# TABLE OF CONTENTS

## EXECUTIVE SUMMARY
- Project Traffic Estimates ................................................................. i
- Intersection Impacts and Mitigation Measures ........................................ i
- Freeway Segment Impacts and Mitigation Measures ...................................... ii
- Transit Service ............................................................................. ii
- Bicycle and Pedestrian Facilities ...................................................... ii
- Vehicle and Bicycle Parking ................................................................ ii
- Site Access and On-Site Circulation .................................................... ii

## 1. INTRODUCTION
- Project Description ........................................................................ 1
- Definitions ................................................................................... 1
- Study Area .................................................................................. 1
- Study Intersections ....................................................................... 1
- Analysis Scenarios ...................................................................... 2
- Analysis Methods .......................................................................... 2
- Moffett Park Specific Plan (MPSP) .................................................... 4
- Citywide Deficiency Plan and Transportation Impact Fee .................. 5
- Report Organization ..................................................................... 5

## 2. EXISTING CONDITIONS
- Existing Roadway Network ............................................................. 8
- Pedestrian Facilities ..................................................................... 9
- Bicycle Facilities .......................................................................... 9
- Existing Transit Service ................................................................ 14
- Existing Intersection Volumes and Lane Configurations .................. 18
- Existing Intersection Levels of Service ........................................... 18
- Field Observations ..................................................................... 20
- Existing Freeway Segment Levels of Service ................................. 23

## 3. EXISTING PLUS PROJECT CONDITIONS
- Existing Project Traffic Estimates ..................................................... 25
- Existing Plus Project Intersection Levels of Service ......................... 26
- Intersection Impact Criteria ............................................................. 32
- Existing Plus Project Intersection Impacts and Mitigation Measures .... 33
- Existing Plus Project Freeway Segment Levels of Service ............... 33
- Freeway Impact Criteria ................................................................ 33
- Existing Freeway Impacts and Mitigation Measures ......................... 33

## 4. BACKGROUND CONDITIONS
- Background No Project Traffic Volumes .......................................... 35
- Background Improvements ............................................................. 36
- Background Plus Project Traffic Volumes .......................................... 36
- Background Intersection Levels of Service ....................................... 36
- Background Intersection Impacts and Mitigation Measures .............. 40

## 5. CUMULATIVE CONDITIONS
- Cumulative No Project Traffic Volumes ........................................... 41
- Cumulative Improvements ............................................................. 41
- Cumulative Plus Project Traffic Volumes .......................................... 41
- Cumulative Intersection Levels of Service ....................................... 41
- Cumulative Intersection Impacts and Mitigation Measures .............. 46
APPENDICES

Appendix A: Existing Traffic Counts
Appendix B: Intersection Level of Service Calculations
Appendix C: Approved, Not Occupied, and Pending Projects
Appendix D: Mitigated Intersection Level of Service Calculations
Appendix E: Peak-Hour Signal Warrants
LIST OF FIGURES

Figure 1  Project Location...........................................................................................................6
Figure 2  Preferred Onizuka Land Uses Map ...............................................................................7
Figure 3  Existing Bicycle Facilities..........................................................................................12
Figure 4  Existing Pedestrian and Bicycle Volumes .................................................................13
Figure 5  Existing Transit Service .............................................................................................17
Figure 6  Existing Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes ....19
Figure 7  Mathilda Avenue Roadway Diagram ..........................................................................22
Figure 8  Project Trip Distribution ............................................................................................28
Figure 9  Project Trip Assignment ............................................................................................29
Figure 10 Existing Plus Project Intersection Peak Hour Volumes ............................................30
Figure 11 Background No Project Intersection Peak-Hour Volumes ......................................38
Figure 12 Background Plus Project Intersection Peak Hour Volumes .....................................39
Figure 13 Cumulative No Project Intersection Peak-Hour Volumes .........................................43
Figure 14 Cumulative Plus Project Intersection Peak Hour Volumes ......................................44
LIST OF TABLES

Table 1  Signalized Intersection Level of Service Definitions Using Average Control Vehicular Delay ........3
Table 2  Unsignalized Intersection Level of Service Definitions Using Average Control Vehicular Delay .....4
Table 3  Freeway Segment Level of Service Definitions .................................................................4
Table 4  Existing Transit Service ........................................................................................................14
Table 5  Existing Intersection Levels of Service ................................................................................18
Table 6  Existing Freeway Segment Levels of Service .....................................................................24
Table 7  Trip Generation – Onizuka Air Force Station Resue Plan ..................................................26
Table 8  Existing and Existing Plus Project Intersection Levels of Service ....................................31
Table 9  Existing Plus Project Freeway Segment Levels of Service .................................................34
Table 10  Annual Growth Rates .......................................................................................................35
Table 11  Background and Background Plus Project Intersection Levels of Service ....................37
Table 12  Cumulative Intersection Levels of Service ......................................................................45
Table 13  Vehicle Parking Requirements for Office Uses .................................................................48
EXECUTIVE SUMMARY

This report presents the results of the transportation impact analysis (TIA) for the proposed Reuse Plan (Project) for the Onizuka Air Force Station located in the City of Sunnyvale, California. The Project consists of 52,000 square feet (s.f.) of single tenant office space, 70,000 s.f. of Research & Development (R&D) space, and a community college campus with an estimated peak population of 1,000 students. With the exception of an existing and operational fire station, vacant buildings occupy the project site. The Project is located within the Moffett Park Specific Plan (MPSP) area at the southwest corner of Moffett Park Drive and Mathilda Avenue. The roadway system was evaluated under the No Project and Plus Project scenarios for Existing, Background, and Cumulative Conditions. Site access for all modes and parking are also addressed.

PROJECT TRAFFIC ESTIMATES

The amount of traffic anticipated to be added to the surrounding roadway system by the proposed projects were estimated based data published in Institute of Transportation Engineers’ (ITE) Trip Generation 8th Edition (2008).

Two trip reductions strategies based on VTA’s Transportation Impact Analysis Guidelines (March 2009) were applied to the Project traffic estimates to determine the number of net new trips generated by the project. Because of the Project’s proximity to the existing Moffett Park light rail station, we applied a three percent reduction for employment that is within 2,000 feet of a light rail station to account for transit ridership. We also applied a five percent transportation demand management (TDM) trip reduction to the office and R&D uses, assuming that the office developments would provide some level of TDM programs, such as financial incentives with Eco Pass participation.

The proposed project is estimated to generate 2,600 net new daily vehicle trips, 307 net new AM peak-hour trips, and 310 net new PM peak-hour trips.

INTERSECTION IMPACTS AND MITIGATION MEASURES

Existing Plus Project Conditions

Measured against the City of Sunnyvale’s and VTA’s level of service standards, the project is not expected to have significant impacts at any of the study intersections under Existing plus Project conditions; therefore, no mitigation is required.

Background Plus Project Conditions

Based on the City of Sunnyvale’s and VTA’s impact criteria the project is expected to operate at unacceptable service levels at the following three intersections:

Int. 1. Enterprise Way/Manila Drive/Moffett Park Drive
Int. 6. Mathilda Avenue/Moffett Park Drive
Int. 7. Mathilda Avenue/SR 237 Westbound Ramps

In each case the critical delay increases by more than four seconds (and the critical V/C ratio increases by more than 0.01 between the Background No Project and Background Plus Project Scenario and the project would be considered to have a significant impact. However, the project is considered to have less-than-significant impact, because the proposed uses generate less trips than allowed under air base uses.
**Cumulative Plus Project Conditions**

Based on the City of Sunnyvale’s and VTA’s impact criteria the project is expected to operate at unacceptable service levels. However, as discussed under Background Conditions, the project is considered to have less-than-significant impact, because the proposed uses generate less trips than allowed under air base uses.

**FREEWAY SEGMENT IMPACTS AND MITIGATION MEASURES**

**Existing Plus Project Conditions**

The proposed project will have not have a significant impact on any of the study freeway segments, as the addition of project traffic will not degrade operations on any segment to unacceptable LOS F or exacerbate unacceptable LOS F operations by adding traffic equal to at least one percent of a freeway segment’s capacity; therefore, no mitigation is required.

**TRANSIT SERVICE**

The proposed project will generate demand for existing transit services in the area, which can be accommodated by the existing supply. Transit impacts are considered significant if the proposed project conflicts with existing or planned transit facilities or generates potential transit trips and does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. Based on these criteria, the project would not have a potentially significant impact on transit service.

**BICYCLE AND PEDESTRIAN FACILITIES**

The proposed Project would generate bicycle demand on the adjacent roadways, which immediately around the project site have limited designated bicycle facilities. Bike lanes are provided on 11th Avenue; however no designated facilities are currently available on Innovation Way or Moffett Park Drive and Mathilda Avenue only is designated as a bike route north of Innovation Way. The City has plans to provide bike lanes on Moffett Park Drive between Enterprise Way and Innovation Way and a bike route between Innovation Way and Mathilda Avenue, since right-of-way constraints limit the feasibility of bike lanes in the segment east of Innovation Way.

**VEHICLE AND BICYCLE PARKING**

Based on the requirements of the MPSP, the office uses of the project would be required to provide a minimum of 403 parking spaces and maximum of 488 parking spaces at the Onizuka Redevelopment site.

The project description does not contain sufficient information to evaluate fully the college’s required parking supply. However, the project does anticipate supplying parking for 556 cars.

**SITE ACCESS AND ON-SITE CIRCULATION**

The preferred land use plan for the project site provides a general site diagram for future development. Absent from the land use plan are the location of project driveways and an internal circulation system to illustrate auto, pedestrian, and bicycle traffic and the site plan is not detailed enough to evaluate on-site circulation. We recommend that the City evaluate on-site circulation when a more detailed site plan is available.
1. INTRODUCTION

This report presents the results of the transportation impact analysis (TIA) for the proposed Reuse Plan (Project) for the Onizuka Air Force Station located in the City of Sunnyvale, California. The project site is located within the Moffett Park Specific Plan (MPSP) area and is bounded by Innovation Way to the west and north, Mathilda Avenue to the east, and West Moffett Park Drive to the south. Additionally, the Santa Clara Valley Transportation Authority’s (VTA’s) light rail tracks extend along the south and east borders of the site, and the Moffett Park station is approximately a 2,000-foot walk from the site. The site location is shown on the map in Figure 1. The preferred land use plan is included in Figure 2.

The purpose of this analysis is to identify potentially significant adverse impacts of the proposed project on the surrounding transportation system and to recommend measures to mitigate significant impacts. The TIA was prepared following the guidelines of the City of Sunnyvale and Santa Clara Valley Transportation Authority (VTA), the congestion management agency for Santa Clara County.

PROJECT DESCRIPTION

The Project is a Reuse Plan for the Onizuka Air Force Station consisting of 52,000 s.f. of office space, 70,000 s.f. of research and development (R&D) space, and a community college campus with a peak population of 1,000 students. With the exception of an existing and operational fire station, the project site is occupied by vacant buildings.

DEFINITIONS

- Existing – Conditions of roadways and intersections as of April 2011, when data for the majority of the study area was collected. Two intersection counts were conducted in November 2011.
- Project – Traffic associated with the proposed office (52,000 s.f.), R&D (70,000 s.f.), and college (1,000 students) uses.
- Background – Existing conditions plus growth associated with “approved and not built” and “not occupied” development, plus a growth factor until 2013.
- Cumulative – Existing conditions plus background growth plus all planned and pending projects, as well as a growth factor from 2013-2016.
- Constrained Projects – A planned project for which VTA anticipates full funding within the timeframe of the regional transportation plan (“Valley Transportation Plan 2035”).

STUDY AREA

The roadway impacts of the proposed projects were evaluated for the following intersections and freeway segments:

Study Intersections

1. Enterprise Way/Manila Dr/Moffett Park Dr
2. US 101 Northbound/Moffett Park Dr
3. Innovation Way/Moffett Park Dr
4. Innovation Way/11th Ave
5. Innovation Way/Mathilda Ave
6. Mathilda Ave/Moffett Park Dr
7. Mathilda Ave/SR 237 Westbound Ramps
8. Mathilda Ave/SR 237 Eastbound Ramps
9. Mathilda Ave/Ross Dr
10. Ahwanee Ave/Mathilda Ave/Almanor Ave
11. Mathilda Ave/Maude Ave
The listed intersections were selected in consultation with the City of Sunnyvale and determined based on VTA’s ten trip per lane guideline, which indicates that intersections should be included if the proposed project adds 10 or more peak hour vehicles per lanes to any intersection movement.

Freeway Segments

**US 101 (Northbound and Southbound):**
- Between Mathilda Ave and Fair Oaks Ave
- Between SR 237 and Mathilda Ave
- Between SR 237 and Ellis St

**SR 237 (Eastbound and Westbound):**
- Between Maude Avenue and US 101
- Between US 101 and Mathilda Avenue
- Between Mathilda Avenue and Fair Oaks Ave

Project impacts to pedestrian facilities, bicycle facilities, and transit service and facilities are also addressed.

**ANALYSIS SCENARIOS**

The operations of the key intersections and freeway segments were evaluated during the weekday morning (AM) and afternoon (PM) peak hours for the following six scenarios:

**Scenario 1:** *Existing Conditions* - Existing volumes obtained from counts.

**Scenario 2:** *Existing plus Project Conditions* - Scenario 1 volumes plus traffic generated by the proposed project.

**Scenario 3:** *Background No Project Conditions* - Existing volumes plus traffic from “approved but not yet built” and “not occupied” developments in the area plus ambient growth to the anticipated completion year of the project.

**Scenario 4:** *Background plus Project Conditions* - Scenario 3 volumes plus traffic generated by the proposed project.

**Scenario 5:** *Cumulative Conditions* - Cumulative year traffic volumes based on estimates developed for the Ariba and Moffett Towers Expansion TIA.

**Scenario 6:** *Cumulative Plus Project Conditions* - Scenario 5 volumes plus traffic generated by net increase in traffic due to implementation of the proposed project.

**ANALYSIS METHODS**

The operations of roadway facilities are described with the term *level of service*. Level of Service (LOS) is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, as the best operating conditions, to LOS F, or the worst operating conditions. LOS E represents “at-capacity” operations. When traffic volumes exceed the intersection capacity, stop-and-go conditions result, and operations are designated as LOS F.

**Signalized Intersections**

The method described in Chapter 16 of the 2000 *Highway Capacity Manual* (HCM) (Special Report 209, Transportation Research Board) was used to prepare the level of service calculations for the study intersections. This level of service method, which is approved by the City of Sunnyvale and VTA, analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average
control delay for signalized intersections is calculated using TRAFFIX analysis software and is correlated to a LOS designation as shown in Table 1.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Description</th>
<th>Average Control Delay Per Vehicle (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Operations with very low delay occurring with favorable progression and/or short cycle lengths.</td>
<td>≤ 10.0</td>
</tr>
<tr>
<td>B+</td>
<td>Operations with low delay occurring with good progression and/or short cycle lengths.</td>
<td>10.1 to 12.0</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>12.1 to 18.0</td>
</tr>
<tr>
<td>B-</td>
<td></td>
<td>18.1 to 20.0</td>
</tr>
<tr>
<td>C+</td>
<td>Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.</td>
<td>20.1 to 23.0</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>23.1 to 32.0</td>
</tr>
<tr>
<td>C-</td>
<td></td>
<td>32.1 to 35.0</td>
</tr>
<tr>
<td>D+</td>
<td>Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.</td>
<td>35.1 to 39.0</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>39.1 to 51.0</td>
</tr>
<tr>
<td>D-</td>
<td></td>
<td>51.1 to 55.0</td>
</tr>
<tr>
<td>E+</td>
<td>Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.</td>
<td>55.1 to 60.0</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>60.1 to 75.0</td>
</tr>
<tr>
<td>E-</td>
<td></td>
<td>75.1 to 80.0</td>
</tr>
<tr>
<td>F</td>
<td>Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.</td>
<td>&gt; 80.0</td>
</tr>
</tbody>
</table>


The City of Sunnyvale’s minimum threshold for acceptable signalized intersection operations is LOS D, except for the Mathilda Avenue corridor, which is identified as regionally significant. The threshold for the Mathilda corridor is LOS E. The threshold of Santa Clara County CMP intersections is LOS E, which applies only to the intersection of Mathilda Avenue/Maude Avenue.

**Unsignalized Intersections**

The operations of the unsignalized intersections were evaluated using the method contained in Chapter 17 of the 2000 HCM. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side-street-controlled intersections, the average control delay is calculated for each stopped movement, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. Table 2 summarizes the relationship between delay and LOS for unsignalized intersections.

The City of Sunnyvale does not have an officially level of service standard for unsignalized intersections. Based on previous studies in the City of Sunnyvale, acceptable service levels for unsignalized intersections are generally defined as LOS E; though evaluation of traffic signal warrant from the California Manual of Uniform Traffic Control Devices (MUTCD) are also considered in determining acceptable operations.
### TABLE 2
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS
USING AVERAGE CONTROL VEHICULAR DELAY

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Description</th>
<th>Average Control Delay Per Vehicle (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Little or no delay.</td>
<td>$\leq 10.0$</td>
</tr>
<tr>
<td>B</td>
<td>Short traffic delay.</td>
<td>10.1 to 15.0</td>
</tr>
<tr>
<td>C</td>
<td>Average traffic delays.</td>
<td>15.1 to 25.0</td>
</tr>
<tr>
<td>D</td>
<td>Long traffic delays.</td>
<td>25.1 to 35.0</td>
</tr>
<tr>
<td>E</td>
<td>Very long traffic delays.</td>
<td>35.1 to 50.0</td>
</tr>
<tr>
<td>F</td>
<td>Extreme traffic delays with intersection capacity exceeded.</td>
<td>$&gt; 50.0$</td>
</tr>
</tbody>
</table>


### Freeway Segments

Freeway segments are evaluated using VTA’s analysis procedure, which is based on the density of the traffic flow using methods described in the 2000 HCM. Density is expressed in passenger cars per mile per lane. The Congestion Management Program range of densities for freeway segment level of service is shown in Table 3. The LOS standard for the freeway segments is LOS E.

### TABLE 3
FREEWAY SEGMENT LEVEL OF SERVICE DEFINITIONS

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Density (passenger cars per mile per lane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$\leq 11$</td>
</tr>
<tr>
<td>B</td>
<td>11.1 to 18.0</td>
</tr>
<tr>
<td>C</td>
<td>18.1 to 26.0</td>
</tr>
<tr>
<td>D</td>
<td>26.1 to 46.0</td>
</tr>
<tr>
<td>E</td>
<td>46.1 to 58.0</td>
</tr>
<tr>
<td>F</td>
<td>$&gt; 58.0$</td>
</tr>
</tbody>
</table>


### MOFFETT PARK SPECIFIC PLAN (MPSP)

The Moffett Park Specific Plan (MPSP) was adopted by the City of Sunnyvale on April 27, 2004. The MPSP defines goals and objectives for future development, community and design guidelines, infrastructure improvements, and development standards for the Moffett Park area. The Moffett Park area is located in the northern most portion of the City of Sunnyvale and is generally bounded by the Moffett Federal Airfield in the west, the San Francisco Bay to the north, SR 237 to the south and Sunnyvale Baylands Park to the east. In regards to transportation, the MPSP includes guidelines for mandatory transportation demand management programs, parking requirements for both vehicles and bicycles, planned roadway improvements to accommodate vehicles, transit, bicyclists, and pedestrian with the proposed build out of Moffett Park.
The Moffett Park Specific Plan assumed the continued long-term operation of the Onizuka Air Force Station by the Air Force without any proposed future land use changes. The MPSP provides the site with a maximum Floor Area Ratio (FAR) of 0.35.

**CITYWIDE DEFFICIENCY PLAN AND TRANSPORTATION IMPACT FEE**

In compliance with VTA, the City of Sunnyvale maintains a Citywide Deficiency Plan (CDP, September 2005) to address existing and anticipated deficiencies in the level of service of intersections within the City. The objective of the CDP is to set forth a comprehensive citywide solution to LOS deficiencies at CMP facilities for which no localized mitigation is feasible. The CDP includes a list of transportation improvements to mitigate identified deficiencies. Improvements include intersection and roadway modifications, as well as, pedestrian, bicycle, and transit infrastructure improvements to facilitate multi-modal access throughout the City. Directly related to the project area is the Mary Avenue Extension project, which will extend Mary Avenue from its current terminus at Almanor Avenue north over SR 237 and US 101 connecting to 11th Avenue. The new roadway connection will change travel patterns on adjacent streets (particularly the parallel arterials) and will reduce congestion on key facilities such as Mathilda Avenue as compared to conditions without the extension.

The identified improvements will be funded through a combination of state and regional transportation funds and countywide taxes and over $80 million will be funded through the City’s two-tiered traffic impact fee (TIF), which identifies a separate fee structure for the Moffett Park Specific Plan area north of SR 237 and the remainder of the City south of SR 237.

However, the City’s TIF program was developed when the Onizuka Air Force Base was in operation and the TIF and associated improvements and fee structure took into account the amount of traffic that the air force uses were generating in their baseline analysis. Based on the analysis presented in the Onizuka Redevelopment Traffic Analysis[1] Technical Memorandum (Fehr & Peers, March 2008), the air force uses were estimated to generate 4,970 daily vehicle trips, 736 AM peak hour trips (648 inbound and 88 outbound) and 700 PM peak hour trips (119 inbound and 581 outbound).

**REPORT ORGANIZATION**

The remainder of this report is divided into five chapters. The existing transportation system serving the sites and the current operating conditions of the key intersections and freeway segments are described in Chapter 2. Chapter 3 describes Existing plus Project Conditions, including the method used to estimate the amount of traffic added to the surrounding roadways by the proposed projects and their impacts on the transportation system. Background Conditions without and with the project are described in Chapter 4 and Cumulative Conditions without and with the project are described in Chapter 5. A multi-modal and site access evaluation is contained in Chapter 6.

---

[1] The purpose of the analysis was to evaluate the traffic operations on key nearby intersections for five development alternatives and to recommend mitigation measures, if necessary. The analysis included evaluating the existing operation of 14 key intersections, estimating trip generation for the five alternatives, and evaluating 2020 Conditions.
### ONIZUKA REDEVELOPMENT PLAN PREFERRED LAND USES

<table>
<thead>
<tr>
<th>Ref</th>
<th>Name</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emergency Services</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>VA with expansion</td>
<td>4.41</td>
</tr>
<tr>
<td></td>
<td>Educational Use</td>
<td>9.56</td>
</tr>
<tr>
<td></td>
<td>Moffett Park Industrial</td>
<td>4.60</td>
</tr>
</tbody>
</table>

*Source: Onizuka Air Force Station Local Redevelopment Authority Amended Redevelopment Plan, City of Sunnyvale, CA (2011)*
2. EXISTING CONDITIONS

This chapter describes the existing conditions of the roadway facilities, pedestrian and bicycle facilities, and transit service. It also presents existing traffic volumes and operations for the study intersections and freeway segments with the results of level of service calculations.

EXISTING ROADWAY NETWORK

State Route 237 (SR 237), US 101, and Central Expressway provide regional access to the project sites. The following streets provide local access to the project sites: Mathilda Avenue, Moffett Park Drive/Manila Drive, 11th Avenue, Innovation Way, Enterprise Way, Middlefield Road, Ellis Street, Mary Avenue, and Maude Avenue. Descriptions of these roadways are presented below. Figure 1 shows the locations of these facilities in relation to the project sites.

SR 237 is located immediately south of the project site and provides regional freeway access between the Cities of Mountain View and Milpitas. SR 237 is an east-west freeway with two mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction. HOV lanes, also known as diamond or carpool lanes, restrict use to vehicles with two or more persons (carpool, vanpool, and buses) or motorcycles during the morning (5:00 AM to 9:00 AM) and evening (3:00 PM to 7:00 PM) commute periods. Access from SR 237 is provided via its interchanges with Ellis Street (via US 101), Mathilda Avenue, Fair Oaks Avenue, and Lawrence Expressway. Near the project site SR 237 has an average daily traffic (ADT) volume of approximately 90,000 vehicles.

US 101 extends north through San Francisco and south through San Jose. Near the project site, US 101 travels in an east-west direction with approximately 140,000 daily vehicles. The freeway has three mixed-flow lanes and one HOV lane in each direction. Similar to SR 237, interchanges at Ellis Street, Mathilda Avenue, Fair Oaks Avenue, and Lawrence Expressway provide local access to the project site.

Mathilda Avenue is a major six-lane north-south arterial that also provides regional access to SR 237 and US 101. North of SR 237, Mathilda Avenue connects to Caribbean Drive, which is the extension of Lawrence Expressway. To the south, Mathilda Avenue passes through central Sunnyvale and becomes Sunnyvale-Saratoga Road ultimately connecting to I-280 and SR 85. Mathilda Avenue is one of the City of Sunnyvale’s designated truck routes for trucks over three tons in weight. Approximately 45,000 daily vehicles travel on Mathilda Avenue south of SR 237 on an average weekday.

Moffett Park Drive/Manila Drive is a two-lane east-west roadway that runs along the southern border of the Onizuka Project site. Moffett Park Drive/Manila Drive provides direct regional access to the project site at the SR 237 interchange (except for the westbound off-ramp) and US 101 interchange. The Drive has an ADT of approximately 5,000 vehicles. Moffett Park Drive connects to Mathilda Avenue east of the project area and extends east as far as Caribbean Drive. Manila Drive extends west of the project site to Moffett Park Boulevard in Mountain View. No access is provided to Moffett Park Drive west of Mathilda Avenue from the SR 237 westbound off-ramp; vertical delineators currently prevent access to the northbound left-turn lanes.

11th Avenue is a four-lane, east-west roadway that extends from Enterprise Way to Innovation Way. 11th Avenue turns into Innovation Way, which extends south to W Moffett Park Drive.

Innovation Way is a four-lane, north-south roadway that extends from Moffett Park Drive to Mathilda Avenue and forms the western border of the Project site. Innovation Way used to be closed between Mathilda Avenue and 11th Avenue, but was opened to public access in the summer of 2011.

Enterprise Way is a four-lane, north-south roadway at the western border of the MPSP area that connects to Moffett Park/Manila Drive and provides regional access to US 101 and SR 237. There is an existing security gate located on Enterprise Way approximately 2,500 feet north of the 11th Avenue intersection (just south of 5th Avenue), which restricts access into the Lockheed Martin complex.
Mary Avenue is a four-lane, north-south roadway that extends from Homestead Road in Cupertino to Almanor Avenue (just north of Maude Avenue). It has an ADT of approximately 12,000 vehicles near the project site. Mary Avenue currently provides access to Central Expressway. There are future plans to continue Mary Avenue to the north, passing over US 101, SR 237, and Moffett Park Drive before terminating at 11th Avenue. The Mary Avenue extension project is identified by the City as a fiscally constrained improvement project and the timeline for construction of the extension is uncertain at this time; therefore, the Mary Avenue extension project is not included as a future transportation improvement under the Background No Project and Background plus Project scenarios (Scenarios 3 and 4).

Maude Avenue is a four-lane, east-west roadway from SR 237 in the west to Wolfe Road in the east. It also has a partial interchange with SR 237, complementing the Middlefield Road interchange. Near the project site Maude Avenue has an ADT of approximately 15,000 vehicles on an average weekday.

PEDESTRIAN FACILITIES

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. Near the project site, sidewalks are provided on both sides of 11th Avenue Innovation Way and Mathilda Avenue. Mathilda Avenue connects pedestrians to/from the Lockheed Martin Transit Center to Innovation Way and the project site. Access to the Moffett Park light rail station just south of the Ariba campus site is provided via sidewalks on Innovation Way and a pedestrian path along the southern border of the Ariba campus just north of Moffett Park Drive and the light rail tracks. There are no sidewalks on Moffett Park Drive/Manila Drive, though the City has identified sidewalks on Moffett Park/Manila Drive as a future pedestrian improvement. Most study intersections include crosswalks and pedestrian signals on all approaches.

At the Mathilda Avenue/SR 237 interchange, north-south pedestrian movements are limited to the east side of Mathilda Avenue and east-west crossing of Mathilda Avenue is prohibited within the interchange area. Pedestrians crossing Mathilda (east-west) have to use the crosswalk on the north leg of the Mathilda Avenue/Moffett Park Drive intersection. Sidewalks continue on the east side of Mathilda Avenue from the SR 237 interchange to south of the US 101 interchange, at which point sidewalks continue on both sides of Mathilda Avenue. The City has identified providing sidewalks on both sides of Mathilda Avenue between Moffett Park Drive and US 101 as a future pedestrian improvement and are included in the TIF program.

Crosswalks and pedestrian signals are provided only in the east-west direction of the intersection of Enterprise Way/Manila Drive. A multi-use pedestrian/bicycle bridge crosses US 101 east of Mathilda Avenue providing a pedestrian/bicycle connection between Moffett Park to the north and the residential neighborhood to the south.

BICYCLE FACILITIES

Bikeway planning and design in California typically relies on guidelines and design standards established by California Department of Transportation (Caltrans) in the Highway Design Manual (Chapter 1000: Bikeway Planning and Design). Caltrans provides for three distinct types of bikeway facilities, as described below and shown on the accompanying figures.
• **Class I Bikeway (Bike Path)** provides a completely separate right-of-way and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized.

![Image of Class I Bikeway](image)

• **Class II Bikeway (Bike Lane)** provides a restricted right-of-way and is designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.

![Image of Class II Bikeway](image)

• **Class III Bikeway (Bike Route)** provides for a right-of-way designated by signs or pavement markings (sharrows) for shared use with pedestrians or motor vehicles. Sharrows are a type of pavement marking (bike and arrow stencil) placed to guide bicyclists to the best place to ride on the road, avoid car doors, and remind drivers to share the road with cyclists.

![Image of Class III Bikeway](image)

**Figure 3** shows the location of the existing bicycle facilities in the vicinity of the project sites.

Near the project sites, there are bicycle lanes in both directions along 11th Avenue, on Enterprise Way from Manila Avenue to 5th Avenue, Mathilda Avenue (north of Bordeaux Drive), and Moffett Park Drive (east of Bordeaux Drive). There are also bicycle lanes on Maude Avenue between SR 237 and Mary Avenue, on Ellis Street between Middlefield Road and the US 101 southbound ramps intersection, on Manila drive between Ellis Street, and Enterprise Way, on Bordeaux Drive between Moffett Park Drive and Java Drive, on Borregas Avenue between Maude Avenue and Caribbean Drive, and on Middlefield Road west of Bernardo Avenue. A bicycle route is designated on Mathilda Avenue from Bordeaux Drive to Innovation Way and on Mary Avenue.
south of Maude Avenue. A discontinuous bicycle path extends from Garner Drive to Weddell Drive along the north side of US 101 east of Mathilda Avenue.

Additionally, VTA has adopted the Santa Clara Countywide Bicycle Plan (CBP). The CBP guides the development of major bicycling facilities by identifying Cross County Bicycle Corridors and other projects of countywide or intercity significance. Several of these routes travel through the study area, including routes along Mary Avenue, Maude Avenue, Middlefield Road, Ellis Street, and Manila Drive/Moffett Park Drive.

Pedestrian and bicycle volumes were collected at nine of the eleven study intersections in March and April 2011 for the Ariba and Moffett Towers Expansion Transportation Impact Analysis. Pedestrian and bicycle volumes were collected for the remaining intersections (Innovation Way/11th Avenue and Innovation Way/Mathilda Avenue) in November 2011. Pedestrian and bicycle volumes in the study network are shown in Figure 4. There is moderate bicycle use along Moffett Park Drive and Manila Drive during the peak hours; most other bicycle movements have only a few users. Along Mathilda Avenue and Innovation Way pedestrian volumes are low. It appears that pedestrians typically cross at marked crossings at most intersections.
FIGURE 4
EXISTING BICYCLE AND PEDESTRIAN VOLUMES

KEY
XX (YY) AM (PM) Peak Hour Ped/Bike Volumes
Pedestrian Crossing
Bicycle Turn Movement Volume
**EXISTING TRANSIT SERVICE**

The project site is located near both the Lockheed Martin and the Moffett Park light rail transit (LRT) stations. From the center of the project site the Lockheed Martin LRT is approximately a 2,000-foot walk away, and the walking distance to the Moffett Park LRT is approximately 2,400 feet. Both stations are on the Mountain View to Winchester Avenue light rail line (line 902) operated by the Santa Clara Valley Transportation Authority (VTA). VTA also operates bus service in the area. Shuttles to Caltrain and Altamont Commuter Express (ACE) stations also serve the project site. Figure 5 shows the existing transit service near the project site, which are described in detail below and summarized in Table 4. Included in the table are the origin and destination, the operating hours, the headways, and the average peak load factor. The average peak load factor is a measure of resource utilization. It compares the supply of seats on a bus versus the average peak number of on-board passengers aboard at any time during the peak period. For all-day service, the average peak load factor is based on the average peak load factor over the entire day.

<table>
<thead>
<tr>
<th>Route</th>
<th>From / Transit Center</th>
<th>To / Transit Center</th>
<th>Weekdays</th>
<th>Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Service (VTA)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Eastridge Transit Center</td>
<td></td>
<td>0.49</td>
<td>5:23 a – 11:49 p</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>De Anza College</td>
<td></td>
<td>0.33</td>
<td>6:03 a – 9:29 p</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>Fremont BART Station</td>
<td>Lockheed Martin Transit Center</td>
<td></td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>Gilroy Transit Center</td>
<td></td>
<td>0.52</td>
<td>4:31 a – 8:45 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>122</td>
<td>Santa Teresa LRT Station</td>
<td></td>
<td>0.38</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>321</td>
<td>Great Mall/Main Transit Center</td>
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<td>0.08</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>328</td>
<td>South San Jose</td>
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<td>0.24</td>
<td>6:00 a – 7:02 a</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>826 (ACE)</td>
<td>ACE Great America Station</td>
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<td>N/A</td>
<td>6:14 a – 9:02 a</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary/Moffett Area Caltrain Shuttle</td>
<td>Mountain View Caltrain Station</td>
<td>Alma Plaza</td>
<td>N/A</td>
<td>6:35 a – 10:23 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Light Rail Service (VTA)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>902</td>
<td>Downtown Mountain View</td>
<td>Winchester</td>
<td>0.34</td>
<td>4:46 a – 12:39 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Average peak load factor is the ratio of the average peak number of on-board passengers aboard during the peak period to supply of seats.
2. Headways are defined as the time interval between two transit vehicles traveling in the same direction over the same route.

Source: VTA, Caltrain, November 2011.
**VTA LRT and Local Bus Routes**

The VTA Mountain View to Winchester Avenue light rail (line 902) runs along Java Drive, Mathilda Avenue, Moffett Park Drive, and Manila Drive near the project site. This line operates between 4:46 AM and 12:39 AM on 15- to 30-minute headways. On weekends, service is provided between 6:04 AM and 12:39 AM with 30-minute headways.

*Bus Route 26* operates on Mathilda Avenue, Java Drive, and Fair Oaks Avenue. Route 26 provides service between the Eastridge Mall and Lockheed Martin/Moffett Park transit centers. Route 26 follows major arterials and travels through Sunnyvale, Cupertino, San Jose, and Campbell. During weekdays, Route 26 operates between 5:15 AM and 11:50 PM with 20 to 30-minute headways. On weekends, Route 26 operates between 6:25 AM and 11:00 PM with 30-minute headways. Bus stops for Route 26 are provided at Java Drive and the Lockheed Martin/Moffett Park Transit Center.

Similar to Bus Route 26, *Bus Route 54* operates on Mathilda Avenue, Java Drive, and Fair Oaks Avenue. Route 54 provides service between De Anza College and Sunnyvale/Fair Oaks Avenue. During weekdays, Route 54 serves the stops near the project site between 6:03 AM and 9:29 PM with 30-minute headways. On weekends, Route 54 operates between 7:51 AM and 7:51 PM with 45 to 60-minute headways. Bus stops for Route 54 are provided along Mathilda Avenue near Maude Avenue, Ahwanee Avenue, Ross Drive, and north of Moffett Park Drive at the Lockheed Martin/Moffett Park Transit Center.

Additionally, *Bus Route 32* operates on Mathilda Avenue and could be used as a connection to Bus Route 54. Route 32 provides service between the San Antonio and Santa Clara transit centers. Route 32 follows major arterials and travels through Mountain View, Sunnyvale, and Santa Clara.

**Express and Limited Stop Bus Routes**

The VTA also runs several express bus routes and limited stop bus routes throughout the project area.

*Bus Route 120* is an express bus route that operates on SR 237, Caribbean Drive, Java Drive, and Mathilda Avenue; it connects Fremont (Fremont BART Station) to the Lockheed Martin Transit Center. Four Route 120 runs occur during each weekday peak period (to the project area in the morning and from it in the afternoon). The buses arrive between 6:15 AM and 8:30 AM with 30 to 60-minute headways; the same buses leave between 4:05 PM and 6:15 PM with the same headways.

*Bus Route 121* is an express bus route that operates on Lawrence Expressway, Caribbean Drive, Java Drive, and Mathilda Avenue; it connects Gilroy (Gilroy Transit Center) and Morgan Hill (Morgan Hill Caltrain Station) to the Lockheed Martin Transit Center. Six Route 121 runs occur during each weekday peak period (to the project area in the morning and from it in the afternoon). The buses arrive between 5:30 AM and 8:45 AM with 30 to 45-minute headways; the same buses leave between 2:50 PM and 6:10 PM with 30 to 60-minute headways.

*Bus Route 122* is an express bus route that operates on US 101, Lawrence Expressway, Caribbean Drive, Java Drive, and Mathilda Avenue; it connects south San Jose (Santa Teresa LRT Station) to the Lockheed Martin Transit Center. One Route 122 run occurs during each weekday peak period (to the project area in the morning and from it in the afternoon). The bus arrives at 6:45 AM and leaves at 4:45 PM.

*Bus Route 321* is a limited stop bus route that operates on the Lawrence Expressway, Caribbean Drive, Java Drive, and Mathilda Avenue; it connects Milpitas (Great Mall Transit Center) to the Lockheed Martin Transit Center. One Route 321 run occurs during each weekday peak period (away from the project area in the morning and to it in the afternoon). The bus arrives at 8:44 AM and leaves at 5:45 PM.

*Bus Route 328* is a limited stop bus route that operates on the Lawrence Expressway, Caribbean Drive, Java Drive, and Mathilda Avenue; it connects south San Jose (near Almaden Expressway) to the Lockheed Martin Transit Center. One Route 321 run occurs during each weekday peak period (away from the project area in the morning and to it in the afternoon). The bus arrives at 7:00 AM and leaves at 5:00 PM.
Additionally, Bus Route 104 passes the project site on US 101 and SR 237; it connects Palo Alto, Mountain View, Milpitas, and San Jose.

**Caltrain and ACE Shuttles**

Caltrain provides intercity passenger rail service between San Francisco and San Jose. Four *Mary/Moffett Area Caltrain Shuttle* runs connect the Mountain View Caltrain Station with office buildings in the Mary Avenue and Moffett Park areas. During weekday AM and PM commute periods, the Caltrain shuttle operates every 50 to 60 minutes on Mathilda Avenue with a stop near Ahwanee Avenue; there is another stop on Hamlin Court off Ross Drive. The Mountain View station is a designated express train station for Caltrain. Bus service between the Sunnyvale Caltrain Station and the Moffett Park area is provided by VTA Route 54. Additional private shuttles to the Moffett Park area from the Sunnyvale Caltrain Station are operated by local employers. These services are generally limited to the specific employer(s).

The *Altamont Commuter Express* provides passenger rail service between Stockton and San Jose. The *Altamont Commuter Express Red Line Shuttle (Route 826)* provides free shuttle service between buildings in the Moffett Park and the ACE Great America Station in Santa Clara. This shuttle operates on Mathilda Avenue north of the study area. Shuttle stops are provided at the Lockheed Martin/Moffett Park Transit Center. Three shuttle runs operate during each commute period with 60-minute headways.

**Local Shuttles**

There are a number of local shuttles specific to Moffett Park Area that provide service within Moffett Park and to surrounding neighborhoods and major transit facilities. The Moffett Park Business & Transportation Association provides information on the shuttle programs to the tenant in Moffett Park.
EXISTING INTERSECTION VOLUMES AND LANE CONFIGURATIONS

The existing operations of the study intersections were evaluated for the highest one-hour volume during the weekday morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak periods. AM and PM peak-hour intersection turning movement counts were conducted in March, April, and November 2011. Copies of new traffic counts are included in Appendix A. Figure 6 presents the existing AM and PM peak-hour turning movement volumes, lane configurations, and traffic control devices at the study intersections.

EXISTING INTERSECTION LEVELS OF SERVICE

Existing intersection lane configurations, signal timings, and peak-hour turning movement volumes were used to calculate the levels of service (LOS) for the key intersections during each peak hour. The results of the LOS analysis using the TRAFFIX software program for Existing Conditions are presented in Table 5. Appendix B contains the corresponding calculation sheets.

The results of the LOS calculations indicate that all study intersections operate at acceptable service levels (LOS D or better for City intersections and LOS E or better for regionally significant and CMP intersections) during the AM and PM peak periods.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour</th>
<th>Intersection Control</th>
<th>Delay</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Enterprise Way/Manila Drive/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>12.4 10.9</td>
<td>B B+</td>
</tr>
<tr>
<td>2 US 101 Northbound On-Ramp/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>1.3 7.5</td>
<td>A A</td>
</tr>
<tr>
<td>3 Innovation Way/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>6.1 12.2</td>
<td>A B</td>
</tr>
<tr>
<td>4 Innovation Way/11th Avenue</td>
<td>AM PM</td>
<td>All-Way Stop</td>
<td>7.8 7.7</td>
<td>A A</td>
</tr>
<tr>
<td>5 Innovation Way/Mathilda Avenue</td>
<td>AM PM</td>
<td>Signal</td>
<td>7.0 8.7</td>
<td>A A</td>
</tr>
<tr>
<td>6 Mathilda Avenue/Moffett Park Drive**</td>
<td>AM PM</td>
<td>Signal</td>
<td>16.4 21.5</td>
<td>B C+</td>
</tr>
<tr>
<td>7 Mathilda Avenue/SR 237 Westbound Ramps**</td>
<td>AM PM</td>
<td>Signal</td>
<td>18.6 17.2</td>
<td>B- B</td>
</tr>
<tr>
<td>8 Mathilda Avenue/SR 237 Eastbound Ramps**</td>
<td>AM PM</td>
<td>Signal</td>
<td>18.5 13.0</td>
<td>B- B</td>
</tr>
<tr>
<td>9 Mathilda Avenue/Ross Drive**</td>
<td>AM PM</td>
<td>Signal</td>
<td>15.6 12.0</td>
<td>B B</td>
</tr>
<tr>
<td>10 Mathilda Avenue/Almanor Avenue/Arwanee Avenue**</td>
<td>AM PM</td>
<td>Signal</td>
<td>22.1 20.5</td>
<td>C+ C+</td>
</tr>
<tr>
<td>11 Mathilda Avenue/Maude Avenue*</td>
<td>AM PM</td>
<td>Signal</td>
<td>42.9 28.0</td>
<td>D C</td>
</tr>
</tbody>
</table>

Notes:
1 AM = morning peak hour, PM = afternoon peak hour.
2 Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Signalized intersections include adjusted saturation flow rates to reflect Santa Clara County Conditions per VTA guidelines. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
3 LOS = Level of Service. LOS calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
* CMP intersection with LOS E threshold.
** Regionally significant intersection with LOS E threshold.

Qualitative Evaluation of Synchro/SimTraffic Analysis for Mathilda Avenue Corridor

The study intersections on the Mathilda Avenue corridor between Moffett Park Drive and Almanor Avenue are closely spaced and the corridor experiences operational issues beyond simple intersection LOS primarily due to vehicle weaving. The TRAFFIX analysis software program does not accurately capture the operations of the Mathilda Avenue corridor since it does not evaluate the interactions of closely spaced and coordinated intersections. To supplement the TRAFFIX analysis results, the results and findings from earlier studies that used the Synchro and SimTraffic software programs to evaluate the Mathilda Avenue corridor are discussed (MPSP, Moffett Towers TIA, VTA State Route 237 Corridor Study, and the Citywide Deficiency Plan).

Based on the Synchro analysis presented in the MPSP EIR\(^1\), the Mathilda Avenue Corridor between Moffett Park Drive and Ross Drive operates at acceptable service levels during the morning peak period. The Mathilda Avenue/Moffett Park Drive intersection operates at unacceptable LOS during the PM peak hour, with the remaining intersections operating at acceptable service levels. Based on the Synchro analysis the overall coordinated signal system for the Mathilda Avenue corridor operates at LOS B during both peak periods.

The MPSP EIR also analyzed the Mathilda Avenue corridor using SimTraffic analysis software to evaluate the effectiveness of signal coordination and queuing impacts. The results showed that during the AM peak hour the northbound approach at the Mathilda Avenue/Ross Drive intersection and during the PM peak hour the westbound approach and southbound through movement at the Mathilda Avenue/Moffett Park Drive intersection experience some additional queuing beyond the provided storage lengths; though queues did not extend more than three car lengths (about 75 feet) beyond available storage capacities.

The intersection turning movement volumes from the MPSP EIR were compared to the 2011 counts collected for this report. On average the 2011 AM peak hour volumes are about nine percent lower and the 2011 PM peak hour volumes are about two percent higher than the volumes collected for the MPSP. Overall, this demonstrates that the Synchro and SimTraffic results from the MPSP EIR are applicable to the results for this report. Additionally, the section below on field observation highlights some of the queuing and weaving issues for the Mathilda Avenue corridor.

FIELD OBSERVATIONS

Field observations of the study intersections were conducted during the morning and evening peak hours in March/April 2011 and November 2011. In most cases, the intersections were observed to operate at the calculated levels of service for each peak hour. However, in some locations there were differences between the observed and calculated operations. During both AM and PM peak commute periods operations at the intersections of Mathilda Avenue/Moffett Park Drive, Mathilda Avenue/SR 237 westbound ramps, and Mathilda Avenue/SR 237 eastbound ramps experienced high traffic volumes that caused long queues and congestion.

Mathilda Avenue, from Moffett Park Drive to Ross Drive – There are four closely spaced, signalized intersections within a distance of 750 feet in this section of Mathilda Avenue. These intersections carry traffic using three major regional roadways: SR 237, US 101, and Mathilda Avenue. The combination of heavy traffic volumes and close intersection spacing make lane changes difficult. The weaving maneuvers for each intersection are described below. In addition, several through lanes on Mathilda Avenue ultimately end in turn lanes at downstream intersections (this condition is commonly referred to as a trap lane). A diagram of the roadway geometry for this corridor is presented on Figure 7. Because of the existing roadway configuration, a large number of weaving maneuvers occur and vehicles spill back to adjacent intersections resulting in travel delays. The TRAFFIX level of service program cannot fully account for these complex maneuvers; therefore, other factors and analysis methods were considered when interpreting the LOS results, as described above.

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**Mathilda Avenue/Moffett Park Drive** – In the AM peak hour, at the Mathilda Avenue/Moffett Park Drive intersection, the heaviest movements were the northbound through and left-turn movements. Due to the short storage length (90 feet) between Moffett Park Drive and the westbound SR 237 ramps, northbound traffic frequently spill backed into the Mathilda Avenue/SR 237 westbound ramps intersection.

During the PM peak commute period, southbound Mathilda through traffic does not efficiently utilize the available green time due to queue spill back from the downstream intersection at Mathilda Avenue/SR 237 Eastbound ramp intersection. This frequently led southbound through traffic to block the intersection, which in turn hinders westbound traffic from making left-turns. It was observed that the westbound left-turn movement had a large queue and only about half of the queue was able to clear during each green phase (cycle). This standing queue resulted in two to three cars per cycle that entered the intersection under the red at the end of each phase serving westbound Moffett Park Drive.

**Mathilda Avenue/SR 237 Westbound Ramps** – Westbound SR 237 off-ramp traffic cannot access westbound Moffett Park Drive; vertical delineators prohibit the right-turn movement into those lanes. Vehicles would have to cross three lanes of through traffic on Mathilda Avenue to access the northbound left-turn lane. These maneuvers would have to be accomplished in less than 100 feet.

**Mathilda Avenue/SR 237 Eastbound Ramps** – During the AM peak period, traffic was heavy at the intersection of Mathilda Avenue/SR 237 Eastbound ramps; however, there was little congestion and no illegal movements observed. During the PM peak period, the southbound through and left-turn lanes have limited storage capacity, which causes vehicles to spill back into the upstream intersection at Moffett Park Drive.

**Mathilda Avenue/Ross Drive** - During the AM peak period, traffic is heaviest in the northbound direction (through movements). Specifically, lane utilization is the heaviest in the outer through lane, with vehicles lining up to access the SR 237 eastbound on-ramp at the next intersection. Queues occasionally backed up near the northbound off-ramp, but cleared within two minutes. The queues did [not?] affect freeway or ramp operations. In the PM peak hour, no major queues or delays were observed. Southbound traffic is held at the signal for the SR 237 eastbound off-ramp and approaches the Mathilda Avenue/Ross Drive intersection in smaller platoons (groups), which minimizes potential delay and queuing problems.
FIGURE 7
MATHILDA AVENUE ROADWAY DIAGRAM

No northbound left-turn from SR 237 WB off-ramp
EXISTING FREEWAY SEGMENT LEVELS OF SERVICE

According to VTA’s *Transportation Impact Analysis Guidelines* (VTA, 2009) a freeway segment analysis should be included if the project meets one of the following requirements:

1. The proposed development project is expected to add traffic equal to at least one percent of a freeway segment’s capacity.
2. The proposed development project is adjacent to one of the freeway segment’s access or egress points.
3. Based on engineering judgment, Lead Agency staff determines that the freeway segment should be included in the analysis.

For mixed-flow lanes, freeway segment capacities are defined as 2,200 vehicles per hour per lane (vphpl) for four-lane freeway segments and 2,300 vphpl for six-lane freeway segments. HOV lane capacities are defined between 1,800 to 1,900 vphpl.

Table 6 contains the existing freeway segment levels of service for the mixed-flow and HOV lanes based on the segment densities reported in the VTA’s *2010 CMP Monitoring and Conformance Report*, which is the most recent report available as of July 2011.

The following six mixed-flow freeway segments exceed VTA’s LOS E standard during the specified peak hour:

- US 101, Northbound, N Fair Oaks Avenue to Mathilda Avenue (AM peak hour)
- US 101, Northbound, Mathilda Avenue to SR 237 (AM peak hour)
- US 101, Northbound, SR 237 to Moffett Boulevard/Ellis Street (AM & PM peak hour)
- SR 237, Westbound, Maude Avenue to US 101 (PM peak hour)
- SR 237, Eastbound, Mathilda Avenue to N Fair Oaks Avenue (PM peak hour)
- SR 237, Westbound, Mathilda Avenue to N Fair Oaks Avenue (AM peak hour)

All other freeway segments operate at acceptable LOS E or better during both peak periods.
## Table 6
### Existing Freeway Segment Levels of Service

<table>
<thead>
<tr>
<th>Freeway Segment</th>
<th>Direction</th>
<th>Peak Hour</th>
<th>Lanes</th>
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<th>LOS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mixed HOV</td>
<td>Mixed HOV</td>
<td>Mixed HOV</td>
</tr>
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<td>US 101, Fair Oaks Avenue to Mathilda Avenue</td>
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<td>SB</td>
<td>AM</td>
<td>3 3</td>
<td>1 1</td>
<td>30 18</td>
</tr>
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<td>US 101, Mathilda Avenue to SR 237</td>
<td>NB</td>
<td>AM</td>
<td>3 3</td>
<td>1 1</td>
<td>32 14</td>
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<tr>
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<td>SB</td>
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<td>3 3</td>
<td>1 1</td>
<td>25 18</td>
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<td>US 101, SR 237 to Moffett Boulevard</td>
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<td>1 1</td>
<td>77 45</td>
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<td>AM</td>
<td>3 3</td>
<td>1 1</td>
<td>36 26</td>
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<td>AM</td>
<td>2 2</td>
<td>0 0</td>
<td>42 21</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>AM</td>
<td>2 2</td>
<td>0 0</td>
<td>32 68</td>
</tr>
<tr>
<td>SR 237, US 101 to Mathilda Avenue</td>
<td>EB</td>
<td>AM</td>
<td>2 2</td>
<td>0 0</td>
<td>38 51</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>AM</td>
<td>2 2</td>
<td>0 0</td>
<td>43 39</td>
</tr>
<tr>
<td>SR 237, Mathilda Avenue to N. Fair Oaks Avenue</td>
<td>EB</td>
<td>AM</td>
<td>2 2</td>
<td>1 1</td>
<td>44 22</td>
</tr>
<tr>
<td></td>
<td>WB</td>
<td>AM</td>
<td>3 3</td>
<td>0 0</td>
<td>33 33</td>
</tr>
</tbody>
</table>

### Notes:
1. AM = morning peak hour, PM = afternoon peak hour.
2. Measured in passenger cars per mile per lane.
3. LOS = level of service.

N/A = Not applicable. Freeway Segment does not have HOV lanes.

**Bold** font indicates unacceptable operations based on VTA’s LOS E Standard.

3. EXISTING PLUS PROJECT CONDITIONS

The potential transportation impacts of the proposed project are discussed in this chapter. First, the method used to estimate the amount of traffic generated by the project is described. Then, the results of the level of service calculations for Existing plus Project Conditions are presented (Project Conditions are defined as Existing Conditions plus traffic generated by the proposed project). A comparison of intersection operations under Existing plus Project Conditions and Existing Conditions is presented and the impacts of the project on the study intersections are discussed. Project impacts on freeways are also addressed.

EXISTING PROJECT TRAFFIC ESTIMATES

The amount of traffic added to the roadway system by proposed development is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of traffic added to the roadway network. The second step estimates the direction of travel to and from the project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. The results of the process for the proposed project are described in the following sections.

Trip Generation

The amount of traffic anticipated to be added to the surrounding roadway system by the proposed project was estimated based on data published in the Institute of Transportation Engineers’ (ITE) Trip Generation 8th Edition (2008). The results are presented in Table 7.

Trip Reduction Strategies

The Moffett Park Specific Plan requires all new projects in the Moffett Park area of Sunnyvale with an FAR greater than 35 percent to implement transportation demand management (TDM) programs that reduce daily and peak hour vehicles trips. However, the Onizuka Reuse Plan project site is limited to development with an FAR of 35 percent or less. Therefore, the site is not required to provide a TDM program under Moffett Park Specific Plan guidelines. However, most office developments do provide some level of TDM programs, such as financial incentives with Eco Pass participation and it is reasonable to assume the office developments proposed as part of the project will participate to some degree. Based on VTA’s Transportation Impact Analysis Guidelines (March 2009), a project can take a trip reduction up to five percent for financial TDM incentives. We applied the five percent trip reduction to the office and R&D uses. We did not apply a TDM trip reduction to the proposed college uses, since the De Anza-Foothill Community College District currently does not provide transit subsidies or other TDM measures to its students or faculty.

Further, considering the project site’s proximity to the existing Moffett Park light rail station, we applied VTA’s three percent trip reduction for employment that is within 2,000 feet of a light rail station to the total project description. Colleges typically have higher transit ridership characteristics than office uses, thus only applying the three percent reduction represents a conservative estimate.

Trip Generation Summary

As shown in Table 7, the proposed project is estimated to generate 2,600 net new daily vehicle trips, 307 net new AM peak hour trips (259 in and 48 out), and 310 net new PM peak hour trips (104 in and 206 out).
### TABLE 7
TRIP GENERATION –ONIZUKA AIR FORCE STATION REUSE PLAN

<table>
<thead>
<tr>
<th>Land Use</th>
<th>ITE Code</th>
<th>Units</th>
<th>Daily Rate</th>
<th>Daily Trips</th>
<th>AM Peak Hour Rate</th>
<th>AM Trips</th>
<th>PM Peak Hour Rate</th>
<th>PM Trips</th>
<th>Total Rate</th>
<th>Total Trips</th>
<th>AM Peak Hour In</th>
<th>AM Peak Hour Out</th>
<th>PM Peak Hour In</th>
<th>PM Peak Hour Out</th>
<th>Total In</th>
<th>Total Out</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office – Single Tenant Office</td>
<td>715</td>
<td>52 ksf</td>
<td>15.48</td>
<td>805</td>
<td>2.10</td>
<td>97</td>
<td>12</td>
<td>109</td>
<td>2.19</td>
<td>17</td>
<td>97</td>
<td>114</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office – Research &amp; Development</td>
<td>760</td>
<td>70 ksf</td>
<td>10.76</td>
<td>753</td>
<td>1.40</td>
<td>81</td>
<td>17</td>
<td>98</td>
<td>1.39</td>
<td>15</td>
<td>82</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community College Campus</td>
<td>540</td>
<td>1,000 stu</td>
<td>1.20</td>
<td>1,200</td>
<td>0.12</td>
<td>98</td>
<td>22</td>
<td>120</td>
<td>0.12</td>
<td>77</td>
<td>43</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Gross Project Trips</td>
<td></td>
<td></td>
<td>2,758</td>
<td>276</td>
<td>51</td>
<td>327</td>
<td>109</td>
<td>222</td>
<td>331</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTA Transit Reduction (3%)²</td>
<td>(83)</td>
<td></td>
<td></td>
<td></td>
<td>(8)</td>
<td>(2)</td>
<td>(10)</td>
<td>(3)</td>
<td>(7)</td>
<td>(10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTA TDM Reduction (5% of Office and R&amp;D Uses Only)³</td>
<td>(78)</td>
<td></td>
<td></td>
<td></td>
<td>(9)</td>
<td>(1)</td>
<td>(10)</td>
<td>(2)</td>
<td>(9)</td>
<td>(11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Net New Project Trips</td>
<td></td>
<td></td>
<td>2,597</td>
<td>259</td>
<td>48</td>
<td>307</td>
<td>104</td>
<td>206</td>
<td>310</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. ksf = 1,000 square feet, stu = students
2. Transit Reduction rate based on VTA TIA Guidelines, for employment near Light Rail or Caltrain with a walking distance of 2,000 feet or less
3. TDM reduction rate based on VTA TIA Guidelines. General office and R&D developments are assumed to provide financial TDM incentives, such as EcoPass.


### Trip Distribution and Assignment

Trip distribution is defined as the directions of approach and departure that vehicles would use to arrive at and depart from the site. Trip distribution percentages were developed based on existing traffic patterns at the study intersections and the locations of complementary land uses. Distribution patterns are expected to be similar for the AM and PM peak periods; however we assumed that the trip distribution patterns between the office/R&D and college uses are different; the office uses are expected to attract trips from a broader region, while the college would likely attract more trips from local jurisdictions to the south and west of the project site (such as Sunnyvale, Cupertino, Mountain View, and Palo Alto). Project-generated trips were assigned to the surrounding transportation network based on the general directions of approach and departure illustrated in Figure 8.

The project trips were assigned to the roadway network based on the trip distribution pattern discussed above. Figure 9 shows the AM and PM peak-hour project trips assigned to each turning movement at the study intersections. The trip assignment was added to the existing volumes to establish volumes under Existing plus Project Conditions, as shown on Figure 10.

### EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection levels of service were calculated with the new traffic added by the proposed project to evaluate the operating conditions of the intersections and identify potential impacts to the roadway system. The results of the intersection level of service calculations for Existing plus Project Conditions are presented in Table 8. Appendix B contains the corresponding calculation sheets. The results for Existing Conditions are included for comparison purposes, along with the projected increases in critical delay and critical volume-to-capacity (V/C) ratios. Critical delay represents the delay associated with the critical movements of the intersection, or
the movements that require the most "green time" and have the greatest effect on overall intersection operations. The changes in critical delay and critical V/C ratio between Existing and Existing plus Project Conditions are used to identify significant impacts.

The results of the LOS calculations indicate that all study intersections operate at acceptable service levels (LOS D or better for City intersections and LOS E or better for regionally significant and CMP intersections) during the AM and PM peak periods.

**Peak-Hour Signal Warrant Analysis**

The California Manual of Uniform Traffic Control Devices (MUTCD) contains a number of guidelines, called warrants, to determine whether the installation of a traffic signal at a particular location is appropriate. The peak-hour signal warrant, one of eight warrants, was evaluated for the unsignalized intersection of 11th Avenue/Innovation Way under both Existing and Existing plus Project Conditions. The results indicate that a traffic signal is not warranted at this location based on the peak-hour warrant. Appendix E contains the peak-hour signal warrants. As shown in Table 8, all unsignalized intersections are operating at acceptable levels of service.

The peak-hour signal warrant analysis should not serve as the only basis for deciding whether and when to install a traffic signal. To reach such a decision, the full set of warrants should be investigated based on a thorough study of traffic and roadway conditions by an experienced engineer. The decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The responsible state or local agency should undertake regular monitoring of actual traffic conditions and accident data and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.
FIGURE 10
EXISTING PLUS PROJECT
LANE CONFIGURATIONS, TRAFFIC CONTROLS, AND PEAK HOUR TRAFFIC VOLUMES

KEY
XX (YY) AM (PM) Peak Hour Traffic Volumes
Traffic Signal
Stop Sign

SJ11-1297_10_EPPVol
### TABLE 8
EXISTING AND EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

<table>
<thead>
<tr>
<th>Intersection</th>
<th>AM</th>
<th>PM</th>
<th>Signal</th>
<th>Existing Conditions</th>
<th>Existing plus Project Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Delay(^2)</td>
<td>LOS(^3)</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td></td>
<td>12.4 10.9</td>
<td>B B+</td>
</tr>
<tr>
<td>Enterprise Way/Manila Drive/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.3 7.5</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>US 101 Northbound On-Ramp/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Innovation Way/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>6.1 12.2</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Innovation Way/11(^{th}) Avenue</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>7.8 7.7</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>All-Way Stop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Innovation Way/Mathilda Avenue</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>7.0 8.7</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Mathilda Avenue/Moffett Park Drive**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>18.6 26.8</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mathilda Avenue/SR 237 Westbound Ramps**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>13.0 20.0</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Mathilda Avenue/SR 237 Eastbound Ramps**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>14.5 14.4</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mathilda Avenue/Ross Drive**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>12.2 12.7</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mathilda Avenue/Almanor Avenue/Ahwanee Avenue**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>22.1 20.5</td>
</tr>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mathilda Avenue/Maude Avenue*</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
<td>42.9 27.7</td>
</tr>
</tbody>
</table>

Notes:
1. AM = morning peak hour, PM = afternoon peak hour.
2. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Signalized intersections include adjusted saturation flow rates to reflect Santa Clara County Conditions per VTA guidelines. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
4. Change in the critical volume-to-capacity ratio (V/C) between Existing and Project Conditions.
5. Change in critical movement delay between Existing and Project Conditions.
6. Signal warrant based CA MUTCD Warrant 3, Peak Hour (Urban Area).
* CMP intersection with LOS E threshold.
** Regionally significant intersection with LOS E threshold.

Some of the study intersections (such as Mathilda Avenue/Moffett Park Drive) show a reduction in average delay with the addition of project traffic, which is counter-intuitive. The average delay values in the table are weighted averages. Weighted average delays will be reduced when traffic is added to a movement with a low delay, such as the through movements in the non-peak direction on Mathilda Avenue. Conversely, relatively small volume increases to movements with high delays can substantially increase the weighted average delay.

**INTERSECTION IMPACT CRITERIA**

**Santa Clara County Valley Transportation Authority (VTA)**

The LOS standard for CMP intersections is LOS E. Traffic impacts at CMP intersections would occur when the addition of traffic associated with implementation of a Project causes:

1. Intersection operations to deteriorate from an acceptable level (LOS E or better) under the Existing Conditions to an unacceptable level (LOS F); or
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 operating at LOS F.
3. The V/C ratio increases by 0.01 or more at an intersection with unacceptable operations (LOS F) when the change in critical delay is negative (i.e., decreases). This can occur if the critical movements change.

The Mathilda Avenue/Maude Avenue is the only CMP intersection analyzed for this report.

**City of Sunnyvale**

The City of Sunnyvale applies impact criteria for intersections based on VTA’s criteria.

**Signalized Intersections**

The LOS standard for City of Sunnyvale intersections is LOS D except for intersections that are designated regionally significant and have an LOS E standard. For the purpose of this report regionally significant facilities include intersections along Mathilda Avenue and freeway ramp junctions for SR 237 and US 101. Traffic impacts at City of Sunnyvale intersections would occur when the addition of traffic associated with implementation of the Project causes:

1. Intersection (except those on designated regionally significant roads) operations to deteriorate from an acceptable level (LOS D or better) under the Existing Conditions to an unacceptable level (LOS E or LOS F); or,
2. Operations for regionally significant designated intersections to deteriorate from an acceptable level (LOS E or better) under the Existing Conditions to an unacceptable level (LOS F); or,
3. 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 operating at LOS E or F (LOS F for regionally significant roads).

**Unsignalized Intersections**

Levels of service analysis at unsignalized intersections are generally used to determine the need for modification in type of intersection control (i.e. all-way stop or signalization). As part of this evaluation traffic
volumes, delay, and traffic signal warrants are evaluated to determine if the existing intersection control is appropriate.

The City of Sunnyvale does not have an officially adopted significance criteria for unsignalized intersections. Based on previous studies in the City of Sunnyvale, significant impacts are defined to occur when the addition of project traffic causes the average intersection delay for all-way stop-controlled intersection or the worst movement/approach for side-street stop-controlled intersections to degrade to LOS F and the intersection satisfies any traffic signal warrant from the MUTCD.

EXISTING PLUS PROJECT INTERSECTION IMPACTS AND MITIGATION MEASURES

Measured against the City of Sunnyvale’s, VTA’s level of service standards, and the resulting significance criteria, the project is not expected to have significant impacts at any of the study intersections under Existing plus Project conditions; therefore, no mitigation is required.

EXISTING PLUS PROJECT FREEWAY SEGMENT LEVELS OF SERVICE

Freeway segments of US 101 and SR 237 were analyzed during the AM and PM peak hours to calculate the amount of project traffic projected to be added to these freeway segments. To be conservative, no project trips were assigned to HOV lanes.

Table 9 presents the estimated number of trips added to the freeway segments under Existing Plus Project Conditions and the estimated densities and service levels.

FREEWAY IMPACT CRITERIA

The LOS standard for CMP freeway segments is LOS E. Traffic impacts on CMP freeway segments occur when the addition of project traffic causes:

1. Freeway segment operations to deteriorate from an acceptable level (LOS E or better) under the Existing Conditions to an unacceptable level (LOS F); or
2. An increase in traffic of more than one percent of the capacity of the segments that operate at LOS F under Existing Conditions.

EXISTING FREEWAY IMPACTS AND MITIGATION MEASURES

The proposed project would not add trips greater than one percent of the freeway segment capacity to any freeway segments already operating at LOS F; therefore, the project has a less-than-significant impact at the identified study freeway segments and no mitigation measures are required.
### TABLE 9
EXISTING PLUS PROJECT FREeway SEGMENT LEVELS OF SERVICE

<table>
<thead>
<tr>
<th>Freeway Segment</th>
<th>Direction</th>
<th>Peak Hour</th>
<th>Capacity (vphpl)</th>
<th>Existing Conditions</th>
<th>Existing Plus Project Conditions</th>
<th>Densit y</th>
<th>LOS</th>
<th>Trips</th>
<th>Density</th>
<th>LOS</th>
<th>% Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>US 101, N. Fair</td>
<td>NB AM</td>
<td></td>
<td>6,900</td>
<td>66 30</td>
<td>42 13 67 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.61%</td>
</tr>
<tr>
<td>Oak Ave. to</td>
<td>SB AM</td>
<td></td>
<td>6,900</td>
<td>30 30</td>
<td>7 38 30 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.10%</td>
</tr>
<tr>
<td>Mathilda Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.60%</td>
</tr>
<tr>
<td>US 101, Mathilda</td>
<td>NB AM</td>
<td></td>
<td>6,900</td>
<td>59 21</td>
<td>0 0 59 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Ave. to SR 237</td>
<td>SB AM</td>
<td></td>
<td>6,900</td>
<td>25 28</td>
<td>21 9 25 28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.30%</td>
</tr>
<tr>
<td>US 101, SR 237</td>
<td>NB AM</td>
<td></td>
<td>6,900</td>
<td>77 69</td>
<td>2 10 77 69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.10%</td>
</tr>
<tr>
<td>to Moffett Blvd</td>
<td>SB AM</td>
<td></td>
<td>6,900</td>
<td>36 36</td>
<td>33 14 36 36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.48%</td>
</tr>
<tr>
<td>SR 237, Maude</td>
<td>EB AM</td>
<td></td>
<td>4,400</td>
<td>42 21</td>
<td>37 17 42 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.40%</td>
</tr>
<tr>
<td>Ave. to US 101</td>
<td>WB AM</td>
<td></td>
<td>4,400</td>
<td>32 68</td>
<td>8 29 32 69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.18%</td>
</tr>
<tr>
<td>SR 237, US 101</td>
<td>EB AM</td>
<td></td>
<td>4,400</td>
<td>38 51</td>
<td>49 22 38 51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.11%</td>
</tr>
<tr>
<td>to Mathilda Ave.</td>
<td>WB AM</td>
<td></td>
<td>4,400</td>
<td>43 39</td>
<td>8 29 43 39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.18%</td>
</tr>
<tr>
<td>SR 237, Mathilda</td>
<td>EB AM</td>
<td></td>
<td>4,600</td>
<td>44 67</td>
<td>5 24 44 68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.11%</td>
</tr>
<tr>
<td>Ave. to N. Fair</td>
<td>WB AM</td>
<td></td>
<td>6,900</td>
<td>96 33</td>
<td>29 11 97 33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.42%</td>
</tr>
<tr>
<td>Oak Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.20%</td>
</tr>
</tbody>
</table>

Notes:
- **Bold** font indicates unacceptable operations based on VTA’s LOS E Standard.
- 1 AM = morning peak hour, PM = afternoon peak hour.
- 2 vphpl = vehicles per hour per lane
- 3 Measured in passenger cars per mile per lane.
- 4 LOS = level of service.
- 5 Project trips added to individual freeway segments
- 6 Percent impact on mixed flow lanes determined by dividing the number of project trips by the freeway segment’s capacity.

4. BACKGROUND CONDITIONS

This chapter presents the results of the level of service calculations under Background Conditions with and without the project. Background No Project Conditions are defined as conditions prior to completion of the proposed development in 2013, which is the projected completion date for the proposed project. Traffic volumes for Background No Project Conditions comprise existing volumes multiplied by a growth factor per the City of Sunnyvale’s traffic model, plus traffic generated by approved “approved but not yet built” and “not occupied” developments in the area. Approved and not occupied projects account for local growth, while the growth factor accounts for regional growth. Background plus Project Conditions are defined as Background No Project Conditions plus traffic generated by the proposed project.

BACKGROUND NO PROJECT TRAFFIC VOLUMES

Background Traffic Growth

Growth factors for local roads, collectors, and arterial roadways were developed based on the City of Sunnyvale’s travel demand forecasting model. The City of Sunnyvale uses the rates in Table 10 to estimate annual regional traffic growth based on the roadway classification.

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>AM Peak-Hour</th>
<th>PM Peak-Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>2.00%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Collector</td>
<td>2.28%</td>
<td>2.34%</td>
</tr>
<tr>
<td>Local</td>
<td>0.50%</td>
<td>0.50%</td>
</tr>
</tbody>
</table>

Source: City of Sunnyvale, 2011.

Using year 2011 as the base year for existing conditions, two-year growth factors (to year 2013) were applied to all movements at the 11 study intersections.

Approved and Not Occupied Projects

Vehicle trips from “approved but not yet built” and “not occupied” developments projects in the study area were added. Staff from the City of Sunnyvale provided a list of “approved but not yet built” and “not occupied” developments projects. Projects in the Cities of Mountain View, Santa Clara, and Cupertino were also considered. Trip generation estimates from approved and not occupied projects that would add traffic to the study intersections were obtained from their respective traffic reports or estimated based on trip generation rates published in the Institute of Transportation Engineers Trip Generation (8th Edition). The trips for each of the background projects were then assigned to the roadway network based on the relative locations of complementary land uses, as well as existing and estimated future travel patterns.

Appendix C contains a list of approved and not occupied projects from each City and their trip generation estimates. Major background projects included in the list are:

- Moffett Towers campus (1,700,000 s.f. of unoccupied building space and 330,000 s.f. for Building D, which was recently approved)
- Ariba campus expansion (200,000 s.f. recently approved)
- Yahoo (200,000 s.f. recently approved expansion)
- Redevelopment of Town Center Mall (284 dwelling units, 16 screen theater, 275,000 s.f. of office, 1 million s.f. of retail)
- Additional office space at the Lockheed Martin site
- Buildout of Network Appliances (1 million s.f. of R&D)
- Completion of R&D buildings at 111 Java Drive (387,000 s.f.)
- 120,000 s.f. of medical office for Palo Alto Medical Foundation

The trips for each of the background projects were added to the existing volumes, which were multiplied by the annual growth rates discussed above to represent Background Conditions, as shown on Figure 11.

BACKGROUND IMPROVEMENTS

Given that the projected completion year of the project is 2013, no approved and funded transportation network improvements were assumed to be constructed prior to project completion. Therefore, the existing roadway network was used for the background analysis.

BACKGROUND PLUS PROJECT TRAFFIC VOLUMES

Trips from the proposed office (52,000 s.f.), R&D (70,000 s.f.), and college (1,000 students) uses (Table 7) were added to the Background traffic projections to develop traffic volumes for Background plus Project Conditions. The resulting volumes are shown on Figure 12.

BACKGROUND INTERSECTION LEVELS OF SERVICE

Table 11 presents the level of service calculations for the study intersections under Background No Project and Background plus Project Conditions. Appendix B contains the corresponding calculation sheets.

Signalized Intersections

Under Background plus Project Conditions the following three signalized intersections are projected to operate at unacceptable service levels during the identified peak hours.

Int. 1. Enterprise Way/Manila Drive/Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operation during the AM peak hour

Int. 6. Mathilda Avenue/Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hours

Int. 7. Mathilda Avenue/SR 237 Westbound Ramps: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hour

Unsignalized Intersections

Under Background and Background plus Project Conditions, the unsignalized intersection at Innovation Way/11th Avenue is projected to operate at acceptable service levels during the AM and PM peak periods. The intersection does not satisfy the peak-hour signal warrant during either peak hour. Appendix E contains the peak-hour signal warrants.

Again, the peak-hour signal warrant analysis should not serve as the only basis for deciding whether and when to install a traffic signal. The responsible state or local agency should undertake regular monitoring of
actual traffic conditions and accident data and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

### TABLE 11
**BACKGROUND AND BACKGROUND PLUS PROJECT INTERSECTION LEVELS OF SERVICE**

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour Control</th>
<th>Background Conditions</th>
<th>Background plus Project Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Delay²</td>
<td>LOS³</td>
<td>Delay²</td>
</tr>
<tr>
<td>Enterprise Way/Manila Drive/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>US 101 Northbound On-Ramp/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Innovation Way/Moffett Park Drive</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Innovation Way/11th Avenue</td>
<td>AM</td>
<td>PM</td>
<td>All-Way Stop</td>
</tr>
<tr>
<td>Innovation Way/Mathilda Avenue</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/Moffett Park Drive**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/SR 237 Westbound Ramps**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/SR 237 Eastbound Ramps**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/Ross Drive**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/Almanor Avenue/Arwanee Avenue**</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
<tr>
<td>Mathilda Avenue/Maude Avenue*</td>
<td>AM</td>
<td>PM</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Notes:
1. AM = morning peak hour, PM = afternoon peak hour.
2. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Signalized intersections include adjusted saturation flow rates to reflect Santa Clara County Conditions per VTA guidelines. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
4. Change in the critical volume-to-capacity ratio (V/C) between Background and Background plus Project Conditions.
5. Change in critical movement delay between Background and Background plus Project Conditions.
6. Signal warrant based CA MUTCD Warrant 3, Peak Hour (Urban Area)
* CMP intersection with LOS E threshold.
** Regionally significant intersection with LOS E threshold.

**Bold** text indicates unacceptable operations.

BACKGROUND LANE CONFIGURATIONS, TRAFFIC CONTROLS, AND PEAK HOUR TRAFFIC VOLUMES

1. Manilla Drive
   1036 (112)
   414 (119)

2. Moffett Park Drive
   730 (84)
   145 (135)

3. 875 (219)
   65 (492)

4. 11th Avenue
   663 (112)
   1 (4)
   726 (1164)

5. Innovation Way
   7 (33)
   3 (85)

6. Mathilda Avenue
   1127 (4028)
   137 (903)

7. Almanor Avenue
   229 (103)
   12 (6)
   44 (24)

8. Mathilda Avenue
   1780 (342)
   0 (10)
   73 (196)

9. Mathilda Avenue
   139 (61)
   4 (5)

10. 197 (123)
    63 (185)

11. Maude Avenue
    159 (114)
    12 (6)
    44 (24)

KEY

XX (YY) AM (PM) Peak Hour Traffic Volumes

Traffic Signal

Stop Sign

FIGURE 11

SJ11-1297_11_BackNPvol
FIGURE 12
BACKGROUND PLUS PROJECT
LANE CONFIGURATIONS, TRAFFIC CONTROLS, AND PEAK HOUR TRAFFIC VOLUMES

KEY
XX (YY) AM (PM) Peak Hour Traffic Volumes
● Traffic Signal
- Stop Sign
Qualitative Evaluation of Synchro/SimTraffic Analysis for Mathilda Avenue Corridor

The MPSP EIR presents future year analysis for the Mathilda Avenue corridor under 2020 General Plan Conditions. Though that scenario presents a further horizon year than the 2013 analysis presented in this report, the information from that analysis was used to qualitatively assess operations in the Mathilda Avenue corridor. Based on the Synchro analysis, the individual intersections in the study corridor would operate at LOS D or better, with the exception of the Mathilda Avenue/Moffett Park Drive intersection. This is similar to the TRAFFIX service levels presented in Table 11, though the analysis for this report also indicates that the Mathilda Avenue/SR 237 Westbound Ramps would operate unacceptably. Based on the MPSP corridor analysis, the overall signal system corridor was estimated to operate at LOS D and C during the AM and PM peak hour, respectively. It should be noted that the 2020 General Plan analysis presented in the MPSP includes major roadway improvements (such as the Mary Avenue extension) that were not included in this report.

The 2006 Moffett Towers TIA also evaluated the Mathilda Avenue corridor using Synchro analysis software. The Project scenario presented in the 2006 report is comparable to the Background plus Project scenario used for this report. According to the Synchro LOS calculations that were performed as part of the 2006 Moffett Towers TIA, the Mathilda Avenue/Maude Avenue intersection is projected to operate at a lower (worse) LOS rating F than the calculated TRAFFIX LOS C under Background No Project Conditions.

The different level of service rating can be attributed to the input parameters for the two software programs. The Synchro software program utilizes the actual signal timing parameters, whereas the TRAFFIX software program calculates and optimizes the signal timings based on the volumes and lane geometry.

BACKGROUND INTERSECTION IMPACTS AND MITIGATION MEASURES

As discussed above the Project is projected to operate at unacceptable service levels at the following three intersections:

Under Background plus Project Conditions the following three signalized intersections are projected to operate at unacceptable service levels during the identified peak hours.

- **Int. 1.** Enterprise Way/Manila Drive/Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operation during the AM peak hour
- **Int. 6.** Mathilda Avenue/Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hours
- **Int. 7.** Mathilda Avenue/SR 237 Westbound Ramps: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hour

In each case the critical delay increases by more than four seconds (and the critical V/C ratio increases by more than 0.01 between the Background No Project and Background Plus Project Scenario and the project would be considered to have a significant impact. However, the City’s TIF program was developed when the Onizuka Air Force Base was in operation and the TIF and associated improvements and fee structure took into account the amount of traffic that the air force uses were generating in their baseline analysis. Based on the analysis presented in the Onizuka Redevelopment Traffic Analysis Technical Memorandum (Fehr & Peers, March 2008), the air force uses were estimated to generate 4,970 daily vehicle trips, 736 AM peak hour trips (648 inbound and 88 outbound) and 700 PM peak hour trips (119 inbound and 581 outbound). The trips generated by the air base uses on the site are greater than those generated by the proposed project (2,600 net new daily vehicle trips, including 307 and 310 net new AM and PM peak hour trips, respectively) and the project is considered to have less-than-significant impact, because the proposed uses to not increase the number of trips assumed in the baseline analysis of the TIF.
5. CUMULATIVE CONDITIONS

This chapter presents the results of the level of service calculations under Cumulative Conditions with and without the project. Traffic volumes for Cumulative No Project Conditions comprise existing volumes multiplied by a growth factor per the City of Sunnyvale’s most recent traffic model update, plus traffic generated by all foreseen development projects that would affect the transportation system in the study area, including “approved but not yet built” and “not occupied,” as well as pending development projects. Approved, not occupied, and pending projects account for local growth, while the growth factor accounts for regional growth. Cumulative plus Project Conditions are defined as Cumulative No Project Conditions plus traffic generated by the proposed project.

CUMULATIVE NO PROJECT TRAFFIC VOLUMES

Cumulative Traffic Growth

Growth factors for local roads, collectors, and arterial roadways that were developed based on the City of Sunnyvale’s travel demand forecasting model as summarized in Table 10 in Chapter 4 under Background Conditions were also used to estimate regional growth for Cumulative Conditions. The growth rates were applied to existing year 2011 volumes for a five-year time horizon to estimate regional traffic growth to the year 2016.

Approved, Not Occupied and Pending Projects

Vehicle trips from “approved but not yet built” and “not occupied” developments projects and from pending development projects in the study area were added. Projects in the Cities of Sunnyvale, Mountain View, Santa Clara, and Cupertino were included. Trip generation estimates were obtained from their respective traffic reports or estimated based on trip generation rates published in the Institute of Transportation Engineers *Trip Generation* (8th Edition). The trips for each of the projects were then assigned to the roadway network based on the relative locations of complementary land uses, as well as, existing and estimated future travel patterns. Appendix C contains a list of approved and not occupied projects from each City and their trip generation estimates.

The trips for each of the approved, not occupied, and pending development projects were added to the existing volumes, which were multiplied by the annual growth rates discussed above to represent Cumulative No Project Conditions, as shown on Figure 13.

CUMULATIVE IMPROVEMENTS

There are no approved and funded transportation network improvements that were assumed to be constructed prior to cumulative horizon year of 2016. Therefore, the existing roadway network was used for the cumulative analysis.

CUMULATIVE PLUS PROJECT TRAFFIC VOLUMES

Vehicle trips from the 52,000 s.f. of office space, the 70,000 s.f. of Research and Development (R&D) space, and the 1,000-student college (Figure 9) were added to the Cumulative No Project volumes on Figure 13. The results are shown on Figure 14.

CUMULATIVE INTERSECTION LEVELS OF SERVICE

Table 12 presents the level of service calculations for the study intersections under Cumulative No Project and Cumulative plus Project Conditions. Appendix B contains the corresponding calculation sheets.
**Signalized Intersections**

Under Cumulative plus Project Conditions the following four signalized intersections are projected to operate at unacceptable service levels during the identified peak hours.

1. Int. 1. Enterprise Way/Manila Drive-Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operation during the AM peak hour
2. Int. 6. Mathilda Avenue/Moffett Park Drive: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hours
3. Int. 7. Mathilda Avenue/SR 237 Westbound Ramps: the addition of project traffic exacerbates unacceptable LOS F operations during the AM and PM peak hours
4. Int. 8. Mathilda Avenue/SR 237 Eastbound Ramps: the addition of project traffic exacerbates unacceptable LOS F operations during the PM peak hour

Intersections 1, 6, and 7 were also projected to operate at unacceptable service levels under Background Plus Project Conditions.

**Unsignalized Intersections**

Under Cumulative and Cumulative plus Project Conditions, the unsignalized intersection at Innovation Way/11th Avenue is projected to operate at acceptable service levels during the AM and PM peak periods. The intersection does not satisfy the peak-hour signal warrant during either peak hour. Appendix E contains the peak-hour signal warrants.

As stated previously, the peak-hour signal warrant analysis should not serve as the only basis for deciding whether and when to install a traffic signal. The responsible state or local agency should undertake regular monitoring of actual traffic conditions and accident data and timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.
### FIGURE 13

CUMULATIVE LANE CONFIGURATIONS, TRAFFIC CONTROLS, AND PEAK HOUR TRAFFIC VOLUMES

<table>
<thead>
<tr>
<th>Number</th>
<th>Key Locations</th>
<th>Traffic Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manila Drive</td>
<td>747 (87) 155 (144)</td>
</tr>
<tr>
<td>2</td>
<td>Moffett Park Drive</td>
<td>902 (230) 70 (504)</td>
</tr>
<tr>
<td>3</td>
<td>Moffett Park Drive</td>
<td>847 (128) 960 (651)</td>
</tr>
<tr>
<td>4</td>
<td>11th Avenue</td>
<td>31 (5) 26 (17)</td>
</tr>
<tr>
<td>5</td>
<td>Innovation Way</td>
<td>0 (0) 0 (0) 0 (0)</td>
</tr>
<tr>
<td>6</td>
<td>Innovation Way</td>
<td>4 (0) 279 (246) 79 (547)</td>
</tr>
<tr>
<td>7</td>
<td>Innovation Way</td>
<td>679 (114) 1 (4) 766 (1222)</td>
</tr>
<tr>
<td>8</td>
<td>Mathilda Avenue</td>
<td>1190 (4198) 141 (923) 1 (12) 28 (106)</td>
</tr>
<tr>
<td>9</td>
<td>Mathilda Avenue</td>
<td>148 (64) 9 (5) 160 (133)</td>
</tr>
<tr>
<td>10</td>
<td>Mathilda Avenue</td>
<td>170 (122) 12 (7) 47 (26)</td>
</tr>
<tr>
<td>11</td>
<td>Mathilda Avenue</td>
<td>434 (380) 181 (865) 48 (394)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>343 (186) 358 (195) 257 (289)</td>
</tr>
</tbody>
</table>

**KEY**

- XX (YY) AM (PM) Peak Hour Traffic Volumes
- Traffic Signal
- Stop Sign
FIGURE 14
CUMULATIVE PLUS PROJECT
LANE CONFIGURATIONS, TRAFFIC CONTROLS, AND PEAK HOUR TRAFFIC VOLUMES

KEY
XX (YY)  AM (PM) Peak Hour
Traffic Volumes

Traffic Signal
Stop Sign
## TABLE 12
CUMULATIVE INTERSECTION LEVELS OF SERVICE

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Inter-</th>
<th>Cumulative Conditions</th>
<th>Cumulative plus Project Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Section Control</td>
<td>Delay(^2)</td>
<td>LOS(^3)</td>
</tr>
<tr>
<td>1 Enterprise Way/Manila Drive/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>92.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.5</td>
<td>B</td>
</tr>
<tr>
<td>2 US 101 Northbound On-Ramp/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.5</td>
<td>B</td>
</tr>
<tr>
<td>3 Innovation Way/Moffett Park Drive</td>
<td>AM PM</td>
<td>Signal</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.2</td>
<td>B</td>
</tr>
<tr>
<td>4 Innovation Way/11(^{th}) Avenue</td>
<td>AM PM</td>
<td>All-Way Stop</td>
<td>11.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.4</td>
<td>A</td>
</tr>
<tr>
<td>5 Innovation Way/Mathilda Avenue</td>
<td>AM PM</td>
<td>Signal</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51.1</td>
<td>D-</td>
</tr>
<tr>
<td>6 Mathilda Avenue/Moffett Park Drive**</td>
<td>AM PM</td>
<td>Signal</td>
<td>&gt;120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;120</td>
<td>F</td>
</tr>
<tr>
<td>7 Mathilda Avenue/SR 237 Westbound Ramps**</td>
<td>AM PM</td>
<td>Signal</td>
<td>94.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;120</td>
<td>F</td>
</tr>
<tr>
<td>8 Mathilda Avenue/SR 237 Eastbound Ramps**</td>
<td>AM PM</td>
<td>Signal</td>
<td>47.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>79.3</td>
<td>E-</td>
</tr>
<tr>
<td>9 Mathilda Avenue/Ross Drive**</td>
<td>AM PM</td>
<td>Signal</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47.9</td>
<td>D</td>
</tr>
<tr>
<td>1 Mathilda Avenue/Almanor Avenue/Ahwanee Avenue**</td>
<td>AM PM</td>
<td>Signal</td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.7</td>
<td>C+</td>
</tr>
<tr>
<td>1 Mathilda Avenue/Maude Avenue*</td>
<td>AM PM</td>
<td>Signal</td>
<td>51.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34.4</td>
<td>C-</td>
</tr>
</tbody>
</table>

Notes:
1. AM = morning peak hour, PM = afternoon peak hour.
2. Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Signalized intersections include adjusted saturation flow rates to reflect Santa Clara County Conditions per VTA guidelines. Total control delay for the worst movement is presented for side-street stop-controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the TRAFFIX level of service analysis software package, which applies the methodology described in the 2000 HCM.
4. Change in the critical volume-to-capacity ratio (V/C) between Cumulative and Cumulative plus Project Conditions.
5. Change in critical movement delay between Cumulative and Cumulative plus Project Conditions.
6. Signal warrant based CA MUTCD Warrant 3, Peak Hour (Urban Area)
* OMP intersection with LOS E threshold.
** Regionally significant intersection with LOS E threshold.
Bold text indicates unacceptable operations.
Qualitative Evaluation of Synchro/SimTraffic Analysis for Mathilda Avenue Corridor

The MPSP EIR presents future year analysis for the Mathilda Avenue corridor under 2020 General Plan Conditions. Though this scenario presents a further horizon year than the 2016 analysis presented in this report, the information from that analysis was used to qualitatively assess operations in the Mathilda Avenue corridor. Based on the Synchro analysis, the individual intersections in the study corridor would operate at LOS D or better, with the exception of the Mathilda Avenue/Moffett Park Drive intersection. This is similar to the TRAFFIX service levels presented in Table 12, though the analysis for this report also indicates that the Mathilda Avenue/SR 237 Westbound Ramps would operate unacceptably. Based on the MPSP corridor analysis, the overall signal system corridor was estimated to operate at LOS D and C during the AM and PM peak hour, respectively. It should be noted that the 2020 General Plan analysis presented in the MPSP includes major roadway improvements (such as the Mary Avenue extension) that were not included in this report.

The 2006 Moffett Towers TIA also evaluated the Mathilda Avenue corridor using Synchro analysis software. The Project scenario presented in the 2006 report is comparable to the Cumulative plus Project scenario used for this report. According to the Synchro LOS calculations that were performed as part of the 2006 Moffett Towers TIA, the Mathilda Avenue/Maude Avenue intersection is projected to operate at a lower (worse) LOS F rating during the PM peak hour than the calculated TRAFFIX LOS C- under Cumulative No Project Conditions:

The different level of service rating can be attributed to the input parameters for the two software programs. The Synchro software program utilizes the actual signal timing parameters, whereas the TRAFFIX software program calculates and optimizes the signal timings based on the volumes and lane geometry.

CUMULATIVE INTERSECTION IMPACTS AND MITIGATION MEASURES

Under Cumulative Plus Project Conditions the Mathilda Avenue/SR 237 Eastbound Ramp intersection in addition to the three intersections identified under Background Conditions are projected to operate at unacceptable service levels. In each case the critical delay increases by more than four seconds and the critical V/C ratio increases by more than 0.01 between the Cumulative No Project and Cumulative Plus Project scenarios and the project would be considered to have a significant impact. However, as discussed under Background Conditions, the project is considered to have less-than-significant impact, because the proposed uses generate less trips than allowed under air base uses, which were assumed in the baseline analysis of the City's TIF program.
6. SITE ACCESS AND MULTI-MODAL EVALUATION

SITE ACCESS EVALUATION

Figure 2 shows the preferred land use plan for the project site as proposed by the Onizuka Air Force Station Local Redevelopment Authority Redevelopment Plan (2011). The land use figure provides a general site diagram for future development. Absent from the land use plan are the location of project driveways and an internal circulation system to illustrate auto, pedestrian, and bicycle traffic and the site plan is not detailed enough to evaluate on-site circulation. We recommend that the City evaluate on-site circulation when a more detailed site plan is available. As such, site access is discussed from a general perspective, with the assumption that a detailed site plan will necessitate a more refined circulation assessment.

Vehicle Access Evaluation

For the purpose of this analysis, two driveway locations were assumed as part of the proposed project: 1) Off of Innovation Way between Mathilda Avenue and 11st Avenue, and 2) one off Innovation Way between 11th Avenue and Moffett Park Drive opposite the existing Ariba campus driveway. When a detailed site plan is available the access points should be evaluated in detail to determine the adequacy of site driveways and access points.

Pedestrian Access Evaluation

Sidewalks are provided on Innovation Way and Mathilda Avenue along the project frontages. Mathilda Avenue connects pedestrians to/from the Lockheed Martin Transit Center to Innovation Way and the project site. Access to the Moffett Park light rail station is provided via sidewalks on Innovation Way and a pedestrian path along the southern border of the Ariba campus just north of Moffett Park Drive and the light rail tracks. Alternatively, a diagonal pathway through the Ariba campus provides a more direct access to the Moffett Park light rail station.

Bicycle Access Evaluation

The project site has bicycle access via the bicycle lanes on 11th Avenue and Enterprise Way; however, no bicycle lanes are provided on Moffett Park Drive east of Enterprise Way. While less than ideal, the roadway is wide enough for bicyclists to share the road with vehicles, but re-stripping the road to accommodate bike lanes could be considered to promote better bicycle access to and within the area. The City has identified the construction of bike lanes on Moffett Park Drive as a future bicycle improvement and the Ariba/Moffett Park TIA includes a conceptual design and cost estimate to provide enhanced bicycle facilities in this corridor. Due to the lack of available right-of-way between the light-rail tracks and the SR-237 westbound on-ramp, no bike lane was added between Innovation Way and Mathilda Avenue. Sharrows and signage will be used to alert vehicles to the potential presence of bicyclists in the Moffett Park Drive segment between Mathilda Avenue and Innovation and the City will continue to study the possibility of adding a bike lane in this segment.

Overall, because the project is within a developed area, most of the existing infrastructure appropriately accommodates bicyclists and pedestrians.

TRANSIT ACCESS

Transit impacts are considered significant if the proposed project conflicts with existing or planned transit facilities or generates potential transit trips and does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. Based on these criteria, the project would not have a potentially significant impact on transit service.
The existing load factors (average number of riders per trip) for Light rail Line 902 and Routes 26, 54, 120, 121, 122, 321, and 328 were provided by VTA. Light rail trains have seated capacities of 65 per car and buses have seated capacities of 38. The load factor for Line 902 at the Moffett Park Station is 0.34 (22 people). For Routes 26 and 54, the load factors are 0.49 (19 people) and 0.33 (13 people), respectively. The express routes have load factors between 0.38 (14 people) and 0.52 (20 people).

The transit service within the immediate project area operates well below capacity, and additional trips generated by the proposed project could be accommodated by existing light-rail and bus service. Existing service on light rail and Route 54 is adequate even if the full VTA TDM reductions were shifted to just these public transit lines and not to carpool, bicyclists, pedestrians, and other transit lines. The area also has a well-used shuttle system (see Existing Conditions and Figure 5) that would be able to accommodate additional riders.

The Lockheed Martin Transit Center, where most of the available transit service is focused, will be accessible to pedestrians and bicyclists generated by the proposed project; the project site is located within a 1/2 mile from the transit center. Pedestrians and bicyclists would travel along Innovation Way to Mathilda Avenue to reach the transit center.

PARKING ASSESMENT

The MPSP provides off-street parking and bicycle requirements for the Moffett Park area.

Vehicle Parking – Office Uses

The MPSP requires general office and R&D land uses with the MPSP area to provide a minimum off-street parking supply at a rate of one space per 300 s.f. of gross floor area; or 3.3 spaces per 1,000 s.f. and a maximum of one space per 250 s.f. of gross floor area (4 spaces per 1000 s.f.). Based on the City of Sunnyvale’s Municipal Code (section 19.46.050) up to 50 percent of the spaces can be designed for compact cars. Table 3 summarizes the proposed parking supply and parking requirements for Onizuka Redevelopment Plan. The MSPS does not include parking requirements for college uses and these are evaluated separately in the next section.

<table>
<thead>
<tr>
<th>Project Site</th>
<th>Project Size (ksf)</th>
<th>Parking Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum Parking ¹</td>
<td>Maximum Parking ²</td>
</tr>
<tr>
<td>Office - Single Tenant Office</td>
<td>52</td>
<td>172</td>
</tr>
<tr>
<td>Office - Research &amp; Development</td>
<td>70</td>
<td>231</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>403</td>
</tr>
</tbody>
</table>

Notes:
1. MPSP requires minimum parking supply ratio of 1 space per 300 s.f. of gross floor area.
2. MPSP sets a maximum parking supply ratio of 1 space per 250 s.f. of gross floor area.


Based on the requirements of the MPSP, the office uses of the project would be required to provide a minimum of 403 parking spaces and maximum of 488 parking spaces at the Onizuka Redevelopment site.
Vehicle Parking – College Uses

The MPSP does not specify parking supply rates for community colleges, though the City’s Municipal Code (Section 19.46) requires educational institutions for grades over 12 to provide the following parking supply:

- 1 space per every 3 fixed seats, plus
- 1 space per 21 sq. ft. of open area or seating space, plus
- 1 space per employee, plus
- 1 space per special purpose vehicle.

Currently, the project description does not contain sufficient information to evaluate fully the college’s required parking supply. However, the project does anticipate supplying parking for 556 cars in its initial phase (included in the proposed project). Once a more detailed site plan is available the City should re-evaluate the parking supply for the college uses to determine if the proposed 556 parking spaces meet City requirements.

Bicycle Parking

The MPSP requires office uses to provide one bicycle parking facility per 6,000 s.f. of gross floor area. Of that requirement 75 percent needs to be Class I parking facilities and 25 percent Class II facilities. Class I facilities protect the entire bicycle from theft, vandalism, and inclement weather and are appropriate for long-term storage. Examples include bike lockers, rooms with key access, guarded parking areas, and valet/check-in parking. Class II parking facilities include bicycle racks to which the frame and at least one wheel can be secured with a user-provided lock. The MPSP bicycle requirements are the same as recommended by the VTA in their TIA Guidelines.

The office uses of the project will need to supply 21 bicycle spaces on site. Of these, 75 percent (16) will be Class I bicycle lockers and remaining 25 percent (5) will be Class II bicycle facilities. With the provision of these bicycle parking facilities the project will meet City and MPSP guidelines.

The MSPS and City Municipal Code do not include parking supply requirements for college uses; thought VTA’s TIA Guidelines do recommend that college uses should provided Class I bicycle lockers for every 30 employee and one spot for every nine student seats (25 percent Class I and 75 percent Class II). The project description does not contain sufficient information to evaluate fully the college’s required bicycle parking supply; though the City should work with project applicant to provide adequate number of Class I and Class II bicycle parking facilities.