Santa Clara I-280 CORRIDOR STUDY

OCTOBER 2017

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Santa Clara Valley Transportation Authority

CITY OF CUPERTINO

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ACRONYMS USED

ATM – Active Traffic Management

ARM – Adaptive Ramp Metering

BOS – Bus on Shoulder

CCTV – Closed Circuit Television

CMS – Changeable Message Sign

DB – Dumbarton Express

DMS – Dynamic Message Sign

EL – Express Lanes

GP – General Purpose

HAR – Highway Advisory Radio

HOT – High Occupancy Toll

HOV – High Occupancy Vehicle

I-280 – Interstate 280

ITS – Intelligent Transportation System

LOS – Level of Service

MTC – Metropolitan Transportation Commission

SOV – Single Occupancy Vehicle

SR-85 – State Route 85

SR-87 – State Route 87

SWITRS – Statewide Integrated Traffic Records System

TMC – Traffic Management Center

VMS – Variable Message Sign

VPD – Vehicles Per Day

VTA – Valley Transportation Authority

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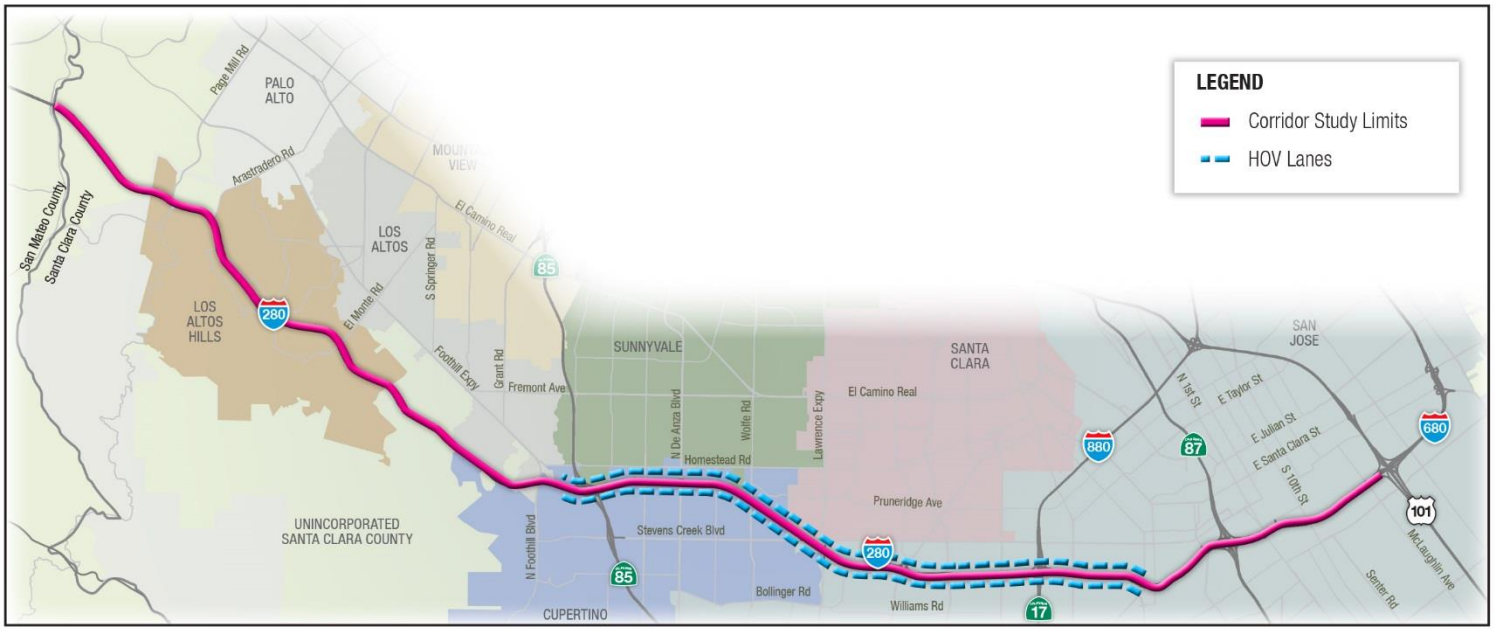
Executive Summary

INTRODUCTION

The I-280 Corridor Study is a highway planning study led by Santa Clara VTA, in partnership with the City of Cupertino and in coordination with other stakeholders in the study area. The study developed a strategic plan for I-280 in Santa Clara County to reduce congestion and to improve mobility for all modes of transportation. The study focuses on improving traffic operations, for all modes of transportation on highway and local streets within the existing right-of-way, to improve mobility within the corridor and promote multimodal operation. The study provides a useful tool for active planning and programming of short-term, mid-term, and long-term projects that include mobility, safety, and connectivity for all modes of transportation. Study recommendations will guide future planning, investment priorities, and funding efforts for VTA and local agencies. The study extends approximately 22 miles between the San Mateo county line at the west and the I-280/I-680/US 101 interchange in the City of San Jose at the east, as shown in Figure ES-1.

> The focus of this study is to reduce congestion and improve mobility for all modes of transportation.

Figure ES-1 – Study Corridor Map



EXISTING CONDITION

Vehicular demand on the corridor exceeds capacity.

I-280 is primarily used as a commute corridor for intra-county and external county trips from San Mateo and Alameda Counties between San Jose/Silicon Valley and San Francisco. The congestion and travel patterns on I-280 are largely due to the large employment centers along the corridor in downtown San Jose, Palo Alto, Cupertino, Santa Clara, and Sunnyvale. The corridor is a multi-lane freeway with up to nine lanes in some segments of the corridor, including an HOV lane in each direction from the Magdalena Avenue interchange in Los Altos, to Leland Avenue in San Jose. Even with the large number of available lanes, the demand on the corridor exceeds the available capacity; this is reflected in the following:

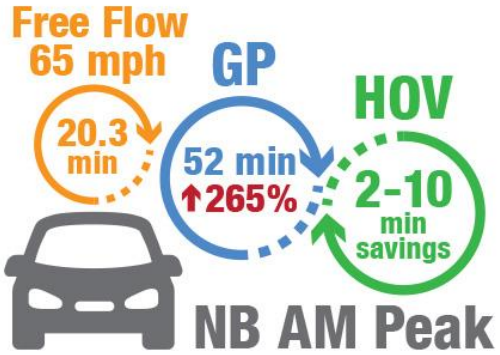
1. According to the 2014 VTA Monitoring and Conformance Report, numerous freeway segments along the corridor (both GP and HOV lanes) are operating at a Level of Service (LOS) F during the northbound AM peak period and during the southbound PM peak period.

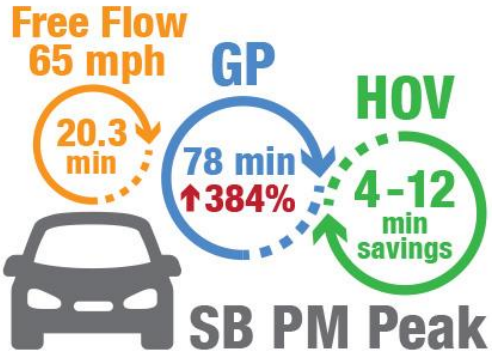
Majority of freeway segments are operating at LOS F during peak periods

2. The observed delays along the corridor in 2011 were over 35 minutes in the general-purpose lanes, and the delays in 2012 in the same lanes increased by 26 minutes. The large increase in delay is due to the recovery in the economy (e.g., increased employment, development, and employers in area) around the time. Since 2011-12, with recovery in high-tech jobs and developments around the corridor, I-280 mainline operating condition became the 3rd worst commute corridor in the Bay Area, according to MTC's "Vital Signs".

3rd Worst commute corridor in the Bay Area-MTC Vital Signs

3. The AM and PM directional travel times in the General Purpose (GP) lanes are more than double those of free flow conditions (non-peak times), as shown below, while the travel times in adjacent HOV lanes (from Leland Avenue to Magdalena Avenue) have travel time savings ranging from a few minutes to as high as 12 minutes as compared to that of the GP lanes.





CORRIDOR ISSUES/NEEDS

Freeway Mobility Issues: Currently, the I-280 mainline is heavily congested in the GP lanes in peak periods, and the four (4) system interchanges are at capacity for the current traffic demands. The violation rates on existing HOV lanes are high during both AM and PM peak periods due to heavy congestion on GP lanes.

Improve operations and reduce travel time delay along the highway corridor

Issues with Interchange Spacing and Lane Drops: The bottlenecks and queues are attributed to closely spaced ramps, inadequate interchange capacity, heavy merge and weave volumes, and lane drops on the mainline.

Address highway bottlenecks and improve weaving conditions

Lack of Pedestrian/Bicycle Connectivity: The freeway ramp interface with the local roadway exposes pedestrians and bicyclists to conflicts with high speed turning traffic on and off the freeway, which is the result of the absence of bicycle and pedestrian features meeting current standards and practices.

Promote and develop alternative modes of transportation

Lack of Exclusive Transit Opportunities: VTA provides Express Bus services along I-280 corridor benefiting from existing HOV lanes in each direction. The benefits to transit along I-280 corridor are not to the maximum potential for multiple reasons: existing congestion in the HOV lanes, no exclusive right-of-way for transit operations, and no transit priority features at the ramps to provide quicker access to the freeway.

Lack of ITS Infrastructure: I-280 corridor has limited ITS infrastructure and could significantly benefit from its inclusion. Having a robust infrastructure provides a multitude of benefits: real-time data feeds from an array of sensors can be used for motorist information and for implementing operational strategies to improve traffic flow; creates a path for the future to accommodate technologies such as connected and autonomous vehicles, which could further enhance mobility and safety on the corridor.

Enable efficient operation of the existing corridor using technology

Need to address Noise Complaints: A preliminary environmental assessment was developed based on: noise complaints submitted by the public gathered from online map based crowd sourcing survey, and a broad inventory and need analysis of conceivable placement of noise reduction measures identified several potential locations to study noise abatement improvements.

Address noise complaints received from public

STUDY PROCESS

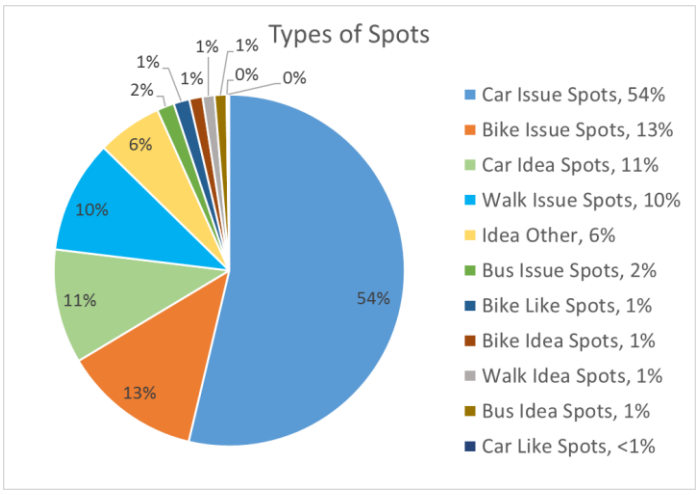
The study process involved a multi-step process as shown in the figure below.

Study Process

Some of keys steps in process were as follows:

- Findings from past studies and field observations of current operations defined the goals and objectives early in the study process.
- A set of evaluation criteria was established to screen potential project alternatives. While most of the screening process for evaluation was qualitative, a preliminary analysis of HOV lanes based on the VTA Travel Demand Model was an important component in the screening process for evaluating mobility for the HOV Lane Improvement projects.
- Public input from the study's outreach process and public agency stakeholders shaped the development and refinement of potential projects.
- A high level environmental screening conducted as part of this study concluded that no existing environmental issues pose a substantial constraint or fatal flaw to the future improvement projects. The environmental screening study is provided as Appendix 1.

Public Input



Stakeholders

THE TOWN OF LOS ALTOS HILLS California

Caltrans

CITY OF SAN JOSE CAPITAL OF SILICON VALLEY

CITY OF PALO ALTO

CITY OF SUNNYVALE CALIFORNIA

City of Santa Clara The Center of What's Possible

CITY OF CUPERTINO

Valley Transportation Authority Solutions that move you

THE COUNTY OF SANTA CLARA

POTENTIAL IMPROVEMENTS

Potential improvements are presented in Section 3 of this study. These potential improvements were developed to address mobility, multimodal, and environmental needs of the corridor. The improvements are categorized as: Highway Improvements; Interchange Improvements; Local Street Improvements; and Noise Abatement Improvements. Elements of improvements include:

Freeway Mobility Improvements: Potential improvements focused on operational strategies including ramp metering, eliminating lane drops, extending HOV lanes and conversion to EL. In lieu of adding capacity to the freeway corridor, alternatives that improve operations and address congestion within existing right-of-way were considered.

ITS Improvements: Potential improvements focused on implementing technology to maximize system performance and develop the corridor to adopt future advancements in transportation technology. Potential strategies considered in this study enable a dynamic range of traffic management strategies for recurrent and non-recurrent congestion such as adaptive ramp metering, junction control, queue warning, speed harmonization, and changeable message signs.

Transit Improvements: Potential improvements focused on providing opportunities for system wide transit service accessibility. Potential improvements include HOV lanes, EL, Bus on Shoulders, Transit access direct ramps, and HOV/EL by-pass lanes for queue jumping.

Bicycle Improvements: Potential improvements focused on bicycle lanes on nearby local streets and through interchanges. Potential improvements include interchange ramp reconstruction to intersect at a 90-degree angle to improve safety, bicycle lane striping to the left of right-turn-only lanes, and avoidance of dual right-turn lanes into interchange reconfiguration/reconstruction projects.

Pedestrian Improvements: Potential improvements considered were removing barriers to pedestrian circulation by squaring up interchange ramp intersections to slow turning vehicles and shorten crossing distances, and striping crosswalks at on and off-ramps along ramp termini.

Soundwall Improvements: Potential locations for noise abatement improvement study were considered based on noise complaints submitted by the public, and a broad inventory and needs analysis of conceivable placement of soundwalls.

CORRIDOR STRATEGIES

The following strategies are recommended to effectively plan and implement the improvements on the I-280 corridor. These potential strategies and improvements would improve mobility and reduce traffic congestion, promote mode shift, help drive economic growth, and enhance the quality of life for Santa Clara County residents.

Develop Projects that focus on improving corridor-wide mobility

- Extend HOV lanes to provide for a continuous HOV lane
- Implement conversion of HOV lanes to EL
- Study in detail improvements to Downtown access between US 101 and SR-87

Every year congestion leads to lost productivity and added fuel costs. These projects focus on reducing travel time and congestion.

Prioritize funding for multi-modal improvements:

- Continue to develop multi-modal interchange improvements at Wolfe Road and Winchester Boulevard (separate ongoing study)
- Study transit ramp access at Tantau Avenue
- Implement HOV Bypass and Transit priorities at interchange ramps

Will improve travel time reliability and promote transit and bicycle use for commute congestion

Empower Innovation

- Develop Transportation Technology Strategic Plan
- Work with Caltrans to deploy smart solutions like demand-based pricing, bus on shoulders, and ATM strategies as demonstration projects

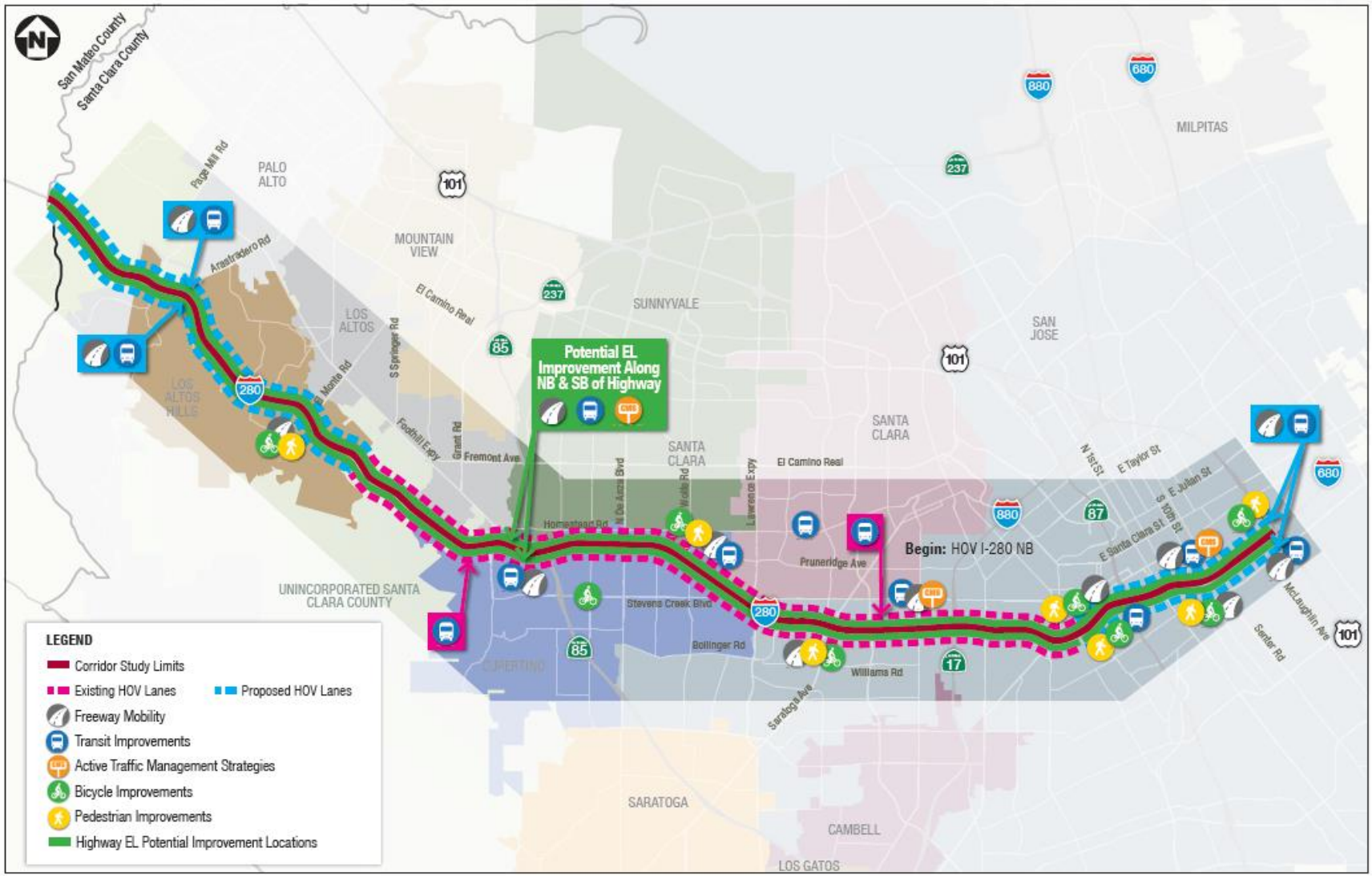
Implementation of technology improves operations within the existing capacity and manages performance in real-time.

POTENTIAL PRIORITY 1 IMPROVEMENTS

Potential improvements for each mode varied in scope, location, and cost, but all potential improvements were organized by the same three priority levels and implementation timeframe: short-term (1 to 3 years), mid-term (3 to 5 years), and long-term improvements (more than 5 years). The priority ranking of all the potential improvements identified by unique ID number and description are included in section 4.3 of this report. All the top ranked priority 1 improvements are listed in the following table and are shown in **Figure ES-2.** Soundwall Improvements as part of noise abatement strategy were not evaluated or ranked for programming. It is recommended that soundwall improvements should be included as part of the highway improvement and interchange improvement projects.

Improvements	Timeline
Near-term Improvements ▪ Communication network along the I-280 corridor to support ITS and ATM strategies ▪ ITS and ATM improvements like adaptive ramp metering, dynamic shoulder use, bus on shoulders, dynamic junction control, dynamic ramp access restrictions, and dynamic real-time traveler information signs ▪ Ramp Intersection improvements at interchanges of: El Monte Road, Foothill Expressway, Meridian Avenue, Bird Avenue, and McLaughlin Avenue ▪ Consolidate NB off ramps to a loop off-ramp and realign Harker Driveway at Saratoga Avenue interchange ▪ HOV Bypass lanes on: Bird Avenue SB on-ramp, McLaughlin NB on-ramps, and US 101 NB to I-280 NB connector ▪ Construct ramp meter and eliminate inside lane merge between US 101 on ramp and I-280 NB ▪ Elimination of lane drop from Wolfe Road to De Anza Boulevard and shoulder running bus lane on De Anza NB off-ramp ▪ Interchange improvements at I-280/Winchester and I-280/Wolfe Road. These projects are currently underway independent of this study. ▪ Add or improve at minimum class II bicycle lanes and pedestrian facilities, signing and striping on El Monte Road, Magdalena Avenue, N De Anza Road, N Tantau Avenue, Saratoga Avenue, MacArthur Avenue, S Bascom Avenue, Leland Avenue, Meridian Avenue, Race Street, Lincoln Avenue, Bird Avenue, 3rd Street to 7th Street, and McLaughlin Avenue	1-3 years
Mid-term Improvements ▪ Extend existing HOV lanes in both directions of the highway between Leland Avenue to US 101 and from Magdalena Avenue to San Mateo County line ▪ Improvements at interchanges of: Page Mill Road, El Monte Road, Foothill Expressway, SR-87 Southbound, 1st Street /Market Street, 3rd Street to 7th Street Downtown access (NB and SB), 10th Street, and 11th Street ▪ Construct Class IV cycle tracks on N Blaney Avenue, N Stelling Road, Stevens Creek Boulevard, and W. San Carlos Street	3-5 years
Long-term Improvements ▪ Convert existing HOV lanes to HOT/EL ▪ Improvements at interchanges of: SR-85, Wolfe Road, N. Tantau Avenue, Lawrence Expressway, Saratoga Avenue Winchester Boulevard, and Parkmoor Avenue/Moorpark Avenue/Leland Avenue ▪ Pedestrian connector between Lawrence Expressway and Saratoga Avenue	5+ years

Figure ES-2: Potential Priority 1 Improvements



NEXT STEPS

Include top ranked improvements in local and regional transportation plans.

The I-280 Corridor Study identifies a wide variety of potential corridor improvements to improve mobility for all modes of transportation, including freeway and local road improvements across the entire 22-mile corridor with general consideration of their benefits and costs. Using this information, it is recommended that these top priority improvements be included in local and regional transportation plans for further study leading to programming, development, and implementation. While potential improvements were evaluated and ranked into tiers, it is recommended that the best suited improvement from any tier is advanced for further detailed studies, design, and implementation to achieve the expected operational improvements in the corridor.

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1.0 Introduction

1.1 Background

The I-280 Corridor Study within Santa Clara County is a high-level highway planning study led by the Santa Clara VTA, in partnership with the City of Cupertino. The study extends approximately 22 miles between the San Mateo county line at the west and I-280/I-680/US 101 interchange in the City of San Jose at the east. The I-280 corridor within Santa Clara County serves residential and commercial uses, as well as high-tech industries, with surrounding land uses that vary between residential, commercial, and industrial. It is primarily used as a commute corridor between San Jose/Silicon Valley and San Francisco and carries commuter traffic from San Jose, Milpitas and Alameda County to the north to destinations in downtown San Jose and Silicon Valley jobs in other cities of Santa Clara County. **Figure 1** illustrates the study corridor and the project limits.

1.2 Goals of Study

The goal of this study is to evaluate the I-280 corridor in Santa Clara County at a high level and identify strategic improvements that can help improve mobility for all modes of transportation.

Study Goals

- Improve mobility for all modes within existing right-of-way
- Improve mainline and interchange operations
- Improve travel time and reliability
- Improve bicycle and pedestian facilities to enhance bicycle/pedestrian safety
- Promote multiple modes of travel
- Promote transit alternatives
- Preserve and enhance the environment

This study provides a useful tool for the planning and programming of short-term, mid-term, and long-term projects that include mobility, safety, and connectivity for all modes of transportation.

1.3 Existing Corridor

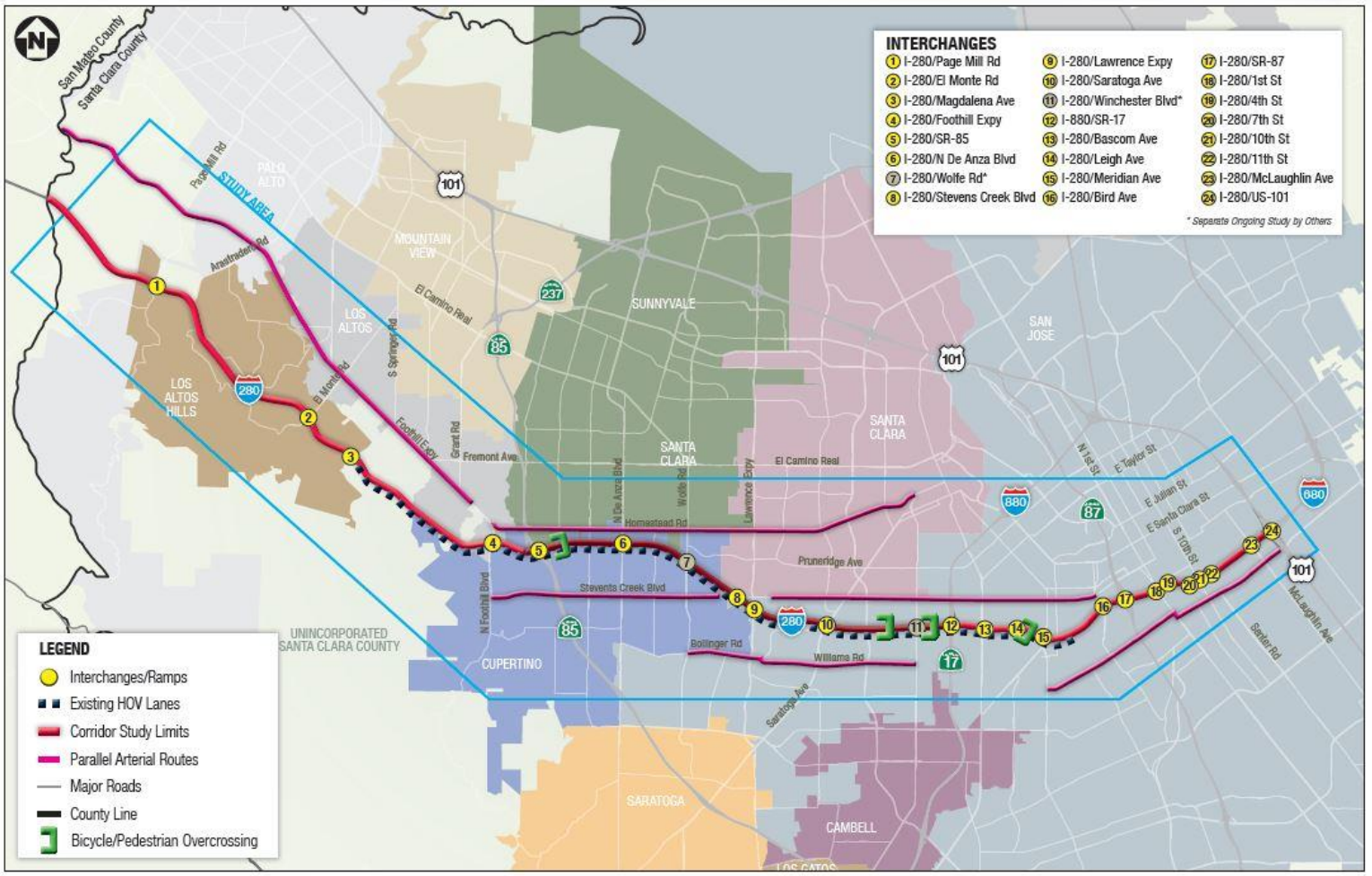
The Santa Clara County I-280 corridor is in relatively flat terrain in urbanized settings from US 101 to SR-85 and in rolling terrain in rural/urbanized settings from SR-85 to the Santa Clara County line in Palo Alto. The number of travel lanes varies from seven to nine lanes with HOV lanes extending through sections of the I-280 corridor in Santa Clara County. A northbound HOV lane exists between Leland Avenue in the City of San Jose and Magdalena Avenue in City of Los Altos, and there is a southbound HOV lane between Magdalena Avenue and Meridian Avenue in San Jose.

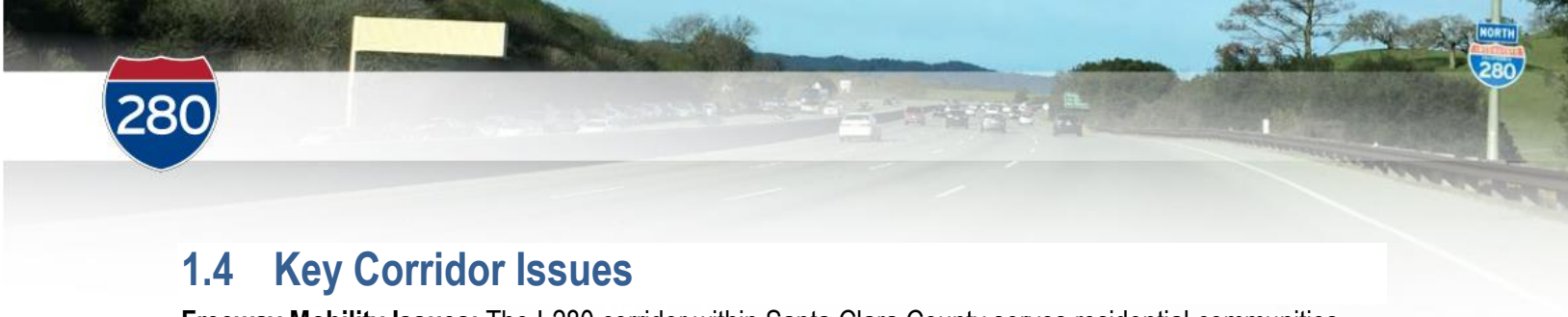
The I-280 study corridor has 24 interchanges and local road crossings within the study area (some minor local roads are paired with a nearby local road or interchange). The 24 interchanges and local road crossings are:

- Page Mill Road
- El Monte Avenue
- Magdalena Avenue
- Foothill Expressway
- State Route 85 (SR-85)
- De Anza Boulevard
- Wolfe Road
- Stevens Creek Boulevard
- Lawrence Expressway
- Saratoga Avenue
- Winchester Boulevard
- Interstate 880 (I-880)
- Bascom Avenue
- Leigh Avenue
- Leland Avenue
- Meridian Avenue/Race Street
- Bird Avenue
- State Route 87 (SR-87)
- Almaden Boulevard/First Street
- 4th Street
- 6th Street/7th Street
- 10th Street
- 11th Street
- McLaughlin Avenue, and
- US Route 101 (US-101).

These interchange areas are briefly described in Section 2 with interchange configuration, local street configuration, and multimodal facilities on the local streets.

Figure 1: Project Study Corridor





1.4 Key Corridor Issues

Freeway Mobility Issues: The I-280 corridor within Santa Clara County serves residential communities, commercial areas, and high-tech industries due to its surrounding land uses that vary between residential, commercial, and industrial. It is primarily used as a commute corridor between San Jose/Silicon Valley and San Francisco. I-280 is not a major freight corridor; there is limited goods movement demand beyond basic service and delivery needs throughout the corridor.

Since 2011-12, with recovery in high-tech jobs and developments around the corridor, I-280 mainline operating condition has become the 3rd worst commute corridor in the Bay Area, according to MTC's "Vital Signs".

At present, the I-280 mainline is heavily congested in the GP lanes in peak periods, and the four (4) system interchanges are at capacity for the current traffic demands. According to VTA's CMP report, existing levels of service along majority of the freeway corridor segments are Level of Service (LOS) F in the northbound direction during the AM peak period and in the southbound direction for the PM peak period.

Travel times in the GP lanes along I-280 corridor are 52 minutes in the northbound direction during the AM peak and 78 minutes in the southbound direction during the PM peak hour as compared to a free flow travel time of 21 minutes. The travel time run results indicate that the HOV lane is providing travel time savings and higher speeds as compared to that of the General Purpose (GP) lanes. Within the HOV lane section, there was approximately 2-10 minutes of travel time savings measured in the northbound direction during the AM peak hour and 4-12 minutes of travel time savings measured in the southbound direction in the PM peak hour as compared to GP lanes. The violation rate on existing HOV lanes is high during both AM and PM peak periods due to heavy congestion on GP lanes. The northbound HOV Lane was observed to be congested from Meridian Avenue to Saratoga Avenue due to heavy traffic merge and weave between HOV lane and SOV lane at SR-17/I-880 interchange.

Issues with Interchange Spacing and Lane Drops: There are 24 interchanges along I-280 within the study area including four system interchanges. The system interchanges are: I-280/US 101, I-280/SR-87, I-280/I-880/ SR-17 and I-280/SR-85. The number of travel lanes varies between three and five lanes in each direction with auxiliary lanes between some of the interchanges.

Significant congestion occurs at the interchange locations with peak period queuing due to limited freeway and ramp capacity. Several bottlenecks and queues at the interchange locations were observed along the study corridor in both directions. The bottlenecks and queues are attributed to closely spaced ramps, inadequate interchange capacities, heavy merge and weave volumes, and lane drops on the mainline.

Lack of Pedestrian/Bicycle Connectivity: The freeway ramp interfaces with the local roadway expose pedestrians and bicyclists to conflicts with high speed turning traffic on and off the freeway, which is the result of the absence of bicycle and pedestrian features meeting current standards and practices. Additionally, there is a lack of pedestrian/bicycle connectivity moving parallel to the I-280 corridor. There are currently no continuous low stress bikeways paralleling the corridor on the north or south. This has resulted in auto travel, currently, being the most viable form of transportation for trips in the area.

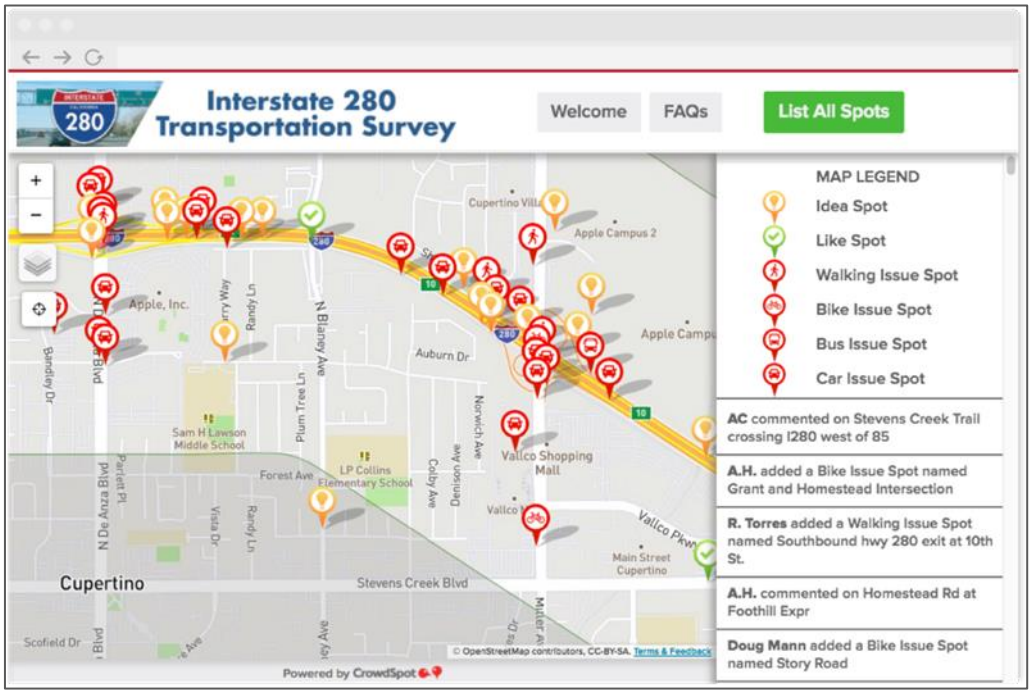
Lack of Exclusive Transit Opportunities: VTA provides Express Bus services along I-280 corridor benefiting from existing HOV lanes in each direction. The benefits to transit along I-280 corridor are not to the maximum potential for multiple reasons: existing congestion in the HOV lanes; no exclusive right-of-way for transit operations; and no transit priority features at the ramps to provide quicker access to the freeway.

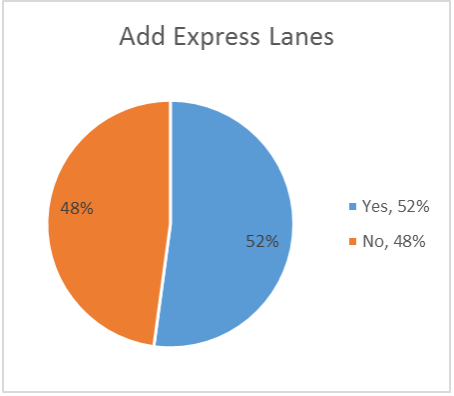
Lack of ITS Infrastructure: I-280 corridor has limited ITS infrastructure and could significantly benefit from its inclusion. Having a robust infrastructure provides a multitude of benefits: real-time data feeds from an array of sensors can be used for motorist information and implemented operational strategies to improve traffic flow; creates a path for the future to accommodate technologies such as connected and autonomous vehicles, which could further enhance mobility and safety on the corridor.

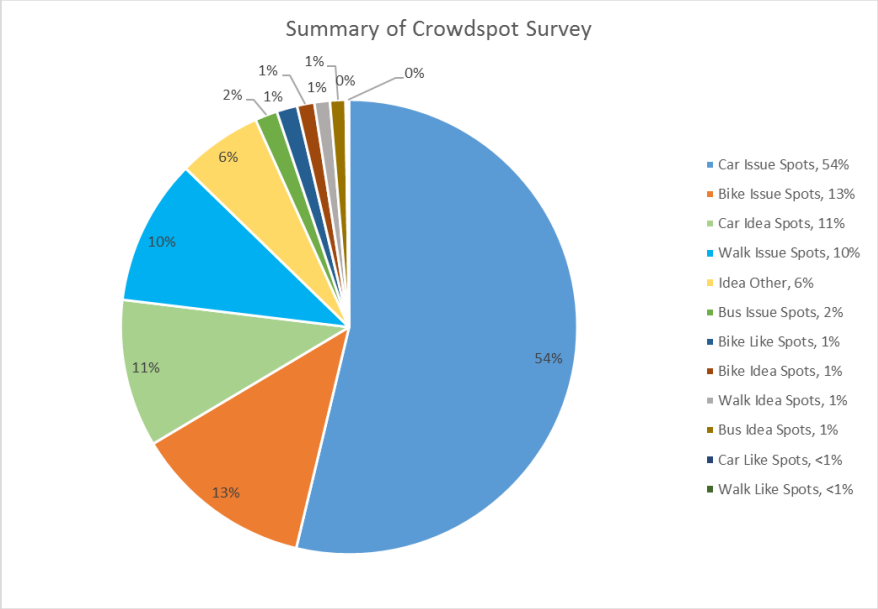
Noise Complaints: Noise complaints submitted by the public gathered from online map based crowd sourcing survey, and a broad inventory and need analysis of conceivable placement of noise reduction measures identified several potential locations to study noise abatement improvements.

1.5 Stakeholder Outreach

The key stakeholders in this study are VTA, Caltrans, The County of Santa Clara, City of Cupertino, City of San Jose, City of Los Altos Hills, City of Sunnyvale, City of Santa Clara, and City of Los Altos. Stakeholder coordination meetings were held periodically to inform on the study progress and seek their input. I-280 Corridor Study project conducted a map-based online survey to seek community input. This survey allowed the public to provide feedback on existing facilities and to identify gaps at specific locations within the study corridor. In addition to the web based input, two public meetings were held for this study. VTA Outreach staff led the public engagement by posting the notice of public meetings, the contribution period, and a link to the Crowdspot map for the I-280 corridor on various websites and social media outlets. The Crowdspot survey offers public to identify multimodal issues,







comments, like or ideas at locations/spots on the corridor. Based on the comments received through the Crowdspot survey, there is considerable interest in carpool and EL.

There were 2549 total submissions on the survey for this corridor with 1018 comments and 712 supports at 819 locations/spots. The heatmap shows the locations with most comments received. The top 10 locations are listed in order of priority and by mode of travel in **Table 1.** Detailed Crowdspot survey report is presented in Appendix 4**.**

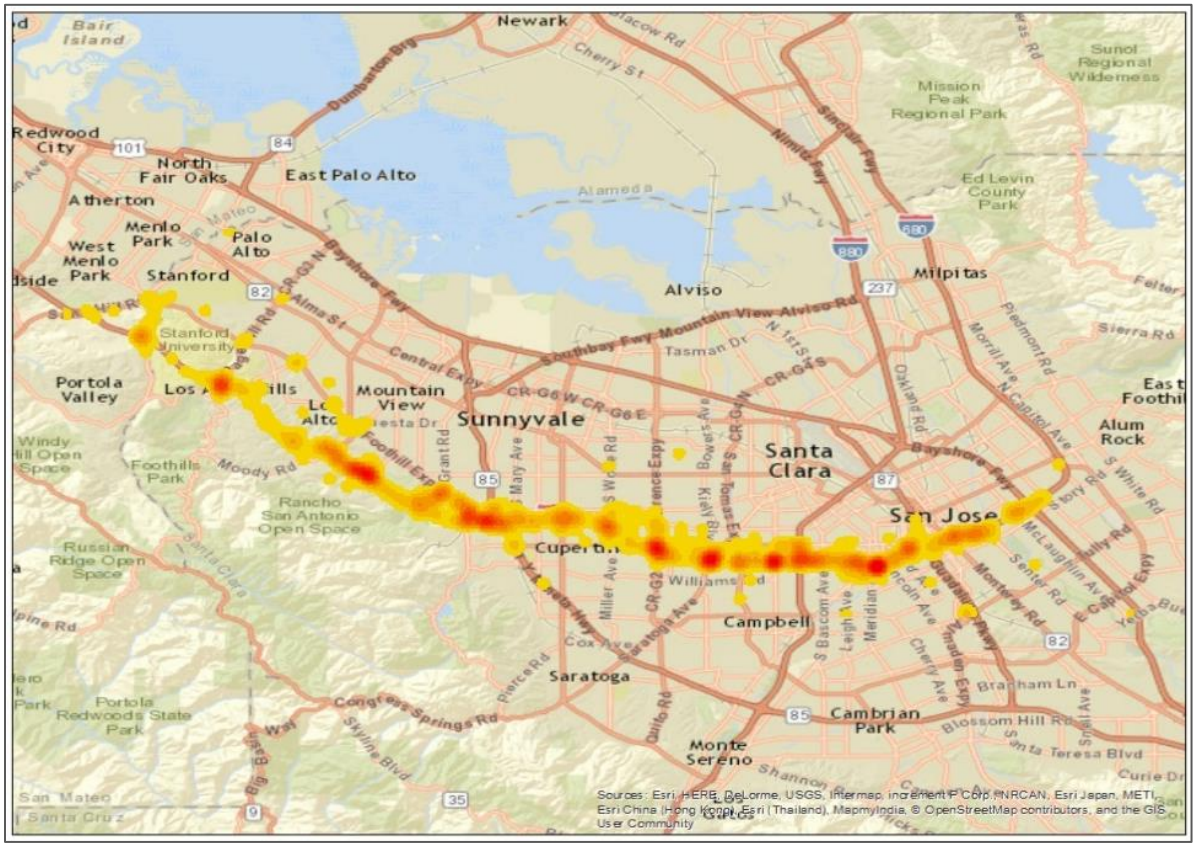


Table 1: Top Ten Comment Locations from Crowdspot Survey

CAR COMMENT LOCATIONS	PEDESTRIAN COMMENT LOCATIONS	BICYCLE COMMENTS LOCATIONS
Magdalena Ave[1]	Race Street[3]	Foothill Expy[4]
SB I-280 between El Monte Rd and Magdalena Ave	Lawrence Expy	Saratoga Ave
Saratoga Ave	N Wolfe Rd	Page Mill Rd
Page Mill Rd.[2]	Bird Ave.	Lawrence Expy
Winchester Ave.	N De Anza Blvd	Meridian Ave
Highway 17	Foothill Expy	Bird Ave
Lawrence Expy.	Winchester Blvd.	Mary Ave. Ped Bridge
NB On-Ramp from 85 to NB merger	S 7th St.	Monroe Ped Bridge
El Monte Rd	Montclaire Elementary School	Steven Creek Blvd
Off-Ramp at Meridian	McLaughlin Ave	Grant

Notes:

1. Top congested location for vehicular traffic
2. Top unsafe location for vehicular traffic
3. Top unsafe location for pedestrians (poor lighting)
4. Top location with high risk of bicycle collisions (no bicycle lanes)

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2.0 Existing Conditions

A summary of the existing facilities and traffic operating conditions of the I-280 corridor is included in this section. Detailed existing facilities and traffic operating conditions of the corridor are presented in a technical memorandum provided as **Appendix 2.**

To understand the traffic operations of the corridor, the following data listed in **Table 2** was collected and studied.

Table 2: Traffic Data Collection Source Summary

TRAFFIC DATA	SOURCES	DATE OF COLLECTION
Roadway Geometrics/Ramp Metering Locations	Aerial Photos	03/2016
	Field Observations	03/2016
Traffic Flow Data	Caltrans Census	2010-2014
	Caltrans PeMS	02/2016 – 04/2016
	Manual Counts	05/2016
	I-280 Ramp Metering Final After Study (Kimley-Horn and Associates)	10/2013
	VTA Forecast Model	2013
Bottlenecks and Queues	Field Observations	03/2016
HOV Lane Usage	Caltrans HOV Reports	2013 and 2012
Truck Percentages	Caltrans Truck Volumes	2014
Travel Times and Speeds	Caltrans PeMS	02/2016 –04/2016
	Travel Time Runs	01/2016

2.1 Mainline

The Santa Clara County I-280 corridor is in relatively flat terrain in urbanized settings from US 101 to SR-85 and in rolling terrain in rural/sub-urbanized settings from SR-85 to the Santa Clara County line in Palo Alto. The number of travel lanes varies from seven to nine lanes with HOV lanes extending through sections of the I-280 corridor in Santa Clara County. A northbound HOV lane exists between Leland Avenue in the City of San Jose and Magdalena Avenue in the City of Los Altos, and there is a southbound HOV lane between

Magdalena Avenue and Meridian Avenue in San Jose. **Figure 2** shows existing auxiliary lane segments and ramp metering locations on I-280. For this study, a field observation was performed to identify the possibility of adding a lane to the ramps, as well as adding lanes at the freeway on-ramp merges. Caltrans provided ramp metering information including the number of on-ramp lanes, HOV bypass lanes, metering rates, and hours of operation. The summary of field observations and information from Caltrans is provided in the Existing Conditions Technical Memorandum (Appendix 2).

2.1.1 Existing Traffic Flow Data

Various sources of traffic flow data like Caltrans Census, Caltrans PeMS, manual counts, and VTA forecast model were used to understand the traffic flow along the study corridor. AADT along the I-280 corridor varies between 96,000 vehicles per day (vpd) (@Alpine Road) and 246,000 vpd (@McLaughlin Avenue) based on Caltrans 2014 Traffic Volumes. Based on the review of Caltrans Census and PeMS data, and from field observations, the peak periods were identified to be 6:00-9:00 am in the mornings and 3:00-7:00 pm in the evenings. Even though congestion continues beyond the peak periods, the Single Occupancy Vehicles (SOV) can use the HOV lane after these peak periods. Based on travel time runs and counts, this project assumes the peak hour for the corridor within the study limits is 7:00-8:00 am and 5:00-6:00 pm.

Based on the Caltrans Managed Lanes report, the percentage of the total traffic that uses the HOV lane during both the am peak hour and pm peak hour is 18% and 12% respectively. Caltrans' goal is to keep the HOV violation rate at less than 10%.

Based on the Caltrans 2014 Truck Volumes report, the truck percentages range from 1.53% to 4.7%, which are similar percentages to other freeways in the Bay Area.

Figure 3 shows vehicular traffic data, percentage of HOV and trucks on I-280.

Figure 2: Existing Auxiliary Lanes and Ramp Metering Locations

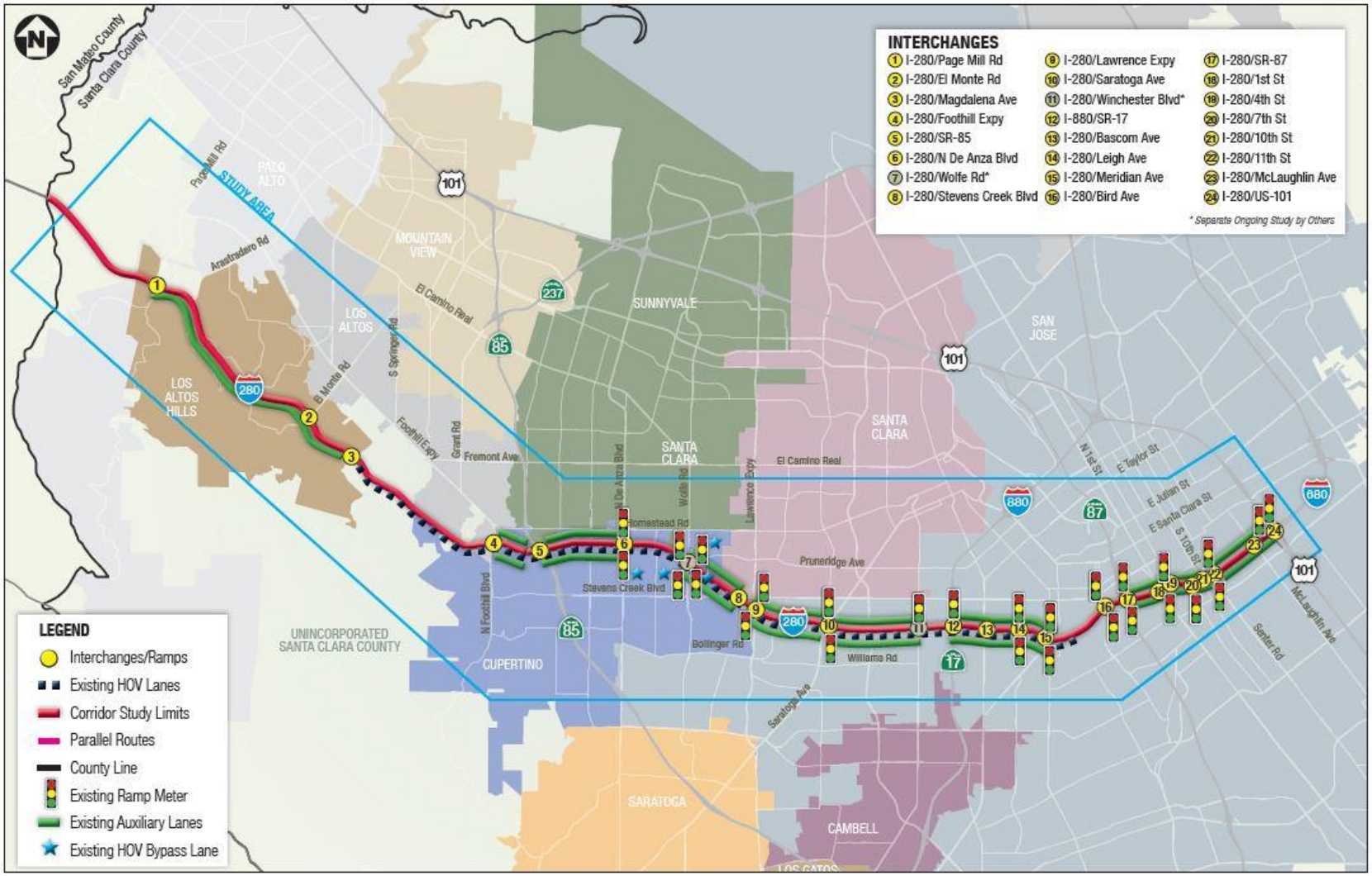
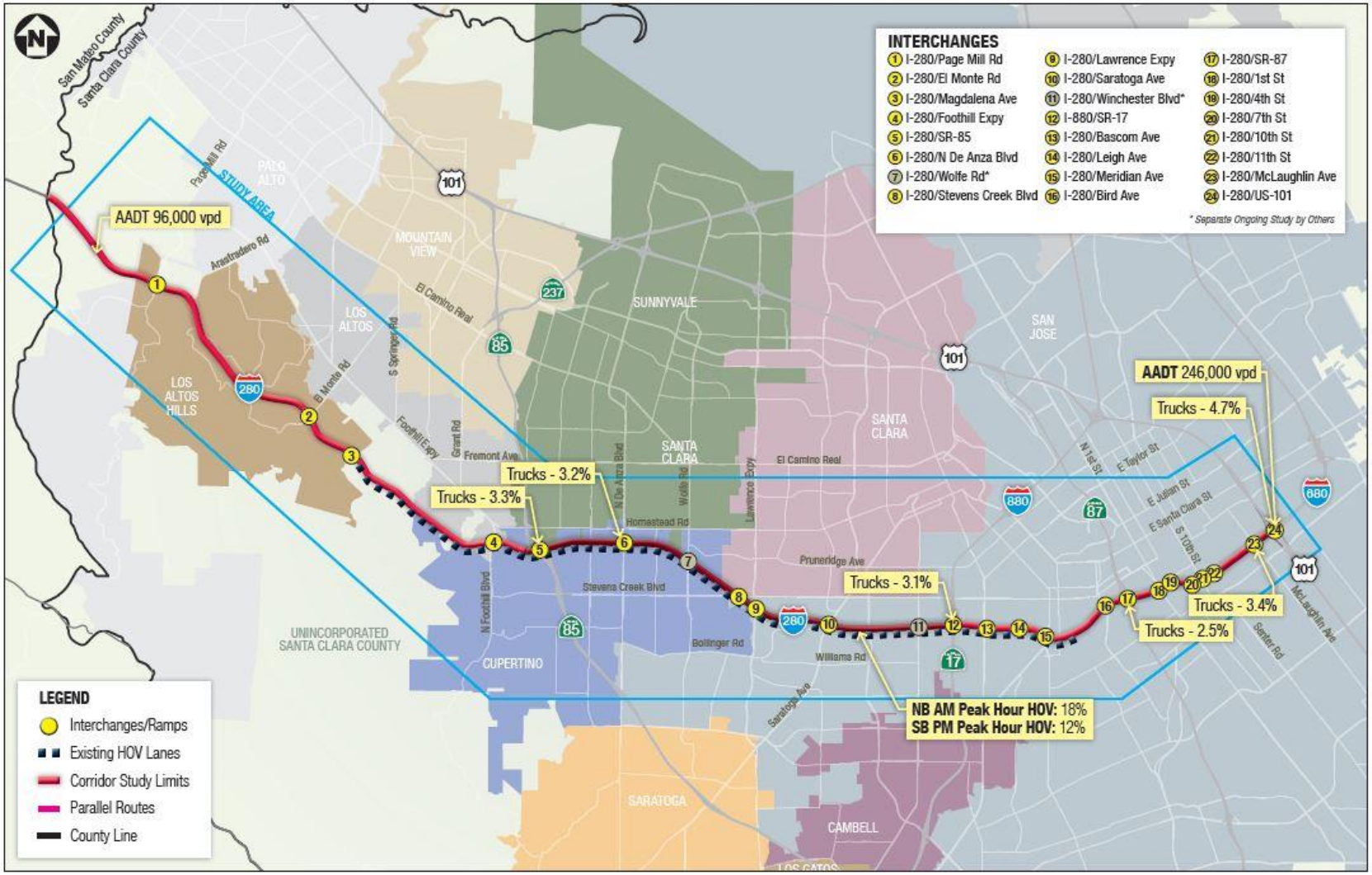
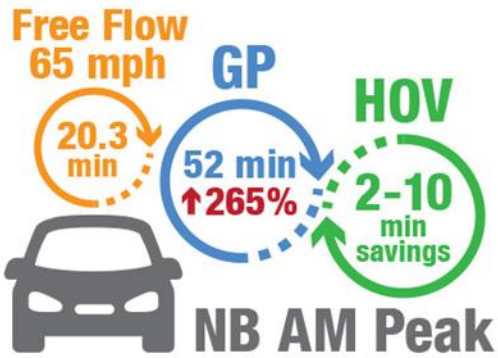


Figure 3: Traffic Data on I-280



2.1.2 Travel Time and Speeds

Travel time runs were performed for both the GP lanes and HOV lanes along the study corridor on January 28, 2016. The performance was measured based on vehicle speed and the time taken to traverse the study segment. Travel times in the GP lanes along 22 miles of I-280 corridor study are 52 minutes in the northbound direction during the AM peak and 78 minutes in the southbound direction during the PM peak hour as compared to a free flow travel time of 20.3 minutes. The results indicate that the HOV lane is providing travel time savings and higher speeds as compared to that of the GP lanes. Within the HOV lane section, there was approximately 2-10 minutes of travel time savings measured in the northbound direction during the AM peak hours and 4-12 minutes of travel time savings measured in the southbound direction in the PM peak hours as compared to GP lanes. These results were the average of seven travel time runs. Detailed travel time run results are provided as part of Appendix 2, Existing Conditions Technical Memorandum. **Figure 4** shows existing speed ranges on GP lanes and HOV lanes for the northbound and southbound directions during the am and pm peak periods.



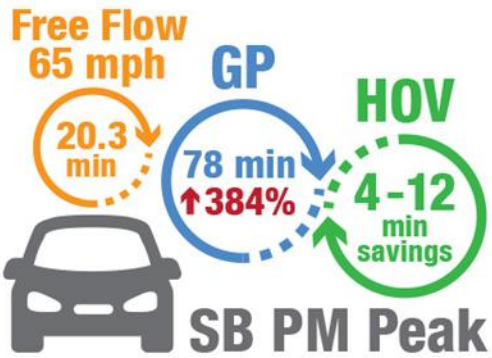
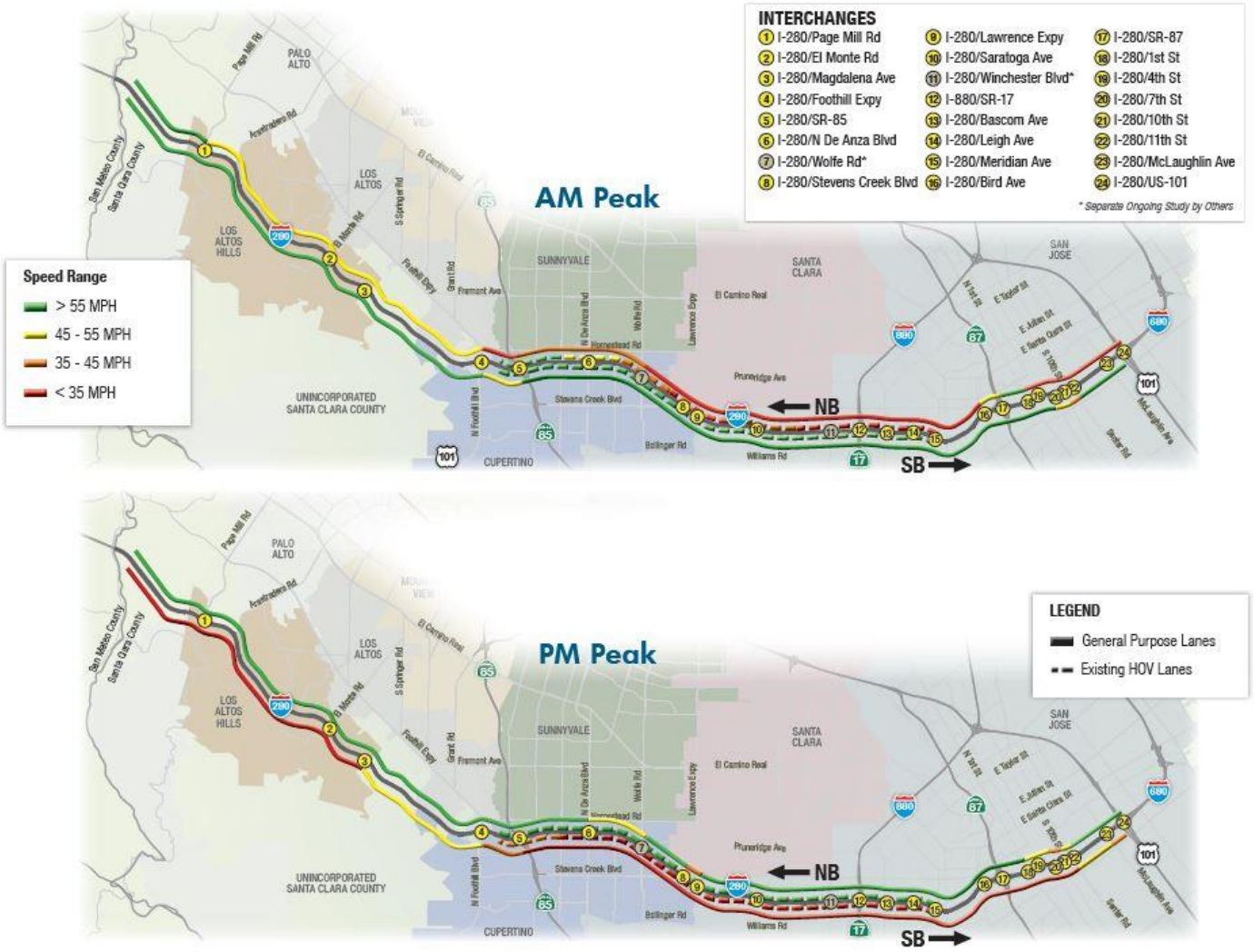


Figure 4: Speed Range Map



2.1.3 Existing Bottlenecks and Queues

Several bottlenecks and queues were observed along the study corridor in both directions from the field observations conducted in February 2016.

Northbound AM Peak:

- A bottleneck was observed between 7th Street off-ramp and SR-87 NB/SB off-ramp. The congestion on SR-87 NB is causing backup on the off-ramp that extends onto the I-280 mainline. Right lane overload is observed at this location due to heavy merge and weave traffic volume from the closely spaced on and off-ramps. The mainline queue extends along I-280 beyond US 101 interchange. The other contributing factors for this long queue include: closely spaced US 101 NB/SB on-ramp merge location, McLaughlin Avenue on-ramp, 7th and 11th street off-ramps, 10th and 4th Street on-ramps, and a lane drop at 7th Street off-ramp.
- A bottleneck was observed at the mainline lane drop just south of I-880/SR-17 off-ramp and Stevens Creek Boulevard off-ramp. The queue from this bottleneck extends along I-280 beyond Meridian Avenue (occasionally it extends to SR-87).
- Slow moving traffic was observed in all lanes from SR-17/I-880 to De Anza Boulevard because of heavy on-ramp traffic from SR-17/I-880 and off-ramp traffic at Lawrence Expressway, Wolfe Road, and De Anza Boulevard interchanges.
- Another bottleneck was observed between SR-85 on-ramp and Foothill Expressway off-ramp due to heavy weaving and less interchange spacing. The queue from this bottleneck extends beyond the SR-85 interchange (occasionally it extends to De Anza Boulevard).
- HOV Lane was observed to be congested from Meridian Avenue to Saratoga Avenue due to heavy traffic merge and weave between HOV lane and SOV lane at SR-17/I-880 interchange.

Northbound PM Peak:

- Slow moving traffic was observed at the Page Mill Road due to a lane drop before the Page Mill Road interchange.

Southbound AM Peak:

- There is no congestion observed in southbound direction during AM peak, except for a very short segment from 11th Street to 7th Street. This segment is observed to have slow moving traffic due to a lane drop.

Southbound PM Peak:

- A bottleneck was observed at Magdalena Avenue off-ramp due to inadequate mainline capacity and one of the mainline lane becomes exit lane for the off-ramp. The queue from this bottleneck extends beyond the Page Mill Road interchange.
- A bottleneck was observed at the SR-85 off-ramp due to heavy off-ramp volume to SB SR-85 and demand exceeding capacity on SR-85. The queue from this bottleneck extends up to Magdalena Avenue and joins the upstream bottleneck at Magdalena Avenue.
- Several major bottlenecks were observed at SR-17/I-280, SR-87/I-280 and US 101/I-280 interchanges due to demand exceeding capacity of the intersecting freeways such as SR-17 southbound, SR-87 southbound and US 101 southbound. The queues from these bottlenecks connect each other and extend to De Anza Boulevard.

Figure 5, on the following page, shows existing bottleneck locations and queues observed in northbound and southbound directions during the am and pm peak periods.

2.1.4 Existing Traffic Operations

In addition to the travel time runs and current field observations, traffic operations along the study corridor for existing conditions were extracted from 2014 VTA Monitoring and Conformance Report. **Figure 6** (pg. 17) shows existing LOS on GP lanes and **Figure 7** (pg. 18) shows existing LOS on HOV lanes for the northbound and southbound directions during the am and pm peak periods from the VTA Monitoring and Conformance Report.

Figure 5: Bottleneck and Queues

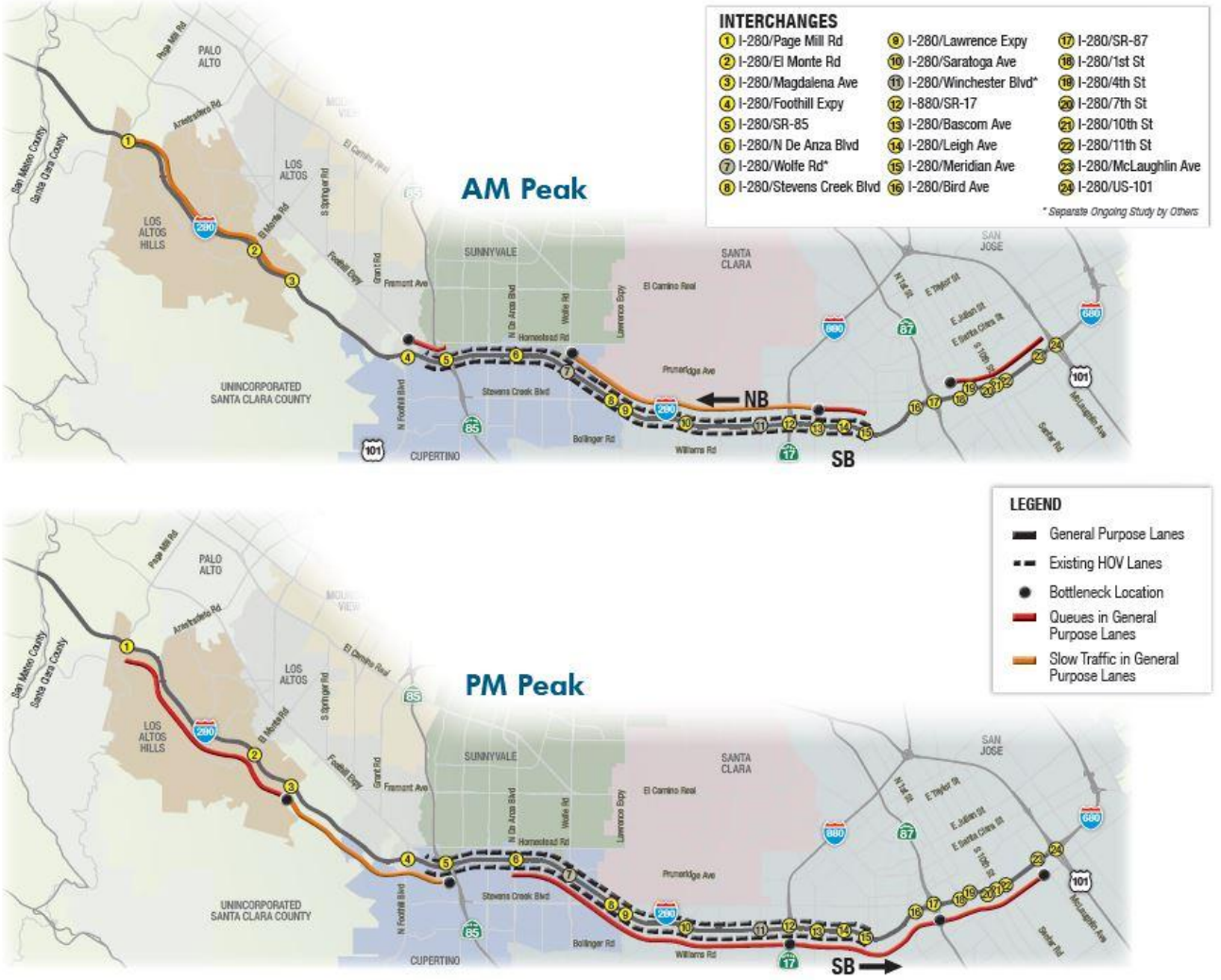


Figure 6: Existing Conditions LOS-GP Lanes

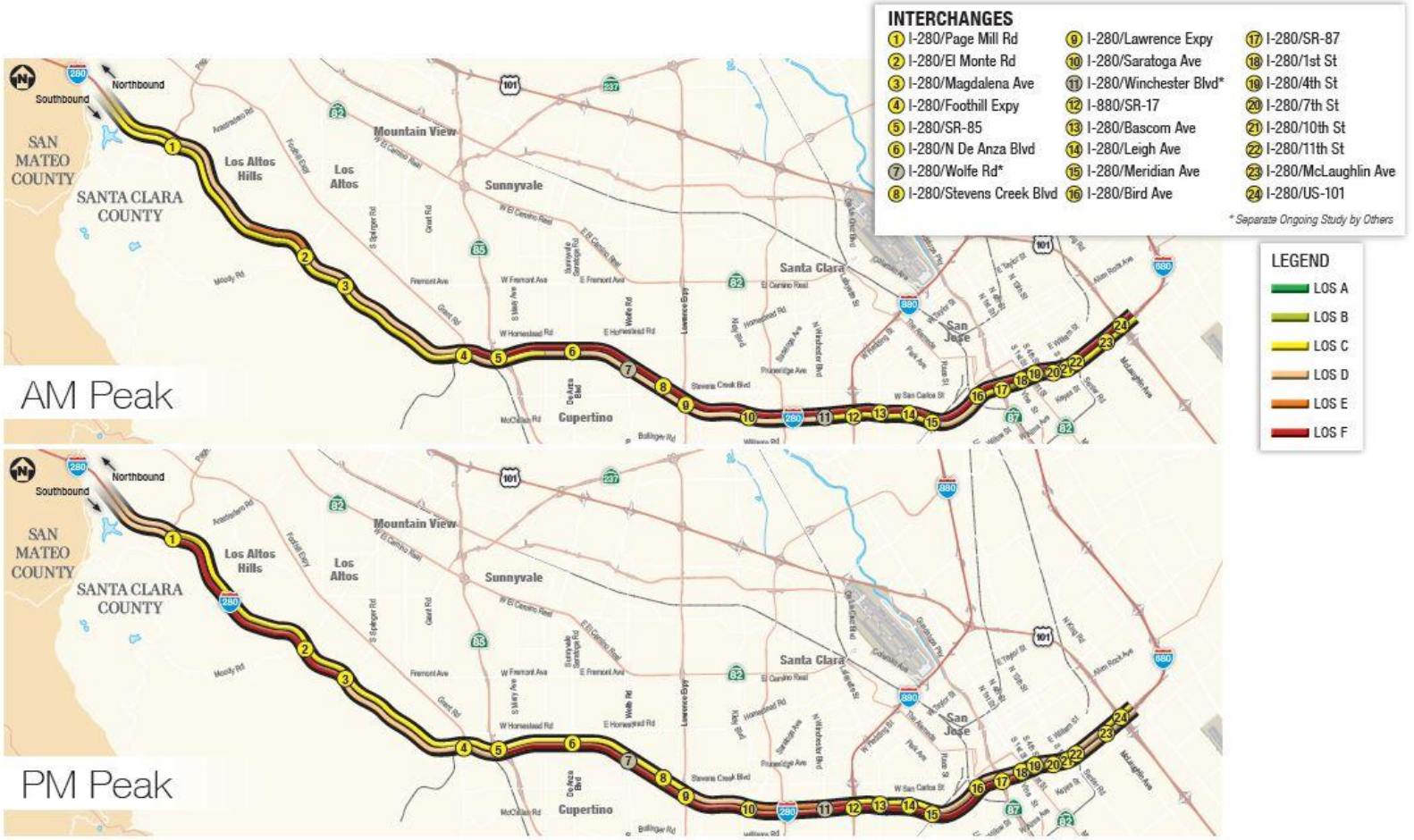
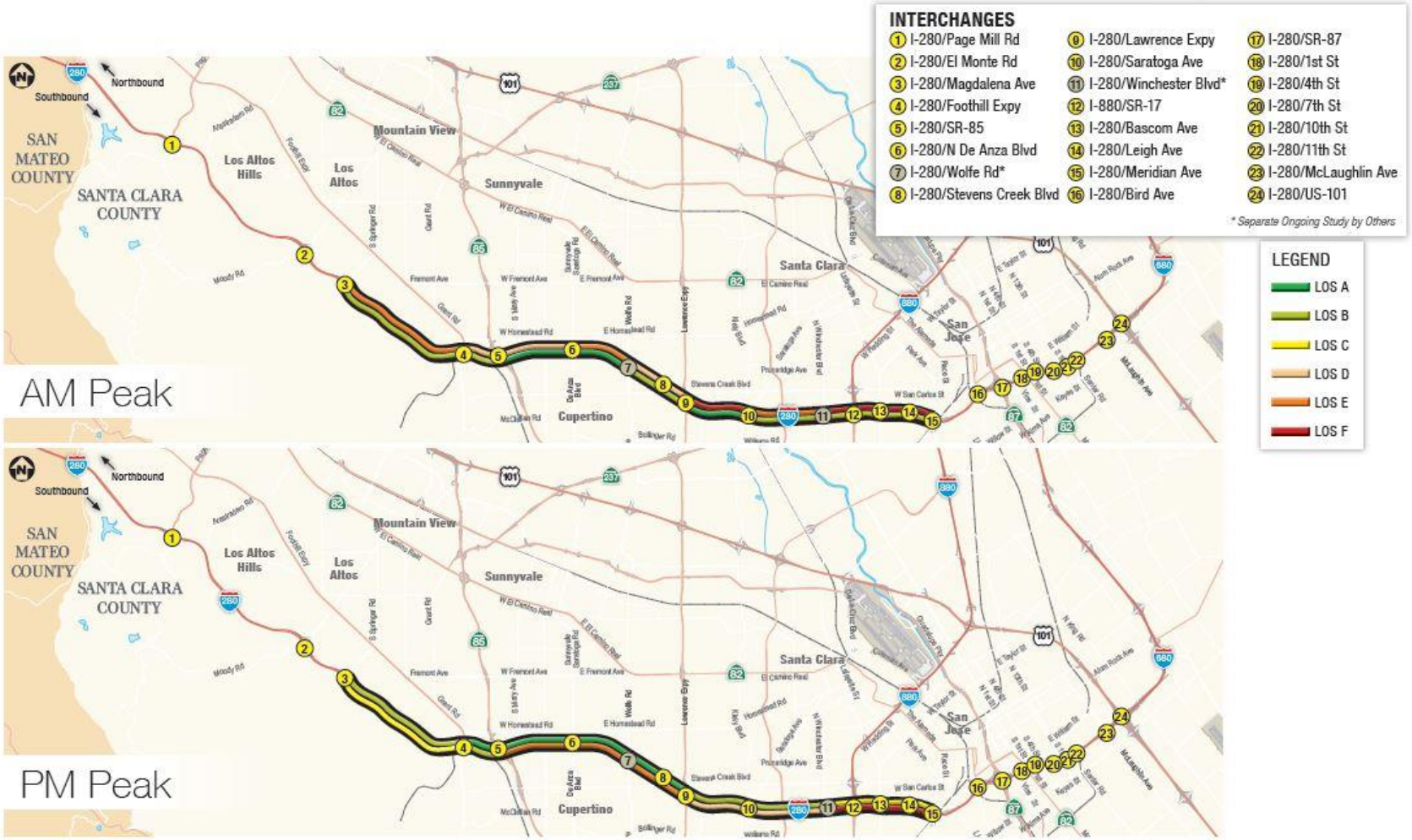


Figure 7: Existing Conditions LOS-HOV Lanes



2.2 Interchanges and Local Street Crossings

I-280 has 24 interchanges and local road crossings within the study area. These interchange areas are briefly summarized below in **Table 3** with interchange configuration, local street configuration, and multimodal facilities on the local streets. Note that the I-280 alignment changes between north-south and east-west along the study area. When referencing direction of travel on I-280, the designation of northbound I-280 (towards San Francisco) and southbound I-280 (towards San Jose) will always be used. When describing cross-streets or interchanges relative to I-280, normal directional convention will be used.

Table 3: Interchanges and Local Street Crossings description

Interchange Name	Interchange Configuration and I-280 accessibility	Local Street Configuration	Transit Routes on local streets	Bicycle/Pedestrian Facilities at the interchange
US-101	Major system interchange. Ramp meters during AM peak hours. I-280 accessible from both directions.	US-101 is an 8-lane freeway	VTA Express Bus Routes 121,122: Monterey-Salinas Transit Routes 55 and 86	N/A
McLaughlin Avenue	Partial Cloverleaf; NB on-ramps controlled by ramp meters, no HOV bypass lanes. SB I-280 is not accessible.	2-lane minor arterial north of I-280 and 4-lane minor arterial south of I-280	VTA local bus Route 72.	Sidewalks and bicycle lanes on both sides
10th and 11th Street	Spread diamond interchange	2-lane minor arterial	VTA local bus Route 73	Existing sidewalks and bicycle lanes
6th Street/7th Street	Half diamond interchange	2-lane minor arterial	VTA local bus Routes 25 and 73	Sidewalks and bicycle lanes on each side of 7th Street at I-280
4th Street		2-lane collector	Do not cross I-280	
Almaden Boulevard/1st Street	Isolated on-ramp to SB I-280	Almaden-6-lane minor arterial 1st Street-4-lane collector	VTA local bus Routes 23, 66, 68, 82, and limited stop bus Route 304	Sidewalks on both sides. No bicycle facilities.
SR-87	System Interchange provides connection to all movements of I-280. Ramp meters with no HOV bypass lanes.	6-lane freeway north and south of I-280	VTA ExpressBus Routes 168, 182 and VTA light rail along the median	N/A
Bird Avenue	Tight diamond interchange	6-lane collector	VTA Bus Routes 64, 65, and Express Bus Route Hwy-17	Sidewalks on both sides and no bicycle facilities on either side of Bird Ave at I-280.

Interchange Name	Interchange Configuration and I-280 accessibility	Local Street Configuration	Transit Routes on local streets	Bicycle/Pedestrian Facilities at the interchange
Race Street/Southwest Expressway	Partial interchange with a northbound off-ramp and southbound on-ramp.	Race Street is a 4-lane collector north of I-280 and a 2-lane collector south of I-280.	VTA light rail station is located close to the Race Street interchange.	Existing sidewalks on each side of the street at I-280 but no bicycle facilities.
Meridian Avenue	Collector-Distributer (C-D) system on both sides of I-280.	Meridian Avenue is a 4-lane major arterial.	VTA local bus Routes 25 and 63.	No existing bicycle or pedestrian facilities.
Parkmoor Avenue/Leland Avenue/Moorpark Avenue	Isolated on and off-ramps providing access to both directions of I-280 between I-880/SR-17 and Meridian Avenue interchanges.	Bascom Avenue- 6-lane major arterial. Leigh Avenue-4-lanes south of I-280 and 2 lanes north of I-280. Parkmoor Avenue- 2-lane local road that runs parallel with I-280. Moorpark Avenue- 2-lane local road that runs parallel on the south side of I-280.	Bascom Avenue- VTA local bus Routes 61 and 62 Leigh Avenue- VTA local bus Route 65	Bascom Avenue- sidewalks on both sides of the street at I-280. Leigh Avenue- sidewalk on north side and sidewalk on some locations on south side. Parkmoor Avenue-sidewalk on the south side. No bicycle facilities Moorpark Avenue-sidewalk on both sides. No bicycle facilities.
I-880/SR-17	System interchange that provides connections to and from the movements of I-280. No ramp meters.	6-lane freeway	VTA Express Bus Route 17 at I-280	N/A
Winchester Boulevard	Half diamond interchange. No NB off-ramp and SB on-ramp	6-lane major arterial	VTA local bus Routes 25 and 60	Sidewalks on both sides of the street at I-280 with no existing bicycle infrastructure.
Saratoga Avenue	Half diamond on the south side and partial cloverleaf on north side. Ramp meters on NB and SB ramps.	5-lane major arterial north of I-280 and a 6-lane major arterial south of I-280.	VTA local bus Routes 57 and 58.	There is a sidewalk on the west side of the street at I-280 and no existing bicycle infrastructure.
Lawrence Expressway/Stevens Creek Boulevard	NB I-280 on-/off-ramps go through Steven Creek Boulevard before it merges with Lawrence Expressway. Similarly, the southbound off-ramp also goes through	8-lane expressway north of I-280 and a 6-lane expressway south of I-280	VTA local bus Route 101 and Rapid Bus Route 323	Existing striped shoulders in each direction and a sidewalk at I-280 on the east side of the street.
Stevens Creek Boulevard	Stevens Creek Boulevard before it joins Lawrence Expressway.	6-lane major arterial	VTA local bus Route 23, Express Bus Routes 101 and 182, and Rapid Bus Route 323	There are existing bicycle lanes and sidewalks in each direction.

Interchange Name	Interchange Configuration and I-280 accessibility	Local Street Configuration	Transit Routes on local streets	Bicycle/Pedestrian Facilities at the interchange
Wolfe Road	Partial cloverleaf interchange with HOV bypass lanes on all on-ramps except NB diagonal ramp.	4-lane minor arterial	VTA local bus Route 26 and Express Bus Route 101.	Bicycle lanes and sidewalks in both directions at I-280
De Anza Boulevard	Spread diamond interchange. Ramp meters at on-ramps. HOV bypass lane on NB on-ramp. I-280 accessible from both directions.	4-lane minor arterial	VTA local bus Route 55	Sidewalks exist on both sides of the street at I-280. Bicycle lanes striped north and south of I-280.
SR-85	System Interchange provides connection to all movements of I-280. Ramp meters on SB ramps.	6-lane freeway	VTA Express Bus Route 102	N/A
Foothill Expressway	No ramp meters. I-280 accessible from both directions.	4-lane expressway	VTA local Route 81	Sidewalk on east side of the street. Wide shoulders to accommodate bicycles.
Magdalena Avenue	Tight diamond interchange. No ramp meters. I-280 accessible from both directions.	4-lane collector road north of I-280 and 2-lane collector south of I-280	N/A	Sidewalks on both sides of the street
El Monte Avenue	Full cloverleaf interchange with no signals at ramps	4-lane major arterial	VTA bus Routes 40 and 52	Striped shoulders east and west of I-280. No sidewalk on south side of I-280
Page Mill Road	Partial Cloverleaf interchange with stop-signs at off-ramps. No ramp meters. I-280 accessible from both directions.	4-lane major arterial north of I-280 and 2-lane minor arterial south of I-280	VTA Express Bus Routes 101,102,103, 104,182, and pull out DB1	Bicycle lanes south of I-280 and sidewalk on east side of the street at I-280

2.3 Multimodal Facilities

2.3.1 Park and Ride Facilities

Park and Ride lots offer convenient locations to transfer from an automobile to a local or regional transit bus, carpool, vanpool, or light rail. Park and Ride lots offer commuter parking that can be used free of charge where operated by Caltrans or VTA.

Park and Ride lots located near the study area are at the following locations:

- Page Mill Road & Arastadero Road (Operated by Caltrans)
- Vallco Shopping Center (Wolfe Road) (Operated by VTA)
- Diridon Caltrain Station (Operated by VTA)
- Tamien Light Rail/Caltrain Station (Operated by VTA)

VTA continue to seek out new Park and Ride opportunities to improve the productivity of the existing transit system.

2.3.2 Transit Facilities

VTA provides Express Bus service currently operates along I-280 corridor and many of the adjacent side streets nearby. Express Bus Routes that operate on I-280 include Routes 101, 102, 103, and 182. Within the study area, Route 101 provides service from Page Mill Road to Lawrence Expressway. The following bus Routes provide service that stretches nearly the entire length of the study area:

- Express Bus Route 102 operates on I-280 from Page Mill Road to SR-85
- Express Bus Route 103 operates on I-280 from Page Mill Road to I-680 existing at Race Street and Southwest Expressway
- Express Bus Route 182 operates on I-280 from Page Mill Road to SR-87
- Highway 17 Express operates on I-280 from Highway 17 to Bird Avenue. This route is operated by a multi-agency consortium of Amtrak, Capitol Corridor, VTA, Santa Clara Metro, and MST

In addition to bus service, VTA light rail also runs through the study area. It crosses the I-280 corridor at Southwest Expressway and within the median of SR-87. The Race Street Station, Fruitdale Station, and Virginia Station are located closest to I-280. **Figure 6** shows transit routes and stops in the corridor.

Improvements focused on providing exclusive right-of-way for transit on freeway and prioritizing transit access to freeway on-ramps will improve the transit service for Express Bus Routes on freeway.

Figure 8: Transit Routes and Stops

2.3.3 Bicycle Facilities

Within the study area, there are several existing and planned cross-county bicycle corridors. These corridors are described in the 2008 Santa Clara Countywide Bicycle Plan and are an important part of the overall bicycle network. The purpose of the Cross-County Bicycle Corridors network is to provide continuous connections between Santa Clara county jurisdictions and to adjacent counties as well as to serve the major regional trip-attractors in the County. For the most part, the corridors use city streets, ranging from major arterials to quiet residential streets. Twenty-four (24) cross-county bicycle corridors and seventeen (17) bicycle trails make up the Santa Clara County bicycle corridor network. Eleven (11) cross-county bicycle corridors and four (4) bicycle trails extend through the study area. The bicycle paths and cross-county corridors located within the study network are summarized in **Table 4** and are shown in **Figure 7**. The Santa Clara Countywide Bicycle Plan will also be updated in 2017/2018 with a revised corridor list.

Table 4: Cross-County Bicycle Corridors (2008 Santa Clara Countywide Bicycle Plan)

ROUTE #	NAME	WHERE IT CROSSES I-280	LIMITS
1	US 101 Corridor	10th Street	San Mateo County to San Benito County
3	Dumbarton - East-West Connector Corridor	Page Mill Road	North Palo Alto to Los Altos
4	El Camino-Grand Boulevard Corridor	1st Street	San Mateo County to Downtown San Jose
5	Shoreline-Miramonte/ El Monte Corridor	Arastradero Road and El Monte Road	Mountain View to Los Altos
7	Old Highway 9 Corridor	Mary Avenue	North Sunnyvale to Los Gatos
9	Wolfe Rd/Borregas Corridor	Wolfe Road	Sunnyvale to Saratoga
10	North of I-280/Stevens Creek Boulevard Corridor	Stevens Creek Boulevard and Tantau Avenue	Cupertino to Northern East San Jose
11	Calabazas Creek/Winchester Corridor	Winchester Boulevard	Sunnyvale to Los Gatos
12	South of I-280 Corridor	Menker Avenue	Cupertino to Hillview, East San Jose
13	Bowers/Kiely/Saratoga Corridor	Saratoga Avenue	North Santa Clara to San Benito County
15	Valley Fair to Santa Teresa Corridor	Leigh Avenue	Downtown Santa Clara to San Benito County
T-02	San Tomas Aquino Creek Trail/Saratoga Creek Trail	Future crossing at Tantau Avenue	Sunnyvale Baylands to Alviso
T-S2	Stevens Creek Trail	Future crossing at Foothill Expressway	San Francisco Bay Trail in Mountain View to Hearthstone Way & Dale Ave
T-S3	Guadalupe River Trail	SR-87	Alviso to Los Alamitos Calero Creek Trail
T-S4	Los Gatos Creek Trail	West of Bird Avenue	Milpitas to Anderson County Park

Note: Santa Clara Countywide Bicycle Plan will be updated and revised corridor lists will be released in 2017/2018

In addition to the cross-county bicycle corridor network, there are many existing on-street bicycle facilities parallel to and crossing I-280. Bicycle facilities are typically categorized into four classes: Off-street Paths (Class I), On-street Lanes (Class II), Signed Routes (Class III), and Cycle Tracks (Class IV).

Class I bicycle facilities cross I-280 at the following locations:

- Don Burnett Bicycle Pedestrian Bridge (8 ft. wide)
- Guadalupe River Trail (10 ft. wide)
- El Monte Road

Connections are planned for the Stevens Creek Trail and the Coyote Creek Trail to cross I-280 in the future.

Class II bicycle facilities cross I-280 at the following locations:

- Arastadero Road (5 ft. wide)
- Stelling Road (5 ft. wide)
- De Anza Boulevard (5 ft. wide)
- Wolfe Road (5 ft. wide)
- Blaney Avenue (4 ft. wide)
- Tantau Avenue (5 ft. wide)
- 2nd Street (6.5 ft. wide)
- 3rd Street (6.5 ft. wide)
- 7th Street (5 ft. wide)
- 10th Street (6 ft. wide)
- 11th Street (5.5 ft. wide)
- McLaughlin Avenue (5 ft. wide)

Class III bicycle facilities cross I-280 at the following locations:

- Robleda Road
- MacArthur Avenue

2.3.3.1 Across Barrier Connections

In some locations within the study area, I-280 creates an impermeable barrier for pedestrians and bicyclists. Even when a roadway crosses I-280, it may have inadequate or no accommodations for bicycles (bicycle lanes or shoulders meeting bicycle lane standards) and/or pedestrians (sidewalks). The 2008 Santa Clara Countywide Bicycle Plan identifies these barriers as an issue that should be addressed with "across barrier connections".

Across barrier connections are bicycle/pedestrian-only bridges or tunnels across a freeway, creek, or railroad, or an at-grade pedestrian crossing of railroad tracks. In some cases, a cross-street may be considered an "adequate roadway crossing". A roadway is considered to provide adequate bicycle access if it is a collector or arterial roadway with bicycle lanes or wide shoulders meeting bicycle lane standards, or it is a local road with low traffic volumes. A roadway is considered to provide inadequate bicycle access if it is a collector or arterial and does not have a bicycle lane or wide shoulders. Segments of I-280 are "gaps" if there is a mile or more between existing crossings (adequate and inadequate). Per the 2008 Santa Clara Countywide Bicycle Plan, the study area along I-280 includes five (5) existing across barrier connections, twelve (12) existing adequate crossings, seventeen (17) existing inadequate crossings, and four (4) existing gaps.

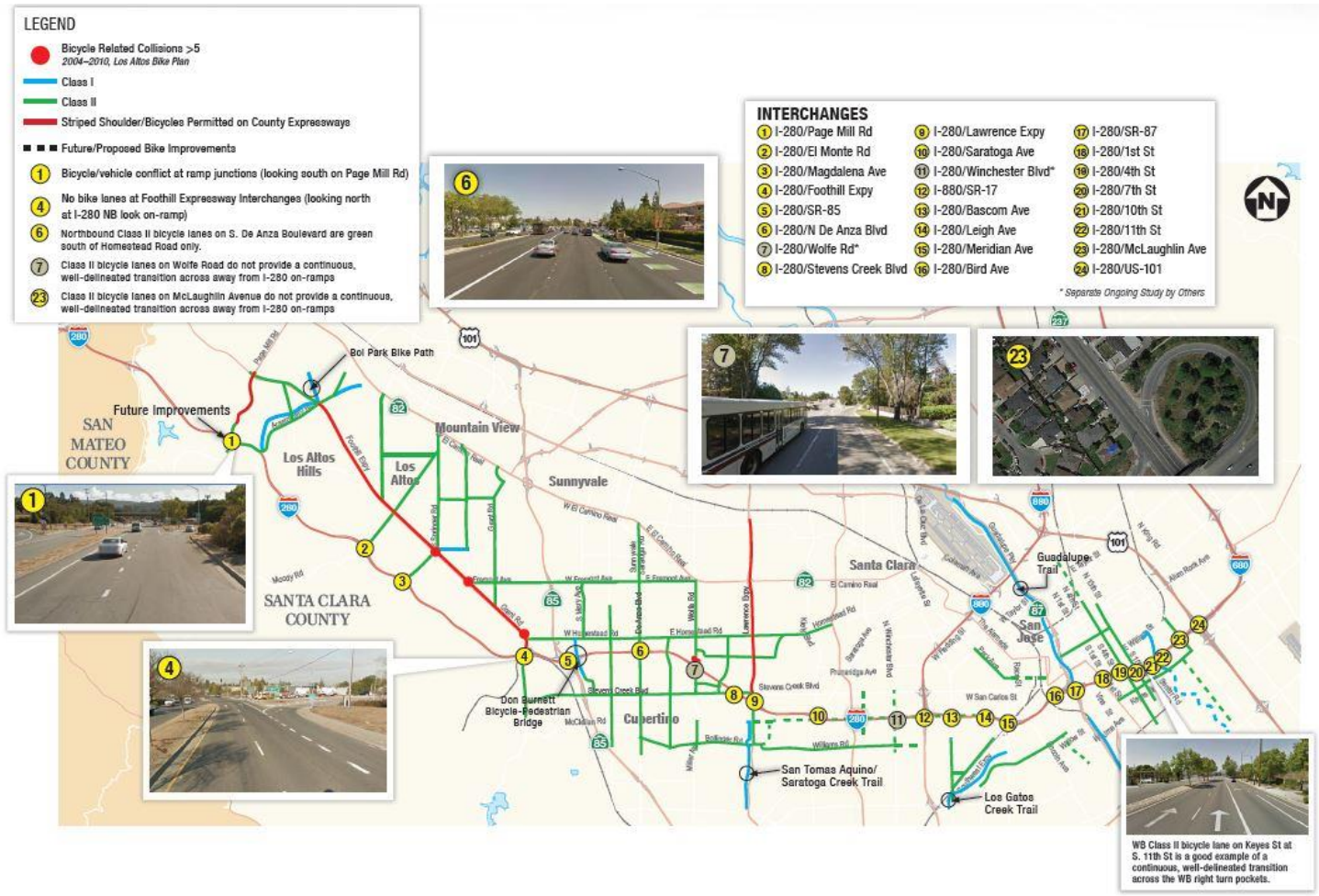
The list of arterial crossings in the study area that do not have bicycle lanes or shoulders per the 2008 Santa Clara Countywide Bicycle Plan is:

- MacArthur Avenue
- Bascom Avenue
- Leland Avenue
- Leigh Avenue
- Race Street
- Vine Street
- Almaden Boulevard

The gap locations within the study area that are included in the 2008 Santa Clara Countywide Bicycle Plan are:

- Segment between Foothill Boulevard to Mary Avenue pedestrian bridge
- Segment between Robleda Rd to El Monte Avenue
- Lawrence Expressway to Saratoga Avenue
- 11th Street to McLaughlin Avenue

Figure 9: Bicycle Facilities



2.4 Pedestrian Facilities

Pedestrian facilities consist of sidewalks, bridges, crosswalks, and pedestrian signals. Within the study area, there are four pedestrian overcrossings.

- 0.30 miles east of SR-85 (Don Burnett Bicycle Pedestrian Bridge)
- 0.18 miles east of San Tomas Expressway
- 0.17 miles west of I-880
- 0.27 miles east of Leigh Avenue

Aside from pedestrian overcrossings, many of the streets crossing I-280 have existing sidewalks for pedestrians. **Figure 10** shows the locations where inadequate or poor pedestrian facilities are identified.

2.5 Collision Data

Collision data was gathered from the Statewide Integrated Traffic Records System (SWITRS). This corridor study looked at five (5) years of collision data within 500 feet of each interchange. This included collisions on the mainline, on-ramps, off-ramps, and cross-streets. The most recent five-year span with available data is 2010- 2014. The data shows a higher concentration of collisions along the eastern portion of the study corridor. S Bascom Avenue has the highest number of collisions within 500 feet of the interchange (122 collisions). The cross-street with the highest number of pedestrian/bicycle collisions from 2010-2014 is Lincoln Avenue (6 collisions).

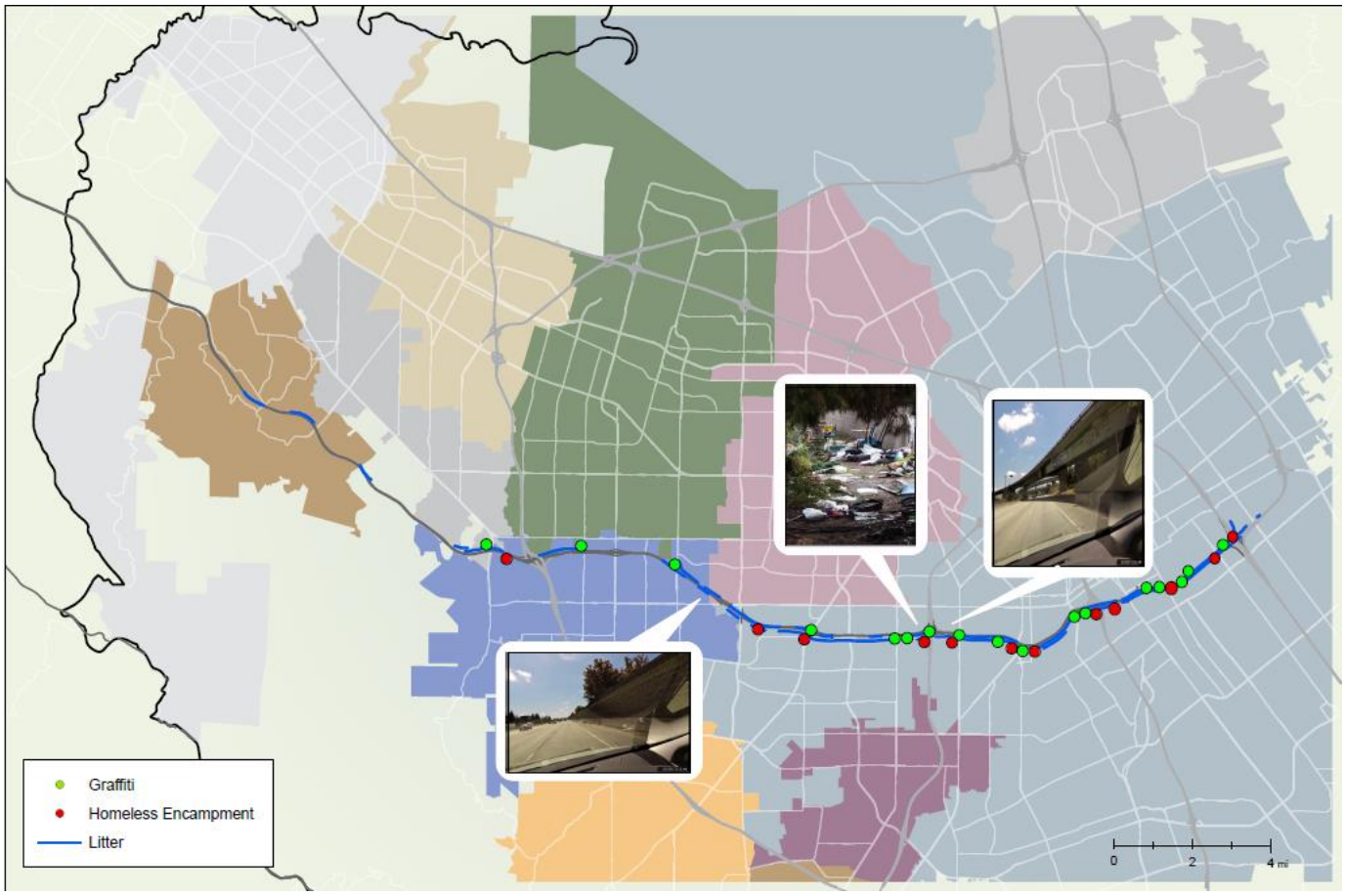
Figure 10: Pedestrian Facilities

2.6 Encampment, Litter, Graffiti Data

The locations of the homeless encampments, litter, and graffiti were identified by the public in the online survey and supplemented by VTA staff observations. In general, litter was observed sporadically along the I-280 corridor with higher concentrations in San Jose and Cupertino. There were also high concentrations of litter on the highway median in Los Altos and Los Altos Hills. Graffiti and homeless encampments were heavily located along Downtown San Jose but were sporadic along the other sections I-280 corridor.

The observations made along the I-280 corridor are not static, and their conditions are dependent on timely cycles of removal. The efforts made by government agencies to improve the safety and visual appearance of the corridor are annually monitored through VTA's Transportation System Monitoring Program (TSMP). TSMP reports are available at http://www.vta.org/tsmp.

The public can report locations and request the removal of graffiti, litter, or homeless encampments. To request graffiti removal from the State highway system, the public can report electronically using the following link: http://www.dot.ca.gov/hq/maint/msrsubmit/.



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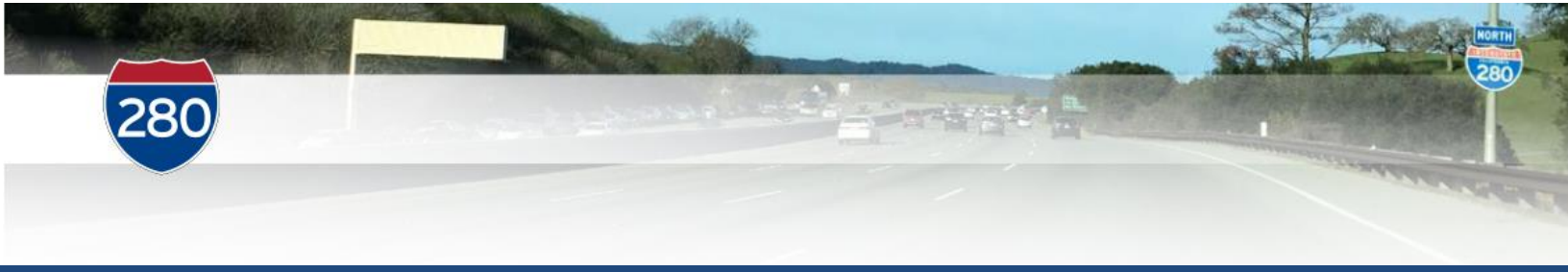


3.0 Potential Improvements

Potential improvements have been identified for consideration with the goals of improving corridor mobility for all modes of transportation. Information from existing transportation conditions, environmental screening, public input, and stakeholder meetings was used to identify several potential improvements for consideration and evaluation. The recommended potential improvements are categorized as Highway Improvements; Interchanges and Auxiliary Lane Improvements; Local Street Improvements; and Noise Abatement Improvements to address the needs of the corridor. The categories of potential improvements to address these key operational issues are listed in **Table 5**. Within each category, the list of viable potential projects is listed in a table and shown on the corridor map. Exhibits illustrating the potential improvements are included in **Attachment 1**.

Table 5: Categories of Potential Improvements

Study Goals	Need/Deficiency	Potential Improvements
Improve travel time reliability; Preserve and enhance the environment	Improve operations and reduce travel time delay along highway corridor	Highway Improvements ▪ HOV Lanes ▪ EL ▪ Mainline Metering (system interchanges)
Improve mainline and interchange operations	Address highway bottlenecks and improve weaving conditions	Interchanges Improvements ▪ HOV/EL direct connectors ▪ HOV by-pass lanes on ramps ▪ Interchange reconfigurations
Promote multiple modes of travel; Promote transit alternatives; Improve bicycle and pedestrian safety	Promote and develop alternative modes of transportation	Local Street Improvements ▪ Add Bicycle Lanes ▪ Add or improve sidewalks ▪ Improve cross walk and curb ramps
Improve travel time reliability; Promote transit alternatives	Enable efficient operation of the existing corridor using technology	Active Traffic Management Improvements ▪ Adaptive Ramp Metering ▪ Speed Harmonization ▪ Queue Warning ▪ Hard Shoulder Running (Bus on Shoulders) ▪ Dynamic Junction Control ▪ Enhanced Traveler Information ▪ Improved Incident Response
Preserve and enhance the environment	Address noise complaints received from the public	Noise Abatement Improvements ▪ Soundwall improvements

3.1 Highway Improvements

This section includes highway improvements focused on improving operations and travel time on I-280. These improvements address existing operational issues as described in **Section 2**-Existing Conditions and complement other ongoing efforts within the study corridor. **Table 6** illustrates potential highway improvements for specific corridor problem identified.

Table 6 Preliminary Potential Highway Improvements

Need/Deficiency	Potential Highway Improvements
Gaps in HOV lane between Leland Ave and Magdalena Avenue interchanges	HOV lane Gap Closure
NB HOV lane congested from Meridian Ave to Saratoga Ave due to heavy traffic merge between HOV lane and GP lane at SR-17/I-880 Interchange	Conversion of HOV lane to EL
SB I-280 HOV lane is congested from Wolfe Road Interchange to I-880	Conversion of HOV lane to EL

The feasibility of these improvements operating along I-280 is discussed in more detail below. **Table 7** shows the highway improvement projects, and **Figure 11** shows the location of the same. Exhibits L-1 to L-19 and D-01 to D-02 show the potential improvements and are included in **Attachment 1**.

3.1.1 HOV Lanes

HOV lanes are a traffic management strategy to promote and encourage ridesharing, thereby alleviating congestion and maximizing the people-carrying capacity of the corridor. The HOV lanes on I-280 are operational Monday thru Friday between 5 AM to 9 AM and 3 PM to 7 PM.

Existing Condition

There are gaps in the HOV lane on I-280 within the study area. Currently the HOV lane start/ends from south of Leland Avenue to end/starts north of Magdalena Avenue.

Potential Improvements

The following alternatives to add HOV lanes are considered:

- Northbound and southbound HOV lanes to extend the existing HOV lanes from Leland Avenue to US 101 on south end of the corridor to provide connection to future planned HOV lanes from the I-680 corridor study. HOV lane construction will require Design Exceptions for lane and median shoulder width. This option would allow adding the HOV lane while maintaining the existing number of mixed-flow lanes within the existing right-of-way.
- In the northbound direction, convert one GP lane to an HOV lane from Magdalena Avenue to San Mateo County Line by converting the #1 lane (next to median) to an HOV lane. Eliminate mainline lane

drop at Page Mill Road by adding a ½-mile deceleration lane to provide a 2-lane exit ramp for Page Mill Road northbound off-ramp.

- In the southbound direction, add an HOV lane in the median by widening from the County Line to the existing HOV lane at Magdalena Avenue. This will eliminate the existing lane drop at Magdalena Avenue and add to capacity during the heavily congested PM peak period.

3.1.2 Express Lanes

With the success of EL in the Bay Area and other locations, it is reasonable to anticipate that future federal and State legislation may continue to provide flexibility in implementing price-managed HOV lanes. Since this Study addresses potential long-term improvements that may not be implemented for many years, various options to expand HOV and Express Lanes are included in the I-280 Corridor Study.

The Envision Silicon Valley project list (10/1/15) includes EL projects for the I-280 corridor. The HOV lane extension mentioned in **Section 3.1.1** could be the initial step in expanding the EL system in Santa Clara County.

Existing Condition

Currently the existing HOV lanes are experiencing congestion due to high HOV 2+ usage and weaving between mixed-flow and HOV lanes. To improve the HOV lane traffic flow and congestion, converting HOV lanes to EL option should be considered. With EL option, the congestion could be controlled with dynamic pricing.

Potential Improvements

To further optimize the existing capacity and improve operations through Downtown San Jose, converting one general purpose lane to EL from US 101 to I-880 should also be considered. Having a two-lane EL through this heavily congested segment of the I-280 corridor would help improve congestion and promote transit ridership. The federal Transportation legislation in 2012, Moving Ahead for Progress in the 21st Century (MAP-21), relaxed previous prohibitions on the imposition of tolls on federal-aid highways. Map-21 allows conversion of an existing HOV lane to an EL but restricts conversion of a GP lane directly to EL

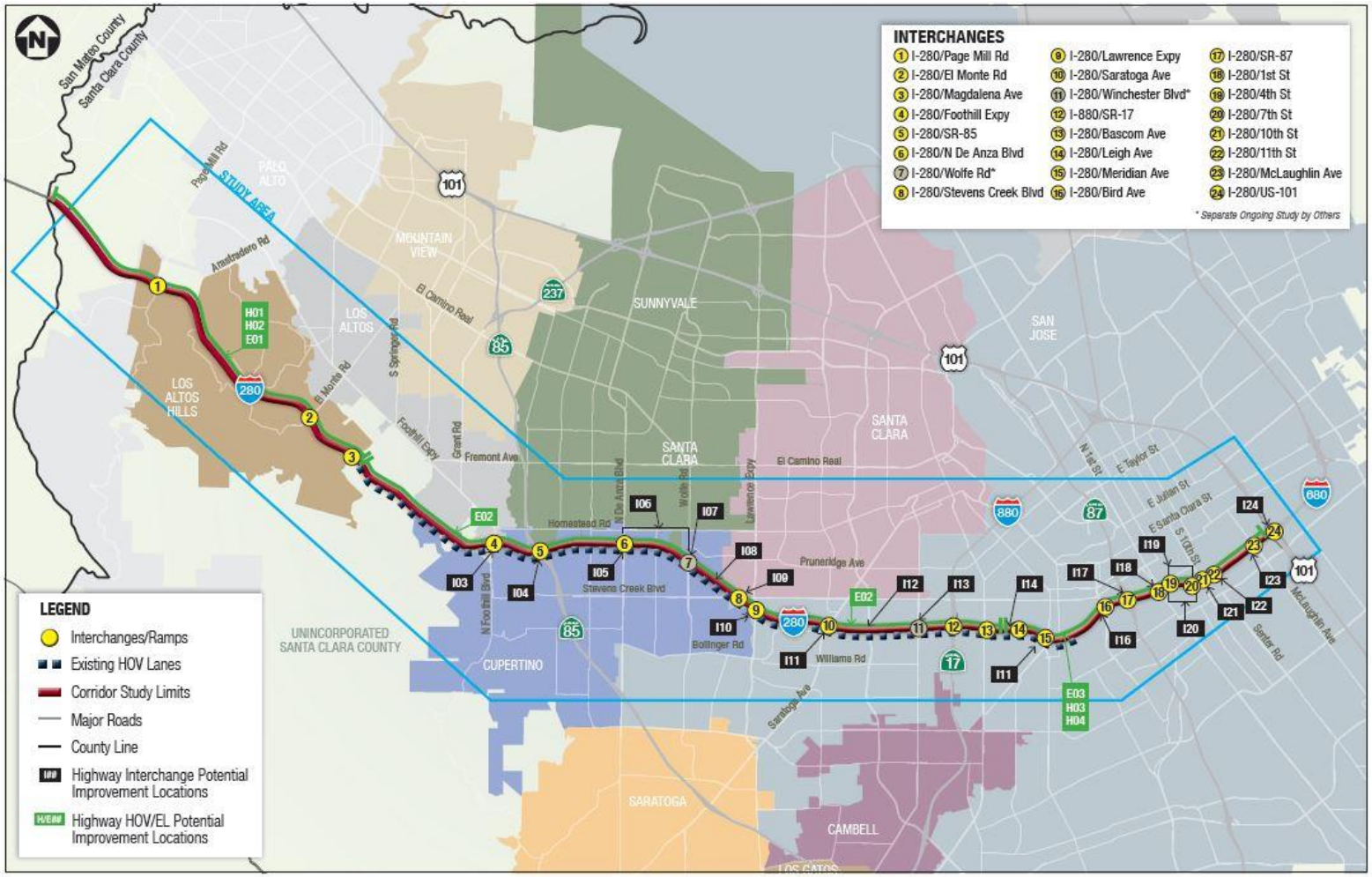
An EL terminus can be provided between SR-17/I-880 to SR-85 wherever the right-of-way permits for a safer merge to general purpose lane and avoid congestion in the EL.

Table 7: HOV/EL Improvements

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
HIGHWAY HOV/EL IMPROVEMENTS				
H01	Los Altos Hills	San Mateo County Line to Magdalena Ave	I-280 HOV Lane Northbound ▪ Extend Existing HOV Lane from Magdalena Ave to San Mateo County Line	$6M to $8M
H02	Los Altos Hills	San Mateo County Line to Magdalena Ave	I-280 HOV Lane Southbound ▪ Extend Existing HOV Lane from Magdalena Ave to San Mateo County Line	$70M to $90M
H03	San Jose	Leland Ave to US 101	I-280 HOV Lane Southbound ▪ Extend Existing HOV Lane from Leland Ave to US 101	$5M to $7M
H04	San Jose	Leland Ave to US 101	I-280 HOV Lane Northbound ▪ Extend Existing HOV Lane from Leland Ave to US 101	$5M to $7M
E01	Los Altos	San Mateo County Line to Magdalena Ave	I-280 EL ▪ ID E280-03* Magdalena Ave to San Mateo County Line	$95M
E02	Los Altos Hills/Los Altos/ Cupertino/San Jose	Magdalena Ave to Leland Ave	I-280 EL ▪ ID E280-02* Leland Ave to Magdalena Ave	$63M
E03	San Jose	Leland Ave to US 101	I-280 EL ▪ ID E280-01* US 101 to Leland Ave	$27M

* Projects programmed and listed in Envision Silicon Valley Project List 10/1/2015

Figure 11: HOV/EL and Interchange Improvements Corridor Map



3.2 Interchange Improvements

Several potential improvements have been identified for interchanges and mainline locations to address the mainline bottlenecks improve weaving conditions. This section details improvements related to the interchanges along I-280 and ramps and mainline lanes leading up to the interchange. Typical improvements include elimination of lane drops to minimize weaving impacts, HOV/EL direct connectors, HOV bypass lanes on-ramps, ramp metering, and interchange reconfigurations to improve operations. Additionally, safety improvements at the intersection of the ramps and local roads, such as squaring up ramps, are also identified in this section. **Table 8** illustrates potential Interchange and auxiliary lane improvements for each type of corridor deficiency. These improvements are summarized in **Table 9**, and locations are shown in **Figure 11**. Exhibits showing the improvements are included in **Attachment 1**. Each of the proposed improvements are described in the following paragraphs.

Table 8: Potential Interchange Improvements

Need/Deficiency	Potential Interchange Improvements
Inadequate capacity of Interchanges	Interchange reconfigurations
Lack of direct access	Interchange reconfigurations
Congestion on freeway due to high volumes entering and existing	Ramp metering HOV/EL direct connectors HOV bypass lanes
Closely spaced and high volume ramps resulting in congestion from significant weaving.	Improve merge weave conditions
Improve capacity and safety at ramp termini	Ramp intersection improvements

3.2.1 Improve Merge Weave Conditions

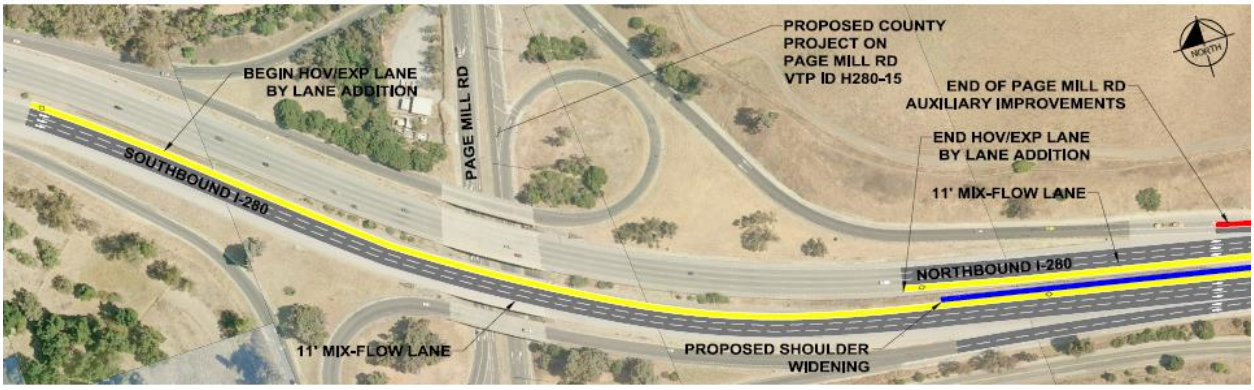
Page Mill Road Interchange (I01)

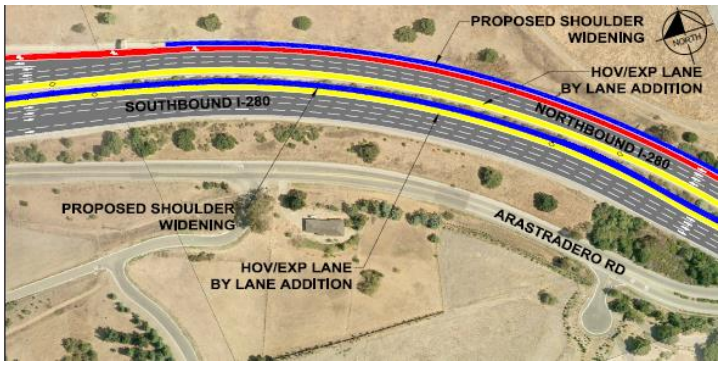
Existing Condition

NB I-280 mainline lane drop – The rightmost mainline lane becomes an exit lane only at this interchange. The mainline lane is added back after the off-ramp. This lane drop and subsequent lane addition at this interchange are causing major weaving on the mainline resulting in northbound off-ramp queue extending back to the mainline during peak hours.

Potential Improvements

Add deceleration lane ½-mile south of the Page Mill Road off-ramp to maintain a two lane exit ramp and provide a continuous through lane to eliminate the lane drop. Santa Clara County identified improvements to the Page Mill Road interchange under their Expressway 2040 Plan.





N. Wolfe Road and N. De Anza Boulevard Interchanges in NB I-280 (I06)

Existing Condition

Severe congestion between the N. Wolfe Road and N. De Anza Boulevard interchanges in the northbound direction due to high volumes exiting at N. De Anza Boulevard.

Potential Improvements

Propose to add an auxiliary lane between N.Wolfe Road and N. De Anza Boulevard to reduce congestion on mainline and improve operations. This improvement needs to be studied in detail as part of the Wolfe Road interchange study. Construction of an auxiliary lane might need a design exception at the Blaney Road overcrossing. N Wolfe Road interchange is currently being studied in another project independently from this report.

Downtown Access Improvement-1st Street/Market Street On-Ramp at SB I-280 (I18)

Existing Condition

Isolated SB loop on-ramp at Market Street creates a merge conflict in a very short distance.

Potential Improvements

Evaluate the possibility of eliminating the isolated loop on-ramp. Eliminate weave between loop on-ramp and 7th street off-ramp with lane drop beginning after the off-ramp.

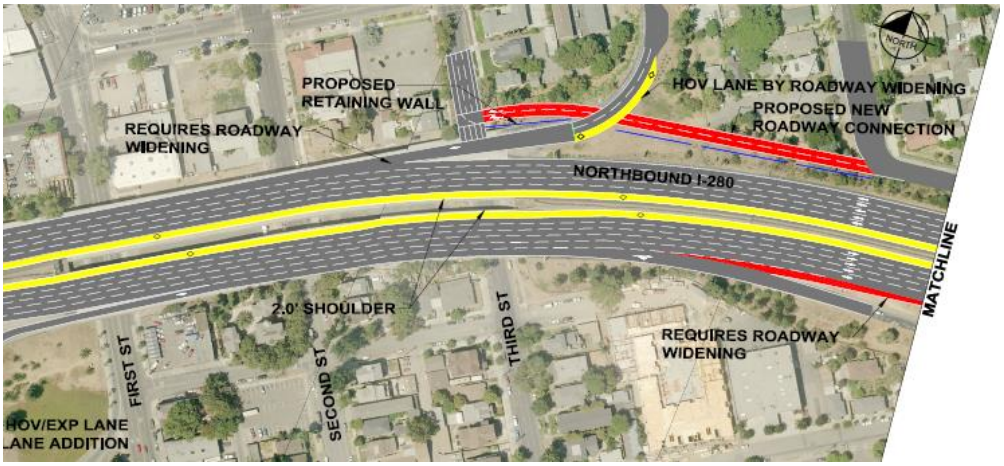
Downtown Access Improvement-7th Street Off-Ramp at NB I-280 (I19)

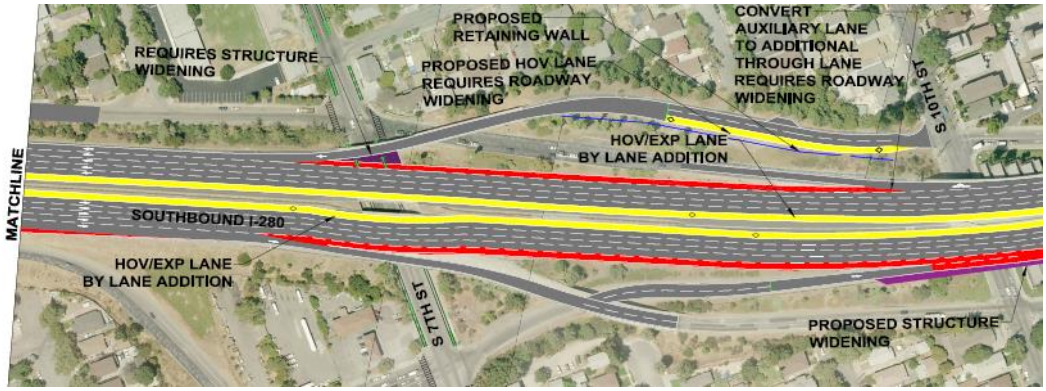
Existing Condition

Mainline lane drops at the 7th and 10th Street off-ramps require conflicting merge-weave movements in a short distance.

Potential Improvements

Eliminate the lane drop at the 7th Street off-ramp and continue the through lane to connect the 10th Street on-ramp/auxiliary lane. This would eliminate weaving between the on-ramps and off-ramp at 7th Street. In addition, provide 7th Street/5th Street to 3rd Street braiding with the 4th Street on-ramp (VTP H39). City of San Jose recommends renaming the destination guide sign on southbound I-280 from "Vine St Almaden Blvd" to "Almaden Blvd".





Downtown Access Improvement-10th Street Off-Ramp at SB I-280 (I21)

Existing Condition

Mainline lanes drop at the 7th street on-ramp and 10th street off-ramp creates conflicting merge-weave movement in a short distance.

Potential Improvements

Eliminate the lane drop between the 10th Street off-ramp and the 7th Street on-ramp to address weaving by providing a continuous lane. City of San Jose recommends renaming the destination guide signs on southbound I-280 from "7th Street/Virginia St/To 82" to "7th Street and on northbound I-280 from "7th Street/To 82" to "7th Street".

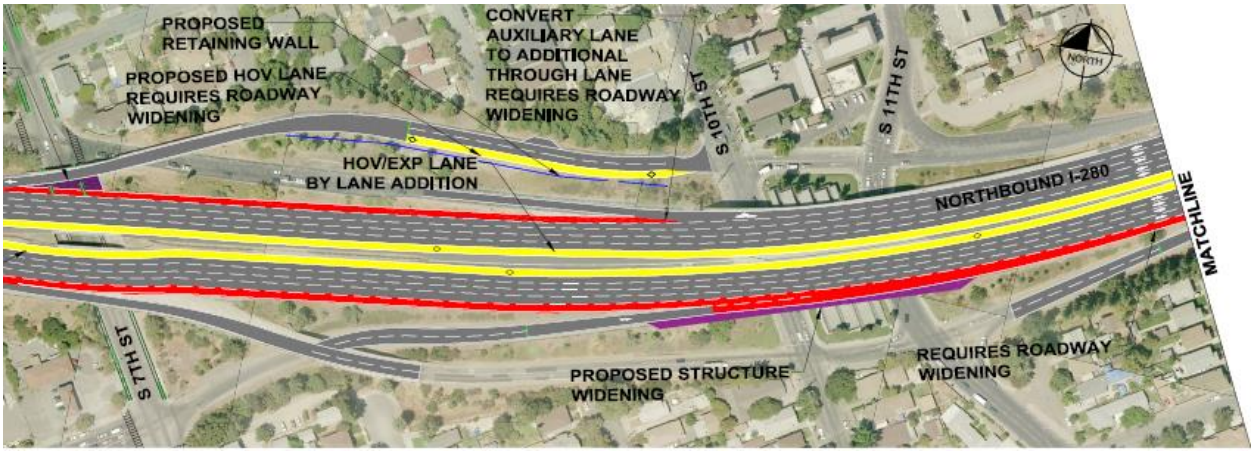
Downtown Access Improvement-11th Street On-Ramp at SB I-280 (I22)

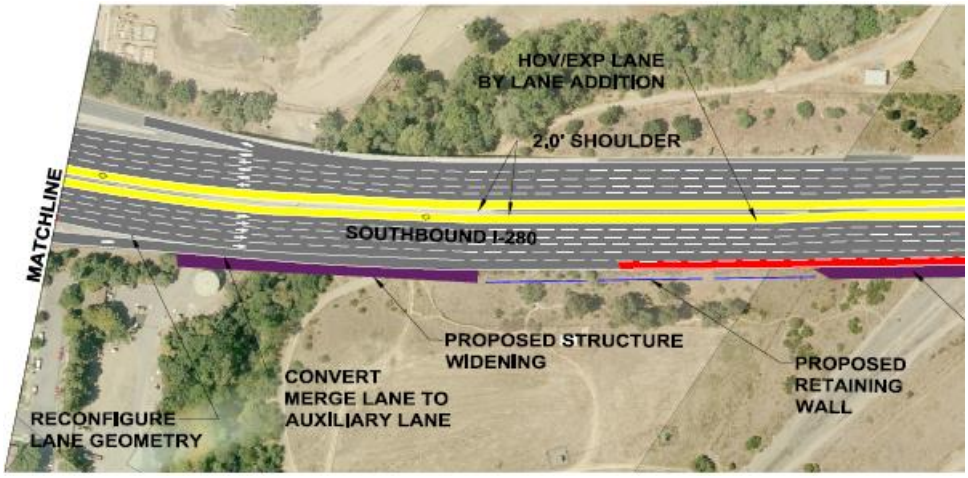
Existing Condition

The closely spaced interchanges in this area currently create congestion at the ramp merge locations.

Potential Improvements

Add a lane from the 11th street on-ramp to southbound I-280 to connect to the existing auxiliary lane from the McLaughlin Avenue off-ramp.





3.2.2 HOV/EL Direct Connectors

This study evaluated the possibility of providing an HOV/EL connector between system interchanges. A direct connector between system interchanges would improve traffic flow and reduce delays. With the

existing layouts of the system interchanges, a direct connector would be very challenging to design and cost prohibitive at US 101, SR-87 and I-880 interchanges. There is a potential to add HOV/EL Direct Connectors from SR-85 NB to I-280 NB and from I-280 SB to SR-85 SB. The potential of this connector is dependent on the future improvements at SR-85. This study recommends evaluating direct connector or a contra-flow lane connector once SR-85 improvements are identified.

Existing Condition

Currently HOV/EL connectors do not exist on these ramps.

Potential Improvements

- Possible HOV/EL direct connectors from SR-85 NB to I-280 NB **(I04)**
- Possible HOV/EL direct connectors from I-280 SB to SR-85 **(I04)**

3.2.3 HOV bypass lanes on-ramps

HOV bypass lanes on ramps are designed to allow HOVs to bypass the general-purpose lanes and the ramp meter. The bypass lane can be used for transit vehicles only or all HOVs. HOV bypass lane not only encourages HOV use but also proportionately reduces ramp meter queues.

Existing Condition

Currently HOV bypass lanes do not exist on these ramps.

Potential Improvements

The feasibility of HOV bypass lanes on-ramps at the following locations are proposed to be evaluated further.

- SB Bird Ave on-ramp **(I16)**
- NB 10th Street on-ramp **(I21)**
- NB 4th Street on-ramp **(I19)**
- SB 7th Street on-ramp **(I20)**
- SB 11th Street on-ramp **(I22)**
- NB McLaughlin Avenue on-ramps **(I23)**
- NB US 101 on-ramp **(I24)**

3.2.4 Ramp Metering

US 101 Interchange Improvements (I24)

Add ramp meters to both US 101 northbound and southbound on-ramps to NB I-280. The ramp meter for northbound ramp can provide for an HOV bypass lane which could also be an Express entry (toll) for single

occupant vehicles. This improvement at the northbound ramps will require an exception for non-standard shoulder width. The southbound US 101 ramp is geometrically constrained to provide for an HOV bypass lane. Additionally, the existing inside lane merge between the on-ramp and I-280 NB lane is eliminated to improve merging of the US 101 traffic on to I-280.

3.2.5 Interchange reconfigurations

There are various possible configurations of freeway interchanges, such as, simple diamond interchange, compressed diamond interchange, tight urban diamond interchange, single point urban interchange, partial cloverleaf interchange, full cloverleaf interchange, roundabout interchange, and modern roundabout interchange. For the I-280 corridor, it is important that the individual context for each location be considered when evaluating the potential options. The following potential improvements show conceptual lane configurations and additional alternatives should be considered for further evaluations and studies as appropriate.

El Monte Road Interchange (I02)

Existing Condition

The merging area from the full clover leaf interchange at El Monte increases congestion and decreases safety.

Potential Improvements

Convert El Monte interchange from a full clover leaf interchange to a partial cloverleaf interchange, eliminating the loop on-ramps to northbound and southbound I-280. Although this change from full cloverleaf to a partial cloverleaf interchange has been generally proven to improve operations and safety, the operational impacts on El Monte Road need further evaluation. The signals that will be added as part of this conversion should have enough capacity on all turn lanes to address the future demand, and new signals proposed must be interconnected with the rest of the signals on El Monte including (Foothill Expressway) to improve cross coordination and improved traffic flow. The improvements also include squaring up all ramps at an intersection to decrease speeds for turning movements and increase local road safety for bicyclists and pedestrians.

Foothill Expressway Interchange Improvements (I03)

Existing Condition

Due to close interchange spacing between SR-85 and Foothill Expressway, major weaving/merging occurs during AM and PM peak periods, and queues extend back on SR-85 to the North De Anza Boulevard interchange in the northbound direction in the AM peak period and beyond the Foothill Expressway interchange in the southbound direction in the PM Peak Period. The major operational issues are weaving and inadequate capacity of SR-85.

Potential Improvements

As a part of SR-85/280/Foothill study, VTA has identified several near-term and long-term improvements to reduce the congestion at this location. Currently VTA/Caltrans are working on northbound off-ramp improvements. This study recommends to further study alternatives identified in the SR-85/280/Foothill study to select a preferred alternative. The I-280/Foothill Expressway interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-02).

De Anza Boulevard Interchange

The I-280/De Anza Blvd. interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-04).

Wolfe Road Interchange

Wolfe Road interchange is part of another ongoing study and hence improvements to Wolfe Road interchange are not included in this report. The I-280/Wolfe Rd. interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-05).

Tantau Avenue Interchange (I08)

Existing Condition

Tantau Avenue is centrally located to several local destinations and does not have direct access to and from I-280.

Potential Improvements

To provide a safe bicycle corridor, facilitate transit movements, and in turn decrease mainline congestion, a northbound Bus Only on-ramp and a southbound Bus Only off-ramp for buses are proposed to be evaluated at this overcrossing. Only a partial interchange North of Tantau is considered due to right-of-way constraints and proximity of on and off ramps at Stevens Creek Boulevard south of Tantau Avenue.

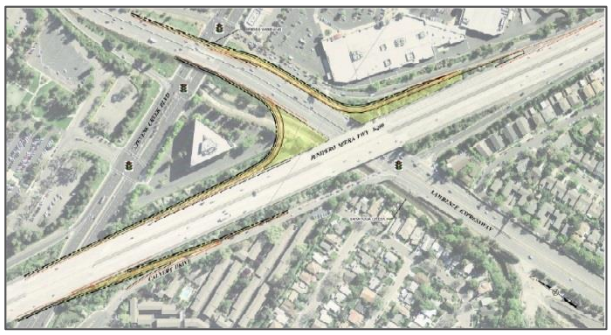
Lawrence Expressway Northbound Off/On-Ramp Improvements (I10)

Existing Condition

There is no direct connection to Lawrence Expressway from I-280 NB, with the Lawrence Expressway traffic needing to go through the Stevens Creek Boulevard intersection to exit to Lawrence Expressway. The combined (Lawrence Expressway and Stevens Creek Boulevard) traffic results in queue spillback to I-280 (up to Saratoga Avenue on-ramp). Santa Clara County is improving the Lawrence Avenue off-ramp to Stevens Creek Boulevard as part of the Apple II Campus mitigation to reduce the queue length of the off-ramp. Local improvements at this intersection proposed by the County study will improve level of service and reduce off-ramp queue.

Potential Improvements

Santa Clara County under their Expressway Plan is evaluating improving access to and from Lawrence Expressway to I-280. Option 1 provides direct connection to Lawrence Expressway northbound without going through the Stevens Creek Boulevard intersection. Option 2 would provide full access (NB & SB) to Lawrence Expressway from NB I-280. Santa Clara County noted that the interchange improvements are Tier 2 and not included in Measure B.



Option #1

Option #2

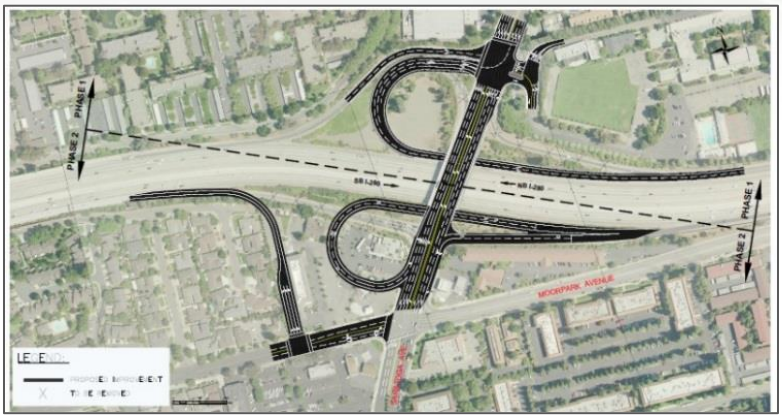
The I-280/Stevens Creek Boulevard/Lawrence Expressway Interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-03).

Saratoga Avenue Interchange (I11)

Existing Condition

During the AM peak hours, heavy left turn and right turn movements from Saratoga Avenue to SB I-280 result in major delay at ramp intersections and long queues that extend beyond the southbound ramp storage, with spillbacks on Saratoga Avenue causing congestion for the local traffic. During the PM peak period, the northbound off-ramp backs up from Saratoga Avenue, with queues extending to the mainline.

Potential Improvements



Eliminate the NB I-280 to Saratoga Avenue northbound diagonal ramp and consolidate both the northbound and southbound off-ramp movements to a loop off-ramp and realign Harker Driveway to provide a full access intersection. In the southbound direction, construct a new loop on-ramp that will eliminate the left turn movement and closely spaced intersection on Saratoga Avenue to improve local circulation and realign the SB I-280 off-ramp to Moorpark Avenue instead of Saratoga Avenue. The proposed interchange improvements are illustrated above. The northbound and southbound improvements can be constructed independent of one another or in two separate phases. The SB improvements has significant ROW impacts and due challenges associated with ROW, the City of San Jose does not currently support the configuration as shown for the SB improvements. Additional alternatives will need to be developed for SB improvements in the project development phase.

The I-280/Saratoga Avenue interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-06).

San Tomas Expressway Interchange (I12)

Existing Condition

Currently, San Tomas Expressway does not have a direct connection to I-280. The traffic to and from San Tomas Expressway must take Moorpark Ave to Saratoga Avenue or Winchester Road to access I-280, causing local street congestion as well as heavy traffic at the Saratoga Ave and Winchester Road interchanges.

Potential Improvements

VTP 2040 proposed a new interchange at San Tomas Expressway. Potential for a new interchange at San Tomas Expressway was evaluated under the SR-17/I-280/I-880 and I-880/ Stevens Creek Boulevard Interchange Improvements project. A new interchange at San Tomas Expressway has the potential to improve traffic circulations and reduce traffic at the Winchester Boulevard and Saratoga Avenue interchanges.

Construction of this new interchange would have major right-of-way impact into the residential neighborhood. In addition, closely spaced adjacent

interchanges would require auxiliary lanes and potentially braided ramps for weaving traffic. The exhibit below shows the potential alternative that was considered in previous study. The I-280/San Tomas Expressway new interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-12). Improvements to San Tomas Expressway are not included in Expressway Plan 2040 (ID EP 2040) and County and City of San Jose do not currently support a new interchange at this location. This proposed improvement is recommended to be removed from the VTP list.

Winchester Avenue Interchange

Winchester Avenue interchange is part of another ongoing study and hence improvements to Winchester Avenue are not included in this report. The I-280/Winchester Avenue interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-07)

Leland Avenue/Leigh Avenue On-Ramps Consolidation (I14)

Existing Condition

Currently the I-280/ Leland Avenue on-ramp is very close to the SR-17/I-880 off-ramp, resulting in significant weaving and conflicts between Leland Avenue on-ramp and I-280 to SR-17/I-880 off-ramp traffic.

Potential Improvements

Several alternatives, as follows, were reviewed and identified to consolidate ramps to address the closely spaced interchanges:

Option 1- Close the existing Leland Avenue on-ramp and redirect the local traffic to use the existing Leigh Avenue on-ramp. Traffic from Moorpark Avenue will use the existing Leigh Avenue overpass, Scott Street, and Menker Avenue to access the existing on-ramp. A high level further detailed study to address all the impacts. Santa Clara County and City of San Jose do not support this option. All the options will need to go through public review.

Option 2 – Close the existing Leland Avenue on-ramp and redirect the local traffic to use the existing Menker Avenue on-ramp. This alternative proposes to build a new overcrossing at Menker Avenue to allow traffic from Moorpark Avenue to access the new on-ramp with no impact to local circulation. Bascom/Moorpark serves as a by-pass for I-280 traffic especially in peak periods. City of San Jose does not support this option. Detailed traffic operational analysis is needed to support this option.

Option 3 - Close both on-ramps (Leland Avenue and south/east side of Leigh Avenue) and build a new on-ramp at the north/west side of Leigh Avenue.

The I-280/Leigh Avenue/Leland Avenue Interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-08).

3.2.6 Ramp Intersection Improvements:

Meridian Avenue Interchange (I15)

Existing Condition

The current free turning movements at the I-280 loop off-ramp and on-ramp termini with Meridian Avenue, which have high turn speeds, result in reduced safety for bicycle and pedestrian traffic.

Potential Improvements

"Square-up" the I-280 loop off and on-ramp terminal to intersect Meridian Avenue at close to a 90-degree angle for decreased turning speeds at the intersection and improved safety.

Bird Avenue Interchange (I16)

Existing Condition

The current free turning movements at the I-280 loop off-ramp and on-ramp termini with Bird Avenue, which have high turn speeds, result in reduced safety for bicycle and pedestrian traffic.

Potential Improvements

"Square-up" the I-280 off and on-ramp termini to intersect Bird Avenue at close to a 90-degree angle and eliminate pork-chop islands for decreased turning speeds at the intersection and improved safety.

The I-280/Bird Avenue interchange improvements are listed in the Envision Silicon Valley Highway Project List (ID H280-16).

McLaughlin Avenue Interchange (I23)

Existing Condition

The current free turning movements at the I-280 loop off-ramp and on-ramp termini with McLaughlin Avenue, which have high turn speeds, result in reduced safety for bicycle and pedestrian traffic.

Potential Improvements

"Square up" the northbound I-280 on-ramps from McLaughlin Avenue to intersect at approximately 90 degrees to improve safety.

Table 9: Interchange Improvements

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
INTERCHANGE AND AUXILIARY LANE IMPROVEMENTS				
I01	Los Altos Hills	Page Mill Road	*Interchange Improvements* Oregon-Page Mill Road Interchange Improvements-Tier 1 Exp Plan 2040 ID H280-15* (Separate Project by County)	$21M-
			Northbound Eliminate Mainline Lane Drop at Off-Ramp and Provide Deceleration Lane for Off-Ramp	$4M to $5M
I02	Los Altos Hills	El Monte Road	*Interchange Improvements* Square-Up" On-and Off-ramps Readjust All Ramps to Intersect El Monte Rd at Approximately 90°	$4M to $5M
			Northbound and Southbound Convert Full Cloverleaf to Partial Cloverleaf Interchange	$0.5M
I03	Los Altos	Foothill Expressway	*Interchange Improvements* Second Exit Lane to Foothill Expressway ID H280-01*	$3M
			Braided Ramps Between SR-85 and Foothill Expressway Interchange ID H280-02	$30M to $45M

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
			Foothill Expressway Interchange Modifications -Tier 1 Exp Plan 2040 ID H280-14 (Separate Project by County)	$5M
			"Square-Up" NB On- and Off-Ramps Readjust NB Ramps to Intersect Foothill Expy at Approximately 90° Widen Off-Ramp to Provide an Additional Right-Turn Lane Add Signal at NB On-and Off-Ramps (Including new traffic signal at SB Off-Ramp as included in the Foothill Expressway Interchange Modifications - Tier 1 Expressway Plan 2040)	$1.4M
I04	Sunnyvale/ Cupertino	SR-85	*Interchange Improvements* Possible HOV/EL Direct Connectors From SR-85 NB to I-280 NB Possible HOV/EL Direct Connectors From I-280 SB to SR-85	$60M to $80M
I05	Cupertino	N De Anza Boulevard	*Interchange Improvements* De Anza Boulevard Interchange ID H280-4	$40M to $60M
I06	Cupertino	Wolfe Rd to De Anza Boulevard	*Interchange Improvements* - Northbound Add Auxiliary Lane Between Wolfe Road and De Anza Boulevard Shoulder Running Bus Lane for De Anza Boulevard Off-Ramp	$2.5M to $4M
I07	Cupertino	N Wolfe Road	*Interchange Improvements* Wolfe Road Interchange ID H280-05* (Separate Project by VTA)	$85M
I08	Cupertino	N Tantau Avenue	*Interchange Improvements* - Northbound Bus Only on-ramp and Southbound Bus Only off-ramp	$15M
I09	Cupertino	Stevens Creek Boulevard	*Interchange Improvements* Northbound I-280 Connector from Stevens Creek Boulevard ID H280-13* (Separate Project by VTA)	$50M
I10	San Jose	Lawrence Expressway	*Interchange Improvements* Interchange Improvements-Tier 2 Exp Plan 2040 ID H280-03	$115M to $160M

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
			Provide Direct Connection Lawrence Expressway NB Without Going Through Stevens Creek Boulevard or Provide Full Access NB and SB to Lawrence Expressway from I-280 NB	
I11	San Jose	Saratoga Avenue	*Interchange Improvements* - Phase I Saratoga Avenue Interchange ID H280-06 Eliminate I-280 NB to Saratoga Avenue NB Diagonal Ramp Consolidate NB and SB Off-Ramp Movements to Loop Off-Ramp Realign Harker Driveway	$5M to $8M
			Phase II Provide Loop On-Ramp for Saratoga Avenue to SB I- 280 Realign I-280 SB Off-Ramp to Moorpark Avenue	$45M to $65M
I12	San Jose	San Tomas Expressway	*Interchange Improvements* San Tomas Expressway New Interchange ID H280-12 - Northbound and Southbound Construct New Diamond Interchange at San Tomas Expressway Realignment of Frontage Roads and Local Circulation Impact	$120M to $150M
I13	San Jose	Winchester Boulevard	*Interchange Improvements* Winchester Boulevard Interchange ID H280-07* (Separate Project by VTA)	$90M
I14	San Jose	Parkmoor Avenue/Moorpark Avenue/Leland Avenue	*Interchange Improvements* Leigh Avenue/Leland Avenue On-Ramp ID H280-08 - Northbound Close Leland Ave and Maintain Leigh Avenue On-Ramp or	$0.5M
			Build New Overpass at Menaker Avenue between Moorpark Avenue and Parkmoor Avenue Keep Leigh Avenue On-Ramp or	$5M to $8M
			Close Leland Avenue and Leigh Avenue On-Ramps and Build New On-Ramp	$10M to $15M
I15	San Jose	Meridian Avenue	*Interchange Improvements* "Square-Up" NB On-ramp and SB Off-Ramp to NB Meridian Avenue	$1.5M

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
I16	San Jose	Bird Avenue	*Interchange Improvements* Bird Avenue Interchange ID H280-16 "Square-Up" On- and Off-Ramps Add HOV Bypass Lane For I-280 SB On-Ramp (Assuming Bridge Widening)	$3M to $5M
I17	San Jose	SR-87	*Interchange Improvements* - Southbound Drop Lane on Connector and Add HOV/EL at Ramp Meter Eliminate Inside Lane Merge between SR-87 Ramps and I-280 SB	$0.3M to $0.5M
I18	San Jose	1st Street /Market Street	*Interchange Improvements* - Southbound Possible elimination of This Isolated Loop On-Ramp	$0.5M
			Eliminate Weave Between Loop On-Ramp and 7th Street Off-Ramp with Lane Drop After Off-Ramp	$0.8M
I19	San Jose	3rd Street to 7th Street	*Downtown Access Improvements (Northbound)* ID H280-10 Northbound (4th Street On-Ramp) Add HOV Bypass Lane For I-280 NB On-Ramp Northbound (7th Street Off-Ramp) Connect Margaret Street from 5th Street to 3rd Street as Specified in VTP 2040 with braided ramp at 4th Street On-Ramp Eliminate Lane Drop at 7th Street Off-Ramp and Extend Mainline Lane From 7th Street Off-Ramp to 4th Street On-Ramp	$20M to $25M
I20	San Jose	7th Street	*Downtown Access Improvements (Southbound)* ID H280-10 Eliminate weaving between Off-Ramp and On-Ramp Add HOV Bypass Lane and ramp metering	$1M to $2M
I21	San Jose	10th Street	*Interchange Improvements* Northbound Add HOV Bypass Lane For I-280 NB On-Ramp	$2M to $3M
			Southbound Eliminate Lane Drop Eliminate Weaving Between On- and Off-Ramps by Providing Continuous Lane From SR-87	$1M to $2M

ID #	CITY	INTERCHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
I22	San Jose	11th Street	*Interchange Improvements* - Southbound Add auxiliary lane from 11th Street On-Ramp to McLaughlin Avenue Off-Ramp Add HOV Bypass Lane	$10M to $15M
I23	San Jose	McLaughlin Avenue	*Interchange Improvements* "Square-Up" NB On-Ramp Add HOV Bypass Lane McLaughlin NB to I-280 NB On-Ramp (Loop) McLaughlin SB to I-280 NB On-Ramp (Diagonal)	$5M to $8M
I24	San Jose	US 101 to I-280 NB	*Northbound* Install New Ramp Meter (US 101 SB to I-280 NB) Add HOV Bypass Lane and Ramp Metering for On-Ramp Eliminate Inside Lane Merge Between US 101 On-Ramp and I-280 NB	$3.5M to $5.8M

* Projects programmed and listed in Envision Silicon Valley Project List 10/1/2015

3.3 Local Streets Improvements

This section includes local street enhancements, involving multi-modal improvements to vehicles, bicycles and pedestrians. The preliminary potential local street improvements listed in **Table 10** promote and develop alternative modes of transportation for more effective safe routes for all users.

Table 10: Potential Local Street Improvements

Need/Deficiency	Potential Local Street Improvements
Promote and develop alternative modes of transportation	Local Street Improvements ▪ Add Bicycle Lanes ▪ Add sidewalks ▪ Improve crosswalk and curb ramps

Even though this section has potential to reduce freeway use by improving multi-modal access, it is categorized independently from the highway improvements presented. The improvements are primarily safety improvements on local streets in interchange zones, such as traffic calming road diets to accommodate safe bicycle and pedestrian access along local streets. The full range of local street improvements proposed by this study along the corridor are depicted in **Figure 12** and defined in **Table 11**. In consideration of the varying respective needs and available funding for each interchange, multiple degrees of improvements are necessary at nearly all interchanges. Proposed improvements for local streets can be broadly classified into two levels, short-term cost effective projects and long-term significant rebuilding projects.

Long-term improvements comprise of significant modifications and additions to interchanges and pedestrian bridge structures. The potential interchange improvements are described in section above. Another potential long-term or short-term improvement would be to improve facilities to meet complete street guidelines through combinations of road diets and facility widening when absolutely necessary.

Short-term improvements comprise of considerable alterations to local roads. Examples of these improvements include road diets, bicycle lane delineation, curb ramp modifications, lighting improvement, reduction of crosswalk distances, better bicycle access and basic upgrades for safety for all pedestrian and bicycle facilities.

3.3.1 Bicycle and Pedestrian Improvements

Bicycle and pedestrian pathways is one element of many to provide effective transportation opportunities and routes. Building a network of multi-use paths is critical to optimizing traffic congestion and promoting safe and convenient methods of transportation. Access to key destinations along the I-280 corridor are limited by various roadway networks and constraints at local road overcrossings at interchanges. Although some bicycle paths are present, many major roadways throughout this stretch of I-280 are not appealing for bicycles or pedestrians to utilize. The focus of improving existing bicycle ways coupled with implementing a low-stress bicycle network around I-280 will provide easier access to desirable destinations. Additionally, the implementation of additional crosswalks will provide pedestrians with a safe and accessible path to their desirable destinations.

Caltrans classifies four major bicycle way designations to provide routes and safe travel for bicyclists.

1. **Class I:** Provides a completely paved bicycle or multi-use path separated from the roadway. A few recommended applications include bicycle ways along rivers, lakes, canals, and abandoned railroad right-of-way.
2. **Class II:** Provides an established signed, striped, and designated lane for bicyclists on a roadway corridor, typically located in the shoulder. The lanes may be enhanced with green paint and buffers separating the nearest travel lane from bicycle traffic. The intent of these bicycle ways should be to improve bicyclists' conditions along the corridor. A few recommended applications include roadways with high traffic volume and speed limits, and local streets mainly used for commuters.
3. **Class III:** Provides a shared-use travel lane with traffic, typically only identified by signs and/or pavement markings. Bicycle boulevards is considered a subset of Class III bicycle ways, which includes calming traffic with various methods to reduce traffic volumes and improving shared-use safety. A few recommended applications for Class III bicycle ways include low volume roadways, low speed streets, and providing access/continuity between other bicycle facilities.
4. **Class IV:** Provides a separated path for exclusive travel of bicyclists, which may include grade separation, flexible posts or other physical barriers, curbs, concrete landscaped areas, or on-street parking separating through traffic vehicles from bicyclists. Class IV bicycle ways are often referred to as "cycle tracks." One-way or two-way cycle tracks may be at sidewalk or street level and provide an experience like on-street bicycle ways. Class IV bicycle ways are recommended whenever on high volume roadways and high speed limits are posted.

Off-street Path (Class I) ***On-street Lane (Class II)*** ***Signed Route (Class III)*** ***Cycle Track (Class IV)***

Guidelines and Recommendations

The VTA *Bicycle Technical Guidelines* (2012) provide recommendations and guidelines to implement for the various bicycle classifications, to maximize bicycle safety and convenience. Technical guidelines are established for Class II bicycle lanes, as well as Class IV cycle tracks, that are pertinent to this study. Minimum width requirements for Class II bicycle lanes vary with design speed and include the width of the gutter pan.

The following optimal minimum width requirements below are specifically for Class II bicycle lanes with no on-street parallel parking. If on-street parallel parking is available, an additional 8 feet should be provided.

- Less than equal to 30 MPH = 5 feet
- 35-40 MPH = 6 feet
- Greater than equal to 45 MPH = 8 feet

One-way Class IV cycle tracks have the following recommendations

- Minimum cycle track width = 6 feet
- Minimum median/buffer width = 4 feet

Other pertinent areas of study include locations where bicycle lanes are provided near pork-chop islands. As stated in the VTA *Bicycle Technical Guidelines* (2012) pork-chop islands can cause conflicts with bicyclists due to odd angles and high-speed turning traffic. It is recommended to remove these pork-chop islands and free right-turn lanes, and to “square-up” the ramps to produce tighter turn angles.

This study focuses on providing potential bicycle improvements within the I-280 corridor zone, identified as being limited in width one intersection on either side of the I-280. Based on the City of Cupertino 2016 Bicycle Transportation Plan, the City of San Jose Bicycle Plan 2020, and the VTA Countywide Bicycle Plan, which is currently being updated, there will be opportunities in the future to connect several bicycle ways to produce a more cohesive and connected bicycle network.

Pedestrian improvements included in this study involve the implementation of crosswalks, as well as curb and sidewalk improvements. These improvements are based upon ADA requirements that will provide all pedestrians safe and convenient access to their destinations. Based upon the ADA requirements, there will be opportunities in the future to implement pedestrian improvements to meet or exceed these guidelines.

I-280, in some locations along the study corridor creates an impermeable barrier for pedestrians and bicyclists. The 2008 Santa Clara Countywide Bicycle Plan identifies these barriers as an issue that should be addressed with "across barrier connections". Additionally, Bicycle and Pedestrian improvements are proposed to be compatible with adjacent land uses and parking demands.

Table 11 summarizes locations for the local streets potential improvements and **Figure 12** illustrates the improvements.

Table 11: Local Street Improvements

ID #	CITY	CROSS STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
LOCAL STREET IMPROVEMENTS				
L01	Los Altos Hills	El Monte Rd	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Improve Crosswalk and Curb Ramps	$280K
L02	Los Altos Hills	Magdalena Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and Add Minimum 2' Buffer ▪ Upgrade AC Sidewalks to PCC Sidewalks on Both Sides of Undercrossing ▪ Add Crosswalks at All Ramps and Upgrade Curb Ramps	$130K
L03	Cupertino	N Stelling Rd	Add Class IV Cycle Track and Improve Pedestrian Facilities, Signing and Striping ▪ Construct Cycle Track ▪ Improve Crosswalk and Curb Ramps	$200K to 700K
L04	Cupertino	N De Anza Blvd	Upgrade Pedestrian Facilities, Signing and Striping ▪ Improve Crosswalk and Curb Ramps on North Side of N De Anza Blvd	$20K
L05	Cupertino	N Blaney Ave	Upgrade Class II Bicycle Lanes to Class IV Cycle Track, Signing and Striping	$600K to $1M
L06	Cupertino	N Tantau Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Improve Delineation of Class II Bicycle Lanes and Add 2' Buffer ▪ Add PCC Sidewalk on West Side of Overcrossing	$100K
L07	Cupertino	Stevens Creek Blvd (Foothill Blvd to Tantau Ave) and extend to Downtown San	Construct Class IV Cycle Tracks ▪ Install detector and communication systems to provide real-time information to bicyclists ▪ Add wayfinding signs and CMS	$9M

ID #	CITY	CROSS STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
		Jose on W San Carlos St.	▪ Construct protected intersections where required	
L08	San Jose	Saratoga Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Improve Crosswalk and Curb Ramps	$130K
L09	San Jose	Macarthur Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and ▪ Add Minimum 2' Buffer ▪ Improve Crosswalk and Curb Ramps	$100K
L10	San Jose	S Bascom Ave	"Road Diet" to Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer ▪ Reduce Left-Turn Pockets to 10' Lanes ▪ Reduce Through Lanes to 11' Lanes ▪ Improve Crosswalks and Curb Ramps	$200K
L11	San Jose	Leland Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and ▪ Add Minimum 2' Buffer ▪ Improve Crosswalks and Curb Ramps	$150K
L12	San Jose	Meridian Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes Both Directions with 2' Buffer on NB Meridian Ave only ▪ Reduce Left-Turn Pocket NB Meridian Ave to 10' Lane ▪ Reduce Through Lanes to 11' Lanes on NB Meridian ▪ Improve Crosswalk and Curb Ramps	$270K
L13	San Jose	Race St	"Road Diet" to Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer ▪ Improve Crosswalk and Curb Ramps ▪ Reduce All Lanes to 11' Lanes	$180K

ID #	CITY	CROSS STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
L14	San Jose	Lincoln Ave	Improve Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and Add Minimum 2' Buffer ▪ Improve Crosswalks and Curb Ramps	$200K
L15	San Jose	Bird Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer on Southwest Segment of Bird Ave ▪ Reduce Left-Turn Pockets to 10' Lanes ▪ Reduce Through Lanes to 11' Lanes ▪ Improve Crosswalk and Curb Ramps	$220K
L16	San Jose	7th St	Improve Class II Bicycle Lanes and Pedestrian Facilities on 7th St, Signing and Striping ▪ Improve Crosswalks and Curb Ramps	$200K
L17	San Jose	McLaughlin Ave	Improve Class II Bicycle Lanes and Pedestrian ▪ Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Add Crosswalks and Improve Curb Ramps	$290K
L18	San Jose	Between Lawrence Expy to Saratoga Ave	Proposed Pedestrian Cross Connector (Recommended at John Mise Park in San Jose Stevens Creek Urban Village Plan Chapter 5)	$9 M

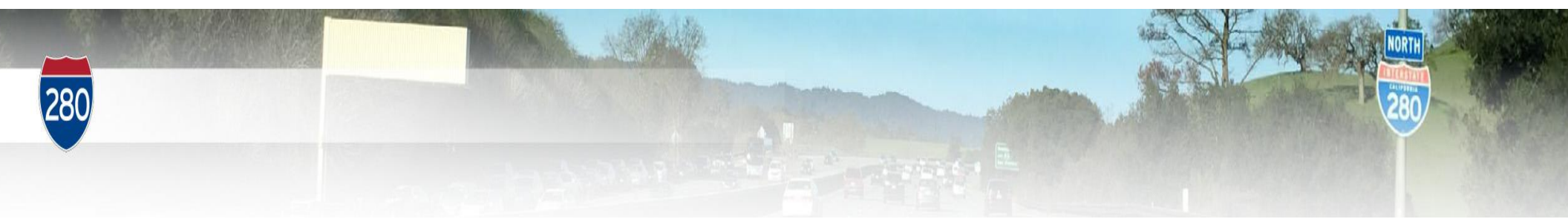
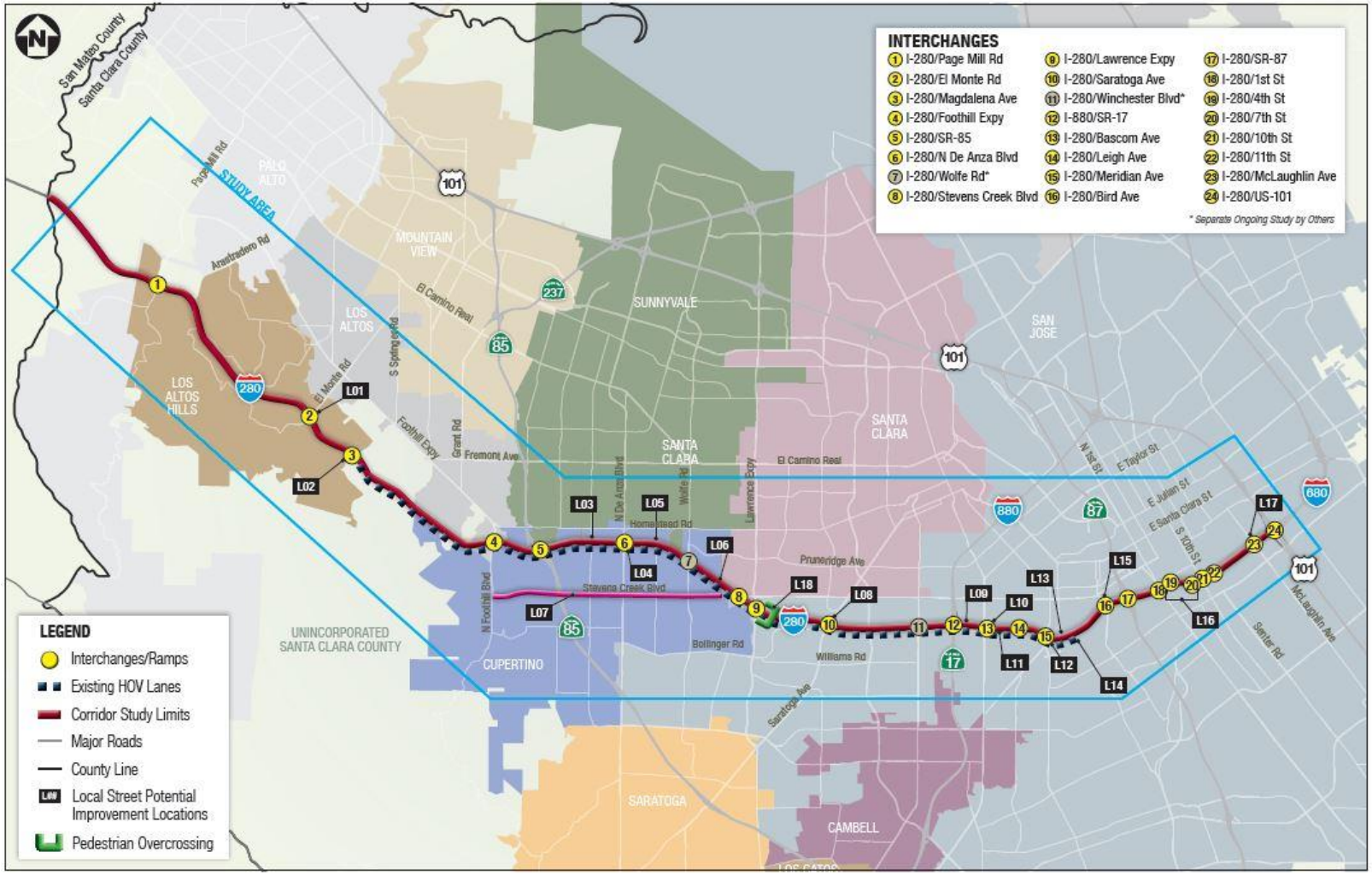


Figure 12: Local Street Improvements Corridor Map



3.4 ITS Improvements - Active Traffic Management Strategies

Active Traffic Management (ATM**)** is defined as the ability to dynamically manage recurrent and nonrecurrent congestion based on prevailing and predicted traffic conditions. ATM strategies use technology to enable efficient operation of the existing system by enhancing system monitoring, traveler information and integrated system operations. As part of the I-280 corridor study, technology as it relates to ATM strategies provides opportunities to move toward a network that operates at its maximum available capacity. This section summarizes the assessment of potential ATM strategies that could provide benefits b to I-280 and the connected roadway system. After the following high-level discussion of possible strategies, feasible solutions are mapped to specific hot spots or deficiencies to identify opportunities for further evaluation.

A variety of ATM strategies were considered for potential deployment on I-280 and are described in **Appendix 3**. **Table 12** illustrates potential ATM strategies for each type of corridor deficiency.

Table 12: Preliminary Potential ATM Strategies

Need/Deficiency	Potential ATM Strategies
Substantial merge and diverge activities near: ▪ I-280/US 101 Interchange ▪ I-280/SR-87 Interchange ▪ I-880/SR-17 Interchange ▪ I-880/SR-85 Interchange	▪ Dynamic Junction Control ▪ Enhanced Traveler Information ▪ Dynamic Lane Management ▪ Mainline Metering
Congestion due to bottleneck locations in NB direction: ▪ Between SR-85 on-ramp and Foothill Boulevard off-ramp ▪ Lane drop just south of I-880/SR-17 ▪ Between 7th Street and SR-87 off-ramp ▪ Downstream of US 101 merge junction	▪ Adaptive Ramp Metering ▪ Speed Harmonization ▪ Dynamic Lane Management
Congestion due to bottleneck locations in SB direction: ▪ Downstream of merge junctions of SR-17/I-880 and SR-87 ▪ SR-85 off-ramp ▪ Magdalena Avenue off-ramp	▪ Adaptive Ramp Metering ▪ Speed Harmonization ▪ Dynamic Lane Management
Closely spaced and high volume ramps between US 101 and Bird Avenue result in congestion from significant weaving.	▪ Dynamic Junction Control ▪ Traveler Information
Congested HOV lane in the northbound direction in the AM peak period from Meridian Avenue to Saratoga Avenue	▪ Adaptive Ramp Metering ▪ Speed Harmonization

Need/Deficiency	Potential ATM Strategies
	▪ Dynamic Lane Management
Large speed differential prevails between left two and right two lanes along the corridor.	▪ Speed Harmonization ▪ Dynamic Lane Management
Lack of ITS infrastructure and incident management plans to manage heavy demand on arterials during incidents.	▪ Adaptive Ramp Metering ▪ Improved Incident Response ▪ Arterial ITS
Local traffic responsive ramp metering between McLaughlin Avenue and N. De Anza Boulevard could be ineffective to combat oversaturated conditions.	▪ Adaptive Ramp Metering
Limited transit routes – Four transit routes-102, 103, 182, and Highway 17 Express-travel on the corridor. Provide opportunities to increase transit service.	▪ Hard Shoulder Running ▪ Transit Signal Priority
High concentration of collisions near SR-87 and I-880.	▪ Dynamic Routing ▪ Adaptive Ramp Metering ▪ Queue Warning ▪ Improved Incident Response ▪ Arterial ITS

Using this preliminary list of possible strategies, we can envision an initial conceptual package of overall ATM strategies and assess the feasibility of these strategies operating along I-280. The specific corridor concepts and operational functionality most feasible for I-280 are first discussed in more detail below; followed by a summary list of ATM strategies with corresponding potential deployment locations within the corridor. Implementation of ATM strategies needs to be coordinated with City of San Jose Traffic Management Center to have access for the traffic management of the corridor.

3.4.1 Adaptive Ramp Metering (ARM)

Adaptive Ramp Metering is one iteration beyond Local Traffic Responsive Ramp Metering currently operating in most locations throughout the Bay Area. Adaptive Ramp Metering (ARM) uses a software algorithm to evaluate all on-ramps along a corridor to determine an optimal metering rate at each ramp to benefit the entire corridor. ARM can effectively manage recurring congestion and freeway incidents. Freeway incidents are typically managed using more restrictive metering upstream and less restrictive metering downstream of the incident. Caltrans can monitor operations of every on-ramp from the Regional Traffic Management Center, and can remotely override or reprogram metering rates and algorithm thresholds when necessary.

Existing Condition

- Presence of multiple bottlenecks between US 101 and I-880 due to heavy volumes and weaving between local ramps and system interchanges.
- Volume fluctuations not only during the day but also in the peak periods.
- Multiple system-to-system connections are present on the I-280 corridor.
- Lack of an incident management plan.
- Need to address changing travel conditions and traffic growth over time. I-280 traffic volumes are expected to grow substantially.

Potential Improvements

- Based on existing operating conditions, the implementation of coordinated adaptive ramp metering can be considered along I-280 NB between SR-85 and King Road and I-280 SB between Page Mill Road and I-880.

3.4.2 Bus on Shoulder (BOS)

Bus on Shoulder operations allows transit vehicles to utilize the designated shoulder, often with driving instructions and restrictions for bus drivers to ensure operational safety along the corridor. Buses are typically limited to use at a specific time of day, and are limited to a specific speed differential or maximum speed compared to the adjacent general purpose lanes. BOS application can be deployed as a pilot project at selected segments or used as a permanent lane.

Given the complexity of the I-280 corridor, this strategy would require development of plans, policies, and guidelines in partnership with private bus operators, transit agencies, Caltrans, local jurisdictions, and California Highway Patrol. Engaging cities and communities along the corridor is key in the decision-making process.

This strategy includes strengthening of shoulders, adding supplemental signs and striping treatments at on and off-ramps, and installing supporting ITS elements and technologies such as detection, Dedicated Short Range Communications from on-ramps to buses, communication system, overhead variable message sign (VMS) and lane control signs. BOS should be implemented with complementary strategies such as dynamic lane use signs, variable message signs, colored/illuminated pavement, dynamic junction control, etc. Design exceptions will be required for this strategy, which should be done in consultation with Caltrans.

This study focused on improving infrastructure to promote transit operations. Expanded transit services on I-280 were not evaluated. However potential projects do not preclude increasing transit service. Transit routes and ridership were not studied to make recommendation for promoting ridership.

Existing Condition

I-280 is currently used by a limited number of buses. With the construction of BART and High Speed Rail stations, transit services to and from the San Jose Downtown are expected to increase. BOS could aid

public and private bus services between education, shopping, and employment destinations in Cupertino and San Jose, and Diridon station. BOS has potential to make transit services more reliable and faster.

BOS can be implemented on right or left shoulders. I-280 provides a minimum of 10-foot-wide shoulders at unconstrained locations. There is an opportunity to provide continuous BOS lane on the left or right shoulder between N. De Anza Boulevard and Winchester Boulevard. The pinch points from the system interchanges, overpass columns and bridge structures would need minor widening or lane realignments to accommodate BOS between Winchester Boulevard and Bird Avenue. The use of overhead dynamic lane control signs and supplement pavement striping would allow buses to merge safely and efficiently into existing managed or general purpose lane at the constrained locations.

Extension of existing HOV lanes and converting HOV lanes to a managed lane and potential addition of a second managed lane in some segments of the corridor are being evaluated in the potential highway improvements section of the corridor study report. While such capacity improvement projects require environmental clearance, and thus could take a long time to build, interim operational strategies such as BOS could be considered on the left shoulder for longer segment and on the right shoulder for short segments of the corridor.

BOS application through the acute bottlenecks at system interchanges is critical. As such, opportunities to add extra pavement width should be explored while planning and designing the physical improvements described earlier. VTA's Next Network project will redesign the transit network in late 2017. The route planning process would also inform BOS opportunities on the I-280 corridor.

Potential Improvements

Based on a review of available shoulder width or ability to add more shoulder width without expensive right-of-way acquisition, BOS application could be further explored between De Anza Boulevard and Winchester Boulevard in both directions. Widening or lane realignment could allow BOS operations to extend to Bird Avenue.

A detailed feasibility and implementation plan is required to not only identify and confirm locations for implementation but also to inform route planning process that VTA is currently undertaking. Screening criteria that can be used to select BOS as a potential ATM treatment are described in detail in **Appendix 3.**

3.4.3 Dynamic Shoulder use for HOV/HOT Bypass Lanes at Ramps

This strategy is similar to BOS strategies, where the shoulder on-ramps will be allowed for HOV/HOT vehicles as a bypass lane where there is no room for HOV bypass lanes. Dynamic shoulder use would not only add more storage but also provide priority treatments for transit vehicles and ridesharing. Dynamic shoulder lanes are typically activated based on congestion levels during peak periods to accommodate general purpose vehicles, which can be particularly effective during special events or in response to incidents or other conditions as warranted.

Existing Condition

- Several interchanges experience long queues and spillbacks onto connecting freeways. Dynamic shoulder use as HOV/HOT lane would not only add more storage but also provide priority treatments for mass transit and ridesharing autos.
- If implemented with adaptive ramp metering, greater flexibility can be achieved in clearing or holding the queues at the on-ramps to maximize throughput on mainline without significant delay at on-ramps.
- Ability to address changing travel conditions and event traffic.
- Ability to optimize use of existing infrastructure.

Potential Improvements

Based on a review of field inventory and available traffic data, dynamic shoulder lane can be added to the following four locations:

- SR-87 N to I-280 N connector
- I-280 N to SR-87 N connector
- US 101 N to I-280 N connector
- SR-87 N to I-280 S connector

All the locations above may be restrained by a few pinch points which could be eliminated by minor widening or realignment. The shoulder lane on-ramps should be supplemented with the adaptive ramp metering to better control discharge flow onto the freeway.

3.4.4 Dynamic Access Restrictions at On-Ramps

This strategy entails dynamically restricting or even closing an access from on-ramps onto the freeway. Access limitations can include allowing only HOV or HOT traffic on the ramp. This strategy includes adding changeable message signs (CMS) on surface streets, and installing supporting ITS elements and technologies such as detection, closed circuit television (CCTV) cameras, communication system, and overhead access control signs. The operations of the subject ramps are controlled and monitored from the TMC. It should be noted that these kinds of facilities may need approvals from Caltrans and Cities as they may disrupt local traffic, and requires use of TMC.

Existing Condition

- Traffic volumes from the above-mentioned ramps conflict with the system interchange operations, resulting in weaving maneuvering and thus loss of capacity.
- The 4th Street on-ramp restricts the storage capacity of the downstream SR-87 off-ramp.
- The Market Street on-ramp restricts discharge capabilities of the upstream SR-87 on-ramp.

- These ramps currently serve 500 to 800 vehicles per hour during the peak period. These volumes are likely to be accommodated by the adjacent ramps.
- Managing the access from these ramps and loading the traffic further away from the overloaded system-to-system connectors would increase the capacity immediately downstream and smooth mainline traffic flow.

Potential Improvements

Based on the stakeholder input and traffic characteristics, the following two locations were identified for potential dynamic ramp access restrictions:

- I-280 N at 4th Street on-ramp (AM peak period only)
- I-280 S Market Street on-ramp (PM peak period only)

Traffic diversion resulting from access restrictions from the 4th Street on-ramp would be accommodated by S. Almaden Street and 10th Street on-ramps. Similarly, traffic diversion from the Market Street on-ramp could be accommodated by the 7th Street on-ramp. Subsequent evaluation of this concept and community participation is required to determine feasibility. This treatment should be supplemented with arterial CMS, passive route guidance signs, as well as automated enforcement techniques at the ramp.

3.4.5 Real-Time Traveler Information

Information can be provided in real time to motorists on the freeway via CMS, highway advisory radio (HAR), in-vehicle navigation systems, or smartphones to advise motorists of downstream conditions to manage their journey through the corridor more effectively. Types of information can include travel times, amount of delay, incident conditions, transit information, and lane use. Providing traveler information can contribute to decreasing congestion. It encourages travelers to use alternate modes and/or travel at times when congestion is lower.

Existing Condition

- I-280 currently lacks a mechanism for disseminating advanced traveler information system.
- High accident rates support the need for advanced traveler information on downstream conditions.

Potential Improvements

Based on a review of corridor characteristics and stakeholder coordination, the following locations were identified with potential for real-time traveler information in the form of electronic message signs or in-vehicle information points:

I-280 N upstream of:

- McKee Avenue
- SR-87
- I-880

- I-280 S upstream of:
- Page Mill Road
- Stevens Creek Road
- SR-87

These locations were based on availability of parallel alternate routes taken when incidents occur on the freeway. A mobile application or communications to in-vehicle applications could also be developed to provide real-time travel time information for major destinations and warn motorists of any incidents and unexpected congestion. This treatment should be supplemented with other ITS technologies, such as detectors, communication systems and a TMC.

3.4.6 Dynamic Junction Control

Dynamic junction control is dynamic allocation of lane access on mainline and ramp lanes in interchange areas where high traffic volumes are present and the relative demand on the mainline and ramps change throughout the day. This may prevent the formation of congestion in merge areas when there is sufficient or imbalanced capacity in the adjacent mainline lanes. This could easily incorporate existing ramp metering systems and could offer the potential of delaying the onset of mainline congestion and balancing demands between the upstream mainline and ramps. Dynamic junction control also can be used as an alternative to freeway to freeway control/metering.

Existing Condition

- A lane reduction on the entrance and/or exit ramp to complement shoulder running operations on the mainline.
- A lane reduction on the mainline upstream of a high-volume entrance ramp to provide an additional lane on the entrance ramp
- Assigning a mainline lane for shared through-exit movements or exit-only movements at an off-ramp.

Potential Improvements

Based on a review of field inventory and available traffic data, dynamic junction control can be considered at the following locations:

- US 101 N on-ramp – lane reduction on the mainline
- SR-87 N off-ramp – assigning a SR-87 S off-ramp lane as shared lane to support dynamic shoulder lane
- Meridian Avenue on-ramp – supporting a shoulder lane on the right between Race Street off-ramp and Meridian Avenue on-ramp
- Foothill Express Way off-ramp – assigning an outside mainline lane for shared through-exit movement

3.4.7 Speed Harmonization and Dynamic Queue Warning

Speed harmonization is an ATM strategy used to proactively manage vehicle speeds to improve roadway safety and maximize freeway throughput. The primary purpose of speed harmonization is to minimize turbulent spatial and temporal variations in speed and is achieved by recommending an advisory speed upstream of areas of congestion or incidents. This strategy can be achieved with regularly spaced lane speed and lane control signs over each lane or on shoulder-mounted installations to dynamically reduce speed limits in areas of congestion, construction work zones, accidents, or special events to maintain traffic flow and reduce the risk of collisions due to speed differentials at the end of queue and throughout the congested area.

Dynamic queue warning is the real-time display of warning messages along a roadway to alert motorists that queues or significant slowdowns are ahead, reducing rear-end crashes. This strategy is appropriate for locations with high rates of secondary crashes, high rate of rear-end collisions, recurring congestion and queuing, and sight distance restrictions.

Speed harmonization and dynamic queue warning can result in a reduction in the number of crashes caused by sudden changes in speed (by reducing speeds before vehicles reach the back of a queue) and by abrupt lane changes (by reducing the speed differential between lanes and therefore eliminating the incentive to change lanes). It also alerts drivers that downstream conditions are changing.

Existing Condition

With the complexity of the geometric configuration on I-280, and a lack of basic ITS infrastructure in place, these strategies might be cost-prohibitive and might not be effective to be implemented as a first phase of improvements. The strategies need to be analyzed further to evaluate the full potential benefits once complementary strategies are in place.

Potential Improvements

Speed harmonization and dynamic queue warning sign strategies could also be considered when the technology allows information to be shown inside the cars or on mobile phones as virtual Changeable Message Signs (CMS).

Table 13 summarizes deployment locations discussed above as potential ITS/ATM projects and **Figure 13** shows them on the corridor map.

Table 13: Potential ATM and ITS Projects

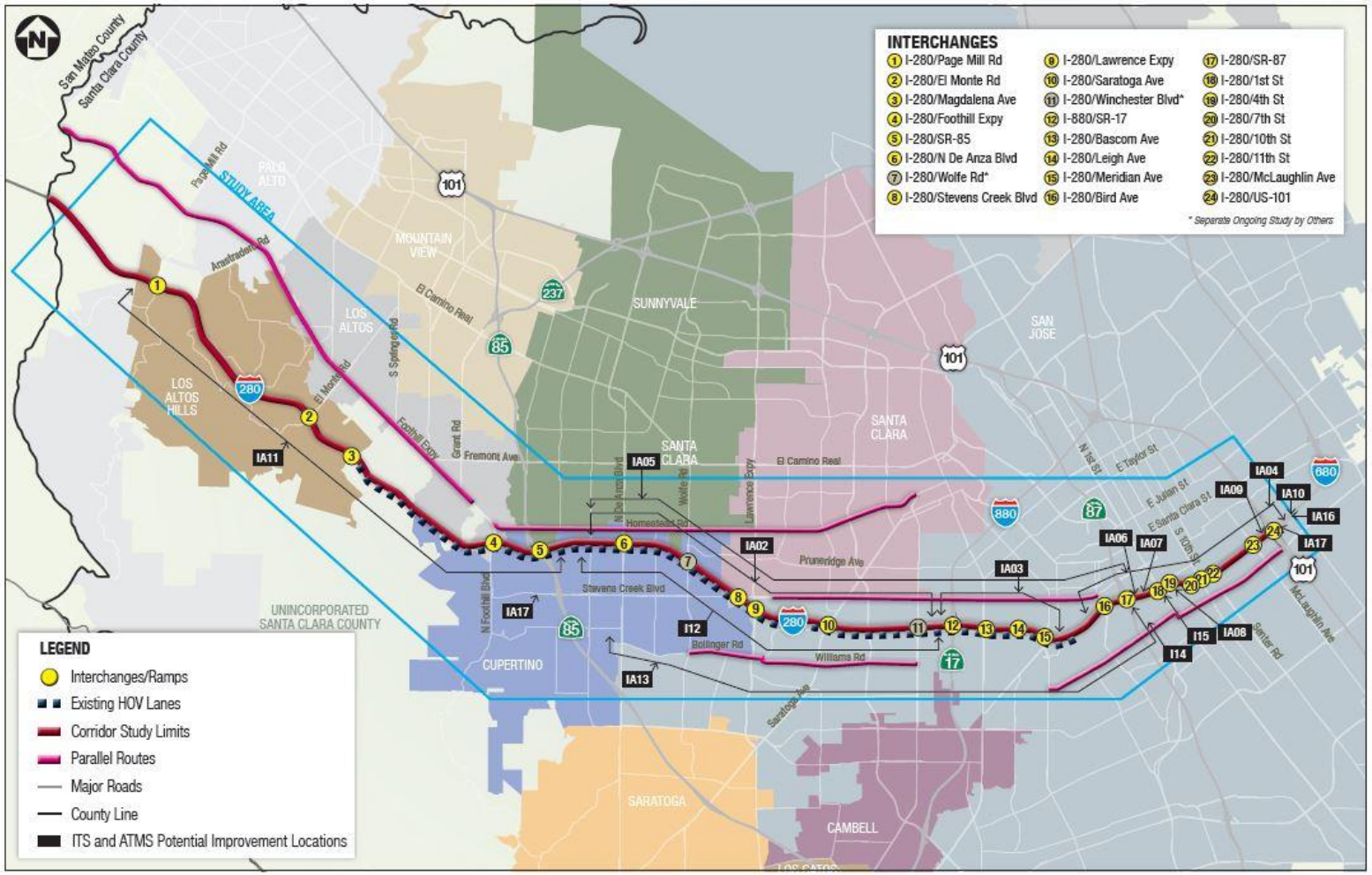
ID #	LOCATION	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
		ITS and ATM STRATEGIES	
IA01	Entire Corridor	*ITS Elements and Technologies* ▪ Detection (in-pavement sensors, CCTV, etc.) with real-time traffic data collection and monitoring ▪ Communication network for the entire corridor and systems, including connection to Center ▪ Information dissemination systems (such as mobile applications, 511.org, etc.) ▪ Connection with TMC ▪ Data Analysis systems	$4 M
IA02	I-280 NB I-880 to De Anza Boulevard	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controllers ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.41M
IA04	I-280 NB King Road to SR-87	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.22M

ID #	LOCATION	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
IA05	I-280 NB Winchester to De Anza Boulevard	*Bus on Shoulders* ▪ Determine feasible locations for local and/or continuous usage of shoulders ▪ Add signing and striping treatments at on and off-ramps ▪ Install CCTV cameras for traffic incident monitoring ▪ Add overhead VMS and lane use signals ▪ Construct emergency pull-out areas where feasible ▪ Pavement rehab cost is not added	$0.66M
IA06	SR-87 N to I-280 N Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M
IA07	I-280 N to SR-87 N Connector	*Dynamic Shoulder Use* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M
IA08	I-280 N 4th Street On-Ramp	*Dynamic Ramp Access Restrictions* ▪ Add detector and communication systems ▪ Install automated enforcement technologies ▪ Add overhead VMS and access control signs	$0.2M
IA09	US 101 N to I-280 N Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M
IA10	I-280 N Upstream of McKee Ave; SR-87; I-880	*Dynamic Real-time Traveler Information Signs* ▪ Install Detector and communication systems ▪ Install roadside or overhead information signs	$0.40M
IA11	I-280 SB Page Mill Road to SR-85	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment	$8 M

ID #	LOCATION	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
		▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	
IA12	I-280 SB SR-85 to I-880	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.51M
IA13	I-280 SB De Anza Boulevard to Winchester	*Bus on Shoulders* ▪ Determine feasible locations for local and/or continuous usage of shoulders ▪ Add signing and striping treatments at on and off-ramps ▪ Install CCTV cameras for traffic incident monitoring ▪ Add overhead VMS and lane use signals ▪ Construct emergency pull-out areas where feasible ▪ Pavement rehab cost is not added	$0.66M
IA14	SR-87 N to I-280 S Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M
IA15	I-280 S Market Street On-Ramp	*Dynamic Ramp Access Restrictions* ▪ Add detector and communication systems ▪ Install automated enforcement technologies ▪ Add overhead CMS and access control signs	$0.2M
IA16	I-280 S Upstream of Page Mill Road; Steven Creek Blvd; SR-87	*Dynamic Real-time Traveler Information Signs* ▪ Install detector and communication systems ▪ Install roadside or overhead information signs	$0.40M

ID #	LOCATION	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST
IA17	I-280 N at US 101 N On-ramp, SR-87 Off-ramp, Meridian On-ramp and Foothill Off-ramp	*Dynamic Junction Control* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$2.5 M

Figure 13: ITS/ATM Strategies Improvements Corridor Map



3.5 Noise Abatement Improvements

3.5.1 Noise Barrier and Soundwall Improvements

The I-280 Corridor Study identified potential noise abatement improvement locations utilizing a preliminary environmental analysis, noise complaints submitted by the public gathered from online map based crowd sourcing survey, and a broad inventory and need analysis of conceivable placement of noise reduction measures.

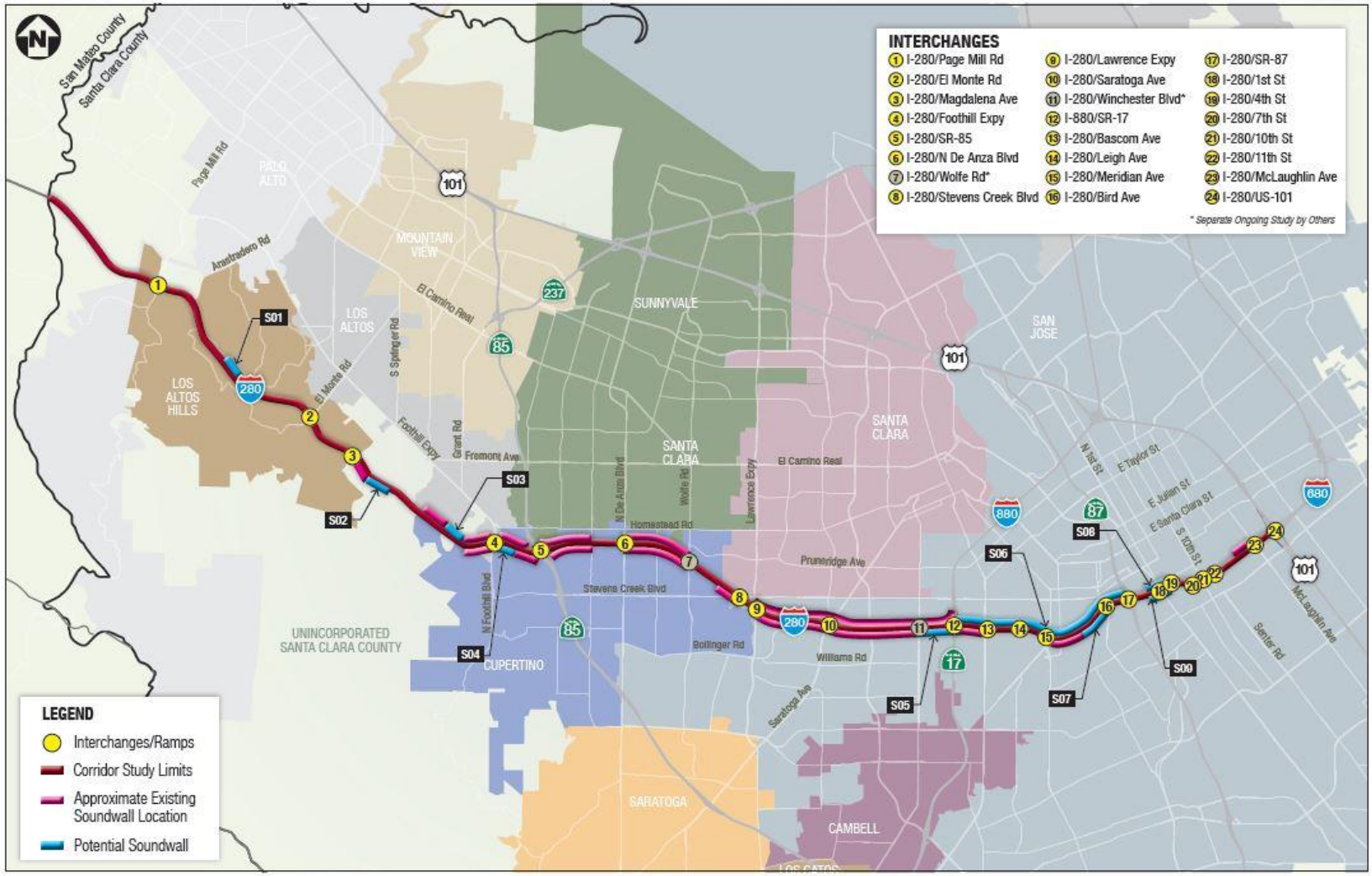
Noise abatement methods which do not include roadway improvements are classified as a Type II noise barrier study. The eligibility requirements for a study to be initiated include public noise complaints and field data collection at the location delivering a noise level above 67 dBA. Local agencies are required to collect their own data regarding noise complaints and submit an application to the VTA Noise Barrier Program for funding. Further information on the program can be accessed from the VTA website.

Prior studies have indicated the need for soundwalls along I-280 from Robleda Road in Los Altos to South 11th Street in San Jose.

The following are potential Type II soundwall improvements extracted from public crowd sourcing data and can be seen on **Figure 14:**

- Northbound between Leander Drive and Robleda Road **(S01)**
- Southbound between existing soundwall near Magdalena Ave and Permanente Creek **(S02)**
- Northbound between existing soundwalls near Sierra Ventura Drive and Via Maderos **(S03)**
- Southbound between N Foothill Blvd and existing soundwall near SR-85 **(S04)**
- Southbound between Eden Avenue and SR-17 **(S05)**
- Northbound between SR-17 and SR-87 **(S06)**
- Southbound between Meridian Avenue and Bird Avenue **(S07)**
- Northbound between 1st Street and 4th Street **(S08)**
- Southbound between 1st Street and 4th Street **(S09)**

Figure 14: Soundwall Improvements Corridor Map



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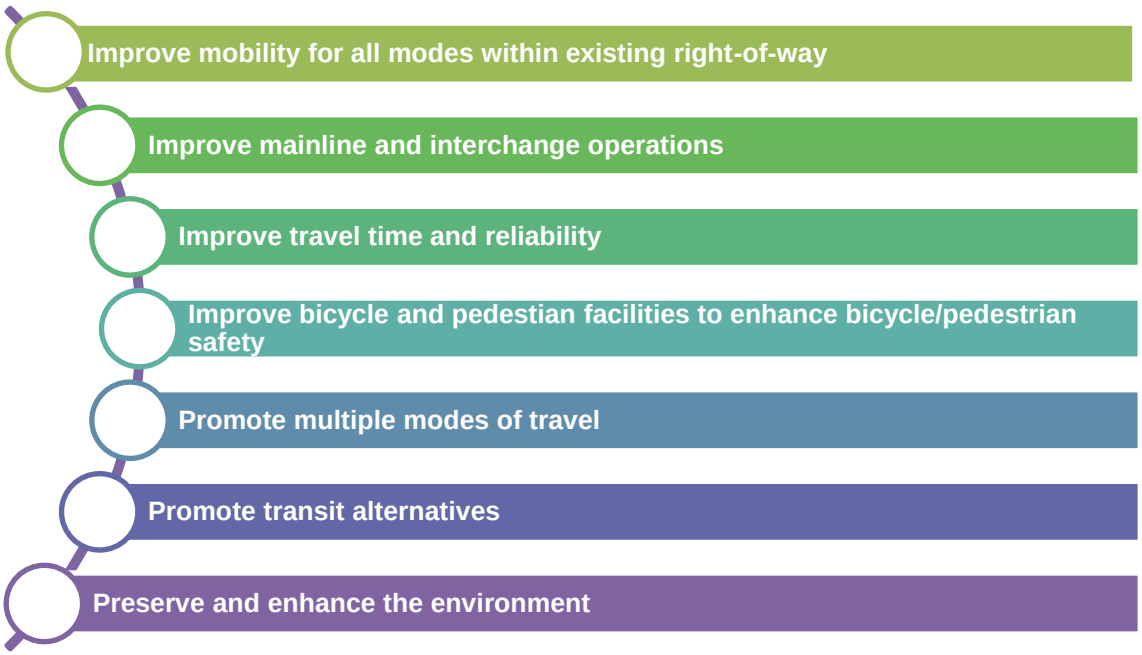
4.0 Evaluation of Potential Improvements

Section 3 of the I-280 Corridor Study report discussed potential improvements for the I-280 corridor to improve mobility for all modes of transportation. This section evaluates those potential improvements and provides ranking and timeframe for implementation. This evaluation will create a framework to select potential improvements to be included in the local and regional programming and to be eligible for funding and project development when the opportunity arises.

4.1 Evaluation Criteria

An important step in the process of assessing transportation improvements is to develop a set of criteria to compare the effectiveness of potential improvements in achieving corridor study goals and objectives, with the overall outcome of identifying potential improvements for enhancing mobility for all transportation modes. The evaluation of potential improvements outlined in Section 3 is based on the study goals:

Study Goals



Using these goals, the following evaluation criteria were defined to rank each project. These criteria encompass the overall study goal, and will help prioritize the projects identified in Section 3.

- **Improve Mobility:** An enhancement that improves traffic operations; reduces travel-time, congestion, and delays; and improves accessibility and circulation.

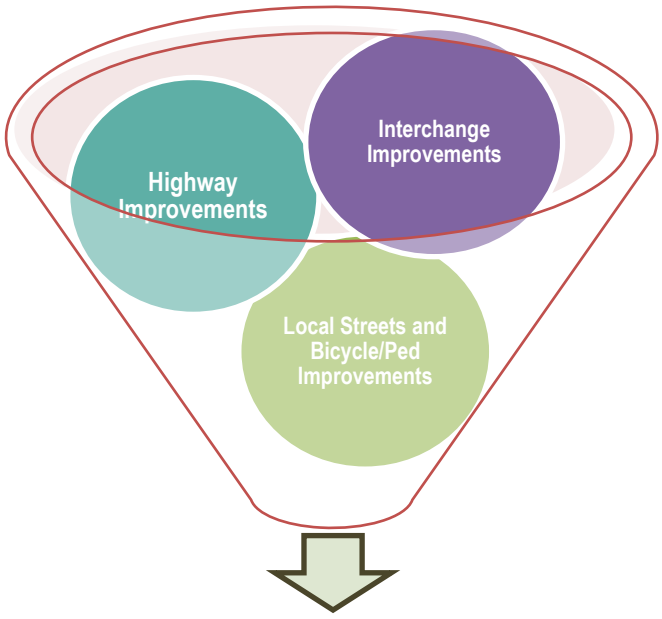
- **Promote Multiple Modes of Transportation:** Promote use of transit, bicycles, and walking through improved transit reliability, encourage mode shift, pedestrian/bicycle safety, and network connectivity.
- **Transportation System Benefit:** Benefits to overall transportation system and application of strategies to manage congestion issues along the corridor and across a regional network.
- **Cost-effectiveness:** Cost of construction and maintenance, right-of-way costs provide benefits relative to cost, environmental and socio-economic effects.
- **Public/Stakeholder Input:** Improvements identified through public input and stakeholder meetings highlighting regional and local priorities.

4.2 Evaluation Methodology

This qualitative evaluation to prioritize projects is the best way to compare such a wide variety of possible transportation solutions. When considering freeway, arterials, transit, bicycles, and pedestrians, it is not appropriate to conduct a detailed modeling effort to prioritize projects. Once each project begins to move forward into project development, it will be necessary to conduct a traffic analysis to evaluate potential benefits of proposed improvements.

4.2.1 Evaluation Categories

The evaluation is organized into three project type categories: Highway Improvements, Interchanges Improvements, and Local Streets. For comparing potential improvement projects with similar benefits, the projects were evaluated separately within each category. Soundwall improvements that were part of noise abatement strategy are not included in the evaluation.



Highway improvements include corridor-wide improvements such as HOV lanes, EL, and ITS improvements.

Interchange improvements include interchange modifications that primarily improve local street connections to freeway ramps, including squaring up ramp connections to local streets.

Local street improvements include "Complete Streets" modifications and bicycle/ pedestrian improvements along local streets. Additionally, bicycle and pedestrian improvements that are separate from street improvements, such as Class I facilities and grade-separated pedestrian overcrossings, are also included in this category.

4.2.2 Scoring Guidelines

The following methodology was used to score each potential improvement within each category.

Each evaluation criterion is assigned a value of zero to five points based on qualitative considerations of various contributing factors listed in **Table 14.** Each evaluation criteria uses weighting factors based on level of importance for how much the criteria contributes to the goals and objectives of the corridor. Since different types of improvements address different goals and objectives, the weighting of evaluation factors varies by project type.

▪ Highest level of benefit or no negative value	5 Points	BEST 
▪ Substantial benefit or limited negative effect	4 Points	
▪ Moderate benefit or small negative effect	3 Points	
▪ Some benefit or moderate negative effect	2 Points	
▪ Little benefit or substantial negative effect	1 Point	
▪ No benefit or highest negative effect	0 Point	

Table 14: Scoring Guidelines

		Contributing Factors	Weighting factors (Highway and Interchange improvements)	Weighting factors (Local Streets Improvements)
EVALUATION CRITERIA	Improve Mobility	▪ Improved Traffic Operations ▪ Reduction in Travel Time ▪ Reduction in congestion and delays ▪ Improving accessibility ▪ Provides transportation choices	30%	10%
	Promote Multiple Modes of Transportation	▪ Promote multiple transportation modes ▪ Improved reliability for transit ▪ Encourage mode shift ▪ Safer pedestrian/bicycle facilities and provide connectivity	25%	20%
	Transportation System Benefit	▪ Consistency with local and regional plans and their benefits to the overall transportation system to manage congestion issues along the corridor and regional network. ▪ Benefits to all modes and improving access to transit.	5%	40%
	Cost Effectiveness	▪ Benefits relative to cost (construction, maintenance, project development and right-of-way costs) ▪ Environmental and socio-economic effects (general impacts to existing development, access to potential job centers and new development areas)	20%	10%
	Public/Stakeholder Input	Based on public input received through CrowdSpot surveys and stakeholder meetings, highlighting regional and local priorities.	20%	20%

4.2.3 Project Prioritization and Implementation Timeline

The evaluation of potential improvements was further divided into three priority levels for Highway Improvements and Interchange Improvements – top 20% of the projects are identified as Priority 1; the next 20% are Priority 2; and the remaining 60% are Priority 3. Since the total score for the local streets improvements is relatively close, to achieve greater segmentation of ranking, a different priority levels were used- top 20% of the projects are identified as Priority 1; the next 10% are Priority 2; and the remaining 70% are Priority 3. The priorities are intended to categorize projects that meet corridor study objectives and provide the highest benefit relative to other projects.

In addition to scoring and prioritizing each of the potential improvements by the recommended criteria, they are further categorized into short-term, mid-term, or long-term improvements based on implementation timeline for programming purposes. The implementation category is solely based on timeframe and needs may be adjusted based on available funding as well as local and regional priorities. **Short-Term projects** are categorized as projects taking approximately one to three years, having minimal to no impact on the environment, and providing cost-effective solutions to immediate needs. **Mid-Term projects** are categorized as projects taking approximately three to five years, having moderate environmental impact, and requiring intensive agency coordination. **Long-Term projects** are categorized as projects taking more than five years to develop and implement, having significant environmental impact, requiring intensive agency coordination, and requiring greater funds to complete.

The combination of prioritization and implementation timeline will allow VTA to work with local agencies to program the potential improvements for a long-range corridor improvement plan.

4.3 Results of Evaluation

Tables 15-17 below summarize the evaluation results with total score out of 100, priority ranking and implementation time-frame.

Table 15: Evaluation of Potential Highway Improvements

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
HIGHWAY IMPROVEMENTS						
H01	San Mateo County Line to Magdalena Ave	I-280 HOV Lane Northbound ▪ Extend Existing HOV Lane from Magdalena Ave to San Mateo County Line	$6M to $8M	69	1	Mid-Term
H02	San Mateo County Line to Magdalena Ave	I-280 HOV Lane Southbound ▪ Extend Existing HOV Lane from Magdalena Ave to San Mateo County Line	$70M to $90M	81	1	Long-Term
H03	Leland Ave to US 101	I-280 HOV Lane Southbound ▪ Extend Existing HOV Lane from Leland Ave to US 101	$5M to $7M	81	1	Mid-Term
H04	Leland Ave to US 101	I-280 HOV Lane Northbound ▪ Extend Existing HOV Lane from Leland Ave to US 101	$5M to $7M	81	1	Mid-term
E01	San Mateo County Line to Magdalena Ave	I-280 EL ▪ ID E280-03* ▪ Magdalena Ave to San Mateo County Line	$95M	78	1	Long-Term
E02	Magdalena Ave to Leland Ave	I-280 EL ▪ ID E280-02 ▪ Leland Ave to Magdalena Ave	$63M	78	1	Long-Term
E03	Leland Ave to US 101	I-280 EL ▪ ID E280-01* ▪ US 101 to Leland Ave	$27M	78	1	Long-term
ITS and ATM STRATEGIES						

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
IA01	Entire Corridor	*ITS Elements and Technologies* ▪ Detection (in-pavement sensors, CCTV, etc.) with real-time traffic data collection and monitoring ▪ Communication network for the entire corridor and systems, including connection to Center ▪ Information dissemination systems (such as mobile applications, 511.org, etc.) ▪ Connection with TMC ▪ Data Analysis systems	$4M	76	1	Short-term
IA02	I-280 NB I-880 to De Anza Boulevard	Adaptive Ramp Metering ▪ Upgrade existing ramp metering controllers ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.41M	64	2	Short-term
IA04	I-280 NB King Road to SR-87	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.22M	64	2	Short-term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
IA05	I-280 NB SR-87 to De Anza Boulevard	*Bus on Shoulders* ▪ Determine feasible locations for local and/or continuous usage of shoulders ▪ Add signing and striping treatments at on and off-ramps ▪ Install CCTV cameras for traffic incident monitoring ▪ Add overhead VMS and lane use signals ▪ Construct emergency pull-out areas where feasible	$0.66M	83	1	Short-term
IA06	SR-87 N to I-280 N Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M	52	2	Short-term
IA07	I-280 N to SR- 87 N Connector	Dynamic Shoulder Use ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M	52	2	Short-term
IA08	I-280 N 4th Street On-Ramp	*Dynamic Ramp Access Restrictions* ▪ Add detector and communication systems ▪ Install automated enforcement technologies ▪ Add overhead VMS and access control signs	$0.2M	48	3	Short-term
IA09	US 101 N to I-280 N Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$0.2M	68	1	Short-term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
IA10	I-280 N Upstream of McKee Ave; SR-87; I-880	Dynamic Real-time Traveler Information Signs ▪ Install Detector and communication systems ▪ Install roadside or overhead information signs	$0.40M	45	3	Short-term
IA11	I-280 SB Page Mill Road to SR-85	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$8 M	64	2	Short-term
IA12	I-280 SB SR-85 to I-880	*Adaptive Ramp Metering* ▪ Upgrade existing ramp metering controller ▪ Add detection upstream and downstream of ramps and adjacent mainline segment ▪ Enable wireless connection among ramps and between ramps and a central system ▪ Add HOV/HOT Bypass lane at on-ramps where feasible	$0.51M	64	2	Short-term
IA13	I-280 SB De Anza Boulevard to SR-87	*Bus on Shoulders* ▪ Determine feasible locations for local and/or continuous usage of shoulders ▪ Add signing and striping treatments at on and off-ramps ▪ Install CCTV cameras for traffic incident monitoring ▪ Add overhead VMS and lane use signals ▪ Construct emergency pull-out areas where feasible	$0.66M	73	1	Short-term
IA14	SR-87 N to I-280 S Connector	*Dynamic Shoulder Use as HOV/HOT Bypass Lane* ▪ Modify signing and striping ▪ Add detector and communication systems	$0.2M	60	2	Short-term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
		▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs				
IA15	I-280 S Market Street On-Ramp	*Dynamic Ramp Access Restrictions* ▪ Add detector and communication systems ▪ Install automated enforcement technologies ▪ Add overhead CMS and access control signs	$0.2M	48	3	Short-term
IA16	I-280 S Upstream of Page Mill Road; Steven Creek Blvd; SR-87	*Dynamic Real-time Traveler Information Signs* ▪ Install detector and communication systems ▪ Install roadside or overhead information signs	$0.40M	45	3	Short-term
IA17	I-280 N at US 101 N On-ramp, SR-87 Off-ramp, Meridian On-ramp and Foothill Off-ramp	*Dynamic Junction Control* ▪ Modify signing and striping ▪ Add detector and communication systems ▪ Install CCTV cameras for traffic monitoring ▪ Add overhead VMS and lane use signs	$2.50M	48	3	Short-term

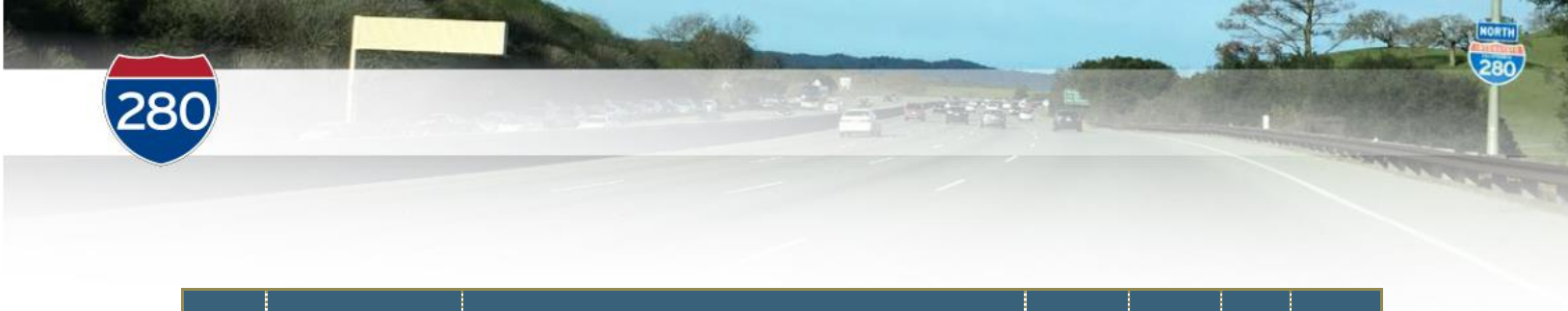
**Projects programmed and listed in Envision Silicon Valley Project List 10/1/2015*

Table 16: Evaluation of Potential Interchange Improvements

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
I01	Page Mill Road	*Interchange Improvements* Oregon-Page Mill Road Interchange Improvements-Tier 1 Expressway Plan 2040 ID H280-15 (Separate Project by County)	$21M-	66	1	Mid-Term
		Northbound Eliminate Mainline Lane Drop at Off-Ramp and Provide Deceleration Lane for Off-Ramp	$4M to $5M	74	1	Mid-Term
I02	El Monte Road	*Interchange Improvements* Square-Up" On-and Off-ramps Readjust All Ramps to Intersect El Monte Rd at Approximately 90°	$4M to $5M	48	2	Short-Term
		Northbound and Southbound Convert Full Cloverleaf to Partial Cloverleaf Interchange	$0.5M	49	2	Mid-Term
I03	Foothill Expressway	*Interchange Improvements* Second Exit Lane to Foothill Expressway ID H280-01	$3M	50	2	Mid-Term
		Braided Ramps Between SR-85 and Foothill Expressway Interchange ID H280-02 (Separate Project by County)	$30M to $45M	50	2	Mid-Term
		Foothill Expressway Interchange Modifications -Tier 1 Expressway Plan 2040 ID H280-14 (Separate Project by County)	$5M	50	2	Mid-term
		"Square-Up" NB On- and Off-Ramps Readjust NB Ramps to Intersect Foothill Expressway at Approximately 90° Widen Off-Ramp to Provide an Additional Right-Turn Lane Add Signal at NB On- and Off-Ramps	$1.4M	53	2	Short-Term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
I04	SR-85	Interchange Improvements Possible HOV/EL Direct Connectors From SR-85 NB to I-280 NB Possible HOV/EL Direct Connectors From I-280 SB to SR-85	$60M to $80M	63	1	Long-Term
I05	N De Anza Boulevard	*Interchange Improvements* De Anza Boulevard Interchange ID H280-4	$40M to $60M	44	3	Long-Term
I06	Wolfe Rd to De Anza Boulevard	*Interchange Improvements* - Northbound Add Auxiliary Lane Between Wolfe Road and De Anza Boulevard Shoulder Running Bus Lane for De Anza Boulevard Off-Ramp	$2M to $4M	68	1	Short-Term
I07	N Wolfe Road	*Interchange Improvements and Upgrade Lighting* Wolfe Road Interchange ID H280-05 (Separate Project by VTA)	$85M	74	1	Long-Term
I08	N Tantau Avenue	*Interchange Improvements* - Northbound Bus Only On ramp and Southbound Bus Only Off-Ramp for Buses,	$15M	66	1	Long-Term
I09	Stevens Creek Boulevard	*Interchange Improvements* Northbound I-280 Connector from Stevens Creek Boulevard ID H280-13 (Separate Project by VTA)	$50M	55	2	Mid-Term
I10	Lawrence Expressway	*Interchange Improvements* Interchange Improvements-Tier 2 Expressway Plan 2040 ID H280-03 Provide Direct Connection Lawrence Expressway NB Without Going Through Stevens Creek Boulevard or Provide Full Access NB and SB to Lawrence Expressway from I-280 NB	$115M to $160M	40	3	Long-Term
I11	Saratoga Avenue	*Interchange Improvements* - Phase I Saratoga Avenue Interchange ID H280-06 Eliminate I-280 NB to Saratoga Avenue NB Diagonal Ramp Consolidate NB and SB Off-Ramp Movements to Loop Off-Ramp Realign Harker Driveway	$5M to $8M	78	1	Short-Term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
		Phase II Provide Loop On-Ramp for Saratoga Avenue to SB I- 280 Realign I-280 SB Off-Ramp to Moorpark Avenue	$45M to $65M	69	1	Long-Term
I12	San Tomas Expressway	*Interchange Improvements* San Tomas Expressway New Interchange ID H280-12 - Northbound and Southbound Construct New Diamond Interchange at San Tomas Expressway Realignment of Frontage Roads and Local Circulation Impact	$120M to $150M	34	3	Long-Term
I13	Winchester Boulevard	*Interchange Improvements* Winchester Boulevard Interchange ID H280-07 (Separate Project by VTA)	$90M	64	1	Long-Term
I14	Parkmoor Avenue/ Moorpark Ave/ Leland Avenue	*Interchange Improvements* Leigh Avenue/Leland Avenue Interchange ID H280-08 - Northbound Close Leland Ave and Maintain Leigh Avenue On-Ramp	$0.5M	41	3	Long-Term
		Build New Overpass at Menaker Avenue between Moorpark Avenue and Parkmoor Avenue Keep Leigh Avenue On-Ramp	$5M to $8M	40	3	Long-Term
		Close Leland Avenue and Leigh Avenue On-Ramps and Build New On-Ramp	$10M to $15M	49	2	Long-Term
I15	Meridian Avenue	*Interchange Improvements* "Square-Up" NB On-ramp and SB Off-Ramp to NB Meridian Avenue	$1.5M	65	1	Short-Term
I16	Bird Avenue	*Interchange Improvements* Bird Avenue Interchange ID H280-16 "Square-Up" On- and Off-Ramps Add HOV Bypass Lane For I-280 SB On-Ramp (Assuming Bridge Widening)	$3M to $5M	65	1	Short-Term



ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
I17	SR-87	*Interchange Improvements* - Southbound Drop Lane on Connector and Add HOV/EL at Ramp Meter Eliminate Inside Lane Merge between SR-87 Ramps and I-280 SB	$0.3M to $0.5M	69	1	Mid-Term
I18	1st Street /Market Street	*Interchange Improvements* - Southbound Possible elimination of This Isolated Loop On-Ramp	$0.5M	39	3	Mid-Term
		Eliminate Weave Between Loop On-Ramp and 7th Street Off-Ramp with Lane Drop After Off-Ramp	$0.8M	65	1	Mid-Term
I19	3rd St to 7th Street	*Downtown Access Improvements (Northbound)* ID H280-10 Northbound (4th Street On-Ramp) Add HOV Bypass Lane For I-280 NB On-Ramp Northbound (7th Street Off-Ramp) Connect Margaret Street from 5th Street to 3rd Street as Specified in VTP 2040 with braided ramp at 4th Street On-Ramp Eliminate Lane Drop at 7th Street Off-Ramp and Extend Mainline Lane From 7th Street Off-Ramp to 4th Street On-Ramp	$20M to $25M	70	1	Mid-Term
I20	7th Street	*Downtown Access Improvements (Southbound)* ID H280-10 Eliminate weaving between On-Ramp and Off-Ramp Add HOV Bypass Lane and ramp metering	$1M to $2M	74	1	Mid-Term
I21	10th Street	*Interchange Improvements* Northbound Add HOV Bypass Lane For I-280 NB On-Ramp	$2M to $3M	69	1	Mid-Term
		Southbound Eliminate Lane Drop Eliminate Weaving Between On- and Off-Ramps by Providing Continuous Lane From SR-87	$1M to $2M	64	1	Mid-Term
I22	11th Street	*Interchange Improvements* - Southbound Add auxiliary lane from 11th Street On-Ramp to McLaughlin Avenue Off-Ramp Add HOV Bypass Lane	$10M to $15M	56	2	Mid-Term

ID #	INTER-CHANGE	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
I23	McLaughlin Avenue	*Interchange Improvements* "Square-Up" NB On-Ramp Add HOV Bypass Lane McLaughlin NB to I-280 NB On-Ramp (Loop) McLaughlin SB to I-280 NB On-Ramp (Diagonal)	$5M to $8M	56	2	Short-Term
I24	US 101 to I-280 NB	*Northbound* Install New Ramp Meter (US 101 SB to I-280 NB) Add HOV Bypass Lane and Ramp Metering for On-Ramp Eliminate Inside Lane Merge Between US 101 On-Ramp and I-280 NB	$3.5M to $5.8M	70	1	Short-Term

Table 17: Evaluation of Potential Local Street Improvements

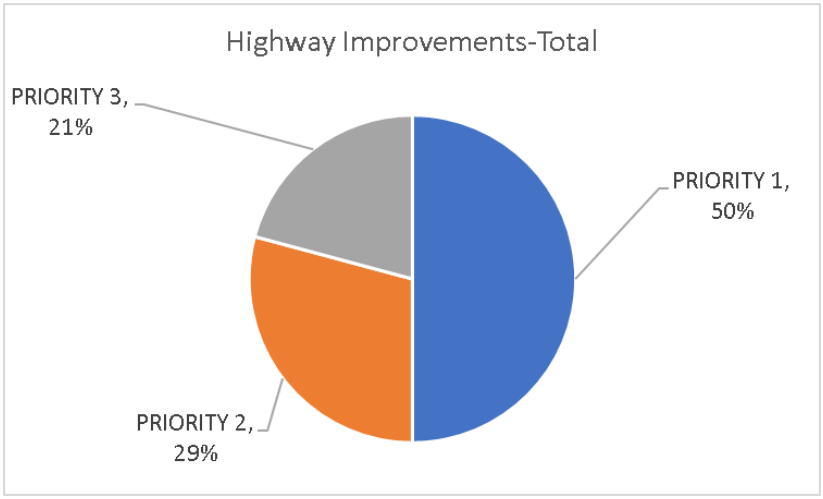
ID #	CROSS-STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
L01	El Monte Rd	Add Class II Bicycle Lanes and Pedestrian Facilities Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Improve Crosswalk and Curb Ramps	$280K	52	2	Short-Term
L02	Magdalena Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and Add Minimum 2' Buffer ▪ Upgrade AC Sidewalks to PCC Sidewalks on Both Sides of Undercrossing ▪ Add Crosswalks at All Ramps and Upgrade Curb Ramps	$130K	56	2	Short-term
L03	N Stelling Rd	Construct Class IV Cycle Track and Improve Pedestrian Facilities, Signing and Striping ▪ Construct Cycle Track ▪ Improve Crosswalk and Curb Ramps	$200K to 700K	54	2	Short-term
L04	N De Anza Blvd	Upgrade Pedestrian Facilities, Signing and Striping ▪ Improve Crosswalk and Curb Ramps on North Side of N De Anza Blvd	$20K	56	2	Short-term
L05	N Blaney Ave	Upgrade Class II Bicycle Lanes to Class IV Cycle Track, Signing and Striping ▪ Construct at Grade or Separated Grade One/Two-Way Cycle Track	$600K to $1,000K	56	2	Mid-term
L06	N Tantau Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Improve Delineation of Class II Bicycle Lanes and Add 2' Buffer ▪ Add PCC Sidewalk on West Side of Overcrossing	$100K	64	1	Short-term
L07	Stevens Creek Blvd (Foothill	Construct Class IV Cycle Tracks	$9M	72	1	Mid-term

ID #	CROSS-STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
	Blvd to Tantau Ave) and extend to Downtown San Jose on W San Carlos St.	▪ Install detector and communication systems to provide real-time information to bicyclists ▪ Add wayfinding signs and CMS ▪ Construct protected intersections where required				
L08	Saratoga Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Improve Crosswalk and Curb Ramps	$130K	56	2	Short-term
L09	Macarthur Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and ▪ Add Minimum 2' Buffer ▪ Improve Crosswalk and Curb Ramps	$100K	50	3	Short-term
L10	S Bascom Ave	"Road Diet" to Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer ▪ Reduce Left-Turn Pockets to 10' Lanes ▪ Reduce Through Lanes to 11' Lanes ▪ Improve Crosswalks and Curb Ramps	$200K	50	3	Short-term
L11	Leland Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and ▪ Add Minimum 2' Buffer ▪ Improve Crosswalks and Curb Ramps	$150K	50	3	Short-term
L12	Meridian Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes Both Directions with 2' Buffer on NB Meridian Ave only ▪ Reduce Left-Turn Pocket NB Meridian Ave to 10' Lane ▪ Reduce Through Lanes to 11' Lanes on NB Meridian	$270K	50	3	Short-term

ID #	CROSS-STREET	DESCRIPTION OF POTENTIAL IMPROVEMENTS	COST	TOTAL SCORE	PRIORITY	TIME-FRAME
		▪ Improve Crosswalk and Curb Ramps				
L13	Race St	"Road Diet" to Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer ▪ Improve Crosswalk and Curb Ramps ▪ Reduce All Lanes to 11' Lanes	$180K	54	2	Short-term
L14	Lincoln Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes and Add Minimum 2' Buffer ▪ Improve Crosswalks and Curb Ramps	$200K	54	2	Short-term
L15	Bird Ave	Add Class II Bicycle Lanes and Pedestrian, Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes with 2' Buffer on Southwest Segment of Bird Ave ▪ Reduce Left-Turn Pockets to 10' Lanes ▪ Reduce Through Lanes to 11' Lanes ▪ Improve Crosswalk and Curb Ramps	$220K	60	1	Short-term
L16	3rd St to 7th St	Add Class II Bicycle Lanes and Pedestrian Facilities on 7th St, Signing and Striping Improve Crosswalks and Curb Ramps	$200K	62	1	Short-term
L17	McLaughlin Ave	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing and Striping ▪ Delineate Class II Bicycle Lanes ▪ Add Crosswalks and Improve Curb Ramps	$290K	50	3	Short-term
L18	Between Lawrence Expy to Saratoga Ave	Proposed Pedestrian Cross Connector (Recommended at John Mise Park in San Jose Stevens Creek Urban Village Plan Chapter 5)	$9M	44	3	Long-Term

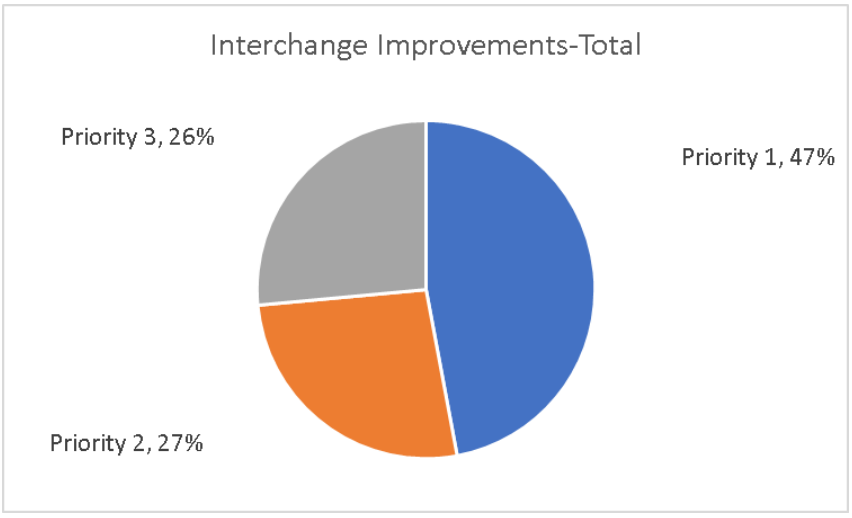
4.4 Summary of Evaluation

The results of the evaluation are summarized in this section in the form of graphs for comparative purposes.



As shown, 50% of the potential highway improvements are ranked as Priority 1 improvements. The types of improvements that were ranked as Priority 1 improvements are HOV improvements, EL improvements and corridor wide ITS improvements. **Table 18** lists the Priority 1 improvements and lists the reasons for higher ranking.

In the interchange improvements category, 47% of the potential improvements are ranked as Priority 1 improvements. The list of improvements that are ranked as Priority 1 are interchanges providing access to major residential, commercial, and regional employment centers, HOV/EL connectors, HOV Bypass lanes, and elimination of lane drop improvements. **Table 19** lists the Priority 1 improvements with reasons for higher ranking.



Within the local streets improvements category, 22% of the potential improvements are ranked as Priority 1 improvements. As listed in **Table 20** bicycle and pedestrian improvements in residential, employment centers, and downtown areas that provide system-wide benefits are ranked as Priority 1 improvements.

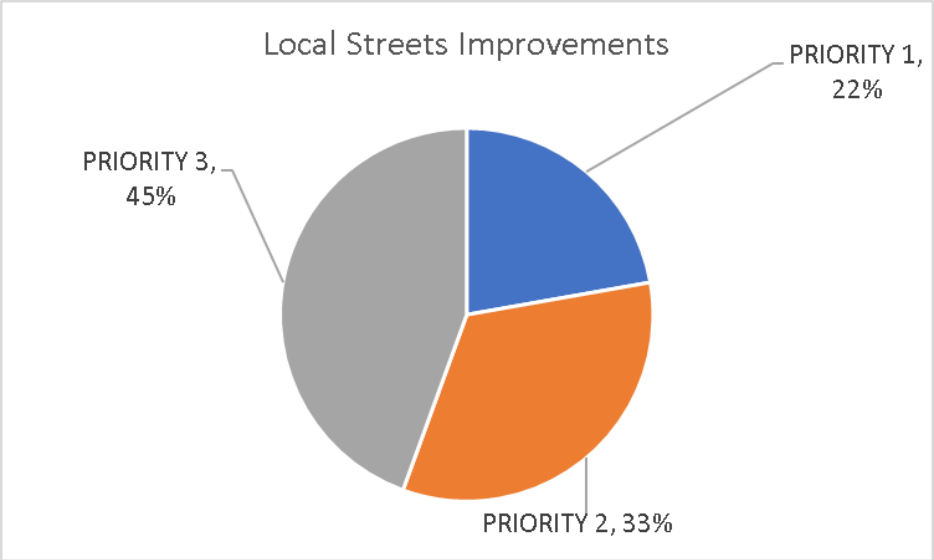


Table 18: Highway Improvements-Summary of Priority 1 Rankings

ID#	Location	Description of Potential Improvement	Reasons for Priority 1 Ranking
H01	Magdalena Avenue to San Mateo County Line	I-280 HOV Lane Northbound	Provides most benefits to the cost by improving mobility and provides for system benefits and promote mode shift to transit. H02 eliminates lane drop at Magdalena Ave. thereby enhances safety.
H02	Magdalena Avenue to San Mateo County Line	I-280 HOV Lane Southbound	
H03	Leland Avenue to US 101	I-280 HOV Lane Southbound	
H04	Leland Avenue to US 101	I-280 HOV Lane Northbound	
E01	Magdalena Avenue to San Mateo County Line	I-280 EL-ID E280-03	
E02	Leland Avenue to Magdalena Avenue	I-280 EL-ID E280-02	
E03	US 101 to Leland Avenue	I-280 EL-ID E280-01	
IA01	Entire Corridor	ITS Elements and Technologies	Operational Improvements to improve mobility and provide system benefits. Sets up corridor for innovative solutions.
IA05	NB I-280-SR-87 to De Anza Boulevard	Bus on Shoulders	Leverage existing capacity to improve mobility and promote transit services.
IA09	US 101 N to I-280 N Connector	Dynamic shoulder use as HOV/EL Bypass lane	Operational Improvements to improve mobility and provide system benefits. Sets up corridor for innovative solutions.
IA13	SB I-280-SR-87 to De Anza Boulevard	Bus on Shoulders	Leverage existing capacity to improve mobility and promote transit services.

Table 19: Interchange Improvements-Summary of Priority 1 Rankings

ID#	Location	Description of Potential Improvement	Reasons for Priority 1 Ranking
I01	Page Mill Road	ID H280-15-Interchange Improvements	Improves local street mobility, interchange operations and eliminates mainline queuing.
		Eliminate Mainline Lane Drop at Off-Ramp and Provide Deceleration Lane for northbound Off-Ramp	
I04	SR-85	HOV/EL direct connectors from SR-85 NB to I-280 NB; HOV/EL direct connectors from I-280 SB to SR-85	Promotes HOV, improves transit access and provides system benefits.
I06	Wolfe Road to De Anza Boulevard	NB Auxiliary Lane; Shoulder running bus lane on De Anza Boulevard NB off-ramp	Improves local street mobility, interchange operations and eliminates mainline queuing.
I07	N Wolfe Road	Interchange Improvements and Upgrade Lighting-ID H280-05*	
I08	N Tantau Avenue	Northbound Bus Only on ramp and Southbound Bus Only off-ramp	Promotes transit access to employment center, improves mobility and provides system benefits.
I11	Saratoga Avenue	ID H280-06; Eliminate NB diagonal off-ramp; consolidate NB and SB off-ramp to loop off-ramp; realign Harker driveway	Improves local street mobility, interchange operations, eliminates mainline queuing, and supports urban villages.
I13	Winchester Boulevard	ID H280-07-Interchange Improvements	Improves mobility and provides system benefits. Promotes HOV, improves local street mobility.
I15	Meridian Avenue	Square up ramps	
I16	Bird Avenue	ID H280-16-Imterchange Improvements; HOV Bypass lane for SB ramp	
I17	SR-87 Southbound	Drop lane on connector and add HOV/EL at ramp meter; Eliminate inside lane merge between SR-87 ramps and I-280 SB	
I18	1st Street/ Market Street	Eliminate Weave between loop on-ramp and 7th Street off-ramp with lane drop	

ID#	Location	Description of Potential Improvement	Reasons for Priority 1 Ranking
I19	3rd Street to 7th Street Downtown Access Northbound	ID H280-10; Add HOV Bypass lane for 4th Street NB on-ramp; Connect Margaret St. from 5th Street to 3rd Street with braided ramp at 4th Street on-ramp; Eliminate lane drop at 7th Street NB off-ramp and extend mainline lane from 7th Street NB off-ramp to 4th Street NB on-ramp	Improves mobility, provides system benefits, and improve access to downtown.
I20	3rd Street to 7th Street Downtown Access Southbound	ID H280-10; Eliminate Weaving between on-ramp and off-ramp; HOV Bypass lane and ramp metering for on-ramp	Improves mobility, provides system benefits, and improve access to downtown.
I21	10th Street	HOV Bypass lane on NB on-ramp SB-Eliminate lane drop; Eliminate weaving between on-and off-ramps by providing continuous lane from SR-87	Promotes HOV, improves interchange operations and eliminates mainline queuing.
I24	US 101 SB to I-280 NB Connector	Ramp Meter; HOV Bypass lane; Eliminate inside lane merge between US 101 on-ramp and I-280 NB	Improves mobility and provides system benefits.

Table 20: Local Streets Improvements-Summary of Priority 1 Rankings

ID#	Location	Description of Potential Improvement	Reasons for Priority 1 Ranking
L06	N Tantau Avenue	Construct Calls II Bicycle Lanes and Pedestrian Facilities, Signing and Striping	Promotes multimodal access to employment center
L07	Stevens Creek Boulevard and W San Carlos Street	Construct Class IV Cycle Tracks	Promotes highest level of mode shift and provides system benefits. City of Cupertino is working on Cycle IV tracks on Stevens Creek Blvd. within its City limits. Further extension on W San Carlos St. to San Jose will provide direct access to Downtown and can potentially be direct access to employment center and promote mode shift.
L15	Bird Avenue	Add Class II Bicycle Lanes and Pedestrian Facilities, Signing, and Striping	Highest public input for bicycle and pedestrian improvements/Safety.
L16	3rd Street to 7th Street	Add Class II Bicycle Lanes and Pedestrian Facilities on 7th Street, Signing and Striping	Improves local access to downtown, and promotes mode shift.

5.0 Recommendations

Evaluation of the ranks the potential improvements into three priorities. The objective was to create a framework to understand how the potential improvements address the needs of the corridor and to have a mechanism in place to advance projects into local and regional programming to be eligible for funding and project development when opportunities arise. This section includes recommended strategies and probable timeline to advance those potential improvements to implementation.

5.1 Recommended Strategies for I-280 Corridor

The following are the recommended strategies to effectively plan and implement the improvements in the I-280 corridor.

Develop Projects that focus on improving corridor-wide mobility

- Extend HOV lanes to provide for a continuous HOV lane
- Implement conversion of HOV lanes to EL
- Study in detail improvements to Downtown access between US 101 and SR-87

Every year congestion leads to lost productivity and added fuel costs. These projects focus on reducing travel time and congestion

Prioritize funding for multi-modal improvements:

- Continue to develop multi-modal interchange improvements at Wolfe Road and Winchester Boulevard (separate ongoing study)
- Study transit ramp access at Tantau Avenue
- Implement HOV Bypass and Transit priorities at interchange ramps

Will improve travel time reliability and promote transit and bicycle use for commute congestion

Empower Innovation

- **Develop** I-280 Corridor Technology Deployment Plan
- Work with Caltrans to deploy smart solutions like demand-based pricing, bus on shoulders, and ATM strategies as demonstration projects

Implementation of technology improves operations within the existing capacity and manage performance in real-time

5.2 Recommended Improvements

The following are the recommended improvements by improvement category associated with probable timeline for implementation. The implementation timeline would need further refinement if there are any changes in the local and regional priorities and availability of funding that may expedite the project implementation.

5.2.1 Recommended Highway Improvements

Highway improvements using technology relating to ATM strategies provides opportunities to move toward a network that operates at its maximum available capacity. Affordable ITS and ATM improvements are recommended for I-280 to dynamically manage recurrent and non-recurrent congestion based on prevailing and predicted traffic conditions. Demonstration projects are recommended to evaluate the benefit potential to support funding for full implementation.

The I-280 corridor has higher benefit potential having a HOV 3+ EL. Current legislation prohibits conversion of GP lane directly to EL. To facilitate a continuous EL and provide opportunities for transit routes on I-280, it is recommended to extend the existing HOV lanes both northbound and southbound from Leland Avenue to US 101 in south and Magdalena Avenue to County line in north. In the situation where changes in legislation occurs allowing direct conversion of GP to EL, it is recommended to construct EL lanes without GP to HOV conversion. The recommendations for highway improvements with implementation timeline is summarized in **Table 21**.

Table 21: Recommended Highway Improvements

Improvements	Timeline
Near-term Improvements ▪ Fiber network along the I-280 corridor to support ITS and ATM strategies. ▪ ITS and ATM improvements like adaptive ramp metering, dynamic shoulder use, bus on shoulders, dynamic junction control, dynamic ramp access restrictions, and dynamic real-time traveler information signs.	
Mid-term Improvements ▪ Extend existing HOV lanes on both sides of the highway between Leland Ave. to US 101 and Magdalena Avenue to San Mateo County line.	
Long-term Improvements ▪ Convert existing HOV lanes to HOT/EL	

5.2.2 Recommended Interchange Improvements

Several improvements are recommended on mainline and interchanges to address bottleneck and weaving conditions. Recommended improvements include minimizing weaving impacts, HOV/EL direct connectors, HOV bypass lanes on-ramps, ramp metering and interchange reconfigurations to improve operations. Safety improvements at the intersection of the ramps and local roads are also recommended. These recommendations are summarized in **Table 22.**

Table 22: Recommended Interchange Improvements

Improvements	Timeline
Near-term Improvements ▪ Ramp Intersection improvements at these interchanges: El Monte Road, Foothill Expressway, Meridian Avenue, Bird Avenue, and McLaughlin Avenue. ▪ Consolidating NB and SB off-ramp to loop off-ramp and realign Harker Driveway at Saratoga Avenue interchange ▪ HOV Bypass lanes on: Bird Avenue SB on-ramp, McLaughlin NB on-ramps, and US 101 SB to I-280 NB connector ▪ Construct ramp meter and eliminate inside lane merge between US 101 on-ramp and I-280 NB ▪ NB auxiliary lane from Wolfe Road to De Anza Boulevard and shoulder running bus lane on De Anza NB off-ramp	1-3 years
Mid-term Improvements ▪ Improvements at interchanges of: Page Mill Road, El Monte Road, Foothill Expressway, SR-87 Southbound, 1st Street /Market Street, 3rd Street to 7th Street Downtown access (NB and SB), 10th Street, and 11th Street.	3-5 years
Long-term improvements ▪ Improvements at interchanges of: SR-85, Wolfe Road, N. Tantau Avenue, Lawrence Expressway, Saratoga Avenue, Winchester Boulevard, and Parkmoor Avenue/Moorpark Avenue/Leland Avenue.	5+ years

5.2.3 Recommended Local Street Improvements

The recommended multimodal improvements are primarily safety improvements on local streets in interchange zones, such as traffic calming road diets to accommodate safe bicycle and pedestrian access. There is scope to improve safe bicycle and pedestrian access on all the I-280 interchange areas in varying degrees. **Table 23** summarizes the recommended local street improvements.

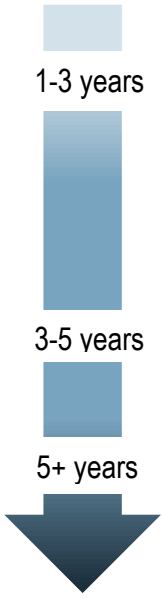
Recommended short-term improvements comprise of considerable alterations to local roads. Examples of these improvements include road diets, bicycle lane delineation, curb ramp modifications, lighting improvement, reduction of crosswalk distances, better bicycle access and basic upgrades for safety for all pedestrian and bicycle facilities. It is recommended that these improvements are considered as part of

interchange improvement projects when funding is available. These improvements can also be implemented as stand-alone projects to achieve benefits with the current configuration of the interchange.

Recommended mid-term improvements include Class IV cycle tracks on N Blaney Avenue, Stevens Creek Boulevard, and W Carlos Street with way-finding signage.

Recommended long-term improvements include pedestrian connector between Lawrence Expressway and Saratoga Avenue. San Jose Stevens Creek Urban Village Plan recommends proposing a pedestrian connector at John Mise Park between Lawrence Expressway and Saratoga Avenue.

Table 23: Recommended Local Street Improvements

Improvements	Timeline
Near-term Improvements ▪ Add or improve Class II bicycle lanes and pedestrian facilities, signing and striping on El Monte Road, Magdalena Avenue,N De Anza Road, N Tantau Avenue, Saratoga Avenue, MacArthur Avenue, S Bascom Avenue, Leland Avenue, Meridian Avenue, Race Street, Lincoln Avenue, Bird Avenue, 3rd Street to 7th Street, and McLaughlin Avenue.	
Mid-term Improvements ▪ Construct Class IV cycle tracks on N Blaney Avenue, N. Stellng Road, Stevens Creek Boulevard, and W. San Carlos Street.	
Long-term Improvements ▪ Pedestrian connector between Lawrence Expressway and Saratoga Avenue. (Recommended at John Mise Park in San Jose Stevens Creek Urban Village Plan Chapter 5)	

5.3 Conclusion and Next Steps

Include top ranked improvements in local and regional transportation plans.

The I-280 Corridor Study identifies wide variety of potential corridor improvements to improve mobility for all modes of transportation, including freeway and local road improvements across the entire 22-mile corridor with general consideration of their benefits and costs. **It is recommended that these top priority improvements be included in local and regional transportation plans for further study leading to programming, development, and implementation.** While potential improvements were evaluated and ranked into tiers, it is recommended that the best suited improvement from any tier is advanced for further detailed studies, design, and implementation to achieve the expected operational improvements in the corridor.