4.15 Construction Methods and Impacts

For each of the build alternatives, this section provides an overview of anticipated construction activities including construction stages and their estimated duration. This section summarizes construction-related impacts discussed in earlier subsections of Chapters 3 and 4. Please refer to those earlier subsections for reviews of the six minor modifications to the Hybrid Alternative/LPA added since publication of the Draft EIS/EIR in terms of potential additive construction effects. Discussions within those subsection demonstrate that none of the minor modifications to the Hybrid Alternative/LPA would change any of the construction impact determinations within any topical/resource area.

This section is based in part on the draft Project Construction Plan, which is a planning tool that presents and evaluates construction scenarios for the build alternatives. Detailed traffic control and detour plans would be developed after final design plans are prepared for the preferred alternative.

The nature of the construction discussion results in a different organization of this section compared to preceding Chapter 4 sections. This section is organized as follows:

- 4.15.1: Summary of Major Construction Activities for Build Alternatives
- 4.15.2: Construction Schedule and Phasing
- 4.15.3: Construction Approach
- 4.15.4: Construction Staging
- 4.15.5: Transportation Management Plan
- 4.15.6 - 4.15.16: Summary of Construction-Related Effects and Avoidance, Minimization, and Mitigation Measures by Environmental Resource Area

This section does not include any discussion of construction related to any of the improvements comprising the No Build Alternative. Under the No Build Alternative, the only construction that would occur is related to previously approved or planned projects.

The construction durations evaluated in this section assume continuous construction of a full corridor alternative. As discussed later in Section 4.15.3, any of the build alternatives would likely need to be constructed in phases. The assessment of continuous construction activities presents "worst-case" evaluation of potential construction period effects. Under a phased construction approach, any potential environmental consequences would not be more intense compared to a continuous construction technique. Further discussion is provided in Section 4.15.2.1.

Many construction period effects, such as noise and air pollutant emissions, would occur only during active construction efforts. Outside of active construction periods, such effects would not be expected to occur. The analysis herein assumes a concentrated construction period, reflecting the highest potential intensity of day-to-day construction efforts and in turn, the highest potential day-to-day construction-related effects regarding air and noise. Other construction-related effects, such as potential effects to cultural resources and effects related to the potential exposure of hazardous materials, are related only to construction activities themselves, not their duration. Phasing of the project's construction would not increase or decrease effects like these. Therefore, the assessment of continuous construction activities of a full corridor alternative represents a "worst-case" for the analysis of potential construction-period effects.

However, subsections 4.15.6 through 4.15.16 include discussions that specifically assess the potential for additive effects of the construction phasing associated with the Hybrid Alternative/LPA. As demonstrated in the discussions below, the construction phasing would not change any of the construction impact conclusions for the Hybrid Alternative/LPA and would not require any new avoidance, minimization, or mitigation measure.

4.15.1 | Summary of Major Construction Activities for Build Alternatives

This section discusses the 11 major types of activities that would occur under all the build alternatives, though not all activities would occur under each alternative. Overall, construction methods and equipment would be similar across all build alternatives, but the duration of the work would vary by alternative, especially between side-running and center-running locations, and by location.

Table 4.15-1 and the discussions below summarizes which of the 11 major construction activities would be performed for each build alternative within each of the four geographic sub-areas of the Geary corridor (see Figure 4.15-1). To provide greater detail for the Hybrid Alternative/Locally Preferred Alternative (LPA), Table 4-15.1 also notes which major construction activities would occur within Phase I or Phase II of the project. (Please see Section 2.2 for a greater discussion of *all proposed* construction activities for all Build Alternatives. A greater discussion of Phase I and Phase II is provided in Section 4.15.3).

4.15.1.1 | CENTER-RUNNING BUS LANES (ALTERNATIVES 3 AND 3-CONSOLIDATED, AND HYBRID ALTERNATIVE/LPA)

Construction of the center-running bus lanes would require four sub-activity categories including:

- **Site Preparation** which involves the removal of existing infrastructure such as curbs, gutters and pavement; landscaped areas (including top soil); and signposts and street lights (where present).
- **Storm Drainage System** and utility work which involves repair and replacement (depending on conditions) of existing stormwater inlets, drain pipes, manholes, and utilities.

- **Roadway/Reconstruction** including excavation of existing roadway; subgrade compaction/repair/reconstruction of road bed subsurface; and construction of curbs and gutters.

- **Bus Lane Construction,** which involves the use of a slab of color-integrated Portland cement concrete. (Alternative colorization of the lanes may be considered.)

4.15.1.2 | PLATFORMS FOR CENTER-RUNNING BUS LANES (ALTERNATIVES 3 AND 3-CONSOLIDATED, AND HYBRID ALTERNATIVE/LPA)

Platforms that flank the bus lanes would be constructed in spaces currently occupied by existing pavement sections. Prior to building the median platform, the pavement section and underlying soil would be removed to the depth (approximately 3 feet) needed to construct the new platform and the station amenities. After removal operations, platform and foundation elements for the station amenities would be built.

4.15.1.3 | LANDSCAPED MEDIANS FOR CENTER-RUNNING BUS LANES (ALTERNATIVES 3 AND 3-CONSOLIDATED, AND HYBRID ALTERNATIVE/LPA)

Similar to the median platforms, landscaped medians flanking center-running bus lanes would be constructed in spaces currently occupied by existing pavement sections. Initial steps would entail removal of pavement sections; underlying soil would be removed to the depth needed (approximately 3 feet) to construct curbs and gutters and to install ground cover, landscaping, and irrigation equipment. Where new lighting is needed, excavation would need to extend as deep as 16 feet (see Table 4.15-2 below).

4.15.1.4 | SIDE-RUNNING BUS LANES (ALL BUILD ALTERNATIVES)

Side-running bus lanes would be constructed on the existing pavement section adjacent to parking lanes (where present) or adjacent to sidewalks. It is anticipated that the existing pavement would be resurfaced for the width of the bus lanes. Resurfacing involves milling out the existing asphalt and then placing new asphalt or color-integrated concrete in some locations.

In addition to resurfacing it is also anticipated that rehabilitation of concrete pavement may be needed between 28th and 26th avenues and between Masonic and Van Ness avenues. The detailed scope of this rehabilitation effort would be defined in the next phase of design.

4.15.1.5 | BUS BULBS (ALL BUILD ALTERNATIVES)

Bus bulbs would be constructed along existing sidewalks to extend curb lines to the new side-running bus lanes to simplify bus docking and patron boarding and alighting. Prior to construction, removal of items such as existing curbs, gutter, adjacent portions of sidewalk, underlying compacted fill, trees, and parking meters would be required. Bus bulb and reinforced concrete bus pad construction would also include the removal of pavement sections within and adjacent to the bulb footprint. Additionally, modification of the pavement cross-slope adjacent to the bus pad is anticipated. These modifications may include construction of new pavement sections or pavement resurfacing.

Following removal operations, construction would proceed for new curbs and gutters, sidewalk, foundations for station amenities, and tree wells. Bus bulb construction may require utility relocation. The extent of relocation depends on local conditions; utilities needing relocation could include: hydrants and valves, manholes, streetlights and traffic signal poles, storm water inlets, and drain pipes. During construction, adjacent sidewalks would need to be narrowed and/or relocated temporarily.

4.15.1.6 | PEDESTRIAN CROSSING BULBS (ALL BUILD ALTERNATIVES)

Pedestrian crossing bulbs would be constructed at various locations selected to improve transit access and pedestrian safety. Most locations would be at corners, but some would be associated with midblock crossings. Preparatory removal work and construction would be similar to bus bulbs, with the exception that pedestrian crossing bulbs would be smaller in area. The Hybrid Alternative/LPA includes the addition of 26 more pedestrian crossing bulbs than previously proposed in the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR), for a total of 91 bulbs; the number proposed for the other build alternatives has not changed since publication of the Draft EIS/EIR. Like the previously proposed 65 pedestrian bulbs, these would be spread out across the Geary corridor (and, thus, their construction effects would be spread out across the Geary corridor). As a result of the additional bulbs, the number of locations of construction activities would be increased with the Hybrid Alternative/LPA.

Pedestrian crossing bulb construction would involve demolition and removal of the existing curb and a portion of the sidewalk. All construction work would take place in a pre-legislated no-parking zone. Equipment used to construct pedestrian bulbs would include jackhammers, excavators, concrete trucks, compactors, and hand tools. Like other construction activities throughout the Geary corridor, construction of pedestrian crossing bulbs would occur during regular business hours between 7 a.m. and 8 p.m., and construction would not restrict pedestrian or business access, per San Francisco Municipal Transportation Agency's (SFMTA) construction policies. The duration to construct a pair of pedestrian crossing bulbs would be approximately four to six days.

The 26 pedestrian crossing bulbs added to the Hybrid Alternative/LPA after publication of the Draft EIS/EIR would result in additional construction activities dispersed throughout the Geary corridor; however, as described above, construction would be short in duration, would not restrict access, and would involve minimal localized construction-related disruptions typical of a dense, urban environment. Therefore, the additional pedestrian crossing bulbs would not result in new or more severe impacts at any location for any topic area, individually or cumulatively than what was described in the Draft EIS/EIR.

4.15.1.7 | MODIFY SEWER (ALTERNATIVES 3 AND 3-CONSOLIDATED, AND HYBRID ALTERNATIVE/LPA)

Construction of center-running bus lanes and associated medians/platforms is anticipated to impact existing sewer infrastructure. As described in Sections 2.2.5 through 2.2.7, three build alternatives include reconstruction or replacement of an existing, more than 120-year-old brick sewer beneath Geary Boulevard between 14th and 4th avenues. Between 14th and 11th avenues, it is assumed that a 55-year-old reinforced concrete sewer would be relocated from under the planned bus rapid transit (BRT) stop to underneath the leftmost eastbound travel lane.

4.15.1.8 | MODIFY TUNNEL (ALTERNATIVES 3 AND 3-CONSOLIDATED)

Two alternatives would feature a new BRT station at the approaches of the Masonic Avenue tunnel beneath Geary Boulevard. Station construction would require removal of existing pavement and the full length of the center barrier. After these removal operations, center-running bus lanes and platforms at the tunnel approaches would be constructed. The platform work would also include the foundations for installation of an elevator, stairs, and other station amenities. Following the heavy work, noise absorbing tiles and other finishes would be installed.

4.15.1.9 | REMOVE FILLMORE STREET UNDERPASS (ALTERNATIVES 3 AND 3-CONSOLIDATED)

Alternatives 3 and 3-Consolidated include the removal of the Fillmore Street underpass at Geary Boulevard. Work would entail the demolition of the Fillmore Street Bridge, underpass pavement, and upper portion of the underpass, and, if required, removal of an existing below-ground pump station and its fuel tank. The pump station is currently used to prevent inundation of the underpass.

Wall demolition and pump station/fuel tank removal would be facilitated by temporary, shored excavations (alternatively, the pump station could be decommissioned and left in place).

Prior to demolition, local utilities carried on the bridge and connected to the pump station would need to be temporarily relocated. Furthermore, temporary pumping may be required to handle stormwater. Following the removal activities, imported dune sand (similar to other underlying soils) would be deposited and compacted in stages to fill the underpass. New utilities would then be installed, followed by the center-running bus lanes, medians, and platforms as described above.

4.15.1.10 | PEDESTRIAN BRIDGE REMOVAL (ALL BUILD ALTERNATIVES)

The alignments of proposed bus-only lanes within each build alternative would conflict with the piers of the existing pedestrian bridge at Steiner Street which would be removed under all build alternatives. Alternatives 2, 3, and 3-Consolidated would also remove the Webster Street pedestrian bridge. Demolition would include removal of the bridge superstructures, substructures, and below-ground (spread footing) foundations. Prior to removing the bridges a protective soil "blanket" would be spread under the bridges to catch debris. For Alternatives 2, 3, and 3-Consolidated, removal of the Webster Street bridge would require protection measures to avoid damage to an adjacent underground Auxiliary Water Supply System (AWSS) cistern. The Hybrid Alternative/LPA would retain the Webster

Street bridge – one of the six modifications proposed after publication of the Draft EIS/EIR – and would thus not require such measures to protect the AWSS.

4.15.1.11 | MIXED-FLOW LANE PAVEMENT REHABILITATION

It is anticipated that rehabilitation of the asphalt wearing surface may be needed between 28th and 10th avenues and between Masonic and Van Ness avenues. Within these limits the concrete pavement base may also require rehabilitation. The scope of the rehabilitation effort would be defined during the project's design phase.

Table 4.15-1 Major Construction Activities by Alternative

SEGMENT	MEDIAN BUS LANES	SIDE BUS LANES	MEDIAN PLATFORM	NEW MEDIANS	BUS BULB	PED XING BULB	MODIFY SEWER	MODIFY TUNNEL	REMOVE UNDER-PASS	REMOVE PEDESTRIAN BRIDGE(S)[1]	MIXED FLOW PAVEMENT REHABILITATION
ALTERNATIVE 2											
34th to Palm		●			●	●					●
Masonic Area		●			●	●					●
Fillmore Area		●			●	●				●	●
Inner Geary Corridor		●			●	●					
ALTERNATIVES 3 & 3-CONSOLIDATED											
34th to Palm	●	●	●	●	●	●	●				●
Masonic Area		●			●	●		●			●
Fillmore Area		●			●	●			●	●	●
Inner Geary Corridor		●			●	●					
HYBRID ALTERNATIVE/LPA											
34th to Palm	●	●	●	●	●	●	●				●
Masonic Area		●			●	●					●
Fillmore Area		●			●	●				●	●
Inner Geary Corridor		●			●	●					

Source: Draft Project Construction Plan, Jacobs Engineering Group, Inc. October 2013

1 Under the Hybrid Alternative/LPA, only the Steiner Street pedestrian bridge would be removed. The Webster Street bridge would be retained.

4.15.1.12 | ANTICIPATED CONSTRUCTION AREAS AND EXCAVATION DEPTHS

Table 4.15-2 summarizes the approximate construction areas expressed as nominal dimensions and the estimated depth of excavation. The removal area considered is roughly the nominal footprint of the construction item or the item to be removed. The table lists the major construction items discussed above and includes detail on proposed bus stop amenities (i.e., shelters, lighting).

Table 4.15-2 Anticipated Construction Areas and Excavation Depths

CONSTRUCTION ITEM	APPROXIMATE AREA	DEPTH (FEET)
Median Platform	9-ft – 6-in wide by 240-ft long per block	3
BRT Bus Bulb	Typically 8-ft wide by 240-ft long per block	1.5
Local Bus Bulb	Typically 8-ft wide by 195 ft long	1.5
Pedestrian Crossing Bulb	40-ft by 8-ft at corners; 8-ft wide by 60-ft long at midblock	1.5
New Center Median	Typically 10-ft wide by 240-ft long per block	3
Center-Running Bus Lanes (New pavement section for 2 lanes)	26-ft to 240-ft long per block	3
Side-Running Bus Lane Pavement Rehabilitation	13-ft wide by 240-ft long excavations	1
Shelter Canopy Foundation	3-ft by 3-ft excavation per Canopy Post	1
Street Lights, Pedestrian Scale Lights, and Traffic Signal Poles	3-ft by 3-ft excavations per Light Pole	16
Surface Mounted Utility (SMU) Foundation	3-ft by 5-ft excavations per SMU	3
Sewer Replacement	8-ft wide by 240-ft excavations per block	16
Catch Basin with Inlet	6-ft by 6-ft excavation	8
Fillmore Underpass Pump Station - Fuel Tank Removal (Alternatives 3 and 3-Consolidated Only)	12-ft by 12-ft excavation	30
Fillmore Underpass and Pump Station Removal (Upper Portion Only) (Alternatives 3 and 3-Consolidated Only)	8-ft wide by 100-ft (Blue Book limit)	12
Hydrant Relocation	5-ft by 5-ft excavation	8

Source: SFCTA, 2015

4.15.2 | Construction Schedule & Phasing

In the Draft EIS/EIR, San Francisco County Transportation Authority (SFCTA) and SFMTA disclosed that any of the build alternatives would be of such scale that some type of phased implementation would be anticipated. The Draft EIS/EIR identified elements of a potential phased approach, specifically noting that an initial phase of construction could include traffic signal modifications, construction of bus and pedestrian bulbs, implementation of side-running bus lanes, changes to right-turn pockets, and bus stop relocations. At the time of publication of the Draft EIS/EIR, there was uncertainty as to what alternative would be selected as the LPA and thus no detailed construction phasing analysis was completed.

Section 1.2.1 summarizes agency approvals since publication of the Draft EIS/EIR, including selection of the LPA. Since then, SFCTA and SFMTA have developed a more detailed construction phasing plan, outlined in this section. The refined schedule and construction details for the Hybrid Alternative/LPA includes two primary construction phases, described below.

Table 4.15-3 summarizes the estimated duration of construction periods for each build alternative.[1] The construction durations shown in Table 4.15-3 assume continuous construction of a full corridor alternative. These durations represent the anticipated total amount of time for construction of the entire project. Once construction starts, completion of all improvements is expected to take 2 to 4 years, including inactive periods.

Table 4.15-3 Estimated Construction Schedule by Alternative

BUILD ALTERNATIVE	DURATION TO SUBSTANTIAL COMPLETION (WEEKS)
Alternative 2	90
Alternative 3	120[1,2]
Alternative 3-Consolidated	130[1,2]
Hybrid Alternative/LPA	Phase I: 100[1] Phase II: 100[1]

1: Does not include sewer and water modifications that may be sponsored by SF Public Utilities Commission and coordinated with the Geary BRT project. Such modifications are not necessary for implementation of the Geary BRT project. However, does include sewer and water modifications triggered by the project.

2: Does not include the scope of utility modifications at Fillmore, the scope of this work is to be determined.

Source: SFCTA, 2017.

As illustrated in Figure 4.15-1, Phase I would entail all work east of Stanyan Street, with one exception, where BRT would operate in side-running bus-only lanes. Phase II would include all work west of Stanyan Street, where BRT operations would be in predominantly center-running bus-only lanes. Phase II would also construct a new dedicated bike facility within the Phase I geographic limits on Geary Boulevard between Masonic and Presidio avenues. The project would likely be constructed using the Staggered Multiple Block Segment Approach described later in this chapter. This construction approach has the greatest potential to minimize overall construction duration (one to 12 months maximum) at any given location.

While construction of the Hybrid Alternative/LPA would occur in two phases, this Final EIS discusses environmental impacts as a whole. The refined construction phasing for the Hybrid Alternative/LPA would not result in any different construction-period effects, other than clarification as to when and where such effects would occur. While the Draft EIS/EIR acknowledged that the project would be constructed in phases with a multiple-block approach, the plan to implement the Hybrid Alternative/LPA in two phases (generally splitting at Stanyan Street) would simply change *when* localized construction-period effects would occur within the Geary corridor.

[1] At this time the construction-period estimates do not include the impact of major utility work because interagency coordination with the various utilities has not been completed.

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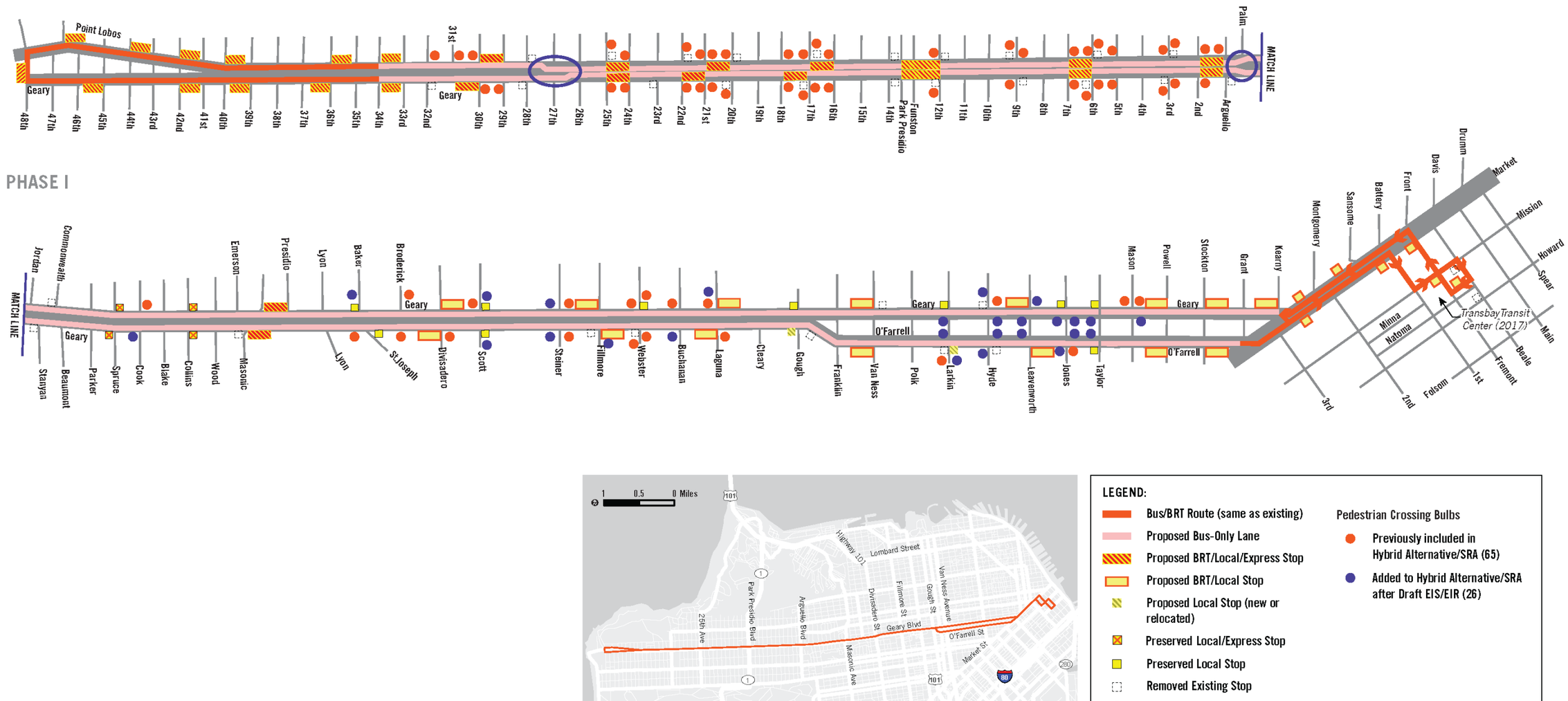
Figure 4.15-1 Construction Phasing for the Hybrid Alternative/LPA



Note: Construction of Class I bicycle lanes between Masonic and Presidio would be part of Phase II **(not to scale)**

Source: SFCTA, 2017

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4.15.2.1 | HYBRID ALTERNATIVE/LPA - PHASE I

Phase I improvements are anticipated to have a duration of 100 weeks and would occur along the Geary corridor between Market and Stanyan streets. The improvements consist of four major categories:

- Side-running bus-only lanes
- Bus and pedestrian bulbs
- Bridge removal at Steiner Street
- Traffic signal work

Phase I would extend the existing side-running bus-only lanes from Market Street west to Stanyan Street. Bus stops on this segment of the Geary corridor would also be relocated to improve operations. Other improvements would entail traffic signal work, pedestrian improvements, and new bus bulbs. Signal work would include installation of new signals, transit queue jumps, new pedestrian countdown signals, and other general modifications. Traffic signal retiming, including optimization of Transit Signal Priority (TSP), would be included. New pedestrian bulbs and/or medians, as well as bus bulbs, would be added at various intersections. The Steiner Street pedestrian bridge would also be removed in Phase I. Fiber optic conduit would be installed between Stanyan and Gough streets to make the existing corridor's TSP more reliable. Utility modifications coordinated with the project could include sewer main replacement between Stanyan Street and Van Ness Avenue as well as water main replacement from Masonic Avenue to Market Street.

Proposed bicycle improvements on Geary between Masonic and Presidio avenues (construction of Class I bicycle lanes in both directions on this block) would be the one exception to the geographic limits separating the Phase I and Phase II limits. These bicycle improvements include reconfiguring the center median island to accommodate a new dedicated bicycle facility. Due to the longer design schedule for these improvements, they would be implemented through the contracting mechanism used to deliver the Phase II improvements west of Stanyan Street. All transit improvements in this area, including bus-only lanes, bus stop consolidation and a transit signal queue jump, would still be part of Phase I.

Construction for the planned Phase I improvements could begin soon after all appropriate project approvals are received. See Section 2.9 and Table 2-11 for a list of required permits and approvals.

4.15.2.2 | HYBRID ALTERNATIVE/LPA - PHASE II

Phase II duration is anticipated to be another 100 weeks following Phase I. Phase II would consist of construction of center-running bus-only lanes from 28th to Palm avenues in the eastbound direction and Palm to 27th avenues in the westbound direction (see Figure 4.15-1). In center-running areas, existing medians and plantings would be removed and replaced with bus-only lanes with new dual medians and new landscaping. Phase II would also include the installation of side-running bus-only lanes from 27th/28th Avenues to 34th Avenue.

Traffic signal modifications, pedestrian improvements, bus stop changes, and construction of transit bulbs, similar to the activities described under Phase I, would occur in Phase II on the segment of the Geary corridor between 34th Avenue and Stanyan Street. Fiber optic conduit would be installed between 25th Avenue and Stanyan Street to accommodate TSP. The existing sewer between 4th and 14th avenues would be replaced and the existing sewer between Funston and 12th avenues would be relocated to the eastbound, leftmost lane of Geary Boulevard, with construction occurring between 11th and 14th streets.

The start of construction of Phase II would follow completion of Phase I.

4.15.3 | Construction Approach

As noted in Chapter 2, Alternatives 3, 3-Consolidated, and the Hybrid Alternative/LPA could include replacement or relocation of existing sewers in the Park Presidio vicinity, rather than rehabilitation/protection in place. Replacement and relocation would be likely to lengthen the construction period relative to rehabilitation/protection in place.

Construction activities may require a special permit for partial or complete corridor closure if the construction work zone operations cannot safely be executed in the space made available. The longer the duration of construction, the greater the potential would be for interference with traffic. Construction could require the temporary closure of certain segments for short periods of times (several hours) or longer periods such as several days or weeks.

Examples of construction activities that could require temporary closures include: placement and removal of temporary pedestrian safety barriers, utility relocation, construction of pavement, pedestrian bridge demolition, Masonic Avenue tunnel modifications at Geary Boulevard, filling of the Fillmore Street underpass, and removal/reconstruction of the median and resulting lane realignment between Masonic and Presidio avenues to accommodate new dedicated bike lanes.

Considering the goals and constraints, four construction approaches were evaluated:

- Block-by-Block
- Continuous Multiple Block
- Staggered Multiple Block
- Continuous Corridor

The **Staggered Multiple Block Segment Approach** would significantly reduce construction duration by introducing multiple active work zones. In order to maintain manageable impacts on corridor functions, work zones would be separated, and include up to five blocks each. The separation between the work zones would generally be approximately five blocks long.

Considering project goals and local constraints, the **Staggered Multiple Block Segment Construction Approach** is the most likely construction method to be implemented during the construction of all of the build alternatives. Given this, the **Staggered Multiple Block Segment Construction Approach** is evaluated in this Final EIS.

4.15.4 | Construction Staging

Construction would be divided into the following general stages:

- Mobilization of contractor equipment, facilities, materials, and personnel into staging areas
- Installation of construction area signs, circulation of construction announcements
- Establishment of work zone and perimeter buffers
- Installation of temporary street lighting and traffic signals
- Execution of removal work to prepare the work zone for the construction of new infrastructure; this would include clearing of landscaped medians, removal of pavement, streetlights, signals, and interfering underground utilities
- Construction of infrastructure within the work zone (median bus lane pavement, medians, bus and pedestrian crossing bulbs, lights, utilities, etc.)
- Side-running lane resurfacing
- Installation of bus stop amenities and landscaping, lane striping and lane coloring
- Demobilization

4.15.4.1 | CONSTRUCTION STAGING AREAS

Mobilization of personnel and materials would require areas to set up field offices and trailers for personnel, parking for personnel, and space for material delivery, storage and handling. These areas would need to be in proximity of the Geary corridor, ideally no more than 200 feet away.

At this time the only area that has been identified for such use is within the street right-of-way. Candidate locations include parking areas and medians along the Geary corridor, and parking areas located on adjacent side streets. The environmental study limits account for potential construction staging areas (CSAs) on a portion (100 feet, is the extent that is noted on the Environmental Screening Levels map) of the adjacent side streets that intersect the Geary corridor. It is anticipated that the CSAs would move in tandem with the shifting work zone.

4.15.4.2 | STOCKPILING AND MATERIALS HANDLING

Temporary stockpiling of material is anticipated. Potentially stockpiled materials include excavated soil, crushed concrete and reinforcing steel, imported soil, pipe, appurtenances, and other building materials customary of street and utility construction.

The most significant stockpiling would be anticipated for the filling of the Fillmore Street underpass at Geary Boulevard under Alternatives 3 and 3-Consolidated. Approximately 30,000 cubic yards of imported fill material would be needed to fill the area. Because continuously supplying fill would be a significant challenge, stockpiling would be recommended to facilitate work. This work would also entail significant relocation of a range of utilities (gas, electric, sewer, Muni traction power, water, and AWSS). Stockpiling would likely be needed in CSAs along Steiner, Post, Geary, Fillmore, Webster and O'Farrell streets. Delivery and removal of materials and on-site handling would in some cases involve platoons of vehicles.

Removal of demolished infrastructure could introduce material handling challenges. While successful precedent exists that bridges can be removed within one weekend, it is reasonable to expect that removal of the debris would continue over a longer period.

4.15.4.3 | TEMPORARY LIGHTS AND TRAFFIC SIGNALS

Between 34th Avenue and Palm Avenue, planned new infrastructure for Alternatives 3 and 3-Consolidated, and the Hybrid Alternative/LPA would require that existing street lights and traffic signals be removed and then reinstalled or replaced in other locations. As a result, during construction, temporary lighting and signals would be needed. Temporary poles would likely have above-grade foundations, such as large reinforced concrete cylinders. The poles would be located within the street right-of-way, or within CSAs, depending on the available space.

4.15.4.4 | CONSTRUCTION EQUIPMENT

It is anticipated that conventional equipment that can be transported on street-legal rubber-tired vehicles would be used to construct the various components of the build alternatives. Moreover, most of the equipment itself would be rubber-tired. The exceptions would be track-mounted vehicles, including but not limited to excavators, asphalt cold planers, asphalt pavers, dozers, and earth compacting rollers.

4.15.4.5 | DEMOLITION EQUIPMENT

Demolition of the pedestrian bridges at Steiner and Webster Streets, the Fillmore Street underpass, and the Fillmore Street pump station would be achieved by use of conventional construction equipment with specialized attachments, including but not limited to hammers, hydraulic breakers, demolition shears, pulverizers, grapples, and brooms. Smaller-scale pavement demolition would utilize similar specialized attachments on smaller scale equipment.

4.15.5 | Transportation Management Plan

This section describes anticipated construction conditions, associated impacts, and the outline of the Transportation Management Plan (TMP) that would be developed and implemented as a measure to avoid, minimize, and/or mitigate anticipated adverse impacts.

4.15.5.1 | CONSTRUCTION CONDITIONS

The approach to construction of any of the build alternatives would include maintenance of traffic operations and day-to-day activities along the Geary corridor, while providing the construction contractor sufficient timeframes to enable completion of construction work.

In general, construction would also proceed along both sides of the corridor in multiple segments simultaneously and further assumes that work would proceed during normal daytime work hours of 7 a.m. to 8 p.m.

The size and character of the construction zone would be shaped by construction operations and standing safety regulations such as the *California Manual on Uniform Traffic Control Devices* (CA MUTCD) and the *Regulations for Working in San Francisco Streets* ("The Blue Book"). Geary corridor construction zones would vary in size but would always be separated from traffic and pedestrians by a buffer that would include a temporary barrier. Adjacent to the construction zone, traffic speeds would be reduced and parking would be relocated away from the construction zone when active. Depending on local conditions, there may be opportunities to allow parking or loading when the construction zone is inactive. The layout of the transition of traffic and pedestrian flow around the construction zone would be guided by the CA MUTCD and the Blue Book.

Construction activity would be restricted to specified work hours with some exceptions. The draft Project Construction Plan assumes that normal daytime work hours (7 a.m. to 8 p.m.) would be permitted.[2] The typical work week would have 40 work hours. Nighttime work may be possible in areas where land uses are primarily commercial.

In addition to day-to-day restrictions, there may be seasonal restrictions, such as the Holiday Moratorium (Thanksgiving to January 1). The moratorium applies to any City block where at least 50 percent of the frontage is devoted to business, or to businesses located within Geary corridor from Taylor to Market streets (contractors may apply for a waiver to the moratorium). In addition, the Migratory Bird Treaty Act (MBTA) limits tree removal to the period outside of breeding and nesting season, which is February 1 to August 31.

In general, bus access along the Geary corridor and the transit lines that cross the corridor could be maintained during construction. However, some bus stops or routes could be changed during the course of construction. The selected Staggered Multiple Block Construction Approach would make it possible to locate bus stops outside the construction zone and at reasonable spacing. For example, between 33rd

[2] The Project Construction Plan assumes that a waiver to the limitations imposed on corridors classified as Important Streets can be obtained; without the waiver the work hours would be limited to 9 a.m. to 3 p.m.

Avenue and Palm Avenue, a temporary stop spacing of up to 1,800 feet would be implemented, assuming a five-block construction zone is staggered with an approximately five-block-long separation between construction zones. Transit routes that cross the corridor could be relocated in some cases by corner work resulting from bulb and sidewalk construction. Potentially affected transit routes include the 44 O-Shaughnessy, 33 Stanyan, 43 Masonic, 24 Divisadero, 22 Fillmore, 19 Polk, 27 Bryant, the 5 Fulton, and the Powell Cable Car line.

Temporary bus route changes or detours could occur at Masonic and Fillmore areas. At Masonic, a temporary detour of the 43 Masonic (diesel bus) and the 5 Fulton (trolley bus) would be anticipated for all build alternatives. At Fillmore, a temporary detour of the 22 Fillmore trolley bus would be needed for Alternatives 3 and 3-Consolidated. Trolley buses are more complicated to detour due to their reliance on the overhead contact system for power. Fillmore vehicular traffic would need to be detoured around the construction activities associated with the removal of the underpass and the subsequent construction to restore the entire width of Geary to be at-grade. The strongest candidate for such a detour would be Webster Street, since it is the widest nearby street. However, due to lack of an overhead contact system, buses from the diesel or hybrid electric fleet would therefore likely need to be used.

Periodic sidewalk closures may occur during sidewalk rehabilitation work, utility work, demolition of the pedestrian bridge(s), and during removal of the Fillmore underpass (Alternatives 3 and 3-consolidated only). However, detours would be provided and pedestrian access to fronting land uses would be maintained. Sidewalk area improvements would be completed in several stages of construction in order to maintain access, and some intersection crosswalks may need to be closed with pedestrians detoured to the nearest intersection possible.

Parking within the street right-of-way would be subject to temporary restrictions. Parking within any active construction zone would not be permitted at any time. Parking areas within active construction zones would be relocated as close to the construction zone as is practical. Temporary loading zones (within a mixed-flow lane adjacent to an inactive construction zone) may be possible in some circumstances. The TMP would identify any such areas that may be feasible.

Access to parking or loading areas located outside the street right-of-way would be subject to restrictions. When access is located within a proposed bus stop area, the duration of work would be longer than typical street paving projects. This is because work within the bus stop area may involve a bus bulb and sidewalk concrete work, as well as utility relocation work. When feasible, temporary alternative access may be provided at a location outside the construction zone or within an acceptable location within the construction zone. If alternatives are not available, the TMP would include special provisions.

Street paving work would require periodic interruptions to driveway access along the Geary corridor between 34th Avenue and Market Street. Bus bulb construction would result in interruptions of the driveways facing the eastbound service road between Fillmore and Webster streets.

Geary corridor activities to be maintained through construction include:

Traffic and Parking

- Traffic would be maintained to the minimum number of lanes allowed by the City of San Francisco, but may be interrupted periodically.
- Through-travel: East of Gough Street, at least one mixed-flow travel lane in each direction would generally be maintained. Re-grading of the street for construction of physical improvements may require temporary lane closures.
- West of Gough Street, where the right-of-way is wider, two mixed-flow travel lanes in each direction would generally be maintained with further lane reductions possible during certain construction activities (including, but not limited to, utility relocation).
- During off-peak travel periods and/or during heavy construction activities, one mixed flow travel lane in each direction would generally be maintained, with each lane a minimum of 10 feet in width.
- Parking within the right-of-way along the Geary corridor and adjacent side streets would be subject to some restrictions.
- Driveway access to parking or loading zones located outside the street right-of-way would be subject to restrictions and relocations.

Pedestrian and Accessibility Accommodations

- Pedestrian access throughout the corridor would be preserved, but some crosswalks and sidewalks may need to be detoured.
- Sidewalks, with widths temporarily reduced no less than 6 feet clear in commercial areas; where this is not possible, an absolute minimum width of 4 feet; sidewalks would comply with requirements of the Americans with Disabilities Act.

Transportation

- Ongoing operations for Muni bus routes 38 Geary (Local), 38 Rapid, and 38 Express, as well as 1 California, 43 Masonic, 22 Fillmore, electric trolley bus access to the Presidio Division, and Powell Street Cable Cars.
- Ongoing operations for Golden Gate Transit buses.
- Paratransit and Hospital Shuttle boarding and alighting (possible relocations)
- Bus access would be preserved but some stops may be temporarily relocated and the number of stops temporarily reduced
- Bicycle access may be temporarily detoured in some locations

Table 4.15-4 summarizes the construction conditions anticipated for each build alternative. Temporary traffic conditions for each alternative are generally similar, except at the Masonic and Fillmore areas. The detours noted for Alternatives 3 and 3-Consolidated are a result of modifications to the Masonic tunnel and removal of the Fillmore Street underpass.

Table 4.15-4 Construction Conditions

CONSTRUCTION CONDITIONS	ALT 2	ALT 3	ALT 3-CONSOLIDATED	HYBRID/LPA
Maintain 2 mixed-flow travel lanes each direction of Geary corridor during peak hours	●	●	●	●
Maintain mixed-flow travel lane with minimum temporary width of 10-feet	●	●	●	●
Reduce speed within construction zone, <25 mph	●	●	●	●
Periodic nighttime closure of mixed-flow travel lanes	●	●	●	●
Select extended weekend closure of mixed-flow travel lanes	●	●	●	●
Longer-term detour of Masonic tunnel and Fillmore underpass lanes		●	●	
Longer-term detour of Fillmore Street		●	●	
Interruption of traffic at Park Presidio (14th Avenue, Park Presidio, Funston); type of interruption would depend on scope of sewer work		●	●	●

Source: Draft Project Construction Plan, Jacobs Engineering Group, Inc. October 2013.

Pedestrian/sidewalk effects typical of side bus lane construction

4.15.5.2 | CONSTRUCTION SCHEDULE RISK

The estimated duration of construction activities described herein would likely increase if any of the following occurred:

- Major construction activities for utilities are required
- Delays that result in work conflicting with migratory bird season
- Other related projects on the Geary corridor or crossing the corridor conflicting with the Geary construction plan (utilities, street repair, and other major projects)
- Increased duration of agency review and approval cycles for the items of construction
- Alternatives 3 and 3-Consolidated are exposed to the risk of the significant volume of fill material being unavailable
- Buried cultural resources are discovered
- Unforeseen underground utility or sub-sidewalk basement conflicts
- Waiver for extended work hours is not granted

4.15.6 | Construction Period Effects - Traffic and Transportation

Impacts to traffic, transit, parking, pedestrians, and cyclists that could result during project construction are discussed in the following subsections.

Environmental consequences on traffic and transportation during construction may include increased traffic congestion on the Geary corridor as well as on the streets running parallel to the Geary corridor. Increased congestion would be due to slower operating speeds of both traffic and transit resulting from fewer and/or narrower mixed flow travel lanes near active construction zones and safety protocols employed on travel lanes running adjacent to the active construction zones. During certain construction operations, detours could further increase congestion on side streets and parallel streets adjacent to the Geary corridor. Additionally, typical Geary corridor transportation functions are likely to be interrupted, including but not limited to:

- Altered transit and paratransit service
- Altered loading zone location and operations
- Reduced on-street parking
- Relocated accessible parking
- Interruptions in driveway access

Transit operations are expected to be maintained during construction with some schedule modifications and temporary stop relocations. Transit-users would likely experience some delay in transit service during active construction. Accessibility for pedestrians would also be maintained during construction activity; however, sidewalk disruptions and temporary closures could be possible. Typically, sidewalks would remain open to pedestrians but may be condensed during active construction.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

These potential consequences could be avoided and/or mitigated with an effective TMP to manage traffic congestion and minimize transit service disruptions. Elements of an effective TMP include consideration of:

- Public information programs
- Transit passenger information strategies
- Traveler information strategies
- Incident management and contingency planning
- Construction staging and phasing strategies
- Alternate route strategies

Table 4.15-5 describes each element and its associated objective.

With the refined phasing for the Hybrid Alternative/LPA, construction-period transportation impacts described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. During this time, no construction work would be anticipated west of Stanyan Street. During Phase II, all construction work, with the

exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2, would occur west of Stanyan Street. As described above, the TMP would include consideration of the refined construction phasing for the Hybrid Alternative/LPA.

Regardless of phasing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

Table 4.15-5 Elements of a Transportation Management Plan

ELEMENT	DESCRIPTION	OBJECTIVE
Public Information Program	Website with regular updates about current and upcoming construction activities, mailers, in person town hall style briefings	To provide advanced information allowing travelers to plan for the construction disruption. An effective program often results in reduced congestion and promotes safety by establishing two-way communications between the public and SFMTA
Transit Passenger Information Strategies	Transit focused website with real-time information about bus schedules, mailers, etc.	To provide advanced information allows travelers to plan for the construction disruption. An effective program often results in an improved passenger experience, reduced congestion, and promotes safety by establishing two-way communications between the public and SFMTA
Traveler Information Strategies	Real time information signs located along the corridor to alert traffic and transit users of delays, closures, and recommended alternative routes	To provide motorists on the road and riders in transit with the latest information to make informed decisions about adjustments to travel plans
Incident Management and Contingency Planning	Management of incidents and unforeseen changes in construction. Implementation of an enforcement program with SFPD and SFMTA, which includes the presence of an enforcement officer on site	To provide a flexible plan, underpinned by on-sight enforcement, to minimize disruption of unanticipated events such as vehicle breakdowns, flat tires, collisions, late lane openings and need of additional short term lane closure
Construction Strategies	Implement staggered multiple block construction approach that maintains 2 lanes of traffic during peak hours and provides a reasonable spacing of curbside transit stops, located in the parking lane, during construction Develop Maintenance of Traffic and Access Plan (MOTA) and implement extended work period closures when the complexity of construction and traffic management is difficult to manage safely. Use quick setting and durable concrete Employ modular construction	To minimize disruption in traffic and transit flow by allowing buses to shunt into the parking lane To increase the level of safety by completing relatively complex removal and construction operations without active travel lanes in proximity To use techniques that reduce construction time and complexity, and hence the exposure of the corridor to disruption
Alternative Route Strategies	Alternative route strategies can be developed to facilitate extended work period closures and managed effectively with information management tools and the enforcement program	To minimize traffic, transit, bicycle and pedestrian exposure to construction and hence exposure to delay and reduce the builders exposure to traffic related safety hazards

Source: SFCTA, 2015

4.15.6.1 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Adherence to a TMP would adequately alleviate environmental effects related to traffic during construction. No further measures are needed.

4.15.7 | Construction Period Effects - Land Use and Community

4.15.7.1 | ENVIRONMENTAL CONSEQUENCES

Some adverse effects to area residents, businesses, and visitors could occur on a temporary basis along the street segments under construction. Construction of each of the build alternatives would result in impacts to traffic, circulation, parking, transit service, and the pedestrian and bicycle environment in the Geary corridor, as described above in Section 4.15.1. These impacts could affect the communities' ability to easily access local businesses and community facilities during active construction. Impact minimization measures described earlier would be implemented to reduce these impacts during project construction.

Temporary conversion of parking lanes to mixed-flow travel lanes would be implemented during project construction, resulting in the removal of on-street parking in areas throughout the Geary corridor while construction is taking place. This would also result in the temporary removal of colored truck and passenger loading zones, which could adversely affect operations of adjacent businesses and residents during construction. Similarly, partial closures of sidewalk areas during construction may result in short-term disruption to loading operations of adjacent land uses, and may negatively impact neighboring businesses. Parking constraints and increased traffic would likely cause temporary inconveniences to local businesses and residents.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Land use characteristics differ along the length of the Geary corridor, and include residential, commercial, transportation, public/institutional, recreational, and other mixed-uses. To reduce construction-related impacts to adjacent land uses and to the community (such as access disruptions), the unique characteristics of each area would be taken into consideration in construction planning and scheduling, and access would be maintained to the extent feasible. Construction planning would minimize nighttime construction in residential areas and minimize daytime construction affecting retail and commercial areas. These considerations would be undertaken as part of the public information procedures outlined in the TMP.

Residents, businesses, and visitors along the Geary corridor would also be subject to noise, dust, vibration, and emissions from construction equipment during project construction. These impacts could discourage or restrict pedestrian activity along the blocks under construction and reduce foot traffic, which could impact local businesses. Potential air quality and noise and vibration impacts during construction and associated avoidance and minimization measures are discussed in Section 4.15.10 and 4.15.11 respectively. Light and glare impacts to residential properties that could result from nighttime construction are addressed in Subsection 4.15.8.1.

With the refined phasing for the Hybrid Alternative/LPA, construction-period land use and community impacts described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. These effects include short-term sidewalk closures, detours, conversion of parking lanes to travel lanes, and removal of loading zones, which would temporarily increase traffic and parking difficulties and could disrupt access to public facilities, parks, businesses, and residences within the corridor. During this time, no construction work would be anticipated west of Stanyan Street, where such effects would not be expected.

During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio avenues described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Land use and community effects that would occur during Phase II would be the same as those described for Phase I, but would occur primarily west of Stanyan Street.

Regardless of phasing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.7.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Avoidance and minimization measures related to air quality and noise and vibration impacts during construction phases are included in this Draft EIS/EIR to ensure that there would be no adverse community effects. The following additional measures would be implemented to reduce construction-related impacts to local businesses and residents:

M-CI-C1. A TMP that includes traffic rerouting, a detour plan, and public information procedures shall be developed during the design phase with participation from local agencies, other major project proponents in the area, local communities, business associations, and affected drivers. Early and well-publicized announcements and other public information measures would be implemented prior to and during construction to minimize confusion, inconvenience, and traffic congestion. The TMP shall include at minimum the following provisions:

- Construction planning shall seek to minimize nighttime construction in residential areas and minimize daytime construction impacts on retail and commercial areas.
- As part of the TMP public information program, San Francisco Municipal Transportation Agency (SFMTA) shall coordinate with adjacent properties along the Geary corridor to determine the need for colored parking spaces (i.e., loading zones) and work to identify locations for replacement spaces or plan construction activities to minimize impacts from the loss of these spaces. SFMTA shall also coordinate with adjacent properties along the Geary corridor to ensure that pedestrian access to these properties is maintained.
- The TMP shall incorporate SFMTA's process for accepting and addressing complaints. This includes provision of contact information for the Project Manager, Resident Engineer, and Contractor on project signage with direction to call if there are any concerns. Complaints would be logged and tracked to ensure they are addressed.
- The TMP shall identify or otherwise designate adequate passenger and truck loading zones to be maintained for adjacent land uses, including maintaining access to driveways and providing adequate loading zones on the same or adjoining street block face.

4.15.8 | Construction Period Effects - Aesthetics/Visual Resources

4.15.8.1 | ENVIRONMENTAL CONSEQUENCES

Construction of any of the build alternatives would occur within and adjacent to the existing street right-of-way. Project construction activities would involve the use of a variety of equipment, stockpiling of materials, and other visual signs of construction. Various TMP elements, such as portable changeable message signs, detours, and other signage would be used during construction. While evidence of construction activity would be noticeable to area residents, and transit riders such visual disruptions would be short-term and are a common feature of the urban environment. Measures described in Subsection 4.15.8.2 would reduce aesthetic impacts from construction activities.

Some construction would be accomplished at night. Project specifications would require the project contractor to direct artificial lighting onto the worksite while working in residential areas at night to minimize "spill-over" light or glare effects. This would be a temporary degradation of the visual environment that would be restored at the completion of construction. Construction best practices described in Subsection 4.15.8.2 would minimize nighttime light and glare impacts.

With the refined phasing for the Hybrid Alternative/LPA, construction-period aesthetic impacts described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. During this time, no construction work would be anticipated west of Stanyan Street. Removal of up to approximately 70 trees between Market and Stanyan Streets would occur in Phase I, resulting in a temporary decline in visual quality (as discussed in the Draft EIS/EIR). In Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Approximately 110 trees would be removed in Phase II, and construction activities such as median removal would be more intensive than construction activities in Phase I. Regardless of phasing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.8.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Implementation of the following measures would reduce the severity of any adverse construction-related impacts to visual quality:

MIN-VQ-C1.

- Project construction shall be phased to reduce the period of disruption at any particular location to the shortest practical length of time
- Construction lighting shall be shielded and directed to limit direct illumination to within the area of work and avoid all light trespass
- Construction staging and storage areas shall be screened by visually opaque screening wherever they would be exposed to public view for extended periods of time

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

4.15.9 | Construction Period Effects - Cultural Resources

4.15.9.1 | ENVIRONMENTAL CONSEQUENCES

Though no prehistoric or historic archaeological sites have been recorded within the project's Area of Potential Effects (APE), construction of any of the build alternatives would involve some ground disturbance with the potential to unearth unrecorded or unknown sites and/or resources. As detailed in Section 4.5, of this Draft EIS/EIR, the Archaeological and Native American Cultural Resources Sensitivity Assessment for the project described a few general locations that may be sensitive for the presence of prehistoric archaeological resources. Two main areas within the archaeological APE are considered to have a high potential for prehistoric archaeological sites. This includes a considerable area near the eastern end of study area (within the Phase I geographic area) and a similar area at the western end of the study area (within the Phase II geographic area).

Two portions of the archaeological APE are considered to have moderate to high probability of yielding historic-era archaeological resources. These include the Yerba Buena Cove area northeast of First Street (within the Phase I geographic area), and the portion of the Geary corridor between Masonic and Gough streets (within the Phase I geographic area, with the portion between Masonic and Presidio avenues within the Phase II area as well). It is considered likely that previous construction of Geary Boulevard itself (particularly the widening, underpass, and tunneling in this area) would have removed or destroyed any intact archaeological resources near Masonic and Gough Streets.

Construction activities would not involve directly physically altering or demolishing any character-defining features of any of the historic buildings, properties, or districts within the architectural APE. However, construction activities could result in the relocation of some number of Golden Triangle street lights (within the Phase I geographic area), Japan Center light standards (within the Phase I geographic area), or components of the AWSS (both Phase I and Phase II area). As set forth in avoidance measure **A-CUL-C5**, proposed improvements would be designed to minimize or avoid the removal, relocation, or damage to these historic structures. In the event that one or more of these streetlights must be relocated, such relocation would conform to appropriate Secretary of the Interior Standards. Furthermore, each of the build alternatives would have some potential indirect effects from the introduction of visual elements and construction vibration that differ based on project components unique to each alternative. However, these effects are negligible and do not diminish the integrity of location, setting, feeling, association, workmanship, design or materials for any historic property, particularly with adherence to avoidance and minimization measures incorporated herein.

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts to cultural resources described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. During this time, no construction work would be anticipated west of Stanyan Street.

The Phase I geographic area (i.e., east of Stanyan Street) contains one area of high sensitivity for prehistoric-era archaeological resources, one area of high sensitivity for historic-era archaeological resources (i.e., Yerba Buena cove), and one area of moderate sensitivity for historic-era archaeological resources (i.e., Masonic Avenue to Gough Street). The vast majority of historic architectural resources in the study

area are also located within the geographic area of Phase I: 52 properties that are listed or eligible for the National Register of Historic Places (NRHP).[3] As the majority of moderate-high sensitivity areas for archaeological resources and the majority of historic architectural resources are located within the geographic area of Phase I, the majority of potential impacts to cultural resources, as described in the Draft EIS/EIR, would occur during Phase I of construction.

During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio (identified as an area of moderate sensitivity for historic-era archaeological resources) described above in Subsection 4.15.2.1, would occur west of Stanyan Street. The Phase II geographic area contains one area of high sensitivity for prehistoric-era archaeological resources and two NRHP-eligible historical architectural properties.[4]

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.9.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following measures are proposed to be implemented as part of the construction of any of the build alternatives to avoid or minimize any potential effects upon archaeological, historic architectural or paleontological resources.

MIN-CUL-C1. Limit the use of construction equipment that create high vibration levels, such as vibratory rollers.

MIN-CUL-C2. Develop and implement a Vibration Reduction and Minimization Plan, which would include the identification of vibration-sensitive structures using distance impact thresholds.

MIN-CUL-C3. During advanced conceptual engineering or final design phases, an individual assessment of vibration-sensitive structures' would be conducted where construction activities and equipment would exceed FTA's impact distance guidance for category Category IV structures.

MIN-CUL-C4. Conduct vibration monitoring during construction.

A-CUL-C5. Design proposed stations and stops in the vicinity of the Golden Triangle Streetlights, Japan Center light standards, and components of the AWSS to avoid the removal, relocation, or damage to these historic structures.

OR

MIN-CUL-C6. In the event that avoidance of the Golden Triangle Streetlights, Japan Center light standards, and AWSS are infeasible, all effort will be made first for relocation of such elements within the immediate vicinity of their original location while maintaining placement (distance) within the sidewalk in respect to curb and/or adjacent buildings. For the light standards, additional effort would be made to relocate a light standard within the same block if there is a site where the

[3] One property, the Auxiliary Water Supply System (AWSS), has components across the entire City of San Francisco; elements of the AWSS are thus present in the geographic extents of both construction phases.
[4] See note above.

original light standard has been removed or replaced by modern standards; and last, relocation to an available site within the historic property boundary where an original standard has been removed or replaced by modern standards.

I-CUL-C7. Harmonize the visual qualities of built elements of the build alternatives with adjacent historic properties through careful consideration of design, lighting, materials, and color choices that would complement and be sensitive to nearby historic properties. Where appropriate, ensure adherence to Secretary of the Interior's Standards for the Treatment of Historic Properties.

MIN-CUL-C8. Focused archival research will identify specific areas within the APE that are likely to contain potentially significant remains, and methods and findings will be documented as an addendum to the current report. The Phase I addendum report will be submitted to the City's Environmental Review Officer (ERO) and the State Historic Preservation Officer (SHPO) for concurrence. Research will be initiated once the project's APE map is finalized identifying the major Areas of Direct Impact. The Addendum Survey Report would include:

- A contextual and documentary research section that addresses the development of urban infrastructure that provide a basis for evaluating potential resources as they relate to the history of San Francisco.
- A cut-and-fill reconstruction of the corridor, comparing the modern versus mid-1800s ground surface elevations, to fine-tune the initial prehistoric sensitivity assessment, and refining the location of high-sensitivity locations where prehistoric remains may be preserved.
- Relevant profiles and plan views of specific blocks to illustrate the methods used in analyzing available documentation.
- Summary and conclusions to provide detailed information on locations that have the potential to contain extant historic-era and prehistoric archaeological remains that might be evaluated as significant resources, if any.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Two results are possible based on documentary research:

- No or low potential for sensitive locations: major Areas of Direct impact have no potential to retain extant archaeological remains that could be evaluated as significant resources. No further work would be recommended, beyond adherence to the Unanticipated Discovery Plan.
- Potential sensitive locations: if major Areas of Direct Impact contain locations with moderate to high potential to retain extant historic or prehistoric archaeological remains that could be evaluated as significant resources, further work would be carried out, detailed in a Testing and Treatment Plan.

MIN-CUL-C9. Depending on the results of archival research, in concert with the City's ERO, project avoidance areas or, more likely, areas requiring presence/absence investigations for cultural resources will be identified and fieldwork undertaken following exposure of the ground surface, but prior to construction to identify buried cultural resources.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

MIN-CUL-C10. A Testing and Evaluation/Treatment Plan, if required, will provide archaeological protocols to be employed immediately prior to project construction to test areas identified as potentially significant or having the potential to contain buried cultural resources. In case such areas might be unavoidable, minimization measures will be proposed. The procedures detailed in the Treatment Plan would be finalized in consultation with the City's ERO and the SHPO.

For historic-era resources, work would initially entail detailed, focused documentary research to evaluate the potential significance of any archaeological material identified during initial research that might be preserved. Significance would be based on the data-potential of possible remains applied to accepted research designs. Two results could ensue:

- No potentially significant remains: if no locations demonstrate the potential for significant remains, no further archaeological testing would be recommended.
- Potentially significant remains: if any locations have the potential to contain significant remains, then appropriate field methods will be proposed, including compressed testing and data-recovery efforts. Testing will be initiated immediately prior to construction, when there is access to historic ground levels. Should a site or site feature be found and evaluated as potentially significant, data recovery would take place immediately upon discovery if avoidance of the site is still not possible.

For prehistoric resources, a Treatment Plan will identify relevant research issues for resource evaluation, and pragmatic methods to identify, evaluate, and conduct data recovery if needed. This may include a pre-construction geoarchaeological coring program or a compressed three-phase field effort occurring prior to construction when the ground surface is accessible.

MIN-CUL-C11. Upon completion of all fieldwork, a technical report shall be prepared. This Final Archaeological Resources Report (FARR) shall document all field and laboratory methods, analysis, and findings. The FARR shall be subject to review and approval by the City's ERO and the SHPO. Copies of the approved FARR shall be submitted to the City's ERO, the SHPO, and the Northwest Information Center, together with any associated archaeological site records.

MIN-CUL-C12. If buried cultural resources are encountered during construction activities, construction will be halted and the discovery area isolated and secured until a qualified archaeologist assesses the nature and significance of the find.

MIN-CUL-C13. If human remains are discovered, the County coroner will be notified as soon as is reasonably possible (California Environmental Quality Act Guidelines, Section 15064.5). There will be no further site disturbance where the remains were found. If the remains were determined to be Native American, then the coroner is responsible for contacting the California Native American Heritage Commission within 24 hours, and the Commission, pursuant to Public Resources Code Section 5097.98, will notify those persons it believes to be the most likely descendant. Treatment of the remains will be dependent on the views of the most likely descendant.

MIN-CUL-C14: In the event that paleontological resources are encountered during any phase of project construction, all soil-disturbing activity within 100 feet of the find shall be temporarily halted until a qualified paleontologist can assess the significance of the find and provide proper management recommendations.

4.15.10 | Construction Period Effects - Utilities/Service Systems

4.15.10.1 | ENVIRONMENTAL CONSEQUENCES

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

The build alternatives – including the Hybrid Alternative/LPA could result in adverse impacts to utilities during construction if it would result in the need for expanded or additional facilities by a utility provider. Project demolition and construction waste would be accommodated by existing offsite landfills and recycling centers and it would not affect landfill capacity. Construction activities would be accommodated by existing water and power facilities. Wastewater generation during construction would not exceed wastewater treatment requirements of the San Francisco Regional Water Quality Control Board and would comply with batch discharge permits from the San Francisco Public Utilities Commission (SFPUC), as described in Subsection 4.15.13.2, Hydrology and Water Quality.

The build alternatives would have adverse impacts to utilities during project construction if it would damage facilities, or interfere with utility service to customers and public facilities. As discussed in Section 4.6.4, coordination with all utility providers and proponents of related projects in the project corridor would be initiated during the preliminary engineering phase of the project and carried through final design and construction phases. Coordination and planning efforts would be facilitated through the Committee for Utility Liaison on Construction and Other Projects, Street Construction Coordination Center, and the Department of Transportation (Caltrans), with the focus on identifying potential conflicts and formulating strategies to avoid them, including planning utility relocations/reroutes, and other measures to avoid utility service interruptions.

In general the build alternatives would necessitate some utility relocation in order to maintain utility access and functionality. One example is the construction of bus bulbs and pedestrian crossing bulbs. These features would require relocation of some existing urban infrastructure, including but not limited to stormwater drainage facilities (inlets and laterals), fire hydrants (low pressure and high pressure), valves, manholes, surface-mounted utility boxes, or other appurtenances (see Section 4.6, Utilities). Alternatives 3 and 3-Consolidated propose the potential removal the Fillmore Street underpass and associated pump station. The removals require the relocation of many utilities (such as AWSS, gas, electric, AT&T, SMFTA traction power duct bank, water, sewers, etc.). The largest of these utilities is the combined sewer under Fillmore Street (6-feet-four-inch-by-four-feet elliptical reinforced concrete pipe).

Coordination with SFPW and utility providers would avoid or minimize utility service interruption by staging construction activities and taking appropriate precautions for the protection of any unforeseen utility lines discovered during project construction. This planning and coordination process would avoid and minimize impacts to utilities during construction.

With the refined phasing of the Hybrid Alternative/LPA, construction-period impacts to utilities described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. During this time, no construction work would be anticipated west of Stanyan Street. Both Phases I and II would include replacement and/or relocation of utilities. Phase I utility modifications coordinated with the project could include sewer main replacement between Stanyan Street and Van Ness Avenue as well as water main replacement from Masonic Avenue to Market Street. These utility replacements are not required for the project but, as disclosed in the Draft EIS/EIR, the City of San Francisco coordinates utility replacement work with other street construction projects to minimize disruption to the community (i.e., only dig up the street once).

In Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Phase II would include replacement of the existing sewer between 4th and 14th avenues, as well as relocation of the existing sewer from Funston to 12th Avenue to the eastbound, leftmost lane, with construction occurring between 11th and 14th avenues. As disclosed in the Draft EIS/EIR, this relocation is needed as a result of the project so that the sewer lines can be more readily accessed (i.e., not underneath new bus-only lanes) for future maintenance needs.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.10.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

In compliance with City and Caltrans policies, coordination with the utility providers would be initiated during the preliminary engineering phase of the project and would continue through final design and construction.

Where feasible, utility relocations would be undertaken jointly with project construction to minimize potential service disruptions. Design, construction, and inspection of utilities relocated for any of the build alternatives would be done in accordance with City and Caltrans requirements. SFMTA would coordinate with the affected service provider in each instance to ensure that work completed is in accordance with the appropriate requirements and criteria.

MIN-UT-C1. BRT construction would be closely coordinated with concurrent utility projects planned within the Geary corridor.

MIN-UT-C2. An inspection and evaluation of the sewer pipelines within the project limits would be undertaken to assess the condition of the pipeline and need for replacement. Drain inlets on the corridor shall also be inspected to assess condition and confirm functionality. Spot repairs or minor replacement-in-place of sewers may be performed during construction of the project if desired by SFPUC and agreed to by SFMTA.

MIN-UT-C3. During planning and design, consideration would be given to ensure that the Geary corridor station facilities do not prevent access to the underground AWSS lines. Adequate access for specialized trucks to park next to gate valves shall be maintained. Gate valves shall not be located beneath medians, station platforms, or sidewalks.

MIN-UT-C4. In situations where utility facilities are being protected in place, SFMTA would create a plan to accommodate temporary closure of the transitway and/or stations in coordination with utility providers to allow utility providers to perform maintenance, emergency repair, and upgrade/replacement of underground facilities that may be located beneath project features such as the BRT transitway, station platforms, or curb bulbs. Signage for BRT patrons and safety protocols for Muni operators and utility providers shall be integrated into this plan.

4.15.11 | Construction Period Effects - Geology/Soils/Seismicity/ Topography

4.15.11.1 | ENVIRONMENTAL CONSEQUENCES

The Geary corridor may be susceptible to strong ground shaking and liquefaction induced ground settlement and/or differential compaction (settlement due to densification) during a seismic event. Portions of the Geary corridor also could potentially expose people or structures to adverse effects from liquefaction-induced ground failures. Design of project features, and incorporation of minimization measures described in Subsection 4.7.4, would address liquefaction and settlement impacts. In the event of an earthquake during project construction, very strong ground shaking could result in slope instability near excavated areas. As a result, minimization measures for each build alternative to avoid potential slope instability impacts during project construction is discussed below.

In addition, Alternatives 3 (Center-Lane BRT with Dual Medians and Passing Lanes) and 3-Consolidated (Center-Lane BRT with Dual Medians and Consolidated Bus Service) would include the filling of the underpass at Fillmore Street, decommissioning of the existing pump station at Fillmore Street, and either filling (with inert material) or removing the pump station's fuel tank. There are several seismic-related risks associated with construction activities occurring at the Fillmore Street underpass, particularly in removing the pump station and filling the underpass. The measure below would help minimize any such impacts associated with Alternatives 3 and 3-Consolidated.

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts to geology and soils described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. These impacts could include very strong ground shaking in the event of an earthquake, slope instability effects, and site-specific liquefaction. During Phase I, no construction work would be anticipated west of Stanyan Street. In Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Similar to Phase I, potential impacts during Phase II would include very strong ground shaking, slope instability effects, and site-specific liquefaction.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.11.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

MIN-GE-C1. Shoring will be typically required for all cuts deeper than five feet. Shoring design of open excavations must consider the potential surcharge load from neighboring structures. Furthermore, the potential for lateral movement of excavation walls as a result of earthquake-related surcharge load from nearby structures must also be assessed. The following shoring and slope stability best management practices (BMPs) would be implemented during construction:

- Heavy construction equipment, building materials, excavated soil, and vehicle traffic shall be kept away from the edge of excavations, generally a distance equal to or greater than the depth of the excavation.
- In the event of wet weather, storm runoff shall be prevented from entering the excavation. Excavation sidewalls can be covered with plastic sheeting, and berms can be placed around the perimeter of the excavated areas.
- Sidewalks, slabs, pavement, and utilities adjacent to proposed excavations shall be adequately supported during construction.

4.15.12 | Construction Period Effects - Hazardous Materials

4.15.12.1 | ENVIRONMENTAL CONSEQUENCES

There is a potential to encounter pre-existing hazardous materials during project construction proposed under each build alternative. Construction activities that would occur under the No Build Alternative could also encounter pre-existing hazardous materials, as described in Section 4.8.

Known potential contaminants include naturally-occurring asbestos, aerially deposited lead in median soils, and lead-based paint in streetscape structures, and other hazardous materials. There is also the potential to encounter unknown sources of contamination that are sometimes found in areas of undocumented fill, which is a risk common to construction projects.

Work involving filling the existing Fillmore Street underpass associated with Alternative 3 (Center-Lane BRT with Dual Medians and Passing Lanes) and Alternative 3-Consolidated (Center-Lane BRT with Dual Medians and Consolidated Bus Service) would create a new roadbed, remove part of the existing retaining walls, relocate existing utilities, decommission and possible removal of the existing pump station, and import significant dirt and fill materials. All of these construction activities, including filling, have the potential of encountering hazardous materials and would therefore trigger a requirement to comply with Section 2.4.53(d) of the SFPW Code to ensure that fill materials are clean.

Hazardous materials impacts would occur if construction workers or members of the public were exposed to hazardous materials during excavation, grading, and related construction earthwork activities; therefore, minimization measures for each build alternative to be implemented during project construction are described below.

Additionally, prior to excavation and construction, adherence to hazardous material guidelines for collection; disposal, handling, release, and treatment of hazardous material; site remediation; and worker safety and training would be required. In constructing any of the build alternatives, SFMTA, in consultation with SFDPH, would develop, prescribe, and update such hazardous material guidelines. The guidelines shall require any of the alternatives to comply with all federal, state, and local laws regarding hazardous materials, including the Maher Ordinance.

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts related to hazards and hazardous materials described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I.

Ground-disturbing activities during construction would have the potential to result in exposure to hazardous materials. During Phase I, no construction work would be anticipated west of Stanyan Street; therefore, risk of exposure to hazardous materials would not occur west of Stanyan Street.

During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Phase II construction activities would require a relatively greater level of ground disturbance compared to Phase I. Phase II would disturb existing medians between 27th Avenue and Palm Avenue to construct center-running BRT, which would result in a relatively increased risk exposure risk to hazardous materials, aerially deposited lead in the soil, naturally occurring asbestos, lead, and other environmental concerns compared to construction of side-running BRT in Phase I.

In conclusion, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.12.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following minimization measures are proposed for implementation prior to project construction to reduce or eliminate hazardous material-related effects:

MIN-HZ-C1. Prior to construction, a limited Preliminary Site Investigation shall be performed to investigate hazardous materials concerns related to soil, groundwater, and construction materials on the Geary corridor, as identified in this section.

Areas where soils will be disturbed during construction shall be sampled and tested for contaminants specific to the hazardous materials concerns identified in that location. Soil analytical results shall be screened against the Regional Water Board's Environmental Screening Levels and other applicable risk-based standards to determine appropriate actions to ensure the protection of construction workers, future site users, and the environment and also be screened against state and federal hazardous waste thresholds to determine soil management options. Representative samples of exposed shallow soils shall be collected within 30 feet of the edge of the roadway and analyzed for total lead and soluble lead. For example, aerially-deposited lead is a potential concern throughout the Geary corridor, while naturally-occurring asbestos is potentially present in only a small portion of the Geary corridor. Accordingly, samples in all areas shall be analyzed for total and soluble lead; samples from excavation areas overlying serpentinite bedrock shall also be analyzed for

asbestos. Additional investigation may be required to fully evaluate potential hazardous materials issues if concerns are identified during the Preliminary Site Investigation. All environmental investigations at the project shall be provided to project contractors, so the findings may be incorporated into their Health and Safety and Hazard Communication Programs.

MIN-HZ-C2. Prior to construction, groundwater shall be collected in areas near reported hazardous materials release sites and analyzed for TPH and volatile organic compounds if project excavations were to extend into the groundwater in those areas. Hazardous materials releases sites that have affected groundwater near the Geary corridor are located at 3675 Geary Boulevard, 450 Mission Street, and 2130 O'Farrell Street.

Additional hazardous materials releases may occur or be discovered in the future. Therefore, an updated review of regulatory agency records shall be conducted prior to the groundwater investigation, to ensure that groundwater that will be encountered during construction is properly investigated.

MIN-HZ-C3. A Hazardous Building Materials survey shall be conducted prior to construction. The survey shall minimally sample traffic paint and structures to be demolished or modified.

MIN-HZ-C4. Based on the findings and recommendations of the Preliminary Site Investigation, the project may need to implement special soil, groundwater, and construction materials management and disposal procedures for hazardous materials, as well as construction worker health and safety measures during construction. In addition to the findings and recommendations of the Preliminary Site Investigation, the following measures shall be implemented prior to construction.

- Groundwater from dewatering of excavations, if any, should be stored in Baker tank(s) during construction activities and the water should be characterized prior to disposal or recycling.
- A construction risk management plan should be implemented by contractors with procedures for identifying and mitigating potentially unreported releases of hazardous materials.

4.15.13 | Construction Period Effects - Hydrology and Water Quality

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

4.15.13.1 | ENVIRONMENTAL CONSEQUENCES

In general, construction would include shallow ground disturbance, earthwork grading, and soil excavation within existing roadway median and sidewalk areas. Alternatives 3 and 3-Consolidated would require the most extensive earthmoving activities due to the filling of the Fillmore underpass, and center median reconstruction activities. The total disturbed soil areas for each alternative would be approximately 5.8 acres for Alternative 2 (Side-Lane BRT), 33.9 acres for Alternative 3 and 3-Consolidated, and 18.2 acres for the Hybrid Alternative/LPA. During construction, soils would be exposed and may be entrained in runoff, resulting in erosion within the Geary corridor and potential sediment runoff into the combined sewer system and associated water quality impacts. BMPs required to be implemented during construction under the Construction General Permit would

apply to all build alternatives and would include measures to prevent soil erosion and entrainment of sediment in stormwater runoff.

With a few exceptions relative to Alternatives 3, 3-Consolidated and the Hybrid Alternative/LPA, generally shallow excavations (approximately five to 10 feet deep) would be required for the installation of physical project features of all of the build alternatives. Such features include bus stop amenities, landscaping features, and related equipment. Based on the groundwater depths presented in Subsection 4.9.2.3, excavation to these relatively shallow depths would be highly unlikely to encounter groundwater.

Alternatives 3 and 3-Consolidated would involve filling the underpass at Fillmore Street, and decommissioning and potentially removing the existing pump station north of Geary Boulevard. These actions would allow groundwater in the immediate vicinity of the pump station to return to its natural elevation. This would result in a beneficial impact to groundwater resources, as the amount of groundwater available for beneficial uses in the study area would increase. However, allowing the groundwater elevation in this area to rise from its current level (approximately 30 feet below ground surface (bgs)) to its natural elevation (14 feet bgs), has the potential to adversely affect underground structures located within two blocks of the pump station at depths greater than 14 feet bgs, such as building basements and utility trenches. Avoidance and mitigation measures are identified in Subsection 4.9.4 that would reduce such impacts to nearby underground structures.

In addition, the potential for chemical releases is common at construction sites. Spilled substances such as fuels, oils, paints, and solvents could be picked up by storm runoff and released into groundwater or carried into the combined sewer system. Subsection 4.15.13.2 describes avoidance and minimization measures intended to reduce the release of pollutants and sediment into the combined sewer system and prevent violation of water quality standards and degradation of groundwater resources. These minimization measures would be required under each proposed build alternatives and under the No Build Alternative. The No Build Alternative would involve substantially less earthwork comparatively.

Preparation and implementation of an SWPPP during project construction would minimize or avoid adverse impacts to water quality. Completion of an SWPPP for the National Pollutant Discharge Elimination System (NPDES) General Permit would be required for construction of each build alternative and for earthwork activities under the No Build Alternative, if applicable. The SWPPP would address water quality impacts associated with construction activities, including identification of all drainage facilities onsite, placement of appropriate stormwater and non-stormwater pollution controls and BMPs, erosion and sediment control, spill response and containment plans, inspection scheduling, maintenance, and training of all construction personnel onsite.

The SWPPP would specify how construction-related stormwater effects would be mitigated throughout the project site through:

- The appropriate treatment of overflow stormwater during construction, including inlet protection devices, temporary silt fencing, soil stabilization measures, street sweeping, stabilized construction entrances, and temporary check dams

- Lining storage areas
- Proper and expeditious disposal of items to be removed, such as landscaping, curb bulb waste, existing bus stop shelters, and demolished overhead contact system support poles/streetlights and signal poles

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts to hydrology and water quality described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. During this time, no construction work would be anticipated west of Stanyan Street. During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Earthmoving activities during both Phases I and II would have the potential to result in sediment in the combined sewer system and erosion, which could impact water quality; impacts would be minimized or avoided with the SWPPP as described above. Excavation depths in both phases would be unlikely to encounter groundwater.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.13.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

MIN-HY-C1. Any construction work that impacts the combined sewer system would require coordination with SFPUC, and construction-related activities shall be consistent with the SFPUC's *Keep it on Site, Pollution Prevention Guide for the Construction Industry*.[5]

MIN-HY-C2. Alternatives 3 or 3-Consolidated would result in a potentially adverse structural effect to nearby buildings from the raising of the groundwater levels in the vicinity of the Fillmore Street pump station during construction. One of two measures would be implemented to address the adverse effect:

A-HY-C2a. To avoid the effect, maintain existing pumping regime by maintaining the existing pump station north of Geary or similar pump to keep groundwater in the vicinity of the Fillmore Street area at current (unchanged) elevations.

-or-

MM-HY-C2b. To mitigate the effect, prior to the cessation of pumping at the existing pump station, a detailed groundwater study shall be performed by a qualified professional to determine the effects of groundwater rise on potentially affected structures and utilities. The study shall take into account the potential implementation of any project-related LID improvements in the vicinity. If the projected rise in groundwater levels may bring these structures or utilities into contact with groundwater, an evaluation of those structures or utilities shall be performed by a licensed structural engineer. Remedial measures determined to be necessary by the structural engineer, which may include waterproofing of foundations and subterranean walls and/or additional enhancements and performance standards such as underslab drainage or other features to resist increased hydrostatic pressure as a result of the elevated groundwater level, shall be

[5] Available at: http://sfwater.org/modules/showdocument.aspx?documentid=4622.

implemented prior to the cessation of pumping to minimize structural affects to surrounding buildings.

Implementation of this mitigation measure may result in the need for supplemental environmental review once the extent of needed improvements is identified.

4.15.14 | Construction Period Effects - Air Quality

4.15.14.1 | ENVIRONMENTAL CONSEQUENCES

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Construction activity would generate air emissions from various sources, including equipment engines, truck engines, and earthwork activity. All build alternatives would be required to comply with San Francisco Health Code Article 22B and San Francisco Building Code §106A.3.2.6, which collectively constitute the City's Construction Dust Control Ordinance (adopted in July 2008). Recycled water would be required for use for dust control activities under City Ordinance 175-91. The build alternatives would further be required to comply with Section 6.25 of Chapter 6 of the San Francisco Administrative Code (Clean Construction Ordinance), which requires clean construction practices for all City projects that consist of 20 or more cumulative days of construction. Compliance with these regulations would control fugitive dust emissions and substantially reduce exhaust emissions associated with standard construction equipment.

From an air quality perspective (e.g., equipment use), the majority of construction activity would be similar for the various alternatives. However, construction activity associated with bringing Fillmore Street to grade (Alternatives 3 and 3-Consolidated) would generate the maximum daily emissions as a result of additional truck and equipment activity. Regional construction emissions associated with the build alternatives are presented in Table 4.15-6 for Alternatives 3 and 3-Consolidated, and the Hybrid Alternative/LPA. Table 4.15-6 also includes emissions for Alternative 2, which represents a typical segment that includes fewer truck trips and less equipment activity than needed to bring Fillmore Street to grade level. Accordingly, Alternative 2 is projected to result in lower daily levels of emissions. As shown in Table 4.15-6, each of the build alternatives is projected to generate daily emissions of criteria pollutants below applicable thresholds. Therefore, none of the alternatives would result in an adverse effect regarding construction period emissions.

It is anticipated that highest risk to public health would be associated with bringing Fillmore Street to grade under Alternatives 3 and 3-Consolidated. This segment would experience the highest level of construction intensity in terms of equipment use and truck activity. As shown in Table 4.15-7, construction activity would not generate emissions that would exceed the Bay Area Air Quality Management District (BAAQMD) health-risk significance thresholds. Construction activity associated with Alternative 2 or a typical segment for Alternatives 3 and 3-Consolidated or the Hybrid Alternative/LPA would result in lower risks. Therefore, implementation of the build alternatives would not result in adverse effects related to construction health risk.

Table 4.15-6 Estimated Daily Construction Emissions for all Build Alternatives

CRITERIA POLLUTANT OR OZONE PRECURSOR	POUNDS PER DAY			
	ROG	NOX	PM_{10}	$PM_{2.5}$
Alternative 2				
General Construction Emissions	5	21	1	1
Roadway Striping	3	--	--	--
Regional Significance Threshold	54	54	82	54
Exceed Threshold?	No	No	No	No
Alternative 3				
General Construction Emissions	6	41	1	1
Roadway Striping	3	--	--	--
Regional Significance Threshold	54	54	82	54
Exceed Threshold?	No	No	No	No
Alternative 3-Consolidated				
General Construction Emissions	6	41	1	1
Roadway Striping	3	--	--	--
Regional Significance Threshold	54	54	82	54
Exceed Threshold?	No	No	No	No
Hybrid Alternative/LPA				
General Construction Emissions	6	37	1	1
Roadway Striping	3	--	--	--
Regional Significance Threshold	54	54	82	54
Exceed Threshold?	No	No	No	No

Source: OFFROAD, 2011 and TAHA, 2014

Table 4.15-7 Construction Health Risk Assessment

HEALTH RISK TYPE	UNIT OF MEASUREMENT	FILLMORE STREET	THRESHOLD
Excess Cancer Risk (per million)	Probability per one million population	0.83	10
Chronic Health Risk	Health Index	0.05	1
Acute Health Risk	Health Index	0.40	1
Increase in PM Concentration	Annual Average ($\mu g/m^3$)	0.25	0.3

Source: TAHA, 2014

Asbestos has not been identified in the existing roadway surface that would be removed during the construction process. The use of asbestos in asphalt was discontinued in May 1979; streets comprising the Geary corridor have been demolished and repaved since that date.

As a part of an ongoing study, the U.S. Geological Survey (USGS) identifies and maps reported occurrences of asbestos in the United States.[6] It is not anticipated that construction activity would encounter naturally occurring asbestos. Moreover, the City's Construction Dust Control Ordinance would effectively control

[6] USGS. 2011. Van Gosen, B.S., and Clinkenbeard, J.P. California Geological Survey Map Sheet 59. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Open - File Report 2011 - 1188 Website: http://pubs.usgs.gov/of/2011/1188/. Last Accessed 10/15/2014.

unanticipated naturally occurring asbestos exposure through a variety of required control measures including watering.[7]

Therefore, the only components of the build alternatives to potentially involve exposure of asbestos would be the demolition of the pedestrian bridges at Webster Street (Alternatives 2, 3, and 3-Consolidated only) and Steiner Street (all build alternatives); in addition, Alternatives 3 and 3-Consolidated would decommission an existing below-grade pump station, including removal of a portion of its structure which could contain asbestos.

Accordingly, construction contractors shall comply with BAAQMD Regulation 11 (Hazardous Pollutants) Rule 2 (Asbestos Demolition, Renovation, and Manufacturing). The requirements for demolition activities include removal standards, reporting requirements, and mandatory monitoring and record keeping.

Equipment exhaust and paving activities would result in odor emissions for each of the build alternatives. Odors would be localized and generally confined to the construction area. Each build alternative would utilize typical construction techniques, and the odors would be typical of most construction sites and temporary in nature. Construction activity would not cause an odor nuisance, and construction odors would not result in any adverse impacts for any of the build alternatives.

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts to air quality described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I). During this time, no construction work would be anticipated west of Stanyan Street. Construction activities during Phase I would generate greenhouse gas and fugitive dust emissions from various sources, including equipment engines, truck engines, and earthwork activity.

During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Accordingly, localized air quality impacts would occur primarily east of Stanyan Street in Phase I and west of Stanyan in Phase II. These impacts would generally be the same as those described for Phase I, though could occur to a greater degree in Phase II due to more intensive construction activities associated with median removal.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.14.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

With adherence to City ordinances and regulations regarding construction, such as the Construction Dust Control Ordinance, none of the alternatives would result in any adverse effects during construction related to emissions of air pollutants and

[7] According to the USGS Survey Map for Asbestos in California, the following areas in the County of San Francisco have been identified with asbestos occurrence:
1) U.S. Mint area, located 1 mile to the south of the Geary corridor; 2) Potrero Hill area, located 2 miles to the south of the Geary corridor; 3) Fort Point-Presidio area, located 2 mile to the northwest of the Geary corridor; and 4) Hunter Points Area, located approximately 5 miles to the southwest of the Geary corridor.

greenhouse gases. Therefore, no additional construction-period avoidance, minimization, or mitigation measures would be necessary.

4.15.15 | Construction Period Effects - Noise and Vibration

4.15.15.1 | ENVIRONMENTAL CONSEQUENCES

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Noise: As shown in Table 4.15-8, construction equipment noise (from jackhammers and dump truck activity) would exceed 80 dBA at 100 feet. With adherence to the San Francisco Noise Ordinance, which includes limiting the noise levels from individual pieces of construction equipment to 80 dBA at a distance of 100 feet, equipping impact tools with both intake and exhaust mufflers, and obtaining a noise permit for night work from San Francisco Public Works (SFPW), temporary construction noise effects would not be adverse. Additionally, some construction-related activities have potential to result in disturbance and annoyance effects on nearby sensitive receptors. To this end, minimization measures are incorporated herein to provide for noise monitoring throughout construction as well as the implementation of additional sound-attenuating measures (including but not limited to sound walls, management of truck routes, etc.) that are necessary to address potential adverse effects.

Each of the build alternatives includes demolition and removal of one or both of the pedestrian bridges at Webster and Steiner Streets, including all above- and below-ground bridge components. The bridge at Webster Street (proposed for removal under Alternatives 2, 3, and 3-Consolidated) is located as close as 15 feet to residential uses; the bridge at Steiner Street is proposed for removal under all of the build alternatives and is located approximately 60 feet from residences.

Table 4.15-8 Typical Noise Levels From Construction Equipment

	NOISE LEVEL (DBA)	
NOISE SOURCE	50 FEET	100 FEET
Air Compressor	81	75
Back Hoe	80	74
Compactor	82	76
Concrete Mixer	85	79
Concrete Pump	82	76
Crane Mobile	83	77
Concrete Vibrator	76	70
Drill Rig Truck	79	76
Dump Truck	88	82
Generator	81	75
Jackhammer	88	82
Loader	85	79
Paver	77	71
Pneumatic Tool	85	79
Roller	74	68
Saw	76	70

Source: Federal Transit Administration, 2006

Bridge demolition and removal would expose these residential uses to temporary noise increases during active demolition. The primary source of noise associated with bridge removal would be from jackhammers and similar impact equipment. Jackhammers generate a noise level of approximately 88 dBA at 50 feet, or 82 dBA at 100 feet. Section 2907(b) of the San Francisco Police Code states that it shall be unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise level above 80 dBA when measured at a distance of 100 feet from such equipment. However, this provision is not applicable to impact tools and equipment fitted with intake and exhaust mufflers recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection as best accomplishing maximum noise attenuation. In addition, pavement breakers and jackhammers are required to be equipped with acoustically attenuating shields or shrouds recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection as best accomplishing maximum noise attenuation. With adherence to the San Francisco Noise Control Ordinance the temporary construction noise generated would not result in any adverse effects.

With the construction of Alternatives 3 and 3-Consolidated, the focus of construction activity would occur in the center of the right-of-way, where the new bus-only lanes would be located. This activity would be further from sensitive receptors compared to Alternative 2, which would construct bus-only lanes closer to the edge of the street. The Hybrid Alternative/LPA consists of different components from Alternatives 2, 3, and 3-Consolidated, thus the focus of construction activity would not be concentrated in one particular section of the street right-of-way. Therefore, the Hybrid Alternative/LPA would be represented by the range of construction activity covered between the other three build alternatives.

All build alternatives may result in noise levels in excess of 80 dBA at 100 feet due to removal of pedestrian bridges at Webster and/or Steiner Streets. Given that the Hybrid Alternative/LPA only proposes to remove the pedestrian bridge at Steiner Street, construction-period noise impacts would be slightly reduced, especially in the vicinity of the Webster Street bridge, relative to the other build alternatives. However, with adherence to the aforementioned provisions of the San Francisco Noise Ordinance, these temporary construction noise effects would not be adverse.

Vibration: Vibration effects from equipment used during installation of right-of-way improvements as well as associated utility relocation/demolition activities could potentially cause physical damage or alteration to historic properties, affect existing underground infrastructure, or cause annoyance among nearby sensitive receptors.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Historic properties are typically considered more sensitive to vibration owing to their construction methods, ornamentation, age, fragility, or other factors. Table 4.15-9 shows the distances at which vibration impacts would be projected to occur by vibration level and historic building type.

As shown in Table 4.15-9, the most sensitive buildings are potentially susceptible to vibration-related effects at peak-particle velocities (PPV) of 0.12 inches per second. Vibratory rollers, commonly used in road building, have a PPV of 0.21 inches per second. Per Table 4.15-9, vibratory rollers could have adverse effects on "Class III" historic properties when used at a distance of 25 feet; "Class IV" properties, generally the most susceptible to vibration, could be adversely affected by vibratory

roller use at a distance of 36 feet. In comparison, other typical vibration-causing equipment, like a jackhammer, would have somewhat lower potential to affect historic properties. As shown in Table 4.15-9, jackhammers would have adverse effects if used within 11 feet of a Class IV property or 7 feet of a Class III property.

Table 4.15-9 Vibration Velocities for Construction Equipment

EQUIPMENT	PPV AT 25 FEET (INCHES/SECOND)	IMPACT DISTANCE FOR BUILDING CATEGORY, (FT)			
		I	II	III	IV
Vibratory Roller	0.210	14	19	25	36
Hoe Ram	0.089	7	11	14	20
Large Bulldozer	0.089	7	11	14	20
Jackhammer	0.035	4	5	7	11
Loaded Trucks	0.076	7	10	13	18
Small Bulldozer	0.003	1	1	2	2

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006

There are approximately 53 historical properties along the Geary corridor in proximity of which construction work and thus potential attendant vibration would occur. Since Alternative 2 construction would be focused on side-running lanes, which would be less than 36 feet from most buildings fronting on the Geary corridor, there is potential for an adverse effect to the historic properties along the Geary corridor. However, adherence to minimization measures incorporated herein would avoid or lessen any such effects such that no adverse effect would be expected to occur. Minimization includes employing site-specific, low-vibration construction methods near sensitive resources.

In addition, construction vibration could potentially affect existing SFPUC infrastructure within the project's area of influence, including subsurface brick sewers that are concentrated in the northern and eastern parts of the City.[8] However, prior to construction within the public right-of-way, SFMTA is required to obtain permits from SFPW in accordance with Article 2.4 of the Public Works Code. As part of the plan check process, SFPUC, the agency responsible for maintaining the City's sewer system, reviews the plans. If SFPUC determines that the proposed construction work may damage the older brick sewers, SFPW may impose specific conditions as part of the permit process to eliminate the potential for damage. Adherence to such conditions imposed pursuant to Article 2.4 would avoid or minimize any such potential adverse effects to brick sewers.

Potential annoyance related to vibration would be addressed through a minimization measure incorporated herein. Specifically, the project construction plan would include a program for accepting and addressing noise and construction-related complaints. Contact information for the Project Manager, Resident Engineer, and Contractor would be posted on site, with direction to call if there are any concerns. Complaints would be logged and tracked to ensure they are addressed.

With the refined phasing for the Hybrid Alternative/LPA, construction-period noise and vibration impacts described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I. Localized noise and vibration impacts would occur east of Stanyan Street in Phase I. These would include temporary, intermittent

[8]City and County of San Francisco. (2010). 2030 Sewer System Master Plan Task 500 Technical Memorandum NO. 506 Collection System Rehabilitation Program.

increases in ambient noise and vibration levels. Demolition and removal of the Steiner Street bridge during Phase I would expose sensitive receptors to temporary noise and vibration increases during active demolition, primarily from jackhammers and similar impact equipment. During Phase I, no construction work would be anticipated west of Stanyan Street; therefore, construction-related noise impacts would not occur west of Stanyan Street during Phase I.

During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Accordingly, localized noise and vibration impacts would occur primarily west of Stanyan Street in Phase II. Because Phase II would entail construction of bus-only lanes and medians in the center of Geary, rather than on the sides as in Phase I, construction noise sources would be at a slightly greater distance from sensitive receptors along the corridor.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

4.15.15.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

MIN-NOISE-CI. A Vibration Reduction and Minimization Plan shall be developed to avoid construction vibration damage using all reasonable and feasible means available. The Plan shall provide a procedure for establishing thresholds and limiting vibration values for structures with a potential to be adversely affected. The following steps shall be taken in development of the location-specific vibration reduction plan:

- Potential vibration-sensitive structures shall be identified using the distance impact thresholds in the final engineering drawings.
- Vibration-sensitive structures shall be individually assessed to identify each structure's ability to withstand the loads and displacements due to construction vibrations.
- Construction related vibration in proximity to identified vibration-sensitive historic structures shall not be allowed to exceed the recommended levels set forth in pertinent FTA guidance.
- Peak particle velocities shall be monitored and recorded near sensitive receptors identified where the highest vibration producing activities would occur.
- Rubber-tired instead of tracked vehicles shall be used near vibration sensitive areas.
- Pavement breaking shall be prohibited during nighttime hours.
- Residents within 300 feet of areas where construction activities and pavement breaking would take place shall be notified at least two weeks in advance of the proposed activity through the media and mail. A program shall be implemented to receive and respond to public complaints regarding vibration during construction.

MIN-NOISE-C2. Project construction shall implement best practices in equipment noise control, including the following:

- Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment would generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
- Perform all construction in a manner that minimizes noise. Utilize construction methods or equipment that would provide the lowest level of noise impact.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes.
- Impact tools and equipment, such as jackhammers, shall have intake exhaust mufflers and acoustically attenuating shields or shrouds recommended by the manufacturers and approved by the Director of Public Works or the Director of Building Inspection.

MIN-NOISE-C3. Project construction would conduct truck loading, unloading, and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid passing through residential neighborhoods to the greatest possible extent.

MIN-NOISE-C4. Perform independent noise monitoring in sensitive areas, as needed, to demonstrate compliance with applicable noise limits. Require contractors to modify and/or reschedule their construction activities if monitoring determines that maximum limits are exceeded at residential land uses per the City Noise Ordinance.

MIN-NOISE-C5. Temporary sound walls, curtains, or other noise canceling technologies may be used in locations where sensitive receptors could experience construction-related noise exceedances.

4.15.16 | Construction Period Effects - Biological Resources

4.15.16.1 | ENVIRONMENTAL CONSEQUENCES

Given that the Geary corridor is located entirely within an urban (developed) environment with little or no indigenous vegetation, it is unlikely that any sensitive or special-status species would be impacted by any of the build alternatives, as well as by the No Build Alternative. Furthermore, no species of concern or special-status plant species are known to occur within the Geary corridor. However, the study area does include trees that could host birds, nests, and eggs which are protected by the MBTA.

Construction period effects and avoidance, minimization, and mitigation measures discussed throughout this section are identical to those discussed throughout sections 4.1 through 4.14

Potential adverse effects to biological resources associated with project construction are expected to be limited to:

- Trees protected under the Urban Forestry Ordinance
- Birds, their nests, and eggs as protected under the MBTA
- Potential for introduction or increases in noxious weeds associated with ground disturbance activities, as considered under Executive Order 13112

Mature trees shall be preserved and incorporated into the project landscape plan where space permits. Nonetheless, all of the build alternatives would require removal of mature trees and potential work within tree drip lines.

With the refined phasing for the Hybrid Alternative/LPA, construction-period impacts to biological resources described in the Draft EIS/EIR for the corridor as a whole would occur first just in Phase I). During this time, no construction work would be anticipated west of Stanyan Street. During Phase II, all construction work, with the exception of bicycle improvements between Masonic and Presidio described above in Subsection 4.15.2.1, would occur west of Stanyan Street. Up to approximately 70 trees would be removed in Phase I and approximately 110 trees would be removed in Phase II. Phase II also includes median removal from Palm Avenue to 27th/28th and new planting and thus the potential introduction of noxious weeds/invasive species as disclosed in the Draft EIS/EIR.

Based on the foregoing, overall construction impacts of the Hybrid Alternative/LPA would be similar to those described in the Draft EIS/EIR. No new avoidance, minimization, or mitigation measures would be required.

4.15.16.2 | AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following minimization measures are proposed to offset potential biological resource impacts during construction resulting from the build alternatives:

MIN-BO-C1. Mature trees shall be preserved and incorporated into the project landscape plan as feasible, as well as the planting of replacement trees and landscaping. For each tree removed, a replacement tree is required.

MIN-BO-C2. To preclude potential effects under the MBTA, tree removal shall occur outside nesting bird season (February 1 through August 31). Regardless of time of year, preconstruction surveys shall be performed prior to tree removal to determine occurrence of nesting birds. If active protected bird nests are encountered during preconstruction surveys, no-disturbance buffers would be created around active protected bird and/or raptor nests during the breeding season, or until it is determined that all young have fledged. Typical buffers include 500 feet for raptors and 50 feet for passerine nesting birds. The size of the buffer zones and types of construction activities restricted in these areas may be further modified during consultation with CDFW, and shall be based on existing noise and human disturbance levels at the project site. Nests initiated during are presumed to be unaffected, and no buffer will be necessary. The "take" of any individual protected birds shall be prohibited. Monitoring of active nests when construction activities encroach upon established buffers may be required by CDFW.

MIN-BO-C3. Seed palettes used for revegetation of disturbed areas shall be reviewed to prevent introduction of invasive species to the site. Follow-up site maintenance shall include a protocol for landscaping staff to recognize weeds and perform maintenance in a manner that prevents weed establishment.

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