



MEMORANDUM

Public Works Department

DATE: August 26, 2020

TO: Bicycle/Pedestrian Advisory Committee

FROM: Aruna Bodduna, Transportation Planner
Ria Hutabarat Lo, Transportation Manager

SUBJECT: Castro Street Bikeway Feasibility Study

RECOMMENDATION

Receive and review the draft Castro Street Bikeway Feasibility Study and provide feedback on the alternatives presented in the report.

BACKGROUND

The Castro Street Bikeway Feasibility Study was identified as a project under the Council Major Goal to: “develop and implement comprehensive and innovative transportation strategies to achieve mobility, connectivity, and safety for people of all ages.” The purpose of the feasibility study is to assess options for improving bicycle accommodations along Castro Street between El Camino Real and California Street.

ANALYSIS

The feasibility study includes review of the existing roadway network; multi-modal analysis, including level of traffic stress (LTS); parking analysis; community engagement; and proposed bicycle concept plan alternatives. The key considerations in developing and evaluating alternatives include:

- **Mode Choice:** Providing bicycle facilities that are convenient, safe, and comfortable for a broad range of potential cyclists, and do not diminish pedestrian facilities along Castro Street;
- **Connectivity:** Eliminating barriers to bicycling, improving access to transit nodes, and creating a more complete bicycle network;

- **Accessibility:** Enhancing access for users of all ages and abilities, including children and seniors;
- **Safety:** Providing safe, low-stress, and comfortable options for bicycling and providing clear and consistent visual cues for all road users;
- **Placemaking:** Providing bicycle facilities that complement the pedestrian-oriented nature of the downtown as exemplified by the wide sidewalks, shade trees, and landscaped medians; and
- **Business Vitality:** Encouraging foot traffic and business vitality downtown, including multi-modal access to ground-floor businesses and parking.

Community Engagement

As a part of community engagement process, a biking and walking tour was held in relation to this project on Saturday, June 2, 2019. The tour was led by City and consultant staff to walk and bike the study area with community members and gather feedback on the existing conditions. The participants also filled out a survey to help identify various obstacles and potential opportunities to improve these conditions.

Figure 1: Castro Street Walk/Bike Audit



Community members who participated in the bike tour shared concerns about motor vehicle speeds from California Street to El Camino Real, crossing safety at the El Camino Real intersection, lack of bicycle detection at intersections, lack of definitive bicycle facilities, and limited bicycle parking in the study segment. Suggested improvements

included providing a Class II bike lane or designating Castro Street as a Class III bike route to make this corridor more inviting for bicyclists.

While pedestrian improvements are not included within the scope of this study, bike and walk audit participants highlighted various pedestrian concerns, including narrow sidewalks, limited street lighting, poorly placed street furniture, and locations with uneven pavement (which have since been addressed by City Streets crews). Community members also expressed concerns with motorists not yielding to pedestrians in crosswalks, at both signalized intersections and uncontrolled crossing locations.

A number of comments were also received in regard to parking within the study area. Some participants suggested parking removal, while others suggested converting front-in angled parking to either back-in or parallel parking for enhanced bicyclist safety.

Planning Context

The study goals reflect values and principles outlined in various plans, including the City of Mountain View's General Plan, Downtown Precise Plan, El Camino Real Precise Plan, Bicycle Transportation Plan, and El Camino Real Streetscape Plan.

The City's Bicycle Transportation Plan identifies medium priority projects that include:

- Implementation of Class III Bike Route improvements along Castro Street between California Street and El Camino Real;
- Class III Bike Boulevard improvements on California Street between Castro Street and Bush Street; and
- Crossing and turning improvements for cyclists at Castro Street and El Camino Real.

The El Camino Real Streetscape Plan also identifies Castro Street as a cross-corridor connection with El Camino Real. In this context, the intersection is slated for implementation of protected intersection treatments, which would connect to Class IV protected bikeways along both El Camino Real (subject to Caltrans approval) and Castro Street south of El Camino Real.

Roadway Width

Analysis of existing conditions revealed that there were no existing bicycle network facilities along Castro Street within the area. In terms of roadway cross sections, three different configurations were identified within the Study area:

- **El Camino Real to Yosemite Avenue** has a 52' curb-to-curb width with parallel parking on one side and two left-turn lanes from Castro Street to El Camino Real;
- **Yosemite Avenue to Kaiser Permanente Driveway** has a 32' to 34' curb-to-curb width with angled parking and left-turn pockets at intersections; and
- **Kaiser Permanente Driveway to California Street** has a 66' curb-to-curb width with a 25' landscaped median and a combination of parallel and angled parking between Mercy Street and California Street.

This shifting street profile suggests the need to consider the performance of potential bikeway improvements in each of the three street segments along Castro Street. At the same time, it is important to provide clarity and consistency along the street to reduce risks that could result from confusion among cyclists, pedestrians, and motorists.

Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (LTS) is an approach that quantifies how comfortable a roadway facility is for riding. Bicycle LTS ranges from LTS 1, which indicates that a facility is low-stress and suitable for Ages and Abilities, to LTS 4, which is high-stress and suitable for highly confident riders. The Citywide Bicycle LTS analysis that was presented to B/PAC on June 24, 2020 was undertaken using a modified version of the Mineta Transportation Institute's methodology in order to account for data availability issues at the Citywide level. For the Castro Street Bikeway Feasibility Study, the full updated methodology outlined by Furth was used to provide a more granular perspective.¹ This methodology accounts for the following factors for evaluating roadway segments and intersections within the Castro Street Bikeway study area:

- Speed limit or prevailing speed;
- Average Daily Traffic volume;

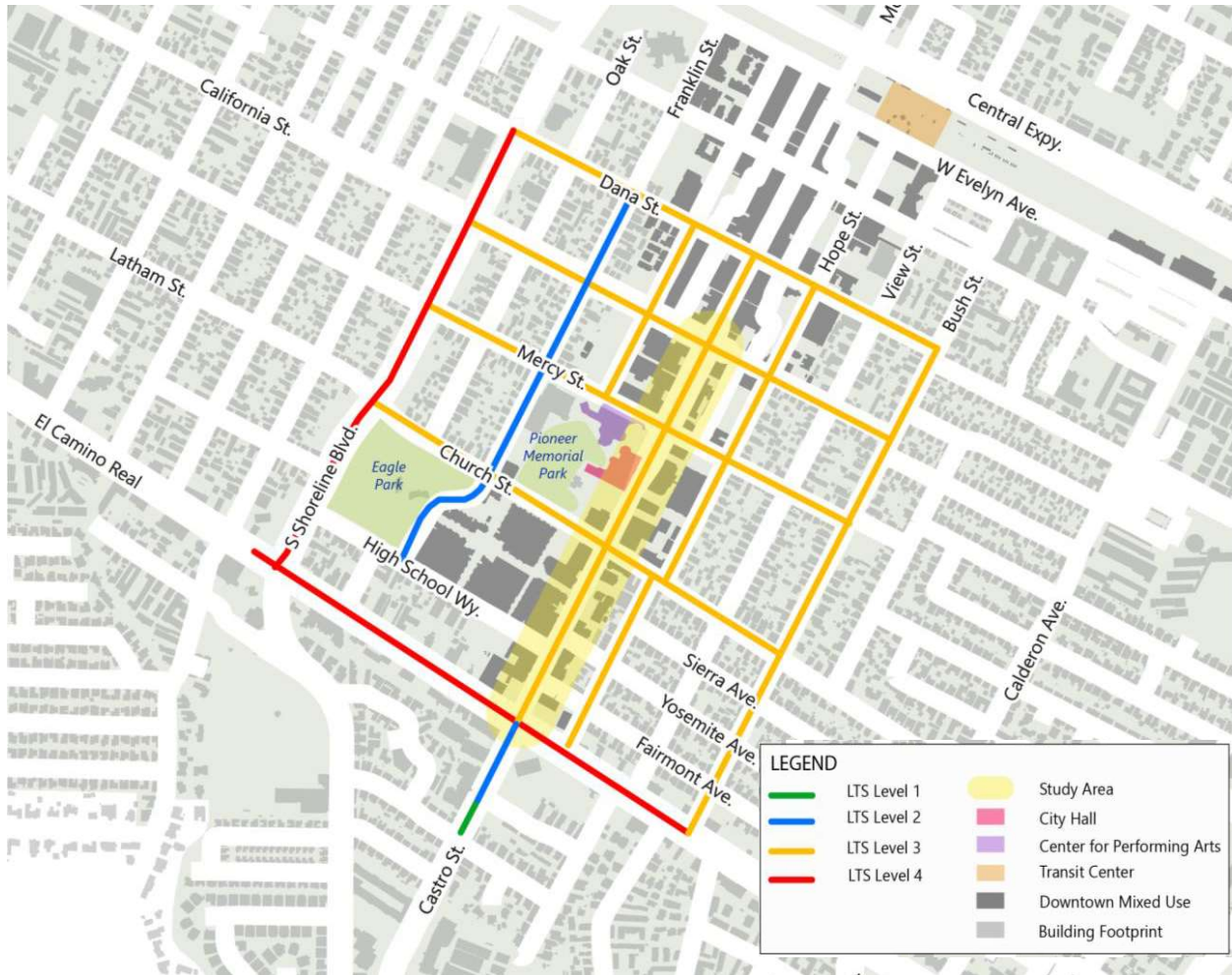
¹ Furth, Peter. 2017. Level of Traffic Stress Criteria for Roadway Segments Version 2.0. <http://www.northeastern.edu/peter.furth/criteria-for-level-of-traffic-stress/>

- Presence of on-street parking;
- Number of travel lanes per direction;
- Lane blockage;
- Turn lane configuration at signalized intersections;
- Presence of right-turn lanes at signalized intersections;
- Width of cross-street at unsignalized intersections; and
- Presence of median refuge at unsignalized intersections.

Under the Citywide analysis (presented to B/PAC on June 24, 2020), Castro Street within the study area received a rating of LTS 2 and LTS 3. Results from the more granular Bicycle LTS analysis undertaken for this study are provided in Figure 2, and indicate that Castro Street has Bicycle LTS 3 throughout the study area.

Given the role of Castro Street in providing access to downtown, Mountain View Transit Center, and across the Caltrain tracks, a rating of LTS 3 suggests the importance of bikeway improvements to provide low-stress bicycle access in the study area.

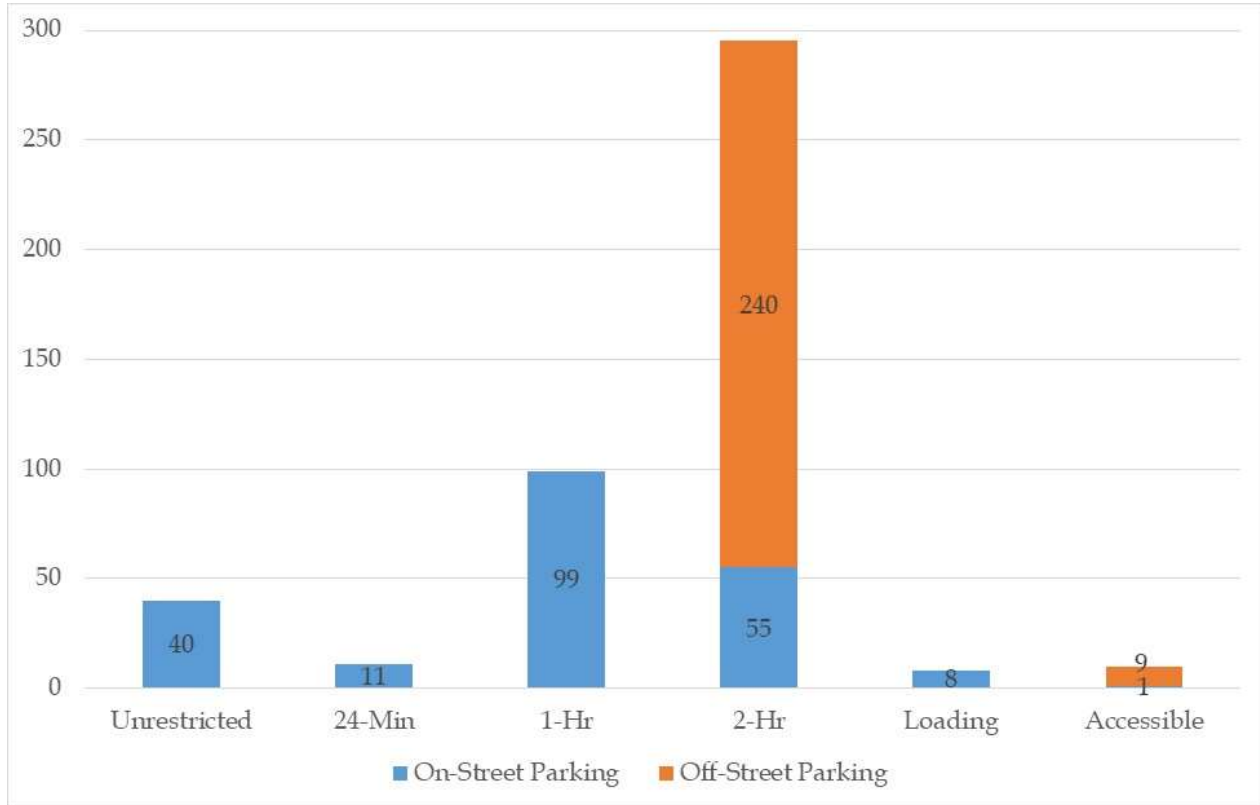
Figure 2: Bicycle Level of Traffic Stress (2017 Furth Methodology)



Parking Analysis

For businesses in the area, parking is a critical concern and loss of parking along Castro Street would likely be controversial. For this study, parking supply and occupancy data was collected for block faces along Castro Street and adjoining side streets as well as two public parking lots, Lots 7 and 12, in the study area. Public parking, including the garage underneath City Hall and the Library, and the surface parking lot adjacent to the Library, were not included in the analysis. Additionally, significant private parking supply, such as that associated with Kaiser Hospital, 650 Castro Street, 801 Church Street, 800 High School Way, and 800 West El Camino Real, were also omitted from the analysis. A total of 463 spaces, including 214 on-street parking spaces and 249 off-street parking spaces, were included in the analysis. As displayed in Figure 3, the bulk of this public parking supply is off-street parking facilities.

**Figure 3: Public Parking within the Study Area,
Excluding City Hall/Library Parking**



For parking included in the analysis, parking occupancy data was collected on a weekday (March 5, 2020) and a weekend day (March 7, 2020), shortly before the County of Santa Clara issued its Shelter-in-Place order. The observations indicated that both on-street and off-street public parking generally remained below the optimal rate of 85 percent during the study period. Given that business activity was depressed and local employers had initiated work-from-home practices, these observations underestimate parking demand during pre-COVID times. Parking observations presented to Council on October 15, 2019, indicate higher rates of on- and off-street parking utilization with peak demand at noon and 8 p.m. Referencing the importance of on-street parking, the Downtown Parking Strategy also recommended options to improve efficient use of on-street parking spaces.

Figure 4: Weekday On-Street and Off-Street Parking Occupancy

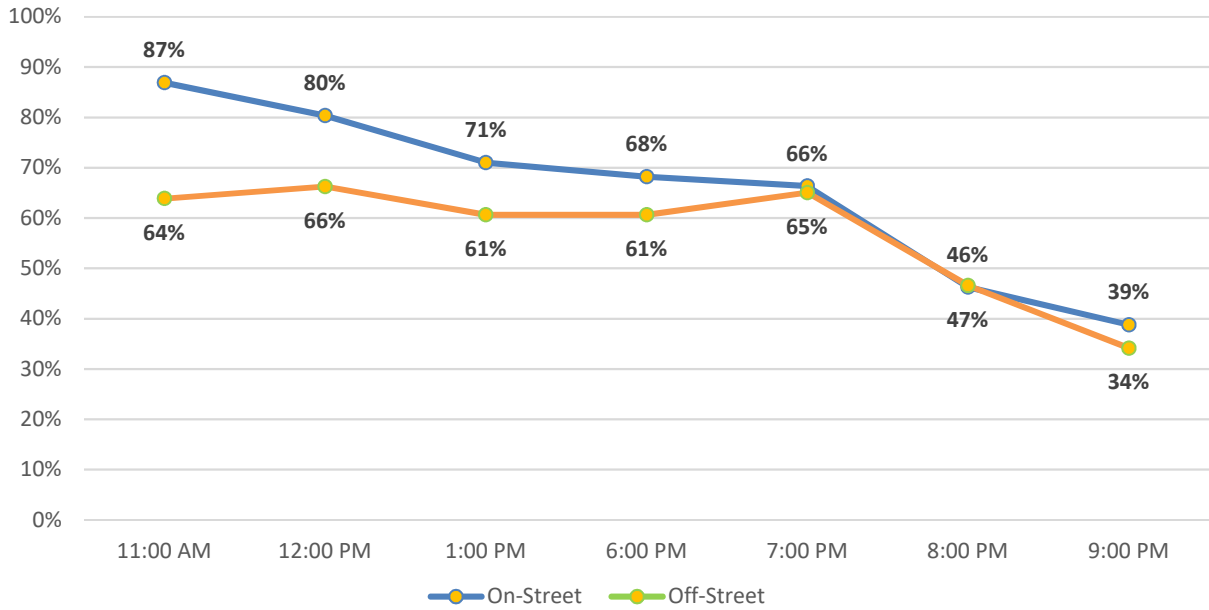
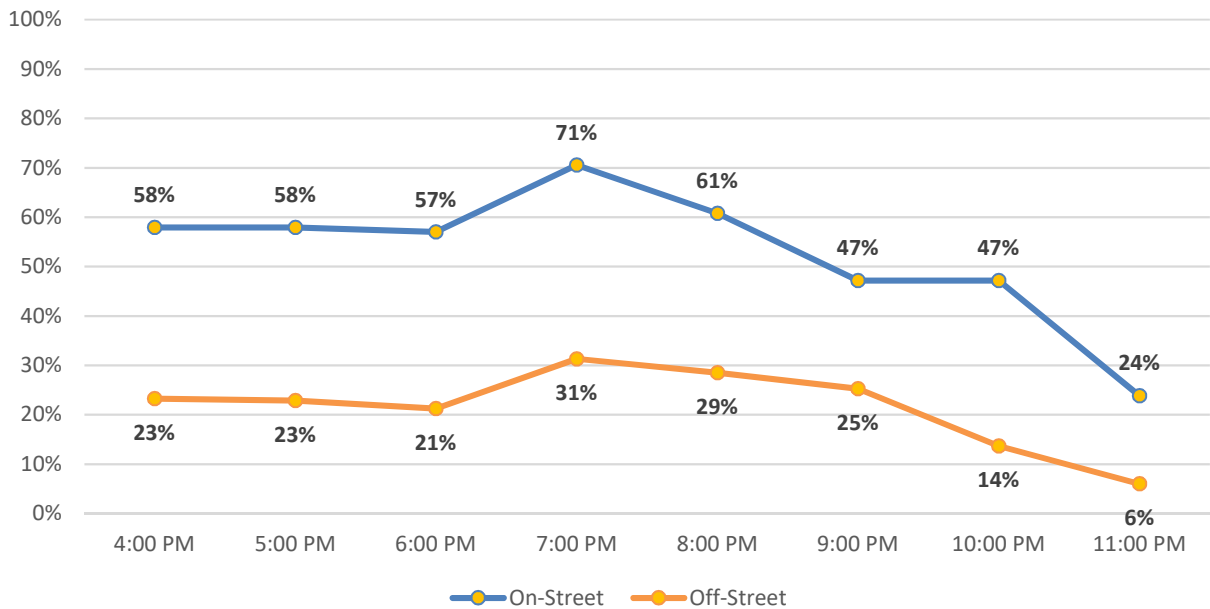


Figure 5: Weekend On-Street and Off-Street Parking Occupancy



ALTERNATIVES

Based on review of the existing conditions, parking data, traffic counts (vehicular, pedestrian, and bicycle counts), and community input, the project team considered alternatives for bicycle accommodation along Castro Street between El Camino Real and California Street. Given the important role of pedestrians along Castro Street, all alternatives were designed to fit into the existing curb-to-curb right-of-way, with no changes to curbs or sidewalks.

Concept plans for both of the feasible alternatives are presented in Attachment 1 and are described below.

Alternative 1: Class II Bike Lanes

Class II bike lanes provide designated space for bicycles with a solid painted line and bike lane markings. In some cases, painted buffers may also be provided to add separation between the bicycle lane and motor vehicle lane. The VTA's Bicycle Technical Guidelines recommend a width of 5' for bike lanes on roadways with posted speed limits less than or equal to 30 miles per hour, and 6' for bike lanes on roadways with posted speed limits between 35 and 40 miles per hour. The posted speed limit on this segment of Castro Street is 25 miles per hour.

Figure 6: Class II Bike Lanes



For Castro Street, Alternative 1 would involve installation of a 5' to 6' bike lane in each direction on Castro Street between El Camino Real and California Street and installation of appropriate signage. This configuration is displayed along with existing conditions in

Attachment 1. Parking changes could potentially be considered in conjunction with this and other alternatives, including a shift from head-in to rear-to-curb angle parking in order to improve motorist awareness of cyclists when existing from on-street parking.

As shown in Table 1, this alternative would improve the bike level of traffic stress along Castro Street by providing clarity and separates lanes for motorists and cyclists. On the other hand, this alternative would require the removal of two-way center turn lanes, removal of turn pockets at each intersection, and removal of 8-phase signal timing that was recently implemented in order to improve pedestrian safety at the intersection of Castro Street and Church Street. The loss of turn pockets may be associated with motorist behaviors aimed at maneuvering around turning vehicles, which may result in vehicle encroachment into the bike lane. Additionally, this alternative would require removal of seven on-street parking spaces on the northbound side of the street between Mercy and California Streets.

Alternative 2: Class III Sharrows

Class III sharrows are pavement markings associated with bike routes that aim to encourage the safe sharing of the street right-of-way by motorists and cyclists. These facilities are generally considered appropriate for low-volume streets with slow travel speeds.

Figure 7: Class III Sharrows



For Castro Street, Alternative 2 would involve installation of sharrow markings between El Camino Real and California Street and installation of appropriate signage. This configuration is displayed in Attachment 2.

As shown in Table 1, this alternative would increase the visibility of cyclists, clarify their right to take the full lane, and slow travel speeds along Castro Street. It would also allow

the City to maintain the existing turn pockets and 8-phase timing at the intersection of Castro Street and Church Street, which are beneficial for reducing encroachment into bicycle facilities and pedestrian safety. On the other hand, sharrows would have less effect on bicycle level of traffic stress and may be associated with impatient motorists maneuvering around cyclists.

Alternative 3: Hybrid Option

In order to maximize benefits and address wider network issues, a hybrid option was developed with Class III sharrows from California Street to Yosemite Avenue/High School Way, and Class II bike lanes from Yosemite Avenue to El Camino Real. At El Camino Real, the proposed bike lane is located against the curb due to the presence of a joint through/right-turn lane that would create a conflict point for cyclists and through movement motorists if the bike lane were shifted to the left.

This option would result in no loss of parking or turn pockets, while boosting bike level of traffic stress in the segment between Yosemite Avenue and El Camino Real where the roadway widens and cyclists from parallel routes in the downtown are required to converge onto Castro Street in order to cross El Camino Real.

Other Alternatives Considered

The study team also considered a number of other options that were deemed as infeasible or unacceptable.

These options included protected bikeway facilities that were deemed unacceptable due to the need for additional right-of-way, loss of turn pockets, loss of 8-phase timing, and significant loss of parking.

Additionally, advisory bike lanes were considered. Advisory bike lanes are dashed bike lanes that provide a bike priority area for cyclists on a roadway that is too narrow for standard bike lanes. Advisory bike lanes are typically used on rural or low-volume roads with no centerline. In the absence of oncoming traffic, motorists will operate closer to the center of the roadway than they would on a roadway with a marked centerline. In this case, advisory bike lanes were considered suboptimal due to their status as an “experimental” treatment, a lack of user familiarity with the treatment, the need for a centerline on Castro Street, and geometric constraints that meant that the treatment could only be applied to a small segment of the street.

Figure 8: Advisory Bike Lanes



Summary

A summary of feasible alternatives for the Castro Street Bikeway Feasibility Study is presented in Table 1 below.

Table 1: Comparison of Alternatives

<i>Alternative</i>	<i>Existing</i>	<i>Alternative 1</i>	<i>Alternative 2</i>	<i>Alternative 3</i>
<i>Description</i>	No Bike Facilities	Class II Bike Lanes	Class III Sharrows	Sharrows California – Yosemite, Bike Lanes Yosemite – El Camino
<i>Bike Level of Traffic Stress (2017)</i>	3	2	3	3 (California-Yosemite) 2 (Yosemite-El Camino)

<i>Alternative</i>	<i>Existing</i>	<i>Alternative 1</i>	<i>Alternative 2</i>	<i>Alternative 3</i>
<i>Bicycle Safety Concerns</i>	Mixed flow		Mixed flow, but with improved visibility	Mixed flow, but with improved visibility (California–Yosemite)
<i>On-Street Parking Supply</i>	85	78	85	85
<i>Pedestrian Safety Implications</i>	8-phase timing	Mixed turn and crossing	8-phase timing	8-phase timing
<i>Vehicle Flow Issues</i>		Queueing associated with loss of turn pockets	Delay associated with shared use	Delay associated with shared use
<i>Cost Considerations</i>	N/A	Low-moderate cost	Minimal cost	Low cost

While Alternative 1 provides a dedicated space for bicycles, staff has concerns about parking, pedestrian, and traffic operations implications of this alternative. On the other hand, Class III sharrows are a relatively minimalist approach that may not be adequate in the final segment of Castro Street where it transitions across the high-stress facility at El Camino Real. For this reason, staff recommends Alternative 3 as a hybrid option that focuses dedicated bike lane treatments in the segment closest to El Camino Real, while providing sharrows and acknowledging the availability of alternative routes on segments further north.

DISCUSSION

B/PAC input is sought on the following questions:

- Do B/PAC members have comments on the analysis or design concepts?
- Does the B/PAC support the staff recommendation for Alternative 3?

NEXT STEPS

Staff will incorporate feedback from B/PAC into the Castro Street Bikeway Feasibility Study, and will return to B/PAC to present the Draft Report. Upon finalization, the study report will be used to inform future capital improvement projects for this work.

AB-RHL/2/PWK
947-08-26-20M

Attachments: 1. Concept Plan Alternative 1
2. Concept Plan Alternative 2

cc: PWD