HEXAGON TRANSPORTATION CONSULTANTS, INC.

Charcot Extension Over I-880

Transportation Analysis

Prepared for:

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1. Introduction

This report presents the results of a Transportation Analysis (TA) for the proposed Charcot Avenue extension over I-880 in San Jose, California. The purpose of this transportation study is to evaluate the potential long-term transportation impacts associated with the proposed Charcot Avenue extension in conformance with the requirements of the California Environmental Quality Act (CEQA). It is important to note that the extension of Charcot as proposed is included as part of the adopted *Envision San Jose 2040 General Plan* roadway network and planned roadway network of the North San Jose Area Development Policy (NSJADP).

The transportation analysis of the project was evaluated following the standards and methodologies set forth in the City of San Jose's *Transportation Analysis Handbook 2018*, and the updated CEQA traffic analysis guidelines, *CEQA VMT Final Guidelines* (November 2017). Based on the City of San Jose's Transportation Policy and *Transportation Analysis Handbook 2018*, the TA report for the project consists of a CEQA vehicle-miles-traveled (VMT) analysis and a supplemental Local Transportation Analysis (LTA).

Project Description

Charcot Avenue currently runs between its intersections with Orchard Parkway to the west and O'Toole Avenue at its eastern end on the west side of I-880. The proposed extension of Charcot Avenue would begin in the vicinity of Paragon Drive, on the west side of I-880, extend over I-880, and connect to Oakland Road, east of I-880 (see Figure 1). The project area includes Charcot Avenue from its intersection with Paragon Drive on the west side of I-880 to its future intersection with Oakland Road on the east side of I-880. The extension is proposed to consist of a two-lane roadway, one travel lane in each direction with sidewalks and Class IV bike lanes on both sides of the roadway as shown in Figure 2. The planned extension also includes the following roadway adjustments:

- The existing Charcot Avenue/O'Toole Avenue intersection will be eliminated. Access to O'Toole Avenue from Charcot Avenue will be maintained via a new slip ramp along the south side of Charcot Avenue. However, access to westbound Charcot Avenue from O'Toole Avenue will not be provided. Access from O'Toole Avenue to Charcot Avenue will be provided via Paragon Drive and its new signalized intersection with Charcot Avenue.
- A new traffic signal will be installed at the existing unsignalized Charcot Avenue and Paragon Drive T-intersection.
- Access to adjacent properties along Charcot Avenue between Paragon Drive and Silkwood Lane will not be provided.
- The extension will follow the current alignment of Silkwood Lane between Oakland Road and Silkwood Lane.

Figure 1
Project Location

Figure 2
Roadway Design Plan

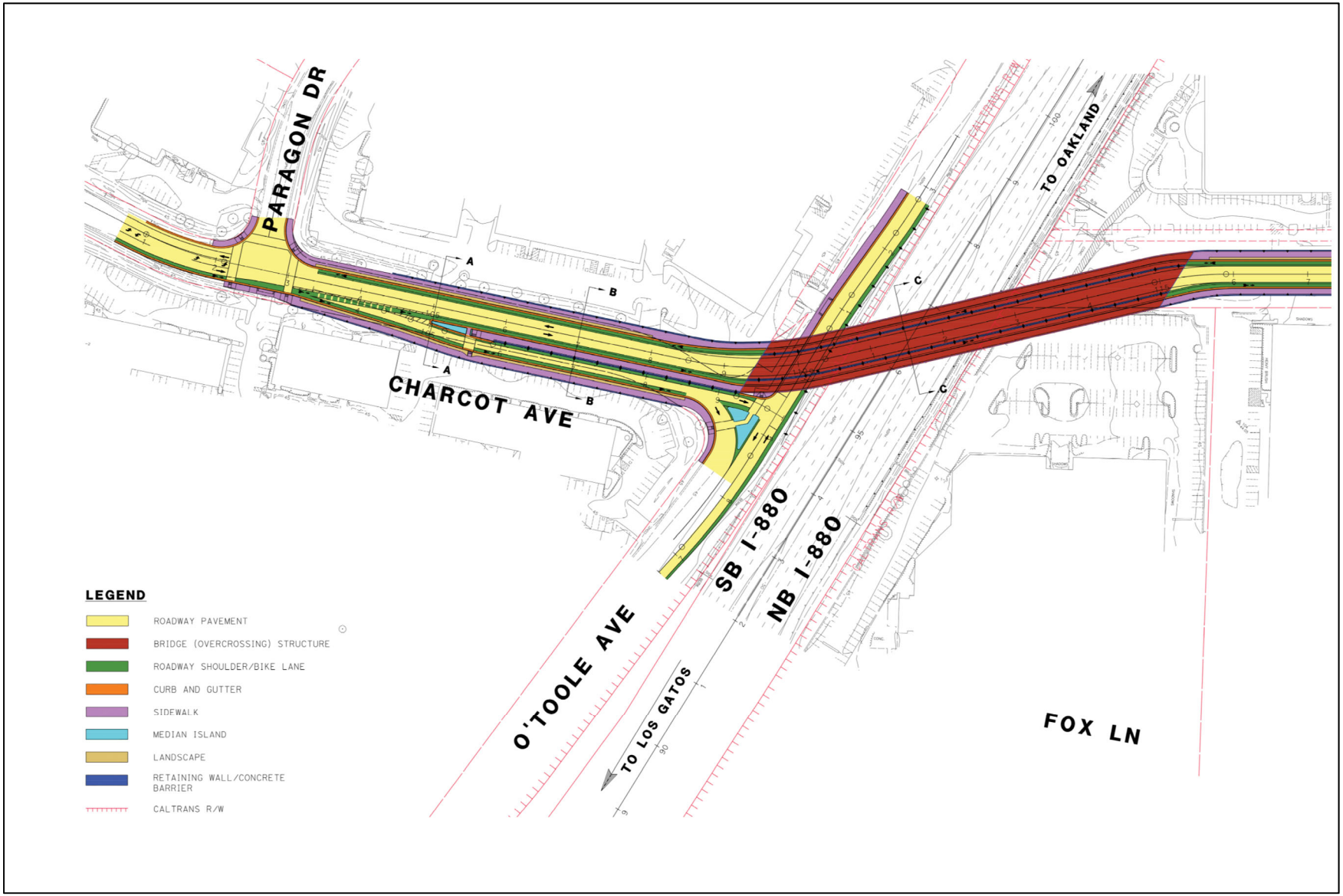
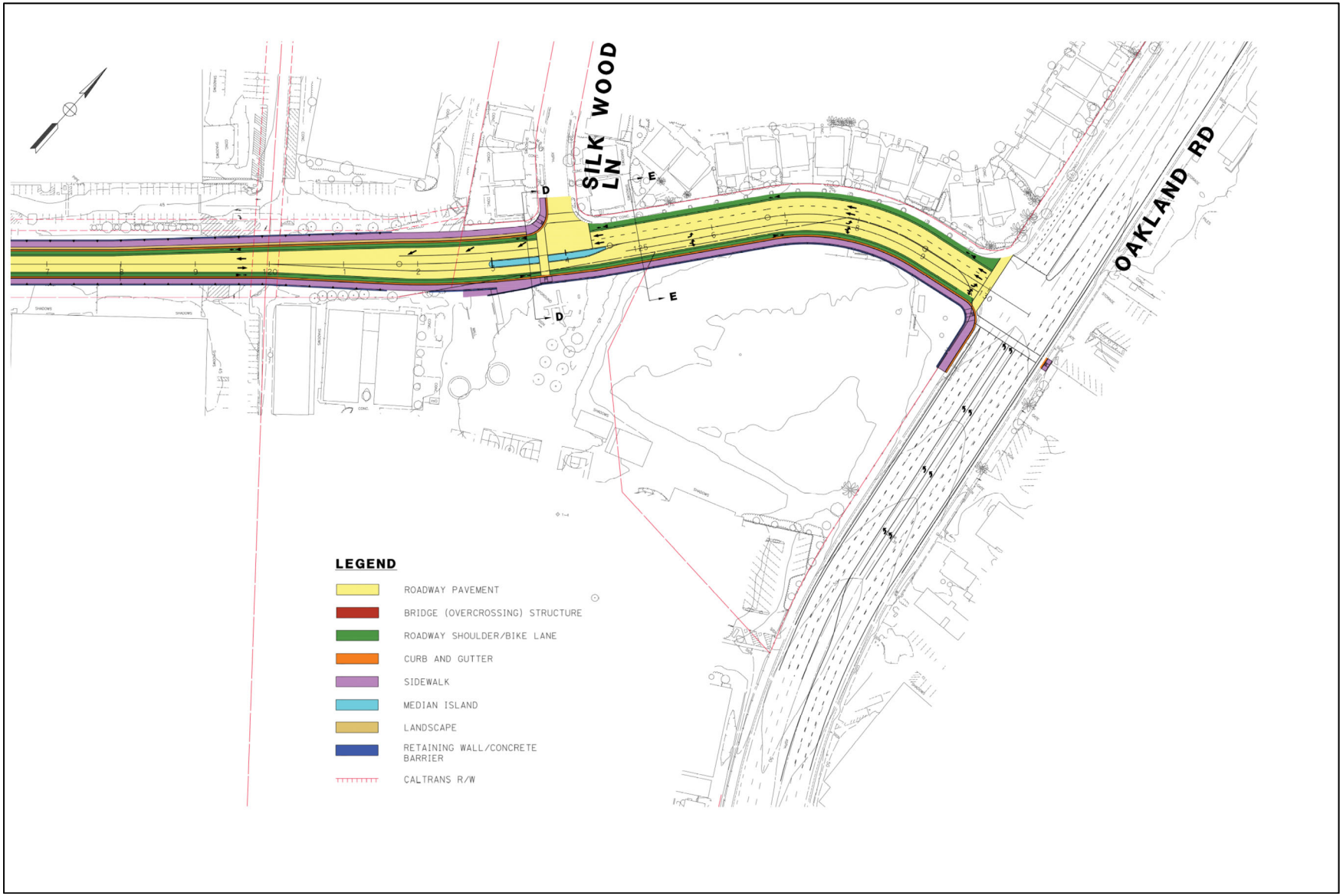


Figure 2 (Continued)
Roadway Design Plan



- A new pedestrian only signal or High-Intensity Activated Crosswalk (HAWK) beacon will be installed along Charcot Avenue at Silkwood Lane. A median will be constructed along Charcot Avenue at Silkwood Lane to restrict turn-movements.
- The existing unsignalized intersection of Silkwood Lane and Oakland Road will be replaced by a new signalized intersection. The proposed lane configurations at the intersection consist of one left-turn and one shared left-right turn lane on Charcot Avenue and two northbound left-turn lanes and six through lanes on Oakland Road.

The proposed Charcot Avenue extension will provide an additional east-west connection between First Street and Oakland Road and reduce traffic congestion during peak commute periods on Brokaw Road, Trimble Road, and Montague Expressway that currently serve as the primary east-west roadways and run parallel to the Charcot Avenue extension. Therefore, it is expected that the Charcot extension would reduce travel time and improve travel speed for vehicles traveling east-west within the study area bounded by Trimble Road and Montague Expressway to the north, First Street to the west, Brokaw Road to the south, and Oakland road to the east.

Transportation Policies

Historically, transportation analysis has utilized delay and congestion on the roadway system as the primary metric for the identification of traffic impacts and potential roadway improvements to relieve traffic congestion that may result due to proposed/planned growth. However, the State of California has recognized the limitations of measuring and mitigating only vehicle delay at intersections and in 2013 passed Senate Bill (SB) 743, which requires jurisdictions to stop using congestion and delay metrics, such as Level of Service (LOS), as the measurement for CEQA transportation analysis. Per Senate Bill (SB) 743 and the updated CEQA Guidelines (Section 15064.3) December 2018, beginning July 1, 2020, public agencies will be required to base the determination of transportation impacts on Vehicle Miles Traveled (VMT) rather than level of service.

In adherence to SB 743, the City of San Jose has adopted a new Transportation Analysis Policy, Council Policy 5-1. The policy replaces its predecessor (Policy 5-3) and establishes the thresholds for transportation impacts under the CEQA based on vehicle miles traveled (VMT) instead of levels of service (LOS). The intent of this change is to shift the focus of transportation analysis under CEQA from vehicle delay and roadway auto capacity to a reduction in vehicle emissions, and the creation of robust multimodal networks that support integrated land uses. All new development and transportation projects are required to analyze transportation impacts using the VMT metric and conform to Council Policy 5-1. The evaluation of a project's impact on level of service at intersections under the jurisdiction of the City of San Jose is no longer required under CEQA.

The Circulation Element of the *Envision San José 2040 General Plan* includes a set of balanced, long-range, multi-modal transportation goals and policies that provide for a transportation network that is safe, efficient and sustainable (minimizes environmental, financial, and neighborhood impacts). These transportation goals and policies are intended to improve multi-modal accessibility to all land uses and create a city where people are less reliant on driving to meet their daily needs. Transportation Policy 1.2 of The Envision San Jose 2040 General Plan states that impacts on overall mobility and all travel modes should be considered when evaluating transportation impacts of new developments or infrastructure projects to encourage the use of non-automobile transportation modes to minimize vehicle trip generation and reduce VMT.

CEQA Transportation Analysis Scope

The City of San Jose Transportation Analysis Policy 5-1 and its *Transportation Analysis Handbook,* April 2018 provide screening criteria that determine whether a CEQA transportation analysis would be required for transportation projects. The criteria are based on the type of project and its resulting changes to the transportation system. Table 1 lists the City's transportation project screening criteria. If a project meets the City's screening criteria, the project is expected to result in less-than-significant VMT impacts and a detailed CEQA VMT analysis is not required.

The proposed project will result in the addition of roadway capacity to the Citywide roadway network that may result in an increase in VMT. However, the project also will improve conditions for pedestrians and bicyclists which will improve the opportunities for use of transit and thus meet the transportation project screening criteria. Therefore, per San Jose Transportation Analysis Policy 5-1, the project is presumed to have less-than-significant transportation impact and is screened from a detailed CEQA transportation analysis. However, for informational purposes, a VMT evaluation for the project was completed and included within this study.

VMT Analysis

The CEQA transportation analysis for the project consists a project-level and General Plan VMT analysis using the City's Transportation Demand Forecasting (TDF) model that demonstrates the project's consistency with the Envision San Jose 2040 General Plan. The VMT analysis was prepared per the recently adopted City of San Jose Transportation Analysis Policy (Council Policy 5-1).

Local Transportation Analysis Scope

A local transportation analysis (LTA) supplements the CEQA VMT analysis and identifies transportation and traffic operational issues that may arise due to the proposed project. The LTA provides a review of the proposed lane configurations at each of the intersections along the planned Charcot Avenue extension. In addition, the LTA analysis also includes an evaluation of average daily traffic (ADT) volumes and speeds on 25 roadway segments and Vehicle-Hours-Traveled (VHT) in the project area.

Intersection Operations Analysis

The LTA includes an operations analysis to aid in the design of necessary lane configurations, lane storage needs, and intersection control at the intersections along the proposed roadway extension. The evaluation consists of intersection level of service, signal warrant checks, and vehicle queue analysis at each of the selected study intersections. Traffic operations were evaluated based upon existing and projected Year 2025 conditions.

The following study conditions were evaluated:

Existing Conditions with the Charcot Extension: Existing conditions with the Charcot Extension is comprised of the existing traffic volumes and existing transportation network with network adjustments associated with the Charcot Extension project.

Year 2025 Conditions with the Charcot Extension: Year 2025 conditions consists of projected Year 2025 traffic volumes and the future transportation network with the addition of the roadway network adjustments associated with the Charcot Extension project.

Roadway Segment Analysis

The proposed Charcot Avenue extension will provide an additional east-west connection between First Street and Oakland Road and reduce traffic congestion during peak commute periods on Brokaw Road,

Table 1
City of San Jose Transportation Project Screening Criteria for CEQA VMT Analysis

Type	Description
Maintenance	• Rehabilitation, maintenance, replacement, and repair projects designed to improve condition of existing transportation assets (e.g. roadways, bridges, culverts, tunnels, transit systems, and assets that serve bicycle and pedestrian facilities) that do not add additional motor vehicle capacity.
Roadway Shoulder	• Roadway shoulder enhancements to provide "breakdown space" (dedicated space for use only by transit vehicles) to provide bicycle access or to improve safety, but which will not be used as motor vehicle travel lanes.
Non-through Lanes	• Installation, removal, reconfiguration of travel lanes that are not for through traffic, such as left-turn, right-turn and U-turn pockets (excluding trap lanes), two-way left-turn-lanes, or emergency breakdown lanes that are not utilized as through lanes.
Through Lanes	• Addition of roadway capacity on local or collector streets provided the project substantially improves conditions for pedestrians, cyclists, and/or transit, including but not limited to: ◦ Protected and separated Class IV bikeway ◦ Pedestrian refuges, bulb-outs, and elements that shorten pedestrian crossing distances ◦ Consistency with the San José Complete Streets Design Standards and Guidelines and/or other applicable design guidelines; OR • Addition of a new lane that is permanently restricted to use only by transit vehicles; OR • Reduction in the number of through lanes; OR • Conversion of roadways from one-way to two-way operations with no net increase in the number of travel lanes.
Traffic Control Devices	• Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority features; OR • Timing of signals to optimize vehicle, bicycle, or pedestrian flow.
Traffic Circles	• Installation of roundabouts or traffic circles.
Traffic Calming Devices	• Installation, enhancement, or reconfiguration of traffic calming devices.
Parking	• Removal or relocation of on-street or off-street parking spaces; OR • Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)
Traffic Wayfinding	• Addition of traffic wayfinding signage
Active Transportation	• Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way; OR • Addition of Class I bike paths, trails, multi-use paths, or other offroad facilities that serve non-motorized travel.
Fuel/Charging Infrastructure	• Installation of publicly available alternative fuel or charging infrastructure.

Source: City of San Jose Transportation Analysis Handbook, April 2018

Trimble Road, and Montague Expressway that currently serve as the primary east-west roadways and run parallel to the Charcot Avenue extension. Therefore, an evaluation of projected ADT and speeds on roadway segments in the project area also was completed using existing and projected traffic volumes without and with the proposed roadway extension.

The key roadway segments were evaluated for the following scenarios:

Existing Conditions: Existing conditions represent existing ADT volumes on the existing roadway network. Existing traffic volumes were obtained from new roadway segment traffic counts collected in September 2018.

Existing Plus Project Conditions: Existing Plus Project conditions reflect existing traffic volumes on the roadway network that includes the proposed Charcot Extension project. Existing plus project conditions are evaluated relative to existing conditions in order to quantify the effect of the proposed roadway improvement project.

Year 2025 No Project Conditions: Year 2025 No-Project conditions represent future traffic volumes on the existing transportation network. The Year 2025 traffic volumes were developed via interpolation of existing and forecasted Year 2040 General Plan Buildout traffic volumes.

Year 2025 Project Conditions: Year 2025 Project conditions reflect projected 2025 traffic volumes on the roadway network that includes the proposed Charcot Extension project. Year 2025 Project conditions are evaluated relative to Year 2025 No-Project conditions in order to determine the effect of the proposed roadway improvement project.

Year 2040 No Project Conditions: Year 2040 No Project conditions represent future traffic volumes on the future transportation network. Year 2040 No-Project conditions include land use growth projections and the roadway network identified in the Envision San Jose 2040 General Plan, excluding the proposed Charcot Extension.

Year 2040 Project Conditions: Year 2040 Project conditions reflect projected 2040 traffic volumes on the future transportation network (including the proposed Charcot Extension) as identified in the Envision San Jose 2040 General Plan. Year 2040 Project conditions are evaluated relative to Year 2040 No-Project conditions in order to quantify the effect of the proposed roadway improvement project.

Supplemental Operational Analysis

Additional analysis and review of other transportation issues, including a project alternatives review, analysis of effects on Orchard School operations, and potential cut-through traffic within the neighborhood located between Silkwood Lane and Rock Avenue also is included in the LTA.

City of San Jose Travel Demand Forecasting Model

Hexagon utilized the recently updated City of San Jose Travel Demand Forecasting (TDF) Model to forecast traffic volumes, daily VMT and VHT values as well as average travel speeds with and without the implementation of the proposed Charcot Extension under baseline (year 2015), Year 2025, and Year 2040 General Plan conditions. The model has the ability to estimate the diversion of traffic and change in traffic patterns due to roadway/transit system changes similar to those proposed by the Charcot Extension.

Report Organization

The remainder of this report is divided into four chapters. Chapter 2 describes existing transportation system including the existing roadway network, bicycle and pedestrian facilities. Chapter 3 describes the CEQA transportation analysis, including the VMT analysis methodology and results. Chapter 4 describes

the LTA, including the intersection operations analysis, roadway segment volumes and speed analysis, supplemental VHT analysis, and the evaluation of other transportation issues. Chapter 5 presents the conclusions of the transportation analysis.

2. Existing Transportation Setting

This chapter describes the existing transportation system within the study area of the project. It describes the surrounding roadway network, transit services, and pedestrian and bicycle facilities.

Existing Roadway Network

Regional access to the project area is provided by Interstate-880 (I-880). I-880 extends along the eastern side of the San Francisco Bay from San Jose to Oakland. South of its interchange with I-280 in west San Jose, I-880 becomes SR 17 and extends southward to Santa Cruz. I-880 runs north-south with 8 travel lanes (6 mixed-flow and 2 high-occupancy vehicle lanes) in the vicinity of the project area. Access to the project area is provided via interchanges at Brokaw Road and Montague Expressway.

Roadways in the vicinity of Charcot Avenue that would be directly affected by the proposed Charcot Extension project include the following:

Charcot Avenue is a two- to four-lane roadway that begins at the US 101/SR 87 junction as the SR 87 off- and on ramps to/from North First Street and runs eastward to O'Toole Avenue, just west of I-880, where it terminates. West of North First Street, Charcot Avenue is a four-lane roadway that provides direct access to SR 87, while the segment east of North First Street functions as a two-lane collector street providing access to adjacent employment areas.

Silkwood Lane is a two-lane L-shape roadway that extends from Rock Avenue southward then eastward to connect to Oakland Road. It currently provides access to an adjacent residential area. As proposed, the Charcot Extension will follow the current alignment of Silkwood Lane between Oakland Road and Silkwood Lane.

Montague Expressway is a six- to eight-lane expressway providing a regional connection through the north San Jose area between Milpitas to the east and Santa Clara to the west. Montague Expressway also provides regional access to the study area via its full interchange at I-880. Its outside lanes operate as high-occupancy vehicle (HOV) lanes in the peak direction of travel during the peak periods.

Trimble Road is a six-lane arterial extending southward from Montague Expressway to De La Cruz Boulevard near US 101. Trimble Road provides regional access to the study area via its full interchange at US 101.

Brokaw Road is six-lane arterial that extends eastward from US 101 to Oakland Road. It provides regional access to the project area via its partial interchange with US 101 and its full access ramps at I-880. West of US 101, Brokaw Road becomes Airport Parkway and provides direct access to the San Jose Airport. East of Oakland Road, Brokaw Road continues as Murphy Avenue and Hostetter Road.

First Street is a north-south roadway that extends from the north San Jose area through downtown San Jose. The Mountain View-Winchester and Alum Rock-Santa Teresa light rail transit (LRT) lines run along the middle of First Street from downtown San Jose to Tasman Drive in north San Jose. In the vicinity of the project area, First Street is a four-lane (plus LRT line) roadway with a full access intersection at Charcot Avenue. First Street, in conjunction with Brokaw Road, provides full access to US 101.

Zanker Road is four-lane arterial that extends from US 101 northward past SR 237 where it transitions to Los Esteros Road. Zanker Road intersects with Charcot Avenue and provides a parallel route to First Street in the study area.

Junction Avenue is a two-lane collector that runs parallel to and east of Zanker Road. It begins just south of Montague Expressway at its intersection with Zanker Road and extends southward past Brokaw Road where it terminates at its intersection with Rogers Avenue. Junction Avenue has a full access intersection with Charcot Avenue.

Oakland Road is a six-lane north-south arterial that provides a major north-south route east of I-880 in San Jose and ultimately connects to US 101 in the south. North of Montague Expressway, Oakland Road transitions into Main and Abel Streets in the City of Milpitas. South of US 101, at Hedding Street, Oakland Road continues as 13th Street through downtown San Jose. Oakland Road consists of a six-lane with center median two-way left-turn lane roadway at its intersection with Silkwood Lane.

Existing Pedestrian, Bicycle and Transit Facilities

San Jose desires to provide a safe, efficient, fiscally, economically, and environmentally-sensitive transportation system that balances the need of bicyclists, pedestrians, and public transit riders with those of automobiles and trucks. The existing bicycle, pedestrian, and transit facilities in the study area are described below.

Existing Bicycle and Pedestrian Facilties

Figure 3 indicates existing pedestrian and bicycle facilities on each roadway between Oakland Road and O'Toole Avenue. Currently, Montague Expressway and Brokaw Road provide the only crossing points of I-880 in the project area. Pedestrian and bicycle facilities on each of the roadways are limited and discontinuous between Oakland Road and O'Toole Avenue. There currently are no bike lanes on Montague Expressway and sidewalks are discontinuous. Brokaw Road does provide bike lanes, however sidewalks on the north side of the roadway west of I-880 are discontinuous. In addition, traffic volumes along both Montague Expressway and Brokaw Road are large since they serve as major east-west travel corridors that provide access to the regional I-880 freeway. The large traffic volumes and congestion on the roadways are not conducive to pedestrian and bicycle travel.

Existing Transit Facilties

Existing transit services in the study area are provided by the VTA and are shown on Figure 4.

VTA Bus Service

The study area is primarily served by one VTA local bus route (66) and one limited stop bus route (321). Bus route 66 runs along Oakland Road in the vicinity of the roadway extension. The nearest bus stops are located at the intersections of Oakland Road with Rock Avenue, Silk Wood Lane and at Fox Lane. Bus route 321 runs along Montague Expressway in the vicinity of the roadway extension. The nearest bus stops are located at the intersection of Montague Expressway with Oakland Road and at O'Toole Avenue/McCarthy Boulevard.

Figure 3
Existing Pedestrian and Bicycle Facilities

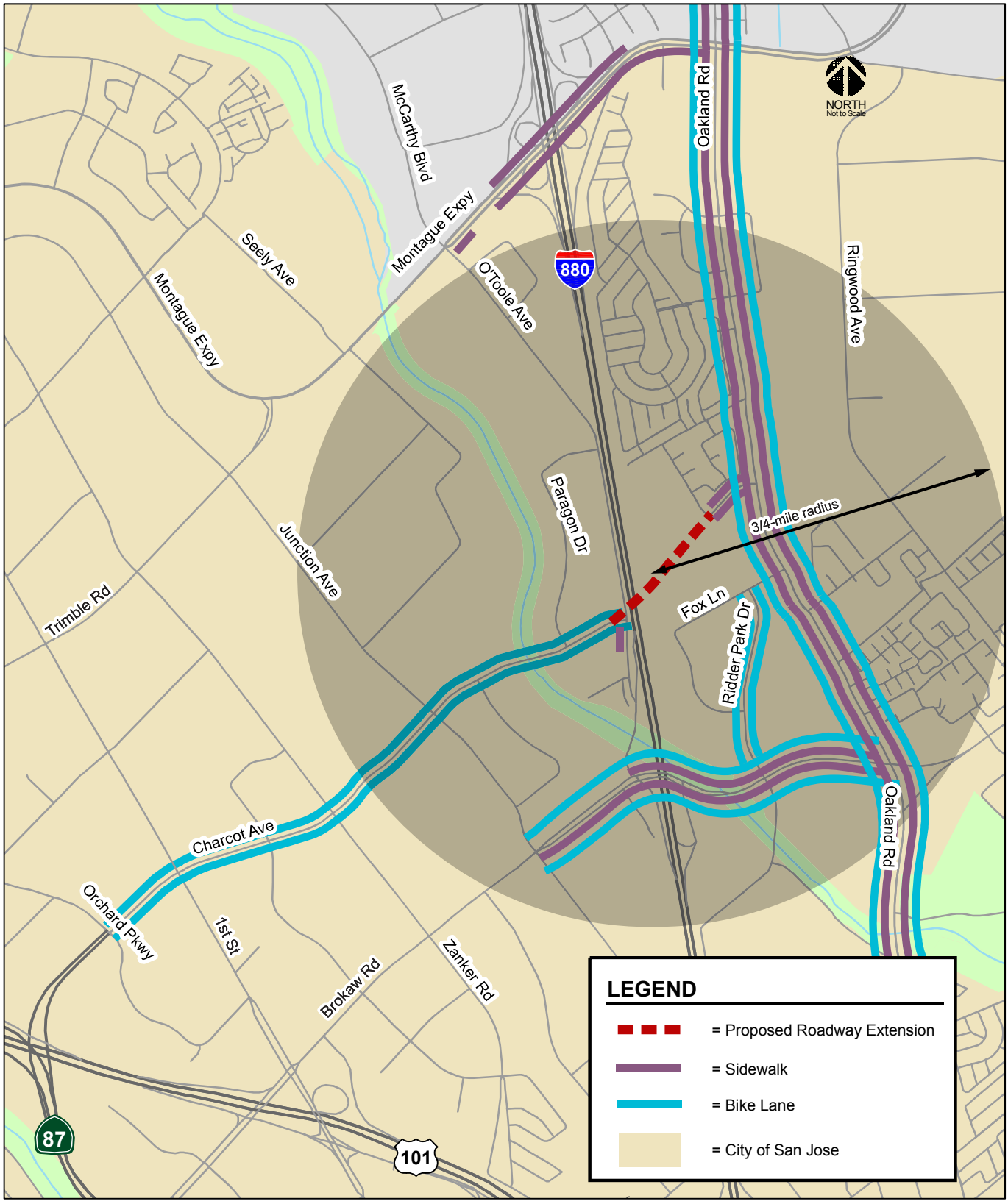
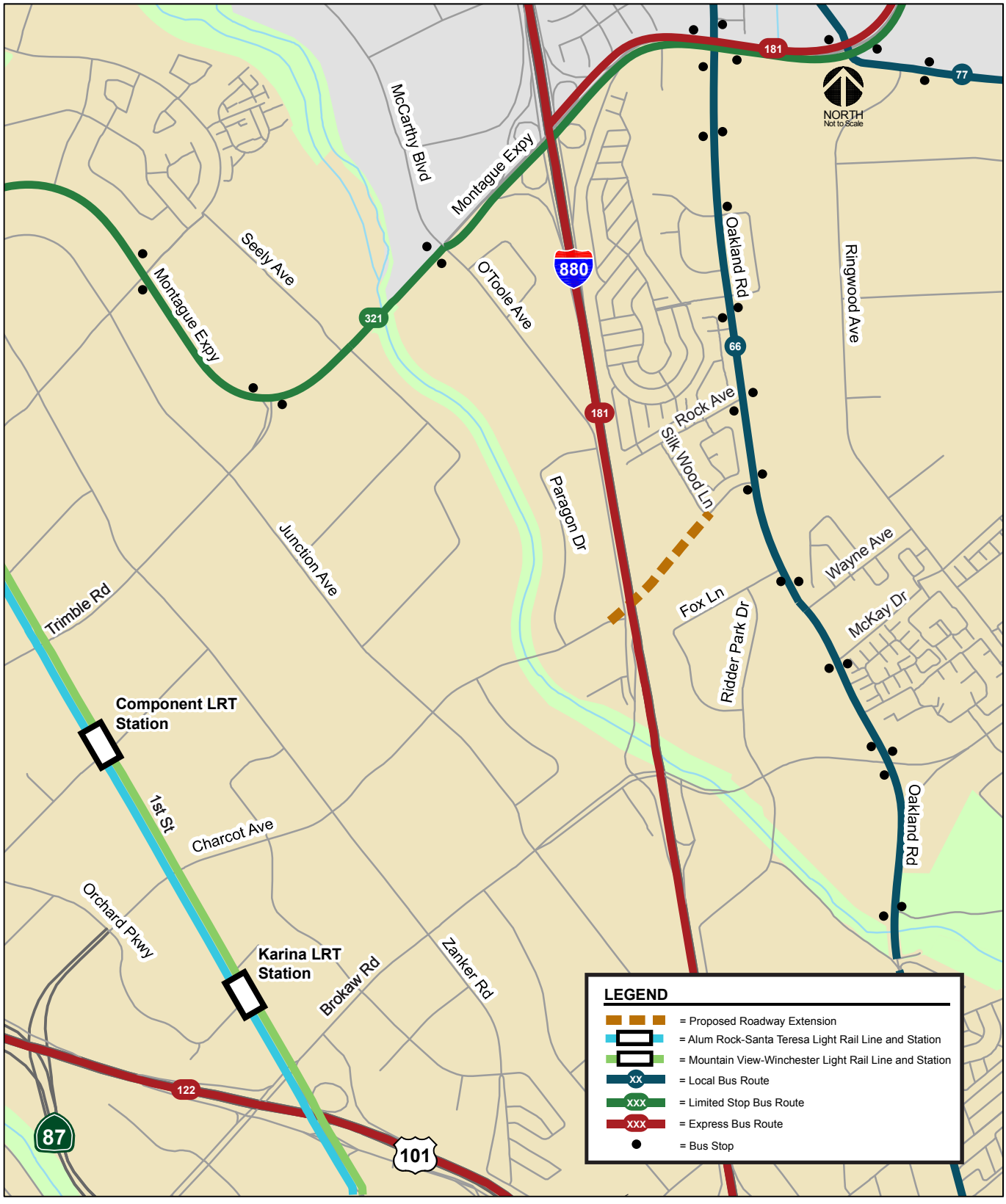


Figure 4
Existing Transit Facilities



VTA Light Rail Transit (LRT) Service

The VTA currently operates the 42.2-mile VTA light rail line system extending from south San Jose through downtown to the northern areas of San Jose, Santa Clara, Milpitas, Mountain View and Sunnyvale. The nearest LRT stations are located along First Street (Component and Karina Stations), approximately one mile west of the roadway extension. LRT service at both stations is provided by the Mountain View-Winchester LRT line, which operates nearly 24 hours a day (4:40 AM to 12:45 AM) with 15-minute headways during peak commute and midday hours. The Mountain View-Winchester LRT line provides service from the Winchester station in Campbell, through Downtown San Jose to north San Jose where it curves west and operates along the Tasman Corridor, bends north and runs along Java Drive and Mathilda Avenue, and ultimately terminates in Downtown Mountain View adjacent to the Mountain View Caltrain Station.

Both stations are also served by the Alum Rock – Santa Teresa line which also operates nearly 24 hours a day (4:00 AM to 2:00 AM) with 10-15-minute headways during peak commute and midday hours. The Alum Rock – Santa Teresa LRT line provides service from the Santa Teresa Station in south San Jose, through Downtown San Jose to north San Jose where it curves east and operates along the Tasman Corridor, bends south and runs along the Capitol Corridor, and ultimately terminates in east San Jose just south of Alum Rock Avenue.

3. CEQA Transportation Analysis

This chapter describes the CEQA transportation analysis, including the VMT analysis methodology and significance criteria, and potential project impacts on VMT.

CEQA Transportation Analysis Exemption

The City of San Jose *Transportation Analysis Handbook,* April 2018 provides screening criteria that determines whether a CEQA transportation analysis would be required for transportation projects. The criteria are based on the type of project and its resulting changes to the transportation system. If a project meets the City's screening criteria, the project is expected to result in less-than-significant VMT impacts and a detailed CEQA VMT analysis is not required.

The proposed project will result in the addition of roadway capacity to the Citywide roadway network that may result in an increase in VMT. However, the project also includes new Class IV separated bike lanes and sidewalks along both sides of the roadway extension that will provide for a safe crossing of I-880 for pedestrians and bicyclists that does not currently exist in the project area. The proposed roadway project will shorten pedestrian and bicycle travel routes and provide the opportunity to utilize walking and bicycling as an alternative travel mode and reduce automobile trips in the project area consistent with the Envision 2040 General Plan goals and policies. The proposed roadway extension will meet the transportation project screening criteria since it will improve conditions for pedestrians and bicyclists which will improve the opportunities for use of transit. Therefore, per San Jose Transportation Analysis Policy 5-1, the project is presumed to have less-than-significant transportation impact and is screened from a detailed CEQA transportation analysis. However, for informational purposes, a VMT evaluation for the project was completed and included within this study.

VMT Analysis Methodology

Per Council Policy 5-1, the effects of the proposed project on VMT was evaluated using the methodology outlined in the City's *Transportation Analysis Handbook*. VMT measures the amount of distance people travel in personal vehicles to destinations in a day. VMT is measured by multiplying the total vehicle trips by the average distance of those trips. The City's Transportation Demand Forecasting (TDF) model was used to produce baseline and projected VMT with the proposed roadway extension.

Thresholds of Significance

The determination of a significant VMT impact is based on the extent to which the project causes a significant increase in VMT for roadways (1) within a sphere of influence including feeder and parallel roadways proximate to the project, and (2) within Santa Clara County. Table 2 shows the VMT

Table 2
CEQA VMT Analysis Transportation Project Significance Criteria

Significance Criteria	Threshold
Percent increase in total VMT for roadways within Sphere of Influence	0.3% for every percent increase in lane-miles for roadways within Sphere of Influence
Percent increase in total VMT for roadways within the Santa Clara County	0.3% for every percent increase in lane-miles for roadways within Santa Clara County

Source: City of San Jose Transportation Analysis Handbook, April 2018

thresholds of significance for transportation projects as established in the Transportation Analysis Policy. If a project is found to have a significant impact on VMT, the impact must be reduced by modifying the project to reduce its effect on VMT to an acceptable level (below the established thresholds of significance applicable to the project).

VMT Evaluation

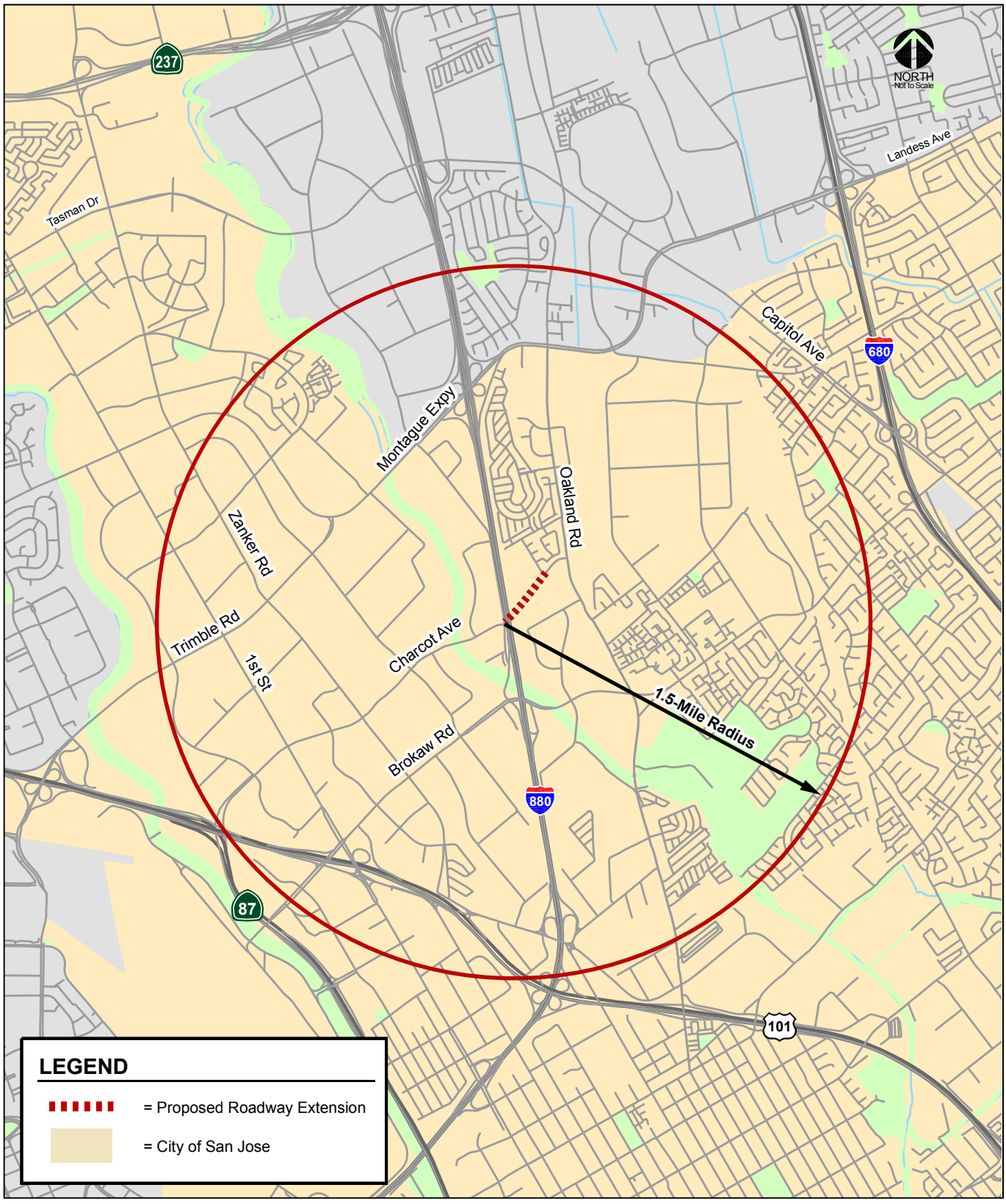
The VMT evaluation considered the effect of the proposed Charcot Avenue extension on all major roadways within a general 1.5-mile radius as indicated in Figure 5. The model results show that the proposed Charcot extension would result in only a negligible increase, less than 0.1 percent, in VMT in the project area during both future forecast years. The projected increase in VMT also would be less than the established VMT impact thresholds. Therefore, the proposed project would not result in an impact on the transportation system based on the City's VMT impact criteria. The results of the VMT evaluation are shown in Table 3.

Table 3
Study Area VMT

	Daily VMT		
Scenario	**Year 2015**	**Year 2025**	**Year 2040 General Plan**
No-Project	1,263,080	1,821,479	2,659,078
Project	1,264,478	1,823,272	2,661,463
Absolute Change	1,398	1,793	2,386
Percent Change	**0.1%**	**0.1%**	**0.1%**
Total Lane-Miles within a 1.5-Mile Radius			102
Charcot Extension Lane-Miles			1.0
% of Charcot Extension			1.0%
Threshold (0.3% for every % increase)			**0.3%**
Significant Impact?			**No**

Notes:
VMT = vehicle-miles-traveled

Figure 5
VMT Sphere of Influence



4. Local Transportation Analysis (Non-CEQA Informational Only)

This chapter presents a Local Transportation Analysis (LTA) and supplemental and evaluation of other non-CEQA required transportation issues. The supplemental evaluation includes the review and/or evaluation of the following issues:

- Intersection Operations Analysis
- Signal Warrant Analysis
- Roadway Segment Analysis
- Vehicle-Hours-Traveled (VHT)

Other transportation issues, including a project alternatives review, analysis of effects on Orchard School operations, and potential cut-through traffic also is included. Unlike the VMT evaluation, which is adopted by the City Council and required per CEQA guidelines, the analyses in this chapter are presented for informational purposes only to better understand other transportation-related effects associated with the proposed roadway extension. However, the determination of project impacts per CEQA requirements are based solely on VMT analysis presented in Chapter 3

Intersection Operations Methodology

The objective of the intersection operations analysis is to aid in the design of necessary lane configurations, lane storage needs, and intersection control at the intersections along the roadway extension. The evaluation consists of intersection level of service, signal warrant checks, and vehicle queue analysis at each of the study intersections. Traffic operations were evaluated based upon existing and projected Year 2025 conditions. However, the recommendations presented within this study are based on the Year 2025 conditions to provide roadway capacity to accommodate future traffic growth. BKF supplied preliminary plans for the proposed extension that included the extension alignment and potential intersection lane configurations.

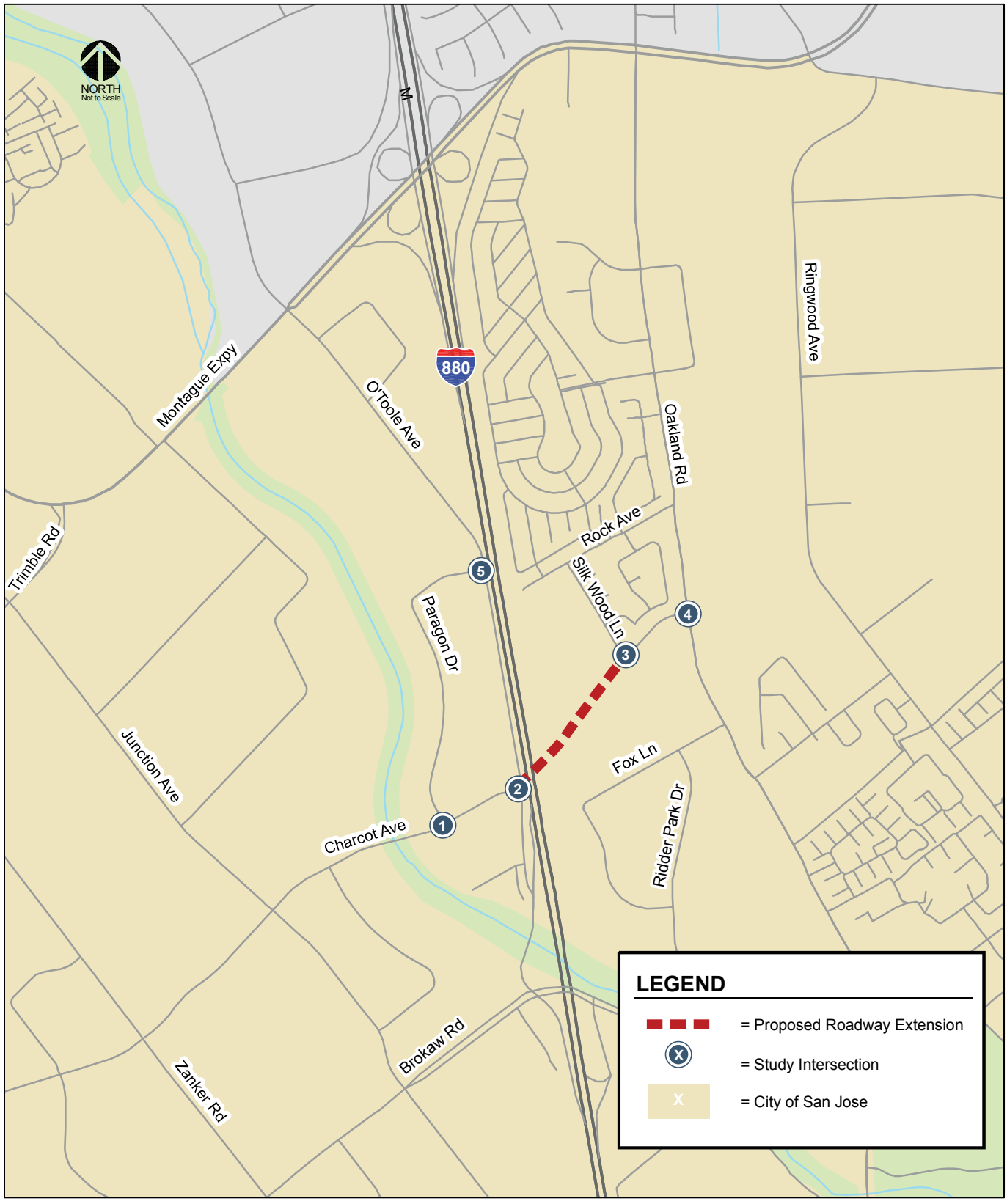
Study Intersections

The analysis includes the study of the following five intersections located along the proposed Charcot Avenue extension between Paragon Drive and Oakland Road:

1. Paragon Drive and Charcot Avenue
2. O'Toole Avenue and Charcot Avenue
3. Silkwood Lane and Charcot Avenue
4. Oakland Road and Charcot Avenue
5. Paragon Drive and O'Toole Avenue

The location of each study intersection is shown in Figure 6.

Figure 6
Study Intersections



Study Scenarios

The following study conditions were evaluated:

Existing Conditions with the Charcot Extension: Existing conditions with the Charcot Extension is comprised of the existing traffic volumes and existing transportation network with network adjustments associated with the Charcot Extension project.

Year 2025 Conditions with the Charcot Extension: Year 2025 conditions consists of projected Year 2025 traffic volumes and the future transportation network with the addition of the roadway network adjustments associated with the Charcot Extension project.

Level of Service Standards and Analysis Methodologies

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The analysis methods are described below.

All study intersections were evaluated based on the *2000 Highway Capacity Manual* (HCM) level of service methodology using the TRAFFIX software. This method evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. TRAFFIX is also the CMP-designated intersection level of service methodology, thus, the City of San Jose employs the CMP default values for the analysis parameters. The correlation between average control delay and level of service at signalized intersections is shown in Table 4.

Table 4
Signalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay per Vehicle (sec.)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	up to 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	Greater than 80.0

Sources: Transportation Research Board, *2000 Highway Capacity Manual. Traffic Level of Service Analysis Guidelines*, Santa Clara County Transportation Authority Congestion Management Program, June 2003.

Intersection Traffic Volumes with the Charcot Avenue Extension

The City of San Jose Travel Demand Forecasting (TDF) model was used to forecast traffic volumes with and without the implementation of the Charcot Avenue extension under baseline (Year 2015) and 2040 General Plan conditions. The traffic forecasts for Year 2025 conditions were developed via interpolation of existing and Year 2040 traffic forecasts. The forecasts were then refined based on existing peak-hour intersection turning movement counts to develop peak-hour intersection turning movement volumes with the Charcot Avenue extension for each of the study conditions. Peak-hour intersection volumes for Existing and Year 2025 conditions with the extension are shown in Figure 7.

Intersection Traffic Operations Analysis and Recommendations

The recommended intersection geometry and traffic control for each study intersection are described below. The recommendations take into account the results of intersection level of service, signal warrant checks, and vehicle queuing analyses, the proposed roadway alignment, and the existing roadway constraints. Table 5 shows the peak-hour levels of service with lane configuration and traffic control options evaluated at the study intersections. The table also shows the results of peak-hour traffic signal warrant checks for unsignalized intersections. Table 6 summaries the vehicle queue lengths for movements with large projected volumes for which the estimated queue lengths could potentially exceed the turn pocket capacity or the distance to the upstream intersection. Figure 8 shows the recommended intersection lane geometry. Figure 9 illustrates the estimated maximum vehicle queue lengths between AM and PM peak hours.

Paragon Drive and Charcot Avenue

The elimination of access to westbound Charcot Avenue from O'Toole Avenue will result in an increase in traffic volumes along Paragon Drive and at its intersection with Charcot Avenue. The level of service analysis results show that the increase in usage of Paragon Drive will result in extensive delay and queues on the stop-controlled approach (Paragon Drive) at its intersection with Charcot Avenue. Peak-hour traffic signal warrant checks indicate that the projected peak-hour traffic volumes will warrant a traffic signal under Year 2025 conditions. The installation of a traffic signal at the intersection would result in LOS E operations during the AM peak hour and LOS F operations during the PM peak hour with long eastbound and westbound (Charcot Avenue) vehicle queues under Year 2025 conditions. Queuing analysis indicates a projected maximum peak-hour queue length of 1,475 feet (59 vehicles) for the eastbound approach in the PM peak hour and a projected maximum peak-hour queue length of 1,150 feet (46 vehicles) for the westbound approach in the AM peak hour under Year 2025 conditions.

The vertical and horizontal alignment of the Charcot Avenue overcrossing of I-880 will result in limited sight distance of the new signalized Paragon Drive and Charcot Avenue intersection for drivers travelling westbound along Charcot Avenue. Presuming a design speed of 35 mph along Charcot Avenue, a minimum clear sight distance of 250 feet will be required along Charcot Avenue. The installation of a traffic signal at the Paragon Drive and Charcot Avenue intersection will result in queues along westbound Charcot Avenue that may not be clearly visible to drivers travelling westbound along Charcot Avenue. Therefore, it is recommended that safety measures be implemented along with the new traffic signal at the Paragon Drive and Charcot Avenue intersection. The safety measures could include advance warning flashing beacons and signage that provide drivers with advance warning of the upcoming signal. In addition, the signal design should consider signal head placement and size to improve its visibility to drivers.

Figure 7
Peak-Hour Intersection Traffic Volumes Under Project Conditions

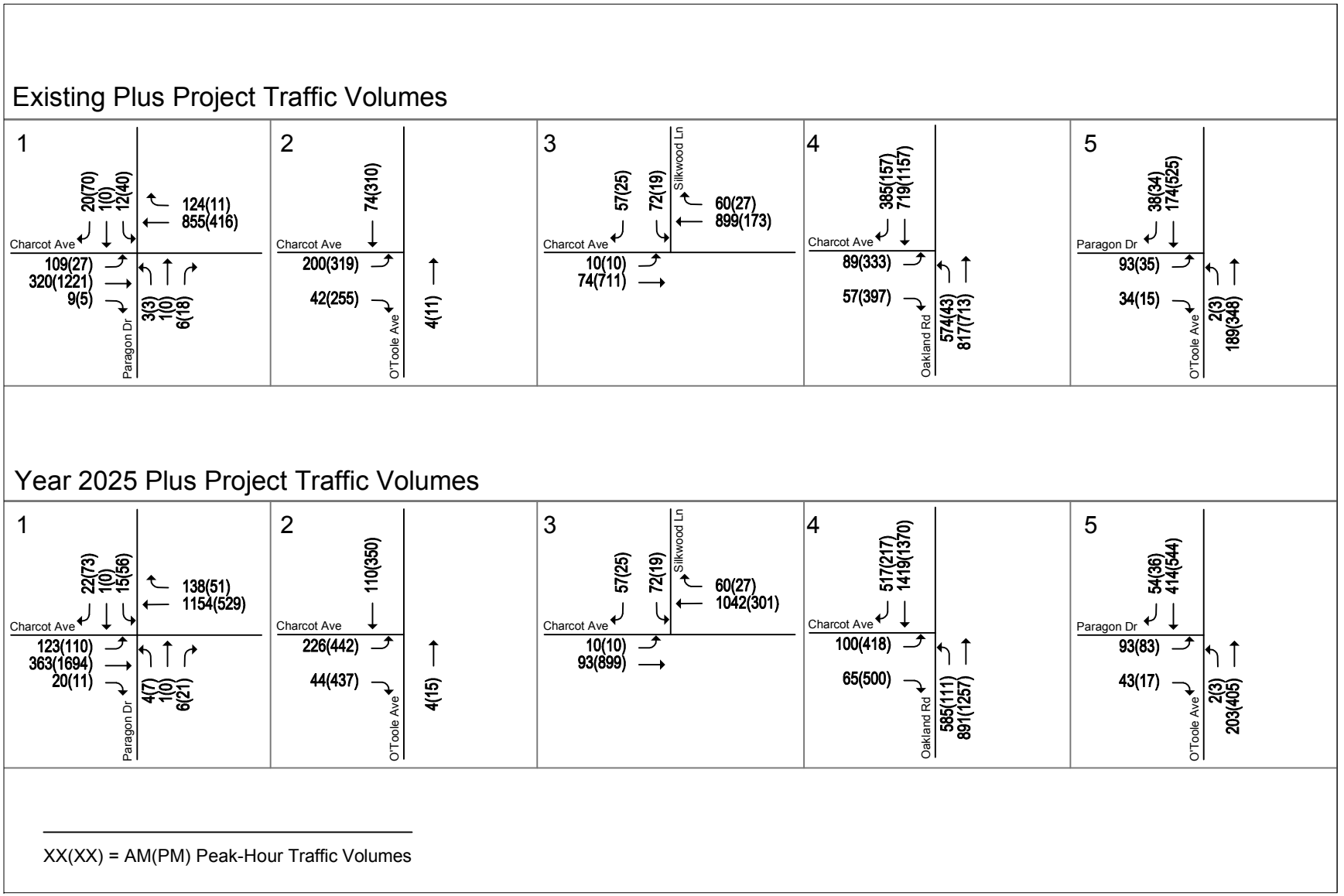


Table 5
Intersection Levels of Service Under Project Conditions

#	Intersection	Alternative: Control	Alternative: Lane Geometry	Peak Hour	Existing Plus Project: Delay[1]	Existing Plus Project: LOS	Existing Plus Project: Warrant Met[2]	Year 2025 Plus Project: Delay[1]	Year 2025 Plus Project: LOS	Year 2025 Plus Project: Warrant Met[2]
1	Paragon Drive and Charcot Avenue	NB/SB Stop-Controlled	One SB lane	AM	31.8	D	No	**75.2**	**F**	No
				PM	**73.4**	**F**	**Yes**	**>600**	**F**	**Yes**
		NB/SB Stop-Controlled	One SB lane with RT in and out of Paragon only	AM	16.5	C	No	23.1	C	No
				PM	22.8	C	No	**43.0**	**E**	No
		Signal	One SB lane	AM	13.6	B	-	30.9	C	-
				PM	13.2	B	-	**69.6**	**E**	-
2	O'Toole Avenue and Charcot Avenue	EB Stop-Controlled	One EB lane	AM	10.2	B	No	10.7	B	No
				PM	28.9	D	**Yes**	**173.3**	**F**	**Yes**
		EB Stop-Controlled	Separate EBL and EBR	AM	9.7	A	-	10.2	B	-
				PM	13.9	B	-	20.4	C	-
		AWSC	One EB lane	AM	8.5	A	-	8.9	A	-
				PM	16.7	C	-	**79.1**	**F**	-
		AWSC	Separate EBL and EBR	AM	9.1	A	-	9.5	A	-
				PM	12.3	B	-	17.7	C	-
		Signal	One EB lane	AM	11.2	B	-	13.0	B	-
				PM	17.3	B	-	20.1	C	-
		Signal	Separate EBL and EBR	AM	11.2	B	-	12.9	B	-
				PM	16.6	B	-	16.7	B	-
3	Silkwood Lane and Charcot Avenue	SB Stop-Controlled	Full Access	AM	21.5	C	No	27.6	D	No
				PM	13.0	B	No	16.7	C	No
		SB Stop-Controlled	No EBL and SBL	AM	11.7	B	No	12.5	B	No
				PM	8.8	A	No	9.2	A	No
4	Oakland Road and Charcot Avenue	Signal	Exclusive EBL, Shared EBL/T/R & 2nd NBL	AM	17.2	B	No	17.8	B	**Yes**
				PM	23.3	C	**Yes**	26.7	C	**Yes**
		Signal	Elimination of 2nd NBL	AM	20.1	C	-	24.4	C	-
				PM	23.3	C	-	27.7	C	-
		Signal	Elimination of Exclusive EBL	AM	18.3	B	-	19.4	B	-
				PM	28.3	C	-	39.9	D	-
5	O'Toole Avenue and Paragon Drive	EB Stop-Controlled	One EB Lane	AM	11.6	B	No	15.4	C	No
				PM	16.7	C	No	22.4	C	No

Notes:
OWSC = one-way stop-controlled; TWSC = two-way stop-controlled; AWSC = all-way stop-controlled
NB = northbound; SB = southbound; EB = eastbound; WB = westbound
[1] Overall weighted average control delay (seconds per vehicle) is reported for signalized and AWSC intersections. Worst stop-controlled approach delay (seconds per vehicle) is reported for OWSC and TWSC intersections.
[2] Signal warrant analysis based on the Peak Hour Signal Warrant #3, Figure 4C Caltrans MUTCD 2014 Edition.
Bold indicates LOS E or F or signal warrant met.

Table 6
Intersection Vehicle Queue Lengths Under Project Conditions

ID	Intersection Name	Alternative: Control	Alternative: Lane Geometry	Peak Hour	Queue Length[1] (feet): Existing Plus Project NB L	NB A	SB R	SB A	EB L	EB T/R	EB R	EB A	WB T/R	Year 2025 Plus Project NB L	NB A	SB R	SB A	EB L	EB T/R	EB R	EB A	WB T/R
1	Paragon Drive and Charcot Avenue	NB/SB Stop-Controlled	One SB lane	AM	-	-	-	25	25	-	-	-	-	-	-	-	50	50	-	-	-	-
				PM	-	-	-	125	25	-	-	-	-	-	-	-	725	25	-	-	-	-
		NB/SB Stop-Controlled	One SB lane with turn restrictions	AM	-	-	25	-	-	-	-	-	-	-	-	25	-	-		-	-	-
				PM	-	-	25	-	-	-	-	-	-	-	-	25	-	-		-	-	-
		Signal	**One SB lane**	**AM**	**-**	**-**	**-**	**75**	**150**	**350**	**-**	**-**	**900**	**-**	**-**	**-**	**75**	**175**	**400**	**-**	**-**	**1,150**
				PM	**-**	**-**	**-**	**150**	**50**	**1,100**	**-**	**-**	**450**	**-**	**-**	**-**	**175**	**150**	**1,475**	**-**	**-**	**575**
2	O'Toole Avenue and Charcot Avenue	EB Stop-Controlled	One EB lane	AM	-	-	-	-	-	-	-	50	-	-	-	-		-	-	-	50	-
				PM	-	-	-	-	-	-	-	200	-	-	-	-		-	-	-	1,325	-
		EB Stop-Controlled	Separate EBL and EBR	AM	-	-	-	-	50	-	25	-	-	-	-	-	-	50	-	25	-	-
				PM	-	-	-	-	75	-	75	-	-	-	-	-	-	150	-	125	-	-
		AWSC	One EB lane	AM	-	0	-	25	-	-	-	50	-	-	0	-	25	-	-	-	50	-
				PM	-	0	-	75	-	-	-	150	-	-	0	-	100	-	-	-	850	-
		AWSC	Separate EBL and EBR	AM	-	0	-	25	50	-	25	-	-	-	0	-	25	50	-	25	-	-
				PM	-	0	-	75	75	-	50	-	-	-	0	-	100	150	-	100	-	-
		Signal	One EB lane	AM	-	25	-	125	-	-	-	275	-	-	25	-	150	-	-	-	300	-
				PM	-	25	-	350	-	-	-	575	-	-	50	-	375	-	-	-	825	-
		Signal	**Separate EBL and EBR**	**AM**	**-**	**25**	**-**	**125**	**250**	**-**	**75**	**-**	**-**	**-**	**25**	**-**	**150**	**275**	**-**	**75**	**-**	**-**
				PM	**-**	**25**	**-**	**350**	**350**	**-**	**300**	**-**	**-**	**-**	**50**	**-**	**375**	**450**	**-**	**450**	**-**	**-**
3	Silkwood Lane and Charcot Avenue	SB Stop-Controlled	Full Access	AM	-	-	-	50	-	-	-	-	-	-	-	-	75	-	-	-	-	-
				PM	-	-	-	25	-	-	-	-	-	-	-	-	25	-	-	-	-	-
		SB Stop-Controlled	**No EBL and SBL**	**AM**	**-**	**-**	**25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**25**	**-**	**-**	**-**	**-**	**-**	**-**
				PM	**-**	**-**	**25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**25**	**-**	**-**	**-**	**-**	**-**	**-**
4	**Oakland Road and Charcot Avenue**	**Signal**	**Exclusive EBL, shared EBL/T/R &**	**AM**	**325**	**-**	**-**	**-**	**75**	**-**	**-**	**150**	**-**	**325**	**-**	**-**	**-**	**100**	**-**	**-**	**150**	**-**
				PM	**50**	**-**	**-**	**-**	**200**	**-**	**-**	**550**	**-**	**100**	**-**	**-**	**-**	**250**	**-**	**-**	**675**	**-**
		Signal	Elimination of 2nd NBL	AM	575	-	-	-	75	-	-	150	-	575	-	-	-	100	-	-	150	-
				PM	75	-	-	-	200	-	-	550	-	75	-	-	-	250	-	-	675	-
		Signal	Elimination of Exclusive EBL	AM	325	-	-	-	-	-	-	200	-	325	-	-	-	-	-	-	200	-
				PM	50	-	-	-	-	-	-	700	-	100	-	-	-	-	-	-	850	-
5	**O'Toole Avenue and Paragon Drive**	**--**	**--**	**AM**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**50**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**50**	**-**
				PM	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**50**	**-**

Notes:
[1]Queue length is based on the 95th percentile queue from Poisson probability distribution.
NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, R = Right, T = Through, L = Left, A = All Movements
Bold indicates recommended lane geometry configurations under project condtions.

Figure 8
Recommended Intersection Lane Geometry Configurations Under Project Conditions

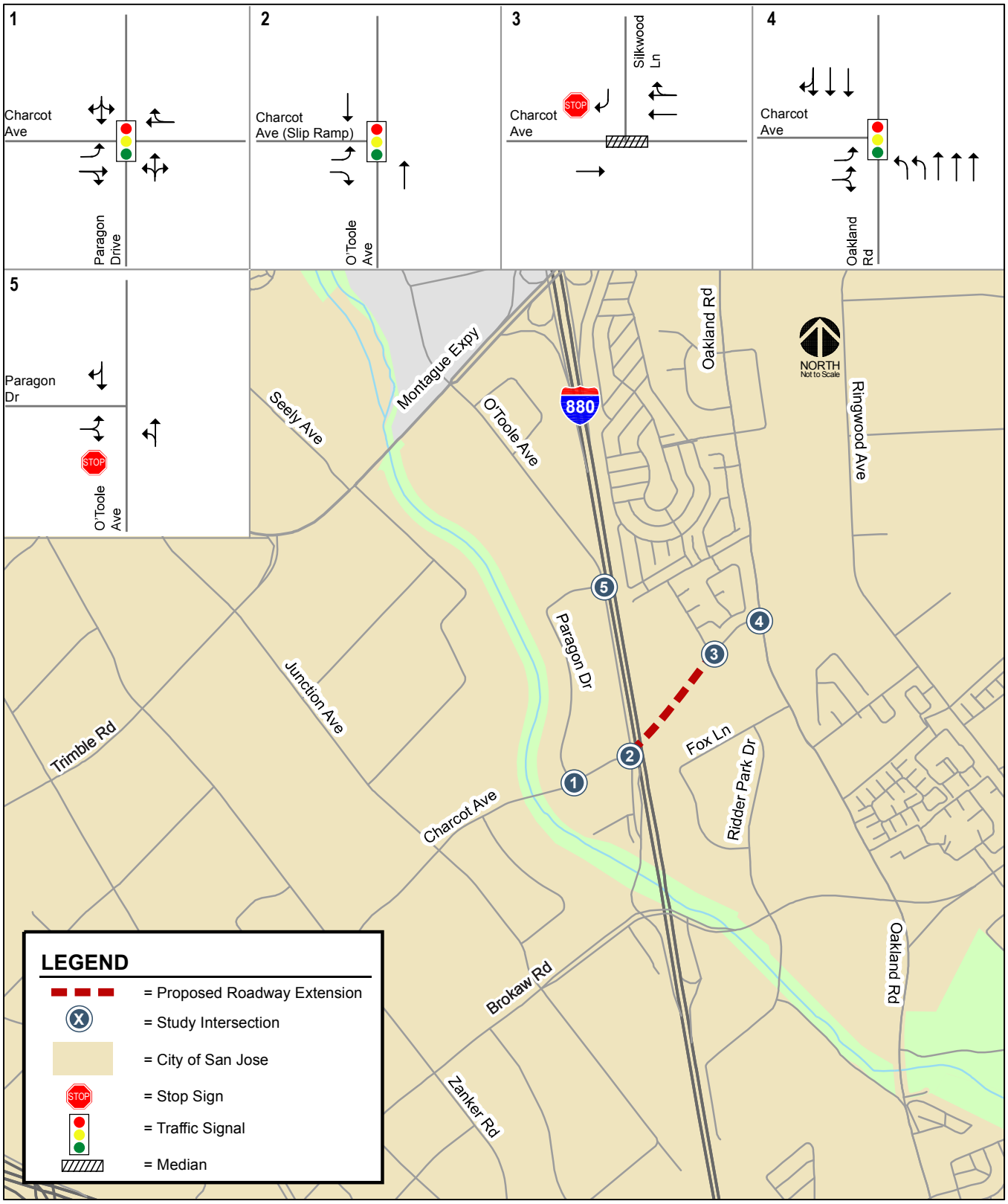


Figure 9
95th Percentile Vehicle Queue Lengths Under 2025 Plus Project Conditions

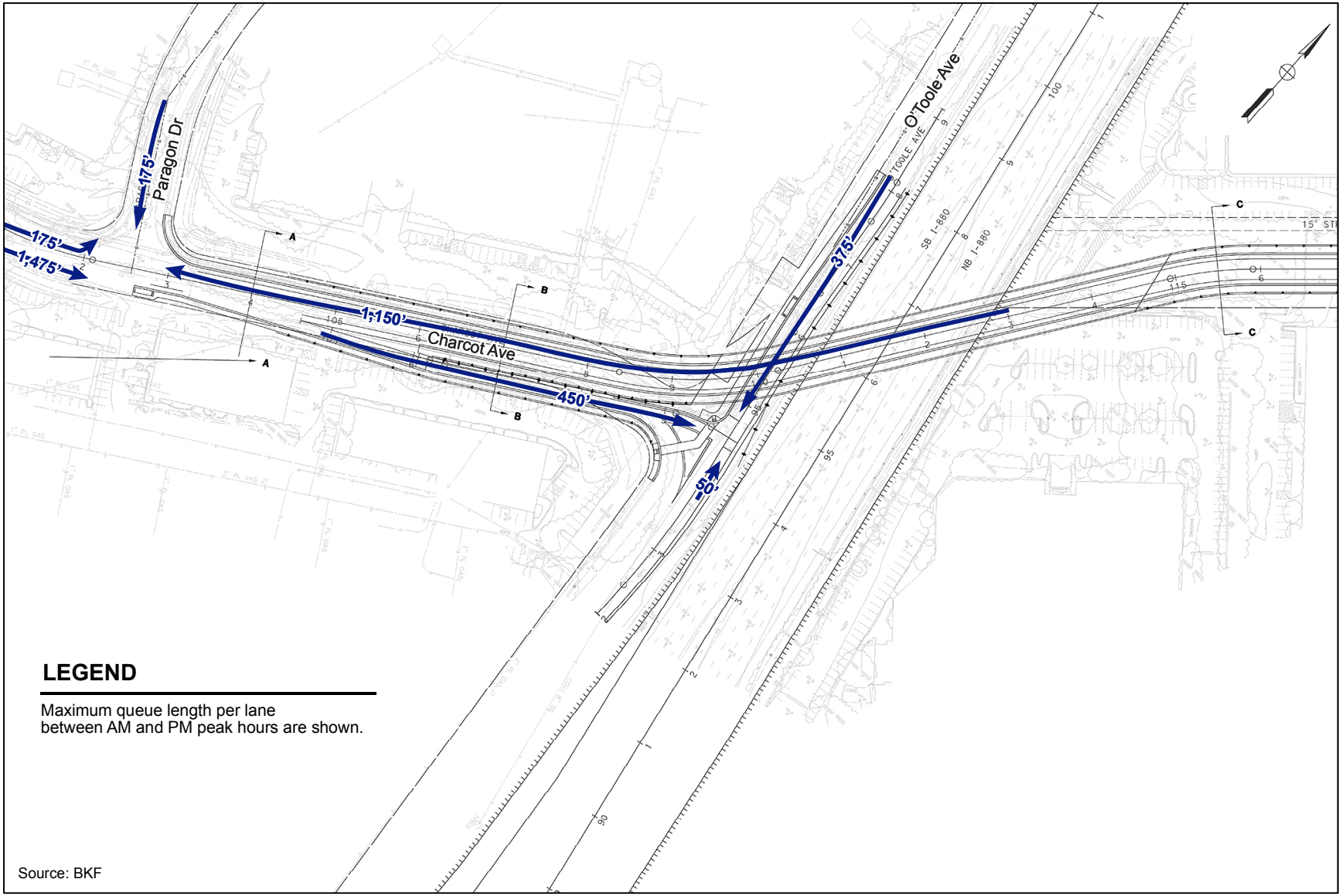
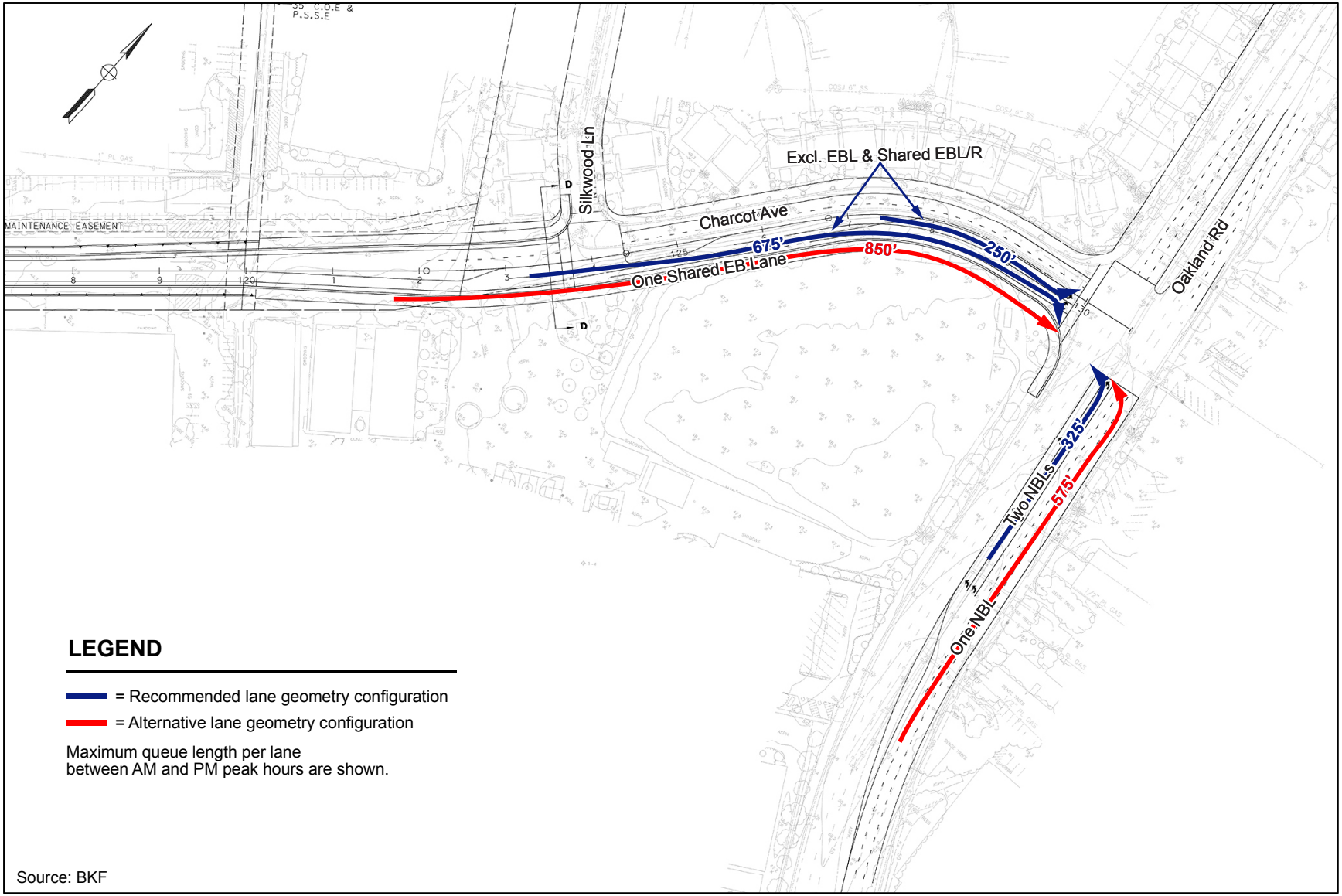


Figure 9 (cont.)
95th Percentile Vehicle Queue Lengths Under 2025 Plus Project Conditions



Recommended Intersection Control and Geometry: Install a traffic signal at the Paragon Drive and Charcot Avenue intersection with safety measures, such as advanced warning beacons, signage, and signal design) to address potential sight distance issues for travel along westbound Charcot Avenue.

O'Toole Avenue and Charcot Avenue

The existing Charcot Avenue/O'Toole Avenue intersection will be eliminated and replaced with a new eastbound Charcot Avenue slip ramp that intersects O'Toole Avenue south of the Charcot Avenue overpass of I-880. Access to westbound Charcot Avenue from O'Toole Avenue will not be provided at the intersection.

The new O'Toole Avenue and Charcot Avenue intersection was evaluated as both a one-way stop-controlled (Charcot Avenue slip-ramp) and all-way stop-controlled intersection. The operations analysis indicates that with one-way stop-control, the Charcot Avenue approach would experience significant delay and vehicle queues that extend back to Paragon Drive under Year 2025 conditions. The large delay and lengthy queue are due to the projected volumes on the Charcot Avenue ramp being greater than the approach volumes on O'Toole Avenue.

The analysis indicates that the implementation of all-way stop-control at the intersection would improve projected delays. In addition, the vehicle queues could be reduced by providing two lanes (one left-turn lane and one right-turn lane) on the Charcot Avenue approach.

However, peak-hour traffic signal warrant checks indicate that a traffic signal would be warranted under Year 2025 conditions. The installation of a traffic signal at the new O'Toole Avenue and Charcot Avenue intersection would greatly improve projected delays and the lengthy vehicle queues in the PM peak hour. A traffic signal at the intersection with one eastbound approach lane would result in a maximum peak-hour queue length of 450 feet (18 vehicles) on the Charcot Avenue approach under Year 2025 conditions. The vehicle queue on the Charcot Avenue ramp is not projected to extend to the end of the ramp and would not block through traffic on Charcot Avenue at the Paragon Drive intersection. The vehicular queues on the Charcot Avenue ramp could be reduced and controlled with signal coordination of the two new signals at Paragon Drive and O'Toole Avenue.

Recommended Intersection Control and Geometry: Install a traffic signal at the new Charcot Avenue/O'Toole Avenue intersection. It is recommended that the new traffic signals at the Paragon Drive and O'Toole Avenue intersections with Charcot Avenue be coordinated to minimize the eastbound vehicle queue on the Charcot Avenue ramp.

Oakland Road and Charcot Avenue

The existing eastbound approach (Silkwood Lane) at the unsignalized intersection of Silkwood Lane and Oakland Road will serve as the Charcot Avenue connection to Oakland Road. The existing Silkwood Lane and Oakland Road intersection will be signalized with the extension of Charcot Avenue.

Proposed Lane Configurations

Intersection level of service analysis indicates that the intersection is projected to operate at LOS D or better conditions during the peak hours under Year 2025 conditions with the planned intersection lane configurations that includes two left-turn lanes on the northbound approach and one left-turn lane and one shared left-right turn lane on the eastbound approach.

The proposed improvement plan shows two approximately 400-foot northbound left-turn lanes at the Charcot Avenue and Oakland Road intersection. Queuing analysis indicates a projected maximum peak-hour queue length of 325 feet (13 vehicles) per lane for the northbound left-turn movement at the Charcot Avenue and Oakland Road intersection under Year 2025 conditions. Thus, the planned northbound left-turn pockets should be adequate to meet the projected queues.

A maximum peak-hour vehicular queue of 675 feet is projected for the eastbound approach (Charcot Avenue) with the planned lane configuration, one left-turn lane and one shared left-and-right-turn lane at the intersection. Approximately 550 feet of space will be provided between Oakland Road and Silkwood Lane. Thus, the projected eastbound queue along Charcot Avenue will extend back and through Silkwood Lane. The extension of the eastbound queue along Charcot Avenue will block the left-turn movement from Silkwood Lane to eastbound Charcot Avenue. In addition, left-turning vehicles from Silkwood Lane could also block westbound traffic flow along Charcot Avenue due to insufficient gaps in the eastbound queue. It also is likely that drivers will choose not to wait in the lengthy eastbound queue and instead utilize Silkwood Lane and Rock Avenue to access Oakland Road to bypass the queue.

A reduction in the projected eastbound queue would require providing three lanes on the eastbound approach at the Charcot Avenue and Oakland Road intersection. However, a third eastbound lane would require acquisition of right-of-way along the south side of Charcot Avenue. Therefore, it is recommended that a median along Charcot Avenue at Silkwood Lane be constructed to restrict turn-movements at the intersection to right-turns to and from Silkwood Lane only. The turn-restrictions at Silkwood Lane will require that residents in the neighborhood north of Charcot Avenue utilize Rock Avenue to access Oakland Road.

Alternative Lane Configurations

The travel lanes and intersection lane configurations at the Charcot Avenue extension intersection with Oakland Road were evaluated to determine the feasibility of narrowing Charcot Avenue at Oakland Road to the greatest extent possible. The effects of these design alternatives, as identified by City staff, on the operations are discussed below.

Elimination of the proposed 2nd northbound left-turn lane from Oakland Road to Charcot Avenue to eliminate the need for a receiving lane along westbound Charcot Avenue:

- The projected northbound left-turn queue is projected to increase to 575 feet should only a single left-turn lane be provided. The projected queue would not extend back to the Fox Lane intersection with Oakland Road that is located approximately 900 feet south of Charcot Avenue. However, peak hour delays will increase slightly on all approaches due to the additional green time that must be allocated to the northbound left-turn movement.

Elimination of the eastbound Charcot Avenue left-turn lane to northbound Oakland Road:

- The eastbound queue would increase to 850 feet and PM peak hour LOS would degrade to LOS D should the planned exclusive left-turn lane not be provided. The extended queue along eastbound Charcot Avenue may not be clearly visible to drivers travelling eastbound along Charcot Avenue due to the vertical alignment of the Charcot Avenue overcrossing of I-880.

Recommended Intersection Control and Geometry: It is recommended that the planned intersection lane configurations that includes two left-turn lanes on the northbound approach and one left-turn lane and one shared left-right turn lane on the eastbound approach be implemented at the Charcot Avenue and Oakland Road intersection. The proposed 400-foot northbound approach (Oakland Road) left-turn pockets will be adequate to serve the projected 325-foot queues. Due to the projected lengthy eastbound queue along Charcot Avenue, turn movements to and from Silkwood Lane should be restricted to right-turns only. A median should be constructed along Charcot Avenue at Silkwood Lane.

Silkwood Lane and Charcot Avenue

The roadway alignment plans indicate that the Charcot Avenue extension will follow the current alignment of Silkwood Lane between Oakland Road and Silkwood Lane. As described above, it is

recommended that a median along Charcot Avenue at its intersection with Silkwood Lane be constructed to restrict turn-movements at the intersection to right-turns to and from Silkwood Lane only.

It is important to note that Orchard School is located along the south side of the proposed Charcot Avenue extension just west of Oakland Road. The roadway alignment plan shows crosswalks on Charcot Avenue at Silkwood Lane. Due to the large projected traffic volumes and limited sight distance along Charcot Avenue, an uncontrolled crosswalk on Charcot Avenue is not recommended. A controlled crossing point of Charcot Avenue is provided at the Oakland Road intersection. Access to the school site along Charcot Avenue is being considered. It is likely that students will cross Charcot Avenue at uncontrolled points, such as the Silkwood Lane intersection, should the school access point be located near Silkwood Lane. Therefore, it is recommended that access to the school site be located near Oakland Road to discourage crossing of Charcot Avenue at points other than the Oakland Road intersection. A new pedestrian only signal or High-Intensity Activated Crosswalk (HAWK) beacon at the Silkwood Lane intersection should be considered should a new access to the school be provided along Charcot Avenue. However, to minimize queues along Charcot Avenue, no left turn-movements to and from Silkwood Lane should be allowed at the crossing point.

Recommended Intersection Control and Geometry: Restrict turn movements at the Silkwood Lane and Charcot Avenue intersection to right-turns only. A median should be constructed along Charcot Avenue at Silkwood Lane. Due to the large projected traffic volumes and limited sight distance along Charcot Avenue, an uncontrolled crosswalk on Charcot Avenue at its intersection with Silkwood Lane is not recommended. A new pedestrian only signal or High-Intensity Activated Crosswalk (HAWK) beacon at the Silkwood Lane intersection should be considered should a new access to the school be provided along Charcot Avenue. However, to minimize queues along Charcot Avenue, no left turn-movements to and from Silkwood Lane should be allowed at the crossing point.

Roadway Circulation Operations Evaluation

The roadway segment analysis consists of an evaluation of the effects of the proposed Charcot Avenue extension on traffic patterns in the vicinity of the project area. The project will result in changes to existing and future travel patterns and traffic volumes on surrounding roadways for which the Charcot Extension would provide an alternate route. The roadway segment analysis evaluates existing and projected future traffic volumes with and without the Charcot Extension on the surrounding roadway network. The analysis includes an evaluation of average daily traffic (ADT) volumes and speeds on 25 roadway segments. The study roadway segments are summarized below and shown graphically on Figure 10.

Study Roadway Segments

1. Charcot Avenue, between 1st Street and Zanker Road
2. Charcot Avenue, between Zanker Road and Junction Avenue
3. Charcot Avenue, between Junction Avenue and Paragon Drive
4. Silk Wood Lane, between Silk Wood Lane and Oakland Road
5. Brokaw Road, between Zanker Road and Junction Avenue
6. Brokaw Road, between Junction Avenue and I-880
7. Brokaw Road, between I-880 and Oakland Road
8. Trimble Road, between Zanker Road and Junction Avenue
9. Trimble Road, between Junction Avenue and Montague Expressway
10. Montague Expressway, between Trimble Road and I-880
11. Montague Expressway, between I-880 and Oakland Road
12. Zanker Road, between Trimble Road and Charcot Avenue
13. Zanker Road, between Charcot Avenue and Brokaw Road

14. Junction Avenue, between Trimble Road and Charcot Avenue
15. Junction Avenue, between Charcot Avenue and Brokaw Road
16. Oakland Road, between Montague Expressway and Silk Wood Lane
17. Oakland Road, between Silk Wood Lane and Brokaw Road
18. Ridder Park Drive, North of Oakland Road
19. Fox Lane, West of Oakland Road
20. Silkwood Lane, South of Rock Avenue
21. Rock Avenue, West of Oakland Road
22. O'Toole Avenue, South of Montague Expressway
23. O'Toole Avenue, North of Charcot Avenue
24. O'Toole Avenue, South of Charcot Avenue
25. Paragon Drive, North of Charcot Avenue

Roadway Segment Traffic Volumes

Traffic volume data were collected for a 24-hour period along each of the 25 study roadway segments in September 2018. In addition to the traffic volumes, speed data also was collected along each of the study segments. The location of each of the 24-hour counts is shown on Figure 10. Peak-hour volumes along each of the roadway segments were extracted from the 24-hour tube counts. Table 7 summarizes the existing ADT and peak-hour volume data as well as the measured 85th-percentile speeds collected from the 24-hour counts on each of the study roadway segments.

The TDF model runs show that the Charcot extension would result in a diversion of traffic to the proposed Charcot Avenue extension from other parallel routes, including Brokaw Road, Trimble Road, and Montague Expressway. Traffic projections indicate that the Charcot Avenue extension could serve approximately 1,080 peak hour trips and 8,700 daily trips under Existing Plus Project conditions and approximately 1,720 peak hour trips and 13,900 daily trips under Year 2040 Project conditions.

The projected roadway segment traffic volumes under Existing Plus Project, 2025 Project, and 2040 Project conditions are summarized in Tables 8, 9, and 10, respectively, and shown in Figures 11, 12, and 13, respectively. With the Charcot Avenue extension, the traffic volumes on east-west streets that run parallel to Charcot Avenue (Brokaw Road, Trimble Road, and Montague Expressway) would decrease while traffic along north-south streets (Zanker Road, Junction Avenue, and Oakland Road) providing access to Charcot Avenue would increase.

The evaluation of roadway segment ADTs indicate that the Charcot extension will result in additional roadway system capacity and reduce traffic volumes and congestion on parallel roadways. It is important to note that roadway improvement projects, unlike development projects, typically do not generate new vehicle trips that are added to the roadway system. Rather roadway improvement projects, such as the proposed project, provide additional roadway system capacity to accommodate traffic that is currently and projected to be on the roadway system regardless of the contemplated roadway improvement project. Roadway improvement projects are necessary to provide increased roadway capacity, better connectivity, improved traffic operations, and/or enhance the safety of all users of the roadway system including pedestrians and bicyclists.

Supplemental VHT and Travel Speed Evaluation

The model results show that VHT would decrease by approximately 1 to 2 percent in the project area. The slight decrease in VHT and minimal increase in VMT is not abnormal since the TDF model is designed to reflect driver's behavior by minimizing the travel time of motorists rather than travel distance. Since the roadways in the area are congested during the morning and afternoon peak periods,

Figure 10
Study Roadway Segments

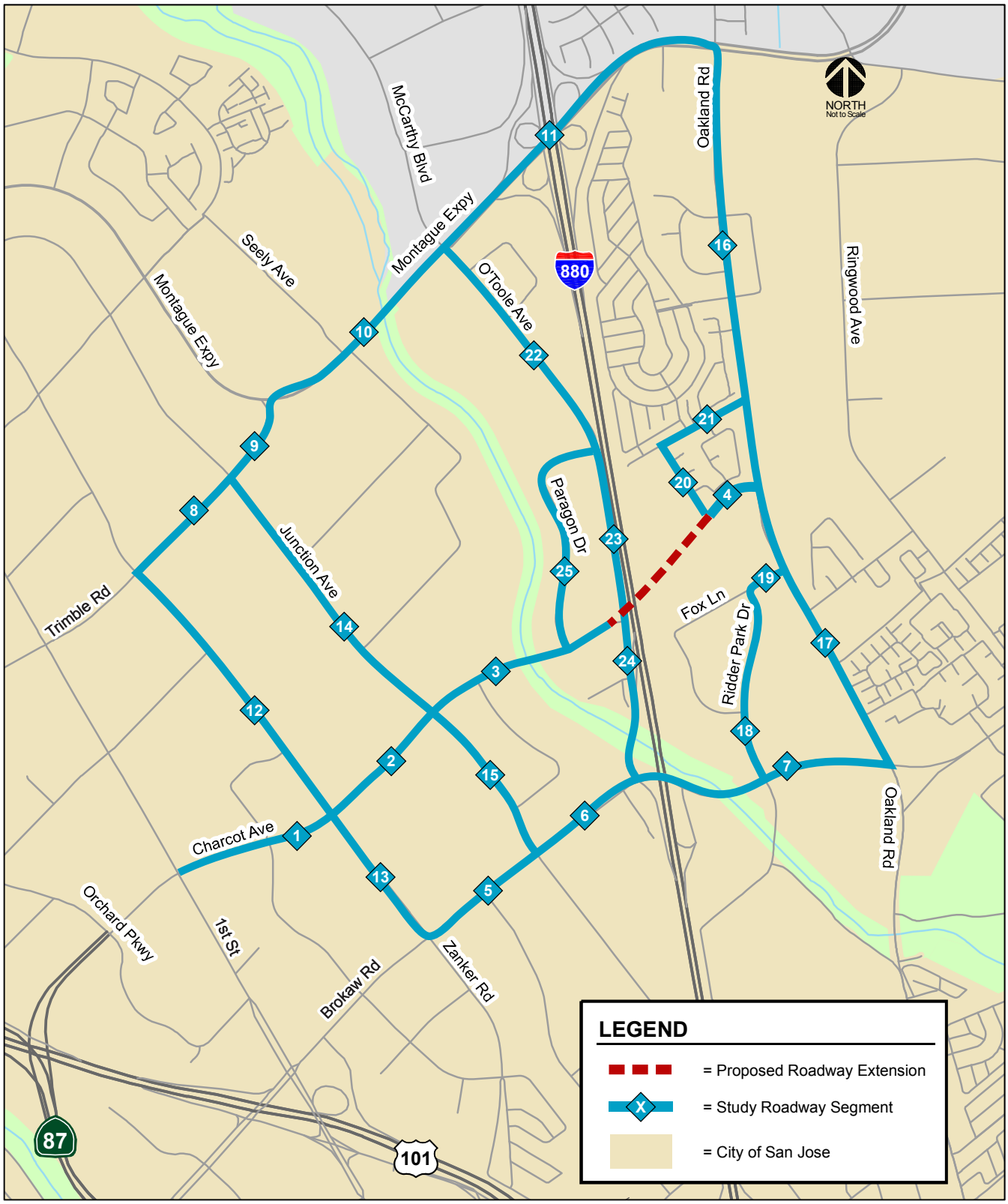


Table 7
Existing Roadway Segment Traffic Volumes and Speed

			NB/EB					SB/WB				
			Speed (mph)		Volume			Speed (mph)		Volume		
#	Roadway	Location	Limit	85th Percentile	AM	PM	ADT	Limit	85th Percentile	AM	PM	ADT
1	Charcot Avenue	East of 1st Street	40	39	450	600	6,500	40	41	460	400	5,400
2	Charcot Avenue	East of Zanker Road	40	35	270	490	4,500	40	32	240	360	3,800
3	Charcot Avenue	East of Junction Avenue	35	34	150	330	2,500	35	35	360	570	5,100
4	Silkwood Lane	West of Oakland Road	25	29	60	20	300	25	28	60	30	400
5	Brokaw Road	East of Zanker Road	40	43	610	1,140	12,700	40	43	1,460	990	18,800
6	Brokaw Road	East of Junction Avenue	40	44	600	1,520	15,100	40	40	1,690	940	21,700
7	Brokaw Road	West of Oakland Road	40	37	580	1,700	17,400	40	33	1,230	1,050	17,700
8	Trimble Road	East of Zanker Road	45	45	660	1,160	12,000	45	57	1,240	830	14,100
9	Trimble Road	East of Junction Avenue	45	41	630	1,030	10,900	45	57	1,120	640	12,700
10	Montague Expressway	East of Seely Avenue	45	54	1,500	1,670	23,000	45	56	2,540	1,350	29,600
11	Montague Expressway	West of Oakland Road	45	43	1,270	1,270	22,700	45	41	2,760	1,280	28,200
12	Zanker Road	South of Trimble Road	45	45	1,320	300	8,400	45	54	210	1,470	9,100
13	Zanker Road	North of Brokaw Road	45	42	1,440	180	8,500	45	37	200	1,310	8,700
14	Junction Avenue	South of Trimble Road	40	36	490	150	4,700	40	38	150	990	5,500
15	Junction Avenue	North of Brokaw Road	40	38	690	200	6,700	40	33	150	830	5,100
16	Oakland Road	North of Silkwood Lane	45	44	810	660	9,500	45	41	550	1,020	10,300
17	Oakland Road	South of Silkwood Lane	45	39	750	560	8,800	45	38	550	1,030	9,700
18	Ridder Park Drive	North of Oakland Road	25	31	420	110	2,900	25	28	310	390	3,800
19	Fox Lane	West of Oakland Road	25	26	70	340	2,700	25	27	550	100	3,400
20	Silkwood Lane	South of Rock Avenue	25	28	70	10	300	25	23	30	30	200
21	Rock Avenue	West of Oakland Road	25	28	150	80	1,600	25	28	210	90	1,600
22	O'Toole Avenue	South of Montague Expressway	40	47	220	410	3,500	40	40	260	510	4,300
23	O'Toole Avenue	North of Charcot Avenue	40	47	200	340	2,800	40	41	180	530	3,800
24	O'Toole Avenue	South of Charcot Avenue	40	24	20	40	300	40	35	120	570	3,700
25	Paragon Drive	North of Charcot Avenue	25	36	100	20	700	25	36	30	70	600

Notes:
AM and PM peak hours volumes were round to the nearest 10, and ADT volumes were rounded to the nearest 100.
NB = northbound, EB = eastbound, SB = southbound, WB = westbound

Table 8
Existing and Existing Plus Project Roadway Segment Traffic Volumes

#	Roadway	Location	AM				PM				ADT			
				Existing+	Change			Existing+	Change			Existing+	Change	
			Existing	Project	Volume	Percent	Existing	Project	Volume	Percent	Existing	Project	Volume	Percent
1	Charcot Avenue	East of 1st Street	910	1,060	150	16%	1,000	1,200	200	20%	11,900	14,100	2,200	18%
2	Charcot Avenue	East of Zanker Road	510	830	320	63%	850	1,240	390	46%	8,300	12,600	4,300	52%
3	Charcot Avenue	East of Junction Avenue	510	1,260	750	147%	900	1,720	820	91%	7,600	16,100	8,500	112%
4	Silkwood Lane	West of Oakland Road	120	1,080	960	800%	50	930	880	1,760%	700	8,700	8,000	1,143%
5	Brokaw Road	East of Zanker Road	2,070	1,900	-170	-8%	2,130	2,000	-130	-6%	31,500	29,200	-2,300	-7%
6	Brokaw Road	East of Junction Avenue	2,290	1,990	-300	-13%	2,460	2,210	-250	-10%	36,800	32,400	-4,400	-12%
7	Brokaw Road	West of Oakland Road	1,810	1,620	-190	-10%	2,750	2,530	-220	-8%	35,100	32,000	-3,100	-9%
8	Trimble Road	East of Zanker Road	1,900	1,860	-40	-2%	1,990	1,950	-40	-2%	26,100	25,500	-600	-2%
9	Trimble Road	East of Junction Avenue	1,750	1,950	200	11%	1,670	1,610	-60	-4%	23,600	24,500	900	4%
10	Montague Expressway	East of Seely Avenue	4,040	3,860	-180	-4%	3,020	2,810	-210	-7%	52,600	49,600	-3,000	-6%
11	Montague Expressway	West of Oakland Road	4,030	3,740	-290	-7%	2,550	2,250	-300	-12%	50,900	46,400	-4,500	-9%
12	Zanker Road	South of Trimble Road	1,530	1,530	0	0%	1,770	1,820	50	3%	17,500	17,700	200	1%
13	Zanker Road	North of Brokaw Road	1,640	1,660	20	1%	1,490	1,550	60	4%	17,200	17,600	400	2%
14	Junction Avenue	South of Trimble Road	640	950	310	48%	1,140	1,410	270	24%	10,200	13,800	3,600	35%
15	Junction Avenue	North of Brokaw Road	840	760	-80	-10%	1,030	980	-50	-5%	11,800	10,900	-900	-8%
16	Oakland Road	North of Silkwood Lane	1,360	1,610	250	18%	1,680	1,990	310	18%	19,800	23,400	3,600	18%
17	Oakland Road	South of Silkwood Lane	1,300	1,740	440	34%	1,590	1,910	320	20%	18,500	23,500	5,000	27%
18	Ridder Park Drive	North of Oakland Road	730	730	0	0%	500	500	0	0%	6,700	6,700	0	0%
19	Fox Lane	West of Oakland Road	620	620	0	0%	440	440	0	0%	6,100	6,100	0	0%
20	Silkwood Lane	South of Rock Avenue	100	100	0	0%	40	40	0	0%	500	500	0	0%
21	Rock Avenue	West of Oakland Road	360	360	0	0%	170	170	0	0%	3,200	3,200	0	0%
22	O'Toole Avenue	South of Montague Expressway	480	470	-10	-2%	920	900	-20	-2%	7,800	7,700	-100	-1%
23	O'Toole Avenue	North of Charcot Avenue	380	350	-30	-8%	870	860	-10	-1%	6,600	6,300	-300	-5%
24	O'Toole Avenue	South of Charcot Avenue	140	140	0	0%	610	580	-30	-5%	4,000	3,900	-100	-3%
25	Paragon Drive	North of Charcot Avenue	130	240	110	85%	90	120	30	33%	1,300	2,200	900	69%

Notes:
Volumes for both directions. AM and PM peak hours volumes were round to the nearest 10, and ADT volumes were rounded to the nearest 100.
NB = northbound, EB = eastbound, SB = southbound, WB = westbound

Table 9
Year 2025 and Year 2025 Plus Project Roadway Segment Traffic Volumes

#	Roadway	Location	AM				PM				ADT			
				Year 2025+	Change			Year 2025+	Change			Year 2025+	Change	
			Year 2025	Project	Volume	Percent	Year 2025	Project	Volume	Percent	Year 2025	Project	Volume	Percent
1	Charcot Avenue	East of 1st Street	1,400	1,600	200	14%	1,680	1,910	230	14%	19,100	21,700	2,600	14%
2	Charcot Avenue	East of Zanker Road	670	1,090	420	63%	1,250	1,760	510	41%	11,800	17,400	5,600	47%
3	Charcot Avenue	East of Junction Avenue	710	1,570	860	121%	1,370	2,390	1,020	74%	11,300	21,400	10,100	89%
4	Silkwood Lane	West of Oakland Road	120	1,240	1,120	933%	50	1,250	1,200	2,400%	700	10,700	10,000	1,429%
5	Brokaw Road	East of Zanker Road	2,500	2,290	-210	-8%	2,890	2,690	-200	-7%	40,300	37,300	-3,000	-7%
6	Brokaw Road	East of Junction Avenue	2,940	2,570	-370	-13%	3,280	2,900	-380	-12%	48,000	42,100	-5,900	-12%
7	Brokaw Road	West of Oakland Road	2,100	1,870	-230	-11%	3,250	2,970	-280	-9%	41,200	37,300	-3,900	-9%
8	Trimble Road	East of Zanker Road	2,600	2,540	-60	-2%	2,770	2,670	-100	-4%	36,100	34,900	-1,200	-3%
9	Trimble Road	East of Junction Avenue	2,540	2,630	90	4%	2,710	2,550	-160	-6%	36,200	35,700	-500	-1%
10	Montague Expressway	East of Seely Avenue	5,390	5,120	-270	-5%	4,560	4,270	-290	-6%	74,100	69,900	-4,200	-6%
11	Montague Expressway	West of Oakland Road	5,010	4,630	-380	-8%	3,990	3,580	-410	-10%	70,600	64,500	-6,100	-9%
12	Zanker Road	South of Trimble Road	2,340	2,330	-10	0%	2,740	2,710	-30	-1%	26,800	26,700	-100	0%
13	Zanker Road	North of Brokaw Road	2,410	2,390	-20	-1%	2,450	2,460	10	0%	26,600	26,700	100	0%
14	Junction Avenue	South of Trimble Road	910	1,220	310	34%	1,510	1,780	270	18%	14,200	17,700	3,500	25%
15	Junction Avenue	North of Brokaw Road	1,090	1,000	-90	-8%	1,430	1,380	-50	-3%	16,100	15,000	-1,100	-7%
16	Oakland Road	North of Silkwood Lane	2,130	2,510	380	18%	2,460	2,860	400	16%	29,800	35,000	5,200	17%
17	Oakland Road	South of Silkwood Lane	1,820	2,290	470	26%	2,280	2,740	460	20%	26,300	32,300	6,000	23%
18	Ridder Park Drive	North of Oakland Road	810	810	0	0%	570	570	0	0%	7,400	7,400	0	0%
19	Fox Lane	West of Oakland Road	700	700	0	0%	490	490	0	0%	6,800	6,800	0	0%
20	Silkwood Lane	South of Rock Avenue	100	100	0	0%	40	40	0	0%	500	500	0	0%
21	Rock Avenue	West of Oakland Road	360	360	0	0%	170	170	0	0%	3,200	3,200	0	0%
22	O'Toole Avenue	South of Montague Expressway	800	730	-70	-9%	1,280	1,240	-40	-3%	11,700	11,000	-700	-6%
23	O'Toole Avenue	North of Charcot Avenue	600	530	-70	-12%	1,080	1,050	-30	-3%	8,800	8,200	-600	-7%
24	O'Toole Avenue	South of Charcot Avenue	180	170	-10	-6%	860	800	-60	-7%	5,600	5,300	-300	-5%
25	Paragon Drive	North of Charcot Avenue	140	260	120	86%	210	260	50	24%	2,100	3,200	1,100	52%

Notes:
Volumes for both directions. AM and PM peak hours volumes were round to the nearest 10, and ADT volumes were rounded to the nearest 100.
NB = northbound, EB = eastbound, SB = southbound, WB = westbound

Table 10
Year 2040 and Year 2040 Plus Project Roadway Segment Traffic Volumes

#	Roadway	Location	AM				PM				ADT			
				Year 2040+	Change			Year 2040+	Change			Year 2040+	Change	
			Year 2040	Project	Volume	Percent	Year 2040	Project	Volume	Percent	Year 2040	Project	Volume	Percent
1	Charcot Avenue	East of 1st Street	2,150	2,390	240	11%	2,700	2,980	280	10%	30,100	33,400	3,300	11%
2	Charcot Avenue	East of Zanker Road	920	1,480	560	61%	1,850	2,540	690	37%	16,900	24,500	7,600	45%
3	Charcot Avenue	East of Junction Avenue	1,020	2,050	1,030	101%	2,090	3,390	1,300	62%	16,800	29,400	12,600	75%
4	Silkwood Lane	West of Oakland Road	120	1,490	1,370	1,142%	50	1,720	1,670	3,340%	700	13,900	13,200	1,886%
5	Brokaw Road	East of Zanker Road	3,170	2,900	-270	-9%	4,020	3,730	-290	-7%	53,700	49,400	-4,300	-8%
6	Brokaw Road	East of Junction Avenue	3,910	3,450	-460	-12%	4,500	3,940	-560	-12%	64,800	56,800	-8,000	-12%
7	Brokaw Road	West of Oakland Road	2,520	2,260	-260	-10%	4,010	3,630	-380	-9%	50,200	45,200	-5,000	-10%
8	Trimble Road	East of Zanker Road	3,660	3,540	-120	-3%	3,940	3,740	-200	-5%	50,900	49,000	-1,900	-4%
9	Trimble Road	East of Junction Avenue	3,740	3,650	-90	-2%	4,260	3,990	-270	-6%	55,100	52,400	-2,700	-5%
10	Montague Expressway	East of Seely Avenue	7,420	7,020	-400	-5%	6,890	6,460	-430	-6%	106,300	100,200	-6,100	-6%
11	Montague Expressway	West of Oakland Road	6,470	5,980	-490	-8%	6,160	5,560	-600	-10%	100,200	91,700	-8,500	-8%
12	Zanker Road	South of Trimble Road	3,560	3,520	-40	-1%	4,190	4,060	-130	-3%	41,000	40,100	-900	-2%
13	Zanker Road	North of Brokaw Road	3,540	3,490	-50	-1%	3,890	3,840	-50	-1%	40,800	40,200	-600	-1%
14	Junction Avenue	South of Trimble Road	1,330	1,630	300	23%	2,070	2,340	270	13%	20,100	23,600	3,500	17%
15	Junction Avenue	North of Brokaw Road	1,470	1,360	-110	-7%	2,010	1,970	-40	-2%	22,300	21,200	-1,100	-5%
16	Oakland Road	North of Silkwood Lane	3,300	3,880	580	18%	3,620	4,180	560	15%	44,900	52,400	7,500	17%
17	Oakland Road	South of Silkwood Lane	2,600	3,110	510	20%	3,330	3,980	650	20%	38,000	45,500	7,500	20%
18	Ridder Park Drive	North of Oakland Road	940	940	0	0%	660	660	0	0%	8,600	8,600	0	0%
19	Fox Lane	West of Oakland Road	810	810	0	0%	560	560	0	0%	7,800	7,800	0	0%
20	Silkwood Lane	South of Rock Avenue	100	100	0	0%	40	40	0	0%	500	500	0	0%
21	Rock Avenue	West of Oakland Road	360	360	0	0%	170	170	0	0%	3,200	3,200	0	0%
22	O'Toole Avenue	South of Montague Expressway	1,280	1,130	-150	-12%	1,820	1,760	-60	-3%	17,400	16,100	-1,300	-7%
23	O'Toole Avenue	North of Charcot Avenue	920	820	-100	-11%	1,400	1,310	-90	-6%	12,100	11,100	-1,000	-8%
24	O'Toole Avenue	South of Charcot Avenue	240	220	-20	-8%	1,240	1,140	-100	-8%	8,000	7,300	-700	-9%
25	Paragon Drive	North of Charcot Avenue	160	300	140	88%	370	480	110	30%	3,200	4,700	1,500	47%

Notes:
Volumes for both directions. AM and PM peak hours volumes were round to the nearest 10, and ADT volumes were rounded to the nearest 100.
NB = northbound, EB = eastbound, SB = southbound, WB = westbound

Figure 11
Existing Conditions Roadway Segment ADT Comparison

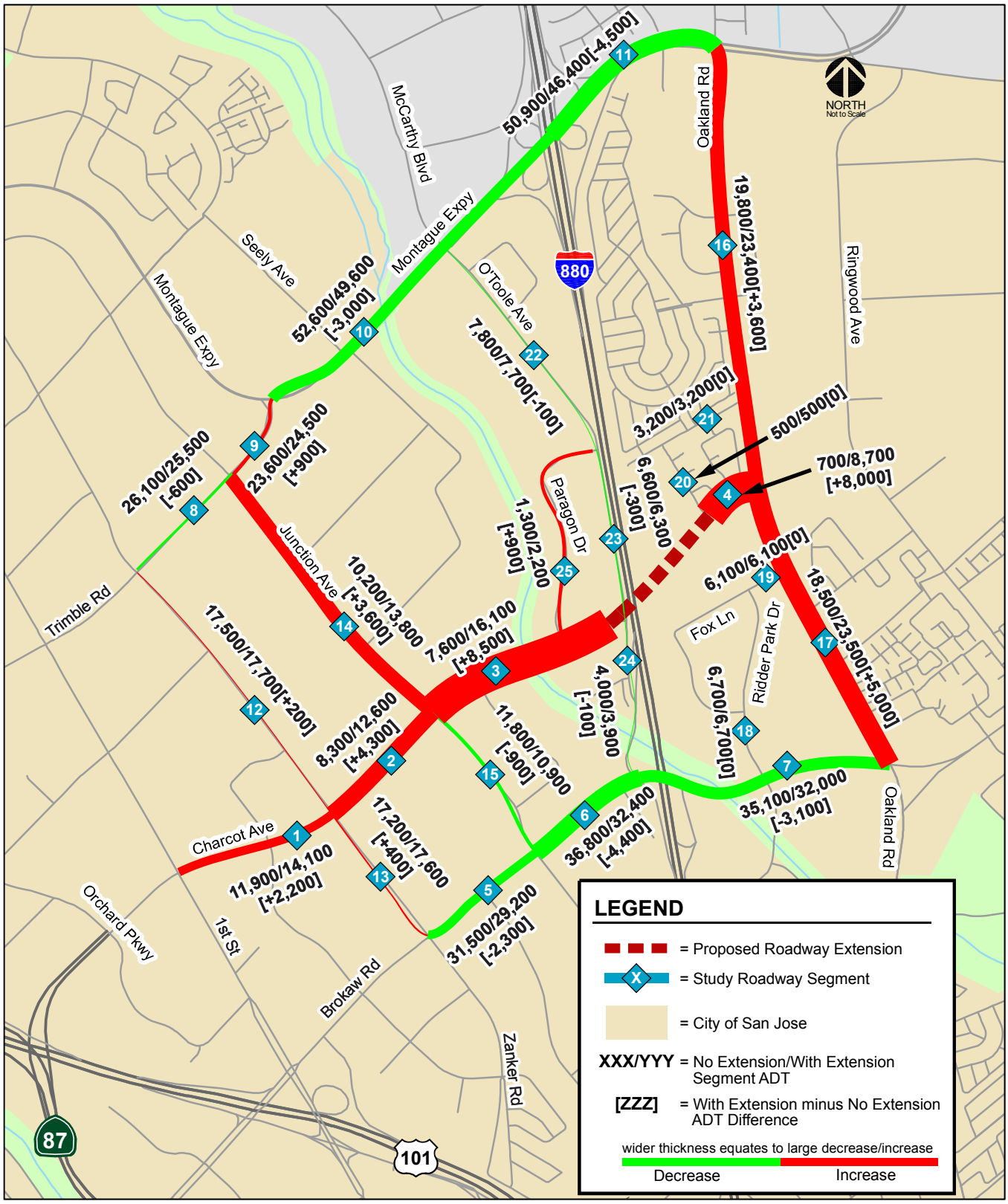


Figure 12
Year 2025 Conditions Roadway Segment ADT Comparison

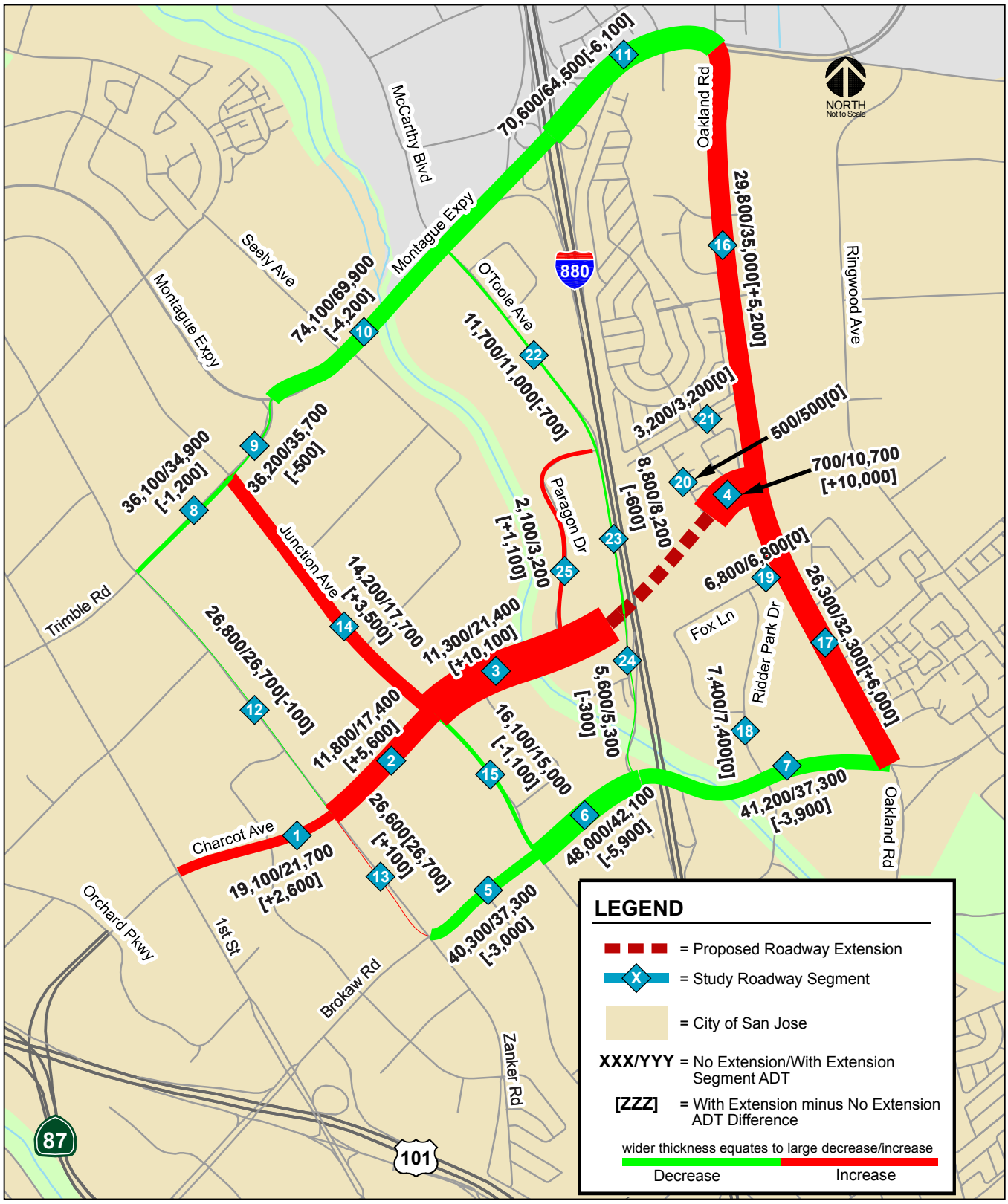
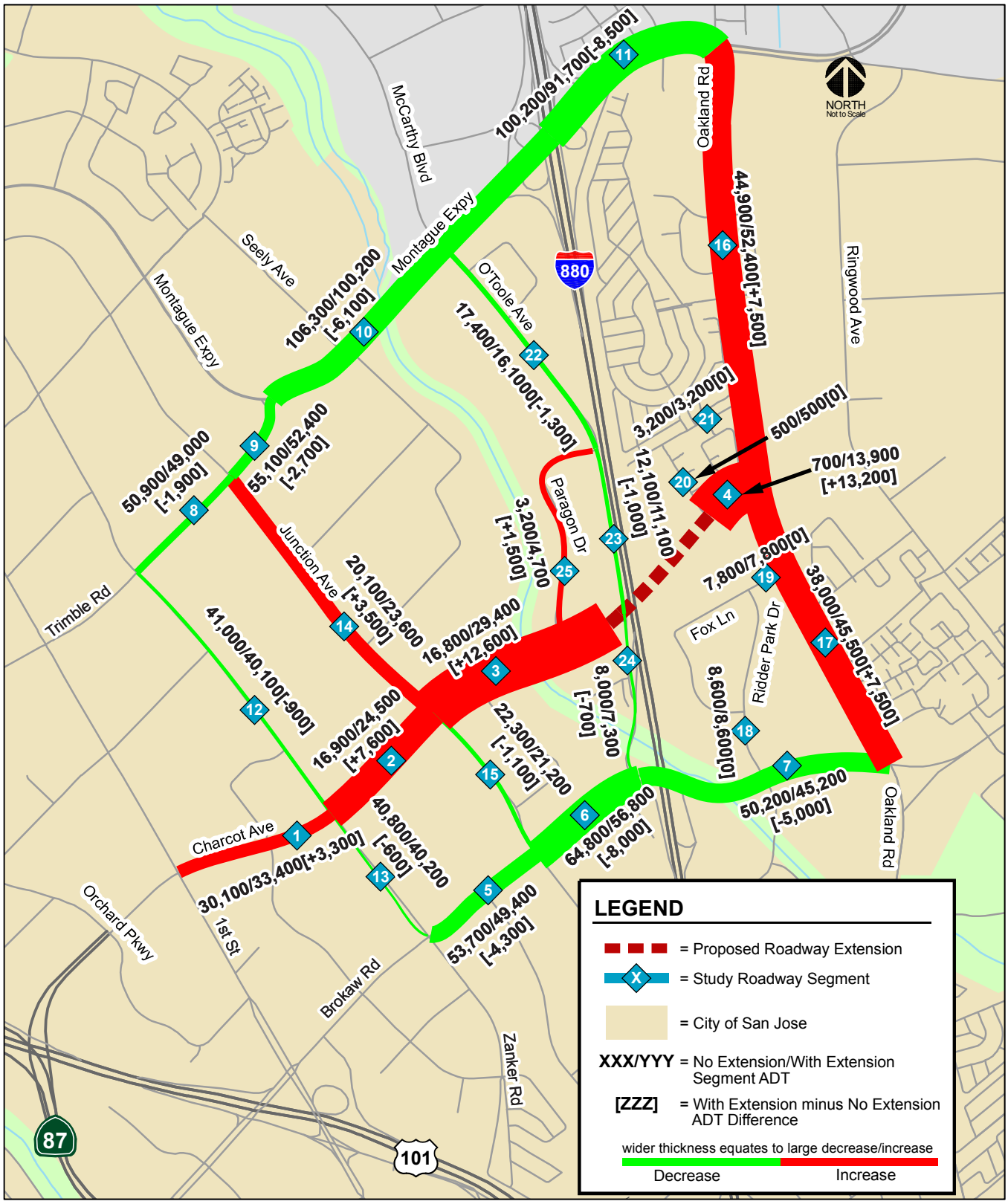


Figure 13
Year 2040 Conditions Roadway Segment ADT Comparison



commuters will drive longer distances to shorten their travel time. The Charcot Avenue extension also would increase the travel speeds on the roadways within the area by approximately 1 to 2 percent.

Table 11 presents the modeled daily VHT and travel speed for baseline, Year 2025, and Year 2040 conditions, with and without the extension. The results of the VHT and travel speed evaluation indicate that the Charcot extension would reduce travel time and improve travel speed on roadways in the study area.

Table 11
Daily VHT and Travel Speed

	Year 2015		Year 2025		Year 2040 General Plan	
Scenario	Daily VHT	Average Speed (mph)	Daily VHT	Average Speed (mph)	Daily VHT	Average Speed (mph)
No-Project	50,074	25.22	104,144	17.49	185,249	14.35
Project	50,019	25.28	103,460	17.62	183,620	14.49
Absolute Change	-55	0.06	-684	0.13	-1,629	0.14
Percent Change	**-0.1%**	**0.2%**	**-0.7%**	**0.8%**	**-0.9%**	**1.0%**

Notes:
VHT = vehicle-hours-traveled

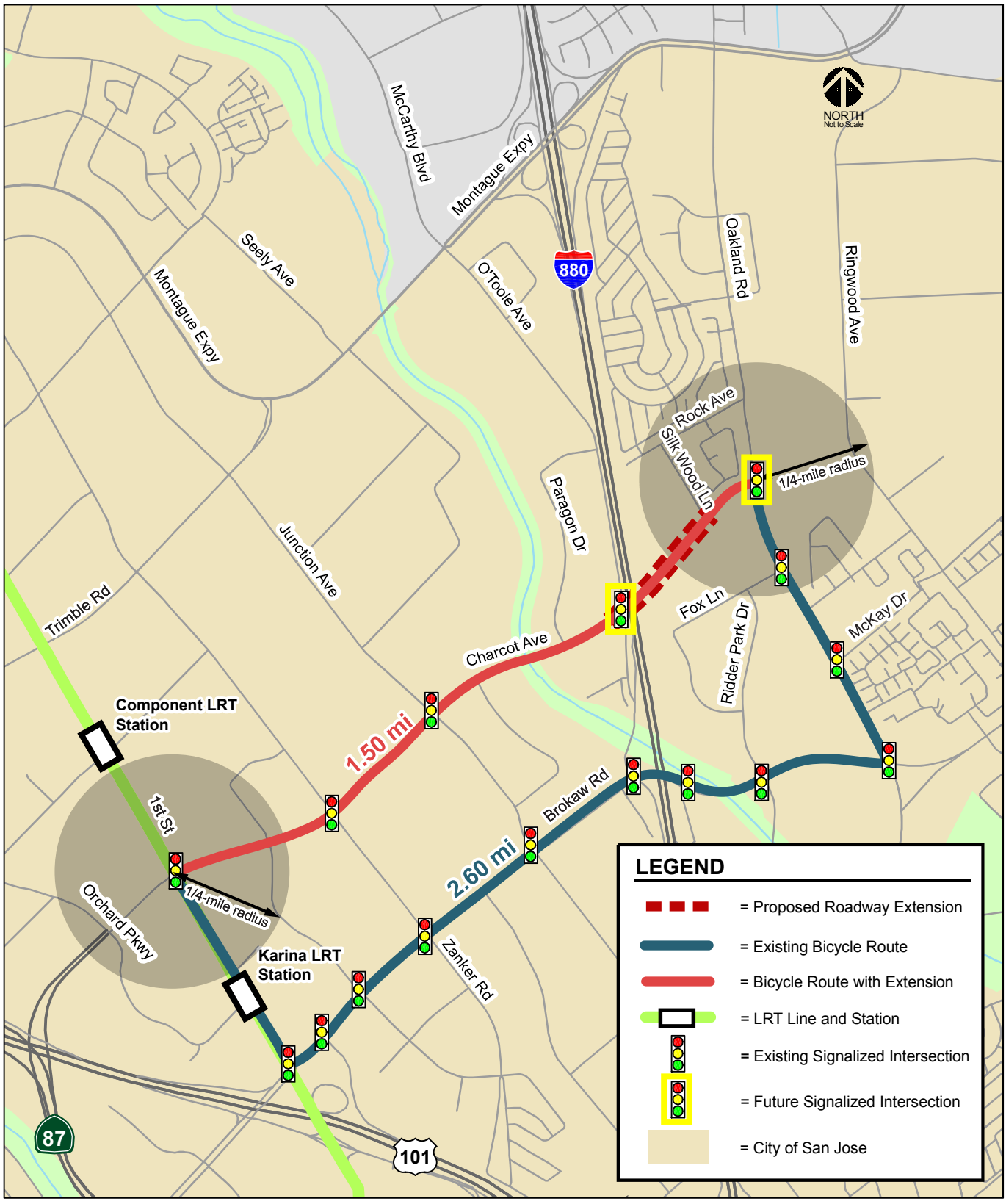
Bicycle and Pedestrian Circulation

The project includes new Class IV bike lanes and sidewalks along both sides of the proposed roadway extension. The new bicycle and pedestrian facilities of the project will provide for a safe crossing of I-880 for pedestrians and bicyclists that does not currently exist in the project area.

The current crossing of I-880 provided by Montague Expressway and Brokaw Road require lengthy travel routes from destinations within the immediate project area. As shown in Figure 14, bicyclists traveling between areas east of I-880 (in the vicinity of Oakland Road and Silk Wood Lane) and areas west of I-880 (including the Karina LRT Station on First Street) currently must utilize Brokaw Road. The approximately two-mile route requires traveling through congested roadway corridors, including Oakland Road and Brokaw Road, and ten or more signalized intersections. Therefore, it is likely that the length of the existing travel paths to cross I-880 and the need to negotiate multiple signalized intersections along high-volume roadways within the project area do not encourage the use of bicycles. With the proposed roadway extension, bicyclists could utilize Charcot Avenue between Oakland Road and First Street. The travel route across I-880 would be reduced by only ¼-mile with the Charcot Avenue extension. However, the travel time along the route provided by the Charcot Avenue extension would be greatly reduced and safety greatly improved since it will allow travel through fewer than five signalized intersections and along a less congested two-lane roadway with protected bike lanes.

Similarly, the current pedestrian routes across I-880 in the vicinity of the extension require the use of sidewalks along Brokaw Road or Montague Expressway. The current pedestrian routes between areas east of I-880 (near the vicinity of Oakland Road and Silk Wood Lane) and areas west of I-880 (near the vicinity of Paragon Drive and Charcot Avenue) require an approximately two-mile walk via Brokaw Road and 2.5 miles via Montague Expressway. In general, walking distances of more than ¾ of a mile are not ideal. Therefore, it is likely that the length of the existing travel paths to cross I-880 within the project area do not encourage walking. With the proposed extension, the pedestrian routes would be reduced to approximately ½-mile with the use of sidewalks provided with the Charcot Avenue extension.

Figure 14
Improved Bicycle Travel Routes



Therefore, the proposed roadway project will provide for a new safe crossing of I-880 in the project area and significantly shorten pedestrian and bicycle travel routes. The reduction in length of travel routes will provide the opportunity to utilize walking and bicycling as an alternative travel mode and reduce automobile trips in the project area. Bicyclists, in particular, would be able to utilize existing bike lanes along Charcot Avenue as a faster alternative to bike lanes along Brokaw Road. In addition, the Envision 2040 General Plan identifies the following goals regarding bicycling and pedestrians:

- Provide a continuous pedestrian and bicycle system to enhance connectivity throughout the City by completing missing segments.
- Build pedestrian and bicycle improvements at the same time as improvements for vehicular circulation.
- Give priority to pedestrian improvement projects that improve pedestrian safety, improve pedestrian access to and within growth areas.

The project improvements to the bicycle network will provide the project site with improved connections to surrounding pedestrian/bike and transit facilities and a balanced transportation system as outlined in the Envision 2040 General Plan goals and policies.

Other Transportation Issues

Project Alternatives

In 2005, the City of San Jose completed an areawide study for planned growth in the North San Jose area, the *North San Jose Area Development Policy (NSJADP) Environmental Impact Report (EIR), March 2005*. The NSJADP EIR included a traffic analysis that evaluated the effects of planned development growth on the roadway system and identified several major roadway improvement projects that would be necessary to serve the planned North San Jose growth. In addition to the widening of Montague Expressway from six to eight lanes, the NSJADP EIR also identified the need to extend Charcot Avenue over I-880 to provide an alternative east-west route to the already congested roadways of Brokaw Road and Montague Expressway.

The extension of Charcot Avenue over I-880 is proposed to be located between two major arterials, Brokaw Road and Montague Expressway. Each of the two roadways serves as a major east-west travel corridor between major regional freeways, US 101 and I-680, and the Cities of Milpitas, San Jose, and Santa Clara. Interchanges along both Brokaw Road and Montague Expressway also provide access to I-880. The roadways currently experience traffic congestion due to the large traffic volumes and reduced travel speeds and congestion along both roadways is projected to increase due to the planned development growth in the North San Jose area.

Local Serving

Unlike Brokaw Road and Montague Expressway, the Charcot overpass of I-880 will not provide access to I-880. Instead, the two-lane roadway would primarily serve as a local connection across I-880 between Oakland Road and Zanker Road. The extension will be of greatest benefit to residents and employees within the area bound by Montague Expressway, Lundy Avenue, Brokaw Road, and Zanker Road by providing an alternative east-west route to the regional serving congested Brokaw Road and Montague Expressway. In addition, the proposed Charcot Avenue overcrossing would provide for a safe crossing of I-880 for pedestrians and bicyclists that does not currently exist in the project area.

Alternative Corridors and Alignments

For many years dating back since 1994 when the City adopted its 2020 General Plan, the City has planned and maintained right-of-way for the proposed alignment of the Charcot Avenue extension over I-

880 from its current terminus at O'Toole Avenue on the west side of I-880 to the current alignment of Silkwood Lane near Oakland Road. This fact notwithstanding, alternatives to the construction of Charcot Avenue extension as planned could fall into two categories: 1) alternative alignments and/or 2) improvement of other roadways. These could include the widening of Montague Expressway, widening of Brokaw Road, improvements along Brokaw Road and Montague Expressway to reduce congestion, or alternative crossing locations of I-880. However, as discussed below, these alternatives will not meet the intended goals of the project.

Montague Expressway/Brokaw Road Improvement

Widening of Montague Expressway beyond its planned eight-lanes or widening of Brokaw Road would require significant right-of-way acquisition. The widening of Montague Expressway and Brokaw Road also may not result in improved east-west travel due to capacity constraints at their connections to major regional freeways including their interchanges with I-880. It is likely that the capacity constraints (ramp meters) at freeway ramps and congestion on the freeway mainline could result in blockage of travel lanes on both roadways even with widening. The improvement of access to and from I-880 also would provide minimal benefit to operations along Brokaw Road and Montague Expressway due to congestion on the freeway mainline that restricts flow onto the freeway.

Alternative Alignments and Locations

An alternative alignment that consisted of an overpass from the Charcot Avenue terminus at O'Toole Avenue across I-880 to Fox Lane was considered. However, the use of Fox Lane as an extension alignment alternative would require acquisition of right-of way and elimination of property access along the north side of Fox Lane. In addition, the Fox Lane alignment would require the removal of existing buildings on the east side of I-880 to accommodate the alignment alternative. In addition, the use of Fox Lane for the Charcot extension would result in increased traffic volumes along the Orchard School frontage, which provides access to the school's designated student drop-off/pick-up area. The Fox Lane alignment also would result in a connection to Oakland Road that would be located in close proximity to the Union Pacific Railroad (UPRR) tracks that cross Oakland Road approximately 240 feet south of Fox Lane. Increased demand at the northbound left-turn movement from northbound Oakland Road to westbound Fox Lane (to the planned Charcot Extension) could result in vehicle queues that extend back from the Oakland Road/Fox Lane intersection and through the UPRR tracks.

Furthermore, alternative locations for the two-lane overcrossing of I-880, such as points south of Brokaw Road would not meet the intended goals of the roadway improvement project that include the following:

- Provide an alternative route to areas on the east and west sides of I-880 between Montague Expressway and Brokaw Road.
- Provide a safe alternative east-west travel route to the predominately vehicle oriented major arterials of Brokaw Road and Montague Expressway for pedestrians and bicyclists.
- Reduce traffic volumes along Montague Expressway and Brokaw Road.

The alternative of locating the crossing north of Montague Expressway or south of Brokaw Road would not meet goals listed in the first and third bullet points listed above, as it would not be effective in alleviating existing and projected roadway congestion, since these two major arterials would continue to provide more direct access with wider lanes and greater speed limits across I-880.

Quantitative Travel Time Evaluation

It is anticipated that the proposed Charcot Extension will reduce travel times for residents and employees within the immediate project area. The projections of traffic volumes, VMT, and VHT provide an estimation of the effects the extension may have on travel times based on extensive traffic modeling.

However, a quantitative evaluation of travel times without and with the proposed roadway extension was completed as a supplement to the traffic modeling.

The evaluation consisted of estimates of travel times to and from major residential and employment destinations within a general two-mile radius of the Charcot Extension. The use of the proposed extension is expected to be minimal outside of a two-mile radius since other roadways, including Montague Expressway (8-lane roadway) and Brokaw Road (6-lane roadway) will continue to provide greater capacity and speed limits than the proposed two-lane roadway extension.

The evaluation utilized Google Maps navigation to estimate current travel times during the morning and evening commute periods to and from destinations on the west and east sides of I-880 within the general two-mile radius. Travel times between the selected origins and destinations were projected assuming that it would take approximately 30 seconds to travel between Oakland Road and O'Toole Avenue via the proposed extension. Figure 15 presents a graphical summary of the travel time evaluation. Table 12 shows the estimated travel time reductions due to the proposed extension.

Highlights of the conclusions of the travel time evaluation are as follows:

- The proposed Charcot extension would provide the greatest reduction in travel times for trips with origins and destinations that are located between Montague Expressway and Brokaw Road. The estimated reduction would vary from one to nine minutes, which equates to a 12 to 60 percent decrease.
- The proposed extension is projected to result in only minimal (i.e., less than three minutes) reductions in travel times for trips with origins and destinations that are located near Montague Expressway and Brokaw Road.

Projected Truck Traffic

Use of the proposed Charcot Avenue extension by large trucks (semis) will not be prohibited. However, it is unlikely that a substantial amount of large trucks will utilize the extension since Montague Expressway and Brokaw Road provide the most direct access routes to regional freeways including US 101, I-680, and I-880. Based on traffic count data collected in September 2018, the percentage of daily traffic volumes on Montague Expressway and Brokaw Road that is comprised of large trucks ranges from 5 to 12 percent with an average of 8 percent. Typical truck traffic percentages on other roadways in the project area range between 1 to 17 percent with an average of 7 percent, as shown in Table 13.

Truck traffic on the proposed Charcot extension is anticipated to be limited to only those trucks originating from or bound for destinations along Charcot Avenue between Oakland Road and Zanker Road. In addition, the Charcot Avenue extension will not provide direct access to US 101, I-680, and I-880. Therefore, it is expected that the composition of truck traffic along the Charcot Avenue extension would be less than that currently along Montague Expressway and Brokaw Road, and comparable to the 7 percent average on other roadways in the project area.

Orchard School Drop-Off and Pick-Up Operations

The proposed Charcot Avenue extension is limited to physical improvements along the northern boundary of an elementary/middle school, Orchard School, located along Oakland Road between Silkwood Lane and Fox Avenue. The school's primary entrances and parking lot are located along Fox Avenue. In addition, there is an access to the school's event center parking lot along Oakland Road, approximately 520 feet from the Oakland Road/Charcot Avenue intersection. Therefore, it is not anticipated that the proposed Charcot Avenue extension would have an adverse effect on the school's access.

The current Orchard School drop-off and pick-up operations were observed to evaluate the potential effects of the proposed Charcot Avenue extension on areas where student drop-off and pick-up activities

Figure 15
Travel Time Reductions

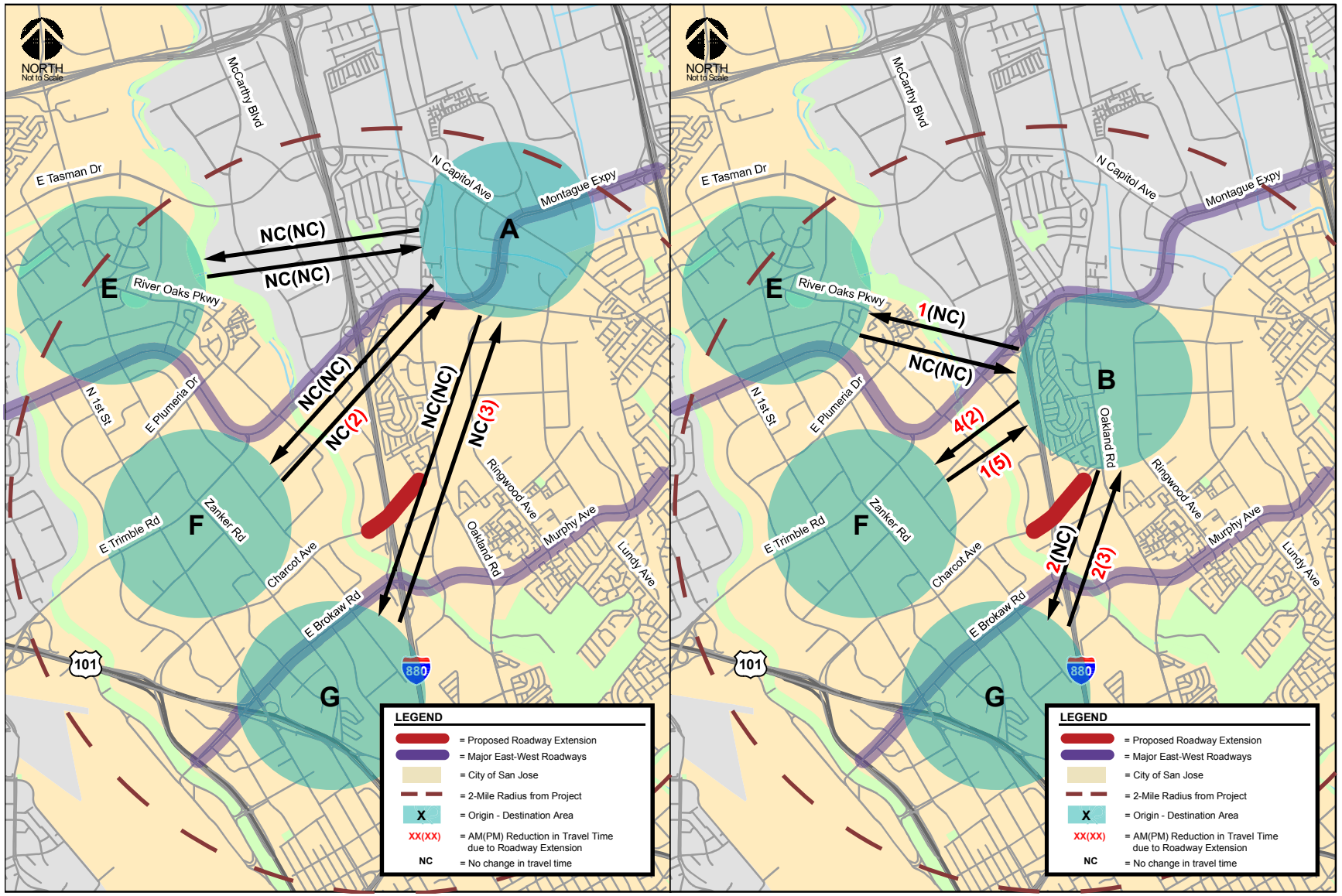


Figure 15 (cont.)
Travel Time Reductions

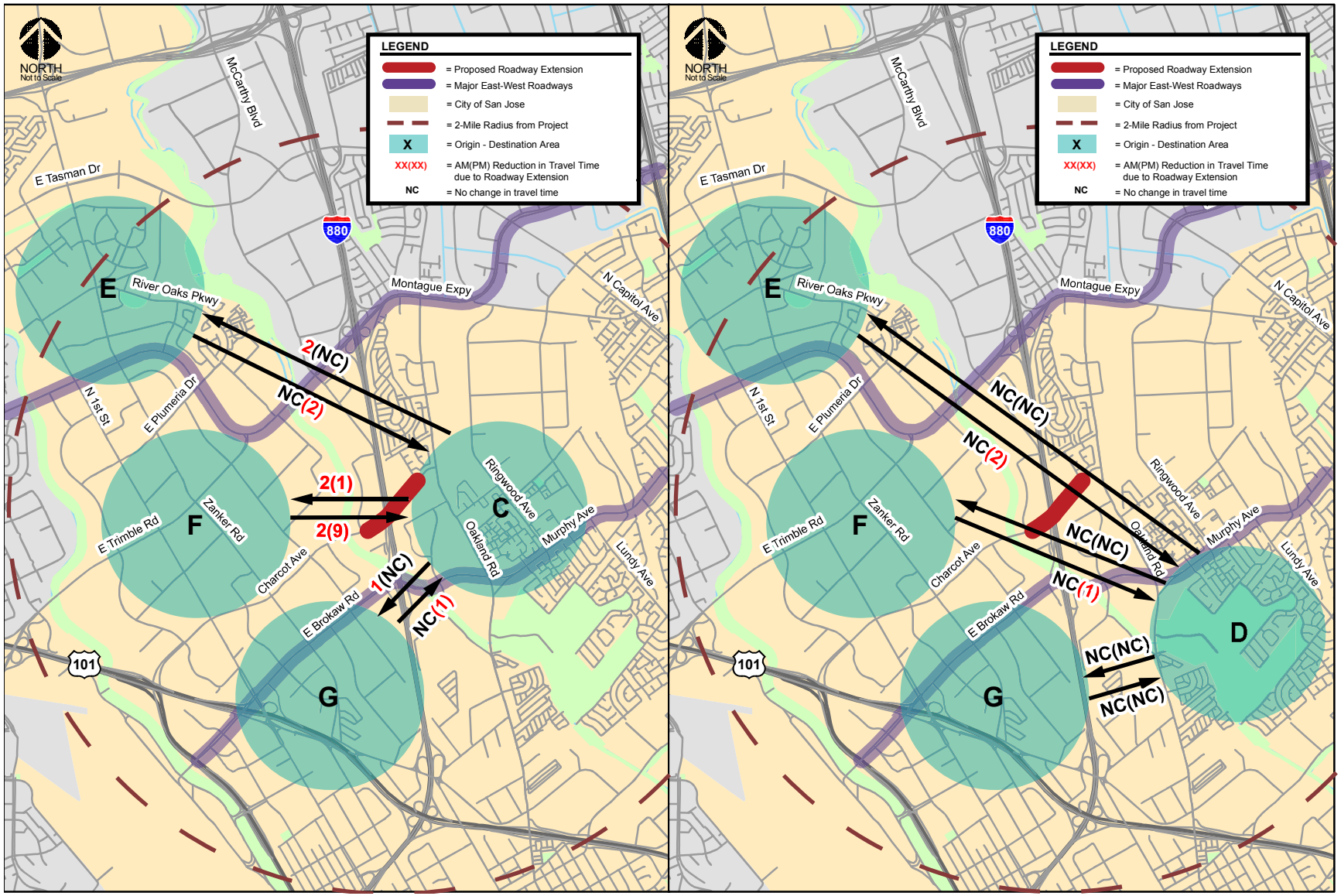


Table 12
Reduction in Travel Times Due to Charcot Extension

Origin	Destination	Peak Hour	Westbound Travel Times (min) via shortest existing route	Westbound Travel Times (min) via Charcot extension	Westbound Travel Times (min) Reduction	Eastbound Travel Times (min) via shortest existing route	Eastbound Travel Times (min) via Charcot extension	Eastbound Travel Times (min) Reduction
A	E	AM	13	17	none	7	12	none
		PM	6	12	none	10	12	none
	F	AM	12	12	none	5	7	none
		PM	7	7	none	9	**7**	2
	G	AM	12	13	none	7	8	none
		PM	9	9	none	11	**8**	3
B	E	AM	10	**9**	1	7	9	none
		PM	7	9	none	10	10	none
	F	AM	8	**4**	4	6	**5**	1
		PM	6	**4**	2	10	**5**	5
	G	AM	8	**6**	2	8	**6**	2
		PM	6	6	none	9	**6**	3
C	E	AM	13	**11**	2	9	11	none
		PM	9	10	none	13	**11**	2
	F	AM	8	**6**	2	8	**6**	2
		PM	6	**5**	1	15	**6**	9
	G	AM	8	**7**	1	7	7	none
		PM	6	7	none	8	**7**	1
D	E	AM	13	13	none	11	12	none
		PM	10	11	none	14	**12**	2
	F	AM	7	8	none	6	7	none
		PM	5	6	none	8	**7**	1
	G	AM	9	10	none	6	8	none
		PM	5	8	none	7	8	none

Notes:
Travel time data collected from Google Maps between October 9, 2018 and October 11, 2018.
Travel times denoted in **bold** indicate less travel time with the Charcot extension compared to travel time using the shortest existing route.

occur and determine if the planned extension of Charcot Avenue and associated intersection adjustments at Oakland Road and Charcot Avenue will require adjustment of current school access and drop-off and pick-up operations. The observations were conducted on September 25th and 26th 2018, which were normal school days during the morning drop-off (7:30-8:30 am) and afternoon pick-up (2:15-3:00 pm) periods.

Current School Site Access and Drop-Off/Pick-Up Activities

Orchard School is currently served by three driveways along Fox Lane that provide access to two on-site parking lots and one driveway along Oakland Road that provides access to the school's event center. There is no vehicular access to the school provided along Silkwood Lane. Further, parking or stopping along the south side of Silkwood Lane at any time of day is currently prohibited.

Each of the school driveways and location of drop-off and pick-up activities are shown in Figure 16.

Table 13
Heavy Vehicle Percentages on Roadways Near Project

#	Roadway	Location	ADT		
				Heavy Vehicles	
			Total	Volume	Percent
1	Charcot Avenue	East of 1st Street	11,854	984	8%
2	Charcot Avenue	East of Zanker Road	8,286	477	6%
3	Charcot Avenue	East of Junction Avenue	7,673	488	6%
4	Silkwood Lane	West of Oakland Road	688	7	1%
5	Brokaw Road	East of Zanker Road	31,476	1,615	5%
6	**Brokaw Road**	**East of Junction Avenue**	**36,828**	**3,736**	**10%**
7	**Brokaw Road**	**West of Oakland Road**	**35,115**	**1,779**	**5%**
8	Trimble Road	East of Zanker Road	26,180	2,275	9%
9	Trimble Road	East of Junction Avenue	23,634	2,115	9%
10	**Montague Expressway**	**East of Seely Avenue**	**52,583**	**6,478**	**12%**
11	**Montague Expressway**	**West of Oakland Road**	**50,953**	**2,331**	**5%**
12	Zanker Road	South of Trimble Road	17,453	1,015	6%
13	Zanker Road	North of Brokaw Road	17,192	725	4%
14	Junction Avenue	South of Trimble Road	10,188	718	7%
15	Junction Avenue	North of Brokaw Road	11,863	1,438	12%
16	Oakland Road	North of Silkwood Lane	19,747	654	3%
17	Oakland Road	South of Silkwood Lane	18,501	935	5%
18	Ridder Park Drive	North of Oakland Road	6,644	275	4%
19	Fox Lane	West of Oakland Road	6,062	143	2%
20	Silkwood Lane	South of Rock Avenue	530	17	3%
21	Rock Avenue	West of Oakland Road	3,146	61	2%
22	O'Toole Avenue	South of Montague Expressway	7,864	1,366	17%
23	O'Toole Avenue	North of Charcot Avenue	6,538	807	12%
24	O'Toole Avenue	South of Charcot Avenue	4,015	230	6%
25	Paragon Drive	North of Charcot Avenue	1,371	161	12%
		Average of All Segments			**7%**
		Average of Montague and Brokaw (6, 7, 10, & 11)			**8%**

Fox Lane

The school parking lot along Fox Lane serves as the designated school drop-off/pick-up area. The school parking lot on Fox lane, as well as curb-parking along the northside of Fox Lane, are heavily used during morning drop-offs and afternoon pick-ups. The northside curb of Fox Lane has designated loading zones. Fox Lane has a posted 25 mph speed limit along the school frontage. Striped crosswalks are provided along the south and east legs of the Ridder Park Drive and Fox Lane stop-controlled intersection. Crosswalks and pedestrian signal heads are provided at the signalized Fox Lane and Oakland Road intersection. Crossing guards were located at both the Fox Lane/Ridder Park Drive and Fox Lane/Oakland Road intersections during drop-off/pick-up periods. Parents also were observed to utilize adjacent private parking lots along Ridder Park Drive to park and walk children onto campus. Parking is not permitted along the south side of Fox Lane between Oakland Road and Ridder Park at

Figure 16
Orchard School Driveways and Drop-off/Pick-up Activities

any time during the day, however parents were observed to utilize the south side of Fox Lane to drop-off/pick-up students.

Oakland Road

The school's event center parking lot along Oakland Road also was observed to be utilized to drop-off and pick-up students. However, the use of the event center parking for student drop-off/pick-up was minimal when compared to activities along Fox Lane and Silkwood Lane. Drop-off/pick-up activity along Oakland Road mostly consisted of parents entering the event center parking lot to drop-off/pick-up students, and a few students were dropped-off/picked-up along the curb on west side of Oakland Road.

Silkwood Lane

There is no vehicular access to the school or school parking lot along Silkwood Lane. The south side of Silkwood Lane along the school property is posted as a no stopping zone at any time. However, the north side of Silkwood Lane provides on-street parking. There is a school access gate on Silkwood Lane that is open during the morning drop-off and afternoon pick-up periods. The access gate is heavily used by students that are dropped-off and picked-up by parents that are driving a vehicle despite the fact that there are no explicitly marked loading zones or signage on Silkwood Lane.

Though Silkwood Lane is not a designated school drop-off/pick-up area, it was observed to be heavily used to drop-off/pick-up students. During the school drop-off/pick-up periods parents were observed to park along the extent of Silkwood Lane, including illegally along the south side of Silkwood Lane, to walk children onto campus and/or wait for students to arrive for pick-up. Parents also were observed to double-park along Silkwood Lane while dropping-off and picking-up students.

Proposed School Drop-Off/Pick-Up Adjustments

The Charcot extension will have no effect on the school's access points, drop-off/pick-up areas, and/or parking lots that are located on Fox Lane and Oakland Road.

With the Charcot extension in place, it will no longer be possible for cars to illegally stop/park along the south side of Silkwood Lane to drop-off, pick-up, or wait for students. Further, the project will remove the existing on-street parking along the north side of Silkwood Lane. These changes will substantially curtail this informal use of Silkwood Lane for student drop-off/pick-up because the only remaining on-street parking will be along the north-south segment of Silkwood Lane that connects to Rock Avenue. This, in turn, will result in a greater use of the official Oakland Road and Fox Lane drop-off/pick-up areas.

It is recommended that Orchard School consider a review of the school drop-off/pick-up plan and procedures and implement measures to reduce adverse effects on surrounding businesses and residential areas during the school drop-off/pick-up periods. Since Silkwood Lane is not a designated school drop-off/pick-up area, parents should be directed to only use designated drop-off/pick-up areas along Oakland Road and Fox Lane. Staggered arrival and dismissal schedules should be considered given the physical limitations of the use of public streets and school parking lots to accommodate the current demand of the school.

Although the project will impact the ability to drop-off/pick-up students on Silkwood Lane, it is likely that students will continue to cross Charcot Avenue/Silkwood Lane as they walk between the school and the neighborhood to the north. To enhance safety for students and all pedestrians crossing Charcot Avenue at this location, the following features will be constructed as part of the project:

- A new pedestrian-only signal such as a High-Intensity Activated crosswalk (HAWK) beacon will be installed along Charcot Avenue at Silkwood Lane.
- A median will be constructed along Charcot Avenue at Silkwood Lane to restrict left-turn movements.

- The width of the sidewalk on the south side of Charcot Avenue at Silkwood Lane will be widened to 11 feet. In addition, a 9-foot wide paved pedestrian path will be constructed next to the 11-foot wide sidewalk to connect to a gate at the school playground.
- The 11-foot wide sidewalk will narrow back to an 8-foot width along the segment of Charcot Avenue between Silkwood Lane and Oakland Road and extend around the northeastern corner of the existing Orchard School ball field.

Silkwood Lane Cut-Through and Rock Avenue Traffic Diversion

The following discussion describes two scenarios of trip diversion that would affect traffic volumes on the streets of the neighborhood located between Silkwood Lane and Rock Avenue. The potential trip diversion routes are shown on Figure 17.

Trip Diversion Scenario #1: A median along the proposed Charcot Avenue extension, at its intersection with Silkwood Lane, is proposed to be constructed to restrict turn-movements at the intersection to right-turns to and from Silkwood Lane only. The turn restrictions at Silkwood Lane will result in a diversion of traffic originating from the neighborhood along Silkwood Lane that would be bound for Oakland Road to instead use Rock Avenue to access Oakland Road. It is estimated that approximately 22 AM peak-hour vehicles and 19 PM peak-hour vehicles would be diverted to Rock Avenue with the turn restrictions at Silkwood Lane along Charcot Avenue. The Oakland Road/Rock Avenue intersection currently operates at LOS B conditions during each of the peak hours. The turn restrictions on Silkwood Lane and resulting traffic diversion would not degrade operations at the Oakland Road/Rock Avenue intersection. Further, the traffic that would be diverted to Rock Avenue is already currently utilizing the internal residential streets of the Silkwood neighborhood and, therefore, would have minimal effect on the neighborhood streets and Rock Avenue.

Trip Diversion Scenario #2: With the proposed Charcot Avenue extension, Silkwood Lane will intersect the new extended Charcot Avenue. As described above, a median is proposed to restrict turn-movements at the intersection to right-turns to and from Silkwood Lane only. However, Silkwood Lane will continue to provide access to Rock Avenue. Therefore, it is possible that drivers may utilize Silkwood Lane as a cut-through route. Drivers travelling along southbound Oakland Road that are bound for westbound Charcot Avenue may choose to use Silkwood Lane as a bypass to avoid congestion and delays at the Oakland Road/Charcot Avenue intersection. Silkwood Lane and Rock Avenue are narrow residential streets with on-street parking along both sides of the streets and speed limits of 25 mph and do not provide for the free-flow of travel as does the six-lane Oakland Road with posted speed limit of 45-mph. In addition, the use of Silkwood Lane results in an increase in travel distance of 0.1-mile when compared to the use of Oakland Road. Therefore, the use of Silkwood Lane as a bypass will be dependent on delay at the Oakland Road/Charcot Avenue intersection and perceived travel time reduction experienced by drivers. Based on the projected southbound right-turn volume at the Oakland Road/Charcot Avenue intersection, it is estimated that approximately 129 AM peak-hour vehicles, and 54 PM peak-hour vehicles could potentially use Silkwood Lane as a cut-through route. Should this volume of cut-through traffic occur, it would represent an increase of peak hour traffic volumes of nearly twice the existing volumes along Silkwood Lane.

Potential Traffic Calming Measures

The recommended median and turn-restrictions along the proposed Charcot Avenue extension, at its intersection with Silkwood Lane, will minimize increases in traffic volumes along Silkwood Lane. In addition, the use of Silkwood Lane as a cut-through route is expected to be minimal. Nevertheless, the effects of a roadway project such as the proposed Charcot Avenue extension on surrounding residential streets like Silkwood Lane are of concern.

Figure 17
Potential Silkwood Lane Cut-Through and Traffic Diversion

In order to minimize any potential adverse effects of traffic conditions along Silkwood Lane, traffic calming measures can be considered for implementation along Silkwood Lane. As an example, Silkwood Lane can be narrowed at its intersections with Charcot Avenue and Rock Avenue by extending the curb radius into the street. Curb extensions are commonly referred to as bulb-outs. Bulb-outs typically shorten the pedestrian crossing lengths, keep the vehicle speeds low and allow better pedestrian visibility around parked cars. However, bulb-outs result in a loss of on-street parking and also impede emergency response vehicles and other trucks. Any traffic calming measures should be evaluated as part of a traffic calming study for the area.

8. Conclusions

This report presented the results of a Transportation Analysis (TA) for the proposed Charcot Avenue extension over I-880 (project) in San Jose, California. The proposed extension of Charcot Avenue would begin in the vicinity of Paragon Drive, on the west side of I-880, extend over I-880, and connect to Silkwood Lane, east of I-880. It is important to note that the extension of Charcot as proposed is included as part of the adopted *Envision San Jose 2040 General Plan* roadway network and planned roadway network of the North San Jose Area Development Policy (NSJADP).

The transportation analysis of the project was evaluated following the standards and methodologies set forth in the City of San Jose's *Transportation Analysis Handbook 2018*, and the updated CEQA traffic analysis guidelines, *CEQA VMT Final Guidelines* (November 2017).

CEQA VMT Analysis

The City of San Jose *Transportation Analysis Handbook,* April 2018 provides screening criteria that determines whether a CEQA transportation analysis would be required for transportation projects. The criteria are based on the type of project and its resulting changes to the transportation system. If a project meets the City's screening criteria, the project is expected to result in less-than-significant VMT impacts and a detailed CEQA VMT analysis is not required.

The proposed project will result in the addition of roadway capacity to the Citywide roadway network that may result in an increase in VMT. However, the project also includes new Class IV separated bike lanes and sidewalks along both sides of the roadway extension that will provide for a safe crossing of I-880 for pedestrians and bicyclists that does not currently exist in the project area. The proposed roadway project will shorten pedestrian and bicycle travel routes and provide the opportunity to utilize walking and bicycling as an alternative travel mode and reduce automobile trips in the project area consistent with the Envision 2040 General Plan goals and policies. The proposed roadway extension will meet the transportation project screening criteria since it will improve conditions for pedestrians, bicyclists, and transit. Therefore, per San Jose Transportation Analysis Policy 5-1, the project is presumed to have less-than-significant transportation impact and is screened from a detailed CEQA transportation analysis. However, for informational purposes, a VMT evaluation for the project was completed and included within this study.

The VMT evaluation results show that the proposed Charcot extension would result in only a negligible increase, less than 0.2 percent, in VMT in the project area. The projected increase in VMT also would be less than the established VMT impact thresholds. Therefore, the proposed project would not result in an impact on the transportation system based on the City's VMT impact criteria.

Local Transportation Analysis Scope

A local transportation analysis (LTA) supplements the CEQA VMT analysis and identifies transportation and traffic operational issues that may arise due to the proposed project. The LTA provides a review of the proposed lane configurations at each of the intersections along the planned Charcot Avenue extension. In addition, the LTA analysis also includes an evaluation of average daily traffic (ADT) volumes and speeds on 25 roadway segments and Vehicle-Hours-Traveled (VHT) in the project area.

Intersection Operations Analysis

The LTA includes an operations analysis to aid in the design of necessary lane configurations, lane storage needs, and intersection control at the intersections along the proposed roadway extension. Table 14 summarizes the recommended intersection lane geometry and controls for the project intersections.

Table 14
Recommended Intersection Lane Geometry and Controls

#	Intersection	Control	Recommended Lane Geometry
1	Paragon Drive and Charcot Avenue	Signal	Install a traffic signal at the Paragon Drive and Charcot Avenue intersection with safety measures, such as advanced warning beacons, signage, and signal design) to address potential sight distance issues for travel along Charcot Avenue.
2	O'Toole Avenue and Charcot Avenue	Signal	Install a traffic signal at the new Charcot Avenue/O'Toole Avenue intersection. It is recommended that the new traffic signals at the Paragon Drive and O'Toole Avenue intersections with Charcot Avenue be coordinated to minimize the eastbound vehicle queue on the Charcot Avenue ramp.
3	Silkwood Lane and Charcot Avenue	SB Stop-Controlled	Restrict turn movements at the Silkwood Lane and Charcot Avenue intersection to right-turns only. A median should be constructed along Charcot Avenue at Silkwood Lane. Due to the large projected traffic volumes and limited sight distance along Charcot Avenue, an uncontrolled crosswalk on Charcot Avenue at its intersection with Silkwood Lane is not recommended. A new pedestrian only signal or High-Intensity Activated crosswalk (HAWK) beacon at the Silkwood Lane intersection should be considered should a new access to the school be provided along Charcot Avenue. However, to minimize queues along Charcot Avenue, no left turn-movements to or from Silkwood Lane should be allowed at the crossing point.
4	Oakland Road and Charcot Avenue	Signal	Provide two northbound left-turn pockets that are a minimum of 375 feet on the northbound approach (Oakland Road). Provide an exclusive left-turn lane and shared left and right turn lane on the eastbound approach (Charcot Avenue).
	Alternative Lane Geometrics		
	With one NB Left-Turn Lane		The projected northbound left-turn queue is projected to increase to 575 feet and peak hour delays will increase slightly on all approaches should only a single left-turn lane be provided.
	With no Exclusive EB Left-Turn Lane		The eastbound queue would increase to 850 feet and PM peak hour LOS would degrade to LOS D should the planned exclusive left-turn lane not be provided.

Roadway Segment Analysis

An evaluation of projected ADT and speeds on roadway segments in the project area also was completed using existing and projected traffic volumes without and with the proposed roadway extension.

The evaluation of roadway segment ADTs indicate that the Charcot extension will result in additional roadway system capacity and reduce traffic volumes and congestion on parallel roadways. It is important to note that roadway improvement projects, unlike development projects, typically do not generate new vehicle trips that are added to the roadway system. Rather roadway improvement projects, such as the proposed project, provide additional roadway system capacity to accommodate traffic that is currently and projected to be on the roadway system regardless of the contemplated roadway improvement project. Roadway improvement projects are necessary to provide increased roadway capacity, better connectivity, improved traffic operations, and/or enhance the safety of all users of the roadway system including pedestrians and bicyclists.

Supplemental VHT and Travel Speed Evaluation

The results of the VMT, VHT and travel speed evaluation indicate that the Charcot extension would reduce travel time and improve travel speed on roadways in the study area.

Bicycle and Pedestrian Circulation

The proposed roadway project will provide for a new safe crossing of I-880 in the project area and significantly shorten pedestrian and bicycle travel routes. The reduction in travel routes will provide the opportunity to utilize walking and bicycling as an alternative travel mode and reduce automobile trips in the project area. In addition, the Envision 2040 General Plan identifies the following goals regarding bicycling and pedestrians:

- Provide a continuous pedestrian and bicycle system to enhance connectivity throughout the City by completing missing segments.
- Build pedestrian and bicycle improvements at the same time as improvements for vehicular circulation.
- Give priority to pedestrian improvement projects that improve pedestrian safety, improve pedestrian access to and within growth areas.

The project improvements to the bicycle network will provide the project site with improved connections to surrounding pedestrian/bike and transit facilities and a balanced transportation system as outlined in the Envision 2040 General Plan goals and policies.