Hatch Mott MacDonald

181 Metro Drive, Suite 510
San Jose, CA 95110
T 408-572-8800
www.hatchmott.com

Sheraton Hotel Expansion

1100 N. Mathilda Avenue

SUNNYVALE, CALIFORNIA

TRAFFIC IMPACT ANALYSIS

FINAL REPORT

Prepared For

City of Sunnyvale
456 W. Olive Avenue
Sunnyvale, California 94086

October 24, 2014

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Executive Summary

This report presents the results of the transportation impact analysis (TIA) for the proposed expansion of the Sheraton Hotel located at 1100 N. Mathilda Avenue in the City of Sunnyvale.

The purpose of this analysis is to identify potentially significant impacts of the proposed project to the transportation system. This study follows the guidelines and procedures of the City of Sunnyvale and the Valley Transportation Authority (VTA), the Santa Clara County Congestion Management Agency (CMA).

The Sheraton Hotel currently has 173 guest rooms and 295 parking spaces. The proposed project involves the demolition of an existing 2-story building with 63 guest rooms and the construction of a 9-story building with 232 guest rooms, for a final total of 342 guest rooms. The new 9-story building will have 2 ballrooms as well as maid, laundry and maintenance space on the first floor. Guest rooms will be located on floors 2 through 9. The project also includes the construction of a 3-level, 166-space parking garage that will displace 56 existing surface parking spaces, for a final total of 405 parking spaces. The existing 10,000 square-foot restaurant on the project site will remain.

Project Trip Generation

Project trip generation was estimated based on the Institute of Transportation Engineers' (ITE) *Trip Generation* handbook, 9th Edition, 2012. The project is estimated to generate 1,508 new daily trips, of which 113 will be generated during the AM peak hour (66 in, 47 out) and 118 will be generated during the PM peak hour (58 in, 60 out).

Project Impacts and Mitigation Measures

Existing Plus Project Conditions

Based on City of Sunnyvale and VTA impact criteria, the proposed project is expected to have a less-than-significant impact at all study intersections.

Background Plus Project Conditions

Based on City of Sunnyvale and VTA impact criteria, the project is expected to have a significant impact at the following intersections:

Int. #2 Mathilda Avenue / Moffett Park Drive

The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the AM and PM peak hours.

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to less-than-significant. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.

Int. #5 Bordeaux Drive / Moffett Park Drive
The addition of project traffic is projected to deteriorate operations at the worst approach from LOS E to LOS F during the PM peak hour.

This intersection is included as part of the Mathilda Avenue / SR 237 WB Ramps improvement project in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program. The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection and would result in the closure of Moffett Park Drive between Bordeaux Drive and Mathilda Avenue. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location and would reduce the impact to less-than-significant.

Cumulative Plus Project Conditions
Based on City of Sunnyvale and VTA impact criteria, the project is expected to have a significant impact at the following intersections:

Int. #2 Mathilda Avenue / Moffett Park Drive
The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the AM and PM peak hours.

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to less-than-significant. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.

Int. #3 Mathilda Avenue / SR 237 WB Ramp
The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the PM peak hour.

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included on the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.
The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements

would reduce the project's impacts to less-than-significant. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.

Int. #5 Bordeaux Drive / Moffett Park Drive
The addition of project traffic is projected to deteriorate operations at the worst approach from LOS E to LOS F during the PM peak hour.

This intersection is included as part of the Mathilda Avenue / SR 237 WB Ramps improvement project in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program. The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection and would result in the closure of Moffett Park Drive between Bordeaux Drive and Mathilda Avenue. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location and would reduce the impact to less-than-significant.

Transit, Bicycle and Pedestrian Facilities

The proposed project is not expected to generate a substantial amount of transit, bicycle or pedestrian activity and is not expected to significantly impact transit, bicycle or pedestrian facilities in the project vicinity.

Although not required, the installation of bike lockers should be considered to encourage an increase in bicycle trips to the project site.

There are no sidewalks along the north side of Moffett Park Drive and the west side of Bordeaux Drive along the project frontage. The project should install sidewalks along the project frontage. In addition, pedestrian connections should be provided between the proposed buildings, parking lots and parking garage.

Parking, Access and Circulation

The project site plan indicates that a total of 405 parking spaces will be provided on-site. On the basis of the parking calculations provided in Section 8 and the City of Sunnyvale municipal code, the parking provided on the site exceeds the minimum requirement by 131 spaces.

Based on the City of Sunnyvale municipal code for bicycle parking, the proposed project exceeds the minimum requirement of bicycle spaces by 23 spaces.

Access to the project will be from three existing driveways on Mathilda Avenue, Moffett Park Drive, and Bordeaux Drive. Due to a raised median on Mathilda Avenue, the existing driveway on Mathilda Avenue only provides right-in, right-out access. Based on the project site plan, on-site vehicular circulation appears to be satisfactory for the anticipated use.

1 Introduction

This report presents the transportation impact analysis for the expansion of the Sheraton Hotel located at 1100 N. Mathilda Avenue in the City of Sunnyvale. The proposed project includes the addition of 169 guest rooms and 110 parking spaces. **Figure 1** shows the location of the project site with respect to the local road network.

The purpose of this analysis is to identify potentially significant impacts of the proposed project to the transportation system. This study follows the guidelines and procedures of the City of Sunnyvale and the Valley Transportation Authority (VTA), the Santa Clara County Congestion Management Agency (CMA).

1.1 Project Description

The Sheraton Hotel currently has 173 guest rooms and 295 parking spaces. The proposed project involves the demolition of an existing 2-story building with 63 guest rooms and the construction of a 9-story building with 232 guest rooms, for a final total of 342 guest rooms. The new 9-story building will have 2 ballrooms as well as maid, laundry and maintenance space on the first floor. Guest rooms will be located on floors 2 through 9. The project also includes the construction of a 3-level, 166-space parking garage that will displace 56 existing surface parking spaces, for a final total of 405 parking spaces. The existing 10,000 square-foot restaurant on the project site will remain. **Figure 2** shows the project site plan.

1.2 Scope of Work

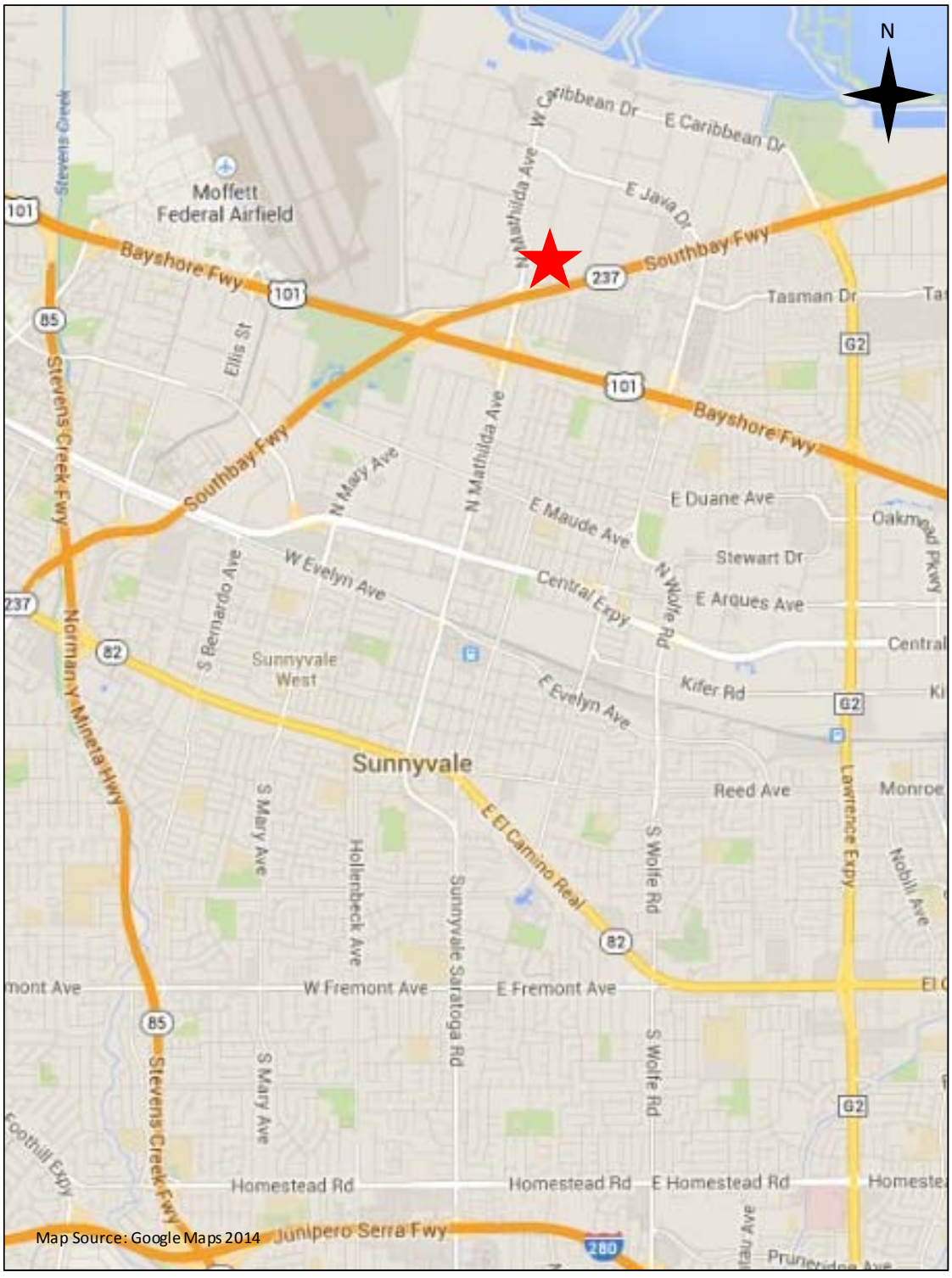
This traffic impact analysis includes an assessment of intersection traffic operations during the typical weekday AM and PM peak commute hours at the following intersections:

Study Intersections

1. US 101 Northbound Ramps / Moffett Park Drive
2. Mathilda Avenue / Moffett Park Drive
3. Mathilda Avenue / SR-237 Westbound Ramps
4. Mathilda Avenue / SR-237 Eastbound Ramps
5. Bordeaux Drive / Moffett Park Drive

The study intersections were selected based on VTA guidelines, and include intersections that the project is expected to add 10 or more peak hour trips per lane to any intersection movement. The project is not expected to add traffic equal to at least one percent of the capacity of freeway segments in the project vicinity (i.e., US 101 and SR-237) and therefore freeway segments were not included in the scope of this study. A table showing the freeway analysis requirement determination is provided in **Appendix A**. A map of the study intersections is provided in **Figure 3**.

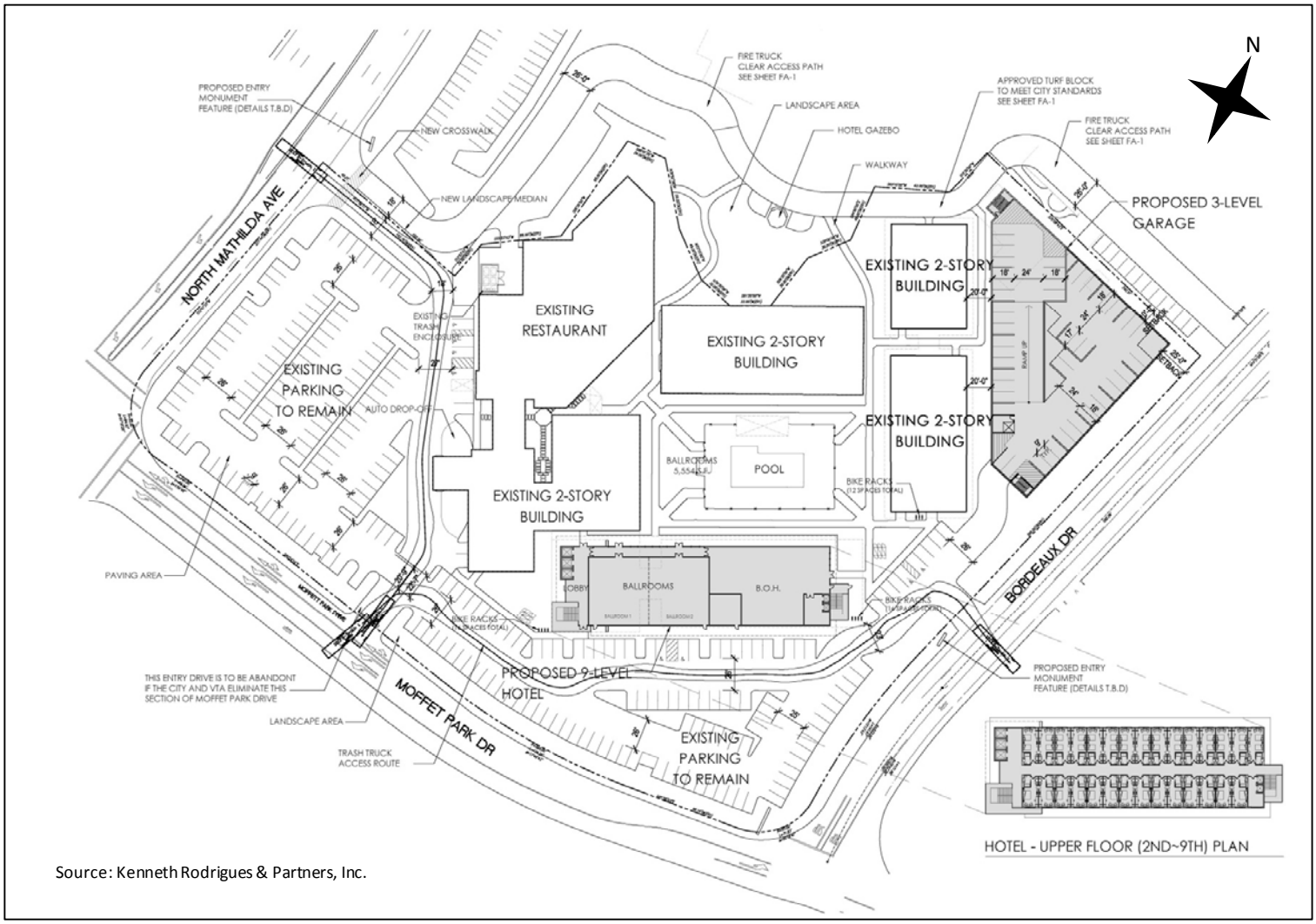
Figure 1
Project Location Map



LEGEND

★ Project Location

Figure 2
Project Site Plan



Source: Kenneth Rodrigues & Partners, Inc.

Figure 3
Project Study Intersections

LEGEND

Project Site

X Study Intersection

The traffic conditions analyzed for this study are described below.

1. Existing Conditions
   This study scenario provides a description of the existing roadway network, transit services, and bikeways that serve the project site. Existing traffic volumes are presented and existing intersection operations are described.

2. Existing Plus Project Conditions
   This study scenario evaluates the addition of project traffic to the existing conditions. This section of the report would identify project impacts, if any, and feasible mitigation measures to reduce impacts to insignificant levels, under existing traffic conditions.

3. Background Conditions (Existing Plus Approved But Not Yet Built Projects)
   This study scenario evaluates background conditions that are based on the sum of existing trips and trips from approved but not yet built developments in the project area.

4. Background Plus Project Conditions (Existing Plus Approved But Not Yet Built Projects Plus Project)
   This study scenario evaluates the addition of project trips to the background conditions. This section of the report would identify project impacts, if any, and feasible mitigation measures to reduce impacts to insignificant levels, under background traffic conditions.

5. Cumulative Conditions
   This study scenario evaluates near-term cumulative analysis conditions using the growth factors listed below to reach year 2019 conditions. This section of the report identifies cumulative impacts, if any, and feasible mitigation measures to reduce cumulative impacts to less than significant levels.

   Arterial Streets – 2% (AM Peak Hour) and 1.75% (PM Peak Hour)
   Collector Streets – 2.28% (AM Peak Hour) and 2.34% (PM Peak Hour)

1.3 Traffic Operation Evaluation Methodologies and LOS Standards

Intersection traffic operations were evaluated based on the Level of Service (LOS) concept. Intersection operations were evaluated using the TRAFFIX analysis software. LOS is a qualitative description of an intersection and roadway's operation, ranging from LOS A to LOS F. Level of service A represents free flow un-congested traffic conditions. Level of service F represents highly congested traffic conditions with unacceptable delay to vehicles on the road segments and at intersections. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes.

For signalized intersections, traffic operations are evaluated based on the overall average delay in seconds per vehicle. The average delay is then correlated to a level of service.

For two-way stop controlled intersections (i.e., Bordeaux Drive / Moffett Park Drive), the delay in seconds per vehicle at the worst approach is used to evaluate operations. The delay at the worst approach is then correlated to a level of service. LOS for each side street is based on the distribution of gaps in the major traffic stream and driver judgment in selecting gaps.

Appendix B provides additional information regarding levels of service for signalized and unsignalized intersections.

The City of Sunnyvale has established LOS D as the general threshold for acceptable traffic operations for signalized intersections. The VTA's minimum threshold for CMP intersections and intersections on CMP designated roadways is LOS E. Mathilda Avenue is designated as a CMP principal arterial; therefore, the maximum acceptable level of service for the following study intersections along Mathilda Avenue is LOS E:

2. Mathilda Avenue / Moffett Park Drive
3. Mathilda Avenue / SR-237 Westbound Ramps
4. Mathilda Avenue / SR-237 Eastbound Ramps

The City of Sunnyvale does not have a formally adopted minimum threshold for unsignalized intersections. For the purposes of this report a minimum threshold of LOS E in combination with the MUTCD peak hour signal warrant volume threshold was used.

1.4 Impact Criteria

CMP Intersections

The Mathilda Avenue / Moffett Park Drive, Mathilda Avenue / SR 237 WB Ramp and Mathilda Avenue / EB Ramp intersections are located on a CMP roadway. These intersections are therefore subject to the CMP significance criteria. LOS E is an acceptable operating condition for CMP intersections and the following significance criteria were applied to evaluate traffic impacts these intersections:

1. The addition of project-generated traffic causes operation of an intersection to deteriorate from an acceptable level of service (LOS E or better) to LOS F, or
2. For intersections already operating at LOS F, the impact would be significant if:
    i. Addition of the project traffic increases the average control delay for critical movements by four (4) seconds or more, and
    ii. Project traffic increases the critical volume-to-capacity (v/c) ratio by 0.01 or more, or
    iii. The critical v/c increases by 0.01 or more when the change in critical delay is negative.

City of Sunnyvale Signalized Intersections:

The US 101 NB Ramp / Moffett Park Drive intersection is signalized and is under the jurisdiction of the City of Sunnyvale.

The City of Sunnyvale has established criteria to determine the level of significance of traffic impacts based on standards set forth by the Sunnyvale General Plan. The following significance criteria were applied to evaluate traffic impacts at the signalized US 101 NB Ramp / Moffett Park Drive intersection:

1. The addition of project-generated traffic causes operation of an intersection to deteriorate from an acceptable level of service (LOS D or better) to LOS E or LOS F.
2. Exacerbation of unacceptable operations by increasing the average critical delay by more than 4 seconds and increasing the critical volume-to-capacity (V/C) ratio by 0.01 or more at an intersection already or forecasted to operate at LOS E or F.

City of Sunnyvale Unsignalized Intersections:

The Bordeaux Drive / Moffett Park Drive intersection is unsignalized and is under the jurisdiction of the City of Sunnyvale.

The City of Sunnyvale does not have significance criteria for unsignalized intersections. Based on previous studies and common industry practice, the following significance criteria were applied to evaluate traffic impacts at the unsignalized Bordeaux Drive / Moffett Park Drive intersection:

1. The addition of project-generated traffic causes operation of the worst movement/approach for a side-street stop-controlled intersection to deteriorate from an acceptable level of service (LOS E or better) to LOS F and the MUTCD peak hour signal warrant volume threshold is met, or
2. Project-generated traffic is added to an intersection already operating unacceptably and the MUTCD peak hour signal warrant volume threshold is met.

2 Existing Conditions

This section of the report evaluates existing conditions and includes a description of the project setting.

2.1 Local Road Network

The project is located at the northeast corner of N. Mathilda Avenue and Moffett Park Drive. The following roadways provide either regional or local access to the project site.

Mathilda Avenue is a major arterial that varies between six and seven lanes. It extends through Sunnyvale in a north-south orientation beginning at Sunnyvale-Saratoga Road and terminating at Caribbean Drive. Mathilda Avenue provides freeway access from the project site to SR 237 and US 101 and is a designated truck route within the City of Sunnyvale. The Average Daily Traffic (ADT) on Mathilda Avenue between SR 237 and Lockheed Martin Way is approximately 20,000 vehicles per day[1]. The posted speed limit on Mathilda Avenue in the vicinity of the project is 45 mph.

Moffett Park Drive is a two-lane collector roadway located along the southern boundary of the project site. It is oriented in an east-west direction and provides regional access from the project site to SR 237 and US 101. The ADT on Moffett Park Drive near Borregas Avenue is approximately 8,340 vehicles per day[2]. The posted speed limit on Moffett Park Drive in the vicinity of the project is 40 mph.

SR 237 is south of the project site and provides regional freeway access from the cities of Mountain View, Santa Clara, San Jose and Milpitas. The freeway, which runs east-west, provides two mixed-flow lanes in each direction. East of Mathilda Avenue, High Occupancy Vehicle (HOV) lanes are provided in each direction. The HOV lanes (also known as carpool lanes) can only be used by vehicles with two or more occupants, motorcycles, transit buses and eligible hybrid vehicles during the peak commute periods of 5:00 AM to 9:00 AM and 3:00 PM to 7:00 PM.

Phase 1 of the SR 237 Express Lane project installed express lanes on SR 237 between Interstate 880 in Milpitas and North First Street in San Jose. These express lanes became operational in March 2012. Phase 2 of the project, planned to be operational in late 2015, will extend the express lanes from North First Street in San Jose to approximately Mathilda Avenue in Sunnyvale. These express lanes, also referred to as High Occupancy Toll (HOT) lanes, operate during the same commute periods as the HOV lanes (with the exception of the westbound SR 237 direction, which is operational between 5:00 AM and 10:00 AM). They allow single-occupancy vehicles access if they pay a toll (unless an "HOV Only" sign is turned on). These

[1] Source: City of Sunnyvale Transportation and Traffic Vehicle Volume Map, 2011 data.
[2] Source: City of Sunnyvale Department of Public Works.

express lanes are free to carpools with two or more occupants, motorcycles, transit buses, and eligible hybrid vehicles.

Interchanges along SR 237 near the project site include US 101, N. Mathilda Avenue, N. Fair Oaks Avenue-Java Drive, and Lawrence Expressway-Caribbean Drive. The ADT on SR 237 near the SR 237 / Mathilda Avenue interchange is approximately 90,000 vehicles per day[3]. The posted speed limit on SR 237 in the vicinity of the project is 55 mph.

US 101 is generally a north-south freeway. It extends through the states of California, Oregon, and Washington, and in the project area provides access to the cities of San Jose, Santa Clara, Sunnyvale, Mountain View, and Palo Alto. It has three mixed-flow lanes and one HOV lane in each direction. US 101 interchanges near the project site include Ellis Street, SR 237, N. Mathilda Avenue, N. Fair Oaks Avenue and Lawrence Expressway. The ADT on US 101 near the US 101 / Mathilda Avenue interchange is approximately 140,000 vehicles per day[3]. The posted speed limit on US 101 in the vicinity of the project is 65 mph.

2.2 Bicycle and Pedestrian Facilities

There are three basic types of bicycle facilities. Each type is described below:

Bike Path (Class I) - A completely separate right-of-way designed for the exclusive use of cyclists and pedestrians, with minimal crossings for motorists.

Bike Lane (Class II) - A lane on a regular roadway, separated from the motorized vehicle right-of-way by paint striping, designated for the exclusive or semi-exclusive use of bicycles. Bike lanes allow one-way bike travel. Through travel by motor vehicles or pedestrians is prohibited, but crossing by pedestrians and motorists is permitted.

Bike Route (Class III) - Provides shared use of the roadway, designated by signs or permanent markings and shared with motorists.

In the vicinity of the project site, Class II Bike Lanes are currently provided on Moffett Park Drive between Bordeaux Drive and Lawrence Expressway, Bordeaux Drive between Moffett Park Drive and Java Drive, and Borregas Avenue between Moffett Park Drive and Caribbean Drive. Mathilda Avenue between Moffett Park Drive and 1st Avenue-Bordeaux Drive is designated as a Class III Bike Route.

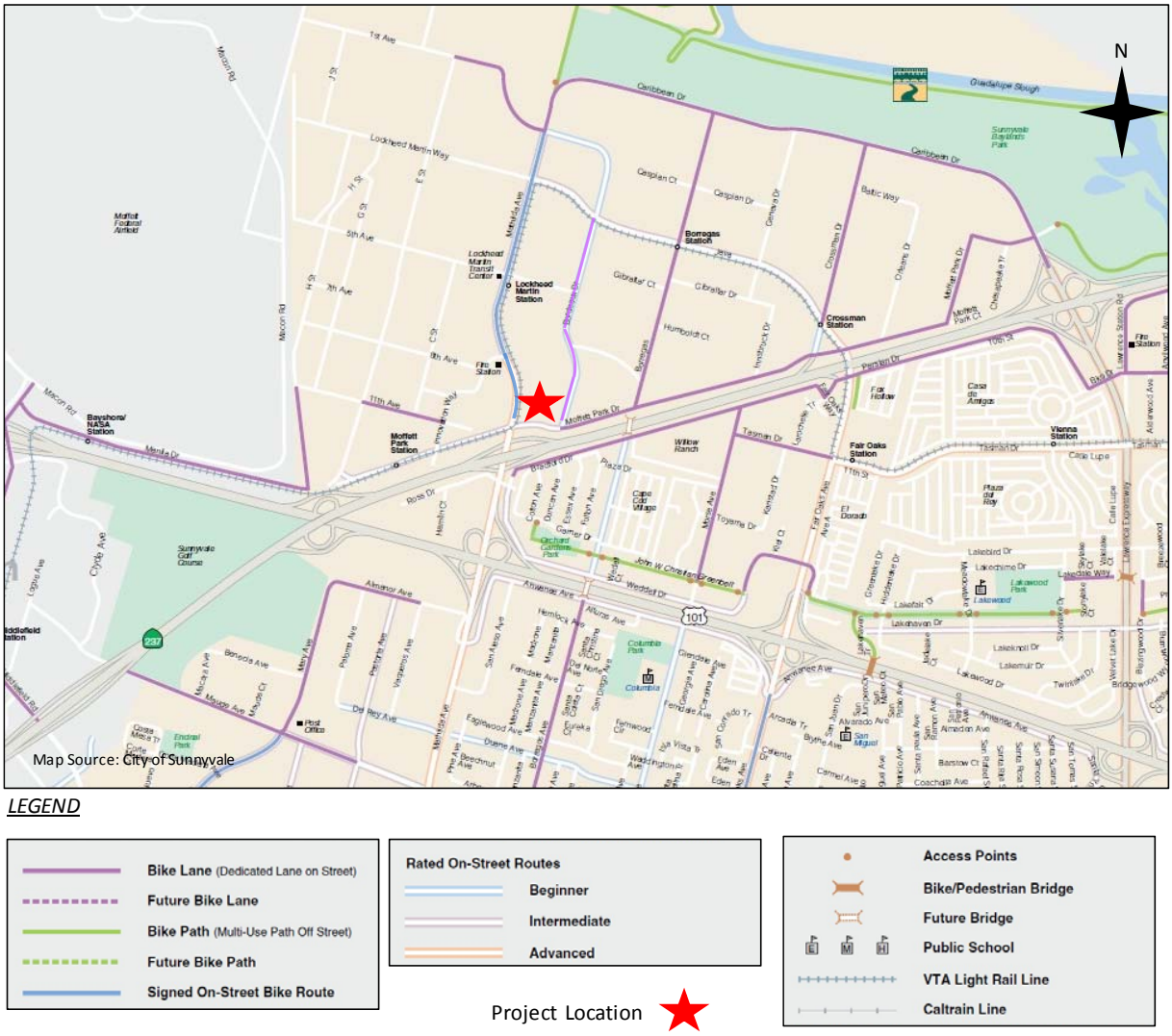
Figure 4 shows a map of existing and proposed bicycle facilities in the vicinity of the project as provided in the City's General Plan.

In the project vicinity, sidewalks are provided on both sides of Mathilda Avenue north of Moffett Park Drive. South of Moffett Park Drive, sidewalks and crosswalks are only provided for

[3] Source: Caltrans Traffic Data Branch webpage, 2012 data.

north-south pedestrian movements on the east side of Mathilda Avenue. Pedestrians wishing to cross Mathilda Avenue east-west are limited to the crosswalks on the north leg of the Mathilda Avenue / Moffett Park Drive intersection and the south leg of the Mathilda Avenue / Ross Drive intersection. Sidewalks are not provided in the vicinity of the project on Moffett Park Drive or Bordeaux Drive.

Figure 4
Bicycle Facilities in Project Vicinity



2.3 Transit Services

Santa Clara Valley Transportation Authority (VTA) operates numerous transit routes and modes within Santa Clara County. VTA currently operates Bus Routes 26, 54, 120, 121, 122, 321 and 328 within the vicinity of the project. The Lockheed Martin Transit Center, which serves the

aforementioned bus routes and VTA light rail Line 902, is located approximately one-third mile from the project site. Below are descriptions of the individual routes.

Caltrain provides train service in the region between San Francisco and San Jose, with limited service to Morgan Hill and Gilroy. Caltrain operates 92 weekday trains, 36 trains on Saturdays, and 32 trains on Sundays. The Sunnyvale Caltrain Station, located on W. Evelyn Avenue, is approximately two miles south of the project site. Thirty-one northbound and 32 southbound trains stop at the Sunnyvale Caltrain Station on weekdays, with an average headway of about 43 minutes. On weekends, 18 northbound and 18 southbound trains stop at the Sunnyvale Caltrain Station with an average headway of about 55 minutes. Bus service between the Sunnyvale Caltrain Station and the project site is provided by VTA route 54.

Light Rail Route 902 provides weekday and weekend service between the cities of Mountain View and Campbell, with stops in Sunnyvale and San Jose. In the vicinity of the project, the route includes stops on Moffett Park Drive, Mathilda Avenue, and Java Drive at the Moffett Park, Lockheed Martin, and Borregas Stations, respectively. The route has headways of approximately 15 minutes on weekdays and 30 minutes on weekends.

Route 26 is a "core" bus route that provides weekday and weekend service between Eastridge Mall in San Jose and the Lockheed Martin Transit Center. The route travels along major arterials within the cities of San Jose, Campbell, Cupertino and Sunnyvale, including Mathilda Avenue and Java Drive in the vicinity of the project site. The route has headways of about 30 minutes on weekdays and 30 to 60 minutes on weekends.

Route 54 is a "local" bus route that provides weekday and weekend service between De Anza College in Cupertino and the Lockheed Martin Transit Center. The route travels along Mathilda Avenue in the vicinity of the project site. The route has headways of approximately 30 minutes on weekdays and 45 to 60 minutes on weekends. Route 54 also serves as a connection between the Sunnyvale Caltrain Station and the project area.

Route 120 is an "express" bus route that only provides weekday service. The route travels along Java Drive and Mathilda Avenue in the vicinity of the project site. The route provides six southbound trips from the Fremont BART Station to the Lockheed Martin Transit Center that depart between 6:12 a.m. and 8:28 a.m., and six northbound trips from the Lockheed Martin Transit Center to the Fremont BART Station that depart between 4:05 p.m. and 6:13 p.m. The route has various stops within the cities of Fremont, Milpitas, and Sunnyvale.

Route 121 is an "express" bus route that only provides weekday service. The route travels along Java Drive and Mathilda Avenue in the vicinity of the project site. The route provides nine northbound trips from the Gilroy Transit Center to the Lockheed Martin Transit Center that depart between 4:30 a.m. and 7:52 a.m., and nine southbound trips from the Lockheed Martin Transit Center to the Gilroy Transit Center that depart between 3:00 p.m. and 6:12 p.m. The route has various stops within the cities of Gilroy, San Martin, Morgan Hill, Santa Clara, and Sunnyvale.

Route 122 is an "express" bus route that only provides weekday service. The route travels along Java Drive and Mathilda Avenue in the vicinity of the project site. The route provides two northbound trips from the Santa Teresa Light Rail Station in south San Jose to the Lockheed Martin Transit Center that depart at 5:51 a.m. and 7:36 a.m., and two southbound trips from the Lockheed Martin Transit Center to the Santa Teresa Light Rail Station that depart between 4:48 p.m. and 6:07 p.m. The route has various stops within the cities of San Jose and Sunnyvale.

Route 321 is a "limited" bus route that only provides weekday service. The route provides one westbound trip that departs from the Great Mall Transit Center in Milpitas at 8:10 a.m. and arrives at the Lockheed Martin Transit Center at 8:46 a.m. In the afternoon, an eastbound trip departs the Lockheed Martin Transit Center at 5:50 p.m. and arrives at the Great Mall Transit Center at 6:32 p.m. The route has various stops within the cities of Milpitas, Santa Clara, and Sunnyvale.

Route 328 is a "limited" bus route which only provides weekday service. The route provides two northbound trips that depart from Almaden Expressway and Via Valiente in San Jose at 6:00 a.m. and 7:20 a.m. and arrive at the Lockheed Martin Transit Center at 7:07 a.m. and 8:40 a.m., respectively. In the afternoon, two southbound trips depart the Lockheed Martin Transit Center at 4:55 p.m. and 6:00 pm. and arrive at Almaden Expressway and Via Valiente at 6:17 p.m. and 7:14 p.m., respectively. The route has various stops within the cities of San Jose, Campbell, Saratoga, Santa Clara, and Sunnyvale.

Figure 5 shows VTA transit routes in the vicinity of the project. **Figure 6** shows the locations of transit stops near the project site.

2.4 Existing Traffic Data

The evaluation of intersection operating conditions is based upon the highest one-hour traffic volumes observed during the morning and evening peak commute periods. To establish existing traffic conditions, intersection traffic counts were collected during the weekday AM (i.e. 7:00 – 9:00am) and PM (i.e. 4:00 – 6:00pm) peak periods at the study intersections.

VTA guidelines recommend using traffic volumes that are not more than two years old. The *Transportation Impact Analysis Moffett Park Office Development* (Fehr & Peers, August 2013) traffic study used traffic counts collected in March 2013. The five study intersections analyzed for this (Sheraton Hotel Expansion) traffic study were all included in the Moffett Place Office Development traffic study. Since these traffic volumes are less than two years old, the counts were taken from the Moffett Place TIA and modified to account for the closely spaced intersections along Mathilda Avenue.

The traffic count data is provided in **Appendix C**. The peak one-hour intersection turning movement volumes and lane configurations were identified for each intersection and are displayed in **Figure 7**.

Figure 5
VTA Transit Routes in Project Vicinity

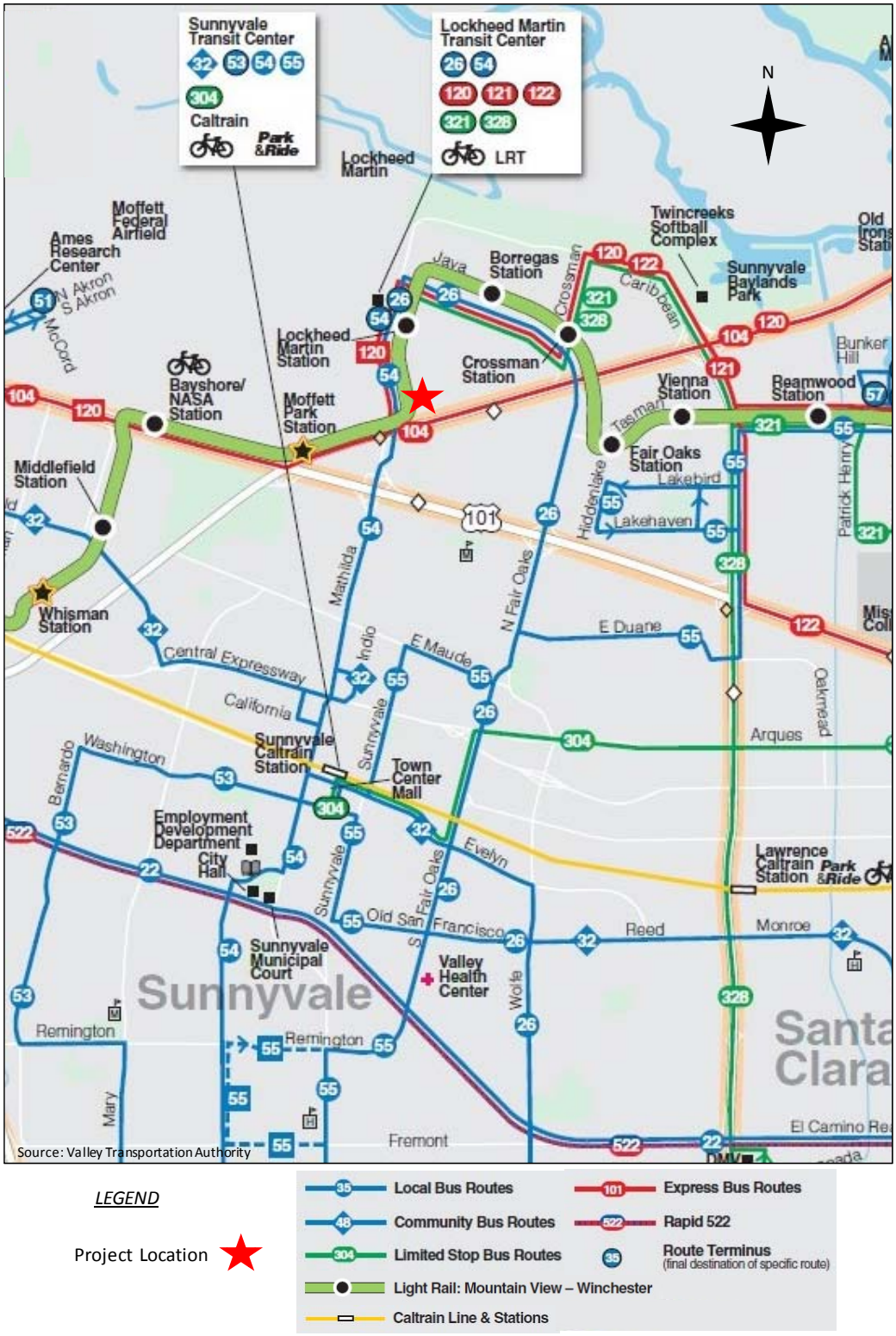
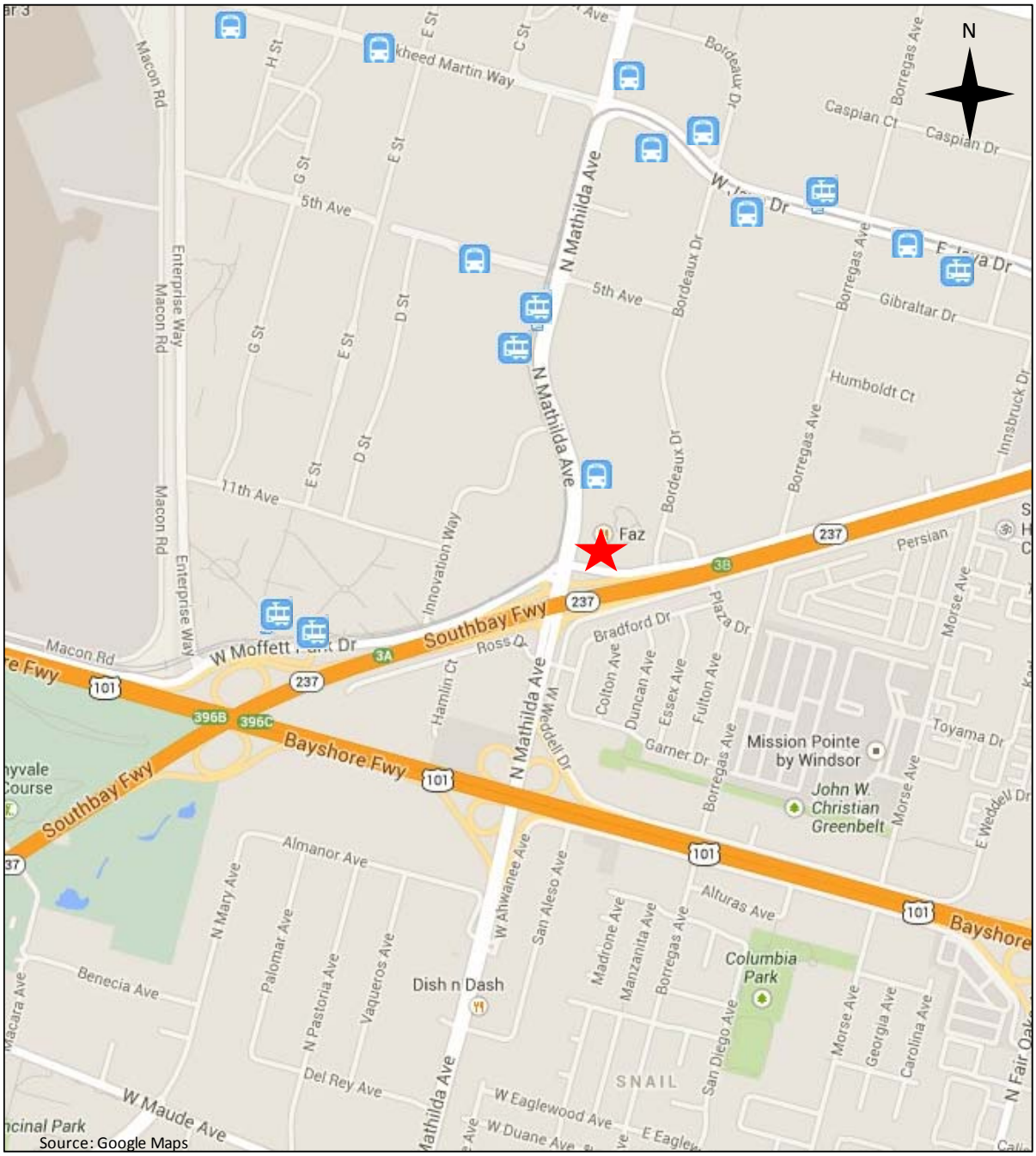


Figure 6
Transit Stops in Project Vicinity



Source: Google Maps

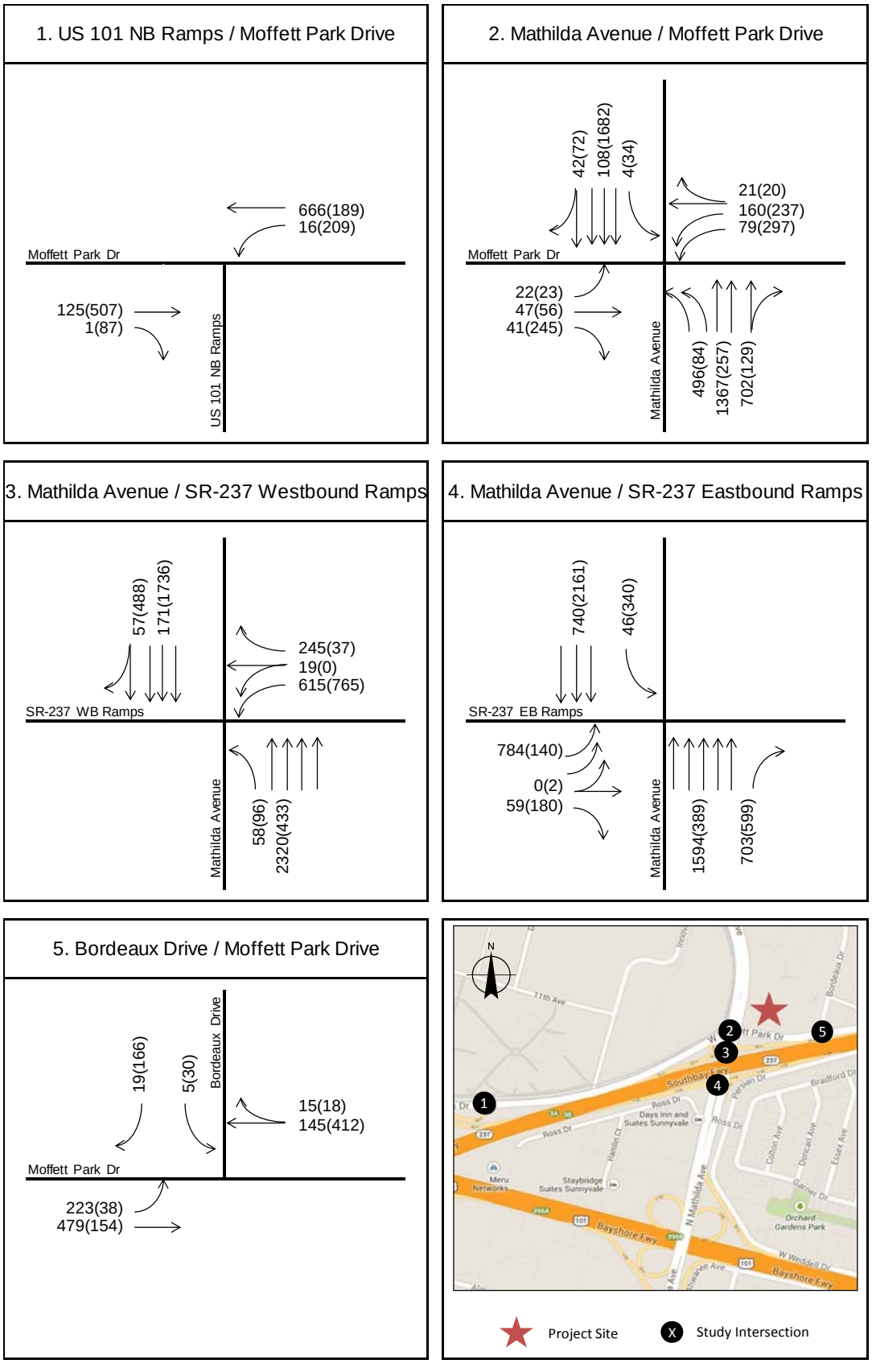
LEGEND

Bus Stop

Light Rail Stop

Project Location

Figure 7
Existing Intersection Peak Hour Volumes and Lane Configurations



XX (YY) = AM (PM)

2.5 Existing Intersection Operations

Intersection levels of service for existing traffic conditions are summarized in **Table 1**. The LOS calculation worksheets for the study intersections under existing conditions are included in **Appendix D**.

2.6 Field Observations

Field observations at all five study intersections were performed in May 2014 during the AM and PM peak hours. In general, there is heavy traffic on Mathilda Avenue, particularly in the northbound direction during the AM peak hour and in the southbound direction during the PM peak hour.

The calculated levels of service at the US 101 NB Ramps / Moffett Park Drive and Bordeaux Drive / Moffett Park Drive intersections are consistent with the observed field observations during both the AM and PM peak periods.

Traffic operations at the study intersections along Mathilda Avenue (at Moffett Park Drive, SR 237 WB Ramps and 237 EB Ramps) were observed to seemingly not be consistent with the calculated levels of service during the AM and PM peak hours.

One reason for the discrepancy between the calculated and observed levels of service is that the TRAFFIX software program analyzes each intersection as an isolated location. The three study intersections along Mathilda Avenue are closely spaced (approximately 250 feet between each intersection) and experience high traffic volumes during the morning and evening peak commute periods. The high traffic volumes and closely spaced intersections result in long queues relative to the close intersection spacing that prevent some vehicles from being served during a given cycle. This is because they cannot enter either the intersection or the left turn lane. These conditions are exacerbated by the presence of several trap lanes (i.e., through lanes that become left-turn lanes at downstream intersections), which require through traffic to weave; these maneuvers cause further congestion. As a result, micro simulation was used to analyze the three study intersections along Mathilda Avenue, which is discussed in more detail in Section 6 of this report.

A discussion of the observed operations at each of these intersections follows:

Mathilda Avenue / Moffett Park Drive (Int. #2)

During the AM peak hour, heavy traffic volumes were observed in the northbound direction, particularly for the northbound left-turn and northbound through movements. Vehicle queues were observed backing up into the Mathilda Avenue / SR 237 WB Ramp intersection from the Mathilda Avenue / Moffett Park Drive intersection, which, from centerline to centerline, is approximately 200 feet upstream.

During the PM peak hour, heavy traffic volumes were observed in the southbound direction. Southbound through vehicles were observed blocking the intersection due to long vehicle queues at the downstream Mathilda Avenue / SR 237 EB Ramp intersection. Westbound vehicles turning left from Moffett Park Drive onto southbound Mathilda Avenue were impeded by these queues, which in turn were observed impeding eastbound through vehicles.

Frequent pedestrians and bicyclists were observed during the AM and PM peak hours, with pedestrians using the crosswalk on the east leg of the intersection and bicyclists primarily traveling in the eastbound and westbound directions on Moffett Park Drive.

Mathilda Avenue / SR 237 WB Ramps (Int. #3)

During the AM peak hour, heavy traffic volumes were observed in the northbound direction, particularly for the northbound through movement. Vehicle queues were observed backing up into the Mathilda Avenue / SR 237 EB Ramp intersection, which, from centerline to centerline, is approximately 260 feet upstream.

During the PM peak hour, heavy traffic volumes were observed in the southbound and westbound directions, particularly the southbound through and westbound left movements. Southbound through vehicles were observed blocking the intersection due to relatively long queues extending from the downstream Mathilda Avenue / SR 237 EB Ramp intersection. Westbound vehicles turning left from the SR 237 WB off-ramp onto southbound Mathilda Avenue were impeded by these queues. The SR 237 WB off-ramp was observed to be very congested, with only about 20 vehicles being served per cycle (approximately 10 vehicles per lane).

Mathilda Avenue / SR 237 EB Ramps (Int. #4)

During the AM peak hour, heavy traffic volumes were observed in the northbound direction, particularly for the northbound through movement. Vehicle queues were occasionally observed backing up into the intersection from the downstream SR 237 WB ramps and Moffett Park Drive.

During the PM peak hour, heavy traffic volumes were observed in the southbound direction, particularly the southbound left and through movements. Southbound through vehicles were observed backing up into the upstream Mathilda Avenue / SR 237 WB Ramp and Mathilda Avenue / Moffett Park Drive intersections.

Overall Observations

Generally, vehicles currently are generally served in one cycle during most of the morning and evening peak hours, in spite of the upstream blocking that occurs. The existing congestion is primarily due to the compact interchange design (250 foot intersection spacing) which inherently limits capacity compared to intersections with the same lane configurations but

normally recommended intersection spacing (greater than 1,200 feet). Also, what would typically be considered normal queue lengths are perceived to be probems because they spill over into adjacent intersections. In other words, the operational problems currently experienced are a result of the spacing of intersections in the interchange rather than the traffic volumes.

Table 1
Existing Intersection Levels of Service - TRAFFIX

	N-S Street	E-W Street	Existing Operational Lane Configuration	Existing Intersection Control	LOS Standard	Existing Conditions (Calculated)			
						AM Peak Hr		PM Peak Hr	
						Avg Delay (sec)	LOS	Avg Delay (sec)	LOS
1	US 101 NB Ramp	Moffett Park Drive	EB 1-T, 1-R WB 1-L, 1-T	Signal	**D**	1.9	A	7.5	A
2*	Mathilda Avenue	Moffett Park Drive	NB 2-L, 2-T, 1-T/R SB 1-L, 3-T, 1-T/R EB 1-L, 1-T, 1-R WB 2-L, 1-T/R	Signal	**E**	18.4	B-	19.3	B-
3*	Mathilda Avenue	SR 237 WB Ramps	NB 1-L, 4-T SB 3-T, 1-T/R WB 1-L, 1-L/T, 1-R	Signal	**E**	12.0	B	15.3	B
4*	Mathilda Avenue	SR 237 EB Ramps	NB 5-T, 1-R SB 1-L, 3-T EB 2-L, 1-L/T/R	Signal	**E**	13.2	B	10.3	B+
5	Bordeaux Drive	Moffett Park Drive	SB 1-L, 1-R EB 1-L, 1-T WB 1-T/R	Stop Sign (Overall) (Worst Approach)	**E**	2.3 11.8	A B	3.5 12.9	A B

NOTES:
1. L, T, R = Left, Through, Right
2. NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3. Analysis performed using 2000 *Highway Capacity Manual* Methodologies
4. General overall LOS standard for signalized City intersections is LOS D.
5. Overall LOS standard for CMP intersections and intersections on CMP roadways (intersections denoted by asterisk *) is LOS E.
6. LOS E was used as the minimum threshold for unsignalized intersections.
7. TRAFFIX LOS results at intersections 2, 3 and 4 do not represent actual conditions due to high traffic volumes and closely spaced intersections.

3 Existing Plus Project Conditions

This section of the report evaluates existing conditions with additional traffic generated by the proposed project. Intersection operations under Existing and Existing Plus Project traffic conditions are compared and significant project impacts are discussed.

3.1 Project Description

As discussed in Section 1 of this report, the Sheraton Hotel is proposing to expand their facility from the current number of 173 rooms to a final total of 342 rooms. This will be accomplished by demolishing an existing building with 63 rooms and constructing a new building with 232 rooms. There are currently 295 parking spaces on-site. The proposed project also involves the construction of a 3-level, 166-space parking garage that will displace 56 existing surface parking spaces, for a final total of 405 parking spaces. The existing 10,000 square-foot restaurant on the project site will remain.

Access to the project site will be provided from the hotel's three existing driveways on Mathilda Avenue, Moffett Park Drive and Bordeaux Drive. Due to the raised median on Mathilda Avenue, the Mathilda Avenue driveway only provides right-in, right-out access.

3.2 Project Trip Generation

Project trip generation was estimated based on the Institute of Transportation Engineers' (ITE) *Trip Generation* handbook, 9th Edition, 2012 and reviewed by City staff. The project site currently has 173 hotel rooms. With the expansion, the total number of rooms will be 342. The project trip generation was calculated by using ITE rates for the future total of 342 rooms, and applying a credit for the traffic generated by the existing 173 rooms. The project is expected to generate 1,508 new daily trips, of which 113 will be generated during the AM peak hour (66 in, 47 out) and 118 will be generated during the PM peak hour (58 in, 60 out). The project trip generation estimate is provided in **Table 2**.

Table 2
Project Trip Generation

	ITE LAND USE CODE	USE DESCRIPTION	UNITS		DAILY TRIPS[2]	AM TRIPS[2]			PM TRIPS[2]		
						IN (58%)	OUT (42%)	TOTAL	IN (49%)	OUT (51%)	TOTAL
TOTAL PROPOSED ROOMS	310	Hotel	342	Rooms	3,051	133	96	229	117	122	239
CREDIT FOR EXISTING ROOMS	310	Hotel	173	Rooms	-1,543	-67	-49	-116	-59	-62	-121
			NEW TRIPS:		**1,508**	**66**	**47**	**113**	**58**	**60**	**118**

Notes:
1. Trip generation rates published by Institute of Transportation Engineers (ITE) "Trip Generation Manual," 9th Edition, 2012.
2. Estimated daily, AM and PM peak hour trips determined by average rate per occupied room.

3.3 Project Trip Distribution and Assignment

The trip distribution for the proposed project was based on existing land use and travel patterns in the study area and engineering judgment. The trip distribution pattern and project trip assignment are presented in **Figure 8** and **Figure 9**, respectively.

Figure 8
Project Trip Distribution

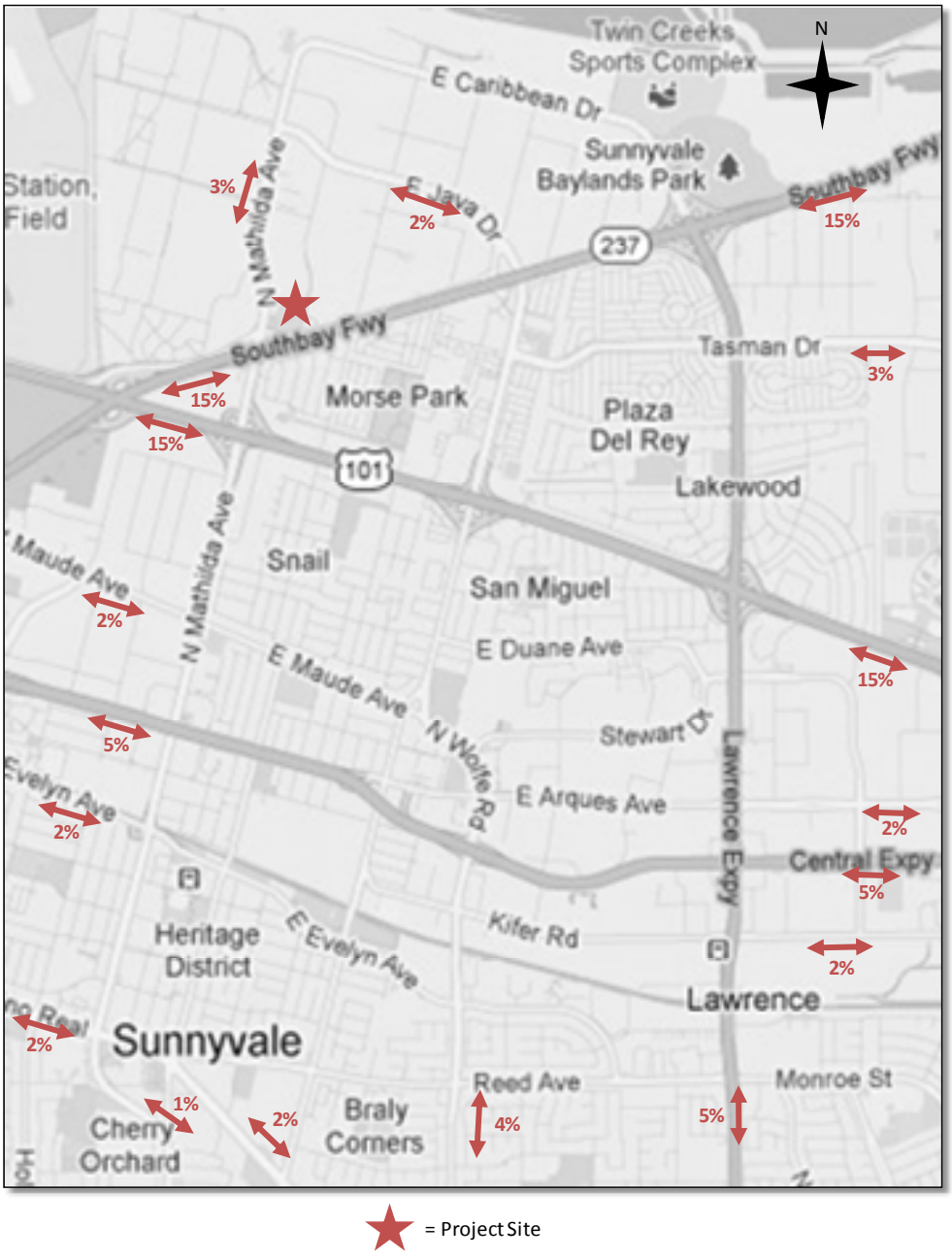
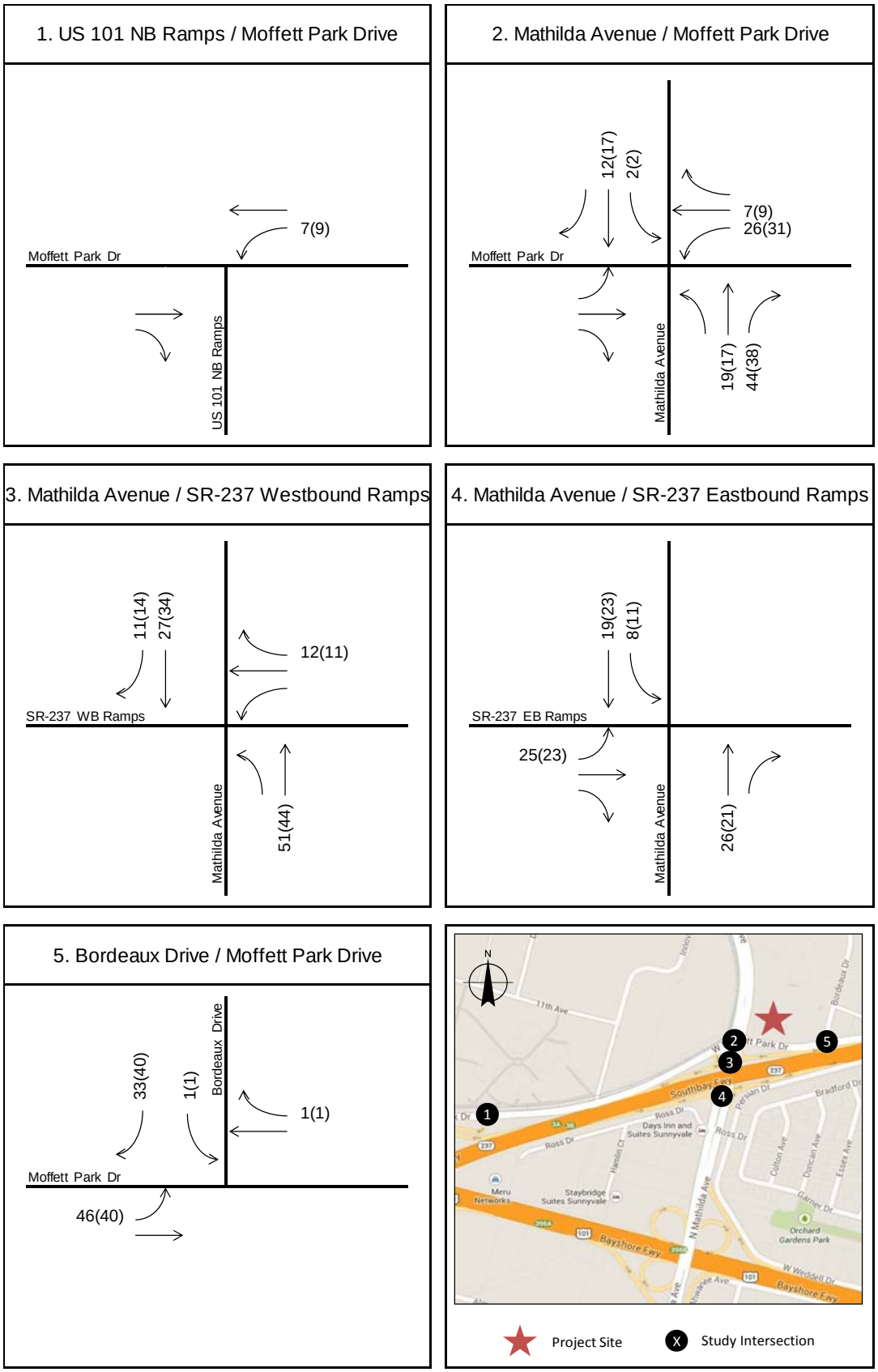


Figure 9
Project Trip Assignment



XX (YY) = AM (PM)

3.4 Existing Plus Project Intersection Operations

Trips generated by the proposed project were combined with the existing traffic volumes to obtain existing plus project traffic volumes, which are shown in **Figure 10**. Intersection levels of service for existing and existing plus project traffic conditions are summarized in **Table 3**. The LOS calculation worksheets are included in **Appendix D**.

According to the City of Sunnyvale and VTA standards, all study intersections are projected to operate at an acceptable level of service under existing plus project conditions; therefore, no mitigations have been identified.

As discussed in Section 1.3, signalized intersections are evaluated based on the overall average delay and two-way stop controlled intersections are evaluated based on the average delay of the worst approach.

Under existing plus project conditions, the average delay of the worst approach at the Bordeaux Drive / Moffett Park Drive intersection decreases with the addition of project traffic during the AM peak hour. Although this appears to be counterintuitive, this occurs because the average delay is based on a weighted average between the southbound Bordeaux Drive left-turn and right-turn movements. The project adds more traffic to the southbound right-turn movement than it does to the southbound left-turn movement, and the southbound right-turn movement has less delay than the southbound left-turn movement. As a result, adding traffic to the southbound right-turn movement decreases the delay of the worst approach, which includes both the left-turn and right-turn movements.

Figure 10
Existing Plus Project Intersection Peak Hour Volumes

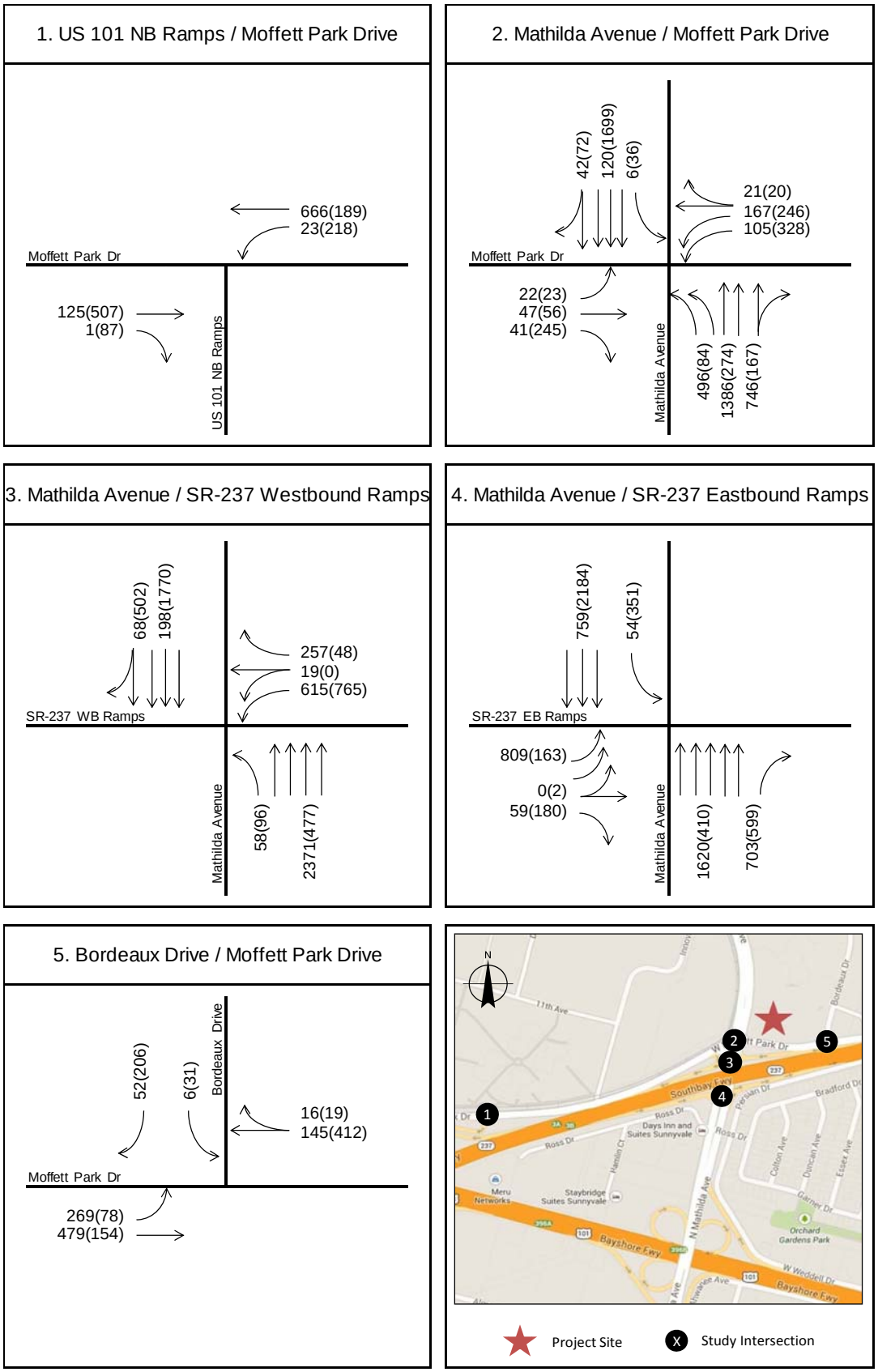


Table 3
Existing and Existing Plus Project Intersection Levels of Service - TRAFFIX

	N-S Street	E-W Street	Existing Operational Lane Configuration	Existing Intersection Control	LOS Standard	Existing Conditions (Calculated)				Existing + Project Conditions			
						AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr	
						Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	US 101 NB Ramp	Moffett Park Drive	EB 1-T, 1-R WB 1-L, 1-T	Signal	**D**	1.9	A	7.5	A	1.9	A	7.6	A
2*	Mathilda Avenue	Moffett Park Drive	NB 2-L, 2-T, 1-T/R SB 1-L, 3-T, 1-T/R EB 1-L, 1-T, 1-R WB 2-L, 1-T/R	Signal	**E**	18.4	B-	19.3	B-	19.0	B-	19.9	B-
3*	Mathilda Avenue	SR 237 WB Ramps	NB 1-L, 4-T SB 3-T, 1-T/R WB 1-L, 1-L/T, 1-R	Signal	**E**	12.0	B	15.3	B	12.1	B	15.3	B
4*	Mathilda Avenue	SR 237 EB Ramps	NB 5-T, 1-R SB 1-L, 3-T EB 2-L, 1-L/T/R	Signal	**E**	13.2	B	10.3	B+	13.4	B	10.3	B+
5	Bordeaux Drive	Moffett Park Drive	SB 1-L, 1-R EB 1-L, 1-T WB 1-T/R	Stop Sign (Overall) (Worst Approach)	**E**	2.3 11.8	A B	3.5 12.9	A B	2.9 10.9	A B	4.3 13.6	A B

NOTES:
1. L, T, R = Left, Through, Right
2. NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3. Analysis performed using 2000 *Highway Capacity Manual* Methodologies
4. General overall LOS standard for signalized City intersections is LOS D.
5. Overall LOS standard for CMP intersections and intersections on CMP roadways (intersections denoted by asterisk *) is LOS E.
6. LOS E was used as the minimum threshold for unsignalized intersections.
7. TRAFFIX LOS results at intersections 2, 3 and 4 do not represent actual conditions due to high traffic volumes and closely spaced intersections.

4 Background Conditions

This section of the report describes the analyses of the study road network under Background No Project and Background Plus Project Conditions.

This scenario represents traffic conditions with and without the proposed project. Background No Project Conditions include the sum of existing traffic and traffic generated by approved but not yet constructed or occupied projects.

Background Plus Project Conditions include the sum of existing traffic, traffic generated by approved but not yet constructed or occupied projects, and traffic generated by the proposed project.

4.1 Background Traffic Volumes

AM and PM peak hour traffic generated by projects approved for development, but not yet constructed or occupied, was estimated based on the Institute of Transportation Engineers' *Trip Generation* handbook, 9th Edition, 2012. The list of approved but not yet built projects is provided in **Appendix E** with the trip generation for each project. The location of each approved but not yet built project is provided in **Appendix F**.

The trips generated by the approved but not yet built projects were assigned to the road network and combined with the existing peak hour volumes to obtain Background No Project Conditions traffic volumes. The Background No Project Conditions peak hour volumes are shown in **Figure 11**.

The project trip assignment was combined with Background No Project Conditions traffic volumes to obtain Background Plus Project traffic volumes. These volumes are shown in **Figure 12**.

4.2 Background Intersection Operations

Intersection levels of service under Background No Project and Background Plus Project conditions are shown in **Table 4**. The LOS calculation worksheets are included in **Appendix D**.

As discussed in Section 1.3, signalized intersections are evaluated based on the overall average delay at the intersection. Under background plus project conditions, the overall average delay at the Mathilda Avenue / SR 237 EB Ramps intersection decreases with the addition of project traffic during the AM peak hour. Although this appears to be counterintuitive, this occurs because the average delay is based on a weighted average of all approaches at the intersection, and the amount of traffic added by the project is not high enough to raise the overall average delay.

Based on City of Sunnyvale and VTA level of service standards, the following intersections are projected to operate at unacceptable levels of service under Background Plus Project Conditions:

Int. #2 Mathilda Avenue / Moffett Park Drive
The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the AM and PM peak hours.

Impacts and Mitigations: The addition of project traffic during the AM peak hour is projected to increase the critical delay by 14.0 seconds and the critical V/C ratio by 0.03. The addition of project traffic during the PM peak hour is projected to increase the critical delay by 10.3 seconds and the critical V/C ratio by 0.02. Therefore, based on VTA impact criteria the proposed project would have a ***significant*** *impact at this intersection during the AM and PM peak hours.*

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included on the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to ***less-than-significant****. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.*

Int. #3 Mathilda Avenue / SR 237 WB Ramp
The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the PM peak hour.

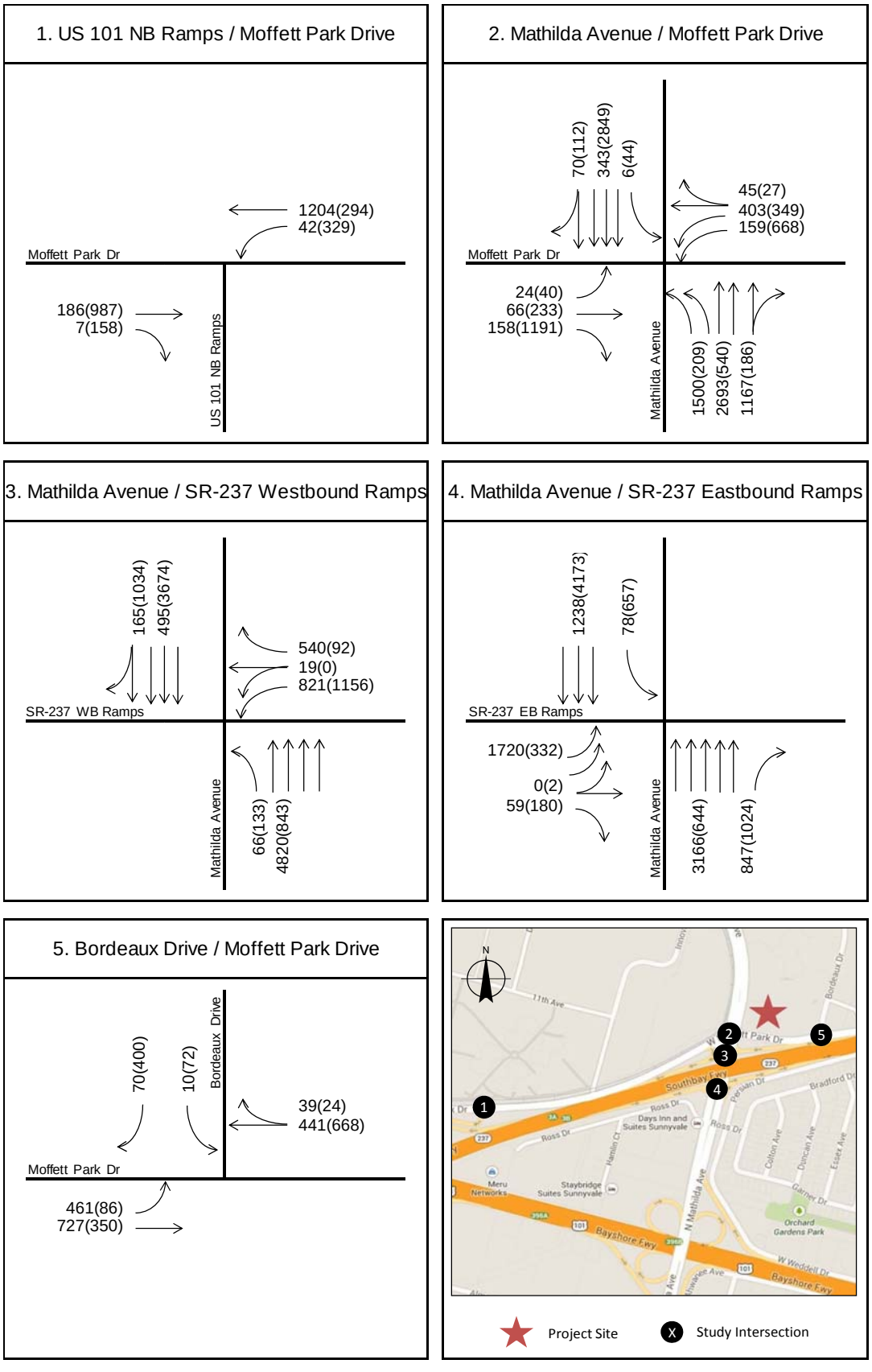
Impacts and Mitigations: Although the Mathilda Avenue / SR 237 WB Ramps intersection would operate unacceptably at LOS F, the addition of project traffic is not projected to increase the critical delay by more than 4 seconds. Therefore, the proposed project would have a ***less-than-significant*** *impact at this intersection based on VTA impact criteria, and no mitigations have been identified.*

Int. #5 Bordeaux Drive / Moffett Park Drive
The addition of project traffic is projected to deteriorate operations at the worst approach from LOS E to LOS F during the PM peak hour.

Impacts and Mitigations: The addition of project traffic is projected to deteriorate operations from LOS E to LOS F during the PM peak hour, and the MUTCD peak hour signal warrant volume threshold would be met during the PM peak hour. MUTCD peak hour signal warrants are included in ***Appendix G****. Therefore, the proposed project would have a* ***significant*** *impact at this intersection based on City of Sunnyvale impact criteria.*

Installation of a traffic signal at this location would reduce the project's impacts to less-than-significant. However, this intersection is included as part of the Mathilda Avenue / SR 237 WB Ramps improvement project in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program. The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.

Figure 11
Background No Project Intersection Peak Hour Volumes



XX (YY) = AM (PM)

Figure 12
Background Plus Project Intersection Peak Hour Volumes

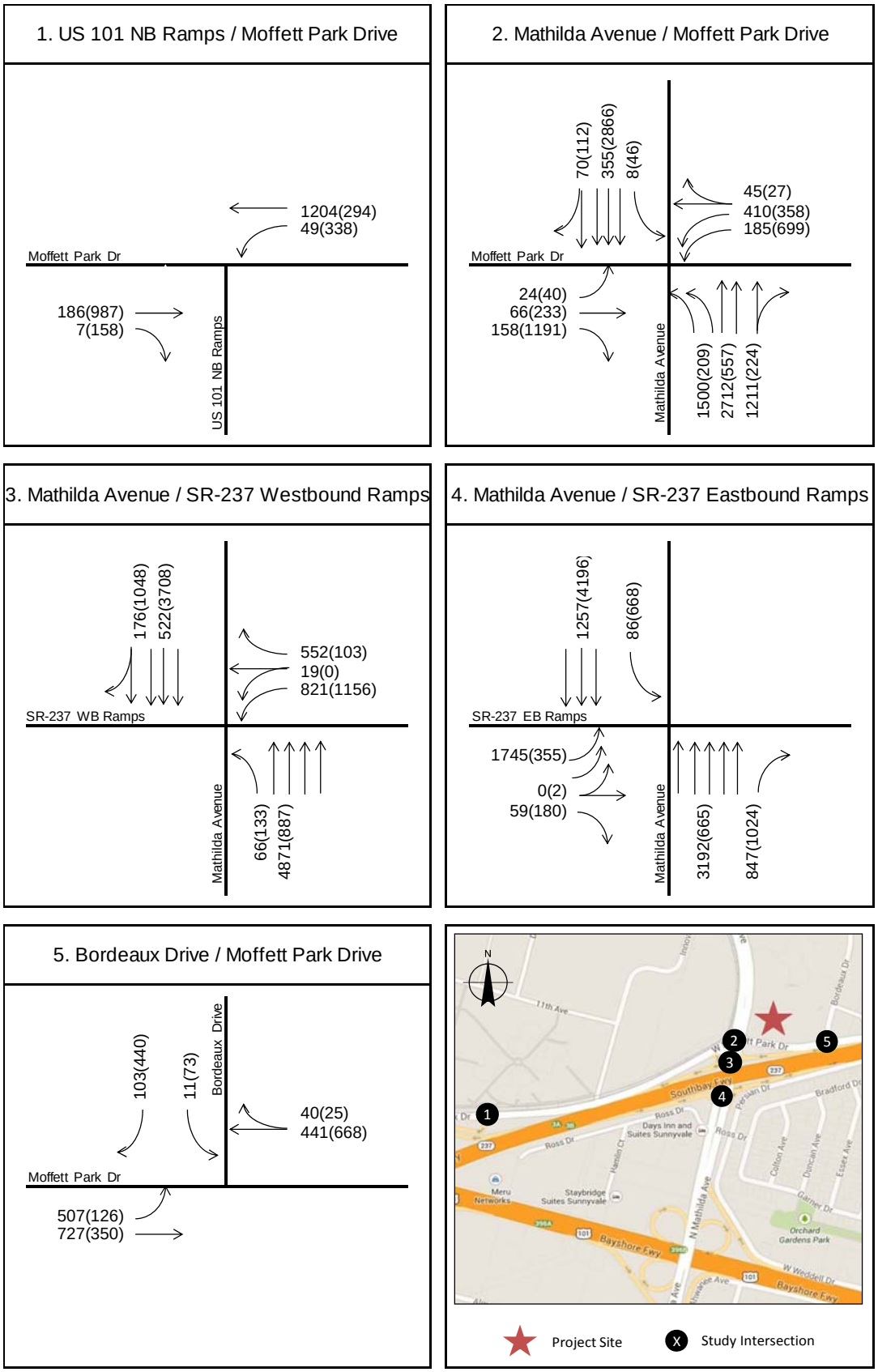


Table 4
Background and Background Plus Project Intersection Levels of Service - TRAFFIX

	N-S Street	E-W Street	Existing Operational Lane Configuration	Existing Intersection Control	LOS Standard	Background No Project Conditions				Background + Project Conditions									
						AM Peak Hr		PM Peak Hr		AM Peak Hr					PM Peak Hr				
						Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Change Critical Delay	Change Critical V/C	Signal Warrant Met?	Avg Delay (sec)	LOS	Change Critical Delay	Change Critical V/C	Signal Warrant Met?
1	US 101 NB Ramp	Moffett Park Drive	EB 1-T, 1-R WB 1-L, 1-T	Signal	**D**	3.2	A	12.0	B	3.2	A	N/A	N/A	N/A	12.4	B	N/A	N/A	N/A
2*	Mathilda Avenue	Moffett Park Drive	NB 2-L, 2-T, 1-T/R SB 1-L, 3-T, 1-T/R EB 1-L, 1-T, 1-R WB 2-L, 1-T/R	Signal	**E**	**146.2**	**F**	**111.5**	**F**	**156.6**	**F**	**14.0**	**0.03**	N/A	**118.6**	**F**	**10.3**	**0.02**	N/A
3*	Mathilda Avenue	SR 237 WB Ramps	NB 1-L, 4-T SB 3-T, 1-T/R WB 1-L, 1-L/T, 1-R	Signal	**E**	58.3	E+	**137.0**	**F**	63.2	E	6.7	0.02	N/A	**139.4**	**F**	3.8	0.01	N/A
4*	Mathilda Avenue	SR 237 EB Ramps	NB 5-T, 1-R SB 1-L, 3-T EB 2-L, 1-L/T/R	Signal	**E**	24.0	C	39.4	D	22.7	C+	-1.6	-0.01	N/A	40.9	D	2.0	0.01	N/A
5	Bordeaux Drive	Moffett Park Drive	SB 1-L, 1-R EB 1-L, 1-T WB 1-T/R	Stop Sign (Overall) (Worst Approach)	**E**	4.0 26.5	A D	14.1 46.1	B E	4.8 27.4	A D	N/A	N/A	No	19.6 **62.0**	C **F**	N/A	N/A	**Yes**

NOTES:
1. L, T, R = Left, Through, Right
2. NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3. Analysis performed using 2000 *Highway Capacity Manual* Methodologies
4. General overall LOS standard for signalized City intersections is LOS D.
5. Overall LOS standard for CMP intersections and intersections on CMP roadways (intersections denoted by asterisk *) is LOS E.
6. LOS E was used as the minimum threshold for unsignalized intersections.
7. TRAFFIX LOS results at intersections 2, 3 and 4 do not represent actual conditions due to high traffic volumes and closely spaced intersections.
8. **Bold** font indicates unacceptable operations based on City and VTA standards
9. **Bold red** font indicates project impact based on City and VTA significance criteria.

5 Cumulative Conditions

This section of the report describes the analyses of the study road network under near-term Cumulative Conditions using the growth factors below to reach year 2019 conditions. This section of the report also identifies cumulative impacts.

As previously discussed in this report, the reconfiguration of the SR 237 / Mathilda Avenue interchange is included in the City of Sunnyvale Transportation Impact Fee program and the VTA's Valley Transportation Plan 2035. However, no preferred alternative has been selected yet. As a result, this analysis uses the existing lane configurations for the study intersections.

5.1 Cumulative Traffic Volumes

Existing traffic volumes were increased to represent cumulative traffic volumes using the following average yearly growth rates provided by City staff:

Arterial Streets – 2% (AM Peak Hour) and 1.75% (PM Peak Hour)
Collector Streets – 2.28% (AM Peak Hour) and 2.34% (PM Peak Hour)

Trip assignments from approved but not yet built projects were added to the resulting growth calculation to obtain Cumulative No Project Traffic Volumes, which are included in **Figure 13**. Trips from the proposed project were combined with the Cumulative No Project Traffic Volumes to obtain Cumulative Plus Project Traffic Volumes, which are included in **Figure 14**.

5.2 Cumulative Intersection Operations

The LOS calculation worksheets for the study intersections under Cumulative No Project and Cumulative Plus Project conditions are included in **Appendix D**. Intersection levels of service under Cumulative No Project and Cumulative Plus Project conditions are shown in **Table 5.**

Based on City of Sunnyvale and VTA level of service standards, the following intersections are projected to operate at unacceptable levels of service under Cumulative Plus Project Conditions:

Int. #2 Mathilda Avenue / Moffett Park Drive
The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the AM and PM peak hours.

Impacts and Mitigations: The addition of project traffic during the AM peak hour is projected to increase the critical delay by 10.0 seconds and the critical V/C ratio by 0.02. The addition of project traffic during the PM peak hour is projected to increase the critical delay by 10.4 seconds and the critical V/C ratio by 0.02. Therefore, based on VTA impact criteria the proposed project would have a ***significant*** *impact at this intersection during the AM and PM peak hours.*

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included on the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to ***less-than-significant****. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.*

Int. #3 Mathilda Avenue / SR 237 WB Ramp

The addition of project traffic is projected to exacerbate the unacceptable LOS F operations during the PM peak hour.

Impacts and Mitigations: The addition of project traffic during the AM peak hour is projected to increase the critical delay by 7.0 seconds and the critical V/C ratio by 0.02. The addition of project traffic during the PM peak hour is projected to increase the critical delay by 3.8 seconds and the critical V/C ratio by 0.01. Therefore, based on VTA impact criteria the proposed project would have a ***significant*** *impact at this intersection during the AM peak hour.*

Improvements at the Mathilda Avenue / SR 237 WB Ramps intersection are included on the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to ***less-than-significant****. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.*

Int. #5 Bordeaux Drive / Moffett Park Drive

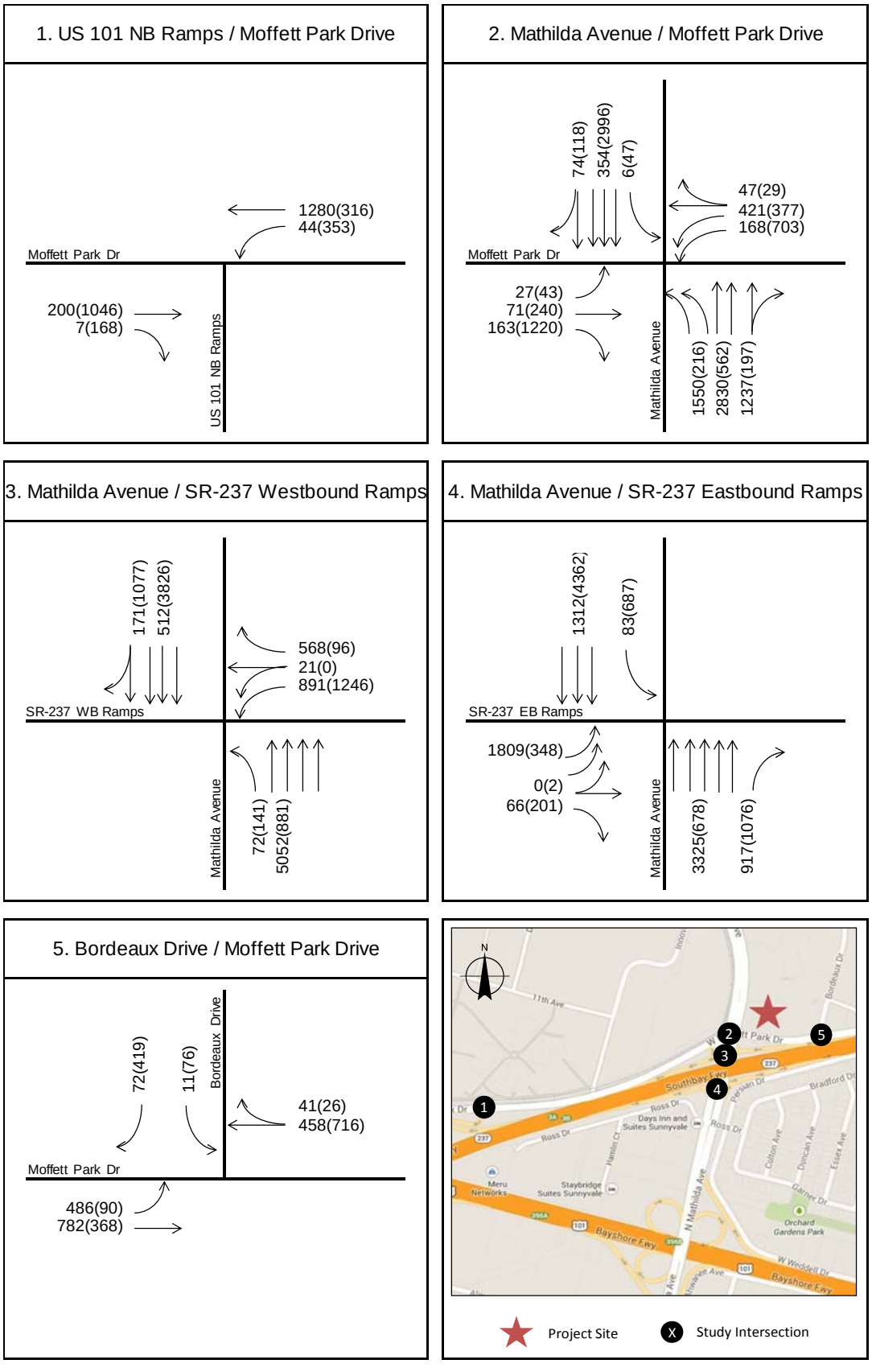
The addition of project traffic is projected to deteriorate operations at the worst approach from LOS E to LOS F during the PM peak hour.

Impacts and Mitigations: The addition of project traffic is projected to exacerbate LOS F operations during the PM peak hour, and the MUTCD peak hour signal warrant volume threshold would be met during the PM peak hour. MUTCD peak hour signal warrants are included in ***Appendix G****. Therefore, the proposed project would have a* ***significant*** *impact at this intersection based on City of Sunnyvale impact criteria.*

Installation of a traffic signal at this location would reduce the project's impacts to less-than-significant. However, this intersection is included as part of the Mathilda Avenue / SR 237 WB Ramps improvement project in the VTA's Valley Transportation Plan 2035 list of constrained projects and the City of Sunnyvale Transportation Impact Fee program.

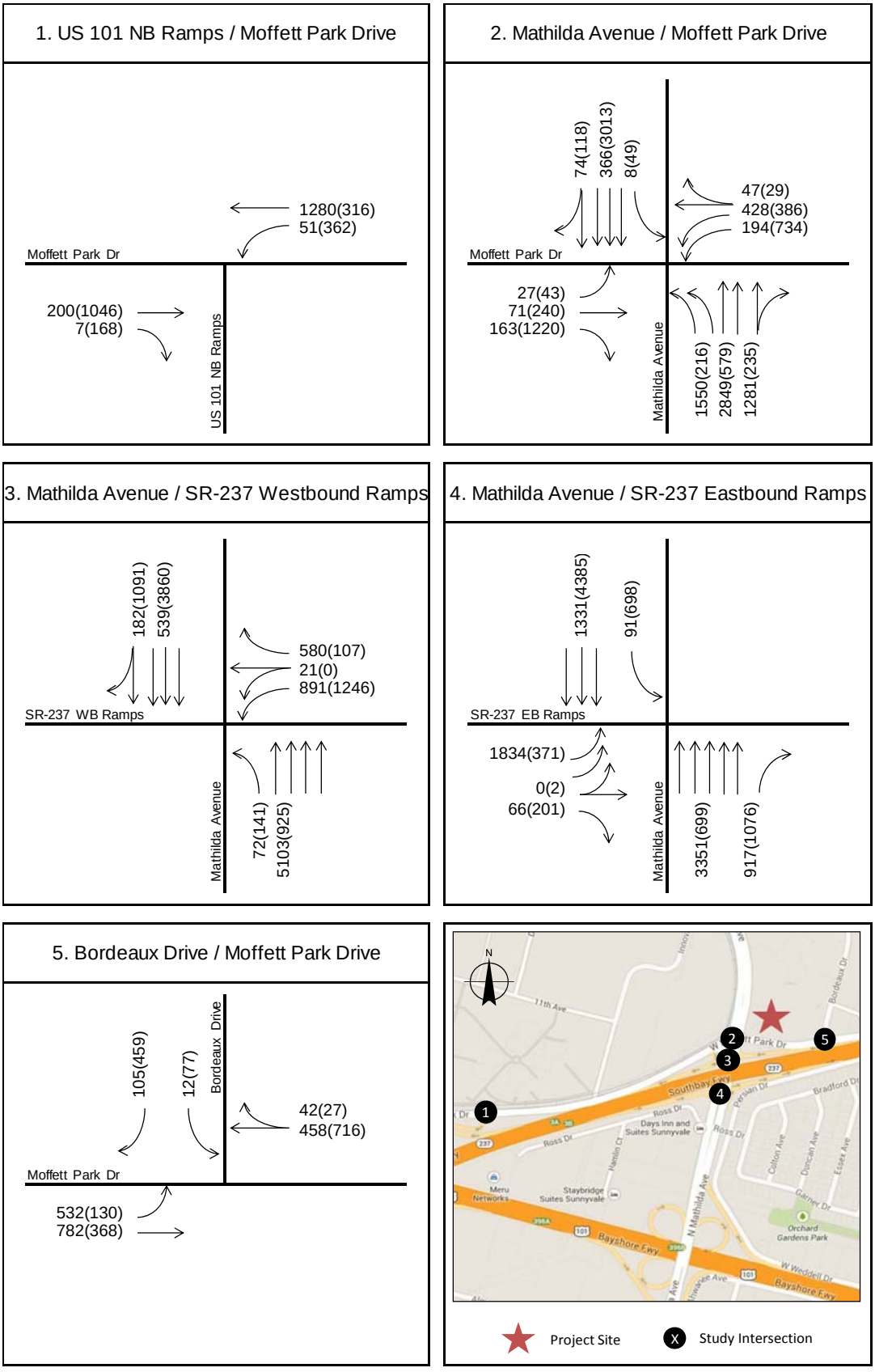
The improvements would re-align the WB SR 237 off-ramp north to become the east leg of the Mathilda Avenue / Moffett Park Drive intersection. Implementation of these improvements would reduce the project's impacts to ***less-than-significant****. Payment of the City's TIF would represent the project's fair share contribution to improvements at this location.*

Figure 13
Cumulative No Project Intersection Peak Hour Volumes



XX (YY) = AM (PM)

Figure 14
Cumulative Plus Project Intersection Peak Hour Volumes



XX (YY) = AM (PM)

Table 5
Cumulative No Project and Cumulative Plus Project Intersection Levels of Service - TRAFFIX

	N-S Street	E-W Street	Existing Operational Lane Configuration	Existing Intersection Control	LOS Standard	Cumulative No Project Conditions						Cumulative + Project Conditions									
						AM Peak Hr			PM Peak Hr			AM Peak Hr					PM Peak Hr				
						Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	Change Critical Delay	Change Critical V/C	Signal Warrant Met?	Avg Delay (sec)	LOS	Change Critical Delay	Change Critical V/C	Signal Warrant Met?
1	US 101 NB Ramp	Moffett Park Drive	EB 1-T, 1-R WB 1-L, 1-T	Signal	**D**	3.7	A	N/A	14.1	B	N/A	3.7	A	N/A	N/A	N/A	14.6	B	N/A	N/A	N/A
2*	Mathilda Avenue	Moffett Park Drive	NB 2-L, 2-T, 1-T/R SB 1-L, 3-T, 1-T/R EB 1-L, 1-T, 1-R WB 2-L, 1-T/R	Signal	**E**	**170.0**	**F**	1.176	**132.5**	**F**	1.061	**176.6**	**F**	**10.0**	**0.02**	N/A	**139.5**	**F**	**10.4**	**0.02**	N/A
3*	Mathilda Avenue	SR 237 WB Ramps	NB 1-L, 4-T SB 3-T, 1-T/R WB 1-L, 1-L/T, 1-R	Signal	**E**	77.1	E-	1.164	**163.8**	**F**	1.287	**82.2**	**F**	**7.0**	**0.02**	N/A	166.1	**F**	3.8	0.01	N/A
4*	Mathilda Avenue	SR 237 EB Ramps	NB 5-T, 1-R SB 1-L, 3-T EB 2-L, 1-L/T/R	Signal	**E**	31.1	C	0.918	53.5	D-	0.987	33.3	C-	2.7	0.02	N/A	55.1	E+	2.1	0.01	N/A
5	Bordeaux Drive	Moffett Park Drive	SB 1-L, 1-R EB 1-L, 1-T WB 1-T/R	Stop Sign (Overall) (Worst Approach)	**E**	4.4 33.8	A D	N/A	19.9 **66.5**	C **F**	N/A	5.3 35.6	A E	N/A	N/A	No	28.2 **91.1**	D **F**	N/A	N/A	**Yes**

NOTES:
1. L, T, R = Left, Through, Right
2. NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound
3. Analysis performed using 2000 *Highway Capacity Manual* Methodologies
4. General overall LOS standard for signalized City intersections is LOS D.
5. Overall LOS standard for CMP intersections and intersections on CMP roadways (intersections denoted by asterisk *) is LOS E.
6. LOS E was used as the minimum threshold for unsignalized intersections.
7. TRAFFIX LOS results at intersections 2, 3 and 4 do not represent actual conditions due to high traffic volumes and closely spaced intersections.
8. **Bold** font indicates unacceptable operations based on City and VTA standards
9. **Bold red** font indicates project impact based on City and VTA significance criteria.

6 Mathilda Avenue Progression Analysis

This section of the report describes additional analyses of the study intersections along Mathilda Avenue, between Moffett Park Drive and the SR 237 EB ramps. This was done because the field observations discussed in Section 2 indicated that these intersections experience perceived operational deficiencies that are not readily apparent using the TRAFFIX analysis software. As a result, a more comprehensive approach was investigated using the micro-simulation techniques provided in the SimTraffic analysis software.

SimTraffic is a microscopic model based on a series of algorithms that simulate the movement of individual vehicles based on car-following and lane-changing logic. Each vehicle is tracked every 0.1 of a second throughout the network. SimTraffic evaluates the dynamic changes to traffic congestion system wide. Impacts of congestion at one location to operations at adjacent locations are considered in the SimTraffic analysis.

The TRAFFIX level of service calculation (Highway Capacity Manual method) is based on deterministic equations developed for predicting traffic flow. The equations are based on field studies, but do not cover all the possibilities and thus have some limitations. The HCM analysis predicts average operating conditions over a 15 minute or one hour period and does not consider varying operating conditions. HCM procedures are good for analyzing the performance of isolated facilities with relatively moderate congestion, but are limited in their ability to analyze network conditions.

SimTraffic distributes traffic to the network randomly, which replicates real world conditions in which travel demand varies between time increments. Therefore, each SimTraffic simulation run produces different results. For this reason, multiple runs are performed and the results averaged. For this study, 10 simulation runs were performed and averaged. In addition, the traffic simulation was conducted for the entire peak hour, considering variations in traffic demand as reflected in the existing peak hour data.

Field observations revealed that the observed existing levels of service at the Mathilda Avenue / Moffett Park Drive, Mathilda Avenue / SR 237 WB Ramps, and Mathilda Avenue / SR 237 EB Ramps intersections may be inconsistent with the calculated existing levels of service, which were based on VTA calculation procedures that require the use of TRAFFIX.

The levels of service under existing conditions using the TRAFFIX software indicated that these three intersections operate acceptably during the AM and PM peak hours. However, in the field, queues that spill back to upstream intersections and travel delays were evident. This is due to the close spacing of the intersections, high traffic volumes, vehicle weaving maneuvers, short left turn lane storage, inefficient lane utilization and the presence of trap lanes (through lanes that become left-turn lanes at downstream intersections).

Table 6 shows the intersection LOS and delay along Mathilda Avenue based on the SimTraffic analysis. A summary of SimTraffic operational statistics are provided in **Appendix H**.

Table 6
SimTraffic Intersection Levels of Service

	N-S Street	E-W Street	Existing Operational Lane Configuration	Existing Intersection Control	LOS Standard	SIMTRAFFIC Existing Conditions				SIMTRAFFIC Existing + Project Conditions				SIMTRAFFIC Background + Project Conditions				SIMTRAFFIC Cumulative + Project Conditions			
						AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr	
						Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS	Avg Delay (sec)	LOS
2	Mathilda Avenue	Moffett Park Drive	NB 2-L, 2-T, 1-T/R SB 1-L, 3-T, 1-T/R EB 1-L, 1-T, 1-R WB 2-L, 1-T/R	Signal	**E**	13.8	B	124.5	**F**	15.6	B	159.2	**F**	188.2	**F**	1554.2	**F**	190.5	**F**	1662.8	**F**
3	Mathilda Avenue	SR-237 WB Ramps	NB 1-L, 4-T SB 3-T, 1-T/R WB 1-L, 1-L/T, 1-R	Signal	**E**	23.0	C+	30.7	C	31.3	C	32.0	C	177.2	**F**	280.4	**F**	177.8	**F**	351.8	**F**
4	Mathilda Avenue	SR-237 EB Ramps	NB 5-T, 1-R SB 1-L, 3-T EB 2-L, 1-L/T/R	Signal	**E**	35.8	D+	11.2	B+	41.3	D	12.0	B+	147.5	**F**	15.2	B	149.6	**F**	15.7	B

Existing Conditions

The SimTraffic analysis shows the Mathilda Avenue / Moffett Park Drive intersection operating at an unacceptable LOS F during the PM peak hour versus LOS B using the TRAFFIX calculations. This is the only instance in which the SimTraffic analysis calculates unacceptable intersection operations at the study intersections under Existing Conditions. TRAFFIX estimated that each of the Mathilda Avenue study intersections operated at LOS B during the AM and PM peak hours under existing conditions.

The reason that the Mathilda Avenue / Moffett Park Drive intersection is shown to operate at LOS B during the PM peak hour using TRAFFIX is because the TRAFFIX calculations do not reflect the constrained capacity of the eastbound Moffett Park Drive right turn movement and the westbound Moffett Park left turn movement. The capacity of these movements is constrained due to the close spacing of the Moffett Park Drive intersection to the intersection with the SR 237 WB ramps and the signal phasing that does not allow these movements to clear the Mathilda Avenue / SR 237 WB Ramps intersection in an efficient progression.

During the PM peak hour, the right turn vehicle queue on the eastbound Moffett Park Drive approach to Mathilda Avenue extends to Innovation Way. In addition, the vehicle queue on the westbound Moffett Park Drive approach to Mathilda Avenue extends through the Moffett Park Drive / Bordeaux Drive intersection.

It should be noted that the SimTraffic analysis shows the Mathilda Avenue / SR-237 EB Ramps operating at LOS B during the PM peak hour, which is inconsistent with the field operations described in Section 2.6. However, upon detailed review of the calculations, the queue lengths are actually within normally acceptable levels. Also, most queues are fully served in each traffic signal cycle. The perceived congestion is again due to the close intersection spacing that affects the upstream intersections, especially Mathilda Avenue/ Moffett Park Drive. This is confirmed by the level of service F at that intersection.

Existing Plus Project

As with Existing Conditions, the Mathilda Avenue / Moffett Park Drive intersection operates at an unacceptable LOS F during the PM peak hour when analyzed using SimTraffic under Existing Plus Project Conditions. This is the only unacceptable operating condition based upon the SimTraffic calculations.

Existing Plus Project levels of service based on the SimTraffic analysis are generally the same as the Existing Conditions SimTraffic levels of service with the exception that the AM peak hour level of service at the Mathilda Avenue / SR 237 WB Ramps intersection deteriorates from C+ to C and the level of service at the Mathilda Avenue / SR 237 EB Ramps intersection deteriorates from D+ to D with the project traffic added to the road network. The three intersections would operate at LOS B during both peak hours based upon the TRAFFIX calculations under Existing Plus Project conditions.

It should be noted that the SimTraffic analysis shows the Mathilda Avenue / SR-237 EB Ramps operating at LOS B during the PM peak hour, which is inconsistent with the field operations described in Section 2.6. However, as with Existing Conditions, the queue lengths are projected to be within normally acceptable levels. Most queues are projected to be fully served in each traffic signal cycle. The perceived congestion under Existing Conditions, which would be expected to also occur under Existing Plus Project Conditions, is due to the close intersection spacing that affects the upstream intersections, especially Mathilda Avenue/ Moffett Park Drive. This is confirmed by the level of service F at that intersection.

Background Plus Project

For the Background Plus Project conditions, the SimTraffic level of service calculations indicate the three Mathilda Avenue intersections at the SR 237 interchange would operate at LOS F during the AM peak hour. The TRAFFIX analysis indicates the Mathilda Avenue intersection with Moffett Park Drive would operate at LOS F, the intersection with the SR 237 WB ramps would operate at LOS E and the intersection with the SR 237 EB ramps would operate at LOS C during the AM peak hour. Further, the SimTraffic analysis indicates the three intersections on Mathilda Avenue would serve less than one-half of the projected Background Plus Project traffic demand. Under Background Plus Project Conditions, the three intersections would operate under oversaturated traffic demand conditions resulting in extended vehicle queues on the SR 237 westbound off-ramp, the SR 237 eastbound off-ramp and northbound Mathilda Avenue south of Ross Drive.

During the PM peak hour, the SimTraffic analysis indicates the Mathilda Avenue / Moffett Park Drive and Mathilda Avenue / SR 237 WB ramps intersection would operate at LOS F and the Mathilda Avenue / SR 237 EB ramps intersection would operate at LOS B. The three Mathilda Avenue intersections would serve about one-half of the projected Background Plus Project PM peak hour traffic demand. As with the AM peak hour, the interchange would operate under oversaturated traffic conditions. Extensive vehicle queues would be generated on southbound Mathilda Avenue, eastbound Moffett Park Drive and westbound Moffett Park drive approaching the Mathilda Avenue / Moffett Park Drive intersection and on the SR 237 westbound off-ramp to Mathilda Avenue.

The planned relocation of the westbound SR 237 off-ramp to the Mathilda Avenue / Moffett Drive intersection would improve traffic operations at the Mathilda Avenue / Moffett Drive intersection and Mathilda Avenue / SR 237 WB Ramps intersection. While not directly providing additional capacity at the Mathilda Avenue / SR 237 EB Ramps intersection, consolidating the SR 237 WB Ramps intersection with the Moffett Park Drive intersection would allow modifications to the system signal timing that would result in improved operations at the Mathilda Avenue / SR 237 EB Ramps intersection during the AM peak hour.

Cumulative Plus Project

The SimTraffic analysis for the Cumulative Plus Project condition are the same as the results for the Background Plus Project Conditions. The Mathilda Avenue / Moffett Park Drive intersection and the Mathilda Avenue / SR 237 westbound ramps intersection would operate at LOS F during the AM and PM peak hours. The Mathilda Avenue / SR 237 eastbound ramps intersection would operate at LOS F during the AM peak hour and LOS B during the PM peak hour. The three intersections have the capacity to serve about one-half of the Cumulative Plus Project traffic demand.

Realignment of the SR 237 westbound off-ramp to Moffett Park Drive would result in improved operations on the Mathilda Avenue corridor at the SR 237 interchange.

7 Transit, Bicycle and Pedestrian Facilities Analysis

Mode split is the proportion of people using a certain mode of transportation. The Santa Clara Valley Transportation Authority's *Valley Transportation Plan 2035 (VTP 2035)* estimates changes in mode splits for home-based work trips and all trips between the years 2005 and 2035. The "2035 Project" scenario represents conditions with the completion of projects and programs in the VTP 2035 that are anticipated to have available funding.

In order to estimate the number of transit, bicycle and pedestrian trips generated by the project, the project's vehicle trips were first converted to person trips using a vehicle occupancy rate of 1.07 for the City of Sunnyvale, which was obtained from the United States Census Bureau website.[4] Since the home-based work trips represent trips originating from a residence and not a hotel, the percentages for all trips were used. The numbers of transit, bicycle and pedestrian trips were then calculated using the "2035 Project" mode splits for all trips, found in the VTA's VTP 2035.

Table 7 provides a summary of the proportions of travelers using transit, bicycle and pedestrian modes of transportation.

Table 7
VTP Mode Split: All Trips

Mode	2005	2035 No Project	2035 Project
Drive Alone	56.90%	52.60%	52.30%
Shared Ride	32.70%	32.80%	32.70%
Transit	2.10%	3.60%	4.10%
Bike	1.70%	1.60%	1.50%
Walk	11.30%	9.40%	9.40%

Transit Facilities

Transit riders are projected to account for 4.10% of all trips under year 2035 conditions. Based on this percentage, the proposed project would generate approximately 5 transit trips (3 in, 2 out) during the AM peak hour and 6 transit trips (3 in, 3 out) during the PM peak hour. This is a conservative (high-side) estimate since the number of transit riders is calculated based on the total trips generated by the hotel (i.e., guests and employees), and hotel guests would be less likely to ride transit to the site than hotel employees.

Caltrain

Each Caltrain has an average seating capacity of 650. Passengers without seats must stand, although standing can be difficult since the trains do not have designated areas for standing

[4] http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t#none

and they lack hand rails. Caltrain passenger headcounts conducted in February 2014 showed that 15 trains operated with a maximum load above 95% seated capacity during the survey period, with 11 trains operating above 100% seated capacity. Peak summer months experience approximately 16% to 17% higher ridership than in February.[5]

Caltrain is planning on adding 11 rail cars to its busiest trains, which would increase capacity by 20%. However, the longer trains may not be operational until 2015. Caltrain's modernization program, which includes electrification of the system, will provide more capacity by allowing more frequent and faster train service. The modernization program is scheduled to be operational by 2019.

Of the 5 to 6 peak hour transit trips generated by the project, it is possible that some would ride the train. People using the train to travel to the project site would likely get on and off at the Sunnyvale Caltrain Station and then take a bus to and from the project site.

The estimated 3 inbound and 3 outbound peak hour transit trips are negligible and would not impact Caltrain services.

Bus and Light Rail

March 2014 bus and light rail load factors, which represent the average number of users per route divided by the capacity of each bus and light rail vehicle, were provided by VTA. Load factors in excess of 1.0 indicate that ridership is over capacity. Load factors for transit routes relevant to the proposed project are as follows:

- Light Rail Route 902 – 0.21
- Bus Route 54 – 0.67
- Bus Route 120 – 0.56
- Bus Route 121 – 0.46
- Bus Route 26 – 0.75
- Bus Route 122 – 0.22
- Bus Route 321 – 0.04
- Bus Route 328 – 0.17

The route with the highest load factor is Bus Route 26, which on average is 75% full. All bus and light rail routes providing service in the vicinity of the proposed project are well below capacity and the project is not expected to have a significant impact on bus or light rail facilities.

Bicycle Facilities

Bicyclists are projected to account for 1.50% of all trips under year 2035 conditions. Based on a percentage of 1.50%, the proposed project would generate approximately 2 bicycle trips (1 in, 1 out) during the AM peak hour and 2 bicycle trips (1 in, 1 out) during the PM peak hour. This is also a conservative (high-side) estimate since the number of bicyclists is calculated based on the total trips generated by the hotel (i.e., guests and employees), and hotel guests would be less likely to bicycle to the site than hotel employees.

[5] http://www.caltrain.com/about/statsandreports/Ridership.html

Pedestrian Facilities

Pedestrians are projected to account for 9.40% of all trips under year 2035 conditions. Based on a percentage of 9.40%, the proposed project would generate approximately 12 pedestrian trips (7 in, 5 out) during the AM peak hour and 12 pedestrian trips (6 in, 6 out) during the PM peak hour. This is also a conservative (high-side) estimate since the number of pedestrians is calculated based on the total trips generated by the hotel (i.e., guests and employees), and hotel guests would be less likely to walk to the site than hotel employees.

A sidewalk on the east side of Mathilda Avenue provides pedestrian access to the bus stop on Mathilda Avenue (which is about 350 feet north of the project site). Pedestrian access to the Lockheed Martin Light Rail station, which is less than a half mile from the project site, is provided by sidewalks along both sides of Mathilda Avenue and crosswalks at the Mathilda Avenue / 5th Street and Mathilda Avenue / Moffett Park Drive intersections.

Based on the preceding discussion, the proposed project is not expected to generate a substantial amount of transit, bicycle or pedestrian activity and is not expected to significantly impact transit, bicycle or pedestrian facilities in the project vicinity.

8 Parking, Access and Circulation

8.1 Project Vehicular Parking

The City of Sunnyvale municipal parking code (Section 19.46.100) requires a minimum of 0.8 parking spaces per hotel room and a maximum 1.2 parking spaces per hotel room. The project is proposing a total of 342 hotel rooms. This equates to a minimum requirement of 274 spaces (342 rooms x 0.8 spaces per room = 274 spaces), and a maximum of 410 spaces (342 rooms x 1.2 spaces per room = 410 spaces). The project site plan indicates that a total of 405 parking spaces will be provided on-site. On the basis of the parking calculations provided, the parking provided on the site exceeds the minimum requirement by 131 spaces.

The City of Sunnyvale requires the minimum dimensions for a standard space to be 8.5 feet wide by 18 feet long. Based on a review of the project site plan, the majority of parking spaces within the new parking structure appear to be 9 feet wide by 18 feet long. The applicant should verify with city staff if the proposed site plan meets the City's parking dimension requirements for this project.

8.2 Project Bicycle Parking

Based on the City of Sunnyvale municipal code for bicycle parking, bicycle parking spaces on the project site shall accommodate a minimum of 21 bicycles (i.e., a minimum of 5% of the total number of vehicular parking spaces provided). The project site plan provides three bicycle racks with a total capacity of 44 bicycles. Based on a review of the project site plan, the proposed project exceeds the minimum requirement of bicycle spaces by 23 spaces.

Per VTA bicycle guidelines, “Racks shall be located outside the typical pedestrian travel path, with additional room for bicyclists to maneuver outside the pedestrian way”. Bike racks shall also be of sufficient height to increase their visibility to pedestrians and shall be located far enough away from motor vehicles to prevent damage to both parked bicycles and vehicles.

Although not required, the installation of bike lockers should be considered to encourage an increase in bicycle trips to the project site.

8.3 Project Access and On-Site Circulation

Access to the project will be from three existing driveways on Mathilda Avenue, Moffett Park Drive, and Bordeaux Drive. Due to a raised median on Mathilda Avenue, the existing driveway on Mathilda Avenue only provides right-in, right-out access.

Based on the project site plan, on-site vehicular circulation appears to be satisfactory for the anticipated use. However, there are no sidewalks along the north side of Moffett Park Drive and the west side of Bordeaux Drive along the project frontage. The project should install sidewalks along the project frontage. In addition, pedestrian connections should be provided

between the proposed buildings, parking lots and parking garage. The addition of sidewalks on the north side of Moffett Park Drive and the west side of Bordeaux Drive, as well as the inclusion of pedestrian connections between the buildings and parking areas, would encourage an increase in pedestrian trips to the project site.