DATE:	April 8, 2014	
TO:	Honorable Mayor and City Council	STUDY
FROM:	James Lightbody, Project Manager Linda Forsberg, Transportation and Business Manager Michael A. Fuller, Public Works Director	SESSION MEMO
VIA:	Daniel H. Rich, City Manager	CITY OF MOUNTAIN VIEW
TITLE:	Shoreline Boulevard Transportation Corridor Study	

#### **PURPOSE**

The purpose of this Study Session is to provide an introduction to, and initial findings of, the Shoreline Boulevard Transportation Corridor Study (Corridor Study). An overview of preliminary transit, bicycle, and pedestrian alternatives along the Shoreline Boulevard Corridor will also be presented for initial Council review and comment.

# BACKGROUND

The Shoreline Regional Park Community Transportation Study (Transportation Study) was completed in 2013. The City Council received and discussed the results of the Transportation Study at Study Sessions on February 5, 2013 and March 26, 2013.

The Transportation Study identified several strategies to respond to the increase in employment and development anticipated in the City's North Bayshore Area as the result of the 2030 General Plan. These strategies included:

- **Improved Roadway Efficiency**—Freeway ramp modifications and an improved street grid throughout the North Bayshore Area.
- **Active Transportation** Enhancements to the bicycle and pedestrian network to make walking and bicycling a more convenient and viable transportation option.
- **Expanded Transit Connections** "Last Mile" connections to Caltrain and light rail with new transit service, dedicated lanes, and Transit Center improvements.
- **Commuter Bus and Ride-Sharing Programs** Primarily employer-based programs that encourage directly operated bus and ride-sharing services.

The Transportation Study also proposed the establishment of a Transportation Management Association (TMA), in partnership with the City.

At the March 26, 2013 Study Session, Council endorsed commute mode-share targets that could be incorporated into the North Bayshore Precise Plan to guide future growth in the North Bayshore Area. These mode share targets are:

Travel Mode	2030 General Plan Growth Scenario
Ride-Sharing (Carpools and Vanpools)	10%
Transit (Public and Private)	35%
Active Transportation	10%
Single-Occupant Vehicle (SOV)	45%

The 45 percent SOV mode goal would allow for some increase in the number of peak commute period SOV trips into the North Bayshore Area above existing levels, but represents a significant decrease from the North Bayshore Area's current drive-alone rate of approximately 60 percent.

The Corridor Study begins development of two of the key strategies (Active Transportation and Expanded Transit Connections) recommended in the Transportation Study, which will be critical for achieving the mode-share targets. The Corridor Study will be closely coordinated with the North Bayshore Precise Plan, now under way, with both expected to be completed by the end of 2014.

The Council approved a professional services agreement with a consultant team led by Nelson\Nygaard on October 29, 2013 to prepare the corridor survey.

# DISCUSSION

# Project Goals/Purpose

The Corridor Study will identify the feasibility and develop the conceptual design of an integrated transit, bicycle, and pedestrian facility in the Shoreline Boulevard Corridor from Downtown Mountain View and the Downtown Transit Center to the North Bayshore Area. For purposes of this Corridor Study, the Shoreline Boulevard Corridor

includes Shoreline Boulevard from El Camino Real to north of Highway 101, portions of Middlefield Road, Moffett Boulevard, Stierlin Road, and the Terra Bella Avenue area west of Shoreline Boulevard (Figure 1, Corridor Area Map).



Figure 1 – Corridor Study Area

The Corridor Study will develop and evaluate alternatives for three major components of the Corridor:

- 1. Improved facilities and access at the Transit Center, including potential gradeseparated pedestrian and bicycle access and expanded transit facilities to serve the anticipated increase in shuttle operations.
- 2. Bicycle and transit improvements along the Corridor, including a cycle track (a fully separated bicycle facility within a street right-of-way) and/or other high-quality bicycle facilities, dedicated transit lanes, signal priority, and other provisions that will serve the high volume of bicycle and shuttle users.
- 3. A new pedestrian and bicycle bridge crossing of Highway 101 west of Shoreline Boulevard and either a new transit bridge or dedicated transit lanes across the Shoreline Boulevard interchange.

In addition to the infrastructure elements, the Corridor Study will develop strategies for expanded shuttle and transit services in the Corridor and identify other supporting programs and needs. These include better management and operation of the Transit Center, expanded bike- and car-sharing facilities, greater bicycle storage, improved customer information, and other programs.

This Study Session will provide an update of work to date, including an assessment of existing Corridor conditions and needs, results from the initial community outreach, and the preliminary identification of alternatives. The options presented below represent an initial range of concepts and have not yet been fully explored in terms of technical feasibility, pros and cons, costs, and other evaluation measures.

# Existing Conditions and Needs

Based on research to date, the consultant team has identified current conditions in the Corridor. A particular area of focus has been private employer shuttle operations at the Transit Center. Recent observations and data collection have documented the growing number of employer shuttles and the resulting congestion in the peak commute hours in and around the Transit Center. Shuttles using the Transit Center serve businesses both within and outside Mountain View as shown in Figure 2.



Figure 2 – Shuttle Origins

The consultant team's evaluation of current conditions and future growth has identified the need for new facilities and services to aid in achieving the City's mode-share targets for North Bayshore Area commuters. Specific Corridor needs include:

- Increased capacity for shuttles and public transit at the Transit Center.
- Increased volume of, and more efficient, shuttle and transit operation.
- Improved pedestrian and bicycle access to and from the Transit Center.
- Safer, protected bicycle facilities along the Shoreline Boulevard Corridor.
- Safer and faster facilities for bikes and transit crossing Highway 101 into the North Bayshore Area.

# Community Outreach

The first phase of the Corridor Study has included initial community outreach activities, including:

- **Project Website** A project website (*www.shorelinecorridor.com*) provides information and updates regarding the Corridor Study. More than 100 individuals have signed up as stakeholders to receive notifications of study-related news and events. Additional information regarding the Corridor Study has been disseminated through social media outlets.
- **Public Workshops and Events** The first community workshop for the Corridor Study was held on February 10. The goal of the meeting was to introduce the Corridor Study to the community and solicit input on key challenges and opportunities in the Corridor. The meeting was attended by approximately 40 people and included polling exercises and informal discussion around a series of interactive boards. The consultant team conducted additional mobile workshops and site visits the week of February 10 at various North Bayshore companies and at the Transit Center. A presentation was also made to the Mountain View Rotary Club in February.
- **Project Survey**—An online survey was developed to gather input about the Corridor and the Transit Center. Approximately 500 surveys have been completed to date. Key observations from the survey include:
  - The Transit Center is safe and fairly easy to access, but better shuttle connections and bicycle parking are needed.
  - Improved bike lanes connecting to North Bayshore are a clear priority.
  - Highway 101 and the Caltrain Corridor are perceived as major barriers for bikes and pedestrians.
  - Bicycle improvements along the Corridor are highly desired.

#### Future Corridor Usage

While the Shoreline Corridor is already an important connection between downtown and North Bayshore, usage of the Corridor (particularly transit and bicycle use) is expected to increase significantly as a result of:

- The need for substantial mode shifts to support the planned growth in North Bayshore and other employment areas in the City.
- The planned electrification of Caltrain, increasing service frequency by about 30 percent in the peak period (and potentially adding further capacity with longer trains).
- Increased VTA light rail service, including express service from BART in Milpitas.

These transit demands are expected to substantially increase the need for improved bicycle and transit connections in the Corridor. For planning purposes (5- to 10-year time frame), the Shoreline Transportation Study estimated that the demand for transit use in the Corridor (employer shuttles and regular transit) could reach 3,000 peak-period users, more than three times the current use.

To provide sufficient capacity for that level of transit use will require the use of full-size buses operating on several regular routes. A preliminary plan has identified a 20-bus system with four basic routes operating on short frequencies (three to four minutes). This service would be phased in over several years and could potentially be operated by a combination of TMA and company service, and regular VTA service. The Stanford University bus system (Marguerite) is a local example of this type of service.

A significant increase in the number of bicyclists using the Corridor for short, local trips, as well as connections to Caltrain and VTA, is also projected. Per the Transportation Study, as many as 2,000 peak-period bicyclists could be using the Corridor within the next five years.

These projections have served as the basis for the development of the alternatives discussed below.

# CORRIDOR CONCEPTS AND ALTERNATIVES

Preliminary alternatives to address key Corridor issues, organized by the three primary project components, are presented below. These alternatives will be further refined and evaluated over the next two months.

#### Transit Center and Surrounding Area

Key needs at the Transit Center, including the Caltrain and VTA light rail stations, include capacity for the increased volume of shuttles and transit service, better and safer access for bicycles and pedestrians (particularly across Central Expressway), and other provisions that will support the planned expansion of Caltrain and VTA service. Because some of the potential solutions will be large in scope and will require substantial capital costs, a series of short-term, lower-cost options have also been developed. Transit Center alternatives include:

**Short-Term Alternatives** – The short-term alternatives for the Transit Center include intersection treatments, relocating private employer shuttle pick-up/drop-off locations, and additional station amenities. These are highlighted in Figure 3 and described in greater detail below.

- Castro Street/Moffett Boulevard/Central Expressway Intersection Treatments Intersection treatments at this intersection would be designed to improve bicycle and pedestrian circulation, particularly given current wait times, which are especially challenging with train crossings in the peak period. The options could include the following:
  - Adding a short bicycle/pedestrian phase of the traffic signal when the Caltrain gates are down to reduce bicycle and pedestrian wait times.
  - Tighter intersection turning radii to reduce vehicle speeds and shorten bicycle/pedestrian crossing distances.
  - Adjusting the Central Expressway signal cycle to better balance the needs of autos, pedestrians, and bikes.
  - Other intersection treatments (e.g., striping) to better delineate the crossing and queuing space for bicycles.

Better crossing provisions at this location would also help bicyclists and pedestrians make use of the features planned for the 100 Moffett Boulevard development, which will be important elements of the Corridor improvements.

• Transit/Shuttle Stop Locations – Private shuttle operators currently share the inner loop of the bus half-circle, often overwhelming the space during the morning peak, and spilling out into crosswalks and onto Evelyn Avenue. As a short-term

solution to private shuttle crowding at the station, the City could seek to establish and expand specific curb loading zones for operations in the morning on East Evelyn Avenue, West Evelyn Avenue, Hope Street, and View Street. These zones could continue to be utilized as on-street parking during off-peak hours. It would also be desirable to employ active management, such as a dedicated person to direct and control shuttle loading.

• Station Amenities—Short-term alternatives could include the relocation of the information display to the station platforms (more convenient for transit riders), the installation of one or more car-share pods in the station parking lot, and the expansion of bike-sharing and bike storage facilities.



Figure 3 – Transit Center Short-Term Alternatives

**Medium-Term Alternatives** – Potential medium-term alternatives for Transit Center improvements include a new, elevated concourse to facilitate bicycle and pedestrian circulation, new permanent shuttle loading areas/facilities, and a new parking structure. A summary of medium-term alternatives is shown in Figure 5.

• Elevated Station Concourse—A potential elevated station concourse would facilitate bicycle and pedestrian circulation to and from the Transit Center and the surrounding community, including the Shoreline Corridor. The concourse could connect the VTA and Caltrain platforms and a potential new station parking structure and cross over Central Expressway. A potential location for the vertical structure north of Central Expressway still needs to be identified. It would improve bicycle and pedestrian circulation from the station to Stierlin Road and Moffett Boulevard, helping to bridge the key barriers at the tracks and Central Expressway.

Due to space restrictions at the station platforms, the concourse would likely require vertical circulation elements such as escalators and elevators. As shown in Figure 4, a local example of a similar existing concourse is at the Oakland Jack London Square Amtrak Station, where the structure enables circulation across the tracks and an adjacent roadway.



Figure 4 – Jack London Square Station Concourse



Figure 5 – Transit Center Medium-Term Alternatives

- Transit/Shuttle Facility In the medium-term, a new transit/shuttle facility could be built to accommodate existing and future demand for shuttle services. Options for shuttle operations could include one, multiple, or all of the following:
  - Developing a loading area on the northwest corner of Central Expressway, to the west of the approved 100 Moffett Boulevard development.
  - Developing a loading area on Moffett Boulevard north of Central Expressway.
  - Repurposing existing perpendicular parking on Evelyn Avenue west of Castro Street.
  - Utilizing on-street zones on northbound Moffett Boulevard.
  - Repurposing the western-most portion of the Caltrain parking lot for shuttle operations, passenger drop-off, taxi loading, bicycle parking, and car-/bikesharing services.
- Parking Structure A new structured parking facility could be constructed on the eastern portion of the existing lot to replace lost parking (due to the repurposed west lot) and expand the number of available parking spaces. Such a facility could connect directly to the elevated station concourse, facilitating circulation to and from the train platforms.

The long-term vision for the Transit Center should consider the potential grade separation of the Caltrain crossing at Castro Street/Moffett Boulevard. This may be needed if the California High-Speed Rail project is further developed. The long-term plan would also need to fully address the implications of higher levels of Caltrain service and greatly increased ridership at the Transit Center. These needs include safe passenger movement to and from the platforms, adequate facilities for transit connections and bicycle users, longer Caltrain platforms, and improved customer facilities. Further station planning efforts may be needed to ensure that near- and midterm investments are compatible with the long-term plan.

# Shoreline Corridor from Downtown to Highway 101

To connect the Transit Center to North Bayshore, various potential bicycle alternatives exist along the Corridor, including segments on Stierlin Road and Shoreline Boulevard.

**Stierlin Road Segment**—Along the Stierlin Road Corridor, two potential treatment options (Figure 7) are proposed—a bicycle boulevard treatment and buffered bicycle lanes. Given that the road is rather wide with low levels of traffic volume, both treatments are viable options to improve the attractiveness and safety of bicycling in the Corridor.

Bicycle boulevard treatments typically seek to reduce vehicle speeds and optimize travel for bicycles. Treatments could include the following:

- Traffic-calming measures, such as lowered speed limits, speed humps, and traffic diverters with bicycle cut-outs.
- Clear signage to direct bicyclists along the route.
- Intersection crossing treatments that favor bicyclists over vehicles



Figure 6 – Example of Buffered Bicycle Lanes

Buffered bicycle lanes (Figure 6) are another option. These lanes would be located along the shoulder of Stierlin Road and would be physically separated from vehicular lanes via a buffer. Buffers could include striping, plantings, on-street parking, and other design features. This option would likely involve a trade-off with parking along Stierlin Road.

To connect the proposed Stierlin Road bicycle lanes or boulevard

treatments to Shoreline Boulevard, it is proposed that northbound bicyclists use the existing Stierlin Road slip lane when traveling to Shoreline Boulevard. For southbound bicyclists, there could be either: (1) a grade-separated or signalized connection to the slip ramp; or (2) intersection modifications at the Shoreline Boulevard/Montecito Avenue intersection.

In conjunction with the above alternatives, the City could also consider completely closing the Stierlin Road slip lane to automobile traffic, and make it a dedicated route for bicyclists and pedestrians only.



**Figure 7**– **Stierlin Road Alternatives** 

**Shoreline Boulevard Segment (Stierlin Road to Terra Bella Avenue)**—On Shoreline Boulevard, two bicycle treatment options are proposed. These include a two-way cycle track on the west side of Shoreline Boulevard and one-way cycle tracks/buffered lanes on either side of the street. For both options, intersection treatments would be needed at both the Shoreline Boulevard and Middlefield Road intersection and the Shoreline Boulevard and Terra Bella Avenue intersection to ensure a fully functioning and safe bicycle and pedestrian network.

A two-way cycle track mimics an off-street path's physical separation from vehicle lanes, but the facility remains within the roadway geometry/curb space. The facility is separated from vehicle lanes horizontally (bollards, parallel parking, barriers, plantings, etc.) and/or vertically (raised or mountable curb). Figure 8 show examples of a two-way cycle track. Installation of a two-way cycle track would require some combination of additional right-of-way and/or elimination or reconfiguration of the existing median/two-way center left-turn lane.

One-way cycle tracks/buffered lanes also involve more substantial separation from the roadway than striping and may be raised, but run along each curb/side of the street.



Figure 8 – Examples of Two-Way Cycle Track

At the Middlefield Road and Terra Bella Avenue intersections, treatments could include curb adjustments to shorten crossing distances and create refuge areas, the addition of speed tables or raised crosswalks to slow turning vehicles, modifications to turn pockets, and other strategies to make bicycle travel more visible and protected.

In addition, potential conflicts with the numerous curb cuts and driveways along this segment of Shoreline Boulevard would need to be addressed and mitigated. Potential treatments would include setbacks for vehicles to establish a two-stage exit for vehicles, channelized turning movements at sharp angles to reduce vehicle turning speeds, clear sight lines at least 30' from driveway/curb cut, and colored pavement and/or markings to identify conflict area.

**Transit Provisions** – In this segment of the Corridor (south of Middlefield), there is not a strong need for specific transit provisions since traffic generally flows well. The bus lanes discussed below may need to extend closer to Middlefield Road from the Highway 101 interchange to bypass peak congestion queues. That will be addressed in the analysis of Highway 101 crossing options.

# Shoreline Boulevard Crossing at Highway 101

Current conditions for bicyclists and pedestrians on the Shoreline Boulevard overcrossing of Highway 101 are uninviting and difficult. Furthermore, transit vehicles

are routinely delayed in traffic along various segments of Shoreline Boulevard (from at approximately Middlefield Road to Pear Avenue), but particularly along the existing Shoreline Boulevard overpass where vehicles must navigate on- and off-ramps and the signalized intersections on the north side of the overpass.

Several potential crossing options are available for transit vehicles, bicyclists, and pedestrians. Preferred options would be designed to connect with the planned transportation network to be included as part of the North Bayshore Precise Plan.

# **Bicycle and Pedestrian Crossing**

**Option 1: Transit/Bike/Pedestrian Bridge.** One alternative would be the construction of a new combined transit/bike/pedestrian bridge via Terra Bella Avenue (Figure 10). Such a facility would require intersection treatments at the Terra Bella Avenue/Shoreline Boulevard intersection to allow cyclists to easily access the crossing.

**Option 2: Bike/Pedestrian Bridge.** Another alternative would be the construction of a new bicycle and pedestrian overpass, similar to existing facilities throughout the Peninsula. For example, the facility could be constructed within, or immediately adjacent to, the freeway right-of-way, as was done in the City of Belmont (see Figure 9). This option would be linked with the bus lane options on the Shoreline Boulevard interchange as discussed below.



**Figure 9 – Belmont Bridge** 



Figure 10 – Highway 101 Bicycle and Pedestrian Crossing Alternatives

# Transit Crossing/Transit Lane Alternatives

For transit vehicles, four alternatives have been developed featuring transit-only lanes for the crossing of Highway 101 (see Figure 11).

**Option 1: Transit/Bike/Pedestrian Bridge.** This alternative provides a new combined transit-, bike- and pedestrian-only bridge over Highway 101 west of the Shoreline Boulevard interchange. This option would require transit vehicles to deviate to and from Shoreline Boulevard and would require acquisition of property between Terra Bella Avenue and Highway 101, but would bypass the peak congestion on Shoreline Boulevard.

**Option 2: Center Reversible Transit Lane.** Under this alternative, a single reversible transit lane would be provided in the center of Shoreline Boulevard between Middlefield Road or Terra Bella Avenue and either Space Park Way or Charleston Road. Buses would use the lane in the peak direction, northbound in the morning and southbound in the evening. This alternative could avoid widening of the right-of-way or reconfiguration of existing travel lanes, but would remove the existing landscaped median and potentially modify existing left-turn lanes.

**Option 3: Side-Running Transit Lane and Center Reversible Traffic Lane.** Under this alternative, a reversible center lane would be created, but it would be used for general traffic, and one existing travel lane in each direction would be converted to transit-only use. Transit would travel in a side-running lane, which could be designated by striping and signage. As with Option 2, this alternative would avoid property acquisition but would impact the existing median and turn lanes.

**Option 4:** Exclusive and Semi-Exclusive<sup>1</sup> Lanes on Shoreline Boulevard, Along the **Curb Between Terra Bella Avenue and Pear Avenue.** This option would require the acquisition of additional right-of-way north and south of the interchange.

Various improvements could, and in some cases would need to, be implemented in tandem given the constraints of current street geometries. For example, if transit-only lanes are installed along the existing overpass, a separate transit bridge would not be needed. As such, a new bike/pedestrian overpass would likely need to be paired with transit only-lanes. Another option to be addressed is the possible use of the transit lanes by other High-Occupancy-Vehicles, such as vanpools or carpools.

<sup>&</sup>lt;sup>1</sup> Private vehicles would be allowed to enter the lanes in order to access Highway 101 on-ramps or turn right.



Figure 11 – Highway 101 Transit Crossing Alternatives

#### **Other Potential Corridor Improvements**

In addition to the infrastructure alternatives presented, various programmatic and policy alternatives should be explored to enhance mobility in the Study Corridor, including:

- Management and Operation of the Transit Center The Transit Center operations could include active management in the form of physical staffing. Traffic-control officers could help better distribute loading and traffic flow, particularly during peak hours, of shuttles, vanpools, and private vehicles.
- Downtown Parking Strategies Strategies would generally seek to better integrate and manage the existing Caltrain lot as part of the greater downtown parking system. This would include the coordination of on- and off-street regulations to encourage efficient use of all downtown facilities. The development of new public parking supply near the station should also be closely coordinated to allow Caltrain commuters to utilize those facilities.
- Directional Signage and Wayfinding—These strategies seek to efficiently coordinate movement within a district or transportation center, pointing users of all modes of travel to the best access routes for their destination.
- Bike-Share Program Expansion—Bay Area Bike Share pods exist at the Transit Center and in downtown Mountain View, but should be significantly expanded to serve the important connection between downtown and large employment/ activity centers in North Bayshore.
- Electric Vehicle Charging Stations—Electric vehicle charging stations could be installed at the Transit Center and other convenient locations in the study area to facilitate the use of climate-friendly vehicles.
- Car-Sharing Facilities The expansion of off-street car-sharing pods and potential introduction of on-street pods could help reduce vehicle ownership for downtown residents and encourage transit use if people knew they had access to a vehicle for daily errands or short trips.
- Real-Time Information and Web-Based Applications—The City and/or the Transportation Management Association could help develop and operate a smart phone application for general transportation within and to the study area. The application could include schedules for the proposed new shuttle system,

information on biking routes and amenities, information on car- and bike-sharing pods and services, and real-time transit/shuttle arrival information.

# **RECOMMENDATION**

Staff seeks input from the City Council regarding the preliminary Shoreline Boulevard Corridor alternatives identified in this report to respond to anticipated growth in the City's North Bayshore Area, the need for additional transit and active transportation commute connections between the Downtown Transit Center and North Bayshore Area, and the North Bayshore commute mode-share goals endorsed by the City Council in March 2013.

As previously noted, the options presented represent an initial range of concepts and have not yet been fully explored in terms of technical feasibility, pros and cons, costs, and other evaluation measures. At this stage of the project, City Council feedback is sought regarding the progress and findings of the Corridor Study to-date, the range of alternatives under study, and any additional options that should be considered.

# NEXT STEPS

An additional round of community outreach is planned for late May, focusing on a review of the alternatives. A second City Council Study Session is tentatively planned on June 17. The purpose of that meeting will be to narrow and better define the alternatives. The remaining concepts will then be further developed between June and late 2014, when the final preferred alternative will be presented to the Council for approval.

When complete, the Corridor Study will provide cost estimates for the preferred alternative, identify funding options, and recommend a phasing/implementation plan.

It is expected that the preferred alternative will be developed to a sufficient level that, if approved, the project could then move to environmental clearance and potential funding as next step actions.

#### 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.

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