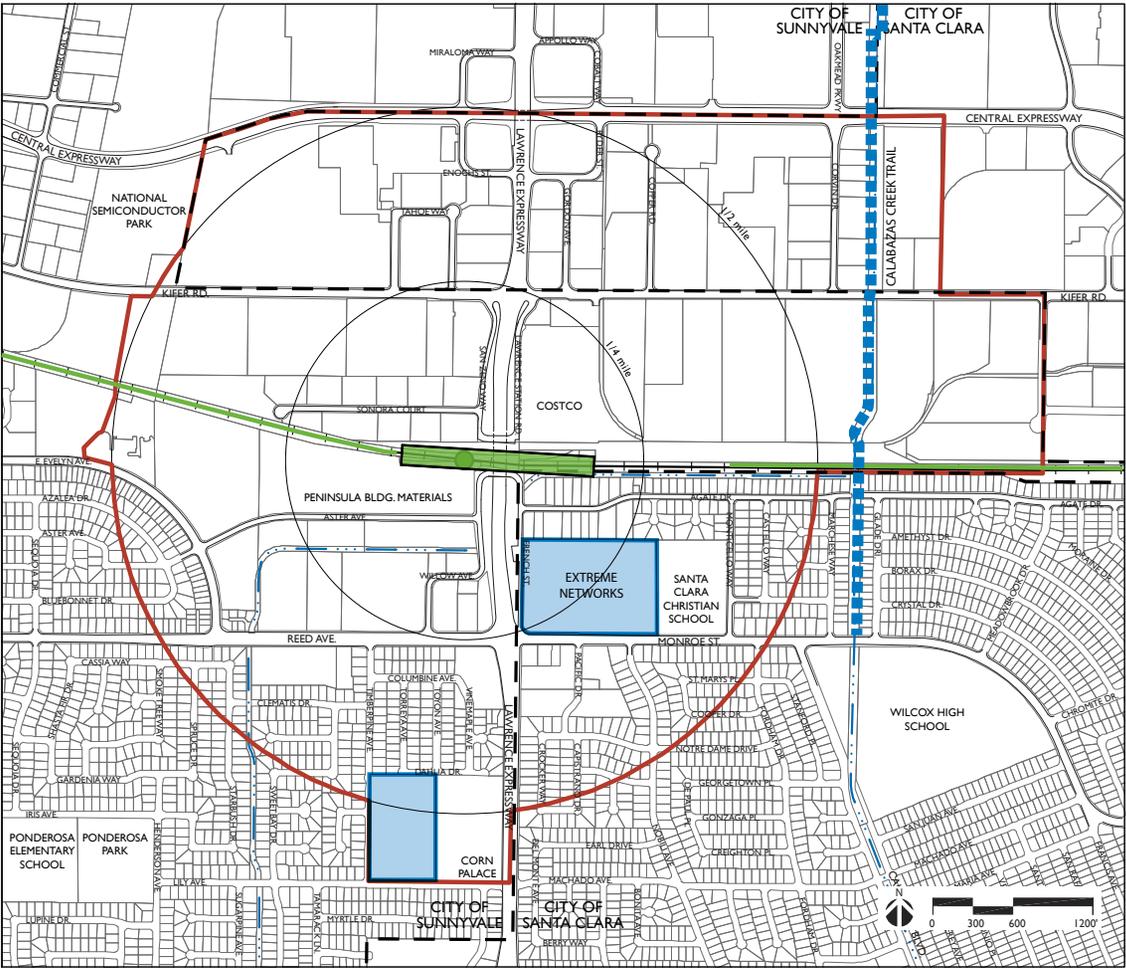


Figure 2.5: Proposed and Pending Projects



- LEGEND**
- STUDY AREA BOUNDARY
  - SUNNYVALE / SANTA CLARA BORDER
  - DRAINAGE CHANNEL / CALABAZAS CREEK
  - LAWRENCE CALTRAIN STATION
  - CALTRAIN STATION PLATFORM AREA
  - EXISTING CALTRAIN RAIL LINES & POTENTIAL HIGH SPEED RAIL TRACK LOCATION
  - PROPOSED CALABAZAS CREEK BIKEWAY
  - OTHER PROPOSED PROJECTS (see text)

**TRANSPORTATION & CIRCULATION**

This section outlines the existing circulation and transportation conditions within the Lawrence Station Area Plan study area and analyzes the existing auto, pedestrian, bicycle and transit facilities.

**Travel Characteristics**

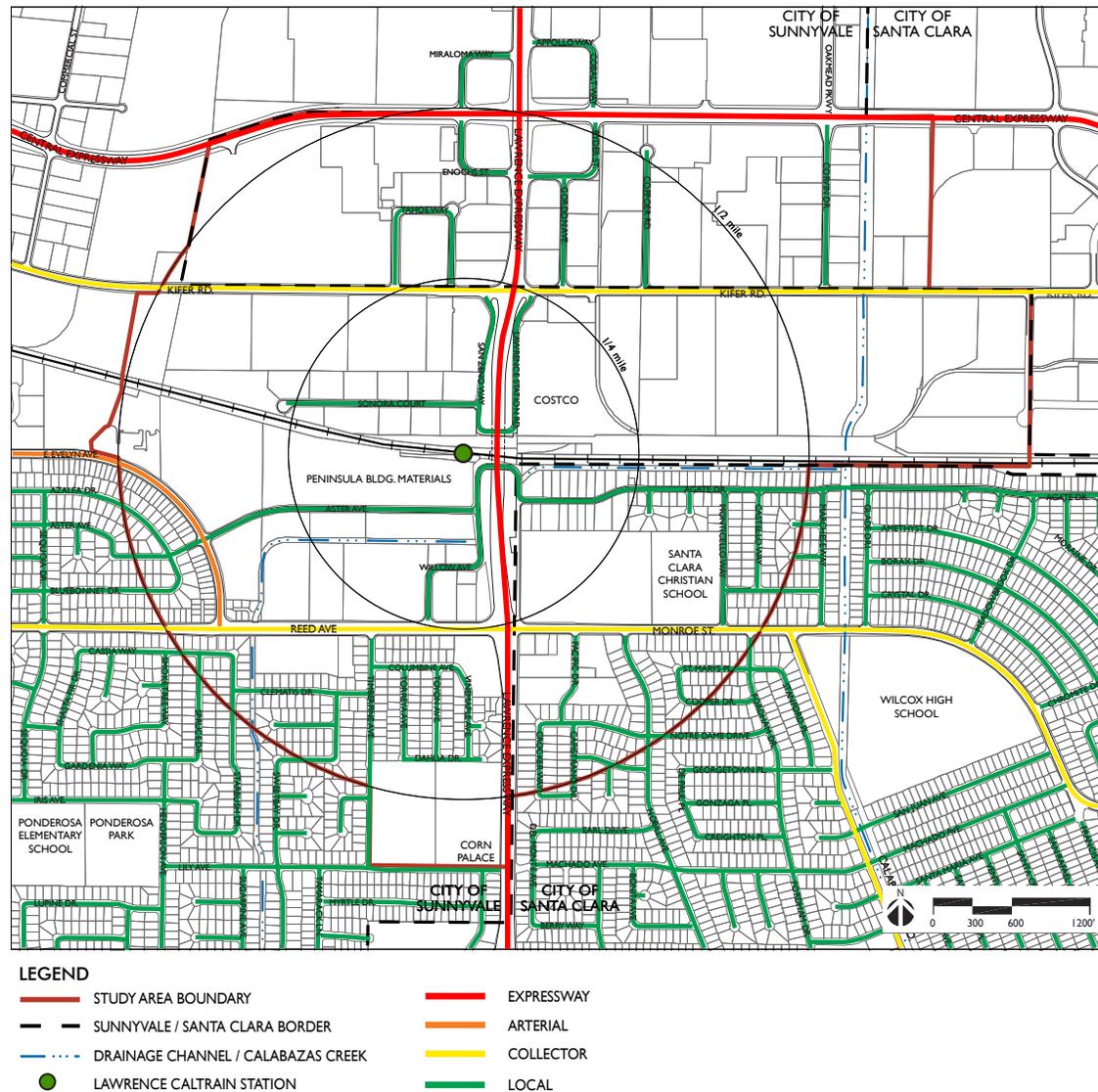
The existing transportation system in Sunnyvale consists of roadways, bicycle and pedestrian facilities, public bus transit system and railroad facilities. Table 2.2 compares the commute characteristics of Sunnyvale residents to those of Santa Clara County, the State of California, and the United States as a whole based on the 2009 American Community Survey (ACS) data. Approximately 85 percent of Sunnyvale residents commute by automobile (includes single occupancy and carpool), which is similar to data for the County but slightly higher than statewide averages.

Sunnyvale’s transit usage is higher than transit usage in Santa Clara County and lower as compared to state and national data. Walking in Sunnyvale represents about 1.5 percent of all commute trips, which is lower than that for the County, State and Nation. The ACS results also indicate that Sunnyvale is comparable to Santa Clara County in the work-from-home category. While the 2009 ACS data groups bicycling with taxis and motorcycles, the 2005 to 2009 ACS 5 year estimates illustrate that approximately 1 percent bicycle to work in Sunnyvale; this is lower than the 1.4 percent countywide average but higher than both California and the United States, at 0.9 percent and 0.5 percent respectively.

Table 2.2: Journey to Work Travel Characteristics - City of Sunnyvale Residents

Commute Mode Choice	Sunnyvale	Santa Clara County	California	United States
<i>Single-Occupant Automobile</i>	75.4%	75.7%	73.0%	76.1%
<i>Carpool</i>	10.5%	11.0%	11.6%	10.0%
<i>Public Transit</i>	4.5%	3.2%	5.2%	5.0%
<i>Bicycle*</i>	1.0%	1.4%	0.9%	0.5%
<i>Walk</i>	1.5%	2.1%	2.8%	2.9%
<i>Work At Home</i>	4.5%	4.5%	5.1%	4.3%
<i>Other</i>	2.6%	2.1%	1.4%	1.2%
Source: American Community Survey, 2009. * ACS 2005-2009 5 year estimates; ACS 2009 does not have bicycle mode share as a separate category				

Figure 2.6: Roadway Types & Classifications



While the ACS data illustrates one aspect of travel patterns (i.e. for commuters), it is important to understand because commute trips make up a significant proportion of traffic volumes during peak periods.

### Roadway Network

Sunnyvale consists of approximately 300 miles of roads including 13 miles of freeways/expressways, 35 miles of arterials, 58 miles of collectors and 194 miles of local streets. Caltrans owns and maintains the freeways, the County of Santa Clara operates the expressways. Lawrence Expressway is a major north-south corridor within the City, in addition to SR 85, Mathilda Avenue/Sunnyvale-Saratoga Road, and Fair Oaks Avenue/Wolfe Road. East-west corridors within the City include SR 237, US 101, Central Expressway, SR 82 and I 280.

### Roadway Types and Classifications

Roadway types and classifications in and around the study area are illustrated on Figure 2.6. The three regional roadways that run through Sunnyvale are US 101, SR 237 and SR 85. US 101 consists of three mixed flow lanes and one high occupancy vehicle lane in each direction within Sunnyvale. The HOV lanes are restricted to two or more persons or motorcycles between 5:00 AM to 9:00AM and 3:00PM to 7:00PM. SR 85 is another north-south freeway that has two mixed flow lanes and one HOV in each direction within Sunnyvale. SR 237 provides access east/west with two mixed flow lanes and one HOV lane in each direction within the City. The Lawrence Caltrain Station is located south of US 101 and north of SR 85 and SR 237.

### *Expressways*

Expressways have high operating speeds and provide mobility throughout the City. Lawrence Expressway runs directly through the station area, has a current 50 mph speed limit, and has HOV lanes that operate from 6:00 to 9:00 AM and 3:00 to 7:00 PM. According to the Countywide Expressway Study update in 2008, Lawrence Expressway has the best performing HOV lanes, meeting all performance measures in the PM, southbound direction, except violation rate, and is very close to meeting all measures in the other direction (measures include: persons/HOV lane, productivity ratio, HOV vehicle peak hour, seconds saved per mile, etc.). According to the VTA 2010 Congestion Management Program Monitoring and Conformance Report, travel times on Lawrence Expressway increased for the AM northbound and PM southbound direction from 2008; meanwhile, the AM southbound direction recorded a decrease in travel time and the PM northbound direction recorded the same travel time as in 2008. Average travel speeds on Lawrence Expressway from 2005 to 2008 were in the 25 to 33 mile per hour range, comparable to most other expressways in Santa Clara County.

### *Arterial streets*

There are no designated arterial streets in the study area.

### *Collector streets*

Collectors provide internal traffic movement access and enhance connections to arterial streets within Sunnyvale. They often provide access to properties. For example, within the study area Kifer Road provides access to commercial properties and Reed

Avenue and Monroe Street both provide residential property access.

### *Local streets*

Local streets have a primary purpose to provide access to adjacent properties and generally have low speeds. These streets typically are configured with two travel lanes and often contain parking lanes on one or both sides.

### **Lawrence Station Access**

Lawrence Station is served by a set of poorly connected local streets, with confusing and difficult access. These local streets are confined by the railroad tracks near Lawrence Station and by Lawrence Expressway. On the north side of the railroad tracks, for example, the station can be accessed through limited access intersections on Kifer Road at San Zeno Way and Lawrence Station Road, two-lane streets that form a loop from Kifer Road to the station. Vehicles traveling south on Lawrence Expressway have indirect access to the station by turning left on Kifer and right on Lawrence Station Road.

Similarly, vehicles traveling north on Lawrence Expressway cannot access French Street to get to the Caltrain station, but must turn left on Reed Avenue and right on Willow Avenue. French Street is unique because it is restricted to one-way northbound traffic for half of the block. Vehicles can access French Street from Monroe Street traveling towards the station, however, vehicles leaving the station can only travel south for half of the street length before it becomes one way, restricting vehicles from connecting back to Monroe Street. This vehicle circulation is indirect,

confusing, and inconvenient for vehicles, bicyclists and pedestrians.

### **Planned Roadway Improvements**

The City of Sunnyvale's Deficiency Plan indicates that the Lawrence Expressway and Reed Avenue intersection is a Congestion Management Program (CMP) intersection. This intersection, along with Kifer and Lawrence Expressway, are planned roadway improvement projects for grade separation, expected to cost \$118 million according to existing conditions analysis undertaken for the General Plan Land Use and Transportation Element (LUTE) update. The *Comprehensive Countywide Expressway Planning Study* indicates that the interchanges at Lawrence and Monroe and Kifer are Tier 1B projects. The County does not currently have any specific conceptual plans for these interchanges, but they still plan to move forward in the future to mitigate congestion. They will collaborate with Lawrence Station and High Speed Rail plans to ensure any track realignment or new developments connect with potential grade separation designs.

### **Traffic Volumes**

The daily traffic volumes in Table 2.3 represent average weekday volumes collected between 2008 and 2010 as part of the 2011 LUTE update. Comparing these results from the 2011 LUTE to the 1997 LUTE (using 1995 data) shows that Lawrence Expressway has seen an increase in the level of traffic volume it serves. Not all major roadways experienced an increase during this period, such as Fair Oak Avenue and El Camino Real, which continue to serve the same levels of vehicular traffic. According to the LUTE existing conditions analysis, average citywide weekday vehicle miles

Table 2.3: Existing Average Weekday Daily Traffic Volumes

Roadway Segment	Average Daily Traffic Volume
<i>Kifer between Wolfe and Lawrence</i>	9,200
<i>Reed between Wolfe and Lawrence</i>	11,400
<i>Central Expressway between Lawrence and Bowers</i>	40,000
<i>Lawrence between El Camino Real and Reed</i>	71,000
<i>Lawrence between Arques Ave and U.S. 101</i>	67,000
<i>Source: 2008-2010 values from City of Sunnyvale 2010 LUTE Update existing conditions analysis</i>	

traveled were 2.23 million in 2005, decreasing to 1.83 million in 2009 in part due to economic conditions within the City and County.

The 2010 Santa Clara General Plan Draft EIR indicates that Lawrence Expressway, between Kifer Road and Monroe Street, has existing daily average traffic volumes of 68,000 and operates at LOS<sup>1</sup> D. This verifies the data collected by the City of Sunnyvale and presented in Table 2.3. Comparatively, Central Expressway between Lawrence Expressway and Bowers Avenue has 40,000 ADT and also operates at LOS D.

#### Traffic Conditions (LOS)

The City of Sunnyvale's General Plan specifies LOS as the appropriate analysis method for signalized intersections, which is consistent with the guidelines adopted by VTA in Santa Clara County. This method is based on the average control vehicular delay expressed in seconds per vehicle. The City's current General Plan LUTE identifies the LOS ratings listed in Table 2.4.

Table 2.5 demonstrates the existing LOS at Kifer Road and Reed Avenue at Lawrence Expressway from the CMP Monitoring Report utilizing 2006 data and 2010 where available. The acceptable LOS

standard for CMP intersections is LOS E while the current City standard is LOS D for non-regionally significant roads. However, since Lawrence Expressway is a regionally significant road, the LOS standard is LOS E for the CMP intersections listed in Table 2.5. Consequently, these intersections are operating at an acceptable LOS.

LOS does not consider the potential impact on walking, bicycling and transit. Pedestrians, bicyclists and transit riders are all users of the roadway system but may not be fully recognized in the traffic operations analysis and the calculation of LOS. Identifying the need for intersection improvements based on the resulting LOS can have unintended impacts to other modes such as increasing the crossing distance for pedestrians. In evaluating the roadway system, a lower vehicle LOS may be desirable when balanced against other community values related to resource protection, social equity, economic development and consideration of pedestrians, bicyclists and transit users.

<sup>1</sup> Traffic operations are traditionally measured using a qualitative measure called level of service (LOS). LOS is a general measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, including indicators such as speed, travel time, traffic interruptions, and freedom to maneuver.

## 2 | EXISTING PHYSICAL CONDITIONS

### Roadway Character

The technical analysis of roadways in the study area focused on issues of throughput and vehicular circulation efficiency. Streets do more, however, than move vehicles, passengers and freight. They are elements of a city's public space framework, typically providing more public space than parks and other open spaces. Their design and character contribute to the perception and experience of a city.

With the exception of the local streets in the mature neighborhoods, most streets in the study area give the impression that passing through is of greater importance than experiencing the place as a set of neighborhoods or destinations. The design of the streets - including wide travel lanes, large radius intersections and curb-cuts, dedicated right turn lanes, and widely spaced controlled intersections - prioritizes motorist efficiency but does not create an attractive or memorable streetscape or encourage pedestrian and bicycle circulation to transit. As discussed below (see Pedestrian Network), the area's minimal pedestrian amenities also indicate that this is not a place where pedestrian travel is considered a priority. Improvement to overall street design in many instances will be necessary if the study area is to capitalize on the transit opportunities in the station area.

Table 2.4: Sunnyvale Level of Service Ratings

LOS	Intersection Delay (Seconds)	Traffic Flow Conditions
A	0 - 5	Free flow
B	5 - 15	Some restricted speed
C	15 - 25	Restricted speed; intersection left-turn backups
D	25 - 40	Some extensive delays; little freedom to maneuver
E	40 - 60	Traffic approaching full capacity; some stoppage
F	More than 60	Long stoppages; low operating speeds

Source: 1997 Sunnyvale General Plan LUTE

Table 2.5: Existing Intersection Level of Service (LOS)

Intersection	Count Year	Peak Hour	Average Delay (Second)	LOS
Kifer Road / Lawrence Expressway	2006	AM	21	C
		PM	47	D
Lawrence Expressway / Reed Ave (CMP)	2006 (AM)	AM	58	E
	2010 (PM)	PM	38	D

Source: 2010 CMP Annual Monitoring and Conformance Report; Sunnyvale LUTE Update Existing Conditions Report (2006)

Table 2.6: Automobile Accessibility Characteristics

<b>AUTOMOBILE ACCESSIBILITY CHARACTERISTICS</b>		
	<b>¼ Mile to Lawrence Station</b>	<b>½ Mile to Lawrence Station</b>
Total Households	500	1,860
Average Vehicle per Household	1.60	1.73
Percent households with 0-1 vehicles available	46	42
Source: US Census 2000; Center for Transit-Oriented Development.		
Note: Average Citywide number of vehicles per household is: 1.76 (US Census 2000).		

The table above demonstrates, the average number of vehicles per household within a quarter mile of the Caltrain station, or a typical 5-minute "walk-shed" range, is 1.60. Of these residents, approximately 46 percent have access to either zero or one vehicles. This is important because it demonstrates that much of the existing population within the Station Area depend on non-automobile forms of transportation. Vehicle ownership can be a strong indication of the travel characteristics of the existing neighborhood.

### **Lawrence Station Parking**

The *Caltrain Strategic Plan 2004-2023* identifies the importance of addressing station access needs and finding effective solutions for parking demand. Currently, there are 122 parking spaces at the Lawrence Caltrain station. Observations in early 2011 indicated the average utilization of these spaces is around 10-20 percent.

Generally, the streets surrounding the station area have ample parking opportunities. The local streets south of the Caltrain tracks have fewer restrictions than those to the north. On-street parking restrictions exist on San Zeno Way and Lawrence Station Road to the north of station, however, Sonora Court and the Costco parking lot provide other opportunities for parking. Willow Avenue has partial restrictions, while French Street and Agate Drive have none. Observations indicate that although the Caltrain parking lot does not reach full occupancy, there is spillover into the local neighborhoods and these streets are often near capacity, particularly in the middle of the weekday. This may indicate that Caltrain passengers are parking on surrounding streets to avoid Caltrain parking charges.

### Transit Network

Sunnyvale’s low- to medium-density land use pattern tends to disperse jobs and housing. This type of land use pattern creates many challenges to creating an efficient transit system that can compete in time and convenience with automobile travel.

### Bus Service

VTA provides bus service in the City of Sunnyvale, and according to the City’s LUTE existing conditions analysis, there are nearly 16,000 citywide daily bus boardings and deboardings in Sunnyvale. No bus routes directly access the station, however two VTA bus routes serve the Lawrence Station study area, and one runs just north of the study area along Arques Avenue:

- VTA Route 32 (Community Route)
- VTA Route 304 (Limited Stop Route)
- VTA Route 328 (Limited Stop Route)

Route 32 runs along Reed/Monroe Avenue and has a stop at Lawrence Expressway. The VTA *Short Range Transit Plan (2010)* identifies this route as a “community” line, which has a standard of 16.7 boardings per revenue hour and provides services to residential streets, community activity centers, and neighborhood/downtown circulators. Route 32 has 22.5 boardings per revenue hour, exceeding VTA’s service standard. Route 32 has 30-minute headways in the morning before about 9:00am and in the afternoons after 3:00pm, with hourly headways in the middle of the day. The bus also runs on Saturdays with one-hour headways.

Routes 304 and 328 provide limited-stop service in the station area. Route 304 runs along Arques

Figure 2.7: Transit Network

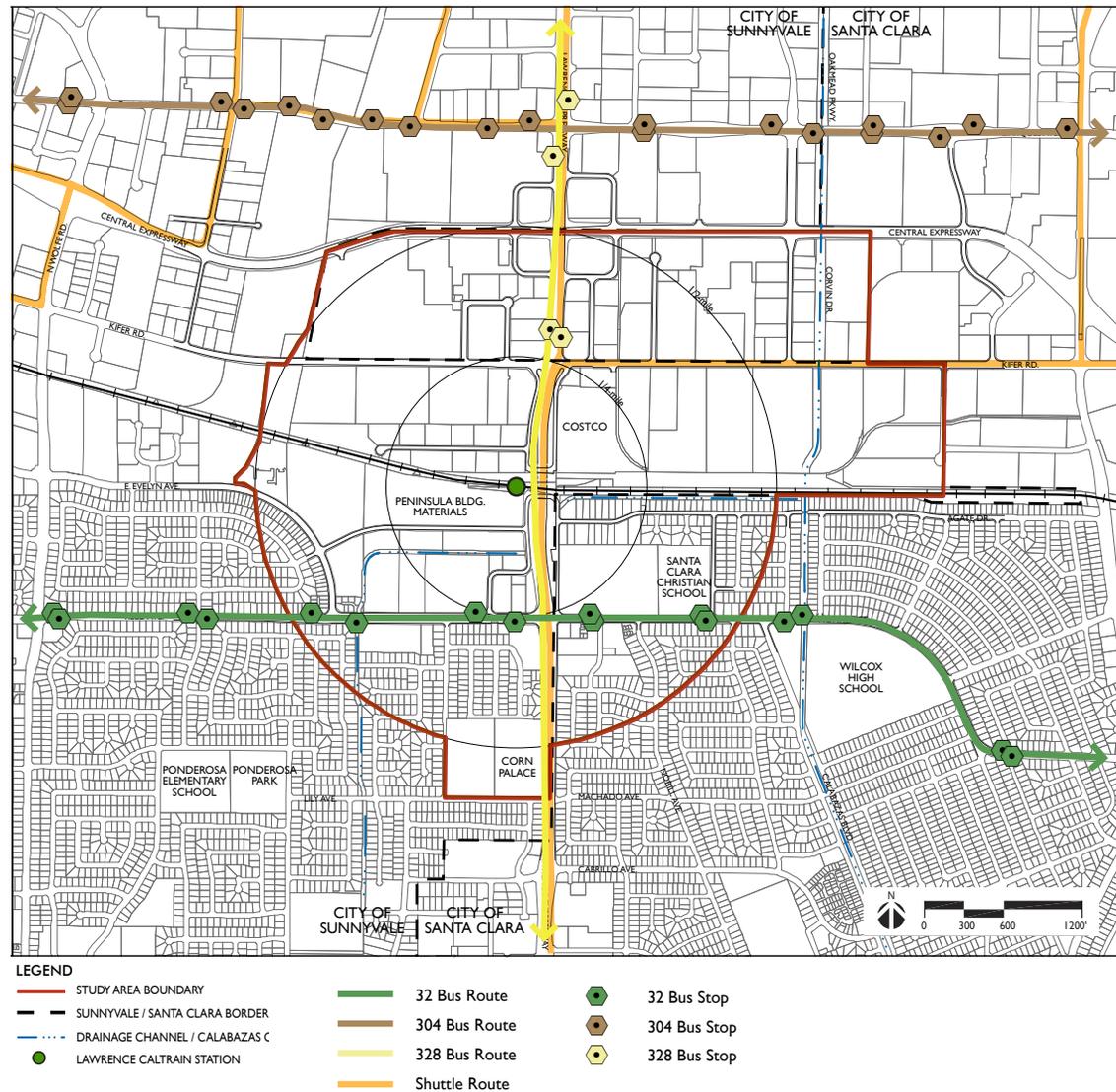


Figure 2.8: Caltrain Average Weekday Boardings

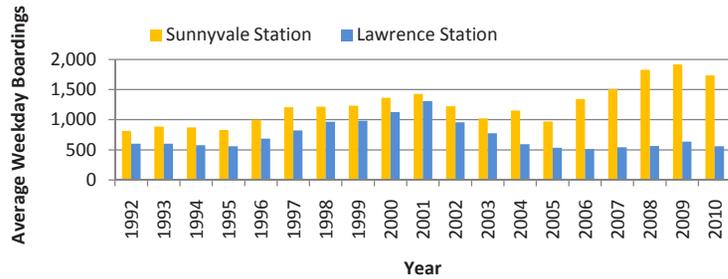


Figure 2.9: Lawrence Station Northbound Boardings and Alightings

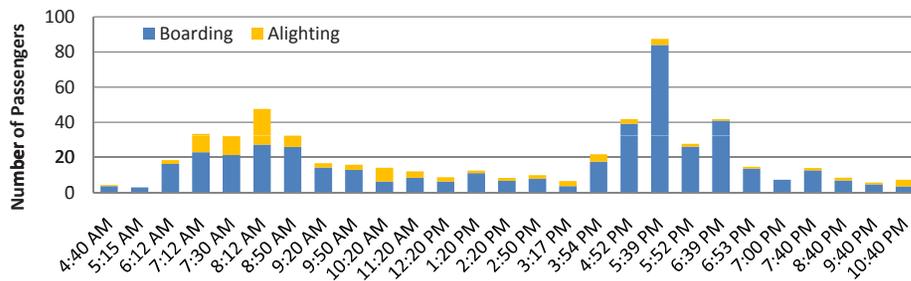
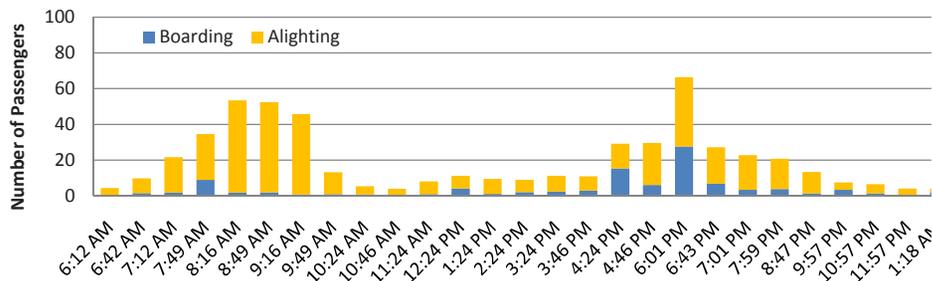


Figure 2.10: Lawrence Station Southbound Boardings and Alightings



Avenue, north of Central Expressway with stops near Lawrence Expressway. Route 304 is a “limited” bus, meaning it has a standard of at least 15 boardings per revenue hour and serves as a commuter-oriented service. Route 304 averaged 16.4 boardings per revenue hour in FY 2009. Four buses run in the morning northbound during the week from 5:55am to 7:23am with 30 minute headways. In the afternoons, buses run southbound from 3:30pm to 5:35pm with 30 minute headways.

Route 328 runs along Lawrence Expressway from either end of the City. The closest stop along this line is just north of Kifer Road. In FY 2009, it averaged 15.7 boardings per revenue hour. VTA operates one bus northbound in the morning starting at 6:00am and one southbound bus starting at 5:06pm during the week.

**Caltrain Commuter/Passenger Rail**

Caltrain operates two stations within Sunnyvale: the downtown Sunnyvale Station and Lawrence Station. Sunnyvale Station is the busier of the two due to its downtown location and proximity to other City amenities, as well as being a “Baby Bullet” train stop.

*Caltrain Ridership Statistics*

Since the Baby Bullet express service began providing limited stop express trains to primary destinations on the Caltrain corridor in 2004, average weekday ridership has grown substantially at the Sunnyvale Station while at Lawrence it has remained relatively constant (Figure 2.8). As of the January 2011 Caltrain schedule, the station serves 50 weekday trains.

According to the *Caltrain 2010 Ridership Report*, Lawrence Station averaged 555 average weekday passenger boardings and alightings in the northbound direction and 536 southbound, compared with Sunnyvale Station at 1,745 and 1,685. The 1,091 total northbound and southbound passengers at Lawrence are lower than the system-wide weekday average at 1,395. The 561 average total boardings at Lawrence comprise 1.5 percent of the system-wide total, which ranks 17th out of 29 stations.

The February 2010 Caltrain counts include 116 total bicyclists getting on and off at Lawrence, which is lower than the system-wide average of 173 but nonetheless a significant contribution (over 10%) to overall station ridership.

Figures 2.9 and 2.10 illustrate that the majority of northbound passengers board at Lawrence rather than alight; similarly, a significant proportion of southbound passengers get off at Lawrence rather than board. This is likely due to Lawrence Station's position near the southern end of the line and the large job pools within the San Francisco, Redwood City, Palo Alto, Mountain View and Peninsula areas. There are fewer destinations south of Lawrence Station, so the shorter distances and generally lower levels of road congestion prompt more commuters to drive rather than use Caltrain. Road congestion during peak periods is higher northbound, with greater impact on travel time due to the longer distances involved to access these job centers.

### High Speed Rail (HSR)

The California HSR is studying utilizing four Caltrain tracks at grade through the eastern part

of the City. Engineering studies currently are being prepared to determine the best alignment for HSR in the study area. The release of the EIR for the Peninsula Corridor HSR section (currently on hold) will provide more details on potential station impacts.

### Commuter Shuttles and Taxi Service

While no VTA bus routes directly access the station, there are three shuttles that operate at this station (see Figures 2.11-2.13)<sup>1</sup>. These include:

- *Duane Avenue Shuttle*: Operates between Mountain View and Lawrence Caltrain Station as well as Duane Avenue office buildings during commute hours.
- *Bowers Walsh Shuttle*: Operates between Lawrence Caltrain Station and Bowers/ Walsh area office buildings during commute periods.
- *Mission Shuttle*: Operates between Lawrence Caltrain Station and the Mission College and Intel areas during commute hours.

The Altamont Commuter Express also runs the Gray Shuttle line three times in the morning (6:14am to 9:06am) in the southbound direction and three in the afternoon (3:10pm to 5:37pm) in the northbound direction. The line runs part of its route north of the Lawrence Caltrain station along Kifer Road and makes stops near Lawrence Expressway during both the morning and evening. The shuttle route provides access to jobs along Kifer Road and Scott Boulevard, which are also served

by the Caltrain shuttles. Although the Gray Line shuttle also extends north to Great America, it is likely that more Lawrence Caltrain passengers will use the free Caltrain shuttles rather than walking up to Kifer Road to access the ACE Shuttle.

VTA runs a Paratransit Program through OUTREACH, a private non-profit. Each bus has lifts or ramps for mobility-impaired riders.

Taxis currently queue in the kiss-n-ride area to the north of the Caltrain station and congregate in an ad-hoc parking area south of the station off Willow Avenue.

Light rail service is provided within Sunnyvale, but is two miles north of the station area, and consequently does not provide direct service to the Lawrence Caltrain Station.

<sup>1</sup> The three shuttle services are funded by the Bay Area Air Quality Management District Transportation Fund for Clean Air, Peninsula Corridor Joint Powers Board, and private companies such as Intel (for the Bowers Walsh and Mission lines) and Advanced Micro Devices (for the Duane Avenue line).

Figure 2.11: Duane Avenue Shuttle route

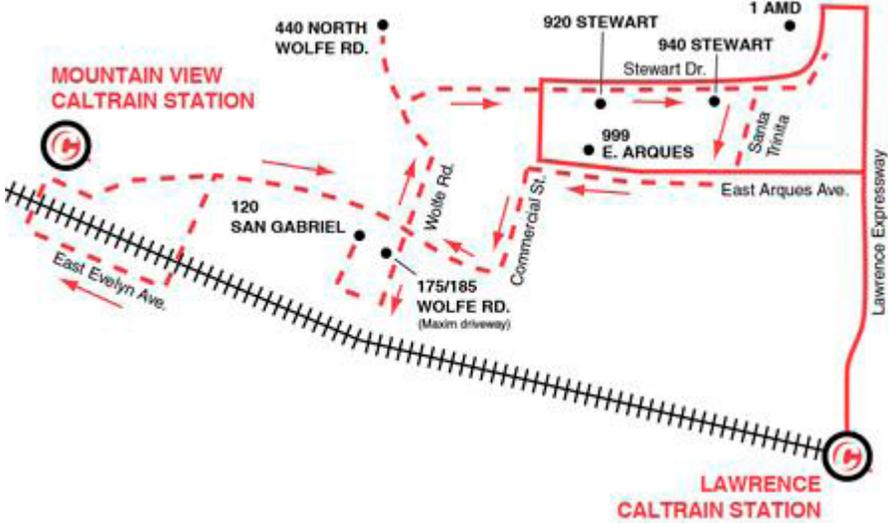


Figure 2.12: Bowers Walsh Shuttle route

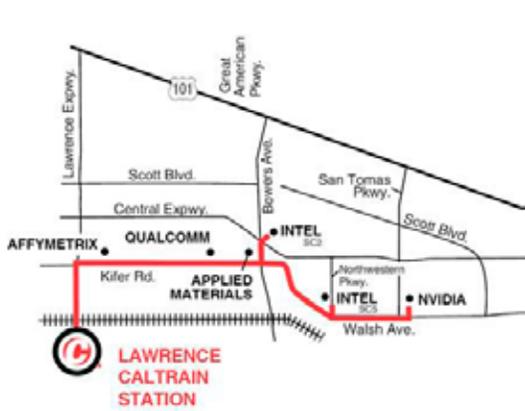
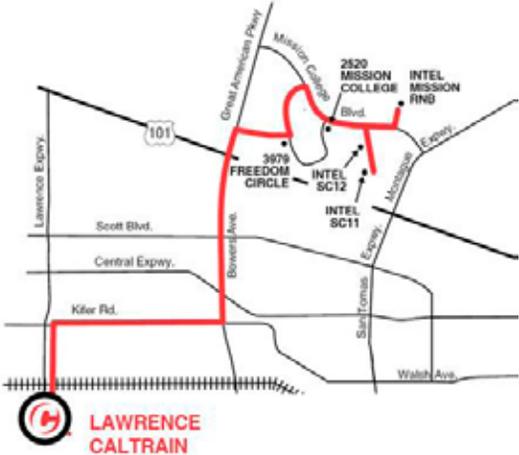


Figure 2.13: Mission Shuttle route



**Caltrain Station Access Mode Share**

As Table 2.7 indicates, About 5 percent of Lawrence station passengers use a free shuttle to get to Lawrence Station and another 22 percent take the shuttle when getting off at Lawrence station.

The majority of passengers traveling to the station come by car, with 34 percent driving to the station and another 34 percent dropped off by a vehicle.

On the other hand, more passengers leave the station on foot (29%), by bicycle (8%), or by shuttle (22%), than by car (25% driving and 14% dropped off).

Table 2.7: Lawrence Station Access Mode Share

Mode	To Station	From Station
Drive	34%	25%
Walk	23%	29%
Another Caltrain	2%	0%
Dropped Off	34%	14%
VTA	0%	2%
Bicycle	2%	8%
Shuttle	5%	22%
Total	100%	100%

Source: Caltrain On-Board Passenger Survey, 2007  
 Note: Data based on sample set of 45 boardings and 52 alightings at Lawrence. Includes peak and off-peak weekday as well as weekend trains.