

**DATE:** June 24, 2014

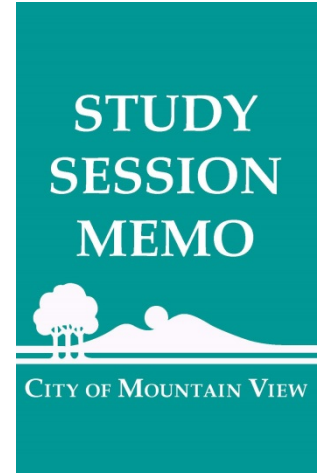
**TO:** Honorable Mayor and City Council

**FROM:** James Lightbody, Project Manager  
Linda Forsberg, Transportation and Business  
Manager  
Michael A. Fuller, Public Works Director

**VIA:** Daniel H. Rich, City Manager

**TITLE:** **Shoreline Boulevard Transportation Corridor  
Study**

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## **PURPOSE**

The purpose of this Study Session is to:

1. Present revised alternatives for integrated transit, bicycle, and pedestrian facilities in the Shoreline Boulevard Corridor between the Downtown Transit Center and the North Bayshore Area.
2. Obtain Council input regarding the concepts/alternatives to be further refined and included in the preferred design alternative that will be presented to the Council later this calendar year.

## **BACKGROUND**

The Shoreline Regional Park Community Transportation Study (Transportation Study), completed in 2013, identified a series of transportation improvement strategies to respond to anticipated increases in employment and development in the North Bayshore Area as the result of the 2030 General Plan. Implementation of these and other transportation improvement strategies will be critical for the City to achieve the following North Bayshore commute mode-share targets endorsed by the Council in March 2013:

<b>Travel Mode</b>	<b>Commute Mode-Share Target</b>
Ride-Sharing (Carpools and Vanpools)	10%
Transit (Public and Private)	35%
Active Transportation	10%
Single-Occupant Vehicle (SOV)	45%

The purpose of the Shoreline Boulevard Transportation Corridor Study (Corridor Study) is to identify the feasibility and develop a conceptual design for integrated transit, bicycle, and pedestrian facilities in the Shoreline Boulevard Corridor from the Downtown Transit Center to the North Bayshore Area.

For this study, the Shoreline Corridor is defined as Shoreline Boulevard, portions of Middlefield Road, Moffett Boulevard, Stierlin Road, and the Terra Bella Avenue area west of Shoreline Boulevard (Figure 1).

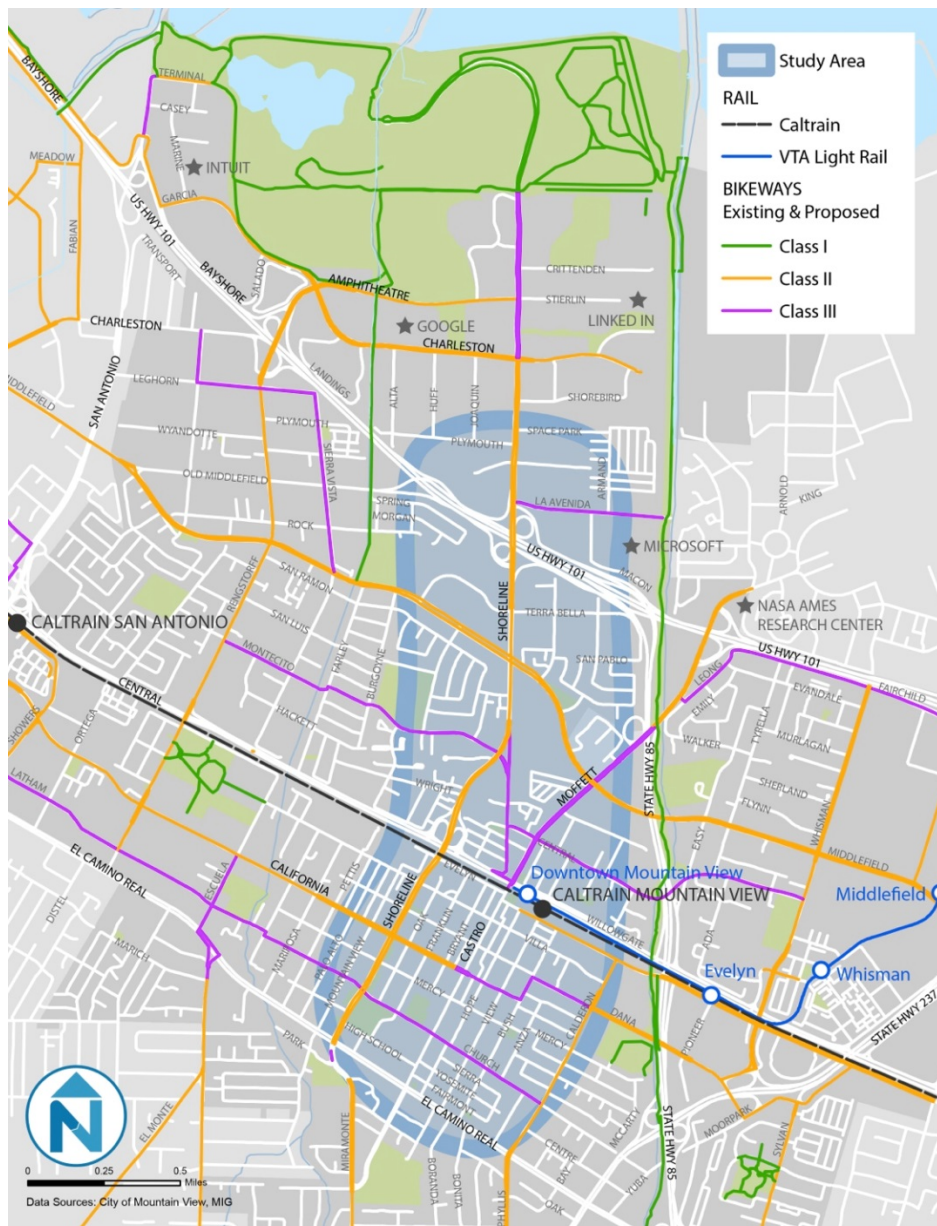


Figure 1 – Corridor Area Map

The current Corridor Study begins action on two key transportation improvement strategies identified in the 2013 Transportation Study—Active Transportation and Expanded Transit Connections—and is being closely coordinated with the development of the North Bayshore Precise Plan.

The City Council received an introduction to, and initial findings of, the Corridor Study at its April 8, 2014 Study Session. Preliminary descriptions of the improvement alternatives under evaluation for the corridor were also provided, including:

1. **Transit Center Improvements**—Improved pedestrian and bicycle access and expanded transit facilities to serve increased shuttle operations.
2. **Bicycle and Transit Improvements Along the Corridor**—Cycle tracks and/or other high-quality bicycle facilities, dedicated transit lanes, and other provisions that will serve the high volume of bicycle and shuttle users.
3. **New Pedestrian and Bicycle Bridge Crossing of U.S. Route 101 West of Shoreline Boulevard**—Coupled with either a new transit bridge or dedicated transit lanes across the existing Shoreline Boulevard interchange.

At this Study Session, the Council will receive more detailed concepts for each of the transportation improvement alternatives, a summary of the results from the second round of community outreach meetings held, and the results of an initial evaluation of the improvement alternatives.

## DISCUSSION

### Community Outreach

An initial series of public workshops and events (a community workshop and mobile workshops/site visits at the Transit Center and various North Bayshore companies) was held in early February.

Community outreach activities in support of the Corridor Study have continued since the Council's April Study Session discussion, with information disseminated, and input solicited, through the project website ([shorelinecorridor.com](http://shorelinecorridor.com)) and the established project e-mail notification list.

A second community workshop for the Corridor Study was held on May 19 to seek community input regarding the corridor improvement alternatives being studied.

Approximately 35 people attended the meeting. A stakeholder workshop was held on May 21, with approximately 25 North Bayshore business, property owner, and transportation agency representatives in attendance. An overview of the Corridor Study was also provided to the Bicycle/Pedestrian Advisory Committee (B/PAC) on May 28.

A summary of the public input received during the second round of community outreach is provided in Attachment 1.

### **Evaluation of Alternatives**

The preliminary transportation alternatives presented to Council in April have been further developed in terms of technical feasibility, advantages and disadvantages, costs, and other evaluation measures. For the purposes of this more detailed discussion, the alternatives are organized into the following segments:

- U.S. Route 101 Crossing (Terra Bella Avenue to Pear Avenue)
- Shoreline Boulevard (Stierlin Road to Terra Bella Avenue)
- Stierlin Road
- Transit Center Station Area

#### ***U.S. Route 101 Crossing Alternatives***

For this segment, three alternatives were evaluated. Each was designed to address key challenges for transit and bicycle commuters in this segment. For bicyclists, high traffic volumes and merging with ramp traffic create high-stress travel in crossing on the Shoreline Boulevard overcrossing. For transit, the peak-period congestion in this segment causes significant travel delays. Many existing shuttles, in fact, avoid Shoreline Boulevard and take a longer but quicker alternative route.

The alternatives are:

- **Alternative 1** – Center-running, reversible transit lane on the Shoreline Boulevard overcrossing and construction of a new bike/pedestrian bridge over U.S. Route 101 to the west of the existing Shoreline Boulevard interchange.

- **Alternative 2**—Side-running transit lanes on the Shoreline Boulevard overcrossing and construction of a new bike/pedestrian bridge over U.S. Route 101 to the west of the existing Shoreline Boulevard interchange.
- **Alternative 3**—Construction of a transit/bike/pedestrian bridge over U.S. Route 101 to the west of the existing Shoreline Boulevard interchange.

An option for each alternative is to retain bike lanes on the existing Shoreline Boulevard overcrossing. Retaining bike lanes (or a wider outside lane) on the Shoreline Boulevard overcrossing is preferred, but will require some median landscaping to be removed.

### Alternative 1

This alternative includes a center-running, reversible transit lane along the existing U.S. Route 101 overpass, as well as the construction of a new bicycle/pedestrian bridge to the west of the existing overpass. The transit lane would travel along Shoreline Boulevard in the existing landscaped median and terminate north of Pear Avenue.



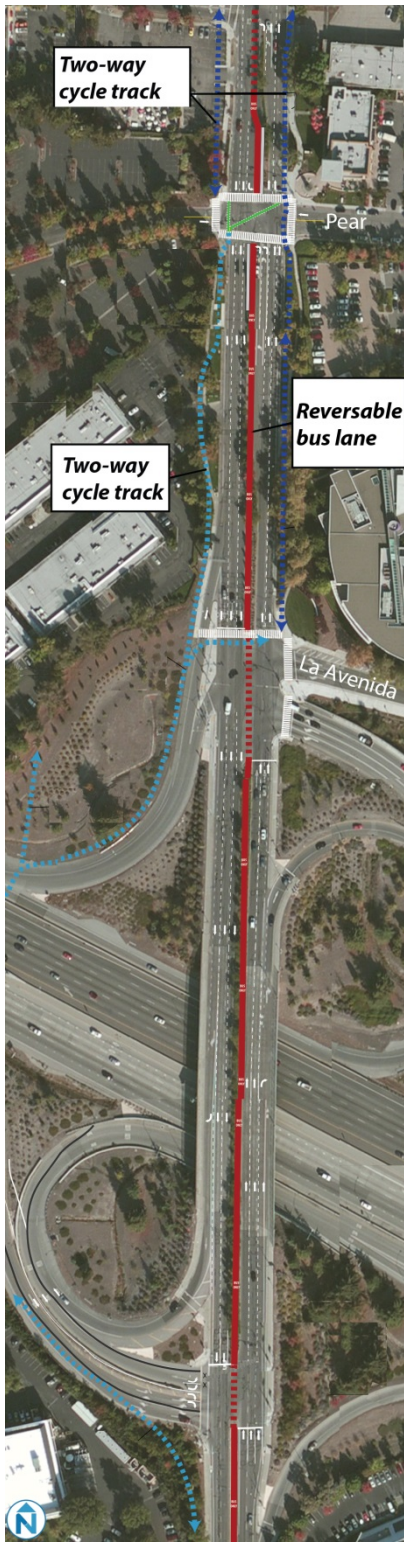


Figure 2 – Reversible Transit Lane at U.S. Route 101 Overcrossing

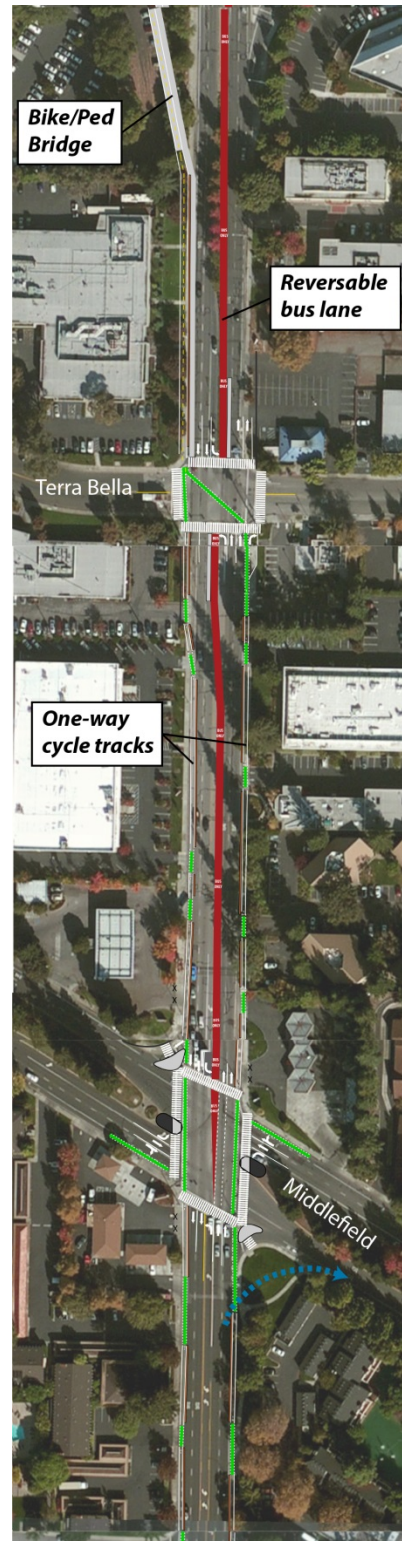
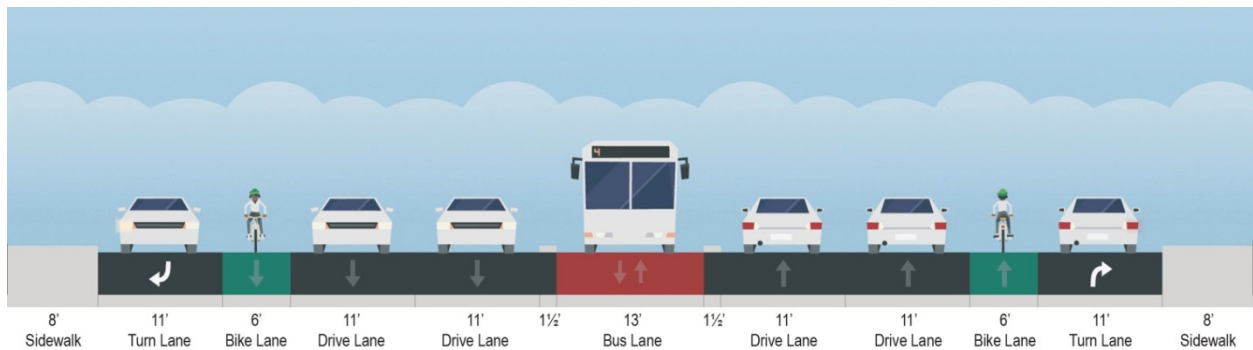


Figure 3 – Reversible Transit Lane South of U.S. Route 101 Overcrossing

With this concept, the transit lane would remain reserved for transit at all times (i.e., it would not serve general traffic in off-peak hours). The dedicated transit lane would operate northbound during the morning and southbound in the afternoon and evening. A median bus stop would be provided at Pear Avenue. The transit lane would serve high volumes of shuttles to the Transit Center, some company-operated commuter buses, and general VTA transit service. The anticipated high volume of transit vehicles and reversible lane controls would preclude other high-occupancy vehicles (e.g., carpools and vanpools) from using the dedicated transit lane.

Figure 4 shows the typical cross-section for Alternative 1, with bike lanes retained.



**Figure 4 – Reversible Transit Lane**

This alternative provides substantial transit travel-time savings while minimizing the right-of-way requirements and the impact on existing general vehicle operation. The primary impact would be the loss of the center median, including existing landscaping on the Shoreline Boulevard overcrossing. However, there would be opportunities to add landscaping, street trees, and landscape enhancements elsewhere along Shoreline Boulevard to offset the loss of the existing street trees and landscaping.

There are approximately 80 existing street trees (a mix of ornamental pear and liquidambar) located in the Shoreline Boulevard median between Terra Bella Avenue and Plymouth Street. These trees are relatively young (less than 20 years) and their removal would likely not be subject to City Heritage Tree Ordinance requirements. Examples of the existing trees are shown in Figures 5 and 6 below.



**Figure 5—Median Trees Between Pear Avenue and Plymouth Street**



**Figure 6—Median Trees on the U.S. Route 101 Overcrossing**

While some experienced bicyclists will prefer to continue traveling on the existing Shoreline Boulevard overcrossing (the most direct route), it is expected that most riders would use the new bicycle/pedestrian bridge, which will be connected to cycle tracks at both ends. For these bicyclists and pedestrians, the proposed new bridge would establish a fully separated route integrated with the planned Shoreline Boulevard cycle tracks and provide a low-stress travel option with the capacity for the planned high-peak volumes. The primary impacts are cost and property acquisition.

Figure 7 shows the alignment of the proposed bicycle/pedestrian bridge, which would be included with this alternative, and how it would connect with the planned cycle track facilities on Shoreline Boulevard north and south of U.S. Route 101.

To accommodate general vehicle turning movements at cross streets (Pear Avenue, Terra Bella Avenue), additional right-of-way would need to be acquired. Property would also be needed, adjacent to the Caltrans right-of-way, for the new bicycle/pedestrian bridge. At the north end, it is envisioned that the bridge would utilize excess Caltrans property.

There would be a reduction in property needs (and cost) if the existing Highway 85 on-ramp from northbound Shoreline Boulevard were closed. This closure would also reduce traffic delays on Shoreline Boulevard. Further study of this option can occur during the next phase of the project.



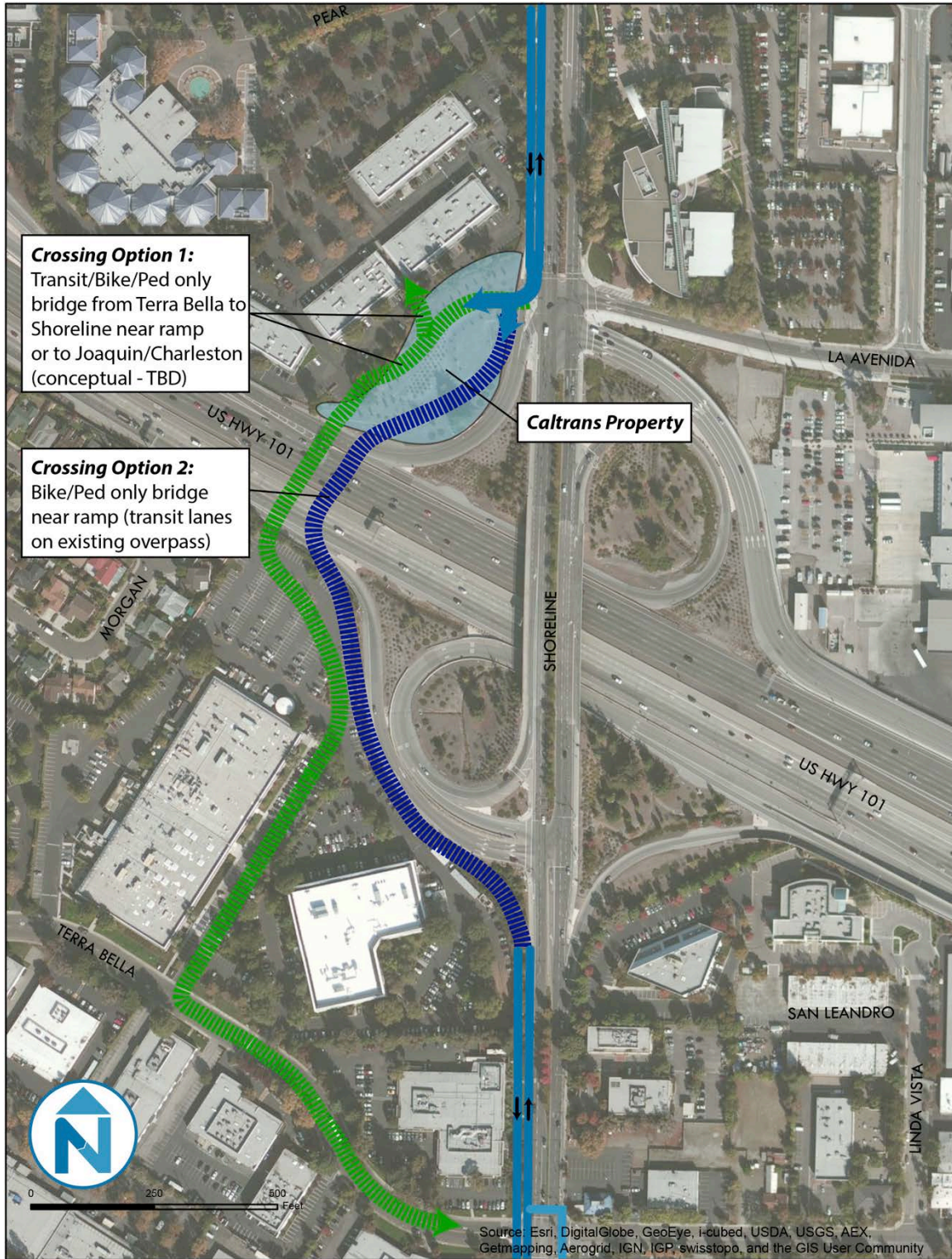
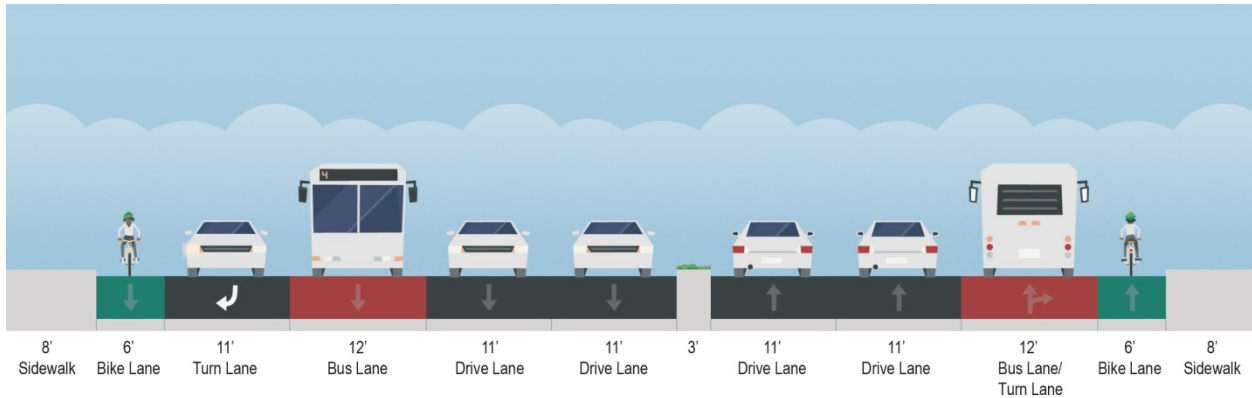


Figure 7 – Highway 101 Bicycle, Pedestrian, and Transit Crossing Alternatives

## Alternative 2

This alternative includes side-running transit lanes on the existing Shoreline Boulevard overpass and a new bicycle and pedestrian bridge proposed to be built to the west of the existing overpass, as discussed in Alternative 1. Figure 8 shows the typical cross-section for Alternative 2, with bike lanes retained.



**Figure 8 – Side-Running Transit Lanes**

Transit lanes would extend along Shoreline Boulevard to a point north of Pear Avenue. Unlike Alternative 1, the transit lanes would not be physically separated. In some sections, the transit lanes would be shared with general traffic making turning movements or entering the freeway ramps. As a result, the travel time savings would be less with this alternative compared to Alternative 1. The outside lanes could provide an opportunity for use by other high-occupancy vehicles, but this would need further study to ensure that transit vehicles were not further delayed.

While the addition of side-running transit lanes could be accommodated on the existing Shoreline Boulevard overcrossing, this configuration would require the acquisition of more right-of-way along Shoreline Boulevard, both north and south of the overcrossing. The side-running lanes would also cause the loss of the landscaped median on the existing bridge. They would allow, however, some median landscaping and left-turn movements to be retained north and south of the Shoreline Boulevard overcrossing.

This alternative would ensure that transit priority was available in both directions to accommodate future needs and would also be easier for transit customers to understand and access. However, given the strong peak direction today, the off-peak direction transit lane would be underutilized.

The new bicycle/pedestrian bridge proposed in this alternative would be the same as discussed for Alternative 1.

### Alternative 3

This alternative provides a combined transit/pedestrian/bicycle bridge across U.S. Route 101 (Figure 7). This option was initially proposed in the event that transit lanes on the Shoreline Boulevard overcrossing proved infeasible.

For this larger bridge to accommodate transit vehicles would require the acquisition of significantly more right-of-way and would be more expensive to build than the proposed bicycle/pedestrian bridge described above. Additionally, shuttles and other transit vehicles that would use the bridge would incur added travel time to access the bridge, offsetting much of the savings from avoiding congestion on the existing overcrossing.

### U.S. Route 101 Crossing Alternatives – Evaluation and Conclusions

Three alternatives for improving access across U.S. Route 101 for transit vehicles, bicycles, and pedestrians have been described above. While there are strengths and challenges with each alternative, staff believes the initial design and evaluation indicates that Alternative 1 (with bike lanes retained on the existing Shoreline Boulevard overcrossing) offers the greatest net benefits, particularly for transit.

Outlined below is a summary of the key decision points between the different transit infrastructure options.

- **Transit Travel Time.** The center-running transit lane offers greater travel time savings than the side-running transit lanes. The difference is largely due to the fact that the side-running lanes cannot be physically separated, which will result in mixing with general traffic. Based on a preliminary operational traffic assessment, the center-running lane is estimated to reduce travel time by 45 percent in the a.m. and 67 percent in the p.m., while the side-running lanes would only achieve 23 percent and 31 percent savings in the two time periods.
- **Safety.** Similarly, because the lanes are not physically separated with the side-running option, there is significantly more chance for conflicts and collisions than the center-running option.
- **Peak Travel Patterns.** Given the strong peak travel patterns in the corridor (northbound in the morning and southbound in the evening), the side-running lanes would not optimize use of roadway capacity. The southbound transit lane would be underutilized in the morning and the northbound lane would be

underutilized in the evening. By contrast, the center-running lane could be reversed based upon traffic patterns, thereby maximizing use of the lane and overall roadway capacity.

- **Right-of-Way Impact.** Both transit options will have impacts to the right-of-way, but the impacts will be more significant with the side-running lane option because right-of-way will be required to accommodate two lanes instead of one.
- **Design and Aesthetics.** Both Alternatives 1 and 2 would require the loss of existing landscaping on the overcrossing. The proposed center-running transit lane would be physically separated with buffers (north and south of the existing overcrossing), presenting an opportunity to add landscaping, street trees, and streetscape enhancements. This could offset the likelihood that some existing street trees and landscaping will be removed to accommodate the improvements.
- **Familiarity.** The center-running option would be a unique roadway design for the region and the City of Mountain View. It would likely result in an adjustment period for motorists, bicyclists, and pedestrians in the corridor. Side-running transit lanes are more familiar and intuitive.

The alternatives discussed above also present two options for a new bridge over U.S. Route 101 for transit vehicles, bicycles, and pedestrians. The initial evaluation suggests that Alternative 3 (a combined transit/bicycle/pedestrian bridge) is viable, but not the preferred option due to its substantially higher design requirements, capital costs, and right-of-way impacts. The impacts of constructing the combined bridge facility to the parcel(s) off of Terra Bella Avenue, as well as the Caltrans property north of the freeway, would also affect their future development potential. The proposed bicycle/pedestrian bridge has similar challenges, but the right-of-way issues appear to be more manageable.

The question of whether to maintain bicycle lanes on the existing overpass requires additional analysis and discussion. At this time, staff recommends Alternative 1 (with bike lanes) be moved forward for additional study, including the following additional tasks:

- Detailed conceptual design of Alternative 1 (with bike lanes) for the U.S. Route 101 overpass and for key intersections, including traffic analysis at key intersections.
- Refined conceptual design for bicycle/pedestrian bridge.
- Detailed assessment of right-of-way impacts.



- Refined cost estimates for Alternative 1 (with bike lanes on the existing overcrossing).
- Additional discussions with staff and key stakeholders, including property owners in the corridor.

### *Shoreline Boulevard Alternatives*

Four alternatives have been evaluated for improvements to Shoreline Boulevard between Montecito Avenue and Terra Bella Avenue, combining transit lanes and cycle tracks.

- **Alternative 1** – Center-running, reversible transit lane with a two-way cycle track along either the east or west side of Shoreline Boulevard.
- **Alternative 2** – Center-running, reversible transit lane with a one-way cycle track on both sides of Shoreline Boulevard.
- **Alternative 3** – Side-running transit lanes with a two-way cycle track along either the east or west side of Shoreline Boulevard.
- **Alternative 4** – Side-running transit lanes with one-way cycle tracks on both sides of Shoreline Boulevard.

### Transit Lanes

As discussed previously, there are two options being considered for transit operations on Shoreline Boulevard—a center-running, reversible lane, and side-running lanes. These lanes would start north of Middlefield Road because the section of Shoreline Boulevard north of Middlefield Road is experiencing significant congestion and traffic delays.

The trade-offs between the two transit lane configuration options (center- and side-running) in this segment of Shoreline Boulevard are similar to those discussed earlier. The center-running lane would require less right-of-way acquisition, would be less costly, and could allow the City the opportunity to retain some median landscaping. Center-running transit would require the City to acquire additional right-of-way at the Middlefield Road and Terra Bella Avenue intersections in order to maintain the left-turn movements.



An additional impact with a center-running transit lane configuration in this section of Shoreline Boulevard is the loss of the existing median turn lanes between Middlefield Road and Terra Bella Avenue. Vehicles needing to access a property on the other side of Shoreline Boulevard would need to continue to the next closest intersection and make a U-turn instead of making a left-turn off of Shoreline Boulevard. Cross-sections for the center-running transit lane are included in the cycle track discussion below.

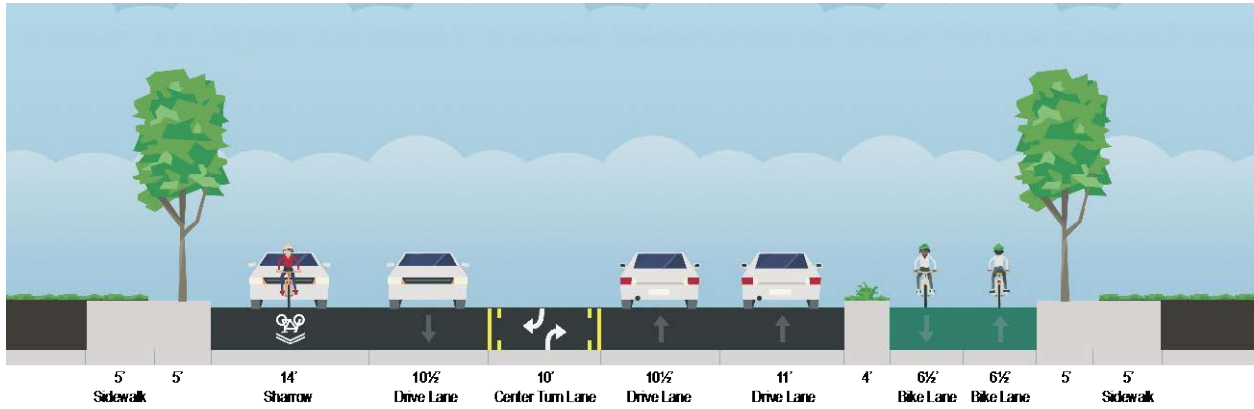
### Cycle Track (Two-Way)

Two-way cycle tracks could run either on the west or east side of Shoreline Boulevard and would include the following key design features:

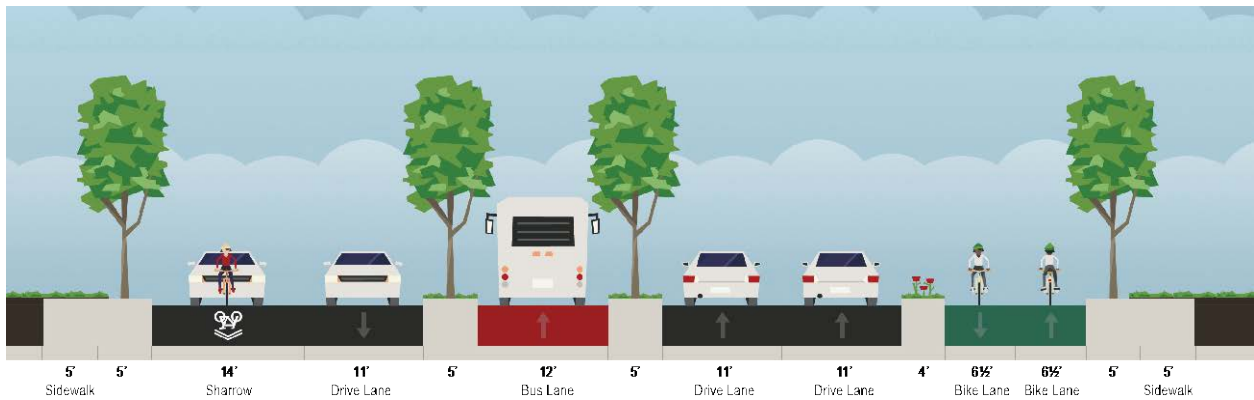
- The cycle track would begin with the transition from the new two-way Stierlin Road slip lane (described below) and run the length of the Shoreline Boulevard corridor to the proposed new bicycle/pedestrian bridge over U.S. Route 101.
- Lane widths would be a minimum of 6.5' (13' total) to provide enough room for bicycle passing—a crucial design detail as bicycle volumes increase.
- A permanent buffer with a minimum width of 3', but preferred width of 4'. The type of buffer has yet to be determined, but should provide distinct vertical separation from vehicles with raised curb, planters, or bollards. As a design option, the cycle track could be raised to the level of the sidewalk or at an intermediate level between the roadway and sidewalk. These options would be further studied in the next phase of the project.
- Some right-of-way acquisition would be needed, possibly impacting existing landscaping and trees. Existing curbs and outside lane widths would be retained on the opposite side of the street to maintain safe bicycle access and to reduce costs.
- Attention to conflict points (intersections and driveways) with proper sight lines, green pavement markings, stop control devices, and high-visibility signage will be needed, including dedicated bicycle signals at Middlefield Road and Terra Bella Avenue.

Cross-sections for the east-side cycle track (with the transit lane options described above) are shown in Figures 9, 10, and 11. The west-side cycle track option would be similar in terms of the cross-section.

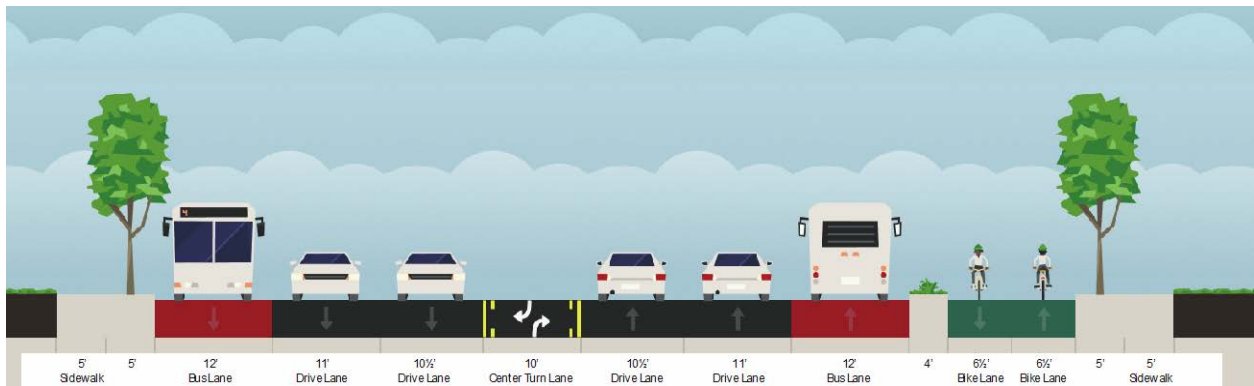
These sections illustrate an optimum configuration. Adjustments would likely need to be made in some locations to accommodate specific right-of-way and landscaping conditions.



**Figure 9 – East-Side Cycle Track on Shoreline Boulevard (South of Middlefield Road)**



**Figure 10 – East-Side Cycle Track on Shoreline Boulevard (North of Middlefield Road with Center Transit Lane)**



**Figure 11 – East-Side Cycle Track on Shoreline Boulevard (North of Middlefield Road with Side Transit Lanes)**

In terms of the east- or west-side cycle track options, operational and design issues are predominantly the same. The primary difference is at which point the transition is made to the west side of Shoreline Boulevard to provide access to the new bicycle/pedestrian bridge over U.S. Route 101, which begins north of Terra Bella Avenue. With the east-side option, the recommended transition location is Terra Bella Avenue. With the west-side option, the recommended transition location would be a new signaled intersection just north of the Stierlin Road/Montecito Avenue intersection near the Bailey Park Plaza Shopping Center and the Mountain View Buddhist Temple (see Figure 12). This signal would allow for left turns into the Buddhist Temple while improving pedestrian access across Shoreline Boulevard to a major neighborhood shopping center. Initial traffic analysis indicates that a new intersection north of the Stierlin Road/Montecito Avenue intersection will not have a significant impact on traffic operations along Shoreline Boulevard during peak periods.

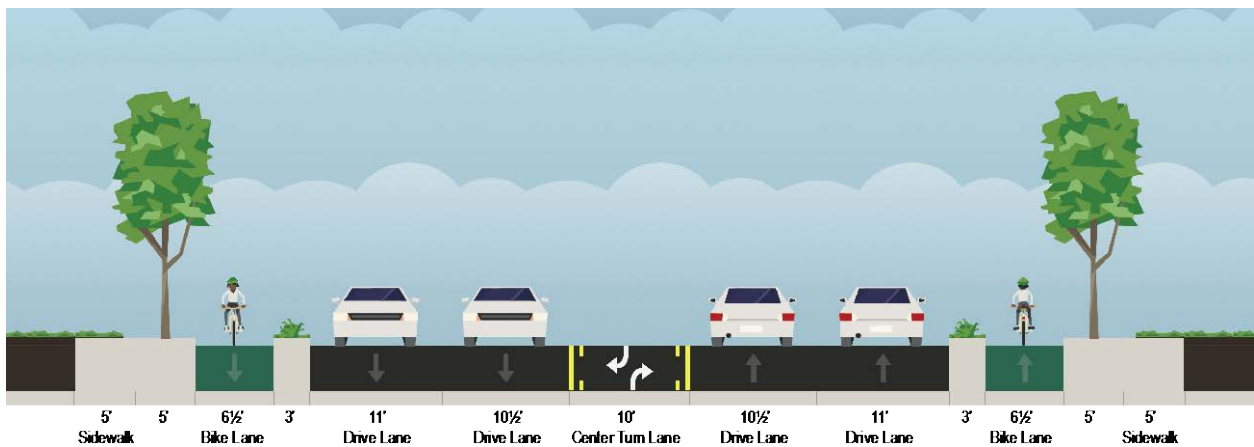


Figure 12 – Potential New Shoreline Boulevard Traffic Signal

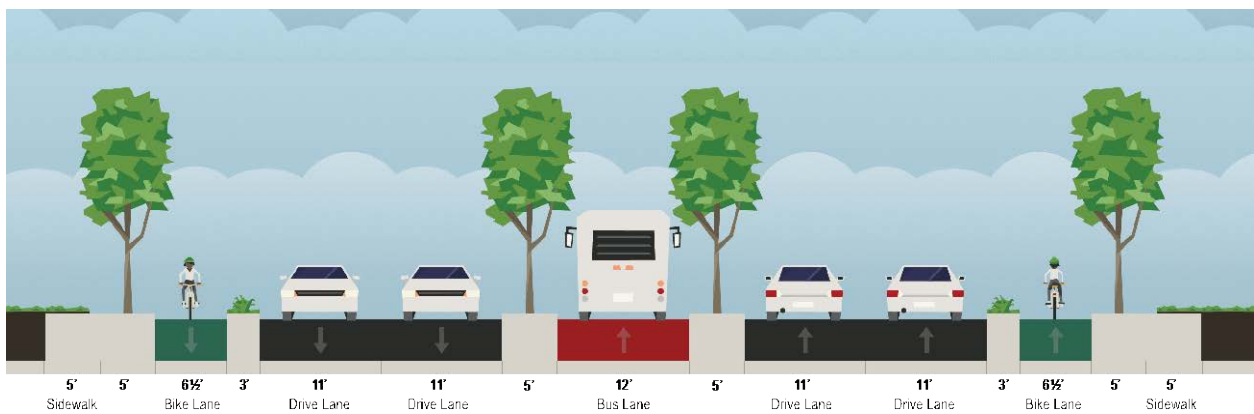
Cycle Track (One-Way)

The cross-sections for the one-way cycle track option are shown in Figures 13 and 14 and include the following key design features:

- Lane widths would be a minimum of 6.5' to provide enough room for bicycle passing, with a 2' to 3' permanent buffer.
- The lanes could operate at street level (essentially replacing existing bike lanes) or could be raised to sidewalk or an intermediate level.
- A transition point from the Stierlin Road slip ramp (discussed below) for the southbound lane would occur at the proposed new signalized intersection discussed above.



**Figure 13 – One-Way Cycle Tracks (South of Middlefield Road)**



**Figure 14 – One-Way Cycle Tracks  
(North of Middlefield Road with Center Transit Lane)**

One-way cycle tracks are more familiar to cyclists and will have fewer conflict points at intersections needing special treatment. Further design is needed, but the preliminary assessment of right-of-way needs indicates an impact similar to that of the two-way lanes. This option would require modification to the curbs and sidewalks on both sides, potentially increasing the cost.

### Cycle Track (Center Running)

Based on input received during the community input process, the option of a center-running, two-way cycle track along the Shoreline Boulevard corridor north of Montecito Avenue was evaluated at a conceptual level, but is not recommended for this segment of Shoreline Boulevard for the following reasons:

- The left-turn lane for the entire length of the corridor along Shoreline Boulevard north of Montecito Avenue would need to be removed, not just between Middlefield Road and Terra Bella Avenue, resulting in reduced access to properties on the east and west sides of Shoreline Boulevard.
- Safety concerns related to operation of the center-running transit lane next to a cycle track and bicyclist ingress and egress to the center-running cycle track.
- Safety concerns related to bicyclists making left turns across the transit lanes and motorists making left turns across the cycle track. These conflicts could be mitigated by distinct signal phases, but may have significant impacts on intersection operations.

The City will soon begin studying alternatives for improving the bicycle and pedestrian environment along Shoreline Boulevard between El Camino Real and Montecito Avenue as part of the expanded scope of Project 14-41, California Street/Escuela Avenue Improvements Study. A center-running, two-way cycle track along Shoreline Boulevard will be one of the options evaluated. The need to coordinate bicycle facility alignments/transitions along Shoreline Boulevard will be considered as both the Shoreline Corridor Study and Project 14-41 continue.

### Shoreline Boulevard Alternatives – Evaluation and Conclusions

The initial design and evaluation indicates that Alternative 2 (a center-running, reversible transit lane with one-way cycle tracks) offers the greatest net benefits.

For the transit options, as noted earlier, the center-running transit lane option offers greater travel time savings than the side-running transit lane alternative. This option



also provides for fully separated lanes for greater safety and would have a lower cost because less right-of-way would need to be acquired. The most significant impact associated with this option is the loss of the two-way left-turn median on Shoreline Boulevard between Middlefield Road and Terra Bella Avenue.

For the cycle track options, outlined below is a summary of the key decision points between the different bicycle infrastructure options.

- **Access and Connectivity.** One-way cycle tracks will ensure access to both sides of Shoreline Boulevard throughout the corridor. The one-way cycle track option could also better facilitate connectivity to east-west bicycle routes that connect to Shoreline Boulevard.
- **Right-of-Way and Construction.** Right-of-way impacts are estimated to be similar for the two options. While a one-way cycle track would require two buffer zones, the two-way cycle track would similarly require an expanded outside travel lane. Construction (e.g., new curb, gutter, and sidewalk) would impact both sides of the street with the one-way cycle track, and only one side with the two-way cycle track (but in a more significant manner).
- **Conflict Zones.** One-way cycle tracks would better facilitate right-turning vehicles at intersections because the design could accommodate a traditional mixing/transition zone. By contrast, two-way cycle tracks would necessitate elimination of free right turns and require a dedicated bicycle phase at intersections.
- **Familiarity.** One-way cycle tracks are more familiar to both bicyclists and motorists. This is particularly crucial at intersections and driveways where motorists are not accustomed to looking for two-way bicycle traffic.
- **Design and Aesthetics.** Two-way cycle tracks offer a more substantial bicycle realm and more closely replicate the environment of an off-street bicycle path. However, improvements would largely be concentrated on one side of the street. A one-way cycle track could benefit both the east and west side by creating a new buffer between the vehicle lanes and the bicycle/pedestrian realm.
- **Costs.** Cost estimates are not substantially different between the two alternatives.

During the next phase of the Study, the preferred alternative, one-way cycle tracks with a center-running transit lane, would be developed in greater design detail, including intersection operations, traffic analysis, right-of-way requirements, and refined cost

estimates. Additional discussions with stakeholders and property owners will also be conducted.

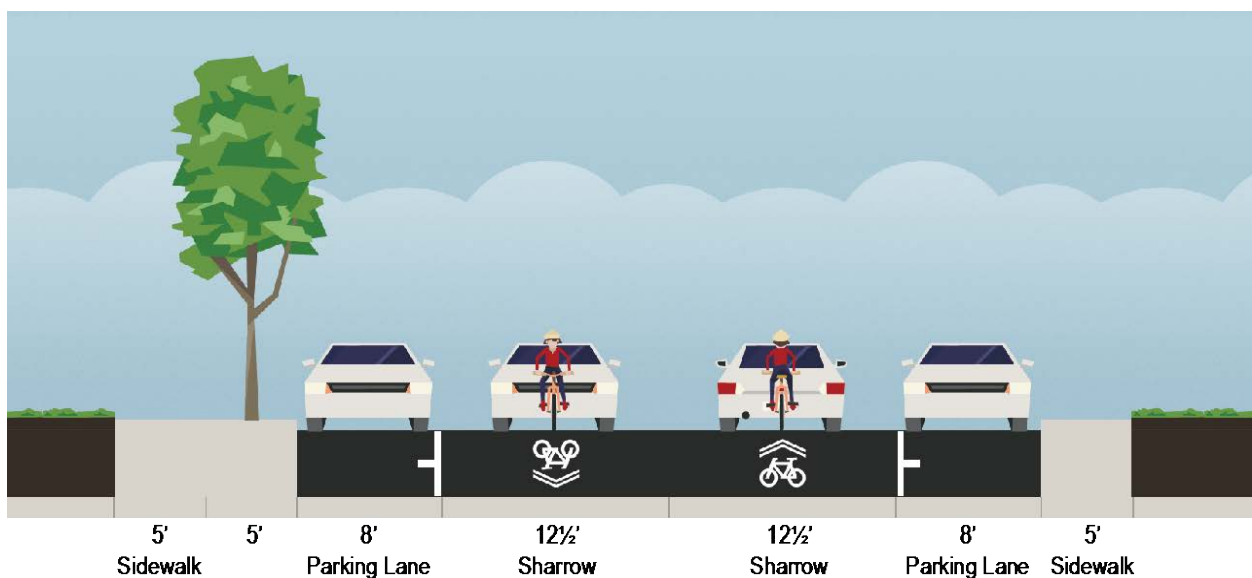
### *Stierlin Road Alternatives*

Stierlin Road provides a direct and natural connection between downtown and the Transit Center and the new multimodal Shoreline Boulevard Corridor, utilizing the bicycle and pedestrian access path to be constructed as part of the new mixed-use development project at 100 Moffett Boulevard.

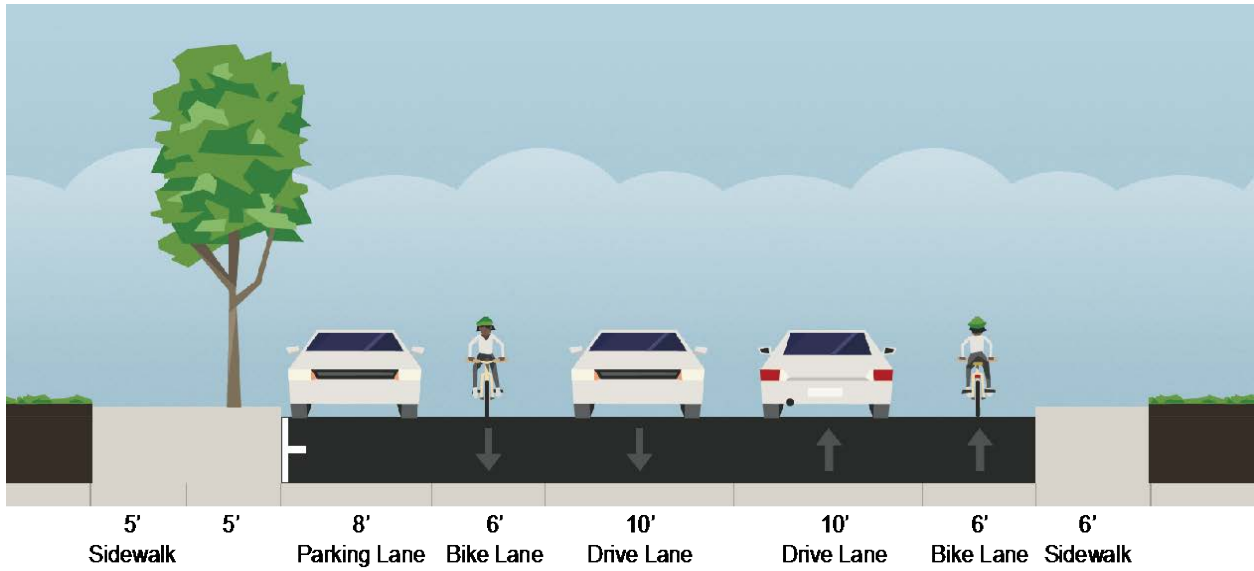
Three potential bicycle facility options are proposed for this segment of the corridor. All three alternatives would successfully integrate with the proposed intersection improvements at Stierlin Road/Montecito Avenue/Shoreline Boulevard.

- Bicycle boulevard.
- Bicycle lanes.
- Buffered bicycle lanes.

The three bicycle options for this segment are shown in Figures 15, 16, and 17. Each includes traffic-calming features along Stierlin Road, such as speed tables. The most significant impact of adding these bicycle facilities would be the reduction or elimination of on-street parking to accommodate striped or buffered bike lanes. Traffic volumes are relatively low on Stierlin Road, making any of the options feasible.



**Figure 15 – Bicycle Boulevard on Stierlin Road**



**Figure 16 – Bicycle Lanes on Stierlin Road**



**Figure 17 – Buffered Bicycle Lanes on Stierlin Road**

A number of potential bicycle and pedestrian improvements have been identified for the Stierlin Road/Montecito Avenue/Shoreline Boulevard intersection, all of which would successfully integrate with any of the three Stierlin Road bicycle facility improvement alternatives described above. As shown in Figure 18, these potential improvements include:

- Removal of one southbound travel lane on Stierlin Road (immediately south of the Shoreline Boulevard intersection) to allow for new bicycle lanes, the installation of a right-turn pocket lane to northbound Shoreline Boulevard from Stierlin Road, widened sidewalks, and a reduction in intersection geometries.
- Shifting the lane alignment on the north side of westbound Stierlin Road to the south side to allow for the installation of a new bicycle lane and vehicle right-turn pocket onto northbound Shoreline Boulevard.
- Modifications to the Stierlin Road slip lane (connecting to/from Shoreline Boulevard) to restrict vehicle movement and create a two-way cycle track.
- Stop-controlled crossings and speed humps/tables along the cycle track on Stierlin Road to allow pedestrians to cross, reduce conflicts points, and improve safety.
- A new traffic signal and intersection geometry at Stierlin Road and Shoreline Boulevard, including new bulb-outs to reduce vehicle turning speeds and pedestrian crossing distances.
- A proposed new signalized intersection discussed above (at the Bailey Park Plaza Shopping Center and Mountain View Buddhist Temple), allowing cycle track users to access the west side of Shoreline Boulevard, as well as improving pedestrian and vehicular access to adjacent properties.

The most significant impact of these potential improvements at the intersection will be the effect on access to the Buddhist Temple. Further investigation of the impacts and consultation with representatives of the Temple will occur in the next project phase.

### Stierlin Road Alternatives – Evaluation and Conclusions

To balance the need for improved bicycle facilities with neighborhood parking needs, the bicycle lane option is staff's preferred alternative. This option would retain parking on one side of the street and provide striped bike lanes. The proposed plan for the Stierlin Road/Montecito Avenue/Shoreline Boulevard intersection will need to be further developed.

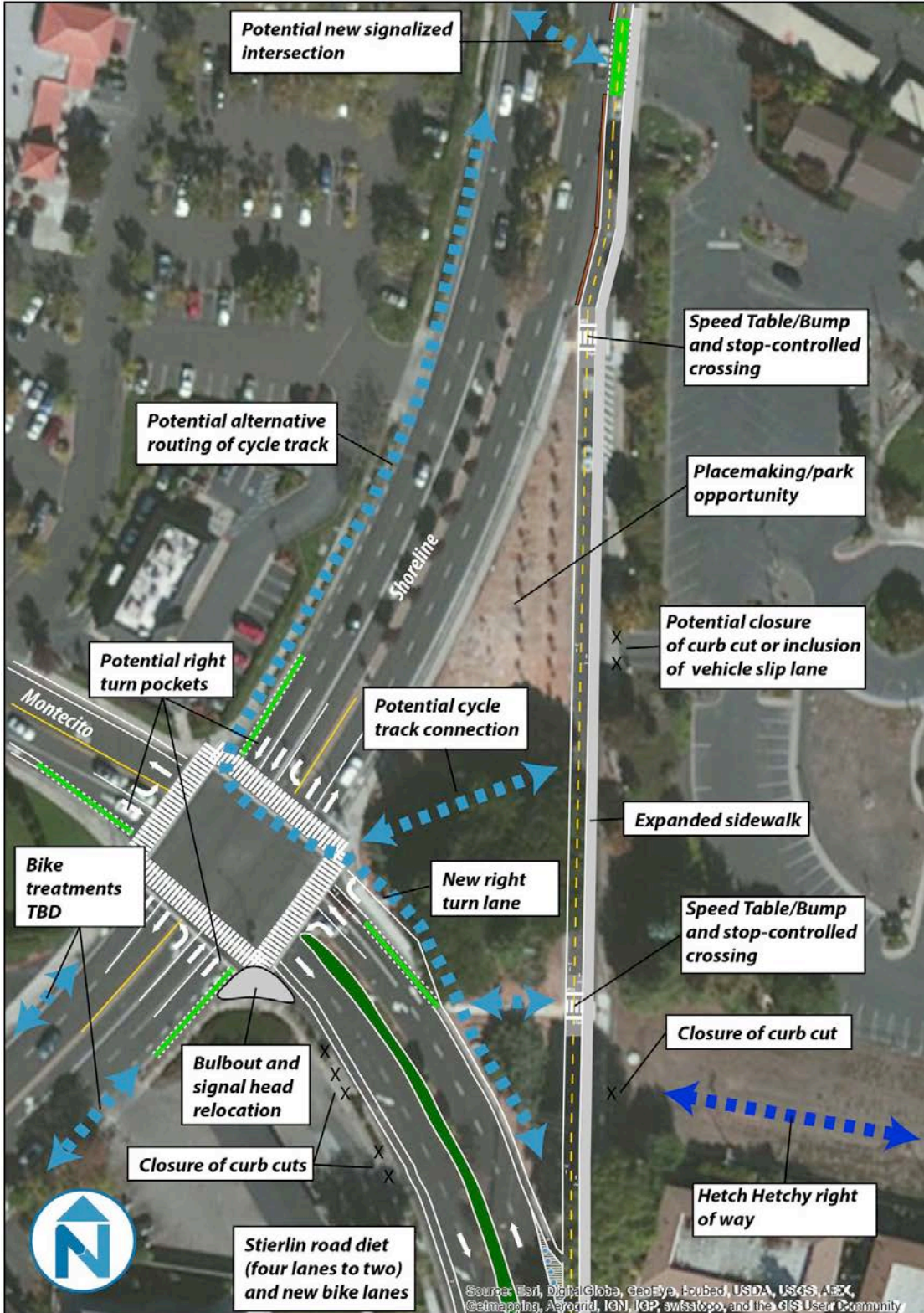


Figure 18 – Stierlin Road/Montecito Avenue/Shoreline Boulevard Intersection Improvements



### *Transit Center Area Alternatives*

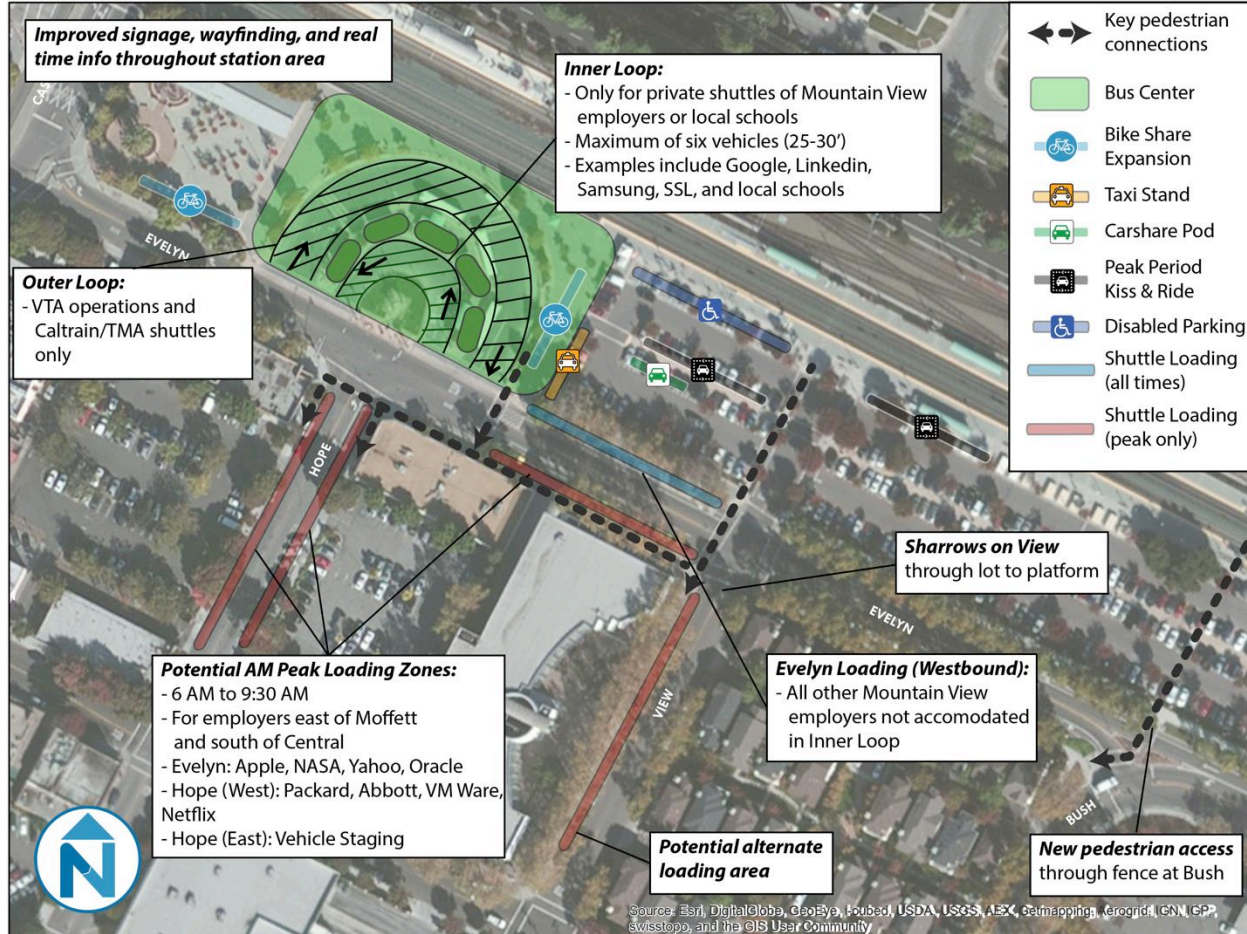
Access to, and travel from, the Downtown Transit Center and the Caltrain and VTA Light Rail Stations provides the final link in the Shoreline Boulevard Corridor.

Two primary issues are being addressed through the Corridor Study relating to the Transit Center area:

- Capacity for transit and shuttle service at the Transit Center, both in response to current demand, and to address the significant growth in service and demand for serving the North Bayshore Area. A related issue is capacity for bicycle storage and bike sharing.
- Bicycle and pedestrian access to the Transit Center (including transit riders accessing shuttle stops). A key location needing improvement is the Castro Street/Moffett Boulevard/Central Expressway intersection.

### Shuttle Loading

Earlier work in the Corridor Study identified the current deficiencies in terms of shuttle loading at the Transit Center. Near-term improvements to address this issue include modifications to the usage of the Transit Center (inner and outer loops), usage of nearby curb space on adjacent streets (during morning commute peak hours) for shuttle loading, and other access improvements. These improvements are shown in Figure 19.



**Figure 19 – Near-Term Transit Center Shuttle Improvements**

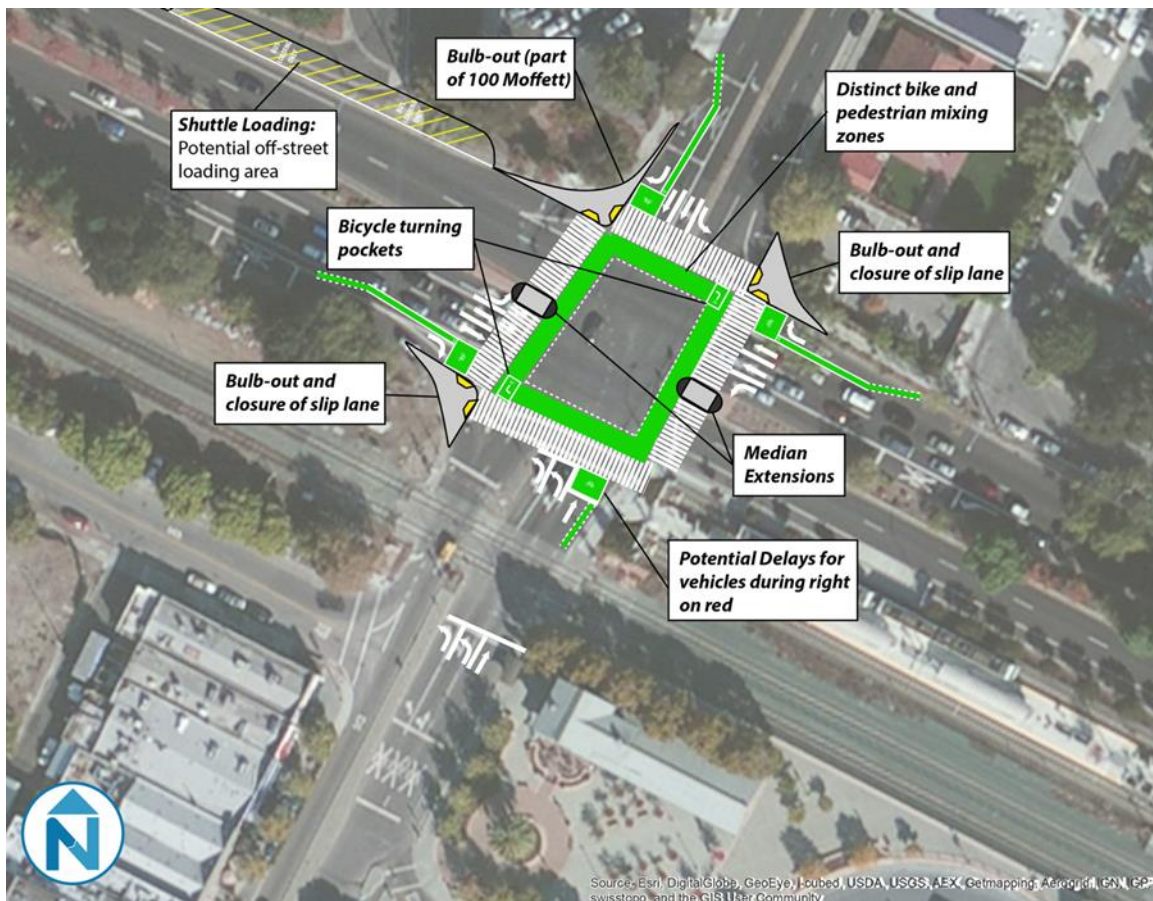
To accommodate the future growth in the number of shuttles serving the North Bayshore Area, a new loading area is proposed along the north side of Central Expressway, west of Moffett Boulevard and adjacent to the development at 100 Moffett Boulevard (Figure 20). The shuttle stop would be approximately 250' to 350' in length. One of the major benefits of this location is improved transit travel times, as it would allow transit vehicles to avoid delays crossing the Central Expressway/Moffett Boulevard/Castro Street intersection. Transit riders from Caltrain and VTA Light Rail would need to cross this intersection, adding to the pedestrian demand. However, even with the added walk time, it appears the total travel time for commuters will be reduced.

Other strategies have been explored for longer-term transit and shuttle capacity at the Transit Center. These would involve a more substantial reconstruction of the existing transit facility and likely would need to be coordinated with other longer-term station improvement strategies. A reconfiguration of space at the Transit Center may also be

needed to accommodate future bicycle facilities, such as expansion of the bike-sharing program or a consolidated bike storage/bike station facility.

### Castro Street/Moffett Boulevard/Central Expressway Intersection

The Castro Street/Moffett Boulevard/Central Expressway intersection would also benefit from a number of potential near-term improvements that could shorten the wait for pedestrians and cyclists and increase their safety. Some of these improvements are shown in Figure 18.



**Figure 20 – Near-Term Castro Street/Moffett Boulevard/  
Central Expressway Intersection Improvements**

These potential improvements include:

- Adding a short bicycle/pedestrian phase to the traffic signals when the Caltrain gates are down to reduce bicycle and pedestrian wait times, which can exceed five minutes during peak periods. This phase should be designed to minimize

additional delays to Central Expressway traffic, which generally has free flow when the gates are down.

- The potential closure of the right-turn slip lanes off of Central Expressway and the expansion of the islands to better accommodate high volumes of pedestrians.
- Tighter intersection turning radii to reduce vehicle turning speeds and bicycle/pedestrian crossing distances.
- Enhanced intersection markings through intersections indicating the intended path of bicyclists and providing a clear boundary between the paths of bicyclists, pedestrians, and vehicles.
- Two-stage crossing treatments and turning pockets to allow bicyclists to safely make left turns across the wide, multi-lane intersection.
- The addition of bike boxes to provide bicyclists with a safe and visible way to get ahead of stopped traffic during a red signal phase.

While these potential improvements and others, such as a pedestrian/bicycle scramble, have been discussed with Santa Clara County Roads and Airports staff and other stakeholders, additional coordination and approval is needed to identify the best combination of actions that will improve conditions and shorten delays for pedestrians and bicycles while minimizing further vehicle delays.

Longer-term solutions involving grade-separated crossings (over or under the railroad tracks and Central Expressway) and a new structured parking facility have also been identified. Grade separation may greatly improve access, but will have a significant cost. There are also unresolved questions regarding the future configuration of Caltrain platforms with electrification and the potential impact of high-speed rail. A new structured parking lot could provide additional parking capacity at the Transit Center and potentially connect directly to an elevated station concourse over Central Expressway to improve access to and from the train platforms. As a result, these ideas should be further explored in the next phase of the study to identify how they can be coordinated with other, longer-term station needs.

### Transit Center Area Alternatives – Evaluation and Conclusions

The short-term recommendations appear to be the most viable and worth developing as part of the detailed design phase of this Corridor Study project. In particular, at-grade



improvements at the Castro Street/Moffett Boulevard/Central Expressway intersection and better management of shuttle loading are high priorities.

As part of developing these improvements, the following tasks are proposed for the next phase of the Study:

- In partnership with Santa Clara County Roads and Airports staff, develop detailed design of the Castro Street/Moffett Boulevard/Central Expressway short-term improvements described above, including a more refined analysis of traffic impacts.
- Conceptual design of proposed shuttle-loading zones on Evelyn Avenue, Hope Street, View Street, and Central Expressway, including a phased implementation plan.
- Additional assessment of loading activity and coordination with employers and the TMA to discuss shuttle-loading revisions.
- Conceptual design of proposed short-term changes to the Caltrain parking lot.

### **NEXT STEPS**

Based upon direction received from the City Council at this Study Session, the conceptual design of the corridor alternatives will be further refined. This work will include cost estimates for the preferred alternative, identification of funding options, and a phasing/implementation plan. An additional round of community outreach is planned for the fall. The final project recommendations will be brought to the City Council in December 2014.

### **RECOMMENDATION**

Staff seeks input from the City Council regarding the following proposed Shoreline Corridor transportation improvement alternatives described in this report so that they can be further refined and included in the preferred design concept that will be presented to the Council later this year.

#### **U.S. Route 101 Crossing Improvements**

- Reversible median transit lane on Shoreline Boulevard from Middlefield Road to north of Pear Avenue.



- A new pedestrian/bicycle bridge over U.S. Route 101 connecting to two-way cycle tracks on Shoreline Boulevard both north and south of the freeway.

#### Shoreline Boulevard and Stierlin Road Improvements

- One-way cycle tracks on each side of Shoreline Boulevard from north of Stierlin Road to Terra Bella Avenue.
- Installation of a new traffic signal on Shoreline Boulevard at the Bailey Park Plaza Shopping Center for pedestrians and bikes to cross and transition from one-way to two-way cycle track, with consideration of possible vehicle movements.
- Modifications to the Stierlin Road slip ramp to create a two-way cycle track, subject to further discussions needed with the Buddhist Temple.
- Modifications to the Montecito Avenue/Shoreline Boulevard intersection.
- The addition of a bicycle lane on Stierlin Road, retention of parking on one side of Stierlin Road, and the installation of additional traffic calming measures.

#### Transit Center and Castro Street/Moffett Boulevard/Central Expressway Intersection Improvements

- Near-term improvements at the Castro Street/Moffett Boulevard/Central Expressway intersection to reduce wait times and improve safety for bicyclists and pedestrians, developed in partnership with Santa Clara County Roads and Airports Department staff.
- Implementation of strategies for near-term improvements for shuttle loading and waiting at the Transit Center (i.e., curb space on adjacent streets, modification to parking lot).
- The addition of a new shuttle loading area on the north side of Central Expressway, near the private development at 100 Moffett Boulevard.
- Further assessment of longer-term Transit Center and Caltrain Station concepts that consider both current needs and other factors resulting from Caltrain electrification and further ridership growth.

## **PUBLIC NOTICING**

In addition to the City's standard agenda posting requirement, notices were sent to more than 100 individuals, including and/or representing: persons/stakeholders requesting notification through the project website; residents; attendees at previous workshops/meetings regarding the Study; City neighborhood associations; transportation agencies; North Bayshore businesses, property owners, and tenants; Bicycle/Pedestrian Advisory Committee; and other interested parties.

JL-LF-MAF/7/CAM

901-06-24-14SS-E

Attachment: 1. Summary of Public Comments – Community Outreach, Phase 2