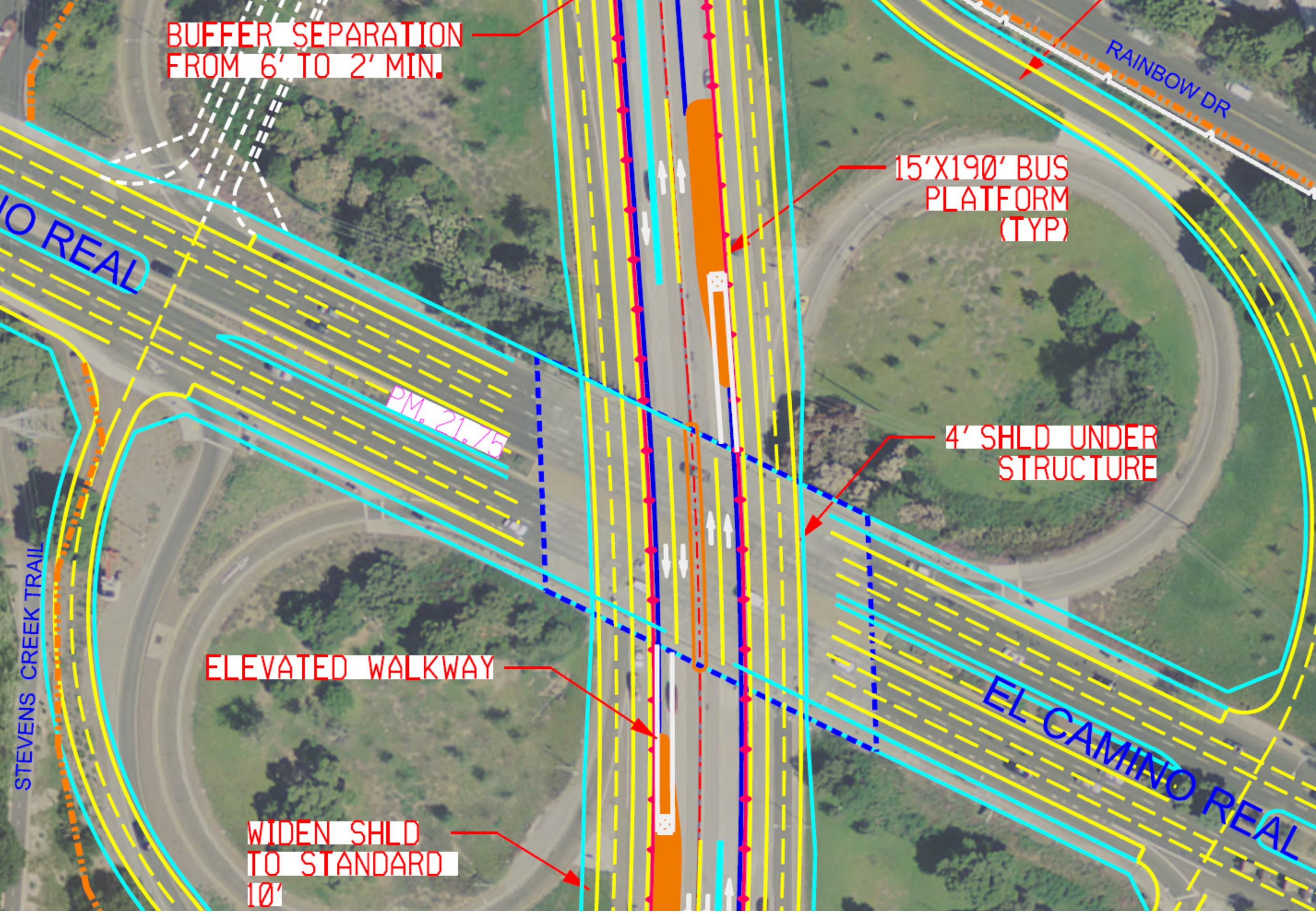


ALTERNATIVES ANALYSIS

STATE ROUTE 85 TRANSIT GUIDEWAY STUDY

CDM Smith

2016 MEASURE B

Table of Contents

List of Figures

List of Tables

Appendices

Chapter 1
Introduction

The purpose of this SR 85 Transit Guideway Study is to investigate alternative transit improvements to address the congestion and delay that now characterizes this major transportation facility. A collaborative process involving each of the cities along the corridor, the VTA, and Caltrans is being used to guide the study. The study is intended to address a broad range of transit options and alternatives including consideration of advanced transit technologies and operational strategies. A comprehensive and transparent process was used to identify, develop and evaluate a full range of transit technology and service alternatives.

This Final Report provides a description of SR 85 improvement alternatives as well as an analysis of alternatives. The information provided will be used by the VTA and the Policy Advisory Board to develop a recommendation for further analysis and development of a preferred alternative.

1.1 Alternatives Development Process

The process was designed to make sure that all merited ideas were considered. The SR 85 Corridor Policy Advisory Board (PAB) was established to ensure the stakeholder cities in the SR 85 corridor are involved in the development of existing and potential transportation capital projects along the corridor and have the opportunity to provide input and recommendations to the VTA Board of Directors. VTA staff brought updates and shared technical findings from the SR 85 Transit Guideway Study to the PAB on a periodic basis as the study progressed.

In addition, community meetings were held to inform the public and stakeholders about the study and to provide a forum for public discussion and feedback. Also, a project website was established to provide easy access to project information.

1.2 Fundamental Decisions

The process of defining and reviewing the alternatives was incremental in nature. Initially, a long list of technology and service options was considered. This list was gradually narrowed based on some fundamental decisions made during the process of working with the PAB and the public. These decisions were also informed by the assessment of existing conditions/transit market analysis and the engineering constraints analysis that was conducted as the first phase of this study. The fundamental decisions that were made were those on mode, service, stations, and right-of-way.

1.2.1 Mode

Initially the study considered light-rail and other rail-based technologies, as well as bus alternatives that would use the SR 85 corridor. The transit market analysis indicated that the corridor is characterized by low density land uses and patterns of travel which are focused in the peak commute periods and are highly directional. It became clear that these characteristics were not supportive of high investment and high capacity rail solutions. Further, an analysis of the cost structure of rail indicated that the high capital and operating costs made it a less suitable choice for a suburb-to-suburb transit connection. At its July 2, 2019 meeting the PAB passed a resolution to eliminate light rail as a considered mode for the SR 85 Transit Guideway Study. This was a major step, focusing the further engineering and planning work on bus-based alternatives.

1.2.2 Service

The approach was to develop transit alternatives with service characteristics that were tailored to the actual travel demands in the corridors. The PAB was provided with an analysis that showed the tradeoffs between maximizing service speed, person throughput, and access while managing costs. The PAB expressed their desire to emphasize speed, seeking to maximize the time competitiveness with traveling by automobile. Accordingly, the number of transit stops was limited and routing options attempted to keep the buses on the freeway as much as possible.

1.2.3 Stations

Consistent with the concept of maximizing transit speed, the PAB indicated that the number of transit stops in the corridor should be limited to 2-6 locations where there was potential for high levels of transit access activity. The concept of developing transit stops or stations that were located on the freeway, so that the buses would not have to exit the freeway to pick-up or drop-off passengers, was preferred by the PAB.

1.2.4 Right-of-Way

The engineering constraints analysis indicated that the transit alternatives could be constructed within the existing SR 85 right-of-way, although there were some “pinch points” where small property acquisitions might be necessary. The PAB indicated a desire to minimize project impacts by avoiding as much as possible the need to acquire additional right-of-way.

These fundamental decisions provided the basis for development of a refined set of bus transit alternatives in the corridor that would emphasize speed, serving a limited number of stops, and using the existing available right-of-way.

1.3 Project History/Background

To understand the rationale behind the identification of the bus alternatives it is important to understand some of the history of SR 85. SR 85 is a relatively young facility. The first portion between Stevens Creek Boulevard and US 101 in Mountain View was completed in 1965 and the full freeway extending all the way to its southern connection with US 101 was completed in 1994. During the development of the freeway, traffic noise was a concern and for this reason portions of the freeway were depressed below grade and large trucks are prohibited. Today the freeway, with its three travel lanes including an HOV lane in each direction, is a major conduit for commuters. It connects homes in South San Jose, Los Gatos, Saratoga, the Coyote Valley and points to the south, as well as Santa Cruz County, to jobs in Mountain View, Sunnyvale, Cupertino and other points along the US 101 and SR 237 corridors.

As part of VTA’s Silicon Valley Express Lanes Program it was proposed to convert the existing HOV lane in each direction to an express lane and then to use the wide median area which is available on SR 85 between SR 87 and I-280 to add an additional express lane. This was to address the fact the current HOV lanes fill to capacity during the peak commute periods in the peak direction. In April 2015, VTA issued the *Initial Study with Negative*

Declaration/Environmental Assessment with Finding of No Significant Impact State for the Route 85 Express Lanes Project. Some of the cities along the corridor objected with two primary concerns: 1) the additional lane would result in increased traffic related noise; and 2) there was an understanding that the available median area between SR 87 and I-280 would be reserved for a future light rail extension or some other transit improvement.

Discussions between the cities and VTA resulted in an agreement that the PAB would be formed to investigate measures to reduce traffic noise and to study alternative transit improvements in the corridor. In addition, it was agreed that a provision would be included in the Measure B transportation sales tax initiative to provide funding to the improvements that would be identified in the studies.

The express lane project has been paused pending the completion of the transit guideway study and the subsequent recommendation about how to proceed in the corridor that the PAB will provide to VTA's Board of Directors.

1.4 Alternatives Advanced

Having the fundamental decisions in place, the available information regarding the engineering and right-of-way constraints evaluated, and the transit market analyzed, a series of alternatives focusing on bus improvements were developed. These were alternative strategies for the construction of transit infrastructure. Three conceptual alternatives were advanced for additional consideration. These were express lanes, transit lanes, bus on shoulder as well as a no change alternative to be used to evaluate the build alternatives. At its meeting in September 2019 the PAB approved these alternatives for final consideration in the study. The following sections provide a much more detailed description of the alternatives that were studied.

1.4.1 No Change

This no-build alternative is the baseline against which the other "build" alternatives will be compared. It represents the existing conditions with no changes to the freeway configuration or other transit improvements.

1.4.2 Express Lanes

Two variations were considered: 1) conversion of the existing HOV lane in each direction to a single express lane; and 2) conversion of the existing HOV lane in each direction to an express lane and the addition of a second express lane in the median area of the freeway to provide dual express lanes (this alternative represents the project evaluated in the 2015 environmental document). Express lanes allow non-carpool vehicles to use the lanes for a fee, which would adjust based on express lane travel speeds to maintain consistent speeds. Carpools can use an express lane for free.

1.4.3 Transit Lanes

Exclusive lanes for transit vehicles designated as "Transit Only" would be created in the median of the freeway adjacent to the existing HOV lanes. A variety of configurations including provision of on-line freeway stations were considered. VTA transit service and private shuttles are envisioned as eligible users of transit lanes.

1.4.4 Bus on Shoulder

The shoulder area of the freeway, either left-side or right-side would be adapted for use by buses. When speeds in the general-purpose lanes drop below 35 miles per hour buses would be allowed to enter the shoulder area and bypass the traffic, but in a carefully controlled manner at speeds no greater than 10-15 miles per hours than that of the general traffic. VTA transit service and private shuttles are envisioned as eligible users of bus on shoulder lanes.

Chapter 2

Alternatives

2.1 SR 85 Corridor Context

The proposed corridor is SR 85 between US 101 in south San Jose and US 101 in Mountain View, California, approximately 24 miles long. For the purposes of this study, SR 85 was broken into three distinct sections based on roadway geometry and traffic volumes as outlined below and shown on **Figure 2-1**.

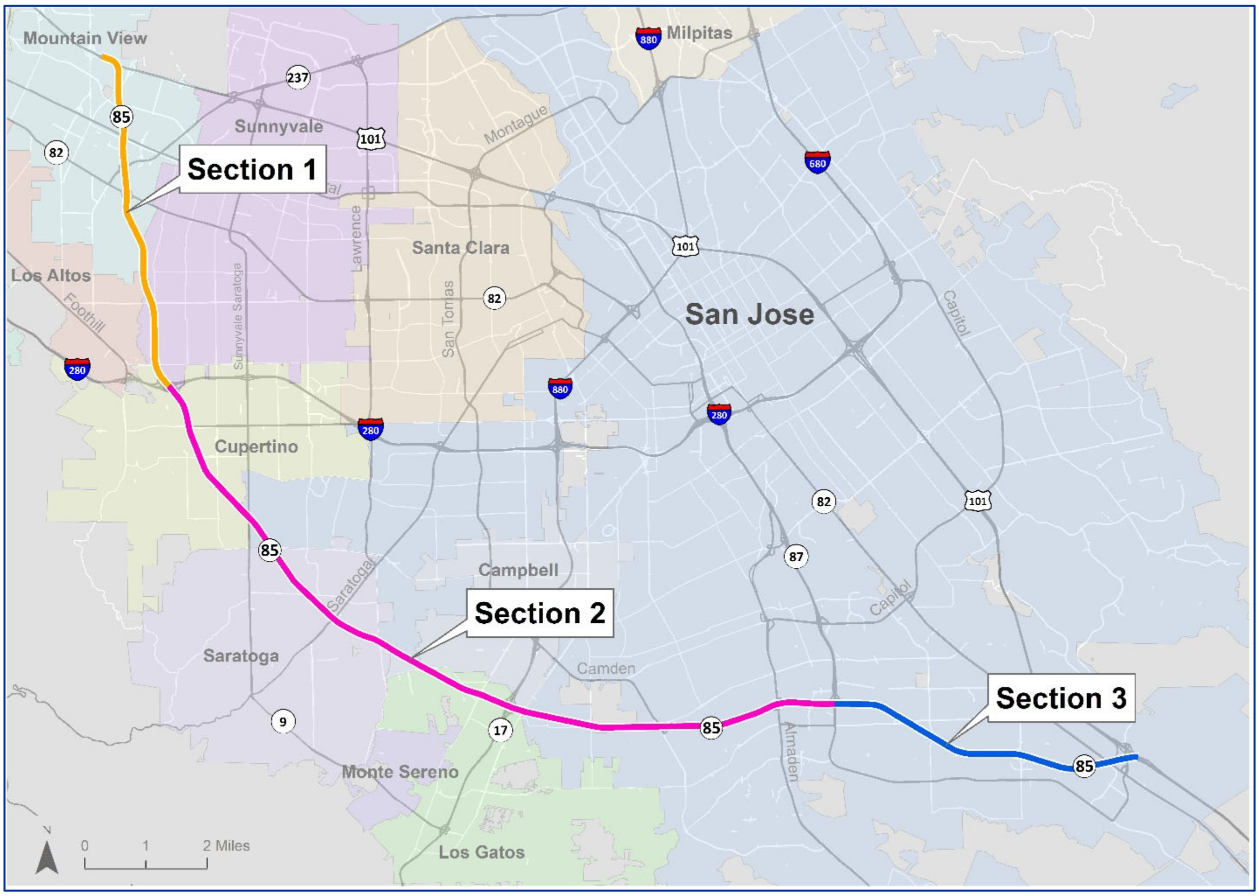


Figure 2-1: SR 85 Analysis Sections

- **Section 1** (approximately 5.5 miles) covers the northern end, beginning at the interchange of I 280 and continues north to the US 101 interchange. This section has a narrow median.
- **Section 2** (approximately 13.5 miles) begins at the SR 87 interchange and continues north to the I 280 interchange. Most of this section has a full shoulder and unpaved median.

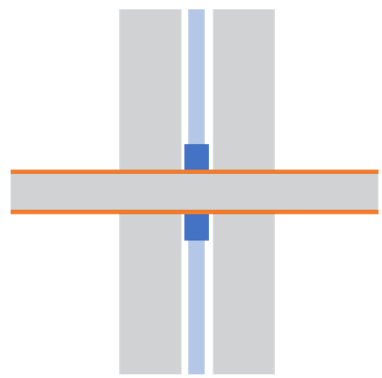
- **Section 3** (approximately 5 miles) covers the southern end of SR 85 where VTA LRT operates in the median. It starts at the interchange with SR 87 and continues to the interchange with US 101.

SR 85 has two general purpose lanes and one High Occupancy Vehicle (HOV) lane along all three sections. It currently experiences heavy congestion during peak periods in the general-purpose lanes as well as slow travel speeds in the HOV lane.

2.2 Stations

To complete the evaluation of alternatives it was necessary to identify locations for new transit stations. As noted, one of the fundamental questions answered by the PAB involved the number of new transit stations. The PAB preferred 2-6 stations in the SR 85 right of way to maximize transit. These new stations are only associated with the Transit Lanes and Bus on Shoulder Alternatives.

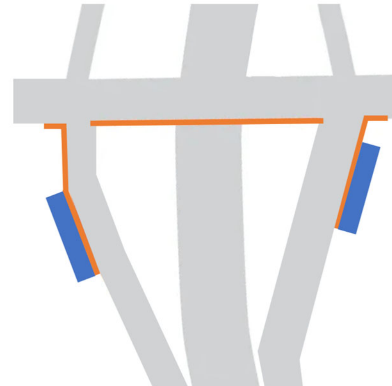
How customers access transit services or connect to local land uses must be established to differentiate and evaluate alternatives. There are several ways to create stations and provide local access to and from land uses.



- At-grade stations in either the SR 85 median or off the right shoulder. These stations would include, as appropriate, stairs, elevator and walkway connections to local streets and would provide access to:
  - Walkers, bikers and scooters
  - Park and ride lots directly adjacent to the station
  - Local bus stops on the cross street
  - Local land uses

- Median ramps where the transit lane either goes up or down to connect to the local street and has either a station on the ramp and/or provides the ability to connect to other bus stops/stations/hubs off SR 85

- Stations located on ramps that are used with the right-side transit lane or bus on shoulder alternatives.



Previous work identified up to six locations for potential stations and local street access (**Figure 2-2**). Each of these locations are discussed below.

- **Mountain View Transit Center** is located approximately 0.5 miles west of SR 85 along West Evelyn Avenue and has connections to LRT at the Mountain View Transit Center, a park and ride lot and connections to several local bus stops. While off the study corridor this could be considered a terminal station for service.

- **El Camino Real** could provide a direct connection to bus routes 22, 522.

- **Stevens Creek** could provide a direct connection to bus route 51 and De Anza College. McClellan Road could be considered for direct access ramps from the median or right for buses (and HOVs).

- **Saratoga Avenue** could provide a direct connection to bus route 26 and is close to West Valley College Transit Center. Direct access ramps from the median or right side for buses (and HOVs) at Quito Road to the south could be considered as well as using Allendale Avenue to access West Valley College Transit Center.

- **Bascom Avenue/Winchester Avenue** are two locations in close vicinity to each other. Bascom would provide a direct connection to Good Samaritan Hospital and several local bus routes including 61 and 27. The Winchester Avenue connection would allow a direct connection to bus route 27 and is immediately adjacent to a major employment complex. Additionally, the proposed extension of Winchester LRT would end at the proposed Vasona Station and park and ride lot. While both locations have merit, the development of only one location is appropriate given the short distance between them. A Bascom Avenue station will be considered for this analysis. Moving the station location to Winchester Avenue can be considered if plans for a Winchester LRT extension advance.

- **Ohlone/Chynoweth** is an existing multimodal center at the intersection of SR 85 and Santa Teresa Boulevard. It currently includes a park and ride lot (549 spaces), connection to the Guadalupe LRT, Almaden LRT Spur, and VTA bus routes 13 and 102. Direct northbound access to/from SR 85 is via ramps and a traffic signal at Santa Teresa Boulevard with access to the park and ride. The southbound direction access would be via ramps to Santa Teresa Boulevard then the signal at the access to the park and ride.

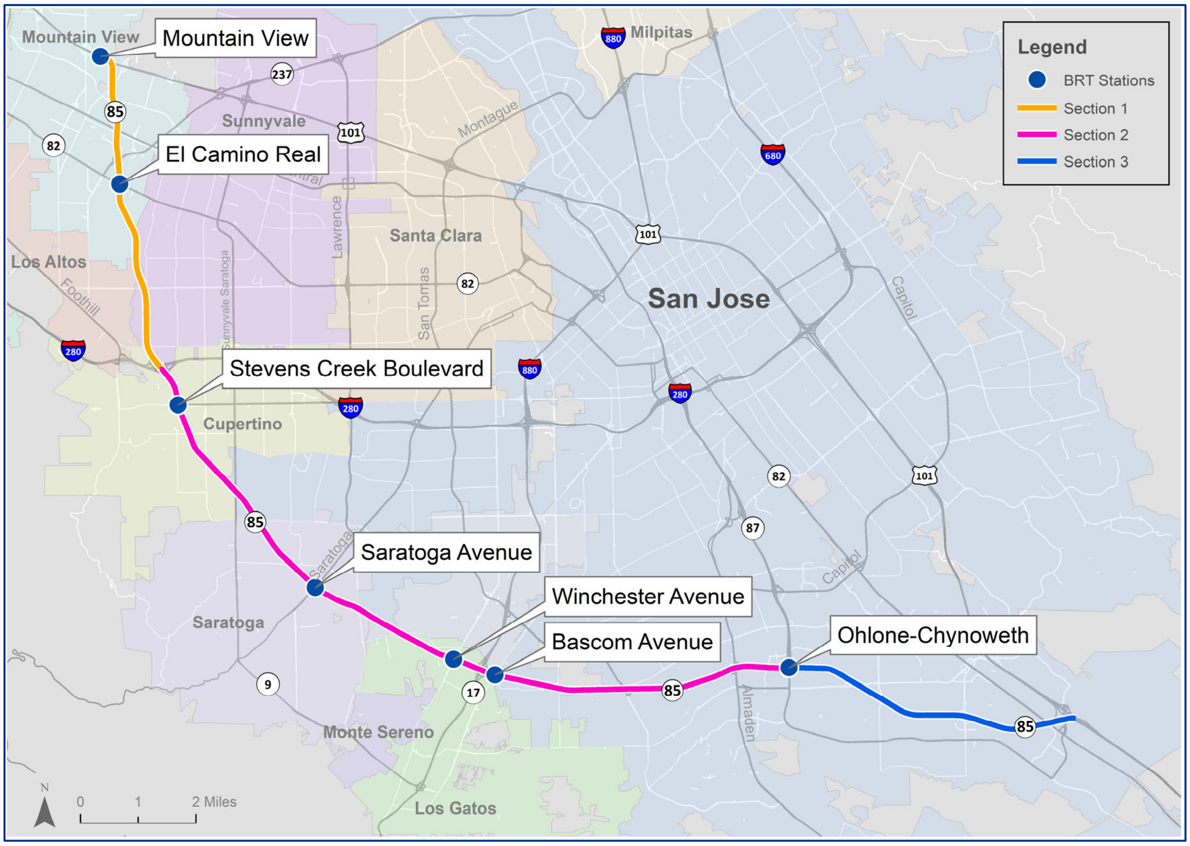


Figure 2-2: SR 85 Proposed BRT Stations

2.2 Alternatives Advanced

The following is a more detailed description of the four alternative categories advanced for analysis. These are construction alternatives. Under the No Change Alternative 1-1, and Express Lane Alternatives 2-1, 2-2 and 2-3, there is no new transit service that runs the length of the corridor. All other transit alternatives (transit lanes and bus on shoulder) will have a two routing options for the provision of a new transit route running the length of the corridor.

Each transit alternative includes three basic components: some form of exclusive transitway, a set of station/stop assumptions and a set of potential transit routings. The alternatives are grouped based on the type and location of the transitway. Following are brief descriptions of each component and the assumptions that will be used to evaluate the alternatives.

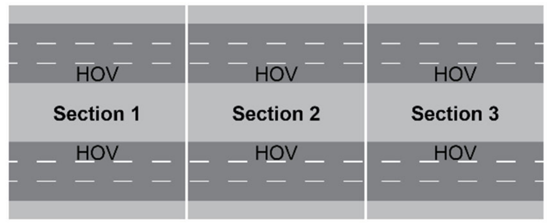
Since LRT currently operates in Section 3, the transit alternatives provide transit only lanes in Sections 1 and/or 2 by creating exclusive transitways in the median (inside) and/or outside or allow buses to use the shoulders when travel speeds in general purpose lanes fall below a set speed threshold (35 mph for example) using either the outside or inside shoulders.

2.2.1 No Change

Alternative 1-1 is the No Change. This alternative assumes no changes to how the existing HOV lane operates and no added travel lanes. Two options are included in this alterative.

- **Option 1** No physical changes to the corridor.
- **Option 2** No improvements in the corridor associated with this project, but all projects included in the Metropolitan Transportation Commission (MTC) Plan Bay Area 2040 or those that have been submitted by VTA for inclusion in the upcoming MTC Plan Bay Area 2050 are assumed to be built as planned. A key project in the corridor is the conversion of the El Camino Boulevard interchange into a diamond interchange. Each of these projects are discussed in greater detail in the Proposed Engineering Features Report developed during this study.

Alternative 1-1 No Change



2.2.2 Express Lanes

An express lane is defined as a managed lane that restricts access based on vehicle occupancy and associated user fees. By using express lanes instead of HOV lanes, these alternatives attempt to improve opportunities to maximize the use of the facility, provide greater modal opportunities and encourage people to shift their mode to transit or carpooling, increasing passenger throughput. The SR 85 express lanes align with VTA's Silicon Valley Express Lane Program.

The following assumptions are required to make the express lanes operational:

- Express lanes would continue to be separated from general purpose lanes with painted lines only and have continual access along the entire length of the corridor
- Tolling gantries would be added along the length of the project
- All on-road equipment would be connected to the existing control center
- Enforcement areas will be created as appropriate along the corridor

In addition to physical construction, policy decisions must be addressed. While final decisions on express lane policies would occur later in project development and align with current express lane policies, the following set of assumptions will be used during the evaluation of alternatives.

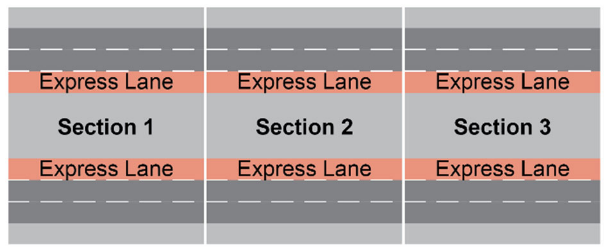
- The pricing of express lanes is assumed to be at a level high enough to ensure traffic would remain free flowing (45 mph).
- The following are assumptions are express lane tolling assumptions:
    - Single Occupancy Vehicles (SOV) – Tolled
    - High Occupancy Vehicles 2+ (HOV 2+) – Tolled at half the price of single occupancy

- High Occupancy Vehicles 3+ (HOV 3+) – Free
- Transit Vehicles – Free
- Private Shuttles – Free
- Electric Vehicles (EV) – Tolled as HOV 2+ unless they meet HOV 3+
- Trucks – Not permitted

▪ If the number of HOV 3+, transit vehicles and private shuttles combined exceeds express lane capacity, then all other vehicles would be prohibited from using the express lanes.

2.2.3 Alternative 2-1 HOV to Express Lane

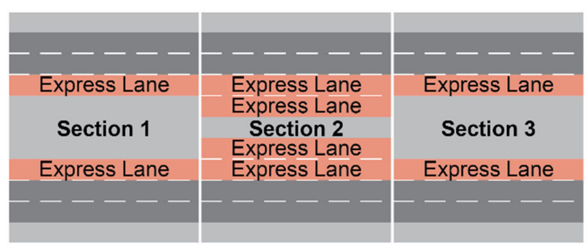
Alternative 2-1 HOV to Express Lane



Under this alternative the existing HOV lane is converted to an express lane. This alternative could be implemented without any physical changes to the roadway/shoulders except for median changes to construct gantries and enforcement areas in the median. Given the congestion along parts of the corridor in the existing HOV lane, to maintain free flow speeds, it is assumed that only HOV 3+ vehicles would be permitted in the express lanes during peak periods. This alternative assumes none of the future improvements noted in Scenario 2, No Change, as they are not required to implement express lanes and would only improve overall operations.

2.2.4 Alternative 2-2 Short Dual Express Lane

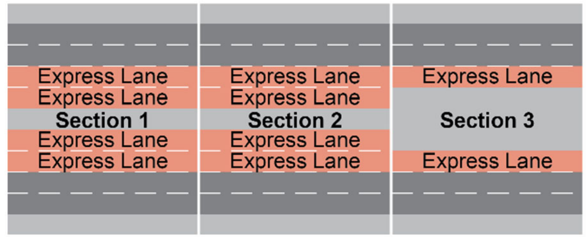
Alternative 2-2 Short Dual Express Lane



Both Alternatives 2-2 and 2-3 build on Alternative 2-1, a single express lane along the entire project. Alternative 2-2 includes a second express lane only in Section 2, as Section 2 is the easiest to implement and targets the area of greatest congestion. This alternative would be accomplished by reconstructing the existing median to accommodate the additional lane in each direction. Alternative 2-2 aligns with the SR 85 express lanes project that received environmental clearance in 2015 and was halted pending the outcome of this study and subsequent PAB recommendation.

2.2.5 Alternative 2-3 Long Dual Express Lane

Alternative 2-3 Long Dual Express Lane



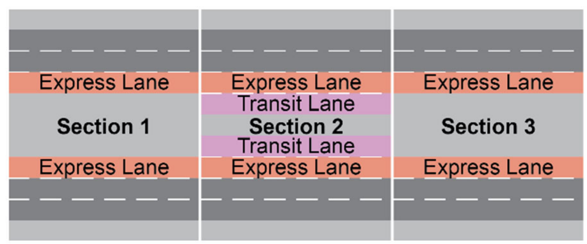
Alternative 2-3 builds on Alternative 2-2, adding a second express lane in Section 1, as well as Section 2. The second express lane in Section 1 would require replacement of the existing median, as well as some additional pavement widening on the outside. This alternative may require moving some sound walls. Additionally, for Alternative 2-3 the reconfiguration of the El Camino Real interchange will be required. This design was not included in VTA's Silicon Valley Express Lanes Program but is included as a point of comparison to transit alternatives that would add a new lane in Section 1 of the corridor.

2.3 Transit Lanes

Alternative 3-1 and 3-2, build on Alternative 2-1, HOV to Express Lane by adding an additional lane in the median for transit vehicles to exit the proposed express lane. Median stations would be included with these alternatives.

2.3.1 Alternatives 3-1 Short Median Transit Lane

Alternative 3-1 Short Median Transit Lane



Alternative 3-1 adds a median transit lane in Section 2, to the HOV to express lane conversion in Alternative 2-1.

Stations used or constructed would be:

- **Stevens Creek** This stop would be a median stop. With a reduced median in this area a split platform configuration could be required. It would require stairways and elevators on both sides of the overpass. Additionally, the bridge and adjacent roadways would need widening to accommodate pedestrian movements.

- **Saratoga Avenue** This stop would be a median crossover stop and would require separation of the bus station from the transit lane with a concrete barrier. Stairs and elevators would be needed on each side of the Saratoga bridge. The Saratoga Avenue overpass and adjacent intersections would need to be widened to accommodate pedestrian movements.

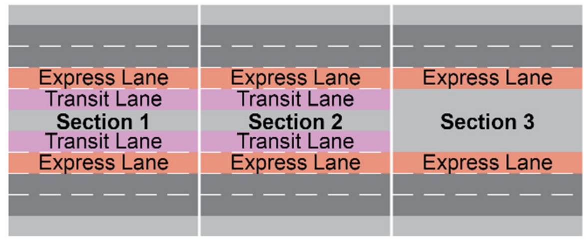
- **Bascom Avenue** This stop would be a median crossover stop and would require separation of the bus station from the transit lane with a concrete barrier. If a wider platform area is required, split platforms could be considered. Stairs and elevators would be needed on each side of the Bascom bridge. The Bascom overpass and adjacent intersections would need to be widened to accommodate pedestrian movements.

- **Ohlone/Chynoweth** This is an existing station and would not have any associated changes.

2.3.2 Alternative 3-2 Long Median Transit Lane

Alternative 3-2 builds on Alternative 3-1 and adds a median transit lane in Section 1 as well as Section 2.

Alternative 3-2 Long Median Transit Lane

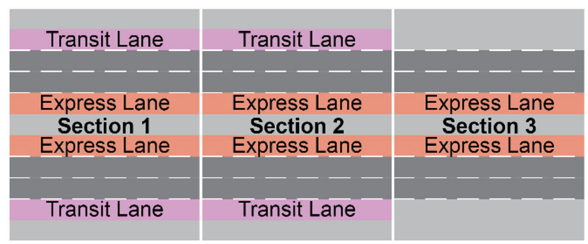


Stations used or constructed under this alterative would be:

- **Mountain View Transit Center** To more directly service this station, the median transit lanes use new median ramps to connect directly to Evelyn Avenue at a signalized intersection. The bus could then continue to the Mountain View Transit Center.
- **Alternative 3-1 Stations** Alternative 3-2 builds on Alternative 3-1. All alternative 3-1 stations would be constructed and included in Alternative 3-2.

2.3.3 Alternative 3-3 Right Side Transit Lane

Alternative 3-3 Right Side Median Transit Lane



This alternative would add a transit only lane on the right side of SR 85 in Sections 1 and 2. The existing three lanes would be moved toward the median with a reduced median shoulder so the expansion could fit within the existing right of way. Like Alternatives 3-1 and 3-2, stations/stops could be constructed on SR 85 but they would be on the right side. Another option would be for the buses to exit to the local street using the existing ramps. In this case, stations could be placed on the ramps or on the local streets depending on the proposed routing.

The following is a description of the stations that would be developed used under this alternative for a transit routing remaining on a right-side transit lane.

- **Mountain View Transit Center** Buses would use the existing ramps. Queue jumps or other appropriate bus treatments could be considered at the intersection with Evelyn Avenue.
- **El Camino Real** A right side bus stop along SR 85 would only be feasible with the proposed reconfiguration of the interchange. With reconfiguration, platforms could be constructed for both directions, separated from traffic by a concrete barrier, with stairs and elevators on each side of El Camino Real. As part of the reconfiguration, the El Camino Real bridge would need to include the appropriate pedestrian amenities.
- **Stevens Creek** Would require platforms for both directions, separated from traffic by a concrete barrier, with stairs and elevators on each side of Stevens Creek. The Stevens Creek overpass and adjacent intersections would need to be widened to accommodate pedestrian movements.
- **Saratoga Avenue** Would require platforms for both directions, separated from traffic by a concrete barrier, with stairs and elevators on each side of Saratoga Avenue. The SR 85 bridge would need to be widened to allow for the additional bus platforms. The Saratoga

overpass and adjacent intersections would need to be widened to accommodate pedestrian movements.

- **Bascom Avenue** Would require platforms for both directions, separated from traffic by a concrete barrier, with stairs and elevators on each side of Bascom Avenue. The Bascom overpass and adjacent intersections would need to be widened to accommodate pedestrian movements.
- **Ohlone Chynoweth** Would not have any associated changes.

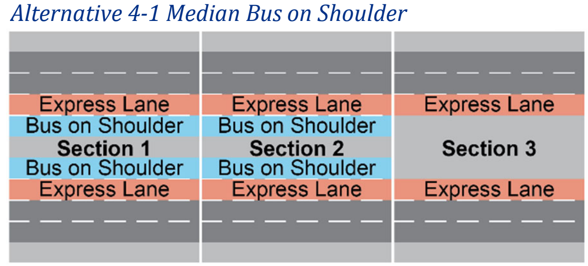
2.4 Bus on Shoulder

Alternatives 4-1 and 4-2 involve the use of shoulders. Operationally, these alternatives would allow buses to operate on the shoulder during periods of congestion. Rather than creating a separate transit only lane, this concept allows the buses to use the shoulders once traffic speeds fall below a certain threshold (35 mph). Buses could travel on the shoulder at up to 45 mph to the next stop. This concept allows buses to bypass the slow-moving traffic. Significant guidance on shoulder facilities operations is provided from the Transportation Cooperative Research Program (TCRP). Currently this type of operation is not permitted. In addition to any physical changes, regulatory changes would also be needed. Bus on shoulder operations could operate with no other improvements in some segments and provide travel time benefits for existing services. They could also be combined with the service improvements identified including adding stations within the right of way or on the ramps like Alternatives 3-1 through 3-3.

2.4.1 Alternative 4-1 Median Bus on Shoulder

This alternative would be a variation of Alternative 2-3. Instead of providing a second managed lane, the median shoulder would be upgraded so that buses could bypass any congestion within the express lane. This alternative could also include the median transit stations or access points as outlined in Alternative 3-2.

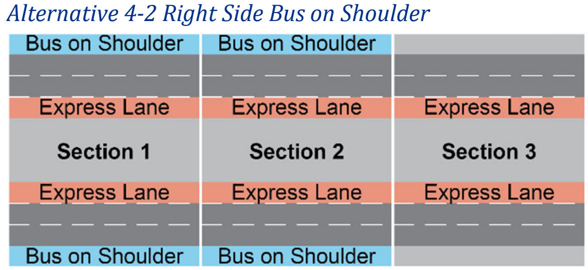
Alternative 4-1 Median Bus on Shoulder



2.4.2 Alternative 4-2 Right Side Bus on Shoulder

This alternative would operate like Alternative 3-3 but rather than a full-time transit lane, the right side would operate as a shoulder unless traffic congestion exists. Stations are not required but could be included and would align with Alternative 3-3.

Alternative 4-2 Right Side Bus on Shoulder



Chapter 3

Transit Operations

The demand for transportation facilities is highly dependent on regional and local land uses and demographics. It is difficult to predict where growth will occur and how dense or intensive it will be. Well planned transportation facilities are those that are flexible and can be adapted based on future conditions without the need for reconstruction. Often an incremental or phased approach is used that doesn't preclude future improvements.

As indicated previously, the No Change alternative and the HOV to Express Lane Conversion do not include any new transit services. The Transit Lane and Bus on Shoulder alternatives do include a new transit service running the length of the corridor. There are two routing options for this new service. One would include building an SR 85 transit facility complete with new in-corridor transit stations and the other option would make only the roadway improvements and use existing off-corridor bus stops.

Either of these transit routing options can be considered for various levels of operating days, service hours and frequencies.

3.1 Transit Routings

Two routing options were developed that explore the ridership tradeoffs between direct travel and increasing direct access to high demand off-corridor locations. These routing options apply to the transit lane (Alternatives 3-1, 3-2, 3-3) and bus on shoulder alternatives (Alternatives 4-1 and 4-2) only.

3.1.1 Option 1

This option assumes that the existing Mountain View Transit Center and the Ohlone/Chynoweth Station are used as the north and south terminus points and that new stations are built as part of the transit alternatives. The service could be expanded to provide greater access to the north by extending it beyond the Mountain View Transit Center in the north or beyond the Ohlone/Chynoweth Station in the south, though extending the route would increase the overall travel time of the route and decrease the average travel speed which would increase vehicle needs and operating cost.

Option 1 includes new stations at

- El Camino Real (except for Alternative 3-1)
- Stevens Creek
- Saratoga Avenue
- Bascom Avenue

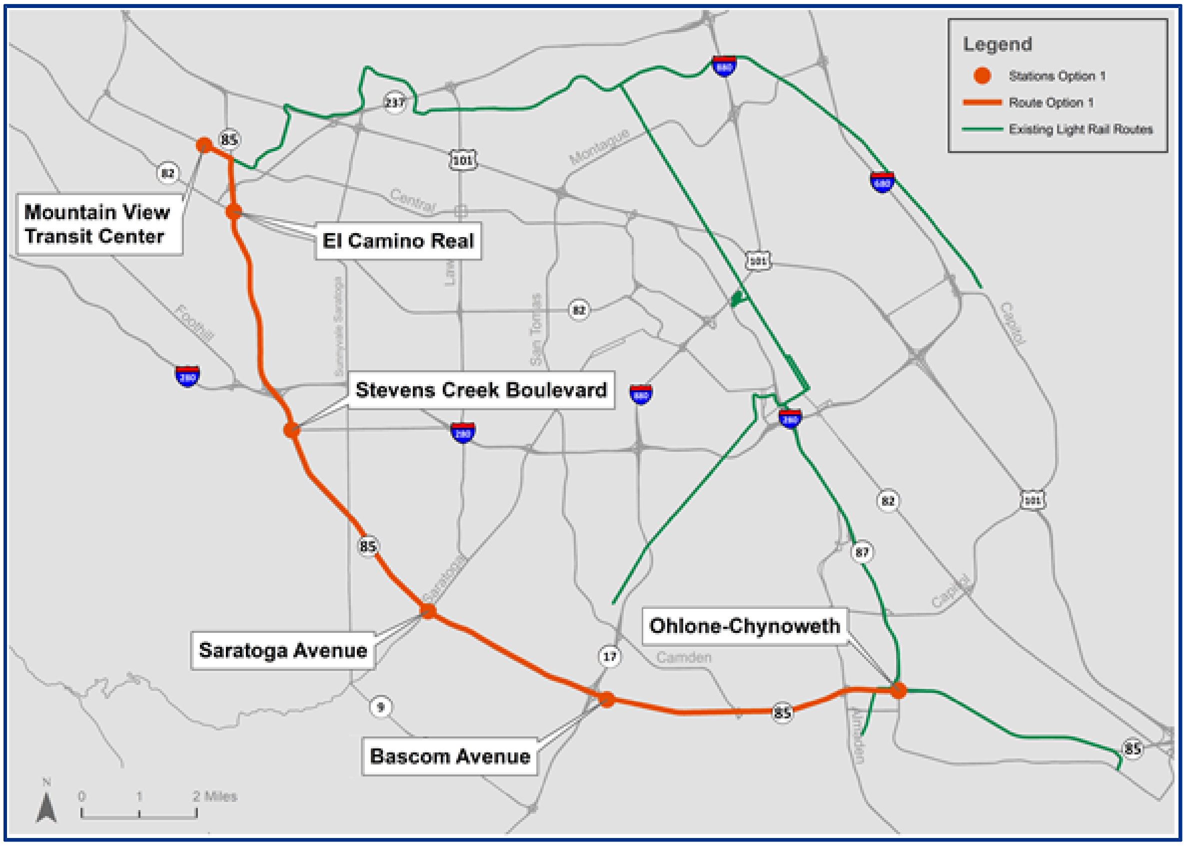


Figure 3-1: Routing Option 1

3.1.2 Option 2

The second service option would operate like the first, except the service would exit SR 85 at Stevens Creek, Saratoga and Bascom to circulate on local streets and connect to local transit centers at De Anza College, West Valley College and Good Samaritan Hospital. By exiting SR 85 to circulate locally, the length of the transit trip would increase, also increasing the transit operating cost. This alternative is shown on **Figure 3-2**.

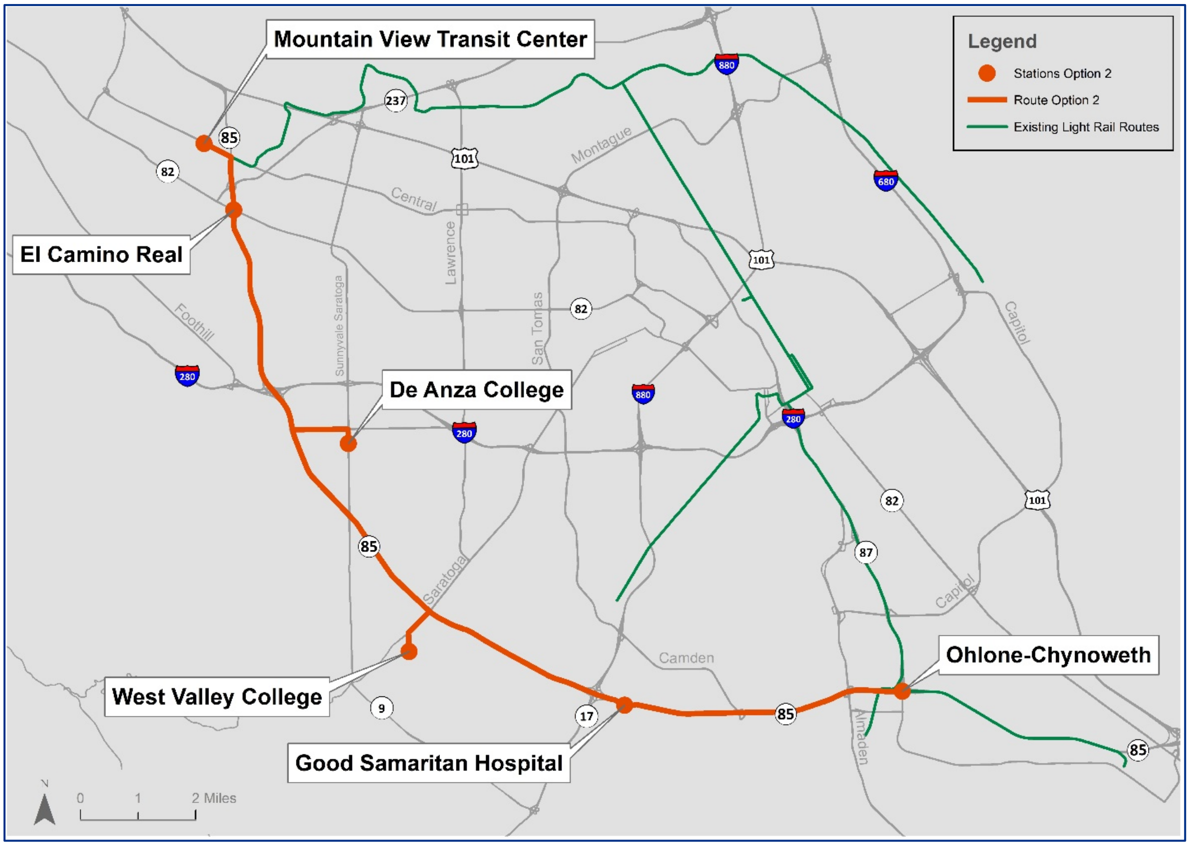


Figure 3-2: Routing Option 2

For transit routing exiting the transit lane to circulate on local streets, the following is a description of bus access for Alternatives 3-1, 3-2 and 4-1.

- **Mountain View Transit Center (Alternatives 3-2 and 4-1 only)** To more directly service this center, the median transit lanes are dropped down and cross under SR 85 to connect directly to Evelyn Avenue at a signalized intersection. The bus could then continue to the Mountain View Transit Center.

- **El Camino Real (Alternatives 3-2 and 4-1 only)** Given the current configuration, no opportunity exists to create a connection to the local street system directly from the median. With a new interchange configuration (cloverleaf to a diamond), a potential opportunity exists for providing direct ramps to the local street.

- **Stevens Creek** An alternative to direct ramps from the median would be to build direct ramps at McClellan Road.

- **Saratoga Avenue** Rather than provide access directly to Saratoga Avenue, direct ramps to Quito Road

- **Bascom Avenue** Assuming the access would be at Bascom Avenue (see above), median ramps would be built up to Bascom Avenue. This addition would require a signal on Bascom.
- **Ohlone/Chynoweth** Would use the existing ramps and then cross traffic to enter the median.

For transit routing that exits the transit lane to circulate on local streets, the following is a description of bus access to local streets for Alternative 3-3 and 4-2.

- **Mountain View Transit Center** Buses would use the existing ramps. Queue jumps or other appropriate bus treatments could be considered at the intersection with Evelyn Avenue.
- **El Camino Real** Without reconfiguration of the interchange, any form of right-side bus station would not be feasible. With the reconfigured interchange, bus stops on/off ramps would be possible. They could be coordinated with the reconfiguration and sidewalk and pedestrian amenities could be provided on the bridge.
- **Stevens Creek** In this area, a large number of riders are assumed to walk to their destination or have easy access to several nearby bus stops. Given this assumption, stations would be constructed on the off-ramps in each direction. Additionally, the bridge would need to be widened to provide appropriate sidewalk widths and the ramp intersections would need to be reconstructed to address bus movements and to provide appropriate pedestrian facilities.
- **Saratoga Avenue** Since the primary focus of this location would be connections to local bus routes providing last miles services there are two potential options for this location:
    - No stations are built in the vicinity of the interchange and buses circulate to West Valley College Transit Center, or
    - Stations would be constructed on the off-ramps in each direction. Additionally, the existing sidewalks would need to be widened and the ramp intersections would need to be reconstructed to address the bus movements and to provide appropriate pedestrian facilities. Bus stops for connecting bus services would be needed on Saratoga Ave.
- **Bascom Avenue** For this location a significant number of riders are assumed to walk to their destination or have easy access to several nearby bus stops. With this assumption, stations would be constructed on the off-ramps in each direction. Additionally, the Bascom bridge would need to be widened to provide appropriate sidewalk widths and ramp intersections would need to be reconstructed to address bus movements and provide appropriate pedestrian facilities.
- **Ohlone Chynoweth** No associated changes.

Table 3-1 summarizes station and stop access for both Routing Option 1 and 2.

Table 3-1: Station and Stop Access

Alternative	Option	New Direct Connection to Evelyn	Stations Locations: El Camino Real	Stations Locations: Stevens Creek	Stations Locations: Saratoga	Stations Locations: Bascom	Bus Routing	New El Camino Interchange	Bus Pathway
3-1 Short Median Transit Lane	**1**			In line at grade	In line at grade	In line at grade	In Line Route		Bus travels in median transit lane and uses the median at-grade stations. Passengers use stairs or elevator to get to cross-street
	2			NB off/SB on from McClellan Rd, *SB off/NB on at Stevens Creek*	NB off/SB on at Quito Rd, *SB off/NB on at Saratoga*	SB off/NB from Bascom, *NB off/SB on from Union*	Deviation Route		Bus travels in the median as in Option 1 except at Stevens Creek, Saratoga and Bascom where they would exit at nearby crossing with ramps and proceed to the nearby transit centers. There are no ramp stations since there are no generators at the end of the ramps.
3-2 Long Median Transit Lane	**1**	Direct Ramps to Evelyn Ave	In line at grade	In line at grade	In line at grade	In line at grade	In Line Route	Yes	Bus travels in median transit lane and uses the median at-grade stations. Passengers use stairs or elevator to get to cross-street
	2	Direct Ramps to Evelyn Ave	In line at grade	NB off/SB on from McClellan Rd, *SB off/NB on at Stevens Creek*	NB off/SB on at Quito Rd, *SB off/NB on at Saratoga*	SB off/NB from Bascom, *NB off/SB on from Union*	Deviation Route	Yes	Bus travels in the median as in Option 1 except at Stevens Creek, Saratoga and Bascom where they would exit at nearby crossing with ramps and proceed to the nearby transit centers. There are no ramp stations since there are no generators at the end of the ramps.

Alternative	Option	New Direct Connection to Evelyn	Stations Locations: El Camino Real	Stations Locations: Stevens Creek	Stations Locations: Saratoga	Stations Locations: Bascom	Bus Routing	New El Camino Interchange	Bus Pathway
3-3 Right Side Transit Lane	**1**	No	In line at grade	In line at grade	In line at grade	In line at grade	In Line Route	Yes	Bus uses the transit lane and bypasses the ramps, the bus pulls off the mainline and across the shoulder into a protected area where the platform is located. Passengers must then use stairs or an elevator to get to the cross street.
	2	No	Ramp Station	No Ramp Station	No Ramp Station	SB off/NB from Bascom, *NB off/SB on from Union*	Deviation Route	Yes	Bus uses the right side transit lane, exits SR 85 and uses ramp stations then crosses the cross street and returns to SR 85
4-1 Median Bus On Shoulder	**1**	Direct Ramps to Evelyn Ave	In line at grade	In line at grade	In line at grade	In line at grade	In Route	Yes	Bus uses the Express Lane and when traffic drops below 35 mph they exit onto the shoulder to bypass the congestion. The station operations are the same as Alt 3-2 Option 1
	2	Direct Ramps to Evelyn Ave	In line at grade	NB off/SB on from McClellan Rd, *SB off/NB on at Stevens Creek*	NB off/SB on at Quito Rd, *SB off/NB on at Saratoga*	SB off/NB from Bascom, *NB off/SB on from Union*	Deviation Route	Yes	Bus uses the Express Lane and when traffic drops below 35 mph they exit onto the shoulder to bypass the congestion. The station operations are the same as Alt 3-2 Option 2

Alternative	Option	New Direct Connection to Evelyn	Stations Locations				Bus Routing	New El Camino Interchange	Bus Pathway
			El Camino Real	Stevens Creek	Saratoga	Bascom			
4-2 Right Side Bus On Shoulder	**1**	No	Ramp Station	Ramp Station	Ramp Station	Ramp Station	In Route	Yes	Bus travels in the right most general purpose lane. When traffic speeds drop below 35 mph the bus moves to the shoulder. The bus uses the ramps to access ramps stations. The bus crosses the cross street and returns to the right general purpose lane unless the speed is less than 35 mph
	2	No	Ramp Station	No Ramp Station	No Ramp Station	SB off/NB from Bascom, *NB off/SB on from Union*	Deviation Route	Yes	Bus travels in the right most general purpose lane. When traffic speeds drop below 35 mph the bus moves to the shoulder. The bus uses the ramps to travel to the transit center. There are no stations on the ramps where the bus goes to a transit center.

3.3 Service Level

All of the transit facility alternatives can operate under either Routing Option 1 or 2. Under either routing option, there can be varying transit service levels. The service levels to be analyzed include all-day, bi-directional weekday service at 15-minute headways.

Chapter 4

Evaluation Criteria and Results

The following is a review of the criteria used to evaluate the SR 85 alternatives.

4.1 Ridership

This section summarizes the data collection effort, methodology, and analysis results of the SR 85 service ridership development. Full analysis is shown in Appendix A.

4.1.1 Data Collection

The following three sources of data were collected:

- US Census LEHD Trips Data: The US Census Longitudinal Employer-Household Dynamics (LEHD) OnTheMap online portal was used to collect the daily work-related trips around station areas.
- American Community Survey: American Community Survey (ACS) 2017 means of transportation to work (ID: B08301) 5-year estimate data were used to calculate the potential transit mode share of trips that could use the SR 85 service once it is built.
- StreetLight Data: The O-D trips during the AM (6-11 am) and PM (2-8 pm) peak periods collected in the previous phase of this project were used to establish the O-D distribution of the potential SR 85 trips in the study area.

4.1.2 Methodology

Two routing options along with stations were evaluated.

- Option 1 - Mountain View Ohlone/Chynoweth with Freeway Stations: buses travel between the Mountain View and Ohlone/Chynoweth terminal stations and stops at freeway stations (BRT does not exit SR 85). The stations along SR 85 are as follows:
  1. Mountain View Light Rail Transit (LRT) Station Bus Stop
  2. El Camino Real
  3. Stevens Creek Blvd
  4. Saratoga Ave
  5. Bascom Ave
  6. Ohlone-Chynoweth LRT Station Bus Stop
- Option 2 - Mountain View Ohlone/Chynoweth with Freeway and Offline Stations: BRT buses travel between the Mountain View and Ohlone/Chynoweth terminal stations and stops at freeway and offline stations. The stations along SR 85 are as follows:

1. Mountain View Light Rail Transit (LRT) Station Bus Stop
2. El Camino Real
3. De Anza College Transit Center
4. West Valley College Transit Center
5. Good Samaritan Hospital
6. Ohlone-Chynoweth LRT Station Bus Stop

The analysis periods are the AM and PM peak periods that correspond to the VTA Regional Travel Demand Model's peak periods. The assumed peak period duration is four hours.

A station catchment area is defined as one third of a mile around each station. About 90 percent of VTA transit trips access transit stops by walking with the balance comprised by bicycling, scooting or being dropped off by automobile. There is no strict rule for walking tolerance, but analysis finds that a quarter mile is about the upper limit for walking to a local transit service. Walking distances are slightly higher for premium transit services, like Caltrain, which offer an appeal greater than local routes. The catchment area also applies to the destination end of the trip, where a transit rider is more likely to be traveling on foot.

For this analysis, catchment areas were defined as a radii around station areas rather than by walking path. This would have the effect of overestimating the number of people and jobs that fall within a reasonable walk, but that is estimated to be offset by those who make longer distance bicycle, scooter and driving trips to access stations.

A buffer was specified in the OnTheMap portal to collect 2017 daily inflow and outflow trips from the LEHD database. It is assumed that the Inflow trips are the "attraction" trips during the AM peak period and "production" trips during the PM peak period. The daily Outflow trips in an area are the "production" trips during the AM peak period and "attraction" trips during the PM peak period.

It was necessary to develop a mode share assumption given there is no existing transit service running the length of the corridor study area, The Santa Clara countywide Census tract data from the ACS Means of Transportation to Work dataset was collected and plotted. The average mode share of 5.1 percent from the top 300 Census was selected to represent the range of potential commuters in the station areas that would use SR 85 BRT service when it is implemented. The attraction and production trips estimated in the Trip Generation phase were multiplied by 5.1 percent to estimate the potential trips that would use the SR 85 BRT service when implemented.

The StreetLight O-D trips during the AM and PM peak periods were collected during the previous phase of this project. An O-D matrix documenting the assigned StreetLight zones and percentages based on origin was developed. Similarly, another O-D matrix documenting the assigned StreetLight zones and percentages based on destination was developed. These matrices were used to derive the SR 85 BRT production and attraction trips between stations.

An O-D Fratar balancing spreadsheet was developed to balance the SR 85 BRT production OD trips. A final set of O-D trips based on production was derived to minimize the relative difference of the OD trips developed to the target total in each row and column. As with the production O-D trips, the SR 85 BRT attraction O-D trips were plugged into the Fratar spreadsheet to derive the final set of O-D trips based on destination.

The O-D trips based on origin and O-D trips based on destination were averaged to derive the final O-D trips. The processes described were conducted for both AM and PM peak periods and for Options 1 and 2.

4.1.3 Results

The OD trips in Options 1 and 2 constitute the baseline ridership range that is used as the basis to further develop SR 85 BRT ridership for the alternatives. The baseline ridership range for the AM and PM peak periods in Options 1 and 2 for all the alternatives are shown in Tables A-7 through A-10 in Appendix A.

The bus OD travel time from the traffic analysis determines the bus travel time between two stations during the AM and PM peak periods and is the input used to derive ridership for the alternatives. The round-trip travel time based on origin (i.e., leaving for work during the AM period and coming home during the PM period) was calculated for each alternative. A base travel time OD pair was calculated based on the highest travel time among the alternatives in each OD pair.

If a travel time OD pair from an alternative is lower than the base travel time OD pair, it is considered more attractive to transit riders and therefore results in higher ridership. An elasticity of -0.6 was used to calculate the percent change in ridership as a result of percent change in travel time. The elasticity formula can be expressed as follows:

$$E = (\Delta Q/Q_0)/(\Delta TT/TT_0)$$

Where E: Elasticity, ΔQ: change in ridership, Q_0: baseline ridership, ΔTT: change in travel time, TT_0: base travel time.

The developed ridership during the AM and PM peak periods in Options 1 and 2 for Alternatives 3-1 through 4-2 is shown in Tables A-11 through A-20 and Tables in Appendix A. The total ridership (sum of ridership for all OD pairs during the AM and PM peak periods) for all alternatives is summarized in Table 4-1

Table 4-1 Ridership Summary

Routing	Time Period	Alternative				
		Transit Lanes			Bus on Shoulder	
		Short Median	Long Median	Right Side	Median	Right Side
		3-1	3-2	3-3	4-1	4-2
Option 1	AM Peak Period	168	296	291	293	262
	PM Peak Period	143	274	270	271	239
	Sum of AM and PM Peak Periods	311	570	561	564	501
Option 2	AM Peak Period	150	276	262	276	252
	PM Peak Period	122	256	244	255	231
	Sum of AM and PM Peak Periods	272	532	506	531	483

Source: Study team calculations

Alternative 3-1 has the lowest level of ridership compared to other alternatives given it does not serve the El Camino Real Station in both Options 1 and 2. Even though the calculated ridership adjustment factors for the OD pairs are the highest in Alternative 3-1, the increase in ridership as a result of travel time savings does not counteract the loss of ridership from lack of service to the El Camino Real Station.

In Option 1, the rank order of sum of total ridership during the AM and PM periods ranked from highest to lowest is Alternative 3-2, Alternative 3-3 and Alternative 4-1 (tied), Alternative 4-2, and Alternative 3-1. In Option 2, the order is Alternative 3-2, Alternative 4-1, Alternative 3-3, Alternative 4-2, and Alternative 3-1.

4.2 Construction Cost

The development of construction costs is based on the report provided in Appendix C (C1 – Cost Summary Matrix, C2 - Part 1: Proposed Engineering Features Revision 3.0, C3 - Part 2: Cross Section and Alignment Plans, C4 – Part 3: Capital Costs) supplemented with additional information from earlier work associated with implementing express lanes on SR 85 and the redesign of the El Camino Real Interchange. Given the uncertainty of the timing for this project all costs are listed as 2020 dollars. Following is a brief summary of conceptual cost estimates for each of the alternatives.

Alternative 1-1 – No Change

This alternative assumes no additional capital costs are included specifically related to implementing express lanes or new transit service in the corridor. A second scenario is included under this alternative that includes the redesign of the El Camino Real Interchange with an associated total project cost of $27 million dollars.

Alternative 2-1 – Express Lanes

This alternative simply converts the existing HOV lanes to Express Lanes. The construction is limited to the installation of the needed equipment and associated signage and pavement marking changes. This amounts to a total project cost of approximately $133 million dollars.

Alternative 2-2 – Short Dual Express Lane

This alternative builds on Alternative 2-1 by adding a second set of express lanes in the median in section two. This alternative aligns with the original Express Lanes conversion EIS that had a total project cost in 2015 dollars of $176 million. When escalated at 2% per year the resulting total project cost in 2020 dollars is $198 million.

Alternative 2-3 – Long Dual Express Lanes

Building on Alternative 2-2, this alternative adds an additional express lane in the median in sections 1 and 2. This alternative requires the reconstruction of the El Camino Real interchange and that cost is included in this alternative. The total project cost for this alternative is almost $270 million.

Alternative 3-1 – Short Median Transit Lane

The cost for this alternative includes the costs for Alternative 2-2 with the addition of station costs at Bascom, Saratoga and Stevens Creek. For Option 1 the stations would be in the median. Costs would include construction of station platforms, an elevator and stairways, associated barriers to protect passengers in the median and additional roadway for connections between the transit lanes and platforms. Amenities would be those typical of a light rail station. An additional allocation is included for work required on the cross street to provide wider sidewalks (may include some bridge widening) and appropriate pedestrian treatments at the nearest adjacent intersections. Option 2 requires the bus to exit the median to the local street. The connection to the local street would be provided by a ramp from the median to the local street. Since this would create a new intersection, the assumption is that it would be signalized and a call to the signal would be made once a bus enters the ramp. For the purpose of this study, the cost for both of the routing options are assumed to be similar. The total project cost for this alternative is almost $250 million.

Alternative 3-2 – Long Median Transit Lanes

The cost for this alternative includes the costs for Alternative 3-2 with the addition of another station at El Camino Real and a connector tunnel from the median to a local road that allows for a speeder connection to the Mountain View Transit Center. This alternative requires the reconstruction of the El Camino Real interchange so that cost is included in this alternative. The total project cost for this alternative is almost $350 million.

Alternative 3-3 – Right Side Transit Lane

This alternative requires widening of the shoulder to accommodate an additional transit lane in sections 1 and 2. This alternative also requires adjusting interchange ramp areas. For Option 1 it is assumed that stations are constructed outside the transit lane, between the ramps with access to the local street by stairs and elevator. Platform amenities would be those typically associated with LRT stations. Like the median alternatives, a cost was also included for widening the sidewalks along the local street as well as pedestrian improvements at the nearest local intersections. The total project cost for Option 1 is $355 million. For Option 2 it is assumed that since the bus was exiting SR 85 there would not be a new station constructed at the interchange and the bus would stop at the nearest local stop if appropriate. The total project cost for Option 2 is $310 million.

Alternative 4-1 – Median Bus on Shoulder

The cost associated with this alternative are like alternative 3-2 but with slightly less construction cost for median construction. The total project cost for both options is $335 million.

Alternative 4-2 – Right Side Bus on Shoulder

The cost associated with this alternative are like alternative 3-3 but with slightly lower construction cost for shoulder construction. The total project cost for Option 1 is $300 million and Option 2 is $255 million.

4.2.1 Summary of Total Project Cost

A summary table of the components and total project cost for each alternative is in Appendix C1.

4.3 Traffic Operations

Traffic analysis was conducted for the SR 85 improvement alternatives to assess and compare traffic operations performance. The performance was measured in terms of vehicle miles of travel and miles of congestion. Other traffic performance measures were also computed for information purposes and include the following: vehicle hours of travel, vehicle hours of delay at a threshold speed of 45 mph, average speed, percent of freeway miles with level of service (LOS) E or F[1] (on general purpose lanes), and percent of congested ramp influence areas.

Santa Clara Valley Transportation Authority (VTA) and City/County Association of Governments (C/CAG) of San Mateo County Regional Travel Demand Model was not available for use in this traffic analysis. The analysis was performed using a combination of field traffic data collection/processing and a spreadsheet-based sketch planning traffic operations modeling. A special case analysis using McTrans Highway Capacity Software Version 7 (HCS7) was conducted on the proposed reconfiguration of the El Camino Real interchange from the existing cloverleaf to a proposed diamond. **Appendix B** provides the full details of the traffic operations methodology.

The traffic analysis was limited to the SR 85 freeway mainline and spanned the length of SR 85 corridor study area, SR 87 in the south to US 101 in the north. The data collection was conducted for SR 85 northbound and southbound directions between 6 am and 8 pm on a weekday, while traffic operations modeling was conducted for the northbound and southbound AM peak period of 6 am to 12 pm and PM peak period of 2 pm to 8 pm on a weekday.

[1] According to the HCM 2016, level of service or LOS on freeway segments is defined by density measured in passenger cars per mile per lane (pcpmpl). The HCM defines six LOS service thresholds. LOS A (free-flow conditions): less than 11 pcpmpl, LOS B (reasonably free-flow conditions): > 11-18 pcpmpl, LOS C (speeds near free flow speed but freedom to maneuver within the traffic stream is noticeably restricted): > 18-26 pcpmpl, LOS D (speeds begin to decline below free flow speed and freedom to maneuver within the traffic stream is seriously limited): > 26-35 pcpmpl, LOS E (flow at or near capacity and little room to maneuver within the traffic stream): > 35-45 pcpmpl, and LOS F (unstable flow and traffic breakdowns): > demand exceeds capacity or density > 45 pcpmpl.

The key performance measures are discussed followed by a summary of the results for the alternatives and the special case analysis. A qualitative discussion of the traffic impacts of the alternatives on local streets is also presented.

4.3.1 Vehicle Miles of Travel

The SR 85 corridor vehicle miles of travel (VMT) varies between the alternatives due to the same factors that affect the volume changes, namely: induced demand due to addition of freeway auxiliary lane-miles or express lane-miles; transit mode shift related auto demand reduction; and HOV use restrictions and tolling related auto sub-mode demand shifts. All build alternatives have a change in VMT due to induced demand. The transit lane alternatives (3-1, 3-2, 3-3) and the bus on shoulder alternatives (4-1 and 4-2) have a change in VMT due to transit mode shift. All build alternatives (2-1, 2-2, 2-3, 3-1, 3-2, 3-3, 4-1 and 4-2) have a change in VMT due to auto sub-mode demand shifts related to HOV use restrictions and tolling. In this analysis, the volume and VMT changes were localized to the segments where the changes in lane-miles and modal or sub-modal use changes occurred.

A one percent increase in lane-miles results in a 0.75 percent increase in VMT. When no lane-miles of general purpose or managed lanes are added it is assumed there will be no change in person throughput. In other words, induced demand due only to speed changes was not estimated. A substantial increase in lane-miles and VMT comes from the development of dual express lanes under Express Lane Alternatives 2-2 and 2-3. Auxiliary lanes added to northbound SR 85 between De Anza Boulevard and Stevens Creek Boulevard interchanges under all build alternatives also contribute to a small increase in VMT.

The higher the ridership estimate under a transit service alternative, the higher is the auto VMT reduction. The analysis found that the ridership per bus estimates are low and even in the peak hour the ridership is less than 10 persons per bus on all SR 85 mainline segments. The transit mode shift has a very small impact on VMT.

Due to the changes in the HOV use restrictions and tolling, the auto sub-modes using the HOV lane would undergo a compositional change. While SOV and HOV3+ shares as percent of HOV lane total are expected to go up by 2.4 percent and 2.3 percent, respectively, the HOV2 share as percent of HOV lane total is expected to drop by 4.7 percent. The added SOV and HOV3+ vehicles would come from the GP lanes, while the removed HOV2 vehicles (and also possibly some CAVs) would travel on the GP lanes. A net decrease in VMT due to an overall increase in average vehicle occupancy on SR 85 corridor is expected and is associated with the change in HOV use restrictions and tolling.

Under the special case analysis for El Camino Real conversion from a cloverleaf to diamond interchange, the change in VMT is attributed to changes in throughput at ramp influence areas associated with the re-configured freeway-to-ramp and ramp-to-freeway flows as well as ramp capacity.

4.3.2 Miles of Congestion

A sketch planning traffic operations model was used to estimate 15-minute interval speeds by freeway mainline segment for the alternatives analysis and HCS7 was used for the special case analysis for the proposed El Camino Real improvement. Using the speed threshold of 45 mph on each SR 85 mainline segment, the peak 15-minute interval speeds in the AM and PM peak hours (by direction) were analyzed to evaluate congestion by freeway mainline segment. The length of all congested freeway segments is reported as miles of congestion. Queuing was not studied in this analysis due to model limitations and miles of congestion cannot be interpreted as queue lengths.

4.3.3 Other Performance Measures

Similar to the miles of congestion, a sketch planning traffic operations model was used to estimate other performance measures in the AM and PM peak hour for the alternatives analysis. HCS7 was used for the special case analysis of the proposed El Camino Real improvement. Average speed is a direct output of the models. Vehicle hours of travel were estimated using 15-minute interval volumes and average travel time (segment length divided by average speed) by freeway mainline segment. Vehicle hours of delay was estimated using 15-minute interval volumes and average travel time in excess of travel time at a threshold speed of 45 mph. Delay is zero when the travel time is below the travel time at the threshold speed, and increases as speed drops below 45 mph. Freeway density was computed on GP lanes as GP lane volume served in passenger cars per hour divided by GP lane speed and number of GP lanes. LOS was identified for freeway segments based on the estimated density and LOS criteria in the 2016 HCM as shown in **Figure 4-1**. Based on the network coding, the ramp influence areas (merge, diverge or weaving type mainline segments) were identified. The segments with average speed below the threshold speed of 45 mph were counted.

LOS	Density (pc/mi/ln)
A	≤11
B	>11–18
C	>18–26
D	>26–35
E	>35–45
F	Demand exceeds capacity OR density > 45

Figure 4-1: 2016 HCM's Level of Service (LOS) Criteria for Basic Freeway Segment

Source: Exhibit 12-15 of 2016 HCM

4.3.4 Local Streets

The impacts of induced traffic due to addition of lane-miles or the benefits of mode shifts on local streets is expected to be minimal compared to the impacts/benefits on the SR 85 mainline. No data was collected directly on the local streets for this analysis. However, the on-ramp and off-ramp volumes were estimated. By inspecting the speeds at the mainline merge and diverge segments under the alternatives, the impacts on local streets were indirectly evaluated. Low speeds in merge area could result in queue spillbacks from on-ramps to local streets, while low speeds in diverge area could result in delays to the traffic exiting SR 85 via off-ramps. The total number of merge, diverge and weaving areas with speeds below 45 mph by alternative in the AM and PM peak 15-minute interval by direction of movement were estimated. There are 28 ramp influence areas in each direction.

Local street traffic can also have impacts on transit operations. The off-corridor routing option includes three offline stations located at De Anza College, West Valley College, and Good Samaritan Hospital. The access to these stations would incur travel time delays due to traffic congestion on local streets. The transit operations analysis in **Appendix E** includes estimates of access times to the offline stations via local streets.

4.3.5 Results of Traffic Related Alternative Analysis

Table 4-1 is showing the year 2020 traffic performance measures estimated on SR 85 corridor between SR 87 and I-280 in the AM and PM peak hours by direction of movement for the 14 alternatives defined for the SR 85 Transit Guideway Project. Note that the results are based on the travel conditions prior to the advent of California and SF Bay Area coronavirus/COVID-19 stay home orders of 2020.

Under the No Change Alternative 1-1, the northbound VMT in the AM peak hour is 1.2 times that of PM peak hour. The southbound VMT in PM peak hour is 1.5 times that of AM peak hour. The SR 85 southbound PM peak hour VMT is 5 percent higher than the SR 85 northbound AM peak hour VMT. In terms of miles of congestion, SR 85 northbound is congested over 7.2 miles of the 18.0 miles in the AM peak hour. SR 85 southbound is congested over 7.7 miles of the 18.0 miles in the PM peak hour, which is about 7 percent higher than the SR 85 northbound AM peak hour.

Comparing the alternatives, VMT is estimated to increase as high as 23 percent in both the northbound and southbound directions under Alternative 2-3, long dual express lane compared to the no Alternative 1-1 No Change. Under Alternative 2-2 short duel express lane, VMT is slightly lower but reaches 17 percent increase over the no change alternative. Alternative 2-1, a conversion of HOV to express lane would result in about a 1 percent increase in VMT over the no change alternative. Transit alternatives (3-1, 3-2, 3-3 Transit Lanes, 4-1 and 4-2 Bus on Shoulder) and their routing options would be marginally lower than Alternative 2-1 due to a mode shift from transit to auto.

Comparing the alternatives, the miles of congestion would decrease by 94 percent in the northbound AM peak direction and by 88 percent in the southbound PM peak direction under the long dual express lane Alternative 2-3 compared to the no change alternative. Under the short dual express lane Alternative 2-2, the miles of congestion would decrease by 81 percent in the northbound AM peak direction and by 60 percent in the southbound PM peak direction. HOV to express lane conversion, Alternative 2-2 would reduce the miles of congestion by 40 percent in the northbound AM peak direction and by 33 percent in the southbound PM peak direction. Transit alternatives (3-1, 3-2, 3-3 Transit Lanes and 4-1 and 4-2 Bus on Shoulder) and their routing options would be similar to Alternative 2-2 in terms of miles of congestion reduced in the northbound AM peak direction, and slightly better in the southbound PM peak direction, where the reduction would be 44 percent.

The number of ramp influence areas congested is indicative of local street impacts. Under the no change alternative, almost 76 percent of the ramp influence areas are congested in the peak hours and directions. The percentage can be reduced to 52 percent or more by implementing any of the build alternatives. The most benefits come from Alternative 2-3, followed by Alternative 2-2. Other performance results are also shown in **Table 4-2** for information purposes.

Table 4-1: 2020 Traffic Performance Measures by SR 85 Transit Guideway Alternative

Alt. #	Alternative Description	Route Option	Alternative Short Description	VMT (veh-mi) AM Peak Hour	VMT (veh-mi) PM Peak Hour	VHT (veh-hrs) AM Peak Hour	VHT (veh-hrs) PM Peak Hour	VHD (veh-hours) AM Peak Hour	VHD (veh-hours) PM Peak Hour	Av Spd (mph) AM Peak Hour	Av Spd (mph) PM Peak Hour	% Miles of Freeway LOS E or F AM Peak Hour	% Miles of Freeway LOS E or F PM Peak Hour	Miles of Congestion* AM Peak Hour	Miles of Congestion* PM Peak Hour	Number of Ramp Influence Areas Congested* AM Peak Hour	Number of Ramp Influence Areas Congested* PM Peak Hour
SR 85 Northbound Mainline Segments (N/O of SR 87 to S/O of US 101)																	
1-1	No Changes	N.A.	1-1	79,825	66,782	2,410	1,115	1,567	107	33	60	34%	5%	7.2	0.9	22	3
2-1	HOV to Express Lane Conversion	N.A.	2-1	80,703	67,546	1,899	1,113	840	101	42	61	19%	5%	4.3	0.9	14	3
2-2	Short Dual Express Lane	N.A.	2-2	91,439	78,329	1,801	1,307	377	124	51	60	8%	5%	1.4	0.9	5	3
2-3	Long Dual Express Lane	N.A.	2-3	96,926	81,984	1,739	1,364	124	124	56	60	2%	5%	0.4	0.9	2	3
3-1	Short Median Transit Lane	In-Corr.	3-1 - RteOpt 1	80,449	67,357	1,871	1,106	818	98	43	61	19%	5%	4.3	0.9	14	3
		Off-Corr.	3-1 - RteOpt 2	80,453	67,369	1,870	1,108	817	99	43	61	19%	5%	4.3	0.9	14	3
3-2	Long Median Transit Lane	In-Corr.	3-2 - RteOpt 1	80,431	67,239	1,869	1,103	816	98	43	61	19%	5%	4.3	0.9	14	3
		Off-Corr.	3-2 - RteOpt 2	80,448	67,248	1,870	1,104	817	98	43	61	19%	5%	4.3	0.9	14	3
3-3	Right Side Median Transit Lane	In-Corr.	3-3 - RteOpt 1	80,438	67,239	1,869	1,103	816	98	43	61	19%	5%	4.3	0.9	14	3
		Off-Corr.	3-3 - RteOpt 2	80,453	67,257	1,870	1,105	817	98	43	61	19%	5%	4.3	0.9	14	3
4-1	Median Bus on Shoulder	In-Corr.	4-1 - RteOpt 1	80,434	67,263	1,869	1,104	816	98	43	61	19%	5%	4.3	0.9	14	3
		Off-Corr.	4-1 - RteOpt 2	80,448	67,248	1,870	1,104	817	98	43	61	19%	5%	4.3	0.9	14	3
4-2	Right Side Bus on Shoulder	In-Corr.	4-2 - RteOpt 1	80,466	67,295	1,873	1,105	819	98	43	61	19%	5%	4.3	0.9	14	3
		Off-Corr.	4-2 - RteOpt 2	80,469	67,257	1,872	1,105	818	98	43	61	19%	5%	4.3	0.9	14	3
SR 85 Southbound Mainline Segments (S/O of US 101 to N/O of SR 87)																	
1-1	No Changes	N.A.	1-1	55,406	83,444	884	3,181	27	2,176	63	26	0%	38%	0.3	7.7	1	21
2-1	HOV to Express Lane Conversion	N.A.	2-1	55,109	82,905	875	2,347	25	1,331	63	35	0%	30%	0.3	5.2	1	15
2-2	Short Dual Express Lane	N.A.	2-2	64,338	96,690	1,003	2,115	0	703	64	46	0%	18%	0.0	3.1	0	8
2-3	Long Dual Express Lane	N.A.	2-3	67,298	102,418	1,039	2,114	0	464	65	48	0%	5%	0.0	0.9	0	3
3-1	Short Median Transit Lane	In-Corr.	3-1 - RteOpt 1	54,985	82,781	872	2,329	25	1,279	63	36	0%	30%	0.3	4.3	1	15
		Off-Corr.	3-1 - RteOpt 2	54,984	82,750	872	2,323	25	1,274	63	36	0%	30%	0.3	4.3	1	15
3-2	Long Median Transit Lane	In-Corr.	3-2 - RteOpt 1	54,919	82,758	869	2,323	24	1,261	63	36	0%	29%	0.3	4.3	1	15
		Off-Corr.	3-2 - RteOpt 2	54,894	82,772	869	2,328	24	1,277	63	36	0%	29%	0.3	4.3	1	15
3-3	Right Side Median Transit Lane	In-Corr.	3-3 - RteOpt 1	54,919	82,758	869	2,323	24	1,261	63	36	0%	29%	0.3	4.3	1	15
		Off-Corr.	3-3 - RteOpt 2	54,909	82,772	869	2,328	24	1,277	63	36	0%	29%	0.3	4.3	1	15
4-1	Median Bus on Shoulder	In-Corr.	4-1 - RteOpt 1	54,919	82,758	869	2,323	24	1,261	63	36	0%	29%	0.3	4.3	1	15
		Off-Corr.	4-1 - RteOpt 2	54,894	82,772	869	2,328	24	1,277	63	36	0%	29%	0.3	4.3	1	15
4-2	Right Side Bus on Shoulder	In-Corr.	4-2 - RteOpt 1	54,919	82,771	869	2,328	24	1,277	63	36	0%	29%	0.3	4.3	1	15
		Off-Corr.	4-2 - RteOpt 2	54,918	82,772	870	2,328	24	1,277	63	36	0%	29%	0.3	4.3	1	15

*Based on GP Lanes - Peak Hour Peak 15-Minute Interval

AM Peak Hour: 7:45 am to 8:45 am; PM Peak Hour: 5 pm to 6 pm.

NOTE: Delay or congestion is assumed when speed on a segment falls below 45 mph (Caltrans threshold)

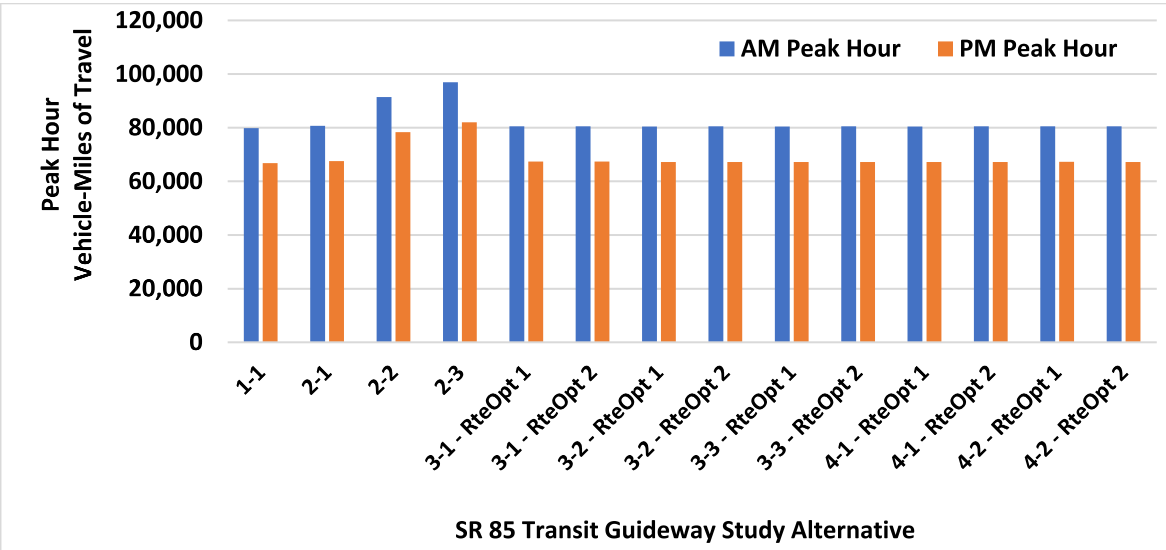
Source: Google Earth for SR 85 / El Camino Real (SR 82) Interchange No Build conditions; Traffic Counts by CDM Smith's Sub-Consultant – Quality Counts, February 2020; Caltrans Traffic Census Counts; Caltrans PeMS; SR 85 Transit Guideway Study Phase 1 Report; CDM Smith Analysis and Assumptions for SR 85 / El Camino Real (SR 82) Interchange Build conditions.

Note: Seg. = Segment, Acc. = Acceleration, Dec. = Deceleration, AM Peak Hour = 7:45 am to 8:45 am, PM Peak Hour = 5 pm to 6 pm.

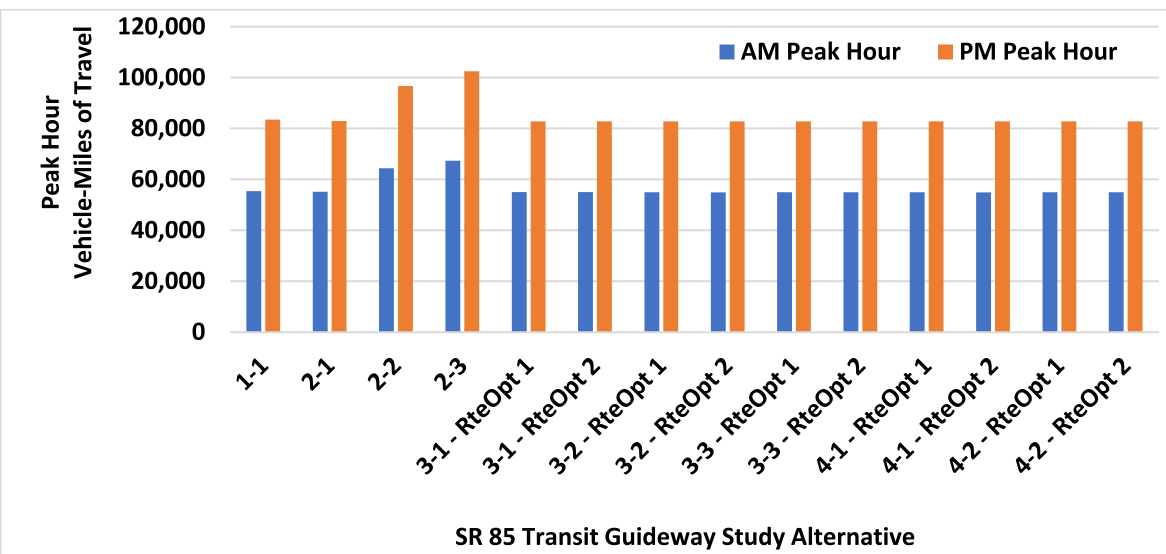
Figure 4-2, Figure 4-3, and **Figure 4-4** are graphical comparisons of the alternatives in terms of 2020 VMT, VHT and VHD by direction. Despite the increased VMT under the dual express lane alternatives (2-2 and 2-3), there is a 65 to 90 percent reduction in VHD due to improvements in travel time compared to the no change alternative. All other build alternatives result in small increases in VMT and around a 40 percent reduction in VHD over the no change alternative. VHT is also reduced under all build alternatives.

Figure 4-2: SR 85 Corridor (SR 87 to I-280) 2020 Vehicle-Miles of Travel (VMT) by Alternative

Northbound Direction



Southbound Direction

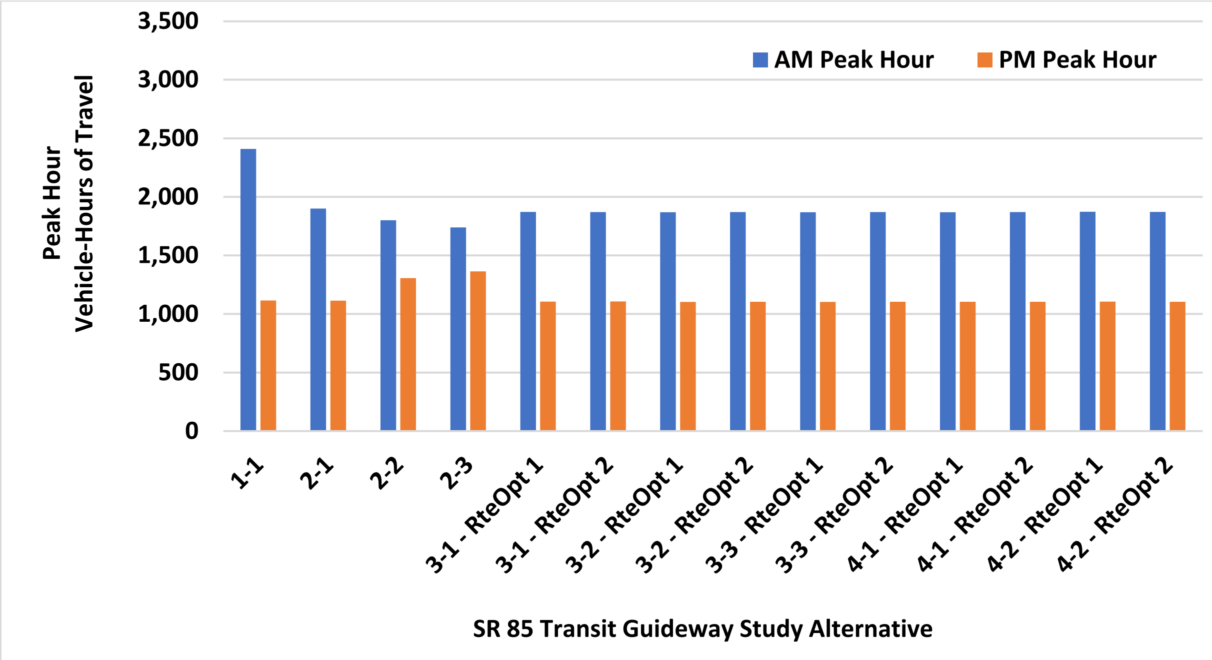


Source: Traffic Counts by CDM Smith's Sub-Consultant – Quality Counts, February 2020; Caltrans Traffic Census Counts; Caltrans PeMS; SR 85 Transit Guideway Study Phase 1 Report; CDM Smith's SR 85 Traffic Operations Model.

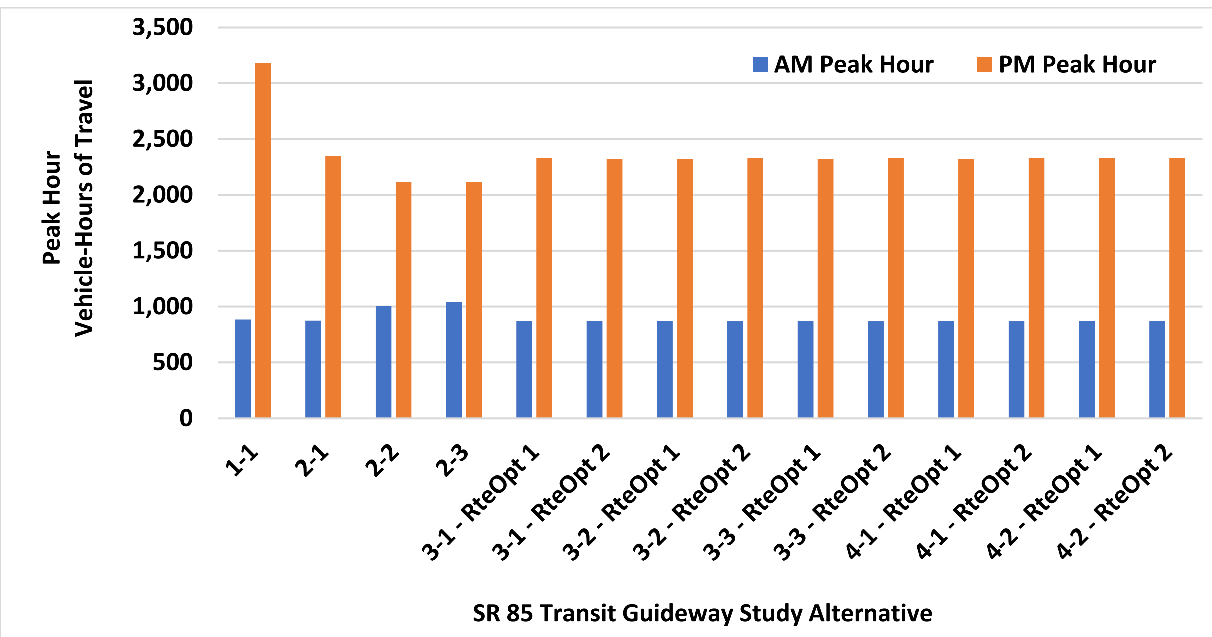
Note: Seg. = Segment, Acc. = Acceleration, Dec. = Deceleration, AM Peak Hour = 7:45 am to 8:45 am, PM Peak Hour = 5 pm to 6 pm.

Figure 4-3: SR 85 Corridor (SR 87 to I-280) 2020 Vehicle-Hours of Travel (VHT) by Alternative

Northbound Direction



Southbound Direction

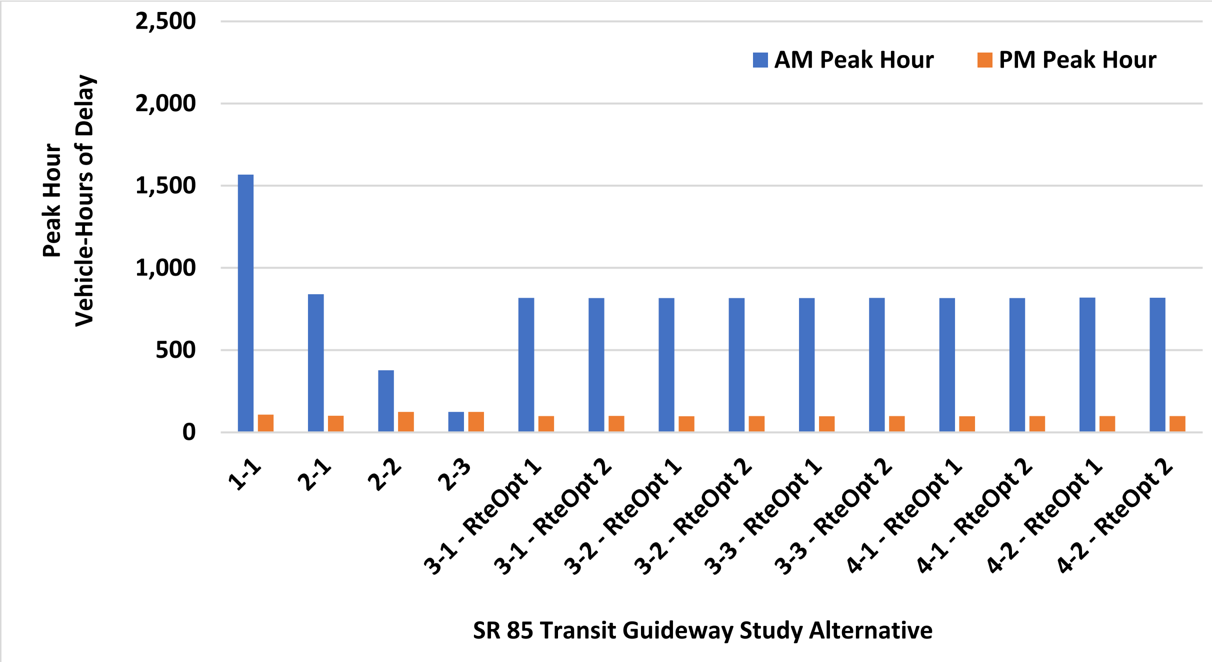


Source: Traffic Counts by CDM Smith's Sub-Consultant – Quality Counts, February 2020; Caltrans Traffic Census Counts; Caltrans PeMS; SR 85 Transit Guideway Study Phase 1 Report; CDM Smith's SR 85 Traffic Operations Model.

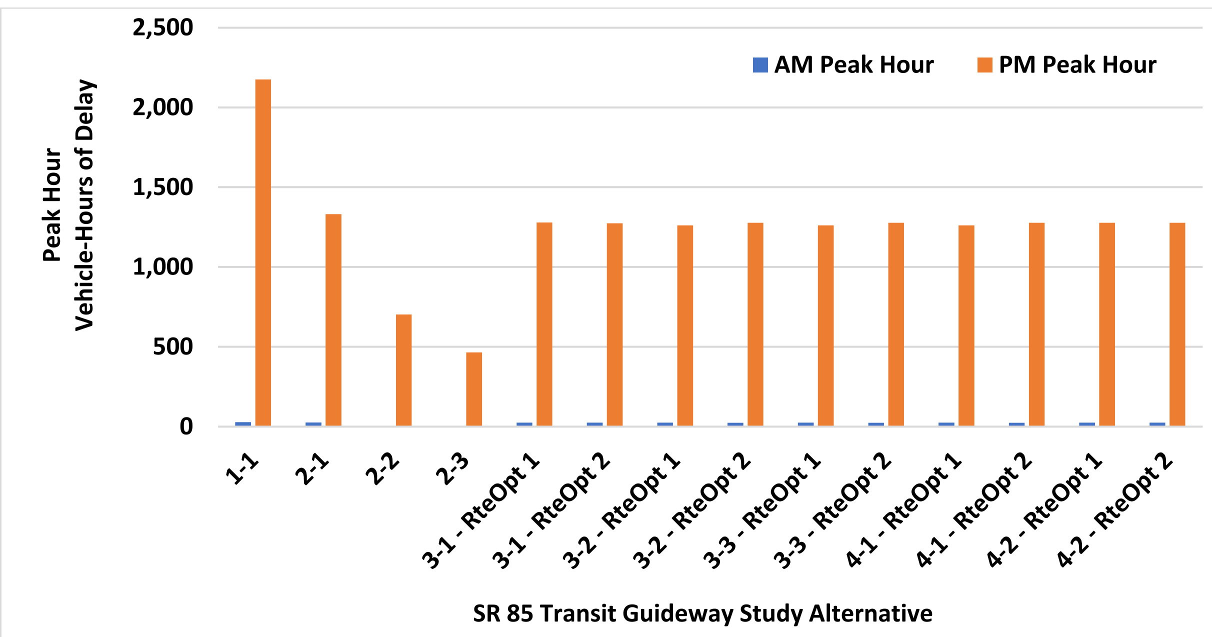
Note: Seg. = Segment, Acc. = Acceleration, Dec. = Deceleration, AM Peak Hour = 7:45 am to 8:45 am, PM Peak Hour = 5 pm to 6 pm.

Figure 4-4: SR 85 Corridor (SR 87 to I-280) 2020 Vehicle-Hours of Delay (VHD) by Alternative

Northbound Direction



Southbound Direction



Source: Traffic Counts by CDM Smith's Sub-Consultant – Quality Counts, February 2020; Caltrans Traffic Census Counts; Caltrans PeMS; SR 85 Transit Guideway Study Phase 1 Report; CDM Smith's SR 85 Traffic Operations Model.

Note: Seg. = Segment, Acc. = Acceleration, Dec. = Deceleration, AM Peak Hour = 7:45 am to 8:45 am, PM Peak Hour = 5 pm to 6 pm.

4.3.6 Results of Traffic Related Special Case Analysis

Table 4-2 shows the year 2020 traffic performance measures estimated in the AM and PM peak hours by direction of movement for scenarios with and without the El Camino Real improvement and with background traffic conditions based on the no change alternative. Note that the results are based on the travel conditions prior to the advent of California and SF Bay Area coronavirus / COVID-19 stay home orders of 2020.

Under existing traffic conditions, congestion and delays are seen on SR 85 segments in the northbound direction only in the AM peak hour. Converting the El Camino Real interchange from a cloverleaf to a diamond would result in the elimination of weaving delays within the El Camino Real interchange area, however it would also result in consolidating the off- and on-ramp volumes at this interchange to fewer ramps. The diverge area delay at the SR 85 northbound off-ramp for the diamond interchange can be mitigated by an increase in deceleration lane length. In this analysis an increase was assumed from 150 feet to 750 feet. Similarly, the merge area delay at SR 85 southbound on-ramp for the diamond interchange can be controlled by an increase in acceleration lane length. In this analysis an increase was assumed from 420 feet to 750 feet. Both these ramps are located south of the El Camino Real centerline.

There are limited opportunities to control the ramp delay added due to the traffic consolidation effect of the interchange conversion on the ramps north of the El Camino Real centerline. In the northbound direction, where traffic congestion is an issue, there are additional ramp traffic conflicts with large SR 85 northbound off-ramp traffic to SR 237 eastbound (over 1,500 vehicles in AM peak hour). The weaving area available for traffic entering via the SR 85 northbound on-ramp from El Camino Real and traffic exiting via the SR 85 northbound off-ramp to SR 237 eastbound is 460 feet. The VHD in SR 85 northbound directions increase by 54 percent, while the throughput and speed decrease by 8 percent and 19 percent, respectively.

Based on the geometric setting, a possible solution to reducing these traffic impacts would be to retain the SR 85 northbound loop on-ramp from El Camino Real while removing the SR 85 northbound loop off-ramp to El Camino Real. This will reduce the traffic consolidation effect and also eliminate weaving. This solution would result in a one leaf partial cloverleaf interchange instead of a diamond only interchange. Further analysis that is beyond the scope of this study would be needed to confirm the benefits.

Table 4-2: 2020 Traffic Performance Measures for El Camino Real Improvement under SR 85 Transit Guideway No Change Alternative (1-1)

Alt. #	Alternative Description	VMT (veh-mi) AM Peak Hour	VMT (veh-mi) PM Peak Hour	VHT (veh-hrs) AM Peak Hour	VHT (veh-hrs) PM Peak Hour	VHD (veh-hours) AM Peak Hour	VHD (veh-hours) PM Peak Hour	Av Spd (mph) AM Peak Hour	Av Spd (mph) PM Peak Hour	% Miles of Freeway LOS E or F AM Peak Hour	% Miles of Freeway LOS E or F PM Peak Hour	Miles of Congestion* AM Peak Hour	Miles of Congestion* PM Peak Hour
SR 85 Northbound Segments near SR 85 / El Camino Real Interchange													
1-1	Without El Camino Real Interchange Improvement	9,201	6,536	285	105	102	0	32.3	62.2	85%	0%	0.7	0.0
1-1	With El Camino Real Interchange Improvement	8,502	5,929	325	96	157	0	26.2	62.0	85%	0%	0.9	0.0
Change		-700	-608	40	-9	55	0	-6.1	-0.2	0%	0%	0.2	0.0
SR 85 Southbound Segments near SR 85 / El Camino Real Interchange													
1-1	Without El Camino Real Interchange Improvement	6,489	9,879	104	164	0	0	62.1	60.3	0%	0%	0.0	0.0
1-1	With El Camino Real Interchange Improvement	5,487	9,467	88	158	0	0	62.0	60.0	0%	0%	0.0	0.0
Change		-1,003	-412	-16	-6	0	0	-0.1	-0.3	0%	0%	0.0	0.0

*Based on GP Lanes - Peak Hour Peak 15-Minute Interval Estimates
AM Peak Hour: 7:45 am to 8:45 am; PM Peak Hour: 5 pm to 6 pm.
NOTE: Delay or congestion is assumed when speed on a segment falls below 45 mph (Caltrans threshold)

Source: Google Earth for SR 85 / El Camino Real (SR 82) Interchange No Build conditions; Traffic Counts by CDM Smith's Sub-Consultant – Quality Counts, February 2020; Caltrans Traffic Census Counts; Caltrans PeMS; SR 85 Transit Guideway Study Phase 1 Report; HCS7 Software; CDM Smith Analysis and Assumptions for SR 85 / El Camino Real (SR 82) Interchange Build conditions.

Note: Seg. = Segment, Acc. = Acceleration, Dec. = Deceleration, AM Peak Hour = 7:45 am to 8:45 am, PM Peak Hour = 5 pm to 6 pm.

4.4 Transit Operations

4.4.1 Reliability

This measure focuses on the ability of buses to maintain their schedule as they progress through the corridor. Implementing express lanes without adding capacity will most likely not improve reliability. As buses move to/from ramps, they will still encounter heavy traffic in the express lanes and the same operational issues in the general-purpose lanes. As additional express or transit only lanes are added, the reliability should improve as the buses should be able to avoid some or all the congested areas. As transit lanes are added with in-line stations, the reliability should improve as bus will no longer need to exit/enter the transit lanes to access stations.

4.4.2 Travel Time

The detailed development of transit travel times is shown in Appendix E1. Transit travel is minimized in Option 1 with the use of freeway stations as shown in **Table 4-3**.

Deviating to off-line stations and stops in Option 2 increases the one-way route length by approximately 3.7 miles, adding 12.5 minutes to the travel time. The one-way running time or travel time from Mountain View to Ohlone/Chynoweth, is 40.5 minutes with freeway stations. The same route with off-line stations, routing Option 2, results in a 53-minute travel time.

Table 4-3: Service Characteristics

Terminals	Option 1	Option 2
	Mountain View	
	Ohlone/Chynoweth	
Station Type	Freeway	Off-line
Number of Peak Buses Required	7	9
Annual Service Miles (millions)	0.86	1.03
Annual Service Hours	36,652	47,965
Annual Operating Costs (millions)	$6.53	$8.59

Notes:

1. Service is provided at 15-minute headways from 5 am to 10 pm on weekdays, 6 am to 7 pm on Saturdays, and 7 AM to 7 PM on Sundays.
2. Peak buses do not include spares.

4.4.3 Operating Cost

The detailed development of operating costs is detailed in Appendix E2. Increased route length and travel time result in an increased operating cost (refer to **Table 4-3)**. Option 1 with freeway stations requires 7 peak buses and 36,652 annual service hours. Option 2 with off-line stations and stops requires 9 peak buses and 47,965 service hours. The annual operating cost of Option 1 is $6.53 million compared to Option 2 at $8.59 million. Option 2 with increased service hours and miles will cost approximately $2.06 million annually to operate. This increased annual operating cost should be compared to the one-time capital cost and annual maintenance cost of constructing freeway stations.

4.4.4 Incremental Cost per Incremental Rider

Incremental cost per incremental rider is a measure used to evaluate the effectiveness of proposed transit service. The calculation is outlined by the Federal Transit Administration (FTA) as part of its project evaluation process. For this project, a 20-year horizon and a 7percent discount rate was used and it was assumed that all riders would be new riders. This measure ranges from $262 for Alternative 4-2, Option 2 Right Side Bus on Shoulder to $459 for Alternative 3-1 Option 2 Short Median Transit Lane.

4.4.5 Employer Shuttles

The number of private employer shuttle buses observed at multiple points within the study area were obtained from Chapter 3 of the prior SR 85 Study Phase 1 Report and are shown in **Table** 4-4.

Table 4-4: Number of Private Shuttles Observed

ID	Location of Observation	Northbound		Southbound	
		AM	PM	AM	PM
1	Middlefield Rd	97	108	73	88
2	El Camino Real	111	130	105	150
3	McClellan Rd	70	69	60	81
4	Quito Rd	69	63	57	88
5	Leigh Ave	49	31	22	38

Source: SR 85 Phase 1 Report

It is assumed that current employer shuttle buses travel through the corridor in the inside HOV/managed lane. Under the proposed alternatives, shuttle buses would travel in the same lanes as the proposed SR 85 BRT buses (under Option 1, no off-freeway stations), but would not stop at freeway stations to drop off and pick up passengers. The operations of shuttle buses under existing and proposed scenarios with transit improvements (3-1, 3-2 and 3-3 transit lanes and 4-1 and 4-2 bus on shoulder) are summarized in **Table 4-5**.

Table 4-5: Configuration of Operations

<table>
<tr><th rowspan="3">Location</th><th rowspan="3">Existing</th><th colspan="3">Transit Lanes</th><th colspan="2">Bus on Shoulder</th></tr>
<tr><th>Alt 3-1</th><th>Alt 3-2</th><th>Alt 3-3</th><th>Alt 4-1</th><th>Alt 4-2</th></tr>
<tr><th>Short</th><th>Long</th><th>Right Side</th><th>Median</th><th>Right Side</th></tr>
<tr><td>SR 85 between Moffett Blvd and I-280</td><td rowspan="2">Managed Lane</td><td>Managed Lane</td><td rowspan="2">Transit Lane</td><td rowspan="2">Transit Lane</td><td rowspan="2">Left Side BOS* (speeds same as Managed Lane)</td><td rowspan="2">Right Side BOS*</td></tr>
<tr><td>SR 85 between I-280 and Almaden Expy</td><td>Transit Lane</td></tr>
</table>

*BOS: Bus on Shoulder

Source: Study team analysis

4.5 Right of Way

One of the guiding principles in the development of the alternatives was to develop them with the goal of not taking any right of way. This is achieved for each of the alternatives with the exception of the planned ROW for the reconfiguration of the El Camino Real interchange. In many alternatives, accommodating an extra lane within the existing right of way means that adhering to Caltrans design standards—mostly for shoulder widths—is not possible. To pursue those designs, VTA will need to seek design exceptions from Caltrans. The designs exceptions for these alternatives are based on exceptions that Caltrans has granted to other freeway projects.

4.6 Environmental

An Environmental Impact Statement (EIS) for the previous SR 85 project was completed with a finding of no significant impact April 2015. The project that received environmental clearance is Alternative 2-2 from this study, short dual express lane. The existing HOV lane would be converted to an express lane and a second express lane would be added in Section 2. A preliminary review of environmental impacts can be completed using the findings of the previously approved EIS. All proposed alternatives in this study stay within the existing SR 85 right of way.

The previous EIS reviewed impacts in many categories. They include land use, growth, farmlands/timberlands, community impacts, environmental justice, utility/emergency services, traffic and transportation/pedestrian and bicycle facilities, visual/aesthetics, hydrology and floodplain, water quality and stormwater runoff, geology/soils/seismicity/topography, paleontology, hazardous waste/material, air quality, noise, natural communities, wetlands and other waters, plant species, animal species, threatened and endangered species, invasive species, and cumulative impacts. A review of these impact categories can be found in Appendix D. Previous community concerns included land use, growth, noise and traffic and transportation related impacts. This study includes a detailed analysis of traffic and transportation issues for each alternative, so it is not necessary to go into detail in the context of this preliminary environmental review.

4.6.1 Growth

The environmental documentation done previously indicates that the alternative evaluated does not have any impact on growth. It is stated that the growth projected in the corridor will occur with or without project construction. None of the build alternatives would involve providing new access to undeveloped areas. The build alternatives would locate stations within the existing SR 85 right of way or use existing transit stations or stops. These new stations and use of the exiting off corridor stops would not alter land use patterns or intensity.

4.6.2 Land Use

It was concluded that the previous project if constructed would not change or conflict with the land use patterns in the corridor and that projected development in the corridor would occur with or without construction of the project. Given that the project connects existing and established transit centers, and all new stations would be located within SR 85 right of way and any off corridor stops or stations would be existing facilities located in already developed areas, any of the build alternatives is not anticipated to contribute to land use changes.

The environmental documentation done previously indicates that the alternative evaluated does not have any impact on growth. It is stated that the growth projected in the corridor will occur with or without project construction. None of the build alternatives would involve providing new access to undeveloped areas. The build alternatives would locate stations within the existing SR 85 right of way or use existing transit stations or stops. These new stations and use of the exiting off corridor stops would not alter land use patterns or intensity.

4.6.3 Noise

Traffic noise levels would vary by alternative. All alternatives will increase the volume of buses along SR 85 and thus increase traffic related noise, but not perhaps a perceptible increase. The alternative evaluated in the previous environmental work was determined to have no effect on existing noise levels, or no more than a 3-decible increase. Three decibels or less is not a perceptible increase. Alternatives such as Alternative 3-3 that involves a right-side transit lane implemented by reducing the right-side shoulder as well as Alternative 3-3, right-side bus on shoulder have potential to increase traffic noise levels, but most likely not a perceptible increase in noise given the limited increase in bus traffic. Some segments of the corridor have existing noise barriers. These may need to be relocated in some cases.

Chapter 5

Alternatives Analysis

The alternatives can be evaluated on the criteria described in Chapter 4. A summary matrix of the evaluation criteria by alternative and option can be found in Appendix F.

5.1 Ridership

Ridership is evaluated in terms of new passengers per day. Under Alternative 1-1, existing or no change, it is assumed no new ridership will be generated on the existing services that operate in parts of the corridor. Under the express lane Alternatives 2-1, 2-2, and 2-3, it is assumed there will be some minimal increase in ridership on existing routes and services attributed to improved travel times associated with new express lanes and conversion of the HOV lane to an express lane. Under the no change Alternative and the Express Lane Alternatives, no new transit routing will be provided.

Under the Transit Lanes and Bus on Shoulder Alternatives, a new transit service is assumed with freeway stations (Option 1) or off-line existing stops and stations (Option 2). Option 2 under all Alternatives increases the travel time making the service less attractive to new riders.

Alternative 3-1, produces the lowest number of new riders per day at 311 under Option 1 and 272 under Option 2. Alternative 3-1 is the only alternative that does not include an El Camino Real Station. This eliminates ridership with an El Camino Real area origin or destination. Alternative 3-1 also has a shorter length of transit lane, resulting in less travel time improvement as compared to the alternatives with improvements in both sections 1 and 2. In general, the Transit Lanes Alternatives provide marginally higher ridership than the Bus on Shoulder Alternatives. This is a result of slightly improved travel times on transit lanes and a restricted maximum transit travel speed on the shoulder. Alternative 3-2, Option 1 results in the most new riders per day at 570. Option 2 of Alternative 3-2 result in 532 new riders per day. These results are similar to Alternative 4-1 Bus on Shoulder with 561 new riders under Option 1 and 531 under Option 2.

5.2 Total Project Cost

There is considerable variation in the total project cost. There is no project cost associated with the no build alternative under Option 1. Under Option 2, No Build, it is assumed the El Camino Real intersection will be rebuilt at a cost of $27 million. Converting existing HOV lanes to Express lanes, Alternative 2-1, is the least costly alternative and requires only minimal improvements. This alternative has a cost of $135 million and is the least costly of any of the build alternatives. Adding new express lane, transit lanes or bus on shoulder lanes are more costly alternatives. These all require adding, widening or improving pavement to construct new travel lanes. All the Express Lane, Transit Lane and Bus on Shoulder Alternatives include the HOV to express lane conversion in Alternative 2-1. The cost for the rest of the alternatives varies by how much new lane area is constructed in the median or shoulder area.

Another key component of cost is right of way acquisition and reconstruction of the El Camino Real interchange. Reconstruction of the interchange is assumed in No Change Option 2, Alternative 2-3 Express Lanes, Alternatives 3-2 and 3-3 Transit Lanes and Alternatives 4-1 and 4-2 Bus on Shoulder. Other alternatives with a center median transit lane or bus on shoulder, 3-1, 3-2, and 4-1, would require additional ramp construction, increasing the total project cost. Taking all required construction into consideration, Alternative 3-3 Option 1, and Alternative 4-1 Options 1 and 2 are the costliest of the build alternatives. Alternative 2-2, Short Dual Express Lane is the least costly of the build alternatives in terms of total construction costs.

5.3 Transit Operations

There are several factors to consider under transit operations. One of the primary considerations from an agency perspective is operating cost. Operating cost is influenced by the level of transit service as well as the vehicle miles and hours of service provided. Option 2 with offline stops and stations under the Transit Lane and the Bus on Shoulder Alternatives is more costly to provide in terms of annual operating cost. This is due to the increased miles and hours of service associated with deviating off SR 85. Additional operating costs associated with the transit alternatives are $6.6 million if freeway stations are constructed. For a service that uses existing off-line stations and stops, the annual operating cost is higher than the low end of the freeway station option at $8.6 million.

A key statistic when looking at productivity or cost effectiveness of the service is the incremental cost per passenger. This is calculated by averaging the capital cost of the project by boardings over a 20-year period. This incremental cost passenger is lowest for Alternative 4-1 Bus on Shoulder Option 2. The highest incremental cost per passenger is $35.20 to $38.50 per passenger for Alternative 3-1, Short Median Transit Lane. Generally, the estimated operating cost of all the transit alternatives is the same at this level of analysis. The incremental cost per passenger is driven by new ridership development. The more new riders, the lower the cost per new rider.

Transit reliability, or improved schedule adherence achieved by minimizing traffic delays makes transit more attractive to riders. Predictability in travel time to work is important to commuters and improves customer satisfaction with transit services. Alternatives 1-1 and 2-1 do not make significant changes to traffic that change transit reliability on existing transit services. Alternative 2-2 and 2-3 adds some additional reliability to transit through use of additional express lanes, adding some reliability improvement. For the transit alternatives, transit reliability is improved only in the sections that include transit improvements such as transit lanes and bus on shoulder.

5.4 Shuttle Passengers

There are a significant number of employer shuttle buses operating in the corridor. Employer shuttle bus passengers will benefit from the improved transit travel time associated with the express lane and transit lane alternatives on SR 85 as well as the bus on shoulder alternatives. Employer shuttle passengers will not use any stops or stations as identified in routing Options 1 or 2.

5.5 Traffic Operations

As shown in the SR 85 transit study evaluation matrix in Appendix F, traffic operations are being evaluated in terms of three metrics. These are vehicle miles of travel, vehicle hours of delay and miles of congestion. All three metrics are compared to the existing condition, Alternative 1-1 No Change and are represented as change from existing conditions.

Vehicle miles of travel increase under all express lane alternatives with the highest increase of 21.4% in the AM peak and 22.7% in the PM peak under Alternative 2-3 Long Dual Express Lane. The smallest increase in VMT of the non-transit alternatives is under Alternative 2-1 HOV to Express Lane Conversion at 0.4% in the AM peak and 0.2% in the PM peak. Under the transit alternatives, both Transit Lanes (3-1, 3-2, 3-3) and Bus on Shoulder (4-1, 4-2), VMT increases slightly in the AM peak due to latent demand and decreases in the PM peak period. Alternative 3-2 Long Transit Lane, routing Option 1 and Alternative 3-3 Long Median Transit Lane, routing Option 1 decrease PM peak VMT the most by 0.2% with all other alternatives and routing options decreasing PM peak VMT by 0.1%.

Vehicle hours of delay are reduced under all build alternatives. The express lane alternatives reduce vehicle hours of delay the most given that they provide benefit to all vehicles. The range of reduction in vehicle hours of delay for the express lane alternatives is 37.3% under Alternative 2-1 HOV to Express Lane in the PM peak to 92.2% under Alternative 2-3 Long Dual Express Lane in the AM peak. All the transit alternatives reduced vehicle hours of delay by just over 47% in the AM peak and around 40% in the PM peak.

As with vehicle hours of delay, miles of congestion area reduced under all the build alternatives. They are reduced the most under the express lane options. Miles of congestion are reduced the most under Alternative 3-3 Long Dual Express Lane with a 94.7% reduction in the AM peak and a 79% reduction in the PM peak. The reduction in miles of congestion is the same across all the transit alternatives at 38.7% percent in the AM peak and 39.5% in the PM peak.

5.6 Local Streets

Impacts to local streets depend on the rebuild of the El Camino Real interchange and the need for new ramps. Alternatives that involve new ramps and off-line stops such as 3-1 Option 2, 3-2 Option 2, and 4-1 Option 2 may have some impact on traffic operations on local streets.

5.7 Environment

Numerous environmental impacts are considered in a federal NEPA documentation process. Three of these appear to be relevant based on public outreach and engagement activities. These are growth, land use and noise impacts. None of the alternatives are assumed to have any impact to growth patterns in the SR 85 corridor or any changes in land use. All build alternatives are limited to SR 85 right of way or use existing stops or stations in already developed areas. All build alternatives are expected to increase noise levels during operating hours, but the increase in noise is minimal and most likely not a perceptible increase.