulation. The transportation study area generally extends two blocks north of the Market Street project corridor and two to three blocks south of the Market Street project corridor, as shown in Figure 4.B-1 on the next page.

REGIONAL AND LOCAL ROADWAYS

REGIONAL ACCESS

US 101 and I-80 are the primary regional access routes to the project area. US 101 serves San Francisco and the Peninsula/South Bay and extends north via the Golden Gate Bridge to the North Bay. Van Ness Avenue serves as US 101 between Market Street and Lombard Street. I-80 connects San Francisco to the East Bay and points east via the San Francisco-Oakland Bay Bridge. US 101 and I-80 merge about 1 mile southeast of the Market Street corridor. Access to US 101 and I-80 is provided from on-ramps and off-ramps on First Street at Harrison Street; on Essex Street at Harrison Street; on Bryant Street east of Second Street and at Fourth, Fifth, Seventh, Eighth, Ninth, 10th, and Sterling streets; on Harrison Street at Fourth, Fifth, Seventh, Eighth, and Fremont streets; at South Van Ness Avenue and 13th/Division streets; at Mission Street and Duboce Avenue/13th Street; and at Market Street at Octavia Boulevard.

I-280 is a generally a north–south freeway that connects San Francisco with the Peninsula and the South Bay. I-280 has an interchange with US 101 approximately 3 miles south of the project corridor and terminates in San Francisco at surface streets in the Mission Bay neighborhood. Near the project corridor, I-280 is a six- to eight-lane facility. The closest access to I-280 is provided at Sixth Street (at Brannan Street) and King Street (at Fifth Street).

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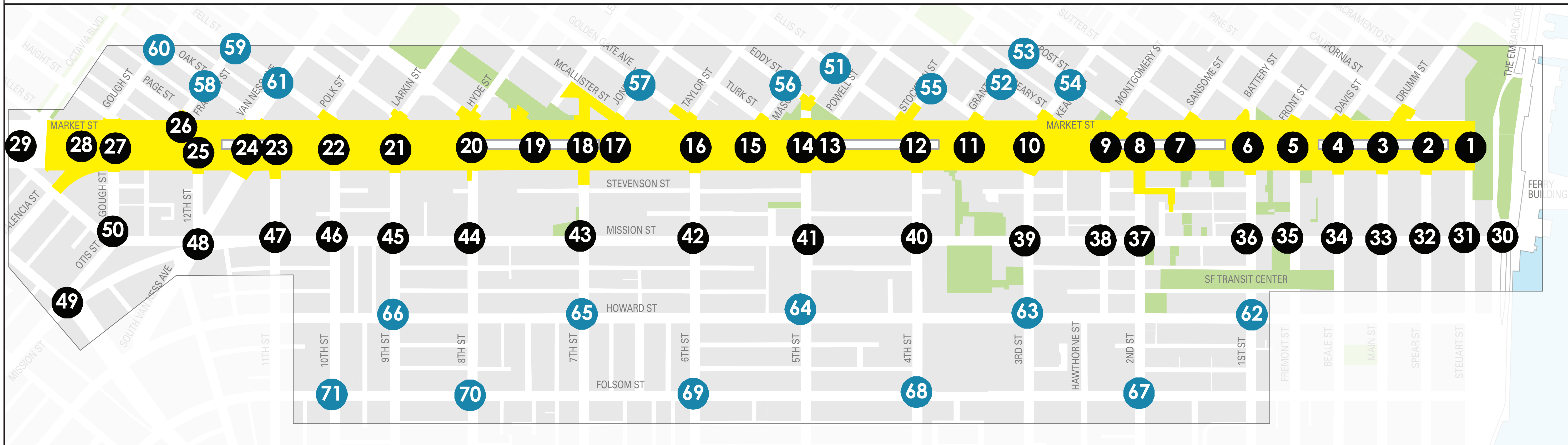
[1] Existing conditions reflect the transportation network as of 2017/2018 and include vehicle counts conducted in 2011 and 2015 and pedestrian and bicycle counts conducted in 2017. Existing transit operating conditions reflect observations conducted between 2015 and 2018. Further detail on existing conditions provided in the Environmental Setting, beginning on this page.



Notes:

- Market Street is shown wider than map scale for clarity.
- Intersections 1 through 50 were studied in VISSIM; intersections 51 through 71 were studied in Synchro
- VISSIM and Synchro are two software packages that were used to evaluate transit travel times. The VISSIM microsimulation software was used to evaluate multi-modal operations and estimate transit travel times on Market and Mission streets, while the Synchro traffic operations software was used to conduct isolated intersection analysis for study intersections located to the north and south of Market and Mission streets.

LEGEND

Project Corridor

Transportation Study Area

BART/Muni Metro Station

VISSIM Study Intersection

Synchro Study Intersection

Source: Fehr & Peers 2019.
Other sources: Streets: City and County of San Francisco 2014

Figure 4.B-1
Transportation Study Area and Study Intersections

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Local Access

Market Street. Market Street runs diagonally across portions of the city in the southwest/northeast directions at the boundary where two street grids intersect. North of Market Street, streets run north–south and east–west; south of Market Street, streets run northwest/southeast and southwest/northeast. Market Street is considered to run east–west. South of Market Street, streets that run in the northwest/southeast directions are generally considered north–south streets (e.g., Valencia, Gough Street, South Van Ness Avenue, 10th, First, Fremont, Steuart streets), whereas streets that run in the southwest/northeast directions are generally considered east–west streets (e.g., Mission Street, Howard, Folsom streets).

Market Street runs between Steuart Street in the financial district and Portola Drive in the Twin Peaks area. Generally, Market Street has two lanes in each direction. Between Steuart and Castro streets, Market Street has streetcar tracks running in each direction within the center travel lanes, which accommodate the San Francisco Municipal Railway's (Muni's) F Market & Wharves historic streetcar. The center lanes are designated as all-day transit-only lanes between 12th and Third streets in the eastbound direction and between Van Ness Avenue and Third Street in the westbound direction. There is a *class II* bicycle lane on each side of Market Street between Castro and Eighth streets, with one section between Octavia Boulevard and Duboce Avenue (west of the Market Street project corridor), now a *class IV* separated bikeway.

Left turns from Market Street are prohibited between Main/Drumm streets and Octavia Boulevard, with the exception of the double left-turn lanes from eastbound Market Street onto northbound Franklin Street and the single left-turn lane from westbound Market Street onto southbound Valencia Street. Between Octavia Boulevard and Castro Street, where a center landscaped median separates the eastbound and westbound travel lanes, left-turn pockets are provided in one or both directions at most intersections.

On eastbound Market Street, private vehicles in the curb travel lane are required to turn right at 10th and Sixth streets. In addition to these required right turns, left and right turn restrictions are in effect on streets approaching Market Street, generally between Third and Eighth Streets, prohibiting turns onto Market Street. Transit, taxis, paratransit, commercial vehicles, bicycles, and emergency vehicles are exempt. The turn restrictions, as well as the direction of travel on Market Street affected by the restrictions, are listed below and shown in Figure 2-5 in Chapter 2, *Project Description*:

- On streets north of Market Street, private vehicle turn prohibitions are in effect on Hyde Street (eastbound), Golden Gate Avenue (westbound), Mason Street (westbound and eastbound), Cyril Magnin Street (westbound), Ellis/Stockton streets (eastbound and westbound), O'Farrell Street (eastbound and westbound).
- On streets south of Market Street, private vehicle turn prohibitions are in effect on Seventh Street (eastbound and westbound), Sixth Street (eastbound), Fifth Street (eastbound) and Third Street (eastbound and westbound).

- In addition, on Market Street, there is a vehicle turn prohibition from westbound Market Street onto northbound Grant Avenue that applies to all vehicles.

Within the Market Street project corridor between Octavia Boulevard and Steuart Street, there are seven driveways to either off-street parking or loading facilities, or vacant lots: three on the south side of the street and three on the north side of the street. On the south side of the street there is a driveway (inbound only) to a surface customer parking lot serving the adjacent McRoskey mattress store at 1687 Market Street, a driveway into a surface vehicle parking lot accommodating 69 vehicles at 1615 Market Street,[2] and an emergency access/loading alley on the south side of Market Street between Eighth and Ninth streets serving the 1275 Market Street building. On the north side of the street there is a driveway to a small surface lot accommodating two vehicles at 1780 Market Street, a driveway to a vacant portion of a lot that continues through to Oak Street (57 Oak Street),[3] and a parking garage egress-only driveway on the north side of Market Street between Battery/Bush streets and Sutter/Sansome streets, serving the One Bush Street building parking garage. On-street parking is not permitted on Market Street east of Octavia Boulevard, with the exception of six metered parking spaces on the north side of Market Street between Steuart and Spear streets; west of Octavia Boulevard, on-street parking is generally provided on both sides of the street. Transit stops are located both at the curbside and at transit boarding islands[4]; the curbside stops are generally staggered from the transit boarding island stops.[5]

The San Francisco General Plan contains definitions and regulatory requirements for a variety of roadway classifications that make up the city's street network and designation of streets.[6] Appendix 7, attachment 1 contains definitions and regulatory requirements for the various

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[2] This surface lot is part of the approved mixed-use development project on multiple lots at 1629 Market Street, and the driveway would be removed as part of that project. Available: http://sfmea.sfplanning.org/!1629MarketStDEIR_2017-05-10-Print%20(1).pdf.

[3] The driveway that is part of the 57 Oak Street lot is part of the proposed mixed-use development project at 98 Franklin Street, and the driveway would be removed as part of that project. Available: http://sfmea.sfplanning.org/2015-000940ENV_2017-008051ENV_2016-014802ENV_Hub_NOP.pdf.

[4] Transit boarding islands are raised areas with a transit stop within the roadway that provide a safe place for riders to get on and off transit vehicles, allowing transit vehicles to use the center lanes without having to pull over to the side of the roadway for riders to get on and off.

[5] In some locations, curbside and boarding island stops are provided along the same curb length.

[6] City roadway designations include (listed in the order of potential vehicle capacity) Freeways, Major Arterials, Transit Conflict Streets, Secondary Arterials, Recreational Streets, Collector Streets, and Local Streets. Each of these roadways has a different potential capacity for mixed-flow traffic and changes that might alter traffic patterns on the given roadway. The General Plan also identifies certain Transit Preferential Streets from among the city's various roadways, each of which is identified as a Primary Transit Street—Transit Oriented, Primary Transit Street—Transit Important, or Secondary Transit Street. The Pedestrian Network is a classification of streets throughout the city used to identify streets developed to be primarily oriented to pedestrian use and includes Citywide Pedestrian Network Streets and Neighborhood Pedestrian Streets. City and County of San Francisco. 2007. San Francisco General Plan. Transportation Element. Available: http://www.sf-planning.org/ftp/General_Plan/I4_Transportation.htm.

general plan roadway classifications. In the San Francisco General Plan, Market Street in the project corridor is classified primarily as a Transit Conflict Street. It is also designated as a Neighborhood Pedestrian Street (neighborhood commercial) and a Primary Transit Street (transit oriented); it is also part of the Citywide Pedestrian Network. The Better Streets Plan identifies Market Street as a ceremonial/civic street.

McAllister Street. McAllister Street runs in an east-west direction between Market Street (at Jones Street) and Masonic Avenue. McAllister Street generally has one to two travel lanes in each direction. The segment of McAllister Street between Market Street and Charles J. Brenham Place included as part of the proposed project has one travel lane in each direction, and on-street parking and/or commercial and passenger loading on both sides of the street. The eastbound travel lane between Hyde Street and Charles J Brenham Place is restricted to buses, taxis, bicyclists, and commercial vehicles. In the San Francisco General Plan, McAllister Street is classified as a Secondary Arterial between Charles J. Brenham Place and Hyde Street, a Secondary Transit Street west of Leavenworth Street, and a Neighborhood Pedestrian Street (neighborhood commercial street). The Better Streets Plan identifies McAllister Street as a downtown commercial street between Market and Larkin streets, and as a ceremonial/civic street between Larkin Street and Van Ness Avenue.

Charles J. Brenham Place. Charles J. Brenham Place runs in a north-south direction for the one-block segment between Market and McAllister streets. Charles J. Brenham Place has two northbound travel lanes and one southbound right-turn-only lane onto westbound Market Street. In the northbound direction, Charles J. Brenham Place serves as the continuation of Seventh Street north of Market Street. In the San Francisco General Plan, Charles J. Brenham Place is identified as a Secondary Arterial, and is part of Citywide Bicycle Route network. The Better Streets Plan identifies Charles J. Brenham Place as a downtown commercial street.

Valencia Street. Valencia Street runs in a north–south direction between Market Street and Mission Street near the Bernal Heights neighborhood (i.e., between 29th and Cesar Chavez streets). Valencia Street generally has one travel lane in each direction, with left-turn pockets at intersections and/or center turn lanes. Bicycle lanes are provided in each direction of Valencia Street, with the exception of the one-block segment between Duncan and Mission streets (i.e., at the southern terminus of Valencia Street).

The segment of Valencia Street between Market and McCoppin streets included as part of the proposed project has one southbound travel lane, two northbound travel lanes, and a bicycle lane in each direction as well as on-street parking on both sides of the street. This segment has three travel lanes, one southbound and two right-turn-only lanes onto eastbound Market Street. Left turns onto westbound Market Street are not permitted. In the San Francisco General Plan, Valencia Street is classified as a Secondary Arterial and a Neighborhood Pedestrian Street (neighborhood commercial street). The Better Streets Plan identifies Valencia Street as a commercial throughway.

Other Streets in the Transportation Study Area. Numerous streets within the transportation study area are one-way streets with multiple travel lanes. Figure 2-5 in Chapter 2, *Project Description*, presents the one-way streets in the vicinity of the Market Street project corridor. South of Market Street, the street grid offers multiple options for intra-city travel. Streets serve as access routes to and from the regional highway network, as described above. North of Market Street, many streets provide east–west access to destinations to the west. Within the transportation study area, Van Ness Avenue/South Van Ness Avenue, Franklin Street, and Stockton Street are the primary north–south streets. As a result of the junction of the two street grids at Market Street, which runs diagonally, many streets north and south of Market Street are offset; therefore, direct access across Market Street is limited. The primary north–south access routes across Market Street include Fremont and Front streets (northbound), Battery and First streets (southbound), Third and Kearny streets (northbound), Fourth and Stockton streets (southbound), Eighth and Hyde streets (southbound), Ninth and Larkin streets (northbound), South Van Ness and Van Ness avenues (northbound/southbound), and Gough Street (southbound). North of Market Street, these streets connect with the major east–west arterials. The Embarcadero, a two-way north-south roadway at the edge of the city that runs between King Street in South Beach and Taylor Street at Fisherman's Wharf, has limited connections with the transportation study area roadways.

The San Francisco General Plan identifies most north–south and east–west streets south of Market Street as Major Arterials as well as the one-way street couplets[7] north of Market Street (e.g., Oak and Fell streets, Golden Gate Avenue and Turk Street, Pine and Bush streets) and Drumm Street, Davis Street, Hayes Street, and Van Ness Avenue. Mission and Sutter streets are designated as Transit Conflict Streets. One-way arterial streets typically have three to five travel lanes, while bidirectional streets generally have one to three travel lanes. Primary Transit Streets include Mission, Stockton, Powell, Battery, and Sansome streets (transit oriented) as well as Third, Fourth, Kearny, Geary, and O'Farrell streets (transit important). Most streets north of the Market Street project corridor are designated Neighborhood Pedestrian Streets (neighborhood commercial), as are most streets south of Market Street between Market and Mission streets and the entirety of Second, Third, and Fourth streets. Mission, Haight, Third, and Fourth streets and Van Ness, South Van Ness, and Grant avenues are also Citywide Pedestrian Network streets. Appendix 7, attachment 1 includes the street classifications and San Francisco General Plan street designations for other local streets in the transportation study area.

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[7] A street couplet refers to a pair of parallel, usually one-way, streets that carry opposite directions of traffic.

TRAFFIC VOLUMES

Intersection turning movement counts were collected at the 71 study intersections presented in Figure 4.B-1, p. 4.B-3, in 2011 and validated according to the additional counts conducted at selected intersections in 2015.[8] Table 4.B-1, below, presents existing traffic volumes (including transit vehicles) at representative locations along the Market Street project corridor.

TABLE 4.B-1. TRAFFIC VOLUMES ON MARKET STREET – EXISTING CONDITIONS – WEEKDAY P.M. PEAK HOUR

Street Segment of Market Street[a]	Eastbound	Westbound	Total
Spear to Steuart streets	186	88	274
First to Fremont streets	336	265	601
Second to New Montgomery streets	560	277	837
Fifth to Fourth streets	331	335	666
Eighth to Seventh streets	218	477	695
Twelfth Street to Van Ness Avenue	357	732	1,089
Franklin to Gough streets	1,191	1,249	2,440

Note:

[a.] Representative segments. Traffic volumes include transit vehicles.

Source: Fehr & Peers, 2011 and 2015. See Appendix 7, attachment 2.

During the weekday p.m. peak hour, traffic volumes on Market Street range between about 300 and 2,500 vehicles per hour. The lowest p.m. peak-hour volumes are at the eastern end of the project corridor where Market Street terminates, while the highest volumes are at the western end of the project corridor between Valencia and Franklin streets.

VEHICLE MILES TRAVELED

The San Francisco County Transportation Authority's San Francisco Chained Activity Modeling Process (SF-CHAMP) travel demand model was used to estimate existing average daily VMT per capita for different land uses for the Transportation Analysis Zone (TAZ)[9] in which the project is located. VMT per capita ratio is used as a measure of the amount and distance that a resident, employee, or visitor drives, accounting for the number of passengers within a vehicle. Many factors affect travel behavior, including density, diversity of land uses, design of the transportation network, access to regional destinations, distance to high quality

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8 *Better Market Street VISSIM Modeling Approach* (Fehr & Peers, October 31, 2018), as presented in Appendix 8.

9 Transportation Analysis Zones are used by planners as part of transportation planning models for transportation analyses and other planning purposes. The TAZs vary in size from single city blocks in the downtown core, multiple blocks in outer neighborhoods, to even larger zones in historically industrial areas such as the Hunters Point Shipyard area.

transit, development scale, demographics, and transportation demand management. Typically, low-density development at great distances from other land uses, located in areas with poor access to non-private vehicular modes of travel, generate more automobile travel compared to development located in urban areas where a higher density, mix of land uses, and travel options other than private vehicles are available.

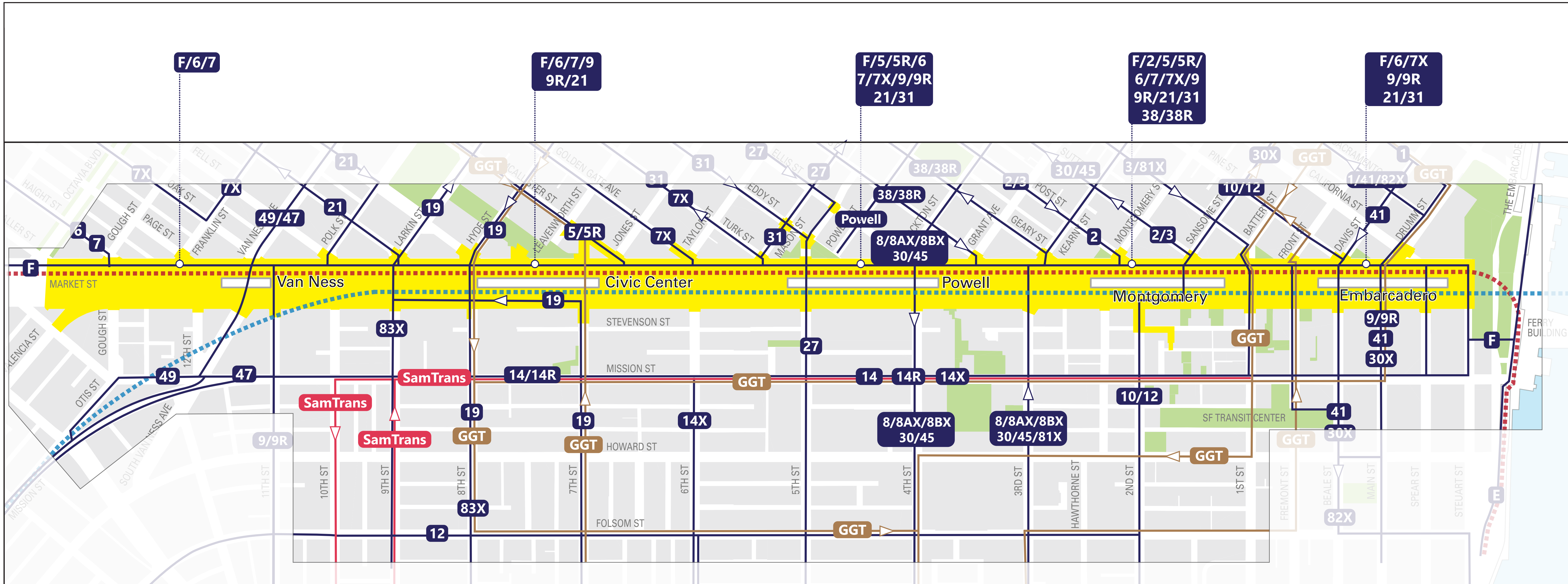
Given the travel behavior factors described above, San Francisco has a lower average VMT ratio than the nine-county San Francisco Bay Area region. In addition, for the same reasons, different areas of the city have different VMT ratios, and some areas of the city, such as the Market Street corridor, have lower VMT ratios than other areas of the city. The current average daily VMT per capita for residents, employees, and visitors for the TAZs along the Market Street corridor is between 40 and 90 percent less than the regional Bay Area averages for the various trip types for the nine-county San Francisco Bay Area. Appendix 7, attachment 3 includes a summary of the VMT per capita for the TAZs along the Market Street corridor.

Transit Service

The Market Street project corridor and transportation study area are well served by both local and regional public transit. Local service is provided by the Muni bus, light rail, historic streetcar and cable car lines, which can be used to access regional transit operators. Service to and from the East Bay is provided by Bay Area Rapid Transit (BART), WestCAT, AC Transit, Amtrak, and Water Emergency Transportation Authority (WETA) ferries. Service to and from the North Bay is provided by Golden Gate Transit buses and ferries as well as Blue & Gold and Water Emergency Transportation Authority ferries. Service to and from the Peninsula and South Bay is provided by Caltrain, SamTrans, BART, and Water Emergency Transportation Authority ferries. Figure 4-B-2, on the following page, illustrates the existing transit route network in the transportation study area.

Local Muni Service

Muni service along the Market Street project corridor consists of the F Market & Wharves historic streetcar line that operates within the center travel lanes along the entire length of the project corridor and 23 bus routes that travel varying distances on Market Street during the p.m. peak hour. Bus routes that make multiple stops on Market Street consist of the Muni 2 Clement, 5 Fulton, 5R Fulton Rapid, 6 Haight/Parnassus, 7 Haight/Noriega, 7X Noriega Express, 9 San Bruno, 9R San Bruno Rapid, 21 Hayes, 31 Balboa, 38 Geary, and 38R Geary Rapid routes. Within the project corridor, the streetcar line and bus routes have 20 eastbound (eight curbside and 12 center boarding islands) and 20 westbound (nine curbside and 11 center boarding islands) stops. During the weekday morning and evening peak periods, the bus routes operate with between 4- and 22-minute headways between buses, while the Muni F Market & Wharves line operates with approximately 6-minute headways between



Notes:

- Market Street is shown wider than map scale for clarity.
- At time of publication, Transbay bus routes are being routed to the Temporary Transbay Terminal rather than to Salesforce Transit Center.
- Routes that do not cross through transportation study area are not shown for clarity (1AX, 1BX, 31AX, 31BX, 38AX, 38BX and 76X).
- Muni routes N and L owls and AC Transit service (routes 800 and 822) also run on Market Street overnight.
- Full Muni map is located in Appendix 7.

LEGEND

- Project Corridor
- BART/Muni Metro Station
- BART Service
- SFMTA Muni Metro
- SFMTA Muni Routes
- SamTrans Service
- Golden Gate Transit (GGT) Service

Routes serving Ferry Plaza
E/F/6/7X/14
14X/21/31

Routes serving Mission & Main
2/9R/14R

Routes serving Salesforce Transit Center
5/5R/7/25
30X/38/38R
41/81X/82X

Source: Fehr & Peers 2019.
Other sources: Streets: City and County of San Francisco 2014.

Figure 4.B-2
Existing Transit Network Within the Vicinity of the Project Corridor

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streetcars. There are also two late-night bus routes that operate on Market Street (i.e., the Muni Owl L and Owl N routes) between 1 a.m. and 5 a.m. In addition to these surface routes, five light-rail lines (Muni J Church, K Ingleside/T Third Street, L Taraval, M Ocean View, and N Judah) operate within a subway along Market Street. Within the project corridor, The Embarcadero, Montgomery, Powell and Civic Center stations are shared with BART, while the Van Ness station serves only the light-rail lines.

Three east–west bus routes operate on Mission Street (Muni 14 Mission, 14R Mission Rapid, and 14X Mission Express), and 20 routes (Muni 3 Jackson, 8 Bayshore, 8AX Bayshore A Express, 8BX Bayshore B Express, 10 Townsend, 12 Folsom, 14 Mission, 14R Mission Rapid, 14X Mission Express, 19 Polk, 27 Bryant, 30 Stockton, 41 Union, 45 Union/Stockton, 47 Van Ness, 49 Van Ness/Mission, 76X Marin Headlands Express, 81X Caltrain Express, 82X Levi Plaza Express, 30X Marina Express, and 83X Mid-Market Express) cross Market Street north–south within the project corridor or travel along a portion of Market Street generally without stopping on Market Street. In addition to these regular service routes, the 90 San Bruno Owl and the 91 Third Street/19th Avenue Owl late-night service routes cross Market Street within the project corridor.

Transit operating conditions were observed during field surveys conducted in 2015 through 2018. Operational conflicts at times occurred between buses and other vehicles along Market Street and other roadways within the transportation study area (e.g., private vehicles or commercial vehicles blocked bus stops, or buses were unable to proceed because of vehicles that were blocking an intersection).

PRIVATELY OPERATED SHUTTLES AND THE PRESIDIO TRUST SHUTTLE SERVICE

A number of private shuttles serve San Francisco locations (e.g., the California Pacific Medical Center shuttles, Mission Bay Transportation Management Association shuttles, University of California, San Francisco shuttles). In addition, there are commuter shuttles that travel between San Francisco and the South Bay (e.g., Facebook, Google) on transportation study area streets and make stops at designated shuttle stops and passenger loading/unloading zones. Although these shuttles run on portions of Market Street, they do not have stops on Market Street. All of the shuttle services are permitted under the San Francisco Commuter Shuttle Program.[10]

In addition to these privately operated shuttles, the Presidio Trust operates a weekday shuttle route, serving residents, employees, and visitors traveling between the Presidio and downtown San Francisco (i.e., the PresidiGo Downtown route). Within the transportation study area, the PresidiGo Downtown route operates on Drumm, Spear, and Main streets; however, it does not stop on Market Street.

[10] In November 2015, the San Francisco Commuter Shuttle Program was approved by the SFMTA Board of Directors, which increased fees and enacted new regulations to restrict larger shuttle buses on smaller streets, require greener fleets to reduce emissions, and prevent labor disruptions (effective February 1, 2016).

REGIONAL TRANSIT SERVICE

EAST BAY

Transit service to and from the East Bay is provided by WestCAT, Amtrak, BART, AC Transit, and the Water Emergency Transportation Authority. BART operates regional rail transit service between the East Bay (from Antioch, Richmond, Dublin/Pleasanton, and Warm Springs) and San Francisco, and between San Mateo County (Millbrae and the San Francisco Airport) and San Francisco. There are four BART stations within the Market Street project corridor, including The Embarcadero, Montgomery, Powell, and Civic Center stations. AC Transit is the primary bus operator for the East Bay, including Alameda and western Contra Costa counties. AC Transit operates 27 routes between the East Bay and San Francisco, all of which terminate at the Salesforce Transit Center. WestCAT's "Lynx" bus service provides peak-period service between the Contra Costa County cities of Hercules and Richmond and the Salesforce Transit Center. Amtrak provides bus service to connect to its Capitol Corridor and San Joaquin trains between the Salesforce Transit Center and the Emeryville Amtrak station. Water Emergency Transportation Authority ferries provide service between San Francisco and Alameda, San Francisco and Oakland, and San Francisco and Richmond from the Ferry Building.

SOUTH BAY

Transit service to and from the South Bay is provided by BART, SamTrans, and Caltrain. SamTrans provides bus service between San Mateo County and San Francisco, including 10 bus lines that serve San Francisco (three routes serve the downtown area). In general, SamTrans service to downtown San Francisco operates along Bayshore Boulevard, Potrero Avenue, and Mission Street to the Salesforce Transit Center. SamTrans cannot pick up northbound passengers at San Francisco stops. Similarly, passengers boarding in San Francisco (and destined for San Mateo County) may not disembark in San Francisco. SamTrans routes stop at northbound and southbound bus stops on Mission Street. Caltrain provides commuter heavy-rail passenger service between Santa Clara County and San Francisco. Caltrain currently operates 44 trains each weekday, with a combination of express and local service. The closest Caltrain station to the Market Street corridor is at the terminus at Fourth and King streets.

NORTH BAY

Transit service to and from the North Bay is provided by Golden Gate Transit buses, ferries, and Water Emergency Transportation Authority ferries. Between the North Bay (Marin and Sonoma counties) and San Francisco, Golden Gate Transit operates 18 commuter bus routes, four basic bus routes, and 16 ferry feeder bus routes, most of which serve the Van Ness Avenue corridor or the Financial District. Golden Gate Transit also operates ferry service between the North Bay and San Francisco. Ferries run between Larkspur and San Francisco and between Sausalito and San Francisco most of the day. Water Emergency Transportation Authority ferries provide service between Vallejo and San Francisco.

WALKING/ACCESS CONDITIONS

Market Street is classified by the San Francisco Better Streets Plan as a Ceremonial (Civic) street, which are "grand civic spaces which serve as major gathering spots and serve as well-known public spaces and attractions."[11] Market Street has high levels of pedestrian activity, transit service, and bicyclists. The street is frequently used for rallies, parades, and marches. Existing sidewalks on Market Street range between 25 and 35 feet wide east of Van Ness Avenue and are about 15 feet wide west of Van Ness Avenue. Objects located on the existing sidewalks include trees, signs, public transit shelters, elevator entrances/exits, newspaper kiosks and boxes, flower stands, public art, bicycle racks, self-cleaning bathrooms, advertising signs, bollards with chains at intersection crossings, and the Path of Gold light standards.

The sidewalk surface, composed of red brick installed in the 1970s, does not meet current standards for compliance with the Americans with Disabilities Act (ADA) of 1990. The large joints in the surface of the brick sidewalk may cause the front end of a wheelchair to vibrate or bounce as it travels across the surface. For many people, this vibration can cause pain or muscle spasms, possibly leading to a loss of control and maneuvering ability. Moreover, the herringbone pattern poses challenges for people with low or no vision. Grates and cracks wide enough to catch the tip of a cane can be dangerous for walking-aid users. In addition, brick may demonstrate a tendency to buckle, creating changes in level and tripping hazards for people with visual impairments as well as ambulatory pedestrians with mobility impairments.

Pedestrian conditions were evaluated qualitatively during field visits in 2017. Pedestrian facilities were noted at the study intersections, including sidewalks, crosswalks, ADA-compliant curb ramps, and pedestrian countdown signals. The following conditions were observed:

- Pedestrian crowding on sidewalks within the Market Street project corridor was generally not observed, except near the Market Street retail district between Third and Sixth streets.
- The pedestrian through zones[12] are kept free of obstructions. Street furniture, bus shelters, street trees, etc., are placed in separate furnishing zones.
- Pedestrian signal heads and countdown signals are currently provided at all signalized intersections within the transportation study area.

Crosswalks on the south side of Market Street tend to follow the direct pedestrian path of travel (i.e., the most direct route). On the north side of Market Street, however, the most direct pedestrian routes are interrupted because of the alignment of the diagonally intersecting streets. As such, some crosswalks on Market Street's north side require pedestrians to walk out of direction or cross in two stages.

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[11] San Francisco Planning Department (2010) *Better Streets Plan*, p. 82.

[12] As defined in the Better Streets Plan, the pedestrian through zone is the portion of the sidewalk intended for pedestrian travel only and should be kept clear of other obstacles.

Most street corners on Market Street provide corner curb ramps within the crosswalk. However, several side-street approaches on the north side of Market Street have curb ramps that are either missing from a marked crosswalk or incorrectly positioned (e.g., located outside the bounds of the marked crosswalk). These missing or incorrectly positioned curb ramps are at the intersections of 12th Street/Franklin Street/Page Street/Market Street, Ninth Street/Larkin Street/Hayes Street/Market Street, Sixth Street/Taylor Street/Golden Gate Avenue/Market Street, Mason Street/Market Street, Third Street/Kearny Street/Geary Street/Market Street, and Second Street/Market Street, Sansome Street/Sutter Street/Market Street, and Beale Street/Davis Street/Pine Street/Market Street (see Appendix 7, attachment 8).

Volume counts of people walking on Market Street sidewalks were conducted during the weekday p.m. peak periods (4 to 6 p.m.) at nine representative locations within the project corridor in October 2017. Table 4.B-2, below, presents the peak-hour volume of people walking at the nine representative locations on the north and south sides of Market Street. The number of people walking along Market Street within the project corridor ranges between 400 and 2,500 pedestrians per hour during the weekday p.m. peak hour. It is highest along the eastern segment of the project corridor and lowest along the western segment of the project corridor. As shown in Table 4.B-2, the number of people walking is greatest in the financial district (generally between Steuart and Third streets) and retail district (generally between Third and Sixth streets); it is lower in the mid-Market area west of Sixth Street.

TABLE 4.B-2. PEDESTRIAN VOLUMES ON MARKET STREET SIDEWALKS WITHIN PROJECT CORRIDOR – EXISTING CONDITIONS, WEEKDAY P.M. PEAK HOUR

Market Street Sidewalk Location	Pedestrians per Hour
North Side of Market Street	
Drumm to Steuart streets	1,863
Montgomery to Sutter streets	1,946
Fifth to Ellis streets	1,574
Larkin to Grove streets	716
South Side of Market Street	
Fremont to Beale streets	2,194
Montgomery to Second streets	1,956
Fifth to Fourth streets	2,482
Eighth to Seventh streets	936
Valencia to Gough streets	377

Notes:
All pedestrian counts conducted in October 2017.
Source: Parisi Transportation Consulting, 2018.

The City designated Market Street as a Vision Zero Corridor as well as a Vision Zero High Injury Network for pedestrians and bicyclists.[13] Figure 4.B-3, p. 4.B-19, presents information on collisions involving pedestrians for the 5-year period between January 2012 and December 2016. See Appendix 7, attachment 8 for additional collision data. During the 5-year period, there were 166 reported pedestrian collisions along the Market Street project corridor, consisting of 137 collisions between vehicles and pedestrians and 29 collisions between pedestrians and bicyclists.

A high number of pedestrian-involved collisions occurred in the retail and financial districts, including the following intersections:

- Montgomery Street/New Montgomery Street/Market Street (9)
- Third Street/Kearny Street/Geary Street/Market Street (7)
- Fifth Street/Cyril Magnin Street/Market Street (18)
- Sixth Street/Taylor Street/Golden Gate Avenue/Market Street (8)
- Seventh Street/Charles J. Brenham Place/Market Street (9)

In addition, the following boarding island locations had a high number of pedestrian-involved collisions:

- Fourth Street/Stockton Street/Ellis Street/Market Street (10)
- Fifth Street/Cyril Magnin Street/Market Street (8)
- Seventh Street/Charles J. Brenham Place/Market Street (9)

Most pedestrian-bicycle collisions occurred at intersections, with most occurring between Third and Eighth streets where there is no designated bicycle facility. Behaviors and site conditions that were identified as common factors in pedestrian collisions included motor vehicle encroachment into crosswalks, motor vehicle right turns conflicting with high pedestrian volumes, wide intersections and long pedestrian crossing distances, multistage pedestrian crossings at traffic islands, and misaligned and narrow curb ramps.

Bicycle Conditions

The project corridor is flat, with minimal changes in grades, facilitating bicycling in the area. West of Valencia Street, Market Street slopes uphill toward the Castro. In addition, west of Kearny Street, streets north of Market Street slope gently uphill. Figure 2-7 in Chapter 2, *Project Description*, identifies the existing bicycle facilities within the transportation study area. Bicycle

[13] The City and County of San Francisco adopted Vision Zero in 2014. Vision Zero is a road safety policy focused on eliminating traffic deaths in San Francisco by 2024. Implemented projects such as Safer Market Street and ongoing project such as the Van Ness Improvement Project are examples of City projects to achieve Vision Zero.

facilities are typically classified as *class I,* class II, *class III*, or class IV facilities.[14] Class I bikeways are bike paths with exclusive rights-of-way for use by bicyclists and pedestrians. Class II bikeways are bicycle lanes striped within the paved areas of roadways and established for the preferential use of bicycles. They include a striped, marked, and signed bicycle lane buffered from vehicle traffic. These facilities are located on roadways and reserve 4 to 6 feet of space exclusively for bicycle traffic. Class III bikeways are routes that allow bicyclists to share travel lanes with vehicles and may include sharrow markings. A class IV bikeway is an exclusive bicycle facility that is separated from vehicular traffic and parked cars by a buffer zone (also referred to as a protected bicycle lane).

Market Street has dedicated street-level bikeway facilities, which vary from a protected cycle track with safe-hit posts to a bicycle lane, between Gough Street and half-way between Ninth and Eighth streets in the eastbound direction and between Eighth Street and Octavia Boulevard in the westbound direction.[15] Sharrows are painted in the curb lanes at all other locations on Market Street to indicate that bicycles and vehicles share these lanes. In the segments of Market Street with a dedicated facility, bicyclists are able to travel at relatively constant speeds with minimal interference. However, in the shared lane segments of Market Street, bicyclists frequently must maneuver around vehicles parked for loading, queued vehicles waiting to turn off Market Street, vehicles traveling on Market Street, and buses queued or picking up and dropping off passengers at transit stops.

Class II or class IV bicycle lanes are provided on The Embarcadero and Seventh, Eighth, 11th, Howard, Folsom, Otis, Polk, and Valencia streets. Class II bicycle lanes are provided on Second Street between Market and Howard streets, and a class III shared-lane/bicycle route only is located south of Howard Street. A class III shared lane bicycle route is provided on Fifth, 10th, Page, Post, Sutter, Sansome, and Battery streets and on Octavia Boulevard.

Bicycle volume counts were conducted during the weekday p.m. peak periods (4 to 6 p.m.) at nine representative locations on Market Street within the project corridor in October 2017. Table 4.B-3, p. 4.B-21, presents the peak-hour volume of bicyclists along the corridor traveling in the eastbound and westbound directions. The number of bicyclists along Market Street within the project corridor ranges between about 100 and 630 bicyclists per hour during the weekday p.m. peak hour. During the weekday p.m. peak period, the peak direction of bicyclist travel is westbound, leaving downtown, and greatest in the western segment of the project corridor.

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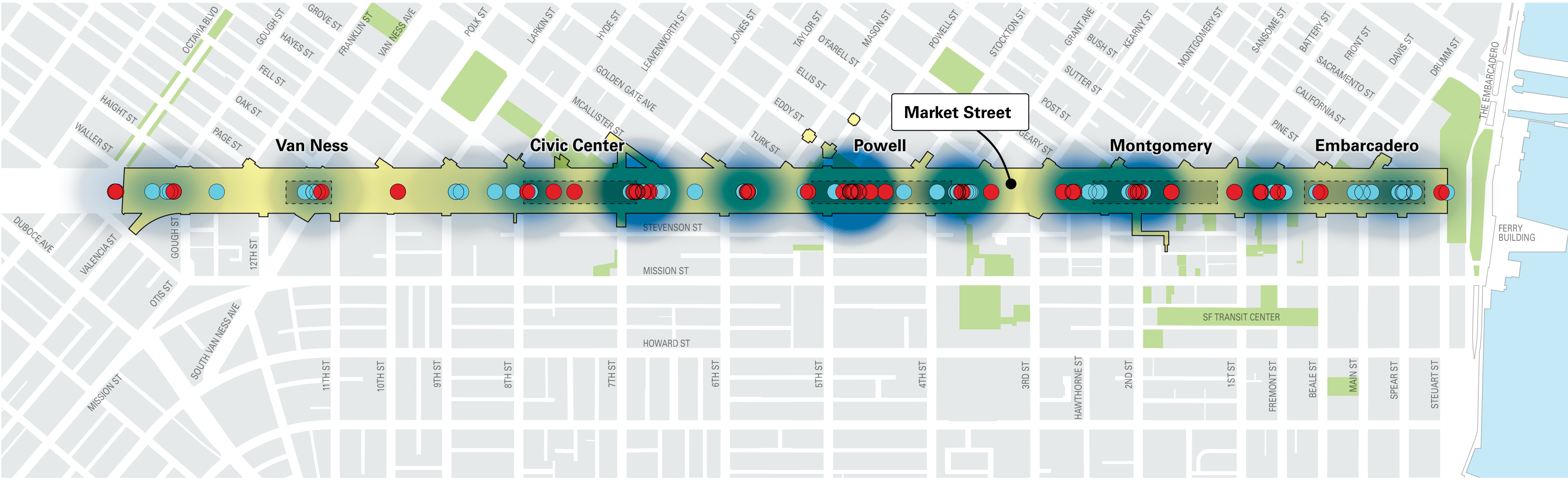
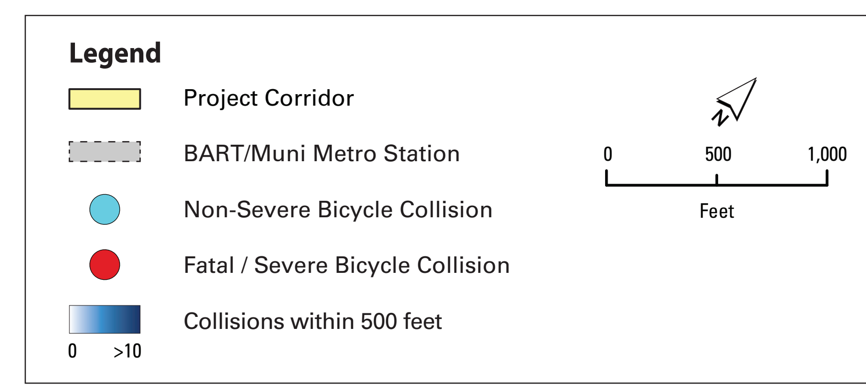
[14] Bicycle facilities are defined by the state in California Streets and Highway Code section 890.4. Available: https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=SHC&division=1.&title=&part=&chapter=8.&article=3. Accessed: October 22, 2018.

[15] On the south side of Market Street, between Gough and 12th streets, an eastbound bikeway has elements of horizontal and vertical separation from the adjacent travel lane. The horizontal separation is a 1- to 2-foot painted buffer with safe-hit posts. The bikeway is raised vertically from the roadway grade by about 3 inches, with the raised section bounded by either a concrete mountable curb, or a concrete vertical curb.



Notes:

- Market Street is shown wider than map scale for clarity.
- Collision density heatmap methodology: The heatmap is a linear gradient generated by summing the number of collisions on Market Street within 500 feet of any given location. The gradient has a maximum value of 15 collisions. Collision records were not weighted by severity or any other factors.



Source: Parisi Transportation Consulting 2018.
Other sources: Streets: City and County of San Francisco 2014.

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Figure 4.B-3
Pedestrian Collisions in the Project Corridor Between 2012 and 2017

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TABLE 4.B-3. BICYCLE VOLUMES ON MARKET STREET WITHIN PROJECT CORRIDOR – EXISTING CONDITIONS, WEEKDAY P.M. PEAK HOUR

Direction of Travel/Market Street Segment	Bicyclists per Hour[1,2]
Eastbound	
Fremont to Beale streets	121
Montgomery to Second streets	123
Fifth to Fourth streets	119
Eighth to Seventh streets	104
Valencia to Gough streets	79
Westbound	
Drumm to Steuart streets	122
Montgomery to Sutter streets	326
Fifth to Ellis streets	595
Larkin to Grove streets	626
Gough to Valencia streets[2]	446

Notes:
1. Counts of bicyclists conducted in October 2017.
2. Supplemental count collected in September 2015.
Source: Parisi Transportation Consulting, 2018.

Streets with higher levels of bicycle activity north of Market Street include Battery Street and Polk streets, each with about 100 bicyclists per hour during the weekday p.m. peak hour. Streets with high levels of bicycle activity south of Market Street include Seventh, Eighth, 11th, and Howard and Folsom streets, with between 100 and 200 bicyclists per hour during the p.m. peak hour.

Figure 4.B-4, p. 4.B-23, presents information on collisions involving bicyclists for the 5-year period between January 2012 and December 2016. See Appendix 7, attachment 9 for additional collision data. During the 5-year period, there were 248 reported bicyclist collisions along the Market Street project corridor, including 29 collisions between people walking and bicyclists.

A high number of bicyclist-involved collisions occurred at the following intersections:

- Fourth Street/Stockton Street/Ellis Street/Market Street (10)
- Fifth Street/Cyril Magnin Street/Market Street (17)
- Sixth Street/Taylor Street/Golden Gate Avenue/Market Street (9)
- Gough Street/Haight Street (9)
- Valencia Street/Market Street (10)
- US 101 off-ramp/Octavia Boulevard/Market Street (19)

In addition, the following boarding island locations and midblock locations had a high number of bicyclist-involved collisions:

- Third Street/Kearny Street/Geary Street/Market Street (12)
- Fourth Street/Stockton Street/Ellis Street/Market Street (9)
- Fifth Street/Cyril Magnin Street/Market Street (12)
- Eighth Street/Hyde Street/Grove Street/Market Street (10)

Most bicyclist collisions (i.e., about 60 percent) occurred between Third and Eighth streets where there is no designated bicycle facility. In this segment, bicyclists must share the curb lanes with vehicles, including buses, taxis and loading vehicles. Double-parking was observed to be a common obstacle for bicyclists in the travel lane. The greatest number of collisions occurred at the intersection of the US 101 off-ramp/Octavia Boulevard/Market Street. In April 2018, the San Francisco Municipal Transportation Authority (SFMTA) implemented protected bicycle lanes between Octavia Boulevard and Duboce Avenue to enhance bicycle travel through this high collision location.

Behaviors and site conditions that were identified as common factors in bicycle collisions included "pinch zones" between sidewalk curb and transit boarding islands, weaving conflicts with right-turning vehicles, prohibited left turns across Market Street, bicyclist encroachment into crosswalks, sight lines impeded by skewed intersection approaches, leapfrogging between bicyclists and vehicles, and double parking and loading in the bicycle lanes and mixed-flow lanes.

On-street bicycle racks are provided throughout the Market Street project corridor. As of November 2017, there were nearly 200 bicycle racks between Octavia Boulevard and Steuart Street. In addition, there are 10 Ford GoBike shared bicycle stations on Market Street, with a combined capacity of approximately 270 docking spaces.

LOADING CONDITIONS

There are 23 existing loading bays on Market Street between Steuart Street and Octavia Boulevard, designated for commercial vehicle loading.[16] The length of the existing loading bays ranges between 40 and 173 feet. There are 11 bays on the north side of the street and 12 bays on the south side of the street. Figure 2-8 in Chapter 2, *Project Description*, presents the location of the existing loading bays, and Table 4.B-6, p. 4.B-85, lists the existing loading bays on Market Street within the project corridor.

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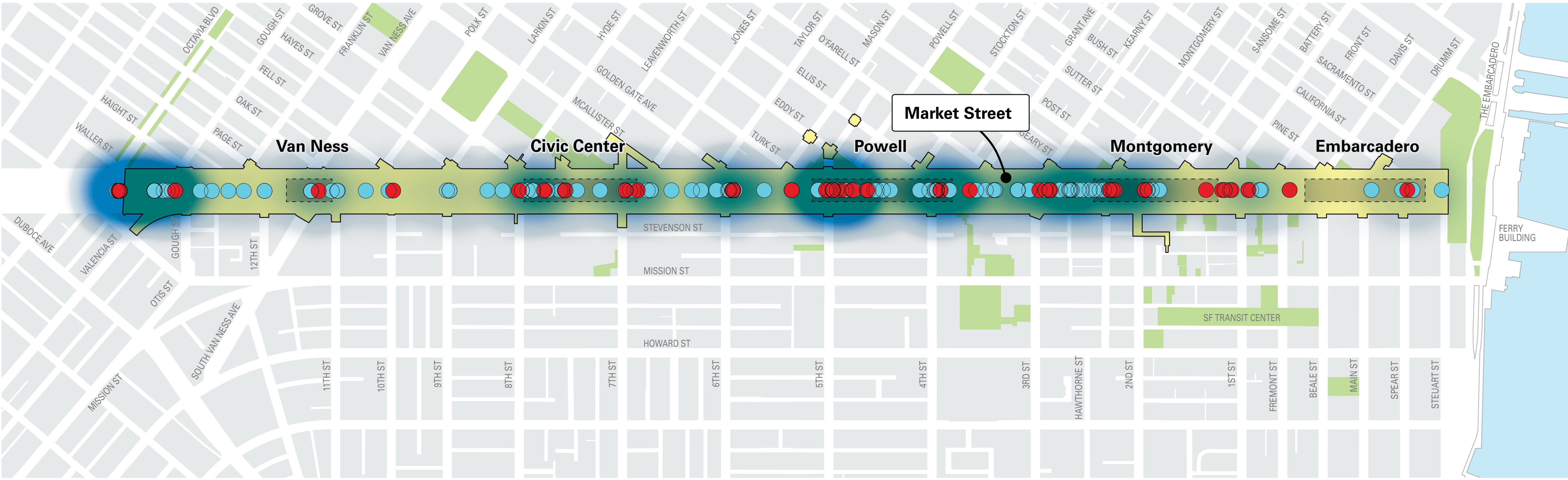
[16] Passenger loading/unloading is permitted in commercial loading zones as long as it is active loading/ unloading and does not exceed two minutes.



Notes:

- Market Street is shown wider than map scale for clarity.
- Collision density heatmap methodology: The heatmap is a linear gradient generated by summing the number of collisions on Market Street within 500 feet of any given location. The gradient has a maximum value of 15 collisions. Collision records were not weighted by severity or any other factors.

Legend

Project Corridor

BART / Muni Metro Station

Non-Severe Bicycle Collision

Fatal / Severe Bicycle Collision

Collisions within 500 feet

0 >15

0 500 1,000

Feet

Source: Parisi Transportation Consulting 2018.
Other sources: Streets: City and County of San Francisco 2014.

Figure 4.B-4
Bicycle Collisions in the Project Corridor Between 2012 and 2017

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On-street commercial loading spaces are provided on streets north and south of Market Street to allow commercial vehicles (typically trucks and service vehicles) to park along the curb to unload or load goods. Commercial loading spaces are generally regulated by meters with 30-minute to 1-hour time limits in effect Monday through Friday (or Saturday), with various start and end times.

In general, the Market Street loading bays and on-street commercial loading spaces are typically well utilized throughout the day, with periods of higher usage during the early mornings (primarily deliveries to restaurants and stores) and during the midday period (primarily package and mail deliveries).

On streets within the transportation study area, including Market Street, violations of regulations regarding on-street commercial loading spaces occur (e.g., use of the spaces by non-delivery vehicles, passenger pickup/drop-off, short-term parking, parking at expired meters), resulting in occasional shortages of available commercial loading spaces in some areas and periods of high demand. When commercial loading spaces are not available or not convenient to the delivery location, delivery/service vehicles have been observed to double park in the adjacent travel lane. During these times, minor congestion occurs, causing adverse effects on vehicle, transit, and bicycle conditions. In addition, delivery/service vehicles also stop within red zones (such as near intersections or fire hydrants) or at bus stops, affecting bus operations and resulting in additional delays and decreasing safety at intersections.

PARKING CONDITIONS

There are six on-street metered parking spaces on the north side of Market Street between Spear and Steuart streets. With the exception of streets such as Third Street that have curb transit-only lanes, most other streets in the transportation study area provide on-street parking spaces. On-street parking generally consists of metered or time-limited spaces, and includes general parking (about 80 percent of all spaces), commercial and passenger loading spaces (about 20 percent of all spaces), and ADA-accessible spaces.[17] During the weekday morning and evening commute periods, on-street parking is prohibited on one or both sides of a number of transit-oriented or arterial streets (e.g., Fifth, Sixth, and Mission streets). On-street parking occupancies during the weekday midday (10 a.m. to 3 p.m.) period for general parking is between 80 and 90 percent.

There are multiple public parking garages within a few blocks north or south of the Market Street project corridor. SFMTA parking garages include the Golden Gateway Garage, Fifth & Mission/Yerba Buena Garage, Moscone Center Garage, Ellis O'Farrell garage, Sutter Stockton Garage, Civic Center Garage, and Performing Arts Garage. Combined, these City and County of San Francisco– (City-) owned garages contain about 9,000 parking spaces, and their average occupancy during the midday 12 p.m. to 3 p.m. peak period ranges from 50 to 70 percent.[18]

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[17] SFMTA. 2017. *Folsom Howard Streetscape Project Alternatives Transportation Analysis, Final Report, July 2018*.
[18] SFMTA. 2017. *Average Occupancies at SFMTA Garages*. See Appendix 8.

EMERGENCY ACCESS CONDITIONS

The travel lane configuration on Market Street enables emergency vehicle access to all buildings within the corridor, and emergency vehicles typically use major arterials[19] through the transportation study area when heading to and from incidents along Market Street. Arterial roadways allow emergency vehicles to travel at higher speeds and provide enough clearance space to allow other traffic to maneuver out of the path of the emergency vehicle and yield the right of way.[20] Many traffic signals north and south of Market Street, as well as on Market Street between Spear and O'Farrell streets, are fire preemption equipped. Fire department stations 1, 13, and 36 currently have fire trucks equipped with preemption equipment; meaning that the intersection signal gives preference to emergency vehicles.

The nearest four stations to the Market Street project corridor are:

- Station No. 1, located on Folsom Street between Fifth and Sixth streets (935 Folsom Street), is about 0.4 mile from Market Street, with primary access to both streets via Fifth Street.
- Station No. 13, located on Sansome and Washington streets (530 Sansome Street), is about 0.5 mile from Market Street. Emergency vehicles from Fire Station No. 13 can access Market Street via Sansome and Battery streets.
- Station No. 35, located at Pier 22½ on The Embarcadero, is approximately 0.6 mile from Market Street. Access to Market Street is provided via Howard and Main streets.
- Station No. 36, located on Oak Street between Franklin and Gough streets (109 Oak Street), is 0.3 mile from Market Street. Station No. 36 is interconnected with adjacent traffic signals at Franklin Street (northbound) and Gough Street (southbound) to facilitate emergency vehicle access from the station in both directions (i.e., to travel westbound against traffic flow on Oak Street to access Gough Street, and to travel eastbound on Oak Street to Franklin Street). Currently the one-block segment of Oak Street between Franklin Street and Van Ness Avenue is used by fire trucks from Station No. 36 to access Van Ness Avenue southbound or Market Street eastbound.

The Market Street project corridor is located within four police districts. These are the Central Police District (station located at 766 Vallejo Street), Tenderloin District (station located at 301 Eddy Street), Northern District (station located at 1125 Fillmore Street) and Southern District (station located at 1251 Third Street).

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[19] Major arterials are cross-town thoroughfares whose primary function is to link districts within the city and to distribute vehicle traffic to and from the regional freeway facilities. Within the transportation study area, Howard, Folsom, Harrison and Bryant streets are identified in the General Plan as major east/west arterials, and portions of all north/south streets between Third and 11th Street are identified as major north/south arterials.

[20] Per the California Vehicle Code, section 21806, all vehicles must yield right-of-way to emergency vehicles and remain stopped until the emergency vehicle has passed.

Baseline Conditions

The analysis in CEQA documents typically presents existing and existing-plus-project scenarios to isolate impacts by comparing conditions with the proposed project to existing conditions. However, in the transportation study area, a number of transportation infrastructure projects and land use development projects were recently completed, under construction, or approved and funded and therefore expected to be under construction or completed by the time the proposed project is under construction. Because of these changing conditions, a baseline other than the existing conditions at the time of the NOP was determined to be appropriate for the analyses prepared in this section because an analysis based on existing conditions could be misleading to decision-makers and the public.

The baseline includes projects that were under construction at the time when the NOP was published, and projects that are approved and funded and therefore likely to be completed by the time the proposed project is under construction. This future baseline year was determined to be 2020. A list of the projects that come under 2020 baseline conditions is provided in Appendix 7, attachment 5. They include various transportation network changes, such as travel lane reductions, new bicycle lanes, safety projects, streetscape projects, that have been recently implemented (e.g., Golden Gate Avenue Safety Project, Upper Market Street Safety Project); transportation projects that have been approved and funded or are under construction (e.g., Van Ness BRT/Van Ness Improvement Project, Polk Street Streetscape Project, Central Subway Project); and land use development projects that would be completed by the 2020 baseline year (e.g., 1075 Market Street Project, 1699 Market Street Project, 1546–1564 Market Street Project).

Two transportation infrastructure projects included in the list of baseline projects directly affect the Market Street project corridor: the SFMTA's Safer Market Street Project and the signal timing changes on Market and Mission streets, both of which were completed prior to 2018. The Safer Market Street Project focused on the section of Market Street between Third and Eighth streets and included turn restrictions, an extension of transit-only lanes, corner sidewalk extensions, daylighting, continental crosswalks, as well as other measures to enhance visibility for people walking, biking, and driving at intersections. Signal timing changes on Market and Mission streets within the transportation study area included changes to the signal cycle duration from 60 to 90 seconds, the addition of protected phases, and the provision of leading pedestrian intervals at many intersections. Other transportation projects do not directly change the Market Street project corridor; however, they modify the transportation network on streets that cross and/or connect with Market Street. Therefore, they affect the circulation of vehicles and bicyclists along and across the Market Street project corridor.

The analysis of transit travel times, VMT, and traffic hazards incorporates the baseline projects, as appropriate, into the San Francisco travel demand model (SF-CHAMP), the traffic assignment model, and the operations model developed for the proposed project. In addition, the 2020 baseline conditions consider increases in transit as well as the number of vehicles, people walking, and people biking that are anticipated to occur as a result of growth by 2020, as projected by SF-CHAMP. Additional information on the use of the travel demand, traffic assignment, and traffic operations models is provided in Appendix 7, attachment 5.

Development of the 2020 baseline conditions for the commercial vehicle loading analysis was based on the project-specific analyses prepared for land use projects along the Market Street project corridor. This involved review of the approved and proposed development projects anticipated to be completed by the baseline year, determination of whether onsite loading facilities would be provided to accommodate the truck loading demand associated with the development, or whether on-street loading bays within the Market Street project corridor would be relied upon to accommodate the loading demand. The loading demand and information on loading facilities for the development projects were obtained from environmental review documents prepared for these projects. Where development projects relied on Market Street loading bays, the loading demand was added to the existing demand identified for the loading bays from SFMTA field surveys to develop the 2020 baseline loading demand. These completed and near-term projects were also considered in the qualitative assessment of 2020 baseline and baseline-plus-project conditions related to people walking and biking, parking, emergency access, and construction.

Regulatory Framework

This section summarizes the plans and policies of the City and regional and state agencies that have policy and regulatory control over the project corridor.

Federal Regulations

Americans with Disability Act (ADA)

The ADA became law in 1990, and was amended in 2008. The ADA is a civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, and transportation, and at all public and private places that are open to the general public. The ADA is divided into five titles (or sections) that relate to different areas of public life. Titles II and III set minimum requirements for newly designed and constructed or altered state and local government facilities, public accommodation, and commercial facilities to be readily accessible and usable by individuals with disabilities.

State Regulations

CEQA Section 21099(b)(1) (Senate Bill 743)

CEQA, section 21099(b)(1), requires that the Office of Planning and Research (OPR) develop revisions to the CEQA Guidelines establishing criteria for determining the significance of transportation impacts of projects that "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." CEQA section 21099(b)(2) states that upon certification of the revised guidelines for determining transportation impacts pursuant to section 21099(b)(1), automobile delay, as described solely by level of service (LOS) or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment under CEQA.

In January 2016, the Office of Planning and Research published for public review and comment a Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA recommending that transportation impacts for projects be measured using a VMT metric.[21] On March 3, 2016, based on compelling evidence in that document and on the City's independent review of the literature on LOS and VMT, the San Francisco Planning Commission adopted the Office of Planning and Research's recommendation to use the VMT metric instead of automobile delay to evaluate the transportation impacts of projects (Resolution 19579). (Note: The VMT metric does not apply to the analysis of impacts on non-automobile modes of travel such as riding transit, walking, and bicycling.)

Caltrans Construction Manual

The California Department of Transportation (Caltrans) Construction Manual contains policies and procedures for construction personnel and construction contract administrators to follow when working on the state highway system. The manual also identifies procedures for projects administered by a local agency that modify, maintain, or improve the state highway system (e.g., construction across Van Ness Avenue) so that construction is conducted efficiently and effectively. It requires local agencies to conform to Caltrans standards and practices, as defined in the manuals and guidance documents pertaining to policies and practices.

[21] Office of Planning and Research, *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA, Implementing Senate Bill 743 (Steinberg, 2013)*, January 20, 2016.

Regional Regulations

General Guidelines for Design and Construction Over or Adjacent to BART Subway Structures

To avoid temporary or permanent adverse effects on the BART system, the BART guidelines identify required design and construction actions. Construction activities within an identified zone of influence, such as shoring, pile driving, excavation, or dewatering, among others, must be closely monitored. In addition, the project's design and construction documents are required to be submitted to BART for review and approval.

Local Regulations and Plans

Transit First Policy

In 1999, the San Francisco voters amended the City Charter (article 8A, section 8A.115) to include a Transit First Policy, which was first articulated as a City priority policy by the board of supervisors in 1973. The Transit First Policy is a set of principles that underscore the City's commitment that travel by transit, bicycle, and foot be given priority over the private automobile. These principles are embodied in the policies and objectives of the Transportation Element of the San Francisco General Plan. All City boards, commissions, and departments are required, by law, to implement transit-first principles in conducting City affairs.

Vision Zero Policy

Vision Zero is San Francisco's road safety policy.[22] The City adopted Vision Zero as a policy in 2014, committing to build better and safer streets, educate the public on traffic safety, enforce traffic laws, and adopt policy changes that save lives. The objective is to create a culture that prioritizes traffic safety and to ensure that mistakes on roadways do not result in serious injuries or death. The goal of this collaborative citywide effort will be safer, more livable streets as San Francisco works to eliminate traffic fatalities by 2024.

San Francisco General Plan

The Transportation Element of the San Francisco General Plan is composed of objectives and policies that relate to the eight aspects of the citywide transportation system: General Regional Transportation, Congestion Management, Vehicle Circulation, Transit, Pedestrian, Bicycles, Citywide Parking, and Goods Management. The Transportation Element references

[22] Information on Vision Zero available at http://visionzerosf.org/about/what-is-vision-zero/. Vision Zero has a new monthly fatality report that presents collision data from police calls and hospital admissions (http://visionzerosf.org/maps-data/). Although the information represents only a sample of the total number of collisions, it supports the proposed project's objectives, goals, and purposes.

San Francisco's Transit First Policy in its introduction, and contains objectives and policies that are directly pertinent to consideration of the proposed project, including objectives related to encouraging transit use, and traffic signal timing to emphasize transit, pedestrian, and bicycle traffic as part of a balanced multimodal transportation system.

BETTER STREETS PLAN

The San Francisco Better Streets Plan (Better Streets Plan) focuses on creating a positive pedestrian environment through measures such as careful streetscape design and traffic calming measures to increase pedestrian safety. The Better Streets Plan includes guidelines for the pedestrian environment, which it defines as the areas of the street where people walk, sit, shop, play, or interact. Generally speaking, the guidelines are for design of sidewalks and crosswalks; however, in some cases, the Better Streets Plan includes guidelines for certain areas of the roadway, particularly at intersections.

STANDARD PAVING MATERIALS IN SAN FRANCISCO'S PUBLIC RIGHTS-OF-WAY, PUBLIC WORKS ORDER 200369

In January 2019, Public Works Order 200369 became effective. Order 200369 provides specifications regarding allowable paving materials and their installation. Order 200369 references several previous City documents, including the Better Streets Plan, as well as the federal ADA.

SAN FRANCISCO BICYCLE PLAN

The San Francisco Bicycle Plan (Bicycle Plan) describes a City program to provide the safe and attractive environment needed to promote bicycling as a transportation mode. The San Francisco Bicycle Plan identifies the citywide bicycle route network and establishes the level of treatment (i.e., class I, class II, class III, or class IV facility) on each route. The Bicycle Plan also identifies near-term improvements that could be implemented within the 5 years after plan adoption, as well as policy goals, objectives and actions to support these improvements. It also includes long-term improvements and minor improvements that would be implemented to facilitate bicycling in San Francisco.

SAN FRANCISCO BICYCLE STRATEGY

The 2013–2018 San Francisco Bicycle Strategy updated the San Francisco Bicycle Plan and set new directions and policy targets to make bicycling a part of everyday life in San Francisco. The key actions are designed to meet the SFMTA 2013 Strategic Plan's mode-share goal, which calls for 50 percent of all trips to include sustainable modes, including bicycling, walking, public transit, and vehicle sharing.

San Francisco Transportation Sector Climate Action Strategy

With the passage of Proposition A in 2007, SFMTA was directed to develop a Climate Action Strategy every 2 years that identifies the climate action strategies and describes the progress towards reducing greenhouse gas emissions from the transportation sector. The 2017 Transportation Sector Climate Action Strategy meets the 2007 directive by identifying seven climate mitigation program areas which contain a diverse array of implementable actions that aim to reduce greenhouse gas emissions across the sector and five climate adaption program areas that provide the framework for building a more resilient transportation system. The strategy contains a mode share goal of shifting 80 percent of all trips to environmentally sustainable modes by 2030. The 2017 Transportation Sector Climate Action Strategy supports the Department of the Environment's Climate Action Strategy which includes goals to source 100 percent of electricity from renewable sources, make 80 percent of all trips outside of personal vehicles, and achieve San Francisco's zero waste goal.

San Francisco Regulations for Working in San Francisco Streets

The San Francisco Regulations for Working in San Francisco Streets (the SFMTA Blue Book) contains regulations that are prepared and regularly updated by SFMTA, under authority derived from the San Francisco Transportation Code, to serve as a guide for contractors working in San Francisco streets. The manual establishes rules and guidance so that work can be done safely and with the least possible interference with pedestrians, bicycle, transit and vehicular traffic. The manual also contains relevant general information, contact information, and procedures related to working in the public right of way when it is controlled by agencies other than the SFMTA.

In addition to the regulations presented in the manual, all traffic control, warning and guidance devices must conform to the California Manual on Uniform Traffic Control Devices. Furthermore, contractors are responsible for complying with all applicable city, state, and federal codes, rules and regulations. The party responsible for setting up traffic controls during construction shall be held accountable and responsible if such controls do not meet the guidance and requirements established by this manual and any applicable state requirements.

Public Works Standard Construction Measures

As discussed in Chapter 2, *Project Description*, Public Works requires all construction contractors to include standard construction measures (SCMs) in bid packages for the purposes of environmental protection. The traffic SCM requires all projects to implement traffic control measures to maintain traffic and pedestrian circulation on streets affected by project construction. In addition, the measures need to be consistent with the requirements of the SFMTA Blue Book. Any temporary rerouting of transit vehicles or relocation of transit facilities would need to be coordinated with SFMTA Muni Operations. Refer to Appendix 5 for additional information on the transportation SCM.

Transportation Demand Management Ordinance

In January 2017 the San Francisco Board of Supervisors approved an amendment to the City's Planning Code requiring most new development projects in San Francisco to incorporate "design features, incentives, and tools" intended to reduce vehicle miles traveled. New development projects meeting the applicability requirement are required to choose measures from a menu of options to develop an overall Transportation Demand Management (TDM) plan. Each development project's TDM plan will require routine monitoring and reporting to the planning department to demonstrate compliance.

Environmental Impacts

Significance Criteria

The criteria for determining the significance of impacts in this analysis are consistent with the environmental checklist in Appendix G of the CEQA Guidelines, as modified by the San Francisco planning department.

For the purpose of this analysis, the following questions were used to determine whether implementing the project would result in a significant impact on transportation and circulation. Implementation of the proposed project would have a significant effect on transportation and circulation if the project would:

- Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel, and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, bicycle and pedestrian paths, and mass transit;
- Conflict with an applicable congestion management program, including, but not limited to, level-of-service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses;
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities or otherwise decrease the performance or safety of such facilities.

As discussed above the San Francisco Planning Commission replaced automobile delay (vehicle LOS) with the VMT criteria (Resolution 19579). Accordingly, this analysis does not contain a discussion of automobile delay impacts. Instead, a VMT and induced automobile travel impact analysis is provided.

As part of implementing CEQA requirements within San Francisco, the City uses the following significance criteria, organized by transportation mode, to facilitate the transportation analysis and address the aforementioned questions. The transportation significance criteria are similar to those in Appendix G of the CEQA Guidelines as listed above, except for the criteria related to traffic hazards and VMT. The criteria are as follows:

- **Vehicle Miles Traveled**
  - The project would have a significant effect on the environment if it would cause substantial additional VMT.
  - The project would have a significant effect on the environment if it would substantially induce additional automobile travel by increasing physical roadway capacity in congested areas (i.e., by adding new mixed-flow travel lanes) or by adding new roadways to the network.
- **Traffic Hazards.** The project would have a significant effect on the environment if it would cause major traffic hazards.
- **Transit.** The project would have a significant effect on the environment if it would cause a substantial increase in operating costs or delays such that significant adverse impacts in transit service levels could result.
- **Walking/Accessibility.** The project would have a significant effect on the environment if it would create potentially hazardous conditions for people walking, or otherwise interfere with accessibility of people walking to and from the project site and adjoining areas.
- **Bicycles.** The project would have a significant effect on the environment if it would create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas.
- **Loading.** The project would have a significant effect on the environment if it would result in a loading demand during the peak hour of loading activities that could not be accommodated within the proposed onsite off-street loading facilities or within convenient on-street loading zones and if it would create potentially hazardous conditions affecting traffic, transit, bicycles, or pedestrians, or significant delays affecting transit.
- **Parking.** A project would have a significant effect on the environment if it would result in a substantial parking deficit that could create hazardous conditions affecting traffic, transit, bicycles or pedestrians, or significant delays affecting transit.
- **Emergency Access**. A project would have a significant effect on the environment if it would result in inadequate emergency access.

- **Construction.** Construction of the project would have a significant effect on the environment if, in consideration of the project site location and other relevant project characteristics, the temporary construction activities' duration and magnitude would result in substantial interference with pedestrian, bicycle, or vehicle circulation and accessibility to adjoining areas thereby resulting in potentially hazardous conditions.

APPROACH TO ANALYSIS

This section describes the methodology for analyzing transportation impacts and information considered in developing travel demand forecasts used in the analyses for the proposed project. The impacts of the proposed project on the surrounding transportation network were analyzed using the Transportation Impact Analysis Guidelines issued by the planning department in 2002 (SF Guidelines) and subsequent updates and planning commission resolution 19579, which provide direction for analyzing transportation conditions and in identifying the transportation impacts of a proposed project.

ANALYSIS SCENARIOS AND PERIODS

The analysis of the proposed project was conducted for "baseline plus project" and 2040 cumulative conditions. The "baseline plus project" conditions assess the near-term impacts of the proposed project, while "2040 cumulative" conditions assess the long-term impacts of the proposed project in combination with other reasonably foreseeable development. The year 2020 was selected for the near-term impact analysis because it represents the nearest baseline year for which travel demand forecasts are available. The year 2040 was selected as the future analysis year because 2040 is the latest year for which future travel demand forecasts were available from the San Francisco County Transportation Authority travel demand forecasting model.

Per the SF Guidelines, the weekday p.m. peak hour is the standard analysis period for projects in San Francisco and was analyzed for the proposed project.

CONSTRUCTION IMPACTS METHODOLOGY

Potential short-term construction impacts were assessed qualitatively based on preliminary construction information for the proposed project. The construction impact evaluation addresses the staging and duration of construction activities, roadway and/or sidewalk closures, and evaluates the effects of construction activities on transit facilities and service, bicycle circulation, travel lanes and people walking. The analysis assumes that the proposed project would comply with the requirements of Public Works' SCM (see Appendix 5) and, as discussed in Chapter 2, *Project Description*, the construction contractor(s) would implement a construction management plan that would address issues related to circulation, safety, construction staging, parking, and other activities in the area during the construction period.

VMT ANALYSIS METHODOLOGY

The project is a transportation project; therefore, the following thresholds of significance and screening criteria were used to determine if the project would result in significant impacts by inducing substantial additional automobile travel. Pursuant to the Office of Planning and Research's proposed January 2016 transportation impact guidelines, a transportation project would substantially induce automobile travel if it would generate more than 2,075,220 VMT per year. This threshold is based on the fair share VMT allocated to transportation projects required to achieve California's long-term greenhouse gas emissions reduction goal of 40 percent below 1990 levels by 2030.

The Office of Planning and Research's proposed transportation impact guidelines includes a list of transportation project types that would not likely lead to a substantial or measurable increase in VMT. If a project fits within the general types of projects (including combinations of types) described below, then it is presumed that VMT impacts would be less than significant and a detailed VMT analysis is not required. Accordingly, the proposed project would not result in a substantial increase in VMT because it would include any or a combination of the following components and features.

- Active Transportation, Rightsizing (aka "Road Diet"), and Transit Projects:
  - Reduction in the number of through lanes.
  - Infrastructure projects, including safety and accessibility improvements, for people walking and bicycling.
  - Installation or reconfiguration of traffic calming devices.
  - Creation of new or conversion of existing mixed-flow travel lanes (including vehicle ramps) to transit-only lanes.
- Other Minor Transportation Projects:
  - Rehabilitation, maintenance, replacement and repair projects designed to improve the condition of existing transportation assets (e.g., highways, roadways, bridges, culverts, tunnels, transit systems, and bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity.
  - Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, or emergency breakdown lanes that are not used as through lanes.
  - Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features.
  - Conversion of existing general purpose lanes (including vehicle ramps) to managed lanes (e.g., High-Occupancy Vehicle (HOV), High-Occupancy Toll (HOT), or truck lanes).

- Timing of signals to optimize vehicle, bicycle or pedestrian flow on local or collector streets.
- Addition of transportation wayfinding signage.
- Removal of off-street or on-street parking spaces.
- Adoption, removal or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and referential/reserved parking permit programs).

In addition, a quantitative analysis of the change in VMT as a result of the circulation changes was conducted using output from the City's travel demand model and the traffic assignment model that was developed for the transportation study area. For conditions with and without the proposed project's street network changes, the number of vehicles on each roadway segment within the study area was multiplied by the distance of the roadway segment to obtain total VMT. The change in VMT between the analysis scenarios with and without the proposed project's street network changes represents the net increase or decrease in VMT as a result of implementation of the proposed project.

TRAFFIC HAZARDS ANALYSIS METHODOLOGY

In assessing traffic hazards, the proposed project's changes to the transportation network along and near the project corridor were reviewed to determine whether they would obstruct, hinder, or impair reasonable and safe views by drivers traveling on the same street or restrict the ability of a driver to stop the motor vehicle short of a collision.

TRANSIT ANALYSIS METHODOLOGY

Impacts of the proposed project on transit operations were measured in terms of increases to transit travel times. The transit operations were split into three categories as shown in Figure 4.B-5, p. 4.B-39, and as described below.

Transit travel times were estimated for 2020 baseline and baseline plus project conditions for routes operating along Market Street and on Mission Street for more than two blocks. On Market Street, these consist of the Muni F Market & Wharves historic streetcar, 2 Clement, 5 Fulton, 5R Fulton Rapid, 6 Parnassus, 7 Haight, 7X Haight/Noriega Express, 9 San Bruno, 9R San Bruno Rapid, 21 Hayes, 31 Balboa, 38 Geary, and 38R Geary Rapid. On Mission Street these consist of the 14 Mission, 14R Mission Rapid, and 14X Mission Express; Golden Gate Transit routes to Marin County; as well as SamTrans bus routes to San Mateo County.

Transit travel times were estimated for routes that travel in mixed-flow travel lanes. These consist of the Muni 3 Jackson, 10 Townsend, 30X Marina Express,12 Folsom, 19 Polk, 27 Bryant, 41 Union, 82X Levi Plaza Express routes, as well as Golden Gate Transit bus routes to Marin and Sonoma counties.

Transit travel times were not estimated for routes on cross streets that operate within transit-only lanes within the transportation study area. Because these routes operate in separate facilities, they are not substantially affected by changes in traffic volumes within adjacent travel lanes.[23] Routes on cross streets that travel in transit-only lanes consist of the 8 Bayshore, 8AX/8BX Bayshore Expresses, 30 Stockton, 45 Union/Stockton, 47 Van Ness, and the 49 Van Ness/Mission.

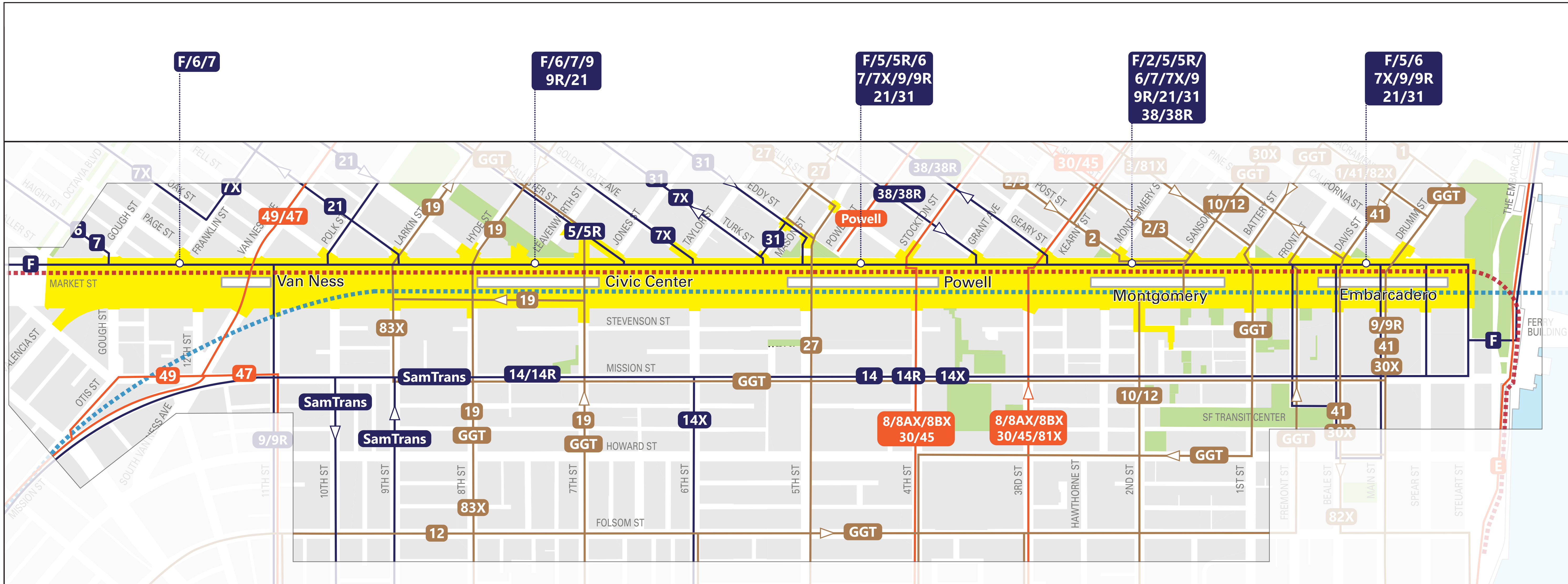
To estimate transit travel times for routes running through the study area, two intersection operations models were developed for the transportation study area using VISSIM and Synchro intersection traffic operations software. The study area and intersections included in these separate models are presented in Figure 4.B-1, p. 4.B-3. The VISSIM microsimulation software was used to evaluate multi-modal operations and estimate transit travel times on Market and Mission streets, while the Synchro traffic operations software was used to conduct isolated intersection analysis for study intersections located to the north and south of Market and Mission streets. The two models are described in more detail in Appendix 7, attachment 5.

Changes to transit travel times between baseline and baseline-plus-project conditions were evaluated, based on the following factors:

- **Traffic congestion delay**—Traffic congestion associated with increases in traffic slows down transit vehicles and results in increased transit travel times. Traffic congestion delays are calculated by summing the average vehicular delay caused by the project at each intersection along the transit routes within the transportation study area. The increase in total route segment delay is equal to the increase in travel time associated with traffic generated by the proposed project.
- **Transit reentry delay**—Transit vehicles typically experience delays after stopping to pick up and drop off passengers while waiting for gaps in adjacent street traffic in order to pull out of bus stops. As traffic volumes on the adjacent streets increase, reentering the flow of traffic becomes more difficult and transit vehicles experience increased delays. Total transit reentry delay for each route is calculated as the sum of transit reentry delay at each stop within the transportation study area.

The proposed project would be determined to have a significant impact if it would increase existing transit travel times on a route so that additional transit vehicles would be required to maintain the existing headways. This was assumed to be the case if the proposed project's travel-time increases on a particular route would be greater than or equal to 4 minutes or half of the existing route headway (regional routes), whichever is less (Muni), as determined by SFMTA's

[23] Transit-only lanes demarcated with red paint, such as those on Third or Fourth streets, allow Muni bus operations to remain consistent despite increases in vehicles within adjacent travel lanes. *Red Transit Lanes Final Evaluation Report,* SFMTA, February 10, 2017.



Notes:

- Market Street is shown wider than map scale for clarity.
- At time of publication, Transbay bus routes are being routed to the Temporary Transbay Terminal rather than to Salesforce Transit Center.
- Some portions of the Cross-Market Street Routes within Transit-Only Lanes operate in mixed flow lanes; however, the majority of these routes operate in transit-only lanes through the transportation study area.
- Routes that do not cross through transportation study area are not shown for clarity (1AX, 1BX, 31AX, 31BX, 38AX, 38BX and 76X).
- Muni routes N and L owls and AC Transit service (routes 800 and 822) also run on Market Street overnight.
- Full Muni map is located in Appendix 7.

Legend

- Project Corridor
- BART/Muni Metro Station
- BART Service
- SFMTA Muni Metro
- **Market and Mission Street Routes** — Analysis Method: VISSIM Microsimulation Model
- **Cross-Market Street Routes within Transit-Only Lanes** — Analysis Method: Qualitative Assessment
- **Cross-Market Street Routes within Mixed-Flow Lanes** — Analysis Method: Intersection Operation Analysis Using Synchro and VISSIM Models

Routes serving Ferry Plaza
E/F/6/7X/14
14X/21/31

Routes serving Mission & Main
2/9R/14R

Routes serving Salesforce Transit Center
5/5R/7/25
30X/38/38R
41/81X/82X

Source: Fehr & Peers 2019.
Other sources: Streets: City and County of San Francisco 2014.

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Figure 4.B-5
Approach for Transit Travel Time Analysis

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scheduling spreadsheet and the schedules for Golden Gate Transit and SamTrans. If it was determined that the proposed project would have a significant project-specific travel time impact under baseline plus project conditions, then, if significant cumulative impacts are identified, the project would also be understood to contribute considerably to significant cumulative conditions.

WALKING/ACCESSIBILITY ANALYSIS METHODOLOGY

Walking/accessibility conditions were assessed qualitatively. The qualitative assessment included assessment of safety and right-of-way issues, potential worsening of existing, or creation of new, safety hazards, and conflicts with bicycles, transit, and vehicles, and whether the project would interfere with the accessibility of people walking along Market Street or adjoining areas.

Information on walking conditions in terms of walking LOS along Market Street are presented in this EIR for informational purposes. A quantitative assessment of walking conditions on Market Street was conducted at nine locations along the project corridor to determine the effect of the reduced sidewalk width on the pedestrian flows on the remaining sidewalk area that would be available to people walking. Pedestrian walkway LOS conditions were analyzed for baseline and baseline-plus-project conditions for the peak hour of the p.m. peak period using the *Highway Capacity Manual 2000* methodology. With the *Highway Capacity Manual* methodology, pedestrian flows on sidewalks are assessed by determining the number of pedestrians per minute per foot of sidewalk area; the higher the pedestrian flows, the more constrained pedestrian travel is. LOS D, at approximately 10 to 15 pedestrians per minute per foot represents the upper limit of generally unconstrained walking conditions. LOS E and LOS F represent constrained walking conditions. At LOS E, normal walking gaits must be adjusted due to congested conditions, and independent movements are difficult; at LOS F, walking speeds are severely restricted. Pedestrian volumes for 2020 baseline conditions were estimated by applying a 1 percent annual growth rate for 3 years to the 2017 pedestrian volumes at the study locations. The annual growth rate was determined using output from the SF-CHAMP travel demand model.

BICYCLE ANALYSIS METHODOLOGY

Bicycle conditions were assessed qualitatively as they relate to the project area, including bicycle routes, safety and right-of-way issues, potential worsening of existing or creation of new safety hazards, conflicts with vehicles and commercial vehicle loading activities, and whether the project would interfere with the accessibility of people bicycling on Market Street or in adjoining areas.

LOADING ANALYSIS METHODOLOGY

The commercial and passenger loading analysis was conducted by identifying changes to the on-street loading facilities on Market Street and curb parking regulations on cross and side streets within the project corridor, and the on-street loading spaces supply that would be removed or added with implementation of the proposed project. The proposed project would not result in an increase in commercial vehicle or passenger loading demand but, instead, could displace some existing demand to other locations. The analysis assesses the potential for existing demand to be met by other convenient loading spaces, either existing or relocated. If that demand is not met, the analysis assesses whether potentially hazardous conditions or significant delays that would affect traffic, transit, bicycles, or pedestrians could occur.

PARKING ANALYSIS METHODOLOGY

Parking conditions are not static, as parking supply and demand varies from day to day, from day to night, from month to month, etc. Hence, the availability of parking spaces (or lack thereof) is not a permanent physical condition, but changes over time as people change their modes and patterns of travel. While parking conditions change over time, a substantial deficit in parking caused by a project that creates hazardous conditions or significant delays to traffic, transit, bicycles or pedestrians could adversely affect the physical environment. Whether a deficit in parking creates such conditions will depend on the magnitude of the shortfall and the ability of drivers to change travel patterns or switch to other travel modes. If a substantial deficit in parking caused by a project creates hazardous conditions or significant delays in travel, such a condition also could result in secondary physical environmental impacts (e.g., air quality or noise impacts cause by congestion), depending on the project and its setting.

The absence of a ready supply of parking spaces, combined with available alternatives to auto travel (i.e., taxis, Muni, regional transit providers, bicycle and pedestrian facilities) and a relatively dense pattern of urban development, induces many drivers to seek and find alternative parking facilities, shift to other modes of travel, or change their overall travel habits. Any such resulting shifts to transit service or other modes (walking and biking), would be in keeping with the City's "Transit First" policy and numerous San Francisco General Plan Polices, including those in the Transportation Element. The City's Transit First Policy, established in the City's Charter article 8A, section 8A.115, provides that "parking policies for areas well served by public transit shall be designed to encourage travel by public transportation and alternative transportation."

The proposed project would not generate a parking demand because it would not change land uses and would not result in an increase in employment, population or housing, but it would result in on-street parking changes along Market Street and on cross and side streets. A parking assessment was conducted by identifying project-related changes to on-street parking regulations and parking supply that would be removed or added with implementation of the proposed project, and the net parking change was determined.

In evaluating whether a parking deficit is substantial, and, thus, could result in hazardous conditions or delays, the following factors were considered: if the parking demand resulting from elimination of on-street spaces could not be met either with on-street spaces or existing parking facilities near the project corridor and whether the project area is adequately served by other modes of transportation (i.e., taxis, Muni, regional transit providers, bicycle and pedestrian facilities). Generally, if the parking loss is not substantial, it is anticipated that it would not create hazardous conditions or significant delays for other modes. In situations where a parking deficit is considered substantial, in addition to alternate transportation modes, potentially hazardous conditions related to the parking loss, and, more specifically, the increased traffic circling the area were considered to determine whether substantial hazard related to the parking deficit of the project could occur. For the proposed project, the potential hazards or delays that could occur include whether the parking loss leading to additional traffic circling in the area would result in vehicles double parking in a bicycle lane, a mixed-flow lane, or transit-only lane or whether vehicles would cause or substantially increase instances of sidewalks and/or driveways being blocked in an attempt to locate parking.

Emergency Access Analysis Methodology

Potential impacts on emergency access were assessed qualitatively. Specifically, the analysis assessed whether the proposed street network changes and/or travel demand associated with the proposed project would impair, hinder, or preclude adequate emergency vehicle access.

Methodology for Analysis of Cumulative Impacts

Travel demand forecasts used in the analysis of 2040 cumulative conditions were estimated based on projected land use development and transportation network changes included in the San Francisco SF-CHAMP travel demand model, as further described below. The growth projections are based on population and employment assumptions developed by the Association of Bay Area Governments (ABAG) and account for the cumulative development projects described in Appendix 5, which includes a list of past, present, and reasonably foreseeable projects in the vicinity of the project corridor. In addition, the future year 2040 cumulative analysis assumes completion of certain planned and reasonably foreseeable transportation network changes, such as those listed below that could affect circulation in the vicinity of the Market Street project corridor. These are also described in Appendix 5 and include, but are not limited to:

- Van Ness BRT Project/Van Ness Improvement Project
- Geary BRT Project
- Muni Forward Transit Infrastructure Project and Service Improvements
- Polk Street Streetscape Project
- San Francisco Bicycle Plan (2009)
- San Francisco Bicycle Strategy 2013–2018
- Upper Market Street Safety Project
- Sixth Street Pedestrian Safety Project

- Central Subway Project
- Transit Center District Plan and Public Realm Plan
- Central SoMa Plan Street Network Changes
- Western SoMa Community Plan
- Eastern Neighborhoods Rezoning and Area Plans
- Market and Octavia Area Plan

As described in Section F, *Relationship to Other Projects,* in Chapter 2, the Hub Plan for the easternmost portion of the Market and Octavia Area Plan was developed subsequent to the issuance of the NOP for the Better Market Street Project in 2015. To the extent that growth within the Hub Plan area is included in the Market and Octavia Area Plan, the travel demand was accounted for in the cumulative analysis. At the time when the transportation analysis for this project was being conducted, the proposed street network changes within the Hub Plan area were not developed to a level of detail that can be included in the analysis. The proposed Hub Plan's street network changes do not include any changes to Market Street. Environmental review for the Hub Plan's rezoning and street network changes is currently ongoing.

2040 Cumulative Vehicle Forecasts

Future 2040 cumulative traffic volume forecasts, for use in the transit travel-time (operational) analysis described above, were developed using the City's SF-CHAMP travel demand model. The SF-CHAMP model is an activity-based travel demand model that was developed and validated by the San Francisco County Transportation Authority, using household travel survey information to represent current and future transportation conditions in San Francisco. The model predicts all person travel for a full day (a typical weekday), based on totals and locations for population, housing units, and employment, which are then allocated to different periods throughout the day. The SF-CHAMP model predicts person travel by mode for auto, transit, walking, and bicycling. The SF-CHAMP model also provides forecasts of vehicular traffic on regional freeways, major arterials, and the study area roadway network, considering the available roadway capacity, origins and destinations of trips, and travel speeds.

As noted above, the SF-CHAMP model uses population and employment projections to determine increases in future travel demand. The proposed project is a transportation project and not a land use project; therefore, it would not generate new trips by any mode. Also, in addition to the list of cumulative transportation network projects listed above, the 2040 cumulative analysis assumes the street network changes included as part of the proposed project (i.e., changes to the turn restrictions, transit stop spacing, total number of travel lanes, etc.).

The SF-CHAMP traffic volume outputs were used as inputs for a localized traffic assignment model developed for the transportation study area (i.e., the Dynamic Traffic Assignment model). The Dynamic Traffic Assignment model was used to determine traffic volumes on study area roadways and develop traffic volumes by movement at study intersections, accounting for congestion, signal timing, delay due to transit, individual lane assignments, queuing, and other factors that directly influence the routes and reliability of vehicle assignment.[24,25]

Thus, 2040 cumulative traffic volumes reflect changes that could result from the proposed project, including diversions of vehicles from one street to another or shifts in vehicle travel from inside the study area to outside the study area. In general, weekday p.m. peak-hour traffic volumes at the study intersections are projected to increase by an average of 10 percent between 2020 baseline and 2040 cumulative conditions. The projected growth in traffic volumes is slightly higher on a percentage basis on the north-south streets in the eastern half of the study area than in the western half. This generally reflects the relative land use change in the eastern versus the western half of the study area due to the Transit Center District Plan, the Central SoMa Plan and other development projects to the south in Mission Bay (e.g., Mission Rock, etc.). The number of vehicles on Mission Street is projected to increase more on the western half of the street due to the limited capacity for additional vehicles on the eastern half of the street. Market Street volumes generally were consistent between 2020 and 2040 due to the turn restrictions that limit non-transit vehicles.

IMPACTS AND MITIGATION MEASURES

CONSTRUCTION IMPACTS

Impact TR-1. Construction of the proposed project and project variant could result in substantial interference with pedestrian, bicycle, or vehicle circulation and accessibility to adjoining areas, and could result in potentially hazardous conditions. (Significant and Unavoidable with Mitigation)

Prior to construction, as part of the permit process, Public Works and its construction contractor(s) would be required to meet with SFMTA personnel to develop and review truck routing plans for demolition, disposal of excavated materials, materials delivery and storage,

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24 The model validation and calibration processes are described in more detail in the memorandum *Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project,* dated October 30, 2015, presented in Appendix 8.

25 Additional details about these projects are presented the Chapter 2 – Project Description and in the following memorandums: *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (San Francisco County Transportation Authority, May 11, 2015) and *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (San Francisco County Transportation Authority, July 17, 2015).

as well as staging for construction vehicles. The construction contractor(s) would be required to construct the proposed project in conformance with the City's Regulations for Working in San Francisco Streets, eighth edition (also known as the "SFMTA Blue Book"). These guidelines establish regulations for working in San Francisco streets so that the activities are conducted safely and with the least possible interference with pedestrians, bicyclists, transit, and vehicles. The construction contractor(s) would meet with SFMTA staff to determine if any peak-period or holiday moratorium on construction activities or special traffic permits would be required.[26] The proposed project may require waivers related to SFMTA Blue Book requirements to maintain all travel lanes during daylight hours[27] as well as SFMTA Blue Book requirements regarding limits on construction hours. In addition to the regulations in the SFMTA Blue Book, the contractor(s) would be responsible for complying with all city, state and federal codes, rules and regulations.

Within the project corridor below Market Street is a BART easement and Zone of Influence[28] within the subway tunnel. Some elements of below-grade project construction may occur within the Zone of Influence, meaning that there would be specific shoring requirements as outlined in the General Guidelines for Design and Construction Over or Adjacent to BART's Subway Structures.[29] The BART Real Estate Department coordinates permits and plan review for any construction on, or adjacent to, the BART right-of-way. The construction contractor(s) would be required to follow these procedures and conform to the standards set forth by BART with regard to the construction of proposed project within the BART easement or BART Zone of Influence.

Construction of the proposed project would commence in 2020, and would be conducted at up to seven location-specific segments along Market Street over a minimum of 6 and up to a 14-year period, including inactive periods.[30,31] Each segment would consist of multiple blocks along the length of Market Street between Octavia Boulevard and Steuart Street. Construction would proceed along up to two segments simultaneously. Active construction per segment is anticipated to be 1 year. Construction along Market Street would be divided into stages,

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[26] The *SFMTA Blue Book*, 8th Edition, is available online through SFMTA (www.sfmta.com).

[27] The requirements are specified in Table 1 on page 46 of the Blue Book.

[28] The BART Zone of Influence is the designated area on either side of the rails that could be affected by construction activities in the vicinity of the tracks and is defined in order to avoid construction-related impacts.

[29] *General Guidelines for Design and Construction Over or Adjacent to BART's Subway Structures*, BART, October 2003.

[30] At this time, the anticipated duration may not fully encompass the impact of major utility work because interagency coordination with the various utilities has not been completed.

[31] The overall duration of construction and selection of the staggered multiple-block approach for the proposed project are based on funding availability. If funding is not available, the overall duration of construction may be as long as 14 years, inclusive of inactive periods. The assessment of construction activities under the staggered multiple-block approach presents a conservative (worst-case), yet potentially realistic, evaluation of potential construction-period effects.

which would be confirmed during final project design. In general, these stages include construction within the center travel lanes and track replacement, construction within the curb travel lanes, construction within the sidewalk areas, and construction within intersections. Because construction would depend on the availability of funding and other factors, a detailed plan for the segments is not currently available from Public Works. Other details associated with the construction activities, including the summary of major construction components, overall approach, and construction staging are presented in Chapter 2.

In general, construction-related activities would typically occur between 7 a.m. and 5 p.m. Nighttime and weekend construction activities would be required to expedite the construction schedule, minimize disruption to peak-period commutes by all modes, and facilitate track replacement and construction within intersections. The contractor(s) would be required to comply with the San Francisco Noise Ordinance, which requires a permit for nighttime work. Construction staging (e.g., staging of construction vehicles, staging of construction materials, construction worker parking, and delivery and haul trucks) would occur on-street within or nearby the segment under construction.

As described in Chapter 2, Public Works would prepare a project construction plan that presents and evaluates construction scenarios as design plans for the proposed project are advanced. After final design plans are completed, a construction management plan would be prepared. The construction management plan would be prepared in consultation with the SFMTA, and elements would include circulation and detour routes, bus route reroutes and stop relocations, temporary transit priority improvements on streets the buses are detoured to, advance warning signage, construction truck routes, maintenance of access and circulation for people walking and bicycling (including detour routes, as appropriate), designation of sufficient staging areas, scheduling and monitoring of construction vehicle movements, and coordination with public service providers such as fire, police, schools, hospitals, and transit. The construction management plan would serve to inform City agencies of project construction and minimize temporary effects along Market Street and in the vicinity of the construction areas. Prior to implementation, the construction management plan, including its procedures to minimize construction impacts on the transportation network, would be reviewed by the SFMTA and multi-agency Transportation Advisory Staff Committee (TASC).

Impacts on Transit and Vehicular Circulation. During the construction period, vehicular traffic on the segment of Market Street under construction would be restricted to Muni and paratransit vehicles only. Therefore, all other vehicles currently using Market Street would be detoured to other streets. Detours would change depending on the location of the segment under construction. The detours and diversion of vehicles to other streets, primarily parallel streets south of Market Street, would result in an increase in overall vehicle congestion throughout the South of Market neighborhood and the transportation study area, which may lead to reduced vehicle speeds and longer peak-period queues.

Transit access along Market Street and within the segment under construction would be maintained, but some transit stops may be temporarily relocated and/or temporarily terminated. Detours along some transit routes may be required for the duration of the construction period, and these would be identified in the traffic control and detour plans that would be developed prior to final design and construction. A temporary overhead contact system (OCS) would be provided on Market Street to allow SFMTA to continue using electric trolley coaches during construction as much as possible. Where detours are necessary, additional transit priority features, such as full-time transit-only lanes and extended bus zones, may be provided to accommodate the increased level of bus service. This would be required on Mission Street specifically, but may also be required on other streets. Consistent with the SFMTA Blue Book, Public Works or its contractor(s) would be required to post appropriate signage, indicating temporarily discontinued stops and temporary new stops.

During the stages that include construction of the center travel lanes and rail track replacement, and construction within the curb, all Muni routes on Market Street would need to travel within a single travel lane in each direction or be detoured off Market Street. Private commuter shuttle routes and other private shuttle routes that travel on portions of Market Street would not be permitted to travel on Market Street during construction. When construction occurs within the center travel lanes, the Muni F Market & Wharves historic streetcar service would be substituted with buses. If all transit vehicles on Market Street were to travel within one travel lane in each direction, this would include approximately 100 transit vehicles per hour during the peak periods. This number of transit vehicles would exceed the capacity of the single travel lane and transit boarding islands, resulting in temporary increases in travel times for transit service on Market Street. If some transit routes were to shift to other streets such as Mission Street, this would result in somewhat increased transit travel time due to the longer distance and congestion on cross streets or Mission Street. During these periods, both nighttime and weekend construction may be required to reduce the period that these transit routes would have to operate in a single travel lane or use a detour. It also would be necessary to extend Mission Street transit-only lanes to all day (24 hours a day, 7 days a week) and extend bus zones to accommodate increased all-day bus volumes. The project sponsor is also considering as options early implementation of the Muni F Market & Wharves historic streetcar loop and temporarily shortening bus routes north of Market Street so they do not operate on Market Street. If some bus routes temporarily turn back prior to reaching Market Street, this may result in somewhat increased transit travel time for existing routes on these streets due to the additional buses traveling on the streets north of Market Street.

In addition to the construction-related effects on transit service along Market Street, transit routes that cross Market Street may be subject to temporary changes. In general, bus access for the transit routes that cross the corridor would be maintained during construction. However, some bus stops or routes could be changed during the course of construction. Potentially affected bus routes include Muni 1AX California A Express, 1BX California B Express, 3

Jackson, 8 Bayshore, 8AX Bayshore A Express, 8BX Bayshore B Express, 10 Townsend, 12 Folsom/Pacific, 19 Polk, 27 Bryant, 30 Stockton, 30X Marina Express, 31AX Balboa A Express, 31BX Balboa B Express, 38AX Geary A Express, 38BX Geary B Express, 41 Union, 45 Union/Stockton, 47 Van Ness, 49 Van Ness-Mission, 81X Caltrain Express, 82X Levi Plaza Express, 83X Mid-Market Express, 90 San Bruno Owl, and the 91 Third Street-19th Avenue Owl, Golden Gate Transit routes, the PresidiGo Downtown route, and privately operated shuttles. Disruption of surface transit service on Market Street and increased congestion on other streets would lead to disruption of other local and regional bus routes. As noted above for routes on Market Street, Public Works or its contractor(s) would be required to post appropriate signage, indicating temporarily discontinued stops and temporary new stops.

Impacts on Walking/Accessibility. Access for people walking throughout the corridor would be preserved during construction, including access to existing or relocated transit stops, BART/Muni stations, and adjacent land uses along the project corridor. However, periodic sidewalk, plaza, or crosswalk closures would occur during sidewalk reconstruction and utility work. Where intersection crosswalks would be closed, pedestrians would be detoured to the nearest intersection possible. The SFMTA Blue Book regulations and the Public Works standard construction measures require maintaining pedestrian circulation and the implementation of construction safety measures for people walking. Construction activities that require use of any part of the sidewalk are required to maintain pedestrian access for all users. Where complete sidewalk closures are required, alternative pedestrian access walkways and detours are required to be implemented with adequate signage. The detours and temporary changes to transit stop locations would increase travel distance and may be an inconvenience to some people walking. As part of the pedestrian detours, appropriate pedestrian signs, including but not limited to "Sidewalk Closed" would be posted. For all pedestrian facilities, the alternate path of travel would meet the minimum width required to maintain ADA compliance so that pedestrian overcrowding would not occur at busier locations along the corridor.

Impacts on Bicycling. The SFMTA Blue Book and Public Works standard construction measures require maintaining bicycle access and circulation during project construction. However, bicycle access on Market Street may be temporarily detoured at some locations or along the entire corridor to Mission Street, Howard Street, and/or Folsom Street. If the proposed project temporarily detours bicycle traffic to Mission Street, it would be necessary to temporarily remove parking on both sides of the roadway to provide dedicated transit and bicycle lanes. Where bicyclists would be detoured to other streets, advance warning signs would be posted. Although bicycle facility changes would be completed in multiple stages to maintain access where possible, general accessibility for bicyclists on Market Street would be substantially affected during project construction. Proposed project construction truck traffic and detoured traffic from Market Street would also result in a temporarily increased potential for vehicle-bicycle conflicts throughout the transportation study area.

Impacts on Loading and Parking. On segments of Market Street that include existing loading bays, commercial or passenger loading/unloading would be relocated, as close to the construction site as possible. Commercial and passenger loading activities may be relocated to adjacent side streets and/or during restricted hours along Market Street (e.g., staggered hours for loading and construction activities). Loading activities within an active construction zone would not be permitted at any time. On-street parking on side and cross streets would be restricted to accommodate construction staging, as well as temporary commercial vehicle loading spaces. On-street parking would also be removed to accommodate rerouted bus service on some streets, such as Mission Street.

Construction workers who drive to the site would cause a temporary parking demand. The time-limited on-street parking on streets near the Market Street project corridor limits legal all-day parking, and it is anticipated that construction workers would park in nearby public parking facilities, such as the Fifth and Mission Garage, the Union Square Garage, the Civic Center Garage or the Performing Arts Garage, depending on the segment under construction. Construction workers also have access to other travel modes to access Market Street.

Impacts on Emergency Access. Emergency vehicle access would be maintained on Market Street during construction by maintaining two transit-only travel lanes (a single travel lane in each direction). However, access and response times may be affected. Temporary travel lane closures on Market Street would be reviewed by TASC, which includes review by the fire and police departments so that emergency vehicle access is not impaired. In addition, emergency vehicles from existing stations would be able to use other east-west arterials to reach their destinations. Pursuant to the SFMTA Blue Book, Public Works or its contractor(s) would be required to work with the SFMTA to identify detour routes and locations where detour signs would be implemented, and would incorporate the detour plans into the proposed project's construction management plan.

Impact Summary. Although construction of the proposed project would be conducted per SFMTA Blue Book requirements so that construction activities are conducted safely and with the least possible interference, substantial disruption to transit, pedestrian, and bicycle travel along and near the project corridor would occur over a period of at least 6 and up to 14 years and therefore result in significant impacts on transportation. In particular, emergency access and many bicyclists and numerous transit routes on Market Street, on cross streets, and nearby parallel streets would be affected by project construction. Construction of the proposed project would substantially interfere with these modes and would be considered a ***significant impact***.

MITIGATION MEASURE. As noted above, although Public Works would require preparation and implementation of a construction management plan, Mitigation Measure M-TR-1, Construction Management Plan – Additional Measures, identifies additional measures that would be included as a part of the proposed project's construction management plan to minimize significant construction-related transportation impacts and avoid secondary significant impacts. However, because project construction would still require travel lane closures and detours for transit, bicyclists, and people walking over a prolonged period, substantial disruptions to transportation would continue to occur, even with implementation of Mitigation Measure M-TR-1; therefore, this mitigation measure would not reduce the significant impacts to less-than-significant levels. Therefore, proposed project impacts would remain ***significant and unavoidable with mitigation.***

M-TR-1: *Construction Management Plan – Additional Measures*

As part of the proposed project's construction management plan, the project sponsor shall require additional measures to further minimize disruptions to emergency vehicles, transit, bicyclists, and pedestrians during project construction. The additional measures shall include, but not be limited to, the following:

- *Establish Temporary Transit-only Lanes and Extend Bus Zones on Mission Street during Detours* – When detours are implemented, SFMTA shall implement additional transit priority features, such as all-day transit-only lanes and extended bus zones on Mission Street, to accommodate the increased level of bus service on streets adjacent and parallel to Market Street during construction.
- *Active Monitoring of Detours* – When detours for transit, other vehicles, and/or people walking and bicycling are implemented, SFMTA shall require that police officers or parking control officers shall monitor critical locations along the detour to promote unobstructed travel by vehicular traffic, transit, and people walking and bicycling.
- *Coordinated Construction Management Plan* – If construction of the proposed project is determined to overlap with any nearby project(s) involving temporary travel lane closures or temporary sidewalk closures and/or using the same truck access routes in the project vicinity, the SFMTA shall require that construction contractor(s) consult with various city departments, as deemed necessary by the SFMTA, Public Works, and the Planning Department, to develop a Coordinated Construction Management Plan and minimize the severity of any disruptions of access to land uses and transportation facilities.
- *Emergency Access Response Plan* – SFMTA shall require that contractor(s) submit a segment-specific emergency access response plan as part of compliance with bid specifications. This plan shall include fire department and emergency service access to construction areas and maintainability of emergency services such as fire hydrants.

- *Carpool, Bicycle, Walk and Transit Access for Construction Workers* – The construction contractor(s) shall include methods to encourage carpooling, bicycling, walking, and transit access to the project corridor by construction workers (such as providing secure bicycle parking spaces, participating in free-to-employee and employer ride matching program from www.511.org, participating in emergency ride home program through the City of San Francisco [www.sferh.org], and providing transit information to construction workers).
- *Construction Coordination with Adjacent Businesses* – During construction of the proposed project, access to all abutting businesses shall be maintained either through the existing or a reduced sidewalk area or via temporary access ramps. Signs shall be installed indicating that the businesses are "open during construction." All temporary access ramps shall be in compliance with the ADA.
- *Project Construction Updates for Adjacent Businesses and Residents* – To minimize construction impacts on access for nearby institutions and businesses, the project sponsor shall provide adjacent and nearby businesses and residents with regularly-updated information regarding project construction, including construction activities, peak construction vehicle activities, travel lane closures, and lane closures. At regular intervals to be defined in the construction management plan, a regular email notice shall be distributed by the project sponsor that shall provide current construction information of interest to neighbors, as well as contact information for specific construction inquiries or concerns.

WESTERN VARIANT

Construction activities for the Western Variant would be similar to the proposed project, and therefore significant construction-related transportation impacts could result due to travel lane closures, detours for transit, bicyclists, and people walking, and increased congestion and travel times on cross streets and other streets near the project corridor. Therefore, similar to the proposed project, construction-related transportation impacts of the Western Variant would be significant. Mitigation Measure M-TR-1 would be applicable to the Western Variant. However, similar to the proposed project, even with implementation of these additional construction management measures, construction-related transportation impacts would remain ***significant and unavoidable with mitigation***.

OPERATIONAL IMPACTS

VMT IMPACTS

Impact TR-2. The proposed project and project variant would not cause substantial additional VMT or induced automobile travel. (Less than Significant)

The proposed project is a transportation project, and includes features that would alter the transportation network. Therefore, as described above in *Approach to Analysis* under "VMT Analysis Methodology," the VMT impact assessment entailed a review of the proposed project features that would alter the transportation network to determine whether they would induce automobile travel. The proposed project is not a land development project, and therefore would not generate additional VMT per capita.

Proposed project features that would alter the transportation network include reduction in the number of mixed-flow travel lanes, conversion of transit-only travel lanes to Muni-only lanes (i.e., only Muni transit vehicles and emergency vehicles would be permitted), new bicycle facilities, reconstructed sidewalks, sidewalk bulb-outs, new transit facilities, changes to transit stop locations and characteristics, upgrades to transit boarding islands, removal of on-street vehicle parking, on-street commercial and passenger loading/unloading zones, new traffic signals, and changes to signal timing (see Chapter 2, section F, *Project Characteristics*). These features fit within the general types of projects identified above in *Approach to Analysis* under "VMT Analysis Methodology" that would not substantially induce automobile travel. In addition, the quantitative analysis of changes to vehicular travel on transportation study area streets with and without the proposed project determined that total VMT within the study area would not substantially change with implementation of the proposed project.[32] Therefore, the impact of the proposed project related to VMT and induced automobile travel would be ***less than significant.***

WESTERN VARIANT

In addition to the transportation network changes included in the proposed project, the Western Variant would further alter the transportation network in the western segment of the project corridor between Octavia Boulevard and 300 feet east of the intersection of Ninth Street/Larkin Street/Hayes Street/Market Street. The Western Variant would include features noted above, as well as a further reduction in mixed-flow travel lanes, sidewalk widening, raised crosswalks, and additional vehicle and turn restrictions. These additional features also fit within the general types of projects that would not substantially induce automobile travel. Therefore, the impacts of the Western Variant related to VMT and induced automobile travel would be ***less than significant.***

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[32] Total VMT within the transportation study area was calculated as the sum of the number of vehicles on each roadway segment multiplied by each roadway segment length. The results of this analysis are included in Appendix 7.

TRAFFIC HAZARDS IMPACTS

Impact TR-3. The proposed project and project variant would not create major traffic hazards. (Less than Significant)

The proposed project would be designed consistent with City policies and design standards, including the Better Streets Plan, and would not result in traffic hazards. These engineering recommendations and standards have been developed over the years so that streets are designed to enhance safety, thereby providing safe facilities for the movement of motor vehicles. Furthermore, the proposed implementation of the street network changes (e.g., new sidewalk-level cycle tracks, sidewalk extensions, traffic signals modifications to support pedestrian and cycling, raised crosswalks, wider transit boarding islands) and vehicle access restrictions on Market Street would reduce the potential for conflicts between vehicles by designing the streets to enhance sight lines and visibility, reduce non-transit vehicle travel speeds, and accommodate all travel modes.

The transportation assessment also considered how implementation of the proposed project would affect traffic circulation and in particular whether the proposed project would introduce new vehicle hazards to the transportation study area or worsen existing vehicle hazards due to changes in traffic circulation patterns or anticipated vehicle queuing. This assessment includes the effects of conversion from one-way to two-way streets, constructing a streetcar loop, and private vehicle restrictions on Market Street and turn restrictions onto Market Street on p.m. peak-hour vehicle queuing. As further described below, the results of this assessment determined that implementation of the proposed project would not change conditions on local streets or regional facilities as to result in conditions substantially different from existing conditions, or resulting in a new traffic hazard, or worsening of an existing traffic hazard. Therefore, proposed project impacts related to traffic hazards would be less than significant.

Conversion from One-way to Two-way Streets and Required Turns. The proposed project includes conversion of four street segments from one-way to two-way travel and one street segment from two-way to one-way travel. These changes to vehicular travel directions, along with turn restrictions, would support vehicle access through the study area following implementation of the turn restrictions on Market Street. Each of these streets are one- or two-block segments located either north (i.e., Jones, Turk, Mason, and Ellis streets) or south (i.e., Spear Street) of Market Street where the street grid connects with Market Street at a diagonal. These segments, which connect directly with Market Street, consist of:

- Jones Street between McAllister Street and Golden Gate Avenue (one-block segment from one-way travel southbound to two-way travel).
- Turk Street between Taylor and Market streets (one-block segment from one-way travel westbound to two-way travel).

- Mason Street between Eddy and Market streets (one-block segment from one-way travel southbound to two-way travel).
- Spear Street between Market and Mission streets (one-block segment from one-way travel southbound to two-way travel).
- Ellis Street between Market and Cyril Magnin streets (two-block segment from two-way travel to one-way westbound travel).

In addition to these changes in vehicular travel directions, the proposed project would implement required turns, either required right or left turns, to divert vehicles on these streets from turning onto Market Street. For example, eastbound left turns would be required at McAllister Street and at Turk Street, similar to existing turn restrictions at eastbound O'Farrell Street at Grant Avenue. Because of the low volumes of vehicles approaching Market Street on McAllister and Turk streets, the required turns would not result in a substantial diversion of vehicles to nearby streets.

F Market & Wharves Historic Streetcar Loop. The proposed project includes a new F Market & Wharves historic streetcar track loop ("F loop") running one way westbound from Market Street for about 450 feet along McAllister Street (i.e., between Market Street and Charles J. Brenham Place) within a mixed-flow travel lane, and one way southbound for about 250 feet along Charles J. Brenham Place (i.e., between McAllister and Market streets) within a Muni-only lane (the existing mixed-flow travel lane would be converted to a Muni-only lane). The traffic signals at the intersections of Jones Street/McAllister Street/Market Street, McAllister Street/Charles J. Brenham Place, and Seventh Street/Charles J. Brenham Place/Market Street would be modified to provide a separate signal phase for the streetcar movement, allowing streetcars to turn from westbound or eastbound Market Street onto McAllister Street from southbound Charles J. Brenham Place to eastbound or westbound Market Street. The design's conformance to the recommendations and standards above, and the addition of separate signal phases onto and off Market Street, would allow the new streetcar loop to operate without introducing new traffic hazards.

Redistribution of Vehicular Traffic on Local Streets. As noted above, the proposed project is a transportation project and not a land development project; therefore, it would not be expected to generate new vehicle trips as would a new land use. However, the proposed project is expected to result in a redistribution of vehicles due to travel lane reductions and vehicle restrictions on Market Street, leading to increases in total vehicle volumes on Mission Street and on some cross and side streets throughout the study area. Other cross and side streets would experience decreases in traffic volumes as vehicles using Market Street to reach them would shift to other routes, while other streets that already operate at capacity during peak periods would have minimal changes in vehicle volumes but may have some additional queuing outside of the transportation study area.

The redistribution of traffic volumes on Market Street during the weekday p.m. peak hour due to implementation of the proposed project is presented below for the westbound and eastbound directions, respectively.

Westbound Market Street

- Under 2020 baseline conditions, people who drive westbound on Market Street from origins south of Market Street enter from Steuart and Main streets and, for the most part, exit by Pine Street (left turns onto Market Street are prohibited for all other northbound streets east of Eighth Street). With implementation of the proposed project, these drivers would shift primarily to northbound Fremont Street and cross Market Street to reach westbound Pine Street.
- Most of the people driving westbound on Market Street west of Pine Street enter from southbound Battery and Montgomery streets and use Market Street to reach westbound one-way streets such as Sutter, Geary, Turk, and Hayes streets or destinations west of Van Ness Avenue. With implementation of the proposed project, these westbound drivers would disperse throughout the grid network north of Market Street to travel westbound. For the subset of these westbound drivers with destinations on Market Street west of Van Ness Avenue, they would use Van Ness Avenue, Gough Street, or Octavia Boulevard to reach Market Street west of the private vehicle restrictions.
- On the west end of the project corridor, people driving on Market Street also can enter at Hyde, Ninth, Page, and Fell streets and at Van Ness Avenue. With implementation of the proposed project, these westbound drivers would disperse throughout the grid network north of Market Street and use Van Ness Avenue, Gough Street, or Octavia Boulevard to reach Market Street west of the private vehicle restrictions.
- Overall, during the p.m. peak hour, the proposed private vehicle restrictions affecting westbound Market Street would result in fewer vehicles on streets such as Steuart, Main, Battery, and Montgomery streets and up to 250 to 300 additional vehicles per hour on streets such as Fremont and Gough streets, and with smaller increases on Hyde Street, Van Ness Avenue, and Octavia Boulevard.

In addition to redistribution of traffic volumes due to vehicle access restrictions and travel lane changes on Market Street, the proposed project would close the 200-foot-long segment of Battery Street between Bush and Market streets (referred to as the Battery Street bridge) to vehicular traffic. This segment of Battery Street allows vehicles from southbound Battery Street and eastbound Bush Street to make a southbound right turn onto westbound Market Street. During the weekday p.m. peak hour, about 125 vehicles make this turn onto westbound Market Street. The One Bush parking garage exit onto Market Street, which exits parallel and immediately adjacent to the Battery Street bridge and is controlled by the same traffic signal as the Battery Street bridge, would remain open, but the driveway would be reconfigured to provide for an uninterrupted sidewalk and sidewalk-level bikeway on the north side of Market Street between Bush/Battery/First and Sutter/Sansome streets. Thus, private vehicle access would be allowed for the approximately 270-foot segment of westbound Market Street between the One Bush parking garage driveway and Sutter/Sansome streets. Vehicle egress from the parking garage would not be signalized, and vehicles exiting the parking garage would need to yield to westbound traffic on Market Street. Because of the low number of vehicles exiting the parking garage during the weekday p.m. peak hour (about 50 vehicles per hour), the limited number of vehicles in the westbound travel lanes as a result of the private vehicle access restrictions on the remaining portion of the Market Street corridor (about 40 vehicles east of the One Bush parking garage driveway during the weekday p.m. peak hour), and the existing traffic signal about 130 feet east of the garage driveway (which stops the westbound traffic flow while vehicles on southbound First Street cross Market Street), there would be adequate gaps in the traffic flow for vehicles exiting the parking garage to merge into the Market Street traffic flow without resulting in traffic hazards.

Closure of the segment of Battery Street between Bush and Market streets would require all vehicles on Bush and Battery streets that are currently permitted to access westbound Market Street via the Battery Street bridge to continue southbound onto First Street (about 125 vehicles during the weekday p.m. peak hour). The diverted vehicles from Battery Street would share the three southbound travel lanes on Bush/First Street crossing Market Street. Vehicles destined to the north would most likely turn right from southbound First Street onto Mission Street to northbound Third Street or would continue south to eastbound Folsom Street to access The Embarcadero. Vehicles destined to the west would turn right onto westbound Mission Street or Howard Street and continue westbound to their destination. Because the 125 diverted vehicles during the weekday p.m. peak hour would disperse among multiple streets and within multiple travel lanes south of Market Street and would not substantially affect traffic operations, the closure of the Battery Street bridge would not result in any new traffic hazards.

Eastbound Market Street

- Under 2020 baseline conditions, eastbound traffic volumes on Market Street would be generally lower than westbound volumes because of existing turn restrictions at 10th and Sixth streets.
- West of 10th Street, the proposed project would restrict vehicles from turning onto eastbound Market Street at Page Street and at Van Ness Avenue. With implementation of the proposed project, the vehicles currently using Page Street to travel eastbound to Market Street are anticipated to shift to southbound Gough Street to access eastbound Market Street. With implementation of the proposed project, the majority of these vehicles making the northbound right turn from Van Ness Avenue onto eastbound

Market Street (under 2020 baseline conditions, would be required to exit at either 11th or 10th streets) would continue north across Market Street and use Fell Street to reach 10th Street.

- The majority of people driving on eastbound Market Street between 10th Street and Sixth Street currently access Market Street at Ninth Street and exit at Eighth Street or Sixth Street, and would continue to do so under 2020 baseline conditions. However, with implementation of the proposed project, these drivers would travel northbound across Market Street to access Grove Street or Fulton Street and access southbound Hyde Street for destinations on Eighth Street.
- Under 2020 baseline conditions, people driving on eastbound Market Street east of Sixth Street generally access Market Street at Montgomery, Second, Battery, Fremont, Davis, Drumm, and Main streets. In general, on the eastern segment of Market Street, drivers use eastbound Market Street to connect between two north–south streets. With implementation of the proposed turn restrictions, drivers would instead continue north or south across Market Street and use other streets north or south of Market Street to reach their final destination. The exception would be for people driving on Second Street, who would use Mission, Stevenson, and Folsom streets to reach other north–south streets.
- The eastbound private vehicle restrictions would result in fewer people driving on streets such as Ninth, Second, Montgomery, and Battery streets and up to an additional 150 vehicles per hour on some segments of Mission Street (e.g., near Ninth Street or Second Street), although other segments of eastbound Mission Street would have fewer than 100 additional vehicles per hour during the p.m. peak hour.

Implementation of the proposed turn restrictions on streets approaching Market Street would also change traffic volumes on streets intersecting with Market Street. The greatest change would be due to the closure of eastbound Ellis Street between Market Street and Cyril Magnin Street. Ellis Street is one of three routes that allow vehicles to cross Market Street at either Fourth or Fifth streets. The other two routes include Stockton Street, which also crosses at Fourth Street, and Cyril Magnin Street, which crosses at Fifth Street. Under 2020 baseline conditions, southbound Stockton Street is projected to operate at capacity with recurring vehicle queues extending beyond O'Farrell Street, while southbound Cyril Magnin Street would have some available capacity for vehicles crossing Market Street. Therefore, the closure of eastbound Ellis Street would cause some drivers traveling southbound across Market Street at Fourth Street to shift to Cyril Magnin Street and Fifth Street to avoid the congestion on Stockton Street. Other changes to streets, such as Turk Street and Mason Street and McAllister Street and Jones Street, would result in shifts of fewer than 100 vehicles per hour on these streets.

Overall, almost all streets in the transportation study area would experience some level of increase or decrease in traffic volumes, although, on most streets, the change would be less than 100 vehicles per hour (representing 5 to 10 percent of total p.m. peak-hour volumes on these streets). This level of traffic volume change would be less than the average daily fluctuation in traffic volumes, indicating that this change would be imperceptible to the average driver.[33] Under 2020 baseline conditions, because drivers would primarily use Market Street to travel between north–south streets, and because the total number of people driving traveling through the transportation study area would not change with the proposed project, any increase in vehicles on one street crossing Market Street would generally have a corresponding decrease in vehicles on another street. These shifts in traffic would most likely cause shifts in travel patterns outside of the transportation study area where drivers may choose to take less-direct routes because of the Market Street turn restrictions. This shift in routes used by drivers would be facilitated by the street grids on either side of Market Street and the increasing use of vehicle and cell phone navigation systems that account for real-time congestion and roadway conditions.

The redistribution of traffic volumes could lead to increases in conflicts between vehicles on some roadway segments compared with baseline conditions, with decreasing conflicts on other roadway segments. However, the proposed project, as a whole, would include elements that would address many existing hazards, including updated signal timing and reduced vehicle speeds throughout the transportation study area due to vehicle restrictions on Market Street and elsewhere. As such, this redistribution of vehicular traffic is not expected to increase or exacerbate existing hazards.

For the above reasons, implementation of the proposed project would not create traffic hazards, and therefore, proposed project impacts related to traffic hazards would be ***less than significant.***

WESTERN VARIANT

The Western Variant, with respect to features affecting traffic hazards, would be similar to the proposed project as described above. The primary difference in terms of roadway configuration would be that the Western Variant would reduce the number of travel lanes from two to one on Market Street in the westbound direction between Hayes and 12th streets, and in the eastbound direction between 12th and 11th streets. Similar to the proposed project, the Western Variant would be designed consistent with City policies and design standards, including the Better Streets Plan, and would not result in traffic hazards. These roadway configuration changes would be paired with the additional vehicle restrictions and vehicle circulation changes described below.

The Western Variant would extend the proposed private vehicle restrictions on westbound Market Street from Van Ness Avenue to 12th Street. Only Muni vehicles, paratransit vehicles,

[33] Center for Transportation Analysis, Oak Ridge National Laboratory, for the Federal Highway Administration. 1997. *Variability in Traffic Monitoring Data Final Summary Report.* August.

taxis, and emergency vehicles would be allowed to continue westbound on Market Street between Ninth Street and 12th Street. In addition, at Van Ness Avenue, southbound right-turns to westbound Market Street would be prohibited to all vehicles except Muni and emergency vehicles. With implementation of the Western Variant, private vehicles (which would be restricted from making a right turn onto westbound Market Street) would instead use southbound Gough Street. This detour may affect queues on Gough Street, although this assessment indicates that private vehicles traveling to the south of Market Street may shift from Gough Street to Van Ness Avenue if vehicle queues worsen on Gough Street and lessen on Van Ness Avenue. Therefore, the turn restriction from southbound Van Ness Avenue to westbound Market Street would not substantially change traffic conditions or create hazards, similar to the proposed project.

On eastbound Market Street, the Western Variant includes additional private vehicle restrictions between Valencia and 11th streets. A new turn restriction would be implemented from eastbound Market Street to southbound Valencia Street (i.e., right turns from eastbound Market Street onto southbound Valencia Street would not be permitted). Instead, the Western Variant would include new signage to indicate that eastbound private vehicles must turn right from Market Street at Gough Street to access freeways and other destinations south of Market Street. As for the proposed project, the existing left turn lanes from eastbound Market Street onto northbound Franklin Street would not be affected.

All other eastbound vehicles on Market Street east of Gough Street, besides Muni, emergency vehicles, paratransit vehicles, and taxis, would be required to turn right onto 12th Street, which is a one-block local street between Market Street and South Van Ness Avenue/Otis Street. This would be the final opportunity for private vehicles on eastbound Market Street to comply with the private vehicle restrictions to the east.

The result of these eastbound Market Street restrictions would be that private vehicles using Market Street to reach Valencia Street or 10th Street would most likely instead shift to Gough Street, Duboce Avenue, and 14th Street upstream of the intersection of Van Ness Avenue/South Van Ness Avenue/Market Street.

For northbound vehicles on 12th Street, the Western Variant would force northbound vehicles to turn left onto westbound Market Street (i.e., right turns from northbound 12th Street onto eastbound Market Street would not be permitted). In general, these restrictions would not substantially affect access or travel patterns beyond the first few blocks from leaving 12th Street. Because 12th Street near Market Street provides primarily local access to properties between Otis and Market streets, the redistribution of vehicles due to this change would be negligible compared to the surrounding roadway volumes.

These shifts in vehicle travel patterns due to the Western Variant would not by themselves create traffic hazards compared to the proposed project, nor would vehicles be expected to shift to streets with transit operating in mixed-flow lanes in substantial numbers.

In summary, implementation of the Western Variant would not change conditions on local streets or regional facilities so as to result in conditions substantially different from existing conditions, a new traffic hazard, or worsening of an existing traffic hazard. Therefore, similar to the proposed project, the Western Variant impacts related to traffic hazards would be ***less than significant.***

TRANSIT IMPACTS

Impact TR-4. The proposed project and project variant would not result in a substantial increase in delays or operating costs such that significant adverse impacts on local or regional transit would occur. (Less than Significant)

The project includes multiple elements intended to improve transit operations along Market Street. With implementation of the proposed project, Market Street would continue to have two travel lanes in each direction between Franklin and Beale streets, three travel lanes between Beale and Spear streets (one eastbound and two westbound), and two travel lanes between Spear and Steuart streets (one travel lane in each direction). West of Franklin Street, four to seven travel lanes (two through travel lanes in each direction plus turn lanes) would be provided, similar to existing conditions. The proposed project would convert the existing center transit-only or mixed-flow lanes to Muni-only lanes generally between 12th and Main streets. Within the Muni-only lanes, only Muni buses, historic streetcars, and emergency vehicles would be permitted. Taxis, paratransit vehicles, bicycles, other vehicles, and transit vehicles operated by other transit agencies would be excluded from Muni-only lanes. The proposed project would also restrict access to Market Street for all private vehicles between Steuart Street and Van Ness Avenue in the westbound direction, and between 10th and Main streets in the eastbound direction. Therefore, in these segments, non-transit vehicles in the curb travel lane would consist of only taxis, commercial vehicles, and paratransit vehicles. Bicycles would be permitted however, a separated sidewalk-level bikeway would be provided in both directions for the majority of the project corridor for bicycle travel along Market Street.

An exception to the private vehicle restrictions described above would be on the segment of westbound Market Street between the One Bush parking garage driveway and Sutter Street. In this segment, private vehicles exiting the One Bush garage would be able to travel westbound on Market Street to Sutter/Sansome streets where they would be required to turn right onto either westbound Sutter Street or northbound Sansome Street. Because of the limited number of vehicles exiting the One Bush parking garage onto westbound Market Street (about 50 vehicles during the weekday p.m. peak hour), the proposed private vehicle access restrictions that would limit vehicles on this segment primarily to transit vehicles, the two westbound travel lanes, and the fact that the exit is an existing condition, it is not anticipated that vehicles exiting the One Bush parking garage would substantially delay buses traveling within the westbound travel lanes, nor would vehicles exiting the garage conflict with the proposed bus stop (120 feet in length) that would be located between the One Bush parking garage driveway and Sutter Street.

Other transit network changes within the Market Street project corridor include modifications to transit stop spacing and new stop locations (including sidewalk/curb stops and boarding islands), minor service changes to bus routes related to transit stop changes, reconstruction, removal or relocation of transit boarding islands to meet ADA standards, full replacement of the existing street streetcar rail tracks, modifications to Muni route terminal locations, replacement of the transit traction power system and overhead wires,[34] and construction of the F-loop. This streetcar loop would be in addition to the streetcar tracks in the travel lanes of 11th Street between Market and Mission streets that currently allow streetcars to turn around and layover, which would not be affected by the proposed project. With construction of the streetcar loop, a new F-Short line would be implemented to provide service between the loop and Fisherman's Wharf. During the p.m. peak hour, service would be provided as often as every 10 minutes. Therefore, the combination of the existing F Market & Wharves streetcar line and the new F-Short streetcar line between the F-loop and Fisherman's Wharf would provide streetcar service as often as every 5 minutes.

As discussed in *Approach to Analysis*, the impact of the proposed project on Muni transit operations in terms of increased transit travel times was analyzed separately for routes using Market Street, routes using Mission Street, and routes crossing Market Street that do not operate in transit-only lanes.

Table 4.B-4, on the following page, presents the results of the transit travel time analysis for p.m. peak-hour conditions for 2020 baseline and 2020 baseline plus project. The table presents the headways for the routes for 2020 baseline conditions (i.e., reflects implementation of Muni Forward service changes approved for implementation by 2020), the transit travel time changes between 2020 baseline and 2020 baseline plus project conditions, and the transit travel time changes as a percentage of the 2020 headways. As described in the Approach to Analysis section, 2020 baseline travel-time analysis accounts for the increase in vehicle trips due to land use and transportation changes in the transportation study area that are anticipated to be completed by 2020. The detailed transit travel-time analysis is included in Appendix 7, attachment 6.

[34] Overhead wires are suspended over streets and rail tracks to provide electric power to trolley coaches, streetcars, and light-rail vehicles.

TABLE 4.B-4. MUNI TRANSIT OPERATIONS ANALYSIS – 2020 BASELINE-PLUS-PROJECT CONDITIONS – WEEKDAY P.M. PEAK HOUR

Route/Direction[a]	2020 Baseline Headways (min:sec)	2020 Baseline plus-Project Conditions: Threshold[b] (min:sec)	2020 Baseline plus-Project Conditions: Travel Time Change (min:sec)
Market Street Routes			
F Market & Wharves – inbound[c]	10:00	4:00	-5:07
F Market & Wharves – outbound	10:00	4:00	-6:45
2 Clement – inbound	7:30	3:45	0:35
2 Clement – outbound	7:30	3:45	-2:03
5 Fulton – inbound	7:30	3:45	-4:16
5 Fulton – outbound	7:30	3:45	-4:28
5R Fulton Rapid – inbound	7:30	3:45	-4:16
5R Fulton Rapid – outbound	7:30	3:45	-4:28
6 Haight/Parnassus – inbound[d]	12:00	4:00	0:55
6 Haight/Parnassus – outbound[d]	12:00	4:00	-0:36
7 Haight/Noriega – inbound[d]	7:00	3:30	-1:40
7 Haight/Noriega – outbound[d]	7:00	3:30	0:59
7X Noriega Express – outbound	9:00	4:00	-3:33
9 San Bruno – inbound	10:00	4:00	-4:27
9 San Bruno – outbound	10:00	4:00	-4:13
9R San Bruno Rapid – inbound	10:00	4:00	-4:27
9R San Bruno Rapid – outbound	10:00	4:00	-4:13
21 Hayes – inbound	9:00	4:00	0:41
21 Hayes – outbound	9:00	4:00	-4:02
31 Balboa – inbound	12:00	4:00	0:42
31 Balboa – outbound	12:00	4:00	-3:33
38 Geary – inbound	6:00	3:00	-0:42
38 Geary – outbound	6:00	3:00	-0:37
38R Geary Rapid – inbound	5:00	2:30	-0:42
38R Geary Rapid – outbound	5:00	2:30	-0:37
Mission Street Routes			
14 Mission – inbound	7:30	3:45	-1:11
14 Mission – outbound	7:30	3:45	-0:47
14R Mission Rapid – inbound	7:30	3:45	-1:11
14R Mission Rapid – outbound	7:30	3:45	-0:47
14X Mission Express – inbound	7:30	3:45	-1:21
14X Mission Express – outbound	7:30	3:45	-0:03

Route/Direction[a]	2020 Baseline Headways (min:sec)	2020 Baseline plus-Project Conditions Threshold[b] (min:sec)	2020 Baseline plus-Project Conditions Travel Time Change (min:sec)
Cross Street Routes			
3 Jackson – inbound	15:00	4:00	0:11
3 Jackson – outbound	15:00	4:00	0:12
10 Townsend – inbound	6:00	3:00	-1:14
10 Townsend – outbound	6:00	3:00	-0:10
12 Folsom – inbound	15:00	4:00	-1:06
12 Folsom – outbound	15:00	4:00	-0:02
19 Polk – inbound	15:00	4:00	0:55
19 Polk – outbound	15:00	4:00	0:36
27 Bryant – inbound	15:00	4:00	0:11
27 Bryant – outbound	15:00	4:00	3:32
30X Marina Express – outbound	8:00	4:00	-0:55
41 Union – inbound	8:00	4:00	-0:05
41 Union – outbound	8:00	4:00	-0:55
82X Levi Plaza Express – outbound	15:00	4:00	-0:05
Regional Routes[e]			
Golden Gate Transit 24, 54, 92, 93 routes – inbound[f]	15:00	7:30	0:37
Golden Gate Transit 24, 54, 92, 93 routes – outbound	15:00	7:30	2:52
Golden Gate Transit Financial District routes – inbound	12:00	6:00	-2:59
Golden Gate Transit Financial District routes – outbound	12:00	6:00	0:01
Golden Gate Transit Salesforce Transit Center routes – inbound	30:00	15:00	-1:05
Golden Gate Transit Salesforce Transit Center routes – outbound	30:00	15:00	1:40
SamTrans 292 and KX – inbound[g]	20:00	10:00	-1:11
SamTrans 292 and KX – outbound	20:00	10:00	-0:47

Notes:

a. Inbound direction generally means headed towards downtown San Francisco. It is the opposite of the outbound direction. Routes that do not go downtown have a consistent definition for inbound and outbound. For example, the 19 Polk is defined as heading inbound to the Marina and outbound to Hunters Point; the F Market & Wharves is defined as heading inbound to Fisherman's Wharf and outbound to Castro.

b. The threshold for significant impacts for Muni routes is half the headway or 4 minutes, whichever is less. The threshold for significant impacts for regional transit service routes is half the headway.

c. The proposed F-Short streetcar line, which would travel between Seventh/Charles J. Brenham and Steuart streets within the Market Street project corridor, is not included in this table. The F Market & Wharves historic streetcar line presents the travel time savings for the entire project corridor between Octavia Boulevard and Steuart Street.

d. Although the 6 Haight/Parnassus and 7 Haight/Noriega generally travel along the same segments of Market Street, the travel time changes due to the proposed project are slightly different. In the inbound direction, the proposed project would move the 6 Haight/Parnassus from the center Muni-only lane to the curb mixed-flow

Route/Direction[a]	2020 Baseline Headways (min:sec)	2020 Baseline plus-Project Conditions Threshold[b] (min:sec)	Travel Time Change (min:sec)

lane, while the 7 Haight/Noriega would remain in the curb mixed-flow lane. Therefore, the proposed project would reduce travel times for the 7 Haight/Noriega but not the 6 Haight/Parnassus because of the slower average travel speeds in the curb mixed-flow lane compared with the center Muni-only lane. In the outbound direction, the proposed project would shift both routes from the center Muni-only lane to the curb mixed-flow lane, resulting in small increases to travel times for both routes west of Fremont Street. However, the 6 Haight/Parnassus also travels on the westbound segment of Market Street between Steuart Street and Fremont Street, while the 7 Haight/Noriega enters at Fremont Street. The proposed project would reduce transit travel times on Market Street east of Fremont Street for the 6 Haight/Parnassus, resulting in an overall reduced travel time through the whole corridor.

e. The new Salesforce Transit Center was opened in August 2018 and in September 2018 was temporarily closed for repairs. It is anticipated that the Salesforce Transit Center will reopen by the 2020 analysis year. With the opening of the Salesforce Transit Center, AC Transit no longer will operate on streets within the transportation study area due to the direct ramps connecting to the Bay Bridge.

f. Within the transportation study area, Golden Gate transit routes operate on the following streets: Routes 24, 54, 92, 93 routes operate on Hyde, Eighth, and Folsom in the inbound direction, and McAllister, Seventh, and Harrison streets in the outbound direction; Financial District routes operate on Battery, First, and Howard streets in the inbound direction and Pine, Sansome, Fremont, Folsom streets in the outbound direction; Salesforce Transit Center routes operate on Hyde, Eighth, and Mission streets in the inbound direction, and McAllister, Seventh, and Mission streets in the outbound direction.

g. SamTrans routes KX and 292 travel through the study area along Mission Street from Ninth and 10th streets to the Salesforce Transit Center. Route 292 operates approximately every 20 minutes in inbound and outbound direction during p.m. peak period. SamTrans route KX operates approximately every hour in the outbound direction only during the p.m. peak hour.

Source: SFMTA, Fehr & Peers, 2018.

Muni F Market & Wharves Streetcar and Market Street Bus Routes. In general, as shown in Table 4.B-4, p. 4.B-63, implementation of the proposed project would decrease weekday p.m. peak-hour transit travel times for most routes operating on Market Street. In particular, the proposed project would decrease weekday p.m. peak-hour transit travel times for the Muni F Market & Wharves streetcar by more than 5 minutes because of the substantial transit improvements along the entire Market Street project corridor. In addition, the proposed project would decrease travel time for most of the remaining 12 bus routes that operate on Market Street, with greater improvements for routes traveling a longer distance on Market Street. Some routes could see a slight increase in travel time should they shift from center Muni-only lane to the curb mixed-flow lane. As shown in Table 4.B-4, implementation of the proposed project would not result in significant increases in transit travel times.

It should be noted that the analysis presented in Table 4.B-4 is based on the initial roadway design, which assumed that bicyclists would travel in the curb mixed-flow travel lane, similar to existing conditions. The transit travel time analysis in Table 4.B-4 reflects the impact of the initial roadway design on transit travel times. Subsequent to the analysis of the initial roadway design for Market Street transit, the proposed project was revised to include a separated bikeway. The revised roadway design would reduce travel times for transit routes operating in the curb mixed-flow travel lane compared to what is presented in Table 4.B-4 because there would be fewer bicycles operating in that lane. The transit travel time analysis was not updated to reflect the revised roadway design because the determination that the proposed project would result in less-than-significant increases in transit travel times would not change with the revised roadway design. Therefore, the analysis presented in Table 4.B-4 is valid for determining proposed project impacts on transit travel time. As discussed above, with implementation of the proposed project, any increases in transit travel times for routes traveling on Market Street would not exceed 4 minutes or one-half of the headway between transit vehicles.

In general, implementation of the proposed project would increase the reliability of bus routes operating on Market Street as they travel through the city by reducing bunching of buses,[35] gaps between buses, and crowding due to bunching.

Mission Street Bus Routes. As shown on Table 4.B-4 implementation of the proposed project would not result in increased transit travel times on the Muni 14 Mission, 14R Mission Rapid, and 14X Mission Express routes. Overall, the changes to volumes on Mission Street due to shifts in vehicles from Market Street would not substantially affect Mission Street travel times. The implementation of the proposed project could reduce vehicle queues on Mission Street at two congested locations where private vehicles making right turns often conflict with Muni vehicles under 2020 baseline conditions. Restricting vehicle turns from eastbound Market Street onto First Street would increase the likelihood that vehicles turning from eastbound Mission Street onto First Street would find gaps in traffic to make this turn, thus slightly reducing the queue on Mission Street. Restricting vehicle turns from northbound Ninth Street onto eastbound Market Street would reduce the frequency of vehicle queues that extend on Ninth Street from Market Street onto westbound Mission Street. The reduction in frequency and length of vehicle queues at these locations would allow Muni vehicles to travel slightly faster on Mission Street on average with the implementation of the proposed project.

Cross Street Bus Routes. For routes on cross streets operating in transit-only lanes, congestion due to increased volumes of private vehicles diverted from Market Street is not expected to affect transit travel times on these routes. Based on the limited locations where the diverted vehicles could affect these routes, there would be few changes to queuing activity at intersections or congestion in transit-only lanes. Travel times on the 27 Bryant route would

[35] Bunching of buses refers to a group of two or more buses on the same route that arrive in quicker succession than the scheduled frequency (e.g., two buses arrive within 1 minute of each other when they are scheduled to arrive every 10 minutes).

increase the most due to additional (i.e., diverted) vehicles on Fifth Street within the mixed-flow travel lanes that buses travel in, but the increase would remain below the significance threshold.

Regional Bus Routes. As shown on Table 4.B-4, implementation of the proposed project would result in minimal changes to transit travel times on the regional routes running through the transportation study area. SamTrans 292 and KX routes operate primarily on Mission Street through the transportation study area and therefore would experience similar small changes in travel time as would Muni routes on Mission Street. Travel times on the Golden Gate Transit routes would increase the most due to additional (i.e., diverted) vehicles on Seventh and Folsom streets within the mixed-flow travel lanes that Golden Gate Transit buses travel in, but the increase would remain below the significance threshold.

F Market & Wharves Historic Streetcar Loop. The proposed F-loop would benefit riders along the eastern portion of Market Street, on the Embarcadero and in Fisherman's Wharf by providing more frequent service along the portion of the route with the highest ridership. Streetcars traveling eastbound or westbound on Market Street would also be able to turn into the F-loop from Market Street at McAllister Street to remove disabled vehicles from service or other emergency measures if needed. The F Market & Wharves streetcars would have signal phases allowing them to turn south from Charles J. Brenham Place to eastbound or westbound Market Street and from eastbound or westbound Market Street to McAllister Street.

In general, implementation of the proposed project would increase reliability and reduce travel times (as shown in Table 4.B-4) on the F Market & Wharves due to the historic streetcar track loop at McAllister Street, Muni-only lanes in which the streetcar travels, boarding island improvements, and stop modifications.

For the reasons described above, the proposed project would not substantially affect the Muni or regional transit operations, and proposed project impacts on transit operations would be ***less than significant.***

WESTERN VARIANT

The Western Variant would be similar to the proposed project, with the exception of the approximately 0.6-mile portion of Market Street between Octavia Boulevard and approximately 300 feet east of the Hayes and Market Street intersection. Similar to the proposed project, the Western Variant would generally convert the existing center lanes on Market Street from transit-only lanes to Muni-only lanes. However, unlike the proposed project, the Western Variant would allow only Muni vehicles, taxis, paratransit, and emergency vehicles to continue westbound on Market Street at Hayes Street. In addition, unlike the proposed project, the Western Variant would allow only Muni vehicles, paratransit vehicles, emergency vehicles, and taxis to continue eastbound on Market Street at 12th Street.

With the Western Variant, the number of westbound travel lanes on Market Street between Hayes and 12th streets would be reduced from two to one travel lane. Unlike the proposed project, only Muni, taxis, paratransit, and emergency vehicles would be allowed to continue westbound on Market Street at Hayes Street (i.e., trucks would not be permitted to continue westbound on Market Street west of Hayes Street). In addition, unlike the proposed project, only Muni vehicles, paratransit vehicles, emergency vehicles, and taxis would be allowed to continue eastbound on Market Street at 12th Street.

The Western Variant changes in the western segment would primarily affect transit operations on the F Market & Wharves historic streetcar, 6 Haight/Parnassus, 7 Haight/Noriega, 21 Hayes, 9 San Bruno and 9R San Bruno Rapid that operate on the section of Market Street that would be affected by the project variant. A travel time analysis was conducted for the Western Variant similar to the proposed project to determine whether the Western Variant would substantially affect transit travel times.[36] For the F Market & Wharves historic streetcar and Muni routes operating on Market Street, transit travel times would not be substantially different from the proposed project. Vehicles diverted from this segment of Market Street with the Western Variant would generally use streets on which transit does not operate (e.g., Gough Street, Duboce Avenue, 14th Street). In addition, transit on Van Ness Avenue (including Muni and Golden Gate Transit buses) would operate within exclusive transit-only lanes, while on Market Street, Muni buses would operate within exclusive Muni-only lanes, and therefore transit vehicles would not be subject to additional delay due to diverted vehicles. Therefore, the Western Variant would not substantially affect transit operations on other streets in the transportation study area. Similar to the proposed project, the Western Variant would not substantially affect the Muni or regional transit operations, and impacts would be ***less than significant.***

WALKING/ACCESSIBILITY IMPACTS

Impact TR-5. The proposed project and project variant would not create hazardous conditions for people walking, or otherwise interfere with accessibility for people walking to the site or adjoining areas. (Less than Significant)

Features of the proposed project that would modify the pedestrian network and affect people walking include:

- Sidewalk reconfiguration along Market Street
- Upgrades and new traffic signals along the project corridor
- Sidewalk bulb-outs crossing side streets at multiple locations
- Modification and expansion of boarding islands and curbside stops, including changes to stop spacing

[36] Results of the transit travel time analysis are presented in Attachment 6b of Appendix 7.

- Potential relocation of the elevator at the BART/Muni Civic Center station
- Other streetscape improvements, including replacement of uneven sidewalk surfaces with accessible materials (consistent with Public Works Order 200369)
- Vehicle access restrictions

Sidewalk Reconfiguration. Sidewalks on Market Street along the project corridor are currently about 15 to 35 feet wide. The project would generally narrow the sidewalks on either side of Market Street by 5 to 15 feet to construct a dedicated bicycle facility and furnishing zone at the sidewalk level. A 1- to 3-foot-wide buffer would be provided between the bicycle facility and the pedestrian furnishing zone. Although the bicycle facility and pedestrian sidewalk would be at the same grade, a buffer zone would be designed through the use of markings, signs, and raised features to discourage bicyclists from bicycling onto the sidewalk and people from walking in the bikeway. Access to the existing portals for the four BART/Muni stations (i.e., Embarcadero, Montgomery, Powell, Civic Center) and the Muni Van Ness station, as well as the elevators to these stations for people walking and bicycling, would be maintained. The exception is the potential relocation of the elevator at the BART/Muni Civic Center station, discussed below. At curbside transit stops, a sidewalk-level bikeway would be placed behind the transit stop, between the stop and the sidewalk furnishing zone. Pedestrians would have designated places to cross the bicycle lane to connect from the transit stop to the sidewalk. ADA-compliant curb ramps would be installed at all intersections along the project corridor.[37]

The proposed project would also close the segment of Battery Street between Bush and Market streets (i.e., the Battery Street bridge), which allows for vehicles on Bush and Battery streets to turn right onto westbound Market Street, to create a new pedestrian plaza in its stead. This closure would enhance facilities for people walking between Bush and Market streets. The existing sidewalk for north/south travel adjacent to the One Bush Street site is narrow (approximately 5 feet in width on the west side of the Battery Street bridge); at Market Street, the sidewalk terminates within the crosswalk across the Battery Street bridge and the One Bush Street garage exit driveway between these two travel lanes. In addition, as part of the proposed project, the One Bush Street parking garage exit driveway adjacent to the Battery Street bridge would be reconfigured to intersect the pedestrian through zone at the Market Street sidewalk grade, with a ramp at the curb rather than a uniform slope from the garage exit through the entire width of the sidewalk. Vehicles exiting the parking garage via the Market Street driveway (about 50 vehicles during the weekday p.m. peak hour) would yield to people walking. Elimination of the Battery Street bridge and reconfiguration of the One Bush Street parking garage exit onto Market Street would remove the

[37] The Americans with Disabilities Act (ADA) became law in 1990. The ADA is a civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, transportation, and all public and private places that are open to the general public (e.g., streets and sidewalks).

approximately 45-foot-long crosswalk across the vehicle travel lanes and provide for an uninterrupted sidewalk on the north side of Market Street between Bush/Battery and Sutter/Sansome streets.

Upgrade/New Signals. The proposed project would upgrade the existing signal infrastructure on Market Street between Octavia Boulevard and Steuart Street, and signals would include accessible pedestrian signal buttons, and bicycle and pedestrian signals at some locations. New signal timing would provide leading pedestrian intervals (LPIs)[38] for Market Street and cross-street crossings at most intersections, and the green walk and flashing red hand "Don't Walk" times for people crossing would meet the City standard of 2.5 to 3.0 feet per second.[39] The proposed project would signalize the intersections of 11th Street/Market Street and Steuart Street/Market Street, and a midblock location on Market Street between Powell and Ellis streets. The new midblock signal on Market between Powell and Ellis streets would shorten the distance pedestrians have to walk to access a signalized crossing across Market Street within the retail core. The new signal at the intersection of 11th Street/Market Street would allow for a new marked pedestrian crosswalk across Market Street where none currently exist. At the intersection of Steuart Street/Market Street, signalization would clarify right-of-way between vehicles and people walking. In addition, with reconfiguration of the intersection of 12th Street/Market Street, one of the existing signalized pedestrian crossing across Market Street at 12th Street would be removed. The existing signalized pedestrian crossing that is located at Page Street/Franklin Street/Market Street (approximately 125 feet west) would be retained; therefore access for people crossing Market Street would not be substantially affected. New crosswalks would be provided at intersections, and signage and traffic striping would be added to reinforce the turn restrictions and provide clear demarcation for vehicles, transit, bicyclists and people walking.

Sidewalk Bulb-outs. The proposed project would provide corner bulb-outs on at least one corner of nearly every intersection between Drumm Street/Main Street/Market Street and Fell Street/Polk Street/10th Street/Market Street. The intersection of 12th Street/Page Street/Franklin Street/Market Street would also include a corner bulb-out at the southwest corner. Corner bulb-outs would shorten the pedestrian crossing distance across Market Street's intersecting side streets, and would increase the visibility of pedestrians to drivers by placing crossing pedestrians into the turning drivers' line of sight farther in advance. The corner bulb-outs would reduce the likelihood of a pedestrian collision by shortening pedestrians' exposure to vehicle traffic and lessen the chance of drivers failing to yield to pedestrians in a crosswalk.

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[38] A leading pedestrian interval is a signal phase at signalized intersections that typically provides pedestrians a three- to five-second head start when entering an intersection with a corresponding green signal in the same direction of travel. For vehicle drivers the leading pedestrian intervals make it easier to see people walking in the intersection and reinforce their right-of-way over turning vehicles.

[39] SFMTA, *Pedestrian Signal Guidelines Memorandum*, Third Edition, May 2018.

Boarding Islands and Curbside Stops. With the proposed project, transit routes would serve at least one of the new relocated or modified stops on Market Street, consisting of 18 curbside stops (nine inbound, nine outbound) and 11 center boarding island stops (six inbound and five outbound). The stop relocations and modification may require some passengers to walk farther to access a transit stop. The increased distance may inconvenience some passengers; however, the curb-lane stop spacing would be consistent with SFMTA's local stop-spacing standards. Real-time transit information signs, advertisements, and transit shelters would be provided at all transit stops along the corridor.

All platforms (center boarding island and curbside stops) would be ADA-accessible and allow Muni riders with mobility impairments to use the transit system. The transit boarding islands along Market Street would be widened to 9 feet, 2 inches in width, and lengthened to accommodate two or three 60-foot buses. Every center transit boarding island would be constructed with a streetcar boarding ramp (i.e., a mini-high platform[40]). The larger boarding islands would provide more room for passengers getting on and off buses and streetcars and transit shelters for waiting transit passengers. At curbside transit stops, a sidewalk-level bikeway would be placed behind the transit stop, between the stop and the sidewalk furnishing zone. People walking would have designated places to cross the bicycle lane to connect from the transit stop to the sidewalk. Bicyclists would be able to pass stopped transit vehicles via the bicycle channel and avoid having to merge into the adjacent vehicle lane to pass.

The proposed F-loop would include a sidewalk stop and ADA platform on Charles J. Brenham Place. The curbside stop would serve all non-ADA passengers getting on and off the streetcar, while the streetcar boarding ramp (i.e., a mini-high platform, as described above) would serve wheelchair users. The mini-high platform would ramp down to the sidewalk within the adjacent plaza area in front of the 10 United Nations Plaza building. People walking on the west side of Charles J. Brenham Place between Market and McAllister streets would need to walk around the platform ramp. The path for a person walking from north of the streetcar boarding ramp to the northeast corner of Market Street/Charles J. Brenham Place would be approximately 30 feet longer than the existing direct path of travel (80 feet versus 50 feet). However, because adequate sidewalk spaces would remain (i.e., United Nations Plaza is located to the west of the platform ramps), the platform ramp would not impede people walking or access to adjoining areas.

The F-loop area would also include a transit operator restroom that would be located on the east sidewalk of Charles J. Brenham Place (i.e., across the street from the streetcar platform) adjacent to the building. At this location, the sidewalk is 13 feet wide, and locating a 6-foot-wide restroom at this location would maintain sufficient sidewalk area for people walking.

[40] A mini-high platform is used as a retrofit for older streetcars, using a small platform and ramp to permit accessible boarding to select transit vehicle doors.

Relocation of BART/Muni elevator at Civic Center Station. As part of the proposed project, the existing elevator at the BART/Muni Civic Center station that is located on the north side of Market Street between Seventh and Eighth streets near United Nations Plaza would either remain in place or would be relocated to a potential location within an existing staircase and escalator area in United Nations Plaza approximately 80 feet to the west. Relocation of the elevator from its existing location would be required because the elevator would conflict with the proposed sidewalk-level bikeway and transit stop and because relocation would facilitate the proposed upgrade of Muni's Civic Center traction power substation. If the elevator remains in place, the design of the curbside stop and the bikeway would be adjusted (i.e., the curbside stop would be shifted to the east, the bikeway would be narrowed, and the curbside stop would be widened). The possible elevator location would not substantially affect access for people walking to the BART/Muni Civic Center station. In addition to the elevator providing access to the station, there are five staircases/escalators on both the north and south sides of Market Street.[41]

Other Streetscape Improvements. The proposed project also includes streetscape improvements, such as street trees, street furniture, pedestrian-scale lighting, and new sidewalk surfaces, to improve the experience and safety of people walking. The street trees, street furniture, and lighting would be placed in a manner that meets City standards and ADA requirements for maintaining unobstructed and wide paths of travel for pedestrians and wheelchair users (i.e., by maintaining a minimum clearance width of 60 inches, exclusive of the width of the curb, and a recommended clearance width of 72 inches or more in high-use areas). In addition, the red brick sidewalk surface would be replaced with new continuous firm, stable, slip-resistant and smooth surfaces to meet City and ADA requirements (as set forth in Public Works Order 200369). The new sidewalk surface would remove existing challenges for people with disabilities, especially users of wheelchairs and other mobility assistive devices (such as canes).

Vehicle Access Restrictions. Implementation of proposed restrictions to private vehicle travel along most of Market Street between Steuart and 10th streets, as well as turn restrictions from intersecting cross streets onto Market Street, would limit motor vehicle access on Market Street to public transit vehicles, commercial vehicles, emergency vehicles, taxis, paratransit vehicles and bicycles. Private vehicles would be prohibited from turning onto westbound Market Street between Steuart Street and Van Ness Avenue and onto eastbound Market Street between 10th and Main streets. An exception to the private vehicle restrictions described above would be on the segment of westbound Market Street between the One Bush parking garage driveway and Sutter Street. In this segment, private vehicles exiting the One Bush garage would be able to travel westbound on Market Street to Sutter/Sansome streets where they would be required to turn right onto either westbound Sutter Street or northbound Sansome Street. Private vehicles crossing Market Street would continue to be allowed. Vehicles traveling across Market Street that block the

[41] In November 2018, BART permanently closed the entrance to the Civic Center station on the south side of Market Street west of Eighth Street to make room for a new traction power substation for BART trains.

intersection would be subject to traffic enforcement actions. Commercial vehicles would continue to be accommodated within dedicated loading spaces that would be separated from the pedestrian path of travel. Time-of-day loading restrictions on Market Street would be used to promote more efficient use of limited curb space and avoid conflicts between loading and other activities. Therefore, with implementation of the proposed project, the number of vehicles on Market Street would be reduced from baseline conditions, and exposure to conflicting vehicle traffic on Market Street with people walking would also be reduced with the proposed change.

Overall, the improvements described above would enhance pedestrian conditions and reduce the collision potential at high frequency collision locations along Market Street. One typical example of an existing high-frequency collision location whose collision likelihood would be reduced with implementation of the proposed project is the intersection of Cyril Magnin Street/Fifth Street/Market Street. The proposed project would restrict private vehicle access to crossing Market Street only; turns by private vehicles onto Market Street from Montgomery and Bush streets would not be permitted, which would reduce the number of westbound vehicles turning right from westbound Market Street onto Cyril Magnin Street. The proposed project would continue the existing turn restrictions in effect at this location, which would continue to reduce the potential conflicts for people crossing Market Street from vehicles turning left or right across the crosswalk. Corner bulb-outs at the southwest and southeast corners would shorten the pedestrian crossing distance at the south crosswalk. The proposed sidewalk-level bikeway on Market Street would increase the crossing distance across Market Street for people walking, but as noted above, their overall exposure to conflicting vehicle traffic would be reduced with the restrictions due to the private automobile access and vehicle turn restrictions. Conflicts between bicyclists and people walking would also be reduced with the dedicated bicycle facility and demarcated bicycle queuing areas (two-stage left-turn queue boxes) for bicycle left turns. Pedestrian circulation and safety would also be improved with the proposed implementation of a new signalized midblock crosswalk across Market Street between Powell and Ellis streets because it would shorten the distance for pedestrians to access a signalized crossing across Market Street.

The proposed project would not generate new trips by any mode, however, it is anticipated that the number of bicyclists using the new bicycle lanes on Market Street may increase, as bicyclists would likely find the improved Market Street route more comfortable and attractive than other east-west routes for reaching popular destinations and transit stations. Because the bicycle and pedestrian movements through and along Market Street would be concurrent at intersections (i.e., pedestrians and bicyclists would receive a green signal at the same time), there is potential for increased conflict between bicyclists turning right and pedestrians in the crosswalk. However, at intersections pedestrians would receive a leading pedestrian interval which would give people crossing a head start, and bicyclists turning to and from Market Street would be required to yield to pedestrians, as is the current condition. Therefore, the shift in bicyclists to Market Street would not result in potentially hazardous conditions for people walking.

In summary, implementation of the proposed project would accommodate people walking along and across Market Street, improve visibility and safety of people walking and crossing the street, and would not result in hazardous conditions or present barriers to people walking. Therefore, for the above reasons, impacts of the proposed project on people walking would be ***less than significant.***

A quantitative pedestrian LOS analysis was conducted for baseline plus project conditions to determine the effect of the proposed sidewalk narrowing at nine locations on Market Street, selected to reflect varying volumes of people walking and sidewalk widths. This analysis was conducted for weekday p.m. peak-hour conditions and is presented for informational purposes only.

As shown on Table 4.B-5, on the next page, with implementation of the proposed project, the sidewalk level of service at the nine study locations throughout the project corridor would be LOS D or better, which reflects conditions where pedestrians can travel in their desired path, but where the speed and ability to pass slower pedestrians may be restricted.[42] With implementation of the proposed project, the density of people walking would increase from baseline conditions. However, sidewalk widths would remain adequate to accommodate people walking without resulting in substantial overcrowding. The sidewalk narrowing at signalized crossings due to the bikeway ramping down to street grade would lengthen the crossing distances across Market Street, and therefore pedestrian signal crossing times (i.e., the time allocated to the walking person and flashing red hand) for people crossing Market Street would be lengthened to accommodate the increased distance. Crosswalk widths across Market Street would range between 55 and 94 feet (compared to between 55 and 84 feet under existing conditions).

WESTERN VARIANT

The Western Variant, with respect to features affecting the pedestrian realm, would be similar to the proposed project as described above. The following key pedestrian-related features included as part of the Western Variant would be different from the proposed project:

Between 12th and 11th streets, the sidewalks on both sides of Market Street would be widened to be between 22 and 26 feet in most locations. The sidewalk on the north side of Market Street from 11th to Ninth streets would also be widened. The additional sidewalk width would allow for additional sidewalk space for people walking, queuing at transit stops, and additional space around the Muni Van Ness station. The Western Variant would also incorporate additional entrances into the Muni Van Ness station as part of future development projects if they are determined to be feasible. The wider sidewalks would reduce the pedestrian crossing distance across Market Street at the intersections of Van Ness Avenue/South Van Ness Avenue/Market Street, 12th Street/Market Street, and 10th Street/Polk Street/Fell Street/Market Street.

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[42] *Highway Capacity Manual*, 2010, Exhibit 17-16, Qualitative Description of Pedestrian Space.

TABLE 4.B-5. PEDESTRIAN SIDEWALK LEVEL OF SERVICE ANALYSIS – 2020 BASELINE-PLUS-PROJECT CONDITIONS – WEEKDAY P.M. PEAK HOUR

Side of Street/Street Segment	Pedestrians (Hourly)	2020 Baseline			2020 Baseline plus Project		
		Effective Sidewalk Width (ft)[a]	Density (peds/ min/ft)[b]	LOS	Effective Sidewalk Width (ft)	Density (peds/ min/ft)	LOS
North Side of Market Street							
Drumm – Steuart streets	3,836	32	2.0	B	16	4.0	C
Montgomery – Sutter streets	4,008	13	5.1	C	7.5	8.9	D
Fifth – Ellis streets	3,242	11.5	4.7	C	8.5	6.4	D
Larkin – Grove streets	1,474	18.5	1.3	B	15	1.6	B
South Side of Market Street							
Fremont – Beale streets	4,518	12	6.3	D	12	6.3	D
New Montgomery – Second streets	4,028	19	3.5	C	17	3.9	C
Fifth – Fourth streets	5,112	11.5	7.4	D	11.5	7.4	D
Seventh – Eighth streets	1,928	11	2.9	B	6.5	4.9	C
Valencia – Gough streets	776	9	1.4	B	5	2.6	B

Notes:

a. "Effective width" equals the sidewalk pinch-point width minus a 2-foot-shy distance from buildings, 2-foot-shy distance from BART portals, 3-foot-shy buffer distance from separated bikeways, and loading zones.

b. Pedestrians per minute per foot of sidewalk width.

Source: Parisi, 2018. See Appendix 7, attachment 8**.**

Additional corner bulb-outs would be provided on intersecting streets in the western segment at the intersections of Ninth Street/Market Street and 12th Street/Market Street. As noted above, corner bulb-outs would reduce crossing distances and times and reduce the exposure of people walking to vehicular traffic.

At the three intersections of Rose Street/Market Street, Brady Street/Market Street, and 12th Street/Market Street, the Western Variant would raise the level of the roadway grade at the intersection of Rose Street (north side of Market Street) and Brady and 12th streets (south side of Market Street) to the level of the sidewalk on Market Street. With implementation of the raised crosswalk, the sidewalk would not ramp down to roadway grade, and a level pedestrian path of travel would be provided in the east-west direction along Market Street. In addition, the raised crosswalks would slow drivers' turning maneuvers onto and out of these side streets onto Market Street.

Pedestrian refuges between the bikeway and adjacent Muni, paratransit, taxi lane would be provided across Market Street at the intersections of Van Ness Avenue/South Van Ness Avenue/Market Street, 10th Street/Polk Street/Fell Street/Market Street, and Ninth Street/Larkin Street/Hayes Street/Market Street. These pedestrian refuges would allow pedestrians to cross a shorter distance during the walk phase if they queue on the refuge.

Unlike the proposed project, the Western Variant would not signalize the intersection of 11th Street/Market Street. Instead, it (i.e., 11th Street) would remain a minor street, stop-sign controlled, and a new crosswalk would not be constructed across Market Street at this location.

With the Western Variant there would be minor modifications to the location of transit stops (e.g., relocation from near side to far side of the intersection[43]) and dimensions of stops and boarding islands on Market Street between Hayes/Larkin streets and Octavia Boulevard from those included in the proposed project, however, these differences would not substantially affect pedestrian circulation or access to transit service. At the intersection of Van Ness Avenue/South Van Ness Avenue/Market Street, the transit stops in both the eastbound and westbound direction would be integrated into the widened sidewalks west of Van Ness Avenue, and the westbound transit stop would be relocated from the east side of Van Ness Avenue to the west side of Van Ness Avenue.

The adjacent intersections of Franklin Street/Page Street/Market Street and 12th Street/Market Street would be reconfigured differently than under the proposed project in order to incorporate a bicycle-only connection between Page and Market streets. As a result, the existing crosswalk across Market Street at the intersection of 12th Street/Market Street would be retained as part of the project variant.

The Western Variant also includes additional private vehicle and turn restrictions in both directions on the western segment which would reduce the number of vehicles on Market Street and turning onto Market Street. The Western Variant would restrict right turns from southbound Van Ness Avenue onto westbound Market Street, which would reduce the number of vehicles crossing the crosswalk on the west leg of the intersection. As described in Impact TR-3, these turning vehicles would take alternate routes to their destinations, and would be distributed among a number of streets (e.g., would use southbound Gough Street, or continue south onto South Van Ness Avenue and turn right onto Otis Street), and would therefore not substantially increase the number of turning vehicles across crosswalks at other intersections. The Western Variant would include a new required right turn from eastbound Market Street onto southbound 12th Street, and from westbound Market Street onto northbound Larkin Street or westbound Hayes Street. The signal timing at the intersections of Ninth Street/Larkin Street/Hayes Street/Market Street and 12th Street/Market Street would be adjusted to accommodate the additional turning vehicles.

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[43] Near side of an intersection is the first or nearest side encountered when passing through, contrasted with the far side of an intersection, which is the second or farthest side encountered when passing through.

For the above reasons, the Western Variant would further enhance the pedestrian network along Market Street and reduce the potential for conflicts between people walking, bicyclists and vehicles in the western segment of Market Street between Octavia Boulevard and Ninth/Larkin/Hayes streets. Therefore, similar to the proposed project, impacts of the Western Variant on people walking would be ***less than significant***.

BICYCLE IMPACTS

Impact TR-6. The proposed project and project variant would not result in potentially hazardous conditions for bicyclists, or otherwise interfere with bicycle accessibility to the project site or adjacent areas. (Less than Significant)

As described in Chapter 2, the proposed project would construct a raised sidewalk-level bikeway on Market Street in each direction between the curb travel lane and the pedestrian through zone. The raised sidewalk-level bikeway would be provided on Market Street between Octavia Boulevard and Steuart Street. The new bikeway would be adjacent to the pedestrian through zone and would include buffers on both sides to designate space for bicyclists. There would be several areas where the new bikeway on Market Street would be at roadway level to accommodate constrained or limited roadway widths, new bicycle connections, widened bicycle connections and widened boarding islands. On the south side of Market Street between South Van Ness Avenue and 10th Street, a new buffered street-level bikeway would be provided. The proposed project also includes implementation of new street-level parking-protected bicycle lanes on both sides of Valencia Street between Market and McCoppin streets. Bicycle signals and two-stage left-turn queue boxes, as appropriate, would be installed at most intersections. Leading bicycle signal intervals would be installed at some intersections. At one intersection, bicycle boxes would allow bicyclists to queue at the front of the vehicle queue during red lights.

The proposed project also includes restrictions to private vehicle travel along most of Market Street between Steuart and 10th streets as well as turn restrictions from intersecting cross streets onto Market Street. The proposed project would limit vehicle access on Market Street to public transit vehicles, emergency vehicles, taxis, commercial vehicles, paratransit vehicles, and bicycles. Commercial vehicles, taxis, and paratransit vehicles would be prohibited on eastbound Market Street between Beale and Main streets at all times. Commercial vehicles would be permitted to travel on Market Street at all times and allowed to park for loading activities during off-peak hours or during peak hours in the off-peak direction (e.g., prohibited from parking within the loading zones on eastbound Market Street during the a.m. peak period). Private vehicles would be prohibited from turning onto westbound Market Street between Steuart Street and Van Ness Avenue and onto eastbound Market Street at Page Street, Van Ness Avenue, and between 10th and Main streets. An exception to the private vehicle restrictions described above would be on the segment of westbound Market Street between the One Bush parking garage driveway and

Sutter Street. In this segment, private vehicles exiting the One Bush garage would be able to travel westbound on Market Street to Sutter/Sansome streets where they would be required to turn right onto either westbound Sutter Street or northbound Sansome Street. Private vehicles crossing Market Street would continue to be allowed. Therefore, with implementation of the proposed project, the number of vehicles on Market Street would be reduced from existing conditions, and bicyclists' exposure to conflicting vehicle traffic on Market Street would also be reduced with the proposed change. The impacts of the proposed project features on bicyclists are discussed below.

Separated Bicycle Facility on Market Street. The proposed project would construct a continuous bicycle facility in the eastbound and westbound direction between Octavia Boulevard and Steuart Street. The bicycle facility would largely be at sidewalk level, except for an eastbound section between Franklin and 10th streets, and three westbound sections, including between Second and Montgomery streets, between 11th Street and Van Ness Avenue, and between Rose and Valencia streets. The bicycle facility would provide a horizontal buffer of 1 to 4 feet from adjacent vehicle traffic on the left and a similar buffer of 1 to 3 feet from pedestrians on the right. Bicyclist safety would be improved with the dedicated and separated right-of-way, compared to existing conditions on Market Street, primarily east of Eighth Street, where bicyclists share a travel lane with adjacent vehicle traffic. The proposed project would enhance cycling conditions along Market Street and at the connections with bicycle lanes on several intersecting bikeways.

The egress driveway from the One Bush parking garage onto Market Street would be reconfigured to intersect the bikeway at the bikeway grade, with a ramp at the curb rather than a uniform slope from the garage exit through the entire width of the sidewalk and bikeway. The change in driveway grade from sloped to level with the sidewalk would serve to reduce travel speeds for exiting vehicles and improve the user experience for pedestrians and bicyclists by not having a grade change at the driveway. Street and sidewalk furnishings would be located to provide an adequate sight triangle for both bicyclists and drivers. In addition, pavement markings and "Yield to Bikes" signage would identify the conflict area and make it clear that the bikeway has priority over exiting vehicles. Although the driveway would not be signalized, it is anticipated that the majority of exiting vehicles would cross the bikeway and access Market Street when southbound Battery and Bush Street vehicles cross Market Street and westbound bicycle and vehicular traffic is stopped.

Closure of Battery Street between Bush and Market streets (i.e., the Battery Street bridge) and reconstruction of the exit driveway for the One Bush Street parking garage onto Market Street would enhance westbound bicycle travel on Market Street by eliminating a traffic signal and allowing an uninterrupted sidewalk-level bikeway on the north side of Market Street between Bush/Battery and Sutter/Sansome streets. Bicyclists would also be permitted to traverse the new pedestrian plaza to connect between the sidewalk-level bikeway and Bush and Battery streets.

In order to accommodate loading activities along Market Street, the proposed project would reconfigure the existing loading bays on Market Street to 20 loading zones at the sidewalk level, which would require vehicles accessing the loading zones to cross through the bikeway to access the loading area. The curb within the loading area would be mountable. The zone would be 17 feet wide from the curb, with approximately 10 feet dedicated to loading vehicles (single-unit truck and semi-trailer (WB-40) design vehicles are 8 feet wide)[44] and 6 feet dedicated to bicyclists. The remaining 1 foot would be for the rolled curb. The length of the loading zones would vary, but would range between 32 and 100 feet. Color, yield lines, and "Yield to Bike" signage would be installed, as appropriate, to make it clear that the bicycle lane has priority over vehicles entering and exiting the loading areas. Once a driver is conducting the maneuver, bicyclists would need to yield to vehicles merging across the bikeway.

The movement by loading vehicles into the sidewalk-level loading zone would involve crossing the bicyclist path of travel at each location. This movement would be similar to baseline conditions where vehicles must cross a class II bicycle lane to access parking or loading spaces. However, the number of loading zones on either side of Market Street would be limited (about 10 zones on each side of the street) and the movement from roadway grade to sidewalk grade would require the loading vehicle to maneuver slowly into the space. When parking the vehicle within the bay, the driver would need to position the loading vehicle to the far right edge of the loading zone to avoid blocking the bikeway, and exercise care to avoid hitting bicyclists when opening doors and loading freight. Under baseline conditions, when next to loading vehicles, bicyclists can move farther left and into the shared lane to reduce the risk for "dooring" (i.e., a bicyclist crashing into door opened by a person exiting a loading vehicle); under the proposed project, bicyclists would be restricted to the 6-foot bikeway next to the loading zone or need to enter the vehicle lane to move farther away from a loading vehicle. At the loading zones, the proposed project would improve bicyclist safety with respect to adjacent vehicle traffic by providing a raised and separated bikeway; however, the proposed project could increase potential bicyclist conflicts when a loading vehicle or exiting driver/passenger encroaches into the bikeway and the 6-foot bikeway does not offer adequate room for bicyclists to maneuver away from the loading vehicle without entering the adjacent traffic lane.

The proposed project would include regulations, education, and enforcement to restrict all loading activities on Market Street, except for paratransit vehicles, during peak periods in the peak direction of travel (i.e., eastbound towards downtown during the morning peak, and westbound away from downtown during the p.m. peak). Time-of-day loading restrictions on Market Street zones would be used to promote more efficient use of the curb space, and smaller delivery trucks and nighttime loading would be incentivized to minimize conflicts between bicyclists, transit, taxis, paratransit and delivery vehicles. Smaller delivery trucks have fewer blind

[44] American Association of State Highway and Transportation Officials. n.d. *A Policy on Geometric Design of Highways and Streets*. Sixth edition. Figures 2-2 through 2-13.

spots, are more maneuverable, and take up less space. As noted above, the proposed project would include markings and signage to indicate to both drivers and bicyclists direction on proper positioning through the loading zone area and expected rights-of-way between vehicles and bicyclists. Overall, the combination of recommended signage, markings, time of day management policies, and incentives for smaller trucks and nighttime loading on access to and from the sidewalk-level loading zones by commercial vehicles, paratransit, and taxis would not result in potentially hazardous conditions for bicyclists or interfere with bicycle accessibility.

Protected Bicycle Lane on Valencia Street – The proposed project would upgrade the existing bicycle lane on the one block segment of Valencia Street between Market and McCoppin streets to a protected bicycle lane. With implementation of the proposed project, the on-street parking would be located between the bicycle lane and the travel lane, and drivers would not cross over into the bicycle lane to park. Thus, the new protected bicycle lane would enhance the connection between the existing bicycle lanes on Otis Street and Market Street via McCoppin Street.

Two-stage Bicycle Left-turn Queue Boxes.[45] The proposed project would provide green-painted, two-stage left-turn queue boxes for bicyclists turning onto or off from bicycle facilities that intersect Market Street. These turn queue boxes allow bicyclists to wait in a specially marked area (i.e., the two-stage left-turn queue box) in front of stopped traffic for the cross-street green phase, then proceed through the intersection. There are currently several two-stage left-turn queue boxes on Market Street that facilitate movements to and from existing bicycle routes (e.g., at Polk Street and at Charles J. Brenham Place). The proposed project would provide or improve two-stage left-turn queue boxes at the following intersections with Market Street: 10th Street/Polk Street, Eighth Street/Grove Street/Hyde Street, Seventh Street, Golden Gate Avenue/Taylor Street/Sixth Street, Cyril Magnin Place/Fifth Street, Second Street, Sutter Street/Sansome Street, and Pine Street/Davis Street/Beale Street.

Another configuration of a two-stage turn box is called a T-Intersection “jughandle.” The two-stage “jughandle” is a protected area within a sidewalk cut-out that allows bicyclists to complete a similar two-stage left turn. There is an existing jughandle turn area at westbound Market Street and Valencia Street. The proposed project would provide a new “jughandle” at Market Street and 11th Street. The proposed project would include a new signal at the intersection of 11th Street/Market Street, with a turn cut-out in the sidewalk to allow bicyclists to complete a two-stage left turn, and would include bicycle signal and bikeway guideways to facilitate bicycle turns from westbound Market Street onto southbound 11th Street.

Two-stage bicycle left-turn queue boxes would serve to reduce vehicle-bicycle conflicts, increase bicyclists’ visibility to drivers, and provide bicyclists with a head start when the signal to cross the street turns green. Bicyclist safety would be improved as bicycle boxes would provide a

[45] Two-stage bicycle turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right-side cycle track or bicycle lane or right turns from a left-side cycle track or bicycle lane.

dedicated place for the bicyclist to queue, and bicycle access would be improved with the bicycle boxes serving as a wayfinding tool to intersecting bicycle routes. Thus, the proposed project would enhance connections with bicycle lanes on several intersecting bikeways.

Bicycle Boxes.[46] The proposed project would also provide bicycle boxes to allow bicyclists ahead of queued vehicles on Market Street at Van Ness Avenue. Bike boxes differ from two-stage bicycle left-turn queue boxes because they facilitate bicyclists' through and turning movements, rather than only turns. Bicycle boxes would also minimize encroachment of vehicles into the pedestrian crosswalk.

Raised Bicycle Channels. The proposed project would construct vertical and horizontal buffers adjacent to street-grade bicycle facilities at Valencia Street (westbound), 12th Street, 11th Street, and 10th Street (eastbound) as well as Hyde Street (northbound), McAllister Street (westbound), Fourth Street/Stockton Street (eastbound), and Montgomery Street (westbound). At 10th, 11th, 12th, and Valencia streets, the channels would replace the currently painted horizontal buffers supplemented by vertical delineators in these areas. The proposed project would increase bicyclist safety by reconstructing the buffers with a raised curb that would be impermeable for most vehicle traffic.

Bicycle Channels Adjacent to Transit Boarding Islands. The proposed project would construct a street-grade bicycle channel adjacent to existing and proposed transit boarding islands at 11th Street, Charles J. Brenham Place, and McAllister Street in order to reduce potential conflicts with transit vehicles. At these locations, a street-level bikeway would be placed behind the transit island, between the island and the sidewalk. Pedestrians would have designated places to cross the bicycle lane in order to connect the transit stop to the sidewalk. Bicyclists would be able to pass stopped transit vehicles via the bicycle channel, and avoid having to merge into the adjacent vehicle lane to pass.

Bicycle Signals. The proposed project would install bicycle signals and vehicle right-turn signals wherever the bikeway is to the right of a right-turn only vehicle lane; these installations would occur in the eastbound direction at Gough, Beale, Spear and Steuart streets. Providing separate bicycle and right-turn vehicle phasing would reduce the likelihood of vehicles encroaching into and blocking the bikeway to make a right turn, and reduce the likelihood for "right-hook" crashes between bicyclists, people walking, and vehicles. Leading bicycle interval signals could also be implemented to give bicycles a head start over vehicles in the adjacent lane.

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[46] Bicycle queue boxes (bicycle boxes) are striped waiting areas for bicyclists situated behind a crosswalk and in front of a motor vehicle stop bar. The motor vehicle stop bar is moved back 6 to 12 feet from the crosswalk to accommodate the bicycle box. Bicycle queue boxes allow bicyclists approaching an intersection in a bicycle lane to move in front of a queue of motor vehicles during the red traffic signal indication, and position themselves for through or turning movements at the intersection. When the traffic signal for approach changes to green, bicyclists proceed first.

Implementation of the proposed project may increase the number of bicyclists traveling on Market Street because the bikeway would offer safer and calmer cycling conditions for a wider range of cyclists and cycling purposes, and therefore may attract new bicyclists and may divert bicyclists from alternative parallel routes. Implementation of the separated bicycle lanes would be expected to reduce the average risk of serious injuries while bicyclist volumes increase.

As described in Impact TR-3, due to proposed vehicle restrictions on Market Street and turn restrictions from cross streets onto Market Street, implementation of the proposed project would result in a diversion of a portion of vehicles currently traveling on Market Street to other east-west streets in the study area, primarily to streets south of Market Street. This diversion of vehicles from Market Street would occur over numerous street segments and would not be substantial enough to affect bicycle travel or facilities in the area, create potentially hazardous conditions for bicyclists, or interfere with bicycle accessibility. There are segments of class II bicycle lanes on Howard Street (westbound) and a class IV separated bikeway on Folsom Street (eastbound); bicyclists would not be substantially affected by increases in vehicle traffic in the adjacent travel lanes.

In summary, implementation of the proposed project would provide a continuous 2.2 miles (in each direction of Market Street) of protected bicycle facilities and supporting features (e.g., bicycle signals, two-stage left-turn queue boxes, bicycle boxes) that would enhance bicycle circulation and safety on Market Street, and improve connectivity with other north-south bicycle facilities. In addition, implementation of the proposed project would reduce the number of vehicles on the Market Street project corridor through private vehicle restrictions and turn restrictions, thereby reducing the potential for vehicle-bicycle conflicts. Commercial vehicle and passenger loading activities at the sidewalk-level loading zones would not result in potentially hazardous conditions for bicyclists or interfere with bicycle accessibility. Therefore, for the above reasons, impacts of the proposed project on bicyclists would be ***less than significant.***

WESTERN VARIANT

The Western Variant would be similar to the proposed project, with the exception of the western segment of Market Street between Octavia Boulevard and about 300 feet east of the intersection of Market Street with Hayes/Larkin/Ninth streets. The Western Variant would reduce the number of westbound travel lanes between Hayes/Larkin/Ninth streets and 12th Street from two to one travel lane, and in the eastbound direction from 12th Street to 11th Street, from two to one travel lane. This would allow for a sidewalk-level bikeway facility in the eastbound direction between 12th and 11th streets, and in the westbound direction between 11th Street and Van Ness Avenue. The sidewalk-level bikeway would be separated from the adjacent vehicle lane behind a raised curb and horizontal buffer and would be wider than the class II bike lane.

The intersection of 11th Street/Market Street would be modified from the proposed project in several ways that affect bicycle access. The north side of Market Street between Van Ness Avenue and approximately 300 feet to the east would be redesigned to provide an expanded sidewalk. The expanded sidewalk would preclude bicyclists traveling northbound on 11th Street to turn left onto westbound Market Street. Instead, bicyclists traveling westbound would be directed to take an alternate route from Mission Street onto westbound Otis Street. In addition, the westbound bicycle left turn from Market Street would be moved from 11th Street to Van Ness Avenue to allow people bicycling to cross at a perpendicular angle to the in-street streetcar rails. The intersection of 11th Street/Market Street would continue to operate as a minor street, stop-sign controlled, and the new signal and crosswalk across Market Street at 11th Street, included as part of the proposed project, would not be constructed.

The Western Variant also includes additional private vehicle restrictions in both directions on the western segment of Market Street affected by the project variant. In the eastbound direction, the project variant would restrict turns from Market Street onto southbound Valencia Street, and implement a required right turn at 12th Street for private vehicles. Right turns for paratransit and taxis would not be permitted from eastbound Market Street onto southbound South Van Ness Avenue or southbound 11th Street (i.e., paratransit vehicles and taxis would be required to continue through on eastbound Market Street at these locations), thereby eliminating turns across the bicycle lane at these intersections.

For the above reasons, the Western Variant would further enhance the bicycle network along Market Street and reduce the potential for conflicts between bicyclists and turning vehicles in the western segment of Market Street between Octavia Boulevard and Ninth/Larkin/Hayes streets. Therefore, similar to the proposed project, impacts of the Western Variant on bicyclists would be ***less than significant*.**

LOADING IMPACTS

Impact TR-7. The proposed project and project variant would not result in a reduction in on-street commercial and passenger loading supply such that loading demand during the peak hour of loading activities would not be accommodated with the loading supply. (Less than Significant)

COMMERCIAL VEHICLE LOADING/UNLOADING

There are currently 23 loading bays on Market Street between Steuart Street and Octavia Boulevard, most of which are recessed and separated from travel lanes and designated primarily for six-wheeled commercial vehicle loading but also capable of capable of accommodating passenger loading/unloading activities. The length of the existing loading bays ranges from 40 to 173 feet. There are 11 bays on the north and 12 bays on the south side of the street.

As described in Chapter 2, the proposed project would remove commercial and/or passenger loading zones along the Market Street project corridor and replace them with new loading zones near or at the same location as existing facilities. Table 4.B-6, on the following page, lists the locations and lengths of the existing and proposed loading zones within the project corridor. Figure 2-8 in Chapter 2, *Project Description*, presents the proposed locations within the project corridor.

The proposed project would reconfigure the loading bays within the Market Street project corridor to loading zones that would serve both commercial vehicle and paratransit loading/unloading and accommodate BART and Muni vehicles for emergency and operational functions at stations within the Market Street project corridor. Twenty of the 22 loading zones would be sidewalk level. The existing loading zone for shuttle coaches for the Hotel Whitcomb on the south side of Market Street between Eighth and Ninth streets, as well as the existing passenger loading zone on the north side of Market Street between Montgomery and Kearny streets, would be within the curb travel lane, as under baseline conditions. There would be 12 loading zones on the north side of the street, and 10 loading zones on the south side of the street. The length of the loading zones would range from 32 to 100 feet, with 13 of the 22 loading zones 100 feet in length. The proposed project would lengthen nine zones, shorten six zones, one zone would remain the same length as baseline, seven zones would be eliminated, and 6 new zones would be created where none currently exist.

As presented in Table 4.B-6, on the following page, the new bays that would be created include three on the north side of Market Street (between 11th and 10th streets, between 10th and Ninth streets, and between Ninth and Eighth streets), and three on the south side of the street (between 11th and 10th streets, between Second and Sutter streets, and between Fremont and First streets). The bays that would be eliminated from Market Street project corridor include two on the north side of the street (between Fourth and O'Farrell streets, and between Second and Sutter streets), and five on the south side of the street (between McAllister and Sixth streets, between Sixth and Mason streets, between Fifth and Fourth streets, between Kearny and Montgomery streets, and between Montgomery and Second streets).

For each proposed loading zone on Market Street, the range of vehicle capacities was estimated to reflect the various sizes of vehicles. Truck classification surveys conducted by the SFMTA in 2016 found that 40-foot trucks (i.e., WB-40) and larger commercial vehicles represent about 3 percent of the commercial vehicles parking in the loading zones, 30-foot trucks (i.e., SU-30) represent about 46 percent, and light utility/small commercial vehicles represent about 51 percent. The lower range of the loading zone capacity was based on a 30-foot truck, with an additional 10 feet for maneuvering, which results in a capacity of 34 trucks that could be accommodated at one time within the 22 loading zones. The upper range of capacity was estimated based on the actual vehicle mix using these Market Street zones from surveys conducted by the SFMTA in 2016 and 2017. Using data from the surveys, the upper limit of vehicle capacity at the loading zones was calculated at 55 vehicles. Therefore, the total vehicle capacity of the proposed configuration of the 22 loading zones would generally range between 34 and 55 vehicles at one time.

TABLE 4.B-6. EXISTING LOADING BAYS AND PROPOSED LOADING ZONES ON MARKET STREET

Block of Market Street	Side of Street	Existing Bay Length (feet)	Proposed Loading Zone Length (feet)
12th Street to Van Ness Avenue[a]	North	140	100
11th Street to 10th Street[b]	North	--	100
	South	--	100
10th Street to Ninth Street[a]	North	--	68
Ninth Street to Eighth Street	North	--	100
	South	80[d]	100[d]
Eighth Street to Seventh Street	North	60	70
	South	65	63
Seventh Street to McAllister Street	South	55	32
McAllister Street to Sixth Street	North	116	63
	South	90	0
Sixth Street to Mason Street[c]	North	40	100
	South	89 and 52	100
Fifth Street to Fourth Street	North	57	95
	South	58	0
Fourth Street to O'Farrell Street[c]	North	64	0
	South	173	32
O'Farrell Street to Third Street	North	62	100
Kearny Street to Montgomery Street	North	55	40
	South	110	0
Montgomery Street to Second Street	South	56	0
Second Street to Sutter Street	North	60	0
	South	--	100
Battery Street to Front Street	North	88	100
First Street to Fremont Street	South	--	100
Fremont Street to Beale Street	South	72	72
Spear Street to Steuart Street	North	84	100
	South	50	91
Total Length		1,776	1,825

Notes:

-- = No existing bays

a. These proposed loading zones on the north side of Market Street would be restricted to paratransit/taxi use with the Western Variant (discussed in detail in Chapter 2, Section G, *Western Variant*).

b. The proposed loading zone on the north side of Market Street could be restricted to paratransit/taxi use with the Western Variant (discussed in detail in Chapter 2, Section G, *Western Variant*).

c. Includes loading bays located on the south side of Market Street, across from and within the intersections at Mason and O'Farrell streets.

d. This loading zone is in an active travel lane and would be available only to shuttle coaches while actively loading or unloading in front of the Hotel Whitcomb.

Source: SFMTA, *Better Market Street Loading and Parking Recommendations Memorandum*, February 22, 2018.

On streets north and south of Market Street between Steuart and Valencia Street (i.e., referred to as cross and side streets), the proposed project would convert 227 parking spaces to commercial loading spaces. However, proposed daylighting,[47] bulb-outs, a new Muni layover, accessible parking (blue) spaces, and new passenger loading/unloading zones on the north/south cross streets would eliminate 39 existing commercial loading spaces on these streets (27 loading spaces for daylighting, the new Muni layover, accessible parking space, and bulb-outs and 12 loading spaces for passenger loading/unloading zones). Therefore, the net total increase in the number of on-street commercial loading spaces on streets generally one block north and south of Market Street would be 188 spaces (i.e., 227 new spaces converted from general parking spaces to commercial loading spaces, less 39 existing spaces removed for daylighting and passenger loading/unloading zones = 188 net new commercial loading spaces).

Analysis. The proposed project is a transportation project and does not include any land use development, and therefore would not result in an increase in commercial loading demand. With the proposed project, the reconfigured loading facilities would accommodate both existing and projected new loading demand associated with the pending development projects on Market Street in the vicinity of these zones.

As discussed in *Approach to Analysis*, the loading analysis for Market Street was conducted for each loading zone. The analysis compared the peak baseline demand (existing plus known approved or proposed projects) to the loading supply to determine whether the demand would be accommodated within the proposed loading zones. If the proposed loading zone would not accommodate the loading demand, the potential to accommodate the demand nearby (i.e., within 200 to 400 feet of the existing bay) within existing or proposed on-street commercial loading spaces on cross and side streets was reviewed. In addition, nearby existing and proposed on-street commercial loading spaces on cross and side streets were reviewed to determine if the loading demand associated with the seven existing loading bays that would be eliminated could be accommodated.

The existing peak loading demand was based on SFMTA surveys conducted in 2016 and 2017.[48] The 2020 baseline demand was developed by taking existing loading vehicle demand during the peak hour of loading activities (i.e., 46 vehicles) and adding the loading demand associated with known development projects along Market Street that were identified as partially or completely relying on the existing bays on Market Street for commercial loading activities. Most development projects fronting Market Street that are planned by 2020 include onsite loading facilities or propose to use on-street commercial loading spaces on side streets adjacent to the site instead of Market Street loading bays. During the peak loading hour, four

[47] *Daylighting* refers to restricting vehicle parking adjacent to corners to enhance visibility for people walking and drivers at the intersection.

[48] Appendix 7, attachment 4c contains the loading analysis.

additional vehicles were projected to use the Market Street loading zones. Therefore, under 2020 baseline conditions, peak demand from 50 loading vehicles (i.e., 46 existing loading vehicles plus four associated with development projects = 50 loading vehicles) would need to be accommodated within the Market Street loading zones. The analysis demonstrates the following:

- At 13 loading zones within the Market Street project corridor, the peak loading demand would be accommodated within the proposed loading zones.
- At nine loading zones within the Market Street project corridor, the peak loading demand would be accommodated within the loading zones, within proposed on-street commercial loading spaces within 400 feet of the existing zones, or would be accommodated within nearby existing off-street commercial loading spaces.
- At the seven locations where existing loading bays within the Market Street project corridor would be eliminated, the demand would be accommodated within proposed on-street commercial loading spaces within 400 feet of the existing zones, or would be accommodated within nearby existing off-street commercial loading spaces.

As noted above, trucks 40 feet in length or longer represent about 3 percent of commercial vehicles using the loading bays. At most loading zones, trucks 40 feet in length would be accommodated within the reconfigured zones or accommodated within on-street commercial loading spaces on cross and side streets. Trucks longer than 65 feet (e.g., construction equipment delivery trucks) or wider than 8.5 feet require an extra-legal truck permit[49] to travel within San Francisco. These vehicles would not access the new loading zones but would conduct their loading/unloading in the adjacent travel lane. The permit would most likely limit access to Market Street by these vehicles to off-peak and overnight hours.

As discussed above in Impact TR-6, the majority of the reconstructed loading zones on Market Street would be located at the sidewalk level, between the sidewalk-level bikeway and the pedestrian zone. The curb within the loading zone would be mountable, and vehicles accessing the loading zone would cross through the bicycle lane to access the zone. To limit the potential of conflicts between bicyclists traveling in the bikeway and vehicles accessing the zone, commercial vehicles would be permitted to use the loading zone during off-peak hours only.

Proposed project loading impacts were determined to be less than significant for the following reasons:

[49] An extra-legal vehicle is a one that exceeds 8.5 feet in width, 65 feet in length, 14 feet in height, or 34,000 pounds in weight on any one axle.

- Along the Market Street project corridor, the proposed project would accommodate loading/unloading activities by replacing the existing loading bays with loading zones in a similar number as currently exist (i.e., 23 bays under existing conditions, 22 loading zones with implementation of the proposed project). In addition, a similar number of loading vehicles could be accommodated (i.e., 37 to 54 vehicles under baseline conditions, 34 to 55 vehicles with implementation of the proposed project).
- On cross and side streets, the proposed project would result in a net increase of 188 on-street commercial loading spaces (i.e., 227 new, less 39 existing loading spaces removed for daylighting or passenger loading/unloading zones). However, some loading activities may require carting deliveries further between the loading space and the destination.
- At locations where existing bays would be eliminated and where the loading vehicle demand at the proposed loading zone exceeds the available supply of spaces, the loading demand would generally be accommodated in existing or proposed on-street commercial loading spaces within 400 feet of the existing bay.
- On the south side of Market Street between Fourth and Fifth streets where the existing recessed bay would be eliminated, the three existing buildings fronting Market Street have off-street loading facilities that are accessed from both Jessie and Fourth streets and could be used to accommodate the loading demand currently accommodated on Market Street. Also, there are on-street commercial loading spaces on the west side of Fourth Street that could also serve the ground floor uses.
- The addition of on-street commercial loading spaces on cross and side streets would further accommodate existing loading activities on those streets and remove conflicts associated with double-parking within bicycle lanes, transit-only lanes, or mixed-flow travel lanes.

For the above reasons, while the proposed project would reduce the on-street loading supply on Market Street, the loading demand under baseline-plus-project conditions would be accommodated. Therefore, the proposed project's impacts related to commercial loading would be ***less than significant.***

PASSENGER LOADING/UNLOADING

A few of the existing loading bays along Market Street are currently used for passenger loading/unloading activities. Private vehicle access on eastbound Market Street is restricted through the use of required right turns, which currently limits private autos from stopping on Market Street to load and unload passengers. Locations along Market Street with high paratransit activity include the north side of Market Street between Ninth and 10th streets, both sides of Market Street between Seventh and Eighth streets and between Fourth and Fifth streets, and the south side of Market Street between Third and Fourth streets.

As described above, the existing loading bays would be reconfigured as part of the proposed project to provide loading zones at the sidewalk level that would accommodate both commercial vehicle and paratransit loading/unloading activities. Private autos (including app-based ride hailing services) would be prohibited from traveling on Market Street within the project corridor; therefore, passenger loading/unloading activities would occur on cross and side streets. Thus, the potential for passenger loading/unloading activities on Market Street would decrease compared with existing conditions.

The proposed project would continue to accommodate paratransit passenger loading/unloading activities on Market Street within the proposed loading zones. Loading zones would be provided at the locations with high paratransit activity, with the exception of the south side of Market Street between Fourth and Fifth streets. Instead, paratransit would be able to use existing passenger zones on Fourth and Fifth streets south of Market Street.

The proposed project would convert on-street general parking and commercial loading spaces to passenger loading zones or would extend part-time passenger loading/unloading zones to full-time zones on Market Street cross and side streets to provide for 23 passenger loading zones (each zone would accommodate between one and three vehicles for a total of 46 vehicles). Specifically, 10 zones would be provided on cross and side streets between Steuart and Third/Kearny streets, five zones would be provided on cross and side streets between Third/Kearny and Eighth/Hyde streets, and eight zones would be provided on the segment between Eighth/Hyde streets and Octavia Boulevard. The additional passenger loading/unloading zones would generally be split between locations north and south of Market Street.

Overall, the proposed project would accommodate the commercial and passenger loading demand. Therefore, the proposed project's impact related to passenger loading would be ***less than significant.***

WESTERN VARIANT

The reconstructed loading zones on Market Street discussed above for the proposed project would be the same as for the Western Variant. In addition, changes to on-street commercial and passenger vehicle loading spaces on cross and side streets would be the same. However, the additional vehicle restrictions on Market Street between Larkin/Hayes and 12th streets include a required right turn from Market Street onto Hayes or Larkin streets. Only Muni vehicles, paratransit vehicles, taxis, and emergency vehicles would be allowed to continue westbound on Market Street. In addition, at Van Ness Avenue southbound right turns onto Market Street westbound would be prohibited. As a result, the three loading zones on the north side of Market Street in the western segment affected by the additional Western Variant restrictions (i.e., between Larkin/Hayes streets and Polk/Fell streets, between Polk/Fell streets and Van Ness Avenue, and between Van Ness Avenue and Franklin/Page streets) would serve only paratransit vehicles and taxis.

The two loading zones between Larkin/Hayes streets and Van Ness Avenue would be new loading zones proposed as part of the project, and therefore limiting their use to paratransit or taxi loading/unloading would not affect 2020 baseline loading activities. The 2020 baseline commercial vehicle loading vehicle demand using the loading zone between Van Ness Avenue and Franklin/Page streets would be accommodated within existing and planned on-street commercial loading spaces on Franklin and Oak streets. Therefore, similar to the proposed project, the Western Variant's impact related to freight/service vehicles and passenger loading/unloading operations would be ***less than significant***.

PARKING IMPACTS

Impact TR-8. The proposed project and project variant would not result in a reduction in on-street parking supply such that a substantial parking deficit would occur. (Less than Significant)

There are six on-street metered parking spaces on the north side of Market Street between Spear and Steuart streets. With implementation of the proposed project, these parking spaces would be removed. Nine additional general parking spaces on side and cross streets would be removed to allow for daylighting, a boarding island, and a traffic calming island.

Implementation of the proposed project would convert on-street parking spaces as follows:

- The proposed project would convert 227 on-street parking spaces on Market Street cross streets or side streets north and south of Market Street to commercial loading spaces (i.e., removal of 73 spaces on streets between Steuart and Third/Kearny streets, 101 spaces on streets between Third/Kearny and Eighth/Hyde streets, and 53 spaces on streets between Eighth/Hyde streets and Octavia Boulevard).
- The proposed project would convert 34 on-street parking spaces on Market Street cross and side streets to provide for additional passenger loading/unloading zones (i.e., removal of a total of 34 parking spaces, including removal of 14 spaces on streets between Steuart and Third/Kearny streets, 6 spaces on streets between Third/Kearny and Eighth/Hyde streets, and 14 spaces on streets between Eighth/Hyde streets and Octavia Boulevard).

The proposed project is a transportation project and not a land development project and therefore would not result in an increase in parking demand. In the downtown area, there are a number of large public parking garages that serve the Financial District, Union Square, and Civic Center areas, as well as numerous garages associated with office buildings that are open to the general public. These facilities currently have capacity to accommodate additional demand, depending on time of day. Large public parking facilities include Golden Gateway Garage with 1,095 parking spaces, the Fifth and Mission/Yerba Buena Garage with 2,585 spaces, the Moscone Garage with 752 spaces, the SFMOMA Garage with 410 spaces, the Jessie Square Garage with 372 spaces, the

Ellis O'Farrell Garage with 800 spaces, the Union Square Garage with 800 spaces, the Sutter Stockton Garage with 1,650 spaces, the Performing Arts Garage with 598 spaces, the Civic Center Garage with 843 spaces, among others. In 2017, the average occupancy of the SFMTA facilities during the midday period between 12 and 3 p.m. ranged between 50 and 70 percent, which indicates that off-street parking spaces are available in these facilities to accommodate additional vehicles.

Proposed project parking impacts were determined to be less than significant for the following reasons:

- The parking loss as a result of the proposed project would be spread out over the Market Street project corridor between Octavia Boulevard and Steuart Street both north and south of Market Street (i.e., about 32 percent on streets between Steuart Street and Third/Kearny streets, about 46 percent on streets between Third/Kearny and Eighth/Hyde streets, and about 22 percent on streets between Eighth/Hyde streets and Octavia Boulevard).
- There are a number of large public parking garages that have capacity to accommodate the demand displaced through the on-street parking removal.
- The Market Street project corridor has a diverse set of transportation options (e.g., transit, taxis, app-based ride hailing services, regional transit providers, and bicycle and pedestrian facilities).
- The proposed project would not increase parking demand.
- The proposed project would encourage transit use through the reduction of transit travel time and increase of transit reliability, which may further lead to a mode shift from private passenger vehicles to transit and bicycling, and the proposed project would improve conditions for people taking transit, walking, and bicycling.
- The proposed project would include 23 passenger loading/unloading zones on cross and side streets to serve people taking taxis and app-based ride hailing services. Passenger loading/unloading could occur within these zones without double-parking within bicycle lanes, transit-only lanes, or mixed-flow vehicle lanes.

The permanent elimination of on-street parking spaces to implement daylighting improvements and conversion to commercial loading spaces or passenger loading/unloading zones would not substantially affect on-street parking activities or substantially change area wide parking conditions. Therefore, the on-street parking loss would not result in a substantial parking deficit, and impacts related to parking would be ***less than significant***.

WESTERN VARIANT

Impacts of the Western Variant on parking would be the same as for the proposed project, and therefore, similar to the proposed project, the impact of the Western Variant related to parking would be ***less than significant.***

EMERGENCY ACCESS IMPACTS

Impact TR-9. The proposed project and project variant would not result in inadequate emergency vehicle access. (Less than Significant)

With implementation of the proposed project, emergency access along Market Street and nearby streets would remain essentially unchanged from existing conditions. Implementation of proposed restrictions to private vehicle travel on Market Street between Steuart and 10th streets and turn restrictions from intersecting cross streets onto Market Street would limit motor vehicle access on Market Street to public transit vehicles, emergency vehicles, taxis, paratransit vehicles, and bicycles. On the segment of westbound Market Street between the One Bush parking garage driveway and Sutter Street where the existing One Bush parking garage driveway egress onto Market Street would be maintained, conditions for emergency service providers would be similar to existing conditions because of the low number of vehicles exiting the One Bush parking garage (e.g., about 50 vehicles during the weekday p.m. per hour) and the limited number of vehicles in the westbound travel lanes as a result of the private vehicle access restrictions to the east.

Implementation of the proposed project would not preclude emergency vehicle access along Market Street. Emergency vehicles would be able to travel within the Muni-only lanes, which would have fewer vehicles than the existing mixed-flow travel lanes and the transit-only lanes. If needed, fire and rescue vehicles would be able to deploy fire truck apparatus onto the sidewalk-level bikeway to access buildings along Market Street. In addition, the physical changes proposed to the street network would be undertaken in consultation with the fire department, and would still allow for emergency vehicle access. As discussed in Impact TR-3, the proposed street network changes would be required to undergo more detailed design and review by multiple City agencies including SFMTA's TASC, the San Francisco Fire Department, Public Works, along with other City agencies. The design and permitting process reviews potential safety issues, including whether private vehicles would be exempted from yielding the right-of-way to approaching emergency vehicles; therefore, emergency access concerns are resolved prior to the beginning of project construction.

Although the project would result in additional vehicles on adjacent streets, the increases would not impede or hinder emergency vehicles. The upgrade of existing signal equipment would include preemption equipped signals to accommodate emergency vehicles that are equipped with preemption equipment. The signal preemption allows the traffic signals in front of the emergency vehicle to change the green phase to allow vehicles to clear before the arrival of the emergency vehicle at the intersection. Because of the wider multiple travel lanes on streets in the vicinity as well as the presence of bicycle lanes on some streets (e.g., Howard, Folsom, Valencia, Second, Seventh, and Eighth streets), vehicles would be able to pull over to the side of the street and provide a clear travel path when an emergency vehicle with lights and sirens approaches. Emergency vehicles are also permitted to use transit-only lanes (i.e., the center median right-of-way of the Van Ness BRT, and transit-only lanes on Third, Fourth, and Mission streets), if needed. Therefore, for the reasons described above, the proposed project's impact on emergency access would be ***less than significant***.

WESTERN VARIANT

Emergency access with the Western Variant would be similar to the proposed project. Changes in the physical and operational configuration of travel lanes would be similar to the proposed project, except only one westbound and one eastbound travel lane would be provided on Market Street between Larkin/Hayes and 12th streets. In addition, with the Western Variant, sidewalks would be widened on both sides of Market Street between Polk/Fell and 12th streets, and the transit boarding islands for the inbound and outbound directions on the F Market & Wharves historic streetcar line, and the 6 Parnassus and 7 Haight/Noriega bus routes would be located west of Van Ness Avenue/South Van Ness Avenue (i.e., the transit boarding island in the westbound direction would be relocated). Thus, in the segment of Market Street between 11th and Franklin streets, the number of travel lanes would be reduced from four existing to two travel lanes with the project variant.

As described in the *Existing Setting*, fire department station 36 is located on Oak Street between Franklin and Gough streets, and fire trucks use Market Street as a route to access destinations to the east. The fire station is interconnected with adjacent traffic signals at Franklin and at Gough streets to facilitate emergency vehicle access from the station in both directions on Oak Street: to travel westbound on Oak Street against the one-way eastbound traffic flow (i.e., contraflow) to access southbound Gough Street, and to travel eastbound on Oak Street to access northbound Franklin Street or southbound Van Ness Avenue. Currently the one block segment of Oak Street between Franklin Street and Van Ness Avenue is one-way westbound and is used by fire trucks contraflow to access Van Ness Avenue to continue on southbound South Van Ness Avenue southbound or eastbound Market Street. This fire truck access route would not be affected by the Western Variant. Thus, although the Western Variant would narrow the roadway width and reduce the number of travel lanes for the segment of Market Street between 11th and Franklin streets, this segment is not the part of the primary access routes for fire station 36. The Western Variant would not preclude emergency vehicle access along Market Street. Emergency vehicles would be able to mount and travel on the sidewalk-level bikeway in the Western Variant area. Therefore, similar to the proposed project, the Western Variant's impacts on emergency access would be ***less than significant.***

CUMULATIVE IMPACTS

The geographic context for the analysis of cumulative transportation impacts includes the sidewalks and roadways along the Market Street project corridor, and the nearby local roadway and transit network on cross streets and side streets. The discussion of cumulative transportation impacts assesses the degree to which the proposed project would affect the transportation network in conjunction with overall citywide growth and other reasonably foreseeable projects pursuant to CEQA Guidelines section 15355. Cumulative transportation conditions were assessed based on projected changes to the citywide land use and transportation network assumptions and the associated changes in travel demand in 2040.

Cumulative Construction Impacts

Impact C-TR-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative construction-related transportation impacts. (Significant and Unavoidable with Mitigation)

Construction of the proposed project may overlap with the construction of land development and other public infrastructure projects near and/or along the length of the Market Street project corridor (see Appendix 5), although the timing of overlap in construction of the majority of these projects cannot be determined at this time. For example, approved or proposed land development projects at 1500–1540 Market Street, 1629 Market Street, 10 South Van Ness Avenue, and 30 Otis Street, and 1028 Market Street may be under construction during the project construction period and may partially overlap with project construction. Overall, localized cumulative construction-related transportation impacts could occur as a result of cumulative projects along and near the project corridor that either generate increased traffic at the same time and on the same roads as other land development projects or the overlap with public infrastructure projects that reduce the number of travel lanes on the local roadway network, as well as generate increased construction-related vehicle trips.

Given the magnitude of projected cumulative development and transportation/streetscape projects anticipated to occur within a few blocks of the project corridor, and the uncertainty concerning construction schedules, cumulative construction activities could result in multiple travel lane closures, high volumes of trucks, and travel lane and sidewalk closures, which in turn could disrupt or delay transit, pedestrians, or bicyclists, or result in potentially hazardous conditions (i.e., high volumes of trucks turning at intersections). Despite the best efforts of the project sponsors and project construction contractors, it is possible that simultaneous construction of the cumulative projects could result in significant disruptions to transit, pedestrian, and bicycle circulation, even if each individual project alone would not result in significant impacts. In some instances, depending on construction activities, construction overlap of two or more projects may not result in significant impacts. However, for conservative purposes, given the concurrent construction of multiple buildings and transportation projects adjacent to and near the project corridor, some in proximity to each other, the expected intensity and duration, and likely impacts on transit, bicyclists, and people walking, cumulative construction-related transportation impacts would be considered significant. Because the proposed project would result in significant construction-related transportation impacts under baseline plus project conditions, the proposed project would also be considered to contribute considerably to these significant cumulative construction-related transportation impacts.

Similar to the proposed project, project sponsors and construction managers of infrastructure and development projects considered in the cumulative analysis would be required to coordinate with the project sponsor, and coordinate any temporary sidewalk and travel lane closures. Mitigation Measure M-TR-1, presented in Impact TR-1, also addresses the potential for project overlap with other development and infrastructure projects. Implementation of Mitigation Measure M-TR-1 would minimize, but would not eliminate, the significant cumulative impacts related to conflicts between construction activities and people walking, bicyclists, transit, and other vehicles. Other measures, such as imposing sequential (i.e., non-overlapping) construction schedules for all projects in the vicinity, were considered but deemed infeasible due to potentially lengthy delays in project implementation. Therefore, construction of the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, could contribute considerably to cumulative construction-related transportation impacts, which would remain ***significant and unavoidable with mitigation***.

Western Variant

As discussed in Impact TR-1, construction activities for the Western Variant would be similar to the proposed project. Even with implementation of Mitigation Measure M-TR-1, significant construction-related transportation impacts could result due to travel lane closures, detours for transit, bicyclists and people walking, and increased congestion and travel times on cross streets and other streets near the project corridor. Therefore, construction of the Western Variant could contribute considerably to cumulative construction-related transportation impacts, which would remain ***significant and unavoidable with mitigation***.

Cumulative VMT Impacts

Impact C-TR-2. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not contribute considerably to significant cumulative impacts related to VMT. (Less than Significant)

VMT by its very nature is largely a cumulative impact. The amount and distance of past, present, and future projects might cause people to drive and contribute to the physical secondary environmental impacts associated with VMT; therefore, cumulative impacts related to VMT would be considered significant. It is likely that no single project by itself would be sufficient in size to prevent the region or state in meeting its VMT reduction goals. Instead, a project's individual VMT contributes to the cumulative VMT impacts. The VMT and induced automobile travel project-level thresholds are based on levels at which new projects are not anticipated to conflict with state and regional long-term greenhouse gas emission reduction targets and statewide VMT per capita reduction targets set in 2020.

As discussed in Impact TR-2 for baseline plus project conditions, the proposed project does not include land use development and therefore would not generate additional VMT per capita. Therefore, the assessment of the impact on VMT is based on whether the transportation features of the proposed project would induce automobile travel. As discussed in Impact TR-2, the transportation features of the project are consistent with the general types of projects that would not substantially induce automobile travel. Therefore, because the proposed project would not exceed the project-level thresholds for induced automobile travel, the proposed project contribution to cumulative VMT impacts would be less than cumulatively considerable. In addition, as noted in Impact TR-2, a quantitative analysis of changes to vehicular travel on transportation study area streets without and with the proposed project determined that total VMT within the study area would not substantially change with implementation of the proposed project. Therefore, the proposed project's contribution to cumulative VMT impacts would be ***less than significant.***

WESTERN VARIANT

As discussed in Impact TR-2, the Western Variant would further alter the transportation network in the western segment of the project corridor, however, these additional features would also fit within the general types of projects that would not substantially induce automobile travel. The Western Variant would not exceed the project level thresholds for induced automobile travel, and therefore, as discussed above for the proposed project, the Western Variant's contribution to cumulative VMT impacts would be ***less than significant***.

CUMULATIVE TRAFFIC HAZARDS IMPACTS

Impact C-TR-3. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts related to major traffic hazards. (Less than Significant)

A number of cumulative transportation network projects are currently underway or planned that would enhance the transportation network in the project vicinity, particularly for pedestrians and bicyclists. These include the Sixth Street Pedestrian Safety Project, Seventh Street Road Diet, and the Transit Center District Plan, Western SoMa Plan, Market and Octavia Plan, Hub Plan, and Central SoMa Plan street network changes, The Embarcadero Enhancement Project, among others not listed above. Cumulative projects, including the proposed project, would be designed to meet City standards. Other development projects proposing street changes in the area would be subject to these requirements as well. Similar to the proposed project, these street changes would be designed consistent with City policies and design standards, including the Better Streets Plan, and therefore would not result in significant cumulative impacts related to traffic hazards.

Increases in vehicles on Mission Street and cross streets under 2040 cumulative conditions due to background land use development could result in the potential for increased conflicts between vehicles. The increases in vehicles would very likely occur in areas that are already experiencing significant levels of traffic congestion and corresponding low speeds; as such, conditions would not change substantially under 2040 cumulative conditions, would not be considered a new hazard or substantial worsening of a traffic hazard, or result in significant cumulative traffic hazard impacts. Therefore, the proposed project, in combination with past, present, and reasonably foreseeable development projects, would result in ***less-than-significant*** cumulative traffic hazard impacts.

WESTERN VARIANT

As discussed in Impact TR-3, the Western Variant would be similar to the proposed project, however, in the western portion of Market Street additional travel lane reductions would be made, that would be paired with additional vehicle restrictions and vehicle circulation changes. As discussed above for the proposed project, there would not be significant cumulative traffic hazard impacts, and therefore, the Western Variant would result in ***less-than-significant*** cumulative traffic hazard impacts.

CUMULATIVE TRANSIT IMPACTS

Impact C-TR-4. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative transit impacts related to transit operations on the Muni 27 Bryant but would not contribute considerably to significant cumulative transit impacts on other local and regional routes. (Significant and Unavoidable)

A number of cumulative transportation network projects are currently under way or planned that would enhance the transportation network in the project vicinity, including for transit operations. These include Muni Forward and Central SoMa Plan street network changes, in addition to those that would be completed by 2020 such as the Central Subway, Salesforce Transit Center, and Van Ness BRT. The cumulative projects would implement or enhance transit-only lanes on Mission Street, Third Street, Fourth Street, and Geary Boulevard, thereby reducing conflicts between private vehicles and transit vehicles and improving transit travel times on those streets.

F Market & Wharves Streetcar and Market Street Bus Routes. Transit operations for 2040 cumulative conditions on Market Street were assessed by updating the 2020 baseline plus project VISSIM network to reflect the proposed service enhancements under Muni Forward (including headway and fleet mix changes) anticipated to occur between 2020 and 2040 cumulative conditions. In addition, 2040 cumulative transit operations also account for the increased transit ridership along Market Street due to the anticipated land use changes by 2040. The additional transit vehicles due to the Muni Forward service enhancements and the additional riders generated by cumulative land use changes would affect transit operating conditions on Market Street under 2040 cumulative conditions. Other transportation projects and land use changes projected by 2040 would not substantially affect transit operating conditions on Market Street due to the proposed project's private vehicle turn restrictions. Transit operations for routes operating on other streets were assessed separately as described below.

Table 4.B-7, below, presents the results of the transit travel time analysis for p.m. peak-hour conditions for 2040 cumulative conditions (i.e., including the proposed project). The table presents headways for routes along Market Street under 2040 cumulative conditions (i.e., with implementation of Muni Forward service changes approved for implementation by 2040) and transit travel-time changes from the 2020 baseline conditions, both in minutes and seconds and as a percentage of the 2040 headways. As shown in Table 4.B-7, below, under 2040 cumulative conditions, which include the proposed project, transit travel times would decrease for most routes compared to 2020 baseline conditions. Some routes that operate in the curb mixed-flow lane of Market Street could see an increase in travel time as a result of the increased service frequency and ridership under 2040 conditions. The segment of Market Street between First and Fourth streets would have the greatest number of transit routes and associated congestion in the curb lane. However, these increases in transit travel time would not exceed 4 minutes or one-half the headway of individual routes; therefore, implementation of the proposed project, in combination with other land use and transportation changes anticipated by 2040, would not result in a cumulative transit impact on Market Street routes.

TABLE 4.B-7. MUNI TRANSIT OPERATIONS ANALYSIS – 2040 CUMULATIVE CONDITIONS – WEEKDAY P.M. PEAK HOUR

Route/Direction[a]	2040 Cumulative Headways (min:sec)	Threshold[b] (min:sec)	Travel Time Change From 2020 Baseline Conditions (min:sec)
F Market & Wharves – inbound[c]	8:00	4:00	-4:35
F Market & Wharves – outbound	8:00	4:00	-6:21
2 Clement – inbound	7:30	3:45	0:49
2 Clement – outbound	7:30	3:45	-1:42
5 Fulton – inbound	6:00	3:00	-3:00
5 Fulton – outbound	6:00	3:00	-3:55
5R Fulton Rapid – inbound	6:00	3:00	-3:00
5R Fulton Rapid – outbound	6:00	3:00	-3:55
6 Haight/Parnassus – inbound[d]	12:00	4:00	2:23
6 Haight/Parnassus – outbound[d]	12:00	4:00	2:09

Route/Direction[a]	2040 Cumulative Headways (min:sec)	Threshold[b] (min:sec)	Travel Time Change From 2020 Baseline Conditions (min:sec)
7 Haight/Noriega – inbound[d]	7:30	3:45	-0:49
7 Haight/Noriega – outbound[d]	7:30	3:45	3:17
7X Noriega Express – outbound	10:00	4:00	-0:55
9 San Bruno – inbound	10:00	4:00	-2:08
9 San Bruno – outbound	10:00	4:00	-3:16
9R San Bruno Rapid – inbound	8:00	4:00	-2:08
9R San Bruno Rapid – outbound	8:00	4:00	-3:16
21 Hayes – inbound	9:00	4:00	2:09
21 Hayes – outbound	9:00	4:00	-1:17
31 Balboa – inbound	12:00	4:00	1:58
31 Balboa – outbound	12:00	4:00	-0:55
38 Geary – inbound	6:00	3:00	-0:28
38 Geary – outbound	6:00	3:00	0:31
38R Geary Rapid – inbound	2:30	1:15	-0:28
38R Geary Rapid – outbound	2:30	1:15	0:31

Notes:

a. Inbound direction generally means headed toward downtown San Francisco. It is the opposite of the outbound direction. Routes that do not go downtown have explicit definitions for inbound and outbound. For example, the 19 Polk is defined as heading inbound to the Marina and outbound to Hunters Point; the F Market & Wharves is defined as heading inbound to Fisherman's Wharf and outbound to Castro.

b. The threshold for significant impacts for Muni routes is half the headway or 4 minutes, whichever is less.

c. The proposed F-Short streetcar line which would travel between Seventh/Charles J. Brenham and Steuart streets within the Market Street project corridor is not included in this table. The F Market & Wharves historic streetcar line presents the travel time savings for the entire project corridor between Octavia Boulevard and Steuart Street.

d. Although the 6 Haight/Parnassus and 7 Haight/Noriega generally travel along the same segments of Market Street, the travel time changes due to the proposed project are slightly different. In the inbound direction, the proposed project would move the 6 Haight/Parnassus from the center Muni-only lane to the curb mixed-flow lane, while the 7 Haight/Noriega would remain in the curb mixed-flow lane. Therefore, the proposed project would reduce travel times for the 7 Haight/Noriega but not the 6 Haight/Parnassus because of the slower average travel speeds in the curb mixed-flow lane compared with the center Muni-only lane. In the outbound direction, the proposed project would shift both routes from the center Muni-only lane to the curb mixed-flow lane, resulting in overall increased travel times for both routes west of Fremont Street in combination with the other changes transit operating conditions on Market Street under 2040 cumulative conditions. However, the 6 Haight/Parnassus also travels on the westbound segment of Market Street between Steuart Street and Fremont Street, while the 7 Haight/Noriega enters at Fremont Street. The proposed project would reduce transit travel times on Market Street east of Fremont Street for the 6 Haight/Parnassus, resulting in a smaller increase in travel times through the whole corridor under 2040 cumulative conditions.

Source: Fehr & Peers, 2018.

Other Muni and Regional Routes. The area plans, transportation plans, and individual developments noted in Appendix 5 include land use and street network changes that would result in additional vehicle trips, additional transit riders, removal of travel lanes, and increased congestion on other streets throughout the study area besides Market Street. These increases in vehicle volumes (averaging around 10 to 20 percent total across the study area) would very likely result in increased delay for all vehicles traveling in shared lanes through the study area. As documented in the Central SoMa Plan EIR[50] and the Transit Center District Plan EIR[51], this combination of land use and street network changes (e.g., travel lane removal, conversion from one-way to two-way operations, installation of protected bicycle lanes) would result in a significant 2040 cumulative impact on transit operations for Muni and other regional routes operating on cross streets and streets south of Market Street. Cumulative impacts on transit operations would be due to increases in transit ridership (i.e., increasing the amount of time it takes for passengers to get on the bus), traffic volumes associated with future land use growth, and/or street network changes that would reduce the number of shared travel lanes. Affected bus routes include Muni routes 8 Bayshore, 8AX/BX Bayshore Expresses, 10 Townsend, 12 Folsom Pacific, 14 Mission, 14R Mission Rapid, 14X Mission Express, 27 Bryant, 30 Stockton, 41 Union, 45 Union/Stockton, and 47 Van Ness and the Golden Gate Transit and SamTrans routes operating on streets south of Market Street. Therefore, the proposed project, in combination with past, present, and reasonably foreseeable future projects, would result in significant cumulative transit impacts on other Muni routes and regional routes.

The proposed project would not generate new vehicle trips, nor would it generate new transit riders. However, the vehicle restrictions included as part of the proposed project would remove private vehicle access from eastbound Ellis Street to southbound Fourth Street. These vehicle restrictions would result in southbound vehicles that currently access Fourth Street (with multiple travel lanes, including a transit-only lane) shifting to southbound Fifth Street (with no transit-only lanes), as Stockton Street would not have the available capacity to handle increased traffic; Muni 27 Bryant runs in the southbound direction on southbound Fifth Street.

The proposed project would result in considerable increases in transit travel times along the Muni 27 Bryant route. The SFMTA is currently investigating possible changes to the Muni 27 Bryant route as part of the 27 Bryant Transit Reliability Project and the planned improvements to Fifth Street to enhance this route's operations. Potential changes currently being considered include shifting the route from Mason Street onto Eddy Street, shifting the transit stop and creating a bus bulb at the intersection of Fifth Street/Mission Street, removing the bus stop at the intersection of Fifth Street/Howard Street, and converting the existing bus zones at the intersection of Fifth

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[50] City and County of San Francisco, Central SoMa Plan, Final EIR, April 12, 2018. Planning Department Case File No. 2011-1356ENV.

[51] City and County of San Francisco, *Transit Center District Plan and Transit Tower* EIR, Final EIR, May 2012, Planning Department Case File Nos. 2007.0558E and 2008.0789E.

Street/Folsom Street to bus boarding islands. However, because the effectiveness of the changes have not yet been determined, the proposed project's contribution on Muni 27 Bryant cumulative transit travel times would be considerable. No feasible mitigation measures are available that would improve travel times along the Muni 27 Bryan route; therefore, the impact would be ***significant and unavoidable***.

Implementation of the proposed project would not divert a substantial number of vehicles to streets in the South of Market area where other Muni, Golden Gate Transit, and SamTrans routes operate in shared travel lanes and are projected to experience cumulative transit impacts. In some instances, such as on Second Street, the proposed project would remove private vehicles, which would reduce delays for the 10 Townsend and 12 Folsom Pacific routes. Therefore, the proposed project would not contribute considerably to significant cumulative transit impacts on other Muni routes and regional routes; therefore, the impact on these other routes would be ***less than significant***.

WESTERN VARIANT

As discussed in Impact TR-4, under the Western Variant, transit travel times for Muni and regional routes would be similar to the proposed project. Therefore, for the reasons described above for the proposed project the Western Variant would contribute considerably to significant cumulative transit impacts on the Muni 27 Bryant bus route**.** No feasible mitigation measures are available that would improve travel times along the Muni 27 Bryan route; therefore, the impact would be ***significant and unavoidable***. However, the Western Variant would not contribute considerably to significant cumulative impacts on other local Muni and regional routes; therefore, the impact on the other routes would be ***less than significant***.

CUMULATIVE WALKING/ACCESSIBILITY IMPACTS

Impact C-TR-5. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts on people walking. (Less than Significant)

A number of cumulative projects have been implemented, or are currently proposed to enhance walking conditions along and near the Market Street corridor. Projects that include improvements to the pedestrian network are contained within the Transit Center District Plan, Central SoMa Plan, Western SoMa Community Plan, Market and Octavia Area Plan, Sixth Street Pedestrian Safety Project, Polk Street Streetscape Project, Van Ness Improvement Project, and the Hub Plan, The Embarcadero Enhancement Project, among others. Furthermore, as part of Vision Zero, the SFMTA has been implementing projects near the Market Street corridor including sidewalk widening, new traffic signals, leading pedestrian intervals, continental crosswalks, corner sidewalk extensions, daylighting (i.e., restricting parking adjacent to corners to enhance visibility for pedestrians and drivers at the intersection), and travel lane reductions. Upcoming Vision Zero projects include improvements on streets south of Market Street, including on Sixth, Seventh, Eighth, Folsom, and Howard streets, as well as on streets north of Market Street, including on Powell, Turk, and Taylor streets. Cumulative development projects along and near the Market Street corridor would be required comply with the Better Streets Plan requirements for Ceremonial (Civic) Streets.

The number of people walking would increase between completion of the proposed project and the 2040 cumulative conditions due to projected growth along and near Market Street. Under 2040 cumulative conditions, with projected increases in the number of people walking along Market Street (i.e., about 20 percent increase over 2020 baseline conditions) and the reduction in sidewalk widths, the sidewalks would be more crowded. At locations with high volumes of people walking (e.g., the north side of Market Street between Montgomery and Sutter streets, or between Fifth and Fourth streets), conditions for people walking would be more constrained, with friction and interaction between people. However, adequate sidewalk width would be provided to accommodate people walking without interfering with accessibility along Market Street or creating a safety concern for people walking.

The projected traffic volumes under 2040 cumulative conditions on Market Street cross streets would result in an increase in the potential for vehicle-pedestrian conflicts at intersections in the study area. However, along Market Street, proposed project implementation would reduce this potential for conflicts. In combination with the planned and proposed street network improvements under cumulative conditions, these increases in traffic volumes would not create potentially hazardous conditions for people walking, or otherwise interfere with accessibility along Market Street and adjoining areas. For the reasons described above, significant cumulative walking/accessibility impacts would not occur. Therefore, the proposed project, in combination with past, present, and reasonably foreseeable development in San Francisco, would result in ***less-than-significant*** cumulative impacts on walking/accessibility.

WESTERN VARIANT

As discussed in Impact TR-5, the Western Variant would be similar to the proposed project, however, additional changes to the pedestrian realm would be made along Market Street between 12th and Ninth streets (e.g., additional sidewalk width, new Muni station entrances, additional corner bulb-outs, raised crosswalks) to further enhance the pedestrian network in this segment. As discussed above for the proposed project, there would not be significant cumulative impacts on walking/accessibility, and therefore, the Western Variant would result in ***less-than-significant*** cumulative impacts on walking/accessibility.

CUMULATIVE BICYCLE IMPACTS

Impact C-TR-6. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative bicycle impacts. (Less than Significant)

A number of bicycle projects are currently being proposed near the Market Street project corridor. The proposed project include new separated bikeways on either side of Market Street between Octavia Boulevard and Steuart Street that would connect with bicycle facilities intersecting Market Street. These include both recently implemented separated bikeway projects on Polk and Eighth streets, planned separated bikeway projects along Valencia, 11th, Seventh, and Second streets, planned bike lane projects along Fifth Street, and a proposed two-way protected bikeway on The Embarcadero. Improvements facilitating bicycle turns on and off these intersecting bicycle facilities would improve bicycle connectivity to existing and planned class II and class IV bicycle facilities within the Central SoMa Plan area to the south on Howard, Folsom, Brannan, Third, and Fourth streets. These bicycle projects would enhance cycling conditions in the transportation study area. In addition, the proposed bicycle facilities along the Market Street project corridor would connect with recently completed parking-protected bicycle lanes on upper Market Street between Octavia Boulevard and Duboce Avenue (see Figure 4.B-6, p. 4.B-105).

Bicycling trips in the area may increase between the completion of the proposed project and the 2040 cumulative scenario due to general growth in the area and increasing bike share. Under 2040 cumulative conditions, projected increases in vehicles on streets in the transportation study area may result in an increase in vehicle-bicycle conflicts at intersections in the study area, however, along Market Street, implementation of the vehicle restrictions (i.e., both required right-turns and turn prohibitions) as part of the proposed project would reduce the number of vehicles traveling along Market Street and turning across the bicycle facilities, and would therefore reduce the potential for conflicts between bicyclists and vehicles. The cumulative increase in vehicles on study area streets, in combination with planned and proposed improvements to the bicycle network and increased bicycle use, is not anticipated to create potentially hazardous conditions for bicycles, or otherwise interfere with bicycle accessibility along Market Street. The bicycle projects currently being implemented, planned, or proposed in the transportation study area, including those that would be provided as part of the proposed project, would accommodate future growth in bicycle trips, and would not result in significant cumulative bicycle impacts. Therefore, for the above reasons, the proposed project, in combination with past, present, and reasonably foreseeable development in San Francisco, would result in ***less-than-significant*** cumulative impacts on bicyclists.

WESTERN VARIANT

As discussed in Impact TR-6, the Western Variant would be similar to the proposed project, with the exception of the western segment of Market Street where additional changes to bicycle facilities would be made to further enhance the bicycle network along Market Street. As discussed above for the proposed project, there would not be significant cumulative bicycle impacts, and therefore, the Western Variant would result in ***less-than-significant*** cumulative impacts on bicyclists.

CUMULATIVE LOADING IMPACTS

Impact C-TR-7. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not contribute considerably to significant cumulative loading impacts. (Less than Significant)

Projected growth through 2040 cumulative conditions within the greater Market Street study area, particularly south of Market Street, would generate both commercial and passenger loading demand, and transportation projects would affect the supply of on-street commercial loading spaces.

Commercial Vehicle Loading: For cumulative development projects, to the extent that the commercial loading demand is not accommodated within the development project site (i.e., within off-street/onsite truck loading spaces), it would need to be accommodated within existing or new on-street commercial loading spaces. In addition, transportation projects that are part of the Transit Center District Plan, the Central SoMa Plan, the Hub Plan, the Second Street Improvement Project, the Sixth Street Pedestrian Safety Project, and Muni Forward projects would implement street network changes that would result in part-time and/or permanent removal of commercial loading spaces. This would require existing delivery and service vehicles using these spaces to seek alternative accommodations and would result in fewer on-street commercial loading spaces being available for future development. To the extent that the cumulative commercial loading demand cannot be accommodated within off-street and on-street spaces, double-parking, illegal use of sidewalks and other public spaces is likely to occur with associated disruptions and impacts on transit and traffic operations, as well as to bicyclists and people walking. Given the magnitude of potential future growth in residential and commercial development in the area south of the Market Street project corridor as a result of the area plans (e.g., Transit Center District Plan, Central SoMa Plan, Eastern Neighborhoods Plan, Western SoMa, the Hub Plan, and the Market and Octavia Plan), inability to provide adequate supply of off-street commercial loading spaces for individual projects and the removal of large amounts of on-street commercial loading spaces would be considered a significant cumulative impact.

Notes:

- Market Street is shown wider than map scale for clarity.
- Planned bicycle facilities noted in this figure are planned by MTA and included in the cumulative analysis. In addition, potential bicycle facilities that are currently at a conceptual design stage (and are not approved and funded) are not included in this figure.

Bikeway Definitions:

- Class II Bicycle Facility – Bike Lane
- Class III Bicycle Facility – Bike Route
- Class IV Bicycle Facility – Separated Bikeway

Legend

- Project Corridor
- Existing Class II Bicycle Facility
- Existing Class III Bicycle Facility
- Existing Class IV Bicycle Facility
- Planned Class II Bicycle Facility
- Planned Class IV Bicycle Facility
- Proposed Project Sidewalk-Level Bikeway (Class IV Bicycle Facility)

0 500 1,000
Feet

Source: Parisi Transportation Consulting 2018.
Other sources: Streets: City and County of San Francisco 2014

Figure 4.B-6
Existing, Proposed Project, and Planned Bicycle Facilities in the Vicinity of the Project Corridor

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As discussed in Impact TR-6, the proposed project would not result in a substantial net change in the number of loading zones along Market Street, and would be able to accommodate a generally similar number of commercial vehicles loading/unloading. In addition, implementation of the proposed project would increase the number of on-street commercial loading spaces on cross and side streets north and south of Market Street. The location of the proposed new on-street commercial loading spaces was based on a review of known cumulative projects and street network changes so that the on-street commercial loading spaces implemented by the proposed project would not be eliminated as part of future projects. In addition, the proposed project would not result in an increase in commercial loading demand. Therefore, the proposed project would not contribute considerably to significant cumulative commercial loading impacts. The impact would be ***less than significant***.

Passenger Loading: Similar to commercial loading, significant cumulative passenger loading impacts are anticipated to occur due to increased demand associated with cumulative development growth, particularly south of Market Street, as well as implementation of transportation projects that would reduce or limit the future supply of passenger loading/unloading zones. Furthermore, the existing passenger loading/unloading activities have increased with the use of app-based ride hailing services, and which is anticipated to continue through 2040 cumulative conditions.

The impact of inadequate passenger loading/unloading zones on South of Market streets could result in double parking along streets that could adversely affect local transit, vehicle and bicycle circulation, particularly where protected transit and bicycle facilities are not provided, and lead to congestion and delays, and this would be considered a significant cumulative passenger loading impact.

The proposed project would add 23 on-street passenger loading/unloading zones (i.e., accommodating 46 vehicles) on cross and side streets north and south of Market Street, and would accommodate passenger loading/unloading needs along Market Street for persons traveling by taxis and paratransit services. The proposed project would not generate passenger loading/unloading demand. Therefore, the proposed project would not contribute considerably to significant cumulative passenger loading impacts. The impact would be ***less than significant***.

WESTERN VARIANT

As discussed in Impact TR-7, commercial and passenger loading conditions for the Western Variant would be similar to the proposed project, however. additional vehicle restrictions would be implemented between Larkin/Hayes and 12th streets. The additional restrictions would limit use of loading zones in this segment to paratransit or taxi loading/unloading, however, loading demand would be accommodated within existing and proposed loading spaces along Market Street as well as on nearby side and cross streets. Thus, the Western Variant would not contribute considerably to significant cumulative commercial and passenger loading impacts. The impact would be ***less than significant***.

CUMULATIVE PARKING IMPACTS

Impact C-TR-8. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts related to parking. (Less than Significant)

Over time, due to the land use development and increased density anticipated within the City, parking demand and competition for on- and off-street parking is likely to increase. Within the Market Street transportation study area, development projects projected under the Transit Center District Plan, Central SoMa Plan, Eastern Neighborhoods (Eastern SoMa) Plan, Western SoMa, Hub Plan, and the Market and Octavia Plan are anticipated to result in a substantial increase in residential and commercial development south of Market Street. Some of the new developments in these areas would include new off-street parking facilities but not to the ratios from when the Planning Code required minimum amounts of off-street parking spaces (~1950s to 1990s). In addition, through the implementation of the City's Transit First Policy, Vision Zero and Better Streets program and related projects, as well as street network changes included in the plans identified above, on-street parking may be further removed to promote alternative modes of travel and sustainable street designs. Similar to the proposed project, these projects would encourage transit use through the reduction of transit travel times, would encourage bicycle use through provision of separate bicycle facilities that would offer a higher level of security than bicycle lanes and would be attractive to a wider spectrum of people, and would enhance walking conditions.

Although parking removal would occur with implementation of the proposed project, the removal would be spread out among numerous cross and side streets along the 2.2-mile Market Street project corridor, and would not represent a substantial portion of the parking shortfalls that would occur over time. In addition, the proposed project would not result in an increase in parking demand, but instead implementation of the street network changes would encourage use of transit and travel by walking and bicycling.

The absence of a ready supply of parking spaces, combined with available alternatives to auto travel as well as compliance by development projects with the TDM Ordinance requirements may lead to a mode shift from private passenger vehicles to transit or other modes of travel. Therefore, considering the downtown project corridor, with its dense pattern of urban development, multiple travel modes, as well as proposed improvements to the transit, pedestrian, and bicycle networks, a substantial parking deficit would not occur under cumulative conditions (i.e. there would be no cumulative parking impact). Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would result in ***less-than-significant*** cumulative parking impacts.

WESTERN VARIANT

As discussed in Impact TR-8, impacts of the Western Variant on parking would be the same as for the proposed project. As discussed above for the proposed project, a substantial parking deficit would not occur under cumulative conditions, and therefore. the Western Variant would result in ***less-than-significant*** cumulative parking impacts.

CUMULATIVE EMERGENCY ACCESS IMPACTS

Impact C-TR-9. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative emergency access impacts. (Less than Significant)

As discussed in Impact TR-9 above for baseline plus project conditions, with implementation of the proposed project, emergency access along Market Street would remain similar to existing conditions. Emergency vehicles would continue to travel along Market Street within either of the travel lanes, including the proposed Muni-only lanes, to access incidents along the corridor or other destinations.

There are no other cumulative transportation network projects along Market Street that would affect emergency access. Under cumulative conditions, there would be a projected increase in vehicles on study area streets, however, the increase would not impede or hinder emergency vehicle travel. For these reasons, under 2040 cumulative conditions there would not be significant cumulative emergency vehicle access impacts on Market Street.

Cumulative growth in housing and employment in San Francisco would result in an increased demand of emergency response calls, and would also increase the number of vehicles on nearby streets, and result in increased vehicle delays. As described above, a number of cumulative projects would affect the street network of other streets in the transportation study area, and, in particular, as part of the Transit Center District Plan and the Central SoMa Plan, however, none of these projects would introduce physical barriers that would preclude emergency vehicle access. Emergency vehicle providers may need to adjust travel routes to respond to incidents, and would be subject to increased congestion associated with cumulative development and street network changes.

Because four travel lanes would mostly remain on Market Street and varying numbers of travel lanes on adjacent streets, vehicles would be able to pull over to the side of the street and provide a clear travel path when an emergency vehicle with sirens is approaching, and emergency vehicles would not be substantially delayed. Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would result in ***less-than-significant*** cumulative emergency access impacts.

WESTERN VARIANT

As discussed in Impact TR-9, emergency access under the Western Variant would be similar to the proposed project. As discussed above for the proposed project, there would not be significant cumulative emergency access impacts, and therefore, the Western Variant would result in ***less-than-significant*** cumulative emergency access impacts.

4.C NOISE

This section describes the existing noise and vibration environment along the project corridor and discusses the potential for noise and vibration generated by the Better Market Street Project (proposed project or project) to adversely affect established sensitive land uses or land use activities. The impact analysis evaluates the potential construction and operational noise and vibration impacts and identifies mitigation measures to avoid or reduce adverse impacts. Supporting detailed technical information is included in Appendix 8, *Noise and Vibration Supporting Information*. Appendix 8 also includes supporting detail regarding the development and validation of the predictive models used in the noise analysis.

The initial study prepared for the proposed project (Appendix 2) determined that the project corridor is not located within an airport land use plan area or within 2 miles of any public airports or public use airports that have not adopted land use plans. The project corridor also is not located in the vicinity of a private airstrip. Therefore, further discussion of exposing people residing or working in the area to excessive noise levels from a public airport, public use airport, or private airstrip is not required in this EIR.

No comments pertaining to noise or vibration were received in response to the NOP (Appendix 1).

ENVIRONMENTAL SETTING

The following section includes an introduction to the key concepts and terms that are used in the evaluation of noise and vibration. The environmental setting of the project corridor and a description of the existing noise and vibration environment are also included below.

FUNDAMENTALS OF ENVIRONMENTAL NOISE AND VIBRATION

TERMINOLOGY

A brief description of the noise and vibration concepts and terminology used in this assessment is provided below.

- **A-Weighted Level (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear for low- to mid-level sounds. The dBA scale is the most widely used for environmental noise assessment.
- **Ballast and Tie or Ballasted Track.** A system of rock (ballast) that stabilizes the rail and crosstie supports. The rail is fastened to the tie.
- **Ballast Mat.** A resilient layer installed below the ballast that reduces the transfer of vibration from the rail and ballast into the ground.

- **C-Weighted Level (dBC).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear at high noise levels. The C-weighting scale is flatter and therefore includes more of the low-frequency sound energy than the A-weighting scale.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the sound levels occurring during the period from 7 p.m. to 10 p.m. and 10 dB added to the sound levels occurring during the period from 10 p.m. to 7 a.m. L_{dn} and CNEL are typically within 1 dBA of each other and, for all intents and purposes, interchangeable.
- **Crossover.** A special track section where the rail vehicle switches from one track to the other. This configuration usually requires a gap to allow the wheel to cross to the other track; this gap can add noise and/or vibration in that area.
- **Day-Night Sound Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to sound levels between 10 p.m. and 7 a.m. Also abbreviated as DNL.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- **Direct-Fixation Track.** A configuration where the rail is fastened directly to a concrete bed (invert) without the use of ballast.
- **Equivalent Sound Level (L_{eq})**. The equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy. The 1-minute A-weighted equivalent sound level (L_{eq} 1m) is the energy average of A-weighted sound levels occurring during a 1-minute period.
- **Frequency.** The frequency, or pitch, of a sound is the rate at which pressure oscillations occur. It is defined as the number of oscillations (or cycles) per second. The International System of Units frequency unit is Hertz (Hz).
- **Impulsive Noise.** Impulsive noise has fluctuating noise levels, produced by equipment such as impact-hammer pile drivers, jack-hammers, or other types of equipment with noise levels that vary significantly during use.
- **Maximum Sound Levels (L_{max}).** The maximum sound level measured during a given measurement period.
- **Noise- and Vibration-Sensitive Receptor.** Generally speaking, structures or land uses where the occupants would be affected or annoyed by noise and/or vibration. Typically, this includes places where people sleep (residences, hotels, hospitals) and non-sleeping uses for which a quiet environment is important (concert halls, schools, libraries, museums, places of worship). Specific categories defined by the Federal

Transit Administration are discussed below. Laboratories and research facilities can also have equipment that is sensitive to vibration.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Non-Impulsive Noise.** Non-impulsive noise is relatively steady-state noise, characteristic of engines, motors, and pumps.
- **Passby.** The noise or vibration from a single vehicle in motion (approaching, passing by, or receding) that is observed to be audible above ambient levels. Noise or vibration levels from passbys are often expressed in terms of SEL and L_{max}.
- **Peak Particle Velocity (PPV).** A measurement of ground vibration, defined as the maximum speed at which a particle in the ground is moving, expressed in inches per second (in/sec). This is used in analysis of building damage from construction vibration and sometimes in analysis of annoyance from construction activities.
- **Percentile Level (L_n)**. The noise level that is exceeded n-percent of the time in a stated measurement interval. For example, the hourly L_{50} is the noise level exceeded 50 percent of the time during that hour.
- **Sound Exposure Level (SEL).** Typically used to describe noise events, SEL is the logarithmic (decibel) measure of *sound exposure*, or the integrated sound pressure over the duration of the event. It is equivalent to L_{eq} normalized to a duration of 1 second and provides a way to compare noise events of different durations.
- **Sound**. A vibratory disturbance transmitted by pressure waves through a medium such as air that is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Vibration Velocity Level (or Vibration Decibel Level, VdB).** Like sound, vibration is often quantified using a decibel scale. To distinguish vibration quantified in decibels, the "V" is inserted. Whereas the sound decibel is a ratio of sound pressure values, the vibration decibel is a ratio of the vibration velocity values, where the vibration is expressed in inches per second, and the reference vibration is 1 micro-inch per second. The root-mean-square velocity amplitude for measured ground motion expressed in dB. This metric is usually used for evaluating annoyance from transit operations; occasionally, it is also used to evaluate annoyance from construction activities.

OVERVIEW OF NOISE AND SOUND

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially results in adverse psychological or physiological effects on human health. Because noise is an environmental pollutant that can interfere with human activities, an evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is characterized by various parameters, including the rate of oscillation of sound waves (frequency), the speed of sound waves through a medium (propagation speed), and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum; therefore, noise measurements are weighted more heavily toward frequencies to which humans are sensitive through a process referred to as A-weighting. Table 4.C-1, on the following page, summarizes typical A-weighted sound levels for different noise sources.

Loudness is a subjective measure of a sound, and while it is related to measures of acoustical level such as sound pressure, it is not identical. Human sound perception, in general, is such that a change in sound level of 1 dB cannot typically be perceived by the human ear. A change in sound level of 3 dB is barely noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving of the sound level. A doubling of actual sound energy is required to result in a 3 dB increase, or a barely noticeable increase in loudness; in practice, for example, this means that the volume of traffic on a roadway would typically need to double to result in a noticeable increase in noise.[1]

The level of a sound decreases (or attenuates) as the distance from the source of that sound increases. For a compact noise source, such as a stationary compressor or construction equipment, sound attenuates at a rate of 6 dB per doubling of distance. For linearly distributed noise sources such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance. Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and affect the level received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface, such as grass, attenuates at a greater rate than sound that travels over a hard surface, such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers, such as buildings or topographic factors, which block the line of sight between a source and receptor also increase the attenuation of sound over distance. The degree to which atmospheric, absorptive, and topographic factors affect the propagated noise level depends on the distances involved and the frequency of the sound.

[1] California Department of Transportation. 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf. Accessed: October 25, 2018.

TABLE 4.C-1. TYPICAL A-WEIGHTED SOUND LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Fly-over at 300m (1000 ft)	110	Rock Band
Gas Lawn Mower at 1 m (3 ft)	100	
Diesel Truck at 15 m (50 ft), at 80 km (50 mph)	90	Food Blender at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	80	Garbage Disposal at 1 m (3 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	70	Vacuum Cleaner at 3 m (10 ft) Normal Speech at 1 m (3 ft)
	60	Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime Quiet Suburban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Rural Nighttime	30	Library Bedroom at Night, Concert Hall (Background)
	20	Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

dBA = A-weighted decibel; m = meter; ft = feet

Source: California Department of Transportation. 2013. *Technical Noise Supplement*. November. Sacramento, CA: Division of Environmental Analysis. Sacramento, CA. Available: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed: October 25, 2018.

In urban environments, simultaneous noise from multiple sources frequently occurs. Because sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Adding a new noise source to an existing noise source, with both producing noise at the same level, will not double the noise level. For two noise sources that are equal in level, the combined noise level will be 3 dB higher than the individual sources. If the difference between two noise sources is 2 to 3 dBA, the resultant noise level will be 2 dB above the higher noise source. If the difference between two noise sources is 4 to 10 dB, the resultant noise level will be 1 dB higher than the higher noise source. Finally, if the difference between two noise sources is 10 dB or more, the higher noise source is said to dominate and the resultant noise level will be essentially the same as the noise level of the higher noise source.

Community noise environments are generally perceived as quiet when the L_{dn} noise level is below 45 dBA, moderate in the 45 to 60 dBA range, and loud above 60 dBA. Very noisy urban residential areas are usually around 70 dBA CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA CNEL. Incremental increases of 3 to 5 dB to the existing 1-hour L_{eq}, or to the CNEL, are common standards for an adverse community reaction to a noise increase. However, there is evidence that an incremental noise increase in this range may not be adequately protective in areas where noise-sensitive uses are located and CNEL is already high (i.e., above 60 dBA). In these areas, limiting noise increases to 3 dB or less is recommended.[2]

Overview of Ground-borne Vibration

Ground vibration is an oscillatory motion of the soil with respect to the equilibrium position and can be quantified in terms of displacement, velocity, or acceleration. Vibration can be described by its peak or root-mean-square (RMS) amplitudes. The RMS amplitude (essentially, an average) is useful for assessing human annoyance, while peak vibration is most often used for assessing the potential for damage to building structures due to construction activities.

The rate or velocity (in inches per second) at which these particles move is referred to as peak particle velocity (PPV), the commonly accepted descriptor of vibration amplitude for building structure response. This is commonly done to assess the potential for building damage because the strain in the building structure is proportional to the PPV. For human annoyance evaluations, it is common to use the velocity level in decibels to quantify vibration because

[2] Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. Report No. 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 31, 2018.

human perceptibility of vibration correlates well with the velocity level and the decibel scale covers the wide range of magnitudes that can be encountered. The vibration is expressed in terms of the velocity level (L_v) in decibel units, defined as:

$$L_v = 20 \text{ x } \log_{10}(v/v_{ref}), \text{ VdB}$$

Where "v" is the RMS velocity amplitude and "v_{ref}" is the reference velocity amplitude.[3] Thus, the descriptor used in this report to assess ground-borne vibration for human annoyance is the L_v in decibels, denoted VdB.[4] The frequency of vibratory motion is measured in cycles/second which is also known as Hertz (Hz). Ground vibration of concern for transportation sources generally spans from 4 to 100 Hz. The *overall* vibration is the combined energy of ground motion at all frequencies, and this overall vibration level is used in this analysis.

The operation of rail transportation systems and heavy construction equipment, particularly impact devices (e.g., pavement breakers), creates ground vibration waves that radiate along the surface of the ground and downward. These surface waves can be felt as ground vibration. Vibration from the operation of this type of equipment can result in effects that range from annoyance for people to damage for structures. Buildings respond differently to ground vibration depending on the type of foundation, the mass of the building, and the building interaction with the soil. Once inside the building, vibration propagates throughout the building with some attenuation with distance from the foundation, but it can also be amplified due to floor resonances.

The basic concepts for rail-system-generated ground vibration are illustrated in Figure 4.C-1, on the following page. This concept is also generally applicable to construction vibration. The vibration is generated at the source (e.g., the rail system, construction activities) and then transmitted into the ground and propagated through the ground. If a building is encountered, the vibration then transfers to the building. Whereas airborne sound propagates through the air, ground-borne vibration propagates through the ground.

Perceptible ground-borne vibration is generally limited to areas within a few hundred feet of construction or rail transportation activities. As ground vibration waves travel outward from a vibration source, they cause rock and soil particles to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch.

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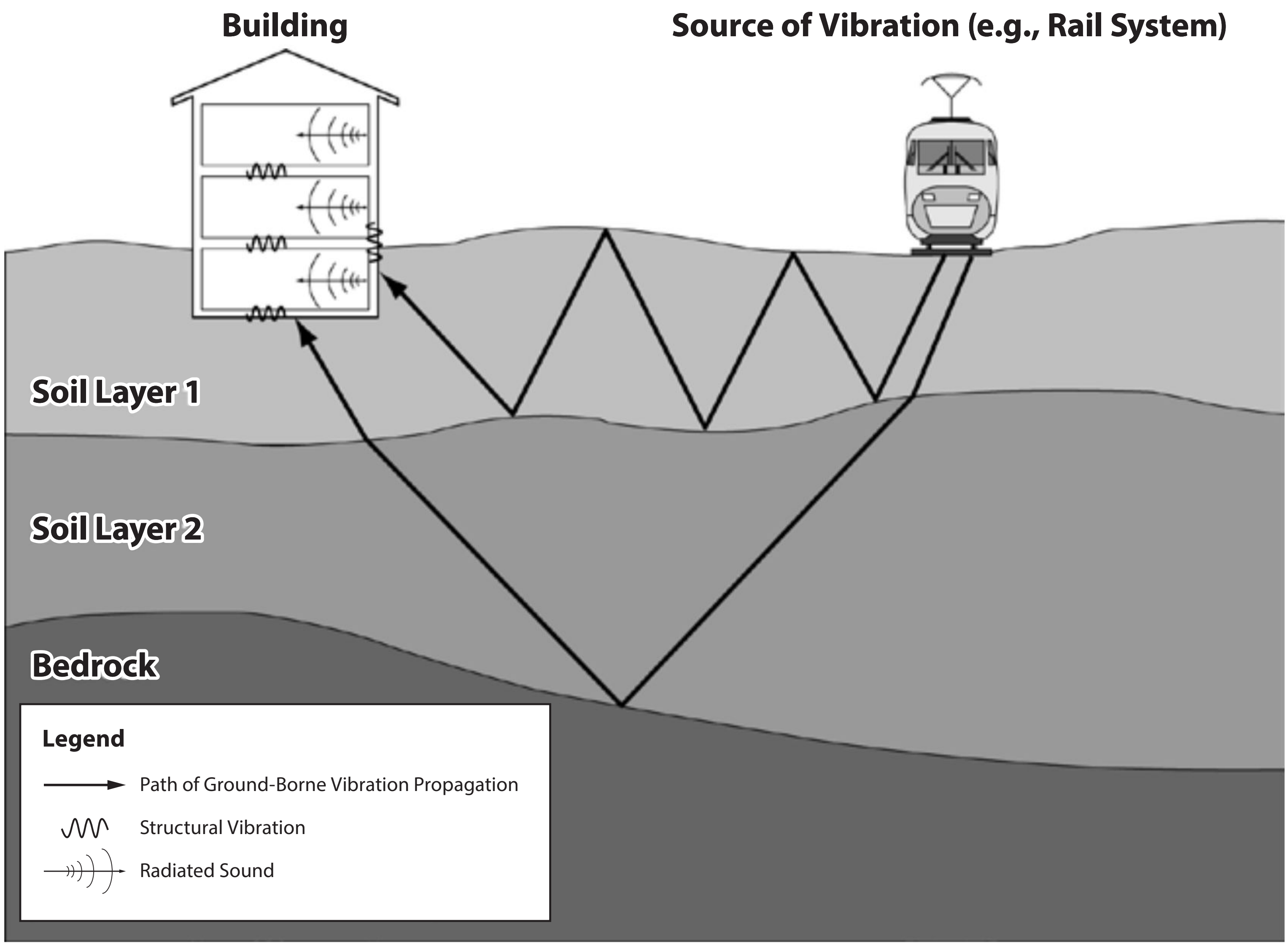
[3] The standard reference quantity for vibration velocity in the USA and used by the U.S. Department of Transportation is $1 \text{ x } 10^{-6}$ inches/second, or 1 micro-inch/second.

[4] The abbreviation VdB is used in this document for vibration levels to reduce the potential for confusion with sound decibels (dB).



Note: Vibration is generated at a source (e.g. a rail system) and is transmitted into the ground. The vibration then transmits (or propagates) through the ground. If a building is encountered, the vibration transfers into the building.

Source: Federal Railroad Administration 2012.

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Figure 4.C-1
Propagation of Ground-Borne Vibration into Buildings

Vibration amplitude attenuates (or decreases) over distance. This attenuation is a complex function of how energy is imparted into the ground as well as the soil or rock conditions through which the vibration is traveling (variations in geology can result in different vibration levels).

The following equation is used to estimate the vibration level at a given distance for typical soil conditions.[5] PPV_{ref} is the reference PPV for specific equipment at 25 feet.

$$PPV_{equip} = PPV_{ref} \text{ x } (25/\text{distance})^{1.5}$$

Where n is a factor that is determined by the local soil conditions. The Federal Transit Administration uses a value of n = 1.5, whereas the California Department of Transportation (Caltrans) guidelines use values of n = 1 to 1.4.[6] Table 4.C-2, below, summarizes typical vibration levels generated by construction equipment at a reference distance of 25 feet as well as other distances, as determined with use of the attenuation equation above.

TABLE 4.C-2. VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV at 25 Feet	PPV at 50 Feet[1]	PPV at 75 Feet[1]	PPV at 100 Feet[1]	PPV at 175 Feet[1]
Vibratory roller	0.210	0.085	0.050	0.035	0.017
Hoe ram	0.089	0.036	0.021	0.015	0.007
Large bulldozer	0.089	0.036	0.021	0.015	0.007
Loaded truck	0.076	0.031	0.018	0.013	0.006
Jackhammer	0.035	0.014	0.008	0.006	0.003
Small bulldozer	0.003	0.001	0.001	>0.001	>0.001

[1] Vibration propagated at n = 1.3

PPV = peak particle velocity

Source: California Department of Transportation. 2013. Transportation and Construction Vibration Guidance Manual. September. Chapter 8 and Table 18 Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

"Pogo stick" compactors (small hand-held soil compactors), crack-and-seat equipment (to break and re-seat pavement), excavation equipment, static compaction equipment, tracked vehicles, vehicles on highways, and vibratory compaction equipment are typically associated with continuous vibration. Activities that are typically associated with single-impact (transient) or low-rate, repeated impact vibration include blasting and the use of drop balls or dropped metal plates.

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[5] Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. Report No. 0123. Office of Planning and Environment. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: November 13, 2018.

[6] California Department of Transportation. 2013. Transportation and Construction Vibration Guidance Manual. September. Table 19. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

The background vibration velocity level in primarily residential areas is usually around 50 VdB or lower. The vibration velocity level threshold of perception for humans is approximately 65 VdB. Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, the movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are heavy construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible.

Table 4.C-3, below, summarizes the typical ground-borne vibration velocity levels and the average human response to vibration that may be anticipated when a person is at rest in quiet surroundings. If the person is engaged in any type of physical activity, vibration tolerance increases considerably. The duration of the event has an effect on human response, as does its daily frequency of occurrence. Generally, as the duration and frequency of occurrence increase, the potential for adverse human response increases.

TABLE 4.C-3. TYPICAL LEVELS OF GROUND-BORNE VIBRATION

Human or Structural Response	Vibration Velocity Level (VdB)	Typical Sources (50 feet from source)
Standard for minor cosmetic damage to fragile buildings	100	Blasting from construction project
	95	
		Bulldozer or heavy-tracked construction equipment
Difficulty in reading computer screen	90	
	85	Upper range of commuter rail
Standard for residential annoyance for occasional events (e.g., commuter rail)	80	Upper range of rapid transit
	75	Typical commuter rail
Standard for residential annoyance for frequent events (e.g., rapid transit)		Bus or truck over bump
	70	Typical rapid transit
Approximate standard for human perception of vibration; limit for vibration-sensitive equipment	65	Typical bus or truck on public road
	60	
	55	
		Typical background vibration
	50	

VdB = vibration decibel level

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. Report No. 0123. Office of Planning and Environment. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: November 13, 2018.

The track type (e.g., ballast and tie or direct-fixation track) can have an effect on the vibration that propagates from the rail into the ground and hence out to the surrounding area. The more rigidly the rail is fixed to the ground or invert, the more readily vibration from the train wheel/rail interface transmits into the ground.

Ground-borne noise is a secondary component of ground-borne vibration. When a building structure vibrates, noise is radiated into the interior of the building. Typically, this is a low-frequency sound that can be perceived as a low rumble. The magnitude of the sound depends on the frequency characteristic of the vibration and the manner in which the room surfaces in the building radiate sound. Ground-borne noise is quantified by the A-weighted sound level inside the building. The sound level accompanying vibration is generally 25 to 40 dBA lower than the vibration velocity level in VdB. Ground-borne vibration levels of 65 VdB can result in ground-borne noise levels of up to 40 dBA, which can disturb sleep. Ground-borne vibration levels of 85 VdB can result in ground-borne noise levels of up to 60 dBA, which can be annoying to daytime noise-sensitive land uses, such as schools.[7]

EXISTING NOISE LEVELS

The project corridor is in a densely developed urban area, consisting almost entirely of mid- to high-rise structures. The existing noise environment is largely dominated by surface transportation noise from bus, automobile, and truck traffic as well as fixed-guideway electric streetcar operations.

NOISE MONITORING RESULTS

A noise measurement survey was performed to characterize the existing noise environment along Market Street and on side streets within three blocks of the project corridor. The survey consisted of attended and unattended monitoring of the prevailing ambient noise level as well as measurements of passby noise from the historic streetcars operating along the F Market & Wharves historic streetcar (F-Line) on Market Street. Details regarding the noise measurement survey are provided in Appendix 8.

Noise monitoring was performed between April 30 and May 1, 2018 at four long-term and nine short-term measurement locations. Noise monitoring was performed on April 19, 2018, at 10 locations to measure streetcar passby noise. Figure 4.C-2, p. 4.C-13, shows the noise measurement locations. Table 4.C-4, on the following page, lists the noise measurement locations, describes the locations, and summarizes the measured noise levels for the long-term

[7] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. Office of Planning and Environment.

TABLE 4.C-4. EXISTING LONG-TERM AND SHORT-TERM NOISE MEASUREMENT LOCATIONS AND NOISE LEVELS

Site ID	Site Location	Peak Hour	$L_{eq}(24)$	L_{dn}
Long-term Measurements (24 hours)[1]				
LT-1	Between Brady and 12th streets (south side)[2]	78	71	75
LT-2	Between 7th and 8th streets (at United Nations Plaza)[3]	74	67	73
LT-3	Between Montgomery and Kearny streets (north side)[2]	75	72	77
LT-4	Between Spear and Steuart streets (south side)[2]	73	70	75
Short-term Measurements (20 to 30 minutes)[1, 4]				
ST-1	Market Street at 11th Street (north side)[2]	75	68	72
ST-2	Southwest corner of 10th and Market streets[2]	77	70	74
ST-3	Northwest corner of McAllister and Jones streets[2]	73	65	69
ST-4	East side of Hallidie Plaza[2]	74	71	76
ST-5	Southwest corner of Market Street and Yerba Buena[2]	74	71	76
ST-6	Yerba Buena (300 feet from Market Street)[3]	69	65	70
ST-7	Yerba Buena (on south side of Mission Street)[3]	67	64	69
ST-8	North side of Market Street (100 feet east of 2nd Street)[2]	74	70	76
ST-9	Between Fremont and 1st streets (south side)[2]	75	73	77

Notes:

1 Noise monitoring was performed between April 30 and May 1, 2018.

2 Site located to measure primarily streetcar noise and traffic on Market Street.

3 Site located to measure primarily traffic noise on side streets adjacent to Market Street.

4 L_{dn} and $L_{eq}(24)$ values for short-term measurements were extrapolated using long-term measurement data.

L_{eq} (24) = 24 hour equivalent sound level

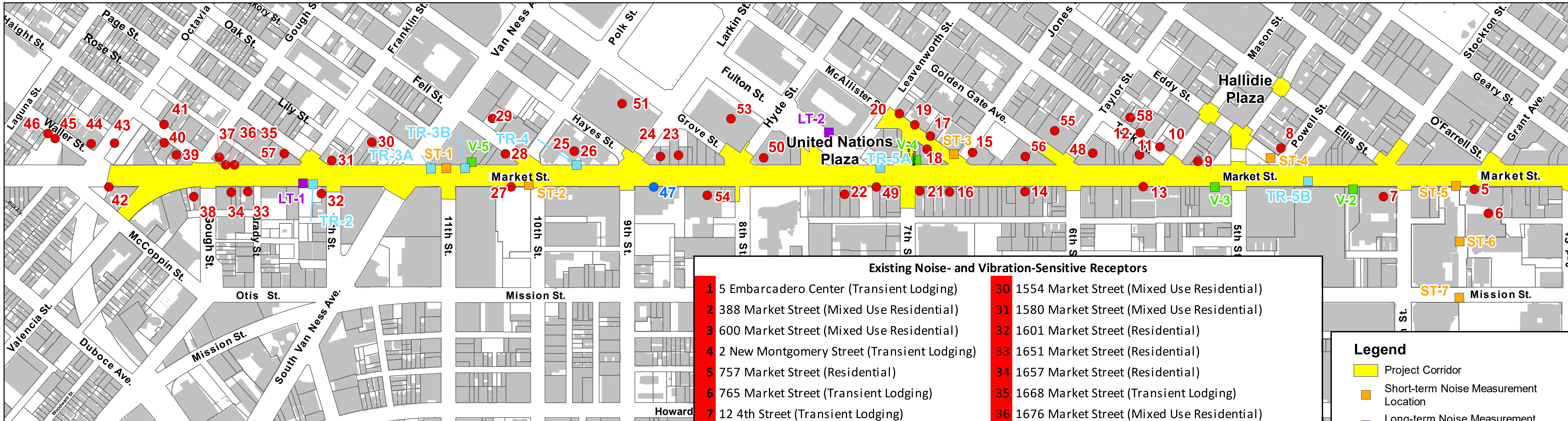
L_{dn} = day-night sound level

Source: Vibro-Acoustic Consultants 2018.

and short-term noise measurements. The long-term and short-term noise measurement locations were selected to provide reasonably uniform spatial coverage and capture the range of noise exposure along the project corridor.

Unattended long-term noise monitors were installed on utility poles at a height of approximately 10 feet. The attended short-term measurements were performed using portable sound-level meters mounted on tripods, which were set at ear height.

The short-term measurements provided supporting detail about the existing noise environment and served as "infill" measurements, complementing the long-term monitoring along Market Street. The long-term measurements covered a 24-hour period; short-term measurements were either 20 or 30 minutes in duration.



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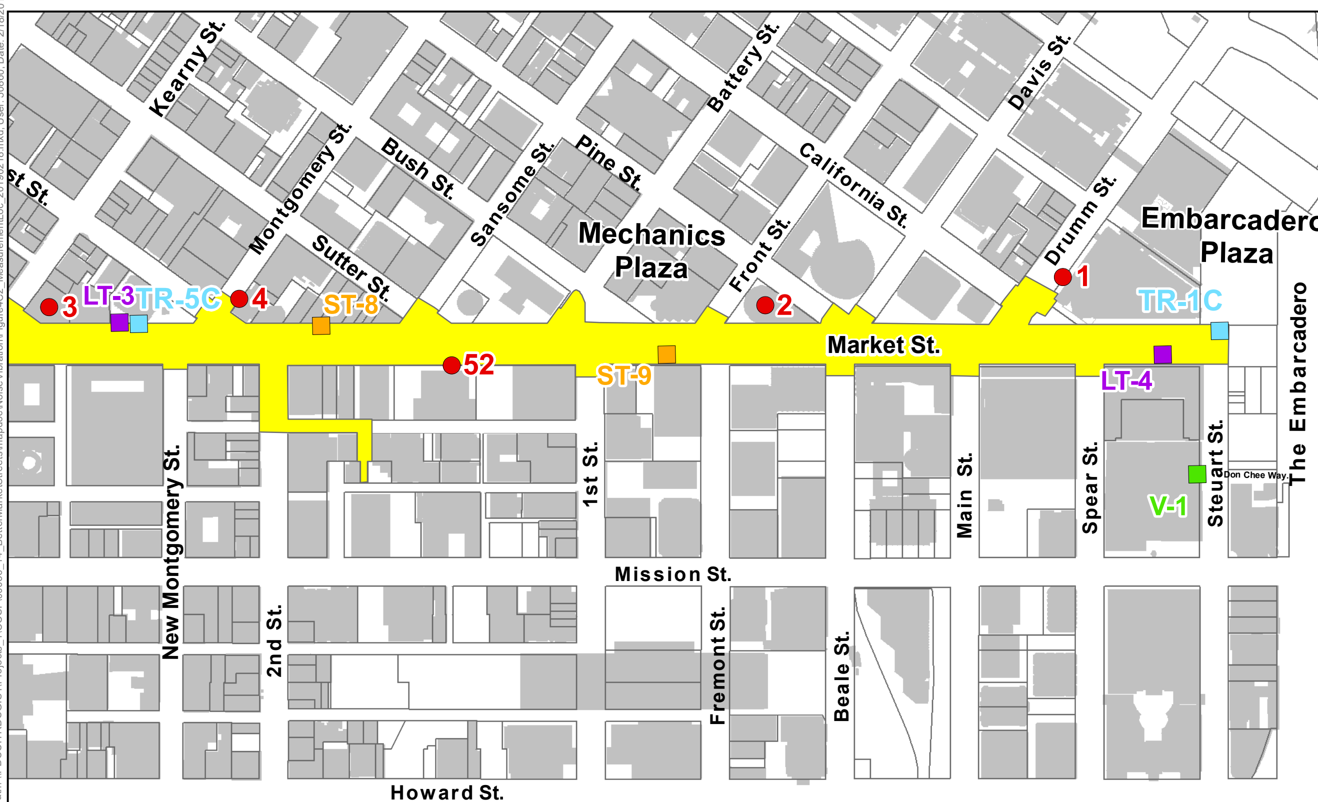

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Existing Noise- and Vibration-Sensitive Receptors

1	5 Embarcadero Center (Transient Lodging)	30	1554 Market Street (Mixed Use Residential)
2	388 Market Street (Mixed Use Residential)	31	1580 Market Street (Mixed Use Residential)
3	600 Market Street (Mixed Use Residential)	32	1601 Market Street (Residential)
4	2 New Montgomery Street (Transient Lodging)	33	1651 Market Street (Residential)
5	757 Market Street (Residential)	34	1657 Market Street (Residential)
6	765 Market Street (Transient Lodging)	35	1668 Market Street (Transient Lodging)
7	12 4th Street (Transient Lodging)	36	1676 Market Street (Mixed Use Residential)
8	10 Cyril Magnin Street (Mixed Use Residential)	37	1698 Market Street (Mixed Use Residential)
9	942 Market Street (Residential)	38	1693 Market Street (Residential)
10	16 Turk Street (Transient Lodging)	39	11 Haight Street (Mixed Use Residential)
11	34 Turk Street (Mixed Use Residential)	40	33 Haight Street (Mixed Use Residential)
12	972 Market Street (Residential)	41	60 Haight Street (Place of Worship)
13	973 Market Street (Residential)	42	1751 Market Street (Residential)
14	1023 Market Street (Mixed Use Residential)	43	8 Octavia Boulevard (Mixed Use Residential)
15	20 Jones Street (Place of Worship)	44	22 Waller Street (Place of Worship)
16	1075 Market Street (Mixed Use Residential)	45	41 Waller Street (Mixed Use Residential)
17	44 McAllister Street (Mixed Use Residential)	46	55 Waller Street (School)
18	45 McAllister Street (Transient Lodging)	47	1275 Market Street (Commercial, Dolby Laboratories)
19	45 McAllister Street (Residential)	48	982 Market Street (Theater/Auditorium)
20	60 Leavenworth Street (Mixed Use Residential)	49	1127 Market Street (Theater/Auditorium)
21	1087 Market Street (Transient Lodging)	50	1192 Market Street (Theater/Auditorium)
22	1139 Market Street (Transient Lodging)	51	99 Grove Street (Theater/Auditorium)
23	1272 Market Street (Transient Lodging)	52	545 Market Street (Library)
24	1278 Market Street (Transient Lodging)	53	100 Larkin Street (Library)
25	1390 Market Street (School)	54	1231 Market Street (Transient Lodging)
26	1390 Market Street (Residential)	55	1 Taylor Street (Theater/Auditorium)
27	8 10th Street (Residential)	56	1000 Market Street (Residential)
28	1 Polk Street (Mixed Use Residential)	57	1600 Market Street (Residential)
29	50 Fell Street (School)	58	48 Turk Street (Transient Lodging)

Legend

- Project Corridor
- Short-term Noise Measurement Location
- Long-term Noise Measurement Location
- Streetcar Passby Noise Measurement Location
- Short-term Vibration Measurement Location
- Existing Noise- and Vibration-Sensitive Receptor
- Existing Vibration-Sensitive Receptor

Note: The following measurement locations are located outside this map and are not included to maintain the map's clarity: Streetcar Passby Measurement Location TR-1A at Castro and Market streets, Streetcar Passby Measurement Location TR-1B at Noe and Market streets, and Short-term Vibration Measurement Location V-6B at 3906 17th Street. There may be additional sensitive receptors located in the vicinity of the project corridor that were not specifically considered in the noise and vibration analyses prepared for the proposed project. The receptors identified in this figure are as close to noise- and vibration-generating activities as possible (i.e. within or adjacent to the project corridor) and therefore are representative of other sensitive receptors that may exist within or adjacent to the project corridor but which are not specifically identified.

0 500 1,000
Feet

Better Market Street Project
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Figure 4.C-2
Noise and Vibration Measurement Locations and Existing Sensitive Receptors in the Vicinity of the Project Corridor

Source: Parcels, City and County of San Francisco 2014;
Streets, City and County of San Francisco 2014;
Building Footprints, City and County of San Francisco 2011
Land Use,SF Planning Department, 2018
Wilson Ihrig, Vibro-Acoustic Consultants and ICF, 2018

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Measured noise levels along Market Street are fairly uniform, with L_{dn} values at long-term measurement locations ranging from 73 to 77 dBA. L_{dn} values at the short-term measurement locations, inferred by comparing short-term and long-term results, ranged from 69 to 77 dBA. Levels at measurement locations not directly on Market Street (Sites LT-2, ST-6, and ST-7) ranged from 69 to 73 dBA, which is about 4 dB lower on average than noise levels on Market Street.

Figure 4.C-3, on the following page, shows the hourly noise level (long-term sites) and L_{eq} (short-term sites) levels for the noise measurement locations along Market Street. The diurnal cycle is discernable but not particularly pronounced, and hourly noise levels rarely fell below 65 dBA. Variation in level for the three long-term measurement locations directly on Market Street (Sites LT-1, LT-3, and LT-4) ranged from 9 to 14 dB over the 24-hour period. At the long-term measurement locations, the hourly noise level remained above 70 dBA for most daylight hours.

Streetcar Passby Noise Measurements

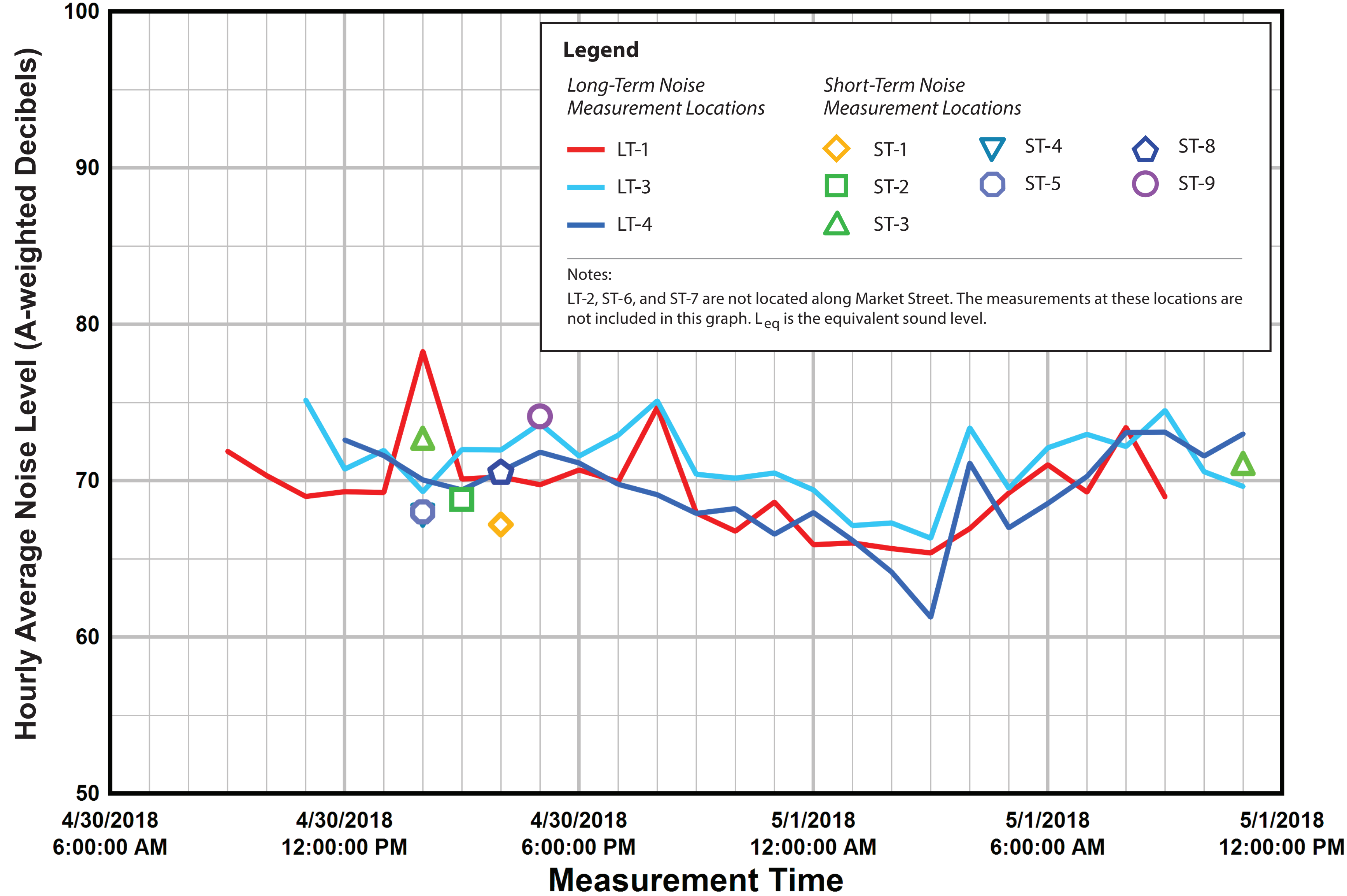
Streetcar passby noise measurements were performed on April 19, 2018, using the in-service, historic F-Line streetcars. As depicted in Table 2-1 in Chapter 2, *Project Description*, the existing peak-hour service frequency on the F-Line is approximately 7.5 minutes in each direction. The measurements taken for this analysis included a sampling of Milan streetcars, considered by SFMTA to be among the noisier vehicles in its inventory.[8] The number of Milan streetcars currently operating on the F-Line varies by hour and day. A total of 43 streetcar passby noise measurements were taken at 10 locations with 11 different streetcars. For analysis and noise modeling purposes, the measurements were pooled into three categories of track:

1. Tangent (straight line) track,
2. Tangent track over Bay Area Rapid Transit (BART) grates, and
3. Short-radius curved track (radius of 100 feet or less).

The majority of the 2.2-mile-long project section along the F-Line consists of tangent (straight-line) track embedded in pavement. BART grates of various lengths (3 to 50 linear feet) are distributed along the F-Line tangent track, for a total of approximately 1,500 linear feet of tangent track over BART grates within the project corridor. There is one section of approximately 100 linear feet of short-radius curved track along the F-Line within the project corridor at the intersection of Steuart and Market streets.

Table 4.C-5, p. 4.C-17, lists the noise measurement locations, describes the locations, and summarizes the average noise levels for the streetcar passby noise measurements. Figure 4.C-4, p. 4.C-18, summarizes the range of maximum streetcar passby noise levels over each of the

[8] Kevin Day, SFMTA; email communication with Liz Brisson, Major Corridors Planning Manager, SFMTA, February 13, 2018.



Source: Vibro-Acoustic Consultants 2018.

00056.14 (11-6-2018)

Better Market Street Project
Case No. 2014.0012E

Figure 4.C-3
Measured Short- and Long-term Noise Levels at Market Street Monitoring Locations

TABLE 4.C-5. EXISTING STREETCAR PASSBY NOISE MEASUREMENT LOCATIONS AND NOISE LEVELS

Site ID	Site Location	Average Maximum Passby Level, Non-Milan Streetcars, dBA[1]	Average Maximum Passby Level, Milan Streetcars, dBA[1]	Average Single-Event Level, Non-Milan Streetcars, dBA[1]	Average Single-Event Level, Milan Streetcars, dBA[1]
Streetcar Passby Noise Measurement Locations (timing varies by passby)					
TR-1A[2]	Southeast corner of Castro Street and Market Street	80	82	85	92
TR-1B[2]	Southeast corner of Market Street and Noe Street	80	82	85	92
TR-1C[2]	Corner of Market and Steuart streets	80	82	85	92
TR-2[3]	Southwest corner of Market and 12th streets	76	89	84	95
TR-3A[3]	Northeast corner of Market Street and Van Ness Avenue	76	89	84	95
TR-3B[3]	Market between Van Ness Avenue and 10th Street (north side)	76	89	84	95
TR-4[3]	Market Street between 9th and 10th streets (north side)	76	89	84	95
TR-5A[4]	Northwest corner of Market Street and Charles J. Brenham Place	82	92	88	98
TR-5B[4]	Market Street at Powell Street (south side)	82	92	88	98
TR-5C[4]	Northwest corner of Market and Montgomery streets	82	92	88	98

Notes:

1 Noise levels for streetcar passbys are averaged across sites, based on type of streetcar noise measured (e.g., tangent track over asphalt, tangent track over BART grates, or curve squeal).

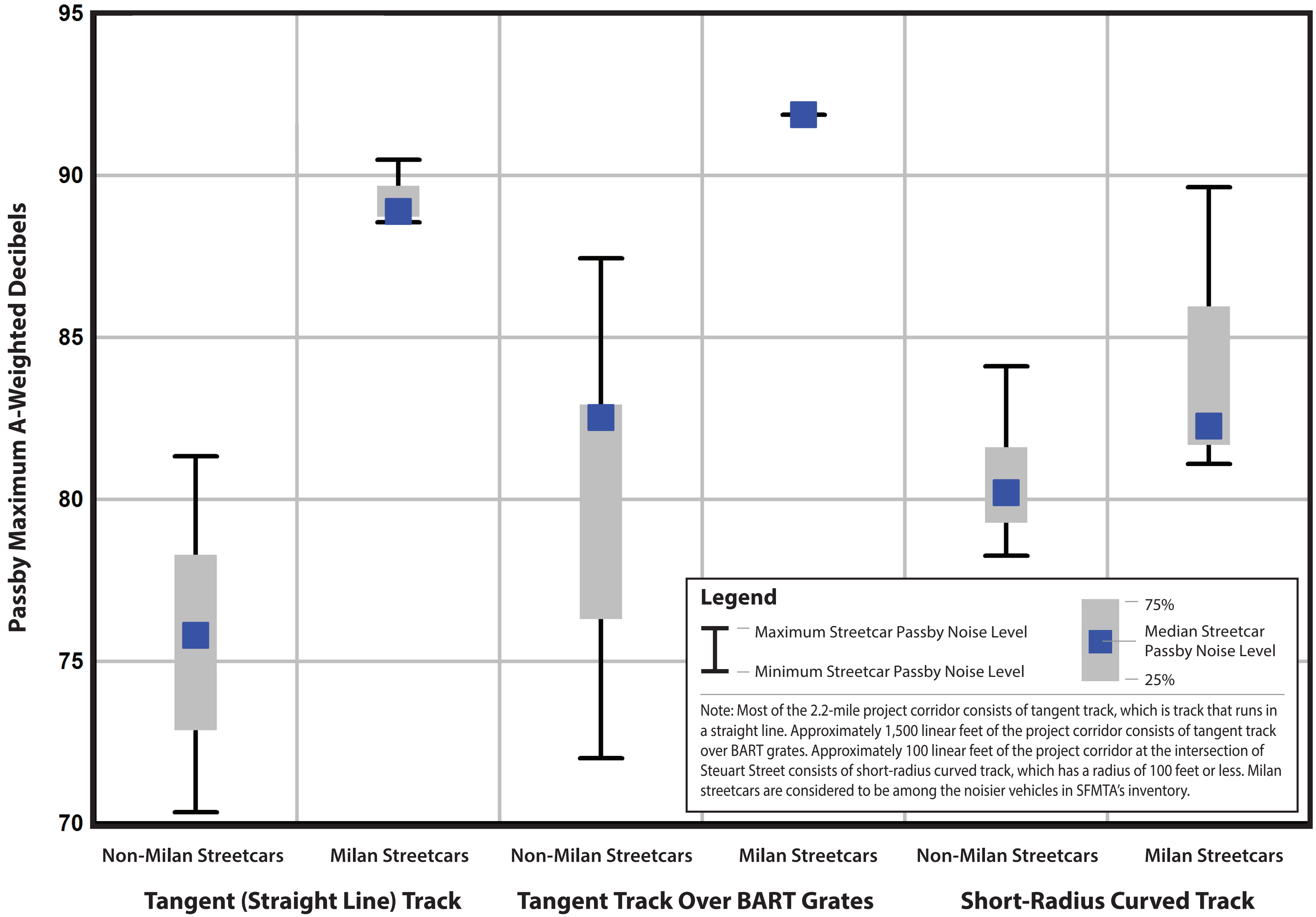
2 Location selected to measure primarily streetcar noise from squeal on curves.

3 Location selected to measure primarily streetcar noise from tangent track over asphalt.

4 Location selected to measure primarily streetcar noise from tangent track over BART grates.

dBA = A-weighted decibel

Source: Vibro-Acoustic Consultants 2018.



00056.14 (11-6-2018)

Source: Vibro-Acoustic Consultants 2018.

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Figure 4.C-4
Graphical Representation of Existing Noise from Streetcar Passby Measured at Different Distances and Different Locations

three categories of track (tangent [straight line] track, tangent track over BART grates, and short-radius curved track), with the Milan streetcars separated from the remainder of the fleet. For non-Milan streetcar at-speed (tangent-track) passbys, levels vary significantly from car to car. The two in-service Milan streetcars were distinctly noisier that the other streetcars, exhibiting passby levels that were consistently 10 dB higher than levels from any of the other streetcars. The inter-quartile range of levels across the non-Milan streetcars was 5 to 7 dB. On short-radius curved track, the difference between Milan and non-Milan streetcars is notably smaller, with a total range of 6 to 8 dB within type.

Baseline Conditions For Noise Analysis

The analysis in CEQA documents typically presents existing and existing-plus-project scenarios to isolate impacts by comparing conditions with the proposed project to existing conditions. The baseline considered here includes land use development projects that were recently completed or are currently under construction as well as transportation infrastructure projects that were recently completed, are under construction, or approved and funded and therefore expected to be under construction or completed by the time the proposed project is under construction. Because of these changing conditions, a baseline other than the existing conditions was determined to be appropriate for the traffic-related noise analysis in this section because an analysis based on existing conditions could be misleading to decision-makers and the public.

The baseline for the traffic-related noise analysis in this section is related to the baseline for transportation described in Section 4.B, *Transportation and Circulation*, because vehicle circulation and volumes in the transportation study area influence the ambient noise environment. The baseline for transportation includes projects that were under construction at the time when the NOP was published, and projects that are approved and funded and therefore likely to be completed by the time the proposed project is under construction. This future baseline year for transportation was determined to be 2020, and that same future baseline is used for the traffic-related noise impact analysis in this section. Additional information on the 2020 baseline conditions influencing traffic circulation and volumes is provided in Section 4.B, *Transportation and Circulation*, and Appendix 8.

The transit-related noise analysis in this section follows the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment* (FTA Manual),[9] which stipulates that a project's potential impact is measured in terms of its contribution to existing noise levels. Therefore, for the evaluation of F-Line streetcar noise, baseline conditions on Market Street and the proposed F-loop are described in terms of the existing frequency of streetcars operating on the F-Line and

[9] Federal Transit Administration. 2018. Transit Noise and Vibration Impact Assessment. FTA Report No. 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 31, 2018.

noise measurements taken in 2018, which are compared to modeled 2020 plus-project noise levels. Accordingly, the analysis of changes to the F-Line and proposed F-loop do not utilize the future 2020 baseline described above, consistent with guidance in the FTA Manual.

Existing Vibration Levels

The existing vibration environment is largely dominated by surface transportation noise from bus, automobile, and truck traffic as well as fixed-guideway streetcar operations.

A vibration measurement survey was performed to characterize the existing vibration environment along Market Street. The survey consisted of attended monitoring of the prevailing ambient vibration levels as well as specific measurements of passby vibration from the historic streetcars operating along the F-Line on Market Street. Details regarding the vibration measurement survey are provided in Appendix 8.

Vibration monitoring was performed on April 19, 2018, at five short-term measurement locations[10] along the project corridor. Figure 4.C-2, p. 4.C-13, shows the vibration measurement locations. Table 4.C-6, on the following page, lists the vibration measurement locations, describes the location, indicates the track type and distance from near-track centerline to measurement location, and summarizes the exterior ground vibration levels at buildings along the project corridor. Figure 4.C-5, p. 4.C-22, depicts the data for all streetcars at each location plotted as a function of distance, adjusted for a nominal speed of 25 mph. Measurements were conducted at one or two distances per location, one at the façade and/or one at the curb or similar intermediate distance between the building, to obtain a range of data. The maximum envelope of this data is indicated by the blue solid line for special trackwork and the dashed line for regular track (including curves). For reference, this is also graphically compared to the generalized vibration curve for light-rail vehicles (dashed orange line) published by the Federal Transit Administration, which is an average-trend curve that was developed for the purpose of environmental analysis.

Vibration measurement locations were selected to capture overall ground vibration from vibration sources, such as SFMTA streetcars and vehicular traffic. Because the existing system encompasses several track conditions, locations were selected that would provide measurements for each. At all locations, the highest vibration was caused by SFMTA streetcars. Vibration levels varied with the different streetcars because of the speeds, vehicle suspension systems, and/or wheel conditions, among other factors. The measurements were conducted at the curb and nearby façades.

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[10] Measurement Site V-6B is not located within the project corridor and therefore is not shown on Figure 4-C-2. Vibration was measured at Site V-6B on April 25, 2018, to provide additional data for direct fixation ballasted track, with additional information collected at 25 feet (façade) from the track configuration at that location.

TABLE 4.C-6. EXISTING EXTERIOR GROUND-LEVEL VIBRATION AT VIBRATION MEASUREMENT LOCATIONS

Site ID	Site Location	Track Type[1]	Distance from Near-track Centerline to Measurement Position (feet)	Vibration at the Façade (VdB)[2]
V-1	One Market Street on Steuart Street	DF (slow speed and curves)	33	46–62
V-2	801 Market Street (Old Navy)	B&T	21	43–79 (curb)
V-3	901 Market Street (Saks off 5th)	B&T at crossover with ballast mat	55	58–74
V-4	1100 Market Street (Proper Hotel)	B&T	59	62–70
V-5	825 Market Street (Walgreens)	B&T at crossover	52	60–68
V-6B	3906 17th Street (residence)	B&T (slow speed)	25	50–64

Notes:

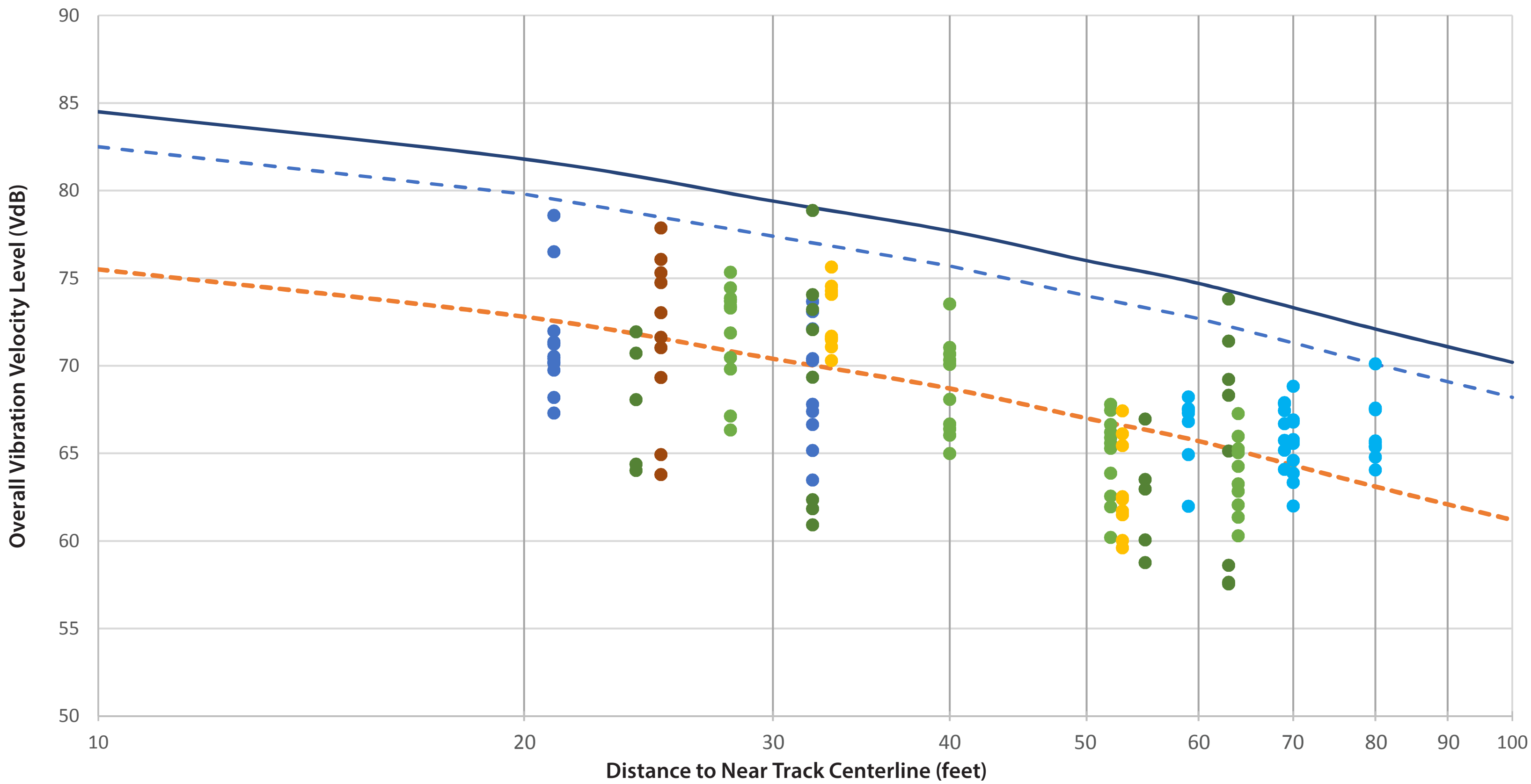
1 *Track type* refers to the manner in which the rail is fastened to the support structure. DF = direct-fixation track fastened to concrete; B&T = ballasted and crosstie embedded in pavement.

2 Vibration monitoring was performed on April 19, 2018, at Sites V-1 through V-5. Vibration monitoring was performed at Site V-6B on April 25, 2018. At all sites, the highest vibration was caused by SFMTA streetcars.

Source: Wilson Ihrig 2018.

Also shown in Figure 4.C-5, on the following page, and listed in Table 4.C-6, above, are data from vibration measurement Site V-6B, which is not located within the project corridor. Vibration was measured at Site V-6B on April 25, 2018, to provide additional data for ballasted track, with additional information collected at 25 feet (façade) from the track configuration at that location.

As shown in Figure 4.C-5, on the following page, most of the measured data fall between the generalized Federal Transit Administration curve at 25 mph (dashed orange line) and the Federal Transit Administration curve at 25 mph with a 7 dB correction added to encompass passbys without crossovers; this is consistent with the Federal Transit Administration guidance to add 8 dB for vehicles with stiff suspensions (e.g., Milan streetcars). Other conditions, such as wheels with flats, worn tracks, joints, or special trackwork, could account for another 5 to 10 dB above the generalized curve. The two streetcar passbys above the dashed blue line were apparently caused by trains moving over gaps in the crossovers. Streetcars moving through the crossovers caused some other data points to fall above the generalized 25 mph curve, but because many of the higher data points occurred at locations without crossovers, the dashed blue line was set as the typical maximum range for streetcars without crossovers. Although the maximum operating speed was limited to 25 mph, streetcar speeds were not uniform, which accounts for measurement data at several locations falling below the generalized curve.



Legend

- Generalized Federal Transit Administration vibration curve for light rail vehicles at 25 mph
- Streetcars at 25 mph on regular track (including curves)
- Streetcars at 25 mph on crossovers or special trackwork
- Vibration Measurement Location V-1—Direct Fixation Scaled to 25 mph from 5 mph
- Vibration Measurement Location V-2—Standard Ballast and Tie
- Vibration Measurement Location V-3—Ballast and Tie with Crossover and Ballast Mat
- Vibration Measurement Location V-4—Standard Ballast and Tie
- Vibration Measurement Location V-5—Standard Ballast and Tie with Crossover
- Vibration Measurement Location V-6B—Standard Ballast and Tie Scaled to 25 mph from 5 mph

Note: Each vibration measurement location is identified in Figure 4.C-2.

Source: Wilson Ihrig 2018.

00056.14 (1-29-2019)

Figure 4.C-5
Graphical Representation of Existing Exterior Ground-Level Vibration from Streetcar Passbys Measured at Different Distances and Different Locations

As discussed above, the measurement locations were selected to obtain a range of track configurations: ballast and tie, direct-fixation track, crossover and ballast mat. Crossovers have a gap in the rail that tends to add vibration (5 to 10 dB) as the wheel runs over the gap; ballast mats generally reduce vibration (10 dB); under some conditions, ballast and tie track and direct-fixation track can generate different vibration levels. As a whole, the vibration data shown at Figure 4.C-5, on the prior page, appears to be independent of track configuration, with the highest vibration occurring at the location closest to the ballast mat.

Table 4.C-7, below, provides estimates of the expected interior vibration levels at five buildings near the vibration measurement locations along the project corridor. The estimates are based on measured exterior vibration levels but have been adjusted for distance to the façade, if needed, in accordance with the data trend shown in Figure 4.C-5, on the prior page. This accounts for the coupling loss into the building, floor resonance amplification, and floor-to-floor attenuation (loss). These adjustment factors are discussed in more detail in the *Approach to Analysis* subsection. Based on these results, it is anticipated that the existing vibration levels do not exceed the Federal Transit Administration standard for interior vibration at residential use (72 VdB) or institutional use (75 VdB).

TABLE 4.C-7. EXPECTED INTERIOR VIBRATION AT BUILDINGS NEAR VIBRATION MEASUREMENT LOCATIONS ON MARKET STREET

Site ID[1]	Building Location	Track Type[2]	Vibration at Building (First Level) (VdB)	Vibration at Building (Second Level) (VdB)
V-1	One Market Street on Steuart	DF (slow speed)	36–52	40–56
V-2	801 Market Street (Old Navy)	B&T	29–64	33–68
V-3	901 Market Street (Saks off 5th)	B&T at crossover with ballast mat	48–64	52–68
V-4	1100 Market Street (Proper Hotel)	B&T	52–60	56–64
V-5	825 Market Street (Walgreens)	B&T at crossover	50–58	54–62

Notes:

[1] Site V-6B is not included in this table because it is not located within the project corridor.

[2] *Track type* refers to the manner in which the rail is fastened to the support structure. DF = direct-fixation track fastened to concrete; B&T = ballasted and crosstie embedded in pavement.

Source: Wilson Ihrig 2018.

According to comments submitted to the San Francisco Planning Department (planning department) by the property manager at the historic Hibernia Bank, windows rattle at the building from streetcar passbys. Based on distance, the vibration from streetcars on the F-Line traveling along Market Street at the Hibernia Bank building is less than the maximum 70 VdB measured at nearby location V-4, listed above in Table 4.C-6, p. 4.C-21. This is below any building-damage criteria presented in Table 4.C-15, p. 4.C-45, or annoyance criteria presented in Table 4.C-13, p. 4.C-43.[11] The maximum ground vibration measured at the fence around the building on McAllister Street indicates that the maximum vibration from rubber-tired vehicles ranges from 62 to 77 VdB.

EXISTING NOISE- AND VIBRATION-SENSITIVE RECEPTORS

Noise- and vibration-sensitive receptors in the project corridor are buildings or land uses where the occupants would be affected or annoyed by noise and/or vibration. Typically, this includes places where people sleep (e.g., residences, transient lodging, hospitals) and non-sleeping uses where a quiet environment is important (concert halls, schools, libraries, museums, places of worship). Specific categories defined by the Federal Transit Administration are discussed below. Laboratories and research facilities can also have equipment that is sensitive to vibration. Figure 4.C-2, p. 4.C-13, and Table 4.C-8, on the following page, show the existing 58 vibration-sensitive receptors within the project corridor. All but one of these receptors are also noise-sensitive receptors, for a total of 57 noise-sensitive receptors.

The Dolby Laboratories building at 1275 Market Street is a commercial building that was constructed in 2015. Normally, it would be evaluated as being non-sensitive to noise and vibration, like any other commercial office building. However, the Dolby Laboratories building contains at least one auditorium/theater space and several assembly spaces that could be sensitive to ground-borne vibration and ground-borne noise. As such, it is considered to be a vibration-sensitive facility. Like any other commercial office building, it is not considered to be sensitive to airborne noise. Vibration (and related ground-borne noise) from BART, SFMTA, the San Francisco Municipal Railway (Muni) was an existing condition when the building was designed and completed in 2015. Movie theaters are included in the list below (Table 4.C-8, on the following page).

[11] The conversion from 70 VdB referenced to 1 microinch/sec assumes a crest factor of 4 to arrive at 0.006 PPV in/sec ($0.006 = 4x(1x10^{-6})x10^{(70/20)}$), below the Caltrans guidance for extremely fragile historic buildings of 0.12 PPV in/sec from transient sources and 0.08 PPV in/sec from continuous or frequent intermittent sources and below the Caltrans guidance for barely perceptible vibration of 0.04 PPV in/sec from transient sources and 0.01 PPV in/sec from continuous or frequent intermittent sources.

TABLE 4.C-8. EXISTING NOISE- AND VIBRATION-SENSITIVE RECEPTORS[1]

No.	Location	Land Use[1]	No.	Location	Land Use[1]
1	5 Embarcadero Center	Transient Lodging	30	1554 Market	Mixed-Use Residential
2	388 Market Street	Mixed-Use Residential	31	1580 Market Street	Mixed-Use Residential
3	690 Market Street	Mixed-Use Residential	32	1601 Market Street	Residential
4	2 New Montgomery Street	Transient Lodging	33	1651 Market Street	Residential
5	757 Market Street	Residential	34	1657 Market Street	Residential
6	765 Market Street	Transient Lodging	35	1668 Market Street	Transient Lodging
7	12 4th Street	Transient Lodging	36	1676 Market Street	Mixed-Use Residential
8	10 Cyril Magnin Street	Mixed-Use Residential	37	1698 Market Street	Mixed-Use Residential
9	942 Market Street	Residential	38	1693 Market Street	Residential
10	16 Turk Street	Transient Lodging	39	11 Haight Street	Mixed-Use Residential
11	34 Turk Street	Mixed-Use Residential	40	33 Haight Street	Mixed-Use Residential
12	972 Market Street	Residential	41	60 Haight Street	Place of Worship
13	973 Market Street	Residential	42	1751 Market Street	Residential
14	1023 Market Street	Mixed-Use Residential	43	8 Octavia Boulevard	Mixed-Use Residential
15	20 Jones Street	Place of Worship	44	22 Waller Street	Place of Worship
16	1075 Market Street	Mixed-Use Residential	45	41 Waller Street	Mixed-Use Residential
17	44 McAllister Street	Mixed-Use Residential	46	55 Waller Street	School
18	45 McAllister Street	Transient Lodging	47	1275 Market Street	Commercial (Dolby Laboratories)[2]
19	54 McAllister Street	Residential	48	982 Market Street	Theater/Auditorium
20	60 Leavenworth Street	Mixed-Use Residential	49	1127 Market Street	Theater/Auditorium
21	1087 Market Street	Transient Lodging	50	1192 Market Street	Theater/Auditorium
22	1139 Market Street	Transient Lodging	51	99 Grove Street	Theater/Auditorium
23	1272 Market Street	Transient Lodging	52	545 Market Street	Library

No.	Location	Land Use[1]	No.	Location	Land Use[1]
24	1278 Market Street	Transient Lodging	53	100 Larkin Street	Library
25	1390 Market Street	School	54	1231 Market Street	Transient Lodging
26	1390 Market Street	Residential	55	1 Taylor Street	Theater/Auditorium
27	8 10th Street	Residential	56	1000 Market Street	Residential
28	1 Polk Street	Mixed-Use Residential	57	1600 Market Street	Residential
29	50 Fell Street	School	58	48 Turk Street	Transient Lodging

Notes:

[1] There may be additional sensitive receptors located in the vicinity of the project corridor that were not specifically considered in the noise and vibration analysis prepared for the proposed project. The receptors identified in this table are as close to noise and vibration-generating activities as possible (i.e. directly adjacent to the project corridor) and therefore are representative of other sensitive receptors that may exist along the project corridor but which are not specifically listed.

[2] Uses in this building could be affected by ground-borne vibration and noise. Therefore, this is a vibration-sensitive facility. Like any other commercial office building, this building is not considered to be sensitive to airborne noise.

Source: Building footprint layer, www.data.sfgov.org, updated May 3, 2017; land use layer, www.data.sfgov.org, updated December 7, 2017; Wilson Ihrig 2018; Vibro-Acoustic Consultants, 2018; ICF, 2018.

REGULATORY FRAMEWORK

NOISE

FEDERAL

NOISE CONTROL ACT OF 1972

The Noise Control Act of 1972 (Public Law 92 574) established a requirement for all federal agencies to administer their programs in a manner that promotes an environment that is free of noise that jeopardizes public health or welfare. The U.S. Environmental Protection Agency (EPA) was given responsibility for:

- Providing information to the public regarding the identifiable effects of noise on public health and welfare;
- Publishing information on the levels of environmental noise to protect the public health and welfare with an adequate margin of safety;
- Coordinating federal research and activities related to noise control; and
- Establishing federal noise emission standards for selected products distributed in interstate commerce.

In 1974, EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, a comprehensive document that identifies noise levels consistent with the protection of public health and welfare against hearing loss, annoyance, and activity interference.

In response to the requirements of the Noise Control Act, EPA identified indoor and outdoor noise limits to protect public health and welfare. Outdoor L_{dn} limits of 55 dB and indoor L_{dn} limits of 45 dB were identified as desirable for protecting against speech interference and sleep disturbance in residential areas and at educational and health care facilities. The sound-level criterion for protecting against hearing damage in commercial and industrial areas is identified as the 24-hour L_{eq} value of 70 dB (both outdoors and indoors). Based on attitudinal surveys, EPA determined that a 5 dB increase in L_{dn} or L_{eq} is the minimum required for a change in community reaction.[12]

The Noise Control Act also directed federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. Although EPA was given a major role in disseminating information to the public and coordinating with federal agencies, each federal agency retained authority to adopt noise regulations pertaining to agency programs. EPA can, however, require federal agencies to justify their noise regulations in terms of Noise Control Act policy requirements.

FEDERAL TRANSIT ADMINISTRATION NOISE IMPACT CRITERIA FOR OPERATION

Noise and vibration impacts associated with project streetcar operations are based on guidance in the FTA Manual. The FTA Manual describes impact criteria for assessment of potential noise impacts on the existing environment from rapid transit sources. The noise impact criteria defined in the FTA Manual are based on an objective that calls for maintaining a noise environment that is considered acceptable for noise-sensitive land uses.

For assessing noise from transit operations, the Federal Transit Administration defines three land use categories:

- **Category 1**: Tracts of land where quiet is an essential element of their intended purpose, such as outdoor amphitheaters, concert pavilions, and national historic landmarks with significant outdoor use.
- **Category 2**: Residences and buildings where people normally sleep, including homes, hospitals, and hotels.

[12] U.S. Environmental Protection Agency. 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March. Washington, DC: U.S. Environmental Protection Agency, Office of Noise Abatement and Control.

- **Category 3**: Institutional land uses (e.g., schools, places of worship, libraries) that are typically available during daytime and evening hours. Other uses in this category can include medical offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities.

Noise exposure values are reported as the L_{dn} sound level for residential land uses (Category 2) or L_{eq}(h), the equivalent sound level over a 1-hour time period, for other land uses (Categories 1 and 3). Commercial and industrial uses are not included in the vast majority of cases because they are generally compatible with higher noise levels. Exceptions include commercial land uses with a feature that receives significant outdoor use, such as a playground, or uses that require quiet as an important part of their function, such as recording studios.

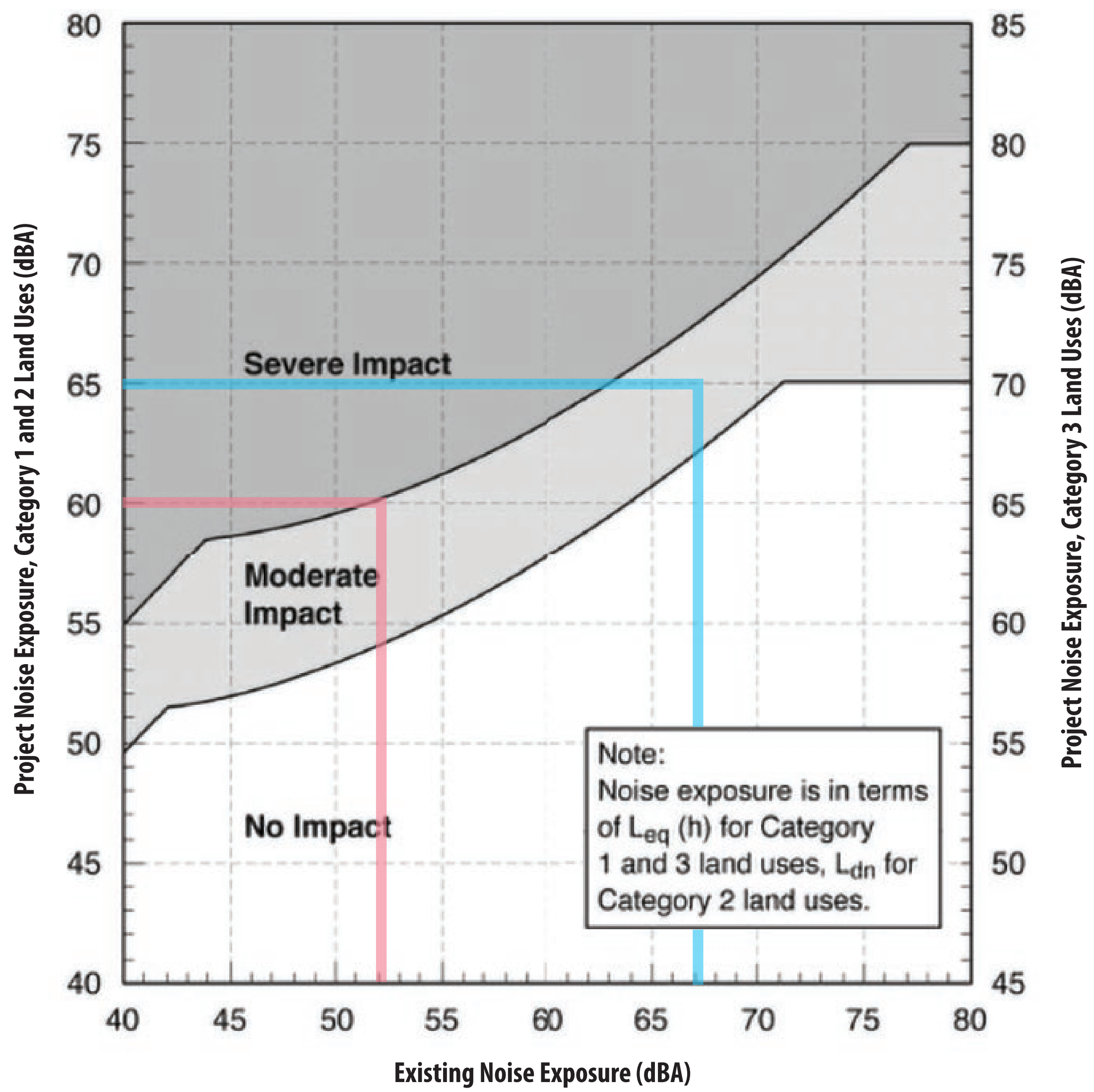
In the FTA Manual, the noise impact criteria for operation of rapid transit facilities consider a project's contribution to existing noise levels, using a sliding scale according to the land uses affected. The criteria correspond to heightened community annoyance due to the introduction of a new transit facility relative to existing ambient noise conditions.

Noise impacts are assessed by determining the project noise exposure relative to existing noise exposure, as illustrated in the two charts shown in Figure 4.C-6, on the following page. The criterion for each degree of impact is based on a sliding scale that is dependent on the existing noise exposure and the increase in cumulative noise exposure due to a project.

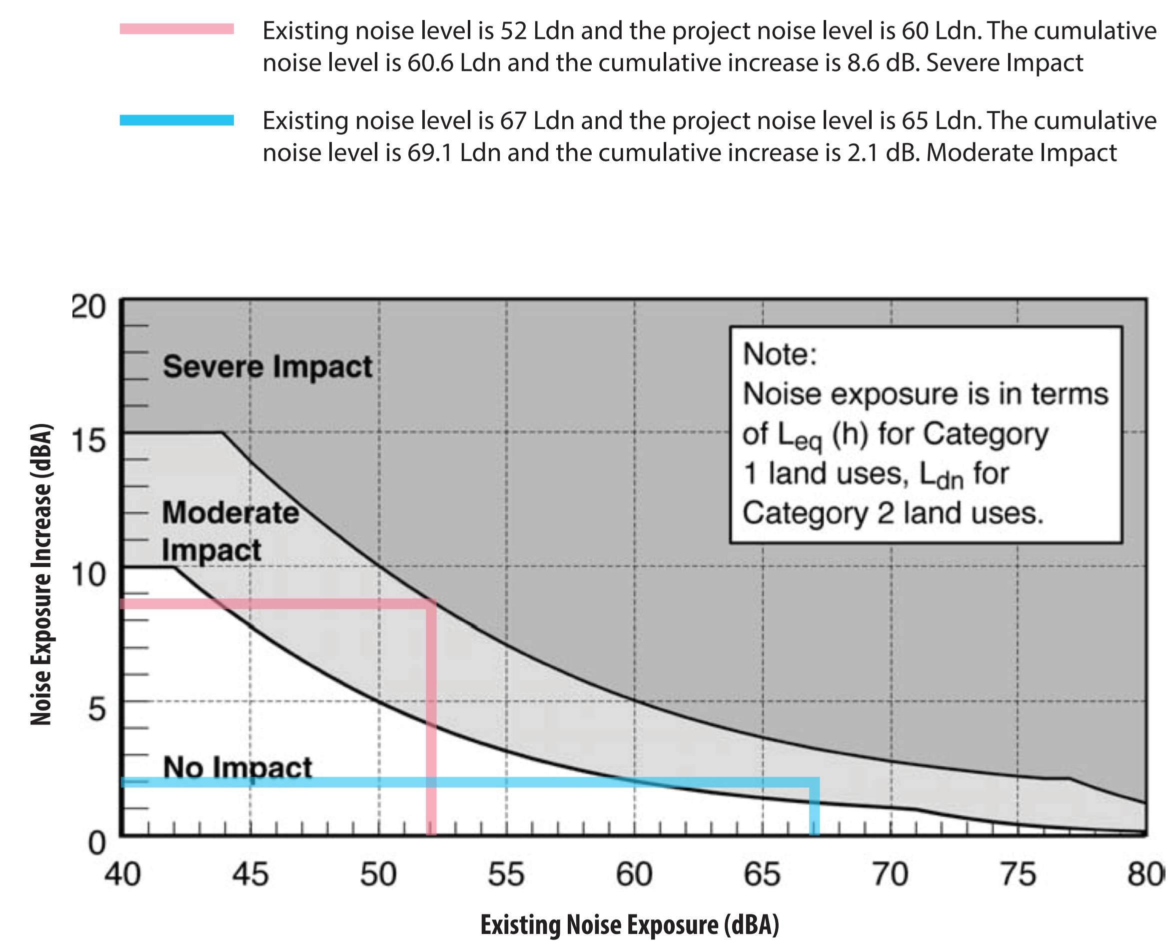
The noise impact categories are as follows:

- **No Impact:** A project, on average, will result in an insignificant increase in the number of instances where people are "highly annoyed" by new noise.
- **Moderate Impact:** The change in cumulative (ambient plus project) noise is noticeable to most people but may not be enough to cause strong adverse community reactions.
- **Severe Impact:** A significant percentage of people would be highly annoyed by the noise, perhaps resulting in vigorous community reaction.

The charts shown in Figure 4.C-6 are used to determine the impact category for a receiver that would be exposed to noise from a transit project. The left-hand chart depicts impact thresholds for noise produced by a transit project, exclusive of other noise sources. The right-hand chart depicts impact thresholds for the cumulative increase in noise levels due to a transit project, based on existing noise exposure at a given receiver. The focus of the analysis in this report is on Category 2 receivers, which are buildings where people normally sleep. These receivers are analyzed using the L_{dn} metric. To determine the impact category using the charts in Figure 4.C-6, the existing noise level and the noise level produced by the project at the receiver location must be known. The following are two examples of how to use the charts in Figure 4.C-6 and determine the impact category using the FTA impact assessment process.



Federal Transit Administration Noise Impact Criteria for Transit Sources



Increase in Cumulative Noise Levels Allowed by Criteria for Transit Sources

Legend

No Impact: A project, on average, will result in an insignificant increase in the number of instances where people are "highly annoyed" by new noise.

Moderate Impact: The change in cumulative noise is noticeable to most people but may not be enough to cause strong adverse community reactions.

Severe Impact: A significant percentage of people would be highly annoyed by the noise, perhaps resulting in vigorous community reaction.

Category 1 land use: Tracts of land where quiet is an essential element of their intended purpose.

Category 2 land use: Residences and buildings where people normally sleep.

Category 3 land use: Institutional land uses that are typically available during daytime and evening hours. Other uses in this category can include medical offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities.

L_{eq} (h): Hourly noise level

L_{dn}: Day-night sound level

Source: Federal Transit Administration 2006.

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Figure 4.C-6
Federal Transit Administration Noise Impact Criteria for Operation

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- **Example #1**: The existing noise level and the project noise level are plotted on the left-hand chart in Figure 4.C-6, on the prior page (shown as red lines). The existing noise level at the receiver is 52 L_{dn} and the predicted noise level from the transit project is 60 L_{dn}. These two values differ by 8 dB. The point at which the red lines intersect determines the impact category. In this case, the impact is considered to be a severe impact because the lines intersect at the line that defines the "severe impact" criteria. The right-hand chart can be used to come to the same conclusion using a different process. The vertical axis on the right-hand chart is the cumulative noise level, which is the sum of the existing noise level and the project noise level. Using decibel addition (discussed in the fundamentals section), the sum of 52 L_{dn} and 60 L_{dn} is 60.6 L_{dn}. The difference between the cumulative noise level of 60.6 L_{dn} and the existing noise level of 52 L_{dn} is 8.6 dB. The existing noise level of 52 L_{dn} and cumulative noise level increment of 8.6 dB are plotted using red lines on the right-hand chart. The lines once again converge on the "severe impact" line, consistent to what was demonstrated in the left-hand chart.
- **Example #2**: The existing noise level is 67 L_{dn} and the project noise level is 65 L_{dn}. These two values differ by 2 dB. These lines are plotted in blue on the left-hand chart. In this case, the lines intersect inside the zone that defines a "moderate impact". The sum of 67 L_{dn} and 65 L_{dn} is 69.1 L_{dn}. The cumulative noise increase is therefore 2.1 dB. The existing noise level of 67 and the increase of 2.1 dB are plotted on the right-hand chart (shown as blue lines). The impact category shown is "moderate impact," consistent with what was demonstrated in the left-hand chart.

The impact curves in Figure 4.C-6, on the prior page, are based on community increases in cumulative (existing- plus-project) noise exposure relative to existing conditions. The justification for the sliding scale depicted in these figures recognizes that people who are already exposed to high levels of noise in the ambient environment are expected to tolerate small increases in noise in their community, according to the level of their existing noise exposure.

FEDERAL TRANSIT ADMINISTRATION STANDARDS FOR CONSTRUCTION NOISE

The Federal Transit Administration has developed methods for evaluating construction noise levels, which are discussed in the FTA Manual. The FTA Manual does not contain standardized criteria for assessing construction noise impacts but includes guidelines for suggested noise limits at land uses that may result in an adverse community reaction. These guidelines are summarized in Table 4.C-9, on the following page.

TABLE 4.C-9. FEDERAL TRANSIT ADMINISTRATION CONSTRUCTION NOISE IMPACT GUIDELINES

Land Use	1-hour L_{eq} (dBA), Day[1]	1-hour L_{eq} (dBA), Night[1]
Residential	90	80
Commercial	100	100
Industrial	100	100

Notes:

[1] Daytime hours are 7 a.m. to 10 p.m.; nighttime hours are 10 p.m. to 7 a.m.

dBA = A-weighted decibel

L_{eq} = equivalent sound level

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. Report No. 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 31, 2018.

STATE

CALIFORNIA NOISE INSULATION STANDARDS

California requires each local government entity to perform noise studies and implement a noise element as part of its general plan. State land use guidelines for evaluating the compatibility of various land uses as a function of community noise exposure are presented below under "Local."

Part 2, title 24, of the California Code of Regulations, California Noise Insulation Standards, establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under this regulation, interior noise levels attributable to exterior noise sources cannot exceed 45 L_{dn} in any habitable room.

LOCAL

SAN FRANCISCO NOISE ORDINANCE

CONSTRUCTION (SECTIONS 2907 AND 2908)

Article 29 of the San Francisco Police Code regulates noise and establishes City and County of San Francisco (City) polices to prohibit excessive or unnecessary noise. In particular, sections 2907 and 2908 of the code deal with construction equipment and construction work at night, respectively. Section 2907(a) prohibits any powered construction equipment from exceeding 80 dBA when measured at a distance of 100 feet. Impact tools, such as jackhammers and pavement breakers, are exempt from this requirement, but section 2907(b) requires that all such equipment be used with manufacturer-approved acoustic shields.

Section 2908 addresses construction work at night. This prohibits construction between 8 p.m. and 7 a.m. if the resulting noise level would exceed the ambient noise level by 5 dB or more. This restriction can be waived or modified only by special permit issued by the director of San Francisco Public Works.

NOISE LIMITS (SECTION 2909)

This section of the Noise Ordinance regulates noise from mechanical equipment and other similar sources. The Noise Ordinance (section 2909(a) and (b)) limits noise from sources, which are defined as “any machine or device, music, or entertainment or any combination of same,” located on residential or commercial/industrial property to 5 dBA or 8 dBA, respectively, above the local “ambient”[13] noise level at any point outside of the property line of a residential or commercial/industrial property. The Noise Ordinance also limits noise from sources located on public property[14] to 10 dBA above the local ambient noise level at a distance of 25 feet or more, unless the machine or device is being operated to serve or maintain the property.

Section 2909(d) of the Noise Ordinance limits noise, as measured from inside any sleeping or living room in any dwelling unit located on residential property, from a “fixed source” to 17 to 45 dBA between the hours of 10 p.m. and 7 a.m. or 55 dBA between the hours of 7 a.m. and 10 p.m. with windows open, except where building ventilation is achieved through mechanical systems that allow windows to remain closed.

SAN FRANCISCO GENERAL PLAN

The Environmental Protection Element of the San Francisco General Plan comprises objectives and policies for avoiding or mitigating transportation noise, including guidelines for determining the compatibility of land uses with noise levels. According to these guidelines, the maximum “satisfactory, with no special insulation requirements,” exterior noise level for residential land uses (including transient lodging such as hotels) is approximately 60 dBA L_{dn}. For office and most commercial land uses, the maximum “satisfactory, with no special insulation requirement,” noise level is 70 dBA L_{dn}. If such uses are to be located in areas where noise levels exceed these guidelines, a detailed analysis of noise reduction requirements should be done, with noise insulation features included in the design. The San Francisco Land Use Compatibility Chart for Community Noise is shown in Figure 4.C-7, on the following page.

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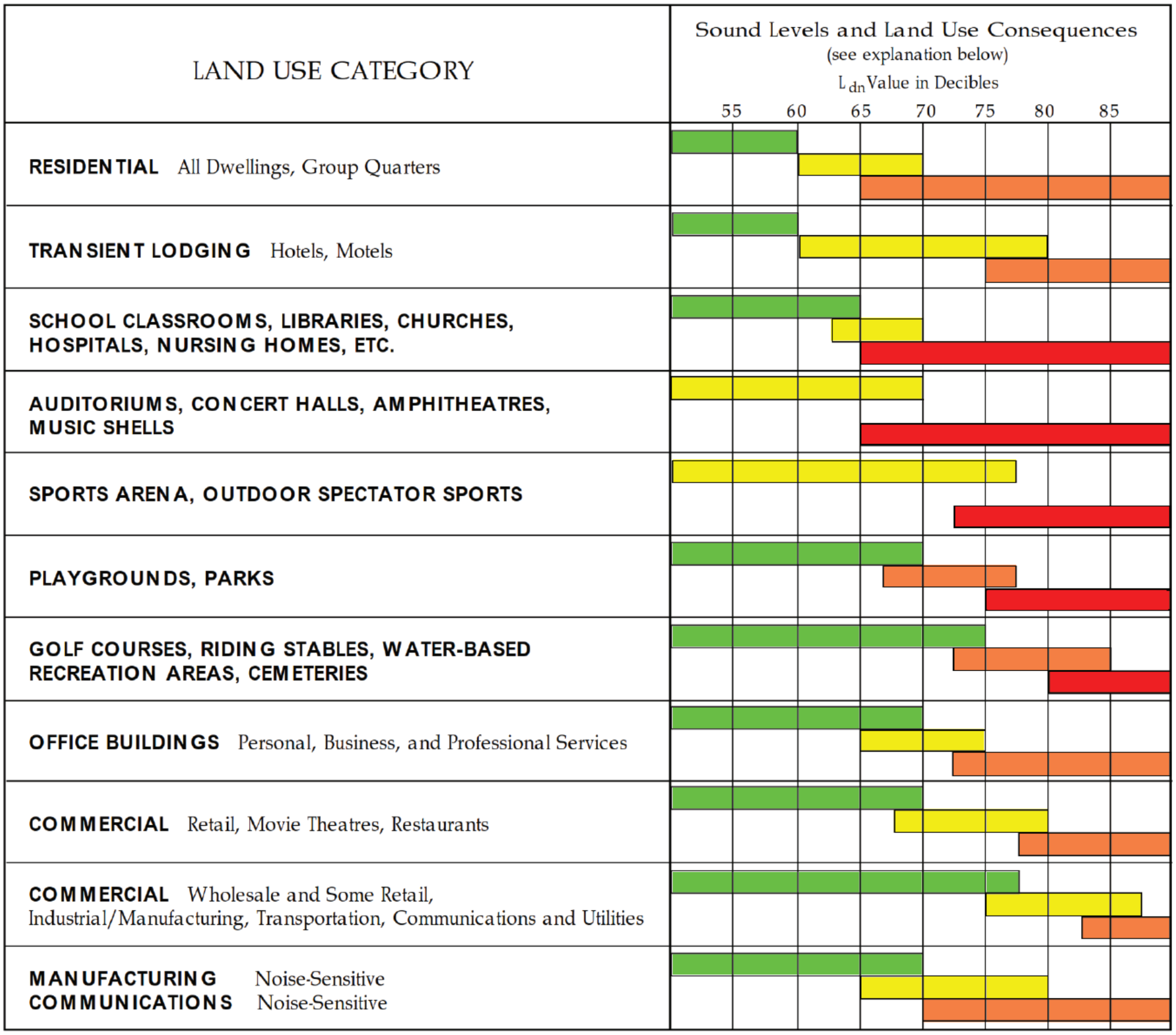
[13] Noise Ordinance Section 2901(a) states that “ambient” is the lowest sound level repeating itself during a minimum 10-minute period, as measured with a Type 1 precision sound-level meter set on “slow” response and A-weighting. In no case shall ambient be considered or determined to be (1) less than 35 dBA for interior residential noise and (2) 45 dBA in all other locations.

[14] Noise Ordinance Section 2901(l) defines "public property" as property leased or owned by a government entity to which the public or a substantial group of persons has access, including, but not limited to, any street, highway, parking lot, plaza, transportation facility, school, place of amusement, park, or playground.



Satisfactory, with no special noise insulation requirements.

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features in the design.

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

New construction or development should generally not be undertaken.

Source: San Francisco General Plan.

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Figure 4.C-7
Land Use Categories and Recommended Noise Levels

PUBLIC WORKS' STANDARD CONSTRUCTION MEASURES FOR NOISE

As discussed in Chapter 2, *Project Description*, Public Works requires all construction contractors to include standard construction measures (SCMs) in bid packages for the purposes of environmental protection. The noise SCM requires all projects to comply with local noise ordinances for regulating construction noise, as described above, to use best available noise control technologies on noise-generating equipment, to locate stationary noise sources away from sensitive receptors, and erect temporary noise barriers. For nighttime construction activities the noise SCM also requires intake exhaust mufflers and/or acoustically attenuating shields or shrouds for impact tools, avoiding the use of water blasters, reducing the use of back-up warning alarms to the extent feasible, and administrative controls for worker protection from backing movements by vehicles.

VIBRATION

FEDERAL

FEDERAL TRANSIT ADMINISTRATION

The Federal Transit Administration provides guidance for evaluating vibration impacts from bus and rail transit projects, including construction impacts, through the FTA Manual. The manual includes prediction methods, assessment procedures, and impact criteria for vibration from transit and construction sources. These guidelines are used by the planning department for this project to determine the significance of a vibration impact.

Table 4.C-10, below, shows the Federal Transit Administration vibration damage criteria. The table provides PPV limits for four building categories. These limits are similar to guidance provided by Caltrans.

TABLE 4.C-10. VIBRATION THRESHOLD GUIDELINES FOR BUILDING DAMAGE

Building Category	Peak Particle Velocity (inches/second)
I. Reinforced-concrete, steel, or timber buildings (no plaster)	0.5
II. Engineered concrete and masonry buildings (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings that are extremely susceptible to vibration damage	0.12

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. Report No. 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: October 31, 2018.

The Federal Transit Administration also provides guidelines to assess the human response to different levels of ground-borne vibration and ground-borne noise (e.g., vibration that causes a structure to vibrate and re-radiate noise into a room). Ground-borne noise analysis is typically only for projects that have below-grade operations or possibly special buildings, such as recording studios.

Vibration annoyance impact standards depend on several factors, including the types of land uses affected by a project. For a new vibration source, the standards shown in Table 4.C-11, on the following page, are used, which are applied only to occupied spaces in potentially affected buildings (i.e., receptors). For a project that would modify an existing transportation source, such as the proposed project, the Federal Transit Administration considers additional factors, such as a change in schedule or vibration. These factors relate to the relative change in amplitude or frequency of the source. For instance, if a project would generate vibration levels that would be 5 VdB or more above the existing condition, the standards shown in Table 4.C-11, on the following page, would be used to determine impact. However, if the future vibration would not increase vibration by 5 VdB, then on a "heavily used" corridor, such as the project corridor,[15] the current vibration would be assessed to determine the existing impact, and this information would then be used to establish the impact criteria for annoyance at vibration-sensitive receptors. The vibration standards applied to this analysis are listed below.

- If there is no existing source (e.g., the vicinity of the proposed F-loop on McAllister Street), then the Federal Transit Administration criteria in Table 4.C-11, on the following page, are used;
- If there is an existing source (e.g., streetcars on Market Street) and the project would raise the vibration by 5 VdB or more, then the Federal Transit Administration criteria identified in Table 4.C-11, on the following page, or Table 4.C-12, p. 4.C-37, are used.
- If there is an existing source that already exceeds the guideline levels in Table 4.C-11, on the following page, or in Table 4.C-12, p. 4.C-37, but the future vibration would not cause a 5 VdB increase, a project would have an impact if either of the following occurs:
    - The number vibration events would increase by a factor of about 2.
    - Future vibration would increase by 3 VdB or more.
    - If neither of these conditions would occur, a project would not generate a vibration impact, even if the vibration levels would exceed those outlined in Table 4.C-11, on the following page, or in Table 4.C-12, p. 4.C-37.

[15] The term "heavily used" is defined as more than 12 trains per day (FTA 2006).

TABLE 4.C-11. GROUND-BORNE VIBRATION AND GROUND-BORNE NOISE IMPACT CRITERIA FOR GENERAL ASSESSMENT

	GBV Impact Levels (VdB re: 1 μin/sec)			GBN Impact Levels (dB re: 20 μPa)		
Land Use Category	**Frequent Events[1]**	**Occasional Events[2]**	**Infrequent Events[3]**	**Frequent Events[1]**	**Occasional Events[2]**	**Infrequent Events[3]**
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[5]	N/A[5]	N/A[5]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

1. *Frequent Events* is defined as more than 70 vibration events of the same kind per day.
2. *Occasional Events* is defined as between 30 and 70 vibration events of the same kind per day.
3. *Infrequent Events* is defined as fewer than 30 vibration events of the same kind per day.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air-conditioning systems and stiffened floors.
5. Vibration-sensitive equipment is not sensitive to ground-borne noise.

GBN = ground-borne noise
GBV = ground-borne vibration
VdB = vibration decibel
μin/sec = microinch per second
dB = decibel
μPa = micropascal
dBA = A-weighted decibel
N/A = not applicable

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. Report No. 0123. Office of Planning and Environment. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: November 13, 2018.

TABLE 4.C-12. GROUND-BORNE VIBRATION AND GROUND-BORNE NOISE IMPACT CRITERIA FOR SPECIAL BUILDINGS

Type of Building or Room[1]	Ground-Borne Vibration Impact Levels (VdB re: 1 μin/sec) Frequent Events[2]	Ground-Borne Vibration Impact Levels (VdB re: 1 μin/sec) Occasional or Infrequent Events[3]	Ground-Borne Noise Impact Levels (dB re: 20 μPA) Frequent Events[2]	Ground-Borne Noise Impact Levels (dB re: 20 μPA) Occasional or Infrequent Events[3]
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA

Notes:

[1] If the building will rarely be occupied when the trains are operating, there is no need to consider impact. As an example, consider locating a commuter rail line next to a concert hall. If no commuter trains will operated after 7 p.m., it should be rare that the trains interfere with the use for the hall.

[2] *Frequent Events* is defined as more than 70 vibration events of the same source per day.

[3] *Occasional or Infrequent Events* is defined as fewer than 70 vibration events of the same source per day.

VdB = vibration decibel
dB = decibel
μPa = micropascal
dBA = A-weighted decibel

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. Report No. 0123. Office of Planning and Environment. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: November 13, 2018.

To avoid temporary annoyances for building occupants or interference with vibration-sensitive equipment inside special-use[16] buildings during construction, the Federal Transit Administration recommends using the vibration criteria from the guidance manual for a long-term general assessment of operations.

Table 4.C-12, above, shows the Federal Transit Administration ground-borne vibration and noise impact criteria for special buildings. These limits were used to identify areas that should be considered during design of the project.

STATE

Caltrans also provides guidance regarding the evaluation of vibration impacts associated with construction activities in its *Transportation and Construction Vibration Guidance Manual*. The manual includes prediction methods, assessment procedures, and impact criteria for construction vibration.

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[16] Special-use buildings are those that are particularly sensitive to vibration, such as some research or laboratory buildings. In some cases, performing arts facilities are also sensitive to vibration.

Table 4.C-15, p. 4.C-46, shows Caltrans vibration damage criteria. These differ from the Federal Transit Administration criteria shown in Table 4.C-12, on the prior page, in that all construction activities are treated the same by the Federal Transit Administration, while the Caltrans criteria consider continuous or frequent intermittent sources that could increase the risk of building damage.

Caltrans establishes different guidance for each structure type. In some cases, Caltrans reduces vibration limits for continuous or frequent intermittent sources (historic and fragile buildings) or raises vibration limits for transient sources (modern commercial/industrial buildings and newer residential structures).

Vibration can also be annoying for occupants of nearby buildings; this annoyance could occur at vibration amplitudes that are lower than those cited above for building damage. Caltrans provides guidelines for evaluating annoyance. However, as noted under the City requirements, only nighttime sleep disturbance or daytime/nighttime sleep disturbance at inpatient facilities would be evaluated. Buildings with vulnerable populations, such as inpatient health care facilities, would be considered vibration sensitive with respect to daytime construction work; however, no such facilities have been identified in the immediate project corridor.

LOCAL

PUBLIC WORKS' STANDARD CONSTRUCTION MEASURES FOR VIBRATION

Public Works SCMs require all projects to restrict vibration-intensive construction activities between the hours of 8:00 p.m. and 7:00 a.m. The SCMs also include draft standard vibration control procedures (see the section titled *Vibration Control Procedures for Inclusion in Construction Contracts* provided in Appendix 4), which are refined to be project specific and included in all construction contracts for Public Works projects. These vibration control procedures require a vibration control plan to be prepared, submitted, and approved at least 30 days prior to commencing construction. At a minimum, the vibration control plan must identify vibration-sensitive resources, standards for vibration thresholds that are not to be exceeded by construction activities, real-time activity monitoring to identify when vibration levels approach the predetermined value at which damage could occur, requirements to immediately cease construction activities when vibration levels reach levels at which damage could occur, and procedures for restoring resources to their pre-construction condition should damage occur as a result of construction-related vibration. The identification of vibration-sensitive resources is conducted in consultation with the planning department. Such resources could include buildings of modern construction, historic buildings, structures, or resources that may be identified as vibration-sensitive in consideration of the types of construction activities and the distance from such activities to the resource.

ENVIRONMENTAL IMPACTS

This section provides the impact analysis related to noise and vibration that could result from construction and operation of the proposed project. It describes the methods used to determine the impacts of the proposed project and lists the significance criteria used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact.

SIGNIFICANCE CRITERIA

The project would have a significant effect if it would result in any of the conditions listed below.

- Result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies.
- Result in the exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the project vicinity, above levels existing without the project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity, above levels existing without the project.

APPROACH TO ANALYSIS

Two types of noise and vibration impacts were considered in this analysis: short-term, temporary impacts resulting from project construction activities, and impacts due to long-term "operational" changes in the noise environment brought about by the proposed project.

CONSTRUCTION NOISE

Construction activities have the potential to increase ambient noise levels substantially on a temporary basis. However, in practice, noise levels from most construction activities vary substantially as equipment moves within the construction areas and the number of concurrently operating sources changes.

Equipment types, numbers, and usage factors were taken from the Better Market Street Off-road Construction Equipment List in Appendix 8. Noise reference levels in the Federal Highway Administration's *Road Construction Noise Model User's Guide* were used to assess noise from construction equipment.[17] The analysis assumes that requirements of Public Works' SCM are included in contracts for construction contractors working on the project (see Appendix 4).

[17] Federal Highway Administration. 2006. *Roadway Construction Noise Model User's Guide*. Available: http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf. January. Washington, DC.

San Francisco Noise Ordinance Maximum Noise Levels for Individual Pieces of Equipment

Maximum equipment noise levels associated with project-related construction activities were evaluated by assessing the noise-generation potential for each individual piece of equipment proposed for use on the site. Noise from each individual piece of equipment was compared to the City's limit on construction equipment noise of 80 dBA at 100 feet, per the City Noise Ordinance for construction (sections 2907 and 2908).

Federal Transit Administration Criteria for Overall Construction noise levels

Estimates of both maximum and hourly L_{eq} noise levels for each construction stage and sub-stage were calculated using Federal Highway Administration reference levels. The construction noise assessment procedure in the FTA Manual was used to calculate overall combined worst-case noise levels at noise-sensitive receivers. The procedure takes into consideration the proximity of receptors, the construction equipment planned for use (including the numbers and duty cycles), and times of construction activity. Overall worst-case noise levels were calculated by summing the noise levels of the two loudest pieces of equipment that may be used simultaneously at a given time for each phase of construction. Full utilization of each type of equipment was assumed in the analysis.

Per Federal Transit Administration guidelines, modeled construction noise levels at the nearest residential land use were compared to the Federal Transit Administration general assessment construction noise criteria of 90 dBA for the daytime one-hour L_{eq} and 80 dBA for the nighttime one-hour L_{eq} at residential receptor locations.

Substantial Temporary Increase in Noise Levels

To determine if the project would result in a substantial temporary increase in noise at sensitive receptor locations, potential worst-case construction noise levels for each construction stage were compared to existing ambient noise levels. For this project, the lowest one-hour daytime L_{eq} from long-term noise measurements was used as the existing ambient noise level and a point of comparison for project-related construction noise. A temporary increase is considered substantial if the increase would be greater than 10 dBA above the existing ambient level, which is consistent with FTA guidance. An increase of 10 dBA corresponds to a perceived doubling of loudness. Modeled construction noise levels were compared to measured ambient noise levels in the area to determine if a 10 dBA increase may occur under worst-case conditions. This criterion is used to address whether the project would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Qualitative factors are also considered in the construction analysis because construction noise is a temporary and intermittent source that includes impulsive and non-impulsive sounds. The quality of noise from construction equipment also has the potential to affect a receiver's experience of the overall noise level. As such, full utilization of equipment is assumed in the analysis to account for the potential level of annoyance a receiver may experience during construction.

Operational Noise

F-Line, F-Loop, and F-Short Streetcar Noise

Fixed-guideway streetcar operations were modeled as line noise sources using SoundPLAN, a standards-based environmental noise program for calculating community noise exposure from a wide range of noise sources.. Reference noise levels for F-Line streetcar operations were derived from the passby noise measurements described above.

To model the project-related increase in noise levels relative to existing conditions, the incremental increase in streetcar trips east of the F-loop was modeled for the F-Line along the project corridor. This assumed 10-minute headways during the peak hour for the F-Line in 2020. Streetcar trips along the F-loop were modeled as a new source of streetcar noise with an assumed peak-hour headway of 10 minutes in 2020. The combination of the F Market & Wharves streetcar line (approximately 10-minute headways) and the new F-Short streetcar line (approximately 10-minute headways) between the F-loop and Fisherman's Wharf would provide streetcar service as often as every 5 minutes in 2020 on average east of the F-loop.

These peak-hour frequencies are described in Table 2-1 in Chapter 2, *Project Description*. Details regarding the noise model inputs are provided in Appendix 8.

The following assumptions were used in the streetcar noise model:

- Up to four Milan cars operating on the F-Line during peak hours.
- Tangent track normal operating speed is estimated at 25 miles per hour,[18] except on the F-loop where the speed would be about 15 miles per hour.
- Streetcar speed on curves would be approximately the same as on other curves, such as the Embarcadero or the Castro Street loop (about 5 miles per hour). Noise on curves for Milan and non-Milan streetcars is based on noise measurements of existing streetcar curving movements.
- Through crossovers, streetcars would travel at a speed of 5 miles per hour for diverging movements and 25 miles per hour for non-diverging movements.

[18] Existing average transit travel speeds on Market Street are approximately 5 to 6 miles per hour. This analysis conservatively assumes F-Line and F-Short travel speeds of up to 25 miles per hour to account for faster travel speeds during off-peak hours.

A noise impact due to project improvements on Market Street is considered to occur at a receptor location if the project-related noise exposure for the applicable land use category of the receptor (Category 1, 2, or 3) equals or exceeds the Federal Transit Administration criterion for "moderate impact" or "severe impact" indicated in Figure 4.C-6, p. 4.C-29, based on the existing (2018) noise exposure for the receptor compared to modeled 2020 plus-project noise levels. The impact criteria are described in detail in the federal regulations section under *Federal Transit Administration Noise Impact Criteria for Operation.*

SIDE-STREET TRAFFIC NOISE

Traffic noise levels along side streets were calculated using peak-hour traffic volume data provided by the project traffic consultant and traffic noise emissions from data tables developed from the Federal Highway Administration's Traffic Noise Model, version 2.5 (Federal Highway Administration 1998, 2004). The traffic noise model estimates average noise levels at fixed distances from the roadway centerline, based on estimated traffic volumes, vehicle speeds, and a designated noise drop-off rate based on ground type (hard ground is assumed in the model). Shielding effects from topographical features and buildings are not accounted for in the traffic noise model. The model was programmed to produce a conservative worst-hour estimate of traffic-generated noise levels due to redistribution of vehicle trips from Market Street to side streets associated with the project. Traffic noise levels were modeled for existing-year (2018), baseline-year (2020) no-project, and 2020 plus-project conditions.

Changes in traffic noise levels were determined by comparing future 2020 Plus Project noise levels to future 2020 no-project noise levels (see Baseline Conditions for Noise Analysis, p. 4.C-19). To determine the significance of project-related traffic noise increases on side streets, the following standards are applied: (1) An increase of more than 5 dBA (clearly noticeable) is considered a significant traffic noise increase, and (2) in places where the existing or resulting noise environment is "conditionally acceptable," "conditionally unacceptable," or "unacceptable," based on the San Francisco Land Use Compatibility Chart for Community Noise (Figure 4.C-7, p. 4.C-34), any noise increase greater than 3 dBA (barely perceptible) is considered a significant traffic noise increase.[19]

CONSTRUCTION VIBRATION

ASSESSING ANNOYANCE FROM CONSTRUCTION VIBRATION

Potential construction-related impacts related to annoyance from ground-borne vibration are considered in the context of nighttime sleep disturbance or daytime/nighttime sleep disturbance at buildings with vulnerable populations, such as inpatient health care facilities, and compared to the

[19] California Department of Transportation. 2009. *Technical Noise Supplement,* pp. 2-48 and 2-49. Division of Environmental Analysis. November. Available: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf. Accessed: January 31, 2017.

annoyance criteria in Table 4.C-13, below. However, no such facilities are located within the project corridor. Therefore, the analysis of annoyance from construction-related vibration is limited to the potential for nighttime construction activities to disturb the sleep of residential receptors. For this purpose, it is assumed that a significant construction-related impact from annoyance would occur if a residential sensitive receptor were exposed to nighttime vibration levels that elicit a strongly perceptible human response, correlate with a transient source PPV of 0.9, and correspond with a strongly perceptible human response level as shown in Table 4.C-13. The analysis assumes that the proposed project would comply with the requirements of Public Works' SCM (see Appendix 4).

TABLE 4.C-13. GUIDELINES FOR VIBRATION ANNOYANCE POTENTIAL

	Maximum Peak Particle Velocity (inches/second)	
Human Response	**Transient Sources[1]**	**Continuous/ Frequent Intermittent Sources[2]**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Notes:

[1] Transient sources create a single, isolated vibration event (e.g., blasting or drop balls).

[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment; however, pile driving activities are not anticipated to be required for the proposed project.

Source: California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* Table 19. September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf.

ASSESSING DAMAGE FROM CONSTRUCTION VIBRATION

As noted above, the Caltrans vibration criteria for building damage is more restrictive than the Federal Transit Administration guidance. Therefore, the construction vibration impact assessment was conducted in accordance with Caltrans guidance, which identifies the source vibration and scales the vibration amplitude with distance to the sensitive receptor, as discussed below. The construction equipment associated with the construction phasing and work zones developed by the project sponsor is included in Appendix 8. The construction phasing and work zones were reviewed in consideration of source vibration values for the different types of construction equipment identified in Table 4.C-14, on the following page, which were then used to estimate construction vibration levels. Table 4.C-14 summarizes the source vibration values, which were adjusted for distance using the equation below. For this analysis, the hoe ram vibration value was also applied to the backhoe, excavator and tractor; the large bulldozer vibration value was also applied to the scraper and grader; and the jackhammer vibration value was also applied to the plate compactor. The following equation was applied to determine buffer distances from construction vibration for each applicable criteria value. The analysis assumes that the proposed project would comply with the requirements of Public Works' SCM (see Appendix 4).

TABLE 4.C-14. TYPICAL CONSTRUCTION EQUIPMENT VIBRATION

Equipment[1]	Type	Peak Particle Velocity at 25 Feet
Vibratory roller	Continuous/Frequent Intermittent	0.210
Hoe ram, backhoe, excavator, tractor	Transient	0.089
Large bulldozer, scraper, grader	Transient	0.089
Loaded trucks	Transient	0.076
Jackhammer, plate compactor	Transient	0.035
Small bulldozer	Transient	0.003

Notes:

[1] No impact or vibratory piles are anticipated. Shoring for deep excavations during utility work does not currently call out vibratory sheet piles. Demolition for median and sidewalk require the use of jackhammers or hoe rams.

Sources:

California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Table 19. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. Report No. 0123. Office of Planning and Environment. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: November 13, 2018.

BUFFER DISTANCE (FEET) = $(PPV_{REF}/PPV_{LIMIT})^{1/N}$ X 25

PPV_{ref} = source reference vibration at 25 feet

PPV_{limit} = target criteria limit

n = soil attenuation rate (non-dimensional)

The Federal Transit Administration recommends the use of n=1.5 for “typical soils.” Caltrans suggests the use of 1.3 for competent soils (e.g., most sands, sandy clays, silty clays), and this value was used in this analysis because it assumes a slower attenuation rate with distance, and it is more conservative.

Table 4.C-15, on the following page, summarizes guidelines developed by Caltrans for damage from the transient and continuous vibration that is usually associated with construction.

TABLE 4.C-15. GUIDELINES FOR VIBRATION DAMAGE POTENTIAL

Structure and Condition	Maximum Peak Particle Velocity (inches/second) Transient Sources[1]	Continuous/ Frequent Intermittent Sources[2]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Notes:

[1] Transient sources create a single, isolated vibration event (e.g., blasting or drop balls).

[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment, however pile driving activities are not anticipated to be required for the proposed project.

Source: California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* Table 19. September. Available: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed: June 27, 2018.

OPERATIONAL VIBRATION

ASSESSING ANNOYANCE FROM OPERATIONAL VIBRATION

Potential operational impacts related to annoyance from ground-borne vibration are considered in the context of nighttime sleep disturbance for residential receptors. For this purpose it is assumed that a significant operational-related vibration impact from annoyance would occur if a residential sensitive receptor were exposed to nighttime vibration levels exceeding the level for frequent events at Category 2 land uses (residences and buildings where people normally sleep), as depicted in Table 4.C-11, p. 4.C-36. This criterion is applied as a standard approach required by the Federal Transit Administration for evaluating annoyance from rail transit projects.

Vibration data on F-Line streetcar operations were collected as part of this analysis and used to establish impact buffer distances and evaluate the potential annoyance of occupants at residential buildings under existing and project conditions. As discussed above, there is no evidence that streetcars that operate on ballast and tie track generate substantially different vibrations compared with operations on direct-fixation track. Because the track alignment would be substantially unchanged (except at the new F-loop, which would also be direct-fixation track), impact buffer distances are the same for existing and future conditions. Although there can be site-specific differences in the way vibration propagates through the soil or subsurface strata, at close distances (i.e., less than 100 feet), those differences are small. The “vibration vs. distance“ curve shown in Figure 4.C-5, p. 4.C-22, developed from the SFMTA streetcar data take into account the worst-case vibration sources (i.e., Milan and several other streetcars). These impact buffer distances for the project are based on Federal Transit Administration thresholds and SFMTA streetcar data.

The method for determining the vibration impact at any specific building is as follows:

1. Identify the distance from the building façade to the near-track centerline.
2. Apply that distance to the table in Appendix 8 to determine the expected ground vibration (exterior). Apply speed correction at the proposed F-loop area : 5 mph and -14 dB at curves and special trackwork; 15 mph and -4 dB at tangent track
3. Apply analysis adjustments, based on the Federal Transit Administration methodology:
   a. Building coupling loss: -7 dB for one- to two-story masonry buildings; -10 dB, and even more, for larger buildings
   b. Floor resonance: +6 dB
   c. Floor-to-floor loss: -2 dB per floor up to five floors, -1 dB per floor up to 10^{th} floor
   d. The net adjustment for estimating interior vibration on the second floor of a small residential building is 3 dB below the vibration expected on the ground level outside the building. For larger buildings, the net adjustment is 6 dB below ground-level vibration.
   e. If applicable, calculate the ground-borne noise level in dBA by adding -35 dB to the vibration level.

The corresponding buffer distances for small residential buildings (e.g., one- or two-story masonry buildings) from track without and with crossovers are 42 feet and 55 feet, respectively, at a 25 mph operating speed. This is a conservative approach, as the many larger buildings would provide even more coupling loss and possibly less floor resonance. An impact buffer distance of 55 feet was developed based on the potential impact for small residential structures with these building adjustment factors: -7 dB coupling loss, -2 dB to the second floor, +6 dB floor amplification. Combined with the interior vibration criterion of 72 VdB for residences, the exterior ground vibration would have to be 75 VdB or greater to generate vibration impact at the small residential structures, which corresponds to a 55-foot distance from the near track centerline from crossovers or special trackwork; 42 feet distance for tangent (straight) track. However, for larger residential buildings, that buffer distance reduces to 35 feet from special trackwork and 25 feet from tangent track, respectively. For office buildings, which are all substantial structures, the net negative adjustment is 10 dB to the interior vibration on the ground floor; so even with a crossover, the buffer distance for impacts is 18 feet at 25 mph.

Assessing Damage from Operational Vibration

If the operational vibration were to approach or exceed 90 VdB (0.125 in/sec PPV) at buildings along the corridor, then a building damage assessment would be warranted to determine the potential building damage effect from project operations. The presence of buildings that would be exposed to vibration at this screening level is evaluated first, and if further analysis is warranted, the operational vibration is converted to PPV to compare directly with building damage criteria.

METHODOLOGY FOR ANALYSIS FOR CUMULATIVE IMPACTS

Cumulative impacts are those that would occur as a result of the interaction between the proposed project and other existing and reasonably foreseeable nearby projects. Cumulative construction and operational noise and vibration impacts are considered significant if the *combined* impact exceeds the relevant standard value. Where a significant cumulative impact is identified, the analysis considers whether the contribution of the proposed project to that cumulative impact is considerable. The determination on whether the proposed project would have a considerable contribution to a significant cumulative impact is made as follows.

The proposed project would result in a considerable contribution to a significant cumulative construction noise impact if the with-project increase in noise levels under the 2040 plus-project condition, compared with the existing (2018) noise condition, were to exceed 5 dBA anywhere or the increase were to exceed 3 dBA in areas that are conditionally acceptable, unconditionally acceptable, or unacceptable per the Land Use Compatibility Chart (Figure 4.C-7, p. 4.C-34). Similarly, the proposed project would result in a considerable contribution to a significant cumulative operational impact if the increase in the 2040 plus-project condition were to exceed 5 dBA anywhere or the increase were to exceed 3 dBA in areas that are conditionally acceptable, unconditionally acceptable, or unacceptable per the Land Use Compatibility Chart. For construction vibration, a significant cumulative impact would occur if combined construction vibration levels exceed the transient guidelines for building damage identified in Table 4.C-15, p. 4.C-45, or the annoyance guidelines identified in Table 4.C-13, p. 4.C-43. Because of the limited horizontal propagation potential of vibration, the proposed project would have a considerable contribution to a significant cumulative construction vibration impact if vibration generated by the project would exceed the guidelines for building damage or annoyance, respectively.

A significant cumulative operational vibration impact would occur if combined vibration sources in the project area (e.g., BART or Muni) were to exceed the Federal Transit Administration criteria and increase service by a factor of 2 (200 percent) or the vibration level by 5 VdB. Because of the limited horizontal propagation potential of vibration, the proposed project would have a considerable contribution to a significant cumulative operational vibration impact if vibration generated by the project would exceed the guidelines for annoyance.

IMPACTS AND MITIGATION MEASURES

Impact NO-1. Construction of the proposed project and project variant would generate noise levels in excess of standards or result in substantial temporary increase in ambient noise levels. (Less than Significant with Mitigation)

GENERATION OF NOISE LEVELS IN EXCESS OF SAN FRANCISCO NOISE ORDINANCE LIMITS

Construction of the project would require a phased approach, involving up to seven location-specific project segments over a projected six-year construction period, beginning in 2020. A project segment is generally defined as multiple blocks along the project corridor. Assumptions regarding construction phasing and equipment were based on information received from the project sponsor for one construction segment. Construction of a single segment consists of four primary stages:[20]

- Center lanes and rail track replacement
- Outside/curbside lanes
- Sidewalks
- Intersections

Noise levels generated by construction would fluctuate, depending on the equipment type, duration of use, distance between noise source and listener, and the presence or absence of barriers during each construction stage. In general, sensitive receptors would be exposed to the highest levels of construction noise during the outside/curb and sidewalk stages of construction; this could last for approximately seven months at any given location during the outside/curb lane stage and approximately 10 months at any given location during the sidewalk stage. These construction activities may or may not overlap. These stages would involve intense construction activity, including the use of excavators and backhoes to remove asphalt and concrete, in proximity to sensitive receptors. Construction activities involving asphalt and concrete removal, as well as the use of heavy construction equipment, would generate persistent, time-varying noise levels, which can be highly annoying. In addition, some nighttime construction would be required during the intersection phase to minimize impacts on transit riders; this nighttime work would require a special permit from the Director of Public Works per Section 2908 of the San Francisco Noise Ordinance.

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[20] Typical sub-stages for each construction segment consist of the following: demolition, earthwork and grading, utility infrastructure, roadway or sidewalk construction and paving, and painting and coating stages, among others. The utility infrastructure sub-stage includes San Francisco Municipal Railway traction power duct bank work under Market Street and under Second and Stevenson streets. For the purpose of this analysis, San Francisco Municipal Railway traction power duct bank work under Market Street and traction power duct bank work under Second and Stevenson streets were modeled separately. See Appendix 8 for additional information.

Based on the information provided by the project sponsor, it is anticipated that construction of the proposed project would require the equipment shown in Table 4.C-16, on the following page. For each equipment type in Table 4.C-16, the corresponding L_{max} values at a distance of 50 feet from the source are shown, based on the Federal Highway Administration's *Road Construction Noise Model User's Guide*. L_{max} values at 100 feet, also shown in Table 4.C-16, were calculated by subtracting 6 dBA from the L_{max} values at 50 feet, based on geometric attenuation for a point source of 6 dB per doubling of distance.

Individually, equipment noise levels from non-impact equipment (at a distance of 100 feet) range from 64 to 78 dB and do not exceed the 80 dB limit of section 2907(a) of the San Francisco Police Code (Table 4.C-16 shows the noise levels of typical construction equipment at this distance). Therefore, construction noise from individual non-impact equipment would comply with the limits specified in section 2907(a) of the San Francisco Police Code. Although it is anticipated that some construction impact equipment (such as a jackhammer and hoe ram) could exceed 80 dB, noise from impact equipment is not limited by the Noise Ordinance as long as it is equipped with the appropriate noise control features, as recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection (as explained under section 2907[b]). Under article 29 of the San Francisco Police Code, construction noise impacts would be avoided as long as:

1. Contractors comply with the requirement that individual pieces of non-impact equipment not exceed 80 dB at 100 feet,
2. All impact equipment receives the approval of the Public Works Director (and includes appropriate noise control features), and
3. Nighttime (8 p.m. to 6 a.m.) construction activity is avoided, unless the Director of Public Works issues a permit exempting this (section 2908).

Construction contractors would comply with Public Works' SCMs for nighttime construction activities, which requires intake exhaust mufflers and/or acoustically attenuating shields or shrouds for impact tools, avoiding the use of water blasters, reducing the use of backup warning alarms to the extent feasible, and administrative controls for worker protection from backing movements by vehicles. Thus, the project would comply with the City's Noise Ordinance and the SCMs, and impacts related to compliance with local standards related to construction noise from nonimpact equipment would be ***less than significant***.

TABLE 4.C-16. FEDERAL TRANSIT ADMINISTRATION ESTIMATED CONSTRUCTION NOISE EMISSION LEVELS FOR TYPICAL CONSTRUCTION EQUIPMENT

Equipment	L_{max} at 50 feet (dBA)[1]	L_{max} at 100 feet (dBA)[2]
Air Compressor	78	72
Backhoe	78	72
Compactor	83	77
Concrete Mixer Truck	79	73
Concrete Pump Truck	81	75
Crane	81	75
Dozer	82	76
Dump Truck	76	70
Excavator	81	75
Forklift[3]	84	78
Front-end Loader	79	73
Generator	81	75
Hoe Ram	90	84
Jackhammer	89	83
Roller	80	74
Paver	77	71
Pickup Truck	75	69
Scraper	84	78
Water Truck[4]	76	70

Notes:

1. These values represent the loudest noise levels generated by each equipment type at a distance of 50 feet.
2. These values were calculated by subtracting 6 dBA from each L_{max} value at 50 feet, based on geometric attenuation for a point source.
3. Represented by Tractor from the Federal Highway Administration's *User's Guide*.
4. Represented by Dump Truck from the Federal Highway Administration's *User's Guide*.

dBA = A-weighted decibel

L_{max} = maximum sound levels

Source: Federal Highway Administration. 2006. *Roadway Construction Noise Model User's Guide*. Available: http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf. January. Washington, DC.

Mesikepp, Sam. Hathaway Dinwiddie Construction Company. August 31, 2016—written communication.

Generation of Combined Construction Equipment Noise Levels in Excess of the Federal Transit Administration Assessment Criteria

Because the Noise Ordinance does not include a combined construction equipment noise standard or establish a noise limit for impact equipment, modeled combined construction noise of the two loudest pieces of equipment proposed for use during a given stage is considered by comparing combined project noise levels to Federal Transit Administration guidance criteria (described in the *Approach to Analysis* section).

The anticipated combined construction noise levels for each construction stage are shown in Table 4.C-17, on the following page, based on information provided by the project sponsor. This table shows L_{eq} noise levels of the two loudest pieces of equipment in each construction sub-stage, assuming both 100 percent utilization of equipment and standard utilization factors. As indicated in the table, construction activities may occur at a distance as close as 15 feet from a residence or other noise-sensitive use adjacent to construction areas. The modeling results, assuming standard Federal Highway Administration utilization factors, were compared to the criteria to determine potential impacts. As shown in the table, combined construction noise during most construction stages would be expected to produce levels that would exceed the Federal Transit Administration criteria for residential uses of 90 dBA during the hours of 7 a.m. to 10 p.m. (daytime hours) and 80 dBA during the hours of 10 p.m. to 7 a.m. (nighttime hours).

Construction noise is expected to exceed the noise level increase threshold of 10 dB at some receptor locations. As a point of comparison, to assess the increase in noise levels from construction, existing 24-hour L_{eq} in the project area, shown in Table 4.C-4, p. 4.C-12, ranged from approximately 67 to 72 dBA L_{eq}. With modeled hourly construction noise levels ranging from 85 to 93 dBA L_{eq}, the noise increase over ambient would be in the range of 13 to 26 dB for all stages of work. This would be greater than the noise level increase threshold of 10 dB above existing ambient levels.

The analysis assumes, as a worst case, that construction may occur intermittently and as close as 15 feet from the nearest noise-sensitive use; however, this is not expected to occur on a routine basis. Construction in a given location would be short term as completion of the proposed improvements progresses along the project corridor and equipment is relocated to new work areas. On a temporary basis, however, construction noise may exceed Federal Transit Administration daytime and nighttime criteria at noise-sensitive land uses and may also cause ambient noise levels to increase by more than 10 dB at noise-sensitive receptor locations.

TABLE 4.C-17. SUMMARY OF ANTICIPATED NOISE LEVELS DURING CONSTRUCTION

Construction Stage	Construction Sub-stage	Loudest Types of Equipment in Sub-Stage[1]	Approximate Worst-case Distance from Equipment to Nearest Receptors, Feet	Noise Level: Worst-case Hourly L_{eq}[2]	Noise Level: Hourly L_{eq}[3]
Center Lane and Rail Track Replacement	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Loaders	25	94	90
	Drainage/Utilities/Sub-Grade (Utility Infrastructure: Track and Sewer)	Excavator, Loader	25	94	90
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)[4]	Loader, Roller	25	94	90
Outside/ Curbside Lanes	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Loaders	25	94	90
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Excavator, Backhoe	25	92	88
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Paver, Roller	25	92	88
Sidewalks	Grubbing/Land Clearing (Demolition)	Loader, Backhoe	15[5]	89	85
	Grading/Excavation (Earthwork and Grading)	Loader, Backhoe	15[5]	89	85
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Backhoe, Truck	15[5]	92	88
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Loader, Roller	15[5]	94	90
Intersection	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Excavator, Scraper	25	94	90
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Scraper, Compactor	25	94	90
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Loader, Roller	25	94	90
Traction Power	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Excavator, Scraper	25	94	90

Construction Stage	Construction Sub-stage	Loudest Types of Equipment in Sub-Stage[1]	Approximate Worst-case Distance from Equipment to Nearest Receptors, Feet	Noise Level: Worst-case Hourly L_{eq}[2]	Noise Level: Hourly L_{eq}[3]
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Scraper, Compactor	25	94	90
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Loader, Roller	25	94	90
Special Track Construction	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Dozer, Roller	25	94	90
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Excavator, Loader	25	94	90
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Paver, Roller	25	92	88
Second Street Connection	Grubbing/Land Clearing (Demolition)	Excavators, Hoe Ram	25	97	93
	Grading/Excavation (Earthwork and Grading)	Excavator, Scraper	25	94	90
	Drainage/Utilities/Sub-Grade (Utility Infrastructure)	Scraper, Compactor	25	94	90
	Paving (Roadbed and Curb Construction, Paving, and Painting/Coating)	Loader, Roller	25	94	90

Notes:

[1] Both on-road and off-road equipment were considered when determining the loudest types of equipment.

[2] The worst-case levels represent the condition where all equipment is at full power at the same time, which would be expected to occur only occasionally.

[3] The hourly L_{eq} values in the table have the equipment usage factors applied and represent the equivalent noise level for that activity. The equipment usage factors are the fraction of the time each piece of equipment operates at full power during the day.

[4] The paving activities are assumed to occur in this sub-stage provide a conservative estimate of noise levels for this sub-stage.

[5] Assumes nearest receiver would be at a second-floor location.

L_{eq} = equivalent sound level

Source: ICF, Vibro-Acoustic Consultants 2018.

The project sponsor requires all construction contractors to include SCMs in bid packages for the purposes of environmental protection, including protection from construction-related noise and specific rules regarding nighttime construction activities to limit the types of equipment that can be used and restrict some noise generating activities (see Appendix 4). Although the SCMs include measures that would be effective to reduce noise, they do not specifically require noise levels from construction activity to be reduced to levels at or below the 90 dBA L_{eq} combined noise standard during daytime hours, and they do not require noise increases over ambient from construction activity to be 10 dB or less at noise-sensitive receptor locations. Construction activities, including those that involve asphalt and concrete removal, as well as the use of heavy construction equipment, would generate persistent but time-varying noise levels, which can be highly annoying. Given that sensitive receptors would be exposed to noise levels that would exceed relevant noise standards and the SCMs do not definitively reduce noise levels to below these standards, this impact would be ***significant***.

Some of the proposed project's construction activities could result in noise levels exceeding one-hour L_{eq} criteria of 90 dBA during daytime hours and 80 dBA during nighttime hours at adjacent noise-sensitive land uses. Construction of the project may also result in a noise level increase of 10 dB or more at adjacent noise-sensitive land uses. Mitigation Measure M-NO-1, Prepare and Implement a Construction Noise Control Plan to Reduce Construction Noise at Noise-Sensitive Land Uses, requires noise reduction techniques such as enclosures and barriers, which are effective methods to reduce noise levels by 5 to 10 dB, however use of these methods may not be feasible in all cases. This measure also requires that equipment be located away from receivers, which would result in lower noise levels relative to the distance from the receiver, however some construction in near proximity to sensitive receivers would be required in some situations. This measure also requires that sensitive receptors and property owners within 200 feet of extreme noise-generating activities (defined as activities that generate noise levels of 90 dBA or greater) be notified about the estimated duration of the activity and the associated control measures that would be implemented to reduce noise levels from construction activities. This 200-foot notification area correlates with the distance at which noise levels would attenuate below relevant noise standards. With implementation of Mitigation Measure M-NO-1, this impact would be ***less-than-significant with mitigation***.

M-NO-1: *Prepare and Implement a Construction Noise Control Plan to Reduce Construction Noise at Noise-Sensitive Land Uses.*

The project sponsor shall develop a noise control plan to reduce construction noise to levels at or below the 90 dBA L_{eq} combined noise standard during daytime hours and reduce noise increases over ambient from construction activity to 10 dB or less at noise-sensitive receptor locations. The noise control plan shall also address measures to minimize sleep disturbance at adjacent residential uses where nighttime work is required such that noise levels do not exceed 80 dBA L_{eq} during nighttime hours at residential uses. Implementation of these measures will reduce noise by maximizing the distance between construction sources and receptors, providing shielding between sources and receptors and limiting when noise-generating construction activity will occur. The noise control plan shall require the following:

- Construction contractors shall specify noise-reducing construction practices that will be employed to reduce construction noise from construction activities. The measures shall be reviewed and approved by Public Works prior to the issuance of construction permits. Measures that can be used to limit noise include, but are not limited to, those listed below.
  - Locate construction equipment as far as feasible from noise-sensitive uses.
  - Require that all construction equipment powered by gasoline or diesel engines have sound control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation.
  - Idling of inactive construction equipment for prolonged periods shall be prohibited (i.e., more than 2 minutes).
  - Prohibit gasoline or diesel engines from having unmuffled exhaust systems.
  - Equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, intake silencers, ducts, engine enclosures, acoustically attenuating shields or shrouds) wherever feasible.
  - Monitor the effectiveness of noise attenuation measures by taking noise measurements. A plan for noise monitoring shall be provided to the City for review prior to the commencement of each construction stage.
  - Prohibit pavement breaking during nighttime hours (between 10 p.m. and 7 a.m.).
  - Minimize equipment noise during nighttime hours within 100 feet of the nearest residential use.
  - Use noise-reducing enclosures or curtains around equipment that has the potential to disturb nearby land uses.
- Impact tools (e.g., jack hammers, pavement breakers, rock drills) used for project construction shall be "quiet" gasoline-powered compressors or electrically powered compressors, and electric rather than gasoline- or diesel-

powered engines shall be used to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used; which could achieve a reduction of 5 dBA. Quieter equipment shall be used when feasible, such as drills rather than impact equipment.

- Construction contractors shall be required to use "quiet" gasoline-powered compressors or electrically powered compressors and electric rather than gasoline- or diesel-powered forklifts for small lifting.
- Stationary noise sources, such as temporary generators, shall be located as far from nearby receptors as possible; they shall be muffled and enclosed within temporary enclosures and shielded by barriers, which could reduce construction noise by as much as 5 dB, or other measures, to the extent feasible.
- Prior to the issuance of the construction permit, along with the submission of construction documents, the project sponsor shall submit to the Planning Department and Department of Building Inspection a list of measures for responding to and tracking complaints pertaining to construction noise. These measures shall include:
  - Identification of measures that will be implemented to control construction noise.
  - A procedure and phone numbers for notifying the Department of Building Inspection, the Department of Public Health, or the Police Department of complaints (during regular construction hours and off hours).
  - A sign posted onsite describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction.
  - Designation of an onsite construction complaint and enforcement manager for the project.
  - A plan for notification of neighboring residents and nonresidential building managers within 200 feet of the project construction area at least 30 days in advance of extreme noise-generating activities (defined as activities that generate noise levels of 90 dBA or greater) about the estimated duration of the activity and the associated control measures that will be implemented to reduce noise levels.

WESTERN VARIANT

Construction of the Western Variant would entail the same construction approach, components, and duration as the proposed project; therefore, it has the same potential to create construction noise impacts as the proposed project. The anticipated construction noise in Table 4.C-17, p. 4.C-53, for the proposed project would be the same for the Western Variant and would be significant. With implementation of Mitigation Measure M-NO-1, this impact would be ***less-than-significant with mitigation***.

Impact NO-2. Operation of the proposed project and project variant would not result in the exposure of persons to or generation of noise levels in excess of the San Francisco Noise Ordinance or a substantial temporary, periodic, or permanent increase in ambient noise levels in the project vicinity, above levels existing without the project. (Less than Significant)

Streetcar noise from operation of the F-Line is the predominant source of noise along the project corridor. The addition of the F-loop and F-Short with the proposed project would change the operational noise characteristics of streetcar-generated noise in the project corridor. Traffic noise is another main source of noise along the project corridor. Both F-Line streetcar noise and traffic noise are discussed below.

F-LINE, F-LOOP, AND F-SHORT STREETCAR NOISE

The proposed project would add a new F-loop, introducing a new source of transit noise along the proposed F-loop around McAllister Street and Charles J. Brenham Place and allowing for operation of a new F-Short route east of the F-loop.

The new F-Short route would provide service as frequently as every 10 minutes under the proposed project, resulting in streetcar headways east of the F-loop of approximately 5 minutes on average where the F-Short route would combine with the F Market & Wharves streetcar, which would have headways of approximately 10 minutes.

The proposed project would include five short-radius curves along the F-loop. As streetcars travel along curves in track, friction at the wheel/rail interface can result in high-frequency noise events, generally referred to as *curve squeal*. Noise levels from curve squeal can be highly variable, depending on vehicle type, wheel and rail conditions, weather conditions, curve radius, vehicle speed, and the timing of the vehicle's most recent maintenance. Individual noise events from curve squeal can be as high as 100 dBA L_{max} at 50 feet. In general, a standard steel wheel on a steel rail tends to initiate curve squeal on a curve with a radius of less than 1,000 feet, or a factor of 100 multiplied by the truck wheelbase (i.e., the separation distance between the wheel axles).[21] For the proposed project, curves in the alignment would have approximate radius lengths between 50

[21] Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment.* Report No. 0123. Washington DC, September.

and 120 feet. As a result, noise from curve squeal is predicted to result in a noise-level increase at receptors near curved sections of track along the F-loop. The area along the project corridor with the greatest potential for impacts on noise-sensitive receptors is the F-loop because of the introduction of new track and rail service, including crossovers and curved sections of track.

The proposed project would also introduce four new crossovers where each end of the F-loop connects to existing tangent track, allowing for either east or west turns onto Market Street from Charles J. Brenham Place or entry onto McAllister Street from either eastbound or westbound streetcars on Market Street. Crossovers introduce a gap in the wheel/rail interface that results in an impact sound as the wheel crosses the gap. Noise from new crossovers is predicted to result in a noise-level increase at receptors located along McAllister Street and Market Street adjacent to the proposed F-loop.

Project-related noise levels due to F-Line streetcar operations were assessed for impacts, based on the Federal Transit Administration noise impact criteria indicated in Figure 4.C-6, p. 4.C-29. Modeled noise levels account for both adding streetcar service for the F-Short and introducing new streetcar service along the proposed F-loop as part of the proposed project. A description of the source levels used for the streetcar noise analysis is provided in Appendix 8. Noise-sensitive receptors along the project corridor are generally located near residential or mixed-use land uses. As such, to provide a conservative analysis, this analysis assumes that all 57 noise-sensitive receptors are Category 2 land uses and that noise levels are reported in terms of L_{dn}. Worst-case noise levels due to project-related F-Line streetcar operations (which include the proposed F-loop and F-Short) under 2020 and 2040 conditions are shown in Table 4.C-18, on the following page.

The volume of streetcars on the portion of the F-Line east of the F-loop (the F-Short route) would approximately double under the proposed project relative to existing conditions because of new streetcar service on the F-Short that would be added to streetcars currently operating on the F-Line. Although the number of streetcars operating on the F-Short would increase, bus transit traffic and existing ambient sources on Market Street would continue to be the dominant sources of noise along the F-Short. As indicated in Table 4.C-18 on the following page, existing noise levels have a range of values from 69 to 77 L_{dn} for modeled Category 2 receivers. Project-related noise levels due to streetcar operations would result in a noise level increase of up to 2.1 dB compared to existing noise levels at Category 2 land uses along the project corridor. The highest noise level increases are predicted to occur at Receptors 15, 16, 17, 18, 19, and 21, as a result of operation of the F-loop. With Federal Transit Administration thresholds applied to the project-related noise increase due to F-loop and F-Short streetcar operations, moderate impacts are predicted at 15 noise-sensitive receptors; no severe impacts are predicted to occur. Therefore, no severe impacts are predicted at any Category 2 land uses as a result of project-related operation of the F-loop and F-Short, based on Federal Transit Administration criteria under both 2020 and 2040 worst-case conditions (the 2040 comparison is later referenced in the cumulative analysis). This impact is considered to be ***less than significant***.

TABLE 4.C-18. NOISE LEVELS AND NOISE IMPACT ASSESSMENT DUE TO PROJECT-RELATED F-LINE STREETCAR OPERATIONS UNDER 2020 AND 2040 CONDITIONS [1]

Receptor No.	Location	Existing (2018) Measured Ambient Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Noise Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Increase over Existing, dB	Moderate Impact Increase Threshold, dB[2]	Severe Impact Increase Threshold, dB[2]	Federal Transit Administration Impact Category[3]
1	5 Embarcadero Center	75	75.4	0.4	0.4	2.2	Moderate
2	388 Market Street	77	77.2	0.2	0.3	2.0	No Impact
3	690 Market Street	77	77.2	0.2	0.3	2.0	No Impact
4	2 New Montgomery Street	77	77.3	0.3	0.3	2.0	Moderate
5	757 Market Street	76	76.3	0.3	0.3	2.1	Moderate
6	765 Market Street	70	70.0	0.0	1.0	2.8	No Impact
7	12 4th Street	76	76.4	0.4	0.3	2.1	Moderate
8	10 Cyril Magnin Street	76	76.1	0.1	0.3	2.1	No Impact
9	942 Market Street	76	76.3	0.3	0.3	2.1	Moderate
10	16 Turk Street	69	69.3	0.3	1.1	2.9	No Impact
11	34 Turk Street	69	69.1	0.1	1.1	2.9	No Impact
12	972 Market Street	76	76.3	0.3	0.3	2.1	Moderate
13	973 Market Street	76	76.3	0.3	0.3	2.1	Moderate
14	1023 Market Street	74	74.5	0.5	0.5	2.3	Moderate
15	20 Jones Street	69	70.9	1.9	1.1	2.9	Moderate
16	1075 Market Street	74	76.1	2.1	0.5	2.3	Moderate
17	44 McAllister Street	69	70.2	1.2	1.1	2.9	Moderate
18	45 McAllister Street	69	70.1	1.1	1.1	2.9	Moderate
19	54 McAllister Street	69	70.3	1.3	1.1	2.9	Moderate
20	60 Leavenworth Street	69	69.4	0.4	1.1	2.9	No Impact
21	1087 Market Street	74	75.7	1.7	0.5	2.3	Moderate

Receptor No.	Location	Existing (2018) Measured Ambient Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Noise Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Increase over Existing, dB	Moderate Impact Increase Threshold, dB[2]	Severe Impact Increase Threshold, dB[2]	Federal Transit Administration Impact Category[3]
22	1139 Market Street	74	74.1	0.1	0.5	2.3	No Impact
23	1272 Market Street	73	73.0	0.0	0.6	2.4	No Impact
24	1278 Market Street	73	73.0	0.0	0.6	2.4	No Impact
25	1390 Market Street	72	72.0	0.0	0.8	2.5	No Impact
26	1390 Market Street	72	72.0	0.0	0.8	2.5	No Impact
27	8 10th Street	74	74.0	0.0	0.5	2.3	No Impact
28	1 Polk Street	72	72.0	0.0	0.8	2.5	No Impact
29	50 Fell Street	72	72.0	0.0	0.8	2.5	No Impact
30	1554 Market Street	72	72.0	0.0	0.8	2.5	No Impact
31	1580 Market Street	75	75.0	0.0	0.4	2.2	No Impact
32	1601 Market Street	75	75.0	0.0	0.4	2.2	No Impact
33	1651 Market Street	75	75.0	0.0	0.4	2.2	No Impact
34	1657 Market Street	75	75.0	0.0	0.4	2.2	No Impact
35	1668 Market Street	75	75.0	0.0	0.4	2.2	No Impact
36	1676 Market Street	75	75.0	0.0	0.4	2.2	No Impact
37	1698 Market Street	75	75.0	0.0	0.4	2.2	No Impact
38	1693 Market Street	75	75.0	0.0	0.4	2.2	No Impact
39	11 Haight Street	75	75.0	0.0	0.4	2.2	No Impact
40	33 Haight Street	72	72.0	0.0	0.8	2.5	No Impact
41	60 Haight Street	72	72.0	0.0	0.8	2.5	No Impact
42	1751 Market Street	75	75.0	0.0	0.4	2.2	No Impact
43	8 Octavia Boulevard	72	72.0	0.0	0.8	2.5	No Impact
44	22 Waller Street	72	72.0	0.0	0.8	2.5	No Impact
45	41 Waller Street	72	72.0	0.0	0.8	2.5	No Impact

Receptor No.	Location	Existing (2018) Measured Ambient Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Noise Level, L_{dn}	Existing (2018) Plus-Project (2020 and 2040) Increase over Existing, dB	Moderate Impact Increase Threshold, dB[2]	Severe Impact Increase Threshold, dB[2]	Federal Transit Administration Impact Category[3]
46	55 Waller Street	72	72.0	0.0	0.8	2.5	No Impact
48	982 Market Street	69	69.3	0.3	1.1	2.9	No Impact
49	1127 Market Street	73	73.2	0.2	0.6	2.4	No Impact
50	1192 Market Street	73	73.0	0.0	0.6	2.4	No Impact
51	1 Grove Street	73	73.0	0.0	0.6	2.4	No Impact
52	545 Market Street	77	77.1	0.1	0.3	2.0	No Impact
53	100 Larkin Street	73	73.0	0.0	0.6	2.4	No Impact
54	1231 Market Street	74	74.0	0.0	0.5	2.3	No Impact
55	1 Taylor Street	69	69.2	0.2	1.1	2.9	No Impact
56	1000 Market Street	69	70.6	1.6	1.1	2.9	Moderate
57	1600 Market Street	75	75.0	0.0	0.4	2.2	No Impact
58	48 Turk Street	69	69.1	0.1	1.1	2.9	No Impact

Notes:

Existing ambient level from noise measurements collected April 30 to May 1, 2018 (see Table 4.C-4, p. 4.C-12).

[1] Category 2: Residences and buildings where people normally sleep. Noise-sensitive receptors along the project corridor are generally near residential or mixed use land uses. As such, and to provide a conservative analysis, this analysis assumes that all 57 noise-sensitive receptors are Category 2 land uses and noise levels are reported in terms of L_{dn}.

[2] Increase thresholds are based on Federal Transit Administration impact criteria for Increase in Cumulative Noise Levels Allowed by Criteria for Transit Sources (see Figure 4.C-6, p. 4.C-29).

[3] *No Impact:* A project, on average, will result in an insignificant increase in the number of instances where people are "highly annoyed" by new noise. *Moderate Impact:* The change in cumulative noise is noticeable to most people but may not be enough to cause strong adverse community reactions.

L_{dn} = day-night sound level; dB = decibel

Source: ICF 2018.

SIDE-STREET TRAFFIC NOISE

As discussed in Section 4.B, *Transportation and Circulation*, the proposed project would not generate new vehicle trips. However, the proposed project is expected to result in a redistribution of vehicles due to travel lane reductions and vehicle restrictions on Market Street, leading to increases in total vehicle volumes on Mission Street and some cross and side streets throughout the transportation study area. Other cross and side streets would experience decreases in traffic volumes because vehicles that use Market Street to reach them would shift to other routes. Traffic volumes are projected to decrease on Market Street as a result of the project; therefore, side-street traffic noise is the focus of this analysis.

Project-related noise levels due to the redistribution of traffic on side streets within three blocks of the project corridor were assessed for impacts, based on the San Francisco Land Use Compatibility Chart for Community Noise (Figure 4.C-7, p. 4.C-34). The greatest increase in traffic noise levels from the redistribution of traffic is projected to occur at two locations: along O'Farrell Street east of Stockton Street, and along Mason Street south of Eddy Street. Traffic noise levels are predicted to increase by up to 2.2 dB compared to 2020 no-project conditions at both these locations. No traffic noise levels on side streets are expected to exceed the traffic noise level increase threshold of 3 dB at receptors where existing noise levels exceed the 60 L_{dn} "satisfactory" standard or 5 dB where existing noise levels are below the 60 L_{dn} standard. In addition, the future reduction in traffic volumes on Market Street would result in a decrease of less than 1 dB in overall noise levels at receptors on Market Street, which would not be a perceptible change relative to existing conditions. The anticipated maximum noise levels due to project-related redistribution of traffic on side streets would range between 45.3 and 67.8 L_{dn} in the 2020 Plus Project scenario, with a maximum difference relative to the 2020 no-project scenario ranging from a reduction of 12.4 dB to an increase of 2.2 dB. Detailed tables of traffic noise levels along side streets are provided in Appendix 8.

Traffic noise levels would not be expected to exceed the traffic noise level increase threshold of 3 dB where noise levels in the 2020 no-project scenario exceed the 60 L_{dn} standard or 5 dB where traffic noise levels in the 2020 no-project scenario are below 60 L_{dn} standard. This impact would be ***less than significant***.

WESTERN VARIANT

The differences between the Western Variant and the proposed project include changes regarding roadway configuration, private vehicle access, surface transit, and bicycle and pedestrian facilities in the western segment of the project corridor. The Western Variant would not induce or generate new vehicle trips or associated noise during operation. New lane configurations and turn restrictions on Market Street would result in a noise level increase of less than 1 dB relative to the proposed project without this variant on routes along Duboce Avenue, Gough Street, and 12th Street. Noise levels increases would be below 3 dB relative to the 2020 no-project scenario.

Furthermore, the Western Variant would not change operation of the F-Line, F-loop, or F-Short relative to the proposed project. Therefore, operation of the Western Variant would be similar to operation of the proposed project and would result in a ***less-than-significant*** impact.

Impact NO-3. Construction of the proposed project and project variant would expose persons to or generate excessive ground-borne vibration levels related to annoyance but would not generate excessive ground-borne vibration levels related to damage to buildings. (Less than Significant with Mitigation)

ANNOYANCE

As discussed above, vibration annoyance from construction is evaluated only for nighttime impacts at residential receptors and daytime and nighttime impacts at inpatient facilities. Although some nighttime construction could occur at intersections to minimize impacts on transit riders, no inpatient facilities are located along the project corridor. Should nighttime construction occur, it is possible that vibration could be perceptible and cause annoyance at nearby residential land uses. Pile driving is not proposed for project construction, and Public Works' SCM (see Appendix 4) would prohibit "vibration-intensive" activities during nighttime hours, although these activities are not defined. Should a large bulldozer be operating near residential land uses, it is estimated that vibration at a distance of 25 feet would be 0.089 PPV in/sec. This is below the annoyance impact threshold of 0.9 PPV in/sec for transient sources, as shown in Table 4.C-13, p. 4.C-43. A small bulldozer would generate even less vibration (approximately 0.003 PPV in/sec at this distance). However, some equipment (such as large bulldozers) could operate closer than approximately 25 feet from a nearby residence during nighttime hours, which would generate vibration levels that could cause annoyance at adjacent residential land uses. The SCM does not provide a specific performance threshold to limit vibration-intensive activities or equipment; it is possible that construction work conducted within 25 feet of residential land uses could generate levels of vibration that would result in nighttime annoyance. Thus, annoyance impacts from nighttime construction vibration would be ***significant***.

Implementation of Mitigation Measure M-NO-3, Nighttime Construction Vibration Control Measures – Annoyance, would reduce potential vibration impacts on residences located near potential areas of nighttime construction by requiring a plan that, among other things, would establish PPV vibration levels that could not be exceeded, prescribe the use of smaller construction equipment, and locate vibration-generating construction activity in areas where the least amount of disturbance to existing sensitive land uses would occur. Implementation of Mitigation Measure M-NO-3 would reduce vibration impacts related to annoyance to ***less-than-significant*** levels.

M-NO-3: Nighttime Construction Vibration Control Measures – Annoyance

Prior to issuance of a construction permit, a detailed pre-construction vibration assessment and monitoring plan shall be prepared for all construction activities conducted between the hours of 8 p.m. and 7 a.m. This plan shall evaluate and select the smallest feasible equipment that can be used during this construction period and shall recommend specific location of equipment within the construction area to maximize the distance between the vibration-generating sources and vibration-sensitive receptors. This plan shall also require that vibration levels at vibration-sensitive receptors along the project corridor do not exceed a PPV vibration level of the strongly perceptible level of 0.10 in/sec for continuous sources and 0.90 in/sec for transient sources.

The project contractor shall:

- Retain the services of a qualified professional to prepare a pre-construction assessment and vibration monitoring plan. This assessment and vibration monitoring plan shall identify all vibration-sensitive receptors adjacent to the project corridor which could be exposed to vibration from nighttime construction activities exceeding a PPV vibration level of 0.10 in/sec for continuous sources and 0.90 in/sec for transient sources. The qualified professional shall submit the plan to Public Works for review and approval prior to issuance of a construction permit.
- Inform vibration-sensitive receptors of upcoming construction activities that may generate high levels of vibration a minimum of one week in advance of such construction activities. Method of notification shall include mailed notices as well as notifications hand-posted on doorways. The notification shall include the name and contact information for a person that can be reached during nighttime construction hours.
- Perform real-time vibration monitoring during all construction activities conducted between the hours of 8 p.m. and 7 a.m. at a location representative of the nearest vibration sensitive receptor. If vibration levels exceed a PPV vibration level of 0.10 in/sec for continuous sources and 0.90 in/sec for transient sources, the vibration monitor shall immediately alert the construction manager, who shall immediately cease construction activity. Construction activity shall resume only after the vibration-generating equipment is adjusted or relocated such that the PPV vibration level no longer exceeds 0.10 in/sec for continuous sources and 0.90 in/sec for transient sources, or such activity is otherwise conducted between the hours of 7 a.m. and 8 p.m.

STRUCTURE DAMAGE

With regard to construction-related vibration damage, the majority of the proposed project's construction would be at distances that would preclude vibration damage to existing buildings. The buffer distances, listed by building type, necessary to avoid potential structural damage are as follows:

- For modern buildings (reinforced concrete structures), construction conducted within 2 feet could exceed the 2.0 PPV in/sec threshold for transient sources; construction conducted within 13 feet could exceed the 0.5 PPV in/sec threshold for continuous or frequent intermittent sources.
- For historic structures (reinforced), construction conducted within 7 feet could exceed the 0.5 PPV in/sec threshold for transient sources; construction conducted within 22 feet could exceed the 0.25 PPV in/sec threshold for continuous or frequent intermittent sources.
- For historic structures (unreinforced), construction conducted within 13 feet could exceed the 0.2 PPV in/sec threshold for transient sources; construction conducted within 44 feet could exceed the 0.1 PPV in/sec threshold for continuous or frequent intermittent sources.

For example, track and utility work would occur more than 25 feet from existing buildings. Because most of the track and utility work would be conducted at the curb or median, such activities would not cause a vibration impact. However, the sidewalk stage of construction would occur immediately adjacent to building façades along the project corridor (at 0 feet from buildings). However, regardless of the distance of construction activities from structures that could be damaged, Public Works' SCMs would require vibration control procedures to be incorporated into the construction contract for the proposed project as well as all other construction projects over which it has jurisdiction. These procedures would require the identification of all resources that could be affected by construction-related vibration; real-time monitoring to avoid exceedance of the threshold at which damage could occur, as determined for each resource; cessation of construction activities if that threshold is reached; and procedures to restore resources to their pre-construction condition should they be damaged as a result of construction-related vibration. As a result, application of the SCMs and vibration control procedures would avoid damage to buildings and structures throughout the project corridor. Therefore, construction-related vibration damage resulting from the proposed project would be ***less than significant***.

Refer to Impact CP-4 in Section 4.A, *Cultural Resources*, for an analysis of the proposed project's vibration impacts on historical resources.

WESTERN VARIANT

As discussed under Impact NO-1, construction of the Western Variant would entail the same construction approach, components, and duration as the proposed project; therefore, it has the same potential to create construction vibration impacts as the proposed project. With implementation of Mitigation Measure M-NO-3, impacts related to construction-related nighttime annoyance would be ***less than significant with mitigation***. Public Works' SCMs would avoid building damage from construction-related vibration; therefore, impacts related to building damage would be ***less than significant***.

Impact NO-4. Operation of the proposed project and project variant would not expose persons to or generate excessive ground-borne vibration levels related to annoyance. Operation of the project would not generate excessive ground-borne vibration levels related to damage to buildings. (Less than Significant)

ANNOYANCE

Existing F-Line streetcar vibration is the predominant source of vibration along the project corridor; therefore, the potential annoyance from the F-Line is the focus of this analysis. The proposed F-Line track alignment along Market Street would be nearly unchanged compared with the existing alignment, with the exception of alignment changes between Gough and Valencia streets, Fremont and Beale streets, and Main and Steuart streets. Using the Federal Transit Administration criteria for annoyance from operations in Table 4.C-11, p. 4.C-36, and Table 4.C-12, p. 4.C-37, no vibration impacts are anticipated to occur at most of the vibration-sensitive uses along the project corridor, with the exception of the crossovers associated with the proposed F-loop.

The specific evaluation scenarios are discussed below.

Receptors with Potential Existing Impacts from F-Line Streetcars. The proposed F-Line streetcar tracks on Market Street would be located very close to their existing alignment using the direct-fixation track type[22] at distances that would preclude vibration annoyance at residential sensitive uses within nearby buildings. However, although the F-Line streetcar tracks on Market Street would be more than 55 feet from most residential buildings, one such building at 388 Market Street would be 36 feet from the near-track centerline on Market Street. It is anticipated that ground vibration without nearby crossovers would be 76 VdB; with a crossover, ground vibration would be 78 VdB. However, the 55-foot buffer distance is conservative, assuming that the buildings are one- to two-story masonry structures, with the

[22] The vibration estimates are based on the vibration surface of the existing system, which uses primarily an embedded ballasted track type. However, no changes are expected on an overall basis by changing to the direct-fixation track type.

sensitive uses on the first floor. Several adjustment were made to evaluate vibration at the second-floor offices and residential areas on the 17th floor. Vibration levels on the residential floors would be below 65 VdB after applying -1 to -2 dB per floor and below the Federal Transit Administration vibration impact standard of 72 VdB for residential uses under existing and future conditions.

This impact would be ***less than significant***.

Receptors along the Proposed F-loop. For receptors along the proposed F-loop, the proposed streetcar tracks on the F-loop would be constructed using direct-fixation track located at distances that would preclude vibration annoyance at sensitive uses within nearby buildings. There are no existing streetcars on Charles J. Brenham or McAllister Street. Therefore, buildings in the vicinity of the proposed F-loop are not currently affected by streetcar vibration. The proposed streetcar operations on the F-loop tracks on McAllister Street and Charles J. Brenham Place would be limited to 5 mph through the curves and turnouts, which would adjust the vibration by -14VdB, and 15 mph on the tangent track areas, which would adjust the vibration by -4 VdB; these would correspondingly reduce the buffer distances. The residential buildings adjacent to the proposed F-loop streetcar tracks are small/mid-sized (four to eight stories) structures compared to smaller residential structures. Therefore, there would be further adjustments to account for these building types.

For a four- to eight-story building, the analysis would apply additional adjustments of -3 dB for the building compared to a smaller residential structure but with potential first floor residences. Therefore, the buffer distance would be adjusted to less than 5 feet at the turnouts and 15 feet at the tangent sections to be below the Federal Transit Administration vibration impact standard of 72 VdB for residential use. No residential buildings would be located this close to the center line of the track.

With these speed adjustments and building type adjustments, vibration at these buildings would be below the Federal Transit Administration vibration annoyance impact standard of 72 VdB for residential uses. Therefore, this impact would be ***less than significant***.

Other Receptors Affected by the Proposed F-loop. For existing receptors who would be exposed to streetcar vibration near the proposed F-loop, the proposed streetcar tracks would be located at distances that would preclude vibration annoyance at sensitive uses within nearby buildings. Specifically, Proper Hotel at 1100 Market Street/45 McAllister Street would be approximately 59 feet from the near-track centerline, which is more than the 55-foot distance for residential receptors. This is an area where non-diverging streetcars are anticipated to proceed through the proposed crossover along Market Street at 25 mph. At that speed, it is anticipated that the streetcar would generate vibration of 75 VdB at the building’s façade. After applying adjustments for a mid-sized building (seven stories) of -10 dB, floor resonance of +6 dB, and -2 dB for attenuation from ground level to the second floor, second-floor interior vibration would be 69 VdB under future conditions with the proposed F-loop crossover, which would be below the Federal Transit Administration vibration impact standard of 72 VdB. Therefore, this impact would be ***less than significant***.

BUILDING DAMAGE

As all buildings would be greater than 15 feet from the centerline of the proposed track alignment, the operational vibration at these buildings would be 83 VdB or less, which is less than the 90 VdB (0.125 in/sec PPV) screening level discussed above in the section titled *Assessing Damage from Operational Vibration* on page4.C-46. Thus, no vibration-sensitive buildings along the existing Market Street F-Line, F-Short, or F-loop alignment would be exposed to vibration that would exceed the applicable Federal Transit Administration criteria for building damage outlined in Table 4.C-10, p. 4.C-35. This impact would be ***less than significant.***

WESTERN VARIANT

The Western Variant would entail the same operational characteristics for the F-Line, F-loop, and F-Short as the proposed project; it has the same potential to result in vibration-related operational impacts as the proposed project. Therefore, annoyance and building damage impacts from operation of the Western Variant would be ***less than significant***.

CUMULATIVE IMPACTS

The geographic scope of analysis for cumulative noise and vibration impacts encompasses reasonably foreseeable projects within 300 feet of the project corridor for noise and 100 feet for vibration. The project setting includes a high-density mix of multi-story buildings that provide significant acoustical shielding for the more distant receptors. The FTA Manual specifies a screening distance of 175 for light-rail projects in areas with intervening buildings. Therefore, 300 feet was chosen as a conservative estimate for the cumulative noise analysis. The largest buffer distances for project vibration impacts (construction or operations) would be 20 feet for sidewalk demolition (Impact NO-3) and 55 feet for operations with a crossover (Impact NO-4). Therefore, the potential for cumulative vibration impacts includes projects out to 100 feet from the proposed project. Beyond these distances, the contributions of noise and vibration from other projects would be greatly attenuated through both distance and intervening structures, and their contribution would be expected to be minimal. For cumulative vehicular noise impacts, cumulative noise increases would result primarily from increased traffic on the local roadway network. Cumulative plus-project traffic data, which include existing and future developments as well as other current projects, probable future projects, and projected future growth within the city through 2040, were used to estimate the cumulative operational noise increases.

Impact C-NO-1. Construction activities for the proposed project and project variant, in combination with other past, present, and reasonable future projects in the city, would result in a substantial temporary increase in noise or noise levels in excess of the applicable local standards. (Significant and Unavoidable with Mitigation)

With regard to cumulative construction noise impacts, there are numerous reasonably foreseeable projects along the project corridor.

Construction activities under the proposed project and other planned and future projects could be conducted concurrently and in proximity to each other. In such instances cumulative construction noise impacts are anticipated.

The cumulative increase in the noise level that would result from concurrent construction activity is difficult to predict. In each instance, an accurate assessment would require knowing:

1. How close the work zones are to one another and the extent of the work areas;
2. The scale of each project and the types and numbers of construction equipment in use;
3. The particular construction activities at the two sites on a day-to-day basis.

As shown in Appendix 5, there are numerous reasonably foreseeable projects within 300 feet of the project corridor. A cumulative increase in temporary construction noise levels would occur if construction of the project were to occur concurrently in proximity to one or more reasonably foreseeable projects. As such, a cumulative noise impact could occur if one or more of the projects were to be constructed adjacent to a portion of the proposed project corridor that is undergoing active construction. The large number of foreseeable projects in the corridor, in combination with the staggered, multi-block construction approach of the project and the overall length of construction which could approach six years in duration, means these conditions are likely to be met in at least some cases. Many of the projects that could be constructed concurrently and in proximity to the proposed project are located west of the proposed F-loop (e.g., in the area around Van Ness Avenue [the Hub Plan area]). As such, a cumulative impact from combined construction noise is more likely in that area.

As discussed for Impact NO-1, the Noise Ordinance for construction limits noise from individual pieces of powered construction equipment to 80 dBA L_{max} at a distance of 100 feet, except for impact equipment (note that energy-average or L_{eq} noise levels would be even lower). Noise from impact equipment is not limited by the Noise Ordinance as long as it is equipped with appropriate noise control features, as recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection. The construction equipment for other projects in the vicinity of the project site would be similar to the equipment proposed for construction of the project. Therefore, it is likely that no individual piece of nonimpact equipment associated with construction of the foreseeable projects would violate the Noise Ordinance. If nearby projects utilize impact equipment, it would need to be equipped with noise control features to be in compliance with the City's

Noise Ordinance. Further, according to the San Francisco Noise Ordinance, construction activities are generally prohibited between the hours of 8 p.m. and 7 a.m. without permits from San Francisco Public Works.

As also discussed under Impact NO-1, combined noise levels from construction equipment operating simultaneously during construction of the project could be as high as 93 dBA L_{eq} at the nearest noise-sensitive land use. This is in excess of the 90 dBA L_{eq} combined construction noise standard, and it exceeds the standard of 10 dB over ambient noise. If other construction projects are located in the same vicinity, construction noise could combine to result in even greater noise levels. Other projects may include even louder equipment, such as impact pile drivers. Therefore, combined construction noise levels from the proposed project and other foreseeable projects could result in significant noise impacts during construction. As was the case with direct project impacts discussed under Impact NO-1, a substantial temporary increase from construction activity in noise could also occur under cumulative conditions.

As noted under Impact NO-1, construction noise from the project alone (without the addition of noise from cumulative projects) would exceed the ambient noise level at some receptors by more than 10 dB. Therefore, it can be assumed that the combined noise level from all construction projects in the area would also result in noise levels of more than 10 dB above ambient conditions in some areas. Because project construction would result in noise levels of more than 10 dB over ambient conditions, the project would result in a substantial temporary increase in cumulative noise. Therefore, the project, in combination with reasonably foreseeable projects, may also result in an exceedance of Federal Transit Administration construction noise criteria. Although construction of the reasonably foreseeable projects would generally comply with the San Francisco Noise Ordinance (e.g., abiding by hour limitations, using necessary control measures on impact equipment, requiring that no piece of equipment results in noise in excess of 80 dBA L_{eq} at a distance of 100 feet), combined noise from project construction and other adjacent projects could result in overall noise levels in excess of 90 dBA L_{eq} at sensitive receptors. The project's contribution to this temporary cumulative impact would be considerable.

Mitigation Measure M-NO-1, *Prepare and Implement a Construction Noise Control Plan to Reduce Construction Noise at Noise-Sensitive Land Uses*, described above under Impact NO-1, would reduce project-generated construction noise, and would reduce the severity of construction noise impacts on nearby sensitive receptors. With implementation of Mitigation Measure M-NO-1, this impact would be ***significant and unavoidable with mitigation***.

WESTERN VARIANT

As described under Impact-NO-1, anticipated construction noise for the proposed project would be the same for the Western Variant. Thus, as with the proposed project, the contribution of the proposed project with the Western Variant to significant cumulative construction noise impacts would be considerable. With implementation of Mitigation Measure M-NO-1, this impact would be ***significant and unavoidable with mitigation***.

Impact C-NO-2. Operation of the proposed project and project variant, in combination with other past, present, and reasonably foreseeable future projects in the city, would not result in the exposure of persons to noise in excess of the applicable local standards or a substantial permanent ambient noise level increase in the project vicinity. (Less than Significant)

Under cumulative conditions, streetcar service in 2040 would be the same as described under Impact NO-2. The maximum increase in noise between existing conditions and 2040 conditions along the Market Street corridor is 2.1 dB, which would result in moderate impacts relative to the Federal Transit Administration thresholds at 15 noise-sensitive receptors (see Table 4.C-18, p. 4.C-60). No noise-sensitive receptors would be exposed to severe impacts, and therefore the cumulative noise impact resulting from operation of the F-Short and F-loop would be ***less than significant***.

With respect to traffic noise changes on side streets, the anticipated maximum noise levels due to project-related redistribution of traffic would range between 45.3 and 68.2 L_{dn} in the 2040 Plus Project scenario, with a maximum difference relative to the 2040 no-project scenario ranging from a reduction of 12.8 dB to an increase of 2.4 dB. Detailed tables of traffic noise levels along side streets are provided in Appendix 8. Operation of the proposed project would not result in other stationary noise generating sources which could exceed the standards of the San Francisco Noise Ordinance. Although other reasonably foreseeable projects could result in the addition of stationary noise sources, those developments would need to comply with the standards of the San Francisco Noise Ordinance in Sections 2909(a), 2909(b) and 2909(c). Accordingly, the cumulative noise impact resulting from project-related redistribution of traffic and addition of stationary noise sources would be ***less than significant*** because the maximum projected increase in traffic noise levels would not exceed 3 dB.

WESTERN VARIANT

As described under Impact-NO-2, anticipated operational noise for the proposed project would be the same for the Western Variant. Thus, as with the proposed project, cumulative noise operation impacts would be ***less than significant***.

Impact C-NO-3. Construction and operation of the proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts related to vibration. (Less than Significant)

CONSTRUCTION

Vibration impact criteria are based on a per-event basis from vibration sources; vibration is not generally evaluated in aggregate with other vibration sources due to the limited propagation potential of vibration. However, concurrent projects in proximity to each other could combine to increase vibration from all continuous or frequent intermittent sources. Other projects that could be under construction concurrently with the project are listed in Appendix 5.

With respect to annoyance from nighttime construction, it is unlikely that two projects requiring nighttime construction would occur simultaneously because nighttime construction activities associated with any individual project, including the proposed project, are infrequent; therefore, there is very limited potential for cumulative annoyance and sleep disturbance resulting from nighttime construction. Therefore, cumulative annoyance impacts resulting vibration generated during construction would be ***less than significant***. Furthermore, implementation of Mitigation Measure M-NO-3 would eliminate annoyance from project-related nighttime construction.

With respect to building damage, although the actual occurrence and timing of vibration-generating construction activities would vary, multiple simultaneous project construction activities would have to be conducted within 44 feet of each other to exceed the 0.1 PPV in/sec threshold for continuous or frequent intermittent sources to result in damage to unreinforced historic structures. For historic structures (reinforced), multiple simultaneous construction activities conducted within 22 feet could exceed the 0.25 PPV in/sec threshold for continuous or frequent intermittent sources. For modern buildings (reinforced concrete structures), multiple simultaneous construction activities conducted within 13 feet could exceed the 0.5 PPV in/sec threshold for continuous or frequent intermittent sources. It is unlikely that simultaneous peak events from high-impact/vibration-related construction activities in this proximity would occur. Furthermore, Public Works' SCMs would require vibration control procedures to be incorporated into the construction contract for the proposed project as well as all other construction projects over which it has jurisdiction. These procedures would require the identification of all resources that could be affected by construction-related vibration; real-time monitoring to avoid exceedance of the threshold at which damage could occur, as determined for each resource; cessation of construction activities if that threshold is reached; and procedures to restore resources to their pre-construction condition should they be damaged as a result of construction-related vibration. The SCMs and vibration control procedures would avoid damage to buildings and structures throughout the project corridor resulting from the proposed project as well as other projects over which Public Works has jurisdiction. Therefore, cumulative impacts regarding building damage resulting from vibration generated by construction would be ***less than significant***.

OPERATION

For operations, BART and Muni train vibration is much lower than surface streetcar vibration; as such, the Federal Transit Administration criteria are not exceeded by those facilities. The new BART Transbay Corridor Core Capacity Program[23] will increase train throughput in the tube and downtown area by 30 percent, which is less than 200 percent. No other vibration source in the project area (e.g., BART or Muni) has been identified as currently exceeding the Federal

[23] Bay Area Rapid Transit District. 2018. *Transbay Corridor Core Capacity Program*. Available: https://www.bart.gov/about/projects/corecapacity. Accessed: September 29, 2018.

Transit Administration criteria or potentially increasing service by a factor of 2 or vibration level by 5 VdB. Furthermore, as described in Impact NO-4, operation of the existing F-Line and the proposed F-loop and F-Short would not result in vibration levels that exceed the criteria for nighttime annoyance or building damage. Cumulative operation vibration impacts would be ***less than significant***.

WESTERN VARIANT

As discussed under Impacts NO-3 and NO-4, construction and operation of the Western Variant would entail the same construction approach, components, and duration, as well as the same operational characteristics, as the proposed project. Therefore, cumulative annoyance and building damage impacts would be ***less than significant***. Furthermore, implementation of Mitigation Measure M-NO-3 would further reduce the potential for annoyance from construction vibration associated with the proposed project, and Public Works' SCMs would avoid damage to buildings and structures throughout the project corridor resulting from the proposed project as well as other projects over which Public Works has jurisdiction.

4.D AIR QUALITY

This section describes the existing air quality conditions in the project area, presents the regulatory framework for air quality management, and discusses the potential for the Better Market Street Project (proposed project) to affect existing air quality conditions, both regionally and locally, from short-term construction and long-term operational project activities that emit criteria and non-criteria air pollutants. The analysis in this section is based on a review of existing air quality conditions in the Bay Area region and air quality regulations administered by the U.S. Environmental Protection Agency (EPA), the California Air Resources Board, and the Bay Area Air Quality Management District. This analysis includes methodologies identified in the updated Bay Area Air Quality Management District *California Environmental Quality Act Air Quality Guidelines* and its companion documentation.[1]

This section also discusses the potential air quality impacts that would result from short–term construction and long–term operation of the proposed project. The section identifies both project–level and cumulative environmental impacts as well as feasible mitigation measures to reduce the identified impacts. No comments pertaining to air quality were received in response to the notice of preparation (Appendix 1).

Emissions of greenhouse gases (GHGs) resulting from the proposed project's potential impacts on climate change and the City and County of San Francisco's (City's) and state's goals for GHG emissions were discussed in the initial study prepared for the proposed project (Appendix 2). The initial study demonstrated that the proposed project would comply with the applicable provisions of the City's GHG Reduction Strategy and, therefore, that the potential GHG impacts of the proposed project would be less than significant. Similarly, odor impacts, which were discussed and disclosed in the initial study, will not be discussed further in this section because there has been no change in the intensity or magnitude of odor emissions. Odors impacts would be less than significant.

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[1] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

Bay Area Air Quality Management District. 2016. *Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2016/reg-2-5/hra-guidelines_clean_jan_2016-pdf.pdf?la=en. Accessed: August 22, 2018.

ENVIRONMENTAL SETTING

CLIMATE AND METEOROLOGY

California is divided into 15 air basins that correspond to the geographic features that create their distinctive regional climates. The proposed project is located within the San Francisco Bay Area Air Basin (SFBAAB), which contains all of Napa, Contra Costa, Alameda, Santa Clara, San Mateo, San Francisco, and Marin counties as well as portions of Sonoma and Solano counties. Climate in the SFBAAB is affected primarily by its latitude, topography, marine air flow, and the proximity to San Francisco Bay.

The proposed project would be in the Peninsula subregion of the SFBAAB. The Peninsula subregion extends from northwest of San José to the Golden Gate Bridge. The Santa Cruz Mountains run along the center of the peninsula, with elevations above 2,000 feet at the southern end but decreasing to 500 feet in South San Francisco. Coastal towns experience a high incidence of cool, foggy weather in the summer. San Francisco lies at the northern end of the peninsula. Because most of San Francisco's topography is below 200 feet, marine air can flow easily across most of the city, making its climate cool and windy. Cities in the southeastern peninsula experience warmer temperatures and fewer foggy days because the marine layer is blocked by the ridgeline to the west.

The regional climate within the SFBAAB is considered semi-arid and characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate onshore breezes in the daytime, and moderate humidity. A wide range of meteorological and emissions-related sources, such as the dense population centers, heavy vehicular traffic, and industrial activity, influence air quality in the SFBAAB.

Air pollutant emissions within the SFBAAB are generated from stationary, mobile, and natural sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified location and are usually associated with manufacturing and industry. Examples are combustion equipment and boilers that produce electricity or generate heat. Area sources consist of many smaller point sources that are widely distributed. Examples of area sources include residential and commercial water heaters, painting operations, portable generators, lawn mowers, agricultural fields, landfills, and consumer products, such as barbeque lighter fluid and hair spray. Construction activities that create fugitive dust (e.g., excavation and grading) also contribute to area-source emissions. Mobile sources are emissions from motor vehicles, including tailpipe and evaporative emissions. These are classified as either on-road or off-road sources. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, ships, trains, and self-propelled construction equipment. Air pollutants can also be generated by the natural environment, such as when fine dust particles are pulled from the ground surface and suspended in the air during high wind events.

PROJECT VICINITY

The proposed project would include transportation and streetscape improvements on Market Street and redistribute vehicle traffic from Market Street onto surrounding streets (e.g., Mission Street). The primary sources of air pollutants in the project vicinity are vehicle and transit emissions from roadways and permitted stationary sources. Land uses surrounding the project corridor include residential, office, hotel, retail, parking, and public facility uses that typify central and downtown San Francisco and its immediate surroundings. The closest sensitive receptors are those residential land uses located immediately adjacent to the project corridor (see the discussion of sensitive receptor locations below and Figure 4.D-1, p. 4.D-5).[2]

AMBIENT AIR QUALITY

CRITERIA AIR POLLUTANTS

As required by the 1970 federal Clean Air Act (CAA), the EPA initially identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. The EPA calls these pollutants "criteria air pollutants" because the agency has regulated them by developing specific public health–based and welfare-based criteria for setting permissible levels. Ozone, particulate matter, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead are the six criteria air pollutants originally identified by the EPA. Since adoption of the CAA, subsets of particulate matter have been identified for which permissible levels have been established. These include particulate matter of 10 microns in diameter or less (PM10) and particulate matter of 2.5 microns in diameter or less (PM2.5).

The federal and state governments have established National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) (see Table 4.D-1, p. 4.D-16) for six criteria pollutants. Ozone and NO_2 are considered regional pollutants because they (or their precursors) affect air quality on a regional scale. Pollutants such as CO, SO_2, and lead are considered local pollutants because they tend to accumulate in the air locally. PM10 and PM2.5 are both regional and local pollutants.

The region's air quality monitoring network, operated by the Bay Area Air Quality Management District and the California Air Resources Board, provides information on ambient concentrations of criteria air pollutants at various locations in the San Francisco Bay Area. A number of these ambient air quality monitoring stations monitor progress toward attainment of the NAAQS and the CAAQS. The Bay Area Air Quality Management District maintains these stations.

[2] Single-room-occupancy housing is considered a residential land use and identified in Figure 4.D-1, p. 4.D-5, as a residential sensitive receptor.

The nearest monitoring station to the project corridor is the San Francisco-Arkansas Street monitoring station, which is approximately 1.5 miles to the south. Data collected at the San Francisco-Arkansas Street monitoring station indicate that neither the federal nor the state ambient air quality standards for ozone, CO, and NO_2 were exceeded between 2011 and 2016. However, annual violations of the federal standard for PM2.5 were recorded at the station in 2011, 2012, and 2013, and the state standard for PM10 was exceeded in 2012.[3]

The principal characteristics surrounding ozone, including nitrogen oxides (NO_X) and reactive organic gas (ROG), CO, and particulate matter, are discussed below.

Ozone, or smog, is a photochemical oxidant that is formed when ROG and NO_X (both byproducts of the internal combustion engine) react with sunlight. Ozone poses a health threat to those who already suffer from respiratory diseases as well as healthy people. In addition, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive, resulting in property damage, such as the degradation of rubber products.

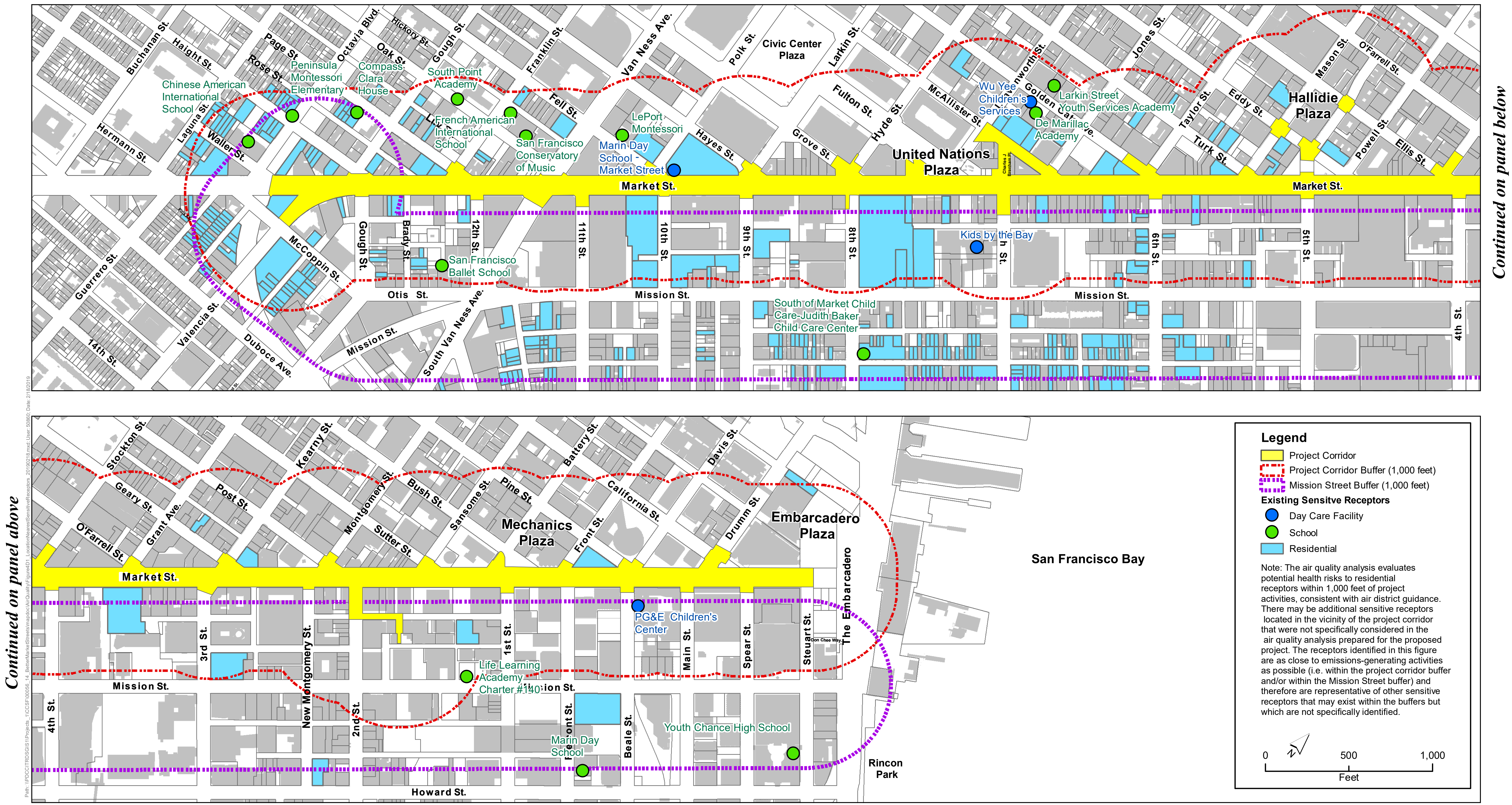
Reactive organic gases are made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of ROG are emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. Adverse effects on human health are not caused directly by ROG but, rather, by reactions of ROG that form secondary pollutants such as ozone.

Nitrogen oxides serve as integral participants in photochemical smog production. The two major forms of NO_X are nitric oxide (NO) and NO_2. NO is a colorless, odorless gas that forms from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown gas, formed by the combination of NO and oxygen. NO_X acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

Carbon monoxide is a colorless, odorless toxic gas that is produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation.

Particulate matter consists of finely divided solids or liquids, such as soot, dust, aerosols, fumes, and mists. Emissions of two forms of fine particulates are regulated by state and federal agencies (i.e., inhalable coarse particles [PM10] and inhalable fine particles [PM2.5]). Particulate discharge

[3] California Air Resources Board. 2018. *iADAM Air Quality Data Statistics Top 4 Summary.* Available: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed: April 23, 2018.
U.S. Environmental Protection Agency. 2018. *Monitor Values Report.* Available: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. Accessed: April 23, 2018.



Better Market Street Project
Case No. 2014.0012E

Source: Parcels, City and County of San Francisco 2014;
Streets, City and County of San Francisco 2014;
Building Footprints, City and County of San Francisco 2011
Land Use,SF Planning Department, 2018

Figure 4.D-1
Existing Air Quality Sensitive Receptors in the Vicinity of the Project Corridor

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into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading. Both PM10 and PM2.5 may adversely affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems.

Although there are federal standards for air pollutants as well as state and regional air quality control plans, air pollutants continue to have impacts on human health throughout the country. California has found that particulate matter exposure can cause health effects at levels that are lower than the national standards. The current health burden of particulate matter demands that, where possible, public agencies take feasible available action to reduce the sources of particulate matter exposure. According to the California Air Resources Board, reducing PM2.5 concentrations to the state and federal standards of 12 micrograms per cubic meter ($\mu g/m^3$) in the San Francisco Bay Area would prevent between 200 and 1,300 premature deaths.[4]

HEALTH EFFECTS

All criteria pollutants are associated with some form of health risk (e.g., asthma, asphyxiation). Adverse health effects associated with criteria pollutant emissions are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). Ozone precursors (ROG and NO_X) affect air quality on a regional scale. Health effects related to ozone are therefore the product of emissions generated by numerous sources throughout a region.

Increased emissions of ozone precursors (ROG and NO_X) generated by a project could increase photochemical reactions and the formation of tropospheric ozone, which, at certain concentrations, could lead to respiratory symptoms (e.g., coughing), decreased lung function, and inflammation of airways. Several factors influence these health impacts, including ozone concentrations, the exposure duration, average volume of air breathed per minute, the length of intervals between short-term exposures, and the sensitivity of the person to the exposure.[5,6] The concentration of ground-level ozone is influenced by the volume of air available for dilution, temperature, and the intensity of ultraviolet light. Worst-case conditions for ozone formation in the Bay Area occur in summer or early fall on warm, windless sunny days.[7] Although these health effects are associated

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4 California Air Resources Board. 2008. *Methodology for Estimating Premature Deaths Associated with Long-term Exposure to Fine Airborne Particulate Matter in California*. Table 4c. Staff report. October 24.

5 The World Bank Group. 1999. *Pollution Prevention and Abatement Handbook 1998: Toward Cleaner Production*, pages 227–230. Available: http://www.ifc.org/wps/wcm/connect/dd7c9800488553e0b0b4f26a6515bb18/%20Handbook%20GroundLevel%20Ozone.pdf?MOD=AJPERES. Accessed: April 26, 2018.

6 U.S. Environmental Protection Agency. 2015. *Air Quality Guide for Ozone*. Available: https://www3.epa.gov/airnow/ozone/air-quality-guide_ozone_2015.pdf. Accessed: April 26, 2018.

7 Bay Area Air Quality Management District. 2018. *Pollutant Glossary*. Available: http://www.baaqmd.gov/about-air-quality/glossary. Accessed: April 26, 2018.

with ozone, the impacts are a result of cumulative and regional ROG and NO_X emissions. Because of these numerous and interconnected factors, it is difficult to predict the magnitude of health effects from a project's exceedance of significance criteria for regional ROG emissions.

Toxic Air Contaminants

Individual projects may emit toxic air contaminants (TACs), a diverse group of air pollutants that can result in chronic (i.e., long-duration) and acute (i.e., severe but short-term) adverse effects on human health, including carcinogenic effects. Human health effects associated with TACs include birth defects, neurological damage, cancer, and mortality. There are hundreds of different TACs, with varying degrees of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

Although the NAAQS and CAAQS have been established for criteria pollutants, no ambient standards exist for TACs. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the California Air Resources Board has consistently found that there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity studied by the California Office of Environmental Health Hazard Assessment.

Air toxics are generated by many sources, including stationary sources, such as dry cleaners, gas stations, auto body shops, and combustion sources; mobile sources, such as motor vehicles, diesel trucks, ships, and trains; and area sources, such as farms, landfills, and construction sites. The adverse health effects of TACs can be carcinogenic (cancer causing), short-term (acute) non-carcinogenic, and long-term (chronic) non-carcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

TACs are regulated by the Bay Area Air Quality Management District, using a risk-based approach to determine which sources and pollutants to control as well as the degree of control. A health risk assessment (HRA) is an analysis in which human exposure to toxic substances is estimated and considered together with information regarding the toxic potency of the substances to provide quantitative estimates of health risks.[8]

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[8] In general, an HRA is required if the Bay Area Air Quality Management District concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggest a potential public health risk. The project sponsor is then subject to an HRA for the source in question. Such an assessment generally evaluates chronic long-term effects and estimates the increased risk of cancer because of exposure to one or more TACs.

Air pollution does not affect every individual in the population in the same way; some groups are more sensitive to adverse health effects than others. Land uses such as residences, schools, children's day care centers, hospitals, and nursing and convalescent homes are the most sensitive to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress or, as in the case of residential receptors, their exposure time is greater than that for other land uses. Therefore, these groups are referred to as sensitive receptors. Exposure assessment guidance typically assumes that residences would be exposed to air pollution 24 hours per day, 350 days per year, for 70 years. The latest guidance from the Office of Environmental Health Hazard Assessment recommends a 30-year exposure duration as the basis for estimating cancer risk at the maximally affected receptor (MIR) in all HRAs. Therefore, assessments of air pollutant exposure for residents typically result in the greatest adverse health outcomes of all population groups.

Exposures to fine particulate matter (PM2.5) are strongly associated with mortality, respiratory diseases, lung development in children, and other endpoints, such as hospitalization for cardiopulmonary disease.[9] In addition to PM2.5, diesel particulate matter (DPM) is also a concern and the primary TAC associated with the project. The California Air Resources Board identified DPM as a TAC in 1998, based primarily on evidence that demonstrated the cancer effects in humans.[10] Compared to other air toxics the California Air Resources Board has identified, DPM emissions are estimated to be responsible for about 70 percent of the total ambient air toxics risk.[11]

San Francisco Modeling of Air Pollutant Exposure Zone

The City partnered with the Bay Area Air Quality Management District to identify the areas of San Francisco that are most adversely affected by the sources of TACs and assess air pollution and exposure from vehicles, stationary sources, and area sources within the city. For this assessment, the City conducted citywide dispersion modeling, using AERMOD, to assess emissions from the following primary sources: roadways, permitted stationary sources, port and maritime sources, and Caltrain. Emissions of PM10, PM2.5, and total organic gas (TOG) were modeled on a 20- by 20-meter receptor grid that covered the entire city. This analysis

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[9] San Francisco Department of Public Health. 2008. *Assessment and Mitigation of Air Pollutant Health Effects from Intra-Urban Roadways: Guidance for Land Use Planning and Environmental Review*. May.

[10] California Air Resources Board. 1998. *The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines*. Fact Sheet. October. Available: https://www.arb.ca.gov/toxics/dieseltac/factsht1.pdf. Accessed: April 26, 2018.

[11] California Air Resources Board. 1998. *Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant.* August 27. Available: https://www.arb.ca.gov/regact/diesltac/res98-35.pdf. Accessed: April 26, 2018.

resulted in a comprehensive assessment of existing cumulative exposures to air pollution throughout the city. The *San Francisco Community Risk Reduction Plan: Technical Support Documentation* contains the methodology and technical documentation for the assessment.[12]

The City identified areas with poor air quality as an Air Pollutant Exposure Zone (APEZ), based on modeling results that relied on three sets of criteria. First, the City designated an area as an APEZ if it had pollutant levels that exceeded the following health-protective criteria:

1. Cumulative PM2.5 concentrations greater than 10.0 μg/m^3, and/or
2. Excess cancer risk greater than 100 per 1 million from the contribution of emissions from all modeled sources.

Second, the City designated an area as an APEZ if it was located within the San Francisco ZIP codes with the worst quintile of Bay Area health vulnerability scores (i.e., ZIP codes 94102, 94103, 94105, 94124, 94130), using the following, more conservative, criteria:

1. Cumulative PM2.5 concentrations greater than 9.0 μg/m^3, and/or
2. Excess cancer risk greater than 90 per 1 million from the contribution of emissions from all modeled sources.

Third, the City included in the APEZ all parcels within 500 feet of a major freeway, consistent with the findings in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*,[13] which suggests that air pollutant levels decrease substantially about 500 feet from a freeway.

The entire project corridor is located within the APEZ, although some lots within 1,000 feet of the project corridor are not. In addition, most of the project corridor and lots within 1,000 feet of the project corridor are within the health-vulnerable zip codes of 94102, 94103, and 94105. Figure 4.D-2, on the following page, presents the APEZ and health-vulnerable zip codes along the project corridor. Permitted stationary sources that generate TACs are also shown.

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[12] Bay Area Air Quality Management District, San Francisco Department of Public Health, and San Francisco Planning Department. 2012. *The San Francisco Community Risk Reduction Plan: Technical Support Documentation.* Available: http://www.gsweventcenter.com/Appeal_Response_References/2012_1201_BAAQMD.pdf. Accessed: May 15, 2018.

[13] California Air Resources Board. 2005. *Air Quality and Land Use Handbook*. April. Available: http://www.arb.ca.gov/ch/handbook.pdf. Accessed: April 25, 2018.

Better Market Street Project
Case No.2014.0012E

Source: Parcels, City and County of San Francisco 2014;
Streets, City and County of San Francisco 2014;
Building Footprints, City and County of San Francisco 2011
Land Use,SF Planning Department, 2018

Figure 4.D-2
Existing Permitted Stationary Sources and Health Vulnerable Zip Codes within the Air Pollutant Exposure Zone and Project Area in the Vicinity of the Project Corridor

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EXCESS CANCER RISK

The 100-per-1-million-persons criterion used by the City is based on EPA guidance for conducting air toxic analyses and making risk management decisions at the facility and community-scale level.[14] As described by the Bay Area Air Quality Management District, EPA considers a cancer risk of 100 per 1 million to be within the “acceptable” range of cancer risk. Furthermore, in the 1989 preamble to the benzene National Emissions Standards for Hazardous Air Pollutants rulemaking,[15] EPA states that it “…strives to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million and (2) limiting to no higher than approximately 1 in 10,000 (100 in 1 million) the estimated risk that a person living near a plant would have if he or she were exposed to the maximum pollutant concentrations for 70 years.” The 100-per-1-million excess cancer cases are consistent with the ambient cancer risk in the most pristine portions of the Bay Area, based on the Bay Area Air Quality Management District’s regional modeling.[16]

FINE PARTICULATE MATTER

In April 2011, EPA published its *Policy Assessment for the Particulate Matter Review of the National Ambient Air Quality Standards* (Particulate Matter Policy Assessment). The Particulate Matter Policy Assessment concluded that the then-current federal annual PM2.5 standard of 15 μg/m^3 should be revised to a level within the range of 11 to 13 μg/m^3, with evidence that strongly supported a standard within the range of 11 to 12 μg/m^3.[17] The APEZ for San Francisco is based on the health-protective PM2.5 standard of 11 μg/m^3, as supported by EPA’s Particulate Matter Policy Assessment. This standard is lowered to 10 μg/m^3 to account for the uncertainty in accurately predicting air pollutant concentrations with use of emissions modeling programs.

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[14] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, pp. D-31–D-33. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_ may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

[15] 54 *Federal Register* 38044, September 14, 1989. Available: https://www.epa.gov/sites/production/files/2016-03/documents/54_fr_38044.pdf. Accessed: April 25, 2018.

[16] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, pp. D-31–D-33. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_ may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

[17] U.S. Environmental Protection Agency. 2011. *Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards.* Available: https://www3.epa.gov/ttn/naaqs/standards/pm/data/20110419 pmpafinal.pdf. Assessed: May 15, 2018.

DIESEL PARTICULATE MATTER

In 1998, the California Air Resources Board identified DPM as a TAC, based primarily on evidence that demonstrates cancer effects in humans. Many of the hundreds of different gaseous and particulate components of exhaust from diesel engines are toxic. The primary sources of diesel emissions include mobile sources, such as trucks and buses.

Concentrations of DPM are highest near heavily traveled highways. In 2000, the California Air Resources Board estimated that the average cancer risk from exposure to DPM in the Bay Area, based on a population-weighted average ambient DPM concentration, is approximately 480 in 1 million. This is much higher than the risk associated with any other toxic air pollutant that is routinely measured in the region. The California Air Resources Board determined that the statewide DPM risk declined from 750 in 1 million in 1990 to 570 in 1 million in 1995. In addition, the California Air Resources Board estimated that the average statewide DPM cancer risk in 2000 was 540 in 1 million.[18,19]

In September 2000, the California Air Resources Board approved a comprehensive Diesel Risk Reduction Plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. Subsequent California Air Resources Board regulations apply to new trucks and diesel fuel. With new controls and fuel requirements, 60 trucks built in 2007 would have the same particulate exhaust emissions as one truck built in 1988.[20] By 2020, the regulation is anticipated to result in an 80 percent decrease in the statewide diesel health risk compared with the risk in 2000.

ROADWAY-RELATED POLLUTANTS

Roadway-related pollutants are produced by motor vehicles through tailpipe emissions, road dust, and brake and tire wear. Vehicle tailpipe emissions contain many TACs, including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, naphthalene, and diesel exhaust. Engine exhaust from diesel, gasoline, and other combustion engines is a complex mixture of particles and gases with collective and individual toxicological characteristics. Health effects have been associated with proximity, or exposure, to vehicle-related pollutants collectively as a mixture, even though each pollutant in engine exhaust has a unique

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[18] California Air Resources Board. 2009. *California Almanac of Emissions and Air Quality, 2009 Edition*. Table 5- 44 and Figure 5-12. Available: https://www.arb.ca.gov/aqd/almanac/almanac09/pdf/chap509.pdf. Accessed: April 25, 2018.

[19] This calculated cancer risk value from ambient air exposure in the Bay Area can be compared with the lifetime probability of being diagnosed with cancer in the United States from all causes, which for men is more than 40 percent (based on a sampling of 17 regions nationwide), or more than 400,000 in 1 million, according to the American Cancer Society. American Cancer Society. 2016. *Lifetime Risk of Developing or Dying from Cancer.* Last revised: March. Available: http://www.cancer.org/cancer/cancerbasics/lifetime-probability-of-developing-or-dying-from-cancer. Accessed: April 25, 2018.

[20] Pollution Engineering. 2006. *New Clean Diesel Fuel Rules Start*. July. Available: http://www.gsweventcenter.com/Draft_SEIR_References/2006_0702_PollutionEngineering.pdf. Accessed: April 25, 2018.

toxicological profile. Exposure to PM2.5 is strongly associated with mortality, respiratory diseases, impaired lung development in children, and hospitalization for cardiopulmonary disease, among other results. People living within proximity to freeways or busy roadways have poor health outcomes. Air pollution monitoring done alongside epidemiological studies has confirmed that roadway-related health effects vary with modeled exposure to particulate matter and NO_2. Traffic-related studies have shown that an additional non-cancer health risk, attributable to roadway proximity, occurs within 1,000 feet of a roadway and is strongest within 300 feet.

REGULATORY FRAMEWORK

FEDERAL

FEDERAL CLEAN AIR ACT

The CAA was enacted in 1963 and amended numerous times in subsequent years (1967, 1970, 1977, and 1990). The CAA establishes the NAAQS and specifies future dates for achieving compliance. The CAA also mandates that states submit and implement a State Implementation Plan (SIP) for local areas that fail to meet the standards. The plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA identify specific emissions-reduction goals for areas that do not meet the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones. Table 4.D-1, on the following page, shows the NAAQS and CAAQS currently in effect for each criteria pollutant.

Local monitoring data are used to designate areas as nonattainment, maintenance, attainment, or unclassified areas for the NAAQS and CAAQS. The four designations are further defined as:

- Nonattainment – assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- Maintenance – assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- Attainment – assigned to areas where pollutant concentrations meet the standard in question over a designated period of time.
- Unclassified – assigned to areas with insufficient data for determining whether a pollutant is violating the standard in question.

The SFBAAB (and city of San Francisco) fails to meet national standards for ozone and PM2.5 and therefore is considered a federal nonattainment area for these pollutants. Table 4.D-2, p. 4.D-17, lists each criteria pollutant and its related attainment status.

TABLE 4.D-1. FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b]
Ozone (O_3)	1 hour	0.09 ppm	–
	8 hours	0.070 ppm	0.070 ppm
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm
	8 hours	9.0 ppm	9 ppm
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	100 ppb
	Annual arithmetic mean	0.030 ppm	0.053
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	75 ppb
	24 hours	0.04 ppm	0.14 ppm
Respirable Particulate Matter (PM10)	24 hours	50 μg/m³	150 μg/m³
	Annual arithmetic mean	20 μg/m³	–
Fine Particulate Matter (PM2.5)	24 hours	–	35 μg/m³
	Annual arithmetic mean	12 μg/m³	12.0 μg/m³
Sulfates	24 hours	25 μg/m³	–
Lead (Pb)	30-day average	1.5 μg/m³	–
	Calendar quarter	–	1.5 μg/m³
	Rolling 3-month average	–	0.15 μg/m³
	1 hour	0.003	–
Hydrogen Sulfide	24 hours	0.01 ppm	–
Vinyl Chloride	24 hours	25 μg/m³	–

Note:

[a.] The CAAQS for O_3, CO, SO_2 (1-hour and 24-hour standards), NO_2, PM10, and PM2.5 are not to be exceeded. All other California standards shown are not to be equaled or exceeded.

[b.] The NAAQS, other than O_3 and those that are based on annual averages, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than 1.

CAAQS = California Ambient Air Quality Standards

NAAQS = National Ambient Air Quality Standards

ppm = parts per million by volume

ppb = parts per billion

μg/m³ = micrograms per cubic meter

Source: California Air Resources Board. 2016. *Ambient Air Quality Standards.* June 4. Available: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf, Accessed: April 25, 2018.

TABLE 4.D-2. FEDERAL AND STATE AMBIENT STATUS FOR THE BAY AREA AIR BASIN

Pollutant	Federal Classification	State Classification
O_3 (1-hour standard)	—	Nonattainment
O_3 (8-hour standard)	Nonattainment – Marginal	Nonattainment
PM10	Attainment	Nonattainment
PM2.5	Nonattainment Moderate	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Pb	Attainment	Attainment

Note:
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM10 = particulate matter 10 microns or less in diameter
PM2.5 = particulate matter 2.5 microns or less in diameter
O_3 = ozone
Pb = lead
SO_2 = sulfur dioxide

Sources: California Air Resources Board. 2015a. *Area Designations Maps/State and National.* Lased revised: December 2015. Available: https://www.arb.ca.gov/desig/adm/adm.htm. Accessed: April 25, 2018.

U.S. Environmental Protection Agency. 2018. *Nonattainment Areas for Criteria Pollutants* (Greenbook). Available: https://www.epa.gov/green-book. Accessed: June 1, 2018.

STATE

CALIFORNIA CLEAN AIR ACT AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

In 1988, the state legislature adopted the California CAA, which established a statewide air pollution control program. The California CAA requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the federal CAA, the California CAA does not set precise attainment deadlines. Instead, the California CAA establishes increasingly stringent requirements for areas that require more time to achieve the standards. The CAAQS are generally more stringent than the NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride. The CAAQS and NAAQS are listed together in Table 4.D-1, on the prior page.

The California Air Resources Board and local air districts bear responsibility for achieving California's air quality standards, which are to be achieved through district-level air quality management plans. These plans are then collected and incorporated into the SIP, which is a collection of regulations by state and local air districts to reduce air pollution in areas that do not meet the NAAQS. In California, EPA has delegated authority to prepare SIPs to the California Air Resources Board, which, in turn, has delegated that authority to individual air districts. Traditionally, the California Air Resources Board established state air quality standards and maintained oversight authority with respect to air quality planning as well as developing programs for reducing emissions from motor vehicles, developing air emissions inventories, collecting air quality and meteorological data, and approving SIPs.

The California CAA substantially adds to the authority and responsibilities of air districts. It designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The California CAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The California CAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and establish transportation control measures.

STATE ENGINE EMISSION STANDARDS

The California Air Resources Board has established the following series of increasingly strict emissions standards for new off-road diesel equipment, on-road diesel trucks, and harbor craft.

- Small Off-Road Engines (13 California Code of Regulations [CCR] sections 2403–2407)
- Tier 4 Off-Road Compression-Ignition Engine Regulations and Exhaust Emission Certification Test Fuel for Off-Road Spark-Ignition Engines, Equipment, and Vehicles (13 CCR sections 2421–2427)
- California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles (13 CCR section 1956),
- Low-Sulfur Fuel Requirement, Emission Limits, and Other Requirements for Commercial Harbor Craft (13 CCR section 2299.6)
- Airborne Toxic Control Measure for Commercial Harbor Craft (13 CCR section 93118.5).

These standards apply to new or rebuilt engines that were manufactured after certain compliance dates, as specified by the individual rules.

The California Air Resources Board has also adopted emissions standards to reduce NO_X, DPM, and other criteria pollutant emissions from in-use (i.e., existing) off-road diesel-fueled vehicles (Regulation for In-Use Off-Road Diesel-Fueled Fleets (13 CCR section 2449) and in-use on-road diesel-fueled vehicles (Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen, and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles (13 CCR section 2025). These standards apply to existing and currently in-use engines.

TOXIC AIR CONTAMINANT REGULATION

California regulates TACs primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 ("Hot Spots" Act). In the early 1980s, the California Air Resources Board established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Tanner Act created California's program to reduce exposure to air toxics. The "Hot Spots" Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people who were exposed to a significant health risk, and facility plans to reduce these risks. The "Hot Spots" Act requires the Office of Environmental Health Hazard Assessment to develop an approach for health risk assessments that can be used to determine the "likelihood of risks." The resultant guidance manual is titled *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.*[21]

In September 2000, the California Air Resources Board approved a comprehensive Diesel Risk Reduction Plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan was to reduce respirable DPM emissions and the associated health risk by 75 percent in 2010 and 85 percent in 2020. The plan identifies 14 measures that the California Air Resources Board has implemented or may implement. DPM from on-road and off-road vehicles is also directly controlled through CCR title 13, division 3, sections 2485 and 2449. These sections prohibit a vehicle's primary diesel engine from idling for longer than 5 minutes at any location.

REGIONAL

BAY AIR QUALITY MANAGEMENT DISTRICT

The Bay Area Air Quality Management District is the regional agency with jurisdiction over the nine-county SFBAAB. The Bay Area Air Quality Management District is responsible for attaining and maintaining air quality in the SFBAAB with respect to federal and state air quality standards, as established by the federal CAA and the California CAA, respectively. Specifically, the Bay Area Air Quality Management District has responsibility for monitoring ambient air pollutant levels throughout the SFBAAB and developing and implementing strategies to attain the applicable federal and state standards. The air quality district is also responsible for establishing and enforcing local air quality rules and regulations to address the requirements of federal and state air quality laws and ensuring that the NAAQS and CAAQS are met. A list of applicable Bay Area Air Quality Management District rules is provided below.

- Regulation 6, Rule 1 (Particulate Matter): This regulation restricts emissions of particulate matter darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour.
- Regulation 9, Rule 8 (Stationary Internal-Combustion Engines): This regulation limits emissions of NO_X and CO from stationary internal-combustion engines of more than 50 horsepower.

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21 Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February. Available: https://oehha.ca.gov/ media/downloads/crnr/ 2015guidancemanual.pdf. Accessed: April 25, 2018.

The most recent air quality plan, the 2017 Clean Air Plan, was adopted by the Bay Area Air Quality Management District on April 19, 2017.[22] The 2017 Clean Air Plan updates the most recent Bay Area ozone plan, the 2010 Clean Air Plan, in accordance with the requirements of the state Clean Air Act to implement all feasible measures to reduce ozone; provide a control strategy to reduce particulate matter, air toxics, and GHGs in a single, integrated plan; and establish emission control measures to be adopted or implemented. The 2017 Clean Air Plan contains the following primary goals:

- Protect Air Quality and Health at the Regional and Local Scale: Attain all state and national air quality standards, and eliminate disparities among Bay Area communities in cancer health risk from TACs; and
- Protect the Climate: Reduce Bay Area GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

The 2017 Clean Air Plan is the most current applicable air quality for the air basin. Consistency with this plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of an air quality plan.

LOCAL

SAN FRANCISCO GENERAL PLAN AIR QUALITY ELEMENT

The San Francisco General Plan provides long-term guidance and policies for maintaining and improving the quality of life and the man-made and natural resources of the community.[23] The air quality element of the San Francisco General Plan is concerned primarily with improving air quality. The element seeks to achieve this goal through adherence to air quality standards and improvements related to mobile sources, land use planning, public awareness, dust, and energy conservation.

SAN FRANCISCO CONSTRUCTION DUST CONTROL ORDINANCE

Dust can be an irritant that causes watery eyes or lung, nose, or throat irritation. Demolition, excavation, grading, and other construction activities can cause wind-blown dust, which could contribute particulate matter to the local atmosphere. Depending on exposure, adverse health effects can result from this particulate matter in general as well as specific contaminants, such as lead or asbestos, which may be constituents of the soil. In response, the San Francisco Board of

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[22] Bay Area Air Quality Management District. 2017. *Final 2017 Clean Air Plan*. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed: May 15, 2018.

[23] San Francisco Planning Department. n.d. *San Francisco General Plan*. Available: http://generalplan.sfplanning.org/I10_Air_Quality.htm. Accessed: April 25, 2018.

Supervisors approved the Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008) to reduce the quantity of dust generated during site preparation, demolition, and construction work and protect the health of the general public and onsite workers, minimize public nuisance complaints, and avoid orders to stop work by the Department of Building Inspections (DBI).

San Francisco Health Code article 22B[24] and San Francisco Building Code section 106.A.3.2.6[25] collectively constitute the Construction Dust Control Ordinance. San Francisco Public Works (Public Works) has incorporated similar provisions in the San Francisco Building Code into Public Works Order No. 171,378.[26] For projects involving more than 0.5 acre, the Construction Dust Control Ordinance requires the project sponsor to submit a dust control plan for approval by the San Francisco Department of Public Health prior to issuance of a construction permit by DBI. The ordinance requires all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or expose or disturb more than 10 cubic yards, or 500 square feet, of soil to comply with specified dust control measures, whether the activity requires a permit from the DBI or not.

Construction permits will not be issued without written notification from the director of the San Francisco Department of Public Health that states that the project sponsor has a site-specific dust control plan, unless the director waives the requirement. The Construction Dust Control Ordinance requires the project sponsors and contractors who are responsible for construction activities to minimize visible dust on the site. Dust suppression activities may include watering all active construction areas to prevent dust from becoming airborne. Increased watering frequency may be necessary whenever wind speeds exceed 15 mph. Reclaimed water must be used if required by article 21, section 1100 et seq., of the Public Works Code.

San Francisco Clean Construction Ordinance

In April 2007, the city adopted an ordinance requiring public projects to reduce emissions at construction sites starting in 2009. In March 2015, the city expanded the existing ordinance to require public projects to reduce emissions at construction sites in areas with high background concentrations of air pollutants. Establishment of the APEZ was used as the basis for approving

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[24] San Francisco Department of Public Health. 2008. *Article 22B: Construction Dust Control Requirements.* Available: http://library.amlegal.com/nxt/gateway.dll/California/health/healthcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1. Accessed: April 25, 2018.

[25] San Francisco Department of Building Inspections. n.d. *Building Code section 106.A.3.2.6*. Available: http://library.amlegal.com/nxt/gateway.dll/California/sfbuilding/sanfranciscobuildinginspectioncommission?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1. Accessed: April 25, 2018.

[26] San Francisco Public Works. 1998. *Order No. 171,378*. November 18. Available: http://sfpublicworks.org/sites/default/files/Public%20Works%20Order%20171%2C378.pdf. Accessed: April 25, 2018.

a series of amendments to the San Francisco Environment and Administrative Codes, generally referred to as the Clean Construction Ordinance, or Environment Code chapter 25 (Ordinance 28-15, effective April 19, 2015).[27] The purpose of the Clean Construction Ordinance is to protect the public health, safety, and welfare by requiring contractors on Public Works projects to reduce diesel and other particulate matter emissions generated by construction activities. For projects located within the APEZ, such as the proposed project, the Clean Construction Ordinance requires the items listed below.

EQUIPMENT REQUIREMENTS

- Equipment must meet or exceed Tier 2 standards for off-road engines and operate with the most effective California Air Resources Board Verified Diesel Emissions Controls (VDECs) available for the engine type (Tier 4 engines automatically meet this requirement).
- Portable diesel engines are prohibited where access to alternative sources of power is available.
- Idling of off-road and on-road equipment is limited to 2 minutes at any location, except as provided in applicable state regulations (e.g., traffic conditions, safe operating conditions). The contractor must post legible and visible signs in English, Spanish, and Chinese in designated queuing areas and at the construction site to remind operators of the 2-minute idling limit.
- *Construction Emissions Minimization Plan*. A Construction Emissions Minimization Plan must be prepared before the start of construction. The plan is required to include estimates of the construction timeline by stage and a description of each piece of off-road equipment required for every construction stage (e.g., equipment type, manufacturer, identification number, model year, tier rating, horsepower, expected fuel usage, hours of operation). Additional details may be included for VDECs (e.g., technology type, serial number, make, model, manufacturer, California Air Resources Board verification number level). For off-road equipment using alternative fuels, the description must specify the type of alternative fuel being used.
- *Monitoring.* Monitoring and reporting actions are required during construction to document compliance with the ordinance.
- *Waivers.* Waivers to the requirements of the Clean Construction Ordinance can be issued under unusual circumstances (e.g., lack of available qualifying equipment).

[27] City and County of San Francisco. 2015. *Clean Construction Ordinance.* August. Available: https://www.sfdph.org/dph/files/EHSdocs/AirQuality/San_Francisco_Clean_Construction_Ordinance_2015.pdf. Accessed: April 25, 2018.

Public Works' Standard Construction Measures

As discussed in Chapter 2, *Project Description*, Public Works requires all construction contractors to include standard construction measures (SCMs) in bid packages for the purposes of environmental protection. The air quality SCM requires all projects to comply with the Construction Dust Control Ordinance, as described above. Major projects with more than 20 days of construction within an APEZ must also comply with the Clean Construction Ordinance. Refer to Appendix 4 for additional information on the air quality SCM.

Environmental Impacts

This section describes the impact analysis related to air quality for the proposed project. It describes the methods used to determine the impacts of the project and lists the significance criteria that were used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, compensate for) significant impacts accompany the discussion of any identified significant impact.

Significance Criteria

The proposed project would have a significant effect if it would result in any of the conditions listed below.

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase in any criteria pollutant for which the project region is in nonattainment status under an applicable federal, state, or regional ambient air quality standard (including through the release of emissions that exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.

Approach to Analysis

The air quality analysis employs emission factors, models, and tools distributed by a variety of agencies, including the California Air Resources Board, California Air Pollution Officers Association, Office of Environmental Health Hazard Assessment, and EPA. In addition, the analysis includes the methodologies identified in the Bay Area Air Quality Management District's *California Environmental Quality Act Air Quality Guidelines* (May 2017).

Methodology for Analysis of Impacts

In general, the proposed project would result in two types of air quality impacts – construction and operational. First, construction activity would result in air pollution. Second, the proposed project would result in changes in travel patterns and vehicle distribution along Market Street and nearby streets. Although these transportation network improvements are not expected to increase overall criteria pollutant emissions, they would change the location of existing and future vehicle volumes and associated emissions.

This section describes the methodology used to evaluate project impacts related to consistency with the Clean Air Plan, emissions of criteria pollutants, and local health risks and hazards. Each of these direct impacts is, in turn, separated into impacts from criteria air pollutant emissions, which are generally regional in nature, and impacts associated with exposure to TACs and PM2.5, which can result in localized health risks. The assessment of criteria air pollutant impacts addresses the second and third bulleted significance criteria identified above. The assessment of localized health risk and exposure impacts addresses the potential exposure of sensitive receptors to substantial pollutant concentrations (the final bulleted significance criterion above).

CLEAN AIR PLAN CONSISTENCY

The applicable air quality plan is the Bay Area Air Quality Management District's 2017 Clean Air Plan (discussed in the *Regulatory Setting* section above), which identifies measures to reduce emissions and ambient concentrations of air pollutants; safeguard public health by reducing exposure to the air pollutants that pose the greatest health risk, with an emphasis on protecting communities that are most heavily affected by air pollution; and reduce GHG emissions to protect the climate. Consistency with the 2017 Clean Air Plan can be determined by considering whether a project supports the goals of the plan, includes applicable control measures from the plan, or disrupts or hinders implementation of any control measures from the plan. Consistency with this plan is the basis for determining whether a proposed project would conflict with or obstruct implementation of an applicable air quality plan.

CRITERIA AIR POLLUTANTS

As described in the earlier Regulatory Framework discussion, the SFBAAB experiences low concentrations of most pollutants under federal or state standards and is designated as either in attainment or unclassified for most criteria pollutants, except for ozone and particulate matter (PM2.5, and PM10). The SFBAAB is designated as a nonattainment area for these pollutants under either state or federal standards.

Regional air pollution is largely a cumulative impact because no single project is large enough by itself to result in nonattainment of air quality standards. Instead, a project's individual emissions contribute to cumulative air quality conditions. If a project's contribution to cumulative air quality conditions is considerable, then the project's impact on air quality is considered significant.[28]

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[28] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, p. 2-1. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

Table 4.D-3, below, identifies the significance thresholds for criteria air pollutants during construction, followed by a discussion of each threshold. Projects that would result in criteria pollutant emissions that would be below these significance thresholds would not violate an air quality standard, contribute substantially to an air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants within the SFBAAB.

TABLE 4.D-3. CRITERIA POLLUTANT THRESHOLDS

Pollutant	Construction, Average Daily Emissions	Operations, Average Daily and Annual
ROG	54 lbs/day	54 lbs/day or 10 tpy
NO_X	54 lbs/day	54 lbs/day or 10 tpy
PM10	82 (exhaust) lbs/day	82 (total) lbs/day or 15 tpy
PM2.5	54 (exhaust) lbs/day	54 (total) lbs/day or 10 tpy
Fugitive Dust	Construction Dust Ordinance or Other Best Management Practices	—

Note:
lbs/day = pounds per day; ROG = reactive organic gas
NO_X = nitrogen oxides; tpy = tons per year
PM10 = particulate matter less than or equal to 10 microns in diameter
PM2.5 = particulate matter less than or equal to 2.5 microns in diameter
Source: Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May. Pg. 2-2. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

The potential for a project to result in a cumulatively considerable net increase in criteria air pollutants that may contribute to an existing or projected air quality violation is based on the state and federal CAA emissions limits. Projects that would result in emissions below these thresholds would not be considered projects that would contribute to an existing or projected air quality violation or result in a considerable net increase in ozone precursors or particulate matter. Because of the temporary nature of construction activities, only the average daily thresholds are applicable to construction-stage emissions.

Fugitive dust emissions are typically generated during construction stages. Studies have shown that the application of best management practices (BMPs) at construction sites controls fugitive dust significantly, and individual measures have been shown to reduce fugitive dust by anywhere from 30 to 90 percent.[29] The Bay Area Air Quality Management District has identified several BMPs to control fugitive dust emissions from construction activities. San Francisco's

[29] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, p. D-47. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

Construction Dust Control Ordinance requires several fugitive dust control measures to avoid the generation of visible dust from construction activities. This analysis assumes that the proposed project would implement the requirements of the ordinance, pursuant to Public Works' SCM (see Appendix 4). Compliance with the Construction Dust Control Ordinance is the basis for determining the significance of air quality impacts due to fugitive dust emissions.

CRITERIA AIR POLLUTANT EMISSIONS METHODS

CONSTRUCTION

Average daily criteria pollutant emissions were estimated using the Road Construction Emissions Model (RCEM) (version 8.1.0), which is an emissions estimation and evaluation model for linear projects. Although RCEM is maintained by the Sacramento Metropolitan Air Quality Management District, the Bay Area Air Quality Management District has recommended its use for proposed projects that are linear in nature to determine construction-related emissions.[30]

RCEM separates the construction process into four default stages to account for various construction scenarios: grubbing/land clearing, grading/excavation, drainage/utility/sub-grade work, and paving. From these default stages, RCEM estimates emissions from the following sources:

- Off-road construction equipment
- On-road mobile equipment associated with work, vendors, and hauling
- Fugitive dust associated with grading, demolition, and truck loading
- ROG emissions from paving

Construction of the project would require a staged approach, involving up to seven location-specific project segments over a projected 6-year construction period, beginning in 2020. A project segment is generally defined as multiple blocks along the project corridor. Assumptions regarding construction phasing and equipment were based on information received from the project sponsor for one construction segment. Construction of a single segment includes four primary stages:[31]

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[30] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, pp. B-11and B-12. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

[31] Typical sub-stages for each construction segment include the following: demolition, earthwork and grading, utility infrastructure, roadway or sidewalk construction and paving, and painting and coating stages, among others. The utility infrastructure sub-stage includes San Francisco Municipal Railway traction power duct bank work under Market Street and under Second and Stevenson streets. For the purpose of this analysis, San Francisco Municipal Railway traction power duct bank work under Market Street and traction power duct bank work under Second and Stevenson streets were modeled separately and added to the construction emissions of the four primary stages. See Appendix 9, *Air Quality Modeling Details*, for additional information.

- Center lanes and rail track replacement
- Outside/curbside lanes
- Sidewalks
- Intersections

Activities during several stages would occur concurrently; therefore, it was assumed that, during these periods of overlap, all equipment would operate concurrently. In addition, based on construction sequencing and required activities, no more than two segments would be constructed in any given year. Therefore, construction emissions were modeled for one construction segment and then conservatively doubled to account for concurrent construction of a second segment.[32]

Where construction information was unavailable, RCEM model defaults were used. Emissions were modeled by assuming compliance with the City's Clean Construction Ordinance engine requirements, which require, at minimum, the use of Tier 2 engines and the most effective VDECs available for the engine type. Modeled emissions were converted from tons per year to pounds per day. Calculations of daily average emissions were based on the number of working days per year, which was assumed to be 235 (5 days per week, 47 weeks per year).[33]

Construction emissions for the proposed project are modeled for the first year of construction (2020). Emissions from construction equipment will decline as a function of time because current regulations require future emissions reductions. Therefore, construction emissions presented for the first year of construction represent a likely "worst case." Emissions generated during subsequent years of construction would most likely be lower than those presented in this analysis. The modeling files, which include a complete list of construction equipment by stage, construction stage duration, and the model defaults used in this analysis, are included in the RCEM output sheets, which are provided in Appendix 9, *Air Quality Modeling Details.*

OPERATIONS

Operation of the proposed project would alter the transportation network and could result in changes in travel patterns and vehicle distribution along Market Street and surrounding side streets. However, the proposed project would not induce or generate new vehicle trips that

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[32] The proposed project requires only one construction segment with traction power duct bank work under Second and Stevenson streets, so construction emissions for this segment in any given year were not doubled in the analysis.

[33] Though some weekend work may be required for the proposed project, assuming a shorter construction work week presents a worst-case analysis because less construction activity would be required on average per 6- or 7-day work week as opposed to a 5-day work week, which would require more construction activity. The City has a holiday moratorium that prohibits construction work during the last five weeks of the year. Accordingly, construction activity was only assumed over a period of 47 weeks.

would result in a substantial increase in vehicle miles traveled (VMT). The proposed project would also add a new F-loop on the F Market & Wharves historic streetcar (F-Line) and provide service on a new F-Short route between the F-loop and Fisherman's Wharf. Although there would be an increase in service frequency on the F-Short route relative to existing service on the F-Line in this area, there would be no changes to existing F-Line operations (e.g., additional cars), and subsequently, no additional operational emissions are anticipated. In addition, because the F-Line is an electrified light-rail service, future changes to operations (e.g., increase in service frequency, additional cars) would also not result in operational emissions. As discussed in Chapter 4.B, *Transportation and Circulation*, the features associated with the proposed project (e.g., reduction in the number of mixed-flow travel lanes, conversion of mixed-flow travel lanes to San Francisco Municipal Railway–only [Muni-only] lanes, new bicycle facilities) are not the general types of transportation system changes that would substantially induce automobile travel. In addition, the proposed project is not a land use development project and would not generate new vehicle trips or additional VMT per capita. Therefore, the proposed project would not result in a substantial increase in VMT or associated criteria pollutant emissions. Therefore, a criteria air pollutant emissions analysis was not conducted for regional operational emissions.

Local Health Risk and Hazards From Vehicle Relocation

Although the proposed project would not have a substantial effect on regional emissions, it would relocate emissions sources and potentially expose existing sensitive receptors to additional vehicle emissions, such as TACs, and associated health risks. An HRA was conducted to provide quantitative estimates of health risks from exposure to TACs from vehicle relocation.[34] The threshold of significance used to evaluate health risks from vehicle relocation is based on the potential for the proposed project to substantially affect sensitive receptors within the APEZ. The protective health standards used in determining the APEZ, as well as supporting evidence, are provided in the *Environmental Setting* section, above. The standards were developed in consultation with the Bay Area Air Quality Management District as part of preparation of a Community Risk Reduction Plan.[35]

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[34] The HRA prepared for the proposed project is based on traffic volumes that have subsequently been revised. The revised traffic volumes were used in the transportation analysis included in Section 4.B, *Transportation and Circulation*. Based on a review of the revised traffic volumes (but not re-running the HRA model), the data trend indicates that the HRA modeling domain still represents worst-case conditions, and the modeled maximum cancer risk would most likely stay the same or decrease slightly with the revised traffic volumes. Thus, the HRA represents a conservative analysis, and the conclusions therein apply to the revised traffic volumes.

[35] Bay Area Air Quality Management District, San Francisco Department of Public Health, and San Francisco Planning Department. 2012. *The San Francisco Community Risk Reduction Plan: Technical Support Documentation.* Available: http://www.gsweventcenter.com/Appeal_Response_References/2012_1201_BAAQMD.pdf. Accessed: May 15, 2018.

The project corridor is within the APEZ; therefore, the thresholds of significance for receptors at the project corridor are based on:

1. Cumulative PM2.5 concentrations greater than 0.2 μg/m^3, and/or
2. Excess cancer risk from the contribution of emissions from all modeled sources greater than 7.0 per 1 million in the population.

For receptors already in the APEZ, the Bay Area Air Quality Management District considers contributions to cumulative health risks from operations not considerable at levels below the 0.2 μg/m^3 PM2.5 concentration and the excess cancer risk of 7.0 per 1 million persons exposed. For the proposed project, these thresholds apply to sensitive receptors that are currently in the APEZ.

Health Risk Assessment Methods

Health risks and DPM and PM2.5 exhaust concentrations at sensitive receptor locations associated with the proposed project's vehicle redistribution were evaluated in the HRA. Because residential exposure assumptions are more conservative than those for other sensitive receptor types, such as hospitals, schools, and day care facilities, a conservative approach that considered all sensitive receptors within 1,000 feet to be residential sensitive receptors was used in this analysis. The HRA assessed health risk impacts using the Office of Environmental Health Hazard Assessment's 2015 guidance (*Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments*).[36] This guidance incorporates the latest science and recommendations from the Office of Environmental Health Hazard Assessment.

Pollutant Selection

This analysis evaluates health risks based on receptor exposure to TAC emissions,[37] including DPM, PM2.5 exhaust, and TOGs. DPM is a complex mixture of gases and fine particles, including more than 40 substances that are listed by EPA as hazardous air pollutants and by the California Air Resources Board as TACs.[38] However, per Bay Area Air Quality Management District guidance, the DPM analysis uses PM2.5 diesel exhaust as a surrogate for DPM.[39] The analysis also evaluates health risks associated with specific TOG emissions from gasoline vehicles, including 1,3-

[36] Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: April 25, 2018.

[37] Toxic air contaminants evaluated in this analysis include 1,3-butadiene, acetaldehyde, benzene, ethylbenzene, formaldehyde, and naphthalene.

[38] California Air Resources Board. 2015. *The Report on Diesel Exhaust*. Last reviewed: July 21. Available: https://www.arb.ca.gov/toxics/dieseltac/de-fnds.htm. Accessed: May 31, 2018.

[39] Kirk, Alison. Bay Area Air Quality Management District. December 14, 2016—personal communication with Laura Yoon (ICF).

butadiene, acetaldehyde, benzene, ethylbenzene, formaldehyde, and naphthalene. TOG emissions were estimated by multiplying total ROG emissions by TAC speciation factors. For gasoline vehicles, these were taken from the Bay Area Air Quality Management District.

MODELING DOMAIN

The HRA was completed for a worst-case study area (model domain) where incremental emissions and receptor locations combine to generate the greatest potential incremental project risk. Selection of the model domain was based on total peak-hour traffic volumes at 49 intersections in the project area. Under the proposed project, Mission Street between Eighth and Third streets, continuing to the Market Street and Third Street intersection, would experience the greatest change in traffic of the areas nearest to receptors.[40] Residences in the model domain were identified using the City's land use data. All residential receptors were assumed to be on the second floor of buildings, representative of the building types within the modeling domain.

EMISSIONS INVENTORY

DPM, PM2.5 exhaust (diesel and gasoline), and TAC emissions from vehicle travel along the modeling domain and at the connecting intersections were quantified using the California Air Resources Board's EMFAC2017 model; vehicle volumes provided by the transportation engineers, Fehr & Peers and CHS Consulting Group; and the air toxic speciation factors described above. The peak-hour volumes for the intersections within the model domain were converted to average daily volumes, assuming that 10 percent of daily traffic occurs in the peak hour. The reported intersection volumes were used to define traffic volumes on each leg of the modeled intersections in the modeling domain.

Volumes were separated into light-/medium-duty and heavy-duty vehicles. Based on the Sixth Street Pedestrian Safety Project, heavy trucks were assumed to represent 2.1 percent of vehicle volumes, whereas buses were assumed to represent 3 percent.[41] The remaining volumes were assumed to be light-/medium-duty vehicles. EMFAC 2017 was used to determine fuel types for light-/medium-duty and heavy-duty vehicles, while transit buses were assumed to be 70 percent electric and 30 percent diesel and diesel-electric, based on information from the traffic engineers.[42]

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[40] The selected modeling domain experiences the greatest increase in peak-hour volumes over a contiguous area. See Impact AQ-3 for additional information regarding the selected modeling domain and anticipated risk.

[41] Goyne, Matt. Fehr & Peers. April 13, 2018—personal communication to Laura Yoon (ICF) (*Fwd: BMS – information needs for air quality analysis*).

[42] Goyne, Matt. Fehr & Peers. April 13, 2018—personal communication to Laura Yoon (ICF) (*Fwd: BMS – information needs for air quality analysis*).

The DPM, PM2.5 exhaust, and TAC emissions from light-/medium-duty vehicles and heavy-duty/transit vehicles were determined for each segment in the modeling domain. Each leg of each intersection was defined and modeled such that the entirety of Mission Street, along with the leg of Third Street from Mission Street to Market Street, was included in the modeling. Consistent with the assumptions underlying the analysis for mass emissions, vehicle speeds were assumed to not differ significantly between project and no-project conditions or analysis years. EMFAC 2017 aggregate speed emission factors were used to determine emissions from the provided traffic volumes. Both peak-hour and daily emissions were quantified for use in the air dispersion model, provided in Appendix 9, *Air Quality Modeling Details.*

AIR DISPERSION MODELING

EPA's AERMOD model (version 18081) was used to estimate annual DPM, PM2.5 exhaust, and TAC concentrations at nearby receptors. Modeling inputs, including source characteristics (e.g., release height, initial dispersion), were based on published guidance from EPA,[43] the Office of Environmental Health Hazard Assessment,[44] and the Bay Area Air Quality Management District.[45]

Meteorological data from the nearest meteorological air monitoring site were used. The nearest air monitoring site is the Mission Bay monitoring site (Site ID #5803). The most recently available dataset (2008–2012) was obtained from the Bay Area Air Quality Management District for the Mission Bay site.

Based on the land use characteristics in the project vicinity, urban dispersion coefficients were used in AERMOD and flat terrain was assumed. All other inputs were regulatory defaults; however, the use of AERMOD's FASTAREA processing was included to speed up calculations.

[43] U.S. Environmental Protection Agency. 2015. *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas*. EPA-420-B-15-084. Appendices. November. Available: https://www.epa.gov/state-and-local-transportation/project-level-conformity-and-hot-spot-analyses#pmguidance.

[44] Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: April 25, 2018.

[45] Bay Area Air Quality Management District. 2012. *Recommended Methods for Screening and Modeling Local Risk and Hazards* (Table 14). May. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf?la=en. Accessed: June 12, 2018.

RISK ASSESSMENT

Health risks were calculated for 30-year exposure scenarios (the Office of Environmental Health Hazard Assessment requires analysis of a 30-year exposure)[46] for year 2020 and 2040 conditions because sensitive receptors within the modeling domain could be exposed to operational emissions as vehicular traffic is redistributed. Each scenario included a beginning period for exposure in the third trimester of pregnancy to capture the most conservative risk scenario for a maximally exposed sensitive receptor. Cancer risks were assessed from both DPM and vehicle-related TACs from gasoline TOG emissions, along with chronic and acute non-cancer risks and exhaust PM2.5 exhaust concentrations.

CUMULATIVE IMPACTS

The contribution of a project's individual air emissions to regional air quality impacts is, by its nature, a cumulative effect. Emissions from past, present, and future projects in the vicinity also have or will contribute to adverse regional air quality impacts on a cumulative basis. As described above, the project-level thresholds for criteria air pollutants are based on levels that are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants. Therefore, if a project's emissions are below the project-level thresholds, the project would not be considered to contribute considerably to any cumulative air quality impacts.

Similarly, the project-level thresholds for a localized health risk are based on levels that are not anticipated to contribute to a health risk within the APEZ. Evaluation of the proposed project's significance is based on a threshold of 7.0 cancer incidences per 1 million to accommodate the increased air pollution risk in this area. If a project's localized health risk is below these thresholds, the project would not be considered to contribute considerably to cumulative health risk impacts.

IMPACTS NOT EVALUATED IN DETAIL

OTHER CRITERIA AIR POLLUTANTS

Regional concentrations of CO in the Bay Area have not exceeded the state standards since the early 1990s and as a result, the Bay Area is in attainment for CO. Vehicle traffic is the primary source of CO emissions in the Bay Area and emissions from on-road vehicles have been declining annually because of increasingly stringent vehicle regulations and improvements in engine technology. The Bay Area Air Quality Management District has demonstrated that traffic volumes would need exceed 44,000 vehicles per hour at a single intersection or

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[46] Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: April 25, 2018.

24,000 vehicles per hour where vertical and/or horizontal mixing is limited to exceed the California ambient air quality standard of 9.0 ppm (8-hour average) or 20.0 ppm (1-hour average) for CO.[47] Project-related traffic would be well below these levels. Accordingly, CO impacts are considered less-than-significant and are not discussed further.

Regional concentrations of SO_2 in the Bay Area have never exceeded the state standards. Combustion and other industrial/commercial processes are the primary source of SO_2 emissions in the Bay Area. The project does not include any industrial or commercial uses that would result in substantial SO_2 emissions. Accordingly, the proposed project would not result in a cumulatively considerable net increase in SO_2, and quantitative analysis is not required. The impact on SO_2 emissions would be less than significant.

Impacts and Mitigation Measures

Impact AQ-1. Construction of the proposed project and project variant would generate fugitive dust and criteria air pollutants but would not violate an air quality standard or contribute substantially to an existing or project air quality violation. (Less than Significant with Mitigation)

Construction of the proposed project has the potential to create air quality impacts through the use of heavy-duty construction equipment, construction workers' vehicle trips to the project corridor, and truck hauling trips (to and from the project corridor). In addition, fugitive dust emissions would result from site disturbance (such as pavement removal and excavation). Paving would generate fugitive ROG emissions. The assessment of construction air quality impacts considers each of these potential sources.

Fugitive Dust

Project-related demolition, excavation, grading, and other construction activities may cause wind-blown dust, which could contribute particulate matter to the local atmosphere. The Construction Dust Control Ordinance requires all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or expose or disturb more than 10 cubic yards, or 500 square feet, of soil to comply with specified dust control measures.

Construction permits will not be issued without written notification from the director of the San Francisco Department of Public Health that states that the project sponsor has a site-specific dust control plan, if required, unless the director waives the requirement. The

[47] Bay Area Air Quality Management District. 2017. *California Environmental Quality Act Air Quality Guidelines*. May, p. 3-4. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed: April 25, 2018.

Construction Dust Control Ordinance requires the project sponsors and contractors who are responsible for construction activities to minimize visible dust on the site. Minimum dust control measures that apply to all projects include the following:

- Watering all construction areas to prevent dust from becoming airborne.
- Providing as much water as necessary to control dust (without creating runoff) in any area of land clearing, earth movement, excavation, drilling, or other dust-generating activity.
- Wet sweeping or vacuuming streets, sidewalks, paths, or intersections during excavation and earthmoving activities where work is in progress at the end of the workday.
- Covering any inactive stockpiles greater than 10 cubic yards, or 500 square feet for excavated materials.
- Using dust enclosures, curtains, and dust collectors as necessary to control dust in the excavation area.

Other dust control measures that may be part of a required dust control plan include, but are not limited to, wetting down the area around soil improvements, analyzing wind direction, placing dust monitors, keeping records of particulate monitoring results, inspecting for and keeping records of visible dust, and establishing a hotline for members of the surrounding community to call and report visible dust problems. Reclaimed water must be used if required by article 21, section 1100 et seq., of the Public Works Code.

City Ordinance 175-91 requires the use of non-potable water for soil compaction and dust control measures undertaken in conjunction with any construction or demolition project occurring within the boundaries of San Francisco, unless permission is obtained from the San Francisco Public Utilities Commission. The San Francisco Public Utilities Commission operates a recycled water fill at the Southeast Water Pollution Control Plant, which provides recycled water at no charge.

In addition to the requirements listed above, the site-specific dust control plan would require the project sponsor to submit a map to the director of the San Francisco Department of Public Health that shows all sensitive receptors within 1,000 feet of the site. The project sponsor would be required to designate an individual to monitor project compliance with the dust control requirements. Compliance with the regulations and procedures of the Construction Dust Control Ordinance would reduce potential dust-related impacts to a ***less-than-significant*** level.

CRITERIA AIR POLLUTANTS

Table 4.D-4, below, summarizes estimated construction emissions. As indicated in Table 4.D-4, construction-related NO_X emissions (215 pounds per day) are anticipated to exceed the threshold of 54 pounds per day by approximately 161 pounds. The primary source of NO_X emissions would be off-road construction equipment. Intersection construction and the traction power duct bank work would generate most of the NO_X emissions, followed by construction of outside/curbside lanes. NO_X emissions from the other construction stages (e.g., sidewalks) represent a smaller amount of total construction emissions compared with the aforementioned activities. This is a ***significant*** impact.

TABLE 4.D-4. AVERAGE DAILY UNMITIGATED CONSTRUCTION EMISSIONS

	Average Daily Emission (lbs/day)[a]			
Year	**ROG**	**NO_X**	**PM10 Exhaust**	**PM2.5 Exhaust**
2020	8	<u>215</u>	2	2
Significance Threshold	*54*	*54*	*82*	*82*

Note:

[a] Emissions over threshold levels are <u>underlined</u>. Emissions assume compliance with the city's Clean Construction Ordinance engine requirements.

lbs = pounds

NO_X = nitrogen oxides

PM10 = particulate matter less than or equal to 10 microns in diameter

PM2.5 = particulate matter less than or equal to 2.5 microns in diameter

ROG = reactive organic gases

Source: Road Construction Emissions Model.

Implementation of Mitigation Measure M-AQ-1, Off-Road Construction Equipment Emissions Minimization, would reduce the magnitude of this impact to a less-than-significant level. Mitigation Measure M-AQ-1 requires all off-road equipment to meet EPA-approved Tier 3 or 4 final emissions standards, depending on engine horsepower. As shown in Table 4.D-5, on the following page, with implementation of Mitigation Measure M-AQ-1, NO_X emissions would be reduced by 76 percent and would no longer exceed the threshold of significance. Therefore, this impact would be ***less than significant with mitigation.***

TABLE 4.D-5. AVERAGE DAILY MITIGATED CONSTRUCTION EMISSIONS

	Average Daily Emission (lbs/day)[a]			
Year	**ROG**	**NO_X**	**PM10 Exhaust**	**PM2.5 Exhaust**
2020	8	51	2	1
Significance Threshold	*54*	*54*	*82*	*82*
Exceeds Threshold?	No	No	No	No

Note:
[a.] Emissions assume compliance with the city's Clean Construction Ordinance engine requirements as well as Mitigation Measure M-AQ-1.
lbs = pounds
NO_X = nitrogen oxides
PM10 = particulate matter less than or equal to 10 microns in diameter
PM2.5 = particulate matter less than or equal to 2.5 microns in diameter
ROG = reactive organic gases
Source: Road Construction Emissions Model.

M-AQ-1: Off-Road Construction Equipment Emissions Minimization

A. Equipment Requirements

a. All off-road equipment with engines (greater than or equal to 90 horsepower) shall meet EPA or California Air Resources Board Tier 4 final off-road emissions standards, while equipment with smaller engines (less than 90 horsepower) shall meet or exceed Tier 3 off-road emissions standards.

B. Waivers

a. The San Francisco Planning Department's environmental review officer (ERO) or designee may waive the requirement for an alternative source of power from subsection (A) if an alternative source of power is limited or infeasible at the project site. If the ERO grants the waiver, the contractor must submit documentation that the equipment used for onsite power generation meets the requirements of subsection (A).

b. The ERO may waive the equipment requirements of subsection (A) if use of a particular piece of off-road equipment with a Tier 4 final or Tier 3 compliant engine is not feasible or reasonable, the equipment would not produce the desired emissions reductions because of the expected operating modes, installation of the equipment would create a safety hazard or impair visibility for the operator, or a compelling emergency exists that would require the use of off-road equipment that is not Tier 4 final or Tier 3 compliant. If seeking an exception, the project sponsor shall demonstrate to the ERO's satisfaction that the resulting construction emissions would not exceed the NO_X threshold of significance, as identified within the EIR under Impact AQ-1. If the ERO grants the waiver, the contractor must use the next-cleanest piece of available off-road equipment, according to the table below:

Compliance Alternative[a]	Engine Emission Standard
1	Tier 4 Interim
2	Tier 3 with California Air Resources Board Level 3 VDECs
3	Tier 3
4	Tier 2 with California Air Resources Board Level 3 VDECs

Note:
[a] If the environmental review officer (ERO) or designee determines that the equipment requirements cannot be met, then the contractor shall meet Compliance Alternative 1. If the ERO or designee determines that the contractor cannot supply off-road equipment meeting Compliance Alternative 1, then the contractor shall meet Compliance Alternative 2. If the ERO or designee determines that the contractor cannot supply off-road equipment meeting Compliance Alternative 2, then the contractor shall meet Compliance Alternative 3. If the ERO or designee determines that the contractor cannot supply off-road equipment meeting Compliance Alternative 3, then the contractor shall meet Compliance Alternative 4.
VDECs = Verified Diesel Emission Controls

WESTERN VARIANT

Construction of the Western Variant would entail the same construction approach, components, and duration as the proposed project; therefore, it has the same potential to create air quality impacts as the proposed project. Estimated construction emissions in Table 4.D-5, on the prior page, for the proposed project would be the same for the Western Variant. Construction-related NO_X emissions for the Western Variant are anticipated to exceed the NO_X threshold of 54 pounds per day by approximately 161 pounds. This is a ***significant*** impact. Implementation of Mitigation Measure M-AQ-1 would reduce the magnitude of this impact to a less-than-significant level. This impact would therefore be ***less than significant with mitigation***.

Impact AQ-2. Operation of the proposed project and project variant would not result in emissions of criteria pollutants at levels that would violate an air quality standard or contribute to an existing air quality violation. (Less than Significant)

Operation of the proposed project could result in changes in travel patterns and vehicle distribution along Market Street and nearby streets. As described above, although these changes to the transportation network would occur, the proposed project would not induce or generate new vehicle trips that would result in a substantial increase in VMT. The proposed project, however, is expected to increase transit vehicle and taxi speeds on Market Street and potentially decrease private vehicle speeds on some cross streets. Criteria pollutant emissions generated by vehicles vary as a function of speed, with greater emissions emitted at lower and higher vehicle speeds (e.g., 5 to 20 mph and greater than 55 mph). Although average vehicle speeds may change because of the proposed project, the impact on overall criteria pollutant emissions in the project area is expected to be minor, given that implementation of the proposed project would not substantially increase VMT or the vehicle fleet mix. Accordingly, this impact would be ***less than significant***.

WESTERN VARIANT

The differences between the Western Variant and the proposed project include changes to roadway configuration, private vehicle access, surface transit, and pedestrian and bicycle facilities in the western segment of the project corridor. The Western Variant would not induce or generate new vehicle trips that would result in a substantial increase in VMT or substantially affect vehicle fleet mix. Accordingly, like the proposed project, the Western Variant would not result in appreciable changes in operational emissions. This impact would be ***less than significant***.

Impact AQ-3. Construction and operation of the proposed project and project variant would generate TACs, including DPM, but would not expose sensitive receptors to substantial air pollutant concentrations. (Less than Significant with Mitigation)

CONSTRUCTION

The project corridor is in the APEZ. This zone indicates that the proposed project's construction-related DPM emissions could pose health risks. Diesel-powered equipment would operate throughout the entire project corridor, thereby helping to disperse toxic pollutants and minimize exposure at specific receptor locations. Construction on any one block would be expected to occur over a relatively short period of approximately 1 year, which is far shorter than the exposure duration of 30 years that is typically associated with chronic cancer risk.[48] Compliance with the Clean Construction Ordinance and Mitigation Measure M-AQ-1 would further reduce the magnitude of the project's contribution to local health risks. Furthermore, the proposed project would be required to comply with California regulations that limit idling to no more than 5 minutes,[49] which would further reduce nearby sensitive receptors' exposure to temporary and variable DPM emissions. As discussed above, Mitigation Measure M-AQ-1 requires all off-road equipment to meet EPA-approved Tier 3 or 4 final emission standards, depending on engine horsepower, and reduce emissions below the thresholds of significance. This is expected to reduce construction-related health risk impacts on nearby sensitive receptors.

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[48] Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot-Spots Program Guidance Manual for the Preparation of Health Risk Assessments.* February. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed: April 25, 2018.

[49] California Code of Regulations, Title 13, Division 3, section 2485 (on-road) and section 2449(d)(2) (off-road).

Operation

Operation of the proposed project would redistribute existing vehicle emissions, thereby reducing receptor exposure to PM2.5 exhaust and DPM emissions in certain areas while increasing exposure in other areas. Cancer and non-cancer health risks associated with receptor exposure to relocated PM2.5 exhaust and DPM emissions from vehicle travel was assessed within the model domain, which represents the area with the greatest anticipated increase in health risk because of project implementation (refer to the *Health Risk Assessment Methods* section).[50]

The modeled cancer risk and PM2.5 exhaust concentrations at the maximum exposed individual (MEI) receptor location are presented in Table 4.D-6, below. The table presents the incremental change in health risk and PM2.5 exhaust exposure associated with implementation of the project, relative to no-project conditions in 2020 and 2040. As noted above, all receptors were assumed to be residential receptors.

TABLE 4.D-6. MAXIMUM CANCER RISK AND PM2.5 EXHAUST EXPOSURE UNDER 2020 AND 2040 CONDITIONS

	2020 (Project – No Project)[a]		2040 (Project – No Project)[a]	
	Cancer Risk	**PM2.5 Exhaust (μg/m³)**	**Cancer Risk**	**PM2.5 Exhaust (μg/m³)**
Incremental Risk	2.4	< 0.1	0.6	< 0.1
Significance Threshold	7.0	0.2	7.0	0.2
Above Threshold	No	No	No	No

Note:
[a.] This value represents the incremental difference between project and no-project conditions.
PM2.5 = particulate matter less than or equal to 2.5 microns in diameter
μg/m³ = microgram per cubic meter
Source: AERMOD.

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[50] The intersection of Octavia Boulevard and Market Street is projected to experience the greatest incremental increase in peak-hour traffic volumes with implementation of the project (approximately 740 vehicles per hour). However, the selected modeling domain has the greatest increase in peak-hour volumes over a contiguous area with proximate receptors. Nevertheless, some residential receptors west of Van Ness Avenue and adjacent to the intersection or Octavia Boulevard and Market Street may be exposed to a slightly higher risk than those analyzed within the modeling domain. However, based on the change in peak-hour traffic volumes (740 vehicles per hour at Octavia Boulevard and Market Street and 600 vehicles per hour at Mission and Eighth streets) and modeled health risks (see Table 4.D-6), any increase in risk at Octavia Boulevard and Market Street is not anticipated to exceed the City's thresholds.

As shown in Table 4.D-6, on the prior page, relocated vehicle traffic in the modeling domain would not result in increased health risks or PM2.5 exhaust concentrations in excess of the cumulative project contribution thresholds. In addition, the chronic non-cancer risk (health hazard) would be less than 0.1, which is far below the Bay Area Air Quality Management District's threshold of 1.0.

The modeled health risks are based on the maximum incremental exposure to emissions from relocated vehicles on Mission Street within the modeling domain and would not be observed throughout the entire project area. Health risks outside of the modeling domain on Mission Street would be lower than those presented in Table 4.D-6, on the prior page. Because vehicle volumes would decrease on Market Street, emissions and associated health risks to receptors along Market Street from vehicle travel would also decrease relative to no-project conditions.

In addition to relocating general vehicle travel, the proposed project would create several new loading zones along Market Street. The loading zones would be designed to accommodate a variety of vehicle types, including paratransit, taxi, and commercial vehicles. Up to 22 loading zones would be created on Market Street, replacing the existing 23 commercial loading bays (with several of the new 22 zones overlapping in part or whole with one of the existing 23 bays). See Figure 2-8 in Chapter 2, *Project Description*. In addition to these loading zones, commercial loading spaces would be created in the alleys south of Market Street to accommodate truck loading (specifically, Angelo's Alley and Jessie [100 and 800 blocks], Stevenson [100, 200, 400, 500, and 600 blocks], and Annie [unit block] streets).[51]

Although the total number of commercial vehicles loading and unloading in the study area is not expected to change substantially, idling vehicles in the new loading zones could increase ambient PM2.5 and DPM concentrations and expose receptors to additional health risks. However, as shown in Figure 2-8, except for four new loading zones between Eight Street and South Van Ness Avenue and one new loading zone between First and Fremont Streets, all new loading zones on Market Street would replace existing loading bays at the same location or directly adjacent to the proposed location. The existing loading bays are used primarily (67 percent) by commercial vehicles, which are predominantly diesel-fueled vehicles, whereas the new loading zones would support active paratransit, taxi, and commercial vehicles.[52] Although some paratransit vehicles and taxis may be diesel fueled, the majority use gasoline, which has

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[51] San Francisco Municipal Transportation Agency. 2018. *Better Market Street Loading and Parking Recommendations Memorandum.* February 22, 2018.

[52] Trout, Ian. San Francisco Municipal Transportation Agency. June 11, 2018—personal communication with Jessica Viramontes (ICF) regarding existing loading characteristics.

significantly lower cancer toxicity than diesel fuel.[53] The penetration of alternative fuels, including electricity, is also expected to increase in the future, further reducing localized idling emissions.[54] Accordingly, health risks associated with the new multi-use loading zones would be lower than the risks associated with the adjacent traditional commercial loading bays, which would continue to operate under no-project conditions. Combined health risks for receptors along Market Street from diverted vehicle travel and loading are therefore expected to decrease with implementation of the proposed project.

As noted above, new loading spaces would be created in the alleys south of Market Street. Unlike the multi-use zones proposed on Market Street, these spaces could be used predominantly by diesel-fueled commercial vehicles. Receptors adjacent to these new loading spaces may be exposed to increased diesel emissions from vehicle idling. However, all loading and unloading involving commercial vehicles in these spaces would be subject to CCR title 13, section 2485, which limits idling to fewer than 5 minutes. Moreover, with the proposed project, fewer than four vehicles per hour would be expected on Jessie Street, Annie Street, and Angelo's Alley, and fewer than 11 vehicles per hour would be expected on Stevenson Street.[55]

The proposed project itself would not induce loading demand (e.g., by introducing a new land use). Furthermore, vehicles that would have otherwise idled at one of the loading bays on Market Street or in the alleys south of Market Street, including unauthorized locations (e.g., an alley travel lane or a parking lane), would be diverted from Market Street. Proposed side-street loading spaces on Angelo's Alley as well as Stevenson, Jessie, and Annie streets would be adjacent (i.e., within the same block) to existing loading bays, which would either be removed or relocated and converted into multi-use loading zones. Accordingly, the overall pollutant burden within 1,000 feet of the new loading spaces is anticipated to be similar to existing and no-project conditions, and incremental health risks are not expected to exceed the cumulative project contribution thresholds.

SUMMARY OF IMPACT AQ-3

The proposed project would not generate cancer risk and PM2.5 concentrations above significance thresholds during project construction (with implementation of Mitigation Measure M-AQ-1) or operations. Therefore, the proposed project would not expose sensitive receptors to substantial air pollutant concentrations. This impact would be ***less than significant with mitigation.***

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[53] For example, according to the California Air Resources Board's EMFAC2017 model, approximately 97 percent of light-duty automobiles (e.g., taxi) will be gasoline powered in 2020.

[54] For example, according to the California Air Resources Board's EMFAC2017 model, the number of electric-powered light-duty automobiles (e.g., taxis) in San Francisco County is expected to increase by more than 500 percent between 2015 and 2030.

[55] San Francisco Municipal Transportation Agency. 2018. *Better Market Street Loading and Parking Recommendations Memorandum*. February 22, 2018.

Western Variant

Construction of the Western Variant would entail the same construction approach, components, and duration as the **p**roposed **p**roject; therefore, it has the same potential to create health risk impacts as the **p**roposed **p**roject. Compliance with the Clean Construction Ordinance and Mitigation Measure M-AQ-1 would reduce the magnitude of the variant's contribution to local health risks. As discussed above, Mitigation Measure M-AQ-1 requires all off-road equipment to meet EPA-approved Tier 3 or 4 final emission standards, depending on engine horsepower, and reduce emissions below the Bay Area Air Quality Management District's significance thresholds. This is expected to reduce construction-related health risk impacts on nearby sensitive receptors.

The Western Variant includes changes in roadway configuration, private vehicle access, surface transit, and pedestrian and bicycle facilities in the western segment of the project corridor. The variant would not induce new vehicle trips, and the distribution of diverted traffic within the modeling domain is expected to be similar to that of the proposed project. The modeled cancer risk and PM2.5 concentrations at the MEI receptor location presented in Table 4.D-6, p. 4.D-39, for the proposed project would therefore be representative of maximum health risks expected for the Western Variant. The Western Variant would not increase health risks or PM2.5 concentrations in excess of the cumulative project contribution thresholds. Therefore, it would not expose sensitive receptors to substantial air pollutant concentrations. With respect to loading, the Western Variant would restrict three proposed loading zones on the north side of Market Street, between Hayes and 12th streets, to paratransit vehicles and taxis. On 11th Street, the 46-foot-long white zone and three 22-foot-long yellow zones would be removed to construct the northbound transit island. These modifications would support multiple vehicle and fuel types, including Muni buses, and therefore would most likely reduce emissions and associated health risks from idling compared with emissions from loading zones that currently serve diesel-powered commercial vehicles. This impact would be ***less than significant with mitigation***.

Impact AQ-4. The proposed project and project variant would not conflict with, or obstruct implementation of, the 2017 Clean Air Plan (Less than Significant with Mitigation)

The most recently adopted air quality plan for the SFBAAB is the 2017 Clean Air Plan. The Clean Air Plan is a road map that demonstrates how the SFBAAB will achieve compliance with the state ozone standards as expeditiously as practicable and how the region will reduce the transport of ozone and ozone precursors to neighboring air basins. In determining consistency with the 2017 Clean Air Plan, this analysis considers whether the project would (1) support the primary goals of the Clean Air Plan, (2) include applicable control measures from the Clean Air Plan, and (3) avoid disrupting or hindering implementation of control measures identified in the Clean Air Plan.

Would the proposed project support the primary goals of the Clean Air Plan?

The primary goals of the 2017 Clean Air Plan are to (1) reduce emissions and decrease concentrations of harmful pollutants, (2) safeguard public health by reducing exposure to air pollutants that pose the greatest health rick, and (3) reduce GHG emissions.

With respect to attainment of air quality standards, Mitigation Measure M-AQ-1 is identified above to reduce construction-related NO_X emissions to a level below the significance threshold. In addition, the proposed project would not result in health risks or PM2.5 concentrations above significance thresholds, thereby protecting public health in the Bay Area.

The proposed project's impact with respect to GHGs is discussed in the proposed project's initial study, which demonstrates that the proposed project would comply with the applicable provisions of the city's GHG Reduction Strategy. Thus, the proposed project would not result in any significant impacts associated with an increase in GHGs or conflict with measures adopted to reduce GHG emissions.

Does the proposed project include applicable control measures from the Clean Air Plan?

To meet the primary goals, the 2017 Clean Air Plan recommends specific control measures and actions. These control measures are grouped into various categories and include stationary-source measures, mobile-source measures, and transportation control measures. The 2017 Clean Air Plan recognizes that community design dictates individual travel mode and that a key long-term control strategy to reduce emissions of criteria pollutants, air toxics, and GHGs from motor vehicles is to channel future Bay Area growth into vibrant urban communities where goods and services are close at hand and people have a range of viable transportation options. To this end, the 2017 Clean Air Plan includes control measures that are aimed at reducing air pollution in the SFBAAB.

The measures most applicable to the proposed project are transportation control measures. These measures include the following:

- TCM-A1: Local and Area-wide Bus Service Improvements – Maintain and improve existing service, including new Express Bus or Bus Rapid Transit on major corridors, fund replacement of older buses, and implement Transit Priority Measures of the Transportation Climate Action Campaign.
- TCM-A2: Improve Local and Regional Rail Service – Maintain and expand existing service via funds to maintain railcars and other rail capital assets.
- TCM-C2: Safe Routes to Schools and Safe Routes to Transit Programs – Facilitate safe route to schools and transit by providing funds and working with transportation agencies, local governments, schools, and communities to implement safe access for pedestrians and cyclists.

- TCM-D1: Bicycle Access and Facilities Improvements – Expand bicycle facilities serving employment sites, educational and cultural facilities, residential areas, shopping districts and activity centers.
- TCM-D2: Pedestrian Access Facilities Improvements – Improve pedestrian facilities and encourage walking by funding projects that improve pedestrian access to transit, employment and major activity centers.
- TCM-D3: Local Land Use Strategies – Promote and support land use patterns, policies, and infrastructure investments that support high density mix-used, residential and employment development in order to facilitate walking, bicycling and transit use.

The proposed project would redesign and provide various transportation and streetscape improvements along the project corridor. Transportation and streetscape improvements would include changes to roadway configuration and private vehicle access, traffic signals, and surface transit, including changes regarding Muni-only lanes, stop spacing and service, stop locations, stop characteristics, and infrastructure. Also included are bicycle facilities, pedestrian facilities, and streetscapes. These features would decrease transit travel time, improve pedestrian circulation and safety, create a safer and more inviting bicycle route, and accommodate necessary motor trips, which would help to reduce the number of automobile trips compared with current conditions. Therefore, the proposed project would support the applicable control measures identified in the 2017 Clean Air Plan to meet the plan's primary goals.

Does the proposed project disrupt or hinder implementation of control measures identified in the Clean Air Plan?

Examples of projects that could disrupt or delay 2017 Clean Air Plan control measures are projects that preclude the extension of a transit route or a bike path or propose excessive parking requirements. The proposed project includes improvements that would encourage walking, bicycling, and transit use; improve transit service and efficiency; and improve the efficiency of the roadway system. It would not preclude extension of a transit route or a bike path or any other transit improvement. The proposed project does not include improvements that would provide excess parking capacity. Thus, the proposed project would not disrupt or hinder implementation of the control measures identified in the 2017 Clean Air Plan.

SUMMARY OF IMPACT AQ-4

The proposed project would be consistent with the 2017 Clean Air Plan, particularly with implementation of the Mitigation Measure M-AQ-1 to reduce construction-related NO_X emissions. In addition, the project would be consistent with the 2017 Clean Air Plan because it would incorporate several of its control measures, such as transportation control measures that support walking, bicycling, and transit use; improve transit service and efficiency; and improve the efficiency of the roadway system. The proposed project would also not hinder implementation of the 2017 Clean Air Plan. Therefore, the proposed project would not conflict with, or obstruct implementation of, the 2017 Clean Air Plan. This impact would be ***less than significant with mitigation.***

WESTERN VARIANT

The Western Variant would entail the same components as the proposed project; therefore, it would be consistent with the 2017 Clean Air Plan, particularly with implementation of Mitigation Measure M-AQ-1 to reduce construction-related NO_X emissions. In addition, the Western Variant would be consistent with the 2017 Clean Air Plan because it would incorporate various Clean Air Plan control measures, such as transportation control measures that encourage walking, bicycling, and transit use; improve transit service and efficiency; and improve the efficiency of the roadway system. The Western Variant would also not hinder implementation of the 2017 Clean Air Plan. Therefore, the Western Variant would not conflict with, or obstruct implementation of, the 2017 Clean Air Plan. This impact would be ***less than significant with mitigation.***

CUMULATIVE IMPACTS

As stated previously, the contribution of a project's individual air emissions to regional air quality impacts is, by its nature, a cumulative effect. If a project's emissions are below the project-level thresholds, the project would not be considered to contribute considerably to any cumulative air quality impacts. Similarly, if a project's localized health risk is below levels not anticipated to contribute to a health risk within the APEZ, the project would not be considered to contribute considerably to cumulative health risk impacts.

Impact C-AQ-1. The proposed project and project variant's construction, in combination with other past, present, and reasonably foreseeable future projects, would not contribute to cumulative regional air quality impacts. (Less than Significant with Mitigation)

Regional air pollution is by its very nature largely a cumulative impact. Emissions from past, present, and future projects contribute to the region's adverse air quality on a cumulative basis. No single project by itself would be enough to result in regional nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative adverse air quality impacts. The project-level thresholds for criteria air pollutants are based on levels that are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants. Therefore, because the proposed project's construction NO_X emissions (see discussion of Impact AQ-1) would not exceed the project-level threshold after mitigation, the proposed project would not result in a cumulatively considerable contribution to regional air quality impacts. This impact would be ***less than significant with mitigation.***

Western Variant

Construction of the Western Variant would entail the same construction approach, components, and duration as the proposed project; therefore, it has the same potential to create cumulative air quality impacts as the proposed project. With implementation of mitigation (see discussion of Impact AQ-1), the Western Variant would not exceed a project-level threshold and would not result in a cumulatively considerable contribution to regional air quality impacts. This impact would be ***less than significant with mitigation.***

Impact C-AQ-2. The proposed project and project variant's operation, in combination with other past, present, and reasonably foreseeable future projects, would not contribute to cumulative regional air quality impacts. (Less than Significant)

As discussed under Impact AQ-2, the proposed project would not induce or generate new vehicle trips that would result in a substantial increase in VMT or associated criteria pollutant emissions. Therefore, the proposed project's operation would not result in a cumulatively considerable contribution to regional air quality impacts. This impact would be ***less than significant.***

Western Variant

As discussed under Impact AQ-2, the Western Variant would not induce or generate new vehicle trips that would result in a substantial increase in VMT or associated criteria pollutant emissions. Therefore, operation of the Western Variant would not result in a cumulatively considerable contribution to regional air quality impacts. This impact would be ***less than significant***.

Impact C-AQ-3. Construction and operation of the proposed project and project variant, in combination with other past, present, and reasonably foreseeable future projects, would generate TACs, including DPM, but would not expose sensitive receptors to substantial air pollutant concentrations. (Less than Significant with Mitigation)

As discussed in Impact AQ-3, the project site is in an area that already experiences poor air quality. The project would add construction sources within an area that is already adversely affected by poor air quality, resulting in a considerable contribution to cumulative health risks and impacts on nearby sensitive receptors. This would be a significant cumulative impact. The proposed project would be required to implement Mitigation Measure M-AQ-1, which would require cleaner construction equipment. Implementation of this mitigation measure would reduce the project's contribution to the cumulative health risk to a less than considerable level. In addition, relocated vehicle traffic would not result in long-term health risks (refer to Table 4.D-6, p. 4.D-39). Therefore, the proposed project's operation would not result in a cumulatively considerable contribution to a health risk. This impact would be ***less than significant with mitigation***.

Western Variant

As discussed under Impact AQ-3, construction of the Western Variant would not expose sensitive receptors to substantial air pollutant concentrations or generate health risks beyond significance thresholds, particularly with implementation of Mitigation Measure M-AQ-1. In addition, relocated vehicle traffic would not result in long-term health risks in excess of thresholds. Therefore, the variant's operation would not result in a cumulatively considerable contribution to a health risk. This impact would be ***less than significant with mitigation.***

Impact C-AQ-4. The proposed project and project variant, in combination with other past, present, and reasonably foreseeable future projects, would not conflict with, or obstruct implementation of, the 2017 Clean Air Plan. (Less than Significant with Mitigation)

As discussed under Impact AQ-4, the proposed project could interfere with implementation of the 2017 Clean Air Plan. In addition, implementation of Mitigation Measure M-AQ-1 would reduce construction-related NO_X emissions to a level below the Bay Area Air Quality Management District's NO_X threshold. Therefore, this impact would be ***less than significant with mitigation***. The proposed project would not contribute to a cumulative conflict with the 2017 Clean Air Plan.

Western Variant

As discussed under Impact AQ-4, the Western Variant could interfere with implementation of the 2017 Clean Air Plan, but implementation of Mitigation Measure M-AQ-1 would reduce construction-related NO_X emissions to a level below the Bay Area Air Quality Management District's NO_X threshold. Therefore, this impact would be ***less than significant with mitigation***.

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4.E WIND

This section describes existing wind conditions along the project corridor and discusses the potential for the Better Market Street Project (proposed project) to create or substantially worsen wind hazards. The analysis in this section is based in part on the *Better Market Street Screening-level Wind Assessment* (wind study) prepared by Rowan Williams Davies & Irwin (RWDI) and included as Appendix 10.

No comments pertaining to wind were received in response to the notice of preparation (NOP) (Appendix 1).

ENVIRONMENTAL SETTING

Generally, winds in San Francisco originate over the Pacific Ocean and blow through the city in an easterly direction (i.e., from the west). Average wind speeds are highest in the summer and lowest in the winter. However, the strongest peak winds occur during the winter. The highest average wind speeds occur during the mid-afternoon; the lowest wind speeds occur during the morning. The winds that are most prevalent in San Francisco are those from the northwest, west-northwest, west, and west-southwest.

The comfort of pedestrians varies under different conditions (e.g., with variations in sun exposure, temperature, wind speed). Winds of up to 4 miles per hour (mph) have no noticeable effect on pedestrian comfort. With velocities between 4 and 8 mph, wind is felt on the face. Winds between 8 and 13 mph will disturb hair, cause clothing to flap, and extend a light flag mounted on a pole; winds between 13 and 19 mph will raise loose paper, dust, and dry soil and disarrange hair. For wind velocities between 19 and 26 mph, the force will be felt on the body. Between 26 and 34 mph, umbrellas are used with difficulty, hair is blown straight, there is difficulty in walking steadily, and the noise is unpleasant. Winds of more than 34 mph can result in loss of balance; higher gusts can blow people over.

Pedestrian wind conditions along Market Street are largely influenced by the surrounding buildings. Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. Such a downwashing[1] flow is often the main cause for wind accelerations around tall buildings at the pedestrian level. These winds can be relatively strong and turbulent, especially around exposed building corners. Downwashed winds may subsequently be channeled along street canyons between buildings, making these areas windy. Canopies can be helpful in intercepting and redirecting downwashed winds.

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1 "Downwashing" is an airstream directed downward by an object or structure (in this case, a building).

Pedestrian areas within the project corridor include sidewalks, crosswalks, transit stops and platforms, bicycle facilities, and outdoor seating areas. For most of the project corridor, a single row of deciduous street trees (*Platanus acerifolia*, or London plane tree) is included within the existing sidewalks on either side of the street. Some portions of the corridor, where sidewalks are widest, have a double row (e.g., between Fifth and Sixth streets, on the north side of Market Street between Drumm and Davis streets, plus others).

Various wind studies have been conducted, both along and in proximity to Market Street. These wind studies are referenced for the proposed project to identify existing wind conditions along the project corridor and help inform analysis of the proposed project's potential impacts.

As discussed below, the San Francisco Planning Code sets forth a 26-mile-per-hour wind speed for a single hour or more per year as a wind hazard criterion. The wind study found that wind conditions along Market Street generally do not exceed the wind hazard criterion through most of the project corridor because of the dense surroundings in the downtown area. However, the wind study found that three locations along Market Street experience wind speeds that exceed the wind hazard criterion:

Location 1: Around the intersection of Market Street with Third Street/Kearny Street, which is an "entrance" for prevailing west and west-northwest winds into the downtown core of dense, tall buildings. At this location, tall buildings on the east side of Kearny Street form a wall that deflects prevailing winds into the open Market Street intersection area.

Location 2: At the **north** end of Yerba Buena Lane on the west side of an existing hotel tower. At this location, winds along Yerba Buena Lane are caused by prevailing westerly winds that are deflected down (downwashed) by the tower at 757 Market Street (Four Seasons Hotel).

Location 3: Between Van Ness Avenue and Fell Street/Polk Street/10th Street. At this location, wind conditions are caused by downwashing from tall towers that are exposed to northwesterly winds and the relatively low buildings to the west.

WIND EFFECTS ON PEOPLE

The comfort of pedestrians varies under different conditions (e.g., with variations in sun exposure, temperature, wind speed).[2] Winds of up to 4 mph have no noticeable effect on pedestrian comfort. With velocities between 4 and 8 mph, wind is felt on the face. Winds between 8 and 13 mph will disturb hair, cause clothing to flap, and extend a light flag mounted

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[2] Lawson, T.V., and A.D. Penwarden, *The Effects of Wind on People in the Vicinity of Buildings*, Proceedings of the Fourth International Conference on Wind Effects on Buildings and Structures, London, 1975, Cambridge University Press, Cambridge, U.K., 605–622, 1976.

on a pole; winds between 13 and 19 mph will raise loose paper, dust, and dry soil and disarrange hair. For wind velocities between 19 and 26 mph, the force will be felt on the body. Between 26 and 34 mph, umbrellas are used with difficulty, hair is blown straight, there is difficulty in walking steadily, and the noise is unpleasant. Winds of more than 34 mph can result in loss of balance; higher gusts can blow people over.

Regulatory Framework

Planning Code Section 148

San Francisco Planning Code section 148 sets forth criteria for both wind "comfort" and wind "hazard" that are applicable to certain zoning districts. Section 148 defines "equivalent wind speed" as "an hourly mean wind speed adjusted to incorporate the effect of gustiness or turbulence on pedestrians." Section 148 requires proposed buildings as well as additions to buildings in Downtown Commercial (C-3) districts to be shaped or have wind-baffling measures where criteria may be exceeded.[3] Specifically, section 148 states that new buildings (including additions) must not result in an exceedance of the comfort level of a 11 mph equivalent wind speed in areas of substantial pedestrian use or a 7 mph equivalent wind speed in public seating areas more than 10 percent of the time year-round between 7:00 a.m. and 6:00 p.m. In addition, section 148 explicitly prohibits new buildings/additions that would cause equivalent wind speeds to reach or exceed the hazard level of 26 miles per hour for a single hour of the year.

Environmental Impacts

This section describes the impact analysis for the proposed project related to wind. It describes the significance criterion used to evaluate impacts as well as the approach to analysis.

Significance Criterion

The proposed project would be considered to have a significant impact related to wind if it were to alter wind in a manner that would substantially affect public areas.

The modifications proposed for the streets and sidewalks within the project corridor would occur within the existing operational public right-of-way and would not involve construction of or alterations to buildings along Market Street.

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[3] The planning code criteria are defined in terms of equivalent wind speed, which is an average wind speed (mean velocity) that has been adjusted to include the level of gustiness and turbulence. This section refers to the data as wind speeds.

Although the language of section 148 could be construed as inapplicable to the proposed project (section 148 calls out buildings and additions to buildings; the proposed project is largely focused on streetscape improvements and includes only new ancillary buildings, such as a restroom for transit operators and an elevator structure), the San Francisco Planning Department (planning department) has elected to use the wind hazard criterion of section 148 for determining whether the *whole* of the proposed project would have a significant effect. This is because of the "placemaking" objectives of the proposed project, which include encouraging the activation of public spaces; wind comfort is also a relevant consideration for this objective, although, as explained below, comfort is not included as a CEQA criterion.

APPROACH TO ANALYSIS

The methodology and criteria for analyzing potential project wind impacts in this EIR are derived from Planning Code section 148. For this project, the proposed streetscape changes would have an impact if they were to cause wind speeds that would equal or exceed 26 mph, averaged for a full hour for any hour of the year. The 26 mph, 1-hour wind hazard criterion is converted to a 1-minute average wind speed of 36 mph; therefore, 36 mph is used as the hazard threshold.

As also described above, section 148 establishes wind comfort criteria, whereby a project shall not cause ground-level wind currents to exceed, more than 10 percent of the time, 11 mph in areas of substantial pedestrian use and 7 mph in public seating areas. The planning department does not consider exceedances of the comfort criteria to be a significant impact for CEQA purposes.

The wind study compared the wind environment under both existing and project conditions. To determine existing conditions, the wind study drew upon numerous studies along and near the project corridor. Some of the wind tunnel models used in the previous studies did not include or assume existing street trees or street furniture in the models, solely buildings (see Appendix 10 for a description of the studies referenced). Because street trees and street furniture are considered positive wind control measures (i.e., they can reduce wind speeds experienced by people on the ground), actual wind speeds experienced by people may be lower than those predicted/assumed by the wind study.

To determine wind conditions with the proposed project, the wind study considered existing conditions at numerous points along Market Street and examined proposed project improvements for their potential to alter existing wind conditions such that the hazard criterion would be exceeded. As further detailed below, the wind study divided the project corridor into five study segments to determine whether the proposed project could have any significant effect.

IMPACTS AND MITIGATION MEASURES

Impact WS-1. The proposed project and project variant would not alter wind in a manner that would substantially affect public areas. (Less than Significant)

In a built-up area such as Market Street, the main factors affecting ground-level wind conditions are the buildings in the immediate surrounding area. As previously noted, tall buildings can create "downwash" conditions in which upper-level winds are directed/deflected to the ground.

The proposed project would not involve any new tall buildings but would occur in a corridor where downwashing conditions influence ground-level winds. The main feature of the proposed project that would have the potential to affect wind conditions is the proposed removal and replacement/relocation of all existing street trees along Market Street. As previously stated, closely planted trees, particularly those with dense canopies of foliage, can help reduce the wind speeds experienced by people at ground level near or by such trees. As noted in Chapter 2, the proposed project would replace the existing *Platanus* monoculture with trees from up to seven genera; Figures 2-3a through 2-3e show the proposed tree spacing.

The project also proposes placement of kiosks, retail stands, and other street furniture in various locations. The wind study notes that such features, particularly those in excess of 6 feet in height, may not only provide some wind protection but potentially reduce wind speeds at ground level on their leeward side. Smaller proposed features (i.e., those under 6 feet tall) would not be expected to substantially affect wind conditions. The exact placement of such features has not yet been determined but will be part of the final design.

Certain other elements of the proposed project with the ability to provide protection from and/or buffer wind speeds include a proposed restroom for transit operators, a relocated elevator shaft, and boarding ramps ("mini-highs") at various locations. As further discussed below, the wind study recommends street furniture and similar features, 6 feet in height or more, in selected locations to lessen wind speeds felt at ground level.

The wind study divided the Market Street project corridor into five slightly overlapping segments and examined existing and proposed conditions for each to determine whether any new or worsened effect might occur. The wind study's findings are summarized below by segment, from east to west.

Steuart Street to Sansome Street: This segment is heavily sheltered by tall buildings in the downtown core. Existing wind activity in this segment does not exceed the wind hazard criterion. Proposed project changes in this segment would have an insubstantial effect on existing wind conditions. This impact would be ***less than significant***.

Sutter Street to Stockton Street: This segment includes two of the three locations where exceedances of the wind hazard criterion currently occur: Locations 1 and 2. The wind study notes that tall buildings at these two locations cause higher wind speeds. The previous studies that were used to prepare the current wind study did not specifically model the presence of existing street trees or existing street furniture to lessen wind speeds experienced by people; however, the wind study more qualitatively assumes that existing trees (which the proposed project would remove and replace) have some positive wind control effects.

The wind study notes that removal of the existing double row of trees and replacement with a single row of closely spaced new trees would eventually create a canopy for pedestrians. Overall, the wind study notes that the proposed project improvements are not expected to significantly alter existing wind conditions or create any wind hazard exceedances. This impact would be ***less than significant***.

Ellis Street to Jones Street: This segment is generally surrounded by dense lower-rise buildings. It experiences relatively low wind activity (i.e., below the hazard criterion). Earlier studies of this segment did not include street trees or street furniture yet showed comfortable wind conditions. Accordingly, the wind study notes that the proposed project is not expected to result in any wind hazard exceedances. This impact would be ***less than significant***.

McAllister Street to Polk Street: This segment is lined with relatively dense medium-rise buildings on both sides of Market Street. Previous studies for this segment did not identify wind hazard exceedances and did not assume the presence of any landscaping (street trees). The proposed project would remove the existing double row of trees and replace them with a single row. Overall, the wind study found that proposed project improvements for this segment would not have any substantial effect on existing wind conditions or result in any wind hazard exceedances. This impact would be ***less than significant***.

Fell Street to Octavia Boulevard: This segment includes one of the three locations where wind hazard exceedances were predicted (Location 3). The wind study notes that the Market Street intersections at Fell Street/Polk Street/10th Street and Van Ness Avenue/Oak Street/11th Street currently experience exceedances of the wind hazard criterion because of downwashing associated with nearby tall buildings. The wind study concluded that the proposed project would not increase wind speeds or exposure to wind hazard conditions because the number and size of the replacement trees are expected to be similar to those existing. The wind study further notes that street furniture and public art would have the potential to improve wind conditions, particularly where such features are of a certain height and porosity and combined with nearby street trees.

The wind study also looked at portions of the segment west of Van Ness Avenue. West of Van Ness Avenue, both sides of Market Street are lined with low buildings. The wind study predicts that wind conditions with the proposed project would be similar to existing conditions and that no hazard exceedances would occur. This impact would be ***less than significant***.

Although the proposed project would not result in substantially worsened wind conditions or new exceedances of the hazard criterion, the wind study identified a list of measures that could help lower existing wind speeds at locations where the wind hazard criterion is currently exceeded. Appendix 10 includes a list of these suggested measures.

WESTERN VARIANT

The Western Variant would entail the westernmost 0.6 mile of the project corridor. As set forth in Chapter 2, Section G, the Western Variant would have a slightly modified program of roadway changes, private vehicle access restrictions, and streetscape features compared with the proposed project; the remainder of the corridor would be identical to the proposed project. Of relevance to the consideration of potential wind effects, the Western Variant would include an opportunity for yet-to-be-defined "gateway features" at one or more of the corners of the Market Street/Van Ness Avenue intersection. This intersection is at a location that currently experiences wind hazard conditions (Location 3). Street furniture (such as a gateway feature) could help reduce experienced wind speeds, particularly furniture of a particular design combined with street trees.

As noted in the wind study, the Western Variant would not introduce any features that would substantially worsen wind speeds. Therefore, the impact of the Western Variant would be ***less than significant***.

CUMULATIVE IMPACTS

Impact C-WS-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, could alter wind in a manner that would substantially affect public areas. However, the proposed project's contribution would not be cumulatively considerable. (Less than Significant)

The geographic context for the analysis of cumulative impacts associated with wind hazards considers the area surrounding Market Street. As shown in Appendix 5, several buildings are proposed along and near Market Street. Pedestrian wind conditions along Market Street are influenced largely by the surrounding buildings; therefore, the addition of buildings on and near Market Street could result in increased wind speeds. A cumulative impact could occur if additional buildings result in increased wind speeds that exceeds the wind hazard criterion. This analysis examines the potential for a cumulative impact and the contribution of the proposed project. Several past, present, and reasonably foreseeable projects would be within the vicinity of the project corridor. Appendix 5 identifies the following projects that would be on Market Street and result in the construction of a new residential and/or commercial building:

- 1390 Market Street (Assessor's Block 0813/006)
- One Oak Street (formerly 1500–1540 Market Street) (Assessor's Block 0836/002)
- 1100 Market Street (Assessor's Block 0351/001)
- 1546–1564 Market Street (Assessor's Block 0836/007)
- 1700 Market Street (Assessor's Block 0855/016)
- 1066 Market Street (Assessor's Block 0350/003)

- 1075 Market Street (Assessor's Block 3703/062)
- 950–974 Market Street (Assessor's Block 0342/001)
- 1125 Market Street (Assessor's Block 3702/047)
- 1870 Market Street
- 1699 Market Street (Assessor's Block 3504/030)
- 1740 Market Street (Assessor's Block 0855/010)
- 1028 Market Street (Assessor's Block 0350/002)
- 1053 Market Street (Assessor's Block 3703/066)
- 1095 Market Street (Assessor's Block 3703/059)
- 1629 Market Street (1601–1637 Market Street, 1125 Stevenson Street, 53 Colton Street [Plumbers Union site]) (Assessor's Block 3505/001, 007, 008, 027, 028, 029, 031, 031A, 032, 032A, 033, 033A, 035)
- 1601–1937 Market Street/53 Colton Street (Assessor's Block 3505/001)

In addition, Appendix 5 identifies plans that could result in the construction of new buildings in the vicinity of the proposed project. For example, the Market and Octavia Area Plan as well as the Hub Plan would result in zoning changes that could lead to the construction of new buildings adjacent to the project corridor. Because pedestrian wind conditions along Market Street are influenced largely by surrounding buildings, these projects could affect wind conditions by adding new buildings, exacerbating existing wind hazards where they currently exist between Van Ness Avenue and Fell Street/Polk Street/10th Street, or resulting in an exceedance of the wind hazard criterion where such an exceedance does not currently exist. The cumulative impact would therefore be considered ***significant***.

As described in Impact WS-1, the wind impact from the proposed project would not be substantial because the project would not include any new buildings that could result in additional downwashing. Therefore, the project's contribution to a significant cumulative impact would not be considerable and this impact would be ***less than significant.***

WESTERN VARIANT

For the same reasons described above for the proposed project, wind conditions with implementation of the Western Variant would be similar to those of the proposed project. Therefore, the Western Variant's contribution to a significant cumulative impact would not be considerable and this impact would be *less than significant*.

5. OTHER CEQA CONSIDERATIONS

This chapter discusses the following topics in relation to the Better Market Street Project (proposed project or project) and the project variant: growth inducement, significant environmental effects that cannot be avoided if the proposed project is implemented, significant irreversible environmental changes that would result if the proposed project, including the project variant, is implemented, and areas of controversy and issues to be resolved.

A. GROWTH-INDUCING IMPACTS

Section 15126.2(d) of the California Environmental Quality Act (CEQA) Guidelines states that an environmental impact report (EIR) should discuss "…the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Growth can be induced in a number of ways, including through the elimination of obstacles to growth, through the stimulation of economic activity within the region, or through precedent-setting action. CEQA requires a discussion of how a project could increase population, employment, or housing in the areas surrounding a project as well as an analysis of the infrastructure and planning changes that would be necessary to implement the project.

The proposed project and the project variant would not induce growth through the creation of a substantial number of new permanent jobs. As discussed in Section E.3 of the initial study (Appendix 2), *Population and Housing*, the proposed project would not increase the residential population or introduce new commercial, office, or industrial uses in the city. The project objectives include maximizing surface public transit system capacity in the project corridor to support planned housing and job growth consistent with adopted land use plans. Specifically, the proposed project is intended to optimize the surface public transit system's capacity and travel times, reduce safety hazards to bicyclists and pedestrians, improve pedestrian accessibility, and replace infrastructure that is nearing the end of its useful life. Implementation of the project would accommodate current demand as well as planned/approved development and population growth at both the city and regional levels. The proposed project is not anticipated to shift travel patterns in the city in any fundamental way such that growth would occur in neighborhoods where it is not otherwise anticipated. Overall, the project would support the planned growth and planning goals of the City and County of San Francisco. The project corridor and surrounding area is urban and built out with adequate infrastructure, utilities, and transit service.

Although the project variant was not considered in the initial study, the characteristics of the project variant are similar to or the same as the proposed project and would not change the impact determinations presented in the initial study.

Impacts typically related to growth-inducing projects include those on infrastructure (i.e., transportation, water supply, electricity, wastewater conveyance infrastructure) and public services (i.e., emergency services, schools, parks, libraries). The project corridor is in an area with connectivity to existing local and regional transit services. The proposed project and the project variant would be designed to optimize transit, bicycle, and pedestrian modes of travel.

Although the proposed project and the project variant would not include any new transit lines that would bring transit riders to unserved areas, the proposed project is anticipated to enhance transit capacity and carry more passengers more efficiently within the project corridor, including through the addition of the new F-loop along McAllister Street and Charles J. Brenham Place, which would increase service frequency on a new F-Short route. The proposed project and the project variant would not induce population growth at a level in excess of what is projected for the city and regional area. The proposed project and the project variant would not extend or expand existing roads, utilities, or other infrastructure beyond the extent of the current operational public right-of-way or outside of the project corridor. It would not substantially alter existing or induce new development because transit service already exists in the project corridor.

B. SIGNIFICANT UNAVOIDABLE IMPACTS

In accordance with sections 21100 (b)(2)(A) and 21100.1(a) of the CEQA Statute and section 15126.2(b) of the CEQA Guidelines, an EIR is required to identify any significant environmental effects that cannot be avoided if a project is implemented. Many potential impacts identified for the proposed project would either be less than significant or mitigated to a less-than-significant level. The proposed project was determined to have the following significant and unavoidable impacts, even with implementation of feasible mitigation measures, as described in detail in the respective environmental resource sections in Chapter 4, *Environmental Setting and Impacts*. Each of these impacts is equally applicable to the project variant.

CULTURAL RESOURCES

- Impact CP-1.C. The proposed project and project variant would cause a substantial adverse change in the significance of the Market Street Cultural Landscape District as a designed landscape associated with the Market Street Redevelopment Plan.
- Impact C-CP-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would result in a cumulatively considerable contribution to a significant cumulative impact on the Market Street Cultural Landscape District but not on any other historic architectural resources.

TRANSPORTATION AND CIRCULATION

- Impact TR-1. Construction of the proposed project and project variant could result in substantial interference with pedestrian, bicycle, or vehicle circulation and accessibility to adjoining areas, and could result in potentially hazardous conditions.
- Impact C-TR-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative construction-related transportation impacts.
- Impact C-TR-4. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative transit impacts related to transit operations on the Muni 27 Bryant but would not contribute considerably to significant cumulative transit impacts on other local and regional routes.

NOISE

- Impact C-NO-1. Construction activities for the proposed project and the project variant, in combination with other past, present, and reasonable future projects in the city, would result in a substantial temporary increase in noise or noise levels in excess of the applicable local standards.

C. SIGNIFICANT IRREVERSIBLE CHANGES

In accordance with section 21100(b)(2)(B) of the CEQA Statute and section 15126.2(c) of the CEQA Guidelines, an EIR must identify any significant irreversible environmental changes that could result from implementation of a project. This may include current or future uses of nonrenewable resources and secondary or growth-inducing impacts that commit future uses of nonrenewable resources. Also included are secondary or growth-inducing impacts that commit future generations to similar uses. According to the CEQA Guidelines, irretrievable commitments of resources should be evaluated to consider whether current consumption is justified. In general, such irreversible commitments include the use of resources, such the materials to construct a project, as well as the energy and natural resources (including water) that would be required to sustain a project and its inhabitants or occupants over the usable life of the project.

The consumption of nonrenewable resources includes conversion of agricultural lands and lost access to mining reserves. As discussed in section E.3 of the initial study, *Agriculture and Forest Resources*, the California Department of Conservation designates the site as "Urban and Built-Up Land." The project corridor is located in an urbanized area of San Francisco. Therefore, no existing agricultural lands would be converted to non-agricultural uses. In addition, the project corridor does not contain known mineral resources and does not serve as a mining reserve; therefore, development of the proposed project and the project variant would not result in the loss of access to mining reserves.

No significant environmental damage, such as accidental spills or explosions of hazardous materials, is anticipated with implementation of the proposed project and the project variant. Compliance with federal, state, and local regulations would avoid this impact. Impacts associated with accidental spills or explosions of hazardous materials would be less than significant.

Where necessary, the project sponsor would be required to demonstrate compliance with the performance standards outlined in the Maher Ordinance, subject to review and approval by the San Francisco Department of Public Health. Other regulations related to hazards and hazardous materials, such as applicable health and safety requirements of Public Works Code article 2.4 and San Francisco Health Code article 22B, would also apply. As such, no irreversible changes would result from development of the proposed project and the project variant.

Construction of the proposed project and the project variant would require additional fuel, water, and energy for construction vehicles and equipment as well as water for construction site activities, such as dust control and equipment wash-downs. Specifically, electricity would be used to operate construction equipment such as hand tools and lighting. Construction vehicles and equipment would use primarily diesel fuel; construction workers would use gasoline, diesel, and electricity to travel to and from the project corridor. However, the amount of fuel and energy used during construction would be typical of public works projects and would not be expected to be used in a wasteful manner.

Non-potable water is required to be used for construction dust control, pursuant to article 21 of the Public Works Code. The proposed project, including the project variant, also would be required to comply with the Resource Efficiency and Green Building Ordinance and Construction Recycled Content Ordinance, which indirectly reduce energy use by reducing the need to extract, transport, and manufacture new construction materials. In addition, during operation of the proposed project and the project variant, energy and fuel would be used more efficiently than under existing conditions because the proposed project and the project variant would enhance transit capacity and carry more passengers more efficiently within the project corridor.

The proposed project and the project variant would not generate new vehicle trips. The project objectives include optimizing the reliability, safety, efficiency and comfort of all users of sustainable transportation modes (transit, walking, and cycling) along and across Market Street from Octavia Boulevard to Steuart Street. In addition, the proposed project was planned with the goal of reducing surface public transit travel time by minimizing idle time caused by congestion and intersection wait times, which increase energy and fuel use. Therefore, the proposed project and the project variant would not result in a significant impact associated with the consumption of nonrenewable resources.

D. AREAS OF KNOWN CONTROVERSY AND ISSUES TO BE RESOLVED

This EIR analyzes the potential environmental effects of the proposed project and the project variant. A notice of preparation (NOP) for the proposed project was issued on January 14, 2015 (Appendix 1 of this EIR). Although the project variant was not described in the NOP, the characteristics of the project variant are generally similar to or the same as those of the proposed project and within the same project corridor. On the basis of public comments submitted following publication of the NOP, it was determined that the potential areas of controversy and unresolved issues for the proposed project and the project variant include:

- Potential impacts of the proposed changes to Market Street on the capacity provided by the Central Freeway and local street system (Section 4.B, *Transportation and Circulation*)
- Potential impacts on the U.S. 101/Octavia Boulevard and U.S. 101/Mission Street off-ramps, including average daily traffic, a.m. and p.m. peak-hour volumes, and levels of service (LOS) on affected facilities under existing, existing-plus-project, cumulative, and cumulative-plus-project scenarios (Section 4.B, *Transportation and Circulation*)
- Potential impacts related to area traffic and the degradation of existing and cumulative LOS as well as the identification of mitigation measures (including fair-share contribution, schedule, and implementation responsibilities) to reduce impacts, where feasible (Section 4.B, *Transportation and Circulation*)
- Potential impacts resulting from recent and proposed changes in the project area, including the closure of Annie Street and other changes proposed under the Central SoMa Plan (Section 4.B, *Transportation and Circulation*)
- Potential impacts of an alternative that considers transit operating in one lane in each direction on Market Street (Chapter 6, *Alternatives*)
- Potential impacts related to emergency access and operational functions regarding revenue collection and service vehicles (Section 4.B, *Transportation and Circulation*)
- Potential safety and LOS impacts related to changes to surface transit on Market Street (Section 4.B, *Transportation and Circulation*)
- Potential access impacts for private vehicles, including private vehicles exiting the garage at One Bush Street (Section 4.B, *Transportation and Circulation*)
- Potential impacts, including impacts related to safety, on state facilities for bicyclists/pedestrians, as well as their connections, as a result of the proposed project (e.g., the one-way streets near the U.S. 101 on- and off-ramps) (Section 4.B, *Transportation and Circulation*)
- Potential performance and quality of service impacts on bicyclists/pedestrians and transit (Section 4.B, *Transportation and Circulation*)

- Potential secondary impacts from implementation of identified mitigation measures (Section 4.B, *Transportation and Circulation*)
- Potential impacts resulting from increases in bicycle trips and changes to bicycle circulation on Market Street (Section 4.B, *Transportation and Circulation*)
- Potential loading impacts on commercial and passenger vehicles (Section 4.B, *Transportation and Circulation*)
- Potential impacts related to general plan consistency (Chapter 3, *Plans and Policies,* and the initial study included in Appendix 2)

6. ALTERNATIVES

A. INTRODUCTION

This chapter presents the alternatives analysis for the proposed project. The chapter identifies what the California Environmental Quality Act (CEQA) requires for an alternatives analysis, summarizes the alternatives formulation, refinement, and screening processes, and compares the proposed project against potentially feasible alternatives.

The alternatives are evaluated for their comparative merits with respect to minimizing significant environmental effects of the proposed project. This chapter also identifies the environmentally superior alternative. Finally, it describes other alternative concepts that were considered but eliminated from detailed consideration and the reasons for their elimination.

ORGANIZATION OF THIS CHAPTER

This chapter is divided into five main sections.

- Section 6.A is this introductory section, which includes a discussion of state and local requirements for the analysis of alternatives.
- Section 6.B describes the basis for selecting the alternatives analyzed in this EIR; it reviews the project objectives, summarizes the significant impacts of the project that were identified in Chapter 4, *Environmental Setting and Impacts*, and describes the alternatives screening and selection process.
- Section 6.C provides a detailed description of each of the selected alternatives and summarizes their ability to meet the project objectives.
- Section 6.D presents the detailed alternatives analysis and evaluates the environmental impacts of each of the alternatives, compared to those of the proposed project and relative to each other; it is organized by resource topic and compares the impacts of the alternatives to the impacts of the proposed project and to one another. Section 6.D identifies the environmentally superior alternative.
- Section 6.E discusses alternative concepts considered but rejected from further study.

REQUIREMENTS FOR ALTERNATIVES ANALYSIS

CEQA

CEQA requires the analysis of a reasonable range of alternatives to the proposed project (potentially including the location of the project), that would feasibly attain most of the basic objectives of the project and avoid or substantially lessen any of the significant effects of the project (CEQA Guidelines section 15126.6). The range of alternatives required in an environmental impact report (EIR) is governed by a "rule of reason," which stipulates that an EIR shall set forth only those alternatives that are necessary for informed public participation and an informed and reasoned choice by the decision-making body (CEQA Guidelines section 15126.6(f)) and potentially feasible (CEQA Guidelines section 15126.6(a)). CEQA, the CEQA Guidelines, and the case law on the subject have found that *feasibility* can be based on a range of factors and influences. CEQA Guidelines, section 15364, defines "feasibility" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." The following factors may also be taken into consideration when assessing the feasibility of alternatives: site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and the ability of the proponent to attain site control (CEQA Guidelines section 15126.6(f)(1)).

An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. Furthermore, an EIR need not consider every conceivable alternative but must consider a reasonable range of alternatives that would foster informed decision-making and public participation.

CEQA also requires that a *No-Project Alternative* be evaluated (CEQA Guidelines section 15126.6(e)). The analysis of a No-Project Alternative's potential environmental effects allows decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. CEQA further requires identification of an *environmentally superior alternative* from among the alternatives considered. The environmentally superior alternative is generally defined as the alternative that would result in the fewest significant environmental impacts. If an EIR finds that the No-Project Alternative is the environmentally superior alternative, the EIR must also identify an environmentally superior alternative among the other alternatives.

CEQA Guidelines section 15126.6(c) also requires an EIR to identify and briefly discuss any alternatives that were considered by the lead agency but rejected as infeasible. For the Better Market Street project, the project sponsor and partner agencies undertook a multi-year process to formulate and evaluate numerous design concepts as potential alternatives. Section 6.E (*Alternatives Considered but Rejected*) summarizes this process.

Historic Preservation Commission Resolution 746

Resolution 746 of the City's Historic Preservation Commission (HPC) sets forth further requirements for the City's environmental review of certain projects. Resolution 746 states for that projects found to have significant environmental effects to one or more cultural resources, the EIR should include at least two alternatives specific to avoiding or minimizing such effects. Specifically, the resolution states that one alternative should fully preserve the features of the affected historic resource “while still meeting most of the basic objectives of the project” and another alternative which would “preserve as many features of the resource as possible that convey its historic significance while taking into account the feasibility of the proposed alternative and the project objectives.”

To this end, this chapter identifies and provides comparative impacts for a Full Preservation Alternative and two Partial Preservation Alternatives. These are described further in subsequent sections, including Sections 6.B (*Alternatives Screening and Selection*) and 6.C (*Description of Alternatives Selected for Analysis*). This chapter incorporates feedback received regarding the adequacy of preservation alternatives from the Architectural Review Committee of the HPC at a January 16, 2019, public hearing.[1]

B. Alternatives Screening and Selection

In accordance with CEQA Guidelines section 15126.6(a), this chapter examines a reasonable range of alternatives to the proposed project. This section of the CEQA Guidelines sets forth three general criteria pertaining to alternatives:

1. The alternative would be potentially feasible.
2. The alternative would feasibly attain most of the project’s basic objectives;
3. The alternative would avoid or substantially lessen one or more of the significant environmental impacts of the proposed project;

Project Objectives

Refer to Chapter 2, *Project Description*, for a complete list of project objectives, including “basic objectives” (i.e., most important). As noted above, an EIR need only consider alternatives that would feasibly attain most of the project’s basic objectives.

Summary of Significant Impacts

The alternatives to the proposed project are meant to feasibly attain most of the basic project objectives while avoiding or substantially lessening significant impacts. Significant impacts from the proposed project would occur with respect to cultural resources and transportation and circulation, as listed below.

[1] Materials related to the January 16, 2019, meeting of the HPC and its Architectural Review Committee can be reviewed and obtained on line at https://sf-planning.org/meetings/18.

Significant and Unavoidable Impacts

The proposed project was determined to have the following significant and unavoidable impacts, even with implementation of feasible mitigation measures, as described in detail in Chapter 4, *Environmental Setting and Impacts*. Each of these impacts would be equally applicable to the Western Variant.

Cultural Resources Impacts

- Impact CP-1.C. The proposed project and the project variant would cause a substantial adverse change in the significance of the Market Street Cultural Landscape District (landscape district) as a designed landscape associated with the Market Street Redevelopment Plan.
- Impact C-CP-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would result in a cumulatively considerable contribution to a significant cumulative impact to the Market Street Cultural Landscape District but not on any other historic architectural resources.

Transportation and Circulation Impacts

- Impact TR-1. Construction of the proposed project and project variant could result in substantial interference with pedestrian, bicycle, or vehicle circulation and accessibility to adjoining areas, and could result in potentially hazardous conditions.
- Impact C-TR-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative construction-related transportation impacts.
- Impact C-TR-4. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative transit impacts related to transit operations on the Muni 27 Bryant but would not contribute considerably to significant cumulative transit impacts on other local and regional routes.

Noise Impacts

- Impact C-NO-1. Construction activities for the proposed project and the project variant, in combination with other past, present, and reasonable future projects in the city, would result in a substantial temporary increase in noise or noise levels in excess of the applicable local standards.

Overview of Alternatives Screening

As documented extensively in Section 6.E (*Alternatives Considered but Rejected*), the project sponsor and project team began in 2011 to formulate and evaluate design concepts and options. This highly iterative process generated more than 20 potential design concepts and options, each including a mix of both corridor-wide and more site-specific elements. In concluding that various elements would either be infeasible and/or not meet basic project objectives, the project sponsor and team revised and refined such elements, ultimately shaping a complete and feasible corridor-wide proposed project that most robustly achieved project objectives. As further detailed in Section 6.E, the consideration (and rejection) of various potential alternatives led directly to the identification of the proposed project.

Strategies to Avoid or Lessen Significant Impacts

As noted above, the proposed project would result in significant and unavoidable impacts in two environmental resource areas: cultural resources and transportation. The proposed project is intended to reshape and reprogram Market Street. As the very landscape of Market Street itself has been determined to be an eligible cultural resource (the landscape district, which includes numerous character-defining features), almost any large-scale proposed change to the appearance of Market Street would impact the eligibility of this resource. To this end, the EIR includes three alternatives that are expressly intended to be potentially feasible, avoid or minimize significant impacts on the eligible cultural landscape district, and attempt to meet basic project objectives. These alternatives are discussed below (*Preservation Alternatives*). Furthermore, in recognition that heavy construction associated with project-related utility upgrade/replacement work is a major factor in significant project-related transportation impacts as well as cumulatively considerable construction noise impacts, the EIR includes an alternative (*Alternative E: Core Elements Alternative*, p. 6-48) that would preserve streetscape, safety, and transit related elements of the project but omit most underground utility work and thus reduce the scale and timeframe of construction so as to lessen project-related noise and traffic disruption. Section 6.C in this chapter details the *Core Elements Alternative*.

Preservation Alternatives

As set forth in Section 4.A, *Cultural Resources*, the proposed project would have a significant and unavoidable impact on a cultural resource, namely, the landscape district. Unlike a historic building or object, which is usually limited to a discrete property, the landscape district comprises the entire project corridor and encompasses the public right-of-way, namely, Market Street itself, sidewalks and plazas along Market Street and adjacent side streets, and intersections with adjacent cross streets (see Figure 4.A-1).

Per the 2016 *Cultural Landscape Evaluation*, the landscape district is a complex historic architectural resource that is eligible for listing in both the National Register of Historic Places (NRHP) and the California Register of Historic Resources (CRHR).[2] More specifically, the landscape district is significant under NRHP Criteria A and C/CRHR Criteria 1 and 3. The landscape district is considered historically significant under three key criteria, each related to a different historical "role" of Market Street:

- As San Francisco's main circulation artery and facilitator of urban development (NRHP A/CRHR 1)
- As a venue for civic engagement in San Francisco (NRHP A/CRHR 1)
- As a designed landscape associated with the Market Street Redevelopment Plan (NRHP C/CRHR 3)

As part of the 2016 study, the landscape district's eligibility was built on a detailed inventory and evaluation of its character-defining features. Each of the historic significance statements above encompasses a number of character-defining features. The 2016 study weights the character-defining features for each significance statement differently under one of three "priority" levels:

- Priority 1 are those features most critical to expressing association with a given area of significance.
- Priority 2 are those features that contribute meaningfully to expressing association with a given significance where aggregate loss can greatly diminish the ability to read Market Street's associations with history.
- Priority 3 are those features that are least essential to the expression of Market Street's associations with history and whose loss will diminish Market Street's integrity but not to the extent of making the landscape unreadable as a cultural resource.

Please see Section 4.A and Appendix 6 for more detail on all of the character-defining features of the landscape district.

As demonstrated in Section 4.A, the proposed project would have a less-than-significant impact on the landscape district under the first two criteria (Market Street as a circulation artery; Market Street as a civic engagement venue) but a significant and unavoidable impact under the third (Market Street as a designed landscape associated with the Market Street Redevelopment Plan [MSRP]).

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[2] *Cultural Landscape Evaluation, Better Market Street Project, Market Street, San Francisco, CA*, 2016, final, November, San Francisco, CA, prepared for San Francisco Public Works, San Francisco, CA.

According to the 2016 study, 30 existing character-defining features convey the landscape district's significance as a designed landscape associated with the MSRP. Of these, 13 are priority 1. Of the 13 priority 1 character-defining features, the proposed project would adversely alter three such features. These are:

- Red brick paving in herringbone pattern that distinguishes pedestrian from vehicular spaces (see *Historic Paving Materials,* below)
- Street trees (species vegetation characteristics)
- Small plazas (Robert Frost, Mechanics Monument, Crocker, and Mark Twain plazas)

In addition, the Path of Gold light standards are a priority 1 character-defining feature that would be altered by the project but not incompatibly.

The project variant would have effects identical to those of the proposed project with respect to Market Street's significance as a designed landscape associated with the MSRP. Therefore, for the purposes of generating preservation alternatives, attention was focused on the three priority 1 character-defining features associated with the landscape district's significance as a designed landscape associated with the MSRP that the proposed project would demolish or incompatibly alter. Part of the intent of the alternative generation work was to determine whether an alternative could fully preserve the resource (i.e., avoid a significant impact under CEQA) by avoiding demolition or incompatible alteration of one or more of the priority 1 character-defining features.

The discussion below focuses on the strategies used to develop the preservation alternatives around these three priority 1 character-defining features as well as the Path of Gold. Complete details on the preservation alternatives are in Section 6.C, below.

HISTORIC PAVING MATERIALS

In fulfillment of safety and accessibility objectives, the proposed project would remove all existing red bricks as well as the granite curbs separating the bricks from vehicular spaces and replace them with new paving materials that meet current regulations and guidelines for fully accessible pedestrian areas. Granite curbs would be reused as feasible as part of the proposed project, but the red brick (as a priority 1 character-defining feature) was of particular focus in developing preservation alternatives.

The project sponsor considered replacing the brick with paving materials that would be similar to or compatible with the historic brick so as to lessen impacts on this resource while simultaneously meeting safety and accessibility needs. However, preserving either the material or the herringbone pattern may be incompatible with accessibility regulations and guidelines, which specify that pedestrian areas be maximally accessible by people with limited mobility and/or vision.[3] For example, San Francisco Public Works Order 200369 (included in Appendix 3) identifies standard paving materials for public rights-of-way in San Francisco and incorporates provisions of the federal Americans with Disabilities Act (ADA) that require pedestrian access routes within the public right-of-way to minimize impediments to people with disabilities. Furthermore, the San Francisco Better Streets Plan, among other measures, states that paving materials "should not pose tripping hazards or cause excessive vibration for wheelchairs." The order adds detail to this policy by specifying acceptable paving materials and their installation for both major (as on Market Street) and minor pedestrian access routes.

The numerous joints associated with the existing brick paving have been found to cause vibration for some people who use wheelchairs as well as visually impaired persons and individuals with mobility impairments who use canes.[4] The requirement related to joints in the surface of the pedestrian access route is intended to eliminate, to the greatest extent possible, surfaces that tend to cause the front end of a wheelchair to vibrate or bounce as it travels across the surface. For many people who must use wheelchairs, this vibration can cause pain or muscle spasms, possibly leading to loss of control of the wheelchair. Moreover, the existing herringbone pattern, with its wide joints, poses challenges for visually impaired persons. Joints between bricks can be wide enough to catch the tip of a cane and thus be dangerous for those with walking aids. In addition, brick has a tendency to buckle over time, creating tripping issues for people with visual impairments as well as pedestrians with mobility impairments. To address such concerns, Public Works Order 200369 stipulates allowable dimensions and shapes for paving materials and specifies the maximum allowable joint/gap areas.

The preservation alternatives were developed with the understanding that, in any location where the curb-to-curb width of Market Street would be altered and/or other elements would entail removal of substantial areas of the red brick, the above-referenced federal and local accessibility regulations would require either a) the removal of all brick and replacement with more accessible sidewalk surfaces or b) retention of some brick, provided that a fully accessible and pedestrian access route of sufficient width (10 feet) was provided. Accordingly,

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3 Federal and local regulations informing development of preservation alternatives include the U.S. Access Board Standards for public sidewalks, the Accessibility chapter (8-6) of the 2016 California Historical Building Code, the 2016 California Access Compliance Advisory Reference Manual, the 2010 ADA standards, the May 2016 legal opinion of the U.S. Department of Transportation Office of General Counsel (49 CFR 37.43a), and the San Francisco paver order.

4 Conclusions in this discussion are drawn from the U.S. Access Board. n.d. *Guidelines and Standards.* Advisory Committee Report. Available: https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/background/access-advisory-committee-final-report/x02-new-construction-minimum-requirements-x02-1-public-sidewalks?highlight=WyJ2aWJyYXRpb24iLCJ2aWJyYXRlIiwidmlicm F0aW5nIiwidmlicmF0b3IiLCJ2aWJyYXRpb25zIiwidmlicmF0ZXMiLCJ3aGVlbGNoYWlyIiwid2hlZWxja GFpcnMiLCJ3aGVlbGNoYWlyJ3MiLCJ3aGVlbGNoYWlyJyJd. Accessed: December 12, 2018.

the development of preservation alternatives hinged greatly on the disposition of the existing red brick. Each of the three preservation alternatives has a different treatment for the existing red brick.

- Alternative B (Full Preservation Alternative) would retain all existing red brick, despite (as further descried below) the inability of the existing red brick to fully meet the project's safety and accessibility objectives.
- Alternative C (Partial Preservation Alternative 1) would remove all existing red brick and replace it with paving materials consistent with the accessibility, size, color, and other requirements of Public Works Order 200369 that, at the same time, reference the existing red brick and its herringbone pattern.
- Alternative D (Partial Preservation Alternative 2) can be considered a hybrid of Alternatives B and C insofar as about half of the blocks within the project corridor would see retention of the existing red bricks in a herringbone pattern. On the other half of the project corridor's blocks, the existing red brick would be replaced (similar to Alternative C) with paving materials consistent with Public Works Order 200369.

STREET TREES

Another priority 1 character-defining feature of the landscape district is the street trees, namely, their species characteristics. As further detailed in Section 4.A, *Cultural Resources*, the MSRP included a monoculture of *Platanus x acerifolia* or London plane trees. However, since the trees were planted, Public Works has found that this single tree type has not performed well in the Market Street environment and that the monoculture of trees leaves the trees more susceptible to catastrophic disease relative to a mix of trees.[5] Moreover, in the years since the MSRP was implemented, various City agencies have developed and enacted new guidance and regulations regarding street tree type and selection, based on current and anticipated climate, durability in urban conditions, drought tolerance, size, and other criteria.

Because the species characteristic or monoculture of trees is a priority 1 character-defining feature of the landscape district, removal of these trees without replacing the monoculture would contribute to a conclusion of a significant impact on the landscape district. The proposed project would remove the existing monoculture and, consistent with the Better Street Plan and other City regulations and guidance concerning urban forestry, replant with trees from a selection of seven species deemed suitable for an environment like Market Street.

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[5] HortScience, Inc., *Better Market Street Project Tree Inventory Report*, August 2016.

In contrast, the three preservation alternatives offer the following plans for street trees:

- Alternative B (Full Preservation Alternative) would replace the existing *Platanus* monoculture with new, more disease-resistant *Platanus* species, retaining the species monoculture.
- Alternative C (Partial Preservation Alternative 1) would replace the existing *Platanus* with trees of similar height and canopy spread as the *Platanus* from a selection of three to five genera. The monoculture would no longer be present, but the replacement trees would reference the *Platanus* in their form.
- Alternative D (Partial Preservation Alternative 2) would replace the *Platanus* monoculture with new, more disease-resistant *Platanus* species, retaining the species monoculture.

It should also be noted that the arrangement of trees in a linear pattern is a priority 2 character-defining feature of the landscape district. This was a secondary consideration in generating preservation alternatives, given that two of the preservation alternatives (Alternatives B and D) would each retain the species monoculture (a priority 1 character-defining feature).

Small Plazas

The proposed project would remove and replace all existing sidewalk materials (i.e., the red bricks, discussed above). It is assumed that small plazas and their small-scale features (e.g., benches, lighting) would need to be removed or replaced as part of sidewalk removal and replacement. However, the proposed project would preserve the monument associated with Mechanics Monument Plaza in place. Moreover, the proposed project would not alter the physical dimensions of the small plazas.

- Alternative B (Full Preservation Alternative) would retain existing sidewalk materials and thus would retain existing small plazas, similar to existing conditions.
- Alternative C (Partial Preservation Alternative 1) would replace all sidewalk material with new accessible paving material, consistent with Public Works Order 200369. Otherwise, Alternative C would be similar to the proposed project in retaining the physical dimensions of the small plazas and the location of the Mechanics Monument.
- Alternative D (Partial Preservation Alternative 2) would alter the sidewalks on the blocks, including Mechanics Monument Plaza, Crocker Plaza, and Mark Twain plaza, but would retain the physical dimensions of the plazas. Alternative D would not alter sidewalks at Robert Frost Plaza, which would remain similar to existing conditions.

Path of Gold Light Standards

As further detailed in Chapter 2, p. 63, the Path of Gold light standards are collectively designated as an Article 10 landmark by the City of San Francisco; this includes all light standards from The Embarcadero to the Castro District. Generally, the current linear arrangement of the standards follows the Market Street Redevelopment Plan– (MSRP-) era installation of replicated Path of Gold standards between the Embarcadero and Octavia Boulevard. Since the re-installation was completed in 1976, individual standards have been moved as needed to accommodate changes within the public right-of-way.

As discussed in Section 4.A, *Cultural Resources*, as part of the proposed project, the 236 Path of Gold light standards within the project corridor would be partially restored (the three-part trident top with each prong containing a light globe), reconstructed (base and pole), and realigned. Specifically, the existing poles would be replaced with larger poles, and the existing trident light fixtures and light globes would be restored and reused at the top of the new poles. Where cast iron components of the trident have deteriorated, they would be recast and reinstalled. The high pressure sodium lights installed in 1972 would be replaced with energy efficient LED lights, and the clamshell bases would be recast and modified to accommodate the larger poles (see Figure 2-4, p. 2-43). Some individual standards may need to be moved or removed from their existing locations to avoid conflicts; however, no more than 25 percent (up to 58) of the standards would be removed or located out of alignment with other standards.

The proposed project includes a new sidewalk-level bicycle facility along the length of Market Street that would meet several project objectives (e.g., safety and mobility). In many locations, the new bicycle facility would interfere with the current location of the Path of Gold. Other elements of the project (e.g., transit stops, loading zones), intended to achieve additional project objectives (e.g., reduce conflicts between loading vehicles), would interfere with the current location of the Path of Gold. In addition, the existing poles are near the end of their useful life, thereby conflicting with a project objective because they are deteriorating. Furthermore, the heights of the OCS wires connected to the poles do not meet current standards in some locations.

In contrast to the changes regarding the existing red bricks in a herringbone pattern and the street tree species, the proposed project's modifications to the Path of Gold would not be considered incompatible alterations insofar as the integrity of the priority 1 character-defining feature would remain intact. Nonetheless, the preservation alternatives contemplate different treatments for the Path of Gold, resulting from the different streetscape changes assumed in each alternative.

- Alternative B (Full Preservation Alternative) would not modify the width of the streetscape, obviating any need to relocate light standards in association with new bicycle facilities or modified OCS. Therefore, Alternative B would retain the Path of Gold light standards as they are in their current locations.
- Alternative C (Partial Preservation Alternative 1) would implement the same streetscape modifications as the proposed project, except for differences in sidewalk paving materials and trees. Because of the streetscape modifications, Alternative C would need to implement the same treatment to the Path of Gold light standards (partial restoration, reconstruction, and realignment) as the proposed project.

- Alternative D (Partial Preservation Alternative 2) would implement some of the streetscape modifications of the proposed project but not the protected bicycle facility. The streetscape modifications of Alternative D would necessitate changes to the OCS system, which, in turn, would require the same partial restoration, reconstruction, and realignment of the Path of Gold light standards as the proposed project.

PRIORITY 2 AND 3 CHARACTER-DEFINING FEATURES

As described further below, the above-referenced priority 1 features formed an adequate basis on which to develop a full preservation alternative, consistent with HPC Resolution 0746, as well as two partial preservation alternatives. Although the proposed project would remove, demolish, or otherwise incompatibly alter several other priority 2 character-defining features of Market Street as a representation of the MSRP, such as the cluster arrangement of street trees, the potential modification of one elevator to BART/Muni, and granite bollards, the preservation alternatives focused on the priority 1 character-defining features.

The proposed project would not demolish or incompatibility alter any priority 3 character-defining features. Thus, the preservation alternatives do not address these features.

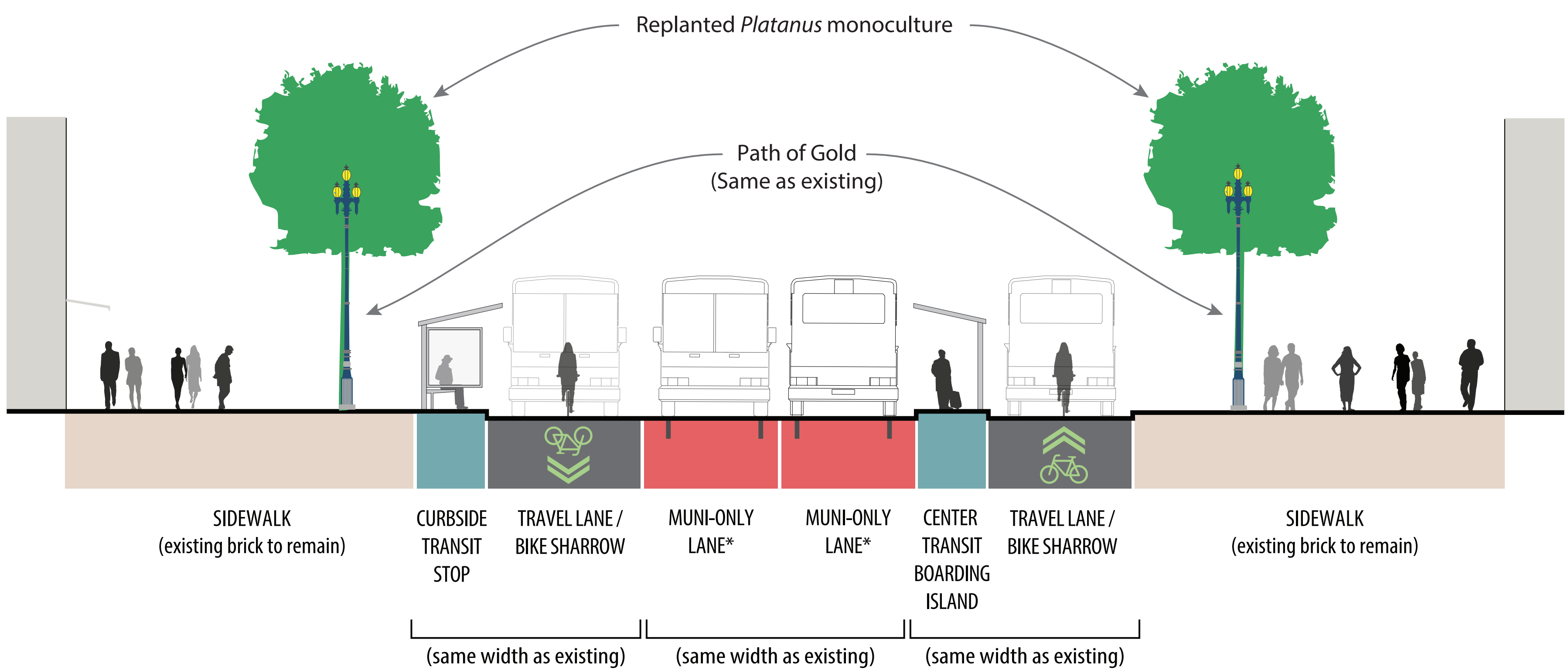
C. DESCRIPTIONS OF ALTERNATIVES SELECTED FOR ANALYSIS

Considering the screening process described above, as well as state and local regulatory requirements, the following five alternatives were selected for detailed analysis in the EIR, in addition to the proposed project:

- Alternative A: No-Project Alternative
- Alternative B: Full Preservation Alternative
- Alternative C: Partial Preservation Alternative 1
- Alternative D: Partial Preservation Alternative 2
- Alternative E: Core Elements Alternative

These five alternatives adequately represent the range of potentially feasible alternatives required by CEQA for this project. The alternatives would lessen or, in some cases, avoid the significant and unavoidable adverse impacts of the project and project variant. A "No-Project Alternative" is included as Alternative A, as required by CEQA, even though it would not meet the basic project objectives. Alternative B, included to reduce the significant impact on historical architectural resources to a less-than-significant level, would not meet many of the project's objectives.

Figures 6-1, 6-3, and 6-5, pp. 6-13, 6-15, 6-17, are cross-section drawings of Alternatives B, C, and D, respectively. Figures 6-2, 6-4, and 6-6, pp. 6-14, 6-16, 6-18, are sample block views of each alternative.



* Muni-only lanes would permit Muni buses and streetcars and emergency vehicles only. Taxis, paratransit vehicles, bicycles, and all other vehicles (including vehicles operated by other transit agencies) would be excluded from Muni-only lanes at all times.

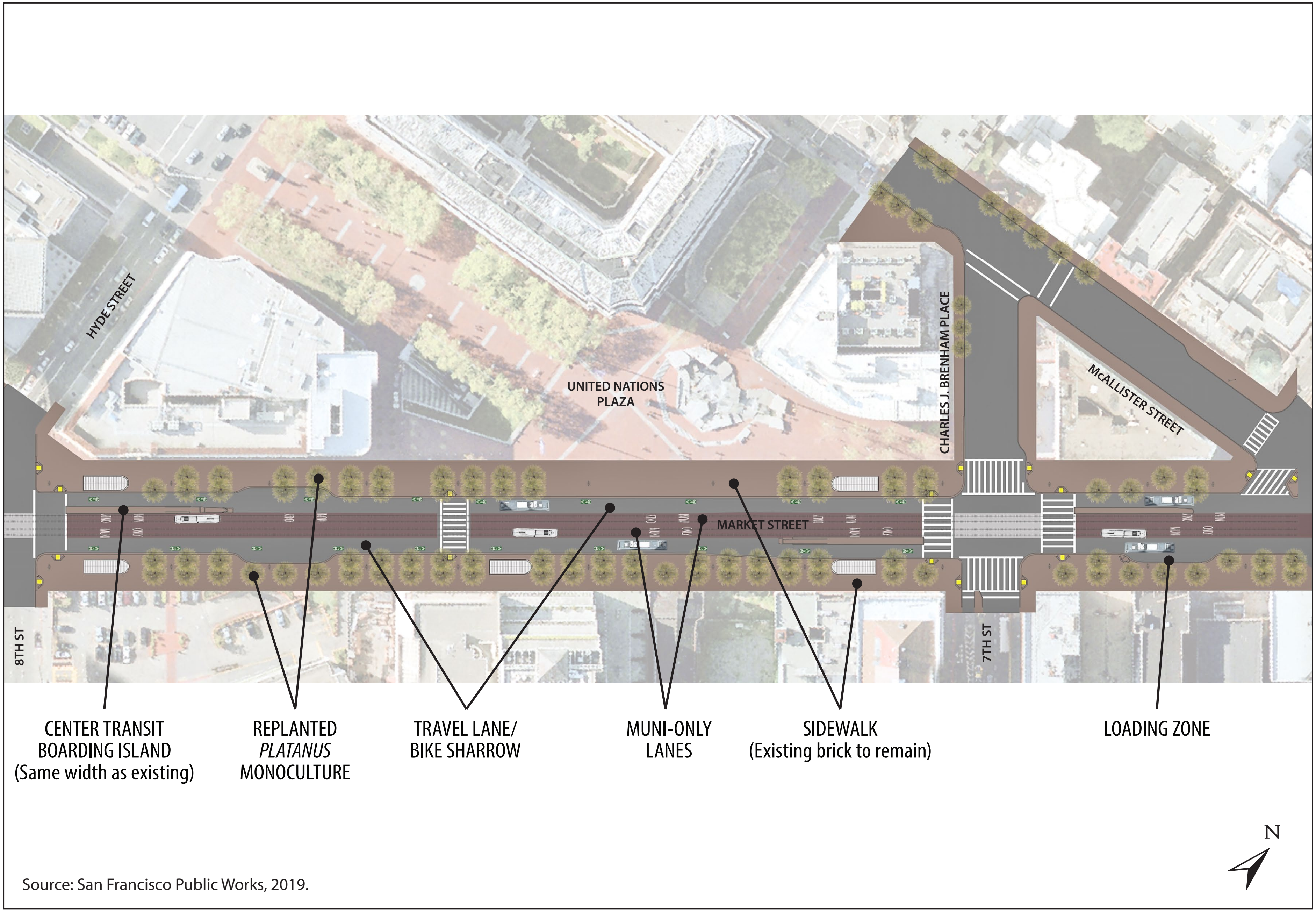
Source: San Francisco Public Works, 2018.

Not to Scale

00056.14 (1-28-2019)

Better Market Street Project
Case No. 2014.0012E

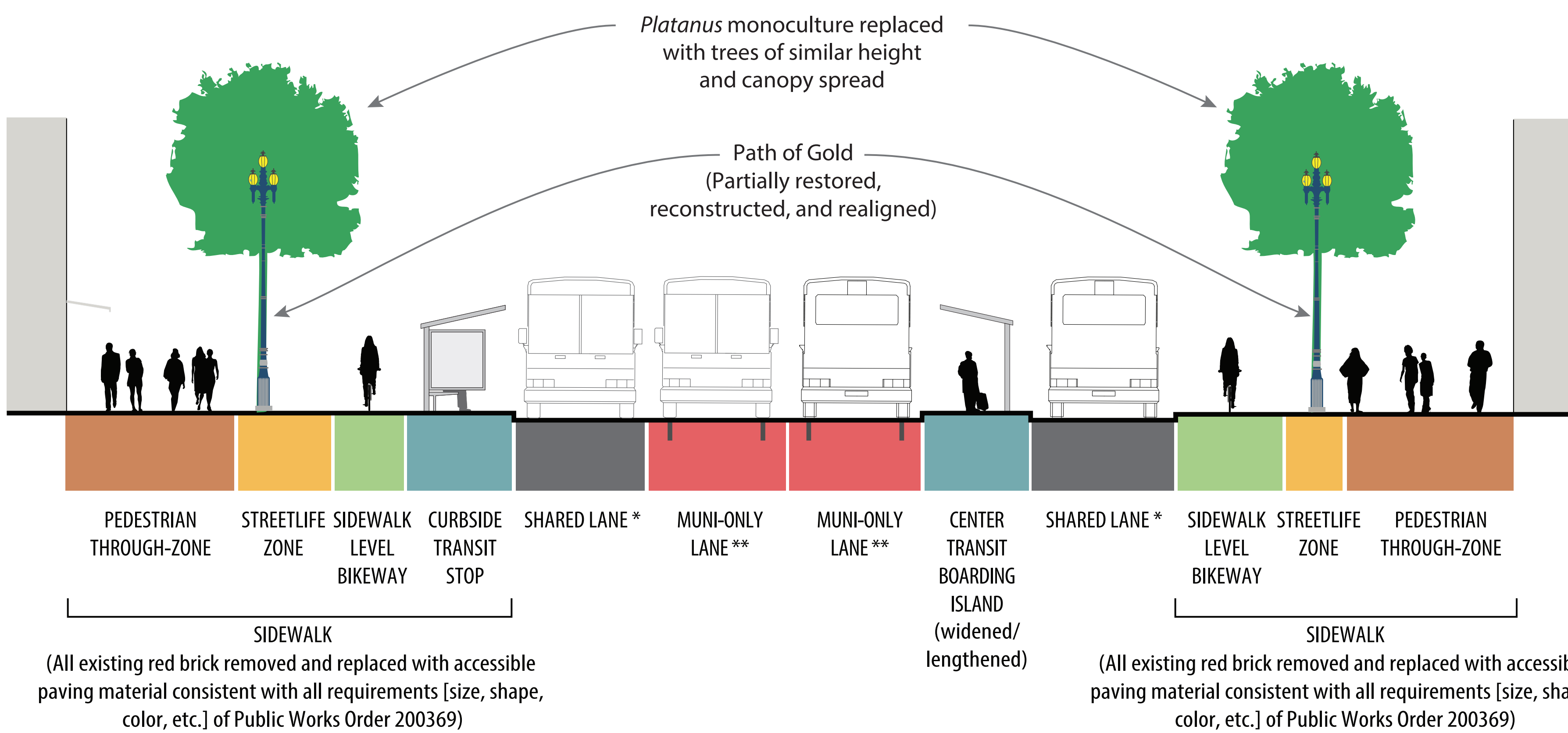
Figure 6-1
Full Preservation Alternative
Typical Mid-Block Cross Section of Market Street



Source: San Francisco Public Works, 2019.

00056.14 (2-20-2019)

Figure 6-2
Full Preservation Alternative Sample Block



* SHARED LANES would permit public transit vehicles, emergency vehicles, taxis, paratransit vehicles, bicycles at all times, and commercial vehicles during off-peak hours.

** At all times, shared lanes would permit public transit vehicles, emergency vehicles, taxis, paratransit vehicles, bicycles, and commercial vehicles (although commercial vehicle loading would only be permitted on Market Street during off-peak hours).

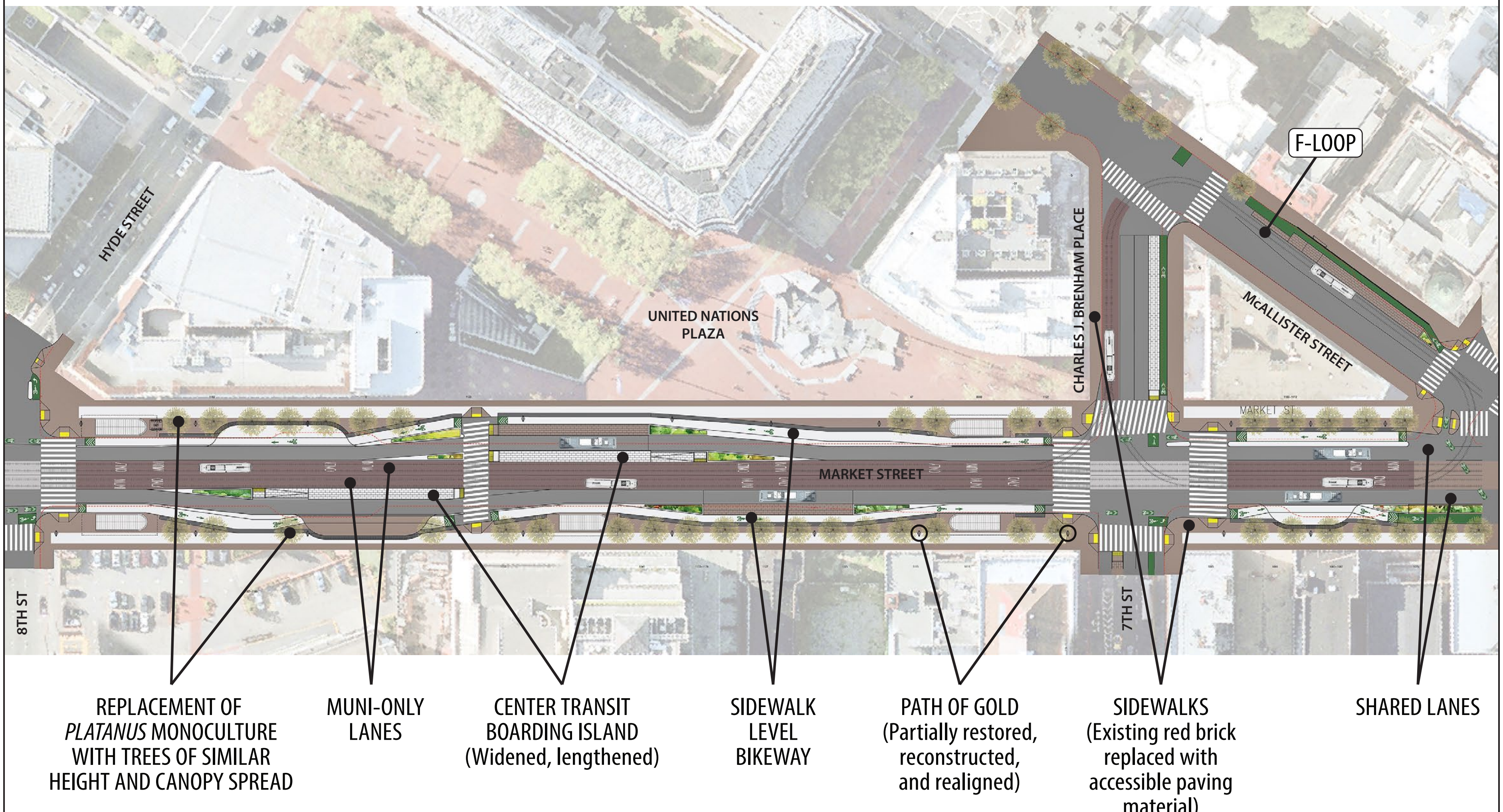
Source: San Francisco Public Works, 2018.

Not to Scale

00056.14 (2-21-2019)

Better Market Street Project
Case No. 2014.0012E

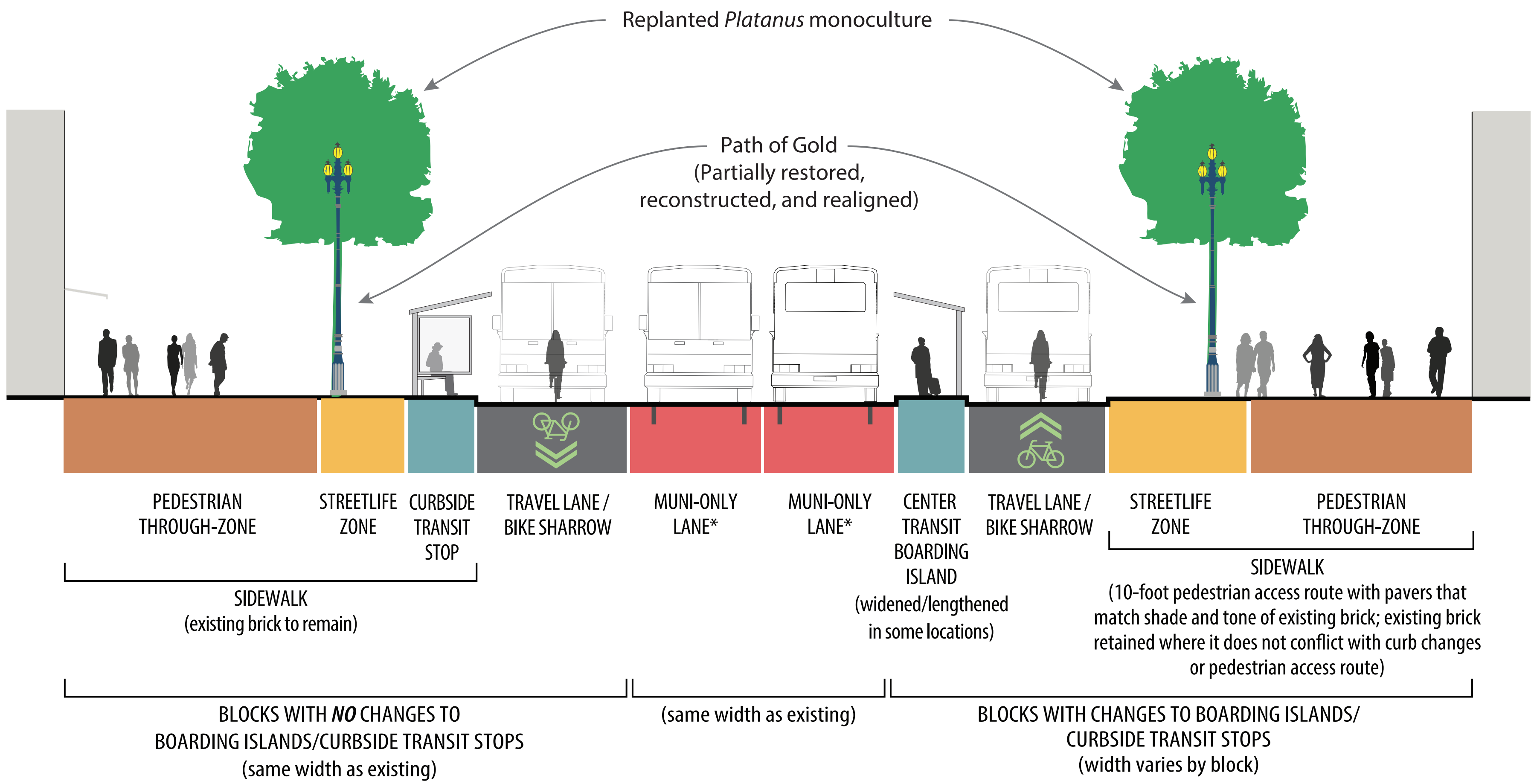
Figure 6-3
Partial Preservation Alternative 1 (Entire Corridor)
Typical Mid-Block Cross Section of Market Street



Source: San Francisco Public Works, 2019.

00056.14 (1-29-2019)

Figure 6-4
Partial Preservation Alternative 1 (Entire Corridor) Sample Block



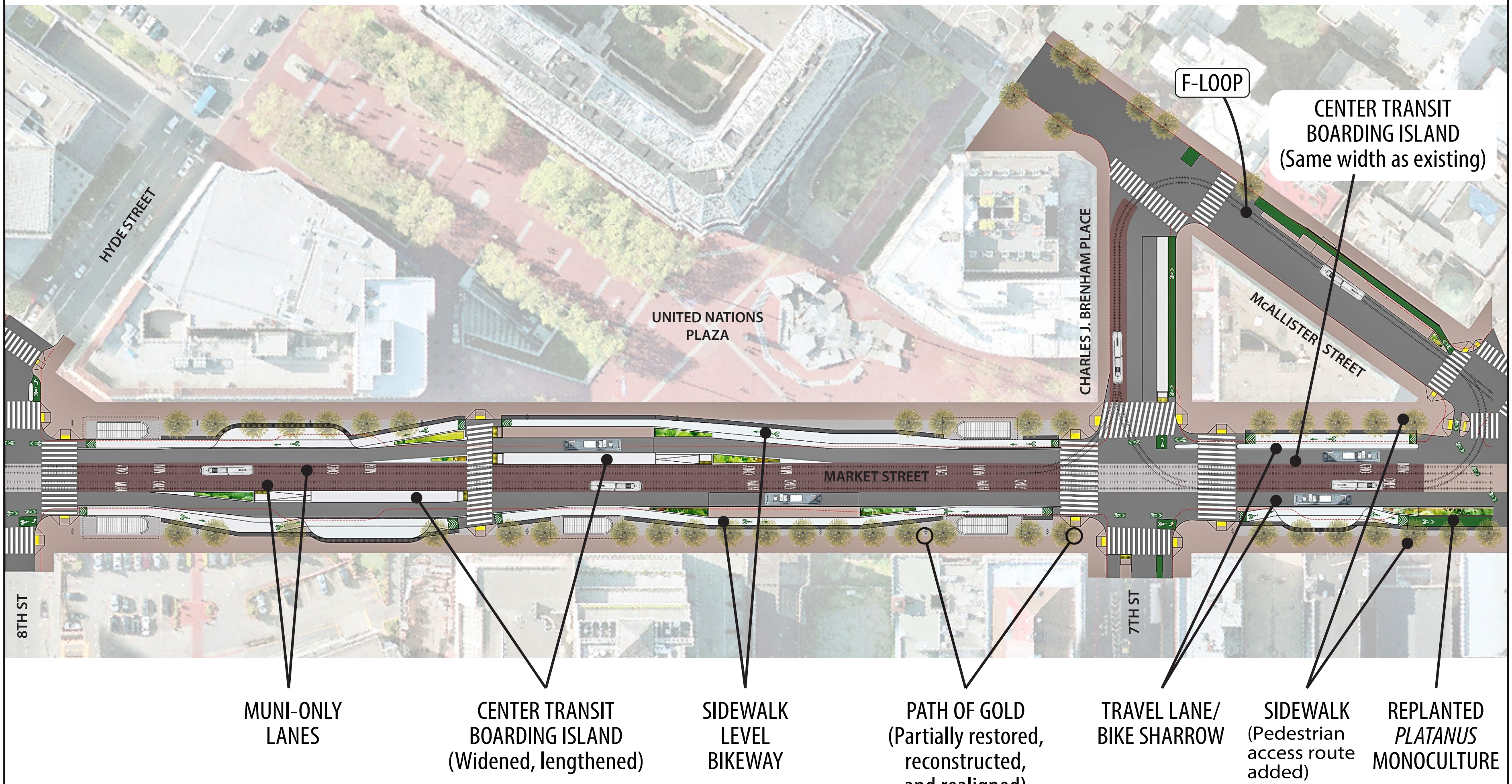
* Muni-only lanes would permit Muni buses and streetcars and emergency vehicles only. Taxis, paratransit vehicles, bicycles, and all other vehicles (including vehicles operated by other transit agencies) would be excluded from Muni-only lanes at all times.

Source: San Francisco Public Works, 2018.

Not to Scale

00056.14 (1-28-2019)

Figure 6-5
Partial Preservation Alternative 2 (Transit Stop Modifications)
Typical Mid-Block Cross Section of Market Street



Note: This figure only shows blocks of Market Street that would change under this alternative. Refer to Section C in Chapter 6, *Alternatives*, for a detailed description of this alternative.

Source: San Francisco Public Works, 2019.

00056.14 (1-31-2019)

Better Market Street Project
Case No. 2014.0012E

Figure 6-6
Partial Preservation Alternative 2 (Transit Stop Modifications) Sample Block

Alternative A would be similar to existing conditions (see Figure 2-4 in Chapter 2, *Project Description*). Alternative E would have the same physical layout of the proposed project (see Figure 2-3 and Figure 2-4 in Chapter 2, *Project Description*).

Table 6-1, on the following page, provides basic information about the features of each alternative. Table 6-2, p. 6-23, summarizes the ability of each alternative to meet the project objectives. The proposed project would fully meet all of the project objectives. Table 6-2 indicates whether each alternative would meet, partially meet, or not meet the objectives. For the purposes of Table 6-2, if an alternative meets even a small portion of the objective, a conclusion of "partially" is indicated.

Following the figures and tables, each alternative is described in detail, including discussions of how each alternatives meets or does not meet the project objectives.

ALTERNATIVE A: NO-PROJECT ALTERNATIVE

CEQA requires that analysis of the No-Project Alternative document existing conditions at the time the notice of preparation was published as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved and development continued to occur in accordance with existing plans and consistent with available infrastructure and community services (CEQA Guidelines section 15126.6(e)(2)).

Under the No-Project Alternative, the project corridor would remain in its current condition. The roadway configuration; access for private vehicles; traffic signals; surface transit, such as Muni service and infrastructure; bicycle facilities; pedestrian facilities; streetscapes; commercial and passenger loading; vehicular parking; and utilities would remain in their current conditions.

Routinely scheduled maintenance activities for existing streetscape elements (such as tree trimming) and limited physical changes related to operational needs and emergency repairs of the existing transit infrastructure would continue to occur. In addition, the following planned/approved projects or activities would be implemented within, or would overlap a portion of the project corridor, resulting in some degree of physical change on Market Street.

- Muni Forward
- Van Ness Improvement Project
- Geary Rapid Project
- Electrification of the two existing track switches on Market Street at 11th Street
- Replacement/repair of BART/Muni Metro ventilation grates
- Addition of concrete protection to bike lanes
- Refreshing existing crosswalk and other pavement markings
- Minor signal timing changes to improve vehicle progression

TABLE 6-1. CHARACTERISTICS OF PROJECT ALTERNATIVES

Project Features	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Roadway Configuration	Retain the same lane configuration as currently exists		Implement expanded transit stops and sidewalk level bikeways, same as proposed project	Implement some expanded transit stops similar to the proposed project, but would generally retain the existing roadway configuration	Implement expanded transit stops and sidewalk level bikeways, same as the proposed project
Private Vehicle Access	Same as existing conditions	Implement the same private vehicle access restrictions as the proposed project, including Muni-only lanes			
Traffic Signals	Same as existing conditions	Replace existing traffic signals and signage, similar to the proposed project			Same as existing conditions
Muni-only lanes	None, but would retain existing transit-only lanes	Implement Muni-only lanes similar to the proposed project			
Stop spacing and service	Same as existing conditions	Same as existing conditions	Same as proposed project	Retain some existing stop spacing but would also incorporate some changes associated with proposed project	Same as proposed project
Stop locations/ characteristics	Same as existing conditions	Same as existing conditions	Add/expand center transit boarding islands and curbside stops, same as proposed project	Add/ modify stops compared to existing conditions, but not as extensively as proposed project	Add/expand center transit boarding islands and curbside stops, same as proposed project

Project Features	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Track and OCS Locations	Same as existing conditions	Same as existing conditions	Same as the proposed project: would add F-loop track and service; partial restoration, reconstruction, and realignment of Path of Gold light standards to support OCS		
Infrastructure	Same as existing conditions	Retain existing Path of Gold in current locations	Partial restoration, reconstruction, and realignment of Path of Gold light standards, similar to the proposed project (though realignment would be distinct for Alternative D)		
Bicycle Facilities	Same as existing conditions – class II and class III facilities	Same as existing conditions – class II and class III facilities	Same as proposed project, implement sidewalk-level bikeway	Same as existing conditions – class II and class III facilities	Same as proposed project, implement sidewalk-level bikeway
Pedestrian Facilities	Same as existing conditions	Same as existing conditions	Same as proposed project, replace all existing red brick with new material meeting Public Works Order 200369's accessibility and other requirements	Same as existing conditions on selected blocks (red brick retained); new pedestrian access route installed along modified blocks composed of material meeting Public Works Order 200369's accessibility and other requirements	Same as proposed project, replace all existing red brick with new material meeting Public Works Order 200369's accessibility and other requirements
Streetscapes	Same as existing conditions	Replant existing *Platanus* monoculture; add street furniture to increase programming of underutilized spaces (to create "streetlife" zones)	Replace existing *Platanus* monoculture with trees of similar height and canopy spread; add "streetlife" zones	Replant existing *Platanus* monoculture; add "streetlife" zones on selected blocks; add street furniture on others to active spaces	Replace existing *Platanus* monoculture with trees similar to the proposed project; add streetlife zones, same as proposed project

Project Features	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Commercial and passenger loading	Same as existing conditions	Would retain existing loading zones on Market Street, add new zones on side streets, and implement restrictions similar to proposed project	Same as proposed project, provide new zones with new restrictions	Incorporate some new zones similar to proposed project but retain some existing; implement same new restrictions as proposed project	Same as proposed project, provide new zones with new restrictions
Vehicular parking	Retain existing on-street parking	Remove existing on-street parking from Market Street and side streets, same as proposed project			
Utilities	Make only emergency repairs and conduct routine maintenance	Include only those activities that would be accommodated beneath the existing roadway	Make same utility upgrades/ replacements as the proposed project	Primarily include those activities that would be accommodated beneath the existing roadway, but could also make upgrades under replaced sidewalks	Eliminate all utility upgrades associated with the proposed project
Implementation of Western Variant	No	No, because the variant incorporates streetscape modifications inconsistent with this alternative.	Yes	Potentially	Yes

Source: ICF 2018

TABLE 6-2. ABILITY OF PROJECT ALTERNATIVES TO MEET PROJECT OBJECTIVES

Project Objectives	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
	Would the alternative meet this objective?				
Place					
Provide an accessible sidewalk that identifies Market Street as one of the city's pre-eminent ceremonial streets.*	No	No	Yes	Partially	Yes
Correct the barriers that Market Street's existing design poses to accessibility, its lack of accommodation for bicycles, its problems arising from wide paved areas without any dedicated use, and its arboricultural deficiencies.	No	No	Yes	Partially	Yes
Maximize the reuse of underutilized street space to encourage the activation of public spaces.	Partially	Partially	Yes	Yes	Yes
Use high-quality materials fitting for the city's pre-eminent ceremonial street.	No	No	Yes	Partially	Yes
Mobility					
Provide facilities that reduce the number of traffic fatalities, collisions, and severe injuries to the extent feasible.*	No	Partially	Yes	Partially	Yes

Project Objectives	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
	Would the alternative meet this objective?				
Provide a bicycle facility that is designed to reduce the number of collisions involving bicycles, as much as feasible, from Steuart Street to Octavia Boulevard.*	No	No	Yes	Partially	Yes
Reduce conflicts between transit, taxis, paratransit, commercial vehicles, private vehicles, bicyclists, and pedestrians to the extent feasible.*	No	Partially	Yes	Partially	Yes
Provide an appropriate pedestrian throughway and improve (i.e., reduce) crossing distances.	No	No	Yes	Partially	Yes
Optimize the surface public transit system's capacity and travel times in the project corridor and vicinity.*	No	Partially	Yes	Partially	Yes
Replace infrastructure when nearing the end of its useful life on this section of Market Street to keep people, goods, and City services moving.*	No	Partially	Yes	Partially	Partially

Project Objectives	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
	Would the alternative meet this objective?				
Economic Development					
Integrate transportation improvements with the Mid-Market revitalization planning effort to improve the economic health and productivity of Market Street.*	No	Partially	Yes	Partially	Partially
Provide commercial loading zones that do not impede or introduce new barriers to the movement of goods and people along Market Street.	No	Partially	Yes	Partially	Yes
Support planned housing and job growth in the project corridor, consistent with adopted land-use plans.	No	Partially	Yes	Partially	No

Source: ICF 2019

Asterisks (*) indicate basic project objectives.

ABILITY OF ALTERNATIVE A (NO-PROJECT ALTERNATIVE) TO MEET THE PROJECT OBJECTIVES

Alternative A would fail to fully or partially meet any of the basic project objectives. This is because Alternative A would not include any of the proposed project's streetscape, transit, infrastructure, or operational improvements. Alternative A would largely perpetuate existing conditions.

Alternative A would partially meet one project objective related to place ("maximize the reuse of underutilized street space to encourage the activation of public spaces"). This conclusion is based on the premise that Market Street currently has substantial areas of underutilized space that in the past have been activated on a temporary basis through such programming as prototyping festivals. Although Alternative A does not explicitly include any such programming, it would not limit future programming from occurring.

ALTERNATIVE B: FULL PRESERVATION ALTERNATIVE

The *Full Preservation Alternative* would avoid significant impacts on the landscape district, specifically, its significance as a designed landscape associated with the MSRP, by substantially reducing the scope of proposed project changes such that several priority 1 character-defining features of the landscape district would remain intact. Alternative B would omit many project-related alterations to physical features of Market Street. Accordingly, as further detailed below, transit stop spacing and service, bicycle facilities, and commercial and passenger loading facilities would be similar to existing conditions.

Alternative B would retain all existing curb lines as well as all red brick sidewalks and small plazas. Existing tree wells would be replanted with new trees to preserve the *Platanus* monoculture, selecting from one of two varieties[6] similar in character to the trees that would be removed but with greater disease tolerance.[7] The exact species would be determined by Public Works' landscape architect in coordination with SF Planning, but only a single species would be selected to maintain the monoculture uniformity of the tree alleé features (a priority 2 character-defining feature of the landscape district). Existing tree wells, which are restricting tree growth, would be upgraded to increase the depth, improve the soil quality, and develop a watering and maintenance program to better ensure the success and resiliency of the new trees. The bronze tree grates, another priority 2 character-defining feature, would not be altered under this alternative.

6 These varieties are 1) *Platanus x acerfolia* Bloodgood, Columbia, and Yarwood and 2) *Platanus x acerfolia* Liberty.

7 HortScience, Inc., *Better Market Street Project Tree Inventory Report*, August 2016.

Alternative B would include all roadway access changes for private vehicles and changes to on-street parking on Market Street proposed as part of the project. Traffic signals and signage, which are also priority 2 character-defining features to the landscape district, would be retained.

Loading locations on Market Street would remain the same as existing conditions; however, the proposed project's time restrictions would apply to these existing loading zones. The removal of parking from side streets would open opportunities to add additional loading zones in those areas, which too would be subject to the proposed project's time restrictions.

Transit operations would be generally similar to existing conditions, except this alternative would include the same extension of the Muni-only lanes as the proposed project (i.e., redesignation of the existing transit-only lanes to Muni-only lanes). This alternative would retain all curbside boarding stops and maintain center boarding islands as they exist today. This alternative would not include construction of a new F-loop; therefore, the F-line would retain the same physical and operational characteristics as existing conditions.

Bicycle access would be the same as under existing conditions, comprising *class II* facilities (bicycle lanes) west of Eighth Street and the *class III* facilities (bicycle route markings in a mixed flow lane) east of Eighth Street. Notably, these facilities would continue to operate alongside curbside bus stops. This alternative could designate new streetlife and furnishing zones within currently underutilized portions of the existing sidewalk where such features can be accommodated while maintaining an adequate pedestrian through zone. The Path of Gold light standards would remain in place and would not be partially restored, reconstructed, and realigned (unlike the proposed project). Because Alternative B would retain the existing configuration of Market Street, there would be no need to replace the existing poles with taller poles (the proposed project includes modifications to the OCS).

Alternative B would include only those utility relocation or rehabilitation activities that can be accommodated beneath the existing roadway and thus avoid excavation into the sidewalk. Utility relocation or rehabilitation activities that could be conducted entirely within the roadway right-of-way include portions of some wastewater lines, water lines, Muni traction power duct banks, and some dry utilities.[8] The overall duration and intensity of construction

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[8] The proposed project includes placement of dry utilities in a joint utility trench beneath the sidewalks on both sides of Market Street. Excavation beneath the sidewalk would require removal of the existing brick material which would likely damage some or most of the existing bricks that would need to be removed to access the areas to be excavated. In addition, the activity of removing the existing bricks triggers compliance with ADA standards, which in turn require replacement of enough material to maintain a pedestrian through corridor of at least ten feet in width. Therefore, rehabilitated utility infrastructure associated with this alternative would be placed beneath the roadway to the extent feasible. Where such utility rehabilitation and relocation could not be accommodated beneath the roadway due to existing conflicts with other subsurface utilities, such activity would not be included as part of this alternative to avoid removal and replacement of existing sidewalk brick material.

activities associated with this alternative is expected to be at least six years, including inactive periods. This is comparable to the lower-end estimate for the proposed project (six to 14 years, inclusive of inactive periods).[9]

ABILITY OF ALTERNATIVE B (FULL PRESERVATION ALTERNATIVE) TO MEET THE PROJECT OBJECTIVES

Alternative B would not fully meet any of the project objectives. As indicated in Table 6-2, p. 6-23, Alternative B would partially meet five of the seven basic project objectives and partially meet three other objectives.

In terms of basic objectives, Alternative B would partially meet the two objectives related to providing facilities to reduce the number of traffic fatalities and collisions and reduce conflicts between the various users of Market Street because Alternative B would implement the same private vehicle restrictions as the proposed project and remove on-street parking spaces from Market Street and adjacent side streets (opening side streets to new loading zones). Reducing the number of private vehicles on Market Street, removing on-street parking, and creating new side-street loading zones would be likely to contribute to reduced private vehicle activity on Market Street, thus reducing the number of collisions/conflicts between private vehicles and other users (particularly pedestrians and bicyclists). Alternative B would not, however, provide a fully separated bicycle route for the length of the project corridor (as does the proposed project), so it would not meet these two objectives as robustly as the proposed project.

Alternative B would partially meet the basic objective to optimize surface transit. The aforementioned private vehicle restrictions would contribute to the partial meeting of this objective; fewer private vehicles on Market Street would allow surface transit to operate with fewer impediments. Moreover, Alternative B would also convert the existing transit-only lanes to Muni-only lanes, removing other users from Market Street's transit-only lanes and thus permitting buses and streetcars to operate more freely. Alternative B would not, however, provide a new F-loop or additional streetcar service, nor would it include improved transit boarding facilities, including accessible center transit boarding islands.

On the basis of partially meeting the above three basic project objectives, Alternative B would partially meet the basic project objective to integrate transportation improvements with the larger mid-Market revitalization efforts towards meeting larger economic development goals. As Alternative B would partially contribute towards reducing fatalities, collisions, and conflicts (as described above), it can be said to also contribute partially towards the greater mid-Market revitalization effort.

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9 San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

Alternative B would also partially meet the basic objective to replace aging infrastructure. While Alternative B would leave intact existing curblines and sidewalk areas (as well as the Path of Gold light standards), Alternative B would still allow for the replacement of utilities that are located below the roadway portion of Market Street. By extension, Alternative B can be said to partially meet the project objective related to supporting planned housing growth in and near the project corridor.

Similar to Alternative A, Alternative B would also be able to partially meet the objective to maximize underutilized sidewalk space. Alternative B would retain Market Street sidewalks in their existing condition (similar to Alternative A). Accordingly, Alternative B would have the similar potential of Alternative A to see better activation of its substantial areas of underutilized space on a temporary basis through such programming as prototyping festivals. While Alternative B does not include any such programming, it would not limit future programming from occurring.

Finally, Alternative B would partially meet the project objective to improve commercial loading along the project corridor. Through removing on-street parking from the project corridor and side streets, Alternative B would thus create additional loading areas (on side streets) and would also impose the same loading restrictions as the proposed project. However, Alternative B would not change or add any loading zones on Market Street itself.

Alternative B would fail to meet two basic project objectives. Alternative B would fail to meet the basic project objective to provide a bicycle facility designed to reduce collisions. Alternative B would retain existing bicycle facilities on Market Street, which do not provide adequate physical separation between bicycles and other vehicles. By retaining existing bicycle facilities, Alternative B would not contribute to meeting this project objective.

Alternative B would fail to meet the basic project objective of providing an accessible sidewalk, nor the related objectives of providing an appropriate pedestrian throughway and correcting barriers. Alternative B would retain existing red brick sidewalks in a herringbone pattern. As discussed in Chapter 2, Section B, as well as in this chapter's discussion of historic paving materials (Section B, above), the existing red brick sidewalk in a herringbone pattern does not meet current accessibility requirements for a pedestrian access route set forth in Public Works Order 200369 (which incorporates by reference provisions of the federal Americans with Disabilities Act as well as the local Better Streets Plan). For the same reasons, Alternative B would fail to meet the objective of using high-quality materials. The existing red brick is prone to buckling and having wide gaps. Retention of the existing red brick would thus not be considered to meet this project objective.

Although Alternative B would replant the existing *Platanus* monoculture, it would not address the objective of correcting arboricultural deficiencies, which are inherent within monoculture plantings. Replanting the existing trees, many of which have performed poorly according to analysis prepared for the proposed project, could temporarily alleviate the existing conditions, which include many unhealthy trees. However, replacing one monoculture with another would leave the project corridor susceptible to potential harm in the future, particularly in the event of the introduction of a disease that affects the replanted *Platanus* species. Perpetuating the monoculture would thus fail to meet the project objective of correcting the corridor's arboricultural deficiencies.

Alternative C: Partial Preservation Alternative 1 – Entire Corridor

In contrast to Alternative B, which sought to avoid a significant impact on the landscape district by retaining the existing red brick in a herringbone pattern (a priority 1 character-defining feature), Alternative C would completely replace the existing red brick in a herringbone pattern in order to better meet safety and mobility objectives of the proposed project while lessening the significant impact on the landscape district.

Specifically, all existing red bricks would be replaced with paving material (such as unit pavers or concrete) consistent with the accessibility requirements of Public Works Order 200369. This order sets forth allowable paving materials, dimensions, and shapes, as well as installation standards (including on maximum allowable gaps or joints). The order permits exceptions related to materials, but not to factors that would limit accessibility (including but not limited to dimension/shape of pavers, allowable gaps/joints, etc.).

The color of the paving material for Alternative C would be as close as possible to the existing red brick, consistent with Order 200369's stipulations on color. Order 200369 features a list of approved unit pavers (approved size, shape, color) as well as a limited exception process. None of the approved pavers would allow for a close match of the existing red brick in a herringbone pattern, but Alternative C would seek to implement the same uniformity of sidewalk paving material as exists to the maximum allowable extent of the order, including its exception process. This is in contrast to the proposed project, which would use a variety of approved, accessible materials. Similar to the project, Alternative C would remove most existing bollards and would reuse granite curbs as feasible.

Similar to the proposed project, Alternative C would add a sidewalk-level bikeway for the entirety of Market Street between Octavia Boulevard and Steuart Street.

Existing tree wells would be replanted with new species of three to five genera. Selection of specific varieties would be determined in the same manner as the process described for the proposed project. New trees would be planted in consistent patterns/groupings as the existing trees and would be selected to most closely replicate the height and canopy spread of existing trees. Existing tree wells would be upgraded to increase the depth, improve the soil quality, and develop a watering and maintenance program. The bronze tree grates would be removed in this alternative, like the proposed project.

Alternative C would also involve the same partial restoration, reconstruction, and realignment of the Path of Gold lighting standards as the proposed project.

All roadway access changes for private vehicles, traffic signals and signage, parking and loading, and utility replacements and relocations would be the same as in the proposed project.

Transit operations would be generally similar to the proposed project. As with the proposed project, this alternative would include center boarding islands at the 5 Muni stations (Embarcadero, Montgomery, Powell, Civic Center, and Van Ness) and would serve streetcars, rapid buses, and local buses. Certain buses would also use curbside boarding stops at all other locations along the project corridor. Center boarding islands would be lengthened and widened similar to the proposed project. This alternative would include construction of a new F-loop with the same physical and operational characteristics as the proposed project.

The overall duration and intensity of construction activities associated with this alternative would be generally similar to the proposed project as both would entail the same types of roadway work, utility relocation, creation of the sidewalk-level bikeway, and modifications to all sidewalks. The project sponsor estimates a period comparable to the proposed project to construct Alternative C (six to 14 years, inclusive of inactive periods).[10]

Ability of Alternative C (Partial Preservation Alternative 1) to Meet the Project Objectives

As indicated in Table 6-2, p. 6-23, Alternative C would fully meet all project objectives (similar to the proposed project) including all seven basic project objectives. As discussed below, Alternative C would meet two of the objectives in slightly different ways than the proposed project.

Because Alternative C would incorporate the same streetscape, bicycle, and transit facilities as the proposed project, along with the same private vehicle restrictions and Muni-only lanes, Alternative C would fully meet the basic objectives related to reducing fatalities and collisions, providing a protected bicycle facility, reducing conflicts between users of Market Street, and optimizing surface transit facilities. Alternative C would entail the same treatment to the Path of Gold light standards and OCS as the proposed project and thus would help meet the objectives related to replacing aging infrastructure and optimizing surface transit. Moreover, Alternative C would include the same utility replacements as the proposed project. Based on the foregoing, Alternative C would contribute robustly to meeting the objective of contributing to the overall mid-Market revitalization effort.

Like the proposed project, Alternative C would replace the existing red brick sidewalks with accessible paving materials consistent with Public Works Order 200369. Therefore, Alternative C would meet the basic objective related to providing an accessible sidewalk and

[10] San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

the other objectives related to using high quality materials and reducing barriers on Market Street. Alternative C, like the proposed project, would meet the objectives of improving accessibility and reducing barriers.

Alternative C would also correct the existing arboricultural deficiencies of the project corridor but in a different manner than the proposed project. Alternative C would replace the existing *Platanus* monoculture with trees of three to five genera that would have similar canopy shape and height as the existing *Platanus*. The uniformity of tree species is a character-defining feature of the landscape district. Alternative C's replacement of the monoculture with a variety of trees that would reference the monoculture in terms of height and shape would somewhat lessen but not fully avoid the incompatible alteration of the character-defining feature. Notwithstanding, by removing the monoculture, Alternative C would meet the project objective of correcting arboricultural deficiencies.

Alternative D: Partial Preservation Alternative 2

Alternative D would modify/replace key components of the proposed project with the intent to preserve and/or complement character-defining features of the landscape district. Alternative D would include more alterations to Market Street than Alternative B, but different in number/character than those associated with the proposed project and Alternative C.

Alternative D would reduce impacts on the landscape district relative to the proposed project by reducing the scope of alterations/modifications to character-defining features of the landscape district. The basic concept of Alternative D is that blocks of Market Street where no modifications to center boarding islands or curbside transit stops are needed, those blocks would generally retain streetscapes similar to existing conditions. In contrast, blocks of Market Street where modifications to center boarding island and/or curbside transit stops are needed would see streetscape improvements similar to the proposed project. Figures 6-5 and 6-6, pp. 6-17 and 6-18, illustrate Alternative D.

Bicycle facilities would be similar to existing conditions on select blocks (unprotected class II bicycle route) and similar to the proposed project (protected *class IV* bicycle lane) on other blocks.

This alternative would remove, add, or expand select curbside transit stops and/or center transit boarding islands on 20 blocks of Market Street (nine blocks on the north side, 11 blocks on the south side). Twenty-two blocks of Market Street would remain unmodified as part of this alternative (10 blocks on the north side and 12 blocks on the south side). The following blocks would be modified:

- Main Street to Beale Street (south side of Market Street)
- Front Street to Bush/Battery Street (north side of Market Street)[11]
- First Street to Second Street (south side of Market Street)
- Sansome/Sutter Street to Montgomery/Post Street (north side of Market Street)
- New Montgomery Street to Third Street (south side of Market Street)[12]
- Montgomery/Post Street to Kearny/Geary Street (north side of Market Street)[12]
- Third Street to Fourth Street (south side of Market Street)
- Grant Avenue/O'Farrell Street to Stockton/Ellis Street (north side of Market Street)[12]
- Fourth Street to Fifth Street (south side of Market Street)[12]
- Stockton/Ellis Street to Cyril Magnin Street (north side of Market Street)
- Fifth Street to Sixth Street (south side of Market Street)[12]
- Mason/Turk Street to Taylor Street/Golden Gate Avenue (north side of Market Street)[12]
- Sixth Street to Seventh Street (south side of Market Street)[12]
- Jones/McAllister Street to Charles J. Brenham Place (north side of Market Street)[12]
- Seventh Street to Eighth Street (south side of Market Street)[12]
- Charles J. Brenham Place to Hyde/Grove Street (north side of Market Street)[12]
- Eighth Street to Ninth Street (south side of Market Street)[12]
- Hyde/Grove Street to Larkin/Hayes Street (north side of Market Street)[12]
- Ninth Street to 10th Street (south side of Market Street)[12]
- Larkin/Hayes Street to Polk/Fell Street (north side of Market Street)

On the side of each block seeing transit stop modifications, existing curb lines would need to shift between 2 and 9 feet toward the sidewalk. A new 10-foot wide pedestrian access route meeting the requirements of Public Works Order 200369 would be constructed along all blocks seeing transit stop modifications. The pedestrian access route would use paving material consistent with the dimension, size, and other accessibility requirements of the Order. The Order also includes a list of approved material colors; Alternative D would select a color as close as possible to the shade and tone of the existing brick. All existing brick that would not have to be removed to accommodate curb changes or the pedestrian access route would be retained. Similar to the proposed project, most existing bollards would be removed from these blocks; granite curbs would be reused as feasible.

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[11] A boarding island would be removed within this block, which may require curb adjustments to accommodate regrading of the roadway crown and drainage.

All other blocks (i.e., those not seeing transit stop modifications) would retain existing curb lines as well as all existing brick sidewalks and plazas. Along such blocks, transit operations would function similarly as existing conditions, though Alternative C would redesignate existing transit-only lanes to Muni-only use and incorporate the same private vehicle restrictions as the proposed project.

This alternative would also include construction of a new F-loop with the same physical and operational characteristics as the proposed project.

Existing tree wells would be replanted with new trees to preserve the *Platanus* monoculture, selecting from one of two varieties[12] similar in character to the trees that would be removed, but with greater disease tolerance.[13] The exact variety would be determined by in the same manner as the process described for the proposed project, but only a single variety would be selected to maintain the monoculture uniformity of the tree alleé features (a priority 2 character-defining feature of the landscape district). Existing tree wells would be upgraded to increase the depth, improve the soil quality, and develop a watering and maintenance program.

On modified blocks, bronze tree grates would be removed (similar to the proposed project); on non-modified blocks, these grates would be retained (similar to existing conditions).

This alternative would include all roadway access changes for private vehicles and changes to on-street parking as the proposed project. Existing traffic signals and signage, which are also priority 2 character features to the landscape district, would be replaced.

For those blocks which would have no changes to curbside or center boarding island stops, loading locations would remain the same as existing conditions, however, the proposed project's time restrictions would apply to these existing loading zones. For all other blocks, including side street locations where parking would be removed, the loading locations and time restrictions would be the same as the proposed project.

Bicycle access would be the same as under existing conditions for the blocks where no transit stop changes are proposed, which comprise class II facilities (bicycle lanes) west of Eighth Street and class III facilities (bicycle route markings in a mixed-flow lane) east of Eighth Street. Notably, these facilities would continue to operate alongside curbside bus stops. At locations where transit stop changes are proposed, a class IV facility would be built at sidewalk level. This alternative would provide new streetlife and furnishing zones in the existing sidewalks where such features can be accommodated while maintaining an adequate pedestrian through zone; streetlife and furnishing zones would also be included in blocks where the sidewalks would be replaced.

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12 These two varieties are 1) *Platanus* x *acerfolia Bloodgood* "Columbia" and 2*) Platanus x acerfolia* "Liberty."

13 HortScience, Inc., *Better Market Street Project Tree Inventory Report*, August 2016.

Alternative D would also involve the same partial restoration, reconstruction, and realignment of the Path of Gold lighting standards as the proposed project.

Alternative D would not include utility relocation or rehabilitation activities that are associated with the proposed project in blocks which would retain the existing brick material because those activities generally require excavation into the sidewalk.[14] Utility relocation or rehabilitation activities that could be conducted within the blocks which would have the sidewalk material replaced or which could be located entirely within the roadway right-of-way may occur under this alternative, including portions of some wastewater lines, water lines, and Muni traction power duct banks.[15]

The overall duration and intensity of construction associated with this alternative would be lower relative to the proposed project primarily due a reduced scope of proposed project changes. The project sponsor estimates that construction duration (at least six years) would be shorter than Alternative C and the proposed project but longer than Alternative B.[16]

Ability of Alternative D (Partial Preservation Alternative 2) to Meet the Project Objectives

As noted in Table 6-2, p. 6-23, Alternative D would partially meet all basic project objectives. This is due to it providing a mix of elements of the proposed project on some blocks while retaining existing conditions on others.

By installing an accessible pedestrian access route on some blocks of Market Street, Alternative D would partially meet the basic objective of improving accessibility and the related objectives of providing an adequate pedestrian throughway and correcting some of Market Street's existing barriers. Relatedly, Alternative D would partially meet the objective of repaving certain blocks of Market Street's sidewalks with high-quality materials (less prone to buckling or excessive gapping than current materials). Since Alternative D would retain existing brick sidewalks fully on some blocks and in part on other blocks, it would only partially meet all of these objectives. The "patchwork" nature of improvements to Market Street associated with Alternative D would arguably render Alternative D unable to meet part of one project objective that seeks to reinforce Market Street's role as the City's pre-eminent ceremonial street.

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14 Excavation beneath the sidewalk would require removal of the existing brick material which would likely damage some or most of the existing bricks that would need to be removed to access the areas to be excavated. In addition, the activity of removing the existing bricks triggers compliance with ADA standards, which in turn require replacement of enough material to maintain a pedestrian through corridor of at least ten feet in width. Therefore, this alternative does not include any utility work that would need to occur beneath the sidewalks on blocks that would not have any changes to curbside or boarding island stops.

15 Because the entire corridor would not be opened to utility replacement, Alternative D would likely need to forego any utility upsizing, but instead repair/replace existing infrastructure on affected blocks.

16 San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

As shown in Figure 6-6, p. 6-18, Alternative D would provide a physically separated (sidewalk-level) bicycle facility on modified blocks of Market Street, while retaining existing conditions (class II and class III on-street bicycle lanes on others. Accordingly, Alternative D would partially meet the basic objectives of providing a protected bicycle facility, reducing fatalities, and reducing conflicts between users. Alternative D would further contribute to the last two of these objectives by imposing the same private vehicle restrictions as the proposed project.

Alternative D's inclusion of the private vehicle restrictions would also contribute to its partial meeting of the basic objective of optimizing surface transit. The partial provision of a protected bicycle facility would also help surface transit by separating buses and bicycles at several curbside transit stops. However, by retaining existing curbside stops in several areas (where bicycles and buses share a lane), Alternative D would not fully meet the related basic objectives.

Alternative D would partially meet the basic objective of replacing aging infrastructure. Alternative D would enable the replacement of infrastructure below the travel lanes of Market Street as well as the sidewalks of the modified blocks. Infrastructure beneath non-modified blocks would not be replaced. However, Alternative D would incorporate the same partial restoration, reconstruction, and realignment of the Path of Gold light standards as the proposed project.

For its partial meeting of all of the above basic objectives (and related other objectives), Alternative D would thus partially meet the basic objective of contributing to the revitalization of mid-Market Street.

Alternative D would fully meet one project objective: making better use of underutilized sidewalk space. On the modified blocks of Market Street, the new streetlife and furnishing zones would see the installation of street furniture, consistent with the proposed project. On non-modified blocks, existing underutilized spaces could also receive such new furnishings. However, Alternative D would place all such furnishings within sidewalks paved in existing red brick, which would make such furnishings less than fully accessible.

Alternative D would replant existing trees with a new *Platanus* monoculture. In so doing, Alternative D would not meet the latter part of the project objective to reduce barriers and correct arboricultural deficiencies.

Alternative D would partially meet all other project objectives.

ALTERNATIVE E: CORE ELEMENTS ALTERNATIVE

Alternative E was developed in recognition that a substantial portion of the project's effects, particularly construction impacts at both the project and cumulative levels, are not directly associated with "core" elements of the proposed project but with associated upgrades/replacements of major infrastructure. The elements of this alternative associated with roadway configuration, transit facilities and operations, and pedestrian and bicycle facilities would be the same as the proposed project. However, the Core Elements Alternative would not include the following "state of good repair" infrastructure upgrades:

- Relocation/rehabilitation of SFMTA signals
- Full upgrade of all existing signal infrastructure on Market between Octavia Boulevard and Steuart Street
- Full track replacement
- Replacement of traction power system duct banks
- Roadway and roadway subbase replacement
- Relocation/rehabilitation of the following:
  - Fiber optic conduits
  - Wastewater facilities (sewer lines, manholes, catch basins)
  - Water facilities (water lines, low-pressure fire hydrants)
  - AWSS line/cisterns/hydrants
  - Muni traction power duct banks
  - Electrical lines serving traffic signals/streetlights
  - SFPUC power lines
  - Fire alarm call boxes

Removal of these elements would allow the "core" elements of the proposed project to proceed with lessened construction-related effects (please see below for an evaluation of how Alternative E would meet project objectives). Spot-repairs and minor realignments of existing F-line tracks would likely continue to be required, along with spot repairs to the roadway surface. However, it can be assumed/expected that over time, existing infrastructure would continue to decay past its useful life, potentially resulting in the need for future ad hoc/emergency repairs and/or replacements. Such repairs and replacements would be expected to require as-needed removal and reconstruction of core elements of the proposed project.

The intent of this alternative was to shorten construction duration and thus limit adverse effects associated with construction (traffic disruption, noise). However, as this alternative was further analyzed, it was determined that omitting certain state of good repair elements would not substantially reduce construction time such that significant construction-related impacts of the project would be avoided. Moreover, this analysis indicated that Alternative B, the Full Preservation Alternative, would likely result in the shortest construction duration of Alternatives B through E.

The following elements would be the same as the proposed project (bullets below refer to headings in the project description):

- Roadway configuration
- Private vehicle access
- Surface transit facilities (Muni-only lanes, stop spacing and service, stop characteristics, track and OCS locations, overhead catenaries and trolley poles, other surface infrastructure)
- Bicycle facilities
- Pedestrian facilities
- Commercial and passenger loading
- Vehicular parking
- Path of Gold – partial restoration, reconstruction, and realignment

The project sponsor estimates that construction duration (at least six years) would be shorter than Alternative C as well as the proposed project, but longer than Alternative B.[17]

Ability of the Core Elements Alternative to Meet the Project Objectives

Alternative E would fully meet several basic project objectives. Because Alternative E would incorporate all of the same streetscape, transit, bicycle, and pedestrian facilities as the proposed project, as well as proposed vehicle restrictions and parking/loading changes, Alternative E would fully meet the basic project objectives related to providing an accessible sidewalk, providing facilities to reduce fatalities, providing a protected bicycle facility, reducing conflicts between users of Market Street, and optimizing surface transit operations. In meeting these basic objectives, Alternative E would also meet other related objectives, such as providing an adequate pedestrian throughway, correcting existing barriers to movement, maximizing underutilized sidewalk areas, and upgrading Market Street with high-quality materials. Alternative E would also replace the existing trees in the same manner as the proposed project, thereby meeting the objective to correct existing arboricultural deficiencies. However, Alternative E would only partially meet the objective of replacing aging infrastructure to keep people, goods, and services moving. While Alternative E would replace existing surface rail as well as the OCS (along with partially restored, reconstructed, and realigned Path of Gold light standards), Alternative E would leave in place all existing below-ground infrastructure. Some of this infrastructure was found to be at or beyond its useful life. By retaining underground

[17] San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

infrastructure as it exists, Alternative E would be unable to fully meet this basic project objective and thus would preclude Alternative E from fully meeting the related basic project objective of contributing the revitalization of the mid-Market area. Retaining existing underground infrastructure would not contribute toward meeting related objectives of supporting planned housing and other growth in the project corridor.

D. Alternatives Analysis

The analysis below compares the significant and unavoidable impacts of the proposed project as assessed in this EIR to anticipated impacts of the five alternatives. Additionally, the analysis below provides a summary comparison between the proposed project and five alternatives for other impacts. Table 6-4, p. 6-56, summarizes impacts of the proposed project from this EIR to the comparative impacts the five alternatives.

Cultural Resources

Proposed Project

The proposed project would demolish or incompatibly alter a number of character-defining features of the landscape district. Table 6-3, on the following page, depicts each of these features.

Because the effect on the landscape district is the only significant preservation effect of the proposed project that cannot be avoided, it formed the basis for the development of preservation alternatives (see the discussion in Section 6.B [*Alternatives Screening and Selection*], above). The impact on the landscape district is also considered to be a significant cumulative impact.

Table 6-3, on the following page, does not include the Path of Gold light standards, whose project-related partial restoration, reconstruction, and realignment is not considered an incompatible alteration. Neither the proposed project nor any of the alternatives would result in an incompatible alteration of the Path of Gold light standards.

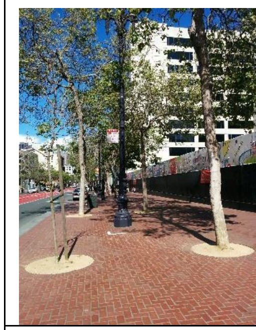
Regarding other cultural resources impacts, the proposed project would result in significant construction vibration and archaeological impacts. However, mitigation would reduce all such impacts to a less-than-significant level.

TABLE 6-3. CHARACTER-DEFINING FEATURES OF THE MARKET STREET CULTURAL LANDSCAPE DISTRICT IN ITS SIGNIFICANCE AS A DESIGNED LANDSCAPE ASSOCIATED WITH THE MARKET STREET REDEVELOPMENT PLAN

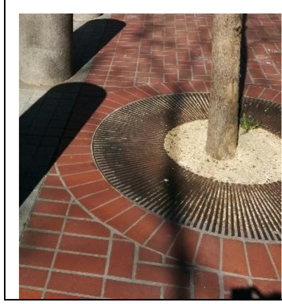
Image	Description	Proposed Project	Alt A (No Project)	Alt B (Full Preservation)	Alt C (Partial Pres. 1)	Alt D (Partial Pres. 2)	Alt E (Core Elements)
"X" indicates that the proposed project or alternative would demolish or incompatibly alter this resource. * Indicates a priority 1 character-defining feature of the Market Street Cultural Landscape District							
Small Plazas							
	Robert Frost Plaza*	X			X		X
	Mechanics Monument Plaza*	X			X	X	X
	Crocker Plaza*	X			X	X	X

Image	Description	Proposed Project	Alt A (No Project)	Alt B (Full Preservation)	Alt C (Partial Pres. 1)	Alt D (Partial Pres. 2)	Alt E (Core Elements)
"X" indicates that the proposed project or alternative would demolish or incompatibly alter this resource. *** Indicates a priority 1 character-defining feature of the Market Street Cultural Landscape District**							
	Mark Twain Plaza*	X			X	X	X
	Cluster arrangement of street trees in double and single rows down sidewalks	X			X	X (only on modified blocks)	X
	Red brick paving in herringbone pattern that distinguishes pedestrian from vehicular space *	X			X	X (only on modified blocks)	X
	Vertical circulation features of BART/Muni stations and Muni-only station[18]	X			X	X	X

[18] The proposed project could relocate a single existing elevator at the Civic Center BART/Muni station to one of two nearby locations. For purposes of this analysis, this elevator is assumed to have been a bronze street elevator. If the proposed project does not relocate this elevator, there would be no project-related demolition or incompatible alteration of this character-defining feature.

Image	Description	Proposed Project	Alt A (No Project)	Alt B (Full Preservation)	Alt C (Partial Pres. 1)	Alt D (Partial Pres. 2)	Alt E (Core Elements)
"X" indicates that the proposed project or alternative would demolish or incompatibly alter this resource. * Indicates a priority 1 character-defining feature of the Market Street Cultural Landscape District							
	Street trees (species vegetation characteristics)*	X			X		X
	Granite bollards with chain links	X (relocated or retained where feasible but assumed to be incompatibly altered)			X (relocated or retained where feasible but demolished or incompatibly altered)	X (only on modified blocks)	X (relocated or retained where feasible but assumed to be incompatibly altered)
	Bronze BART/Muni street level elevators[19]	X			X	X	X

[19] See footnote 16 above.

Image	Description	Proposed Project	Alt A (No Project)	Alt B (Full Preservation)	Alt C (Partial Pres. 1)	Alt D (Partial Pres. 2)	Alt E (Core Elements)
"X" indicates that the proposed project or alternative would demolish or incompatibly alter this resource. * Indicates a priority 1 character-defining feature of the Market Street Cultural Landscape District							
	Square and circular pole-mounted street signage	X			X	X	X
	Semaphore-style traffic signage and traffic lights	X			X	X	
	Bronze tree grates	X			X	X (on modified blocks only)	X

Source: ICF 2019.

HISTORIC ARCHITECTURAL RESOURCES

ALTERNATIVE A: NO-PROJECT ALTERNATIVE

Alternative A would generally preserve the character-defining features of the landscape district.

The routinely scheduled maintenance activities for existing streetscape elements and limited operational needs and emergency repairs of existing transit infrastructure, which would continue to occur, may result in minor modifications to portions of the existing red brick sidewalks, which are a character-defining feature of the landscape district. However, such activities would be limited and consistent with conditions associated with the use of Market Street throughout the period of significance associated with the historically significant MSRP design by Halprin, Ciampi, and Warnecke.

Similarly, the planned and approved projects or activities that would be implemented within or overlapping with a portion of the project corridor[20] may result in minor modifications to the streetscape including removal and replacement of limited portions of the existing brick sidewalks, but they would not demolish or lead to incompatible alteration of character-defining features of the landscape district.

Overall, Alternative A would have a ***less than significant impact*** on cultural resources along the project corridor compared with the significant and unavoidable impacts of the proposed project. The proposed project would result in substantial adverse changes to the landscape district as a designed landscape associated with the MSRP.

Alternative A would not contribute considerably to significant cumulative impacts identified for the LGBTQ Tenderloin Historic District, the landscape district (as a designed landscape associated with the MSRP), the Civic Center Landmark District, or United Nations Plaza. This impact would be ***less than significant***.

ALTERNATIVE B: FULL PRESERVATION ALTERNATIVE

As shown in Table 6-3, p. 6-40, Alternative B would not demolish or incompatibly alter any of the character-defining features that contribute to the significance of the landscape district. This is because Alternative B was developed expressly to avoid demolition and/or incompatible alteration of all existing priority 1 character-defining features of the landscape district (red brick sidewalks, small plazas, and species of street trees). This alternative would

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[20] These include Muni Forward, Van Ness Improvement Project, Geary Rapid Project, electrification of the two existing track switches on Market Street at 11th Street, replacement/repair of BART/Muni Metro ventilation grates, addition of concrete protection to bike lanes, refreshing existing crosswalk and other pavement markings, and minor signal timing changes to improve vehicle progression.

not alter center boarding islands, curbside transit stops, add the F-loop, or introduce any other element that would alter the physical configuration of Market Street, including sidewalk areas.

Although Alternative B would provide opportunities for new streetlife and furnishing zones within the existing sidewalk area, the majority of street furnishings that date to the MSRP design (benches, trash cans, bus shelters, newspaper racks, phone booths, etc. of unified design) are no longer extant and were found not to be character-defining.

Replacement of existing street furnishings that are not character-defining features of the historic streetscape would not represent a substantial change to the landscape district. Existing traffic signals and signage, which are also priority 2 character-defining features to the landscape district, would be retained. Alternative B would not alter the Path of Gold light standards and associated utility boxes.

Although tree wells would be replanted with new trees, this alternative would include selection of a species similar in character to those considered to be character-defining features of the landscape district and include a monoculture planting plan. Although this would represent an alteration, this approach would be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties as in-kind replacement and thus a compatible alteration.

Under these conditions, the demolition and incompatible alteration of character-defining features associated with Alternative B would be more limited than under the proposed project, and the landscape district would not be materially impaired. Therefore, impacts would be ***less than significant***, and no mitigation would be required**.** This is in contrast with the effects of the proposed project (significant and unavoidable, even with adherence to Mitigation Measures M-CP-1a, M-CP-1b, and M-CP-1c).

At the cumulative level, Alternative B would have a vastly scaled back set of improvements relative to the proposed project and thus would not contribute considerably to significant cumulative impacts identified for the landscape district, the LGBTQ Tenderloin Historic District, the Civic Center Landmark District, or United Nations Plaza. This impact would be ***less than significant***.

ALTERNATIVE C: PARTIAL PRESERVATION ALTERNATIVE 1

Alternative C would include alterations to Market Street generally similar to those of the proposed project, with a key difference being the treatment of the red brick sidewalks, which would lessen the degree of incompatible alteration to this character-defining feature of the Market Street Cultural Landscape District.

As shown in Table 6-3, p. 6-40, Alternative C would entail demolition or incompatible alteration of the same character-defining features that contribute to the significance of the landscape district as the proposed project. The key difference between Alternative C and the proposed project is that Alternative C would replace all existing red brick sidewalks with accessible paving materials consistent with Public Works Order 200369, and as harmonious in unity and color as the provisions of Order 200369 will permit.

Because Order 200369 would not permit a precise match with the existing red brick, it is assumed that the replacement materials would incompatibly alter the character-defining feature. Similarly, Alternative C would be expected to incompatibly alter the small plazas.

Alternative C would include the new F-loop and construction of an onboarding ramp adjacent to the southbound lane of Charles J. Brenham Place at the corner of Market Street. As such, similar to the proposed project, this alternative would alter a portion of the sidewalk within the boundaries of the landscape district and further contribute to the incompatible alteration of that character-defining feature. However, the other priority 1 character-defining feature of the landscape district (street tree species) would be altered with Alternative C. Replacement of the existing trees with new trees of up to five different genera would incompatibly alter this character-defining feature.

Alternative C would remove most existing bollards (priority 2 character-defining features of the landscape district), similar to the proposed project. Unlike some of Market Street's other small-scale character-defining features, these bollards do not have a legacy of being moved within the sidewalk area in the past.

Given these conditions, incompatible alterations to character-defining features would be lessened under Alternative C compared with the proposed project, but the character-defining features would still be materially impaired by the aggregate incompatible alterations to the Market Street Cultural Landscape, as demonstrated by the summary in Table 6-3, p. 6-40. This is a ***significant impact***.

Implementation of Mitigation Measures M-CP-1a, M-CP-1b, and M-CP-1c, as identified for the proposed project, would be required for Alternative C to reduce impacts. Although Alternative C would result in fewer incompatible alterations and changes than the proposed project, application of the proposed mitigation measures would not reduce the degree of material impairment. As such, Alternative C's impacts on the landscape district would remain ***significant and unavoidable with mitigation.***

With regard to cumulative effects, Alternative C would have largely similar improvements as the proposed project. Accordingly, Alternative C would (similar to the proposed project) contribute considerably to the significant cumulative impact identified for the landscape district. This impact would be ***significant and unavoidable with mitigation***. Alternative C would not contribute considerably to significant cumulative impacts identified for the LGBTQ Tenderloin Historic District, the Civic Center Landmark District, and United Nations Plaza. This impact would be ***less than significant***.

ALTERNATIVE D: PARTIAL PRESERVATION ALTERNATIVE 2

As shown in Table 6-3, p. 6-40, Alternative D would incompatibly alter fewer character-defining features of the landscape district than the proposed project and Alternative C but more than Alternatives A and/or B.

This alternative would remove, modify or add new select curbside transit stops and/or center transit boarding islands on 20 blocks of Market Street, but 22 blocks would remain unmodified. On the 20 blocks where an existing stop would be removed or a new or expanded curbside or center boarding island stop would be constructed, the existing curb lines would shift between 2 and 9 feet toward the sidewalk. A new 10-foot wide pedestrian access route meeting ADA accessibility standards would be constructed within the sidewalk area along the 20 blocks.

This pedestrian access route would use paving material consistent with the requirements of Public Works Order 200369 and that harmonize as much as the Order will permit with the shade and tone of the existing brick. Existing brick that would not have to be removed to accommodate the curb changes or pedestrian access route would be retained.

Although Alternative D would retain more historic sidewalk material than the proposed project and include an ADA-compliant pedestrian access route that would use pavers that would be consistent with the requirements of Public Works Order 200369, this alteration would only partially retain the resource; therefore, the alternative would incompatibly alter the character-defining feature. As noted in Table 6-3, p. 6-40, Alternative D would alter sidewalk material at three small plazas that are character-defining features while leaving the existing sidewalk material at Robert Frost Plaza.

Regarding street tree species, the other priority 1 character-defining feature that the proposed project would incompatibly alter, Alternative D would replant existing trees with a new *Platanus* monoculture, similar to Alternative B.

Although Alternative D would retain existing bollards and granite curbs within the 22 blocks that would not include transit stop modifications, within the 20 blocks that would include transit alterations, the bollards would generally be removed. On these 20 blocks, granite curbs would reused as part of the project as feasible.

Given that Alternative D would include construction of the new F-loop, construction of the onboarding ramp adjacent to the southbound lane of Charles J. Brenham Place at the corner of Market Street would be required. As such, similar to the proposed project, Alternative D would alter a portion of the sidewalk within the boundaries of the landscape district and further contribute to the incompatible alteration of that character-defining feature.

Under these conditions, changes to character-defining features associated with Alternative D would be less than under the proposed project, given that the street tree treatment can be considered consistent with the Secretary of the Interior's Standards for the Treatment of Historic

Properties. However, the resource would still be materially impaired by the aggregate incompatible alterations to the character-defining features of the Market Street Cultural Landscape. This is a ***significant impact***.

As such, implementation of Mitigation Measures M-CP-1a, M-CP-1b, and M-CP-1c to reduce impacts, as identified for the proposed project, would be required for Alternative D. Although Alternative D would include fewer incompatible alterations and changes than the proposed project, application of the proposed mitigation measures would not reduce the degree of material impairment. As such, Alternative D's impacts on the landscape district would remain ***significant and unavoidable with mitigation.***

At the cumulative level, Alternative D would have largely similar improvements as the proposed project on about half the blocks of the project corridor. Alternative D's effects on the landscape district would thus be similar to those of the proposed project. Accordingly, Alternative D's contribution to the cumulative impact would be considerable, like that of the project). This impact would be ***significant and unavoidable with mitigation***. Alternative D would not (similar to the proposed project) contribute considerably to significant cumulative impacts identified for the LGBTQ Tenderloin Historic District, the Civic Center Landmark District or United Nations Plaza. This impact would be ***less than significant***.

ALTERNATIVE E: CORE ELEMENTS ALTERNATIVE

Alternative E would include activities associated with roadway configuration, transit facilities and operations, and pedestrian and bicycle facilities that would be the same as activities under the proposed project but would not include upgrade/replacement of below-ground infrastructure or some surface-level infrastructure.

As shown in Table 6-3, p. 6-40, Alternative E would incompatibly alter most of the same character-defining features of the landscape district as the proposed project, except the semaphore-style traffic signage and traffic signal lights. This is because Alternative E would omit utility replacement activities (as fully described in the definition of Alternative E in Section 6.C).

Aside from this exception, Alternative E would incompatibly alter all of the same character-defining features associated with the landscape district as the proposed project. The semaphore style traffic signage is a priority 2 character-defining feature of the landscape district. While this difference is noteworthy, Alternative E's total degree of incompatible alterations to character-defining features would be only slightly reduced compared with the proposed project, and the resource would still be materially impaired. This is a ***significant impact***.

As such, implementation of Mitigation Measures M-CP-1a, M-CP-1b, and M-CP-1c to reduce impacts, as identified for the proposed project, would be required for the Core Elements Alternative. However, as with the proposed project, even with this mitigation, Alternative E's impacts on the physical characteristics of the landscape district would be ***significant and unavoidable with mitigation***.

With regard to cumulative effects, Alternative E would have largely similar improvements as the proposed project. Accordingly, Alternative E's contribution to the significant cumulative impact to the landscape district would be considerable, like that of the project. Because of its similarity to the proposed project, Alternative E would not (similar to the proposed project) contribute considerably to significant cumulative impacts on the LGBTQ Tenderloin Historic District, the Civic Center Landmark District, or United Nations Plaza. Impacts on these historic districts would be ***less than significant***.

Transportation and Circulation

Proposed Project

Transportation impacts of the proposed project are described in Section 4.B, *Transportation and Circulation.* Construction of the proposed project would involve substantial construction within the roadway and on sidewalks along the Market Street project corridor, and would result in substantial disruption to transit, pedestrian, and bicycle travel along and near the project corridor for multiple years. Therefore, construction-related transportation impacts of the proposed project would be significant. Mitigation Measure M-TR-1, Construction Management Plan – Additional Measures, would minimize significant construction-related transportation impacts, however, because project construction would still require travel lane closures, sidewalk closures, and detours for transit, bicyclists, and people walking over a prolonged period, substantial disruption to transportation would continue to occur. Thus, even with implementation of Mitigation Measure M-TR-1, construction-related transportation impacts would remain ***significant and unavoidable with mitigation***.

All operational impacts of the proposed project—related to VMT, traffic hazards, local and regional transit operations, people walking and bicycling, commercial and passenger loading, parking, and emergency access—would be ***less than significant***. See Section 4.B for a detailed description of the project impacts.

Construction-related Transportation Impacts

Alternative A: No-Project Alternative

The No-Project Alternative would include limited changes to the Market Street project corridor and would involve minimal construction activity. The construction duration of the No-Project Alternative would be substantially shorter and less severe than those of the proposed project. Thus, unlike the proposed project, the construction-related transportation impacts of the No-Project Alternative would be ***less than significant***. Mitigation Measure M-TR-1, Construction Management Plan – Additional Measures, identified for the proposed project, would not be applicable to the No-Project Alternative.

ALTERNATIVE B: FULL PRESERVATION, ALTERNATIVE C: PARTIAL PRESERVATION 1, AND ALTERNATIVE D: PARTIAL PRESERVATION 2 ALTERNATIVES

These alternatives would include several construction activities affecting the transportation network similar to the proposed project, although the extent and duration of construction activities would vary.

The project sponsor estimates at least a six-year period to construct Alternative B, C, or D, inclusive of inactive periods, with Alternative B expected to entail the shortest duration, Alternative C's duration being similar to the proposed project, and Alternative D's duration being shorter than Alternative C and the proposed project but longer than Alternative B.[21]

Certain construction activities (particularly replacement/upgrades of utilities) for these three alternatives would be similar to the proposed project, and therefore significant construction-related transportation impacts could result due to travel lane closures, detours for transit and bicyclists, and increased congestion and travel times on cross streets and other streets near the project corridor. Extensive detours for people walking would be required for Alternatives C and D (which would modify sidewalks in addition to roadways) but not for Alternative B. Nonetheless, construction-related transportation impacts of Alternatives B, C, and D would be significant. Mitigation Measure M-TR-1, Construction Management Plan – Additional Measures, identified for the proposed project, would also be applicable to these alternatives. Similar to the proposed project, these measures would minimize effects to users of Market Street, but each would involve a prolonged period of construction and associated disruption to transportation. Accordingly, the impacts of Alternatives B, C, and D would remain ***significant and unavoidable with mitigation***. For Alternatives B and D, the anticipated reduced duration of construction (relative to the proposed project) would lessen the degree of impact, but the impacts would remain significant and unavoidable.

ALTERNATIVE E: CORE ELEMENTS ALTERNATIVE

Alternative E would include the same roadway configuration, transit facilities and operations, and pedestrian and bicycle facilities as the proposed project, but not project elements associated with infrastructure upgrades/replacement such as track replacement, water lines, and sewer lines. Although the utility components of the proposed project would not be constructed, the overall construction period for this alternative would be at least six years, inclusive of inactive periods, which is expected to be shorter than Alternative C or the proposed project, but longer than Alternative B.[22]

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[21] San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

[22] San Francisco Public Works, personal communication from Flora Law, February 19, 2019.

Construction activities for components of this alternative that would be similar to the proposed project would require travel lane closures, detours for transit, bicyclists, and people walking, and increased congestion and travel times on cross streets and other streets near the project corridor. Therefore, similar to the proposed project, construction-related transportation impacts of Alternative E would be significant, and Mitigation Measure M-TR-1, Construction Management Plan – Additional Measures, identified for the proposed project, would also be applicable to this alternative. Therefore, like the proposed project, the construction-related transportation impacts of Alternative E would be ***significant and unavoidable with mitigation***, albeit, due to its shorter duration, impacts of this alternative would be somewhat less severe than those of the proposed project.

CUMULATIVE IMPACTS

ALTERNATIVE A: NO-PROJECT ALTERNATIVE

Alternative A would include minimal physical changes to the project corridor and would involve very limited construction activities. Therefore, unlike the proposed project, Alternative A would not contribute considerably to significant cumulative construction-related transportation impacts.

Alternative A would include minimal changes to the transportation network and, similar to the proposed project, would not contribute considerably to significant cumulative VMT impacts.

Unlike the proposed project, Alternative A would not include additional vehicle access or turn restrictions within the project corridor, and therefore would not contribute considerably to the significant cumulative impact on the Muni 27 Bryant bus operations, nor would it not contribute considerably to significant cumulative transit impacts on other local and regional routes. This impact would be ***less than significant***.

ALTERNATIVE B: FULL PRESERVATION, ALTERNATIVE C: PARTIAL PRESERVATION 1 ALTERNATIVE, AND ALTERNATIVE D: PARTIAL PRESERVATION 2

Alternative B would make minimal physical changes to the project corridor (e.g., traffic signal timing changes, Muni-only lanes, vehicle restrictions, parking conversion to loading on side streets), with a curtailed amount of construction. Alternatives C and D would make physical changes to the Market Street project corridor similar to the proposed project, although Alternative D would reconstruct about half the blocks within the Market Street corridor. Similar to the proposed project, these alternatives would contribute considerably to significant cumulative construction-related transportation impacts**.** This impact would be ***significant and unavoidable with mitigation***.

Alternatives B, C, and D include similar transportation network changes and vehicle access and turn restrictions as the proposed project, and, similar to the proposed project, these three alternatives would not contribute considerably to significant cumulative VMT impacts. This impact would be ***less than significant***.

Similar to the proposed project, Alternatives B, C, and D would contribute considerably to significant cumulative impacts on the 27 Bryant bus operations, but would not contribute considerably to significant cumulative transit impacts on other local and regional routes. Impacts on the 27 Bryant bus operations would be ***significant and unavoidable with mitigation***, and impacts on all other local and regional routes would be ***less than significant***.

ALTERNATIVE E: CORE ELEMENTS ALTERNATIVE

Construction activities for Alternative E would result in significant construction-period transportation impacts related to travel lane closures; detours for transit, bicyclists, and people walking; and increased congestion and travel times on cross streets and other streets near the project corridor, at least six years. Therefore, similar to the proposed project, Alternative E would contribute considerably to significant cumulative construction-related transportation impacts. This impact would be ***significant and unavoidable with mitigation***.

Alternative E would include similar transportation network changes and vehicle access and turn restrictions as the proposed project that would not induce automobile travel. Thus, similar to the proposed project, Alternative E would not contribute considerably to significant cumulative VMT impacts. Similar to the proposed project, Alternative E would contribute considerably to significant cumulative impacts on the 27 Bryant bus operations, but similar to the proposed project, would not contribute considerably to significant cumulative transit impacts on other local and regional routes Impacts on the 27 Bryant bus operations would be ***significant and unavoidable with mitigation***, and impacts on all other local and regional routes would be ***less than significant***.

NOISE

PROPOSED PROJECT

Although all of the proposed project's construction-period and operational effects would be either less than significant or rendered less than significant with adherence to mitigation measures, the project's construction-period effects would be cumulatively considerable. Combined noise levels from various pieces of construction equipment operating simultaneously during construction of the project could be as high as 93 A-weighted decibels (dBA), equivalent noise level (L_{eq}), at the nearest noise-sensitive land use. This would exceed both the combined construction noise standard (90 dBA L_{eq}) and the applicable ambient noise standard (80 dBA). In non-technical terms, an increase of 10 dBA would be perceived as a doubling of the noise (given the logarithmic nature of decibels). Moreover, if other construction projects are located in the same vicinity, construction noise could combine to result in even greater noise levels resulting in a significant cumulative impact. Other projects may include even louder equipment, such as impact pile drivers. In addition, project construction would occur over a period of at least six and possibly up to 14 years, meaning that the period of exposure and potential for combining with other projects is high, and therefore the contribution of the proposed project to this significant cumulative impact is considerable. Impacts would be ***significant and unavoidable with mitigation***.

ALTERNATIVE A: NO-PROJECT ALTERNATIVE

Alternative A would include minimal physical changes to the project corridor and very limited construction activities. Therefore, unlike the proposed project, Alternative A would not contribute considerably to significant cumulative construction-related noise impacts. This impact would be ***less than significant***.

ALTERNATIVE B: FULL PRESERVATION ALTERNATIVE; ALTERNATIVE C: PARTIAL PRESERVATION ALTERNATIVE 1; ALTERNATIVE D: PARTIAL PRESERVATION ALTERNATIVE 2; AND ALTERNATIVE E: CORE ELEMENTS ALTERNATIVE

The remaining alternatives would be expected to have construction periods of at least six years, with the shortest duration associated with Alternative B, Alternative C having a similar duration as the proposed project, and Alternatives D and E having a shorter duration than Alternative C or the proposed project, but longer than Alternative B. Each alternative would involve construction activities similar to those of the proposed project. Therefore, each alternative would each be expected to contribute considerably to the significant cumulative impact. Impacts for Alternatives B, C, D, and E would be ***significant and unavoidable with mitigation***.

OTHER TOPICS

The previous analysis focused on avoiding or reducing the significant and unavoidable effects of the proposed project, as identified in the technical sections of this environmental impact report (cultural resources, transportation, and noise). The alternatives analyzed above would not change impact conclusions that were found to be less than significant for the subtopics of each of these resources and would not change the impact conclusions for air quality or wind. Furthermore, as discussed in Chapter 4, the 2016 initial study for the proposed project “screened out” from further environmental review several topics on the City’s environmental review checklist. These topics were:

- Land use
- Aesthetics
- Population and housing

- Transportation and circulation (air traffic patterns)
- Noise (excessive noise levels from airport land use plan area or private airstrip and exposure to existing noise levels)
- Air quality (objectionable odors)
- Greenhouse gas emissions
- Shadow
- Recreation
- Utilities and service systems
- Public services
- Biological resources
- Geology and soils
- Hydrology and water quality
- Hazards and hazardous materials
- Mineral and energy resources
- Agricultural and forest resources

The three preservation alternatives (B, C, and D) and Alternative E, the Core Elements Alternative, were developed with the express intent to avoid and/or lessen the significant and unavoidable effects of the proposed project (summarized in Section 6.B, above). These four alternatives generally removed or scaled back elements of the proposed project, such as the extent of sidewalk modification (all of the preservation alternatives) or construction (some of the preservation alternatives and Alternative E). In addition, Alternative A removed all project-related improvements.

None of the alternatives considered here introduced any new elements that would introduce new or different environmental effects in any of the resource topics screened out via the initial study. Many of the topics screened out via the initial study related to resources that are not present in the project corridor (mineral/energy resources, agricultural/forest resources, and others). None of the alternatives considered here altered the project location such that resources previously ruled out as not present would become present. Accordingly, the alternatives considered here would not result in any substantially new or worsened environmental effects for the topics screened out via the initial study.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Section 21002 of the CEQA Statute[23] states that "public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects" of the project. This section of the CEQA statute adds that a lead agency may approve a project with significant environmental effects if the lead agency can demonstrate that specific economic, social or other conditions make such mitigation measures or alternatives infeasible.

CEQA also requires that an environmentally superior alternative be identified among the alternatives analyzed. The environmentally superior alternative is the alternative that avoids or substantially lessens some or all of the significant and unavoidable impacts of a project. If the environmentally superior alternative is the No-Project Alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives (CEQA Guidelines section 15126.6).

Table 6-4, on the following page, compares the anticipated impacts of the proposed project and the five alternatives. The primary consideration in determining an environmentally superior alternative is the extent to which an alternative avoids or lessens the significant effects of the project. As stated in Section 6.B, above, and detailed in the technical sections of Chapter 4, the proposed project (as well the Western Variant) would result in two significant and unavoidable impacts at the project level (one cultural, one transportation) and four at the cumulative level (one cultural, two transportation, one noise).

On the basis of comparing the extent to which the alternatives avoid or lessen the significant and unavoidable impacts of the proposed project, the No-Project Alternative would avoid two of the significant and unavoidable environmental impacts of the proposed project, would not contribute considerably to any significant cumulative impact, and would not result in any other significant impacts. Alternative A would be the environmentally superior alternative but for the provisions of section 15126.6 of the CEQA Guidelines, which requires the lead agency to identify another environmental superior alternative among the other alternatives. See also Table 6-2, p. 6-23, which indicates that Alternative A would not fully or partially meet any project objectives.

Alternatives C and D would entail many similar components of the proposed project, and thus, as indicated in Table 6-4, on the following page, would result in generally similar significant and unavoidable impacts on transportation (construction period operations) and the landscape district as the proposed project.

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23 California Public Resources Code section 21000 et seq.

TABLE 6-4. COMPARISON OF SIGNIFICANT AND UNAVOIDABLE ENVIRONMENTAL IMPACTS OF PROPOSED PROJECT WITH IMPACTS OF ALTERNATIVES

Impact of Proposed Project	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Significant and Unavoidable Impacts of the Proposed Project					
Impact CP-1.C. The proposed project and project variant would cause a substantial adverse change in the significance of the Market Street Cultural Landscape District as a designed landscape associated with the Market Street Redevelopment Plan. (SUM)	Less than project (LTS)	Less than project (LTS)	Less than project but still SUM	Less than project but still SUM	Similar to project, SUM
Impact C-CP-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects in the city, would result in a cumulatively considerable contribution to a significant cumulative impact to the Market Street Cultural Landscape District but not on any other historical architectural resources. (SUM)	Less than project (not cumulatively considerable)	Less than project (not cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)

Impact of Proposed Project	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Impact TR-1. Construction of the proposed project and project variant could result in substantial interference with pedestrian, bicycle, or vehicle circulation and accessibility to adjoining areas as well as potentially hazardous conditions. (SUM)	Less than project (LTS)	Less than project but still SUM	Less than project but still SUM	Less than project but still SUM	Less than project but still SUM
Impact C-TR-1. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative construction-related transportation impacts. (cumulatively considerable)	Less than project (not cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)
Impact C-TR-4. The proposed project and project variant, in combination with past, present, and reasonably foreseeable future projects, would contribute considerably to significant cumulative transit impacts related to transit operations on the Muni 27 Bryant but would not contribute considerably to significant cumulative transit impacts on other local and regional routes. (cumulatively considerable for 27 Bryant)	Less than project (not cumulatively considerable for any transit route)	Similar to project (cumulatively considerable for the 27 Bryant, not cumulatively considerable for any other route)	Similar to project (cumulatively considerable for the 27 Bryant, not cumulatively considerable for any other route)	Similar to project (cumulatively considerable for the 27 Bryant, not cumulatively considerable for any other route)	Similar to project (cumulatively considerable for the 27 Bryant, not cumulatively considerable for any other route)

Impact of Proposed Project	Alternative A: No-Project Alternative	Alternative B: Full Preservation Alternative	Alternative C: Partial Preservation Alternative 1	Alternative D: Partial Preservation Alternative 2	Alternative E: Core Elements Alternative
Impact C-NO-1. Construction activities for the proposed project and the project variant, in combination with other past, present, and reasonable future projects in the city, would result in a substantial temporary increase in noise or noise levels in excess of the applicable local standards.	Less than project (not cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)	Similar to project (cumulatively considerable)

Alternative E would omit all of the below-ground infrastructure replacements/upgrades associated with the proposed project. While this would involve less physical change than the proposed project, Alternative E is expected to nonetheless require at least six years to construct. This expected change in duration would not result in any substantially different or lesser construction or noise impact conclusion relative to the proposed project. Moreover, Alternative E would implement the same streetscape changes as the proposed project, and thus would (like the proposed project) result in a significant and unavoidable impact on the landscape district.

The remaining alternative, the Full Preservation Alternative (Alternative B), would avoid the significant and unavoidable project-level and cumulative impacts on the landscape district (Impact CP-1.C and Impact C-CP-1) because it would not incompatibly alter character-defining features of the landscape district. However, because Alternative B would include utility replacements/upgrades beneath the roadway portion of Market Street, Alternative B would still require a substantial period of construction, comparable to that of the proposed project. Accordingly, Alternative B would result in a significant and unavoidable impact on transportation and contribute considerably to cumulative construction-period transportation impacts, similar to the proposed project.

As set forth in Section 6.C, above, Alternative B was developed as a preservation alternative in response to HPC Resolution 0746. Alternative B was further included as an alternative evaluated in detail within this chapter because it is "potentially feasible" in the sense that the nature of the alternative (which entails a substantially reduced set of project-related improvements) could be implemented. However, as discussed in Section 6.C and indicated in Table 6-2, p. 6-23, the omission of several proposed project elements, which was necessary to formulate an alternative that would fully avoid the significant and unavoidable cultural resource impact (in the case of the proposed project, the impact on the landscape district), renders Alternative B unable to fully meet any of the seven basic project objectives, although it would partially meet five of the seven basic project objectives. On the basis of the foregoing analysis, Alternative B would be the environmentally superior alternative.

Among the other alternatives that better meet project objectives, Alternative C would fully meet all basic project and other project objectives, but would result in essentially similar significant and unavoidable impacts as the proposed project. Alternative D would partially meet basic project objectives, fully meeting none, while resulting in similar significant and unavoidable impacts as the proposed project. Moreover, the "patchwork" nature of Alternative D's improvements could hinder the ability to meet the project objective related to reinforcing Market Street's identity as the city's pre-eminent ceremonial street.

Alternative E would fully meet six of the seven basic project objectives. Alternative E would result in the same significant and unavoidable cultural resource impact as the proposed project but a lessened, yet still significant and unavoidable, construction-period transportation impact.

Because it would lessen one of the significant impacts of the proposed project, Alternative E represents a notable improvement relative to Alternatives C and D in terms of resulting a lesser degree of impacts. However, based on all of the foregoing, Alternative B would remain the environmentally superior alternative insofar that it is the only alternative that would fully avoid one of the proposed project's two significant and unavoidable impacts.

E. ALTERNATIVES CONSIDERED BUT REJECTED

The project sponsor and project team considered numerous design concepts and options as potential project alternatives as part of the alternatives screening and selection process. As stated in State CEQA Guidelines section 15126.6(f)(1), the factors that may be considered when a lead agency assesses feasibility include:

> …site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site.

Because the objectives to the proposed project are specific to Market Street and relate directly to its physical centrality within San Francisco, the project sponsor did not consider an alternative location for the proposed project. However, initial design concepts identified in the screening process for a time included parallel portions of Mission Street, but such alternatives were ultimately screened out for reasons described below.

To arrive at the alternatives that were carried forward, the project team explored different elements for decades, including more than 20 different design concepts and alternatives over the seven years. The discussion below summarizes the alternatives development and screening process.

BACKGROUND

The proposed project builds on efforts dating back to the late 1990s led by the San Francisco County Transportation Authority. Given this time, along with the centrality and complexity of Market Street within the City's transportation network, objectives for the project have been continually refined and honed through a multi-year, multi-faceted public engagement process.

Following implementation of many elements of its 2004 Market Street Study and Action Plan,[24] in 2009, the transportation authority continued examining questions of allocating street space on Market Street, in particular, building a framework in which to better understand the role of

[24] San Francisco County Transportation Authority, *Market Street Study Action Plan*, 2004, accessed January 25, 2019, https://www.sfcta.org/sites/default/files/content/Planning/MarketStreet/action%20plan.pdf.

Market Street in the City's overall transportation network and be better able to investigate the potential for private vehicle restrictions. The Better Market Street Project was launched in the wake of these 2009 considerations. The project team was expanded to include the citywide division of the San Francisco Planning Department, the San Francisco Municipal Transportation Agency, and San Francisco Public Works (the project sponsor).

INITIAL OPTIONS AND DESIGN CONCEPTS

Formal public outreach for the proposed project's conceptual design began in early 2011 as part of phase I. Phase I involved a public visioning process and conceptual planning and design. People from both the immediately adjacent neighborhoods and all over the city provided broad input through a series of coordinated workshops, online comments, social media, and other outreach venues. Three rounds of public outreach workshops and webinars were conducted from May 2011 to July 2013. Refer to Chapter 2, *Project Description*, for a detailed description of each round of public outreach. Through the public outreach process, several design priorities and drivers were established in coordination with the proposed project's goals and publicly identified design drivers, which evolved over time to become the objectives for the proposed project.

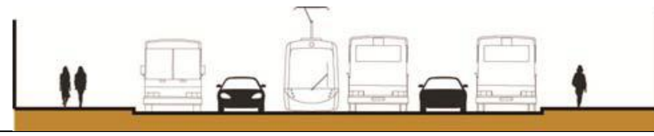
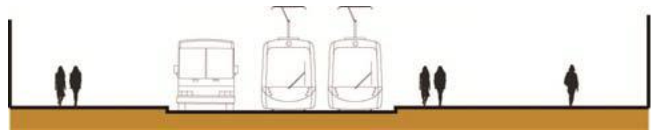
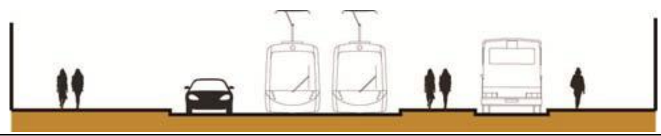
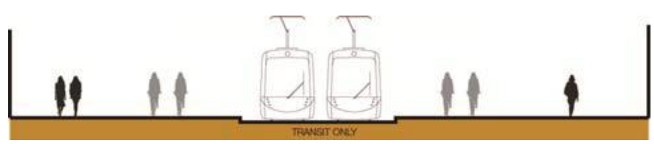
Based on the design priorities and design drivers, such as improving mobility and safety for bicyclists and pedestrians and improving transit speed, reliability, and capacity, 17 potential project corridor design concepts were identified for consideration.

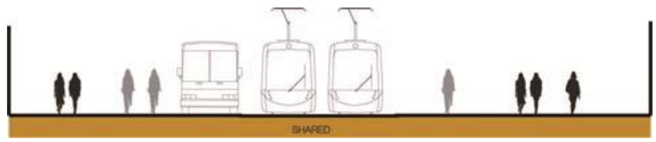
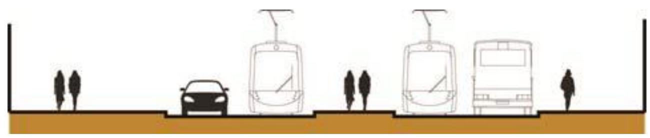
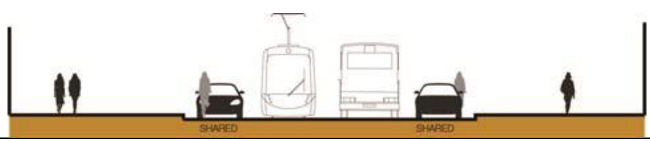
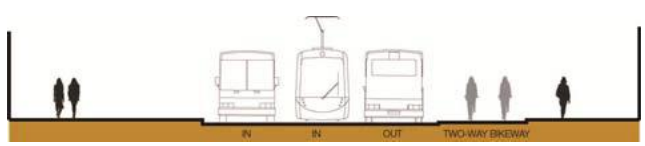
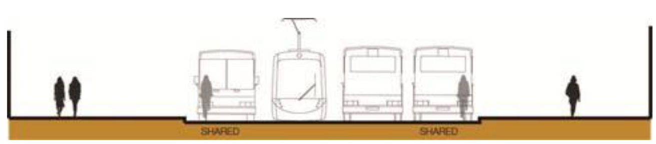
The 17 design concepts were evaluated by the interagency team at that time (Public Works, SFMTA, the planning department, San Francisco County Transportation Authority, and San Francisco Public Utilities Commission), based on their consistency with the proposed project's goals and compatibility with community-identified design priorities.

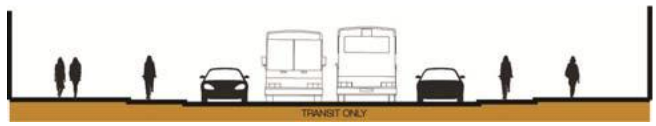
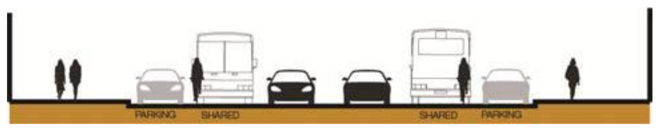
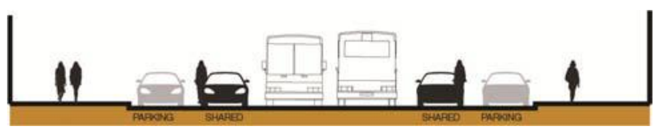
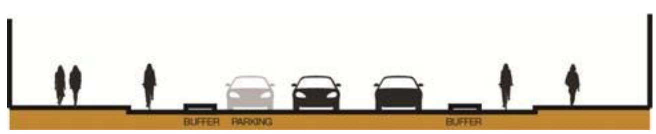
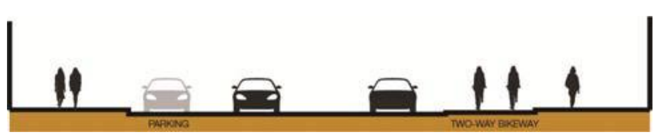
Of the 17 design concepts evaluated, 13 were focused primarily on Market Street streetspace allocation and/or allowable operations; four introduced proposed modifications of the parallel section of Mission Street. Table 6-5, on the following page, provides summary information about the 17 design concepts, as excerpted from the 2013 *Better Market Street Final Report* (Appendix 11).

As shown in Table 6-5, on the following page, the concepts contemplated major modifications to the allocation of streetspace. In particular, concepts 5 and 6 explored the possibility of reducing substantial portions of Market Street to two transit-only lanes (one in each direction) with or without the addition of multi-use lanes. These concepts are similar to comments received from the public during the public scoping period for this EIR. Concept 5 would have implemented this solution between Van Ness Avenue and The Embarcadero; concept 6 would have extended from Fifth Street to The Embarcadero. Similarly, concept 10 contemplated condensing all transit operations (streetcar and bus) to two transit-only lanes.

TABLE 6-5. PHASE I INITIAL DESIGN CONCEPTS

Design Concept Description	Cross-Section Drawing
I. Widen to Provide Total of Six Travel Lanes • Reduces sidewalk width to accommodate six travel lanes.	
II. One Lane along Boarding Area, Two Lanes in Opposite Direction • Buses would share the center transit-only lane where there are boarding islands, otherwise there would be four lanes. • Would require a new, third signal phase, resulting in shorter phases overall.	
III. Replace Historic F-line with Modern, High Speed, ADA-accessible Tram • Maintain current street alignment, but replace historic cars with modern tram cars.	
IV. Limited Transit Turnarounds During Peak Hours and All Transit Operates in Transit-only Center Lanes • Center lanes would be transit only. • During peak hours, limited number of bus lines would turn around at Market Street. • F-line service would be supplemented with modern • low-floor streetcars during peak to alleviate transit-transit • conflicts and improve speed, reliability and accessibility. • Transit service would resume to operate as normal during off-peak hours, but still in center lanes. • Bicyclists would share curb lane with private vehicles, taxis and loading.	
V. Rail-only Service between Fifth Street and The Embarcadero, with Pedestrians and Bicyclists • All transit lines would be rerouted such that riders would alight at Market Street at Fifth Street and transfer to augmented Market Street rail service. • Creates possibility of new significant transit node, with associated economic development potential and public realm activation. • Could free up space along the curb to accommodate a bike lane and loading zones.	

<table>
<tr><th>Design Concept Description</th><th>Cross-Section Drawing</th></tr>
<tr><td>VI. Rail-only Transit Service between Van Ness Avenue and The Embarcadero, with Pedestrians and Bicyclists
• Remove all transit except for F-line, supplemented by additional modern trams.
• Would allow for flexibility in the streetscape design to accommodate pedestrians and bicyclists and capture Complete Street objectives.</td><td></td></tr>
<tr><td>VII. Single Surface, Shared Space between Fourth and Fifth Streets
• Curb-less shared space for all modes with paving treatments, street layout, and signage to encourage cooperative use of the space.
• Would reflect prominence of this block in the City as the most visited street in San Francisco
• Would offer potential to best capture public life potential of confluence with Powell Street, Hallidie Plaza, Westfield Mall, and Market Street.</td><td></td></tr>
<tr><td>VIII. Create Ramblas (i.e., large center median allowing active uses), Realign Tracks with Center Boarding and Wide Center-Street Public Space
• Shift F-line to provide 20-foot center space along length of corridor to act as shared waiting space for center-running transit (F-line and bus routes).
• For stretches not including transit stops, space could be engaged with varied streetscape and recreational opportunities.</td><td></td></tr>
<tr><td>IX. Boulevard Layout, Local Access and Center Through Lanes
• Maintains four lanes of traffic.
• Maximizes private vehicle access to buildings.
• Potential to improve quality of waiting experience of transit riders, depending on design of local-access lane.</td><td></td></tr>
<tr><td>X. Skip Stop
• Transit concentrated into center lanes.
• Curbside lane shared by taxis, paratransit, private vehicles and bicyclists.</td><td></td></tr>
<tr><td>XI. "3:1" Concept
• Two inbound Market Street lanes, one outbound lane/couplet with Mission Street for a portion of Market Street's outbound transit.
• Two-way cycle track on Market Street.</td><td></td></tr>
<tr><td>XII. Limited Auto Restriction and Shared Transit/Bicycle Lane
• Transit only center lanes
• Auto restrictions, with curb lane shared by transit, paratransit/taxis, private autos and bicycles.</td><td></td></tr>
</table>

Design Concept Description	Cross-Section Drawing
XIII. Curbside Cycle track • Transit only center lanes • Auto restrictions, with curb lane shared by transit, paratransit/taxis, and private autos, but not bicycles. • Directional, separated bicycle facilities at mid-grade or sidewalk grade.	
XIV. Mission Street TEP Moderate Concept with Side-running Bus Lanes • Miscellaneous features (e.g., extending right-turn lanes) • Bus stops: extend existing bus zones, select stop consolidations, new boarding island at Transbay Transit Center (inbound) • 24-hour transit only lanes between Beale and 11th • No parking between 7 a.m. and 7 p.m.	
XV. Mission Street TEP Expanded Concept with Center-running Bus Lanes • Miscellaneous features (e.g., extending right-turn lanes, required right turns, queue jumps) • Bus stops: extend existing bus zones, select stop consolidations, near-side boarding islands • 24-hour transit only lanes between Beale and 11th; center-running transit lane between Fremont and Sixth • No parking 24 hours a day between Fremont and Sixth	
XVI. Mission Street Bikeway with One-way Cycle track on Each Side • Two 6- to 8-foot wide bikeways on each side of Mission Street, with two- to five-foot painted buffer • Floating parking on one side of the street • Introduce left-turns from Mission Street at select intersections • Move Muni 14-Mission line, Golden Gate Transit buses and SamTrans lines to Market Street • Time traffic signals to prioritize bicycle progression along Mission Street	
XVII. Mission Street Bikeway with Two-way Cycle track on One Side • A 12- to 16-foot wide two-way bikeway on the north side of Mission Street • Curbside parking on the south side of Mission Street • Move Muni 14-Mission line, Golden Gate Transit buses and SamTrans lines to Market Street • Time traffic signals to prioritize bicycle progression along Mission Street	

Cycle track = a class IV protected bikeway that would be partially grade-separated from motor vehicle traffic for use exclusively, or primarily, by bicycles

Source: Better Market Street Final Report 2013

Of the 17 concepts in Table 6-5, p. 6-62, concepts 12, 13, and 16 were carried forward for further analysis. The 14 other concepts were discarded from further development/exploration in 2013 (documented in the *Better Market Street Final Report*) based on conclusions by the project team and/or Technical Advisory Committee that the concepts were inconsistent with the design drivers, were impractical due to cost and/or transit operations considerations, would hinder economic development goals, and/or would introduce undesirable conflicts. As set forth in the *Better Market Street Final Report* (Appendix 11) most of the concepts were dismissed for multiple reasons.

Concepts 12, 13, and 16 were further refined and evolved into three complete options and two related design concepts, all described in detail below. These were considered the end products of Phase I of outreach. These options and design concepts were subsequently refined and were the subject of the initial study prepared for the proposed project in 2016. However, the project team continued its evaluation of these three options and two design concepts as the environmental review phase progressed after publication of the initial study. As noted in the discussion of each option below, this evaluation following the initial study concluded that all three options were infeasible or did not meet the project objectives because of the following key issues:

- Safety concerns regarding private vehicle operation on Market Street and the city emphasis on Vision Zero
- Substantial delays for surface transit
- Protection of bicyclists from vehicle conflicts
- Restriction or elimination of commercial and passenger loading on Market Street

Most of these options and related design concepts would not avoid the proposed project's significant and unavoidable impacts on cultural resources and transportation.

Of the 13 concepts that were limited to potential modifications along Market Street, the vast majority would have entailed modifications to the streetscape (e.g., increasing the number of traffic lanes on Market Street, widening sidewalks, adding new medians or ramblas, converting the roadway and sidewalk to a single level surface, adding separated bicycle lanes) that would have entailed similar significant impacts on the Market Street Cultural Landscape District as well as a substantial period of construction to implement and thus would not have avoided the significant construction-related transportation and noise impacts.

Some of the concepts, such as concepts 3 and 10, contemplated operational changes, such as new tram service, within the current configuration of Market Street. Although such options might have avoided the significant impacts of the proposed project, particularly impacts on the cultural landscape district, they were rejected because they inadequately addressed key project objectives (as they existed at the time), particularly their failure to include a fully protected bicycle facility.

OPTION 1: MARKET STREET (COMPLETE STREET AND TRANSIT PRIORITY IMPROVEMENTS)

This Option 1 was evaluated as Alternative 1: Market Street (Complete Street and Transit Priority Improvements) in the 2016 initial study prepared for the proposed project. This option, along with Options 2 and 3, was developed as a result of the public outreach process that began in early 2011. In addition, two design concepts associated with this option were developed for the bicycle facilities on Market Street: Design Concept A and Design Concept B.

- Design Concept A would provide an enhanced version of the existing shared vehicle and bicycle lane, with the addition of painted sharrows (shared lane pavement markings) where a dedicated bicycle facility is not already present. This design concept was evaluated as Design Option A in the 2016 initial study prepared for proposed project.
- Design Concept B would provide a new raised cycle track (i.e., a class IV protected bikeway that would be partially grade-separated from motor vehicle traffic for use exclusively, or primarily, by bicycles) along the entire length of Market Street, except where Bay Area Rapid Transit [BART]/Muni entrances or other obstructions would not allow it. The cycle track would be 3 to 4 inches higher than the roadway and would not have any horizontal separation from vehicles in the curb lane. Design Concept B also would provide a new protected cycle track on Valencia Street between Market and McCoppin streets. This design concept was evaluated as Design Option B in the 2016 initial study prepared for the proposed project.

This option would have prohibited private vehicles on Market Street between Steuart Street and Van Ness Avenue in the westbound direction and between 10th and Main streets in the eastbound direction. In addition, this option would not have allowed commercial or passenger loading on Market Street, with the exception of paratransit users.

This option was rejected from further consideration because, based on the conclusions of pilot project analysis, the design of the bicycle facilities under both Design Concepts A and B would not meet objectives to (1) improve the safety, comfort, and mobility of bicyclists along the length of the project corridor and (2) reduce friction and conflicts between transit, taxis, commercial vehicles, private vehicles, bicyclists, and pedestrians. The shared vehicle and bicycle lane proposed as part of Design Concept A would not include a buffered bicycle facility and therefore would provide inadequate protection for bicyclists. The results of a 2015 SFMTA and Public Works pilot project for a bicycle facility, similar in concept to Design Concept B, indicated that there were safety issues for bicyclists because of commercial vehicles that block bikeways to perform loading activities, requiring bicycles to enter vehicle travel lanes. Therefore, neither design concept under Option 1 would meet objectives related to bicycle safety. An additional reason this option was rejected from further consideration was because the loading restrictions associated with this option could result in the elimination of loading options for some businesses and residences and could result in significant loading impacts.

Option 2: Market Street – Moderate Option (Complete Street and Moderate Transit Priority Improvements)

This Option 2 was evaluated as Alternative 2: Market Street – Moderate Alternative (Complete Street and Moderate Transit Priority Improvements) in the 2016 initial study prepared for the proposed project. This option was the same as Option 1, except that Option 2 would have allowed commercial and passenger loading on Market Street. It also proposed slightly fewer private vehicle restrictions.

Option 2 was rejected from further consideration because it would not meet objectives to (1) improve pedestrian safety, comfort, and mobility along and across Market Street from Octavia Boulevard to Steuart Street; (2) improve the safety, comfort, and mobility of bicyclists along the length of the project corridor; and (3) reduce friction and conflicts between transit, taxis, commercial vehicles, private vehicles, bicyclists, and pedestrians. The design of the bicycle facilities (Design Concepts A and B) would be the same as under Option 1. As explained above, these facilities would not meet objectives related to bicycle safety. Furthermore, Option 2 would allow private vehicles on portions of Market Street, except at locations where required right-turn regulations are in place. Therefore, conflicts among vehicles, bicyclists, and pedestrians would continue under Option 2. These conflicts result in corresponding reductions in the performance of the surface transit system and bicycle facilities. Therefore, continued operation of private vehicles on Market Street would not meet core project objectives regarding a safer experience for pedestrians and bicyclists.

Option 3: Market Street + Mission Street (Complete Street and Transit Priority Improvements on Market plus Bicycle Facility Improvements on Mission)

This Option 3 was evaluated as Alternative 3: Mission Street (Complete Street and Transit Priority Improvements on Market plus Bicycle Facility Improvements on Mission) in the 2016 initial study prepared for the proposed project. This option would have provided the same modifications to Market Street as described under Option 1, Design Concept A, but would have also included modifications to Mission Street. Mission Street would have been reconfigured to include one travel lane in each direction (with right-turn pockets where feasible) as well as a new sidewalk-level bikeway in each direction. This option would have relocated all existing transit service on Mission Street between the Transbay Terminal and 11th Street (provided by SFMTA, Golden Gate Transit, and SamTrans) to Market Street. In addition, this option would have resulted in the removal of all loading spaces on Market Street and a significant number of loading spaces on Mission Street.

Option 3 was rejected from further consideration because it would not meet objectives to (1) provide faster and more reliable surface public transit for all users along Market Street between Octavia Boulevard and Steuart Street; (2) improve pedestrian safety, comfort, and mobility along and across Market Street from Octavia Boulevard to Steuart Street; or (3) reduce friction and conflicts between transit, taxis, commercial vehicles, private vehicles, bicyclists, and pedestrians. Preliminary traffic analyses indicated that the rerouting of transit from Mission Street to Market Street would cause substantial delays for Muni routes 14/14R. This would conflict with the project objective to provide faster and more reliable surface public transit. Furthermore, the design of the bicycle facilities (Design Concept A) would be the same as the design under Option 1; as explained above, these facilities would not meet objectives related to bicycle safety. In addition, this option was rejected from further consideration because the loading restrictions could result in the elimination of loading options for some businesses and residences.

Other Environmental Considerations

The proposed project would result in considerable increases in transit travel times along the Muni 27 Bryant route and as stated in Section 4.B, these increases would be cumulatively considerable (but not significant at the project level). Because the SFMTA is currently investigating possible changes to the Muni 27 Bryant route as part of the 27 Bryant Transit Reliability Project and there are also planned improvements to Fifth Street that are expected to enhance this route’s operations, design options to specifically eliminate this cumulative impact were contemplated but rejected from further analysis. Not only would Alternative A avoid this considerable contribution to the significant cumulative impact, but formulating an alternative to address the transit travel time of a single Muni route would likely have required other transportation system network changes that would have significantly impacted other modes. Moreover, given the studies, it is anticipated that those efforts will create a more robust solution to improve 27 Bryant service and potentially reduce the travel time increases associated with the proposed project.

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