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MEMORANDUM

Date: March 5, 2021 Project #: 195950.030

To: Mark Dreger, Casey Hildreth
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1 Van Ness Avenue
San Francisco, CA 94103

From: Amanda Leahy, AICP; Mike Alston, RSP

Project: Ocean Avenue Safety Project

Subject: Task 2.4 Preferred Alternative Memo

INTRODUCTION

Kittelson & Associates, Inc. (Kittelson) is supporting the San Francisco Municipal Transportation Agency (SFMTA) with the Frida Kahlo / Ocean / Geneva Safety Project ("project"). This memorandum (memo) provides a draft evaluation comparison table, conceptual-level cost-estimates associated with two staff-preferred project alternatives, and next steps for project implementation. This memorandum also documents concepts that have been proposed and removed from further consideration. This memorandum uses the term *project team* to identify actions taken and decisions made by Kittelson and SFMTA collaboratively.

The concepts presented here have been developed collaboratively with the SFMTA, based on reviewing background documents and prior work documented in the May 28, 2020 Existing Conditions Memo, and discussions with staff. As part of Task 2.1a of this project, the project team met to define the essential elements of these concepts. Kittelson submitted three draft concepts, which were subsequently revised and narrowed down to two concepts: a near-term concept (Concept 1) and a long-term concept (Concept 2).

These concepts were documented in the October 12, 2020, Task 2.2d Revised Alternatives Memo. Subsequently, the project team identified further design adjustments to Concept 1 and Concept 2. The Concept 1 and Concept 2 designs presented in this memo reflect those modifications.

This memorandum is organized as follows:

- Existing Conditions and Proposed Concepts

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  - Concept 2: Long-Term Concept
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- Alternatives Evaluation
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EXISTING CONDITIONS AND PROPOSED CONCEPTS

This section includes a brief description of existing conditions and descriptions of the proposed concepts.

Existing Conditions

The existing intersection configuration is shown in Figure 1 and the basic intersection lane configuration and constraints are described in this section. Appendix 1 includes figures showing existing driving, walking, and biking activity at the Frida Kahlo / Ocean / Geneva intersection in the weekday peak hours and existing Muni service.

- **South Leg (Geneva Avenue):** The northbound approach includes two lanes consisting of one left-turn lane and one shared left/right turn lane, along with bicycle pavement markings (“sharrows”) in the right lane. This approach is downhill and is not aligned with the northbound receiving lanes along Frida Kahlo Way. Departing the intersection southbound, Geneva Avenue has two uphill lanes with sharrows in the right lane.
- **North Leg (Frida Kahlo Way):** The southbound approach includes three approach lanes consisting of one shared left-turn/through lane, one through lane, and one right-turn lane. Sharrows are present in the through and right lanes. The City College Muni Terminal exit is approximately 150 feet north of the stop bar at the intersection. Departing the intersection are two lanes which merge into a single northbound lane alongside an on-street bike lane (class II) and parking lane approximately 150 feet north of the intersection.

- **West Leg (Ocean Avenue):** The eastbound approach includes three approach lanes consisting of a left-turn lane, a through lane, and a shared through/right-turn lane. Sharrows are present in the right lane. A near side Muni stop is located at the stop bar along a transit boarding island that fronts a parking lot. The Muni light rail tracks occupy the left-turn lane, and the KT Ingleside/Third shares this lane with left-turning vehicle for its through movement. Access to and from Harold Avenue is approximately 175 feet west of the stop bar at the intersection. Departing the intersection are three lanes which merge to two lanes within 100 feet after the intersection. The inside departure lane includes light rail tracks.
- **East Leg (Ocean Avenue):** The westbound approach includes two motor vehicle through lanes, with a third lane added approximately 130 feet east of Frida Kahlo Way where the northbound left-turn movement merges onto Ocean Avenue. The 130-foot-long area provides vehicle storage between the Frida Kahlo Way and Geneva Avenue intersection legs. Within this area, the configuration includes two through lanes and a shared through/right lane with sharrows. The leftmost through lane includes Muni light rail tracks. Departing the intersection are two lanes which merge to one lane within 100 feet of the intersection and an eastbound on-street bike lane (class II) that begins between Frida Kahlo Way and Geneva Avenue. The track lanes are separated east of the intersection.

Bicycle Facilities

The existing intersection configuration includes the following bicycle facilities:

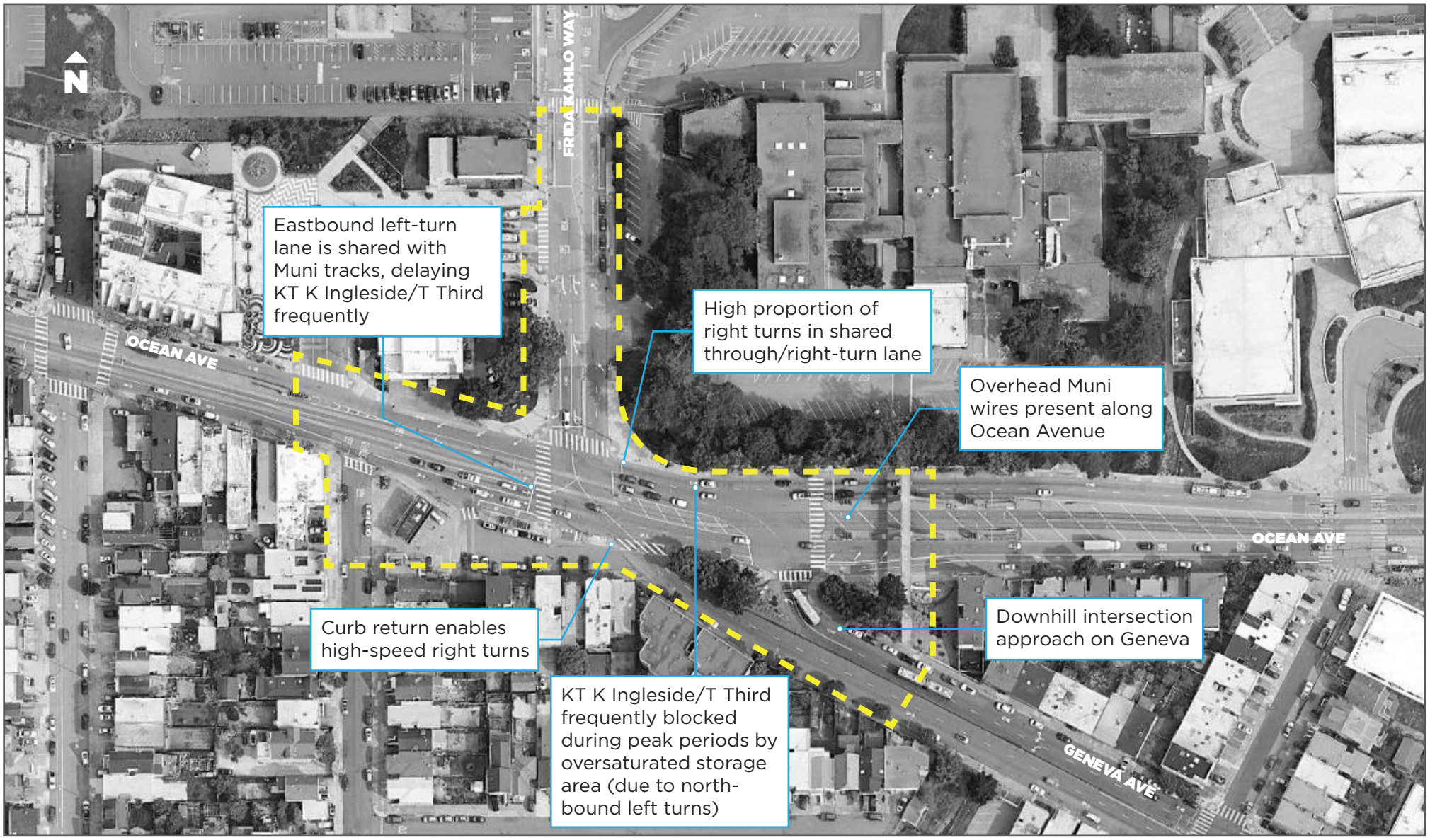
- **Ocean Avenue:** Westbound Ocean Avenue includes a bike route (Class III) to and through the intersection. In the eastbound direction, an on-street bike lane (Class II) begins at the intersection and continues to Howth Street, where it transitions to a bike route (Class III) until Cayuga Avenue.
- **Geneva Avenue:** A bike route (Class III) runs east–west from Frida Kahlo Way to Paris Street where it becomes an on-street bike lane (Class II) and alternates between facility types to the Cow Palace.
- **Frida Kahlo Way:** In the northbound direction, an on-street bike lane (Class II) begins at the City College Muni Terminal exit and continues along Judson Avenue to Gennessee Street. In the southbound direction, on-street bike lanes (Class II) are provided between Gennessee along Judson and along Frida Kahlo Way to Cloud Circle (south), where the bike lane transitions to a bike route with pavement markings.

Pedestrian Facilities

The intersection includes sidewalk on all intersection corners and approaches. These include:

- **Ocean Avenue** includes a 10-foot-wide sidewalk along its south side and a 6-foot-wide sidewalk along its north side with the clear path of travel interrupted by sidewalk furniture.
- **Frida Kahlo Way** includes a 10-foot-wide sidewalk along the east side and an 11-foot-wide sidewalk along the west side.

- **Geneva Avenue** includes 8-foot-wide sidewalks along the south side of Geneva Avenue exiting the intersection and along the north/east side of the Geneva Avenue approach.
- The northwest and northeast corners of the intersection include landscaping setbacks that provide additional space for people walking.



LIMIT OF WORK

Figure 1

Frida/Ocean/Geneva Intersection
Intersection Configuration

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SFMTA

Concept 1: Near-Term Concept

See Concept 1 on page 7. The concept includes the following changes:

Eastbound Ocean Avenue

The concept reconfigures the eastbound approach by repurposing the existing eastbound left-turn lane as a Muni-only lane (serving the KT and 29 lines) and shifting general purpose lanes to the south. The concept includes addition of a bike box at the eastbound stop bar and replacement of the auxiliary through lane in the eastbound receiving lanes with a buffered bike lane.

Eastbound transit vehicles receive a 4-second leading transit interval coinciding with an existing leading pedestrian interval. As a result, through movements are reduced to a single lane. The near side Muni stop serving the 29 and 91 lines is relocated to the far side of the intersection. The relocated stop serves the 29 but not the 91, which turns right onto Geneva Avenue. No replacement stop for the 91 is provided; the 91 is served by the remaining stops approximately 500 feet west on Ocean Avenue at Lee Avenue and approximately 700 feet east on Geneva Avenue.

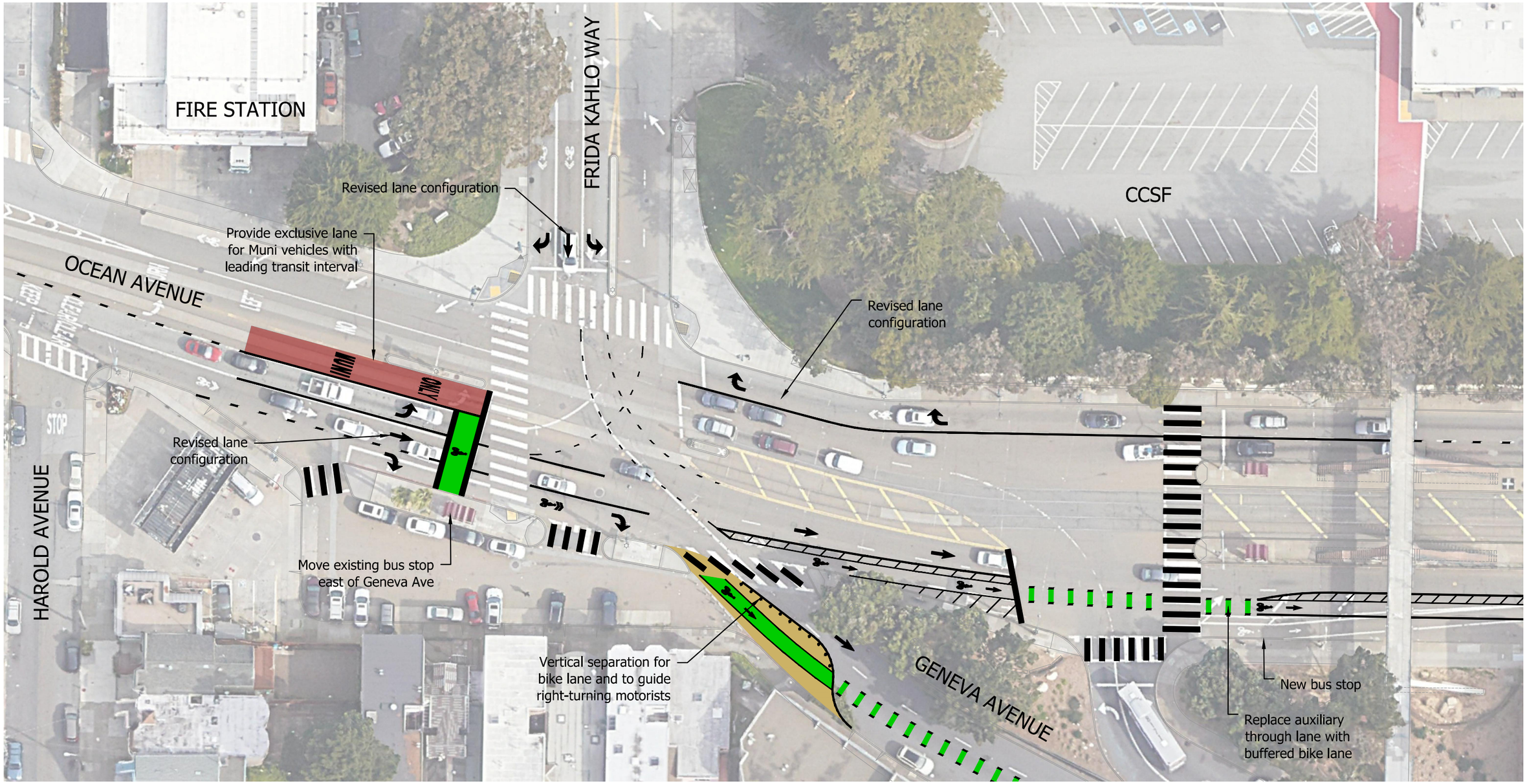
Southbound Frida Kahlo Way and Geneva Avenue

The concept reconfigures the southbound Frida Kahlo Way approach and converts the shared left-turn/through lane to a left-turn only lane. The other lane assignments remain the same. The southbound Geneva Avenue receiving lanes are reduced to a single general purpose motor vehicle lane and a remaining lane that could serve either an on-street bike lane or a shared bus/bike lane. Vertical flex posts delineate a bike lane and provide vertical separation at the corner of the intersection, shifting eastbound right-turning vehicle paths to the east and constraining them, and reducing pedestrian crossing exposure.

The concept could be implemented with striping, signal timing adjustments, and temporary curb extension materials. There are no constructability concerns with implementation.

Concept 1 - Near-Term Concept

Preliminary Design Subject to Change
Date: March 2021



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Concept 2: Long-Term Concept

See Concept 1 on page 10. The concept includes the following changes, including many present in the near-term concept:

Eastbound Ocean Avenue

As with the near-term concept, the long-term concept reconfigures the eastbound approach by repurposing the existing eastbound left-turn lane as a Muni-only lane (serving the KT and 29 lines) and shifting general purpose lanes to the south. Eastbound transit vehicles receive a 4-second leading transit interval, coinciding with the existing leading pedestrian interval. As a result, through movements are reduced to a single lane.

As with the near-term concept, the near side Muni stop serving the 29 and 91 lines is relocated to the far side of the intersection. Under Concept 2, the relocated Muni stop is located in a shared center-running transitway, shared with Muni light rail vehicles, instead of adjacent to the sidewalk. The relocated stop serves the 29 but not the 91, which turns right onto Geneva Avenue. No replacement stop for the 91 is provided; it is served by the remaining stops approximately 500 feet west on Ocean Avenue at Lee Avenue and approximately 700 feet east on Geneva Avenue.

Under the long-term concept, the curb line is moved south to accommodate additional approach roadway width. Curb line adjustment allows room for a “pocket” bike lane leading to a bike box at the eastbound stop bar. The auxiliary through lane in the eastbound receiving lanes is replaced with a buffered bike lane. The eastern parking lot access in the southwest intersection corner is closed to provide continuous sidewalk, remove a conflict point, and consolidate parking access. The western access point would be widened to allow ingress and egress. Because of the curb line adjustment noted above, the parking lot is smaller than in existing conditions.

Southbound Frida Kahlo Way and Geneva Avenue

As with the near-term concept, the southbound Frida Kahlo Way approach is reconfigured to convert the shared left turn/through lane to a left-turn only lane. The other lane assignments remain the same.

The southbound Geneva Avenue receiving lanes are reduced to a single general purpose motor vehicle lane and a remaining lane that could serve either an on-street bike lane or a shared bus/bike lane. Vertical flex posts delineate a bike lane and provide vertical separation at the corner of the intersection, shifting eastbound right-turning vehicle paths to the east and constraining them, and reducing pedestrian crossing exposure. A mountable curb would separate bicycle and vehicle movements within the intersection influence area.

The existing parking lot access point along Geneva Avenue (currently blocked with bollards) is replaced with a continuous sidewalk. The south leg pedestrian crossing of Geneva is aligned with the newly constructed sidewalk.

Track realignment along Ocean Avenue

The concept includes track realignment to provide cross sectional width to accommodate Muni buses in the center-running track lane (eastbound and westbound) on the intersection's east leg. The southern island on the east side of the intersection shifts to the south to accommodate the necessary width.

Westbound Ocean Avenue and Frida Kahlo Bicycle and Pedestrian Improvements

The concept includes a sidewalk-level two-way shared-used path on the north side of Ocean Avenue along the City College of San Francisco (CCSF) frontage with transition to a two-way separated bicycle lane on the east side of Frida Kahlo Way. Both of these could vary in ultimate cross-sectional width but are presented at their minimum desired widths.

The two-way multiuse path on Ocean Avenue provides 12 feet wide of travel way with an additional 1.5 feet of shy distance to vertical obstructions on each side (and 6 feet of landscaping and separation from the motor vehicle lane). The path design includes a ramp to a bike box for people biking continuing westbound on Ocean Avenue. It also provides detectable warnings, a ramp, and yield markings for the transition to the separated bike lane along Frida Kahlo Way.

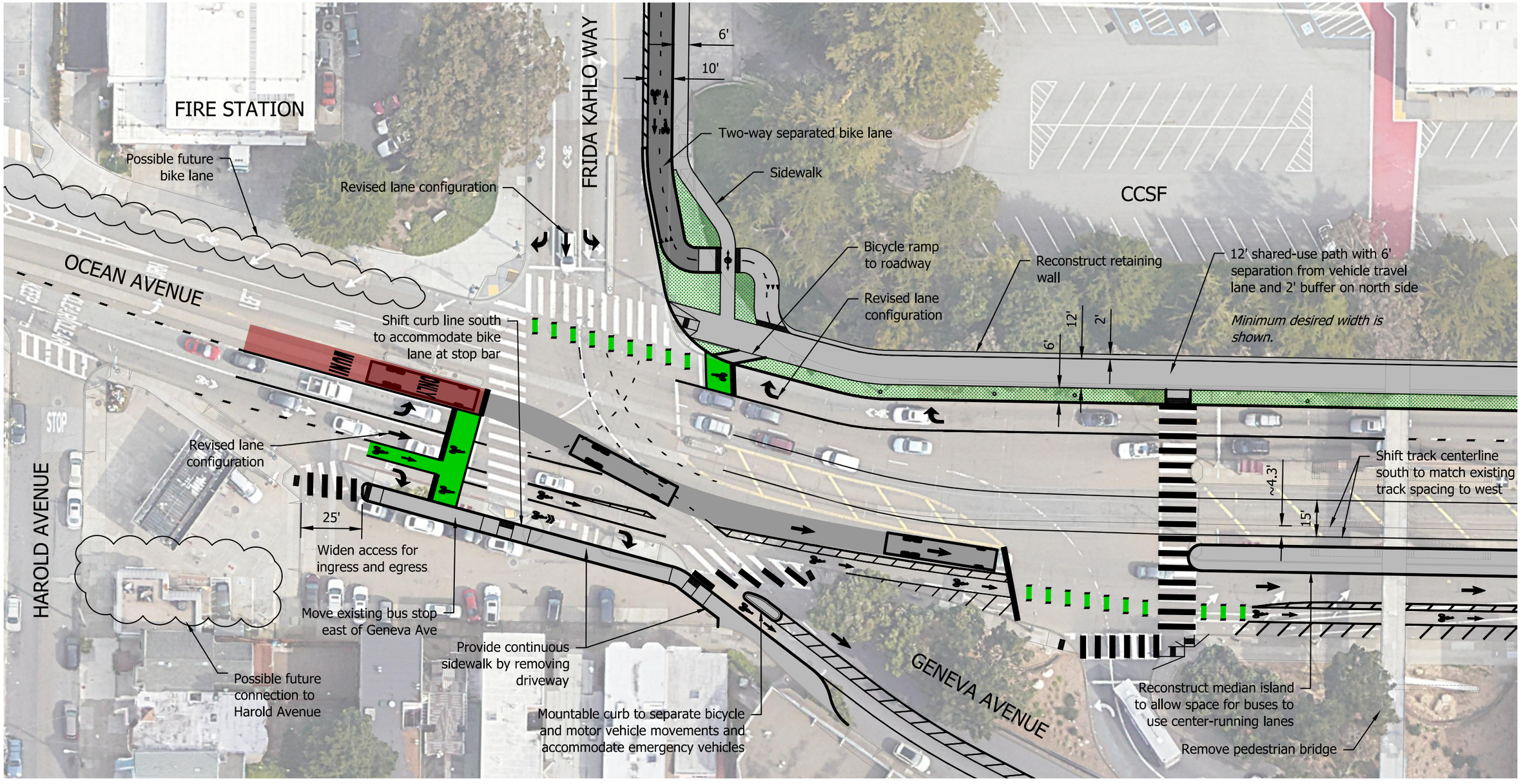
The Frida Kahlo Way bicycle lane provides 5 feet of travel way in each direction and raised concrete separation that transitions to a painted 2-foot buffer to the north.

The concept assumes the following construction:

- Moving the curb line to, and closing access along, the southwest corner of the intersection.
- Relocating and reconstructing the retaining wall on the north side of Ocean Avenue.
- Removing the pedestrian bridge as a result of the multiuse path development. The removal of the pedestrian bridge is assumed to be triggered by the retaining wall relocation.

Concept 2 - Long-Term Concept

Preliminary Design Subject to Change
Date: March 2021



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EVALUATION CRITERIA

The concepts are evaluated qualitatively with nine criteria organized into three evaluation categories. These are presented in Table 1.

Table 1: Evaluation Criteria

Evaluation Category	Criteria	Measure
Street User Safety	Pedestrian Safety	Number and type of conflict points, relative crossing distances, vehicle speeds, and turn radii
	Bicyclist Safety	Number and type of conflict points, facility type and separation, vehicle speed at conflict points
	Driver Safety	Number and type of conflict points, vehicle speeds associated with geometrics
Accessibility and Connectivity	Pedestrian Comfort and Access	Width and comfort of pedestrian paths, directness of walking routes, connection to existing facilities, and connection to transit
	Bicyclist Comfort and Access	Width and comfort of bicycle facilities, directness of routes; connection to existing facilities and destinations
	Vehicle Access, Connectivity, and Parking	Routes and connections for motor vehicles to and through the intersection; parking supply affected by proposed changes.
Operations	Vehicle Operations	Vehicle travel delay
	Vehicle Queue Lengths	Vehicle queue lengths
	Transit Speed and Reliability	Intersection delay; qualitative assessment of operational effects and sources of delay from transit-only lane, signal timing modifications, and bus stop locations

Constructability and cost of each concept is also discussed in a subsequent section but is not included in the matrix for comparison, because each concept would be compared against a “do-nothing” alternative which has no direct cost or constructability considerations.

ALTERNATIVES EVALUATION

The comparison of concepts to existing conditions is provided in Table 2. All comparisons, indicated by the icons below and summarized in Table 2, are made to the existing conditions. The icons indicate the following:

⊕ Minor improvement

● No change or negligible change

⊖ Minor adverse effect

⊕⊕ Improvement

⊖⊖ Adverse effect

Table 2: Alternatives Comparison

Evaluation Category	Criteria	Evaluation (Relative to Existing Conditions)	
		Near-Term Concept	Long-Term Concept
Street User Safety	Pedestrian Safety	⊕	⊕
	Bicyclist Safety	⊕	⊕⊕
	Driver Safety	⊕	⊕
Accessibility & Connectivity	Pedestrian Comfort and Access	⊕	⊕⊕
	Bicycle Comfort and Access	⊕	⊕⊕
	Vehicle Access, Connectivity, and Parking	●	⊖
Service	Vehicle Operations	●	●
	Vehicle Queue Lengths	⊖	⊖
	Transit Speed and Reliability	⊕⊕	⊕⊕

Pedestrian Safety

Pedestrian safety is evaluated by qualitatively comparing the number and type of conflict points between people walking and people driving or riding bicycles. A decrease in conflict points, or improved conditions where conflict points exist (e.g., increased visibility or reduced speeds, shortened crossing distances) improves conditions for pedestrian safety.

Existing Conditions

Existing conditions related to the pedestrian safety evaluation are as follows:

- The intersection currently includes at-grade pedestrian crossings at every intersection approach leg. Crossing Geneva Avenue occurs over two separate crossings: one each for the approach and departure lanes.
- The parking lot on the southwest corner includes two active vehicle access points: an uncontrolled access to the west (introducing uncontrolled conflicts with entering turning drivers) and an exit controlled by a flashing yellow indication (creating a conflict separated by signal control).
- Pedestrian crossings across Ocean Avenue are the longest crossing distances at the intersection: 85 feet on the west leg of the intersection at Frida Kahlo Way and 95 feet on the east leg at the Geneva Avenue approach.
- The corner radius for eastbound Ocean Avenue drivers turning right onto Geneva Avenue is relatively large, which promotes high-speed turns.
- Three-second leading pedestrian intervals are currently provided for pedestrians crossing Ocean Avenue at both the east and west crossing and for pedestrians crossing Geneva Avenue.
- The existing eastbound Ocean Avenue bus stop location (on the near side of the intersection) may obstruct drivers' view of pedestrians crossing Ocean Avenue and vice versa.

Near-Term Concept

The near-term concept offers a **minor improvement** with respect to pedestrian safety for the following reasons:

- Pedestrians crossing Ocean Avenue on the east leg of the intersection cross one fewer lane of vehicle traffic, given the conversion of the auxiliary through lane to a buffered bike lane. (The physical crossing distance is the same.)
- Crossing exposure is reduced for pedestrians crossing Geneva Avenue along the south side of Ocean Avenue, due to the reduction of a receiving vehicle lane and addition of a buffered bike lane. This realignment also reduces the effective corner radii for right-turning vehicles by narrowing the receiving roadway, inducing slower vehicle travel speeds.
- The concept extends the leading interval from three to four seconds for pedestrians crossing Ocean Avenue.

- The concept relocates the existing near side eastbound bus stop on Ocean Avenue to the far side of the intersection. Its location downstream from all pedestrian crossings will minimize obstructions to visibility between drivers and pedestrians.

Long-Term Concept

The long-term concept offers a **minor improvement** with respect to pedestrian safety for the following reasons:

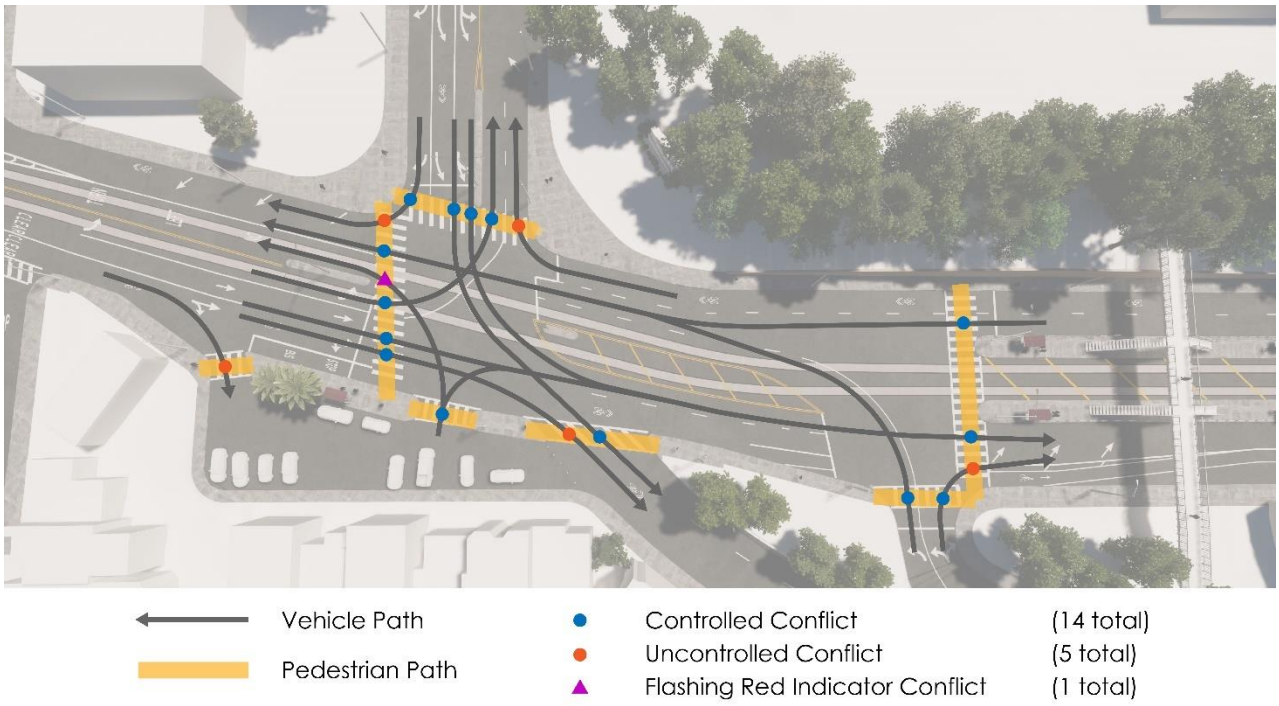
- As with the near-term concept, the long-term concept reduces the number of Ocean Avenue travel lanes pedestrians cross on the east leg of the intersection with the conversion from vehicle travel lane to buffered bike lane.
- As with the near-term concept, pedestrian exposure at Geneva Avenue on the south intersection leg is reduced with the reduction in vehicle travel lanes. This realignment also reduces the effective corner radii for right-turning vehicles by narrowing the receiving roadway, inducing slower vehicle travel speeds.
- The long-term concept closes the eastern parking access along Ocean Avenue, reducing conflict points between pedestrians and motor vehicles.
- The concept extends the leading pedestrian interval to four seconds for pedestrians crossing Ocean Avenue.
- This concept also relocates the existing near-side bus stop on Ocean Avenue and allows for the buses to stop in the center-running track lane with a bus stop in the median island.

Note the following other changes which may increase potential for conflicts between people walking and other modes or exposure for pedestrians:

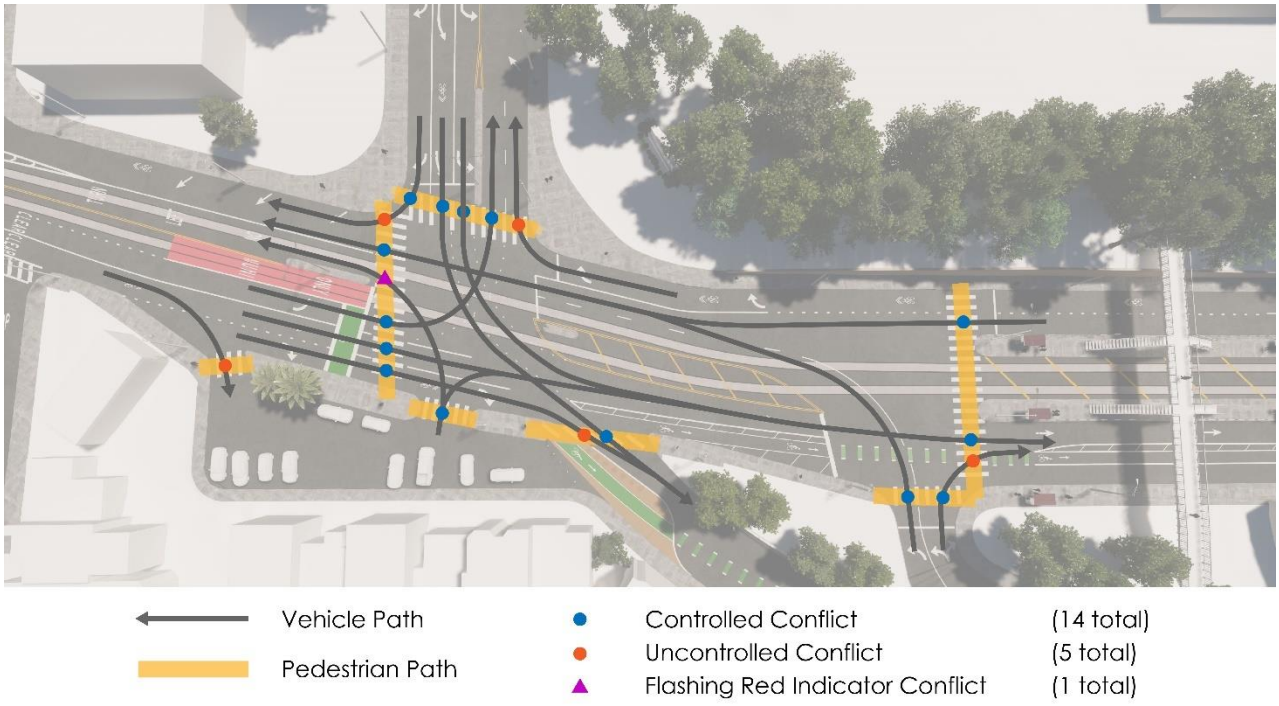
- The concept assumes removal of the pedestrian bridge, which would bring all pedestrian crossings over Ocean Avenue at street level and would increase pedestrian exposure and the number of potential at-grade pedestrian-vehicle conflicts.
- The long-term concept includes a 12-foot-wide shared-use path along the north side of Ocean Avenue, providing a buffer not currently offered between pedestrian paths and vehicle travel lanes and bringing people walking and biking into a shared space.
- The crosswalk on the west leg of the intersection increases by approximately 5 feet due to the addition of the eastbound pocket bike lane.

Figure 2: Pedestrian-Vehicle Conflict Point Comparison

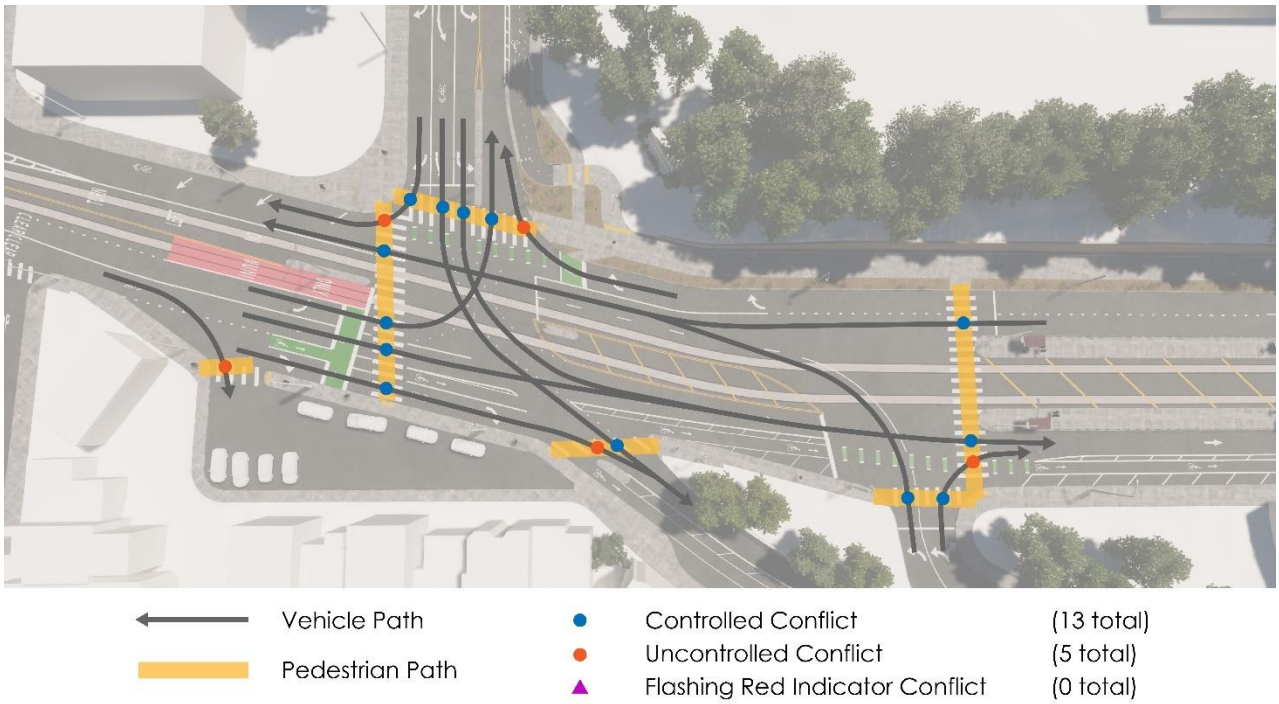
Existing Conditions



Near-Term Concept



Long-Term Concept



Bicyclist Safety

Bicyclist safety is evaluated by qualitatively comparing the number and type of conflict points between people biking and people driving, along with the degree of separation provided. A decrease in conflict points, or improved conditions where conflict points exist (e.g., increased visibility or reduced speeds) improves conditions for bicyclist safety.

Existing Conditions

Existing conditions related to bicyclist safety are as follows:

- People biking through the intersection share travel lanes with vehicles for most movements approaching and traveling through the intersection. The exception is traveling eastbound on Ocean Avenue: a buffered on-street bike lane (Class II) is developed on the intersection departure along Ocean Avenue between Geneva Avenue approach and departure lanes.
- Based on the collision history between 2015 and 2019, a pattern of eastbound "right-hook" collisions is present (in which a motorist turns right into the path of a same-direction bicyclist). People biking and continuing through the intersection share a lane with (and are positioned to the right of) right-turning motorists, who have a large turning radii which allows for high vehicle speeds.

Near-Term Concept

The near-term concept offers a **minor improvement** with respect to bicycle safety for the following reasons:

- The revised eastbound Ocean Avenue approach provides a dedicated right-turn lane rather than a shared right/through lane. In combination with the bike box, people biking are positioned to the *left* of right-turning drivers rather than to their right, mitigating "right-hook" conflict potential. The eastbound bike box allows people biking who arrive on a red signal phase to position themselves for a left turn onto Frida Kahlo Way.
- The addition of buffered bicycle lanes on eastbound Ocean Avenue (between Geneva Avenue approach and departure lanes) and on southbound Geneva Avenue provides separation from motor vehicles for people biking from motor vehicles. It also directs eastbound right-turning drivers to a single lane, constraining their paths and controlling speeds.

Long-Term concept

The long-term concept offers an **improvement** with respect to bicycle safety and enhances many of the improvements in the near-term concept. These include:

- As with the near-term concept, the revised eastbound Ocean Avenue approach provides a dedicated right-turn lane (rather than a shared right/through lane). In combination with the bike box, people biking are positioned to the *left* of right-turning drivers rather than to their right,

mitigating "right-hook" conflict potential. The eastbound bike box also allows people biking who arrive on a red signal phase to position themselves for a left turn onto Frida Kahlo Way.

- Sharrows at the eastbound approach to Frida Kahlo Way transition into a "pocket" bike lane and bike box at the stop bar, accommodated by shifting the curb line south and removing the existing access point to the parking lot. This provides more lateral space for people biking and removes one potential conflict point with motor vehicles.
- As with the near-term concept, the addition of buffered bike lanes on eastbound Ocean Avenue and southbound Geneva Avenue provides separation from motor vehicles for people biking.
- A two-way shared-use path along the north side of Ocean Avenue east of Frida Kahlo Way provides physical separation from vehicle traffic and reduces conflict potential. For people biking to continue westbound, a bicycle ramp leads to a bike box. An existing leading pedestrian interval could be leveraged to provide separation in time for people biking from motor vehicle movements, as well.

Driver Safety

Driver safety is evaluated by qualitatively comparing the number and type of conflict points and the operational (i.e., speed) effects of intersection geometrics. A decrease in conflict points, or improved conditions where conflict points exist (e.g., increased visibility or reduced speeds) improves conditions for driver safety.

Existing Conditions

The intersection collision data reviewed include five collisions over a five-year period with two westbound rear end collisions. Additionally, the eastbound right turn includes a large corner radius with potential for high speeds. Otherwise, no substantial vehicle safety needs were identified (conflicts with people walking or biking are discussed in separate sections).

Near-Term Concept

The near-term concept offers a **minor improvement** with respect to driver safety for the following reasons:

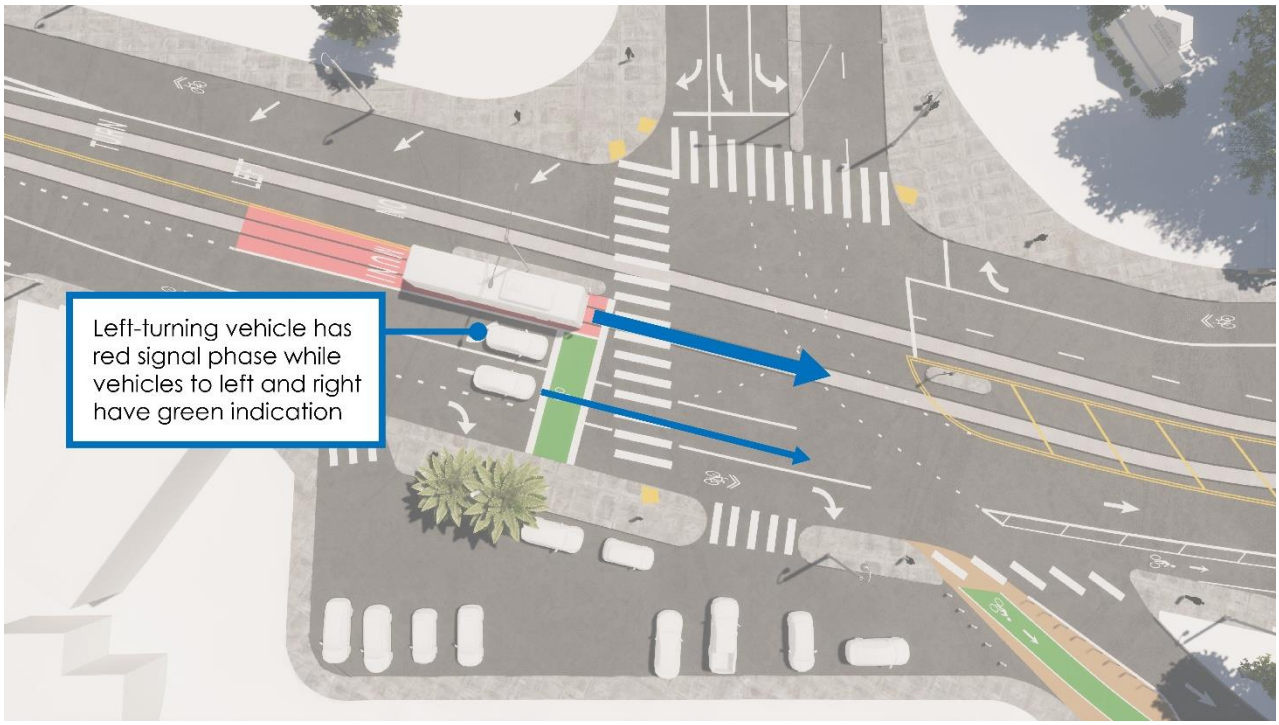
- It removes the auxiliary through lane on the eastbound Ocean Avenue intersection departure, formalizing the space and reducing merging conflicts.
- It eliminates one eastbound (Ocean Avenue) and one southbound (Geneva Avenue) through lane, reducing overall traveled way width and visually narrowing the traveled way.
- The overall reduction of travel way on Geneva Avenue (southbound) constrains vehicle paths for both southbound through drivers and eastbound right-turning drivers, likely resulting in reduced speeds.

Overall, the revisions provide more consistency and guidance for all roadway users, including additional lane striping providing positive guidance for left turns. The concept does decrease the overall amount

of general purpose traffic storage for through vehicles on eastbound Ocean Avenue with conversion of one lane to a Muni only lane. This will result in longer queues but does not otherwise create more conflict or impact vehicle speeds. (Vehicle queue lengths are discussed in a separate evaluation section below.)

With the changes proposed in the near-term concept, left-turning drivers will have a lagging left-turn phase. Through movements from transit vehicles to their left and general purpose traffic to their right will proceed while left-turn drivers have a red arrow signal indication (see Figure 3). If left-turning drivers take visual cues from surrounding drivers, they may be tempted to start turning left while the conflicting through transit vehicle movement proceeds. Signal head positioning or visibility modifications, including a "No Left Turn" blank-out sign, may be considered to reinforce driver expectations.

Figure 3: Left-Turning Drivers with Through Movements on Both Sides



Long-Term Concept

The long-term concept offers similar benefits to the near-term concept and provides a **minor improvement** with respect to driver safety for the following reasons:

- As with the near-term concept, it removes the auxiliary through lane on the eastbound Ocean Avenue intersection departure, formalizing the space and reducing merging conflicts.
- As with the near-term concept, it eliminates one eastbound (Ocean Avenue) and one southbound (Geneva Avenue) through lane, reducing overall traveled way width and potentially reducing travel speeds.
- As with the near-term concept, the overall reduction of travel way on Geneva Avenue (southbound) constrains vehicle paths for both southbound through drivers and eastbound right-turning drivers and will thus likely result in reduced speeds.
- The concept removes the auxiliary through lane on Frida Kahlo Way (northbound, intersection departure), formalizing the space and reducing merging conflicts.

Pedestrian Comfort and Access

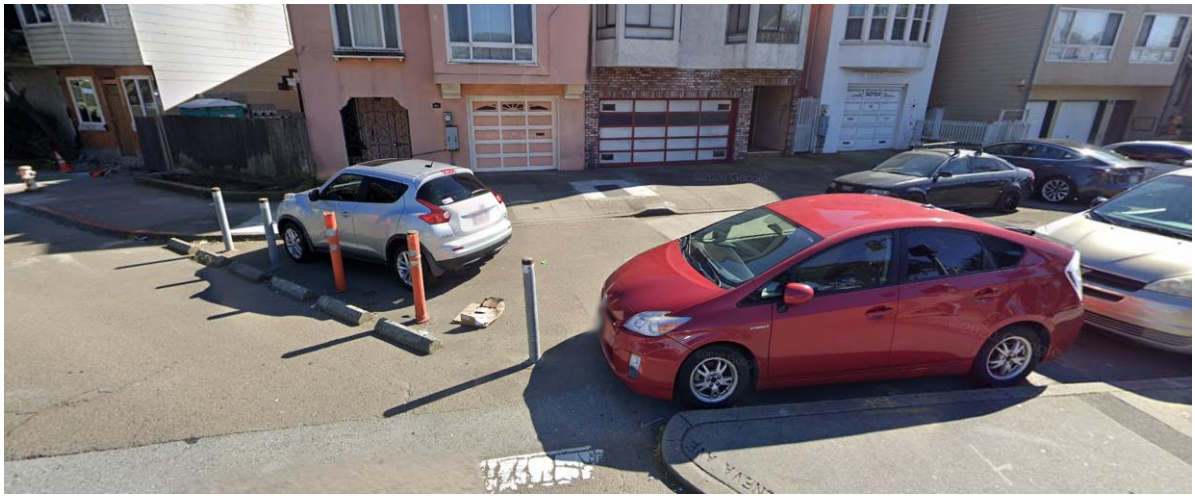
Pedestrian comfort and access are evaluated by qualitatively comparing the width, comfort, and connectivity of pedestrian paths, including route directness and access to transit.

Existing Conditions

The existing intersection generally provides sidewalks and connections, but the following elements impede comfort and connectivity for people walking:

- A driveway access along Geneva Avenue (in the southwest corner of the intersection) is blocked by bollards—which prevents vehicle access—but interrupts the sidewalk and can be blocked by parked cars (see Figure 4).
- The north side of Ocean Avenue east of Frida Kahlo Way includes a 6-foot-wide sidewalk with no buffer or separation from the vehicle travel lane. The clear path of travel is obstructed in several locations by power poles and other support poles.

Figure 4: Parking Driveway along Geneva Avenue, Southwest Corner of Intersection. The sidewalk is interrupted, no curb ramps are provided, and parking can obstruct a clear path of pedestrian travel.



Source: Google Earth

The pedestrian bridge on the east side of the intersection provides grade-separated access between Geneva Avenue and the CCSF campus, with stairwells providing access to the light rail stops in the middle of Ocean Avenue. The 2015 *Ocean and Geneva Corridor Design* Plan documented community support for removing the bridge due to "concerns around personal safety and the desire to redirect pedestrian activity to the street".[1] The Plan proposed three options: demolition, stair removal, or bridge upgrades (lighting and upgrading railing and stairs). Bridge upgrades would trigger accessibility improvements as the pedestrian bridge does not meet current accessibility standards. There is a slope of 8 percent on the southern span and there are stairs but no alternate means of access to the transit platforms.

Near-Term Concept

The near-term concept offers a **minor improvement** with respect to pedestrian comfort and access for the following reasons:

- The concept retains all existing sidewalks and pedestrian crossings and slightly reduces the pedestrian crossing distance of Ocean Avenue at the east leg of the intersection with NB Geneva Avenue and the crossing distance across the Geneva Avenue departure lanes along the south side of Ocean Avenue.

[1] The Plan is available online at https://default.sfplanning.org/plans-and-programs/in-your-neighborhood/ocean_ave_corridor/OceanAvenueCorridorDesignFinalReport.pdf. A detailed discussion of the three options for the Pedestrian Bridge are included on page 23.

- The relocated bus stop serving the 29 on Ocean Avenue provides a more direct connection to the CCSF campus.

Note the following change may decrease pedestrian comfort and access:

- The relocated bus stop is farther from commercial destinations on Ocean Avenue to the west. The closest stop to the west is at Lee Avenue, both around 500 feet from the existing stop location. The relocated bus stop will not serve the 91, which turns right onto Geneva Avenue. The closest stops serving that line are at Lee Avenue about 500 to the west and on Geneva Avenue about 700 feet southeast from the existing stop location.

Long-Term Concept

The long-term concept offers an **improvement** with respect to pedestrian comfort and access for the following reasons:

- As with the near-term concept, it retains all existing sidewalks and pedestrian crossings and slightly reduces the pedestrian crossing distance of Ocean Avenue at the east leg of the intersection.
- As with the near-term concept, the relocated bus stop serving the 29 on Ocean Avenue provides a more direct connection to the CCSF campus. In this concept it would be located in a median boarding island, with the 29 operating in the center-running lanes in addition to the KT. As a result, people accessing CCSF via Muni would only cross the vehicle lanes north of the center-running transitway when boarding and alighting from transit vehicles.
- It closes the eastern parking access on Ocean Avenue (in the southwest intersection corner), extending the sidewalk and providing a continuous sidewalk.
- It extends sidewalk across the parking access on Geneva Avenue to provide a continuous sidewalk and improves accessibility.
- It provides a wider path of travel on the north side of Ocean Avenue with the shared-use path. The path includes a buffer from vehicle traffic, improving pedestrian comfort and separation.

Note the following other changes which may decrease pedestrian comfort and access:

- The relocated bus stop is farther from commercial destinations on Ocean Avenue to the west. The closest stop to the west is at Lee Avenue, both around 500 feet from the existing stop location. The relocated bus stop will not serve the 91, which turns right onto Geneva Avenue. The closest stops serving that line are at Lee Avenue about 500 to the west and on Geneva Avenue about 700 feet southeast from the existing stop location.
- The reconstruction of the retaining wall to provide the multi-use path is assumed to trigger accessibility improvements or removal of the pedestrian bridge connecting Geneva Avenue to CCSF.

Bicyclist Comfort and Access

Bicyclist comfort and access describe the provision of facilities and connections provided for people biking to travel to and through the intersection. It is evaluated qualitatively by comparing the width, comfort, and connectivity of paths through the intersection, including route directness and separation.

Existing Conditions

The existing intersection provides full bicycle accessibility for all movements through the intersection except for a westbound left-turn, which is prohibited for motor vehicles as well. Access is provided primarily through shared use of vehicle lanes. Bicycle safety considerations are discussed in the *Bicyclist Safety* evaluation.

Near-Term Concept

The near-term concept offers a **minor improvement** with respect to bicycle access and connectivity by providing more dedicated bicycle facilities to improve movements and connections.

- The bike box provided on the eastbound Ocean Avenue approach allows people biking arriving on a red signal phase to position themselves adequately a turn or through movement.
- The buffered bicycle lane on Geneva Avenue provides people biking with a separated connection into a bicycle lane, separating their paths from those of right-turning drivers and providing dedicated space.

Long-Term Concept

The long-term concept offers an **improvement** with respect to bicycle access and connectivity, for the following reasons:

- As with the near-term concept, the bike box provided on the eastbound Ocean Avenue approach allows people biking who arrive on a red signal phase to position themselves adequately a turn or through movement. The long-term concept also provides a bicycle lane leading into and departing from the bike box to provide more dedicated lateral space for people biking.
- As with the near-term concept, the buffered bicycle lane on Geneva Avenue provides people biking with a separated connection into a bicycle lane, separating their paths from those of right-turning drivers and providing dedicated space.
- The concept also provides off-street connectivity between north-south Frida Kahlo Way travel and east-west Ocean Avenue travel with the provision of the separated bicycle lane and multi-use path.

Further details of the multi-use path connections will be developed in subsequent project development phases.

Vehicle Access, Connectivity, and Parking

Vehicle access and connectivity describes the routes and connections for motor vehicles to and through the intersection. It is evaluated qualitatively by comparing motor vehicle routes. The evaluation also includes parking supply affected by proposed changes.

Existing Conditions

All vehicle movements through the intersection are provided for, with the exception of westbound left turns, which are restricted. Notable features include:

- Eastbound left-turning drivers share a lane with the K/T Muni line, which proceeds straight. Both vehicle classes proceed on the same signal phase.
- Northbound left-turning and through movements from Geneva Avenue operate in two stages during separate signal phases, with northbound through drivers turning left onto Ocean Avenue and then right onto Frida Kahlo Way.

Near-Term Concept

The near-term concept has **little effect** on vehicle access and connectivity.

- It converts a southbound shared left/through lane into an exclusive left-turn lane.
- Eastbound on Ocean Avenue, it removes an auxiliary through lane which provides a nominal reduction in vehicle storage but does not affect vehicle access or connectivity.
- The concept does not affect access to, or the quantity of, parking within the southwest corner parking lot.

Long-Term Concept

The long-term concept has a **minor adverse effect** on vehicle access and connectivity.

- As with the near-term concept, it converts a southbound shared left/through lane into an exclusive left-turn lane.
- As with the near-term concept, it removes an eastbound auxiliary through lane on Ocean Avenue which provides a nominal reduction in vehicle storage but does not affect vehicle access or connectivity.
- The concept closes the eastern access point along Ocean Avenue to the southwest corner parking lot. Ingress and egress are provided from the remaining access point further west. This provides a marginal adverse effect on connectivity: drivers may currently exit the parking area during a flashing red signal phase that operates concurrently with the southbound Frida Kahlo Way approach and allows for travel in all directions. Drivers exiting the lot will no longer be able to exit traveling directly westbound.

- The overall quantity of parking in the southwest corner lot is reduced by about three or four spaces. The informal perpendicular parking in the eastern half of the lot and parking along the Geneva Avenue frontage (as previously depicted in Figure 4) would no longer be possible.

Vehicle Operations

The comparison of vehicle operations uses vehicle delay as quantified by level of service (LOS) based on the Highway Capacity Manual (HCM) definitions, included as Table 3 for reference.

Table 3: Level of Service Standards

Level of Service	Delay Per Vehicle (Seconds)	
	Signalized Intersection	Unsignalized Intersection
A	< 10.0	< 10.0
B	> 10.0 to 20.0	> 10.0 to 15.0
C	> 20.0 to 35.0	> 15.0 to 25.0
D	> 35.0 to 55.0	> 25.0 to 35.0
E	> 55.0 to 80.0	> 35.0 to 50.0
F	> 80.0	> 50.0

Source: Highway Capacity Manual

The HCM methodology assigns an LOS grade to an intersection based on the delay for vehicles at the intersection, ranging from LOS A to LOS F; LOS A signifies very slight delay with no approach phase fully utilized while LOS F signifies very high delays and congestion, frequent cycle failures, and long queues.

A comparison of the existing, near-term, and long-term concept LOS scores is provided in Table 4 and Table 5. Approaches that do not change across concept alternatives are not presented in these tables. The eastbound right and southbound left movements, where not provided, share a lane with the corresponding through movement. Synchro output sheets presenting these operations results are included in Appendix 5.

The following directional and temporal trends are relevant to intersection capacity and sensitivity of results:

- The eastbound approach serves more traffic and is closer to capacity in the AM peak hour than in the PM peak hour.
- The southbound approach serves more traffic and is closer to capacity in the PM peak hour than in the AM peak hour.

Table 4: Operations Analysis Results (Delay (seconds/vehicle) and Level of Service)

		Delay (Level of Service)								
Period	Scenario	EBL	EBT	EBR	EB Approach	SBL	SBT	SBR	SB Approach	Intersection Total
AM	Existing	78.2 (E)	21.2 (C)	-[1]	30.6 (C)	-[1]	20.2 (C)	43.9 (D)	25.8 (C)	41.0 (D)
	Near-Term	66.7 (E)	31.5 (C)	29.9 (C)	36.9 (D)	18.7 (B)	23.2 (C)	38.7 (D)	26.2 (C)	36.4 (D)
	Long-Term	66.7 (E)	31.5 (C)	29.9 (C)	36.9 (D)	18.7 (B)	23.2 (C)	38.7 (D)	26.2 (C)	36.4 (D)
PM	Existing	63.8 (E)	8.8 (A)	-[1]	15.6 (B)	-[1]	30.7 (C)	53.8 (D)	36.6 (D)	30.8 (C)
	Near-Term	44.2 (D)	14.8 (B)	16.5 (B)	18.9 (B)	27.8 (C)	34.0 (C)	51.5 (D)	37.2 (D)	27.3 (C)
	Long-Term	44.2 (D)	14.8 (B)	16.5 (B)	18.9 (B)	27.8 (C)	34.0 (C)	51.5 (D)	37.2 (D)	27.3 (C)

[1]This movement shares a lane with the accompanying through movement in existing conditions and does not have independent vehicle delay numbers.
Note: Delay is presented in seconds per vehicle. EB = eastbound, SB = southbound, EBL = eastbound left, EBT = eastbound through, EBR = eastbound right, SBL = southbound left, SBT = southbound through, SBR = southbound right

Table 5: Operations Analysis Results (Volume to Capacity Ratios)

		Volume to Capacity Ratio						
Period	Scenario	EBL	EBT	EBR	SBL	SBT	SBR	Intersection
AM	Existing	0.86	0.67	-	-	0.33	0.08	0.60
	Near-Term	0.86	0.86	0.71	0.13	0.50	0.08	0.73
	Long-Term	0.86	0.86	0.71	0.13	0.50	0.08	0.73
PM	Existing	0.68	0.58	-	-	0.39	0.11	0.55
	Near-Term	0.68	0.72	0.65	0.21	0.53	0.11	0.66
	Long-Term	0.68	0.72	0.65	0.21	0.53	0.11	0.66

Note: EBL = eastbound left, EBT = eastbound through, EBR = eastbound right, SBL = southbound left, SBT = southbound through, SBR = southbound right

Existing Conditions

The intersection has an overall volume-to-capacity ratio of 0.6 in the AM peak hour and 0.55 in the PM peak hour. The most saturated movement is the eastbound left turn, with a ratio of 0.86 in the AM peak hour.

The westbound Ocean Avenue shared through/right turn lane was coded for operations analysis as a right-turn only lane. It was observed based on turning movement counts and usage patterns to function as a right-turn only lane. Thus, although the concepts show a striping change, the analysis results indicate no change in westbound right-turn operational characteristics and results.

Near-Term Concept

Overall, the near-term concept has **little effect** on vehicle operations. The eastbound and southbound approaches are affected, but northbound and westbound approaches are unaffected by the concept changes.

- Overall average intersection delay is decreased in both the AM and PM peak hours, by about 5 seconds and 4 seconds, respectively.
- In the AM peak hour, overall eastbound approach average delay increases from an average of 31 seconds to 37 seconds.
  - Average eastbound left-turning movement delay is reduced with the near-term concept. As shown in Table 5, the volume-to-capacity ratio for this movement does not change, but delay is estimated to decrease slightly because of the change in phase sequencing (the switch to a lagging left-turn phase)[2].
  - Average eastbound through and right-turning delay is increased by about 50 percent with the near-term concept, from 21 seconds to 32 seconds. The volume-to-capacity ratio for the through movement increases to 0.86 in the AM peak hour and to 0.72 in the PM peak hour, still below capacity.
- The southbound approach shows a minor increase in overall average vehicle delay (<1 second) in the AM and PM peak hours.
  - In both peak hours, the southbound through movement shows modest increases in average delay, and the southbound right-turning movement shows modest increases in average delay.

[2] The Synchro analysis assumes that with a lagging left-turn phase more drivers would arrive during a green signal, thereby reducing delay for left-turning drivers.

Long-Term Concept

Overall, the long-term concept has **little effect** on vehicle operations. The operations results are identical to those of the near-term concept.

Vehicle Queue Lengths

Queue lengths help to evaluate potential vehicle operations regarding access to turn lanes and driveways. Queue analysis supplements the operations and delay results. A comparison of the existing, near-term, and long-term concept queue lengths is provided in Table 6. Because Synchro does not provide queuing results for its implementation of HCM methodologies, this report utilizes Synchro's methodology to calculate queuing.

Table 6: Operations Analysis Results (Queueing)

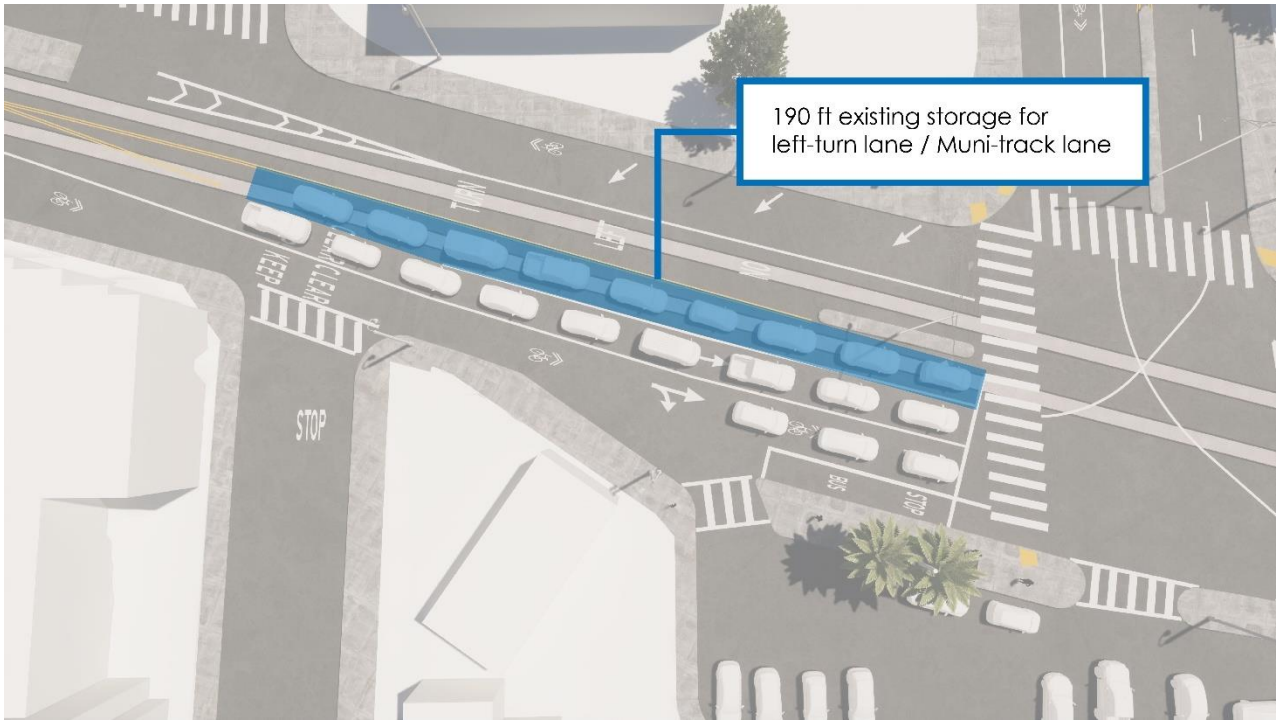
Scenario	Queue Length (feet)											
	EBL		EBT		EBR		SBL		SBT		SBR	
	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th	50th	95th
AM												
Existing	124	243*	142	251	-	-	-	-	56	100	0	15
Near-Term	109	231*	288	563*	115	201*	19	**46**	90	166	0	15
Long-Term	109	231*	288	563*	115	201*	19	**46**	90	166	0	15
PM												
Existing	69	**159***	35	124	-	-	-	-	99	148	14	54
Near-Term	62	**150***	133	308	73	189	42	87	140	225	14	56
Long-Term	62	**150***	133	308	73	189	42	87	140	225	14	56

Note: EB = eastbound, SB = southbound, EBL = eastbound left, EBT = eastbound through, EBR = eastbound right, SBL = southbound left, SBT = southbound through, SBR = southbound right.
* 95th percentile volume exceeds capacity, queue may be longer
Bold text indicates that volume is metered by upstream signal

Existing Conditions

Operations analysis of intersection existing conditions show median (50th percentile) queue lengths to be within existing storage length for all approaches. The 95th percentile queue lengths on the eastbound approach are shown to exceed left-turn lane/Muni track lane storage. The storage in the existing left-turn/track lane (and to access the lane) is shown in Figure 5. The 95th percentile queues exceed the storage by about 50 feet or 2 vehicles in the AM peak period. The analysis shows that the 95th percentile queue length would be approximately 160 feet during the PM peak period (within the storage length) and is metered by the upstream signal, so in actuality the queue may be longer.

Figure 5: Left-turn/Muni Track Lane Storage and Access in Existing Conditions (Left-Turn Lane is Converted to Exclusive Muni Lane in Near-Term and Long-Term Concept)



Near-Term Concept

The queue reports show queue lengths generally increasing for eastbound through and right-turn movements. The 95th percentile queues reflect an increase in variability. Access to the eastbound transit lane is provided for approximately 190 feet in advance of the stop bar, even with the storage length available in the turn lane (as depicted in Figure 5). As shown in Table 6, the 95th percentile queue lengths for eastbound left turning vehicles for both the near-term and long-term concepts during the AM and PM peak periods are 231 feet and 150 feet, respectively. Thus, in the AM peak period, queues may obstruct access to the proposed transit lane about five percent of the time. In the PM peak period, queues are metered by the upstream signal so may in actuality the queue may be longer.

Overall, the near-term concept has a **minor adverse effect** on vehicle queueing.

Long-Term Concept

Overall, the long-term concept has a **minor adverse effect** on vehicle queuing. The queueing results are identical to those of the near-term concept.

Transit Speed and Reliability

Transit speed and reliability is addressed qualitatively. The Ocean Avenue corridor operates with transit signal priority which is not captured by the operations modeling for this project.

Existing Conditions

In existing conditions, transit operations are generally captured by the operations results presented in the *Vehicle Operations* and *Vehicle Queue Lengths* sections and in Table 4, Table 5, and Table 6. Transit operations inefficiencies *not* captured by the operations modeling, and affected by proposed changes, include:

- The 29 bus traveling eastbound on Ocean Avenue has a nearside stop at the curb, to the right of right-turning drivers. After serving boarding/alighting passenger events, the line incurs reentry delay as operators look for gaps to merge and continue along Ocean Avenue.
- The eastbound KT line shares a lane with left-turning motor vehicles served by a dedicated protected left-turn phase. Thus, when the KT approaches a red signal phase or is not served by the leading left-turn phase, it can subsequently only proceed with the next left-turn signal indication rather than during the adjacent through signal phase.

Near-Term Concept

The near-term concept provides an **improvement** in transit speed and reliability. Note the following details about how transit would operate in the near-term concept:

- The dedicated center-running lane on the eastbound Ocean Avenue approach gives bus operators (line 29) the option to approach in the dedicated Muni lane and use a 4-second leading transit interval, or to use the general purpose lane during off-peak periods when they will be at the front of a queue or approach during a green phase. If 29 operators choose to use the center-running transit lane, they can use the leading interval to merge back into the general purpose lane ahead of adjacent traffic.
- The signal timing would be changed from a leading left-turn phase to a lagging left-turn phase to accommodate a leading transit interval for through movements.

Benefits include:

- The relocated bus stop on Ocean Avenue (from the near side to the far side of Geneva Avenue) 29 eliminates the nearside reentry delay discussed in existing conditions.
- The dedicated eastbound transit lane allows the KT to be served during the eastbound through signal phase, which provides more green time compared to the eastbound left-turn phase serving the KT in existing conditions.

As presented in Table 6, the dedicated Muni lane may be obstructed in the peak 5 percent of cases during the AM peak period. This condition is no worse than existing queueing with respect to access to the center-running track lane (for the KT) and the 29/91 bus stop at the stop bar on the curb). In the remaining majority of cases, the center-running lane is still accessible and provides additional benefit. The proposed changes give bus operators flexibility depending on the circumstance: the general purpose lanes or center-running lane may be preferable depending on signal phase and/or position in a platoon of vehicles on intersection approach.

Long-Term Concept

The long-term concept provides an **improvement** in transit speed and reliability. All of the changes and benefits described in the near-term concept apply to the long-term concept, with a few additions and modifications:

- The center-running transit/track lanes would be widened to allow for Muni buses to use them in both travel directions.
- The relocated eastbound Ocean Avenue bus stop are located in the center-running track lane. This would allow the 29 bus to proceed from the dedicated Muni lane on intersection approach and through the center-running track lanes.
- Buses traveling eastbound in the center-running trackway would not incur any travel delay farther to the east approaching I-280 given their use of the exclusive traveled way.

As with the near-term concept, the dedicated Muni lane may be obstructed in the peak 5 percent of cases during the AM peak period. The proposed changes give bus operators flexibility depending on the circumstance: the general purpose lanes or center-running lane may be preferable depending on signal phase and/or position in a platoon of vehicles on intersection approach.

COST ESTIMATES

The concepts were assessed for constructability and related cost estimates.

Constructability

Concept 1 – Near-Term Concept

No constructability issues are present with the near-term concept. This alternative is comprised of striping work including colored Muni and bike lanes, a bike lane with safe-hit delineators on southbound Geneva Avenue, other lane bike lane striping, and the relocation of a bus stop and shelter. (See Concept 1 on page 7). There is no curb, gutter, or major paving work proposed. Additional design and evaluation will be required to assess if the bus stop and shelter will fit, or if any grading or utility challenges exist. However, no major issues are expected. The conceptual level costs are presented on page 33. Costs will vary based on subsequent design and evaluation.

Concept 2 – Long-Term Concept

The proposed scope is extensive and may be disruptive to normal traffic unless staged properly. Costs are difficult to specify at this level of design but would be expected to be higher than presented once added design, topography and utility investigation is performed. Costs associated with removal of the existing pedestrian bridge and numerous other items are included as placeholders with sources identified in the notes. The conceptual level costs are presented on page 34.

See Concept 2 on page 10 for scope definition. The scope of work is summarized as follows:

- The existing pedestrian overpass will be removed.
- One of the two raised Muni platforms will be removed and replaced.
- The south track (east bound) shifted about 5’ requiring about 400 linear feet (LF) of track removal and replacement.
- Additionally, the proposed bike and pedestrian shared-use path, adjacent to City College of San Francisco property (CCSF), is a 12-14’ wide separated sidewalk requiring the removal and replacement of an existing about 8’ high maximum retaining wall.
- The proposed wall is shifted about 12’+/- horizontally into a hillside, will be about 3-15’ high and will be about 400’ long.
- Concept 2 also includes a new sidewalk at the Ocean Avenue and Geneva Intersection (southwest corner) as well as significant improvements at Ocean Avenue on to Frida Kahlo Way (northeast corner, CCSF Frontage).
- The entire paved area of this project will be grinded and have a 2” overlay. Note the approximate paving limit shown in Figure 6 (page 36).
- Estimated costs exclude bus substitution during construction and Overhead Contact System revision.

Conceptual Level Costs

The conceptual level costs are presented on the next two pages. The major uncertainties to cost and constructability are underground utilities, removal of the pedestrian bridge, retaining wall details, movement of tracks, and associated costs and scope of replacing the Muni Platform. Wall heights and the proposed bike and pedestrian shared-use path constraints are unknown at this time due to the lack of design data and topography. Constructability will be hindered by underground utilities and the overhead conductors for Muni. No constructability fatal flaws appear to be present but costs may increase significantly with further investigations and design.

EXHIBIT 2
ENGINEERING COST ESTIMATE
OCEAN AVENUE SAFETY STUDY
CONCEPT 1 - NEAR-TERM CONCEPT

NUMBER	MAJOR ELEMENTS	ITEM	UNITS	QUANTITY	UNIT COST	TOTALS
CONSTRUCTION COSTS						
G	GENERAL-CONCEPT SPECIFIC					
		Signal Timing (Muni Lane)	LS	1	$12,500	$12,500
		Traffic Routing	LS	1	$15,000	$15,000
		Minor AC Grinding	LS	1	$12,500	$12,500
1	Exclusive Muni Lane					
		Signal Head (Allowance)	LS	1	$8,500	$8,500
		Special Colored Paint	SF	1400	$25	$35,000
		Striping	LF	500	$10	$5,000
		Lettering/Symbols/Arrows	LS	8	$400	$3,200
2	Revised Lanes (3 locations)					
		Striping	LF	600	$10	$6,000
		Lettering/Symbols/Arrows	LS	5	$400	$2,000
3	Remove Existing 29 & 91 Bus Stop Shelter					
		Relocate Shelter and Signage	LS	1	$2,500	$2,500
		Demo utilities in place	LS	1	$2,000	$2,000
4	Delineators- Bike Lane/Right Turning					
		Special Colored Paint	SF	1400	$25	$35,000
		Striping	LF	550	$10	$5,500
		Lettering/Symbols/Arrows	LS	7	$400	$2,800
		Delineators/Safe-Hit Posts	LS	10	$250	$2,500
5	Replace Auxiliary Lane with Buffered Bike Lane					
		Striping	LF	750	$10	$7,500
		Lettering/Symbols/Arrows	LS	8	$400	$3,200
		Special Colored Paint	SF	120	$25	$3,000
6	Relocated 29 Bus Stop Shelter					
		Place Shelter and Signage	LS	1	$3,500	$3,500
		New utilities	LS	1	$4,500	$4,500
					SUBTOTAL CONSTRUCTION COST	$171,700
DESIGN AND CONSTRUCTION COSTS						
Topographic Survey (allowance)						$5,000
Design Contingency (5%)						$8,585
Mobilization (5%)						$8,585
Traffic Control (10%)						$17,170
Design and Engineering (10%)						$17,170
Construction Support (10%)						$17,170
					SUBTOTAL DESIGN AND CONSTRUCTION COST	$73,680
					SUBTOTAL COST	$245,000
					20% PROJECT CONTINGENCY	$49,000
					TOTAL ESTIMATED COST	$294,000

NOTES/ASSUMPTIONS/LIMITATIONS

See Concept Plan View for Major Element definitions.
These are conceptual-level engineering cost estimates for feasibility evaluations only.
Unit costs are based on Caltrans and other historical engineering construction cost.
No civil design, construction documents, detailed Topographic survey nor utility investigation has been completed. Those costs are roughly provided but can not be determined with certainty at this time.
Utility work is not expected for Concept 1.
No curb, gutter, retaining walls nor street work is included in this estimated.
Striping includes removal and replacement. Lettering/Symbols/Arrows at 20sf/unit*$20/sf for Methacrylate Spray Material.
Striping unit costs are interpreted from MTA provided spreadsheets.
Reuse the existing Bus Shelter.

LEGEND

LS	lump sum
SF	square feet
LF	linear feet
AB	Aggregate Base
AC	Asphalt Concrete

EXHIBIT 2
ENGINEERING COST ESTIMATE
OCEAN AVENUE SAFETY STUDY
CONCEPT 2 - LONG -TERM CONCEPT

NUMBER	MAJOR ELEMENTS	ITEM	UNITS	QUANTITY	UNIT COST	TOTALS
CONSTRUCTION COSTS						
G	GENERAL-CONCEPT SPECIFIC					
		Signal Timing	LS	1	$35,000	$35,000
		Traffic Routing	LS	1	$45,000	$45,000
		ADA Curb Ramps**	LS	7	$20,000	$140,000
		Paving Reconstruction under Tracks (2' AB+1'AC)	SF	5100	$15	$76,500
		Repaving - 2" Grind and Overlay Entire Limit	SF	55700	$5	$278,500
1-4	Widen Access/Remove (E)Bus Stop/Remove Driveway/Mountable Island					
		(N) Curb & Gutter	LF	450	$50	$22,500
		(N) Sidewalk (4'-8' Custom)	SF	1400	$10	$14,000
		Striping	LF	1100	$10	$11,000
		Lettering/Symbols/Arrows	LS	12	$400	$4,800
5	Reconstruct Median Island Raised MUNI Platform /Remove and Replace/Reuse Shelters					
		3' High Platform Demo and Construction (2100 sf)	LS	1	$125,000	$125,000
		Striping	LF	450	$10	$4,500
		Lettering/Symbols/Arrows	LS	5	$400	$2,000
		Railing Salvage/Replacement**	LS	1	$50,000	$50,000
		Replace Street Lights**	LS	1	$75,000	$75,000
		New Low/High Acessible LRV Ramp**	LS	1	$50,000	$50,000
6	Remove Pedestrian Bridge (allowance)					
			LS	1	$2,000,000	$2,000,000
7	Adjust/Shift Muni Track					
		Adjust Muni Track/Overhead Catenary System**	LS	1	$500,000	$500,000
8-9	12' Shared Use Path, 6' Planter, Net 20' wide Curb to Face of wall + New Retaining Walls & Remove Sharrows					
		(N) Curb & Gutter	LF	400	$50	$20,000
		14' Wide Sidewalk	SF	7200	$10	$72,000
		Retaining Walls <10' High	LF	250	$700	$175,000
		Retaining Walls >10' High, 15'+/-Max	LF	170	$1,600	$272,000
		Striping	LF	350	$10	$3,500
		Lettering/Symbols/Arrows	LS	3	$400	$1,200
		Landscape Demo And Offhaul**	LS	1	$15,000	$15,000
		Landscaping (Allowance)**	LS	1	$30,000	$30,000
		Utility Adjustments (Allowance)**	LS	1	$500,000	$500,000
10-12	Bike Ramp to Frida Kahlo, Sidewalk and Separated Bike Lane					
		(N) Curb & Gutter Construction	LF	120	$50	$6,000
		(N) Sidewalk Construction	SF	1800	$10	$18,000
		(N) Driveway Approach	LS	1	$12,500	$12,500
		AC Bike Paving	SF	1400	$8	$11,200
13	Revised Lanes (3 locations)					
		Special Colored Paint	SF	420	$25	$10,500
		Striping	LF	150	$10	$1,500
		Lettering/Symbols/Arrows	LS	5	$400	$2,000
					SUBTOTAL CONSTRUCTION COST	$4,584,200
DESIGN AND CONSTRUCTION COSTS						
Topographic Survey including utility investigation (allowance)						$75,000
Design Contingency (15%)						$687,630
Mobilization (5%)						$229,210
Traffic Control (5%)						$229,210
Design and Engineering, Geotech Report and Structural Design (15%)						$687,630
Construction Support (20%)**						$916,840
Bus Substitution (Allowance)**						$500,000
					SUBTOTAL DESIGN AND CONSTRUCTION COST	$3,325,520
					SUBTOTAL COST	$7,910,000
					40% CONTINGENCY	$3,164,000
					TOTAL ESTIMATED COST	$11,074,000

NOTES/ASSUMPTIONS/LIMITATIONS

See Concept Plan View for Major Element definitions.
These are conceptual-level engineering cost estimates for feasibility evaluations only.
Unit costs are based on Caltrans and other historical engineering construction cost.
** Placeholder estimate by SFMTA. All costs in 2020/2021 Dollars.
Pedestrian bridge removal estimate is from MTA's Preliminary Cost Estimate dated 5/25/2016 with a multiplier of 2.
No civil design, construction documents, detailed Topographic survey nor utility investigation has been completed.
Retaining wall installation costs include soil cut and disposal. Assume no hazardous waste is present.
No Street Lighting nor Bike Signalization work is included in this estimated.
Track Relocation subbase costs is included in the 3' thick paving reconstruction in general item noted above.
Striping includes removal and replacement. Lettering/Symbols/Arrows at 20sf/unit*$20/sf for Methacrylate Spray Material.
Striping unit costs are interpreted from MTA provided spreadsheets.

LEGEND

LS	lump sum
SF	square feet
LF	linear feet
AB	Aggregate Base
AC	Asphalt Concrete
OCS	Overhead Catenary System

Assumptions and Limitations

The concept scopes are developed by the project team as presented in previous sections of this report and renderings of conceptual horizontal layouts. These are conceptual-level studies solely for feasibility evaluations.

No construction documents, nor detailed topography, nor utility investigations are available. No fit test has been conducted for new horizontal layout and no vertical information is known nor provided. There is no horizontal nor vertical control for these concepts.

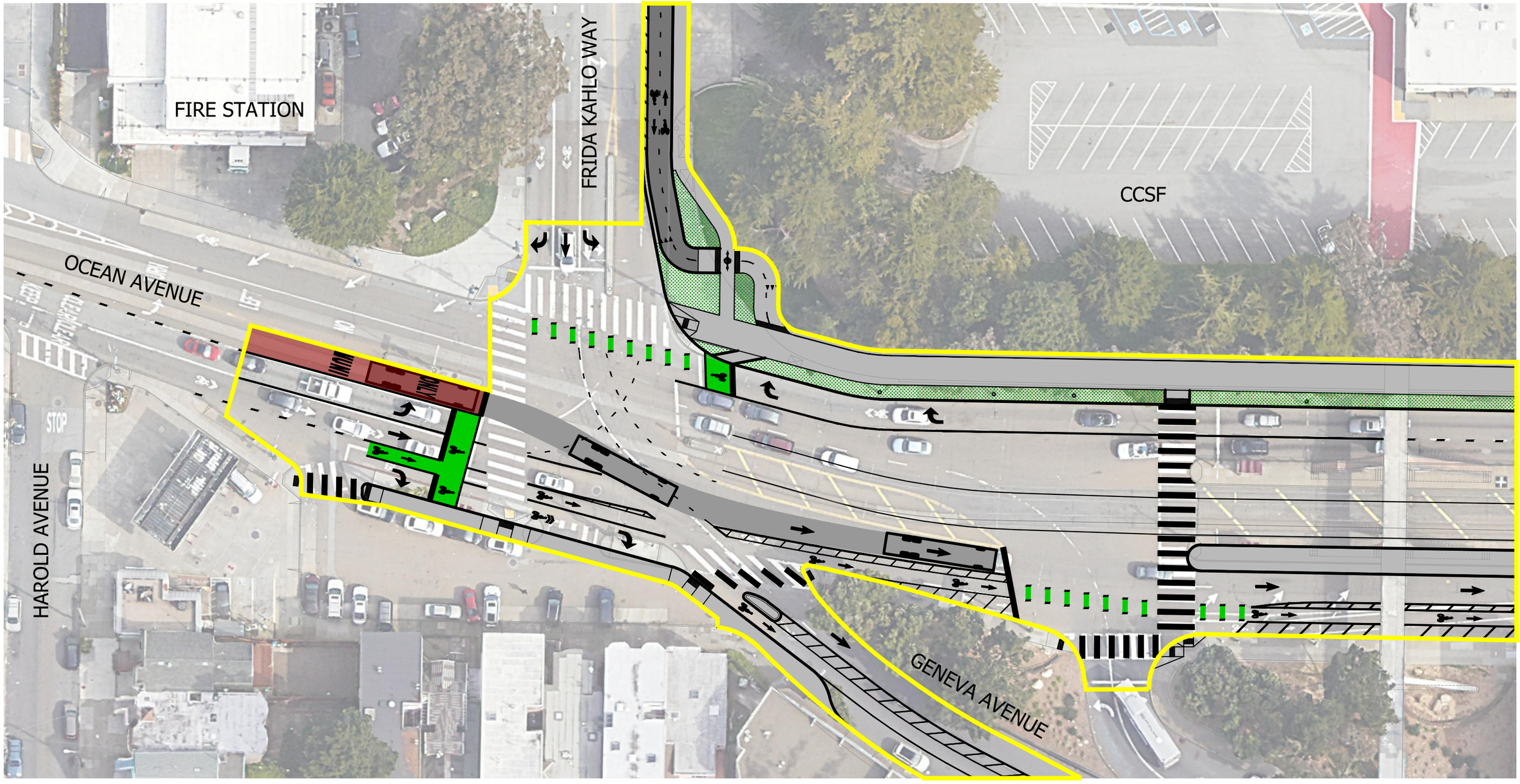
Costs for these concepts are based on Caltrans bid information, other historical engineering costs, and previous cost estimates by SFMTA dated May 25, 2016. Several items are presented as placeholder estimates provided by SFMTA. A 20 to 40 percent contingency is applied based on complexity and unknowns for each option but should not be relied upon without additional studies and design. Additional assumptions and limitations are detailed in the estimates on the subsequent pages.

Conceptual layout is provided based on unreconciled aerial imagery with very limited topographic information and field observations. Striping cost for lines, colored paint, arrows, and text were extrapolated from SFMTA-provided spreadsheets.

Assumed repaving limits are presented in Figure 6 on the next page.

Figure 6 - Assumed Repaving Limits

Preliminary Design Subject to Change
Date: March 2021



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PROPOSED NEXT STEPS

The work conducted on this project and presented in this memorandum provides the SFMTA with planning level concept designs and initial steps toward implementation of both the near- and long-term concepts. This section outlines the additional planning and project development work and considerations to achieve successful implementation of either/both the near- and long-term concepts. This section identifies activities for project development needs generally; details may vary according to SFMTA process (e.g., makeup of a project development team) and external factors (e.g., funding sources).

Planning and project initiation are essential first steps in the project development process. These steps include assembling a project development team of stakeholders, developing project objectives and preliminary scopes, and feasibility planning. This memo details activities that constitute most if not all of the planning phase. One remaining key aspect of the planning phase is engaging community and stakeholders, which has been done prior to this contract and is discussed below.

A common project initiation step is to develop a project work plan, which identifies required activities and approvals, along with a timeline and cost estimate for steps along the way to project implementation. This section provides the initial information and subsequent steps to develop a project work plan. These next steps include:

- Stakeholder Coordination
- Community Engagement
- Engineering Studies
- Refine Project Scopes
- Environmental Studies
- Final Design and PS&E
- Construction

Key Stakeholder Coordination

For both concepts the project team would benefit from engaging relevant stakeholders. Relevant stakeholders include:

- **Other SFMTA divisions and departments.** This project engaged other SFMTA representatives for review and comment of preliminary concepts, especially including potential Muni changes. Their input and approval will likely be necessary throughout the project development.
- **CCSF.** The long-term concept presumes the development of transportation facilities on CCSF property, reconstruction of the retaining wall fronting the campus, and some level of impact to the campus driveway along Frida Kahlo Way. Their involvement would be key to refine the project scope and to provide relevant information required for technical analysis and studies.
- **The Balboa Reservoir project team.** The Balboa Reservoir project's approval identified a contribution to infrastructure improvements at this intersection as a mitigation measure. The

project also proposes multi-use development in proximity to the intersection and includes changes to existing circulation to and from Ocean Avenue and Frida Kahlo Way.

- **District 7 Board of Supervisor staff.** Presenting the scope of and rationale for improvements to the district Supervisor and staff, along with community feedback, will help garner long-term support for the project's implementation.

Community Engagement

Identify the level, timing, and type of community engagement desirable and required for the project. Community engagement can accomplish the following:

- Update community members on project progress since the 2015 *Ocean and Geneva Corridor Design Plan*.
- Provide an opportunity for feedback on project goals and the proposed concepts.
- Identify community champions to advocate and build momentum for proposed improvements.
- Help the project team refine the scope of proposed concepts based on feedback.

The annotated plan view, isometric, and cross-section renderings included in this memo were prepared for easy adaptation for sharing with the public.

Engineering Studies

This memorandum and the conceptual level cost estimates have already identified relevant engineering studies necessary to assess constructability and cost the long-term concept. The community engagement and stakeholder coordination can clarify the relative support and willingness to partner on these project components, respectively. These include:

- **Removal of the pedestrian bridge.** The long-term concept identified in this project presents the minimum desired multi-use path on the north side of Ocean Avenue and is presumed to impact the pedestrian bridge, requiring its removal. The PDT may ultimately determine a different improvement on the north side of Ocean Avenue. A follow-up engineering study would identify:
  - The constraint that determines impact to the pedestrian bridge
  - A project scope, cost, and timeline for pedestrian bridge removal
  - Any necessary permitting or coordination for such a project

- **Muni track realignment.** The Muni track realignment provides key benefits of the long-term concept. A follow-up detailed engineering study would:
  - Refine details of track alignment to meet the desired outcome presented in the long-term concept
  - Determine the feasibility of track realignment, including the phasing and staging of work and impacts to Muni service
  - Develop a project scope, cost, and timeline for track realignment

Refine Project Scopes

The concepts produced with this project are planning-level and were developed as conceptual horizontal layouts without right-of-way maps, utility location information, or detailed topography. The project scopes are conceptual. The steps listed above will inform any project scope or design changes that may be appropriate based on community support or more detailed feasibility information.

For the near-term concept, the project scope may be refined based on the information assembled and provided in this project. However, for the long-term concept, further information and analysis will be required, especially with respect to the following uncertainties:

- Bicycle and vehicle circulation in the southwest corner of the intersection
- Underground utility locations
- Removal of the pedestrian bridge
- Track realignment, Muni platform replacement, and overhead wire impacts
- Relocation and reconstruction of retaining wall
- Connection to facilities outside limits of work (e.g., continuation of bicycle lanes along Frida Kahlo Way or Geneva Avenue)

The project team would then produce documentation to include:

- The project scope, including any changes to the concepts presented here
- Consistency between SFMTA goals and the proposed project scopes
- Phasing of improvements
- Identifying stakeholders and managing and documenting engagement and coordination
- Alternatives, if necessary: Some concept alternatives considered and rejected are included in Appendix 7 of this memo. For the long-term concept, alternatives may include different circulation alternatives at the southwest corner, possibly including parcel acquisition, and may also include connection outside of this project's scope of work limits. These were not explored in detail in this project.

The project would then proceed to engineering and environmental studies in order to refine project cost and schedule estimates. It is possible no engineering or environmental studies are necessary for the short-term concept. In fact, elements of the near-term concept may be scoped as a quick-build project using light-weight materials installed by city crews.[3] thus, the project manager can determine how best to manage parallel project development tracks where more activity will be required to progress the long-term concept.

[3] The improvements on the southeast corner of the intersection and restriping work can be done by these quick-build crews. The lane reassignments may require new signal hardware to display the correct signal indications.

Environmental Studies

Once the project scope is refined and the engineering constraints and needs are identified, environmental clearance may be necessary. The project will need to be presented to the Planning Department to develop a project description and determine the necessary level of environmental review. For the short-term alternative, little to no environmental study may be required. For the long-term activity, an initial study may be required and, depending on the scope of potential environmental impacts, the need for further environmental review may be identified.

Final Design and PS&E

With the project scope defined and environmental clearance, the project would advance to Plans, Specifications, and Estimate (PS&E) phases. Benchmarks may be established for certain levels of completion (e.g., 60% PS&E, 90% PS&E). The project will be refined with design surveys and mapping as well as additional technical design needs. This stage will result in final design plans that allow for a contract to bid and build the project, including a refinement of cost estimates and any specifications for the work.

Construction

With final design plans, SFMTA can put construction of the long-term concept out for bid.

Appendix 1 Existing Conditions Figures: Multimodal Turning Movement Volumes and Transit Service

Appendix 2 Concept Plan View Renderings

Appendix 3 Concept Isometric Renderings

Appendix 4 Concept Cross-Section Renderings

Appendix 5 Operations Analysis Results

Appendix 6 Turn Template Analysis

Appendix 7 Concept Development

Appendix 8 July 10, 2020 Meeting to Define Alternatives